

STRUCTURE	Silicon Monolithic Integrated Circuit		
PRODUCT SERIES	BTL Driver for car-CD		
TYPE	B A 5 8 1 4 F M		
PACKAGE OUTLINES	Figure 1 (Plastic Mold)	POWER DISSIPATION	Figure 2
BLOCK DIAGRAM	Figure 3	APPLICATION	Figure 4
TEST CIRCUIT	Figure 5	SWITCH TABLE	Figure 6

- FUNCTIONS
- ◎ 5ch Driver for BTL.
  - ◎ Available in a HSOP-M28 power package
  - ◎ Incorporates a thermal shut down circuit.
  - ◎ Wide dynamic range (6.0V (Typ.) at  $V_{cc}=8V, R_L=8\Omega$ )
  - ◎ Incorporates two trimmer regulator. (external PNP Tr.is necessary)

ABSOLUTE MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Limit	Unit
Supply voltage	$V_{cc}$	13.5	V
Power dissipation	$P_d$	2.2*	W
Operating temperature	$T_{opr}$	-40~85	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55~150	$^\circ\text{C}$

Reduce power by 17.6mW for each degree above  $25^\circ\text{C}$ , on a glass epoxy PCB (70mm×70mm,1.6mm thick).

GUARANTEED OPERATING RANGES

$V_{cc}$	4.3 ~ 13.2 V
----------	--------------

●Electrical characteristic (Unless otherwise noted, Ta=25°C, Vcc=8V, PVcc45=5V, BIAS=2.5V, RL=8Ω)

Parameter	Symbol	MIN	TYP	MAX	Unit	Conditions	Test circuit
Quiescent current	ICC	—	20	30	mA	input open	Figure 5
<b>&lt; BTL Driver &gt;</b>							
Output offset voltage	VOOF	-50	0	50	mV		Figure 5
High level output voltage 1	VOM1	5.4	6.0	—	V	CH1, 2, 3	Figure 5
High level output voltage 2	VOM2	3.6	4.0	—	V	CH4, 5	Figure 5
Closed loop voltage gain 1	GVC1	9.5	12.0	14.5	dB	CH1 RIN=10kΩ	Figure 5
Closed loop voltage gain 2	GVC2	15.5	18.0	20.5	dB	CH2 RIN=10kΩ	Figure 5
Closed loop voltage gain 3	GVC3	16.5	18.0	19.5	dB	CH3, 4, 5	Figure 5
Mute on voltage	VMTON	—	—	0.5	V		Figure 5
Mute off voltage	VMTOFF	2.0	—	—	V		Figure 5
Input current for mute pin	IMUTE	—	90	140	μA	VMUTE=5V	Figure 5
Input current for bias pin	IBIAS	—	75	120	μA		Figure 5
<b>&lt; Regulator &gt;</b>							
Threshold voltage of RE_I pin	VREITH	1.14	1.2	1.26	V		Figure 5
Output sink current of RE_O pin	ISIN	10	50	—	mA		Figure 5
Input bias current of RE_I pin	IBOP	—	20	300	nA		Figure 5

© This product is not designed for protection against radioactive rays.

