

Molding Type Module IGBT, Chopper in 1 Package, 1200 V and 50 A


INT-A-PAK
FEATURES

- High short circuit capability, self limiting to $6 \times I_C$
- 10 μ s short circuit capability
- Low inductance case
- Fast and soft reverse recovery antiparallel FWD
- Isolated copper baseplate using DCB (Direct Copper Bonding) technology
- $V_{CE(on)}$ with positive temperature coefficient
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

PRODUCT SUMMARY	
V_{CES}	1200 V
I_C at $T_C = 80^\circ\text{C}$	50 A
$V_{CE(on)}$ (typical) at $I_C = 50\text{ A}, 25^\circ\text{C}$	1.7 V
Speed	8 kHz to 30 kHz
Package	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 ultralow 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	I_C	$T_C = 25^\circ\text{C}$	100	A
		$T_C = 80^\circ\text{C}$	50	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1\text{ ms}$	100	
Diode continuous forward current	I_F		50	
Diode maximum forward current	I_{FM}		100	
Maximum power dissipation	P_D	$T_J = 150^\circ\text{C}$	446	
Short circuit withstand time	t_{SC}	$T_J = 125^\circ\text{C}$	10	μ s
I^2t -value, diode	I^2t	$V_R = 0\text{ V}, t = 10\text{ ms}, T_J = 125^\circ\text{C}$	420	A^2s
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

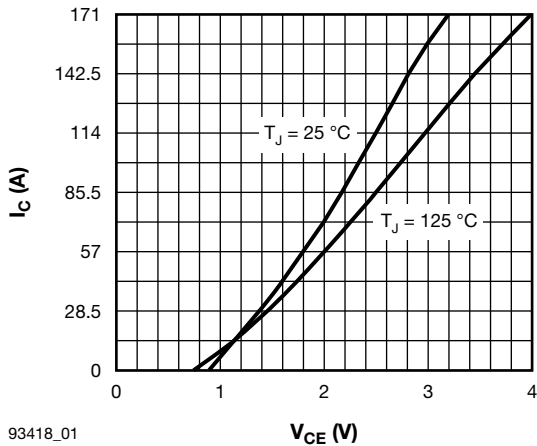
IGBT ELECTRICAL SPECIFICATIONS ($T_C = 25^\circ\text{C}$ unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{(BR)CES}$	$T_J = 25^\circ\text{C}$	1200	-	-	V
Collector to emitter saturation voltage	$V_{CE(on)}$	$V_{GE} = 15\text{ V}, I_C = 50\text{ A}, T_J = 25^\circ\text{C}$	-	1.70	-	
		$V_{GE} = 15\text{ V}, I_C = 50\text{ A}, T_J = 125^\circ\text{C}$	-	1.95	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 2\text{ mA}, T_J = 25^\circ\text{C}$	5.0	6.2	7.0	
Zero gate voltage collector current	I_{CES}	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}, T_J = 25^\circ\text{C}$	-	-	1.0	mA
Gate to emitter leakage current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}, T_J = 25^\circ\text{C}$	-	-	400	nA



