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[Vishay Semiconductor/Diodes Division](#)  
[VS-GB300AH120N](#)

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## VS-GB300AH120N

Vishay Semiconductors

### 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  $\mu$ 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
- 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 $T_C = 80^\circ\text{C}$	300 A
$V_{CE(on)}$ (typical) at $I_C = 300$ A, $25^\circ\text{C}$	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	$V_{GES}$		$\pm 20$	
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	$\mu$ s
$I^2t$ -value, diode	$I^2t$	$V_R = 0$ V, $t = 10$ ms, $T_J = 125^\circ\text{C}$	19 000	$\text{A}^2\text{s}$
RMS isolation voltage	$V_{ISOL}$	$f = 50$ Hz, $t = 1$ min	2500	V

#### Note

<sup>(1)</sup> Repetitive rating: pulse width limited by maximum junction temperature.



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IGBT ELECTRICAL SPECIFICATIONS (T <sub>C</sub> = 25 °C unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	V <sub>(BR)CES</sub>	T <sub>J</sub> = 25 °C	1200	-	-	V
Collector to emitter saturation voltage	V <sub>CE(on)</sub>	V <sub>GE</sub> = 15 V, I <sub>C</sub> = 300 A, T <sub>J</sub> = 25 °C	-	1.9	-	
		V <sub>GE</sub> = 15 V, I <sub>C</sub> = 300 A, T <sub>J</sub> = 125 °C	-	2.1	-	
Gate to emitter threshold voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 12 mA, T <sub>J</sub> = 25 °C	5	6.2	7.0	
Zero gate voltage collector current	I <sub>CES</sub>	V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0 V, T <sub>J</sub> = 25 °C	-	-	5.0	mA
Gate to emitter leakage current	I <sub>GES</sub>	V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0 V, T <sub>J</sub> = 25 °C	-	-	400	nA

SWITCHING CHARACTERISTICS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	t <sub>d(on)</sub>	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 300 A, R <sub>g</sub> = 4.7 Ω, V <sub>GE</sub> = ± 15 V, T <sub>J</sub> = 25 °C	-	90	-	ns
Rise time	t <sub>r</sub>		-	55	-	
Turn-off delay time	t <sub>d(off)</sub>		-	460	-	
Fall time	t <sub>f</sub>		-	55	-	mJ
Turn-on switching loss	E <sub>on</sub>		-	28	-	
Turn-off switching loss	E <sub>off</sub>		-	25	-	
Turn-on delay time	t <sub>d(on)</sub>	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 300 A, R <sub>g</sub> = 4.7 Ω, V <sub>GE</sub> = ± 15 V, T <sub>J</sub> = 125 °C	-	110	-	ns
Rise time	t <sub>r</sub>		-	60	-	
Turn-off delay time	t <sub>d(off)</sub>		-	500	-	
Fall time	t <sub>f</sub>		-	60	-	mJ
Turn-on switching loss	E <sub>on</sub>		-	31	-	
Turn-off switching loss	E <sub>off</sub>		-	27	-	
Input capacitance	C <sub>ies</sub>	V <sub>GE</sub> = 0 V, V <sub>CE</sub> = 25 V, f = 1.0 MHz	-	21	-	nF
Output capacitance	C <sub>oes</sub>		-	1.5	-	
Reverse transfer capacitance	C <sub>res</sub>		-	0.9	-	
SC data	I <sub>SC</sub>	t <sub>sc</sub> ≤ 10 μs, V <sub>GE</sub> = 15 V, T <sub>J</sub> = 125 °C, V <sub>CC</sub> = 900 V, V <sub>CEM</sub> ≤ 1200 V	-	1300	-	A
Stray inductance	L <sub>CE</sub>		-	-	20	nH
Module lead resistance, terminal to chip	R <sub>CC'+EE'</sub>	T <sub>C</sub> = 25 °C	-	0.18	-	mΩ

