Half Bridge IGBT Power Module, 600 V, 100 A

INT-A-PAK

FEATURES

- Low $V_{CE(on)}$ trench IGBT technology
- 5 µs short circuit capability
- $V_{CE(on)}$ with positive temperature coefficient
- Maximum junction temperature 175 °C
- Low inductance case
- Fast and soft reverse recovery antiparallel FWD
- Isolated copper baseplate using DCB (direct copper bonding) technology
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

TYPICAL APPLICATIONS

- UPS (uninterruptable power supply)
- Switching mode power supplies
- Electronic welders

DESCRIPTION

Vishay's IGBT power module provides ultra low conduction loss as well as short circuit ruggedness. It is designed for applications such as UPS and SMPS.

PRIMARY CHARACTERISTICS	
V_{CES}	600 V
I_C at T_C = 80 °C	100 A
$V_{CE(on)}$ (typical) at I_C = 100 A, 25 °C	1.65 V
Speed	8 kHz to 30 kHz
Package	INT-A-PAK
Circuit configuration	Half bridge

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

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	V_{CES}		600	V
Gate to emitter voltage	V_{GES}		± 20	
Collector current	I_C	T_C = 25 °C	160	A
		T_C = 80 °C	100	
Pulsed collector current	I_{CM} (1)	t_p = 1 ms	200	
Diode continuous forward current	I_F	T_C = 80 °C	100	
Diode maximum forward current	I_{FM} (1)	t_p = 1 ms	200	
Maximum power dissipation	P_D	T_J = 175 °C	417	W
Short circuit withstand time	t_{SC}	T_C = 125 °C	5	µs
RMS isolation voltage	V_{ISOL}	f = 50 Hz, t = 1 min	4000	V

Note

(1) Repetitive rating: pulse width limited by maximum junction temperature

IGBT ELECTRICAL SPECIFICATIONS (T_C = 25 °C unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{(BR)CES}$	T_J = 25 °C	600	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	V_{GE} = 15 V, I_C = 100 A, T_J = 25 °C	-	1.65	2.10	
		V_{GE} = 15 V, I_C = 100 A, T_J = 175 °C	-	2.00	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	V_{CE} = V_{GE}, I_C = 1.0 mA, T_J = 25 °C	4.0	4.4	6.5	
Collector cut-off current	I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0 V, T_J = 25 °C	-	-	5.0	mA
Gate to emitter leakage current	I_{GES}	V_{GE} = V_{GES}, V_{CE} = 0 V, T_J = 25 °C	-	-	400	nA

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SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	$t_{d(on)}$	V_{CC} = 300 V, I_C = 100 A, R_g = 2.2 Ω, V_{GE} = ± 15 V, T_J = 25 °C	-	106	-	ns
Rise time	t_r		-	49	-	
Turn-off delay time	$t_{d(off)}$		-	102	-	
Fall time	t_f		-	85	-	
Turn-on switching loss	E_{on}		-	0.46	-	mJ
Turn-off switching loss	E_{off}		-	0.95	-	
Turn-on delay time	$t_{d(on)}$	V_{CC} = 300 V, I_C = 100 A, R_g = 2.2 Ω, V_{GE} = ± 15 V, T_J = 125 °C	-	112	-	ns
Rise time	t_r		-	62	-	
Turn-off delay time	$t_{d(off)}$		-	126	-	
Fall time	t_f		-	109	-	
Turn-on switching loss	E_{on}		-	0.78	-	mJ
Turn-off switching loss	E_{off}		-	1.73	-	
Input capacitance	C_{ies}	V_{GE} = 0 V, V_{CE} = 30 V, f = 1.0 MHz	-	7.71	-	nF
Output capacitance	C_{oes}		-	0.53	-	
Reverse transfer capacitance	C_{res}		-	0.23	-	
SC data	I_{SC}	$t_p \leq 5$ µs, V_{GE} = 15 V, T_J = 125 °C, V_{CC} = 360 V, $V_{CEM} \leq$ 1200 V	-	900	-	A
Stray inductance	L_{CE}		-	-	30	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$		-	0.75	-	mΩ

