

## Molding Type Module IGBT, Chopper in 1 Package, 1200 V, 75 A


**INT-A-PAK**

**RoHS  
COMPLIANT**
**FEATURES**

- High short circuit capability, self limiting to  $6 \times I_C$
- 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 anti-parallel 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**

- 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.

PRODUCT SUMMARY	
$V_{CES}$	1200 V
$I_C$ at $T_C = 80$ °C	75 A
$V_{CE(on)}$ (typical) at $I_C = 75$ A, 25 °C	1.82 V
Speed	8 kHz to 30 kHz
Package	INT-A-PAK
Circuit	Half bridge

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	$V_{GES}$		$\pm 20$	
Collector current	$I_C$	$T_C = 25$ °C	170	A
		$T_C = 80$ °C	75	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1$ ms	150	
Diode continuous forward current	$I_F$		75	
Diode maximum forward current	$I_{FM}$		150	
Maximum power dissipation	$P_D$	$T_J = 150$ °C	658	W
Short circuit withstand time	$t_{SC}$	$T_J = 125$ °C	10	$\mu$ s
RMS isolation voltage	$V_{ISOL}$	$f = 50$ Hz, $t = 1$ min	2500	V
$I^2t$ -value, diode	$I^2t$	$V_R = 0$ V, $t = 10$ ms, $T_J = 125$ °C	1190	A <sup>2</sup> s
Operating junction temperature range	$T_J$		-40 to +150	°C

**Note**

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

IGBT ELECTRICAL SPECIFICATIONS ( $T_C = 25$ °C unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{(BR)CES}$	$T_J = 25$ °C	1200	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	$V_{GE} = 15$ V, $I_C = 75$ A, $T_J = 25$ °C	-	1.82	-	
		$V_{GE} = 15$ V, $I_C = 75$ A, $T_J = 125$ °C	-	2.05	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$ , $I_C = 3.0$ mA, $T_J = 25$ °C	5.0	6.2	7.0	
Collector cut-off current	$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0$ V, $T_J = 25$ °C	-	-	1.0	mA
Gate to emitter leakage current	$I_{GES}$	$V_{GE} = V_{GES}$ , $V_{CE} = 0$ V, $T_J = 25$ °C	-	-	400	nA



SWITCHING CHARACTERISTICS							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}, I_C = 75\text{ A}, R_g = 4.7\ \Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	140	-	ns	
Rise time	$t_r$		-	37	-		
Turn-off delay time	$t_{d(off)}$		-	370	-		
Fall time	$t_f$		-	55	-		
Turn-on switching loss	$E_{on}$			-	7.2	-	mJ
Turn-off switching loss	$E_{off}$			-	4.5	-	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}, I_C = 75\text{ A}, R_g = 4.7\ \Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	150	-	ns	
Rise time	$t_r$		-	40	-		
Turn-off delay time	$t_{d(off)}$		-	400	-		
Fall time	$t_f$		-	64	-		
Turn-on switching loss	$E_{on}$			-	9.0	-	mJ
Turn-off switching loss	$E_{off}$			-	7.4	-	
Input capacitance	$C_{ies}$	$V_{GE} = 0\text{ V}, V_{CE} = 25\text{ V}, f = 1.0\text{ MHz}$	-	5.52	-	nF	
Output capacitance	$C_{oes}$		-	0.40	-		
Reverse transfer capacitance	$C_{res}$		-	0.26	-		
SC data	$I_{SC}$	$t_{sc} \leq 10\ \mu\text{s}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C},$ $V_{CC} = 900\text{ V}, V_{CEM} \leq 1200\text{ V}$	-	420	-	A	
Internal gate resistance	$R_{gint}$		-	3	-	$\Omega$	
Stray inductance	$L_{CE}$		-	-	30	nH	
Module lead resistance, terminal to chip	$R_{CC'+EE'}$	$T_C = 25\text{ }^\circ\text{C}$	-	0.75	-	m $\Omega$	

