

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



Double INT-A-PAK

FEATURES

- 10 μ s short circuit capability
- Low switching losses
- Rugged with ultrafast performance
- $V_{CE(on)}$ with positive temperature coefficient
- 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 $T_C = 80\text{ }^{\circ}\text{C}$	400 A
$V_{CE(on)}$ (typical) at $I_C = 400\text{ A}$, $T_J = 25\text{ }^{\circ}\text{C}$	3.10 V
Package	Double INT-A-PAK
Circuit	Half bridge

TYPICAL APPLICATIONS

- Inductive heating
- Switching mode power supplies
- Electronic welder

DESCRIPTION

Vishay's IGBT power module provides ultrafast switching speed as well as short circuit ruggedness. It is designed for applications such as electronic welder and inductive heating.

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}		± 20	
Collector current	I_C	$T_C = 25\text{ }^{\circ}\text{C}$	660	A
		$T_C = 80\text{ }^{\circ}\text{C}$	400	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1\text{ ms}$	800	
Diode continuous forward current	I_F	$T_C = 80\text{ }^{\circ}\text{C}$	400	
Diode maximum forward current	$I_{FM}^{(1)}$	$t_p = 1\text{ ms}$	800	
Maximum power dissipation	P_D	$T_J = 150\text{ }^{\circ}\text{C}$	2660	W
Short circuit withstand time	T_{SC}	$T_J = 125\text{ }^{\circ}\text{C}$	10	μ s
RMS isolation voltage	V_{ISOL}	$f = 50\text{ Hz}$, $t = 1\text{ min}$	2500	V

Note

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

**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	$V_{CE(on)}$	$V_{GE} = 15\text{ V}, I_C = 400\text{ A}, T_J = 25\text{ }^{\circ}\text{C}$	-	3.10	3.60	
		$V_{GE} = 15\text{ V}, I_C = 400\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$	-	3.45	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 4.0\text{ mA}, T_J = 25\text{ }^{\circ}\text{C}$	4.4	4.9	6.0	
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

SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}, I_C = 400\text{ A}, R_g = 2.2\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 25\text{ }^{\circ}\text{C}$	-	680	-	ns
Rise time	t_r		-	142	-	
Turn-off delay time	$t_{d(off)}$		-	638	-	
Fall time	t_f		-	99	-	
Turn-on switching loss	E_{on}	$V_{CC} = 600\text{ V}, I_C = 400\text{ A}, R_g = 2.2\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$	-	19.0	-	mJ
Turn-off switching loss	E_{off}		-	32.5	-	
Turn-on delay time	$t_{d(on)}$		-	690	-	ns
Rise time	t_r		-	146	-	
Turn-off delay time	$t_{d(off)}$		-	669	-	
Fall time	t_f		-	108	-	
Turn-on switching loss	E_{on}	$V_{GE} = 0\text{ V}, V_{CE} = 30\text{ V}, f = 1.0\text{ MHz}$	-	26.1	-	mJ
Turn-off switching loss	E_{off}		-	36.7	-	
Input capacitance	C_{ies}		-	33.7	-	nF
Output capacitance	C_{oes}		-	2.99	-	
Reverse transfer capacitance	C_{res}		-	1.21	-	
SC data	I_{SC}	$t_p \leq 10\text{ }\mu\text{s}, V_{GE} = 15\text{ V}, T_J = 25\text{ }^{\circ}\text{C}, V_{CC} = 600\text{ V}, V_{CEM} \leq 1200\text{ V}$	-	2600	-	A
Internal gate resistance	R_g		-	0.5	-	Ω
Stray inductance	L_{CE}		-	-	18	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$	$T_C = 25\text{ }^{\circ}\text{C}$	-	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
Forward voltage	V _F	I _F = 400 A	T _J = 25 °C	-	1.95	2.25	V
			T _J = 125 °C	-	1.85	-	
Reverse recovery charge	Q _{rr}	I _F = 400 A, V _R = 600 V, dI _F /dt = - 2850 A/μs V _{GE} = - 15 V	T _J = 25 °C	-	24.1	-	μC
			T _J = 125 °C	-	44.3	-	
Peak reverse recovery current	I _{rr}		T _J = 25 °C	-	220	-	A
			T _J = 125 °C	-	295	-	
Reverse recovery energy	E _{rec}		T _J = 25 °C	-	13.9	-	mJ
			T _J = 125 °C	-	24.8	-	

**THERMAL AND MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction temperature range	T _J		-	-	150	°C
Storage temperature range	T _{Stg}		- 40	-	125	°C
Junction to case	R _{θJC}	IGBT	-	-	0.047	K/W
Diode			-	-	0.096	
Case to sink (Conductive grease applied)	R _{θCS}		-	0.035	-	
Mounting torque		Power terminal screw: M5	2.5 to 5.0			Nm
		Mounting screw: M6	3.0 to 6.0			
Weight		Weight of module	-	350	-	g

