

ASC1N1700MF3PB

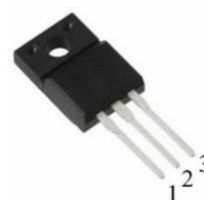
1700V N-Channel MOSFET

Description

Silicon Carbide (SiC) MOSFET use a completely new technology that provide superior switching performance and higher reliability compared to Silicon. In addition, the low ON resistance and compact chip size ensure low capacitance and gate charge. Consequently, system benefits include highest efficiency, faster operating frequency, increased power density, reduced EMI, and reduced system size.

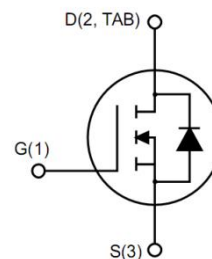
Features

- High Speed Switching with Low Capacitances
- AST Technology with 12V Gate Drive
- Lower Q_G and Device Capacitances(C_{oss} , C_{rss})
- Body Diode with Low V_F and Low Q_{RR}
- Faster and More Efficient Switching
- ROHS Compliant, Halogen free



Application

- Solar String Inverter and Central Inverter
- UPS
- Switch Mode Power Supplies
- Power Factor Correction Modules
- Battery Charging
- Auxiliary Power Supply
- High Voltage Converter



Ordering Information

Part Number	Marking	Package	Packaging
ASC1N1700MF3PB	ASC1N1700MF3	TO-220F	Tube

Absolute Maximum Ratings(Tc=25℃)

Symbol	Parameter	Value	Unit
V _{DS}	Drain-Source Voltage	1700	V
I _D	Drain Current(continuous)at Tc=25℃	1	A
I _D	Drain Current(continuous)at Tc=100℃	0.5	A
I _{DM}	Drain Current (pulsed)	2	A
V _{GS}	Gate-Source Voltage	-5/+15	V
P _D	Power Dissipation T _C = 25℃	20	W
T _J , Tstg	Junction and Storage Temperature Range	-55 to +175	℃

Electrical Characteristics(T_J = 25℃ unless otherwise specified)

Typical Performance-Static

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV _{DS}	Drain-source Breakdown Voltage	I _D =100uA, V _{GS} =0V	1700			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =1700V, V _{GS} =0V, T _J =25℃			10	uA
I _{GSS}	Gate-body Leakage Current	V _{DS} =0V ; V _{GS} =-5 to 15V			250	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =200uA	1.5	2	3	V
V _{GS(on)}	Recommended turn-on Voltage	Static		12		V
V _{GS(off)}	Recommended turn-off Voltage			-3		V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} =12V, I _D =0.5A		10	15	Ω
		V _{GS} =12V, I _D =0.5A T _J =175℃		18		Ω

Typical Performance-Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS}=1000V, f=1MHz, V_{GS}=0V$ $V_{AC}=25mV$		50		pF
C_{oss}	Output Capacitance			2		pF
C_{rss}	Reverse Transfer Capacitance			0.5		pF
g_{fs}	Transconductance	$V_{DS}=10V, I_D=0.5A$		0.3		S
E_{OSS}	C_{OSS} Stored Energy	$V_{DS}=1000V, f=1MHz$		1.2		μJ
E_{ON}	Turn-On Energy (Body Diode)	$V_{DS}=1200V, V_{GS}=-3V/12V,$ $I_D=0.5A, L=1mH, T_J=175^\circ C$ $R_{ext}=25\Omega$		16		μJ
E_{OFF}	Turn-Off Energy (Body Diode)			3.6		μJ
Q_g	Total Gate Charge	$V_{DS}=1200V, V_{GS}=-3V/12V,$ $I_D=0.5A$		2.5		nC
Q_{gs}	Gate-source Charge			0.4		nC
Q_{gd}	Gate-Drain Charge			0.8		nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=1200V, V_{GS}=-3V/12V,$ $I_D=0.5A, L=1mH$ $R_{ext}=25\Omega$		2.6		ns
t_r	Rise Time			1.7		ns
$t_{d(off)}$	Turn-off Delay Time			2.2		ns
t_f	Fall Time			1.5		ns

Typical Performance-Reverse Diode($T_J = 25^\circ C$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{FSD}	Forward Voltage	$V_{GS}=0V, I_F=0.2A, T_J=25^\circ C$		3.5	6	V
		$V_{GS}=0V, I_F=0.2A, T_J=175^\circ C$		3	6	V
I_S	Continuous Diode Forward Current	$V_{GS}=0V, T_C=25^\circ C$				A

Thermal Characteristics

Symbol	Parameter	Value.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	7.5	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	$^\circ C/W$

The values are based on the junction-to case thermal impedance which is measured with the device mounted to a large heat sink assuming maximum junction temperature of $T_J(max)=175^\circ C$

Electrical Characteristics

Fig1. Output characteristics ($T_J = 25^\circ\text{C}$)

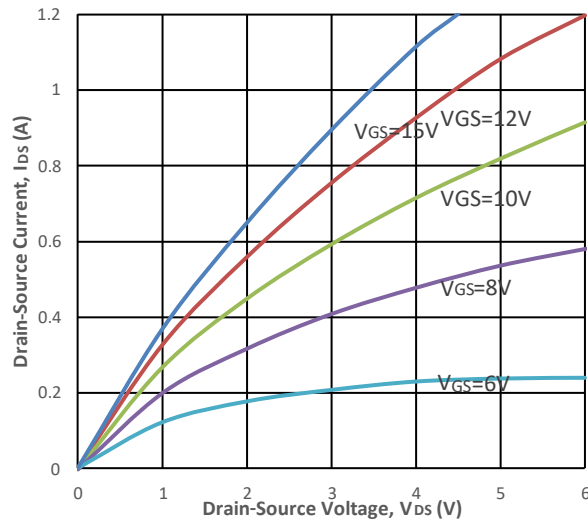


Fig2. Output characteristics ($T_J = 175^\circ\text{C}$)

