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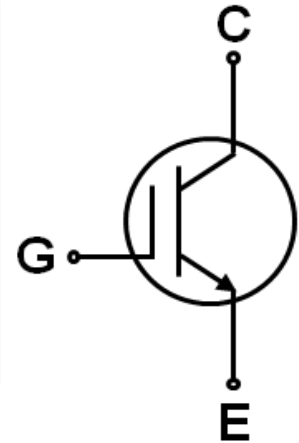
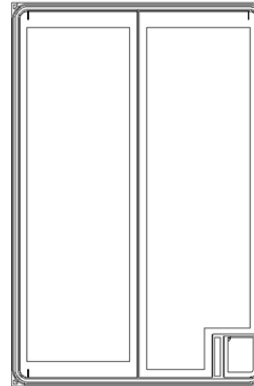


# PCGA160T65NF8

## 650 V, 160 A Field Stop Trench IGBT

### Features

- AEC-Q101 Qualified
- Max Junction Temperature 175°C
- Positive Temperature Co-efficient
- Ease of Paralleling
- Short Circuit Rated
- Very Low Saturation Voltage:  $V_{CE(SAT)} = 1.6V$  (Typ.) @  $I_C = 160A$
- Optimized for Motor Control Applications



### Applications

- Automotive Traction Modules
- General Power Modules

### Ordering Information

|                             |                                |                       |
|-----------------------------|--------------------------------|-----------------------|
| P/N                         | PCGA160T65NF8                  |                       |
| Packing                     | Wafer (Sawn-On-Foil)           |                       |
|                             | mils                           | μm                    |
| Die Size                    | 276 X 394                      | 7,000 X 10,000        |
| Emitter Attach Area         | 110 x 340                      | 2,803 x 8,641 (Left)  |
|                             | 111 x 349                      | 2,813 x 8,862 (Right) |
| Gate pad Attach Area        | 28 x 35                        | 700 x 900             |
| Die thickness               | 3                              | 78                    |
| Top Metal                   | Al (0.5% Cu, 0.8% Si)          |                       |
| Back Metal                  | Al/VNi/Ag                      |                       |
| Topside Passivation         | Silicon Nitride Plus Polyimide |                       |
| Wafer diameter              | 200mm                          |                       |
| Max. Possible Die Per Wafer | 327                            |                       |

PCGA160T65NF8 650V, 160A Field Stop Trench IGBT

**Absolute Maximum Ratings** ( $T_{VJ} = 25^{\circ}\text{C}$  unless otherwise noted)

| Symbol    | Parameter  | Ratings     | Units              |
|-----------|--|-------------|--------------------|
| $V_{CES}$ | Collector to Emitter Voltage   | 650         | V                  |
| $V_{GES}$ | Gate-to-Emitter Voltage  | $\pm 20$    | V                  |
| $I_C$     | Collector Current, limited by $T_{VJ}$ max   | (Note 1)    | A                  |
| $I_{CM}$  | Pulsed Collector Current, $V_{GE} = 15\text{V}$ , limited by $T_{VJ}$ max  | 480         | A                  |
| $S_{CWT}$ | Short Circuit Withstand Time, $V_{GE} = 15\text{V}$ , $V_{CE} \leq 400\text{V}$ , $T_{VJ} \leq 150^{\circ}\text{C}$ (Note 1) | 6           | $\mu\text{s}$      |
| $T_{VJ}$  | Junction Temperature Range   | -40 to +175 | $^{\circ}\text{C}$ |
|           | Operating Junction Temperature   | -40 to +150 | $^{\circ}\text{C}$ |
| $T_{stg}$ | Storage Temperature Range  | +17 to +25  | $^{\circ}\text{C}$ |

**Notes:**

1: Depends on the thermal properties of assembly

**Electrical Characteristics of the IGBT** ( $T_{VJ} = 25^{\circ}\text{C}$  unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|--------|-----------|-----------------|------|------|------|-------|
|--------|-----------|-----------------|------|------|------|-------|

