

Molding Type Module IGBT, 2-in-1 Package, 1200 V, 400 A



Double INT-A-PAK

FEATURES

- Low $V_{CE(on)}$ trench IGBT technology
- 10 μ 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



RoHS
COMPLIANT

PRODUCT SUMMARY

V_{CES}	1200 V
I_C at $T_C = 80$ °C	400 A
$V_{CE(on)}$ (typical) at $I_C = 400$ A, 25 °C	1.90 V
Speed	8 kHz to 30 kHz
Package	Double INT-A-PAK
Circuit	Half bridge

TYPICAL APPLICATIONS

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

DESCRIPTION

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

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

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	V_{CES}		1200	V
Gate to emitter voltage	V_{GES}		± 30	
Collector current	I_C	$T_C = 25$ °C	750	A
		$T_C = 80$ °C	400	
Pulsed collector current	I_{CM}	$t_p = 1$ ms	800	
Diode continuous forward current	I_F		400	
Diode maximum forward current	I_{FM}	$t_p = 1$ ms	800	
Maximum power dissipation	P_D	$T_J = 175$ °C	2344	W
RMS isolation voltage	V_{ISOL}	$f = 50$ Hz, $t = 1$ min	2500	V
Operating junction temperature range	T_J		-40 to +150	°C

**IGBT ELECTRICAL SPECIFICATIONS** ($T_C = 25\text{ }^{\circ}\text{C}$ 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	$V_{CE(on)}$	$V_{GE} = 15\text{ V}, I_C = 400\text{ A}, T_J = 25\text{ }^{\circ}\text{C}$	-	1.90	2.35	
		$V_{GE} = 15\text{ V}, I_C = 400\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$	-	2.30	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 20\text{ mA}, T_J = 25\text{ }^{\circ}\text{C}$	5.0	5.9	7.5	
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

SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}, I_C = 400\text{ A}, R_g = 1.4\text{ }\Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 25\text{ }^{\circ}\text{C}$	-	187	-	ns
Rise time	t_r		-	57	-	
Turn-off delay time	$t_{d(off)}$		-	180	-	
Fall time	t_f		-	149	-	
Turn-on switching loss	E_{on}	$V_{CC} = 600\text{ V}, I_C = 400\text{ A}, R_g = 1.4\text{ }\Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$	-	19.9	-	mJ
Turn-off switching loss	E_{off}		-	18.8	-	
Turn-on delay time	$t_{d(on)}$		-	189	-	
Rise time	t_r		-	58	-	
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 600\text{ V}, I_C = 400\text{ A}, R_g = 1.4\text{ }\Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$	-	187	-	ns
Fall time	t_f		-	220	-	
Turn-on switching loss	E_{on}		-	31.2	-	
Turn-off switching loss	E_{off}		-	23.4	-	
Input capacitance	C_{ies}	$V_{GE} = 0\text{ V}, V_{CE} = 30\text{ V}, f = 1.0\text{ MHz}$	-	51.2	-	nF
Output capacitance	C_{oes}		-	1.84	-	
Reverse transfer capacitance	C_{res}		-	1.28	-	
SC data	I_{SC}	$t_p \leq 10\text{ }\mu\text{s}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^{\circ}\text{C},$ $V_{CC} = 900\text{ V}, V_{CEM} \leq 1200\text{ V}$	-	3560	-	A
Internal gate resistance	R_{gint}		-	0.59	-	Ω
Stray inductance	L_{CE}		-	-	18	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$		-	0.32	-	m Ω

DIODE ELECTRICAL SPECIFICATIONS ($T_C = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Diode forward voltage	V _F	I _F = 400 A	T _J = 25 °C	-	1.80	2.20	V
			T _J = 125 °C	-	1.85	-	
Recovery charge	Q _{rr}	I _F = 400 A, V _R = 600 V, R _g = 4.1 Ω, V _{GE} = -15 V	T _J = 25 °C	-	26	-	μC
			T _J = 125 °C	-	49	-	
Peak reverse recovery current	I _{rr}		T _J = 25 °C	-	212	-	A
			T _J = 125 °C	-	281	-	
Reverse recovery energy	E _{rec}		T _J = 25 °C	-	23.4	-	mJ
			T _J = 125 °C	-	33.8	-	



THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction temperature	T _J max.		-	-	175	°C
Operating junction temperature range	T _{Jop}		-40	-	150	
Storage temperature range	T _{STG}		-40	-	125	
Junction to case IGBT Diode	R _{thJC}		-	-	0.064	K/W
			-	-	0.098	
Case to sink	R _{thCS}	Conductive grease applied	-	0.032	-	
Mounting torque		Power terminal screw: M6	2.5 to 5.0			Nm
		Mounting screw: M6	3.0 to 5.0			
Weight			350			g

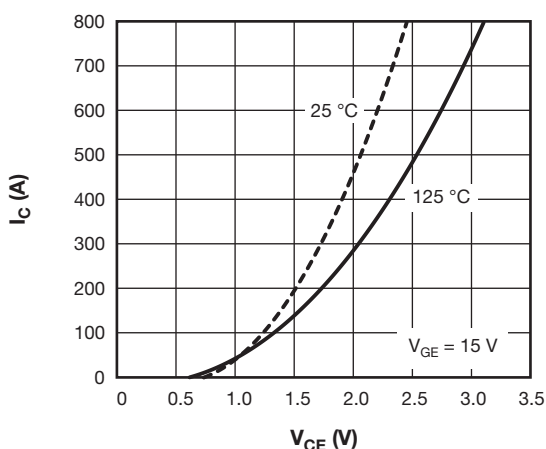


Fig. 1 - IGBT Output Characteristics

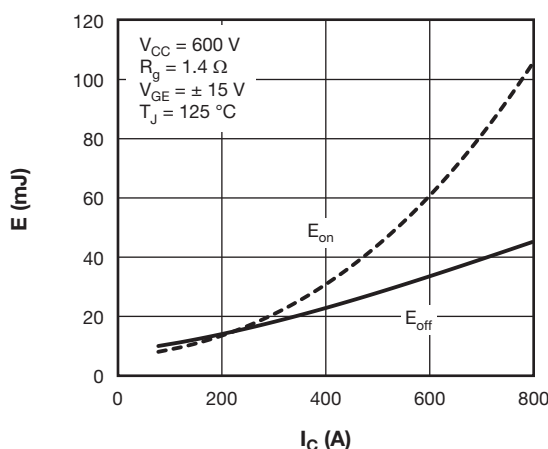


Fig. 3 - IGBT Switching Loss vs. I_C

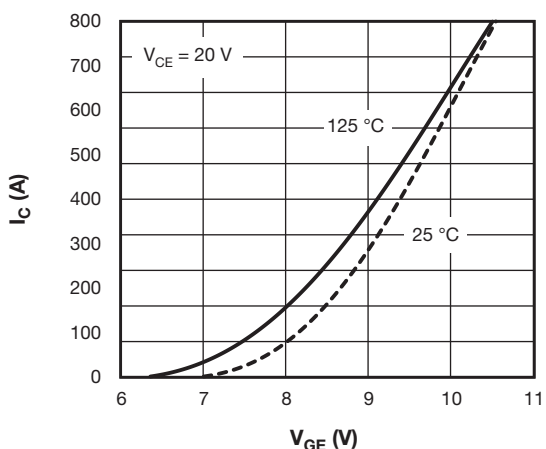


Fig. 2 - IGBT Transfer Characteristics

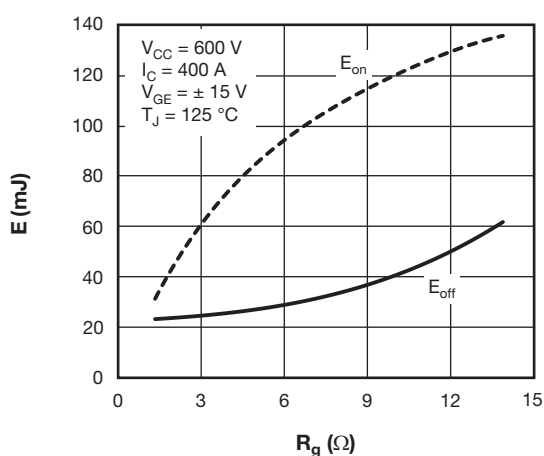


Fig. 4 - IGBT Switching Loss vs. R_g

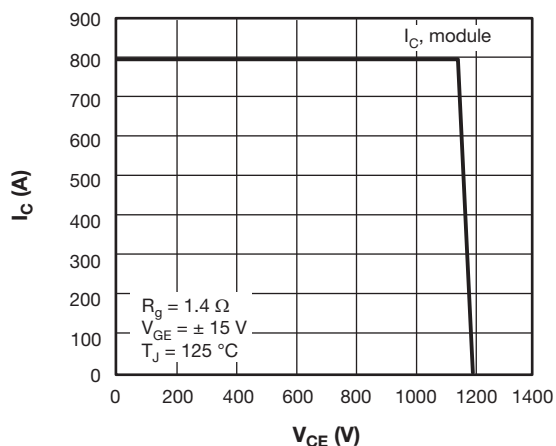


Fig. 5 - RBSOA

