

## Half Bridge IGBT Power Module, 600 V, 100 A



INT-A-PAK

### FEATURES

- Low  $V_{CE(on)}$  trench IGBT technology
- 5  $\mu$ s 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](http://www.vishay.com/doc?99912)



RoHS  
COMPLIANT

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

### 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.

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	$V_{GES}$		$\pm 20$	
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	$\mu$ s
RMS isolation voltage	$V_{ISOL}$	$f = 50$ Hz, $t = 1$ min	4000	V

#### Note

<sup>(1)</sup> 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



SWITCHING CHARACTERISTICS							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 300\text{ V}, I_C = 100\text{ A}, R_g = 2.2\ \Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	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	$t_{d(on)}$	$V_{CC} = 300\text{ V}, I_C = 100\text{ A}, R_g = 2.2\ \Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	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	$C_{ies}$	$V_{GE} = 0\text{ V}, V_{CE} = 30\text{ V}, f = 1.0\text{ MHz}$	-	7.71	-	nF	
Output capacitance	$C_{oes}$		-	0.53	-		
Reverse transfer capacitance	$C_{res}$		-	0.23	-		
SC data	$I_{SC}$	$t_p \leq 5\ \mu\text{s}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C},$ $V_{CC} = 360\text{ V}, V_{CEM} \leq 1200\text{ V}$	-	900	-	A	
Stray inductance	$L_{CE}$		-	-	30	nH	
Module lead resistance, terminal to chip	$R_{CC'+EE'}$		-	0.75	-	m $\Omega$	

DIODE ELECTRICAL SPECIFICATIONS ( $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Forward voltage	$V_F$	$I_F = 100\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	-	1.40	1.80	V
			$T_J = 125\text{ }^\circ\text{C}$	-	1.40	-	
Reverse recovery charge	$Q_{rr}$	$I_F = 100\text{ A}, V_R = 600\text{ V},$ $R_G = 5.6\ \Omega,$ $V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	5.5	-	$\mu\text{C}$
			$T_J = 125\text{ }^\circ\text{C}$	-	7.3	-	
Peak reverse recovery current	$I_{rr}$	$I_F = 100\text{ A}, V_R = 600\text{ V},$ $R_G = 5.6\ \Omega,$ $V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	68	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	88	-	
Reverse recovery energy	$E_{rec}$	$I_F = 100\text{ A}, V_R = 600\text{ V},$ $R_G = 5.6\ \Omega,$ $V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	0.89	-	mJ
			$T_J = 125\text{ }^\circ\text{C}$	-	1.71	-	

THERMAL AND MECHANICAL SPECIFICATIONS							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Maximum junction temperature	$T_J$		-	-	175	$^\circ\text{C}$	
Storage temperature range	$T_{Stg}$		-40	-	125		
Junction to case	$R_{thJC}$			-	-	0.36	K/W
				-	-	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	

