DESCRIPTION

The 532 consists of two independent, high gain, internally frequency compensated operational amplifiers designed specifically to operate from a single power supply over a wide range of voltages. Operation from dual power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

FEATURES

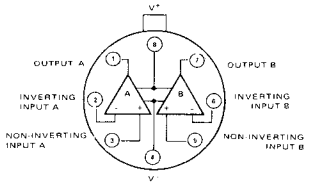
- **Internally frequency compensated for unity gain**
- **Large dc voltage gain—(100dB)**
- **Wide bandwidth (unity gain)—1MHz (temperature compensated)**
- **Wide power supply range**
  single supply—(3Vdc to 30Vdc)
  or dual supplies—(±1.5Vdc to ±15Vdc)
- **Very low supply current drain (400μA)—essentially independent of supply voltage (1mW/op amp at +5Vdc)**
- **Low input biasing current—(45nA dc temperature compensated)**
- **Low input offset voltage—(2mVdc) and offset current—(5nA dc)**
- **Differential input voltage range equal to the power supply voltage**
- **Large output voltage—(0Vdc to V+—-1.5Vdc swing)**
- **SE532 Mil std 883A,B,C available**

UNIQUE FEATURES

In the linear mode the input common-mode voltage range includes ground and the output voltage can also swing to ground, even though operated from only a single power supply voltage. The unity gain cross frequency is temperature compensated. The input bias current is also temperature compensated.

PIN CONFIGURATIONS

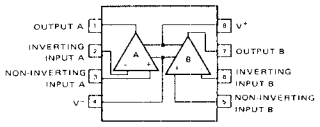
T PACKAGE
(Top View)



ORDER PART NO.

SE532T	NE532T
SE532AT	NE532AT
SA532T	

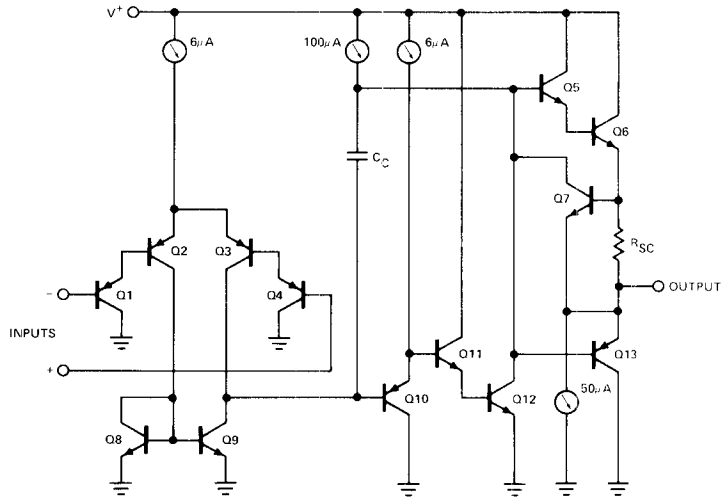
N PACKAGE
(Top View)



ORDER PART NO.

SE532N	NE532N
SA532N	
SE532AN	NE532AN

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
Supply voltage, V+	32 or ±16	Vdc
Differential input voltage	32	Vdc
Input voltage	-0.3 to +32	Vdc
Power dissipation		
T package	680	mW
N package	625	mW
Output short-circuit to GND		
V+ < 15 Vdc and T_A = 25°C	Continuous	
Operating temperature range		
NE532	0 to +70	°C
SA532	-40 to +85	°C
SE532	-55 to +125	°C
Storage temperature range	-65 to +150	°C
Lead temperature (soldering, 10sec)	300	°C

NE/SE532/532A/SA532-N,T

DC ELECTRICAL CHARACTERISTICS

T_A = 25°C, V+ = +5V unless otherwise specified (see Notes on following page).

