4-channel BTL driver for CD players

BA6797FP / BA6797FM

The BA6797FP and BA6797FM are 4-channel BTL power drivers for CD players and each have an internal 5V regulator (requires attached PNP transistor). Because the input stage of each driver channel connects to an operational amplifier, and there are both positive and negative input pins, making these ICs adaptable for a wide range of inputs and greatly simplify filter configuration. In addition, the internal level shifting circuit reduces the number of external components.

●Applications

CD players, CD-ROM drives and other optical disc devices

●Features

1) 4-channel BTL driver in a HSOP 28-pin power package, ideal for application miniaturization.
2) Wide dynamic range.
3) Internal thermal shutdown circuit.
4) Internal level shifting circuit reduces the number of external components.
5) Dual positive and negative input pins, for adaptability for a wide range of inputs (including negative phase input). Also simplifies filter configuration.

●Absolute maximum ratings (Ta = 25°C)

Parameter		Symbol	Limits	Unit
Power supply voltage		V_{CC}	18	V
Power dissipation	BA6797FP	Pd	1800 *1	mW
	BA6797FM		2200*2	mW
Operating temperature		Topr	−40～+85	℃
Storage temperature		Tstg	−55～+150	℃

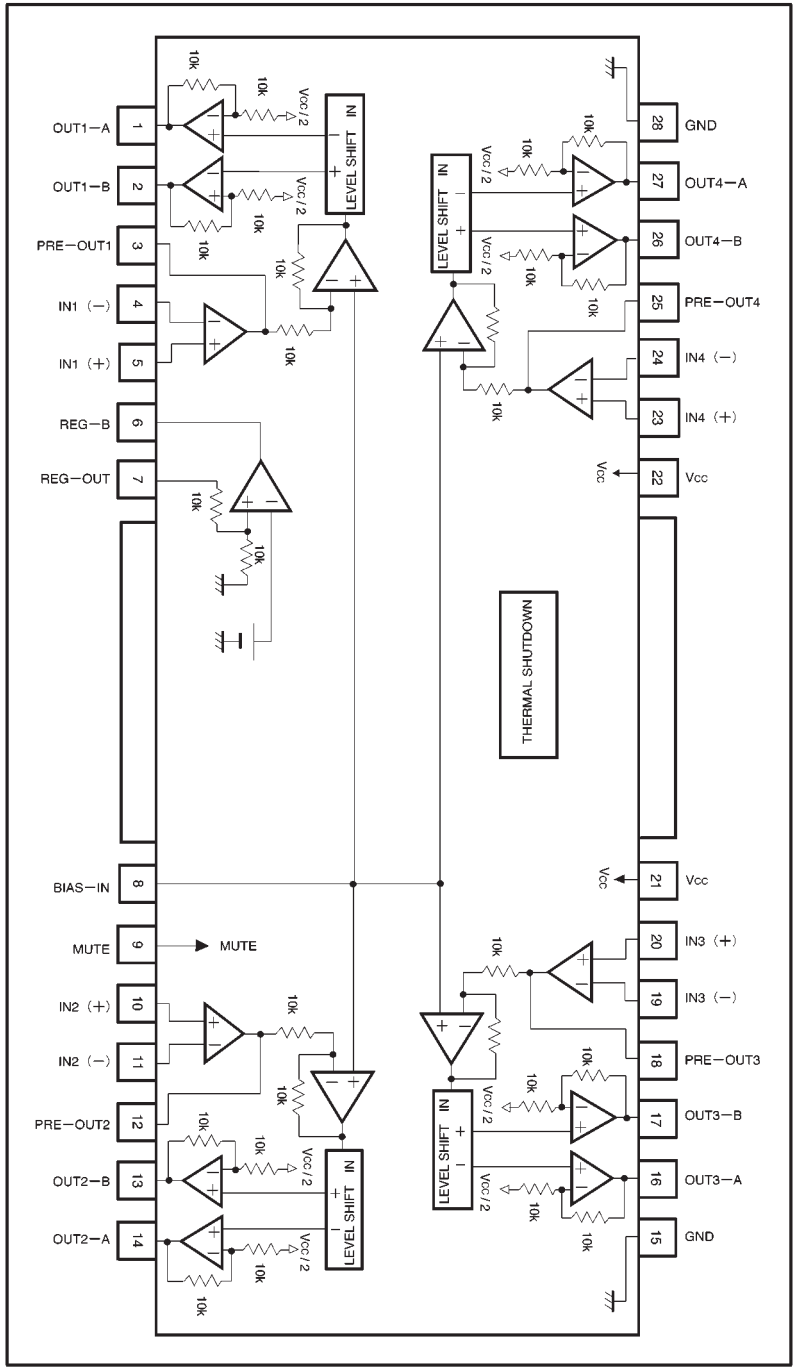
*1. Reduced by 14.4 mW for each increase in Ta of 1℃ over 25℃.
When mounted on a 70 mm × 70 mm × 1.6 mm glass epoxy board with less than 3% copper foil
*2. Reduced by 17.6 mW for each increase in Ta of 1℃ over 25℃.

