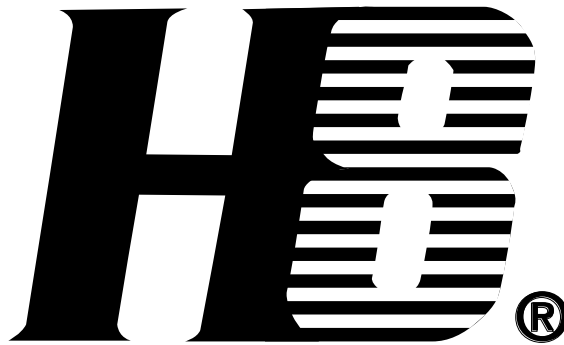


EMBEDDED



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Datasheet.Directory

EMBEDDED



MICROCONTROLLERS

**Family of 8- and 16-bit CISC
Embedded Microcontrollers**

August 2001

H8 Family Overview

- **High Peripheral Integration**
- **Large On-Chip Memory**
- **Highest-Performance Architecture**
- **Low Power**
- **High-Performance High-Level Programming**
- **Widely Used**



High Peripheral Integration

Timers

- 8-bit, 14-bit, 16-bit timers
 - Watchdog timers
 - PWM timers
 - Input capture & compare match functions
 - Auto reload

Analog Interfaces

- Analog-to-digital converters
- Digital-to-analog converters

Communications Interfaces

- Sync/Async Serial Communication Interfaces (SCI)
- I²C interface
- IrDA
- Smart Card I/F
- CAN 2.0B

Display Drivers & Controllers

- Segment & Dot matrix LCD display drivers & controllers
- High-current (LED) outputs

PC-Specific Features

- Keyboard scan
- PS/2 ports
- LPC/ISA-bus host interface

Glue-less Memory Interface

- Programmable wait-state controller
- Programmable bus width (8 or 16 bits)
- Programmable chip selects

Other Peripherals

- DMA controller
- Data transfer controller
- Hardware multiply/accumulator
- On-chip PLL
- On-chip 32-KHz sub-clock generator



High Integration Provides Power In Your Product

Large On-Chip Memory

Memory Options

- Up to 512 Kbytes of on-chip FLASH
- MASK ROM versions available for high-volume applications
- Eliminates need for external memory components
- Up to 32 Kbytes of SRAM

Single-Cycle Access to Internal Memory

- H8S/2623 is the first 16-bit microcontroller to support 256 kilobytes of flash memory... on chip... with single-cycle access
- H8/300H and the H8S support glue-less interfaces to external memory to minimize external component needs and cost

Lower System Power

- Less bus utilization
- Single chip powered vs. multiple chips

Lower Development Cost

- Flash can be programmed/erased instead of discarding multiple OTPs

Lower Manufacturing Cost

- Scrapping of OTPs due to code changes can be eliminated

Initial Flexibility During Manufacturing

- A single end product can be “personalized” at final assembly or test for different customers or end-markets

After-Shipment Software Upgrades

- End product can be modified repeatedly in the field



Lower Your Costs With Higher Flexibility

Highest Performance Architecture

The World's Fastest 16-bit Microcontroller

- 30ns instruction execution
- 33 MHz clock speeds
- Single-state on-chip & two-state off-chip memory accesses (H8S)
- Two-state on-chip & two-state off-chip memory accesses (H8/300H)

Large Linear Address Space

- The 16-bit members provide 16 megabytes of linear address space
- No need to set up page registers
- No limitations on size of code modules, data arrays, or structures

Unparalleled Performance

- Multiple Register Push to and POP FLASH (the stack) Instruction (H8S)
 - Further reduces interrupt service times
- Single-Instruction 64KB Block Transfer
- On-Chip Hardware MAC (H8S/26xx)
- Low EMI (noise generation)
- Improved EMS (noise tolerance)
- Fast oscillation stabilization time



The World's Fastest 16-bit Microcontroller

Low Power

Optimized for Battery-Powered Portable Products

- Operating voltage as low as 1.8V for H8/300L devices
- H8/300L devices save power via use of internal voltage step-down circuits
- H8S uses fully-static circuit design

16-bit Devices Support Clock “Gearing”

H8S Series Typical Power Consumption

- 50mA @ 5V/20MHz, active mode
- 60µA @ 3V/32KHz, subactive mode
- 0.01µA, standby mode

Modes	H8/300L	H8/300H	H8/300HT	H8S/2xxx
Medium-Speed	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Subactive	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Sleep	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Subsleep	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Watch	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
Standby	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Module Stop		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SW Standby		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
HW Standby		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>



Solutions to Support Any 8- or 16-bit Application

High Software Performance

H8 Designed for High-Level Programming

- Load-Store Architecture
 - All operations performed on registers
 - Any register can be used a source or destination for any operation
 - No accumulator bottleneck
- 100% Upward Code Compatibility (H8/300L _ H8S)
- Eight Powerful & Flexible Addressing Modes

Compilers Produce Fast, Efficient, Dense Code

- Hitachi & 3rd Party versions available
- Compact C and embedded C++ code



Code Compatibility Minimizes Your Development Effort

Widely Used

Shipping over 16 million units/month

- Over 5 million units/month are FLASH
- More than twice as many FLASH units as the nearest competitor
- Over 100 different products in mass production

Development Tool Choice

- Fully-featured real-time emulators, compilers, assemblers, simulator/debuggers
- Variety of real-time operating systems, and other development and analysis tools

Quick Time-to-Market

- Full lineup of low-cost evaluation and development kits
- Extensive 3rd party support
- IAR MakeApp to set up peripheral drivers



You Maintain Control Over Your Product

H8 Family

High Peripheral Integration

- Timers, LCD controller/drivers, ADC, D/A, DMAC, I²C, PS/2, IrDA, SCI, etc.

Large On-Chip Memory

- Up to 512KB flash/MROM/OTP
- Up to 32KB SRAM

Highest Performance

- 30ns basic instruction execution (H8S/2000)
- 16-bit x 16 in 120ns (42-bit signed result)

Low Power

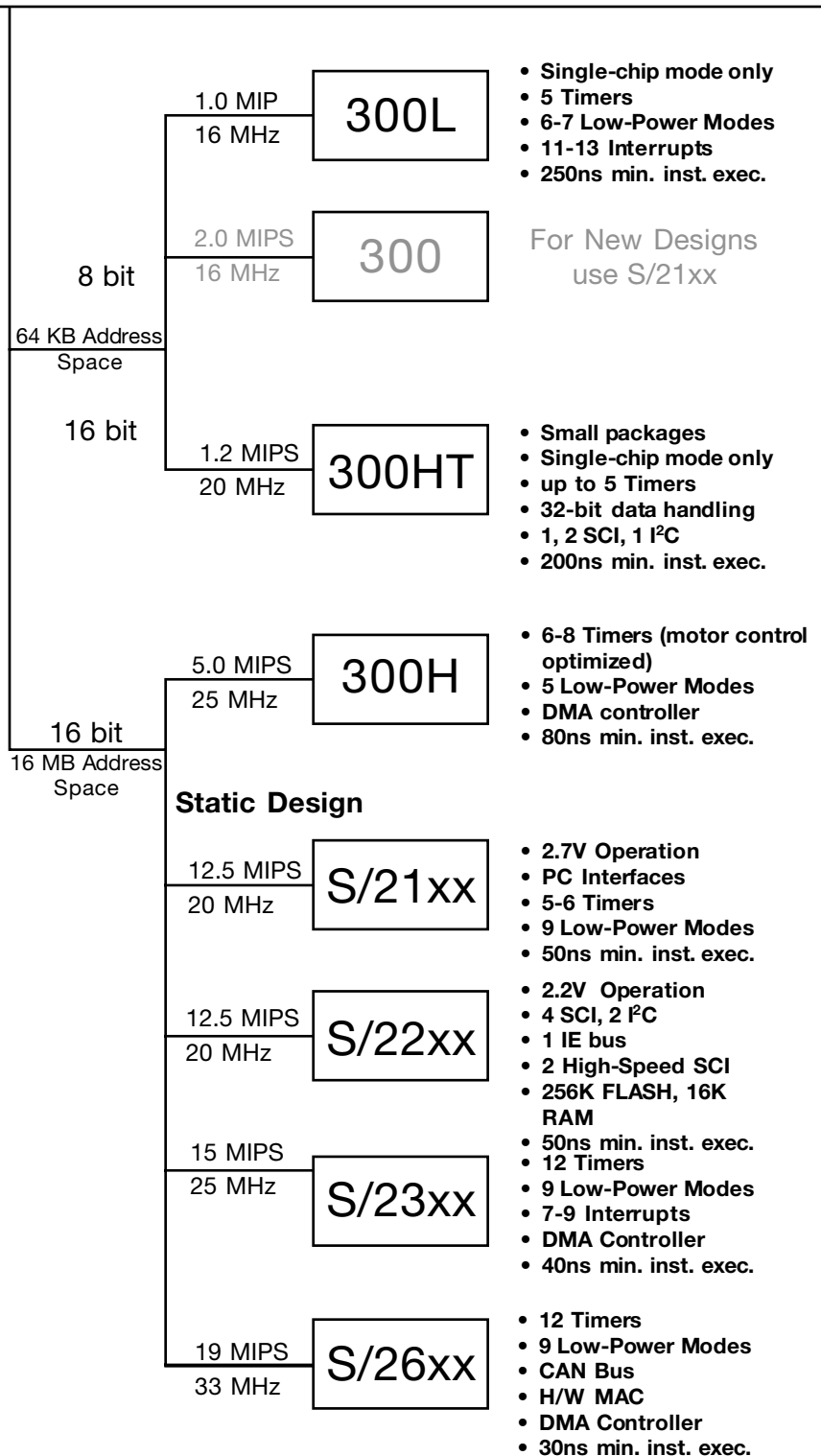
- H8/300L: active mode 5mA typ.; standby mode 5 A max. (V_{cc}=2.5V)
- H8S/2000: active mode 13mA typ.; standby mode 0.01 A typ. (V_{cc}=3V)

