

Molding Type Module IGBT, 1-in-1 Package, 1200 V and 300 A



Double INT-A-PAK

FEATURES

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



RoHS
COMPLIANT

PRODUCT SUMMARY

V_{CES}	1200 V
I_C at $T_C = 80^\circ\text{C}$	300 A
$V_{CE(on)}$ (typical) at $I_C = 300\text{ A}$, 25°C	1.90 V
Speed	8 kHz to 30 kHz
Package	Double INT-A-PAK
Circuit	Single switch with AP diode

TYPICAL APPLICATIONS

- Switching mode power supplies
- AC inverter drives
- Electronic welders at f_{sw} up to 20 kHz

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 at $T_J = 150^\circ\text{C}$	I_C	$T_C = 25^\circ\text{C}$	620	A
		$T_C = 80^\circ\text{C}$	300	
Pulsed collector current	$I_{CM}^{(1)}$	$T_C = 80^\circ\text{C}$	600	
Diode continuous forward current	I_F		300	
Diode maximum forward current	I_{FM}		600	
Maximum power dissipation	P_D	$T_J = 150^\circ\text{C}$	2500	W
Short circuit withstand time	t_{SC}	$T_J = 125^\circ\text{C}$	10	μ s
I^2t -value, diode	I^2t	$V_R = 0\text{ V}$, $t = 10\text{ ms}$, $T_J = 125^\circ\text{C}$	19 000	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** ($T_C = 25\text{ }^{\circ}\text{C}$ 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 saturation voltage	$V_{CE(on)}$	$V_{GE} = 15\text{ V}, I_C = 300\text{ A}, T_J = 25\text{ }^{\circ}\text{C}$	-	1.9	-	
		$V_{GE} = 15\text{ V}, I_C = 300\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$	-	2.1	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 12\text{ mA}, T_J = 25\text{ }^{\circ}\text{C}$	5	6.2	7.0	
Zero gate voltage collector current	I_{CES}	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}, T_J = 25\text{ }^{\circ}\text{C}$	-	-	5.0	mA
Gate to emitter leakage current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}, T_J = 25\text{ }^{\circ}\text{C}$	-	-	400	nA

SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}, I_C = 300\text{ A}, R_g = 4.7\text{ }\Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 25\text{ }^{\circ}\text{C}$	-	90	-	ns
Rise time	t_r		-	55	-	
Turn-off delay time	$t_{d(off)}$		-	460	-	
Fall time	t_f		-	55	-	
Turn-on switching loss	E_{on}	$V_{CC} = 600\text{ V}, I_C = 300\text{ A}, R_g = 4.7\text{ }\Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$	-	28	-	mJ
Turn-off switching loss	E_{off}		-	25	-	
Turn-on delay time	$t_{d(on)}$		-	110	-	ns
Rise time	t_r		-	60	-	
Turn-off delay time	$t_{d(off)}$		-	500	-	
Fall time	t_f		-	60	-	
Turn-on switching loss	E_{on}	$V_{GE} = 0\text{ V}, V_{CE} = 25\text{ V}, f = 1.0\text{ MHz}$	-	31	-	mJ
Turn-off switching loss	E_{off}		-	27	-	
Input capacitance	C_{ies}		-	21	-	nF
Output capacitance	C_{oes}		-	1.5	-	
Reverse transfer capacitance	C_{res}		-	0.9	-	
SC data	I_{SC}	$t_{sc} \leq 10\text{ }\mu\text{s}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^{\circ}\text{C},$ $V_{CC} = 900\text{ V}, V_{CEM} \leq 1200\text{ V}$	-	1300	-	A
Stray inductance	L_{CE}		-	-	20	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$	$T_C = 25\text{ }^{\circ}\text{C}$	-	0.18	-	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 = 300 A	T _J = 25 °C	-	2.0	2.4	V
			T _J = 125 °C	-	2.2	2.5	
Diode reverse recovery charge	Q _{rr}	I _F = 300 A, V _R = 600 V, dI/dt = -2400 A/μs, V _{GE} = -15 V	T _J = 25 °C	-	27	-	μC
	T _J = 125 °C		-	50	-		
Diode peak reverse recovery current	I _{rr}		T _J = 25 °C	-	120	-	A
			T _J = 125 °C	-	170	-	
Diode reverse recovery energy	E _{rec}		T _J = 25 °C	-	9	-	mJ
			T _J = 125 °C	-	20	-	

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 module	IGBT Diode R _{thJC}		-	-	0.05	K/W
			-	-	0.12	
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			310			g