●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{CC}	6.0	—	13.5	V
		4.5	—	13.5	V*3

*3. Without regulator

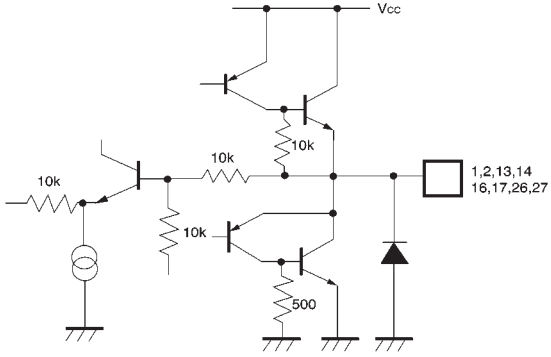
●Block diagram

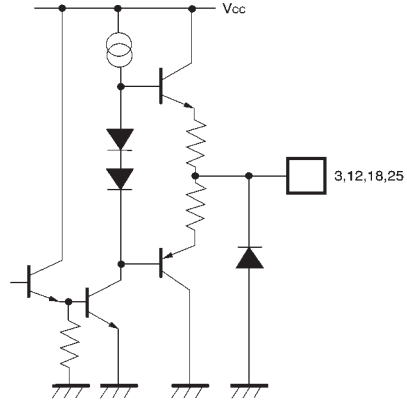


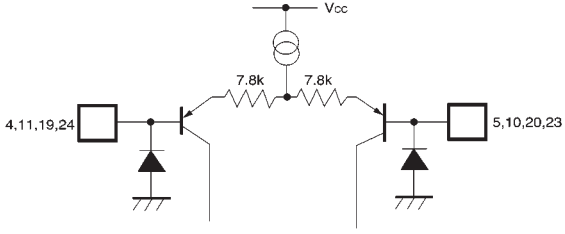
●Pin descriptions

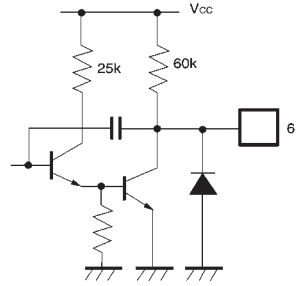
Pin No.	Pin name	Function
1	OUT1−A	Driver channel 1 output
2	OUT1−B	Driver channel 1 output
3	PRE−OUT1	Channel 1 preamplifier output
4	IN1 (−)	Channel 1 preamplifier inverted input
5	IN2 (+)	Channel 1 preamplifier non-inverted input
6	REG−B	Attached transistor base connection
7	REG−OUT	Constant voltage output (connect to attached transistor collector)
8	BIAS−IN	Bias input
9	MUTE	Mute control
10	IN2 (+)	Channel 2 preamplifier non-inverted input
11	IN2 (−)	Channel 2 preamplifier inverted input
12	PRE−OUT2	Channel 2 preamplifier output
13	OUT2−B	Driver channel 2 output
14	OUT2−A	Driver channel 2 output
15	GND	Substrate ground
16	OUT3−A	Driver channel 3 output
17	OUT3−B	Driver channel 3 output
18	PRE−OUT3	Channel 3 preamplifier output
19	IN3 (−)	Channel 3 preamplifier inverted input
20	IN3 (+)	Channel 3 preamplifier non-inverted input
21	V_{CC}	V_{CC}
22	V_{CC}	V_{CC}
23	IN4 (+)	Channel 4 preamplifier non-inverted input
24	IN4 (−)	Channel 4 preamplifier inverted input
25	PRE−OUT4	Channel 4 preamplifier output
26	OUT4−B	Driver channel 4 output
27	OUT4−A	Driver channel 4 output
28	GND	Substrate ground

