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IGBT

TRENCHSTOP™ IGBT3 Chip  
SIGC158T120R3E

Data Sheet

Industrial Power Control



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## TRENCHSTOP™ IGBT3 Chip

### Features:

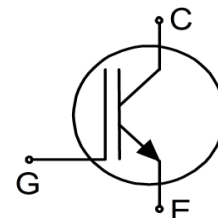
- 1200V trench & field stop technology
- Low turn-off losses
- Short tail current
- Positive temperature coefficient
- Easy paralleling

### Recommended for:

- Power modules

### Applications:

- Drives



Chip Type	V <sub>CE</sub>	I <sub>Cn</sub> <sup>1</sup>	Die Size	Package
SIGC158T120R3E	1200V	150A	12.56mm x 12.56mm	Sawn on foil

### Mechanical Parameters

Die size	12.56 x 12.56	mm <sup>2</sup>
Emitter pad size	See chip drawing	
Gate pad size	1.320 x 0.821	
Area total	157.75	
Thickness	140	µm
Wafer size	200	mm
Maximum possible chips per wafer	156	
Passivation frontside	Photoimide	
Pad metal	3200nm AlSiCu	
Backside metal	Ni Ag – system To achieve a reliable solder connection it is strongly recommended not to consume the Ni layer completely during production process	
Die bond	Electrically conductive epoxy glue and soft solder	
Wire bond	Al, ≤500µm	
Reject ink dot size	Ø 0.65mm; max. 1.2mm	
Storage environment	for original and sealed MBB bags	Ambient atmosphere air, temperature 17°C – 25°C, <6 months
	for open MBB bags	Acc. to IEC62258-3: atmosphere >99% Nitrogen or inert gas, humidity <25%RH, temperature 17°C – 25°C, <6 months

<sup>1</sup> Nominal collector current at T<sub>C</sub>=100°C for chip packaged in power modules, see application example cited on page 5.

## Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage, $T_{vj}=25^{\circ}\text{C}$	$V_{CE}$	1200	V
DC collector current, limited by $T_{vj\text{ max}}^2$	$I_C$	-	A
Pulsed collector current, $t_p$ limited by $T_{vj\text{ max}}^3$	$I_{C,puls}$	450	A
Gate-emitter voltage	$V_{GE}$	$\pm 20$	V
Junction temperature range	$T_{vj}$	-55 ... +175	$^{\circ}\text{C}$
Operating junction temperature	$T_{vj}$	-55 ... +150	$^{\circ}\text{C}$
Short circuit data <sup>3/4</sup> $V_{GE}=15\text{V}$ , $V_{CC}=900\text{V}$ , $T_{vj}=125^{\circ}\text{C}$	$t_{sc}$	10	$\mu\text{s}$
Reverse bias safe operating area <sup>3</sup> (RBSOA)	$I_{C,max}=300\text{A}$ , $V_{CE,max}=1200\text{V}$ , $T_{vj}\leq 125^{\circ}\text{C}$		

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0\text{V}$ , $I_C=6\text{mA}$	1200	-	-	V
Collector-emitter saturation voltage	$V_{CEsat}$	$V_{GE}=15\text{V}$ , $I_C=45\text{A}$	0.98	1.19	1.37	
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C=6\text{mA}$ , $V_{GE}=V_{CE}$	5.0	5.8	6.5	
Zero gate voltage collector current	$I_{CES}$	$V_{CE}=1200\text{V}$ , $V_{GE}=0\text{V}$	-	-	20	$\mu\text{A}$
Gate-emitter leakage current	$I_{GES}$	$V_{CE}=0\text{V}$ , $V_{GE}=20\text{V}$	-	-	600	nA
Integrated gate resistor	$r_G$		5			$\Omega$

## Electrical Characteristics <sup>3</sup>

Parameter	Symbol	Conditions	Value			Unit	
			min.	typ.	max.		
Collector-emitter saturation voltage	$V_{CEsat}$	$V_{GE}=15\text{V}$ , $I_C=150\text{A}$	$T_{vj}=25^{\circ}\text{C}$	1.4	1.7	2.1	V
			$T_{vj}=125^{\circ}\text{C}$	-	2.0	-	
Input capacitance	$C_{ies}$	$V_{CE}=25\text{V}$ , $V_{GE}=0\text{V}$ , $f=1\text{MHz}$ $T_{vj}=25^{\circ}\text{C}$	-	10766	-	pF	
Reverse transfer capacitance	$C_{res}$		-	488	-		

<sup>2</sup> Depending on thermal properties of assembly.

<sup>3</sup> Not subject to production test - verified by design/characterization.

