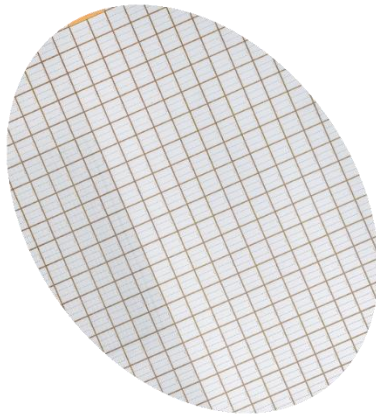


# DATASHEET

## SIS0200C120i20

I20 fine pattern IGBT, 11.9mm x 11.9mm



Symbolic picture

**$V_{CE} = 1200\text{ V}$**

**$I_C = 200\text{ A}$**

- I20 ultra-low loss fine pattern Trench IGBT chipset
- positive temperature coefficient
- easy paralleling

### Maximum ratings<sup>1</sup>

| PARAMETER                      | SYMBOL       | CONDITIONS                                                                               | MIN | MAX  | UNIT |
|--------------------------------|--------------|------------------------------------------------------------------------------------------|-----|------|------|
| Collector-emitter voltage      | $V_{CES}$    | $V_{GE} = 0\text{ V}$ , $T_{vj} \geq 25\text{ °C}$                                       |     | 1200 | V    |
| DC collector current           | $I_C$        |                                                                                          |     | 200  | A    |
| Peak collector current         | $I_{CM}$     | $t_p$ limited by $T_{vj\text{ max}}$<br>脉冲宽度依据 $T_{vj\text{ max}}$ 设定                    |     | 400  | A    |
| Gate-emitter voltage           | $V_{GES}$    |                                                                                          | -20 | 20   | V    |
| Junction temperature           | $T_{vj}$     |                                                                                          | -40 | 175  | °C   |
| Junction operating temperature | $T_{vj(op)}$ |                                                                                          | -40 | 175  | °C   |
| Short circuit <sup>2</sup>     | $t_{sc}$     | $V_{GE} = 15\text{ V}$ , $V_{CC} = 800\text{ V}$ , $T_{vj} = 175\text{ °C}$ <sup>3</sup> |     | 10   | µs   |



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<sup>1</sup> Maximum rated values indicate limits beyond which damage to the device may occur per IEC 60747

<sup>2</sup> Not subject to production test, capability depending on module design

<sup>3</sup> Short circuit performance at high temperature requires suitable die assembly process

## IGBT<sup>4</sup>

| PARAMETER                                         | SYMBOL               | CONDITIONS                                                                                                                          |                          | MIN  | TYP  | MAX | UNIT |
|---------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------|------|-----|------|
| Collector(-emitter) breakdown voltage             | V <sub>(BR)CES</sub> | V <sub>GE</sub> = 0 V, I <sub>C</sub> = 0.25mA, T <sub>vj</sub> = 25°C                                                              |                          | 1200 |      |     | V    |
| Collector-emitter saturation voltage <sup>5</sup> | V <sub>CEsat</sub>   | I <sub>C</sub> = 200 A, V <sub>GE</sub> = 15 V                                                                                      | T <sub>vj</sub> = 25 °C  |      | 1.7  |     | V    |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 125 °C |      | 2.05 |     | V    |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 175 °C |      | 2.2  |     | V    |
| Collector cut-off current                         | I <sub>CES</sub>     | V <sub>CE</sub> = 1200 V, V <sub>GE</sub> = 0 V                                                                                     | T <sub>vj</sub> = 25 °C  |      |      | 1.0 | μA   |
| Gate leakage current                              | I <sub>GES</sub>     | V <sub>CE</sub> = 0 V, V <sub>GE</sub> = ±20 V                                                                                      |                          | -0.5 |      | 0.5 | μA   |
| Gate-emitter threshold voltage                    | V <sub>GE(th)</sub>  | I <sub>C</sub> = 10 mA, V <sub>CE</sub> = V <sub>GE</sub> , T <sub>vj</sub> = 25°C                                                  |                          | 5    | 5.8  | 7.5 | V    |
| Gate charge                                       | Q <sub>G</sub>       | I <sub>C</sub> = 200 A, V <sub>CE</sub> = 600 V, V <sub>GE</sub> = -15 V .. 15 V                                                    |                          |      | 1.26 |     | μC   |
| Input capacitance                                 | C <sub>ies</sub>     | V <sub>CE</sub> = 25 V, V <sub>GE</sub> = 0 V, f = 100 kHz, T <sub>vj</sub> = 25 °C                                                 |                          |      | 11   |     | nF   |
| Output capacitance                                | C <sub>oes</sub>     |                                                                                                                                     |                          |      | 0.61 |     | nF   |
| Reverse tansfer capacitance                       | C <sub>res</sub>     |                                                                                                                                     |                          |      | 0.51 |     | nF   |
| Internal gate resistor                            | R <sub>Gint</sub>    | Per switch 每个芯片                                                                                                                     |                          |      | 4.4  |     | Ω    |
| Turn-on delay time                                | t <sub>d(on)</sub>   | V <sub>CC</sub> = 600 V, I <sub>C</sub> = 200 A, R <sub>G</sub> = 2 Ω, V <sub>GE</sub> = ± 15 V                                     | T <sub>vj</sub> = 25 °C  |      | 147  |     | ns   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 125 °C |      | 165  |     | ns   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 175 °C |      | 173  |     | ns   |
| Rise time                                         | t <sub>r</sub>       |                                                                                                                                     | T <sub>vj</sub> = 25 °C  |      | 47   |     | ns   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 125 °C |      | 50   |     | ns   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 175 °C |      | 53   |     | ns   |
| Turn-off delay time                               | t <sub>d(off)</sub>  | V <sub>CC</sub> = 600 V, I <sub>C</sub> = 200 A, R <sub>G</sub> = 5.5 Ω, V <sub>GE</sub> = ± 15 V                                   | T <sub>vj</sub> = 25 °C  |      | 434  |     | ns   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 125 °C |      | 545  |     | ns   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 175 °C |      | 598  |     | ns   |
| Fall time                                         | t <sub>f</sub>       |                                                                                                                                     | T <sub>vj</sub> = 25 °C  |      | 314  |     | ns   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 125 °C |      | 396  |     | ns   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 175 °C |      | 433  |     | ns   |
| Turn-on switching energy                          | E <sub>on</sub>      | V <sub>CC</sub> = 600 V, I <sub>C</sub> = 200 A, R <sub>G</sub> = 2 Ω, V <sub>GE</sub> = ± 15 V                                     | T <sub>vj</sub> = 25 °C  |      | 15   |     | mJ   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 125 °C |      | 21   |     | mJ   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 175 °C |      | 26   |     | mJ   |
| Turn-off switching energy                         | E <sub>off</sub>     | V <sub>CC</sub> = 600 V, I <sub>C</sub> = 200 A, R <sub>G</sub> = 5.5 Ω, V <sub>GE</sub> = ± 15 V                                   | T <sub>vj</sub> = 25 °C  |      | 21   |     | mJ   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 125 °C |      | 29   |     | mJ   |
|                                                   |                      |                                                                                                                                     | T <sub>vj</sub> = 175 °C |      | 32   |     | mJ   |
| Short circuit current                             | I <sub>SC</sub>      | t <sub>pcs</sub> ≤ 10 μs, V <sub>GE</sub> = 15 V, T <sub>vj</sub> = 175 °C, V <sub>CC</sub> = 800 V, V <sub>CEM</sub> Chip ≤ 1200 V |                          |      | 497  |     | A    |

