STRUCTURE: Silicon Monolithic Integrated Circuit
TYPE: 2ch DC/DC converter IC
PRODUCT SERIES: **BD95830MUV**
FEATURES:
・Built in 2ch H^3Reg DC/DC converter controller
・Adjustable output voltage setting (0.8V～5.5V)

○Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Limit	Unit
Input Voltage	VIN1, VIN2, VINS	15.1 *1*2	V
BOOT Voltage	BOOT1,BOOT2	21.1 *1*2	V
BOOT-SW Voltage	BOOT1-SW1, BOOT2-SW2	7 *1*2	V
Output Voltage	VOUT1, VOUT2	7 *1*2	V
Output Feedback Voltage	FB1, FB2	VREG	V
VREG Voltage	VREG	7 *1*2	V
VCC Voltage	VCC	VREG	V
Logic Input Voltage	EN1, EN2	15.1 *1*2	V
Power Dissipation 1	Pd1	0.38 *3	W
Power Dissipation 2	Pd2	0.88 *4	W
Power Dissipation 3	Pd3	3.26 *5	W
Power Dissipation 4	Pd4	4.56 *6	W
Operating Temperature Range	Topr	-20～+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 3.04mW/℃ for each increase in Ta of 1℃ over 25℃ (when don't mounted on a heat radiation board)
*4 Reduced by 7.04mW/℃ for increase in Ta of 1℃ over 25℃. (when mounted on a board 74.2mm×74.2mm×1.6mm Glass-epoxy PCB(1 layer), copper foil area : 20.2mm^2)
*5 Reduced by 26.11mW/℃ for increase in Ta of 1℃ over 25℃. (when mounted on a board 74.2mm×74.2mm×1.6mm Glass-epoxy PCB(4 layer), copper foil area: 20.2mm^2, 2-3layer: 5505mm^2)
*6 Reduced by 36.5mW/℃ for increase in Ta of 1℃ over 25℃. (when mounted on a board 74.2mm×74.2mm×1.6mm Glass-epoxy PCB(4 layer), copper foil area: 5505mm^2)

○Operating Conditions （Ta=25℃）

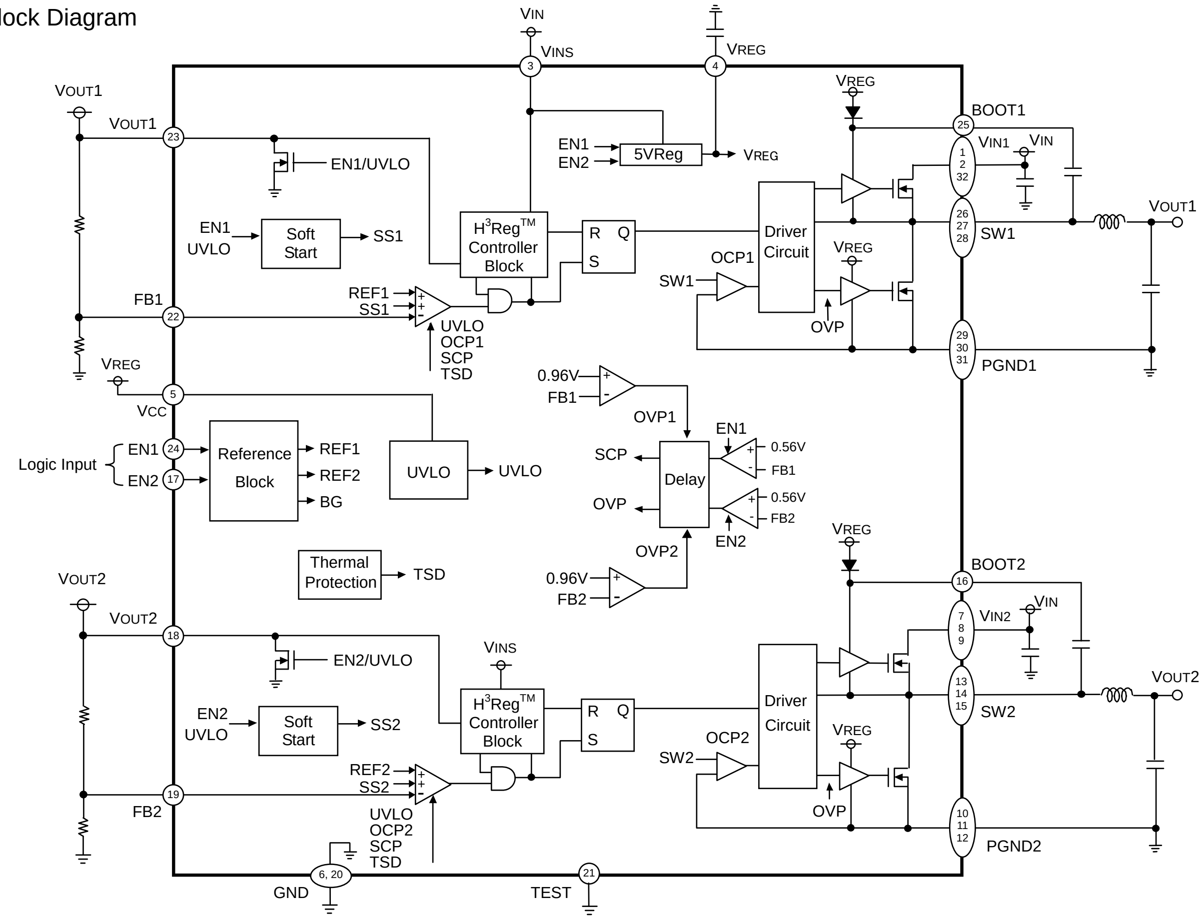
Parameter	Symbol	MIN.	MAX.	Unit
Input Voltage	VIN1, VIN2, VINS	7.5	15	V
BOOT Voltage	BOOT1, BOOT2	4.5	21	V
SW Voltage	SW1, SW2	-0.7	15	V
BOOT-SW Voltage	BOOT1-SW1, BOOT2-SW2	4.5	5.5	V
Logic Input Voltage	EN1, EN2	0	15	V
Output Voltage	VOUT1, VOUT2	0.8	5.5	V
MIN ON TIME	tonmin	-	100	ns

