

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

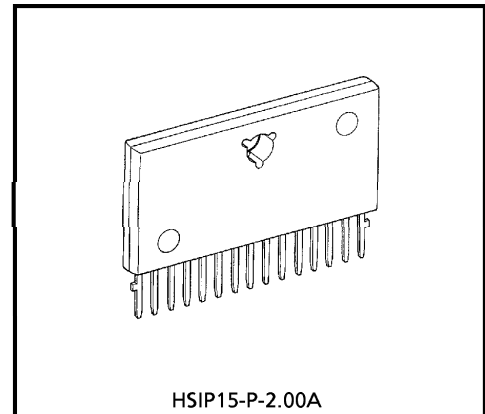
TA8238K**7.3W×2CH AUDIO POWER IC**

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
 - : $V_{CC(opr.)} = 6\sim 18V$



HSIP15-P-2.00A

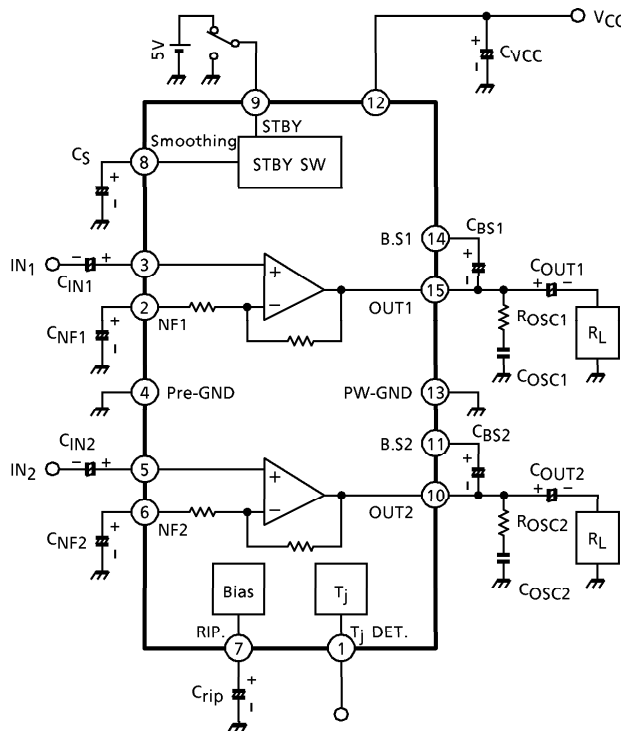
Weight : 3.9g (Typ.)

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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 .

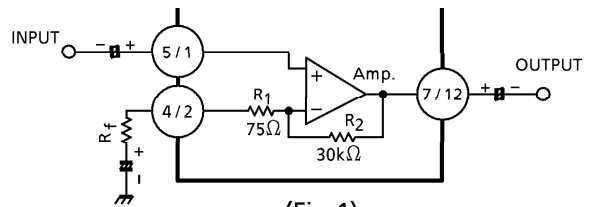
$$G_V = 20 \log \frac{R_f + R_1 + R_2}{R_f + R_1} \text{ (dB)}$$

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

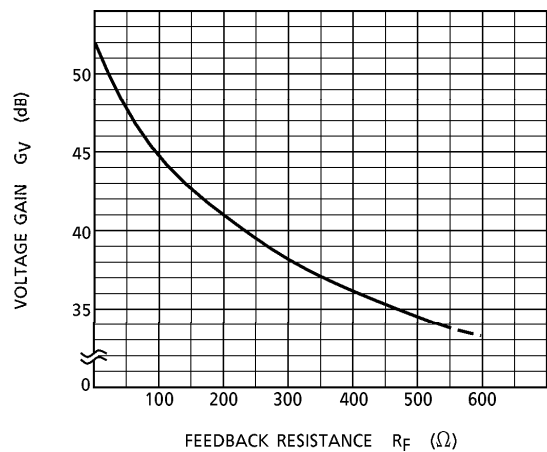
The voltage gain is reduced when R_f is increased.

(Fig.2)

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



(Fig.1)



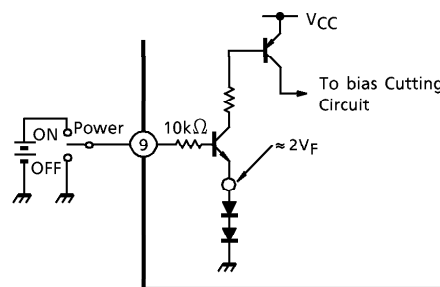
(Fig.2)

2. Stand-by SW Function

By means of controlling pin⁹ (Stand-by terminal) to High and Low, the power supply can be set to ON and OFF. The threshold voltage of pin⁹ is set at 2.1V (3V_{BE}), and the Power Supply current is about 1μA (Typ.) at the stand-by state.

Control Voltage pin⁹ : V (SB)

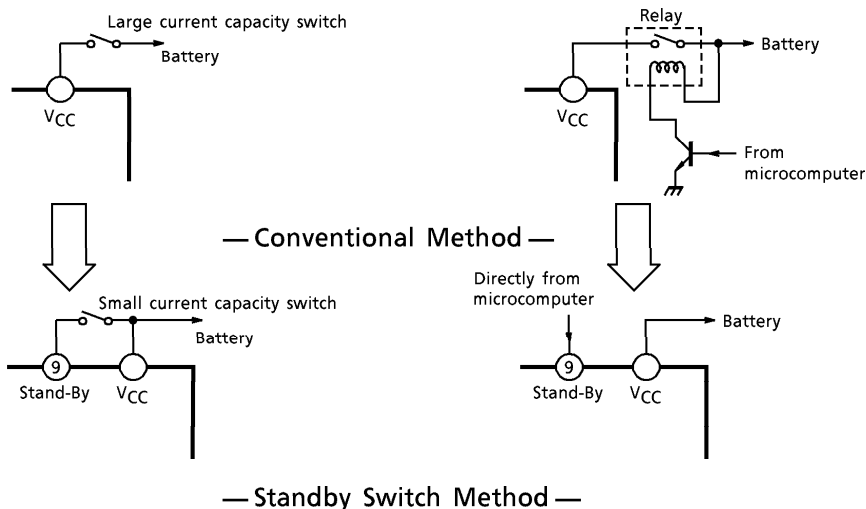
Stand-By	Power	V (SB) (V)
ON	OFF	0~2
OFF	ON	3~V _{CC}



(Fig.3)With Pin⁹ Set to High, Power is Turned ON.

Advantage of Stand-by SW

- (1) Since V_{CC} 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

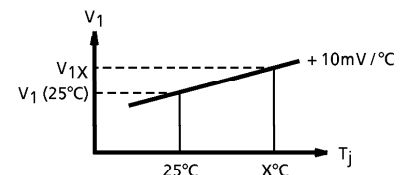
In case of its use with the voltage gain G_V reduced or with the feedback amount increased, care must be taken because the phase-inversion is caused by the high frequency resulting in making the oscillation liable generated.

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.

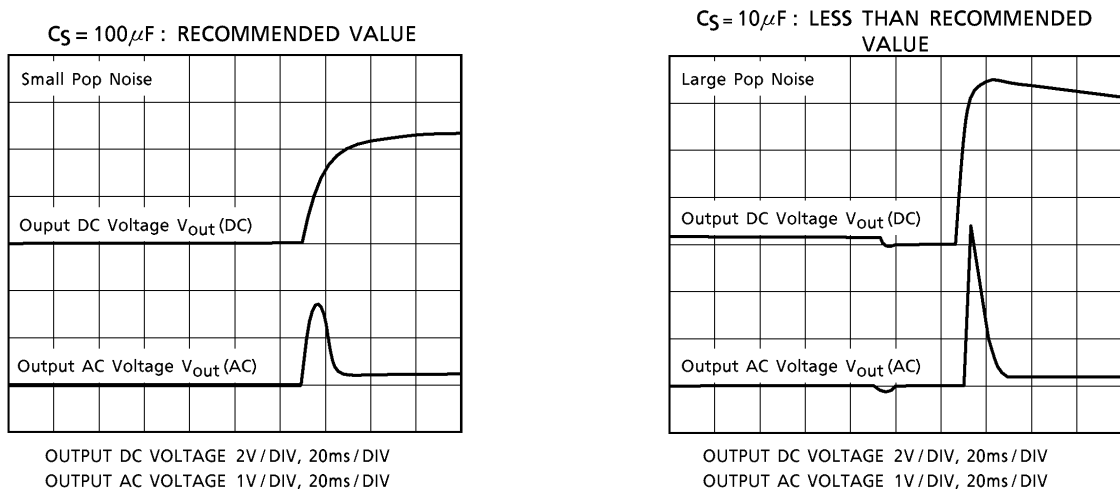


(Fig.4)

5. Pop Noise

The pop noise is reduced by the time constant τ of pin⑧ : smoothing.

