

## Molding Type Module IGBT, Chopper in1 Package, 1200 V and 100 A



Double INT-A-PAK

PRODUCT SUMMARY	
$V_{CES}$	1200 V
$I_C$ at $T_C = 80\text{ }^\circ\text{C}$	100 A
$V_{CE(on)}$ (typical) at $I_C = 100\text{ A}$ , $25\text{ }^\circ\text{C}$	1.77 V
Speed	8 kHz to 30 kHz
Package	Double INT-A-PAK
Circuit	Chopper low side switch

### FEATURES

- High short circuit capability, self limiting to  $6 \times I_C$
- 10  $\mu\text{s}$  short circuit capability
- $V_{CE(on)}$  with positive temperature coefficient
- Maximum junction temperature 150  $^\circ\text{C}$
- 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](http://www.vishay.com/doc?99912)


 RoHS  
COMPLIANT

### 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 ( $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted)				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	$V_{CES}$		1200	V
Gate to emitter voltage	$V_{GES}$		$\pm 20$	
Collector current	$I_C$	$T_C = 25\text{ }^\circ\text{C}$	200	A
		$T_C = 80\text{ }^\circ\text{C}$	100	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1\text{ ms}$	200	
Diode continuous forward current	$I_F$	$T_C = 80\text{ }^\circ\text{C}$	100	
Diode maximum forward current	$I_{FM}$	$t_p = 1\text{ ms}$	200	
Maximum power dissipation	$P_D$	$T_J = 150\text{ }^\circ\text{C}$	833	
Short circuit withstand time	$t_{SC}$	$T_J = 125\text{ }^\circ\text{C}$	10	$\mu\text{s}$
RMS isolation voltage	$V_{ISOL}$	$f = 50\text{ Hz}$ , $t = 1\text{ min}$	2500	V
$I^2t$ -value, diode	$I^2t$	$V_R = 0\text{ V}$ , $t = 10\text{ ms}$ , $T_J = 125\text{ }^\circ\text{C}$	1700	$\text{A}^2\text{s}$

#### Note

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



<b>IGBT ELECTRICAL SPECIFICATIONS</b> ( $T_C = 25\text{ }^\circ\text{C}$ 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	$V_{CE(on)}$	$V_{GE} = 15\text{ V}, I_C = 100\text{ A}, T_J = 25\text{ }^\circ\text{C}$	-	1.77	-	
		$V_{GE} = 15\text{ V}, I_C = 100\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	2.0	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 2.0\text{ mA}, T_J = 25\text{ }^\circ\text{C}$	5.0	6.2	7.0	
Collector cut-off current	$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	-	1.0	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

<b>SWITCHING CHARACTERISTICS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}, I_C = 100\text{ A}, R_g = 8\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	75	-	ns
Rise time	$t_r$		-	40	-	
Turn-off delay time	$t_{d(off)}$		-	400	-	
Fall time	$t_f$		-	60	-	
Turn-on switching loss	$E_{on}$	$V_{CC} = 600\text{ V}, I_C = 100\text{ A}, R_g = 8\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	6.0	-	mJ
Turn-off switching loss	$E_{off}$		-	3.7	-	
Turn-on delay time	$t_{d(on)}$		-	80	-	
Rise time	$t_r$		-	50	-	
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 600\text{ V}, I_C = 100\text{ A}, R_g = 8\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	420	-	ns
Fall time	$t_f$		-	65	-	
Turn-on switching loss	$E_{on}$		-	8.4	-	
Turn-off switching loss	$E_{off}$		-	5.8	-	
Input capacitance	$C_{ies}$	$V_{GE} = 0\text{ V}, V_{CE} = 25\text{ V}, f = 1.0\text{ MHz}$	-	8.96	-	nF
Output capacitance	$C_{oes}$		-	0.96	-	
Reverse transfer capacitance	$C_{res}$		-	0.45	-	
SC data	$I_{SC}$	$t_{sc} \leq 10\text{ }\mu\text{s}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C}, V_{CC} = 900\text{ V}, V_{CEM} \leq 1200\text{ V}$	-	540	-	A
Internal gate resistance	$R_{GINT}$		-	5	-	$\Omega$
Stray inductance	$L_{CE}$		-	-	20	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$	$T_C = 25\text{ }^\circ\text{C}$	-	0.35	-	m $\Omega$

