

## Molding Type Module IGBT, 2-in-1 Package, 1200 V and 150 A



Double INT-A-PAK


**RoHS**  
COMPLIANT

### FEATURES

- Low  $V_{CE(on)}$  SPT + IGBT technology
- 10  $\mu$ s short circuit capability
- $V_{CE(on)}$  with positive temperature coefficient
- Maximum junction temperature 150 °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)

### TYPICAL APPLICATIONS

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply (UPS)

### DESCRIPTION

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

PRODUCT SUMMARY	
$V_{CES}$	1200 V
$I_C$ at $T_C = 80\text{ }^\circ\text{C}$	150 A
$V_{CE(on)}$ (typical) at $I_C = 150\text{ A}$ , $25\text{ }^\circ\text{C}$	1.9 V
Speed	8 kHz to 30 kHz
Package	Double INT-A-PAK
Circuit	Half bridge

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted)				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	$V_{CES}$		1200	V
Gate to emitter voltage	$V_{GES}$		$\pm 20$	
Collector current	$I_C$	$T_C = 25\text{ }^\circ\text{C}$	300	A
		$T_C = 80\text{ }^\circ\text{C}$	150	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1\text{ ms}$	300	
Diode continuous forward current	$I_F$	$T_C = 80\text{ }^\circ\text{C}$	150	
Diode maximum forward current	$I_{FM}$	$t_p = 1\text{ ms}$	300	
Maximum power dissipation	$P_D$	$T_J = 150\text{ }^\circ\text{C}$	1008	W
Short circuit withstand time	$t_{SC}$	$T_J = 125\text{ }^\circ\text{C}$	10	$\mu$ s
RMS isolation voltage	$V_{ISOL}$	$f = 50\text{ Hz}$ , $t = 1\text{ min}$	2500	V

#### Note

<sup>(1)</sup> Repetitive rating: pulse width limited by maximum junction temperature.



<b>IGBT ELECTRICAL SPECIFICATIONS</b> ( $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{(BR)CES}$	$T_J = 25\text{ }^\circ\text{C}$	1200	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	$V_{GE} = 15\text{ V}, I_C = 150\text{ A}, T_J = 25\text{ }^\circ\text{C}$	-	1.90	2.35	
		$V_{GE} = 15\text{ V}, I_C = 150\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	2.10	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 6\text{ mA}, T_J = 25\text{ }^\circ\text{C}$	5.0	6.2	7.0	
Collector cut-off current	$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	-	5.0	mA
Gate to emitter leakage current	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	-	400	nA

<b>SWITCHING CHARACTERISTICS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}, I_C = 150\text{ A}, R_g = 4.7\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	336	-	ns
Rise time	$t_r$		-	75	-	
Turn-off delay time	$t_{d(off)}$		-	346	-	
Fall time	$t_f$		-	182	-	
Turn-on switching loss	$E_{on}$			-	7.25	-
Turn-off switching loss	$E_{off}$		-	9.30	-	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}, I_C = 150\text{ A}, R_g = 4.7\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	346	-	ns
Rise time	$t_r$		-	77	-	
Turn-off delay time	$t_{d(off)}$		-	389	-	
Fall time	$t_f$		-	322	-	
Turn-on switching loss	$E_{on}$			-	9.95	-
Turn-off switching loss	$E_{off}$		-	16.0	-	
Input capacitance	$C_{ies}$	$V_{GE} = 0\text{ V}, V_{CE} = 25\text{ V}, f = 1.0\text{ MHz}$	-	11.0	-	nF
Output capacitance	$C_{oes}$		-	0.80	-	
Reverse transfer capacitance	$C_{res}$		-	0.52	-	
SC data	$I_{SC}$	$t_{sc} \leq 10\text{ }\mu\text{s}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C}, V_{CC} = 900\text{ V}, V_{CEM} \leq 1200\text{ V}$	-	890	-	A
Internal gate resistance	$R_{GINT}$		-	1.5	-	$\Omega$
Stray inductance	$L_{CE}$		-	-	20	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$	$T_C = 25\text{ }^\circ\text{C}$	-	0.35	-	m $\Omega$

