



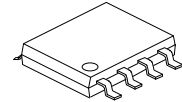
MC33272

LINEAR INTEGRATED CIRCUIT

SINGLE SUPPLY, HIGH SLEW RATE ,LOW INPUT OFFSET VOLTAGE OPERATIONAL AMPLIFIERS

■ DESCRIPTION

The UTC **MC33272** is a Bipolar dual operational amplifier with high performance concepts. This amplifier exhibits low input voltage noise with high gain bandwidth product and slew rate. The all NPN output stage exhibits no deadband crossover distortion, large output voltage swing, excellent phase and gain margins, low open loop high frequency output impedance and symmetrical source and sink AC frequency performance.



SOP-8

■ FEATURES

- * Single (or dual) supply operation from +3 V to +36V ($\pm 1.5V \sim \pm 18V$)
- * Large output voltage swing: +14.1V/-14.6V
- * Input offset voltage trimmed to 100 μ V (Typ.)
- * Very low input bias current: 60nA (Typ.)
- * Very low input offset current: 5.0nA (Typ.)
- * High input resistance: 16M Ω
- * High slew rate: 15V/ μ s
- * High gain bandwidth product: 26MHz @ 100kHz

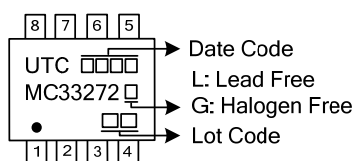
- * Low total harmonic distortion: 0.003%
- * Power supply drain current: 2.15mA per amplifier
- * Low noise: 18nV / $\sqrt{\text{Hz}}$ @ 1.0kHz

■ ORDERING INFORMATION

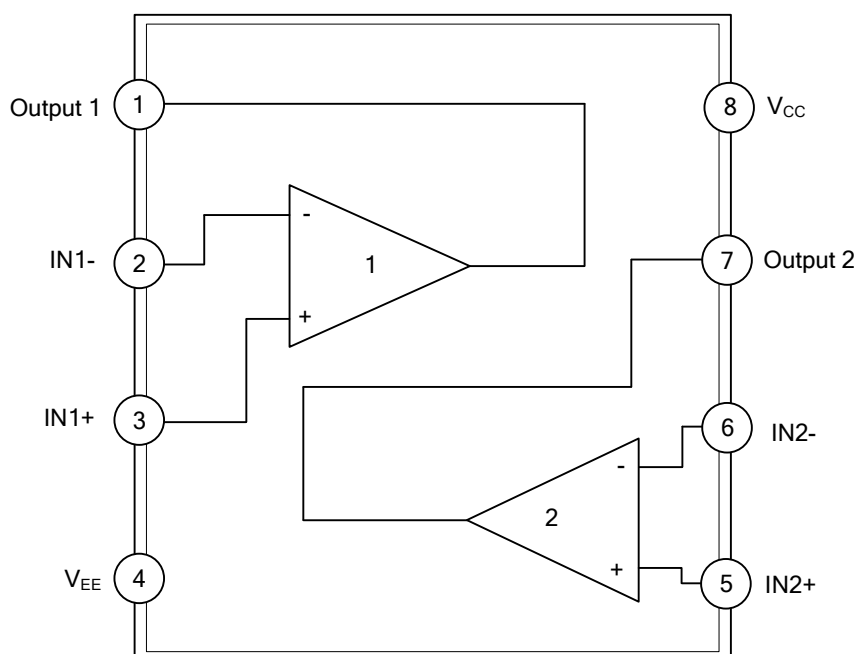
Ordering Number		Package	Packing
Lead Free	Halogen Free		
MC33272L-S08-R	MC33272G-S08-R	SOP-8	Tape Reel

