

# General purpose operational amplifier

MC/SA1458/MC1558

## DESCRIPTION

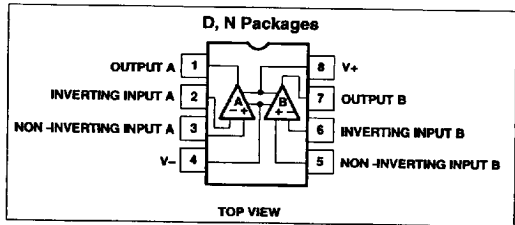
The MC1458 is a high-performance operational amplifier with high open-loop gain, internal compensation, high common-mode range and exceptional temperature stability. The MC1458 is short-circuit protected.

The MC1458/SA1458/MC1558 consists of a pair of 741 operational amplifiers on a single chip.

## FEATURES

- Internal frequency compensation
- Short-circuit protection
- Excellent temperature stability
- High input voltage range
- No latch-up
- 1558/1458 are 2 "op amps" in space of one 741 package

## PIN CONFIGURATION



## ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
8-Pin Plastic Small Outline (SO) Package	0 to +70°C	MC1458D	0174C
8-Pin Plastic Dual In-Line Package (DIP)	0 to +70°C	MC1458N	0404B
8-Pin Plastic Small Outline (SO) Package	-40°C to +85°C	SA1458D	0174C
8-Pin Plastic Dual In-Line Package (DIP)	-40°C to +85°C	SA1458N	0404B
8-Pin Plastic Dual In-Line Package (DIP)	-55°C to +125°C	MC1558N	0404B

## ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V <sub>S</sub>	Supply voltage		
	MC1458	±18	V
	SA1458	±18	V
	MC1558	±22	V
T <sub>J</sub>	Junction temperature	+150	°C
P <sub>D MAX</sub>	Maximum power dissipation, T <sub>A</sub> =25°C (still-air) <sup>1</sup>		
	N package	1160	mW
	D package	780	mW
V <sub>DIFF</sub>	Differential input voltage	±30	V
V <sub>IN</sub>	Input voltage <sup>2</sup>	±15	V
	Output short-circuit duration	Continuous	
T <sub>A</sub>	Operating ambient temperature range		
	MC1458	0 to +70	°C
	SA1458	-40 to +85	°C
	MC1558	-55 to +125	°C
T <sub>STG</sub>	Storage temperature range	-65 to +150	°C
T <sub>SOLD</sub>	Lead soldering temperature (10sec max)	300	°C

### NOTES:

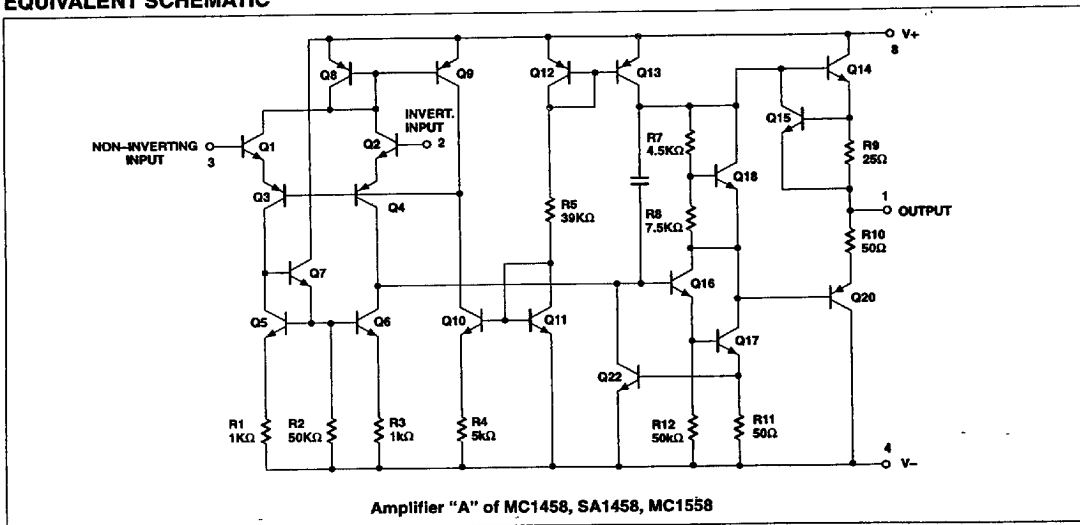
1. The following derating factors should be applied above 25°C; N package at 9.3mW/°C; D package at 6.2mW/°C
2. For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

