

## Reference Board User's Manual for SiC6xx

### DESCRIPTION

This manual is good for all DrMOS products with MLP5x5-31L footprints and Vishay part list show-in as below,

- SiC620CD-T1-GE3, SiC620ACD-T1-GE3, SiC620RCD-T1-GE3, SiC620ARCD-T1-GE3
- SiC631CD-T1-GE3, SiC632CD-T1-GE3, SiC634CD-T1-GE3

This reference board (Fig. 1) allows the end user to evaluate the SiC6xx family devices for their features and functionalities. It can also be a reference design for a user's application.

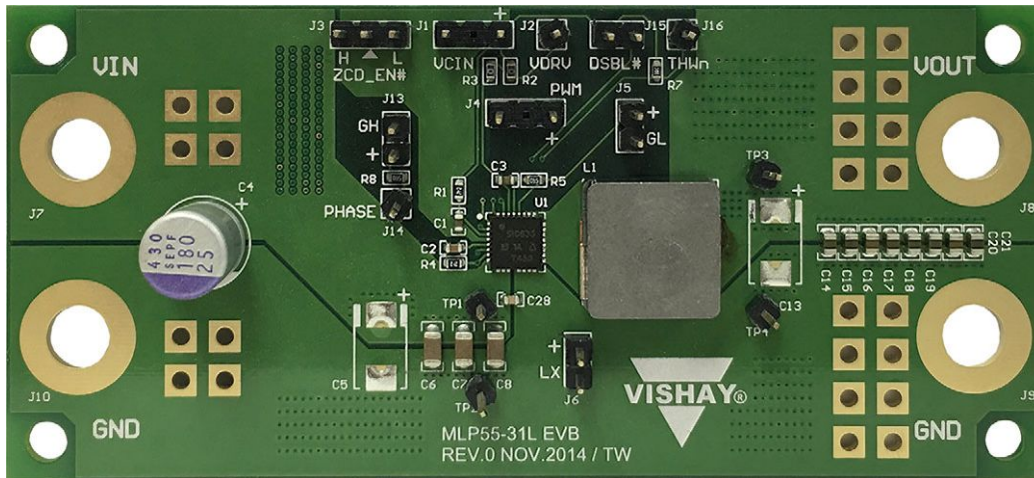


Fig. 1 - MLP5x5-31L Reference Board

### CONNECTION AND SIGNAL / TEST POINTS

#### Power Sockets

J7 -  $V_{IN}$  (see device datasheet for  $V_{IN}$  range)

J8 -  $V_{OUT}$

J9, J10 - Power Ground

#### Signal and Test Leads

PIN #	NAME	FUNCTION
TP1	$V_{IN}$	INPUT voltage measurement pin
TP2	Ground	Ground pin for INPUT voltage measurement
TP3	$V_{OUT}$	OUTPUT voltage measurement pin
TP4	Ground	Ground pin for OUTPUT voltage measurement
J1	$V_{CIN}$	Supply voltage for internal logic circuitry
J2	$V_{DRV}$	Supply voltage for internal gate driver
J3	ZCD_EN#	ZCD_EN# is LOW, diode emulation is allowed. When ZCD_EN# is HIGH, continuous conduction mode is forced. ZCD_EN# can also be put in a high impedance mode by floating the pin.
J4	PWM	PWM input logic
J5	GL	Low-side MOSFET gate signal
J6	LX	Switch node of the power stage
J13	GH	High-side MOSFET gate signal
J14	PHASE	Return path of high-side gate driver
J15	DSBL#	Disable pin. Active low
J16	THWn	Thermal warning open drain output

**OPERATION**

1. Enable the device: jump DISBL# leads.
2. Connect logic and drive voltage: set a power supply output voltage to 5 V and connect it to J2 ( $V_{DRV}$ ) pins. Since R2 is populated, J1 ( $V_{CIN}$ ) is shorted to J2 ( $V_{DRV}$ ) pins.
3. To power J1 ( $V_{CIN}$ ) and J2 ( $V_{DRV}$ ) pins separately with two different power supplies, make sure R2 is removed to avoid short between power supplies.
4. Connect PWM signal: preset a waveform or function generator with desired amplitude, frequency and duty cycle, and connect it to J4 (PWM). As an example, for 12 V to 1.8 V; 500 kHz operating condition, the function generator can be set to pulse mode with 500 kHz frequency; 300 ns on time, 0 V to 5 V amplitude (0 V to 3.3 V for SiC6xxA version). By increasing or decreasing on time, corresponding duty cycle will vary.
5. Connect input power supply with desired voltage to J7 ( $V_{IN+}$ ) and J10 ( $P_{GND}$ ) sockets. Now the system should be up running.

If diode emulation mode is wanted, connect ZCD\_EN# (J3) with external control signal.

