

**TOSHIBA**

**TA8238K**

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA8238K

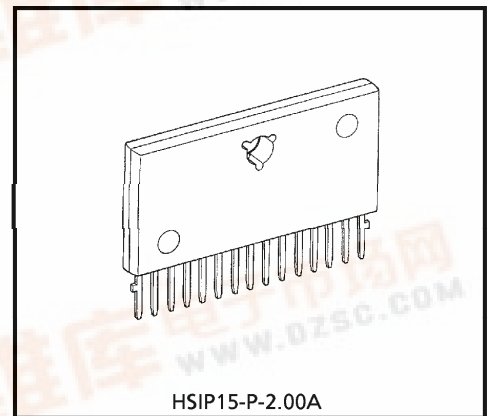
## 7.3W×2CH AUDIO POWER IC

The TA8238K is dual audio power amplifier for consumer application.

It contains various kind of protectors and the function of stand-by switch.

### FEATURES

- Output Power
  - :  $P_{OUT(1)} = 7.3W$  (Typ.)  
( $V_{CC} = 13.2V$ ,  $f = 1kHz$ ,  $THD = 10\%$ ,  $R_L = 2\Omega$ )
  - :  $P_{OUT(2)} = 6.4W$  (Typ.)  
( $V_{CC} = 14.4V$ ,  $f = 1kHz$ ,  $THD = 10\%$ ,  $R_L = 4\Omega$ )
  - :  $P_{OUT(3)} = 5.3W$  (Typ.)  
( $V_{CC} = 13.2V$ ,  $f = 1kHz$ ,  $THD = 10\%$ ,  $R_L = 4\Omega$ )
- Total Harmonic Distortion
  - :  $THD = 0.1\%$  (Typ.)  
( $V_{CC} = 13.2V$ ,  $f = 1kHz$ ,  $P_{out} = 1W$ ,  $R_L = 4\Omega$ )
- Built In Stand-By Switch Function
  - :  $I_{STBY} = 1\mu A$  (Typ.)  
(With Pin⑨ set at High, power is turned ON.)
- Built In Junction Temperature Detection Function  
(Pin① :  $10mV/^\circ C$ )
- Built In Various Protection Circuits
  - : Over Voltage, Thermal Shut Down  
Out to GND, Out to  $V_{CC}$
- Operating Supply Voltage
  - :  $V_{CC}$  (opr.) =  $6\sim 18V$



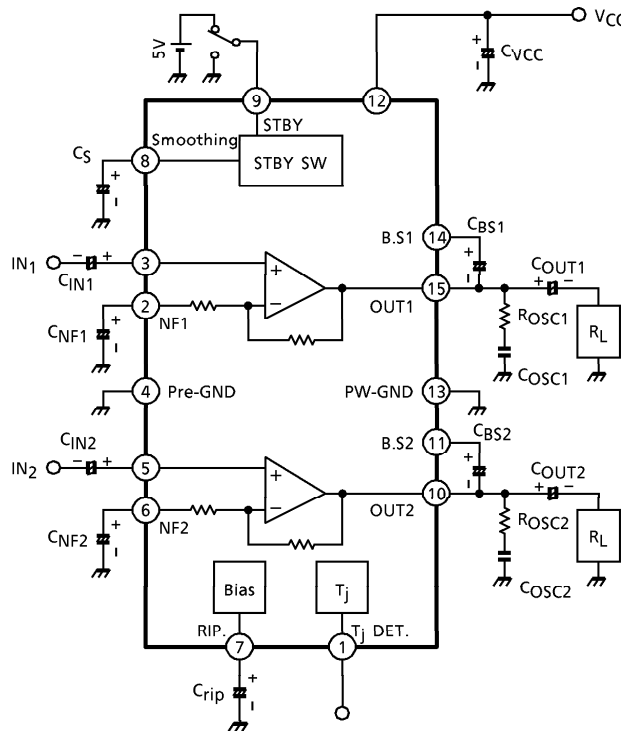
Weight : 3.9g (Typ.)