High Software Performance

- Upwardly code compatible (H8/300L to H8S/2000)
- Efficient C and eC++ compiler
- Software investment maintained

Readily Available

- More than 16Mu/mo. H8 MCUs shipping today
- More than 5Mu/mo. FLASH MCUs shipping today



300L

(page 1 of 2)

Performance

- 1 MIP

Low Power

- 6-7 modes
- 7 standard modes
- 1.8 – 5.5 V

Timers

- 6 Timers
- Watchdog Timer
- 10-bit PWM

Clock

- 32 KHz sub generator

ADC

- 8 / 12 channels
- 8bit / 10bit

Interrupts

- 11-13 external
- 16-24 internal

I/O

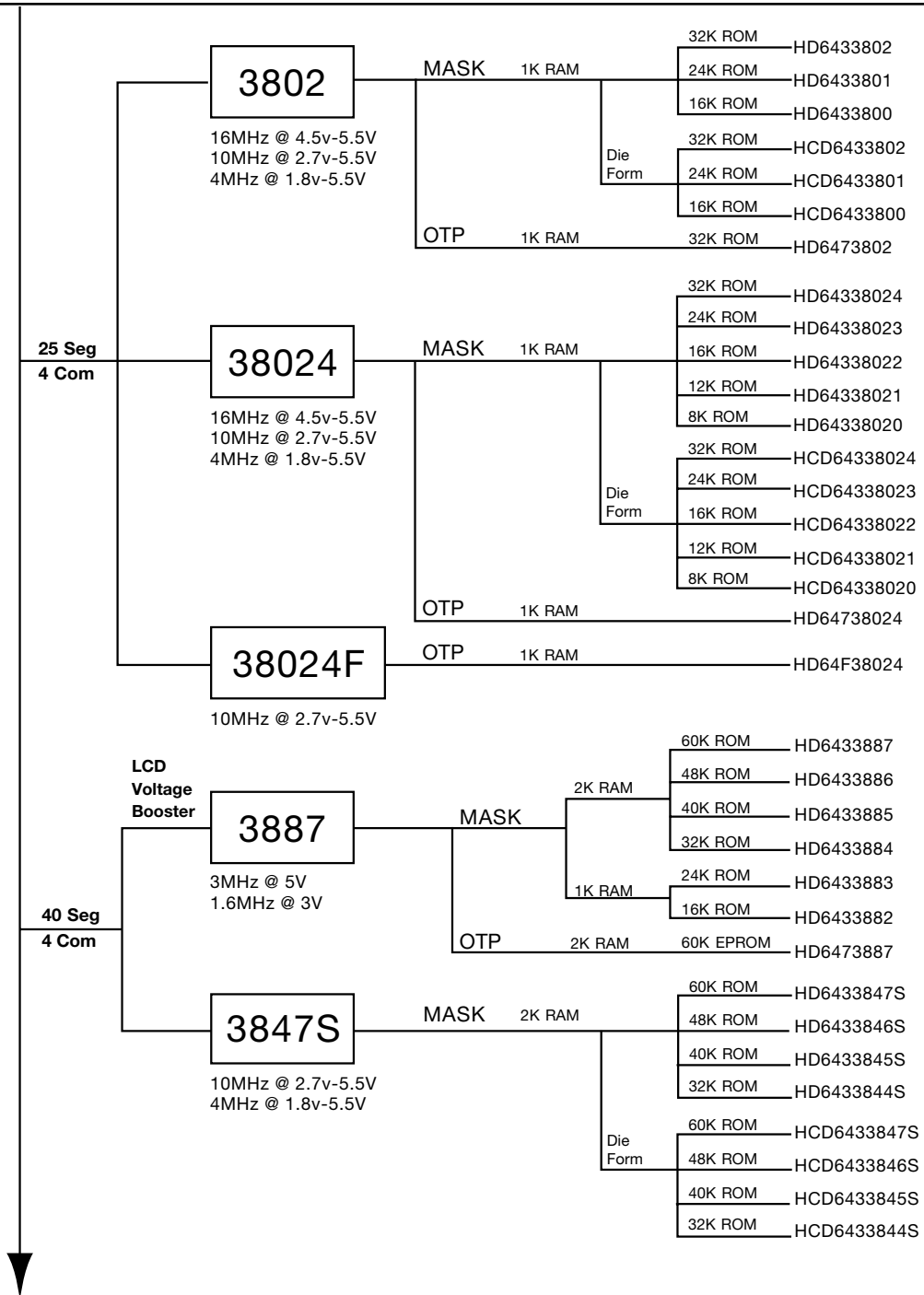
- 35 – 71 pins
- 8 – 13 input
- 2 serial (1st Async, 2nd Sync/Async)

Display

- Integrated LCD Drivers

Memory

- 512 – 2K RAM
- 32K Flash



300L continued

(page 2 of 2)

Performance

- 1 MIP
- Low Power**
- 6-7 modes
- 7 standard modes
- 1.8 – 5.5 V

Timers

- 6 Timers
- Watchdog Timer
- 10-bit PWM

Clock

- 32 KHz sub generator

ADC

- 8 / 12 channels
- 8bit / 10bit

Interrupts

- 11-13 external
- 16-24 internal

I/O

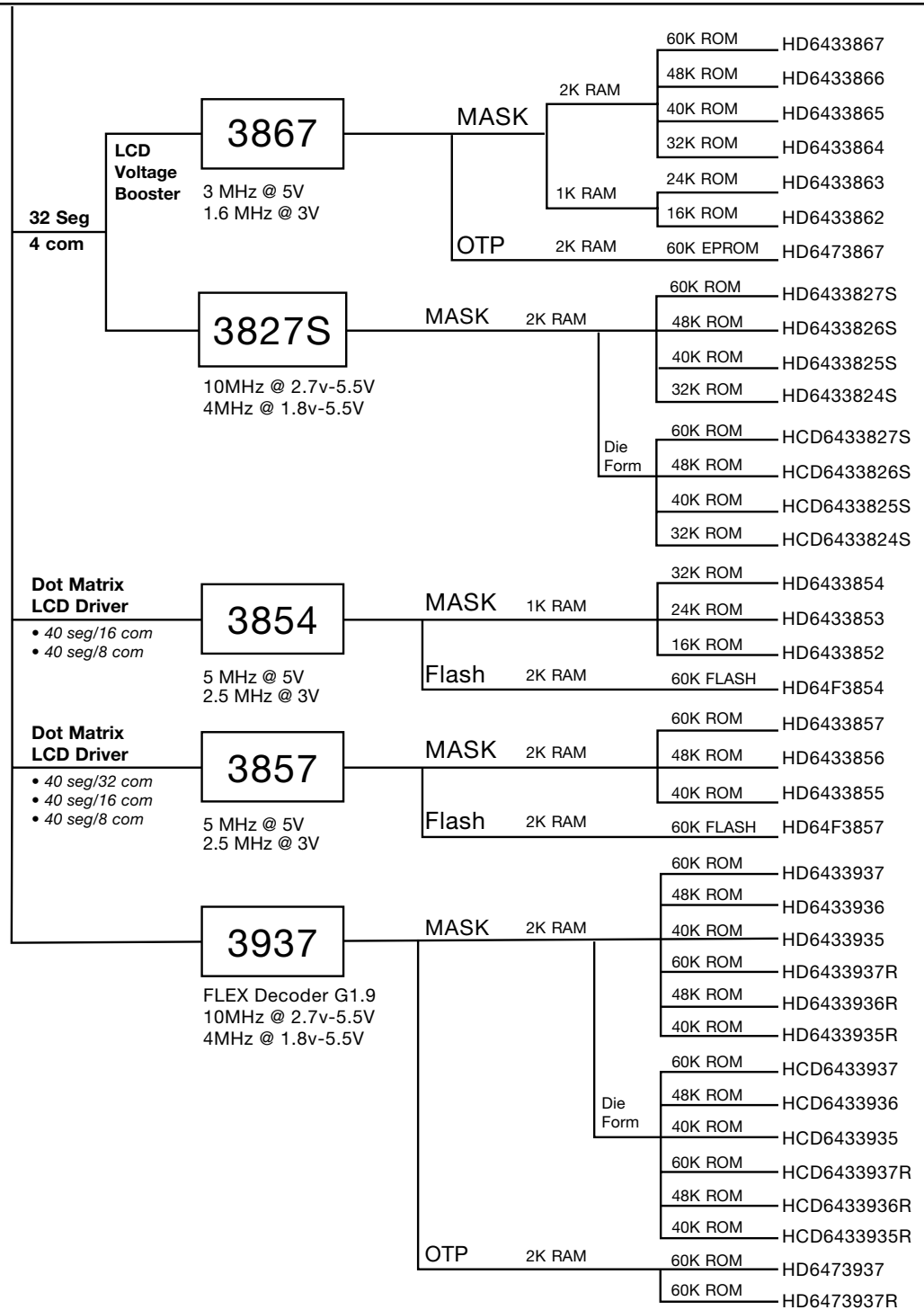
- 35 – 71 pins
- 8 – 13 input
- 2 serial (1st Async, 2nd Sync/Async)

