

MC/SA1458/MC1558

General-Purpose Operational Amplifier

Product Specification

Linear Products

DESCRIPTION

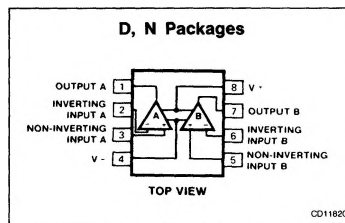
The MC1458 is a high-performance operational amplifier with high open-loop gain, internal compensation, high common-mode range and exceptional temperature stability. The MC1458 is short-circuit protected.

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
8-Pin Plastic SO	0 to +70°C	MC1458D
8-Pin Plastic DIP	0 to +70°C	MC1458N
8-Pin Plastic SO	-40°C to +85°C	SA1458D
8-Pin Plastic DIP	-40°C to +85°C	SA1458N
8-Pin Plastic DIP	-55°C to +125°C	MC1558N

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V_S	Supply voltage		
	MC1458	± 18	V
	SA1458	± 18	V
	MC1558	± 22	V
T_J	Junction temperature	+150	°C
$P_D \text{ MAX}$	Maximum power dissipation, $T_A = 25^\circ\text{C}$ (still-air) ¹		
	N package	1160	mW
	D package	780	mW
V_{DIFF}	Differential input voltage	± 30	V
V_{IN}	Input voltage ²	± 15	V
	Output short-circuit duration	Continuous	
T_A	Operating ambient temperature range		
	MC1458	0 to +70	°C
	SA1458	-40 to +85	°C
	MC1558	-55 to +125	°C
T_{STG}	Storage temperature range	-65 to +150	°C
T_{SOLD}	Lead soldering temperature (10sec max)	300	°C

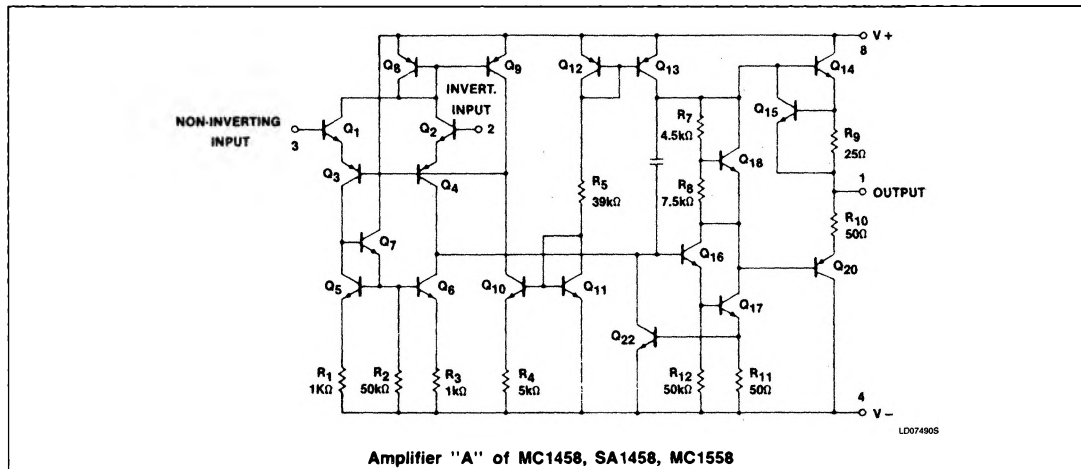
NOTES:

- The following derating factors should be applied above 25°C:
N package at 9.3mW/°C
D package at 6.2mW/°C.
- For supply voltages less than $\pm 15\text{V}$, the absolute maximum input voltage is equal to the supply voltage.