Therefore, we recommend $C_5 = 100\mu\text{F}$, which is between pin⑧ and GND, because the pop noise will become worse by using the smaller capacity of C_5 .



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Peak Supply Voltage (0.2s)	$V_{CC}(\text{surge})$	50	V
DC Supply Voltage	$V_{CC}(DC)$	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

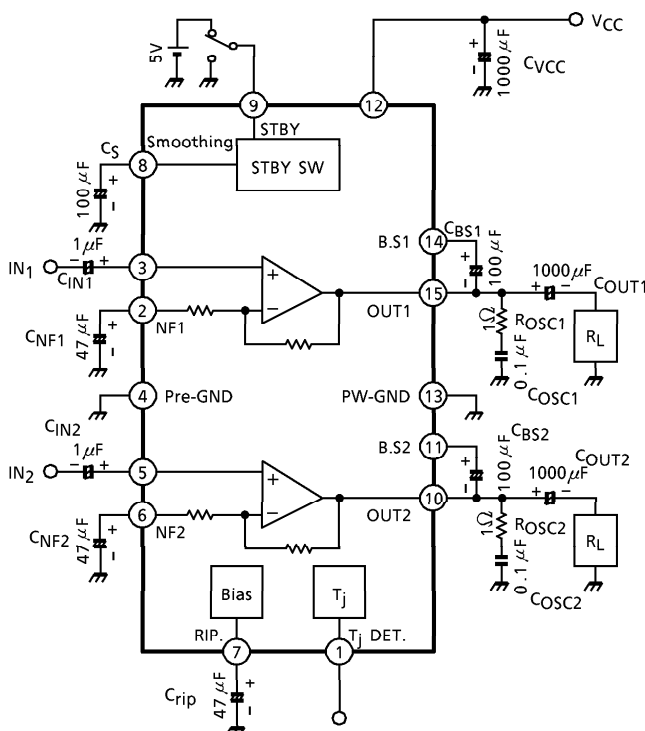
