

# High-output dual power amplifier

## BA5417

The BA5417 is a 6 to 15V-compatible dual power amplifier developed for use radio cassette players. It is equipped with standby switching functions for excellent total harmonic distortion and other basic characteristics.

### ●Applications

Radio cassette / Mini compo players

### ●Features

- 1) High output.  
 $P_{OUT} = 2.8W$  ( $V_{CC} = 9V$ ,  $R_L = 3\Omega$ , THD = 10%)  
 $P_{OUT} = 5.0W$  ( $V_{CC} = 12V$ ,  $R_L = 3\Omega$ , THD = 10%)
- 2) Excellent audio quality  
 THD = 0.1% ( $f = 1kHz$ ,  $P_o = 0.5W$ )  
 $V_{NO} = 0.3mV_{rms}$  ( $R_g = 10k\Omega$ )  
 $RR = 55dB$  ( $f_{RR} = 100Hz$ )
- 3) Wide supply voltage operating range  
 ( $V_{CC} = 6.0V$  to  $15.0V$ ).
- 4) Switching noise ("pop" noise) generated when the power is switched on and off is small.
- 5) Ripple mixing when motor starts has been prevented.
- 6) Built-in thermal shutdown circuit.
- 7) Built-in standby switch. Output is not influenced by the standby pin voltage.
- 8) Soft clipping.

### ●Absolute maximum ratings ( $T_a = 25^\circ C$ )

Parameter	Symbol	Limits	Unit
Power supply voltage	$V_{CC}$	20*1	V
Power dissipation	$P_d$	15*2	W
Operating temperature	$T_{opr}$	-20 ~ +75	$^\circ C$
Storage temperature	$T_{stg}$	-55 ~ +150	$^\circ C$

\*1 Must be within standby values.

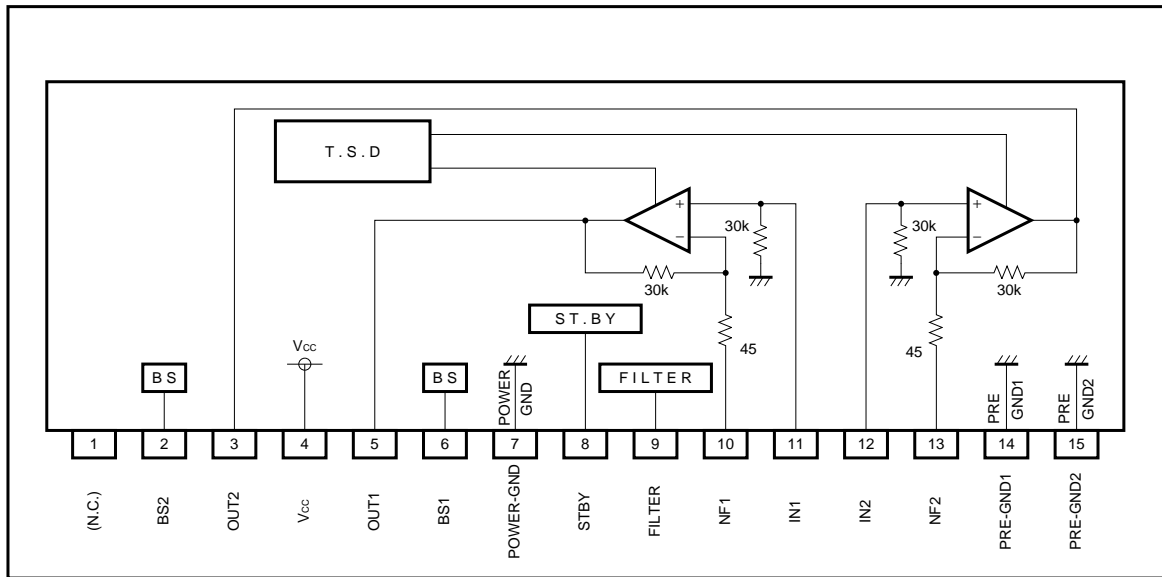
\*2  $T_a = 75^\circ C$  (when using infinite heatsink)

