STRUCTURE Silicon Monolithic Integrated Circuit

TYPE Step down DC/DC converter Controller IC for NOTE PC

PRODUCT SERIES **BD95371MUV**

FEATURES
- Built in H^3Reg DC/DC controller
- Switching Frequency Variable (f=200kHz～500kHz)

○ ABSOLUTE MAXIMUM RATINGS（Ta=25℃）

Parameter	Symbol	Limit	Unit
Input Voltage 1	VCC	7 *1*2	V
Input Voltage 2	VDD	7 *1*2	V
Input Voltage 3	VIN	28 *1*2	V
BOOT Voltage	BOOT	35 *1*2	V
BOOT-SW Voltage	BOOT-SW	7 *1*2	V
HG-SW Voltage	HG-SW	7 *1*2	V
LG Voltage	LG	VDD	V
Output Voltage	VOUT/Is+/Is-	VCC	V
EN Input Voltage	EN	7 *1	V
Power Dissipation 1	Pd1	0.34*3	W
Power Dissipation 2	Pd2	0.70*4	W
Power Dissipation 3	Pd3	2.20*5	W
Power Dissipation 4	Pd4	3.56*6	W
Operating Temperature Range	Topr	-10～+100	℃
Storage Temperature Range	Tstg	-55～+150	℃
Maximum Junction Temperature	Tjmax	+150	℃

*1 Not to exceed Pd.
*2 Instantaneous surge voltage, back electromotive force and voltage under less than 10% duty cycle.
*3 Reduced by 2.7mW/℃ for each increase in Ta of 1℃ over 25℃. (when don't mounted on a heat radiation board)
*4 Reduced by 5.6mW/℃ for increase in Ta of 1℃ over 25℃. (when mounted on a board 70.0mm × 70.0mm × 1.6mm 1-layer Glass-epoxy PCB, copper foil area: 10.29mm^2)
*5 Reduced by 17.6mW/℃ for increase in Ta of 1℃ over 25℃. (when mounted on a board 70.0mm × 70.0mm × 1.6mm 4-layer Glass-epoxy PCB, copper foil area: 10.29mm^2 2,3-layer copper foil area: 5505mm^2)
*6 Reduced by 28.5mW/℃ for increase in Ta of 1℃ over 25℃. (when mounted on a board 70.0mm × 70.0mm × 1.6mm 4-layer Glass-epoxy PCB, copper foil area: 5505mm^2)

○ OPERATING CONDITIONS（Ta=25℃）

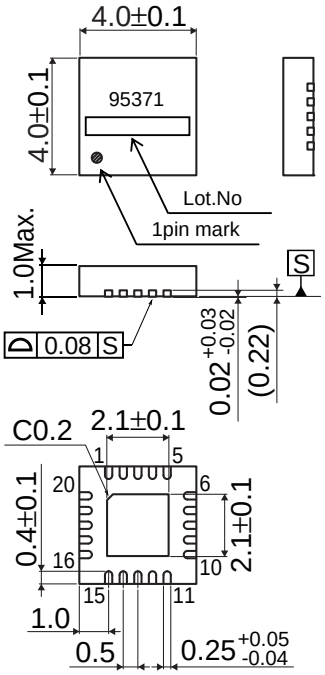
Parameter	Symbol	MIN	MAX	Unit
Input Voltage 1	VCC	4.5	5.5	V
Input Voltage 2	VDD	4.5	5.5	V
Input Voltage 3	VIN	4.5	25	V
BOOT Voltage	BOOT	4.5	30	V
SW Voltage	SW	-0.7	25	V
BOOT-SW Voltage	BOOT-SW	4.5	5.5	V
EN Input Voltage	EN	0	5.5	V
Is Input Voltage	Is+/Is-	0.7	2.7	V
MIN ON Time	Tonmin	-	80	ns

★ This product is not designed for protection against radioactive rays.

