## Final datasheet

## EconoPIM™3 module with Trench/Fieldstop IGBT4 and emitter controlled 3 diode and NTC

### Features


- Electrical features
  - $V_{CES}$ = 650 V
  - $I_{C\ nom}$ = 100 A / $I_{CRM}$ = 200 A
  - Increased blocking voltage capability up to 650 V
  - High short-circuit capability
  - $T_{vj,op}$ = 150°C
  - Trench IGBT 4
  - $V_{CE,sat}$ with positive temperature coefficient
- Mechanical features
  - Integrated NTC temperature sensor
  - Copper base plate
  - Solder contact technology
  - Standard housing

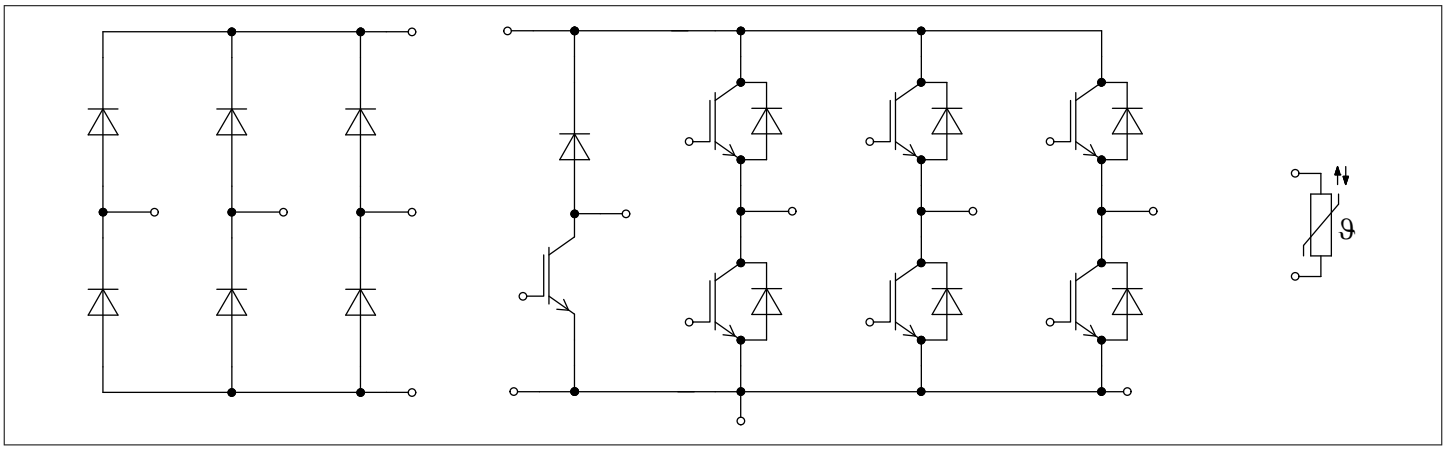
### Potential applications

- Motor drives

### Product validation

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

### Description



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# 1 Package

**Table 1 Insulation coordination**

| Parameter | Symbol | Note or test condition | Values | Unit |
|---|---|---|---|---|
| Isolation test voltage | $V_{ISOL}$ | RMS, f = 50 Hz, *t* = 1 min | 2.5 | kV |
| Material of module baseplate | | | Cu | |
| Internal isolation | | basic insulation (class 1, IEC 61140) | $Al_2O_3$ | |
| Creepage distance | $d_{Creep}$ | terminal to heatsink | 10.0 | mm |
| Clearance | $d_{Clear}$ | terminal to heatsink | 7.5 | mm |
| Comparative tracking index | *CTI* | | > 200 | |

**Table 2 Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Thermal resistance, case to heat sink | $R_{thCH}$ | $\lambda_{grease}$ = 1 W/(m·K) | | | 0.009 | | K/W |
| Stray inductance module | $L_{sCE}$ | | | | 40 | | nH |
| Module lead resistance, terminals - chip | $R_{AA'+CC'}$ | $T_C$ = 25 °C, per switch | | | 2 | | mΩ |
| Module lead resistance, terminals - chip | $R_{CC'+EE'}$ | $T_C$ = 25 °C, per switch | | | 4 | | 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 |
| Weight | *G* | | | | 300 | | g |

***Note**: for operation with Vge= 0V/+15V we recommend a Rgon,min of 24 ohms and a Rgoff,min of 24 ohms (see AN 2006-01)*

