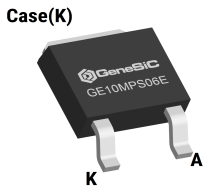
650V 10A SiC Schottky MPS™ Diode

V_{RRM}	=	650 V
I_F	=	10 A
Q_C	=	25 nC

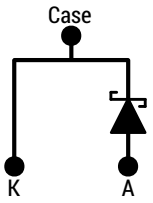
Features

- Gen5 SiC MPS™Technology for Low V_F of 1.22V
- Benchmark Low Built-In Voltage (V_{BI})
- Superior Figure of Merit Q_C * V_F
- Enhanced Surge Current & UIS Robustness
- Low Thermal Resistance
- Zero Reverse Recovery and Zero Forward Recovery
- Excellent dV/dt Ruggedness

Package



TO-252-2



RoHS

REACH

Advantages

- Lowest Conduction Losses Across All Load Conditions
- Increased System Power Density
- Optimal Price Performance
- High System Reliability
- Reduced Cooling Requirements
- Temperature Independent Fast Switching
- Easy to Parallel without Thermal Runaway

Applications

- Switched Mode Power Supply (SMPS)
- Server and Telecom Power Supply
- Solar Microinveter
- Power Factor Correction (PFC)
- Uninterruptible Power Supply (UPS)

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Values	Unit	Note
Repetitive Peak Reverse Voltage	V_{RRM}		650	V	
Continuous Forward Current	I_F	T_C = 25°C, D = 1	31	A	Fig. 4
		T_C = 110°C, D = 1	20		
		T_C = 155°C, D = 1	10		
Non-Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,SM}$	T_C = 25°C, t_P = 10 ms	60	A	
		T_C = 150°C, t_P = 10 ms	50		
Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,RM}$	T_C = 25°C, t_P = 10 ms	37	A	
		T_C = 150°C, t_P = 10 ms	25		
i^2t Value	$\int i^2dt$	T_C = 25°C, t_P = 10 ms	18	A^2s	
Non-Repetitive Avalanche Energy	E_{AS}	L = 1.3 mH, I_{AS} = 10 A	67	mJ	
Diode Ruggedness	dV/dt	V_R = 0 ~ 520 V	200	V/ns	
Power Dissipation	P_{TOT}	T_C = 25°C	111	W	Fig. 3
Operating and Storage Temperature	T_j , T_{stg}		-55 to 175	°C	

SEE IMPORTANT NOTICES AND DISCLAIMERS AT THE END OF THIS DATA SHEET REGARDING THE INFORMATION IN THIS DATA SHEET, THE USE OF OUR PRODUCTS, AND YOUR RESPONSIBILITIES RELATING TO SUCH USE.

Electrical Characteristics

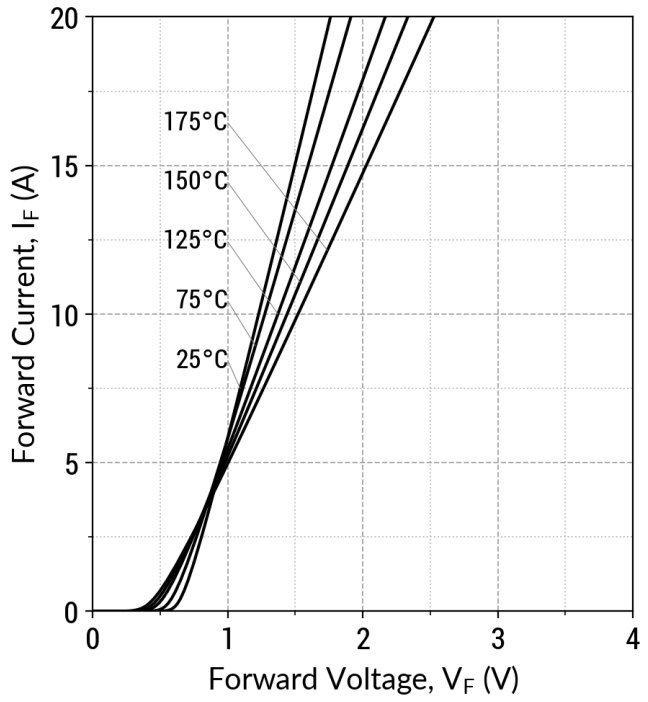
Parameter	Symbol	Conditions	Values			Unit	Note
			Min.	Typ.	Max.		
Diode Forward Voltage	V_F	I_F = 10 A, T_j = 25°C		1.22	1.45	V	Fig. 1
		I_F = 10 A, T_j = 125°C		1.4			
Reverse Current	I_R	V_R = 650 V, T_j = 25°C		3	150	µA	Fig. 2
		V_R = 650 V, T_j = 125°C		67			
Total Capacitive Charge	Q_C	$I_F \le I_{F,MAX}$, dI_F/dt = 200 A/µs, V_R = 300 V		21		nC	Fig. 7
		V_R = 400 V		25			
Switching Time	t_S	V_R = 300 V		< 10		ns	
		V_R = 400 V					
Total Capacitance	C	V_R = 1 V, f = 1MHz		463		pF	Fig. 6
		V_R = 400 V, f = 1MHz		33			

Thermal/Package Characteristics

Parameter	Symbol	Conditions	Values			Unit	Note
			Min.	Typ.	Max.		
Thermal Resistance, Junction - Case	R_{thJC}			1.36		°C/W	Fig. 9
Weight	W_T			0.3		g	

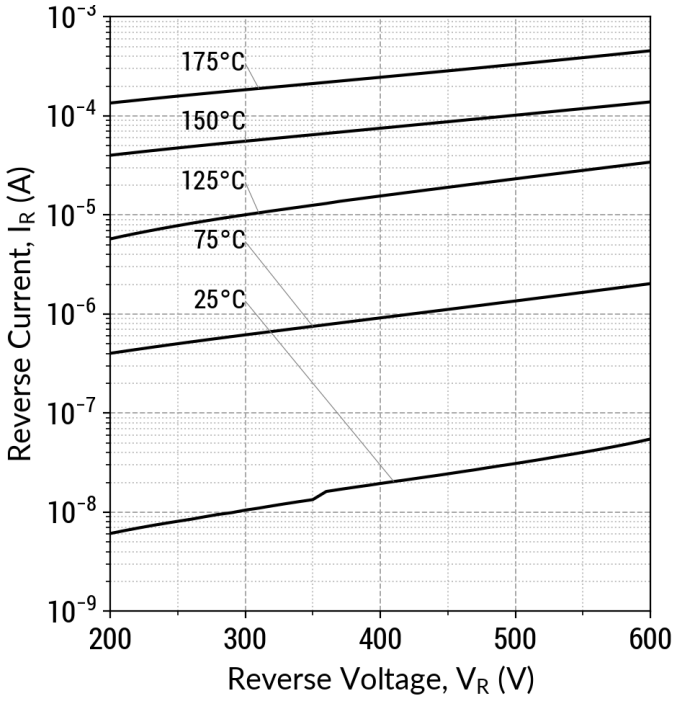
NOTE: This datasheet provides preliminary specifications. Parameters, conditions and values are subject to change.

