



**Linear/Mixed-Signal
Designer's Guide**

February 1999



Welcome to National Semiconductor's February 1999 Edition of the **Linear/Mixed-Signal Designer's Guide!** Included in this guide are:

- Alphanumeric index
- Product selection trees
- Product selection guides
- Package descriptions
- CD-ROM with complete datasheets, a pdf version of this guide, and other valuable information

Updated information on each of the products listed in this guide plus new products can be found on the web at: **<http://www.national.com>**

Some of the topics you will find at our site:

- Search engine for parts, application notes and other information
- Design Engineer Product Information
 - Product trees, datasheets, application notes
 - Parametric selection guides, system diagrams, models and software
 - Featured product sites, technical support
- Events and Seminars
- Purchasing Information
 - Order samples and purchase product on-line
 - Pricing and distributor inventory searches
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Section I

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DS3691	5-13	5-17, 5-18	RS-422/RS-423 Line Driver with TRI-STATE Outputs
DS3695	5-14	5-18	Multipoint RS-485/RS-422 Transceiver
DS36950	5-2, 5-14	5-18	Quad Differential Bus Transceiver
DS36954	5-2, 5-14	5-18	Quad Differential Bus Transceiver
DS3696	5-14	5-18	Multipoint RS485/RS422 Transceiver
DS3697	5-14	5-18	Multipoint RS-485/RS-422 Repeater
DS36C200	5-3	5-11, 5-17	Dual High Speed Bi-Directional Differential Transceiver
DS36C278	5-14	5-18	Low Power Multipoint TIA/EIA-485 Transceiver
DS36C279	5-14	5-18	Low Power TIA/EIA-485 Transceiver with Sleep Mode
DS36C280	5-14	5-18	Slew Rate Controlled CMOS TIA/EIA-485 Transceiver
DS36F95	5-14	5-18	EIA-485/EIA-422A Differential Bus Transceiver
DS3862		5-17	Octal High Speed Trapezoidal Bus Transceiver
DS3883		5-17	BTL 9-bit Data Transceiver
DS3884		5-17	BTL Handshake Transceiver
DS3886		5-17	BTL 9-bit Latching Data Transceiver
DS3893		5-17	BTL TurboTransceiver
DS3896		5-17	BTL Trapezoidal Transceiver
DS3897		5-17	BTL Trapezoidal Transceiver
DS38C86		5-17	CMOS BTL 9-bit Latching Data Transceiver
DS481	5-14	5-18	Low Power RS-485/RS-422 Multipoint Transceiver with Sleep Mode
DS485	5-14	5-18	Low-Power RS-485/RS-422 Multipoint Transceiver
DS75107		5-17	Dual Line Receiver

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DS75150	5-15	5-17	Dual Line Driver
DS75154	5-15	5-17	Quad Line Receiver
DS75160		5-17	IEEE-488 GPIB Transceiver
DS75161		5-17	IEEE-488 GPIB Transceiver
DS75176	5-14	5-18	Multipoint RS-485/RS-422 Transceiver
DS7820		5-17	Dual Line Receiver
DS7830		5-17	Dual Differential Line Driver
DS7831		5-17, 14-3	Dual TRI-STATE Line Driver
DS78C120		5-18, 14-3	Dual CMOS Compatible Differential Line Receiver
DS78C20		5-18, 14-3	Dual CMOS Compatible Differential Line Receiver
DS78LS120		5-18	Dual Differential Line Receiver (Noise-Filtering and Fail-Safe)
DS8641		5-17	Quad Unified Bus Transceiver
DS8820		5-17	Dual Line Receiver
DS8832		5-17	Dual TRI-STATE Line Driver
DS8838		5-17	Quad Unified Bus Transceiver
DS88C20		5-18	Dual CMOS Compatible Differential Line Receiver
DS8921	5-13	5-18	Differential Line Driver and Receiver Pair
DS8922	5-13	5-18	TRI-STATE RS-422 Dual Differential Line Driver and Receiver Pair
DS8923	5-13	5-18	TRI-STATE RS-422 Dual Differential Line Driver and Receiver Pair
DS8925	5-2	5-18	Local Talk Dual Driver/Triple Receiver
DS8935	5-2	5-18	LocalTalk Dual Driver/Triple Receiver
DS89C21	5-13	5-18	Differential CMOS Line Driver and Receiver Pair
DS89C386	5-13	5-18	Twelve Channel CMOS Differential Line Receiver
DS89C387	5-13	5-18	Twelve Channel CMOS Differential Line Driver
DS90C031	5-3	5-11, 14-3, 14-9	LVDS Quad CMOS Differential Line Driver
DS90C032	5-3	5-11, 14-3, 14-9	LVDS Quad CMOS Differential Line Receiver
DS90C363	5-5	5-10	+3.3V Programmable LVDS Transmitter 18-bit Flat Panel Display (FPD) Link - 65Mhz
DS90C365		5-10	+3.3V Programmable LVDS Transmitter 18-bit Flat Panel Display (FPD) Link - 85MHz
DS90C383	5-5	5-10	+3.3V Programmable LVDS Transmitter 24-bit Flat Panel Display (FPD) Link - 65MHz
DS90C385		5-10	+3.3V Programmable LVDS Transmitter 24-bit Flat Panel Display (FPD) Link - 85MHz
DS90C387		5-10	+3.3V LVDS 24-bit Dual Pixel Flat Panel Display (FPD) Link-SVGA to UXGA [Preliminary]

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DS90C402	5-3	5-11	Dual Low Voltage Differential Signaling (LVDS) Receiver
DS90CF363	5-5	5-10	+3.3V LVDS Transmitter 18-bit Flat Panel Display (FPD) Link - 65MHz
DS90CF364	5-7	5-10	+3.3V LVDS Receiver 18-bit Flat Panel Display (FPD) Link - 65MHz
DS90CF366	5-7	5-10	+3.3V LVDS Receiver 18-bit Flat Panel Display (FPD) Link - 85MHz [Preliminary]
DS90CF383	5-5	5-10	+3.3V LVDS 24-bit Flat Panel Display (FPD) Link - 65MHz
DS90CF384	5-7	5-10	+3.3V LVDS Receiver 24-bit Flat Panel Display (FPD) Link - 65MHz
DS90CF386	5-7	5-10	+3.3V LVDS Receiver 24-bit Flat Panel Display (FPD) Link - 85MHz [Preliminary]
DS90CF561	5-4	5-10	LVDS 18-bit Color Flat Panel Display (FPD) Link
DS90CF562	5-6	5-10	LVDS 18-bit Color Flat Panel Display (FPD) Link
DS90CF563		5-10	LVDS 18-bit Color Flat Panel Display (FPD) Link - 65MHz
DS90CF564		5-10	LVDS 18-bit Color Flat Panel Display (FPD) Link - 65MHz
DS90CF581	5-4	5-10	LVDS Transmitter 24-bit Color Flat Panel Display (FPD) Link
DS90CF583		5-10	LVDS 24-bit Color Flat Panel Display (FPD) Link - 65MHz
DS90CF584	5-6	5-10	LVDS 24-bit Color Flat Panel Display (FPD) Link - 65MHz
DS90CR211	5-8	5-12	21-bit Channel Link
DS90CR212	5-8	5-12	21-bit Channel Link
DS90CR213	5-8	5-12	21-bit Channel Link - 66MHz
DS90CR214	5-8	5-12	21-bit Channel Link - 66MHz
DS90CR215	5-8	5-12	+3.3V Rising Edge Data Strobe LVDS 21-bit Channel and Link - 66MHz
DS90CR216	5-8	5-12	+3.3V Rising Edge Data Strobe LVDS Receiver 21-bit Channel Link - 66MHz
DS90CR217	5-8	5-12	+3.3V Rising Edge Data Strobe LVDS 21-bit Channel Link - 85MHz
DS90CR218	5-8	5-12	+3.3V Rising Edge Data Strobe LVDS 21-bit Channel Link - 85MHz
DS90CR281	5-8	5-12	28-bit Channel Link
DS90CR282	5-8	5-12	28-bit Channel Link
DS90CR283	5-8	5-12	28-bit Channel-Link - 66MHz
DS90CR284	5-8	5-12	28-bit Channel-Link - 66MHz
DS90CR285	5-8	5-12	+3.3V Rising Edge Data Strobe LVDS 28-bit Channel - 66MHz
DS90CR286	5-8	5-12	+3.3V Rising Edge Data Strobe LVDS 28-bit Channel - 66MHz
DS90CR287	5-8	5-12	+3.3V Rising Edge Data Strobe LVDS Transmitter - 85MHz
DS90CR288	5-8	5-12	+3.3V Rising Edge Data Strobe LVDS 28-bit Channel - 85MHz
DS90CR483	5-8	5-12	+3.3V, 112MHz LVDS 24-bit Dual Pixel Flat Panel Display (FPD) Link Transmitter - SVGA-UXGA

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DS90CR561	5-4	5-10	LVDS 18-bit Color Flat Panel Display (FPD) Link
DS90CR562	5-6	5-10	LVDS 18-bit Color Flat Panel Display (FPD) Link
DS90CR563		5-10	LVDS 18-bit Color Flat Panel Display (FPD) Link - 65MHz
DS90CR564	5-6	5-10	LVDS 18-bit Color Flat Panel Display (FPD) Link - 65MHz
DS90CR581	5-4	5-10	LVDS Transmitter 24-bit Color Flat Panel Display (FPD) Link
DS90CR583		5-10	LVDS 24-bit Color Flat Panel Display (FPD) Link
DS90CR584	5-6	5-10	LVDS 24-bit Color Flat Panel Display (FPD) Link - 65MHz
DS90LV017	5-3	5-11	LVDS 24-bit Color Flat Panel Display (FPD) Link - 65MHz
DS90LV018	5-3	5-11	3V LVDS Single CMOS Differential Line Receiver
DS90LV019	5-3	5-11	3.3V or 5V LVDS Driver/Receiver
DS90LV027	5-3	5-11	LVDS Dual High Speed Differential Driver
DS90LV028	5-3	5-11	3V LVDS Dual CMOS Differential Line Receiver
DS90LV031	5-3	5-11	3V LVDS Quad CMOS Differential Line Driver
DS90LV032	5-3	5-11	3V LVDS Quad CMOS Differential Line Receiver
DS90LV047	5-3	5-11	3V LVDS Quad CMOS Differential Line Driver
DS90LV048	5-3	5-11	3V LVDS Quad CMOS Differential Line Receiver
DS92LV010	5-3	5-9	Bus LVDS 3.3/5.0V Single Transceiver
DS92LV1021		5-9	16MHz - 40MHz 10-bit Serializer
DS92LV1210		5-9	16MHz - 40MHz 10-bit Deserializer
DS92LV1212		5-9	16-40MHz 10-bit Bus LVDS Random Lock Deserializer with Embedded Clock Recovery
DS92LV222		5-9	Two Channel Bus LVDS MUXed Repeater
DS96172	5-14	5-18	RS-485/RS-422 Quad Differential Line Driver
DS96173	5-14	5-18	RS-485/RS-422 Quad Differential Line Receiver
DS96174	5-14	5-18	RS-485/RS-422 Quad Differential Line Driver
DS96175	5-14	5-18	RS-485/RS-422 Quad Differential Line Receiver
DS96176	5-14	5-18	RS-485/RS-422 Differential Bus Transceiver
DS96177	5-14	5-18	RS-485/RS-422 Differential Bus Repeater
DS9622		5-17, 14-3	Dual Line Receiver
DS9627	5-15	5-17, 14-3	Dual Line Receiver
DS9636		5-17, 14-3	RS-423 Dual Programmable Slew Rate Line Driver
DS9637	5-13	5-18, 14-3	Dual Differential Line Receiver

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DS96F172	5-14	5-18, 14-3	EIA-485/EIA-422 Quad Differential Driver
DS96F173	5-14	5-18, 14-3	RS-485/RS-422 Quad Differential Receiver
DS96F174	5-14	5-18, 14-3	EIA-485/EIA-422 Quad Differential Driver
DS96F175	5-14	5-18, 14-3	RS-485/RS-422 Quad Differential Receiver
LF111	2-23	2-24	Voltage Comparator
LF147	2-17, 2-18	2-21	Military Wide Bandwidth Quad JFET Operational Amplifier
LF155	2-17, 2-18	2-19	LF155/LF156/LF157 Series Monolithic JFET Input Operational Amplifier
LF156	2-17, 2-18	2-19, 14-6	Military JFET Input Op Amp
LF157	2-17, 2-18	2-19	Military JFET Input Op Amp
LF311	2-23	2-24	Voltage Comparator
LF347	2-17, 2-18, 3-7	2-21, 3-8	Wide Bandwidth Quad JFET Input Operational Amplifier
LF353	2-17, 2-18, 3-7	2-20, 3-8	Wide Bandwidth Dual JFET Input Operational Amplifier
LF411	3-7	3-8	Low Offset, Low Drift JFET Input Operational Amplifier
LF412	2-17, 2-18	2-20, 3-8	Low Offset, Low Drift Dual JFET Input Operational Amplifier
LF442	2-17, 2-18	2-20	Dual Low Power JFET Input Operational Amplifier
LF444	2-17, 2-18, 3-7	2-21, 3-8	Quad Low Power JFET Input Operational Amplifier
LM10	2-9, 2-10, 2-11, 2-17, 2-18	2-13, 2-19	Operational Amplifier and Voltage Reference
LM101	2-17, 2-18	2-19, 14-6	Operational Amplifier
LM1036	3-2	3-3	Dual DC Operated Tone/Volume/Balance Circuit
LM105		11-10, 14-6	Operational Amplifier
LM107		14-6	Operational Amplifier
LM108		14-6	Operational Amplifier
LM1084	11-2	11-8, 11-9	5A Low Dropout Positive Regulator
LM1085	11-2	11-8, 11-9	3A Low Dropout Positive Regulator
LM1086	11-2	11-8, 11-9	1.5A Low Dropout Positive Regulator
LM109	11-2	11-10, 14-6	5V Regulator
LM111	2-23	14-6	Voltage Comparator
LM1117	11-2	11-8, 11-9	800mA Low-Dropout Linear Regulator
LM113	10-2	10-3, 14-6	Precision Reference
LM117		11-10, 14-6	3-Terminal Adjustable Regulator
LM118	2-17, 2-18	2-19, 14-6	Operational Amplifier

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LM12	6-2	2-16, 6-3	80 Watt Operational Amplifier
LM120	11-2	11-11, 14-6	Series 3-Terminal Negative Regulators
LM123	11-2	11-10	3A, 5V Positive Regulator
LM124	2-17, 2-18	2-21, 14-4, 14-6	Military Qualified Quad Low Power Op Amps
LM12454	4-2	4-5	12-bit Plus Sign Data Acquisition System with Self-Calibration
LM12458	4-2	4-5	Military 12 bit Data Acquisition System
LM129	10-2	10-3, 14-4	Precision Reference
LM12H458		4-5, 14-4	12-bit Plus Sign Data Acquisition System with Self-Calibration
LM12L458		4-5	12-bit Plus Sign Data Acquisition System with Self-Calibration
LM133	11-2	11-11	3-Amp Adjustable Negative Regulator
LM134	9-2		3-Terminal Adjustable Current Source
LM135	9-2	9-3, 14-6	Precision Temperature Sensor
LM136	10-2	10-3, 14-4, 14-6	Voltage Reference Diode
LM137	11-2	11-11, 14-4, 14-6	3-Terminal Adjustable Negative Regulator
LM138	11-2	11-10	5 Amp Adjustable Regulator
LM139	2-23	2-24, 14-4, 14-6	Military Qualified Low Power Quad Comparator
LM1458	2-17, 2-18	2-20	Dual Operational Amplifier
LM146	2-17, 2-18	2-21	Programmable Quad Operational Amplifier
LM148	2-17, 2-18	2-21, 14-7	Series Quad 741 Operational Amplifier
LM149	2-17, 2-18	2-21	WideBand Decompensated (AV (MIN) Equal 5)
LM150	11-2	11-10, 14-4	3A Adjustable Regulator
LM1558	2-17, 2-18	2-20	Dual Operational Amplifier
LM1575	11-3	11-5, 14-4, 14-5, 14-7	SIMPLE SWITCHER 1A Step-Down Voltage Regulator
LM1577	11-3	11-5, 14-5	Series SIMPLE SWITCHER Step-Up Voltage Regulator
LM158	2-17, 2-18	2-20, 14-5, 14-7	Low Power Dual Operational Amplifier
LM160		14-5	High Speed Differential Comparator
LM161	2-23	2-24	High Speed Differential Comparator
LM1875	3-4	3-6	20-Watt Audio Power Amplifier
LM1876	3-4	3-6	Overture Audio Power Amplifier Series Dual 20-Watt Audio Power Amplifier with Mute and Standby Modes
LM1877	3-4	3-5, 3-6	Dual Audio Power Amplifier
LM1894	3-2		Dynamic Noise Reduction System DNR

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LM193	2-23	2-24, 14-5, 14-7	Low Power Low Offset Voltage Dual Comparator
LM1971	3-2	3-3	Digitally Controlled 62dB Audio Attenuator with Mute
LM1972	3-2	3-3	Micro-Pot 2-Channel 78dB Audio Attenuator with Mute
LM1973	3-2	3-3	Micro-Pot 3-Channel 76dB Audio Attenuator with Mute
LM199	10-2	10-3, 14-5	Precision Reference
LM201	2-17, 2-18	2-19	Operational Amplifier
LM211	2-23		Voltage Comparator
LM218	2-17, 2-18	2-19	Operational Amplifier
LM224	2-17, 2-18	2-21	Low Power Quad Operational Amplifier
LM231	4-2		Precision Voltage-to-Frequency Converter
LM234	9-2	9-3	3-Terminal Adjustable Current Source
LM235	9-2	9-3	Precision Temperature Sensor
LM236	10-2		Reference Diode
LM239	2-23	2-24	Low Power Low Offset Voltage Quad Comparator
LM2574	11-3	11-5	SIMPLE SWITCHER 0.5A Step-Down Voltage Regulator
LM2575	11-3	11-5	SIMPLE SWITCHER 1A Step-Down Voltage Regulator
LM2576	11-3	11-5	SIMPLE SWITCHER 3A Step-Down Voltage Regulator
LM2577	11-3	11-5	SIMPLE SWITCHER Step-Up Voltage Regulator
LM2578	11-3		Switching Regulator
LM258	2-17, 2-18	2-20	Low Power Dual Operational Amplifier
LM2585	11-3	11-5	SIMPLE SWITCHER 3A Flyback Regulator
LM2586	11-3	11-5	SIMPLE SWITCHER 3A Flyback Regulator
LM2587	11-3	11-5	SIMPLE SWITCHER 5A Flyback Regulator
LM2588	11-3	11-5	SIMPLE SWITCHER 5A Flyback Regulator with Shutdown
LM2594	11-3, 12-2	11-5	SIMPLE SWITCHER Power Converter 150kHz 0.5A Step-Down Voltage Regulator
LM2595	11-3, 12-2	11-5, 14-5, 14-7	SIMPLE SWITCHER Power Converter 150kHz 1A Step-Down Voltage Regulator
LM2596	11-3, 12-2	11-5	SIMPLE SWITCHER Power Converter 150kHz 3A Step-Down Voltage Regulator
LM2597	11-3, 12-2	11-5	SIMPLE SWITCHER Power Converter 150kHz 0.5A Step-Down Voltage Regulator
LM2598	11-3, 12-2	11-5	SIMPLE SWITCHER Power Converter 150kHz 1A Step-Down Voltage Regulator, with Features
LM2599	11-3, 12-2	11-5	SIMPLE SWITCHER Power Converter 150kHz 3A Step-Down Voltage Regulator with Features
LM2621	11-3	11-12	Low Input Voltage, Step-Up DC-DC
LM2630	11-3	11-12	Synchronous Step-Down Voltage Regulator

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LM2635	11-3	11-12	5-bit Programmable Synchronous Buck Regulator Controller
LM2636	11-3	11-12	5-bit Programmable Synchronous Buck Regulator Controller
LM2637	11-3	11-12	Motherboard Power Supply Solution with a 5-bit Programmable Switching Controller and Two Linear Regulator Controllers
LM2638	11-3	11-12	Motherboard Power Supply Solution with A 5-bit Programmable Switching Controller and Two Linear Regulator Controllers
LM2640	11-3	11-12	Dual Adjustable Step-Down Switching Power Supply Controller
LM2641	11-3	11-12	Dual Adjustable Step-Down Switching Power Supply Controller
LM2650	11-3, 12-2	11-12	Synchronous Step-Down DC/DC Converter
LM2660	11-3	11-4	Switched Capacitor Voltage Converter
LM2661	11-3	11-4	Switched Capacitor Voltage Converter
LM2662	11-3	11-4	Switched Capacitor Voltage Converter
LM2663	11-3	11-4	Switched Capacitor Voltage Converter
LM2664	11-3	11-4	Switched Capacitor Voltage Converter
LM2665	11-3	11-4	Switched Capacitor Voltage Converter
LM2670	11-3	11-5	SIMPLE SWITCHER High Efficiency 3A Step-Down Voltage Regulator with Sync
LM2671	11-3, 12-2	11-5	SIMPLE SWITCHER Power Converter High Efficiency 500mA Step-Down Voltage Regulator with Features
LM2672	11-3, 12-2	11-5	SIMPLE SWITCHER Power Converter High Efficiency 1A Step-Down Voltage Regulator with Features
LM2673	11-3	11-5	SIMPLE SWITCHER 3A Step-Down Voltage Regulator with Adjustable Current Limit
LM2674	11-3, 12-2	11-5	SIMPLE SWITCHER Power Converter High Efficiency 500mA Step-Down Voltage Regulator
LM2675	11-3, 12-2	11-5	SIMPLE SWITCHER Power Converter High Efficiency 1A Step-Down Voltage Regulator
LM2676	11-3	11-5	SIMPLE SWITCHER High Efficiency 3A Step-Down Voltage Regulator
LM2678	11-3	11-5	SIMPLE SWITCHER High Efficiency 5A Step-Down Voltage Regulator
LM2679	11-3	11-5	SIMPLE SWITCHER 5A Step-Down Voltage Regulator with Adjustable Current Limit
LM2825	11-3, 12-2	11-4	Integrated Power Supply 1A DC-DC Converter
LM2876	3-4, 6-2	3-6	High-Performance 40 Watt Audio Power Amplifier w/Mute
LM2901	2-23		Low Power Low Offset Voltage Quad Comparator
LM2901	2-23	2-24	Low Power Low Offset Voltage Quad Comparator
LM2902	2-17, 2-18	2-21	Low Power Quad Operational Amplifier
LM2903	2-23	2-24	Low Power Low Offset Voltage Dual Comparator
LM2904	2-17, 2-18	2-20	Low Power Dual Operational Amplifier
LM293	2-23	2-24	Low Power Low Offset Voltage Dual Comparator
LM2930	11-2	11-6, 11-7	3-Terminal Positive Regulator

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LM2931	11-2	11-6, 11-7	Series Low Dropout Regulator
LM2936	11-2	11-6, 11-7	Ultra-Low Quiescent Current 5V Regulator
LM2937	11-2	11-8, 11-9	500mA Low Dropout Regulator
LM2940	11-2	11-8, 11-9, 14-5	1A Low Dropout Regulator
LM2941	11-2	11-8, 11-9, 14-5	1A Low Dropout Adjustable Regulator
LM2984	11-2	11-8, 11-9	Microprocessor Power Supply System
LM299	10-2	10-3	Precision Reference
LM2990	11-2	11-8, 11-9, 14-5	Negative Low Dropout Regulator
LM2991	11-2	11-8, 11-9, 14-5, 14-7	Negative Low Dropout Adjustable Regulator
LM301	2-17, 2-18	2-19	Operational Amplifier
LM3046		2-16	Transistor Array
LM305		11-10	Voltage Regulator
LM309	11-2	11-10	5-Volt Regulator
LM311	2-23		Voltage Comparator
LM313	10-2	10-3	Precision Reference
LM317	11-2	11-10	3-Terminal Adjustable Regulator
LM318	2-17, 2-18	2-19	Operational Amplifier
LM319	2-23	2-24	High Speed Dual Comparator
LM320	11-2	11-11	Series 3-Terminal Negative Regulators
LM323	11-2	11-10	3A, 5V Positive Regulator
LM324	2-17, 2-18	2-21	Low Power Quad Operational Amplifier
LM325		11-10, 11-11	Dual Voltage Regulator
LM329	10-2	10-3	Precision Reference
LM330	11-2	11-6, 11-7	3-Terminal Positive Regulator
LM3302	2-23	2-24	Low Power Low Offset Voltage Quad Comparator
LM331	4-2	4-5	Precision Voltage-to-Frequency Converter
LM333	11-2	11-11	3A Adjustable Negative Regulator
LM334	9-2	9-3	3-Terminal Adjustable Current Source
LM335	9-2	9-3	Precision Temperature Sensor
LM3350	11-3	11-4	Switched Capacitor Voltage Converter
LM3351	11-3	11-4	Switched Capacitor Voltage Converter
LM3352	11-3	11-4	Regulated 200mA Buck-boost Switched Capacitor DC/DC Converter

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LM338	11-2	11-10	5A Adjustable Regulator
LM339	2-23	2-24	Low Power Low Offset Voltage Quad Comparator
LM34	9-2	9-3	Precision Fahrenheit Temperature Sensor
LM340	11-2	11-10	Series 3-Terminal Positive Regulators
LM341	11-2	11-10	3-Terminal Positive Voltage Regulators
LM3411	7-2	7-3	Precision Secondary Regulator/Driver
LM3420	7-2, 12-2	7-3	4.2, 8.2, 8.4, 12.6, 16.8 Lithium-Ion Battery Charge Controller
LM346	2-17, 2-18	2-21	Programmable Quad Operational Amplifier
LM3460	7-2, 11-2	7-3, 11-8, 11-9	Precision Controller for GTLP and GTL Bus Termination
LM348	2-17, 2-18	2-21	Quad 741 Operational Amplifier
LM3480	11-2	11-6, 11-7	100mA, SOT-23, Quasi Low-Dropout Linear Voltage Regulator
LM3490	11-2	11-6, 11-7	100mA, SOT-23, Quasi Low-Dropout Linear Voltage Regulator with Logic-Controlled ON/OFF
LM35	9-2	9-3, 14-6	Precision Centigrade Temperature Sensor
LM350	11-2	11-10	3-Amp Adjustable Regulator
LM3578	11-3		Switching Regulator
LM358	2-17, 2-18	2-20	Low Power Dual Operational Amplifier
LM359		2-16	Dual, High Speed, Programmable, Current Mode (Norton) Amplifier
LM360	2-23	2-24	High Speed Differential Comparator
LM3620	7-2	7-3	Lithium-Ion Battery Charger Controller
LM3621	7-2	7-3	Single Cell Lithium-Ion Battery Charger Controller
LM380	3-4	3-5, 3-6	Audio Power Amplifier
LM3812	7-2	7-3	Current Gauge IC with Ultra-Low Loss Sense Element and PWM Output, for High-Side Sensing
LM3813	7-2	7-3	Current Gauge IC with Ultra Low Loss Sense Element and PWM Output, for Low-Side Sensing
LM3814	7-2	7-3	Current Gauge IC with Ultra-Low Loss Sense Element and PWM Output, for High-Side Sensing
LM3815	7-2	7-3	Current Gauge IC with Ultra-Low Loss Sense Element and PWM Output, for Low-Side Sensing
LM384	3-4	3-5, 3-6	5-Watt Audio Power Amplifier
LM385	10-2	10-3	Adjustable Micropower Voltage Reference
LM386	3-4	3-5	Low Voltage Audio Power Amplifier
LM3875	3-4, 6-2	3-6	High-Performance 56 Watt Audio Power Amplifier
LM3876	3-4, 6-2	3-6	High-Performance 56 Watt Audio Power Amplifier with Mute
LM3886	3-4, 6-2	3-6	High-Performance 68 Watt Audio Power Amplifier with Mute

Part Number	Decision Tree Page #	Selection Guide Page #	Descriptor
LM392	2-23	2-16, 2-24	Low Power Operational Amplifier/Voltage Comparator
LM393	2-23	2-24	Low Power Low Offset Voltage Dual Comparator
LM3940	11-2	11-8, 11-9, 14-5	1A Low Dropout Regulator for 5V to 3.3V Conversion
LM399	10-2	10-3	Precision Reference
LM4040	10-2, 12-2	10-3	Precision Micropower Shunt Voltage Reference
LM4041	10-2, 12-2	10-3	Precision Micropower Shunt Voltage Reference
LM4250	2-9, 2-10, 2-11	2-13	Programmable Operational Amplifier
LM431	10-2	10-3	Adjustable Precision Zener Shunt Regulator
LM4431	10-2	10-3	Micropower Shunt Voltage Reference
LM45	9-2, 12-2	9-3	Sot-23 Precision Centigrade Temperature Sensor
LM4540	3-10	3-10	AC '97 Codec with Stereo and National 3D Sound
LM4543	3-10	3-10	AC '97 Codec with Stereo and National 3D Sound
LM4545	3-10	3-10	AC '97 Codec with Stereo Headphone Amplifier and National 3D Sound
LM4546	3-10	3-10	AC '97 Rev 2 Codec with Sample Rate Conversion and National 3D Sound
LM4547	3-10	3-10	AC '97 Rev 2 Codec with National 3D Sound
LM4548	3-10	3-10	AC '97 Codec with Sample Rate Conversion and National 3D Sound
LM4560	3-11	3-11	Advanced PCI Audio Accelerator
LM4700	3-4, 6-2	3-6	Overture 30 Watt Audio Power Amplifier with Mute and Standby Modes
LM4701	3-4	3-6	Overture 30 Watt Audio Power Amplifier with Mute and Standby Modes
LM4752	3-4	3-6	Stereo 11 Watt Audio Power Amplifier
LM4755	3-4	3-6	Stereo 11 Watt Audio Power Amplifier with Mute
LM4765	3-4	3-6	Overture Audio Power Amplifier Series Dual 30-Watt Audio Power Amplifier with Mute and Standby Modes
LM4766	3-4	3-6	2 X40 Watt Stereo Audio Amplifier with Standby and Mute Control
LM4830	3-2, 3-4, 3-9, 12-2	3-5, 3-9	Two-Way Audio Amplification System with Volume Control
LM4831	3-4, 3-9	3-5, 3-9	Boomer Audio Power Amplifier Series
LM4832	3-4, 3-9	3-5, 3-9	Digitally Controlled Tone and Volume Circuit with Stereo Audio Power Amplifier, Microphone Preamp Stage and National 3D Sound
LM4834	3-4, 3-9	3-5, 3-9	Boomer 1.75 Watt Audio Power Amplifier with DC Volume Control and Microphone Preamp
LM4860	3-4	3-5	1 Watt Audio Power Amplifier with Shutdown Mode
LM4861	3-4, 12-2	3-5	1 Watt Audio Power Amplifier with Shutdown Mode
LM4862	3-4, 12-2	3-5	675mW Audio Power Amplifier with Shutdown Mode
LM4863	3-4	3-5	Dual 2.2 Watt Audio Amplifier Plus Stereo Headphone Function
LM4864	3-4	3-5	300mW Audio Power Amplifier with Shutdown Mode

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Part Number	Decision Tree Page #	Selection Guide Page #	Descriptor
LM4870	3-4	3-5	1.1 Watt Audio Power Amplifier with Shutdown Mode
LM4871	3-4	3-5	1.1 Watt Audio Power Amplifier with Shutdown Mode
LM4873	3-4	3-5	Dual 2.1 Watt Audio Amplifier Plus Stereo Headphone Function
LM4880	3-4	3-5	Dual 200mW Audio Power Amplifier with Shutdown Mode
LM4881	3-4	3-5	Boomer Dual 200mW Headphone Amplifier with Shutdown Mode
LM4882	3-4	3-5	Boomer Audio Power Amplifier Series 250mW Audio Power Amplifier with Shutdown Mode
LM50	9-2, 12-2	9-3, 14-7	SOT-23 Single-Supply Centigrade Temperature Sensor
LM555			Timer
LM56	9-2, 12-2	9-3	Dual Output Low Power Thermostat
LM60	9-2, 12-2	9-3	2.7V SOT-23 Temperature Sensor
LM61	9-2	9-3	2.7V, SOT-23 or TO-92 Temperature Sensor
LM611		2-16	Operational Amplifier and Adjustable Reference
LM6121		2-22, 14-5	High Speed Buffer
LM613	2-23	2-16, 2-24	Dual Operational Amplifier, Dual Comparator and Adjustable Reference
LM6132	2-9, 2-10, 2-12, 12-2	2-14	Dual, Low Power 10MHz Rail-to-Rail I/O Operational Amplifier
LM6134	2-9, 2-10, 2-11, 2-12, 12-2	2-15, 14-5	Quad, Low Power 10MHz Rail-to-Rail I/O Operational Amplifier
LM6142	2-9, 2-10, 2-11, 2-12, 3-7, 12-2	2-14, 3-8, 14-5, 14-7	Dual, High Speed/Low Power 17MHz Rail-to-Rail Input-Output Operational Amplifier
LM6144	2-9, 2-10, 2-11, 2-12, 3-7, 12-2	2-15, 3-8	Quad, High Speed/Low Power 17MHz Rail-to-Rail Input-Output Operational Amplifier
LM6152	2-9, 2-10, 2-11, 2-12, 12-2	2-14	Dual High Speed/Low Power 75MHz Gain Bandwidth Rail-to-Rail I/O Operational Amplifier
LM6152	2-9		Dual High Speed/Low Power 75MHz Gain Bandwidth Rail-to-Rail I/O Operational Amplifier
LM6154	2-9, 2-10, 2-11, 2-12, 12-2	2-15	Quad High Speed/Low Power 75MHz Gain Bandwidth Rail-to-Rail I/O Operational Amplifier
LM6161		14-5, 14-7	High Speed Operational Amplifier
LM6162		14-5	High Speed Operational Amplifier
LM6164		14-5	High Speed Operational Amplifier
LM6165		14-5	High Speed Operational Amplifier
LM6171	2-2, 2-3	2-6, 2-7	High Speed Low Power Low Distortion Voltage Feedback Amplifier
LM6172	2-2, 2-3	2-6, 2-7, 14-5, 14-7	Dual High Speed, Low Power, Low Distortion Voltage Feedback Amplifiers
LM6181	2-2, 2-3	2-6, 2-7	100mA, 100MHz Current Feedback Amplifier
LM6182	2-2, 2-3	2-6, 2-7	Dual 100mA Output, 100MHz Current Feedback Amplifier
LM6218	2-17, 2-18	2-20	Fast Settling Dual Operational Amplifier
LM6221		2-22	High Speed Buffer
LM628	6-2	6-3	Precision Motion Controller

Part Number	Decision Tree Page #	Selection Guide Page #	Descriptor
LM629	6-2	6-3	Precision Motion Controller
LM6321	2-2, 2-3	2-6, 2-7, 2-22	High Speed Buffer
LM6361	2-2, 2-3	2-6, 2-7	High Speed Operational Amplifier
LM6364		2-6, 2-7	High Speed Operational Amplifier
LM6365		2-6, 2-7	High Speed Operational Amplifier
LM6511	2-23	2-24	180ns 3V Comparator
LM66	9-2	9-3	Dual Output Low Power Thermostat
LM675	6-2	2-16, 6-3	Power Operational Amplifier
LM709	2-17, 2-18	2-19	Operational Amplifier
LM7121	2-2, 2-3, 2-12	2-6, 2-7	175MHz Tiny Low Power Voltage Feedback Amplifier
LM7131	2-2, 2-3, 12-2	2-6, 2-7	Tiny High Speed Single Supply Operational Amplifier
LM7171	2-2, 2-3	2-6, 2-7, 14-5, 14-7	Very High Speed, High Output Current, Voltage Feedback Amplifier
LM723		11-10, 14-7	Voltage Regulator
LM725	2-17, 2-18	2-19, 14-5	Operational Amplifier
LM7301	2-9, 2-10, 2-11, 2-12, 12-2	2-13	Low Power, 4MHz GBW, Rail-to-Rail Input-Output Operational Amplifier
LM7301	2-9		Low Power, 4MHz GBW, Rail-to-Rail Input-Output Operational Amplifier
LM741	2-17, 2-18	2-19	Operational Amplifier
LM748	2-17, 2-18	2-19	Operational Amplifier
LM75	9-2, 12-2	9-3	I2C Digital Temperature Sensor and Thermal Watchdog
LM77	9-2	9-3	9-bit + Sign Digital Temperature Sensor and Thermal Window Comparator with Two-Wire Interface
LM78	9-2	9-3	Microprocessor System Hardware Monitor
LM78LxxAC	11-2		3-Terminal Positive Regulators
LM78Mxx	11-2	11-10	Voltage Regulator
LM78S40	11-3	14-5	Universal Switching Regulator Subsystem
LM78xx	11-2		Voltage Regulators
LM79	9-2	9-3	Microprocessor System Hardware Monitor
LM79Lxx		11-11	Series 3-Terminal Negative Regulators
LM79LxxAC	11-2		Series 3-Terminal Negative Regulators
LM79Mxx	11-2	11-11	Voltage Regulator
LM79xx	11-2	11-11	Series 3-Terminal Negative Regulator
LM80	9-2	9-3	Serial Interface ACPI Compatible Microprocessor System Hardware Monitor
LM81	9-2	9-3	Microprocessor System Hardware Monitor

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Part Number	Decision Tree Page #	Selection Guide Page #	Descriptor
LM833	2-17, 2-18, 3-7	2-20, 3-8	Dual Audio Operational Amplifier
LM837	2-17, 2-18, 3-7	2-21, 3-8	Low Noise Quad Operational Amplifier
LMC1982	3-2	3-3	Digitally-Controlled Stereo Tone and Volume Circuit with Two Selectable Stereo Inputs
LMC1983	3-2	3-3	Digitally-Controlled Stereo Tone and Volume Circuit with Three Selectable Stereo Inputs
LMC2001	2-9, 2-10, 2-11, 2-12	2-13	The "PERFECT" Op Amp
LMC272	2-9, 2-10, 2-11, 2-12	2-14	CMOS Dual Low Cost Rail to Rail Output Operational Amplifier
LMC555		14-5	CMOS Timer
LMC6001	2-9, 2-10, 2-11	2-13	Ultra Ultra-Low Input Current Amplifier
LMC6022	2-9, 2-10, 2-11	2-14	Low Power CMOS Dual Operational Amplifier
LMC6024	2-9, 2-10, 2-11	2-15	Low Power CMOS Quad Operational Amplifier
LMC6032	2-9, 2-10, 2-11	2-14	CMOS Dual Operational Amplifier
LMC6034	2-9, 2-10, 2-11	2-15	CMOS Quad Operational Amplifier
LMC6035	2-9, 2-10, 2-11, 2-12	2-14	Low Power 2.7V Single Supply CMOS Operational Amplifiers
LMC6036	2-9, 2-10, 2-11, 2-12	2-15	Low Power 2.7V Single Supply CMOS Operational Amplifier
LMC6041	2-9, 2-10, 2-11	2-13	CMOS Single Micropower Operational Amplifier
LMC6042	2-9, 2-10, 2-11	2-14	CMOS Dual Micropower Operational Amplifier
LMC6044	2-9, 2-10, 2-11	2-15	CMOS Quad Micropower Operational Amplifier
LMC6061	2-9, 2-10, 2-11	2-13, 14-5	Precision CMOS Single Micropower Operational Amplifier
LMC6062	2-9, 2-10, 2-11	2-14, 14-5, 14-7	Precision CMOS Dual Micropower Operational Amplifier
LMC6064	2-9, 2-10, 2-11	2-15, 14-5	Precision CMOS Quad Micropower Operational Amplifier
LMC6081	2-9, 2-10, 2-11	2-13	Precision CMOS Single Operational Amplifier
LMC6082	2-9, 2-10, 2-11	2-14	Precision CMOS Dual Operational Amplifier
LMC6084	2-9, 2-10, 2-11	2-15	Precision CMOS Quad Operational Amplifier
LMC6442	2-9, 2-10, 2-12	2-14	Dual Micropower Rail-to-Rail Output Single Supply Operational Amplifier
LMC6462	2-9, 2-10, 2-11	2-14, 14-5	Micropower Dual Rail To Rail I/O CMOS Operational Amplifier
LMC6464	2-9, 2-10, 2-11	2-15, 14-5	CMOS Dual Rail-to-Rail Input and Output Operational Amplifier
LMC6482	2-9, 2-10, 2-11, 2-12, 12-2	2-14, 14-5	CMOS Dual Rail-to-Rail Input and Output Operational Amplifier
LMC6484	2-9, 2-10, 2-11, 12-2	2-15, 14-5	CMOS Quad Rail to Rail Input and Output Operational Amplifier
LMC6492	2-9, 2-10, 2-11	2-14	Dual CMOS Rail-to-Rail Input and Output Operational Amplifier
LMC6494	2-9, 2-10, 2-11	2-15	Quad CMOS Rail-to-Rail Input and Output Operational Amplifier
LMC6572	2-9, 2-10, 2-11, 2-12, 12-2	2-14	Dual Low Voltage (2.7V to 3V) Operational Amplifier
LMC6574	2-9, 2-10, 2-11, 12-2	2-15	Quad Low Voltage (2.7V to 3V) Operational Amplifier

Part Number	Decision Tree Page #	Selection Guide Page #	Descriptor
LMC6582	2-9, 2-10, 2-11	2-14	Dual Low Voltage, Rail-to-Rail Input and Output CMOS Operational Amplifier
LMC6584	2-9, 2-10, 2-11	2-15	Quad Low Voltage, Rail-to-Rail Input and Output CMOS Operational Amplifier
LMC660	2-9, 2-10, 2-11	2-15, 14-5	CMOS Quad Operational Amplifier
LMC662	2-9, 2-10, 2-11	2-14	Dual CMOS Operational Amplifier
LMC6681	2-9, 2-10, 2-11	2-13, 2-16	Single Low Voltage, Rail-to-Rail Input and Output CMOS Amplifier Unit Shutdown
LMC6682	2-9, 2-10, 2-11	2-14, 2-16	Dual Low Voltage, Rail-to-Rail Input and Output CMOS Amplifier Unit Shutdown
LMC6684	2-9, 2-10, 2-11	2-15, 2-16	Quad Low Voltage, Rail-to-Rail Input and Output CMOS Amplifier Unit Shutdown
LMC6762	2-23	2-24	Dual Micro-Power Rail-to-Rail Input and Output CMOS Comparator with Push-Pull Output
LMC6772	2-23	2-24	Dual Micro-Power Rail-to-Rail Input CMOS Comparator with Open Drain Output
LMC6953	7-2	7-3	PCI Local Bus Power Supervisor
LMC7101	2-9, 2-10, 2-11, 2-12, 12-2	2-13	Tiny Low Power Operational Amplifier with Rail-to-Rail Input and Output
LMC7111	2-9, 2-10, 2-11, 2-12, 12-2	2-13	Tiny CMOS Comparator with Rail-to-Rail Input
LMC7211	2-23, 12-2	2-24	Tiny CMOS Comparator with Rail-to-Rail Input
LMC7215	2-23, 12-2	2-24	Micro-Power, Rail-to-Rail CMOS Comparators with Open-Drain/Push-Pull Outputs and TinyPak Package
LMC7221	2-23	2-24	Tiny CMOS Comparator with Rail-to-Rail Input and Open Drain Output
LMC7225	2-23, 12-2	2-24	Micro-Power, Rail-to-Rail CMOS Comparators with Open-Drain/Push-Pull Outputs
LMC7660	11-3		Switched Capacitor Voltage Converter
LMD18200	6-2	6-3, 14-5	3A, 55V H-Bridge
LMD18201	6-2	6-3	3A, 55V H-Bridge
LMD18245	6-2	6-3	3A, 55V DMOS Full-Bridge Motor Driver
LMF100	8-2	8-2	High Performance Dual Switched Capacitor Filter
LMV321	2-9, 2-10, 2-11, 2-12	2-13	General Purpose, Low Voltage, Rail-to-Rail Output Operational Amplifier
LMV324	2-9, 2-10, 2-11, 2-12	2-15	General Purpose, Low Voltage, Rail-to-Rail Output Operational Amplifier
LMV331	2-23	2-24	Single General Purpose, Low Voltage, TinyPack Comparator
LMV339	2-23	2-24	Quad General Purpose, Low Voltage, TinyPack Comparator
LMV358	2-9, 2-10, 2-11, 2-12	2-14	General Purpose, Low Voltage, Rail-to-Rail Output Operational Amplifier
LMV393	2-23	2-24	Dual General Purpose, Low Voltage, TinyPack Comparator
LMV821	2-9, 2-10, 2-11, 2-12	2-13	5MHz, Low Voltage, Low Power, RRO, 5MHz Operational Amplifier
LMV822	2-9, 2-10, 2-11, 2-12	2-14	Low Voltage, Low Power, RRO, 5MHz Operational Amplifier
LMV824	2-9, 2-10, 2-11, 2-12	2-15	Low Voltage, Low Power, RRO, 5MHz Operational Amplifier
LMX1600		12-4, 12-5	2.0GHz/500MHz PLLatinum Low Cost Dual Frequency Synthesizer
LMX1601		12-4, 12-5	1.1GHz/500MHz PLLatinum Low Cost Dual Frequency Synthesizer

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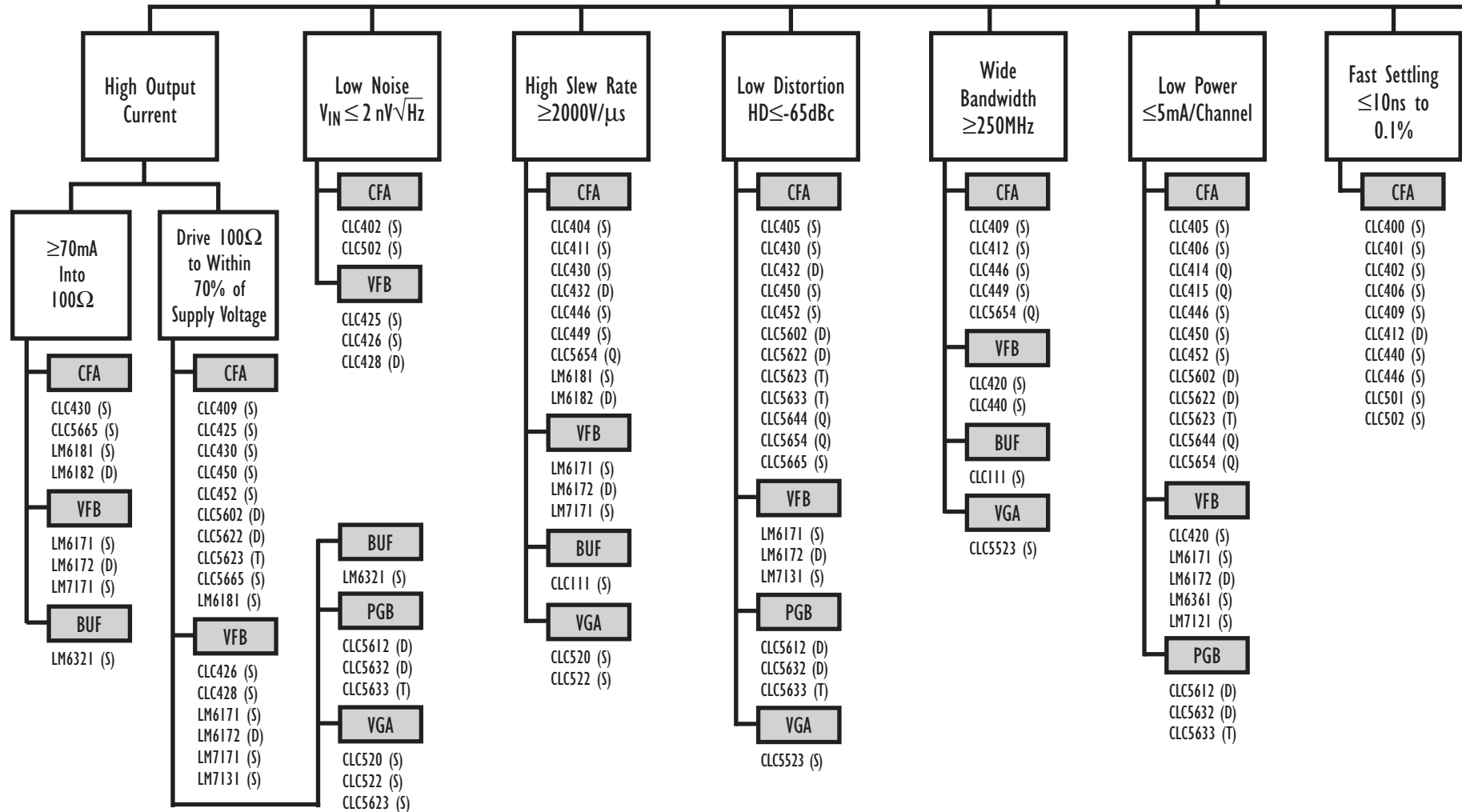
Part Number	Decision Tree Page #	Selection Guide Page #	Descriptor
LMX1602		12-4, 12-5	1.1GHz/1.1GHz PLLatinum Low Cost Dual Frequency Synthesizer
LMX2305	12-2	12-4, 12-5, 14-7	PLLatinum Frequency Synthesizer for RF Personal Communications
LMX2306	12-2	12-4, 12-5	550MHz PLLatinum Low Power Frequency Synthesizer for RF Personal Communications
LMX2315	12-2	12-4, 12-5, 14-7	PLLatinum 1.2GHz Frequency Synthesizer for RF Personal Communications
LMX2316	12-2	12-4, 12-5	1.2GHz PLLatinum Low Power Frequency Synthesizer for RF Personal Communications
LMX2324	12-2		2.0GHz Single PLL Frequency Synthesizer
LMX2325	12-2	12-4, 12-5, 14-7	PLLatinum 2.5GHz Frequency Synthesizer for RF Personal Communications
LMX2326	12-2	12-4, 12-5	3.0GHz PLLatinum Low Power Frequency Synthesizer for RF Personal Communications [Preliminary]
LMX2330	12-2	12-4, 12-5	PLLatinum Dual Frequency Synthesizer for RF Personal Communications
LMX2331	12-2	12-4, 12-5	PLLatinum Dual Frequency Synthesizer for RF Personal Communications
LMX2332	12-2	12-4, 12-5	(1.2GHz/0.51GHz) PLLatinum Dual Frequency Synthesizer for RF Personal Comm
LMX2335	12-2	12-4, 12-5	PLLatinum 1.1GHz Dual Frequency Synthesizer for RF Personal Communications
LMX2336	12-2	12-4, 12-5	PLLatinum 1.1GHz Dual Frequency Synthesizer for RF Personal Communications
LMX2337	12-2	12-4, 12-5	PLLatinum 1.1GHz Dual Frequency Synthesizer for RF Personal Communications
LMX2350		12-4, 12-5	2.5GHz/550MHz PLLatinum Fractional N RF / Integer N IF Dual Low Power Frequency Synthesizer
LMX2352		12-4, 12-5	1.2GHz/550MHz PLLatinum Fractional N RF / Integer N IF Dual Low Power Frequency Synthesizer
LMX3161	12-2	12-3	Single Chip DECT RF Transceiver
LP2902		2-15	Micropower Quad Operational Amplifier
LP2950	11-2, 12-2	11-6, 11-7	Series of Adjustable Micropower Voltage Regulator
LP2951	11-2, 12-2	11-6, 11-7, 14-5, 14-7	Series of Adjustable Micropower Voltage Regulator
LP2952	11-2, 12-2	11-6, 11-7	Adjustable Micropower Low-Dropout Voltage Regulator
LP2953	11-2, 12-2	11-6, 11-7, 14-5, 14-7	Adjustable Micropower Low-Dropout Voltage Regulator
LP2954	11-2	11-6, 11-7	5V Micropower Low-Dropout Voltage Regulator
LP2956	11-2, 12-2	11-6, 11-7, 14-5, 14-7	Dual Micropower Low-Dropout Voltage Regulator
LP2957	11-2	11-6, 11-7	5V Low-Dropout Regulator for μ P Application
LP2960	11-2, 12-2	11-8, 11-9	Adjustable Micropower 0.5A Low-Dropout Regulator
LP2966	11-2	11-6, 11-7	Dual 150mA Ultra Low-Dropout Regulator
LP2975	11-2	11-8, 11-9	MOSFET LDO Driver/Controller
LP2980	11-2, 12-2	11-6, 11-7	Micropower SOT, 50mA Ultra Low-Dropout Regulator
LP2981	11-2, 12-2	11-6, 11-7	Micropower SOT, 100mA Ultra Low-Dropout Regulator
LP2982	11-2, 12-2	11-6, 11-7	Micropower SOT, 50mA Ultra Low-Dropout Regulator
LP2985	11-2	11-6, 11-7	Micropower SOT, 150mA Low-Noise Ultra Low-Dropout Regulator

