

G2R1000MT17J

1700 V 1000 mΩ SiC MOSFET



Silicon Carbide MOSFET N-Channel Enhancement Mode

V_{DS}	=	1700 V
$R_{DS(ON)(Typ.)}$	=	1000 mΩ
$I_D (T_C = 100^\circ C)$	=	4 A

Features

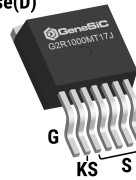
- G2R™ Technology - +20 V / -5 V Gate Drive
- Superior $Q_G \times R_{DS(ON)}$ Figure of Merit
- Low Capacitances and Low Gate Charge
- High V_{th} for Increased System Stability
- Fast and Reliable Body Diode
- High Avalanche and Short Circuit Ruggedness
- Low Conduction Losses at High Temperatures
- Optimized Package with Separate Driver Source Pin

Advantages

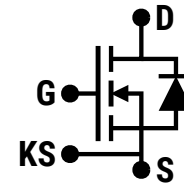
- Increased Power Density for Compact System
- High Frequency Switching
- Reduced Losses for Higher System Efficiency
- Minimized Gate Ringing
- Improved Thermal Capability
- Superior Cost-Performance Index
- Ease of Paralleling without Thermal Runaway
- Simple to Drive

Package

Case(D)



T0-263-7



D = Drain
G = Gate
S = Source
KS = Kelvin Source



Applications

- Auxiliary Power Supply
- Switched Mode Power Supplies
- High Voltage Converters
- Pulsed Power

Absolute Maximum Ratings (At $T_C = 25^\circ C$ Unless Otherwise Stated)

Parameter	Symbol	Conditions	Values	Unit	Note
Drain-Source Voltage	$V_{DS(max)}$	$V_{GS} = 0 V, I_D = 100 \mu A$	1700	V	
Gate-Source Voltage (Dynamic)	$V_{GS(max)}$		-10 / +25	V	
Gate-Source Voltage (Static)	$V_{GS(op)}$	Recommended Operation	-5 / +20	V	
Continuous Forward Current	I_D	$T_C = 100^\circ C, V_{GS} = -5 / +20 V$	4	A	Fig. 14
		$T_C = 135^\circ C, V_{GS} = -5 / +20 V$	3		
Pulsed Drain Current	$I_{D(pulse)}$	$t_P \leq 10 \mu s, D \leq 1\%, \text{Note 1}$	8	A	Fig. 13
Power Dissipation	P_D	$T_C = 25^\circ C$	54	W	Fig. 15
Operating and Storage Temperature	T_j, T_{stg}		-55 to 175	$^\circ C$	

Thermal/Package Characteristics

Parameter	Symbol	Conditions	Values			Unit	Note
			Min.	Typ.	Max.		
Thermal Resistance, Junction - Case	R_{thJC}			2.34	2.79	$^\circ C/W$	Fig. 13
Weight	W_T			1.45		g	

Note 1: Pulse Width t_P Limited by $T_{j(max)}$

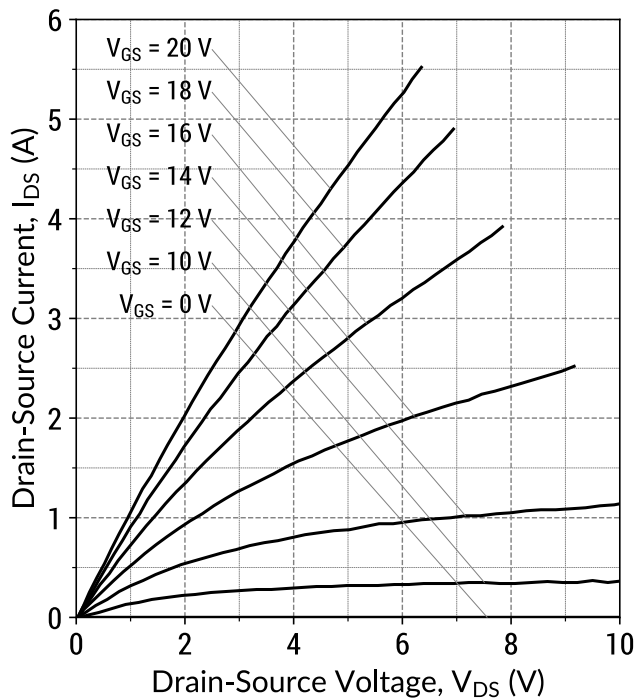
Electrical Characteristics (At $T_c = 25^\circ\text{C}$ Unless Otherwise Stated)

