SOT-227 Power Module
Single Switch - Super Junction Power MOSFET, 100 A

SOT-227

FEATURES

- Super junction power MOSFET
- Low $R_{DS(on)}$
- Low conduction losses and low switching losses
- Maximum 150 °C junction temperature
- UL approved file E78996
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

APPLICATIONS

- DC/DC converter
- DC/AC inverter
- UPS
- Charging stations
- Solar inverters

PRIMARY CHARACTERISTICS	
V_{DSS}	650 V
$R_{DS(on)}$ typical	22 mΩ
I_D	82 A at T_C = 90 °C
Type	Modules - MOSFET
Package	SOT-227

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MAX.**	**UNITS**
MOSFET				
Drain to source voltage	V_{DSS}		650	V
Continuous drain current, $V_{GS\ at}$ 13 V	I_D	T_C = 25 °C	113	A
		T_C = 90 °C	82	
Pulsed drain current	I_{DM} (1)	T_C = 25 °C	240	
Power dissipation	P_D	T_C = 25 °C	833	W
Gate to source voltage	V_{GS}		± 20	V
Single pulse avalanche energy (2)	E_{AS}	T_C = 25 °C, L = 5 mH, V_{DS} = 75 V	480	mJ
Avalanche current	I_{AS}		13.9	A
MODULE				
Operating junction temperature range	T_J		-55 to +150	°C
Operating storage temperature range	T_{Stg}		-40 to +150	
Insulation voltage (RMS)	V_{ISOL}	Any terminal to case, t = 1 min	2500	V

Notes

(1) Limited at max. junction temperature

(2) Duty cycle ≤ 1 %

ELECTRICAL CHARACTERISTICS (T_J = 25 °C unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Drain to source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 0.5 mA	650	-	-	V
Breakdown voltage temperature coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	I_D = 0.5 mA (25 °C to 125 °C)	-	0.51	-	V/°C
Static drain to source on-resistance	$R_{DS(on)}$	V_{GS} = 13 V, I_D = 100 A	-	22	27.3	mΩ
		V_{GS} = 13 V, I_D = 100 A, T_J = 125 °C	-	46	-	
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 0.5 mA	2.9	4.0	5.1	V
		V_{DS} = V_{GS}, I_D = 0.5 mA, T_J = 125 °C	-	3.0	-	
Temperature coefficient of threshold voltage	$\Delta V_{GS(th)}/\Delta T_J$	V_{DS} = V_{GS}, I_D = 0.5 mA (25 °C to 125 °C)	-	-10.0	-	mV/°
Forward transconductance	g_{fs}	V_{DS} = 20 V, I_D = 100 A, V_{GS} = 10 V	-	87	-	S
Drain to source leakage current	I_{DSS}	V_{DS} = 650 V, V_{GS} = 0 V	-	0.23	5.0	µA
		V_{DS} = 650 V, V_{GS} = 0 V, T_J = 125 °C	-	53.3	-	
Gate to source leakage	I_{GSS}	V_{GS} = ± 20 V	-	-	± 200	nA
Total gate charge	Q_g	I_D = 46 A, V_{DS} = 480 V, V_{GS} = 0 V / 13 V	-	338	-	nC
Gate to source charge	Q_{gs}		-	68	-	
Gate to drain ("Miller") charge	Q_{gd}		-	110	-	
Turn-on switching energy	E_{on}	V_{DD} = 400 V, I_D = 100 A, $R_{g(on)}$ = 1.0 Ω, V_{GS} = 13 V, T_J = 125 °C Used one diode of VS-U5FX150FA60 as free wheeling	-	1.24	-	mJ
Turn-on delay time	$t_{d(on)}$		-	38	-	ns
Rise time	t_r		-	51	-	
Turn-off switching energy	E_{off}	V_{DD} = 400 V, I_D = 100 A, $R_{g(off)}$ = 4.7 Ω, V_{GS} = 13 V / -10 V, T_J = 125 °C Used one diode of VS-U5FX150FA60 as free wheeling	-	0.47	-	mJ
Turn-off delay time	$t_{d(off)}$		-	119	-	ns
Fall time	t_f		-	6	-	
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 400 V, f = 100 kHz	-	12.4	-	nF
Output capacitance	C_{oss}		-	0.11	-	
Reverse transfer capacitance	C_{rss}		-	0.02	-	

