GS3M4517K
1700 V 45 mΩ SiC MOSFET

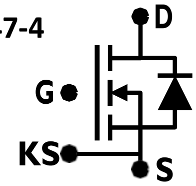
Silicon Carbide MOSFET
N-Channel Enhancement Mode

V_{DS}	=	1700 V
$R_{DS(ON)(Typ.)}$	=	45 mΩ
I_D (T_C = 100°C)	=	41 A

Features
- GS3M™ SiC MOSFET Technology
- Superior Q_G x $R_{DS(ON)}$ 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

Package


TO-247-4



D = Drain
G = Gate
S =Source
KS = K lvin S r

RoHS
REACH

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

Applications
- Electric Vehicle Fast Charging
- Solar Inverters
- Traction Inverters
- Smart Grid and HVDC
- High Voltage DC-DC Converters
- Switched Mode Power Supply
- Wind Energy Converters
- Pulsed Power

Absolute Maximum Ratings (At T_C = 25°C Unless Otherwise Stated)

Parameter	Symbol	Conditions	Values	Unit	Note
Drain-Source Voltage	$V_{DS(max)}$	V_{GS} = 0 V, I_D = 100 μs	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°C, V_{GS} = 20 V	41	A	Fig. 14
		T_C = 135°C, V_{GS} = 20 V	30		
Pulsed Drain Current	$I_{D(pulse)}$	t_P ≤ 10μs, D ≤ 1%, Note 1	140	A	Fig. 13
Power Dissipation	P_D	T_c = 25°C	256	W	Note 2
Operating and Storage Temperature	T_j , T_{stg}		-55 to 175	°C	

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

Note 2: Assuming $Rth_{JC(max)}$ = 0.59°C/W

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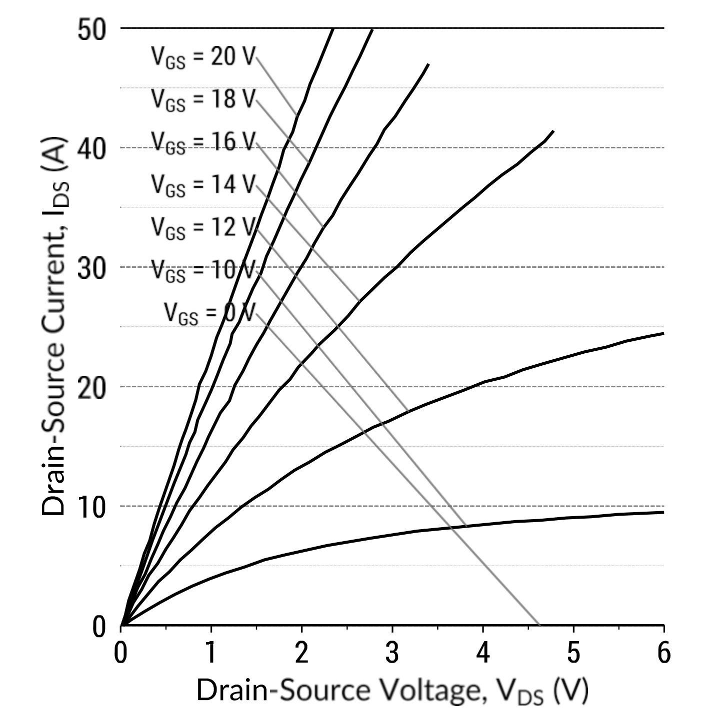
Electrical Characteristics (At T_C = 25°C Unless Otherwise Stated)

Parameter	Symbol	Conditions	Values Min.	Values Typ.	Values Max.	Unit	Note
Drain-Source Breakdown Voltage	V_{DSS}	V_{GS} = 0 V, I_D = 100 µA	1700			V	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1700 V, V_{GS} = 0 V		1		µA	
Gate Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 25 V V_{DS} = 0 V, V_{GS} = -10 V			100 -100	nA	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 10 mA V_{DS} = V_{GS}, I_D = 10 mA, T_j = 175°C	3.3	4 3		V	Fig. 9
Transconductance	g_{fs}	V_{DS} = 10 V, I_D = 35 A V_{DS} = 10 V, I_D = 35 A, T_j = 175°C		9.3 7.7		S	Fig. 4
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 20 V, I_D = 35A V_{GS} = 20 V, I_D = 35 A, T_j = 175°C		45 76	54	mΩ	Fig. 5-8
Input Capacitance	C_{iss}	V_{DS} = 1000 V, V_{GS} = 0 V f = 1 MHz, V_{AC} = 25mV		2693		pF	Fig. 10
Output Capacitance	C_{oss}			99			
Reverse Transfer Capacitance	C_{rss}			17.3			
C_{oss} Stored Energy	E_{oss}			113		µJ	Fig. 11
C_{oss} Stored Charge	Q_{oss}			175		nC	
Internal Gate Resistance	$R_{G(int)}$	f = 1 MHz, V_{AC} = 25 mV		1.5 Ω			

