

# DATASHEET

## SISD0900ED170i23

ED-Type phase leg IGBT module



**$V_{CE} = 1700 \text{ V}$**

**$I_C = 2 \times 900 \text{ A}$**

- i23 ultra-low loss micropattern Trench IGBT chip-set
- Baseplate isolation with reinforced  $\text{Al}_2\text{O}_3$  ceramic
- Cu baseplate for low thermal resistance
- Industry standard package with reduced internal impedance

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

| PARAMETER                      | SYMBOL              | CONDITIONS                                                                              | MIN | MAX              | UNIT                  |
|--------------------------------|---------------------|-----------------------------------------------------------------------------------------|-----|------------------|-----------------------|
| Collector-emitter voltage      | $V_{CES}$           | $V_{GE} = 0 \text{ V}$ , $T_{vj} = 25 \text{ °C}$                                       |     | 1700             | V                     |
| DC collector current           | $I_C$               | $T_C = 95 \text{ °C}$ , $T_{vj} = 175 \text{ °C}$                                       |     | 900              | A                     |
| Peak collector current         | $I_{CM}$            | $t_p = 1 \text{ ms}$                                                                    |     | 1800             | A                     |
| Gate-emitter voltage           | $V_{GES}$           |                                                                                         | -20 | 20               | V                     |
| Total power dissipation        | $P_{tot}$           | $T_C = 25 \text{ °C}$ , $T_{vj} = 175 \text{ °C}$ , per switch                          |     | 3660             | W                     |
| DC forward current             | $I_F$               |                                                                                         |     | 900              | A                     |
| Peak forward current           | $I_{FRM}$           | $t_p = 1 \text{ ms}$                                                                    |     | 1800             | A                     |
| Surge current                  | $I_{FSM}$<br>$I^2t$ | $V_R = 0 \text{ V}$ , $T_{vj} = 150 \text{ °C}$ , $t_p = 10 \text{ ms}$ , half-sinewave |     | 2800<br>40000    | A<br>A <sup>2</sup> s |
| Isolation voltage              | $V_{isol}$          | 1 min, $f = 50 \text{ Hz}$                                                              |     | 3400             | V                     |
| Junction operating temperature | $T_{vj(op)}$        |                                                                                         | -40 | 175              | °C                    |
| Case temperature               | $T_C$               |                                                                                         | -40 | 125 <sup>2</sup> | °C                    |
| Storage temperature            | $T_{stg}$           |                                                                                         | -40 | 125              | °C                    |
| Mounting torques <sup>3</sup>  | $M_S$               | Base-heatsink, M5 screws                                                                | 3   | 6                | Nm                    |
|                                | $M_{t1}$            | Main terminals, M6 screws                                                               | 3   | 6                | Nm                    |



Scan for latest version download

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

<sup>2</sup> For UL1557 compliance  $T_{Cmax}$  must be limited to 125°C

<sup>3</sup> For details, please refer to the mounting instructions.

**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> = 1 mA, T <sub>vj</sub> = 25°C                                                                                             |                          | 1700 |      |     | V    |
| Collector-emitter saturation voltage <sup>5</sup> | V <sub>CEsat</sub>   | I <sub>C</sub> = 900 A, V <sub>GE</sub> = 15 V                                                                                                                   | T <sub>vj</sub> = 25 °C  |      | 1.75 | 2.1 | V    |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 125 °C |      | 2.0  |     | V    |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 175 °C |      | 2.15 |     | V    |
| Collector cut-off current                         | I <sub>CES</sub>     | V <sub>CE</sub> = 1700 V, V <sub>GE</sub> = 0 V                                                                                                                  | T <sub>vj</sub> = 25 °C  |      |      | 1   | mA   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 125 °C |      | 5    |     | mA   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 175 °C |      | 45   |     | mA   |
| 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> = 30 mA, V <sub>CE</sub> = V <sub>GE</sub> , T <sub>vj</sub> = 25°C                                                                               |                          | 5.0  | 6.0  | 7.0 | V    |
| Gate charge                                       | Q <sub>G</sub>       | I <sub>C</sub> = 900 A, V <sub>CE</sub> = 900 V, V <sub>GE</sub> = -15 V .. 15 V                                                                                 |                          |      | 7.8  |     | 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                                                                              |                          |      | 113  |     | nF   |
| Output capacitance                                | C <sub>oes</sub>     |                                                                                                                                                                  |                          |      | 2.89 |     | nF   |
| Reverse tansfer capacitance                       | C <sub>res</sub>     |                                                                                                                                                                  |                          |      | 0.72 |     | nF   |
| Internal gate resistor                            | R <sub>Gint</sub>    | Per switch, f = 1 MHz, V <sub>GE</sub> = 0V, CE short                                                                                                            |                          |      | 0.33 |     | Ω    |
| Turn-on delay time                                | t <sub>d(on)</sub>   | V <sub>CC</sub> = 900 V, I <sub>C</sub> = 900 A,<br>R <sub>G</sub> = 0.5 Ω, V <sub>GE</sub> = ± 15 V,<br>L <sub>s</sub> = 35 nH, inductive load                  | T <sub>vj</sub> = 25 °C  |      | 170  |     | ns   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 125 °C |      | 195  |     | ns   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 175 °C |      | 215  |     | ns   |
| Rise time                                         | t <sub>r</sub>       |                                                                                                                                                                  | T <sub>vj</sub> = 25 °C  |      | 75   |     | ns   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 125 °C |      | 85   |     | ns   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 175 °C |      | 91   |     | ns   |
| Turn-off delay time                               | t <sub>d(off)</sub>  | V <sub>CC</sub> = 900 V, I <sub>C</sub> = 900 A,<br>R <sub>G</sub> = 1.5 Ω, V <sub>GE</sub> = ± 15 V,<br>L <sub>s</sub> = 35 nH, inductive load                  | T <sub>vj</sub> = 25 °C  |      | 512  |     | ns   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 125 °C |      | 609  |     | ns   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 175 °C |      | 654  |     | ns   |
| Fall time                                         | t <sub>f</sub>       |                                                                                                                                                                  | T <sub>vj</sub> = 25 °C  |      | 370  |     | ns   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 125 °C |      | 527  |     | ns   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 175 °C |      | 601  |     | ns   |
| Turn-on switching energy                          | E <sub>on</sub>      | V <sub>CC</sub> = 900 V, I <sub>C</sub> = 900 A,<br>R <sub>G</sub> = 0.5 Ω, V <sub>GE</sub> = ± 15 V,<br>L <sub>s</sub> = 35 nH, inductive load                  | T <sub>vj</sub> = 25 °C  |      | 147  |     | mJ   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 125 °C |      | 232  |     | mJ   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 175 °C |      | 290  |     | mJ   |
| Turn-off switching energy                         | E <sub>off</sub>     | V <sub>CC</sub> = 900 V, I <sub>C</sub> = 900 A,<br>R <sub>G</sub> = 1.5 Ω, V <sub>GE</sub> = ± 15 V,<br>L <sub>s</sub> = 35 nH, inductive load                  | T <sub>vj</sub> = 25 °C  |      | 187  |     | mJ   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 125 °C |      | 256  |     | mJ   |
|                                                   |                      |                                                                                                                                                                  | T <sub>vj</sub> = 175 °C |      | 286  |     | mJ   |
| Short circuit current                             | I <sub>SC</sub>      | t <sub>pcs</sub> ≤ 6 μs, V <sub>GE</sub> = 15 V, T <sub>vj</sub> = 175 °C, R <sub>G,on</sub> = 1.5 Ω,<br>V <sub>CC</sub> = 1100V, V <sub>CEM Chip</sub> ≤ 1700 V |                          |      | 3500 |     | A    |