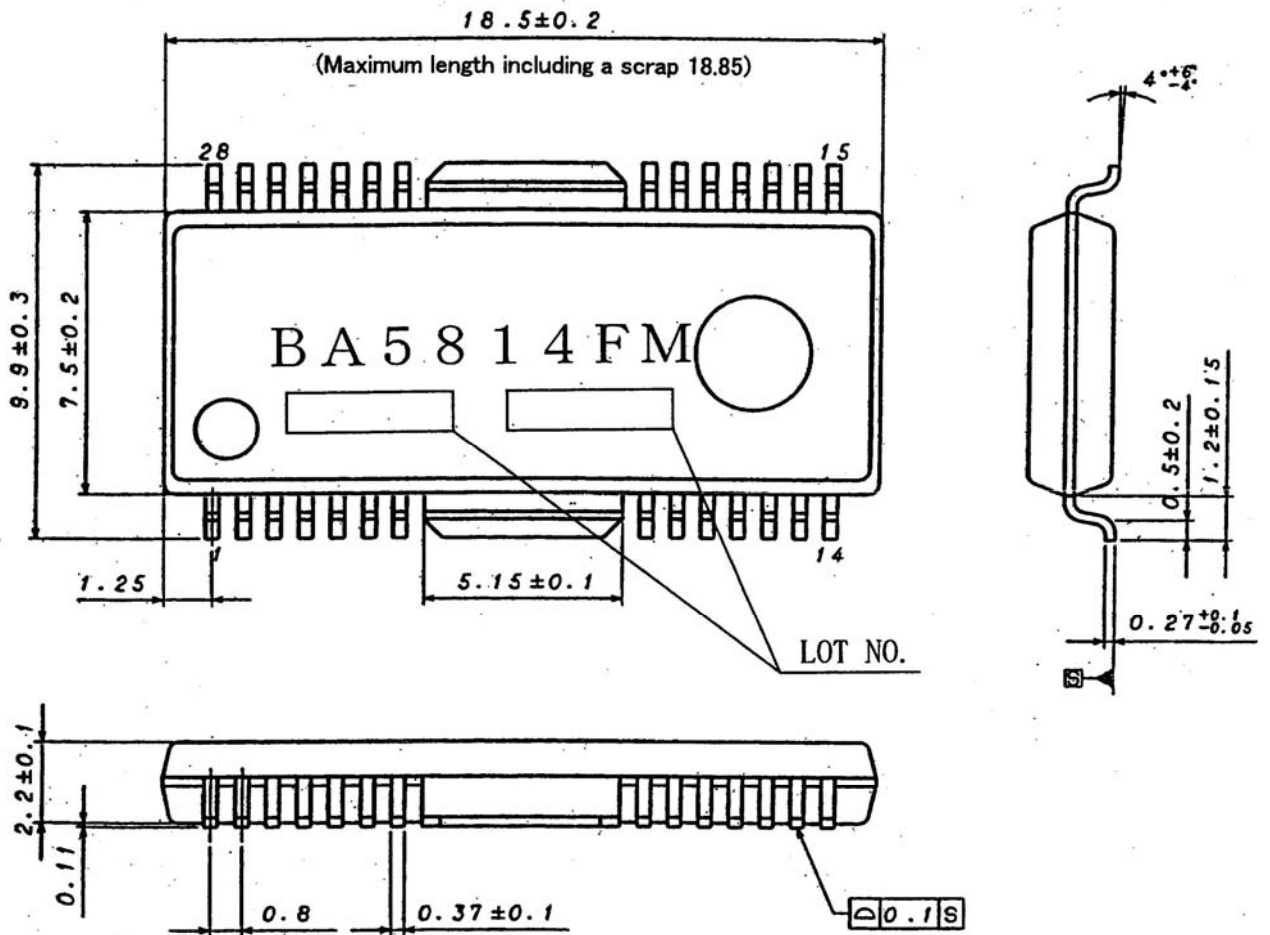
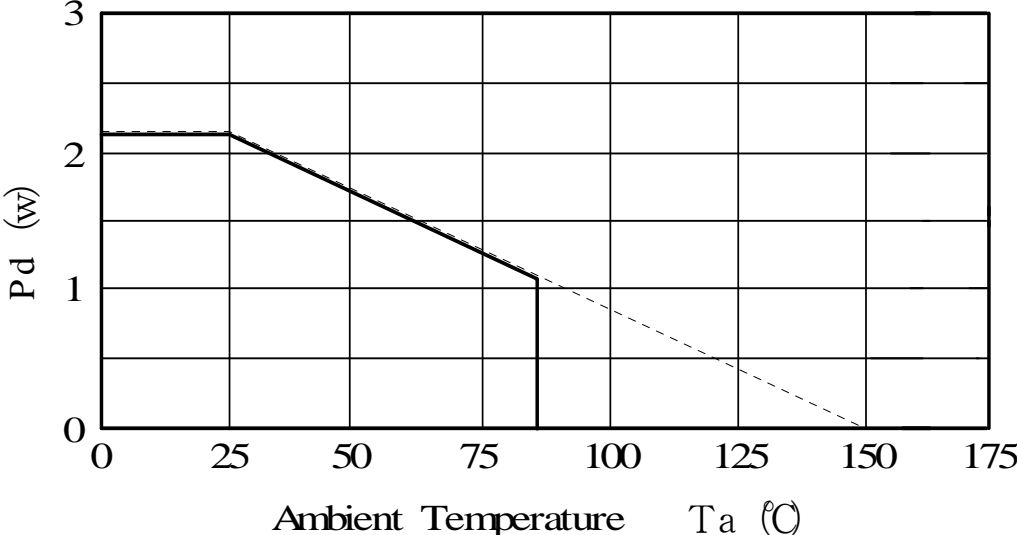