MC33272G-S08-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING



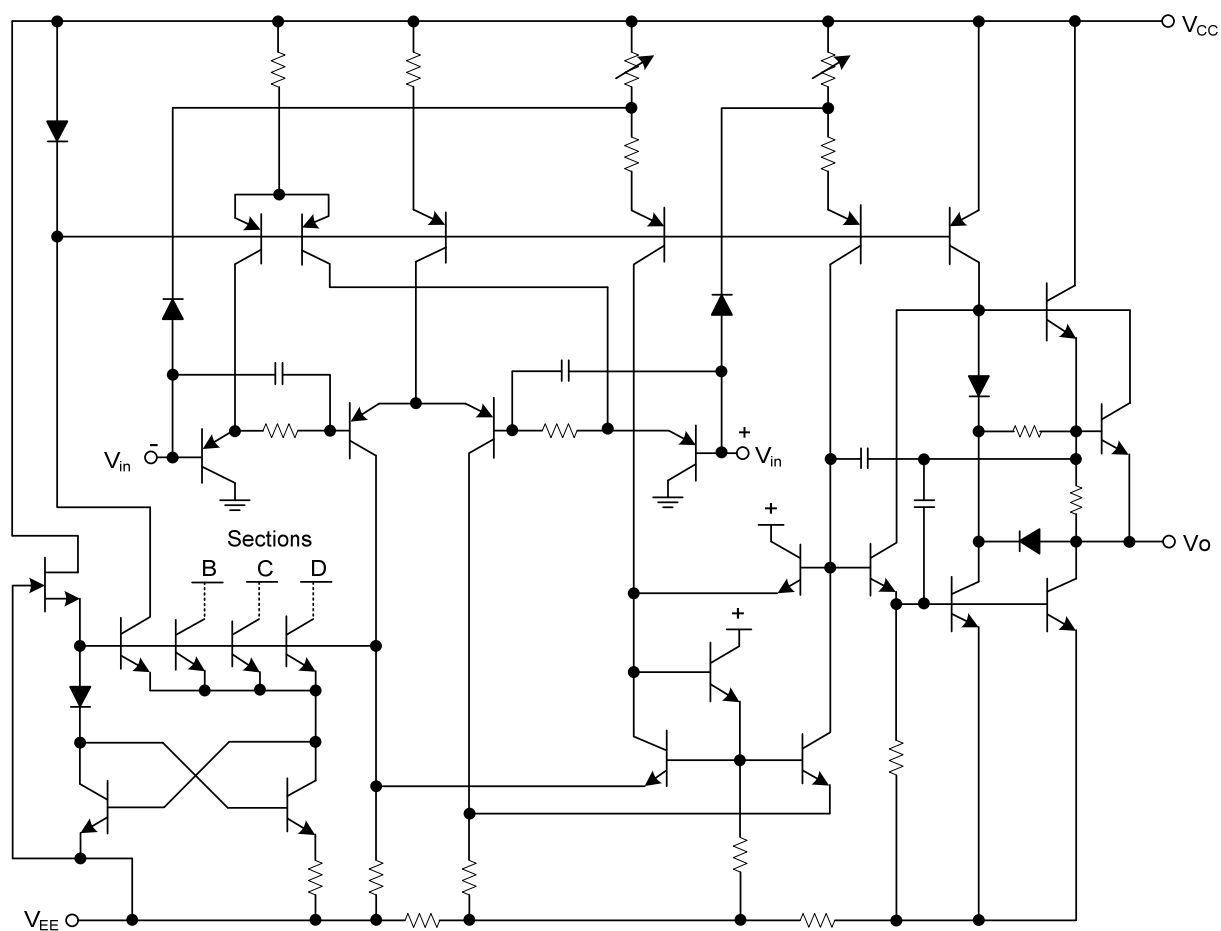
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	Output 1	The output of channel 1
2, 3	IN1-, IN1+	The input of channel 1
4	V_{EE}	Power supply
5, 6	IN2+, IN2-	The input of channel 2
7	Output 2	The output of channel 2
8	V_{CC}	Power supply

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC} to V_{EE}	+36	V
Input Differential Voltage Range	V_{IDR}	(Note 2)	V
Input Voltage Range	V_{IR}	(Note 2)	V
Output Short Circuit Duration (Note 3)	t_{SC}	Indefinite	sec
Maximum Power Dissipation	P_D	(Note 3)	mW
Maximum Junction Temperature	T_J	+150	°C
Operating Temperature Range	T_{OPR}	-40 ~ +85	°C
Storage Temperature	T_{STG}	-60 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Either or both input voltages must not exceed the magnitude of V_{CC} or V_{EE} .