SOURCE-DRAIN RATINGS AND CHARACTERISTICS (T_J = 25 °C unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Pulsed source current (body diode)	I_{SM}	6 ms rectangular pulse	-	-	1224	A
Diode forward voltage	V_{SD}	I_S = 100 A, V_{GS} = 0 V	-	0.97	1.5	V
Reverse recovery time	t_{rr}	T_J = 25 °C, I_F = I_S = 50 A, dI/dt = 100 A/µs, V_R = 100 V	-	183	-	ns
Reverse recovery charge	Q_{rr}		-	1310	-	nC
Reverse recovery current	I_{RRM}		-	14.3	-	A

THERMAL AND MECHANICAL SPECIFICATIONS							
PARAMETER		**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Operating junction temperature range		T_J		-55	-	150	°C
Operating storage temperature range		T_{Stg}		-40	-	150	
Junction to case	MOSFET	R_{thJC}		-	-	0.15	°C/W
Case to heatsink	Module	R_{thCS}	Flat, greased surface	-	0.1	-	
Weight				-	30	-	g
Mounting torque			Torque to terminal	-	-	1.1 (9.7)	Nm (lbf. in)
			Torque to heatsink	-	-	1.8 (15.9)	Nm (lbf. in)
Case style				SOT-227			

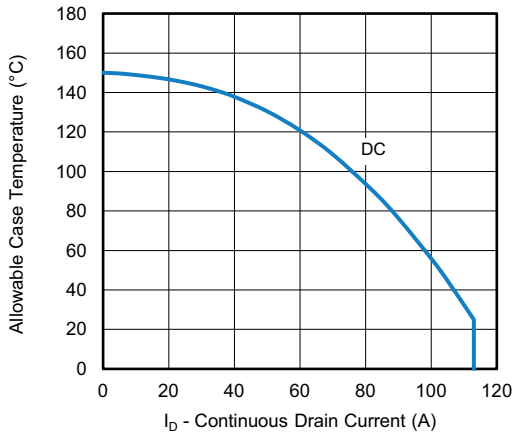


Fig. 1 - Maximum Continuous Drain Current vs. Case Temperature

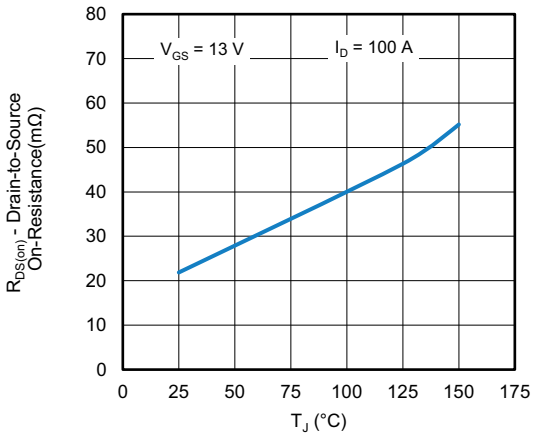


Fig. 4 - Typical Drain-to-Source On-Resistance vs. Temperature

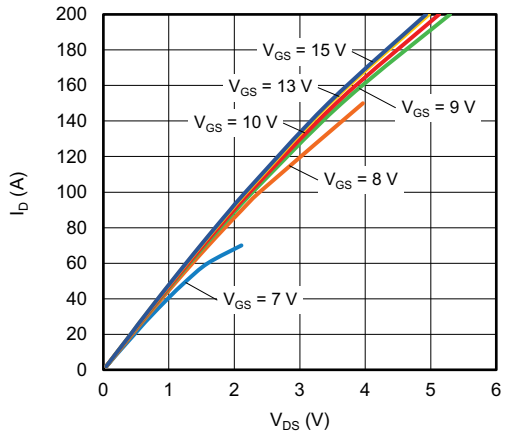


Fig. 2 - Typical Drain to Source Current Output Characteristics at T_J = 25 °C

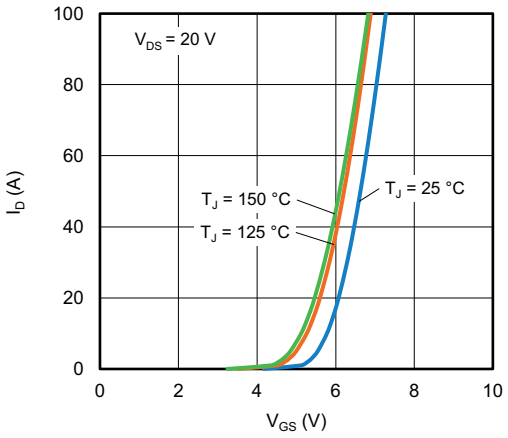


Fig. 5 - Typical Transfer Characteristics

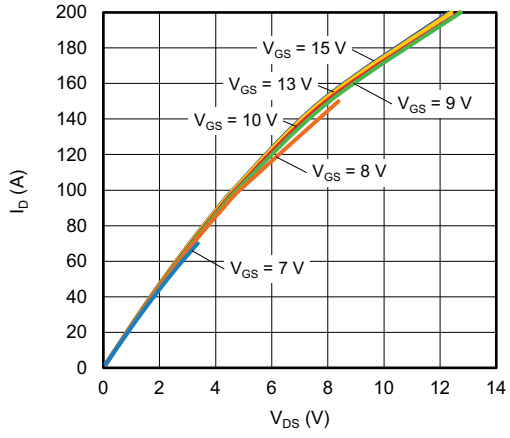


Fig. 3 - Typical Drain to Source Current Output Characteristics at T_J = 125 °C