Figure 1

(UNIT: mm)

Figure No. : EX141-5001

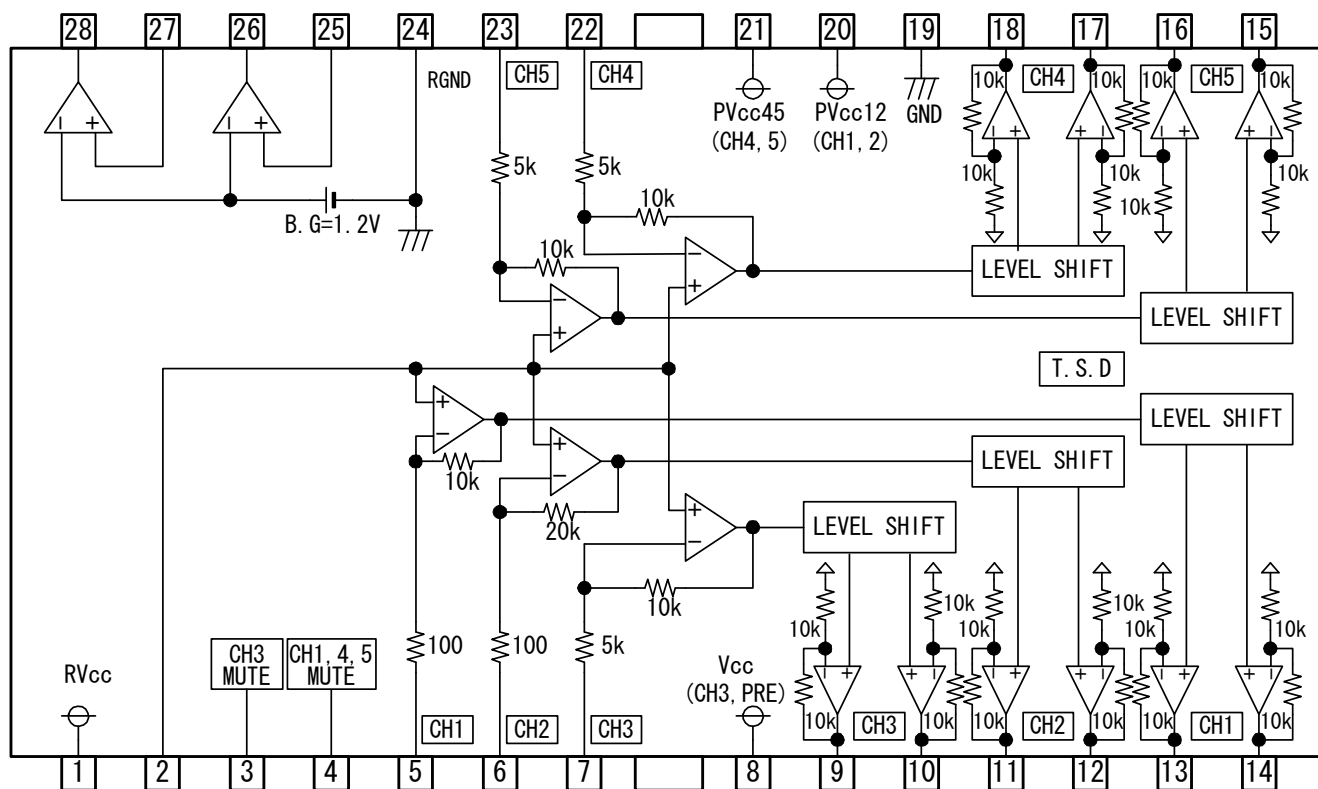
Power dissipation



$P_d$  : power dissipation

Conditions : On less than 3% (percentage occupied by copper foil),  
70mm × 70mm 1.6mm thick, glass epoxy mounting.

