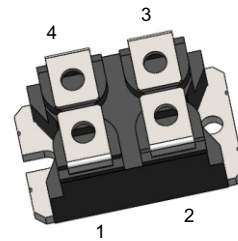


Features

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- High operating junction temperature capability
- Very fast and robust intrinsic body diode
- Kelvin gate input easing driver circuit design

Product Summary			
V _{DS}	R _{DS(on)} (mΩ)Typ	I _D (A)	Q _g (Typ)
1200V	40 @ 18V 20A	65	110nc

SOT-227



Mechanical Data

- Case:SOT-227 Package

Application

- Motor drivers
- Solar inverters
- Automotive DC/DC converters
- Automotive compressor inverters
- Switch mode power supplies

Block Diagram

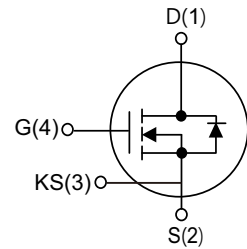


Table1 Absolute Maximum Ratings (T_c=25°C, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	1200	V
Gate-Source Voltage(Max)	V _{GS(DC)}	-5/+20	V
Gate-Source Voltage(Max)	V _{GS (Spike)}	-10/+23	V
Continuous Drain Current	I _D	T _C =25°C	65
		T _C =100°C	48
Pulsed Drain Current (Note 1)	I _{DM}	162	A
Recommended turn-on voltage	V _{GSon}	18±0.5	V
Recommended turn-off voltage	V _{GSoff}	-3.5/-2	V
Power Dissipation T _C =25°C	P _D	417	W
Operating Junction and Storage Temperature	T _J /T _{STG}	-55 ~ +175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	SC40N120S7P	Unit
Thermal resistance Junction to Case	R _{θJC}	0.36	°C/W

Table 3. Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
Off Characteristics							
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=1mA$	1200	-	-	V	
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=1200V, V_{GS}=0V$	-	-	100	μA	
Gate- Source Leakage Current	Forward	I_{GSS}	$V_{GS}=20V, V_{DS}=0V$	-	-	100	nA
	Reverse	I_{GSS}	$V_{GS}=-5V, V_{DS}=0V$	-	-	-100	nA
On Characteristics							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=9mA$	1.8	2.8	4.5	V	
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=18V, I_D=20A, T_J=25^{\circ}\text{C}$	-	40	52	m Ω	
		$V_{GS}=18V, I_D=20A, T_J=175^{\circ}\text{C}$	-	75	-		
Gate Resisitance	R_G	$f=1\text{MHz}$	-	2.1	-	Ω	
Dynamic Characteristics							
Input Capacitance	C_{ISS}	$V_{DS}=800V, V_{GS}=0V, f=1\text{MHz}, V_{AC}=25\text{mV}$	-	2160	-	pF	
Output Capacitance	C_{OSS}		-	100	-	pF	
Reverse Transfer Capacitance	C_{RSS}		-	5.8	-	pF	
Coss stored energy	E_{OSS}		-	40	-	μJ	
Turn-on switching energy	E_{ON}	$V_{DS}=800V, I_D=30A, V_{GS}=-3.5/18V, R_G=3.3\Omega, L=200\mu\text{H}, T_J=25^{\circ}\text{C}$	-	446.3	-	μJ	
Turn-off switching energy	E_{OFF}		-	70	-	μJ	
Turn-On Delay Time	$t_{d(on)}$		-	9.6	-	ns	
Turn-On Rise Time	t_r		-	22.1	-	ns	
Turn-Off Delay Time	$t_{d(off)}$		-	19.3	-	ns	
Turn-Off Fall Time	t_f		-	10.5	-	ns	
Total Gate Charge	Q_G	$V_{DD}=800V, I_D=30A, V_{GS}=-3/18V$	-	110	-	nC	
Gate-Source Charge	Q_{GS}		-	25	-	nC	
Gate-Drain Charge	Q_{GD}		-	59	-	nC	
Drain-Source Diode Characteristics and Maximum Ratings(Note 2)							
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=20A$	-	4.2	-	V	
Reverse Recovery Time	t_{rr}	$V_{GS}=-3.5V/+18V, V_R=800V, R_G(\text{ext})=10\Omega, L=200\mu\text{H}$	-	42	-	ns	
Recovered charge	Q_{rr}	$I_{SD}=30A, diF/dt=3000A/\mu\text{s}$	-	198.1	-	nC	
Peak reverse recovery current	I_{rrm}		-	17.4	-	A	

