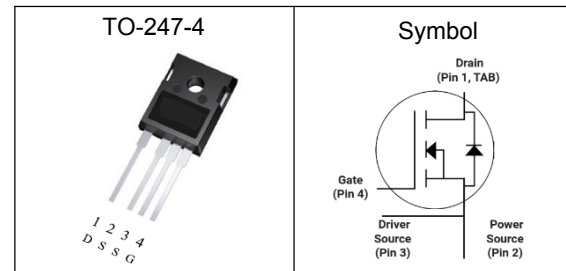


1200V N-Channel Silicon Carbide Power MOSFET
Features

- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Fast intrinsic diode with low reverse recovery (Q_{rr})
- 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
$R_{DS(ON)-Typ}$	80	m Ω
I_D	42	A

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	1200	V
I_D	Continuous Drain Current	42	A
$I_{D, pulse}$	Pulse Drain Current Tested	80	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	208	W
T_J	Maximum Junction Temperature	-55 to 175	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.68	$^\circ\text{C/W}$



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
Static Electrical Characteristics						
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	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=5mA$	2	3	4	V
I_{GSS}	Gate Leakage Current	$V_{GS}=20V, V_{DS}=0V$	---	---	250	μA
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=20V, I_D=20A$	---	80	100	$m\Omega$
Dynamic Characteristics						
$R_{G(int)}$	Internal Gate Resistance	$f=1MHz, V_{AC}=25\text{ mV}$	---	4	---	Ω
C_{iss}	Input Capacitance	$V_{DS}=1000V, V_{GS}=0V, f=1MHz$	---	1128	---	pF
C_{oss}	Output Capacitance		---	86	---	
C_{rSS}	Reverse Transfer Capacitance		---	5	---	
E_{OSS}	C_{OSS} Stored Energy		---	44	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DS}=800V, V_{GS}=-5/+20V, I_D=20A, R_{G(ext)}=2.5\Omega$	---	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	$V_{DS}=800V, V_{GS}=-5/+20V, I_D=20A$	---	52	---	nC
Q_{gs}	Gate-Source Charge		---	17	---	
Q_{gd}	Gate-Drain Charge		---	15	---	
Source-Drain Characteristics						
I_S	Continuous Diode Forward Current	$V_{GS}=0V$	---	42	---	A
V_{SD}	Diode Forward Voltage	$I_S=10A, V_{GS}=0V$	---	4	---	V
t_{rr}	Reverse Recovery Time	$V_{DS}=800V, I_S=20A, V_{GS}=-5V, dif/dt=2100\text{ A}/\mu s$	---	26	---	nS
Q_{rr}	Reverse Recovery Charge		---	163	---	nC
I_{rrm}	Peak reverse recovery current		---	12	---	A



