SOT-227 Power Module
Single Switch - Power MOSFET, 420 A

SOT-227

FEATURES

- I_D > 420 A, T_C = 25 °C
- TrenchFET® power MOSFET
- Low input capacitance (C_{iss})
- Reduced switching and conduction losses
- Ultra low gate charge (Q_g)
- Avalanche energy rated (U_{IS})
- UL approved file E78996
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

PRIMARY CHARACTERISTICS	
V_{DSS}	100 V
$R_{DS(on)}$	1.3 mΩ
I_D (1)	330 A at 90 °C
Type	Modules - MOSFET
Package	SOT-227

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
MOSFET				
Drain to source voltage	V_{DSS}		100	V
Continuous drain current, V_{GS} at 10 V	I_D	T_C = 25 °C	435	A
		T_C = 90 °C	330	
Pulsed drain current	I_{DM} (1)		1130	
Power dissipation	P_D	T_C = 25 °C	652	W
Gate to source voltage	V_{GS}		± 20	V
Single pulse avalanche energy	E_{AS}	T_C = 25 °C, L = 10 mH, V_{GS} = 10 V	11 500	mJ
Single pulse avalanche current	I_{AS}	T_C = 25 °C, L = 10 mH, V_{GS} = 10 V	48	A
MODULE				
Insulation voltage (RMS)	V_{ISOL}	any terminal to case, t = 1 min	2500	V
Operating junction temperature range	T_J		-55 to +175	°C

Notes

(1) Limited at maximum junction temperature

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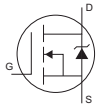
THERMAL - MECHANICAL SPECIFICATIONS							
PARAMETER		SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction and storage temperature range		T_J, T_{Stg}		-55	-	175	°C
Junction to case	MOSFET	R_{thJC}		-	-	0.23	°C/W
Case to heat sink	Module	R_{thCS}	Flat, greased surface	-	0.1	-	
Weight				-	30	-	g
Mounting 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			

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 = 750 µA	100	-	-	V
Static drain to source on-resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 200 A	-	1.3	2.15	mΩ
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 750 µA	2.2	2.9	3.8	V
Forward transconductance	g_{fs}	V_{DS} = 20 V, I_D = 20 A, V_{GS} = 10 V	-	94	-	S
Drain to source leakage current	I_{DSS}	V_{DS} = 100 V, V_{GS} = 0 V	-	0.6	4	µA
		V_{DS} = 100 V, V_{GS} = 0 V, T_J = 125 °C	-	32	-	
Gate to source leakage	I_{GSS}	V_{GS} = ± 20 V	-	-	± 350	nA
Total gate charge	Q_g	I_D = 200 A V_{DS} = 50 V V_{GS} = 10 V	-	375	-	nC
Gate to source charge	Q_{gs}		-	84	-	
Gate to drain (“Miller”) charge	Q_{gd}		-	138	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 50 V I_D = 100 A R_g = 1.2 Ω V_{GS} = 10 V	-	45	-	ns
Rise time	t_r		-	275	-	
Turn-off delay time	$t_{d(off)}$		-	152	-	
Fall time	t_f		-	172	-	
Input capacitance	C_{iss}	V_{GS} = 0 V V_{DS} = 25 V f = 1 MHz	-	17.3	-	nF
Output capacitance	C_{oss}		-	9.2	-	
Reverse transfer capacitance	C_{rss}		-	0.9	-	

SOURCE-DRAIN RATINGS AND CHARACTERISTICS (T_J = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Continuous source current (body diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode 	-	-	435	A
Pulsed source current (body diode)	I_{SM}		-	-	1130	
Diode forward voltage	V_{SD}	I_S = 200 A, V_{GS} = 0 V	-	0.91	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 = 50 V	-	171	-	ns
Reverse recovery charge	Q_{rr}		-	740	-	nC
Reverse recovery current	I_{RM}		-	8.7	-	A

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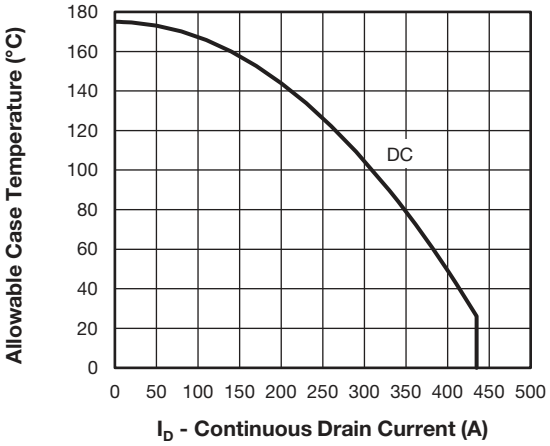