Notes: 1 Repetitive Rating Pulse width limited by maximum junction temperature

 2 Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

Typical Characteristics Diagrams

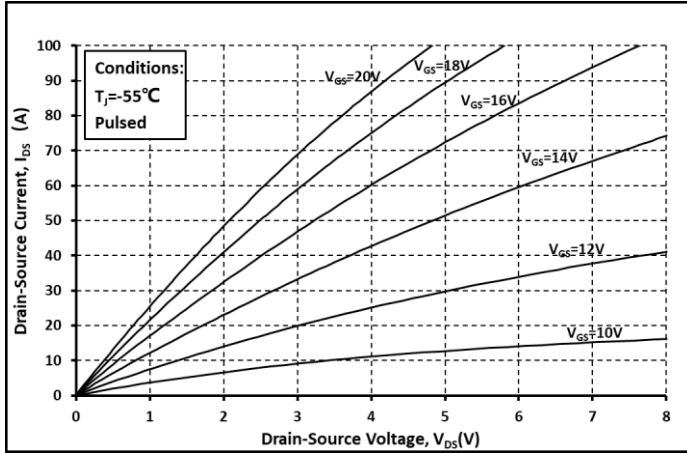


Fig. 1 Output Curve @ $T_j = -55^\circ\text{C}$

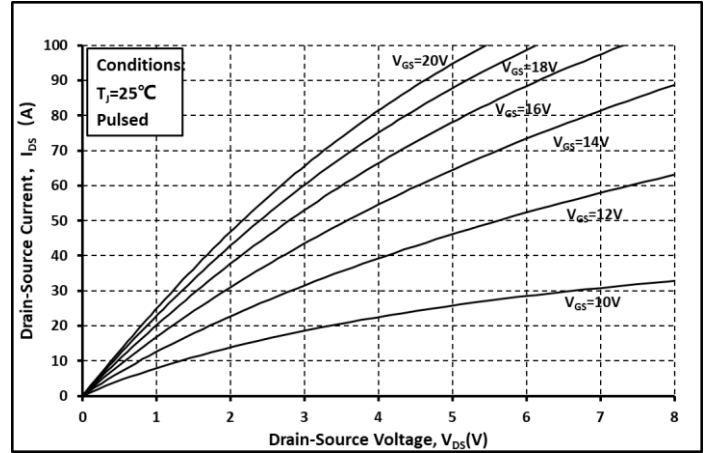


Fig. 2 Output Curve @ $T_j = 25^\circ\text{C}$

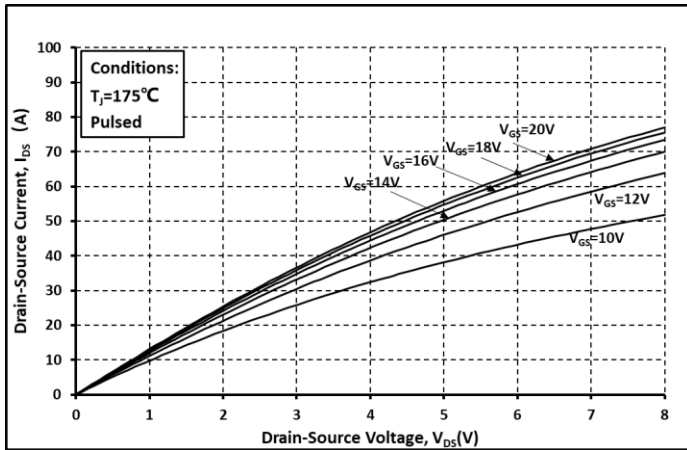


Fig. 3 Output Curve @ $T_j = 175^\circ\text{C}$

