Insulated Gate Bipolar Transistor (Trench IGBT), 80 A



SOT-227

FEATURES

- Trench IGBT technology
- Positive $V_{CE(on)}$ temperature coefficient
- Square RBSOA
- 10 µs short circuit capability
- HEXFRED® low Q_{rr}, low switching energy
- T_J maximum = 150 °C
- Fully isolated package
- Very low internal inductance (≤ 5 nH typical)
- Industry standard outline
- UL approved file E78996
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

BENEFITS

- Designed for increased operating efficiency in power conversion: UPS, SMPS, welding, induction heating
- Easy to assemble and parallel
- Direct mounting to heatsink
- Plug-in compatible with other SOT-227 packages
- Low EMI, requires less snubbing

PRIMARY CHARACTERISTICS	
V_{CES}	1200 V
I_C DC	80 A at 104 °C
$V_{CE(on)}$ typical at 80 A, 25 °C	2.0 V
Speed	8 kHz to 30 kHz
Package	SOT-227
Circuit configuration	Single switch with AP diode

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	V_{CES}		1200	V
Continuous collector current	I_C	T_C = 25 °C	139	A
		T_C = 90 °C	93	
Pulsed collector current	I_{CM}		170	
Clamped inductive load current	I_{LM}		250	
Diode continuous forward current	I_F	T_C = 25 °C	98	
		T_C = 90 °C	61	
Single pulse forward current	I_{FSM}	10 ms sine or 6 ms rectangular pulse, T_J = 25 °C	350	
Gate to emitter voltage	V_{GE}		± 20	V
Power dissipation, IGBT	P_D	T_C = 25 °C	658	W
		T_C = 90 °C	316	
Power dissipation, diode	P_D	T_C = 25 °C	403	
		T_C = 90 °C	194	
Isolation voltage	V_{ISOL}	Any terminal to case, t = 1 min	2500	V

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ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{BR(CES)}$	V_{GE} = 0 V, I_C = 2.6 mA	1200	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	V_{GE} = 15 V, I_C = 80 A	-	2.0	2.55	
		V_{GE} = 15 V, I_C = 80 A, T_J = 125 °C	-	2.4	-	
		V_{GE} = 15 V, I_C = 80 A, T_J = 150 °C	-	2.5	-	
Gate threshold voltage	$V_{GE(th)}$	V_{CE} = V_{GE}, I_C = 2.6 mA	4.75	5.7	7.0	
Temperature coefficient of threshold voltage	$\Delta V_{GE(th)}/\Delta T_J$	V_{CE} = V_{GE}, I_C = 2.6 mA (25 °C to 125 °C)	-	-12	-	mV/°C
Collector to emitter leakage current	I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V	-	1.0	100	µA
		V_{GE} = 0 V, V_{CE} = 1200 V, T_J = 125 °C	-	0.9	-	mA
Forward voltage drop	V_{FM}	I_F = 80 A, V_{GE} = 0 V	-	2.9	3.5	V
		I_F = 80 A, V_{GE} = 0 V, T_J = 125 °C	-	3.1	-	
		I_F = 80 A, V_{GE} = 0 V, T_J = 150 °C	-	3.1	-	
Gate to emitter leakage current	I_{GES}	V_{GE} = ± 20 V	-	-	± 220	nA