DIODE ELECTRICAL SPECIFICATIONS (T <sub>C</sub> = 25 °C unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Diode forward voltage	V <sub>F</sub>	I <sub>F</sub> = 300 A	T <sub>J</sub> = 25 °C	-	2.0	2.4	V
			T <sub>J</sub> = 125 °C	-	2.2	2.5	
Diode reverse recovery charge	Q <sub>rr</sub>	I <sub>F</sub> = 300 A, V <sub>R</sub> = 600 V, dI/dt = -2400 A/μs, V <sub>GE</sub> = -15 V	T <sub>J</sub> = 25 °C	-	27	-	μC
			T <sub>J</sub> = 125 °C	-	50	-	
Diode peak reverse recovery current	I <sub>rr</sub>		T <sub>J</sub> = 25 °C	-	120	-	A
			T <sub>J</sub> = 125 °C	-	170	-	
Diode reverse recovery energy	E <sub>rec</sub>		T <sub>J</sub> = 25 °C	-	9	-	mJ
			T <sub>J</sub> = 125 °C	-	20	-	

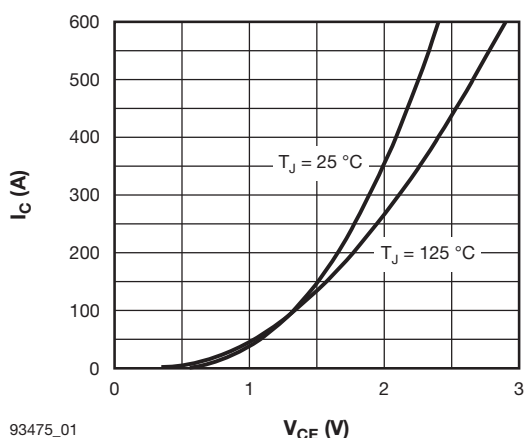


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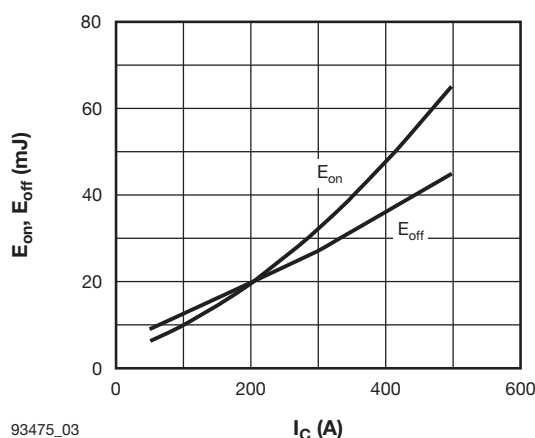
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THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating junction temperature range	T <sub>J</sub>		-40	-	150	°C
Storage temperature range	T <sub>Stg</sub>		-40	-	125	
Junction to case per module	IGBT Diode	R <sub>thJC</sub>	-	-	0.05	K/W
			-	-	0.12	
Case to sink	R <sub>thCS</sub>	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



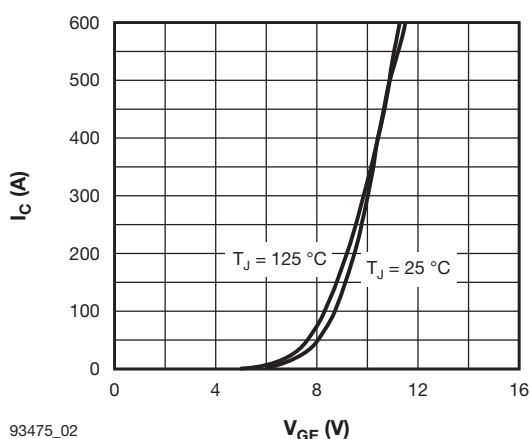
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Fig. 1 - Typical Output Characteristics  
 $V_{\text{GE}} = 15 \text{ V}$



