ROHM
SEMICONDUCTOR

Structure	Silicon Monolithic Integrated Circuit
Product series	9ch Power Driver for Blu-ray, CD/DVD
Type	**BD7755RFV**
Characteristic	・3-phase-sensor-less system, therefore don't need three hall sensors. ・Output current detection resister is not necessary with internally equipped detection circuit.

○Absolute maximum ratings

Parameter	Symbol	Limits	Unit
POWER MOS Power supply voltage1	SPVM,SLVM	15 #1	V
POWER MOS Power supply voltage2	SAVM	7 #2	V
Preblock/BTL powerblock Power supply voltage	Vcc, AVM,LDVM	15	V
PWM control block Power supply voltage	DVcc	7	V
Power dissipation	Pd	1.5 #3	W
Operating temperature range	Topr	-20～70	℃
Storage temperature	Tstg	-55～150	℃
Junction temperature	Tjmax	150	℃

#1　POWER MOS output terminals (40～43, 47,48,50pin) is contained.
#2　POWER MOS output terminals (35～38pin) is contained.
#3　PCB (70mm×70mm×1.6mm,occupied copper foil is less than 3%,glass epoxy standard board) mounting.
　　　Reduce power by 12mW for each degree above 25℃.

○Recommended operating conditions (Ta=-20～+70℃)
　　　(Set the power supply voltage taking allowable dissipation into considering)

Parameter	Symbol	MIN	TYP	MAX	Unit
Spindle, Sled motor driver powerblock power supply voltage	SPVM, SLVM	－	Vcc#4	－	V
Preblock power supply voltage	Vcc	10.8	12	13.2	V
Loading driver power block power supply voltage	LDVM	4.3	5.0	Vcc	V
SA, Actuator driver powerblock power supply voltage	SAVM, AVM	4.3	5.0	5.5	V
PWM control block power supply voltage	DVcc	4.3	5.0	5.5	V
Spindle driver output current	Iosp	－	1.0	2.5#5	A
Actuator/SA/sled motor/loading motor driver output current	Ioo	－	0.5	0.8	A

#4　Set the same supply voltage to SPVM,SLVM and Vcc.
#5　The current is guaranteed 3.5A in case of the Short-circuit braking mode and the current which is turned on/off
　　　in a duty-ratio of less than 1/10 with a maximum on-time of 5msec.
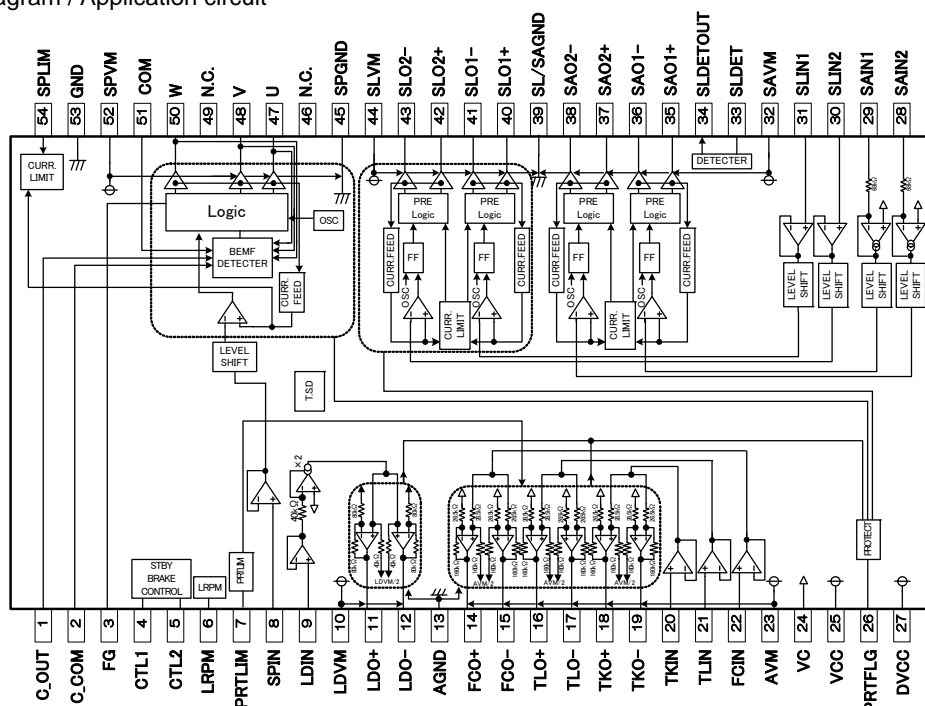
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○Electrical characteristics

(Unless otherwise noted, Ta=25℃, Vcc=SPVM=SLVM=12V, DVcc=AVM=SAVM=LDVM=5V, VC=1.65V, RL=8Ω, RLSP=2Ω)

	Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Circuit current	Quiescent current 1	IQ1	–	14	30	mA	Vcc (Loading OFF)
	Quiescent current 2	IQ2	–	7.5	16	mA	Vcc (Loading ON)
	Quiescent current 3	IQ3	–	7	14	mA	DVcc
	Standby-on current1	IST1	–	1.1	2.4	mA	Vcc
	Standby-on current 2	IST2	–	0.16	0.4	mA	DVcc
Sled motor driver block	Input dead zone (one side)	VDZSL	0	30	80	mV	
	Input output gain	gmSL	0.75	1.0	1.25	A/V	
	Output ON resistor	RONSL	–	2.2	3.8	Ω	IL=500mA
	Output limit current	ILIMSL	0.8	1.1	1.4	A	
	PWM frequency	fosc	–	100	–	kHz	
Spindle driver block	Input dead zone (one side) 1	VDZSP1	20	55	90	mV	VLRPM=L
	Input dead zone (one side) 2	VDZSP2	20	240	450	mV	VLRPM=H
	Input output gain H	gmSPH	2.68	3.5	4.32	A/V	VLRPM=L
	Input output gain L	gmSPL	0.53	0.7	0.87	A/V	VLRPM=H
	Output ON resistor	RONSP	–	1.0	1.7	Ω	IL=500mA
	Output limit current	ILIMSP	1.35	1.6	1.85	A	RSPLIM=1.5kΩ
	PWM frequency	fosc	–	167	–	kHz	
Focus Tracking Tilt driver block	Output offset voltage	VOFA	-50	0	50	mV	
	Output saturation Voltage	VOHA	–	0.9	1.8	V	IL=500mA
	Voltage gain H	GVAH	19.6	21.6	23.6	dB	VLRPM=L
	Voltage gain L	GVAL	13.6	15.6	17.6	dB	VLRPM=H
SA motor driver block	Input dead zone (one side)	VDZSA	40	80	160	mV	
	Input output gain	gmSA	0.15	0.2	0.25	A/V	
	Output ON resistor	RONSA	–	1.3	2.5	Ω	IL=200mA
	Output limit current	ILIMSA	0.28	0.4	0.52	A	
	PWM frequency	fosc	–	100	–	kHz	
Loading driver block	Output offset voltage	VOFLD	-50	0	50	mV	
	Output saturation Voltage 1	VOLD1	–	0.7	1.6	V	IL=500mA LDVM=5V
	Output saturation Voltage 2	VOLD2	–	2.1	3.6	V	IL=500mA LDVM=12V
	Voltage gain	GVLD	15.5	17.5	19.5	dB	
CTL1,2 LRPM	Input high voltage	VIH	2.5	–	3.7	V	
	Input low voltage	VIL	GND	–	0.5	V	
Others	VC drop-muting	VMVC	0.4	0.7	1.0	V	
	Vcc drop-muting	VMVcc	3.45	3.85	4.25	V	

○Package outlines

HTSSOP-B54R (UNIT : mm)

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○ Block diagram / Application circuit

○Pin description

No.	Symbol	Description	No.	Symbol	Description
1	C_OUT	Smooth capacitor connection terminal (output side)	28	SAIN2	SA driver 2 input
2	C_COM	Smooth capacitor connection terminal (com side)	29	SAIN1	SA driver 1 input
3	FG	Frequency generator output	30	SLIN2	Sled driver 2 input
4	CTL1	Driver logic control 1 input	31	SLIN1	Sled driver 1 input
5	CTL2	Driver logic control 2 input	32	SAVM	SA driver power block power supply
6	LRPM	Low rotation mode change terminal	33	SLDET	Sled motor detection signal control input
7	PRTLIM	Adjustable resistor connection for actuator protection	34	SLDETOUT	Sled motor detection signal output
8	SPIN	Spindle driver input	35	SAO1+	SA driver 1 positive output
9	LDIN	Loading driver input	36	SAO1-	SA driver 1 negative output
10	LDVM	Loading driver block power supply	37	SAO2+	SA driver 2 positive output
11	LDO+	Loading driver positive output	38	SAO2-	SA driver 2 negative output
12	LDO-	Loading driver negative output	39	SL/SAGND	Sled/SA driver block pre and power ground
13	AGND	BTL driver block GND	40	SLO1+	Sled driver 1 positive output
14	FCO+	Focus driver positive output	41	SLO1-	Sled driver 1 negative output
15	FCO-	Focus driver negative output	42	SLO2+	Sled driver 2 positive output
16	TLO+	Tilt driver positive output	43	SLO2-	Sled driver 2 negative output
17	TLO-	Tilt driver negative output	44	SLVM	Sled motor driver power supply
18	TKO+	Tracking driver positive output	45	SPGND	Spindle driver power ground
19	TKO-	Tracking driver negative output	46	N.C.	N.C.
20	TKIN	Tracking driver input	47	U	Spindle driver output U
21	TLIN	Tilt driver input	48	V	Spindle driver output V
22	FCIN	Focus driver input	49	N.C.	N.C.
23	AVM	Actuator driver block power supply	50	W	Spindle driver output W
24	VC	Reference voltage input	51	COM	Motor coil center point input
25	Vcc	Pre block power supply	52	SPVM	Spindle driver power supply
26	PRTFLG	Protection flag output	53	GND	Pre block GND
27	DVcc	PWM block control power supply	54	SPLIM	Adjustable resistor connection for spindle driver current limit

● Positive/negative of the output terminals are determined in reference to those of the input terminals.