1200V N-Channel Silicon Carbide Power MOSFET

Typical Performance Characteristics

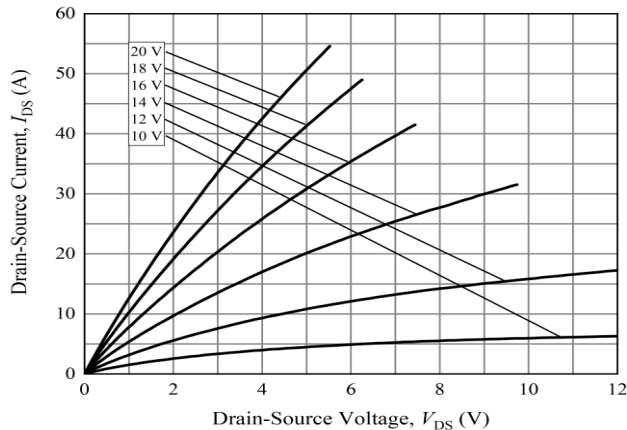


Figure 1: Typical Output Characteristics at $T_j = -55\text{ }^\circ\text{C}$

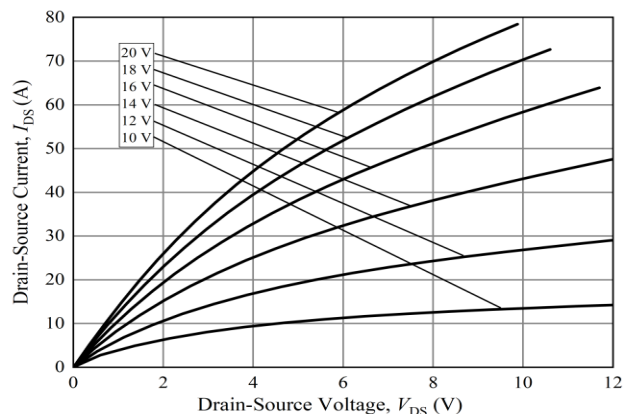


Figure 2: Typical Output Characteristics at $T_j = 25\text{ }^\circ\text{C}$

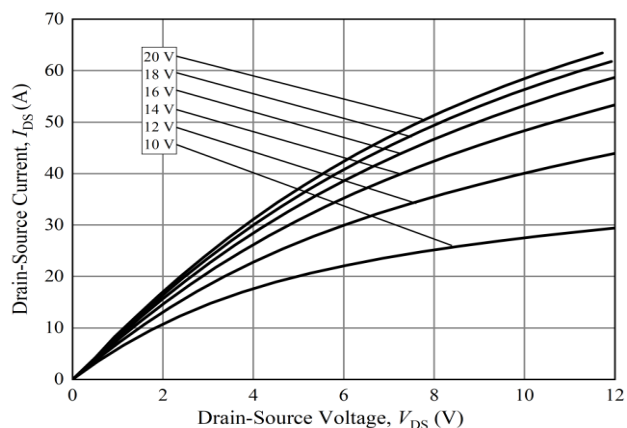


Figure 3: Typical Output Characteristics at $T_j = 175\text{ }^\circ\text{C}$

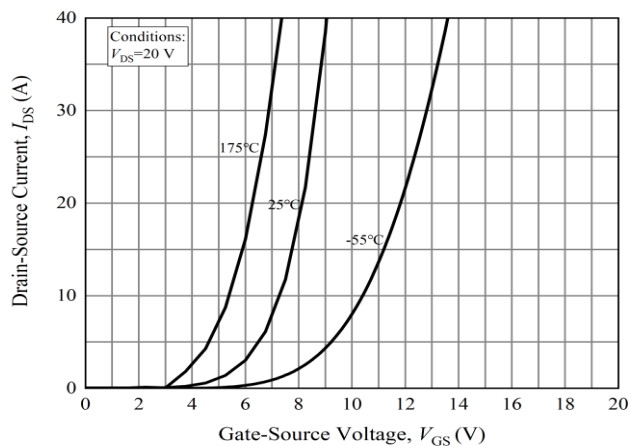


Figure 4: Typical Transfer Characteristics for Various Temperature

