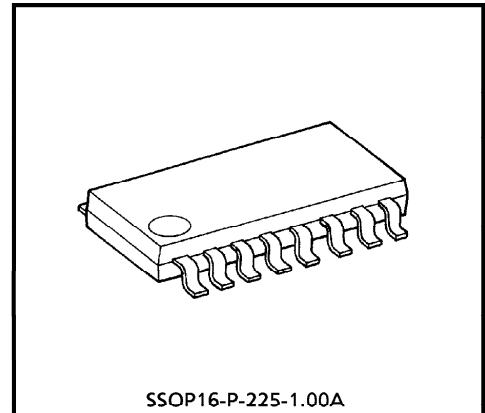


TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA2062F

5 BAND GRAPHIC EQUALIZER

TA2062F is 5-Band graphic equalizer IC, which have 5 resonance circuit and an output buffer amplifier. 5 band graphic equalizer for one channel can be formed easily by externally connecting capacitors and variable resistors which fix f_0 (resonance frequency). This is suitable for sound field control of Car Audio System.



Weight : 0.14g (Typ.)

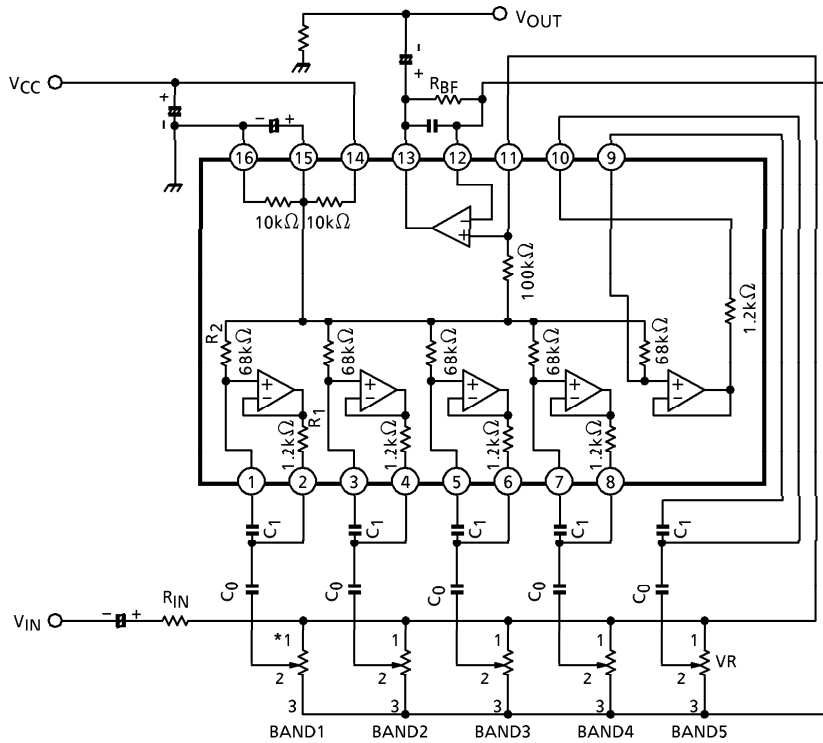
FEATURES

- Few External Parts
- BOOST / CUT CONTROL RANGE : $\pm 12\text{dB}$
- Low Distortion
 - : THD = 0.001% (Typ.)
 - ($V_{CC} = 8\text{V}$, $f = 1.1\text{kHz}$, $V_{IN} = 1V_{rms}$, FLAT)
- Low Noise
 - : $V_{NO} = 3\mu V_{rms}$
 - ($V_{CC} = 8\text{V}$, $R_g = 0\Omega$, FLAT, $BW = 20\text{Hz} \sim 20\text{kHz}$)
- Low Harmonic Distortion at Boost or Cut Mode
 - : 2nd and 3rd Harmonic Distortion are :
 - 2HD, 3HD $\leq 0.01\%$ (Typ.)
 - ($V_{CC} = 8\text{V}$, $V_{IN} = 1V_{rms}$, $\pm 6\text{dB}$ Boost or Cut, $f = 20\text{Hz} \sim 20\text{kHz}$)
- Maximum Output Voltage
 - : $V_{OM} = 2.3V_{rms}$ (Typ.)
 - ($V_{CC} = 8\text{V}$, $f = 1.1\text{kHz}$, THD = 1%, FLAT)
- Operating Supply Voltage Range
 - : $V_{CC} (opr) = 4 \sim 16\text{V}$ ($T_a = 25^\circ\text{C}$)

