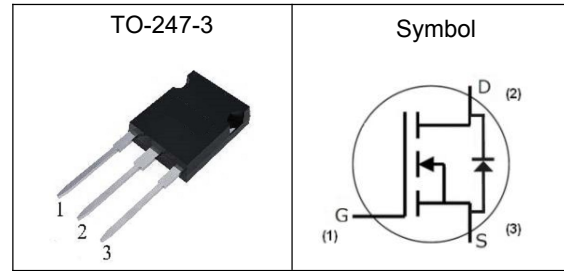


**1200V N-Channel Silicon Carbide Power MOSFET**
**Features**

- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Fast intrinsic diode with low reverse recovery (Qrr)
- Easy to parallel
- RoHS compliant

**Pin Description**

**Applications**

- Switch Mode Power Supplies
- DC/DC converters
- Solar Inverters
- Battery Chargers
- Motor Drives

$V_{DS}$	1200	V
$R_{DS(ON)-Typ}$	40	m $\Omega$
$I_D$	75	A

**Absolute Maximum Ratings** ( $T_C=25^{\circ}C$ , Unless Otherwise Noted)

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage	1200	V
$I_D$	Continuous Drain Current	75	A
$I_{D, pulse}$	Pulse Drain Current Tested	150	A
$V_{GSmax}$	Maximum Gate Source Voltage	-10/+25	V
$V_{GS,op}$	Recommend Gate Source Voltage	-5/+20	V
$P_D$	Maximum Power Dissipation	330	W
$T_J$	Maximum Junction Temperature	-55 to 175	$^{\circ}C$
$T_{STG}$	Storage Temperature Range	-55 to 175	$^{\circ}C$

**Thermal Characteristics**

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.39	$^{\circ}C/W$



**1200V N-Channel Silicon Carbide Power MOSFET**

**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$ , Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Static Electrical Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=100\mu A$	1200	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=1200V, V_{GS}=0V$	---	10	100	$\mu A$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=10mA$	2	3	4	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=20V, V_{DS}=0V$	---	---	250	$\mu A$
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=20V, I_D=40A$	---	40	55	$m\Omega$
<b>Dynamic Characteristics</b>						
$R_{G(int)}$	Internal Gate Resistance	$f=1MHz, V_{AC}=25\text{ mV}$	---	2	---	$\Omega$
$C_{iss}$	Input Capacitance	$V_{DS}=1000V, V_{GS}=0V, f=1MHz$	---	2190	---	pF
$C_{oss}$	Output Capacitance		---	153	---	
$C_{rSS}$	Reverse Transfer Capacitance		---	8	---	
$E_{OSS}$	$C_{OSS}$ Stored Energy		---	83	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DS}=800V, V_{GS}=-5/+20V, I_D=40A, R_{G(ext)}=2.5\Omega$	---	18	---	nS
$T_r$	Turn-on Rise Time		---	65	---	
$T_{d(off)}$	Turn-off Delay Time		---	36	---	
$T_f$	Turn-off Fall Time		---	15	---	
$Q_g$	Total Gate Charge	$V_{DS}=800V, V_{GS}=-5/+20V, I_D=40A$	---	99	---	nC
$Q_{gs}$	Gate-Source Charge		---	32	---	
$Q_{gd}$	Gate-Drain Charge		---	29	---	
<b>Source-Drain Characteristics</b>						
$I_S$	Continuous Diode Forward Current	$V_{GS} = 0V$	---	75	---	A
$V_{SD}$	Diode Forward Voltage	$I_S=20A, V_{GS}=0V$	---	4	---	V
$t_{rr}$	Reverse Recovery Time	$V_{DS}=800V, I_S=20A, V_{GS} = -5V, dif/dt = 2100\text{ A}/\mu s$	---	28	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	232	---	nC
$I_{rrm}$	Peak reverse recovery current		---	13	---	A