SWITCHING CHARACTERISTICS (T_J = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Total gate charge (turn-on)	Q_g	V_{GE} = -15 V, V_{GE} = ± 15 V		-	570	-	
Input capacitance	C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		-	4400	-	pF
Reverse transfer capacitance	C_{res}			-	235	-	
Turn-on switching loss	E_{on}	I_C = 80 A, V_{CC} = 600 V, V_{GE} = 15 V, R_g = 1.0 Ω, L = 500 µH, T_J = 25 °C	Energy losses include tail and diode recovery Diode used HFA16PB120	-	3.0	-	mJ
Turn-off switching loss	E_{off}			-	3.2	-	
Total switching loss	E_{tot}			-	6.2	-	
Turn-on switching loss	E_{on}	I_C = 80 A, V_{CC} = 600 V, V_{GE} = 15 V, R_g = 1.0 Ω, L = 500 µH, T_J = 125 °C		-	3.9	-	mJ
Turn-off switching loss	E_{off}			-	5.5	-	
Total switching loss	E_{tot}			-	9.4	-	
Turn-on delay time	$t_{d(on)}$			-	134	-	ns
Rise time	t_r			-	65	-	
Turn-off delay time	$t_{d(off)}$			-	281	-	
Fall time	t_f			-	155	-	
Reverse bias safe operating area	RBSOA	T_J = 150 °C, I_C = 250 A, R_g = 1.0 Ω, V_{GE} = 15 V to 0 V, V_{CC} = 800 V, V_P = 1200 V, L = 500 µH		Fullsquare			
Diode reverse recovery time	t_{rr}	I_F = 50 A, dI_F/dt = 200 A/µs, V_R = 400 V		-	179	-	ns
Diode peak reverse current	I_{rr}			-	11.5	-	A
Diode recovery charge	Q_{rr}			-	1029	-	nC
Diode reverse recovery time	t_{rr}	I_F = 50 A, dI_F/dt = 200 A/µs, V_{rr} = 400 V, T_J = 125 °C		-	275	-	ns
Diode peak reverse current	I_{rr}			-	17.8	-	A
Diode recovery charge	Q_{rr}			-	2451	-	nC
Short circuit safe operating area	SCSOA	V_{GE} = 15 V, V_{CC} = 800 V, V_{CE} max.= 1200 V, T_J = 150 °C		10			µs

THERMAL AND MECHANICAL SPECIFICATIONS

PARAMETER		SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction and storage temperature range		T_J, T_{Stg}		-40	-	150	°C
Junction to case	IGBT	R_{thJC}		-	-	0.19	°C/W
	Diode			-	-	0.31	
Case to heatsink		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	-	-	1.3 (11.5))	Nm (lbf. in)
Case style		SOT-227					

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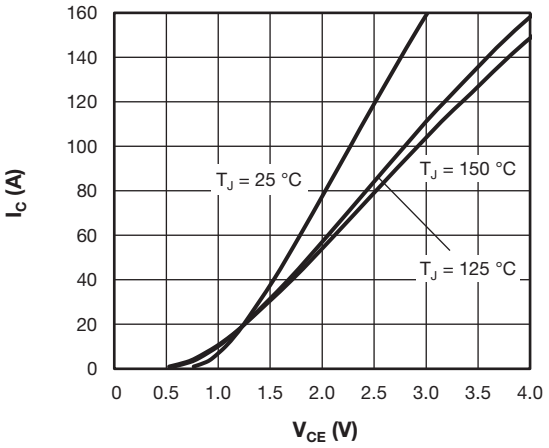