Reverse Diode Characteristics

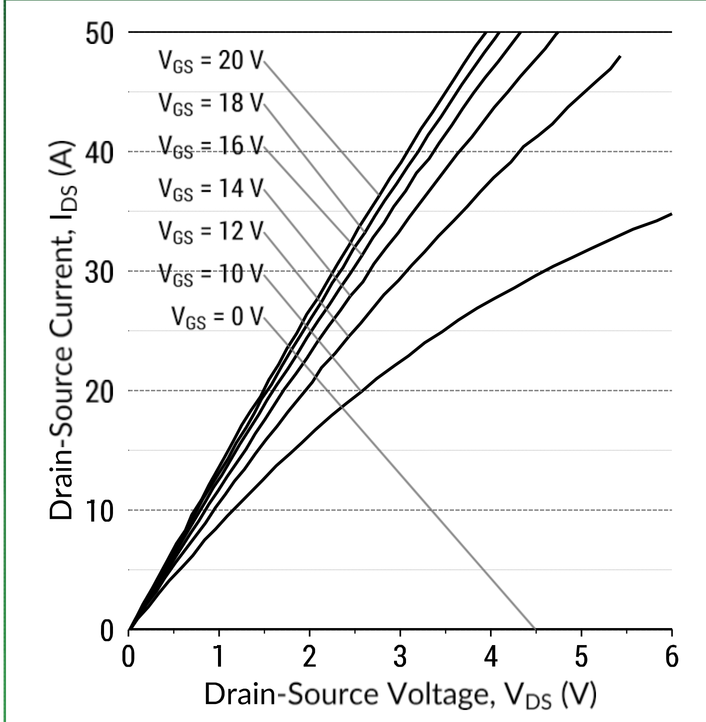
Parameter	Symbol	Conditions	Values Min.	Values Typ.	Values Max.	Unit	Note
Diode Forward Voltage	V_{SD}	V_{GS} = -5 V, I_{SD} = 17 A V_{GS} = -5 V, I_{SD} = 17 A, T_j = 175°C		4 3.5		V	Fig. 12-13
Continuous Diode Forward Current	I_S	V_{GS} = -5 V, T_c = 100°C		28		A	
Diode Pulse Current	$I_{S(pulse)}$	V_{GS} = -5 V, Note 1		140		A	

Figure 1: Output Characteristics (T_j = 25°C)



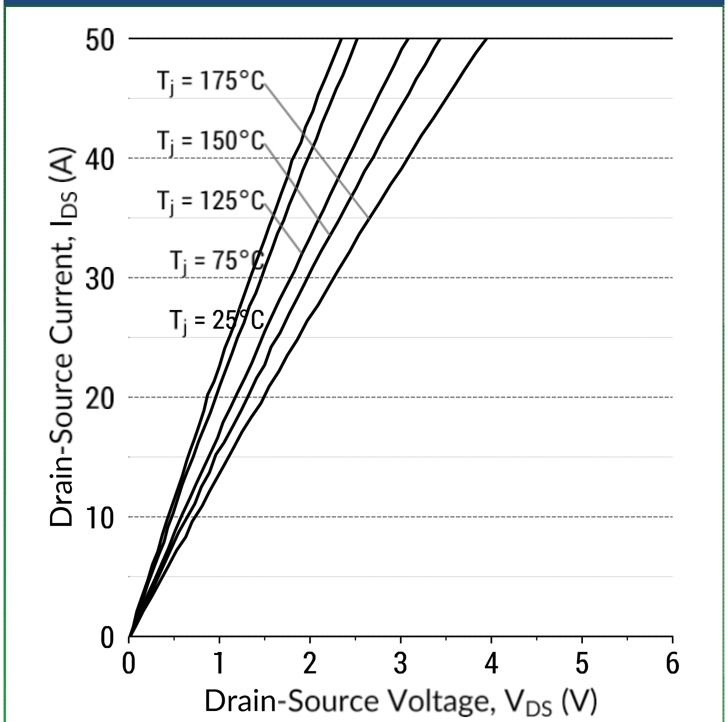
I_D=f(V_{DS},V_{GS});t_P=250μs

Figure 2: Output Characteristics (T_j = 175°C)



