

## Final datasheet

### EconoDUAL™3 module with TRENCHSTOP™ IGBT7 and emitter controlled 7 diode and PressFIT / NTC

#### Features

- Electrical features
  - $V_{CES} = 1700\text{ V}$
  - $I_{C\text{ nom}} = 750\text{ A} / I_{CRM} = 1500\text{ A}$
  - Integrated temperature sensor
  - High current density
  - Low  $V_{CE,sat}$
  - Overload operation up to  $175^{\circ}\text{C}$
  - TRENCHSTOP™ IGBT7
  - $V_{CE,sat}$  with positive temperature coefficient
  - Enlarged diode for regenerative operation
- Mechanical features
  - High power density
  - Isolated base plate
  - PressFIT contact technology
  - Standard housing



#### Potential applications

- High-power converters
- Medium-voltage converters
- Motor drives
- Wind turbines
- Power transmission and distribution

#### Product validation

- Qualified for industrial applications according to the relevant tests of IEC 60747, 60749 and 60068

#### Description

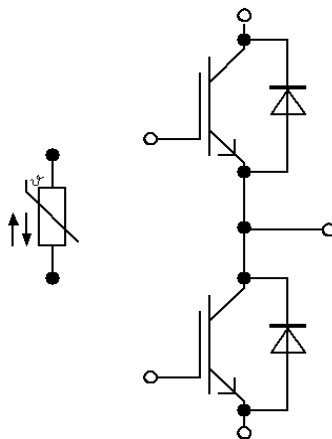


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**1 Package**

**1 Package**

**Table 1 Insulation coordination**

| Parameter                           | Symbol                  | Note or test condition                                   | Values | Unit |
|-------------------------------------|-------------------------|----------------------------------------------------------|--------|------|
| Isolation test voltage              | $V_{ISOL}$              | RMS, $f = 50 \text{ Hz}$ , $t = 1 \text{ min}$           | 3.4    | kV   |
| Isolation test voltage NTC          | $V_{ISOL(NTC)}$         | RMS, $f = 50 \text{ Hz}$                                 | 3.4    | kV   |
| Material of module baseplate        |                         |                                                          | Cu     |      |
| Internal isolation                  |                         | basic insulation (class 1, IEC 61140)                    | Al2O3  |      |
| Creepage distance                   | $d_{Creep \text{ nom}}$ | terminal to baseplate, nom., (PD2, IEC 60664-1, Ed. 3.0) | > 15   | mm   |
| Creepage distance                   | $d_{Creep \text{ min}}$ | terminal to baseplate, min., (PD2, IEC 60664-1, Ed. 3.0) | 14.7   | mm   |
| Creepage distance                   | $d_{Creep \text{ nom}}$ | terminal to terminal, nom., (PD2, IEC 60664-1, Ed. 3.0)  | 12.1   | mm   |
| Creepage distance                   | $d_{Creep \text{ min}}$ | terminal to terminal, min., (PD2, IEC 60664-1, Ed. 3.0)  | 11.5   | mm   |
| Clearance                           | $d_{Clear \text{ nom}}$ | terminal to baseplate, nom.                              | > 12.5 | mm   |
| Clearance                           | $d_{Clear \text{ min}}$ | terminal to baseplate, min.                              | 12.5   | mm   |
| Clearance                           | $d_{Clear \text{ nom}}$ | terminal to terminal, nom.                               | 10.0   | mm   |
| Clearance                           | $d_{Clear \text{ min}}$ | terminal to terminal, min.                               | 9.6    | mm   |
| Comparative tracking index          | $CTI$                   |                                                          | > 200  |      |
| Relative thermal index (electrical) | $RTI$                   | housing                                                  | 140    | °C   |

**Table 2 Characteristic values**

| Parameter                                | Symbol        | Note or test condition                         |           | Values |      |      | Unit |
|------------------------------------------|---------------|------------------------------------------------|-----------|--------|------|------|------|
|                                          |               |                                                |           | Min.   | Typ. | Max. |      |
| Stray inductance module                  | $L_{sCE}$     |                                                |           |        | 20   |      | nH   |
| Module lead resistance, terminals - chip | $R_{CC'+EE'}$ | T <sub>C</sub> = 25 °C, per switch             |           |        | 0.8  |      | mΩ   |
| Storage temperature                      | $T_{stg}$     |                                                |           | -40    |      | 125  | °C   |
| Mounting torque for module mounting      | $M$           | - Mounting according to valid application note | M5, Screw | 3      |      | 6    | Nm   |
| Terminal connection torque               | $M$           | - Mounting according to valid application note | M6, Screw | 3      |      | 6    | Nm   |
| Weight                                   | $G$           |                                                |           |        | 345  |      | g    |

## 2 IGBT, Inverter

**Table 3 Maximum rated values**

| Parameter                              | Symbol     | Note or test condition              |                                                                | Values | Unit |
|----------------------------------------|------------|-------------------------------------|----------------------------------------------------------------|--------|------|
| Collector-emitter voltage              | $V_{CES}$  |                                     | $T_{vj} = 25\text{ °C}$                                        | 1700   | V    |
| Continuous DC collector current        | $I_{CDC}$  | $T_{vj\text{ max}} = 175\text{ °C}$ | $T_C = 80\text{ °C}$                                           | 750    | A    |
| Maximum RMS module DC-terminal current | $I_{tRMS}$ |                                     | $T_{\text{Terminal}} = 90\text{ °C},$<br>$T_C = 90\text{ °C}$  | 580    | A    |
|                                        |            |                                     | $T_{\text{Terminal}} = 105\text{ °C},$<br>$T_C = 90\text{ °C}$ | 565    |      |
| Repetitive peak collector current      | $I_{CRM}$  | $t_p$ limited by $T_{vj\text{ op}}$ |                                                                | 1500   | A    |
| Gate-emitter peak voltage              | $V_{GES}$  |                                     |                                                                | ±20    | V    |