# 2 IGBT, Inverter

**Table 3 Maximum rated values**

| Parameter | Symbol | Note or test condition | | Values | Unit |
|---|---|---|---|---|---|
| Collector-emitter voltage | $V_{CES}$ | | $T_{vj}$ = 25 °C | 650 | V |
| Continuous DC collector current | $I_{CDC}$ | $T_{vj\,max}$ = 175 °C | $T_C$ = 70 °C | 100 | A |
| Repetitive peak collector current | $I_{CRM}$ | $t_p$ limited by $T_{vj\,op}$ | | 200 | 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 | $V_{CE\,sat}$ | $I_C$ = 100 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25 °C | | 1.55 | 1.95 | V |
| | | | $T_{vj}$ = 125 °C | | 1.70 | | |
| | | | $T_{vj}$ = 150 °C | | 1.75 | | |
| Gate threshold voltage | $V_{GEth}$ | $I_C$ = 1.6 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25 °C | | 5.05 | 5.80 | 6.45 | V |
| Gate charge | $Q_G$ | $V_{GE}$ = ±15 V | | | 1 | | µC |
| Internal gate resistor | $R_{Gint}$ | $T_{vj}$ = 25 °C | | | 2 | | Ω |
| Input capacitance | $C_{ies}$ | $f$ = 1000 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 6.2 | | nF |
| Reverse transfer capacitance | $C_{res}$ | $f$ = 1000 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 0.19 | | nF |
| Collector-emitter cut-off current | $I_{CES}$ | $V_{CE}$ = 650 V, $V_{GE}$ = 0 V | $T_{vj}$ = 25 °C | | | 1 | mA |
| Gate-emitter leakage current | $I_{GES}$ | $V_{CE}$ = 0 V, $V_{GE}$ = 20 V, $T_{vj}$ = 25 °C | | | | 400 | nA |
| Turn-on delay time (inductive load) | $t_{don}$ | $I_C$ = 100 A, $V_{CC}$ = 300 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 3.3 Ω | $T_{vj}$ = 25 °C | | 0.070 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.080 | | |
| | | | $T_{vj}$ = 150 °C | | 0.080 | | |
| Rise time (inductive load) | $t_r$ | $I_C$ = 100 A, $V_{CC}$ = 300 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 3.3 Ω | $T_{vj}$ = 25 °C | | 0.020 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.020 | | |
| | | | $T_{vj}$ = 150 °C | | 0.020 | | |
| Turn-off delay time (inductive load) | $t_{doff}$ | $I_C$ = 100 A, $V_{CC}$ = 300 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 3.3 Ω | $T_{vj}$ = 25 °C | | 0.260 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.290 | | |
| | | | $T_{vj}$ = 150 °C | | 0.300 | | |
| Fall time (inductive load) | $t_f$ | $I_C$ = 100 A, $V_{CC}$ = 300 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 3.3 Ω | $T_{vj}$ = 25 °C | | 0.070 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.070 | | |
| | | | $T_{vj}$ = 150 °C | | 0.070 | | |
| Turn-on energy loss per pulse | $E_{on}$ | $I_C$ = 100 A, $V_{CC}$ = 300 V, $L_\sigma$ = 30 nH, $V_{GE}$ = ±15 V, $R_{Gon}$ = 3.3 Ω, di/dt = 5100 A/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 0.33 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 0.77 | | |
| | | | $T_{vj}$ = 150 °C | | 0.88 | | |
| Turn-off energy loss per pulse | $E_{off}$ | $I_C$ = 100 A, $V_{CC}$ = 300 V, $L_\sigma$ = 30 nH, $V_{GE}$ = ±15 V, $R_{Goff}$ = 3.3 Ω, dv/dt = 4000 V/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 3.5 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 4.7 | | |
| | | | $T_{vj}$ = 150 °C | | 4.9 | | |

**(table continues...)**

**Table 4 (continued) Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| SC data | $I_{SC}$ | $V_{GE} \le 15$ V, $V_{CC} = 360$ V, $V_{CEmax}=V_{CES}-L_{sCE}*di/dt$ | $t_P \le 10$ µs, $T_{vj}=25$ °C | | 480 | | A |
| | | | $t_P \le 10$ µs, $T_{vj}=150$ °C | | 380 | | |
| Thermal resistance, junction to case | $R_{thJC}$ | per IGBT | | | | 0.450 | K/W |
| Thermal resistance, case to heat sink | $R_{thCH}$ | per IGBT, $\lambda_{grease} = 1$ W/(m·K) | | | 0.140 | | K/W |
| Temperature under switching conditions | $T_{vj\,op}$ | | | -40 | | 150 | °C |

# 3 Diode, Inverter

**Table 5 Maximum rated values**

| Parameter | Symbol | Note or test condition | | Values | Unit |
|---|---|---|---|---|---|
| Repetitive peak reverse voltage | $V_{RRM}$ | | $T_{vj} = 25$ °C | 650 | V |
| Continuous DC forward current | $I_F$ | | | 100 | A |
| Repetitive peak forward current | $I_{FRM}$ | $t_P = 1$ ms | | 200 | A |
| $I^2t$ - value | $I^2t$ | $t_P = 10$ ms, $V_R = 0$ V | $T_{vj} = 125$ °C | 1100 | $A^2s$ |
| | | | $T_{vj} = 150$ °C | 990 | |

**Table 6 Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Forward voltage | $V_F$ | $I_F = 100$ A, $V_{GE} = 0$ V | $T_{vj} = 25$ °C | | 1.55 | 1.95 | V |
| | | | $T_{vj} = 125$ °C | | 1.50 | | |
| | | | $T_{vj} = 150$ °C | | 1.45 | | |
| Peak reverse recovery current | $I_{RM}$ | $V_{CC} = 300$ V, $I_F = 100$ A, $V_{GE} = -15$ V, $-di_F/dt = 5100$ A/µs ($T_{vj} = 150$ °C) | $T_{vj} = 25$ °C | | 130 | | A |
| | | | $T_{vj} = 125$ °C | | 150 | | |
| | | | $T_{vj} = 150$ °C | | 160 | | |
| Recovered charge | $Q_r$ | $V_{CC} = 300$ V, $I_F = 100$ A, $V_{GE} = -15$ V, $-di_F/dt = 5100$ A/µs ($T_{vj} = 150$ °C) | $T_{vj} = 25$ °C | | 4 | | µC |
| | | | $T_{vj} = 125$ °C | | 8 | | |
| | | | $T_{vj} = 150$ °C | | 10 | | |

**(table continues...)**

**Table 6 (continued) Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Reverse recovery energy | $E_{rec}$ | $V_{CC}$ = 300 V, $I_F$ = 100 A, $V_{GE}$ = -15 V, -di$_F$/dt = 5100 A/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 1.3 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 2.25 | | |
| | | | $T_{vj}$ = 150 °C | | 2.75 | | |
| Thermal resistance, junction to case | $R_{thJC}$ | per diode | | | | 0.800 | K/W |
| Thermal resistance, case to heat sink | $R_{thCH}$ | per diode, $\lambda_{grease}$ = 1 W/(m·K) | | | 0.250 | | K/W |
| Temperature under switching conditions | $T_{vj\,op}$ | | | -40 | | 150 | °C |

# 4 Diode, Rectifier

**Table 7 Maximum rated values**

| Parameter | Symbol | Note or test condition | | Values | Unit |
|---|---|---|---|---|---|
| Repetitive peak reverse voltage | $V_{RRM}$ | | $T_{vj}$ = 25 °C | 1600 | V |
| Maximum RMS forward current per chip | $I_{FRMSM}$ | $T_C$ = 80 °C | | 100 | A |
| Maximum RMS current at rectifier output | $I_{RMSM}$ | $T_C$ = 80 °C | | 150 | A |
| Surge forward current | $I_{FSM}$ | $t_P$ = 10 ms | $T_{vj}$ = 25 °C | 740 | A |
| | | | $T_{vj}$ = 150 °C | 580 | |
| $I^2t$ - value | $I^2t$ | $t_P$ = 10 ms | $T_{vj}$ = 25 °C | 2750 | $A^2s$ |
| | | | $T_{vj}$ = 150 °C | 1700 | |

**Table 8 Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Forward voltage | $V_F$ | $I_F$ = 100 A | $T_{vj}$ = 150 °C | | 1.10 | | V |
| Reverse current | $I_r$ | $T_{vj}$ = 150 °C, $V_R$ = 1600 V | | | 1 | | mA |
| Thermal resistance, junction to case | $R_{thJC}$ | per diode | | | | 0.500 | K/W |
| Thermal resistance, case to heat sink | $R_{thCH}$ | per diode, $\lambda_{grease}$ = 1 W/(m·K) | | | 0.160 | | K/W |
| Temperature under switching conditions | $T_{vj,\,op}$ | | | -40 | | 150 | °C |

# 5 IGBT, Brake-Chopper

**Table 9 Maximum rated values**

| Parameter | Symbol | Note or test condition | | Values | Unit |
|---|---|---|---|---|---|
| Collector-emitter voltage | $V_{CES}$ | | $T_{vj}$ = 25 °C | 650 | V |
| Continuous DC collector current | $I_{CDC}$ | $T_{vj\,max}$ = 175 °C | $T_C$ = 80 °C | 75 | A |
| Repetitive peak collector current | $I_{CRM}$ | $t_p$ limited by $T_{vj\,op}$ | | 150 | A |
| Gate-emitter peak voltage | $V_{GES}$ | | | ±20 | V |

**Table 10 Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Collector-emitter saturation voltage | $V_{CE\,sat}$ | $I_C$ = 75 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25 °C | | 1.55 | 1.95 | V |
| | | | $T_{vj}$ = 125 °C | | 1.70 | | |
| | | | $T_{vj}$ = 150 °C | | 1.75 | | |
| Gate threshold voltage | $V_{GEth}$ | $I_C$ = 1.2 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25 °C | | 5 | 5.80 | 6.5 | V |
| Gate charge | $Q_G$ | $V_{GE}$ = ±15 V | | | 0.75 | | µC |
| Internal gate resistor | $R_{Gint}$ | $T_{vj}$ = 25 °C | | | 0 | | Ω |
| Input capacitance | $C_{ies}$ | $f$ = 1000 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 4.6 | | nF |
| Reverse transfer capacitance | $C_{res}$ | $f$ = 1000 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 0.145 | | nF |
| Collector-emitter cut-off current | $I_{CES}$ | $V_{CE}$ = 650 V, $V_{GE}$ = 0 V | $T_{vj}$ = 25 °C | | | 1 | mA |
| Gate-emitter leakage current | $I_{GES}$ | $V_{CE}$ = 0 V, $V_{GE}$ = 20 V, $T_{vj}$ = 25 °C | | | | 400 | nA |
| Turn-on delay time (inductive load) | $t_{don}$ | $I_C$ = 75 A, $V_{CC}$ = 300 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 5.1 Ω | $T_{vj}$ = 25 °C | | 0.025 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.025 | | |
| | | | $T_{vj}$ = 150 °C | | 0.025 | | |
| Rise time (inductive load) | $t_r$ | $I_C$ = 75 A, $V_{CC}$ = 300 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 5.1 Ω | $T_{vj}$ = 25 °C | | 0.020 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.020 | | |
| | | | $T_{vj}$ = 150 °C | | 0.020 | | |
| Turn-off delay time (inductive load) | $t_{doff}$ | $I_C$ = 75 A, $V_{CC}$ = 300 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 5.1 Ω | $T_{vj}$ = 25 °C | | 0.210 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.240 | | |
| | | | $T_{vj}$ = 150 °C | | 0.250 | | |

**(table continues...)**

**Table 10 (continued) Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Fall time (inductive load) | $t_f$ | $I_C$ = 75 A, $V_{CC}$ = 300 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 5.1 Ω | $T_{vj}$ = 25 °C | | 0.060 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.070 | | |
| | | | $T_{vj}$ = 150 °C | | 0.070 | | |
| Turn-on energy loss per pulse | $E_{on}$ | $I_C$ = 75 A, $V_{CC}$ = 300 V, $L_\sigma$ = 30 nH, $V_{GE}$ = ±15 V, $R_{Gon}$ = 5.1 Ω, di/dt = 4000 A/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 0.385 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 0.55 | | |
| | | | $T_{vj}$ = 150 °C | | 0.66 | | |
| Turn-off energy loss per pulse | $E_{off}$ | $I_C$ = 75 A, $V_{CC}$ = 300 V, $L_\sigma$ = 30 nH, $V_{GE}$ = ±15 V, $R_{Goff}$ = 5.1 Ω, dv/dt = 4000 V/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 3.35 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 3.9 | | |
| | | | $T_{vj}$ = 150 °C | | 4.2 | | |
| SC data | $I_{SC}$ | $V_{GE}$ ≤ 15 V, $V_{CC}$ = 360 V, $V_{CEmax}$=$V_{CES}$-$L_{sCE}$*di/dt | $t_P$ ≤ 10 µs, $T_{vj}$=25 °C | | 360 | | A |
| | | | $t_P$ ≤ 10 µs, $T_{vj}$=150 °C | | 290 | | |
| Thermal resistance, junction to case | $R_{thJC}$ | per IGBT | | | | 0.600 | K/W |
| Thermal resistance, case to heat sink | $R_{thCH}$ | per IGBT, $\lambda_{grease}$ = 1 W/(m·K) | | | 0.190 | | K/W |
| Temperature under switching conditions | $T_{vj\,op}$ | | | -40 | | 150 | °C |

# 6 Diode, Brake-Chopper

**Table 11 Maximum rated values**

| Parameter | Symbol | Note or test condition | | Values | Unit |
|---|---|---|---|---|---|
| Repetitive peak reverse voltage | $V_{RRM}$ | | $T_{vj}$ = 25 °C | 650 | V |
| Continuous DC forward current | $I_F$ | | | 30 | A |
| Repetitive peak forward current | $I_{FRM}$ | $t_P$ = 1 ms | | 60 | A |
| $I^2t$ - value | $I^2t$ | $t_P$ = 10 ms, $V_R$ = 0 V | $T_{vj}$ = 125 °C | 90 | $A^2s$ |
| | | | $T_{vj}$ = 150 °C | 82 | |

