Molding Type Module IGBT, 1-in-1 Package, 1200 V and 400 A

Dual INT-A-PAK

FEATURES

- High short circuit capability, self limiting to 6 x I_C
- 10 µs 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
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

TYPICAL APPLICATINS

- 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 inverters and UPS.

PRIMARY CHARACTERISTICS	
V_{CES}	1200 V
I_C at T_C = 80 °C	400 A
$V_{CE(on)}$ (typical) at I_C = 400 A, 25 °C	1.90 V
Speed	8 kHz to 30 kHz
Package	Dual INT-A-PAK
Circuit configuration	Single switch with AP diode

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}		± 20	
Collector current at T_J = 150 °C	I_C	T_C = 25 °C	650	A
		T_C = 80 °C	400	
Pulsed collector current	I_{CM} (1)	T_C = 80 °C	800	
Diode continuous forward current	I_F		400	
Diode maximum forward current	I_{FM}		800	
Maximum power dissipation	P_D	T_J = 150 °C	2500	W
Short circuit withstand time	t_{SC}	T_J = 125 °C	10	µs
I^2t-value, diode	I^2t	V_R = 0 V, t = 10 ms, T_J = 125 °C	27 500	A^2s
RMS isolation voltage	V_{ISOL}	f = 50 Hz, t = 1 min	2500	V

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 saturation voltage	$V_{CE(on)}$	V_{GE} = 15 V, I_C = 400 A, T_J = 25 °C	-	1.9	-	
		V_{GE} = 15 V, I_C = 400 A, T_J = 125 °C	-	2.1	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	V_{CE} = V_{GE}, I_C = 8 mA, T_J = 25 °C	5.0	6.2	7.0	
Zero gate voltage collector current	I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0 V, T_J = 25 °C	-	-	5.0	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 V, I_C = 400 A, R_g = 4 Ω, V_{GE} = ± 15 V, T_J = 25 °C	-	100	-	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}		-	33	-	mJ
Turn-off switching loss	E_{off}		-	42	-	
Turn-on delay time	$t_{d(on)}$	V_{CC} = 600 V, I_C = 400 A, R_g = 4 Ω, V_{GE} = ± 15 V, T_J = 125 °C	-	120	-	ns
Rise time	t_r		-	60	-	
Turn-off delay time	$t_{d(off)}$		-	490	-	
Fall time	t_f		-	75	-	
Turn-on switching loss	E_{on}		-	35	-	mJ
Turn-off switching loss	E_{off}		-	46	-	
Input capacitance	C_{ies}	V_{GE} = 0 V, V_{CE} = 25 V, f = 1.0 MHz	-	30	-	nF
Output capacitance	C_{oes}		-	4	-	
Reverse transfer capacitance	C_{res}		-	3	-	
SC data	I_{SC}	t_{sc} ≤ 10 µs, V_{GE} = 15 V, T_J = 125 °C, V_{CC} = 900 V, V_{CEM} ≤ 1200 V	-	1900	-	A
Stray inductance	L_{CE}		-	-	20	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$	T_C = 25 °C	-	0.18	-	mΩ

DIODE ELECTRICAL SPECIFICATIONS (T_C = 25 °C unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Diode forward voltage	V_F	I_F = 400 A	T_J = 25 °C	-	2.1	2.2	V
			T_J = 125 °C	-	2.2	2.3	
Diode reverse recovery charge	Q_{rr}	I_F = 400 A, V_R = 600 V, dI/dt = -4000 A/µs, V_{GE} = -15 V	T_J = 25 °C	-	40	-	µC
			T_J = 125 °C	-	48	-	
Diode peak reverse recovery current	I_{rr}		T_J = 25 °C	-	320	-	A
			T_J = 125 °C	-	400	-	
Diode reverse recovery energy	E_{rec}		T_J = 25 °C	-	12	-	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	R_{thJC}		-	-	0.05	K/W
	Diode			-	-	0.09	
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