**Table 4 Characteristic values**

| Parameter                            | Symbol              | Note or test condition                                                                              |                          | Values |       |      | Unit |
|--------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------|--------------------------|--------|-------|------|------|
|                                      |                     |                                                                                                     |                          | Min.   | Typ.  | Max. |      |
| Collector-emitter saturation voltage | $V_{CE\text{ sat}}$ | $I_C = 750\text{ A}, V_{GE} = 15\text{ V}$                                                          | $T_{vj} = 25\text{ °C}$  |        | 1.70  | 1.85 | V    |
|                                      |                     |                                                                                                     | $T_{vj} = 125\text{ °C}$ |        | 1.95  |      |      |
|                                      |                     |                                                                                                     | $T_{vj} = 150\text{ °C}$ |        | 2.05  |      |      |
|                                      |                     |                                                                                                     | $T_{vj} = 175\text{ °C}$ |        | 2.10  |      |      |
| Gate threshold voltage               | $V_{GETh}$          | $I_C = 15.7\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25\text{ °C}$                                      |                          | 5.15   | 5.80  | 6.45 | V    |
| Gate charge                          | $Q_G$               | $V_{GE} = \pm 15\text{ V}, V_{CC} = 900\text{ V}$                                                   |                          |        | 7.15  |      | μC   |
| Internal gate resistor               | $R_{Gint}$          | $T_{vj} = 25\text{ °C}$                                                                             |                          |        | 0.33  |      | Ω    |
| Input capacitance                    | $C_{ies}$           | $f = 100\text{ kHz}, T_{vj} = 25\text{ °C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$              |                          |        | 78.1  |      | nF   |
| Reverse transfer capacitance         | $C_{res}$           | $f = 100\text{ kHz}, T_{vj} = 25\text{ °C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$              |                          |        | 0.275 |      | nF   |
| Collector-emitter cut-off current    | $I_{CES}$           | $V_{CE} = 1700\text{ V}, V_{GE} = 0\text{ V}$                                                       | $T_{vj} = 25\text{ °C}$  |        |       | 5    | mA   |
| Gate-emitter leakage current         | $I_{GES}$           | $V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25\text{ °C}$                                  |                          |        |       | 100  | nA   |
| Turn-on delay time (inductive load)  | $t_{don}$           | $I_C = 750\text{ A}, V_{CC} = 900\text{ V},$<br>$V_{GE} = \pm 15\text{ V}, R_{Gon} = 0.51\text{ Ω}$ | $T_{vj} = 25\text{ °C}$  |        | 0.158 |      | μs   |
|                                      |                     |                                                                                                     | $T_{vj} = 125\text{ °C}$ |        | 0.172 |      |      |
|                                      |                     |                                                                                                     | $T_{vj} = 150\text{ °C}$ |        | 0.178 |      |      |
|                                      |                     |                                                                                                     | $T_{vj} = 175\text{ °C}$ |        | 0.184 |      |      |

(table continues...)

**Table 4** (continued) Characteristic values

| Parameter                              | Symbol      | Note or test condition                                                                                                                                                                                            | Values                                                  |        |        | Unit          |
|----------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------|--------|---------------|
|                                        |             |                                                                                                                                                                                                                   | Min.                                                    | Typ.   | Max.   |               |
| Rise time (inductive load)             | $t_r$       | $I_C = 750 \text{ A}$ , $V_{CC} = 900 \text{ V}$ ,<br>$V_{GE} = \pm 15 \text{ V}$ , $R_{Gon} = 0.51 \Omega$                                                                                                       | $T_{vj} = 25 \text{ °C}$                                | 0.046  |        | $\mu\text{s}$ |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 125 \text{ °C}$                               | 0.053  |        |               |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 150 \text{ °C}$                               | 0.055  |        |               |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 175 \text{ °C}$                               | 0.057  |        |               |
| Turn-off delay time (inductive load)   | $t_{doff}$  | $I_C = 750 \text{ A}$ , $V_{CC} = 900 \text{ V}$ ,<br>$V_{GE} = \pm 15 \text{ V}$ , $R_{Goff} = 2.2 \Omega$                                                                                                       | $T_{vj} = 25 \text{ °C}$                                | 0.536  |        | $\mu\text{s}$ |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 125 \text{ °C}$                               | 0.613  |        |               |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 150 \text{ °C}$                               | 0.631  |        |               |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 175 \text{ °C}$                               | 0.648  |        |               |
| Fall time (inductive load)             | $t_f$       | $I_C = 750 \text{ A}$ , $V_{CC} = 900 \text{ V}$ ,<br>$V_{GE} = \pm 15 \text{ V}$ , $R_{Goff} = 2.2 \Omega$                                                                                                       | $T_{vj} = 25 \text{ °C}$                                | 0.231  |        | $\mu\text{s}$ |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 125 \text{ °C}$                               | 0.450  |        |               |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 150 \text{ °C}$                               | 0.525  |        |               |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 175 \text{ °C}$                               | 0.599  |        |               |
| Turn-on energy loss per pulse          | $E_{on}$    | $I_C = 750 \text{ A}$ , $V_{CC} = 900 \text{ V}$ ,<br>$L_\sigma = 25 \text{ nH}$ , $V_{GE} = \pm 15 \text{ V}$ ,<br>$R_{Gon} = 0.51 \Omega$ , $di/dt = 11.1 \text{ kA}/\mu\text{s}$ ( $T_{vj} = 175 \text{ °C}$ ) | $T_{vj} = 25 \text{ °C}$                                | 74     |        | mJ            |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 125 \text{ °C}$                               | 171    |        |               |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 150 \text{ °C}$                               | 204    |        |               |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 175 \text{ °C}$                               | 238    |        |               |
| Turn-off energy loss per pulse         | $E_{off}$   | $I_C = 750 \text{ A}$ , $V_{CC} = 900 \text{ V}$ ,<br>$L_\sigma = 25 \text{ nH}$ , $V_{GE} = \pm 15 \text{ V}$ ,<br>$R_{Goff} = 2.2 \Omega$ , $dv/dt = 3600 \text{ V}/\mu\text{s}$ ( $T_{vj} = 175 \text{ °C}$ )  | $T_{vj} = 25 \text{ °C}$                                | 132    |        | mJ            |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 125 \text{ °C}$                               | 208    |        |               |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 150 \text{ °C}$                               | 224    |        |               |
|                                        |             |                                                                                                                                                                                                                   | $T_{vj} = 175 \text{ °C}$                               | 239    |        |               |
| SC data                                | $I_{SC}$    | $V_{GE} = 15 \text{ V}$ , $V_{CC} = 1000 \text{ V}$ ,<br>$V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$                                                                                                              | $t_p \leq 8 \mu\text{s}$ ,<br>$T_{vj} = 150 \text{ °C}$ | 2600   |        | A             |
|                                        |             |                                                                                                                                                                                                                   | $t_p \leq 6 \mu\text{s}$ ,<br>$T_{vj} = 175 \text{ °C}$ | 2500   |        |               |
| Thermal resistance, junction to case   | $R_{thJC}$  | per IGBT                                                                                                                                                                                                          |                                                         |        | 0.0551 | K/W           |
| Thermal resistance, case to heat sink  | $R_{thCH}$  | per IGBT, $\lambda_{grease} = 1 \text{ W}/(\text{m} \cdot \text{K})$                                                                                                                                              |                                                         | 0.0345 |        | K/W           |
| Temperature under switching conditions | $T_{vj op}$ |                                                                                                                                                                                                                   | -40                                                     |        | 175    | °C            |