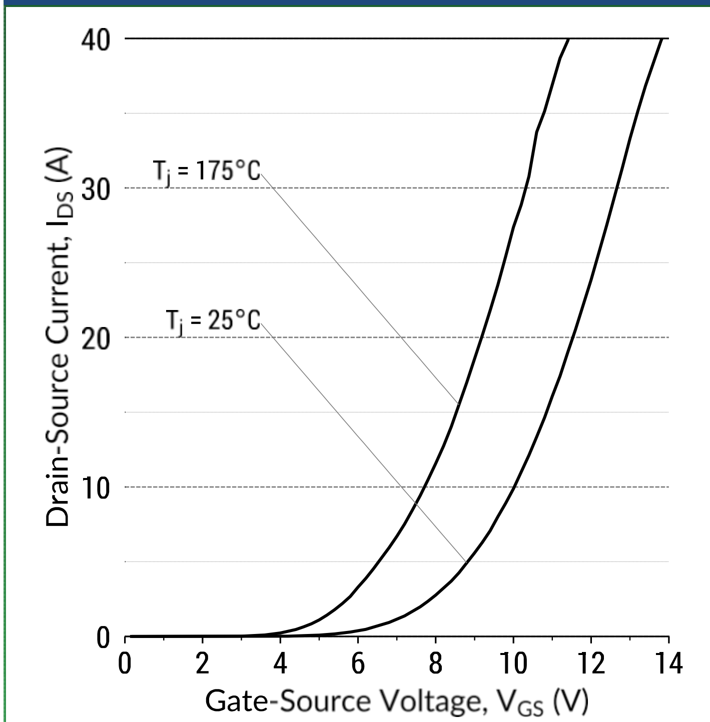
I_D=f(V_{DS},V_{GS});t_P=250μs

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



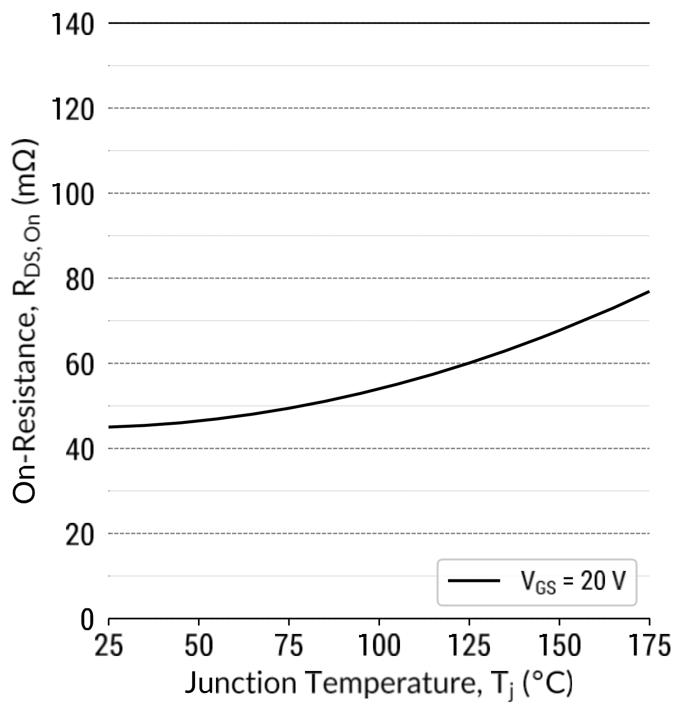
I_D=f(V_{DS},T_j);t_P=250μs

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



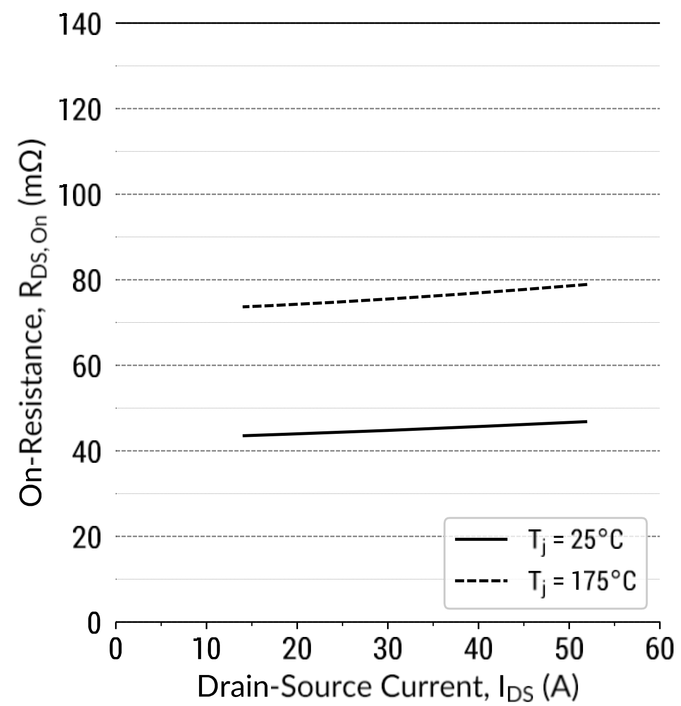
I_D=f(V_{GS},T_j);t_P=100μs

Figure 5: On-State Resistance v/s Temperature



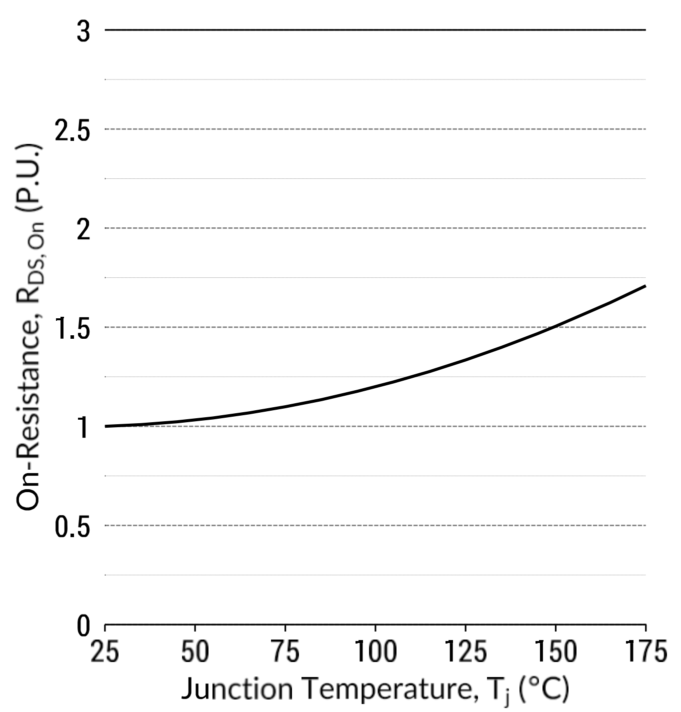
$R_{DS(ON)} = f(T_j, V_{GS}); t_P = 250 \mu s; I_D = 35 A$