1200V N-Channel Silicon Carbide Power MOSFET

Typical Performance Characteristics

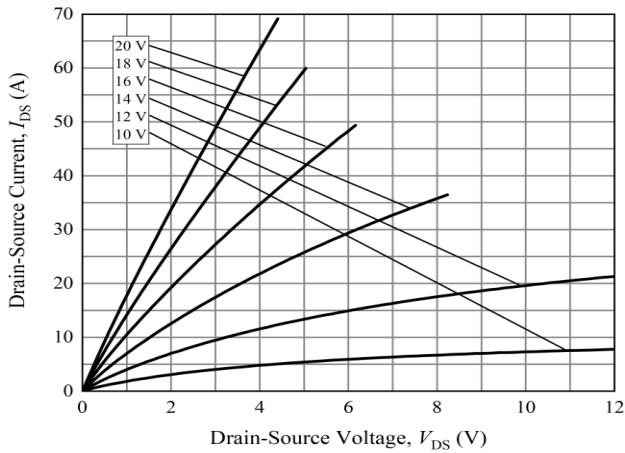


Figure 1: Typical Output Characteristics at  $T_j = -55\text{ }^\circ\text{C}$

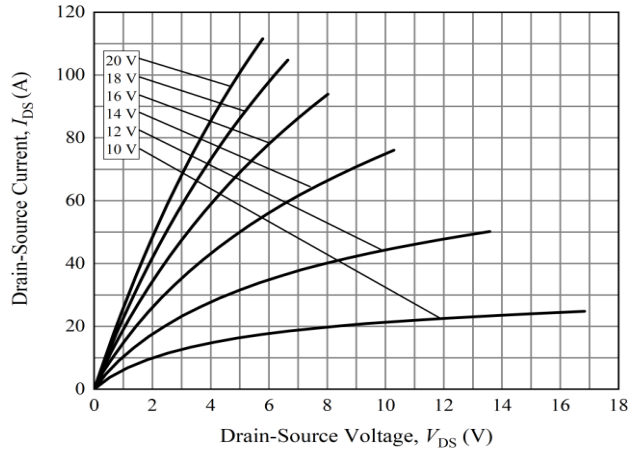


Figure 2: Typical Output Characteristics at  $T_j = 25\text{ }^\circ\text{C}$

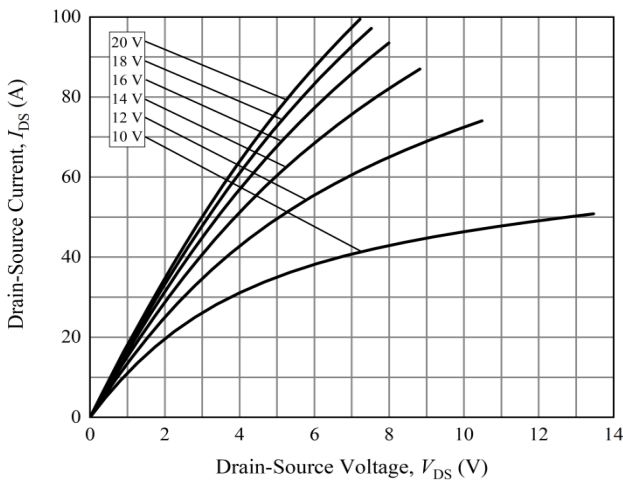


Figure 3: Typical Output Characteristics at  $T_j = 175\text{ }^\circ\text{C}$