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**BLOCK DIAGRAM**

( $G_V = 52\text{dB}$ )



**CAUTION AND APPLICATION METHOD**

(Description is made only on the single channel.)

1. Voltage Gain Adjustment

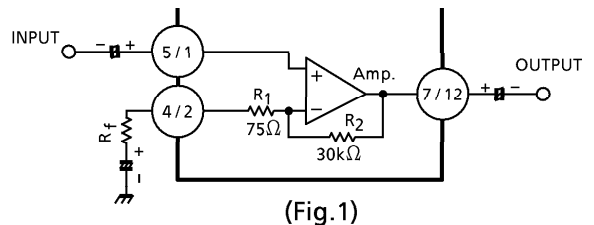
The closed loop voltage gain ( $G_V$ ) is determined by  $R_1$ ,  $R_2$  and  $R_f$ .

$$G_V = 20 \log \frac{R_f + R_1 + R_2}{R_f + R_1} \text{ (dB)}$$

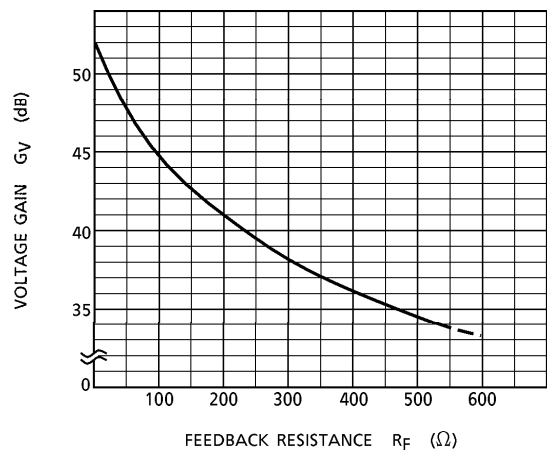
When  $R_f = 0$ ,  $G_V = 52\text{dB}$  (Typ.) is given.

The voltage gain is reduced when  $R_f$  is increased. (Fig.2)

With the voltage gain reduced, since the oscillation stability is reduced, refer to the items 3.



(Fig.1)



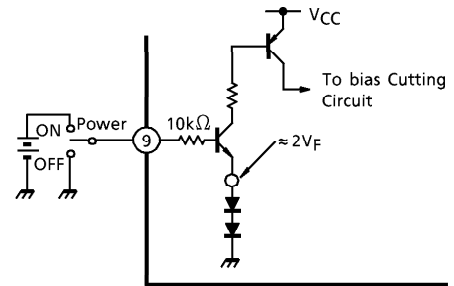
(Fig.2)

2. Stand-by SW Function

By means of controlling pin<sup>9</sup> (Stand-by terminal) to High and Low, the power supply can be set to ON and OFF. The threshold voltage of pin<sup>9</sup> is set at 2.1V ( $3V_{BE}$ ), and the Power Supply current is about  $1\mu A$  (Typ.) at the stand-by state.

Control Voltage pin<sup>9</sup> : V (SB)

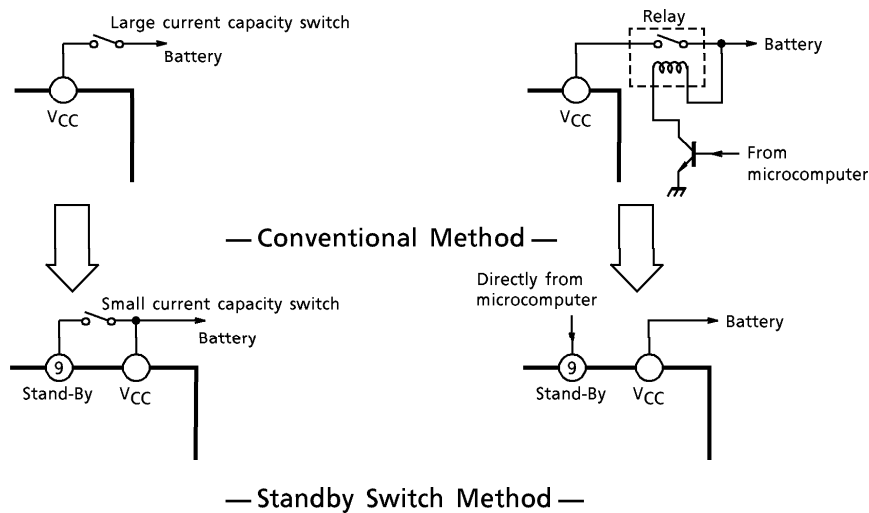
Stand-By	Power	V (SB) (V)
ON	OFF	0~2
OFF	ON	3~V <sub>CC</sub>



