

Description

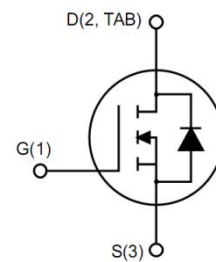
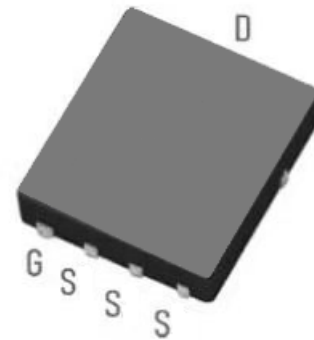
Silicon Carbide (SiC) MOSFET use a completely new technology that provide superior switching performance and higher reliability compared to Silicon. In addition, the low ON resistance and compact chip size ensure low capacitance and gate charge. Consequently, system benefits include highest efficiency,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

Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low RDS(on)
- Optimized package with separate driver source pin
- Easy to parallel and simple to drive
- ROHS Compliant, Halogen free

Application

- EV Charging
- DC/DC Converters
- Switch Mode Power Supplies
- Power Factor Correction Modules
- Solar PV inverters



Ordering Information

Part Number	Marking	Package	Packaging
ASR320N650D88	ASR320N650D88	DFN8*8	Reel

Absolute Maximum Ratings(Tc=25 °C)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	650	V
I_D	Drain Current(continuous)at Tc=25 °C	8	A
I_D	Drain Current(continuous)at Tc=100 °C	6	A
I_{DM}	Drain Current (pulsed)	12	A
V_{GS}	Gate-Source Voltage	-5/+15	V
P_D	Power Dissipation T _C = 25 °C	65	W
T _J , Tstg	Junction and Storage Temperature Range	-55 to +150	°C

Electrical Characteristics(T_J = 25 °C unless otherwise specified)
Typical Performance-Static

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DS}	Drain-source Breakdown Voltage	$I_D=250\mu A, V_{GS}=0V$	650			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V, T_J=25^\circ C$			50	μA
I_{GSS}	Gate-body Leakage Current	$V_{DS}=0V; V_{GS}=-5 \text{ to } 15V$		10	250	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=1mA$	1.5	1.9	2.5	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	$V_{GS}=12V, I_D=2A$		320	380	m Ω
		$V_{GS}=12V, I_D=2A, T_J=150^\circ C$		500		m Ω

Typical Performance-Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C _{iss}	Input Capacitance	V _{DS} =600V, f=1MHz, V _{AC} =25mV		339		pF
C _{oss}	Output Capacitance			20		pF
C _{rss}	Reverse Transfer Capacitance			3.5		pF
g _{fs}	Transconductance	V _{DS} =12V, I _D =2A		2.8		S
E _{oss}	Coss Stored Energy	V _{DS} =600V, f=1MHz		5		μJ
E _{on}	Turn-On Energy (Body Diode)	V _{DS} =400V, V _{GS} =-3/12V, I _D =2A, L=1.5mH T _J =150°C		47		μJ
E _{off}	Turn-Off Energy (Body Diode)			8.5		μJ
Q _g	Total Gate Charge	V _{DS} =400V, V _{GS} =-3V/12V, I _D =2A		12.8		nC
Q _{gs}	Gate-source Charge			3		nC
Q _{gd}	Gate-Drain Charge			4		nC
R _{G(int)}	Internal Gate Resistance	f=1MHz, V _{AC} =25mV		8		Ω
t _{d(on)}	Turn-on Delay Time	V _{DS} =400V, V _{GS} =-3V/12V, I _D =2A, L=1mH R _{ext} =2.5Ω		5		ns
t _r	Rise Time			6		ns
t _{d(off)}	Turn-off Delay Time			7		ns
t _f	Fall Time			8.8		ns

