

SANYO	No.1513D	LA3600
	5-BAND GRAPHIC EQUALIZER	

**Applications**

- . Portable component stereos, tape-recorders, radio-cassette recorders, car stereos.

**Features**

- . On-chip one operational amplifier
- . 5-band graphic equalizer for one channel can be formed easily by externally connecting capacitors and variable resistors which fix  $f_o$  (resonance frequency).
- . Series connection of two LA3600's makes multiband (6 to 10 bands) available.
- . Highly stable to capacitive load.

**Maximum Ratings at  $T_a=25^\circ\text{C}$**

Maximum Supply Voltage	$V_{CC}$ max	20	unit	V
Allowable Power Dissipation	$P_d$ max	300	mW	
Operating Temperature	$T_{opr}$	-20 to +75	$^\circ\text{C}$	
Storage Temperature	$T_{stg}$	-40 to +125	$^\circ\text{C}$	

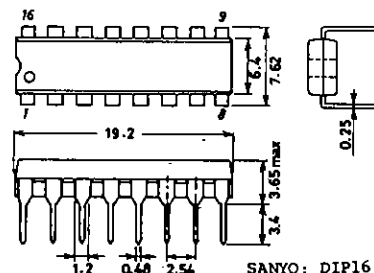
**Operating Conditions at  $T_a=25^\circ\text{C}$**

Recommended Supply Voltage	$V_{CC}$	8	unit	V
Operating Voltage Range	$V_{CC}$ op	5 to 15	V	

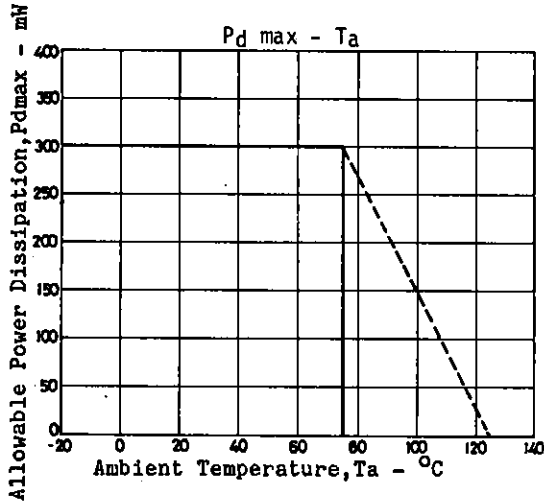
**Operating Characteristics at  $T_a=25^\circ\text{C}$ ,  $V_{CC}=8\text{V}$ ,  $R_L=10\text{kohms}$ ,  $R_g=600\text{ohms}$ ,**

			See specified Test Circuit.	min	typ	max	unit	
Quiescent Current	$I_{cco}$			3.0	5.0	8.0	mA	
Voltage Gain	VG	$f=1\text{kHz}$ , $V_{in}=-10\text{dB}$ at all flat mode		-3.8	0.8	+2.2	dB	
Boost Amount	BOOST	$f=100\text{Hz}$	}	8	10	12	dB	
		$f=340\text{Hz}$		8	10	12	dB	
		$f=1\text{kHz}$		8	10	12	dB	
		$f=3.4\text{kHz}$		8	10	12	dB	
		$f=10\text{kHz}$		8	10	12	dB	
Cut Amount	CUT	$f=100\text{Hz}$		}	-12	-10	-8	dB
		$f=340\text{Hz}$			-12	-10	-8	dB
		$f=1\text{kHz}$			-12	-10	-8	dB
		$f=3.4\text{kHz}$			-12	-10	-8	dB
		$f=10\text{kHz}$			-12	-10	-8	dB
Total Harmonic Distortion	THD	$f=1\text{kHz}$ , $v_o=1.0\text{V}$			0.03	0.1		%
Output Noise Voltage	$V_{NO}$	$R_g=0$ , All flat B.P.F. 10Hz to 30kHz			2.0	20		$\mu\text{V}$

