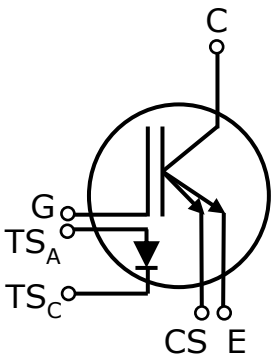
# EDT2 IGBT for Automotive Applications

## IGBT

## Quality Requirement Category: Automotive

### Features

- 750V trench + field stop technology
- Low $V_{CE(sat)}$
- Low switching losses
- Short tail current
- Positive temperature coefficient
- Integrated gate resistor
- Easy paralleling
- Integrated current mirror (current sensor)
- Integrated temperature sensor
- Solderable / sinterable front side pads




### Applications

- Drives

### Description

- Recommended for power modules

### Product Validation

- Technology qualified for automotive applications. Ready for validation for automotive applications according to AEC Q100/101 or AQG324.

### Key Performance Parameters

| Chip Type | $V_{CE}$ | $I_{Cn}$ | Die Size | Package |
|---|---|---|---|---|
| IGC80T75E12RD2CKA | 750V | 150A | 80.1mm$^2$ | Sawn on foil |

## Table of Contents

# 1 Parameters and Characteristics

## Table 1 Mechanical Parameters

| | | | |
|---|---|---|---|
| Raster size | | 8.900 x 9.000 | $mm^2$ |
| Area total | | 80.1 | $mm^2$ |
| Emitter pad size | | See chip drawing | |
| Gate pad size | | See chip drawing | |
| Silicon thickness | | 70 | µm |
| Wafer size | | 300 | mm |
| Maximum possible chips per wafer | | 769 | |
| Passivation frontside | | Photoimide | |
| Pad metal | | NiP/Pd/Au | |
| Backside metal | | NiP/Pd/Au | |
| Die bond | | Soft solder or sinter | |
| Wire bond | | Al, ≤500µm | |
| Reject ink dot size | | Inkless | |
| Storage environment (<6 months) | For original and sealed MBB bags[1] | Ambient atmosphere air, temperature 17°C – 25°C | |

## Table 2 Maximum Ratings[2]

| Parameter | Symbol | Conditions | Value | Unit |
|---|---|---|---|---|
| Collector-emitter voltage | $V_{CES}$ | 25°C ≤ $T_{vj}$ ≤ 175°C | 750 | V |
| | | $T_{vj}$ = -40°C[3] | 700 | |
| DC collector current, limited by $T_{vj\,max}$ | $I_C$ | | -[4] | A |
| Pulsed collector current, $t_p$ limited by $T_{vj\,max}$ | $I_{C,pulse}$ | | 450 | A |
| Gate-emitter voltage | $V_{GE}$ | | ±20 | V |
| Operating junction temperature | $T_{vj,op}$ | | -40 ... +175 | °C |
| Short circuit withstand time [5/6] | $t_{sc}$ | $V_{GE}$ ≤ 15V, $V_{CC}$ ≤ 450V, $T_{vj}$ ≤ 175°C | 3 | µs |
| Reverse bias safe operating area | *RBSOA* | $I_{C,max}$ = 300A, $V_{CE,max}$ = $V_{CES}$, -40°C ≤ $T_{vj,op}$ ≤ 175°C | | |

[1] https://www.infineon.com/dgdl/Storage_of_Products_Supplied_by_Infineon_Technologie.pdf?fileId=5546d461641369bf01643b95d8500011

[2] Not subject to production test - verified by design/characterization.

[3] $V_{CES}$ increases linearly between -40°C and 25°C.

[4] Depending on thermal properties of assembly.

[5] Allowed number of short circuits: <1000; time between short circuits: >1s.

[6] Depending on electrical design of assembly.

### Table 3 Static Characteristics (Tested on Wafer), $T_{vj}$=25°C

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| Collector-emitter saturation voltage | $V_{CEsat}$ | $V_{GE}$= 15V, $I_C$= 45A | - | 1.0 | 1.15 | V |
| Gate-emitter threshold voltage | $V_{GE(th)}$ | $I_C$= 2.2mA, $V_{GE}$= $V_{CE}$ | 5.0 | 5.8 | 6.5 | V |
| Zero gate voltage collector current | $I_{CES}$ | $V_{CE}$= 750V, $V_{GE}$= 0V | - | - | 100 | µA |
| Gate-emitter leakage current | $I_{GES}$ | $V_{CE}$= 0V, $V_{GE}$= 20V | - | - | 600 | nA |
| Integrated gate resistor | $r_G$ | | - | 2 | - | Ω |
| Temperature sensor | $V_{fTS}$ | $I_{TS}$= 1mA, $T_{vj}$= 25°C | 2.53 | 2.58 | 2.63 | V |