### ●Recommended operating conditions ( $T_a = 25^\circ C$ )

Parameter	Symbol	Limits	Unit
Power supply voltage	$V_{CC}$	6.0 ~ 15.0	V

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●Block diagram



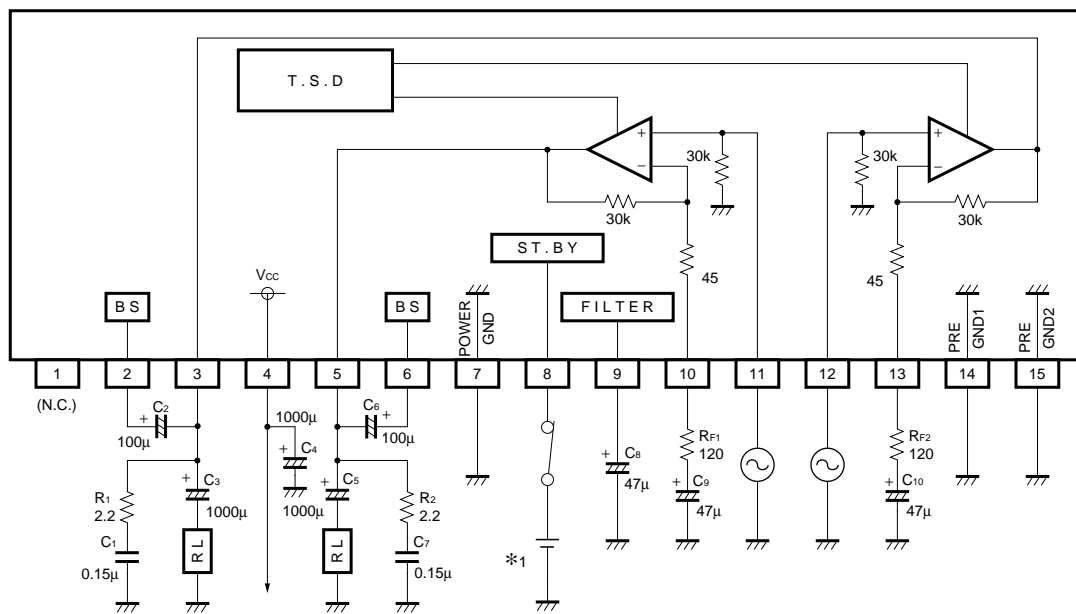
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●Electrical characteristics

(unless otherwise noted, Ta=25°C, Vcc=9.0V, RL=3Ω, RF=120Ω, Rg=600Ω, f=1kHz, OTL mode)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Coniditions
Quiescent current	I <sub>o</sub>	–	22	45	mA	V <sub>IN</sub> =0Vrms
Rated output voltage 1	P <sub>OUT1</sub>	2.2	2.8	–	W	TDH=10%
Rated output voltage 2	P <sub>OUT2</sub>	4.0	5.0	–	W	TDH=10%, V <sub>CC</sub> =12V
Closed-loop voltage gain	G <sub>VC</sub>	43	45	47	dB	–
Output noise voltage	V <sub>NO</sub>	–	0.3	1.0	mVrms	R <sub>g</sub> =10kΩ, DIN AUDIO
Total harmonic distortion	THD	–	0.1	1.0	%	P <sub>OUT</sub> =0.5W
Ripple rejection	RR	42	55	–	dB	f <sub>RR</sub> =100Hz, V <sub>RR</sub> =-10dBm
Crosstalk	CT	48	65	–	dB	V <sub>o</sub> =0dBm
Circuit current (with standby switch off)	I <sub>OFF</sub>	–	0	20	μA	–
Standby pin current when on	I <sub>SIN</sub>	–	0.15	0.4	mA	V <sub>STBY</sub> =V <sub>CC</sub>
Standby pin control voltage	Activated	V <sub>STH</sub>	3.5	–	–	–
	Not activated	V <sub>STL</sub>	–	–	1.2	–

