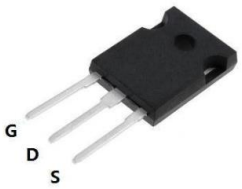
N-CHANNEL SiC POWER MOSFET

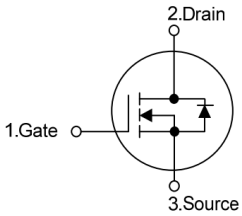
Features

- $R_{DS(on)}$=25mΩ(Typ.) @V_{GS}=20V,I_D=50A
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Fast intrinsic diode with low reverse recovery



Applications

- Solar inverters
- DC/DC converters
- Motor drives
- Switch Mode Power Supplies



Key Performance and Package Parameters

Order codes	V_{DS}	I_D	$R_{DS(ON)}$, Typ	T_{vjmax}	Marking	Package
XC025M120A1S3-A	1200V	63A	25mΩ	150˚C	C25M120A1A	TO247-3

Absolute Maximum Ratings (T_c= 25 ˚C unless otherwise specified.)

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	1200	V
V_{GSmax}	Absolute maximum Gate-Source Voltage	-10/+25	V
I_D	Continuous Drain Current (T_C=25 ˚C)	63	A
	Continuous Drain Current (T_C=100 ˚C)	39	A
$I_{DM(pulse)}$	Pulsed Drain Current,Pulse width t_p limted by T_{jmax}	250	A
P_D	Maximum Power Dissipation (T_C=25 ˚C)	378	W
T_J	Operating Junction Temperature Range	-55 to 150	˚C
T_{STG}	Storage Temperature Range	-55 to 150	˚C

Thermal Data

Symbol	Parameter	Conditions	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Steady State)	TO247	0.33	˚C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	TO247	40	˚C/W

Electrical Characteristics (T_c= 25˚C unless otherwise specified.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}= 0V, I_{DS}= 100uA	1200	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=1200V, V_{GS}=0V	---	2	100	uA
I_{GSS}	Gate Leakage Current, Forward	V_{GS}=20V, V_{DS}= 0V	---	---	250	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_{DS}= 15mA	2.0	2.6	4.0	V
$R_{DS(ON)}$	Drain-Source On-state Resistance	V_{GS}=20V, I_{DS}=50A	---	25	34	mΩ
Q_g	Total Gate Charge	V_{DS}=800V	---	194	---	nC
Q_{gs}	Gate-Source Charge	V_{GS}=-5V/20V	---	46	---	nC
Q_{gd}	Gate-Drain Charge	I_{DS}=50A	---	71.5	---	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=800V	---	15	---	ns
t_r	Rise Time	V_{GS}=-5V/20V	---	58	--	ns
$t_{d(off)}$	Turn-off Delay Time	I_{DS}=50A, R_G=2.5Ω	---	33	---	ns
t_f	Fall Time		---	17	---	ns
C_{iss}	Input Capacitance	V_{DS}=1000V	---	3140	---	pF
C_{oss}	Output Capacitance	V_{GS}=0V	---	224	---	pF
C_{rss}	Reverse Transfer Capacitance	f = 1MHz	---	9	---	pF
E_{ON}	Turn-On Switching Energy (Body Diode)	V_{DS}= 800 V, V_{GS}= -5 /20 V, I_D= 50 A, R_G = 2.5 Ω L= 99 μH	---	2.18	---	mJ
E_{OFF}	Turn Off Switching Energy (Body Diode)		---	0.68	---	mJ
E_{ON}	Turn-On Switching Energy (External Diode)	V_{DS}= 800 V, V_{GS}= -5 /20 V, I_D= 50 A, R_G = 2.5 Ω L= 99 μH	---	1.14	---	mJ
E_{OFF}	Turn Off Switching Energy (External Diode)		---	0.8	---	mJ

Reverse Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{SD}	Diode Forward Voltage	I_{SD}=25A, V_{GS}=-5V	---	4.1	---	V
I_S	Continuous Diode Forward Current	T_C= 25˚C	---	---	63	A
t_{rr}	Diode Reverse Recovery Time	V_R=800V, I_{SD}=50A, dI_F/dt=1320A/s	---	67	---	ns
Q_{rr}	Diode Reverse Recovery Charge		---	386	---	nC
I_{rrm}	Peak Reverse Recovery Current		---	15	---	A