Part Number	Decision Tree Page #	Selection Guide Page #	Descriptor
LP2986	11-2, 12-2	11-6, 11-7	Micropower, 200mA Ultra Low-Dropout Fixed or Adjustable Voltage Regulator
LP2987	11-2, 12-2	11-6, 11-7	Micropower, 200mA Ultra Low-Dropout Voltage Regulator with Programmable Power-On Reset Delay
LP2988	11-2, 12-2	11-6, 11-7	Micropower, 200mA Ultra Low-Dropout Low Noise Voltage Regulator with Programmable Power-On Reset Delay
LP324	2-10	2-15	Micropower Quad Operational Amplifier
LP339	2-23	2-24	Ultra-Low Power Quad Comparator
LP3470	7-2	7-3	Tiny Power On Reset Circuit
LPC660	2-10, 2-11	2-15	Low Power CMOS Operational Amplifier
LPC661	2-10, 2-11	2-13	Low Power CMOS Operational Amplifier
LPC662	2-10, 2-11	2-14	Low Power CMOS Dual Operational Amplifier
MF10	8-2	8-2	Universal Monolithic Dual Switched Capacitor Filter
MF4	8-2	8-2	4th Order Switched Capacitor Butterworth Lowpass Filter
MF6	8-2	8-2	6th Order Switched Capacitor Butterworth Lowpass Filter
SC14401	12-2		DECT Baseband Processor
SC14420	12-2		Two Line DECT Baseband Processor

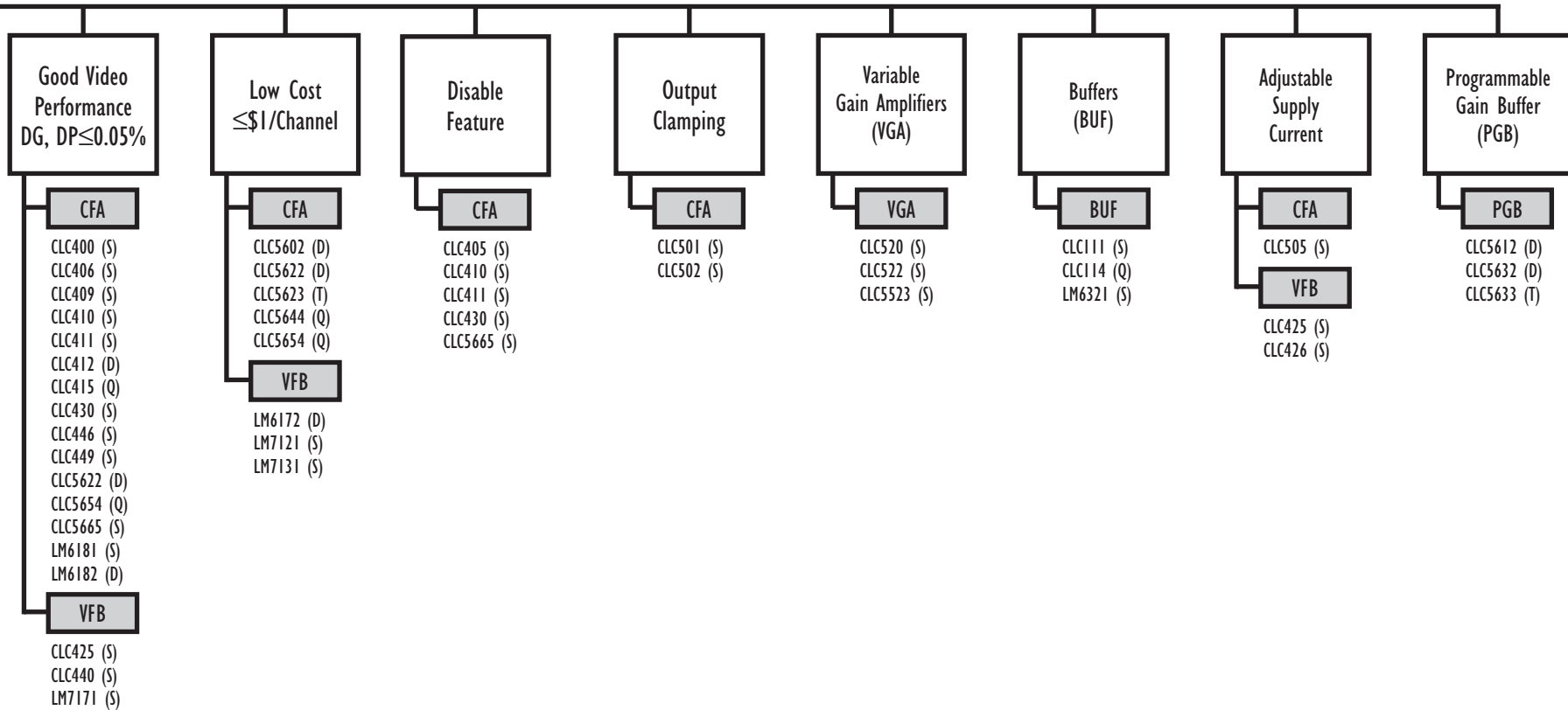
Section 2

AMPLIFIERS/BUFFERS/COMPARATORS

High-Performance High-Speed Amplifiers



(Op Amps, Buffers, VGAs, PGBs)



(S) Single
(D) Dual
(T) Triple
(Q) Quad

CFA Current Feedback Op Amp
VFB Voltage Feedback Op Amp
BUF Buffer
PGB Programmable Gain Buffer
VGA Variable Gain Amplifier

AMPLIFIERS/BUFFERS/COMPARATORS

HIGH-SPEED AMPLIFIER

≤5mA Low Power	Part Number	Single/ Dual Trip/Quad	Features	Mode	SSBW MHz	Av V/V ¹	2nd/3rd HD into RL = 100Ω	Slew Rate V/μs	I _{cc} mA/ch	NTSC Diff G/P %/deg	I _{out} mA	Settling Time (2V step) ns to %
✓	CLC111	S	Closed Loop Buffer	BUF	800	1	-62/-62 at 20MHz	3500	10.5	0.15/0.04	60	16 to 0.1
	CLC114	Q	Closed Loop Buffer	BUF	200	1	-50/-58 at 20MHz	450	3	0.08/0.1	25	20 to 0.01
	CLC400	S	Optimized for Low Gain	CFB	200	2	-60/-60 at 20MHz	700	15	0.03/0.01	70	12 to 0.05
	CLC401	S	Optimized for High Gain	CFB	150	20	-45/-60 at 20MHz	1200	15	NA	70	10 to 0.1
	CLC404	S	Wideband, High SR	CFB	175	6	-53/-60 at 20MHz	2600	11	0.07/0.03	70	10 to 0.2
✓	CLC405	S	Disable Feature	CFB	110	2	-72/-70 at 1MHz	350	3.5	0.01/0.25	60	18 to 0.05
✓	CLC406	S	Wideband, Low-Power	CFB	160	6	-46/-50 at 20MHz	1500	5	0.02/0.02	70	12 to 0.05
	CLC409	S	Very Wideband, Low Distortion	CFB	350	2	-49/-59 at 60MHz	1200	13.5	0.03/0.01	70	8 to 0.1
	CLC410	S	Fast Settling with Disable Feature	CFB	200	2	-60/-60 at 20MHz	700	16	0.01/0.01	70	12 to 0.05
	CLC411	S	High-Speed with Disable Feature	CFB	200	2	-48/-52 at 20MHz	2300	11	0.02/0.03	70	15 to 0.1
	CLC412	D	Wideband Video	CFB	250	2	-46/-50 at 20MHz	1300	5.1	0.02/0.02	70	12 to 0.05
✓	CLC414	Q	Low-Power	CFB	90	6	-47/-55 at 5MHz	1000	2.5	0.1/0.12	70	16 to 0.1
✓	CLC415	Q	Wideband	CFB	160	6	-44/-54 at 20MHz	1500	5	0.03/0.03	70	12 to 0.1
✓	CLC420	S	High-Speed	VFB	300	1	-50/-53 at 20MHz	1100	4	NA	70	18 to 0.01
	CLC425	S	Adjustable Supply Current, Ultra Low Noise, Wideband	VFB	95	20	-53/-75 at 10MHz	350	15	0.014/0.01	90	22 to 0.2
	CLC426	S	Adjustable Supply Current, Low Noise, Wideband	VFB	130	2	-62/-68 at 10MHz	400	11	NA	80	16 to 0.05
	CLC428	D	Low Noise	VFB	160	1	-62/-72 at 10MHz	500	11	NA	80	16 to 0.1
	CLC430	S	GP with Disable Feature	CFB	75	2	-89/-92 at 1MHz	2000	11	0.03/0.05	85	35 to 0.05
	CLC432	D	Wideband	CFB	62	2	-65/-75 at 1MHz	2000	7.1	0.12/0.12	60	70 to 0.05
	CLC440	S	High-Speed, Low-Power	VFB	750	1	-64/-70 at 5MHz	1500	7	0.015/0.025	90	10 to 0.05

Temperature Range Codes

C = Commercial (0°C to +70°C)
 I = Industrial (-40°C to +85°C)
 M = Military (-55°C to +125°C)
 All values are typical at room temperature unless otherwise specified.

Package Codes

LMyyyy (4 digit P/N)
CLCxxxx (4 digit P/N)
CLCxxx (3 digit P/N)

M = Plastic SOIC
 N = Plastic DIP
 MS = 5-Pin SOT-23
 WG = Ceramic SOIC

E = Plastic SOIC
 P = Plastic DIP
 MS = 5-Pin SOT-23
 J = Ceramic DIP (Military)
 WG = Ceramic SOIC

Eval Board

DIP	SOIC	DIP	SOIC
A = CLC730013	CLC730027	G = CLC730028	
B = CLC730038	CLC730036	H = CLC730035	CLC730039
C = CLC730012	CLC730045	I = CLC730029	CLC730033
D = CLC730023		J = CLC730065	CLC730066
E = CLC730024	CLC730031	K = CLC730075	CLC730074
F = CLC730055	CLC730060	S = CLC730068 (5-Pin SOT-23)	
		T = CLC730043	CLC730046

Mode

CFB = Current Feedback
 VFB = Voltage Feedback
 BUF = Closed Loop Buffer
 PGB = Programmable Gain Buffer

Notes

- Closed Loop Gain used to specify most parameters.
- Spec. Supply Range is the range of total supply voltage where operation is possible but parameters are not necessarily guaranteed. Refer to datasheets for more details.
- 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

HIGH-SPEED AMPLIFIER

≤5mA Low Power	Part Number	Single/ Dual Trip/Quad	V _{OS} mV Typ/Temp Limit	Spec. ² Supply Range (V)	Noise Voltage (nV√Hz)	i _{nn} (pA/√Hz)	i _{ni} (pA/√Hz)	Temp Range	Package	Eval Board	SPICE Model	Price ³
	CLC111	S	2/17	±3 to 13	4.0	1.6	—	I, M	E, P, J	C	Y	\$2.11
√	CLC114	Q	0.5/8.2	±5	3.9	0.9	—	I, M	E, P, J	D	N	\$7.30
	CLC400	S	2/9	±5	2.6	3.2	14.2	I, M	E, P, J	A	Y	\$3.43
	CLC401	S	3/11	±5	2.4	2.6	17.0	I, M	E, P, J	A	Y	\$3.65
	CLC404	S	2.10	±5	3.2	2.2	12.3	I, M	E, P, M5, J	A,S	Y	\$2.61
√	CLC405	S	1/8	±5	5.0	3.0	12.0	I, M	P, E, J	A	Y	\$1.55
√	CLC406	S	2/12	±5	2.7	2.1	11.0	I, M	P, E, M5, J	A,S	Y	\$2.44
	CLC409	S	0.5/9.5	±5	2.2	3.2	14.3	I, M	P, E, M5, J	A,S	Y	\$3.36
	CLC410	S	2/9	±5	2.4	2.5	13.5	I, M	E, P, J	A	Y	\$2.90
	CLC411	S	2/14	±10 to ±15	2.5	6.3	12.9	I, M	E, P, J	A	Y	\$3.65
	CLC412	D	2/12	±5	3.0	2.0	12.0	I, M	E, P, J	B	Y	\$3.22
√	CLC414	Q	2/14	±5	4.2	1.3	9.8	I, M	WG, E, P, J	E	Y	\$6.00
√	CLC415	Q	2/10	±5	3.0	2.0	11.5	I, M	E, P, J	E	Y	\$6.85
√	CLC420	S	.5/1.8	±5	4.2	2.0	2.0	I, M	WG, E, P, J	A	Y	\$2.85
	CLC425	S	0.1/1	±5	1.05	1.6	1.6	I, M	WG, E, P, M5, J	A,S	Y	\$3.23
	CLC426	S	1/2.8	±5	1.60	2.0	2.0	I, M	WG, E, P, J	A	Y	\$3.26
	CLC428	D	1/3.5	±5	2.0	2.0	2.0	I, M	E, P, J	B	Y	\$4.26
	CLC430	S	1/10	±5 to ±15	3.0	3.2	15.0	I, M	WG, E, P, J	A	Y	\$1.59
	CLC432	D	3/7	±5 to ±15	3.3	2.0	13.0	I, M	E, P, J	B	Y	\$2.29
	CLC440	S	1/4	±2.5 to ±6	3.5	2.5	2.5	I, M	E, P, J	F	Y	\$4.08

Temperature Range Codes

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Package Codes

LMyyyy (4 digit P/N)

CLCxxxx (4 digit P/N)

M = Plastic SOIC

N = Plastic DIP

MS = 5-Pin SOT-23

WG = Ceramic SOIC

E = Plastic SOIC

P = Plastic DIP

MS = 5-Pin SOT-23

J = Ceramic DIP (Military)

WG = Ceramic SOIC

CLCxxx (3 digit P/N)

Eval Board

DIP

A = CLC730013

B = CLC730038

C = CLC730012

D = CLC730023

E = CLC730024

F = CLC730055

SOIC

CLC730027

CLC730036

CLC730045

CLC730031

CLC730060

DIP

G = CLC730028

H = CLC730035 CLC730039

I = CLC730029 CLC730033

J = CLC730065 CLC730066

K = CLC730075 CLC730074

S = CLC730068 (5-Pin SOT-23)

T = CLC730043 CLC730046

Mode

CFB = Current Feedback

VFB = Voltage Feedback

BUF = Closed Loop Buffer

PGB = Programmable Gain Buffer

Notes

- Closed Loop Gain used to specify most parameters.
- Spec. Supply Range is the range of total supply voltage where operation is possible but parameters are not necessarily guaranteed. Refer to datasheets for more details.
- 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

AMPLIFIERS / BUFFERS / COMPARATORS

HIGH-SPEED AMPLIFIER

≤5mA Low Power	Part Number	Single/ Dual Trip/Quad	Features	Mode	SSBW MHz	A _v V/V ¹	2nd/3rd HD into R _L = 100Ω	Slew Rate V/μs	I _{cc} mA/ch	NTSC Diff G/P %/deg	I _{out} mA	Settling Time (2V step) ns to %
✓	CLC446	S	Wideband, Low-Power	CFB	400	2	-54/-50 at 50MHz	2000	4.8	0.02/0.03	48	9 to 0.1
	CLC449	S	Ultra Wideband	CFB	1100	2	-44/-62 at 50MHz	2500	12	0.03/0.02	90	11 to 0.1
✓	CLC450	S	Low-Power, High Output Current	CFB	135	2	-86/-65 at 1MHz	370	1.6	0.03/0.3	130	15 to 0.05
✓	CLC452	S	Low-Power, High Output Current	CFB	160	2	-77/-72 at 1MHz	540	3.2	0.05/0.08	130	20 to 0.05
	CLC501	S	High-Speed, Output Clamping, High Gain	CFB	75	32	-45/-60 at 20MHz	1200	18	NA	70	12 to 0.05
	CLC502	S	Fast Settling, Output Clamping	CFB	150	2	-50/-60 at 20MHz	800	17	0.01/0.05	55	25 to 0.0025
✓	CLC505	S	High-Speed, Adjustable Supply Current	CFB	50	6	-50/-65 at 5MHz	800	1	0.04/0.06	45	35 to 0.1
✓	CLC5602	D	Video Amp, High Output	CFB	135	2	-86/-85 at 1MHz	300	1.6	0.06/0.02	130	15 to 0.05
✓	CLC5612	D	High Output	PGB	90	2	-74/-86 at 1MHz	290	1.6	0.15/0.02	130	17 to 0.05
✓	CLC5622	D	Video Amp, High Output, High Capacity Load	CFB	160	2	-95/-95 at 1MHz	370	3.2	0.05/0.03	130	18 to 0.05
✓	CLC5623	T	Video Amp, High Output, High Capacity Load	CFB	148	2	-78/-94 at 1MHz	370	3.2	0.06/0.06	130	18 to 0.05
✓	CLC5632	D	High Output	PGB	130	2	-82/-69 at 1MHz	410	3.2	0.08/0.02	130	17 to 0.05
✓	CLC5633	T	High Output	PGB	130	2	-73/-92 at 1MHz	410	3.2	0.03/0.06	130	20 to 0.05
✓	CLC5644	Q	Low-Power, Low Cost	CFB	125	2	-72/-79 at 5MHz	1000	2.5	0.04/0.07	70	16 to 0.1
✓	CLC5654	Q	High-Speed, Low Cost	CFB	350	2	-71/-82 at 5MHz	2000	5	0.03/0.03	70	12 to 0.1
	CLC5665	S	Disable Feature	CFB	90	1	-89/-92 at 1MHz	1800	11	0.05/0.05	85	35 to 0.05
✓	LM6171	S	High-Speed, Low-Power, Low Distortion	VFB	160	1	-72/-70 at 1MHz	3600	2.5	0.03/0.5	100	48 to 0.1
✓	LM6172	D	High-Speed, Low-Power, Low Distortion	VFB	160	1	-72/-70 at 1MHz	3000	2.3	0.28/0.6	100	65 to 0.1
	LM6181	S	100MHz, 100mA	CFB	160	2	-50/-55 at 10MHz	2000	7.5	0.05/0.04	100	50 to 0.1
	LM6182	D	100MHz, 100mA	CFB	100	2	-50/-55 at 10MHz	2000	7.5	0.05/0.04	100	50 to 0.1
	LM6321	S	High-Speed, High Output	BUF	50	1	NA	800	15	NA	300	NA
✓	LM6361	S	High-Speed, Wide Supply Range	VFB	50	1	NA	300	5	0.1/0.1	65	120 to 0.1
✓	LM6364	S	High-Speed, A _v > +5	VFB	35	5	NA	300	5	NA	65	100 to 0.1
✓	LM6365	S	High-Speed, A _v > +25	VFB	25	25	NA	300	5	NA	65	80 to 0.1
✓	LM7121	S	Low-Power, High-Speed	VFB	235	1	NA	1300	5	0.3/0.65	40	74 to 0.1
	LM7131	S	Low-Voltage, High-Speed, Single Supply	VFB	90	1	-74/-94 at 1MHz	130	7.5	0.25/1.0	65	NA
	LM7171	S	High-Speed, High Output Current, A _v > +2	VFB	220	2	-75/-55 at 5MHz	4100	6.5	0.01/0.02	100	42 to 0.1

Temperature Range Codes

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M = Military (-55°C to +125°C)

All values are typical at room temperature unless otherwise specified.

Package Codes

LMyyyy (4 digit P/N)

CLCxxxx (4 digit P/N)

CLCxxx (3 digit P/N)

M = Plastic SOIC

N = Plastic DIP

MS = 5-Pin SOT-23

WG = Ceramic SOIC

E = Plastic SOIC

P = Plastic DIP

MS = 5-Pin SOT-23

J = Ceramic DIP (Military)

WG = Ceramic SOIC

Eval Board

DIP

SOIC

DIP

SOIC

A = CLC730013

CLC730027

G = CLC730028

B = CLC730038

CLC730036

H = CLC730035 CLC730039

C = CLC730012

CLC730045

I = CLC730029 CLC730033

D = CLC730023

J = CLC730065 CLC730066

E = CLC730024

CLC730031

K = CLC730075 CLC730074

F = CLC730055

CLC730060

S = CLC730068 (5-Pin SOT-23)

T = CLC730043 CLC730046

Mode

CFB = Current Feedback

VFB = Voltage Feedback

BUF = Closed Loop Buffer

PGB = Programmable Gain Buffer

Notes

- Closed Loop Gain used to specify most parameters.
- Spec. Supply Range is the range of total supply voltage where operation is possible but parameters are not necessarily guaranteed. Refer to datasheets for more details.
- 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

HIGH-SPEED AMPLIFIER

≤5mA Low Power	Part Number	Single/ Dual Trip/Quad	V _{OS} mV Typ/Temp Limit	Spec. ² Supply Range (V)	Noise Voltage (nV/√Hz)	i _{nn} (pA/√Hz)	i _{ni} (pA/√Hz)	Temp Range	Package	Eval Board	SPICE Model	Price ³
√	CLC446	S	2/11	±5	3.8	2.0	16.0	I, M	E, P, J	F	N	\$1.80
	CLC449	S	3/9	±5	2.2	3.0	15.0	I, M	E, P, J	F	Y	\$3.22
√	CLC450	S	2/8	+5 to ±5	3.0	6.9	8.5	I	E, P, M5	A,S	N	\$1.20
√	CLC452	S	1/8	+5 to ±5	2.8	7.5	10.5	I, M	E, P, M5, J	A,S	N	\$1.24
	CLC501	S	1.5/5	±5	2.4	8.4	10.2	I, M	WG, E, P, J	A	Y	\$5.90
	CLC502	S	0.5/2.8	±5	2.0	18.0	22.0	I, M	E, P, J	A	Y	\$3.20
√	CLC505	S	13/14.5	±5	5.2	1.3	9.0	I, M	P, E, J	A	Y	\$3.37
√	CLC5602	D	2/8	+5 to ±5	3.4	6.3	8.7	I	M, N	B	N	\$1.83
√	CLC5612	D	3/35	+5 to ±5	3.4	6.3	8.7	I	M, N	B	N	\$1.83
√	CLC5622	D	1/8	+5 to ±5	3.4	6.3	8.7	I	M, N	B	N	\$1.88
√	CLC5623	T	1/8	+5 to ±5	4.9	6.6	11.1	I	M, N	K	N	\$2.42
√	CLC5632	D	7/35	+5 to ±5	3.4	6.3	8.7	I	M, N	B	N	\$1.88
√	CLC5633	T	7/35	+5 to ±5	4.9	6.6	11.1	I	M, N	K	N	\$2.42
√	CLC5644	Q	2.5/15	±5	4.5	1.5	10.0	I	M, N	E	N	\$3.23
√	CLC5654	Q	2.5/11	±5	3.3	2.5	12	I	M, N	E	N	\$2.98
	CLC5665	S	1/10	±5 to ±15	3.0	3.2	15	I	M, N	A	Y	\$1.14
√	LM6171	S	1.5/5	±5 to ±15	12	1.0	1.0	I	M, N	—	Y	\$1.29
√	LM6172	D	0.4/4	±5 to ±15	12	1.0	1.0	I, M	WG, M, N, J	—	Y	\$1.60
	LM6181	S	2/4	±5 to ±15	4	3	16	I	M, N	—	Y	\$1.49
	LM6182	D	2/4	±5 to ±15	4	3	16	I	M, N	—	N	\$2.49
	LM6321	S	15/50	±5 to ±15	na	na	na	C, I	M, N	—	N	\$2.56
√	LM6361	S	5/10	±5 to ±15	15	1.5	1.5	C, I	M, N	—	Y	\$1.16
√	LM6364	S	2/11	+4.75 to ±16	8	1.5	1.5	C	M, N	—	Y	\$1.44
√	LM6365	S	1/4	+4.75 to ±16	5	1.5	1.5	C	M, N	—	Y	\$1.51
√	LM7121	S	0.9/15	+5 to ±15	17	1.9	1.9	I	M, N, M5	—	Y	\$0.99
	LM7131	S	0.02/4	+2.7 to ±5	17	1.9	1.9	C	M, N, M5	—	Y	\$0.93
	LM7171	S	0.2/4	±5.5 to ±15	14	1.8	1.8	I, M	M,N, WG, J	—	Y	\$1.29

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All values are typical at room temperature unless otherwise specified.

Package Codes

LMyyyy (4 digit P/N)
CLCxxxx (4 digit P/N) **CLCxxx (3 digit P/N)**

M = Plastic SOIC	E = Plastic SOIC
N = Plastic DIP	P = Plastic DIP
M5 = 5-Pin SOT-23	M5 = 5-Pin SOT-23
WG = Ceramic SOIC	J = Ceramic DIP (Military)
	WG = Ceramic SOIC

Eval Board

DIP	SOIC	DIP	SOIC
A = CLC730013	CLC730027	G = CLC730028	
B = CLC730038	CLC730036	H = CLC730035	CLC730039
C = CLC730012	CLC730045	I = CLC730029	CLC730033
D = CLC730023		J = CLC730065	CLC730066
E = CLC730024	CLC730031	K = CLC730075	CLC730074
F = CLC730055	CLC730060	S = CLC730068 (5-Pin SOT-23)	
		T = CLC730043	CLC730046

Mode

CFB = Current Feedback
 VFB = Voltage Feedback
 BUF = Closed Loop Buffer
 PGB = Programmable Gain Buffer

Notes

- 1 Closed Loop Gain used to specify most parameters.
- 2 Spec. Supply Range is the range of total supply voltage where operation is possible but parameters are not necessarily guaranteed. Refer to datasheets for more details.
- 3 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

AMPLIFIERS/BUFFERS/COMPARATORS

MULTIPLEXER PRODUCTS

Device	Channels	Switching Speed (ns)	Crosstalk Rejection (dB) ¹	Settling Time to 0.01 (ns)	2nd Harmonic Distortion ² HD2 (dBc)	3rd Harmonic Distortion ² HD3 (dBc)	SSBW (MHz)	Supply Voltage V _S (V)	Supply Current I _S (mA)	Digital Interface	Temp Range	Pkg	Eval Board	SPICE Model	Price ³
CLC532	2:1	5	80	17	80	86	190	±5	23	CMOS/TTL/ECL	I, M	J, E, P	G	Y	\$2.38
CLC533	4:1	6	80	17	80	86	180	±5	28	CMOS/TTL/ECL	I, M	J, E, P	H	N	\$5.20

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Package Codes

LMyyyy (4 digit P/N)
CLCxxxx (4 digit P/N)
 M = Plastic SOIC
 N = Plastic DIP
 MS = 5-Pin SOT-23
 J = Ceramic DIP (Military)

CLCxxx (3 digit P/N)
 E = Plastic SOIC
 P = Plastic DIP
 MS = 5-Pin SOT-23
 J = Ceramic DIP (Military)

Eval Board

DIP	SOIC	DIP	SOIC
A = CLC730013	CLC730027	G = CLC730028	
B = CLC730038	CLC730036	H = CLC730035	CLC730039
C = CLC730012	CLC730045	I = CLC730029	CLC730033
D = CLC730023		J = CLC730065	CLC730066
E = CLC730024	CLC730031	K = CLC730075	CLC730074
F = CLC730055	CLC730060	S = CLC730068 (5-Pin SOT-23)	

Notes

1 Crosstalk tested @ 10MHz, 2Vpp
 2 Harmonic Distortion @ 5MHz, 2Vpp
 3 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

VARIABLE GAIN AMPLIFIER PRODUCTS

Device	Single/Dual/Trip/Quad	Signal Channel BW (MHz)	Control Channel BW (MHz)	Gain Adjust Range (dB)	Slew Rate SR (V/μS)	Supply Voltage V _S (V)	Supply Current I _S (mA)	Common Mode Input Range CMIR (V)	Temp Range	Pkg	Eval Board	SPICE Model	Comments	Price ³
CLC520	S	160	100	40	2000	±5	28	±2.2	I, M	E, P, J	I	Y	Gain Linear in dB	\$4.98
CLC522	S	165	165	40	2000	±5	46	±2.2	I, M	J, E, P	I	Y	Linear Gain Control (V/V)	\$4.09
CLC523	S	250	95	80	1800	±5	13.5	±3.8	I	N, M	J	N	Gain Linear in dB	\$3.91

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Package Codes

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CLCxxxx (4 digit P/N)
 M = Plastic SOIC
 N = Plastic DIP
 MS = 5-Pin SOT-23
 J = Ceramic DIP (Military)

CLCxxx (3 digit P/N)
 E = Plastic SOIC
 P = Plastic DIP
 MS = 5-Pin SOT-23
 J = Ceramic DIP (Military)

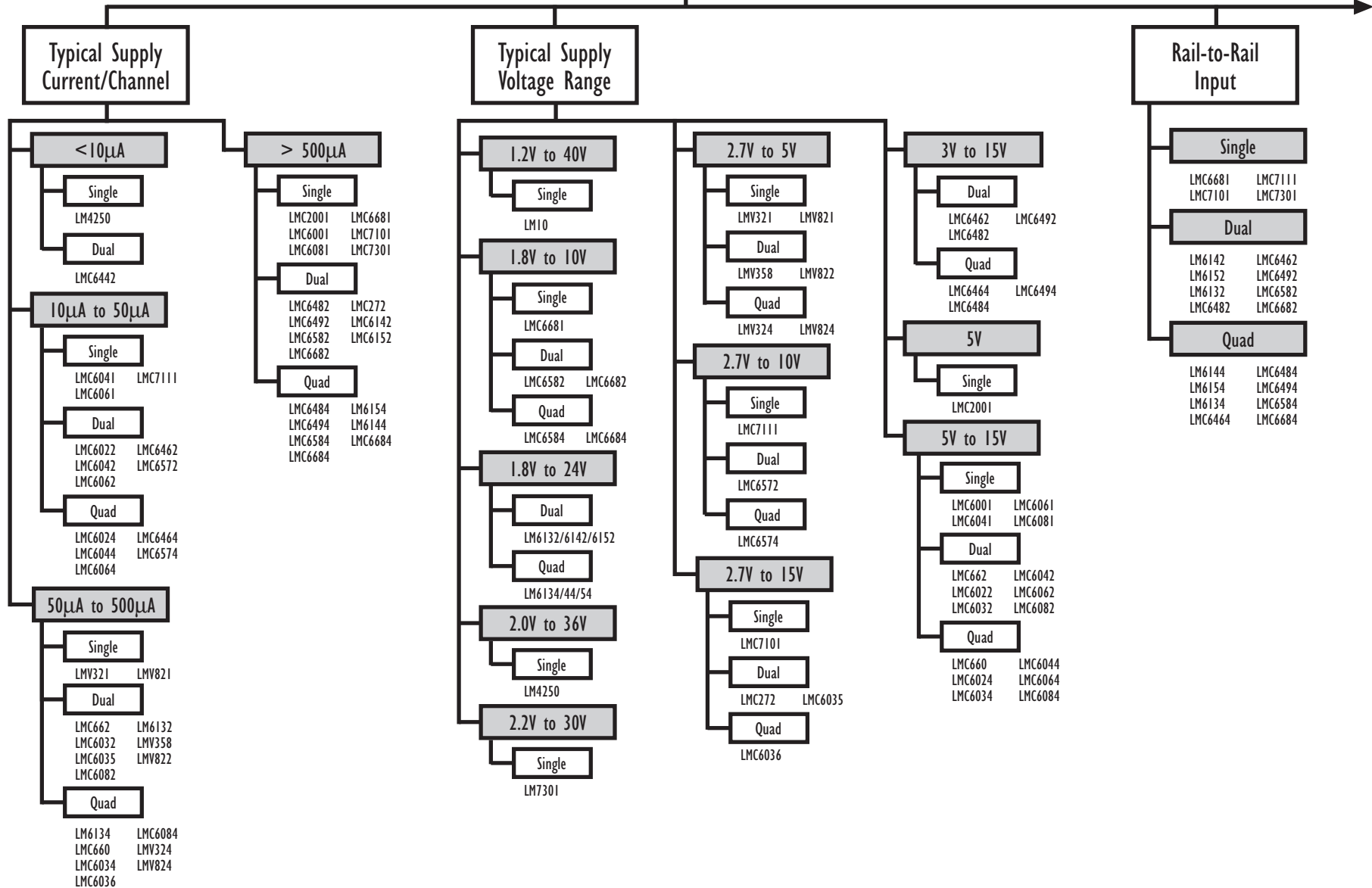
Eval Board

DIP	SOIC	DIP	SOIC
A = CLC730013	CLC730027	G = CLC730028	
B = CLC730038	CLC730036	H = CLC730035	CLC730039
C = CLC730012	CLC730045	I = CLC730029	CLC730033
D = CLC730023		J = CLC730065	CLC730066
E = CLC730024	CLC730031	K = CLC730075	CLC730074
F = CLC730055	CLC730060	S = CLC730068 (5-Pin SOT-23)	

Notes

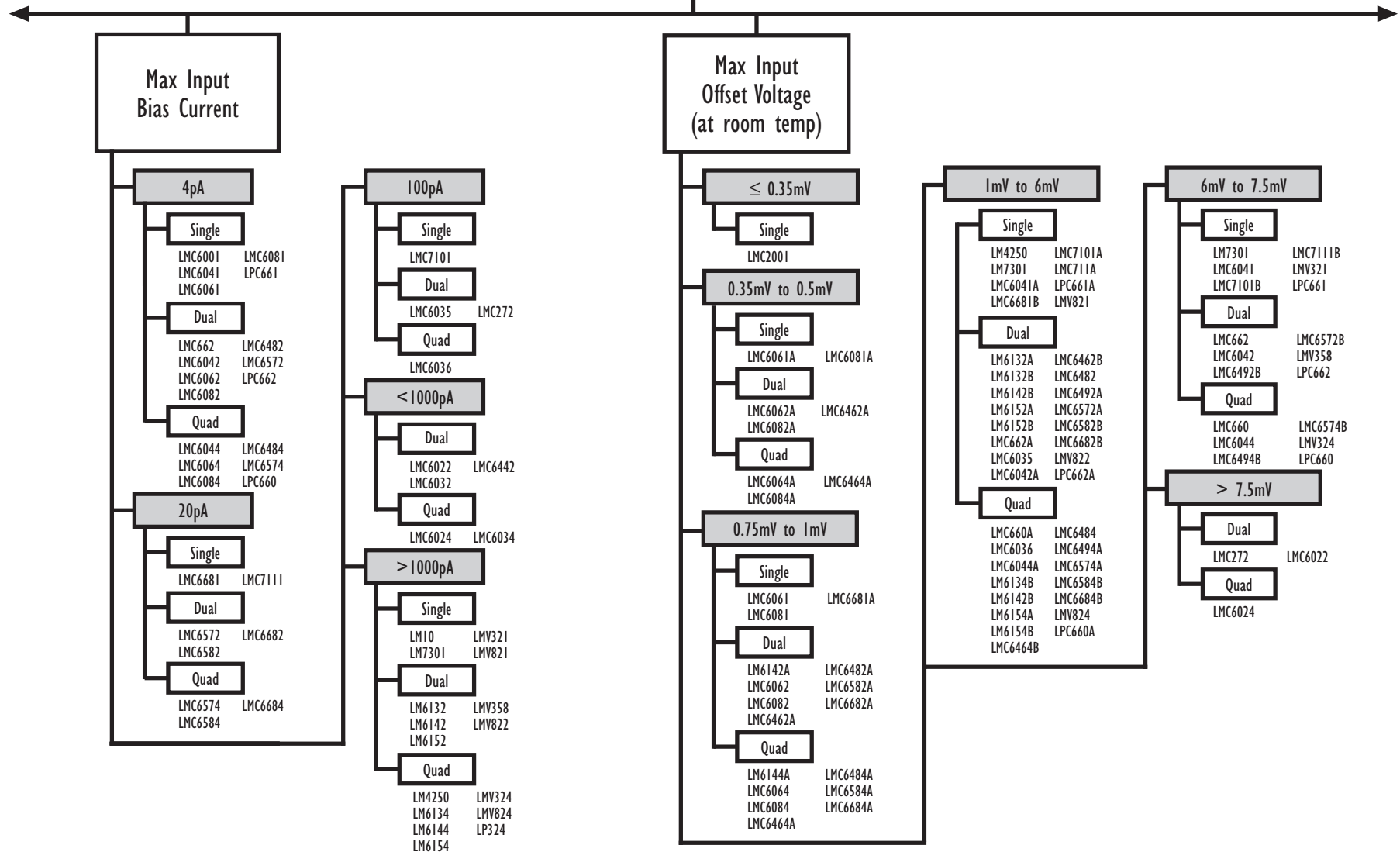
1 Crosstalk tested @ 10MHz, 2Vpp
 2 Harmonic Distortion @ 5MHz, 2Vpp
 3 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.
 A_{VMAX} = 10

Low-Power Op Amps

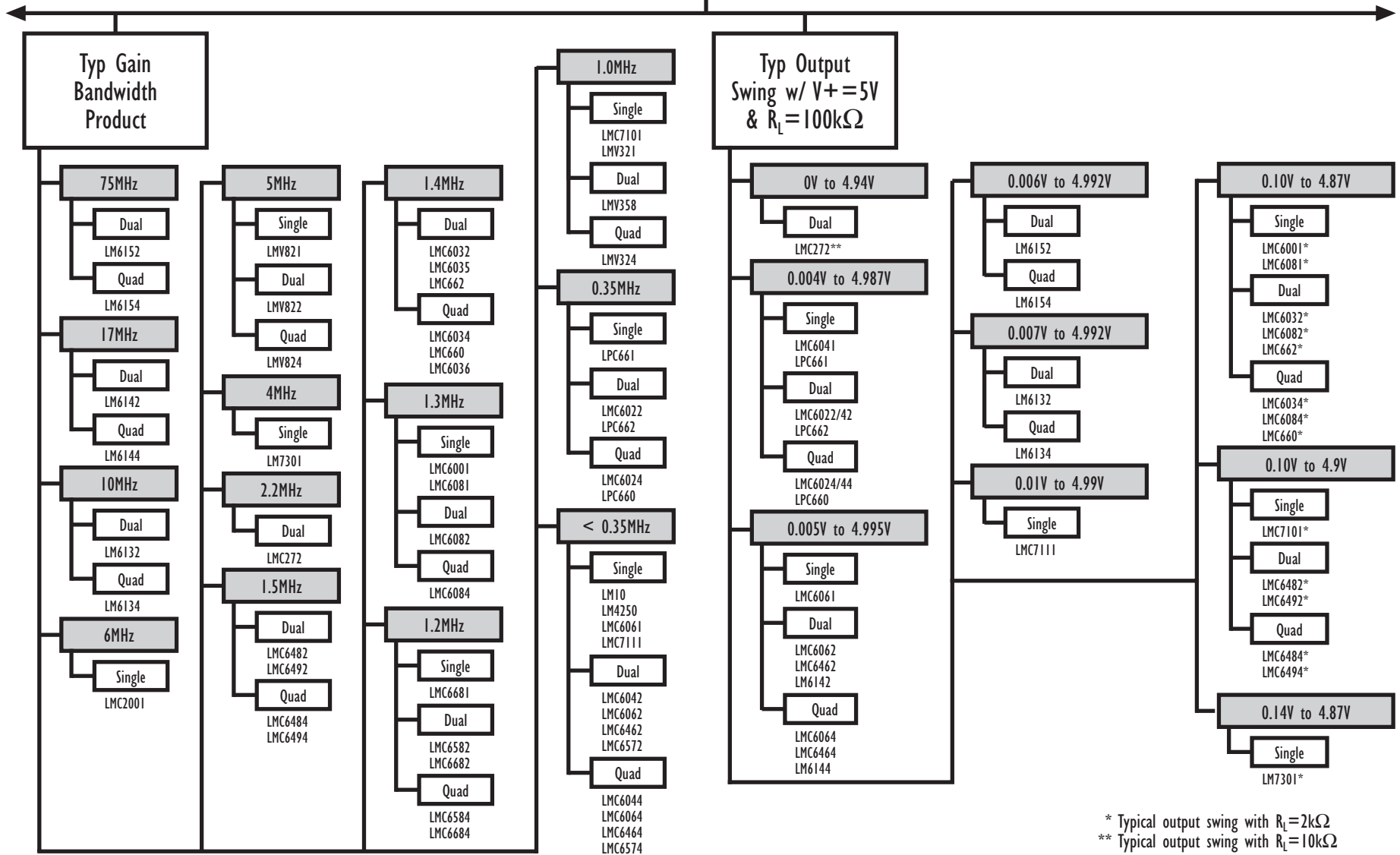


AMPLIFIERS / BUFFERS / COMPARATORS

Low-Power Op Amps



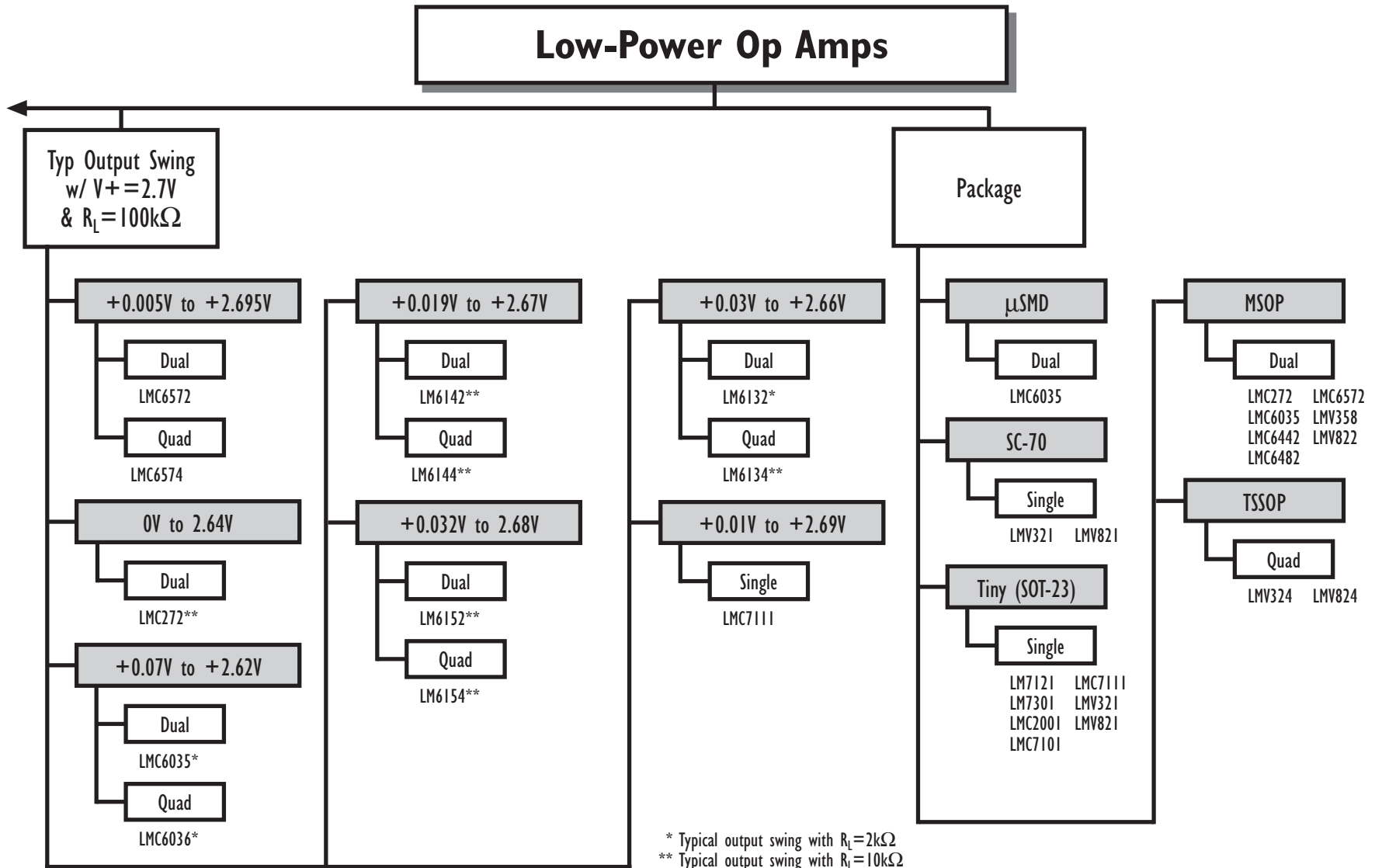
Low-Power Op Amps



* Typical output swing with $R_L = 2k\Omega$
 ** Typical output swing with $R_L = 10k\Omega$

AMPLIFIERS / BUFFERS / COMPARATORS

Low-Power Op Amps



SINGLE-LOW POWER OPERATIONAL AMPLIFIERS

ORDERING GUIDE

Part Number	Supply Current	Input Offset Voltage	Input Bias Current	Common Mode Voltage Range	Output Swing (V)	Gain Bandwidth	Supply Voltage		Packages	Oper. Temp Ranges	Price†
	I _s (μA) Typ	V _{OS} (mv) Max	I _b (fA) Typ	CMVR (V) Typ	Typ with R _L = 100kΩ Unless Otherwise Spec	GBW (MHz) Typ	Min (V)	Max (V)			
LM10	300	4	40nA	-0.3 to 4.9	0.015 to 4.9	0.05	1.2	40	M08, N08, H08	I, M	\$2.00
LM4250	10 (adj)	6	30nA	0.9 to 4.1	0.9 to 4.1	0.2	2	36	M08, N08, H08	C, M	\$0.86
LM7301	600	6	9nA	-0.1 to 5.1	0.14 to 4.87*	4	1.8	32	M5, M	I	\$0.88
LMC2001	750	0.04	4pA	0 to 4	0.03 to 4.97	6	4.5	5.5	M08, M5	I, C	\$1.32
LMC6001A	450	0.35	25	-0.4 to 3.1	0.10 to 4.87*	1.3	5	15	N08	I	\$8.95
LMC6001B	450	1	100	-0.4 to 3.1	0.10 to 4.87*	1.3	5	15	N08	I	\$5.50
LMC6001C	450	1	1000	-0.4 to 3.1	0.10 to 4.87*	1.3	5	15	N08	I	\$1.90
LMC6041	14	6	2	-0.4 to 3.1	0.004 to 4.987	0.075	5	15	M08, N08	I	\$0.76
LMC6041A	14	3	2	-0.4 to 3.1	0.004 to 4.987	0.075	5	15	M08, N08	I	\$0.95
LMC6061	20	0.8	10	-0.4 to 3.1	0.005 to 4.995	0.1	5	15	M08, N08	I	\$0.56
LMC6061A	20	0.35	10	-0.4 to 3.1	0.005 to 4.995	0.1	5	15	M08, N08	I, M	\$0.78
LMC6081	450	0.8	10	-0.4 to 3.1	0.10 to 4.87*	1.3	5	15	M08, N08	I	\$1.27
LMC6081A	450	0.35	10	-0.4 to 3.1	0.10 to 4.87*	1.3	5	15	M08, N08	I, M	\$1.90
LMC6681A	800	1	80	-0.3 to 5.3	0.05 to 4.9*	1.2	1.8	10	M08, N08	I	\$1.40
LMC6681B	800	3	80	-0.3 to 5.3	0.05 to 4.9*	1.2	1.8	10	M08, N08	I	\$1.12
LMC7101A	500	3	1000	-0.3 to 5.3	0.10 to 4.90*	1.0	3	15	M5, N08	I	\$0.79
LMC7101B	500	7	1000	-0.3 to 5.3	0.10 to 4.90*	1.0	3	15	M5, N08	I	\$0.48
LMC7111A	25	3	100	-0.3 to 5.25	0.01 to 4.99	0.05	2.5	11	M5, N08	I	\$0.96
LMC7111B	25	7	100	-0.3 to 5.25	0.01 to 4.99	0.05	2.5	11	M5, N08	I	\$0.55
LMV321	130	7	500nA	0.065 to 4.9	0.065 to 4.9	1	2.7	5	M7, M5	I	\$0.29
LMV821	300	3.5	150nA	0.065 to 4.9	0.55 to 4.9	5	2.7	5	M7, M5	I	\$0.41
LPC661	55	6	2	-0.4 to 3.1	0.004 to 4.987	0.35	5	15	M08	I	\$0.65

Specs at T_A = 25°C & V_S = +5V

Footnotes

* Typical Output Swing with R_L = 2kΩ

** Typical Output Swing with V_S = +2.7V

† 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

Package Code Key (Letter = Pkg Type, Number = # of Pins)

- E = LCC
- H/G = Metal Can
- J/D = Ceramic Dual-In-Line
- K = Metal Can (TO-3)
- M = SOIC
- MF = TSSOP
- MM = MSOP
- M3 = SOT23-3
- M5 = SOT23-5
- M7 = SC70-5
- N = Plastic Dual-In-Line (PDIP)
- T = TO-220
- V = PLCC
- W = Flatpak
- WG = Ceramic SOIC
- Z = TO-92

