

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		-	-	0.064	K/W
	Diode		-	-	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

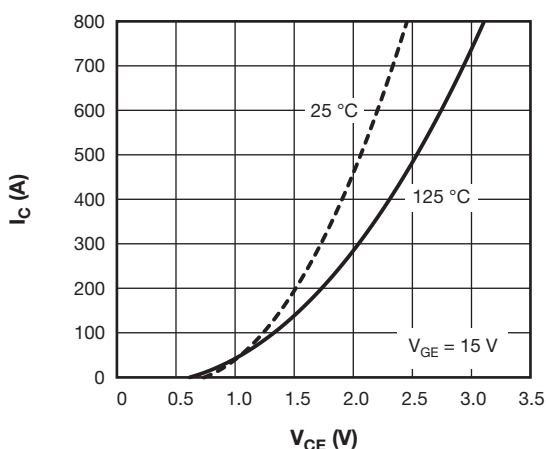


Fig. 1 - IGBT Output Characteristics

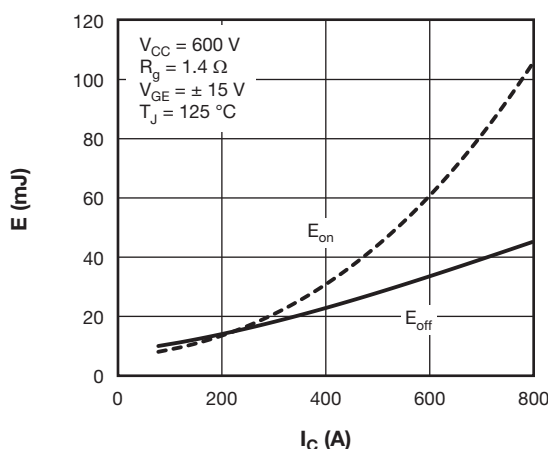


Fig. 3 - IGBT Switching Loss vs. I_C

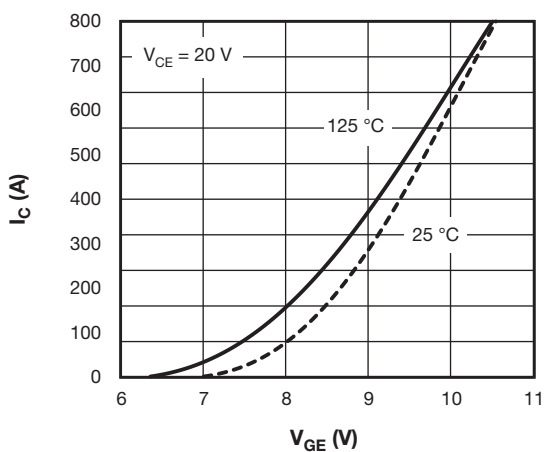


Fig. 2 - IGBT Transfer Characteristics

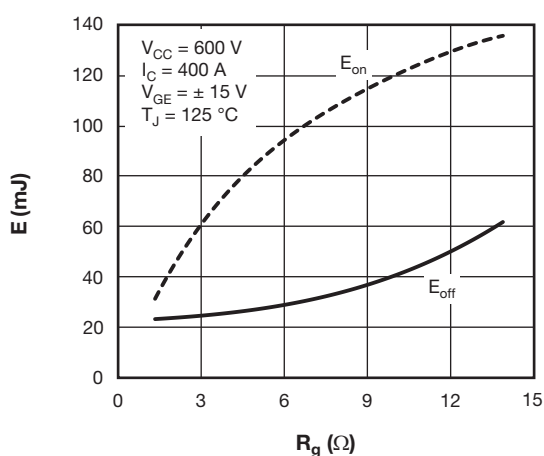


Fig. 4 - IGBT Switching Loss vs. R_g