PARAMETER	TEST CONDITIONS	SE532 Min	SE532 Typ	SE532 Max	NE532 Min	NE532 Typ	NE532 Max	UNIT
V_{OS} Offset voltage[1]	$R_S \leq 10k$		±2	±5		±2	±6	mV
	$R_S \leq 10k\Omega$, over temp.			±7			±7.5	mV
V_{OS} Drift	$R_S = 0\Omega$, over temp.		7			7		μV/°C
I_{OS} Offset current	$I_{IN}(+)$ or $I_{IN}(-)$		±3	±30		+5	±50	nA
I_{OS} Offset current	Over temp.			±100			±150	nA
I_{OS} Drift	Over temp.		10			10		pA/°C
I_{BIAS} Input current[2]	$I_{IN}(+)$ or $I_{IN}(-)$		45	150		45	250	nA
	Over temp., $I_{IN}(+)$ or $I_{IN}(-)$		40	300		40	500	nA
V_{CM} Common mode voltage range[3]	V+ = 30V	0		V+-1.5	0		V+-1.5	V
	Over temp., V+ = 30V			V+-2.0			V+-2.0	V
C_{MRR} Common mode rejection ratio	$R_S \leq 10k\Omega$	70	85		65	70		dB
V_{OUT} Output voltage swing (V_{OH})	$R_L \geq 2k\Omega$, V+ = 30V	26			26			V
	$R_L \geq 10k\Omega$, V+ = 30V	27	28		27	28		V
V_{OUT} Output voltage swing (V_{OL})	$R_L \leq 10k\Omega$, over temp.		5	20		5	20	mV
I_{CC} Supply current	$R_L = \infty$ on all amplifiers, over temp		0.5	1.2		0.5	1.2	mA
A_{VOL} Large signal voltage Gain	$R_L \geq 2k\Omega$, V_{OUT} ± 10V, V_S = ±15V	50	100		25	100		V/mV
	Over temp.	25			15			V/mV
P_{SRR} Supply voltage rejection ratio	$R_S \leq 10k\Omega$	65	100		65	100		dB
Amplifier-to-amplifier coupling[4]	f = 1kHz to 20kHz (input referred)		-120			-120		dB
Output current source	$V_{IN}+$ = 1Vdc, $V_{IN}-$ = 0Vdc, V+ = 15Vdc	20	40		20	40		mA
Output current sink	$V_{IN}-$ = 1Vdc, V_{IN} = 0Vdc, V+ = 15Vdc	10	20		10	20		mA
	$V_{IN}-$ = 1Vdc, V_{IN} = 0Vdc, V_{OUT} = 200mVdc	12	50		12	50		μA
I_{SC}[5]			40	60		40	60	mA

DC ELECTRICAL CHARACTERISTICS

(Cont'd) T_A=25°C, V+ = +5V unless otherwise specified (see Notes on following page).

PARAMETER	TEST CONDITIONS	SA532 Min	SA532 Typ	SA532 Max	SE532A Min	SE532A Typ	SE532A Max	UNIT
V_{OS} Offset voltage[1]	$R_S \leq 10k$		±2	±6		1	2	mV
	$R_S \leq 10k\Omega$, over temp.			±7.5			4	mV
V_{OS} Drift	$R_S = 0\Omega$, over temp.		7			7	15	μV°C
I_{OS} Offset current	$I_{IN}(+)$ or $I_{IN}(-)$		±5	±50		2	10	nA
I_{OS} Offset current	Over temp.			±150			30	nA
I_{OS} Drift	Over temp.		10			10	200	pA/°C
I_{BIAS} Input current[2]	$I_{IN}(+)$ or $I_{IN}(-)$		45	250		20	50	nA
	Over temp., $I_{IN}(+)$ or $I_{IN}(-)$		40	500		40	100	nA
V_{CM} Common mode voltage range[3]	V+ = 30V	0		V+-1.5	0		V+-1.5	V
	Over temp., V+ = 30V			V+-2.0	0		V+-1.5	V
C_{MRR} Common mode rejection ratio	$R_S \leq 10k\Omega$	65	70		70	85		dB
V_{OUT} Output voltage swing (V_{OH})	$R_L \geq 2k\Omega$, V+ = 30V	26						V
	$R_L \geq 10k\Omega$, V+ = 30V	27	28					V
V_{OUT} Output voltage swing (V_{OL})	$R_L \leq 10k\Omega$, over temp.		5	20				mV
I_{CC} Supply current	$R_L = \infty$ on all amplifiers, over temp.		0.5	1.2		0.5	1.2	mA
A_{VOL} Large signal voltage Gain	$R_L \geq 2k\Omega$, V_{OUT} ± 10V, V_S = ±15V	25	100		50	100		V/mV
	Over temp.	15			25			V/mV
P_{SRR} Supply voltage rejection ratio	$R_S \leq 10k\Omega$	65	100		65	100		dB
Amplifier-to-amplifier coupling[4]	f = 1kHz to 20kHz (input referred)		-120			-120		dB
Output current source	$V_{IN}+$ = 1Vdc, $V_{IN}-$ = 0Vdc, V+ = 15Vdc	20	40		20	40		mA
Output current sink	$V_{IN}-$ = 1Vdc, V_{IN} = 0Vdc, V+ = 15Vdc	10	20		10	20		mA
	$V_{IN}-$ = 1Vdc, V_{IN} = 0Vdc, V_{OUT} = 200mVdc	12	50		12	50		μA
I_{SC}[5]			40	60		40	60	mA