Parameter	Symbol	Conditions	Values			Unit	Note
			Min.	Typ.	Max.		
Drain-Source Breakdown Voltage	V_{DSS}	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$	1700			V	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 1700\text{ V}, V_{GS} = 0\text{ V}$		1		μA	
Gate Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = 25\text{ V}$			100	nA	
		$V_{DS} = 0\text{ V}, V_{GS} = -10\text{ V}$			-100		
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 2\text{ mA}$	3.3	4		V	Fig. 9
		$V_{DS} = V_{GS}, I_D = 2\text{ mA}, T_j = 175^\circ\text{C}$		3			
Transconductance	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 2\text{ A}$		0.74		S	Fig. 4
		$V_{DS} = 10\text{ V}, I_D = 2\text{ A}, T_j = 175^\circ\text{C}$		0.71			
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 20\text{ V}, I_D = 2\text{ A}$		1000	1200	mΩ	Fig. 5-8
		$V_{GS} = 20\text{ V}, I_D = 2\text{ A}, T_j = 175^\circ\text{C}$		1680			
Input Capacitance	C_{iss}			139		pF	Fig. 10
Output Capacitance	C_{oss}			22			
Reverse Transfer Capacitance	C_{rss}	$V_{DS} = 1000\text{ V}, V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}, V_{AC} = 25\text{ mV}$		6.2		μJ	Fig. 11
C_{oss} Stored Energy	E_{oss}			15			
C_{oss} Stored Charge	Q_{oss}			27		nC	
Internal Gate Resistance	$R_{G(int)}$	$f = 1\text{ MHz}, V_{AC} = 25\text{ mV}$		5		Ω	

Reverse Diode Characteristics

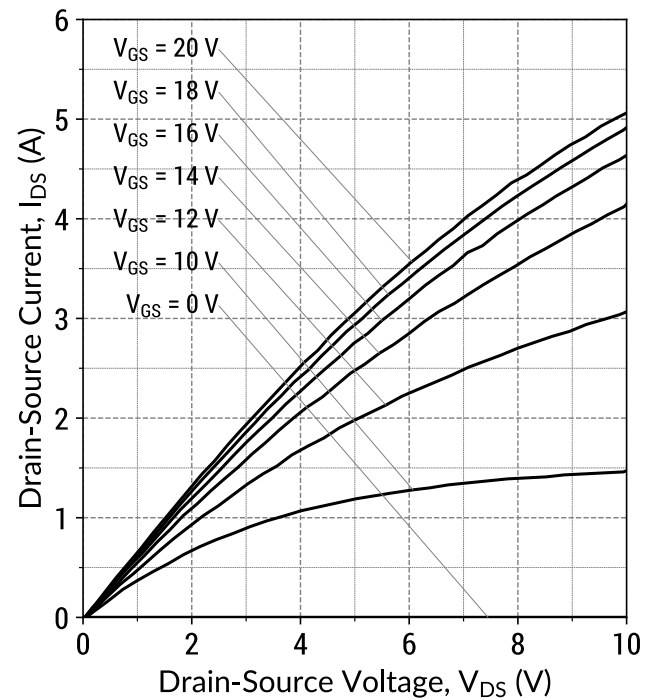
Parameter	Symbol	Conditions	Values			Unit	Note
			Min.	Typ.	Max.		
Diode Forward Voltage	V_{SD}	$V_{GS} = -5\text{ V}, I_{SD} = 1\text{ A}$		4		V	Fig. 16-17
		$V_{GS} = -5\text{ V}, I_{SD} = 1\text{ A}, T_j = 175^\circ\text{C}$		3.5			
Continuous Diode Forward Current	I_S	$V_{GS} = -5\text{ V}, T_c = 100^\circ\text{C}$	4			A	
Diode Pulse Current	$I_{S(pulse)}$	$V_{GS} = -5\text{ V}, \text{Note 1}$		16		A	

Figure 1: Output Characteristics ($T_j = 25^\circ\text{C}$)



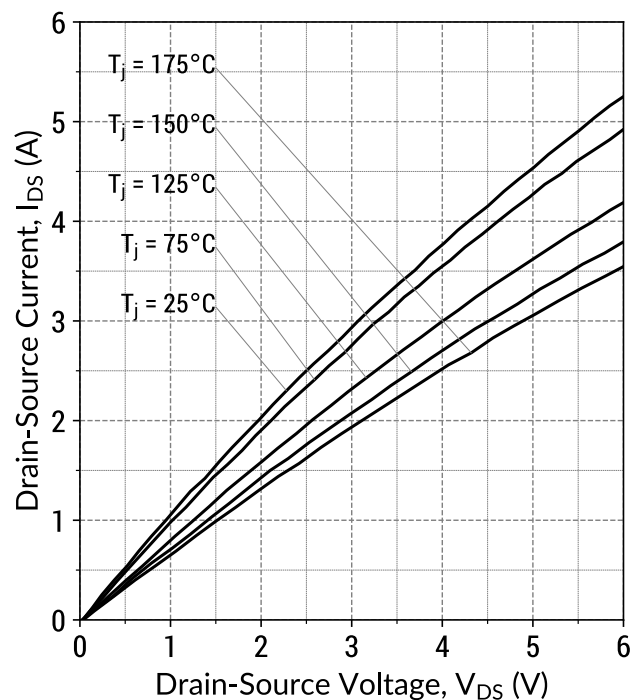
$$I_D = f(V_{DS}, V_{GS}); t_P = 250 \mu\text{s}$$

Figure 2: Output Characteristics ($T_j = 175^\circ\text{C}$)