Typical Characteristics

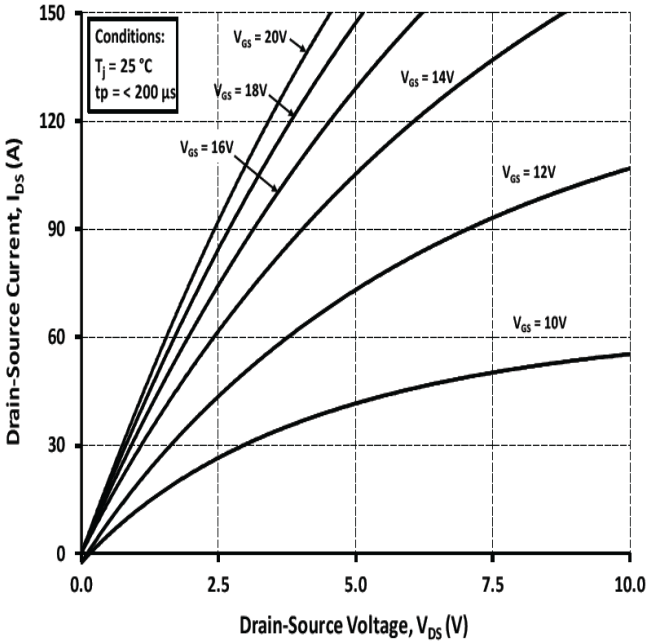


Fig.1 Output Characteristics

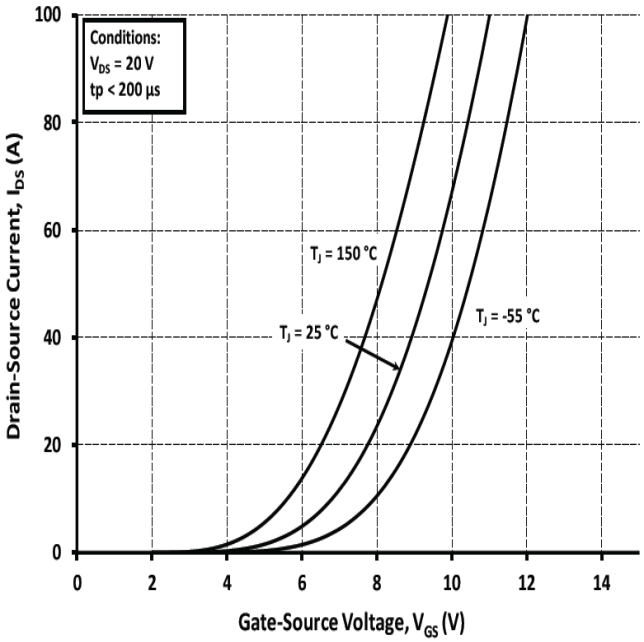


Fig.2 Output Characteristics

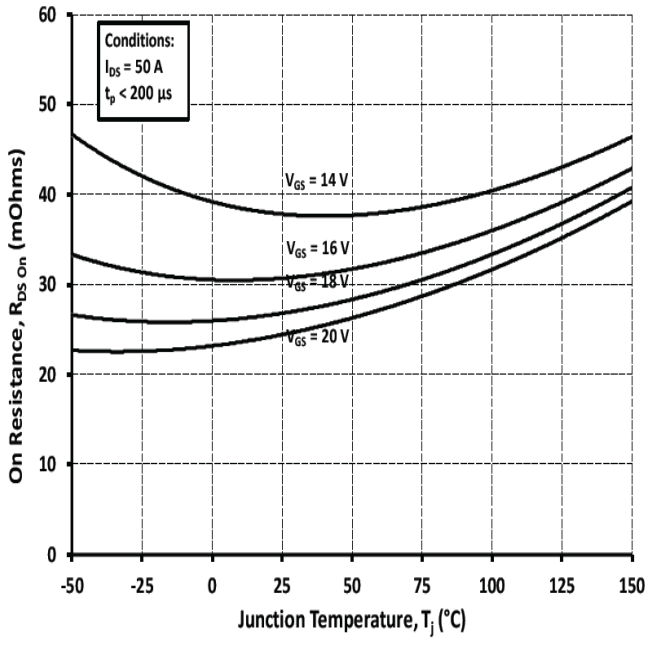


Fig.3 Drain-Source On Resistance