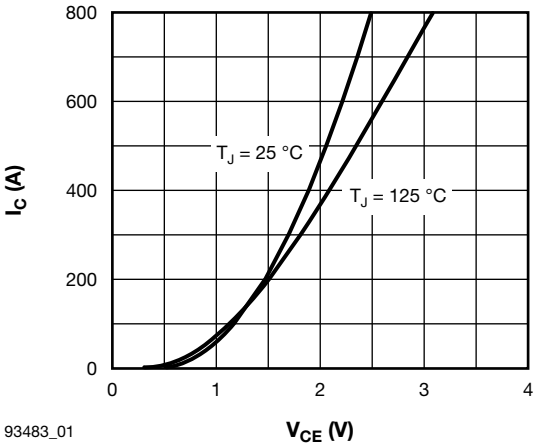


Fig. 1 - Typical Output Characteristics
V_{GE} = 15 V

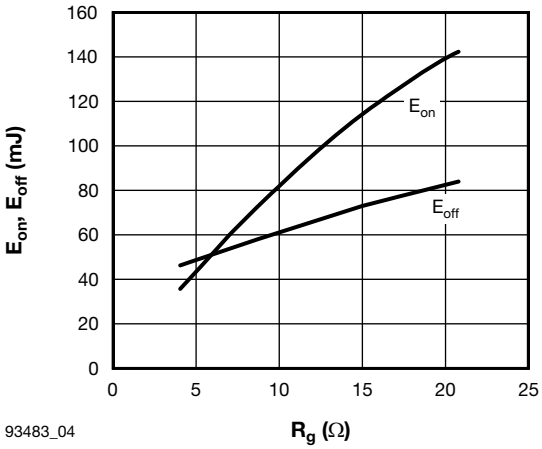


Fig. 4 - Switching Loss vs. Gate Resistor
V_{CC} = 600 V, I_C = 400 A, V_{GE} = ± 15 V, T_J = 125 °C

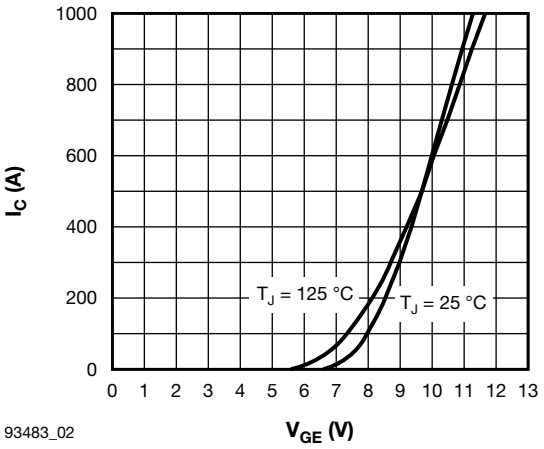


Fig. 2 - Typical Transfer Characteristics
V_{CE} = 20 V

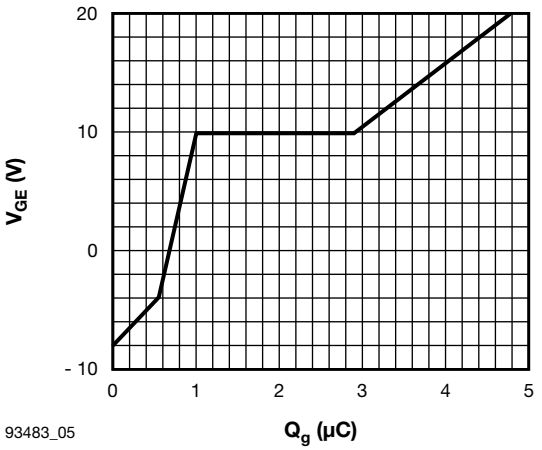


Fig. 5 - Gate Charge Characteristics
V_{CC} = 600 V, I_C = 400 A, T_J = 25 °C

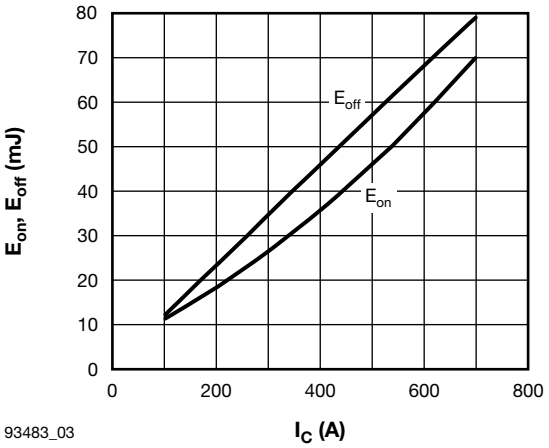


Fig. 3 - Switching Loss vs. Collector Current
V_{CC} = 600 V, R_g = 4 Ω, V_{GE} = ± 15 V, T_J = 125 °C

