

IGBT Die

PCFG50T65SQF

Using novel field stop IGBT technology, onsemi's new series of field stop 4th 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: $V_{CE(sat)} = 1.6\text{ V (Typ.) @ } I_C = 50\text{ A}$
- High Input Impedance
- Fast Switching
- Tighten Parameter Distribution

Typical Applications

- Solar Inverters
- UPS Systems

MECHANICAL DATA

Parameter	Mils	μm
Die Size	153.94×153.94	3910×3910
Gate Pad Size	118.9×108.58	3020×2758
Emitter Pad Size	14.05×17.68	357×449.2
Die Thickness	2.48	63
Scribe Width	80 μm	
Top Metal	5 μm AlSiCu	
Back Metal	1.05 μm Al/NiV/Ag	
Topside Passivation	Silicon Nitride	
Wafer Diameter	200 mm	
Max Possible Die Per Wafer	1743	
Recommended Storage Environment	In original container, in dry nitrogen, < 3 months at ambient temperature of 23°C	

MAXIMUM RATINGS

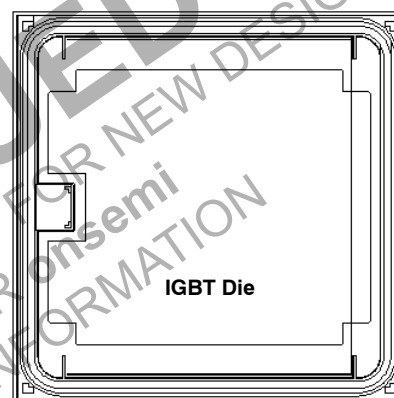
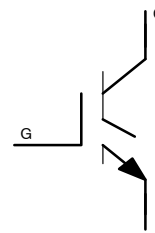
Parameter	Symbol	Value	Unit
Collector to Emitter Voltage, $T_J = 25^{\circ}\text{C}$	V_{CES}	650	V
Gate to Emitter Voltage	V_{GES}	± 20	V
Collector Current @ $T_C = 25^{\circ}\text{C}$	I_C	(Note 1)	A
Pulsed Collector Current	I_{CM}	200	A
Operating Junction Temperature	T_J	-40 to +175	$^{\circ}\text{C}$
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.

$$V_{RCE} = 650\text{ V}$$

$$I_C = \text{Limited by } T_{j(\text{max})}$$



DIE Outline

ORDERING INFORMATION

Device	Inking?	Shipping Method
PCFG50T65SQF	No	Sawn Wafer on Tape

PCFG50T65SQF

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

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage	V _{GE} = 0 V, I _C = 1 mA	BV _{CES}	650			V
Temperature Coefficient of Breakdown Voltage	I _C = 1 mA, reference to 25°C	ΔBV _{CES} /ΔT _J		0.6		V/°C
Collector-Emitter Cutoff Current	V _{GE} = 0 V, V _{CE} = V _{CES}	I _{DSS}			250	μA
Gate Leakage Current	V _{CE} = 0 V, V _{GE} = V _{GES}	I _{GSS}			±400	nA

ON CHARACTERISTICS

G-E Threshold Voltage	V _{GE} = V _{CE} , I _C = 50 mA	V _{GE(th)}	2.6	4.5	6.4	V
Collector-Emitter Saturation Voltage	I _C = 50 A, V _{GE} = 15 V	V _{CE(sat)}		1.6	2.1	V
	I _C = 50 A, V _{GE} = 15 V, T _C = 175°C			1.92		V

DYNAMIC CHARACTERISTICS

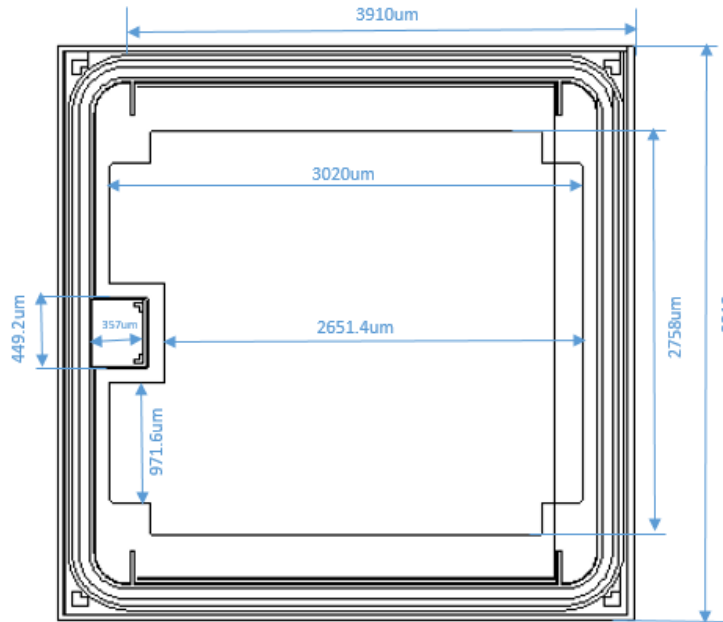
Input Capacitance	V _{GE} = 0 V, V _{CE} = 30 V, f = 1 MHz	C _{ies}		3275		pF
Output Capacitance		C _{oes}		84		
Reverse Transfer Capacitance		C _{res}		12		

GATE CHARGE CHARACTERISTICS

Total Gate Charge	V _{CE} = 400 V, I _C = 50 A, V _{GE} = 15 V	Q _g		99		nC
Gate to Emitter Charge		Q _{ge}		17		
Gate to Collector Charge		Q _{gc}		23		

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.

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



(all dimensions in μm)

Figure 1. Die Layout

Further Electrical Characteristic

Switching characteristics and thermal properties are depending strongly on module design and mounting technology and can therefore not be specified for a bare die.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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 **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** 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 **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales