

PCGA200T65NF8M1

650 V, 200 A Field Stop Trench IGBT with Solderable Top Metal



ON Semiconductor®

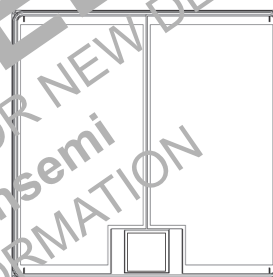
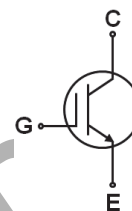
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Features

- AEC-Q101 Qualified
- Maximum Junction Temperature 175°C
- Positive Temperature Coefficient
- Easy Paralleling
- Short Circuit Rated
- Very Low Saturation Voltage: $V_{CE(SAT)} = 1.53 \text{ V(Typ.) @ } I_C = 200 \text{ A}$
- Optimized for Motor Control Applications
- Emitter Pad Covered with Solderable Metal Layer

Applications

- Automotive Traction Modules
- General Power Modules



ORDERING INFORMATION

Part Number	PCGA200T65NF8M1	
Packing	Water (sawn on foil)	
	mils	μm
Die Size	394 × 394	10,000 × 10,000
Emitter Attach Area	2 × (177 × 348)	2 × (4,493.5 × 8,832)
Gate / Sensor Pad Attach Area	55 × 55	1,408 × 1,406
Die Thickness	3	79
Top Metal	5 μm AlSiCu + 1.15 μm Ti/NiV/Ag (STM)	
Back Metal	0.95 μm NiV/Ag	
Topside Passivation	Silicon Nitride plus Polyimide	
Wafer Diameter	200 mm	
Max Possible Die Per Wafer	234	

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ABSOLUTE MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Ratings	Units
Collector-Emitter Voltage	V_{CES}	650	V
Gate-Emitter Voltage	V_{GES}	± 20	V
DC Collector Current, limited by T_J max	I_C	(Note 1)	A
Pulsed Collector Current, $V_{GE}=15\text{ V}$, t_p limited by T_J max (Note 2)	I_{CM}	600	A
Short Circuit Withstand Time, $V_{GE} = 15\text{ V}$, $V_{CE} \leq 400\text{ V}$, $T_J \leq 150^\circ\text{C}$	t_{sc}	5	μs
Operating Junction Temperature	T_J	-40 to $+175$	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	$+17$ to $+25$	$^\circ\text{C}$

1. Depends on the thermal properties of assembly
2. Not subject to production test – verified by design/characterization

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Units
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Static Characteristics (Tested on wafers)

Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE} = 0\text{ V}$, $I_C = 1\text{ mA}$	650	–	–	V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C = 100\text{ A}$, $V_{GE} = 15\text{ V}$	–	1.25	1.75	V
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 200\text{ mA}$	4.5	5.5	6.5	V
Collector Cut-Off Current	I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0\text{ V}$	–	–	40	μA
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}$, $V_{CE} = 0\text{ V}$	–	–	± 400	nA

Electrical Characteristics (Not subjected to production test – verified by design/characterization)

Collector to Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C = 200\text{ A}$, $V_{GE} = 15\text{ V}$	$T_J = 25^\circ\text{C}$	–	1.53	1.9	V
			$T_J = 175^\circ\text{C}$	–	2.04	–	V
Input Capacitance	C_{IES}	$V_{CE} = 30\text{ V}$, $V_{GE} = 0\text{ V}$ $f = 1\text{ MHz}$		–	9.6	–	nF
Output Capacitance	C_{OES}			–	445	–	pF
Reverse Transfer Capacitance	C_{RES}			–	78	–	pF
Internal Gate Resistance	R_G	$f = 1\text{ MHz}$		–	2.0	–	Ω
Total Gate Charge	$Q_{G(Total)}$	$V_{CE} = 400\text{ V}$, $I_C = 200\text{ A}$ $V_{GE} = 15\text{ V}$		–	229	–	nC
Gate-to-Emitter Charge	Q_{GE}			–	66	–	nC
Gate-to-Collector Charge	Q_{GC}			–	64	–	nC
Turn-On Delay Time	$t_{d(on)}$	$V_{CE} = 400\text{ V}$, $I_C = 200\text{ A}$ $R_G = 15\text{ }\Omega$ $V_{GE} = 15\text{ V}$ Inductive Load $T_J = 25^\circ\text{C}$		–	67	–	ns
Rise Time	t_r			–	233	–	ns
Turn-Off Delay Time	$t_{d(off)}$			–	118	–	ns
Fall Time	t_f			–	177	–	ns
Turn-On Delay Time	$t_{d(on)}$	$V_{CE} = 400\text{ V}$, $I_C = 200\text{ A}$ $R_G = 15\text{ }\Omega$ $V_{GE} = 15\text{ V}$ Inductive Load $T_J = 175^\circ\text{C}$		–	64	–	ns
Rise Time	t_r			–	236	–	ns
Turn-Off Delay Time	$t_{d(off)}$			–	124	–	ns
Fall Time	t_f			–	208	–	ns