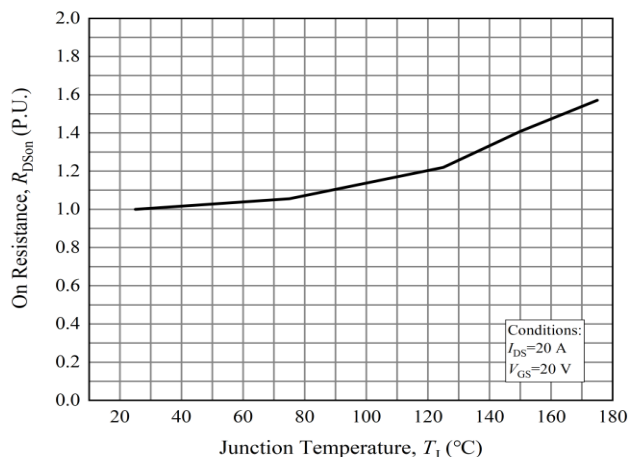


Figure 5: Normalized On-Resistance vs. Temperature

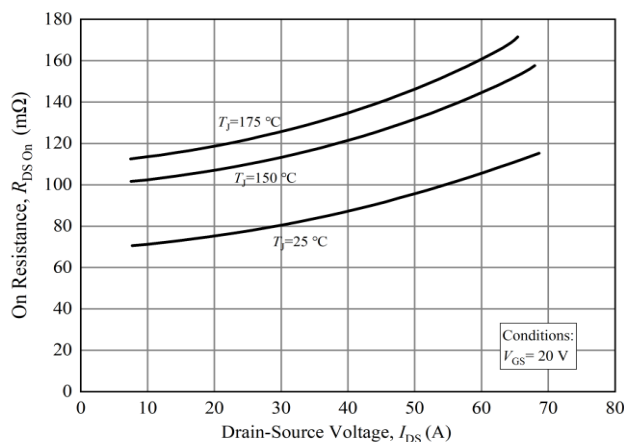


Figure 6: On-Resistance vs. Drain Current for Gate Various Temperatures

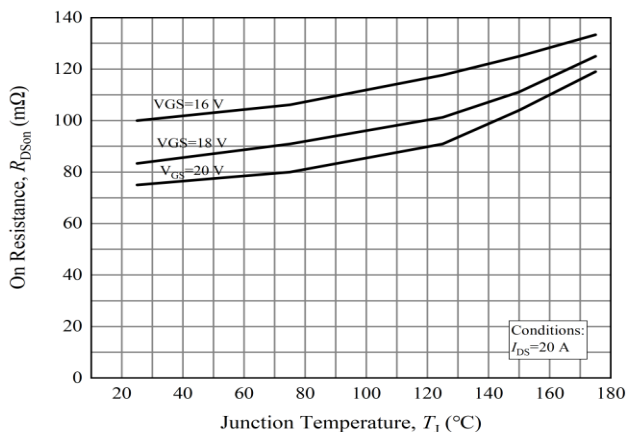
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Figure 7: On-Resistance vs. Temperature for Various Voltage

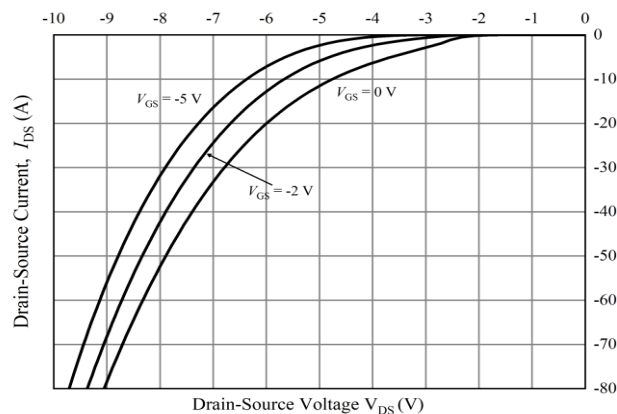


Figure 8: Typical Body Diode Characteristics at $T_J = -55\text{ }^\circ\text{C}$