<b>DIODE ELECTRICAL SPECIFICATIONS</b> ( $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Diode forward voltage	$V_F$	$I_F = 100\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	-	1.98	-	V
			$T_J = 125\text{ }^\circ\text{C}$	-	2.21	-	
Diode reverse recovery charge	$Q_{rr}$	$I_F = 100\text{ A}, V_R = 600\text{ V}, dI/dt = -3600\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	10	-	$\mu\text{C}$
			$T_J = 125\text{ }^\circ\text{C}$	-	16	-	
Diode peak reverse recovery current	$I_{rr}$	$I_F = 100\text{ A}, V_R = 600\text{ V}, dI/dt = -3600\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	90	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	120	-	
Diode reverse recovery energy	$E_{rec}$	$I_F = 100\text{ A}, V_R = 600\text{ V}, dI/dt = -3600\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	3.5	-	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	°C
Storage temperature range	$T_{STG}$		-40	-	125	
Junction to case	$R_{thJC}$	IGBT part, per 1/2 module	-	-	0.15	K/W
		Diode part, per 1/2 module	-	-	0.29	
Case to sink	$R_{thCS}$	Conductive grease applied	-	0.035	-	
Mounting torque		Power terminal screw: M6	2.5 to 5.0			Nm
		Mounting screw: M6	3.0 to 6.0			
Weight			300			g