Figure 1: Typical Forward Characteristics



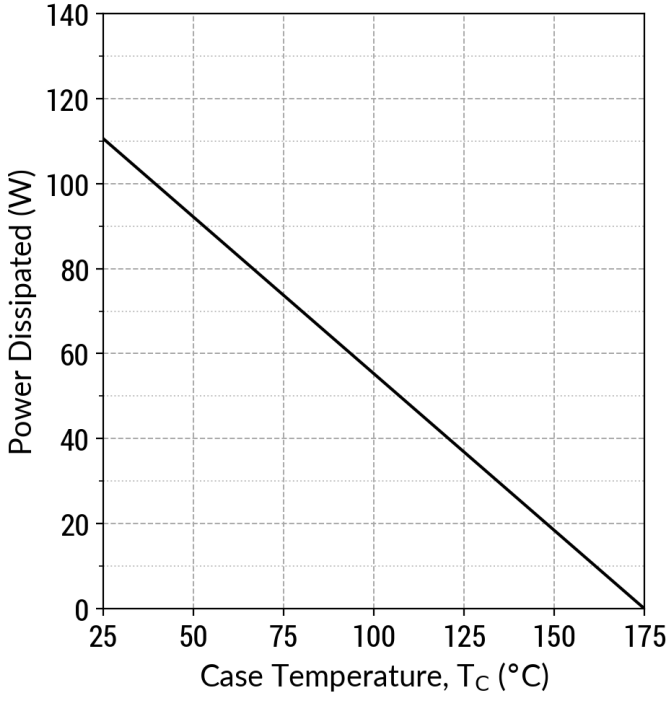
$I_F = f(V_F, T_j)$; $t_P = 250\ \mu s$

Figure 2: Typical Reverse Characteristics



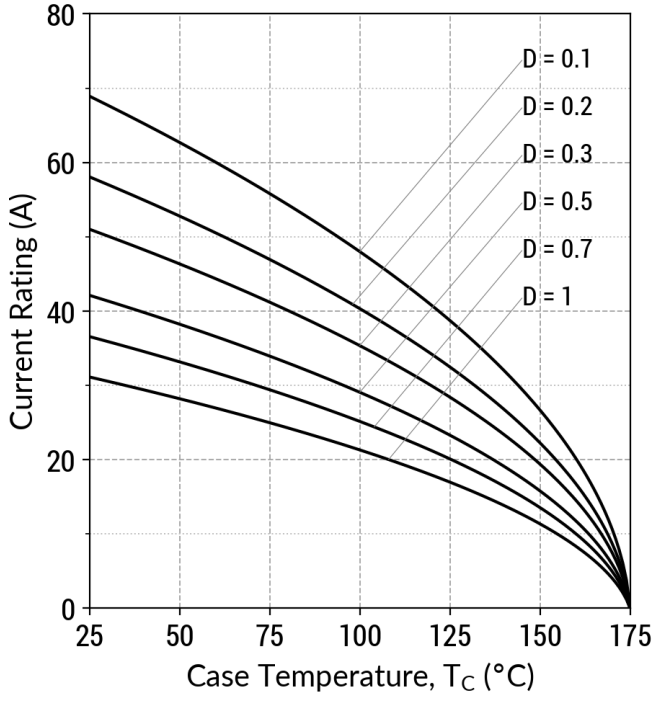
$I_R = f(V_R, T_j)$

Figure 3: Power Derating Curves



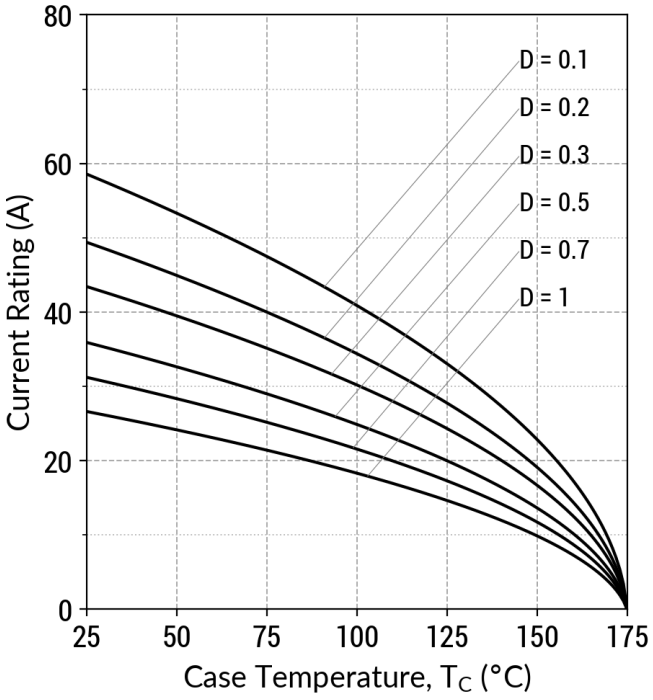
$P_{TOT} = f(T_C)$; $T_j = 175°C$

Figure 4: Current Derating Curves (Typical V_F)