SWITCHING CHARACTERISTICS							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}$, $I_C = 50\text{ A}$, $R_g = 18\ \Omega$, $V_{GE} = \pm 15\text{ V}$, $T_J = 25\text{ }^\circ\text{C}$	-	220	-	ns	
Rise time	t_r		-	60	-		
Turn-off delay time	$t_{d(off)}$		-	420	-		
Fall time	t_f		-	60	-		
Turn-on switching loss	E_{on}		$V_{CC} = 600\text{ V}$, $I_C = 50\text{ A}$, $R_g = 18\ \Omega$, $V_{GE} = \pm 15\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$	-	2.1	-	mJ
Turn-off switching loss	E_{off}			-	2.6	-	
Turn-on delay time	$t_{d(on)}$	-		270	-	ns	
Rise time	t_r	-		60	-		
Turn-off delay time	$t_{d(off)}$	-		500	-		
Fall time	t_f	-		65	-		
Turn-on switching loss	E_{on}	$V_{GE} = 0\text{ V}$, $V_{CE} = 25\text{ V}$, $f = 1.0\text{ MHz}$	-	4.1	-	mJ	
Turn-off switching loss	E_{off}		-	4.7	-		
Input capacitance	C_{ies}		$V_{GE} = 0\text{ V}$, $V_{CE} = 25\text{ V}$, $f = 1.0\text{ MHz}$	-	4.29	-	nF
Output capacitance	C_{oes}			-	0.30	-	
Reverse transfer capacitance	C_{res}			-	0.20	-	
SC data	I_{SC}		$t_{sc} \leq 10\ \mu\text{s}$, $V_{GE} = 15\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$, $V_{CC} = 900\text{ V}$, $V_{CEM} \leq 1200\text{ V}$	-	270	-	A
Internal gate resistance	R_{gint}		-	10	-	Ω	
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 Ω	

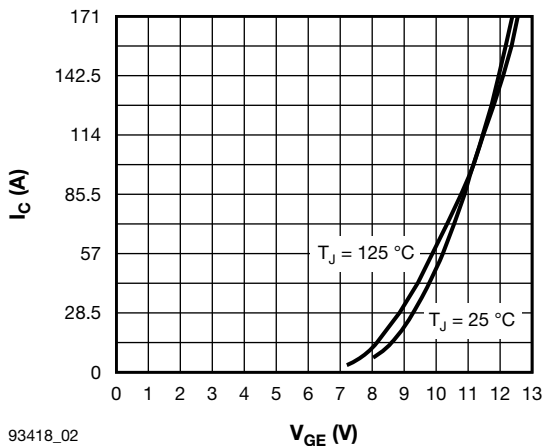
DIODE ELECTRICAL SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Diode forward voltage	V_F	$I_F = 50\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	-	2.15	-	V
			$T_J = 125\text{ }^\circ\text{C}$	-	2.35	-	
Diode reverse recovery time	t_{rr}	$I_F = 50\text{ A}$, $V_R = 600\text{ V}$, $di/dt = -2100\text{ A}/\mu\text{s}$, $V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	90	-	ns
			$T_J = 125\text{ }^\circ\text{C}$	-	130	-	
Diode peak reverse recovery current	I_{RM}		$T_J = 25\text{ }^\circ\text{C}$	-	52	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	60	-	
Diode reverse recovery energy	E_{rec}		$T_J = 25\text{ }^\circ\text{C}$	-	1.9	-	mJ
			$T_J = 125\text{ }^\circ\text{C}$	-	4.0	-	

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 per 1/2 module	R_{thJC}		-	-	0.28	K/W
			-	-	0.65	
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			150			g



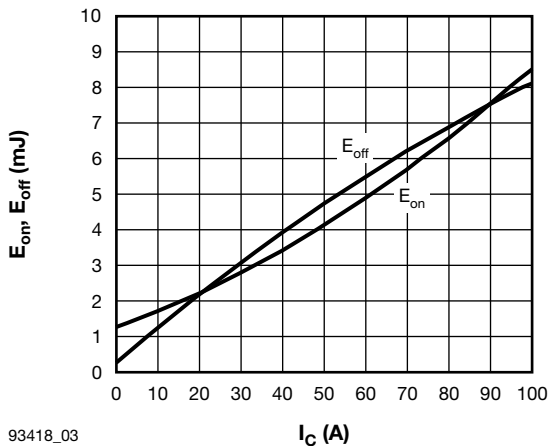
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Fig. 1 - Typical Output Characteristics
 $V_{GE} = 15\text{ V}$