Temperature Ranges

- C = 0 to 70°C
- I = -40 to 85°C
- M = -55 to 125°C
- E = -40 to 125°C

AMPLIFIERS/BUFFERS/COMPARATORS

DUAL-LOW POWER OPERATIONAL AMPLIFIERS

ORDERING GUIDE

Part Number	I _s (μA) Typ	V _{OS} (mV) Max	I _b (fA) Typ	CMVR (V) Typ	Output Swing (V)		GBW (MHz) Typ	Supply Voltage		Packages	Operating Temperature Ranges	Price†
					Typ with R _L = 100kΩ	Unless Otherwise Specified		Min (V)	Max (V)			
LM6132A	720	2	1.8nA	-0.25 to 5.25	0.007 to 4.992	10	1.8	24	M08, N08	I	\$1.80	
LM6132B	720	6	1.8nA	-0.25 to 5.25	0.007 to 4.992	10	1.8	24	M08, N08	I	\$1.43	
LM6142A	1300	1	1.8nA	-0.25 to 5.25	0.005 to 4.995	17	1.8	24	M08, N08, J08	I, M	\$3.50	
LM6142B	1300	2.5	1.8nA	-0.25 to 5.25	0.005 to 4.995	17	1.8	24	M08, N08	I	\$2.34	
LM6152A	2800	2	1.1nA	-0.25 to 5.25	0.006 to 4.992	75	2.7	24	M08, N08	I	\$3.59	
LM6152B	2800	5	5nA	-0.25 to 5.25	0.006 to 4.992	75	2.7	24	M08, N08	I	\$2.39	
LMC272	1950	7	1000	-0.3 to 4.2	0 to 4.94	2	2.5	15	M08, N08, MM08	C	\$0.44	
LMC662	750	6	2	-0.4 to 3.1	0.1 to 4.87	2	5	15	M08, N08	I	\$0.82	
LMC662A	750	3	2	-0.4 to 3.1	0.10 to 4.87*	1.4	5	15	M08, N08	I	\$1.10	
LMC6022	86	9	40	-0.4 to 3.1	0.004 to 4.987	0.35	5	15	M08	I	\$0.96	
LMC6032	750	9	40	-0.4 to 3.1	0.10 to 4.87*	1.4	5	15	M08, N08	I	\$0.40	
LMC6035	800	5	20	-0.5 to 4.5	0.08 to 4.9*	1.4	2	15	M08, MM08, BP08	I	\$0.55	
LMC6042	20	6	2	-0.4 to 3.1	0.004 to 4.987	0.1	5	15	M08, N08	I	\$0.94	
LMC6042A	20	3	2	-0.4 to 3.1	0.004 to 4.987	0.1	5	15	M08, N08	I	\$1.27	
LMC6062	32	0.8	10	-0.4 to 3.1	0.005 to 4.995	0.1	5	15	M08, N08	I	\$1.00	
LMC6062A	32	0.35	10	-0.4 to 3.1	0.005 to 4.995	0.1	5	15	M08, N08, J08	I, M	\$1.43	
LMC6082	900	0.8	10	-0.4 to 3.1	0.10 to 4.87*	1.3	5	15	M08, N08	I	\$1.56	
LMC6082A	900	0.35	10	-0.4 to 3.1	0.10 to 4.87*	1.3	5	15	M08, N08	I	\$2.53	
LMC6462A	40	0.5	150	-0.2 to 5.3	0.005 to 4.995	0.05	3	15	M08, N08	I, M	\$1.43	
LMC6462B	40	3	150	-0.2 to 5.3	0.005 to 4.995	0.05	3	15	M08, N08	I	\$1.12	
LMC6482	1000	3	20	-0.3 to 5.3	0.10 to 4.9*	1.3	3	15	M08, N08, MM08	I	\$0.78	
LMC6482A	1000	0.75	20	-0.3 to 5.3	0.10 to 4.9*	1.3	3	15	M08, N08, MM08, J08	I, M	\$1.25	
LMC6492A	1000	3	150	-0.3 to 5.3	0.10 to 4.9*	1.5	5	15	M08, N08	E	\$1.25	
LMC6492B	1000	6	150	-0.3 to 5.3	0.10 to 4.9*	1.5	5	15	M08, N08	E	\$1.01	
LMC6572A	80	3.3	20	-0.2 to 1.9	0.005 to 2.695**	0.22	2.7	11	M08, N08	I	\$1.56	
LMC6572B	80	3.7	20	-0.2 to 1.9	0.005 to 2.695**	0.22	2.7	11	M08, N08, MM08	I	\$0.64	
LMC6582A	1500	1	80	-0.3 to 5.3	0.05 to 4.9*	1.2	1.8	10	M08, N08	I	\$1.27	
LMC6582B	1500	3	80	-0.3 to 5.3	0.05 to 4.9*	1.2	1.8	10	M08, N08	I	\$1.04	
LMC6442	2	7	5	-0.4 to 4.1	0.02 to 4.99	0.01	1.5	15	M14, MM14, N14	I	\$1.43	
LMC6442A	2	3	-	-0.4 to 4.1	0.02 to 4.99	0.01	1.5	15	M08, N08, MM08, WG10, J08	I, M	\$1.51	
LMC6682A	1500	1	80	-0.3 to 5.3	0.05 to 4.9*	1.2	1.8	10	M14, N14	I	\$2.19	
LMC6682B	1500	3	80	-0.3 to 5.3	0.05 to 4.9*	1.2	1.8	10	M14, N14	I	\$1.88	
LMV358	210	7	500nA	0.065 to 4.90	0.065 to 4.9	1	2.7	5	MM08, M08	I	\$0.28	
LMV822	500	3.5	150nA	0.065 to 4.90	0.55 to 4.9	5	2.7	5	MM08, M08	I	\$0.48	
LPC662	86	6	2	-0.4 to 3.1	0.004 to 4.987	0.35	5	15	M08	I	\$1.31	
LPC662A	86	3	2	-0.4 to 3.1	0.004 to 4.987	0.35	5	15	M08	I, M	\$1.34	

Specs at T_A = 25°C & V_S = +5V

Footnotes

* Typical Output Swing with R_L = 2kΩ

** Typical Output Swing with V_S = +2.7V

† 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

Package Code Key

(Letter = Pkg Type, Number = # of Pins)

E = LCC
H/G = Metal Can
J/D = Ceramic Dual-In-Line
K = Metal Can (TO-3)
M = SOIC
MF = TSSOP
MM = MSOP
M3 = SOT23-3
M5 = SOT23-5
N = Plastic Dual-In-Line (PDIP)
T = TO-220
V = PLCC
W = Flatpak
WG = Ceramic SOIC
Z = TO-92
BP = μSMD or Micro-SMD

Temperature Ranges

C = 0 to 70°C
I = -40 to 85°C
M = -55 to 125°C
E = -40 to 125°C

QUAD-LOW POWER OPERATIONAL AMPLIFIERS

ORDERING GUIDE

Part Number	Is (μA) Typ	VOS (mv) Max	Ib (fA) Typ	CMVR (V) Typ	Output Swing (V) Typ with RL = 100kΩ Unless Otherwise Specified	GBW (MHz) Typ	Supply Voltage		Packages	Operating Temperature Ranges	Price†
							Min (V)	Max (V)			
LM6134A	1440	2	1.1nA	-0.25 to 5.25	0.005 to 4.995	10	1.8	24	M14, N14	I	\$2.27
LM6134B	1440	6	1.1nA	-0.25 to 5.25	0.005 to 4.995	10	1.8	24	M14, N14	I	\$1.80
LMC660A	1500	3	2	-0.4 to 3.1	0.10 to 4.87*	1.4	5	15	M14, N14	I	\$1.04
LMC660C	1500	6	2	-0.4 to 3.1	0.10 to 4.87*	1.4	5	15	M14, N14	I	\$0.72
LMC6024	160	9	40	-0.4 to 3.1	0.004 to 4.987	0.35	5	15	M14, N14	I	\$1.18
LMC6034	1500	9	40	-0.4 to 3.1	0.10 to 4.87*	1.4	5	15	M14	I	\$0.40
LMC6036	1300	5	20	-0.5 to 4.5	0.08 to 4.9*	1.4	2	15	M14	I	\$0.77
LMC6044	40	6	2	-0.4 to 3.1	0.004 to 4.987	0.1	5	15	M14, N14	I	\$1.19
LMC6044A	40	3	2	-0.4 to 3.1	0.004 to 4.987	0.1	5	15	M14, N14	I	\$1.54
LMC6064	64	0.8	10	-0.4 to 3.1	0.005 to 4.995	0.1	5	15	M14, N14	I	\$1.75
LMC6064A	64	0.35	10	-0.4 to 3.1	0.005 to 4.995	0.1	5	15	M14, N14, J14	I, M	\$2.80
LMC6084	1800	0.8	10	-0.4 to 3.1	0.10 to 4.87*	1.3	5	15	M14, N14	I	\$2.40
LMC6084A	1800	0.35	10	-0.4 to 3.1	0.10 to 4.87*	1.3	5	15	M14, N14	I	\$3.79
LM6144A	2600	1	1.8nA	-0.25 to 5.25	0.005 to 4.995	17	1.8	24	M14, N14	I	\$5.40
LM6144B	2600	2.5	1.8nA	-0.25 to 5.25	0.005 to 4.995	17	1.8	24	M14, N14	I	\$3.62
LM6154B	5600	5	5nA	-0.25 to 5.25	0.005 to 4.995	75	1.8	24	M14, N14	I	\$3.71
LMC6464A	80	0.5	150	-0.2 to 5.3	0.005 to 4.995	0.05	3	15	M14, N14, J14, WG14	I, M	\$2.22
LMC6464B	80	3	150	-0.2 to 5.3	0.005 to 4.995	0.05	3	15	M14, N14	I	\$1.91
LMC6484	2000	3	20	-0.3 to 5.3	0.10 to 4.9*	1.3	3	15	M14, N14	I, M	\$1.54
LMC6484A	2000	0.5	20	-0.3 to 5.3	0.10 to 4.9*	1.3	3	15	M14, N14, J14, WG14	I, M	\$2.07
LMC6494A	2000	3	150	-0.3 to 5.3	0.10 to 4.9*	1.5	5	15	M14, N14	E	\$3.15
LMC6494B	2000	6	150	-0.3 to 5.3	0.10 to 4.9*	1.5	5	15	M14, N14	E	\$1.75
LMC6574A	160	3	20	-0.2 to 1.9	0.005 to 2.695*	0.22	2.7	11	M14, N14	I	\$2.84
LMC6574B	160	7	20	-0.2 to 1.9	0.005 to 2.695*	0.22	2.7	11	M14, N14	I	\$1.82
LMC6584A	3000	1	80	-0.3 to 5.3	0.05 to 4.9*	1.2	1.8	10	M14, N14	I	\$2.03
LMC6584B	3000	3	80	-0.3 to 5.3	0.05 to 4.9*	1.2	1.8	10	M14, N14	I	\$1.88
LMC6684A	3000	1	80	-0.3 to 5.3	0.05 to 4.9*	1.2	1.8	10	M16, N16	I	\$3.01
LMC6684B	3000	3	80	-0.3 to 5.3	0.05 to 4.9*	1.2	1.8	10	M16, N16	I	\$2.67
LMV324	410	7	500nA	0.065 to 4.90	0.065 to 4.9	1	2.7	5	MT14, M14	I	\$0.32
LMV824	1000	3.5	150nA	0.065 to 4.90	0.055 to 4.9	5	2.7	5	MT14, M14	I	\$0.56
LP324	85	4	10nA	-0.1 to 4.9	0.7 to 3.6	0.1	3	32	M14, N14	I	\$0.53
LP2902	85	4	20nA	-0.1 to 4.9	0.7 to 3.6	0.1	3	32	M14, N14	E	\$0.73
LPC660	160	6	2	-0.4 to 3.1	0.004 to 4.987	0.35	5	15	M14	I	\$1.35
LPC660A	160	3	2	-0.4 to 3.1	0.004 to 4.987	0.35	5	15	M14	I	\$2.50

Specs at T_A = 25°C & V_S = +5V

Footnotes

* Typical Output Swing with R_L = 2kΩ

** Typical Output Swing with V_S = +2.7V

† 1,000 pc. suggested resale, FOB Santa Clara, California, USA.
Price may vary by package or grade.

Package Code Key (Letter = Pkg Type, Number = # of Pins)

E = LCC
H/G = Metal Can
J/D = Ceramic Dual-In-Line
K = Metal Can (TO-3)
M = SOIC
MT = TSSOP
MM = MSOP
M3 = SOT23-3
M5 = SOT23-5
N = Plastic Dual-In-Line (PDIP)
T = TO-220
V = PLCC
W = Flatpak
WG = Ceramic SOIC
Z = TO-92

Temperature Ranges

C = 0 to 70°C
I = -40 to 85°C
M = -55 to 125°C
E = -40 to 125°C

AMPLIFIERS/BUFFERS/COMPARATORS

SPECIAL FUNCTION OPERATIONAL AMPLIFIERS

ORDERING GUIDE

Part Number	V _{OS} (mv) Max	I _B (nA) Max	GBW (MHz) Typ	Slew Rate (V/μs) Typ	Supply Current (mA) Max	Supply Voltage		Pkg.	Operating Temp Ranges	Special Note	Price†
						Min (V)	Max (V)				
LM12	15	150	0.7	0.7	9	60	±7	K	C	80W operational amplifier	\$15.40
LM359		15 μA	30	30	60	22	5	M14, N14	C	Dual high speed programmable "Norton" amplifier	\$1.47
LM392	5	250	1	1		2	3	M14, N14	C	Low power op amp with voltage comparator	\$0.60
LM611	5	35	0.8	0.7	0.35	4	36	M14, J14	I, C, M	Single amplifier with adjustable voltage reference from 1.2V to 6.3V	\$0.95
LM613	5	35	0.8	0.7	1.00	4	36	N16, J16	I, M	Dual comparator and dual amplifiers with adjustable voltage reference from 1.2V to 6.3V	\$1.38
LM675	10	2 μA	5.5	5.5	8	20	±6	T	C	3 Amp Power Op Amp	\$3.30
LM3046			120					M14	I	Transistor array Low noise figure 3.2dB @ 1KHz	\$0.82
LMC6681A	1	0.02	1.2	1.2	1.24	1.8	10	M08, N08	I	Shutdown input I _{SOFF} = 1.5 μA	\$1.40
LMC6681B	3	0.02	1.2	1.2	1.24	1.8	10	M08, N08	I	Shutdown input I _{SOFF} = 1.5 μA	\$1.12
LMC6682A	1	0.02	1.2	1.2	2.48	1.8	10	M14, N14	I	Shutdown input I _{SOFF} = 1.5 μA	\$2.19
LMC6682B	3	0.02	1.2	1.2	2.48	1.8	10	M14, N14	I	Shutdown input I _{SOFF} = 1.5 μA	\$1.88
LMC6684A	1	0.02	1.2	1.2	4.96	1.8	10	M16, N16	I	Shutdown input I _{SOFF} = 1.5 μA	\$2.61
LMC6684B	3	0.02	1.2	1.2	4.96	1.8	10	M16, N16	I	Shutdown input I _{SOFF} = 1.5 μA	\$3.01

Specs at T_A = 25°C & V_S = +5V

Footnotes

* Typical Output Swing with R_L = 2kΩ

** Typical Output Swing with V_S = +2.7V

† 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

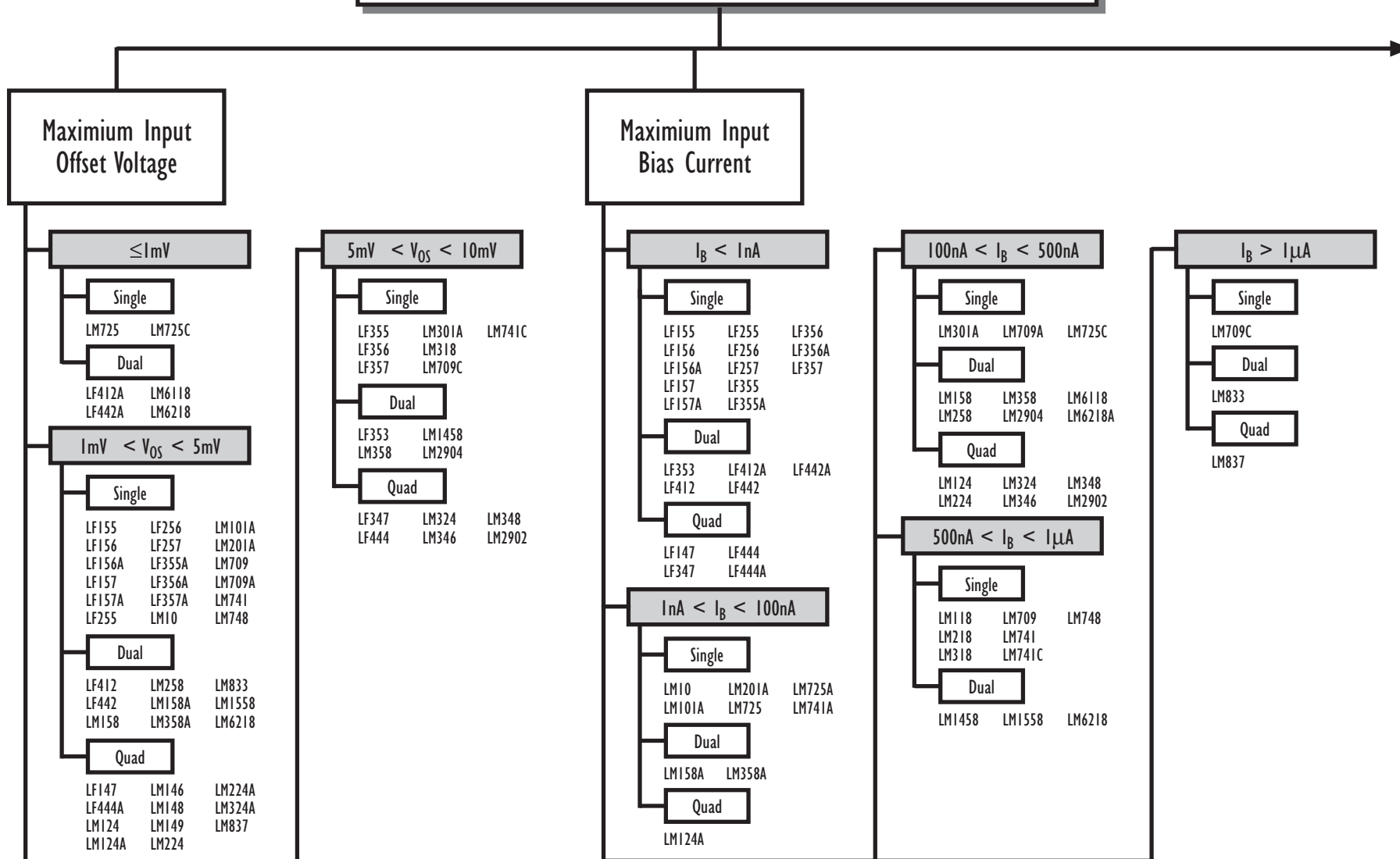
Package Code Key (Letter = Pkg Type, Number = # of Pins)

E = LCC
H/G = Metal Can
J/D = Ceramic Dual-In-Line
K = Metal Can (TO-3)
M = SOIC
MF = TSSOP
MM = MSOP
M3 = SOT23-3
M5 = SOT23-5
N = Plastic Dual-In-Line (PDIP)
T = TO-220
V = PLCC
W = Flatpak
WG = Ceramic SOIC
Z = TO-92

Temperature Ranges

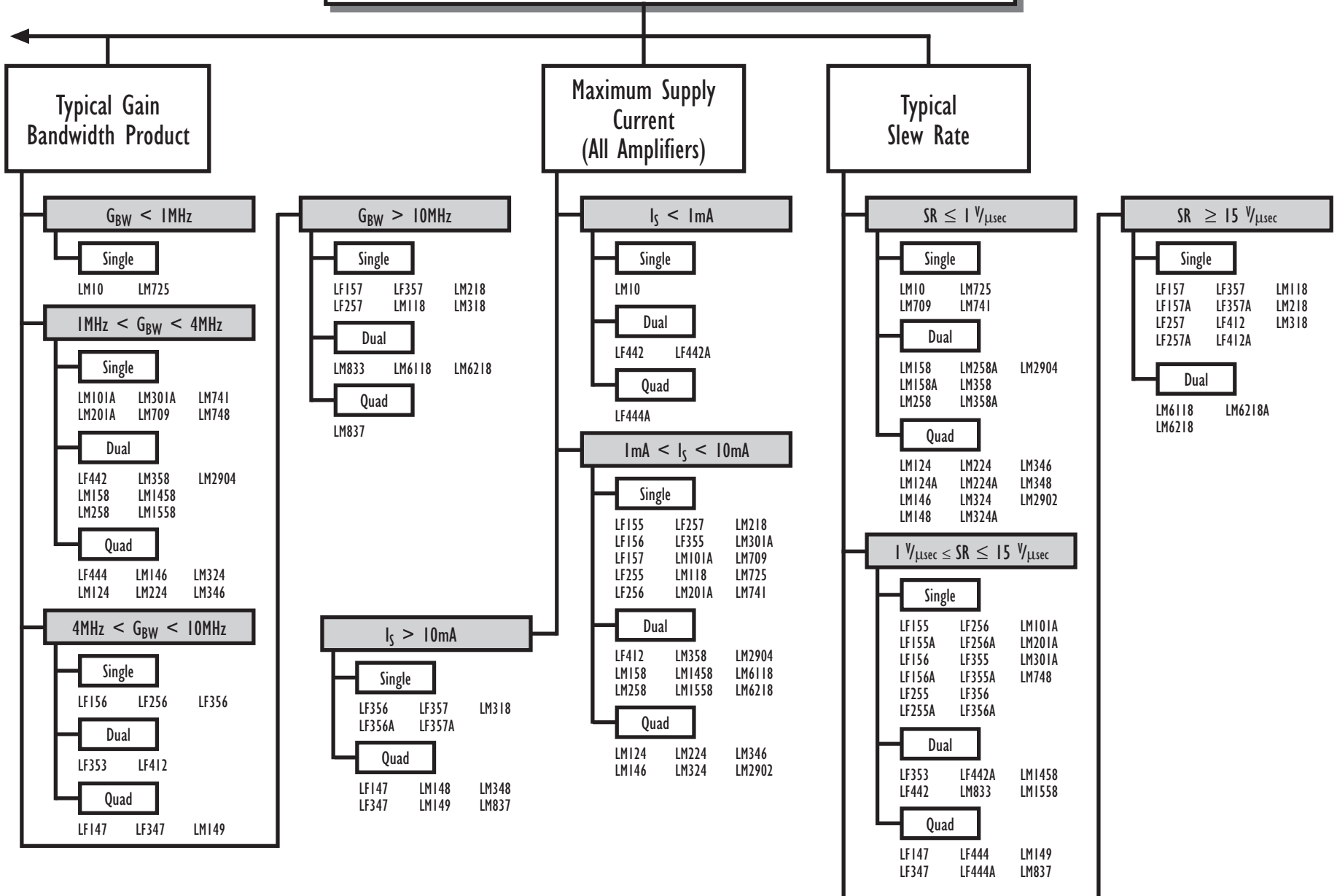
C = 0 to 70°C
I = -40 to 85°C
M = -55 to 125°C
E = -40 to 125°C

General Purpose Operational Amplifier



AMPLIFIERS/BUFFERS/COMPARATORS

General Purpose Operational Amplifier



SINGLE – GENERAL PURPOSE OPERATIONAL AMPLIFIERS

ORDERING GUIDE

Part Number	VOS (mv) Max	IB (nA) Max	GBW (MHz) Typ	Slew Rate (V/μs) Typ	Supply Current (mA) Max	Supply Voltage		Packages	Operating Temperature Ranges	Price†
						Min (V)	Max (V)			
LF155	5	0.1	2.5	5	4	10	44	H08	M, I	\$2.14
LF155A	2.5	0.05	2.5	5	4	10	44	H08	M	\$7.45
LF156	5	0.1	5	12	7	10	44	H08	M, I	\$2.24
LF156A	2	0.05	5	12	7	10	44	H08	M	\$7.45
LF157	5	0.1	20	50	7	10	44	H08	M, I	\$2.15
LF157A	2	0.05	20	50	7	10	44	H08	M	\$17.90
LM10	2	20	0.09	0.1	0.4	1.2	44	H08, N08, WM14	C, M	\$1.30
LM101A/201A	2	75	1	10	3	10	44	H08, J08, J14, W10	M, I	\$1.34
LM118/218	4	500	15	70	8	10	40	H08, J08, W10, J14	M, I	\$3.65
LM301A	7.5	250	1	10	3	10	36	H08, N08	C	\$0.42
LM318	10	750	15	70	10	10	40	H08, M08, N08	C	\$0.64
LM709	5	500	1	0.25	5.5	10	36	H08	M	\$1.37
LM709A	2	200	1	0.25	3.6	10	36	H08	M	\$1.80
LM709C	7.5	1500	1	0.25	6.6	10	36	H08	C	\$1.24
LM725	1	100	0.5	0.3	4.5	6	44	H08	M	\$7.65
LM725A	0.5	80	0.5	0.3	4.5	6	44	H08	M	\$8.80
LM725C	2.5	125	0.5	0.3	4.8	6	44	H08, N08	C	\$1.17
LM741	5	500	1.5	0.5	2.8	6	44	H08, J08, W10	M	\$1.20
LM741A	3	80	1.5	0.7	2.8	6	44	H08	M	\$4.29
LM741C	6	500	1.5	0.5	2.8	6	36	H08, N08	C	\$0.25
LM748	5	500	1	1	2.8	10	40	H08	M	\$2.36

Specs at $T_A = 25^\circ\text{C}$ & $V_S = +5\text{V}$

Footnotes

* Typical Output Swing with $R_L = 2\text{k}\Omega$

** Typical Output Swing with $V_S = +2.7\text{V}$

† 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

Package Code Key (Letter = Pkg Type, Number = # of Pins)

E = LCC
H/G = Metal Can
J/D = Ceramic Dual-In-Line
K = Metal Can (TO-3)
M = SOIC
MF = TSSOP
MM = MSOP
M3 = SOT23-3
M5 = SOT23-5
N = Plastic Dual-In-Line (PDIP)
T = TO-220
V = PLCC
W = Flatpak
WG = Ceramic SOIC
Z = TO-92

Temperature Ranges

C = 0 to 70°C
I = -40 to 85°C
M = -55 to 125°C
E = -40 to 125°C

AMPLIFIERS/BUFFERS/COMPARATORS

DUAL – GENERAL PURPOSE OPERATIONAL AMPLIFIERS

ORDERING GUIDE

Part Number	VOS (mv)	IB (nA)	GBW (MHz)	Slew Rate (V/μs)	Supply Current (mA)	Supply Voltage		Packages	Operating Temperature Ranges	Price†
	Max	Max	Typ	Typ	Max	Min (V)	Max (V)			
LF353	10	0.2	4	13	6.5	10	36	N08, M08	C	\$0.34
LF412	3	0.2	4	15	6.5	10	36	H08, N08, J08	C, M	\$0.80
LF412A	1	0.2	4	15	5.6	10	36	N08	C, M	\$3.54
LF442	5	0.1	1	1	0.5	10	36	H08, N08, J08	C, M	\$0.55
LF442A	1	0.05	1	1	0.4	10	44	H08, N08	C, M	\$3.54
LM158/258	5	150	1	0.5	2	3	32	H08, J08	M, I	\$1.20
LM158A	2	50	1	0.5	2	3	32	H08, J08	M	\$3.89
LM358	7	250	1	0.5	2	3	32	H08, M08, N08	C	\$0.17
LM358A	3	100	1	0.5	2	3	32	M08, N08	C	\$0.20
LM833	5	1000	15	7	8	10	32	MM08, M08, N08	C	\$0.32
LM1458	6	500	1	1	5.6	10	36	H08, N08, M08	C	\$0.20
LM1558	5	500	1	1	5	10	44	H08, J08	M	\$1.55
LM2904	7	250	1	0.5	2	3	26	M08, N08	I	\$0.19
LM6218A	1	350	17	140	7	10	42	J08, N08, E20	M, I	\$5.00
LM6218	3	500	17	140	7	10	42	N08, WM14	I	\$3.85

Specs at $T_A = 25^\circ\text{C}$ & $V_S = +5\text{V}$

Footnotes

* Typical Output Swing with $R_L = 2\text{k}\Omega$

** Typical Output Swing with $V_S = +2.7\text{V}$

† 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

Package Code Key (Letter = Pkg Type, Number = # of Pins)

E = LCC
H/G = Metal Can
J/D = Ceramic Dual-In-Line
K = Metal Can (TO-3)
M = SOIC
MF = TSSOP
MM = MSOP
M3 = SOT23-3
M5 = SOT23-5
N = Plastic Dual-In-Line (PDIP)
T = TO-220
V = PLCC
W = Flatpak
WG = Ceramic SOIC
Z = TO-92

Temperature Ranges

C = 0 to 70°C
I = -40 to 85°C
M = -55 to 125°C
E = -40 to 125°C

QUAD – GENERAL PURPOSE OPERATIONAL AMPLIFIERS

ORDERING GUIDE

Part Number	VOS (mv) Max	IB (nA) Max	GBW (MHz) Typ	Slew Rate (V/μs) Typ	Supply Current (mA) Max	Supply Voltage		Packages	Operating Temperature Ranges	Price†
						Min (V)	Max (V)			
LF147	5	0.1	4	13	11	10	44	J14	M	\$7.50
LF347	10	0.2	4	13	11	10	36	M14, N14	C	\$0.60
LF444	10	0.1	1	1	1	10	36	M08, N08, D14	C, M	\$0.70
LF444A	5	0.05	1	1	0.8	10	44	N14	C	\$1.90
LM124/224	5	150	1	0.5	3	3	32	J14, W	I	\$0.97
LM124A	2	50	1	0.5	3	3	32	J14, W14, E20	M	\$4.80
LM146	5	100	1.2	0.4	2	3	44	J16	M	\$4.90
LM148	5	100	1	0.5	3.6	10	44	J14, E20	M	\$1.26
LM149	5	100	4	2	3.6	10	44	J14	M	\$4.83
LM224A	3	80	1	0.5	3	3	32	J14	I	\$4.70
LM324	7	250	1	0.5	3	3	32	M14, N14, J14	C	\$0.19
LM324A	3	100	1	0.5	3	3	32	M14, N14	C	\$0.22
LM346	6	250	1.2	0.4	2.5	3	36	M16, N16	C	\$0.67
LM348	6	200	1	0.5	4.5	10	36	M14, N14, J14	C	\$0.39
LM837	5	1000	25	10	15	10	32	M14, N14	C	\$0.80
LM2902	7	250	1	0.5	3	3	26	M14, N14	I	\$0.20

Specs at $T_A = 25^\circ\text{C}$ & $V_S = +5\text{V}$

Footnotes

* Typical Output Swing with $R_L = 2\text{k}\Omega$

** Typical Output Swing with $V_S = +2.7\text{V}$

† 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

Package Code Key (Letter = Pkg Type, Number = # of Pins)

E = LCC
H/G = Metal Can
J/D = Ceramic Dual-In-Line
K = Metal Can (TO-3)
M = SOIC
MF = TSSOP
MM = MSOP
M3 = SOT23-3
M5 = SOT23-5
N = Plastic Dual-In-Line (PDIP)
T = TO-220
V = PLCC
W = Flatpak
WG = Ceramic SOIC
Z = TO-92

Temperature Ranges

C = 0 to 70°C
I = -40 to 85°C
M = -55 to 125°C
E = -40 to 125°C

AMPLIFIERS/BUFFERS/COMPARATORS

BUFFERS

ORDERING GUIDE

Part Number	Key Features	Slew Rate (V/ μ Sec) typ	Bandwidth -3dB (MHz) typ	Gain (Av) typ	Output (V, mA)	Full Power BW (MHz @ Vpp, RI)	Packages	Operating Temperature Ranges	Price†
CLC109	Low Power Closed Loop Buffer	350	270	0.997	$\pm 4, 30$	30 @ 4, 100 Ω	M5, M8, N8, J8	I, M	\$1.56
CLC110	Wideband Closed Loop Buffer	800	730	0.97	$\pm 4, 70$	90 @ 5, 100 Ω	M8, N8, J8	I, M	\$5.15
CLC111	Ultra-High Slew Rate Closed Loop Buffer	3500	800	0.996	$\pm 3.9, 60$	450 @ 4, 100 Ω	M8, N8, J8	I, M	\$2.89
CLC114	Quad Closed Loop Buffer	450	200	0.97	$\pm 4, 60$	95 @ 2, 100 Ω	M14, N14, J14, V20, E20	I, M	\$8.05
CLC115	Quad Wideband Closed Loop Buffer	2700	700	0.97	$\pm 4, 60$	270 @ 4, 100 Ω	M14, N14, J14	I, M	\$10.60
CLC417	Dual, Low-Power, Programmable Gain Buffer	400	120	1,2,-1	$\pm 3, 60$	50 @ 4, 100 Ω	M8, N8	I	\$2.51
CLC451	Single Supply, Low Power, High Output, Programmable Buffer	260	85	1,2,-1	$\pm 2, 100$	70 @ 2.5, 100 Ω	M5, M8, N8	I	\$1.47
CLC453	Single Supply, Low Power, High Output, Programmable Buffer	370	110	1,2,-1	$\pm 2, 100$	85 @ 2.5, 100 Ω	M5, M8, N8	I	\$1.73
CLC5612	Dual, High Output, Programmable Gain Buffer	290	90	1,2,-1	$\pm 4, 130$	62 @ 2, 100 Ω	M8, N8	I	\$1.97
CLC5632	Dual, High Output, Programmable Gain Buffer	410	130	1,2,-1	$\pm 4, 130$	90 @ 2, 100 Ω	M8, N8	I	\$2.02
CLC5633	Triple, High Output, Programmable Gain Buffer	410	130	1,2,-1	$\pm 4, 130$	97 @ 2, 100 Ω	M14, N14	I	\$2.51
LM6121/6221/6321	High Speed 50 Ω Drive	800	50	0.99	$\pm 12, \pm 300$	7 @ 27, 50 Ω	H08, N08, M08, J08	C, I, M	\$3.83

Specs at $T_A = 25^\circ\text{C}$ & $V_S = +5\text{V}$

† 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

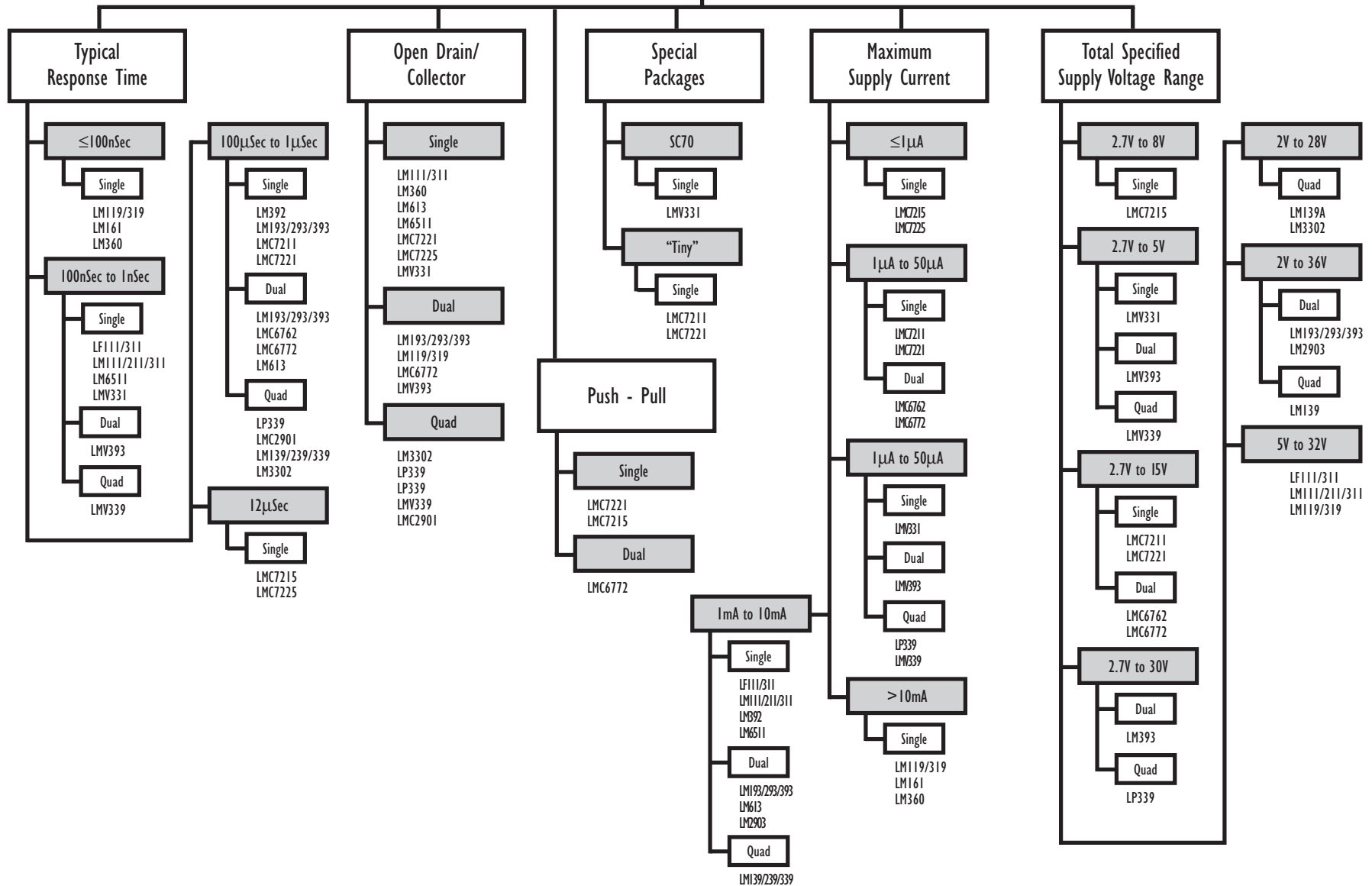
Package Code Key
(Letter = Pkg Type,
Number = # of Pins)

E = LCC
H/G = Metal Can
J/D = Ceramic Dual-In-Line
K = Metal Can (TO-3)
M = SOIC
MF = TSSOP
MM = MSOP
M3 = SOT23-3
M5 = SOT23-5
N = Plastic Dual-In-Line (PDIP)
T = TO-220
V = PLCC
W = Flatpak
WG = Ceramic SOIC
Z = TO-92

Temperature Ranges

C = 0 to 70 $^\circ\text{C}$
I = -40 to 85 $^\circ\text{C}$
M = -55 to 125 $^\circ\text{C}$
E = -40 to 125 $^\circ\text{C}$

Comparators



AMPLIFIERS/BUFFERS/COMPARATORS

VOLTAGE COMPARATORS

ORDERING GUIDE

Part Number	Number of Channels	Output Type†	Response Time (ns) Typ	VOS (mV) Max	IS (mA) Max	IB (nA) Max	Packages	Operating Temperature Ranges	Price‡‡
LF111/311	1	OC	200	10	7.5	7	H08	C, I	\$2.67
LM111/211/311	1	OC	200	7.5	7.5	250	W10, J08, H08, M08, N08, E20, WG10	C, I, M	\$0.28
LM119/319	1	OC	80	8	12.5	1000	W10, J14, H10, M14, N14, E20, WG10	C, I, M	\$0.57
LM139/239/339	4	OC	1300	5	2.5	250	W14, J14, M14, N14, E20, WG14	C, I, M	\$0.24
LM161	1	OC	14	5	20	30000	H10, M14, N14	C, M	\$1.67
LM193/293/393	2	OC	1300	5	2.5	250	J08, H08, M08, N08	C, I, M	\$0.22
LM360	1	OC	14	5	32	20000	M08, N08, H10	C	\$2.27
LM392	1	OC	1300	10	1	400	M08, N08	C	\$0.60
LM613	2	OC	1500	5	1	35	J16, M16	C, M	\$1.32
LM2901	4	OC	1300	7	2.5	250	M14, N14	I	\$0.26
LM2903	2	OC	1500	7	2.5	250	M08, N08	I	\$0.24
LM3302	4	OC	1300	20	2.5	500	N14	I	\$0.47
LM6511	1	OC	180	5	3.5	130	M08	I	\$1.96
LMC6762	2	PP	4000	3	0.02	40fA (typ)	M08, N08	I	\$1.17
LMC6772	2	OC	4000	3	0.02	40fA (typ)	M08, N08	I	\$1.17
LMC7211A	1	PP	8000	5	0.014	40fA (typ)	M5, M08, N08	I	\$1.00
LMC7211B	1	PP	8000	15	0.014	40fA (typ)	M5, M08, N08	I	\$0.75
LMC7215	1	PP	12000	1	0.001	5fA (typ)	M08, M5, J08	I, M	\$0.85
LMC7221A	1	OC	4000	5	0.014	40fA (typ)	M08, M5, N08	I	\$1.00
LMC7221B	1	OC	4000	15	0.014	40fA (typ)	M08, N08, M5	I	\$0.75
LMC7225	1	OC	12000	1	0.008	5fA (typ)	M08, M5, J08	I, M	\$0.85
LMV331	1	OC	300	7	0.1	250	M7, M5	I	\$0.28
LMV339	4	OC	300	7	0.20	250	M14, MT14	I	\$0.32
LMV393	2	OC	300	7	0.14	250	M08, MM08	I	\$0.28
LP339	4	OC	8000	5	0.1	25	M14, N14	C	\$0.53

Specs at $T_A = 25^\circ\text{C}$ & $V_S = +5\text{V}$

Footnotes

* Typical Output Swing with $R_L = 2\text{k}\Omega$

** Typical Output Swing with $V_S = +2.7\text{V}$

† O = Open Collector

P = Push-Pull

‡‡ 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

Note 1: 1995 Operational Amplifiers Databook

Package Code Key

(Letter = Pkg Type,
Number = # of Pins)

E = LCC

H/G = Metal Can

J/D = Ceramic Dual-In-Line

K = Metal Can (TO-3)

M = SOIC

MT = TSSOP

MM = MSOP

M3 = SOT23-3

M5 = SOT23-5

M7 = SC70-5

N = Plastic Dual-In-Line (PDIP)

T = TO-220

V = PLCC

W = Flatpak

WG = Ceramic SOIC

Z = TO-92

Temperature Ranges

C = 0 to 70°C

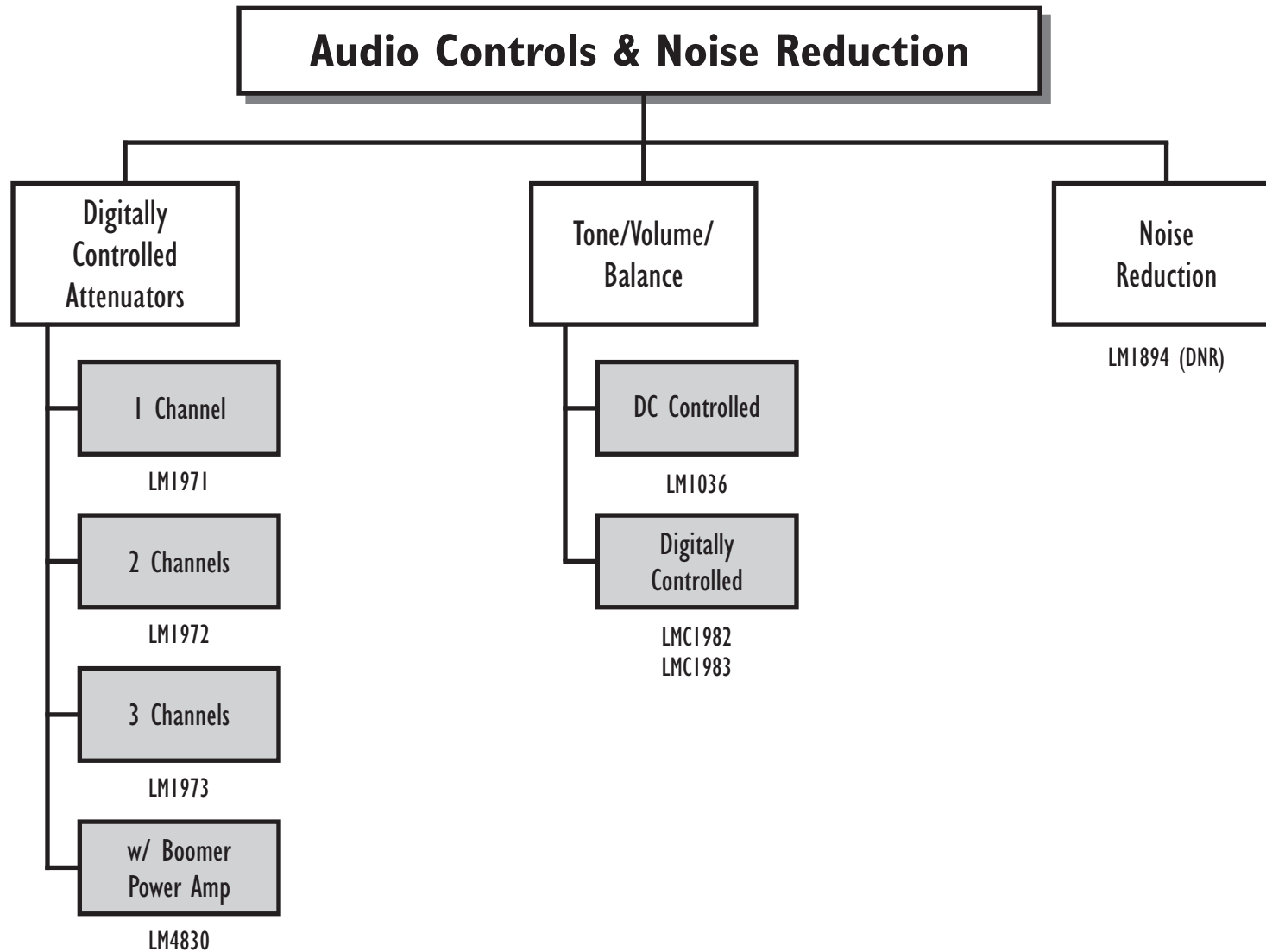
I = -40 to 85°C

M = -55 to 125°C

E = -40 to 125°C

Section 3

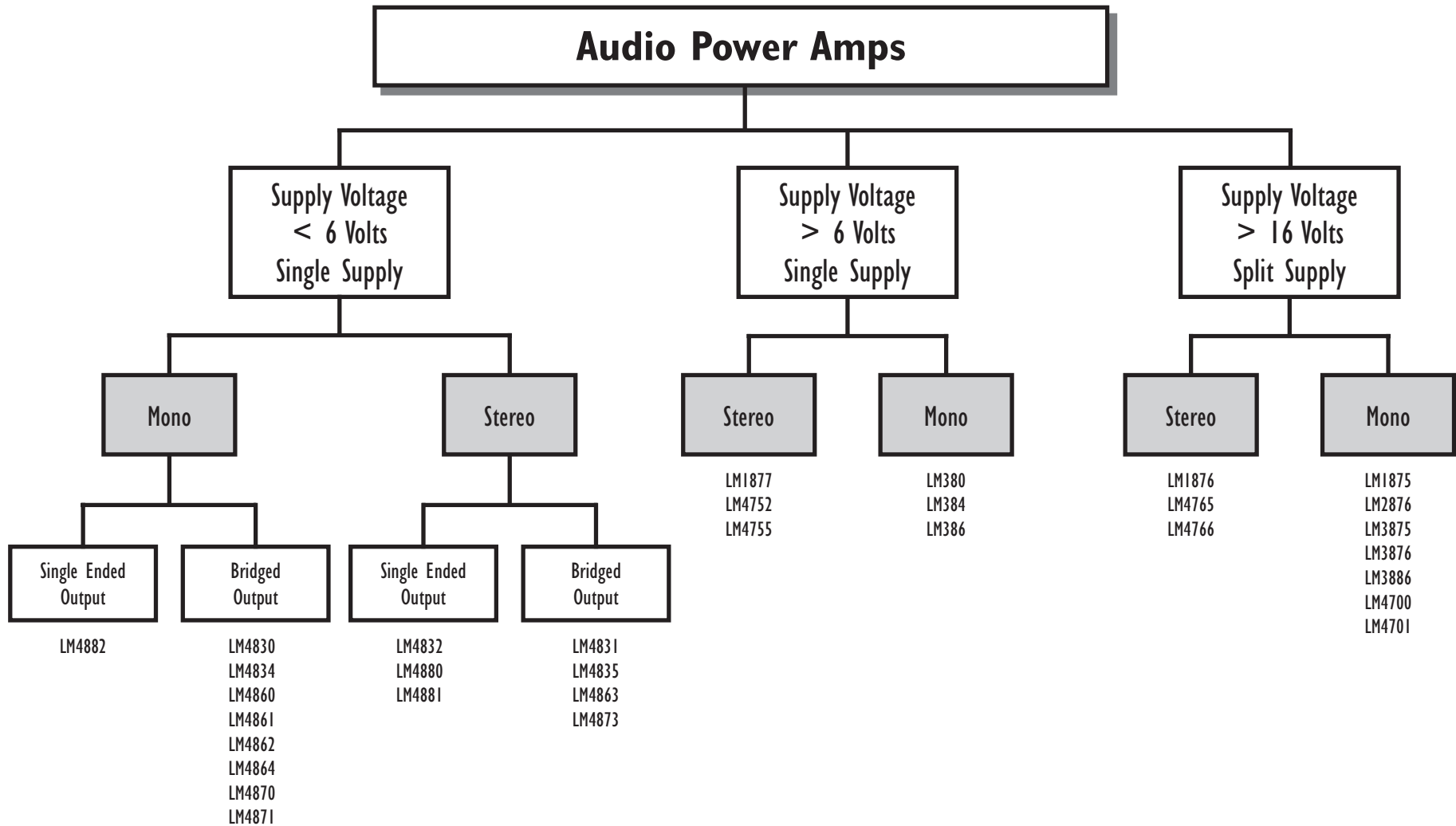
AUDIO



AUDIO CONTROLS

Part Number	Description	Audio Channels	Supply Range	SNR (Typ)	THD (Typ)	Separation Typ	Package (Pin)	Comm. Interface	Price ¹
LM1036	Dual DC Operated Tone/ Volume Balance Circuit	2	9V-16V	80dB	.05%	75dB	Dip(20), SO(20)	DC Control	\$1.10
LM1971	Single Channel Audio Attenuator	1	4.5V-12V	115dB	.001%	NA	Dip(8), SO(8)	Serial	\$2.25
LM1972	2 Channel Digitally Controlled Audio Attenuator	2	4.5V-12V	120dB	.0008%	110dB	Dip(20), SO(20)	Serial	\$2.20
LM1973	3 Channel Digitally Controlled Audio Attenuator	3	4.5V-12V	120dB	.0008%	110dB	Dip(20), SO(20)	Serial	\$2.28
LMC1982	Digitally-Controlled Stereo Tone/Volume/Balance Control	4	6V-12V	95dB	.008%	80dB	Dip(28), PLCC(28)	Serial	\$3.75
LMC1983	Digitally-Controlled Stereo Tone/Volume/Balance Control	6	6V-12V	95dB	.008%	80dB	Dip(28), PLCC(28)	Serial	\$3.75

¹ 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.