Display

- Integrated LCD Drivers

Memory

- 512 – 2K RAM
- 32K Flash



300HT Tiny Series

Performance

- 1.2 MIPS
- 10MHz @ 2.7 V
- 20MHz @ 5.0 V

Low Power

- 3-5 modes
- 5 standard modes
- 2.7 – 5.5 V

Timers

- 2-3 8-bit Timers
- 1-2 16-bit Timers
- Watchdog Timer

Clock

- Clock pulse generator
- 32KHz subclock

ADC

- 8 channel, 10bit

Interrupts

- 9-11 external
- 17-38 internal

I/O

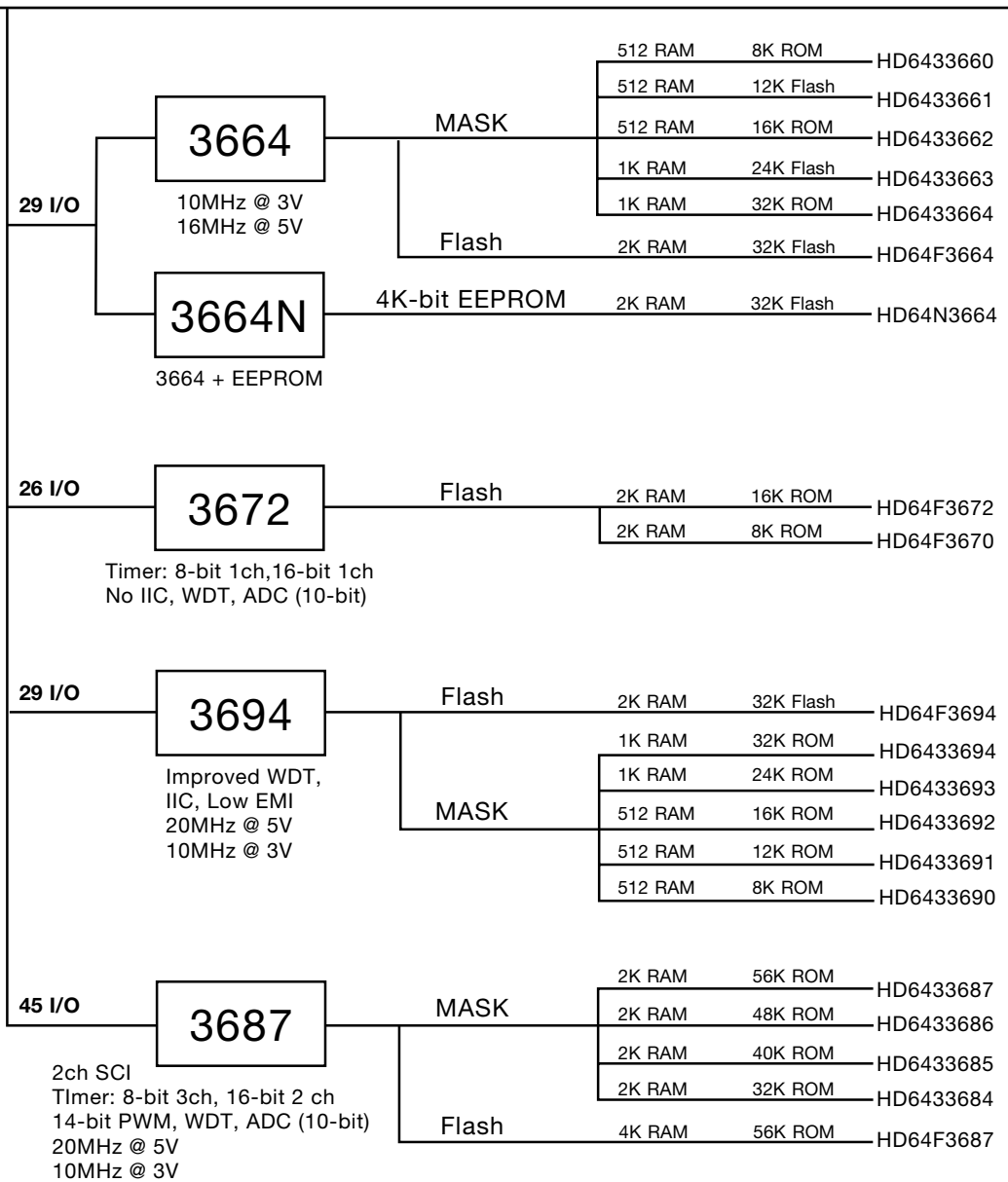
- 26-45 I/O pins, 8 input only
- 1-2 serial I/F
- 1 I²C I/F

