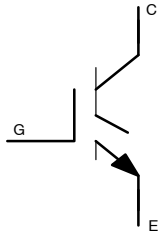
# IGBT Die

# PCFG50T65SQF

$V_{RCE}$ = 650 V
$I_C$ = Limited by $T_{j(max)}$

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.

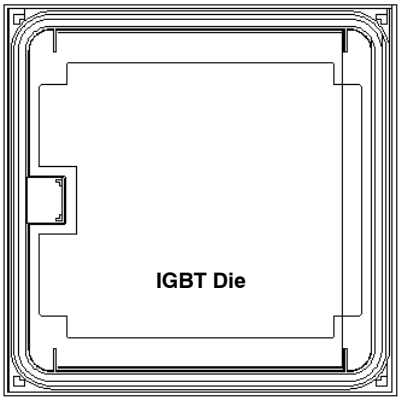



### Features

- Maximum Junction Temperature: $T_J$ = 175°C
- Positive Temperature Co−efficient for Easy Parallel Operating
- High Current Capability
- Low Saturation Voltage: $V_{CE(sat)}$ = 1.6 V (Typ.) @ $I_C$ = 50 A
- High Input Impedance
- Fast Switching
- Tighten Parameter Distribution

### Typical Applications

- Solar Inverters
- UPS Systems




**DIE Outline**

### MECHANICAL DATA

| Parameter | Mils | μm |
|---|---|---|
| Die Size | 153.94 × 153.94 | 3910 x 3910 |
| Gate Pad Size | 118.9 × 108.58 | 3020 x 2758 |
| Emitter Pad Size | 14.05 × 17.68 | 357 x 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 | |

### ORDERING INFORMATION

| Device | Inking? | Shipping Method |
|---|---|---|
| PCFG50T65SQF | No | Sawn Wafer on Tape |

### MAXIMUM RATINGS

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector to Emitter Voltage, $T_J$ = 25°C | $V_{CES}$ | 650 | V |
| Gate to Emitter Voltage | $V_{GES}$ | ±20 | V |
| Collector Current @$T_C$ = 25°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.

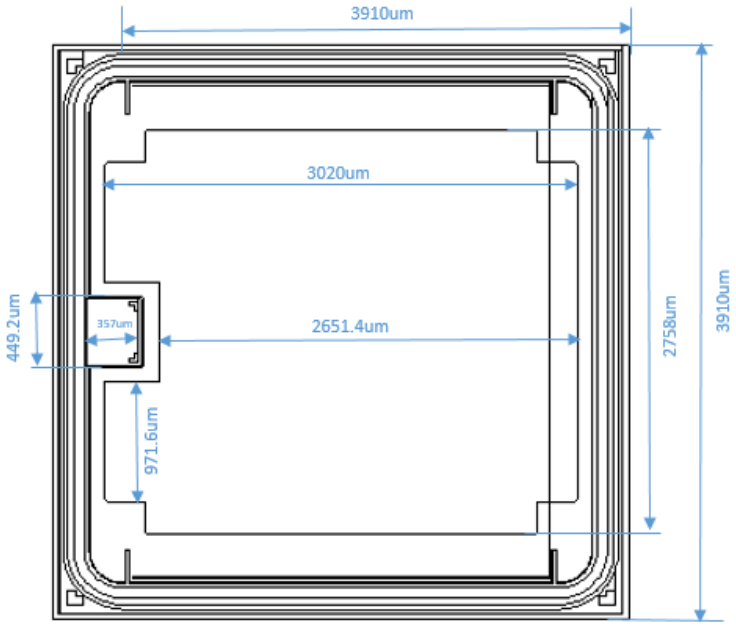
1. Depending on the thermal properties of assembly.
2. Not subject to production test − verified by design/characterization.

**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 | $\Delta BV_{CES}/\Delta T_J$ | | 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 | | Coes | | 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.

## 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