

**SANYO**

No.1845C

**LA3605**
 Monolithic Linear IC  
 7-BAND GRAPHIC EQUALIZER
**Applications**

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

**Features**

- One OP amp on chip.
- 7-band graphic equalizer for one channel can be formed easily by externally connecting capacitors and variable resistors which fix  $f_0$  (resonance frequency).
- Series connection of two LA3605's makes multiband available.
- Highly stable to capacitive load.

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

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

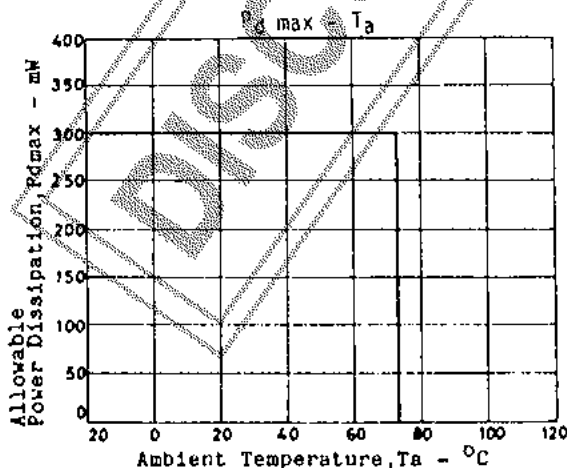
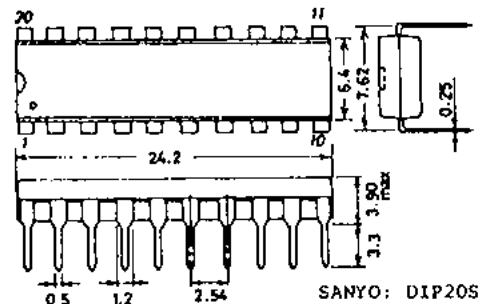
**Operating Conditions at  $T_a=25^\circ\text{C}$** 

			unit
Recommended Supply Voltage	$V_{CC}$	8	V
Operating Voltage Range	$V_{CC\text{OP}}$	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	$I_{CCQ}$ Quiescent		7	9	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 $f=60\text{Hz}$ $f=150\text{Hz}$ $f=400\text{Hz}$ $f=1\text{kHz}$	$V_o=-10\text{dB}$ is taken as 0dB at all flat mode at $f=1\text{kHz}$ .			8	10	12	dB
					8	10	12	dB
					8	10	12	dB
					8	10	12	dB

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**Case Outline 3021B-D20SIC**  
 (unit:mm)


Specifications and information herein are subject to change without notice.