○ELECTRICAL CHARACTERISTICS （unless otherwise noted, Ta=25℃ VCC=5V,VDD=5V,EN=3V,VIN=12V,VOUT=1.05V,R_{FS}=36kΩ）

Parameter	Symbol	Standard Value			Unit	Condition
		MIN	TYP	MAX		
[Whole Device]						
VCC Bias Current	Icc	-	1500	1800	μA	
VCC Standby Current	Iccstb	-	0	10	μA	EN＝0V
VIN Bias Current	Iin	-	30	80	μA	
VIN Standby Current	Iinstb	-	0	10	μA	EN＝0V
EN Low Voltage	VEN_low	GND	-	0.8	V	
EN HighVoltage (Forced Continuous mode)	VENth_con	2.3	-	3.8	V	
EN HighVoltage (SLLM Mode)	VENth_sllm	4.5	-	5.5	V	
EN Bias Current	Ien	-	15	25	μA	EN=3V
[Under Voltage Locked Out]						
VCC threshold voltage	Vcc_UVLO	3.7	4.0	4.3	V	VCC:Sweep up
VCC hysteresis voltage	dVcc_UVLO	100	160	220	mV	VCC:Sweep down
[H^3REG Control]						
ON Time	Ton	194	219	244	ns	
MAX ON Time	Tonmax	-	3.5	-	μs	
MIN OFF Time	Toffmin	-	490	700	ns	
[FET Driver]						
HG Higher side ON resistor	HGhon	-	3.0	6.0	Ω	
HG Lower side ON resistor	HGlon	-	2.0	4.0	Ω	
LG Higher side ON resistor	LGhon	-	3.0	6.0	Ω	
LG Lower side ON resistor	LGlon	-	0.5	1.0	Ω	
[SCP]						
SCP strat-up Voltage	Vscp	0.345	0.420	0.495	V	
SCP delay time	Tscp	-	2.5	-	ms	
[OVP]						
FB threshold voltage	Vovp	0.825	0.900	0.975	V	
[Soft start]						
Charge current	Iss	1	2	3	μA	
Standby voltage	Vss_stb	-	-	50	mV	
[Current Limit Block]						
Setting Current	Iilim	-	10	-	μA	
Current limit threshold	Ilim	75	100	125	mV	RILIM=100kΩ
[Output Voltage setting]						
VOUT typical voltage	REF	0.743	0.750	0.757	V	
Is+ Input current	IIs+	-1	0	1	μA	Is+=1.05V
Is- Input current	IIs-	-1	0	1	μA	Is-=1.05V
[Power Good]						
FB Power Good	V_{PGOOD}	0.38	0.47	0.56	V	
Discharge ON resistor	Ronpgood	-	50	150	Ω	
[BOOT Diode]						
VF voltage	VF	0.4	0.5	0.6	V	IF=1mA