**Table 12 Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Forward voltage | $V_F$ | $I_F$ = 30 A, $V_{GE}$ = 0 V | $T_{vj}$ = 25 °C | | 1.60 | 2.00 | V |
| | | | $T_{vj}$ = 125 °C | | 1.55 | | |
| | | | $T_{vj}$ = 150 °C | | 1.50 | | |
| Peak reverse recovery current | $I_{RM}$ | $V_{CC}$ = 300 V, $I_F$ = 30 A, -di$_F$/dt = 600 A/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 22 | | A |
| | | | $T_{vj}$ = 125 °C | | 24 | | |
| | | | $T_{vj}$ = 150 °C | | 27 | | |
| Recovered charge | $Q_r$ | $V_{CC}$ = 300 V, $I_F$ = 30 A, -di$_F$/dt = 600 A/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 1.15 | | µC |
| | | | $T_{vj}$ = 125 °C | | 2.3 | | |
| | | | $T_{vj}$ = 150 °C | | 2.7 | | |
| Reverse recovery energy | $E_{rec}$ | $V_{CC}$ = 300 V, $I_F$ = 30 A, -di$_F$/dt = 600 A/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 0.12 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 0.3 | | |
| | | | $T_{vj}$ = 150 °C | | 0.36 | | |
| Thermal resistance, junction to case | $R_{thJC}$ | per diode | | | | 1.80 | K/W |
| Thermal resistance, case to heat sink | $R_{thCH}$ | per diode, $\lambda_{grease}$ = 1 W/(m·K) | | | 0.570 | | K/W |
| Temperature under switching conditions | $T_{vj\,op}$ | | | -40 | | 150 | °C |

# 7 NTC-Thermistor

**Table 13 Characteristic values**

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

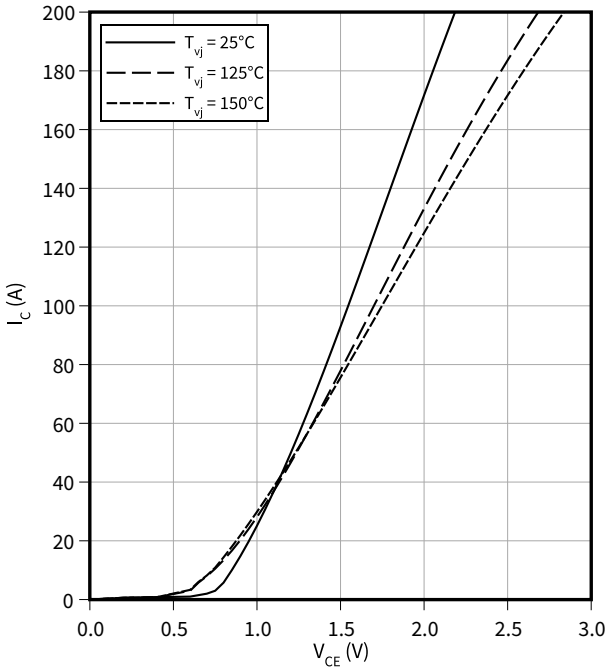
***Note**: Specification according to the valid application note.*