DIODE ELECTRICAL SPECIFICATIONS (T_C = 25 °C unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Forward voltage	V_F	I_F = 100 A	T_J = 25 °C	-	1.40	1.80	V
			T_J = 125 °C	-	1.40	-	
Reverse recovery charge	Q_{rr}	I_F = 100 A, V_R = 600 V, R_G = 5.6 Ω, V_{GE} = -15 V	T_J = 25 °C	-	5.5	-	µC
			T_J = 125 °C	-	7.3	-	
Peak reverse recovery current	I_{rr}		T_J = 25 °C	-	68	-	A
			T_J = 125 °C	-	88	-	
Reverse recovery energy	E_{rec}		T_J = 25 °C	-	0.89	-	mJ
			T_J = 125 °C	-	1.71	-	

THERMAL AND MECHANICAL SPECIFICATIONS

PARAMETER		SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction temperature		T_J		-	-	175	°C
Storage temperature range		T_{Stg}		-40	-	125	
Junction to case	IGBT	R_{thJC}		-	-	0.36	K/W
	Diode			-	-	0.57	
Case to sink (conductive grease applied)		R_{thCS}		-	0.05	-	
Mounting torque			Power terminal screw: M5	2.5 to 5.0			Nm
			Mounting screw: M6	3.0 to 5.0			
Weight				-	150	-	g

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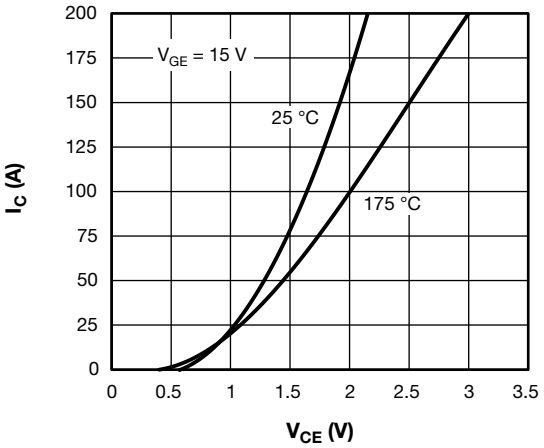