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EQUIVALENT SCHEMATIC



DC ELECTRICAL CHARACTERISTICS

T<sub>A</sub>=25°C, V<sub>S</sub>=±15V, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	MC1558			UNIT
			Min	Typ	Max	
V <sub>OS</sub>	Offset voltage	R <sub>S</sub> =10kΩ		1.0	5.0	mV
ΔV <sub>OS</sub>	Offset voltage	R <sub>S</sub> =10kΩ, over temperature Over temperature		10	6.0	μV/°C
I <sub>OS</sub>	Offset current	Over temperature		20	200	nA
ΔI <sub>OS</sub>	Offset current	Over temperature		0.10	500	nA/°C
I <sub>BIAS</sub>	Input bias current	Over temperature		80	500	nA
ΔI <sub>BIAS</sub>	Bias current	Over temperature		1.0	1500	nA/°C
V <sub>OUT</sub>	Output voltage swing	R <sub>L</sub> =10kΩ, over temperature R <sub>L</sub> =2kΩ, over temperature	±12 ±10	±14 ±13		V
A <sub>VOL</sub>	Large-signal voltage gain	R <sub>L</sub> =2kΩ, V <sub>O</sub> =±10V R <sub>L</sub> =2kΩ, V <sub>O</sub> =± temperature	50 20	100		V/mV
	Offset voltage adjustment range			±30		mV
PSRR	Power supply rejection ratio	R <sub>S</sub> ≤10kΩ		30	150	μV/V
CMRR	Common mode rejection ratio		70	90		dB
I <sub>CC</sub>	Supply current			2.3	5.0	mA
V <sub>IN</sub>	Input voltage range		±12	±13		V
P <sub>D</sub>	Power consumption			70	150	mW
	Channel separation			120		dB
R <sub>OUT</sub>	Output resistance			75		Ω
I <sub>SC</sub>	Output short-circuit current		10	25	60	mA



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## DC ELECTRICAL CHARACTERISTICS (Continued)

 $T_A=25^{\circ}\text{C}$   $V_{CC}=\pm 15\text{V}$ , unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	MC1458			SA1458			UNIT
			Min	Typ	Max	Min	Typ	Max	
$V_{OS}$	Offset voltage	$R_S=10\text{k}\Omega$ $R_S=10\text{k}\Omega$ , over temp.		2.0	6.0		2.0	6.0	mV
$\Delta V_{OS}$	Offset voltage	Over temperature		12	7.5		12	7.5	$\mu\text{V}/^{\circ}\text{C}$
$I_{OS}$	Offset current	Over temperature		20	200		20	200	nA
$\Delta I_{OS}$	Offset current	Over temperature		0.10	300		0.10	500	nA
$I_{BIAS}$	Input bias current	Over temperature		80	500		80	500	nA
$\Delta I_{BIAS}$	Bias current	Over temperature		1.0	800		1.0	1500	nA
$V_{OUT}$	Output voltage swing	$R_L=10\text{k}\Omega$ , over temp. $R_L=2\text{k}\Omega$ , over temp.	$\pm 12$ $\pm 10$	$\pm 14$ $\pm 13$		$\pm 12$ $\pm 10$	$\pm 14$ $\pm 13$		V
$A_{VOL}$	Large-signal voltage gain	$R_L=2\text{k}\Omega$ , $V_O=\pm 10\text{V}$ $R_L=2\text{k}\Omega$ , $V_O=\pm 10\text{V}$ , Over temperature	25 15	200		20 15	200		V/mV V/mV
	Offset voltage adjustment range			$\pm 30$			$\pm 30$		mV
PSRR	Power supply rejection ratio	$R_S \leq 10\text{k}\Omega$		30	150		30	150	$\mu\text{V}/\text{V}$
CMRR	Common-mode rejection ratio		70	90		70	90		dB
$I_{CC}$	Supply current			2.3	5.6		2.3	5.6	mA
$V_{IN}$	Input voltage range		$\pm 12$	$\pm 13$		$\pm 12$	$\pm 13$		V
$R_{IN}$	Input resistance		0.3	1		0.3	1		M $\Omega$
$P_D$	Power consumption			70	170		70	170	mW
	Channel separation			120			120		dB
$I_{SC}$	Output short-circuit current			25			25		mA

## AC ELECTRICAL CHARACTERISTICS

 $T_A=25^{\circ}\text{C}$   $V_S=\pm 15\text{V}$ , unless otherwise specified.

