Signetics

MC/SA1458/MC1558
General-Purpose Operational Amplifier

Product Specification

Linear Products

DESCRIPTION

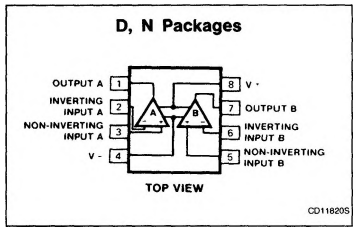
The MC1458 is a high-performance operational amplifier with high open-loop gain, internal compensation, high common-mode range and exceptional temperature stability. The MC1458 is short-circuit protected.

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

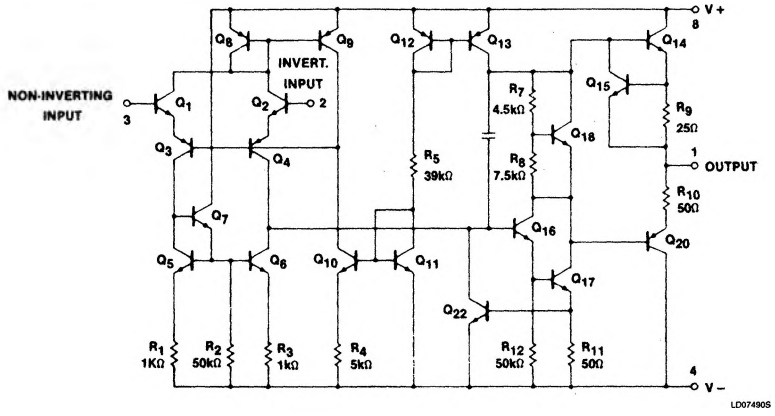
ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V_S	Supply voltage MC1458 SA1458 MC1558	 ±18 ±18 ±22	 V V V
T_J	Junction temperature	+150	°C
$P_{D\ MAX}$	Maximum power dissipation, T_A = 25°C (still-air)[1] N package D package	 1160 780	 mW 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 SA1458 MC1558	 0 to +70 −40 to +85 −55 to +125	 °C °C °C
T_{STG}	Storage temperature range	−65 to +150	°C
T_{SOLD}	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.

EQUIVALENT SCHEMATIC



Amplifier "A" of MC1458, SA1458, MC1558

DC ELECTRICAL CHARACTERISTICS $T_A = 25°C$, $V_S = \pm 15V$, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	MC1558			UNIT
			Min	Typ	Max	
V_{OS}	Offset voltage	$R_S = 10k\Omega$		1.0	5.0	mV
		$R_S = 10k\Omega$, over temperature			6.0	mV
ΔV_{OS}	Offset voltage	Over temperature		10		μV/°C
I_{OS}	Offset current			20	200	nA
		Over temperature			500	nA
ΔI_{OS}	Offset current	Over temperature		0.10		nA/°C
I_{BIAS}	Input bias current			80	500	nA
		Over temperature			1500	nA
ΔI_{BIAS}	Bias current	Over temperature		1.0		nA/°C
V_{OUT}	Output voltage swing	$R_L = 10k\Omega$, over temperature	±12	±14		V
		$R_L = 2k\Omega$, over temperature	±10	±13		V
A_{VOL}	Large-signal voltage gain	$R_L = 2k\Omega, V_O = \pm 10V$	50	100		V/mV
		$R_L = 2k\Omega$, $V_O = \pm$ temperature	20			V/mV
	Offset voltage adjustment range			±30		mV
PSRR	Power supply rejection ratio	$R_S \leq 10k\Omega$		30	150	μV/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

DC ELECTRICAL CHARACTERISTICS (Continued) $T_A = 25°C$, $V_{CC} = \pm 15V$, unless otherwise specified.

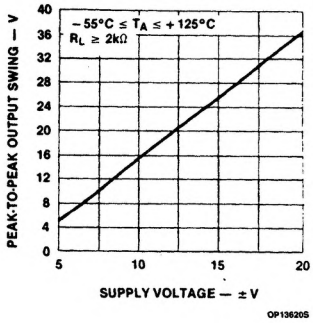
SYMBOL	PARAMETER	TEST CONDITIONS	MC1458			SA1458			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{OS}	Offset voltage	$R_S = 10k\Omega$		2.0	6.0		2.0	6.0	mV
		$R_S = 10k\Omega$, over temp.			7.5			7.5	mV
ΔV_{OS}	Offset voltage	Over temperature		12			12		μV/°C
I_{OS}	Offset current			20	200		20	200	nA
		Over temperature			300			500	nA
ΔI_{OS}	Offset current	Over temperature		0.10			0.10		nA/°C
I_{BIAS}	Input bias current			80	500		80	500	nA
		Over temperature			800			1500	nA
ΔI_{BIAS}	Bias current	Over temperature		1.0			1.0		nA/°C
V_{OUT}	Output voltage swing	$R_L = 10k\Omega$, over temp.	±12	±14		±12	±14		V
		$R_L = 2k\Omega$, over temp.	±10	±13		±10	±13		V
A_{VOL}	Large-signal voltage gain	$R_L = 2k\Omega$, $V_O = \pm 10V$	25	200		20	200		V/mV
		$R_L = 2k\Omega$, $V_O = \pm 10V$, Over temperature	15			15			V/mV
	Offset voltage adjustment range			±30			±30		mV
PSRR	Power supply rejection ratio	$R_S \leq 10k\Omega$		30	150		30	150	μV/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		MΩ
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 $T_A = 25°C$, $V_S = \pm 15V$, unless otherwise specified.