(Fig.3)With Pin<sup>9</sup> Set to High, Power is Turned ON.

Advantage of Stand-by SW

- (1) Since V<sub>CC</sub> can directly be controlled to ON, OFF by the microcomputer, the switching relay can be omitted.
- (2) Since the control current is microscopic, the switching relay of small current capacity is satisfactory for switching.



### 3. Preventive Measure Against Oscillation

$C_{OSC}$  : For preventing the oscillation, it is advisable to use  $C_{OSC}$ , the condenser of polyester film having small characteristic fluctuation of the temperature and the frequency.

The resistance R to be series applied to  $C_{OSC}$  is effective for phase correction of high frequency, and improves the oscillation allowance.

- (1) Voltage gain to be used ( $G_V$  Setting)
- (2) Capacity value of condenser
- (3) Kind of condenser
- (4) Layout of printed board

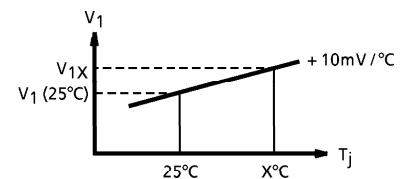
In case of its use with the voltage gain  $G_V$  reduced or with the feedback amount increased, care must be taken because the phase-inversion is caused by the high frequency resulting in making the oscillation liable generated.

### 4. Junction Temperature Detecting pin①

Using temperature characteristic of a band gap circuit and in proportion to junction temperature, pin① DC voltage :  $V_2$  rises at about  $+10\text{mV}/^\circ\text{C}$  temperature characteristic. So, the relation between  $V_2$  at  $T_j = 25^\circ\text{C}$  and  $V_{2x}$  at  $T_j = x^\circ\text{C}$  is decided by the following expression :

$$T (x^\circ\text{C}) = \frac{V_{2x} - V_2 (25^\circ\text{C})}{10\text{mV}/^\circ\text{C}} + 25 (^\circ\text{C})$$

In deciding a heat sink size, a junction temperature can be easily made clear by measuring voltage at this pin while a backside temperature of IC was so far measured using a thermocouple type thermometer.

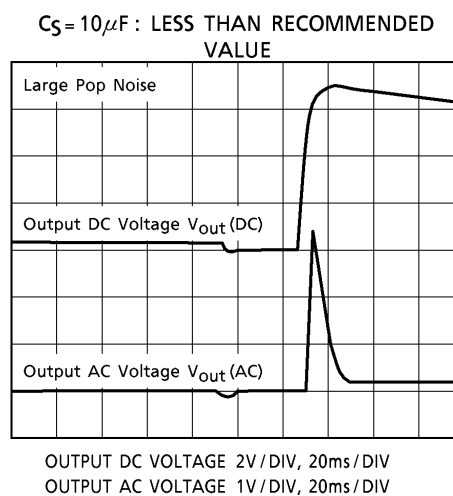
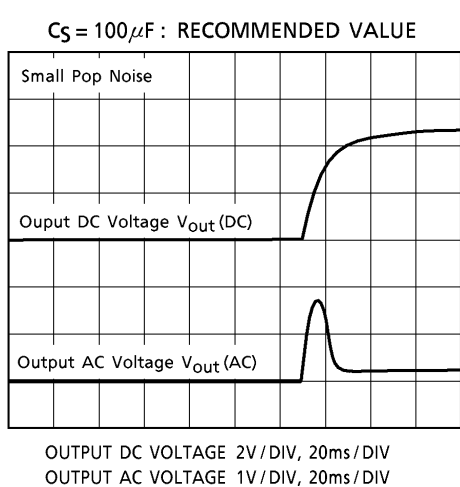


(Fig.4)

5. Pop Noise

The pop noise is reduced by the time constant  $\tau$  of pin<sup>Ⓢ</sup> : smoothing.

Therefore, we recommend  $C_S = 100\mu\text{F}$ , which is between pin<sup>Ⓢ</sup> and GND, because the pop noise will become worse by using the smaller capacity of  $C_S$ .



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Peak Supply Voltage (0.2s)	$V_{CC}(\text{surge})$	50	V
DC Supply Voltage	$V_{CC}(\text{DC})$	20	V
Operating Supply Voltage	$V_{CC}(\text{opr})$	18	V
Output Current (peak)	$I_O(\text{peak})$	4.5	A
Power Dissipation	$P_D$	15	W
Operating Temperature	$T_{opr}$	-30~85	°C
Storage Temperature	$T_{stg}$	-55~150	°C

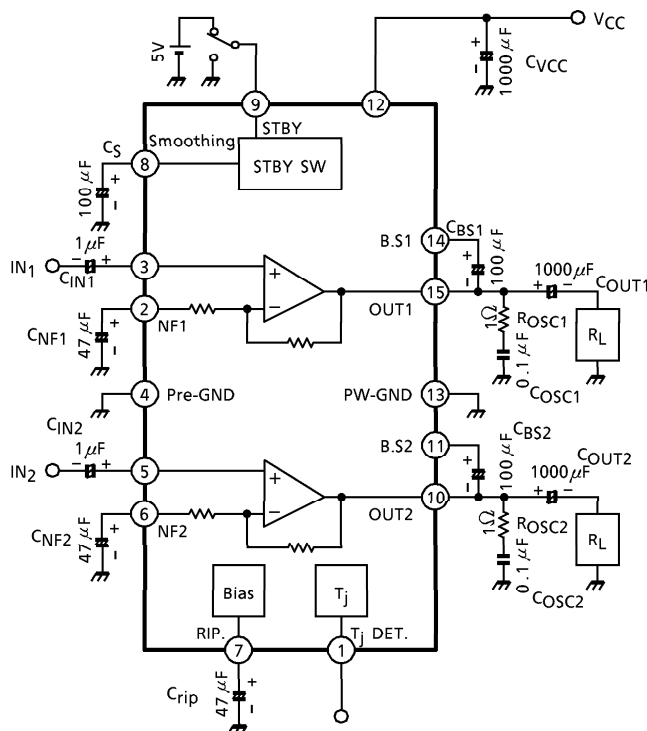
**ELECTRICAL CHARACTERISTICS**

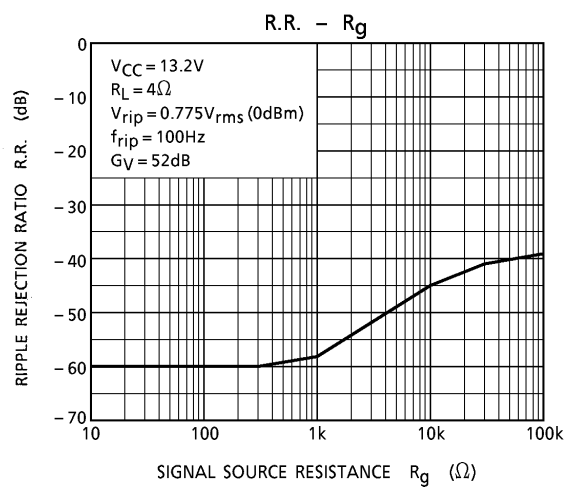
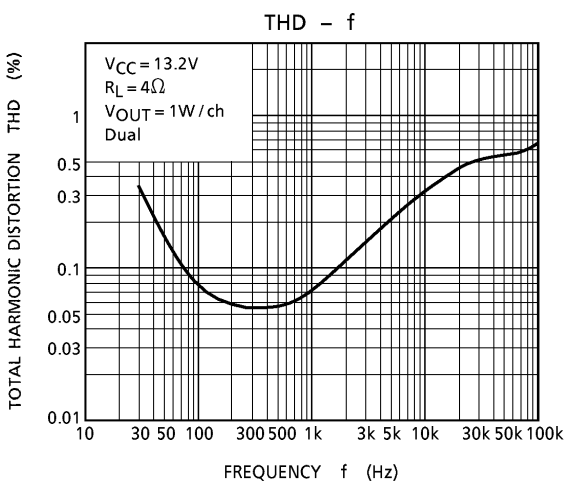
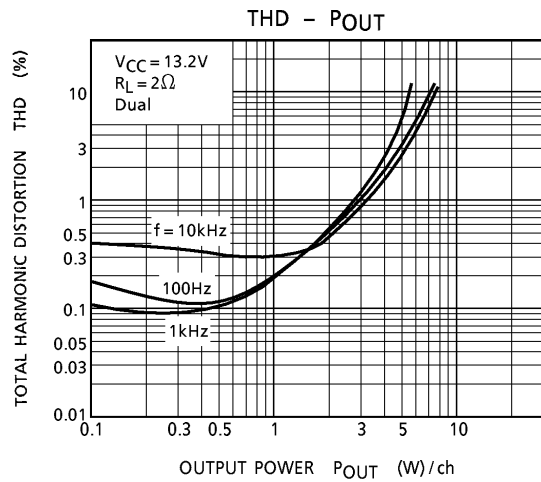
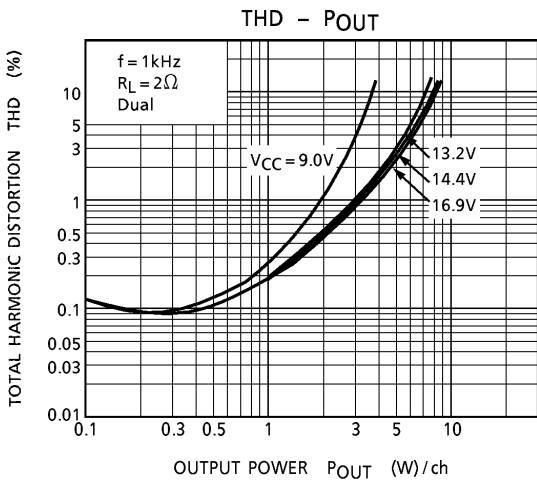
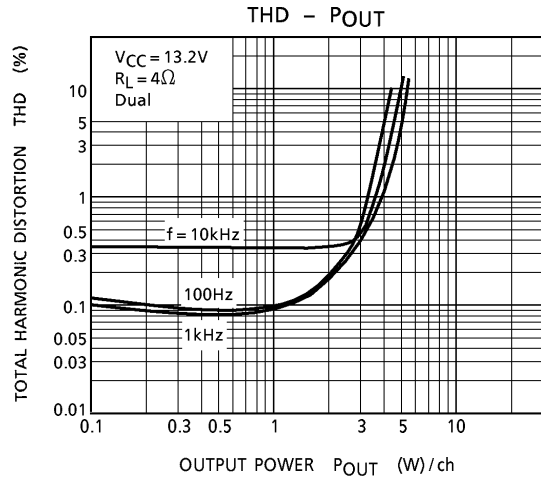
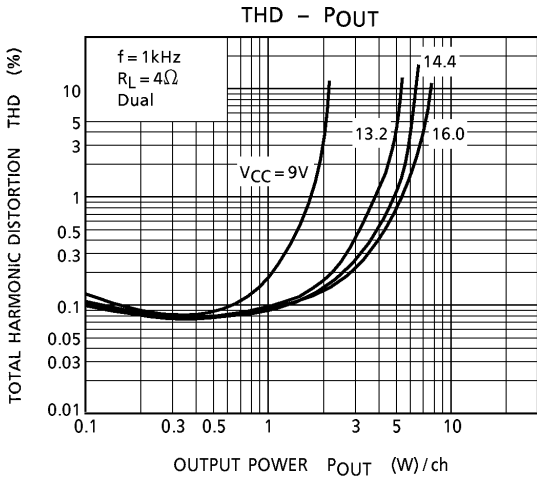
(Unless otherwise specified,  $V_{CC} = 13.2V$ ,  $f = 1kHz$ ,  $R_g = 600\Omega$ ,  $R_L = 4\Omega$ ,  $T_a = 25^\circ C$ )