AUDIO POWER AMP

User Supply Voltage	Part Number	Power [THD ≤ 1% (Typ)] ¹			Power [THD ≤ 10% (Typ)] ¹			Typical THD Ratings	THD Measurement Conditions	Supply Range (V)	Single/Dual	Package (Pin Count)	Price ⁴
		4 Ω	8 Ω	16 Ω	4 Ω	8 Ω	16 Ω						
3V & 5V	LM4830	1.5W	1.15W	0.6W	2W	1.4W	0.85W	0.20%	Po=1W @ V _s =5V	2.7V to 5.5V	Single	SO(24) Dip(24)	\$2.65
	LM4831	1.5W	1.1W	NA	1.9W	1.4W	NA	0.50%	Po=1W @ V _s =5V	2.7V to 5.5V	Dual	TQFP(44)	\$3.75
	LM4832	0.33W	0.25W	NA	0.42W	0.33W	NA	0.15%	Po=0.22W @ V _s =5V	4.5V to 5.5V	Dual	SSOP(28) DIP(28)	\$2.99
	LM4834	1.75W	1.1W	0.65W	2.2W	1.5W	0.85W	0.3%	Po=1W @ V _s =5V	4.5V to 5.5V	Single/Dual	SSOP(28)	\$2.25
	LM4860	1.55W	1.15W	0.6W	1.9W	1.45W	0.85W	0.72%	Po=1W @ V _s =5V	2.7V to 5.5V	Single	SO(16)	\$1.20
	LM4861	1.55W	1.15W	0.6W	1.9W	1.45W	0.85W	0.72%	Po=1W @ V _s =5V	2.0V to 5.5V	Single	SO(8)	\$1.20
	LM4862	0.52W	0.68W	0.53W	0.69W	0.83W	0.66W	0.50%	Po=.4W @ V _s =5V	2.7V to 5.5V	Single	SO(8) Dip(8)	\$0.89
	LM4863	2.2W	1.1W	0.6W	2.7W	1.5W	0.85W	0.45%	Po=.5W @ V _s =5V	2.0V to 5.5V	Dual	SO(16) ² Dip(16) ² TSSOP(20) ² TSSOPe(20)	\$2.00
	LM4864	NA	0.675W	0.55W	NA	0.84W	0.68W	0.7%	Po=.3W @ V _s =5V	2.7V to 5.5V	Single	MSOP(8) ² SO(8) Dip(8)	\$0.83
	LM4870	1.7W	1.18W	0.65W	2.15W	1.5W	0.85W	0.25%	Po=1W @ V _s =5V	2.0V to 5.5V	Single	SO(16)	\$1.00
	LM4871	1.7W	1.18W	0.65W	2.15W	1.5W	0.85W	0.25%	Po=1W @ V _s =5V	2.0V to 5.5V	Single	SO(8) Dip(8)	\$1.00
	LM4873	2.1W	1.1W	0.65W	2.6W	1.5W	0.85W	0.3%	Po=2W @ V _s =5V	2.0V to 5.5V	Dual	TSSOP(20) ² TSSOPe(20) ² TSSOPe(28)	\$2.00
	LM4880	0.34W	0.27W	0.17W	0.43W	0.33W	0.2W	0.03%	Po=.2W @ V _s =5V	2.7V to 5.5V	Dual	SO(8) Dip(8)	\$0.76
	LM4881	NA	0.25W	0.15W	NA	0.3W	0.2W	0.04%	Po=.2W @ V _s =5V	2.7V to 5.5V	Dual	MSOP(8) SO(8) Dip(8)	\$0.67
	LM4882	0.38W	0.27W	0.17W	0.43W	0.33W	0.2W	0.03%	Po=.2W @ V _s =5V	2.4V to 5.5V	Single	MSOP(8) SO(8)	\$0.60
	(V _s =6V)	LM386	0.25W	0.25W	0.15W	0.32W	0.3W	0.2W	0.25%	Po=.125W @ V _s =6V	4V to 18V	Single	SO(8) Dip(8) MSOP(8)
12V	LM380	1.5W	1.0W	NA	2.25W	1.5W	NA	0.50%	Po=4W @ V _s =22V	10V to 22V	Single	Dip(14) Dip(8)	\$0.50
	LM384	NA	NA	NA	1.75W	NA	NA	0.25%	Po=4W @ V _s =22V	12V to 26V	Single	Dip(14)	\$0.88
	LM386	0.25W	0.6W	0.6W	0.35W	0.8W	0.95W	0.25%	Po=.125W @ V _s =6V	4V to 18V	Single	SO(8) Dip(8) MSOP(8)	\$0.19
14V	LM1877	1.5W	1.0W	0.55W	1.75W	1.3W	0.75W	0.06%	Po=1W @ V _s =14V	6V to 24V	Dual	Dip(14) SO(14)	\$0.80
	LM380	2.5W	1.75W	NA	3.25W	2.25W	NA	0.20%	Po=4W @ V _s =22V	10V to 22V	Single	Dip(14) Dip(8)	\$0.50
(V _s =16V)	LM384	NA	NA	NA	3.25W	NA	NA	0.25%	Po=4W @ V _s =22V	12V to 26V	Single	Dip(14)	\$0.88
	LM386	NA	0.6W	1.0W	NA	0.8W	1.6W	0.25%	Po=.125W @ V _s =6V	4V to 18V	Single	SO(8) Dip(8)	\$0.19
	LM1877	2.0W	1.3W	0.85W	2.5W	1.75W	1.0W	0.06%	Po=1W @ V _s =14V	6V to 24V	Dual	Dip(14) SO(14)	\$0.80

¹ Power Specified as Continuous RMS

² The package doesn't support the fullpower rating. See Datasheet.

³ Isolated packages available

⁴ 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

User Supply Voltage	Part Number	Power [THD ≤ 1% (Typ)] ¹			Power [THD ≤ 10% (Typ)] ¹			Typical THD Ratings	THD Measurement Conditions	Supply Range (V)	Single/Dual	Package (Pin Count)	Price ⁴
		4 Ω	8 Ω	16 Ω	4 Ω	8 Ω	16 Ω						
20V & Above													
(V _S = ±22V)	LM1876	23W	20W	11W	29W	26W	14W	0.08%	Po=15W @ V _S =±20V	20V to 54V	Dual	TO-220(15) ³	\$1.80
(V _S = 20V)	LM1877	2.0W	2.0W	NA	2.5W	3.0W	NA	0.06%	Po=1W @ V _S =14V	6V to 24V	Dual	Dip(14) SO(14)	\$0.80
(V _S = 22V)	LM380	NA	4.0W	2.5W	NA	5W	3.25W	0.20%	Po=4W @ V _S =22V	10V to 22V	Single	Dip(14) Dip(8)	\$0.50
(V _S = 26V)	LM384	NA	5.5W	NA	2.5W	7W	5W	0.25%	Po=4W @ V _S =22V	12V to 26V	Single	Dip(14)	\$0.88
(V _S = ±25V)	LM1875	20W	20W	NA	25W	30W	NA	0.02%	Po=20W @ V _S =±25V	16V to 60V	Single	TO-220(5)	\$1.29
(V _S = ±30V)	LM2876	25W	40W	22W	35W	50W	26W	0.06%	Po=25W @ V _S =±30V	20V to 60V	Single	TO-220(11) ³	\$1.81
(V _S = ±35V)	LM3875	45W (V _S =±25V)	56W	30W	56W (V _S =±25V)	70W	39W	0.06%	Po=40W @ V _S =±35V	20V to 84V	Single	TO-220(11) ³	\$2.40
(V _S = ±35V)	LM3876	45W (V _S =±25V)	56W	30W	56W (V _S =±25V)	70W	39W	0.06%	Po=40W @ V _S =±35V	20V to 84V	Single	TO-220(11) ³	\$2.20
(V _S = ±35V)	LM3886	68W (V _S =±28V)	63W	33W	87W (V _S =±28V)	78W	41W	0.03%	Po=60W @ V _S =±28V	20V to 84V	Single	TO-220(11) ³	\$2.45
(V _S = ±28V)	LM4700	23W	34W	19W	29W	42W	24W	0.08%	Po=30W @ V _S =28V	20V to 64V	Single	TO-220(11) ³	\$1.80
(V _S = ±28V)	LM4701	23W	34W	19W	29W	42W	24W	0.08%	Po=30W @ V _S =28V	20V to 64V	Single	TO-220(9)	\$1.90
(V _S = 24V)	LM4752	8W	4.8W	3W	11W	7W	4W	0.05%	Po=4.5W @ V _S =24V	10V to 32V	Dual	TO220(7)	\$1.90
(V _S = 24V)	LM4755	8W	4.8W	3W	11W	7W	4W	0.05%	Po=4.5W @ V _S =24V	10V to 32V	Dual	TO220(9)	\$1.90
(V _S = ±28V)	LM4765	24W	32W	18W	28W	40W	22W	0.08%	Po=30W @ V _S =±28V	20V to 64V	Dual	TO220(15)	\$2.00
(V _S = ±30V)	LM4766	26W	42W	23W	37W	53W	28W	0.06%	Po=25W @ V _S =±30V	20V to 60V	Dual	TO220(15)	\$2.10

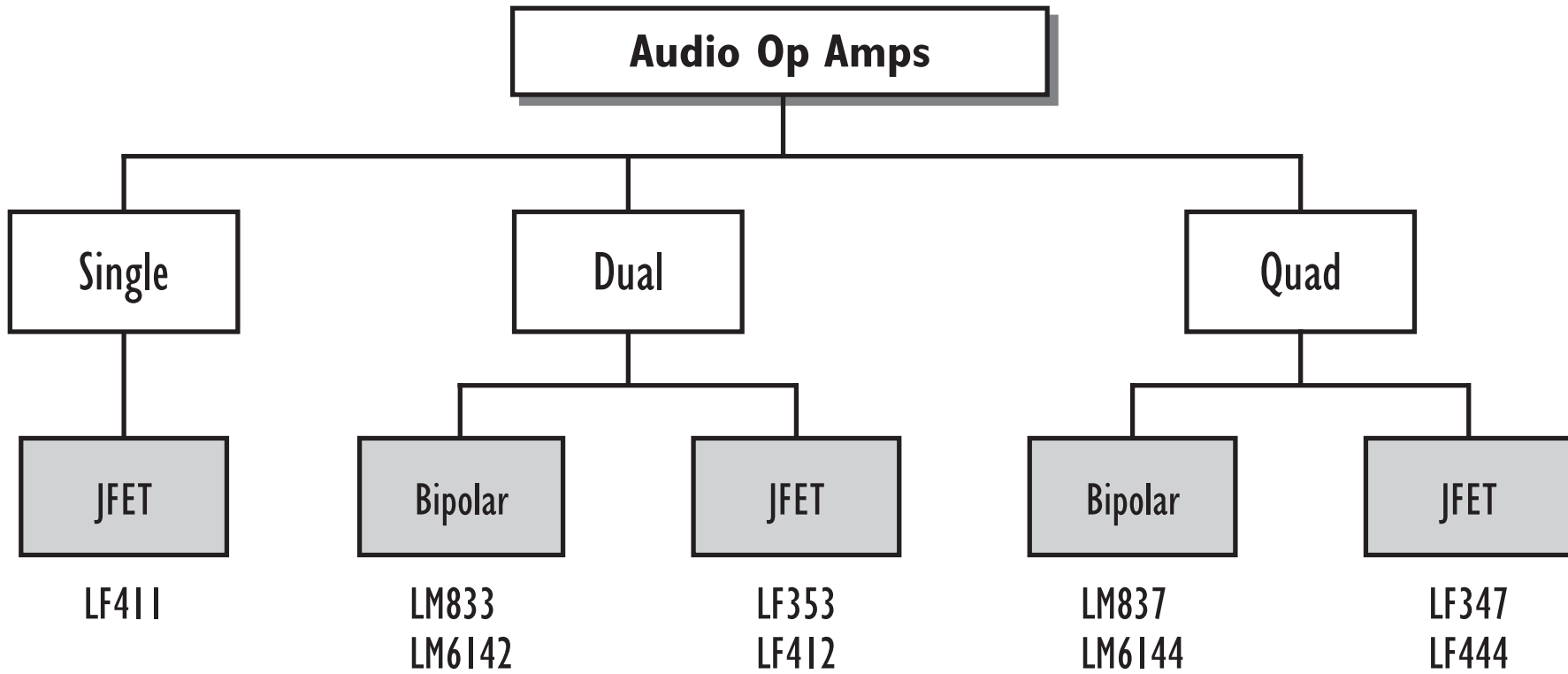
¹ Power Specified as Continuous RMS

² The package doesn't support the fullpower rating. See Datasheet.

³ Isolated packages available

⁴ 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

Audio Op Amps



AUDIO

AUDIO OP AMPS

Part Number	Description	Input Ref. Noise Voltage	THD	Slew Rate	GBW	PSRR	Supply Range	Package (Pin)	Price ¹
LM833	Dual Audio Amplifier	4.5nV/√Hz	0.002%	7V/μs	15MHz	100dB	±18V	SO(8), Dip(8)	\$0.32
LM837	Quad Audio Amplifier	4.5nV/√Hz	0.0015%	10V/μs	25MHz	100dB	±18V	SO(14), Dip(14)	\$0.80
LF347	Quad Wide Bandwidth JFET	20nV/√Hz	0.02%	13V/μs	4MHz	100dB	±18V	Dip(14), SO(14)	\$0.60
LF353	Dual LF351	16nV/√Hz	0.02%	13V/μs	4MHz	100dB	±18V	SO(14), Dip(14)	\$0.32
LF411	Single Low Offset, Low Drift JFET	25nV/√Hz	0.02%	15V/μs	3MHz	100dB	±18V	Dip(8), CAN(8)-Mil, CERDIP(8)	\$0.61
LF412	Dual LF411	25nV/√Hz	0.02%	15V/μs	3MHz	100dB	±18V	Dip(8), CAN(8)-Mil, CERDIP(8)	\$0.80
LF444	Low Power JFET Quad	35nV/√Hz	0.02%	1V/μs	1MHz	100dB	±18V	Dip(14), SO(14), CERDIP(14)	\$0.70
LM6142	High-Speed Low Power Dual	16nV/√Hz	0.03%	15V/μs	10MHz	87dB	±1.8V to 24V	Dip(8), SO(8), CERDIP(8)	\$2.10
LM6144	High-Speed Low Power Quad	16nV/√Hz	0.03%	15V/μs	10MHz	87dB	±1.8V to 24V	Dip(14), SO(14), CERDIP(8)	\$3.26

¹ 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

Integrated Audio Systems

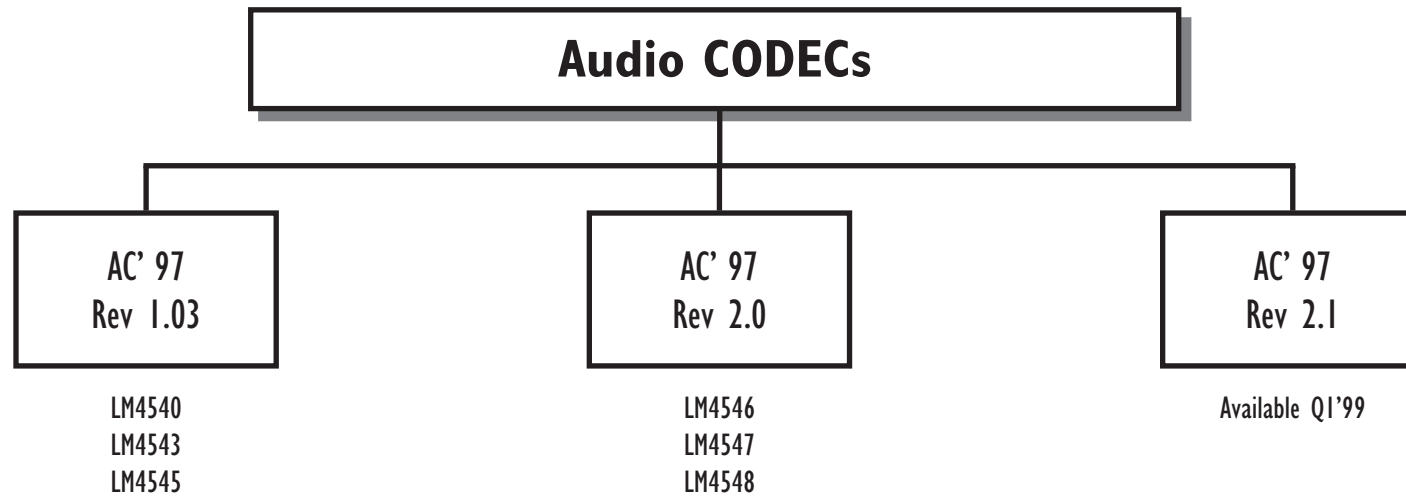
LM4830
LM4831
LM4832
LM4834
LM4835

INTEGRATED AUDIO SYSTEM

Part Number	Applications	Features	Audio Channels	Supply Range	Package (Pin)	Control/Interface	Price ¹
LM4830	Two-way Audio Amplification System w/Volume Control	Volume Control (Parallel), Mono Boomer Power Amp, Headphone Driver, Microphone Pre-amp, Low Power Shutdown Mode	2 Microphone Inputs, 1 Output	2.7V to 5.5V	SO(24), DIP(24)	Parallel	\$2.65
LM4831	Desktop Audio Systems	Stereo 1.1W Boomer Power Amp, Headphone Amp and Line Out 3 Stereo Input Mixing, Microphone Amp, Low Power Shutdown Mode	3 Stereo Input, Microphone In and Out, Stereo Line Out, Stereo BTL or SEL Power Amp	2.7V to 5.5V	TQFP(44)	Parallel	\$3.75
LM4832	Integrated Multimedia Audio System	Tone & Volume Controls, Stereo Boomer Power Amp, Microphone Pre-amp, 3D Sound Mode Low Power Shutdown Mode	Stereo Input, Stereo Power Amp, 2 Microphone Inputs, 1 Microphone Output	4.5V to 5.5V	SO(28), DIP(28)	I ² C	\$2.99
LM4834	PC Audio System	DC Volume Control, Stereo Headphone Driver, Stereo Line Out, Mono Boomer Power Amp, Mic Pre-amp, Low Power Shutdown Mode	Stereo Line Input & Output, 1 Mic Input & Output, 1 BTL Power Amp, Stereo Headphone Out	4.5V to 5.5V	SSOP(28)	DC	\$2.25

¹ 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

AUDIO



AUDIO CODECS

Part Number	AC '97 Rev	3.3V, 5V Digital	SRC	EAPD	Headphone Amp	5.1 Channels Support	2nd Line Out	Video In	Secondary Line Volume Control	Aux In	Multiple CODEC	Analog 3D	Price ¹
LM4540	1.03	√										√	\$3.50
LM4543	1.03	√						√		√		√	\$4.00
LM4545	1.03	√			√		√	√	√	√		√	\$4.50
LM4546	2.0	√	√								√	√	\$4.00
LM4547	2.0	√					√	√	√	√	√	√	\$4.00
LM4548	2.0	√	√				√	√	√	√	√	√	\$4.50

¹1,000 pc. suggested resale, FOB Santa Clara, California, USA.
Price may vary by package or grade.

Audio DSP & Accelerators

DC' 97

LM4560

AUDIO DSP & ACCELERATORS

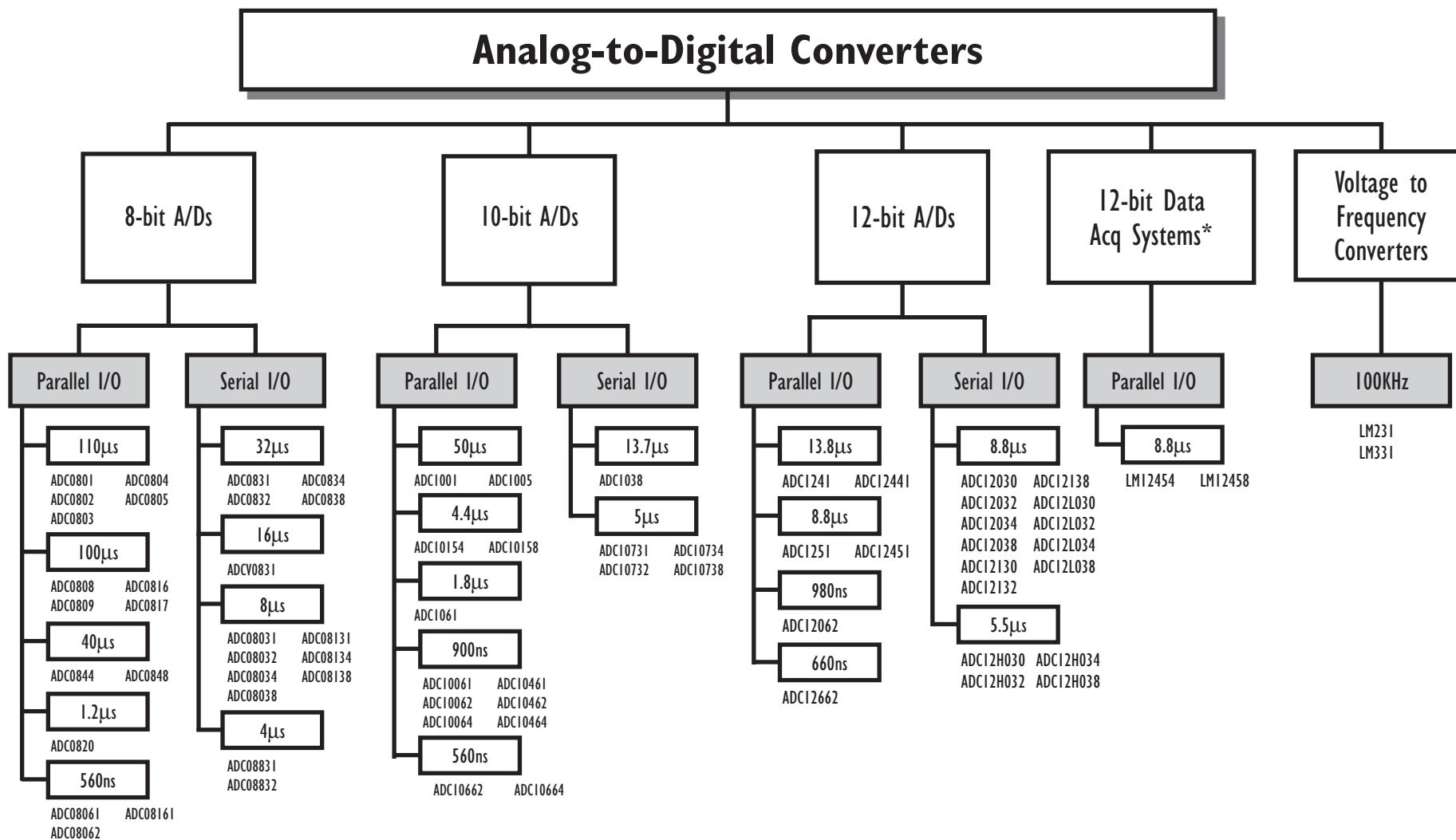
Part Number	PCI 2.1	Hardware Wavetable Synthesis	Simultaneous Stream	Per Voice Effects	Multiple CODECs	I ² S	S/P Dif	MPU401	Legacy	AC '97 1.03, 2.0, 2.1	Driver Support	Supply Voltage	Price ¹
LM4560	√	√	64	√	2	√	√	√	√	√	Win 95/98, NT4.0	3.3V	\$8.00

¹1,000 pc. suggested resale, FOB Santa Clara, California, USA.
Price may vary by package or grade.

DATA CONVERSION

Section 4

DATA CONVERSION



* Products classified as Data Acquisition Systems are configurable to execute multiple conversions without microprocessor intervention. Typically they include on-board FIFO for result storage and sequencing capabilities not found on conventional A/D Converters.

ANALOG-TO-DIGITAL CONVERTERS

Part Number	I/O Type	Resolution (bits)	Conv. Time (max)	Accuracy (max)	# Mux Inputs	S/H	On-Board Reference	Supply Voltage	Temp Range	Power (max)	Pkg.	Comments	Price ¹
8 - B I T													
ADC0801	Parallel	8	110 μs	±1/4 LSB	1	N	N	+5	C	9mW	N	Differential Input	\$5.85
ADC0802	Parallel	8	110 μs	±1/2 LSB	1	N	N	+5V	C	9mW	N, WM	Differential Input	\$3.18
ADC0803	Parallel	8	110 μs	±1/2 LSB	1	N	N	+5V	C	9mW	N	Differential Input	\$2.50
ADC0804	Parallel	8	110 μs	±1 LSB	1	N	N	+5V	C	12.5mW	N, WM	Differential Input	\$1.42
ADC0805	Parallel	8	110 μs	±1 LSB	1	N	N	+5V	C	9mW	N	Ratiometric Operation	\$2.12
ADC0808	Parallel	8	100 μs	±1/2 LSB	8	N	N	+5V	C	15mW	N, V		\$2.70
ADC0809	Parallel	8	100 μs	±1 LSB	8	N	N	+5V	C	15mW	N, V		\$2.39
ADC0816	Parallel	8	100 μs	±1/2 LSB	16	N	N	+5V	C	15mW	N		\$7.10
ADC0817	Parallel	8	100 μs	±1 LSB	16	N	N	+5V	C	15mW	N		\$4.27
ADC0844B	Parallel	8	40 μs	±1/2 LSB	4	N	N	+5V	C	13mW	J		\$7.75
ADC0844C	Parallel	8	40 μs	±1 LSB	4	N	N	+5V	C	13mW	J, N		\$2.13
ADC0848B	Parallel	8	40 μs	±1/2 LSB	8	N	N	+5V	C	13mW	N, V		\$3.06
ADC0848C	Parallel	8	40 μs	±1 LSB	8	N	N	+5V	C	13mW	N, V		\$2.34
ADC0831C	Serial	8	32 μs	±1 LSB	1	N	N	+5V	C	15mW	N, WM		\$1.28
ADC0832C	Serial	8	32 μs	±1 LSB	2	N	N	+5V	C, I	32mW	N, WM		\$1.48
ADC0834C	Serial	8	32 μs	±1 LSB	4	N	N	+5V	C,	15mW	N, M		\$1.70
ADC0838B	Serial	8	32 μs	±1/2 LSB	8	N	N	+5V	C	15mW	V		\$2.58
ADC0838C	Serial	8	32 μs	±1 LSB	8	N	N	+5V	C, I	15mW	J, N, WM		\$1.63
ADC08031C	Serial	8	8 μs	±1 LSB	1	Y	Y	+5V	C, I	20mW	N, M		\$2.63
ADC08038C	Serial	8	8 μs	±1 LSB	8	Y	Y	+5V	I	20mW	N, M		\$3.26
ADC08134C	Serial	8	8 μs	±1 LSB	4	Y	Y	+5V	I	20mW	N, M	Guaranteed Reference O/P	\$3.26
ADC08138C	Serial	8	8 μs	±1 LSB	8	Y	Y	+5V	I	20mW	N, M	Guaranteed Reference O/P	\$3.62
ADC0820B	Parallel	8	1.2 μs	±1/2 LSB	1	N	Y	+5V	C	75mW	N, WM		\$3.18
ADC0820C	Parallel	8	1.2 μs	±1 LSB	1	N	Y	+5V	C	75mW	N, WM		\$1.68
ADC08061B	Parallel	8	560ns	±1/2 LSB	1	N	Y	+5V	I	100mW	N, M	High speed upgrade for ADC0820	\$7.55
ADC08061C	Parallel	8	560ns	±1 LSB	1	N	Y	+5V	I	100mW	N, M	High speed upgrade for ADC0820	\$4.41
ADC08062B	Parallel	8	560ns	±1/2 LSB	2	N	Y	+5V	I	100mW	N, M		\$11.80
ADC08062C	Parallel	8	560ns	±1 LSB	2	N	Y	+5V	I	100mW	N, M		\$7.80
ADC08161B	Parallel	8	560ns	±1/2 LSB	1	N	Y	+5V	I	100mW	N, M	ADC08061 with on-board reference	\$8.30
ADC08161C	Parallel	8	560ns	±1 LSB	1	N	Y	+5V	I	100mW	N, M	ADC08061 with on-board reference	\$4.67
ADC08831	Serial	8	4 μs	±1 LSB	1	Y	N	+5V	I	5.5mW	N, M, MSA	2MHz clock frequency	\$0.95
ADC08832	Serial	8	4 μs	±1 LSB	2	Y	N	+5V	I	6.5mW	N, M, MSA	2MHz clock frequency	\$0.95
ADCV0831	Serial	8	16 μs	±1.5 LSB	1	Y	N	2.7V to +5V	C	720 μW	M6	10nA shutdown supply current	\$1.22

Package Codes:

H = Metal Can MS, MSA = SSOP V = PLCC
 J = Cerdip M6 = SOT-23 VF = PQFP
 M = Small Outline N = Plastic Dip WM = Small Outline

Temperatures:

C = 0°C to +70°C
 I = -25°C to +85°C or -40°C to +85°C
 M = -55°C to +125°C

Note 1: 1,000 pc. suggested resale, FOB Santa Clara, California, USA.

Price may vary by package or grade.

DATA CONVERSION

ANALOG-TO-DIGITAL CONVERTERS

Part Number	I/O Type	Resolution (bits)	Conv. Time (max)	Accuracy (max)	# Mux Inputs	S/H	On-Board Ref.	Supply Volt.	Temp Range	Power (max)	Pkg.	Comments	Price ¹
10-BIT													
ADC1005C	Byte-wide	10	50 μ s	± 1 LSB	1	N	N	+5V	C	15mW	J		\$7.45
ADC1038	Serial	10	13.7 μ s	± 1 LSB	8	N	Y	+5V	I	15mW	WM		\$3.17
ADC10731	Serial	10 + sign	5 μ s	± 1 LSB	1	Y	Y	+5V	I	37mW	N, M	Software power-down to 18 μ W	\$3.89
ADC10732	Serial	10 + sign	5 μ s	± 1 LSB	2	Y	Y	+5V	I	37mW	N, M	Software power-down to 18 μ W	\$5.15
ADC10734	Serial	10 + sign	5 μ s	± 1 LSB	4	Y	Y	+5V	I	37mW	N, M	Software power-down to 18 μ W	\$4.87
ADC10738	Serial	10 + sign	5 μ s	± 1 LSB	8	Y	Y	+5V	I	37mW	N, M	Software power-down to 18 μ W	\$4.37
ADC10154	Byte-wide	10 + sign	4.4 μ s	± 1 LSB	4	Y	Y	+5V, $\pm 5V$	I	33mW	N, M		\$6.75
ADC10158	Byte-wide	10 + sign	4.4 μ s	± 1 LSB	8	Y	Y	+5V, $\pm 5V$	I	33mW	N, M		\$7.10
ADC1061	Parallel	10	1.8 μ s	± 2 LSB	1	N	Y	+5V	I	235mW	N, M		\$5.65
ADC10061C	Parallel	10	900ns	± 1.5 LSB	1	N	Y	+5V	I	235mW	N, M	1MS/s throughput	\$6.15
ADC10062C	Parallel	10	900ns	± 1.5 LSB	2	N	Y	+5V	I	235mW	N, M	1MS/s throughput	\$6.45
ADC10064C	Parallel	10	900ns	± 1.5 LSB	2	N	Y	+5V	I	235mW	N, M	1MS/s throughput	\$6.80
ADC10461	Parallel	10	900ns	± 1 LSB	1	N	Y	+5V	I	235mW	N, M	AC tested version of ADC10061	\$6.05
ADC10462	Parallel	10	900ns	± 1 LSB	2	N	Y	+5V	I	235mW	N, M	AC tested version of ADC10062	\$6.30
ADC10464	Parallel	10	900ns	± 1 LSB	4	N	Y	+5V	I	235mW	N, M	AC tested version of ADC10064	\$6.35
ADC10662	Parallel	10	466ns	± 1.5 LSB	2	N	Y	+5V	I	235mW	N, M	AC Tested, 2MS/s throughput	\$11.40
ADC10664	Parallel	10	466ns	± 1.5 LSB	4	N	Y	+5V	I	235mW	N, M	AC Tested, 2MS/s throughput	\$11.70

Package Codes: M = Small Outline V = PLCC
H = Metal Can MS = SSOP VF = PQFP
J = Cerdip N = Plastic Dip WM = Small Outline

Temperatures: C = 0°C to +70°C
I = -25°C to +85°C or -40°C to +85°C
M = -55°C to +125°C

Note 1: 1,000 pc. suggested resale, FOB Santa Clara, California, USA.
Price may vary by package or grade.

ANALOG-TO-DIGITAL CONVERTERS

Part Number	I/O Type	Resolution (bits)	Conv. Time (max)	Accuracy (max)	# Mux Inputs	S/H	On-Board Ref.	Supply Volt.	Temp Range	Power (max)	Pkg.	Comments	Price ¹
12 - BIT													
ADC1241	Parallel	12 + sign	13.8 μ s	± 1 LSB	1	N	Y	+5V, ± 5 V	I	70mW	J	Self Calibrating	\$7.65
ADC12441	Parallel	12 + sign	13.8 μ s	± 1 LSB	1	N	Y	+5V, ± 5 V	I	70mW	J	AC Tested	\$7.25
ADC12030	Serial	12 + sign	8.8 μ s	± 1 LSB	2	N	Y	+5V	I	33mW	N, M	Software power-down to 100 μ W	\$5.30
ADC12032	Serial	12 + sign	8.8 μ s	± 1 LSB	2	N	Y	+5V	I	33mW	N, M	Software power-down to 100 μ W	\$4.68
ADC12034	Serial	12 + sign	8.8 μ s	± 1 LSB	4	N	Y	+5V	I	33mW	N, M	Software power-down to 100 μ W	\$4.90
ADC12038	Serial	12 + sign	8.8 μ s	± 1 LSB	8	N	Y	+5V	I	33mW	N, M	Software power-down to 100 μ W	\$5.15
ADC12038EVAL	Serial	12 + sign	8.8 μ s		8		N	+5V				Evaluation Kit	\$150.00
ADC12130	Serial	12 + sign	8.8 μ s	± 2 LSB	2	N	Y	3.3V/+5V	I	33mW	N, M	Software power-down to 100 μ W	\$3.30
ADC12132	Serial	12 + sign	8.8 μ s	± 2 LSB	2	N	Y	3.3V/+5V	I	33mW	MS	Software power-down to 100 μ W	\$3.40
ADC12138	Serial	12 + sign	8.8 μ s	± 2 LSB	8	N	Y	3.3V/+5V	I	33mW	N, M, MS	Software power-down to 100 μ W	\$3.59
ADC12L030	Serial	12 + sign	8.8 μ s	± 1 LSB	2	N	Y	+5V	I	15mW	N, M	Software power-down to 40 μ W	\$4.68
ADC12L032	Serial	12 + sign	8.8 μ s	± 1 LSB	2	N	Y	+5V	I	15mW	N, M	3V Guaranteed Operation	\$4.68
ADC12L034	Serial	12 + sign	8.8 μ s	± 1 LSB	4	N	Y	+5V	I	15mW	N, M	3V Guaranteed Operation	\$4.90
ADC12L038	Serial	12 + sign	8.8 μ s	± 1 LSB	8	N	Y	+5V	I	15mW	N, M	3V Guaranteed Operation	\$5.15
ADC12451	Byte-wide	12 + sign	7.7 μ s	± 1 LSB	1	N	Y	+5V, ± 5 V	I	113mW	J	AC Tested	\$9.00
ADC1251	Byte-wide	12 + sign	7.7 μ s	± 1 LSB	1	N	Y	+5V, ± 5 V	I	113mW	J	Self Calibrating	\$9.00
ADC12H030	Serial	12 + sign	5.5 μ s	± 1 LSB	2	N	Y	+5V	I	36mW	N, M	Software power-down to 100 μ W	\$5.50
ADC12H032	Serial	12 + sign	5.5 μ s	± 1 LSB	2	N	Y	+5V	I	36mW	N, M	Software power-down to 100 μ W	\$5.50
ADC12H034	Serial	12 + sign	5.5 μ s	± 1 LSB	4	N	Y	+5V	I	36mW	N, M	Software power-down to 100 μ W	\$6.60
ADC12H038	Serial	12 + sign	5.5 μ s	± 1 LSB	8	N	Y	+5V	I	36mW	N, M	Software power-down to 100 μ W	\$6.10
ADC12062B	Parallel	12	980ns	± 1 LSB	2	N	Y	+5V	I	75mW	V, VF		\$25.90
ADC12062EVAL	Parallel	12	980ns		2		N	+5V				Evaluation Kit	\$148.00
ADC12062C	Parallel	12	980ns	$\pm 11/2$ LSB	2	N	Y	+5V	I	75mW	V, VF		\$5.50
ADC12662	Parallel	12	660ns	$\pm 11/2$ LSB	2	N	Y	+5V	I	200mW	V, VF		\$6.50
LM12454	Parallel	12 + sign	8.8 μ s	± 1 LSB	4	Y	Y	+5V	I	30mW	V	On-board Timer, FIFO, and Sequencer	\$13.10
LM12458	Parallel	12 + sign	8.8 μ s	± 1 LSB	8	Y	Y	+5V	I, M	30mW	V, VF, EL	On-board Timer, FIFO, and Sequencer	\$13.10
LM12458EVAL	Parallel	12 + sign	5.5 μ s		4.8		Y	+5V			V, VF	Evaluation Kit	\$148.00
LM12L458	Parallel	12 + sign	7.3 μ s	± 1 LSB	8	Y	Y	+5V	I, M	15mW	V, VF, EL	3V Version of LM12458	Call
LM12H458	Parallel	12 + sign	5.5 μ s	± 1 LSB	8	Y	Y	+5V	I, M	34mW	V, VF, EL	On-board Timer, FIFO, and Sequencer	Call
LM331	Frequency	V-F	N/A	0.01%	1	N	N/A	+5V to +40V	I, C	30mW	N	V to F Converter, 100kHz Max	\$1.51

Package Codes:

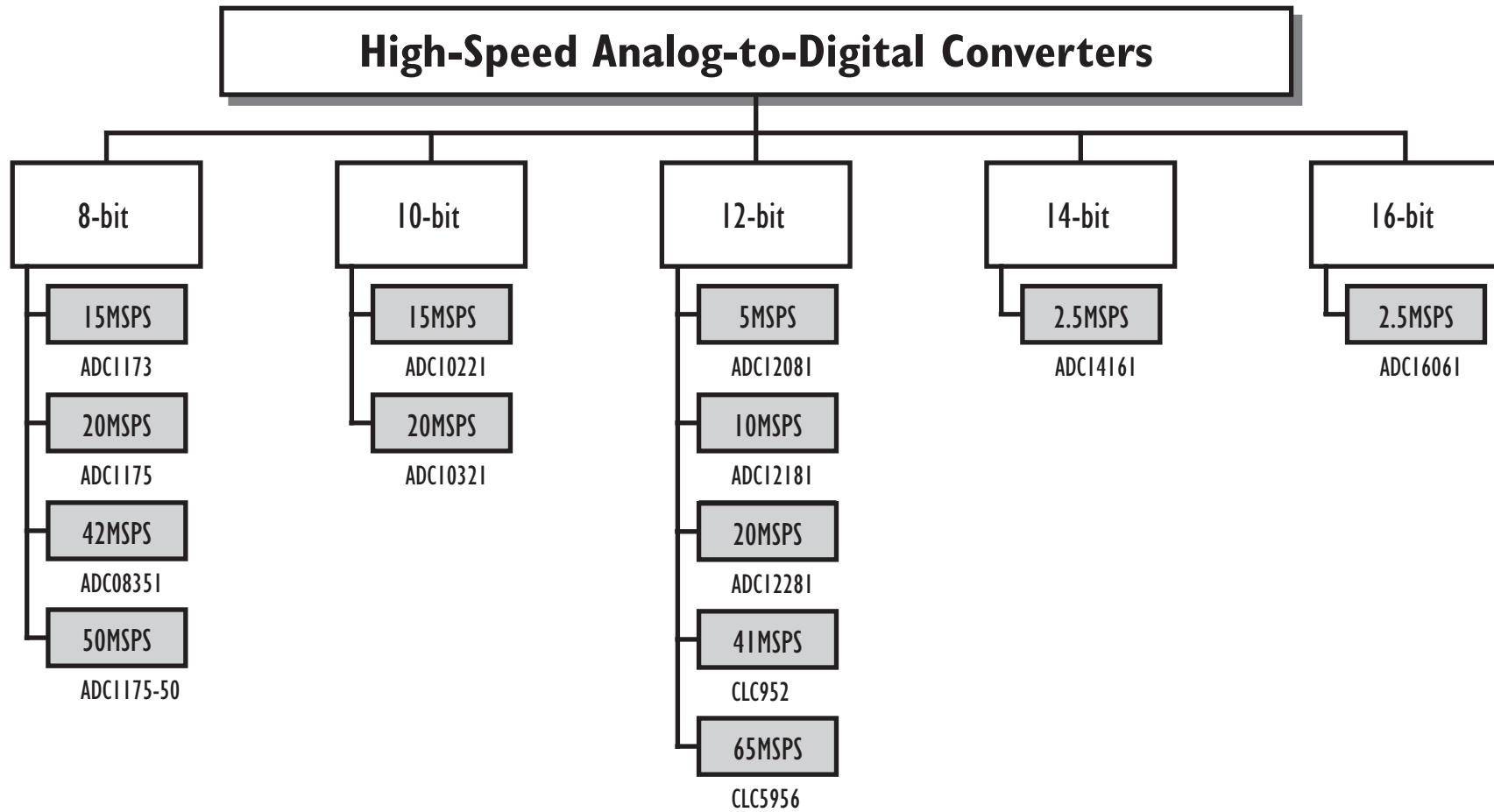
EL = Cerquad M = Small Outline V = PLCC
H = Metal Can MS = SSOP VF = PQFP
J = Cerdip N = Plastic Dip WM = Small Outline

Temperatures:

C = 0°C to +70°C
I = -25°C to +85°C or -40°C to +85°C
M = -55°C to +125°C

Note 1: 1,000 pc. suggested resale, FOB Santa Clara, California, USA.
Price may vary by package or grade.

DATA CONVERSION



HIGH-SPEED ANALOG-TO-DIGITAL CONVERTERS

Part Number	Supply	Power	V _{in}	Resolution Bits	Speed MSPS	Static Perf.			Dynamic Characteristics				Eval Board	Price ¹
						INL	DNL	ENOB	SINAD	SNR	THD	SFDR		
ADC08351	3V	40mW	2V _{pp}	8-Bit	42MSPS	±0.7	±0.6	7.2 Bits	45dB	45dB	-51dB	54dB	No	\$2.05
ADC1173	3V	33mW	2V _{pp}	8-Bit	15MSPS	±0.5	±0.4	7.6 Bits	46dB	48dB	-54dB	51dB	Yes	\$2.20
ADC1175	5V	60mW	2V _{pp}	8-Bit	20MSPS	±0.5	±0.35	7.2 Bits	45dB	45dB	-52dB	48dB	Yes	\$2.60
ADC1175-50	5V	125mW	2V _{pp}	8-Bit	50MSPS	±0.8	±0.7	7.2 Bits	45dB	45dB	-54dB	56dB	Yes	\$3.95
ADC10221	5V	98mW	2V _{pp}	10-Bit	15MSPS	±0.45	±0.35	9.6 Bits	60dB	60dB	-70dB	72dB	Yes	\$2.40
ADC10321	5V	98mW	2V _{pp}	10-Bit	20MSPS	±1.0	±0.5	9.2 Bits	57dB	56dB	-56dB	62dB	Yes	\$2.80
ADC12081	5V	105mW	2V _{pp}	12-Bit	5MSPS	±0.6	±0.35	10.9 Bits	67.6dB	68dB	-79dB	79dB	Yes	\$6.00
ADC12181	5V	235mW	2V _{pp}	12-Bit	10MSPS	±0.7	±0.4	10.4 Bits	64.5dB	65dB	-74dB	73dB	Yes	\$9.00
ADC12281	5V	443mW	2V _{pp}	12-Bit	20MSPS	±1.0	±0.4	10.5 Bits	65dB	65.5dB	-76dB	75dB	Yes	\$13.00
CLC952	+5V/-5V	660mW	1V _{pp}	12-Bit	41MSPS	±3	+1.4/-1.0	10.2 Bits	63.2dB	64dB	-70dB	67dB	Yes	\$22.60
CLC5956	5V	615mW	2V _{pp}	12-Bit	65MSPS	±1.7	±0.65	10.5 Bits	65.5dB	66dB	-71dB	70dB	Yes	\$29.80
ADC14161	5V	390mW	2V _{pp} (Diff)	14-Bit	2.5MSPS	±0.75	±0.3	12.8 Bits	79dB	80dB	-88dB	90dB	Yes	\$25.00
ADC16061	5V	390mW	2V _{pp}	16-Bit	2.5MSPS	±3	±1.0	12.8 Bits	79dB	80dB	-88dB	92dB	Yes	\$30.00

Temperatures: C = 0°C to +70°C
 I = -25°C to +85°C or -40°C to +85°C
 M = -55°C to +125°C

Note 1: 1,000 pc. suggested resale, FOB Santa Clara, California, USA.
 Price may vary by package or grade.

DATA CONVERSION

Digital-to-Analog Converters

8-bit D/As

1 μ s

DAC0830
DAC0832

150ns

DAC0808

100ns

DAC0800
DAC0802

DIGITAL-TO-ANALOG CONVERTERS

Part Number	Resolution (bits)	Linearity % (max)	Settling Time (max)	Voltage Supply	Temp Range	Packages	Comments	Price ¹
DAC0800	8	0.19	100ns	± 5 to ± 15 V	C	N, M	High Speed Multiplying	\$0.76
DAC0802	8	0.1	100ns	± 5 to ± 15 V	C	N, M	High Speed Multiplying	\$1.39
DAC0808	8	0.19	150ns	± 5 to ± 15 V	C	N, M	Multiplying	\$0.97
DAC0830	8	0.05	1 μ s	+5 to +15V	C	N	4-Quadrant Multiplying	\$2.99
DAC0832	8	0.2	1 μ s	+5 to +15V	C	N, WM, V	4-Quadrant Multiplying	\$1.44

Package Codes: M = Small Outline V = PLCC
H = Metal Can MS = SSOP VF = PQFP
J = Cerdip N = Plastic Dip WM = Small Outline

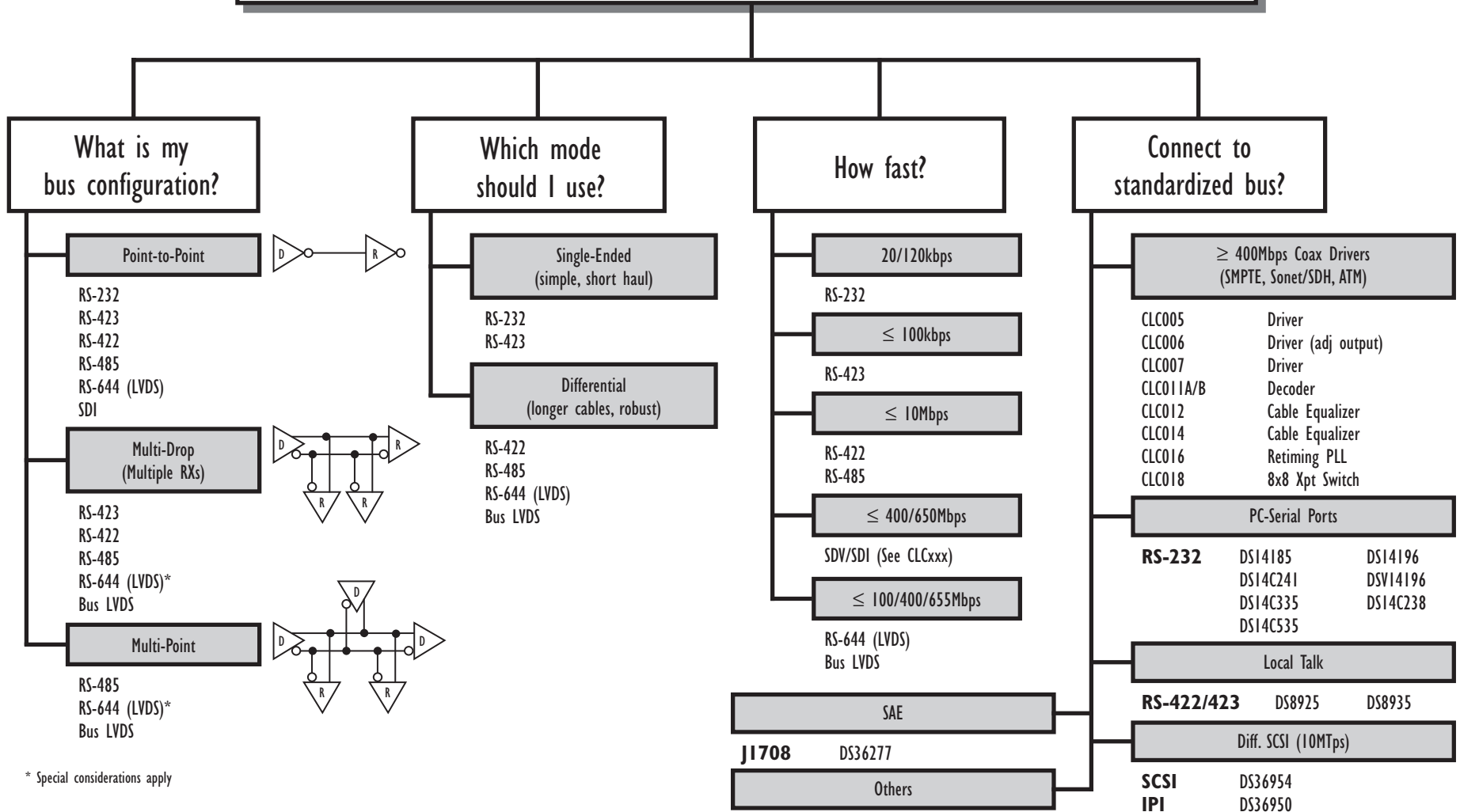
Temperatures: C = 0°C to +70°C
I = -25°C to +85°C or -40°C to +85°C
M = -55°C to +125°C

Note 1: 1,000 pc. suggested resale, FOB Santa Clara, California, USA.
Price may vary by package or grade.

INTERFACE

Section 5

How to Select the Best Recommended Standard



* Special considerations apply

See App. Note AN-216

How to Select the Best LVDS Product for Your Application

What is My Power Supply Voltage?

