STRUCTURE Silicon monolithic integrated circuits

PRODUCT SERIES 1chip motor driver for printer

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

TYPE **BD6794EFV**

FUNCTION
- Built-in thermal shut down circuit
- Built-in UVLO circuit

○Absolute maximum ratings (Ta=25℃)

Parameter	Symbol	Limit	Unit
Supply voltage	VM	36	V
Power dissipation	Pd	1600※1	mW
Logic input voltage	VL	-0.4～5.5	V
RIN applied voltage	VRIN	5.5	V
RNF voltage	VRNF	0.5	V
Motor driver maximum output current (peak500nsec)	IOUT(peak)	8.0	A
Motor driver maximum output current (DC)	IOUT(DC)	2.0※2	A
Switching Reg maximum output current (DC)	IOUT	0.5	A
Series Reg maximum output current (DC)	IOUT	0.25	A
Operating temperature range	TOPR	-25～+85	℃
Storage temperature range	TSTG	-55～+150	℃
Junction temperature	Tjmax	150	℃

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

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

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

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	VM	18	24	32	V
SCLK input frequency	FSCLK	-	-	20	MHz
Switching Reg output voltage	Vswreg	3	-	5	V

This product described in this specification isn't judged whether it applies to COCOM regulations.
Please confirm in case of export.
This product isn't designed for protection against radioactive rays.

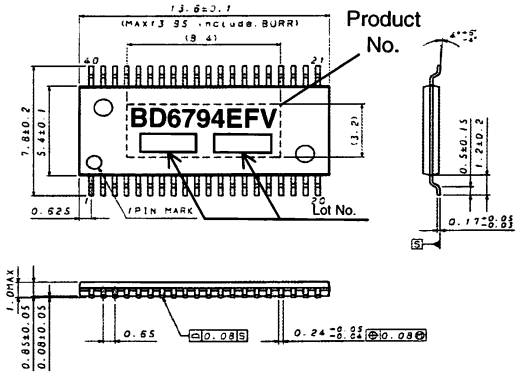
○Electrical characteristics (Unless otherwise specified, Ta=25℃, VM=24V)

Parameter	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Overall						
VM current 1	I_{VM1}	-	-	8	mA	VM=7V
VM current 2	I_{VM2}	-	-	12	mA	VM=24V
H bridge 1						
Output on resistance (source side)	R_{ONH1}	-	0.6	0.78	Ω	IOUT=1A
Output on resistance (sinking side)	R_{ONL1}	-	0.4	0.52	Ω	IOUT=1A
Output leak current	I_{LEAK1}	0	-	10	μA	VM=32V
Built-in diode forward direction voltage (source side)	V_{FH1}	0.6	0.9	1.2	V	IOUT=1A
Built-in diode forward direction voltage (sinking side)	V_{FL1}	0.6	0.9	1.2	V	IOUT=1A
H bridge 2						
Output on resistance (source side)	R_{ONH2}	-	0.7	0.91	Ω	IOUT=1A
Output on resistance (sinking side)	R_{ONL2}	-	0.5	0.65	Ω	IOUT=1A
Output leak current	I_{LEAK2}	0	-	10	μA	VM=32V
Built-in diode forward direction voltage (source side)	V_{FH2}	0.6	0.9	1.2	V	IOUT=1A
Built-in diode forward direction voltage (sinking side)	V_{FL2}	0.6	0.9	1.2	V	IOUT=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}	-	2.0	2.4	Ω	IOUT=250mA
Leak current	I_{SWLEAK}	0	-	10	μA	VM=32V
DUTY_MAX value	DMAX	-	92	-	%	
Clock frequency	FSW	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	IOUT= 70mA
Leak current	I_{SLEAK}	0	-	10	μA	
RESET pin						
Output voltage	V_{RSTL}	0	-	0.2	V	IDRAIN=1mA
Leak current	$I_{RSTLEAK}$	0	-	10	μA	
High VM threshold voltage	V_{MPORH}	6.3	6.5	6.7	V	VM at power-on
Low VM threshold voltage L	V_{MPORL}	5.9	6.1	6.3	V	VM at power-on
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	

○Design guarantee (Tj=25℃, VM=24V) ※Not examined in shipping.

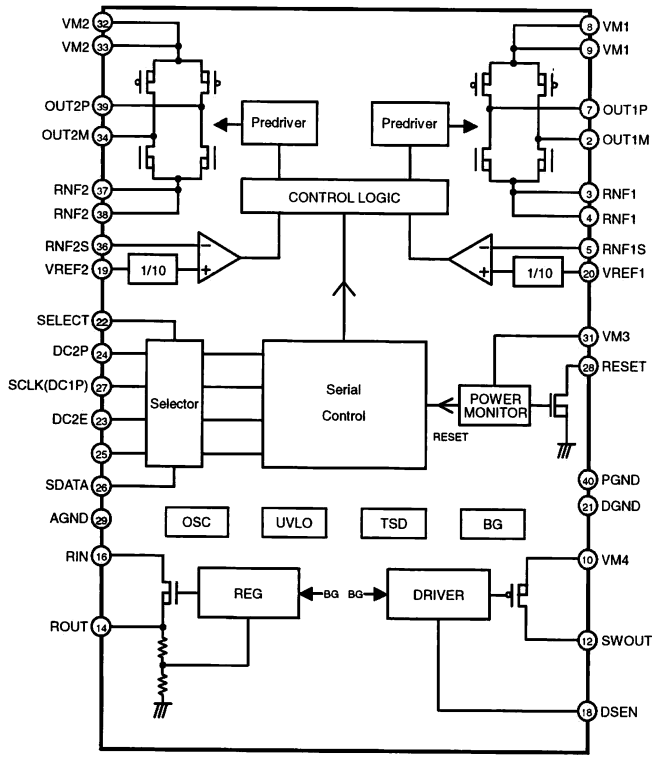
Parameter	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Soft start time	Tss	17	24	30	msec	
Glitch mask time	T_{PORM}	1.5	2.5	3.5	μsec	
Reset output pulse width	T_{POR}	25	40	55	msec	
Internal reference clock frequency	F_{BASE}	5	8	11	MHz	

○Package outline



HTSSOP-B40 (Unit: mm)

○Block diagram



○Pin No. / Pin name

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

○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

This IC incorporates a TSD (thermal shutdown) circuit (TSD circuit). If the temperature of the chip reaches the following temperature, the motor coil output will be opened.The thermal shutdown circuit (TSD circuit) is designed only to shut the IC off to prevent runaway thermal operation. It is not designed to protect the IC or guarantee its operation. Do not continue to use the IC after operating this circuit or use the IC in an environment where the operation of this circuit is assumed.

TSD on temperature [°C] (typ.)	Hysteresis temperature [°C] (typ.)
175	25

(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.

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