# 8 Characteristics diagrams

**Output characteristic (typical), IGBT, Inverter**

$I_C = f(V_{CE})$

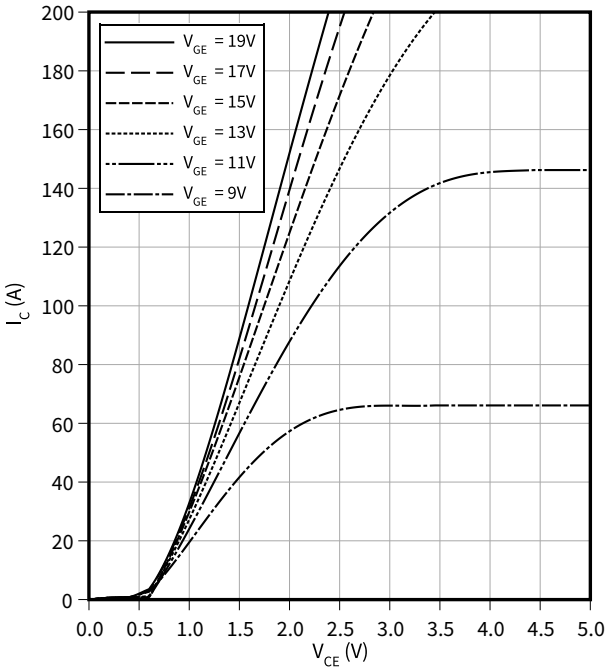
$V_{GE} = 15$ V




**Output characteristic field (typical), IGBT, Inverter**

$I_C = f(V_{CE})$

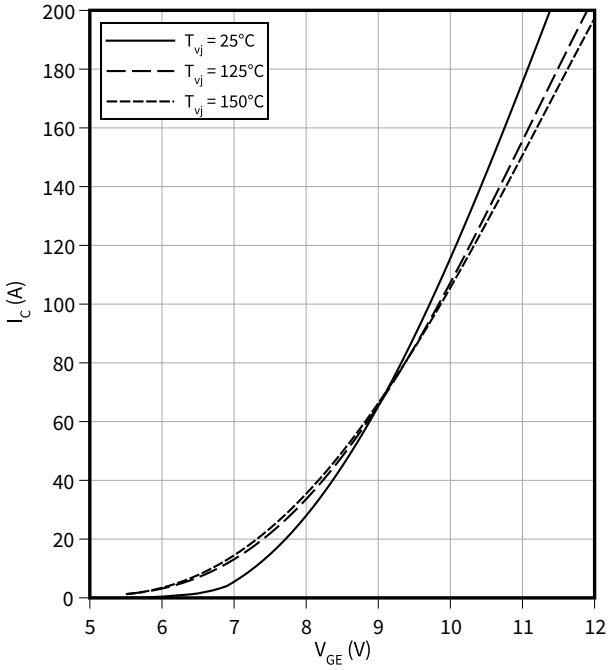
$T_{vj} = 150$ °C




**Transfer characteristic (typical), IGBT, Inverter**

$I_C = f(V_{GE})$

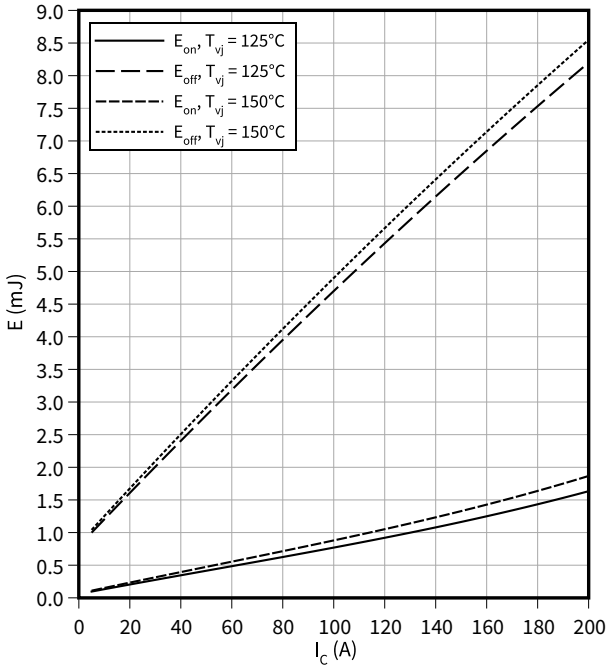
$V_{CE} = 20$ V




**Switching losses (typical), IGBT, Inverter**

$E = f(I_C)$

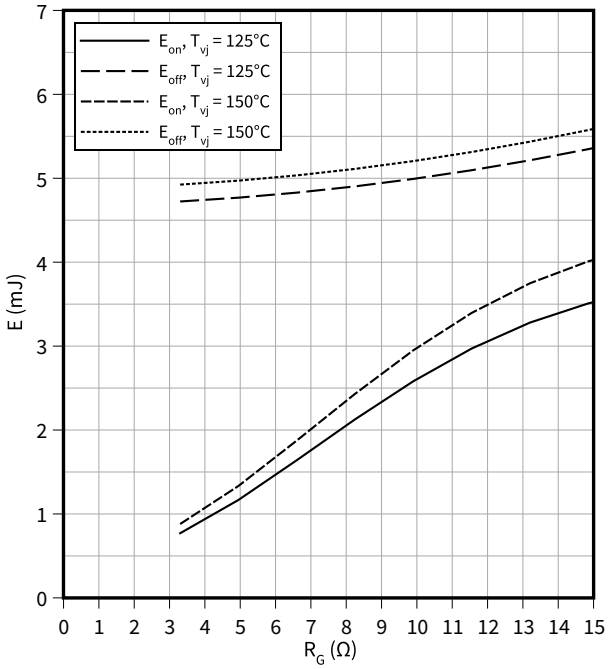
$R_{Goff} = 3.3\ \Omega$, $R_{Gon} = 3.3\ \Omega$, $V_{GE} = \pm 15$ V, $V_{CC} = 300$ V



### Switching losses (typical), IGBT, Inverter

$E = f(R_G)$

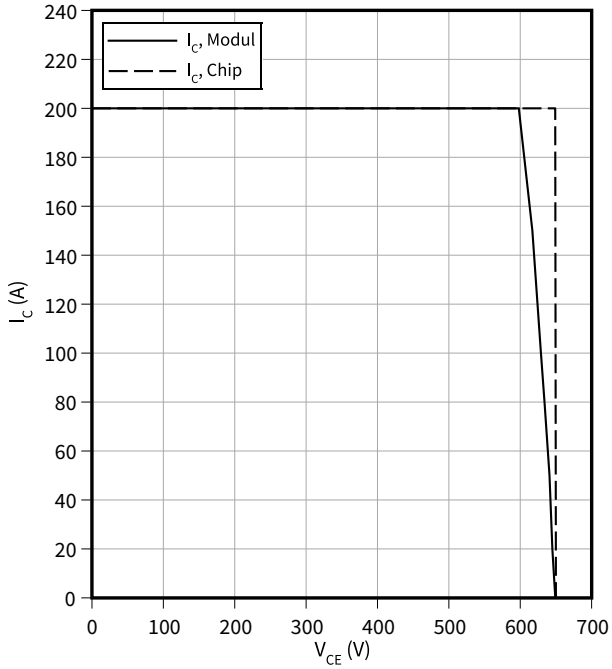
$V_{GE} = \pm 15$ V, $I_C = 100$ A, $V_{CC} = 300$ V