ELECTRICAL CHARACTERISTICS

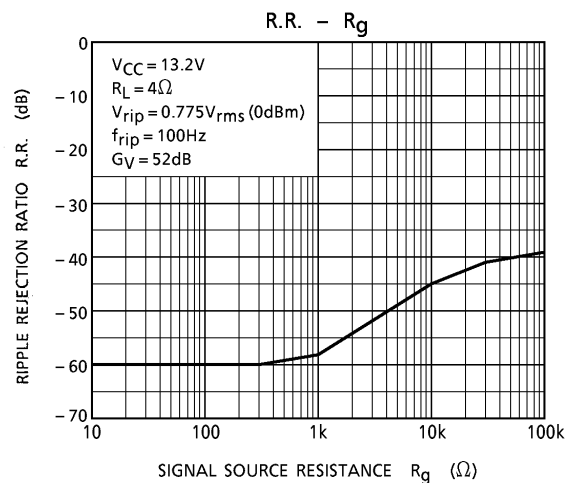
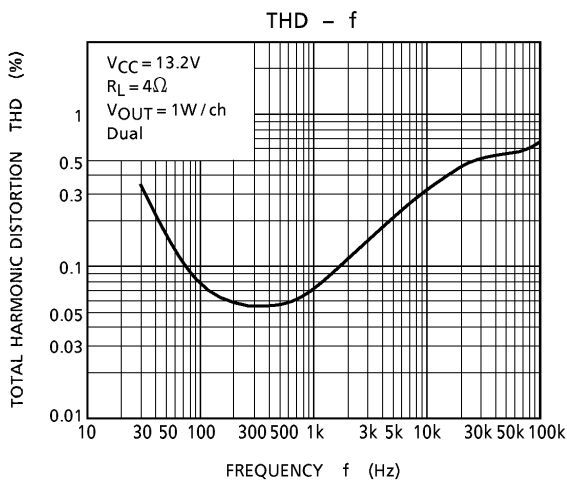
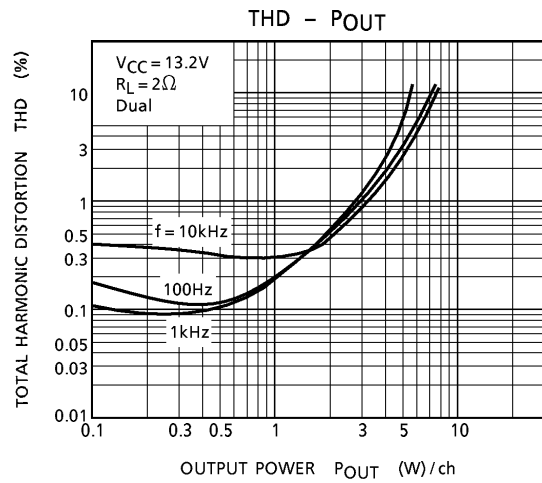
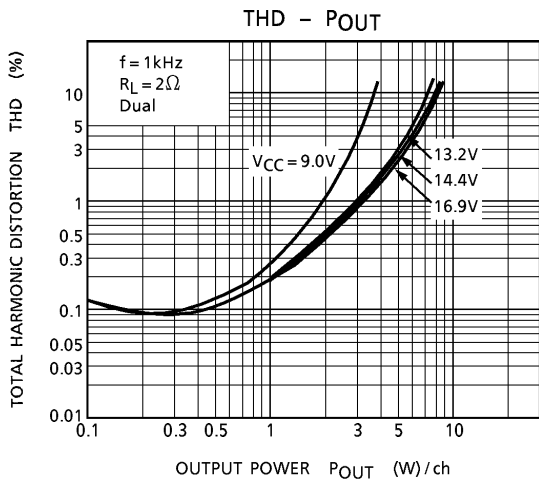
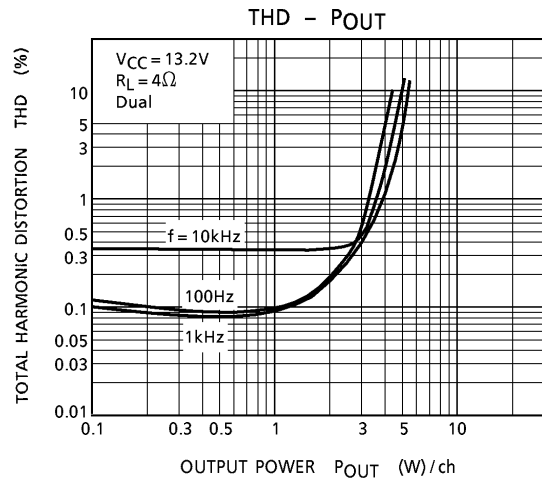
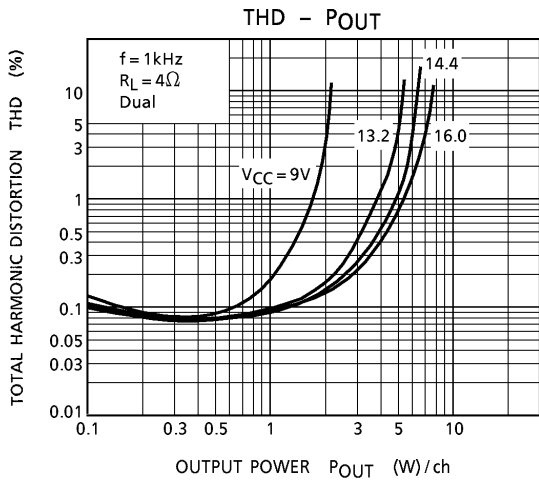
(Unless otherwise specified, $V_{CC} = 13.2V$, $f = 1kHz$, $R_g = 600\Omega$, $R_L = 4\Omega$, $T_a = 25^\circ C$)

