DUAL GENERAL-PURPOSE OPERATIONAL AMPLIFIER — SA/SE/NE4558

DESCRIPTION

The 4558 is a dual operational amplifier internally compensated. The use of planar epitaxial process for silicon chip construction gives the IC unique performance characteristics.

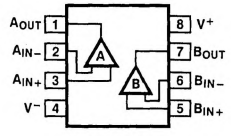
Excellent channel separation allows the use of a dual device in a single amp application, providing the highest packaging density. The SA/SE/NE4558 is a pin for pin replacement for the RC/RM/RV4558.

FEATURES

- **2MHz unity gain bandwidth guaranteed**
- **Supply voltage ± 22V for SE4558 and ± 18V for NE4558**
- **Short circuit protection**
- **No frequency compensation required**
- **No latch-up**
- **Large common mode and differential voltage ranges**
- **Low power consumption**

PIN CONFIGURATION

D, FE, N PACKAGES



TOP VIEW

ORDER NUMBERS

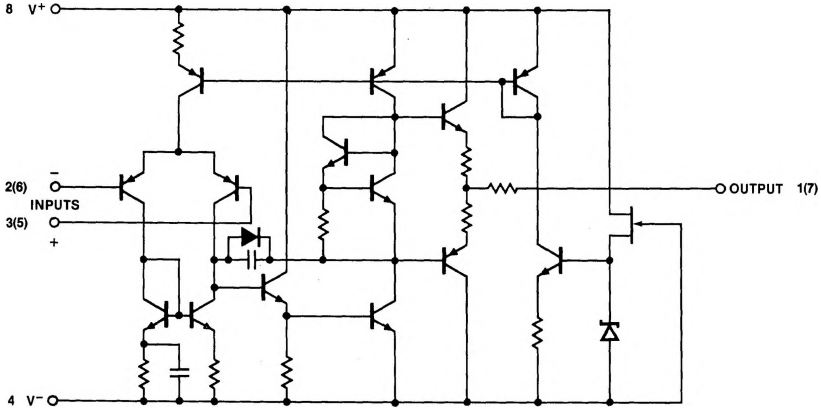
NE4558D	SA4558FE
NE4558FE	SE4558FE
NE4558N	SA4558N

ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
Supply voltage		
SE4558:	± 22	V
NE4558, SA4558:	± 18	V
Internal power dissipation (Note 1)	500	mW
Differential input voltage	± 30	V
Input voltage (Note 2)	± 15	V
Storage temperature range	− 65 to + 150	°C
Operating temperature range		
SE4558:	− 55 to + 125	°C
SA4558:	− 40 to + 85	°C
NE4558:	0 to + 70	°C
Lead temperature (soldering, 60s)	300	°C
Output short circuit duration (Note 3)	Indefinite	

NOTES
1. Rating applies for case temperatures to + 125°C; derate linearly at 5.6 mw/°C for ambient temperatures above + 75°C for SE4558.
2. For supply voltages less than ± 15V, the absolute maximum input voltage is equal to the supply voltage.
3. Short circuit may be to ground on one amp only. Rating applies to + 125°C case temperature or + 75°C ambient temperature for NE4558 and to + 85°C ambient temperature for SA4558.

EQUIVALENT SCHEMATIC



DUAL GENERAL-PURPOSE OPERATIONAL AMPLIFIER SA/SE/NE4558

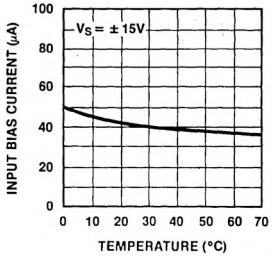
ELECTRICAL CHARACTERISTICS $V_{CC} = \pm 15V$, $T_A = 25°C$ unless otherwise specified.

