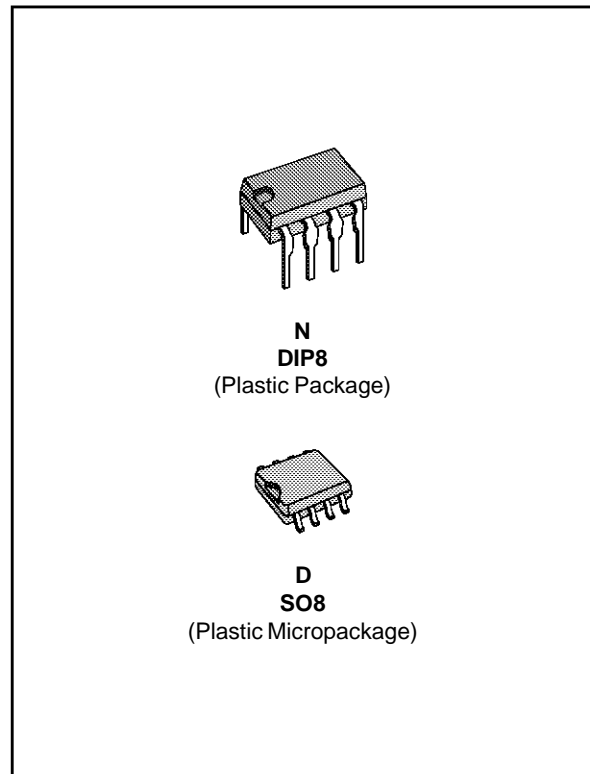


LOW NOISE DUAL OPERATIONAL AMPLIFIERS

- LOW VOLTAGE NOISE : $4.5\text{nV}/\sqrt{\text{Hz}}$
- HIGH GAIN BANDWIDTH PRODUCT : 15MHz
- HIGH SLEW RATE : $7\text{V}/\mu\text{s}$
- LOW DISTORTION : 0.002%
- LARGE OUTPUT VOLTAGE SWING :
+14.3V/-14.6V
- LOW INPUT OFFSET VOLTAGE
- EXCELLENT FREQUENCY STABILITY
- ESD PROTECTION 2kV



DESCRIPTION

The MC33078 is a monolithic dual operational amplifier dedicated to audio applications. The MC33078 offers low voltage noise ($4.5\text{nV}/\sqrt{\text{Hz}}$) and high frequency performances (15MHz gain bandwidth product, $7\text{V}/\mu\text{s}$ slew rate).

In addition the MC33078 has a very low distortion (0.002%) and excellent phase/gain margins.

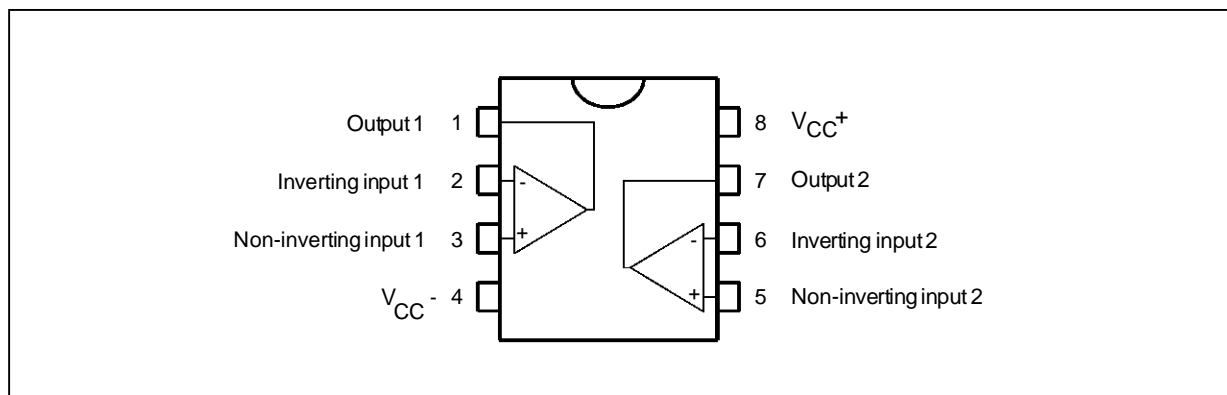
The output stage allows a large output voltage swing and symmetrical source and sink currents.

