

ASC200N1200MDSK

1200V, 250A, 7.5mΩ, N-Channel, Silicon Carbide MOSFET

Product Data Sheet

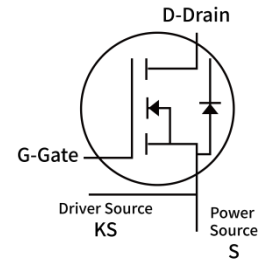
ASTC-3T04-78A A/1



爱仕特科技
AST TECHNOLOGY

General Description

The AST-MDS series SiC MOSFET in SOT-227 package ensures stable high-temperature operation for power-dense and energy-critical systems, enabling compact designs with reduced EMI.



Features

- 3rd Generation SiC MOSFET Technology
- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Optimized Package with Separate Driver Source Pin
- RoHS Compliant, Halogen Free



Applications

- EV Charging
- High Voltage DC/DC Converters
- Switch Mode Power Supplies
- Solar Inverters

Ordering Informations

Order Number	ASC200N1200MDSK
Marking	ASC200N1200MDSK
Package Type	SOT-227
Packing Method	Box

Key Parameters

Symbol	Parameter	Values			Unit	Test Conditions
Absolute maximum rating						
V _{DS}	Drain-Source Voltage	1200			V	T _C =25°C
I _D	Drain Current (continuous)	250			A	T _C =25°C
P _D	Power Dissipation	833			W	T _C =25°C
T _J	Junction Temperature	-55 to +175			°C	
Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics						
R _{DS(on)}	Static Drain-Source on Resistance	-	7.5	9	mΩ	V _{GS} =18V; I _D =100A; T _J =25°C
Dynamic characteristics						
Q _G	Total Gate Charge	-	412	-	nC	V _{DS} =800V; V _{GS} =-5V/18V; I _D =100A; T _J =25°C
Q _{GD}	Gate-Drain Charge	-	128	-		
Source-drain diode						
Q _{rr}	Reverse Recovery Charge	-	735	-	nC	V _{GS} =-5V; I _F =100A; V _R =800V; di/dt=900A/μs; T _J =175°C

Absolute Maximum Ratings (at $T_c=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Values	Unit
V_{DS}	Drain-Source Voltage	1200	V
I_D	Drain Current (continuous; $T_c=25^\circ\text{C}$)	250	A
	Drain Current (continuous; $T_c=100^\circ\text{C}$)	180	
I_{DM}	Drain Current (pulsed)	400	A
V_{GS}	Gate-Source Voltage	-10/+22	V
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	833	W
T_J, T_{stg}	Junction and Storage Temperature Range	-55 to +175	$^\circ\text{C}$

MOSFET Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics (at T _J =25°C unless otherwise specified)						
BV _{DS}	Drain-Source Breakdown Voltage	1200	-	-	V	I _D =250μA; V _{GS} =0V
I _{DSS}	Zero Gate Voltage Drain Current	-	10	100	μA	V _{DS} =1200V; V _{GS} =0V
I _{GSS}	Gate-Body Leakage Current	-	20	250	nA	V _{DS} =0V; V _{GS} =-10 to 20V
V _{GS(th)}	Gate Threshold Voltage	2	3	4	V	V _{DS} =V _{GS} ; I _D =40mA
V _{GS(on)}	Recommended Turn-on Voltage	-	18	-	V	Static
V _{GS(off)}	Recommended Turn-off Voltage	-	-5	-		
R _{DS(on)}	Static Drain-Source on Resistance	-	7.5	9	mΩ	V _{GS} =18V; I _D =100A; T _J =25°C
		-	12	-		V _{GS} =18V; I _D =100A; T _J =175°C
Dynamic characteristics (at T _J =25°C unless otherwise specified)						
C _{iss}	Input Capacitance	-	13.8	-	nF	V _{DS} =1000V; f=1MHz; V _{AC} =25mV
C _{oss}	Output Capacitance	-	568	-	pF	
C _{rss}	Reverse Transfer Capacitance	-	28	-	pF	
g _{fs}	Transconductance	-	65	-	S	V _{DS} =20V; I _D =100A
E _{oss}	Coss Stored Energy	-	285	-	μJ	V _{DS} =1000V; f=1MHz
E _{on}	Turn-on Energy (Body Diode)	-	6.5	-	mJ	V _{DS} =800V; V _{GS} =-5V/18V; I _D =100A; L=68μH; R _{G(ext)} =2.5Ω; T _J =175°C
E _{off}	Turn-off Energy (Body Diode)	-	3.5	-		
Q _G	Total Gate Charge	-	412	-	nC	V _{DS} =800V; V _{GS} =-5V/18V; I _D =100A
Q _{GS}	Gate-Source Charge	-	145	-		
Q _{GD}	Gate-Drain Charge	-	128	-		
R _{G(int)}	Internal Gate Resistance	-	1.1	-	Ω	f=1MHz; V _{AC} =25mV
t _{d(on)}	Turn-on Delay Time	-	58	-	ns	V _{DS} =800V; V _{GS} =-5V/18V; I _D =100A; L=68μH; R _{G(ext)} =2.5Ω
t _r	Rise Time	-	56	-		
t _{d(off)}	Turn-off Delay Time	-	105	-		
t _f	Fall Time	-	36	-		

Body Diode Characteristics (at $T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{SD}	Diode Forward Voltage	-	3.6	6	V	$V_{GS}=0\text{V}; I_F=70\text{A}; T_J=25^{\circ}\text{C}$
		-	3.2	6		$V_{GS}=0\text{V}; I_F=70\text{A}; T_J=175^{\circ}\text{C}$
I_S	Continuous Diode Forward Current	-	180	-	A	$V_{GS}=0\text{V}; T_C=25^{\circ}\text{C}$
T_{rr}	Reverse Recovery Time	-	115	-	ns	$V_{GS}=-5\text{V}; I_F=100\text{A}; V_R=800\text{V};$ $di/dt=900\text{A}/\mu\text{s}; T_J=175^{\circ}\text{C}$
Q_{rr}	Reverse Recovery Charge	-	735	-	nC	
I_{rrm}	Peak Reverse Recovery Current	-	28	-	A	

Thermal Characteristics

Symbol	Parameter	Value.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.18	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	$^{\circ}\text{C}/\text{W}$

The values are based on Junction-to-Case Thermal Impedance measured with the device mounted to a large heat sink, assuming a maximum junction temperature of $T_{J(max)}=175^{\circ}\text{C}$.

Typical Performance

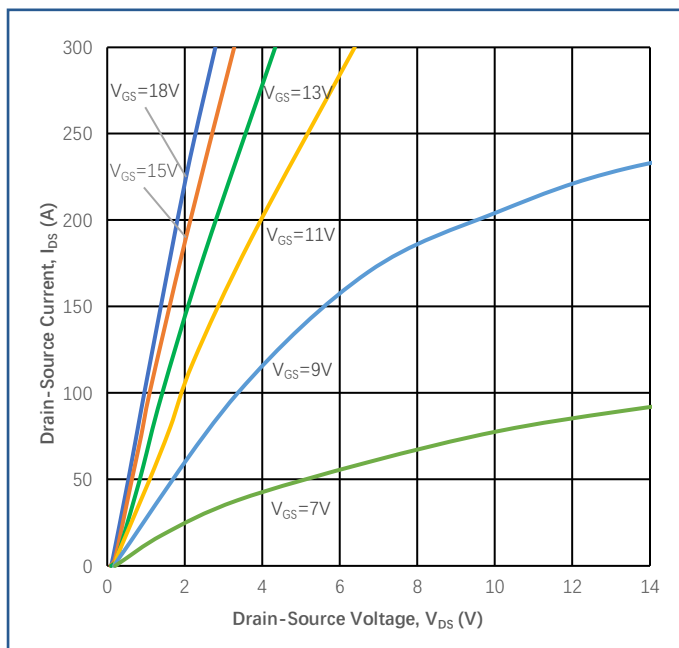


Figure 1
Output Characteristics ($T_J = 25^\circ\text{C}$)

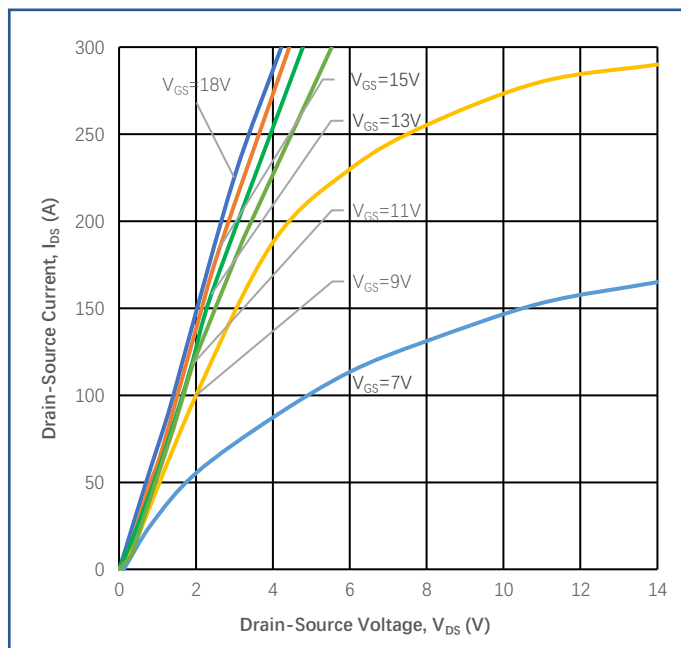


Figure 2
Output Characteristics ($T_J = 175^\circ\text{C}$)

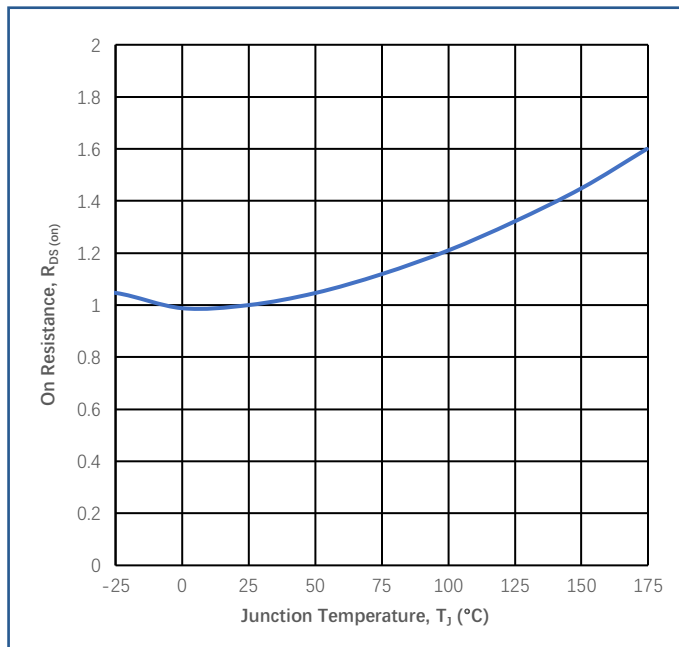


Figure 3
Normalized On-Resistance vs. Temperature

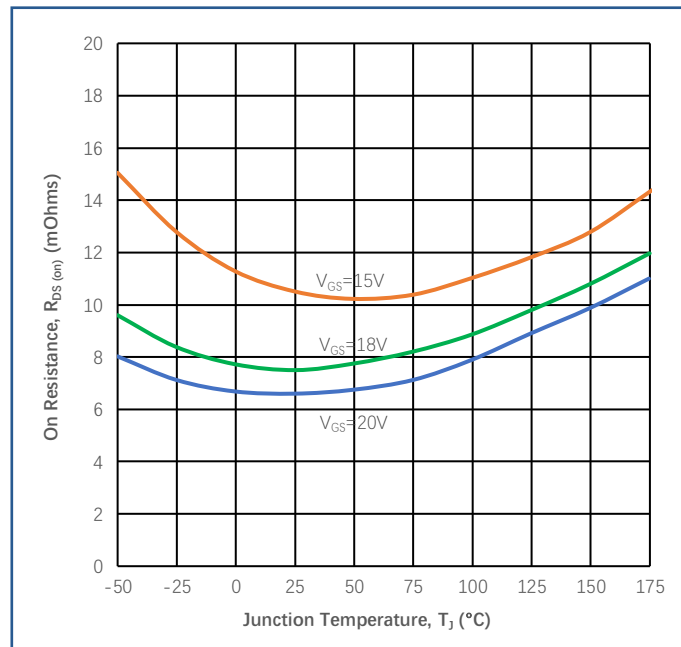


Figure 4
On-Resistance vs. Temperature

Typical Performance

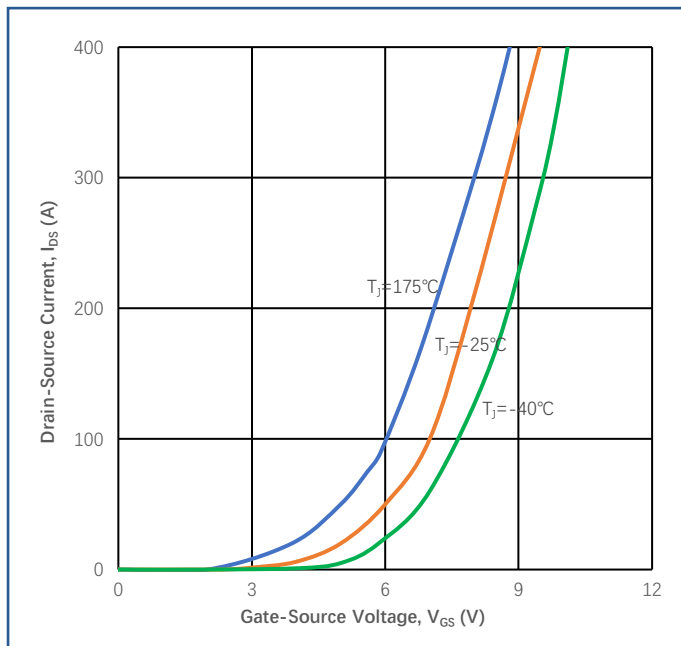


Figure 5
Transfer Characteristic

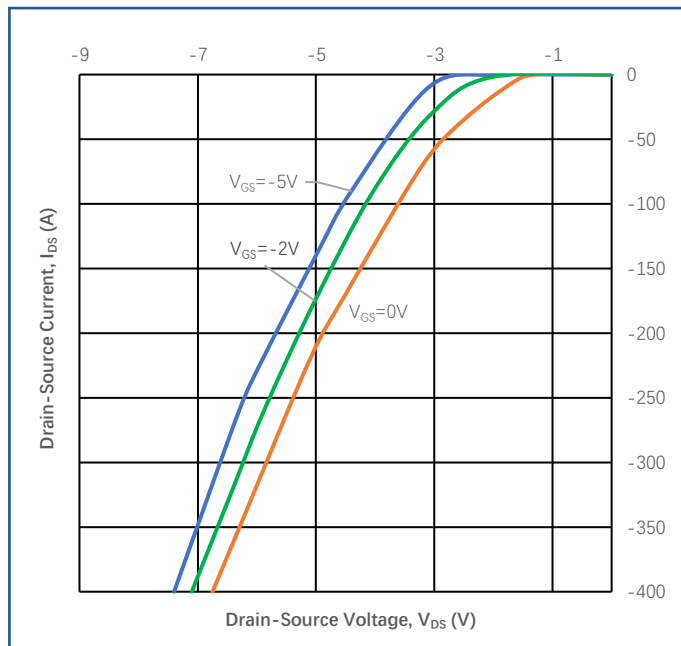


Figure 6
Body Diode Characteristic at 25°C