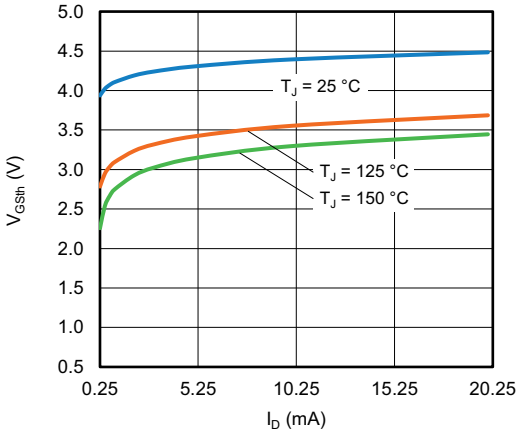


Fig. 6 - Typical Gate Threshold Voltage Characteristics

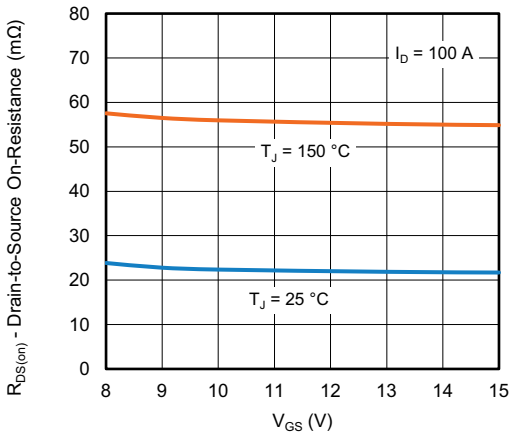


Fig. 7 - Typical Drain-to-Source On-Resistance vs. Gate to Source Voltage

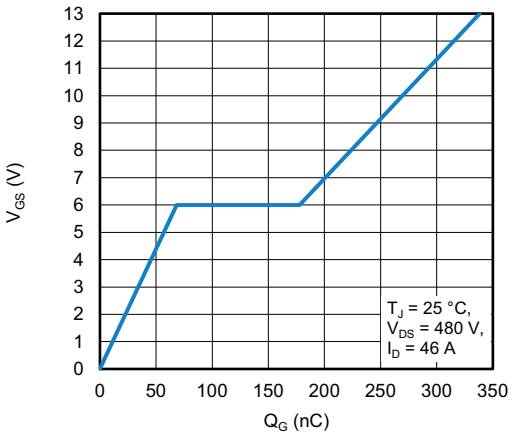


Fig. 10 - Typical Gate Charge vs. Gate to Source Voltage

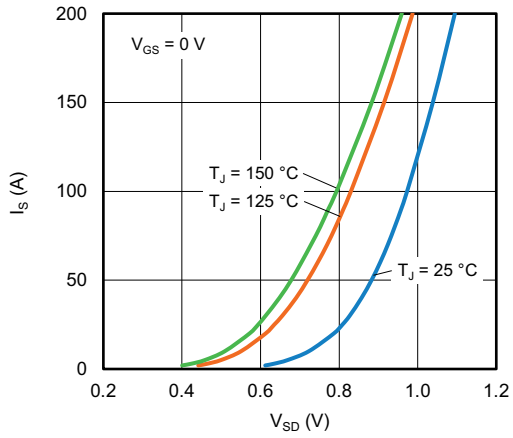


Fig. 8 - Typical Body Diode Source-to-Drain Current Characteristics

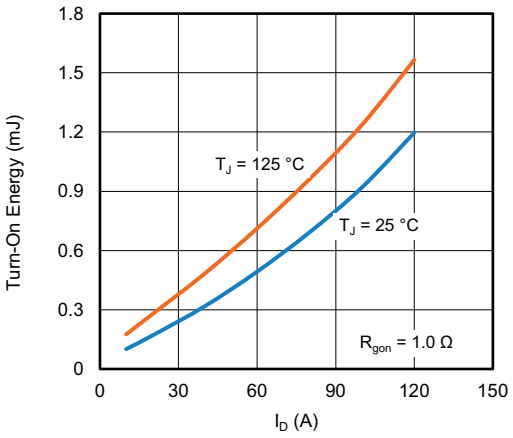


Fig. 11 - Typical Turn-On Energy Loss vs. I_D (V_{GS} = 13 V)

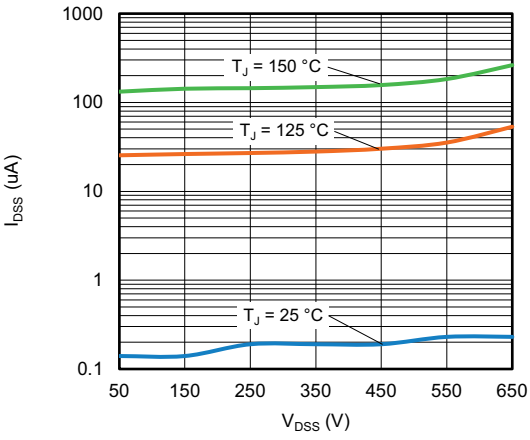


Fig. 9 - Typical Zero Gate Voltage Drain Current

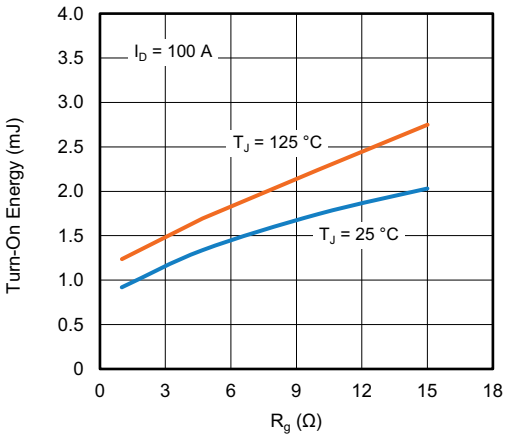


Fig. 12 - Typical Turn-On Energy Loss vs. R_g (V_{GS} = 13 V)

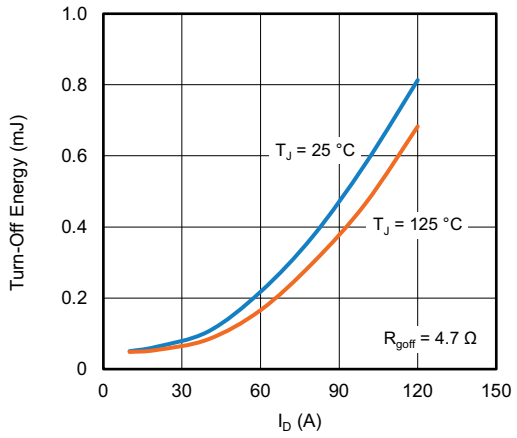


Fig. 13 - Typical Turn-Off Energy Loss vs. I_D
(V_{GS} = 13 V / -10 V)

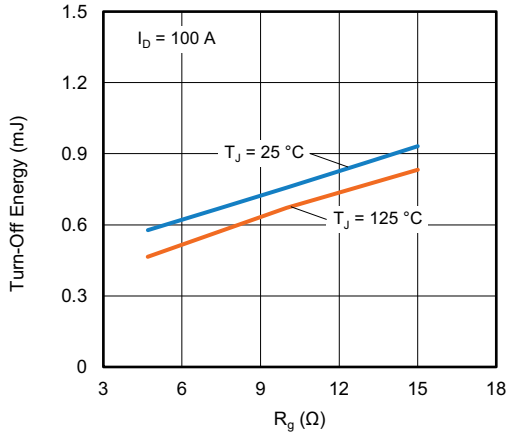


Fig. 14 - Typical Turn-Off Energy Loss vs. R_g
(V_{GS} = 13 V / -10 V)

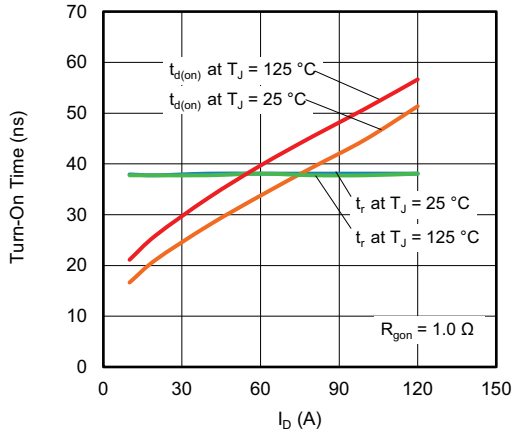


Fig. 15 - Typical Turn-On Switching Time vs. I_D
(V_{GS} = 13 V)

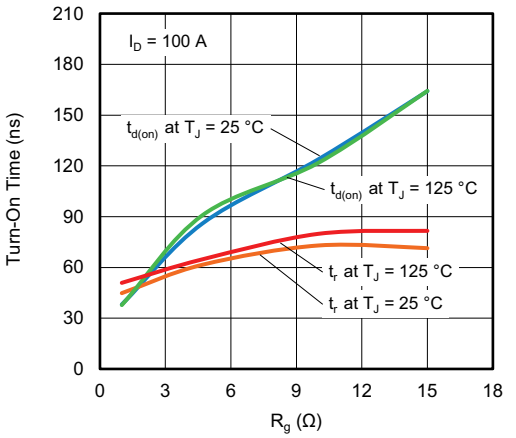


Fig. 16 - Typical Turn-On Switching Time vs. R_g
(V_{GS} = 13 V)

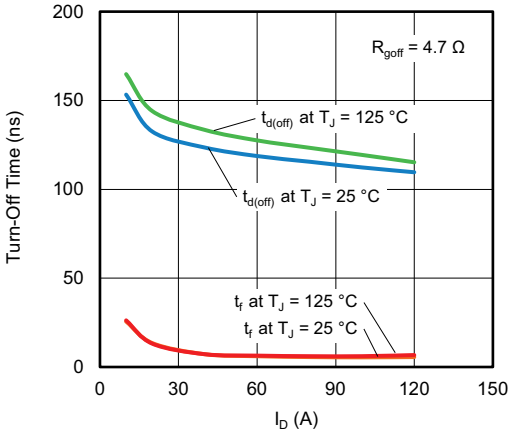


Fig. 17 - Typical Turn-Off Switching Time vs. I_D
(V_{GS} = 13 V / -10 V)