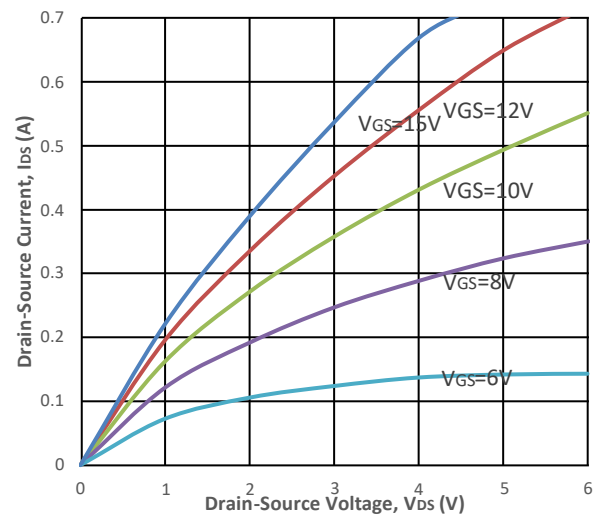


Fig3. Normalized On-Resistance vs. Temperature

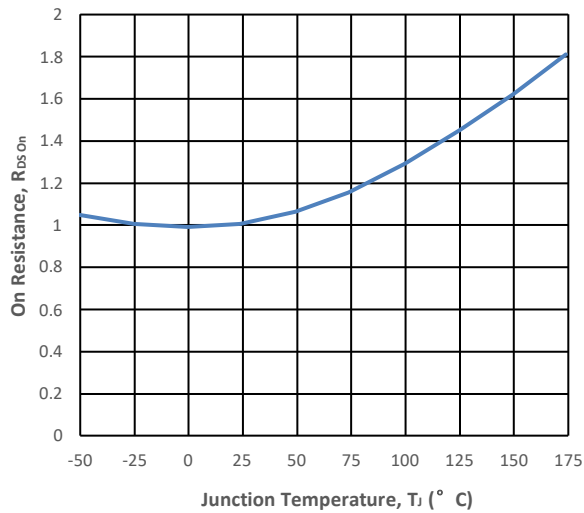


Fig4. On-Resistance vs. Temperature

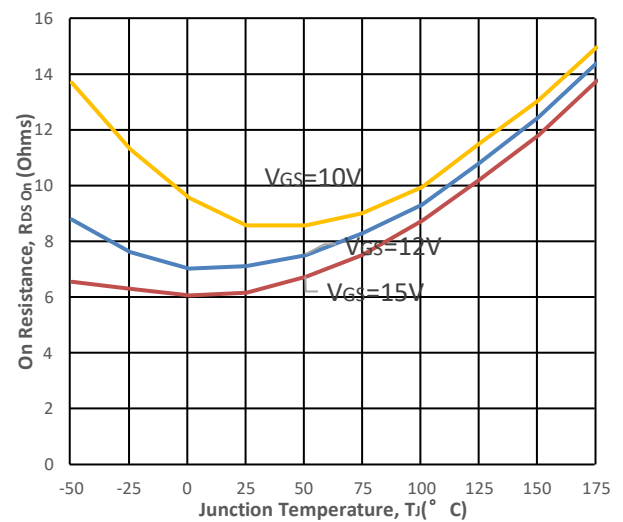


Fig5. Transfer Characteristic

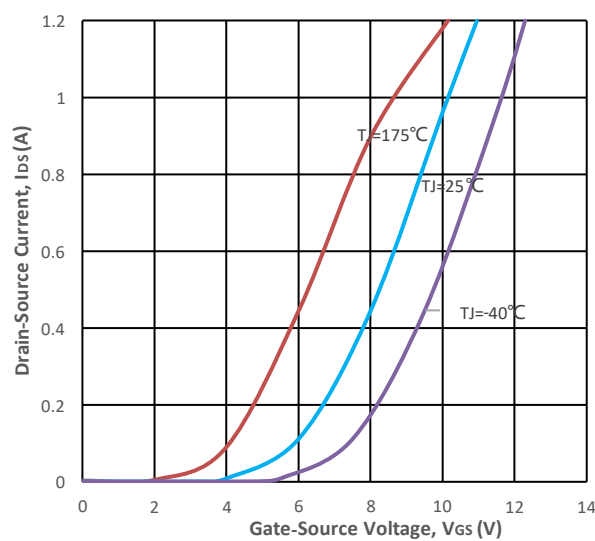


Fig6. Body Diode Characteristic at 25°C

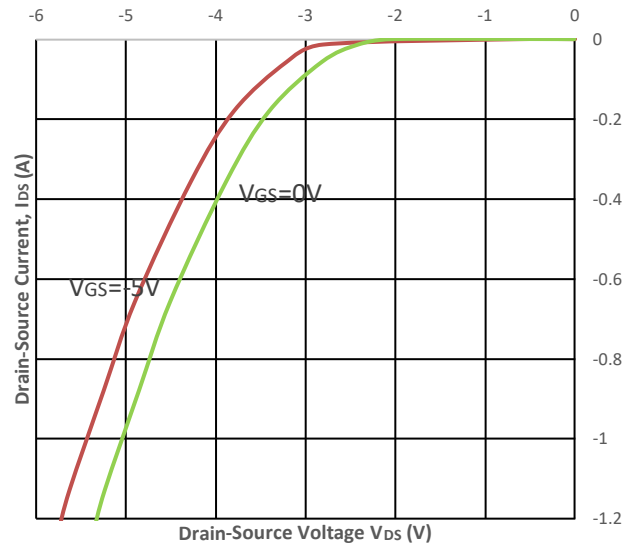


Fig7. Threshold Voltage vs. Temperature