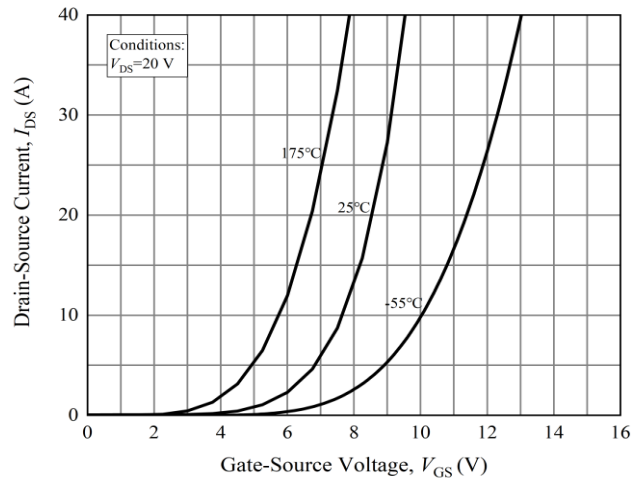


Figure 4: Typical Transfer Characteristics for Various Temperature

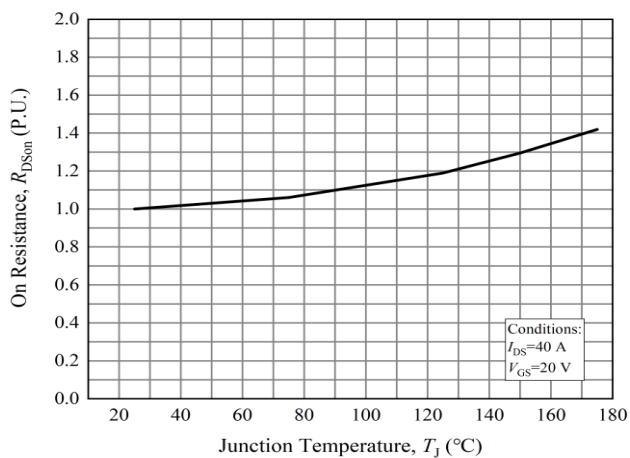


Figure 5: Normalized On-Resistance vs. Temperature

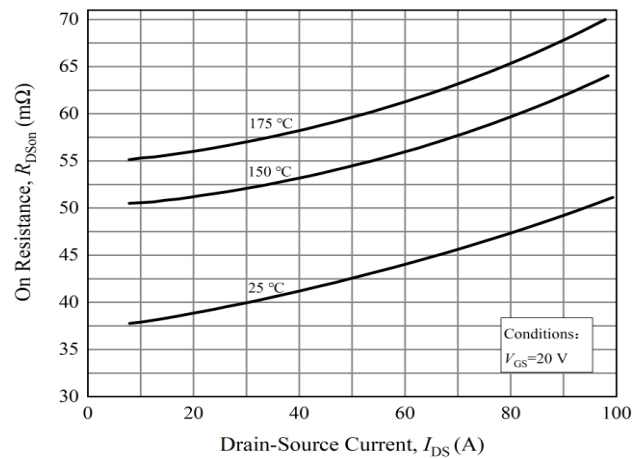


Figure 6: On-Resistance vs. Drain Current for Gate Various Temperatures



1200V N-Channel Silicon Carbide Power MOSFET

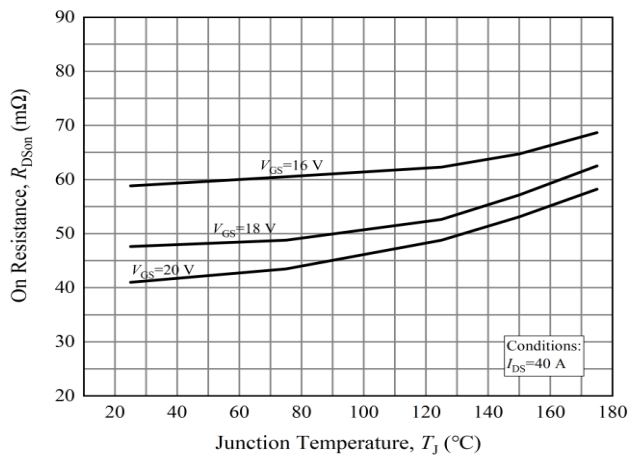