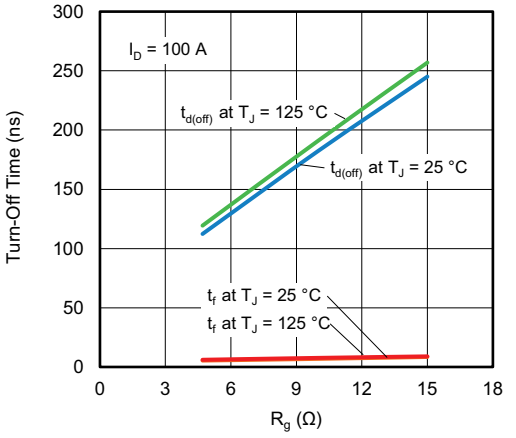


Fig. 18 - Typical Turn-Off Switching Time vs. R_g
(V_{GS} = 13 V / -10 V)

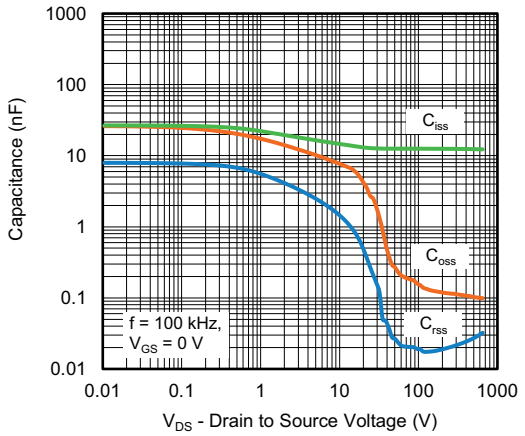


Fig. 19 - Typical Capacitance vs. Drain-to-Source Voltage

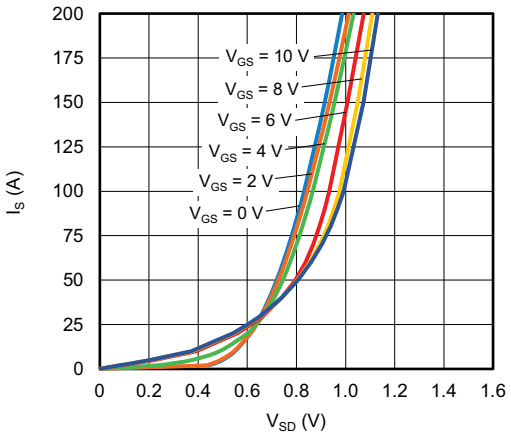


Fig. 21 - Typical Body Diode Source-to-Drain Current Characteristics T_J = 125 °C