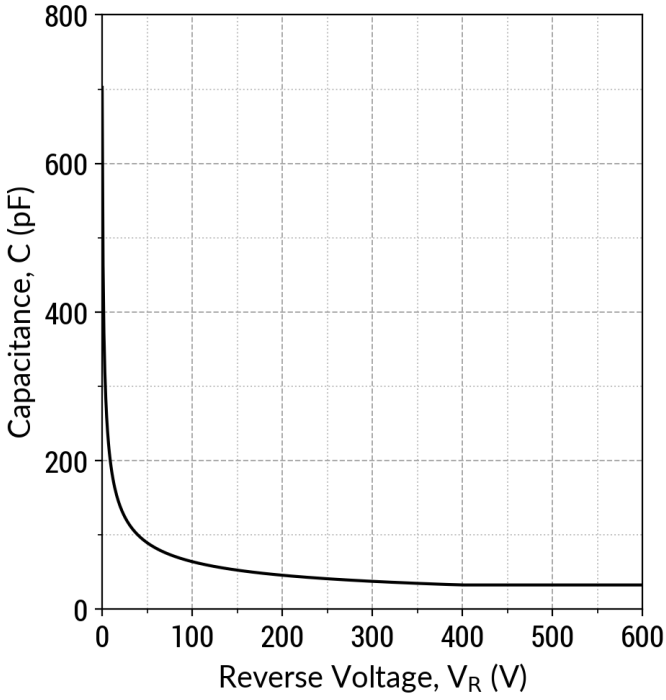
$I_F = f(T_C)$; $D = t_P/T$; $T_j \leq 175°C$; $f_{SW} > 10kHz$

Figure 5: Current Derating Curves (Maximum V_F)



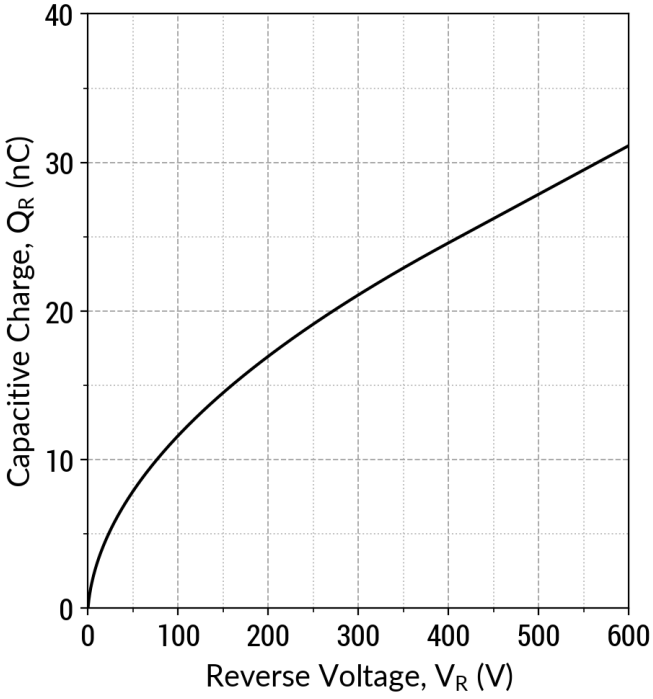
$I_F = f(T_C)$; $D = t_P/T$; $T_j \leq 175°C$; $f_{SW} > 10kHz$