DIODE ELECTRICAL SPECIFICATIONS ( $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Diode forward voltage	$V_F$	$I_F = 75\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	-	2.05	-	V
			$T_J = 125\text{ }^\circ\text{C}$	-	2.25	-	
Diode reverse recovery charge	$t_{rr}$	$I_F = 75\text{ A}, V_R = 600\text{ V},$ $di_F/dt = -2000\text{ A}/\mu\text{s},$ $V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	100	-	$\mu\text{C}$
			$T_J = 125\text{ }^\circ\text{C}$	-	125	-	
Diode peak reverse recovery current	$I_{rr}$		$T_J = 25\text{ }^\circ\text{C}$	-	80	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	100	-	
Diode reverse recovery energy	$E_{rec}$		$T_J = 25\text{ }^\circ\text{C}$	-	3.0	-	mJ
			$T_J = 125\text{ }^\circ\text{C}$	-	6.0	-	

THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating junction temperature range	$T_J$		-40	-	150	$^\circ\text{C}$
Storage temperature range	$T_{STG}$		-40	-	125	
Junction to case	$R_{thJC}$	IGBT (per 1/2 module)	-	-	0.19	K/W
		Diode (per 1/2 module)	-	-	0.48	
Case to sink	$R_{thCS}$	Conductive grease applied	-	0.05	-	
Mounting torque		Power terminal screw: M5	2.5 to 5.0			Nm
		Mounting screw: M6	3.0 to 6.0			
Weight of module			150			g