Figure 2



Unit of resistor [Ω]  
T.S.D:Thermal shut down

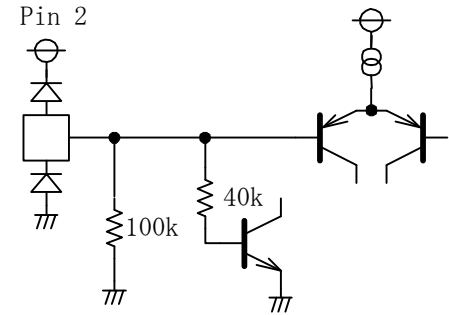
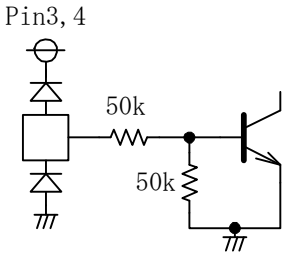
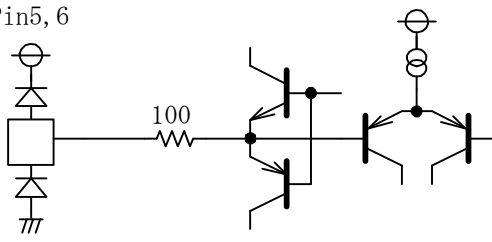
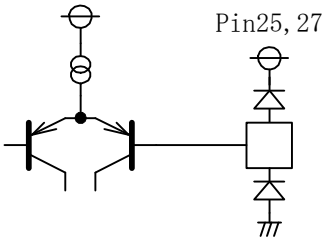
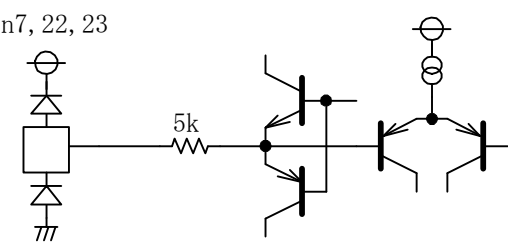
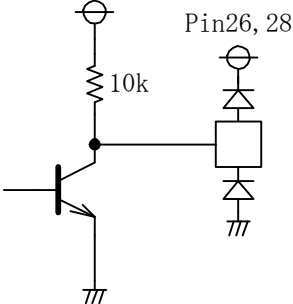
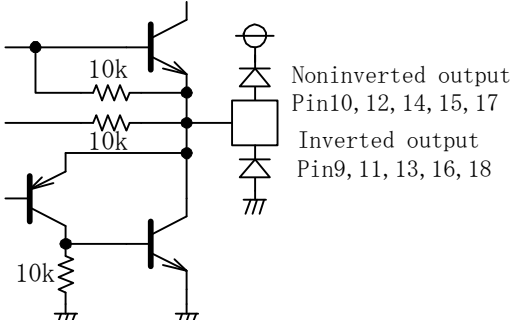
Figure 3

● 端子説明

No.	Symbol	Function	No.	Symbol	Function
1	RVcc	Vcc (for REG)	15	VO5(+)	Noninverted output of CH5
2	BIAS	Input for reference voltage (bias)	16	VO5(-)	Inverted output of CH5
3	MUTE1	CH3 Mute control	17	VO4(+)	Noninverted output of CH4
4	MUTE2	CH1,4,5 Mute control	18	VO4(-)	Inverted output of CH4
5	VIN1	Input for CH1	19	GND	GND (for PRE部、POWER)
6	VIN2	Input for CH2	20	PVcc12	Vcc (for CH1,2 POWER)
7	VIN3	Input for CH3	21	PVcc45	Vcc (for CH4,5 POWER)
8	VCC	Vcc (for PRE,CH3 POWER)	22	VIN4	Input for CH4
9	VO3(-)	Inverted output of CH3	23	VIN5	Input for CH5
10	VO3(+)	Noninverted output of CH3	24	RGND	GND (for REG)
11	VO2(-)	Inverted output of CH2	25	RE_I1	Regulator1 terminal of output feedback
12	VO2(+)	Noninverted output of CH2	26	RE_O1	Regulator1 terminal connected base of output transistor
13	VO1(-)	Inverted output of CH1	27	RE_I2	Regulator2 terminal of output feedback
14	VO1(+)	Noninverted output of CH1	28	RE_O2	Regulator2 terminal connected base of output transistor

notes) Symbol of + and - (output of drivers) means polarity to input pin.  
(For example if voltage of pin.10 is high, pin.9 is low)

