

## Molding Type Module IGBT, Chopper in 1 Package, 1200 V and 150 A



Double INT-A-PAK

### 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 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

PRODUCT SUMMARY	
$V_{CES}$	1200 V
$I_C$ at $T_C = 80$ °C	150 A
$V_{CE(on)}$ (typical) at $I_C = 150$ A, 25 °C	1.87 V
Speed	8 kHz to 30 kHz
Package	Double INT-A-PAK
Circuit	Chopper low side switch

### 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 ( $T_C = 25$ °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	300	A
		$T_C = 80$ °C	150	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1$ ms	300	
Diode continuous forward current	$I_F$	$T_C = 80$ °C	150	
Diode maximum forward current	$I_{FM}$	$t_p = 1$ ms	300	
Maximum power dissipation	$P_D$	$T_J = 150$ °C	1389	
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	4800	A <sup>2</sup> 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	$V_{CE(on)}$	$V_{GE} = 15\text{ V}, I_C = 150\text{ A}, T_J = 25\text{ }^\circ\text{C}$	-	1.87	-	
		$V_{GE} = 15\text{ V}, I_C = 150\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	2.08	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 12.0\text{ mA}, T_J = 25\text{ }^\circ\text{C}$	5.0	6.3	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	$t_{d(on)}$	$V_{CC} = 600\text{ V}, I_C = 150\text{ A}, R_g = 6.8\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	190	-	ns
Rise time	$t_r$		-	60	-	
Turn-off delay time	$t_{d(off)}$		-	460	-	
Fall time	$t_f$		-	55	-	
Turn-on switching loss	$E_{on}$	$V_{CC} = 600\text{ V}, I_C = 150\text{ A}, R_g = 6.8\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	11.2	-	mJ
Turn-off switching loss	$E_{off}$		-	9.8	-	
Turn-on delay time	$t_{d(on)}$		-	220	-	
Rise time	$t_r$		-	60	-	
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 600\text{ V}, I_C = 150\text{ A}, R_g = 6.8\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	530	-	ns
Fall time	$t_f$		-	75	-	
Turn-on switching loss	$E_{on}$		-	16.7	-	
Turn-off switching loss	$E_{off}$		-	15.3	-	
Input capacitance	$C_{ies}$	$V_{GE} = 0\text{ V}, V_{CE} = 25\text{ V}, f = 1.0\text{ MHz}$	-	10.6	-	nF
Output capacitance	$C_{oes}$		-	0.71	-	
Reverse transfer capacitance	$C_{res}$		-	0.47	-	
SC data	$I_{SC}$	$t_{sc} \leq 10\text{ }\mu\text{s}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C}, V_{CC} = 900\text{ V}, V_{CEM} \leq 1200\text{ V}$	-	650	-	A
Internal gate resistance	$R_{gint}$		-	1.5	-	$\Omega$
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	$V_F$	$I_F = 150\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	-	2.05	-	V
			$T_J = 125\text{ }^\circ\text{C}$	-	2.26	-	
Diode reverse recovery charge	$Q_{rr}$	$I_F = 150\text{ A}, V_R = 600\text{ V}, dI/dt = -4800\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	7	-	$\mu\text{C}$
			$T_J = 125\text{ }^\circ\text{C}$	-	18	-	
Diode peak reverse recovery current	$I_{rr}$	$I_F = 150\text{ A}, V_R = 600\text{ V}, dI/dt = -4800\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	150	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	190	-	
Diode reverse recovery energy	$E_{rec}$	$I_F = 150\text{ A}, V_R = 600\text{ V}, dI/dt = -4800\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	4.0	-	mJ
			$T_J = 125\text{ }^\circ\text{C}$	-	8.0	-	



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 (per 1/2 module)	-	-	0.09	K/W
		Diode (per 1/2 module)	-	-	0.24	
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