Figure 7: On-Resistance vs. Temperature for Various Voltage

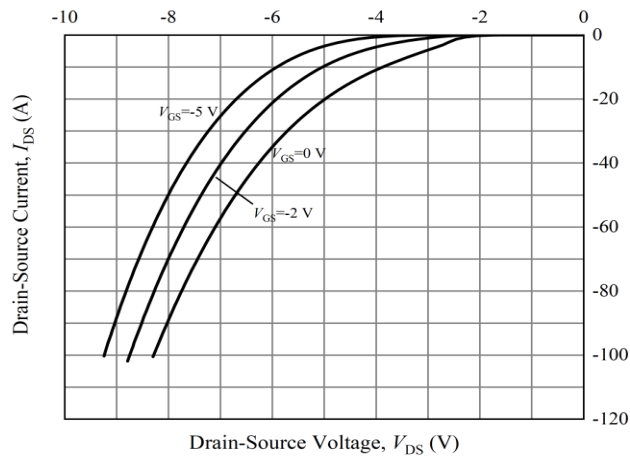


Figure 8: Typical Body Diode Characteristics at  $T_J = -55\text{ }^\circ\text{C}$

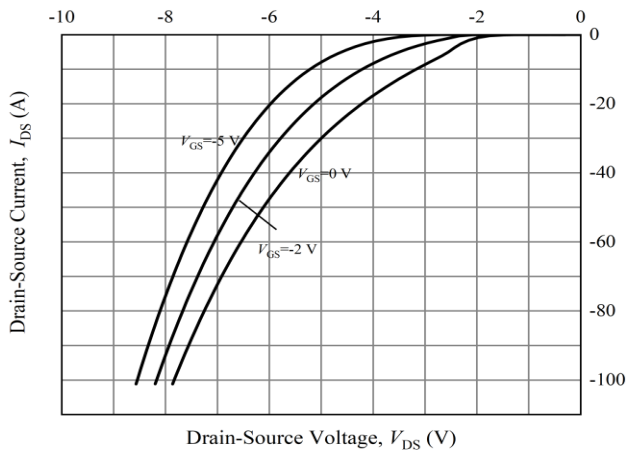


Figure 9: Typical Body Diode Characteristics at  $T_J = 25\text{ }^\circ\text{C}$

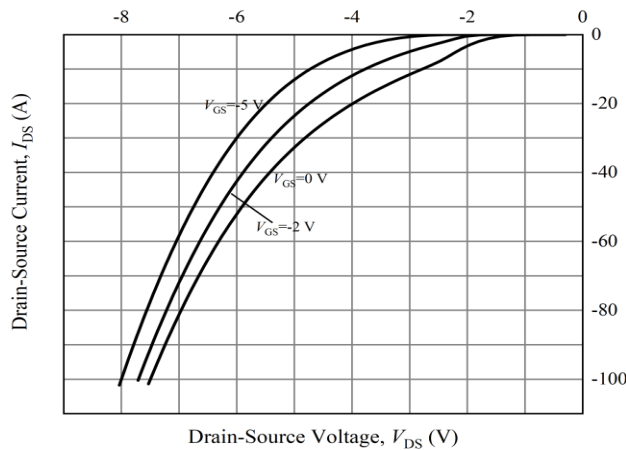


Figure 10: Typical Body Diode Characteristics at  $T_J = 175\text{ }^\circ\text{C}$