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



# SIGC158T120R3E

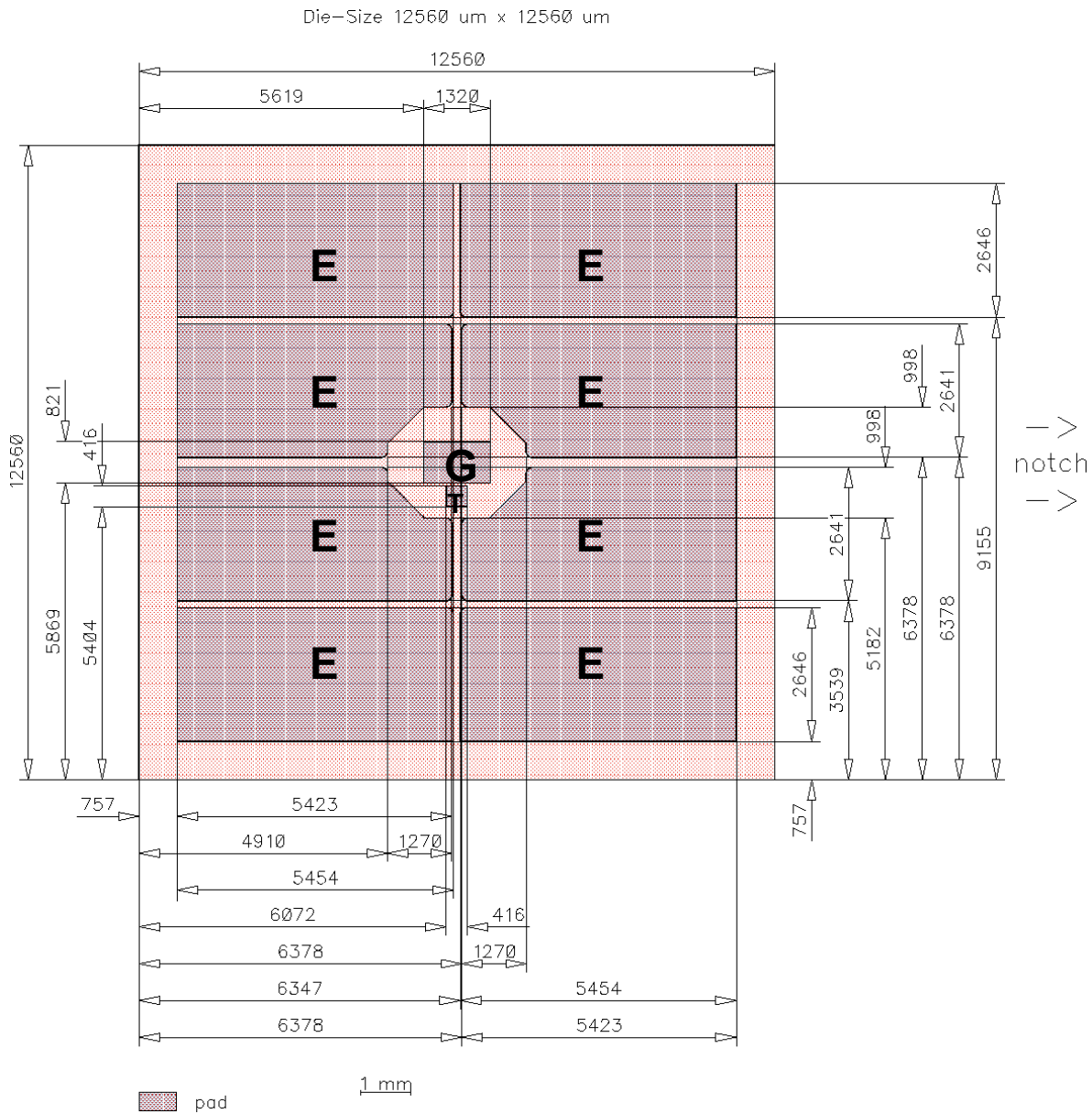
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## Further Electrical Characteristics

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

Application example	FS150R12KE3	Rev. 3.1
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## Chip Drawing



**E** = Emitter

**G** = Gate

**T** = Test pad do not contact



# SIGC158T120R3E

## Bare Die Product Specifics

Test coverage at wafer level cannot cover all application conditions. Therefore it is recommended to test all characteristics which are relevant for the application at package level, including RBSOA and SCSOA.

## Description

AQL 0.65 for visual inspection according to failure catalogue

Electrostatic Discharge Sensitive Device according to MIL-STD 883

## Revision History

Revision	Subjects (major changes since last revision)	Date
2.0	Release of final datasheet, change wafer size to 200mm	30.04.2010
2.1	Additional basic types L7698M, L7698T, L7698E; new gate pad design	02.07.2014
2.2	Minor changes, chip drawing, 100% $V_{CEsat}$ test conditions	06.02.2015
2.3	Update disclaimer	19.08.2015

## Relevant Application Notes

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# SIGC158T120R3E

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