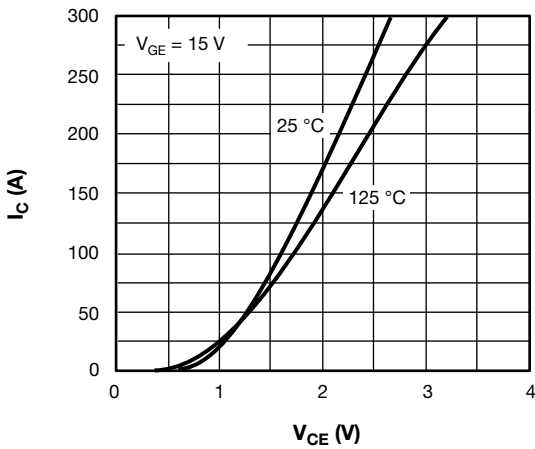


Fig. 1 - Typical Output Characteristics

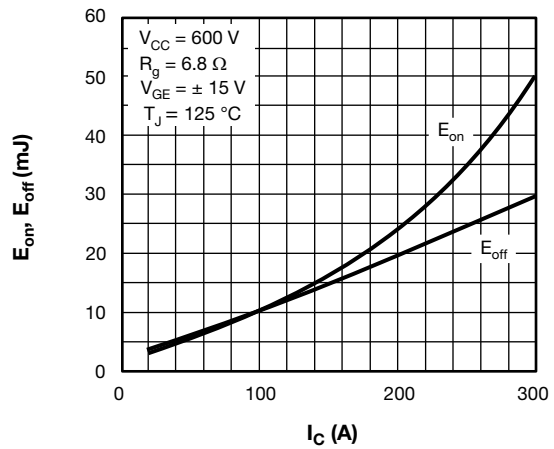


Fig. 3 - Switching Loss vs. Collector Current

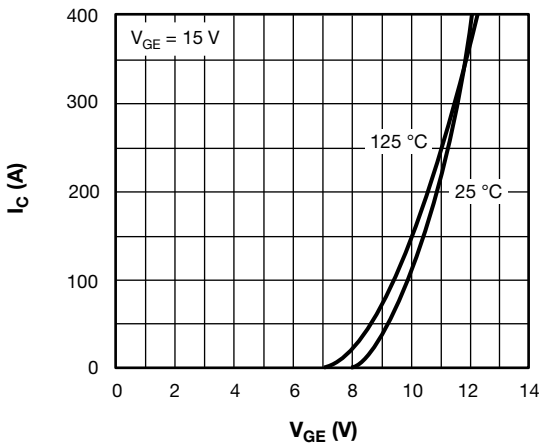


Fig. 2 - Typical Transfer Characteristics

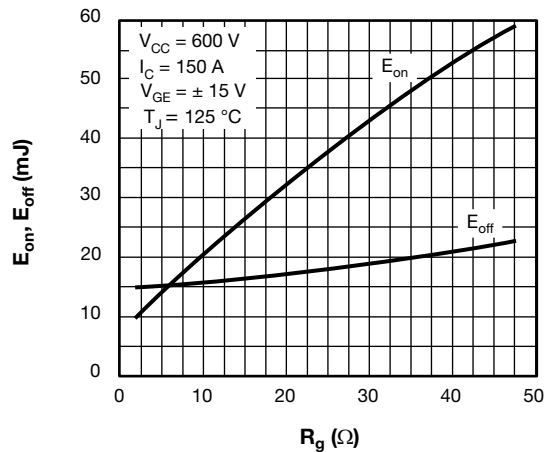


Fig. 4 - Switching Loss vs. gate Resistor

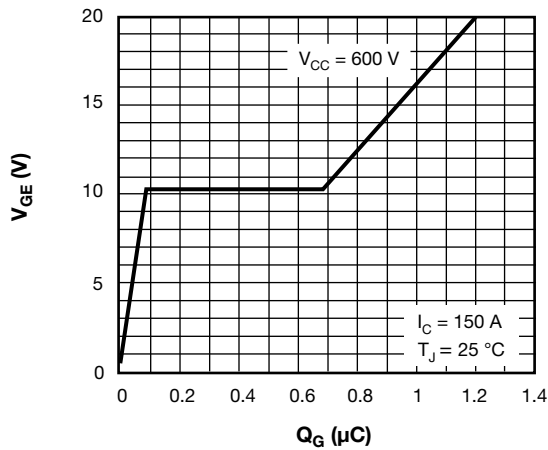


Fig. 5 - Gate Charge Characteristics

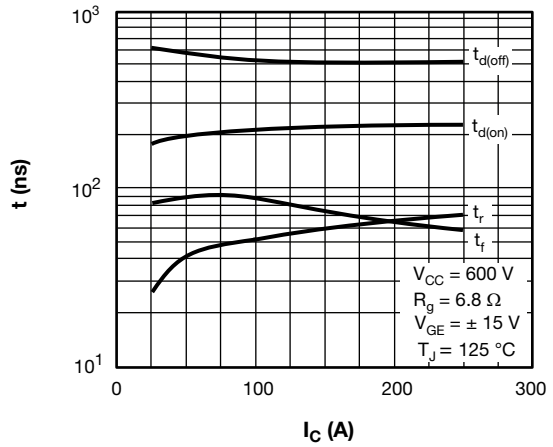


Fig. 7 - Typical Switching Times vs.  $I_C$