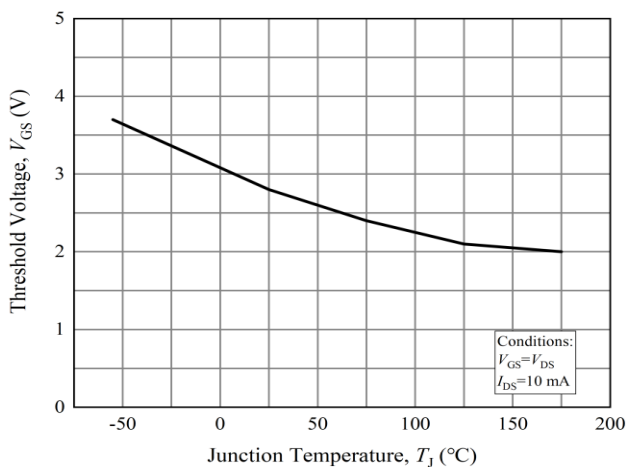


Figure 11: Typical Threshold Voltage vs. Temperature

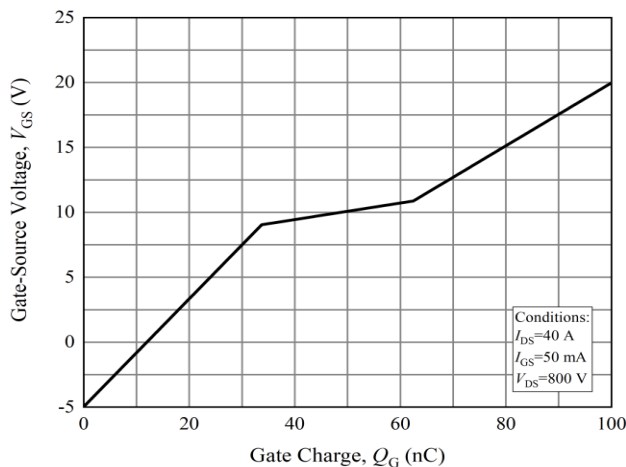


Figure 12: Typical Gate Charge Characteristics at  $T_J = 25\text{ }^\circ\text{C}$

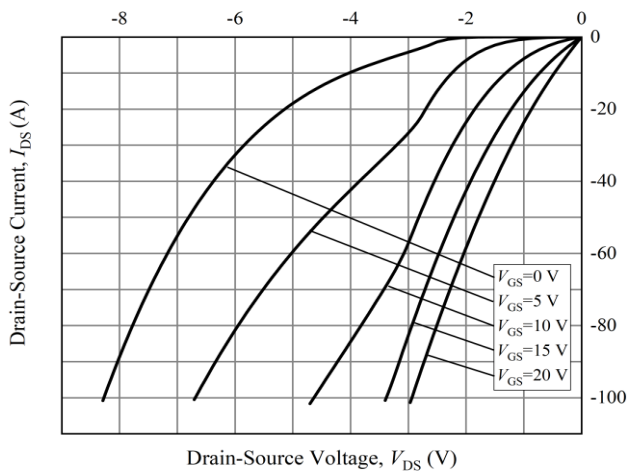
**1200V N-Channel Silicon Carbide Power MOSFET**


Figure 13: Typical 3rd Quadrant Characteristics  
 $T_j = -55\text{ }^\circ\text{C}$

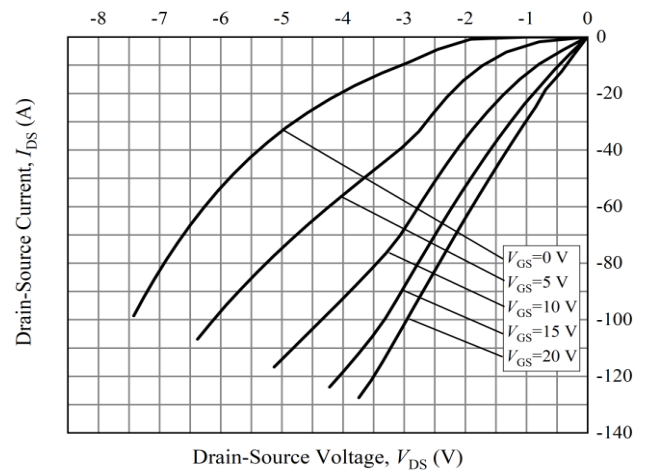


Figure 14: Typical 3rd Quadrant Characteristics at  
 $T_j = 25\text{ }^\circ\text{C}$

