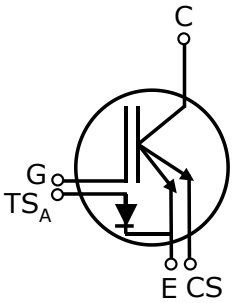
EDT2 IGBT for Automotive Applications

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 current mirror (current sensor)
- Integrated temperature sensor
- Solderable / sinterable front side pads[1]



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
IGC130T75E12D2CKA	750V	280A	130mm^2	Sawn on foil

[1] Depending on customer specific assembly process

Table of Contents

1 Parameters and Characteristics

Table 1 Mechanical Parameters

Raster size		11.4 x 11.4	mm^2
Area total		130	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		464	
Passivation frontside		Photoimide	
Pad metal		NiP/Pd/Au	
Backside metal		NiP/Pd/Au	
Die bond[1]		Soft solder Sinter	
Frontside interconnect[1]		Soft solder Sinter Wire bond: Al, ≤500µm	
Reject ink dot size		Inkless	
Storage environment (<6 months)	For original and sealed MBB bags[2]	Ambient atmosphere air, temperature 17°C – 25°C	

[1] Depending on customer specific assembly process

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

Table 2 Maximum Ratings[1]

Parameter	Symbol	Conditions	Value	Unit
Collector-emitter voltage	V_{CES}	25°C ≤ T_{vj} ≤ 175°C	750	V
		T_{vj} = -40°C[2]	700	
DC collector current, limited by $T_{vj\,max}$	I_C		-[3]	A
Pulsed collector current, t_p limited by $T_{vj\,max}$	$I_{C,pulse}$		840	A
Gate-emitter voltage	V_{GE}		±20	V
Operating junction temperature	$T_{vj,op}$		-40 ... +175	°C
Short circuit withstand time [4/5]	t_{sc}	V_{GE} ≤ 15V, V_{CC} ≤ 450V, T_{vj} ≤ 175°C	3	µs
Reverse bias safe operating area	*RBSOA*	$I_{C,max}$ = 560A, $V_{CE,max}$ = V_{CES}, -40°C ≤ $T_{vj,op}$ ≤ 175°C		

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 = 84A	-	1.0	1.15	V
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C = 4mA, 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
Temperature sensor	$V_{f\,TS}$	I_{TS} = 200µA	2.76	2.83	2.9	V

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

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

[3] Depending on thermal properties of assembly.

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

[5] Depending on electrical design of assembly.

Table 4 Electrical Characteristics[1]

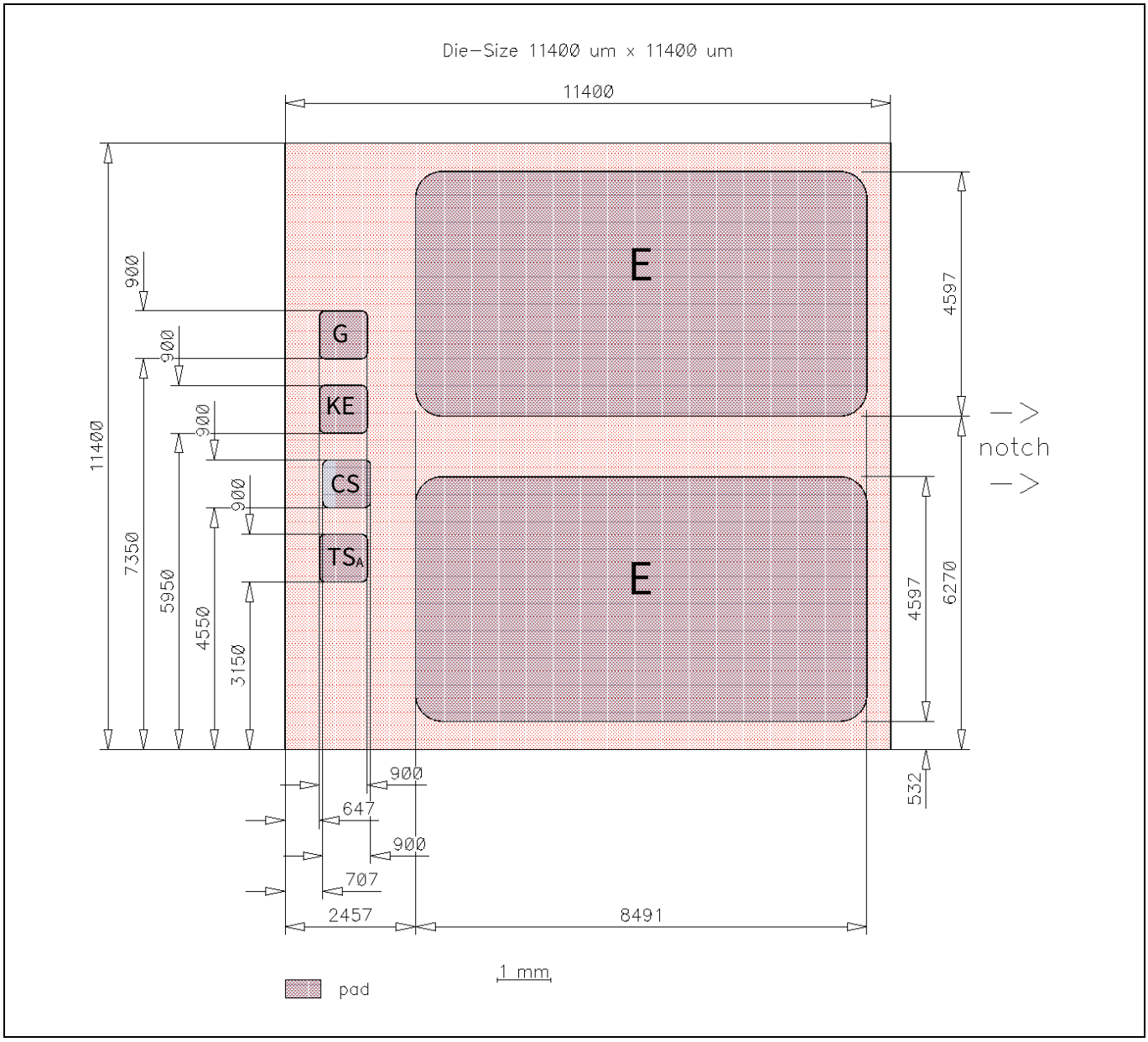
Parameter	Symbol	Conditions		Value			Unit
				min.	typ.	max.	
Collector-emitter saturation voltage	V_{CEsat}	V_{GE} = 15V, I_C = 280A	T_{vj} = 25°C	-	1.25	1.45	V
			T_{vj} = 175°C	-	1.4	-	
Input capacitance	C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 100kHz T_{vj} = 25°C		-	31600	-	pF
Output capacitance	C_{oes}			-	560	-	
Reverse transfer capacitance	C_{res}			-	150	-	
Gate charge	Q_G	V_{CE} = 450V, I_C = 280A V_{GE} = -8V...+15V		-	1700	-	nC
Current sensor Area ratio of active cells to sense cells	A_{Load}/A_{CS}	Defined by design		-	7800	-	
Temperature sensor Temperature coefficient	c_{TS}	I_{TS} = 200µA		-	-7.1	-	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
- KE = Kelvin Emitter
- CS = Current sense
- TS_A = Temperature Sense Anode
- TS_C = E Temperature sense (Cathode)

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	2021-02-01	Initial Final Datasheet

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