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- The information contained herein is subject to change without notice.

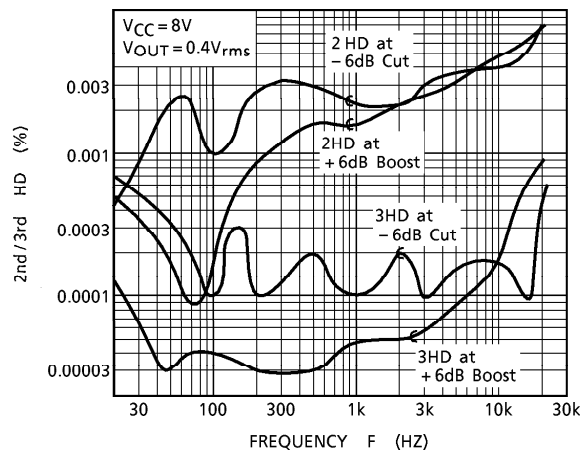
BLOCK DIAGRAM



*1 : CUT 2 : FLAT 3 : BOOST

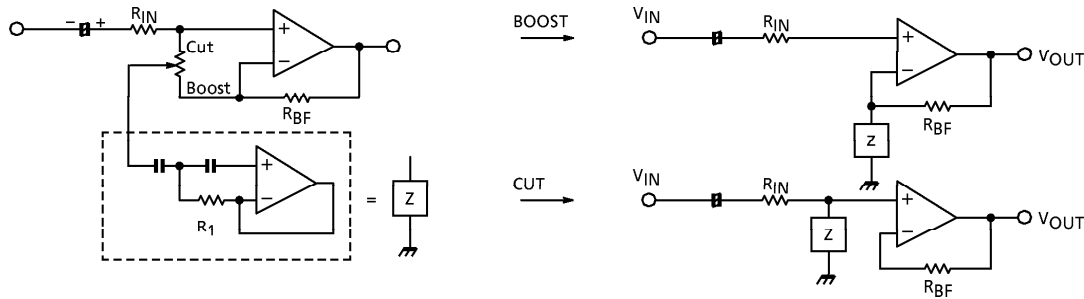
1. (2ND AND 3RD) HARMONIC DISTORTION AT 6dB BOOST OR CUT MODE

This IC is designed the 2nd and 3rd Harmonic Distortion are less than 0.01% at 6dB boost or cut between 20Hz and 20kHz.



(Fig-1)

2. ADJUSTMENT OF BOOST AND CUT AMOUNT



(Fig-2)

Boost and cut amount are decided as below.

$$\text{Boost : } G_V(\text{BOOST}) = \frac{R_{BF} + Z}{Z} \left(\approx \frac{R_{BF} + R_1}{R_1} \right)$$

$$\text{Cut : } G_V(\text{CUT}) = \frac{Z}{R_{IN} + Z} \left(\approx \frac{R_1}{R_{IN} + R_1} \right)$$

It must be adjusted $R_{BF} = R_{IN}$ if Boost amount is same as cut amount.

In case signal source resistance R_g is large enough, it is necessary to be set $R_{BF} = R_{IN} + R_g$.