Fig. 1 - Maximum Continuous Drain Current vs. Case Temperature

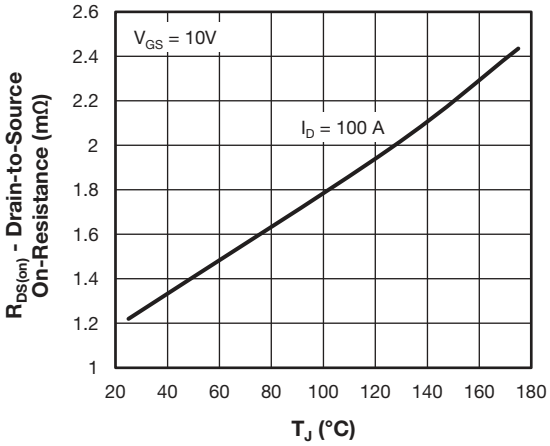

Fig. 4 - Typical Drain-to-Source On-Resistance vs. Temperature

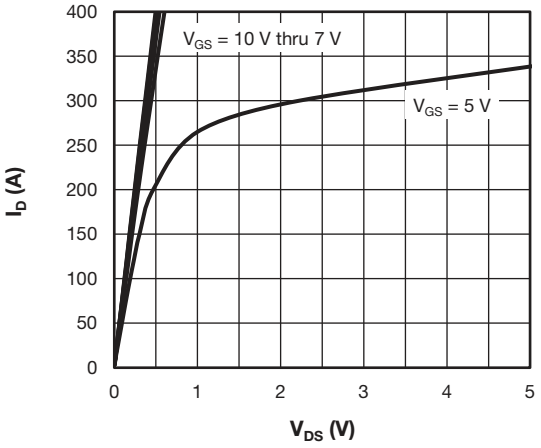

Fig. 2 - Typical Drain to Source Current Output Characteristics at T_J = 25 °C

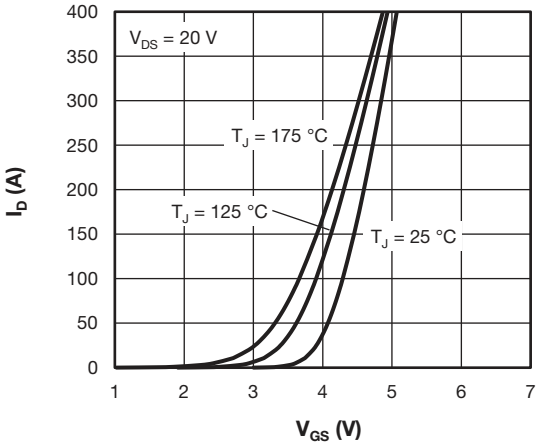

Fig. 5 - Typical Transfer Characteristics

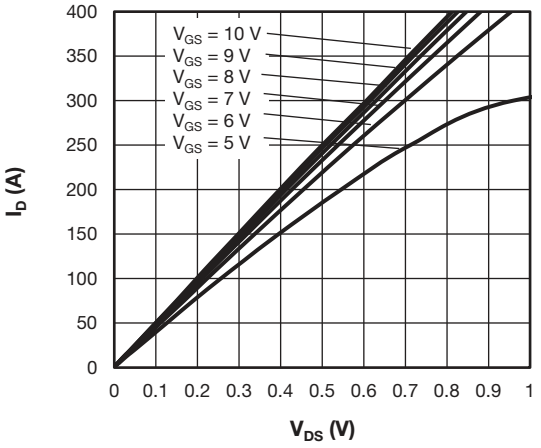

Fig. 3 - Typical Drain to Source Current Output Characteristics at T_J = 125 °C

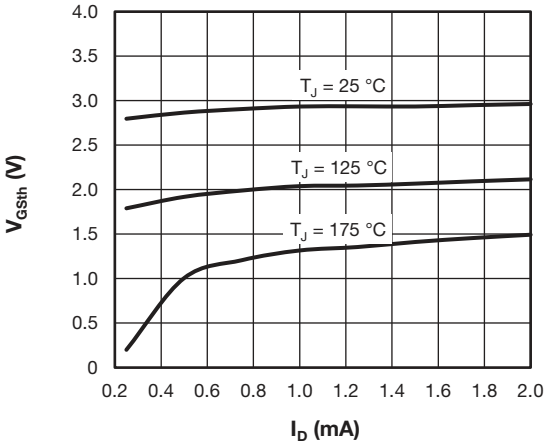

Fig. 6 - Typical Gate Threshold Voltage Characteristics

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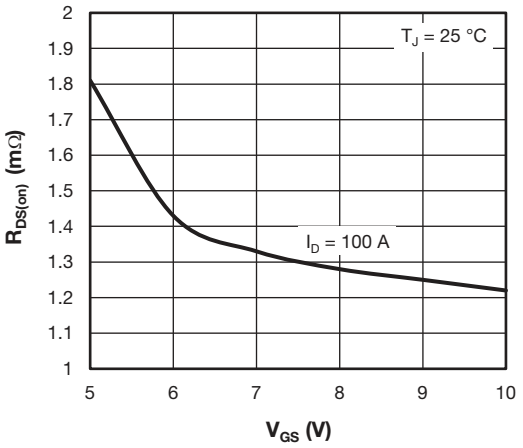

Fig. 7 - Typical Drain-State Resistance vs. Gate-to-Source Voltage

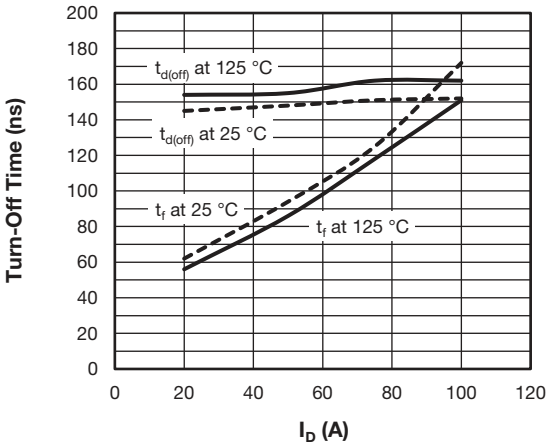

Fig. 10 - Typical Turn off Switching Time vs. I_d
V_{DD} = 50 V, R_g = 1.2 Ω, V_{GS} = ± 10 V, L = 500 µH

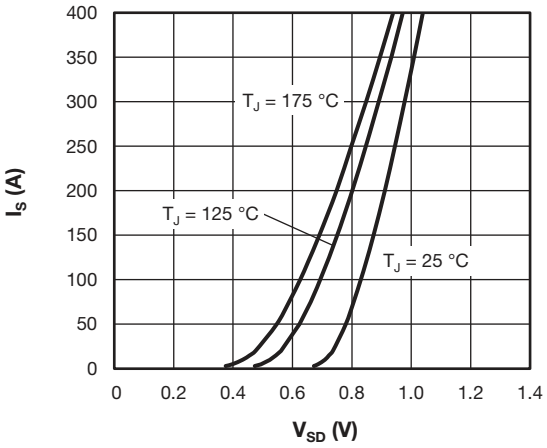

Fig. 8 - Typical Body Diode Source-to-Drain Current Characteristics

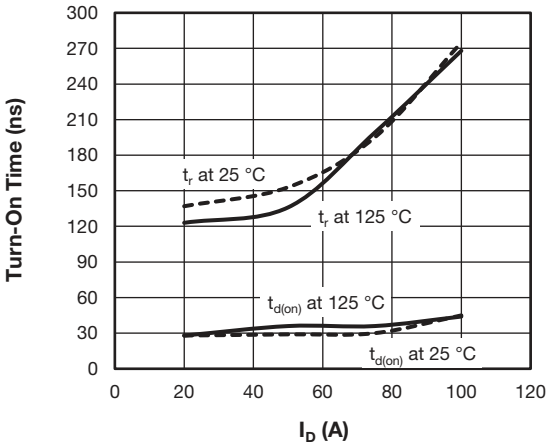

Fig. 11 - Typical Turn-on Switching Time vs. I_d
V_{DD} = 50 V, R_g = 1.2 Ω, V_{GS} = ± 10 V, L = 500 µH