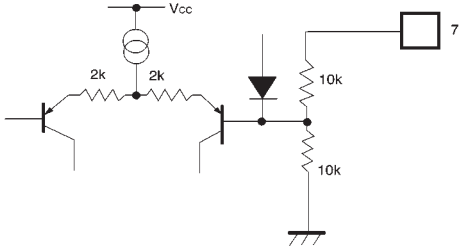
●Input / output circuits

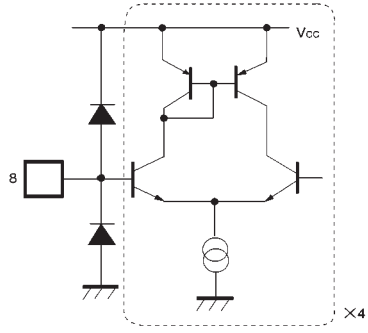


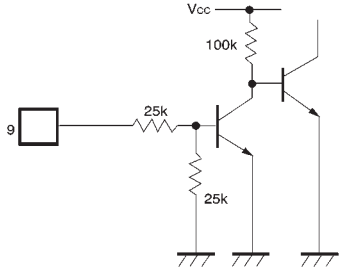












●Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{CC} = 8V, f = 1kHz, R_L = 8Ω)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions		Measurement Circuit
Quiescent current dissipation	I_Q	5.5	9.0	12.5	mA	No load, preamplifier configured		Fig. 1
〈Driver〉								
Output offset voltage	V_{OO}	−70	−	70	mV	Preamplifier buffer configured		Fig. 1
Maximum output amplitude	V_{OM}	5.0	5.4	−	V			Fig. 1
Closed loop voltage gain	G_{VC}	10.5	12.0	13.5	dB	When preamplifier is 0dB, V_{IN}=0.1V_{rms}		Fig. 1
Mute-off voltage	V_{MOFF}	2.0	−	−	V			Fig. 1
Mute-on voltage	V_{MON}	−	−	0.5	V			Fig. 1
Ripple rejection	RR	−	60	−	dB	V_{IN}=0.1V_{rms},100Hz	Preamplifier buffer configured	Fig. 1
Interchannel crosstalk	CT	−	60	−	dB	V_{IN}=0.1V_{rms},1kHz		Fig. 1
〈Operational preamplifier〉								
Input bias current	I_B	−	−	300	nA			Fig. 1
Synchronous input voltage	V_{ICM}	0	−	6.8	V	Preamplifier buffer configured		Fig. 1
Preamplifier V_{OH}	V_{OHP}	6.6	7.1	−	V	Buffer configured (V_{IN} = V_{CC})		Fig. 1
Preamplifier V_{OL}	V_{OLP}	−	0.8	1.1	V	Buffer configured (V_{IN} = GND)		Fig. 1
Preamplifier V_{OH}	I_{OHP}	2	−	−	mA	Ground at 100 Ω output		Fig. 1
Preamplifier I_{OL}	I_{OLP}	5	−	−	mA	Vcc at 100 Ω output		Fig. 1
Slew rate	SR	−	2	−	V/μs	100 kHz square wave, 3V_{P-P} output		Fig. 1
〈5 V regulator〉								
Output voltage	V_{REG}	4.75	5.00	5.25	V	I_L=100mA		Fig. 1
Output load variation	ΔV_{RL}	−50	0	10	mV	I_L=0~200mA		Fig. 1
Supply voltage variation	ΔV_{VCC}	−10	0	25	mV	(V_{CC}=6~9V) I_L=100mA		Fig. 1

◎Not designed for radiation resistance.