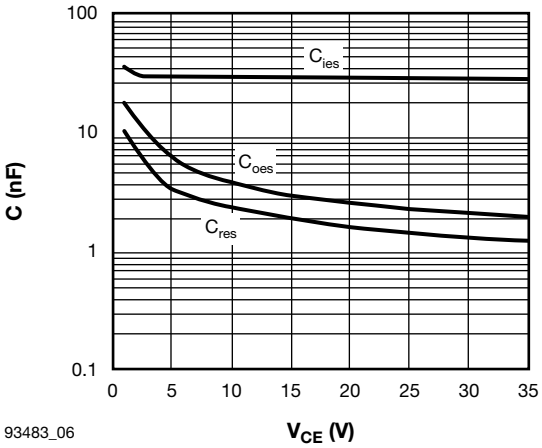


Fig. 6 - Typical Capacitance vs. Collector to Emitter Voltage

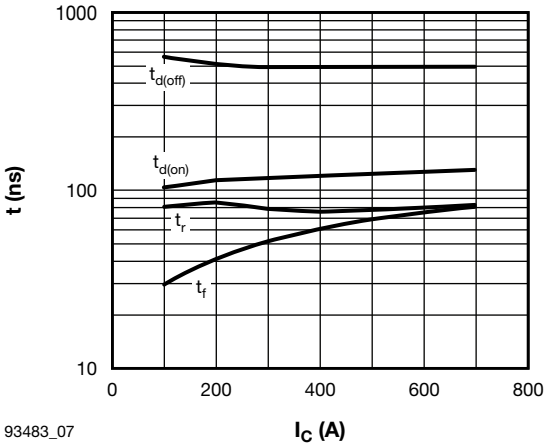


Fig. 7 - Typical Switching Times vs. I_C
V_{CC} = 600 V, R_g = 4 Ω, V_{GE} = ± 15 V, T_J = 125 °C

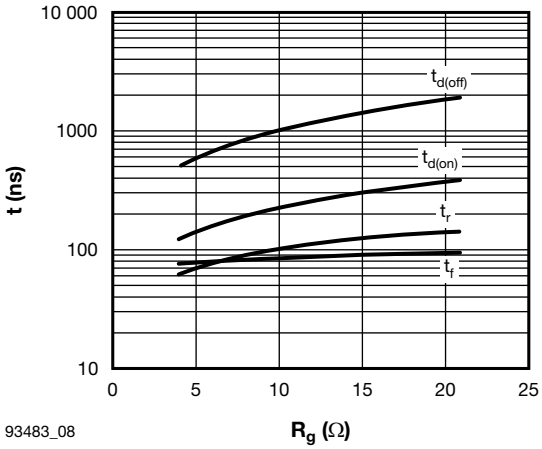


Fig. 8 - Typical Switching Times vs. Gate Resistance
V_{CC} = 600 V, I_C = 400 A, V_{GE} = ± 15 V, T_J = 125 °C

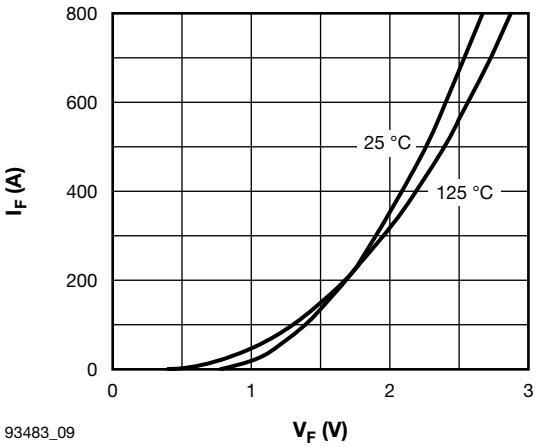


Fig. 9 - Typical Forward Characteristics (Diode)

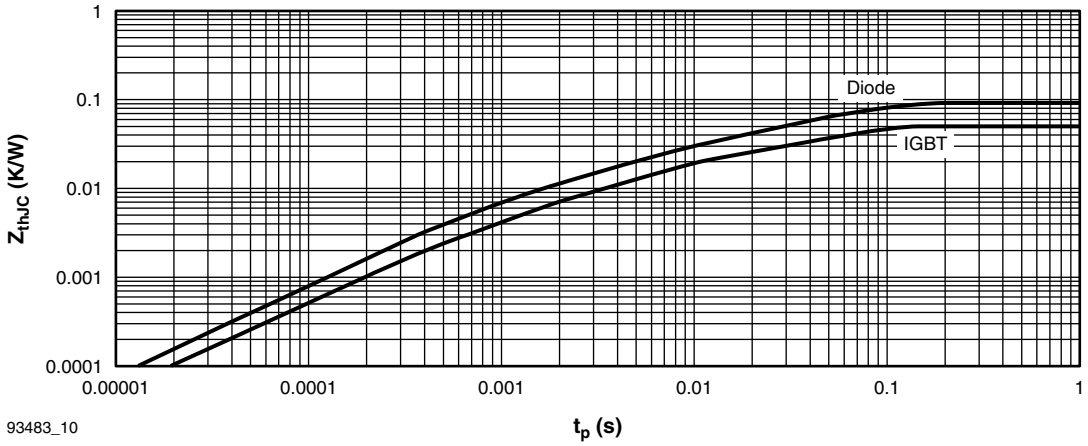
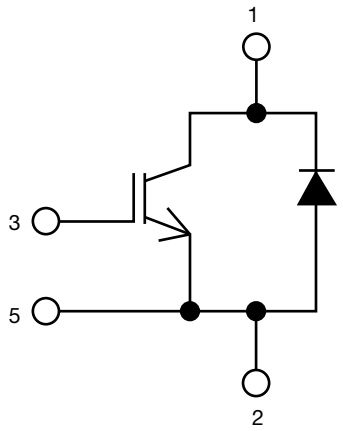