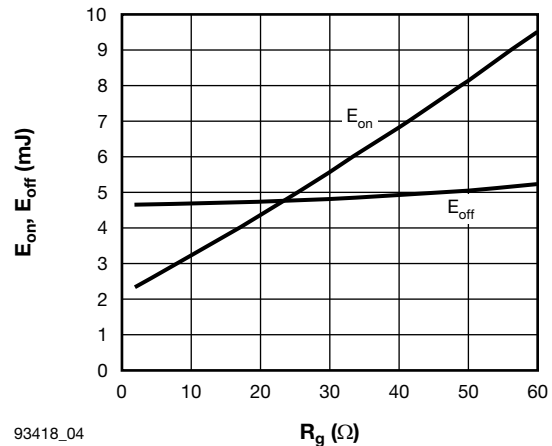
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Fig. 2 - Typical Transfer Characteristics
 $V_{CE} = 20\text{ V}$



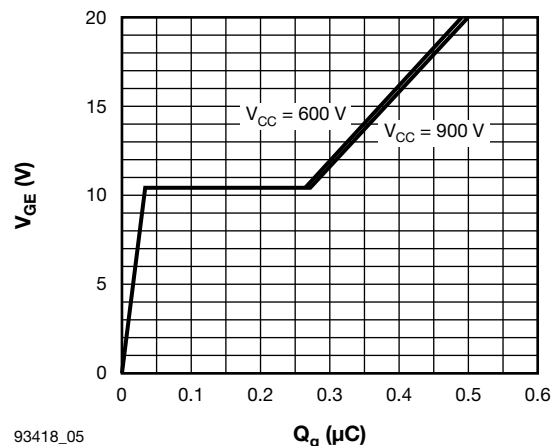
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Fig. 3 - Switching Loss vs. Collector Current
 $T_J = 125\text{ }^\circ\text{C}$, $V_{CC} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_g = 18\text{ }\Omega$



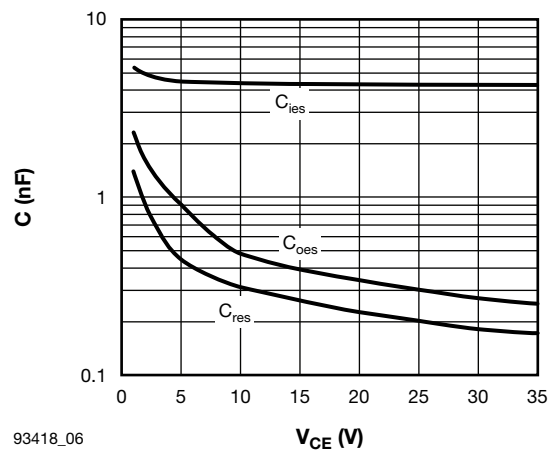
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Fig. 4 - Switching Loss vs. Gate Resistance
 $T_J = 125\text{ }^\circ\text{C}$, $V_{CC} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $I_C = 50\text{ A}$



93418_05

Fig. 5 - Gate Charge Characteristics
 $I_C = 50\text{ A}$, $T_J = 25\text{ }^\circ\text{C}$



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

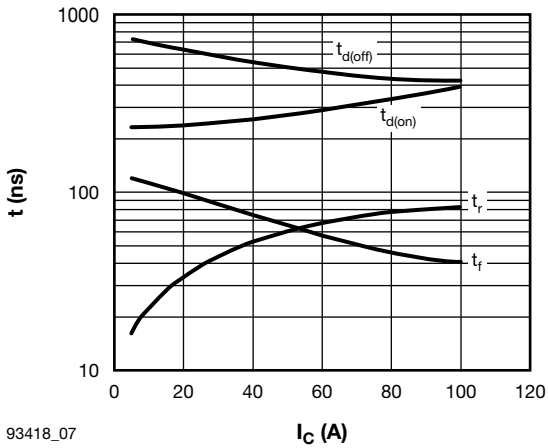


Fig. 7 - Typical Switching Time vs. I_C
 $T_J = 125^\circ\text{C}$, $V_{CC} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_g = 18\ \Omega$

