ROHM

STRUCTURE   Silicon Monolithic Integrated Circuit

PRODUCT SERIES   5-Channel Switching Regulator Controller for Digital Still Camera

TYPE   **B D 9 7 3 0 K V**

FEATURES

● BD9730KV is a 5-channel controller that includes all of the circuits required constructing a switching regulator.
  The circuits on the chip include a triangular-wave oscillator, a reference voltage circuit, a PWM comparator, a C-MOS type driver, and a short-circuit-protector.
● The IC is capable of driving both FET and bipolar external transistors.
  (For bipolar transistors, the base current is user-adjustable.)
● Short Circuit Protector (SCP) for overload condition is included.
● The reference voltage of channel 1 and 5 can be selected externally.
● Channel 1,4 and 5 can be switched ON/OFF individually.
● Dead Time Control (DTC) for all channels is included for each channel.
● VQFP—48 PIN package

○Absolute maximum ratings (Ta=25℃)

Parameter	Symbol	Limits	Units
Power Supply Voltage	Vmax	- 0.3 to 12	V
Power Dissipation	Pd	400(＊1)	mW
		900(＊2)	mW
Operating Temperature	Topr	- 20 to +85	℃
Storage Temperature	Tstg	- 55 to +125	℃

(＊1) With no external heat sink, the power dissipation reduces by 4.0 mW/℃ over 25℃.

(＊2) Reduced by 9.0 mW/℃ over 25℃, when mounted on a PCB (70.0mm × 70.0mm × 1.6mm).

○Recommended operating conditions

| Parameter	Symbol	Spec.			Units
		Min.	Typ.	Max.	
Power Supply Voltage	VCC	2.8	—	11	V
Oscillator Frequency	fosc	100	—	700	kHz
Output Current	IOUT	—	—	30	mA
Timing Resistor	RT	5	—	30	kΩ
Timing Capacitor	CT	100	—	10000	pF
NON1,5 input range	VNON1,5	0.3	—	1.5	V

(＊3) VREGA drops under VCC=2.6V

○Electrical characteristics (Ta=25℃, Vcc=6V, fosc=0.20MHz, STB1-5=3V, unless otherwise noted)

Parameter		Symbol	Spec.			Units	Conditions
			Min.	Typ.	Max.		
Standby Current		Ist	—	—	10	μA	STB1~5=0V
Circuit Current		Icc	—	4.5	9.5	mA	
【Reference Voltage】							
Reference Voltage		Vref	1.485	1.5	1.515	V	Iref=−1mA
Line Regulation		DVLi	—	4.0	12.5	mV	Vcc=3.0V~9.5V
Load Regulation		DVLo	—	1.0	7.5	mV	Iref=−0.1mA~−1mA
Short−Circuit Output Current		Ios	4	16	—	mA	Vref=0V
【Internal Regulator】							
REGA Output Voltage		VREGA	2.4	2.5	2.6	V	Ireg=−1mA
【Over Current Shutdown】							
Channel 1−5 Threshold Voltage		Vsc1~5	1.425	1.5	1.575	V	VSCP1~5=2V~1V
【Protection Circuit】							
SCP Threshold Voltage		Vtsc	0.90	1.0	1.10	V	VSCP=0V~1.5V
SCP Standby Voltage		Vssc	—	22	170	mV	
SCP Output Current		Iscp	−2	−4	−6	μA	VSCP=0.1V
【Triangular wave oscillator】							
Oscillator Frequency		f osc1	0.179	0.20	0.221	MHz	RT=24kΩ,CT=220pF
Frequency Stability (Vcc)		Df	—	1	5	%	Vcc=2.8V→9.5V
RT Output Voltage		VRT	0.78	1	1.22	V	
CT Output Current		Icso	32.2	46	59.8	μA	VCT=1.7V,RT=24kΩ
CT Input Current		Icsi	−29.4	−42	−54.6	μA	VCT=1.7V,RT=24kΩ
【Error Amp】							
Low-level Output Voltage		VOL	—	—	0.3	V	INV=2V
High-level Output Voltage		VOH	VREGA −0.3V	—	—	V	INV=0V
【PWM Comparator】							
DTC Input Current		IDT	—	−1	−5	μA	VDT=1V
Input Threshold Voltage		Vt0	—	1.49	—	V	V1:DUTY0%
		Vt100	—	1.95	—	V	V1:DUTY100%
【Output circuit】							
High-level Output Voltage on driving		VSATH	VCC −0.3	VCC −0.1	—	V	Io=10mA
Low-level Output Voltage on driving		VSATL	—	0.1	0.3	V	Io=−10mA
Maximum Source Current		Iosource	—	—	30	mA	
Maximum Sink Current		Iosink	—	—	−30	mA	
【STB 1-5】							
STB Pull-down Resistor		RSTB	250	400	700	kΩ	
STB Control Voltage	ON	VSTBL	2.0	—	V	V	
	OFF	VSTBH	−0.3	—	V	V	

◎Not designed for radiation resistance.