Figure 6: Typical Junction Capacitance vs Reverse Voltage Characteristics



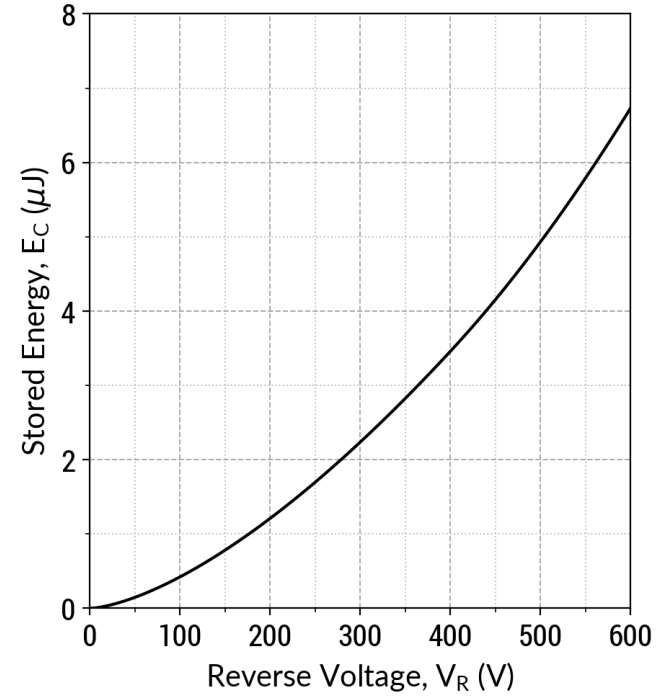
$C = f(V_R)$; $f = 1MHz$

Figure 7: Typical Capacitive Charge vs Reverse Voltage Characteristics



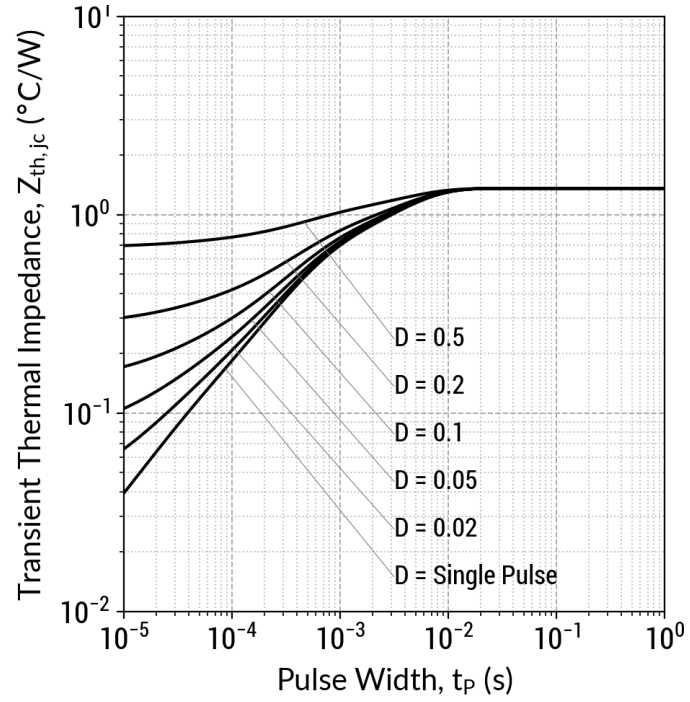
$Q_C = f(V_R)$; $f = 1MHz$

Figure 8: Typical Capacitive Energy vs Reverse Voltage Characteristics



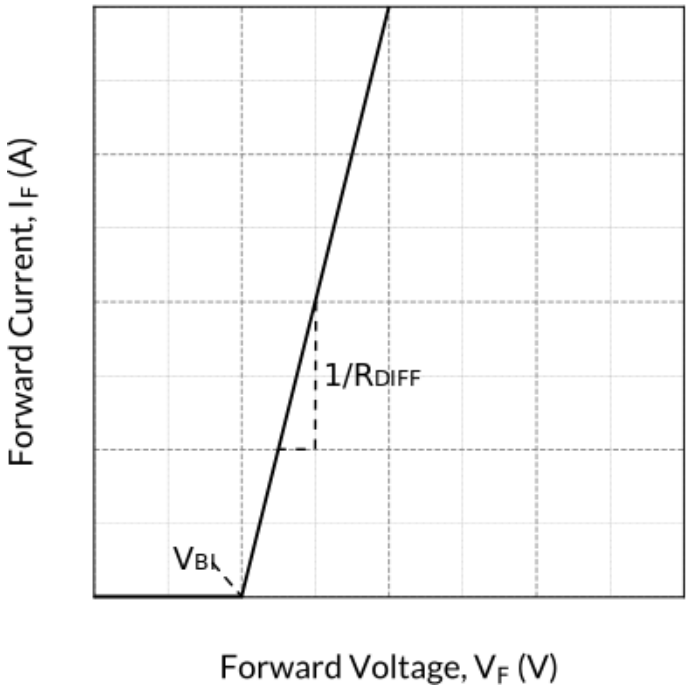
$E_C = f(V_R)$; $f = 1MHz$

Figure 9: Transient Thermal Impedance



$Z_{th,jc} = f(t_P,D)$; $D = t_P/T$

Figure 10: Forward Curve Model



$I_F = f(V_F,T_j)$

Forward Curve Model Equation:

$I_F = (V_F - V_{BI})/R_{DIFF}$ (A)

Built-In Voltage (V_{BI}):

$V_{BI}(T_j) = m \times T_j + n$ (V)

m = -0.00122 (V/°C)

n = 0.725 (V)

Differential Resistance (R_{DIFF}):

$R_{DIFF}(T_j) = a \times T_j^2 + b \times T_j + c$ (Ω)

a = 1.06e-06 (Ω/°C^2)

b = 0.000105 (Ω/°C)