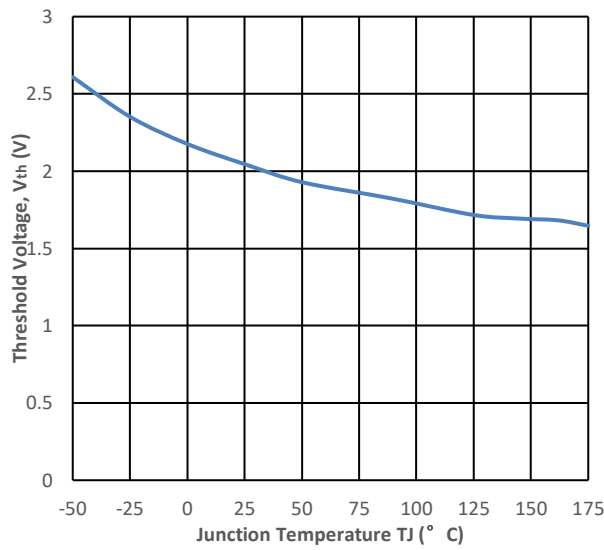


Fig8. Gate Charge Characteristics

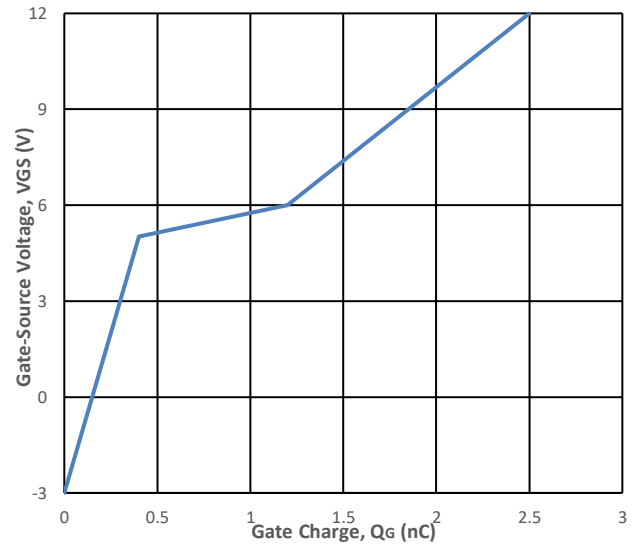


Fig9. 3rd Quadrant Characteristic at 25 $^{\circ}C$

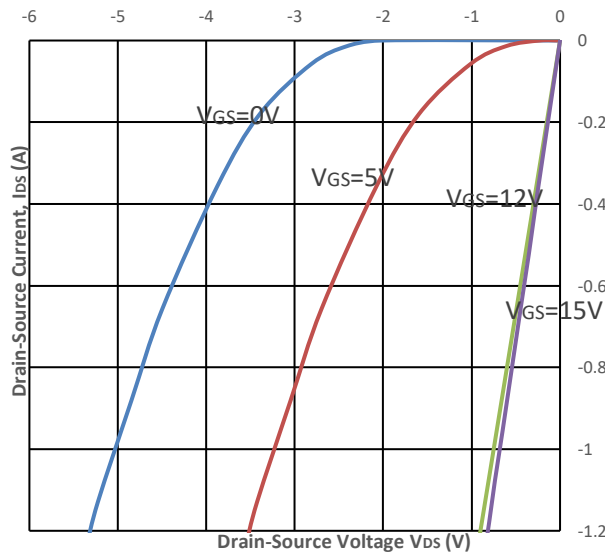


Fig10. Output Capacitor Stored Energy

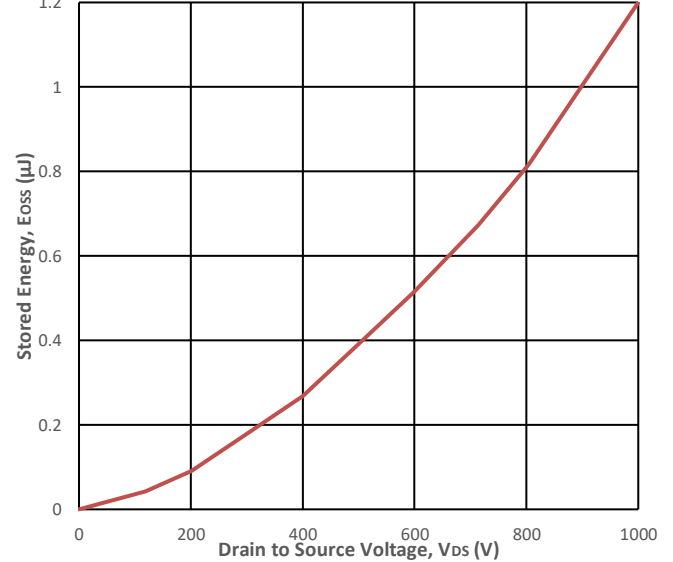


Fig11. Capacitances vs. Drain-Source

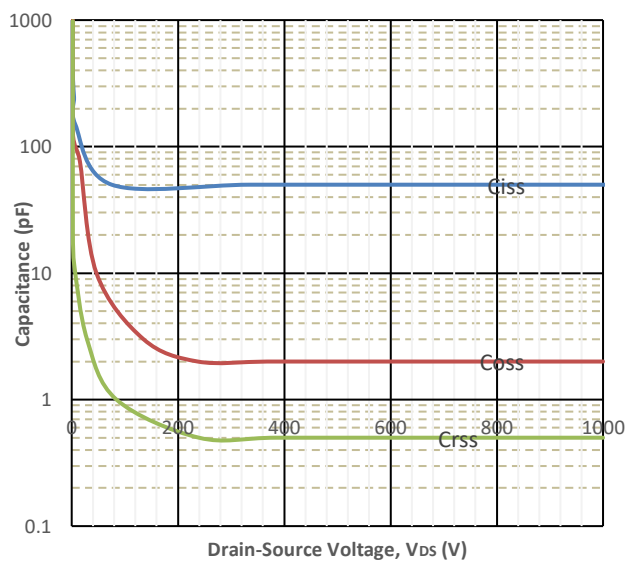


Fig12. Max Power Dissipation Derating Vs Tc

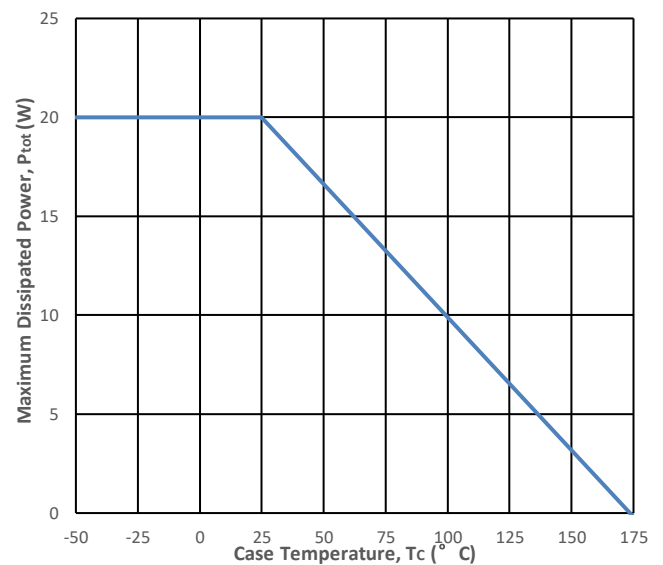


Fig13. Switching Energy vs. Drain Current

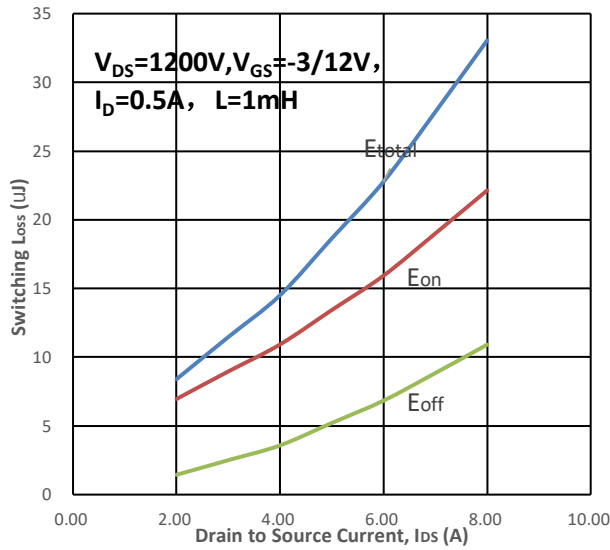


Fig14. Switching Energy vs. $R_{G(ext)}$

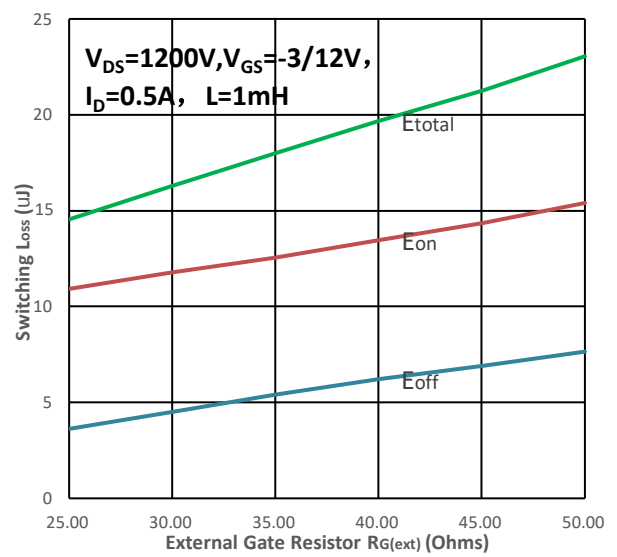


Fig15. Switching Energy vs. Temperature

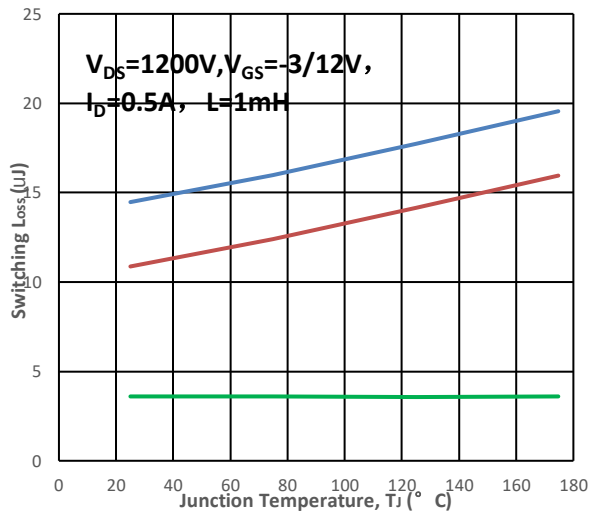


Fig16. Switching Times vs. $R_{G(ext)}$

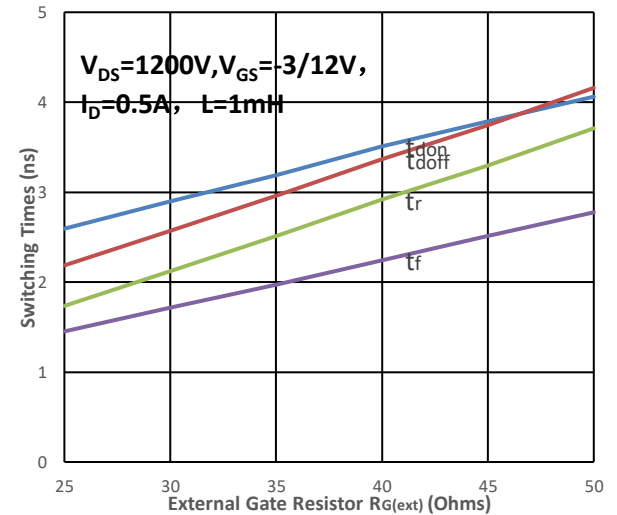


Fig17. Transient Thermal Impedance

