

TA2062F

5 Band Graphic Equalizer

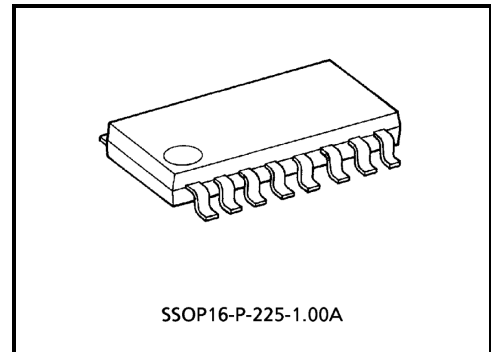
TA2062F is 5-band graphic equalizer IC, which have 5 resonance circuit and an output buffer amplifier.

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.

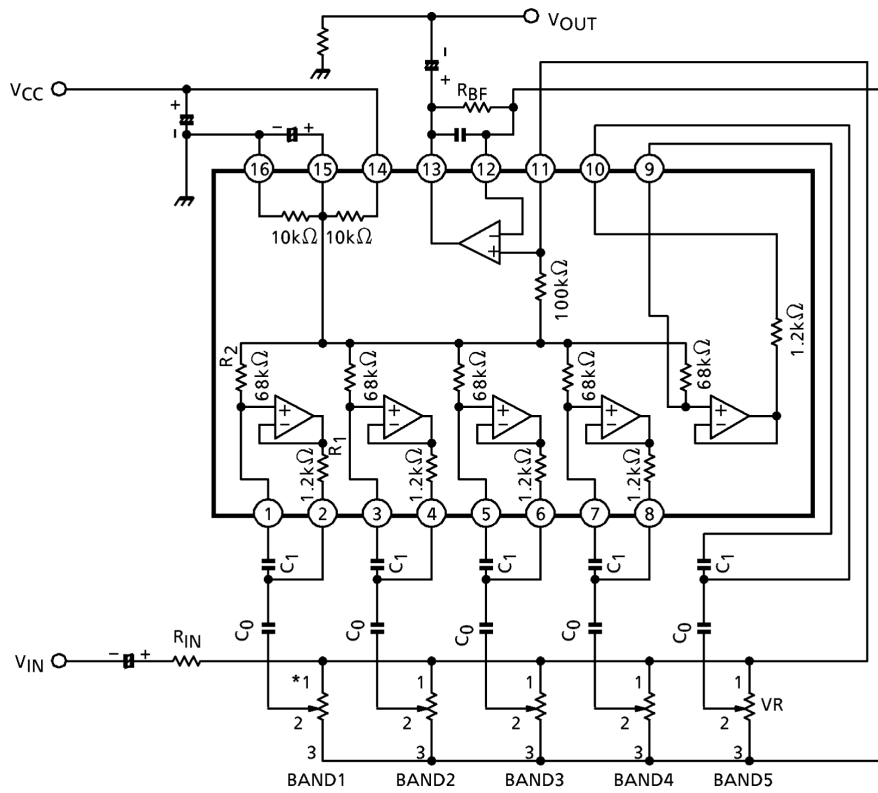
Features

- Few external parts
- Boost / cut control range: $\pm 12\text{dB}$
- Low distortion
 - : THD = 0.001% (typ.)
 - ($V_{CC} = 8\text{V}$, $f = 1.1\text{kHz}$, $V_{IN} = 1V_{\text{rms}}$, flat)
- Low noise
 - : $V_{NO} = 3\mu V_{\text{rms}}$
 - ($V_{CC} = 8\text{V}$, $R_g = 0\Omega$, flat, BW = 20Hz~20kHz)
- Low harmonic distortion at boost or cut mode
 - : 2nd and 3rd harmonic distortion are:
 - 2HD, 3HD $\leq 0.01\%$ (typ.)
 - ($V_{CC} = 8\text{V}$, $V_{IN} = 1V_{\text{rms}}$, $\pm 6\text{dB}$ boost or cut, $f = 20\text{Hz} \sim 20\text{kHz}$)
- Maximum output voltage
 - : $V_{OM} = 2.3V_{\text{rms}}$ (typ.)
 - ($V_{CC} = 8\text{V}$, $f = 1.1\text{kHz}$, THD = 1%, flat)
- Operating supply voltage range
 - : $V_{CC}(\text{opr}) = 4 \sim 16\text{V}$ ($T_a = 25^\circ\text{C}$)



Weight: 0.14g (typ.)