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LA3605

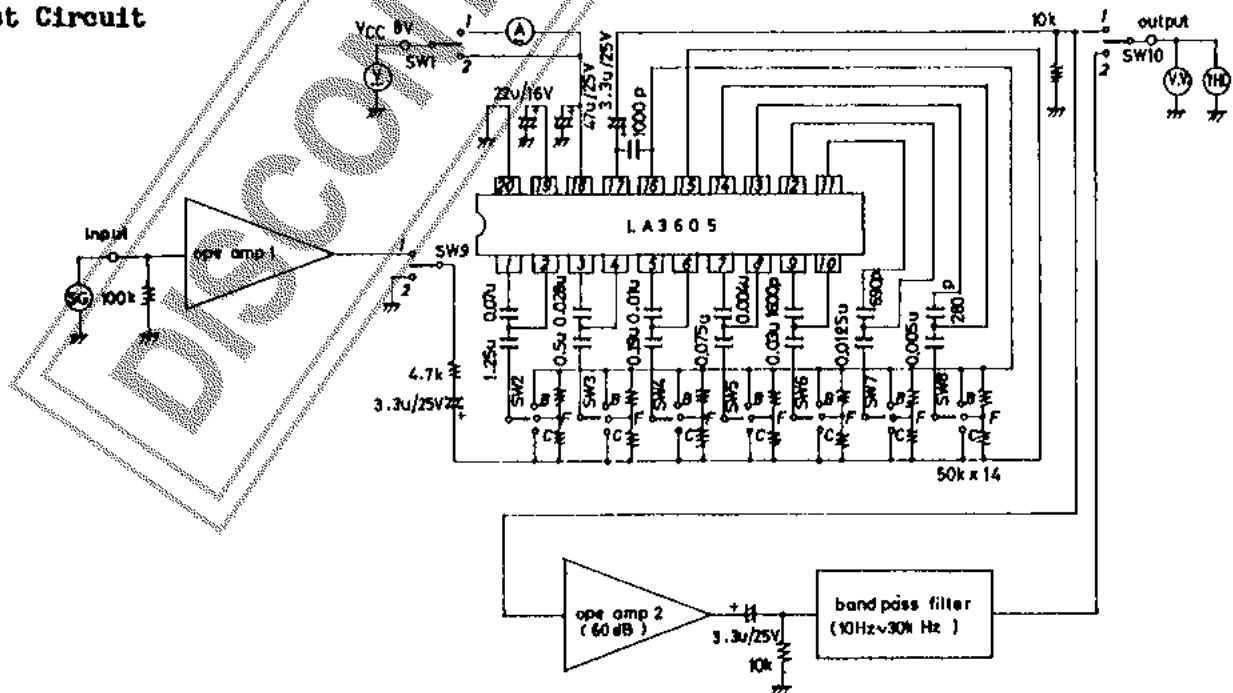
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			min	typ	max	unit
Boost Amount	BOOST	f=2.5kHz	8	10	12	dB
		f=6kHz	8	10	12	dB
		f=15kHz	8	10	12	dB
		Vo=-10dB is taken as 0dB at all				
Cut Amount	CUT	f=60Hz flat mode at f=	-12	-10	-8	dB
		f=150Hz	-12	-10	-8	dB
		f=400Hz	-12	-10	-8	dB
		f=1kHz	-12	-10	-8	dB
		f=2.5kHz	-12	-10	-8	dB
		f=6kHz	-12	-10	-8	dB
		f=15kHz	-12	-10	-8	dB
Total Harmonic Distortion	THD	All FLAT, Vo=1.0V, f=1kHz	0.04	0.1		%
Output Noise Voltage	V <sub>NO</sub>	All FLAT, input short, B.P.F, 10Hz to 30kHz	3	20		uV

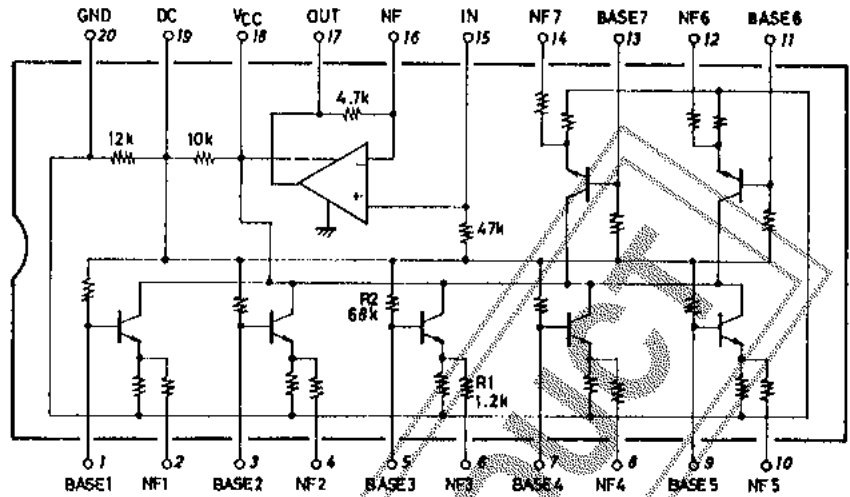
Test Method: V<sub>CC</sub>=8V, R<sub>L</sub>=10kohms, R<sub>g</sub>=600ohms