DC ELECTRICAL CHARACTERISTICS (Cont'd) T_A = 25°C, V+ = +5V unless otherwise specified.

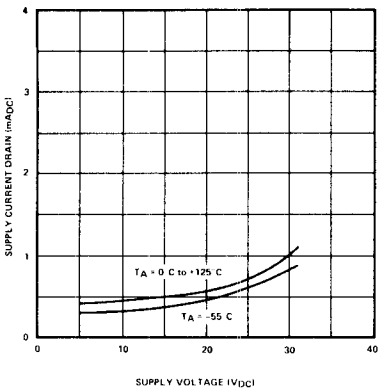
PARAMETER		TEST CONDITIONS	NE532A Min	NE532A Typ	NE532A Max	UNIT
V_{OS}	Offset voltage[1]	$R_S \leq 10k$		2	3	mV
		$R_S \leq 10k\Omega$, over temp.			5	mV
V_{OS}	Drift	$R_S = 0\Omega$, over temp.		7	20	μV°C
I_{OS}	Offset current	$I_{IN}(+)$ or $I_{IN}(-)$		5	30	nA
I_{OS}	Offset current	Over temp.			75	nA
I_{OS}	Drift	Over temp.		10	300	pA/°C
I_{BIAS}	Input current[2]	$I_{IN}(+)$ or $I_{IN}(-)$		45	100	nA
		Over temp., $I_{IN}(+)$ or $I_{IN}(-)$		40	200	nA
V_{CM}	Common mode voltage range[3]	V+ = 30V	0		V+-1.5	V
		Over temp., V+ = 30V	0		V+-1.5	V
C_{MRR}	Common mode rejection ratio	$R_S \leq 10k\Omega$	65	85		dB
V_{OUT}	Output voltage swing (V_{OH})	$R_L \geq 2k\Omega$, V+ = 30V				V
		$R_L \geq 10k\Omega$, V+ = 30V				V
V_{OUT}	Output voltage swing (V_{OL})	$R_L \leq 10k\Omega$, over temp.				mV
I_{CC}	Supply current	$R_L = \infty$ on all amplifiers, over temp.		0.5	1.2	mA
A_{VOL}	Large signal voltage Gain	$R_L \geq 2k\Omega$, $V_{OUT} \pm 10V$, $V_S = \pm 15V$	25	100		V/mV
		Over temp.	15			V/mV
P_{SRR}	Supply voltage rejection ratio	$R_S \leq 10k\Omega$	65	100		dB
	Amplifier-to-amplifier coupling[4]	f = 1kHz to 20kHz (input referred)		-120		dB
	Output current source	$V_{IN}+ = 1Vdc$, $V_{IN}- = 0Vdc$, V+ = 15Vdc	20	40		mA
	Output current sink	$V_{IN}- = 1Vdc$, $V_{IN} = 0Vdc$, V+ = 15Vdc	10	20		mA
		$V_{IN}- = 1Vdc$, $V_{IN} = 0Vdc$, $V_{OUT} = 200mVdc$	12	50		μA
I_{SC}[5]				40	60	mA