**Static Characteristics** (Tested on wafers)

|               |   |   |     |      |           |               |
|---------------|---|---|-----|------|-----------|---------------|
| $B_{V_{CES}}$ | Collector to Emitter Breakdown Voltage  | $V_{GE} = 0\text{V}$ , $I_C = 1\text{mA}$   | 650 | -    | -         | V             |
| $I_{CES}$     | Collector Cut-Off Current               | $V_{CE} = V_{CES}$ , $V_{GE} = 0\text{V}$   | -   | -    | 40        | $\mu\text{A}$ |
| $I_{GES}$     | G-E Leakage Current                     | $V_{GE} = V_{GES}$ , $V_{CE} = 0\text{V}$   | -   | -    | $\pm 400$ | nA            |
| $V_{GE(th)}$  | G-E Threshold Voltage                   | $V_{GE} = V_{CE}$ , $I_C = 160\text{mA}$    | 4.3 | 5.3  | 6.3       | V             |
| $V_{CE(SAT)}$ | Collector to Emitter Saturation Voltage | $I_C = 100\text{A}$ , $V_{GE} = 15\text{V}$ | -   | 1.42 | 1.85      | V             |

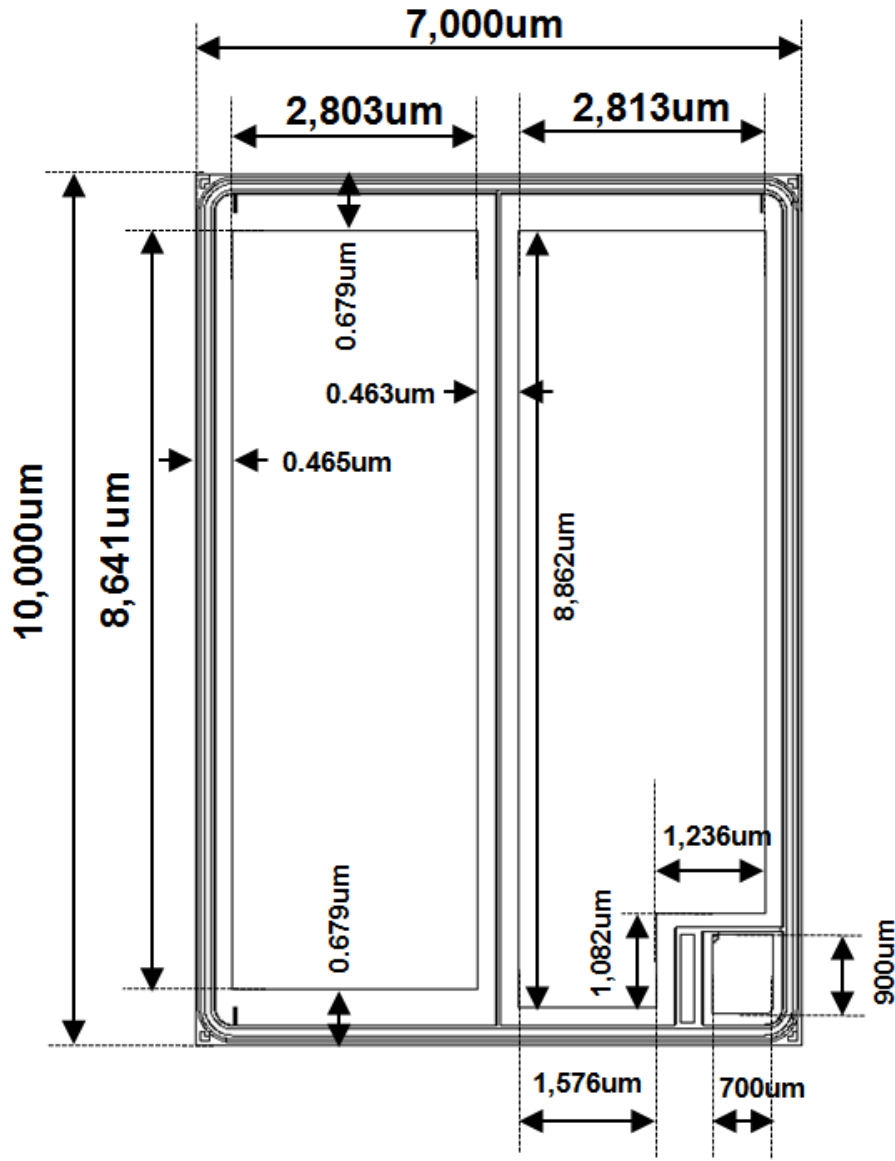
**Electrical Characteristics** (Not subject to production test, verified by design /characterization)