Typical Performance-Reverse Diode(T_J = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{FSD}	Forward Voltage	V _{GS} =0V, I _F =2A, T _J =25°C		5.5	6.5	V
		V _{GS} =0V, I _F =2A, T _J =150°C		4.8	6.5	V
I _S	Continuous Diode Forward Current	V _{GS} =0V, T _C =25°C				A
t _{rr}	Reverse Recovery Time	V _{GS} =-3 V, I _F =2 A, V _R =400 V, T _J =150°C di/dt= 1000 A/μs				nS
Q _{rr}	Reverse Recovery Charge					nC
I _{rrm}	Peak Reverse Recovery Current					A

Thermal Characteristics

Symbol	Parameter	Value.	Unit
R _{θJC}	Thermal Resistance, Junction-to-Case	1.92	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	62	°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)=150°C

Electrical Characteristics

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

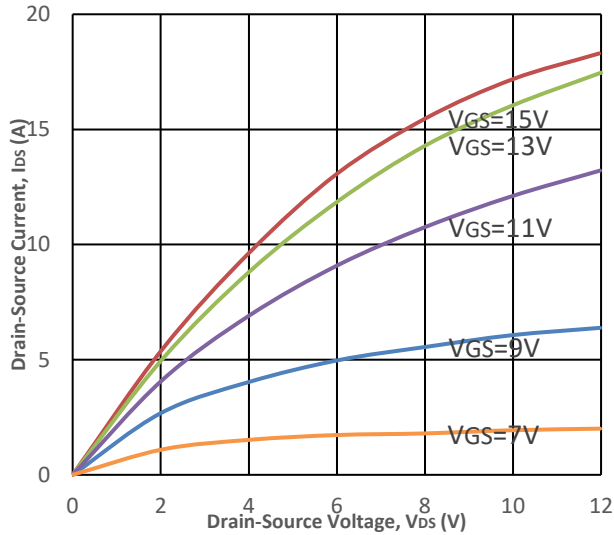


Fig2. Output characteristics ($T_J = 150^\circ\text{C}$)