**Note:**  $T_{vj op} > 150 \text{ °C}$  is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

### 3 Diode, Inverter

**Table 5** Maximum rated values

| Parameter                       | Symbol    | Note or test condition                 |                          | Values | Unit   |
|---------------------------------|-----------|----------------------------------------|--------------------------|--------|--------|
| Repetitive peak reverse voltage | $V_{RRM}$ |                                        | $T_{vj} = 25\text{ °C}$  | 1700   | V      |
| Implemented forward current     | $I_{FN}$  |                                        |                          | 1200   | A      |
| Continuous DC forward current   | $I_F$     |                                        |                          | 750    | A      |
| Repetitive peak forward current | $I_{FRM}$ | $t_P = 1\text{ ms}$                    |                          | 1500   | A      |
| $I^2t$ - value                  | $I^2t$    | $t_P = 10\text{ ms}, V_R = 0\text{ V}$ | $T_{vj} = 125\text{ °C}$ | 48300  | $A^2s$ |
|                                 |           |                                        | $T_{vj} = 175\text{ °C}$ | 37200  |        |

**Table 6** Characteristic values

| Parameter                              | Symbol             | Note or test condition                                                                                                             | Values                   |        |        | Unit          |
|----------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------|--------|---------------|
|                                        |                    |                                                                                                                                    | Min.                     | Typ.   | Max.   |               |
| Forward voltage                        | $V_F$              | $I_F = 750\text{ A}, V_{GE} = 0\text{ V}$                                                                                          | $T_{vj} = 25\text{ °C}$  |        | 2.00   | V             |
|                                        |                    |                                                                                                                                    | $T_{vj} = 125\text{ °C}$ |        | 1.85   |               |
|                                        |                    |                                                                                                                                    | $T_{vj} = 150\text{ °C}$ |        | 1.80   |               |
|                                        |                    |                                                                                                                                    | $T_{vj} = 175\text{ °C}$ |        | 1.75   |               |
| Peak reverse recovery current          | $I_{RM}$           | $V_{CC} = 900\text{ V}, I_F = 750\text{ A}, V_{GE} = -15\text{ V}, -di_F/dt = 11.8\text{ kA}/\mu\text{s} (T_{vj} = 175\text{ °C})$ | $T_{vj} = 25\text{ °C}$  |        | 950    | A             |
|                                        |                    |                                                                                                                                    | $T_{vj} = 125\text{ °C}$ |        | 1020   |               |
|                                        |                    |                                                                                                                                    | $T_{vj} = 150\text{ °C}$ |        | 1020   |               |
|                                        |                    |                                                                                                                                    | $T_{vj} = 175\text{ °C}$ |        | 1020   |               |
| Recovered charge                       | $Q_r$              | $V_{CC} = 900\text{ V}, I_F = 750\text{ A}, V_{GE} = -15\text{ V}, -di_F/dt = 11.8\text{ kA}/\mu\text{s} (T_{vj} = 175\text{ °C})$ | $T_{vj} = 25\text{ °C}$  |        | 115    | $\mu\text{C}$ |
|                                        |                    |                                                                                                                                    | $T_{vj} = 125\text{ °C}$ |        | 218    |               |
|                                        |                    |                                                                                                                                    | $T_{vj} = 150\text{ °C}$ |        | 255    |               |
|                                        |                    |                                                                                                                                    | $T_{vj} = 175\text{ °C}$ |        | 292    |               |
| Reverse recovery energy                | $E_{rec}$          | $V_{CC} = 900\text{ V}, I_F = 750\text{ A}, V_{GE} = -15\text{ V}, -di_F/dt = 11.8\text{ kA}/\mu\text{s} (T_{vj} = 175\text{ °C})$ | $T_{vj} = 25\text{ °C}$  |        | 76     | mJ            |
|                                        |                    |                                                                                                                                    | $T_{vj} = 125\text{ °C}$ |        | 132    |               |
|                                        |                    |                                                                                                                                    | $T_{vj} = 150\text{ °C}$ |        | 152    |               |
|                                        |                    |                                                                                                                                    | $T_{vj} = 175\text{ °C}$ |        | 171    |               |
| Thermal resistance, junction to case   | $R_{thJC}$         | per diode                                                                                                                          |                          |        | 0.0753 | K/W           |
| Thermal resistance, case to heat sink  | $R_{thCH}$         | per diode, $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$                                                                 |                          | 0.0363 |        | K/W           |
| Temperature under switching conditions | $T_{vj\text{ op}}$ |                                                                                                                                    | -40                      |        | 175    | °C            |

**Note:**  $T_{vj\ op} > 150^{\circ}\text{C}$  is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.

## 4 NTC-Thermistor

**Table 7** Characteristic values

| Parameter              | Symbol       | Note or test condition                                        | Values |      |      | Unit       |
|------------------------|--------------|---------------------------------------------------------------|--------|------|------|------------|
|                        |              |                                                               | Min.   | Typ. | Max. |            |
| Rated resistance       | $R_{25}$     | $T_{NTC} = 25^{\circ}\text{C}$                                |        | 5    |      | k $\Omega$ |
| Deviation of $R_{100}$ | $\Delta R/R$ | $T_{NTC} = 100^{\circ}\text{C}$ , $R_{100} = 493\ \Omega$     | -5     |      | 5    | %          |
| Power dissipation      | $P_{25}$     | $T_{NTC} = 25^{\circ}\text{C}$                                |        |      | 20   | mW         |
| B-value                | $B_{25/50}$  | $R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298,15\ \text{K}))]$  |        | 3375 |      | K          |
| B-value                | $B_{25/80}$  | $R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298,15\ \text{K}))]$  |        | 3411 |      | K          |
| B-value                | $B_{25/100}$ | $R_2 = R_{25} \exp[B_{25/100}(1/T_2 - 1/(298,15\ \text{K}))]$ |        | 3433 |      | K          |