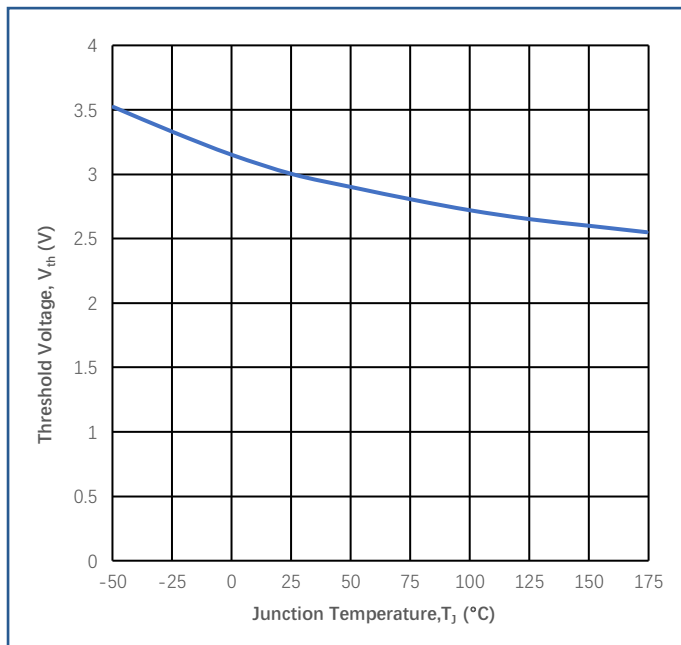


Figure 7
Threshold Voltage vs. Temperature

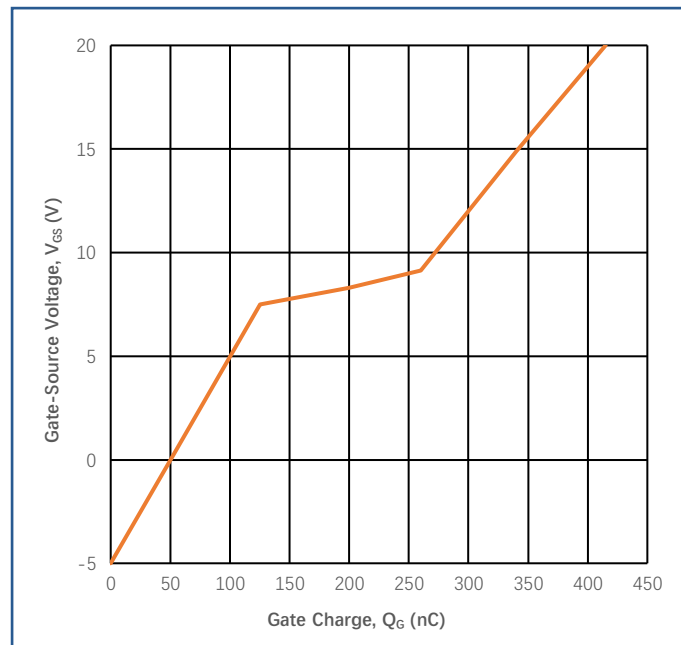


Figure 8
Gate Charge Characteristics

Typical Performance

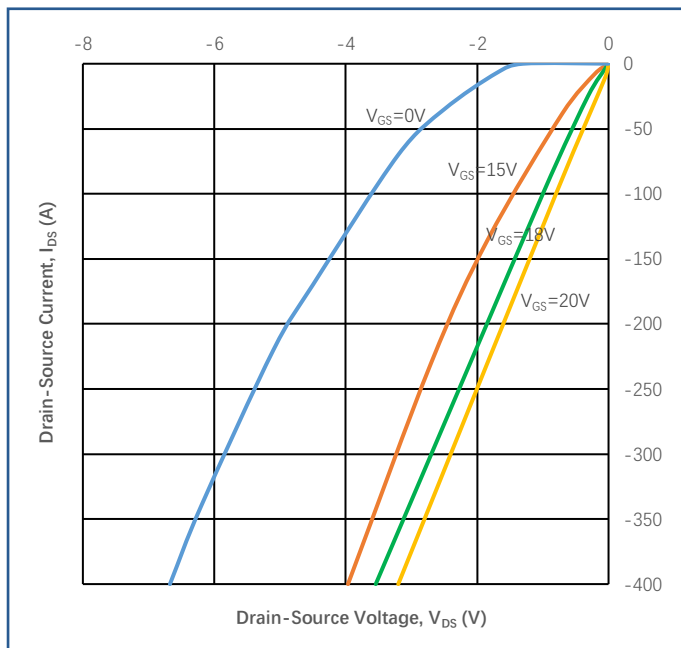


Figure 9
3rd Quadrant Characteristic at 25°C

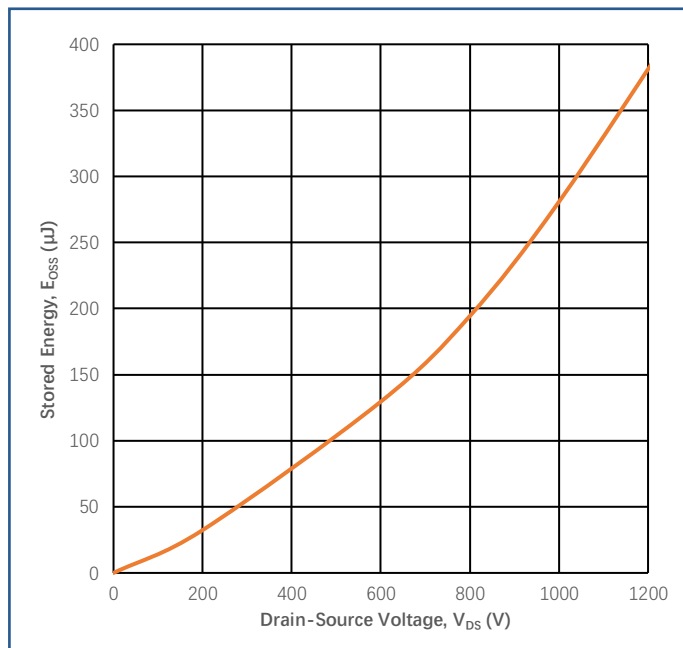


Figure 10
Output Capacitor Stored Energy