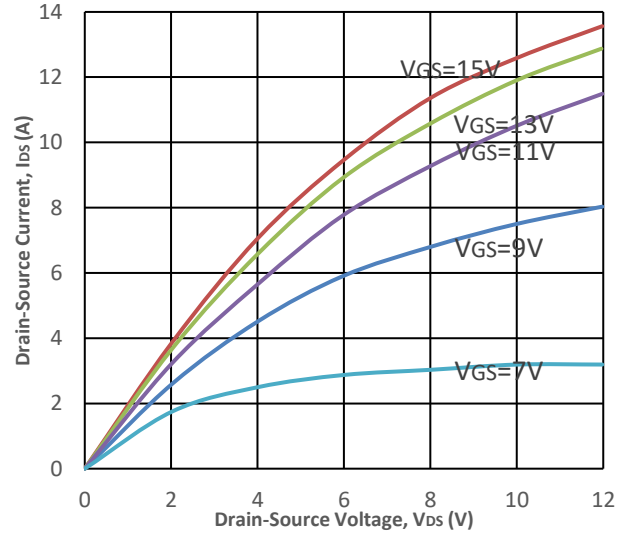


Fig3. Normalized On-Resistance vs. Temperature

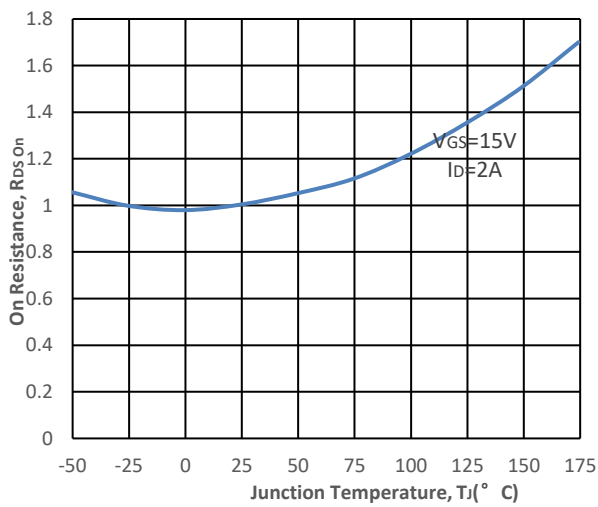


Fig4. On-Resistance vs. Temperature

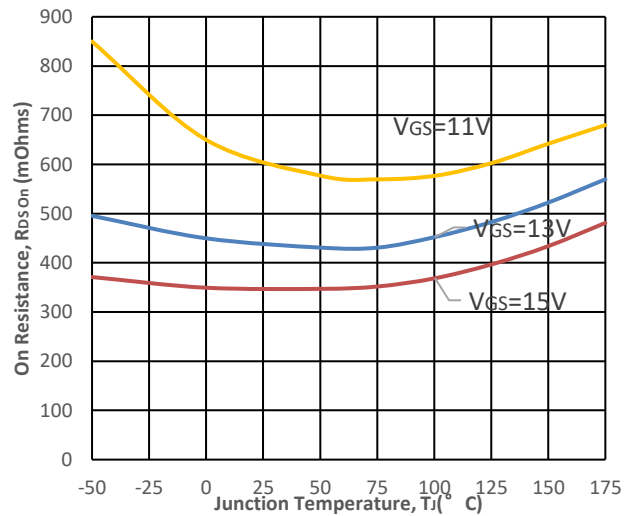


Fig5. Transfer Characteristic

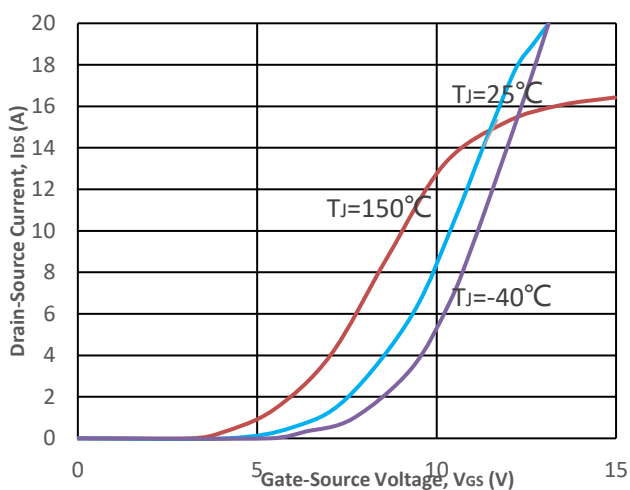


Fig6. Body Diode Characteristic at 25°C

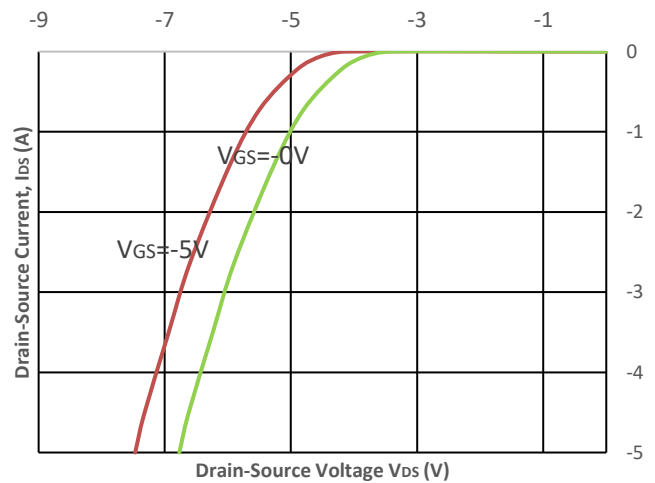


Fig7. Threshold Voltage vs. Temperature

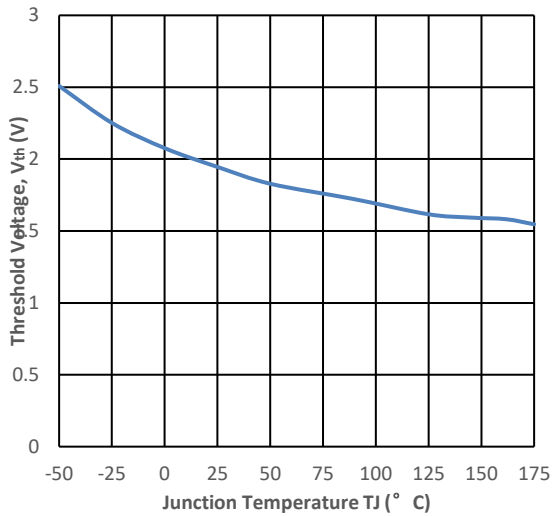


Fig8. Gate Charge Characteristics

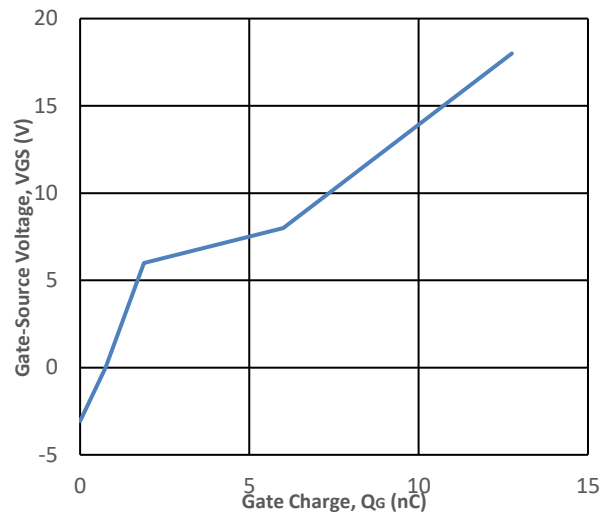


Fig9. 3rd Quadrant Characteristic at 25 $^{\circ}$ C

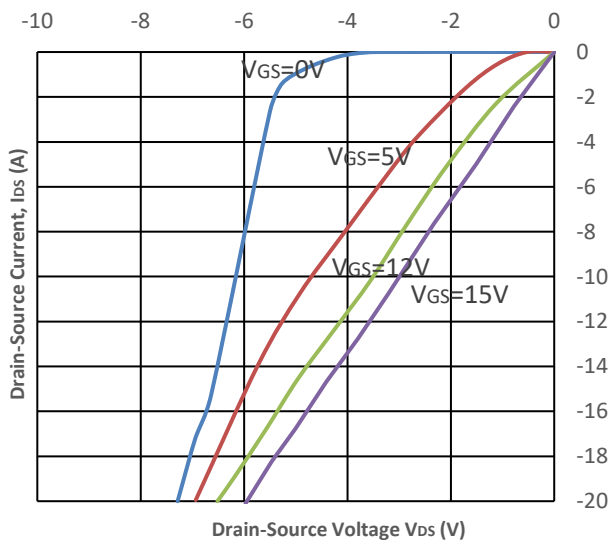


Fig10. Output Capacitor Stored Energy