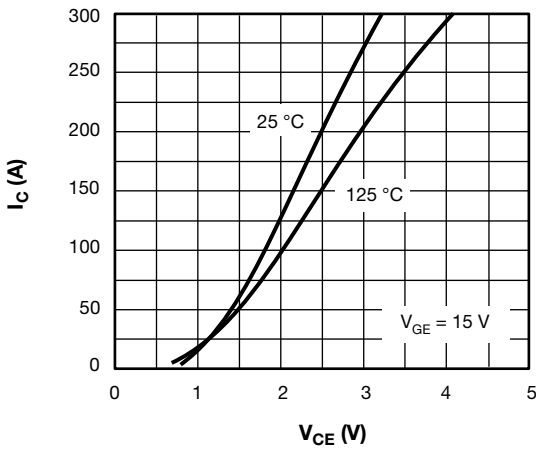


Fig. 1 - IGBT Typical Output Characteristics

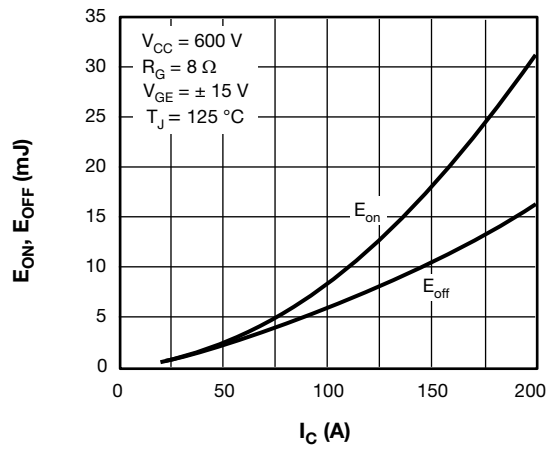


Fig. 3 - IGBT Switching Loss vs.  $I_C$

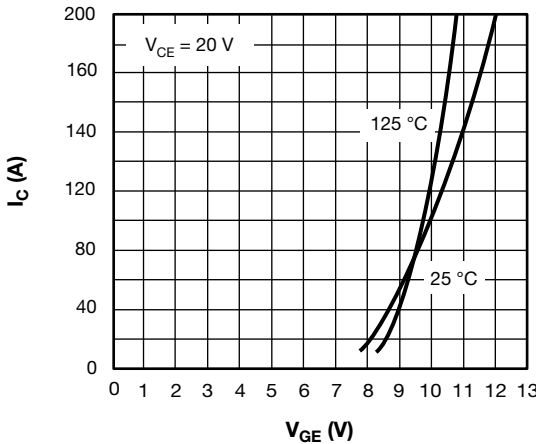


Fig. 2 - IGBT Typical Transfer Characteristics

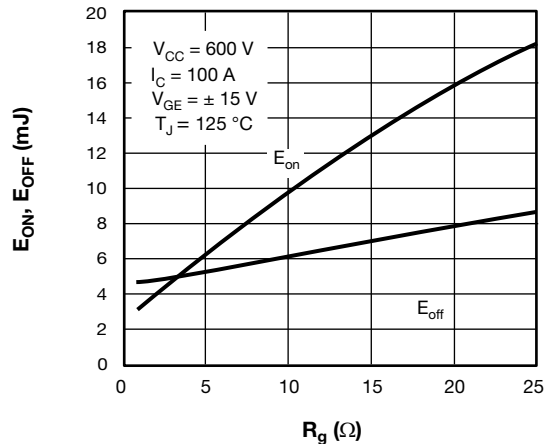


Fig. 4 - IGBT Switching Loss vs.  $R_g$

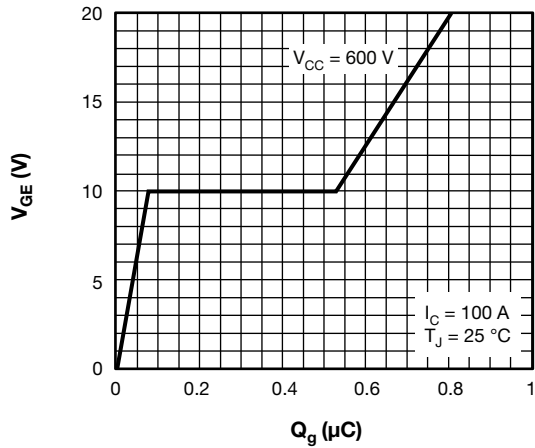


Fig. 5 - Gate Charge Characteristics

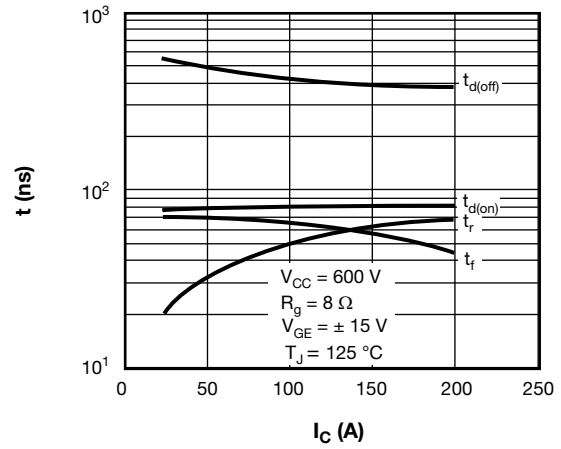


