50 A VRPower® Integrated Power Stage

(Datasheet in Brief)

DESCRIPTION

The SiC654 and SiC654A are 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, SiC654 and SiC654A enable 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 SiC654 and SiC654A 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 SiC654 and SiC654A offer 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 µA)
  - 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 µs)
  - 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 www.vishay.com/doc?99912

APPLICATIONS

- Multi-phase VRDs for computing, graphics card and memory
- Intel core processor power delivery
  - V_{CORE}, $V_{GRAPHICS}$, $V_{SYSTEM\ AGENT}$
  - V_{CCGI}
- Up to 24 V rail input DC/DC VR modules

TYPICAL APPLICATION DIAGRAM

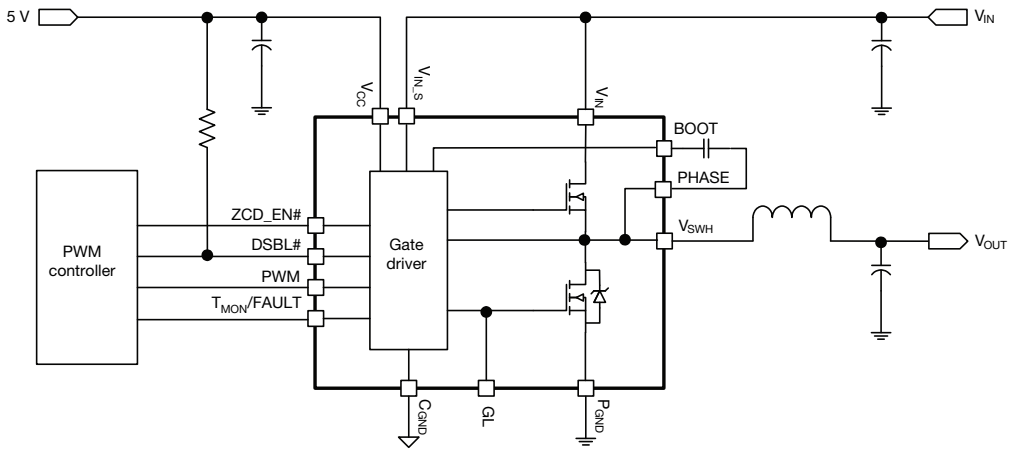

Fig. 1 - Typical Application Diagram

PRODUCT SUMMARY		
Part number	SiC654	SiC654A
Description	50 A Power stage plus, 2.5 V to 24 V_{in}, 5 V P_{WM} with ZCD mode	50 A Power stage plus, 2.5 V to 24 V_{in}, 3.3 V P_{WM} with ZCD mode
Input voltage min. (V)	2.5	2.5
Input voltage max. (V)	24	24
Current rating (A)	50i	50
Switch frequency max. (kHz)	2000	2000
Enable (yes / no)	Yes	Yes
Monitoring features	T_{MON}/FAULT Monitor	T_{MON}/FAULT Monitor
Protection	OCP, OTP, UVLO	OCP, OTP, UVLO
Light load mode	ZCD	ZCD
Pulse-width modulation (V)	5	3.3
Package type	PowerPAK® MLP55-31L	PowerPAK® MLP55-31L
Package size (W, L, H) (mm)	5 x 5 x 0.75	5 x 5 x 0.75
Status code	1	1
Product type	VRPower (DrMOS)	VRPower (DrMOS)
Applications	• Multi-phase VRDs for computing, graphics card and memory • Intel core processor power delivery • Up to 24 V rail input DC/DC VR modules	• Multi-phase VRDs for computing, graphics card and memory • Intel core processor power delivery • Up to 24 V rail input DC/DC VR modules

To request the full version of the datasheet, please contact: ICmarketing@vishay.com

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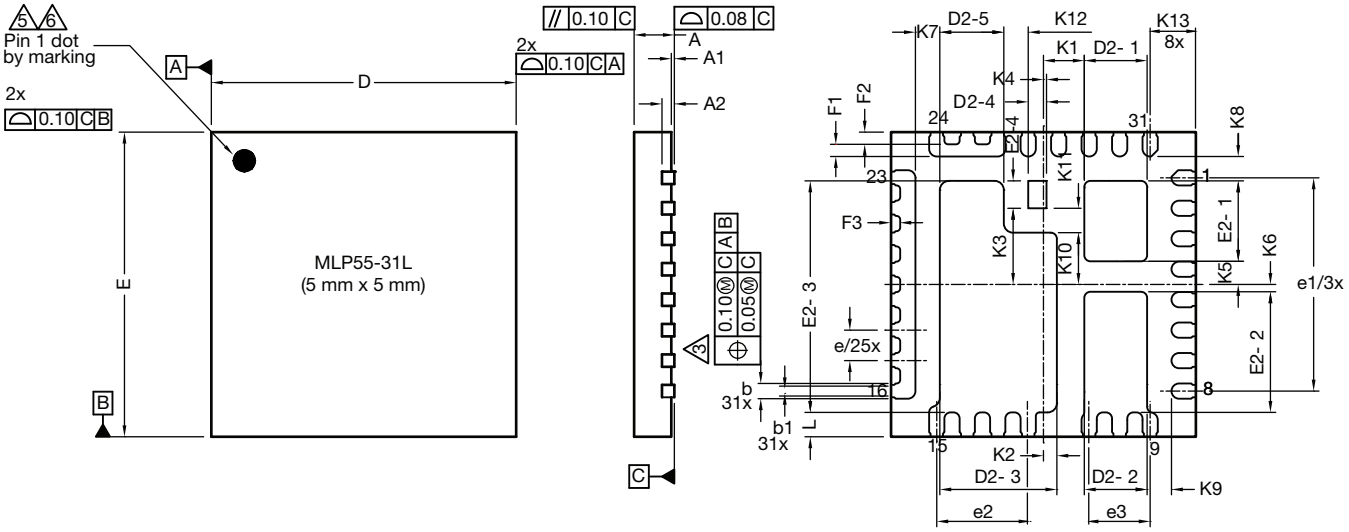
reliability data, see www.vishay.com/ppg?77110.

PowerPAK® MLP55-31L Case Outline



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	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
e		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	
E	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.	

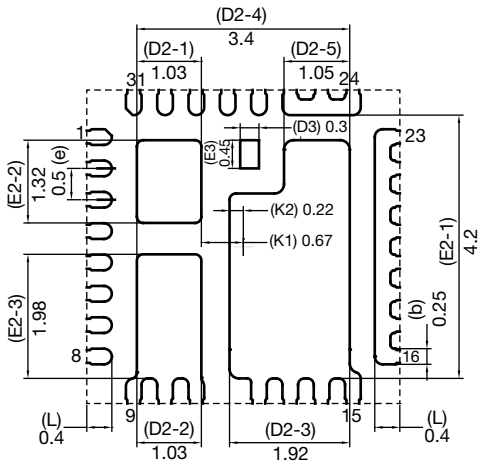
DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
K1		0.67 BSC			0.026 BSC	
K2		0.22 BSC			0.008 BSC	
K3		1.25 BSC			0.049 BSC	
K4		0.10 BSC			0.004 BSC	
K5		0.38 BSC			0.015 BSC	
K6		0.12 BSC			0.005 BSC	
K7		0.40 BSC			0.016 BSC	
K8		0.40 BSC			0.016 BSC	
K9		0.40 BSC			0.016 BSC	
K10		0.85 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	
ECN: T17-0423-Rev. F, 21-Aug-17 DWG: 6025						

Notes

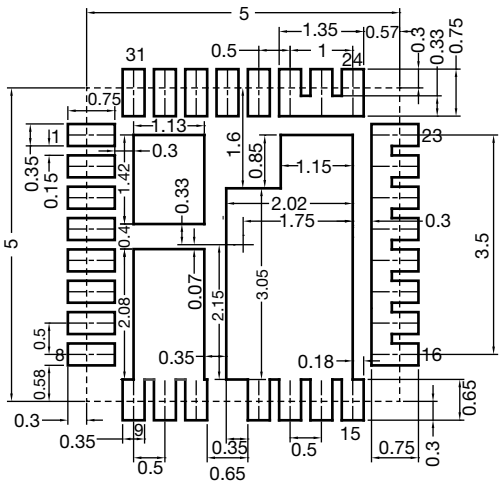
1. Use millimeters as the primary measurement
2. Dimensioning and tolerances conform to ASME Y14.5M. - 1994
3. Dimension b applies to plated terminal and is measured between 0.20 mm and 0.25 mm from terminal tip
4. The pin #1 identifier must be existed on the top surface of the package by using indentation mark or other feature of package body
5. Exact shape and size of this feature is optional
6. Package warpage max. 0.08 mm
7. Applied only for terminals

Recommended Land Pattern
PowerPAK® MLP55-31L

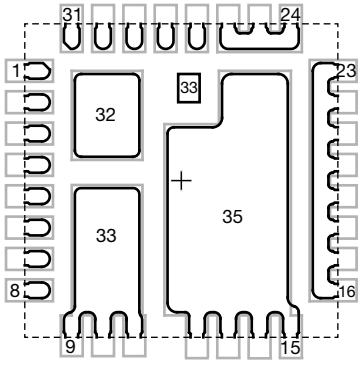
Top side transparent view
(not bottom view)



Land pattern for MLP55-31L



All dimensions in millimeters



Component for MLP55-31L

Land pattern for MLP55-31L

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