Power MOSFET, 40 A



SOT-227

FEATURES

- Fully isolated package
- Easy to use and parallel
- Low on-resistance
- Dynamic dV/dt rating
- Fully avalanche rated
- Simple drive requirements
- Low drain to case capacitance
- Low internal inductance
- UL approved file E78996
- Designed for industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

PRIMARY CHARACTERISTICS	
V_{DSS}	500 V
$R_{DS(on)}$	106 mΩ
I_D	40 A
Type	Modules - MOSFET
Package	SOT-227

DESCRIPTION

Third generation power MOSFETs from Vishay Semiconductors provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The SOT-227 package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 500 W. The low thermal resistance of the SOT-227 contribute to its wide acceptance throughout the industry.

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MAX.**	**UNITS**
Continuous drain current at V_{GS} 10 V	I_D	T_C = 25 °C	40	A
		T_C = 90 °C	29	
Pulsed drain current	I_{DM} (1)		150	
Power dissipation	P_D	T_C = 25 °C	543	W
		T_C = 90 °C	261	
Gate to source voltage	V_{GS}		± 20	V
Single pulse avalanche energy	E_{AS} (2)		400	mJ
Repetitive avalanche current	I_{AR} (1)		13	A
Repetitive avalanche energy	E_{AR} (1)		42	mJ
Peak diode recovery dV/dt	dV/dt (3)		10	V/ns
Operating junction and storage temperature range	T_J, T_{Stg}		-55 to +150	°C
Insulation withstand voltage (AC-RMS)	V_{ISO}		2.5	kV
Mounting torque		M4 screw, on terminals and heatsink	1.3	Nm

Notes

(1) Repetitive rating; pulse width limited by maximum junction temperature (see fig. 18)

(2) Starting T_J = 25 °C, L = 500 µH, R_g = 2.4 Ω, I_{AS} = 40 A (see fig. 18)

(3) $I_{SD} \leq 40$ A, $dI_F/dt \leq 200$ A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150$ °C

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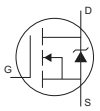
THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Junction and storage temperature range	T_J, T_{Stg}		-55	-	150	°C
Junction to case	R_{thJC}		-	-	0.23	°C/W
Case to heatsink	R_{thCS}	Flat, greased surface	-	0.05	-	
Weight			-	30	-	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 noted)						
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	500	-	-	V
Breakdown voltage temperature coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	Reference to 25 °C, I_D = 1 mA	-	0.65	-	V/°C
Static drain to source on-resistance	$R_{DS(on)}$ (1)	V_{GS} = 10 V, I_D = 23 A	-	106	130	mΩ
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	2	3	4	V
		V_{DS} = V_{GS}, I_D = 250 µA, T_J = 125 °C	-	1.9	-	
Forward transconductance	g_{fs}	V_{DS} = 50 V, I_D = 23 A	-	29	-	S
Drain to source leakage current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V	-	0.5	50	µA
		V_{DS} = 500 V, V_{GS} = 0 V, T_J = 125 °C	-	30	500	
		V_{DS} = 500 V, V_{GS} = 0 V, T_J = 150 °C	-	0.2	3	mA
Gate to source forward leakage	I_{GSS}	V_{GS} = 20 V	-	-	200	nA
Gate to source reverse leakage		V_{GS} = - 20 V	-	-	- 200	
Total gate charge	Q_g	I_D = 38 A V_{DS} = 400 V V_{GS} = 10 V; see fig. 15 and 19 (1)	-	280	420	nC
Gate to source charge	Q_{gs}		-	37	55	
Gate to drain (“Miller”) charge	Q_{gd}		-	150	220	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 250 V, I_D = 40 A, R_g = 2.4 Ω, L = 500 µH, diode used: 60APH06	-	143	-	ns
Rise time	t_r		-	33	-	
Turn-off delay time	$t_{d(off)}$		-	107	-	
Fall time	t_f		-	36	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 250 V, I_D = 40 A, R_g = 2.4 Ω, L = 500 µH, T_J = 125 °C, diode used: 60APH06	-	145	-	ns
Rise time	t_r		-	35	-	
Turn-off delay time	$t_{d(off)}$		-	110	-	
Fall time	t_f		-	40	-	
Internal source inductance	L_S	Between lead, and center of die contact	-	5	-	nH
Input capacitance	C_{iss}	V_{GS} = 0 V V_{DS} = 25 V f = 1.0 MHz, see fig. 14	-	6900	-	pF
Output capacitance	C_{oss}		-	1600	-	
Reverse transfer capacitance	C_{rss}		-	580	-	

Note

(1) Pulse width ≤ 300 µs, duty cycle ≤ 2 %

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SOURCE-DRAIN RATINGS AND CHARACTERISTICS						
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. 	-	-	38	A
Pulsed source current (body diode)	I_{SM} (1)		-	-	150	
Diode forward voltage	V_{SD} (2)	T_J = 25 °C, I_S = 38 A, V_{GS} = 0 V	-	0.9	1.31	V
		T_J = 125 °C, I_S = 38 A, V_{GS} = 0 V	-	0.75	-	
Reverse recovery time	t_{rr}	T_J = 25 °C, I_F = 40 A; dI_F/dt = 100 A/µs (2)	-	560	-	ns
Reverse recovery current	I_{rr}		-	40	-	A
Reverse recovery charge	Q_{rr}		-	11	-	µC
Reverse recovery time	t_{rr}	T_J = 25 °C, I_F = 40 A; dI_F/dt = 100 A/µs (2)	-	680	-	ns
Reverse recovery current	I_{rr}		-	47	-	A
Reverse recovery charge	Q_{rr}		-	16	-	µC
Forward turn-on time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S + L_D)				

Notes

(1) Repetitive rating; pulse width limited by maximum junction temperature (see fig. 18)

(2) Pulse width ≤ 300 µs, duty cycle ≤ 2 %

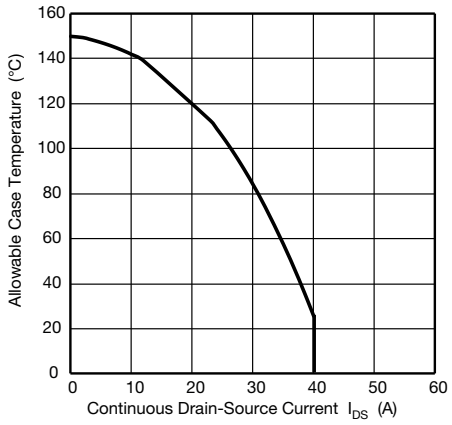


Fig. 1 - Maximum DC MOSFET Drain-Source Current vs. Case Temperature

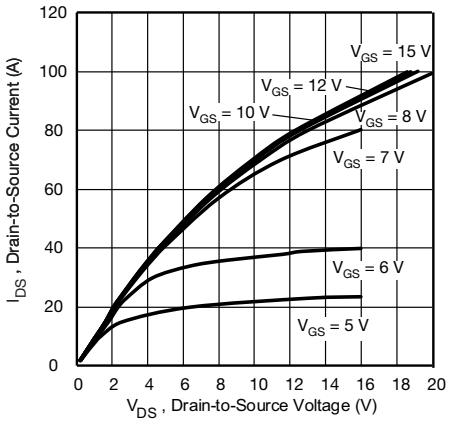


Fig. 3 - Typical Drain-to-Source Current Output Characteristics at T_J = 25 °C

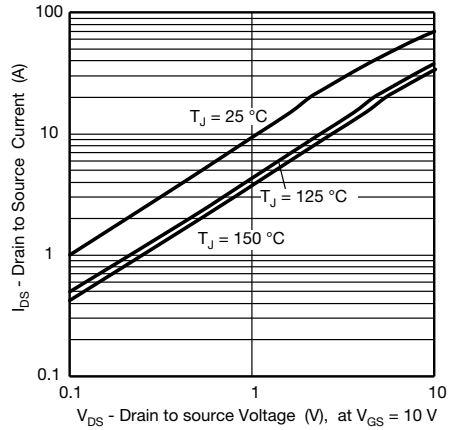


Fig. 2 - Typical Drain-to-Source Current Output Characteristics; V_{GS} = 10 V

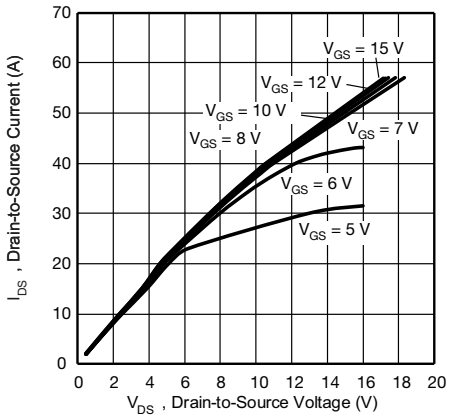


Fig. 4 - Typical Drain-to-Source Current Output Characteristics at T_J = 125 °C

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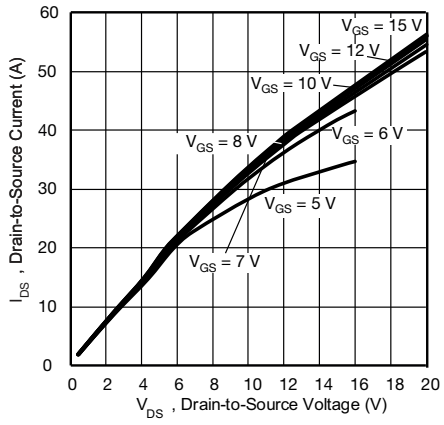