Fig. 1 - Typical IGBT Output Characteristics, V_{GE} = 15 V

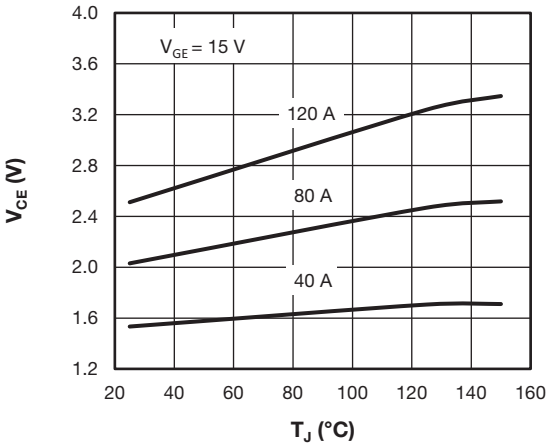


Fig. 4 - Collector to Emitter Voltage vs. Junction Temperature

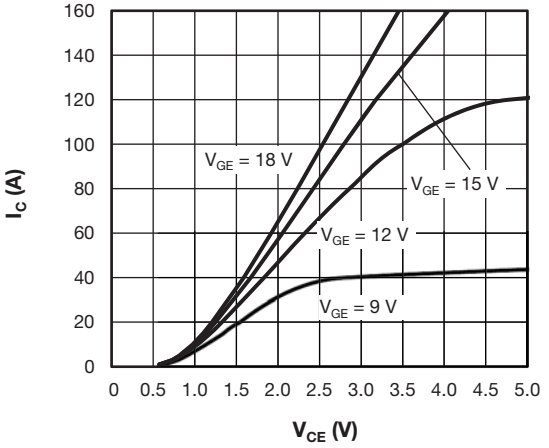


Fig. 2 - Typical IGBT Output Characteristics, T_J = 125 °C

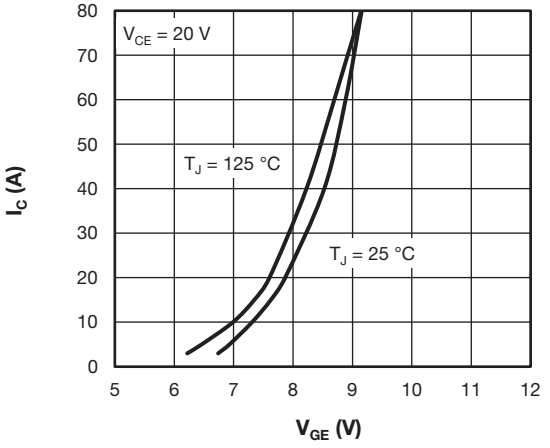


Fig. 5 - Typical IGBT Transfer Characteristics

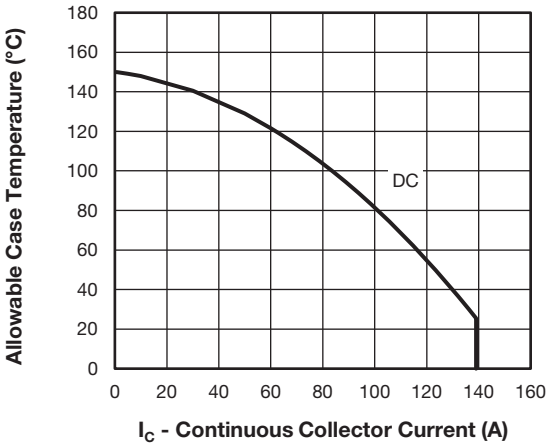


Fig. 3 - Maximum IGBT Continuous Collector Current vs. Case Temperature

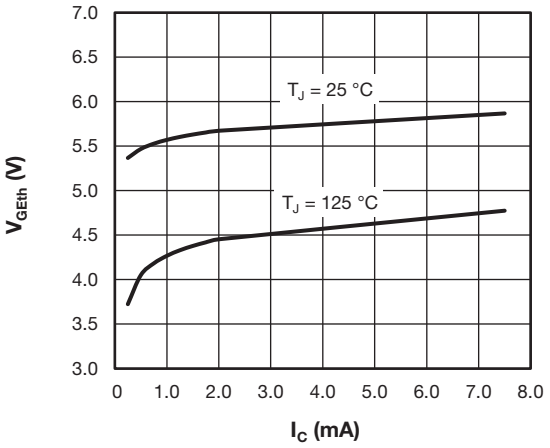


Fig. 6 - Typical IGBT Gate Threshold Voltage

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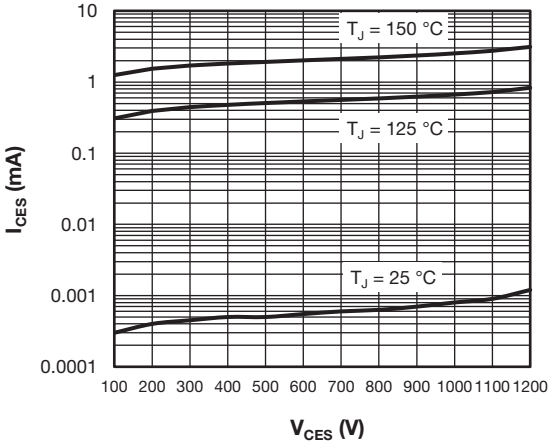


Fig. 7 - Typical IGBT Zero Gate Voltage Collector Current

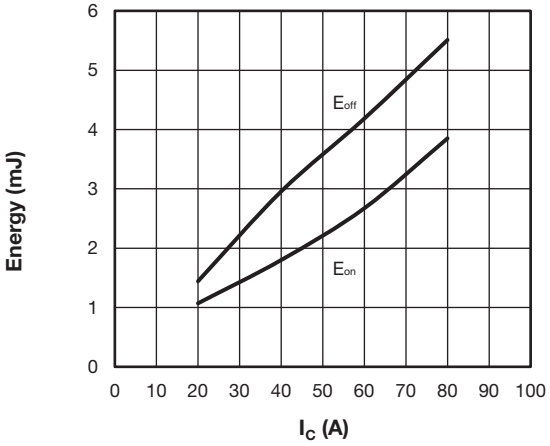


Fig. 10 - Typical IGBT Energy Loss vs I_C
T_J = 125 °C, V_{CC} = 600 V, R_g = 1.0 Ω, V_{GE} = 15 V, L = 500 µH

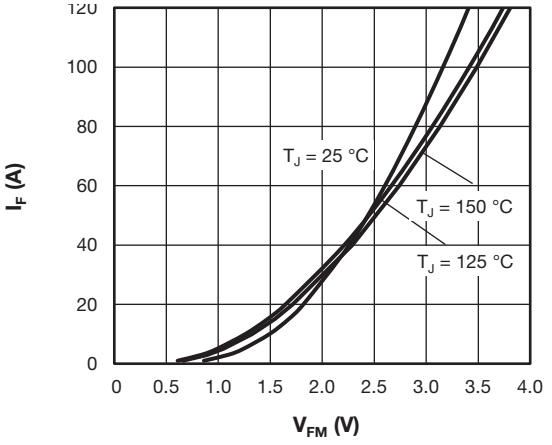


Fig. 8 - Typical Diode Forward Characteristics

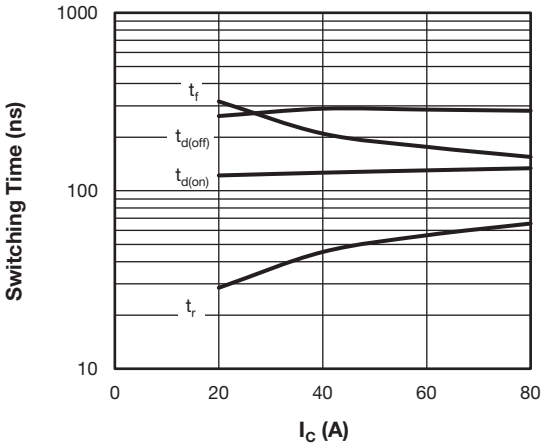


Fig. 11 - Typical IGBT Switching Time vs. I_C
T_J = 125 °C, V_{CC} = 600 V, R_g = 1.0 Ω, V_{GE} = 15 V, L = 500 µH

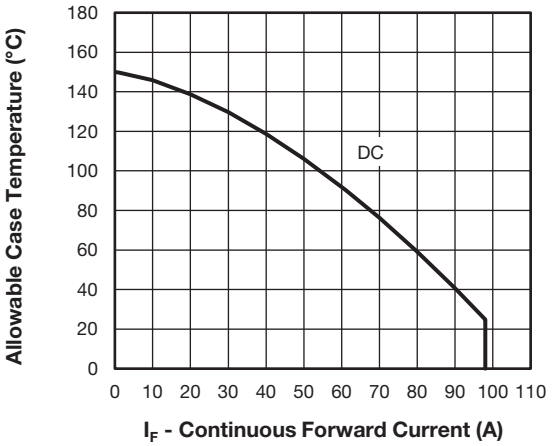


Fig. 9 - Maximum Diode Continuous Forward Current vs. Case Temperature

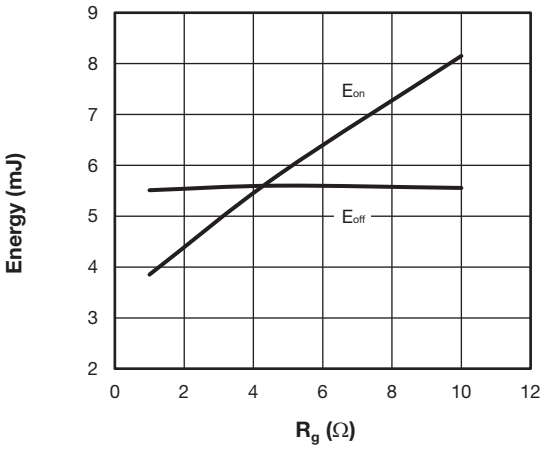


Fig. 12 - Typical IGBT Energy Loss vs. R_g
T_J = 125 °C, V_{CC} = 600 V, I_C = 80 A, V_{GE} = 15 V, L = 500 µH

