

# 40 A VRPower® Integrated Power Stage

(Datasheet in Brief)

## DESCRIPTION

The SiC546 is an integrated power stage solution optimized for synchronous buck applications to offer high current, high efficiency, and high power density performance. Packaged in Vishay's proprietary 4.5 mm x 3.5 mm MLP package, SiC546 enables voltage regulator designs to deliver up to 40 A continuous current per phase.

The internal power MOSFETs utilize Vishay's state-of-the-art Gen IV TrenchFET technology that delivers industry benchmark performance to significantly reduce switching and conduction losses.

The SiC546 incorporates an advanced MOSFET gate driver IC that features high current driving capability, adaptive dead-time control, an integrated bootstrap Schottky diode, and 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 PWM logic.

A user selectable diode emulation mode (ZCD\_EN#) is included to improve the light load performance. The device also supports PS4 mode to reduce power consumption when system operates in standby state.

## FEATURES

- Thermally enhanced PowerPAK® MLP4535-22L package
- Vishay's Gen IV MOSFET technology and a low-side MOSFET with integrated Schottky diode
- Delivers up to 40 A continuous current, 50 A at 10 ms peak current
- High efficiency performance
- High frequency operation up to 2 MHz
- Power on reset
- 5 V PWM logic with tri-state and hold-off
- Supports PS4 mode light load requirement for IMVP8 with low shutdown supply current (5 V, 3  $\mu$ A)
- Under voltage lockout for  $V_{CIN}$
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## APPLICATIONS

- Multi-phase VRDs for computing, graphics card and memory
- Intel IMVP-8 VRPower delivery
- $V_{CORE}$ ,  $V_{GRAPHICS}$ ,  $V_{SYSTEM\ AGENT}$  Skylake, Kabylake platforms
- $V_{CCGI}$  for Apollo Lake platforms
- Up to 24 V rail input DC/DC VR modules