●Measurement circuit

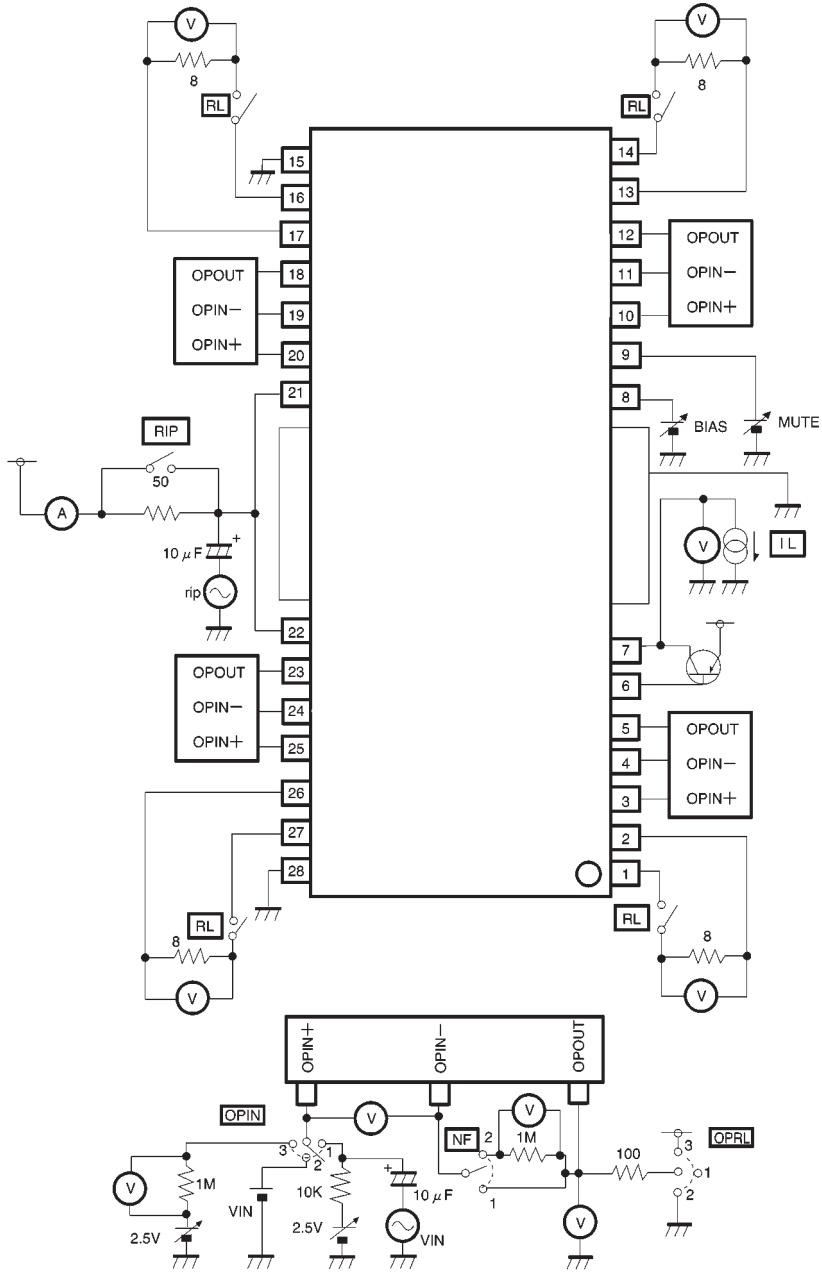


Fig.1

●Measurement circuit switch table

Symbol	Switch					Input						Note
	RIP	RL	OPIN	NF	OPRL	VIN	vin	rip	IL	BIAS	MUTE	
I_Q	ON	OFF	2	1	1	2.5V	—	—	—	2.5V	2.0V	
〈Driver〉												
V_{OO}	ON	ON	2	1	1	2.5V	—	—	—	2.5V	2.0V	
V_{OM}	↓	↓	↓	↓	↓	2.5V	—	—	—	0V, 5V	2.0V	
G_{VC}	↓	↓	1	↓	↓	—	$0.1V_{rms}$	—	—	2.5V	2.0V	
V_{MOFF}	↓	↓	2	↓	↓	3.0V	—	—	—	2.5V	2.0V	
V_{MON}	↓	↓	↓	↓	↓	3.0V	—	—	—	2.5V	0.5V	
RR	OFF	↓	↓	↓	↓	2.5V	—	$0.1V_{rms}$	—	2.5V	2.0V	
CT	ON	↓	1	↓	↓	—	$0.1V_{rms}$	—	—	2.5V	2.0V	
〈Operational amplifier〉												
I_B	ON	OFF	3	2	1	—	—	—	—	2.5V	2.0V	
V_{ICM}	↓	↓	2	1	↓	SWEEP	—	—	—	2.5V	2.0V	
V_{OHP}	↓	↓	↓	↓	↓	V_{CC}	—	—	—	2.5V	2.0V	
V_{OLP}	↓	↓	↓	↓	↓	GND	—	—	—	2.5V	2.0V	
I_{OHP}	↓	↓	↓	↓	2	2.5V	—	—	—	2.5V	2.0V	
I_{OLP}	↓	↓	↓	↓	3	2.5V	—	—	—	2.5V	2.0V	
SR	↓	↓	1	↓	1	—	See Note	—	—	2.5V	2.0V	100 kHz square wave
〈Regulator〉												
V_{REG}	ON	OFF	2	1	1	—	—	—	100mA	—	2.0V	
ΔV_{RL}	↓	↓	↓	↓	↓	—	—	—	0—200mA	—	2.0V	
ΔV_{VCC}	↓	↓	↓	↓	↓	—	—	—	100mA	—	2.0V	