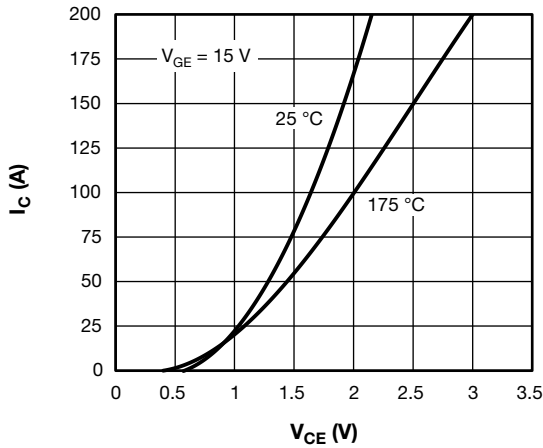


Fig. 1 - IGBT Typical Output Characteristics

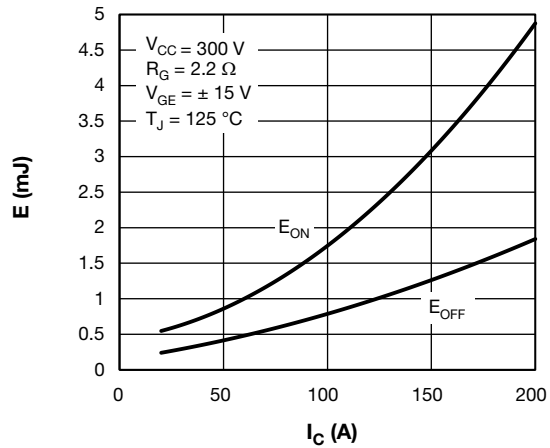


Fig. 3 - IGBT Switching Loss vs.  $I_C$

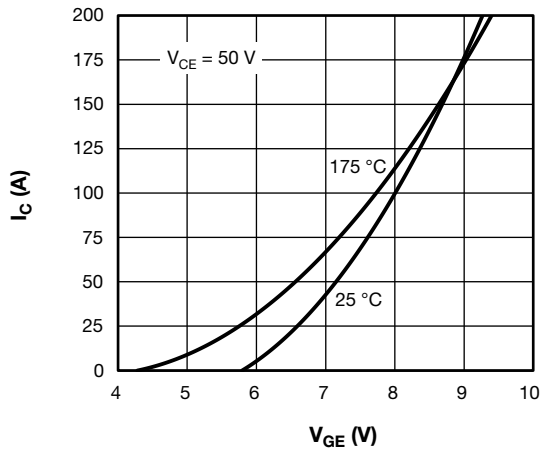


Fig. 2 - IGBT Transfer Characteristics

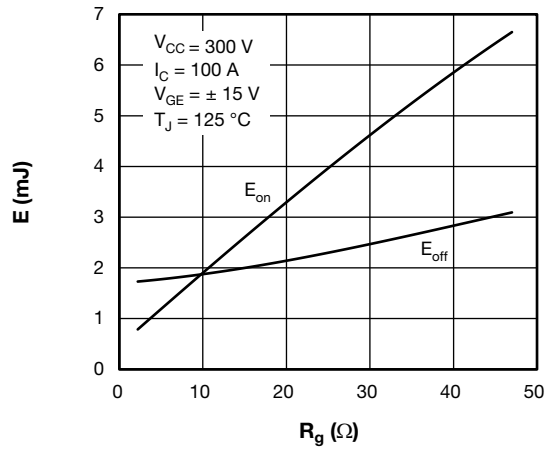


Fig. 4 - IGBT Switching Loss vs.  $R_G$

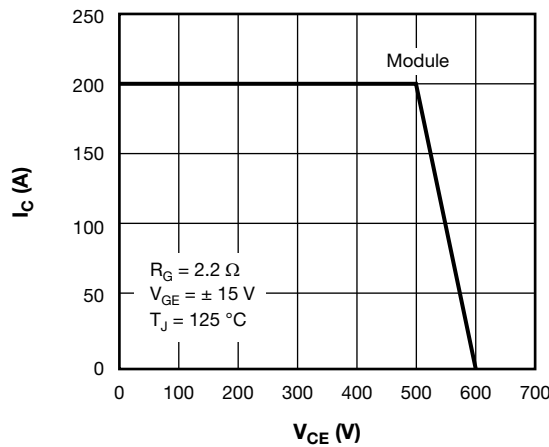


Fig. 5 - RBSOA