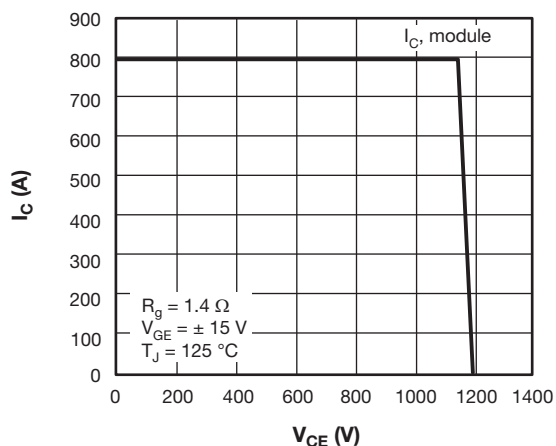


Fig. 5 - RBSOA

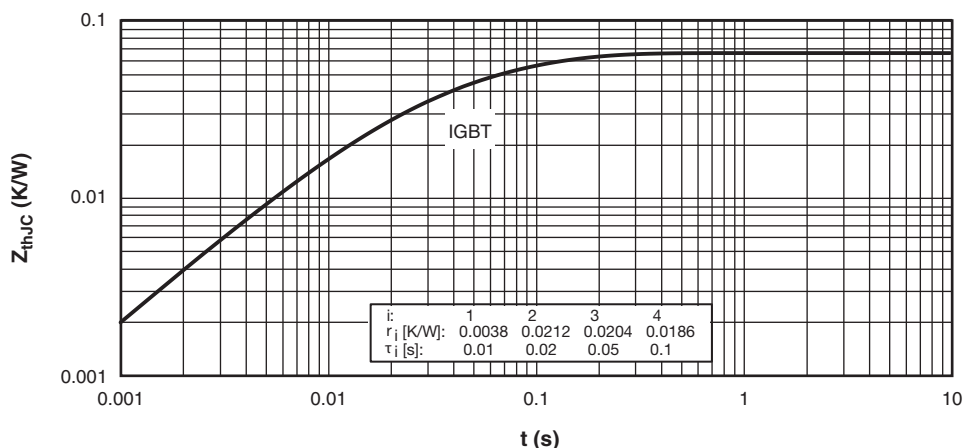


Fig. 6 - IGBT Transient Thermal Impedance

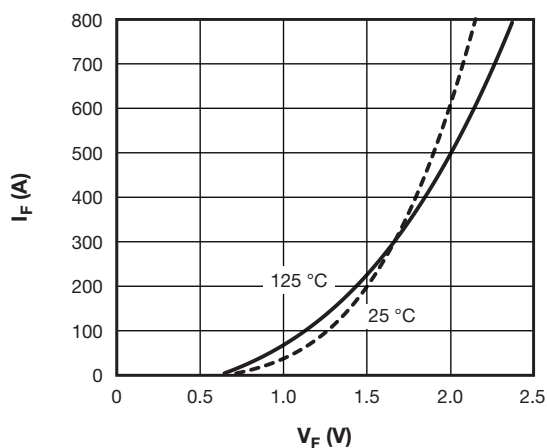
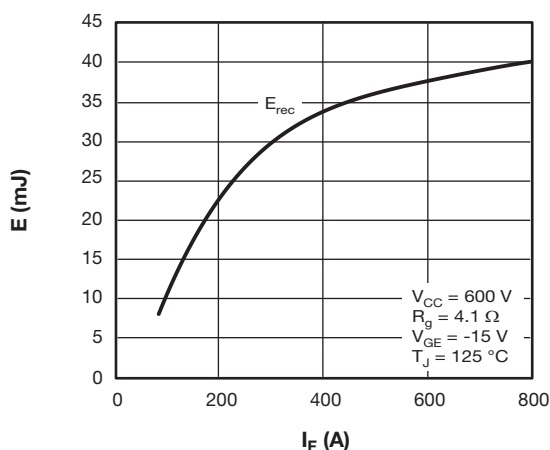


Fig. 7 - Diode Forward Characteristics


Fig. 8 - Diode Switching Loss vs. I_F

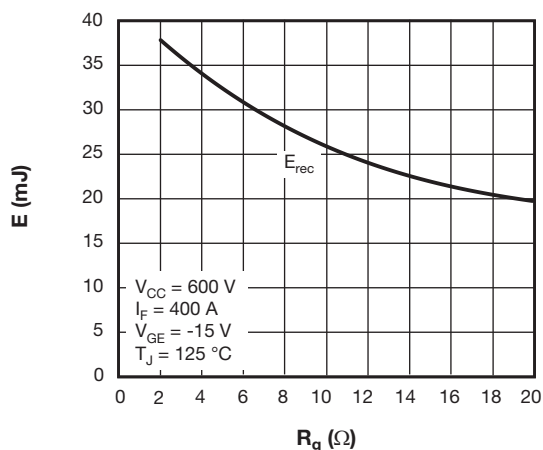
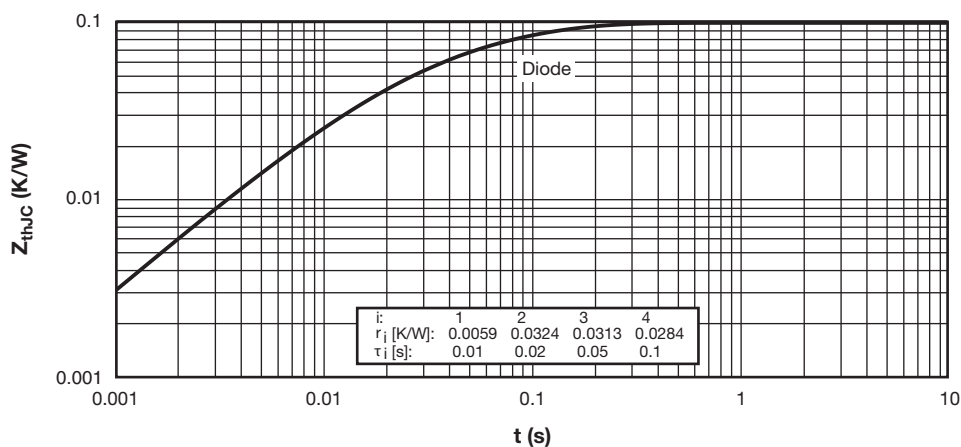
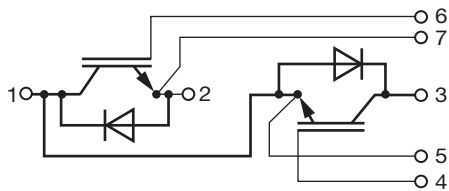