Rev.B

ROHM

○PACKAGE
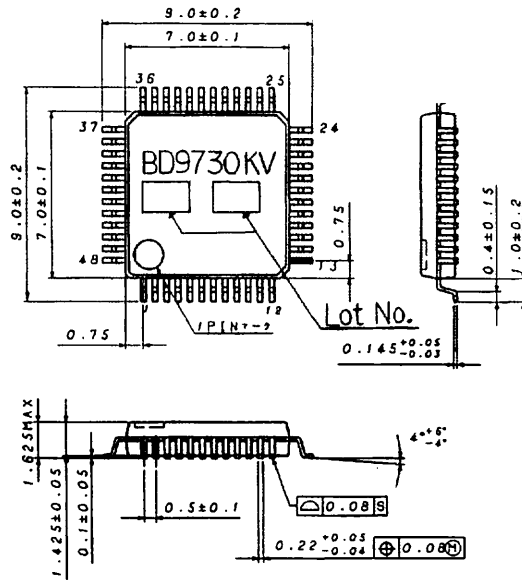
Plastic mold
(UNIT : mm)

○Block Diagram
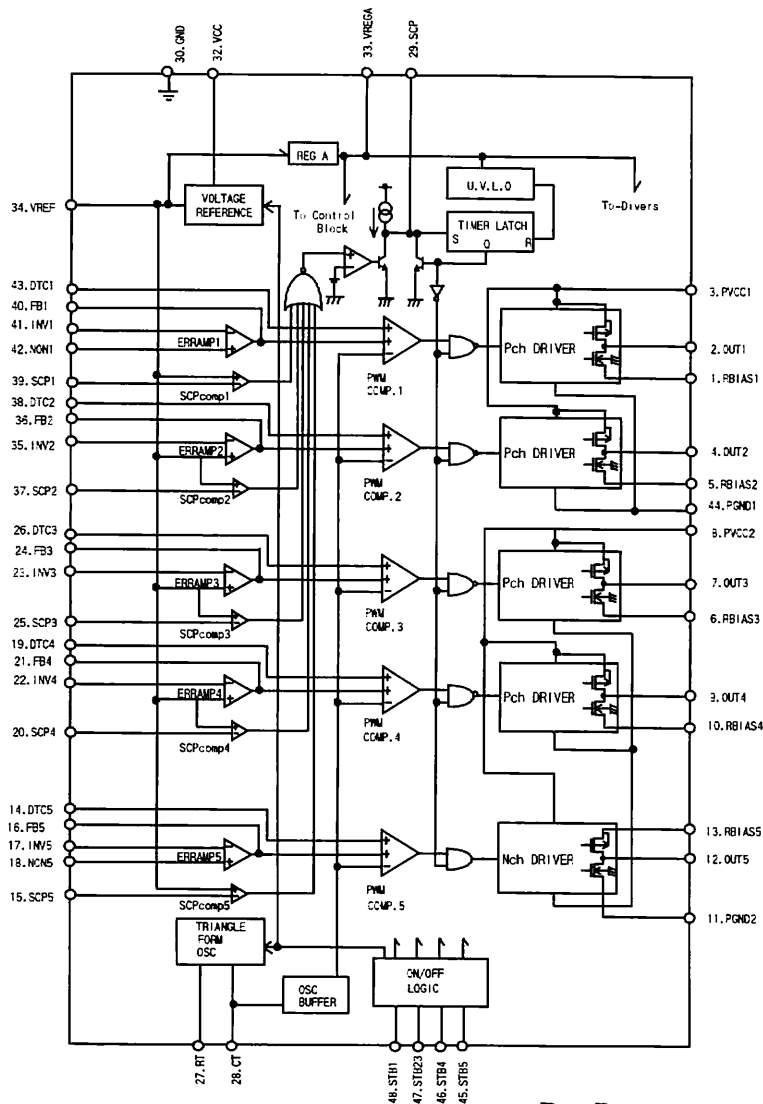
Pin No.	Pin Name
1,5,6,10,13	RBIAS 1,2,3,4,5
14,19,26,38,43	DTC 5,4,3,2,1
15,20,25,37,39	SCP 5,4,3,2,1
16,21,24,36,40	FB 5,4,3,2,1
17,22,23,35,41	INV 5,4,3,2,1
18,42	NON 5,1
27	RT
28	CT
29	SCP
30	GND
33	VREGA
32	VCC
34	VREF
44	PGND 1
45,46,47,48	STB 5,4,2-3,1
2,4,7,9,12	OUT 1,2,3,4,5
3	PVCC 1
8	PVCC 2
11	PGND 2

Rev.B

○NOTE FOR USE

(1) Absolute maximum rating

The device may be destroyed when applied voltage or operating temperature exceeds its absolute maximum rating. Because the source, such as short mode or open mode, cannot be identified if the device is destroyed, it is important to take physical safety measures (such as fusing) if a special mode in excess of absolute rating limits is to be implemented.