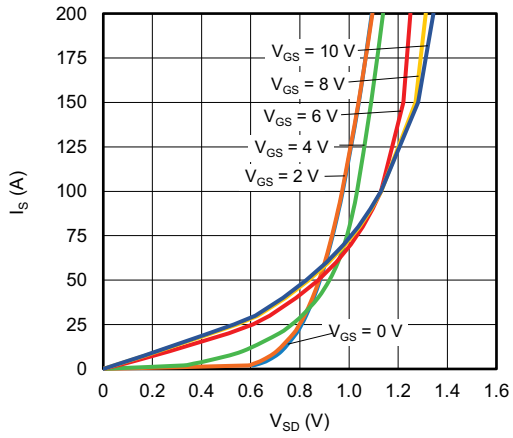


Fig. 20 - Typical Body Diode Source-to-Drain Current Characteristics T_J = 25 °C

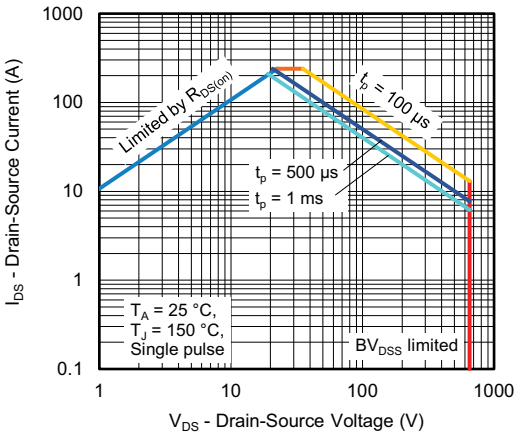


Fig. 22 - Safe Operating Area

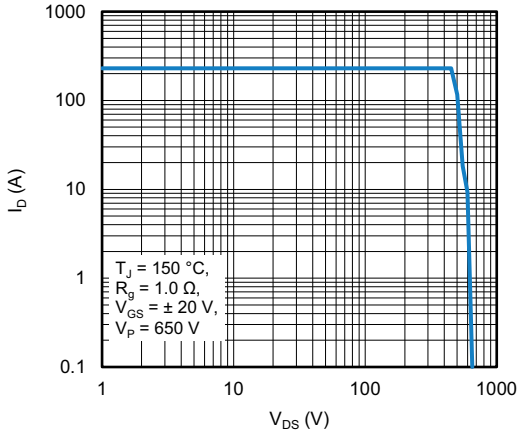


Fig. 23 - Reverse BIAS SOA

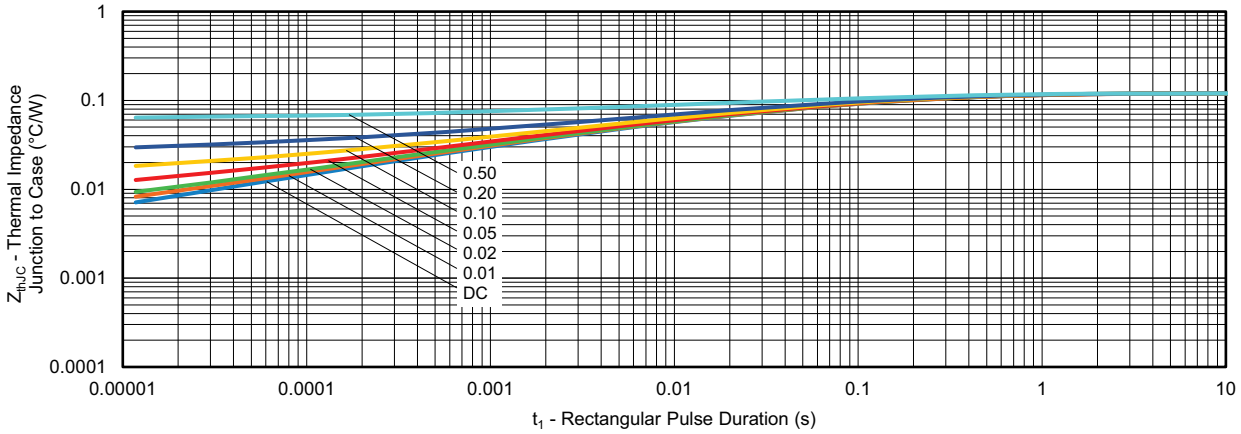


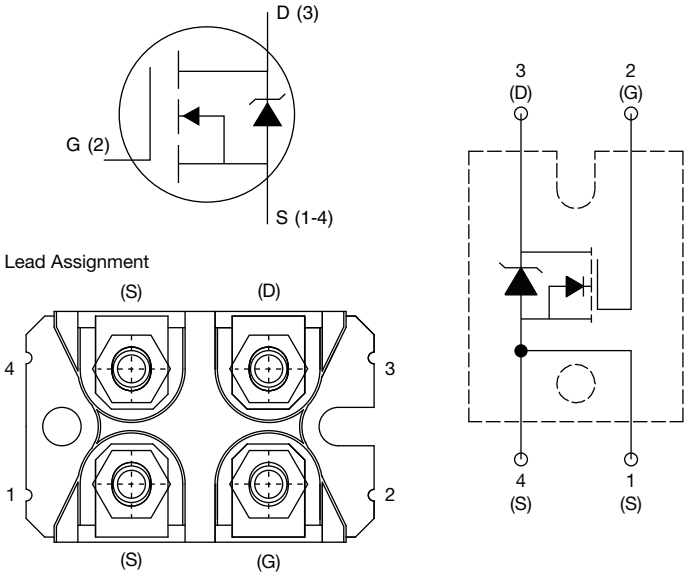
Fig. 24 - Maximum Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code