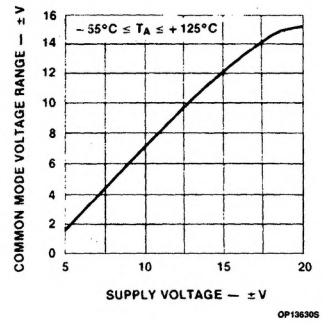
SYMBOL	PARAMETER	TEST CONDITIONS	MC1458, SA1458, MC1558			UNIT
			Min	Typ	Max	
R_{IN}	Parallel input resistance	Open-loop, f = 20Hz	0.3			MΩ
	Common-mode input impedance	f = 20Hz		200		MΩ
	Equivalent input noise voltage	$A_V = 100$, $R_S = 10k\Omega$, BW = 1.0kHz, f = 1.0kHz		30		$nV/\sqrt{Hz}$
BW	Power bandwidth	$A_V = 1$, $R_L = 2.0k\Omega$, THD ≤ 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
	Transient response unity gain	$V_{IN} = 20mV$, $R_L = 2k\Omega$, $C_L \leq 100pF$				
t_R	Rise time			0.3		μs
	Overshoot			5.0		%
SR	Slew rate	$C_L \leq 100pF$, $R_L \geq 2k\Omega$, $V_{IN} = \pm 10V$		0.8		V/μs

TYPICAL PERFORMANCE CHARACTERISTICS

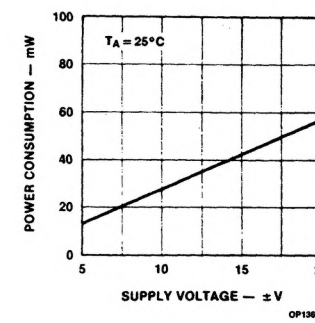
Output Voltage Swing as a Function of Supply Voltage



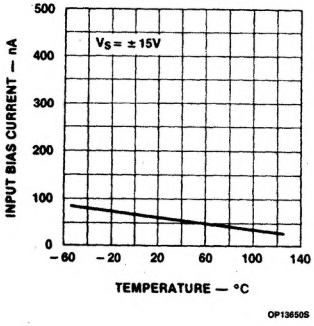
Input Common-Mode Voltage Range as a Function of Supply Voltage



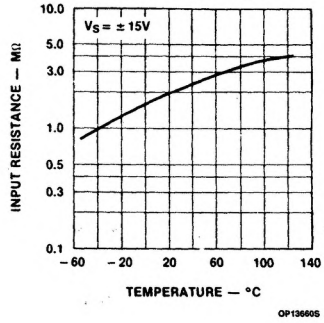
Power Consumption as a Function of Supply Voltage



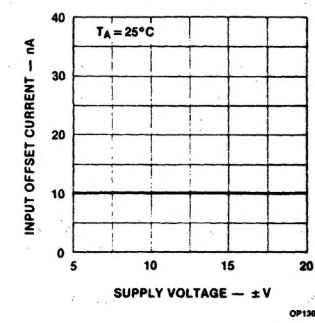
Input Bias Current as a Function of Ambient Temperature



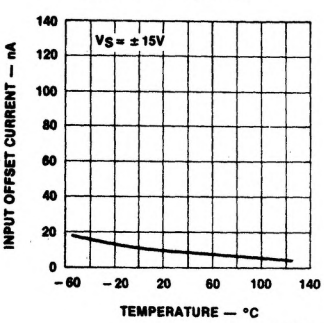
Input Resistance as a Function of Ambient Temperature



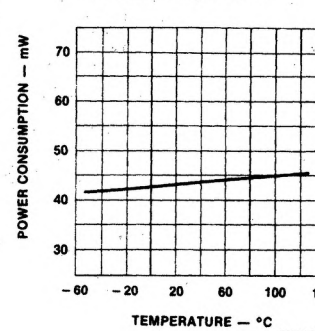
Input Offset Current as a Function of Supply Voltage