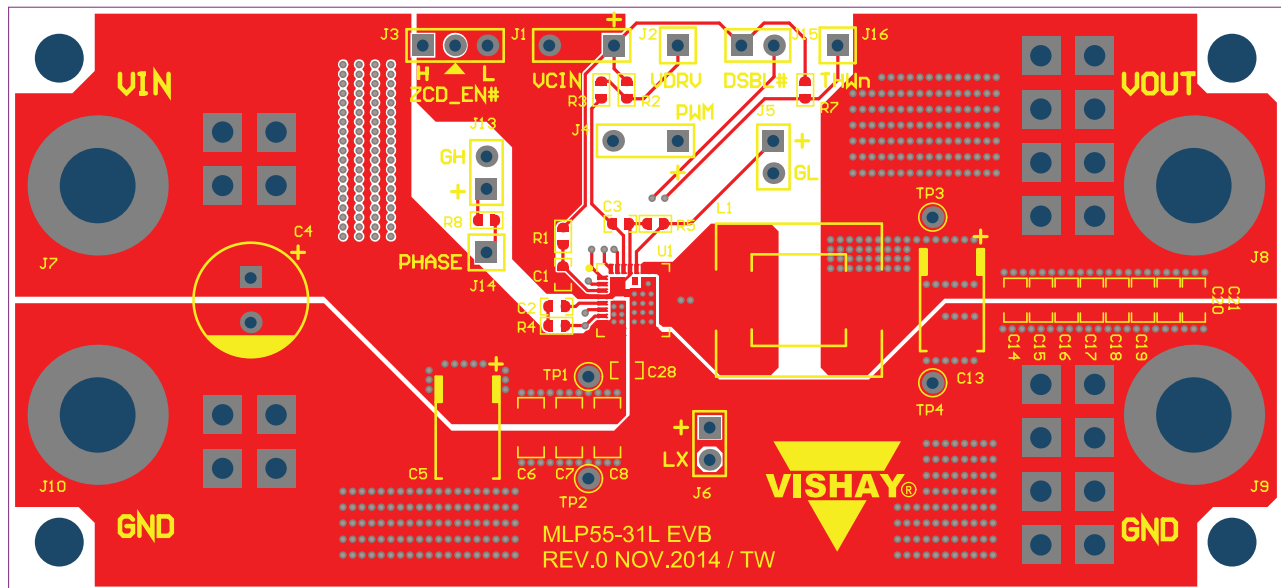
If OTP trip point is to be checked, monitor J16 (THWn) by either connecting it to a volt meter or probing it on oscilloscope.

**Change Output Voltage**

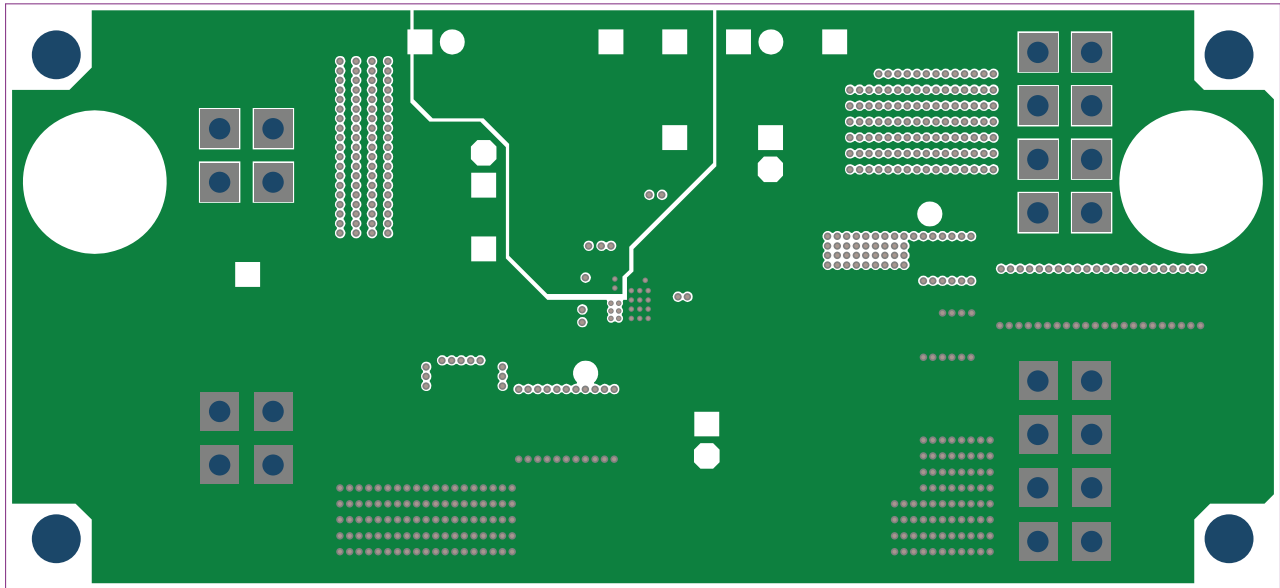
If different output voltage is needed, then simply turn the PWM duty cycle up or down.