Item	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	SW10	Conditions
I <sub>CCO</sub>	1	F	F	F	F	F	F	F	2	1	
V <sub>G</sub>	2	F	F	F	F	F	F	F	1	1	f=1kHz, V <sub>IN</sub> =-10dB
BOOST1	2	B	F	F	F	F	F	F	1	1	f=60Hz
BOOST2	2	F	B	F	F	F	F	F	1	1	f=150Hz
BOOST3	2	F	F	B	F	F	F	F	1	1	f=400Hz
BOOST4	2	F	F	F	B	F	F	F	1	1	f=1kHz
BOOST5	2	F	F	F	F	B	F	F	1	1	f=2.5kHz
BOOST6	2	F	F	F	F	F	B	F	1	1	f=6kHz
BOOST7	2	F	F	F	F	F	F	B	1	1	f=15kHz
CUT1	2	C	F	F	F	F	F	F	1	1	f=60Hz
CUT2	2	F	C	F	F	F	F	F	1	1	f=150Hz
CUT3	2	F	F	C	F	F	F	F	1	1	f=400Hz
CUT4	2	F	F	F	C	F	F	F	1	1	f=1kHz
CUT5	2	F	F	F	F	C	F	F	1	1	f=2.5kHz
CUT6	2	F	F	F	F	F	C	F	1	1	f=6kHz
CUT7	2	F	F	F	F	F	F	C	1	1	f=15kHz
THD	2	F	F	F	F	F	F	F	1	1	f=1kHz, V <sub>o</sub> =1.0V
V <sub>NO</sub>	2	F	F	F	F	F	F	F	2	2	

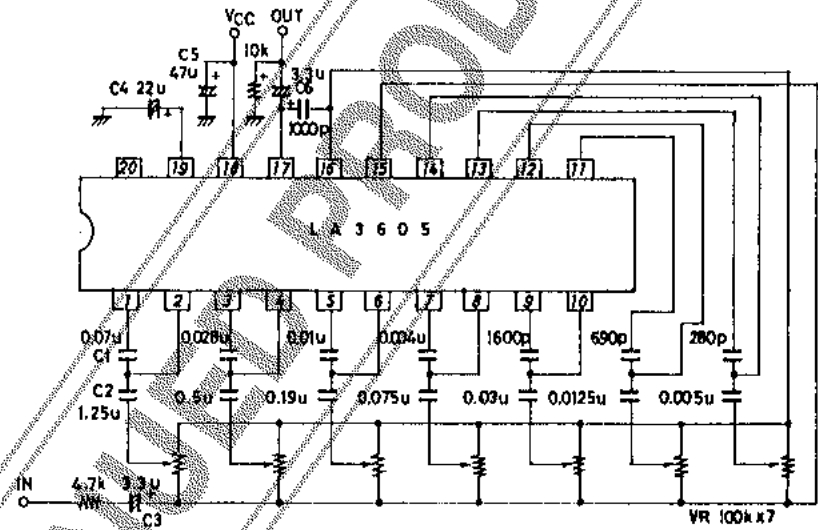
Test Circuit



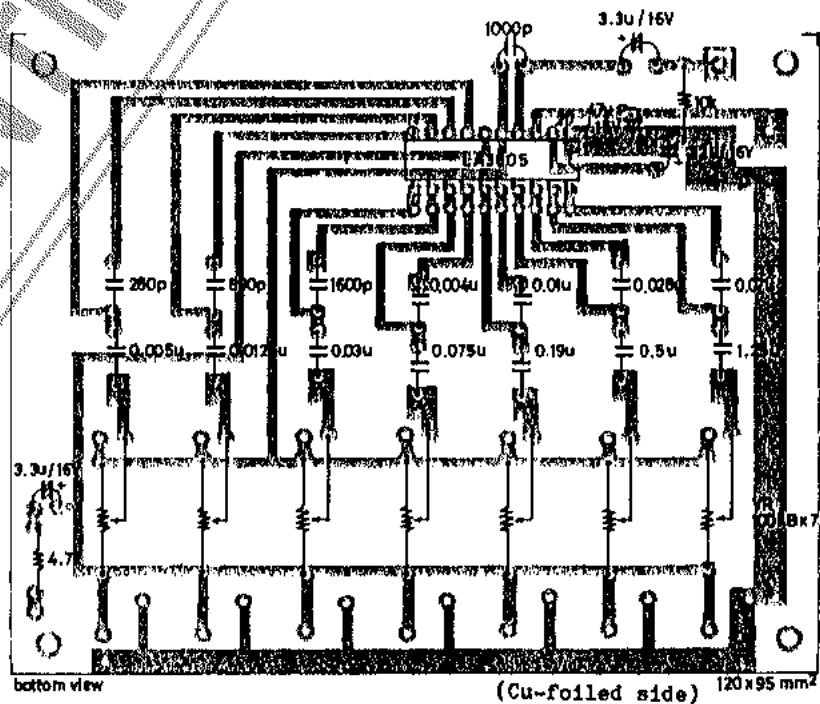
Equivalent Circuit Block Diagram



Sample Application Circuit



Sample Printed Circuit Pattern



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**f<sub>o</sub>(resonance frequency)**

In the sample application circuit, f<sub>o</sub> for each of 7 bands is set as follows:  
 f<sub>o</sub>=60Hz, 150Hz, 400Hz, 1kHz, 2.5kHz, 6kHz, 15kHz  
 f<sub>o</sub> is calculated using the following formula.

$$f_o = \frac{1}{2\pi\sqrt{C1 \cdot C2 \cdot R1 \cdot R2}}$$

**Q (quality factor)**

Q is calculated using the following formula.

$$Q = \sqrt{\frac{C1 \cdot R2}{C2 \cdot R1}}$$

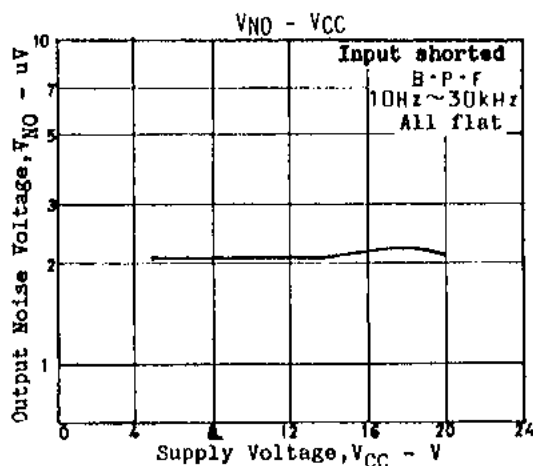
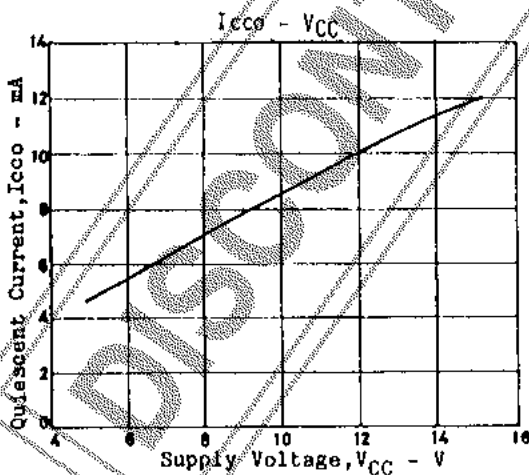
When Q is increased, the frequency band affected by the resonance circuit is narrowed and a clear distinction between this band and an adjacent band is provided, but the frequency response swells greatly at all boost mode and the peak of the composite frequency is lowered.  
 The above must be considered to fix C1, C2.