● This product is not designed to be used in a radioactive environment.

○Electrical Characteristics (Unless otherwise noted, Ta=25℃ V_{CC}=V_{REG}, V_{IN1}=V_{IN2}=V_{INS}=12V, V_{EN1}=V_{EN2}=3V, V_{OUT1}=V_{OUT2}=1.8V)

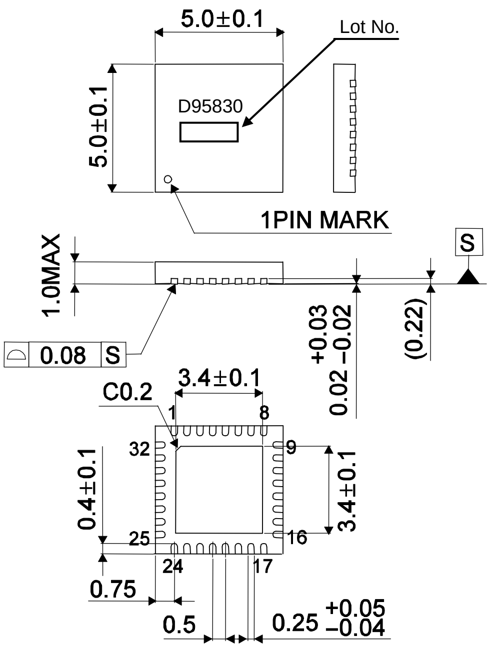
Parameter	Symbol	Standard Value			Unit	Conditions
		MIN.	TYP.	MAX.		
[Whole Device]						
V_{INS} Bias current	I_{INS}	-	1.7	2.2	mA	
V_{INS} Standby current	I_{INS}_stb	-	0	10	μA	V_{EN1}=V_{EN2}=0V
EN Low Voltage1,2	V_{EN}_low1,2	GND	-	0.3	V	
EN High Voltage1,2	V_{EN}_high1,2	2.2	-	15	V	
EN Pull-down resistance1,2	$R_{EN1,2}$	28	48	68	kΩ	
[5VLinear Regulator]						
V_{REG} Standby Voltage	V_{REG}_stb	-	-	0.1	V	V_{EN1}=V_{EN2}=0V
V_{REG} Output Voltage	V_{REG}	4.8	5.0	5.2	V	V_{INS}=7.5V to 15V I_{REG}=10mA
[Under Voltage Lock Out]						
UVLO threshold Voltage	V_{CC_UVLO}	4.0	4.3	4.6	V	V_{CC}:Sweep up
UVLO hysteresis Voltage	dV_{CC_UVLO}	100	160	220	mV	V_{CC}:Sweep down
[Over Voltage Protection]						
OVP threshold Voltage1,2	$V_{OVP1,2}$	0.86	0.96	1.06	V	
[H³Reg™ Control]						
ON Time1,2	$ton_{1,2}$	200	255	310	ns	
MIN OFF Time1,2	$toffmin_{1,2}$	300	550	-	ns	
[FET Driver]						
High side ON resistance1,2	Ron_high1,2	-	75	120	mΩ	
Low side ON resistance 1,2	Ron_low1,2	-	50	75	mΩ	
[Current Control]						
Current Limit 1,2	$Ilim_{1,2}$	3	4	5	A	
[Output Voltage Sense]						
FB threshold Voltage1,2	$V_{FB1,2}$	0.788	0.8	0.812	V	
FB Input current1,2	$I_{FB1,2}$	-1	-	1	μA	
V_{OUT} discharge current1,2	$I_{VOUT1,2}$	5	10	-	mA	V_{OUT}=1V, V_{EN}=0V, V_{CC}=5V
[SCP]						
SCP threshold Voltage1,2	$V_{SCP1,2}$	0.48	0.56	0.64	V	

○Block Diagram



○Physical Dimension

Package：VQFN032V5050



(Unit : mm)