Fig. 10 - Transient Thermal Impedance

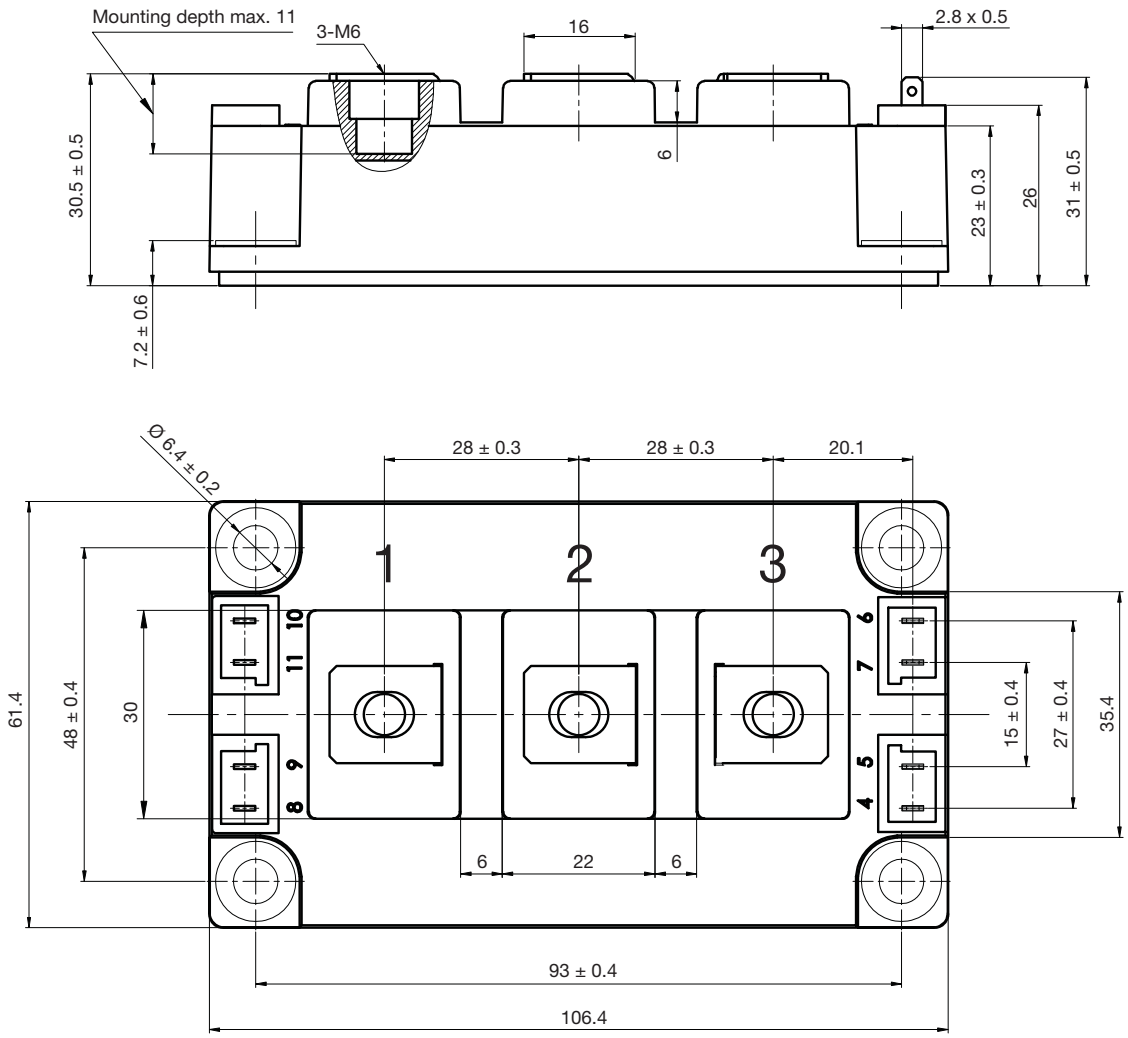
CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95526

Double INT-A-PAK

DIMENSIONS in millimeters (inches)



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