<sup>4</sup> Characteristic values according to IEC 60747-9<sup>5</sup> Collector-emitter saturation voltage is given at chip-level



## Diode<sup>6</sup>

| PARAMETER                     | SYMBOL           | CONDITIONS                                                                                                                                                                                 |                          | MIN | TYP  | MAX | UNIT |
|-------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----|------|-----|------|
| Forward voltage <sup>7</sup>  | V <sub>F</sub>   | I <sub>F</sub> = 900 A                                                                                                                                                                     | T <sub>VJ</sub> = 25 °C  |     | 2.0  | 2.3 | V    |
|                               |                  |                                                                                                                                                                                            | T <sub>VJ</sub> = 125 °C |     | 2.25 |     | V    |
|                               |                  |                                                                                                                                                                                            | T <sub>VJ</sub> = 175 °C |     | 2.2  |     | V    |
| Peak reverse recovery current | I <sub>RM</sub>  | V <sub>R</sub> = 900 V, I <sub>F</sub> = 900 A,<br>di <sub>F</sub> /dt = 9.9 kA/μs (175 °C),<br>R <sub>G</sub> =0.5 Ω, V <sub>GE</sub> = ± 15 V,<br>L <sub>s</sub> = 35 nH, inductive load | T <sub>VJ</sub> = 25 °C  |     | 936  |     | A    |
|                               |                  |                                                                                                                                                                                            | T <sub>VJ</sub> = 125 °C |     | 1040 |     | A    |
|                               |                  |                                                                                                                                                                                            | T <sub>VJ</sub> = 175 °C |     | 1080 |     | A    |
| Recovery charge               | Q <sub>rr</sub>  |                                                                                                                                                                                            | T <sub>VJ</sub> = 25 °C  |     | 143  |     | μC   |
|                               |                  |                                                                                                                                                                                            | T <sub>VJ</sub> = 125 °C |     | 245  |     | μC   |
|                               |                  |                                                                                                                                                                                            | T <sub>VJ</sub> = 175 °C |     | 307  |     | μC   |
| Reverse recovery time         | t <sub>rr</sub>  |                                                                                                                                                                                            | T <sub>VJ</sub> = 25 °C  |     | 631  |     | ns   |
|                               |                  |                                                                                                                                                                                            | T <sub>VJ</sub> = 125 °C |     | 926  |     | ns   |
|                               |                  |                                                                                                                                                                                            | T <sub>VJ</sub> = 175 °C |     | 1132 |     | ns   |
| Reverse recovery energy       | E <sub>rec</sub> |                                                                                                                                                                                            | T <sub>VJ</sub> = 25 °C  |     | 89   |     | mJ   |
|                               |                  |                                                                                                                                                                                            | T <sub>VJ</sub> = 125 °C |     | 144  |     | mJ   |
|                               |                  |                                                                                                                                                                                            | T <sub>VJ</sub> = 175 °C |     | 176  |     | mJ   |