Fig. 9 - Diode Switching Loss vs. R_g


Fig. 10 - Diode Transient Thermal Impedances

CIRCUIT CONFIGURATION



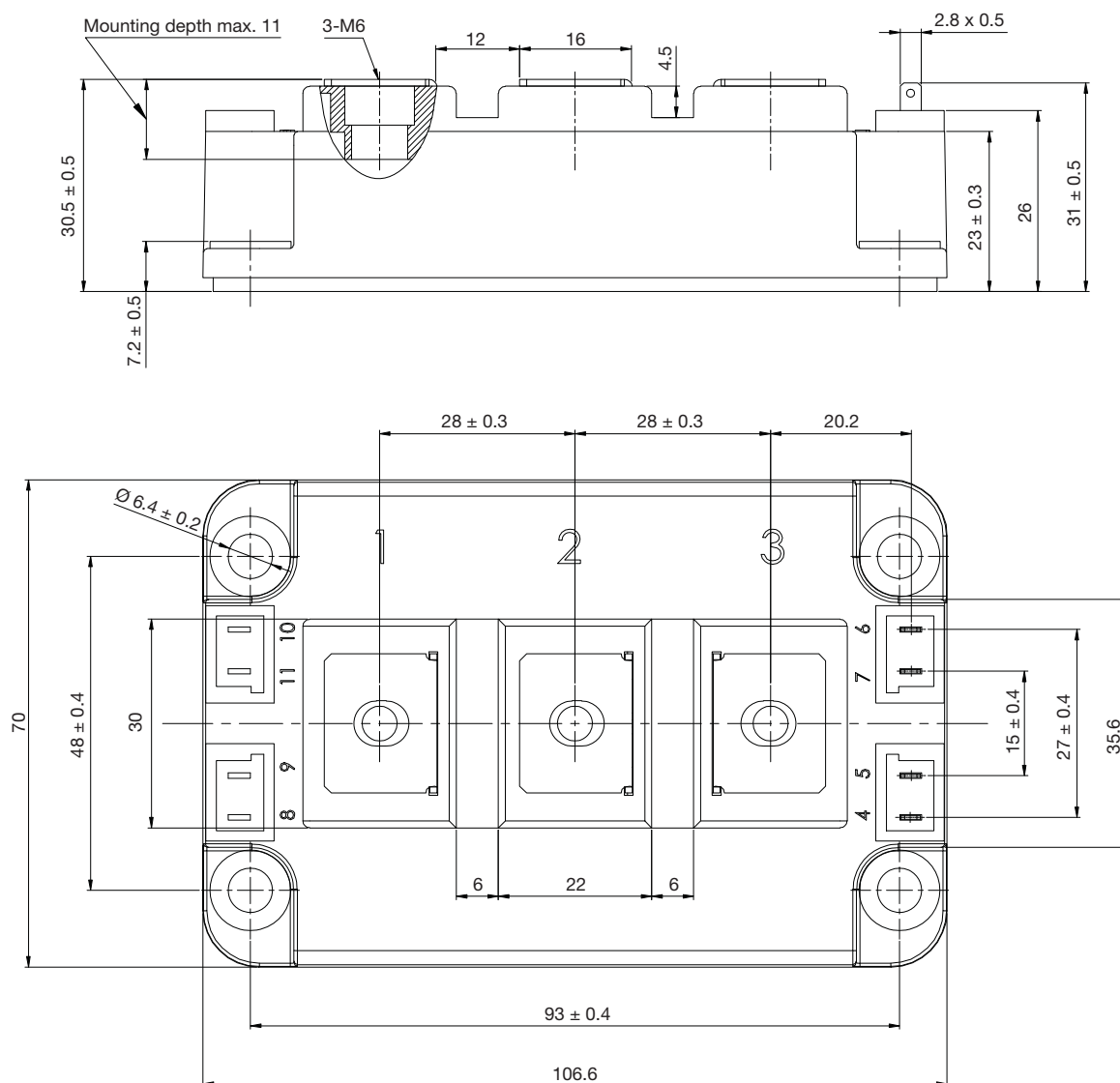
LINKS TO RELATED DOCUMENTS

Dimensions

www.vishay.com/doc?95538

Double INT-A-PAK

DIMENSIONS in millimeters (inches)





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