STRUCTURE Silicon monolithic integrated circuits

PRODUCT SERIES 1chip motor driver for printer

(H bridge driver 2ch, switching regulator, series regulator, reset output)

TYPE **BD64550EFV**

FUNCTION ・Built-in thermal shut down circuit

・Built-in UVLO circuit

○Absolute maximum ratings (Ta=25℃)

Parameter	Symbol	Limit	Unit
Supply voltage	V_M	40	V
Power dissipation	Pd	1600※1	mW
Logic input voltage	V_L	-0.4～5.5	V
RIN applied voltage	V_{RIN}	5.5	V
RNF voltage	V_{RNF}	0.5	V
Motor driver maximum output current (peak500nsec)	I_{OUT}(peak)	8.0	A
Motor driver maximum output current (DC)	I_{OUT}(DC)	2.5※2	A
Switching Reg maximum output current (DC)	I_{OUT}	0.5	A
Series Reg maximum output current (DC)	I_{OUT}	0.25	A
Operating temperature range	T_{OPR}	-25～+85	℃
Storage temperature range	T_{STG}	-55～+150	℃
Junction temperature	T_{jmax}	150	℃

※1 70mm×70mm×1.6mm glass epoxy board. Derating in done at 12.8mW/℃ for operating above Ta=25℃.

※2 Do not exceed Pd, ASO and Tjmax=150℃.

○Recommended operating conditions (Ta= -25～+85℃)

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	V_M	7	24	36	V
SCLK input frequency	F_{SCLK}	-	-	20	MHz
Switching Reg output voltage	V_{swreg}	3	-	5	V

This product isn't designed for protection against radioactive rays.

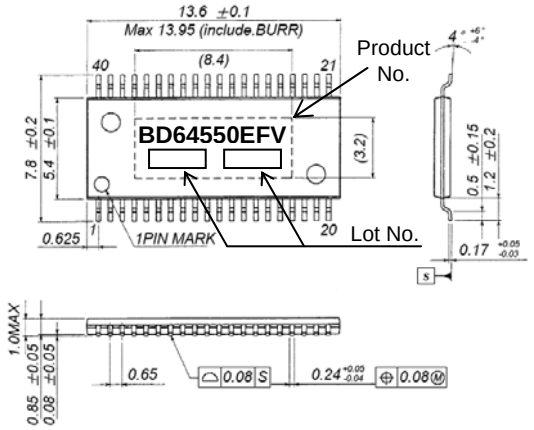
Status of this document

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℃, V_M=24V)

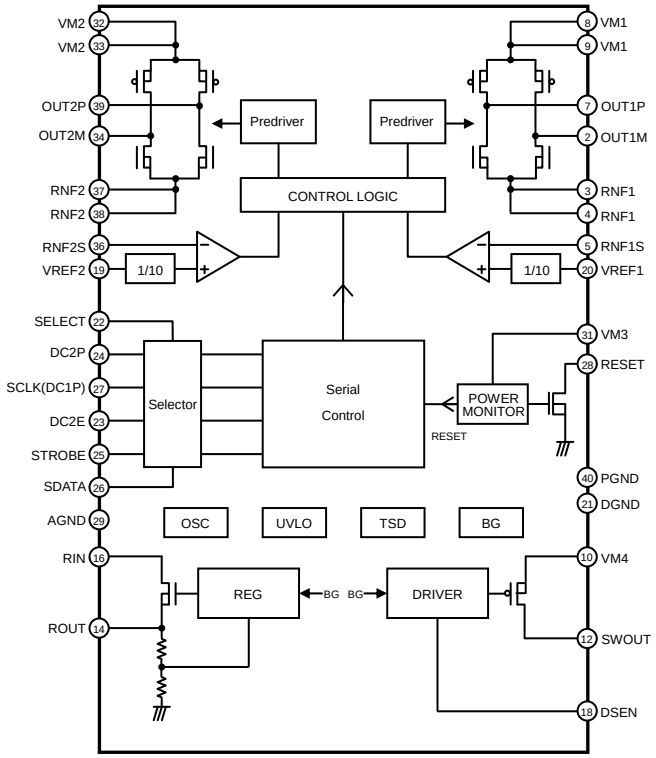
Parameter	Symbol	Limit			Unit	Conditions
		Min.	Typ.	Max.		
Overall						
VM current 1	I_{VM1}	-	-	8	mA	V_M=7V
VM current 2	I_{VM2}	-	-	12	mA	V_M=24V
H bridge 1						
Output on resistance (source side)	R_{ONH1}	-	0.6	0.78	Ω	I_{OUT}=1A
Output on resistance (sinking side)	R_{ONL1}	-	0.4	0.52	Ω	I_{OUT}=1A
Output leak current	I_{LEAK1}	0	-	10	μA	V_M=36V
Built-in diode forward direction voltage (source side)	V_{FH1}	0.6	0.9	1.2	V	I_{OUT}=1A
Built-in diode forward direction voltage (sinking side)	V_{FL1}	0.6	0.9	1.2	V	I_{OUT}=1A
H bridge 2						
Output on resistance（source side）	R_{ONH2}	-	0.7	0.91	Ω	I_{OUT}=1A
Output on resistance（sinking side）	R_{ONL2}	-	0.5	0.65	Ω	I_{OUT}=1A
Output leak current	I_{LEAK2}	0	-	10	μA	V_M=36V
Built-in diode forward direction voltage (source side)	V_{FH2}	0.6	0.9	1.2	V	I_{OUT}=1A
Built-in diode forward direction voltage (sinking side)	V_{FL2}	0.6	0.9	1.2	V	I_{OUT}=1A
Current control						
VREF voltage range	V_{REF}	0.8	-	3.5	V	
VREF pin outflow current	I_{REF}	-	0	1	μA	
RNF pin outflow current	I_{RNF}	5	15	30	μA	
RNFS pin outflow current	I_{RNFS}	-	0	1	μA	
VREF-RNFS offset voltage	V_{OFFSET}	-15	0	15	mV	VREF=2V
Control logic						
High input voltage	V_{INH}	2.0	-	5.5	V	
Low input voltage	V_{INL}	0	-	0.8	V	
Input current	I_{IN}	21	33	45	μA	Input voltage=3.3V
Switching power source						
DSEN threshold voltage	V_{SWBIAS}	0.873	0.9	0.927	V	
Output on resistance	R_{SWON}	-	0.8	1.04	Ω	I_{OUT}=250mA
Leak current	I_{SWLEAK}	0	-	10	μA	V_M=36V
DUTY_MAX value	D_{MAX}	-	92	-	%	
Clock frequency	F_{SW}	130	200	270	kHz	
DSEN pin outflow current	I_{DSEN}	-	0	1	μA	
Series power source						
Output voltage	V_{SOUT}	1.425	1.5	1.575	V	I_{OUT}=70mA
Leak current	I_{SLEAK}	0	-	10	μA	
RESET pin						
Output voltage	V_{RSTL}	0	-	0.2	V	I_{DRAIN}=1mA
Leak current	$I_{RSTLEAK}$	0	-	10	μA	
High VM threshold voltage	V_{MPORH}	6.3	6.5	6.7	V	V_M at power on
Low VM threshold voltage L	V_{MPORL}	5.9	6.1	6.3	V	V_M at power off
High motor UVLO voltage	V_{MMTH}	13.5	15	16.5	V	Off motor only
Low motor UVLO voltage	V_{MMTL}	12.5	14	15.5	V	
Reset delay time	T_{POR}	50	80	110	msec	

