

Structure : Silicon Monolithic Integrated Circuit
 Product Name : Power Driver for DVD-RAMs

Device Name : **BA5955FP**

- Features :
- 2-ch current feedback-type BTL driver
 - Use of an HSOP25PIN power package allows downsizing of the set.
 - A wide dynamic range
 - A built-in thermal shutdown circuit installed.
 - The pre stage (PRE part) and the output stage (POW part) are separated to achieve an efficient drive.
 - A built-in standby function installed.

○ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Parameter	Symbol	Limits	Unit
Power Supply Voltage	Vcc	18	V
Power Dissipation	Pd	1.45 ^{*1}	W
Maximum Output Current	Iomax	1 ^{*2}	A
Operating Temperature Range	Topr	-35 to 85	°C
Storage Temperature Range	Tstg	-55 to 150	°C

*1 When mounted on the glass/epoxy board with the size: 70 mm×70 mm, the thickness: 1.6 mm, and the rate of copper foil occupancy area: 3% or less.
 Over Ta=25°C, derating at the rate of 11.6mW/°C.

*2 The power dissipation should be specified within the ASO range.

○ OPERATING CONDITIONS

Parameter	Symbol	Limits	Unit
Pre-stage Power Supply Voltage	PreVcc	PowVcc+3 to 14	V
Output-stage Power Supply Voltage	PowVcc	4.5 to 11	V

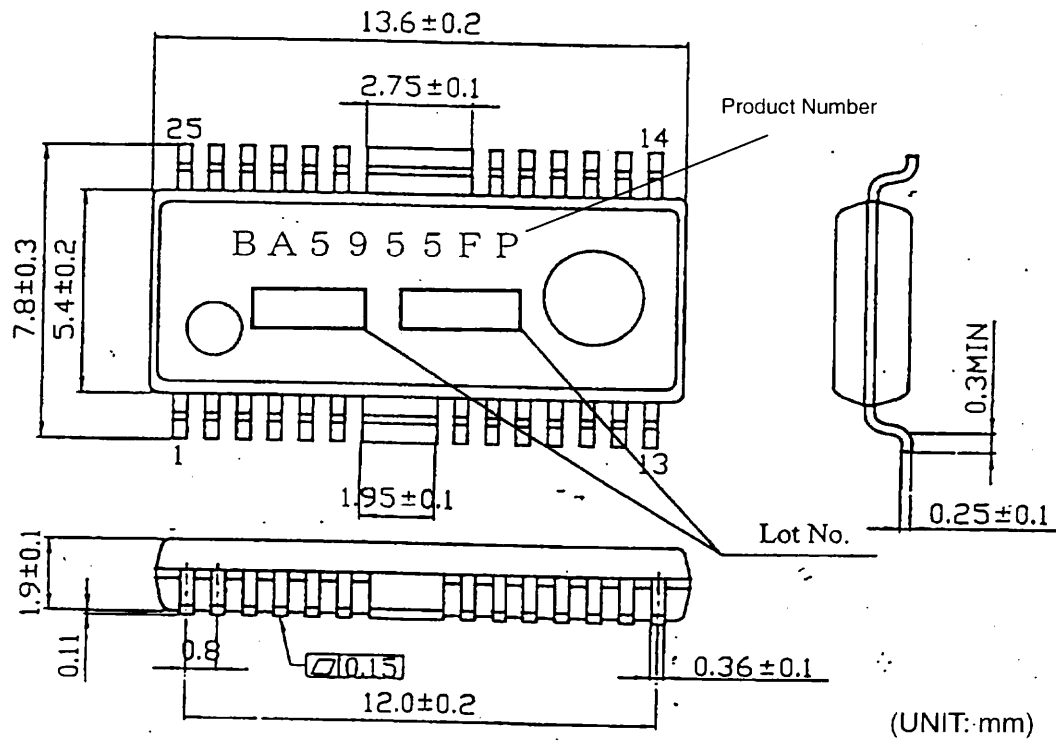
This product has not been checked for the strategic materials (or service) defined in the Foreign Exchange and Foreign Trade Control Law of Japan so that a verification work is required before exporting it.