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

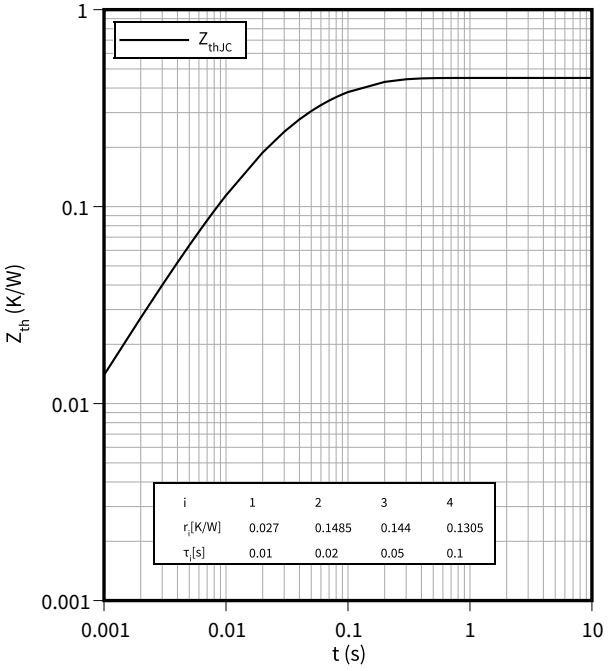
$I_C = f(V_{CE})$

$R_{Goff} = 3.3\ \Omega$, $V_{GE} = \pm 15$ V, $T_{vj} = 150$ °C



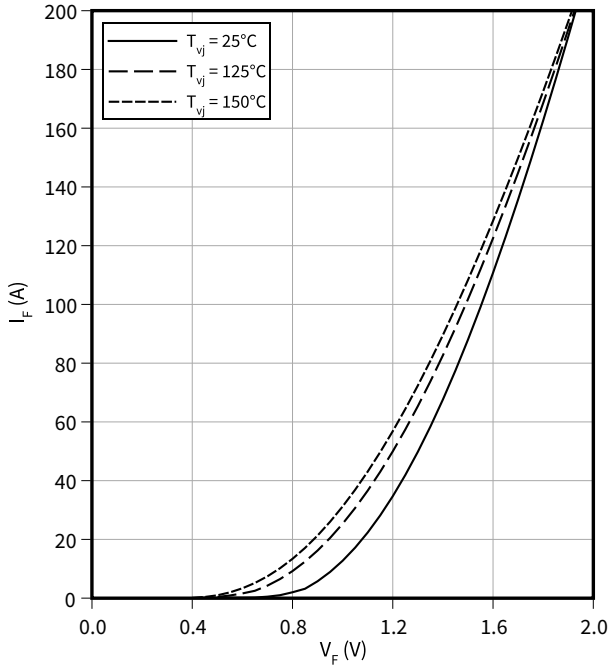

### Transient thermal impedance, IGBT, Inverter

$Z_{th} = f(t)$




### Forward characteristic (typical), Diode, Inverter

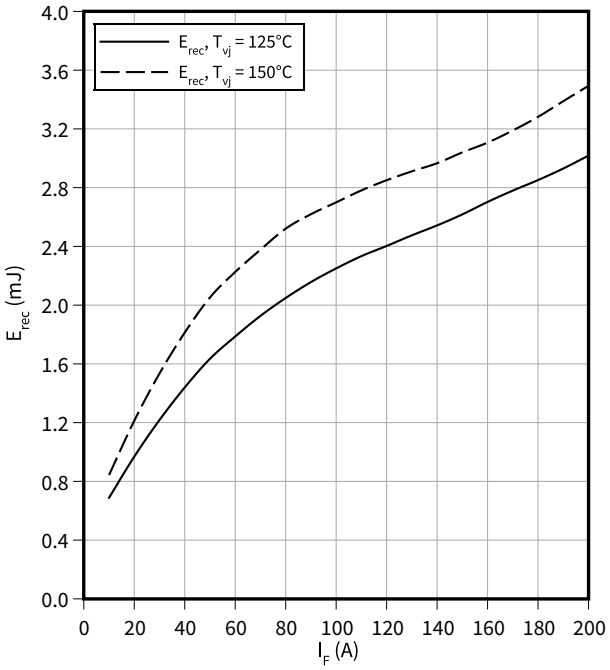
$I_F = f(V_F)$



### Switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$

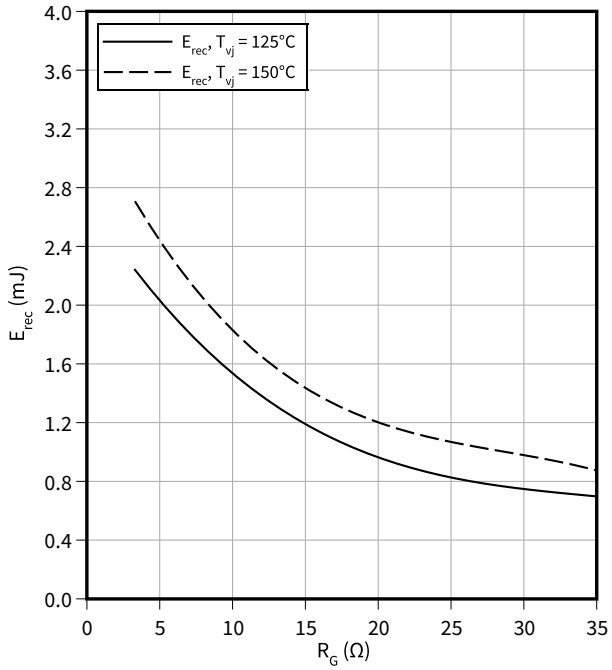
$V_{CE} = 300\ V$, $R_{Gon} = R_{Gon}(IGBT)$