<b>DIODE ELECTRICAL SPECIFICATIONS</b> ( $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Diode forward voltage	$V_F$	$I_F = 150\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	-	1.80	2.20	V
			$T_J = 125\text{ }^\circ\text{C}$	-	1.85	-	
Diode reverse recovery charge	$Q_{rr}$	$I_F = 150\text{ A}, V_R = 600\text{ V}, dI/dt = -2360\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	16.2	-	$\mu\text{C}$
			$T_J = 125\text{ }^\circ\text{C}$	-	26.6	-	
Diode peak reverse recovery current	$I_{rr}$	$I_F = 150\text{ A}, V_R = 600\text{ V}, dI/dt = -2360\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	138	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	166	-	
Diode reverse recovery energy	$E_{rec}$	$I_F = 150\text{ A}, V_R = 600\text{ V}, dI/dt = -2360\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	7.48	-	mJ
			$T_J = 125\text{ }^\circ\text{C}$	-	13.4	-	



THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating junction temperature range	$T_J$		-	-	150	°C
Storage temperature range	$T_{STG}$		-40	-	125	
Junction to case	IGBT	$R_{thJC}$	-	-	0.124	K/W
	Diode		-	-	0.174	
Case to sink	$R_{thCS}$	Conductive grease applied	-	0.035	-	
Mounting torque		Power terminal screw: M6	2.5 to 5.0			Nm
		Mounting screw: M6	3.0 to 5.0			
Weight			300			g