ORDER CODES

Part Number	Temperature Range	Package	
		N	D
MC33078	-40, +105°C	•	•

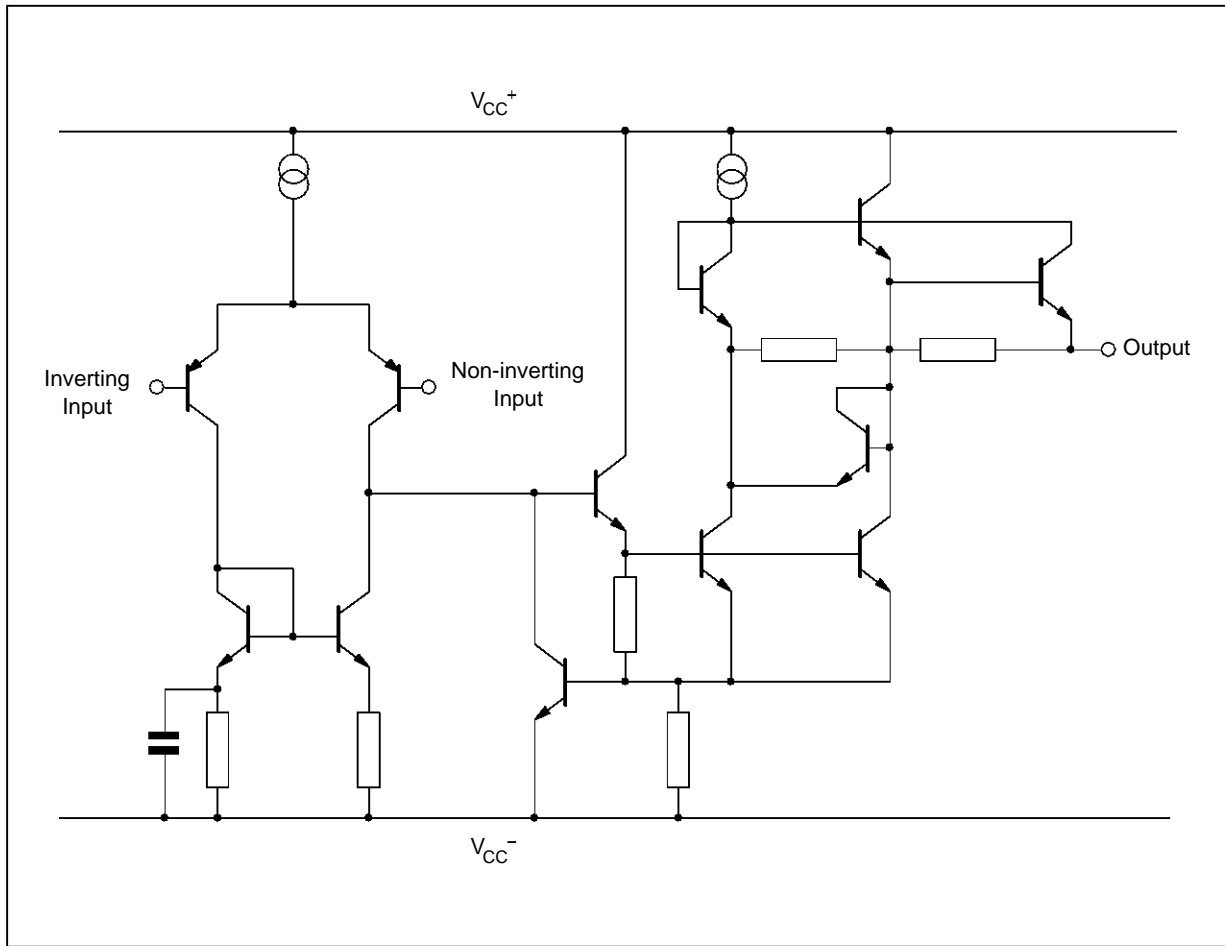
33078-01.TEL

PIN CONNECTIONS (top view)



33078-01.EPS

SCHEMATIC DIAGRAM (1/2 MC33078)



33078-02.EPS

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	± 18 or $+36$	V
V_{id}	Differential Input Voltage - (note 1)	± 30	V
V_i	Input Voltage - (note 1)	± 15	V
	Output Short-Circuit Duration - (note 2)	Infinite	
T_{oper}	Operating Free-air Temperature Range	-40 to $+105$	$^{\circ}C$
T_j	Maximum Junction Temperature	$+150$	$^{\circ}C$
T_{stg}	Storage Temperature	-65 to $+150$	$^{\circ}C$
P_{tot}	Maximum Power Dissipation - (note 2)	500	mW

33078-02.TBL

- Notes :**
1. Either or both input voltages must not exceed the magnitude of V_{CC+} or V_{CC-} .
 2. Power dissipation must be considered to ensure maximum junction temperature (T_j) is not exceeded

OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	± 2.5 to ± 15	V

33078-03.TBL

ELECTRICAL CHARACTERISTICS
 $V_{CC}^+ = +15V$, $V_{CC}^- = -15V$, $T_{amb} = 25^\circ C$ (unless otherwise specified)

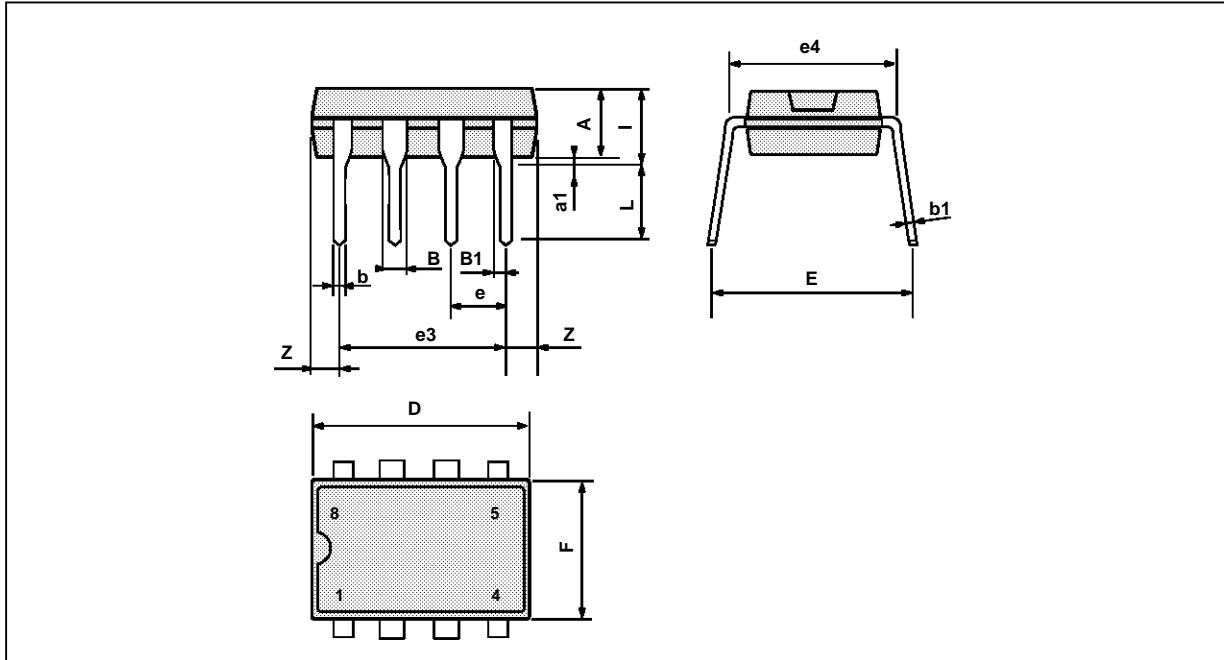
Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{io}	Input Offset Voltage ($V_o = 0V$, $V_{ic} = 0V$) $T_{amb} = +25^\circ C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		0.15	2 3	mV
DV_{io}	Input Offset Voltage Drift $V_{ic} = 0V$, $V_o = 0V$, $T_{min.} \leq T_{amb} \leq T_{max.}$		2		$\mu V/^\circ C$
I_{io}	Input Offset Current ($V_{ic} = 0V$, $V_o = 0V$) $T_{amb} = +25^\circ C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		10	150 175	nA
I_{ib}	Input Bias Current ($V_{ic} = 0V$, $V_o = 0V$) $T_{amb} = +25^\circ C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		250	750 800	nA
V_{icm}	Common Mode Input Voltage Range ($\Delta V_{IO} = 5mV$, $V_o = 0V$)	± 13	± 14		V
A_{vd}	Large Signal Voltage Gain ($R_L = 2k\Omega$, $V_o = \pm 10V$) $T_{amb} = +25^\circ C$ $T_{min.} \leq T_{amb} \leq T_{max.}$	90 85	100		dB
$\pm V_{opp}$	Output Voltage Swing ($V_{id} = \pm 1V$) $R_L = 600\Omega$ $R_L = 600\Omega$ $R_L = 2.0k\Omega$ $R_L = 2.0k\Omega$ $R_L = 10k\Omega$ $R_L = 10k\Omega$		12.2 -12.7 14 -14.2 14.3 -14.6		V
CMR	Common Mode Rejection Ratio ($V_{ic} = \pm 13V$)	80	100		dB
SVR	Supply Voltage Rejection Ratio $V_{CC}^+ / V_{CC}^- = +15V / -15V$ to $+5V / -5V$	80	105		dB
I_o	Output Short Circuit Current ($V_{id} = \pm 1V$, Output to Ground) Source Sink	15 20	29 37		mA
I_{CC}	Supply current ($V_o = 0V$, All Amplifiers) $T_{amb} = +25^\circ C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		4	5 5.5	mA
SR	Slew Rate $V_i = -10V$ to $+10V$, $R_L = 2k\Omega$, $C_L = 100pF$, $A_v = +1$	5	7		V/ μs
GBP	Gain Bandwidth Product ($f = 100kHz$, $R_L = 2k\Omega$, $C_L = 100pF$)	10	15		MHz
B	Unity Gain Bandwidth (Open loop)		9		MHz
A_m	Gain Margin ($R_L = 2k\Omega$) $C_L = 0pF$ $C_L = 100pF$		-11 -6		dB
ϕ_m	Phase Margin ($R_L = 2k\Omega$) $C_L = 0pF$ $C_L = 100pF$		55 30		Degrees
e_n	Equivalent Input Noise Voltage ($R_s = 100\Omega$, $f = 1kHz$)		4.5		$\frac{nV}{\sqrt{Hz}}$
i_n	Equivalent Input Noise current ($f = 1kHz$)		0.5		$\frac{pA}{\sqrt{Hz}}$
THD	Total Harmonic Distortion $R_L = 2k\Omega$, $f = 20Hz$ to $20kHz$, $V_o = 3V_{rms}$, $A_v = +1$		0.002		%
V_{O1}/V_{O2}	Channel Separation ($f = 20Hz$ to $20kHz$)		120		dB
FPB	Full Power Bandwidth ($V_o = 27V_{pp}$, $R_L = 2k\Omega$, $THD \leq 1\%$)		120		kHz
Z_o	Output Impedance ($V_o = 0V$, $f = 9MHz$)		37		Ω
R_i	Input Resistance ($V_{ic} = 0V$)		175		$k\Omega$
C_i	Input Capacitance ($V_{ic} = 0V$)		12		pF

33078-04.TBL

MC33078

PACKAGE MECHANICAL DATA

8 PINS - PLASTIC DIP

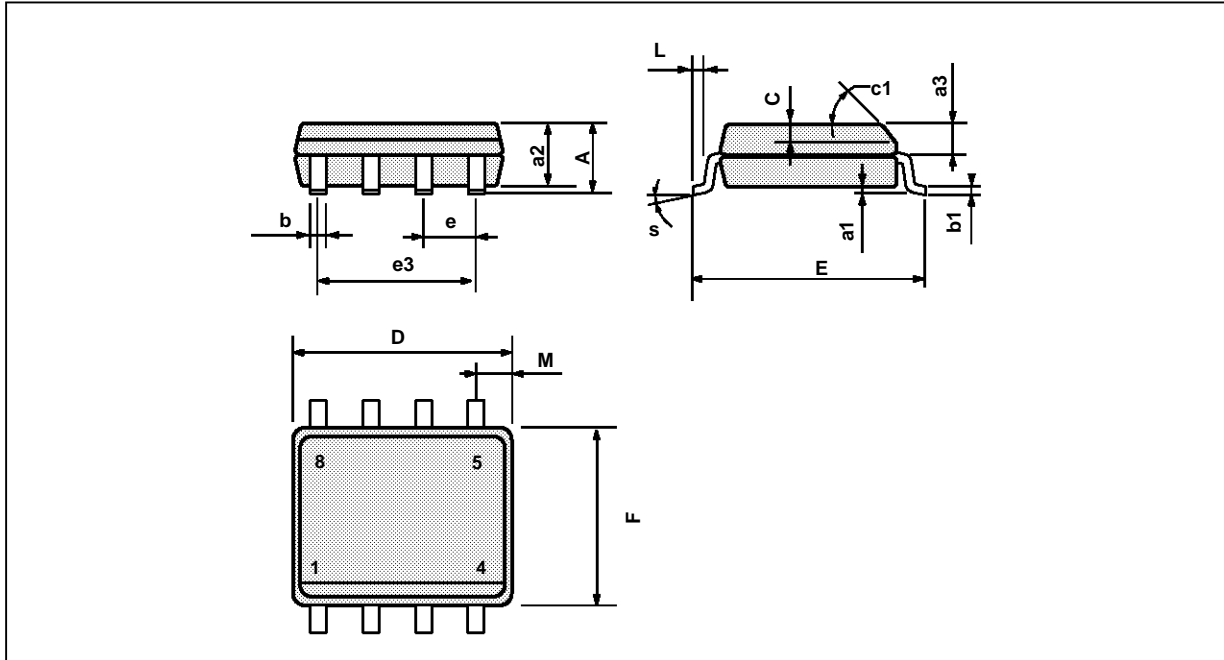


PM-DIP8.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

DIP8.TBL

PACKAGE MECHANICAL DATA
8 PINS - PLASTIC MICROPACKAGE (SO)



PM-S08EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.150		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					

S08.TBL

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