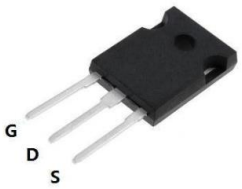
N-CHANNEL SiC POWER MOSFET

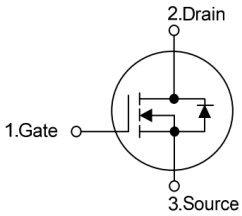
Features

- $R_{DS(on)}$=650mΩ(Typ.) @V_{GS}=20V,I_D=2A
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive



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
XD650B170BV1S3	1700V	7A	0.65Ω	150°C	D650B170BV1	TO247-3

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

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	1700	V
V_{GSmax}	Gate-Source Voltage	-10/+25	V
V_{GSop}	Gate-Source Voltage	-5/+20	V
I_D	Continuous Drain Current (T_C=25 °C)	7.0	A
I_{DM}	Pulsed Drain Current	9	A
P_D	Maximum Power Dissipation (T_C=25 °C)	70	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)	TO247-3	0.6	°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	1700	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=1700V, V_{GS}=0V	---	1	100	uA
I_{GSS}	Gate Leakage Current, Forward	V_{GS}=25V, V_{DS}= 0V	---	1	250	nA
	Gate Leakage Current, Reverse	V_{GS}= -10V, V_{DS}= 0V	---	---	250	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_{DS}= 1mA	2.0	2.6	4.0	V
$R_{DS(ON)}$	Drain-Source On-state Resistance	V_{GS}=20V, I_{DS}=2A	--	650	850	mΩ
Q_g	Total Gate Charge	V_{DS}=1200V	---	23	---	nC
Q_{gs}	Gate-Source Charge	V_{GS}=-5V/20V	---	5.5	---	nC
Q_{gd}	Gate-Drain Charge	I_{DS}=2A	---	7.7	---	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=1200V,	---	13.8	---	ns
t_r	Rise Time	V_{GS}=-5V/20V	---	22.8	--	ns
$t_{d(off)}$	Turn-off Delay Time	I_{DS}=2A, R_G=2.5Ω	---	38	---	ns
t_f	Fall Time		---	14	---	ns
C_{iss}	Input Capacitance	V_{DS}=1000V	---	194	---	pF
C_{oss}	Output Capacitance	V_{GS}=0V	---	13	---	pF
C_{rss}	Reverse Transfer Capacitance	f = 1MHz	---	1.9	---	pF

Reverse Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{SD}	Diode Forward Voltage	I_{SD}=25A, V_{GS}=-5V	4.2	---	---	V
t_{rr}	Diode Reverse Recovery Time	V_R=1200V, I_{SD}=2A, dI_F/dt=1000A/s	---	25	---	ns
Q_{rr}	Diode Reverse Recovery Charge		---	15	---	nC
I_{rrm}	Peak Reverse Recovery Current		---	2.8	---	A

