## Preliminary datasheet
## EconoPIM™2 module with TRENCHSTOP™IGBT7 and Emitter Controlled 7 diode and NTC

### Features




- Electrical features
  - $V_{CES}$ = 1200 V
  - $I_{C\ nom}$ = 100 A / $I_{CRM}$ = 200 A
  - Low $V_{CEsat}$
  - Overload operation up to 175°C
  - TRENCHSTOP™ IGBT7
- Mechanical features
  - $Al_2O_3$ substrate with low thermal resistance
  - Copper base plate
  - Integrated NTC temperature sensor
  - Solder contact technology

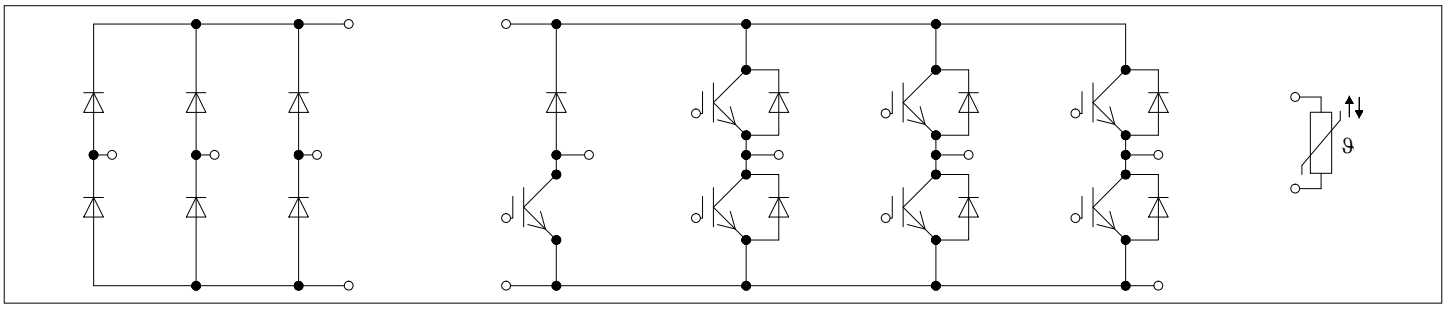
### Potential applications

- Servo drives
- Auxiliary inverters
- 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 | |
| RTI Elec. | *RTI* | housing | 140 | °C |

**Table 2 Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Stray inductance module | $L_{sCE}$ | | | | 35 | | nH |
| Module lead resistance, terminals - chip | $R_{AA'+CC'}$ | $T_C$=25°C, per switch | | | 2.5 | | mΩ |
| Module lead resistance, terminals - chip | $R_{CC'+EE'}$ | $T_C$=25°C, per switch | | | 4.3 | | mΩ |
| Storage temperature | $T_{stg}$ | | | -40 | | 125 | °C |
| Mounting torque for modul mounting | *M* | - Mounting according to valid application note | M5, Screw | 3 | | 6 | Nm |
| Weight | *G* | | | | 180 | | g |

*Note: The current under continuous operation is limited to 80A rms in the main AC and DC power terminals and limited to 50A rms per connector pin.*

# 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 | 1200 | V |
| Continous DC collector current | $I_{CDC}$ | $T_{vj\,max}$ = 175 °C | $T_C$ = 95 °C | 100 | A |
| Repetitive peak collector current | $I_{CRM}$ | $t_P$ = 1 ms | | 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 | | 1.50 | TBD | V |
| | | | $T_{vj}$ = 125 °C | | 1.64 | | |
| | | | $T_{vj}$ = 175 °C | | 1.72 | | |
| Gate threshold voltage | $V_{GEth}$ | $I_C$ = 2.5 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25 °C | | 5.15 | 5.80 | 6.45 | V |
| Gate charge | $Q_G$ | $V_{GE}$ = ±15 V, $V_{CE}$ = 600 V | | | 1.8 | | µC |
| Internal gate resistor | $R_{Gint}$ | $T_{vj}$ = 25 °C | | | 1.5 | | Ω |
| Input capacitance | $C_{ies}$ | $f$ = 100 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 21.7 | | nF |
| Reverse transfer capacitance | $C_{res}$ | $f$ = 100 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 0.076 | | nF |
| Collector-emitter cut-off current | $I_{CES}$ | $V_{CE}$ = 1200 V, $V_{GE}$ = 0 V | $T_{vj}$ = 25 °C | | | 0.01 | mA |
| Gate-emitter leakage current | $I_{GES}$ | $V_{CE}$ = 0 V, $V_{GE}$ = 20 V, $T_{vj}$ = 25 °C | | | | 100 | nA |
| Turn-on delay time (inductive load) | $t_{don}$ | $I_C$ = 100 A, $V_{CE}$ = 600 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 4.3 Ω | $T_{vj}$ = 25 °C | | 0.171 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.185 | | |
| | | | $T_{vj}$ = 175 °C | | 0.190 | | |
| Rise time (inductive load) | $t_r$ | $I_C$ = 100 A, $V_{CE}$ = 600 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 4.3 Ω | $T_{vj}$ = 25 °C | | 0.050 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.055 | | |
| | | | $T_{vj}$ = 175 °C | | 0.058 | | |
| Turn-off delay time (inductive load) | $t_{doff}$ | $I_C$ = 100 A, $V_{CE}$ = 600 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 4.3 Ω | $T_{vj}$ = 25 °C | | 0.324 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.433 | | |
| | | | $T_{vj}$ = 175 °C | | 0.494 | | |
| Fall time (inductive load) | $t_f$ | $I_C$ = 100 A, $V_{CE}$ = 600 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 4.3 Ω | $T_{vj}$ = 25 °C | | 0.093 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.183 | | |
| | | | $T_{vj}$ = 175 °C | | 0.245 | | |
| Turn-on energy loss per pulse | $E_{on}$ | $I_C$ = 100 A, $V_{CE}$ = 600 V, $L_\sigma$ = 35 nH, $V_{GE}$ = ±15 V, $R_{Gon}$ = 4.3 Ω, di/dt = 1450 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 10.4 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 15.3 | | |
| | | | $T_{vj}$ = 175 °C | | 17.6 | | |
| Turn-off energy loss per pulse | $E_{off}$ | $I_C$ = 100 A, $V_{CE}$ = 600 V, $L_\sigma$ = 35 nH, $V_{GE}$ = ±15 V, $R_{Goff}$ = 4.3 Ω, dv/dt = 2850 V/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 6.42 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 9.95 | | |
| | | | $T_{vj}$ = 175 °C | | 12.3 | | |
| SC data | $I_{SC}$ | $V_{GE}$ ≤ 15 V, $V_{CC}$ = 800 V, $V_{CEmax}$=$V_{CES}$-$L_{sCE}$*di/dt | $t_P$ ≤ 8 µs, $T_{vj}$ = 150 °C | | 370 | | A |
| | | | $t_P$ ≤ 7 µs, $T_{vj}$ = 175 °C | | 350 | | |