Fig. 5 - Typical Drain-to-Source Current Output Characteristics at T_J = 150 °C

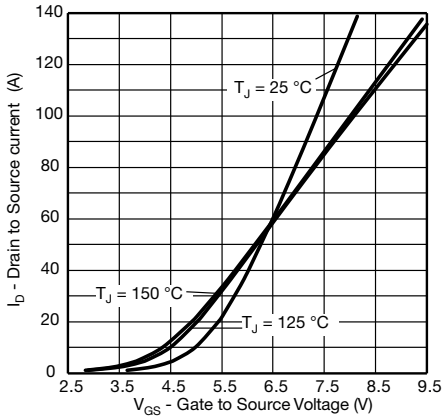


Fig. 8 - Typical MOSFET Transfer Characteristics

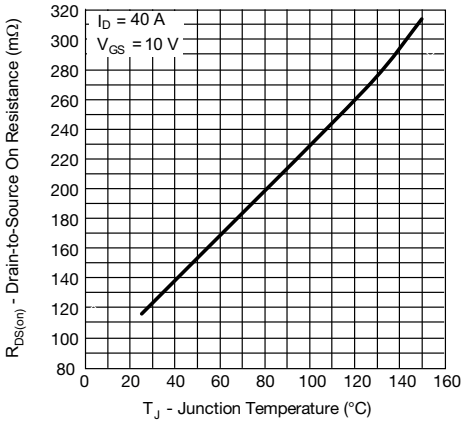


Fig. 6 - Normalized On-Resistance vs. Temperature

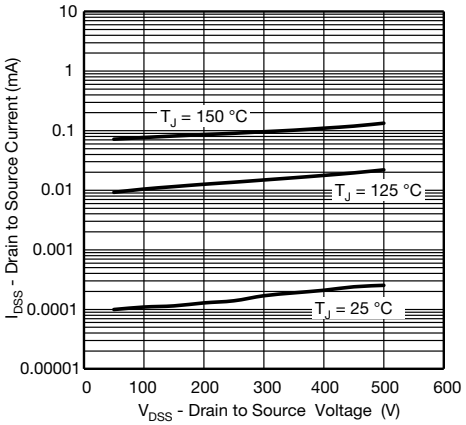


Fig. 9 - Typical MOSFET Zero Gate Voltage Drain Current

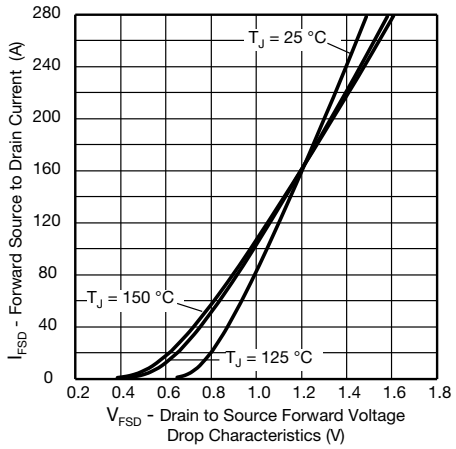


Fig. 7 - Typical Body Diode Forward Voltage Drop Characteristics

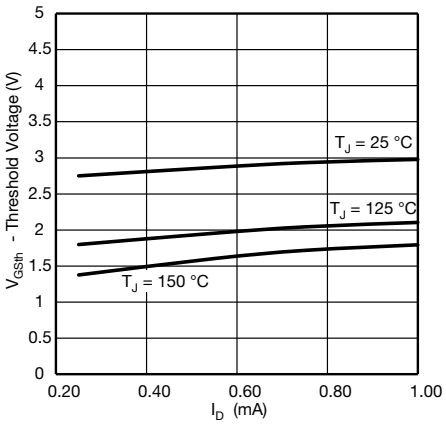


Fig. 10 - Typical MOSFET Threshold Voltage

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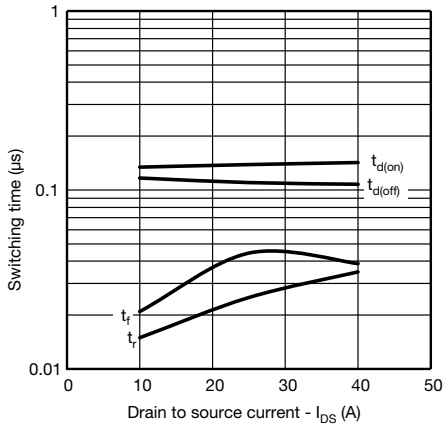


Fig. 11 - Typical MOSFET Switching Time vs. I_{DS}, T_J = 125 °C,
V_{DD} = 250 V, V_{GS} = 10 V, L = 500 µH, R_G = 2.4 Ω
Diode used 60APH06

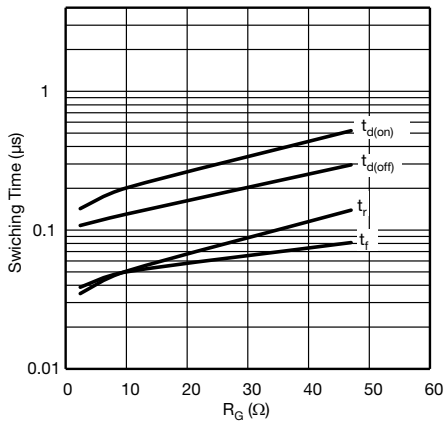


Fig. 12 - Typical MOSFET Switching Time vs. R_G, T_J = 125 °C,
I_{DS} = 40 A, V_{DD} = 250 V, V_{GS} = 10 V, L = 500 µH
Diode used 60APH06