Memory

- 512 – 4K RAM
- up to 56K Flash

Packaging

- 48, 64-pin packages



300H

Performance

- 25MHz @ 3-5 V
- 20MHz @ 5 V
- 10MHz @ 3 V
- 5 MIPS

Low Power

- 3-5 modes
- 5 standard modes
- 2.7 - 5.5 V

Timers

- 6-8 Timers
- Watchdog Timer
- 16-bit Integrated Timing Unit

Clock

- Clock pulse generator

ADC

- 8 channel, 10bit

DAC

- 2 channel, 8bit

Ext. Bus

- SRAM

Interrupts

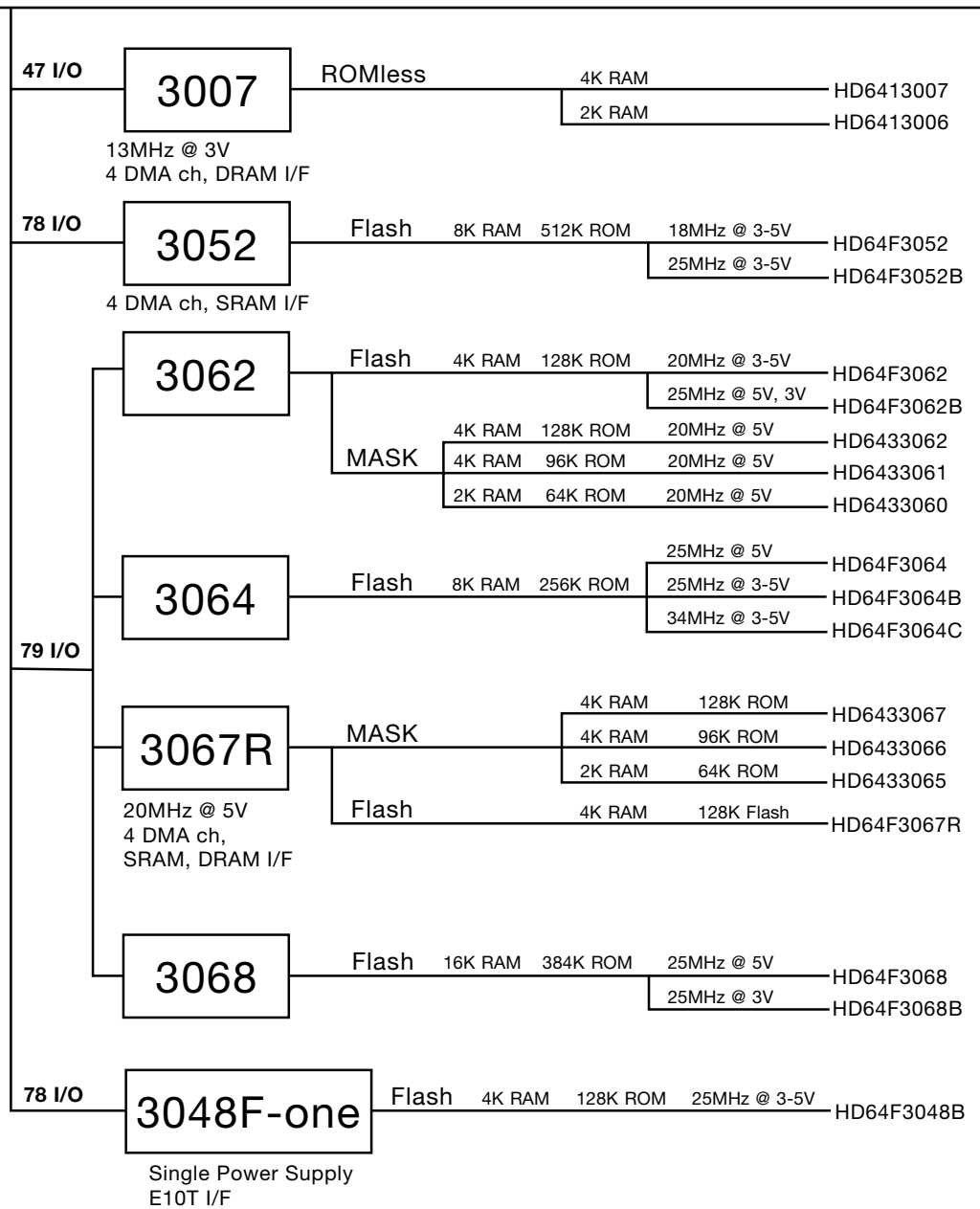
- 5-9 external
- 30-36 internal

I/O

- 70 I/O pins, 9 input only
- 2 serial I/F
- Smartcard I/F

Memory

- 512 - 16K RAM
- 128K - 512K Flash



S/21xx

Performance

- 20MHz @ 5 V
- 10MHz @ 3 V
- 12.5 MIPS

Low Power

- 8 modes
- 2.7 – 5.5 V

Timers

- 6-25 Timers
- 25 Standard
- Watchdog Timer

Clock

- 32KHz subclock

ADC

- 8 channel, 10bit
- 100-pin, 16ch
- 80/64-pin, 8ch

Data Bus

- 8 or 16 bits

Interrupts

- 4-9 external
- 31-46 internal

I/O

- 8 input
- IrDA
- I²C x2 **
- 2-3 Serial

PC I/O

- X-bus x4
- LPC x3
- PS/2 x3
- Keyboard scan I/F

Memory

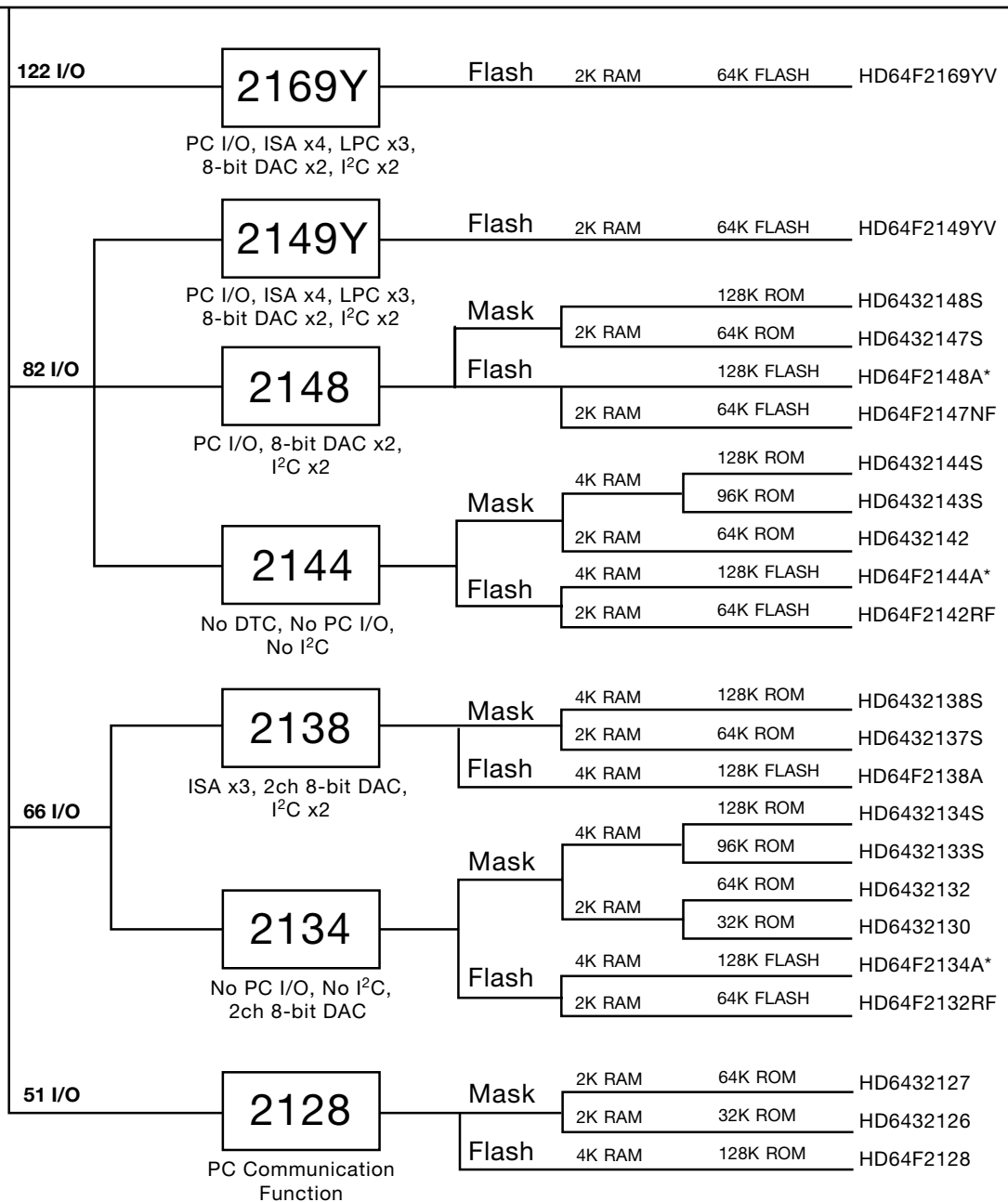
- 2-4K RAM
- 64K - 128K Flash

Address Space

- 16M

Bus Master

- Data Transfer Controller
- CPU



* Low Power version, "V" version, operates at 2.7 - 5V, except Flash devices, which operate at 3.0 - 5V; Flash programming and erase is between 3.0 - 3.6V

** I²C is a trademark of Philips Co. I²C bus I/R is optional in ROM version



S/22xx

Performance

- 20 MHz @ 5V
- 13 MHz @ 2.7V
- 6 MHz @ 2.2V
- 15 MIPS

Low Power

- 5 modes
- 2.2 – 5.5 V

Timers

- 16-bit Timer Pulse Unit (TPU) x3
- 8-bit Timer x2
- Watchdog Timer

ADC

- 8 ch, 10bit

Interrupts

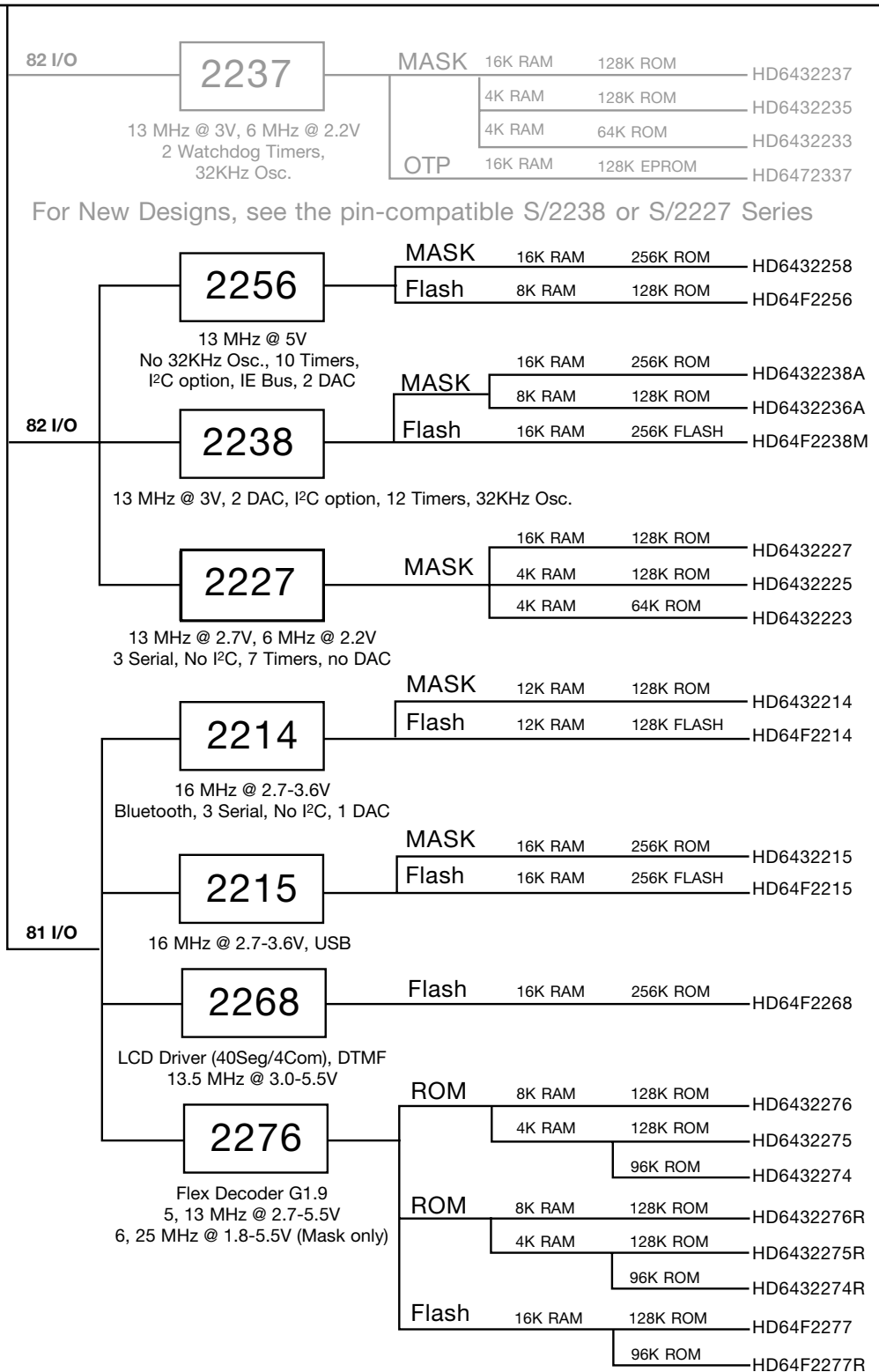
- 9 external
- 31-53 internal

I/O

- 79-82 I/O pins, 4-10 input only
- 4 Serial
- Smartcard I/F
- 85 ch Data Transfer Controller (DTC)