(2) Supply line

Since the motor's reverse electromotive force gives rise to the return of regenerative current, measures should be taken to establish a channel for the current, such as adding a capacitor between the power supply and GND. In determining the approach to take, make sure that no problems will be posed by the various characteristics involved, such as capacitance loss at low temperatures with an electrolytic capacitor.

(3) GND potential

Make sure the potential for the GND pin is always kept lower than the potentials of all other pins, regardless of the operating mode.

(4) Thermal design

Be sure to factor in allowable power dissipation (Pd) in actual operation, and to build sufficient margin into the thermal design to accommodate this power loss.

(5) Operation in strong magnetic fields

Use in strong electromagnetic fields may cause malfunctions. Exercise caution with respect to electromagnetic fields.

(6) ASO

Set the parameters so that output Tr will not exceed the absolute maximum rating or ASO value when the IC is used.

(7) Thermal shutdown circuit

This IC is provided with a built-in thermal shutdown (TSD) circuit, which is activated when the chip temperature reaches the threshold value listed below. When TSD is on, the device goes to high impedance mode. Note that the TSD circuit is provided for the exclusive purpose shutting down the IC in the presence of extreme heat, and is not designed to protect the IC per se or guarantee performance when or after extreme heat conditions occur. Therefore, do not operate the IC with the expectation of continued use or subsequent operation once the TSD is activated.

(8) Mutual impedance

Use short and wide wiring tracks for the main supply and ground to keep the mutual impedance as small as possible. Use inductor and capacitor network to keep the ripple voltage minimum.

(9) Voltage of STB pin

The threshold voltages of STB pin are 0.3V and 2.0V. STB state is set below 0.3V while action state is set beyond 2.0V.
The region between 0.3V and 2.0V is not recommended and may cause improper operation.

(10) Setting Max Duty

Max duty limit might not work normally at high frequency. Consider adequate margin when operating circuit above the maximum allowable switching frequency.

(11) Please use the same power supply of driver block as that of main block.

This IC can't be used on the application that arbitrary voltage is applied to driver block.

The products listed in this document are 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).

Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of with would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

About Export Control Order in Japan

Products described herein are the objects of controlled goods in Annex 1 (Item 16) of Export Trade Control Order in Japan.
In case of export from Japan, please confirm if it applies to "objective" criteria or an "informed" (by MITI clause) on the basis of "catch all controls for Non-Proliferation of Weapons of Mass Destruction.

Thank you for your accessing to ROHM product informations.

More detail product informations and catalogs are available,

please contact your nearest sales office.

Please contact our sales offices for details ;

U.S.A / San Diego	TEL : +1(858)625-3630	FAX : +1(858)625-3670
Atlanta	TEL : +1(770)754-5972	FAX : +1(770)754-0691
Dallas	TEL : +1(972)312-8818	FAX : +1(972)312-0330
Germany / Dusseldorf	TEL : +49(2154)9210	FAX : +49(2154)921400
United Kingdom / London	TEL : +44(1)908-282-666	FAX : +44(1)908-282-528
France / Paris	TEL : +33(0)1 56 97 30 60	FAX : +33(0) 1 56 97 30 80
China / Hong Kong	TEL : +852(2)740-6262	FAX : +852(2)375-8971
Shanghai	TEL : +86(21)6279-2727	FAX : +86(21)6247-2066
Dilian	TEL : +86(411)8230-8549	FAX : +86(411)8230-8537
Beijing	TEL : +86(10)8525-2483	FAX : +86(10)8525-2489
Taiwan / Taipei	TEL : +866(2)2500-6956	FAX : +866(2)2503-2869
Korea / Seoul	TEL : +82(2)8182-700	FAX : +82(2)8182-715
Singapore	TEL : +65-6332-2322	FAX : +65-6332-5662
Malaysia / Kuala Lumpur	TEL : +60(3)7958-8355	FAX : +60(3)7958-8377
Philippines / Manila	TEL : +63(2)807-6872	FAX : +63(2)809-1422
Thailand / Bangkok	TEL : +66(2)254-4890	FAX : +66(2)256-6334

Japan /
(Internal Sales)

Tokyo   2-1-1, Yaesu, Chuo-ku, Tokyo 104-0082
                 TEL : +81(3)5203-0321   FAX : +81(3)5203-0300

Yokohama   2-4-8, Shin Yokohama, Kohoku-ku, Yokohama, Kanagawa 222-8575
                 TEL : +81(45)476-2131   FAX : +81(45)476-2128

Nagoya   Dainagayo Building 9F 3-28-12, Meieki, Nakamura-ku, Nagoya,Aichi 450-0002
                 TEL : +81(52)581-8521   FAX : +81(52)561-2173

Kyoto   579-32 Higashi Shiokouji-cho, Karasuma Nishi-iru, Shiokoujidori, Shimogyo-ku,
                 Kyoto 600-8216
                 TEL : +81(75)311-2121   FAX : +81(75)314-6559

(Contact address for overseas customers in Japan)

Yokohama   TEL : +81(45)476-9270   FAX : +81(045)476-9271

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