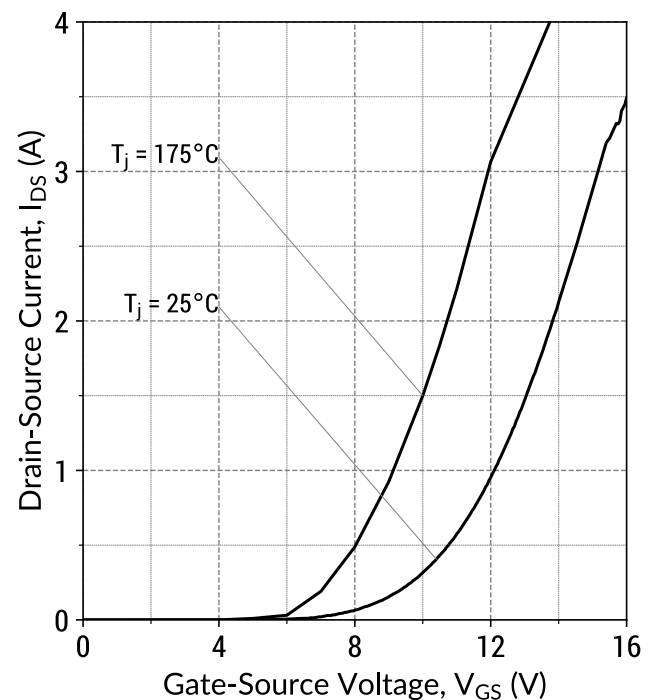
$$I_D = f(V_{DS}, V_{GS}); t_P = 250 \mu\text{s}$$

Figure 3: Output Characteristics ($V_{GS} = 20\text{ V}$)



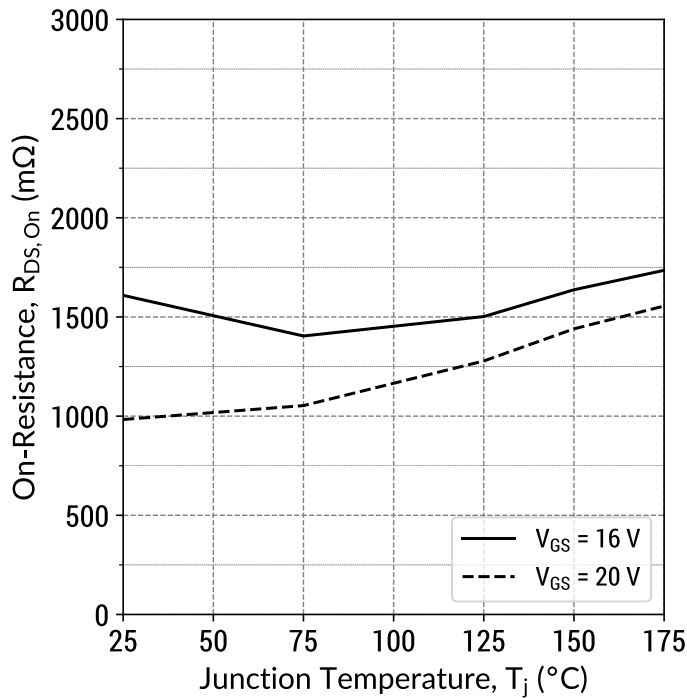
$$I_D = f(V_{DS}, T_j); t_P = 250 \mu\text{s}$$

Figure 4: Transfer Characteristics ($V_{DS} = 10\text{ V}$)



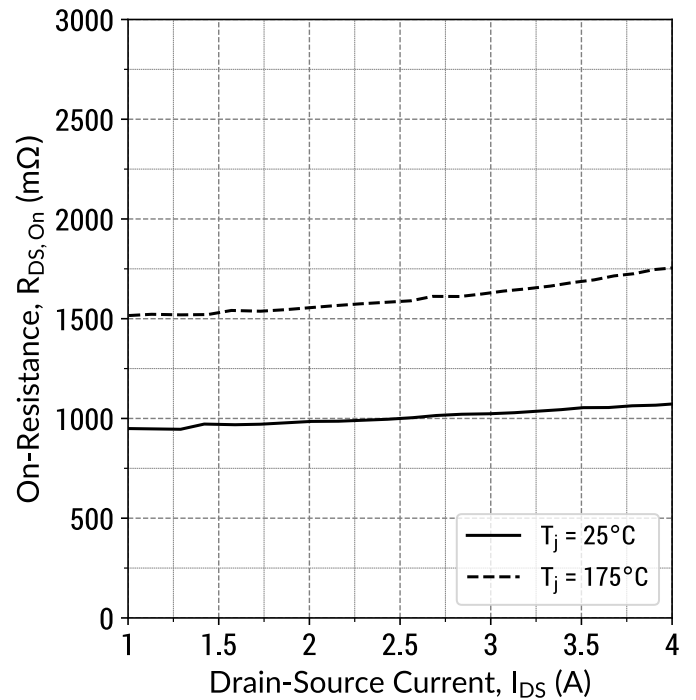
$$I_D = f(V_{GS}, T_j); t_P = 100 \mu\text{s}$$