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



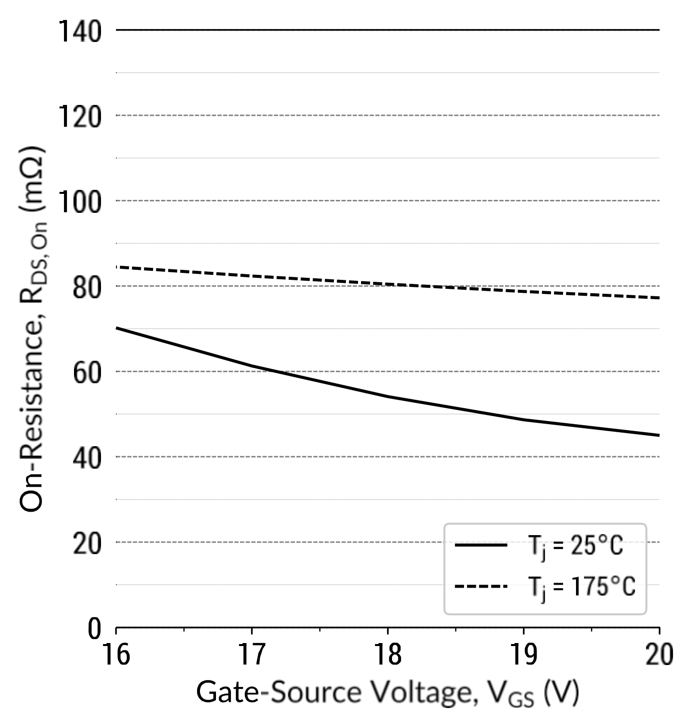
$R_{DS(ON)} = f(T_j, I_D); t_P = 250 \mu s; V_{GS} = 20$

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



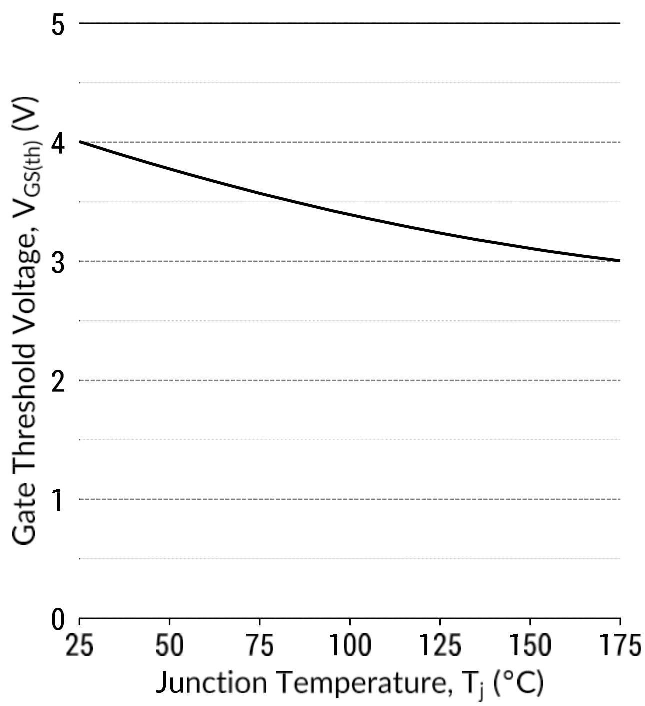
$R_{DS(ON)} = f(T_j); t_P = 250 \mu s; I_D = 35 A; V_{GS} = 20 V$

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



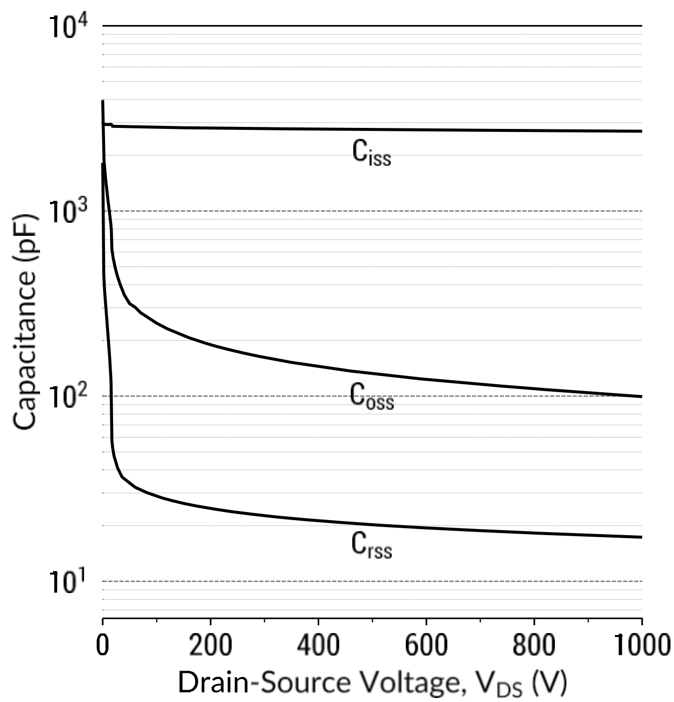
$R_{DS(ON)} = f(T_j, V_{GS}); t_P = 250 \mu s; I_D = 35$