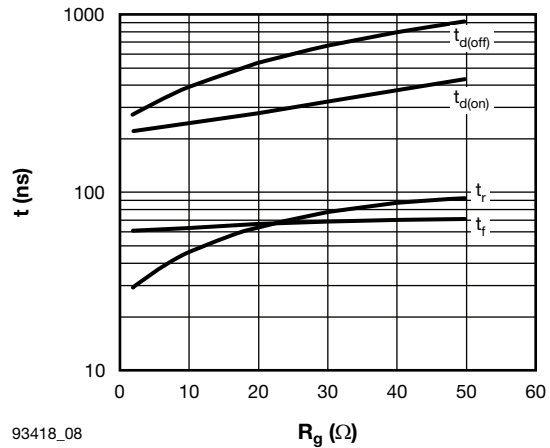


Fig. 8 - Typical Switching Time vs. Gate Resistance
 $T_J = 125^\circ\text{C}$, $V_{CC} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $I_C = 50\text{ A}$

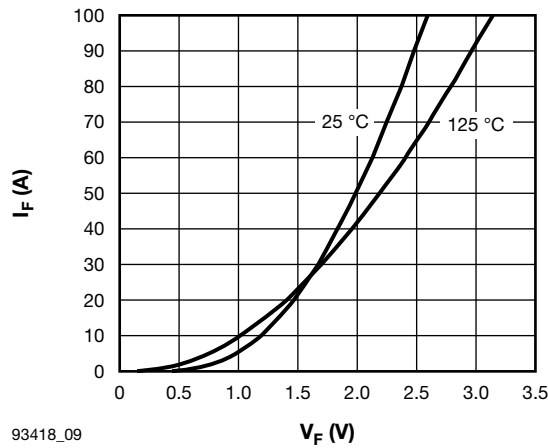


Fig. 9 - Typical Forward Characteristics (Diode)

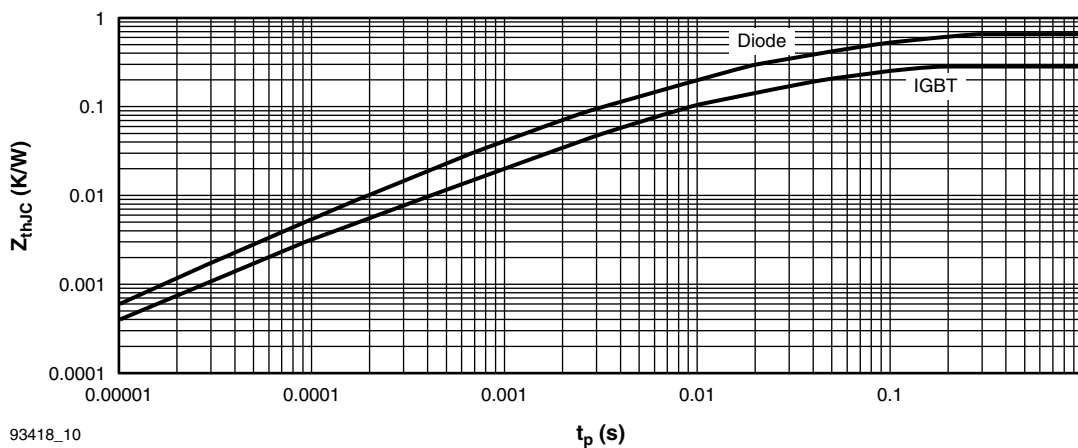
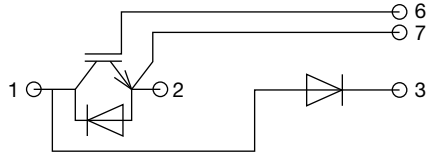


