

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



Dual INT-A-PAK

FEATURES

- High short circuit capability, self limiting $6 \times I_C$
- 10 μ s short circuit capability
- $V_{CE(on)}$ 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

PRIMARY CHARACTERISTICS

V_{CES}	1200 V
I_C at $T_C = 80^\circ\text{C}$	400 A
$V_{CE(on)}$ (typical) at $I_C = 400\text{ A}$, 25°C	1.9 V
Speed	8 kHz to 30 kHz
Package	Dual INT-A-PAK
Circuit configuration	Half bridge

TYPICAL APPLICATIONS

- AC inverter drives
- 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 general inverters and UPS.

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ 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 at $T_J = 150^\circ\text{C}$	I_C	$T_C = 25^\circ\text{C}$	800	A
		$T_C = 80^\circ\text{C}$	400	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1\text{ ms}$, $T_C = 80^\circ\text{C}$	800	
Diode continuous forward current	I_F	$T_C = 80^\circ\text{C}$	400	
Diode maximum forward current	I_{FM}	$t_p = 1\text{ ms}$	800	
Maximum power dissipation	P_D	$T_J = 150^\circ\text{C}$	2604	W
Short circuit withstand time	t_{SC}	$T_J = 125^\circ\text{C}$	10	μ s
RMS isolation voltage	V_{ISOL}	$f = 50\text{ Hz}$, $t = 1\text{ min}$	2500	V
I^2t -value, diode	I^2t	$V_R = 0\text{ V}$, $t = 10\text{ ms}$, $T_J = 125^\circ\text{C}$	34	kA^2s

Note

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

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{(BR)CES}$	$T_J = 25^\circ\text{C}$	1200	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	$V_{GE} = 15\text{ V}$, $I_C = 400\text{ A}$, $T_J = 25^\circ\text{C}$	-	1.9	-	
		$V_{GE} = 15\text{ V}$, $I_C = 400\text{ A}$, $T_J = 125^\circ\text{C}$	-	2.1	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$, $I_C = 16\text{ mA}$, $T_J = 25^\circ\text{C}$	5.0	6.2	7.0	
Collector cut-off current	I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0\text{ V}$, $T_J = 25^\circ\text{C}$	-	-	5.0	mA
Gate to emitter leakage current	I_{GES}	$V_{GE} = V_{GES}$, $V_{CE} = 0\text{ V}$, $T_J = 25^\circ\text{C}$	-	-	400	nA

**SWITCHING CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}$, $I_C = 400\text{ A}$, $R_g = 2.5\ \Omega$, $V_{GE} = \pm 15\text{ V}$, $T_J = 25\text{ }^\circ\text{C}$	-	125	-	ns
Rise time	t_r		-	71	-	
Turn-off delay time	$t_{d(off)}$		-	540	-	
Fall time	t_f		-	72	-	
Turn-on switching loss	E_{on}		-	44	-	mJ
Turn-off switching loss	E_{off}		-	40	-	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}$, $I_C = 400\text{ A}$, $R_g = 2.5\ \Omega$, $V_{GE} = \pm 15\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$	-	130	-	ns
Rise time	t_r		-	75	-	
Turn-off delay time	$t_{d(off)}$		-	600	-	
Fall time	t_f		-	80	-	
Turn-on switching loss	E_{on}		-	48	-	mJ
Turn-off switching loss	E_{off}		-	43	-	
Input capacitance	C_{ies}	$V_{GE} = 0\text{ V}$, $V_{CE} = 25\text{ V}$, $f = 1.0\text{ MHz}$	-	32.7	-	nF
Output capacitance	C_{oes}		-	2.42	-	
Reverse transfer capacitance	C_{res}		-	1.50	-	
SC data	I_{SC}	$t_{sc} \leq 10\ \mu\text{s}$, $V_{GE} = 15\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$, $V_{CC} = 900\text{ V}$, $V_{CEM} \leq 1200\text{ V}$	-	1900	-	A
Internal gate resistance	R_g		-	2	-	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
Diode forward voltage	V _F	I _F = 400 A	T _J = 25 °C	-	2.15	2.20	V
			T _J = 125 °C	-	1.99	2.03	
Diode reverse recovery charge	Q _{rr}	I _F = 400 A, V _R = 600 V, dI _F /dt = -6000 A/μs, V _{GE} = -15 V	T _J = 25 °C	-	52	-	μC
	T _J = 125 °C		-	64	-		
Diode peak reverse recovery current	I _{rr}		T _J = 25 °C	-	360	-	A
			T _J = 125 °C	-	420	-	
Diode reverse recovery energy	E _{rec}		T _J = 25 °C	-	20	-	mJ
			T _J = 125 °C	-	27	-	

