

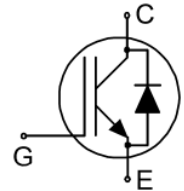
IGBT chip with monolithically integrated diode in packages offering space saving advantage

Features:

TRENCHSTOP™ Reverse Conducting (RC) technology for 600V applications offering:

- Optimised V_{CEsat} and V_F for low conduction losses
- Smooth switching performance leading to low EMI levels
- Very tight parameter distribution
- Operating range of 1 to 20kHz
- Maximum junction temperature 175°C
- Short circuit capability of 5 μ s
- Best in class current versus package size performance
- Qualified according to JEDEC for target applications
- Complete product spectrum and PSpice Models:

<http://www.infineon.com/igbt/>



Applications:

Motor drives

Used for:

Discrete components and molded modules

| Chip Type | V_{CE} | I_{Cn} | Die Size | Package |
|------------|----------|----------|-----------------------------|--------------|
| IGC05R60DE | 600V | 6A | 2.21 x 2.19 mm ² | sawn on foil |

Mechanical Parameters

| | | | |
|--|--|--|-----------------|
| Raster size | 2.21 x 2.19 | | mm ² |
| Emitter pad size | see chip drawing | | |
| Gate pad size | see chip drawing | | |
| Area: total / active IGBT / active Diode | 4.84 / 2.219 / 0.477 | | |
| Thickness | 70 | | μ m |
| Wafer size | 200 | | mm |
| Max.possible chips per wafer | 5775 | | |
| Passivation frontside | Photoimide | | |
| Pad metal | 3200 nm AlSiCu | | |
| Backside metal | Ni Ag –system | | |
| Die bond | Electrically conductive epoxy glue and soft solder (temperature budget: 290°C for 1min. or 260°C for 1.5min.) | | |
| Wire bond | Al, <250 μ m | | |
| Reject ink dot size | \varnothing 0.65mm ; max 1.2mm | | |
| Storage environment | for original and sealed MBB bags | Ambient atmosphere air, Temperature 17°C – 25°C, < 6 month | |
| | for open MBB bags | Acc. to IEC62258-3: Atmosphere >99% Nitrogen or inert gas, Humidity <25%RH, Temperature 17°C – 25°C, < 6 month | |

Maximum Ratings

| Parameter | Symbol | Value | Unit |
|--|--|--------------|---------|
| Collector-Emitter voltage, $T_{vj} = 25\text{ °C}$ | V_{CE} | 600 | V |
| DC collector current, limited by $T_{vj, max}$ | I_C | 1) | A |
| Pulsed collector current, t_p limited by $T_{vj, max}$ | $I_{C, puls}$ | 18 | A |
| Gate emitter voltage | V_{GE} | ± 20 | V |
| Junction temperature range | $T_{vj, max}$ | -40 ... +175 | °C |
| Operating junction temperature | $T_{vj, op, max}$ | -40 ... +175 | °C |
| Short circuit data ²⁾³⁾ $V_{GE} = 15V, V_{CC} = 400V, T_{vj} = 150\text{ °C}$ | t_{SC} | 5 | μs |
| Safe operating area IGBT ²⁾³⁾ | $I_{C, max} = 12A, V_{CE, max} = 600V, T_{vj, op} \leq T_{vj, op, max}$ | | |
| Safe operating area Diode ²⁾ | $I_{F, max} = 12A, V_{R, max} = 600V,$ $P_{max} = 4.8\text{ kW}, T_{vj, op} \leq T_{vj, op, max}$ | | |

1) depending on thermal properties of assembly

2) not subject to production test - verified by design/characterization

3) allowed number of short circuits: <1000; time between short circuits: >1s

Static Characteristics (tested on wafer), $T_{vj} = 25\text{ °C}$

| Parameter | Symbol | Conditions | Value | | | Unit |
|--------------------------------------|---------------|-------------------------------------|-------|------|------|----------|
| | | | min. | typ. | max. | |
| Collector-Emitter breakdown voltage | $V_{(BR)CES}$ | $V_{GE}=0V, I_C=0.2\text{ mA}$ | 600 | | | V |
| Collector-Emitter saturation voltage | V_{CEsat} | $V_{GE}=15V, I_C=6A$ | | 1.65 | 2.1 | |
| Diode Forward Voltage | V_F | $V_{GE}=0V, I_F=6A$ | | 1.7 | 2.1 | |
| Gate-Emitter threshold voltage | $V_{GE(th)}$ | $I_C=0.11\text{ mA}, V_{GE}=V_{CE}$ | 4.3 | 5 | 5.7 | |
| Zero gate voltage collector current | I_{CES} | $V_{CE}=600V, V_{GE}=0V$ | | | 40 | μA |
| Gate-Emitter leakage current | I_{GES} | $V_{CE}=0V, V_{GE}=20V$ | | | 100 | nA |
| Integrated gate resistor | r_G | | | none | | Ω |

Electrical Characteristics (not subject to production test - verified by design / characterization)

| Parameter | Symbol | Conditions | Value | | | Unit |
|--------------------------------------|-------------|---|-------|------|------|------|
| | | | min. | typ. | max. | |
| Collector-Emitter saturation voltage | V_{CEsat} | $V_{GE}=15V, I_C=6A$ | | 1.85 | | V |
| Input capacitance | C_{ies} | $V_{CE}=25V,$ $V_{GE}=0V, f=1\text{ MHz}$ $T_{vj}=25\text{ °C}$ | | 470 | | pF |
| Output capacitance | C_{oes} | | | 24 | | |
| Reverse transfer capacitance | C_{res} | | | 14 | | |



Further Electrical Characteristic

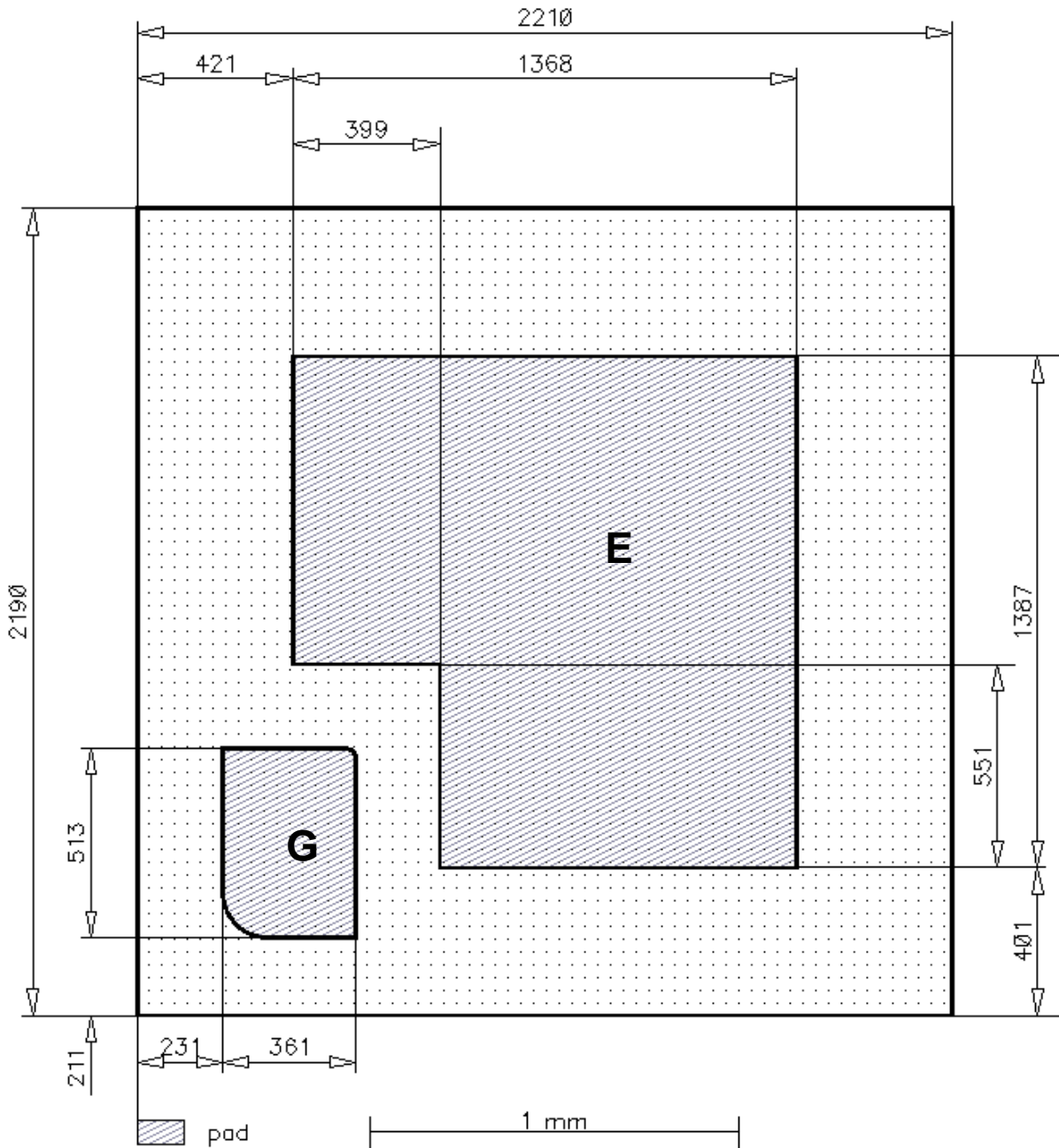
Switching characteristics and thermal properties are depending strongly on package design and mounting technology and can therefore not be specified for a bare die.