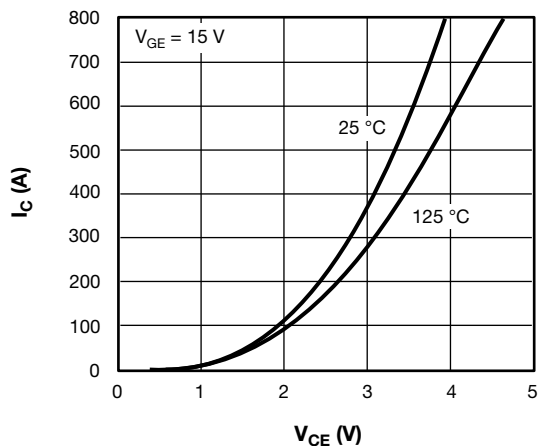


Fig. 1 - IGBT Typical Output Characteristics

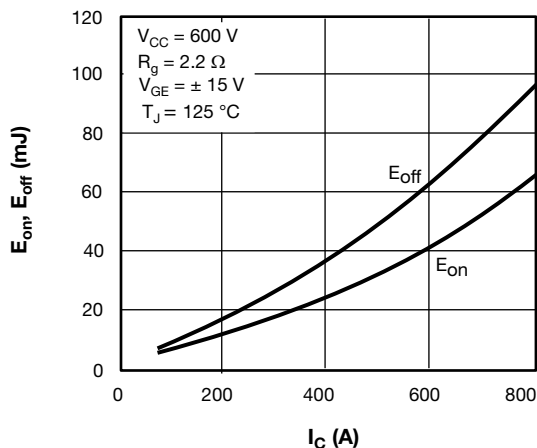
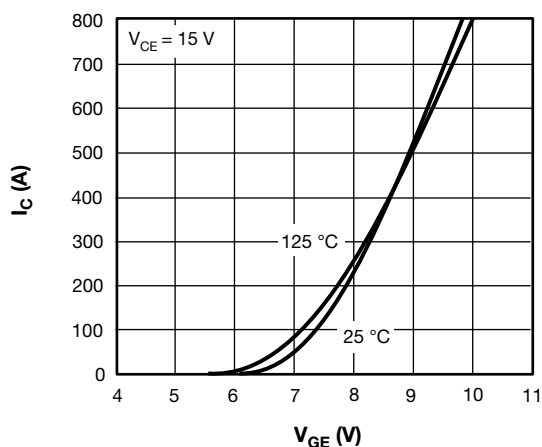
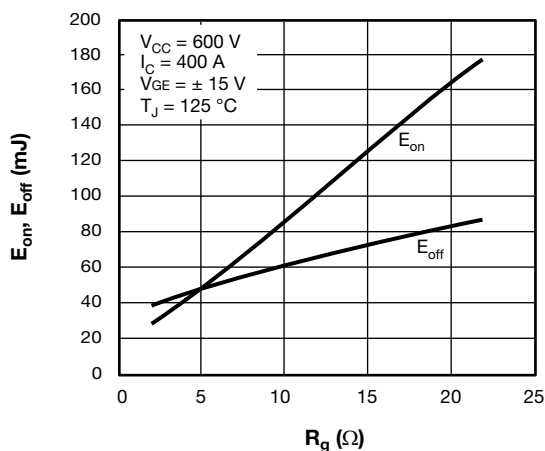
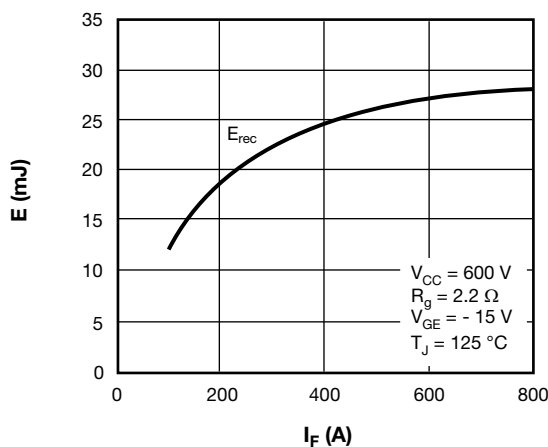
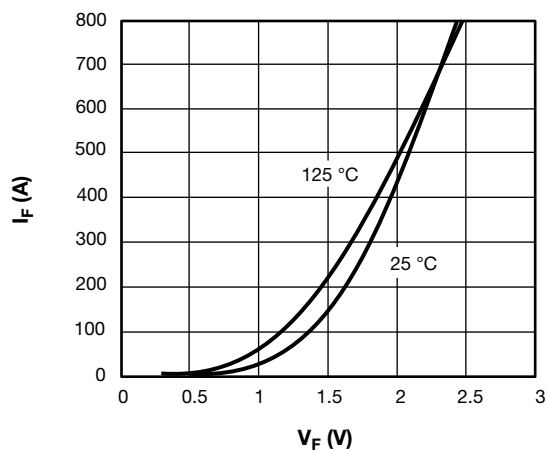
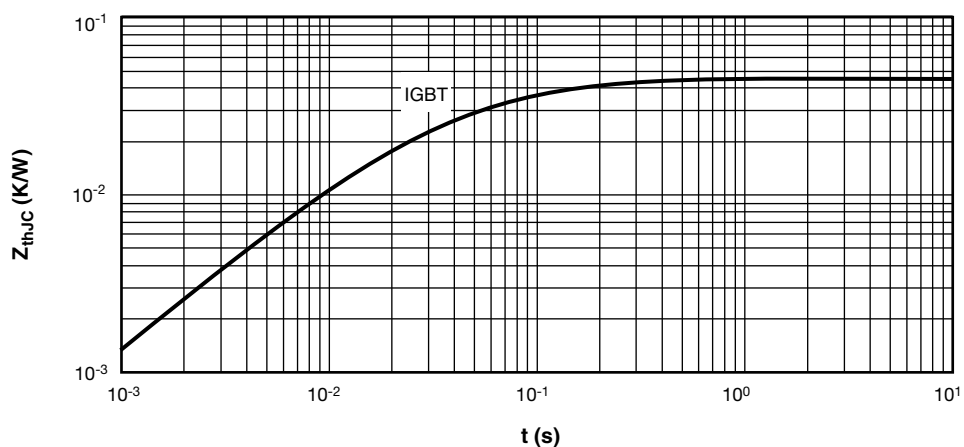
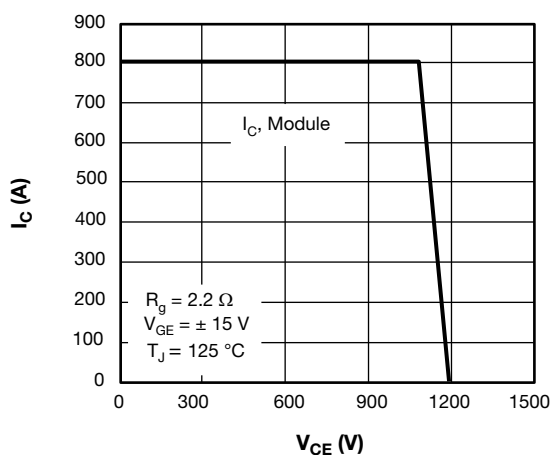
Fig. 3 - IGBT Switching Loss vs. I_C 