NOTES

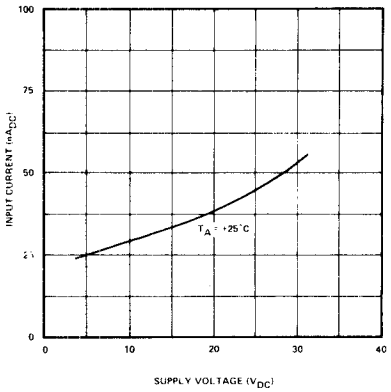
1. $V_O \cong 1.4V$, $R_S = 0\Omega$ with V+ from 5V to 30V; and over the full input common-mode range (9V to V+ -1.5V).
2. *The direction of the input current is out of the IC due to the pnp input stage. This* current is essentially contant, independent of the state of the output so no loading change exists on the input lines.
3. The input common-mode voltage or either input signal voltage should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is V+ -1.5V, but either or both inputs can go to +32V without damage.
4. Due to proximity of external components, insure that coupling is not originating via stray capacitance between these external parts. This typically can be detected as this type of capacitive coupling increases at higher frequencies.
5. Short circuits from the output to V+ can cause excessive heating and eventual destruction. The maximum output current is approximately 40mA independent of the magnitude of V+. At values of supply voltage in excess of +15Vdc, continuous short-circuits can exceed the power dissipation ratings and cause eventual destruction.

TYPICAL PERFORMANCE CHARACTERISTICS

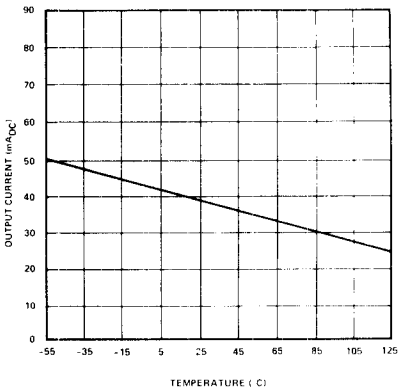
SUPPLY CURRENT



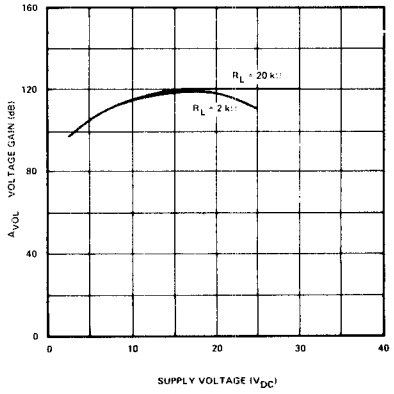
INPUT CURRENT



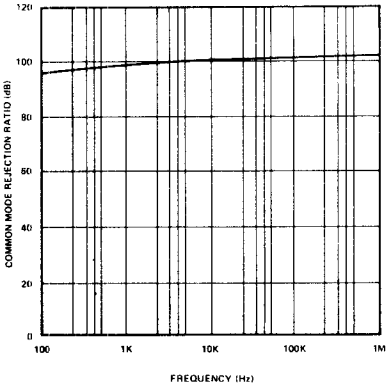
CURRENT LIMITING



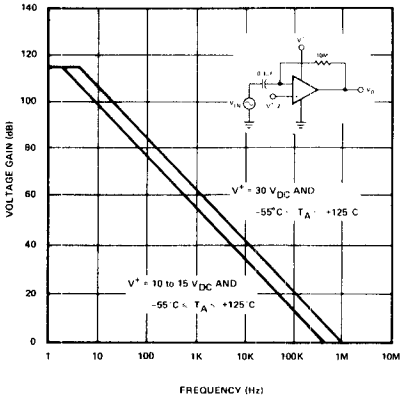
VOLTAGE GAIN



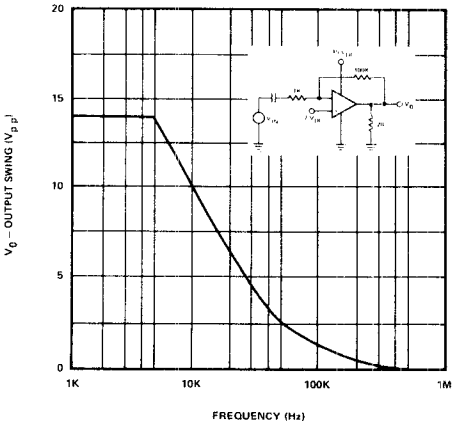
COMMON-MODE REJECTION RATIO



OPEN LOOP FREQUENCY RESPONSE



LARGE SIGNAL FREQUENCY RESPONSE



VOLTAGE FOLLOWER PULSE RESPONSE