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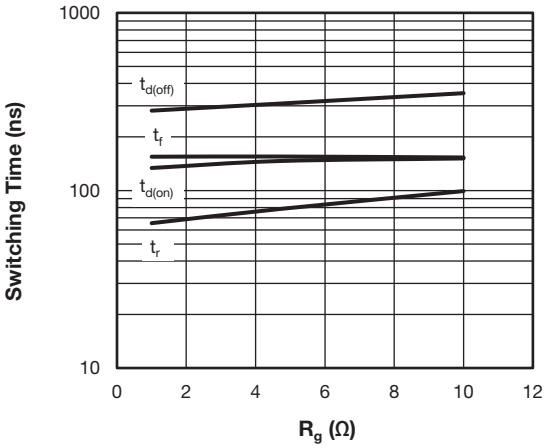


Fig. 13 - Typical IGBT Switching Time vs. R_g
T_J = 125 °C, V_{CC} = 600 V, I_C = 80 A, V_{GE} = 15 V, L = 500 µH

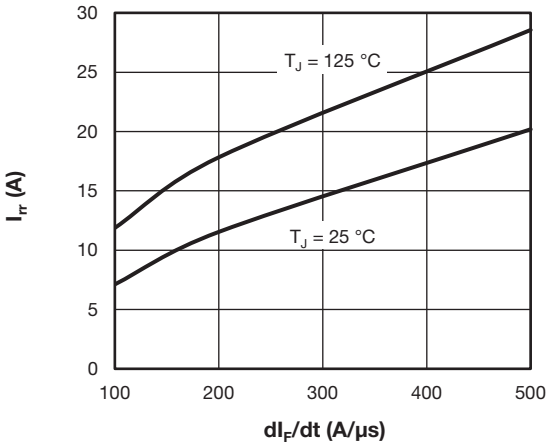


Fig. 15 - Typical Diode Reverse Recovery Current vs. dI_F/dt
V_{rr} = 400 V, I_F = 50 A

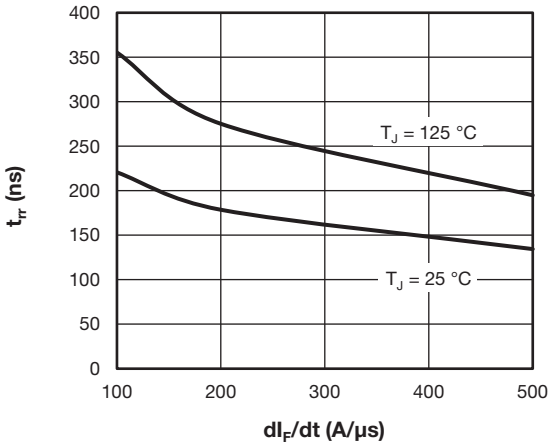


Fig. 14 - Typical Diode Reverse Recovery Time vs. dI_F/dt
V_{rr} = 400 V, I_F = 50 A

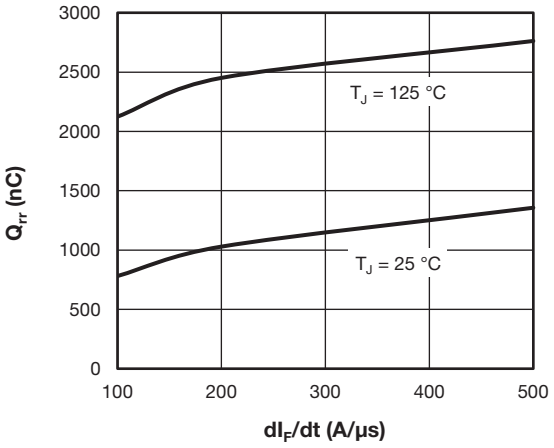


Fig. 16 - Typical Diode Reverse Recovery Charge vs. dI_F/dt
V_{rr} = 400 V, I_F = 50 A