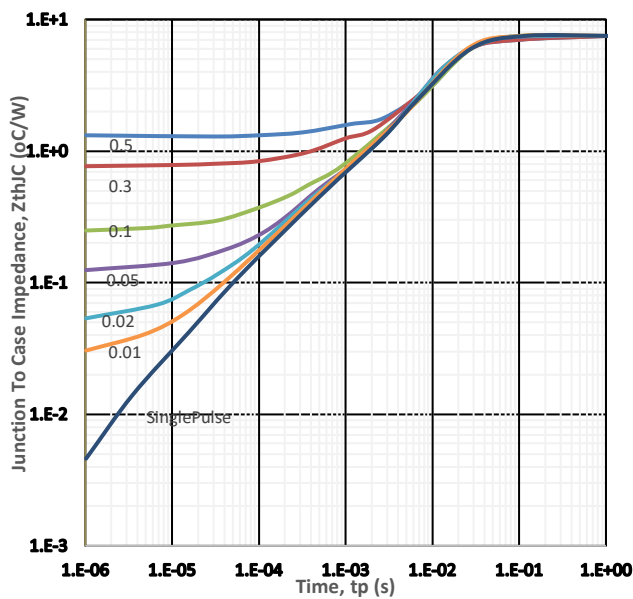
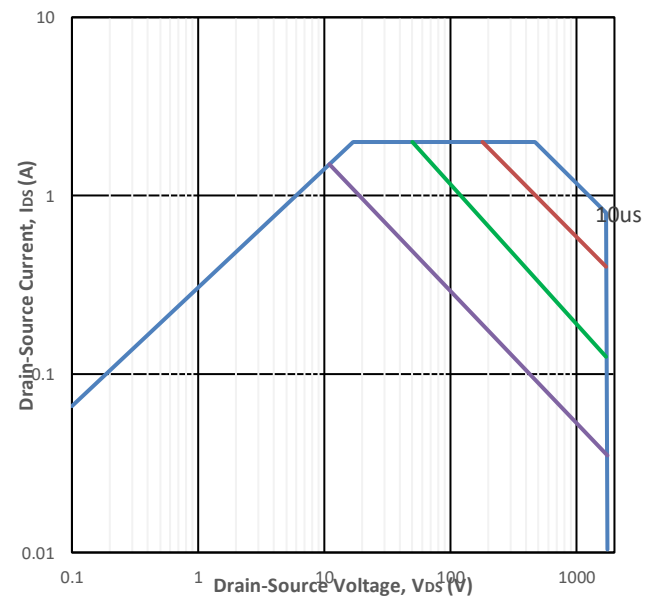
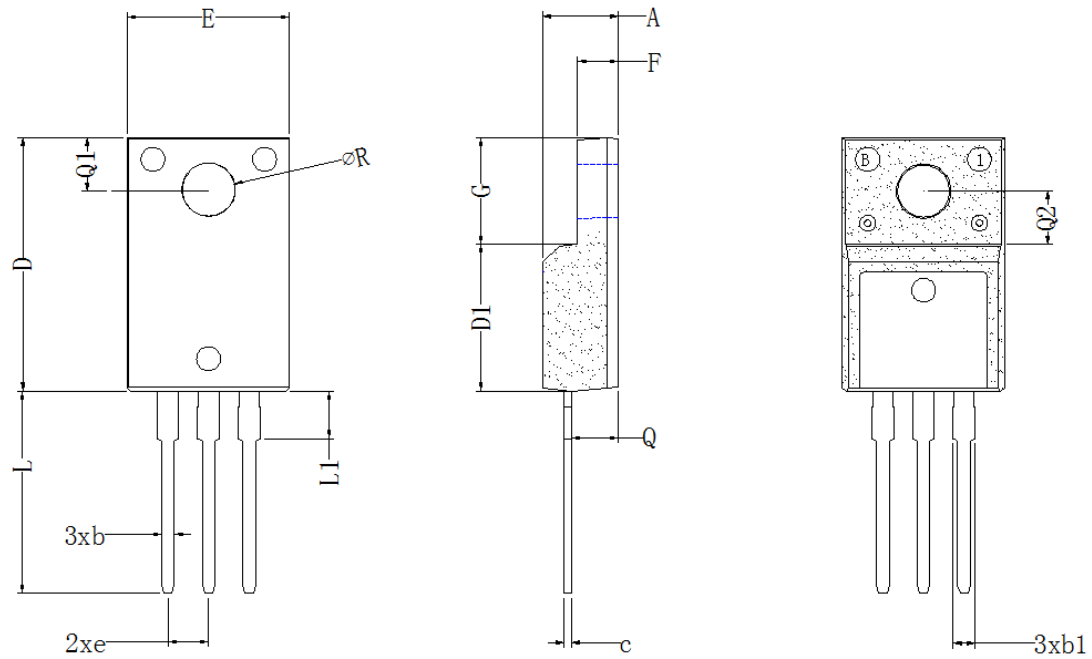


Fig18. Safe Operating Area



Package Drawing



Dimensions (UNIT: mm) :

SYMBDLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	4.50	4.70	4.90
b	0.60	0.80	1.00
b1	1.16	1.36	1.56
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	8.99	9.19	9.39
e	2.04	2.54	3.04
E	9.86	10.16	10.46
F	2.34	2.54	2.74
G	6.48	6.68	6.88
L	12.48	12.68	12.88
L1	2.78	2.98	3.18
Q	2.70	2.90	3.10
Q1	3.15	3.35	3.55
Q2	3.13	3.33	3.53
ϕR	3.10	3.30	3.50

Notes:

- The information in this document is subject to change without notice.
- For more product and company information, please contact us or visit the website.

Contact Info:

- Tel: +86 13510099916
- Web: www.ewsemi.com



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