

# PCFG40T65SQF

## IGBT Die

Using novel field stop IGBT technology, ON Semiconductor's new series of field stop 4<sup>th</sup> generation IGBTs offer the optimum performance for solar inverter and UPS applications where low conduction and switching losses are essential.

### Features

- Maximum Junction Temperature:  $T_J = 175^\circ\text{C}$
- Positive Temperature Co-efficient for Easy Parallel Operating
- High Current Capability
- Low Saturation Voltage:  $V_{CE(sat)} = 1.6\text{ V (Typ.) @ } I_C = 40\text{ A}$
- High Input Impedance
- Fast Switching
- Tighten Parameter Distribution

### Typical Applications

- Solar Inverters
- UPS Systems

### MECHANICAL DATA

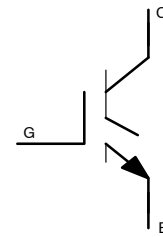
Parameter	Mils	$\mu\text{m}$
Die Size	140.94 × 140.94	3580 × 3580
Gate Pad Size	113.4 × 113.14	2880 × 2874
Emitter Pad Size	15.63 × 19.19	397 × 487.6
Die Thickness	2.48	63
Scribe Width	80 $\mu\text{m}$	
Top Metal	5 $\mu\text{m}$ AlSiCu	
Back Metal	1.05 $\mu\text{m}$ Al/NiV/Ag	
Topside Passivation	Silicon Nitride	
Wafer Diameter	200 mm	
Max Possible Die Per Wafer	1986	
Recommended Storage Environment	In original container, in dry nitrogen, < 3 months at ambient temperature of 23°C	



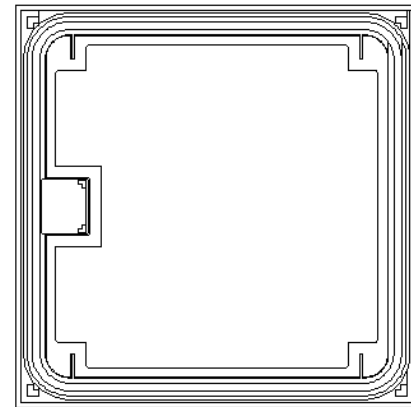
**ON Semiconductor®**

[www.onsemi.com](http://www.onsemi.com)

$V_{RCE} = 650\text{ V}$   
 $I_C = \text{Limited by } T_{J(max)}$



IGBT Die



DIE Outline

### ORDERING INFORMATION

Device	Inking?	Shipping Method
PCFG40T65SQF	No	Sawn Wafer on Tape

# PCFG40T65SQF

## MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Collector to Emitter Voltage, $T_J = 25^\circ\text{C}$	$V_{CES}$	650	V
Gate to Emitter Voltage	$V_{GES}$	$\pm 20$	V
Collector Current @ $T_C = 25^\circ\text{C}$	$I_C$	(Note 1)	A
Pulsed Collector Current	$I_{CM}$	160	A
Operating Junction Temperature	$T_J$	-40 to +175	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-17 to +25	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Depending 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 specified)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
-----------	-----------------	--------	-----	-----	-----	------

### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$	$BV_{CES}$	650			V
Temperature Coefficient of Breakdown Voltage	$I_C = 1\text{ mA}$ , reference to $25^\circ\text{C}$	$\Delta BV_{CES}/\Delta T_J$		0.6		$\text{V}/^\circ\text{C}$
Collector–Emitter Cutoff Current	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$	$I_{DSS}$			250	$\mu\text{A}$
Gate Leakage Current	$V_{CE} = 0\text{ V}, V_{GE} = V_{GES}$	$I_{GSS}$			$\pm 400$	nA

### ON CHARACTERISTICS

G–E Threshold Voltage	$V_{GE} = V_{CE}, I_C = 40\text{ mA}$	$V_{GE(th)}$	2.6	4.5	6.4	V
Collector–Emitter Saturation Voltage	$I_C = 40\text{ A}, V_{GE} = 15\text{ V}$	$V_{CE(sat)}$		1.6	2.1	V
	$I_C = 40\text{ A}, V_{GE} = 15\text{ V}, T_C = 175^\circ\text{C}$			1.92		V