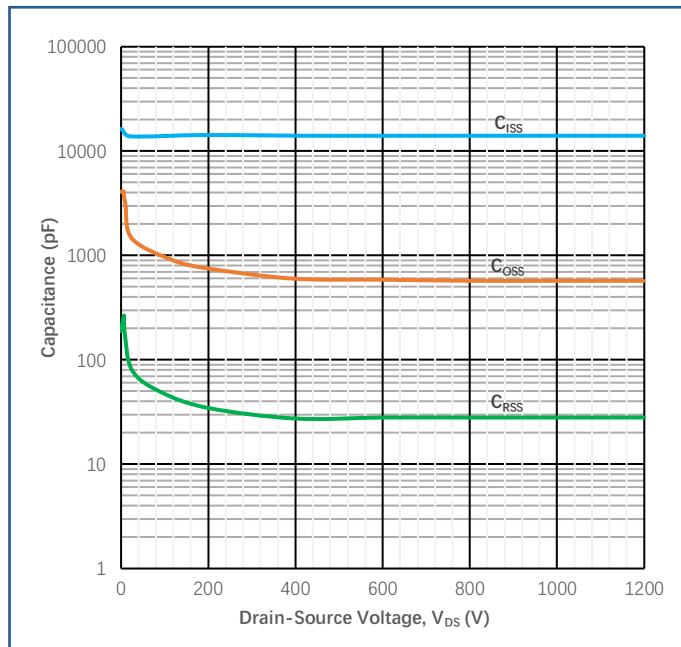


Figure 11
Capacitances vs. Drain-Source

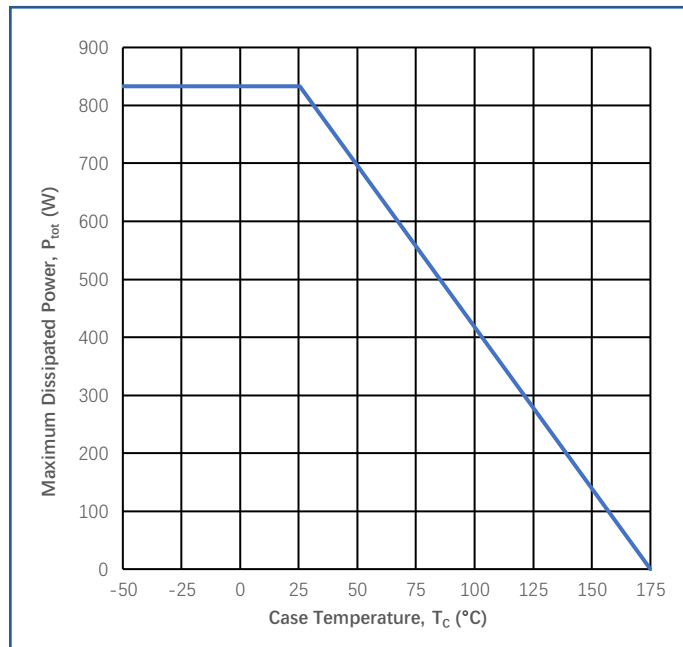


Figure 12
Max Power Dissipation Derating vs T_C

Typical Performance

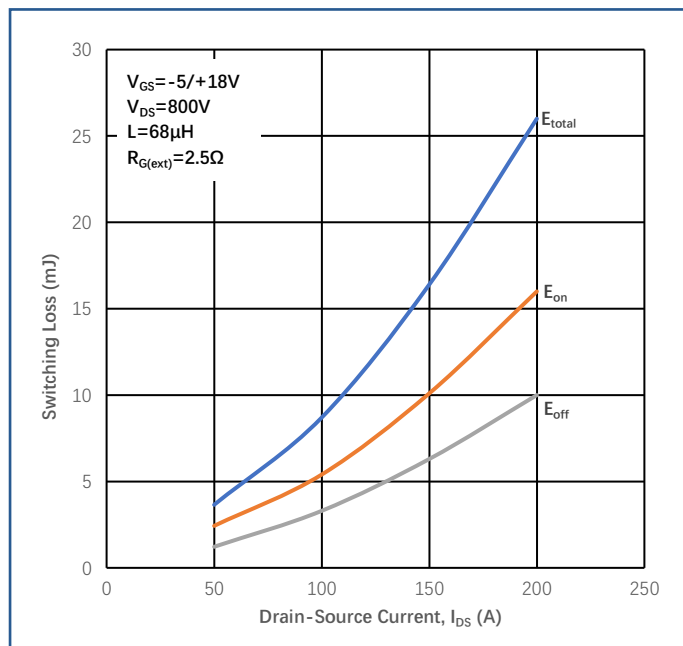


Figure 13
Switching Energy vs. Drain Current

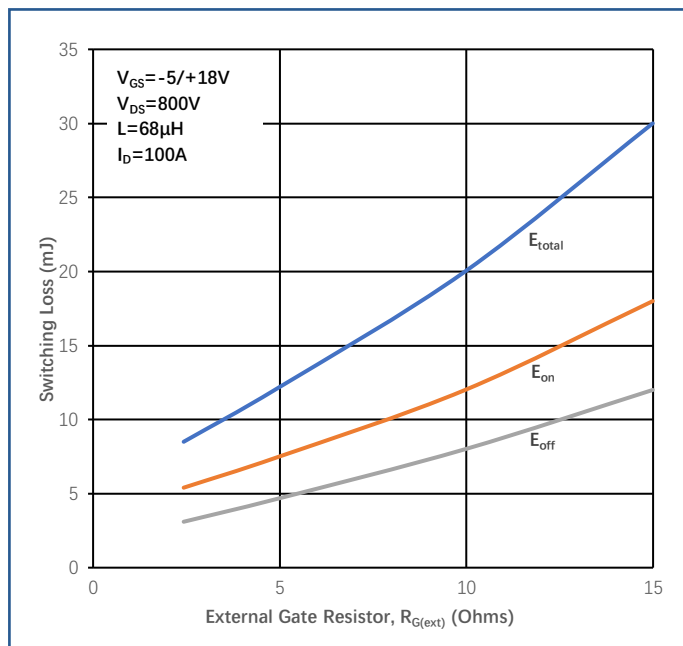


Figure 14
Switching Energy vs. $R_{G(ext)}$