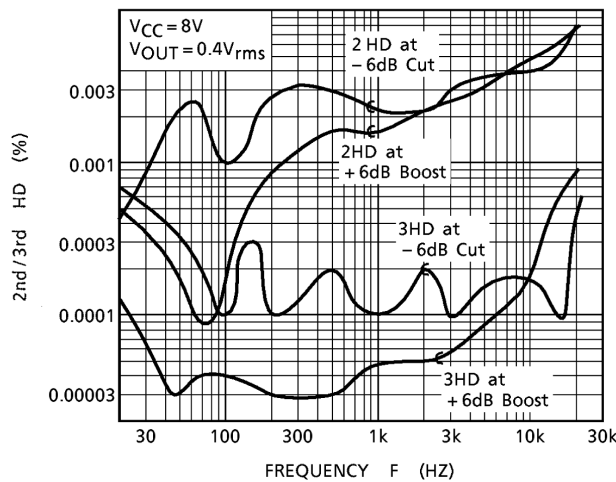
Block Diagram



*1: Cut 2: Flat 3: Boost

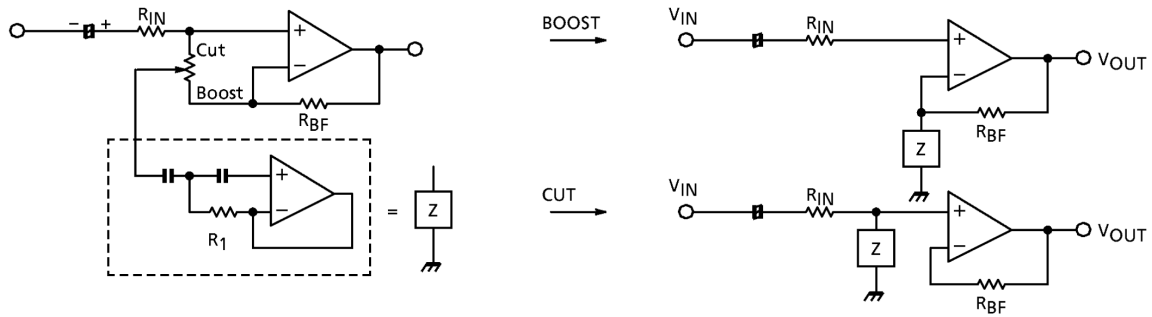
1. (2nd and 3rd) harmonic distortion at 6dB boost or cut mode

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
Operation temperature	T_{opr}	-40~85	°C
Storage temperature (Note)	T_{stg}	-55~150	°C

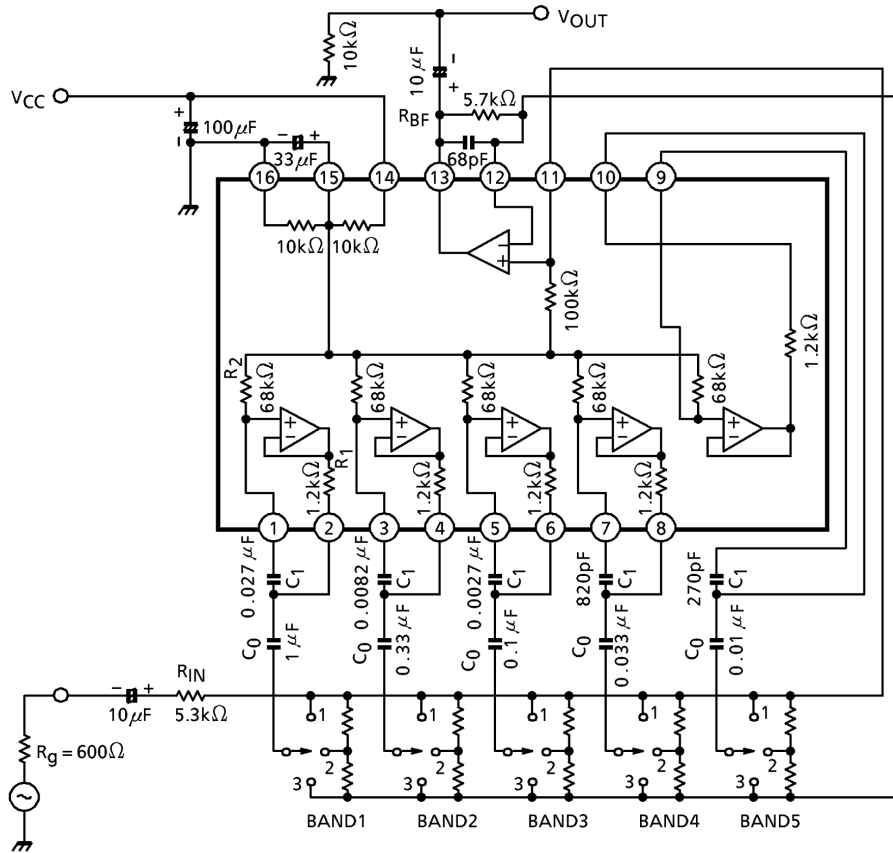
(Note) Derated above $T_a = 25^{\circ}\text{C}$ in the proportion of $2.8\text{mW} / ^{\circ}\text{C}$