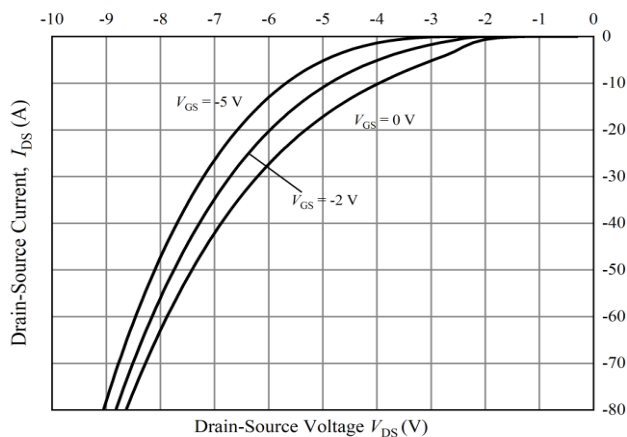


Figure 9: Typical Body Diode Characteristics at $T_J = 25\text{ }^\circ\text{C}$

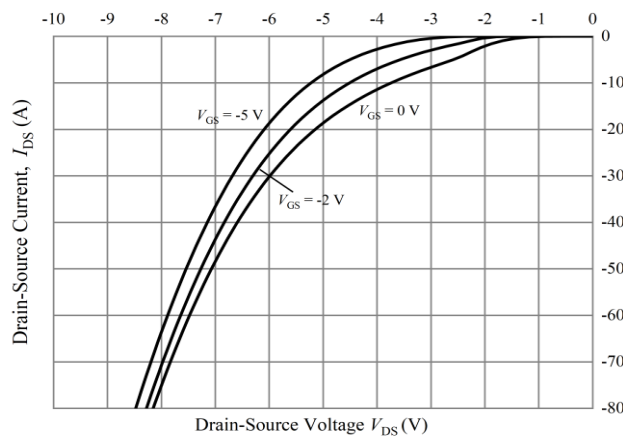


Figure 10: Typical Body Diode Characteristics at $T_J = 175\text{ }^\circ\text{C}$

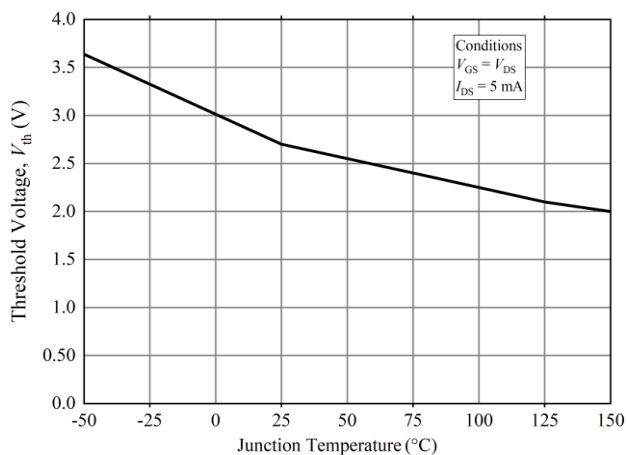


Figure 11: Typical Threshold Voltage vs. Temperature

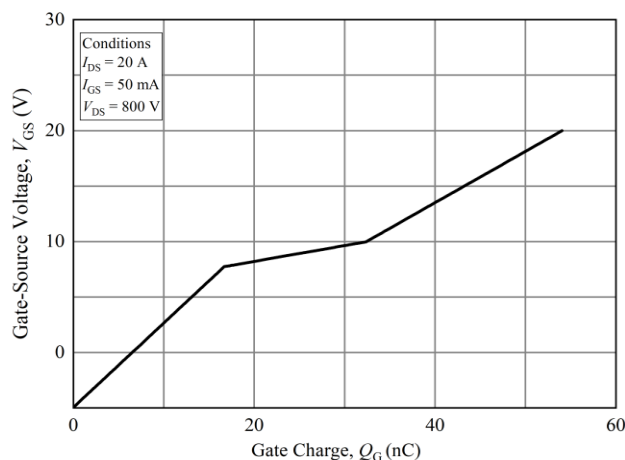


Figure 12: Typical Gate Charge Characteristics at $T_J = 25\text{ }^\circ\text{C}$

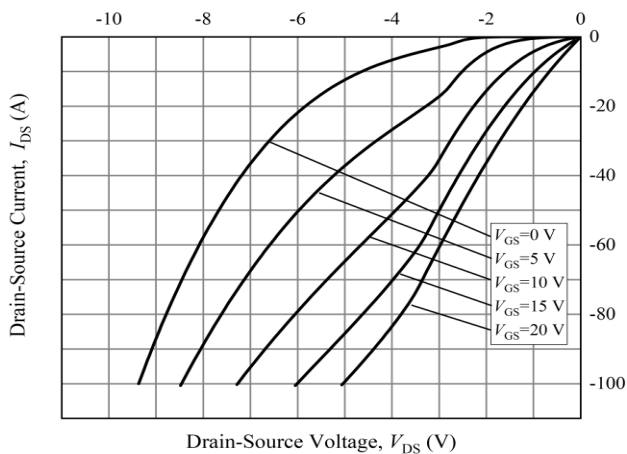
1200V N-Channel Silicon Carbide Power MOSFET


