

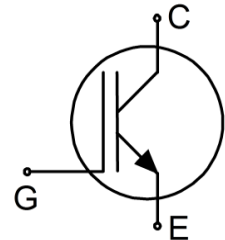
# EDT2 IGBT for Automotive Applications

## 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



#### 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 AQC324.

#### Key Performance Parameters

Chip Type	$V_{CE}$	$I_{Cn}$	Die Size	Package
IGC104T75E12RA	750V	225A	103.8 mm <sup>2</sup>	Sawn on foil

**Table of Contents**

**Features .....1**

**Applications.....1**

**Description .....1**

**Product Validation.....1**

**Key Performance Parameters .....1**

**Table of Contents .....2**

**1      Parameters and Characteristics.....3**

**2      Further Electrical Characteristics .....5**

**3      Chip Drawing.....5**

**4      Bare Die Product Specifics .....6**

**Revision History .....6**

## 1 Parameters and Characteristics

**Table 1 Mechanical Parameters**

Raster size	9.972 x 10.414	mm <sup>2</sup>
Area total	103.8	mm <sup>2</sup>
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	585	
Passivation frontside	Photoimide	
Pad metal	AlCu	
Backside metal	Ni Ag system	
Die bond <sup>1</sup>	Soft solder Sinter	
Frontside interconnect <sup>1</sup>	Wire bond: Al, ≤500μm	
Reject ink dot size	Inkless	
Storage environment (<6 months)	For original and sealed MBB bags <sup>2</sup>	Ambient atmosphere air, temperature 17°C – 25°C

<sup>1</sup> Depending on customer specific assembly process

<sup>2</sup> [https://www.infineon.com/dgdl/Storage\\_of\\_Products\\_Supplied\\_by\\_Infineon\\_Technologie.pdf?fileId=5546d461641369bf01643b95d8500011](https://www.infineon.com/dgdl/Storage_of_Products_Supplied_by_Infineon_Technologie.pdf?fileId=5546d461641369bf01643b95d8500011)

**Table 2 Maximum Ratings<sup>1</sup>**

Parameter	Symbol	Conditions	Value	Unit
Collector-emitter voltage	$V_{CES}$	$25^{\circ}\text{C} \leq T_{vj} \leq 175^{\circ}\text{C}$	750	V
		$T_{vj} = -40^{\circ}\text{C}^2$	700	
DC collector current, limited by $T_{vj\ max}$	$I_C$		<sup>3</sup>	A
Pulsed collector current, $t_p$ limited by $T_{vj\ max}$	$I_{C,pulse}$		675	A
Gate-emitter voltage	$V_{GE}$		$\pm 20$	V
Operating junction temperature	$T_{vj,op}$		-40 ... +175	$^{\circ}\text{C}$
Short circuit withstand time <sup>4/5</sup>	$t_{sc}$	$V_{GE} \leq 15\text{V}$ , $V_{CC} \leq 450\text{V}$ , $T_{vj} \leq 175^{\circ}\text{C}$	3	$\mu\text{s}$
Reverse bias safe operating area	$RBSOA$	$I_{C,max} = 450\text{A}$ , $V_{CE,max} = V_{CES}$ , $-40^{\circ}\text{C} \leq T_{vj,op} \leq 175^{\circ}\text{C}$		

**Table 3 Static Characteristics (Tested on Wafer),  $T_{vj}=25^{\circ}\text{C}$**

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Collector-emitter saturation voltage	$V_{CESat}$	$V_{GE} = 15\text{V}$ , $I_C = 67\text{A}$	-	1.0	1.15	V
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C = 3.2\text{mA}$ , $V_{GE} = V_{CE}$	5.0	5.8	6.5	V
Zero gate voltage collector current	$I_{CES}$	$V_{CE} = 750\text{V}$ , $V_{GE} = 0\text{V}$	-	-	100	$\mu\text{A}$
Gate-emitter leakage current	$I_{GES}$	$V_{CE} = 0\text{V}$ , $V_{GE} = 20\text{V}$	-	-	600	nA
Integrated gate resistor	$r_G$		-	2	-	$\Omega$

**Table 4 Electrical Characteristics<sup>1</sup>**

Parameter	Symbol	Conditions		Value			Unit
				min.	typ.	max.	
Collector-emitter saturation voltage	$V_{CESat}$	$V_{GE} = 15\text{V}$ , $I_C = 225\text{A}$	$T_{vj} = 25^{\circ}\text{C}$	-	1.25	1.45	V
			$T_{vj} = 175^{\circ}\text{C}$	-	1.4	-	
Input capacitance	$C_{ies}$	$V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 100\text{kHz}$ $T_{vj} = 25^{\circ}\text{C}$			26700		pF
Output capacitance	$C_{oes}$				430		
Reverse transfer capacitance	$C_{res}$				123		
Gate charge	$Q_G$	$V_{CE} = 450\text{V}$ , $I_C = 225\text{A}$ $V_{GE} = -8\text{V} \dots +15\text{V}$		-	1500	-	nC

<sup>1</sup> Not subject to production test - verified by design/characterization.

<sup>2</sup>  $V_{CES}$  increases linearly between  $-40^{\circ}\text{C}$  and  $25^{\circ}\text{C}$ .

<sup>3</sup> Depending on thermal properties of assembly.

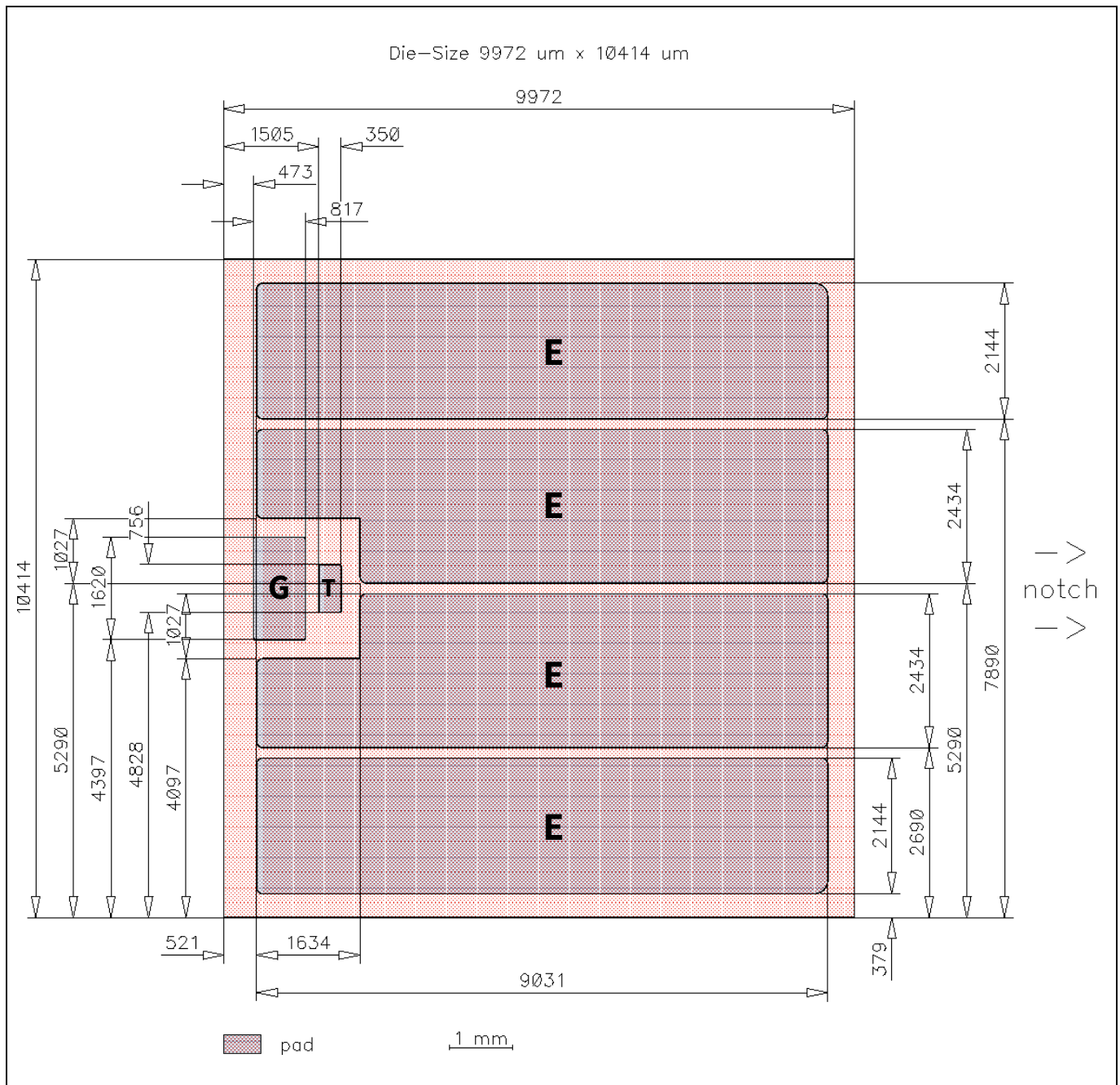
<sup>4</sup> Allowed number of short circuits: <1000; time between short circuits: >1s.

<sup>5</sup> Depending on electrical design of assembly.

## 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.

## 3 Chip Drawing



### Key

- E = Emitter
- G = Gate
- 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	2020-08-10	Initial Final Datasheet
V1.01	2021-08-05	Condition of chip capacitances is changed from $f = 1\text{MHz}$ to $100\text{kHz}$ . The $C_{res}$ value is modified with measurement result at $f = 100\text{kHz}$ .

#### 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**

**© 2022 Infineon Technologies AG.  
All Rights Reserved.**

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

**Email: [erratum@infineon.com](mailto: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](http://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.