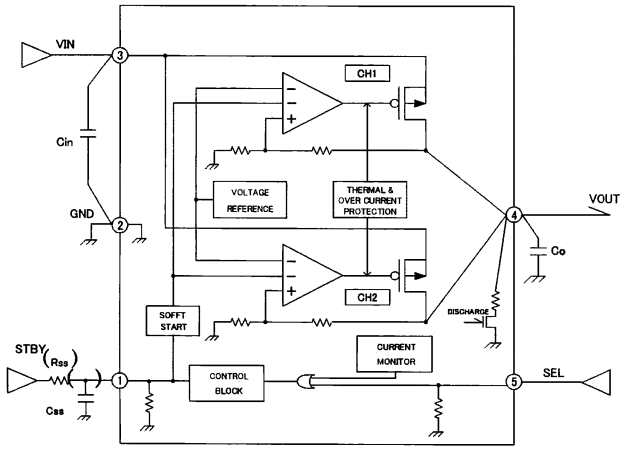
STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT Auto Power Save CMOS Type series regulator

TYPE # BH□□PB1WHFV Series

○ BLOCK DIAGRAM and APPLICATION CIRCUIT



Cin・・・0.47μF (Ceramic)

Co ・・・0.47μF (Ceramic)

Fig.1 BLOCK DIAGRAM and APPLICATION CIRCUIT

○PIN DESCRIPTION

PIN No.	PIN NAME	DESCRIPTION
1	STBY	OUTPUT CONTROL(High:ON, Low:OFF) &SOFT START CONTROL
2	GND	GROUND Pin
3	VIN	INPUT Pin
4	VOUT	OUTPUT Pin
5	SEL	Mode selector (High:Fixed, High Speed Mode Low:Automatic Switch Mode

○ABSOLUTE MAXIMUM RATINGS (Ta=25℃)

PARAMETER	Symbol	Limit	Unit
Power Supply Voltage	VMAX	-0.3 ～ +6.5	V
Power Dissipation	Pd	410 (Note.1)	mW
Operating Temperature Range	Topr	-40 ～ +85	℃
Storage Temperature Range	Tstg	-55 ～ +125	℃

Note.1 Pd derated at 4.1mW/℃ for temperature above Ta=25℃, mounted on 70mm×70mm×1.6mm glass-epoxy PCB.

Application example

The application circuit is recommended for use. Make sure to confirm the adequacy of the characteristics.

When using the circuit with changes to the external circuit constants, make sure to leave an adequate margin for external components including static and transitional characteristics as well as dispersion of the IC.

Note that ROHM cannot provide adequate confirmation of patents.

The product described in this specification is designed to be used with ordinary electronic equipment or devices (such as audio-visual equipment, office-automation equipment, communications devices, electrical appliances, and electronic toys).

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○RECOMMENDED OPERATING RANGE

PARAMETER	Symbol	Limit	Unit
Power Supply Voltage	VIN	1.7 ～ 5.5	V
Output Max Current	IMAX	150	mA

○ELECTRICAL CHARACTERISTICS

(Ta=25℃, VIN=VOUT+1V, STBY=1.5V, SEL=0V, Cin=0.47μF, Co=0.47μF, unless otherwise noted.)

PARAMETER		Symbol	Limit MIN.	Limit TYP.	Limit MAX.	Unit	Conditions
【Regulator】							
Output Voltage		VOUT	-1.0% (-25mV)	-	+1.0% (+25mV)	V	IOUT=1mA, SEL=1.5V At 2.5≦VOUT accuracy is ±25mV
Circuit Current 1		ICC1	-	2	4	μA	IOUT=0mA, Monitor VIN PIN, SEL=0V
Circuit Current 2		ICC2	-	20	40	μA	IOUT=0mA, Monitor VIN PIN, SEL=1.5V
Circuit Current (STBY)		ISTBY	-	-	1.0	μA	STBY=0V
Ripple Rejection Ratio		RR	-	60	-	dB	VRR=-20dBv, fRR=1kHz, IOUT=10mA, SEL=1.5V
Input output Voltage difference 1 Note.1		VSAT1	-	100	200	mV	VIN=VOUT×0.98, IOUT=50mA
Input output Voltage difference 2 Note.1		VSAT2	-	210	400	mV	VIN=VOUT×0.98, IOUT=100mA
Input output Voltage difference 3 Note.1		VSAT3	-	315	600	mV	VIN=VOUT×0.98, IOUT=150mA
Line Regulation 1		VDL1	-	2	20	mV	VIN=VOUT+1V to 5.5V, IOUT=100μA
Line Regulation 2		VDL2	-	2	20	mV	VIN=VOUT+1V to 5.5V, IOUT=10mA
Load Regulation		VDL0	-	10	40	mV	IOUT=10mA to 100mA
Output Voltage temperature Characteristic		ΔVOUT/ΔT	-	±100	-	ppm/℃	IOUT=10mA, Ta=-40～+85℃
【Low Output Current Mode 】							
Current Threshold (Low Icc Mode)		ITH1	-	0.3	-	mA	SEL=0V IOUT=3mA⇒0mA sweep
Current Threshold (Normal Mode)		ITH2	-	1.2	-	mA	SEL=0V IOUT=0mA⇒3mA sweep
【Over Current Protection 1】							
Limit Current		ILMAX	-	300	-	mA	Vo=VOUT×0.90
Short Current		ISHORT	-	50	-	mA	Vo=0V
【Stand-by block】							
STBY Pin Current		ISTB	-	2	4	μA	STBY=1.5V
STBY Control Voltage	ON	VSTBH	1.5	-	VCC	V	
	OFF	VSTBL	-0.3	-	0.3	V	
Discharge resistance at standby		RDCG	-	2.4	-	kΩ	
【SEL Pin】							
Pull Down Resistor of SEL Pin		RSEL	0.5	1.0	2.0	MΩ	
SEL Control Voltage	ON	VSELH	1.5	-	VCC	V	Fixed High speed mode
	OFF	VSELL	-0.3	-	0.3	V	Automatic swith mode