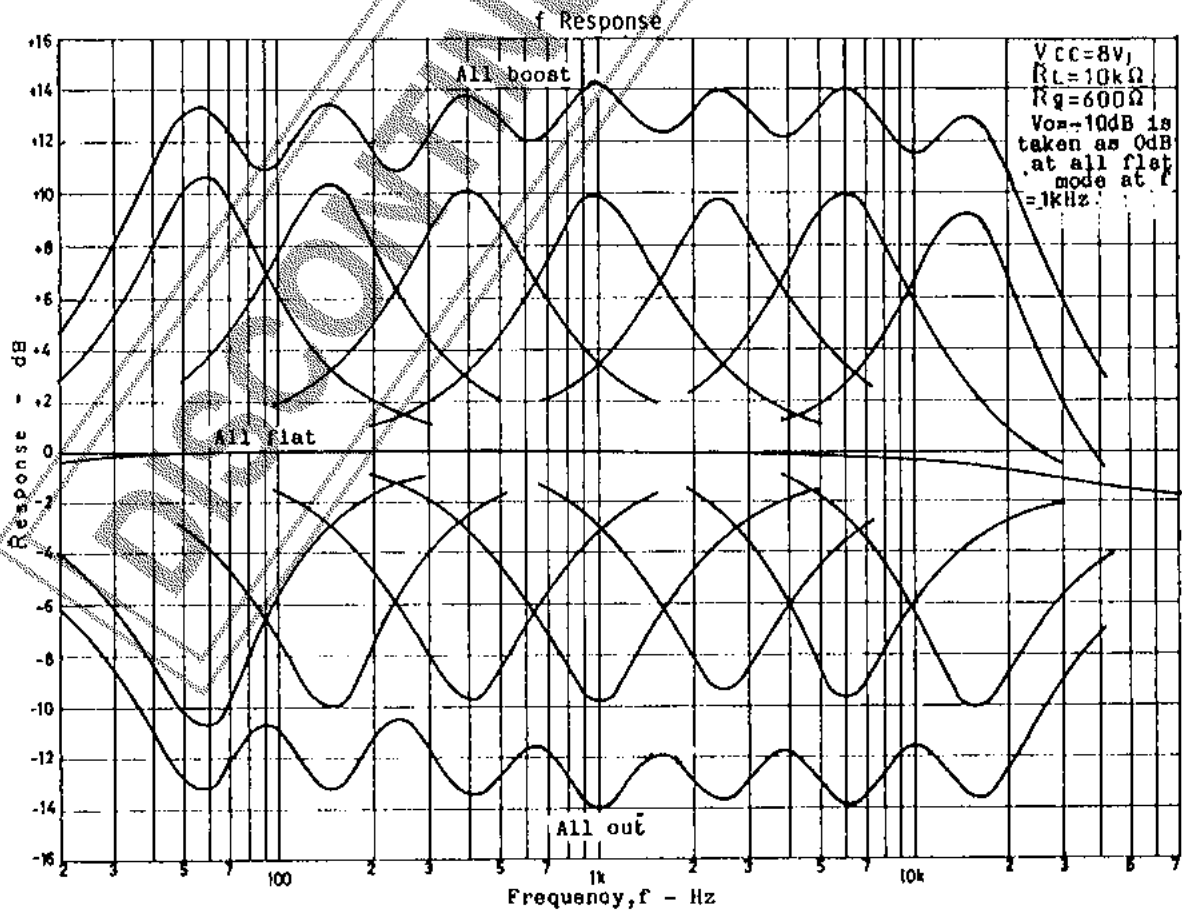
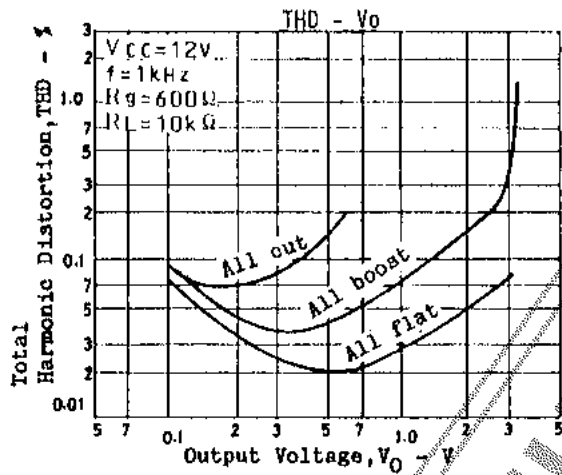
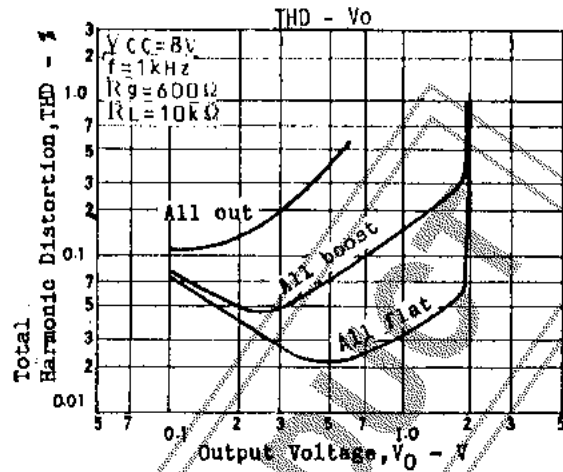
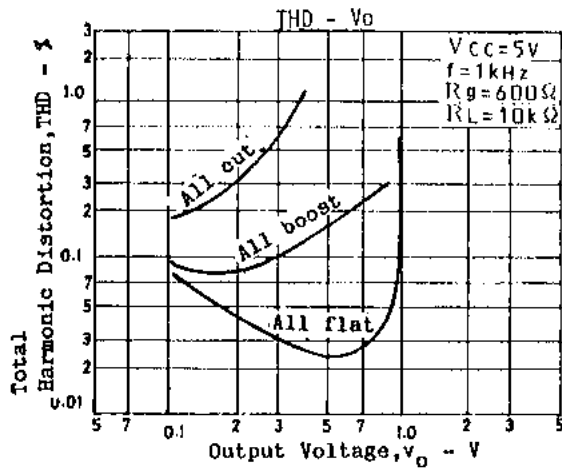
**Description of external parts**