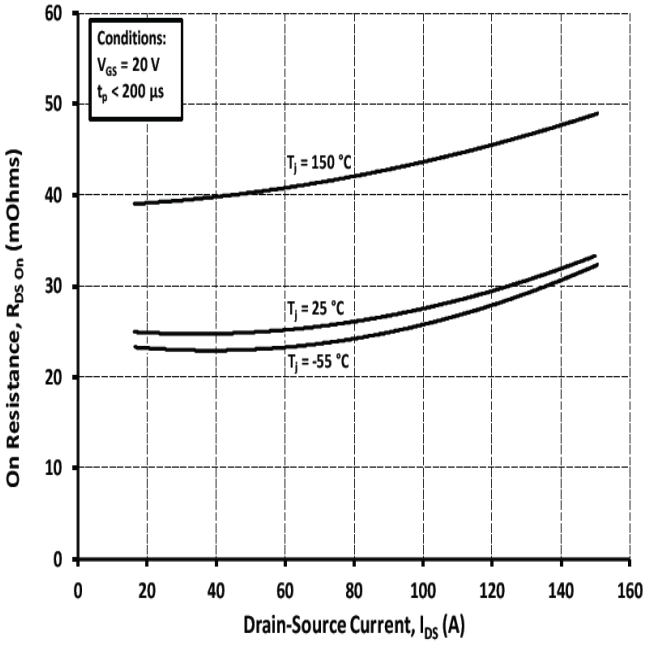


Fig.4 Drain-Source On Resistance

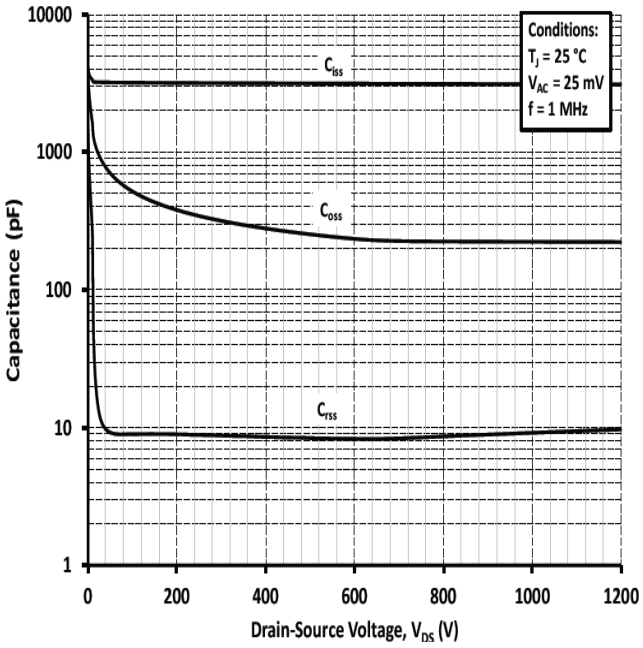


Fig.5 Capacitance

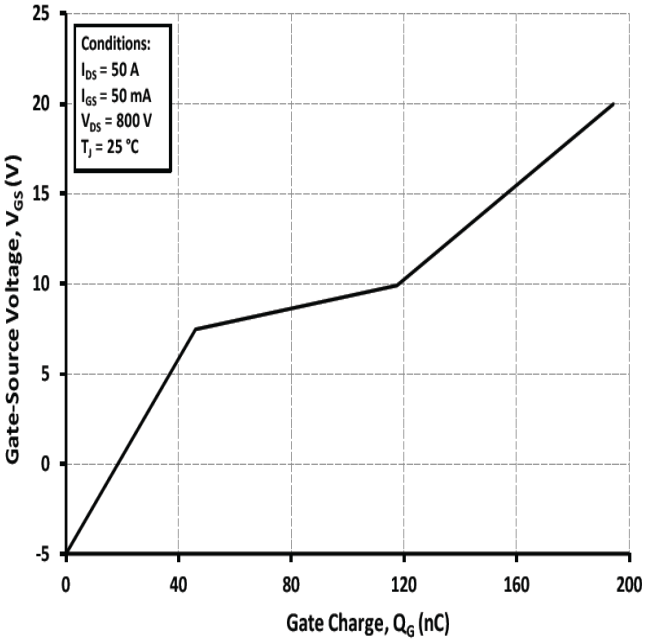
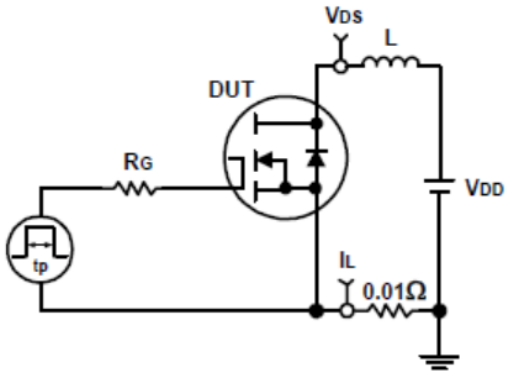
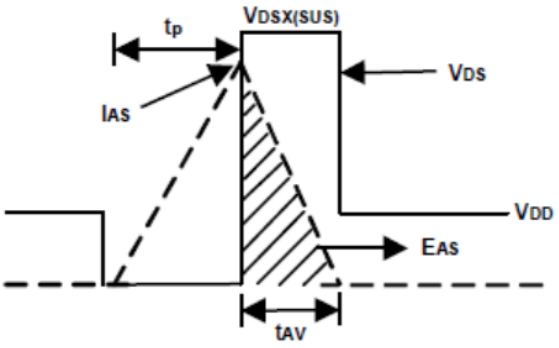