## NTC Thermistor

| PARAMETER        | SYMBOL       | CONDITIONS                                                   | MIN | TYP  | MAX | UNIT       |
|------------------|--------------|--------------------------------------------------------------|-----|------|-----|------------|
| Rated resistance | $R_{25}$     | $T_C = 25 \text{ °C}$                                        |     | 5    |     | k $\Omega$ |
| R100             | $R_{100}$    | $T_C = 100 \text{ °C}$                                       | 468 |      | 518 | $\Omega$   |
| B-value B        | $B_{25/50}$  | $R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15\text{K}))]$  |     | 3375 |     | K          |
| B-value B        | $B_{25/100}$ | $R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298.15\text{K}))]$ |     | 3433 |     | K          |

<sup>6</sup> Characteristic values according to IEC 60747-2

<sup>7</sup> Forward voltage is given at chip-level



## Package properties <sup>8</sup>

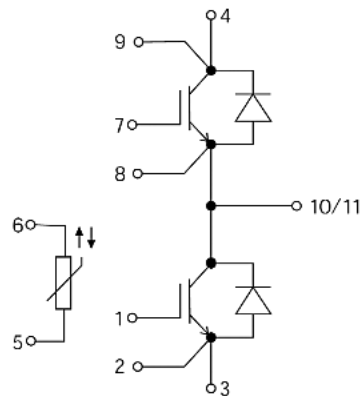
| PARAMETER                                     | SYMBOL             | CONDITIONS       |                              | MIN | TYP   | MAX   | UNIT       |
|-----------------------------------------------|--------------------|------------------|------------------------------|-----|-------|-------|------------|
| IGBT thermal resistance junction to case IGBT | $R_{th(j-c)IGBT}$  | Per switch       |                              |     |       | 0.041 | K/W        |
| Diode thermal resistance junction to case     | $R_{th(j-c)Diode}$ |                  |                              |     |       | 0.069 | K/W        |
| IGBT thermal resistance case to heatsink IGBT | $R_{th(c-s)IGBT}$  | IGBT per switch  |                              |     | 0.030 |       | K/W        |
| Diode thermal resistance case to heatsink     | $R_{th(c-s)Diode}$ | diode per switch |                              |     | 0.036 |       | K/W        |
| Comparative tracking index                    | CTI                |                  |                              | 200 |       |       |            |
| Module stray inductance                       | $L_{s\ CE}$        | Per switch       |                              |     | 16    |       | nH         |
| Resistance, terminal chip                     | $R_{CC'+EE'}$      | Per switch       | $T_{vj} = 25\ ^\circ C$      |     | 0.7   |       | m $\Omega$ |
|                                               |                    |                  | $T_{vj} = 125\ ^\circ C$     |     | 1.0   |       | m $\Omega$ |
|                                               |                    |                  | $T_{vj} = 175\ ^\circ C$     |     | 1.1   |       | m $\Omega$ |
| Maximum RMS DC-Terminal current               | $I_{Term\ RMS}$    |                  | $T_{Terminal} = 90^\circ C$  |     | 590   |       | A          |
|                                               |                    |                  | $T_{Terminal} = 105^\circ C$ |     | 565   |       | A          |

## Mechanical properties

| PARAMETER                 | SYMBOL    | CONDITIONS                                                          |                       | MIN           | TYP | MAX | UNIT            |
|---------------------------|-----------|---------------------------------------------------------------------|-----------------------|---------------|-----|-----|-----------------|
| Dimensions                | L x W x H | Typical                                                             |                       | 152 x 62 x 17 |     |     | mm <sup>3</sup> |
| Clearance distance in air | $d_a$     | According to IEC 60664-1 and EN 50124-1<br>标准 IEC 60664-1EN 50124-1 | Terminal to base:     | 12.5          |     |     | mm              |
|                           |           |                                                                     | Terminal to terminal: | 10            |     |     | mm              |
| Surface creepage distance | $d_s$     | According to IEC 60664-1 and EN 50124-1<br>IEC 60664-1EN 50124-1    | Terminal to base:     | 15            |     |     | mm              |
|                           |           |                                                                     | Terminal to terminal: | 13            |     |     | mm              |
| Mass                      | m         |                                                                     |                       |               | 350 |     | g               |

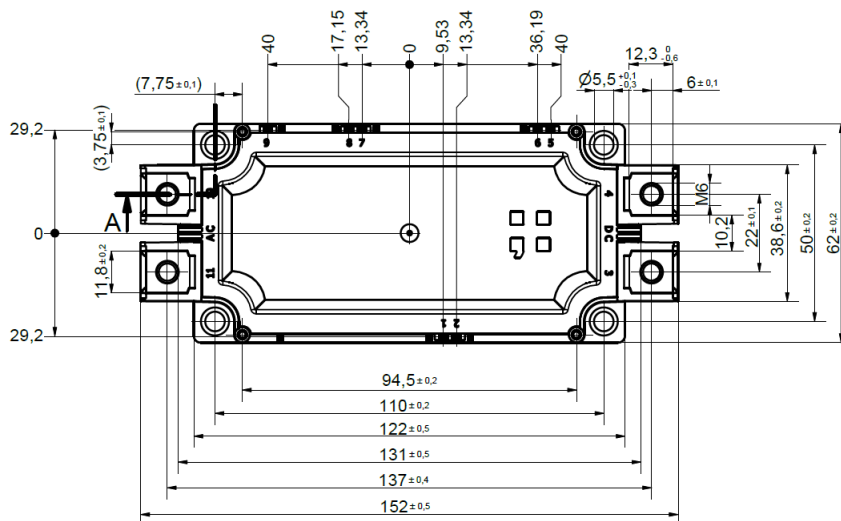
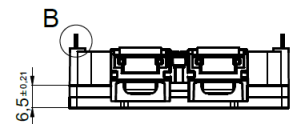
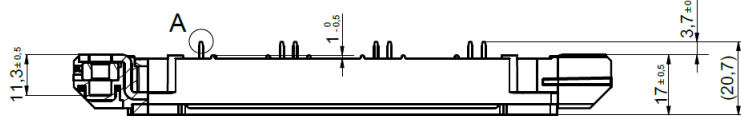
<sup>8</sup> Package and mechanical properties according to IEC 60747-15