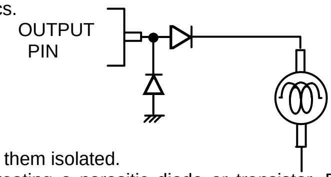
○Pin number・Pin name

PIN No.	PIN name
1,2,32	VIN1
3	VINS
4	VREG
5	VCC
6,20	GND
7-9	VIN2
10-12	PGND2
13-15	SW2
16	BOOT2
17	EN2
18	VOUT2
19	FB2
21	TEST *7
22	FB1
23	VOUT1
24	EN1
25	BOOT1
26-28	SW1
29-31	PGND1
Reverse	FIN *7

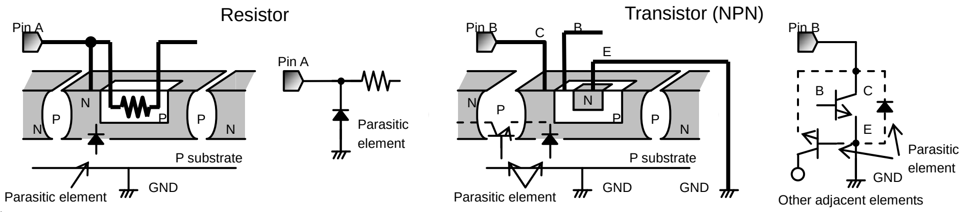
*7 The TEST pin (21pin) and the FIN should be connected with the GND.

○ NOTE FOR USE

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. GND pin voltage
   GND, PGND1 and PGND2 terminal should be connected the lowest voltage, under all conditions. And all terminals except SW should be under GND terminal voltage under all conditions including transient situations. If a terminal exists under GND, it should be inserting a bypass route.
3. Thermal design
   If IC is used on condition that the power loss is over the power dissipation, the reliability will become worse by heat up, such as reduced output current capability. Also, be sure to use this IC within a power dissipation range allowing enough of margin.
4. Input supply voltage
   Input supply pattern layout should be as short as possible.
5. Inter-pin shorts and mounting errors
   Note the direction and the miss-registration of IC enough when you install it in the set substrate. IC might destroy it as well as reversely connecting the power supply connector when installing it by mistake. Moreover, there is fear of destruction when the foreign body enters between terminals, the terminal, the power supply, and grandeur and it is short-circuited.
6. 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.
7. ASO
   When using the IC, set the output transistor so that it does not exceed absolute maximum ratings or ASO.
8. Testing on application boards
   When testing the IC on an application board, connecting a capacitor to a pin with low impedance subjects the IC to stress. Always discharge capacitors after each process or step. Always turn the IC's power supply off before connecting it to or removing it from a jig or fixture during the inspection process. Ground the IC during assembly steps as an antistatic measure. Use similar precaution when transporting or storing the IC.
9. Electrical characteristics
   The electrical characteristics in the Specifications may vary depending on ambient temperature, power supply voltage, circuit(s) externally applied, and/or other conditions. It is therefore requested to carefully check them including transient characteristics.
10. Not of a radiation-resistant design.
11. In the event that load containing a large inductance component is connected to the output terminal, and generation of back-EMF at the start-up and when output is turned OFF is assumed, it is requested to insert a protection diode.



12. Regarding input pin of the IC
   This monolithic IC contains P+ isolation and P substrate layers between adjacent elements in order to keep them isolated.
   P-N junctions are formed at the intersection of these P layers with the N layers of other elements, creating a parasitic diode or transistor. For example, the relation between each potential is as follows:
   When GND > Pin A and GND > Pin B, the P-N junction operates as a parasitic diode.
   When GND > Pin B, the P-N junction operates as a parasitic transistor.
   Parasitic diodes can occur inevitable in the structure of the IC. The operation of parasitic diodes can result in mutual interference among circuits, operational faults, or physical damage. Accordingly, methods by which parasitic diodes operate, such as applying a voltage that is lower than the GND (P substrate) voltage to an input pin, should not be used.



13. 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.
14. Operating ranges
   If it is within the operating ranges, certain circuit functions and operations are warranted in the working ambient temperature range. With respect to characteristic values, it is unable to warrant standard values of electric characteristics but there are no sudden variations in characteristic values within these ranges.
15. 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.

TSD ON temperature [℃] (typ.)	Hysteresis temperature[℃] (typ.)
175	15

16.Output Voltage Resistor Setting
   Output volage is adjusted with resistor. Total 10kohm resistor is recommended so that the output voltage is not affected by the FB input current (Typ. 1uA).
17. Over Output Current Protection
   This IC has an over current protection (4.0A[typ]), with prevents IC from being damage by short circuit at over current. However, It is recommend not to use that continuously operates the protection circuit (For instance, always the load that greatly exceeds the output current ability is connected or the output is short-circuited, etc.) in these protection circuits by an effective one to the destruction prevention due to broken accident.
18. Heat sink (FIN)
   Since the heat sink (FIN) is connected with the Sub, short it to the GND.

Notes

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