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EQUIVALENT SCHEMATIC

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

SYMBOL	PARAMETER	TEST CONDITIONS	MC1558			UNIT
			Min	Typ	Max	
V_{OS}	Offset voltage	$R_S = 10\text{k}\Omega$		1.0	5.0	mV
ΔV_{OS}	Offset voltage	$R_S = 10\text{k}\Omega$, over temperature Over temperature		10	6.0	$\mu\text{V}/^\circ\text{C}$
I_{OS}	Offset current	Over temperature Over temperature		20	200	nA
ΔI_{OS}	Offset current	Over temperature Over temperature		0.10	500	nA
I_{BIAS}	Input bias current	Over temperature Over temperature		80	500	nA
ΔI_{BIAS}	Bias current	Over temperature Over temperature		1.0	1500	nA
V_{OUT}	Output voltage swing	$R_L = 10\text{k}\Omega$, over temperature $R_L = 2\text{k}\Omega$, over temperature	± 12 ± 10	± 14 ± 13		V
A_{VOL}	Large-signal voltage gain	$R_L = 2\text{k}\Omega$, $V_O = \pm 10\text{V}$ $R_L = 2\text{k}\Omega$, $V_O = \pm$ temperature	50 20	100		V/mV V/mV
	Offset voltage adjustment range			± 30		mV
PSRR	Power supply rejection ratio	$R_S \leq 10\text{k}\Omega$		30	150	$\mu\text{V}/\text{V}$
CMRR	Common mode rejection ratio		70	90		dB
I_{CC}	Supply current			2.3	5.0	mA
V_{IN}	Input voltage range		± 12	± 13		V
P_D	Power consumption			70	150	mW
	Channel separation			120		dB
R_{OUT}	Output resistance			75		Ω
I_{SC}	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	$R_S = 10\text{k}\Omega$		2.0	6.0		2.0	6.0	mV
ΔV_{OS}	Offset voltage	$R_S = 10\text{k}\Omega$, over temp. Over temperature		12	7.5		12	7.5	mV $\mu\text{V}/^\circ\text{C}$
I_{OS}	Offset current			20	200		20	200	nA
ΔI_{OS}	Offset current	Over temperature Over temperature		0.10	300		0.10	500	nA $\text{nA}/^\circ\text{C}$
I_{BIAS}	Input bias current			80	500		80	500	nA
ΔI_{BIAS}	Bias current	Over temperature Over temperature		1.0	800		1.0	1500	nA $\text{nA}/^\circ\text{C}$
V_{OUT}	Output voltage swing	$R_L = 10\text{k}\Omega$, over temp. $R_L = 2\text{k}\Omega$, over temp.	± 12 ± 10	± 14 ± 13		± 12 ± 10	± 14 ± 13		V 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			± 30			± 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		± 12	± 13		± 12	± 13		V
R_{IN}	Input resistance		0.3	1		0.3	1		M Ω
P_D	Power consumption			70	170		70	170	mW
	Channel separation			120			120		dB
I_{SC}	Output short-circuit current			25			25		mA

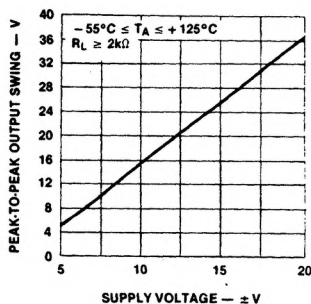
AC ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$, unless otherwise specified.

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 Ω
	Common-mode input impedance	$f = 20\text{Hz}$		200		M Ω
	Equivalent input noise voltage	$A_V = 100$, $R_S = 10\text{k}\Omega$, $BW = 1.0\text{kHz}$, $f = 1.0\text{kHz}$		30		$\text{nV}/\sqrt{\text{Hz}}$
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 Rise time	$V_{IN} = 20\text{mV}$, $R_L = 2\text{k}\Omega$, $C_L \leq 100\text{pF}$		0.3		μs
	Overshoot			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/ μs

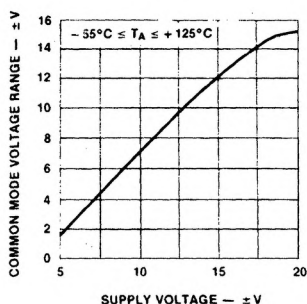
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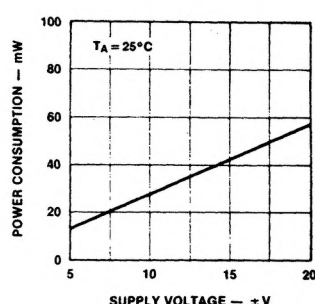
TYPICAL PERFORMANCE CHARACTERISTICS