Figure 9: Threshold Voltage Characteristics



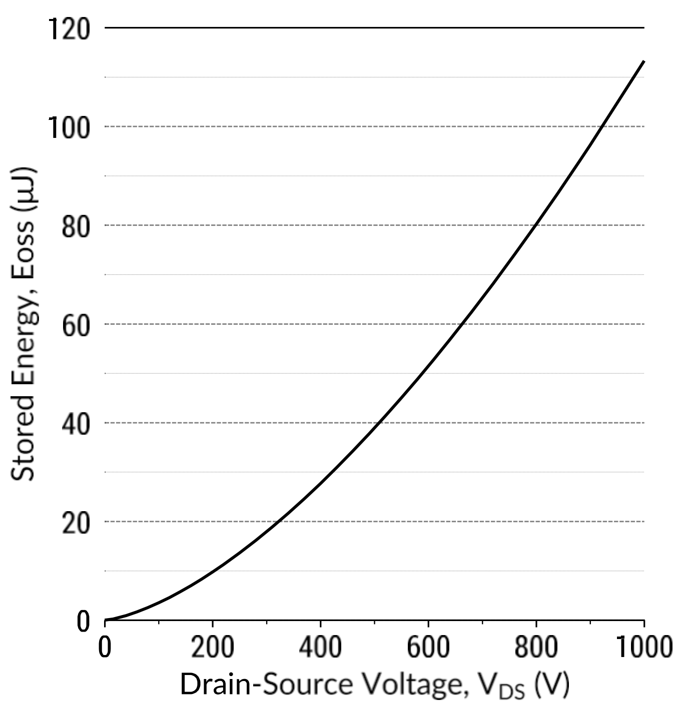
$V_{GS(th)}=f(T_j);V_{DS}=V_{GS};I_D=10$

Figure 10: Capacitance v/s Drain-Source Voltage



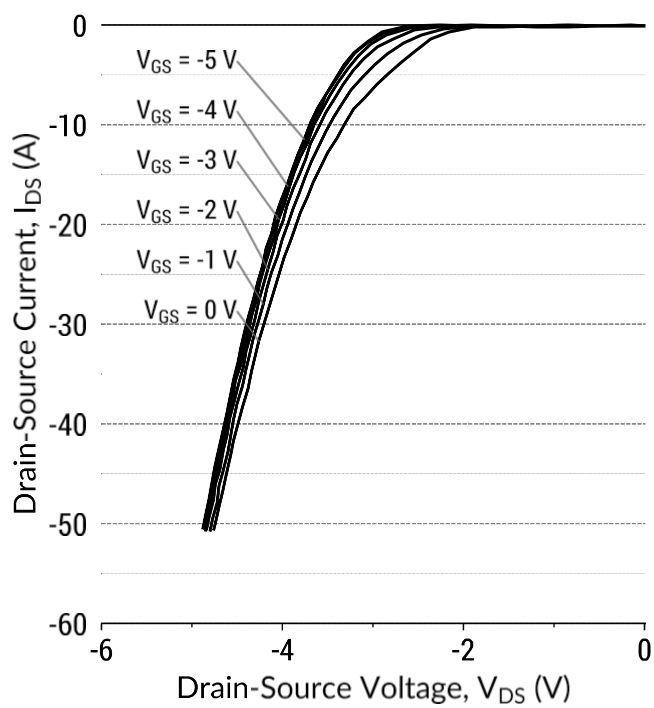
f=1MHz;V_{AC}=25mV

Figure 11: Output Capacitor Stored Energy



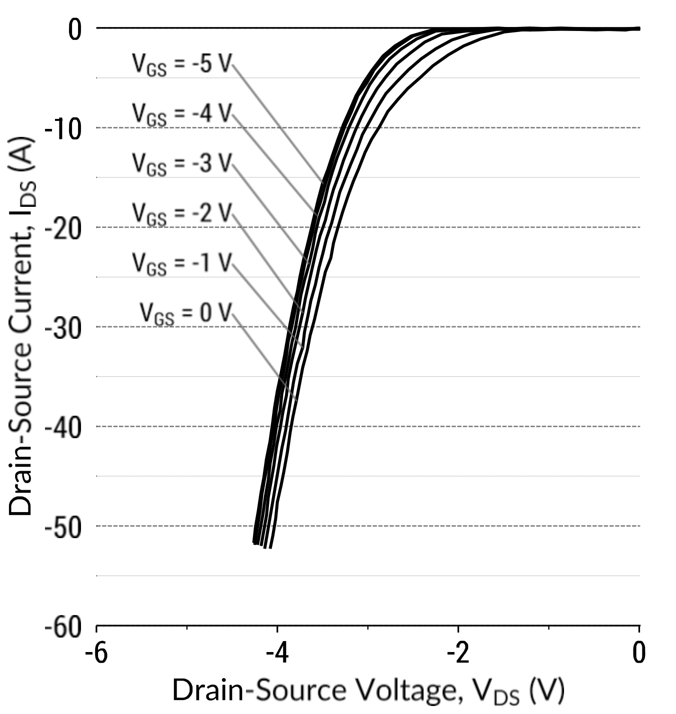
$E_{oss}=f(V_{DS})$

Figure 12: Body Diode Characteristics (T_j = 25°C)