○ PHYSICAL DIMENSIONS



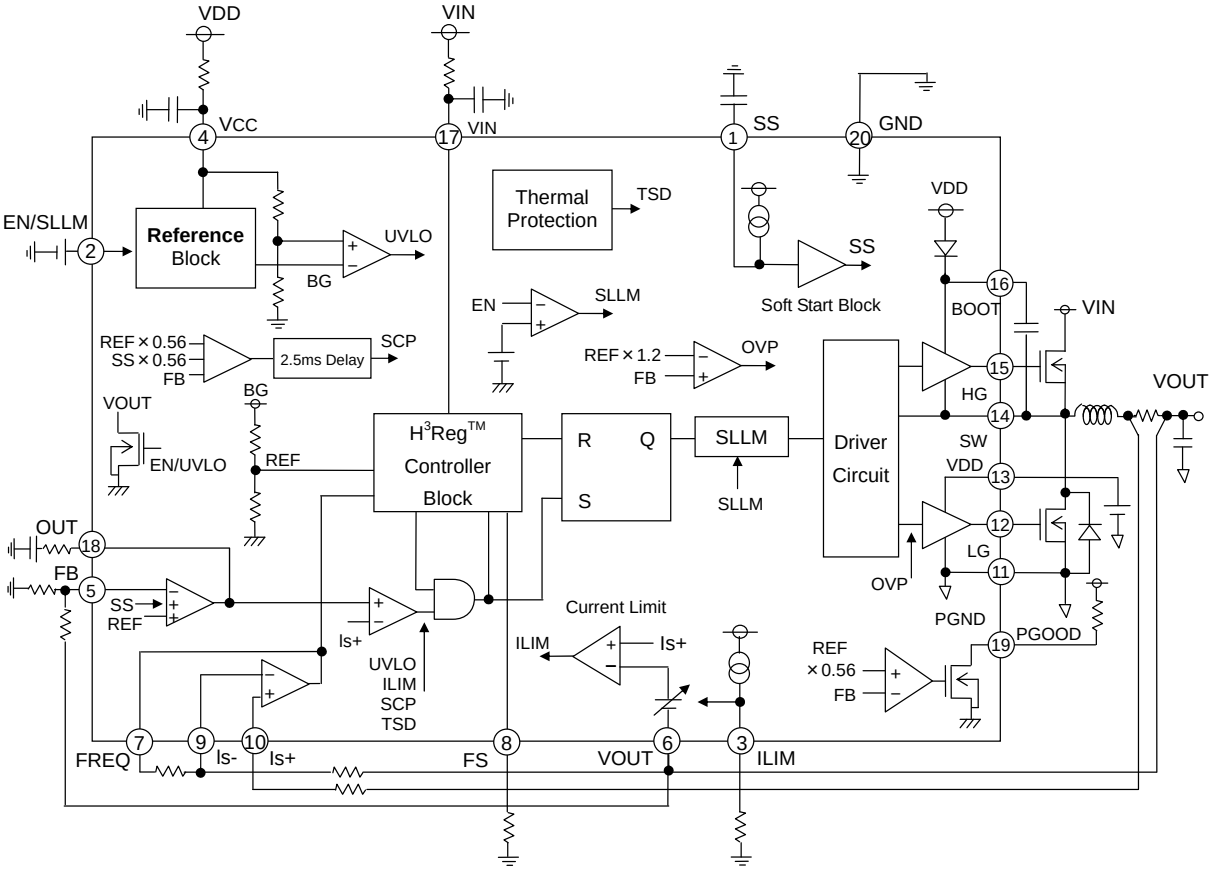
VQFN020V4040 (Unit:mm)

○ Pin Number Pin Name

Pin number	PIN name
1	SS
2	EN/SLLM
3	ILIM
4	VCC
5	FB
6	VOUT
7	FREQ
8	FS
9	Is-
10	Is+
11	PGND
12	LG
13	VDD
14	SW
15	HG
16	BOOT
17	VIN
18	OUT
19	PGOOD
20	GND
reverse	FIN

Please connect FIN to GND.

○ BLOCK DIAGRAM



●Operation Notes

1. Absolute maximum ratings

An excess in the absolute maximum ratings, such as supply voltage, temperature range of operating conditions, etc., can break down the devices, thus making impossible to identify breaking mode, such as a short circuit or an open circuit. If any over rated values will expect to exceed the absolute maximum ratings, consider adding circuit protection devices, such as fuses.

2. Connecting the power supply connector backward

Connecting of the power supply in reverse polarity can damage IC. Take precautions when connecting the power supply lines. An external direction diode can be added.

3. Power supply lines

Design PCB layout pattern to provide low impedance GND and supply lines. To obtain a low noise ground and supply line, separate the ground section and supply lines of the digital and analog blocks. Furthermore, for all power supply terminals to ICs, connect a capacitor between the power supply and the GND terminal. When applying electrolytic capacitors in the circuit, not that capacitance characteristic values are reduced at low temperatures.

4. GND voltage

The potential of GND pin must be minimum potential in all operating conditions.

5. Thermal design

Use a thermal design that allows for a sufficient margin in light of the power dissipation (Pd) in actual operating conditions.

6. Inter-pin shorts and mounting errors

Use caution when positioning the IC for mounting on printed circuit boards. The IC may be damaged if there is any connection error or if pins are shorted together.

7. Actions in strong electromagnetic field

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

8. ASO

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

9. Thermal shutdown circuit

The IC incorporates a built-in thermal shutdown circuit (TSD circuit). The thermal shutdown circuit (TSD circuit) is designed only to shut the IC off to prevent thermal runaway. 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.)
BD95371MUV	175	15

10. 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 ground potential of application 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.

11. Heat sink (FIN)

Since the heat sink (FIN) is connected with the Sub, short it to the GND.

Notes

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