## Electrical configuration

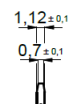


## Outline drawing

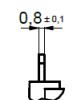
A-A



A (2 : 1)



B (2 : 1)



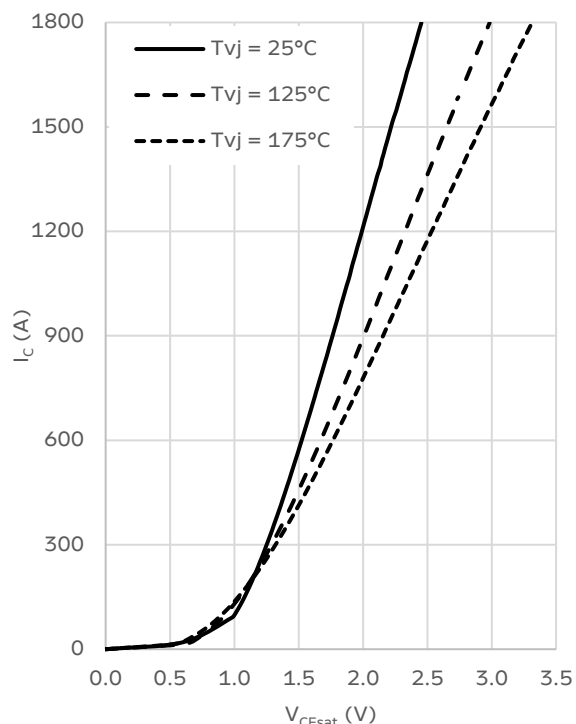
This is an electrostatic sensitive device.

*This product has been designed and qualified for Industrial Level.*

## Characteristics

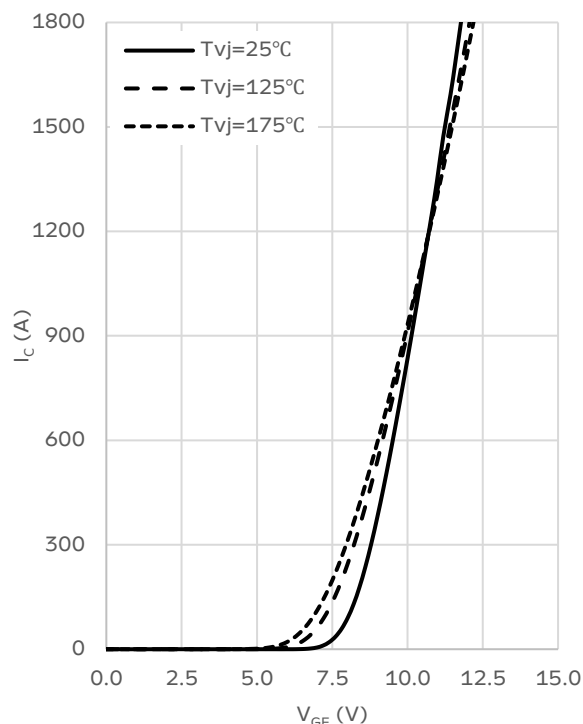
### IGBT on-state characteristics (typical)

$I_C = f(V_{CE})$   
 $V_{GE} = 15 \text{ V}$



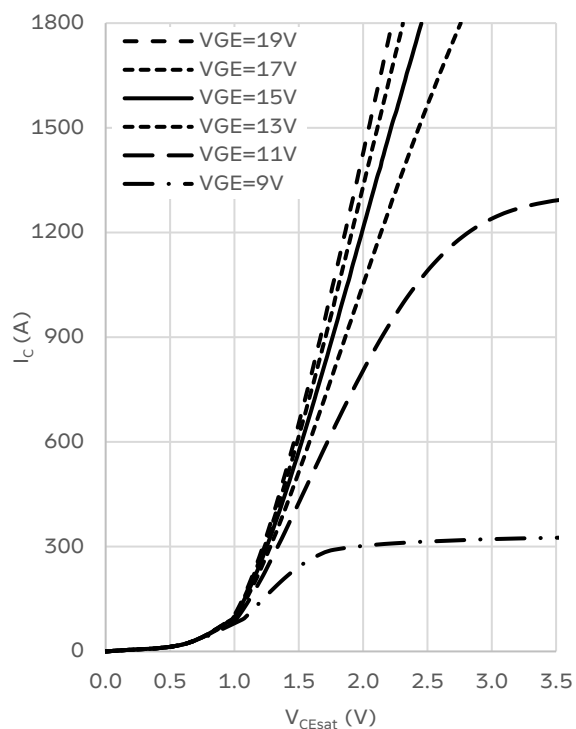
### IGBT transfer characteristics (typical)