Typical Characteristics

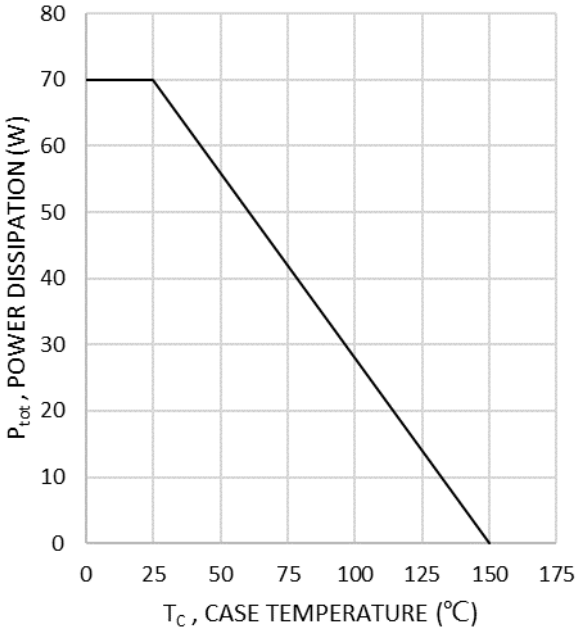


Fig.1 Power Dissipation

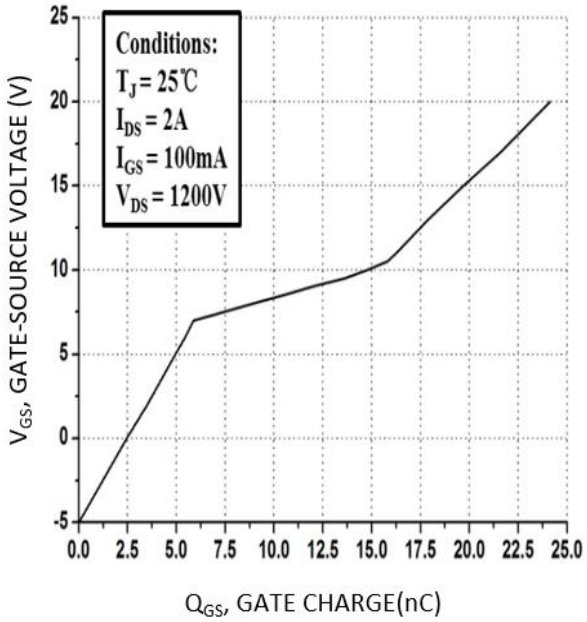


Fig.2 Gate Charge

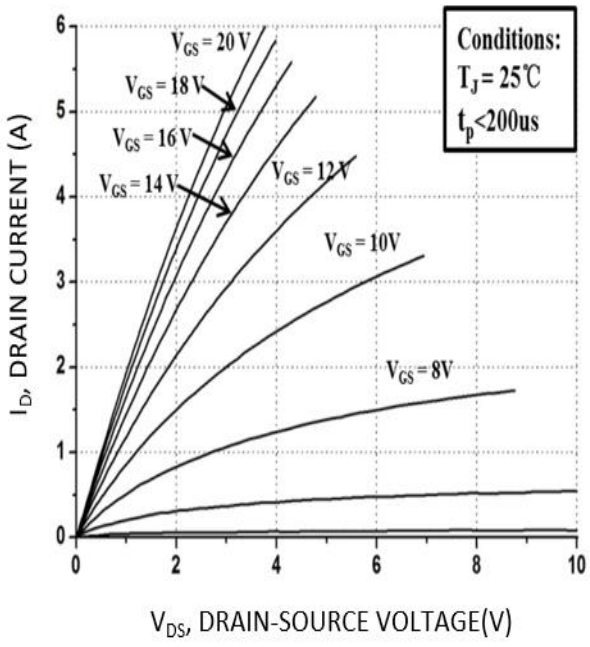


Fig.3 Output Characteristics

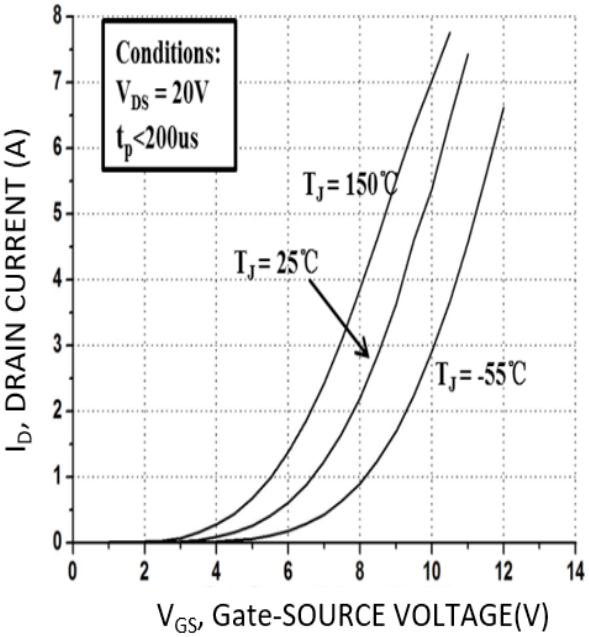


Fig.4 Output Characteristics