Figure 5: On-State Resistance v/s Temperature



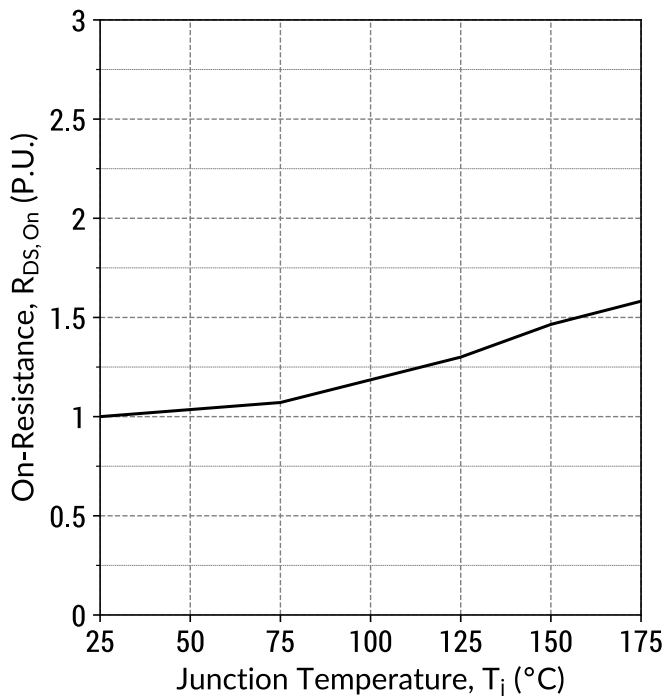
$R_{DS(ON)} = f(T_j, V_{GS}); t_P = 250\ \mu\text{s}; I_D = 2\ \text{A}$

Figure 6: On-State Resistance v/s Drain Current



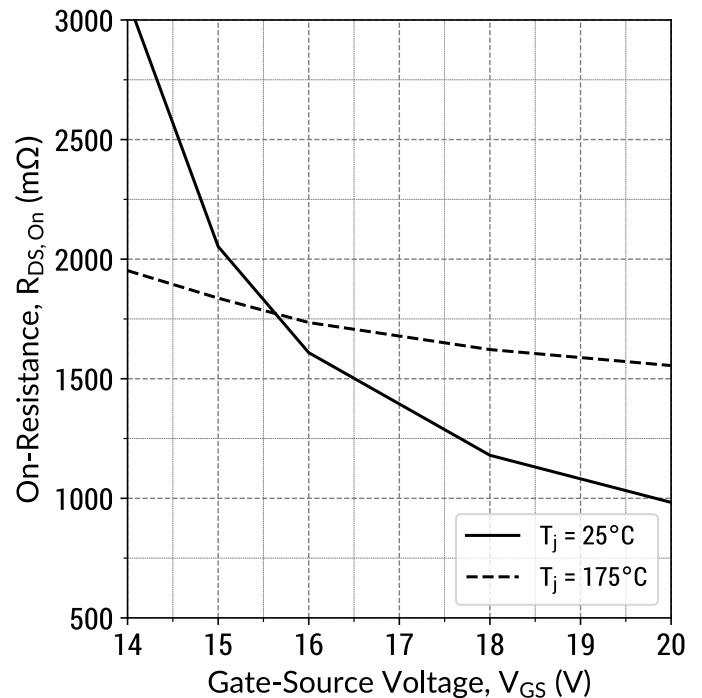
$R_{DS(ON)} = f(T_j, I_D); t_P = 250\ \mu\text{s}; V_{GS} = 20\ \text{V}$

Figure 7: Normalized On-State Resistance v/s Temperature



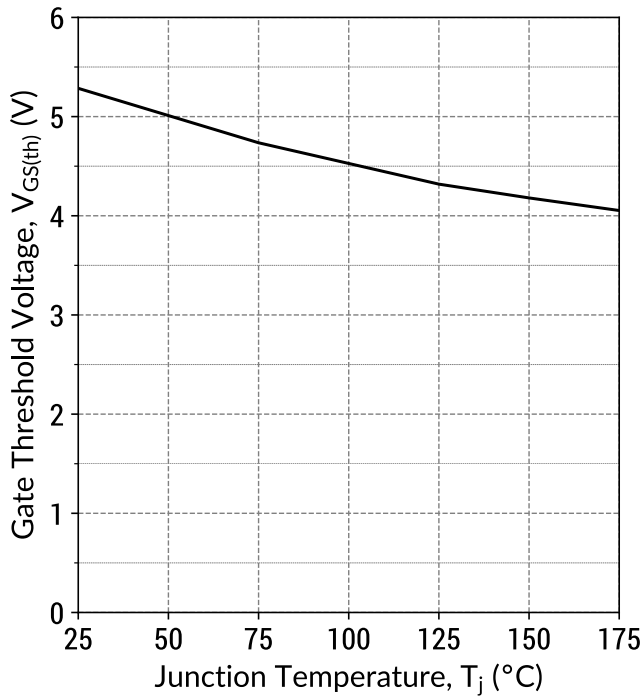
$R_{DS(ON)} = f(T_j); t_P = 250\ \mu\text{s}; I_D = 2\ \text{A}; V_{GS} = 20\ \text{V}$