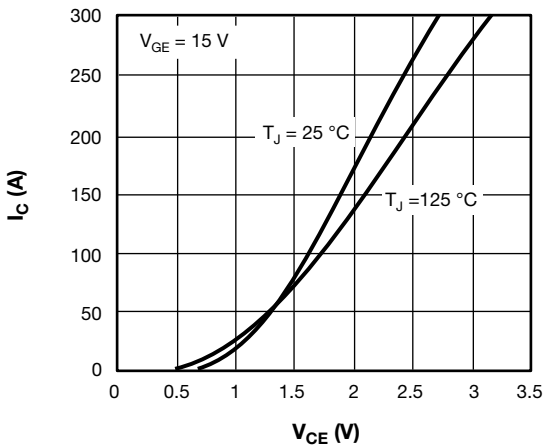


Fig. 1 - IGBT Typical Output Characteristics

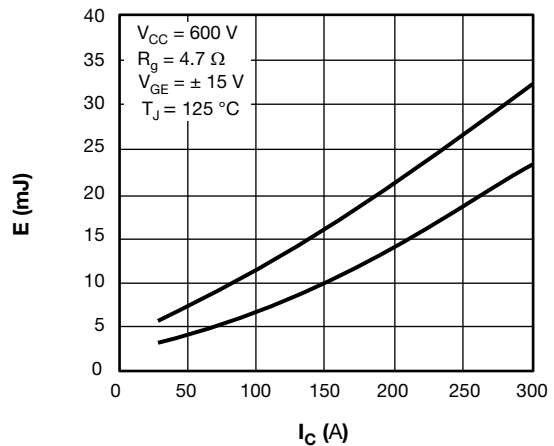


Fig. 3 - IGBT Switching Loss vs.  $I_C$

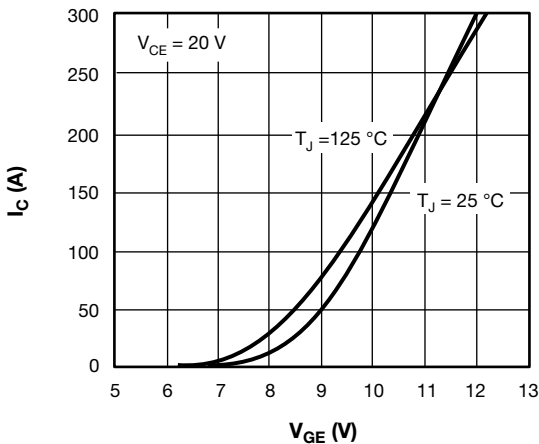


Fig. 2 - IGBT Typical Transfer Characteristics

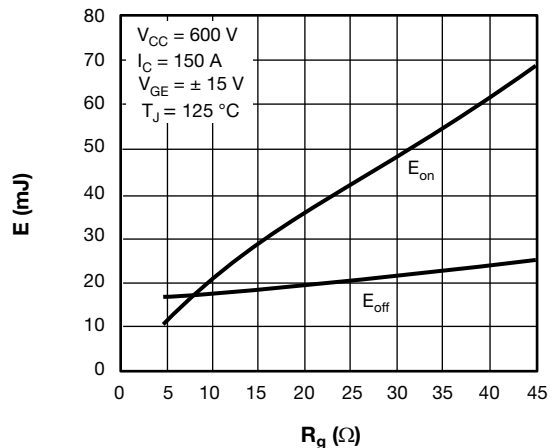


Fig. 4 - IGBT Switching Loss vs.  $R_g$

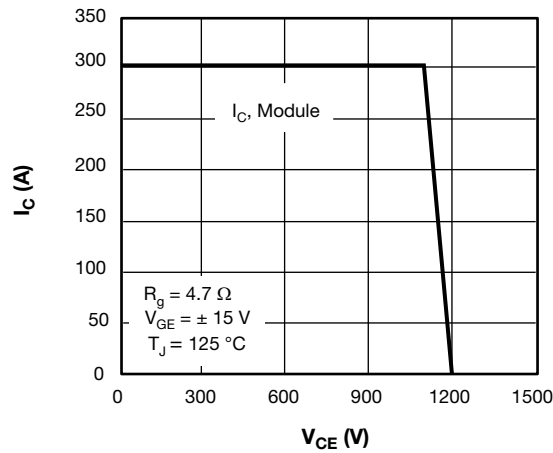


Fig. 5 - RBSOA

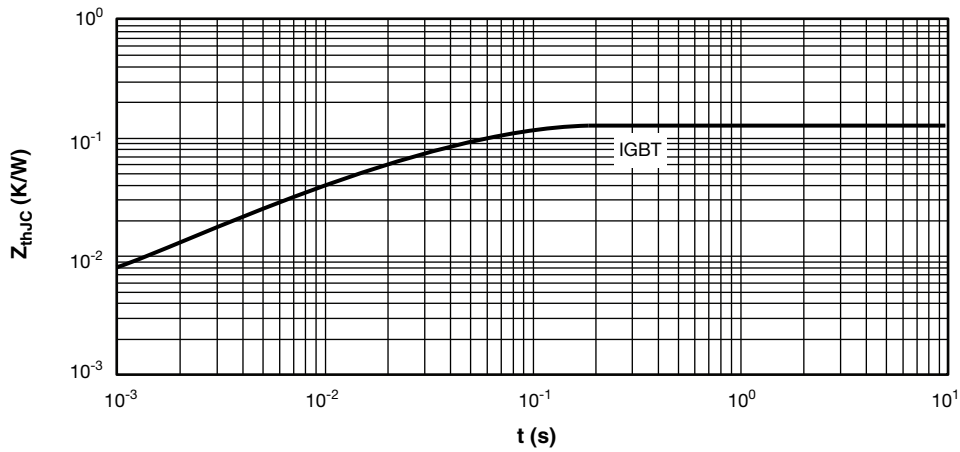


Fig. 6 - IGBT Transient Thermal Impedance

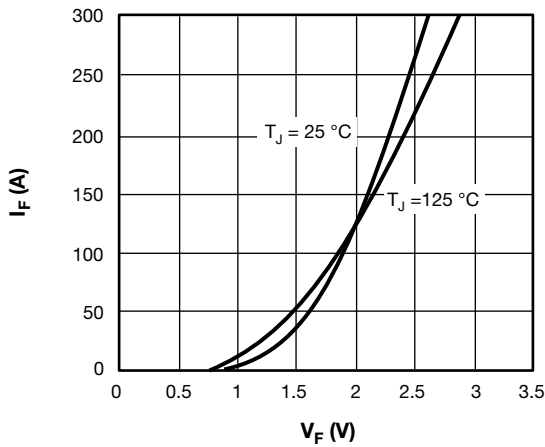