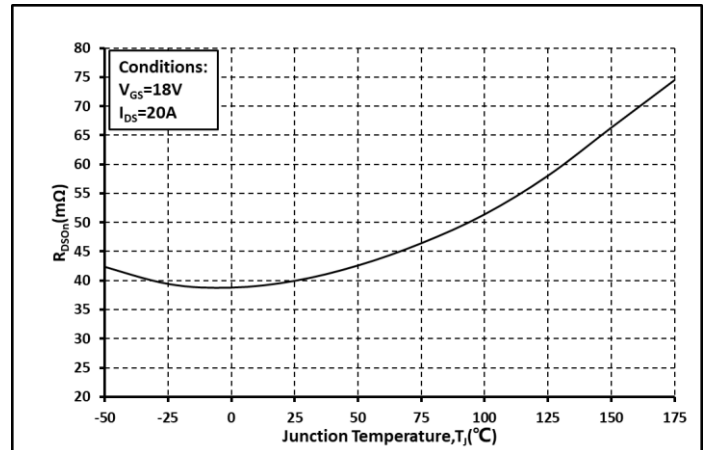


Fig. 4 R_{on} vs. Temperature

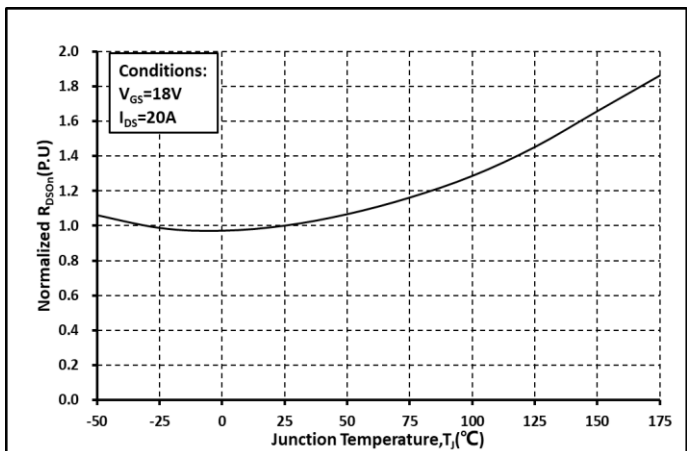


Fig. 5 Normalized R_{on} vs. Temperature

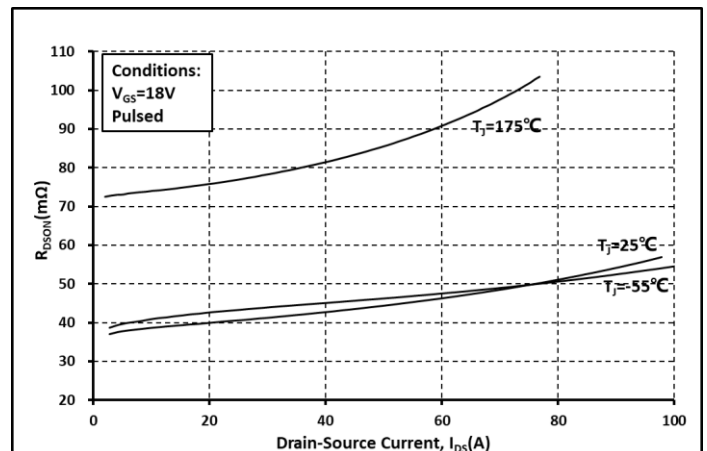


Fig. 6 R_{on} vs. I_{DS} @ Various Temperature

Typical Characteristics Diagrams

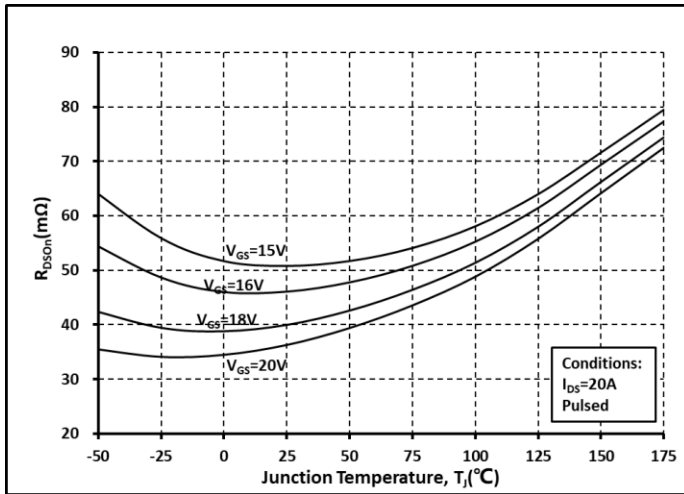


Fig. 7 Ron vs. Temperature @ Various V_{GS}

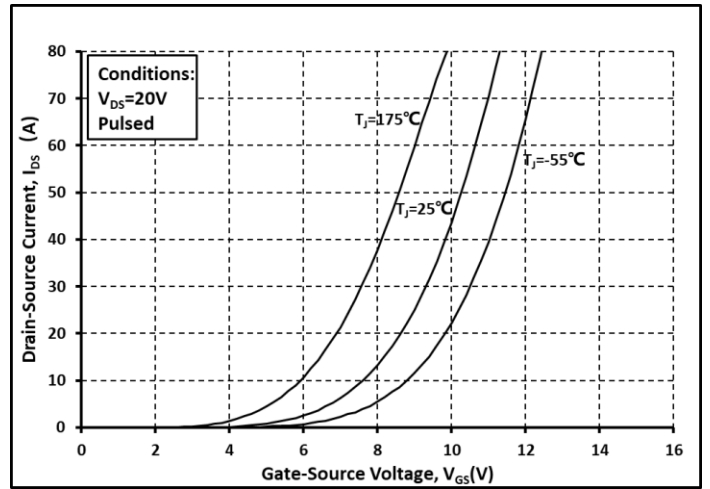


Fig. 8 Transfer Curves @ Various Temperature