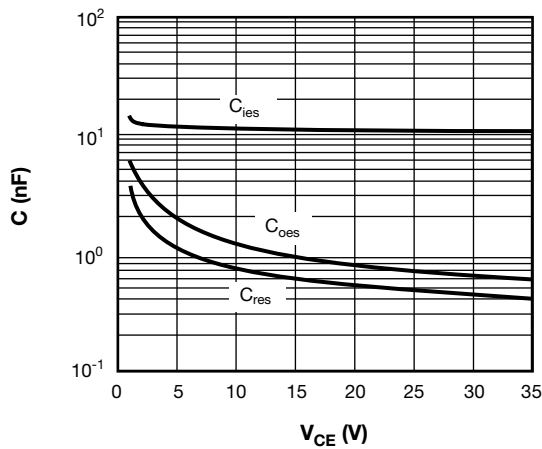


Fig. 6 - Typical Capacitance vs. Collector to Emitter Voltage

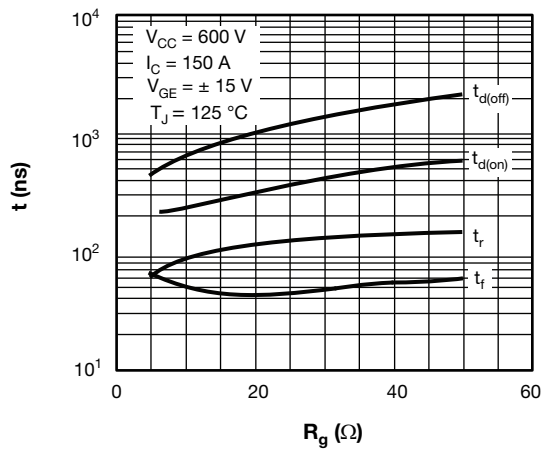


Fig. 8 - Typical Switching Times vs. Gate Resistance  $R_g$

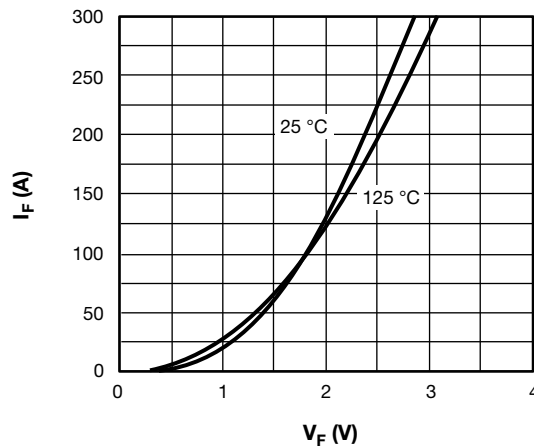


Fig. 9 - Typical Forward Characteristics, Diode

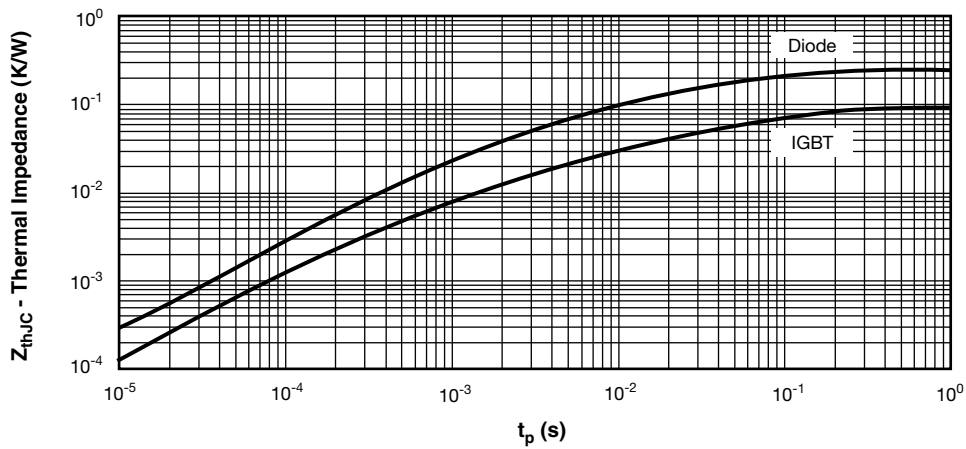
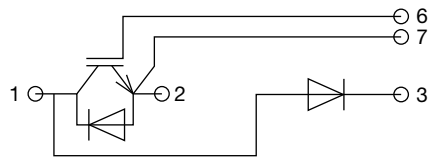


Fig. 10 - Transient Thermal Impedance

**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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