Figure 8: On-State Resistance v/s Gate Voltage



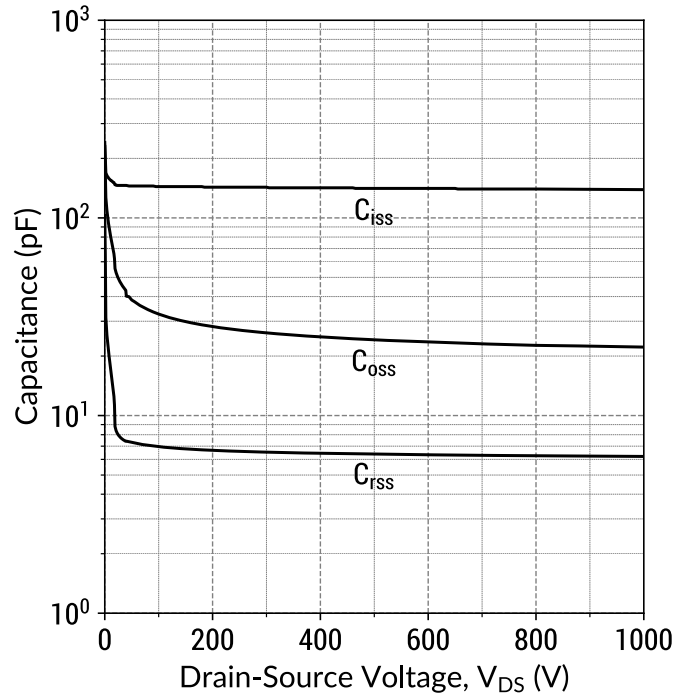
$R_{DS(ON)} = f(T_j, V_{GS}); t_P = 250\ \mu\text{s}; I_D = 2\ \text{A}$

Figure 9: Threshold Voltage Characteristics



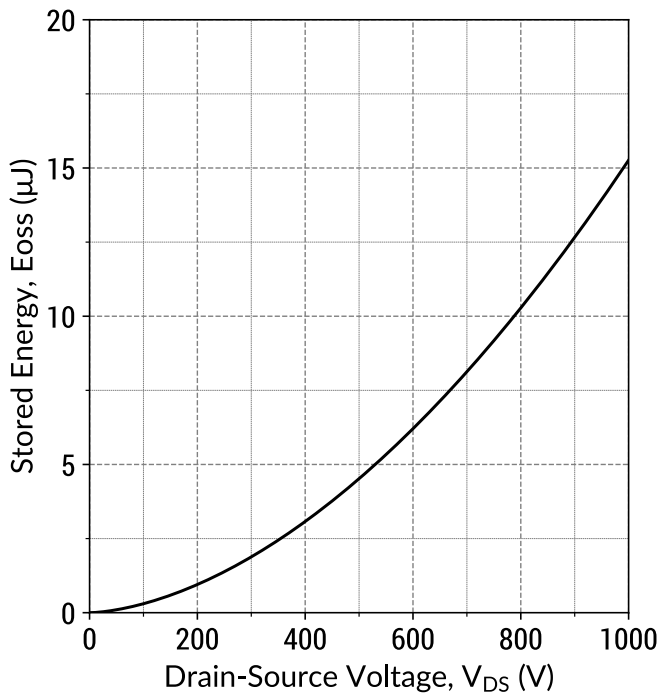
$$V_{GS(th)} = f(T_j); V_{DS} = V_{GS}; I_D = 2 \text{ mA}$$

Figure 10: Capacitance v/s Drain-Source Voltage



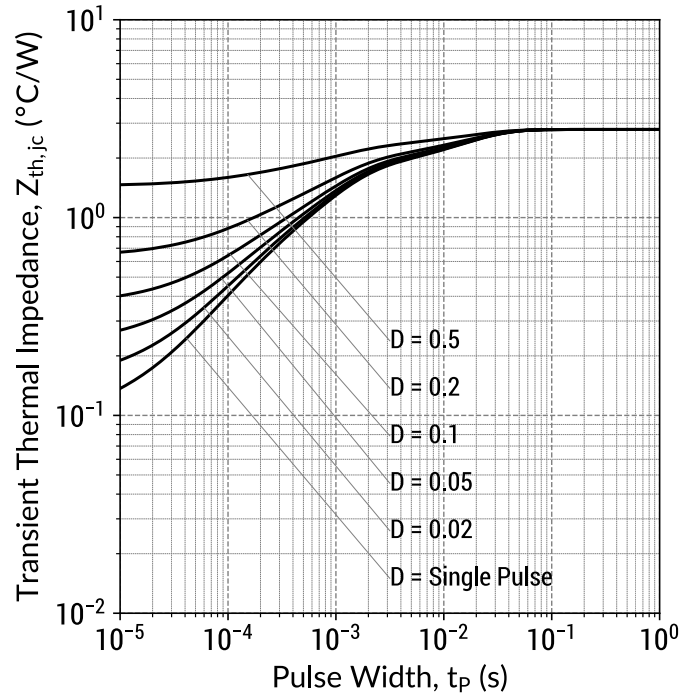
$$f = 1 \text{ MHz}; V_{AC} = 25 \text{ mV}$$