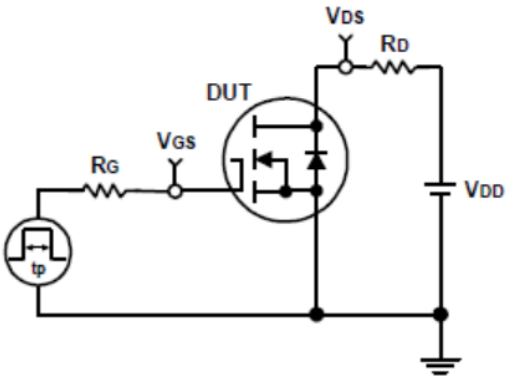
Fig.6 Gate Charge Characteristics

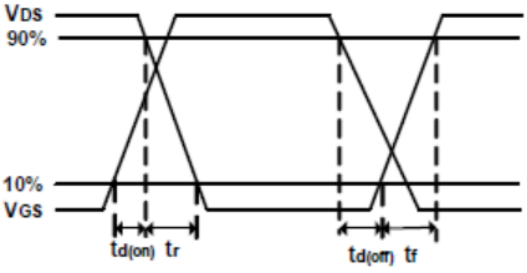
Avalanche Test Circuit and Waveforms





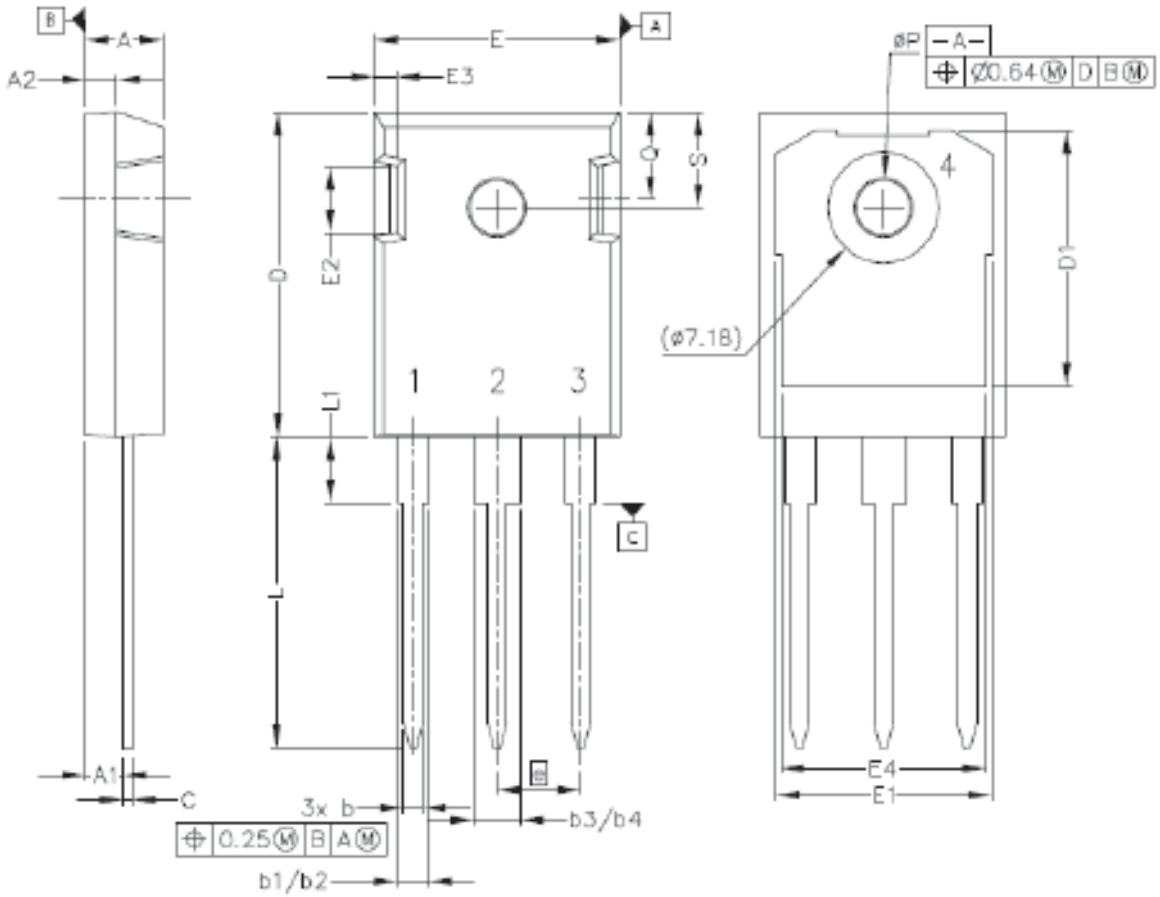
Switching Time Test Circuit and Waveforms

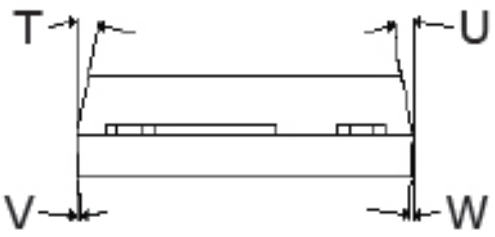




Package Information

TO-247





Pinout Information:

- Pin 1 = Gate
- Pin 2, 4 = Drain
- Pin 3 = Source

POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.042	.052	1.07	1.33
b1	.075	.095	1.91	2.41
b2	.075	.085	1.91	2.16
b3	.113	.133	2.87	3.38
b4	.113	.123	2.87	3.13
c	.022	.027	0.55	0.68
D	.819	.831	20.80	21.10
D1	.640	.695	16.25	17.65
D2	.037	.049	0.95	1.25
E	.620	.635	15.75	16.13
E1	.516	.557	13.10	14.15
E2	.145	.201	3.68	5.10
E3	.039	.075	1.00	1.90
E4	.487	.529	12.38	13.43
e	.214 BSC		5.44 BSC	
N	3		3	
L	.780	.800	19.81	20.32
L1	.161	.173	4.10	4.40
ØP	.138	.144	3.51	3.65
Q	.216	.236	5.49	6.00
S	.238	.248	6.04	6.30
T	9°	11°	9°	11°
U	9°	11°	9°	11°
V	2°	8°	2°	8°
W	2°	8°	2°	8°

NOTES:
ALL DIMENSIONS REFER TO JEDEC STANDARD TO-247 AND DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
EJECTION MARK DEPTH $0.10^{+0.15}_{-0.10}$