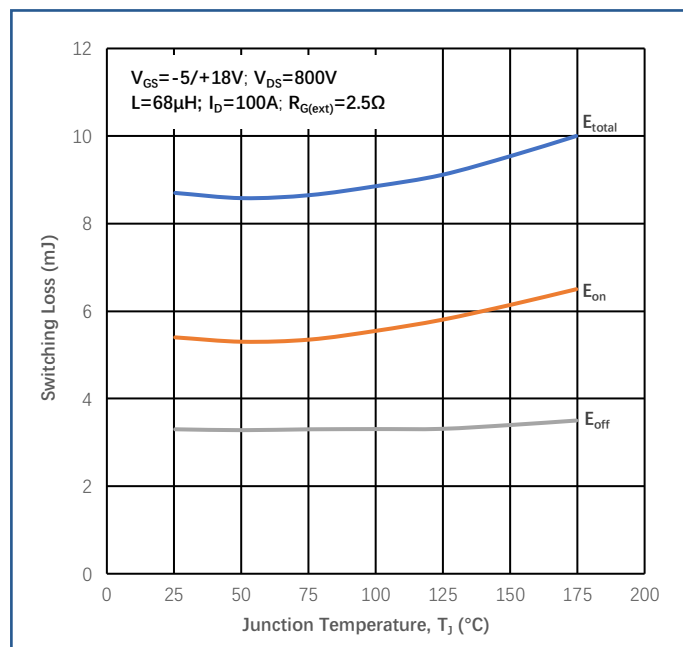


Figure 15
Switching Energy vs. Temperature

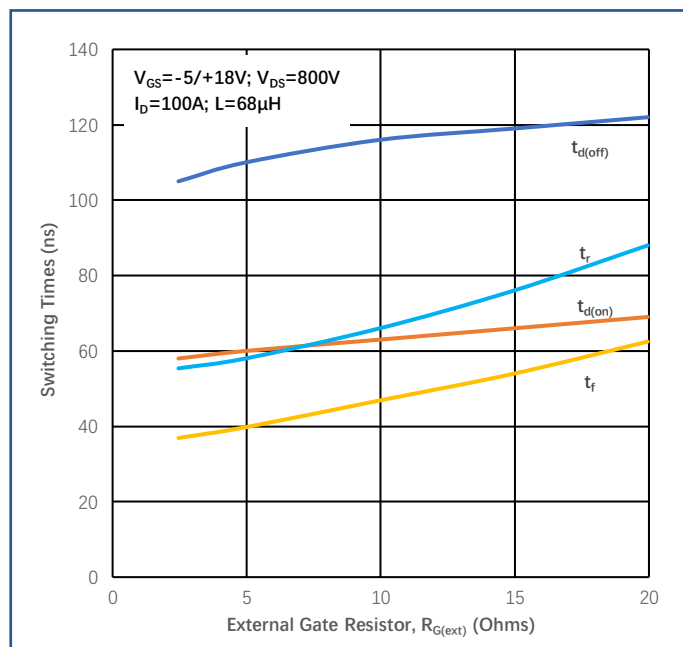


Figure 16
Switching Times vs. $R_{G(ext)}$

Typical Performance

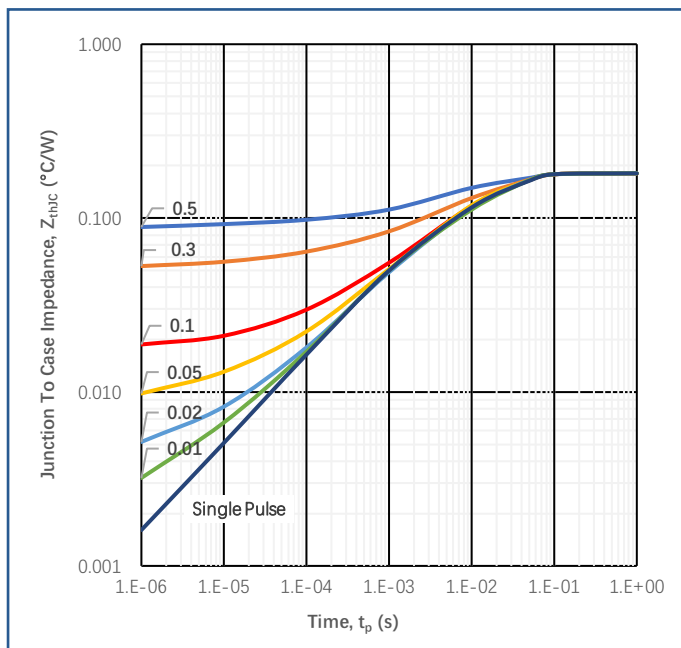


Figure 17
Transient Thermal Impedance

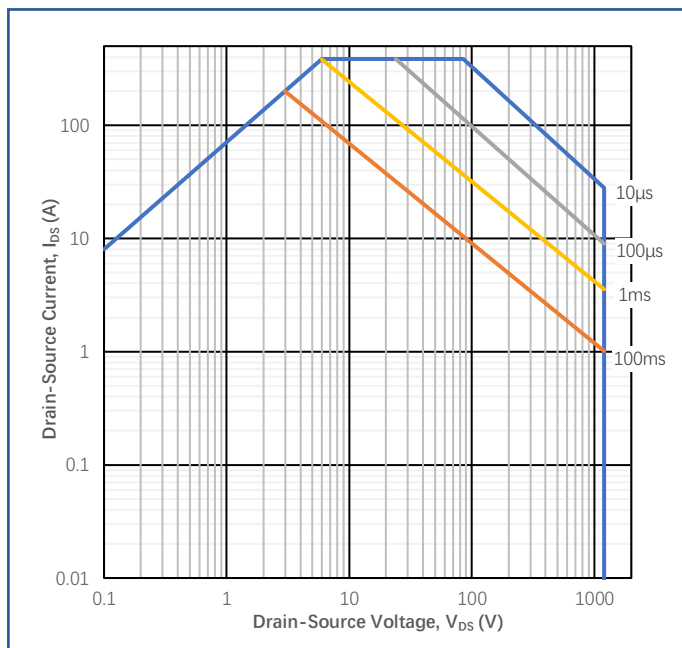
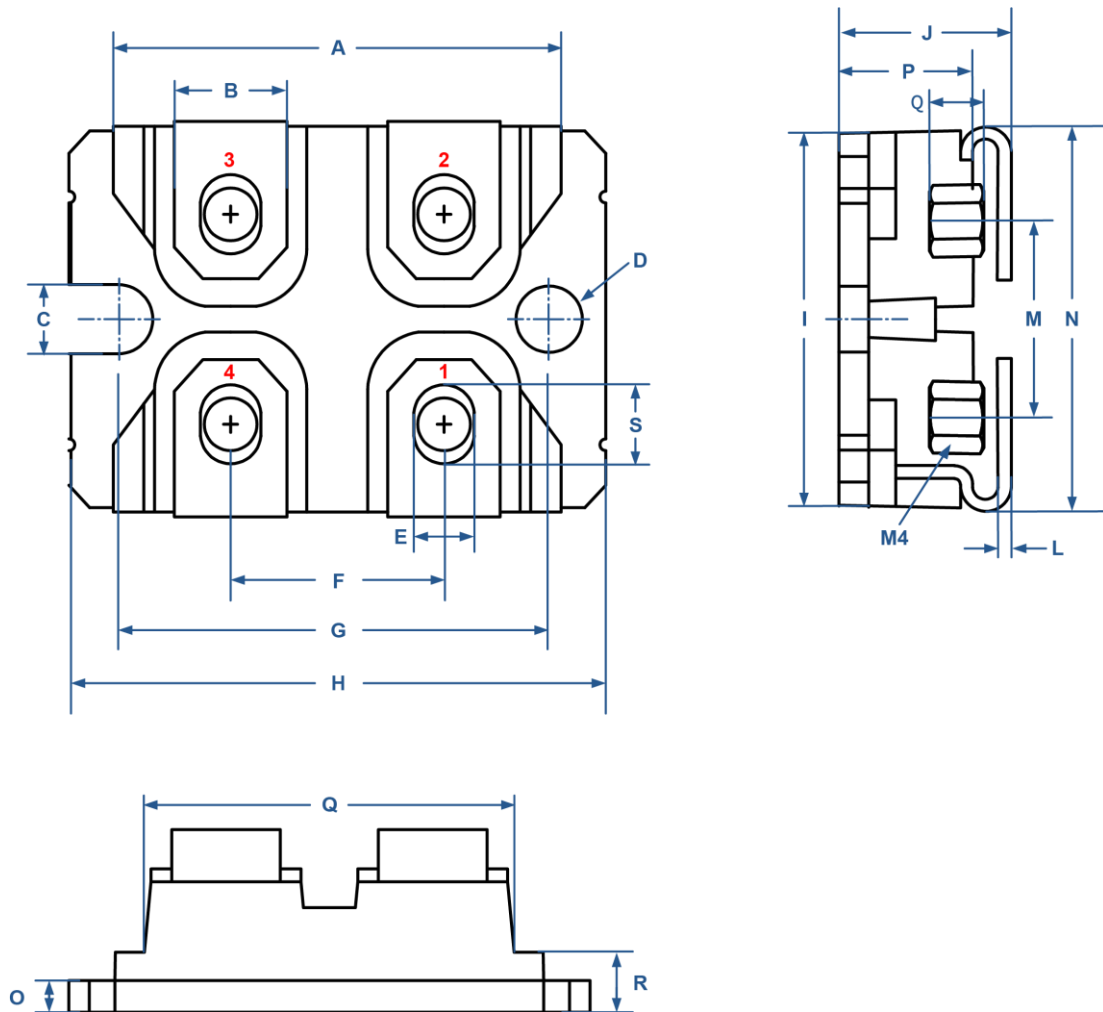


Figure 18
Safe Operating Area

Package Dimensions (mm)

Package Type: SOT-227



Symbol	Millimeters		Symbol	Millimeters	
	Min.	Max.		Min.	Max.
A	31.40	31.60	K *	9.40	9.60
B	7.70	8.10	L	0.75	0.85
C	4.20	4.40	M	12.40	12.80
D	4.20	4.40	N *	24.50	25.40
E	4.10	4.30	O *	1.90	2.10
F	14.90	15.10	P	3.10	3.95
G	30.10	30.40	Q *	26.60	27.00
H *	38.00	38.40	R *	3.80	4.20
I / T	23.80	24.20	S	5.10	5.40
J *	12.20	12.70	Mark * as main/key dimensions.		

Pin	Symbol	Description
1	S	Power Source
2	KS	Driver Source
3	G	Gate
4, Tab	D	Drain

Note:

1. All metal surfaces are Sn plated (matte), except area of cut.
2. Burr or mold flash size (0.5 mm) is not included in the dimensions.

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