●Equivalent circuit of terminal

Bias	Mutel, 2
	
Input for driver (CH1, CH2)	Regulator terminal of output feedback
	
Input for driver (CH3, CH4, CH5)	Regulator terminal connected base of external Tr
	
Output of driver	
 <p>Noninverted output Pin10, 12, 14, 15, 17</p> <p>Inverted output Pin9, 11, 13, 16, 18</p>	

● Application circuit 1

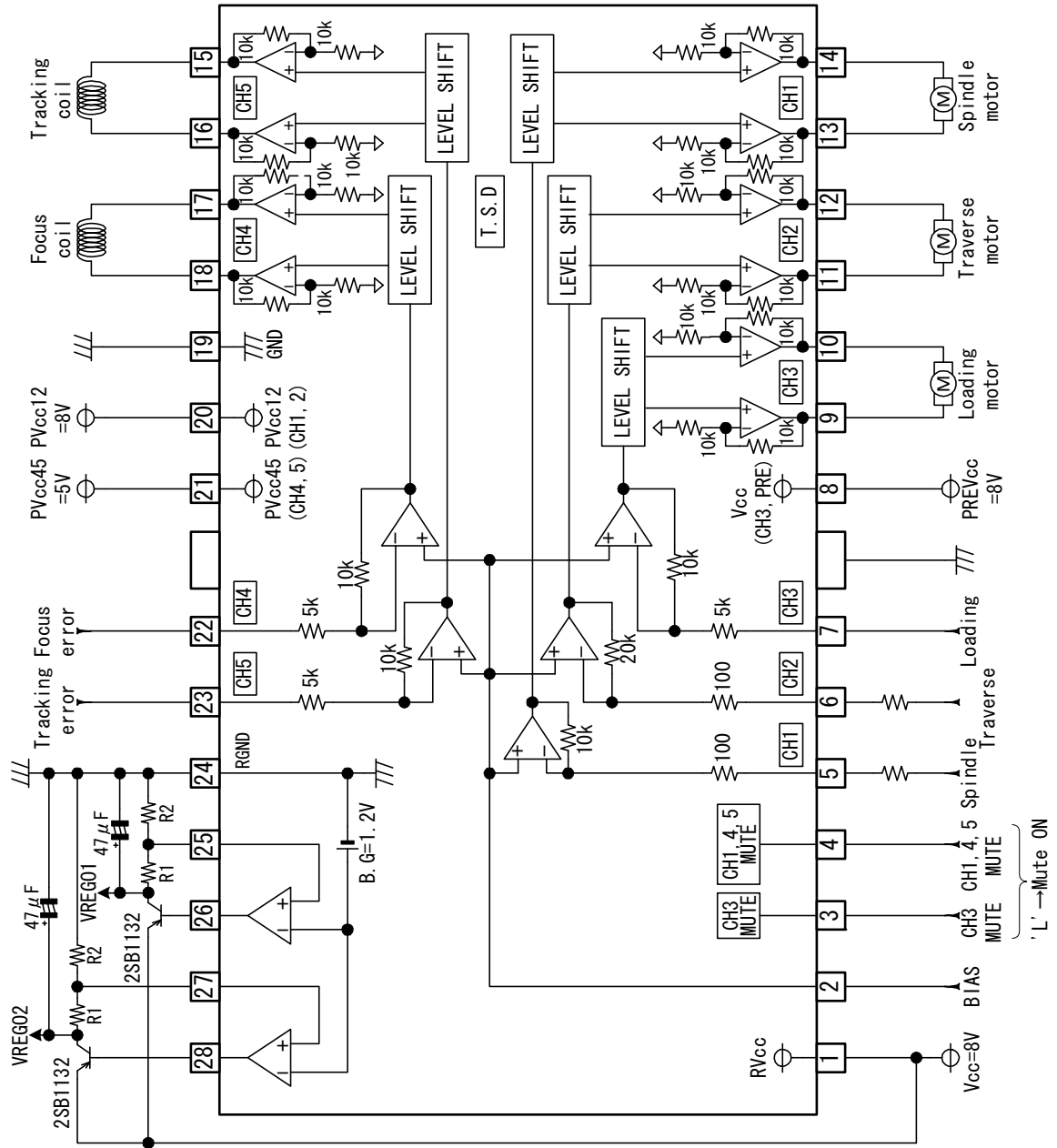


Figure 4

● Test circuit

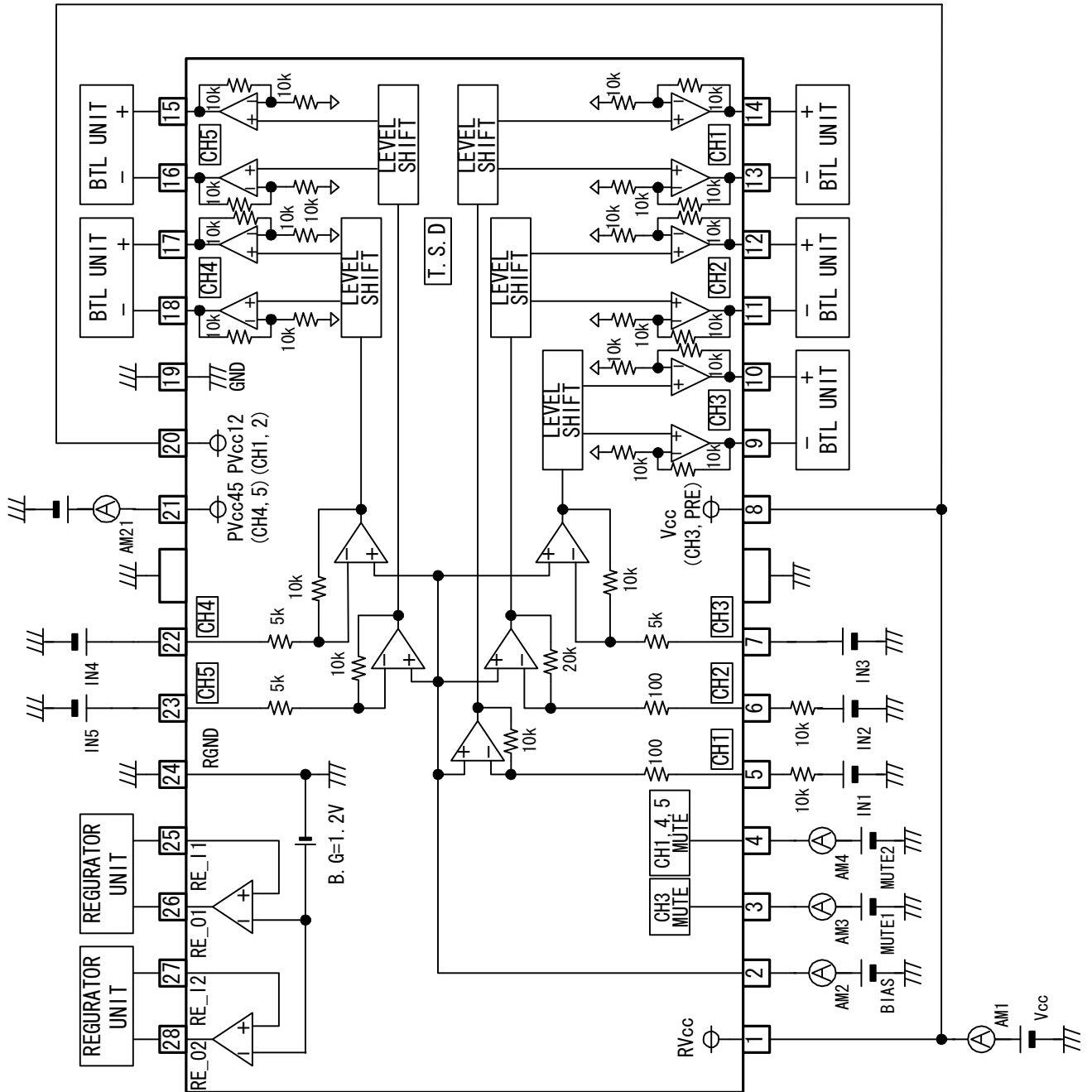


Figure 5



● Switch circuit

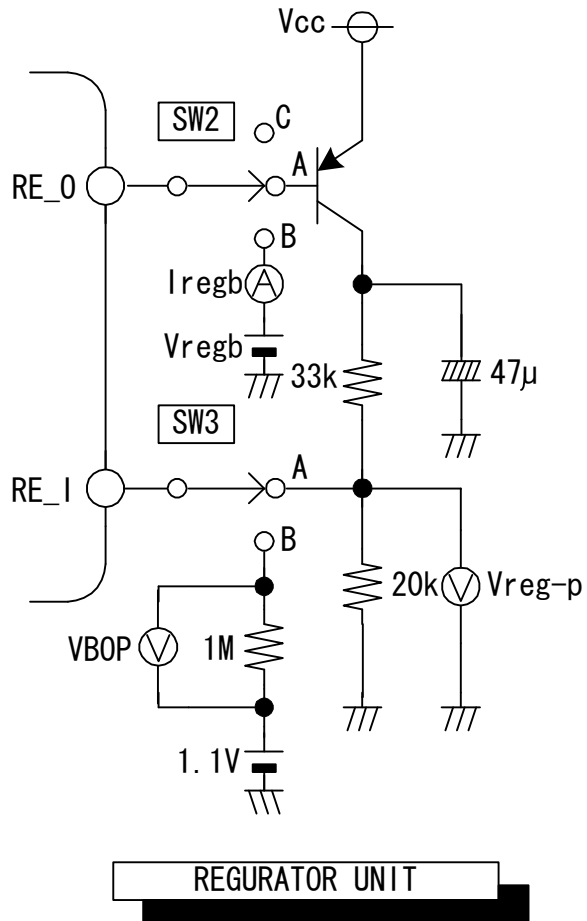