Not designed for radiation resistance.

○ ELECTRIC CHARACTERISTICS (Ta=25°C, PreVcc=12V, PowVcc=5V, Vc=2V, RL=6Ω+150uH, Rd=0.5Ω, unless otherwise noted.)

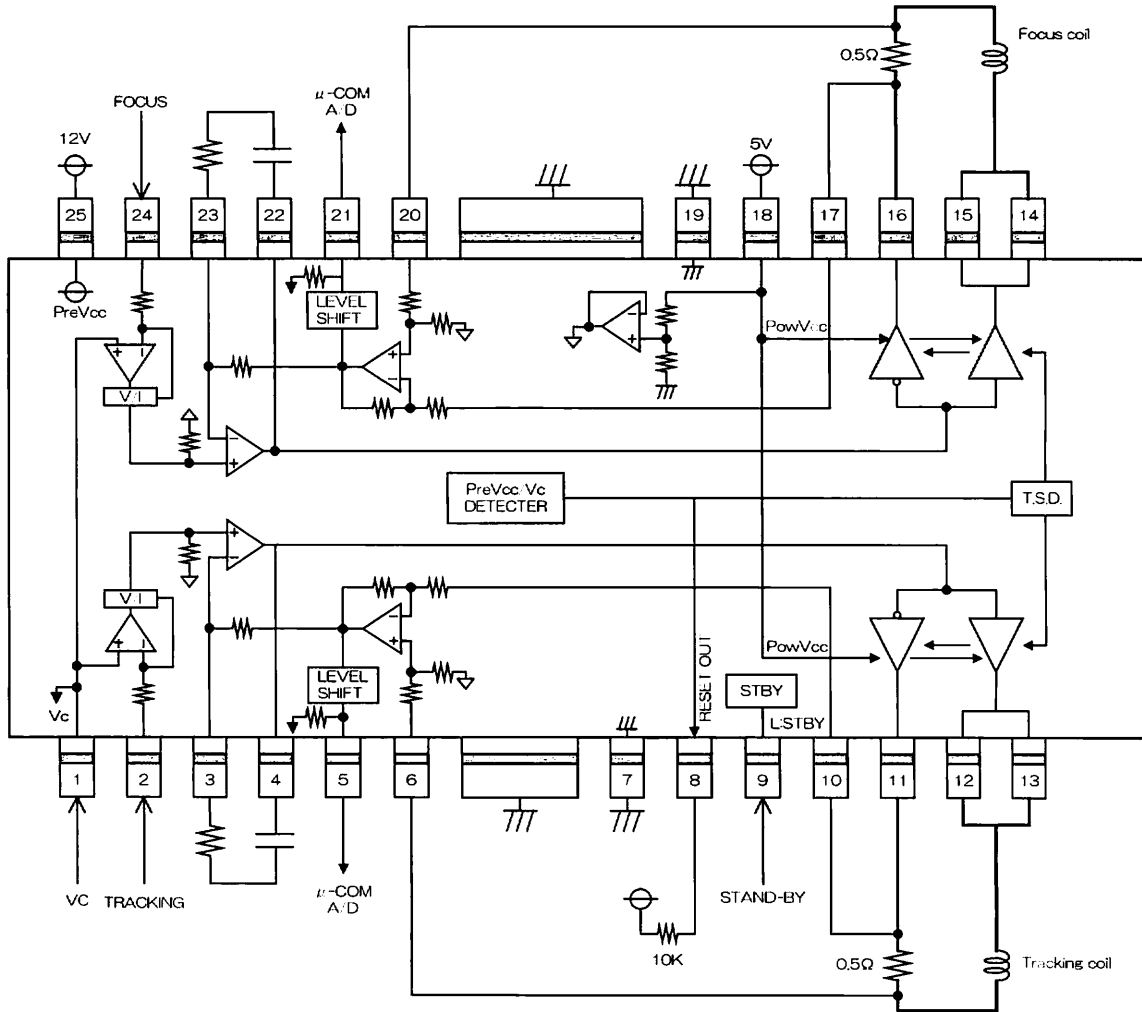
Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Standby Consumption Current	IST	-	0.1	1	mA	At standby
Quiescent Consumption Current	IQpre	-	21	32	mA	
Output Offset Current	I _{oof}	-6	-	6	mA	
Maximum Output Amplitude 1	VOM1	3.6	3.9	-	V	
Maximum Output Amplitude 2	VOM2	5.8	6.1	-	V	When POWVcc= 8V
Transfer Gain	G _m	0.9	1	1.1	A/V	V _{IN} = ±0.2V
STBY ON Voltage	VSON	-	-	0.5	V	
STBY OFF Voltage	VSOFF	2	-	-	V	
<Current Detection Amplifier>						
Output Voltage (at no signal)	V _{odet}	1.9	2.0	2.1	V	
Closed Circuit Voltage Gain	G _{vdet}	5.0	6.0	7.0	dB	
Output Driving Current Sink	I _{Sldet}	1.0	-	-	mA	
Output Driving Current Source	I _{S0det}	1.0	-	-	mA	
Slew Rate	SR _{det}	-	1	-	V/μs	100KHz square wave 2Vp-p output
Voltage Gain Bandwidth Product	GBW	-	10	-	MHz	
<Reset>						
Output Voltage in non-operation	VRSTOFF	2.8	-	-	V	3.3V PULL UP with 10KΩ attached
Output Voltage in operation	VRSTON	-	-	0.5	V	3.3V PULL UP with 10KΩ attached