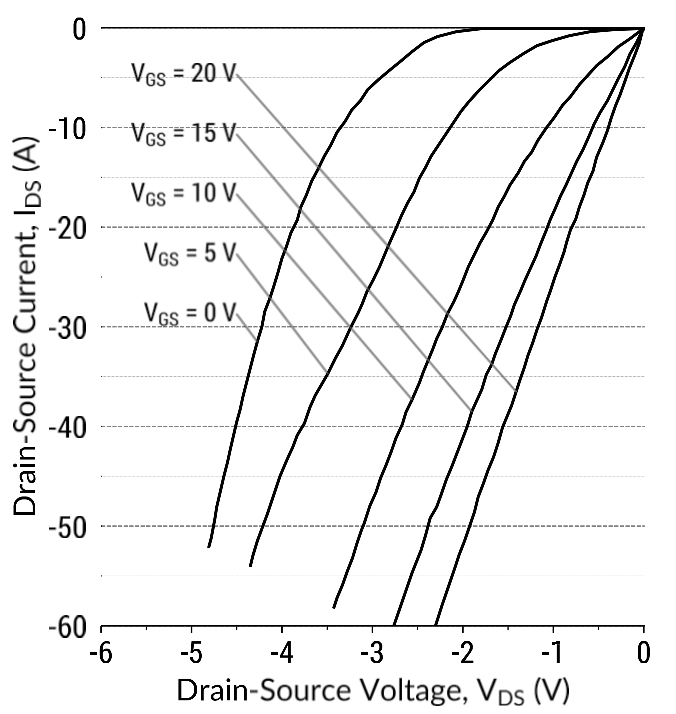
$I_D=f(V_{DS},V_{GS});t_P=250\mu s$

Figure 13: Body Diode Characteristics (T_j = 175°C)



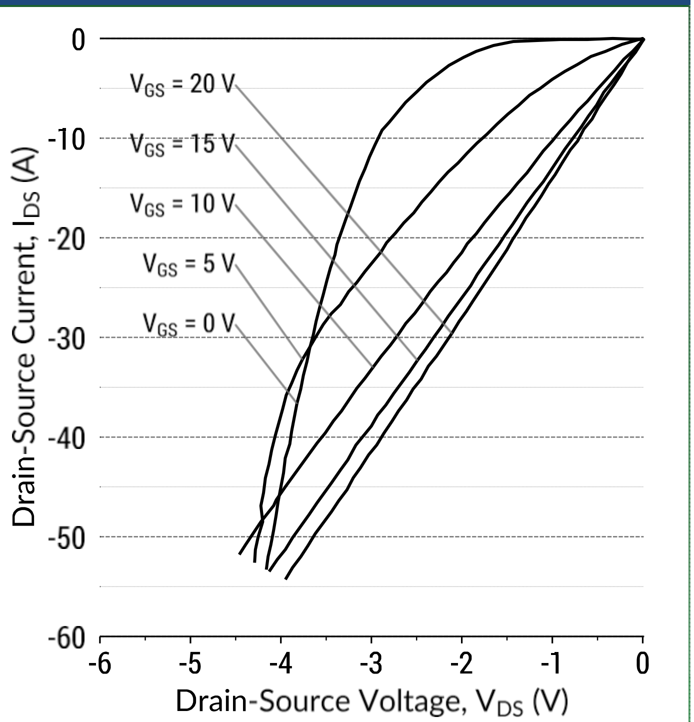
I_D=f(V_{DS},V_{GS});t_P=250μs

Figure 14: Third Quadrant Characteristics (T_j = 25°C)



I_D=f(V_{DS},V_{GS});t_P=250μs

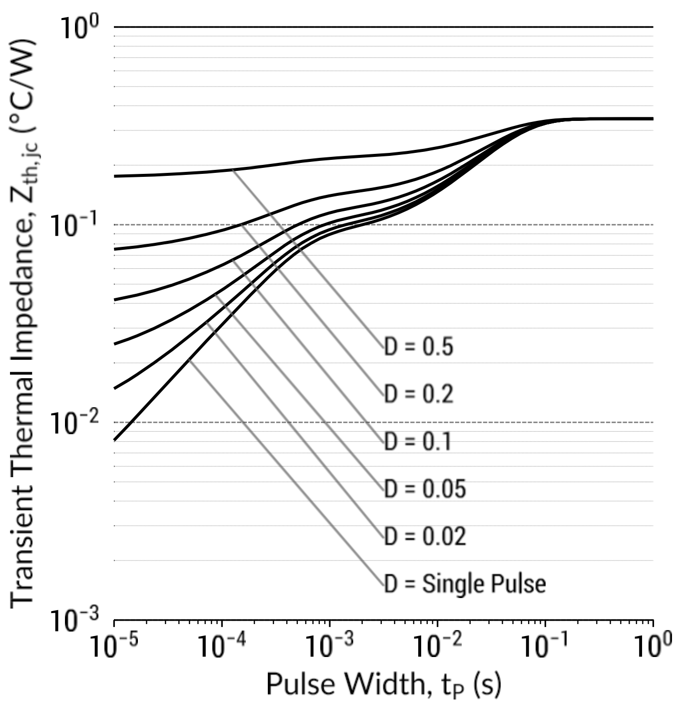
Figure 15: Third Quadrant Characteristics (T_j = 175°C)