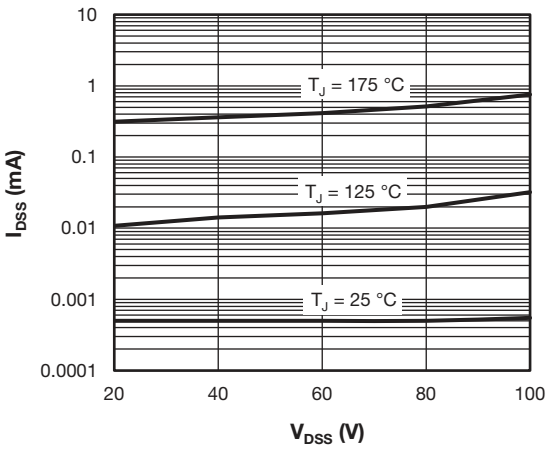

Fig. 9 - Typical Zero Gate Voltage Drain Current

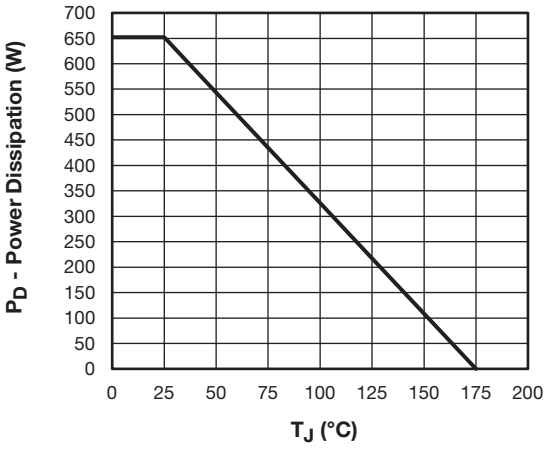

Fig. 12 - Power Dissipation Curve

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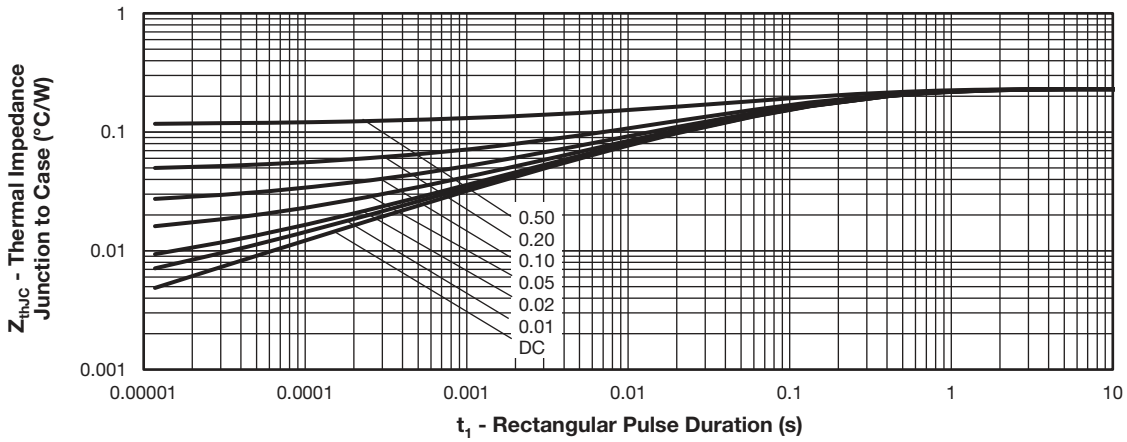

Fig. 13 - Maximum Thermal Impedance Junction-to-Case Characteristics

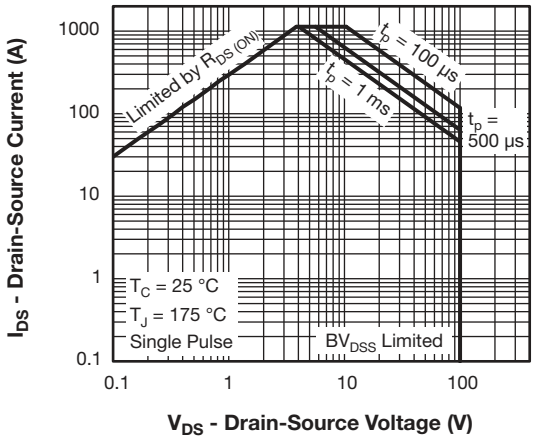

Fig. 14 - Safe Operating Area

ORDERING INFORMATION TABLE

Device code

VS-	F	C	420	S	A	10
1	2	3	4	5	6	7

1	-	Vishay Semiconductors product
2	-	MOSFET module
3	-	MOSFET die generation
4	-	Current rating (420 = 420 A)
5	-	Circuit configuration (S = single switch)
6	-	Package indicator (SOT-227 standard insulated base)
7	-	Voltage rating (10 = 100 V)