Figure 11: Output Capacitor Stored Energy



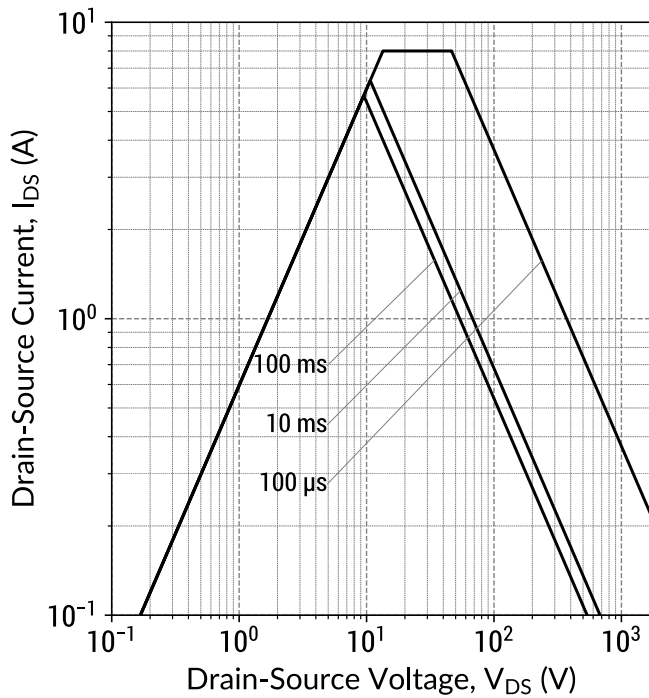
$$E_{oss} = f(V_{DS})$$

Figure 12: Transient Thermal Impedance



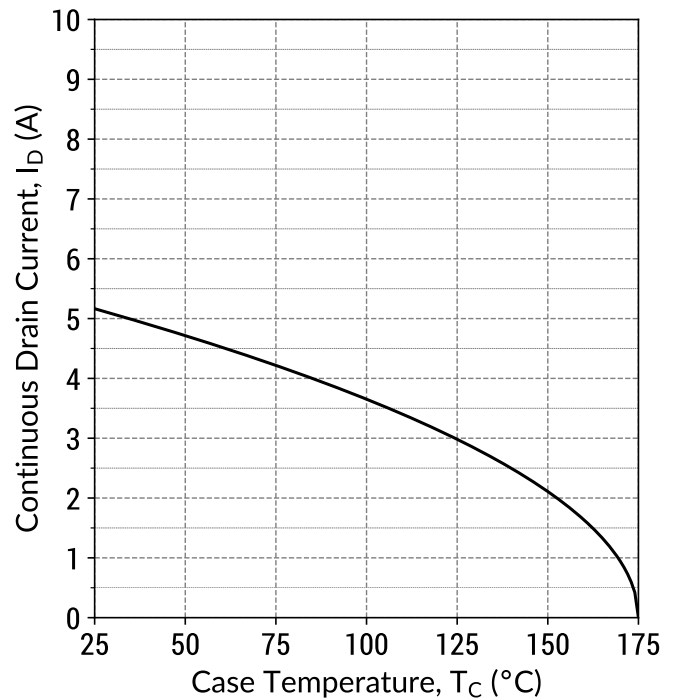
$$Z_{th,jc} = f(t_p, D); D = t_p/T$$

Figure 13: Safe Operating Area ($T_c = 25^\circ\text{C}$)



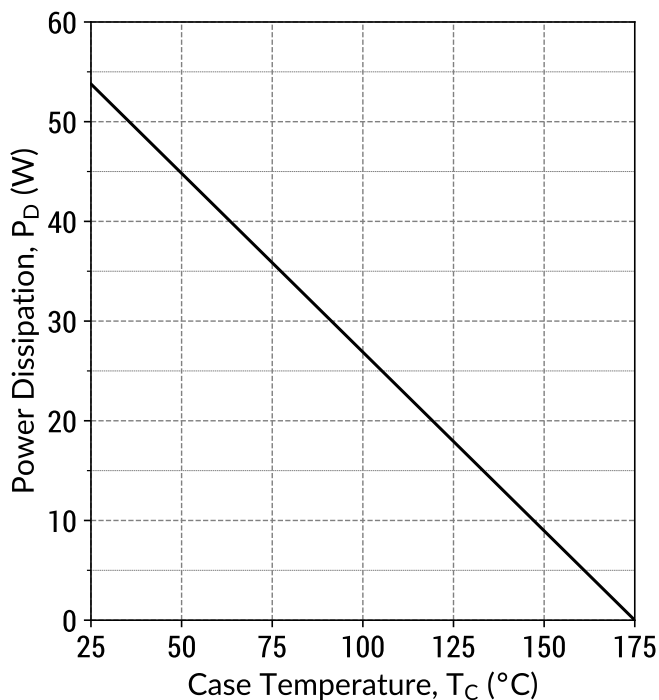
$$I_D = f(V_{DS}, t_p); T_j \leq 175^\circ\text{C}; D = 0$$

Figure 14: Current De-rating Curve



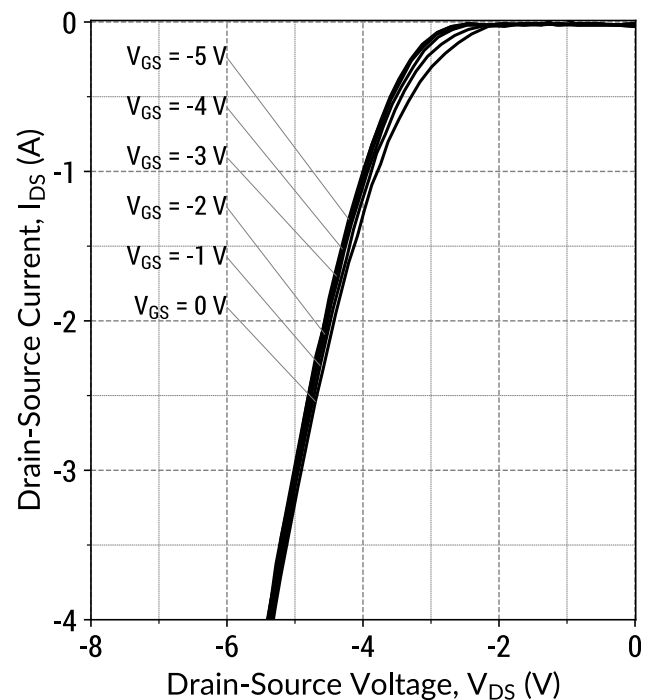
$$I_D = f(T_C); T_j \leq 175^\circ\text{C}$$

Figure 15: Power De-rating Curve



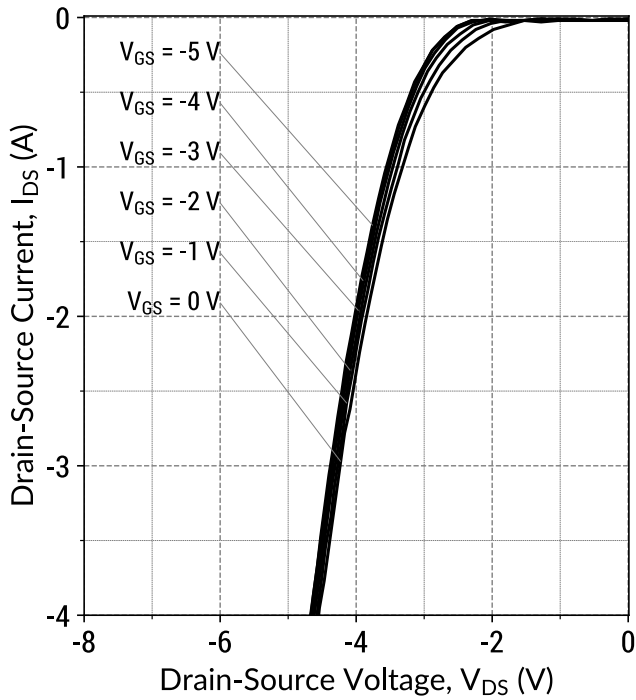
$$P_D = f(T_C); T_j \leq 175^\circ\text{C}$$

Figure 16: Body Diode Characteristics ($T_j = 25^\circ\text{C}$)



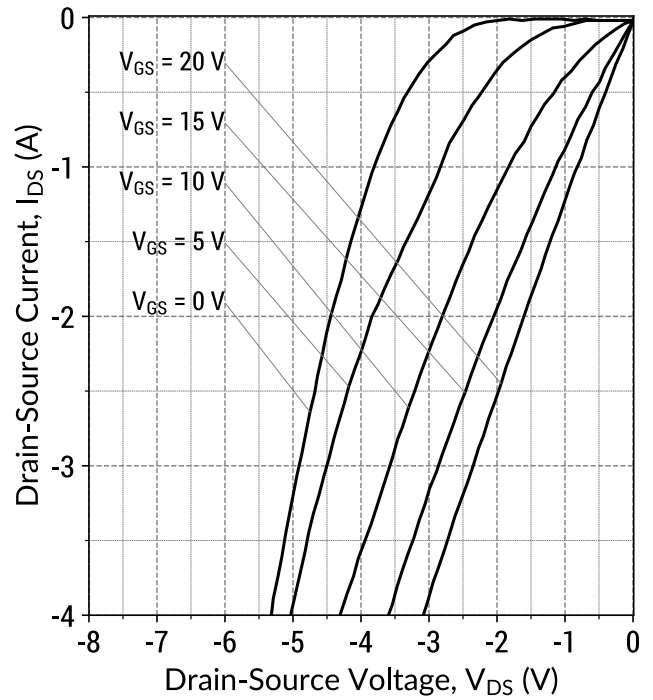
$$I_D = f(V_{DS}, V_{GS}); t_p = 250 \mu\text{s}$$

Figure 17: Body Diode Characteristics ($T_j = 175^\circ\text{C}$)



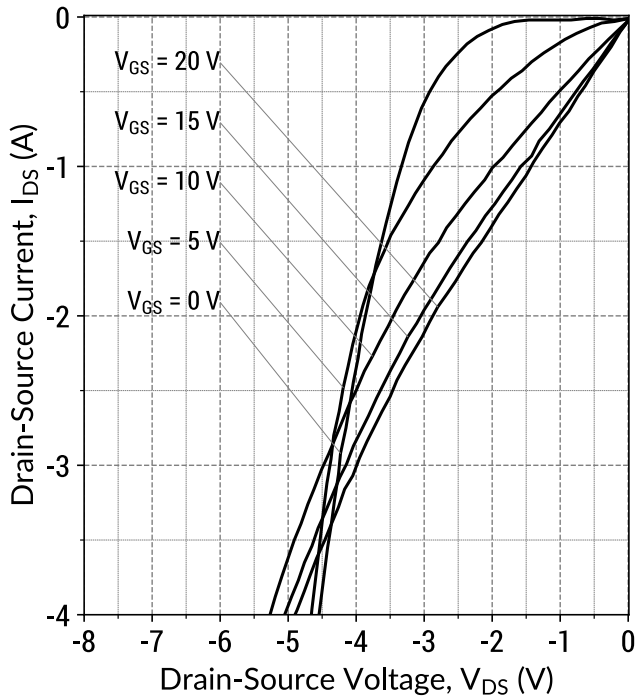
$I_D = f(V_{DS}, V_{GS}); t_P = 250 \mu\text{s}$

Figure 18: Third Quadrant Characteristics ($T_j = 25^\circ\text{C}$)