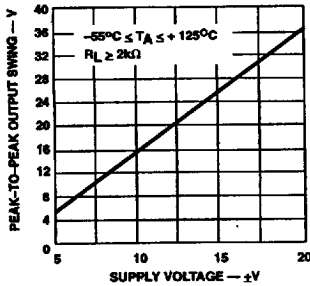
SYMBOL	PARAMETER	TEST CONDITIONS	MC1458, SA1458, MC1558			UNIT
			Min	Typ	Max	
$R_{IN}$	Parallel input resistance	Open-loop, $f=20\text{Hz}$	0.3			M $\Omega$
	Common-mode input impedance	$f=20\text{Hz}$		200		M $\Omega$
	Equivalent input noise voltage	$A_V=100$ , $R_S=10\text{k}\Omega$ , $BW=1.0\text{kHz}$ , $f=1.0\text{kHz}$		30		nV/ $\sqrt{\text{Hz}}$
BW	Power bandwidth	$A_V=1$ , $R_L=2.0\text{k}\Omega$ , $\text{THD} \leq 5\%$ , $V_{OUT}=20V_{P-P}$		14		kHz
	Phase margin			65		degrees
$A_V$	Gain margin			11		dB
	Unity gain crossover frequency	Open loop		1.0		MHz
$t_R$	Transient response unity gain	$V_{IN}=20\text{mV}$ , $R_L=2\text{k}\Omega$ , $C_L \leq 100\text{pF}$		0.3		$\mu\text{s}$
	Rise time			5.0		%
SR	Slew rate	$C_L \leq 100\text{pF}$ , $R_L \geq 2\text{k}\Omega$ , $V_{IN}=\pm 10\text{V}$		0.8		V/ $\mu\text{s}$

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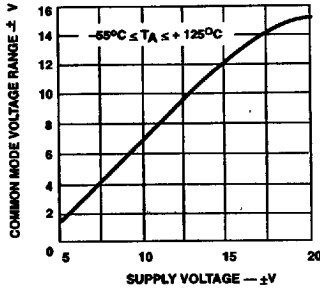
MC/SA1458/MC1558

TYPICAL PERFORMANCE CHARACTERISTICS

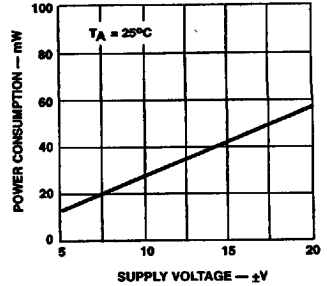
Output Voltage Swing as a Function of Supply Voltage



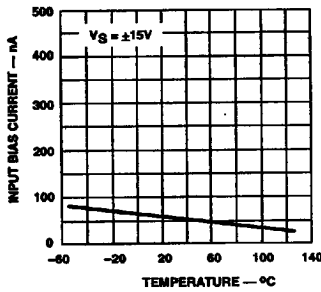
Input Common-Mode Range as a Function of Supply Voltage



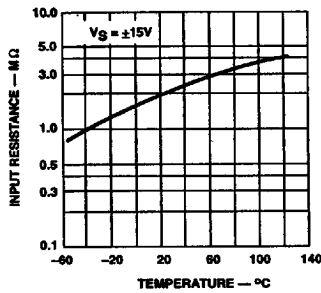
Power Consumption as a Function of Supply Voltage



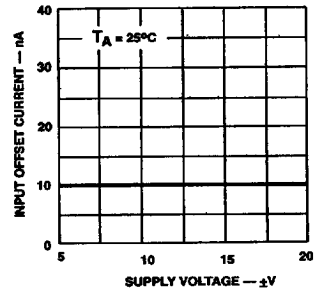
Input Bias Current as a Function of Ambient Temperature



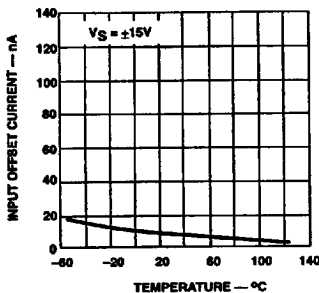
Input Resistance as a Function of Ambient Temperature