Memory

- 4K -16K RAM
- 128K - 256K Flash



S/23xx

Performance

- 25MHz @ 3 V
- 14MHz @ 2.4 V available for MASK versions of 2318/2317
- 15 MIPS

Low Power

- 5 modes
- 3 - 3.6 V
- 2.7 - 3.6 V FLASH versions in planning

Timers

- 16-bit Timer Pulse Unit (TPU) x6
- 8-bit Timer x2
- Watchdog Timer

ADC

- 8 channel, 10bit

DAC

- 2 channel, 8bit

Interrupts

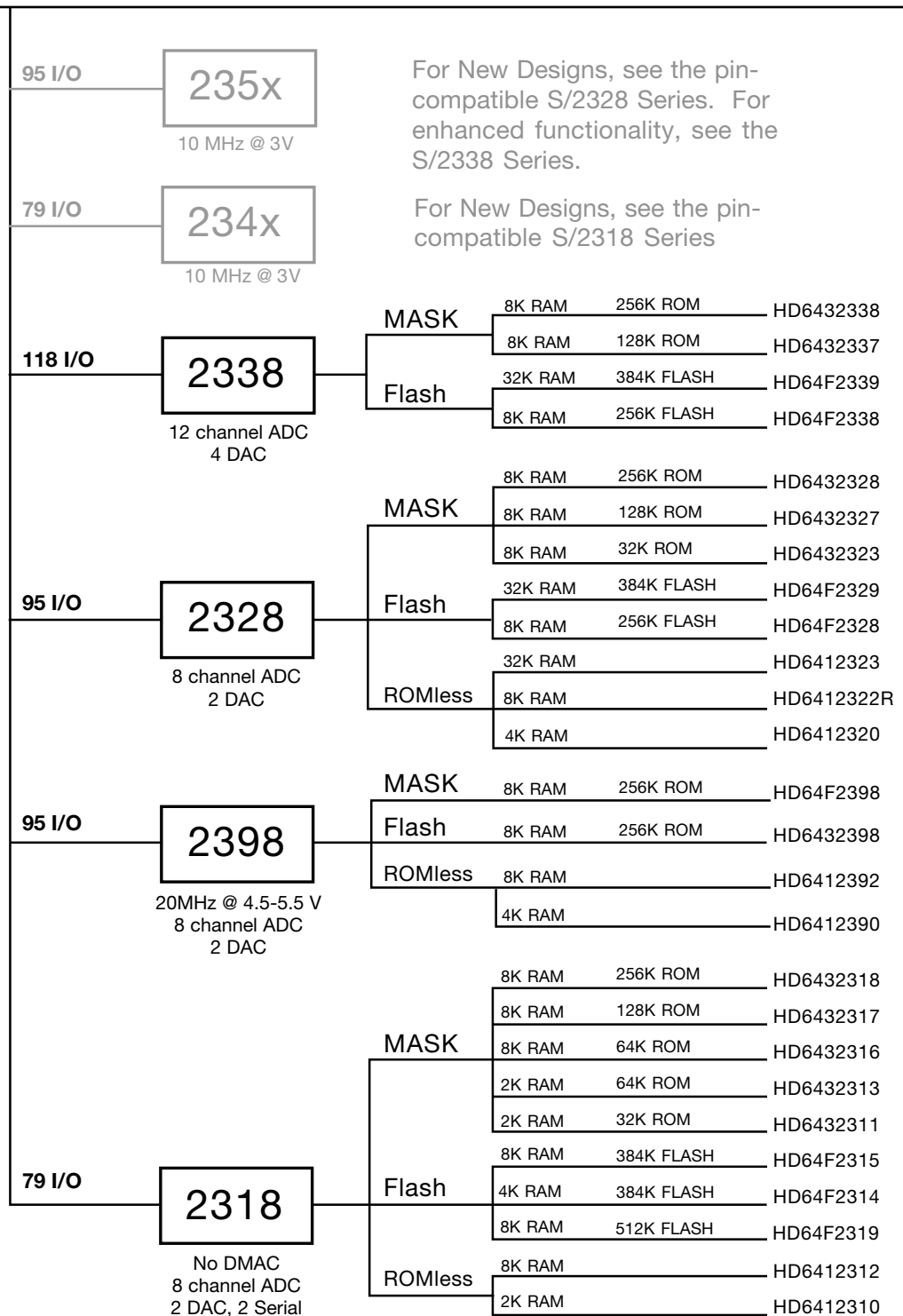
- 9 pins

I/O

- 79-118 I/O pins, 9-10 input only
- 3 Serial
- Smartcard I/F
- DMAC x4
- Data Transfer Controller

Memory

- 4K - 32K RAM
- 256K - 384K Flash
- DRAM Interface



S/26xx

Performance

- 33MHz @ 3 V (2678 Series only)
- 19 MIPS
- 25 MHz @ 5V I/O
- 16 MHz @ 3V I/O

Low Power

- 5 modes
- 3V core
- 3V or 5V I/O

Timers

- 16-bit Timer Pulse Unit (TPU) x6
- 8-bit Timer x2
- Watchdog Timer
- 16-output Programmable Pulse Generator (PPG)

ADC

- 16 channel, 10bit

DAC

- 2 channel, 8bit

Interrupts

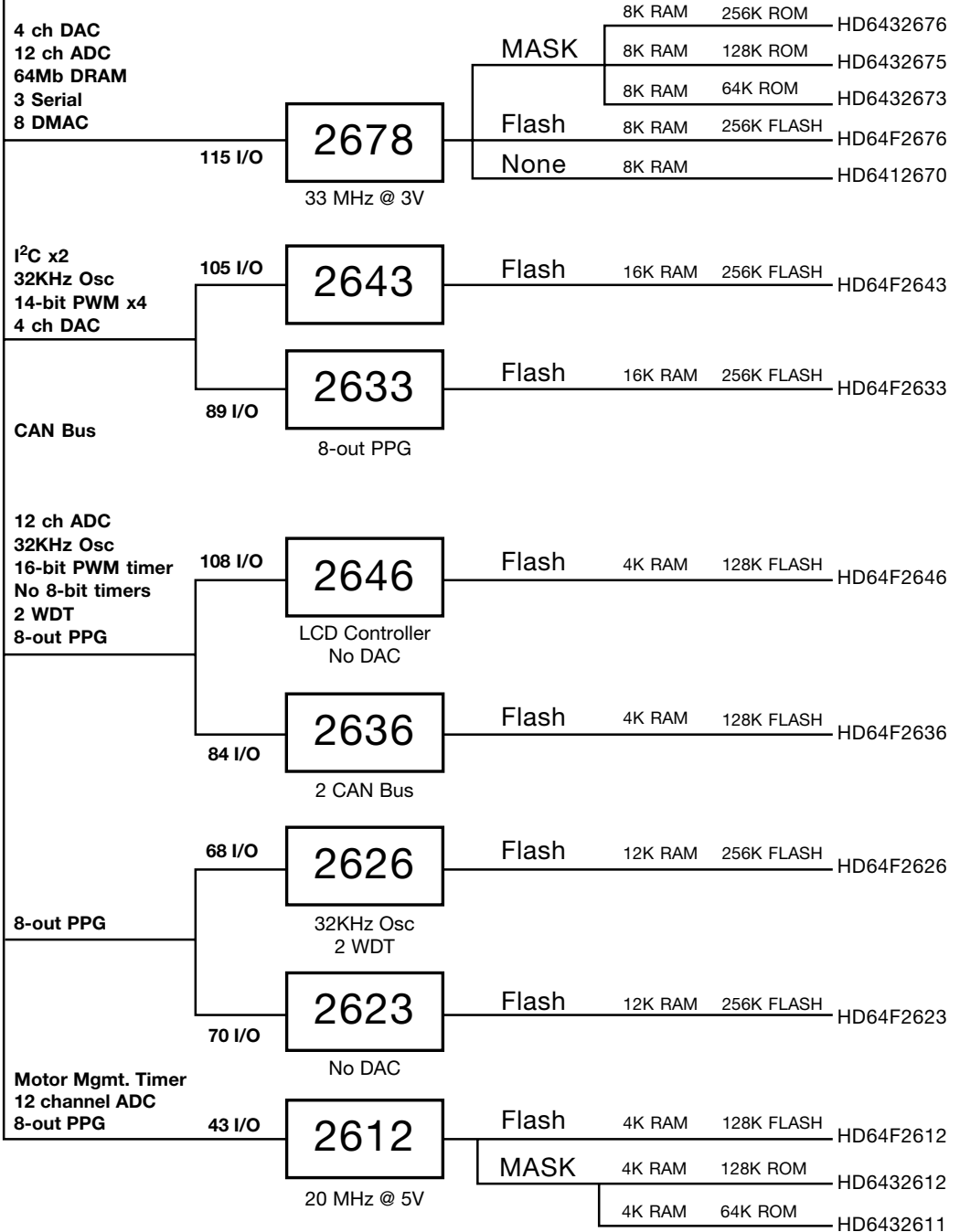
- 7-9 pins

I/O

- 43-115 I/O pins,
- 2-5 Serial
- 4 channel DMAC
- Data Transfer Controller
- CAN Bus

Memory

- 4K - 16K RAM
- 128K - 256K Flash
- DRAM Interface (2678, 2643, 2633 Series only)