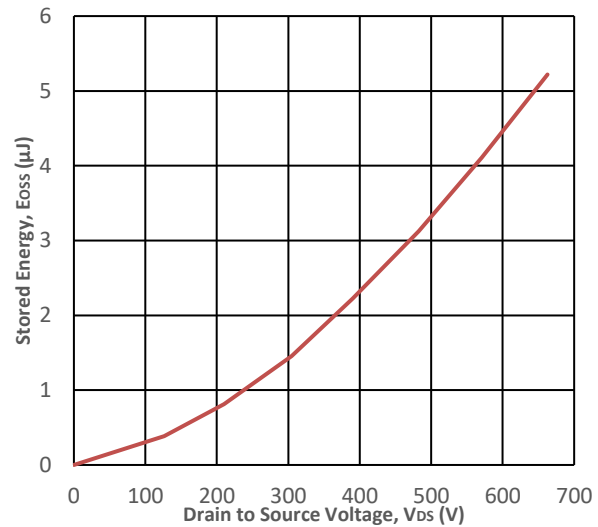


Fig11. Capacitances vs. Drain-Source

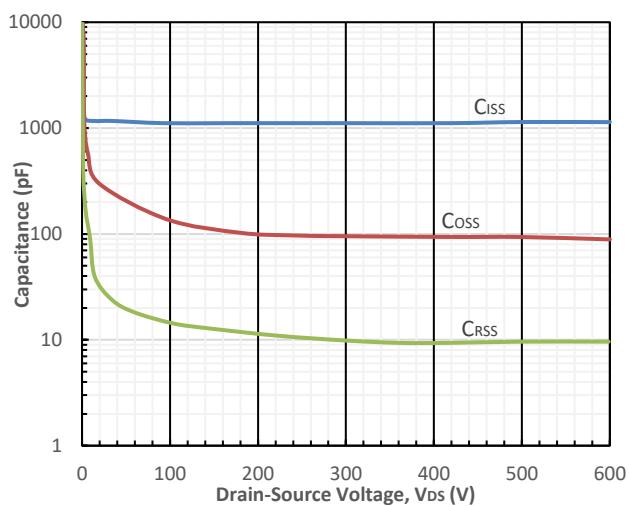


Fig12. Max Power Dissipation Derating Vs T_c

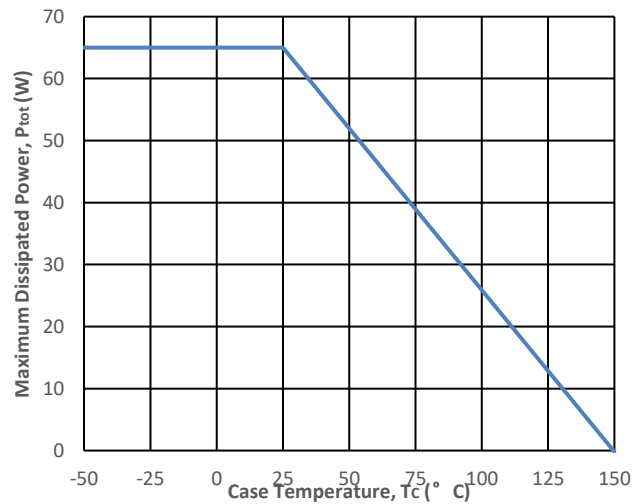


Fig13. Switching Energy vs. Drain Current

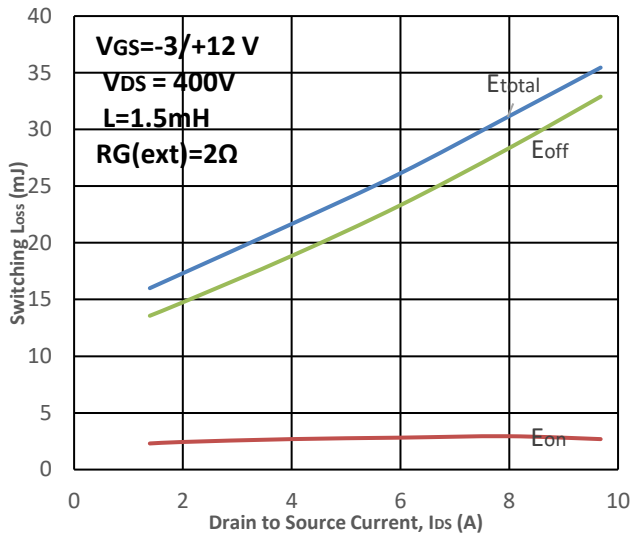