PARAMETER	TEST CONDITIONS	SE4558			SA/NE4558			UNIT
		Min	Typ	Max	Min	Typ	Max	
Input offset voltage	$R_S \leq 10k\Omega$		1.0	5.0		2.0	6.0	mV
$\Delta V_{OS}/\Delta T$	Over temp.		4			4		$\mu V/°C$
Input offset current			50	200		30	200	nA
$\Delta I_{OS}/\Delta T$	Over temp.		20			20		pA/°C
Input bias current			40	500		200	500	nA
$\Delta I_B/\Delta T$	Over temp.		40			40		pA/°C
Input resistance		0.3	1.0		0.3	1.0		MΩ
Large signal voltage gain	$R_L \geq 2K\Omega$ $V_{OUT} = \pm 10V$	50,000	300,000		20,000	300,000		V/V
Output voltage swing	$R_L \geq 10k\Omega$ $R_L \geq 2k\Omega$	± 12 ± 10	± 14 ± 13		± 12 ± 10	± 14 ± 13		V
Input voltage range		± 12	± 13		± 12	± 13	V	
Common mode rejection ratio	$R_S \leq 10k\Omega$	70	100		70	100		dB
Supply voltage rejection ratio	$R_S \leq 10k\Omega$		10	150		10	150	$\mu V/V$
Power consumption (all amplifiers)	$R_L = \bullet$		100	170		100	170	mW
Transient response (unity gain) Risetime Overshoot	$V_{IN} = 20mV$ $R_L = 2K\Omega$ $C_L \leq 100pF$		 100 15.0			 100 15.0		 ns %
Slew rate (unity gain)	$R_L \geq 2k\Omega$		1.0			1.0		V/μs
Channel separation (gain = 100)	f = 10kHz $R_S = 1k\Omega$		90			90		dB
Unity gain bandwidth (gain = 1)		2.5	3.0		2.0	3.0		MHz
θ_M phase margin	$T_A = 25°C$		45			45		Degree
Input noise voltage	f = 1kc		25			25		$nv/\sqrt{Hz}$
I_{SC} short circuit	$T_A = 25°C$	5	25	50	5	25	50	mA
The following specifications apply for $-55°C \leq T_A \leq +125°C$ for SE4558; $0°C \leq T_A \leq +70°C$ for NE4558; $-40°C \leq T_A \leq +85°C$ for SA4558								
Input offset voltage	$R_S \leq 10k\Omega$			6.0			7.5	mV
Input offset current				500			300/500*	nA
Input bias current				1500			800/1500*	nA
Large signal voltage gain	$R_L \geq 2k\Omega$ $V_{OUT} = \pm 10$	25,000			15,000			
Output voltage swing	$R_L \geq 2k\Omega$	± 10			± 10			V
Power consumption	$V_S = \pm 15V$ T_A = HIGH T_A = LOW		90 120	150 200		90 120	150 200	mW

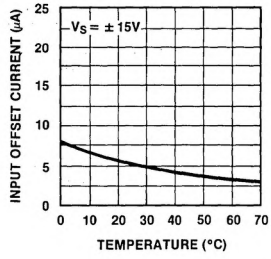
*SA4558

TYPICAL PERFORMANCE CURVES

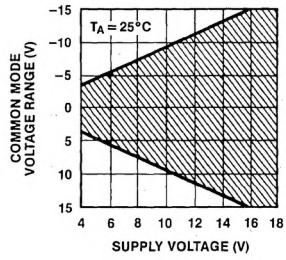
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



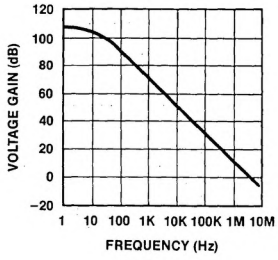
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