Output Voltage Swing
as a Function of
Supply Voltage

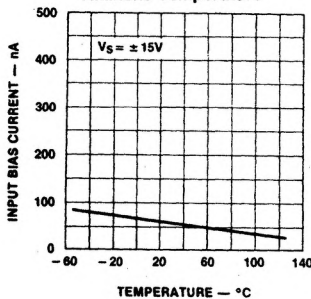
OP136205

Input Common-Mode Voltage
Range as a Function of
Supply Voltage

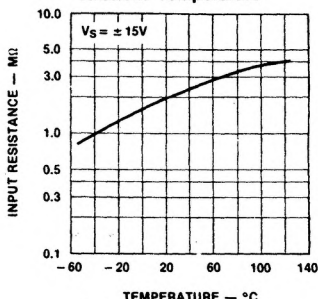
OP136305

Power Consumption
as a Function of
Supply Voltage

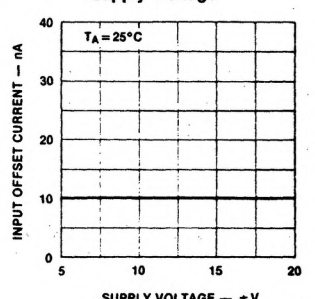
OP136405

Input Bias Current
as a Function of
Ambient Temperature

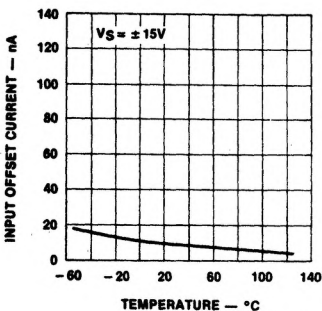
OP136505

Input Resistance
as a Function of
Ambient Temperature

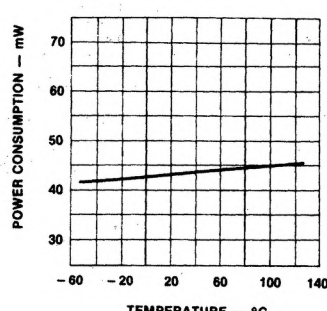
OP136605

Input Offset Current
as a Function of
Supply Voltage

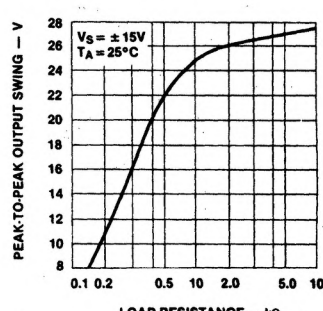
OP136705

Input Offset Current
as a Function of
Ambient Temperature

OP136805

Power Consumption
as a Function of
Ambient Temperature

OP136905

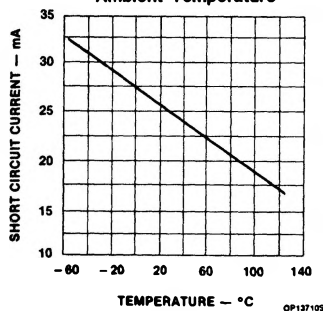
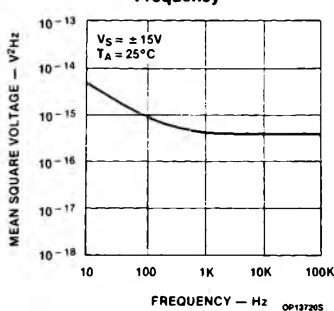
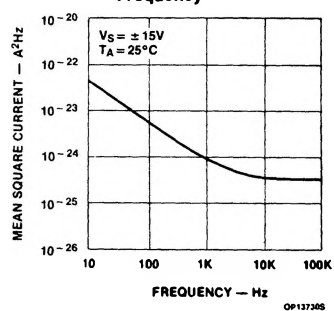
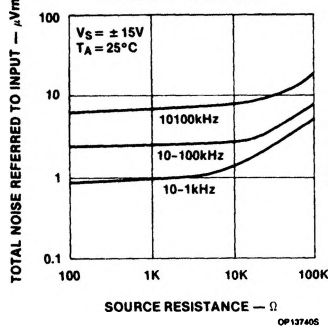
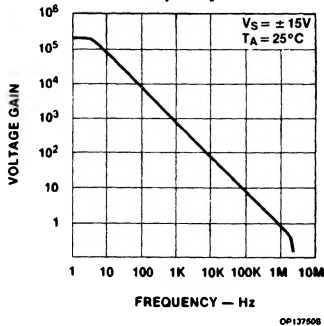
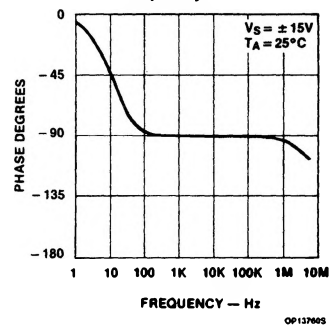
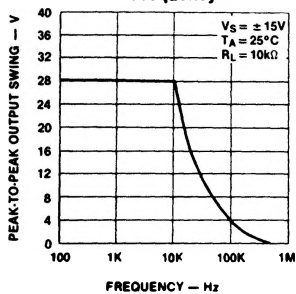
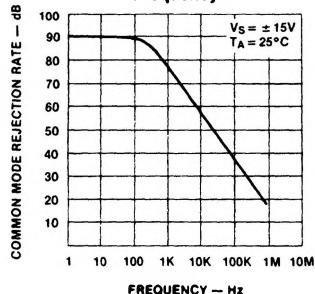
Output Voltage Swing
as a Function of
Load Resistance

OP137005

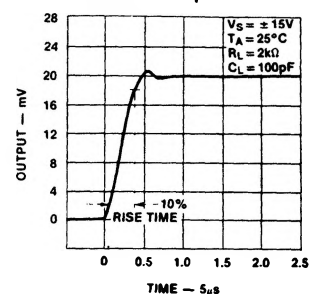
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TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

Output Short-Circuit Current
as a Function of
Ambient TemperatureInput Noise Voltage
as a Function of
FrequencyInput Noise Current
as a Function of
FrequencyBroadband Noise for
Various BandwidthsOpen-Loop Voltage Gain
as a Function of
FrequencyOpen-Loop Phase Response
as a Function of
FrequencyOutput Voltage Swing
as a Function of
FrequencyCommon-Mode Rejection
Ratio as a Function of
Frequency

Transient Response



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TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