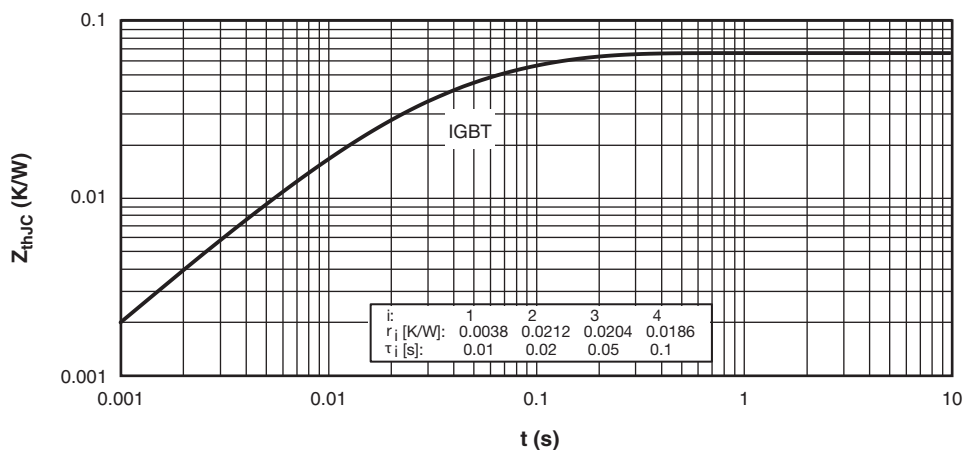


Fig. 6 - IGBT Transient Thermal Impedance

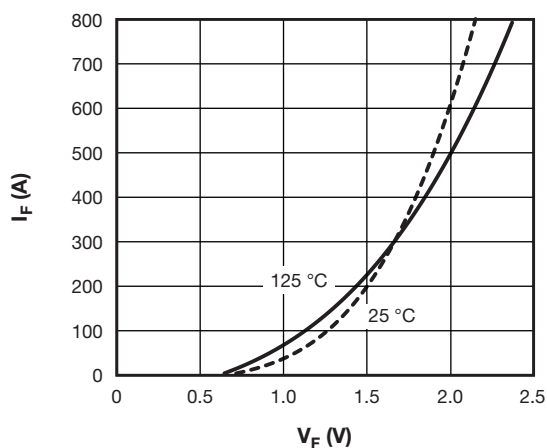
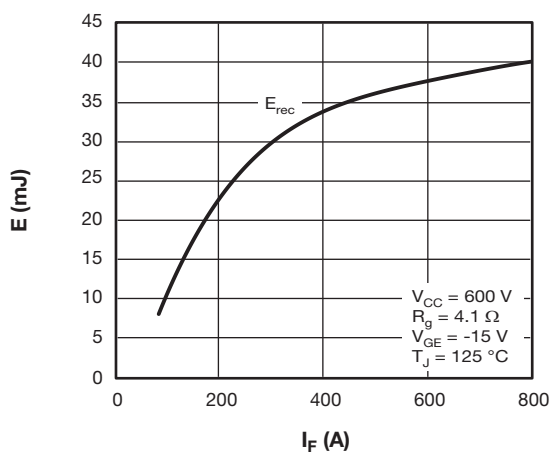


Fig. 7 - Diode Forward Characteristics


Fig. 8 - Diode Switching Loss vs. I_F

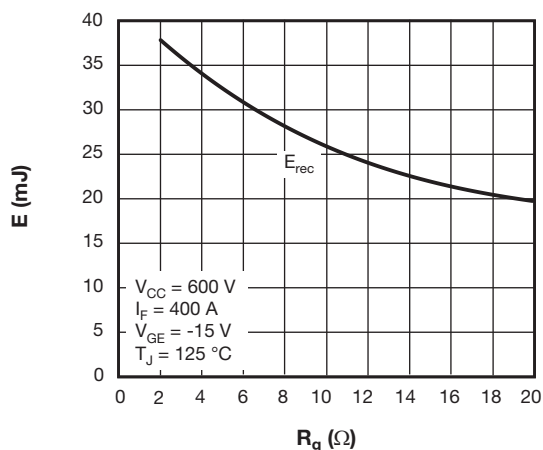


Fig. 9 - Diode Switching Loss vs. R_g

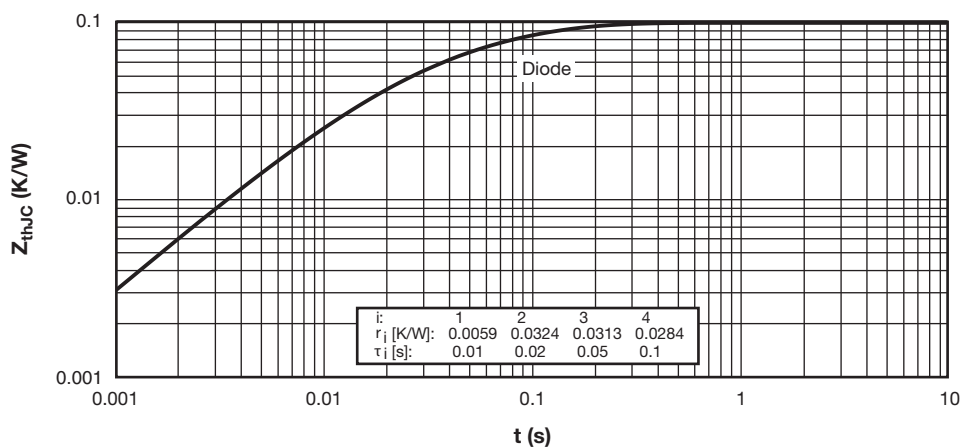
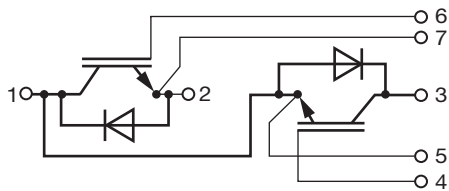