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〇Cautions in using the IC

1．Absolute maximum ratings
    We are careful enough for quality control about this IC. So, there is no problem under normal operation, excluding that it exceeds the absolute maximum ratings. However, this IC might be destroyed when the absolute maximum ratings, such as impressed voltages (Vcc, PVcc) or the operating temperature range(Topr), is exceeded, and whether the destruction is short circuit mode or open circuit mode cannot be specified. Please take into consideration the physical countermeasures for safety, such as fusing, if a particular mode that exceeds the absolute maximum rating is assumed.

2．Power supply line
    Due to switching and EMI noise generated by magnetic components (inductors and motors), using electrolytic and ceramic suppress filter capacitors(0.1μF) close to the IC power input terminals (Vcc and GND) is recommended. Please note: the electrolytic capacitor value decreases at lower temperatures.
    Current rush might flow momentarily by the order of turning on the power supply and the delay in IC with two or more power supplies. Note the capacity of the power supply coupling, width and drawing the power supply and the GND pattern wiring. Please make the power supply lines (where large current flow) wide enough to reduce the resistance of the power supply patterns, because the resistance of power supply pattern might influence the usual operation (output dynamic range etc…).

3．GND line
    The ground line is where the lowest potential and transient voltages are connected to the IC.

4．Thermal design
    Do not exceed the power dissipation (Pd) of the package specification rating under actual operation, and please design enough temperature margins.

5．Short circuit mode between terminals and wrong mounting
    Do not mount the IC in the wrong direction and be careful about the reverse-connection of the power connector. Moreover, this IC might be destroyed when the dust short the terminals between them or GND

6．Radiation
    Strong electromagnetic radiation can cause operation failures.

7．ASO(Area of Safety Operation.)
    Do not exceed the maximum ASO and the absolute maximum ratings of the output driver.

8．TSD(Thermal shut-down)
    The TSD is activated when the junction temperature (Tj) reaches 175℃(with 25℃ hysteresis), and the output terminal is switched to Hi-z. The TSD circuit aims to intercept IC from high temperature. The guarantee and protection of IC are not purpose. Therefore, please do not use this IC after TSD circuit operates, nor use it for assumption that operates the TSD circuit.

9．Inspection by the set circuit board
    The stress might hang to IC by connecting the capacitor to the terminal with low impedance. Then, please discharge electricity in each and all process. Moreover, in the inspection process, please turn off the power before mounting the IC, and turn on after mounting the IC. In addition, please take into consideration the countermeasures for electrostatic damage, such as giving the earth in assembly process, transportation or preservation.

10．Earth wiring pattern
    This IC is a monolithic IC, and has P$^+$ isolation and P substrate for the element separation. Therefore, a parasitic PN junction is firmed in this P-layer and N-layer of each element. For instance, the resistor or the transistor is connected to the terminal as shown in the figure below. When the GND voltage potential is greater than the voltage potential at Terminals A or B, the PN junction operates as a parasitic diode. In addition, the parasitic NPN transistor is formed in said parasitic diode and the N layer of surrounding elements close to said parasitic diode. These parasitic elements are formed in the IC because of the voltage relation. The parasitic element operating causes the wrong operation and destruction. Therefore, please be careful so as not to operate the parasitic elements by impressing to input terminals lower voltage than GND(P substrate). Please do not apply the voltage to the input terminal when the power-supply voltage is not impressed. Moreover, please impress each input terminal lower than the power-supply voltage or equal to the specified range in the guaranteed voltage when the power-supply voltage is impressing.
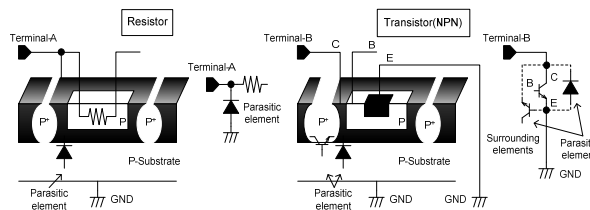
Simplified structure of IC

11．Earth wiring pattern
    Use separate ground lines for control signals and high current power driver outputs. Because these high current outputs that flows to the wire impedance changes the GND voltage for control signal. Therefore, each ground terminal of IC must be connected at the one point on the set circuit board. As for GND of external parts, it is similar to the above-mentioned.

12．Reverse-rotation braking
    In the case of reverse-rotation braking from high speed rotation, pay good attention to reverse electromotive force. Furthermore, fully check the voltage to be applied to the output terminal and consider the revolutions applied to the reverse-rotation brake.

13．About the capacitor between SPVM and SPGND
    The capacitor between SPVM and SPGND absorbs the change in a steep voltage and the current because of the PWM drive, as a result, there is a role to suppress the disorder of the SPVM voltage. However, the effect falls by the influence of the wiring impedance etc, if the capacitor becomes far from IC. Please examine the capacitor between SPVM and SPGND to arrange it near IC.

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Notes

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