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

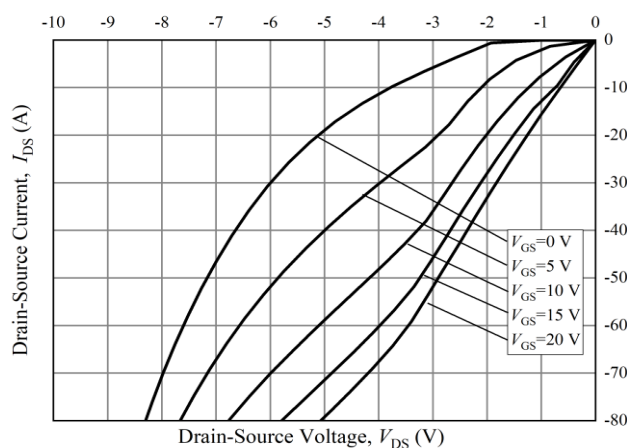


Figure 14: Typical 3rd Quadrant Characteristics at
 $T_j = 25\text{ }^\circ\text{C}$

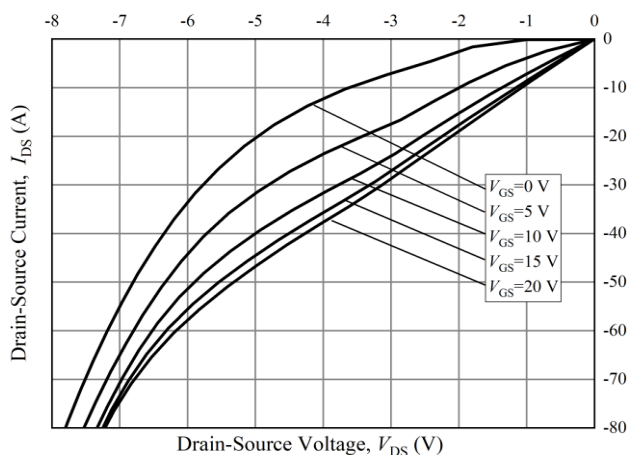


Figure 15: Typical 3rd Quadrant Characteristics
at $T_j = 175\text{ }^\circ\text{C}$