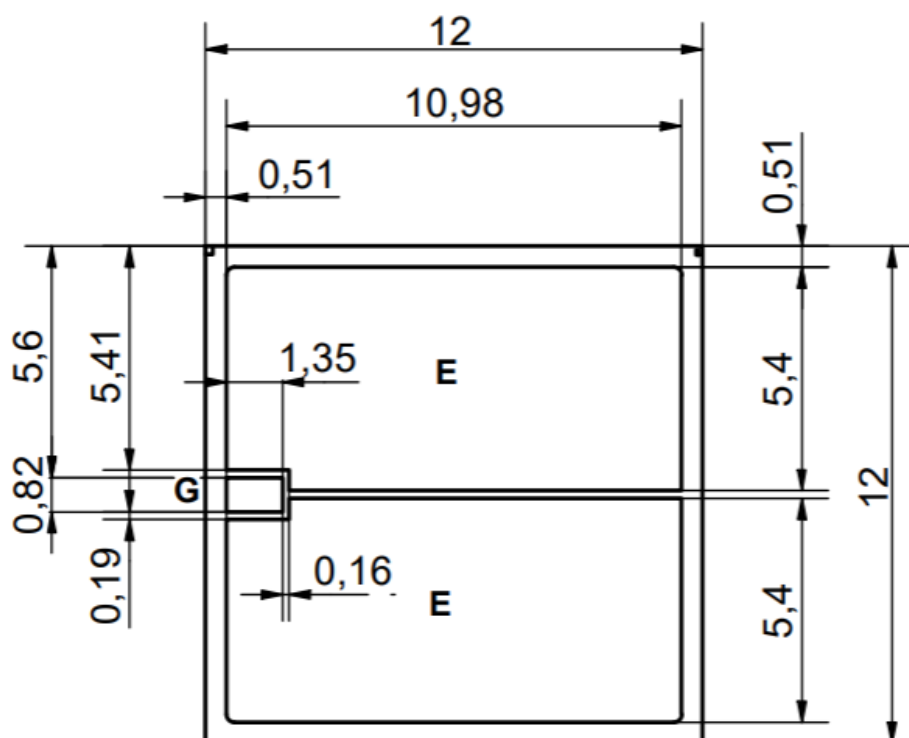
<sup>4</sup> Characteristic values according to IEC 60747-9



## Mechanical properties

| PARAMETER               |                         | UNIT            |
|-------------------------|-------------------------|-----------------|
| Die size                | 12 x 12                 | mm <sup>2</sup> |
| Gate pad size           | 1.3 x 0.8               | mm <sup>2</sup> |
| Thickness               | 135                     | μm              |
| Wafer diameter          | 300                     | mm              |
| Maximum chips per wafer | 420                     | pcs             |
| Frontside passivation   | Polyimide               |                 |
| Frontside metal (pads)  | Al Cu, 5000nm           |                 |
| Backside metal          | Al Ni Ag System, 1100nm |                 |

## Chip drawing



This is an electrostatic sensitive device.