MAXIMUM RATINGS

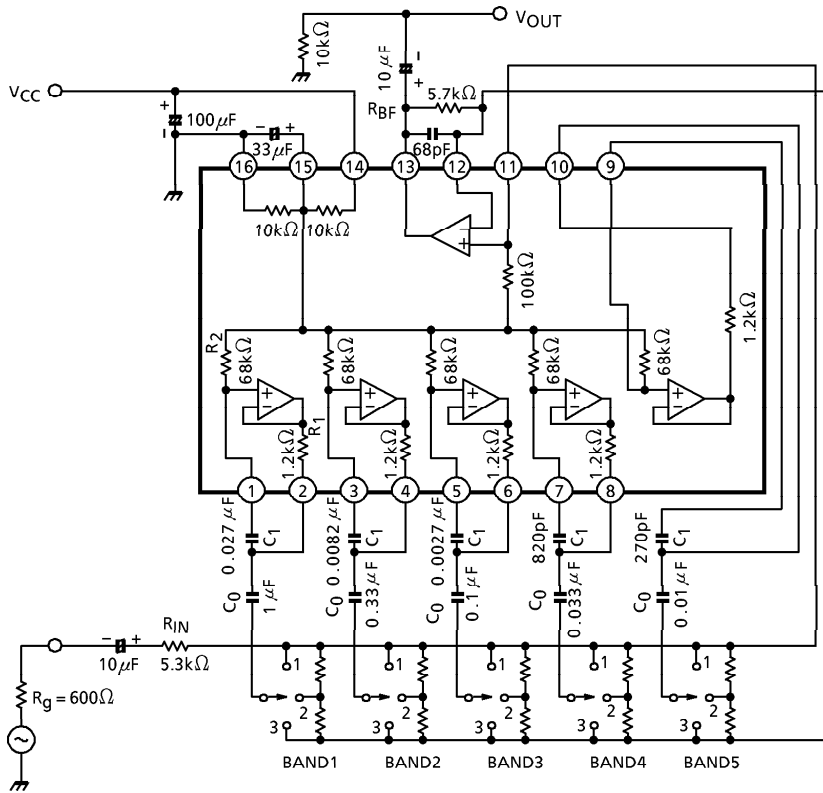
CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	16	V
Power Dissipation	P _D	350	mW
Operating Temperature	T _{opr}	-40~85	°C
Storage Temperature (Note)	T _{stg}	-55~150	°C

(Note) Derated above Ta = 25°C in the proportion of 2.8mW/°C.

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, V_{CC} = 8V, f = 1.1kHz, R_L = 10kΩ, Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Current	I _{ccq}	—	V _{IN} = 0	—	9	15	mA
Voltage Gain	G _V (FLAT)	—	V _{OUT} = 1V _{rms}	-1.5	0	+1.5	dB
	G _V (BST)	—	V _{OUT} = 1V _{rms} , f = 110Hz	10	12	14	
			V _{OUT} = 1V _{rms} , f = 340Hz	10	12	14	
			V _{OUT} = 1V _{rms} , f = 1.1kHz	10	12	14	
			V _{OUT} = 1V _{rms} , f = 3.4kHz	10	12	14	
			V _{OUT} = 1V _{rms} , f = 11kHz	10	12	14	
	G _V (CUT)	—	V _{OUT} = 1V _{rms} , f = 110Hz	-14	-12	-10	
			V _{OUT} = 1V _{rms} , f = 340Hz	-14	-12	-10	
			V _{OUT} = 1V _{rms} , f = 1.1kHz	-14	-12	-10	
			V _{OUT} = 1V _{rms} , f = 3.4kHz	-14	-12	-10	
V _{OUT} = 1V _{rms} , f = 11kHz			-14	-12	-10		
Total Harmonic Distortion	THD (FLT)	—	V _{OUT} = 1V _{rms}	—	0.001	0.01	%
Output Noise Voltage	V _{NO} (FLT)	—	R _g = 620Ω, V _{IN} = 0 BW = 20Hz~20kHz	—	3	8	μV _{rms}
Maximum Output Voltage	V _{OM}	—	THD = 1%	1.8	2.3	—	V _{rms}