●Application example

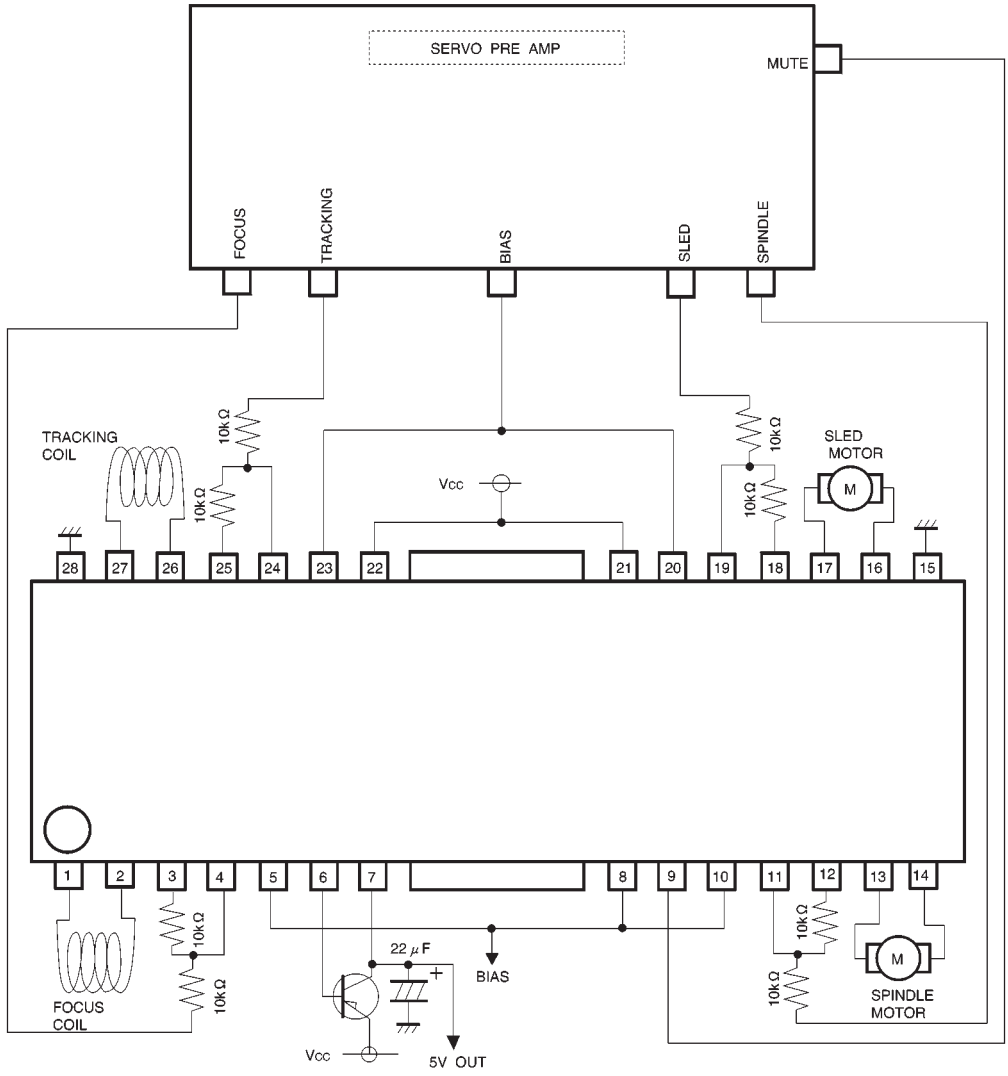


Fig.2

●Operation notes

(1) The BA6797FP and BA6797FM have an internal thermal shutdown circuit. Output current is muted when the chip temperature exceeds 175°C (typically).

(2) If the mute pin (pin 9) voltage is opened or lowered below 0.5V, the output current will be muted. Pin 15 should be pulled up above 2.0V during normal use. During muting, the output pins remain at the internal bias voltage, roughly (V_{CC} / 2).

(3) The bias pin (pin 8) is muted when lowered below 1.4V (typically). Make sure it stays above 1.6V during normal use.