●Measurement circuit



\*1 V<sub>STBY</sub>=3.5V ~ V<sub>CC</sub>

Fig.1

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●Application example

OTL mode circuit

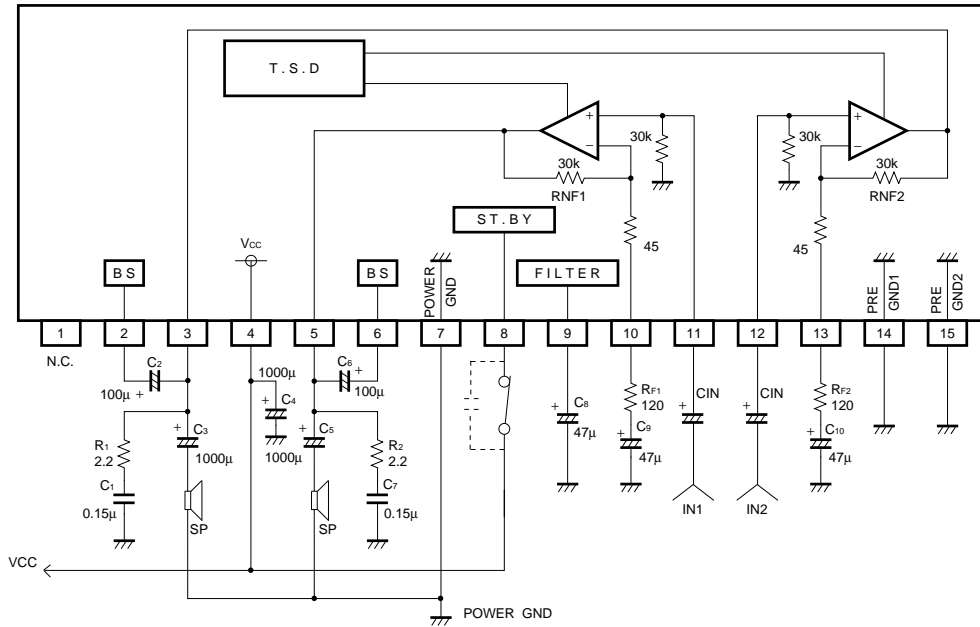
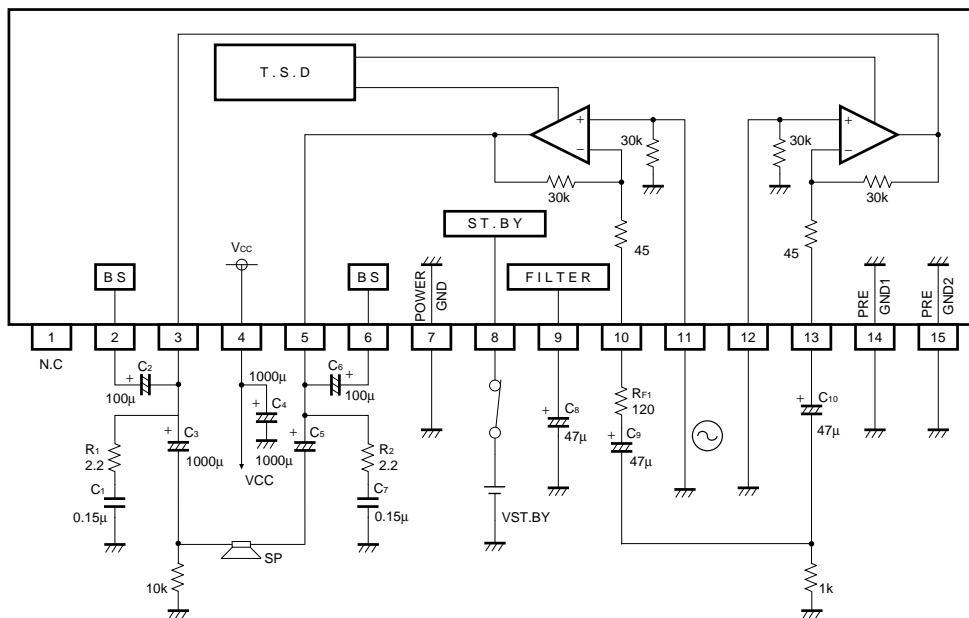


Fig.2

BTL mode circuit



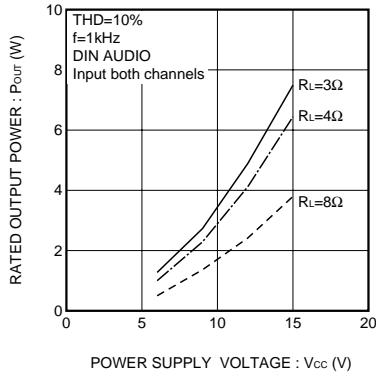
Note : 3pin,5pin need coupling capacitors (C3,C5 100µF) for DC offset voltage.