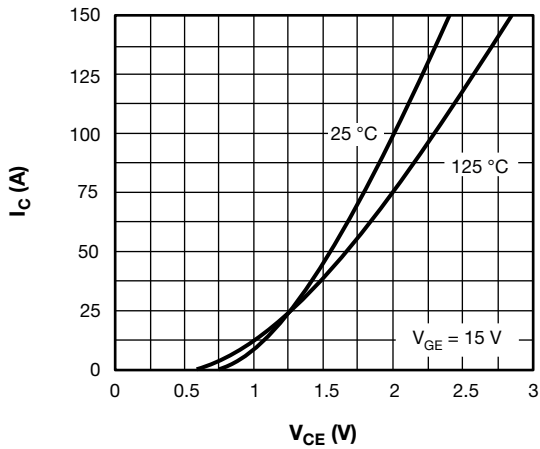


Fig. 1 - Typical Output Characteristics

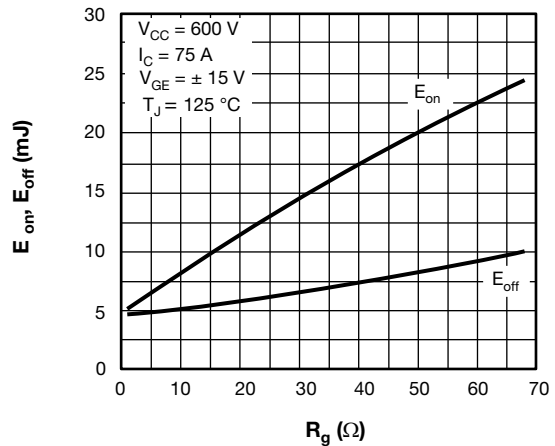


Fig. 4 - Switching Loss vs. Gate Resistor

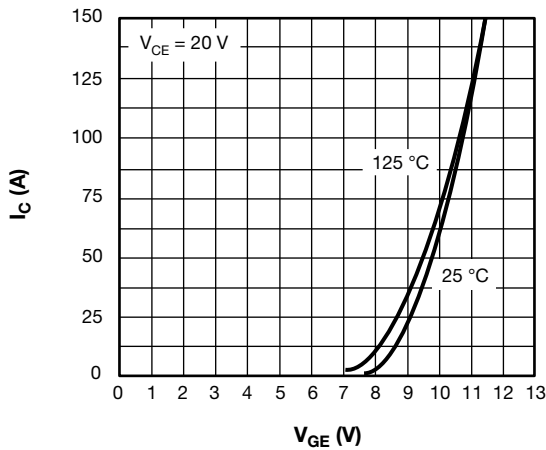


Fig. 2 - Typical Transfer Characteristics

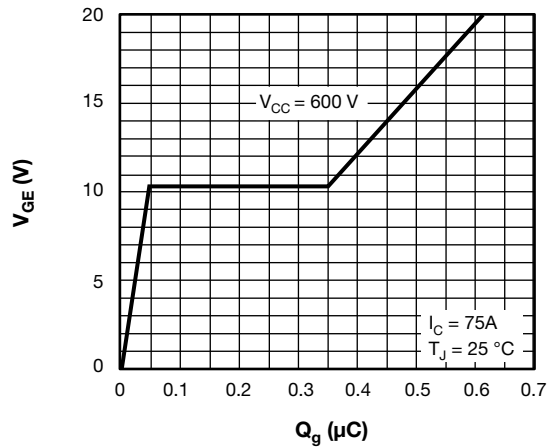


Fig. 5 - Gate Charge Characteristics

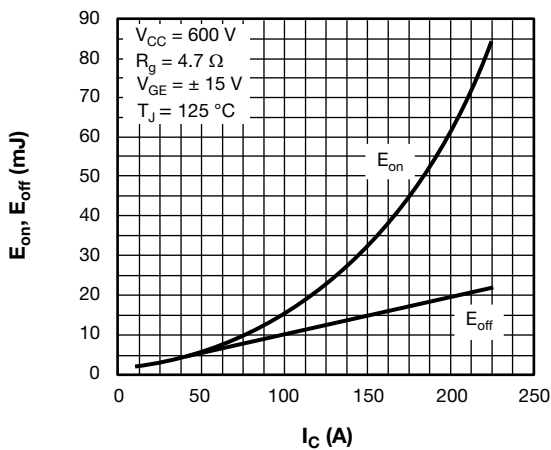


Fig. 3 - Switching Loss vs. Collector Current

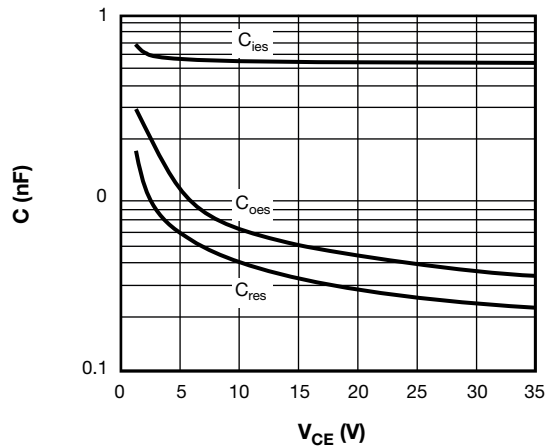