Serializers

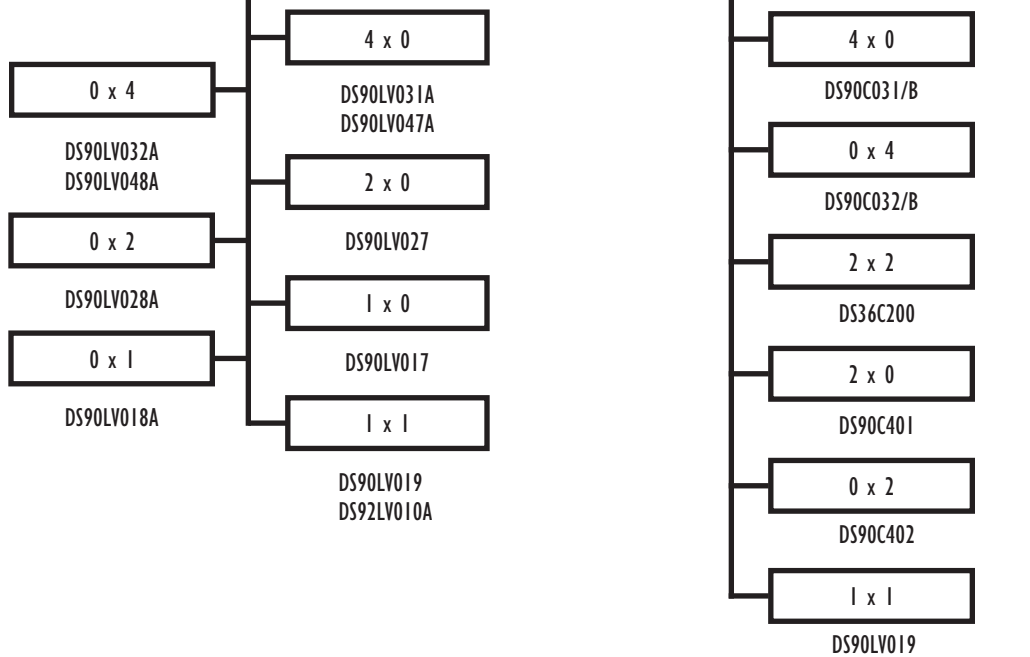
See LVDS Channel Link
and Bus LVDS

3.3V

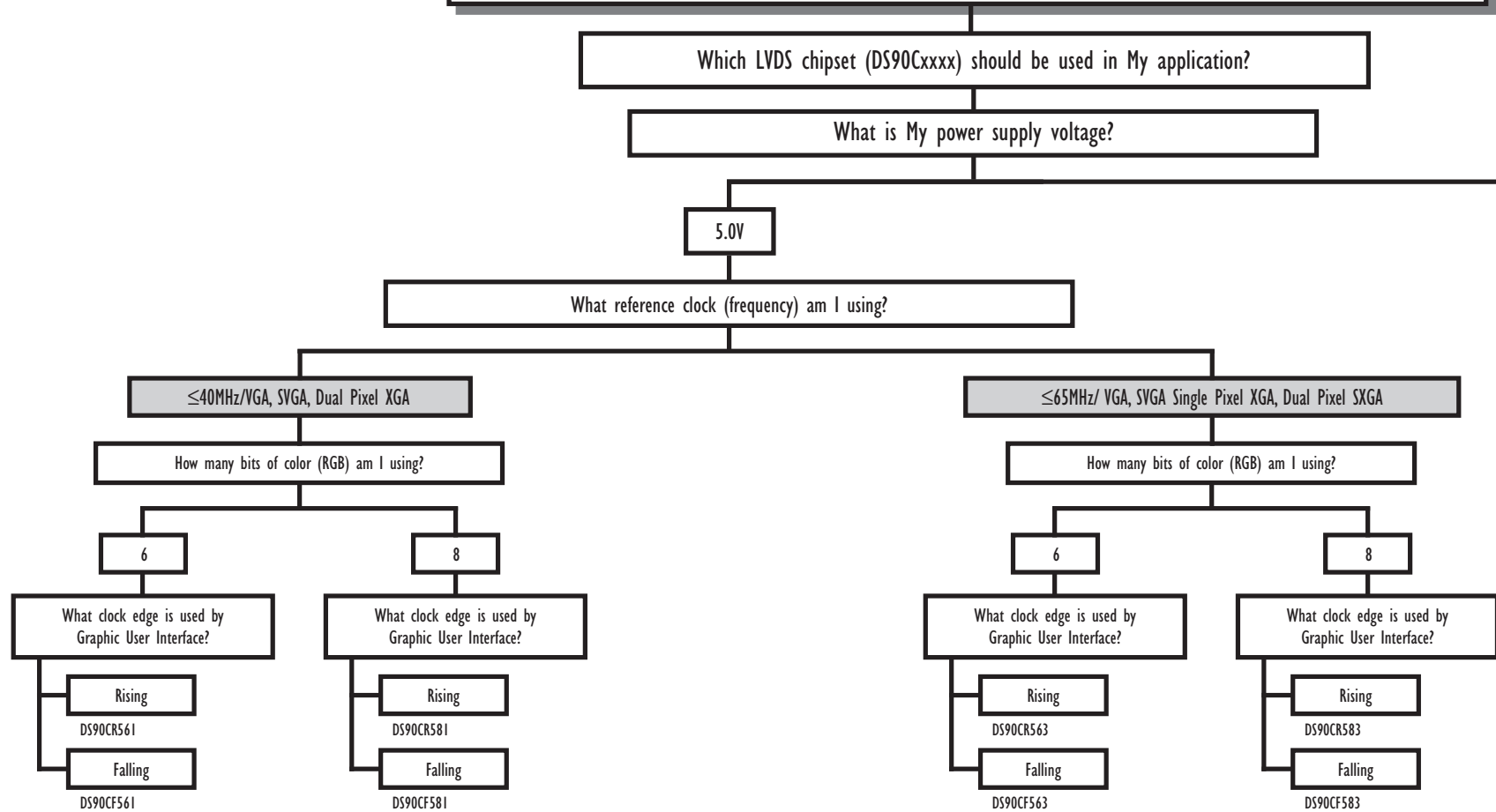
5.0V

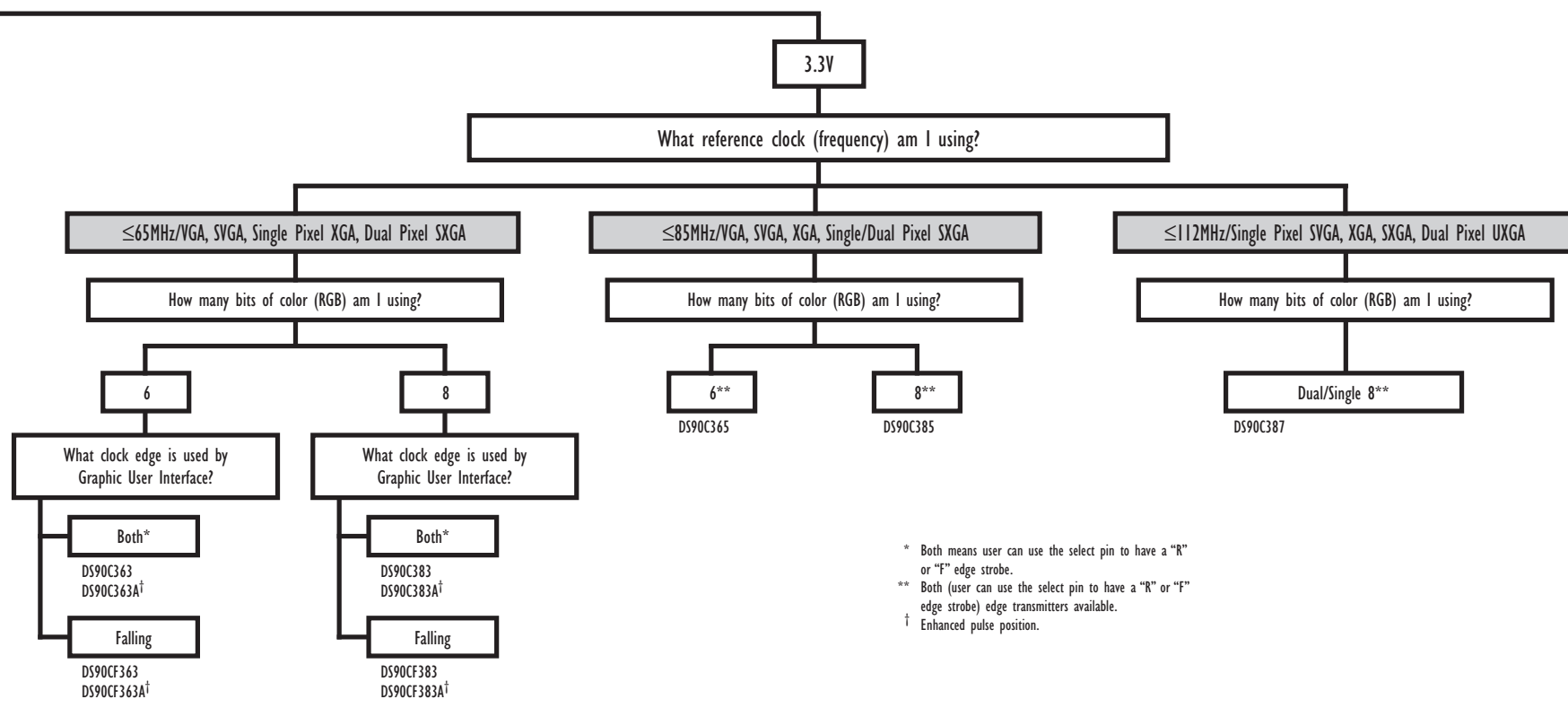
How many Dr/Rx do I need?

How many Dr/Rx do I need?



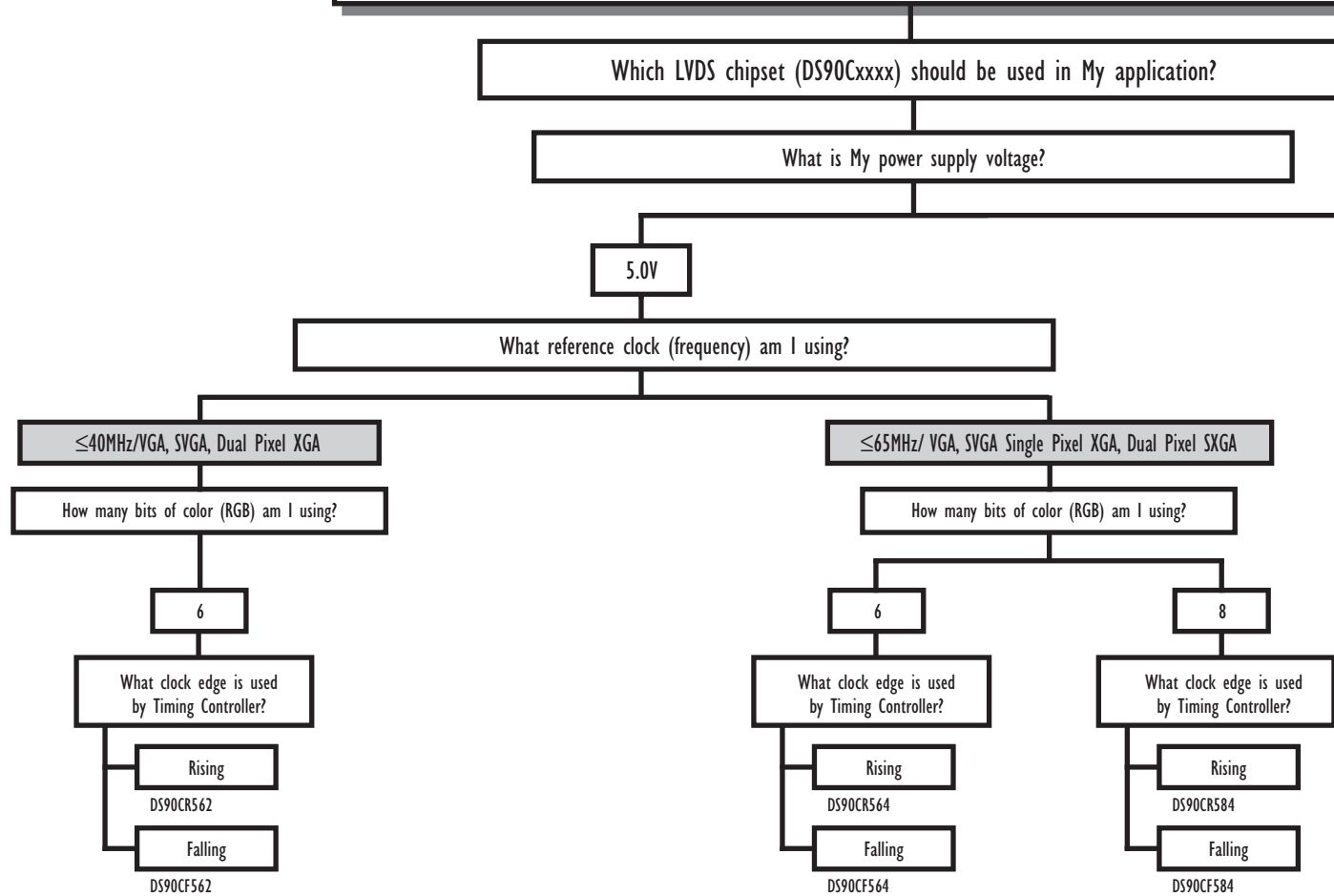
How to Select the Best Flat Panel Display Link Transmitter Product for Your Application

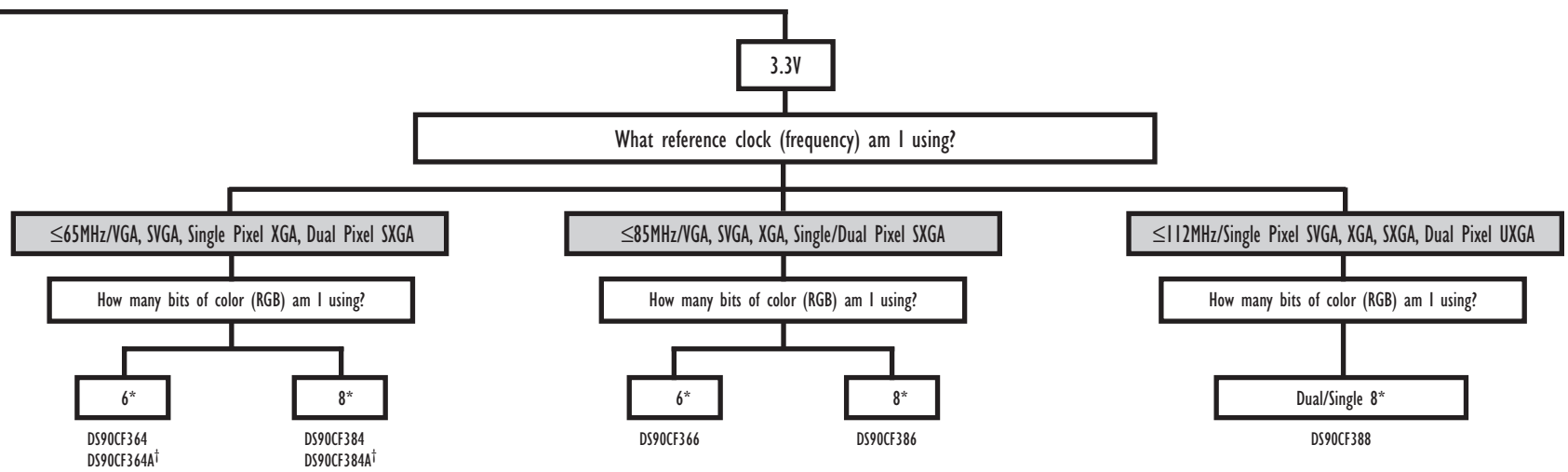




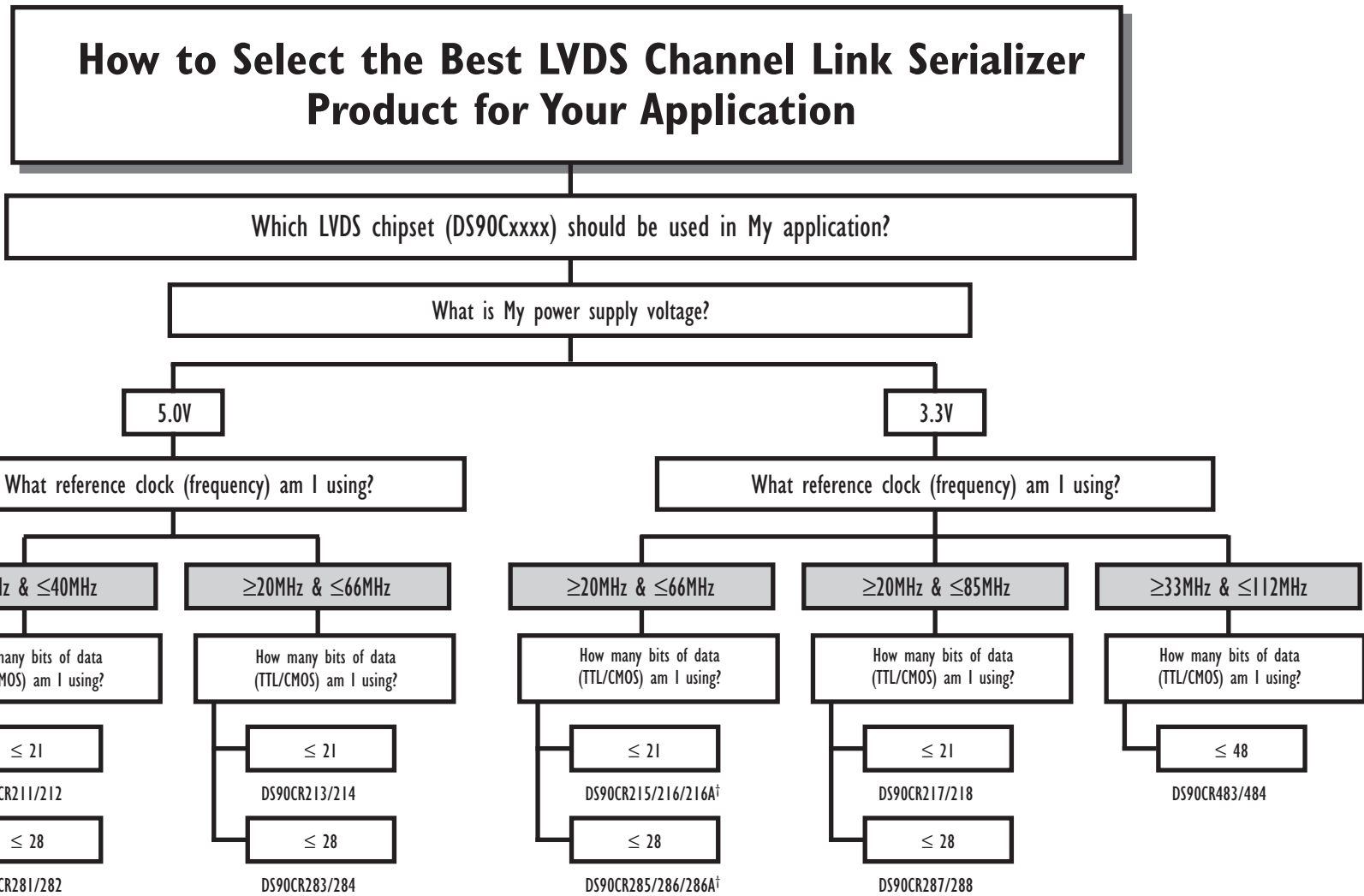
* Both means user can use the select pin to have a "R" or "F" edge strobe.
 ** Both (user can use the select pin to have a "R" or "F" edge strobe) edge transmitters available.
 † Enhanced pulse position.

How to Select the Best Flat Panel Display Link Receiver Product for Your Application





* Only 3V falling edge receivers are available.
 † Enhanced receiver output specification (set and hold times).



Note: See Bus LVDS for 10-to-1 Serializers
[†] Enhanced receiver output specification (set and hold times)

SERIAL DIGITAL INTERFACE* (SDI)

Order Number	Description	Temp Range	Speed	Features	# Leads/Package	Price ²
◆ CLC005AJE	Single Cable Driver	Ind	Up to 622Mbps	ITU-T G.703-Compliant Outputs	8 SOIC	\$5.00
CLC006AJE	Single Cable Driver	Ind	Up to 400Mbps	Adjustable Amplitude Outputs	8 SOIC	\$4.50
CLC007AJE	Single Cable Driver with Dual Complementary Outputs	Ind	Up to 400Mbps	Complementary Output Pair	8 SOIC	\$4.00
◆ CLC011ACQ	Serial Digital Video Decoder	Com	Up to 300Mbps	Data Decoding and Deserializing	28 PLCC	\$7.81
◆ CLC011BCQ	Serial Digital Video Decoder	Com	Up to 360Mbps	Data Decoding and Deserializing	28 PLCC	\$6.75
◆ CLC012AJE	Adaptive Cable Equalizer	Ind	50 to 622Mbps	ITU-T G.703-Compliant Recovery	14 SOIC	\$12.60
CLC014AJE	Adaptive Cable Equalizer	Ind	50 to 650Mbps	SMPT E 259M Serial Recovery	14 SOIC	\$12.20
CLC016ACQ	Data Retiming PLL & Clock Recovery	Com	40 to 400Mbps	Automatic Rate Selection	28 PLCC	\$17.40
CLC016AJQ	Data Retiming PLL & Clock Recovery	Ind	40 to 400Mbps	Automatic Rate Selection	28 PLCC	\$18.70
CLC018AJVQ	8 x 8 Digital Crosspoint Switch	Ind	Up to 1.4Gbps	Non-Blocking, Expandable	64 PQFP	\$17.00

◆ Denotes NEW Product

* High-Speed Non-LVDS Interface Devices

Note 2: 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

BUS LVDS

Order Number	Description	Number of Drivers	Number of Receivers	Temp Range (°C)	Supply Voltage (V)	Speed	Features	# Leads/Package	Price ¹
◆ DS92LV010ATM	Single Bus LVDS Transceiver	1	1	Ind	3.3/5V	155Mbps/Channel	3.3V or 5V Operation	8 SOIC	\$2.33
◆ DS92LV222ATM	Bus LVDS Repeater/Mux	2	2	Ind	3.3V	200Mbps/Channel	Repeater, Mux, or 1:2 Clock Driver Modes	16 SOIC	\$3.16
◆ DS92LV1021TMSA	10:1 Serializer w/Embedded Clock	1	0	Ind	3.3V	400Mbps @ 40MHz CLK	400Mbps Data Payload Over Single Pair	28 SSOP	\$8.64
◆ DS92LV1210TMSA	1:10 Deserializer w/Clock Recovery	0	1	Ind	3.3V	400Mbps @ 40MHz CLK	400Mbps Data Payload Over Single Pair	28 SSOP	\$8.69

◆ Denotes NEW Product

Note 1: 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

INTERFACE

LVDS FLAT PANEL DISPLAY INTERFACE (FPD-LINK & LDI)

Order Number	Color Bits	Type	Supply Voltage	Max Clock Frequency	Display Type	Clock Edge Strobe	# Leads/Package	Price ²
DS90CF561MTD	18-bit	Transmitter	5	40MHz	SVGA	Falling	48 TSSOP	\$5.09
DS90CR561MTD	18-bit	Transmitter	5	40MHz	SVGA	Rising	48 TSSOP	\$5.06
DS90CF562MTD	18-bit	Receiver	5	40MHz	SVGA	Falling	48 TSSOP	\$5.09
DS90CR562MTD	18-bit	Receiver	5	40MHz	SVGA	Rising	48 TSSOP	\$5.06
DS90CF581MTD	24-bit	Transmitter	5	40MHz	SVGA	Falling	56 TSSOP	\$6.25
DS90CR581MTD	24-bit	Transmitter	5	40MHz	SVGA	Rising	56 TSSOP	\$6.25
DS90CF563MTD	18-bit	Transmitter	5	65MHz	XGA	Falling	48 TSSOP	\$6.10
DS90CR563MTD	18-bit	Transmitter	5	65MHz	XGA	Rising	48 TSSOP	\$6.10
DS90CF564MTD	18-bit	Receiver	5	65MHz	XGA	Falling	48 TSSOP	\$6.10
DS90CR564MTD	18-bit	Receiver	5	65MHz	XGA	Rising	48 TSSOP	\$6.10
DS90CF583MTD	24-bit	Transmitter	5	65MHz	XGA	Falling	56 TSSOP	\$6.35
DS90CR583MTD	24-bit	Transmitter	5	65MHz	XGA	Rising	56 TSSOP	\$6.35
DS90CF584MTD	24-bit	Receiver	5	65MHz	XGA	Falling	56 TSSOP	\$5.50
DS90CR584MTD	24-bit	Receiver	5	65MHz	XGA	Rising	56 TSSOP	\$5.50
◆ DS90C363MTD/AMTD††	18-bit	Transmitter	3.3	65MHz	XGA	Programmable	48 TSSOP	\$5.95
◆ DS90CF363MTD/AMTD††	18-bit	Transmitter	3.3	65MHz	XGA	Falling	48 TSSOP	\$5.95
◆ DS90CF364MTD/AMTD†	18-bit	Receiver	3.3	65MHz	XGA	Falling	48 TSSOP	\$7.70
◆ DS90C383MTD/AMTD††	24-bit	Transmitter	3.3	65MHz	XGA	Programmable	56 TSSOP	\$6.25
◆ DS90CF383MTD/AMTD††	24-bit	Transmitter	3.3	65MHz	XGA	Falling	56 TSSOP	\$6.25
◆ DS90CF384MTD/AMTD†	24-bit	Receiver	3.3	65MHz	XGA	Falling	56 TSSOP	\$7.70
◆ DS90C365MTD	18-bit	Transmitter	3.3	85MHz	SXGA	Programmable	48 TSSOP	\$6.55
◆ DS90CF366MTD	18-bit	Receiver	3.3	85MHz	SXGA	Falling	48 TSSOP	\$7.70
◆ DS90C385MTD	24-bit	Transmitter	3.3	85MHz	SXGA	Programmable	56 TSSOP	\$6.85
◆ DS90CF386MTD	24-bit	Receiver	3.3	85MHz	SXGA	Falling	56 TSSOP	\$7.70
◆ DS90C387VJD	48-bit	Transmitter	3.3	112MHz	SXGA/UXGA+	Programmable	100 TQFP	\$11.75

◆ Denotes NEW Product

† Enhanced receiver output specifications (set and hold times)

†† Enhanced pulse position

Note 2: 1,000 pc. suggested resale, FOB Santa Clara, California, USA.
Pricemay vary by package or grade.

LVDS LINE DRIVERS AND RECEIVERS

Order Number	# of Drivers	# of Receivers	Power Supply (V)	Max Icc (mA)	TRI-STATE® Outputs	High Impedance Bus Pins	Temp Range (°C)	Data Rate	Driver Max tpd (ns)	DriverMax Pulse Skew (ns)	Receiver Max tpd (ns)	Receiver Max Pulse Skew (ns)	# Leads/Package	Comments	Price ¹
DS90C031E-QML	4	0	5	7	Yes	No	Mil	>100Mbps	5.0	3.0	—	—	20 LCC	Military-883	\$28.80
DS90C031TM	4	0	5	3	Yes	No	Ind	>155Mbps	3.5	0.9	—	—	16 SOIC		\$1.95
DS90C032E-QML	0	4	5	11	Yes	No	Mil	>100Mbps	—	—	8.0	3.0	20 LCC	Military-883	\$28.80
DS90C032TM	0	4	5	10	Yes	No	Ind	>155Mbps	—	—	6.0	1.2	16 SOIC		\$1.95
DS90C401M	2	0	5	3	No	No	Ind	>155Mbps	3.5	0.9	—	—	8 SOIC		\$1.20
DS90C402M	0	2	5	10	No	No	Ind	>155Mbps	—	—	6.0	1.2	8 SOIC		\$1.20
DS90LV017M	1	0	3.3	4	No	Yes	Com	>155Mbps	6.0	1.9	—	—	8 SOIC		\$0.74
◆ DS90LV018ATM	0	1	3.3	9	No	Yes	Ind	>400Mbps	—	—	2.5	0.4	8 SOIC	New	\$0.64
◆ DS90LV019TM	1	1	3.3/5	20/48	Yes	Yes	Ind	>100Mbps	7.0/6.0	1.0/1.0	9.0/8.0	1.5/1.6	14 SOIC	3.3V or 5V V _{CC}	\$1.48
DS90LV027M	2	0	3.3	4	No	Yes	Com	>155Mbps	6.0	1.9	—	—	8 SOIC		\$1.35
◆ DS90LV028ATM	0	2	3.3	9	No	Yes	Ind	>400Mbps	—	—	2.5	0.4	8 SOIC	New	\$1.21
◆ DS90LV031ATM	4	0	3.3	8	Yes	Yes	Ind	>400Mbps	2.0	0.4	—	—	16 SOIC		\$2.05
◆ DS90LV032ATM	0	4	3.3	15	Yes	Yes	Ind	>400Mbps	—	—	3.3	0.35	16 SOIC		\$2.05
◆ DS90LV047ATM	4	0	3.3	8	Yes	Yes	Ind	>400Mbps	1.7	0.4	—	—	16 SOIC	Flow through pin out	\$2.40
◆ DS90LV048ATM	0	4	3.3	15	Yes	Yes	Ind	>400Mbps	—	—	2.7	0.4	16 SOIC	Flow through pin out	\$2.40
DS36C200M	2	2	5	7	Yes	Yes	Com	>100Mbps	5.5	2.2	9.0	3.0	14 SOIC	1394 Link	\$1.16

◆ Denotes NEW Product

Note 1: 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

INTERFACE

LVDS CHANNEL-LINK SERIALIZERS AND DESERIALIZERS

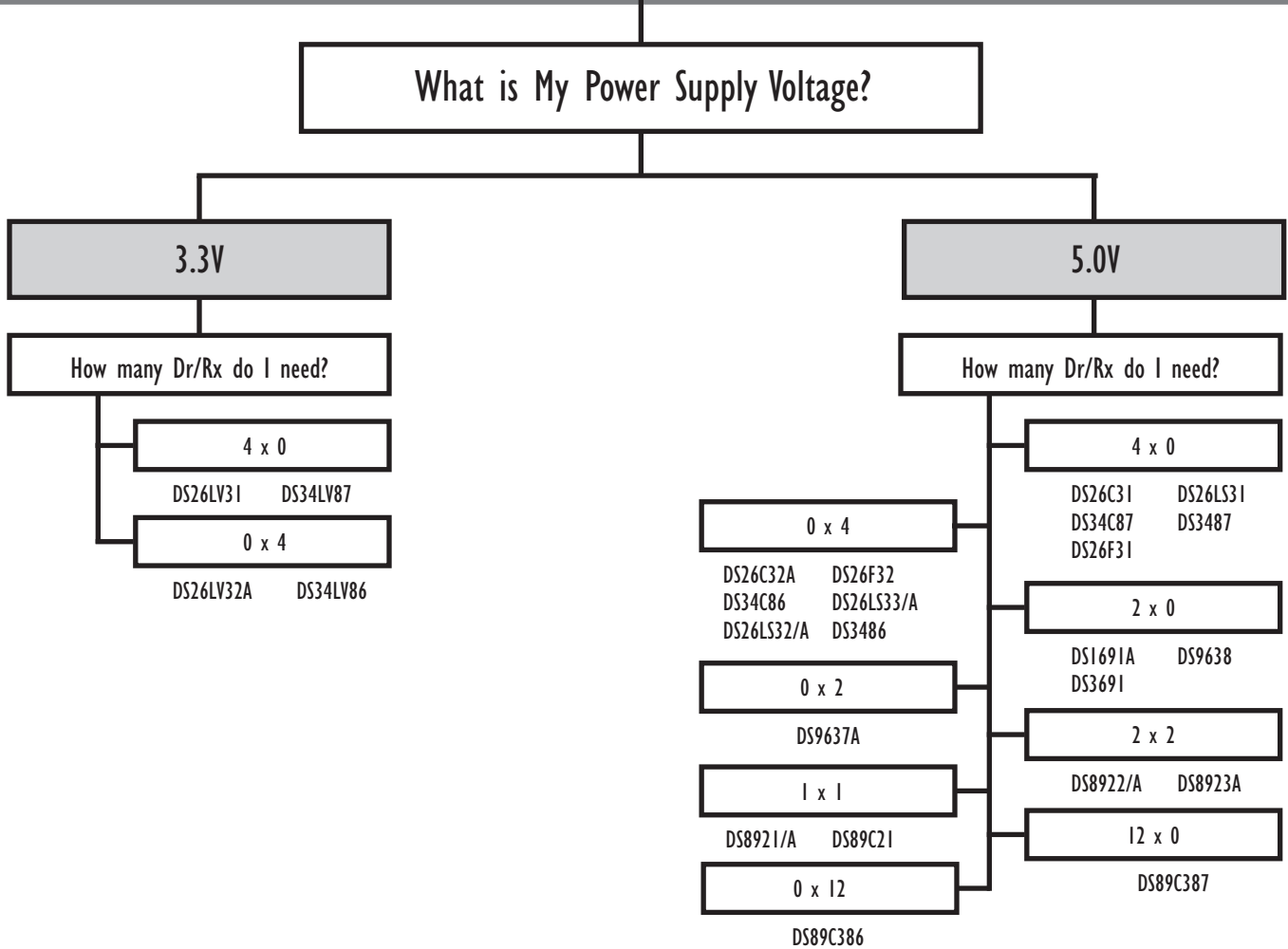
Order Number	Transmitter/ Receiver	TTL Bus Width	Mux/Demux Ratio	Power Supply (V)	Max ICC (mA)	Clock Frequency	Max Throughput	# Leads/ Package	Eval Board Order #	Price ¹
DS90CR211MTD	Transmitter	21	2:3	5	53	20-40MHz	840Mbps	48 TSSOP	CLINK5V28BT-66	\$5.73
DS90CR212MTD	Receiver	21	3:21	5	80	20-40MHz	840Mbps	48 TSSOP	CLINK5V28BT-66	\$5.73
DS90CR213MTD	Transmitter	21	2:3	5	84	20-66MHz	1.38Gbps	48 TSSOP	CLINK5V28BT-66	\$6.23
DS90CR214MTD	Receiver	21	3:21	5	140	20-66MHz	1.38Gbps	48 TSSOP	CLINK5V28BT-66	\$6.23
DS90CR215MTD	Transmitter	21	2:3	3.3	55	20-66MHz	1.38Gbps	48 TSSOP	CLINK3V28BT-66	\$6.23
DS90CR216MTD	Receiver	21	3:21	3.3	105	20-66MHz	1.38Gbps	48 TSSOP	CLINK3V28BT-66	\$6.23
◆ DS90CR216AMTD †	Receiver	21	3:21	3.3	—	20-66MHz	1.38Gbps	48 TSSOP	CLINK3V28BT-66	\$6.23
◆ DS90CR217MTD	Transmitter	21	2:3	3.3	—	20-85MHz	1.78Gbps	48 TSSOP	CLINK3V28BT-66	\$6.73
◆ DS90CR218MTD	Receiver	21	3:21	3.3	—	20-85MHz	1.78Gbps	48 TSSOP	CLINK3V28BT-66	\$6.73
DS90CR281MTD	Transmitter	28	28:4	5	53	20-40MHz	1.12Gbps	56 TSSOP	CLINK5V28BT-66	\$6.94
DS90CR282MTD	Receiver	28	4:28	5	80	20-40MHz	1.12Gbps	56 TSSOP	CLINK5V28BT-66	\$6.94
DS90CR283MTD	Transmitter	28	28:4	5	84	20-66MHz	1.84Gbps	56 TSSOP	CLINK5V28BT-66	\$7.44
DS90CR284MTD	Receiver	28	4:28	5	140	20-66MHz	1.84Gbps	56 TSSOP	CLINK5V28BT-66	\$7.44
DS90CR285MTD	Transmitter	28	28:4	3.3	55	20-66MHz	1.84Gbps	56 TSSOP	CLINK3V28BT-66	\$7.44
DS90CR286MTD	Receiver	28	4:28	3.3	105	20-66MHz	1.84Gbps	56 TSSOP	CLINK3V28BT-66	\$7.44
◆ DS90CR286AMTD †	Receiver	28	4:28	3.3	—	20-66MHz	1.84Gbps	56 TSSOP	CLINK3V28BT-66	\$8.35
◆ DS90CR287MTD	Transmitter	28	28:4	3.3	—	20-85MHz	2.38Gbps	56 TSSOP	CLINK3V28BT-85	\$7.94
◆ DS90CR288MTD	Receiver	28	4:28	3.3	—	20-85MHz	2.38Gbps	56 TSSOP	CLINK3V28BT-85	\$7.94
◆ DS90CR483VJD	Transmitter	48	48:8	3.3	—	33-112MHz	5.37Gbps	100 TQFP	CLINK3V48BT-112	\$14.30
◆ DS90CR484VJD	Receiver	48	8:48	3.3	—	33-112MHz	5.37Gbps	100 TQFP	CLINK3V48BT-112	\$14.30

◆ Denotes NEW Product

† Enhanced receiver output specifications (set and hold times)

Note 1: 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

How to Select the Best RS-422 Product for Your Application



How to Select the Best RS-485 Product for Your Application

What type of device do I need?

Standard Line Dr, Rx and Xcvr

Low Power CMOS Xcvr

Special Xcvr

How many Dr/Rx do I need?

What features do I need?

What features do I need?

1 x 1

1 x 1

1 x 1

4 x 4

DS3695
DS3695A (SOIC)
DS36F95
DS75176B
DS96176
DS16F95

DS481 (Sleep Mode)
DS1487 (1/4 UL, 128 nodes)
DS485 (CMOS)
DS36C278 (1/2, 1/4 UL)
DS36C279 (Sleep Mode)
DS36C280 (Slew Rate Control)

DS36276 (Failsafe)
DS36277 (SAE 1708 App)
DS3696/A (TS Pin)
DS3697 (Repeater)
DS96177 (Repeater)

DS36950
DS36954

4 x 0

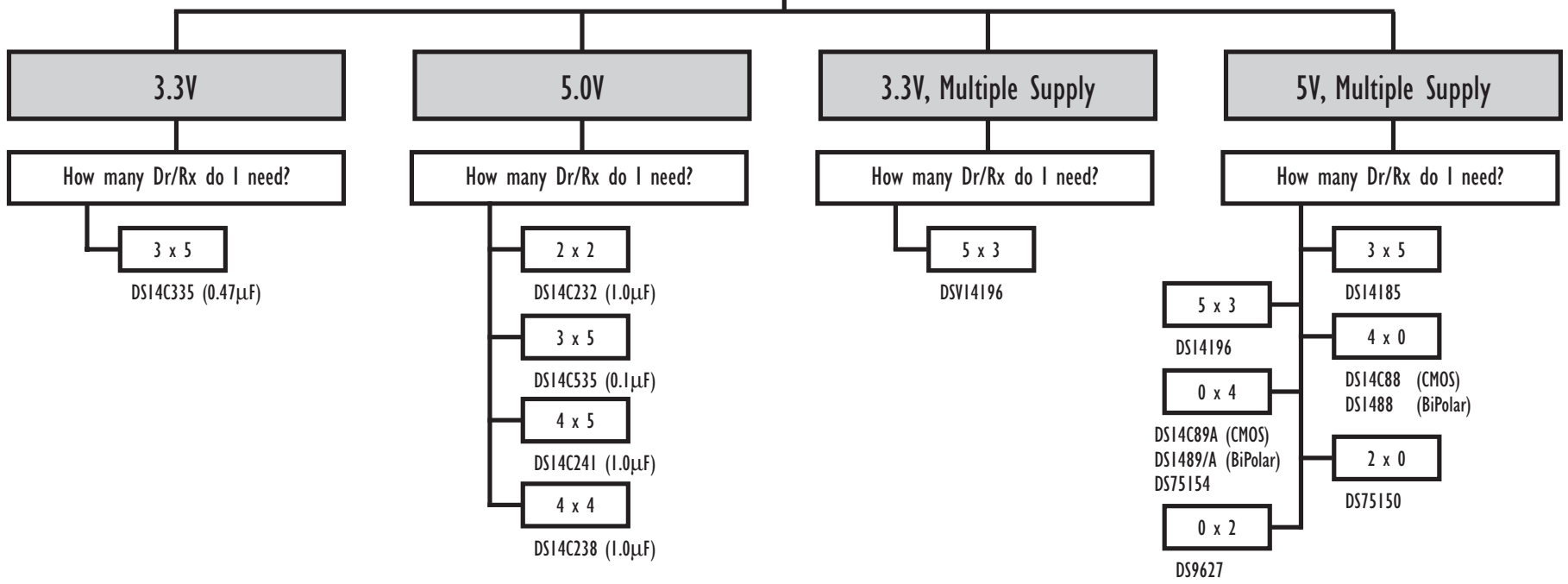
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DS96172
DS96174
DS96F172
DS96F174

DS96173
DS96175
DS96F173
DS96F175

How to Select the Best RS-232 Product for Your Application

What is My Power Supply Voltage?



INTERFACE

DATA TRANSMISSION STANDARDS

Specifications	TIA/EIA-232-F	TIA/EIA-423-B	TIA/EIA-422-B	TIA/EIA-485-A	TIA/EIA-644 (LVDS)	
Mode of Operation	Single-Ended	Single-Ended	Differential	Differential	Differential	
Number of Drivers and Receivers Allowed on One Line	1 Driver, 1 Receiver	1 Driver, 10 Receivers	1 Driver, 10 Receivers	32 Unit Loads	1 Driver, 1 Receiver	
Maximum Cable Length	~ 50 feet (2500pF)	4000 feet	4000 feet	4000 feet	~<20M	
Maximum Data Rate	20kb/s	100kb/s	10Mb/s	10Mb/s	655Mbps	
Driver Output Maximum Voltage	±25V	±6V	-0.25V to +6V	-7V to +12V	±450mV	
Driver Output Signal Level	Loaded	±5V to ±15V	±3.6V	±2V	±1.5V	±250mV
	Unloaded	±25V	±6V	±10V	±6V	—
Driver Load Impedance	3kΩ to 7kΩ	≥450Ω	100Ω typ	54Ω	100Ω	
Maximum Driver Output Current (High Impedance State)	Power On	—	—	±100 μA	—	
	Power Off	6.6mA (±2V)	±100 μA	±100 μA	±100 μA	—
Slew Rate	30V/μs max	Controls Provided	—	—	—	
Receiver Input Voltage Range	±15V	±12V	-10V to +10V	-7V to +12V	GND to +2.4V	
Receiver Input Sensitivity	±3V	±200mV	±200mV	±200mV	±100mV	
Receiver Input Resistance	3kΩ to 7kΩ	4kΩ min	4kΩ min	12kΩ min	High Z	

Tx = Transmitter/Driver
Rx = Receiver

Temp Range:

Commercial (Com) = 0°C to 70°C
Industrial (Ind) = -40°C to 85°C
Military (Mil) = -55°C to 125°C
Military (Mil 883) = -55°C to 125°C

Package Types:

J = Ceramic Dip	MTD = TSSOP	VJD = TQFP
E = LCC	N = Molded DIP	VF = PQFP
M = SOIC	V = PLCC	W = Ceramic Flatpack
MSA = SSOP	VB = PQFP	WG = Ceramic SOIC
MEA = SSOP	VEH = TQFP	WM = Wide SOIC

TIA/EIA-232 (RS-232)

Part Number	Description	Tx	Rx	Temp Range	Mil 883	Package Type	# Leads	Price ²
DS1488	Quad Line Driver	4	0	Com		M, N	14	\$0.19
DS14C88	Quad CMOS Line Driver	4	0	Com		M, N	14	\$0.48
DS75150	Dual Line Driver	2	0	Com		M	8	\$0.53
DS1489	Quad Line Receiver	0	4	Com		M, N	14	\$0.19
DS1489A	Quad Line Receiver	0	4	Com		M, N	14	\$0.20
DS14C89A	Quad CMOS Line Receiver	0	4	Com		M, N	14	\$0.40
DS75154	Quad Line Receiver	0	4	Com		M	16	\$0.67
DS9627M	Dual Line Receiver	0	2	Mil	√	J	16	\$22.60
DS14C232C	Low Power 5V Powered EIA-232 Dual Driver/Receiver	2	2	Com		M, N	16	\$0.77
DS14C232T	Low Power 5V Powered EIA-232 Dual Driver/Receiver	2	2	Ind		M	16	\$0.94
DS14C238	Single Supply EIA-232 4X4 Driver/Receiver	4	4	Com		WM	24	\$2.87
DS14C241	Single Supply EIA-232 4X5 Driver/Receiver	4	5	Com		WM	28	\$3.08
DS14C335	+3.3V Supply TIA/EIA-232 3x5 Driver/Receiver	3	5	Com		MSA	28	\$2.64
DS14C535	+5V Supply EIA/TIA-232 3X5 Driver/Receiver	3	5	Com		MSA	28	\$3.27
DS14185	+5V Supply EIA/TIA-232 3X5 Driver/Receiver	3	5	Com		WM	20	\$0.46
DS14196	+5V Supply EIA/TIA-232 5X3 Driver/Receiver	5	3	Com		WM	20	\$0.69

TIA/EIA-423 (RS-423)

Part Number	Description	Tx	Rx	Temp Range	Mil 883	Package Type	# Leads	Price ²
DS9636A	Dual Programmable Slew Rate Line Driver	2	0	Mil	√	J	8	\$8.00
DS1691A	Quad TRI-STATE Line Driver	4	0	Mil	√	J	16	\$6.05
DS3691	Quad TRI-STATE Line Driver	4	0	Com		M, N	16	\$1.70

SPECIAL INTERFACE

Part Number	Description	Tx	Rx	Temp Range	Mil 883	Package Type	# Leads	Price ²
DS36C200	Dual High Speed Bi-Directional/Differential Transceiver	2	2	Com		M	14	\$1.16

Tx = Transmitter/Driver
Rx = Receiver

Temp Range:
Commercial (Com) = 0°C to 70°C
Industrial (Ind) = -40°C to 85°C
Military (Mil) = -55°C to 125°C
Military (Mil 883) = -55°C to 125°C

Package Types:
J = Ceramic Dip
E = LCC
M = SOIC
MSA = SSOP
MEA = SSOP
MTD = TSSOP
N = Molded DIP
V = PLCC
V = PQFP
VEH = TQFP
VJD = TQFP
VF = PQFP
W = Ceramic Flatpack
WG = Ceramic SOIC
WM = Wide SOIC

GENERAL PURPOSE

Part Number	Description	Tx	Rx	Temp Range	Mil 883	Package Type	# Leads	Price ²
DS75110A	Dual Line Driver	2	0	Com		M, N	14	\$0.45
DS7830	Dual Differential Line Driver	2	0	Mil	√	J, W	14	\$4.80
DS7831	Dual TRI-STATE Line Driver	2	0	Mil	√	J	16	\$20.50
DS8832	Dual TRI-STATE Line Driver	2	0	Com		N	16	\$1.21
DS1692	TRI-STATE Differential Line Driver	2	0	Mil		J	16	\$5.10
DS1603	TRI-STATE Dual Line Receiver	0	2	Mil	√	J	16	\$14.60
DS75107	Dual Line Receiver	0	2	Com		M, N	14	\$0.40
DS7820	Dual Line Receiver	0	2	Mil	√	J	14	\$6.15
DS7820A	Dual Line Receiver	0	2	Mil	√	J	14	\$8.65
DS8820A	Dual Line Receiver	0	2	Com		N	14	\$0.83
DS9622M	Dual Line Receiver	0	2	Mil	√	J, E	14/20	\$7.45
DS3650	Quad Differential Line Receiver	0	4	Com		M, N	16	\$1.60
DS3651	Quad High Speed MOS Sense Amplifier	0	4	Com		N	16	\$1.71
DS8641	Quad Unified Bus Transceiver	4	4	Com		N	16	\$1.20
DS8838	Quad Unified Bus Transceiver	4	4	Com		M, N	16	\$1.10
DS26510	Quad Bus Transceiver	4	4	Com		N	16	\$1.07
DS75160A	IEEE-488 GPIB Transceiver	8	8	Com		N	20	\$1.08
DS75161A	IEEE-488 GPIB Transceiver	8	8	Com		N	20	\$1.08
DS1776	Pi-Bus Transceiver	8	8	Mil	√	E	28	\$66.00
DS3662	Quad High Speed Trapezoidal Bus Transceiver	4	4	Com		N, WM	16	\$2.14
DS3862	Octal High Speed Trapezoidal Bus Transceiver	8	8	Com		N, WM	20	\$4.50

BTL

Part Number	Description	Tx	Rx	Temp Range	Package Type	# Leads	Price ²
DS3883A	BTL 9-Bit Data Transceiver	9	9	Com	VF	44	\$7.65
DS3884A	BTL Handshake Transceiver	6	6	Com	VF	44	\$9.65
DS3886A	BTL 9-Bit Latching Data Transceiver	9	9	Com	V, VF	44	\$7.45
DS38C86A	CMOS BTL 9-Bit Latching Data Transceiver	9	9	Com	VB	48	\$8.20
DS3893A	BTL Turbo Transceiver	4	4	Com	V	20	\$3.82
DS3896	BTL Trapezoidal Transceiver	8	8	Com	M, N	20	\$4.49
DS3897	BTL Trapezoidal Transceiver	4	4	Com	M, N	20	\$3.83

² Price:
1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

INTERFACE

TIA/EIA-485 (RS-485)

Part Number	Description	Tx	Rx	Temp Range	Mil 883	Package Type	# Leads	Price ²
DS96172C	Quad Differential Line Driver	4	0	Com		N	16	\$1.25
DS96F172C	Quad Differential Line Driver	4	0	Com		N	16	\$2.50
DS96F172M	Quad Differential Line Driver	4	0	Mil	✓	J	16	\$12.70
DS96F172M	Quad Differential Line Driver	4	0	Mil	✓	E	16/20	\$30.00
DS96174C	Quad Differential Line Driver	4	0	Com		N	16	\$1.15
DS96F174C	Quad Differential Line Driver	4	0	Com		J, N	16	\$2.30
DS96F174M	Quad Differential Line Driver	4	0	Mil	✓	J, W, E	16/20	\$10.70
DS96173C	Quad Differential Line Receiver	0	4	Com		N	16	\$1.25
DS96F173C	Quad Differential Line Receiver	0	4	Com		J	16	\$3.65
DS96F173M	Quad Differential Line Receiver	0	4	Mil	✓	J, W, E	16/20	\$6.80
DS96175C	Quad Differential Line Receiver	0	4	Com		N	16	\$1.15
DS96F175C	Quad Differential Line Receiver	0	4	Com		J	16	\$3.38
DS96F175M	Quad Differential Line Receiver	0	4	Mil	✓	J, W, E	16/20	\$6.80
DS16F95	Differential Bus Transceiver	1	1	Mil	✓	J	8	\$31.10
DS16F95	Differential Bus Transceiver	1	1	Mil	✓	WG, E	8/10/20	\$35.40
DS3695	Multipoint Transceiver	1	1	Com		N	8	\$0.75
DS3695A	Multipoint Transceiver	1	1	Com		M	8	\$1.22
DS3695AT	Multipoint Transceiver	1	1	Ind		M	8	\$1.22
DS3695T	Multipoint Transceiver	1	1	Ind		N	8	\$0.75
DS36C278	Low Power Multipoint Transceiver	1	1	Com		M, N	8	\$1.25
DS36C278T	Low Power Multipoint Transceiver	1	1	Ind		M, N	8	\$1.25
DS36C279	Low Power Multipoint Transceiver/Sleep Mode	1	1	Com		M, N	8	\$1.25
DS36C279T	Low Power Multipoint Transceiver/Sleep Mode	1	1	Ind		M, N	8	\$1.40
DS36C280	Low Power Multipoint Transceiver/Slew Rate Control	1	1	Com		M, N	8	\$1.25
DS36C280T	Low Power Multipoint Transceiver/Slew Rate Control	1	1	Ind		M, N	8	\$1.25
DS36F95	Differential Bus Transceiver	1	1	Com		J, M	8	\$2.10
DS3696	Multipoint Transceiver	1	1	Com		N	8	\$1.22
DS3696A	Multipoint Transceiver	1	1	Com		M	8	\$1.58
DS3697	Multipoint Repeater	1	1	Com		N	8	\$1.72
DS36276	FAILSAFE Multipoint Transceiver	1	1	Com		M	8	\$1.40
DS36277T	Dominant Mode Multipoint Transceiver	1	1	Ind		M, N	8	\$1.40
DS75176B	Multipoint Transceiver	1	1	Com		M, N	8	\$0.39
DS75176BT	Multipoint Transceiver	1	1	Ind		M, N	8	\$0.50
DS96176C	Differential Bus Transceiver	1	1	Com		N	8	\$1.15
DS96177C	Differential Bus Repeater	1	1	Com		N	8	\$1.10
DS36950	Quad Differential Bus Transceiver	4	4	Com		V	20	\$7.00
DS36954	Quad Differential Bus Transceiver	4	4	Com		M, V	20	\$5.70
DS481	Low Power Multipoint Transceiver/Sleep Mode	1	1	Com		M, N	8	\$0.86
DS481T	Low Power Multipoint Transceiver/Sleep Mode	1	1	Ind		M, N	8	\$0.93
DS485	Low Power Multipoint Transceiver	1	1	Com		M, N	8	\$0.93
DS485T	Low Power Multipoint Transceiver	1	1	Ind		M, N	8	\$0.93
DS1487	Low Power 1/4 Unit Load Multipoint Transceiver	1	1	Com		M, N	8	\$1.25

Tx = Transmitter/Driver
Rx = Receiver

Temp Range:

Commercial (Com) = 0°C to 70°C
Industrial (Ind) = -40°C to 85°C

Military (Mil) = -55°C to 125°C
Military (Mil 883) = -55°C to 125°C

TIA/EIA-422 DRIVERS (RS-422)

TIA/EIA-422/423 RECEIVERS (RS-422/423)

Part Number	Description	Tx	Rx	Temp Range	Mil 883	Package Type	# Leads	Price ²
DS26C31T	Quad CMOS TRI-STATE Differential Line Driver	4	0	Ind		M, N	16	\$0.57
DS26C31M	Quad CMOS TRI-STATE Differential Line Driver	4	0	Mil	✓	J, W, E, WG	16/20	\$9.75
DS26LS31C	Quad High Speed Differential Line Driver	4	0	Com		M, N	16	\$0.43
DS26LS31M	Quad High Speed Differential Line Driver	4	0	Mil	✓	J, W, E	16/20	\$6.00
DS26LV31T	3V Enhanced CMOS Quad Differential Line Driver	4	0	Ind		M, N	16	\$1.00
DS3487	Quad TRI-STATE Line Driver	4	0	Com		M, N	16	\$0.40
DS34C87T	Quad CMOS TRI-STATE Differential Line Driver	4	0	Ind		M, N	16	\$0.81
DS34LV87T	3V Enhanced CMOS Quad Differential Line Driver	4	0	Ind		M, N	16	\$1.12
DS1691A	Dual TRI-STATE Line Driver	2	0	Mil	✓	J	16	\$6.05
DS3691	Dual TRI-STATE Line Driver	2	0	Com		M, N	16	\$1.70
DS89C387T	12 Channel CMOS Differential Line Driver	12	0	Ind		MEA	48	\$6.10
DS9638C	Dual High Speed Differential Line Driver	2	0	Com		M, N	8	\$0.95
DS9638M	Dual High Speed Differential Line Driver	2	0	Mil	✓	J	8	\$10.70
DS26C32AT	Quad CMOS Differential Line Receiver	0	4	Ind		M, N	16	\$0.52
DS26C32AM	Quad CMOS Differential Line Receiver	0	4	Mil	✓	J, E, WG	16/20	\$9.75
DS26LS32AC	Quad Differential Line Receiver	0	4	Com		M, N	16	\$0.43
DS26LS32C	Quad Differential Line Receiver	0	4	Com		M, N	16	\$0.43
DS26LS32M	Quad Differential Line Receiver	0	4	Mil	✓	J, W, E	16/20	\$6.00
DS26LS33M	Quad Differential Line Receiver	0	4	Mil	✓	J	16	\$6.00
DS3486	Quad Differential Line Receiver	0	4	Com		M, N	16	\$0.40
DS34C86T	Quad CMOS Differential Line Receiver	0	4	Ind		M, N	16	\$0.86
DS34LV86T	3V Enhanced CMOS Quad Differential Line Receiver	0	4	Ind		M, N	16	\$1.12
DS78C20	Dual CMOS Compatible Differential Line Receiver	0	2	Mil	✓	J	14	\$15.30
DS78C120	Dual CMOS Compatible Differential Line Receiver	0	2	Mil	✓	J	16	\$17.80
DS78LS120	Dual Differential Line Receiver	0	2	Mil	✓	J, W	16	\$6.95
DS88C20	Dual CMOS Compatible Differential Line Receiver	0	2	Com		N	14	\$2.65
DS89C386T	12 Channel CMOS Differential Line Receiver	0	12	Ind		MEA	48	\$6.10
DS9637AC	Dual Differential Line Receiver	0	2	Com		M, N	8	\$0.83
DS9637AM	Dual Differential Line Receiver	0	2	Mil	✓	J	8	\$9.25
DS8921	Differential Line Driver and Receiver Pair	1	1	Com		M, N	8	\$0.63
DS8921A	Differential Line Driver and Receiver Pair	1	1	Com		M, N	8	\$0.69
DS8921AT	Differential Line Driver and Receiver Pair	1	1	Ind		M	8	\$0.90
DS89C21T	Differential CMOS Line Driver and Receiver Pair	1	1	Ind		M	8	\$1.50
DS8922	Dual TRI-STATE Differential Line Driver/Receiver Pairs	2	2	Com		M, N	16	\$0.85
DS8922A	Dual TRI-STATE Differential Line Driver/Receiver Pairs	2	2	Com		M, N	16	\$0.90
DS8923A	Dual TRI-STATE Differential Line Driver/Receiver Pairs	2	2	Com		M, N	16	\$0.95
DS8925	Local Talk™ 2X3 Driver/Receiver	2	3	Com		M	16	\$1.34
DS8935	Local Talk™ 2X3 Driver/Receiver	2	3	Com		WM	20	\$1.55

Package Types:

J = Ceramic Dip MTD = TSSOP VJD = TQFP
E = LCC N = Molded DIP VF = PQFP
M = SOIC V = PLCC W = Ceramic Flatpack
MSA = SSOP VB = PQFP WG = Ceramic SOIC
MEA = SSOP VEH = TQFP WM = Wide SOIC

2 Price:

1,000 pc. suggested resale,
FOB Santa Clara, California,
USA. Price may vary by pack-
age or grade.