**Package Dimensions**  
(unit: mm)  
3006B



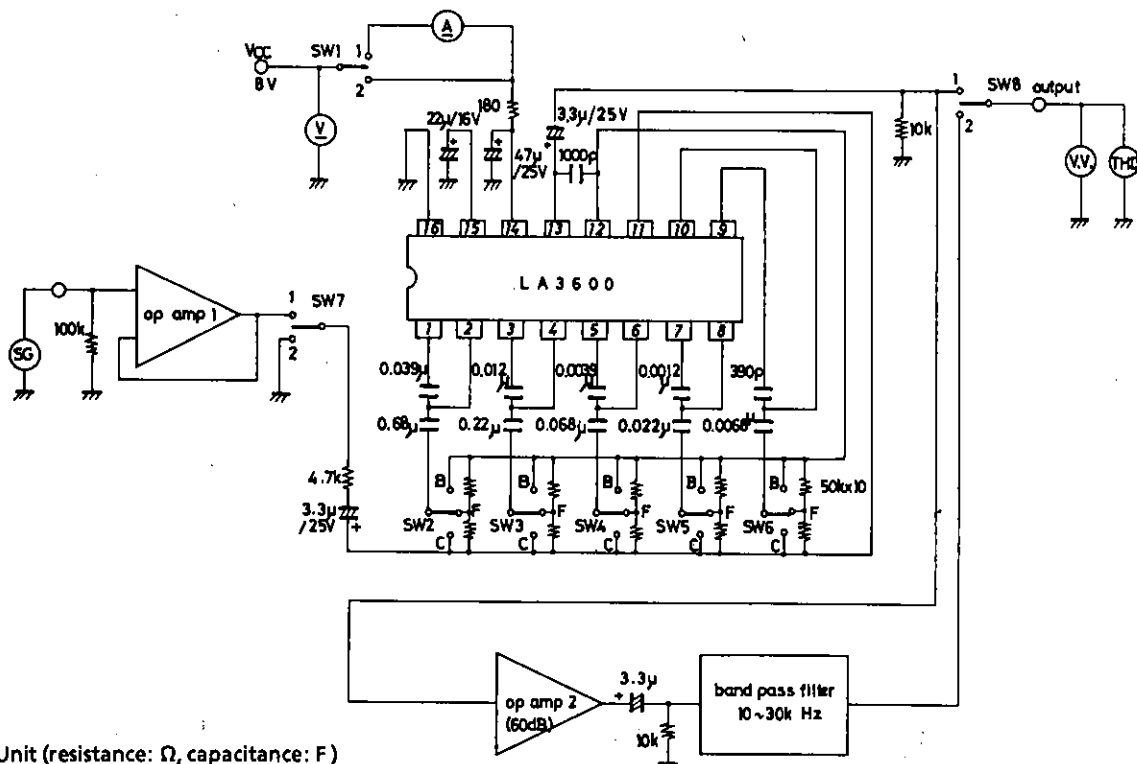
LA3600



Test Method:  $V_{CC}=8V, R_L=10k\Omega, R_g=600\Omega$

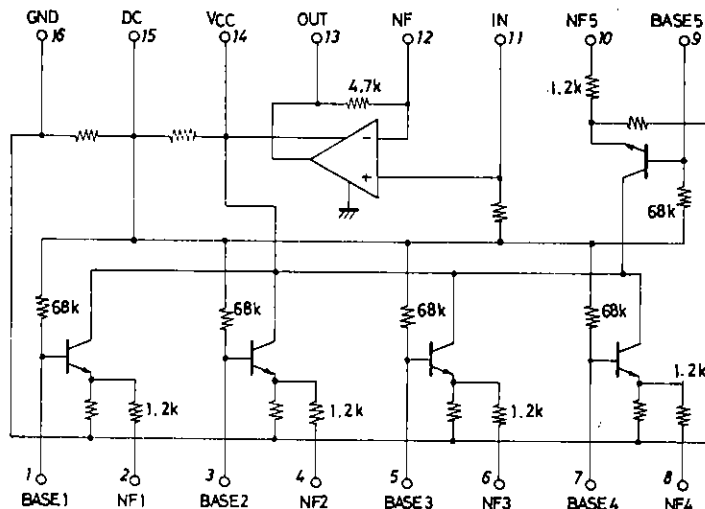
Item	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	Conditions
I <sub>cco</sub>	1	-	-	-	-	-	2	1	
VG	2	F	F	F	F	F	1	1	f=1kHz, V <sub>in</sub> =-10dB
BOOST	2	B	F	F	F	F	1	1	f=100Hz
BOOST	2	F	B	F	F	F	1	1	f=340Hz
BOOST	2	F	F	B	F	F	1	1	f=1kHz
BOOST	2	F	F	F	B	F	1	1	f=3.4kHz
BOOST	2	F	F	F	F	B	1	1	f=10kHz
CUT	2	C	F	F	F	F	1	1	f=100Hz
CUT	2	F	C	F	F	F	1	1	f=340Hz
CUT	2	F	F	C	F	F	1	1	f=1kHz
CUT	2	F	F	F	C	F	1	1	f=3.4kHz
CUT	2	F	F	F	F	C	1	1	f=10kHz
THD	2	F	F	F	F	F	1	1	f=1kHz, V <sub>o</sub> =1.0V
VNO	2	F	F	F	F	F	2	2	