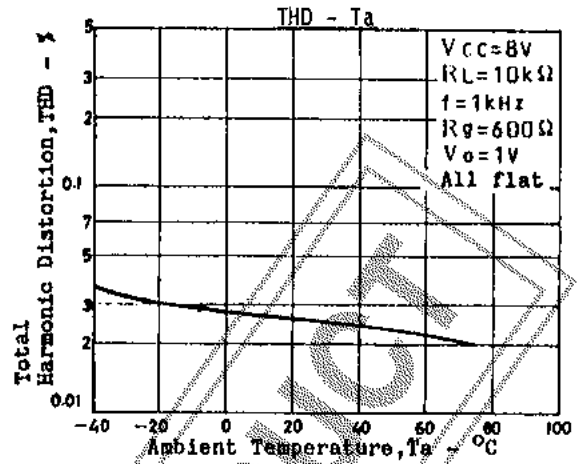
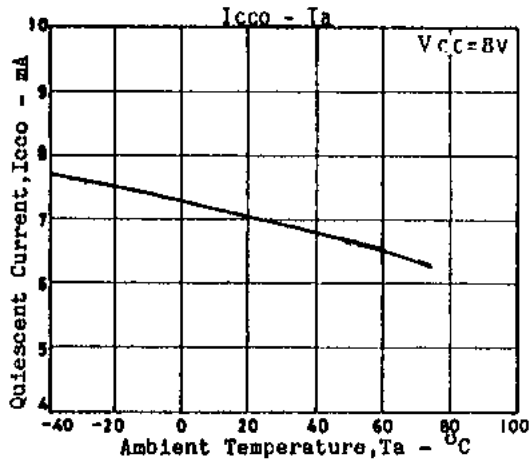
- C1,C2 : Capacitors used to fix f<sub>o</sub> (resonance frequency)
- C3 : Input capacitor. Decreasing the capacitor value lowers the frequency response at low frequencies.
- C4 : Decoupling capacitor. Decreasing the capacitor value makes the effect of power supply stronger, whereby ripple is liable to occur.
- C5 : Power capacitor.
- C6 : Output capacitor. Decreasing the capacitor value lowers the frequency response at low frequencies.

**Proper cares in using IC**

- . Maximum supply voltage V<sub>CC</sub> 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.







DISCONTINUED PRODUCT

The application circuit diagrams and circuit constants herein are included as an example and provide no guarantee for designing equipment to be mass-produced. The information herein is believed to be accurate and reliable. However, no responsibility is assumed by SANYO for its use; nor for any infringements of patents or other rights of third parties which may result from its use.