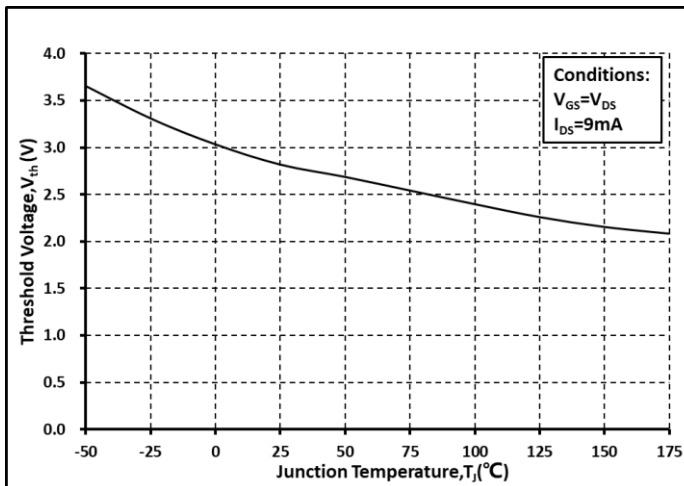


Fig. 9 Threshold Voltage vs. Temperature

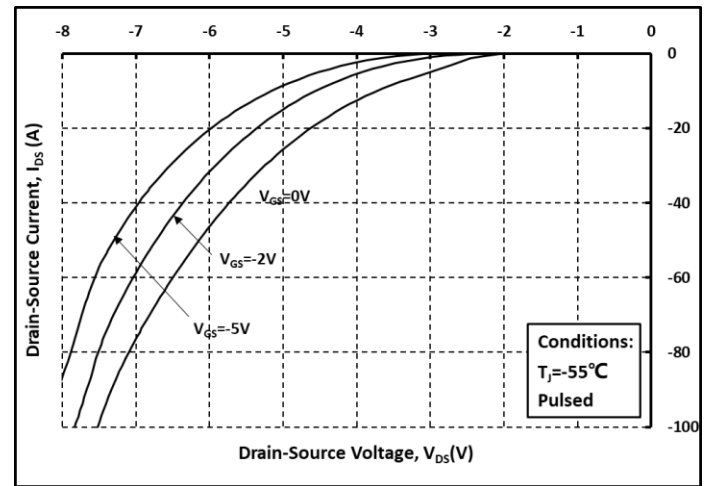


Fig. 10 Body Diode curves @ $T_j = -55^\circ\text{C}$

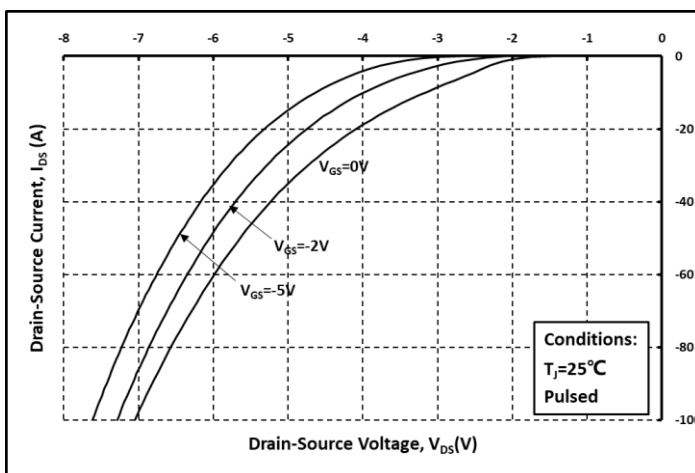


Fig. 11 Body Diode curves @ $T_j = 25^\circ\text{C}$

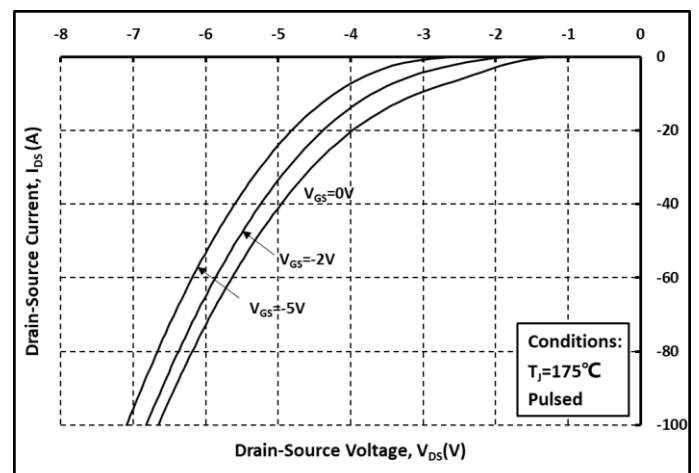


Fig. 12 Body Diode curves @ $T_j = 175^\circ\text{C}$

Typical Characteristics Diagrams

