

# IGBT Die

## PCFG50T65SQF

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

### Typical Applications

- Solar Inverters
- UPS Systems

### MECHANICAL DATA

Parameter	Mils	$\mu\text{m}$
Die Size	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 $\mu\text{m}$	
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	1743	
Recommended Storage Environment	In original container, in dry nitrogen, < 3 months at ambient temperature of 23°C	

### MAXIMUM RATINGS

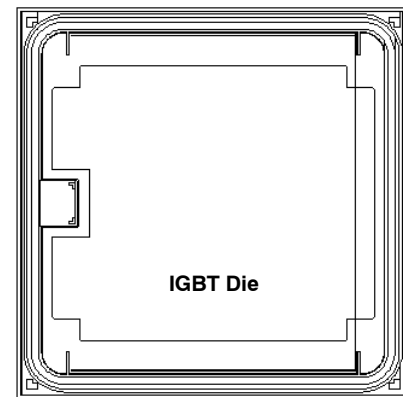
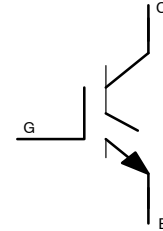
Parameter	Symbol	Value	Unit
Collector to Emitter Voltage, $T_J = 25^\circ\text{C}$	$V_{CES}$	650	V
Gate to Emitter Voltage	$V_{GES}$	±20	V
Collector Current @ $T_C = 25^\circ\text{C}$	$I_C$	(Note 1)	A
Pulsed Collector Current	$I_{CM}$	200	A
Operating Junction Temperature	$T_J$	-40 to +175	°C
Storage Temperature Range	$T_{STG}$	-17 to +25	°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<sub>J</sub> = 25°C unless otherwise specified)

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

## ON CHARACTERISTICS

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

## DYNAMIC CHARACTERISTICS

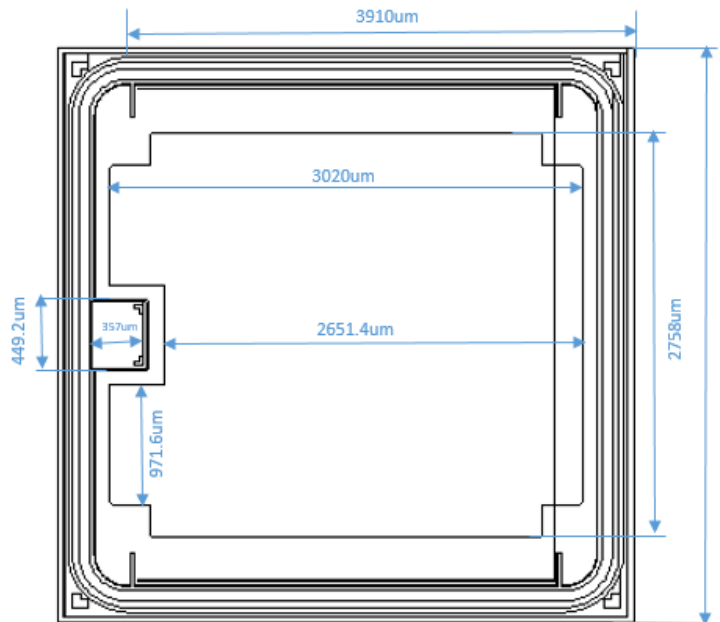
Input Capacitance	V <sub>GE</sub> = 0 V, V <sub>CE</sub> = 30 V, f = 1 MHz	C <sub>ies</sub>		3275		pF
Output Capacitance		C <sub>oes</sub>		84		
Reverse Transfer Capacitance		C <sub>res</sub>		12		

## GATE CHARGE CHARACTERISTICS

Total Gate Charge	V <sub>CE</sub> = 400 V, I <sub>C</sub> = 50 A, V <sub>GE</sub> = 15 V	Q <sub>g</sub>		99		nC
Gate to Emitter Charge		Q <sub>ge</sub>		17		
Gate to Collector Charge		Q <sub>gc</sub>		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](mailto: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.

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