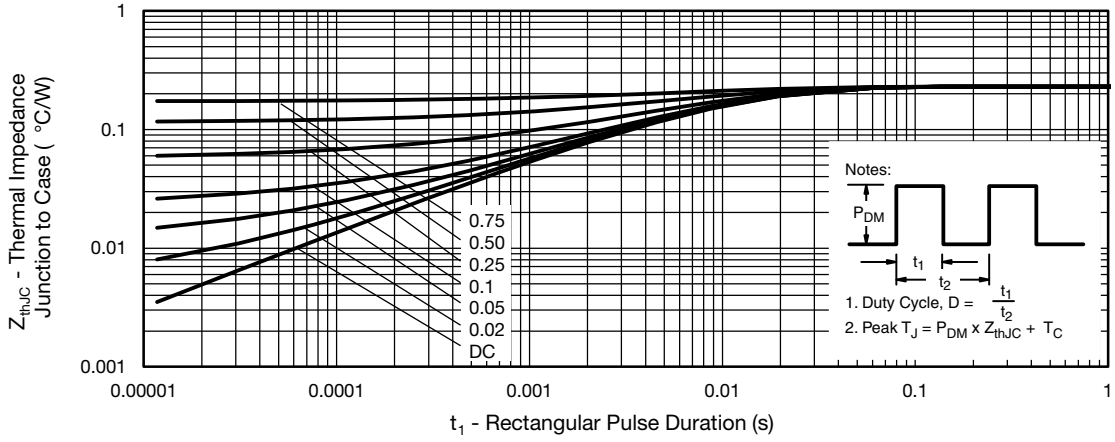


Fig. 13 - Maximum Thermal Impedance Z_{thJC} Characteristics, MOSFET

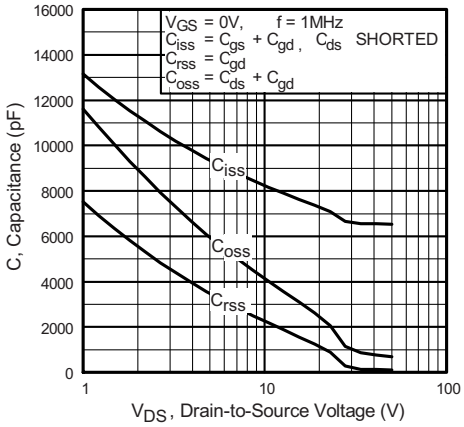


Fig. 14 - Typical Capacitance vs. Drain to Source Voltage

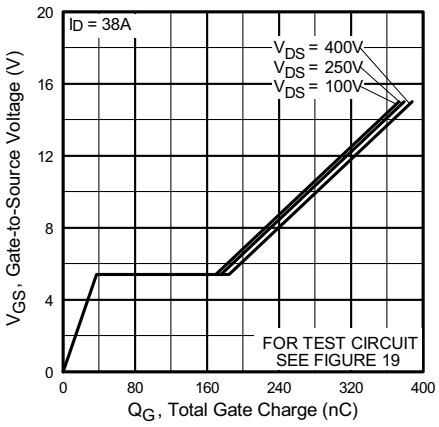


Fig. 15 - Typical Gate Charge vs.
Gate to Source Voltage

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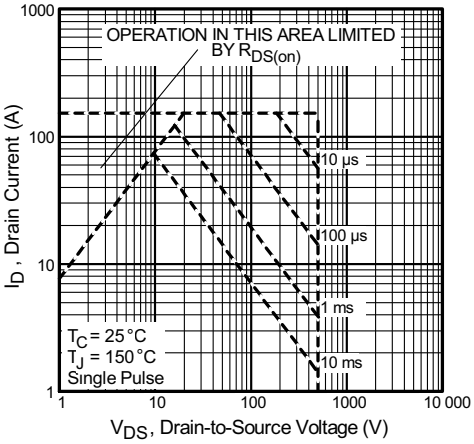