$I_D = f(V_{DS}, V_{GS}); t_P = 250 \mu\text{s}$

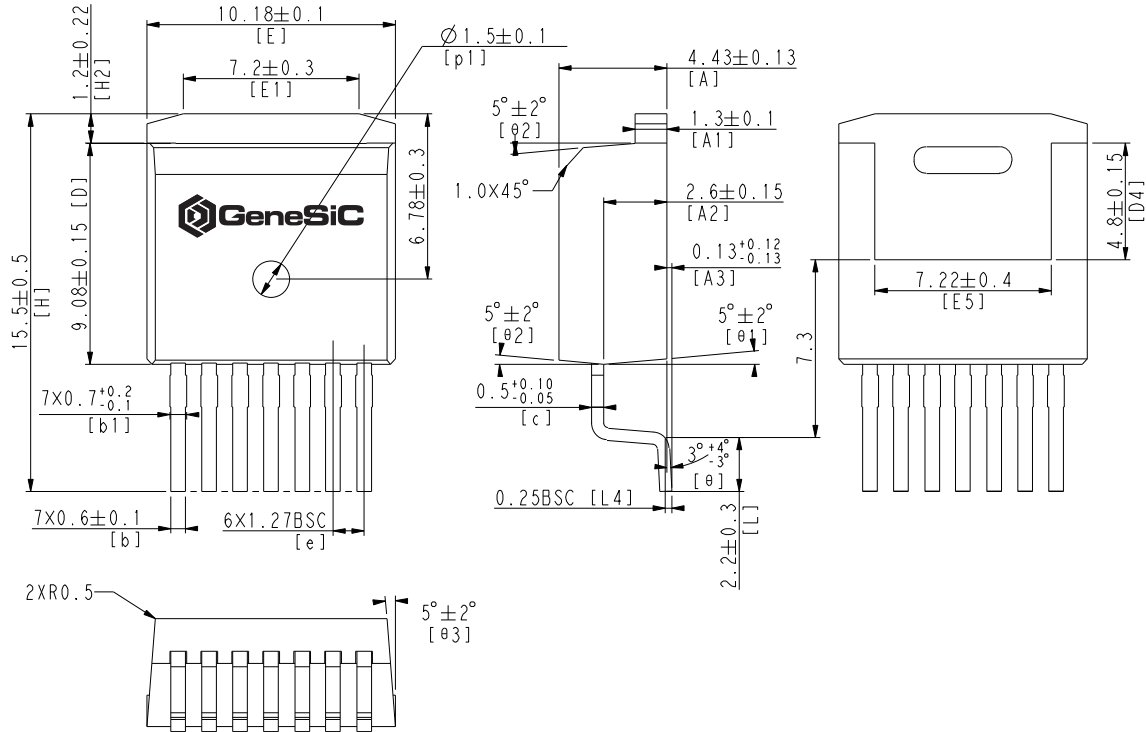
Figure 19: Third Quadrant Characteristics ($T_j = 175^\circ\text{C}$)



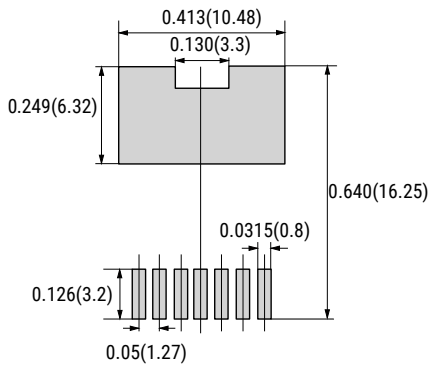
$I_D = f(V_{DS}, V_{GS}); t_P = 250 \mu\text{s}$

Package Dimensions

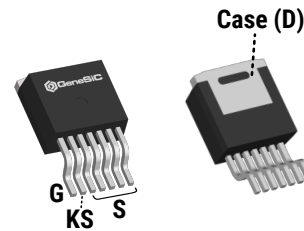
TO-263-7 Package Outline



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 GeneSiC 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 GeneSiC 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.

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Unless otherwise expressly indicated, GeneSiC products are not designed, tested or authorized for use in life-saving, medical, aircraft navigation, communication, air traffic control and weapons systems, nor in applications where their failure may result in death, personal injury and/or property damage.

Related Links

- SPICE Models: https://www.genesicsemi.com/sic-mosfet/G2R1000MT17J/G2R1000MT17J_SPICE.zip
- PLECS Models: https://www.genesicsemi.com/sic-mosfet/G2R1000MT17J/G2R1000MT17J_PLECS.zip
- CAD Models: https://www.genesicsemi.com/sic-mosfet/G2R1000MT17J/G2R1000MT17J_3D.zip
- Gate Driver Reference: <https://www.genesicsemi.com/technical-support>
- Evaluation Boards: <https://www.genesicsemi.com/technical-support>
- Reliability: <https://www.genesicsemi.com/reliability>
- Compliance: <https://www.genesicsemi.com/compliance>
- Quality Manual: <https://www.genesicsemi.com/quality>

Revision History

Date	Revision	Comments	Supersedes
Aug. 3, 2020	Rev 2	Part Number Changed from G3R1000MT17J to G2R1000MT17J	Rev 1
Jun. 2, 2020	Rev 1	Initial Release	



www.genesicsemi.com/sic-mosfet/