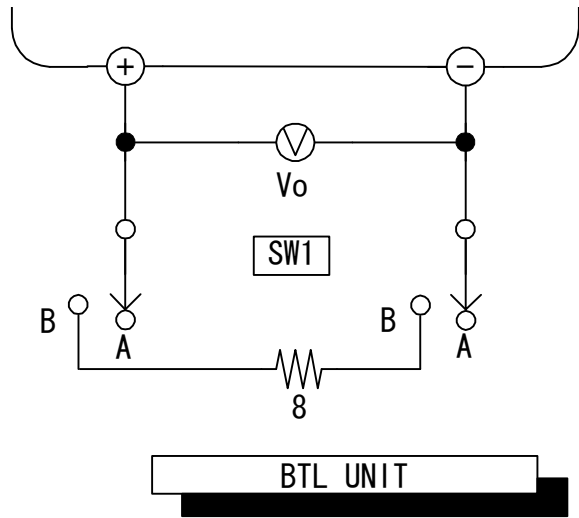


Figure 6

●Switch table

(※VCC=8V,PREVCC45=5V,BIAS=2.5V, SW=A position)

○Current of circuit (MUTE=2V, BIAS=2.5V)

Parameter	Switch			Input voltage (V)			Comments	Test position
	1	2	3					
Quiescent current								AM1+AM21

○BTL Driver

Parameter	Switch			Input voltage (V)			Comments	Test position
	1	2	3	MUTE1, 2	BIAS	VIN		
Output offset voltage	B			2.0	2.5	2.5		V0
High level output voltage	↓			↓	↓	5.0		V0
	↓			↓	↓	0		V0
Closed loop voltage gain	↓			↓	↓	2.8	$20\log\{(V0-V00F)/0.3\}$	V0
	↓			↓	↓	2.2	$20\log\{( V0 +V00F)/0.3\}$	V0
Mute1,2 on voltage				0.5	↓	5.0	Output being mute	V0
Mute1,2 off voltage				2.0	↓	↓	Output being not mute	V0
Input current for mute pin				5.0	↓	2.5		AM3, AM4
Input current for bias pin				2.0	↓	↓		AM2

○Regulator

Parameter	Switch			Input voltage (V)			Comments	Test position
	1	2	3	MUTE	BIAS	Vregb		
Threshold voltage of RE_I pin				1.8	2.5	-		Vreg-p
Output sink current of RE_0 pin		B		↓	↓	0.2		Iregb
Input bias current of RE_I pin		C	B	↓	↓	-	VBOP/(1M*2)	VBOP