Further technical information about the performance of this chip in package PG-TO252-3 is given exemplarily at www.infineon.com/igbt. The chip qualification is independent of the qualification which is performed for the Discretets.

| | | |
|--|-----------|----------|
| This chip data sheet refers to the device data sheet | IKD06N60R | Rev. 2.2 |
|--|-----------|----------|

Chip Drawing

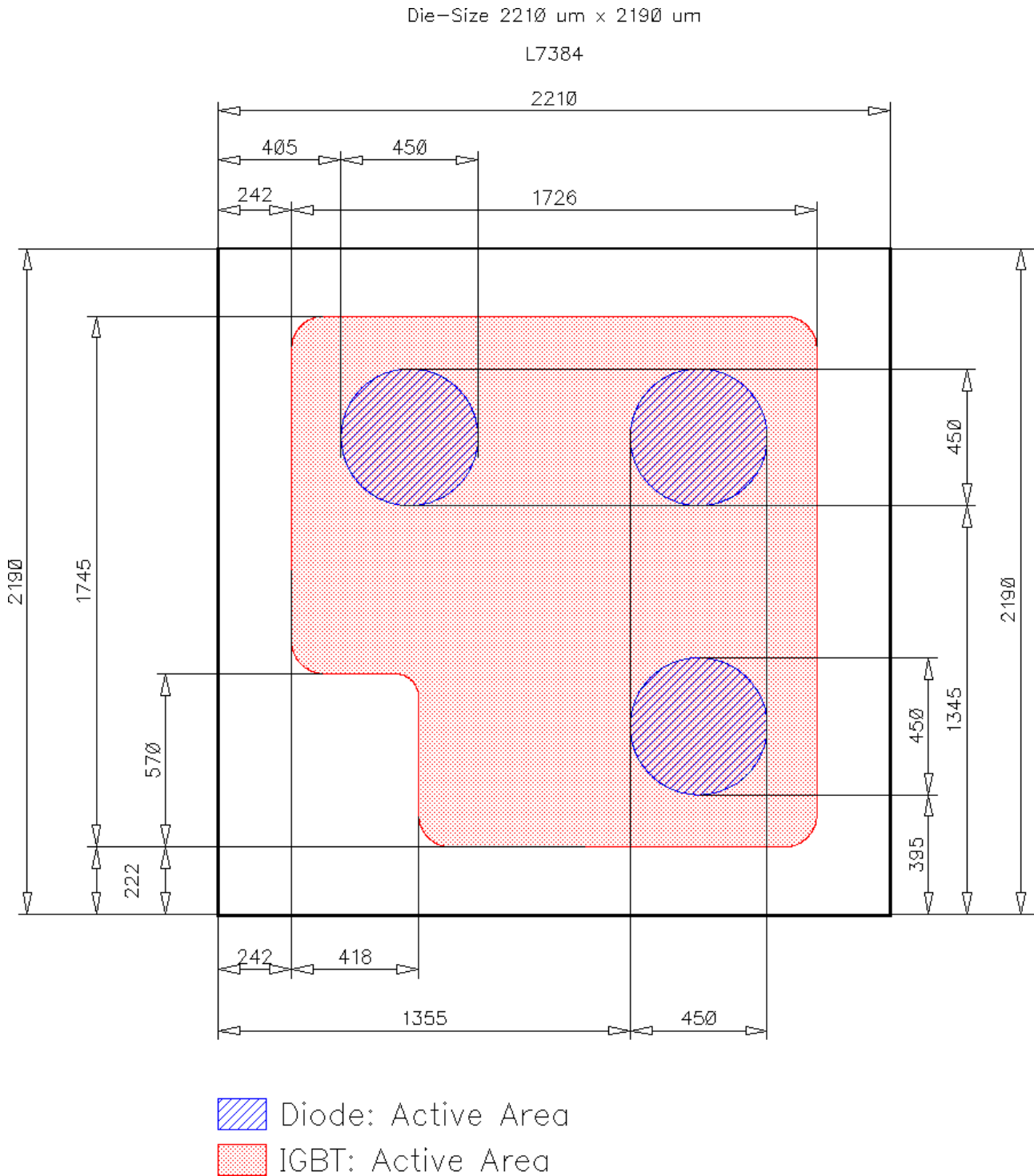
Die-Size 2210 μm x 2190 μm



E = Emitter

G = Gate

Chip Drawing active areas



**Description**

AQL 0,65 for visual inspection according to failure catalogue

Electrostatic Discharge Sensitive Device according to MIL-STD 883

Revision History

| Version | Subjects (major changes since last revision) | Date |
|---------|--|------|
| | | |
| | | |

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