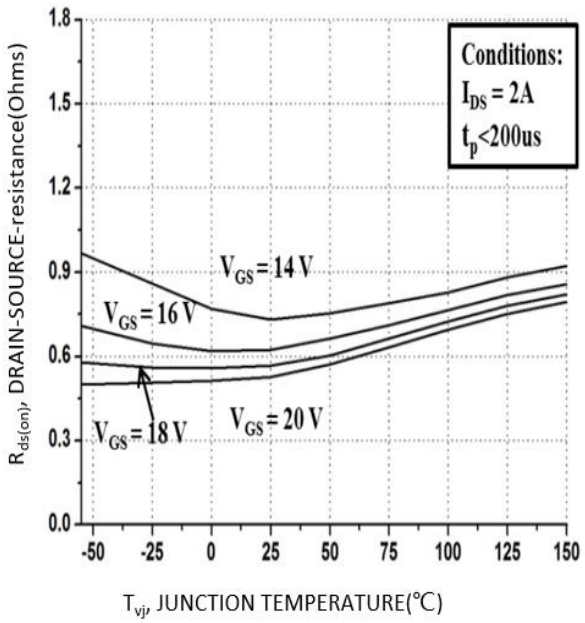


Fig.5 Drain-Source On Resistance

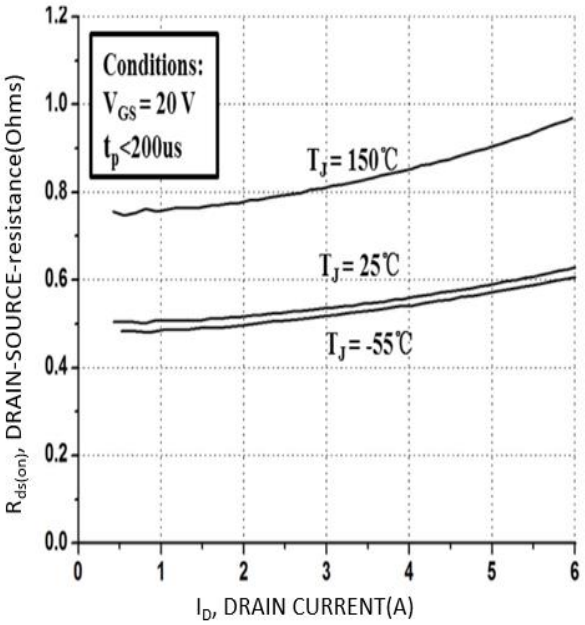


Fig.6 Drain-Source On Resistance

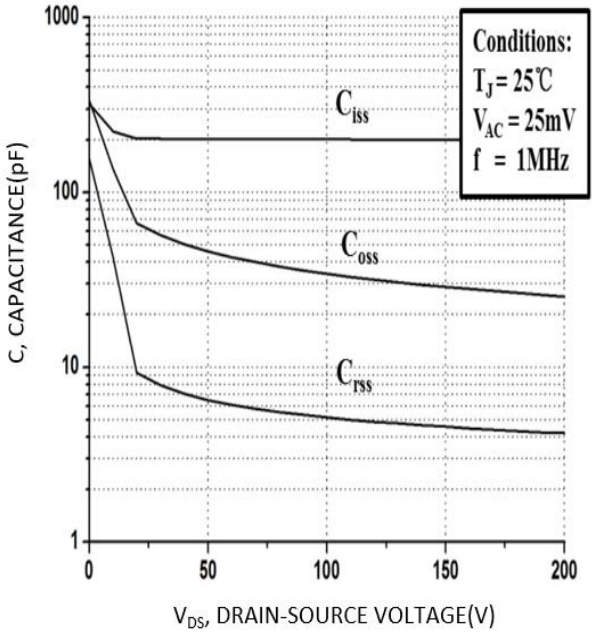


Fig.7 Capacitance

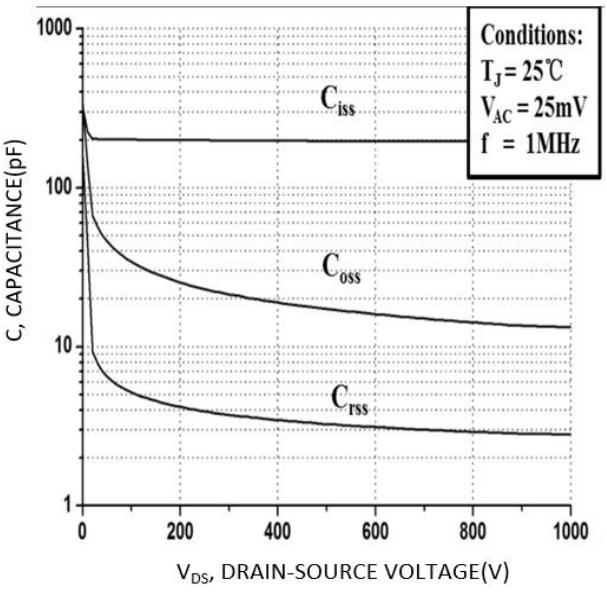
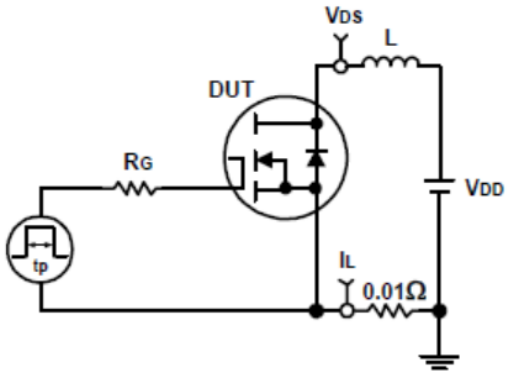
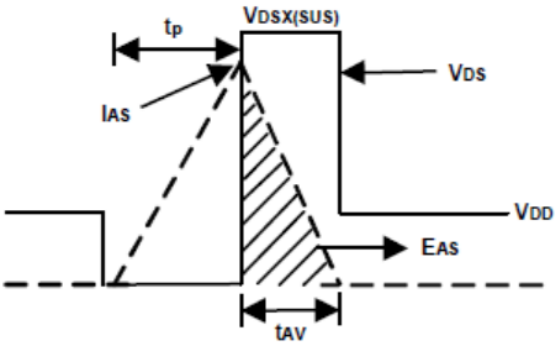