●This product is not designed for protection against radio active rays. Note.1 except at VOUT≦1.5V

○ ELECTRICAL CHARACTERISTICS of EACH OUTPUT VOLTAGE

Output Voltage	PARAMETER	MIN.	TYP.	MAX.	Unit	CONDITION
1.2V	Output Max Current	70	120	-	mA	VCC=1.7V
		150	-	-		VCC=2.0V
1.5V		50	100	-		VCC=1.8V
		150	-	-		VCC=2.2V
1.8V≦VOUT		75	143	-		VCC=VOUT+0.3V
		150	-	-		VCC=VOUT+0.6V

○ TEST CIRCUIT

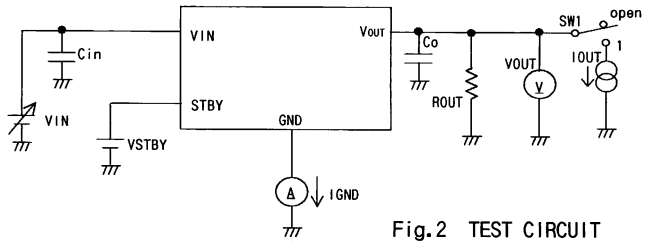

Fig.2 TEST CIRCUIT

○RECOMMENDED OPERATING CONDITION

PARAMETER	Symbol	MIN	TYP.	MAX.	Unit	CONDITION
Input Capacitor	Cin	0.33Note.2	0.47	-	μF	Ceramic capacitor recommended
Output Capacitor	Co	0.33Note.2	0.47	-	μF	Ceramic capacitor recommended

Note.2 Includes temperature coefficient and DC bias of the capacitor. Recommended capacitor type is X5R or X7R

○Power Dissipation Reduction

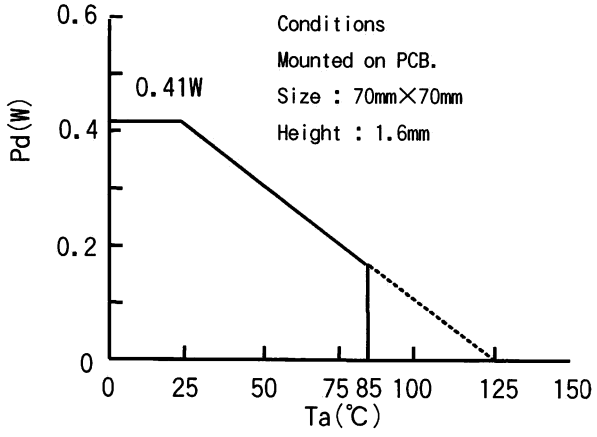

Fig.3 Pd reduction (example)

○Device Name and Marking

Device Name : BH□□PB1WHFV

a

Symbol	Description		Device Mark
	□□	Output Voltage	
a	12	1.2V typ.	PA
	15	1.5V typ.	PB
	18	1.8V typ.	PC
	25	2.5V typ.	PD
	28	2.8V typ.	PE
	29	2.9V typ.	PF
	30	3.0V typ.	PG
	31	3.1V typ.	PH
	33	3.3V typ.	PJ

○Package dimensions (HVSOF5)