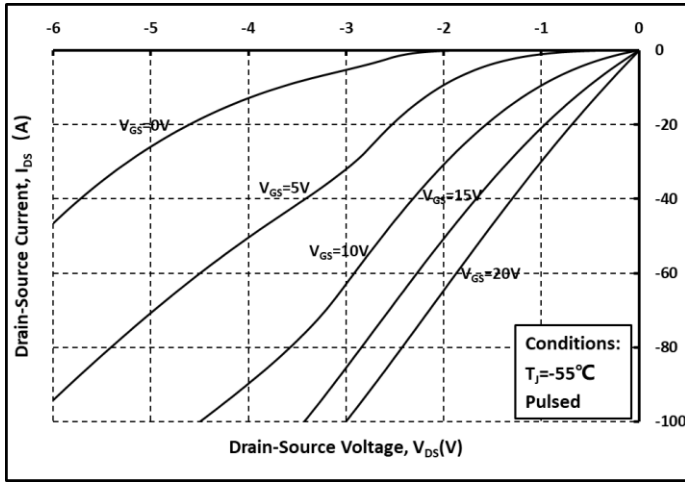


Fig. 13 3rd Quadrant curves @ $T_j = -55^\circ\text{C}$

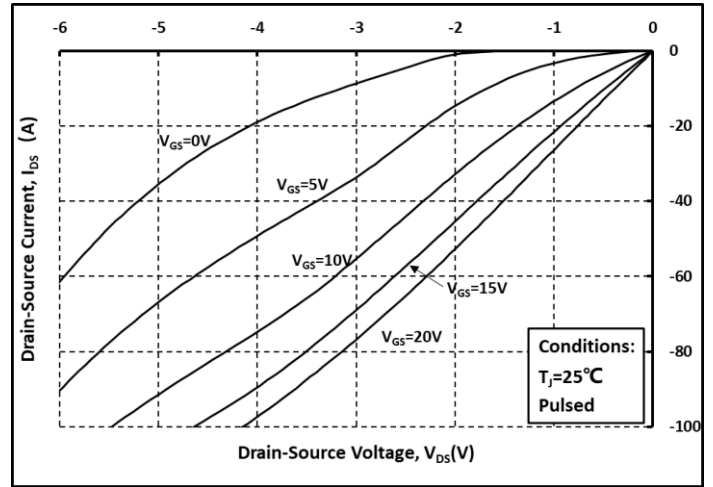


Fig. 14 3rd Quadrant curves @ $T_j = 25^\circ\text{C}$

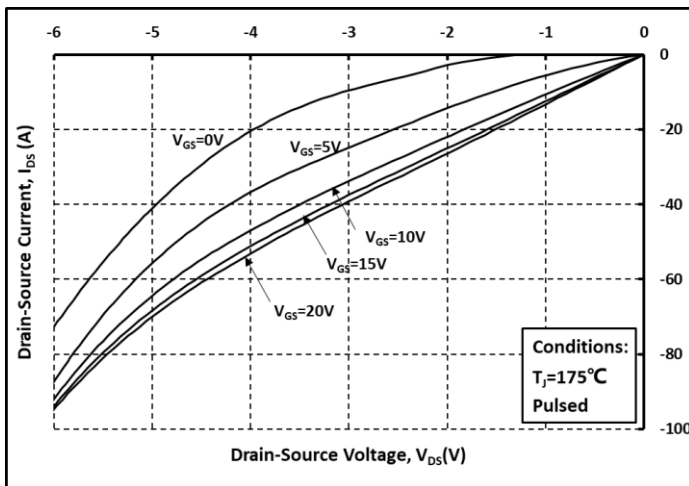


Fig. 15 3rd Quadrant curves @ $T_j = 175^\circ\text{C}$

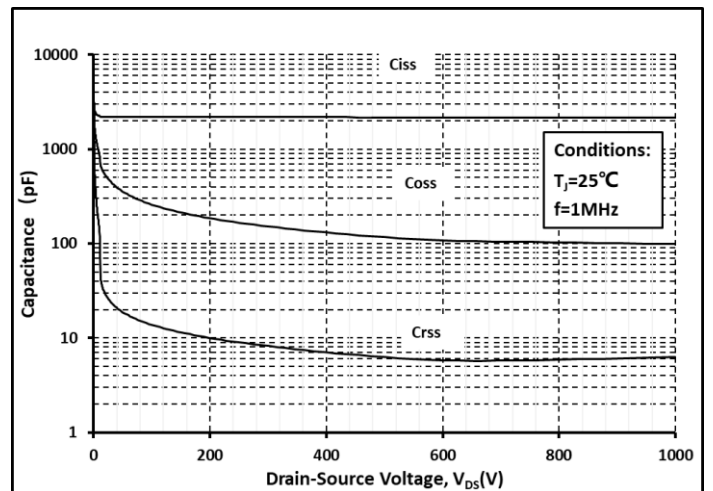


Fig. 16 Capacitance vs. V_{DS}

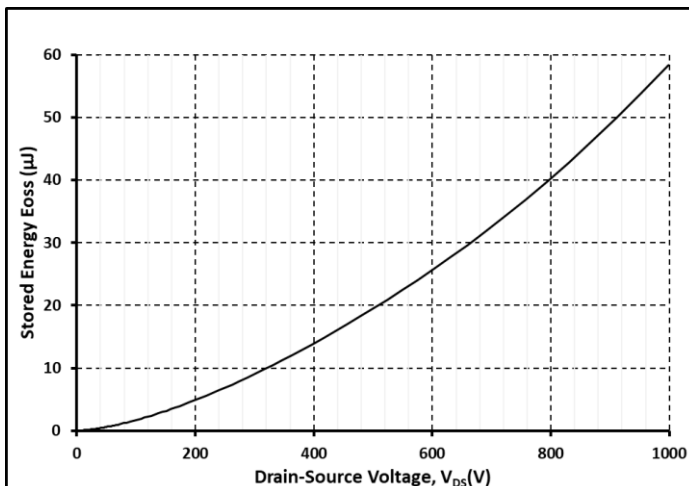


Fig. 17 Output Capacitor Stored Energy