Test Circuit



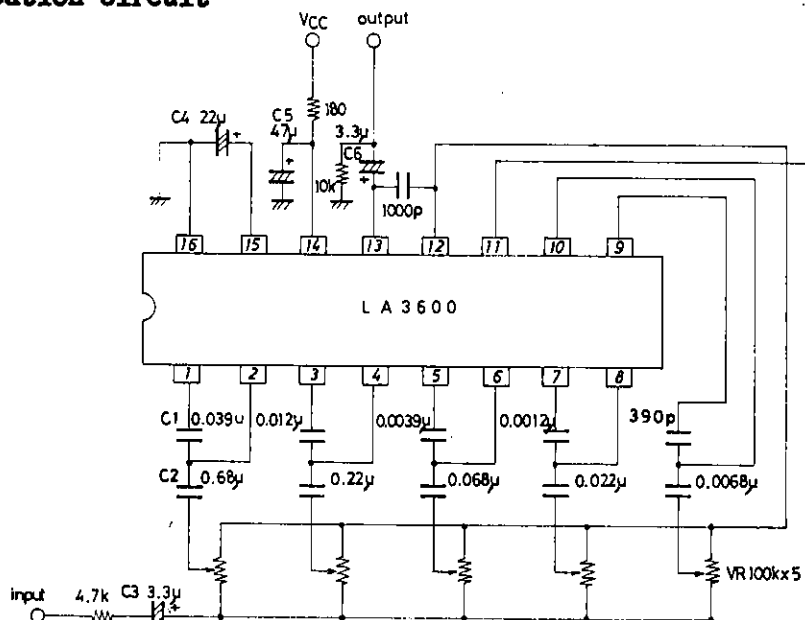
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## Equivalent Circuit Block Diagram



## Sample Application Circuit

Unit (resistance: Ω, capacitance: F)



### fo(resonance frequency)

In the sample application circuit, fo for each of 5 bands is set as follows:

$f_o = 108\text{Hz}, 343\text{kHz}, 1.08\text{kHz}, 3.43\text{kHz}, 10.8\text{kHz}$

$$f_o = \frac{1}{2\pi \sqrt{C1, C2, R1, R2}} \quad (R1=1.2\text{kohms}, R2=68\text{kohms on-chip resistor})$$

### Description of external parts

C1, C2 : Capacitors used to fix fo (resonance frequency)

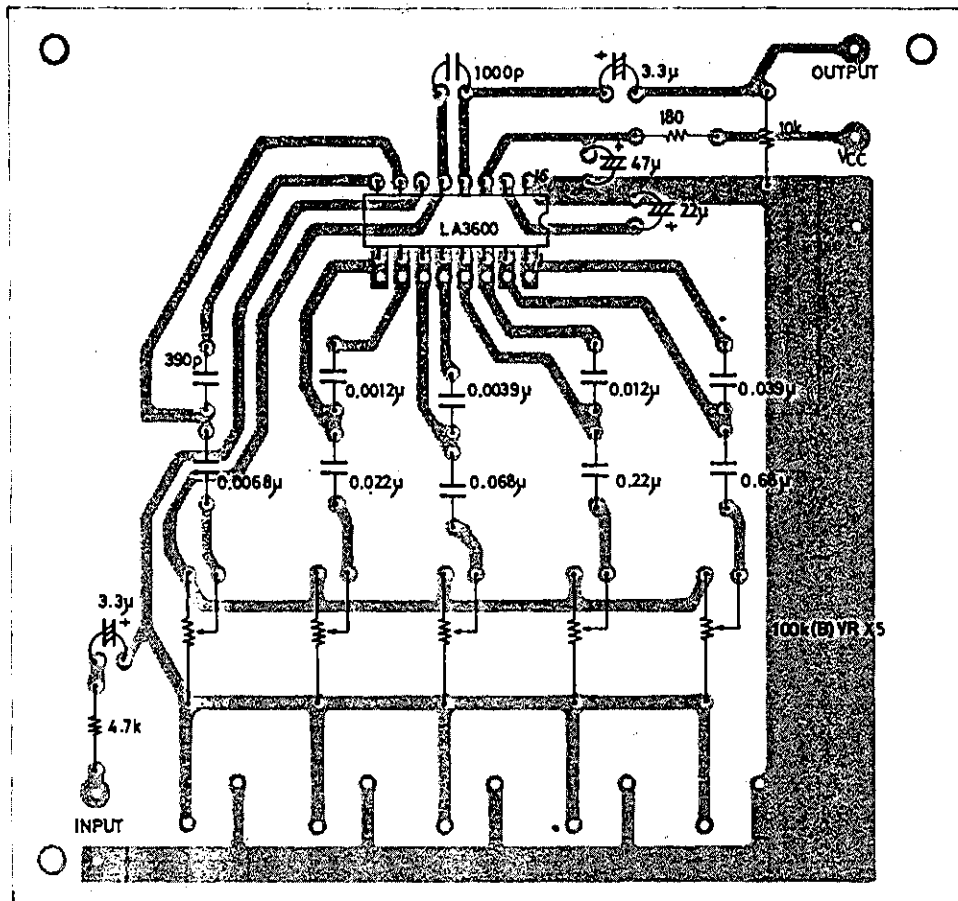
C2 : Input capacitor. Decreasing the capacitor value lowers the frequency response at low frequencies.

