

### Features

- $V_{CES} = 650\text{ V}$
- $I_{Cn} = 75\text{ A}$
- 650 V trench & field stop technology
- High switching speed
- Low  $V_{CEsat}$
- Low EMI
- Low turn-off losses
- Positive temperature coefficient

### Potential applications

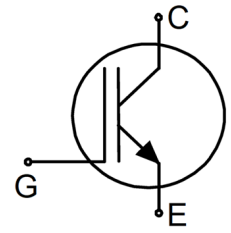
- Uninterruptible power supplies
- Welding converters
- Converters with high switching frequency

### Product validation

- Technology qualified for industrial applications. Ready for validation in industrial applications according to the relevant tests of IEC 60747 and 60749 or alternatively JEDEC47/20/22

### Description

- Recommended for discrete components and modules



Type	Die size	Delivery form
IGC39T65QE	6.59 mm x 5.91 mm	Sawn on foil

## Table of contents

	<b>Description</b> .....	1
	<b>Features</b> .....	1
	<b>Potential applications</b> .....	1
	<b>Product validation</b> .....	1
	<b>Table of contents</b> .....	2
<b>1</b>	<b>Mechanical parameters</b> .....	3
<b>2</b>	<b>Characteristics</b> .....	4
<b>3</b>	<b>Chip drawing</b> .....	5
<b>4</b>	<b>Bare die product specifics</b> .....	6
	<b>Revision history</b> .....	7
	<b>Disclaimer</b> .....	8

## 1 Mechanical parameters

**Table 1** Mechanical parameters

Parameter	Values
Die size	6.59 mm x 5.91 mm
Area total	38.95 mm <sup>2</sup>
Emitter pad size	See chip drawing
Gate pad size	See chip drawing
Silicon thickness	70 μm
Wafer size	200 mm
Maximum possible chips per wafer	686
Passivation frontside	Photoimide
Pad metal	3.2 μm AlSiCu
Backside metal	Ni Ag - system
Die attach	Electrically conductive epoxy glue and soft solder
Frontside interconnect	Wire bond: Al ≤ 500 μm
Reject ink dot size (valid for inked delivery form only)	Ø 0.65 mm; max. 1.2 mm
Storage environment (<12 months) for original and sealed MBB bags	Ambient atmosphere air, temperature 17°C – 25°C
Storage environment (<12 months) for open MBB bags	Acc. to IEC62258-3: Atmosphere >99% Nitrogen or inert gas, Humidity <25%RH, Temperature 17°C – 25°C

## 2 Characteristics

**Table 2** Maximum ratings

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter voltage	$V_{CES}$		$T_{vj} = 25\text{ °C}$	650			V
DC collector current, limited by $T_{vjmax}$	$I_C$			-1)			A
Pulsed collector current, $t_p$ limited by $T_{vjmax}$ 2)	$I_{Cpulse}$			225			A
Gate-emitter voltage	$V_{GE}$			±20			V
Operating junction temperature	$T_{vjop}$			-40...175			°C
Short-circuit withstand time 2) 3)	$t_{SC}$	$V_{CC} = 400\text{ V}, V_{GE} = 15\text{ V}$	$T_{vj} = 150\text{ °C}$	5			µs

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

**Table 3** Static characteristics (tested on wafer),  $T_{vj} = 25\text{ °C}$

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter breakdown voltage	$V_{BRCES}$	$I_C = 2\text{ mA}, V_{GE} = 0\text{ V}$		650			V
Collector-emitter saturation voltage	$V_{CESat}$	$V_{GE} = 15\text{ V}, I_C = 75\text{ A}$		1.38	1.85	2.22	V
Gate-emitter threshold voltage	$V_{GEth}$	$I_C = 1.2\text{ mA}, V_{GE} = V_{CE}$		4.2	5.1	5.6	V
Zero gate-voltage collector current	$I_{CES}$	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}$				3.8	µA
Gate-emitter leakage current	$I_{GES}$	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}$				150	nA
Internal gate resistance	$R_{G,int}$				none		Ω

**Table 4** Electrical characteristics

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CESat}$	$V_{GE} = 15\text{ V}, I_C = 75\text{ A}$	$T_{vj} = 175\text{ °C}$		2.3		V
Input capacitance	$C_{ies}$	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1000\text{ kHz}, T_{vj} = 25\text{ °C}$			4620		pF
Reverse transfer capacitance	$C_{res}$	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1000\text{ kHz}, T_{vj} = 25\text{ °C}$			137		pF

Note: In general, from reliability and lifetime point of view, the lower the operating junction temperature and/or the applied voltage, the greater the expected lifetime of any semiconductor device.

For "Maximum ratings" and "Electrical characteristics": Not subject to production test, specified by design.

### 3 Chip drawing

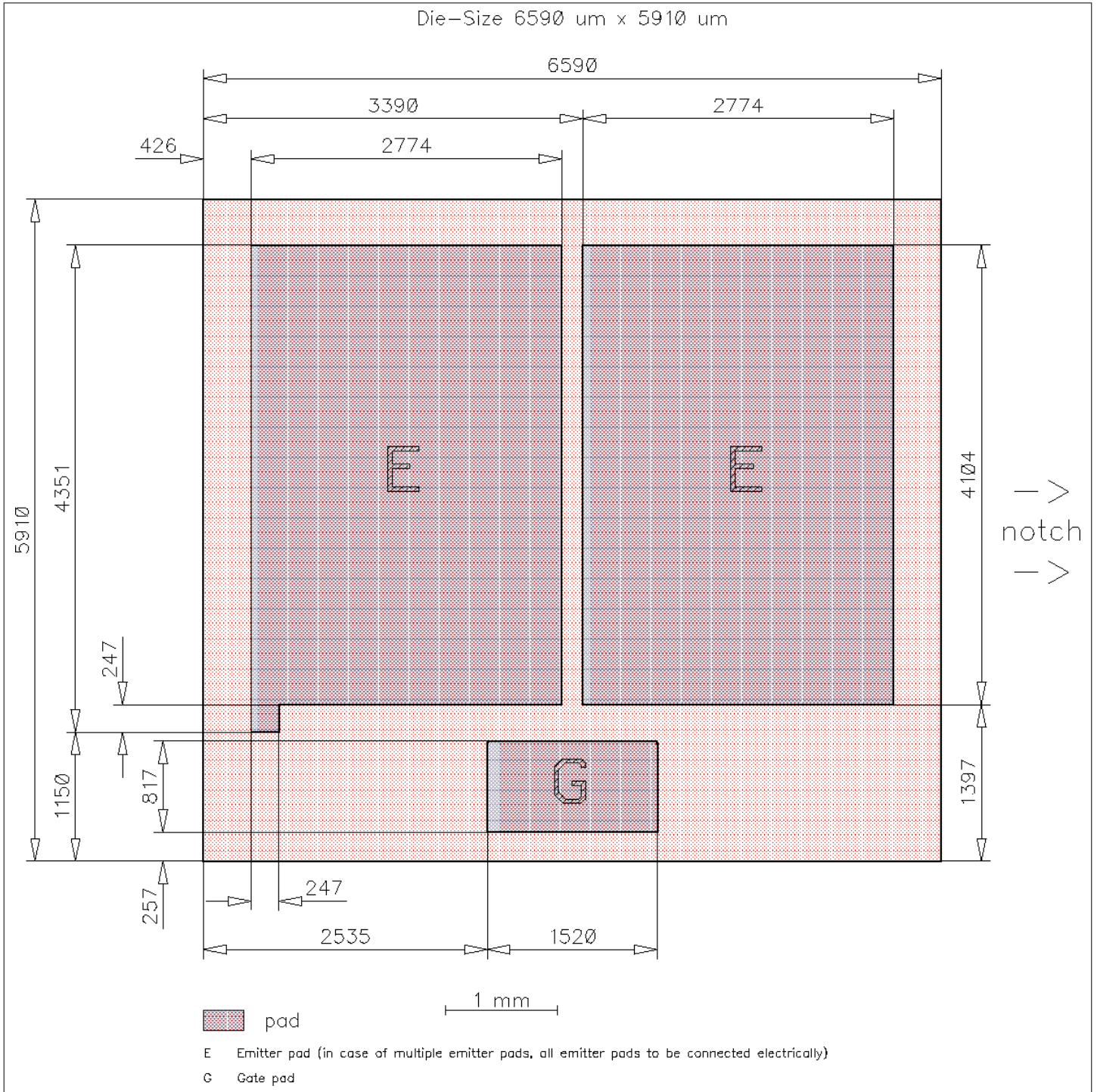


Figure 1

#### **4 Bare die product specifics**

- Switching characteristics and thermal properties are dependent on module design and mounting technology and can therefore not be specified for a bare die.
- AQL 0.65 for visual inspection according to failure catalogue.
- Electrostatic discharge sensitive device according to MIL-STD 883.
- Example application: -

## Revision history

Document revision	Date of release	Description of changes
1.00	2023-04-28	Final datasheet ***Legacy Revisions*** V1.0 2012-08-01

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