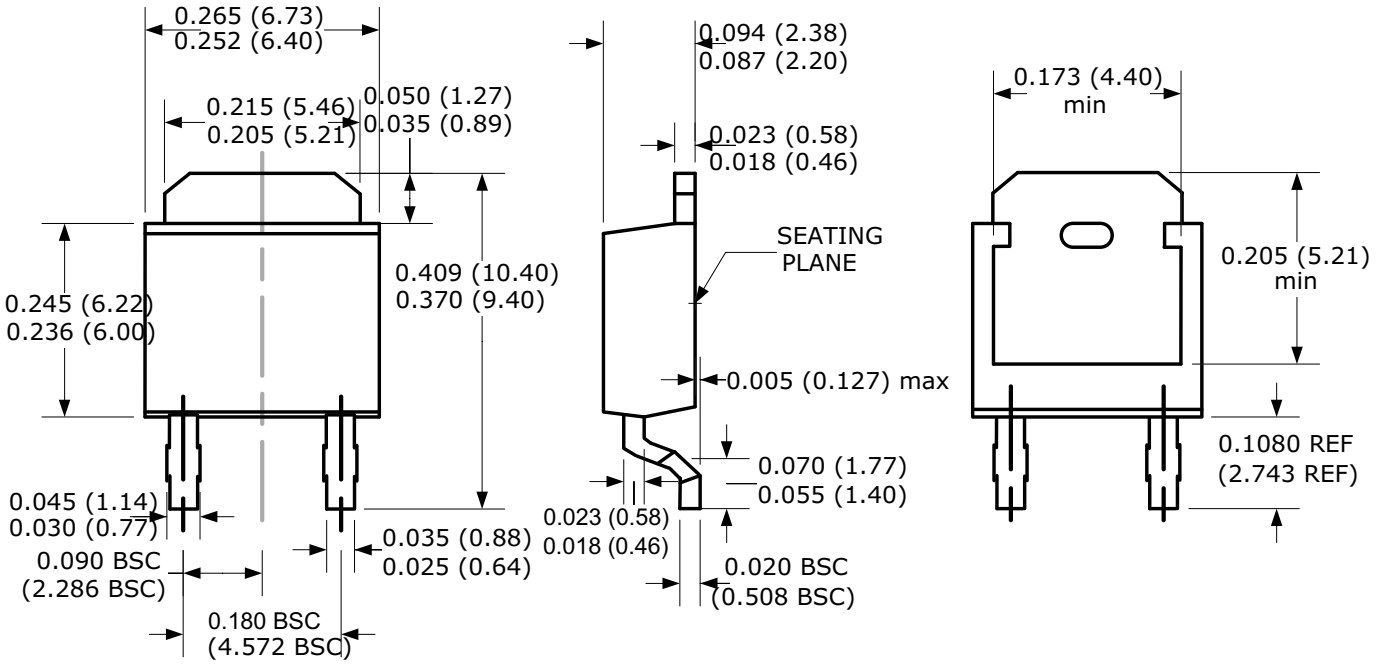
c = 0.0502 (Ω)

Forward Power Loss Equation:

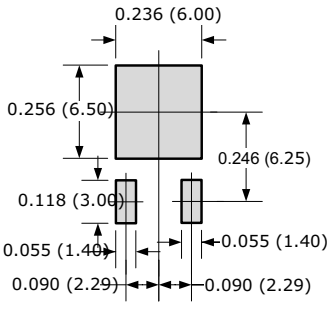
$P_{LOSS} = V_{BI}(T_j) \times I_{AVG} + R_{DIFF}(T_j) \times I_{RMS}^2$

Package Dimensions

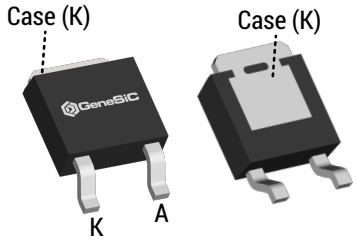
TO-252-2 Package Outline



Recommended Solder Pad Layout



Package View



NOTE

1. CONTROLLED DIMENSION IS INCH. DIMENSION IN BRACKET IS MILLIMETER.
2. DIMENSIONS DO NOT INCLUDE END FLASH, MOLD FLASH, MATERIAL PROTRUSIONS.

Compliance

RoHS Compliance

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS 2), as adopted by EU member states on January 2, 2013 and amended on March 31, 2015 by EU Directive 2015/863. RoHS Declarations for this product can be obtained from your Navitas representative.