Electrical Characteristics

(unless otherwise specified, $V_{CC} = 8\text{V}$, $f = 1.1\text{kHz}$, $R_L = 10\text{k}\Omega$, $T_a = 25^{\circ}\text{C}$)

Characteristic	Symbol	Test Circuit	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)	—	$V_{OUT} = 1V_{rms}$, $f = 110\text{Hz}$	10	12	14	
		—	$V_{OUT} = 1V_{rms}$, $f = 340\text{Hz}$	10	12	14	
		—	$V_{OUT} = 1V_{rms}$, $f = 1.1\text{kHz}$	10	12	14	
		—	$V_{OUT} = 1V_{rms}$, $f = 3.4\text{kHz}$	10	12	14	
		—	$V_{OUT} = 1V_{rms}$, $f = 11\text{kHz}$	10	12	14	
	G_V (BST)	—	$V_{OUT} = 1V_{rms}$, $f = 110\text{Hz}$	-14	-12	-10	
		—	$V_{OUT} = 1V_{rms}$, $f = 340\text{Hz}$	-14	-12	-10	
		—	$V_{OUT} = 1V_{rms}$, $f = 1.1\text{kHz}$	-14	-12	-10	
		—	$V_{OUT} = 1V_{rms}$, $f = 3.4\text{kHz}$	-14	-12	-10	
			$V_{OUT} = 1V_{rms}$, $f = 11\text{kHz}$	-14	-12	-10	
Total harmonic distortion	THD (FLT)		$V_{OUT} = 1V_{rms}$	—	0.001	0.01	%
Output noise voltage	V_{NO} (FLT)		$R_g = 620\Omega$, $V_{IN} = 0$ $BW = 20\text{Hz} \sim 20\text{kHz}$	—	3	8	μV_{rms}
Maximum output voltage	V_{OM}		THD = 1%	1.8	2.3	—	V_{rms}

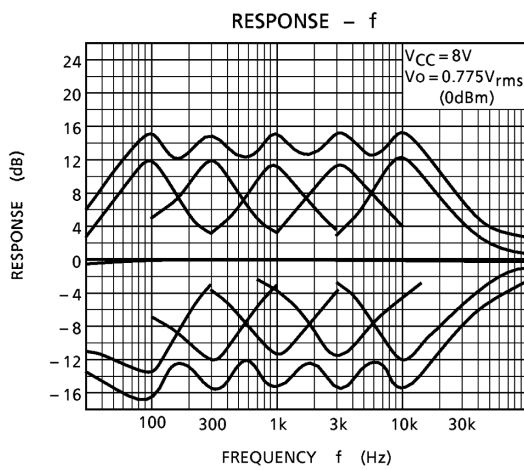
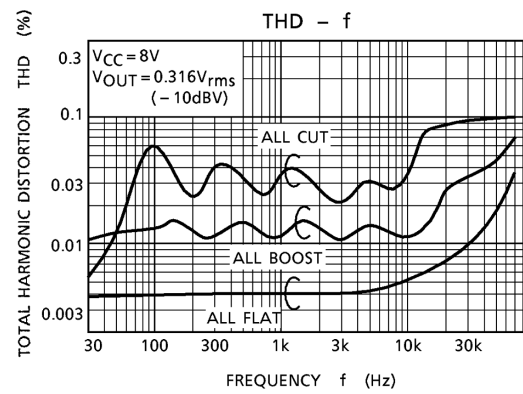
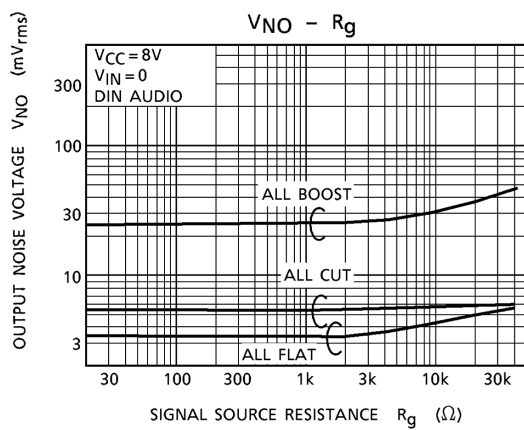
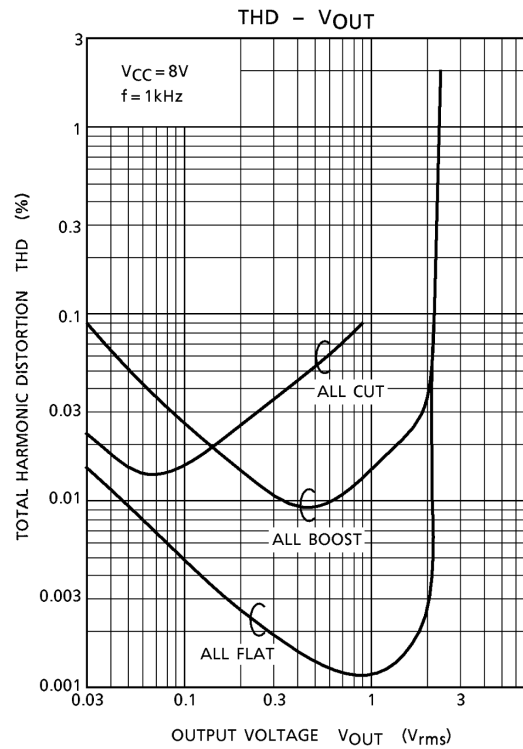
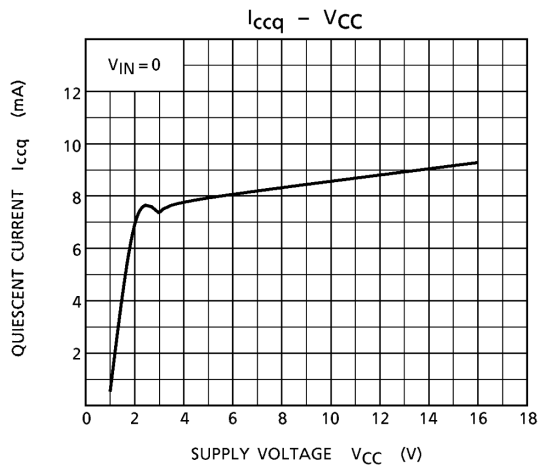
Test Circuit



