

PCGA200T65NF8M1

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



ON Semiconductor®

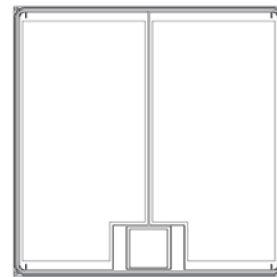
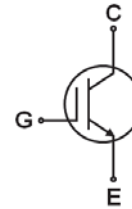
www.onsemi.com

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	

PCGA200T65NF8M1

ABSOLUTE MAXIMUM RATINGS (T_J = 25°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 V, t _p limited by T _J max (Note 2)	I _{CM}	600	A
Short Circuit Withstand Time, V _{GE} = 15 V, V _{CE} ≤ 400 V, T _J ≤ 150°C	t _{sc}	5	μs
Operating Junction Temperature	T _J	–40 to +175	°C
Storage Temperature Range	T _{stg}	+17 to +25	°C

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

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Units
-----------	--------	----------------	------	------	------	-------

Static Characteristics (Tested on wafers)

Collector–Emitter Breakdown Voltage	BV _{CES}	V _{GE} = 0 V, I _C = 1 mA	650	–	–	V
Collector–Emitter Saturation Voltage	V _{CE(SAT)}	I _C = 100 A, V _{GE} = 15 V	–	1.25	1.75	V
Gate–Emitter Threshold Voltage	V _{GE(th)}	V _{GE} = V _{CE} , I _C = 200 mA	4.5	5.5	6.5	V
Collector Cut–Off Current	I _{CES}	V _{CE} = V _{CES} , V _{GE} = 0 V	–	–	40	μA
Gate Leakage Current	I _{GES}	V _{GE} = V _{GES} , V _{CE} = 0 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 A, V _{GE} = 15 V	T _J = 25°C	–	1.53	1.9	V
			T _J = 175°C	–	2.04	–	V
Input Capacitance	C _{IES}	V _{CE} = 30 V, V _{GE} = 0 V f = 1 MHz	–	9.6	–	nF	
Output Capacitance	C _{OES}		–	445	–	pF	
Reverse Transfer Capacitance	C _{RES}		–	78	–	pF	
Internal Gate Resistance	R _G	f = 1 MHz	–	2.0	–	Ω	
Total Gate Charge	Q _{G(Total)}	V _{CE} = 400 V, I _C = 200 A V _{GE} = 15 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 V, I _C = 200 A R _G = 15 Ω V _{GE} = 15 V Inductive Load T _J = 25°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 V, I _C = 200 A R _G = 15 Ω V _{GE} = 15 V Inductive Load T _J = 175°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

PCGA200T65NF8M1

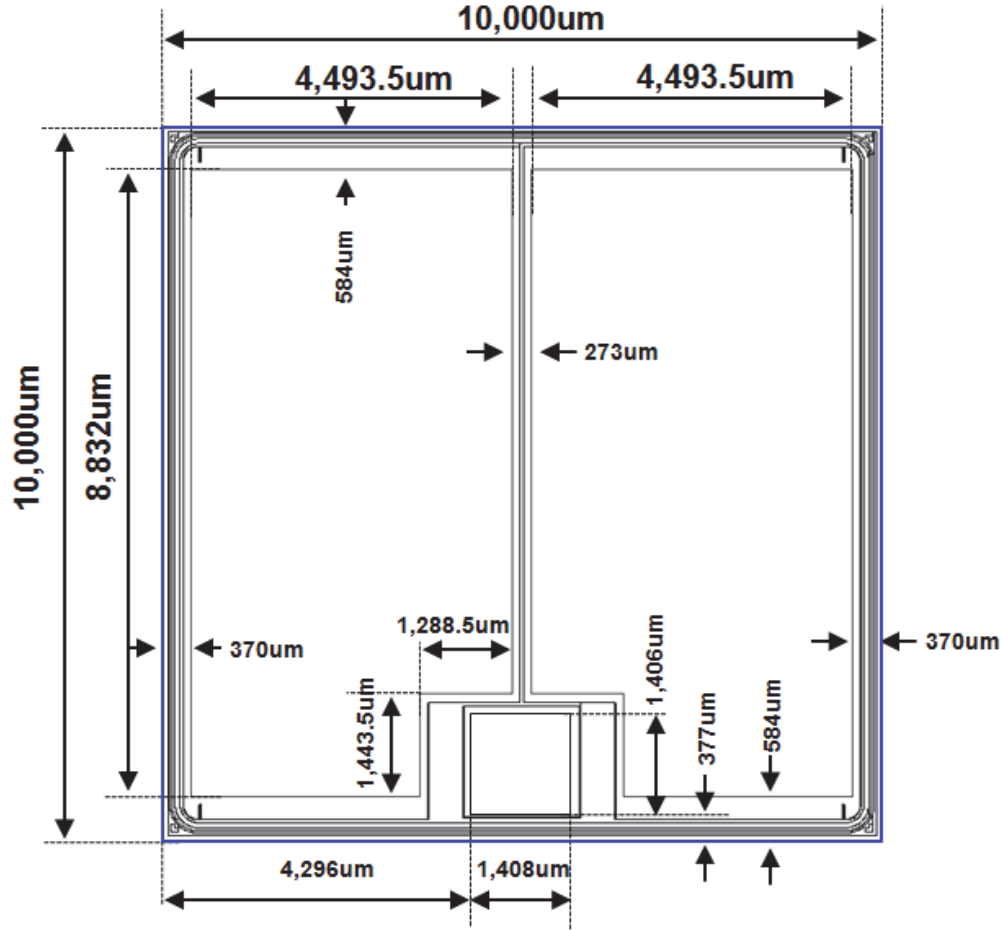



Figure 1. Dimensional Outline and Pad Layout

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
 19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
 USA/Canada
Europe, Middle East and Africa Technical Support:
 Phone: 421 33 790 2910
Japan Customer Focus Center
 Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative