TEB1033
TEF1033-TEC1033

PRECISION DUAL OPERATIONAL AMPLIFIERS

NOT FOR NEW DESIGN

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- VERY LOW INPUT OFFSET VOLTAGE : 1mV max.
- LOW DISTORTION RATIO
- LOW NOISE
- VERY LOW SUPPLY CURRENT
- LOW INPUT OFFSET CURRENT
- LARGE COMMON-MODE RANGE
- HIGH OUTPUT CURRENT
- GAIN-BANDWIDTH PRODUCT : 2MHz
- TEMPERATURE DRIFT : 2µV/°C
- LONG TERM STABILITY : 8µV/YEAR (for $T_{amb} \leq 50°C$)
- SHORT CIRCUIT PROTECTION



N
DIP8
(Plastic Package)



D
SO8
(Plastic Micropackage)

DESCRIPTION

The TEB1033, TEF1033 and TEC1033 are high performance dual operational amplifiers intended for active filter applications. The internal phase compensation allows stable operation as voltage follower in spite of their high gain-bandwidth product.

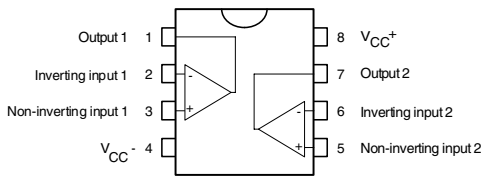
The circuit presents very stable electrical characteristics over the entire supply voltage range.

ORDER CODE

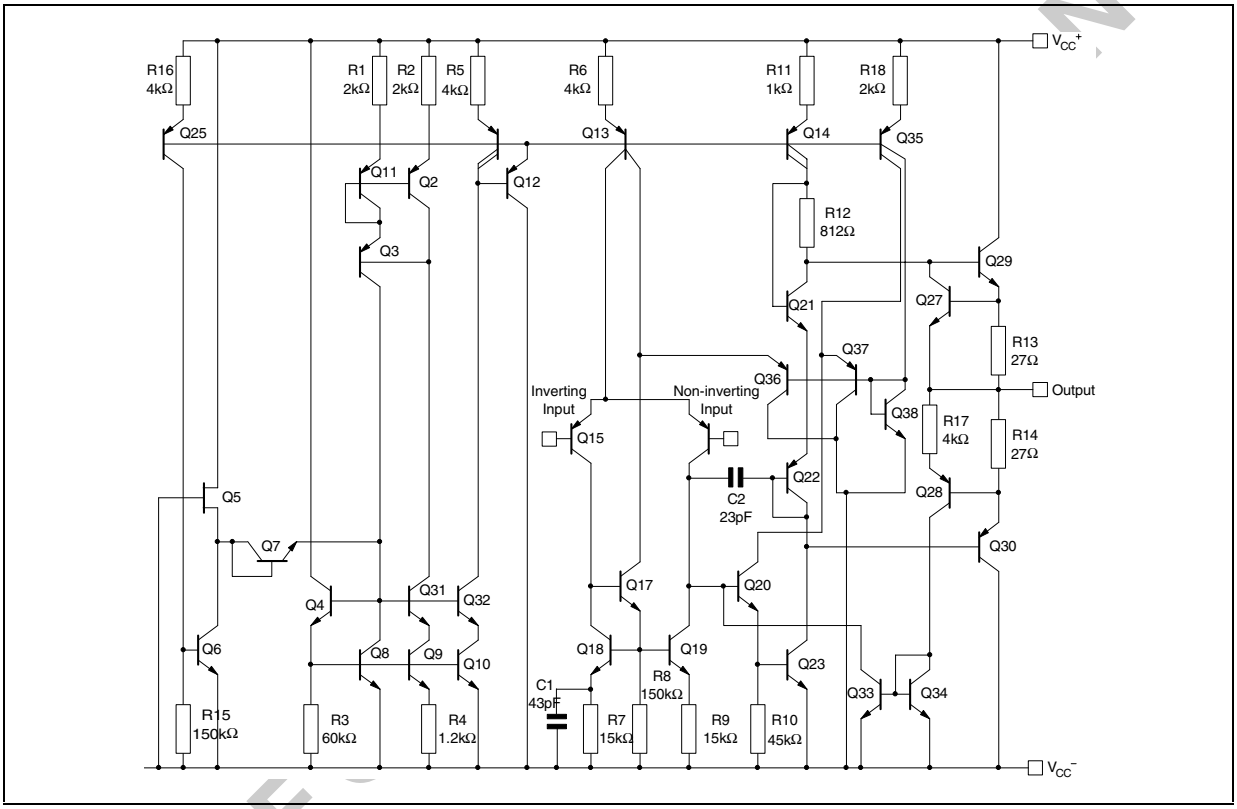
Part Number	Temperature Range	Package	
		N	D
TEB1033	0°C, +70°C	•	•
TEF1033	-40°C, +105°C	•	•
TEC1033	-55°C, +125°C	•	•
Example : TEB1033N			

N = Dual in Line Package (DIP)
D = Small Outline Package (SO) - also available in Tape & Reel (DT))

PIN CONNECTIONS (top view)



SCHEMATIC DIAGRAM (1/2 TEB1033)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage		±18	V
V_{id}	Differential Input Voltage		± (V_{CC} -1)	V
V_i	Input Voltage		± V_{CC}	V
P_{tot}	Power Dissipation	D suffix N suffix	400 665	mW
T_{oper}	Operating Free-Air Temperature Range	TEB1033 TEF1033 TEC1033	0 to +70 -40 to 105 -55 to +125	°C
T_{stg}	Storage Temperature		-65 to +150	°C

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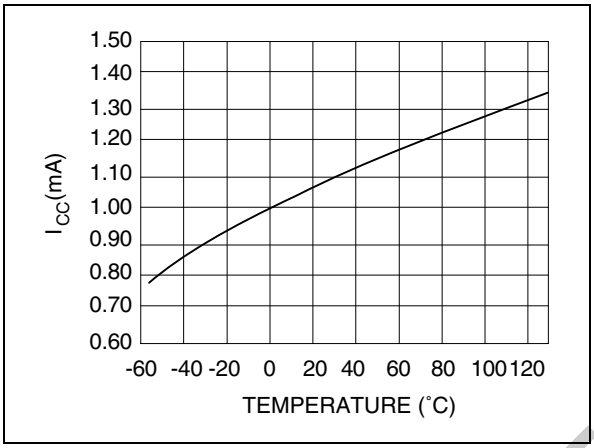
ELECTRICAL CHARACTERISTICS

V_{CC} = ±15V, T_{amb} = 25°C (unless otherwise specified)

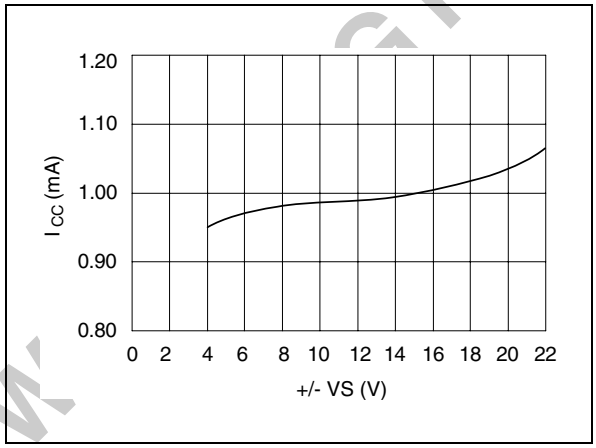
Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{io}	Input Offset Voltage ($R_s \leq 10k\Omega$) T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		0.3	1 3	mV
DV_{io}	Input Offset Voltage Drift		2		µV/°C
I_{io}	Input Offset Current T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		5	20 40	nA
I_{ib}	Input Bias Current T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		50	100 200	nA
A_{vd}	Large Signal Voltage Gain (R_L = 2kΩ, V_o = ±10V) T_{amb} = +25°C $T_{min.} \leq T_{amb} \leq T_{max.}$	80 40	120		V/mV
SVR	Supply Voltage Rejection Ratio (DV_{CC} from ±15V to ±4V) T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$	80 70	100		dB
I_{CC}	Supply Current, all amplifiers, no load T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		1	1.5 2	mA
V_{icm}	Input Common Mode Voltage Range T_{amb} = 25°C	±12			V
CMR	Common-mode Rejection Ratio ($R_s \leq 10k\Omega$, V_i = ±10V) T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$	80 70	100		dB
I_{os}	Output Short Circuit Current T_{amb} = 25°C $T_{min.} \leq T_{amb} \leq T_{max.}$	10 10	23	40 40	mA
$\pm V_{opp}$	Output Voltage Swing T_{amb} = 25°C R_L = 2kΩ $T_{min.} \leq T_{amb} \leq T_{max.}$ R_L = 2kΩ V_{CC} = ±4V, R_L = 2kΩ, T_{amb} = 25°C V_{CC} = ±6V, R_L = 600Ω, T_{amb} = 25°C	13 12 2.8 4.6	14 3 		V
SR	Slew Rate (V_i = ±10V, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, unity gain)	0.6	1		V/µs
GBP	Gain Bandwidth Product (f = 100kHz, T_{amb} = 25°C? V_{in} = 10mV, R_L = 2kΩ, C_L = 100pF)	1.5	2		MHz
R_i	Input Resistance		1		MΩ
THD	Total Harmonic Distortion (f = 1kHz, A_v = 20dB, R_L = 2kΩ, V_o = $2V_{pp}$, C_L = 100pF, T_{amb} = 25°C)		0.008		%
e_n	Equivalent Input Noise Voltage(f = 1kHz) R_S = 50Ω R_S = 1kΩ R_S = 10kΩ		8 10 18		$\frac{nV}{\sqrt{Hz}}$
V_{opp}	Large Signal Voltage Swing R_L = 10kΩ, f = 10kHz	26	28		V
ϕm	Phase Margin		45		Degrees
V_{O1}/V_{O2}	Channel Separation		120		dB

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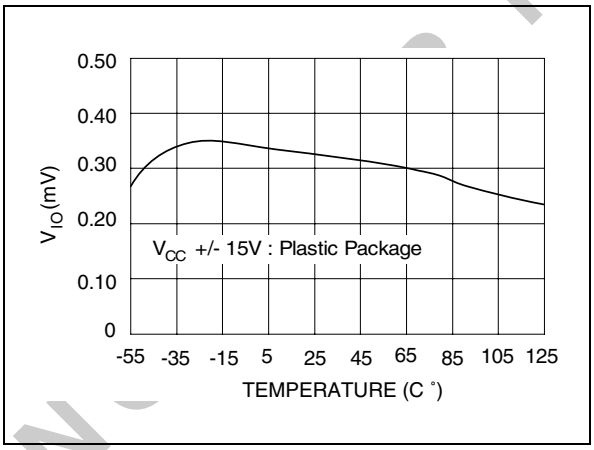
SUPPLY CURRENT vs AMBIENT TEMPERATURE



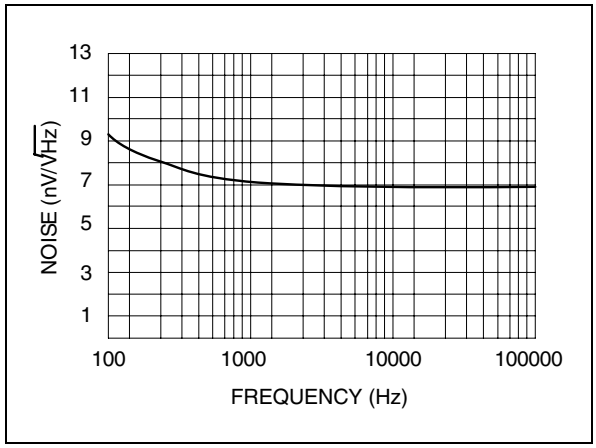
SUPPLY CURRENT vs SUPPLY VOLTAGE



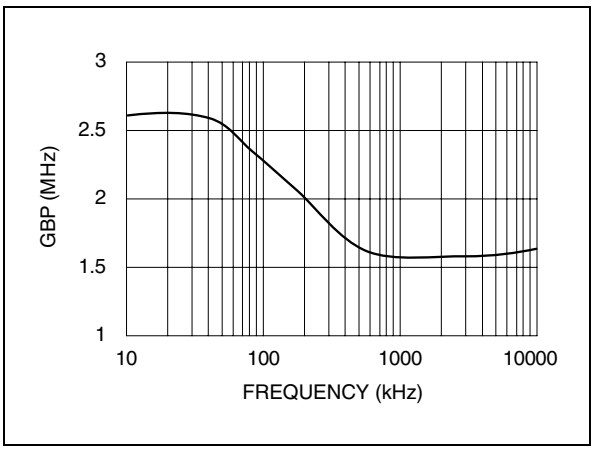
OFFSET VOLTAGE vs AMBIENT TEMPERATURE



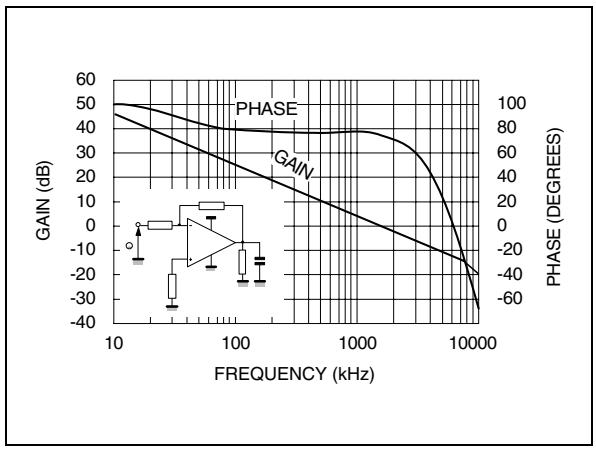
TOTAL INPUT NOISE vs FREQUENCY



GAIN BANDWIDTH PRODUCT vs FREQUENCY

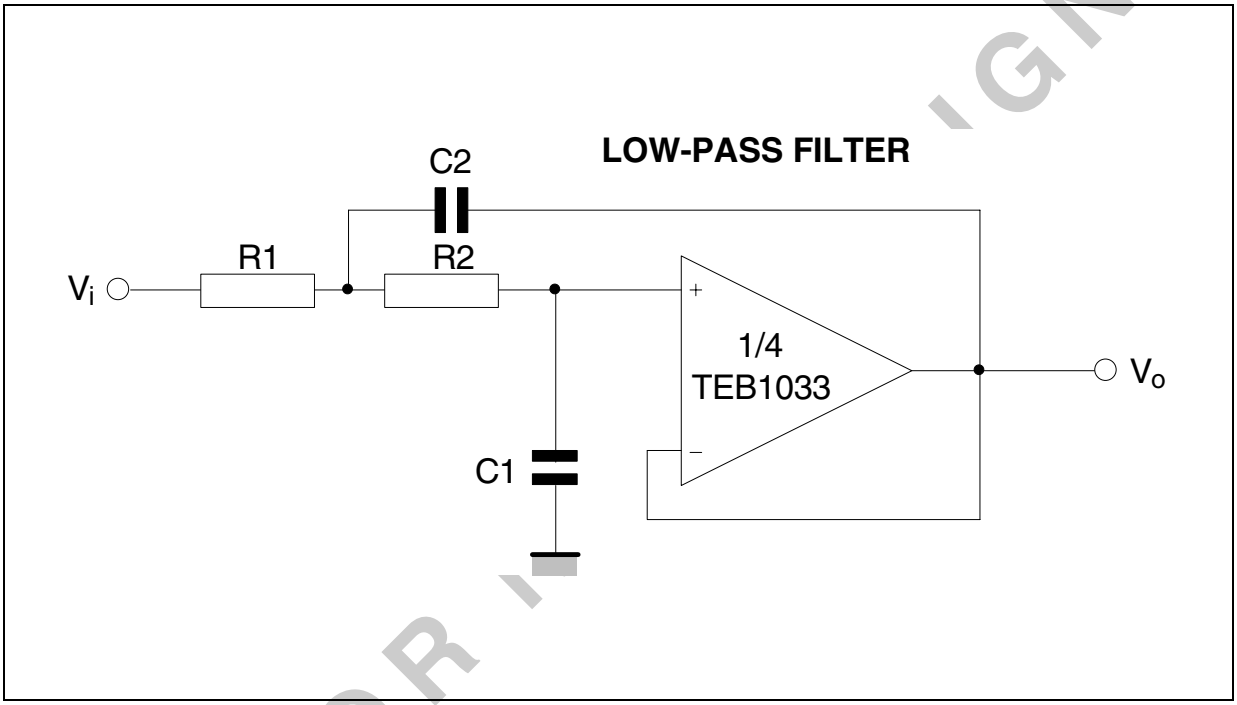


OPEN LOOP FREQUENCY & PHASE RESPONSE



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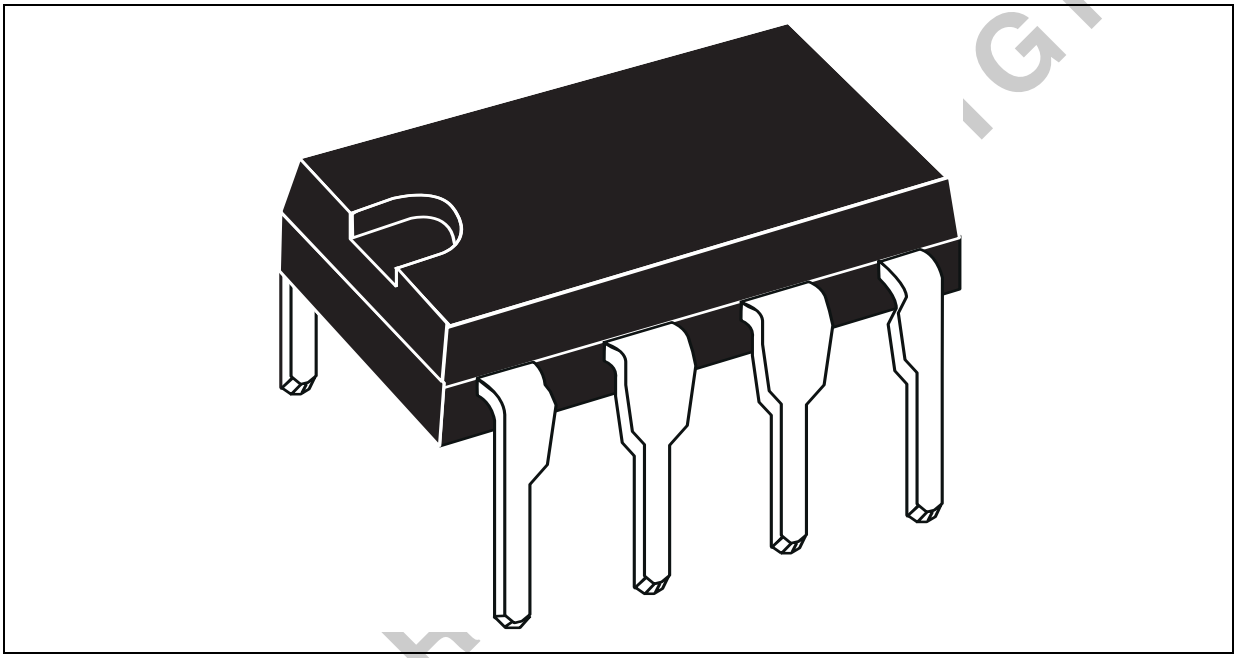
TYPICAL APPLICATION



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PACKAGE MECHANICAL DATA