### DYNAMIC CHARACTERISTICS

Input Capacitance	$V_{GE} = 0\text{ V}, V_{CE} = 30\text{ V}, f = 1\text{ MHz}$	$C_{ies}$		2620		pF
Output Capacitance		$C_{oes}$		60		
Reverse Transfer Capacitance		$C_{res}$		9		

### GATE CHARGE CHARACTERISTICS

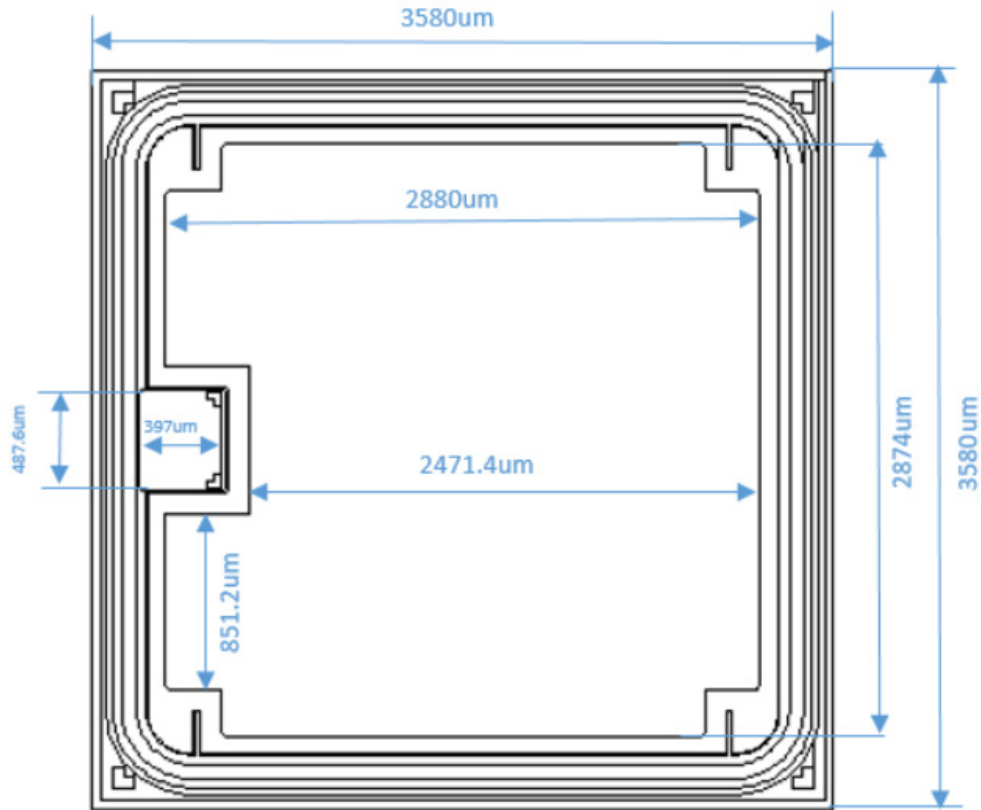
Total Gate Charge	$V_{CE} = 400\text{ V}, I_C = 40\text{ A}, V_{GE} = 15\text{ V}$	$Q_g$		80		nC
Gate to Emitter Charge		$Q_{ge}$		15		
Gate to Collector Charge		$Q_{gc}$		20		

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

\*Switching characteristics and thermal properties depend strongly on module design and mounting technology.


For ordering, technique and other information on ON Semiconductor automotive bare die products, please contact [automotivebaredie@onsemi.com](mailto:automotivebaredie@onsemi.com).

# PCFG40T65SQF



(all dimensions in  $\mu\text{m}$ )

**Figure 1. Die 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](http://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](mailto: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

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local  
Sales Representative