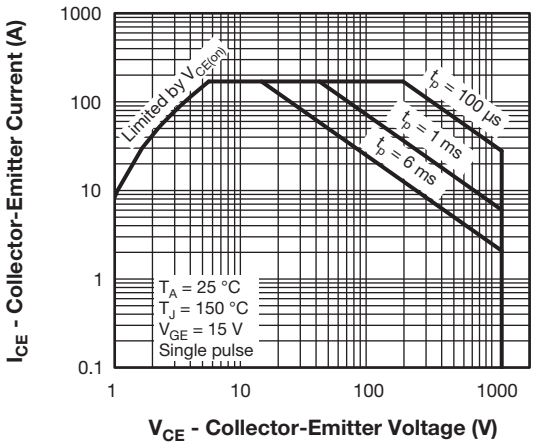


Fig. 17 - IGBT Safe Operating Area

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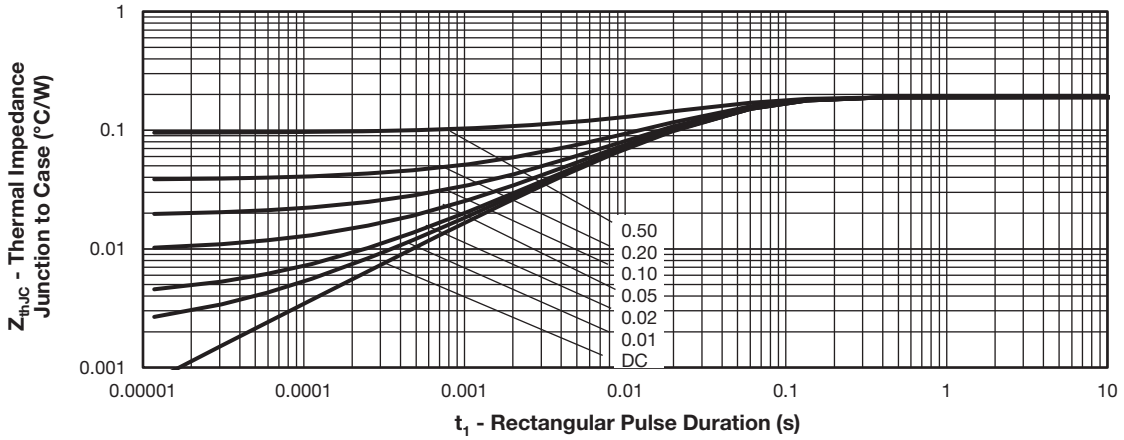


Fig. 18 - Maximum Thermal Impedance Z_{thJC} Characteristics (IGBT)

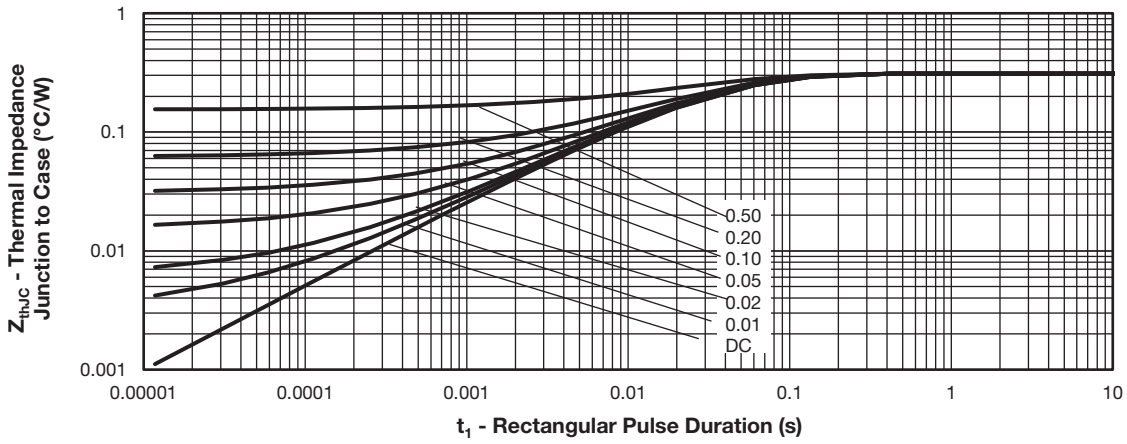


Fig. 19 - Maximum Thermal Impedance Z_{thJC} Characteristics (Diode)