Fig. 16 - Maximum Safe Operating Area

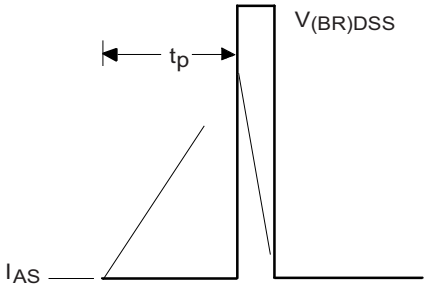


Fig. 20 - Unclamped Inductive Waveforms

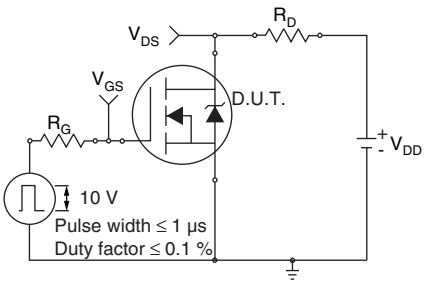


Fig. 17 - Switching Time Test Circuit

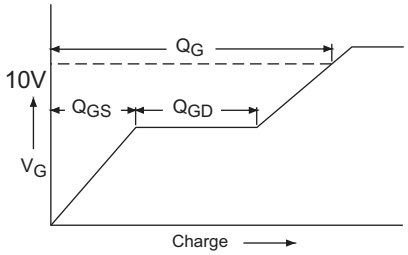


Fig. 21 - Basic Gate Charge Waveform

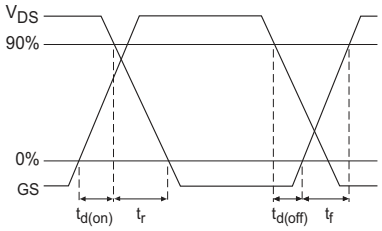


Fig. 18 - Switching Time Waveforms

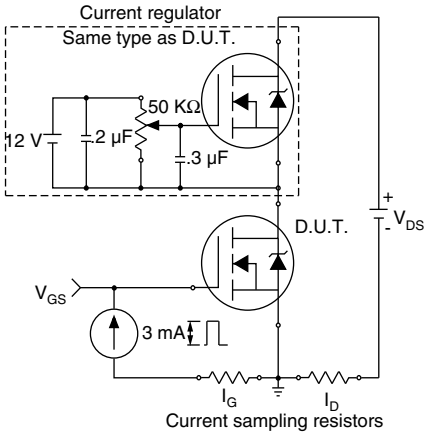


Fig. 22 - Gate Charge Test Circuit