Fig. 7 - Typical Switching Times vs.  $I_C$

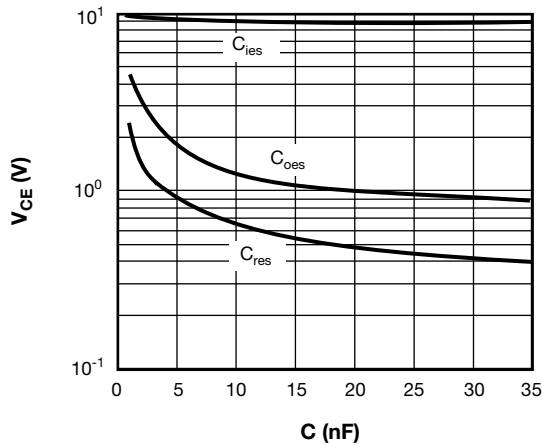


Fig. 6 - Typical Capacitance vs. Collector to Emitter Voltage

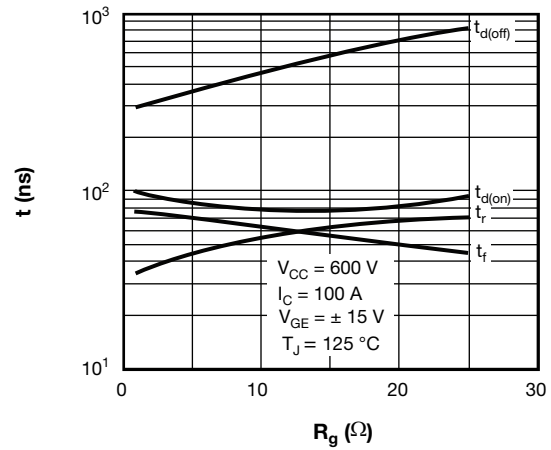


Fig. 8 - Typical Switching Times vs. Gate Resistance  $R_g$

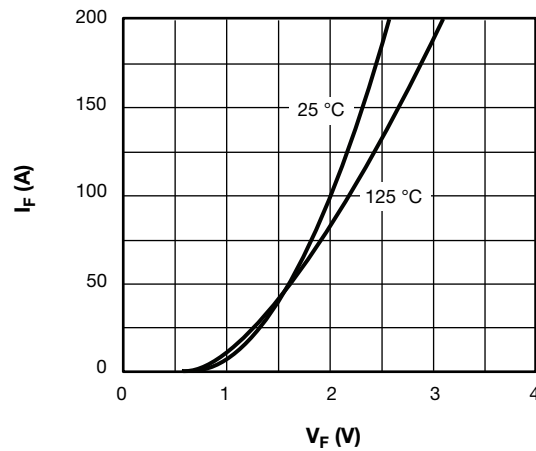


Fig. 9 - Typical Forward Characteristics (Diode)

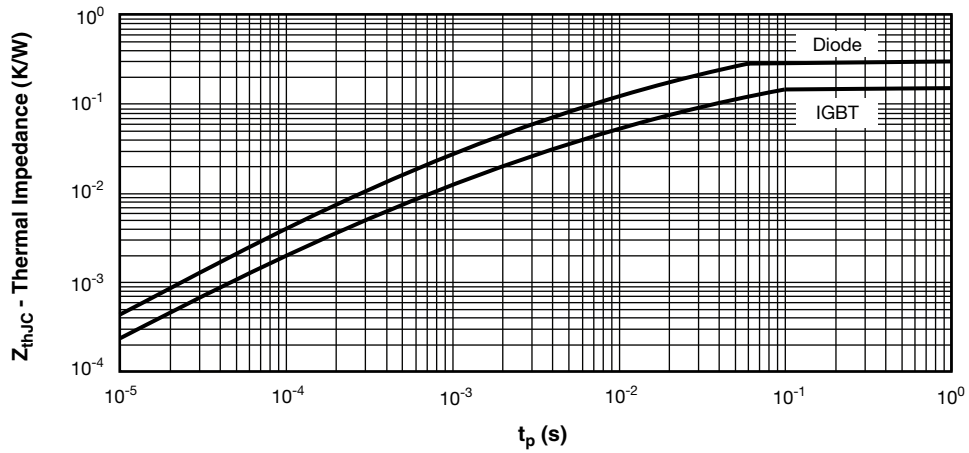
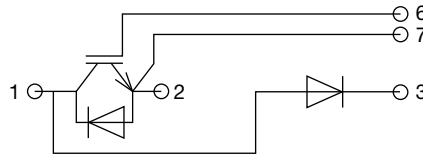