8 PINS - PLASTIC DIP

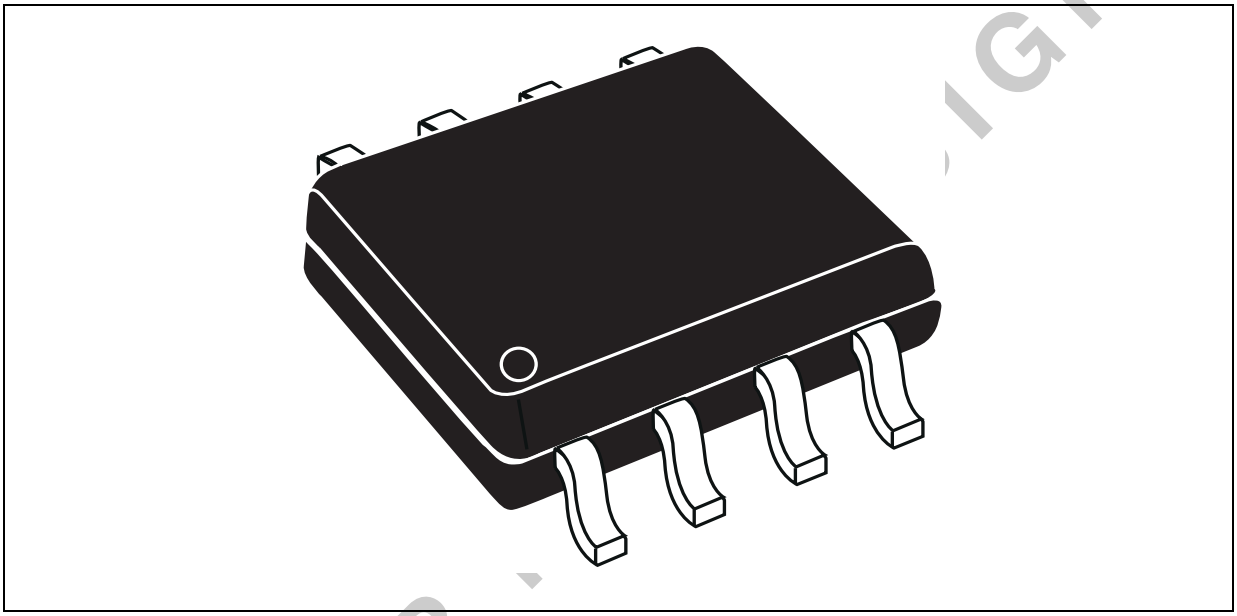


Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

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PACKAGE MECHANICAL DATA

8 PINS - PLASTIC MICROPACKAGE (SO)



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.)					

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