Fig14. Switching Energy vs. $R_{G(ext)}$

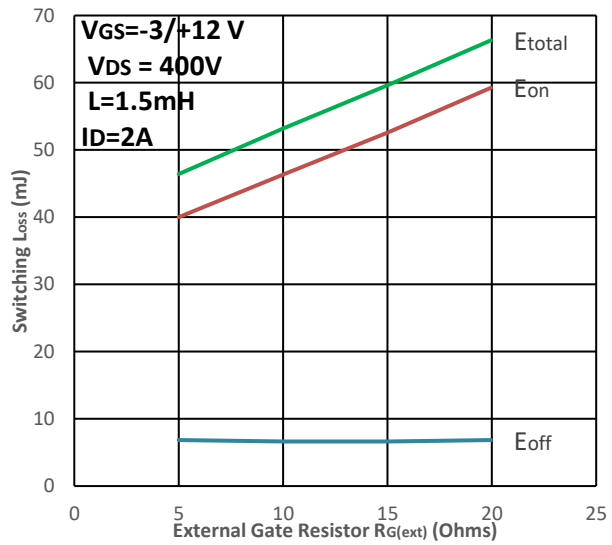


Fig15. Switching Energy vs. Temperature

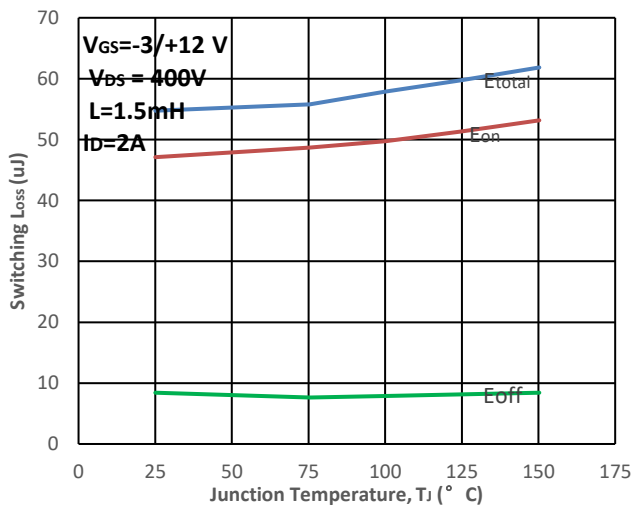


Fig16. Switching Times vs. $R_{G(ext)}$

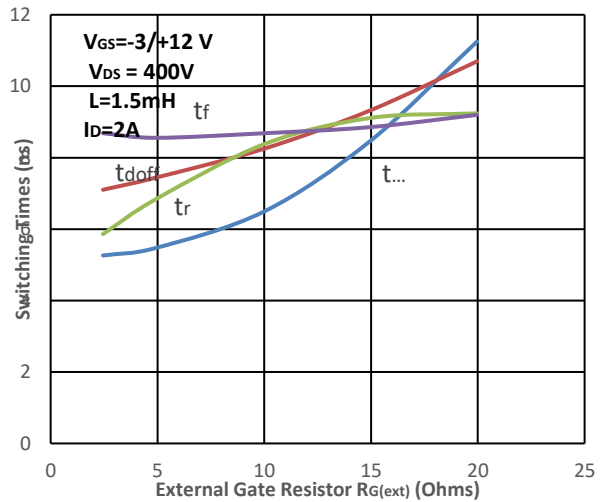


Fig17. Transient Thermal Impedance

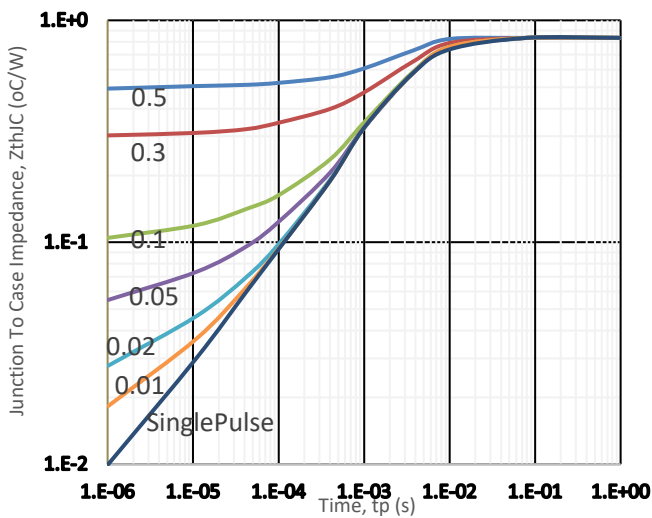