Quantity per tube is 10, M4 screw and washer included

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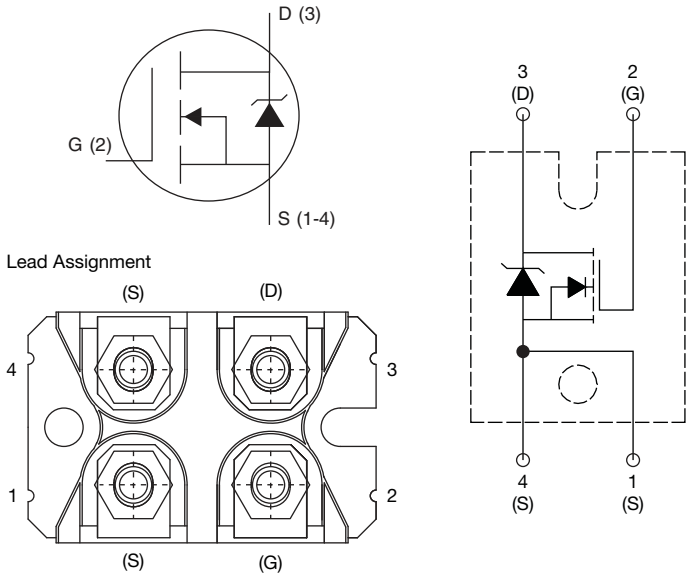
CIRCUIT CONFIGURATION		
CIRCUIT	**CIRCUIT CONFIGURATION CODE**	**CIRCUIT DRAWING**
Single switch	S	

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

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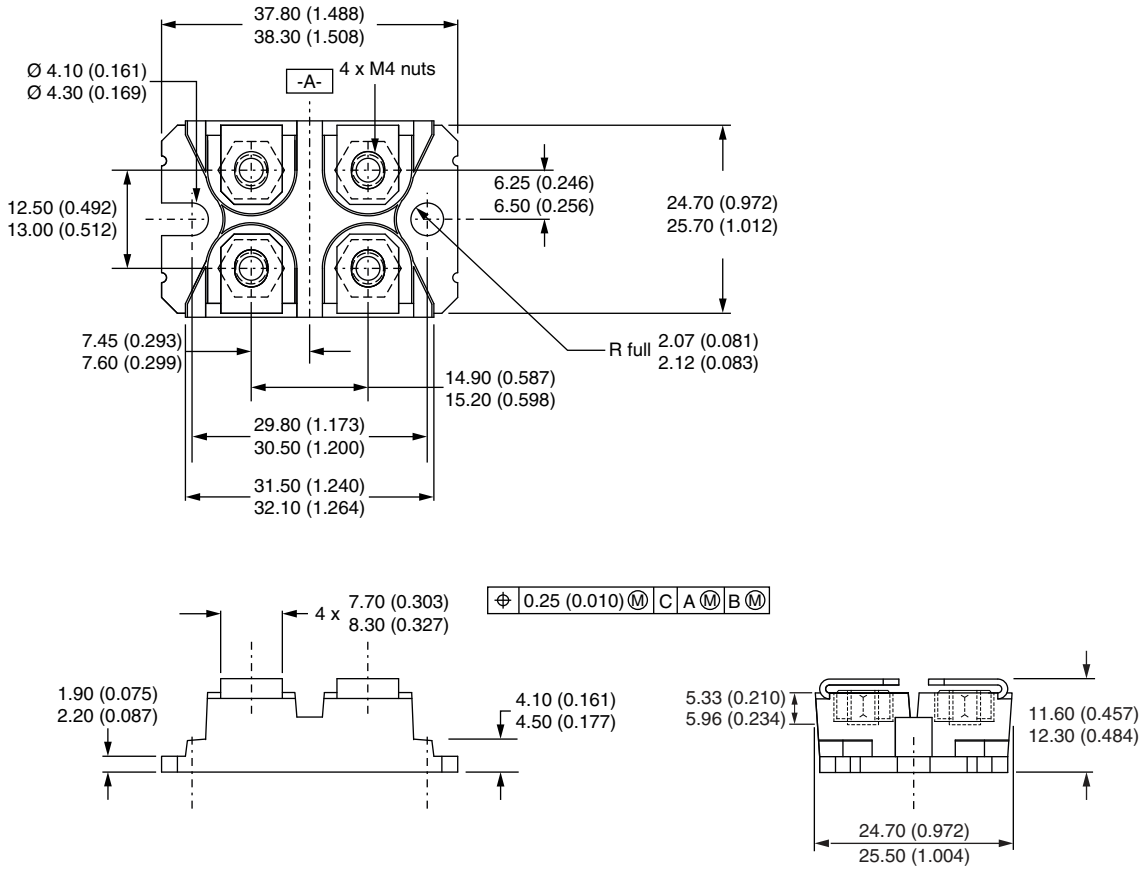
SOT-227 Generation 2

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter

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