Fig. 6 - Typical Capacitance vs. Collector to Emitter Voltage

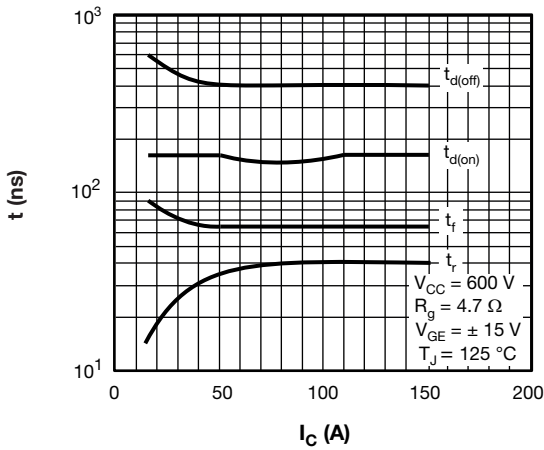


Fig. 7 - Typical Switching Time vs.  $I_C$

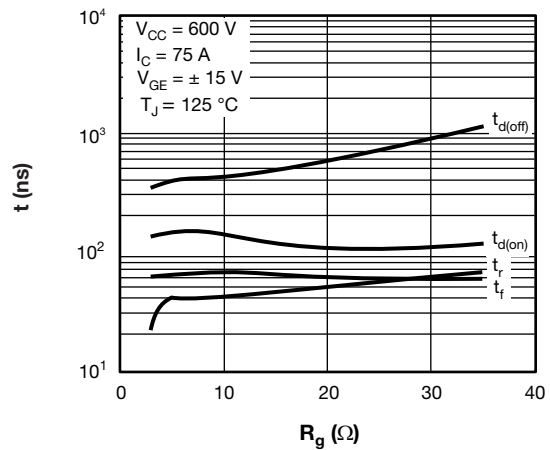


Fig. 8 - Typical Switching Time vs. Gate Resistance  $R_g$

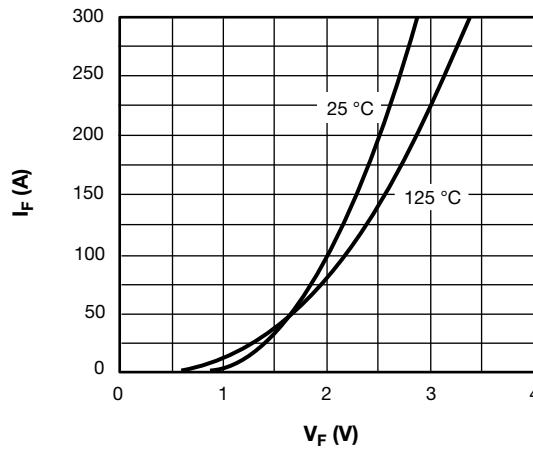


Fig. 9 - Diode Typical Forward Characteristics

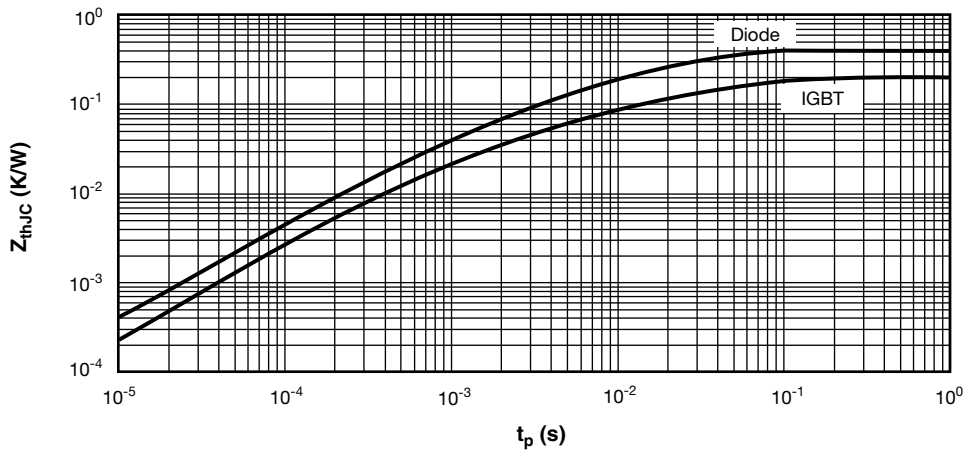
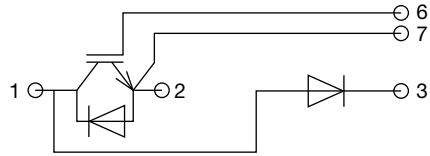