(4) Be sure to connect the IC to a 0.1μF bypass capacitor to the power supply, at the base of the IC.

(5) Connect the radiating fin to an external ground.

(6) The capacitor between regulator output (pin 7) and GND also serves to prevent oscillation of the IC, so select one with good temperature characteristics.

●Electrical characteristic curves

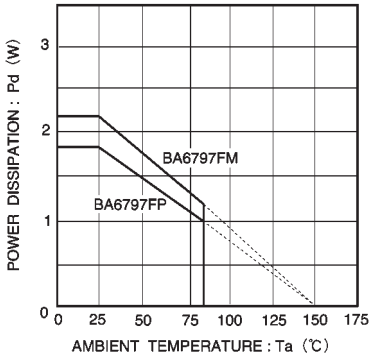


Fig. 3 Thermal derating curve

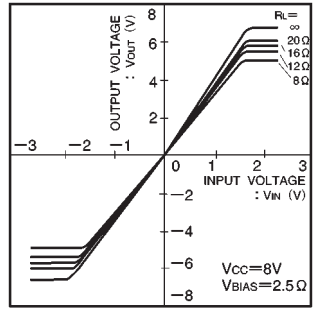


Fig.4 Driver I / O characteristics (when load changes)

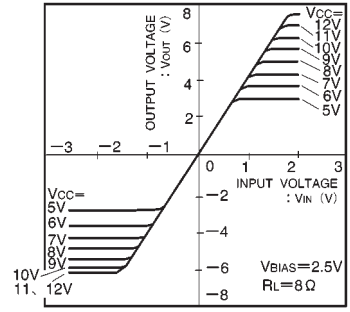


Fig. 5 Drive I / O characteristics (when supply voltage changes)