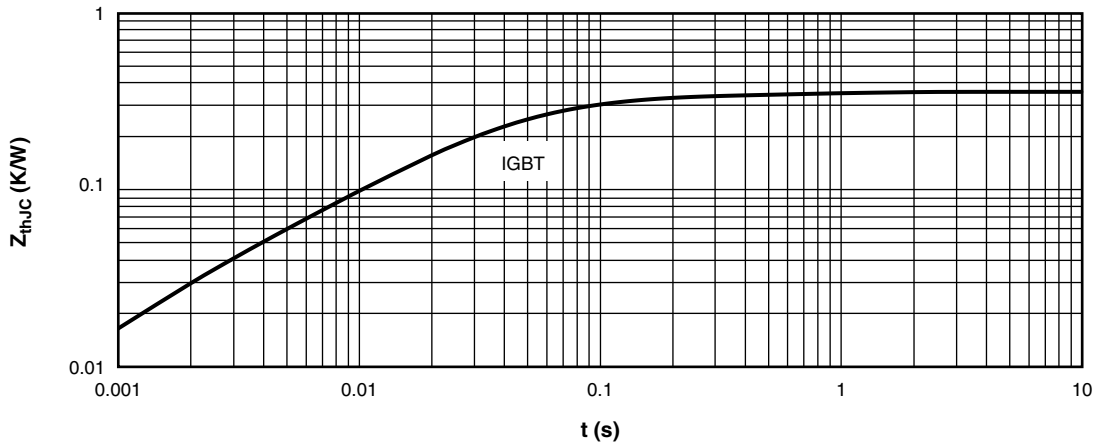


Fig. 6 - IGBT Transient Thermal Impedance

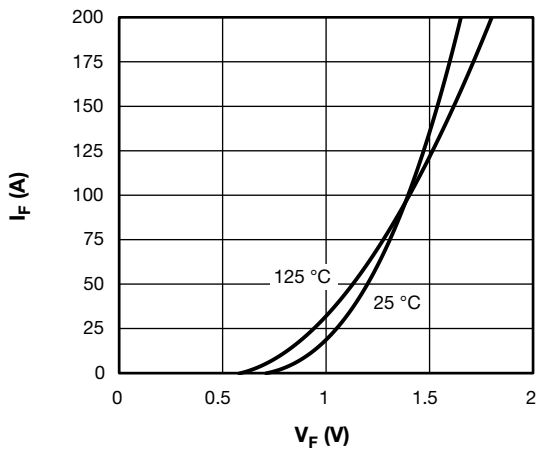


Fig. 7 - Diode Forward Characteristics

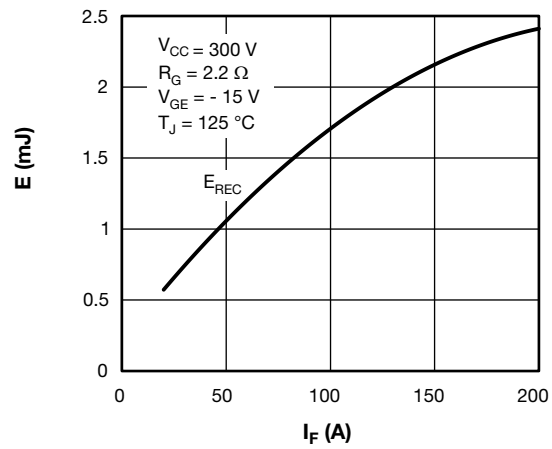


Fig. 8 - Diode Switching Loss vs.  $I_F$

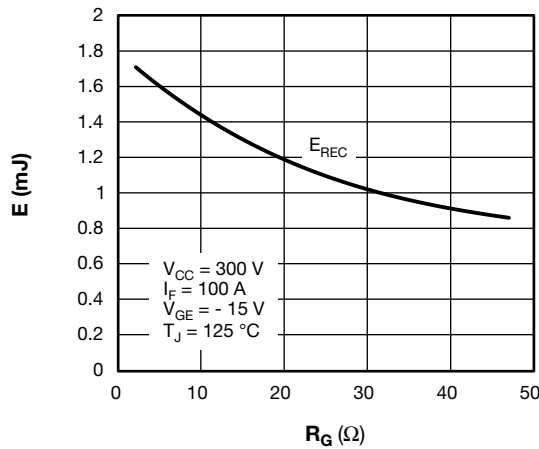


Fig. 9 - Diode Switching Loss vs.  $R_G$

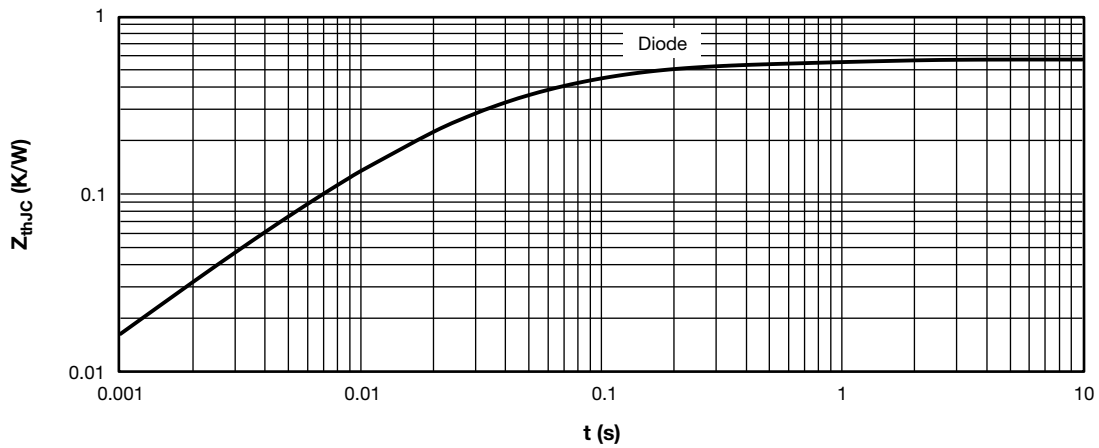
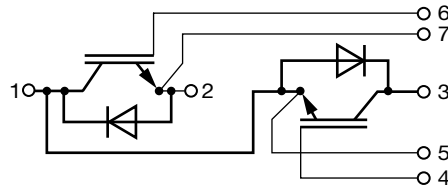