Fig. 10 - Transient Thermal Impedance

**CIRCUIT CONFIGURATION**



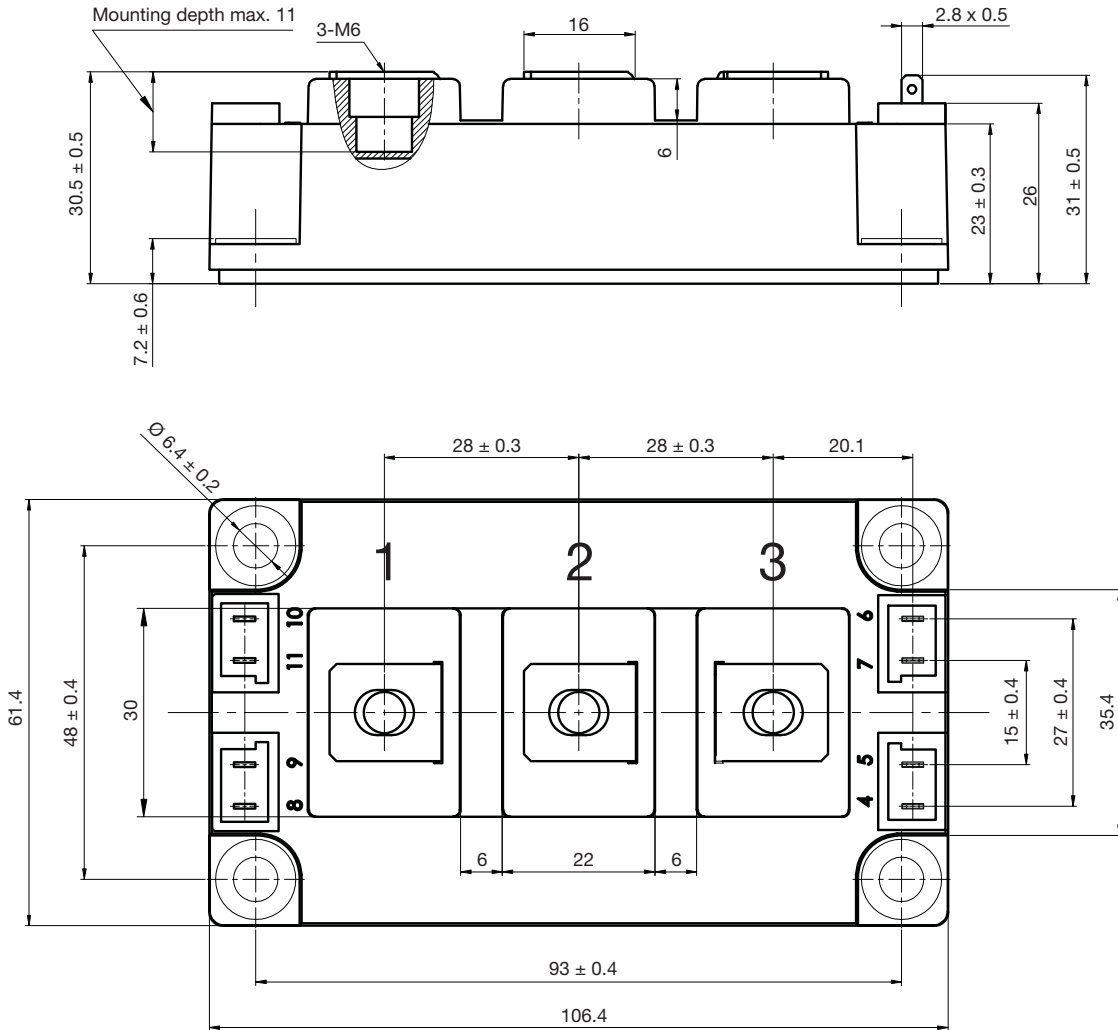
**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?95525">www.vishay.com/doc?95525</a>
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## Double INT-A-PAK

**DIMENSIONS** in millimeters (inches)





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