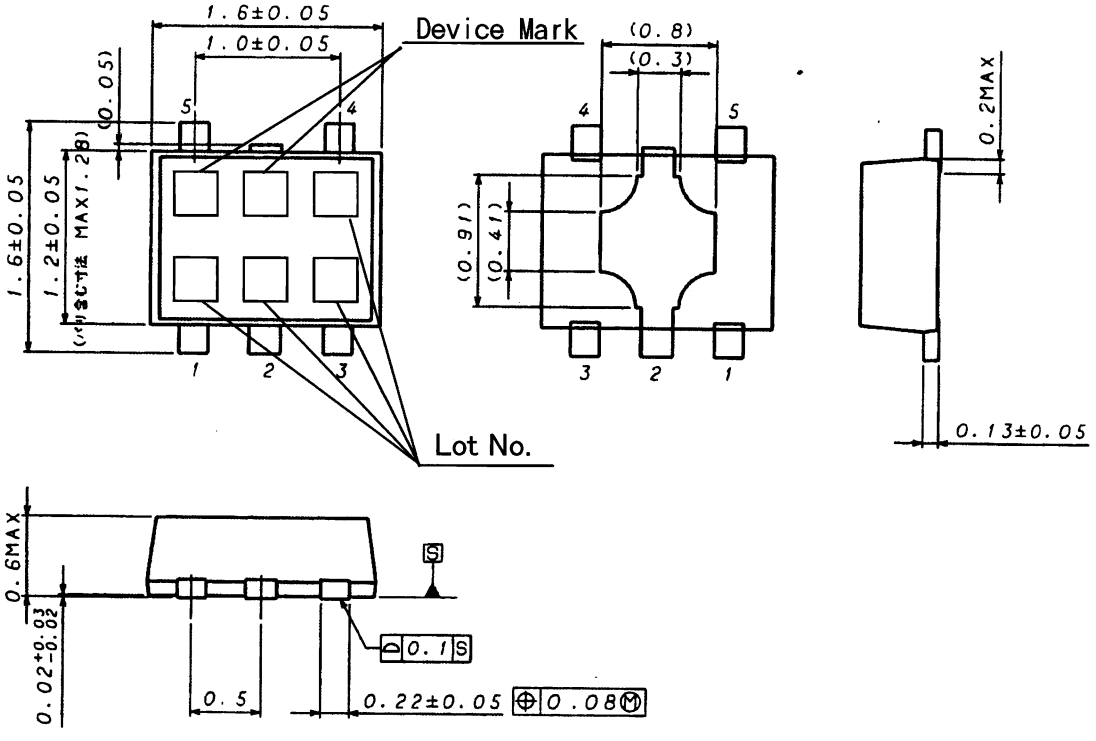

Fig.4 Package dimensions (UNIT:mm)

○Operation Note

1.) Absolute maximum ratings
May be destroyed if it is operated beyond its absolute maximum ratings. If the device is destroyed in exceeding the recommended maximum ratings, the failure mode will be difficult to determine. (E.g. short mode, open mode) Therefore, physical protection counter-measures (like fuse) should be implemented when operating conditions are beyond the absolute maximum ratings specified.

2.) GND potential
GND potential must be the lowest potential no matter what may happen. Actually, including transitional states, all pins except GND must not be below the GND potential.

3.) Setting of heat
Consider Pd at actual application, carry out the heat design that have adequate margin.

4.) Pin short and mistake fitting
When mounting the IC on the PCB, pay attention to the orientation of the IC. If there is a placement mistake, the IC may be burned up.

5.) Actions in strong magnetic field
Using the IC within a strong magnetic field may cause a malfunction.

6.) Mutual impedance
Use short and wide wiring tracks for the power supply and ground to keep the mutual impedance as small as possible. Use a capacitor to keep ripple to a minimum.

7.) Regarding STBY Pin
For standby mode, set STBY voltage below 0.3V. For normal operation, set the pin voltage beyond 1.5V. When voltage is set over 1.5V at normal mode, if in-rush current occurs at startup please put R-C filter at STBY pin.

8.) Over current protection circuit
Over current and short circuit protection is built-in at the output, and IC destruction is prevented at the time of load short circuit. These protection circuits is effective in the destructive prevention by the sudden accident, please avoid use to which a protection circuit operates continuously.

9.) Thermal shutdown
In cases of operation at high temperature, thermal shut-down will be activated and output will be turned off. Once IC is returned on normal operating temperature, the output will be turned back on.

10.) Input output Voltage difference
When operating at saturation state (VIN-VOUT<100mV) at automatic switch mode, Output Noise may increase. To avoid such phenomenon please use with SEL Pin at high state.

11.) Output capacitor
To prevent oscillation at output, it is recommended that the IC be operated at the stable region as shown on Fig.5. It is recommended that the IC operates with capacitor of more than 0.47μF, and ESR below 10Ω.
At larger capacitance value, output becomes more stable and output load fluctuation is improved.

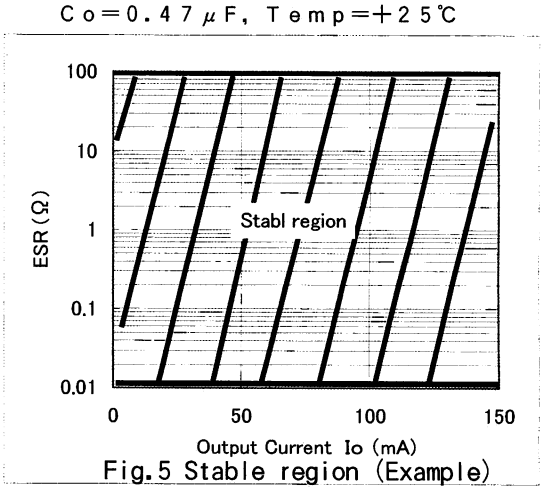

Fig.5 Stable region (Example)

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