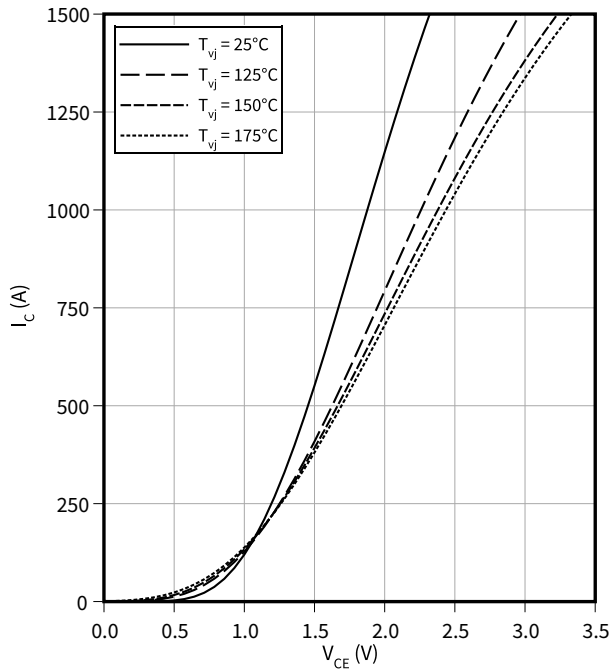
**Note:** For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4