Fig.3

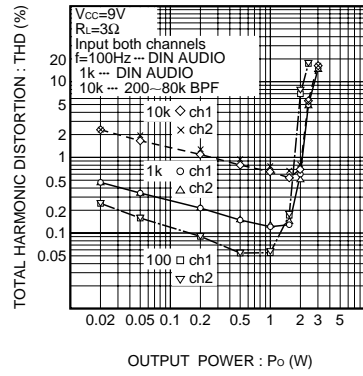
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●Electrical characteristics

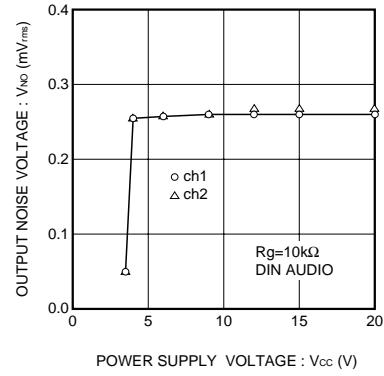
OTL mode



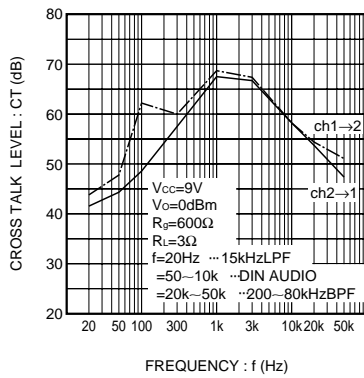
POWER SUPPLY VOLTAGE :  $V_{CC}$  (V)  
Fig.4 Rated output power vs. Power supply voltage



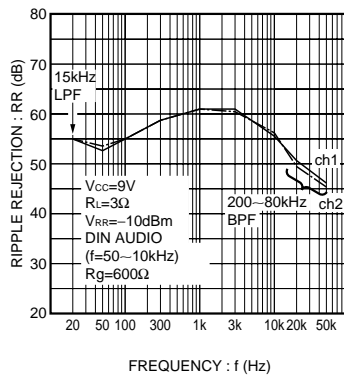
OUTPUT POWER :  $P_o$  (W)  
Fig.5 Total harmonic distortion vs. Output power



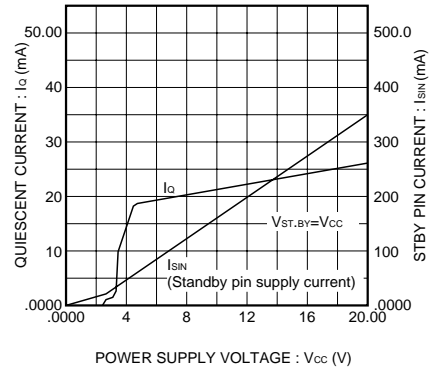
POWER SUPPLY VOLTAGE :  $V_{CC}$  (V)  
Fig.6 Output noise voltage vs. Power supply voltage



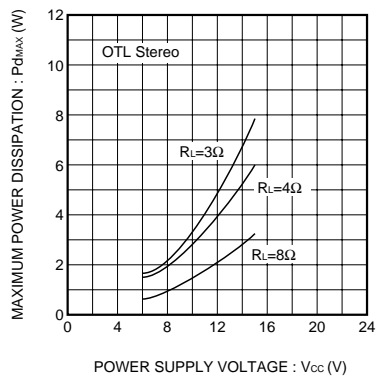
FREQUENCY :  $f$  (Hz)  
Fig.7 Crosstalk vs. Frequency



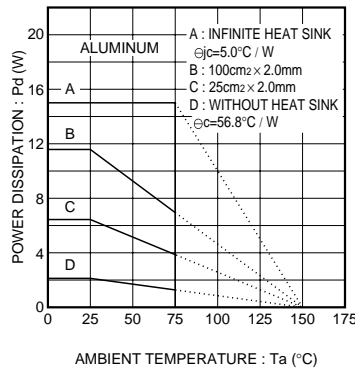
FREQUENCY :  $f$  (Hz)  
Fig.8 Ripple rejection vs. Frequency



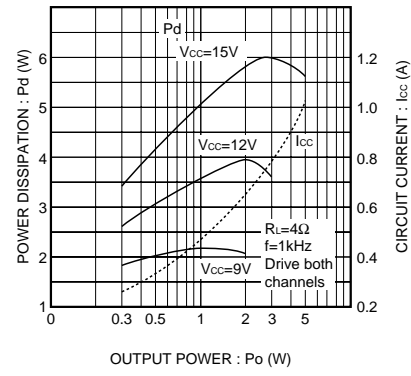
POWER SUPPLY VOLTAGE :  $V_{CC}$  (V)  
Fig.9 Quiescent standby pin supply current vs. Power supply voltage