●NOTES

1. Thermal shut down circuit built in.  
When IC chip temperature rise to 175°C (Typ.), output current is muted. And when IC chip temperature reach 150°C (Typ.), the driver circuit starts up.
2. When mute-terminal (pin.3,4) voltage is open or lowered below 0.5V, output current is muted.  
Under normal use condition, pull up the mute terminal above 1.5V  
(3 pin → mute ch3 4 pin → mute ch1,4,5)
3. When bias-terminal (pin.2) voltage is below 0.7V (Typ.) ,driver is muted. Under normal use condition, set above 1.1V
4. When supply voltage falls below 3.7V (Typ.) , output current is muted. Next time supply voltage rises to 3.9V (Typ.) , the driver circuit start.
5. All drivers are muted by thermal shut down, supply voltage fall and bias voltage fall.  
Output terminal of muted BTL driver applies internal bias voltage (PVCC/2(V)) .
6. Internal resistor allocate to input parts of driver have temperature characteristic about +1200ppm/°C (Typ.).  
Using external resistor to change driver's gain, consider about temperature characteristic.
7. VREGO (output voltage of Regulator) is outputted with obtaining dispersion of VREITH (threshold voltage of RE\_I pin) and external resistor. VREGO is described like under numerical formula by influence of IBOP, and choose the exact external resistor on considering IBOP.

$$V_{REGO} = V_{REITH} \times \left( \frac{R_1}{R_2} + 1 \right) - R_1 \times I_{BOP} \quad (R_1, R_2 : \text{see page 7/11})$$

8. The capacitor between output of regulator and GND also has a property prevents oscillation.  
Use capacitor with good temperature characteristic.
9. The supply voltage of regulator (pin 1) is partly one of internal current source. And GND of Regulator (pin 24) is partly one of internal current source.  
When not using regulator, connect them to each external voltage supply and GND.
10. Insert the by-pass capacitor between Vcc-terminal and GND-terminal of IC as near as possible.  
(approximately 0.1 μ F)
11. Heat dissipation fins are attached to the GND on the inside of the package.  
Make sure to be connected to the external GND.
12. In principle, do not apply voltage below sub-potential of IC to terminal.  
Examine in consideration of operation margin, when each driver output falls below sub-voltage of IC (GND) due to counter-electromotive-force of load.
13. Output pin is to avoid short-circuiting with PVcc and GND and other output pins. And, be fully careful in the direction of an integrated circuit on the substrate. An integrated circuit is damaged, and smoke may come out by the case.

## Notes

No copying or reproduction of this document, in part or in whole, is permitted without the consent of ROHM Co.,Ltd.

The content specified herein is subject to change for improvement without notice.

The content specified herein is for the purpose of introducing ROHM's products (hereinafter "Products"). If you wish to use any such Product, please be sure to refer to the specifications, which can be obtained from ROHM upon request.

Examples of application circuits, circuit constants and any other information contained herein illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

Great care was taken in ensuring the accuracy of the information specified in this document. However, should you incur any damage arising from any inaccuracy or misprint of such information, ROHM shall bear no responsibility for such damage.

The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM and other parties. ROHM shall bear no responsibility whatsoever for any dispute arising from the use of such technical information.

The Products specified in this document are intended to be used with general-use electronic equipment or devices (such as audio visual equipment, office-automation equipment, communication devices, electronic appliances and amusement devices).

The Products specified in this document are not designed to be radiation tolerant.

While ROHM always makes efforts to enhance the quality and reliability of its Products, a Product may fail or malfunction for a variety of reasons.

Please be sure to implement in your equipment using the Products safety measures to guard against the possibility of physical injury, fire or any other damage caused in the event of the failure of any Product, such as derating, redundancy, fire control and fail-safe designs. ROHM shall bear no responsibility whatsoever for your use of any Product outside of the prescribed scope or not in accordance with the instruction manual.

The Products are not designed or manufactured to be used with any equipment, device or system which requires an extremely high level of reliability the failure or malfunction of which may result in a direct threat to human life or create a risk of human injury (such as a medical instrument, transportation equipment, aerospace machinery, nuclear-reactor controller, fuel-controller or other safety device). ROHM shall bear no responsibility in any way for use of any of the Products for the above special purposes. If a Product is intended to be used for any such special purpose, please contact a ROHM sales representative before purchasing.

If you intend to export or ship overseas any Product or technology specified herein that may be controlled under the Foreign Exchange and the Foreign Trade Law, you will be required to obtain a license or permit under the Law.



Thank you for your accessing to ROHM product informations.  
More detail product informations and catalogs are available, please contact us.

### ROHM Customer Support System

<http://www.rohm.com/contact/>