### Switching losses (typical), Diode, Inverter

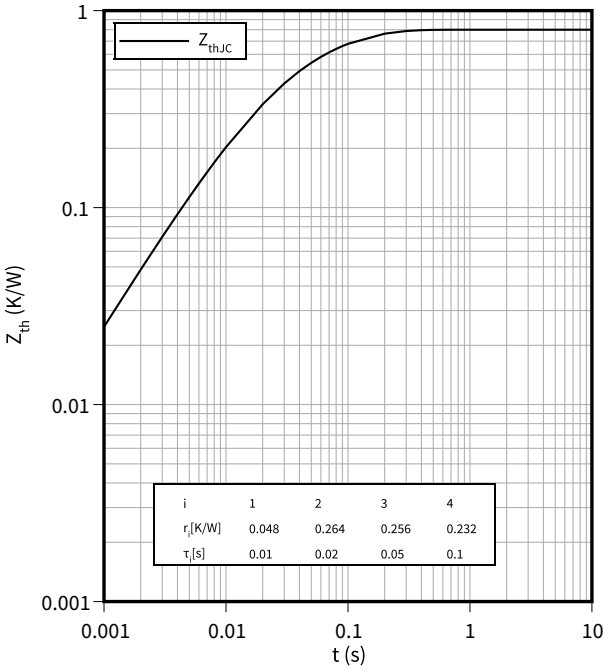
$E_{rec} = f(R_G)$

$V_{CE} = 300\ V$, $I_F = 100\ A$



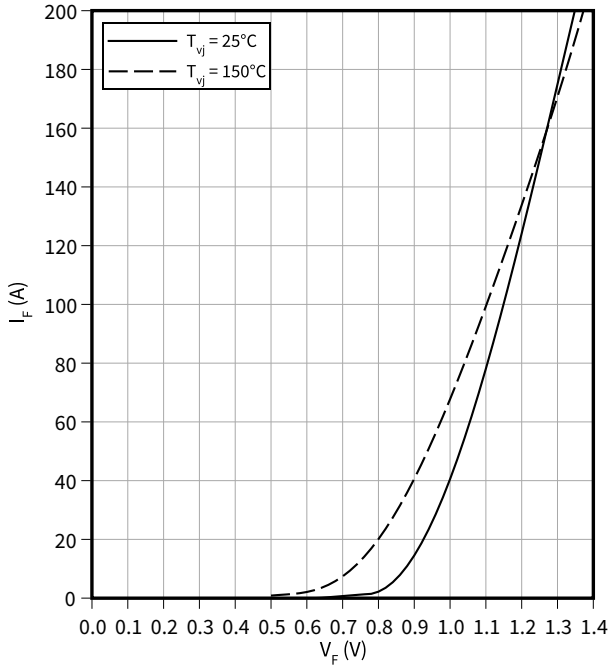

### Transient thermal impedance, Diode, Inverter

$Z_{th} = f(t)$




### Forward characteristic (typical), Diode, Rectifier

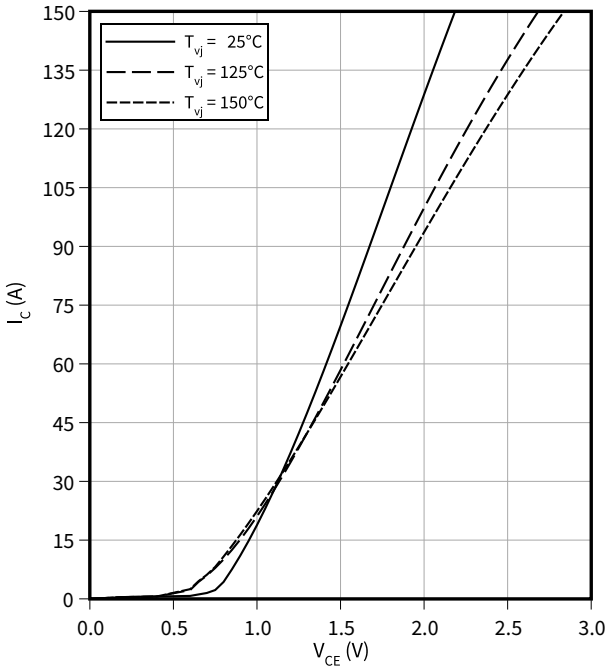
$I_F = f(V_F)$



### Output characteristic (typical), IGBT, Brake-Chopper

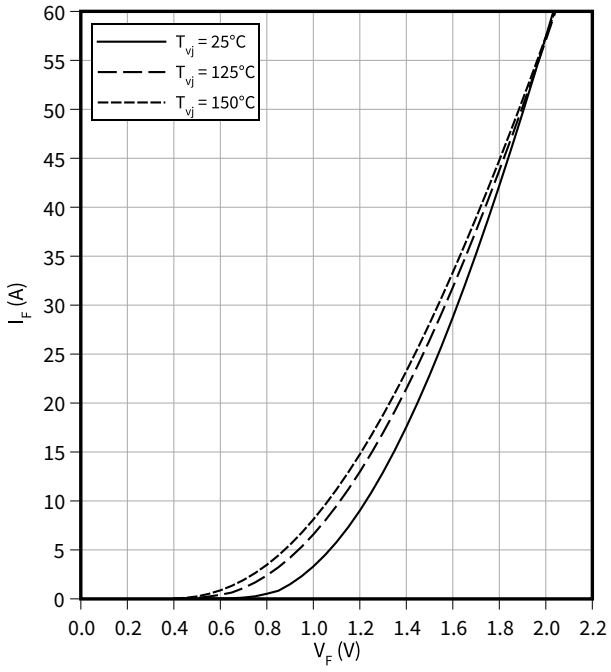
$I_C = f(V_{CE})$

$V_{GE} = 15$ V



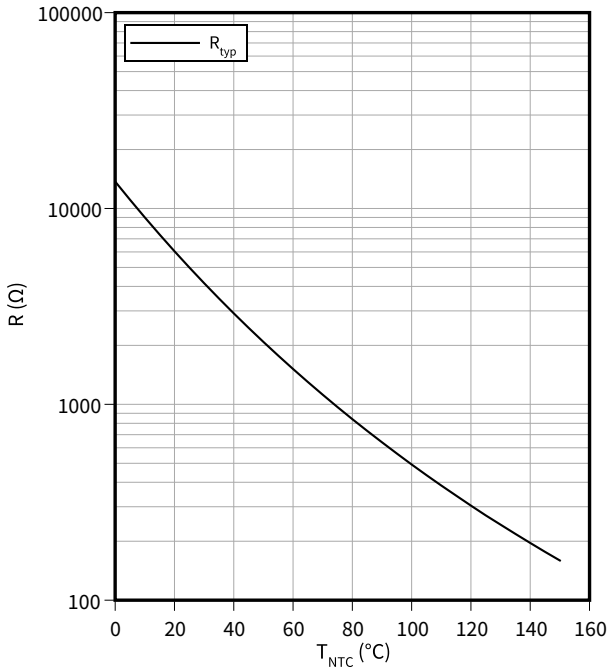

### Forward characteristic (typical), Diode, Brake-Chopper

$I_F = f(V_F)$




### Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



# 9 Circuit diagram

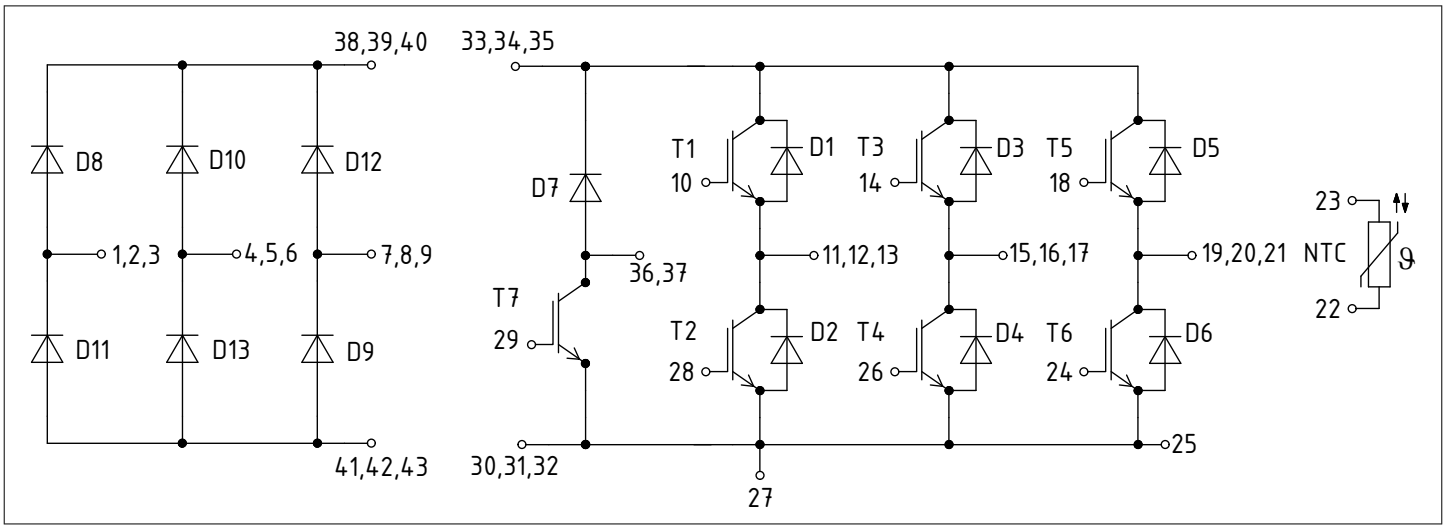



**Figure 1**

# 10 Package outlines

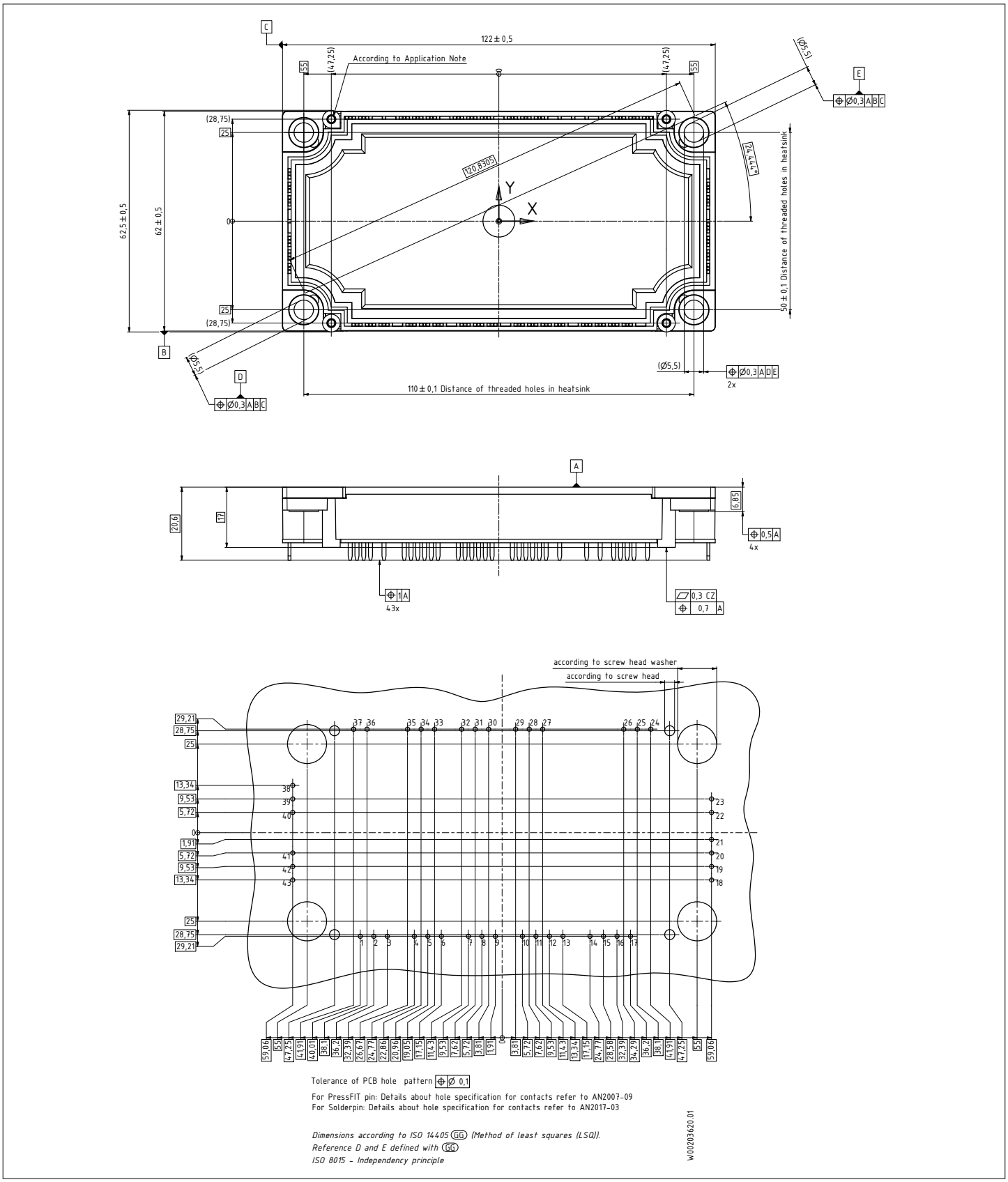



**Figure 2**

# 11 Module label code

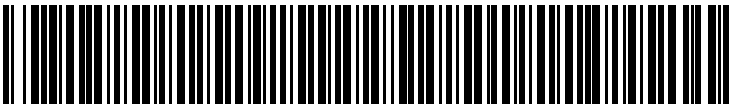
| **Module label code** | | | |
|---|---|---|---|
| Code format | Data Matrix | | Barcode Code128 |
| Encoding | ASCII text | | Code Set A |
| Symbol size | 16x16 | | 23 digits |
| Standard | IEC24720 and IEC16022 | | IEC8859-1 |
| Code content | *Content*<br>Module serial number<br>Module material number<br>Production order number<br>Date code (production year)<br>Date code (production week) | *Digit*<br>1 – 5<br>6 - 11<br>12 - 19<br>20 – 21<br>22 – 23 | *Example*<br>71549<br>142846<br>55054991<br>15<br>30 |
| Example |  7154914284655054991530 | |  7154914284655054991530 |

**Figure 3**

## Revision history

| Document revision | Date of release | Description of changes |
|---|---|---|
| V2.0 | 2011-04-19 | Preliminary datasheet |
| V2.1 | 2012-09-12 | Preliminary datasheet |
| V3.0 | 2020-04-01 | Final datasheet |
| n/a | 2020-09-01 | Datasheet migrated to a new system with a new layout and new revision number schema: target or preliminary datasheet = 0.xy; final datasheet = 1.xy |
| 1.10 | 2024-08-27 | Final datasheet |

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