

STRUCTURE	Silicon Monolithic Integrated Circuit
TYPE	Low Current Consumption MOS System Power Supply
PRODUCT SERIES	<b>B D 4 9 1 2 — V 4</b>
FEATURES	<ul style="list-style-type: none"> <li>• Very low current consumption</li> <li>• With low ESR capacitor for output</li> </ul>

○ABSOLUTE MAXIMUM RATINGS (Ta=25℃)

PARAMETER	SYMBOL	LIMITS	UNIT
Supply Voltage 1	Vcc1	36	V
Supply Voltage 2	Vcc2	36	V
SEL1 Supply Voltage	SEL1	12	V
SEL2 Supply Voltage	SEL2	12	V
Power Dissipation	Pd	3400	mW
Operating Temperature Range	Topr	-40~+85	℃
Storage Temperature Range	Tstg	-55~+150	℃
Peak Supply Voltage 1	Vcc1 PEAK	50(*1)	V
Peak Supply Voltage 2	Vcc2 PEAK	50(*1)	V

(\*1)tr(rising time)is over 1msec, Bias voltage is less than 200msec.

○RECOMMENDED OPERATING RANGES (Ta=25℃)

PARAMETER	SYMBOL	LIMITS			UNIT	COMMENT
		MIN.	TYP.	MAX.		
Recommended Supply Voltage Range 1	Vcc1	10	14.4	18	V	Except VDD and ILM output
Recommended Supply Voltage Range 2	Vcc1'	11.5	14.4	18	V	ILM output
Recommended Supply Voltage Range 3	Vcc2	6.3	14.4	18	V	VDD output

The above conditions may not meet electrical characteristic.

\*This product is not designed for protection against radioactive rays.

\*The product described in this specification is a strategic product (and/or service) subject to COCOM regulations.  
It should not be exported without authorization from the appropriate government.

\*Status of this document

The Japanese version of this document is the formal specification.

A customer may use this translation version only for a reference to help reading the formal version.

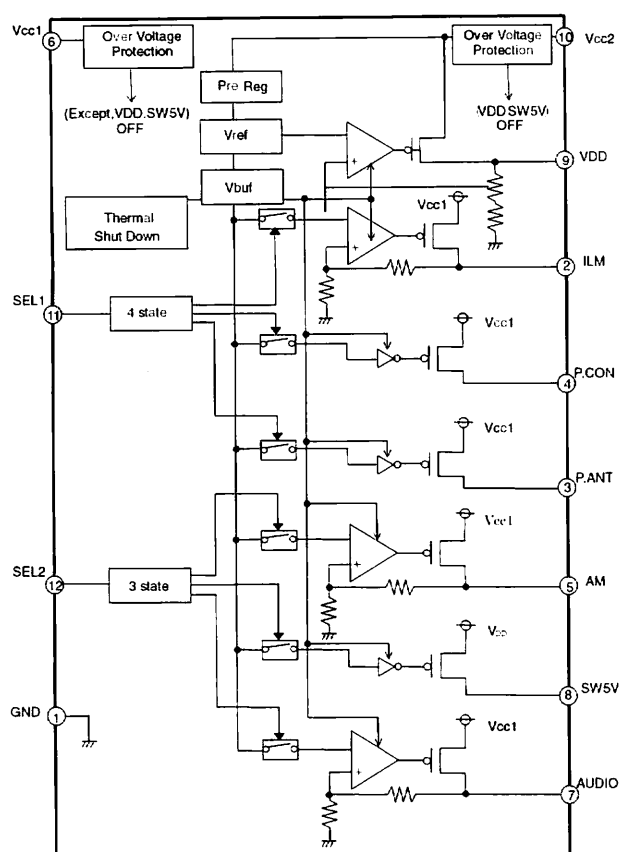
If there are any differences in translation version of this document, formal version takes priority.

○ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta=25°C, Vcc1=Vcc2=14.4V)

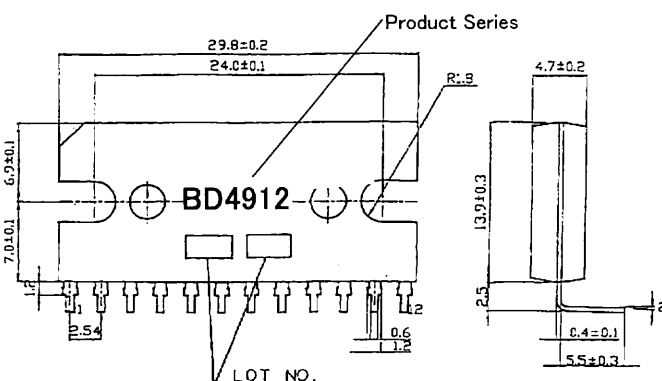
PARAMETER	SYMBOL	LIMITS			UNIT	CONDITION
		MIN.	TYP.	MAX.		
Standby Circuit Current	Ist	-	-	110	μA	
VDD						
Output Voltage (VDD) 1	Vo1	4.80	5.00	5.20	V	Io=300mA, Vcc2=10~18V
Dropout Voltage	ΔVo1	-	0.8	1.1	V	Io=300mA, Vcc2-Vo1
Peak Output Current	Io1	400	-	-	mA	Vo1 ≥ 4.8V
Ripple Rejection Ratio	R.R1	50	55	-	dB	f=100Hz, VRR=-10dBV, Io=300mA
Low VCC Output Voltage	Vo1'	4.8	-	-	V	Vcc2=5V, Io=10mA
AUDIO (SEL2>2.0V)						
Output Voltage (AUDIO) 2	Vo2	7.8	8.12	8.3	V	Io2=200mA, Vcc1=10~18V
Dropout Voltage	ΔVo2	-	0.4	0.7	V	Io2=200mA, Vcc1-Vo2
Peak Output Current	Io2	200	-	-	mA	Vo2 ≥ 7.8V
Ripple Rejection Ratio	R.R2	45	55	-	dB	f=100Hz, VRR=-10dBV, Io=200mA
P.CON (SEL1>3.5V)						
Dropout Voltage (P.CON) 3	ΔVo3	-	0.4	0.7	V	Io3=350mA, Vcc1-Vo3
Peak Output Current	Io3	350	-	-	mA	Vo3 ≥ 13.7V
P.ANT (SEL1>7.0V)						
Dropout Voltage (P.ANT) 4	ΔVo4	-	0.4	0.7	V	Io4=300mA, Vcc1-Vo4
Peak Output Current	Io4	300	-	-	mA	Vo4 ≥ 13.7V
AM (SEL2>3.5V)						
Output Voltage (AM) 5	Vo5	7.5	7.9	8.3	V	Io5=25mA, Vcc1=10~18V
Dropout Voltage	ΔVo5	-	0.4	0.7	V	Io5=25mA, Vcc1-Vo5
Peak Output Current	Io5	25	-	-	mA	Vo5 ≥ 7.5V
Ripple Rejection Ratio	R.R5	45	55	-	dB	f=100Hz, VRR=-10 dBV, Io=25mA
SW5V (SEL2>2.0V)						
Dropout Voltage (SW5V) 6	ΔVo6	-	0.15	0.3	V	Io6=30mA, VDD-Vo6
Peak Output Current	Io6	30	-	-	mA	Vo6 ≥ VDD-0.2V
ILM (SEL1>1.5V)						
Output Voltage (ILM) 7	Vo7	9.9	10.3	10.7	V	Io7=200mA, Vcc1=12~18V
Dropout Voltage	ΔVo7	-	0.5	0.8	V	Io7=200mA, Vcc1-Vo7
Peak Output Current	Io7	200	-	-	mA	Vo7 ≥ 9.9V
Ripple Rejection Ratio	R.R7	40	50	-	dB	f=100Hz, VRR=-10dBV, Io=200mA
Input (SEL1)						
Standby Level	Vth1-1	-	-	1.0	V	
ILM ON	Vth1-2	1.5	-	3.0	V	
ILM, P-CON ON	Vth1-3	3.5	-	5.0	V	
ILM, P-CON, P-ANT ON	Vth1-4	7.0	-	12.0	V	
SW1 Input Impedance	Rin1	100	-	-	kΩ	
Input (SEL2)						
Standby Level	Vth2-1	-	-	1.0	V	
AUDIO, SW5V ON	Vth2-2	2.0	-	3.0	V	
AUDIO, SW5V, AM ON	Vth2-3	3.5	-	VDD	V	
SW2 Input Impedance	Rin2	100	-	-	kΩ	
Overvoltage Protection threshold	Vovp	27	30	33	V	

\*Use Peak Output Current less than Limits Min. values.

## ○BLOCK DIAGRAM



## ○PHYSICAL DIMMENSIONS, MARKING



SIP-M12(V4) (Unit : mm)

## ○ Pin No. • Pin Name

Pin No.	Pin Name
1	GND
2	ILM
3	P. ANT
4	P. CON
5	AM
6	Vcc1
7	AUD10
8	SW5V
9	VDD
10	Vcc2
11	SEL1
12	SEL2

※Refer to the Technical Note about the details of the application.

## NOTES FOR USE

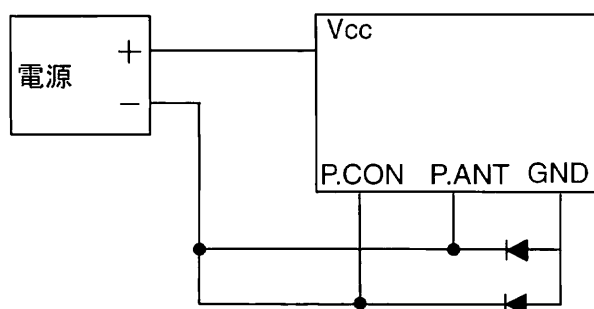
- Over Voltage Protection Circuit**  
The Over Voltage Protection Circuit function is that when the difference voltage of Vcc1 and GND exceeds over about 30V(room temperature), the each output except VDD and SW5V turn off, and when the difference voltage of Vcc2 and Gnd exceeds over about 30V, VDD and SW5V output turn off. Please be sure of the power supply voltage range you use.
- Bypass Capacitor between Vcc1,2 and Gnd**  
It recommend to put into bypass capacitor with 0.47  $\mu$ F degree into the nearest position between Vcc1, 2 and Gnd.
- The oscillation stopper of output capacitor**  
Please use the oscillation stopper between VDD, AUDIO, AM, SW5V, P.CON, P.ANT and ILM each output and Gnd. The capacitor is over 0.1  $\mu$ F and recommended the small temperature change and over B-class DC characteristics. When selecting the value of the output capacitor, please make sure that the transient response.
- Over current Protection Circuit**  
Each output, VDD, AUDIO, AM, SW5V, P.CON, P.ANT and ILM have the Over Current Protection circuit that is enough for the each output current ability, and it protects the IC destruction against the huge current load.  
The protection circuits are "Down Type" for VDD and SW5V and "fold back typer" for others and designed not as to occur the Latch Up by the huge current in a moment by the huge capacitor. But, these protection circuits are effective for preventing destruction by unexpected accident. Please don't use in the situation of continuous protection circuit ON and off. And for the peak output current ability, because this chip has minus characteristic, be careful for the thermal design.

# 5 .Thermal Shut Down Circuit

The Thermal Shut Down circuit is built in IC to prevent the damage due to over heating. Therefore, all the output except VDD are turned off when it works, and turned on when the temperature goes down to the specified level. But, built-in the IC a temperature control circuit to protect itself. Make sure of the thermal design under 150°C.

# 6 .P.CON, P.ANT terminals short to Gnd

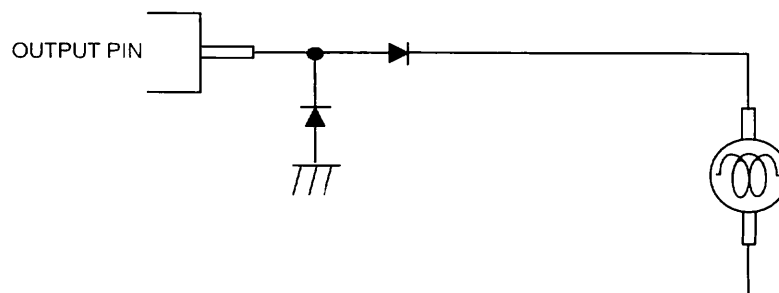
In case of the P.CON, P.ANT connect to Battery (-) terminal: short to Gnd, and IC Gnd(1pin) is Open, The parasitic element occurs in the IC and IC might be destroyed. We recommend taking countermeasure as the using shotteky diode between P.CON, P.ANT and Gnd.



7 .In the application, in case of the each terminal is lower than Gnd, it recommends to use the bypass circuit.

8. We recommend using Diode for protection purpose in case of output pin connected with large loads of impedance or reverse current at initial stages or output off stage.

(Example)



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