C3 : Input capacitor. Decreasing the capacitor value lowers the frequency response at low frequencies.

C4 : Decoupling capacitor. Decreasing the capacitor value makes the effect of power supply stronger, whereby ripple is liable to occur.

C5 : Power capacitor.

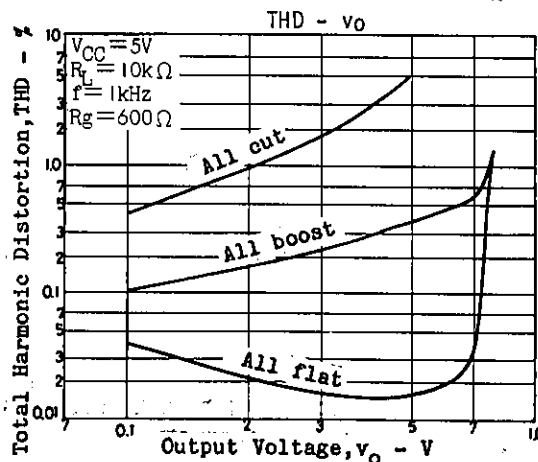
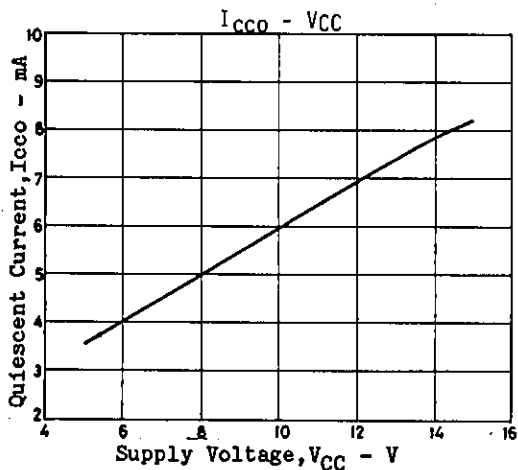
C6 : Output capacitor. Decreasing the capacitor value lowers the frequency response at low frequencies.

