

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



SOT-227

**FEATURES**

- $I_D > 420\text{ A}$ ,  $T_C = 25\text{ }^\circ\text{C}$
- 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](http://www.vishay.com/doc?99912)


**RoHS  
COMPLIANT**

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

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

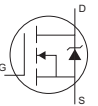
**Notes**

(1) Limited at maximum junction temperature



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

SOURCE-DRAIN RATINGS AND CHARACTERISTICS ( $T_J = 25\text{ }^\circ\text{C}$ 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	$V_{SD}$	$I_S = 200\text{ A}, V_{GS} = 0\text{ V}$	-	0.91	1.5	V
Reverse recovery time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}, I_F = I_S = 50\text{ A},$ $di/dt = 100\text{ A}/\mu\text{s}, V_R = 50\text{ V}$	-	171	-	ns
Reverse recovery charge	$Q_{rr}$		-	740	-	nC
Reverse recovery current	$I_{RM}$		-	8.7	-	A

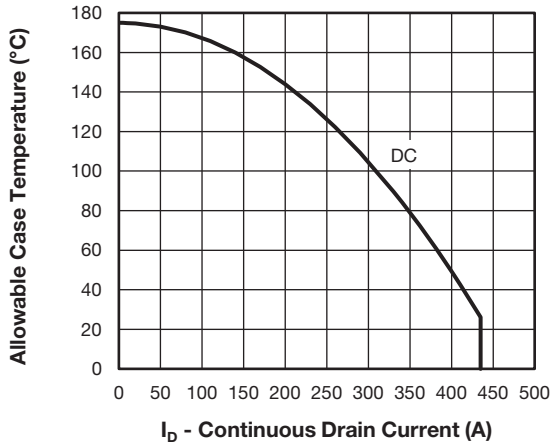


Fig. 1 - Maximum Continuous Drain Current vs. Case Temperature

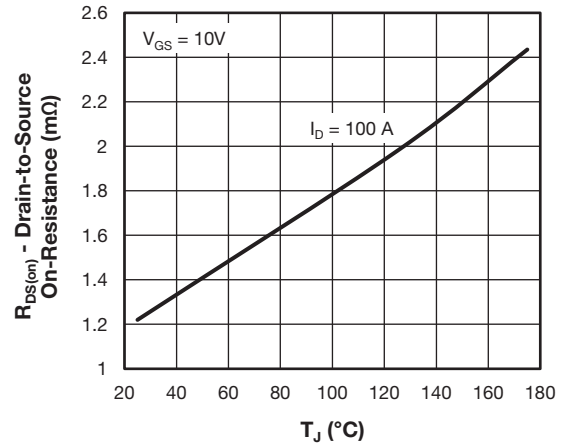


Fig. 4 - Typical Drain-to-Source On-Resistance vs. Temperature

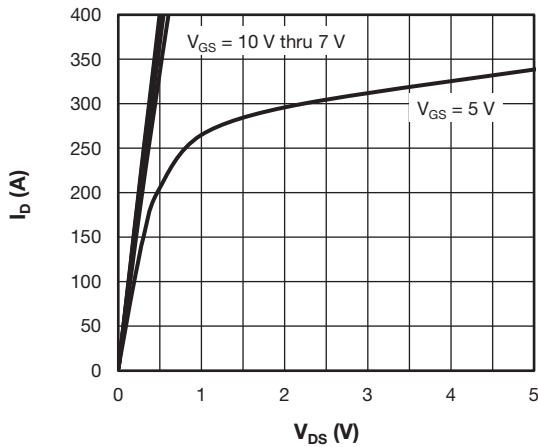


Fig. 2 - Typical Drain to Source Current Output Characteristics at  $T_J = 25\text{ }^\circ\text{C}$

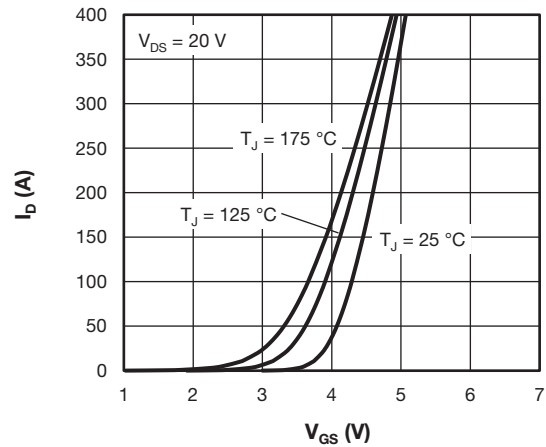


Fig. 5 - Typical Transfer Characteristics

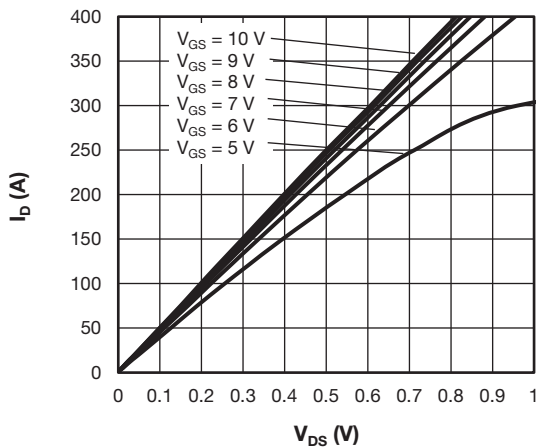


Fig. 3 - Typical Drain to Source Current Output Characteristics at  $T_J = 125\text{ }^\circ\text{C}$

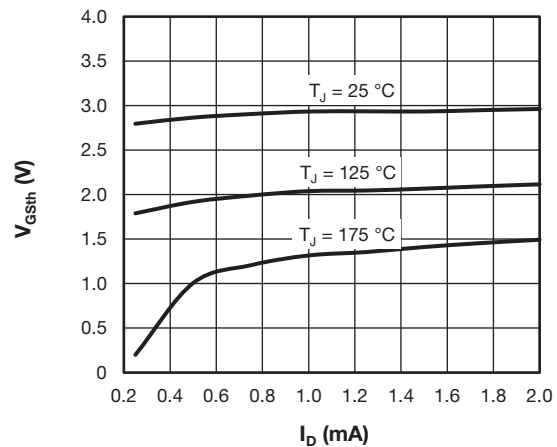


Fig. 6 - Typical Gate Threshold Voltage Characteristics

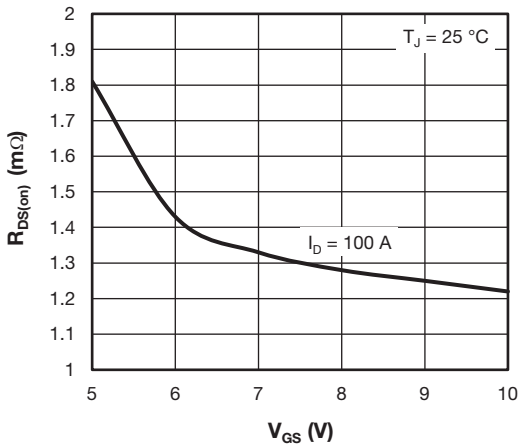


Fig. 7 - Typical Drain-State Resistance vs. Gate-to-Source Voltage

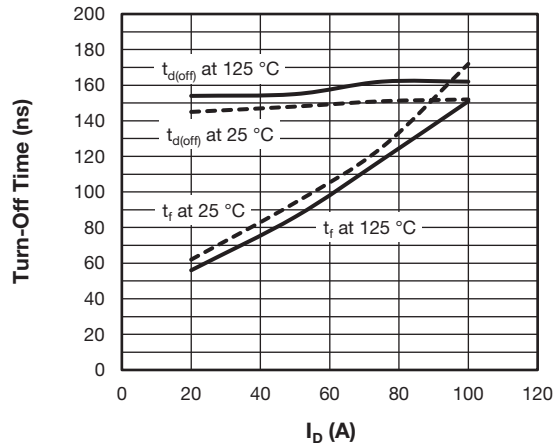


Fig. 10 - Typical Turn off Switching Time vs.  $I_D$   
 $V_{DD} = 50 \text{ V}$ ,  $R_g = 1.2 \text{ } \Omega$ ,  $V_{GS} = \pm 10 \text{ V}$ ,  $L = 500 \text{ } \mu\text{H}$

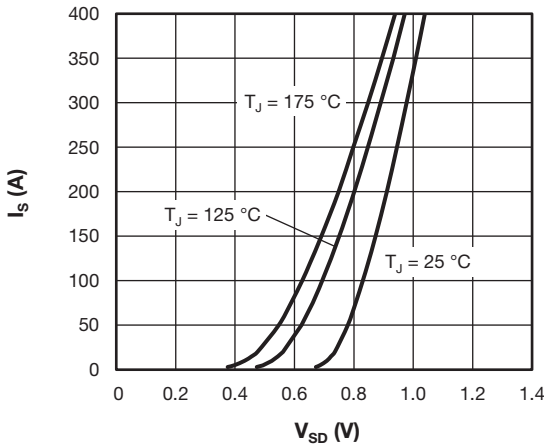


Fig. 8 - Typical Body Diode Source-to-Drain Current Characteristics

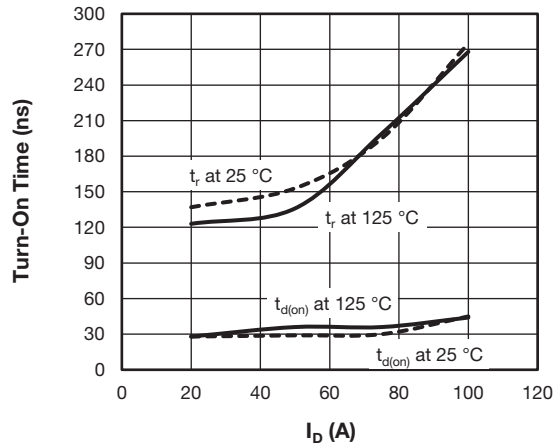


Fig. 11 - Typical Turn-on Switching Time vs.  $I_D$   
 $V_{DD} = 50 \text{ V}$ ,  $R_g = 1.2 \text{ } \Omega$ ,  $V_{GS} = \pm 10 \text{ V}$ ,  $L = 500 \text{ } \mu\text{H}$