## TYPICAL APPLICATION DIAGRAM

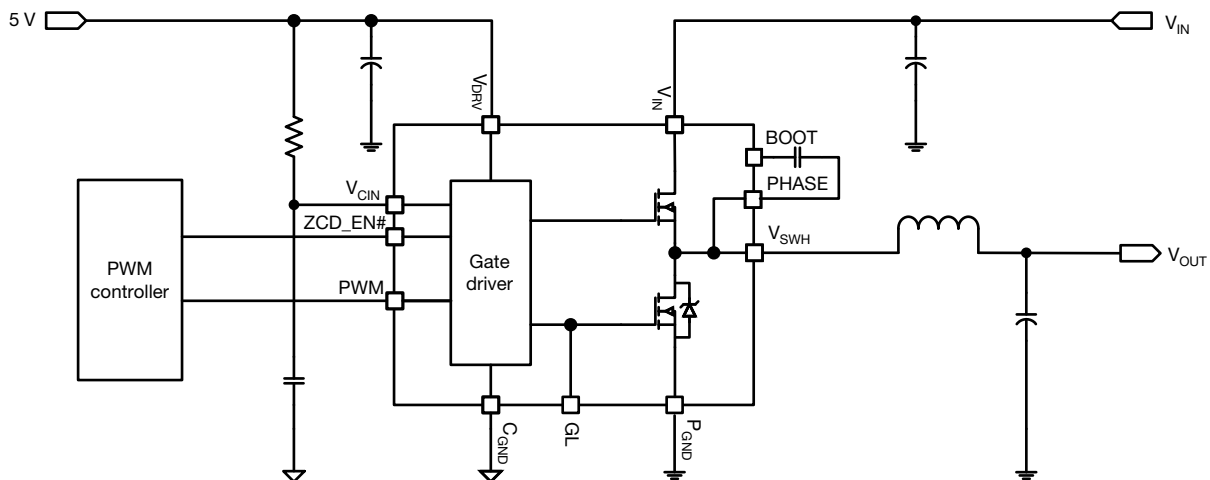


Fig. 1 - Typical Application Diagram



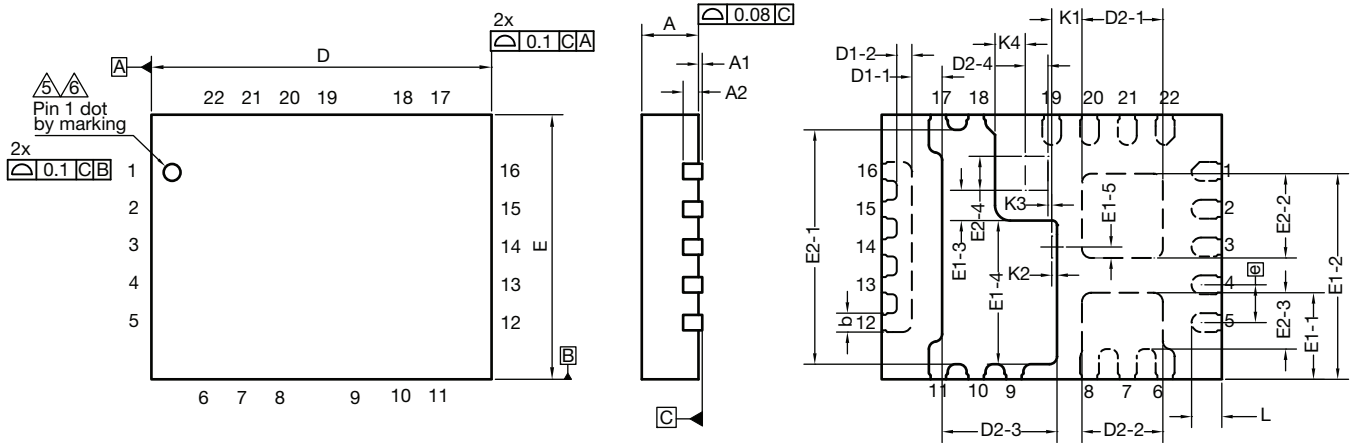
PRODUCT SUMMARY	
Part number	SiC546
Description	40 A power stage, 4.5 V <sub>IN</sub> to 24 V <sub>IN</sub> , 5 V PWM with ZCD, PS4 mode
Input voltage min. (V)	4.5
Input voltage max. (V)	24
Continuous current rating max. (A)	40
Switch frequency max. (kHz)	2000
Enable (yes / no)	No
Monitoring features	-
Protection	UVLO
Light load mode	ZCD, PS4
Pulse-width modulation (V)	5
Package type	PowerPAK MLP4535-22L
Package size (W, L, H) (mm)	4.5 x 3.5 x 0.75
Status code	1
Product type	VRPower (DrMOS)
Applications	Computer, industrial, networking

To request the full version of the datasheet, please contact: [ICmarketing@vishay.com](mailto:ICmarketing@vishay.com)

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package / tape drawings, part marking, and reliability data, see [www.vishay.com/ppg?77468](http://www.vishay.com/ppg?77468).



### MLP 4.5 x 3.5-22L BWL Case Outline



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A <sup>(8)</sup>	0.70	0.75	0.80	0.027	0.0029	0.031
A1	0.00	-	0.05	0.000	-	0.002
A2	0.20 ref.			0.008 ref.		
b <sup>(4)</sup>	0.20	0.25	0.30	0.0078	0.0098	0.0110
D	4.50 BSC			0.177 BSC		
e	0.50 BSC			0.019 BSC		
E	3.50 BSC			0.137 BSC		
L	0.35	0.40	0.45	0.013	0.015	0.017
N <sup>(3)</sup>	22			22		
Nd <sup>(3)</sup>	6			6		
Ne <sup>(3)</sup>	5			5		
D1-1	0.35	0.40	0.45	0.013	0.015	0.017
D1-2	0.15	0.20	0.25	0.005	0.007	0.009
D2-1	1.02	1.07	1.12	0.040	0.042	0.044
D2-2	1.02	1.07	1.12	0.040	0.042	0.044
D2-3	1.47	1.52	1.57	0.057	0.059	0.061
D2-4	0.25	0.30	0.35	0.009	0.011	0.013
E1-1	1.095	1.145	1.195	0.043	0.045	0.047
E1-2	2.67	2.72	2.77	0.105	0.107	0.109
E1-3	0.35	0.40	0.45	0.013	0.015	0.017
E1-4	1.85	1.90	1.95	0.072	0.074	0.076
E1-5	0.095	0.145	0.195	0.0037	0.0057	0.0076
E2-1	3.05	3.10	3.15	0.120	0.122	0.124
E2-2	1.065	1.115	1.165	0.0419	0.0438	0.0458
E2-3	0.695	0.745	0.795	0.027	0.029	0.031
E2-4	0.40	0.45	0.50	0.015	0.017	0.019
K1	0.40 BSC			0.015 BSC		
K2	0.07 BSC			0.002 BSC		
K3	0.05 BSC			0.001 BSC		
K4	0.40 BSC			0.015 BSC		