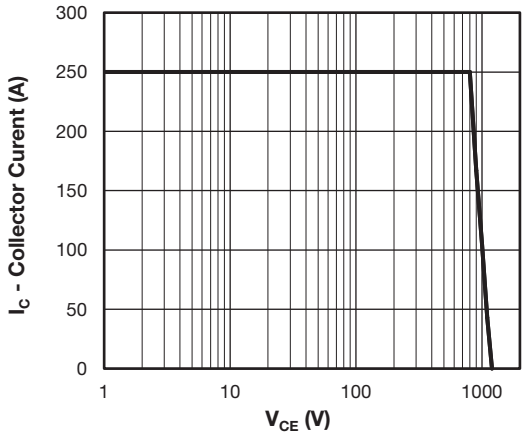
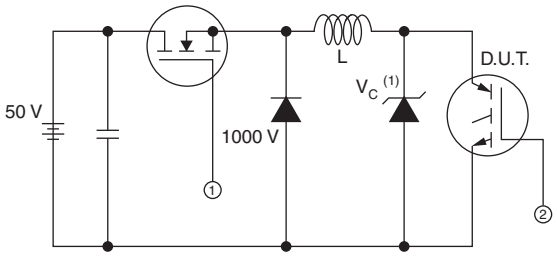


Fig. 20 - IGBT Reverse Bias SOA
V_{GE} = 15 V, T_J = 150 °C

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Note:
(1) Driver same type as D.U.T.; V_C = 80 % of V_{CE} max.
Due to the 50 V power supply, pulse width, and inductor will increase to obtain I_D

Fig. 21 - Clamped Inductive Load Test Circuit

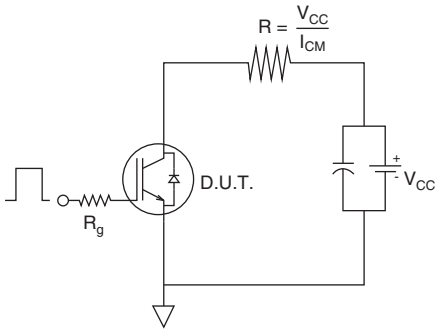


Fig. 22 - Pulsed Collector Current Test Circuit

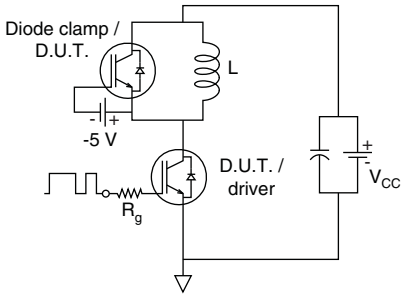


Fig. 23 - Switching Loss Test Circuit

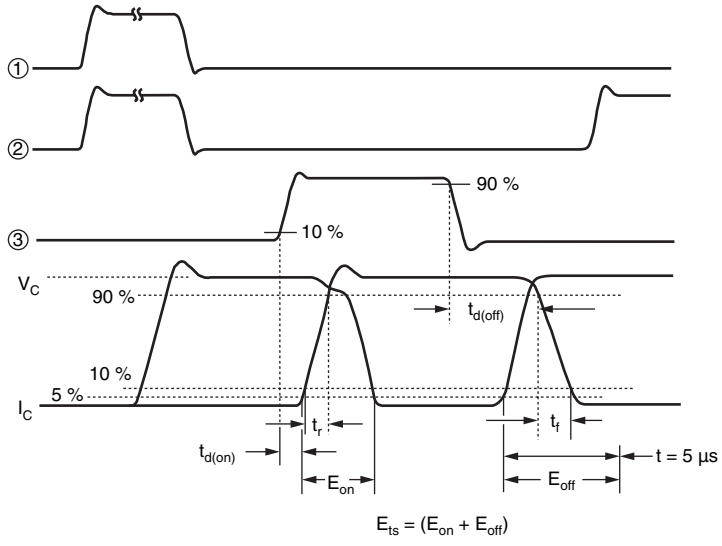


Fig. 24 - Switching Loss Waveforms Test Circuit

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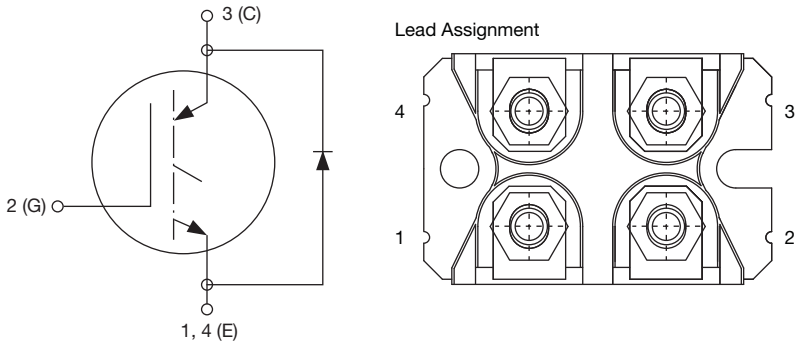
ORDERING INFORMATION TABLE