REACH Compliance

REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a Navitas representative to insure you get the most up-to-date REACH SVHC Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

Related Links

- Reliability: https://navitassemi.com/contact-navitas/
- Quality: https://navitassemi.com/quality/

Revision History

- Rev 24/May: Updated with most recent data

IMPORTANT NOTICES AND DISCLAIMERS

EXCEPT TO THE EXTENT THAT INFORMATION IN THIS DATA SHEET IS EXPRESSLY AND SPECIFICALLY WARRANTED IN WRITING BY NAVITAS SEMICONDUCTOR ("**NAVITAS**"), EITHER PURSUANT TO THE TERMS AND CONDITIONS OF THE LIMITED WARRANTY CONTAINED IN NAVITAS' STANDARD TERMS AND CONDITIONS OF SALE OR A WRITTEN AGREEMENT SIGNED BY AN AUTHORIZED NAVITAS REPRESENTATIVE, (1) ALL INFORMATION IN THIS DATA SHEET OR OTHER RELIABILITY AND TECHNICAL DATA, AND ANY OTHER DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE OR TOOLS, SAFETY INFORMATION AND OTHER RESOURCES, ARE PROVIDED "AS IS" AND WITH ALL FAULTS; AND (2) NAVITAS MAKES NO WARRANTIES OR REPRESENTATIONS AS TO ANY SUCH INFORMATION OR RESOURCES, IN THIS DATA SHEET OR OTHERWISE, AND HEREBY DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

CUSTOMER RESPONSIBILITIES. This data sheet and other design resources and information provided by Navitas are intended only for technically trained and skilled developers designing with Navitas- or GeneSiC-branded products ("**Products**"). Performance specifications and the operating parameters of Products described herein are determined in the independent state and may not perform the same way when installed in customer products. The customer (or other user of this data sheet) is solely responsible for (a) designing, validating and testing the products and systems in which Products are incorporated; (b) designing, validating and testing the application in which Products are incorporated; (c) ensuring the application meets applicable standards and any safety, security, regulatory or other requirements; (d) evaluating the suitability of Products for the intended application and the completeness of the information in this data sheet with respect to such application; (e) procuring and/or developing production firmware, if applicable; and (f) completing system qualification, compliance and safety testing, EMC testing, and any automotive, high-reliability or other system qualifications that apply.

NON-AUTHORIZED USES OF PRODUCTS. Except to the extent expressly provided in a writing signed by an authorized Navitas representative, Products are not designed, authorized or warranted for use in extreme or hazardous conditions; aircraft navigation, communication or control systems; aircraft power and propulsion systems; air traffic control systems; military, weapons, space-based or nuclear applications; life-support devices or systems, including but not limited to devices implanted into the human body and emergency medical equipment; or applications where product failure could lead to death, personal injury or severe property or environmental damage. The customer or other persons using Products in such applications without Navitas' agreement or acknowledgement, as set forth in a writing signed by an authorized Navitas representative, do so entirely at their own risk and agree to fully indemnify Navitas for any damages resulting from such improper use. In order to minimize risks associated with such applications, you should provide adequate design and operating safeguards.

CHANGES TO, AND USE OF, THIS DATA SHEET. This data sheet and accompanying information and resources are subject to change without notice. Navitas grants you permission to use this data sheet and accompanying resources only for the development of an application that uses the Products described herein and subject to the notices and disclaimers set forth above. Any other use, reproduction or display of this data sheet or accompanying resources and information is prohibited. No license is granted to any Navitas intellectual property right or to any third-party intellectual property right. Navitas disclaims any responsibility for, and you will fully indemnify Navitas and its representatives against, any claims, damages, costs, losses and liabilities arising out of your use of this data sheet and any accompanying resources and information.

TERMS AND CONDITIONS. All purchases and sales of Products are subject to Navitas' Standard Terms and Conditions of Sale, including the limited warranty contained therein, unless other terms and conditions have been agreed in a writing signed by an authorized Navitas representative. This data sheet, and Navitas' provision of this data sheet or other information and resources, do not expand or otherwise alter those terms and conditions.

Navitas, GeneSiC, the Navitas and GeneSiC logos, GaNFast, GaNSafe, SICPAK and other Navitas marks used herein are trademarks or registered trademarks of Navitas Semiconductor Limited or its affiliates. Other trademarks used herein are the property of their respective owners.

Copyright © 2024 Navitas Semiconductor Limited and affiliates. All rights reserved.