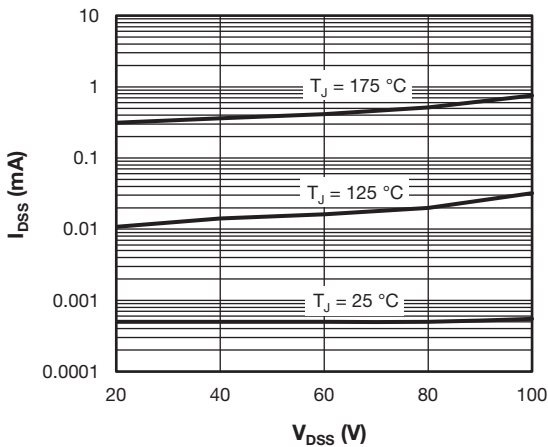


Fig. 9 - Typical Zero Gate Voltage Drain Current

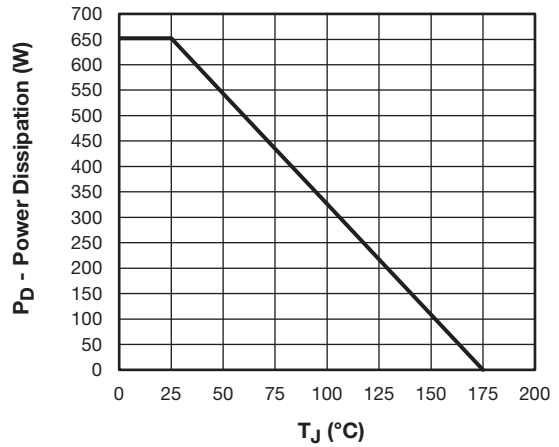


Fig. 12 - Power Dissipation Curve

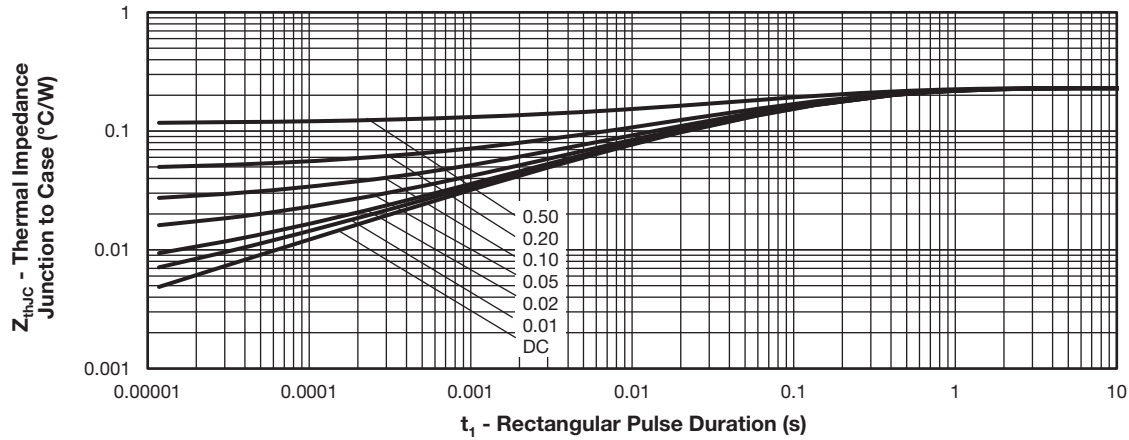


Fig. 13 - Maximum Thermal Impedance Junction-to-Case Characteristics

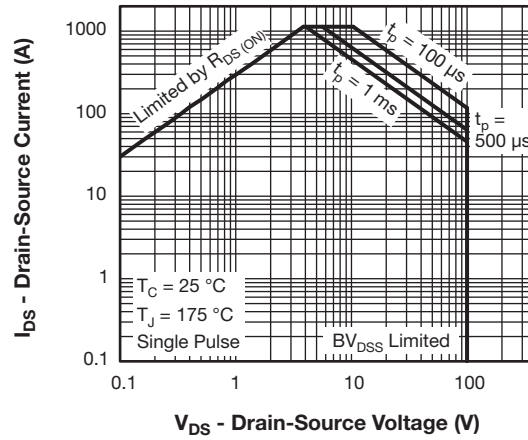


Fig. 14 - Safe Operating Area

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>F</b>	<b>C</b>	<b>420</b>	<b>S</b>	<b>A</b>	<b>10</b>
	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

CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Single switch	S	

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95423">www.vishay.com/doc?95423</a>
Packaging information	<a href="http://www.vishay.com/doc?95425">www.vishay.com/doc?95425</a>



## SOT-227 Generation 2

**DIMENSIONS** in millimeters (inches)



**Note**

- Controlling dimension: millimeter



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