Fig. 7 - Diode Typical Forward Characteristics

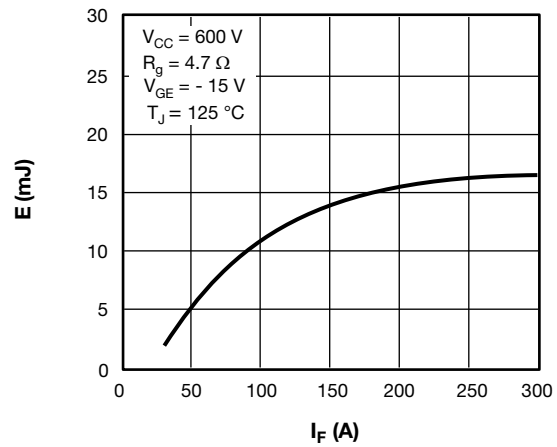


Fig. 8 - Diode Switching Loss vs.  $I_F$

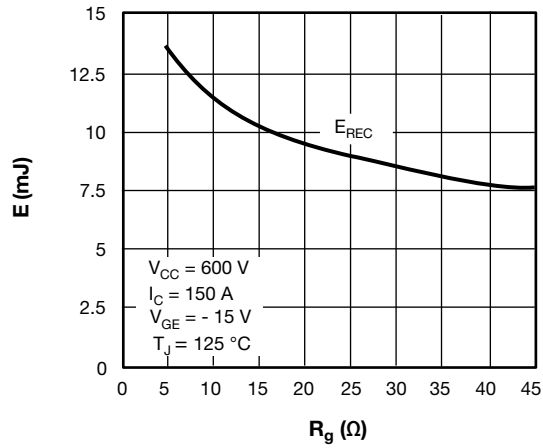


Fig. 9 - Diode Switching Loss vs.  $R_g$

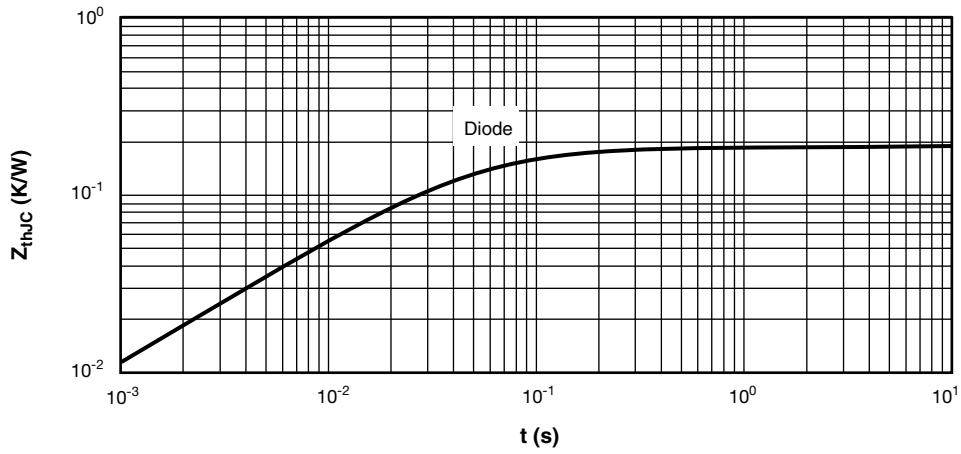
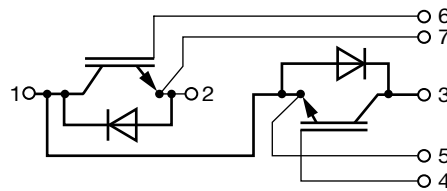


Fig. 10 - Diode Transient Thermal Impedance

**CIRCUIT CONFIGURATION**



LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95525">www.vishay.com/doc?95525</a>





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