**PCB LAYOUT**

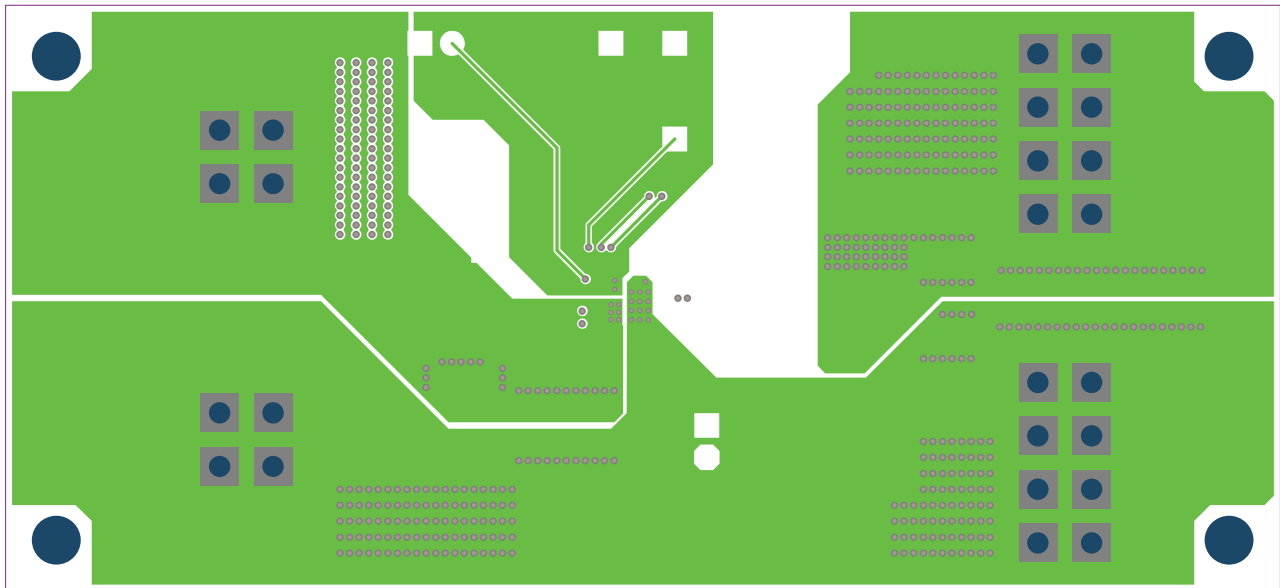
Top



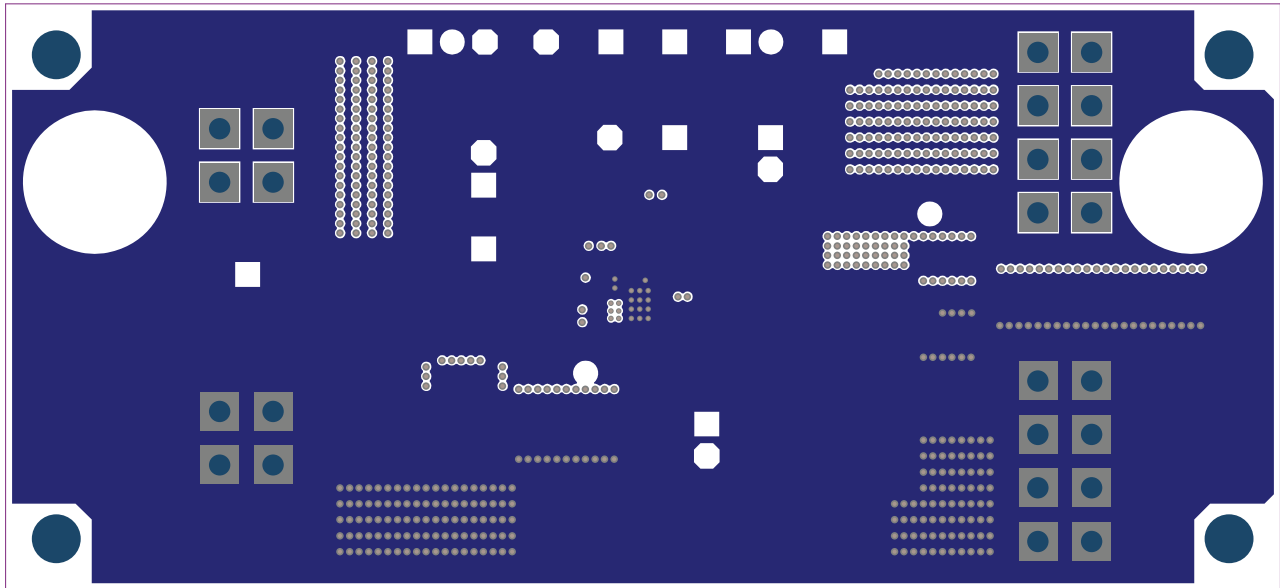
Inner Layer 1



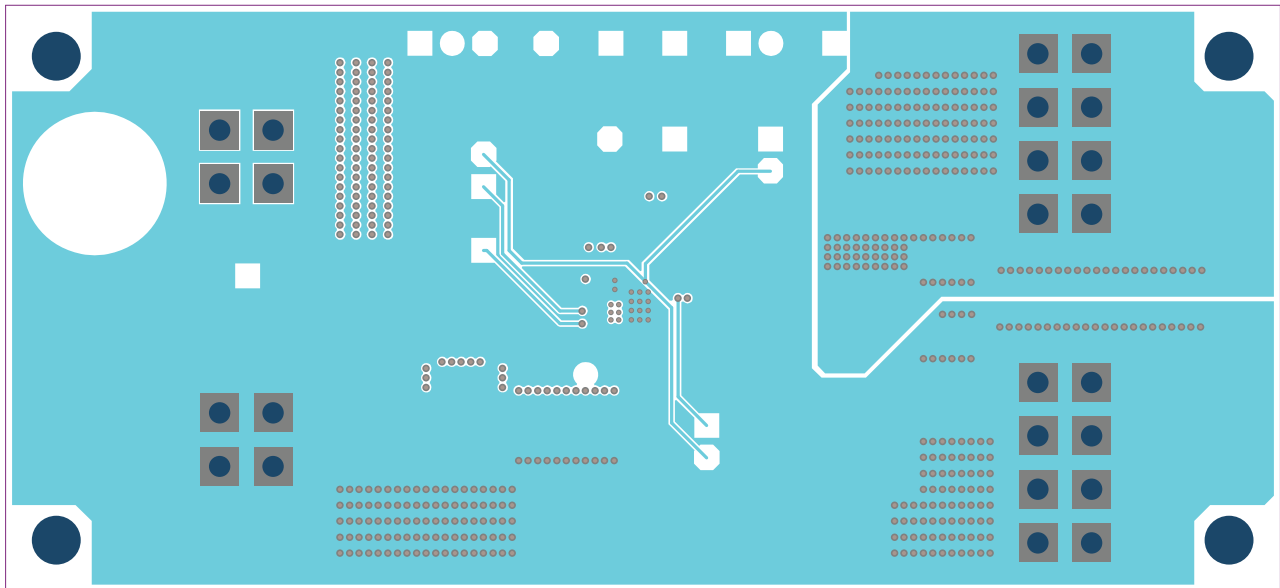
Inner Layer 2



Inner Layer 3



Inner Layer 4







BILL OF MATERIALS							
ITEM	QUANTITY	DESIGNATOR	DESCRIPTION	FOOTPRINT	COMMENT	PART NUMBER	VENDER
1	2	C1, C3	Capacitor	C-0603	C / 1 V	CC0603KRX7R5BB105	Yageo
2	1	C2	Capacitor	C-0603	C / 100 nF	AC0603KRX7R7BB104	Yageo
3	1	C4	Capacitor	C-HS8-3.5	C / NC	ND	
4	1	C5	Capacitor	C-Case-D	C / 100 V	T491X107K025ZT	Kemet
5	6	C6, C7, C8, C9, C10, C11	Capacitor	C-1206	C / 10 $\mu$ F / 35 V	GMK316AB7106KL- TR	Taiyo Yuden
6	1	C12	Capacitor	C-0805	C / NC	ND	
7	1	C13	Capacitor	C-Case-D	C / 470 $\mu$ F	EEF-SX0E331ER	Panasonic
8	14	C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27	Capacitor	C-0805	C / 22 $\mu$ F	CC0805KKX5R5BB226	Yageo
9	1	C28	Capacitor	C-0603	C / 10 nF	AC0603KRX7R9BB103	Yageo
10	1	L1	Inductor	L-4040	TBD	FP1007R1-R17-R	Copper Bussmann
11	2	R1, R4	Resistor	R-0603	R / 2.2 $\Omega$		Generic
12	2	R2, R3	Resistor	R-0603	R / 0 $\Omega$		Generic
13	2	R5, R8	Resistor	R-0603	R / 400 k $\Omega$		Generic
14	1	R6	Resistor	R-0805	R / NC	ND	
15	1	R7	Resistor	R-0603	R / 20 k $\Omega$		Generic
16	1	U1	DrMOS 5 x 5	MLP55-31L	SiC6xx	SiC6xx	Vishay