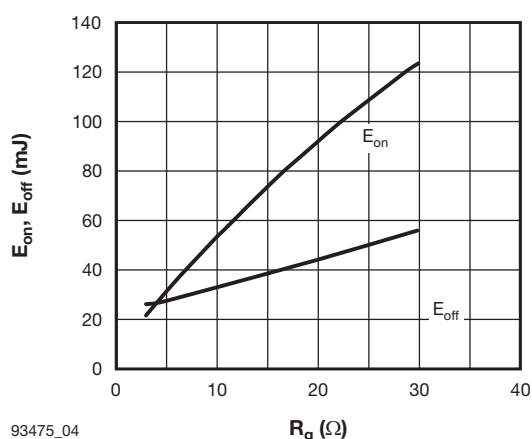
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Fig. 3 - Switching Loss vs. Collector Current  
 $V_{\text{CC}} = 600 \text{ V}$ ,  $R_g = 4.7 \Omega$ ,  $V_{\text{GE}} = \pm 15 \text{ V}$ ,  $T_J = 125 \text{ }^{\circ}\text{C}$



93475\_02

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



93475\_04

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



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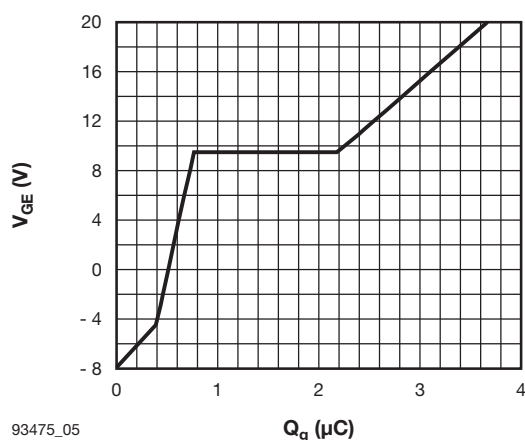


Fig. 5 - Gate Charge Characteristics  
 $V_{CC} = 600\text{ V}$ ,  $I_C = 300\text{ A}$ ,  $T_J = 25\text{ °C}$

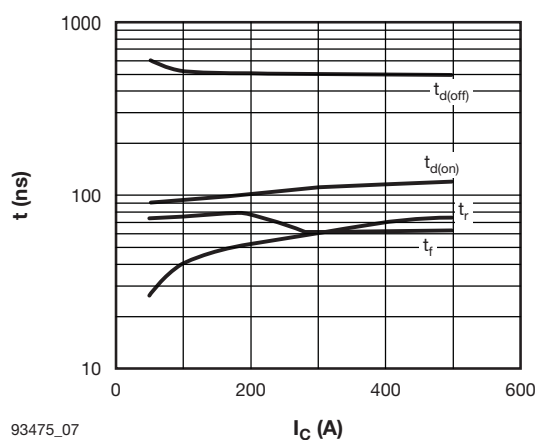


Fig. 7 - Typical Switching Times vs.  $I_C$   
 $V_{CC} = 600\text{ V}$ ,  $R_g = 4.7\text{ Ω}$ ,  $V_{GE} = \pm 15\text{ V}$ ,  $T_J = 125\text{ °C}$