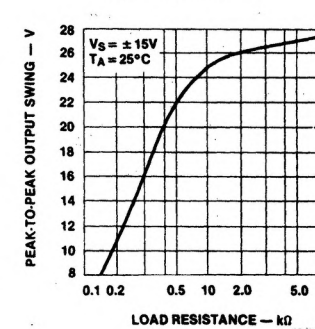
Input Offset Current as a Function of Ambient Temperature



Power Consumption as a Function of Ambient Temperature

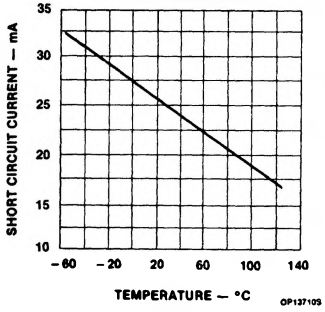


Output Voltage Swing as a Function of Load Resistance

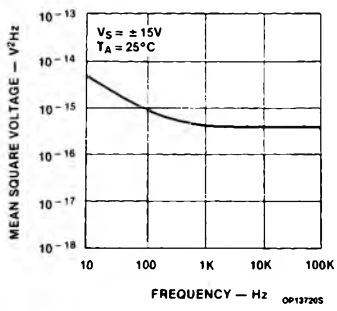


TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

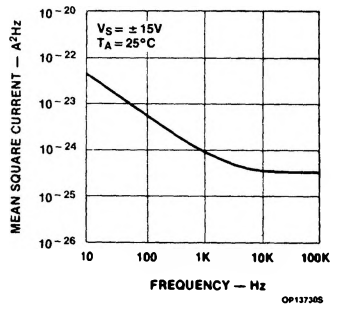
Output Short-Circuit Current as a Function of Ambient Temperature



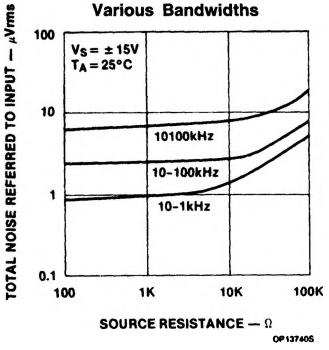
Input Noise Voltage as a Function of Frequency



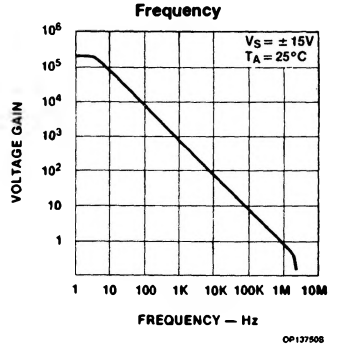
Input Noise Current as a Function of Frequency



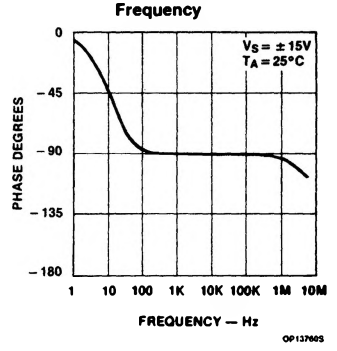
Broadband Noise for Various Bandwidths



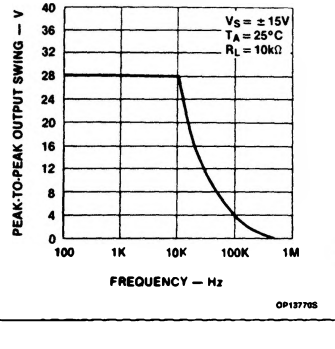
Open-Loop Voltage Gain as a Function of Frequency



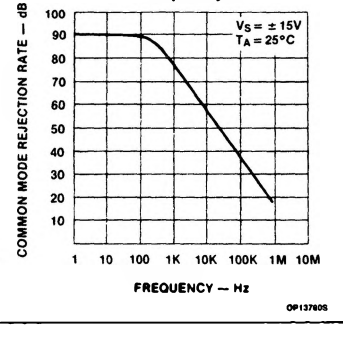
Open-Loop Phase Response as a Function of Frequency



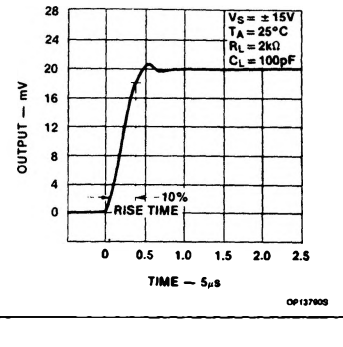
Output Voltage Swing as a Function of Frequency



Common-Mode Rejection Ratio as a Function of Frequency



Transient Response



TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

Power Bandwidth
(Large-Signal Swing vs Frequency)