### Table 4 Electrical Characteristics[1]

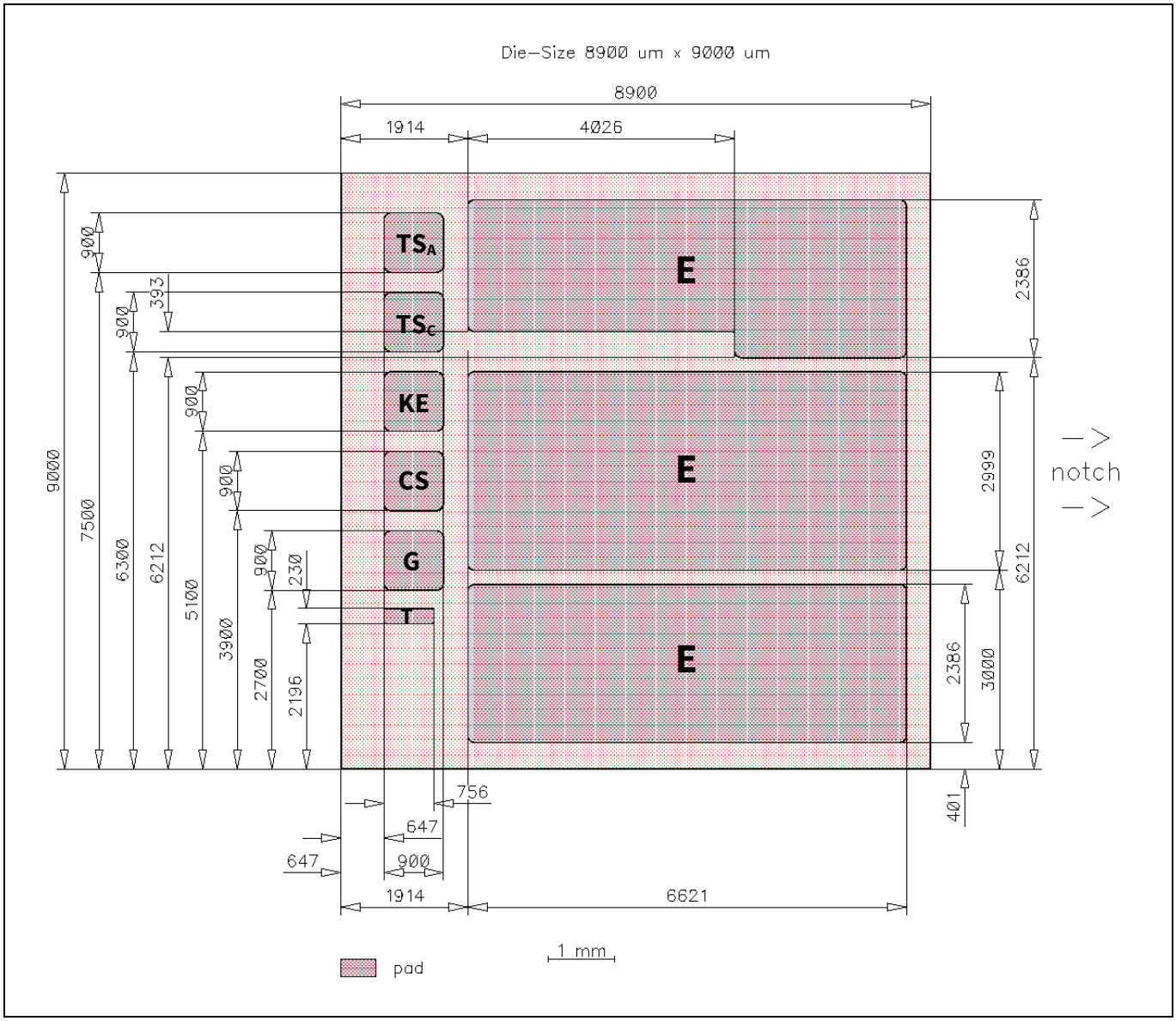
| Parameter | Symbol | Conditions | | Value | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | min. | typ. | max. | |
| Collector-emitter saturation voltage | $V_{CEsat}$ | $V_{GE}$= 15V, $I_C$= 150A | $T_{vj}$= 25°C | - | 1.25 | 1.45 | V |
| | | | $T_{vj}$= 175°C | - | 1.4 | - | |
| Input capacitance | $C_{ies}$ | $V_{CE}$= 25V, $V_{GE}$= 0V, $f$= 100kHz $T_{vj}$= 25°C | | - | 18000 | - | pF |
| Output capacitance | $C_{oes}$ | | | - | 320 | - | |
| Reverse transfer capacitance | $C_{res}$ | | | - | 82 | - | |
| Gate charge | $Q_G$ | $V_{CE}$= 450V, $I_C$ = 150A $V_{GE}$= -8V...+15V | | - | 870 | - | nC |
| Current sensor Area ratio of active cells to sense cells | $A_{Load}/A_{CS}$ | Defined by design | | - | 610 | - | |
| Temperature sensor Temperature coefficient | $c_{TS}$ | | | - | -5 | - | mV/K |

## 2 Further Electrical Characteristics

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

[1] Not subject to production test - verified by design/characterization.

# 3 Chip Drawing




**Key**

- E = Emitter
- G = Gate
- $TS_A$ = Temperature sense (Anode)
- $TS_C$ = Temperature sense (Cathode)
- KE = Kelvin emitter
- CS = Current sense
- T = Test pad, do not contact

# 4 Bare Die Product Specifics

Note: Test coverage at wafer level for IGBTs cannot cover the full range of customer application conditions. Therefore it is the responsibility of the customer to test all performance characteristics, which are relevant for their specific application, at the package level, including RBSOA and SCSOA.

**Description**

- AQL 0.1 for visual inspection according to failure catalogue
- Electrostatic Discharge Sensitive Device according to MIL-STD 883

## Revision History

| Document version | Date of release | Description of changes |
|---|---|---|
| V1.00 | 2020-06-15 | Initial Datasheet |
| V1.01 | 2021-08-05 | Condition $I_C$ of $V_{GE(th)}$ parameter is corrected according to the condition at wafer level test.<br>Condition of chip capacitances is changed from $f$ = 1MHz to 100kHz.<br>The $C_{res}$ value is modified with measurement result at $f$ = 100kHz. |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**Trademarks**
All referenced product or service names and trademarks are the property of their respective owners.

**Edition 2021-08-05**

**Published by**

**Infineon Technologies AG**

**81726 München, Germany**



**Do you have a question about this document?**

**Email:** erratum@infineon.com

**Document reference**

**IMPORTANT NOTICE**

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (**www.infineon.com**).

**WARNINGS**

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.