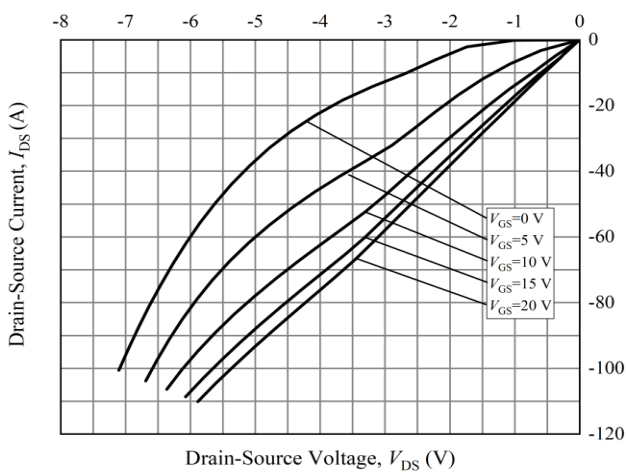


Figure 15: Typical 3rd Quadrant Characteristics  
 at  $T_j = 175\text{ }^\circ\text{C}$

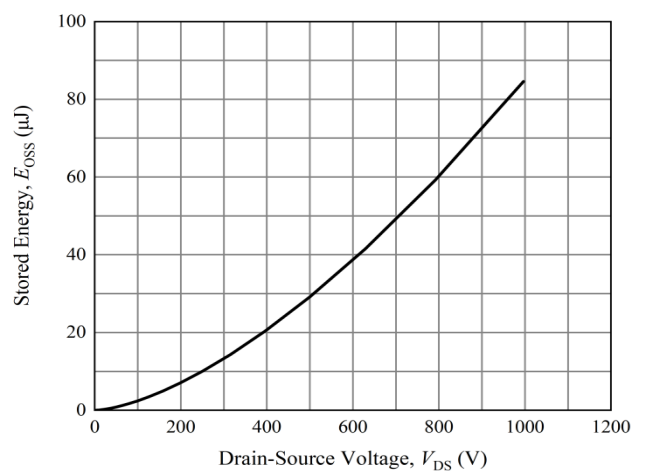


Figure 16: Typical Output Capacitor Stored Energy

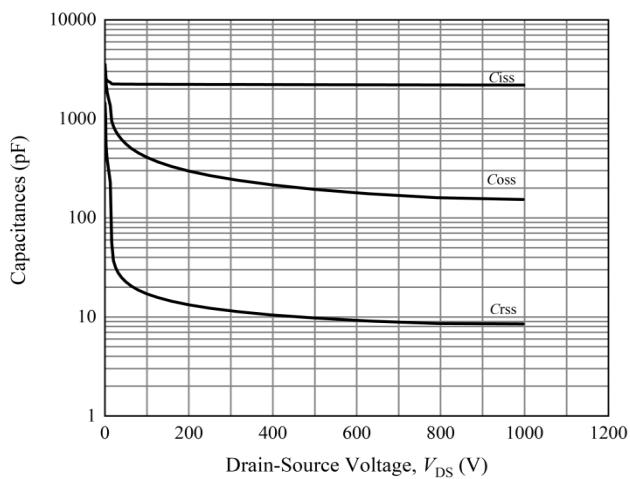


Figure 17: Typical Capacitances vs. Drain-Source  
 Voltage

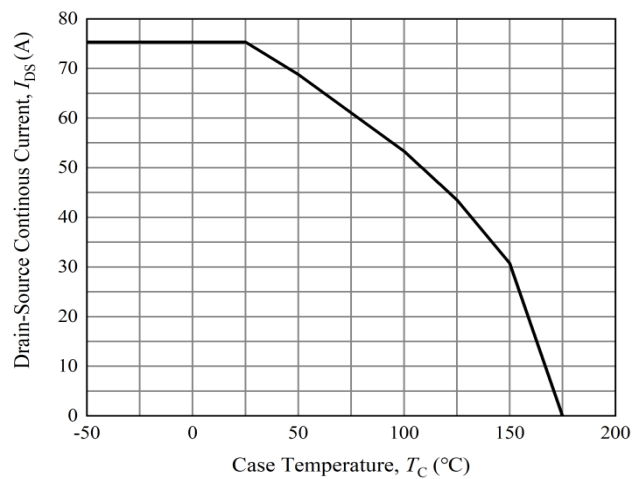


Figure 18: Continuous  $I_{DS}$  Current Derating Curve

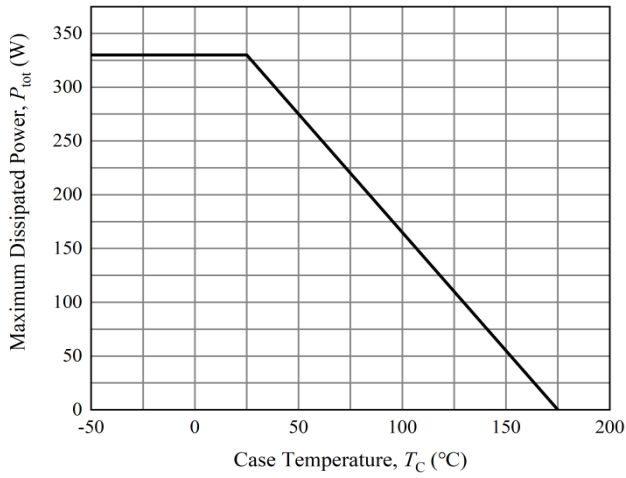
**1200V N-Channel Silicon Carbide Power MOSFET**