$I_C = f(V_{GE})$   
 $V_{CE} = 20 \text{ V}$



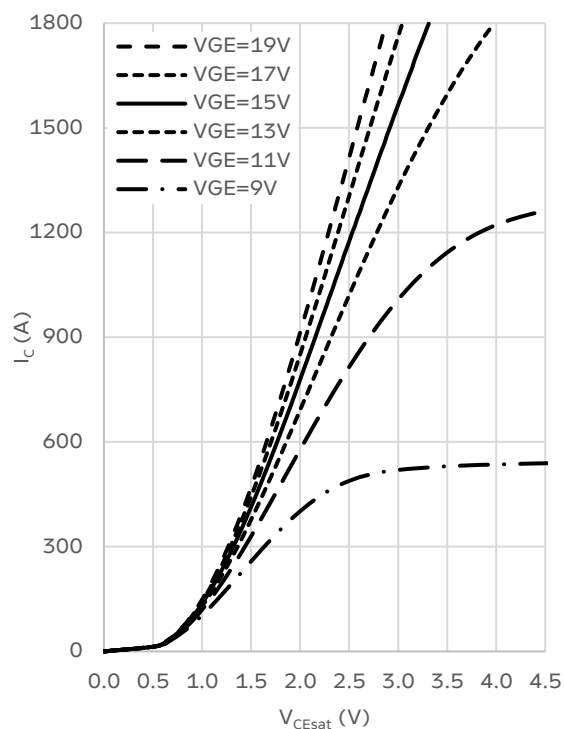
### IGBT output characteristics (typical)

$I_C = f(V_{CE})$   
 $T_{vj} = 25^\circ\text{C}$



### IGBT output characteristics (typical)

$I_C = f(V_{CE})$   
 $T_{vj} = 175^\circ\text{C}$

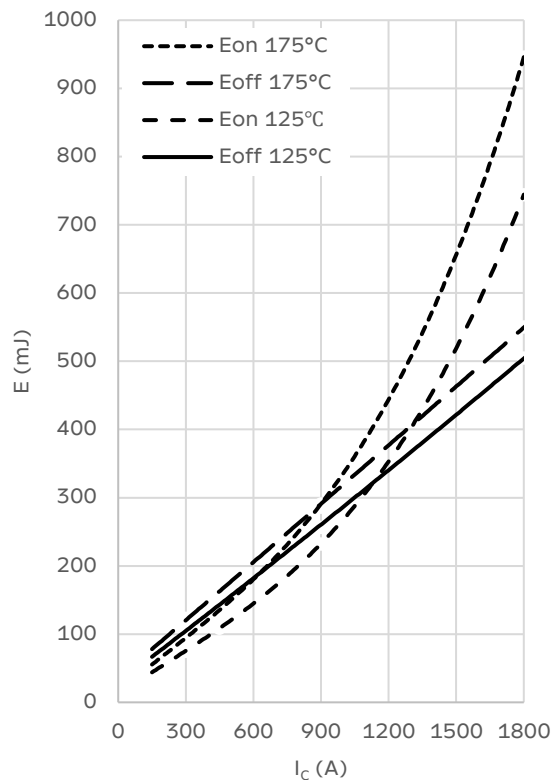




#### IGBT switching losses (typical)

$E = f(I_{CE})$

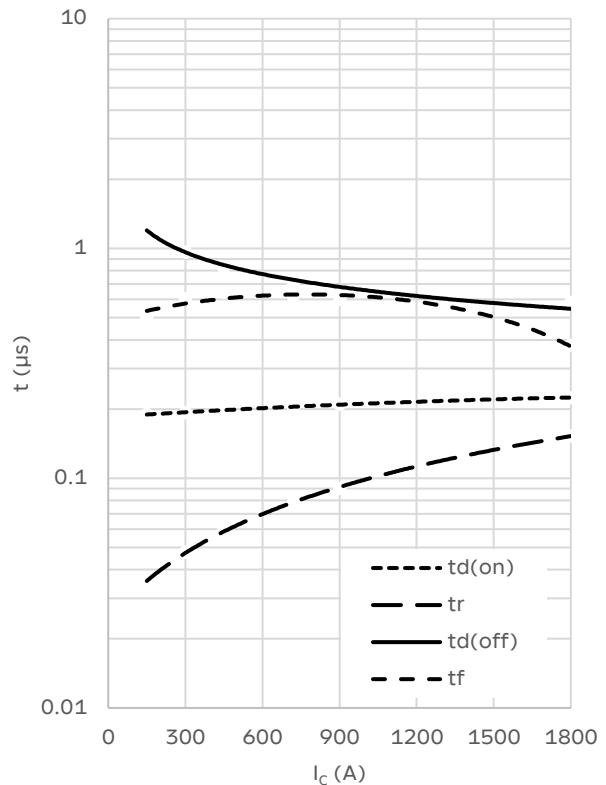
$V_{CE} = 900 \text{ V}$ ,  $R_{Gon} = 0.5 \Omega$ ,  $R_{Goff} = 1.5 \Omega$ ,  $V_{GE} = -15/+15 \text{ V}$