POWER SUPPLY VOLTAGE :  $V_{CC}$  (V)  
Fig.10 Maximum power dissipation vs. Power supply voltage



AMBIENT TEMPERATURE :  $T_a$  (°C)  
Fig.11 Thermal derating curve



OUTPUT POWER :  $P_o$  (W)  
Fig.12 Power dissipation vs. Power supply voltage ( $R_L=4\Omega$ )

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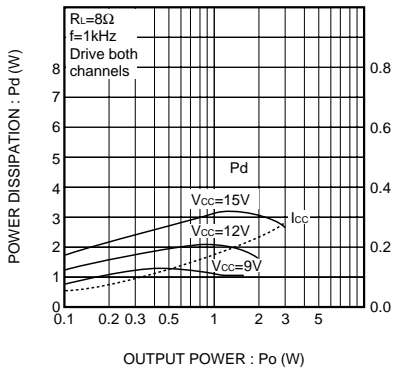


Fig.13 Power dissipation vs. Power supply voltage (RL=8Ω)

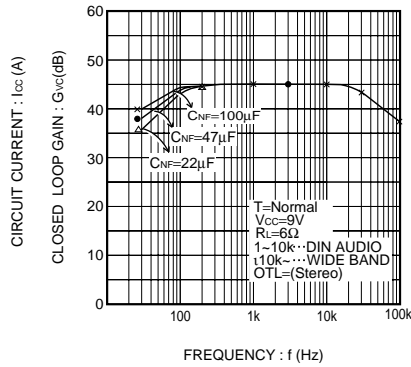


Fig.14 Closed loop gain vs. Frequency

BTL mode

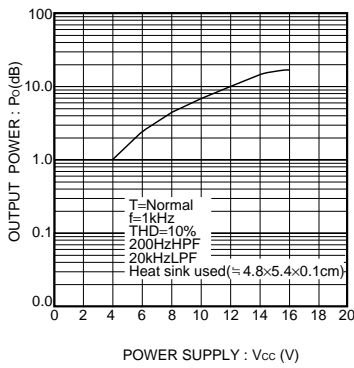


Fig.15 Rated output power vs. Power supply voltage

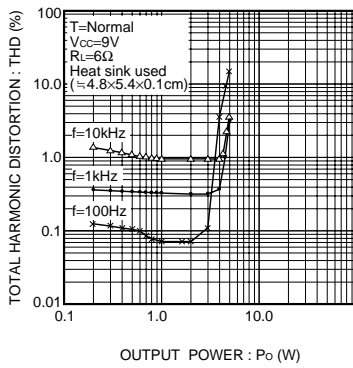


Fig.16 Total harmonic distortion vs. Output power

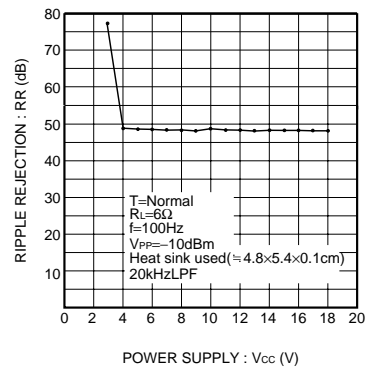


Fig.17 Ripple rejection vs. Power supply voltage

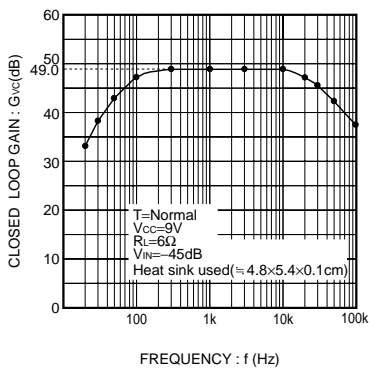


Fig.18 Closed loop gain vs. Frequency

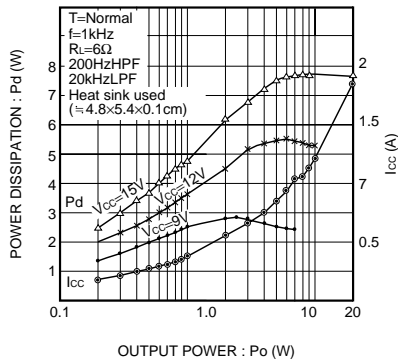


Fig.19 Power dissipation vs. Power supply voltage (RL=6Ω)