|               |   |  |                                |      |      |      |          |
|---------------|---|--|--------------------------------|------|------|------|----------|
| $V_{CE(SAT)}$ | Collector to Emitter Saturation Voltage | $I_C = 160\text{A}$ ,<br>$V_{GE} = 15\text{V}$   | $T_{VJ} = 25^{\circ}\text{C}$  | -    | 1.6  | 2.05 | V        |
|               |   |  | $T_{VJ} = 175^{\circ}\text{C}$ | -    | 2.15 | -    | V        |
| $C_{IES}$     | Input Capacitance                       | $V_{CE} = 30\text{V}$ , $V_{GE} = 0\text{V}$ ,<br>$f = 1\text{MHz}$  | -                              | 6710 | -    | pF   |          |
| $C_{OES}$     | Output Capacitance                      |  | -                              | 450  | -    | pF   |          |
| $C_{RES}$     | Reverse Transfer Capacitance            |  | -                              | 55   | -    | pF   |          |
| $R_G$         | Internal Gate Resistance                |  | $f = 1\text{MHz}$              | -    | 3.0  | -    | $\Omega$ |
| $Q_{G(ToT)}$  | Total Gate Charge                       | $V_{CE} = 400\text{V}$ , $I_C = 160\text{A}$ ,<br>$V_{GE} = 15\text{V}$  | -                              | 167  | -    | nC   |          |
| $Q_{GE}$      | Gate-to-Emitter Charge                  |  | -                              | 51.3 | -    | nC   |          |
| $Q_{GC}$      | Gate-to-Collector Charge                |  | -                              | 47.9 | -    | nC   |          |
| $t_{d(on)}$   | Turn-On Delay Time                      | $V_{CE} = 400\text{V}$ , $I_C = 160\text{A}$ ,<br>$R_{GEN} = 5\Omega$ ,<br>$V_{GE} = 15\text{V}$ ,<br>Inductive Load<br>$T_{VJ} = 25^{\circ}\text{C}$  | -                              | 53   | -    | ns   |          |
| $t_r$         | Rise Time                               |  | -                              | 197  | -    | ns   |          |
| $t_{d(off)}$  | Turn-Off Delay Time                     |  | -                              | 98   | -    | ns   |          |
| $t_f$         | Fall Time                               |  | -                              | 141  | -    | ns   |          |
| $t_{d(on)}$   | Turn-On Delay Time                      | $V_{CE} = 400\text{V}$ , $I_C = 160\text{A}$ ,<br>$R_{GEN} = 5\Omega$ ,<br>$V_{GE} = 15\text{V}$ ,<br>Inductive Load<br>$T_{VJ} = 175^{\circ}\text{C}$ | -                              | 52   | -    | ns   |          |
| $t_r$         | Rise Time                               |  | -                              | 236  | -    | ns   |          |
| $t_{d(off)}$  | Turn-Off Delay Time                     |  | -                              | 104  | -    | ns   |          |
| $t_f$         | Fall Time                               |  | -                              | 204  | -    | ns   |          |

For ordering, technique and other information on Fairchild automotive bare die products, please contact [automotivedie@fairchildsemi.com](mailto:automotivedie@fairchildsemi.com)








**Physical Dimensions** Dimensionis in micrometer unless otherwise noted





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