Fig. 10 - Transient Thermal Impedance



**CIRCUIT CONFIGURATION**

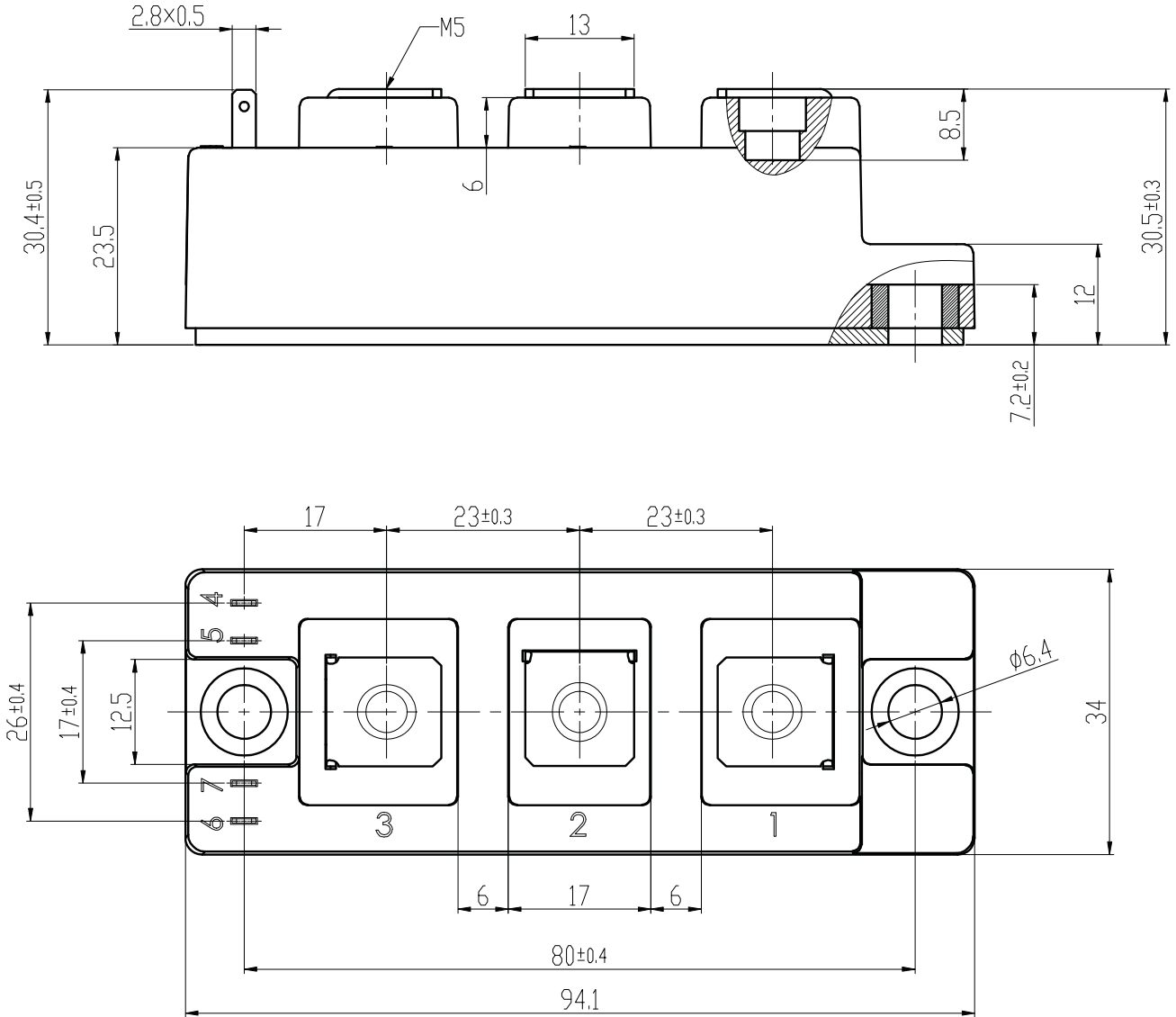


LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95524">www.vishay.com/doc?95524</a>



# INT-A-PAK

**DIMENSIONS** in millimeters (inches)





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