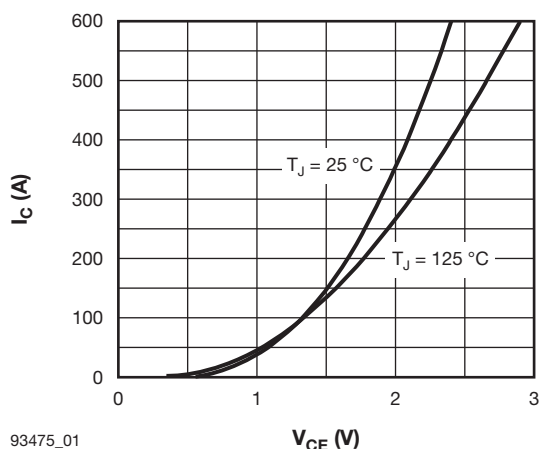


Fig. 1 - Typical Output Characteristics
 $V_{GE} = 15 \text{ V}$

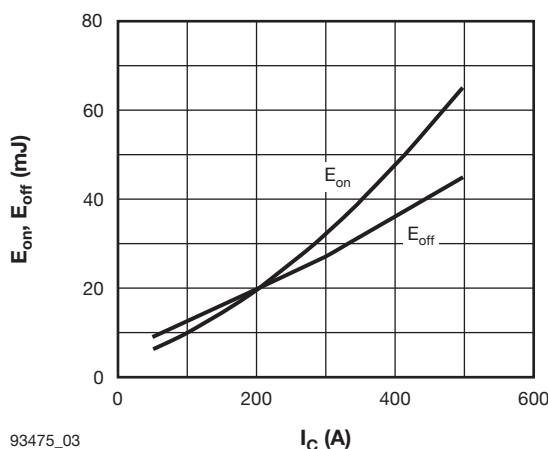


Fig. 3 - Switching Loss vs. Collector Current
 $V_{CC} = 600 \text{ V}$, $R_g = 4.7 \text{ } \Omega$, $V_{GE} = \pm 15 \text{ V}$, $T_J = 125 \text{ } ^\circ\text{C}$

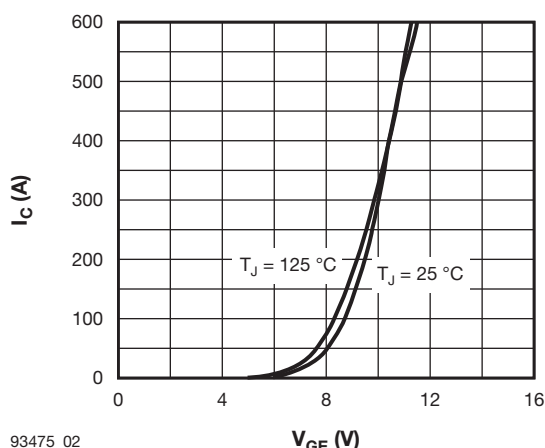


Fig. 2 - Typical Transfer Characteristics
 $V_{CE} = 20 \text{ V}$

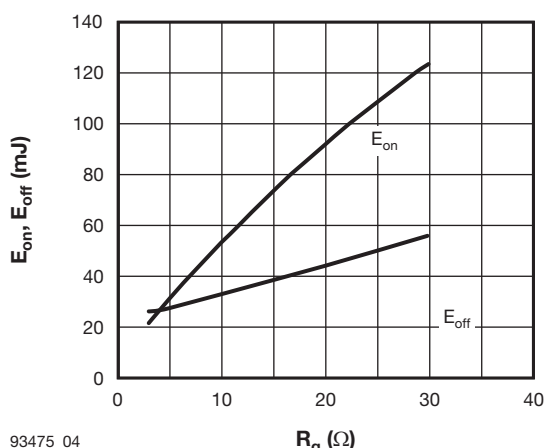


Fig. 4 - Switching Loss vs. Gate Resistor
 $V_{CC} = 600 \text{ V}$, $I_C = 300 \text{ A}$, $V_{GE} = \pm 15 \text{ V}$, $T_J = 125 \text{ } ^\circ\text{C}$

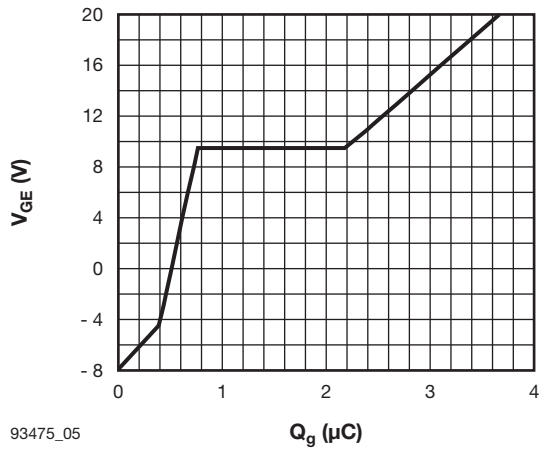


Fig. 5 - Gate Charge Characteristics
 $V_{CC} = 600\text{ V}$, $I_C = 300\text{ A}$, $T_J = 25\text{ }^{\circ}\text{C}$

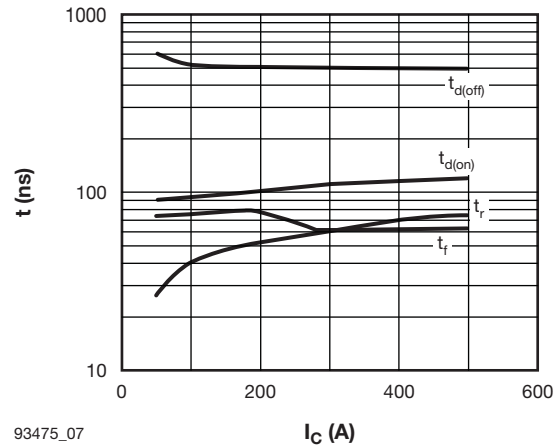


Fig. 7 - Typical Switching Times vs. I_C
 $V_{CC} = 600\text{ V}$, $R_g = 4.7\text{ }\Omega$, $V_{GE} = \pm 15\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$