Fig. 1 - IGBT Typical Output Characteristics

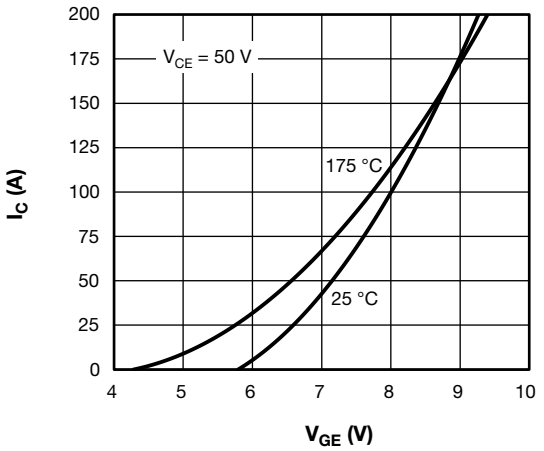

Fig. 2 - IGBT Transfer Characteristics

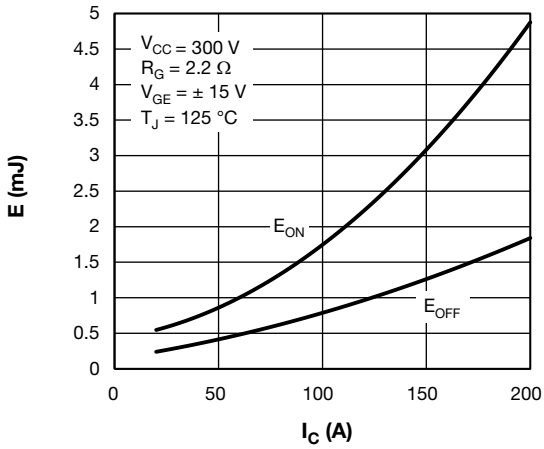

Fig. 3 - IGBT Switching Loss vs. I_C

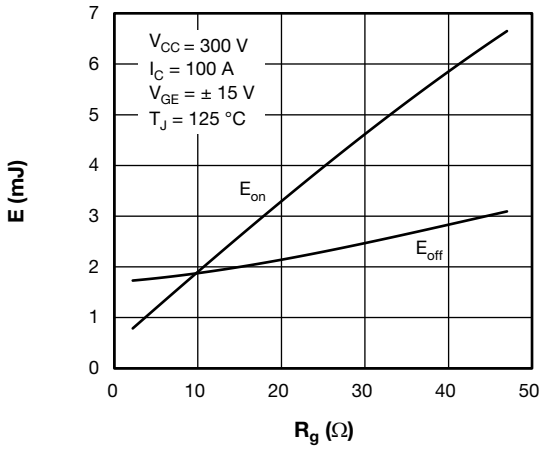

Fig. 4 - IGBT Switching Loss vs. R_G

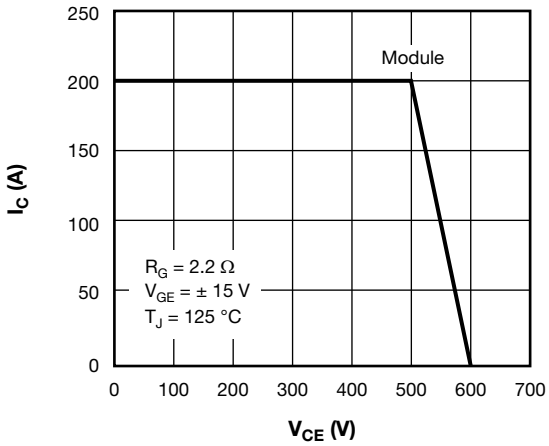

Fig. 5 - RBSOA

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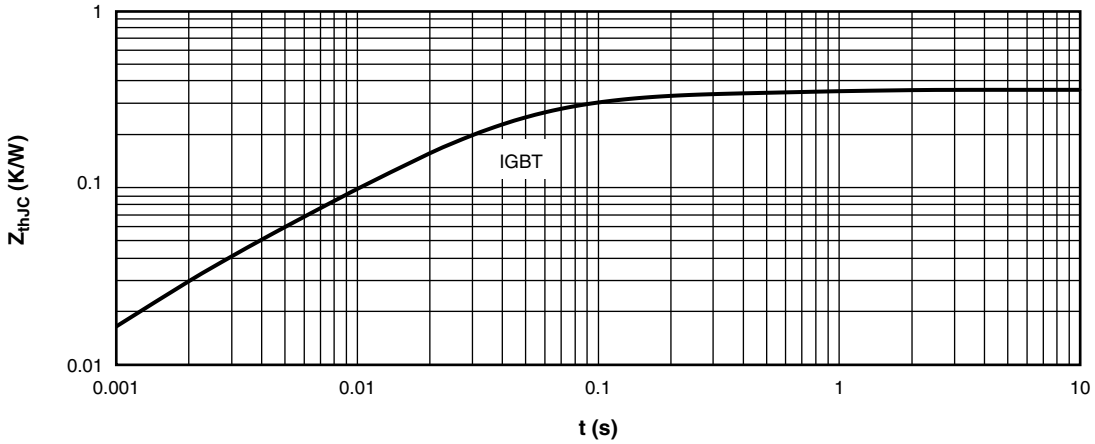

Fig. 6 - IGBT Transient Thermal Impedance

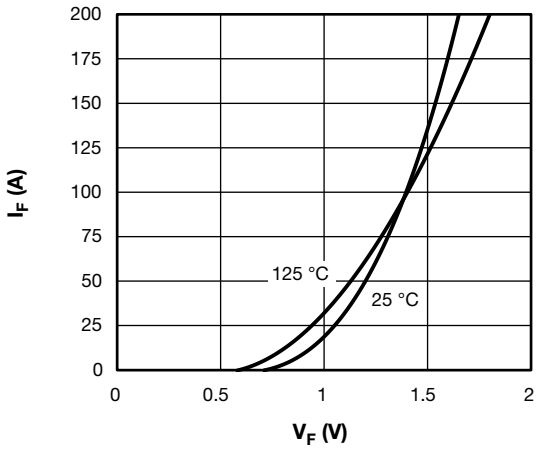

Fig. 7 - Diode Forward Characteristics

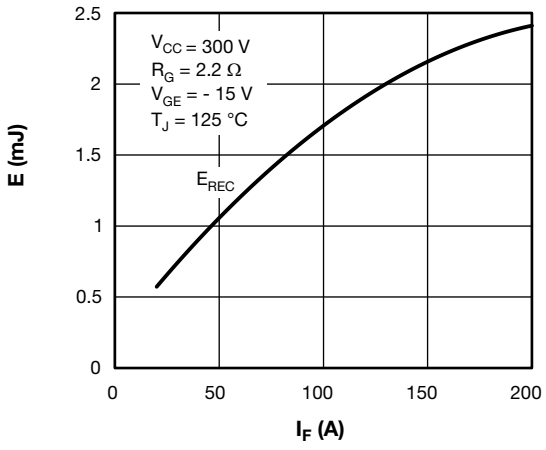

Fig. 8 - Diode Switching Loss vs. I_F

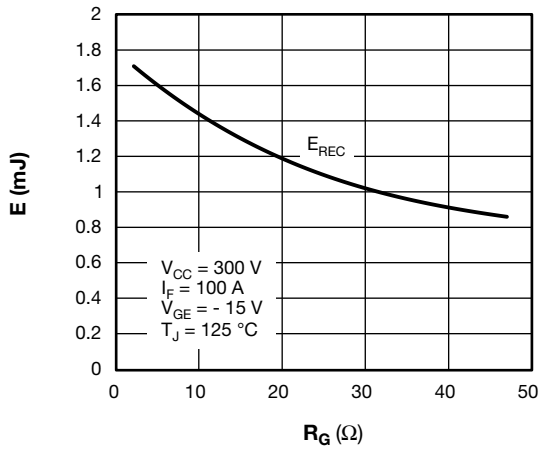

Fig. 9 - Diode Switching Loss vs. R_G

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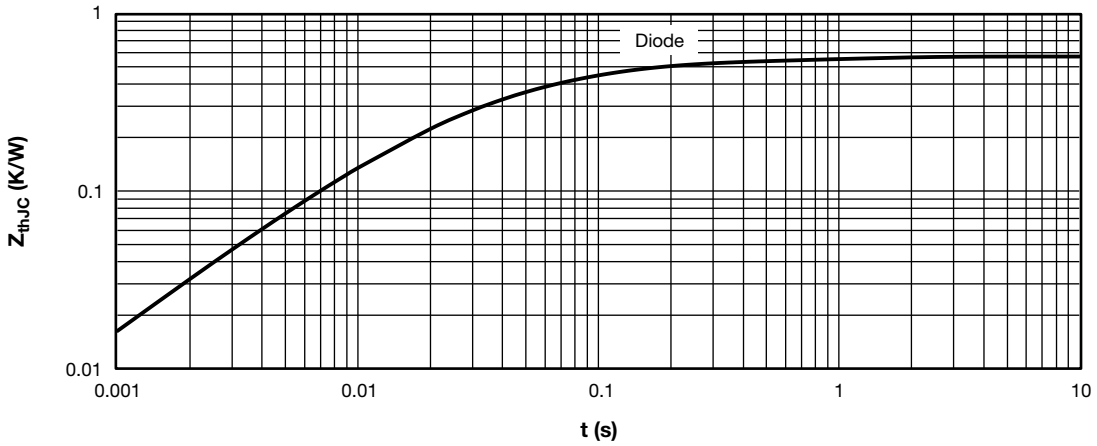
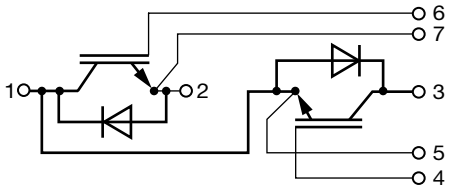