Fig. 10 - Forward Characteristics of Diode

**CIRCUIT CONFIGURATION**

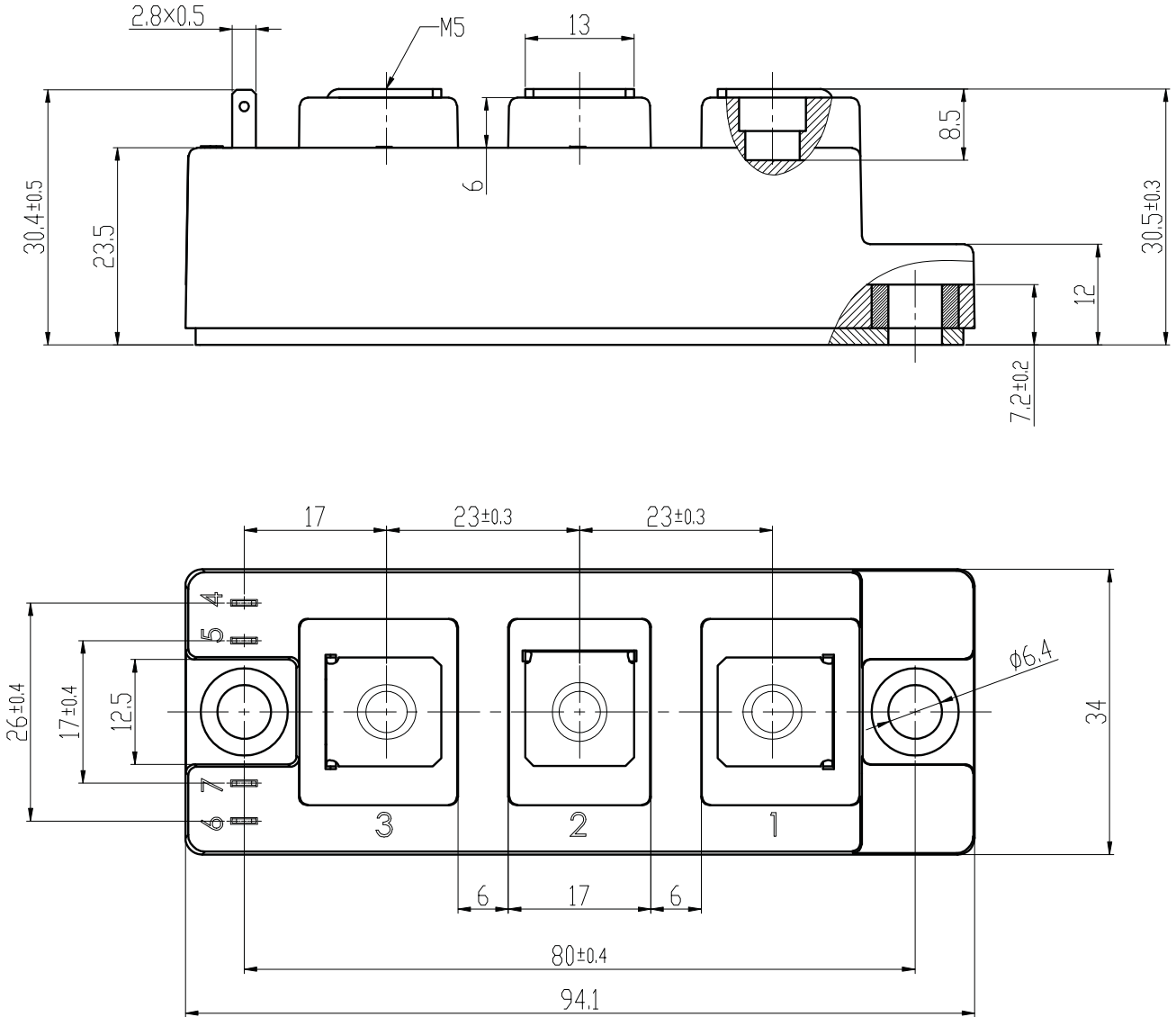


LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95524">www.vishay.com/doc?95524</a>



## INT-A-PAK

**DIMENSIONS** in millimeters (inches)





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