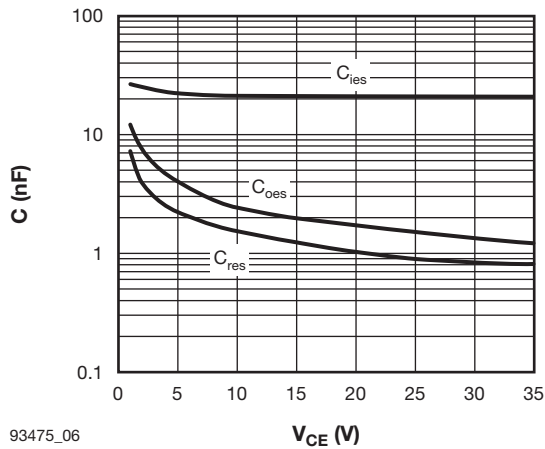


Fig. 6 - Typical Capacitance vs. Collector to Emitter Voltage

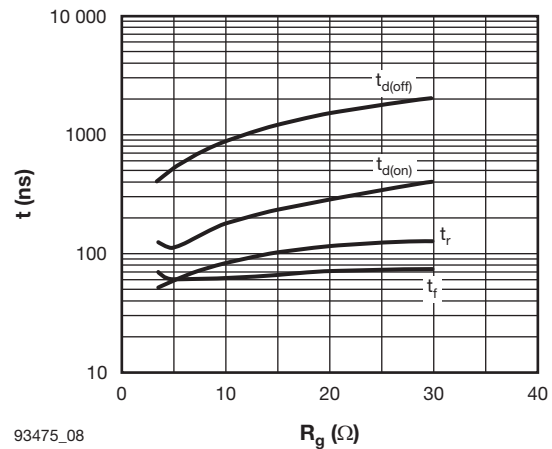


Fig. 8 - Typical Switching Times vs. Gate Resistance
 $V_{CC} = 600\text{ V}$, $I_C = 300\text{ A}$, $V_{GE} = \pm 15\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$

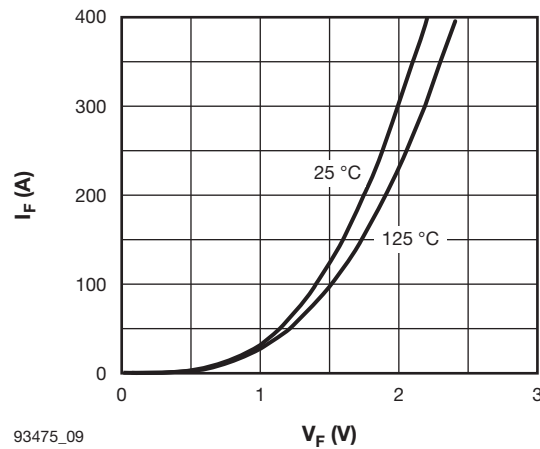


Fig. 9 - Typical Forward Characteristics (Diode)

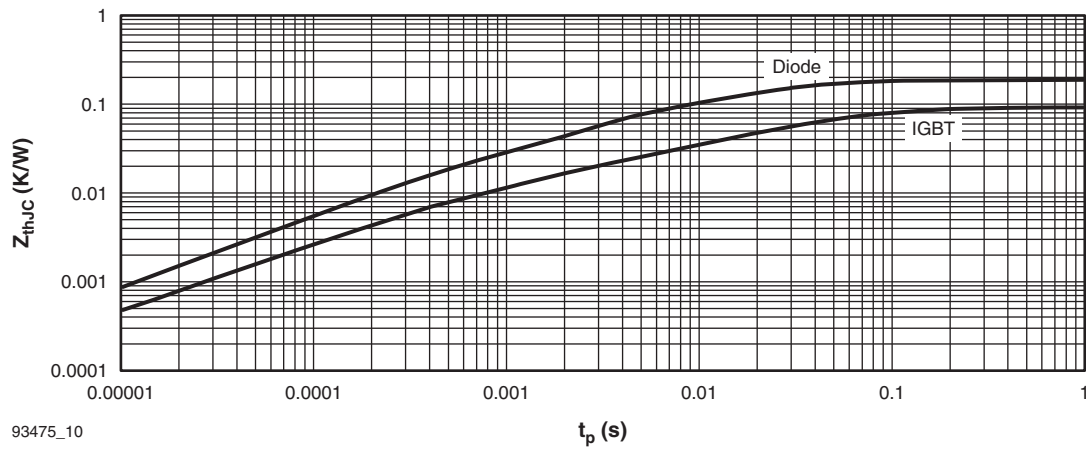


Fig. 10 - Transient Thermal Impedance

CIRCUIT CONFIGURATION