#### IGBT switching times (typical)

$t = f(I_{CE})$ ,  $T_{vj} = 175 \text{ °C}$

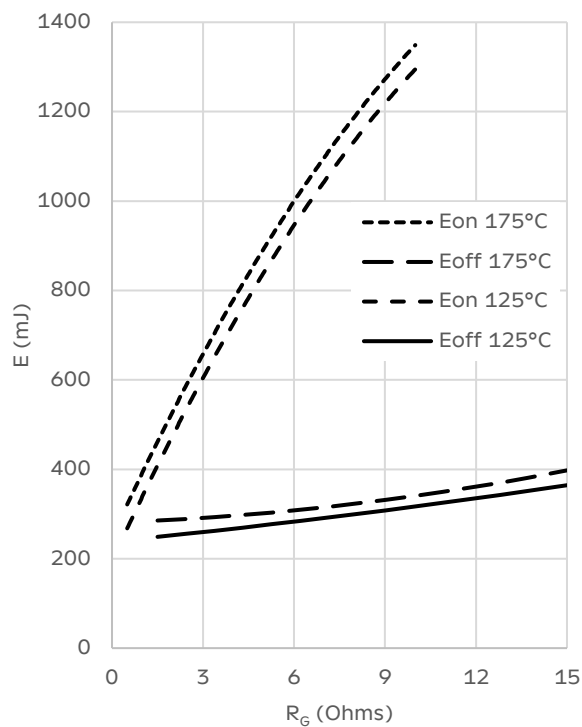
$V_{CE} = 900 \text{ V}$ ,  $R_{Gon} = 0.5 \Omega$ ,  $R_{Goff} = 1.5 \Omega$ ,  $V_{GE} = -15/+15 \text{ V}$



#### IGBT switching losses (typical)

$E = f(R_G)$

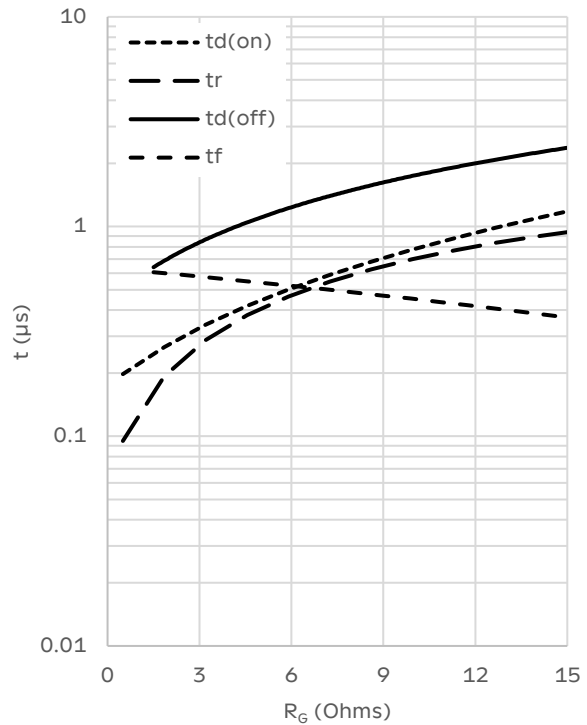
$V_{CE} = 900 \text{ V}$ ,  $I_C = 900 \text{ A}$ ,  $V_{GE} = -15/+15 \text{ V}$



#### IGBT switching times (typical)

$t = f(R_G)$ ,  $T_{vj} = 175 \text{ °C}$

$V_{CE} = 900 \text{ V}$ ,  $I_C = 900 \text{ A}$ ,  $V_{GE} = -15/+15 \text{ V}$

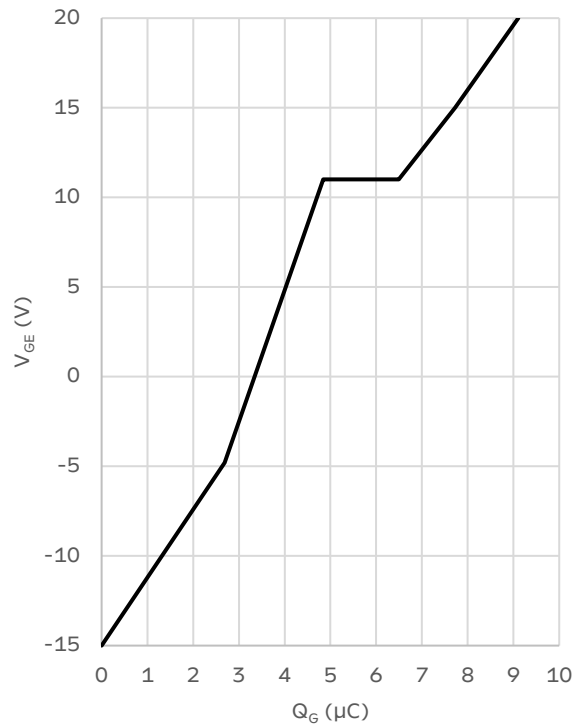




#### IGBT gate charge (typical)

$V_{GE} = f(Q_G)$ ,  $T_{vj} = 25\text{ °C}$

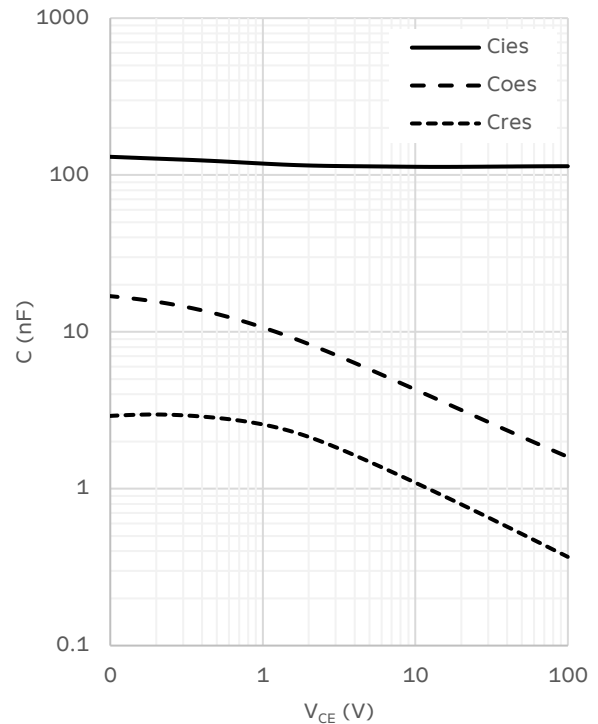
$V_{CE} = 900\text{ V}$ ,  $I_C = 900\text{ A}$