Fig. 10 - Diode Transient Thermal Impedances

CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS

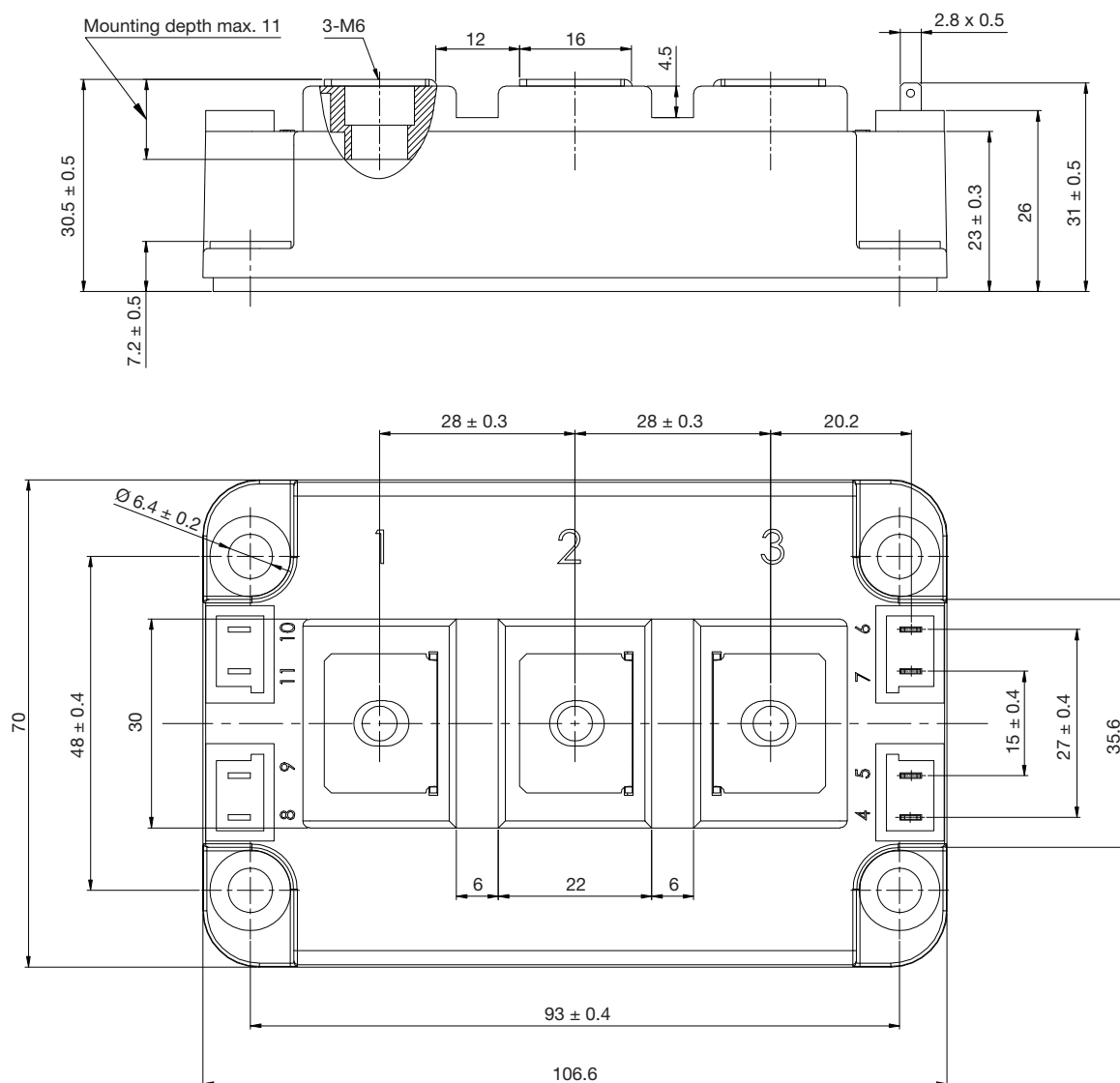
Dimensions

www.vishay.com/doc?95538



Double INT-A-PAK

DIMENSIONS in millimeters (inches)





Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.