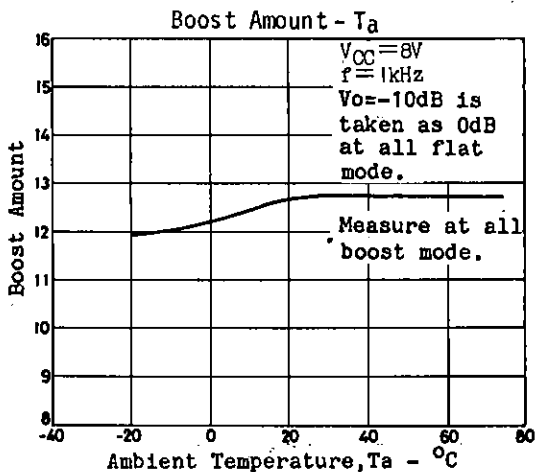
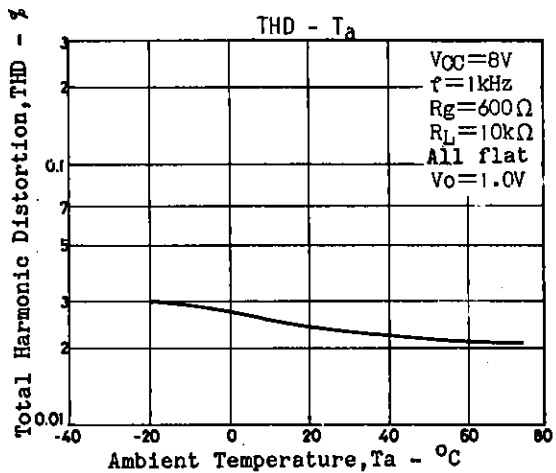
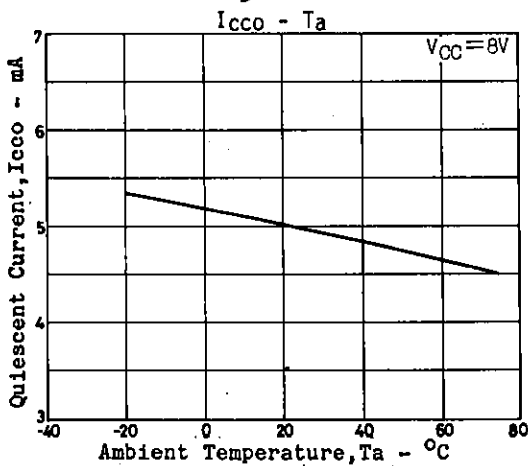
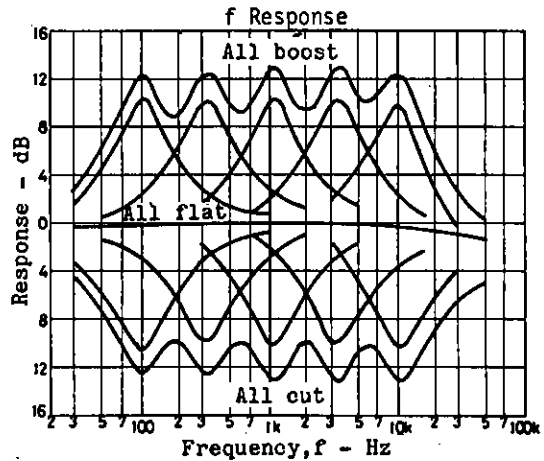
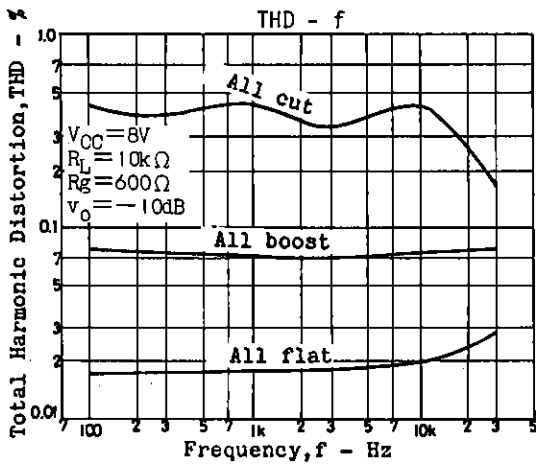
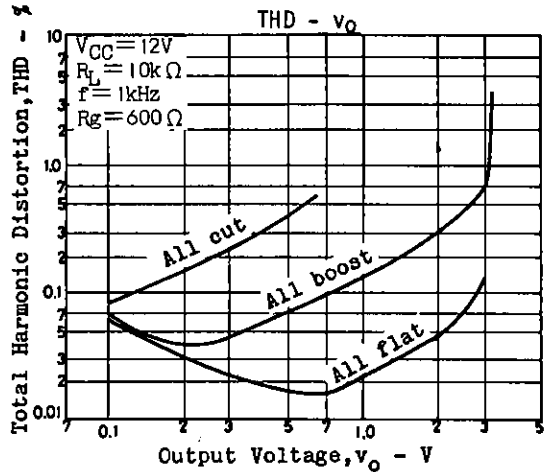
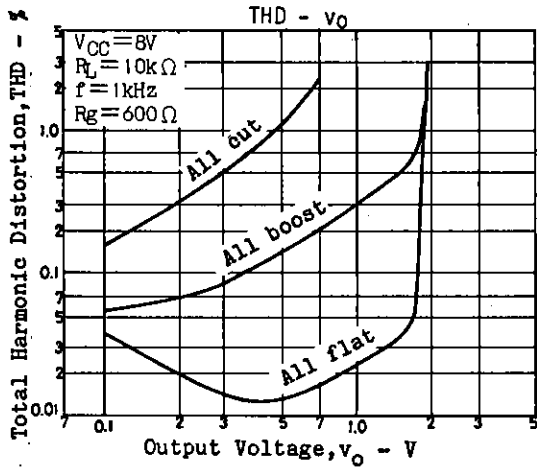


Cu-foiled area 110x102.5mm<sup>2</sup>

Proper cares in using IC

- Maximum supply voltage  $V_{CC}$  max 20V must not be exceeded. The operating voltage is in the range of 5 to 15V.
- Application of power with the pin-to-pin spaces shorted causes breakdown or deterioration of the IC to occur. When mounting the IC on the board or applying power, make sure that the pin-to-pin spaces are not shorted with solder, etc.





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