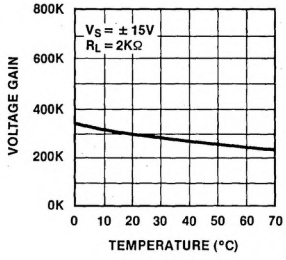
COMMON MODE RANGE AS A FUNCTION OF SUPPLY VOLTAGE



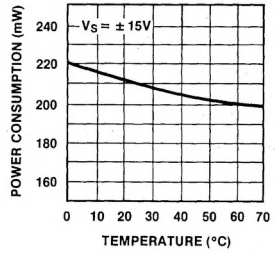
OPEN LOOP VOLTAGE GAIN AS A FUNCTION OF FREQUENCY



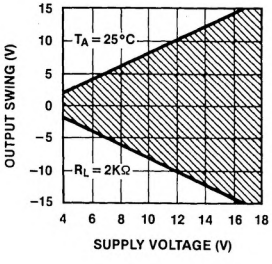
OPEN LOOP GAIN AS A FUNCTION OF TEMPERATURE



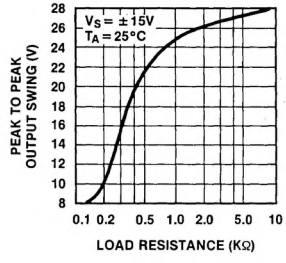
POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



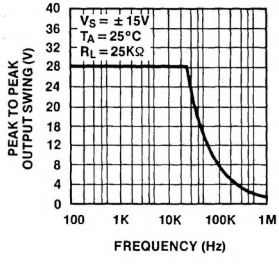
TYPICAL OUTPUT VOLTAGE AS A FUNCTION OF SUPPLY VOLTAGE



OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE

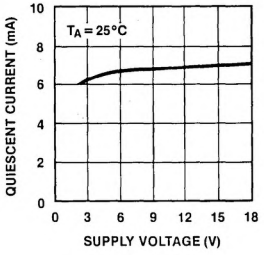


OUTPUT VOLTAGE SWING AS A FUNCTION OF FREQUENCY

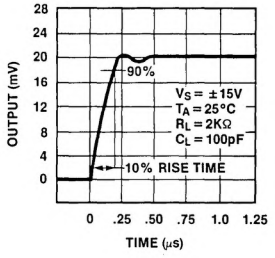


TYPICAL PERFORMANCE CURVES (Continued)

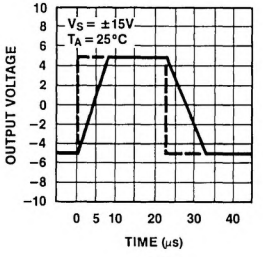
QUIESCENT CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



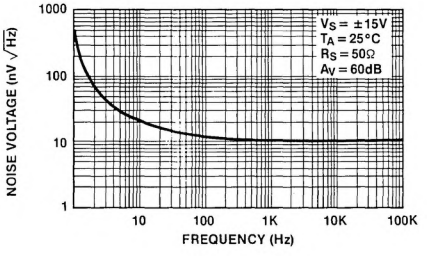
TRANSIENT RESPONSE



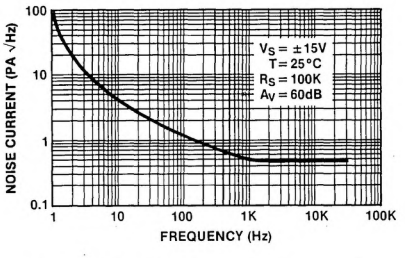
VOLTAGE FOLLOWER LARGE-SIGNAL PULSE RESPONSE



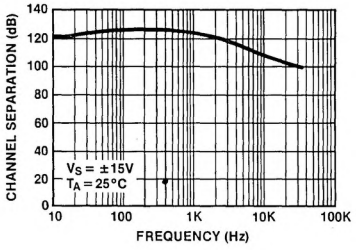
INPUT NOISE VOLTAGE AS A FUNCTION OF FREQUENCY



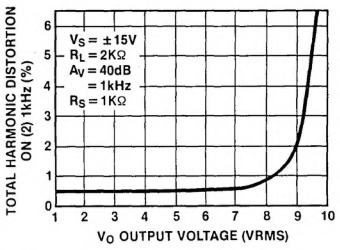
INPUT NOISE CURRENT AS A FUNCTION OF FREQUENCY



CHANNEL SEPARATION



TOTAL HARMONIC DISTORTION vs OUTPUT VOLTAGE



DISTORTION vs FREQUENCY
$V_O = 1vrms$