μA741/741C/SA741C,
MC1458/1558/SA1458-F,N,T

DESCRIPTION

The μA741 is a high performance operational amplifier with high open loop gain, internal compensation, high common mode range and exceptional temperature stability. The μA741 is short-circuit protected and allows for nulling of offset voltage.

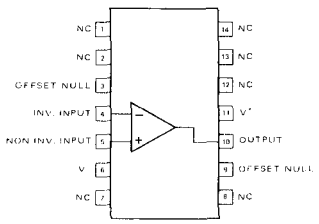
The MC1558/MC1458/SA1458 consist of a pair of 741 operational amplifiers on a single chip.

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**
- **MC1558 Mil std 883A,B,C available**
- **μA741 Mil std 883A,B,C available**

PIN CONFIGURATIONS

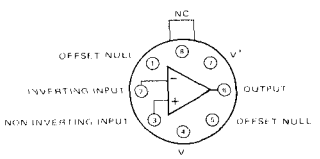
F,N-14 PACKAGE



ORDER PART NO.

μA741F
μA741N-14
μA741CF
μA741CN-14
SA741CF
SA741CN-14

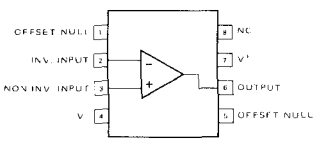
T PACKAGE



ORDER PART NO.

μA741T
μA741CT
SA741CT

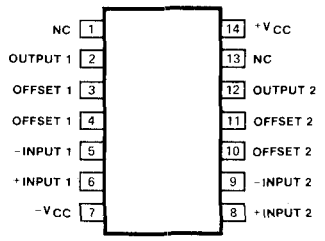
N PACKAGE



ORDER PART NO.

μA741N
μA741CN
SA741CN

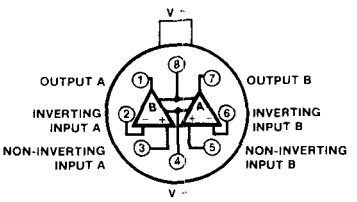
F,N-14 PACKAGE



ORDER PART NO.

MC1458F
MC1558F
SA1458F
MC1458N-14
MC1558N-14
SA1458N-14

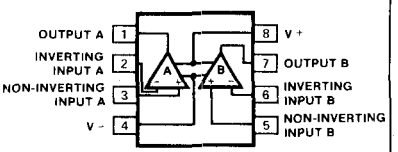
T PACKAGE



ORDER PART NO.

MC1458T
MC1558T
SA1458T

N PACKAGE

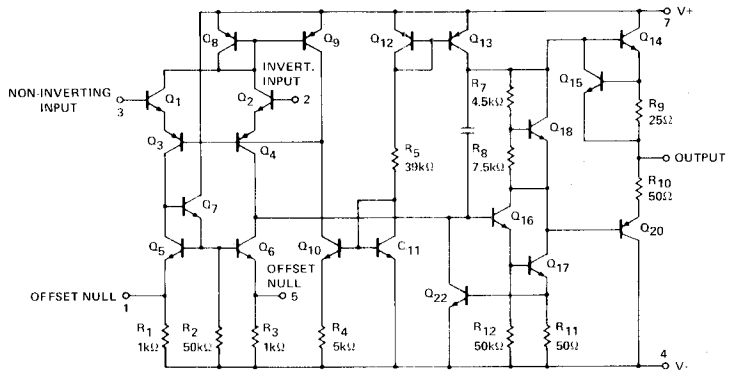


ORDER PART NO.

MC1458N
MC1558N
SA1458N

EQUIVALENT SCHEMATIC

μA741, A741C, SA741C
ONE AMPLIFIER OF MC1558, MC1458, SA1458



ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
Supply voltage		
SA741C, μA741C, MC1458, SA1458	±18	V
μA741, MC1558	±22	V
Internal power dissipation, N-14[4]	600	mW
N package	500	mW
T package[1]	800	mW
F package	1000	mW
Differential input voltage	±30	V
Input voltage[2]	±15	V
Output short-circuit duration	Continuous	
Operating temperature range		
μA741C, MC1458	0 to +70	°C
SA741C, SA1458	-40 to +85	°C
μA741, MC1558	-55 to +125	°C
Storage temperature range	-65 to +150	°C
Lead temperature (soldering 60sec)	300	°C

NOTES

1. Ratings based on thermal resistances, junction to ambient, of 208°C/W, 240°C/W, 150°C/W, 110°C/W for N-14, N, T and F packages respectively, and a maximum junction temperature of 150°C.
2. For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

DC ELECTRICAL CHARACTERISTICS

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

PARAMETER		TEST CONDITIONS	μA741			μA741C			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{OS}	Offset voltage	$R_S = 10k\Omega$ $R_S = 10k\Omega$, over temp.		1.0 1.0	5.0 6.0		2.0	6.0 7.5	mV mV
I_{OS}	Offset current	 Over temp. $T_A = +125°C$ $T_A = -55°C$		20 7.0 20	200 200 500		20	200 300 	nA nA nA nA
I_{BIAS}	Input bias current	 Over temp. $T_A = +125°C$ $T_A = -55°C$		80 30 300	500 500 1500		80	500 800 	nA nA nA nA
V_{OUT}	Output voltage swing	$R_L = 10k\Omega$ $R_L = 2k\Omega$, over temp.	±12 ±10	±14 ±13		±12 ±10	±14 ±13		V V
A_{VOL}	Large signal voltage gain	$R_L = 2k\Omega$, $V_O = \pm 10V$ $R_L = 2k\Omega$, $V_O = \pm 10V$, over temp.	50 25	200		20 15	200		V/mV V/mV
	Offset voltage adjustment range			±30			±30		mV
P_{SRR}	Supply voltage rejection ratio	$R_S \leq 10k\Omega$ $R_S \leq 10k\Omega$, over temp.		 10	 150		10	150	μV/V μV/V
CMRR	Common mode rejection ratio	 Over temp.	 70	 90					dB dB
I_{CC}	Supply current	 $T_A = +125°C$ $T_A = -55°C$		1.4 1.5 2.0	2.8 2.5 3.3		1.4	2.8	mA mA mA
V_{IN} R_{IN}	Input voltage range Input resistance	(μA741, over temp.)	±12 0.3	±13 2.0		±12 0.3	±13 2.0		V MΩ
P_d	Power consumption	 $T_A = +125°C$ $T_A = -55°C$		50 45 45	85 75 100		50	85	mW mW mW
R_{OUT} I_{SC}	Output resistance Output short-circuit current			75 25			75 25		Ω mA

DC ELECTRICAL CHARACTERISTICS (Cont'd) $T_A = 25°C$, $V_S = \pm 15V$, unless otherwise specified.

PARAMETER		TEST CONDITIONS	SA741C			MC1558			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{OS}	Offset voltage	$R_S = 10k\Omega$ $R_S = 10k\Omega$, over temp.		2.0	6.0 7.5		1.0	5.0 6.0	mV mV
I_{OS}	Offset current	 Over temp.		20	200 500		20	200 500	nA nA
I_{BIAS}	Input bias current	 Over temp.		80	500 1500		80	500 1500	nA nA
V_{OUT}	Output voltage swing	$R_L = 10k\Omega$ $R_L = 2k\Omega$, over temp.	±12 ±10	±14 ±13		±12 ±10	±14 ±13		V V
A_{VOL}	Large signal voltage gain	$R_L = 2k\Omega$, $V_O = \pm 10V$ $R_L = 2k\Omega$, $V_O = \pm 10V$, over temp.	20 15	200		50 25	100		V/mV V/mV
	Offset voltage adjustment range			±30			±30		mV
P_{SRR}	Supply voltage rejection ratio	$R_S \leq 10k\Omega$		10	150		30	150	μV/V
CMRR	Common mode rejection ratio						70	90	dB
I_{CC}	Supply current			1.4	2.8		2.3	5.6	mA
V_{IN} R_{IN}	Input voltage range Input resistance	(μA741, over temp.)	±12 0.3	±13 2.0		±12	±13		V MΩ
P_d	Power consumption			50	85		70	150	mW
 R_{OUT} I_{SC}	Channel separation Output resistance Output short-circuit current			 75 25			120 25		dB Ω mA

DC ELECTRICAL CHARACTERISTICS (Cont'd) $T_A = 25°C$, $V_S = \pm 15V$, unless otherwise specified.

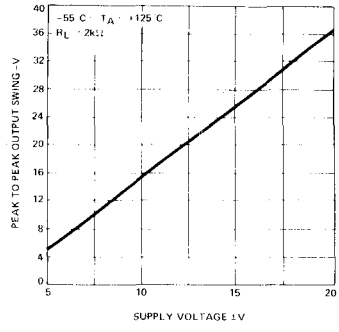
PARAMETER		TEST CONDITIONS	MC1458			SA1458			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{OS}	Offset voltage	$R_S = 10k\Omega$ $R_S = 10k\Omega$, over temp.		2.0	6.0 7.5		2.0	6.0 7.5	mV mV
I_{OS}	Offset current	 Over temp.		20	200 300		20	200 500	nA nA
I_{BIAS}	Input bias current	 Over temp.		80	500 800		80	500 1500	nA nA
V_{OUT}	Output voltage swing	$R_L = 10k\Omega$ $R_L = 2k\Omega$, over temp.	±12 ±10	±14 ±13		±12 ±10	±14 ±13		V V
A_{VOL}	Large signal voltage gain	$R_L = 2k\Omega$, $V_O = \pm 10V$ $R_L = 2k\Omega$, $V_O = \pm 10V$, over temp.	25 15	200		25 15	200		V/mV V/mV
	Offset voltage adjustment range			±30			±30		mV
P_{SRR}	Supply voltage rejection ratio	$R_S \leq 10k\Omega$		30	170		30	150	μV/V
CMRR	Common mode rejection ratio			70	90		70	90	dB
I_{CC}	Supply current			2.3	5.0		2.3	5.6	mA
V_{IN} R_{IN}	Input voltage range Input resistance	(μA741, over temp.)	±12	±13		±12	±13		V MΩ
P_d	Power consumption			70	170		70	170	mW
 I_{SC}	Channel separation Output short-circuit current			120 25			120 25		dB mA

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

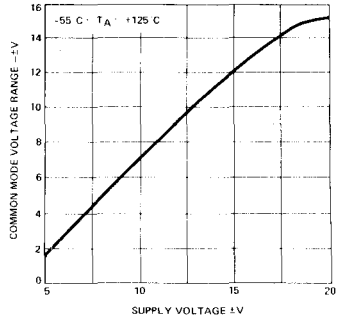
PARAMETER	TEST CONDITIONS	μA741, μA741C, SA741C			MC1558, MC1458, SA1458			UNIT
		Min	Typ	Max	Min	Typ	Max	
Parallel input resistance	Open loop, f = 20Hz				0.3			MΩ
Parallel input capacitance	Open loop, f = 20Hz		1.4					pF
Common mode input impedance	f = 20Hz					200		MΩ
Equivalent input noise voltage	A_V = 100, R_S = 10kΩ, B_W = 1.0kHz f = 1.0kHz					45		$nV\sqrt{Hz}$
Power bandwidth	A_V = 1, R_L = 2.0kΩ, THD ≤ 5% V_{OUT} = 20Vp-p					14		kHz
Phase margin						65		degrees
Gain margin						11		dB
Unity gain crossover frequency	Open loop		1.0			1.0		MHz
Transient response unity gain	V_{IN} = 20mV, R_L = 2kΩ, C_L ≤ 100pf							
Rise time			0.3			0.3		μs
Overshoot			5.0			5.0		%
Slew rate	C ≤ 100pf, R_L ≥ 2k, V_{IN} = ±10V		0.5			0.8		V/μs

TYPICAL PERFORMANCE CHARACTERISTICS

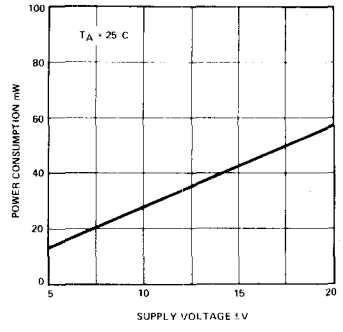
OUTPUT VOLTAGE SWING AS A FUNCTION OF SUPPLY VOLTAGE



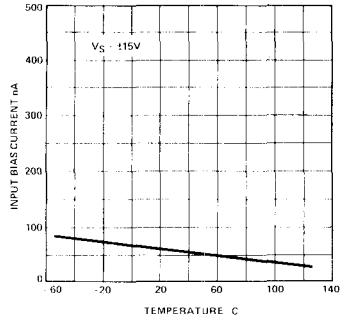
INPUT COMMON MODE VOLTAGE RANGE AS A FUNCTION OF SUPPLY VOLTAGE



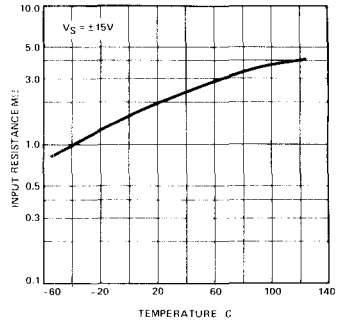
POWER CONSUMPTION AS A FUNCTION OF SUPPLY VOLTAGE



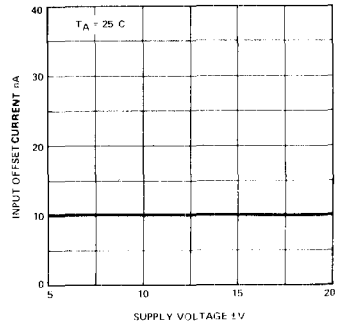
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



INPUT RESISTANCE AS A FUNCTION OF AMBIENT TEMPERATURE

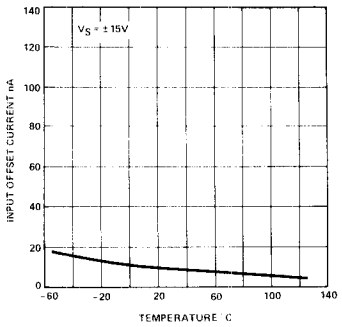


INPUT OFFSET CURRENT AS A FUNCTION OF SUPPLY VOLTAGE

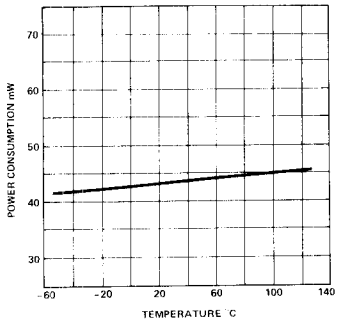


TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

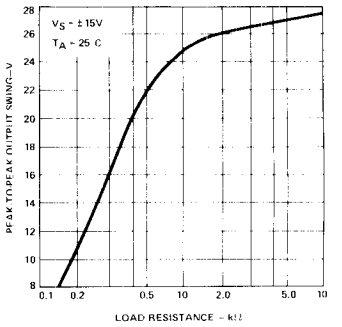
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



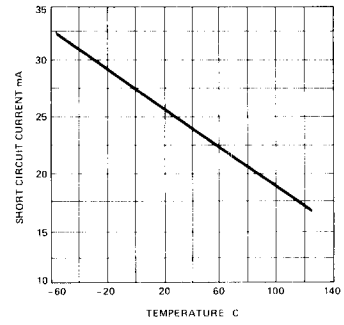
POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



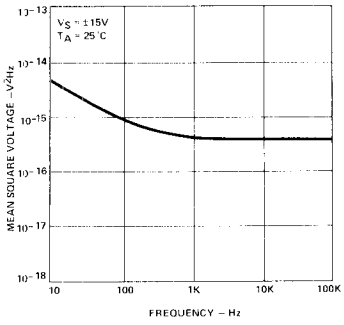
OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE



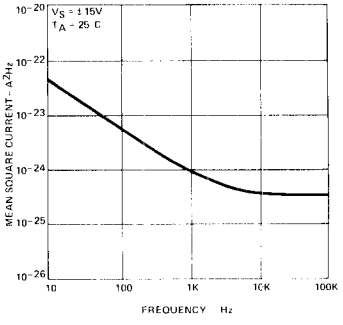
OUTPUT SHORT-CIRCUIT CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



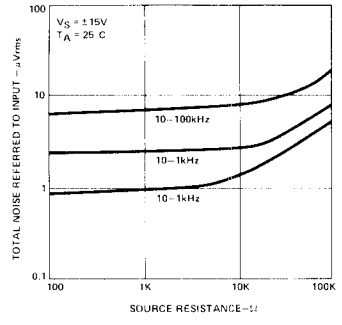
INPUT NOISE VOLTAGE AS A FUNCTION OF FREQUENCY



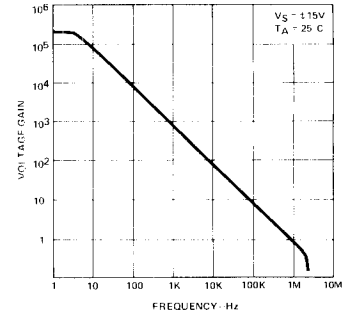
INPUT NOISE CURRENT AS A FUNCTION OF FREQUENCY



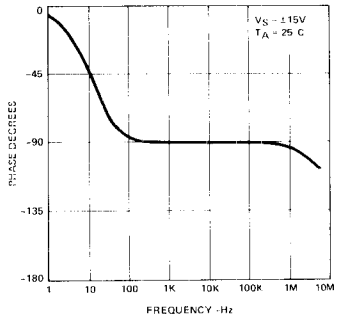
BROADBAND NOISE FOR VARIOUS BANDWIDTHS



OPEN LOOP VOLTAGE GAIN AS A FUNCTION OF FREQUENCY

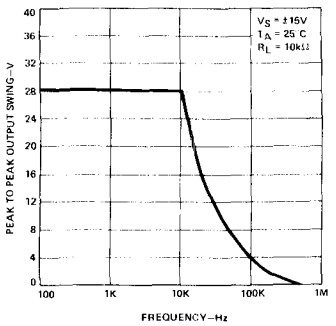


OPEN LOOP PHASE RESPONSE AS A FUNCTION OF FREQUENCY

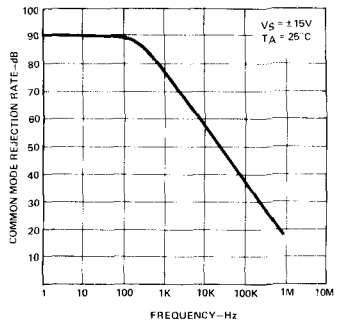


TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

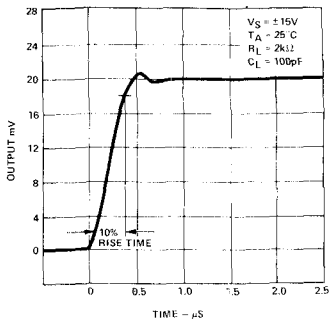
OUTPUT VOLTAGE SWING AS A FUNCTION OF FREQUENCY



COMMON MODE REJECTION RATIO AS A FUNCTION OF FREQUENCY



TRANSIENT RESPONSE



POWER BANDWIDTH (Large Signal Swing vs Frequency)