H8 Device Selector

Family	Series	Base Device Number ⁽⁴⁾	ROM Type ⁽¹⁾	Memory		Max CPU Speed (MHz)		8/16 bit + PWM	Serial I/O (SYNC/ASYN)	A/D (Chres)	D/A (Chres)	Interrupts Ext + Int	OTHER Features	PKG	Extended Temp. ⁽⁶⁾		
				ROM	RAM/Cache	Vcc @ 5.0v	Vcc @ 3.3v										
300L	3802	HD6433800zz	M	8K	512	8	5	2/1	1	4:10	-	11+7	25X4 LCD Controller, 1.8V Operation Available	H = FP-64A FP = FP-64E	I		
		HD6433801zz		12K	512												
		HD6433802zz	16K	1K													
		HD6473802zz	O	16K	1K												
	38024	HD64738024zz	O	32K	1K	8	5	4/2+2	1	8:10	-	13+9	Clock Pulse Generator, LCD Controller (8x13) 1.8V Operation Available	H = FP-80A X = FP-80B W = TFP-80C	I		
	3827R	HD643382xRzz	M	(2)	(2)	8	5	4/1	1/2	8:10	-	13+23	32x4 LCD Controller - Voltage Booster, 1.8V Operation Available	H = FP-80A W = TFP-80C	I		
			O	60K	2K												
		HD643386xzz	M	(2)	(2)	3	2										
			O	60K	2K												
	3847R	HD643384xRzz	M	(2)	(2)	8	5	4/1	1/2	12:10	-	13+24	40x4 LCD Controller - Voltage Booster, 1.8V Operation Available	H = FP-100B X = TFP-100B W = TFP-100G	I		
O			60K	2K													
HD643388xzz		M	(2)	(2)	3	2											
		O	60K	2K													
300HT	3664	HD643366xzz	M	(3)	(3)	16	10	2/1	1	8:10	-	11+20	i°C, Watchdog Timer	FP = FP-64E H = FP-64A FX = FP-48	I, J		
		HD64F3664zz	F	32K	2K							11+21	i°C, On Chip 4Kbit EEPROM Watchdog Timer	FP = FP-64E	I		
		HD64N3664zz															
300H ⁽⁶⁾	3052	HD64F3052zz18	F	512K	8K	18	-	0/5+1	2	8:10	2:08	7+30	4 Channel DMA, Watchdog Timer	F = FP-100B	I		
	3062	HD64F3062Bzz25		128K	4K	25	25	4/3+1				7+27	Watchdog Timer, Clock Pulse Generator	FP = FP-100A F = FP-100B TE = TFP-100B			
	3064	HD64F3064zz25		256K	8K												
H8S/2100	2134A	HD64F2134Az20	F	128K	4K	20	-	3/1+1	3	8:10	2:08	9+31	2 Watchdog Timers, IrDA, Smartcard I/F	FA = FP-80A TF = TFP-80C	J, JE ⁽⁵⁾		
		HD64F2134Avz10						-								10	
	2138A	HD64F2138Az20						20	-	4/1+2	3	8:10	2:08	9+43	2134A + 2 i°C, 2 ISA		-
		HD64F2138Avz10						-	10								
	2144A	HD64F2144Az20						20	-	3/1+1	3	8:10	2:08	9+34	2 Watchdog Timers, IrDA, Smartcard I/F	FA = FP-100B TE = TFP-100B	J, JE ⁽⁵⁾
		HD64F2144Avz10						-	10								
2148A	HD64F2148Az20	20	-	4/1+2	3	8:10	2:08	9+46	2144A + 2 i°C, 2 ISA, 3-Ch PS/2		-						
	HD64F2148Avz10	-	10														
H8S/2200	2214	HD64F2214zz16	F	128K	12K	16	16	2/3	3	-	1:08	9(8)+31	4 Channel DMA	TE = TFP-100B TF = TFP-100G BP = CSP-112	I		
	2238	HD64F2238Mzz13	F	256K	16K	13.5	13.5	4/6	4	8:10	2:08	7+36	4 Channel DMA, DRAM I/F, 2 i°C	FA = FP-100B TE = TFP-100B TF = TFP-100G BP = CSP-112	I		
H8S/2300 ⁽⁶⁾	2328	HD64F2318Vzz25	F	256K	8K	N/A	25	2/6	2	8:10	2:08	9+52	4 Channel DMA, DRAM I/F, Watchdog Timer, 16-output PPG (motor control timer)	F = FP-100A TE = TFP-100B	I		
		HD64F2319Vzz25		512K													
		HD6412320Vzz25	L	4K	32K												
		HD6412322RVzz25		0K													
		HD6412324Vzz25	F	256k	8K												
		HD64F2328Vzz25		384K	32K												
		HD64F2329EVzz25	256K	8K													
		HD64F2338Vzz25	384K	32K													
HD64F2339Vzz25				12:10	4:12	FC = FP-144G											
H8S/2600	2623	HD6432623FA20	M			N/A	20	0/6	3	4:10	-	7+47	HCAN Interface, 16-bit MAC Port Pins = 4.5 -5.5V	FA = FP-100B	J		
		HD64F2623FA20	F	256K	12K												

Notes

- 1) M = Mask ROM, O = OTP, F = Flash, L=ROMless
- 2) x = 2, 16K ROM, 1K RAM
x = 3, 24K ROM, 1K RAM
x = 4, 32K ROM, 2K RAM
x = 5, 40K ROM, 2K RAM
x = 6, 48K ROM, 2K RAM
x = 7, 60K ROM, 2K RAM
- 3) x = 0, 8K ROM, 512 RAM
x = 1, 12K ROM, 512 RAM
x = 2, 16K ROM, 512 RAM
x = 3, 24K ROM, 1K RAM
x = 4, 32K ROM, 1K RAM
- 4) zz = 1 or 2-letter package code from PKG column
- 5) HD64F2134AFA20, HD64F2144AFA20 only
- 6) Blank = Standard Temperature range (-20 to 75 C)
I = -40 to 85 C
J = -40 to 85 C extended reliability
JE = special temperature range, contact factory
- 7) BOLD = EARLY ADOPTER, SAMPLES AVAIL., PARTS ALMOST MP.
- 8) Full part numbers are not in the data book, please use the part number listed in the Focus Product List above

H8 Tool Selector

Series	Emulator Base Unit ⁽¹⁾	Target Cable	Overlay Memory	Emulator-to-PC Interface	Eval. Board	Debugger	C/eC++ Compiler, Asm, Linker				
3802	E6000: HS3800EPI60H	HS3802ECH62H (FP-64E) HS3802ECH61H (FP-64A)	None	HS6000EIP01H (PCMCIA InterfaceCard) HS6000EIC02H (PCI Board) LAN Interface Box Part Number: HS6000ELN01H	None						
38024		HS38024ECH61H (FP-80A) HS38024ECF61H (FP-80B) HS38024ECN61H (TFP-80C)									
3827R 3867	E6000: HS388REPI60H	HS3864ECH61H (FP-80A) HS3864ECN62H (TFP-80C) HS3864ECF61H (FP80B)									
3847R 3887		HS3887ECH61H (TFP/FP-100B) HS3887ECN61H (TFP-100G) HS3887ECF61H (FP-100A)									
3937 (non-roming) 3937 (roming)		HS3937ECH61H (TFP-100B) HS3937ECN61H (TFP-100G)									
3664 3694 3672	E6000: HS3664EPI61H	HS3664ECH61H (FP-64E) HS3664ECH62H (FP-64A)	N/A					HS3664TCM01H (PCMCIA Card) HS3664TCI01H (PCI Card)	US3664EDK1	HDI (Ships with Emulator) or HDI-M (Ships with Target Board)	HEW: USS008PXIW1SR
3664N	E10T Emulator: HS3664TTC01H (FP-64E) HS3664TTC02H (FP-64A)	Included with E10T							US3664NEDK1		
	E6000: HS3664EPI61H	HS3664ECH61H (FP-64E) HS3664ECH62H (FP-64A)	N/A						TBD		
3687	E6000: HS3664EPI61H	HS3687ECH61H (FP-64E) HS3687ECH62H (FP-64A)	N/A						TBD		
3052	E6000: HS3052EPI61H	HS3048ECH61HE (FP/TFP-100B)	HS6000EMS12H						US3052EDK1		
3062 3064 3067 3006 3007	E6000: HS3067EPI62H	HS3067ECH61H (FP/TFP-100B) HS3067ECF61H (FP-100A)			US3067EDK1						
3048F-one 3068	E6000: HS3064BEPI61H	HS3064ECH61H (FP/TFP-100B) HS3064ECF-61H (FP-100A)			TBD						
2134A 2138A	E6000: HS2148EPI61H	HS2138ECH61HE (FP-80A) HS2138ECN61H (TFP-80C)			US2144EDK1 (Has 100-pin device)						
2144A 2148A		HS2148ECH61HE (FP/TFP-100B)		US2148AEDK1 (08/01)							
2214	E6000: HS2214EPI61H	HS2237ECN61H(TFP-100G) HS2238ECH61H(TFP-100B) HS2214ECB61H(TBP-112)			None						
2238	E6000: HS2633EPI61HE	HS2238ECH61H (TFP/FP-100B)		Included with Base Unit	US2633EDK1 (128-pin superset of 2338)						
2318 2319	E6000: HS2339EPI61H	HS2318ECH61H (FP/TFP-100B)		HS6000EMS12H	HS2329KTC01H (FP-128 device)						
2328 2329		HS2328ECN61H (TFP-120) HS2328ECH61H (FP-128)									
2338 2339		HS2338ECH61H (FP-144/144G)									
	E10A PCI Card: HS2339KCI01H	Included with E10A	N/A	N/A							
2623	E6000: HS2633EPI61HE AND HCAN I/O Board: HS2623EIO61HE	HS2623ECH61H (FP-100B)	HS6000EMS12H	HS6000EIP01H (PCMCIA InterfaceCard) HS6000EIC02H (PCI Board)	US2623EDK1						
2626		HS2626ECH61H (FP-100B)	HS6000EMS12H	LAN Interface Box Part Number: HS6000ELN01H		HDI (Ships with Emulator)	HEW: US0700PXIW1SR				

Notes:

E6000 emulators (except those for H8/300L devices) with HE suffix include 4Mbit to 6.5Mbit of overlay memory
 E6000 emulators (except those for H8/300L devices) without HE suffix offer 4Mbit overlay memory option
 4Mbit Part: HS6000EMS12H. EXCEPTION: Overlay Memory option for HS7010EPI60H is 6.5Mbit board. Part: HS6000EMS22H.
 May ship with HiView. Please contact techsupport@hsa.hitachi.com for HDI.
 Flash Programming software (FDT) is available for download at www.hmse.com

H8 Microcontroller Development Tools

E6000 In-circuit Emulator

The E6000 is an advanced real-time in-circuit emulator that supports a number of Hitachi processors. It may be used totally self contained for software development and debugging, or connected via a custom cable to a target system for debugging user hardware.



- Zero wait-state real-time emulation
- Emulation memory from 1M to 4M bytes, which can be mapped in 64 byte blocks into the target processor's address space
- 256 PC Breakpoints
- Up to 12 hardware breakpoints using the event and range channels in the Complex Event System (CES)
- Up to 32K cycles Trace Buffer, which can be stopped and read during program execution
- Trace buffer acquisition filtering using the CES
- Execution time measurement of total time or relative time, with a resolution between 20ns and 16µs
- 4 user logic probes that can be used as CES trigger events
- Automatic tracking of the target system supply voltage to ensure that the emulator draws no power
- Multiple target clock selection
- HDI debugger software supplied as standard
- Compatible with Windows 95/98/NT/2000

E10T In-Circuit Debugger

The E10T is the latest low-cost emulation development from Hitachi. The E10T is designed to be used in conjunction with Hitachi's on-chip debugging interface, currently implemented on members of the new H8/300H Tiny series of microcontrollers. The E10T provides real-time debugging on the target device using dedicated debugging resources on the target microcontroller in the user's hardware. The E10T interfaces to the user's target system via a 4/5 pin interface that can be used both to debug the system and to program the microcontroller's on-chip Flash memory.

- PCI or PCMCIA interface
- 256 PC breakpoints
- Hardware breakpoint on address and data
- 4-level branch trace
- Single stepping at assembly level
- Ability to download application and program the on-chip flash

Low-cost Evaluation Board (EDKs)

Evaluation Kits are a low-cost way for prospective developers to experience the performance of Hitachi microcontrollers.