3. For ordering, technique and other information on Onsemi automotive bare die products, please contact automotivebaredie@onsemi.com

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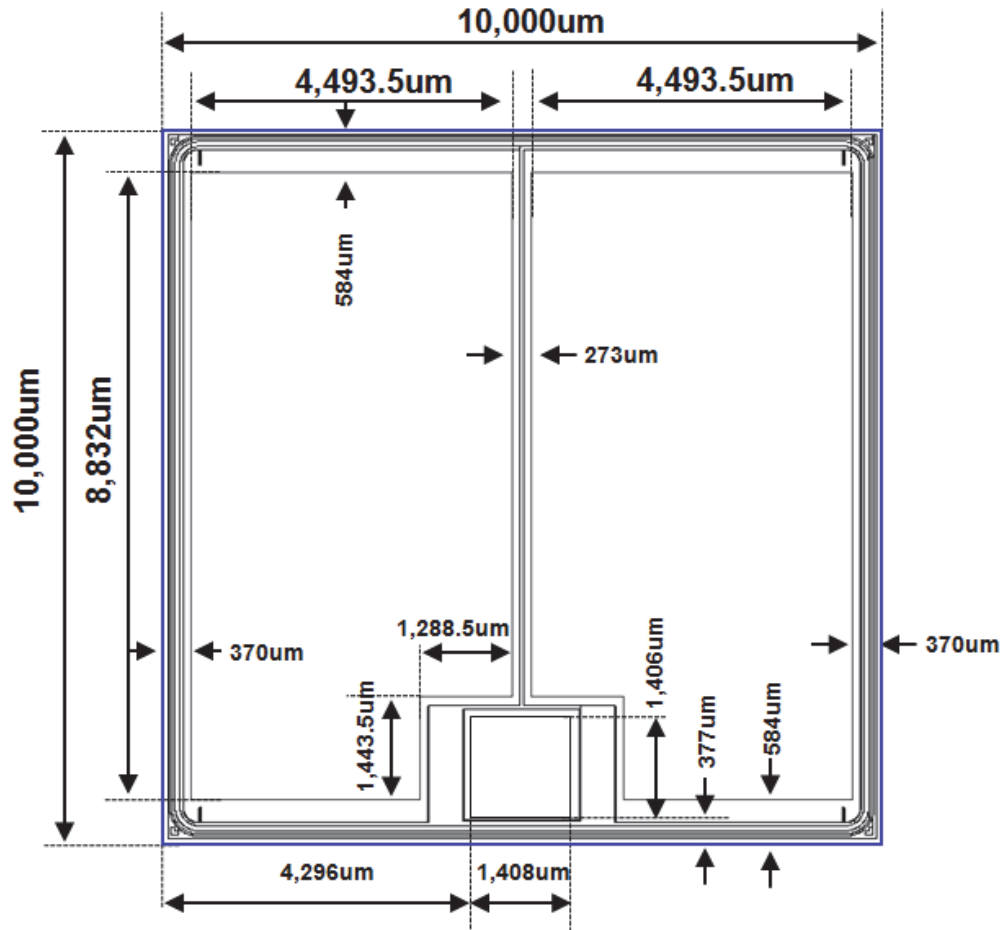


Figure 1. Dimensional Outline and Pad Layout

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