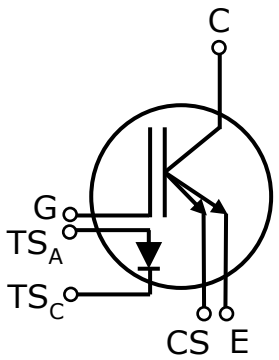
EDT2 IGBT for Automotive Applications

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
IGC120T75E12RD2CKA	750V	250A	119.9mm^2	Sawn on foil

Table of Contents

1 Parameters and Characteristics

Table 1 Mechanical Parameters

Raster size		11.000 x 10.900	mm^2
Area total		119.9	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		507	
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 $T_{vj\,max}$	$I_{C,pulse}$		750	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*	$I_{C,max}$ = 500A, $V_{CE,max}$ = 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= 75A	-	1.0	1.15	V
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C= 3.6mA, 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]

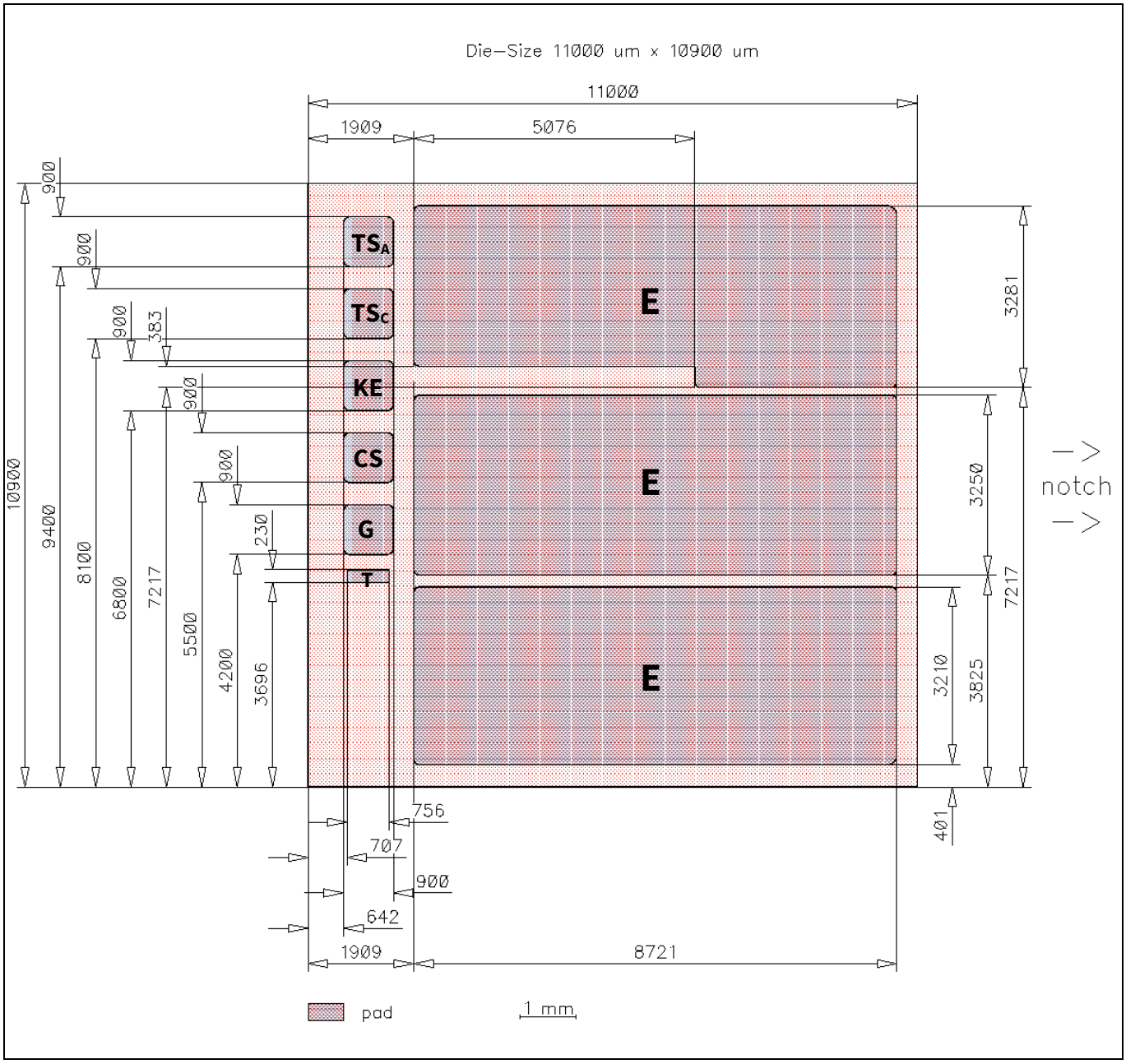
Parameter	Symbol	Conditions		Value			Unit
				min.	typ.	max.	
Collector-emitter saturation voltage	V_{CEsat}	V_{GE}= 15V, I_C= 250A	T_{vj}= 25°C	-	1.25	1.45	V
			T_{vj}= 175°C	-	1.4	-	
Input capacitance	C_{ies}	V_{CE}= 25V, V_{GE}= 0V, f= 100kHz T_{vj}= 25°C		-	28000	-	pF
Output capacitance	C_{oes}			-	520	-	
Reverse transfer capacitance	C_{res}			-	135	-	
Gate charge	Q_G	V_{CE}= 450V, I_C = 250A V_{GE}= -8V...+15V		-	1520	-	nC
Current sensor Area ratio of active cells to sense cells	A_{Load}/A_{CS}	Defined by design		-	750	-	
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 of chip capacitances is changed from f = 1MHz to 100kHz. The C_{res} value is modified with measurement result at f = 100kHz.

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Do you have a question about this document?

Email: erratum@infineon.com

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