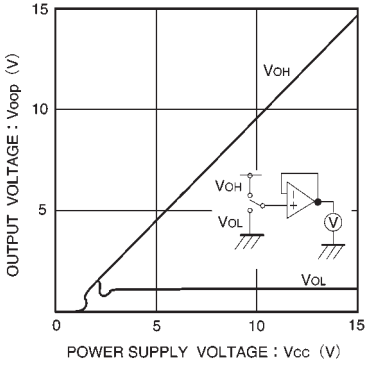


Fig.6 Power supply voltage vs. operational amplifier output for high level voltage / low level voltage

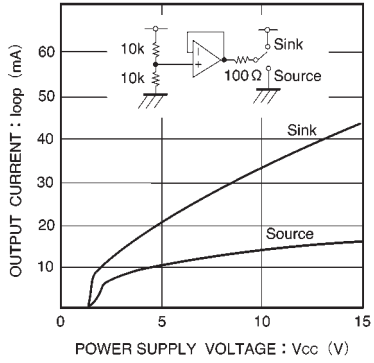


Fig. 7 Power supply voltage vs. operational amplifier output drive current

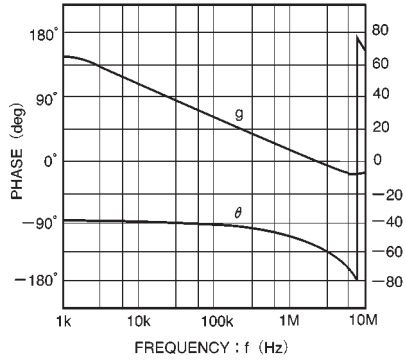


Fig. 8 Operational amplifier vs open loop

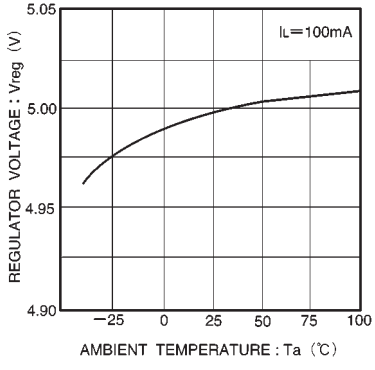


Fig. 9 Regulator voltage vs. temperature

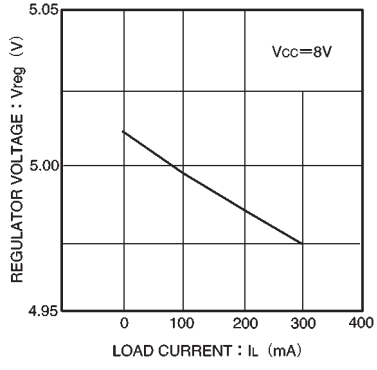
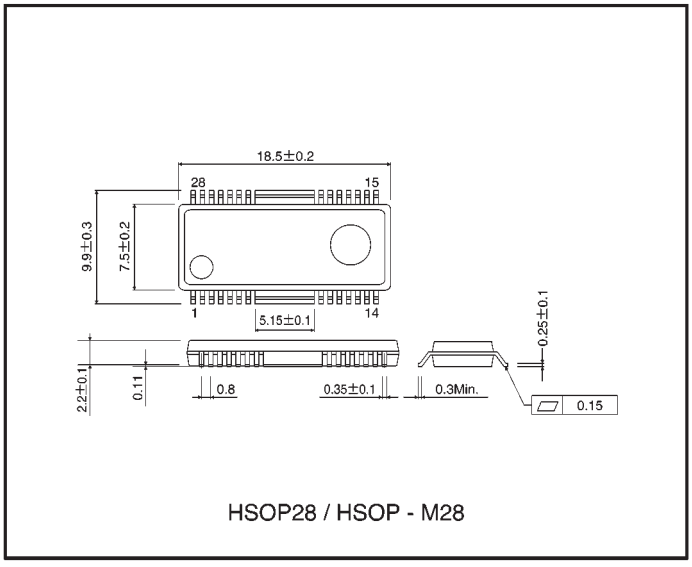


Fig. 10 Load current vs. regulator voltage

●External dimensions (Units: mm)



HSOP28 / HSOP - M28