LVDS APPLICATION NOTES

	AN#	Title
LVDS		LVDS Owner's Manual & Design Guide ¹
	AN-971	An Overview of LVDS Technology
	AN-977	LVDS Signal Quality: Jitter Measurements Using Eye Pattern
	AN-1035	PCB Design Guidelines for LVDS Technology
	AN-1040	Bit Error Rate (BER) Testing Data
	AN-1060	EDN Article Reprint (1/97)
	AN-1088	LVDS Signal Quality: Cable Drive Measurement Using Eye Patterns
	AN-1108	Channel Link PCB and Interconnect Design-in Guidelines
	AN-1110	LVDS Quad Dynamic Icc vs. Frequency
	AN-1115	DS92LV010A Bus LVDS
	Channel & FPD Links	AN-1032
AN-1041		Channel Link Introduction
AN-1045		FPD Rising/Falling Edge Clocking and Bit Mapping
AN-1056		FPD STN Panel Applications
AN-1059		Skew and Jitter
AN-1084		Parallel Application of High Speed Link
AN-1085		FPD Link PCB and Interconnect Design-in Guidelines
AN-1109	Multi-Drop Channel-Link Operation	
General	AN-806	Data Transmission Lines and Their Characteristics
	AN-807	Reflections: Computations & Waveforms
	AN-808	Long Transmission Lines & Data Signal Quality
	AN-905	Transmission Line Rapidesigner Operations ²
	AN-912	Common Data Transmission Parameters & Their Definitions
	AN-916	A Practical Guide To Cable Selection
	AN-1111	An Introduction to IBIS (I/O Buffer Information Specification) Modeling

¹The LVDS Owner's Manual & Design Guide literature number is Lit# 550062

²The literature number for the Transmission Line Rapidesigner is Lit# 633200-001 (metric) or 633201-001 (English units). (The accompanying application note, AN-905, is also available separately as Lit# 100905-001)

ANSI/TIA/EIA-644 (LVDS) SPECIFICATIONS

Parameter	Description	Min	Max	Units
V _{OD}	Differential Output Voltage	247	454	mV
V _{OS}	Offset Voltage	1.125	1.375	V
ΔV _{OD}	Change in V _{OD}		50	mV
ΔV _{OS}	Change in V _{OS}		50	mV
I _{SC}	Short Circuit Current		24	mA
t _r /t _f	Output Rise/Fall Times (≥200Mbps)	0.26	1.5	ns
	Output Rise/Fall Times (<200Mbps)		30% of t _{ui} ³	
I _{IN}	Input Current		20	μA
V _{TH}	Threshold Voltage		100	mV
V _{IN}	Input Voltage Range	0	2.4	V

³ t_{ui} is unit interval (i.e. waveform period).

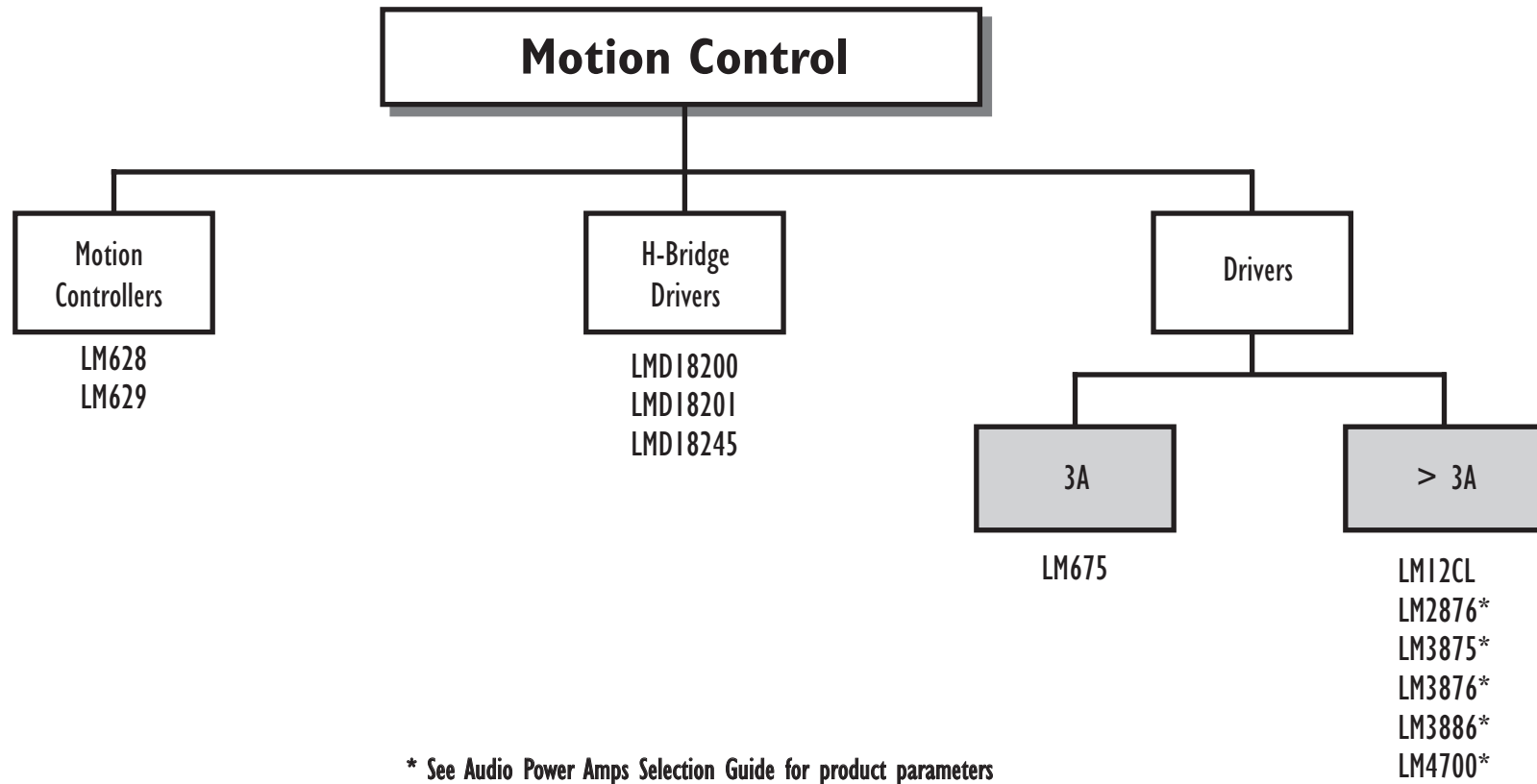
TECHNOLOGY COMPARISON

Parameter	LVDS	PECL	RS-422	TTL/CMOS
Output Voltage Swing	±350mV	±800mV	±2-5V	±2.4-5.5V
Receiver Threshold	±100mV	±200mV	±200mV	1.2/1.5V
Max Speed	>400Mbps	>400Mbps	<30Mbps	<150Mbps
I _{CC} @ 155Mbps	<10mA	87mA	18mA	75mA
Noise/EMI	Low	Low	High	High
Chip Cost	Low	Medium	Low	Low

MOTION CONTROL

Section 6

MOTION CONTROL



MOTOR DRIVE CIRCUITS—BRIDGES

Part Number	Description	Output Current (A)	Max Input Voltage (V)	Operating Temp (T _J)	Package	Price ¹
LMD18200	DMOS H-Bridge with Internal Current Sense	3	55	-40°C to +125°C	11-Lead TO-220	\$7.75
LMD18200-2D	Mil-Std 883. Dual DMOS H-Bridge	3	55	-55°C to +125°C	24-Lead Ceramic Dip	\$98.00
LMD18201	DMOS H-Bridge	3	55	-40°C to +125°C	11-Lead TO-220	\$7.20
LMD18245	DMOS H-Bridge with Digital or Analog Control	3	55	-40°C to +125°C	15-Lead TO-220	\$9.35
LM675	Monolithic Power Op-Amp	3	60	0°C to +70°C	5-Lead TO-220	\$3.00
LM12CL	Monolithic Power Op-Amp	10	60	0°C to +70°C	4-Lead TO-3	\$14.30

PRECISION MOTION CONTROL PROCESSOR

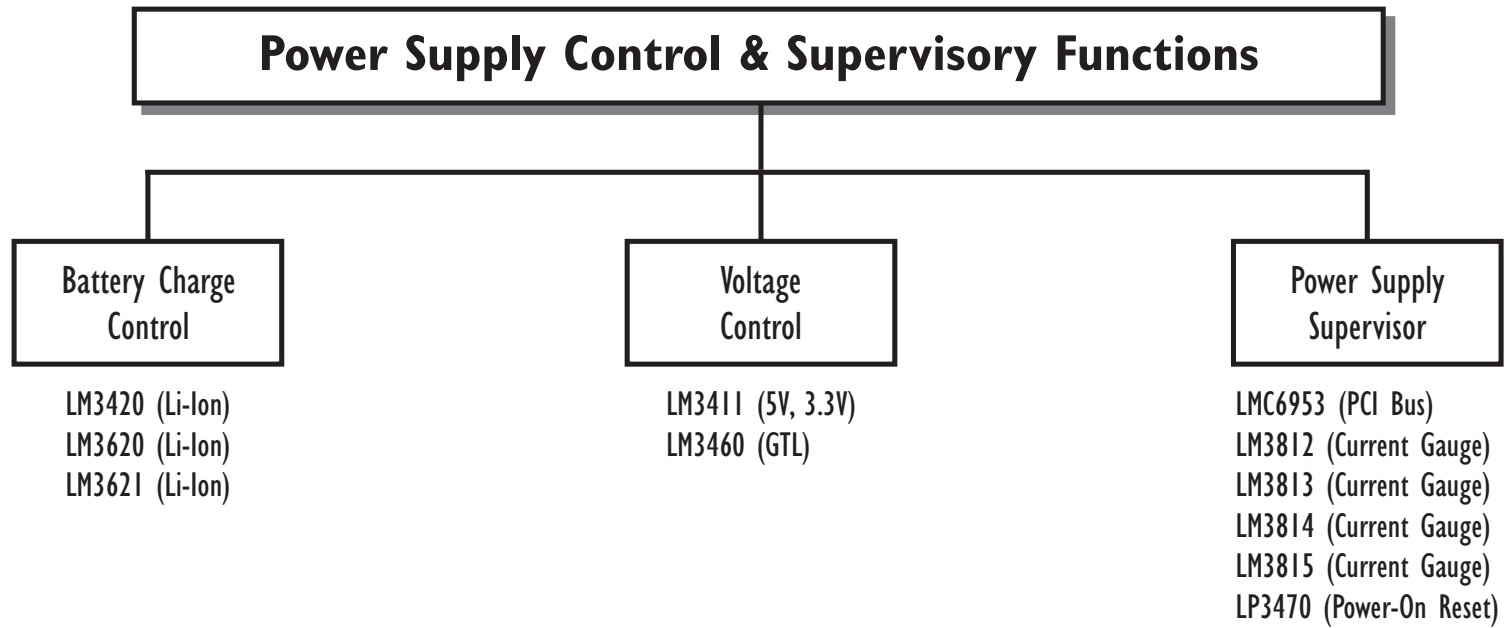
Part Number	Features	Max Clock Speed (MHz)	Operating Temp (T _A)	Package	Price ¹
LM628	32-Bit Position, Velocity, and Acceleration Registers; Position and Velocity Modes; 16-Bit PID Filter with Programmable Coefficients; 8- or 12-Bit DAC Output Data; Quadrature Incremental Encoder Interface; 8-Bit Asynchronous Host Interface	6 or 8	-40°C to +85°C	28-Lead DIP	\$19.00
LM629	Same Features as LM628, but with 8-Bit. PWM Sign/Magnitude Output Data	6 or 8	-40°C to +85°C	28-Lead DIP	\$19.00

Note 1: 1,000 piece suggested resale price. FOB Santa Clara, California, USA Price may vary with package option.

POWER SUPPLY CONTROL & SUPERVISORY FUNCTIONS

Section 7

POWER SUPPLY CONTROL & SUPERVISORY FUNCTIONS



BATTERY CHARGE CONTROL PRODUCTS

Part Number	Function	Input Range (V)	Output	Features	Pkg ¹	Operating Temp Range ²	Price ⁵
LM3420	Charge control for 1, 2, 3, 4, or 5 Li-Ion cells	4.2, 8.2, 8.4, 12.6, 16.8	Current for control of charger (20mA to 15mA)	1% & 0.5% tolerances.	M5	I	\$0.90
LM3620	Charge control for 1 or 2 Li-Ion cells	4 to 30	Current for control of charger (up to 15mA)	1.2% tolerance. Selectable battery type (coke vs graphite anode).	M5	C	\$0.75
LM3621	Full-function charge controller for 1 Li-ion cell	3.0 to 5.5	Analog control of constant-current constant-voltage charger	0.5% tolerance. Selectable battery type (coke vs graphite anode). 5 charge modes plus fault detection.	M16	C	\$1.57

VOLTAGE CONTROL PRODUCTS

Part Number	Function	Input Range (V)	Output	Features	Pkg ¹	Operating Temp Range ²	Price ⁵
LM3411	Power supply feedback control	3.3, 5	Current for control of regulator (20mA to 15mA)	1% & 0.5% tolerances. Custom voltages available (3V to 17V).	M5, M8	I	\$0.52
LM3460	GTL, GTLp Bus voltage control	1.2, 1.5	Current for control of regulator (20mA to 15mA)	1% tolerance.	M5	I	\$0.89

POWER SUPPLY SUPERVISOR PRODUCTS

Part Number	Function	Input Range	Output	Features	Pkg ¹	Operating Temp Range ²	Price ⁵
LMC6953	PCI Local Bus supervisor	1.5-6, 3.3, 5V	Reset flag	Power-on reset with adjustable delay.	M8	C	\$1.48
LM3812-1.0	High-Side Current Gauge	up to 1A	PWM with duty cycle proportional to input current	Sampling interval of 50ms for 4% tolerance.	M8	I	\$1.52
LM3812-7.0	High-Side Current Gauge	up to 7A (10A peak)	PWM with duty cycle proportional to input current	Sampling interval of 50ms for 6% tolerance.	M8	I	\$1.52
LM3813-1.0	Low-Side Current Gauge	up to 1A	PWM with duty cycle proportional to input current	Sampling interval of 50ms for 4% tolerance.	M8	I	\$1.52
LM3813-7.0	Low-Side Current Gauge	up to 7A (10A peak)	PWM with duty cycle proportional to input current	Sampling interval of 50ms for 6% tolerance.	M8	I	\$1.52
LM3814-1.0	High-Side Current Gauge	up to 1A	PWM with duty cycle proportional to input current	Sampling interval of 6ms for 5.5% tolerance.	M8	I	\$1.52
LM3814-7.0	High-Side Current Gauge	up to 7A (10A peak)	PWM with duty cycle proportional to input current	Sampling interval of 6ms for 8.5% tolerance.	M8	I	\$1.52
LM3815-1.0	Low-Side Current Gauge	up to 1A	PWM with duty cycle proportional to input current	Sampling interval of 6ms for 5.5% tolerance.	M8	I	\$1.52
LM3815-7.0	Low-Side Current Gauge	up to 7A (10A peak)	PWM with duty cycle proportional to input current	Sampling interval of 6ms for 8.5% tolerance.	M8	I	\$1.52
LP3470	Power-on Reset	2.63, 2.93, 3.08, 4.00, 4.38, 4.63V	Reset flag	Adjustable delay. Custom voltages available (2.4V-5.0V).	M5	I ³ , C ⁴	\$0.70

¹ Package designation includes number of pins:

- N = plastic dual-in-line
- M = plastic surface-mount
- M5 = 5 Lead SOT-23

² Industrial temperature range, I, denotes a junction temperature range of -40°C to +125°C.
Commercial temperature range, C, denotes a junction temperature range of 0°C to +70°C.

³ Temperature range is -40°C to +85°C.

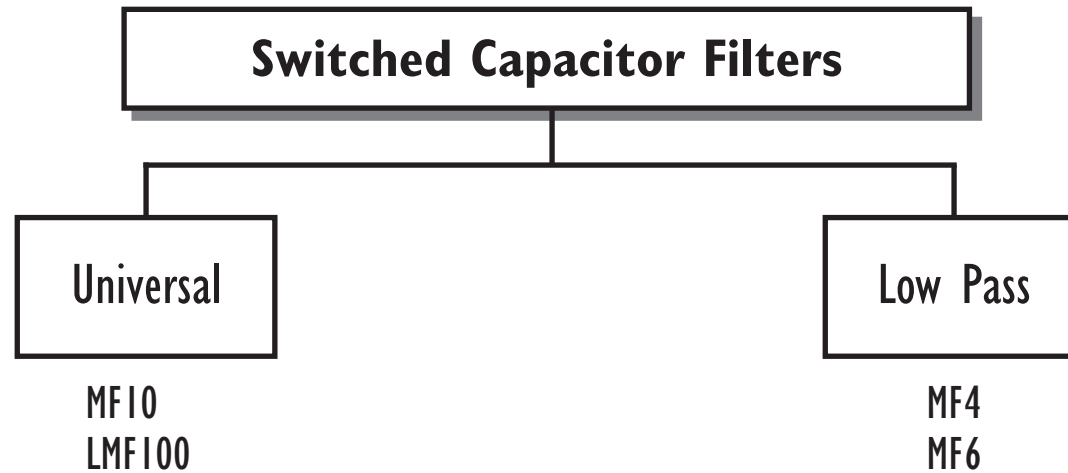
⁴ Temperature range is -20°C to +85°C.

⁵ 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

SWITCHED CAPACITOR FILTERS

Section 8

SWITCHED CAPACITOR FILTERS



SWITCHED CAPACITOR FILTERS

Part Number	Type	Function	Max Order	Freq. Accuracy (max)	Q Accuracy (typ)	Freq. Range	Max F * Q	Temp Range	Package Options	Price ¹
MF10	Universal	Universal	4th	±0.6%	±2%	0.1 - 30kHz	200kHz	C	N, WM	\$1.60
MF6	Lowpass	Butterworth	6th	±1%	N/A	0.1 - 20kHz	N/A	C	WM	\$1.20
MF4	Lowpass	Butterworth	4th	±0.6%	N/A	0.1 - 20kHz	N/A	C	N	\$0.74
LMF100	Universal	Universal	4th	±0.6%	±2%	0.1 - 40kHz	1.8MHz	C, I	N, WM	\$2.64

Package Codes:
 N = Plastic Dip
 J = Cerdip
 H = Metal Can
 MS = SSOP
 VF = PQFP
 V = PLCC
 WM = Small Outline

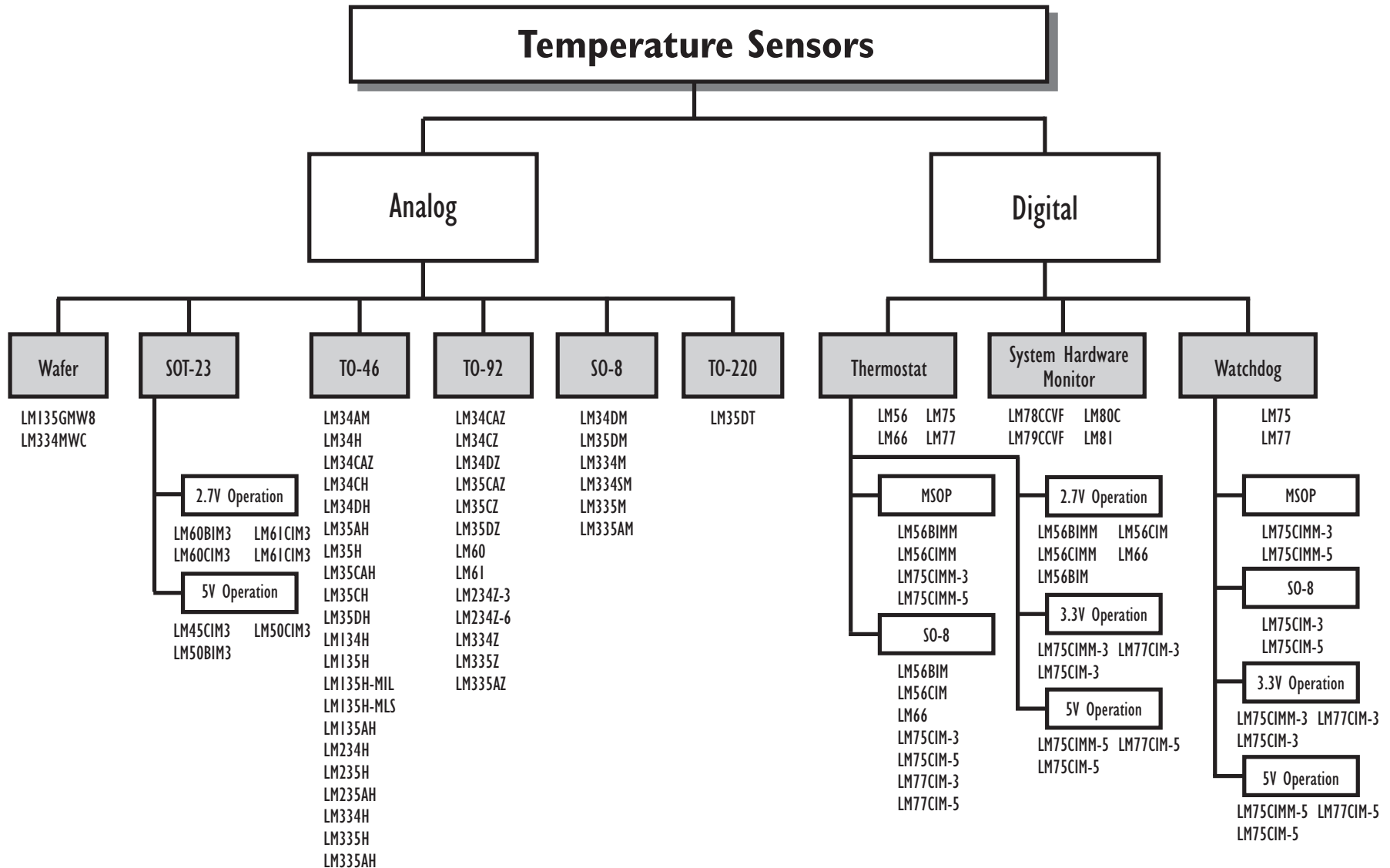
Temperatures:
 C = 0°C to +70°C
 I = -25°C to +85°C or -40°C to +85°C
 M = -55°C to +125°C

Note 1: 1,000 pc. suggested resale, FOB Santa Clara, California, USA.
 Price may vary by package or grade.

TEMPERATURE SENSORS

Section 9

TEMPERATURE SENSORS



Part Number	Product Description	Operating Temp. Range	Accuracy * (Tmin to Tmax)	Sensor Gain (Tmin to Tmax)	Supply Voltage Range	Quiescent Current (Tmin to Tmax)	Packages	Price **
LM34A	Precision Fahrenheit Temperature Sensors Output voltage linearity proportional to Fahrenheit temperature. Complement to LM35 family.	-50°F to +300°F	±2.0°F	10mV/°F	+5V to +30V	163 µA	TO-46	\$10.70
LM34		-50°F to +300°F	±3.0°F	10mV/°F	+5V to +30V	181 µA	TO-46	\$9.20
LM34CA		-40°F to +230°F	±3.0°F	10mV/°F	+5V to +30V	142 µA	TO-46, TO-92	\$4.00
LM34C		-40°F to +230°F	±3.0°F	10mV/°F	+5V to +30V	159 µA	TO-46, TO-92	\$3.10
LM34D		-32°F to +212°F	±4.0°F	10mV/°F	+5V to +30V	159 µA	TO-46, TO-92, SO-8	\$0.90
LM35A	Precision Celsius Temperature Sensors Output voltage linearity proportional to Celsius temperature. Complement to LM34 family.	-55°C to +150°C	±1.0°C	10mV/°C	+4V to +30V	133 µA	TO-46	\$11.40
LM35		-55°C to +150°C	±1.5°C	10mV/°C	+4V to +30V	161 µA	TO-46	\$8.75
LM35CA		-40°C to +110°C	±1.5°C	10mV/°C	+4V to +30V	116 µA	TO-46, TO-92	\$3.82
LM35C		-40°C to +110°C	±2.0°C	10mV/°C	+4V to +30V	141 µA	TO-46, TO-92	\$2.92
LM35D		0°C to +100°C	±2.0°C	10mV/°C	+4V to +30V	141 µA	TO-46, TO-92, SO-8	\$0.88
LM45B	SOT-23 Precision Celsius Temperature Sensors	-20°C to +100°C	±3.0°C	10mV/°C	+4V to +10V	160 µA	SOT-23	\$0.74
LM45C		-20°C to +100°C	±4.0°C	10mV/°C	+4V to +10V	160 µA	SOT-23	\$0.40
LM50B	SOT-23 Precision Celsius Temperature Sensors Negative temperature output available from single supply.	-25°C to +100°C	±3.0°C, -3.5°C	10mV/°C	+4.5V to +10V	180 µA	SOT-23	\$0.74
LM50C		-40°C to +125°C	±4.0°C	10mV/°C	+4.5V to +10V	180 µA	SOT-23	\$0.40
LM56B	Low Power Thermostats Digital output temperature sensor.	-40°C to +125°C	±3.0°C	6.2mV/°C	+2.7V to +10V	230 µA	SO-8, MSOP-8	\$1.00
LM56C		-40°C to +125°C	±4.0°C	6.2mV/°C	+2.7V to +10V	230 µA	SO-8	\$0.75
LM66C***		-40°C to +125°C	±4.0°C	6.2mV/°C	+2.7V to +10V	230 µA	SO-8	***
LM60B	2.7V, SOT-23 Temperature Sensors Negative temperature output available from single supply.	-25°C to +125°C	±3.0°C	6.25mV/°C	+2.7V to +10V	125 µA	SOT-23	\$0.80
LM60C		-40°C to +125°C	±4.0°C	6.25mV/°C	+2.7V to +10V	125 µA	SOT-23	\$0.46
LM61B	SOT-23 Precision Celsius Temperature Sensors	-25°C to +85°C	±3.0°C	10mV/°C	+2.7V to +10V	140 µA	SOT-23	\$0.80
LM61C		-30°C to +100°C	±4.0°C	10mV/°C	+2.7V to +10V	140 µA	SOT-23	\$0.46
LM75C	I²C Digital Temperature Sensors & Thermal Watchdogs	-55°C to +125°C	±3.0°C	2LSB/°C	+3.0V to +5.75V	250 µA	SO-8	\$1.05
LM77		-55°C to +105°C	±2.0°C	2LSB/°C	+2.7V to +5.75V	1mA	SO-8	\$0.90
LM77C		-55°C to +125°C	±3.0°C	2LSB/°C	+2.7V to +5.5V	1mA	SO-8	\$0.90
LM78C	Microprocessor System Hardware Monitors	-10°C to +100°C	±3.0°C	1LSB/°C	+4.25V to +5.75V	2mA	PQFP-44	\$1.95
LM79C		-55°C to +125°C	±3.0°C	1LSB/°C	+4.25V to +5.75V	1mA	PQFP-44	\$1.95
LM80C		-25°C to +125°C	±3.0°C	1 or 5LSB/°C	+2.8V to +5.75V	2mA	TSSOP-24	\$4.00
LM81C		-40°C to +125°C	±3.0°C	1 or 5LSB/°C	+2.8V to +3.8V	2mA	TSSOP-24	\$1.90
LM234-3	Precision Kelvin Temperature Sensors The LM234, 334 family are adjustable current sources specified as true Kelvin temperature sensors.	-25°C to +100°C	±3.0°C	ISET α °K	+1V to +40V	1 µA to 10mA	TO-46, TO-92	\$1.18
LM234-6		-25°C to +100°C	±3.0°C	ISET α °K	+1V to +40V	1 µA to 10mA	TO-46, TO-92	\$0.85
LM334		0°C to +70°C	±6.0°C	ISET α °K	+1V to +40V	1 µA to 10mA	TO-46, TO-92, SO-8	\$0.53
LM135A	Precision Kelvin Temperature Sensors The LM135, 235, 335 family operate as 2-terminal zener diodes with breakdown voltage linearity proportional to Kelvin temperature. Military screening available for LM135.	-55°C to +150°C	±1.0°C	10mV/°K	N/A	400 µA to 5mA	TO-46	\$8.55
LM135		-55°C to +150°C	±1.5°C	10mV/°K	N/A	400 µA to 5mA	TO-46	\$3.93
LM235A		-40°C to +125°C	±1.0°C	10mV/°K	N/A	400 µA to 5mA	TO-46	\$7.10
LM235		-40°C to +125°C	±1.5°C	10mV/°K	N/A	400 µA to 5mA	TO-46	\$2.70
LM335A		-40°C to +100°C	±1.0°C	10mV/°K	N/A	400 µA to 5mA	TO-46, TO-92, SO-8	\$3.40
LM335		-40°C to +100°C	±2.0°C	10mV/°K	N/A	400 µA to 5mA	TO-46, TO-92, SO-8	\$1.14

* Accuracy is guaranteed over Tmin to Tmax and is guaranteed at 25°C.

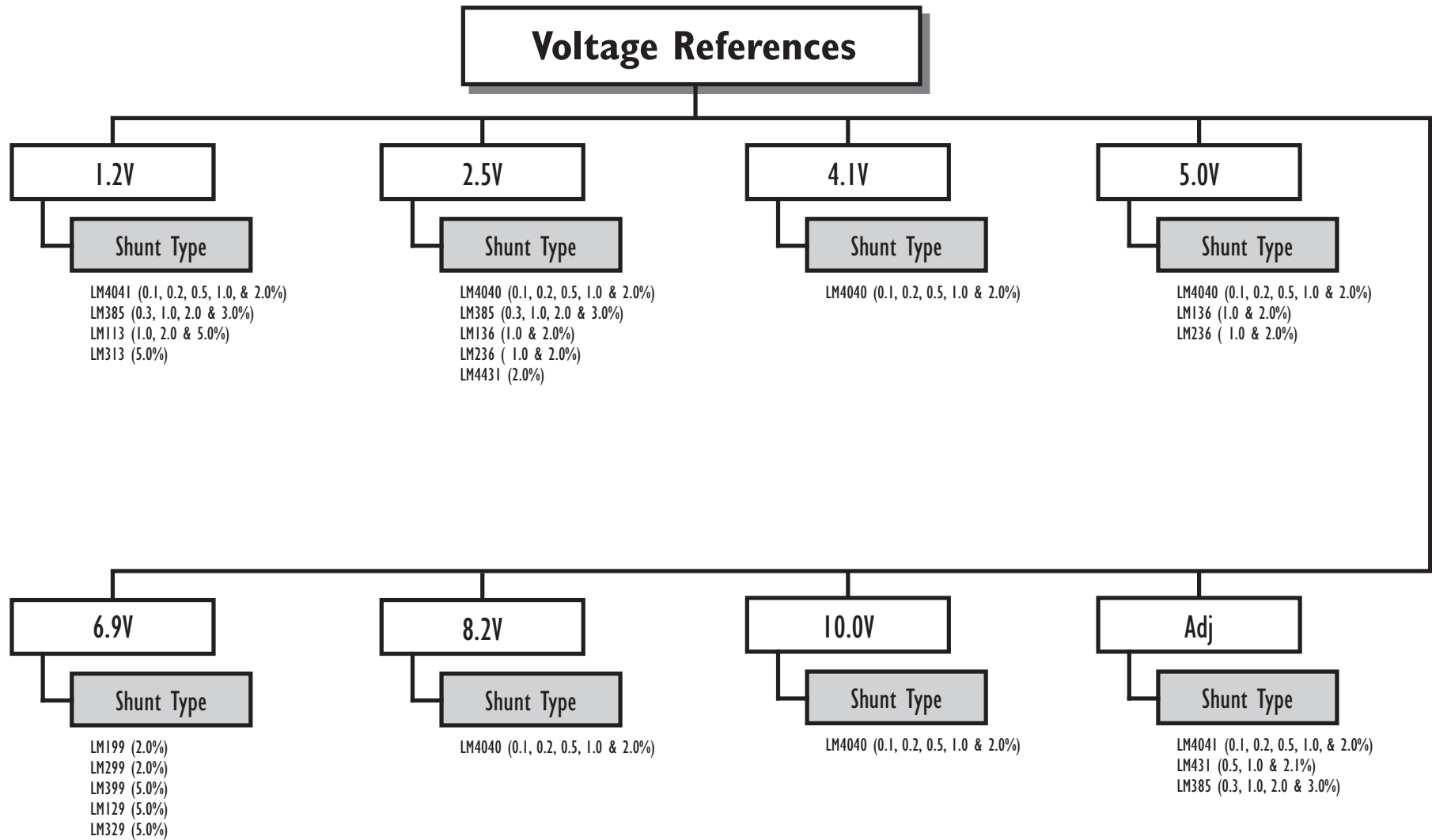
** 1,000 pc. suggested resale, FOB Santa Clara, California, USA.
Price may vary by package or grade.

*** Thermostat values are present internally. Contact National sales reps for availability and pricing.

VOLTAGE REFERENCES

Section 10

VOLTAGE REFERENCE



(Initial accuracy at 25°C as % of full scale)

SHUNT TYPE VOLTAGE REFERENCE

Part Number	Reference Voltage (V _R)	Initial Accuracy (% FS max), T=25°C	TEMPCO (ppm/°C) max	Operating Temp Range ***	Operating Current Range	Package	Notes	Price ¹
LM4040	2.5†, 4.1†, 5V, 8.2†, 10	±0.1, ±0.2, ±0.5, ±1.0, ±2.0	100, 150	Ind, Ext	60 μA to 15mA	SOT-23, TO-92	±1% & ±2% accuracy parts have TEMPCO's of 150 ppm/°C	\$0.32
LM4041	1.2†, Adj	±0.1, ±0.2, ±0.5, ±1.0, ±2.0	100, 150	Ind, Ext	60 μA to 12mA	SOT-23, TO-92	1.225V to 10V Adjustable. TEMPCO same as LM4040	\$0.32
LM185	1.2†, 2.5, Adj	±1.0	30, 50	Mil	10 μA to 20mA	TO-46, LCC	Adjustable from 1.24 to 5.3V	\$5.90
LM285	1.2†, 2.5	±1.0	30, 50	Ind	10 μA to 20mA	SO-8, TO-46, TO-92	Adjustable from 1.24 to 5.3V	\$0.80
LM385	1.2†, 2.5, Adj	±0.5**, ±1.0, ±2.0, ±3.0	30, 50	Com	10 μA to 20mA	SOT-23, SO-8, TO-92	Adjustable from 1.24 to 5.3V	\$0.46
LM113	1.2†	±1.0, ±2.0, ±5.0	100††	Mil	500 μA to 20mA	TO-46	1.22V	\$6.80
LM313	1.2†	±5.0	100††	Com	500 μA to 20mA	TO-46	1.22V	\$4.47
LM431	Adj	±0.5, ±1.0, ±2.0	50††	Com, Ind	1.0mA to 100mA	SOT-23, SO-8, TO-92	Adjustable from 2.5 to 36V	\$0.20
LM4431	2.5	±2.0	30††	Com	100 μA to 15mA	SOT-23		\$0.45
LM136	2.5, 5	±1.0, ±2.0	40	Mil	400-600 μA to 10mA	TO-46	Trimable reference voltage and temperature drift	\$8.70
LM336	2.5, 5	±2.0, ±5.0**	34	Com	400-600 μA to 10mA	SO-8, TO-92	Trimable reference voltage and temperature drift	\$0.57
LM199	6.95	±2.0	0.5	Mil	500 μA to 10mA	TO-46		\$17.40
LM299	6.95	±2.0	1	Ind	500 μA to 10mA	TO-46	Operating Temperature range: -25 to 85°C	\$8.65
LM399	6.95	±5.0	1, 2	Com	500 μA to 10mA	TO-46		\$2.08
LM129	6.95	±3.0**	10*, 20, 50	Mil	600 μA to 15mA	TO-46		\$3.55
LM329	6.95	±5.0	10, 20*, 50, 100	Com	600 μA to 15mA	TO-92, TO46	LM329D has a tempco of 100 ppm/°C	\$0.40
LMV431A	Adj	±1.0	38††	Ind	50 μA to 20mA	SOT-23, TO-92	Adjustable from 1.24 to 30V (Low voltage version of LM431)	\$0.35

† Consult datasheet for precise V_R

* Other TEMPCO's available, lowest are shown.

** Initial Accuracy better than value indicated.

*** Com. = 0 to 70°C, Ind. = -40 to 85°C, Ext. = -40 to 125°C, Mil. = -55 to 125°C.

†† Typical value.

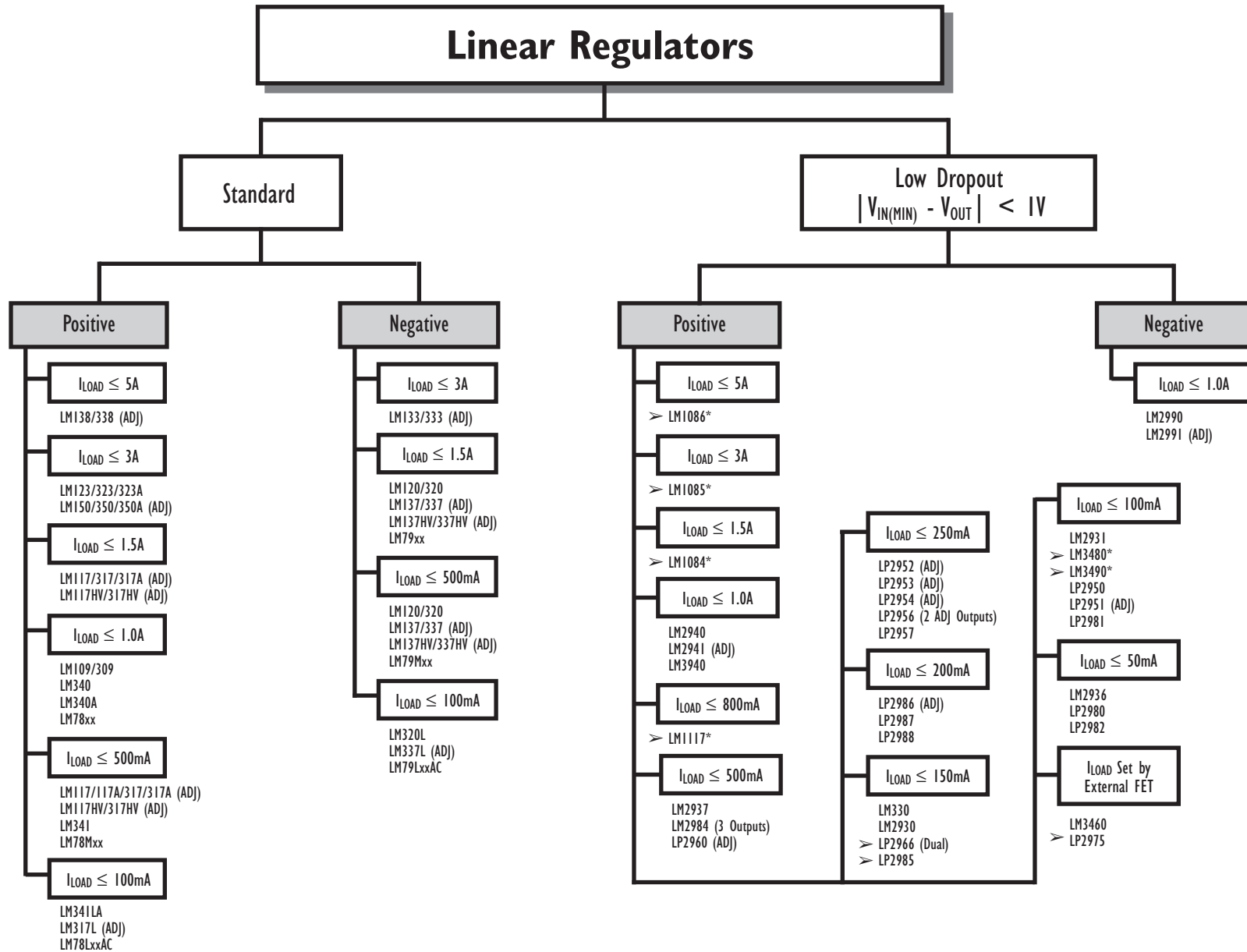
Refer to specific datasheets for exact specifications, available options, and ordering information. Some combinations of reference voltage, initial accuracy and package are not available.

Note 1: 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

VOLTAGE REGULATORS/CONVERTERS

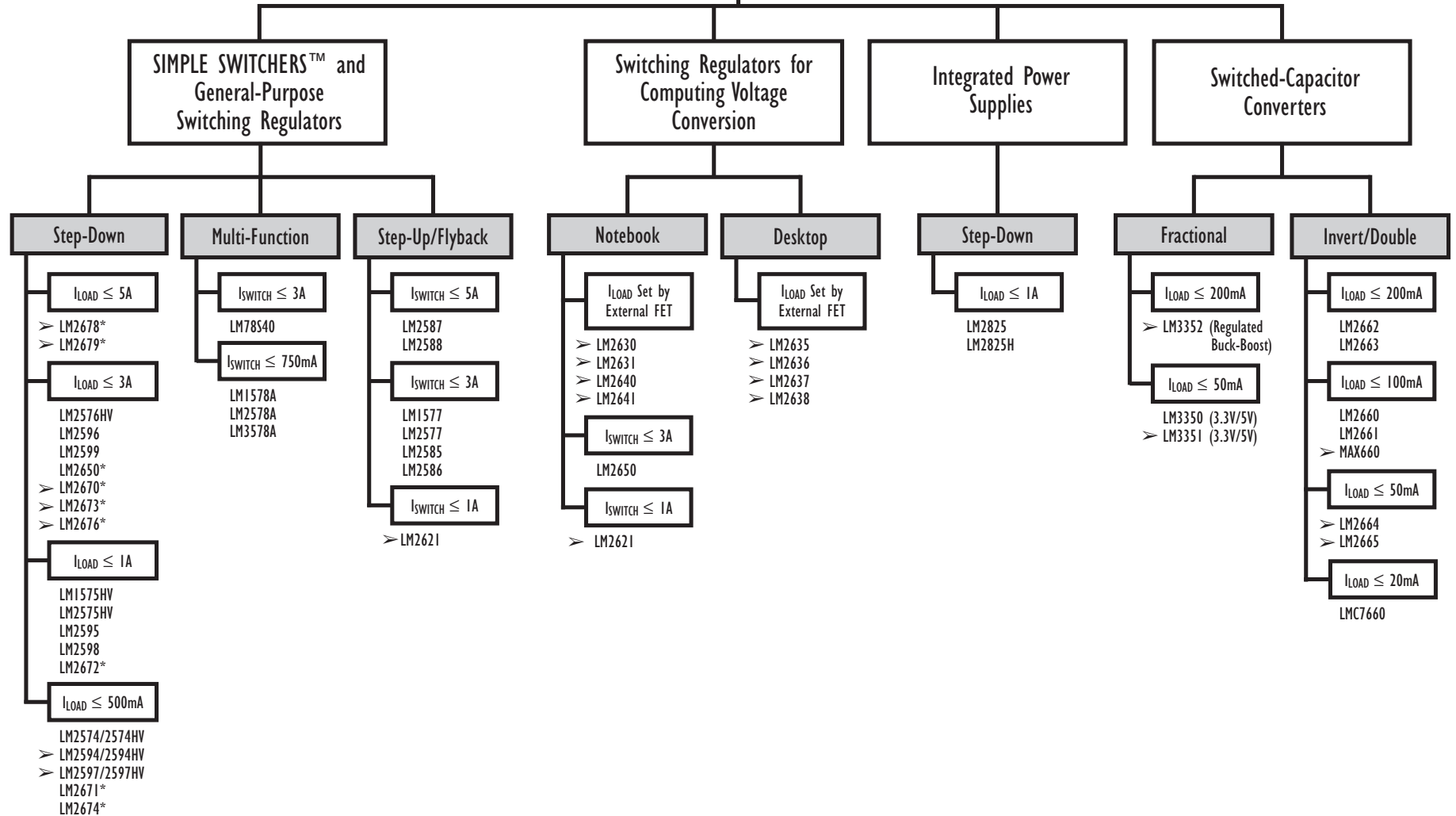
Section 11

VOLTAGE REGULATORS/CONVERTERS



> Indicates new products
 * Indicates dropout voltage ≤ 1.2V - 1.5V

Switching Converters



> Indicates new products
 * Indicates extra-high efficiency converters

VOLTAGE REGULATORS/CONVERTERS

SWITCHED CAPACITOR CONVERTER

Part Number	Function	Output Impedance (ohms)	Output Current (mA)	Input Range (V)	Oscillator Frequency (kHz)	Capacitor Value (μF)	Quiescent Current (μA)	Shutdown	Frequency Control Input	Frequency Sync.	Package ¹	Price ²
Doubler/Inverter												
LM2660	$-(V_{IN})$ or $2(V_{IN})$	6.5	100	1.5 to 5.5	10/80	150 (x2)	120/400	No	Yes	Yes	MSOP-8/SO-8	\$1.59
LM2661	$-(V_{IN})$ or $2(V_{IN})$	6.5	100	1.5 to 5.5	80	150 (x2)	1000	Yes	No	Yes	MSOP-8/SO-8	\$1.59
LM2662	$-(V_{IN})$ or $2(V_{IN})$	3.5	200	1.5 to 5.5	20/150	47 (x2)	300/1300	No	Yes	Yes	SO-8	\$2.10
LM2663	$-(V_{IN})$ or $2(V_{IN})$	3.5	200	1.5 to 5.5	150	47 (x2)	1300	Yes	No	Yes	SO-8	\$2.10
LM2664	$-(V_{IN})$	12	40	1.8 to 5.5	160	3.3 (x2)	220	Yes	No	No	SOT23-6	\$0.85
LM2665	$2(V_{IN})$	12	40	1.8 to 5.5	160	3.3 (x2)	550	Yes	No	No	SOT23-6	\$0.85
Fractional												
LM3350	$3/2(V_{IN})$ or $2/3(V_{IN})$	4.2/1.8	50	1.5 to 5.5	1600	0.33 (x4)	3750	Yes	No	No	MSOP-8	\$1.23
LM3351	$3/2(V_{IN})$ or $2/3(V_{IN})$	4.2/1.8	50	1.5 to 5.5	400	1 (x4)	1110	Yes	No	No	MSOP-8	\$1.25
LM3352	Regulated Output, 2.5V, 3.0V, or 3.3V	n/a	200	2.5 to 5.5	1000	0.33 (x3)	330	Yes	No	No	TSSOP-16	\$2.75

INTEGRATED POWER SUPPLY SELECTION GUIDE

Part Number	V _{IN}	V _{OUT}	I _{OUT}	Application	Package ¹	Price ²
LM2825-3.3	4.75V to 40V	3.3V	1A	Buck	N24	\$10.50
LM2825-5.0	7V to 40V	5.0V	1A	Buck	N24	\$9.65
LM2825-12	15V to 40V	12V	0.75A	Buck	N24	\$10.50
LM2825-ADJ	4.5V to 40V	1.23V to 8V	1A	Buck	N24	\$10.50
LM2825H-ADJ	9V to 40V	7V to 15V	0.55A	Buck	N24	\$10.50

Note ¹ Package designation includes the number of pins. N = Molded DIP

Note ² 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

SIMPLE SWITCHER® POWER CONVERTER FAMILY

Part Number	V _{Out}	Tolerance	Min	Max	Temp Range ³	Switching Frequency	Conv. Effic.	Soft Start	Shut-down	Pwr. Good Flag	Clock Sync	Adj Current Limit	Number External Components	Package ⁴	Price ⁵
BUCK CONVERTERS															
500mA Output Current															
LM2671	3.3V, 5V, 12V, Adj ¹	±1.5%	8V	40V	Ind	260-400	94%	✓	✓		✓		5-6	M, N	\$2.39
LM2674	3.3V, 5V, 12V, Adj ¹	±1.5%	8V	40V	Ind	260	94%		✓				5	M, N	\$2.29
LM2594	3.3V, 5V, 12V, Adj ¹	±4%	4.75V	40V	Ind	150	88%		✓				4	M, N	\$1.40
LM2594HV	3.3V, 5V, 12V, Adj ¹	±4%	4.75V	60V	Ind	150	88%		✓				4	M, N	\$1.95
LM2597	3.3V, 5V, 12V, Adj ¹	±4%	4.75V	40V	Ind	150	88%	✓	✓	✓			4-7	M, N	\$1.82
LM2597HV	3.3V, 5V, 12V, Adj ¹	±4%	4.75V	60V	Ind	150	88%	✓	✓	✓			4-7	M, N	\$2.00
LM2574HV	3.3V, 5V, 12V, 15V, Adj ¹	±4%	4.75V	60V	Ind	52	80%		✓				4	M, N	\$1.95
1.0A Output Current															
LM2672	3.3V, 5V, 12V, Adj ¹	±1.5%	8V	40V	Ind	260-400	94%	✓	✓		✓		5-6	M, N	\$2.69
LM2675	3.3V, 5V, 12V, Adj ¹	±1.5%	8V	40V	Ind	260	94%		✓				5	M, N	\$2.59
LM2595	3.3V, 5V, 12V, Adj ¹	±4%	4.75V	40V	Ind	150	90%		✓				4	S, T	\$1.68
LM2595 Mil	3.3V, 5V, 12V, Adj ¹	±4%	4.75V	40V	Mil	150	90%		✓				4	J	\$12.70
LM2598	3.3V, 5V, 12V, Adj ¹	±4%	4.75V	40V	Ind	150	90%	✓	✓	✓			4-7	S, T	\$2.08
LM1575	3.3V, 5V, 12V, 15V, Adj ¹	±4%	4.75V	40V	Mil	52	85%		✓				4	K	\$7.60
LM1575HV	5V, 12V, 15V, Adj ¹	±4%	4.75V	60V	Mil	52	85%		✓				4	K	\$23.80
LM2575HV	3.3V, 5V, 12V, 15V, Adj ¹	±4%	4.75V	60V	Ind	52	85%		✓				4	M, N, S, T	\$2.15
3.0A Output Current															
LM2670	3.3V, 5V, 12V, Adj ¹	±2%	8V	40V	Ind	260-400	94%		✓		✓		5-9	S, T	\$3.19
LM2673	3.3V, 5V, 12V, Adj ¹	±2%	8V	40V	Ind	260	94%	✓				✓	5-8	S, T	\$3.19
LM2676	3.3V, 5V, 12V, Adj ¹	±2%	8V	40V	Ind	260	94%		✓				5-6	S, T	\$3.08
LM2596	3.3V, 5V, 12V, Adj ¹	±4%	4.75V	40V	Ind	150	90%		✓				4	S, T	\$2.38
LM2599	3.3V, 5V, 12V, Adj ¹	±4%	4.75V	40V	Ind	150	90%	✓	✓	✓			4-7	S, T	\$2.64
LM2576HV	3.3V, 5V, 12V, 15V, Adj ¹	±4%	6V	60V	Ind	52	85%		✓				4	S, T	\$2.78
5.0A Output Current															
LM2678	3.3V, 5V, 12V, Adj ¹	±2%	8V	40V	Ind	260	92%		✓				5-6	S, T	\$3.49
LM2679	3.3V, 5V, 12V, Adj ¹	±2%	8V	40V	Ind	260	92%	✓				✓	5-8	S, T	\$3.69
BOOST/FLYBACK CONVERTERS															
3.0A Switch Current															
LM2585	3.3V, 5V, 12V, Adj ¹	±4%	4V	40V	Ind	100	90%	✓					7	S, T	\$3.17
LM2586	3.3V, 5V, 12V, Adj ¹	±4%	4V	40V	Ind	100-200	90%	✓	✓		✓		7	S, T	\$3.27
LM1577	12V, 15V, Adj ¹	±5%	3.5V	40V	Mil	52	80%	✓					7	K	\$24.10
LM2577	12V, 15V, Adj ¹	±5%	3.5V	40V	Ind	52	80%	✓					7	M, N, S, T	\$3.12
5.0A Switch Current															
LM2587	3.3V, 5V, 12V, Adj ¹	±4%	4V	40V	Ind	100	90%	✓					7	S, T	\$4.17
LM2588	3.3V, 5V, 12V, Adj ¹	±4%	4V	40V	Ind	100-200	90%	✓	✓		✓		7	S, T	\$4.27

All switching converters have Current Limiting and Thermal Shutdown features.