## Notes

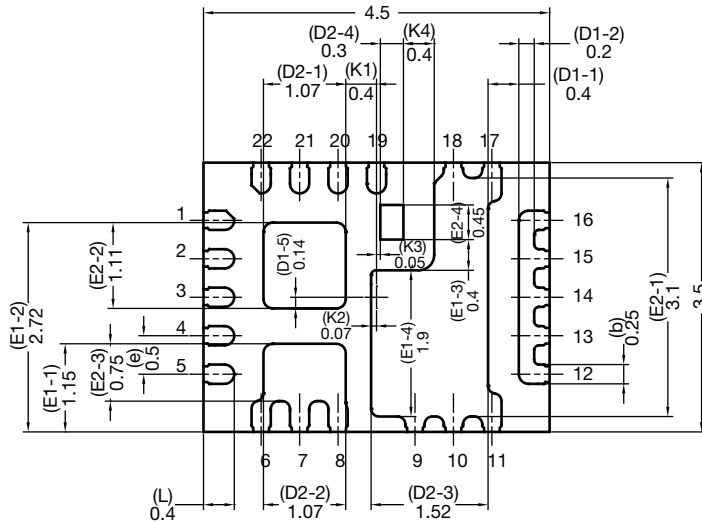
1. Use millimeters as the primary measurement
2. Dimensioning and tolerances conform to ASME Y14.5M. - 1994
3. N is the number of terminals,  
Nd is the number of terminals in X-direction and  
Ne is the number of terminals in Y-direction.
4. Dimension b applies to plated terminal and is measured between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

T14-0626-Rev. A, 20-Oct-14  
DWG: 6028

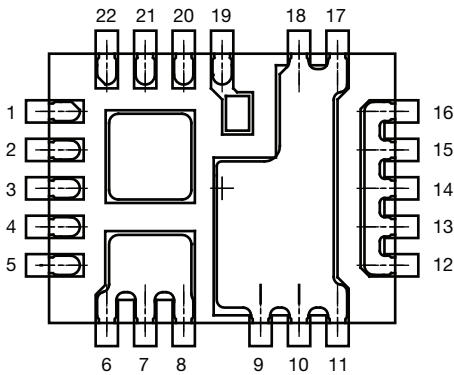
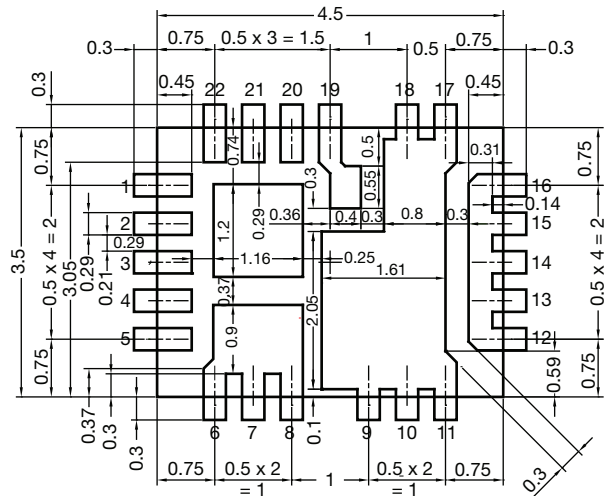


Recommended Land Pattern PowerPAK<sup>®</sup> MLP4535-22L

Package outline top view, transparent  
(not bottom view)



Land pattern



All dimensions in millimeters



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.