- 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_0 (resonance frequency)

$$f_0 = \frac{1}{2\pi\sqrt{C_0 \cdot C_1 \cdot R_1 \cdot R_2}} \quad (R_1 = 1.2k\Omega, R_2 = 68k\Omega \text{ on chip resistor})$$

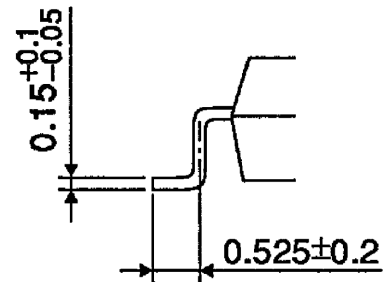
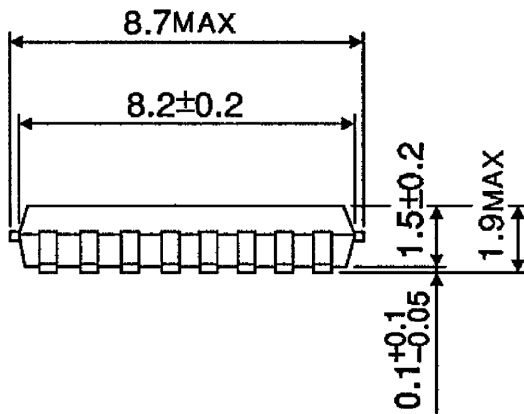
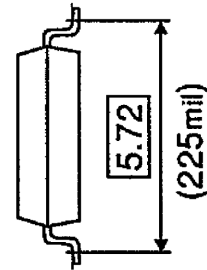
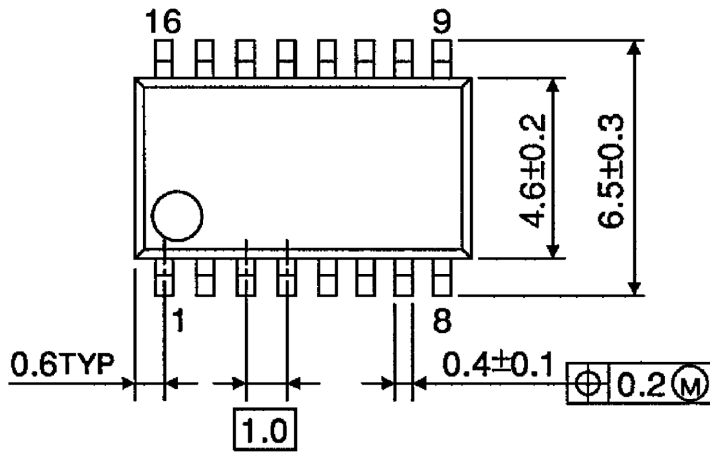
Band	1	2	3	4	5
C_0 (F)	1µ	0.33µ	0.1µ	0.033µ	0.01µ
C_1 (F)	0.027µ	0.0082µ	0.0027µ	820p	270p
f_0 (Hz)	107	340	1.07k	3.40k	10.7k



Package Dimensions

SSOP16-P-225-1.00A

Unit : mm



Weight: 0.14g (typ.)

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