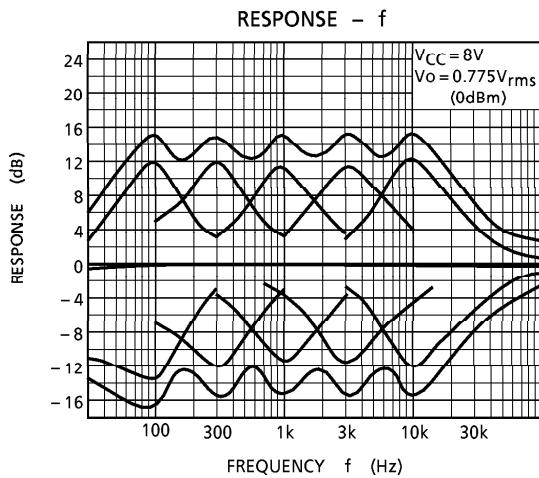
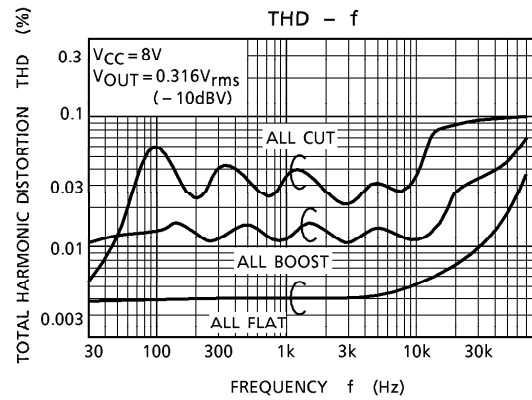
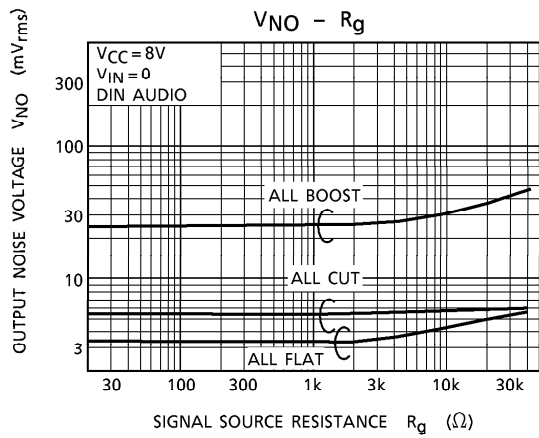
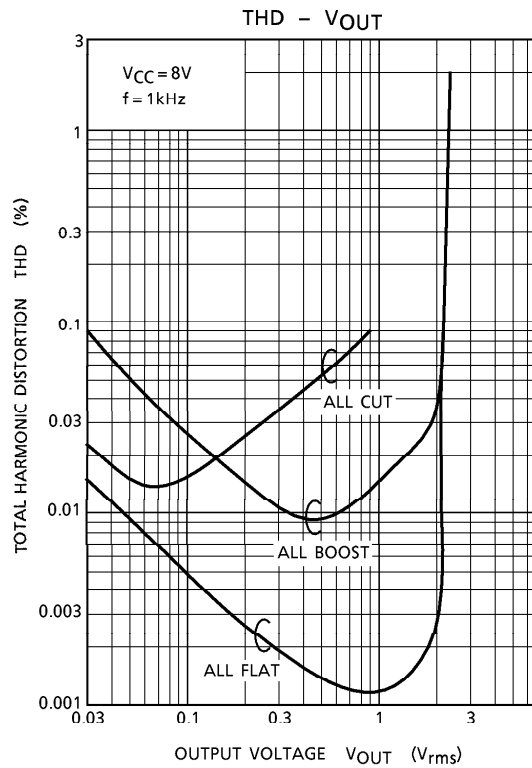
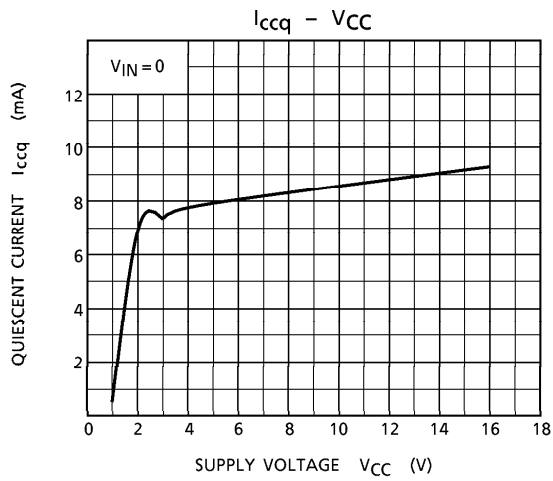
TEST CIRCUIT