¹ Typically 1.23V to (V_{IN} max - 3V).

² For fixed V_{out} devices. Check data sheet for adj. parts.

³ Under Temp Range the letters indicate temperature range.
 Ind = Industrial Temperature range of -40°C to +125°C
 Mil = Military Temperature range of -55°C to +150°C.

⁴ Under Package, the letter identifies the type of package.

K = Metal Can (TO-3)
 M = Small Outline Molded Package (Surface Mount)
 N = Molded Dual-In-Line Package

S = TO-263 (Power Surface Mount)
 T = TO-220 (Power Through Hole)
 J = Aluminum Nitride Ceramic Dual In-Line Package

⁵ 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

VOLTAGE REGULATORS/CONVERTERS

LOW DROPOUT REGULATOR PRODUCTS

Output Current	Device	V _{OUT} Accuracy ¹	Output Voltage (V)						Dropout Voltage V (max) ²	Quiescent Current mA (max) ³	Max. Input Voltage	Reverse Polarity Protection (V)	Transient Protection (V)
			3.0	3.3	5	12	ADJ	Other Available Voltages					
50 mA	LP2980A	0.5%	✓	✓	✓			2.5, 2.6, 2.7, 2.8, 2.9, 3.1, 3.2, 3.5, 3.6, 3.8, 4.0, 4.5, 4.7	0.15	0.095	16 ††	—	—
	LP2980	1%	✓	✓	✓			2.5, 2.6, 2.7, 2.8, 2.9, 3.1, 3.2, 3.5, 3.6, 3.8, 4.0, 4.5, 4.7	0.15	0.095	16	—	—
	LP2982A	1%	✓	✓	✓			2.5, 2.75, 2.8, 3.6, 3.8, 4.0, 4.5, 4.7	0.15	0.095	16	—	—
	LP2982	1.5%	✓	✓	✓			2.5, 2.75, 2.8, 3.6, 3.8, 4.0, 4.5, 4.7	0.15	0.095	16	—	—
	LM2936	3%F			✓				0.4	0.015	40	-15	+60/-50
100 mA	LP2981A	0.75%	✓	✓	✓			2.5, 2.7, 2.8, 2.9, 3.1, 3.2, 3.6, 3.8, 4.0, 4.5, 4.7	0.25	0.095	16	—	—
	LP2981	1.25%	✓	✓	✓			2.5, 2.7, 2.8, 2.9, 3.1, 3.2, 3.6, 3.8, 4.0, 4.5, 4.7	0.25	0.095	16	—	—
	LP2950AC	0.5%	✓	✓	✓				0.45	0.12	30	—	—
	LP2951AC	0.5%	✓	✓	✓		1.24 to 29 [#]		0.45	0.12	30	—	—
	LP2950C	1%	✓	✓	✓				0.45	0.12	30	—	—
	LP2951**	1%			✓		1.24 to 29 [#]		0.45	0.12	30	—	—
	LP2951C	1%	✓	✓	✓		1.24 to 29 [#]		0.45	0.12	30	—	—
	LM2931A	4%			✓				0.6	1.0	26	-15	+60*/-50
	LM3480	4%		✓	✓	✓		15	1.1	4T	30	—	—
	LM3490	4%		✓	✓	✓		15	1.1	4T	30	—	—
	LM2931	5%			✓				0.6	1.0	26	-15	+60*/-50
LM2931C	5%					3 to 24		0.6	1.0	26	-15	+60*/-50	
150 mA	LP2966	1%	✓	✓	✓			1.8, 2.5, 2.8, 3.6	0.195	0.45	7	—	—
	LP2985A	1%	✓	✓	✓			2.8, 3.1, 3.2, 3.6, 3.8, 4.0	0.35	0.095	16	—	—
	LP2985	1.5%	✓	✓	✓			2.8, 3.1, 3.2, 3.6, 3.8, 4.0	0.35	0.095	16	—	—
	LM330	4%			✓				0.6	7	26	-12	+50/-30
	LM2930	6%			✓			8	0.6	7	26	-6	+40*/-12
	200 mA	LP2986A	0.5%	✓	✓	✓		1.24 to 15.5 [#]		0.23	0.12	16	—
LP2987A		0.5%	✓	✓	✓			2.8, 3.2, 3.8	0.23	0.12	16	—	—
LP2988A		0.5%	✓	✓	✓			2.8, 3.2, 3.8	0.23	0.12	16	—	—
LP2986		1%	✓	✓	✓		1.24 to 15.5 [#]		0.23	0.12	16	—	—
LP2987		1%	✓	✓	✓			2.8, 3.2, 3.8	0.23	0.12	16	—	—
LP2988		1%	✓	✓	✓			2.8, 3.2, 3.8	0.23	0.12	16	—	—
250 mA	LP2952A	0.5%		✓	✓		1.23 to 29 [#]		0.6	0.17	30	-20	—
	LP2953A	0.5%		✓	✓		1.24 to 29 [#]		0.6	0.17	30	-20	—
	LP2953AM**	0.5%			✓		1.24 to 29 [#]		0.6	0.17	30	-20	—
	LP2954A	0.5%			✓		1.24 to 29 [#]		0.6	0.15	30	-20	—
	LP2956A***	0.5%			✓		1.24 to 29 [#]		0.6	0.25	30	-20	—
	LP2956A	0.5%			✓		1.24 to 29 [#]		0.6	0.25	30	-20	—
	LP2957A	0.5%			✓			0.6	0.20	30	-20	—	
	LP2952	1%		✓	✓		1.24 to 29 [#]		0.6	0.17	30	-20	—
	LP2953	1%		✓	✓		1.24 to 29 [#]		0.6	0.17	30	-20	—
	LP2954	1%			✓		1.24 to 29 [#]		0.6	0.15	30	-20	—
	LP2956	1%			✓		1.24 to 29 [#]		0.6	0.25	30	-20	—
	LP2957	1%			✓				0.6	0.20	30	-20	—

LOW DROPOUT REGULATOR PRODUCTS

Output Current	Device	Shutdown Control	Error Flag	Power-On Reset	Additional Features	Operating Temp Range ⁴	Package Availability ⁵	Price ⁶
50 mA	LP2980A	✓				Ind	M5	\$0.63
	LP2980	✓				Ind	M5	\$0.52
	LP2982A	✓			Low-noise	Ind	M5	\$0.68
	LP2982	✓			Low-noise	Ind	M5	\$0.55
	LM2936					Ind	M, Z	\$1.10
100 mA	LP2981A	✓				Ind	M5	\$0.70
	LP2981	✓				Ind	M5	\$0.60
	LP2950AC					Ind	Z	\$0.55
	LP2951AC	✓	✓			Ind	N, M	\$0.69
	LP2950C					Ind	Z	\$0.50
	LP2951**	✓	✓			Mil	E, H, J, WG	\$6.45
	LP2951C	✓	✓			Ind	N, M, MM	\$0.64
	LM2931A					Ind	M, S, T	\$0.54
	LM3480					Ind	M3	\$0.32
	LM3490	✓				Ind	M5	\$0.36
	LM2931					Ind	M, S, T, Z	\$0.43
	LM2931C	✓				Ind	M, S, T	\$0.53
150 mA	LP2966	✓	✓		Two independent outputs	Ind	MM	\$0.79
	LP2985A	✓			Low-noise, ceramic output cap.	Ind	M5	\$0.73
	LP2985	✓			Low-noise, ceramic output cap.	Ind	M5	\$0.63
	LM330					Ind	T	\$0.54
	LM2930					Ind	S, T	\$0.50
200 mA	LP2986A	✓	✓			Ind	M, MM	\$1.02
	LP2987A	✓	✓	✓		Ind	M, MM	\$1.11
	LP2988A	✓	✓		Low-noise	Ind	M, MM	\$1.04
	LP2986	✓	✓			Ind	M, MM	\$0.93
	LP2987	✓	✓	✓		Ind	M, MM	\$1.02
	LP2988	✓	✓		Low-noise	Ind	M, MM	\$0.98
250 mA	LP2952A	✓	✓			Ind	N, M	\$1.70
	LP2953A	✓	✓		Aux. Comparator	Ind	N, M	\$2.26
	LP2953AM**	✓	✓		Aux. Comparator	Mil	J, WG	\$12.10
	LP2954A	✓	✓		Shutdown, error flag, & ADJ output on M package only	Ind	M, S, T	\$1.70
	LP2956A**	✓	✓		Aux. Comparator, Aux. 75 mA output	Mil	J	\$16.80
	LP2956A	✓	✓		Aux. Comparator, Aux. 75 mA output	Ind	N, M	\$2.09
	LP2957A	✓	✓			Ind	S, T	\$1.86
	LP2952	✓	✓			Ind	N, M	\$1.00
	LP2953	✓	✓		Aux. Comparator	Ind	N, M	\$1.28
	LP2954	✓	✓		Shutdown, error flag, & ADJ output on M package only	Ind	M, S, T	\$1.00
	LP2956	✓	✓		Aux. Comparator, Aux. 75mA output	Ind	N, M	\$1.49
LP2957	✓	✓			Ind	S, T	\$1.47	

Notes

- "F" denotes accuracy for full temperature range; otherwise, accuracy is at 25°C.
- Dropout voltage is given for full load. "F" denotes value for full temperature range, and "T" denotes typical value; otherwise, values are maximum at 25°C.
- Quiescent current is given for minimum load. "F" denotes value for full temperature range, and "T" denotes typical value; otherwise, values are maximum at 25°C.
- Military temperature range ("Mil") denotes junction temperature range of -55°C to +150°C, unless marked as "X" for products having an upper operating limit of 125°C. Industrial temperature range ("Ind") denotes junction temperature range of -40 to +125°C, unless marked as "X" for products having a lower operating limit of 0°C.
- Under Package Availability, the letter identifies the type of package.
 E = Leadless Ceramic Chip Carrier
 H = Metal Can (TO-99)
 J = Ceramic Dual-In-Line Package
 K = Metal Can (TO-3)
 S = TO-263 (Power Surface Mount)
 N = Molded Dual-In-Line Package
 M = Small Outline Molded Package (Surface Mount)
 M3 = SOT23-3 (3 Lead SOT23 Package)
 M5 = SOT23-5 (5 Lead SOT23 Package)
 MM = Mini 8-Lead Surface-Mount Package
 MP = SOT223 (3 Lead Surface Mount)
 T = TO-220
 WG = Ceramic SOIC
 Z = TO-92
- 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

Other Notes

- * Positive transient protection value also indicates the regulator's load dump capability.
- ** Available in indicated package only as a military specified device.
- †† 20V version available upon request.
- # Denotes products with fixed output voltages that also provide adjustment control of the output voltage.

VOLTAGE REGULATORS/CONVERTERS

LOW DROPOUT REGULATOR PRODUCTS

Output Current	Device	V _{OUT} Accuracy ¹	Output Voltage (V)						Dropout Voltage V (max) ²	Quiescent Current mA (max) ³	Max. Input Voltage	Reverse Polarity Protection (V)	Transient Protection (V)	
			3.0	3.3	5	12	ADJ	Other Available Voltages						
500 mA	LP2960A	0.8%		√	√			1.24 to 29 [#]		0.6	0.6	30	-20	—
	LP2960	1.5%		√	√			1.24 to 29 [#]		0.6	0.6	30	-20	—
	LM2984	3%			√(3)					0.8	100	26	-15	+60*/-35
	LM2937	3%		√	√	√			2.5, 8, 10, 15	1.0F	10	26	-15	+60*/-50
800 mA	LM1117	1%		√	√			1.25 to 13.8		1.3F	10	20	—	—
1.0 A	LM2990**	2%								1.0T	5	-26	—	—
	LM2990	2%								1.0T	5	-26	—	—
	LM2991**	2%						-2 to -25		1.0T	5	-26	—	—
	LM2991	2%						-2 to -25		1.0T	5	-26	—	—
	LM2940**	3%			√	√			8, 15	0.7	15	26	-15	+60*/-50
	LM2940	3%			√	√			8, 9, 10	0.8	15	26	-15	+60*/-50
	LM2940C	3%			√	√			9, 15	0.8	15	26	-15	+45/-45
	LM2941**	3%						5 to 20		0.8	15	26	-15	+60*/-50
	LM2941	3%						5 to 20		0.8	15	26	-15	+60*/-50
	LM2941C	3%						5 to 20		0.8	15	26	-15	+45/-45
	LM3940**	3%		√						0.8	15	7.5	—	—
	LM3940	3%		√						0.8	15	7.5	—	—
	1.5 A	LM1086	1%		√	√			1.25 to 23.5		1.5F	10	30	—
3 A	LM1085	1%		√	√	√		1.25 to 23.5		1.5F	10	30	—	—
5 A	LM1084	1%		√	√	√		1.25 to 23.5		1.5F	10	30	—	—
Controller	LP2975A	1.5%		√	√	√		1.24 to 24 [#]		—	0.24	24	—	—
	LP2975	2.5%		√	√	√		1.24 to 24 [#]		—	0.24	24	—	—
	LM3460	2.5%							1.2, 1.5	—	0.125	—	—	—

LOW DROPOUT REGULATOR PRODUCTS

Output Current	Device	Shutdown Control	Error Flag	Power-On Reset	Additional Features	Operating Temp Range ⁴	Package Availability ⁵	Price ⁶
500 mA	LP2960A	√	√		Aux. Comparator	Ind	N, M	\$1.94
	LP2960	√	√		Aux. Comparator	Ind	N, M	\$1.31
	LM2984	√		√	Three 5V outputs, μ P Watchdog [®]	Ind	T	\$3.10
	LM2937					Ind	MP, S, T	\$0.63
800 mA	LM1117					Ind	MP	\$0.81
1.0 A	LM2990**					Mil	J, WG	\$8.80
	LM2990					Ind	S, T	\$1.17
	LM2991**	√				Mil	J, WG	\$8.80
	LM2991	√				Ind	S, T	\$1.17
	LM2940**					Mil	J, WG	\$8.80
	LM2940					Ind	MP, S, T	\$0.81
	LM2940C					Ind	S, T	\$0.91
	LM2941**	√				Mil	J, WG	\$8.80
	LM2941	√				Ind	S, T	\$1.03
	LM2941C	√				Ind	S, T	\$0.95
	LM3940**					Mil	J, WG	\$9.40
	LM3940					Ind	MP, S, T	\$0.75
	1.5 A	LM1086					Ind	S, T
3 A	LM1085					Ind	S, T	Call
5 A	LM1084					Ind	S, T	Call
Controller	LP2975A	√			User-selected dropout voltage	Ind	MM	\$0.98
	LP2975	√			User-selected dropout voltage	Ind	MM	\$0.87
	LM3460				User-selected dropout voltage	Ind	M5	\$0.89

Notes

- 1 "F" denotes accuracy for full temperature range; otherwise, accuracy is at 25°C.
- 2 Dropout voltage is given for full load. "F" denotes value for full temperature range, and "T" denotes typical value; otherwise, values are maximum at 25°C.
- 3 Quiescent current is given for minimum load. "F" denotes value for full temperature range, and "T" denotes typical value; otherwise, values are maximum at 25°C.
- 4 Military temperature range ("Mil") denotes junction temperature range of -55°C to +150°C, unless marked as "X" for products having an upper operating limit of 125°C. Industrial temperature range ("Ind") denotes junction temperature range of -40 to +125°C, unless marked as "X" for products having a lower operating limit of 0°C.
- 5 Under Package Availability, the letter identifies the type of package.
 E = Leadless Ceramic Chip Carrier
 H = Metal Can (TO-99)
 J = Ceramic Dual-In-Line Package
 K = Metal Can (TO-3)
 S = TO-263 (Power Surface Mount)
 N = Molded Dual-In-Line Package
 M = Small Outline Molded Package (Surface Mount)
 M3 = SOT23-3 (3 Lead SOT23 Package)
 M5 = SOT23-5 (5 Lead SOT23 Package)
 MM = Mini 8-Lead Surface-Mount Package
 MP = SOT223 (3 Lead Surface Mount)
 T = TO-220
 WG = Ceramic SOIC
 Z = TO-92
- 6 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

Other Notes

- * Positive transient protection value also indicates the regulator's load dump capability.
- ** Available in indicated package only as a military specified device.
- †† 20V version available upon request.
- # Denotes products with fixed output voltages that also provide adjustment control of the output voltage.

VOLTAGE REGULATORS/CONVERTERS

POSITIVE REGULATORS

Output Current (A)	Device	Output Voltage (V)	Quiescent Current or Min Load (mA) ¹	Max Input Voltage (V)	Max Load Regulation %	Operating Temp Range ²	Package Availability ³	Additional Features	Price ⁴
100mA	LM317L	Adj. (1.2 to 37)	5	40	1.5	Industrial	M, Z		\$0.30
	LM325	15	3	30	0.07	Commercial	H	Dual ± Tracking Outputs	\$4.32
	LM78Lxx	5, 6.2, 8.2, 9, 12, 15	5	35	1	Ext Commercial	M, Z		\$0.22
200mA	LM109	5	10	35	1	Military	H		\$5.50
	LM309	5	10	35	1	Ext Commercial	H		\$2.07
500mA	LM341	5, 12, 15	10	35	2	Industrial	T		\$0.50
	LM78MXX	5, 12, 15	10	35	2	Industrial	H, T		\$0.50
	LM117A	Adj. (1.2 to 37)	5	40	0.3	Military	H		\$4.86
	LM317A	Adj. (1.2 to 37)	10	40	0.5	Industrial	H		\$2.80
	LM317	Adj. (1.2 to 37)	10	40	0.5	Ext Commercial	H		\$2.60
	LM117HV	Adj. (1.2 to 57)	12	60	0.5	Military	H		\$14.70
	LM317HV	Adj. (1.2 to 57)	12	60	0.3	Ext Commercial	H		\$4.00
	1A	LM109K	5	10	35	1	Military	K	
LM309K		5	10	35	1	Ext Commercial	K		\$2.47
LM317		Adj. (1.2 to 37)	10	40	0.5	Ext Commercial	MP		\$0.45
LM340		5, 12, 15	8	35	1	Commercial	K, S, T		\$0.40
LM340A		5, 12, 15	6	35	0.3	Commercial	T		\$0.87
1.5A	LM117	Adj. (1.2 to 37)	10	35	0.3	Military	K, WG		\$5.40
	LM317	Adj. (1.2 to 37)	10	35	0.5	Ext Commercial	K, MP, S, T		\$0.56
	LM117HV	Adj. (1.2 to 57)	12	60	0.3	Military	K		\$12.20
	LM317HV	Adj. (1.2 to 57)	12	60	0.5	Ext Commercial	K, T		\$1.20
3A	LM123	5	20	20	1	Military	K		\$9.55
	LM323A	5	20	20	2	Industrial	K		\$4.91
	LM323	5	20	20	2	Ext Commercial	K		\$4.00
	LM150	Adj. (1.2 to 33)	5	35	0.3	Military	K		\$8.70
	LM350A	Adj. (1.2 to 33)	10	35	0.3	Industrial	K		\$3.74
	LM350	Adj. (1.2 to 33)	10	35	0.5	Ext Commercial	K		\$2.51
5A	LM138	Adj. (1.2 to 32)	5	40	0.3	Military	K		\$18.20
	LM338	Adj. (1.2 to 32)	10	40	0.5	Ext Commercial	K, T		\$1.15
Imax Set By	LM105	Adj. (4.5 to 40)	2	50	0.05	Military	H	45mA Output w/o Pass	\$2.40
External	LM305A	Adj. (4.5 to 40)	2	50	0.2	Commercial	H	45mA Output w/o Pass	\$1.80
Pass	LM305	Adj. (4.5 to 30)	2	40	0.2	Commercial	H	45mA Output w/o Pass	\$0.80
Element	LM723	Adj. (2 to 37)	4	40	0.2	Military	H, J	Low Noise, High Quality Reference	\$2.47
	LM723C	Adj. (2 to 37)	4	40	0.3	Commercial	H, N	Low Noise, High Quality Reference	\$0.40

¹ Max quiescent current for fixed or minimum load for adjustables

² Operating temp range:
 Commercial = 0°C to +70°C
 Ext Commercial = 0°C to +125°C
 Industrial = -40°C to +125°C
 Military = -55°C to +150°C

³ Under Package Availability, the letter identifies the type of package.

E = Leadless Ceramic Chip Carrier	N = Molded Dual-In-Line Package	MP = SOT223 (3 Lead Surface Mount)
H = Metal Can (TO-99)	M = SOIC	S = TO-263 (Power Surface Mount)
J = Ceramic Dual-In-Line Package	MS = SOT23-5 (5 Lead SOT23)	T = TO-220
K = Metal Can (TO-3)	MM = Mini 8-Lead Surface-Mount	WG = Ceramic SOIC
		Z = TO-92

⁴ 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

NEGATIVE REGULATORS

Output Current (A)	Device	Output Voltage (V)	Quiescent Current or Min Load (mA) ¹	Max Input Voltage (V)	Max Load Regulation %	Operating Temp Range ²	Package Availability ³	Additional Features	Price ⁴
100mA	LM325	-15	5	-30	0.06	Commercial	H	Dual ± Tracking Output	\$4.32
	LM337L	Adj. (-1.2 to -37)	5	-40	1.5	Industrial	M, Z		\$0.69
	LM320L	-5, -12, -15	6	-35	1	Commercial	M, Z		\$0.22
	LM79Lxx	-5, -12, -15	6	-35	1	Ext Commercial	M, Z		\$0.22
500mA	LM137	Adj. (-1.2 to -37)	5	-40	1	Military	H		\$8.75
	LM337	Adj. (-1.2 to -37)	10	-40	1.5	Ext Commercial	H		\$3.14
	LM137HV	Adj. (-1.2 to -47)	5	-50	1	Military	H		\$14.70
	LM337HV	Adj. (-1.2 to -47)	10	-50	1.5	Ext Commercial	H		\$5.15
	LM79Mxx	-5, -12, -15	3	-35*	2	Ext Commercial	T		\$0.39
1A	LM337	Adj. (-1.2 to -37)	10	-40	1.5	Ext Commercial	MP		\$0.48
1.5A	LM120	-5, -12, -15	2	-35*	1	Military	K		\$6.25
	LM320	-5, -12, -15	3	-35*	1	Ext Commercial	T		\$0.77
	LM79xx	-5, -12, -15	3	-35*	1	Ext Commercial	T		\$0.39
	LM137	Adj. (-1.2 to -37)	5	-40	1	Military	K		\$8.75
	LM337	Adj. (-1.2 to -37)	10	-40	1.5	Ext Commercial	K, T		\$0.88
	LM137HV	Adj. (-1.2 to -47)	5	-50	1	Military	K		\$14.70
	LM337HV	Adj. (-1.2 to -47)	10	-50	1.5	Ext Commercial	K		\$6.50
3A	LM133	Adj. (-1.2 to -32)	5	-35	0.5	Military	K		\$26.70
	LM333	Adj. (-1.2 to -32)	5	-35	1	Industrial	K		\$5.15

¹ Max quiescent current for fixed or minimum load for adjustables

² Operating temp range:
 Commercial = 0°C to +70°C
 Ext Commercial = 0°C to +125°C
 Industrial = -40°C to +125°C
 Military = -55°C to +150°C

* Maximum input voltage is -25V for -5V version

³ Under Package Availability, the letter identifies the type of package.

E = Leadless Ceramic Chip Carrier	N = Molded Dual-In-Line Package	MP = SOT223 (3 Lead Surface Mount)
H = Metal Can (T0-99)	M = SOIC	S = T0-263 (Power Surface Mount)
J = Ceramic Dual-In-Line Package	MS = SOT23-5 (5 Lead SOT23)	T = T0-220
K = Metal Can (T0-3)	MM = Mini 8-Lead Surface-Mount	WG = Ceramic SOIC
		Z = T0-92

⁴ 1,000 pc. suggested resale, FOB Santa Clara, California, USA.
 Price may vary by package or grade.

VOLTAGE REGULATORS/CONVERTERS

SWITCHING REGULATORS FOR COMPUTING VOLTAGE CONVERSION

Part Number	Number of Regulated Voltages	Linear Regulator Output (V) ¹	Switching Regulator Output Adj. Range (V)	Initial Output Accuracy ²	5-Bit DAC	Switching Regulator Output Current	Input Voltage		Switching Frequency (kHz)	Features ³							Applications	Package	Price ⁵
							Min	Max		Clock Sync	OVP	UVP	PGOOD	OC	SS	S/D or EN			
DESKTOP VOLTAGE CONVERSION																			
LM2635	1		1.8 to 3.5	2%	√	controller	4.5	5.5	50-1000		√		√	√	√	√	CPU V _{CORE} , V _{I/O}	SO-20	\$1.35
LM2636	1		1.3 to 3.5	1.5%	√	controller	4.5	5.5	50-1000		√		√	√	√	√	CPU V _{CORE} , V _{I/O} ; V _{GTL} ; V _{AGP}	SO-20	\$1.35
LM2637	3	1.5V, 2.5V	1.3 to 3.5	1.5%	√	controller	4.75	5.25	50-1000		√	√	√	√	√	√	CPU V _{CORE} , V _{I/O} ; V _{GTL} ; V _{CLK} ; V _{AGP}	SO-24	\$1.50
LM2638	3	1.25V, 1.5V	1.3 to 3.5	1.5%	√	controller	4.75	5.25	50-1000		√	√	√	√	√	√	CPU V _{CORE} , V _{I/O} ; V _{GTL} ; V _{CLK} ; V _{AGP} ; V _{STDBY} 2.5V, 3.3V	SO-24	\$1.50
NOTEBOOK & BATTERY VOLTAGE CONVERSION																			
LM2621	1		1.2 to 14	3%		1A ⁴	0.65	22	1000					√	√	√	PC Card Supply, TFT/LCD Bias Supply	MSOP-8	\$1.90
LM2630	1		1.8 to 6	2.5%		controller	4.5	30	200-400	√		√	√	√	√	√	CPU V _{CORE}	TSSOP-20	\$2.50
LM2631	1		1.5 to 6	2.5%		controller	4.5	30	200-400	√	√	√	√	√	√	√	CPU V _{CORE}	TSSOP-20	\$2.50
LM2640	3	5	2.2 to 6	2%		controller	5.5	30	200	√	√	√		√	√	√	Main V3.3, V5; V _{STDBY} 5V	TSSOP-28	\$3.50
LM2641	3	5	2.2 to 6	2%		controller	5.5	30	300	√	√	√		√	√	√	Main V3.3, V5; V _{STDBY} 5V	TSSOP-28	\$3.50
LM2650	1		1.5 to 16	5%		3A	4.5	18	90-300					√	√	√	Main V3.3, V5; V _{GTL} ; V _{AGP}	SO-24	\$3.50

Note 1 For LM2637 and LM2638, output voltages of linear controllers default to the fixed values shown but are also adjustable.

Note 2 Accuracy of switching controller over temperature.

Note 3 Available features include these:

Clock Sync.: Ability to synchronize switching frequency to external source

OVP: Output overvoltage protection

UVP: Output undervoltage protection

PGOOD: Output flag that indicates when the output voltage is within 10% of nominal

OC: Output overcurrent protection

SS: Soft-start

S/D or EN: Shutdown or Enable control

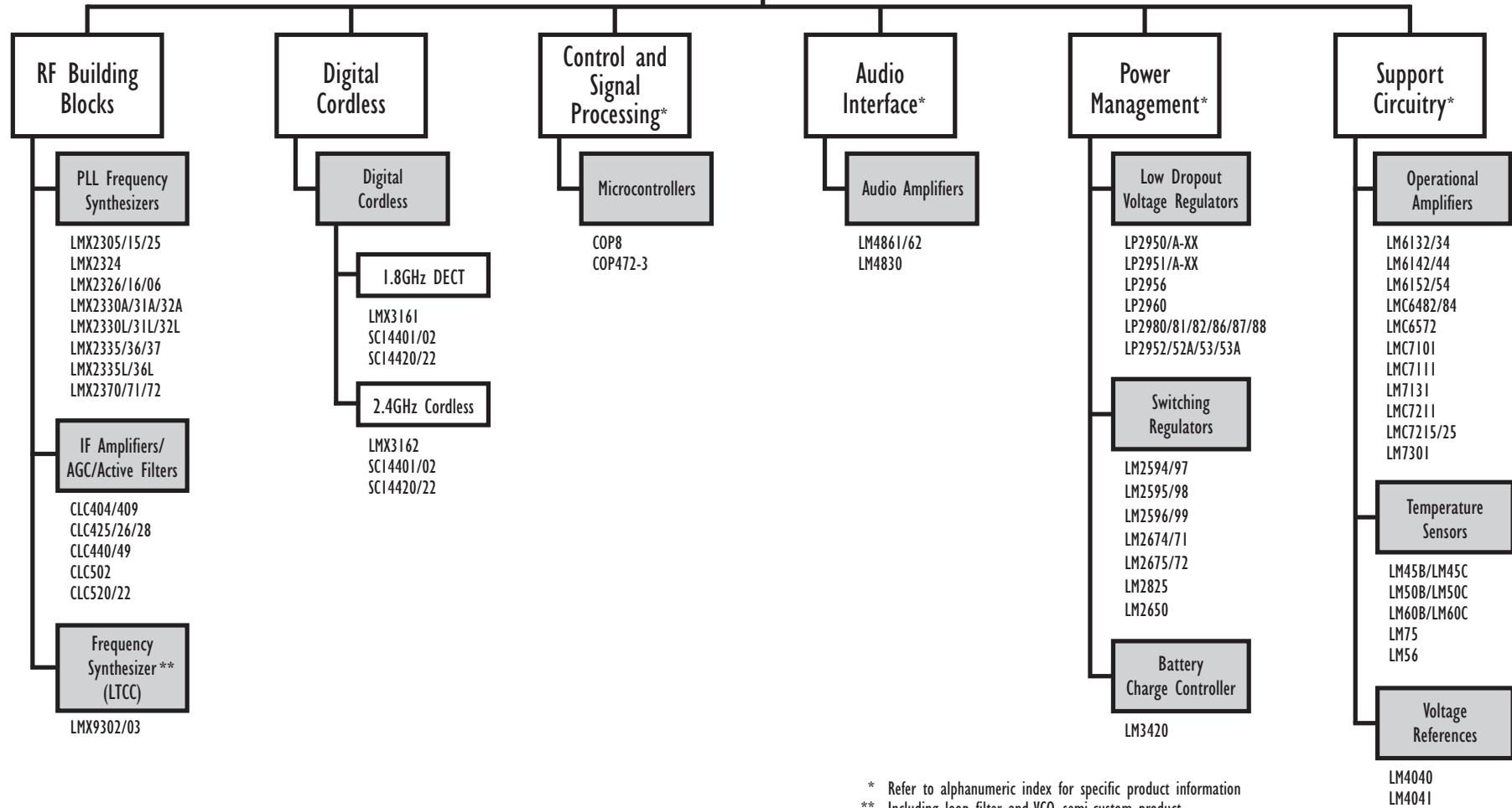
Note 4 LM2621 is a boost converter with a 2.85A (typ) switch. Maximum load current is up to 1A in most applications, but it is limited at lower input voltages. Consult datasheet for further information.

Note 5 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

WIRELESS

Section 12

Wireless Communications



WIRELESS – DIGITAL CORDLESS PRODUCTS

Part Number	Description	Features
LMX3161	1.8 GHz, Single Chip, Radio Transceiver	<ul style="list-style-type: none"> • Single Chip solution for DECT RF Transceiver • RF sensitivity to -93dBm and RSSI sensitivity to -100dBm • Two regulated voltage outputs for discrete amplifiers • High gain (85dB) intermediate frequency strip • Allows unregulated 3.0V-5.5V supply voltage • Power-down mode for increased current savings • System noise figure 6.5dB (typ) • 48 Pin PQFP surface mount plastic package

Part Number	Type	RF Input	Prescalers	Active I _{CC} (typ @ 3V)	Powerdown I _{CC} (typ @ 3V)	V _{CC} Range	Operating Temp Range	FastLock™
SINGLE PLLS								
LMX2305	Military Grade	550 MHz	64/65 or 128/129	4.0mA	30 μA	2.6 to 5.5V	-40 to +105°C	No
LMX2315	Military Grade	1.2 GHz	64/65 or 128/129	6.0mA	30 μA	2.6 to 5.5V	-55 to +105°C	No
LMX2325	Military Grade	2.5 GHz	32/33 or 64/65	11.0mA	30 μA	2.6 to 5.5V	-55 to +90°C	No
LMX2306	Low Power Single	550 MHz	8/9	1.2mA	1 μA	2.3 to 5.5V	-40 to +85°C	Yes
LMX2316	Low Power Single	1.2 GHz	32/33	2.0mA	1 μA	2.3 to 5.5V	-40 to +85°C	Yes
LMX2326	Low Power Single	2.8 GHz	32/33	3.5mA	1 μA	2.3 to 5.5V	-40 to +85°C	Yes
DUAL PLLS								
LMX1600	RF/IF Dual	2.0 GHz (Main PLL), 500 MHz (Aux PLL)	32/33 (Main PLL), 8/9 (Aux PLL)	5mA	1 μA	2.7 to 3.6V	-40 to +85°C	
LMX1601	RF/IF Dual	1.1 GHz (Main PLL), 500 MHz (Aux PLL)	16/17 (Main PLL), 8/9 (Aux PLL)	4mA	1 μA	2.7 to 3.6V	-40 to +85°C	
LMX1602	RF/RF Dual	1.1 GHz (Main PLL), 1.1 GHz (Aux PLL)	16/17 (Main PLL), 8/9 (Aux PLL)	5mA	1 μA	2.7 to 3.6V	-40 to +85°C	
LMX2330A	RF/IF Dual	2.5 GHz (Main PLL), 510 MHz (Aux PLL)	32/33 or 64/65 (Main PLL), 8/9 or 16/17 (Aux PLL)	13mA	1 μA	2.7 to 5.5V	-40 to +85°C	Yes
LMX2331A	RF/IF Dual	2.0 GHz (Main PLL), 510 MHz (Aux PLL)	64/65 or 128/129 (Main PLL), 8/9 or 16/17 (Aux PLL)	12mA	1 μA	2.7 to 5.5V	-40 to +85°C	Yes
LMX2332A	RF/IF Dual	1.2 GHz (Main PLL), 510 MHz (Aux PLL)	64/65 or 128/129 (Main PLL), 8/9 or 16/17 (Aux PLL)	8mA	1 μA	2.7 to 5.5V	-40 to +85°C	Yes
LMX2335	RF/RF Dual	1.1 GHz (Main PLL), 1.1 GHz (Aux PLL)	64/65 or 128/129 (Main PLL), 64/65 or 128/129 (Aux PLL)	9mA	1 μA	2.7 to 5.5V	-40 to +85°C	Yes
LMX2336	RF/RF Dual	2.0 GHz (Main PLL), 1.1 GHz (Aux PLL)	64/65 or 128/129 (Main PLL), 64/65 or 128/129 (Aux PLL)	13mA	1 μA	2.7 to 5.5V	-40 to +85°C	Yes
LMX2337	RF/RF Dual	550 MHz (Main PLL), 550 MHz (Aux PLL)	64/65 or 128/129 (Main PLL), 64/65 or 128/129 (Aux PLL)	9mA	1 μA	2.7 to 5.5V	-40 to +85°C	Yes
LMX2330L	Low Power RF/IF Dual	2.5 GHz (Main PLL), 510 MHz (Aux PLL)	32/33 or 64/65 (Main PLL), 8/9 or 16/17 (Aux PLL)	5mA	1 μA	2.7 to 5.5V	-40 to +85°C	Yes
LMX2331L	Low Power RF/IF Dual	2.0 GHz (Main PLL), 510 MHz (Aux PLL)	64/65 or 128/129 (Main PLL), 8/9 or 16/17 (Aux PLL)	4mA	1 μA	2.7 to 5.5V	-40 to +85°C	Yes
LMX2332L	Low Power RF/IF Dual	1.2 GHz (Main PLL), 510 MHz (Aux PLL)	64/65 or 128/129 (Main PLL), 8/9 or 16/17 (Aux PLL)	3mA	1 μA	2.7 to 5.5V	-40 to +85°C	Yes
LMX2335L	Low Power RF/RF Dual	1.1 GHz (Main PLL), 1.1 GHz (Aux PLL)	64/65 or 128/129 (Main PLL), 64/65 or 128/129 (Aux PLL)	4mA	1 μA	2.7 to 5.5V	-40 to +85°C	Yes
LMX2336L	Low Power RF/RF Dual	2.0 GHz (Main PLL), 1.1 GHz (Aux PLL)	64/65 or 128/129 (Main PLL), 64/65 or 128/129 (Aux PLL)	5mA	1 μA	2.7 to 5.5V	-40 to +85°C	Yes
FRAC-N-DUAL PLLS								
LMX2350	RF/IF Dual Fractional N	2.5 GHz (Main PLL), 550 MHz (Aux PLL)	32/33 or 16/17 (Main PLL), 8/9 (Aux PLL)	7mA	5 μA	2.7 to 5.5V	-40 to +85°C	Yes
LMX2352	RF/IF Dual Fractional N	1.2 GHz (Main PLL), 500 MHz (Aux PLL)	8/9 or 16/17 (Main PLL), 8/9 (Aux PLL)	5.5mA	5 μA	2.7 to 5.5V	-40 to +85°C	Yes

† 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

PLLATINUM™ FAMILY OF PLLS

Part Number	Type	Typical Applications	Package*	Order Number (add "X" suffix for Tape/Reel)	Price†
SINGLE PLLS					
LMX2305	Military Grade	Satellite Transceivers, IF Local Oscillators	Ceramic SOIC 20	LMX2305WG-QML	\$63.50
LMX2315	Military Grade	Satellite Transceivers, IF Local Oscillators	Ceramic SOIC 20	LMX2315WG-QML	\$115.00
LMX2325	Military Grade	Satellite Transceivers, IF Local Oscillators	Ceramic SOIC 20	LMX2325WG-QML	\$135.00
LMX2306	Low Power Single	IF Local Oscillators, Pagers	TSSOP 16	LMX2306TM	\$2.50
LMX2316	Low Power Single	Analog/Digital Cellular and Cordless	TSSOP 16	LMX2316TM	\$2.76
LMX2326	Low Power Single	DECT, PHS, PDC, GPS, PCS1900, DCS1800, WLAN	TSSOP 16	LMX2326TM	\$3.10
DUAL PLLS					
LMX1600	RF/IF Dual	PDC, PHS	TSSOP 16/CSP 16	LMX1600TM	\$1.98
LMX1601	RF/IF Dual	PDC, PHS, AMPS, NAMPS, Cordless Phones, ISM (902-928)	TSSOP 16/CSP 16	LMX1601TM	\$1.80
LMX1602	RF/RF Dual	PDC, PHS, AMPS, NAMPS, Cordless Phones, ISM (902-928)	TSSOP 16/CSP 16	LMX1602TM	\$1.98
LMX2330A	RF/IF Dual	WLAN, DCS1800, PCS1900, ISM (2.4-2.45)	TSSOP 20	LMX2330ATM	\$3.70
LMX2331A	RF/IF Dual	PHS, PDC, DECT, DCS1800, PCS1900	TSSOP 20	LMX2331ATM	\$2.34
LMX2332A	RF/IF Dual	GSM, IS-136, IS-95, ISM (902-928), PDC	TSSOP 20	LMX2332ATM	\$2.15
LMX2335	RF/RF Dual	AMPS, NAMPS, 900MHz Cordless	SO 16/TSSOP 16	LMX2335M/LMX2335TM	\$2.87
LMX2336	RF/RF Dual	Dual Banded PCS Phones, CATV	TSSOP 20	LMX2336TM	\$3.70
LMX2337	RF/RF Dual	Cordless Phones	SO 16/TSSOP 16	LMX2337M/LMX2337TM	\$2.70
LMX2330L	Low Power RF/IF Dual	WLAN, DCS1800, PCS1900, ISM (2.4-2.45)	TSSOP 20/CSP 24	LMX2330LTM	\$3.70
LMX2331L	Low Power RF/IF Dual	PHS, PDC, DECT, DCS1800, PCS1900	TSSOP 20/CSP 24	LMX2331LTM	\$2.34
LMX2332L	Low Power RF/IF Dual	GSM, IS-136, IS-95, ISM (902-928)	TSSOP 20/CSP 24	LMX2332LTM	\$2.15
LMX2335L	Low Power RF/RF Dual	AMPS, NAMPS, 900MHz Cordless	SO 16/TSSOP 16/CSP16	LMX2335LM/LMX2335LTM	\$2.87
LMX2336L	Low Power RF/RF Dual	Dual Band PCS Phones, CATV	TSSOP 20/CSP 24	LMX2336LTM	\$3.70
FRAC-N-DUAL PLLS					
LMX2350	RF/IF Dual Fractional N	Dual Band PCS/PCN Phones, TDMA Systems, CATV	TSSOP 24/CSP 24	LMX2350TM	\$4.25
LMX2352	RF/IF Dual Fractional N	Dual Band PCS/PCN Phones, TDMA Systems, CATV	TSSOP 24/CSP 24	LMX2352TM	\$4.05

† 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

MICROCONTROLLERS

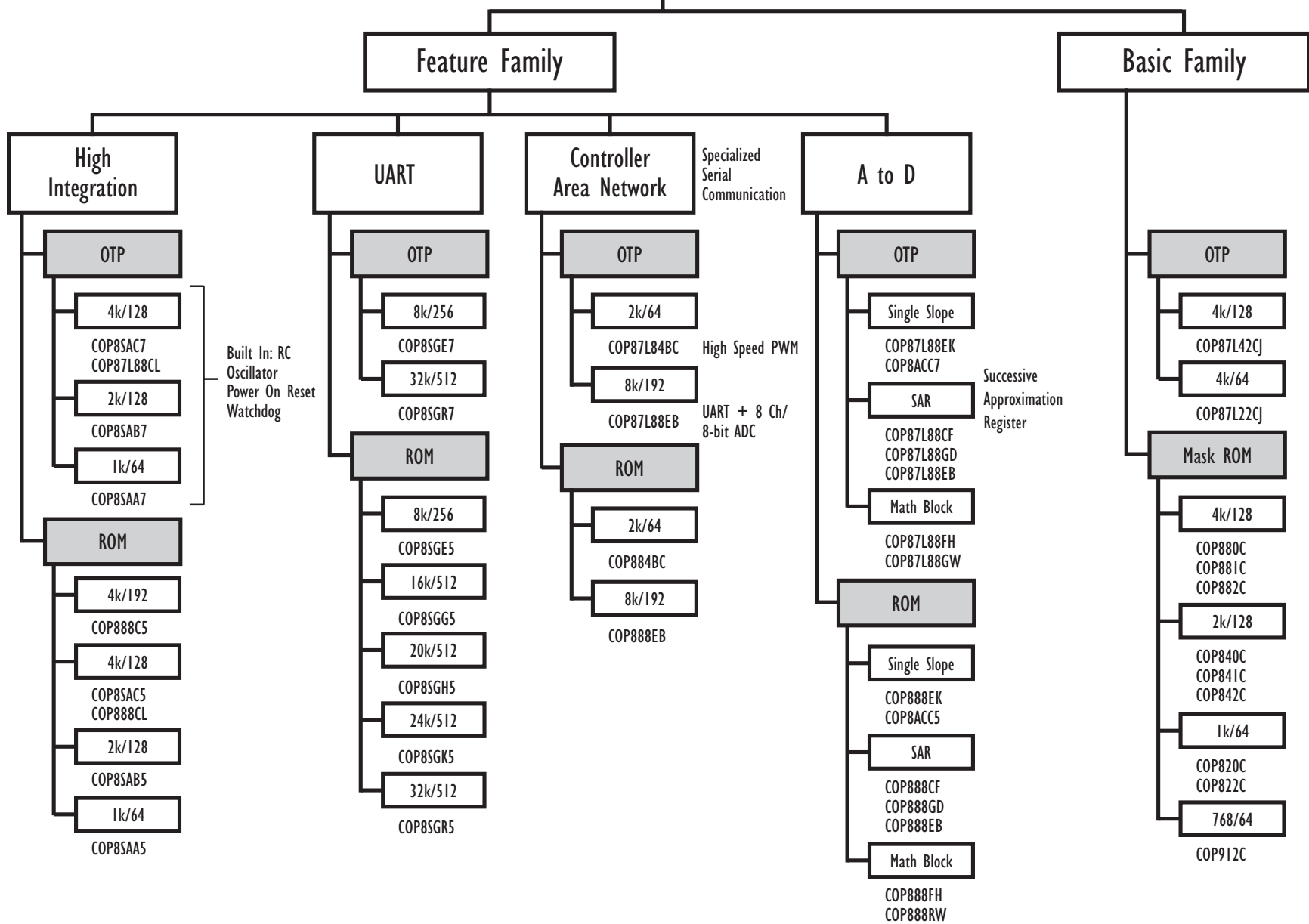
Section 13

MICROCONTROLLERS

Additional Onboard
Peripherals

COP8 Microcontrollers

Basic Requirements



MICROCONTROLLERS

COP8 PRODUCTS

NOTE: All device numbers are prefixed by COP.