5 Characteristics diagrams

Output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

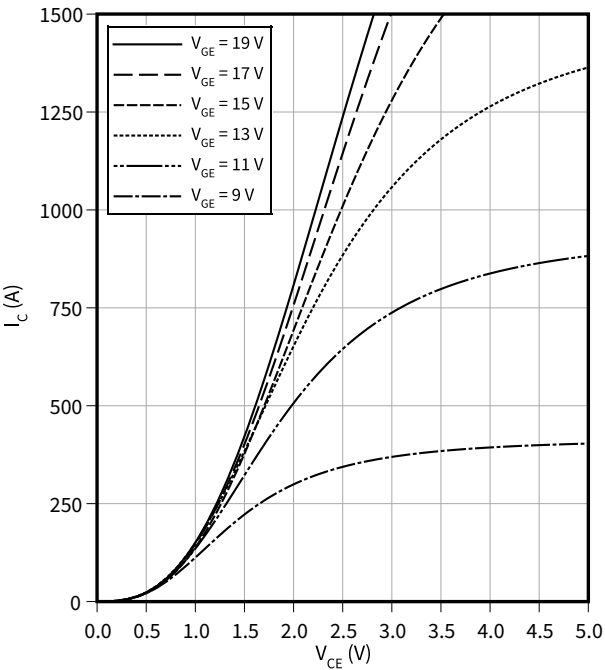
$V_{GE} = 15\text{ V}$



Output characteristic field (typical), IGBT, Inverter

$I_C = f(V_{CE})$

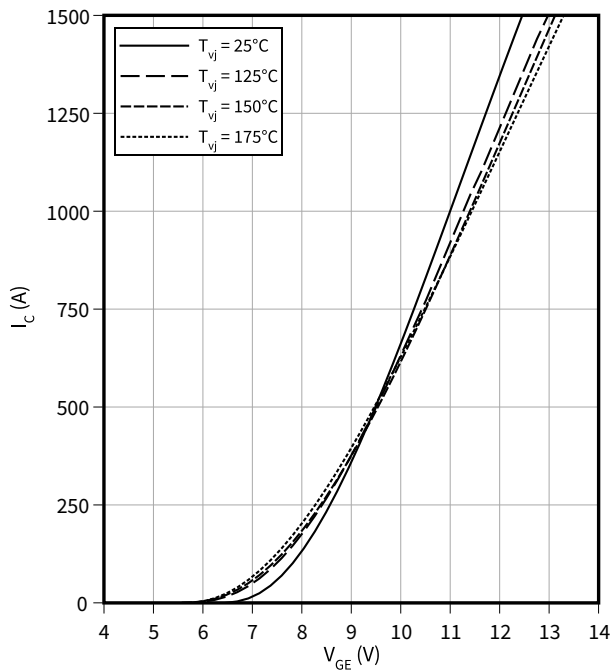
$T_{vj} = 175\text{ °C}$



Transfer characteristic (typical), IGBT, Inverter

$I_C = f(V_{GE})$

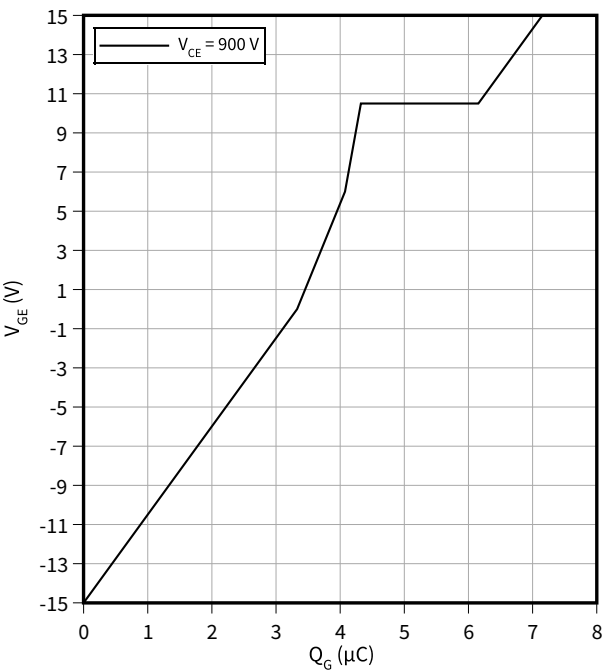
$V_{CE} = 20\text{ V}$



Gate charge characteristic (typical), IGBT, Inverter

$V_{GE} = f(Q_G)$

$I_C = 750\text{ A}, T_{vj} = 25\text{ °C}$

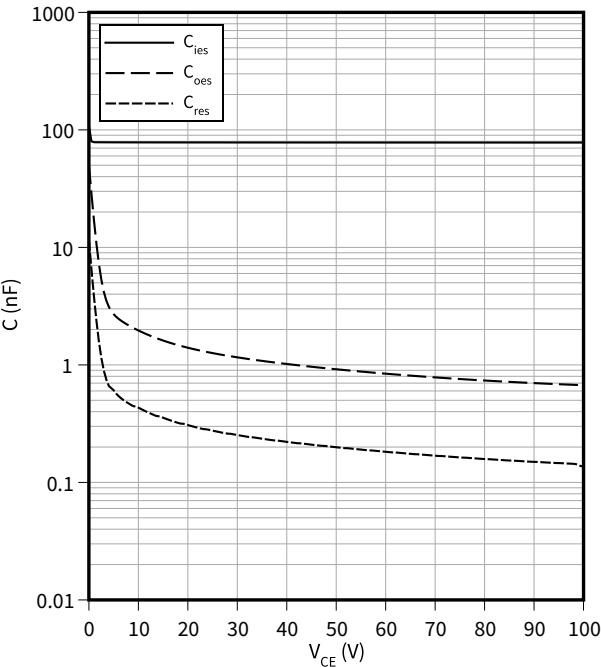




5 Characteristics diagrams

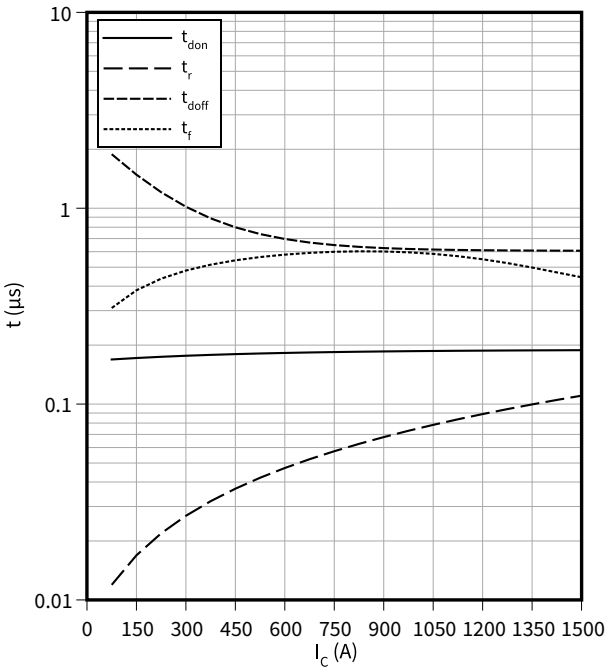
Capacity characteristic (typical), IGBT, Inverter

$C = f(V_{CE})$   
 $f = 100 \text{ kHz}$ ,  $V_{GE} = 0 \text{ V}$ ,  $T_{vj} = 25 \text{ }^{\circ}\text{C}$



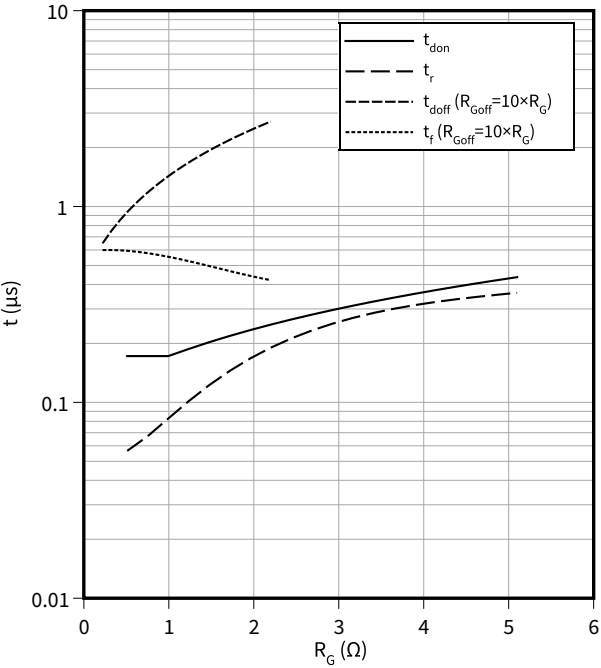
Switching times (typical), IGBT, Inverter

$t = f(I_C)$   
 $R_{Goff} = 2.2 \text{ } \Omega$ ,  $R_{Gon} = 0.51 \text{ } \Omega$ ,  $V_{CC} = 900 \text{ V}$ ,  $V_{GE} = \pm 15 \text{ V}$ ,  $T_{vj} = 175 \text{ }^{\circ}\text{C}$



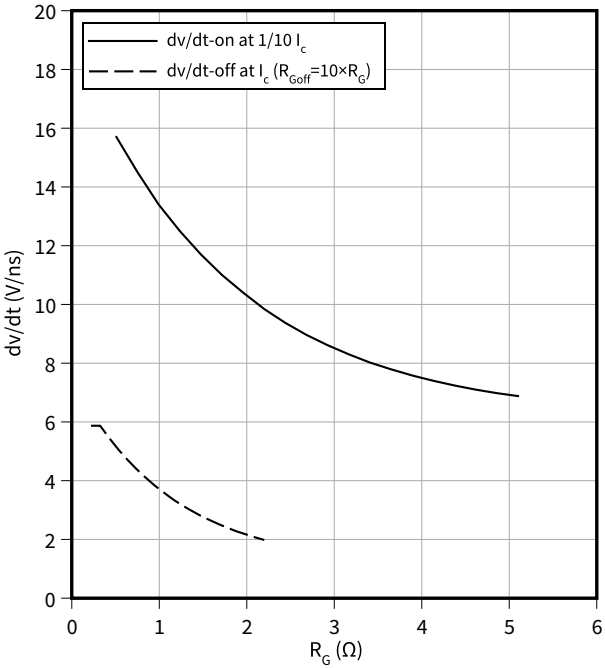
Switching times (typical), IGBT, Inverter

$t = f(R_G)$   
 $I_C = 750 \text{ A}$ ,  $V_{CC} = 900 \text{ V}$ ,  $V_{GE} = \pm 15 \text{ V}$ ,  $T_{vj} = 175 \text{ }^{\circ}\text{C}$