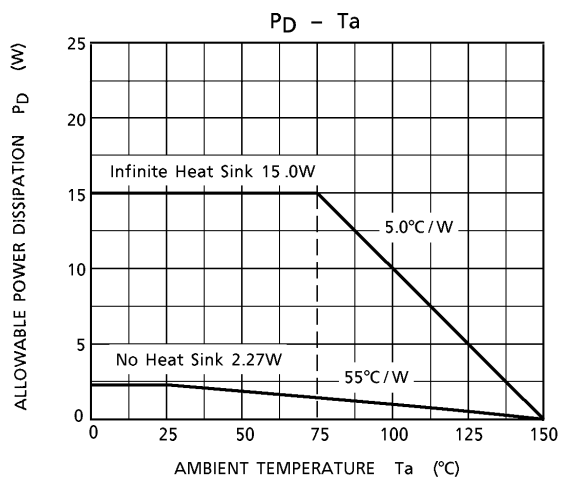
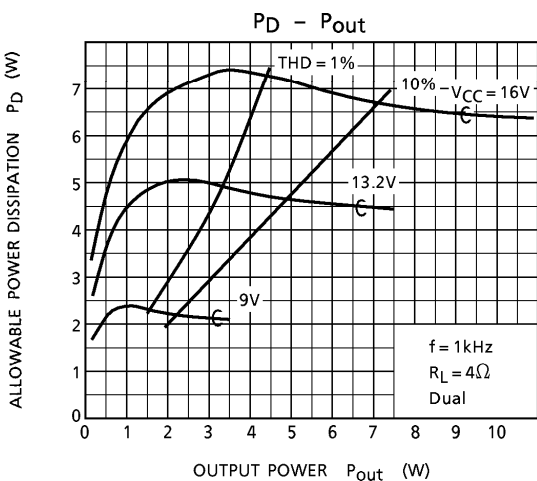
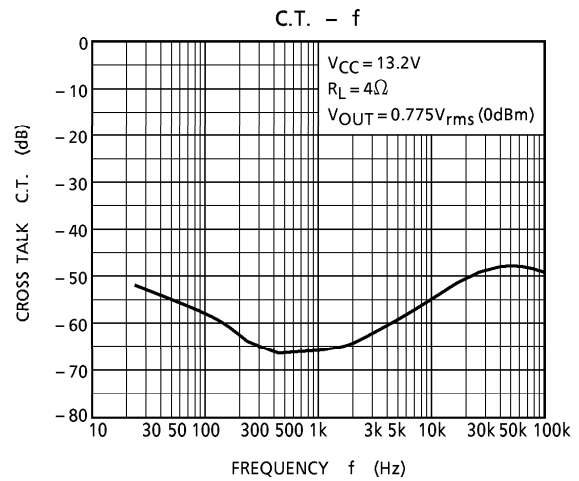
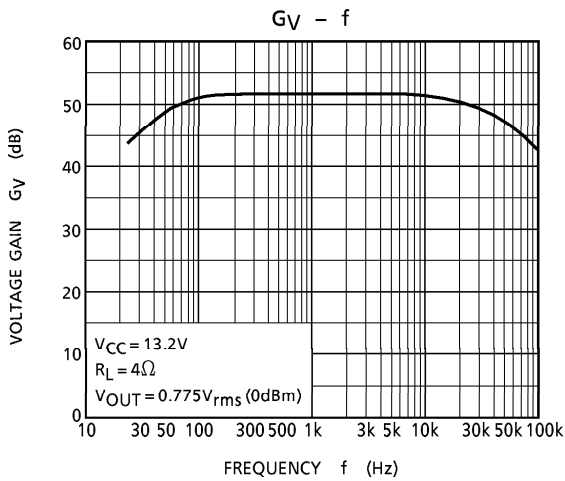
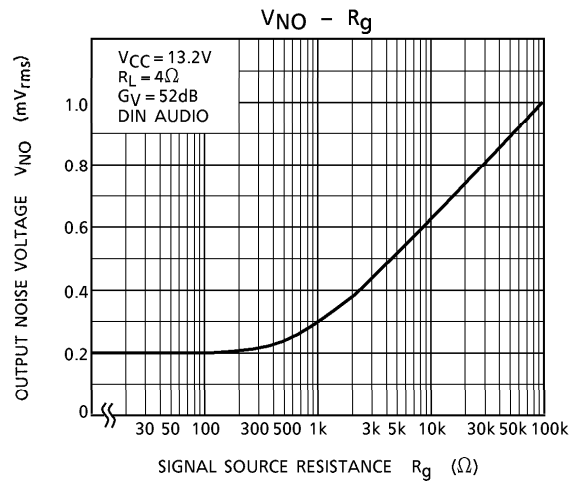
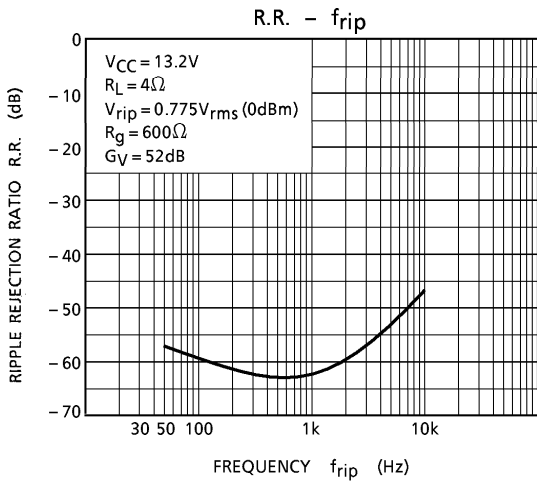
CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Current	I_{ccq}	—	$V_{in} = 0$	—	60	150	mA
Output Power	$P_{out(1)}$	—	THD = 10%, $R_L = 2\Omega$	—	7.3	—	W
	$P_{out(2)}$	—	$V_{CC} = 14.4V$, THD = 10%	—	6.4	—	W
	$P_{out(3)}$	—	THD = 10%	4.8	5.3	—	W
Total Harmonic Distortion	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	ΔG_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 _{rms}
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 Ω
Stand-By Current	I_{STBY}	—	Pin [Ⓢ] : GND	—	1	10	μA