THERMAL AND MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating junction temperature range	T _J		-40	-	150	°C
Storage temperature range	T _{STG}		-40	-	125	
Junction to case, per 1/2 module	R _{thJC}	IGBT	-	-	0.048	K/W
		Diode	-	-	0.085	
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 6.0			
Weight			340			g

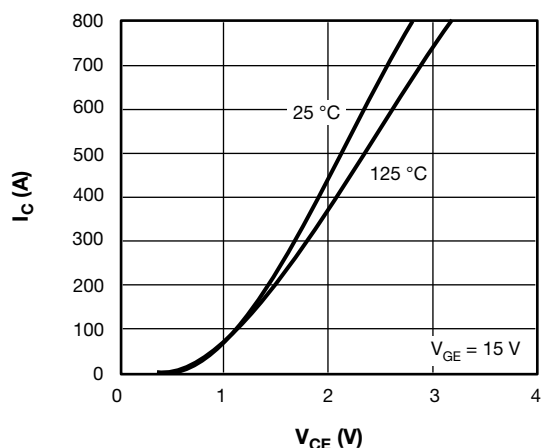


Fig. 1 - Typical Output Characteristics

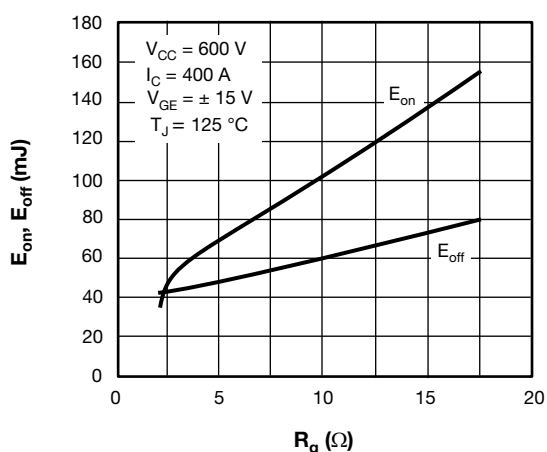
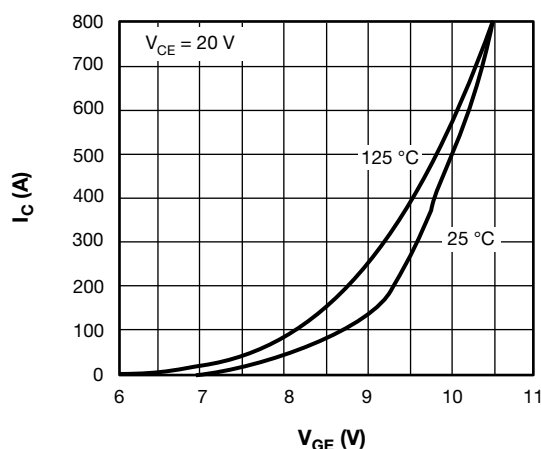

Fig. 4 - Switching Loss vs. R_g


Fig. 2 - Typical Transfer Characteristics

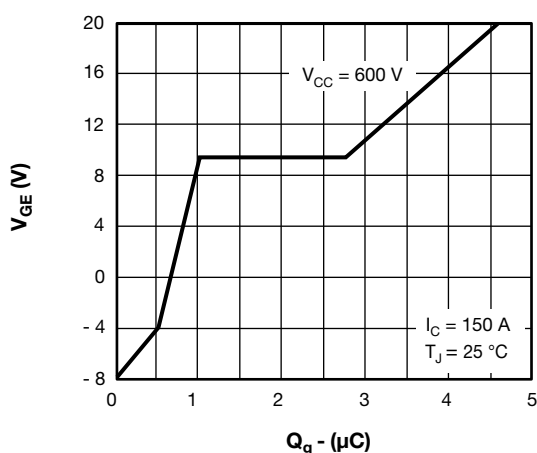


Fig. 5 - Gate Charge Characteristics

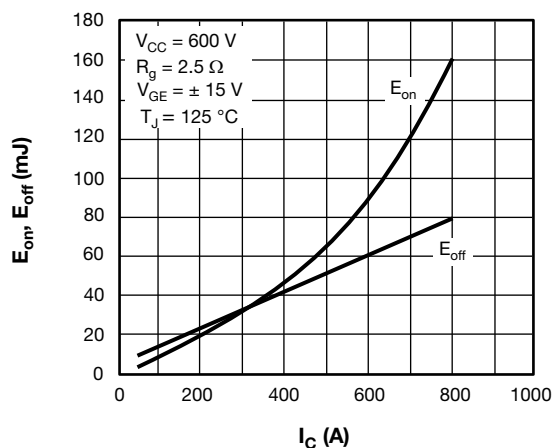
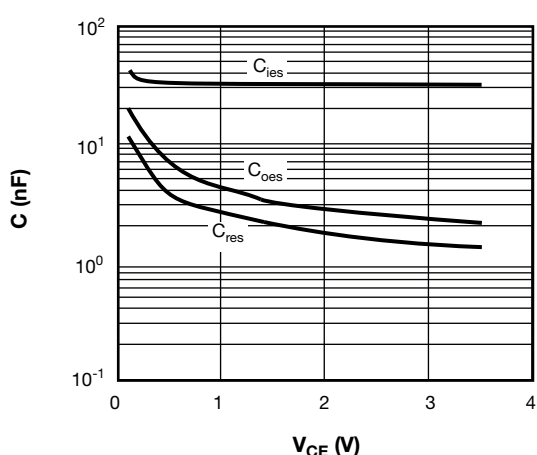