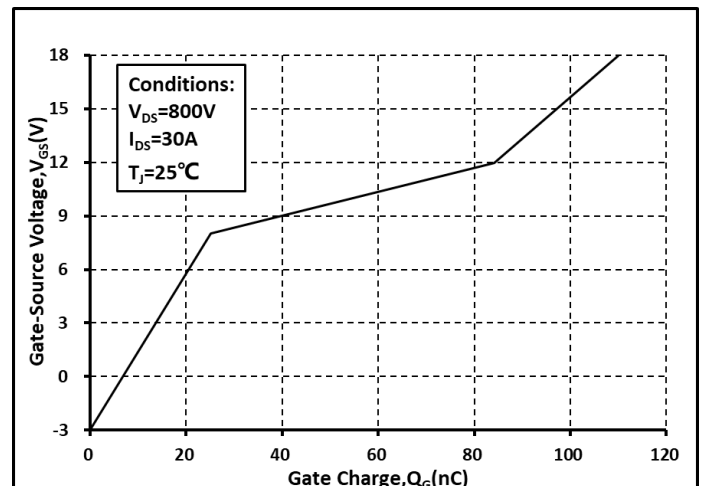


Fig. 18 Gate Charge Characteristics

Typical Characteristics Diagrams

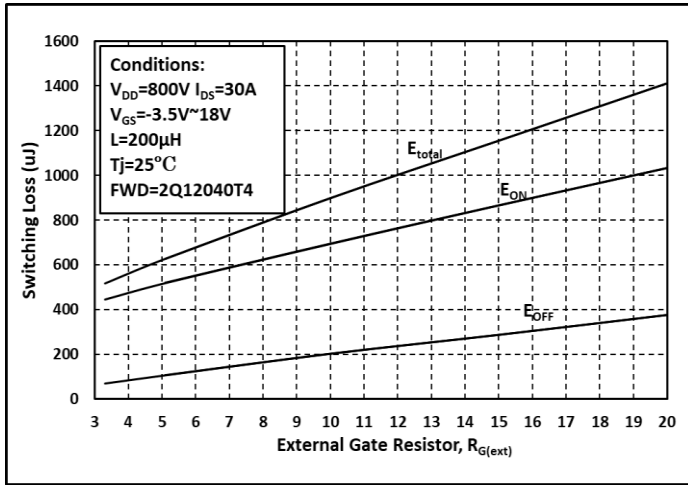


Fig. 19 Switching Energy vs. $R_{G(ext)}$

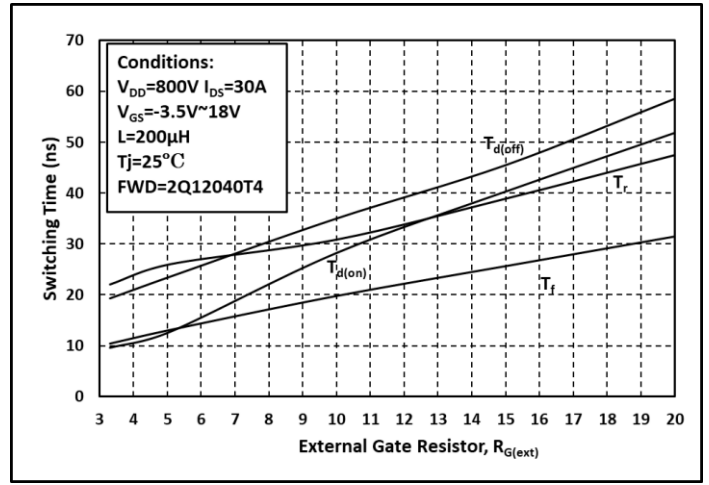


Fig. 20 Switching Times vs. $R_{G(ext)}$

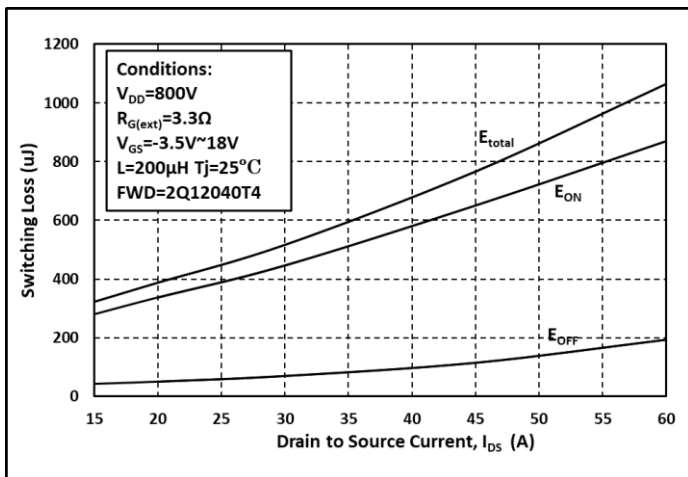


Fig. 21 Switching Energy vs. I_{DS}

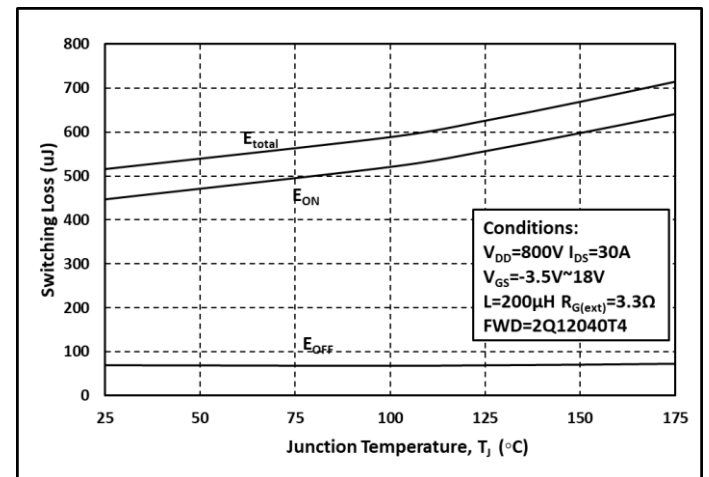


Fig. 22 Switching Energy vs. Temperature