Evaluation boards can also be invaluable for large development teams where the cost of purchasing a full in-circuit emulator for every engineer would be too high. Those engineers who do not require the real-time emulation and tracing features of an emulator can comfortably debug their code using evaluation kits.

- Low-cost development board
- Easy way to evaluate chip performance
- Serial UART
- ET10 I/F
- Expansion I/F
- Comes with power supply and serial cable

Hitachi Software Development Tools:

Hitachi embedded Workshop (HEW): Part No: USS008PXIW1SR

Hitachi Embedded Workshop (HEW) is a flexible code development environment for applications that use Hitachi microcontrollers. It provides an up-to-date "look and feel" with all of the features you would expect from a modern code development environment.

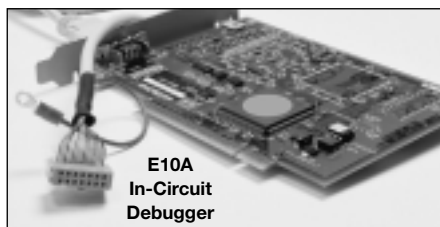
- Project wizard for easy setup
- Project and file management
- Hierarchical project support
- File dependency scanning—non source file can be added
- Hitachi H8 C compiler tool chain
- Fully featured integrated editors
- Designed to incorporate new tools more quickly
- Customizable build process and integrated MAKE facility
- Launches HDI for debugging.

Hitachi Debugging Interface (HDI):

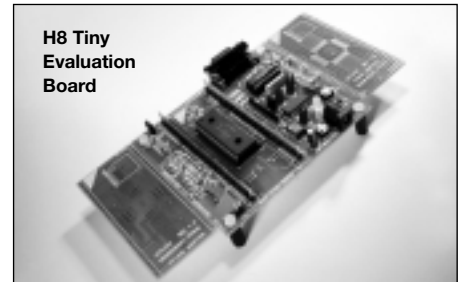
The Hitachi Debugging Interface (HDI) is the latest graphical user interface for debugging C and assembler applications on Windows 95/98 & NT/2000. Its design allows easy connection to different platforms, while providing a consistent debugging interface.

Flash Development Tool kit (FDT):

The Flash Development Toolkit (FDT) application is the latest FLASH programming interface supplied by Hitachi. This can be used to support



H8 Tiny
Evaluation
Board



BOOT and USER modes for both Hitachi's Flash Evaluation Boards and a user's hardware. FDT now supports all Hitachi FLASH microcontrollers, with support for new devices to follow as and when they become available.

- Support of detachable universal programming board provided with EDKs and direct connection to customer's own target.
- Support of Boot and User modes
- Modular Kernels provided for modification
- Advanced messaging levels to aid hardware development
- Serial communications at speeds up to 115,200 baud

H8 HEW CD comes with the following:

- Hitachi Embedded Workshop (HEW)
- H8 C/eC++ and X-assembly tool chain
- Cycle-accurate simulator
- Macro assembler, linker and librarian
- Hitachi Debugging Interface (HDI)
- User manuals with Acrobat PDF installer.

Third-Party Development Tool Partners:

COMPILERS and DEBUGGERS:

HiTech, IAR Software, Red Hat, Inc.,
Microware Systems Corp.

EVALUATION and DEVELOPMENT BOARDS, REFERENCE PLATFORMS:

- Diessner – development boards
- Silicon Wave – reference platforms,
Bluetooth solution

EMULATION PRODUCTS:

- Hewlett Packard – logic analyser system
- Intuitive Solutions – virtual software ICE
- Lauterbach – emulators and debuggers
- Sophia Systems – emulator and debugger interface
- Yokogawa-- emulators and debuggers

OPERATING SYSTEMS:

- Accelerated Technology Inc—RTOS
- CMX Company--RTX RTOS
- Express Logic, Inc.-- ThreadX RTOS
- Microware Systems Corp.

SOCKETS ADAPTERS:

- Yamaichi Electronics
- Data I/O

Package Code and Size Table

Type	Package Code	Pin Count	Nominal Dimensions (mm)	Lead Pitch (mm)
SDIP (Dual Inline Package)	DP-42S	42	15.24	1.78
	DP-64S	64	19.05	1.78
QFP (Quad Flat Package)	FP-44A	44	14 x 14	0.8
	FP-64A	64	14 x 14	0.8
	FP-64	64	14 x 20	1.0
	FP-64B	64	14 x 20	1.0
	FP-54	54	14 x 20	1.0
	FP-80	80	14 x 20	0.8
	FP-80B	80	14 x 20	0.8
	FP-80A	80	14 x 14	0.65
	FP-100A	100	14 x 20	0.65
	FP-100B	100	14 x 14	0.5
	FP-112	112	20 x 20	0.65
	FP-128	128	14 x 20	0.5
	FP-144	144	20 x 20	0.5
QFP-C	FC-256T	256	36 x 36	0.5
LQFP (Low-Profile QFP)	FP-48B	48	7 x 7	0.5
	FP-64E	64	10 x 10	0.5
	FP-144A	144	20 x 20	0.5
	FP-176	176	24 x 24	0.5
TQFP (Thin QFP)	TFP-80A	80	12 x 12	0.5
	TFP-80C	80	12 x 12	0.5
	TFP-80	80	14 x 14	0.65
	TFP-80F	80	14 x 14	0.65
	TFP-100B	100	14 x 14	0.5
	TFP-100G	100	12 x 12	0.4
	TFP-120	120	14 x 14	0.4
	TFP-144	144	16 x 16	0.4
CSP (Chip Scale Package)	TBT-112	112	10 x 10	0.5
	TBT-176	176	12 x 12	0.5
	TBT-216	216	15 x 15	0.5
	TBT-264	264	15 x 15	0.5



Package Availability

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H8/300L

HD6433800FP	FP-64E	HD64F3854H	FP-100B	HD64338024H	FP-80A
HD6433800H	FP-64A	HD6433854W	TFP-100G	HD64338024W	TFP-80C
HD6433801H	FP-64A	HD64F3854W	TFP-100G	HD6473847RH/RHI	FP-100B
HD6433802FP	FP-64E	HD64F3857FQ	FP-144H	HD6473847RF/RFI	FP-100A
HD6473802FP	FP-64E	HD6433862H	FP-80A	HD6473847RW/RWI	TFP-100G
HD6433802H	FP-64A	HD6433862W	TFP-80C	HD6473847RX/RXI	TFP-100B
HD6473802H	FP-64A	HD6433864F	FP-80B	HD6433847RH	FP-100B
HD6433802P	DP-64S	HD6433865H	FP-80A	HD6433847RF	FP-100A
HD6473802P	DP-64S	HD6473867F	FP-80B	HD6433847RW	TFP-100G
HD6433822RH	FP-80A	HD6433867H	FP-80A	HD6433847RX	TFP-100B
HD6433822RW	TFP-80C	HD6473867H	FP-80A	HD6473827RH/RHI	FP-80A
HD6433823RH	FP-80A	HD6433867W	TFP-80C	HD64F3827RF/RFI	FP-80B
HD6433824RH	FP-80A	HD6473867W	TFP-80C	HD6473827RW/RWI	TFP-80C
HD6433827RH	FP-80A	HD6433867WI	TFP-80C	HD6433827RH	FP-80A
HD6473827RH	FP-80A	HD6473867WI	TFP-80C	HD6433827RF	FP-80B
HD6433827RW	TFP-80C	HD6473887F	FP-100A	HD6433827RW	TFP-80C
HD6473827RW	TFP-80C	HD6433887H	FP-100B	HD6473937H/HI	FP-100B
HD6433843RF	FP-100A	HD6473887H	FP-100B	HD6473937RH/RHI	FP-100B
HD6433844RH	FP-100B	HD6473802FP/FPI	FP-64E	HD6473937W/WI	TFP-100G
HD6433846RX	TFP-100B	HD6473802H/HI	FP-64A	HD6473937RW/RWI	TFP-100G
HD6473847RF	FP-100A	HD6433802FP	FP-64E	HD6473937X/XI	TFP-100B
HD6433847RH	FP-100B	HD6433802H	FP-64A	HD6473937RX/RXI	TFP-100B
HD6473847RH	FP-100B	HD64F38024F/FI	FP-80B	HD6433937H	FP-100B
HD6473847RW	TFP-100G	HD64F38024H/HI	FP-80A	HD6433937W	TFP-100G
HD6433847RX	TFP-100B	HD64F38024W/WI	TFP-80C	HD6433937X	TFP-100B
HD6473847RX	TFP-100B	HD64338024F	FP-80B		

H8/300HT "Tiny"

HD6433660H/HI/HJ	FP-64A	HD6433663FP/FPI/FPJ	FP-64E	HD64F3670FX/FXI	FP-48F
HD6433660FP/FPI/FPJ	FP-64E	HD6433663FX/FXI	FP-48F	HD64F3672FP/FPI/FPJ	FP-64E
HD6433660FX/FXI	FP-48F	HD6433663FY/FYI	FP-48B	HD64F3672FX/FXI	FP-48F
HD6433660FY/FYI	FP-48B	HD6433664H/HI/HJ	FP-64A	HD64F3687H/HI/HJ/HJE	FP-64A
HD6433661H/HI/HJ	FP-64A	HD6433664FP/FPI/FPJ	FP-64E	HD64F3687FP/FPI/FPJ/FPJE	FP-64E
HD6433661FP/FPI/FPJ	FP-64E	HD6433664FX/FXI	FP-48F	HD6433687H/HI	FP-64A
HD6433661FX/FXI	FP-48F	HD6433664FY/FYI/FYJ	FP-48B	HD6433687FP/FPI	FP-64E
HD6433661FY/FYI	FP-48B	HD64F3664H/HI/HJ	FP-64A	HD6433686H/HI	FP-64A
HD6433662H/HI/HJ	FP-64A	HD64F3664FP/FPI/FPJ	FP-64E	HD6433686FP/FPI	FP-64E
HD6433662FP/FPI/FPJ	FP-64E	HD64F3664FX/FXI	FP-48F	HD6433685H/HI	FP-64A
HD6433662FX/FXI	FP-48F	HD64F3664FY/FYI	FP-48B	HD6433685FP/FPI	FP-64E
HD6433662FY/FYI	FP-48B	HD64N3664FP/FPI	FP-64E	HD6433684H/HI	FP-64A
HD6433663H/HI/HJ	FP-64A	HD64F3670FP/FPI/FPJ	FP-64E	HD6433684H/HI	FP-64E