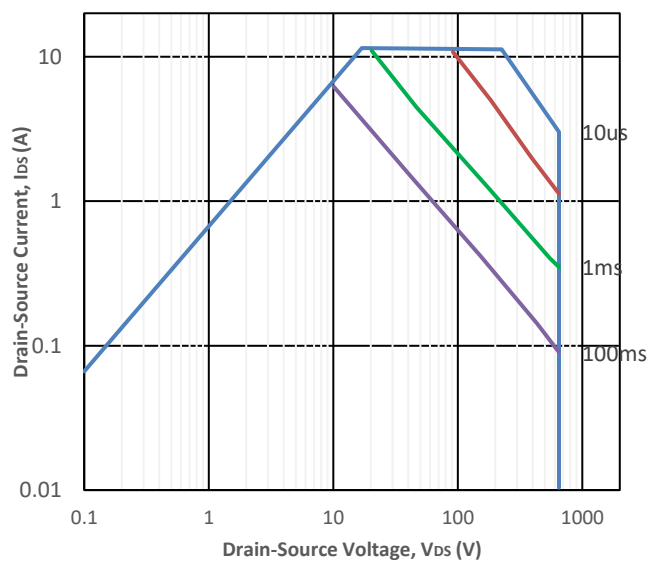
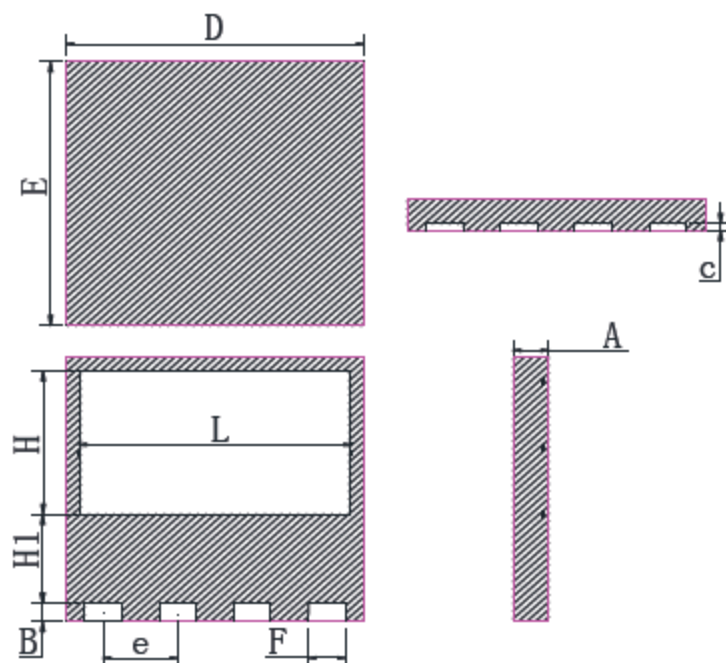


Fig18. Safe Operating Area



Package Drawing:

Dimensions (UNIT: mm)

Symbol	Min	Typ	Max
A	0.90	0.95	1.00
B	0.45	0.55	0.65
C	0.153	0.203	0.253
D	7.90	8.00	8.10
E	7.90	8.00	8.10
e	1.90	2.00	2.10
F	0.90	1.00	1.10
H	4.20	4.35	4.45
H1	2.60	2.70	2.80
L	7.10	7.20	7.3