Voltage slope (typical), IGBT, Inverter

$dv/dt = f(R_G)$   
 $V_{CE} = 900 \text{ V}$ ,  $V_{GE} = \pm 15 \text{ V}$ ,  $I_C = 750 \text{ A}$ ,  $T_{vj} = 25 \text{ }^{\circ}\text{C}$

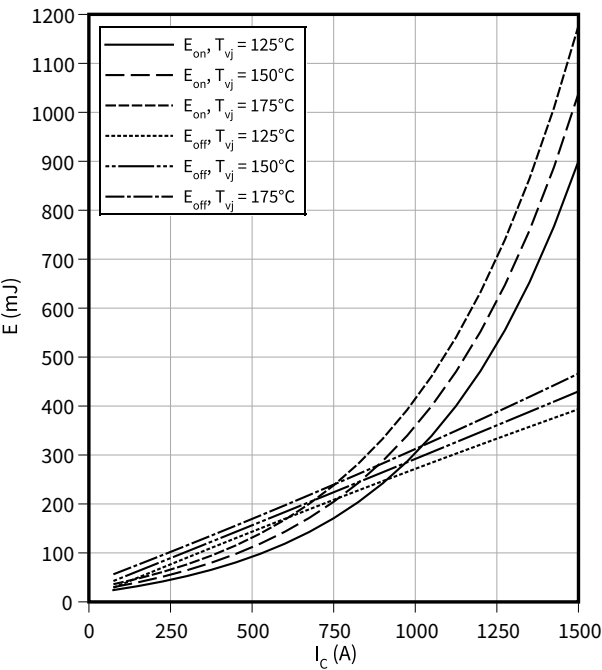


5 Characteristics diagrams

Switching losses (typical), IGBT, Inverter

$E = f(I_C)$

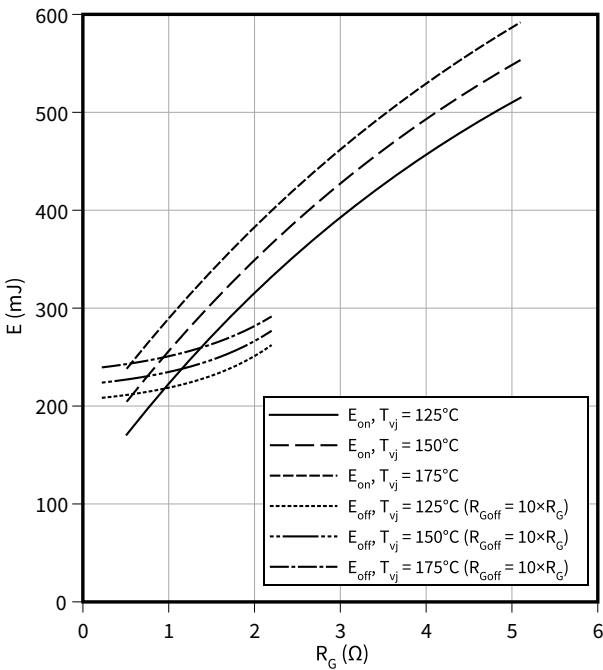
$R_{Goff} = 2.2 \Omega$ ,  $R_{Gon} = 0.51 \Omega$ ,  $V_{CC} = 900 \text{ V}$ ,  $V_{GE} = \pm 15 \text{ V}$



Switching losses (typical), IGBT, Inverter

$E = f(R_G)$

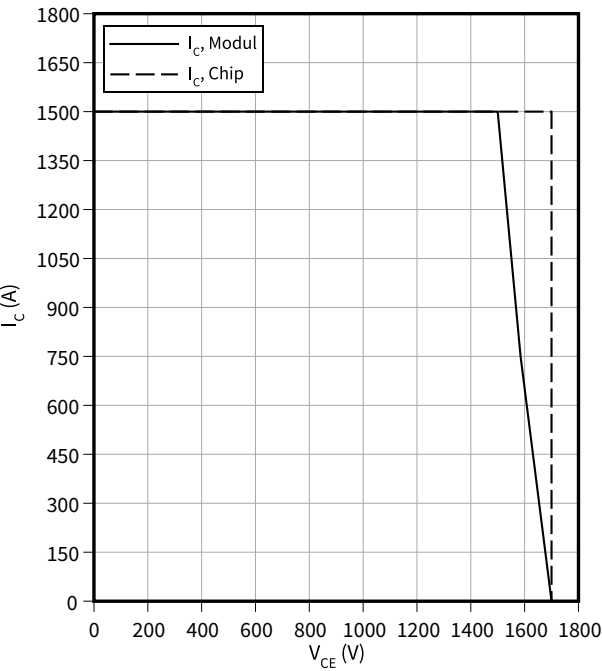
$I_C = 750 \text{ A}$ ,  $V_{CC} = 900 \text{ V}$ ,  $V_{GE} = \pm 15 \text{ V}$



Reverse bias safe operating area (RBSOA), IGBT, Inverter

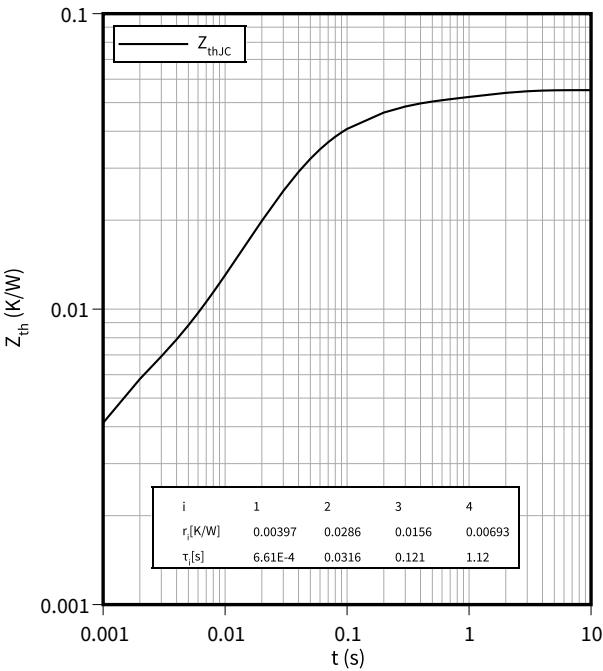
$I_C = f(V_{CE})$

$R_{Goff} = 2.2 \Omega$ ,  $V_{GE} = \pm 15 \text{ V}$ ,  $T_{vj} = 175 \text{ °C}$



