SOT-227 Power Module
Single Switch - Power MOSFET, 270 A

SOT-227

FEATURES

- I_D = 287 A, T_C = 25 °C
- ThunderFET power MOSFET
- Reduced switching and conduction losses
- Maximum 175 °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 conversions
- Motor drives switch
- DC/AC inverter
- Power supplies
  - Uninterruptible power supplies
  - AC/DC switchmode power supplies
  - Solar micro inverter

PRIMARY CHARACTERISTICS	
V_{DSS}	200 V
$R_{DS(on)}$	3.3 mΩ
I_D	219 A at 90 °C
Type	Modules - MOSFET
Package	SOT-227

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MAX.**	**UNITS**
MOSFET				
Drain to source voltage	V_{DSS}		200	V
Continuous drain current, $V_{GS\ at}$ 10 V	I_D	T_C = 25 °C	287	A
		T_C = 90 °C	219	
Pulsed drain current	I_{DM} (1)		680	
Power dissipation	P_D	T_C = 25 °C	937	W
Gate to source voltage	V_{GS}		± 20	V
Single pulse avalanche energy (2)	E_{AS}	T_C = 25 °C, L = 0.1 mH, V_{GS} = 10 V	650	mJ
Avalanche current	I_{AS}		180	A
MODULE				
Operating junction temperature range	T_J		-55 to +175	°C
Operating storage temperature range	T_{Stg}		-40 to +150	
Insulation voltage (RMS)	V_{ISOL}	Any terminal to case, t = 1 min	2500	V

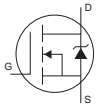
Notes

(1) Limited at max. junction temperature

(2) Duty cycle ≤ 1 %

THERMAL - MECHANICAL SPECIFICATIONS							
PARAMETER		SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating junction temperature range		T_J		-55	-	175	°C
Operating storage temperature range		T_{Stg}		-40	-	150	
Junction to case	MOSFET	R_{thJC}		-	-	0.16	°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			

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 = 1.0 mA	200	-	-	V
Breakdown voltage temperature coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	Reference to 25 °C, I_D = 1.0 mA	-	0.16	-	V/°C
Static drain to source on-resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 200 A	-	3.3	4.7	mΩ
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1.0 mA	1.8	3.16	4.3	V
Forward transconductance	g_{fs}	V_{DS} = 15 V, I_D = 100 A, V_{GS} = 10 V	-	270	-	S
Drain to source leakage current	I_{DSS}	V_{DS} = 200 V, V_{GS} = 0 V	-	0.5	10	µA
		V_{DS} = 200 V, V_{GS} = 0 V, T_J = 150 °C	-	160	-	
Gate to source leakage	I_{GSS}	V_{GS} = ± 20 V	-	-	± 200	nA
Total gate charge	Q_g	I_D = 120 A V_{DS} = 100 V V_{GS} = 10 V	-	250	-	nC
Gate to source charge	Q_{gs}		-	68	-	
Gate to drain ("Miller") charge	Q_{gd}		-	70	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 100 V I_D = 100 A R_g = 1 Ω V_{GS} = 10 V	-	76	-	ns
Rise time	t_r		-	212	-	
Turn-off delay time	$t_{d(off)}$		-	134	-	
Fall time	t_f		-	118	-	
Input capacitance	C_{iss}	V_{GS} = 0 V V_{DS} = 100 V f = 1 MHz	-	16.5	-	nF
Output capacitance	C_{oss}		-	1.0	-	
Reverse transfer capacitance	C_{rss}		-	0.8	-	
Temperature coefficient of threshold voltage	$\Delta V_{GE(th)}/\Delta T_J$	V_{DS} = V_{GS}, I_D = 1.0 mA (25 °C to 125 °C)	-	9.2	-	mV/°

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 	-	-	287	A
Pulsed source current (body diode)	I_{SM}		-	-	680	
Diode forward voltage	V_{SD}	I_S = 200 A, V_{GS} = 0 V	-	0.93	1.23	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	-	210	-	ns
Reverse recovery charge	Q_{rr}		-	1646	-	nC
Reverse recovery current	I_{RM}		-	15.7	-	A

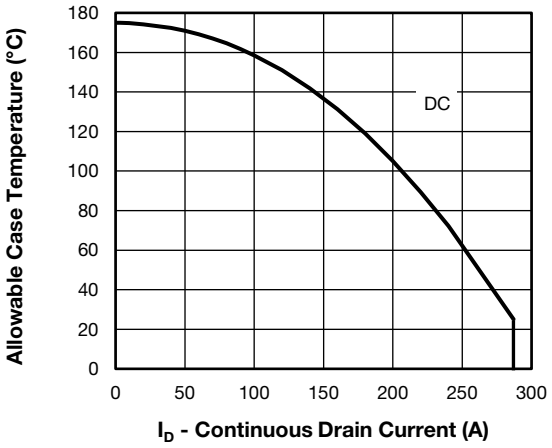


Fig. 1 - Maximum Continuous Drain Current vs. Case Temperature

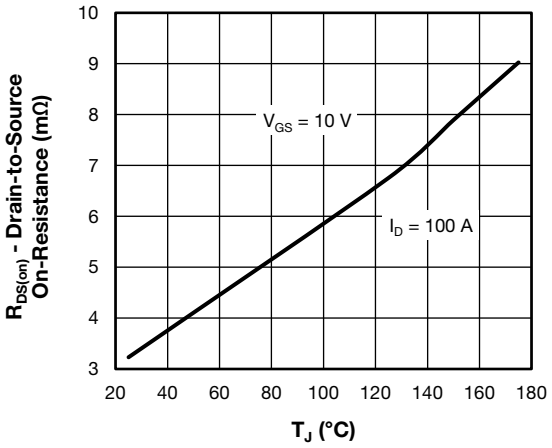


Fig. 4 - Typical Drain-to-Source On-Resistance vs. Temperature

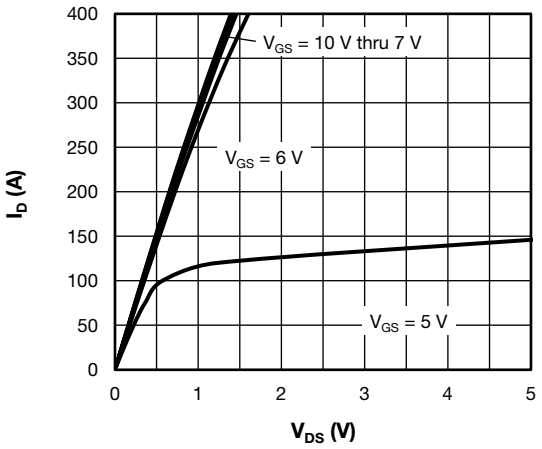


Fig. 2 - Typical Drain to Source Current Output Characteristics at T_J = 125°C

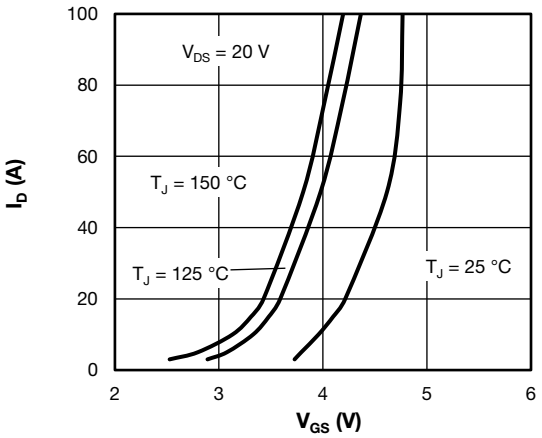


Fig. 5 - Typical Transfer Characteristics

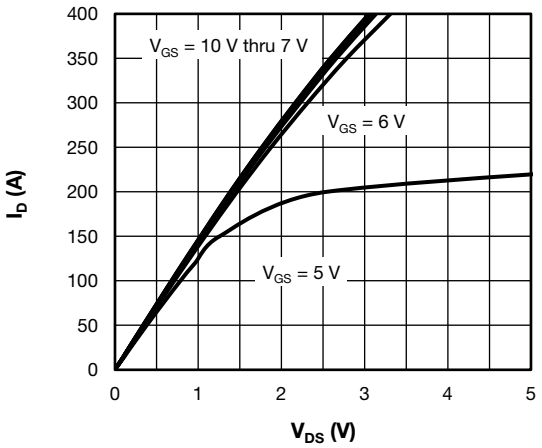


Fig. 3 - Typical Drain to Source Current Output Characteristics at T_J = 125°C

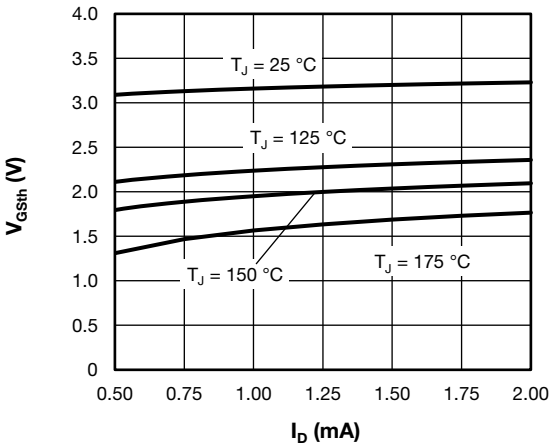


Fig. 6 - Typical Gate Threshold Voltage Characteristics

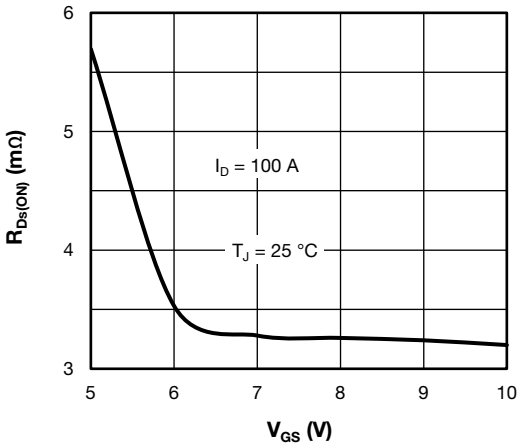


Fig. 7 - Typical Drain - State Resistance vs. Gate to Source Voltage

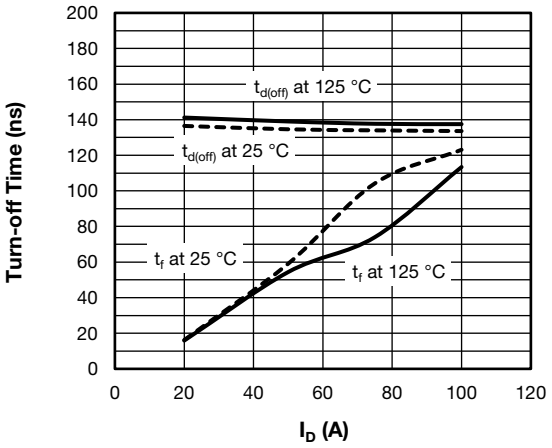


Fig. 10 - Typical Turn-Off Switching Time vs. I_D, V_{DD} = 100 V, R_g = 1.0 Ω, V_{GS} = ± 10 V, L = 500 µH

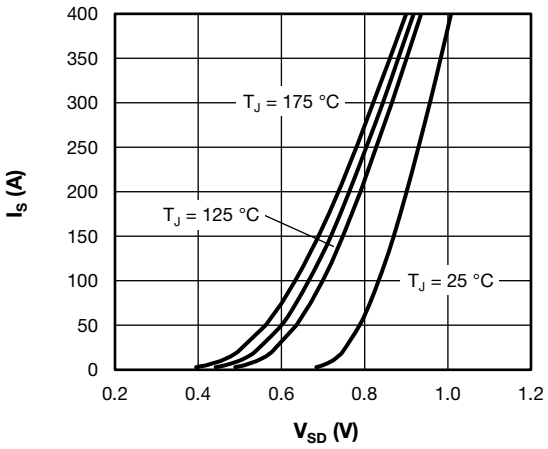


Fig. 8 - Typical Body Diode Source-to-Drain Current Characteristics

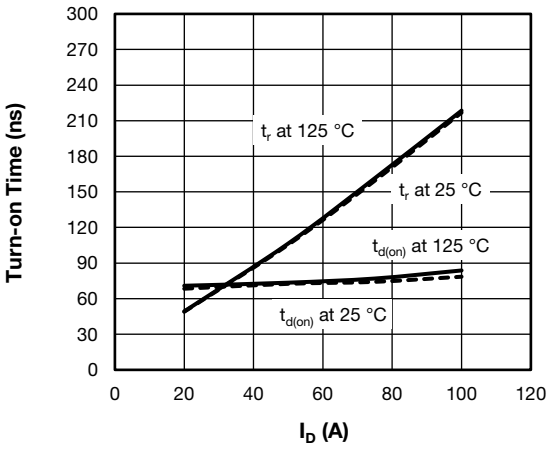


Fig. 11 - Typical Turn-On Switching Time vs. I_D, V_{DD} = 100 V, R_g = 1.0 Ω, V_{GS} = ± 10 V, L = 500 µH

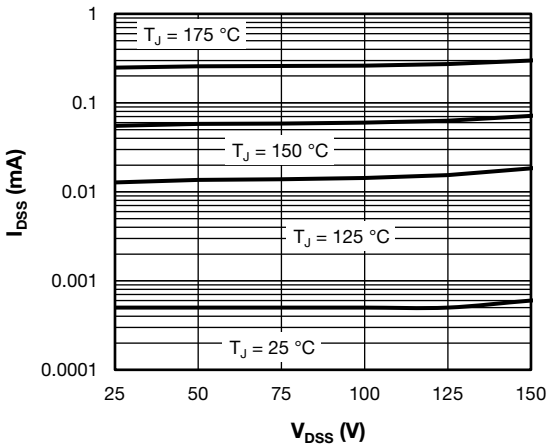


Fig. 9 - Typical Zero Gate Voltage Drain Current

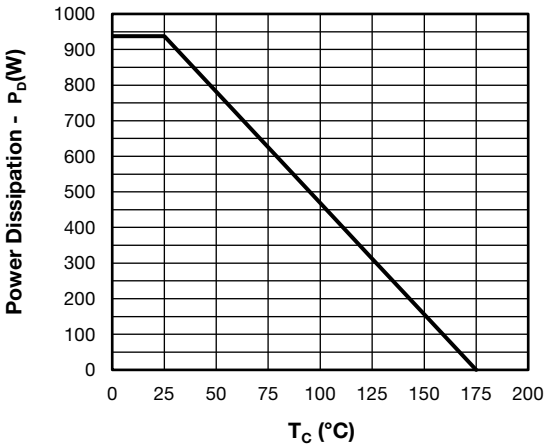


Fig. 12 - Power Dissipation Curve

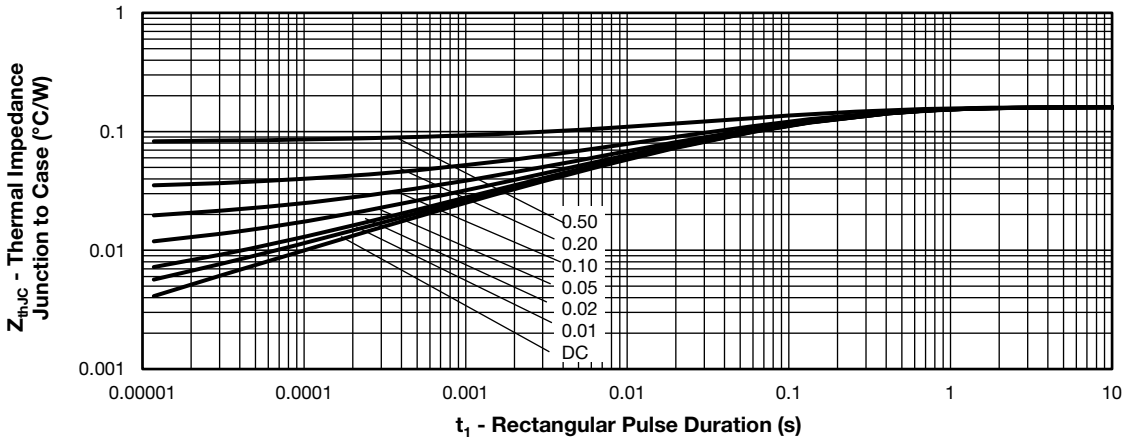


Fig. 13 - Maximum Thermal Impedance Junction-to-Case Characteristics

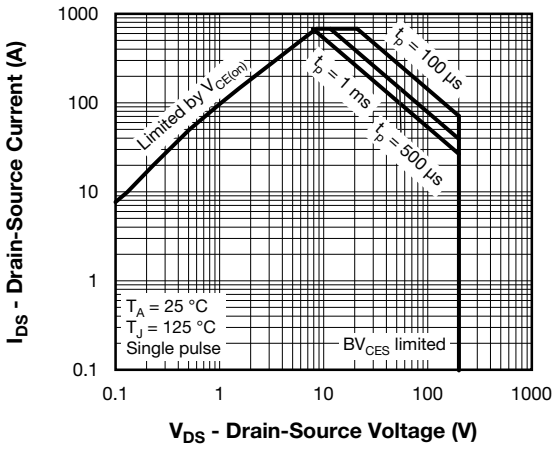


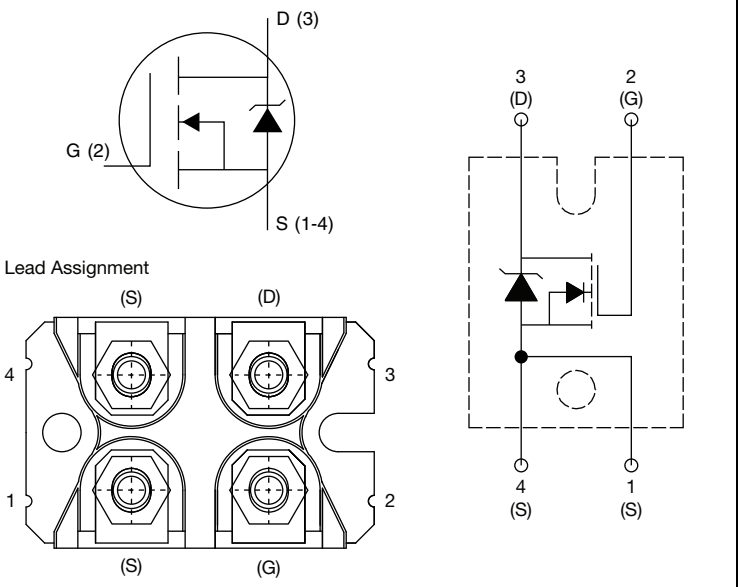
Fig. 14 - Safe Operating Area

ORDERING INFORMATION TABLE

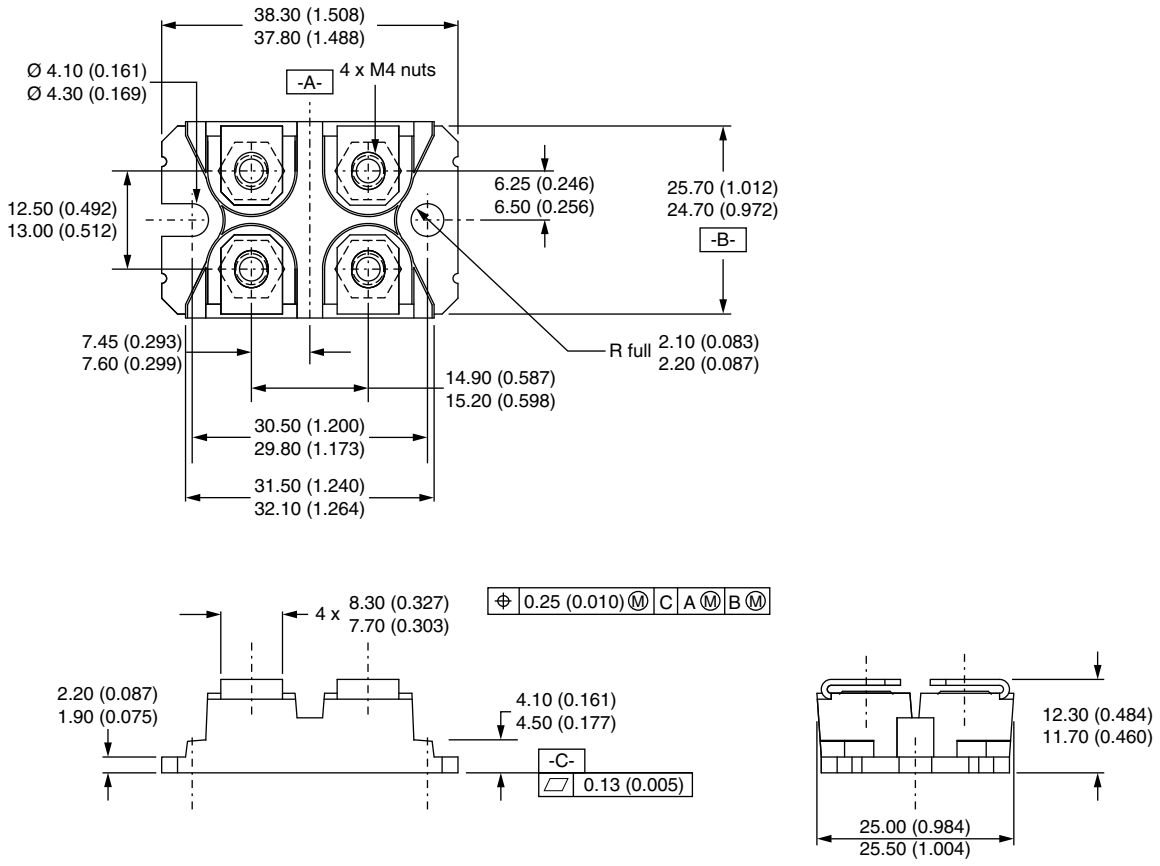
Device code

VS-	F	C	270	S	A	20
1	2	3	4	5	6	7

1	-	Vishay Semiconductors product
2	-	MOSFET module
3	-	MOSFET die generation
4	-	Current rating (270 = 270 A)
5	-	Circuit configuration (S = single switch)
6	-	Package indicator (SOT-227)
7	-	Voltage rating (20 = 200 V)

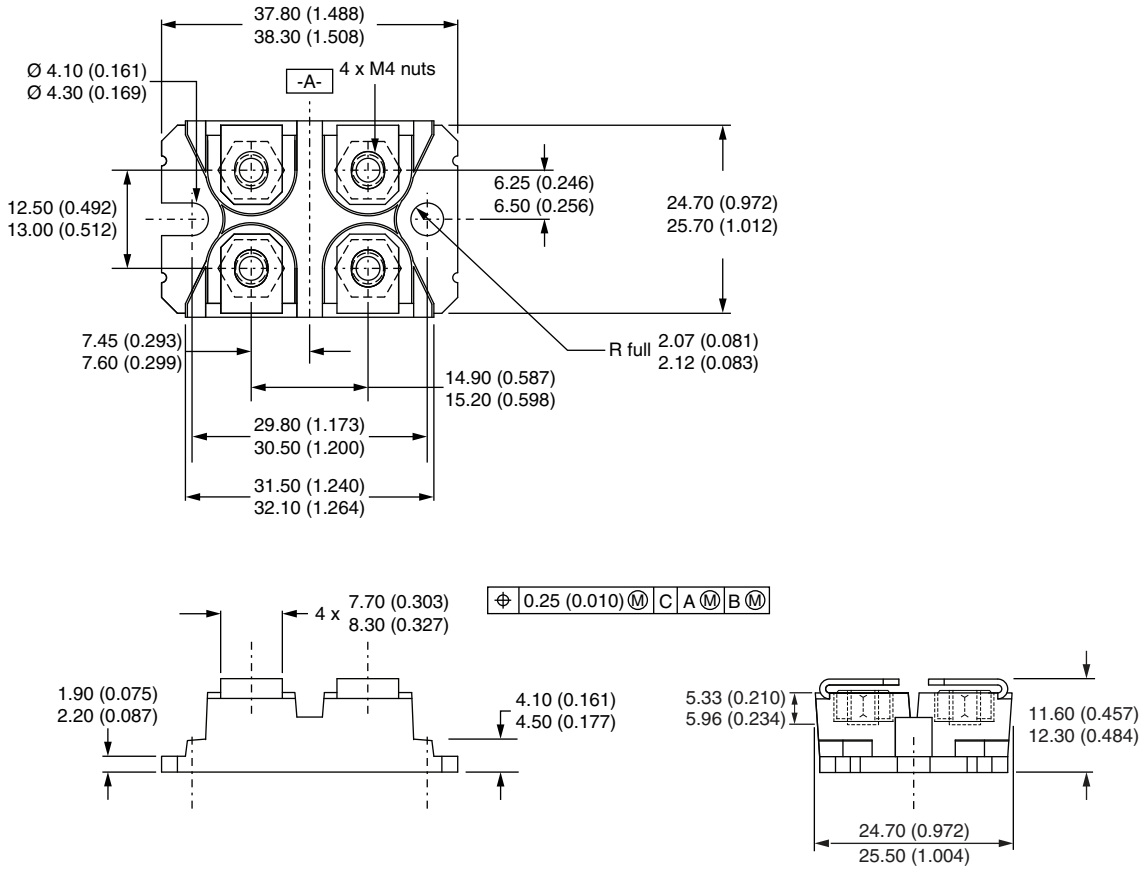
CIRCUIT CONFIGURATION		
CIRCUIT	**CIRCUIT CONFIGURATION CODE**	**CIRCUIT DRAWING**
Single switch	S	

DIMENSIONS in millimeters



SOT-227 Generation 2

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter

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