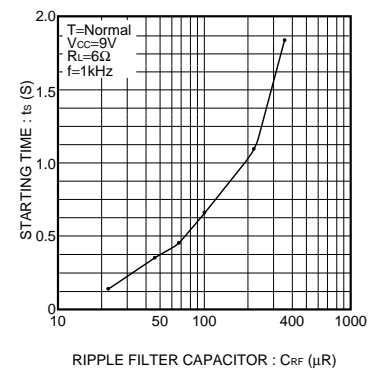
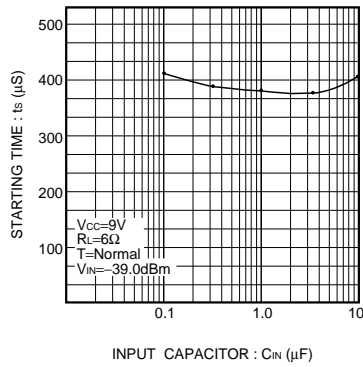


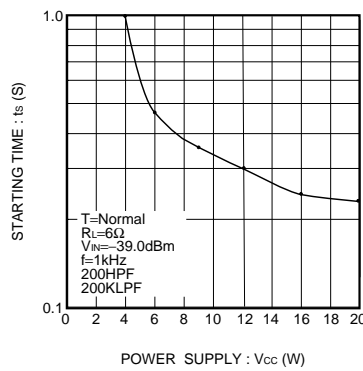
Fig.20 Starting time vs. Ripple filter capacitor

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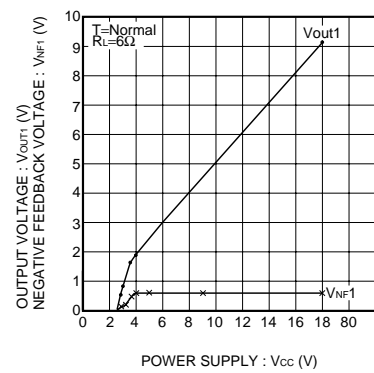
INPUT CAPACITOR : CIN (μF)

Fig.21 Starting time vs. Input capacitor



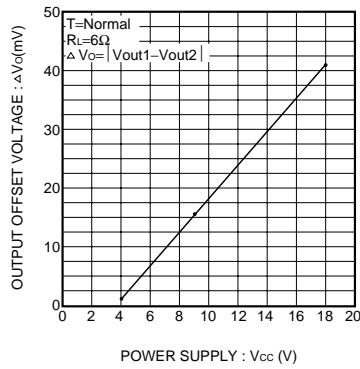
POWER SUPPLY : VCC (V)

Fig.22 Starting time vs. Power supply voltage



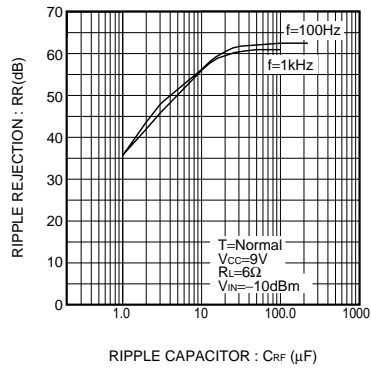
POWER SUPPLY : VCC (V)

Fig.23 Output voltage Negative feedback voltage vs. Power supply voltage



POWER SUPPLY : VCC (V)

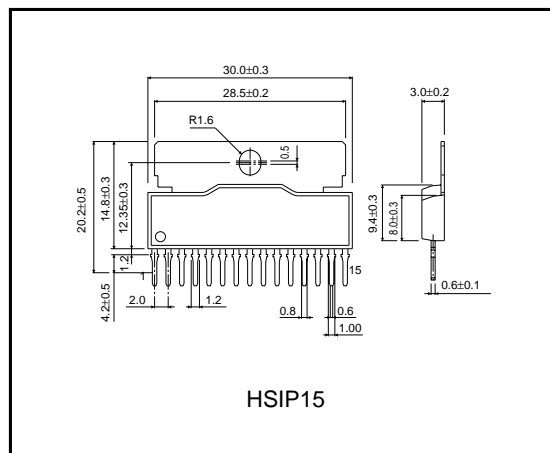
Fig.24 Output offset voltage vs. Power supply voltage



RIPPLE CAPACITOR : CREF (μF)

Fig.25 Ripple rejection vs. Ripple filter capacitor

●External dimensions (Units : mm)



HSIP15

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