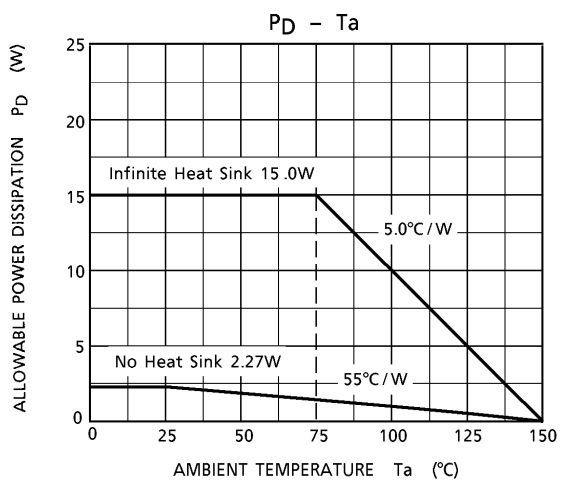
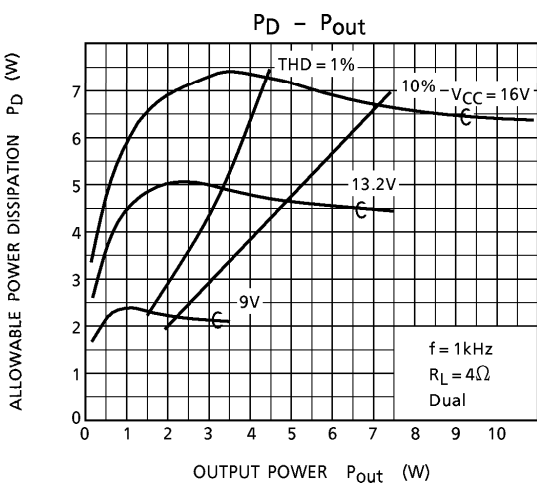
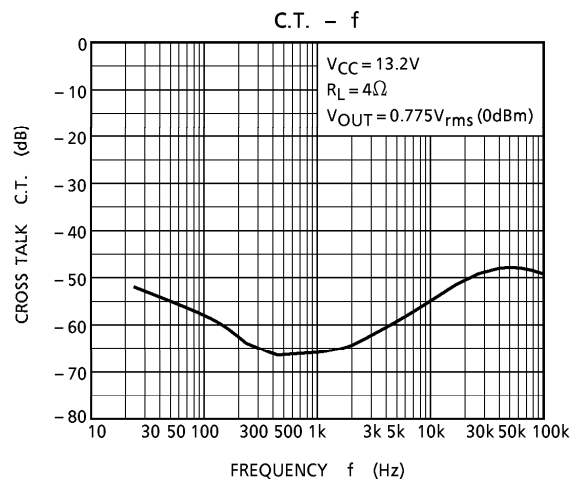
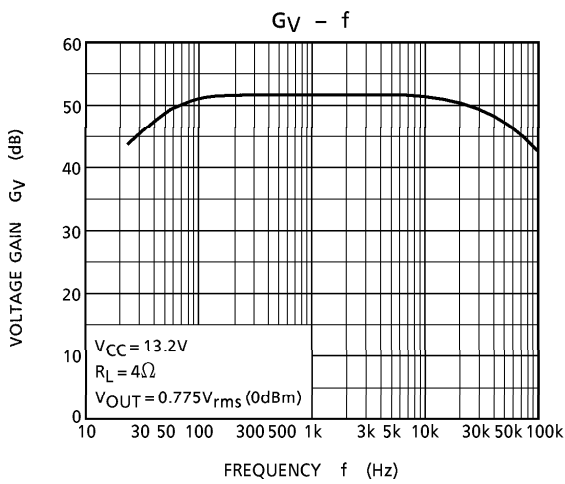
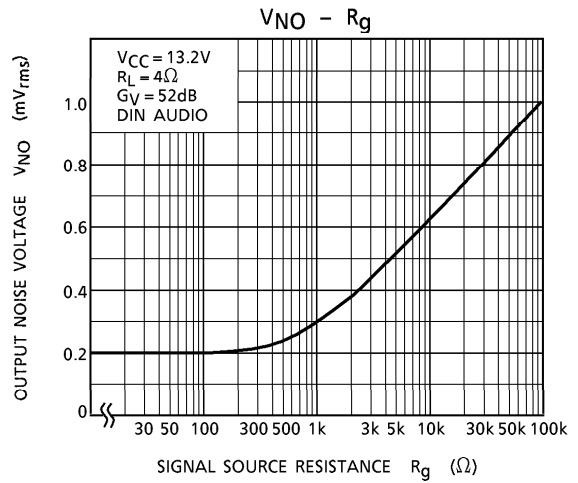
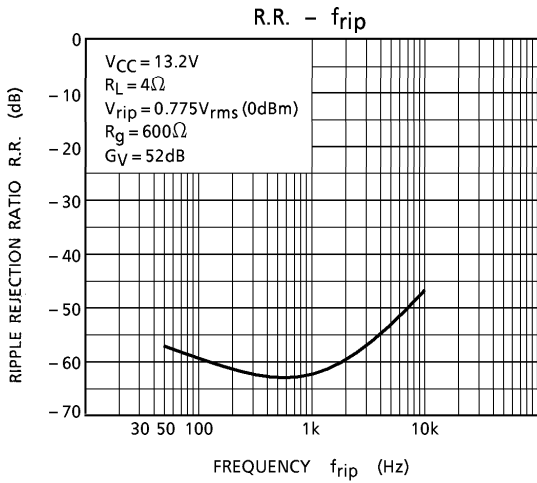
CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Current	$I_{ccq}$	—	$V_{in} = 0$	—	60	150	mA
Output Power	$P_{out(1)}$	—	THD = 10%, $R_L = 2\Omega$	—	7.3	—	W
	$P_{out(2)}$	—	$V_{CC} = 14.4V$ , THD = 10%	—	6.4	—	W
	$P_{out(3)}$	—	THD = 10%	4.8	5.3	—	W
Total Harmonic Distortion	THD	—	$P_{out} = 1W$	—	0.1	0.5	%
Voltage Gain	$G_V$	—	$V_{out} = 0.775V_{rms}$ (0dBm)	50	52	54	dB
Voltage Gain Ratio	$\Delta G_V$	—	$V_{out} = 0.775V_{rms}$ (0dBm)	-1	0	1	dB
Output Noise Voltage	$V_{NO}$	—	$R_g = 0\Omega$ , BW = 20Hz~20kHz	—	0.2	0.7	mV <sub>rms</sub>
Ripple Rejection Ratio	R.R.	—	$f_{ripple} = 100Hz$ , $V_{out} = 0.775V_{rms}$ (0dBm), $R_g = 600\Omega$	40	57	—	dB
Cross Talk	C.T.	—	$R_g = 600\Omega$ , $V_{out} = 0.775V_{rms}$ (0dBm)	—	65	—	dB
Input Resistance	$R_{IN}$	—	—	—	30	—	k $\Omega$
Stand-By Current	$I_{STBY}$	—	Pin $\textcircled{9}$ : GND	—	1	10	$\mu A$