VS-	F	C	100	S	A	65
1	2	3	4	5	6	7

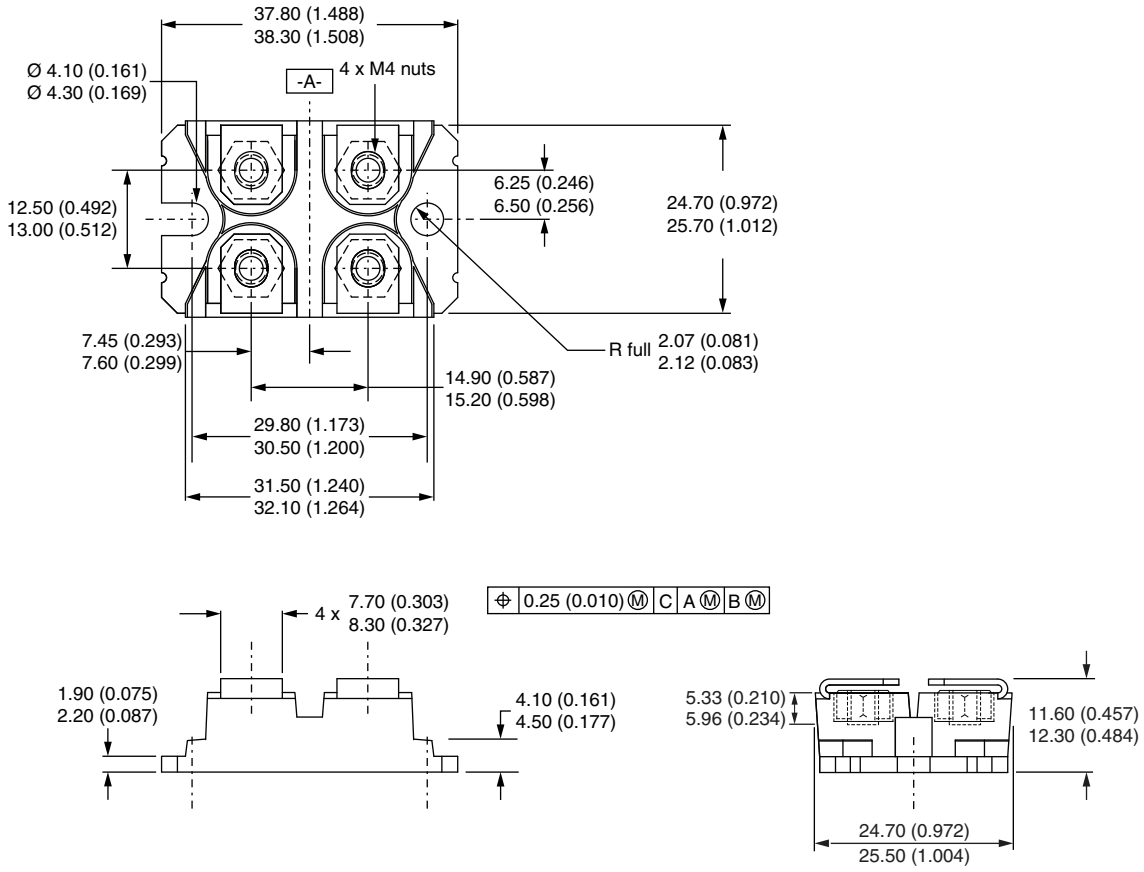
1	-	Vishay Semiconductors product
2	-	MOSFET module
3	-	MOSFET die generation
4	-	Current rating (100 = 100 A)
5	-	Circuit configuration (S = single switch)
6	-	Package indicator (SOT-227)
7	-	Voltage rating (65 = 650 V)

CIRCUIT CONFIGURATION		
CIRCUIT	**CIRCUIT CONFIGURATION CODE**	**CIRCUIT DRAWING**
Single switch	S	

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95423
Packaging information	www.vishay.com/doc?95425

SOT-227 Generation 2

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter

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