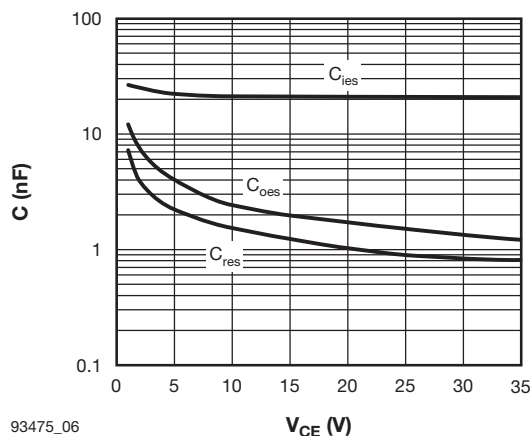


Fig. 6 - Typical Capacitance vs. Collector to Emitter Voltage

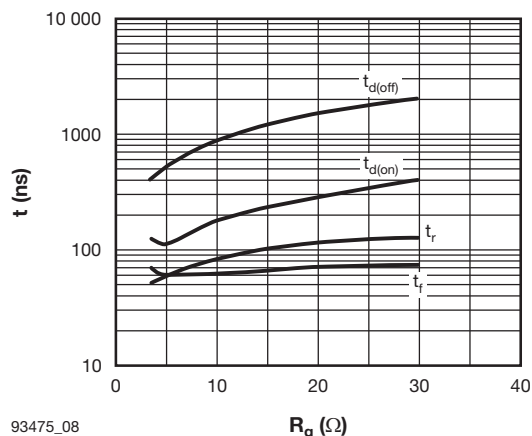


Fig. 8 - Typical Switching Times vs. Gate Resistance  
 $V_{CC} = 600\text{ V}$ ,  $I_C = 300\text{ A}$ ,  $V_{GE} = \pm 15\text{ V}$ ,  $T_J = 125\text{ °C}$

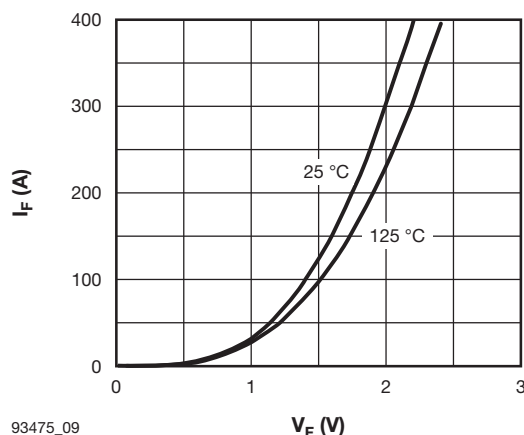


Fig. 9 - Typical Forward Characteristics (Diode)



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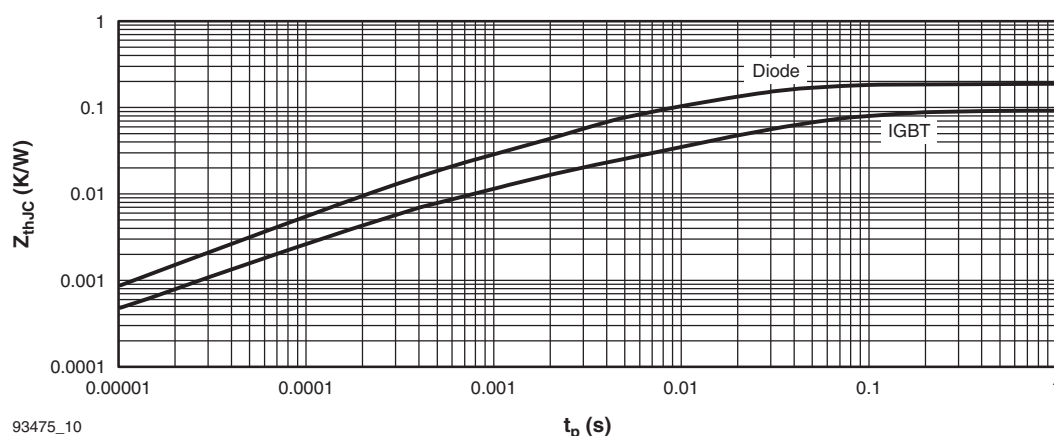
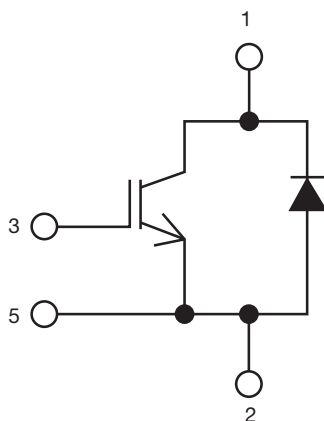


Fig. 10 - Transient Thermal Impedance

### CIRCUIT CONFIGURATION



#### LINKS TO RELATED DOCUMENTS

Dimensions

[www.vishay.com/doc?95526](http://www.vishay.com/doc?95526)



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