TEST CIRCUIT

($G_V = 52dB$)

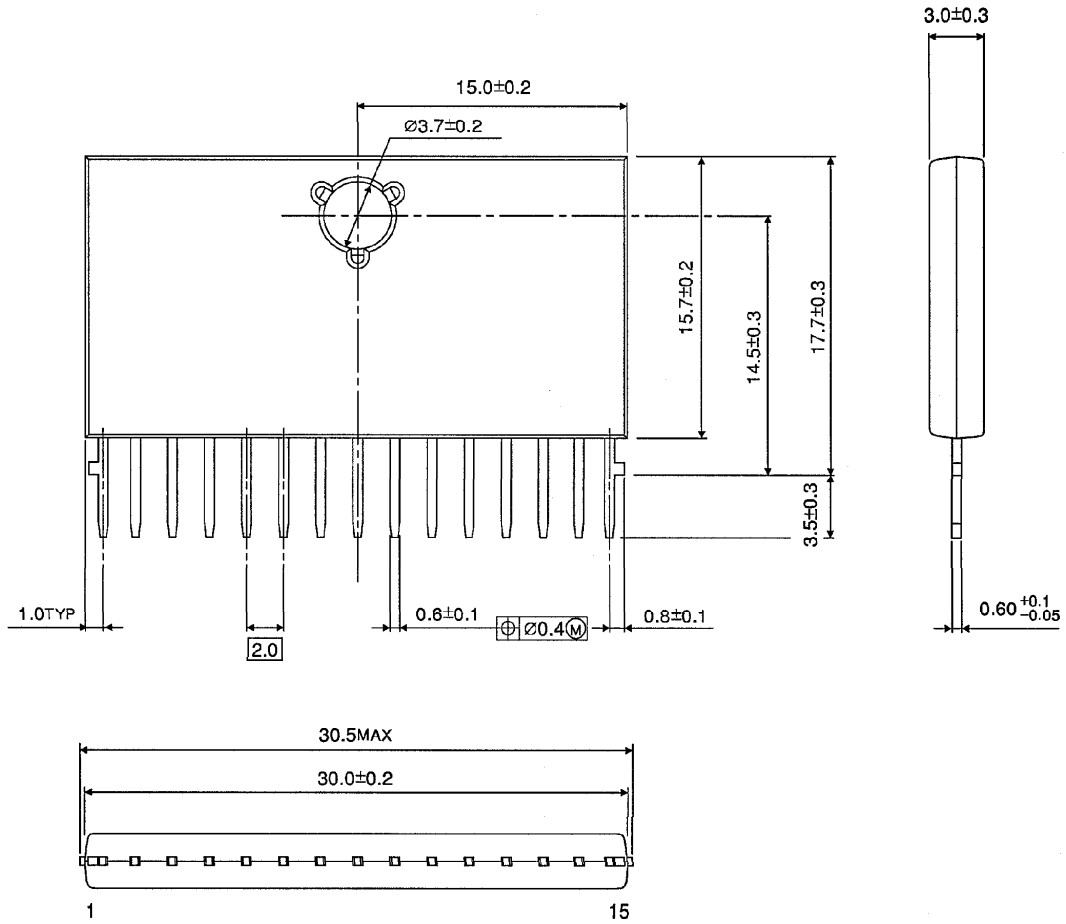






OUTLINE DRAWING
HSIP15-P-2.00A

Unit : mm



Weight : 3.9g (Typ.)