Device code

VS-	G	T	80	D	A	120	U
1	2	3	4	5	6	7	8

1	-	Vishay Semiconductors product
2	-	Insulated gate bipolar transistor (IGBT)
3	-	Trench IGBT technology
4	-	Current rating (80 = 80 A)
5	-	Circuit configuration (D = single switch with antiparallel diode)
6	-	Package indicator (A = SOT-227)
7	-	Voltage rating (120 = 1200 V)
8	-	Speed / type (U = ultrafast)

CIRCUIT CONFIGURATION

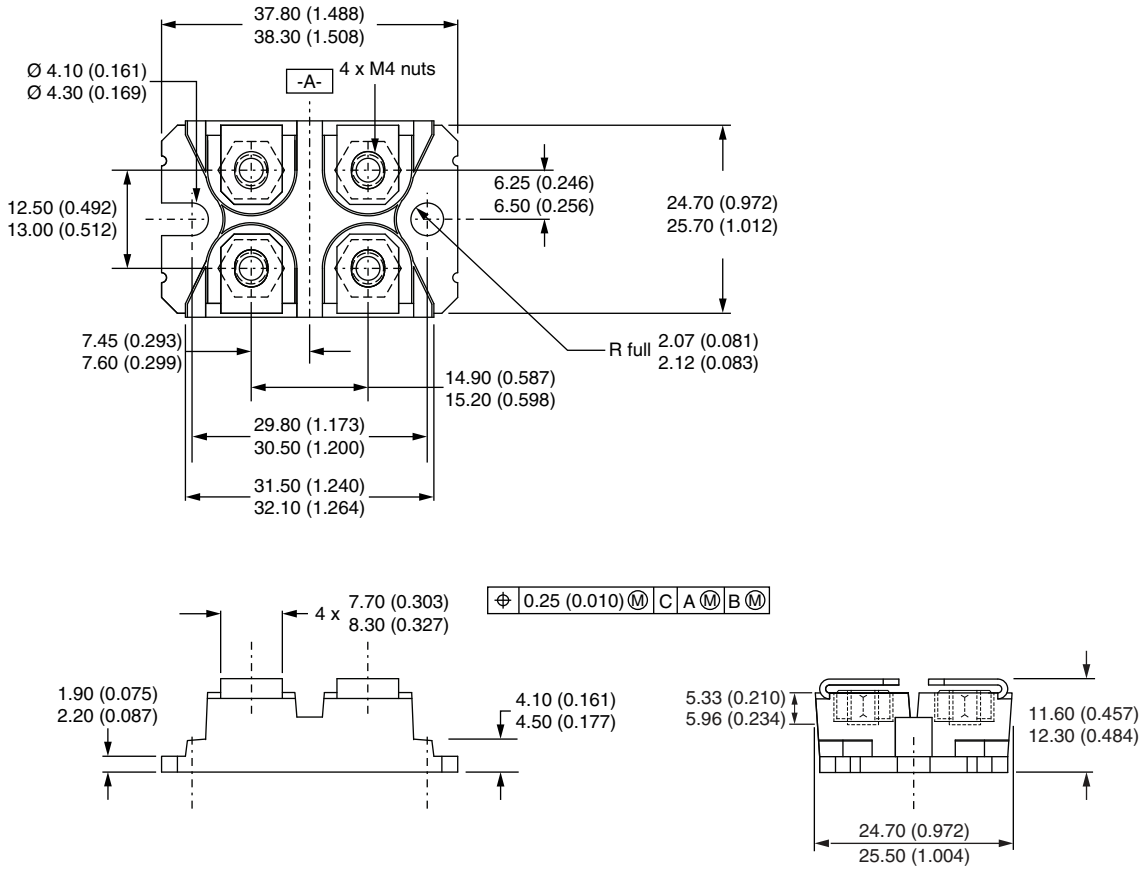
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Single switch with AP diode	D	

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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