H8/300H

HCD6413006C20	CHIP	HD64F3062BFBL25V	FP-100B	HD64F3062RXI20	TFP-100B
HD6413007F20	FP-100B	HD64F3062F20	FP-100B	HD64F3062X20	TFP-100B
HD6413007FI20	FP-100B	HD64F3062FP20	FP-100A	HD64F3067RF20	FP-100B
HD6413007VF13	FP-100B	HD64F3062RF20	FP-100B	HD64F3067RFI20	FP-100B
HD6413007VF13V	FP-100B	HD64F3062RFBL20	FP-100B	HD64F3067RVF13	FP-100B
HD6413007VFI13	FP-100B	HD64F3062RFJ20	FP-100B	HD64F3067RVFI13	FP-100B
HD6413007VX13	TFP-100B	HD64F3062RFP20	FP-100A	HD64F3067RVX13	TFP-100B
HD64F3052F18	FP-100B	HD64F3062RVF13	FP-100B	HD64F3067RX20	TFP-100B
HD64F3062AFBL25	FP-100B	HD64F3062RVFI13	FP-100B	HD64F3064F25	FP-100B
HD64F3062AXBL25	TFP-100B	HD64F3062RVXBL13	TFP-100B	HD64F3064BF25	FP-100B
HD64F3062BFBL25	FP-100B	HD64F3062RXBL20	TFP-100B	HD64F3068F25	FP-100B



Package Availability continued

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H8S/21xx

HD6432120TF	TFP-80C	HD64F2132RFA20	FP-80A	HD6432137SFA	FP-80A	HD64F2147ATE20	TFP-100B
HD6432120TFI	TFP-80C	HD64F2132RVTF10	TFP-80C	HD64F2138FA20	FP-80A	HD64F2147AVTE10	TFP-100B
HD6432122FA	FP-64A	HD6432132TF	TFP-80C	HD64F2138RFA16LG	FP-80A	HD64F2147NVTE10	TFP-100B
HD6432122FAJ	FP-64A	HD64F2132TF20	TFP-80C	HD64F2138RFA20	FP-80A	HD64F2148AFA20	FP-100B
HD6432122FAKG	FP-64A	HD64F2132VTF10	TFP-80C	HD64F2138RFA20J	FP-80A	HD64F2148AVTE10	TFP-100B
HD6432122FALG	FP-64A	HD6432133STF	TFP-80C	HD64F2138RVFA10	FP-80A	HD64F2148FA20	FP-100B
HD6432122TF	TFP-80C	HD64F2134AFA20	FP-80A	HD6432138SFA	FP-80A	HD64F2148RFA20	FP-100B
HD6432127RFA	FP-64A	HD64F2134AFA20JG	FP-80A	HD64F2142FA20	FP-100B	HD64F2148RFA20J	FP-100B
HD64F2128FA16LG	FP-64A	HD64F2134AFA20LG	FP-80A	HD64F2142FA20J	FP-100B	HD64F2148RTE20	TFP-100B
HD64F2128FA20	FP-64A	HD64F2134FA10	FP-80A	HD64F2144AFA20	FP-100B	HD64F2148RTE20I	TFP-100B
HD64F2128FA20J	FP-64A	HD64F2134FA20	FP-80A	HD64F2144AVFA10	FP-100B	HD64F2148RVFA10	FP-100B
HD64F2128PS20	FP-64S	HD64F2134FA20J	FP-80A	HD64F2144FA16LG	FP-100B	HD64F2148RVTE10	TFP-100B
HD64F2128TF20	TFP-80C	HD6432134SFA	FP-80A	HD64F2144FA20	FP-100B	HD6432148SFA	FP-100B
HD64F2128TF20I	TFP-80C	HD6432134SFALG	FP-80A	HD64F2144FA20I	FP-100B	HD6432148STE	TFP-100B
HD6432130FA	FP-80A	HD6432134STF	TFP-80C	HD64F2144FA20J	FP-100B	HD64F2149YVTE10	TFP-100B
HD6432130TF	TFP-80C	HD64F2134TF10	TFP-80C	HD6432144SFA	FP-100B	HD64F2169AVTE10	TFP-144
HD6432132FA	FP-80A	HD64F2134TF20	TFP-80C	HD6432144STE	TFP-100B	HD64F2169YVTE10	TFP-144
HD64F2132FA20	FP-80A	HD64F2134TF20I	TFP-80C	HD64F2144VTE20	TFP-100B		
HD64F2132FA20J	FP-80A	HD64F2134VFA10	FP-80A	HD64F2144VFA10	FP-100B		
HD6432132FAJ	FP-80A	HD64F2134VTF10	TFP-80C	HD64F2144VTE10	TFP-100B		

H8S/22xx

HD64F2214BP16	CSP-112	HD6432237F	FP-100A	HD64F2238ATE13	TFP-100B	HD64F2215TF16	TFP-100G
HD64F2214BPV	CSP-112	HD6472237F10	FP-100A	HD64F2238ATF13	TFP-100G	HD64F2268FA13	FP-100B
HCDF2214GB	CHIP	HD6472237FA10	FP-100B	HD64F2238RFA13	FP-100B	HD64F2268FA20	FP-100B
HD64F2214TE16	TFP-100B	HD6472237TE10	TFP-100B	HD64F2238RTE13	TFP-100B	HD64F2268TE13	TFP-100B
HD64F2214TF16	TFP-100G	HD6472237TE13AM	TFP-100B	HD64F2238RTF13	TFP-100G	HD64F2268TE20	TFP-100B
HD6432224TE	TFP-100B	HD6432237TF	TFP-100G	HD64F2238MTF13V	TFP-100G	HD64F2268TF13	TFP-100G
HD6432225TFI	TFP-100G	HD6472237TF10	TFP-100G	HD64F2258FA13I	FP-100B	HD64F2268TF20	TFP-100G
HD6432227F	FP-100A	HD64F2238ABPSW	CSP-112	HD6432258FAI	FP-100B		
HD6432227TF	TFP-100G	HD64F2238AFA13	FP-100B	HD64F2215BP16	TBP-112		
HD6432236FA	FP-100B	HCD64F2238AGB	CHIP	HD64F2215TE16	TFP-100B		

H8S/23xx

HD6412310VF20	FP-100A	HD6412320VF25	FP-128	HD6412322VTE20	TFP-120	HD64F2328VTE20	TFP-120
HD6412312SVTE25NF	TFP-100B	HD6412320VTE25	TFP-120	HD6412322VTE20I	TFP-120	HD64F2328VTE20I	TFP-120
HD6412312VF20	FP-100A	HD6412320VTE25NF	TFP-120	HD6412324VTE25	TFP-120	HD64F2328VTE25	TFP-120
HD6412312VTE25	TFP-100B	HD6412322RVF25	FP-128	HD64F2328F20	FP-128	HD64F2328VTE25I	TFP-120
HD6432317TE	TFP-100B	HD6412322RVTE20	TFP-120	HD6432328TE	TFP-120	HD64F2329VF25	FP-128
HD64F2318VF25	FP-100A	HD6412322TE20	TFP-120	HD6432328TE20	TFP-120	HD64F2339VFC25	FP-144
HD64F2318VTE20	TFP-100B	HD6412322VF20	FP-128	HD64F2328VF20	FP-128		
HD64F2318VTE25	TFP-100B	HD6412322VF25	FP-128	HD64F2328VF25	FP-128		

H8S/26xx

HD64F2612FA20J	FP-80A	HD64F2633F25	FP-128	HD64F2636F20J	FP-128	HD6472655RTEI	TFP-120
HD64F2623FA	FP-100B	HD6432633F25	FP-128	HD64F2636UF20I	FP-128	HD6472655RVF	FP-128
HD64F2623FA20	FP-100B	HD64F263 3F25I	FP-12 8	HD6432653BF	FP-128	HD6472655RVFI	FP-128
HD64F2623FA20J	FP-100B	HD64F2633FAM	FP-128	HD6432655F	FP-128	HD6472655RVTE	TFP-120
HD64F2626FA20	FP-100B	HD64F2633TE25	TFP-120	HD647 2655RF	FP-128	HD6472655RVTEI	TFP-120
HD64F2626FA20J	FP-100B	HD64F2633TE25I	TFP-120	HD6472655RFI	FP-128	HD6412670VFC33	FP-144
HD6432631F25	FP-128	HD64F2636F20	FP-128	HD647 2655RTE	TFP-120	HD64F2676VFC33	FP-144



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Novus SSI	(770) 263-0320	Norcross, GA
Wes Tech Associates	(319) 393-9790	Cedar Rapids, IA
QuadRep, Inc.	(208) 939-9626	Eagle, ID
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M. Gottlieb Associates, Inc.	(765) 455-0444	Kokomo, IN
Electri-Rep	(913) 649-2168	Overland Park, KS
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Thompson & Associates, Inc.	(724) 662-3481	Mercer, PA
West Associates	(512) 343-1199	Austin, TX
System Sales of Arizona, Inc.	(915) 771-9445	El Paso, TX
West Associates	(956) 618-2701	Houston, TX
West Associates	(972) 680-2800	Richardson, TX
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QuadRep, Inc.	(425) 453-5100	Bellevue, WA
QuadRep, Inc.	(509) 443-1599	Spokane, WA
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