#### Capacitance characteristics (typical)

$C = f(V_{CE})$ ,  $T_{vj} = 25\text{ °C}$

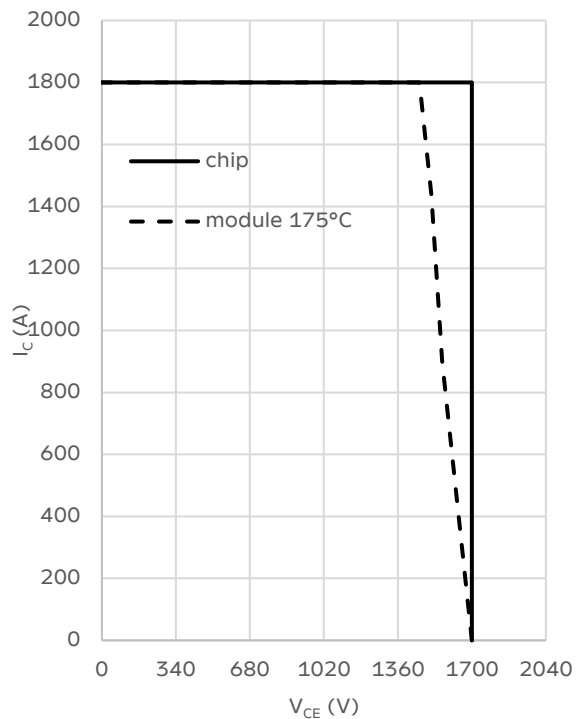
$f = 100\text{ kHz}$ ,  $V_{GE} = 0\text{ V}$