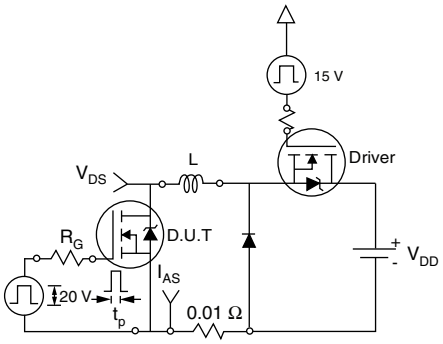


Fig. 19 - Unclamped Inductive Test Circuit

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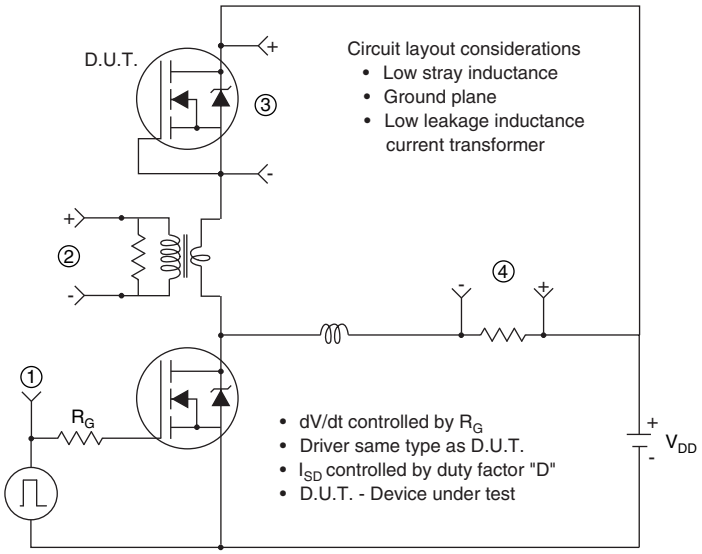
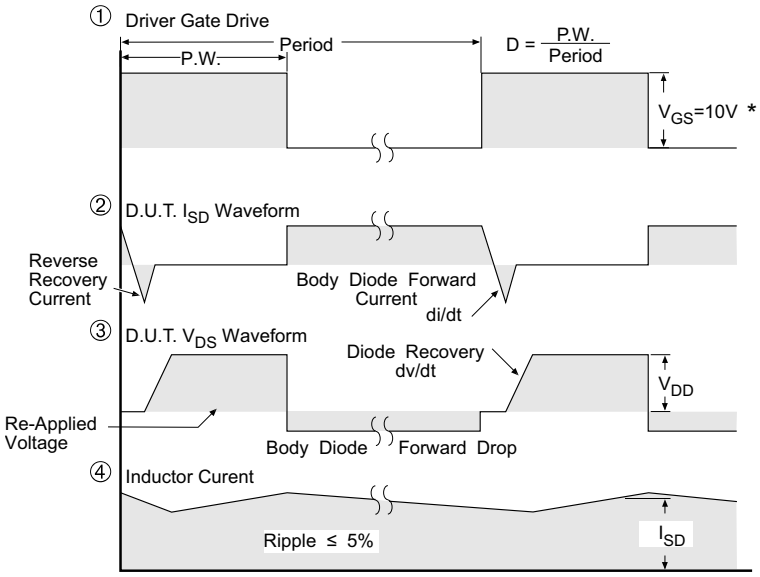


Fig. 23 - Peak Diode Recovery dV/dt Test Circuit



* V_{GS} = 5V for Logic Level Devices

Fig. 24 - For N-Channel Power MOSFETs

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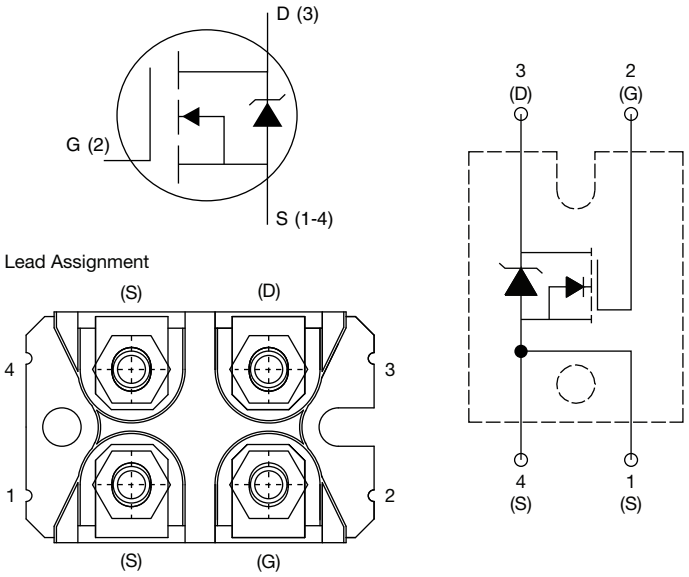
ORDERING INFORMATION TABLE