OTP	Mask ROM			Memory		I/O		Packaging					Power Management			Timers				Features								
One Time Programmable 2	Commercial 1 0°C to +70°C	Industrial -40°C to +85°C	Military 3 Automotive	Instruction Cycle	ROM	RAM	Total	High Sink Current (10 - 15 mA)	Pins	DIP	SO	PLCC	PQFP†	HALT	IDLE	Brown-Out	Normal 4	High Speed 5	PWM Outputs 6	Idle Timer	Interrupts 7	Comparators	A/D Converter	UART	µCROWBIE/ PLUS™	WATCHDOG™	Clock Monitor	
Part Number				µs	Bytes		Pins	Qty	Dice Sales Available																			
COP-	COP-	COP-	COP-																									
85AA7				1	1k	64	12	4	16	✓	✓		✓	✓		1	1	1	✓	8				✓	✓	✓		
85AA7				1	1k	64	16/24	4/8	20/28	✓	✓		✓	✓		1	1	1	✓	8				✓	✓	✓		
85AB7				1	2k	128	16/24	4/8	20/28	✓	✓		✓	✓		1	1	1	✓	8				✓	✓	✓		
85AC7				1	4k	128	15/24	4/8	20/28	✓	✓		✓	✓		1	1	1	✓	8				✓	✓	✓		
85AC7				1	4k	128	36/40	12	40/44	✓	✓	✓	✓	✓		1	1	1	✓	8				✓	✓	✓		
8ACC7	8ACC5	8ACC5		1	4K	128	15	3	20		✓		✓	✓		1		1	✓	9	1	✓		✓	✓	✓		
8ACC7	8ACC5	8ACC5		1	4k	128	23	4	28	✓	✓		✓	✓		1		1	✓	9	1	✓		✓	✓	✓		
87L22CJ		822CJ		1	1k	64	16	4	20		✓		✓	✓	✓	1	1	2	✓	3	1			✓	✓	✓		
87L20CJ		820CJ		1	1k	64	24	4	28		✓		✓	✓	✓	1	1	2	✓	3	1			✓	✓	✓		
87L42CJ		842CJ		1	2k	128	16	4	20		✓		✓	✓	✓	1	1	2	✓	3	1			✓	✓	✓		
87L40CJ		840CJ		1	2k	128	24	4	28		✓		✓	✓	✓	1	1	2	✓	3	1			✓	✓	✓		
87L42	912C			2	768	64	16	0	20		✓		✓	✓		1		1	✓	3				✓	✓	✓		
87L42		822C		1	1k	64	16	0	20		✓		✓	✓		1		1	✓	3				✓	✓	✓		
87L40			✓	1	1k	64	24	4	28		✓		✓	✓		1		1	✓	3				✓	✓	✓		
87L42		842C	✓	1	2k	128	16	0	20		✓		✓	✓		1		1	✓	3				✓	✓	✓		
87L40		840C	✓	1	2k	128	24	4	28		✓		✓	✓		1		1	✓	3				✓	✓	✓		
87L42		882C	✓	1	4k	128	16	0	20		✓		✓	✓		1		1	✓	3				✓	✓	✓		
87L40		881C	✓	1	4k	128	24	4	28		✓		✓	✓		1		1	✓	3				✓	✓	✓		
		880C	✓	1	4k	128	36/40	8	40/44		✓		✓	✓		1		1	✓	3				✓	✓	✓		
87L88EB		888EB	✓	1	8k	192	31	8	44		✓		✓	✓		2		2	✓	14		✓	1	✓	✓	✓		
87L89EB		889EB	✓	1	8k	192	54	8	68		✓		✓	✓		2		2	✓	14		✓	1	✓	✓	✓		
85GE7		85GE5		1	8k	256	40	8	40/44		✓		✓	✓		3			✓	14	2		1	✓	✓	✓		
85GR7		85GG5		1	16k	512	40	8	40/44		✓		✓	✓		3			✓	14	2		1	✓	✓	✓		
85GR7		85GH5		1	20k	512	40	8	40/44		✓		✓	✓		3			✓	14	2		1	✓	✓	✓		
85GR7		85GK5		1	24k	512	40	8	40/44		✓		✓	✓		3			✓	14	2		1	✓	✓	✓		
85GR7		85GR5		1	32k	512	40	8	40/44		✓		✓	✓		3			✓	14	2		1	✓	✓	✓		
87L88FH†		888FH		1	12k	512	36/40	8	40/44		✓		✓	✓		3		3	✓	14	2		1	✓	✓	✓		
87L84EK		884EK		1	8k	256	24	4	28		✓		✓	✓		3		3	✓	12	1	✓		✓	✓	✓		
87L88EK		888EK		1	8k	256	36/40	8	40/44		✓		✓	✓		3		3	✓	12	1	✓		✓	✓	✓		
87L84CL	984CL	884CL	✓	1	4k	128	24	4	28		✓		✓	✓		2		2	✓	10				✓	✓	✓		
87L88CL		888CL	✓	1	4k	128	36/40	8	40/44		✓		✓	✓		2		2	✓	10				✓	✓	✓		
87L88RW		888GW		1	16k	512	56	8	68		✓		✓	✓		2	2	6	✓	14			1	✓	✓	✓		
87L88RD	988GD			1	16k	256	40	8	44		✓		✓	✓		3		3	✓	12		✓		✓	✓	✓		

Notes: (Consult specific datasheets for exact information)

- Two versions available "C" (shown) 2.3 to 4.0V operation, "CH" for 4.0 to 6.0V operation.
- While OTP's/windowed devices are functionally identical to masked ROM devices, electrical specifications may differ. Check sales office for specific availability.

- 8- or 16-bits, clocked at CKI (100nsec max)
- Pulse width modulation 8/16 bits, 1µsec or 100nsec (max) resolution
- One (dedicated) external interrupt on basic family devices, 9 external interrupts (1 dedicated, 8 configurable) on feature family devices
- Patented EMI reducing circuitry on-chip

- Military: -55°C to +125°C
Automobile: -40°C to +125°C
Contact sales office for availability.
- 16-bit, clocked at tc. Can be s/w configured as:
1) PWM, 2) Input capture, 3) External event counter input

Features		Core Family	Window		EPU 13, 16		Debug Module	DM Target Cable Adapters for SMD					Emulator Probe Cards 15			Price 17	
Multi-Input Wake-up	Reduced EMI 8	Additional Features	Windowed EPROM 2	PGMA	COP8SA-EPU	COP8SG-EPU	COP8	44Q	44P	16D-50	20D-50	28D-50	DIP MHW-	PLCC MHW-	Probe Card SMD Adapters MHW-		
		Basic or Feature 9	Part Number														
			COP														
✓	✓	Internal Oscillator	Feature	SMD	✓	4	SA-DM			✓			COP8SA-IMXN		SOIC16	\$0.89	
✓	✓	8-bytes of User Storage Space	Feature	8SAC720Q3 (20-Pin)	SMD	✓	4	SA-DM			✓	✓	COP8SA-IMXN		SOIC20/28	\$1.18	
✓	✓	Power on Reset	Feature	8SAC728Q3 (28-Pin)	SMD	✓	4	SA-DM			✓	✓	COP8SA-IMXN		SOIC20/28	\$1.50	
✓	✓		Feature	8SAC740Q3 (40-Pin)	SMD	✓	4	SA-DM			✓	✓	COP8SA-IMXN		SOIC20/28	\$2.00	
✓	✓		Feature	8SAC744J3 (44-Pin)	SMD	✓	4	SA-DM	✓	✓			COP8SA-IMXN/IM44V		PQFP44	\$2.75	
✓	✓	4 Channel (16-bit) Single Slope A/D (See AN1076)	Feature		DIP/SMD			AC-DM				✓	COP8ACIM28/20N		SOIC20/28	\$3.90	
✓	✓	6 Channel (16-bit) Single Slope A/D (See AN1076)	Feature		DIP/SMD			AC-DM				✓	COP8ACIM28/20N		SOIC20/28	\$5.15	
✓			Basic		DIP/SMD			-DM/840CJ				✓	820CJ20DWPC		SOIC20	\$5.25	
✓			Basic		DIP/SMD			-DM/840CJ				✓	820CJ28DWPC		SOIC28	\$5.45	
✓	✓		Basic		DIP/SMD			-DM/840CJ				✓	820CJ20DWPC		SOIC20	\$5.45	
✓	✓		Basic		DIP/SMD			-DM/840CJ				✓	820CJ28DWPC		SOIC28	\$4.90	
		912 - Lowest Price	Basic		DIP/SMD			-DM/880C				✓	880C20DWPC		SOIC20	\$3.08	
			Basic		DIP/SMD			-DM/880C				✓	880C20DWPC		SOIC20	\$8.75	
			Basic		DIP/SMD			-DM/880C				✓	880C28DWPC		SOIC28	\$9.80	
			Basic		DIP/SMD			-DM/880C				✓	880C20DWPC		SOIC20	\$8.75	
			Basic		DIP/SMD			-DM/880C				✓	880C28DWPC		SOIC28	\$9.80	
			Basic		DIP/SMD			-DM/880C				✓	880C20DWPC		SOIC20	\$8.75	
			Basic		DIP/SMD			-DM/880C				✓	880C28DWPC		SOIC28	\$9.80	
			Basic		SMD			-DM/880C	✓				880C40DWPC	880C44PWPC			
✓	✓	CAN Interface, 8 Channel (8 bit) A/D SAR	Feature		DIP/SMD			-DM/888EB						888EB44PWPC		\$10.00	
✓	✓	CAN Interface, 8 Channel (8 bit) A/D SAR	Feature		DIP/SMD			-DM/888EB						888EB68PWPC		\$11.90	
✓	✓	Internal R/C Oscillator	Feature	85GR740Q3	DIP/SMD		✓	SG-DM	✓				85G-IMPC			\$2.99	
✓	✓	Internal R/C Oscillator	Feature	85GR740Q3	DIP/SMD		✓	SG-DM	✓				85G-IMPC			\$3.55	
✓	✓	Internal R/C Oscillator	Feature	85GR740Q3	DIP/SMD		✓	SG-DM	✓				85G-IMPC			\$3.55	
✓	✓	Internal R/C Oscillator	Feature	85GR740Q3	DIP/SMD		✓	SG-DM	✓				85G-IMPC			\$3.55	
✓	✓	Hardware Multiply/Divide	Feature		SMD			-DM/888FH	✓				888FH40DWPC	888FH44PWPC		\$7.90	
✓	✓	6 Channel (16 bit) A/D Single Slope (See AN983)	Feature		DIP/SMD			-DM/888EK				✓	884EK28DWPC		SOIC28	\$6.30	
✓	✓	6 Channel (16 bit) A/D Single Slope (See AN983)	Feature		SMD			-DM/888EK	✓				888EK40DWPC	888EK44PWPC		\$7.50	
✓			Feature		DIP/SMD			-DM/888GG				✓	884CL28DWPC		SOIC28	\$5.75	
✓			Feature		SMD			-DM/888GG	✓				888CL40DWPC	888CL44PWPC		\$6.30	
✓	✓	Hardware Multiply/Divide, Input Capture Modules	Feature		SMD			-DM/888GW						888GW68PWPC		\$9.50	
✓	✓	8 Channel (8 bit) A/D Successive Approximation	Feature		SMD			-DM/888GD	✓					888GD44PWPC		\$8.00	

9. Reference to User's Manual

10. The SA Family is available in three different temperature ranges, 0°C to +70°C, -40°C to +85°C, and -40°C to +125°C

11. New COP8 part numbering scheme

12. EPU + DM Programming Adapter for:

20/28 DIP and 20/28 SOIC is COP8-PGMB-D5
44 PLCC is COP8-PGMB-D544P includes 20/28 DIP/SOIC
68 PLCC is COP8-PGMA-68P or COP8-PGMB-68P

13. Two versions available. -1 for 110V AC; -2 for 220V AC.

14. Target cables for DIP packages included. SMD adapter kits must be ordered extra.

15. Requires iceMaster 400 (IM-COP8/400). DIP or PLCC adapter kits included. SMD adapters must be ordered separately.

16. PGMA programming adapter required for most SMD and some DIP packages. Contact your local sales office for details.

17. 1,000 pc. suggested resale, FOB Santa Clara, California, USA. Price may vary by package or grade.

† Contact sales office for availability

MIL-AERO

Section 14

MIL-AERO

As one of the largest suppliers of IC products for high reliability applications, we've provided analog and mixed-signal engineering for the Military/Aerospace market for more than 30 years. Our expertise in system design and integration is creating innovative solutions for space, radar, communication, and other applications. For fast, effective product design, development, and delivery, National provides knowledge in systems integration and design, as well as organizational and partnership strategies — whether the product you need comes off-the-shelf or is customized for your environment and application. For a complete listing of Military/Aerospace parts and services, visit us on the web at: www.national.com/mil

National Part Number	SMD/JAN Drawing Number	Function
ADC1251CMJ-QML	5962-9157803QJA	12 Bit ADC
CLC110AJ-QML	5962-8997501PA	WB Closed Loop Monolithic Buffer Amp
CLC111AJ-QML	5962-9687601MPA	High Speed Buffer
CLC114AE-QML	5962-9233901M2A	Low Power Quad Buffer
CLC114AJ-QML	5962-9233901MCA	Low Power Quad Buffer
CLC400AE-QML	5962-89970012A	General Purpose WB Op Amp
CLC400AJ-QML	5962-8997001PA	General Purpose WB Op Amp
CLC401AJ-QML	5962-8997301PA	General Purpose HG Op Amp
CLC402AJ-QML	5962-9203301MPA	Fast Settling Op Amp
CLC404AJ-QML	5962-9099401MPA	Large Signal WB Op Amp
CLC406AJ-QML	5962-9200401MPA	Video Op Amp
CLC409AE-QML	5962-9203401M2A	Low Distortion Op Amp
CLC409AJ-QML	5962-9203401MPA	Low Distortion Op Amp
CLC410AJ-QML	5962-9060001PA	WB Op Amp
CLC411AJ-QML	5962-9456601MPA	High Speed Video Op Amp
CLC412AE-QML	5962-9471901M2A	Low Crosstalk WB Op Amp
CLC412AJ-QML	5962-9471901MPA	Low Crosstalk WB Op Amp
CLC414AE-QML	5962-9169301M2A	General Purpose Quad Op Amp
CLC414AJ-QML	5962-9169301MCA	General Purpose Quad Op Amp
CLC415AJ-QML	5962-9305501MCA	General Purpose Quad Op Amp
CLC420AE-QML	5962-9175801M2A	WB Low Power Op Amp
CLC420AJ-QML	5962-9175801MPA	WB Low Power Op Amp
CLC420BE-QML	5962-9175802M2A	WB Low Power Op Amp
CLC420BJ-QML	5962-9175802MPA	WB Low Power Op Amp
CLC425AJ-QML	5962-9325901MPA	Low Noise Op Amp
CLC426AJ-QML	5962-9459701MPA	Low Noise Unity Gain Op Amp
CLC428AJ-QML	5962-9470801MPA	Dual Low Noise Op Amp
CLC430AE-QML	5962-9203001M2A	Video Op Amp
CLC430AJ-QML	5962-9203001MPA	Video Op Amp
CLC431AE-QML	5962-9472501M2A	Dual Video Op Amp
CLC431AJ-QML	5962-9472501MCA	Dual Video Op Amp
CLC432AJ-QML	5962-9472502MPA	Dual Video Op Amp
CLC440AJ-QML	5962-9751801MPA	WB Low Power Op Amp
CLC446AJ-QML	5962-9751901MPA	WB Low Power Op Amp
CLC449AJ-QML	5962-9752001MPA	WB Op Amp
CLC452AJ-QML	5962-9752101MPA	High Output Low Power Line Driver
CLC501AJ-QML	5962-8997401PA	High Gain Op Amp

SMD/JAN DRAWINGS BY PART NUMBER

National Part Number	SMD/JAN Drawing Number	Function
CLC502AE-QML	5962-9174301M2A	Clamping Op Amp
CLC502AJ-QML	5962-9174301MPA	Clamping Op Amp
CLC505AJ-QML	5962-9099301MPA	High Speed Op Amp
CLC520AJ-QML	5962-9169401MCA	WB AGC Op Amp
CLC522AE-QML	5962-9451701M2A	WB Variable Gain Op Amp
CLC522AJ-QML	5962-9451701MCA	WB Variable Gain Op Amp
CLC532AE-QML	5962-9203501M2A	Wide Range Multiplexer
CLC532AJ-QML	5962-9203501MCA	Wide Range Multiplexer
CLC533AE-QML	5962-9320301M2A	Wide Range Multiplexer
CLC533AJ-QML	5962-9320301MEA	Wide Range Multiplexer
DS1691AJ-SMD	5962-8672101EA	Single Line Driver
DS16F95E/883	5962-89615012A	High Speed Single Transceiver
DS16F95J-QMLV	5962-8961501VPA	High Speed Single Transceiver
DS16F95J/883	5962-8961501PA	High Speed Single Transceiver
DS16F95W-SMD	5962-8961501HA	High Speed Single Transceiver
DS16F95WG/883	5962-8961501QXA	High Speed Single Transceiver
DS1776E/883	5962-9231701M3A	Pi-Bus Transceiver
DS26C31ME/883	5962-9163901M2A	Quad Line Driver
DS26C31MJ/883	5962-9163901MEA	Quad Line Driver
DS26C31MW/883	5962-9163901MFA	Quad Line Driver
DS26C31MWG/883	5962-9163901MXA	Quad Line Driver
DS26C32AME/883	5962-9164001M2A	Quad Line Receiver
DS26C32AMJ/883	5962-9164001MEA	Quad Line Receiver
DS26C32AMW/883	5962-9164001MFA	Quad Line Receiver
DS26C32AMWG/883	5962-9164001MXA	Quad Line Receiver
DS26LS31ME-SMD	5962-7802301Q2A	Quad Line Driver
DS26LS31MJ-QMLV	5962-7802301VEA	Quad Line Driver
DS26LS31MJ-SMD	5962-7802301MEA	Quad Line Driver
DS26LS31MW-QMLV	5962-7802301VFA	Quad Line Driver
DS26LS31MW-SMD	5962-7802301MFA	Quad Line Driver
DS26LS32ME/883	5962-7802006Q2A	Quad Line Receiver
DS26LS32MJ/883	5962-7802006QEA	Quad Line Receiver
DS26LS32MW/883	5962-7802006QFA	Quad Line Receiver
DS26LV31W-QML	5962-9858401QFA +	Quad Low Voltage Line Driver
DS26LV32AW-QML	5962-9858501QFA +	Quad Low Voltage Line Receiver
DS7831J-SMD	8004101EA	Dual Differential Line Driver
DS7831W-SMD	8004101FA	Dual Differential Line Driver

SMD/JAN DRAWINGS BY PART NUMBER

National Part Number	SMD/JAN Drawing Number	Function
DS78C120J/883	5962-8963001EA	Dual Line Receiver
DS78C20J/883	5962-9321101MCA	Dual Line Receiver
DS90C031E-QML	5962-9583301Q2A	Quad LVDS Line Driver
DS90C031W-QML	5962-9583301QFA	Quad LVDS Line Driver
DS90C032E-QML	5962-9583401Q2A	Quad LVDS Line Receiver
DS90C032W-QML	5962-9583401QFA	Quad LVDS Line Receiver
DS9622ME/883	5962-87522012A	Dual Line Receiver
DS9622MJ/883	5962-8752201CA	Dual Line Receiver
DS9627MJ/883	5962-8978701MEA	Dual Line Receiver
DS9636AJ/883	5962-8752301PA	Dual Line Driver
DS9637AMJ/883	5962-8752401PA	Dual Line Receiver
DS9638J/883	5962-8754601PA	Dual Line Driver
DS96F172ME/883	5962-9076501M2A	Quad Line Driver
DS96F172MJ-QMLV	5962-9076501VEA	Quad Line Driver
DS96F172MJ/883	5962-9076501MEA	Quad Line Driver
DS96F173ME/883	5962-9076602M2A	Quad Line Receiver
DS96F173MJ-QMLV	5962-9076602VEA	Quad Line Receiver
DS96F173MJ/883	5962-9076602MEA	Quad Line Receiver
DS96F173MW/883	5962-9076602MFA	Quad Line Receiver
DS96F174ME/883	5962-9076502M2A	Quad Line Driver
DS96F174MJ-QMLV	5962-9076502VEA	Quad Line Driver
DS96F174MJ/883	5962-9076502MEA	Quad Line Driver
DS96F174MW/883	5962-9076502MFA	Quad Line Driver
DS96F175ME/883	5962-9076601M2A	Quad Line Receiver
DS96F175MJ-QMLV	5962-9076601VEA	Quad Line Receiver
DS96F175MJ/883	5962-9076601MEA	Quad Line Receiver
DS96F175MW/883	5962-9076601MFA	Quad Line Receiver
JL101ABCA	JM38510/10103BCA	General Purpose Op Amp
JL101ABGA	JM38510/10103BGA	General Purpose Op Amp
JL101ABHA	JM38510/10103BHA	General Purpose Op Amp
JL101ABPA	JM38510/10103BPA	General Purpose Op Amp
JL101ASGA	JM38510/10103SGA	General Purpose Op Amp
JL101ASHA	JM38510/10103SHA	General Purpose Op Amp
JL101ASPA	JM38510/10103SPA	General Purpose Op Amp
JL108ABCA	JM38510/10104BCA	Precision Op Amp
JL108ABGA	JM38510/10104BGA	Precision Op Amp
JL108ABHA	JM38510/10104BHA	Precision Op Amp

National Part Number	SMD/JAN Drawing Number	Function
JL108ABPA	JM38510/10104BPA	Precision Op Amp
JL108ASCA	JM38510/10104SCA	Precision Op Amp
JL108ASGA	JM38510/10104SGA	Precision Op Amp
JL108ASHA	JM38510/10104SHA	Precision Op Amp
JL108ASPA	JM38510/10104SPA	Precision Op Amp
JL109BXA	JM38510/10701BXA	Voltage Regulator
JL109BYA	JM38510/10701BYA	Voltage Regulator
JL109SXA	JM38510/10701SXA	Voltage Regulator
JL111BCA	JM38510/10304BCA	Voltage Comparator
JL111BGA	JM38510/10304BGA	Voltage Comparator
JL111BHA	JM38510/10304BHA	Voltage Comparator
JL111BPA	JM38510/10304BPA	Voltage Comparator
JL111SGA	JM38510/10304SGA	Voltage Comparator
JL111SHA	JM38510/10304SHA	Voltage Comparator
JL111SPA	JM38510/10304SPA	Voltage Comparator
JL117BXA	JM38510/11703BXA	Adjustable Regulator
JL117BYA	JM38510/11704BYA	Adjustable Regulator
JL117SXA	JM38510/11703SXA	Adjustable Regulator
JL117SYA	JM38510/11704SYA	Adjustable Regulator
JL118BCA	JM38510/10107BCA	Fast Op Amp
JL118BGA	JM38510/10107BGA	Fast Op Amp
JL118BHA	JM38510/10107BHA	Fast Op Amp
JL118BPA	JM38510/10107BPA	Fast Op Amp
JL118SGA	JM38510/10107SGA	Fast Op Amp
JL118SHA	JM38510/10107SHA	Fast Op Amp
JL118SPA	JM38510/10107SPA	Fast Op Amp
JL119BCA	JM38510/10306BCA	High Speed Dual Comparator
JL119BIA	JM38510/10306BIA	High Speed Dual Comparator
JL120-12BXA	JM38510/11502BXA	Voltage Regulator
JL120-12BYA	JM38510/11506BYA	Voltage Regulator
JL120-15BXA	JM38510/11503BXA	Voltage Regulator
JL120-15BYA	JM38510/11507BYA	Voltage Regulator
JL120-15SXA	JM38510/11503SXA	Voltage Regulator
JL120-5BXA	JM38510/11501BXA	Voltage Regulator
JL120-5BYA	JM38510/11505BYA	Voltage Regulator
JL120-5SXA	JM38510/11501SXA	Voltage Regulator
JL120-5SYA	JM38510/11505SYA	Voltage Regulator

National Part Number	SMD/JAN Drawing Number	Function
JL124ABCA	JM38510/11006BCA	Low Power Quad Op Amp
JL124ABDA	JM38510/11006BDA	Low Power Quad Op Amp
JL124ASCA	JM38510/11006SCA	Low Power Quad Op Amp
JL124ASDA	JM38510/11006SDA	Low Power Quad Op Amp
JL124BCA	JM38510/11005BCA	Low Power Quad Op Amp
JL124BDA	JM38510/11005BDA	Low Power Quad Op Amp
JL124SCA	JM38510/11005SCA	Low Power Quad Op Amp
JL124SDA	JM38510/11005SDA	Low Power Quad Op Amp
JL137BXA	JM38510/11803BXA	Adjustable Regulator
JL137BYA	JM38510/11804BYA	Adjustable Regulator
JL137SXA	JM38510/11803SXA	Adjustable Regulator
JL137SYA	JM38510/11804SYA	Adjustable Regulator
JL139BCA	JM38510/11201BCA	Quad Comparator
JL139BDA	JM38510/11201BDA	Quad Comparator
JL139SCA	JM38510/11201SCA	Quad Comparator
JL139SDA	JM38510/11201SDA	Quad Comparator
JL140-12BXA	JM38510/10703BXA	Voltage Regulator
JL140-12BYA	JM38510/10707BYA	Voltage Regulator
JL140-12SXA	JM38510/10703SXA	Voltage Regulator
JL140-12SYA	JM38510/10707SYA	Voltage Regulator
JL140-15BXA	JM38510/10704BXA	Voltage Regulator
JL140-15BYA	JM38510/10708BYA	Voltage Regulator
JL140-15SYA +	JM38510/10708SYA	Voltage Regulator
JL140-24BYA	JM38510/10709BYA	Voltage Regulator
JL140-5BXA	JM38510/10702BXA	Voltage Regulator
JL140-5BYA	JM38510/10706BYA	Voltage Regulator
JL140-5SXA	JM38510/10702SXA	Voltage Regulator
JL140-5SYA	JM38510/10706SYA	Voltage Regulator
JL147BCA	JM38510/11906BCA	Wide BW Quad JFET Op Amp
JL148BCA	JM38510/11001BCA	Quad Op Amp
JL148BDA	JM38510/11001BDA	Quad Op Amp
JL148SCA	JM38510/11001SCA	Quad Op Amp
JL148SDA	JM38510/11001SDA	Quad Op Amp
JL1558BGA	JM38510/10108BGA	Dual Op Amp
JL1558GGA	JM38510/11401BGA	JFET Input Op Amp
JL1568GGA	JM38510/11402BGA	JFET Input Op Amp
JL1568SGA	JM38510/11402SGA	JFET Input Op Amp

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National Part Number	SMD/JAN Drawing Number	Function
JL193BGA	JM38510/11202BGA	Dual Comparator
JL193BPA	JM38510/11202BPA	Dual Comparator
JL198BGA	JM38510/12501BGA	Monolithic Sample And Hold
JL198SGA	JM38510/12501SGA	Monolithic Sample And Hold
JL2951BPA	5962-3870501BPA	LDO Regulator
JL2951SZA	5962-3870501SZA	LDO Regulator
JL2951SPA	5962-3870501SPA	LDO Regulator
JL411BPA	JM38510/11904BPA	JFET Input Op Amp
JL412BGA	JM38510/11905BGA	JFET Input Dual Op Amp
JL412BPA	JM38510/11905BPA	JFET Input Dual Op Amp
JL555BGA	JM38510/10901BGA	Timer
JL555BPA	JM38510/10901BPA	Timer
JL555SGA	JM38510/10901SGA	Timer
JL555SPA	JM38510/10901SPA	Timer
JL723BIA	JM38510/10201BIA	Precision Voltage Regulator
JL723SCA	JM38510/10201SCA	Precision Voltage Regulator
JL723SIA	JM38510/10201SIA	Precision Voltage Regulator
JL741BCA	JM38510/10101BCA	Op Amp
JL741BGA	JM38510/10101BGA	Op Amp
JL741BHA	JM38510/10101BHA	Op Amp
JL741BPA	JM38510/10101BPA	Op Amp
JL741SGA	JM38510/10101SGA	Op Amp
JL741SPA	JM38510/10101SPA	Op Amp
JL747BCA	JM38510/10102BCA	Dual Op Amp
JL747BDA	JM38510/10102BDA	Dual Op Amp
JL747BIA	JM38510/10102BIA	Dual Op Amp
JL747SCA	JM38510/10102SCA	Dual Op Amp
JL747SIA	JM38510/10102SIA	Dual Op Amp
LF147J-SMD	8102306CA	Wide BW Quad JFET Op Amp
LF412MJ-SMD	5962-9676001QPA	JFET Input Dual Op Amp
LM103H-3.0-SMD	7702806XA	Reference Diode
LM103H-3.9-SMD	7702809XA	Reference Diode
LM105H/883	5962-8958801GA	Adjustable Voltage Regulator
LM107H/883	5962-8958901GA	General Purpose Op Amp
LM108AHRQML	5962R9863702QGA +	Precision Op Amp
LM108AHRQMLV	5962R9863702VGA +	Precision Op Amp
LM108AJ-8RQML	5962R9863702QPA +	Precision Op Amp

National Part Number	SMD/JAN Drawing Number	Function
LM108AJ-8RQMLV	5962R9863702VPA +	Precision Op Amp
LM108AJRQML	5962R9863702QCA +	Precision Op Amp
LM108AJRQMLV	5962R9863702VCA +	Precision Op Amp
LM108AWGRQML	5962R9863702QZA +	Precision Op Amp
LM108AWGRQMLV	5962R9863702VZA +	Precision Op Amp
LM108AWRQML	5962R9863702QHA +	Precision Op Amp
LM108AWRQMLV	5962R9863702VHA +	Precision Op Amp
LM10H/883	5962-8760401GA	Op Amp/Voltage Reference
LM113-1H-QMLV	5962-9684302VXA	Reference Diode
LM113-1H-SMD	5962-8671102XA	Reference Diode
LM113-2H-QMLV	5962-9684303VXA	Reference Diode
LM113H-QMLV	5962-9684301VXA	Reference Diode
LM113H-SMD	5962-8671101XA	Reference Diode
LM119E-SMD	86014012A	High Speed Dual Comparator
LM119H-QMLV	5962-9679801VIA	High Speed Dual Comparator
LM119H-SMD	86014011A	High Speed Dual Comparator
LM119J-QMLV	5962-9679801VCA	High Speed Dual Comparator
LM119J-SMD	8601401CA	High Speed Dual Comparator
LM119W-QMLV	5962-9679801VHA	High Speed Dual Comparator
LM119W-SMD	8601401HA	High Speed Dual Comparator
LM119WG-SMD	8601401XA	High Speed Dual Comparator
LM124AE/883	77043022A	Low Power Quad Op Amp
LM124AJ/883	7704302CA	Low Power Quad Op Amp
LM124AJRQML	5962R9950401QCA +	Low Power Quad Op Amp
LM124AJRQMLV	5962R9950401VCA +	Low Power Quad Op Amp
LM124AWG/883	7704302XA	Low Power Quad Op Amp
LM124AWGRQML	5962R9950401QZA +	Low Power Quad Op Amp
LM124AWGRQMLV	5962R9950401VZA +	Low Power Quad Op Amp
LM124AWRQML	5962R9950401QDA +	Low Power Quad Op Amp
LM124AWRQMLV	5962R9950401VDA +	Low Power Quad Op Amp
LM124E/883	77043012A	Low Power Quad Op Amp
LM124J/883	7704301CA	Low Power Quad Op Amp
LM124WG/883	7704301XA	Low Power Quad Op Amp
LM129AH-SMD	5962-8992101XA	Precision Voltage Reference
LM12H458MEL/883	5962-9319502MXC	12 Bit Data Acquisition System
LM12H458MW/883	5962-9319502MYA	12 Bit Data Acquisition System
LM136AH-5.0-SMD	8418002XA	Reference Diode

National Part Number	SMD/JAN Drawing Number	Function
LM137H-SMD	7703403XA	Adjustable Regulator
LM137HVH-SMD	7703404XA	Adjustable Regulator
LM137HVK-SMD	7703404YA	Adjustable Regulator
LM137K-SMD	7703403YA	Adjustable Regulator
LM139AE-SMD	5962-87739012A	Quad Comparator
LM139AJ-QMLV	5962-9673801VCA	Quad Comparator
LM139AJ-SMD	5962-8773901CA	Quad Comparator
LM139AJRQML	5962R9673801QCA +	Quad Comparator
LM139AJRQMLV	5962R9673801VCA +	Quad Comparator
LM139AW-QMLV	5962-9673801VDA	Quad Comparator
LM139AW-SMD	5962-8773901DA	Quad Comparator
LM139AWG-QMLV	5962-9673801VXA	Quad Comparator
LM139AWG-SMD	5962-8773901XA	Quad Comparator
LM139AWGRQML	5962R9673801QXA +	Quad Comparator
LM139AWGRQMLV	5962R9673801VXA +	Quad Comparator
LM139AWRQML	5962R9673801QDA +	Quad Comparator
LM139AWRQMLV	5962R9673801VDA +	Quad Comparator
LM150K/883	5962-8767501XA	Adjustable Power Regulator
LM1575HVK12-QML	5962-9167302QXA	Switching Regulator
LM1575HVK5-QML	5962-9167202QXA	Switching Regulator
LM1575HVKAD-QML	5962-9167102QXA	Switching Regulator
LM1575J-12-QML	5962-9167301QEA	Switching Regulator
LM1575J-15-QML	5962-9167401QEA	Switching Regulator
LM1575J-5.0-QML	5962-9167201QEA	Switching Regulator
LM1575J-ADJ-QML	5962-9167101MEA	Switching Regulator
LM1575K-5.0-QML	5962-9167201MXA	Switching Regulator
LM1575K-ADJ-QML	5962-9167101MXA	Switching Regulator
LM1577K-12/883	5962-9216701MXA	Switching Regulator
LM1577K-ADJ/883	5962-9216601MXA	Switching Regulator
LM158AH-QMLV	5962-8771002VGA	Low Power Dual Op Amp
LM158AH-SMD	5962-8771002GA	Low Power Dual Op Amp
LM158AJ-QMLV	5962-8771002VPA	Low Power Dual Op Amp
LM158AJ/883	5962-8771002PA	Low Power Dual Op Amp
LM158H-SMD	5962-8771001GA	Low Power Dual Op Amp
LM158J/883	5962-8771001PA	Low Power Dual Op Amp
LM160H/883	5962-8767401GA	High Speed Differential Comparator
LM185BYH-SMD	5962-9091401MXA	Adjustable Voltage Reference

SMD/JAN DRAWINGS BY PART NUMBER

National Part Number	SMD/JAN Drawing Number	Function
LM185BYH1.2-SMD	5962-8759405XA	Adjustable Voltage Reference
LM185BYH2.5-SMD	5962-8759406XA	Adjustable Voltage Reference
LM185E-1.2/883	5962-8759401ZA	Adjustable Voltage Reference
LM185H-1.2-SMD	5962-8759401XA	Adjustable Voltage Reference
LM185H-2.5-SMD	5962-8759402XA	Adjustable Voltage Reference
LM193AH-QMLV	5962-9452602VGA	Dual Comparator
LM193AH/883	5962-9452602MGA	Dual Comparator
LM193AJ-QMLV	5962-9452602VPA	Dual Comparator
LM193AJ/883	5962-9452602MPA	Dual Comparator
LM194H/883	5962-8777701XA	Super Mach Pair Op Amp
LM195H/883	5962-8777801XA	Power Transistor
LM195K/883	5962-8777801YA	Power Transistor
LM199AH-SMD	5962-8856101XA	Precision Voltage Reference
LM2595J-12-QML	5962-9650201QEA	Switching Regulator
LM2595J-3.3-QML	5962-9687901QEA	Switching Regulator
LM2595J-5.0-QML	5962-9650301QEA	Switching Regulator
LM2595J-ADJ-QML	5962-9650401QEA	Switching Regulator
LM2940J-12/883	5962-9088401QEA	LDO Regulator
LM2940J-15/883	5962-9088501QEA	LDO Regulator
LM2940J-5.0/883	5962-8958701EA	LDO Regulator
LM2940J-8.0/883	5962-9088301QEA	LDO Regulator
LM2940WGS.0/883	5962-898701XA +	LDO Regulator
LM2941J/883	5962-9166701QEA	Adjustable LDO Regulator
LM2990J-12-QML	5962-9571001QEA	LDO Regulator
LM2990J-15-QML	5962-9570901QEA	LDO Regulator
LM2990J-5.0-QML	5962-9571101QEA	LDO Regulator
LM2991J-QML	5962-9650501QEA	Adjustable LDO Regulator
LM2991J-QMLV	5962-9650501VEA	Adjustable LDO Regulator
LM2991WG-QML	5962-9650501QXA	Adjustable LDO Regulator
LM3940J-3.3-QML	5962-9688401QEA	LDO Regulator
LM3940WG3.3-QML	5962-9688401QXA	LDO Regulator
LM6121H/883	5962-9081201MGA	VIP Buffer
LM6121J/883	5962-9081201MPA	VIP Buffer
LM6125H/883	5962-9081501MGA	VIP Buffer
LM613AMJ/883	5962-9300301MEA	Super Block
LM6142AMJ-QML	5962-9550301QPA	VIP Voltage Feedback Dual Op Amp
LM6161E/883	5962-8962101ZA	VIP Op Amp

National Part Number	SMD/JAN Drawing Number	Function
LM6161J-QMLV	5962-8962101VPA +	VIP Op Amp
LM6161J/883	5962-8962101PA	VIP Op Amp
LM6161W-SMD	5962-8962101HA	VIP Op Amp
LM6161WG-QMLV	5962-8962101VXA +	VIP Op Amp
LM6161WG/883	5962-8962101XA	VIP Op Amp
LM6162J-QMLV	5962-9216501VPA	VIP Op Amp
LM6162J/883	5962-9216501MPA	VIP Op Amp
LM6162WG-QMLV	5962-9216501VXA	VIP Op Amp
LM6162WG/883	5962-9216501MXA	VIP Op Amp
LM6164J-QMLV	5962-8962401VPA	VIP Op Amp
LM6164J/883	5962-8962401PA	VIP Op Amp
LM6164W-SMD	5962-8962401HA	VIP Op Amp
LM6164WG-QMLV	5962-8962401VXA	VIP Op Amp
LM6164WG/883	5962-8962401XA	VIP Op Amp
LM6165J-QMLV	5962-8962501VPA	VIP Op Amp
LM6165J/883	5962-8962501PA	VIP Op Amp
LM6165WG-QMLV	5962-8962501VXA	VIP Op Amp
LM6165WG/883	5962-8962501XA	VIP Op Amp
LM6172AMJ-QML	5962-9560401QPA	VIP Voltage Feedback Dual Op Amp
LM7171AMJ-QML	5962-9553601QPA	VIP Voltage Feedback Op Amp
LM7171AMJ-QMLV	5962-9553601VPA	VIP Voltage Feedback Op Amp
LM7171AMW-QML	5962-9553601QHA	VIP Voltage Feedback Op Amp
LM7171AMWG-QML	5962-9553601QXA	VIP Voltage Feedback Op Amp
LM7171AMWG-QMLV	5962-9553601VXA	VIP Voltage Feedback Op Amp
LM725H/883	5962-9552901MGA	Instrumentation Op Amp
LM78540J/883	5962-8876101EA	Switching Regulator
LMC555J/883	5962-8950305PA	CMOS Timer
LMC6061AMJ/883	5962-9460401MPA	CMOS Op Amp
LMC6062AMJ/883	5962-9209403MPA	CMOS Dual Op Amp
LMC6064AMJ/883	5962-9209303MCA	CMOS Quad Op Amp
LMC6462AMJ-QML	5962-9560301QPA	CMOS Dual Op Amp
LMC6464AMJ-QML	5962-9560302QCA	CMOS Quad Op Amp
LMC6464AMWG-QML	5962-9560302QXA	CMOS Quad Op Amp
LMC6482AMJ/883	5962-9453401MPA	CMOS Dual Op Amp
LMC6484AMJ/883	5962-9453402MCA	CMOS Quad Op Amp
LMC6484AMWG/883	5962-9453402QXA	CMOS Quad Op Amp
LMC660AMJ/883	5962-9209301MCA	CMOS Quad Op Amp

National Part Number	SMD/JAN Drawing Number	Function
LMD18200-2D/883	5962-9232501MXA	Dual H-Bridge
LP2951E/883	5962-3870501MZA	Adjustable LDO Regulator
LP2951H/883	5962-3870501MGA	Adjustable LDO Regulator
LP2951J/883	5962-3870501MPA	Adjustable LDO Regulator
LP2951WG/883	5962-3870501MXA	Adjustable LDO Regulator
LP2953AMJ-QMLV	5962-9233601VEA	Adjustable LDO Regulator
LP2953AMJ/883	5962-9233601MEA	Adjustable LDO Regulator
LP2953AMWG-QMLV	5962-9233601VXA	Adjustable LDO Regulator
LP2953AMWG/883	5962-9233601QXA	Adjustable LDO Regulator
LP2956AMJ-QML	5962-9554701QEA	Adjustable LDO Regulator

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LINEAR PRODUCTS – RADIATION TEST RESULTS

Total Ionizing Dose Results			Single Event Latchup		
Part Number	Total Dose to Pre-Rad Limit (krad)	Functional Level (krad)	SEL	LET (MeV/mg/cm ²)	Process Technology
LF156	10	> 15			Bi-FET
LM35AH	100	> 100			Bipolar-SiCr
LM101	80 - 100	> 100			Bipolar
LM105	100	> 100			Bipolar
LM107	> 100	> 100			Bipolar
LM108	80 - 100	> 100			Bipolar
LM109	20 - 50	> 50			Bipolar
LM111	< 10	> 20			Bipolar
LM113	100	> 100			Bipolar
LM117H	20 - 30	> 30	No	>110	Bipolar
LM117K	30 - 40	> 50	No	>110	Bipolar
LM118	50	> 200			Bipolar
LM119	10 - 20	> 20	No	>100	Bipolar
LM120-12(H)	> 100	> 100	No	>110	Bipolar
LM120-12(K)	> 100	> 100	No	>110	Bipolar
LM120-15(H)	> 100	> 100			Bipolar
LM120-15(K)	> 100	> 100			Bipolar
LM124	> 100	> 125	No	>90	Bipolar
LM124A	25 - 30	> 25			Bipolar
LM12H458MEL	5	< 10			CMOS
LM135	> 50	> 50			Bipolar
LM136AH-2.5	100	> 100	No	>110	Bipolar
LM136AH-5.0	30	>100			Bipolar
LM137(H)	20 - 30	50			Bipolar
LM137(K)	20 - 30	50			Bipolar
LM139	50 - 80	> 100	No	>80	Bipolar
LM140-5(H)	20	> 20			Bipolar

Notes:

1. Linear products have been irradiated to High Dose rates as required by MIL-STD-883D, Method 1019.4. "Worst-case" conditions for Linear products are derived through Low Dose Rate testing.
2. Using pre-radiation limits provides small additional margin for Linear products that are used in space environments tested at high dose rate.
3. Parts qualified to RHA Level R are guaranteed to meet their post rad specifications after 100 krad(Si) total dose. Rad levels for all other products are typical and are not guaranteed.

LINEAR PRODUCTS – RADIATION TEST RESULTS

Total Ionizing Dose Results		Single Event Latchup			
Device	Total Dose to Pre-Rad Limit (krad)	Functional Level (krad)	SEL	LET (MeV/mg/cm ²)	Process Technology
LM140-12I(H)	20	> 50			Bipolar
LM140-12(K)	20	> 50			Bipolar
LM140-15(H)	> 20	> 50			Bipolar
LM140-15(K)	> 20	> 50			Bipolar
LM148	> 20	> 20			Bipolar
LM158	12 - 50	> 50	No		Bipolar
LM158A	12 - 50	> 50	No		Bipolar
LM185	< 10	> 10			Bipolar
LM193	< 20	> 100	No	> 110	Bipolar
LM193A	< 20	> 100	No	> 110	Bipolar
LM555	> 25	> 25			Bipolar
LM723	> 100	> 100			Bipolar
LM1575J-5.0	30	> 50			Bipolar
LM1575J-ADJ	30	> 50			Bipolar
LM6142AMJ	10	< 100			VIP III
LM6161	50	200			VIP I
LM6172	400	> 800			VIP III
LM7171	200	> 200			VIP III
LM2595J-5.0	100	> 100			Bipolar
LM2595J-ADJ	100	> 100			Bipolar
LM2991J	10	< 30			Bipolar
LMC6062	5	10			CMOS
LMX2305	25	50	No	>84	BiCMOS
LMX2315	25	50	No	>84	BiCMOS
LMX2325	25	50	No	>84	BiCMOS
LP2951	> 75	> 100	No	>90	Bipolar
LP2953	> 30	> 75			Bipolar
LP2956	30	< 50			Bipolar

Notes:

1. Linear products have been irradiated to High Dose rates as required by MIL-STD-883D, Method 1019.4. "Worst-case" conditions for Linear products are derived through Low Dose Rate testing.
2. Using pre-radiation limits provides small additional margin for Linear products that are used in space environments tested at high dose rate.
3. Parts qualified to RHA Level R are guaranteed to meet their post rad specifications after 100 krad(Si) total dose. Rad levels for all other products are typical and are not guaranteed.

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HIGH-PERFORMANCE OP AMPS - RADIATION TEST RESULTS

Neutron Irradiation (Neutron/cm ²)	Total Dose	Dose Rate	Result Summary	Product within Process	
CBIC-U (39x39 Mil Die Size) Process Type/Base Chip Technology					
1x10 ¹²	30, 100, 300, 1000	50 rads/sec	Slight change in DC operating point	CLC109 CLC110	CLC111
Not Available	10, 30, 50, 100	570 rads (Si)/min	No degradation of gain; slight degradation of bandwidth at initial radiation exposure	CLC400* CLC401* CLC406 CLC412	CLC425 CLC522 CLC532
CBIC-U (54x54 Mil Die Size) Process Type/Base Chip Technology					
Not Available	10,000	155 rads/sec	Slight change in DC operating point; no degradation in AC characteristics	CLC400* CLC401*	CLC402
Not Available	10, 30, 100, 300, 1000	140 rads (Si)/sec	Negligible degradation to 1000 krads specification; should meet specification to 3000 krads	CLC404 CLC409	CLC410
1.85x10 ¹⁴	None	None	Little change in the small signal frequency response over a wide gain range	CLC420 CLC422	
Not Available	5, 10, 15, 20, 25	500 rads/hour	No degradation of gain; slight degradation of bandwidth at initial radiation exposure	CLC501* CLC502	CLC505
6x10 ¹¹	30, 60, 100, 150, 200	50 rads/sec	Change in DC bias characteristics; no AC testing performed	CLC520*	
1x10 ¹²	30, 100, 300, 1000	50 rads/sec	Slight change in DC operating point		
CBIC-U (76x65 Mil Die Size) Process Type/Base Chip Technology					
Not Available	30, 100, 300, 1000			CLC411 CLC414	CLC415* CLC533
CBIC-V2 (44x44 Mil Die Size) Process Type/Base Chip Technology					
Report Available	10,000			CLC440 CLC446 Generic CBIC-V*	CLC449
CBIC-R (56x68 Mil Die Size) Process Type/Base Chip Technology					
Report Available	10,000	155 rads/sec	Change in outset voltage and bias current; moderate change in transimpedance.	CLC430	

*Tested

Note: Parts available to RHA are guaranteed to meet their post rad specifications after 100krad (si) total dose. Rad levels for all other products are typical and are not guaranteed.

LVDS (LOW VOLTAGE DIFFERENTIAL SIGNALLING) PRODUCTS - RADIATION TEST RESULTS

Product	Parameter	3 krad(Si)	10 krad(Si)	30 krad(Si)	50 krad(Si)	100 krad(Si)	300 krad(Si)	+25°C Anneal	Single Event Effects
									Heavy Ion Test Results Latchup (SEL [MeV/(mg/cm ²)])
DS16F95	All Parameters	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Not available	>120
DS26C31	All Parameters	Meets Pre-Rad	Meets Pre-Rad	–	–	–	–	Not available	>120
DS26C32	All Parameters	Meets Pre-Rad	Meets Pre-Rad	–	–	–	–	Not available	>120
DS26LS31	All Parameters	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Not available	>120
DS26LS32	All Parameters	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Meets Pre-Rad	Not available	>120
DS90C031	I _{CCZ}	10mA	10mA	13mA	13mA		Not available	Not available	
	D _{VOS}	± 25mV	± 25mV	± 35mV	± 35mV		Not available	Not available	
	D _{VOD}	± 35mV	± 35mV	± 45mV	± 45mV		Not available	Not available	
	I _{OZL}	10µA	10µA	25µA	25µA		Not available	Not available	
	I _{OZH}	10µA	10µA	25µA	25µA		Not available	Not available	
DS90C032	I _{CCHQ1}	11mA	11mA	25mA	25mA		25mA		
	I _{CCHQ2}	11mA	11mA	25mA	25mA		25mA		
	I _{CCHQ3}	11mA	11mA	25mA	25mA		25mA		
	I _{CCLQ2}	11mA	11mA	25mA	25mA		25mA		
	I _{CCLQ3}	11mA	11mA	25mA	25mA		25mA		
	I _{CCZQ1}	11mA	11mA	25mA	25mA		25mA		
	I _{CCZQ2}	11mA	11mA	25mA	25mA		25mA		
	I _{CCZQ3}	11mA	11mA	25mA	25mA		25mA		
	I _{CCZQ4}	11mA	11mA	25mA	25mA		25mA		
	I _{CCZQ5}	11mA	11mA	25mA	25mA		25mA		

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PACKAGE DESCRIPTIONS

Section 15

PACKAGE DESCRIPTIONS



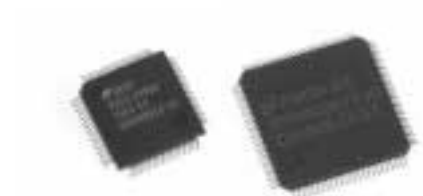
**Molded Plastic Leaded Chip Carrier
(PLCC)**

Product Suffix: **V**
SDI Product Suffix: **Q**



**Molded Plastic Quad Flat Package
(PQFP)**

Product Suffix: **VBG, VCC, VCE, VEF, VF, VH, VHG,
VE, VJ, VJG, VJQ, VLJ, VNG, VQL, VUL, VUW**



**Molded Plastic Thin Quad Flat Package
(TQFP)**

Product Suffix: **VEH, VJD, VF, VH**



**Chip Scale Packaging
(CSP)**

Product Suffix: **SLB**



**MicroSMD
 μ SMD**

Product Suffix: **IBP**

Package photos are actual size. Please see web site at <http://www.national.com/packaging/> for specifications.
Many National products are available in wafer, die, and known good die form. Please go to www.national.com/kgd for more information.



SC70
Product Suffix: **M7**



**Miniature Molded Small Outline Package
(MSOP, Mini SO)**
Product Suffix: **MM**



**Molded Small Outline Package
(SOT-23)**
Product Suffix: **M3, M5, M6**



**Molded Small Outline Package
(SOT-223)**
Product Suffix: **MP**



**Molded Thin Shrink Small Outline Package
(TSSOP)**
Product Suffix: **MTA, MTD, MTC, MT, MTE**



**Molded Small Outline Package
(SO, SOT)**
Product Suffix: **M, WM**
SDI Product Suffix: **E**



**Molded Shrink Small Outline Package
(SSOP)**
Product Suffix: **MSA, MEA, MS**

PACKAGE DESCRIPTIONS



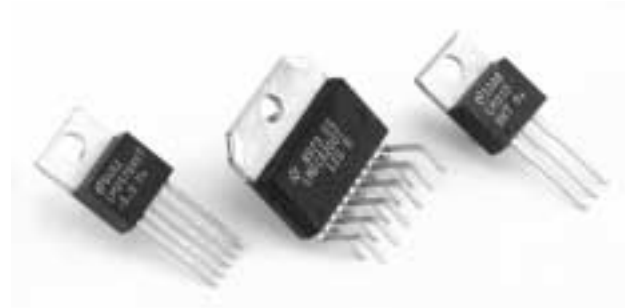
**3-Lead Metal Can Package
TO46**
Product Suffix: **H**



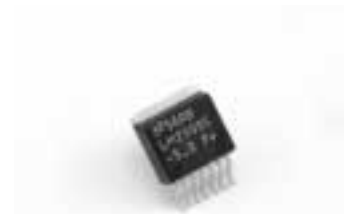
Molded TO-92
Product Suffix: **Z**



Molded TO-220 Isolated Tab
Product Suffix: **TF**



Molded TO-220
Product Suffix: **T, TA**



**Molded Power Surface Mount
(TO-263)**
Product Suffix: **S, TS**

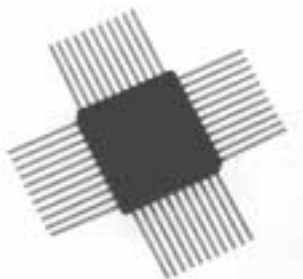


**Molded Dual-in-Line Package
(DIP)**
Product Suffix: **N**

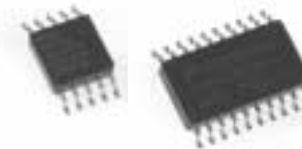
Package photos are actual size. Please see web site at <http://www.national.com/packaging/> for specifications. Many National products are available in wafer, die, and known good die form. Please go to www.national.com/kgd for more information.



Ceramic Flatpack
Product Suffix: **W**



Ceramic Quad Flatpack
Product Suffix: **W**



Ceramic Small Outline Integrated Circuit (Gullwing) (Ceramic SOIC)
Product Suffix: **WG**



Ceramic Dual-in-Line Package (CerDIP)
Product Suffix: **J**



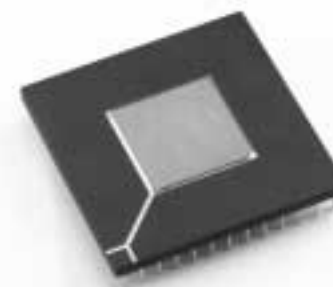
Ceramic Sidebrazed Dual-in-Line Package
Product Suffix: **D**



Ceramic Quad Flatpack (Gullwing)
Product Suffix: **WG**



Ceramic Quad Flatpack J-bend
Product Suffix: **EL**



Ceramic Pin Grid Array (PGA)
Product Suffix: **U**

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