- Fixed $R_{BF} \approx (R_{IN} + R_g)$ to be same as Boost and Cut amount.
- At each band :
 - 1 : CUT 2 : FLAT 3 : BOOST
- f_o (Resonance Frequency)

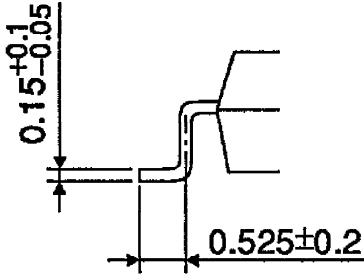
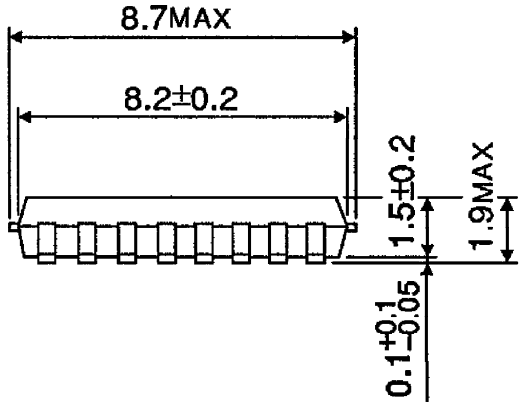
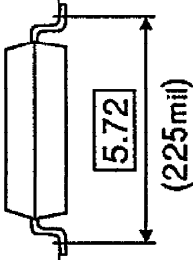
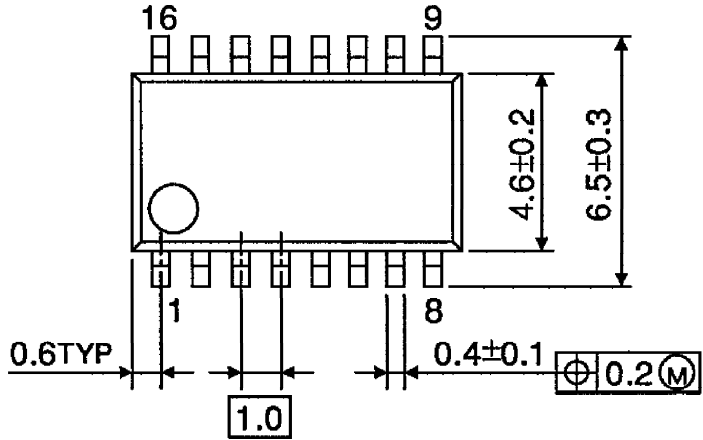
$$f_o = \frac{1}{2\pi\sqrt{C_0 \cdot C_1 \cdot R_1 \cdot R_2}} \quad (R_1 = 1.2k\Omega, R_2 = 68k\Omega \text{ on chip resistor})$$

BAND	1	2	3	4	5
C_0 (F)	1μ	0.33μ	0.1μ	0.033μ	0.01μ
C_1 (F)	0.027μ	0.0082μ	0.0027μ	820p	270p
f_o (Hz)	107	340	1.07k	3.40k	10.7k



OUTLINE DRAWING
SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)