Transient thermal impedance, IGBT, Inverter

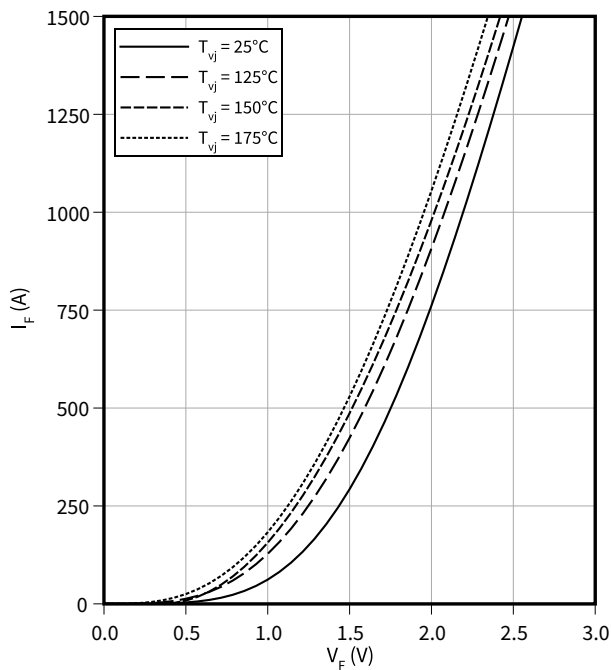
$Z_{th} = f(t)$



5 Characteristics diagrams

Forward characteristic (typical), Diode, Inverter

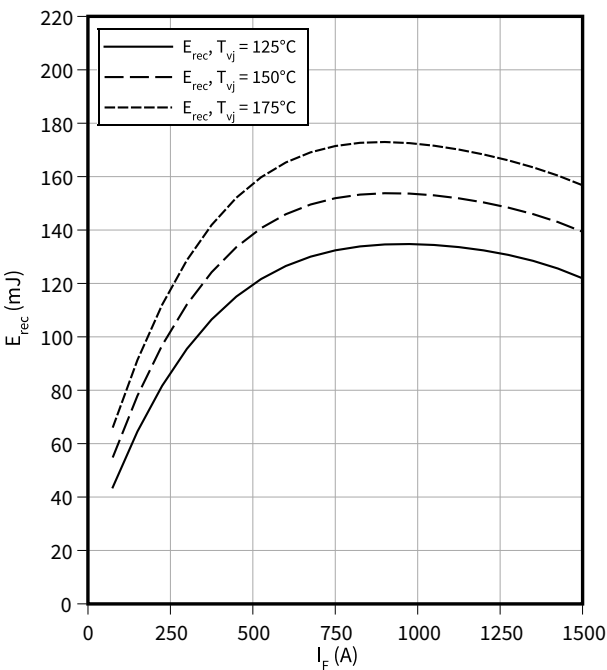
$I_F = f(V_F)$



Switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$

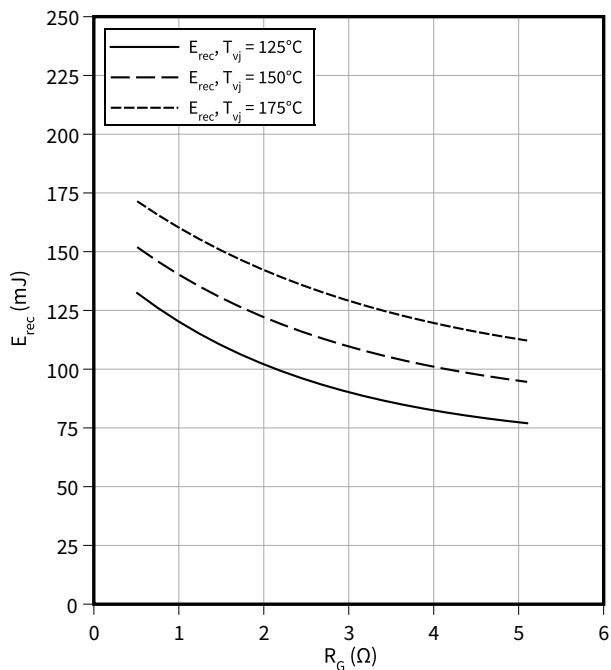
$R_{Gon} = 0.51 \, \Omega$ ,  $V_{CC} = 900 \, \text{V}$