○ OUTLINE DIMENSIONS, SYMBOLS



Rev. A

○ APPLICATION CIRCUIT DIAGRAM



T.S.D: (Thermal shutdown)
Resistance unit: [Ω]

○ PIN Description

No.	Pin Name	Description	No.	Pin Name	Description
1	Vc	Reference input for input signal	25	PreVcc	Pre stage power supply terminal
2	IN1	CH1 input	24	IN2	CH2 input
3	FIL1	Error amp phase compensation external terminal 1	23	FIL2	Error amp phase compensation external terminal 2
4	EOUT1	CH1 error amp output	22	EOUT2	CH2 error amp output
5	DETOUT1	CH1 current detection amp output	21	DETOUT2	CH2 current detection amp output
6	DETIN1P	CH1 current detection amp non-inverted input	20	DETIN2P	CH2 current detection amp non-inverted input
7	GND	Substrate GND			
8	RESET	Reset output	19	GND	Substrate GND
9	STBY	Standby input	18	PowVcc	Output stage power supply terminal
10	DETIN1M	CH1 current detection amp inverted input	17	DETIN2M	CH2 current detection amp inverted input
11	OUT1M	CH1 negative output	16	OUT2M	CH2 negative output
12	OUT1P	CH1 positive output	15	OUT2P	CH2 positive output
13	OUT1P	CH1 positive output	14	OUT2P	CH2 positive output