Fig. 2 - IGBT Typical Transfer Characteristics

Fig. 4 - IGBT Switching Loss vs. R_g



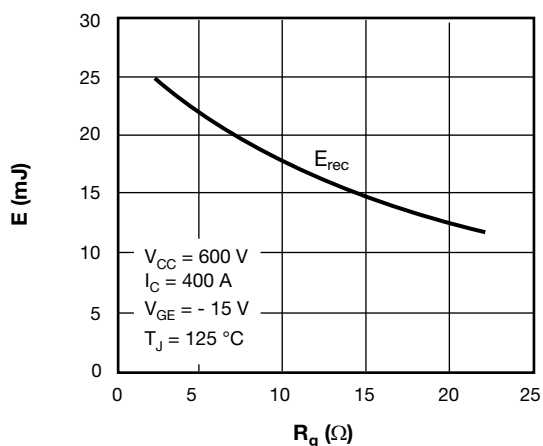
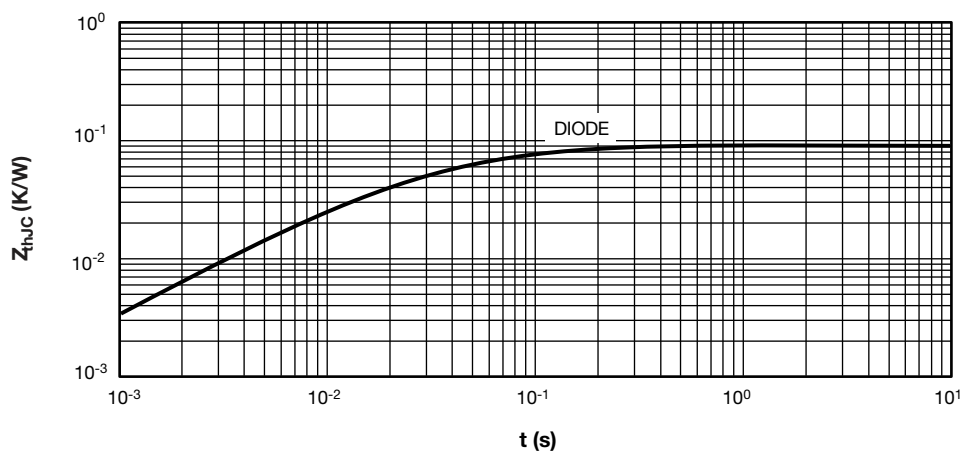
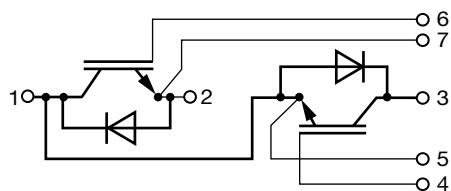