○Package outline



HTSSOP-B40 (Unit: mm)

○Block diagram



○Pin No. / Pin name

Pin No.	Pin name	Pin No.	Pin name
1	NC	21	DGND
2	OUT1M	22	SELECT
3	RNF1	23	DC2E
4	RNF1	24	DC2P
5	RNF1S	25	STROBE
6	NC	26	SDATA
7	OUT1P	27	SCLK
8	VM1	28	RESET
9	VM1	29	AGND
10	VM4	30	NC
11	NC	31	VM3
12	SWOUT	32	VM2
13	NC	33	VM2
14	ROUT	34	OUT2M
15	NC	35	NC
16	RIN	36	RNF2S
17	NC	37	RNF2
18	DSEN	38	RNF2
19	VREF2	39	OUT2P
20	VREF1	40	PGND

NC: Non Connection

○Operation Notes

(1) Absolute maximum ratings

Use of the IC in excess of absolute maximum ratings such as the applied voltage or operating temperature range (TOPR) may result in IC damage. Assumptions should not be made regarding the state of the IC (short mode or open mode) when such damage is suffered. The implementation of a physical safety measure such as a fuse should be considered when use of the IC in a special mode where the absolute maximum ratings may be exceeded is anticipated.

(2) Power supply lines

Regenerated current may flow as a result of the motor's back electromotive force. Insert capacitors between the power supply and ground pins to serve as a route for regenerated current. Determine the capacitance in full consideration of all the characteristics of the electrolytic capacitor, because the electrolytic capacitor may loose some capacitance at low temperatures. If the connected power supply does not have sufficient current absorption capacity, regenerative current will cause the voltage on the power supply line to rise, which combined with the product and its peripheral circuitry may exceed the absolute maximum ratings. It is recommended to implement a physical safety measure such as the insertion of a voltage clamp diode between the power supply and GND pins.

(3) Ground potential

Ensure a minimum GND pin potential in all operating conditions.

(4) Setting of heat

Use a thermal design that allows for a sufficient margin in light of the power dissipation (Pd) in actual operating conditions.
This IC exposes its frame of the backside of package. Note that this part is assumed to use after providing heat dissipation treatment to improve heat dissipation efficiency. Try to occupy as wide as possible with heat dissipation pattern not only on the board surface but also the backside.

(5) Actions in strong magnetic field

Use caution when using the IC in the presence of a strong magnetic field as doing so may cause the IC to malfunction.

(6) ASO

When using the IC, set the output transistor for the motor so that it does not exceed absolute maximum ratings or ASO.

(7) Thermal shutdown circuit

The IC has a built-in thermal shutdown circuit (TSD circuit). If the chip temperature becomes Tjmax=150℃, and higher, coil output to the motor and regulator output will be OFF, and reset output will be L. The TSD circuit is designed only to shut the IC off to prevent runaway thermal operation. It is not designed to protect or indemnify peripheral equipment. Do not use the TSD function to protect peripheral equipment.

(8) Ground Wiring Pattern

When using both small signal and large current GND patterns, it is recommended to isolate the two ground patterns, placing a single ground point at the application's reference point so that the pattern wiring resistance and voltage variations caused by large currents do not cause variations in the small signal ground voltage. Be careful not to change the GND wiring pattern of any external components, either.

Notes

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