

### 50 A VRPower® Integrated Power Stage

(Datasheet in Brief)

#### **DESCRIPTION**

The SiC651 is a high frequency integrated power stage optimized for synchronous buck applications to offer high current, high efficiency, and high power density performance with very low shutdown current. Packaged in Vishay's 5 mm x 5 mm MLP package, SiC651 enables voltage regulator designs to deliver up to 50 A continuous current per phase.

The internal power MOSFETs utilize Vishay's latest TrenchFET® technology that delivers industry benchmark performance to significantly reduce switching and conduction losses.

The SiC651 incorporates an advanced MOSFET gate driver IC that features high current driving capability, adaptive dead-time control, an integrated bootstrap switch, and user selectable zero current detection to improve light load efficiency. The driver is also compatible with a wide range of PWM controllers, supports tri-state PWM, and 5 V / 3.3 V PWM logic.

The device also supports PS4 mode to reduce power consumption when the system is in standby state.

The SiC651 offers operating temperature monitoring, protection features, and warning flags that improve system monitoring and reliability.

#### **FEATURES**

- Highly efficient
  - Thermally enhanced PowerPAK® MLP55-31L package



- Vishay's latest TrenchFET technology and low side MOSFET with integrated Schottky diode
- Integrated, low impedance, bootstrap switch
- Power MOSFETs optimized for 19 V input stage
- Supports PS4 mode light load requirement with low shutdown supply current (5 V, 3  $\mu$ A)
- Zero current detection for improved light load efficiency
- · Highly versatile
- 5 V and 3.3 V PWM logic with tri-state and hold-off timer
- 5 V DSBL#, ZCD\_EN# logic with PS4 state support
- High frequency operation up to 2 MHz
- Robust and reliable
  - Delivers in excess of 50 A continuous current, 70 A, peak (10 ms) and 100 A, peak (10  $\mu$ s)
  - Over current protection
- Over temperature flag
- Over temperature protection
- Under-voltage lockout protection
- High side MOSFET short detection
- Effective monitoring and reporting
  - Accurate temperature reporting
- Warnings and faults reporting flag
- Material categorization: for definitions of compliance please see <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

#### **APPLICATIONS**

- Multi-phase VRDs for computing, graphics card and memory
- Intel core processor power delivery
  - V<sub>CORE</sub>, V<sub>GRAPHICS</sub>, V<sub>SYSTEM AGENT</sub>
  - V<sub>CCG</sub>
- Up to 24 V rail input DC/DC VR modules

### TYPICAL APPLICATION DIAGRAM

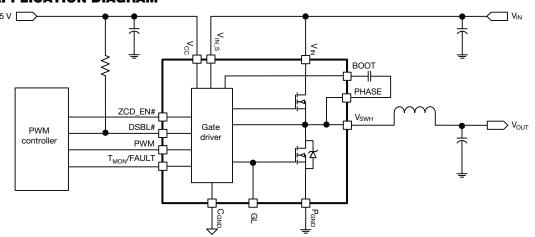


Fig. 1 - Typical Application Diagram



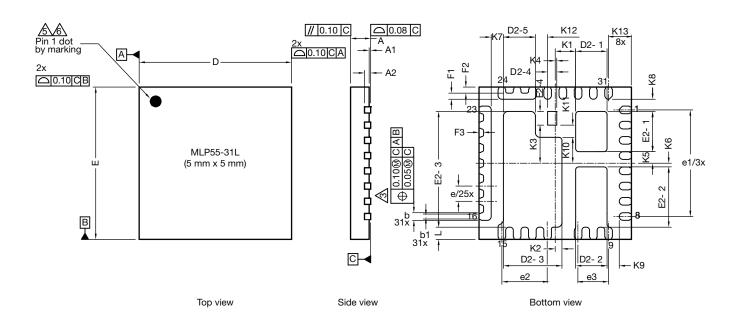
Vishay Siliconix

PRODUCT SUMMARY							
Part number	SiC651	SiC651A					
Description	50 A power stage plus, 2.5 V <sub>IN</sub> to 24 V <sub>IN</sub> , 5 V PWM with ZCD, PS4 mode	50 A power stage plus, 2.5 $\rm V_{IN}$ to 24 $\rm V_{IN}$ , 3.3 V PWM with ZCD, PS4 mode					
Input voltage min. (V)	2.5	2.5					
Input voltage max. (V)	24	24					
Continuous current rating max. (A)	50	50					
Switch frequency max. (kHz)	2000	2000					
Enable (yes / no)	Yes	Yes					
Monitoring features	T <sub>MON</sub>	T <sub>MON</sub>					
Protection	UVLO, OCP, OTP, HS-short	UVLO, OCP, OTP, HS-short					
Light load mode	ZCD, PS4	ZCD, PS4					
Pulse-width modulation (V)	5	3.3					
Package type	PowerPAK MLP55-31L	PowerPAK MLP55-31L					
Package size (W, L, H) (mm)	5.0 x 5.0 x 0.75	5.0 x 5.0 x 0.75					
Status code	1	1					
Product type	VRPower (DrMOS)	VRPower (DrMOS)					
Applications	Computer, industrial, networking	Computer, industrial, networking					

To request the full version of the datasheet, please contact: <a href="mailto:ICmarketing@vishay.com">ICmarketing@vishay.com</a>



## PowerPAK® MLP55-31L Case Outline



DIM.	MILLIMETERS			INCHES			
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
Α	0.70	0.75	0.80	0.027	0.029	0.031	
A1	0.00	-	0.05	0.000	-	0.002	
A2		0.20 ref.		0.008 ref.			
b	0.20	0.25	0.30	0.078	0.098	0.011	
b1	0.15	0.20	0.25	0.006	0.008	0.010	
D	4.90	5.00	5.10	0.193	0.196	0.200	
е	0.50 BSC			0.019 BSC			
e1	3.50 BSC			0.138 BSC			
e2	1.50 BSC			0.060 BSC			
e3	1.00 BSC			0.040 BSC			
Е	4.90	5.00	5.10	0.193	0.196	0.200	
L	0.35	0.40	0.45	0.013	0.015	0.017	
D2-1	0.98	1.03	1.08	0.039	0.041	0.043	
D2-2	0.98	1.03	1.08	0.039	0.041	0.043	
D2-3	1.87	1.92	1.97	0.074	0.076	0.078	
D2-4	0.30 BSC			0.012 BSC			
D2-5	1.05	1.10	1.15	0.041	0.043	0.045	
E2-1	1.27	1.32	1.37	0.050	0.052	0.054	
E2-2	1.93	1.98	2.03	0.076	0.078	0.080	
E2-3	3.75	3.80	3.85	0.148	0.150	0.152	
E2-4	0.45 BSC			0.018 BSC			
F1	0.15	0.20	0.25	0.006	0.008	0.010	
F2	0.20 ref.			0.008 ref.			
F3		0.15 ref.			0.006 ref.		

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# **Package Information**

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### Vishay Siliconix

DIM.	MILLIMETERS			INCHES			
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
K1	0.67 BSC			0.026 BSC			
K2	0.22 BSC			0.008 BSC			
K3	1.25 BSC			0.049 BSC			
K4	0.10 BSC			0.004 BSC			
K5	0.38 BSC			0.015 BSC			
K6	0.12 BSC			0.005 BSC			
K7	0.40 BSC			0.016 BSC			
K8	0.40 BSC			0.016 BSC			
K9	0.40 BSC			0.016 BSC			
K10	0.85 BSC			0.033 BSC			
K11	0.40 BSC			0.016 BSC			
K12	0.40 BSC			0.016 BSC			
K13	0.75 BSC 0.030 BSC				0.030 BSC		

DWG: 6025

#### **Notes**

- 1. Use millimeters as the primary measurement
- 2. Dimensioning and tolerances conform to ASME Y14.5M. 1994

 $\Delta$ Dimension b applies to plated terminal and is measured between 0.20 mm and 0.25 mm from terminal tip

🛝 The pin #1 identifier must be existed on the top surface of the package by using indentation mark or other feature of package body

5 Exact shape and size of this feature is optional

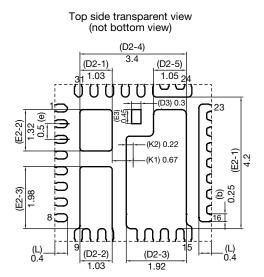
6. Package warpage max. 0.08 mm

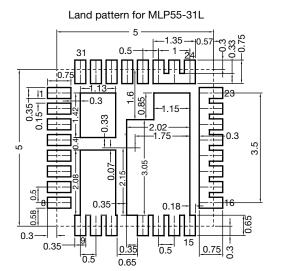
Applied only for terminals



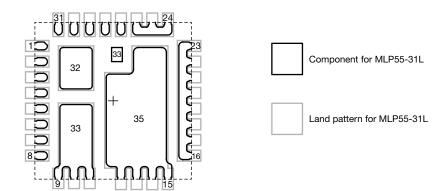


# Recommended Land Pattern PowerPAK® MLP55-31L





All dimensions in millimeters



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