Figure 19: Power Dissipation Derating Curve

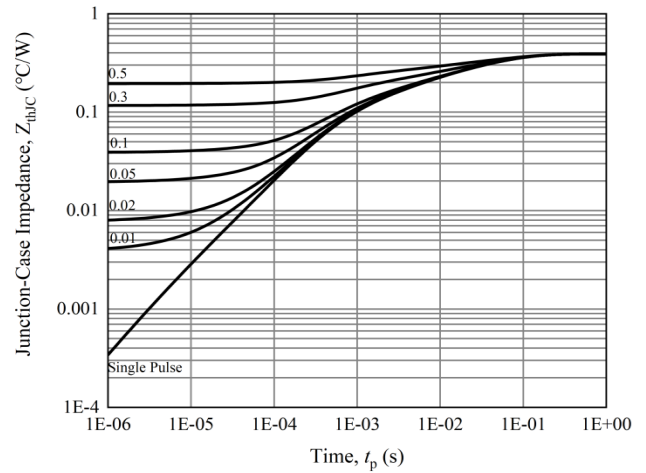


Figure 20: Typical Transient Thermal Impedance (Junction – Case) with Duty Cycle

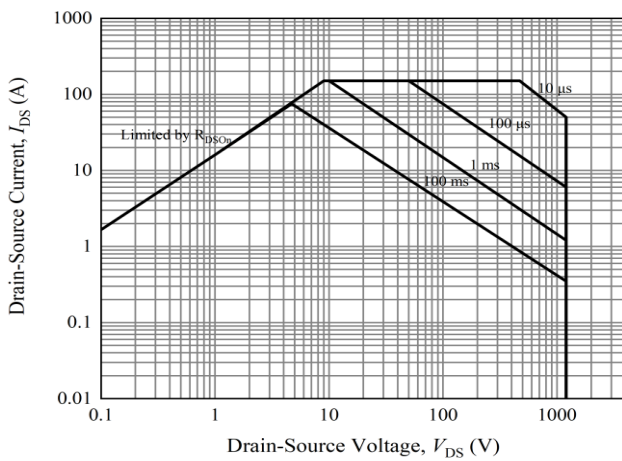


Figure 21: Safe Operate Area

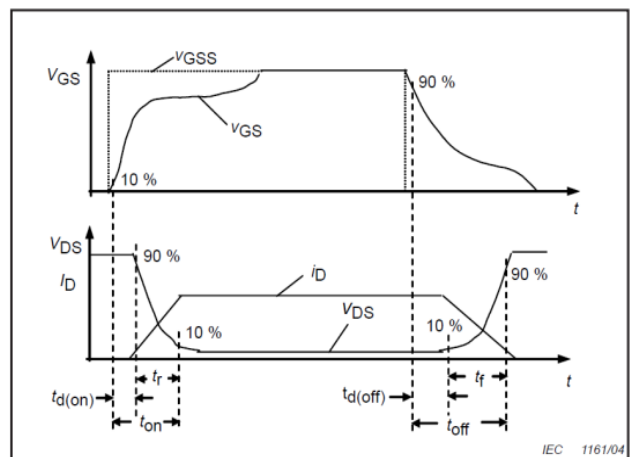
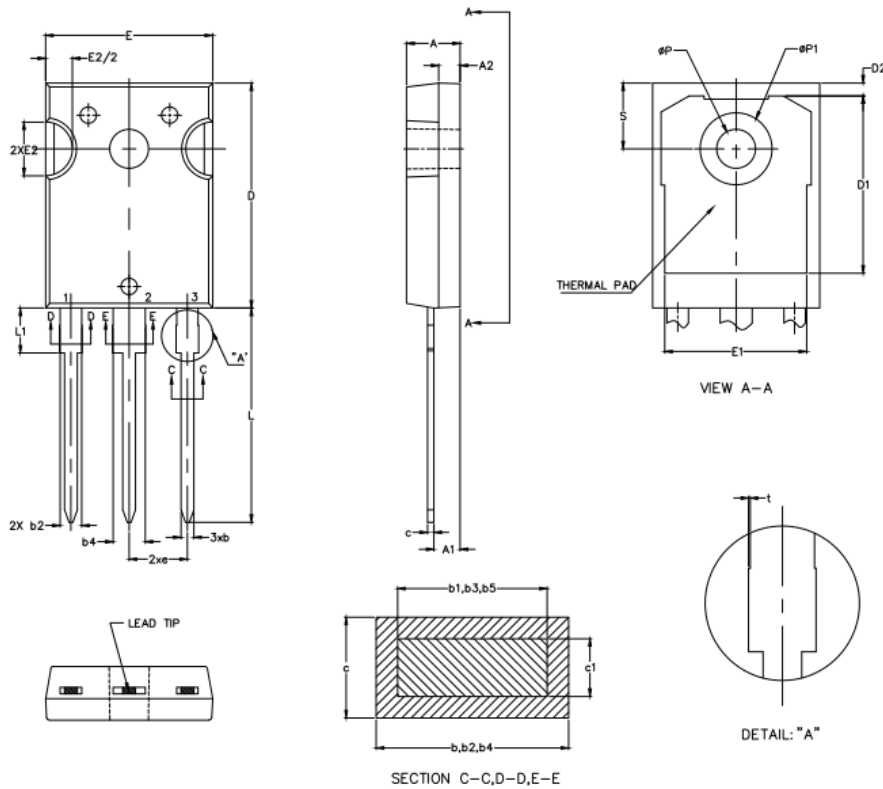


Figure 22: Resistive Switching Time Description

**1200V N-Channel Silicon Carbide Power MOSFET**

Package: TO-247-3



DIMENSIONS	DIMENSIONS			
	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A	4.90	5.10	0.193	0.201
A1	2.31	2.51	0.091	0.099
A2	1.90	2.10	0.075	0.083
b	1.16	1.26	0.046	0.050
b1	1.15	1.22	0.045	0.048
b2	1.96	2.06	0.077	0.081
b3	1.95	2.02	0.077	0.080
b4	2.96	3.06	0.117	0.120
b5	2.95	3.02	0.116	0.119
c	0.59	0.66	0.023	0.026
c1	0.58	0.62	0.023	0.024
D	20.90	21.10	0.823	0.831
D1	16.25	16.85	0.640	0.663
D2	1.05	1.35	0.041	0.053
E	15.75	15.90	0.620	0.626
E1	13.26	—	0.552	—
E2	4.90	5.10	0.193	0.201
e	5.44BSC		0.214BSC	
L	19.80	20.10	0.780	0.791
L1	—	4.30	—	0.169
phi P	3.50	3.70	0.138	0.146
phi P1	—	7.40	—	0.291
S	6.05	6.25	0.238	0.246
t	0.00	0.15	0.000	0.006