Fig. 10 - Forward Characteristics of Diode

CIRCUIT CONFIGURATION



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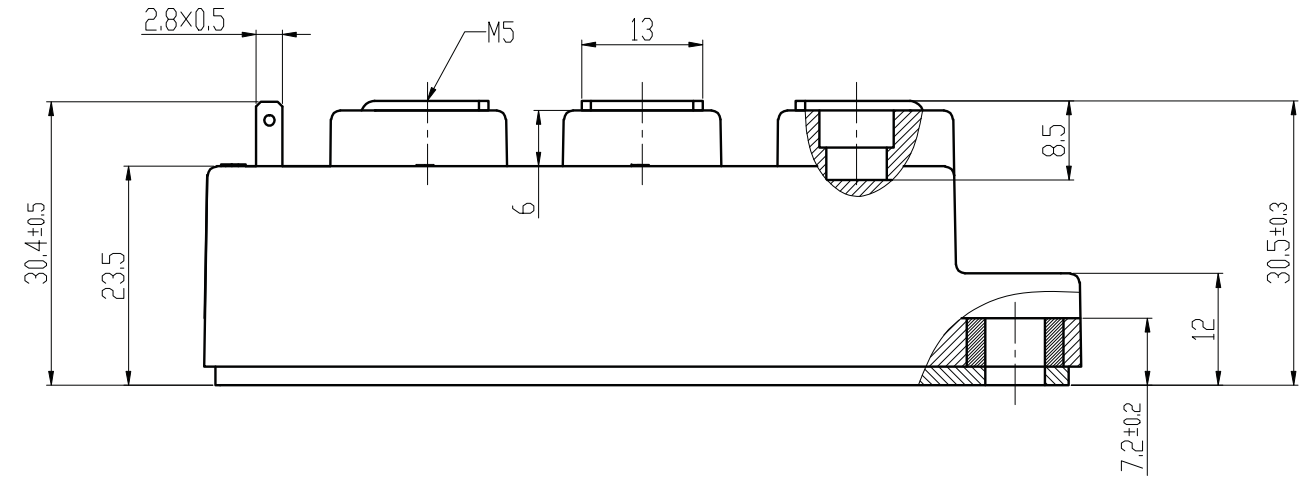
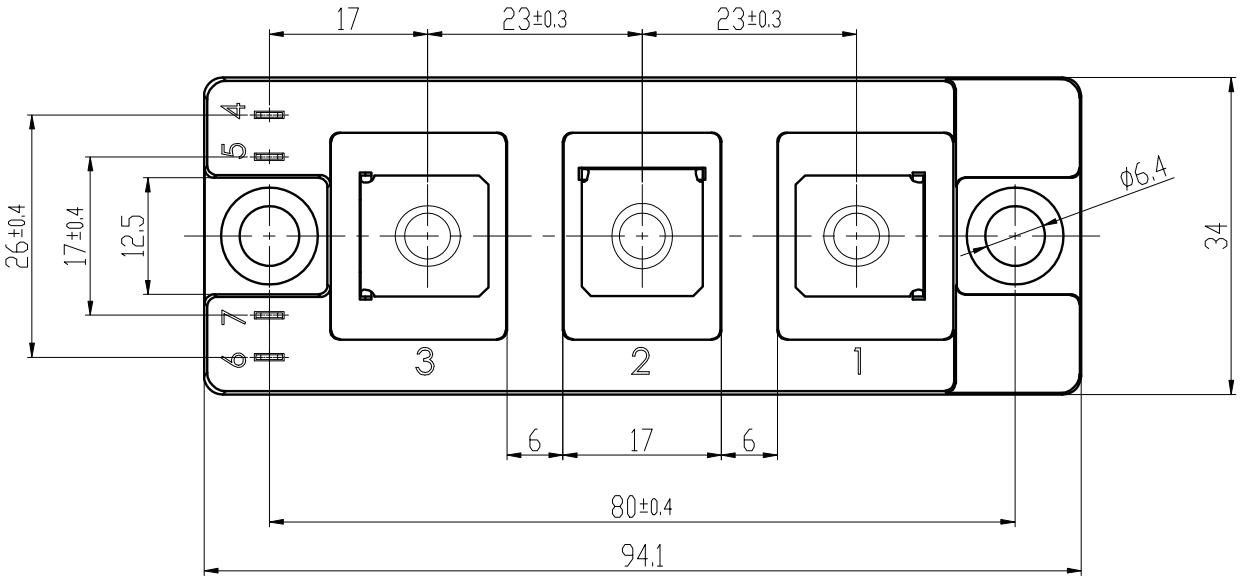
INT-A-PAK

DIMENSIONS in millimeters (inches)





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