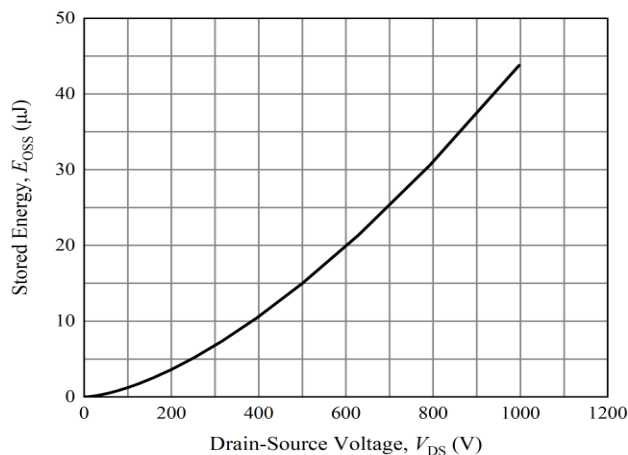


Figure 16: Typical Output Capacitor Stored Energy

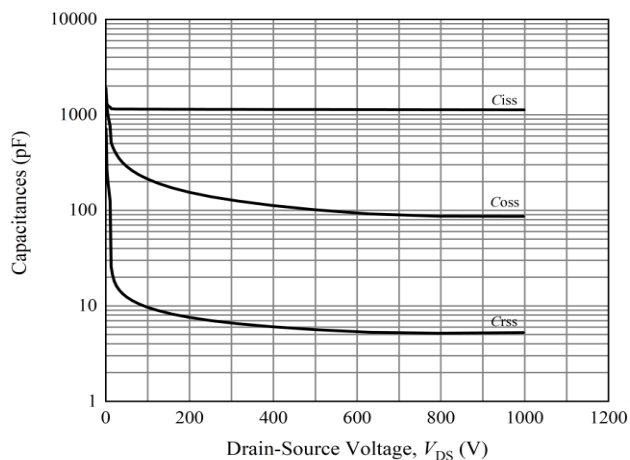


Figure 17: Typical Capacitances vs. Drain-Source
Voltage

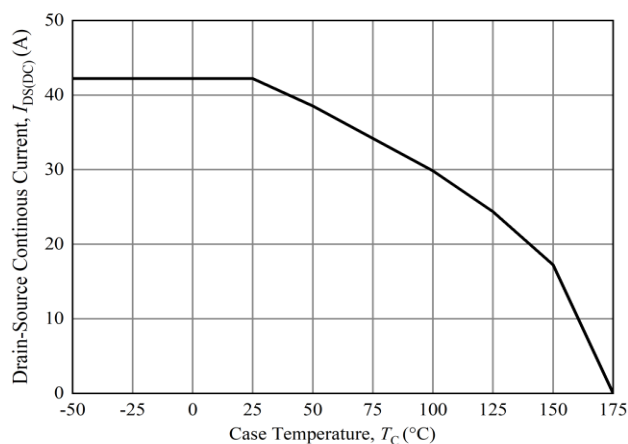


Figure 18: Continuous I_{DS} Current Derating Curve

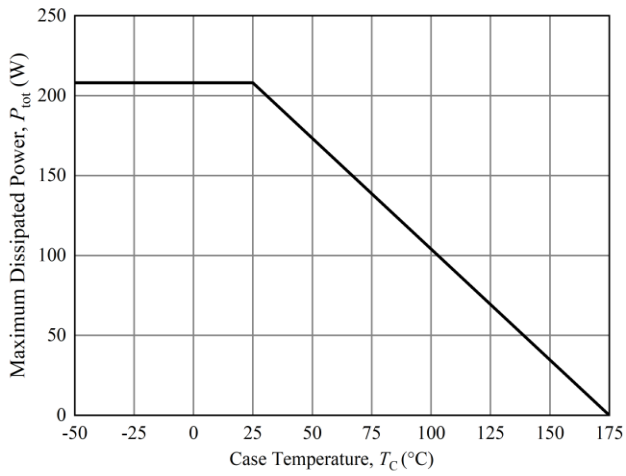
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Figure 19: Power Dissipation Derating Curve