Fig. 10 - Transient Thermal Impedance



CIRCUIT CONFIGURATION

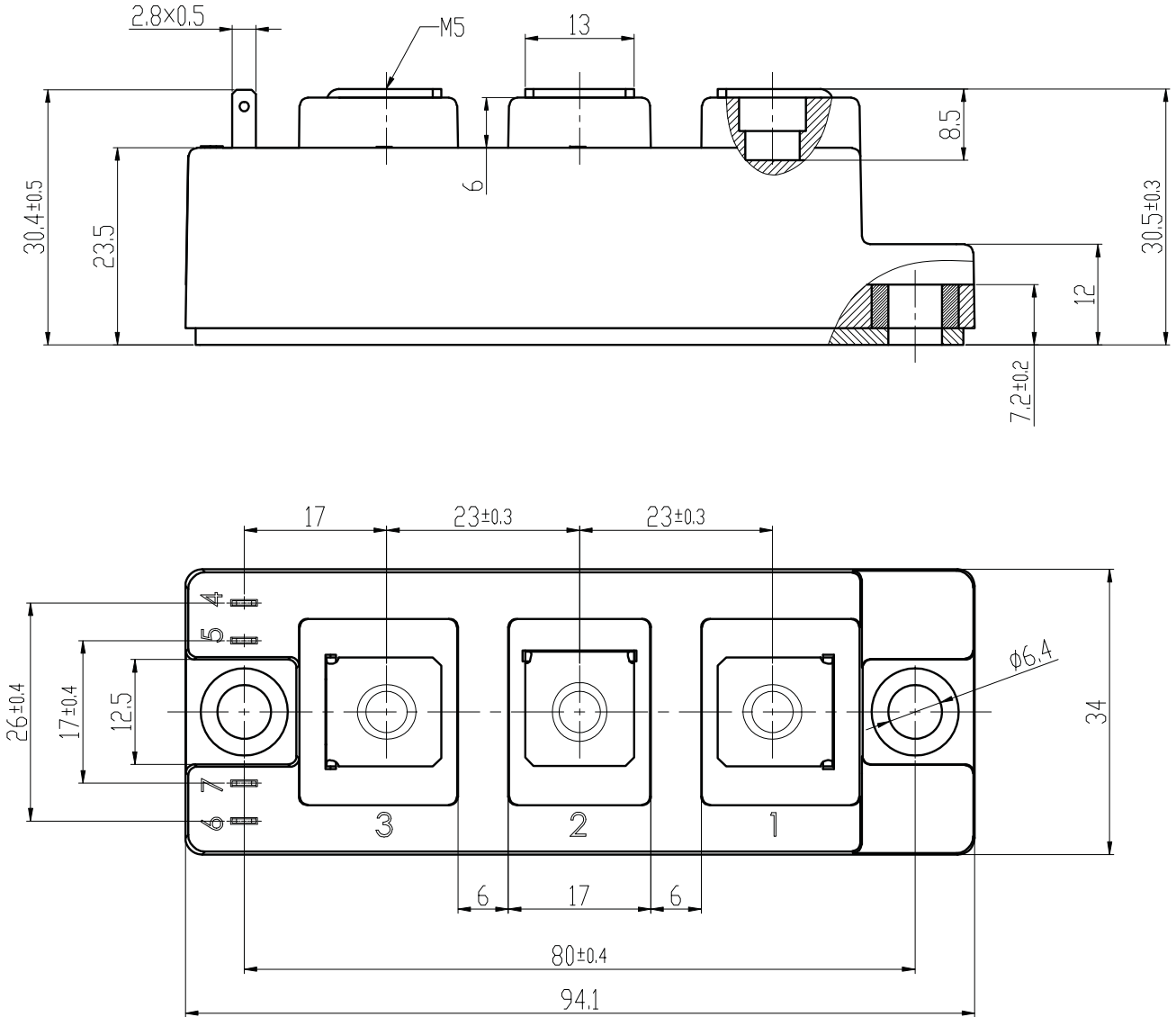


LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95524



INT-A-PAK

DIMENSIONS in millimeters (inches)





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