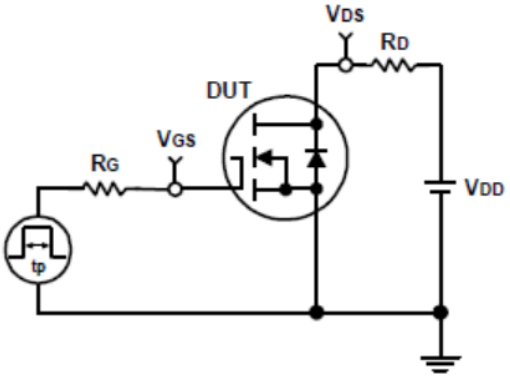
Fig.8 Capacitance

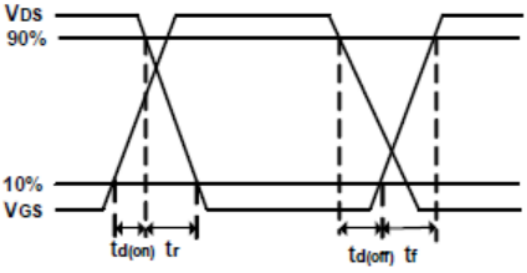
Avalanche Test Circuit and Waveforms





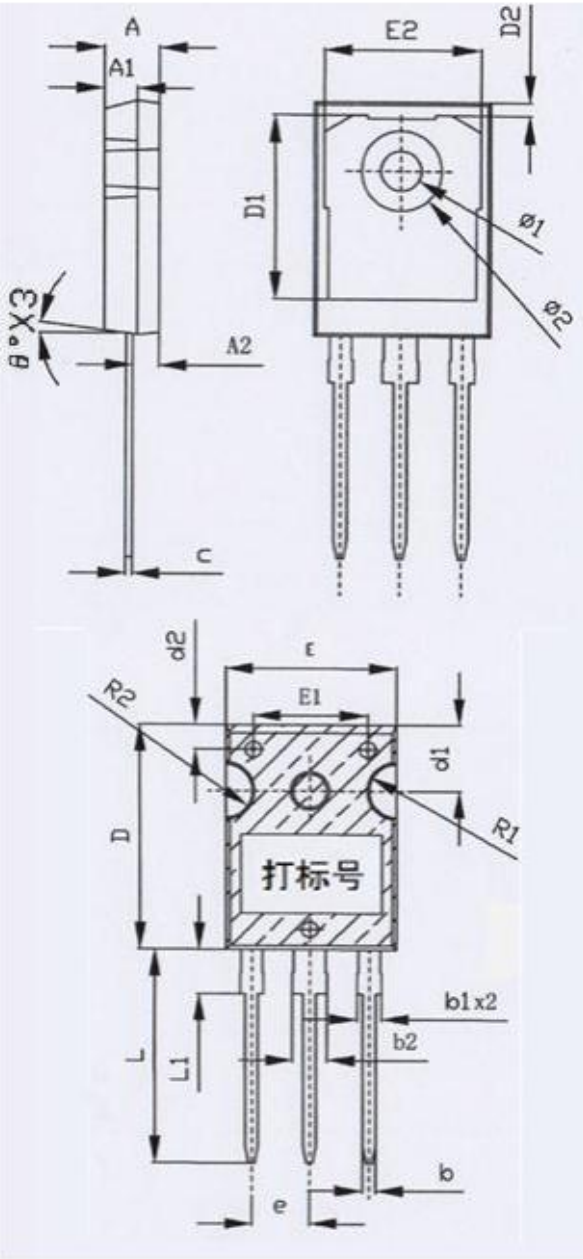
Switching Time Test Circuit and Waveforms





Package Information

TO-247



SYMBOLS	DIMENSIONS IN MILLMETERS		
	MIN	NOM	MAX
A	4.9	5	5.1
A1	2.9	3	3.1
A2	2.31	2.36	2.41
b	1.16	1.2	1.26
b1	2.05	-	2.2
b2	3.05	-	3.2
c	0.58	0.6	0.66
D	20.9	21	21.1
D1	16.46	16.56	16.76
D2		1.17	
d1	6.05	6.15	6.25
d2	2.2	2.3	2.4
E	15.7	15.8	15.9
E1		10.5	
E2		14.02	
e	-	1.27bcs	-
L	19.82	19.92	20.02
L1	1.88	1.98	2.08
θ	0°	7°	8°
R1	-	2.7	-
R2	-	2.5	-
Φ1		3.6	
Φ2	-	7.19	-