Device code

VS-	F	A	40	S	A	50	LC
1	2	3	4	5	6	7	8

- 1 - Vishay Semiconductors product
- 2 - Power MOSFET
- 3 - A = generation 3, MOSFET silicon die
- 4 - Current rating (40 = 40 A)
- 5 - Single switch
- 6 - Package indicator (SOT-227)
- 7 - Voltage rating (50 = 500 V)
- 8 - LC = low charge

CIRCUIT CONFIGURATION

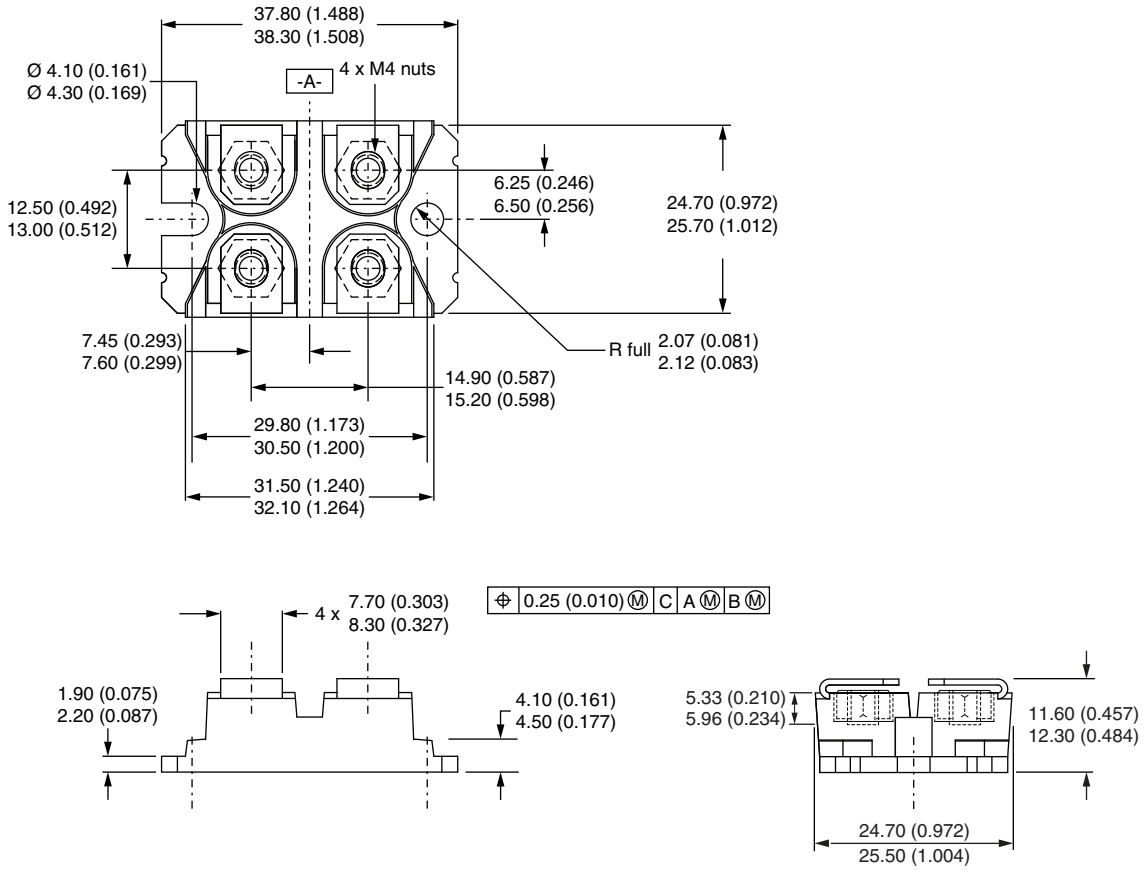
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Single switch	S	

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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Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

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Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

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Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

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