Fig. 3 - Switching Loss vs. I_c


Fig. 6 - Typical Capacitance vs. Collector-to-Emitter Voltage

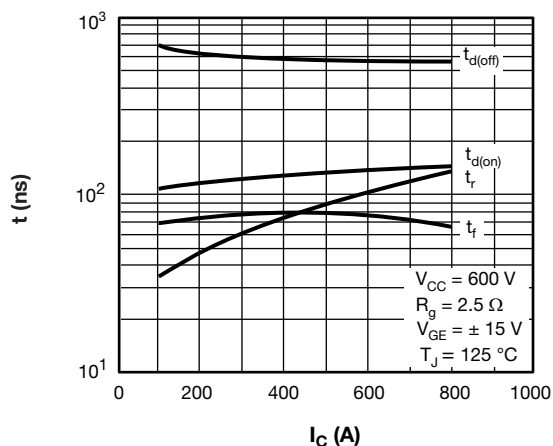
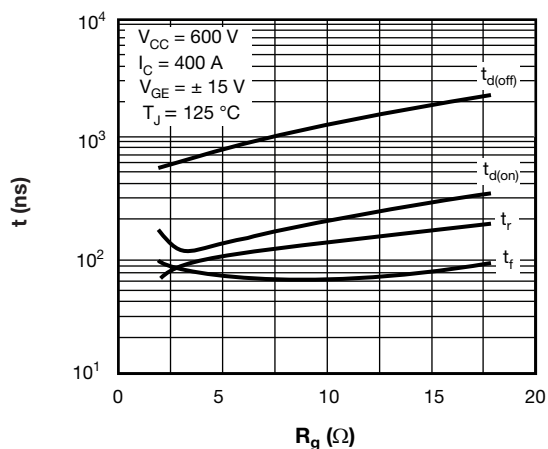
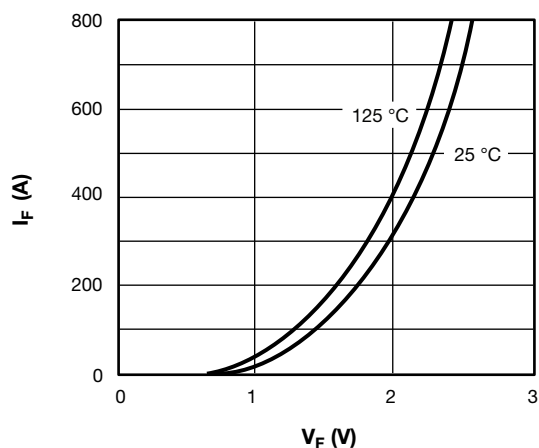

Fig. 7 - Typical Switching Time vs. I_C

Fig. 8 - Typical Switching Time vs. Gate Resistance R_g


Fig. 9 - Typical Forward Characteristics Diode

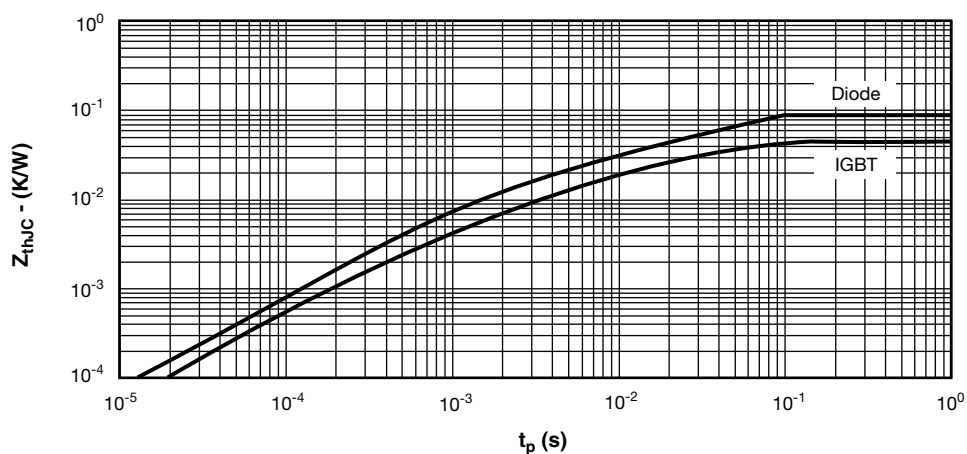
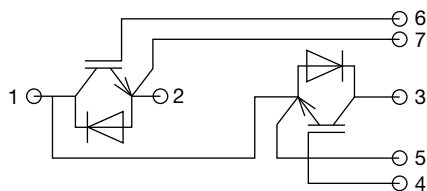


Fig. 10 - Transient Thermal Impedance



CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS

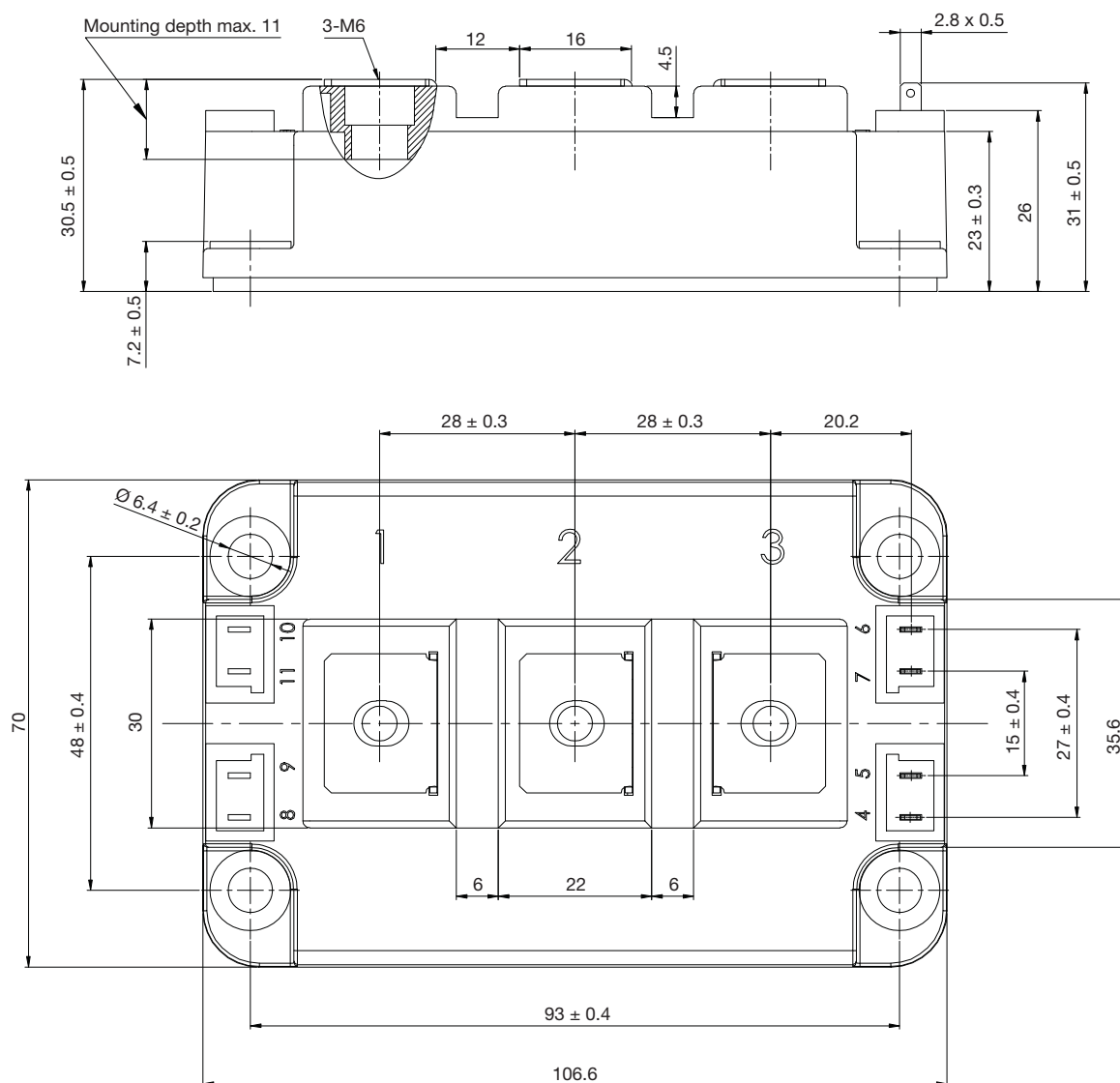
Dimensions

www.vishay.com/doc?95538



Double INT-A-PAK

DIMENSIONS in millimeters (inches)





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