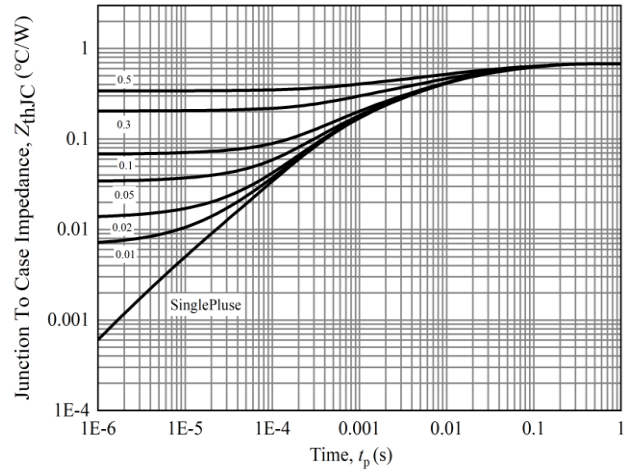


Figure 20: Typical Transient Thermal Impedance (Junction – Case) with Duty Cycle

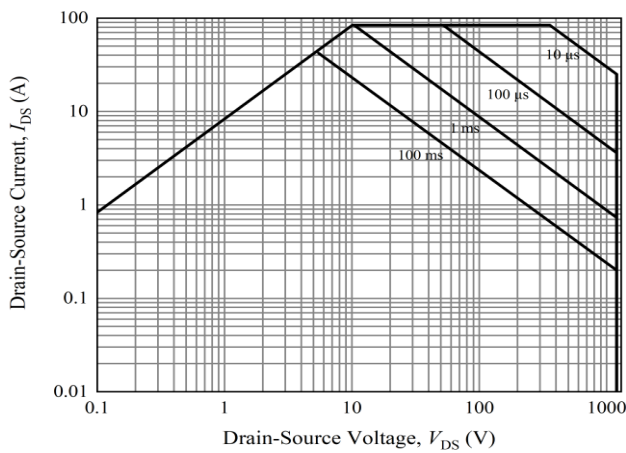


Figure 21: Safe Operate Area

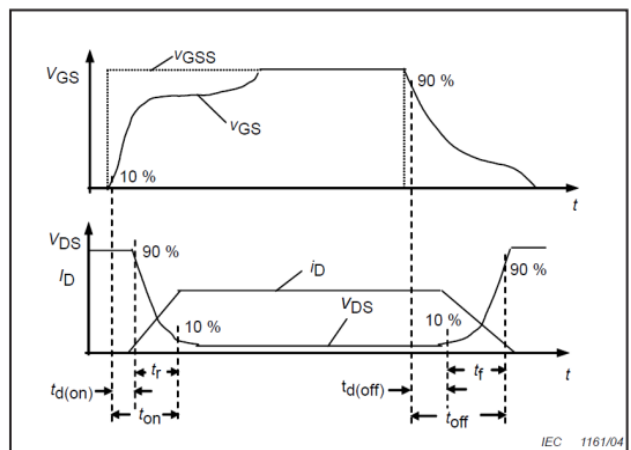
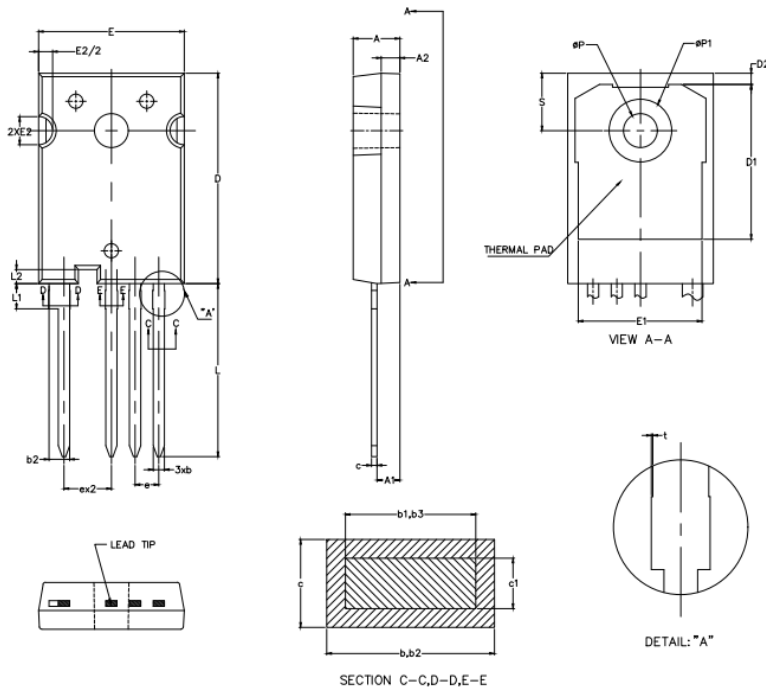


Figure 22: Resistive Switching Time Description

1200V N-Channel Silicon Carbide Power MOSFET

Package: TO-247-4



SYMBOLS	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	2.16	2.26	0.085	0.089
b3	2.15	2.22	0.085	0.087
c	0.59	0.66	0.023	0.026
c1	0.58	0.62	0.023	0.024
D	22.40	22.60	0.882	0.890
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	2.90	3.10	0.114	0.122
e	2.54BSC		0.1BSC	
L	18.30	18.60	0.720	0.732
L1	—	2.80	—	0.110
L2	—	1.50	—	0.059
∅P	3.50	3.70	0.138	0.146
∅P1	—	7.40	—	0.291
S	6.05	6.25	0.238	0.246
t	0.00	0.15	0.000	0.006