3. Power dissipation must be considered to ensure maximum junction temperature (T_J) is not exceeded.

■ DC ELECTRICAL CHARACTERISTICS

($V_{CC}=+15$ V, $V_{EE}=-15$ V, $T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS			MIN	TYP	MAX	UNIT
Input Offset Voltage	$ V_{IO} $	$R_S=10\Omega$, $V_{CM}=0V$, $V_O=0V$	$V_{CC}=+15V$, $V_{EE}=-15V$ $V_{CC}=5.0V$, $V_{EE}=0$			0.1	1.5 2.5	mV mV
Average Temperature Coefficient of Input Offset Voltage	$\Delta V_{IO}/\Delta T$	$R_S=10\Omega$, $V_{CM}=0V$, $V_O=0V$, $T_A=-40^{\circ}C\sim+85^{\circ}C$				2.5		$\mu V/^{\circ}C$
Input Bias Current	I_{IB}	$V_{CM}=0V$, $V_O=0V$				60	650	nA
Input Offset Current	$ I_{IO} $	$V_{CM}=0V$, $V_O=0V$				5	65	nA
Common Mode Input Voltage Range	V_{ICR}	$\Delta V_{IO}=5.0mV$, $V_O=0V$			V_{EE} to $(V_{CC}-1.8)$			V
Large Signal Voltage Gain	A_{VOL}	$V_O=0V\sim 10V$, $R_L=2.0k\Omega$			90	100		dB
Output Voltage Swing	V_{O+}	$V_{ID}=\pm 1.0V$	$V_{CC}=+15V$, $V_{EE}=-15V$	$R_L=2.0k\Omega$	13.4	13.9		V
	V_{O-}			$R_L=2.0k\Omega$		-13.9	-13.5	V
	V_{O+}			$R_L=10k\Omega$	13.4	14		V
	V_{O-}			$R_L=10k\Omega$		-14.7	-14.1	V
	V_{OL}		$V_{CC}=5.0V$, $V_{EE}=0V$	$R_L=2.0k\Omega$			0.2	V
	V_{OH}		$R_L=2.0k\Omega$	3.7		5.0	V	
Common Mode Rejection	CMR	$V_{in}=+13.2V\sim-15V$			80	100		dB
Power Supply Rejection	PSR	$V_{CC}/V_{EE}=+15V/-15V$, $+5.0V/-15V$, $+15V/-5.0V$			80	105		dB
Output Short Circuit Current	I_{SC}	$V_{ID}=1.0V$, Output to Ground	Source		20		mA	
			Sink		-10		mA	
Power Supply Current Per Amplifier	I_{CC}	$V_O=0V$	$V_{CC}=+15V$, $V_{EE}=-15V$		2.15	2.75	mA	
			$V_{CC}=5.0V$, $V_{EE}=0V$			2.75	mA	

■ **AC ELECTRICAL CHARACTERISTICS** ($V_{CC}=+15\text{ V}$, $V_{EE}=-15\text{ V}$, $T_A=25^\circ\text{C}$, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Slew Rate	SR	$V_{in}=-10\text{V}\sim+10\text{ V}$, $R_L=2.0\text{k}\Omega$, $C_L=100\text{pF}$, $A_V=+1.0\text{V}$		15		$\text{V}/\mu\text{s}$
Gain Bandwidth Product	GBW	$f=100\text{kHz}$		26		MHz
AC Voltage Gain	A_{VO}	$R_L=2.0\text{k}\Omega$, $V_O=0\text{V}$, $f=20\text{kHz}$		65		dB
Unity Gain Frequency	f_U	Open Loop		5.5		MHz
Gain Margin	A_m	$R_L=2.0\text{k}\Omega$, $C_L=0\text{pF}$		12		dB
Phase Margin	ϕ_m	$R_L=2.0\text{k}\Omega$, $C_L=0\text{pF}$		55		Degrees
Channel Separation	CS	$f=20\text{Hz}\sim 20\text{kHz}$		-120		dB
Power Bandwidth	BW_p	$V_O=20\text{V}_{pp}$, $R_L=2.0\text{k}\Omega$, $\text{THD}\leq 1.0\%$		160		kHz
Total Harmonic Distortion	THD	$R_L=2.0\text{k}\Omega$, $f=20\text{Hz}\sim 20\text{kHz}$, $V_O=3.0\text{V}_{rms}$, $A_V=+1.0$		0.003		%
Open Loop Output Impedance	$ Z_O $	$V_O=0\text{V}$, $f=6.0\text{MHz}$		35		Ω
Differential Input Resistance	R_{IN}	$V_{CM}=0\text{V}$		16		$\text{M}\Omega$
Differential Input Capacitance	C_{IN}	$V_{CM}=0\text{V}$		3		pF
Equivalent Input Noise Voltage	e_n	$R_S=100\Omega$, $f=1.0\text{kHz}$		18		$\text{nV}/\sqrt{\text{Hz}}$
Equivalent Input Noise Current	i_n	$f=1.0\text{kHz}$		0.5		$\text{pA}/\sqrt{\text{Hz}}$

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