Fig. 9 - Diode Switching Loss vs. R_g


Fig. 10 - Diode Transient Thermal Impedance

CIRCUIT CONFIGURATION



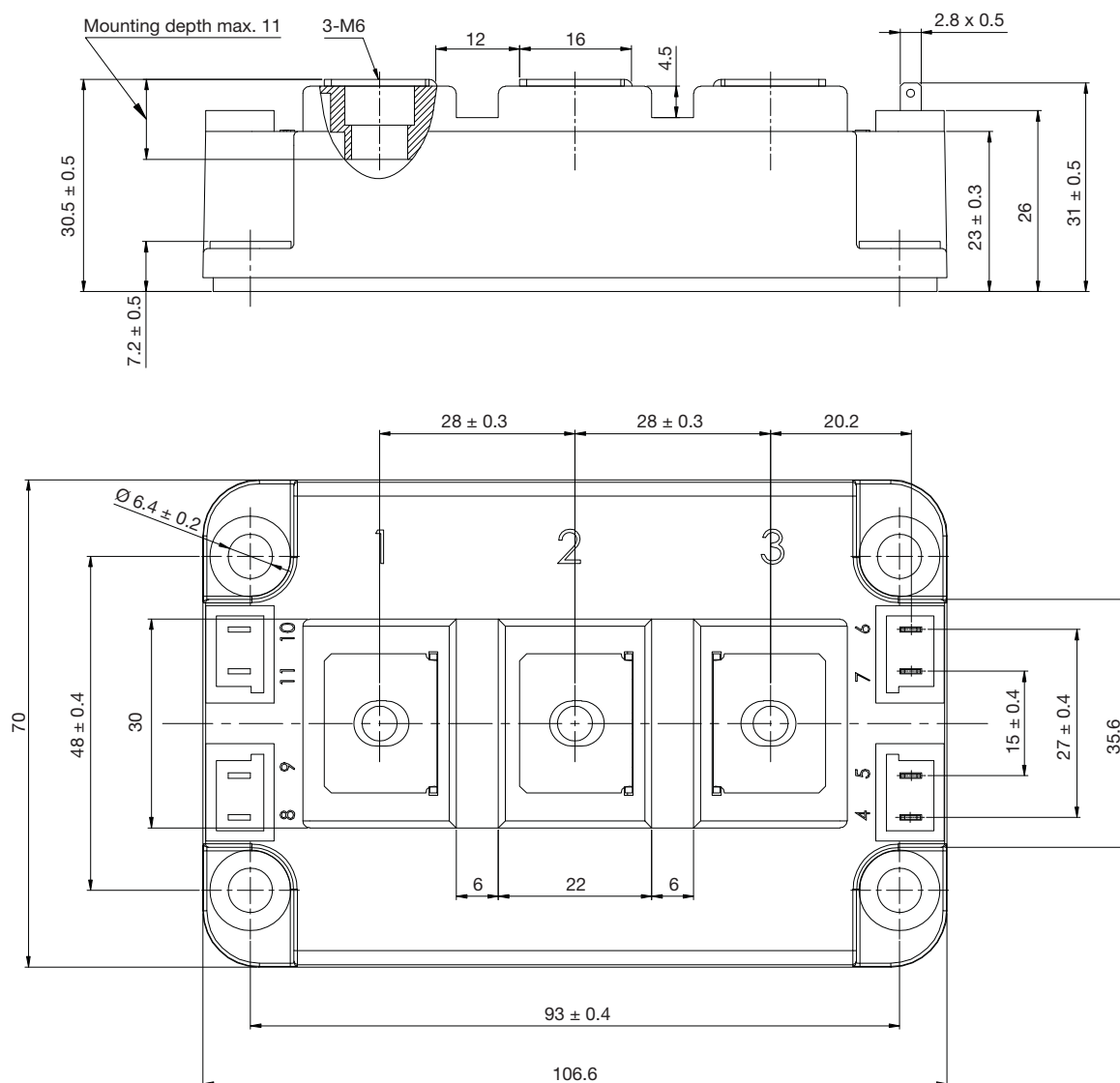
LINKS TO RELATED DOCUMENTS

Dimensions

www.vishay.com/doc?95538

Double INT-A-PAK

DIMENSIONS in millimeters (inches)





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