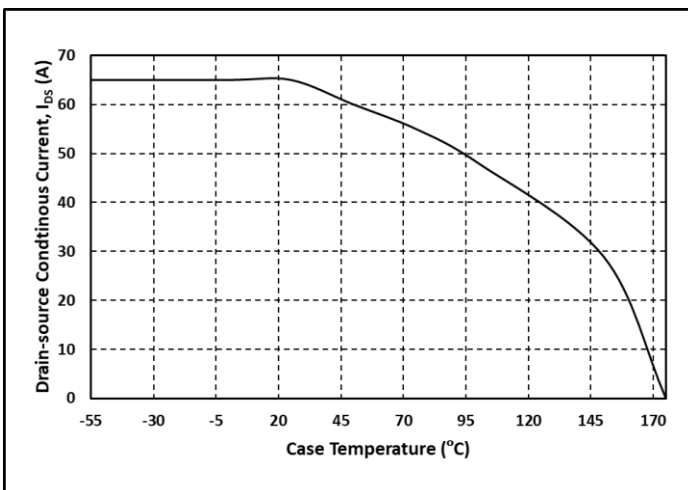


Fig. 23 Continuous Drain Current vs. Case Temperature

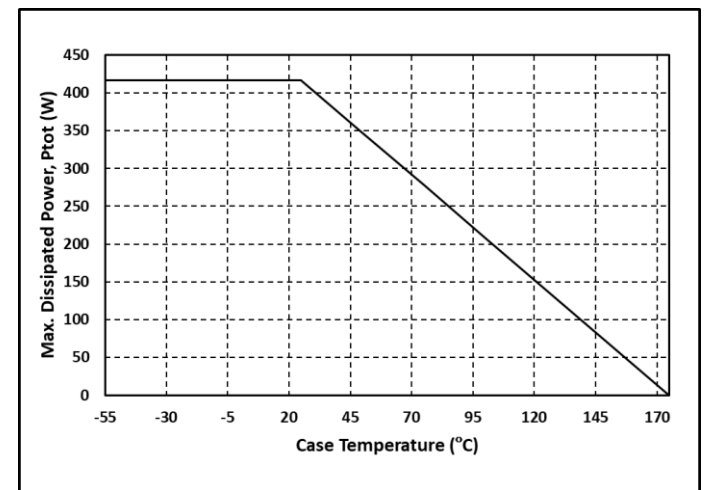


Fig. 24 Max. Power Dissipation Derating vs. Case Temperature

Typical Characteristics Diagrams

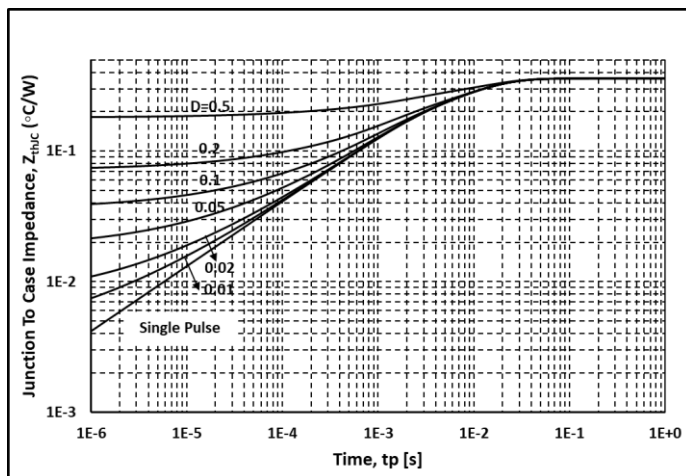


Fig. 25 Thermal impedance

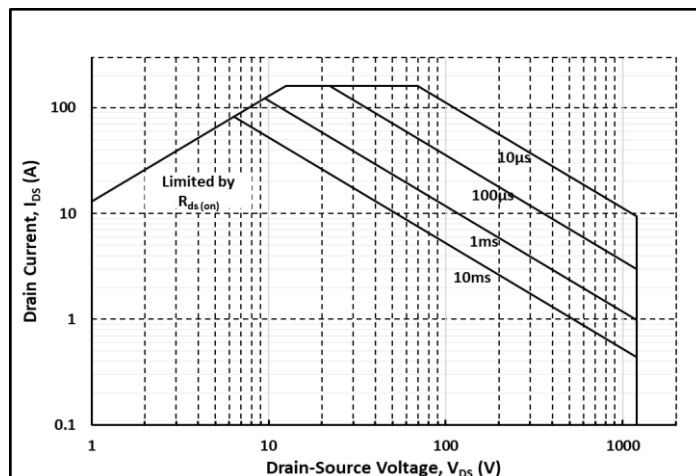
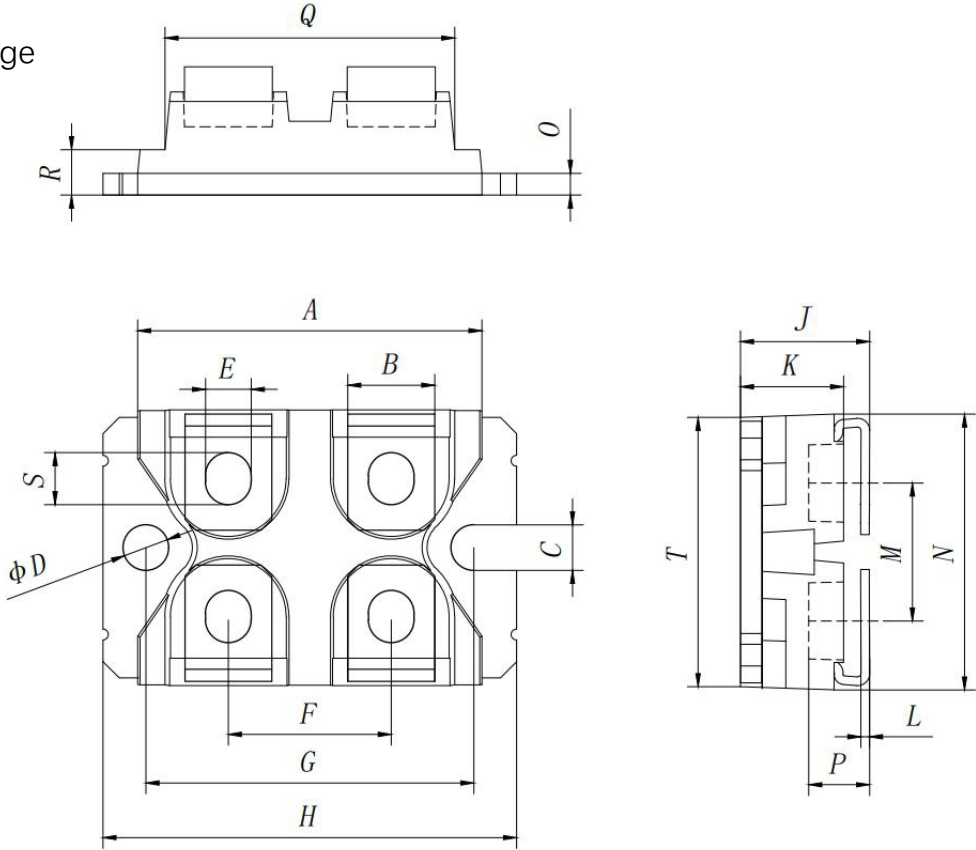


Fig. 26 Safe Operating Area

Dimensions

SOT-227 package



SYMBOLS	DIMENSION IN MM		
	MIN	NOM	MAX
A	31.20	31.70	32.20
B	7.50	8.00	8.50
C	3.80	4.20	4.60
D	3.80	4.20	4.60
E	3.80	4.20	4.60
F	14.50	15.00	15.50
G	29.80	30.20	30.60
H	37.70	38.10	38.50
J	11.50	11.90	12.30
K	8.90	9.50	10.00
L	0.75	0.80	0.85
M	12.40	12.70	13.00
N	25.00	25.40	25.80
O	1.70	2.00	2.30
P	4.95	5.60	6.10
Q	26.40	26.70	27.00
R	3.90	4.18	4.45
S	4.20	4.80	5.40
T	23.80	24.80	25.80

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