○ CAUTIONS ON USE

- (1) The BA5955FP incorporates a TSD circuit (overheat protection circuit) and a reset circuit. When the chip temperature has reached 175°C (typ.), the output current will be muted while the reset output will become 'L' and, when the chip temperature has dropped to 150°C (typ.), the mute function will be reset while the reset output will be 'H.' The reset output also becomes 'L' in the standby state.
- (2) When the power supply voltage (PreVcc) has dropped to 3.8V (typ.) or less, the output current will be muted while the reset output will become 'L' and, when PreVcc has recovered to 4.0V (typ.), the driver part circuit will be initiated to set the reset output to 'H.'
- (3) When the reference input (Vc) voltage has dropped to 0.8V (typ.) or less, the output current will be muted while the reset output will become 'L.'
Under conditions of normal use, it should be 1.2V (typ.) or above.
- (4) Thermal shutdown or a drop of reference voltage or power supply voltage will activate the mute function, where only the driver part can be muted. While muting, the voltage at the output terminal will equal to the internal reference voltage (approximately PowVcc/2).
- (5) Connecting a capacitive load to the OP-AMP output results in a phase margin reduction of the amp and may cause an oscillation or a peak. When connecting a capacitive load, a resistance must be inserted in series between the output and the capacitive load. And after careful consideration of the frequency characteristics, the device should be used within the range where no problem is found in actual use.
- (6) A radiating fin must be connected to the external GND.
- (7) Short-circuits between output pin-VCC, output pin-GND, or output terminals (load short) must be avoided.
Mounting the ICs in improper directions may damage them or produce smoke.
- (8) About absolute maximum ratings
Exceeding the absolute maximum ratings, such as the applied voltage or the operating temperature range, may cause permanent device damage. As these cases cannot be limited to the broken short mode or the open mode, if a special mode where the absolute maximum ratings may be exceeded is assumed, it is recommended to take mechanical safety measures such as attaching fuses.
- (9) About power supply lines
As a measure against the back current regenerated by a counter electromotive force of the motor, a capacitor to be used as a regenerated-current path can be installed between the power supply and GND and its capacitance value should be determined after careful check that any problems, for example, a leak capacitance of the electrolytic capacitor at low temperature, are not found in various characteristics.
- (10) About GND potential
The electric potential of the GND terminal must be kept lowest in the circuitry at any operation states.
- (11) About thermal design
With consideration of the power dissipation (Pd) under conditions of actual use, a thermal design provided with an enough margin should be done.
- (12) About operations in a strong electric field
When used in a strong electric field, note that a malfunction may occur.
- (13) ASO
When using this IC, the output Tr must be set not to exceed the values specified in the absolute maximum ratings and ASO.
- (14) Thermal shutdown circuit
This IC incorporates a thermal shutdown circuit (TSD circuit). When the chip temperature reaches the value shown below, the coil output to the motor will be set to open.
The thermal shutdown circuit is designed only to shut off the IC from a thermal runaway and not intended to protect or guarantee the entire IC functions.
Therefore, users cannot assume that the TSD circuit once activated can be used continuously in the subsequent operations.

TSD ON Temperature [°C] (typ.)	Hysteresis Temperature [°C] (typ.)
175	25

(15) About earth wiring patterns

When a small signal GND and a large current GND are provided, it is recommended that the large current GND pattern and the small signal GND pattern should be separated and grounded at a single point of the reference point of the set in order to prevent the voltage of the small signal GND from being affected by a voltage change caused by the resistance of the pattern wiring and the large current.

Make sure that the GND wiring patterns of the external components will not change, too.

(16) This IC is a monolithic IC which has a P⁺ isolations and P substrate to isolate elements each other.

This P layer and an N layer in each element form a PN junction to construct various parasitic elements. Due to the IC structure, the parasitic elements are inevitably created by the potential relationship.

Activation of the parasitic elements can cause interference between circuits and may result in a malfunction or, consequently, a fatal damage. Therefore, make sure that the IC must not be used under conditions that may activate the parasitic elements, for example, applying the lower voltage than the ground level (GND, P substrate) to the input terminals.

In addition, do not apply the voltage to input terminals without applying the power supply voltage to the IC. Also while applying the power supply voltage, the voltage of each input terminal must not be over the power supply voltage, or within the guaranteed values in the electric characteristics.

<Supplemental Remarks>

Current feedback driver

The transfer gain (output current/input current) can be determined by the following equation:

$$g_m = \frac{I}{2R_d} \quad (\text{A/V})$$

R_d = Resistance for current detection (Ω)

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