**TEST CIRCUIT**

( $G_V = 52dB$ )



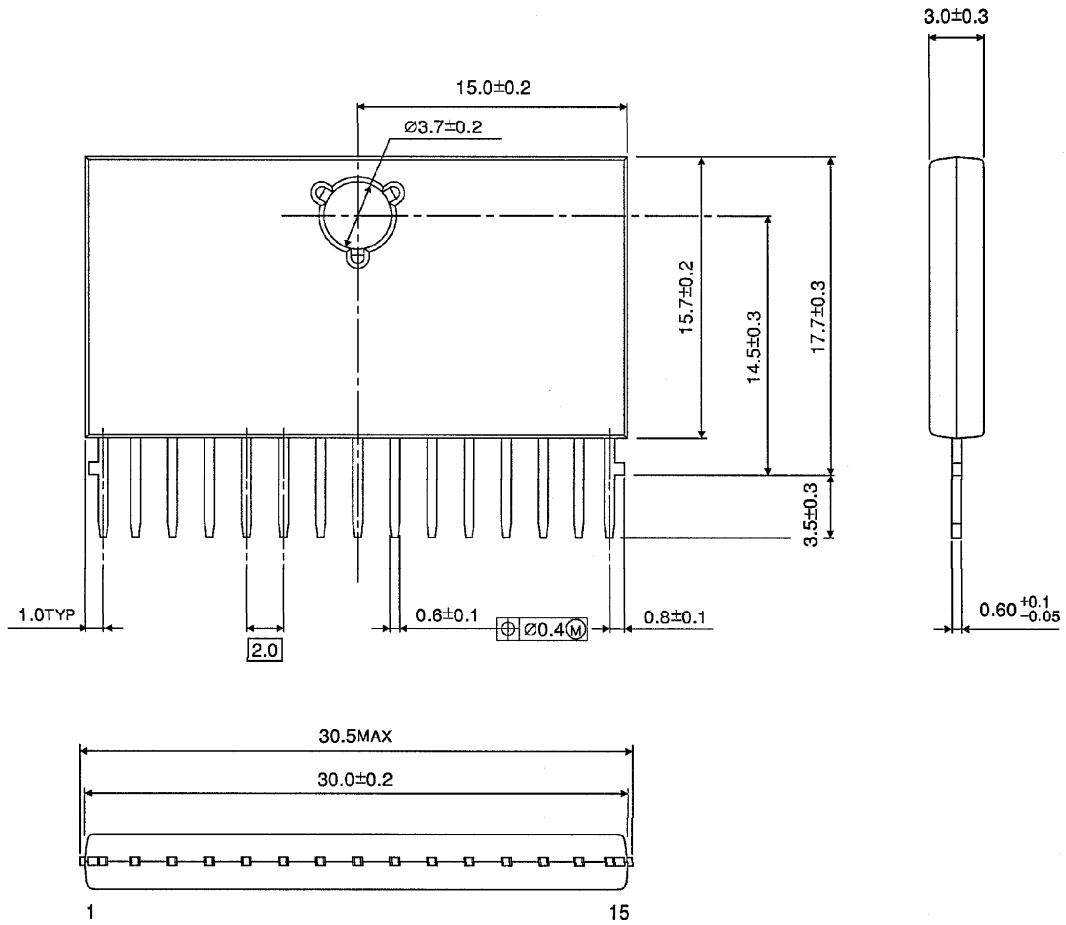






OUTLINE DRAWING  
HSIP15-P-2.00A

Unit : mm



Weight : 3.9g (Typ.)