I_D=f(V_{DS},V_{GS});t_P=250μs

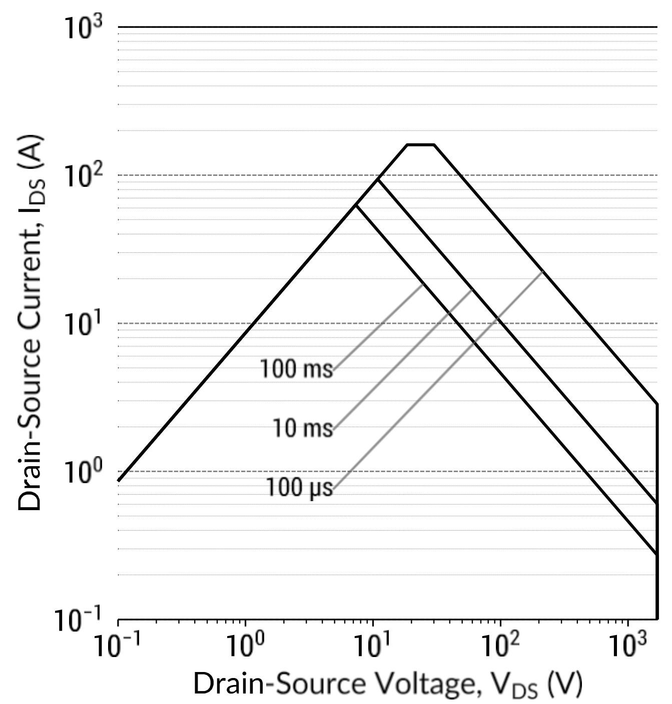
1.

Figure 16: Transient Thermal Impedance



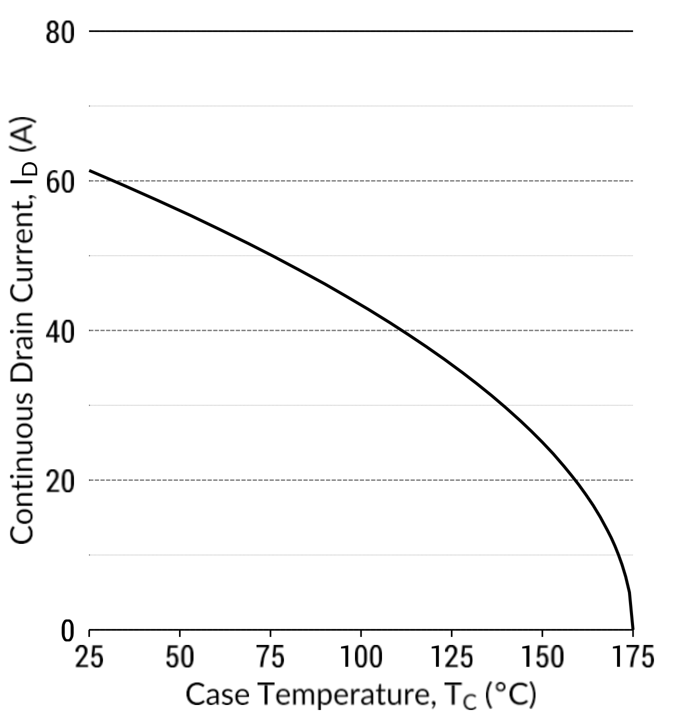
$Z_{th,jc}=f(t_P,D); D=t_P/T$

Figure 17: Safe Operating Area (T_c=25°C)