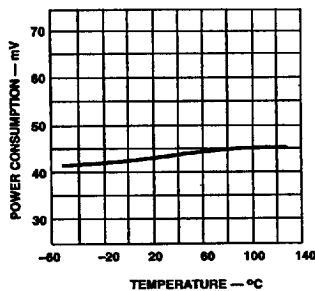
Input Offset Current as a Function of Supply Voltage



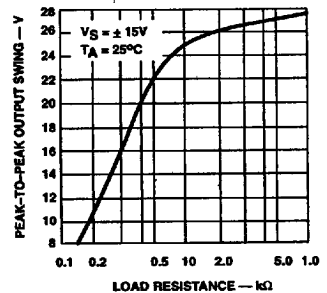
Input Offset Current as a Function of Ambient Temperature



Power Consumption as a Function of Ambient Temperature



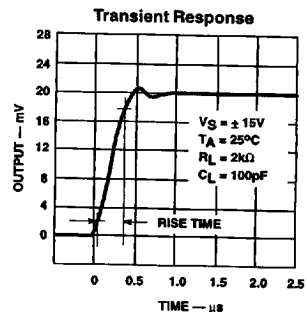
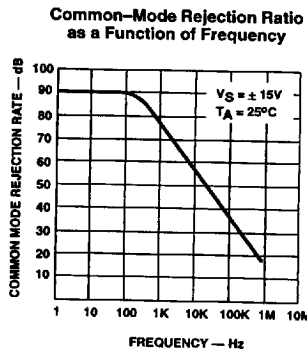
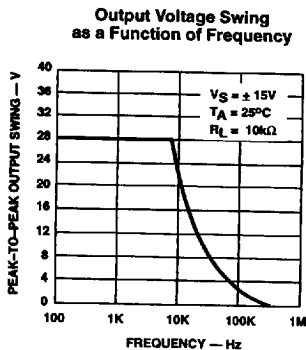
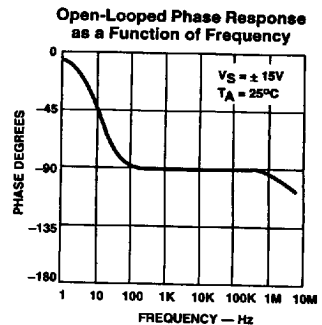
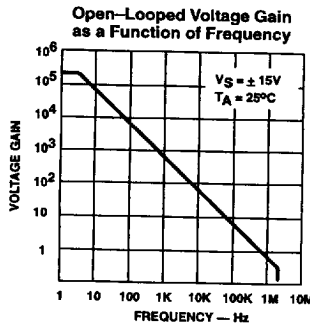
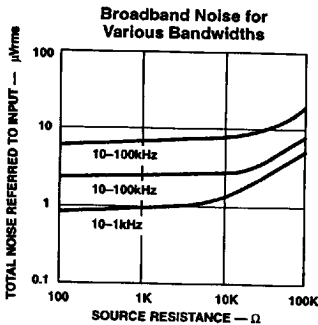
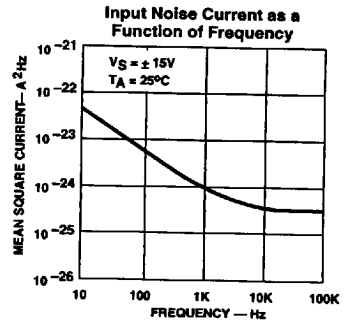
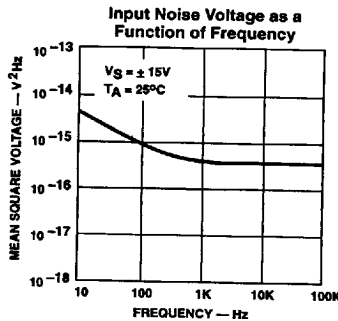
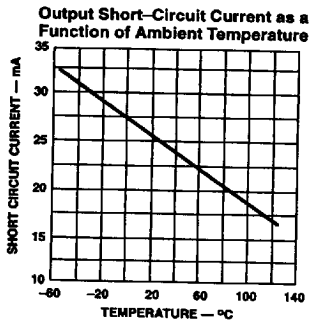
Output Voltage Swing as a Function of Load Resistance



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TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



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### TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