Switching losses (typical), Diode, Inverter

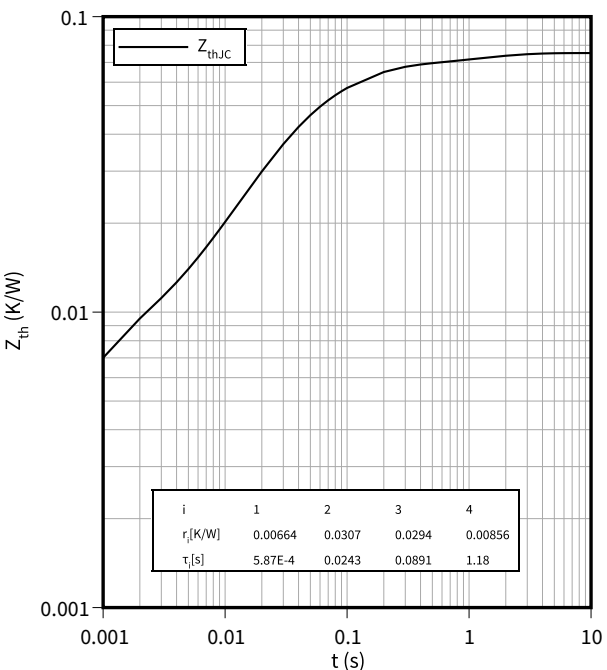
$E_{rec} = f(R_G)$

$I_F = 750 \, \text{A}$ ,  $V_{CC} = 900 \, \text{V}$



Transient thermal impedance, Diode, Inverter

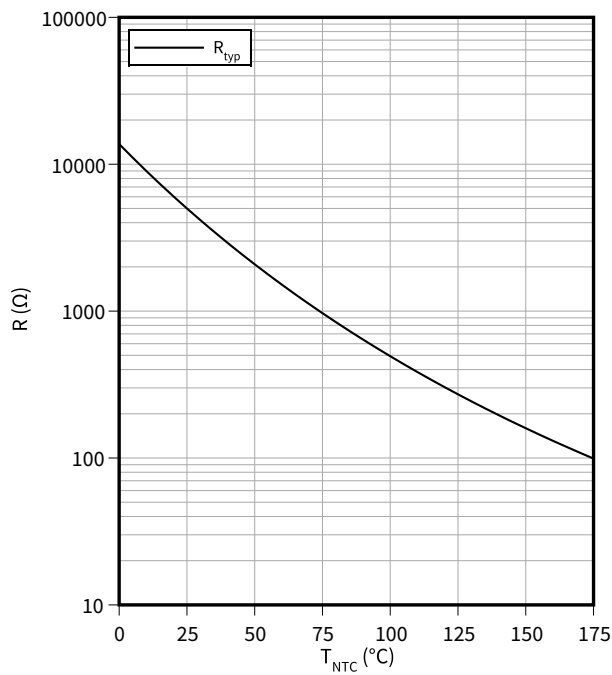
$Z_{th} = f(t)$



5 Characteristics diagrams

Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



6 Circuit diagram

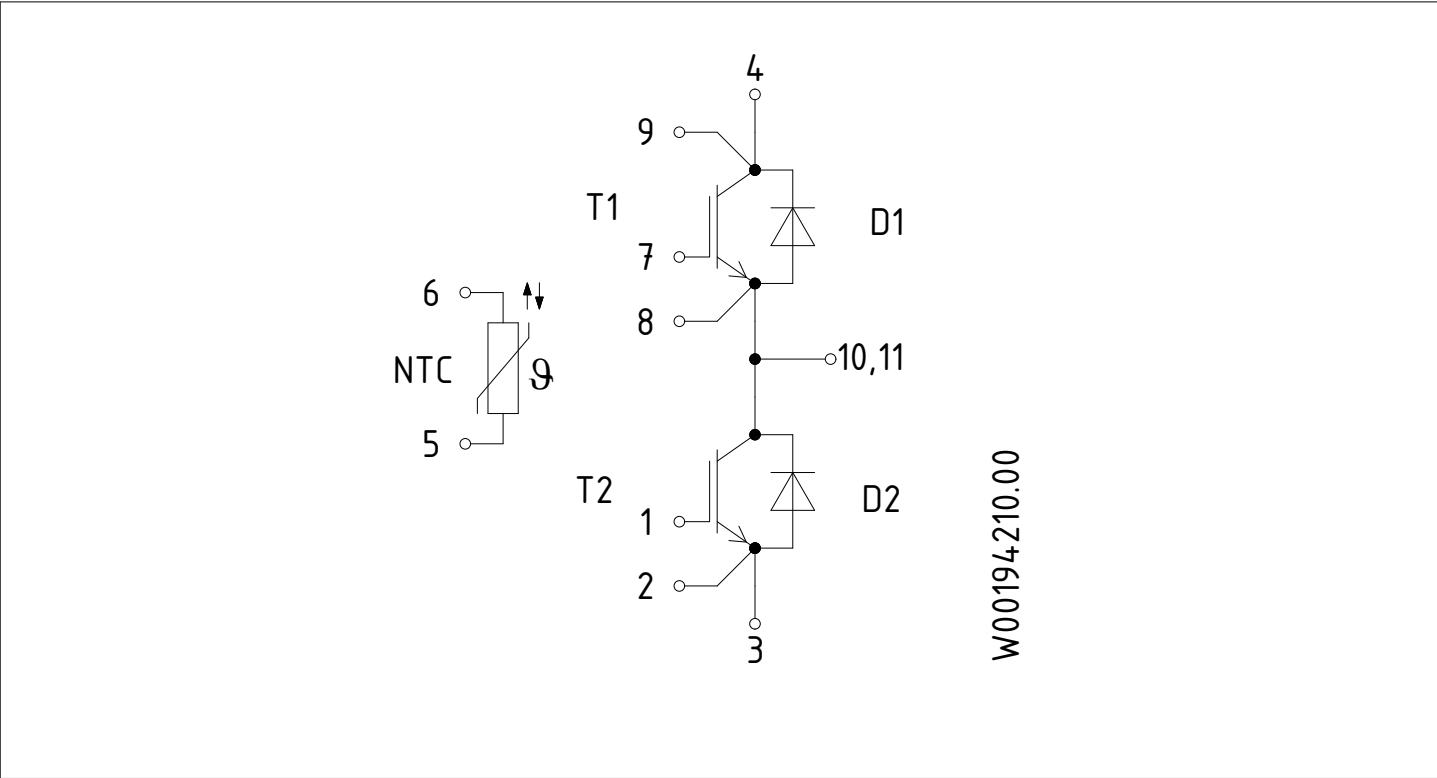


Figure 1



8 Module label code

| Module label code |                                                                                                               |                                                                                                                |                 |
|-------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-----------------|
| Code format       | Data Matrix                                                                                                   |                                                                                                                | Barcode Code128 |
| Encoding          | ASCII text                                                                                                    |                                                                                                                | Code Set A      |
| Symbol size       | 16x16                                                                                                         |                                                                                                                | 23 digits       |
| Standard          | IEC24720 and IEC16022                                                                                         |                                                                                                                | IEC8859-1       |
| Code content      | <i>Content</i>                                                                                                | <i>Digit</i>                                                                                                   | <i>Example</i>  |
|                   | Module serial number                                                                                          | 1 – 5                                                                                                          | 71549           |
|                   | Module material number                                                                                        | 6 - 11                                                                                                         | 142846          |
|                   | Production order number                                                                                       | 12 - 19                                                                                                        | 55054991        |
|                   | Date code (production year)                                                                                   | 20 – 21                                                                                                        | 15              |
|                   | Date code (production week)                                                                                   | 22 – 23                                                                                                        | 30              |
| Example           |                                                                                                               |                                                                                                                |                 |
|                   | <br>71549142846550549911530 | <br>71549142846550549911530 |                 |

Figure 3



Revision history

Revision history

| Document revision | Date of release | Description of changes |
|-------------------|-----------------|------------------------|
| 0.10              | 2021-10-20      | Initial version        |
| 1.00              | 2022-05-06      | Final datasheet        |
| 1.10              | 2024-03-08      | Final datasheet        |



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