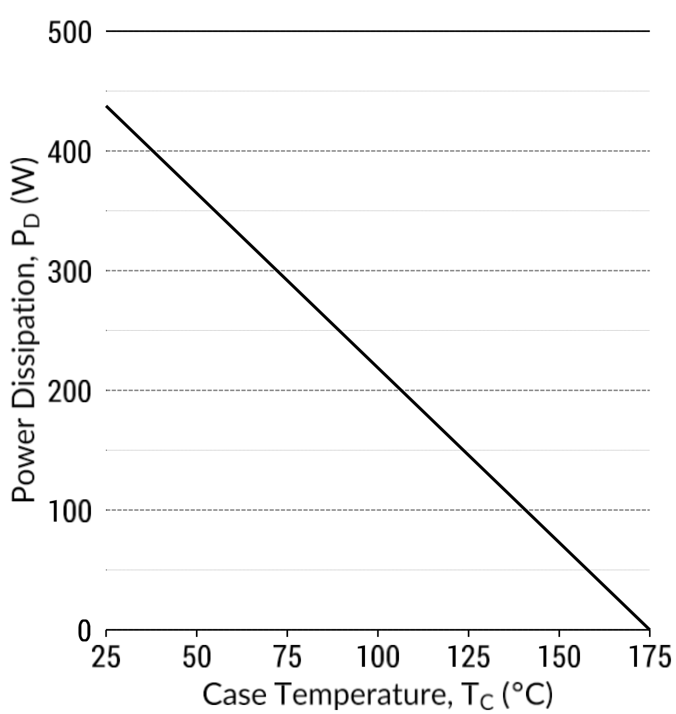
$I_D=f(V_{DS},t_P); T_j\leq 175°C; D=0$

Figure 18: Current De-rating Curve



$I_D=f(T_C); T_j\leq 175°C$

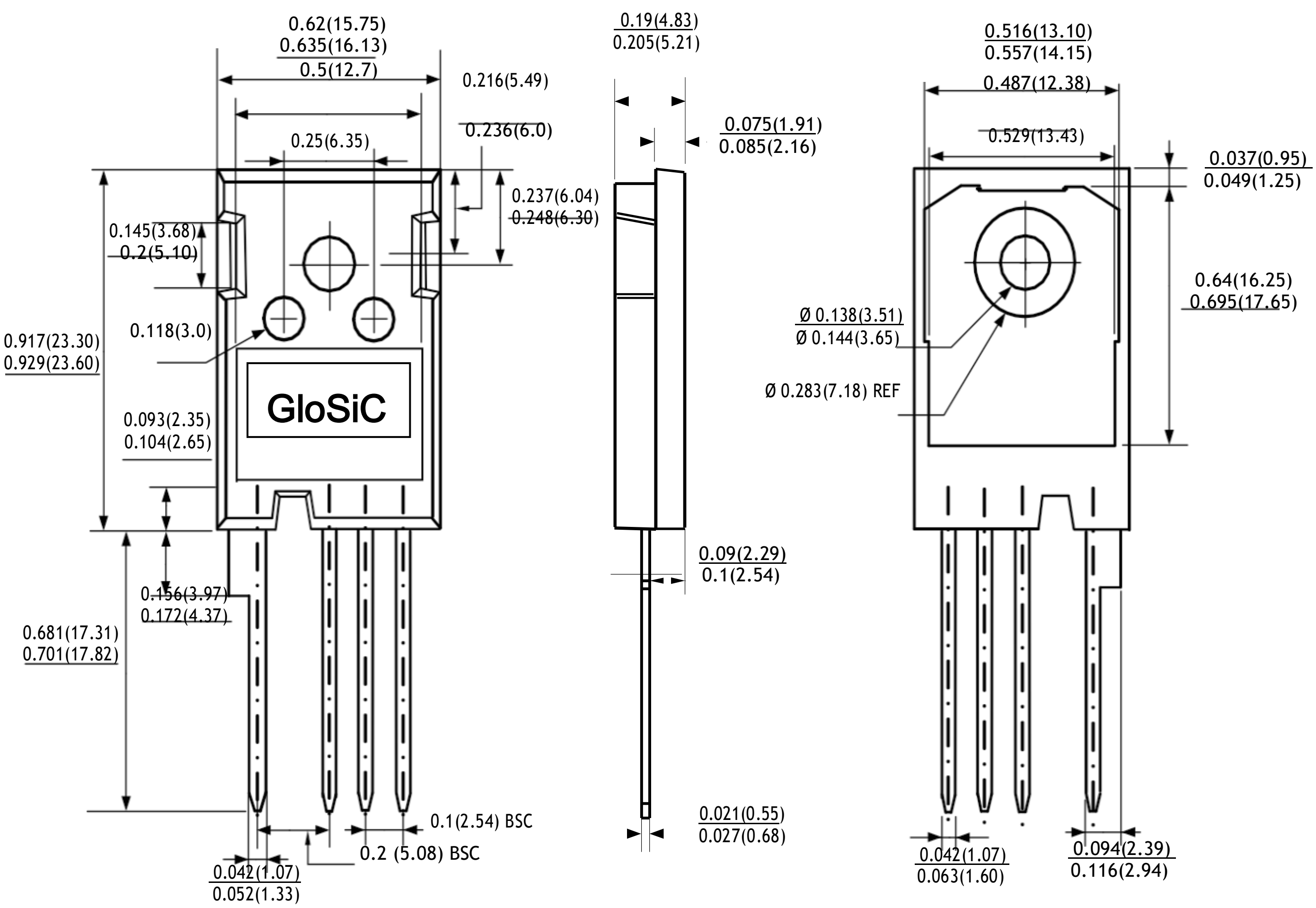
Figure 19: Power De-rating Curve



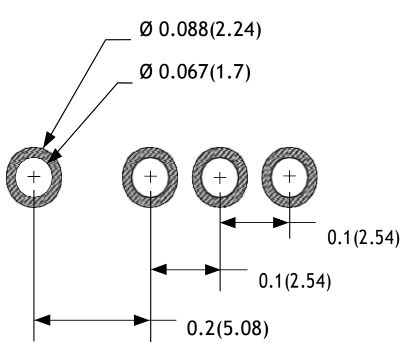
$P_D=f(T_C); T_j\leq 175°C$

Package Dimensions

TO-247-4 Package Outline



Recommended Solder Pad Layout



Package View

NOTE

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

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 GloSiC 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 GloSiC 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.

This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, or air traffic control systems.