#### IGBT RBSOA

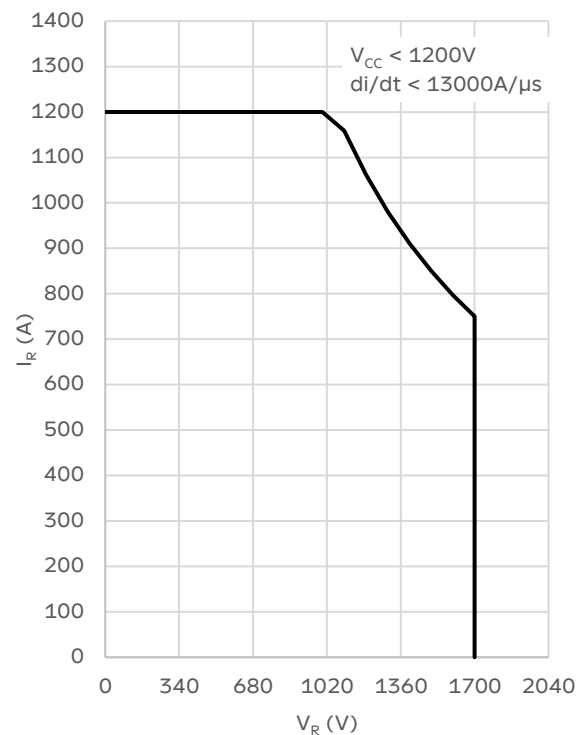
$I_C = f(V_{CEm})$

$R_{Goff} = 1.5\text{ }\Omega$ ,  $V_{GE} = \pm 15\text{ V}$



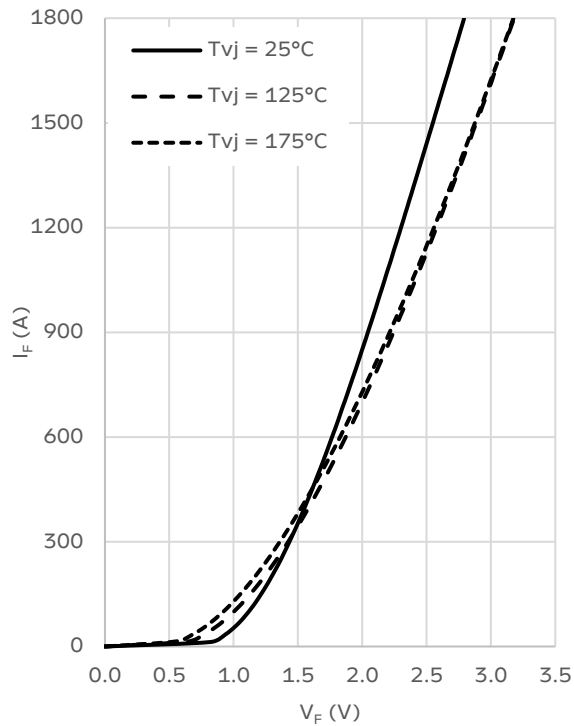
#### Diode SOA

$T_{vj} \leq 175\text{ °C}$



### Diode forward characteristic (typical)

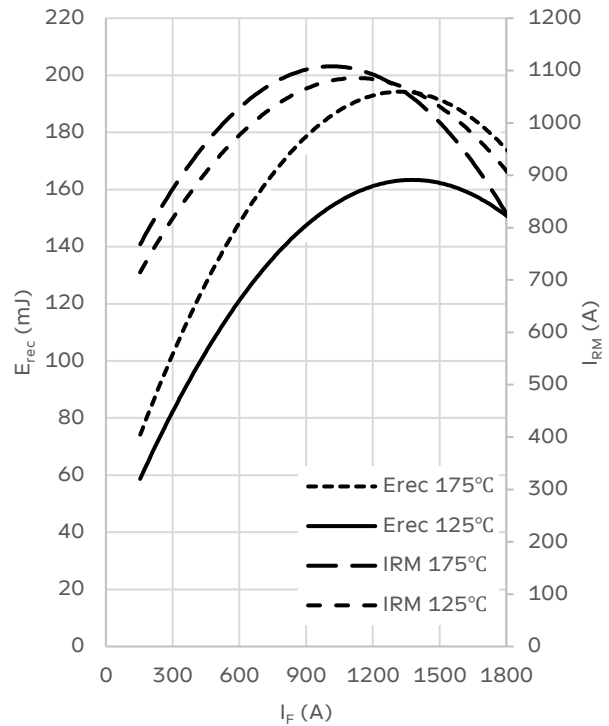
$$I_F = f(V_F)$$



### Diode switching characteristics (typical)

$$E_{rec} = f(I_F), I_{RM} = f(I_F)$$

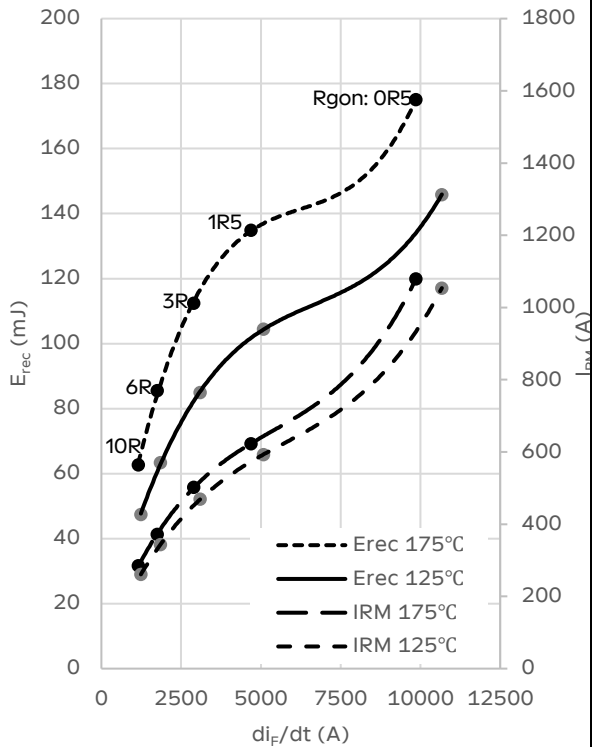
$$V_{DC} = 900 \text{ V}, R_{Gon} = 0.5 \Omega (\text{IGBT}), V_{GE} = -15/+15 \text{ V (IGBT)}$$



### Diode switching characteristics (typical)

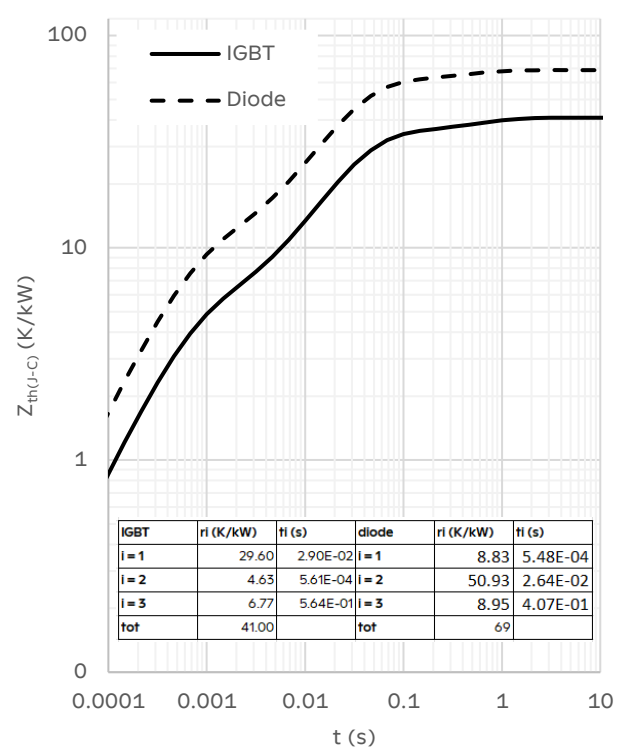
$$E_{rec} = f(di/dt), I_{RM} = f(di/dt)$$

$$V_{DC} = 600 \text{ V}, I_F = 600 \text{ A}, V_{GE} = -15/+15 \text{ V (IGBT)}$$



### Thermal impedance

$$Z_{th(j-c)} = f(t)$$





## Revision History

| Release    | Version | Description     |
|------------|---------|-----------------|
| 2026-07-23 | V5.0    | Final Datasheet |