**Table 4 Characteristic values (continued)**

| Parameter | Symbol | Note or test condition | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Thermal resistance, junction to case | $R_{thJC}$ | per IGBT | | | 0.371 | K/W |
| Thermal resistance, case to heatsink | $R_{thCH}$ | per IGBT, $\lambda_{grease}$= 1 W/(m*K) | | 0.135 | | K/W |
| Temperature under switching conditions | $T_{vj\,op}$ | | -40 | | 175 | °C |

*Note: $T_{vj\,op}$ > 150°C is 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 °C | 1200 | V |
| Continous 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 | 1000 | $A^2s$ |
| | | | $T_{vj}$ = 175 °C | 930 | |

**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 | | 1.72 | TBD | V |
| | | | $T_{vj}$ = 125 °C | | 1.59 | | |
| | | | $T_{vj}$ = 175 °C | | 1.52 | | |
| Peak reverse recovery current | $I_{RM}$ | $V_R$ = 600 V, $I_F$ = 100 A, $V_{GE}$ = -15 V, -$di_F/dt$ = 1450 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 58.2 | | A |
| | | | $T_{vj}$ = 125 °C | | 74.3 | | |
| | | | $T_{vj}$ = 175 °C | | 82.4 | | |
| Recovered charge | $Q_r$ | $V_R$ = 600 V, $I_F$ = 100 A, $V_{GE}$ = -15 V, -$di_F/dt$ = 1450 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 9.83 | | µC |
| | | | $T_{vj}$ = 125 °C | | 15.9 | | |
| | | | $T_{vj}$ = 175 °C | | 20.1 | | |

**Table 6 Characteristic values (continued)**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Reverse recovery energy | $E_{rec}$ | $V_R$ = 600 V, $I_F$ = 100 A, $V_{GE}$ = -15 V, -di$_F$/dt = 1450 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 3.31 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 5.01 | | |
| | | | $T_{vj}$ = 175 °C | | 6.45 | | |
| Thermal resistance, junction to case | $R_{thJC}$ | per diode | | | | 0.592 | K/W |
| Thermal resistance, case to heatsink | $R_{thCH}$ | per diode, $\lambda_{grease}$= 1 W/(m*K) | | | 0.148 | | K/W |
| Temperature under switching conditions | $T_{vj\,op}$ | | | -40 | | 175 | °C |

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

# 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 | $I_{FRMSM}$ | $T_C$ = 110 °C | | 100 | A |
| Maximum RMS current at rectifier output | $I_{RMSM}$ | $T_C$ = 110 °C | | 100 | A |
| Surge forward current | $I_{FSM}$ | $t_P$ = 10 ms | $T_{vj}$ = 25 °C | 745 | A |
| | | | $T_{vj}$ = 150 °C | 515 | |
| $I^2t$ - value | $I^2t$ | $t_P$ = 10 ms | $T_{vj}$ = 25 °C | 2780 | $A^2s$ |
| | | | $T_{vj}$ = 150 °C | 1330 | |

**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 | | 1.16 | | V |
| Reverse current | $I_r$ | $T_{vj}$ = 150 °C, $V_R$ = 1600 V | | | 1 | | mA |
| Thermal resistance, junction to case | $R_{thJC}$ | per diode | | | | 0.697 | K/W |
| Thermal resistance, case to heatsink | $R_{thCH}$ | per diode, $\lambda_{grease}$= 1 W/(m*K) | | | 0.153 | | K/W |

**Table 8 Characteristic values (continued)**

| Parameter | Symbol | Note or test condition | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| 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 | 1200 | V |
| Continous DC collector current | $I_{CDC}$ | $T_{vj\,max}$ = 175 °C | $T_C$ = 115 °C | 50 | A |
| Repetitive peak collector current | $I_{CRM}$ | $t_P$ = 1 ms | | 100 | 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 | $V_{CE\,sat}$ | $I_C$ = 50 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25 °C | | 1.50 | TBD | V |
| | | | $T_{vj}$ = 125 °C | | 1.64 | | |
| | | | $T_{vj}$ = 175 °C | | 1.72 | | |
| Gate threshold voltage | $V_{GEth}$ | $I_C$ = 1.28 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25 °C | | 5.15 | 5.80 | 6.45 | V |
| Gate charge | $Q_G$ | $V_{GE}$ = ±15 V, $V_{CE}$ = 600 V | | | 0.92 | | µC |
| Internal gate resistor | $R_{Gint}$ | $T_{vj}$ = 25 °C | | | 0 | | Ω |
| Input capacitance | $C_{ies}$ | $f$ = 100 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 11.1 | | nF |
| Reverse transfer capacitance | $C_{res}$ | $f$ = 100 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 0.039 | | nF |
| Collector-emitter cut-off current | $I_{CES}$ | $V_{CE}$ = 1200 V, $V_{GE}$ = 0 V | $T_{vj}$ = 25 °C | | | 0.008 | mA |
| Gate-emitter leakage current | $I_{GES}$ | $V_{CE}$ = 0 V, $V_{GE}$ = 20 V, $T_{vj}$ = 25 °C | | | | 100 | nA |
| Turn-on delay time (inductive load) | $t_{don}$ | $I_C$ = 50 A, $V_{CE}$ = 600 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 8.2 Ω | $T_{vj}$ = 25 °C | | 0.060 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.062 | | |
| | | | $T_{vj}$ = 175 °C | | 0.063 | | |
| Rise time (inductive load) | $t_r$ | $I_C$ = 50 A, $V_{CE}$ = 600 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 8.2 Ω | $T_{vj}$ = 25 °C | | 0.036 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.040 | | |
| | | | $T_{vj}$ = 175 °C | | 0.042 | | |

**Table 10 Characteristic values (continued)**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Turn-off delay time (inductive load) | $t_{doff}$ | $I_C$ = 50 A, $V_{CE}$ = 600 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 8.2 Ω | $T_{vj}$ = 25 °C | | 0.290 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.380 | | |
| | | | $T_{vj}$ = 175 °C | | 0.420 | | |
| Fall time (inductive load) | $t_f$ | $I_C$ = 50 A, $V_{CE}$ = 600 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 8.2 Ω | $T_{vj}$ = 25 °C | | 0.110 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.200 | | |
| | | | $T_{vj}$ = 175 °C | | 0.270 | | |
| Turn-on energy loss per pulse | $E_{on}$ | $I_C$ = 50 A, $V_{CE}$ = 600 V, $L_\sigma$ = 35 nH, $V_{GE}$ = ±15 V, $R_{Gon}$ = 8.2 Ω, di/dt = 800 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 5.35 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 7.04 | | |
| | | | $T_{vj}$ = 175 °C | | 8 | | |
| Turn-off energy loss per pulse | $E_{off}$ | $I_C$ = 50 A, $V_{CE}$ = 600 V, $L_\sigma$ = 35 nH, $V_{GE}$ = ±15 V, $R_{Goff}$ = 8.2 Ω, dv/dt = 2900 V/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 3.33 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 5.32 | | |
| | | | $T_{vj}$ = 175 °C | | 6.58 | | |
| SC data | $I_{SC}$ | $V_{GE} \leq$ 15 V, $V_{CC}$ = 800 V, $V_{CEmax}=V_{CES}-L_{sCE}*di/dt$ | $t_P \leq$ 8 µs, $T_{vj}$ = 150 °C | | 190 | | A |
| | | | $t_P \leq$ 7 µs, $T_{vj}$ = 175 °C | | 180 | | |
| Thermal resistance, junction to case | $R_{thJC}$ | per IGBT | | | | 0.580 | K/W |
| Thermal resistance, case to heatsink | $R_{thCH}$ | per IGBT, $\lambda_{grease}$= 1 W/(m*K) | | | 0.147 | | K/W |
| Temperature under switching conditions | $T_{vj\,op}$ | | | -40 | | 175 | °C |

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

## 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 | 1200 | V |
| Continous DC forward current | $I_F$ | | | 35 | A |
| Repetitive peak forward current | $I_{FRM}$ | $t_P$ = 1 ms | | 70 | A |

**Table 11 Maximum rated values (continued)**

| Parameter | Symbol | Note or test condition | | Values | Unit |
|---|---|---|---|---|---|
| $I^2t$ - value | $I^2t$ | $t_P$ = 10 ms, $V_R$ = 0 V | $T_{vj}$ = 150 °C | 125 | $A^2s$ |
| | | | $T_{vj}$ = 175 °C | 95 | |

**Table 12 Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Forward voltage | $V_F$ | $I_F$ = 35 A, $V_{GE}$ = 0 V | $T_{vj}$ = 25 °C | | 1.72 | TBD | V |
| | | | $T_{vj}$ = 125 °C | | 1.59 | | |
| | | | $T_{vj}$ = 175 °C | | 1.52 | | |
| Peak reverse recovery current | $I_{RM}$ | $V_R$ = 600 V, $I_F$ = 35 A, $V_{GE}$ = -15 V, -di$_F$/dt = 700 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 20.1 | | A |
| | | | $T_{vj}$ = 125 °C | | 25.9 | | |
| | | | $T_{vj}$ = 175 °C | | 29.8 | | |
| Recovered charge | $Q_r$ | $V_R$ = 600 V, $I_F$ = 35 A, $V_{GE}$ = -15 V, -di$_F$/dt = 700 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 2.66 | | µC |
| | | | $T_{vj}$ = 125 °C | | 4.73 | | |
| | | | $T_{vj}$ = 175 °C | | 6.94 | | |
| Reverse recovery energy | $E_{rec}$ | $V_R$ = 600 V, $I_F$ = 35 A, $V_{GE}$ = -15 V, -di$_F$/dt = 700 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 0.95 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 1.72 | | |
| | | | $T_{vj}$ = 175 °C | | 2.38 | | |
| Thermal resistance, junction to case | $R_{thJC}$ | per diode | | | | 1.11 | K/W |
| Thermal resistance, case to heatsink | $R_{thCH}$ | per diode, $\lambda_{grease}$= 1 W/(m*K) | | | 0.176 | | K/W |
| Temperature under switching conditions | $T_{vj\,op}$ | | | -40 | | 175 | °C |

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

# 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 |

**Table 13 Characteristic values (continued)**

| Parameter | Symbol | Note or test condition | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| B-value | $B_{25/50}$ | $R_2 = R_{25} \exp[B_{25/50}(1/T_2\text{-}1/(298{,}15\ K))]$ | | 3375 | | K |
| B-value | $B_{25/80}$ | $R_2 = R_{25} \exp[B_{25/80}(1/T_2\text{-}1/(298{,}15\ K))]$ | | 3411 | | K |
| B-value | $B_{25/100}$ | $R_2 = R_{25} \exp[B_{25/100}(1/T_2\text{-}1/(298{,}15\ K))]$ | | 3433 | | K |

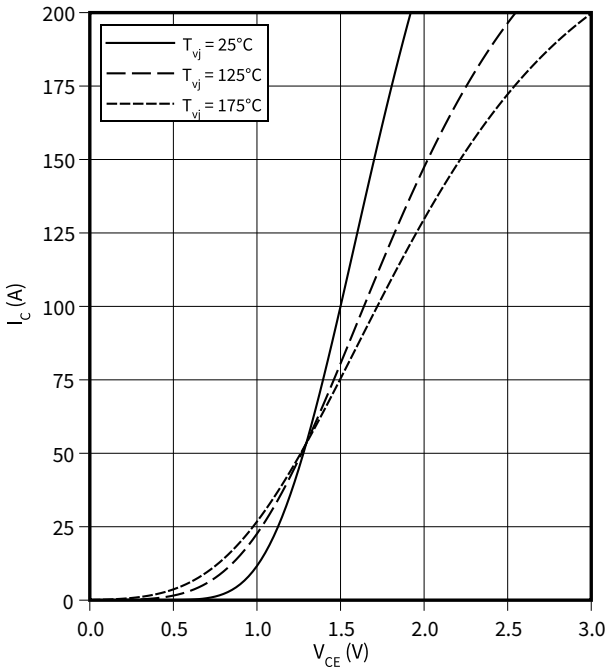
*Note: Specification according to the valid application note.*

# 8 Characteristics diagrams

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

$I_C = f(V_{CE})$

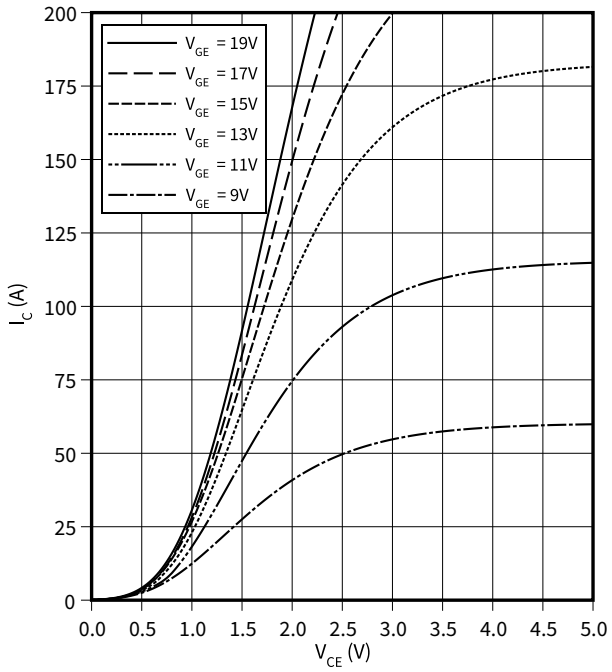
$V_{GE}$ = 15 V




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

$I_C = f(V_{CE})$

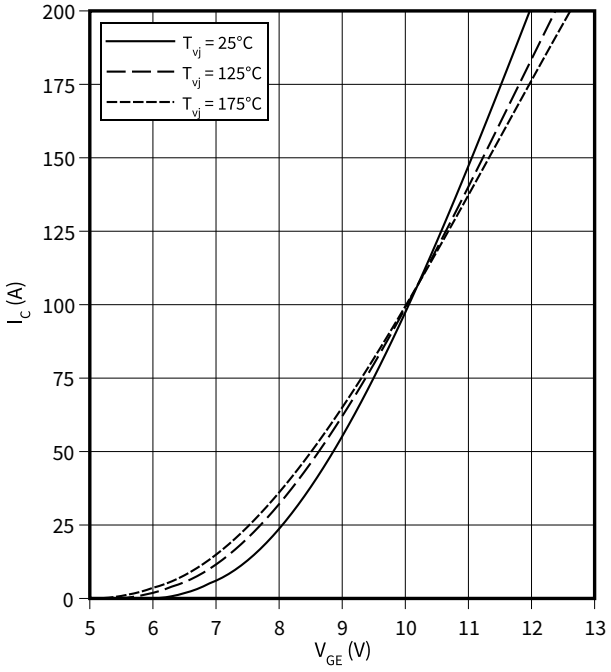
$T_{vj}$ = 175 °C




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

$I_C = f(V_{GE})$

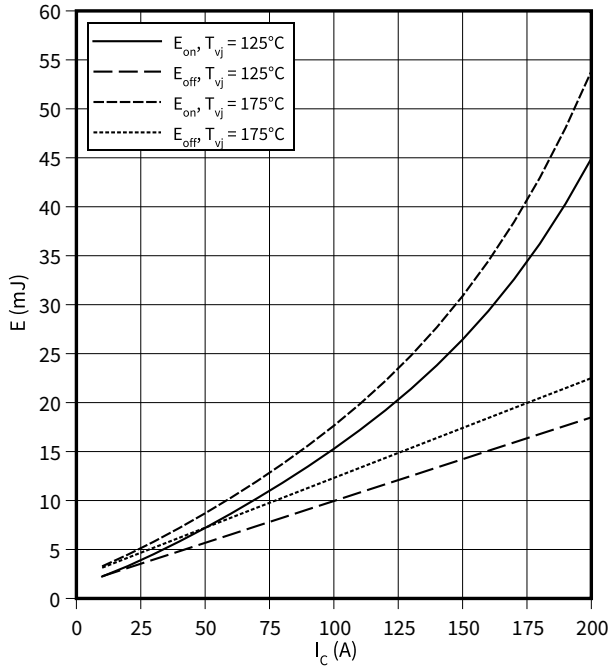
$V_{CE}$ = 20 V




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

$E = f(I_C)$

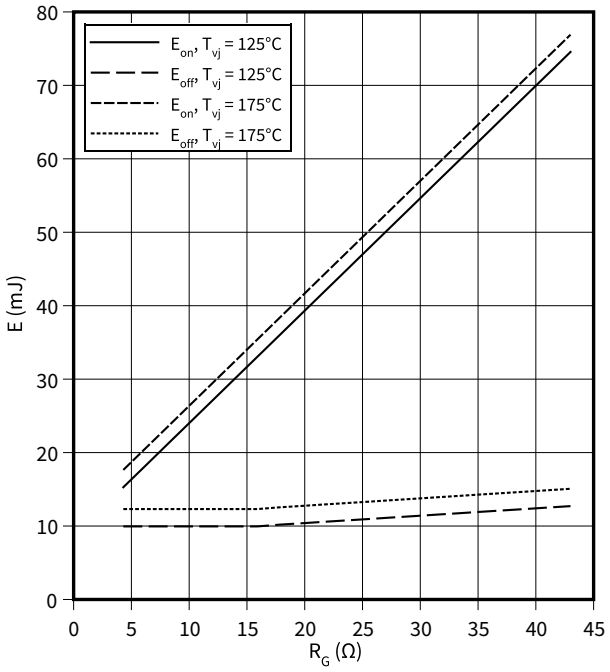
$R_{Goff}$ = 4.3 Ω, $R_{Gon}$ = 4.3 Ω, $V_{CE}$ = 600 V, $V_{GE}$ = ± 15 V



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

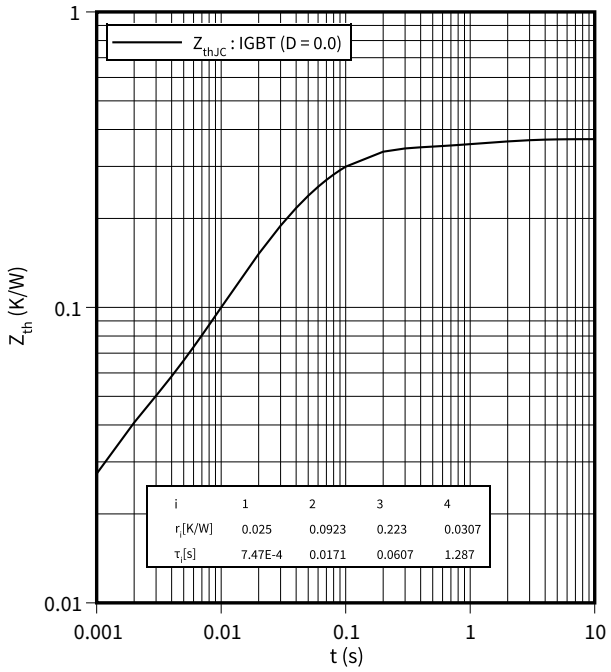
$E = f(R_G)$

$I_C = 100\ A$, $V_{CE} = 600\ V$, $V_{GE} = \pm 15\ V$




### transient thermal impedance , IGBT, Inverter

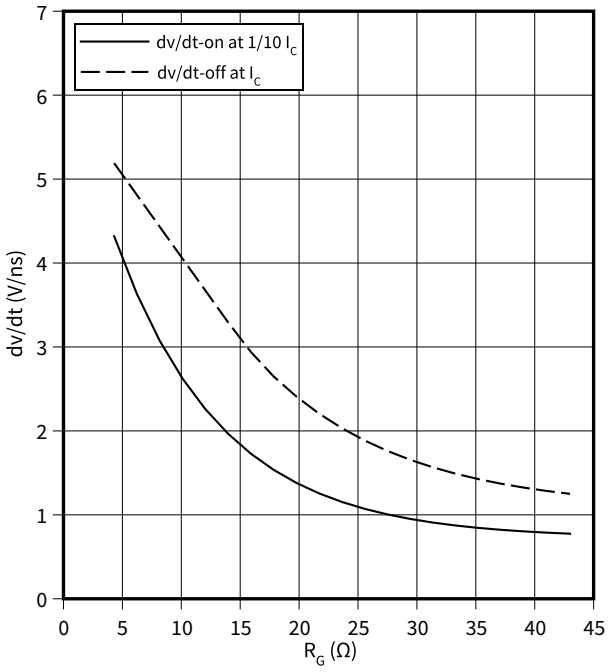
$Z_{th} = f(t)$




### Voltage slope (typical), IGBT, Inverter

$dv/dt = f(R_G)$

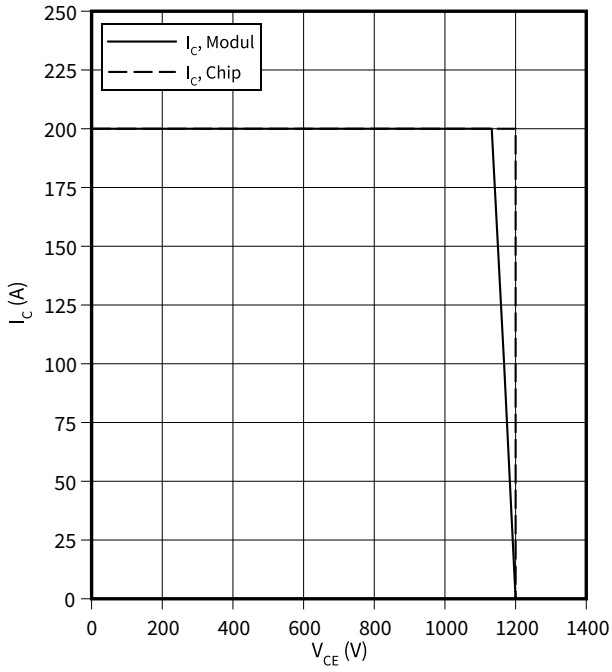
$I_C = 100\ A$, $V_{CE} = 600\ V$, $V_{GE} = \pm 15\ V$, $T_{vj} = 25\ °C$




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

$I_C = f(V_{CE})$

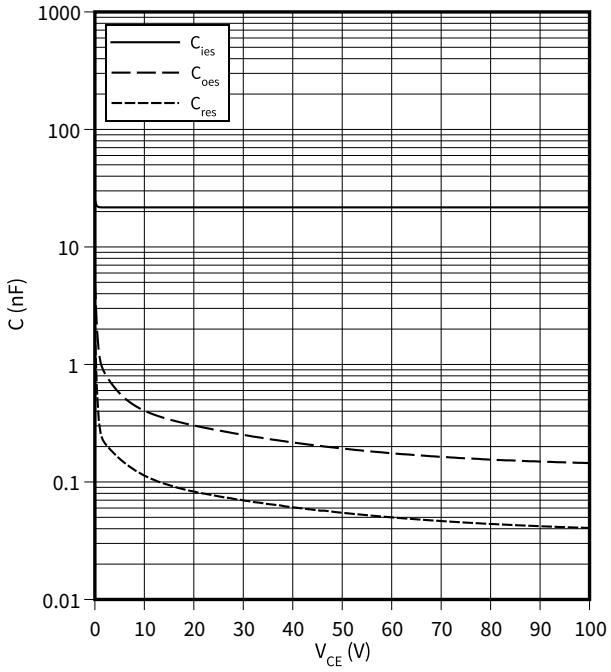
$R_{Goff} = 4.3\ \Omega$, $V_{GE} = \pm 15\ V$, $T_{vj} = 175\ °C$



### capacity characteristic (typical), IGBT, Inverter

$C = f(V_{CE})$

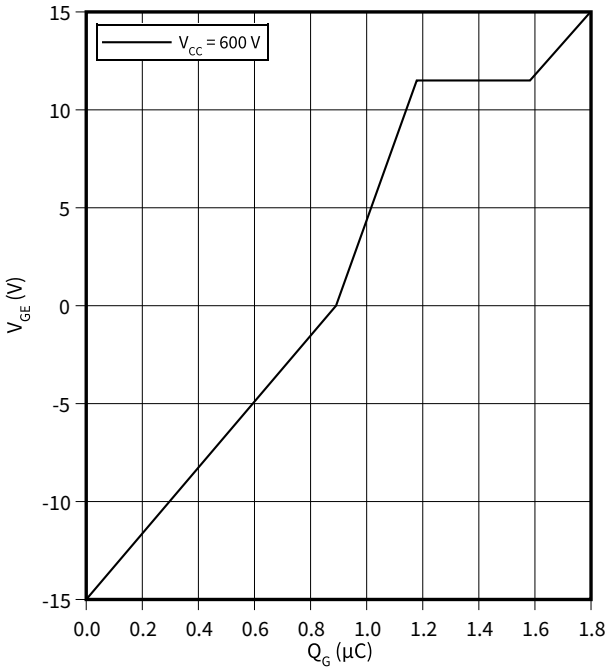
$f = 100$ kHz, $V_{GE} = 0$ V, $T_{vj} = 25$ °C




### gate charge characteristic (typical), IGBT, Inverter

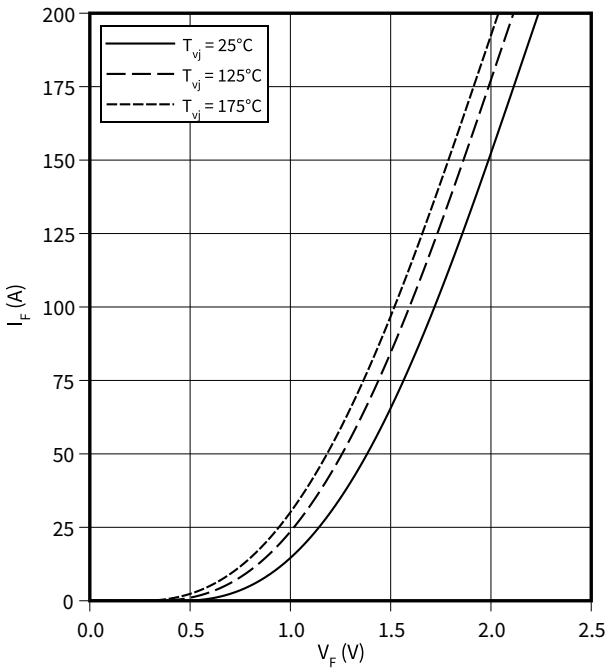
$V_{GE} = f(Q_G)$

$I_C = 100$ A, $T_{vj} = 25$ °C




### forward characteristic of (typical), Diode, Inverter

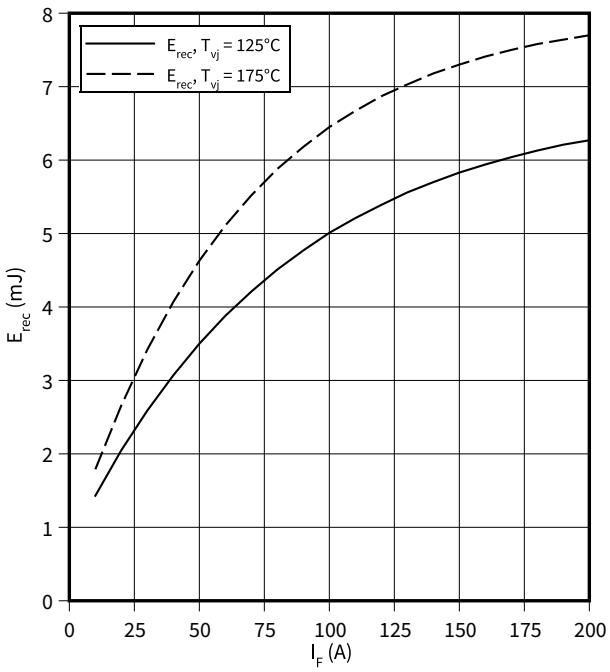
$I_F = f(V_F)$




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

$E_{rec} = f(I_F)$

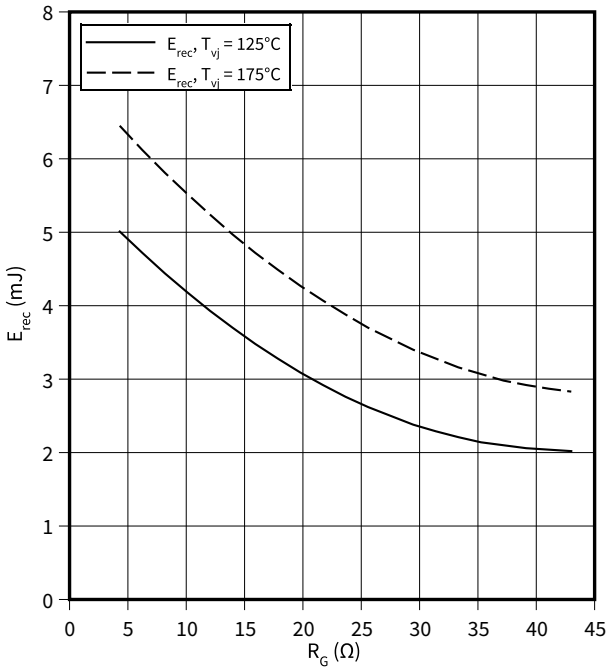
$R_{Gon} = 4.3\ \Omega$, $V_{CE} = 600$ V



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

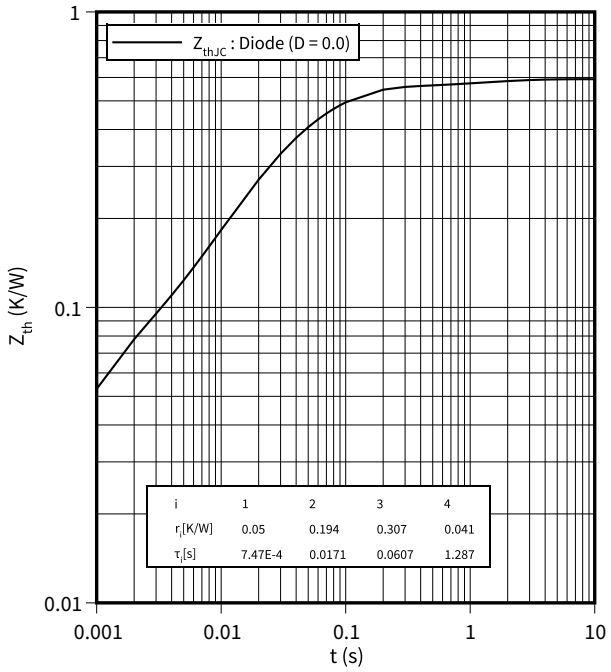
$E_{rec} = f(R_G)$

$V_{CE} = 600$ V, $I_F = 100$ A



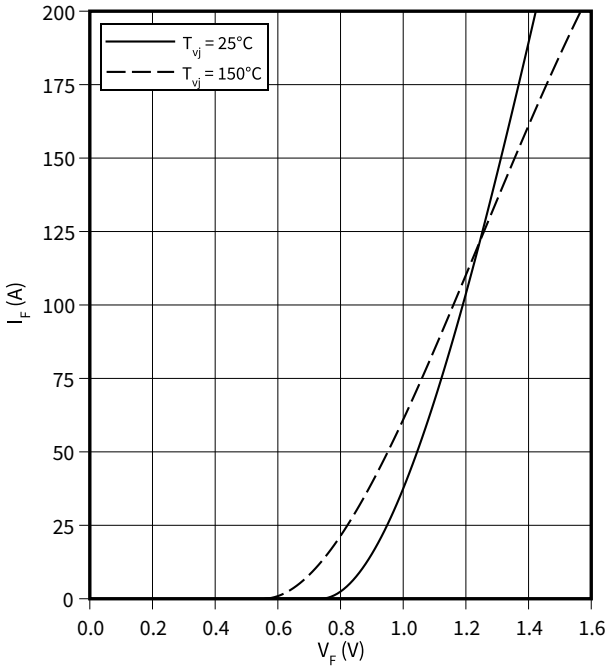

### transient thermal impedance , Diode, Inverter

$Z_{th} = f(t)$



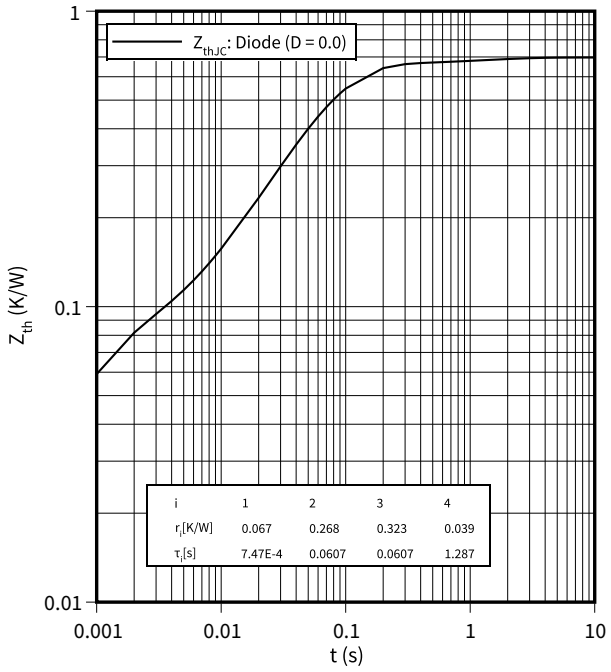

### forward characteristic of (typical), Diode, Rectifier

$I_F = f(V_F)$




### transient thermal impedance , Diode, Rectifier

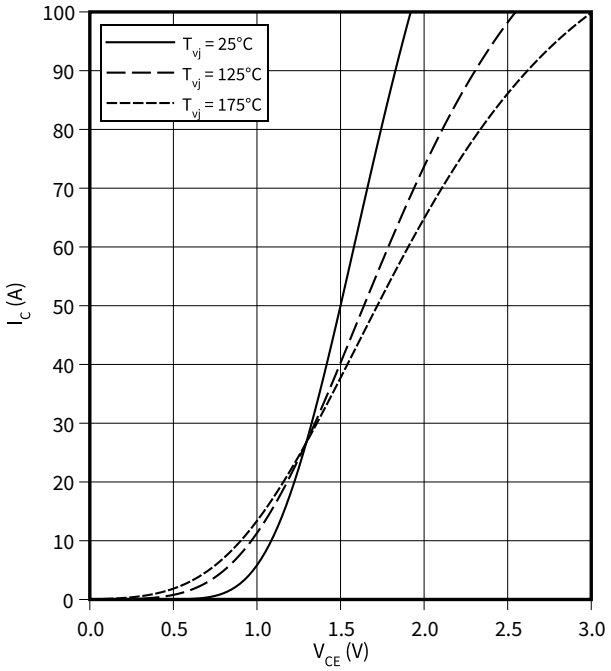
$Z_{th} = f(t)$



**output characteristic (typical), IGBT, Brake-Chopper**

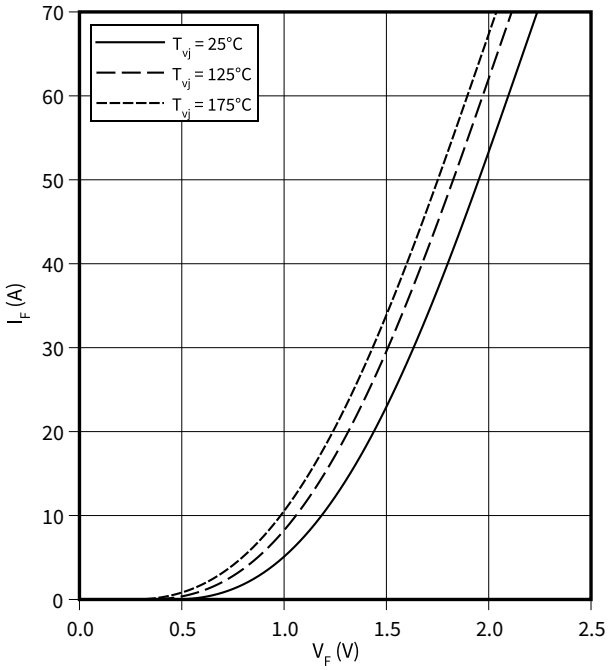
$I_C = f(V_{CE})$

$V_{GE} = 15$ V



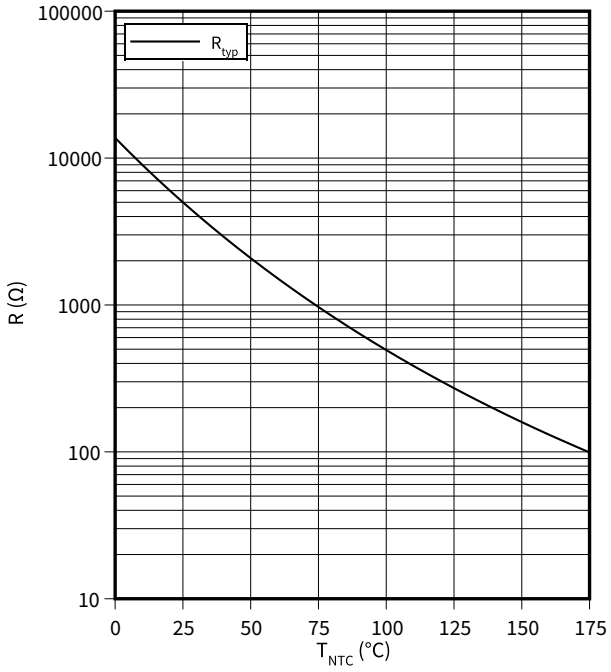

**forward characteristic of (typical), Diode, Brake-Chopper**

$I_F = f(V_F)$




**temperature characteristic (typical), NTC-Thermistor**

$R = f(T_{NTC})$



# 9 Circuit diagram

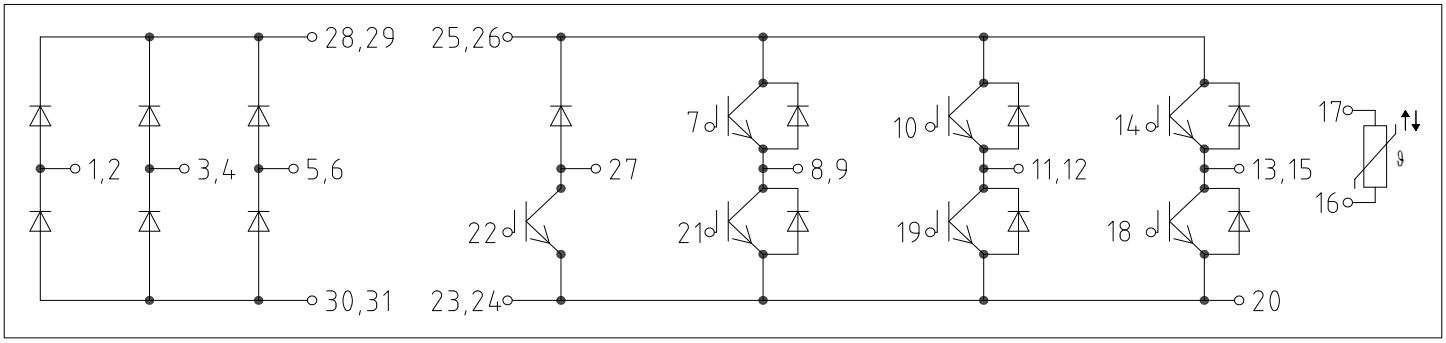



**Figure 2**

# 10 Package outlines

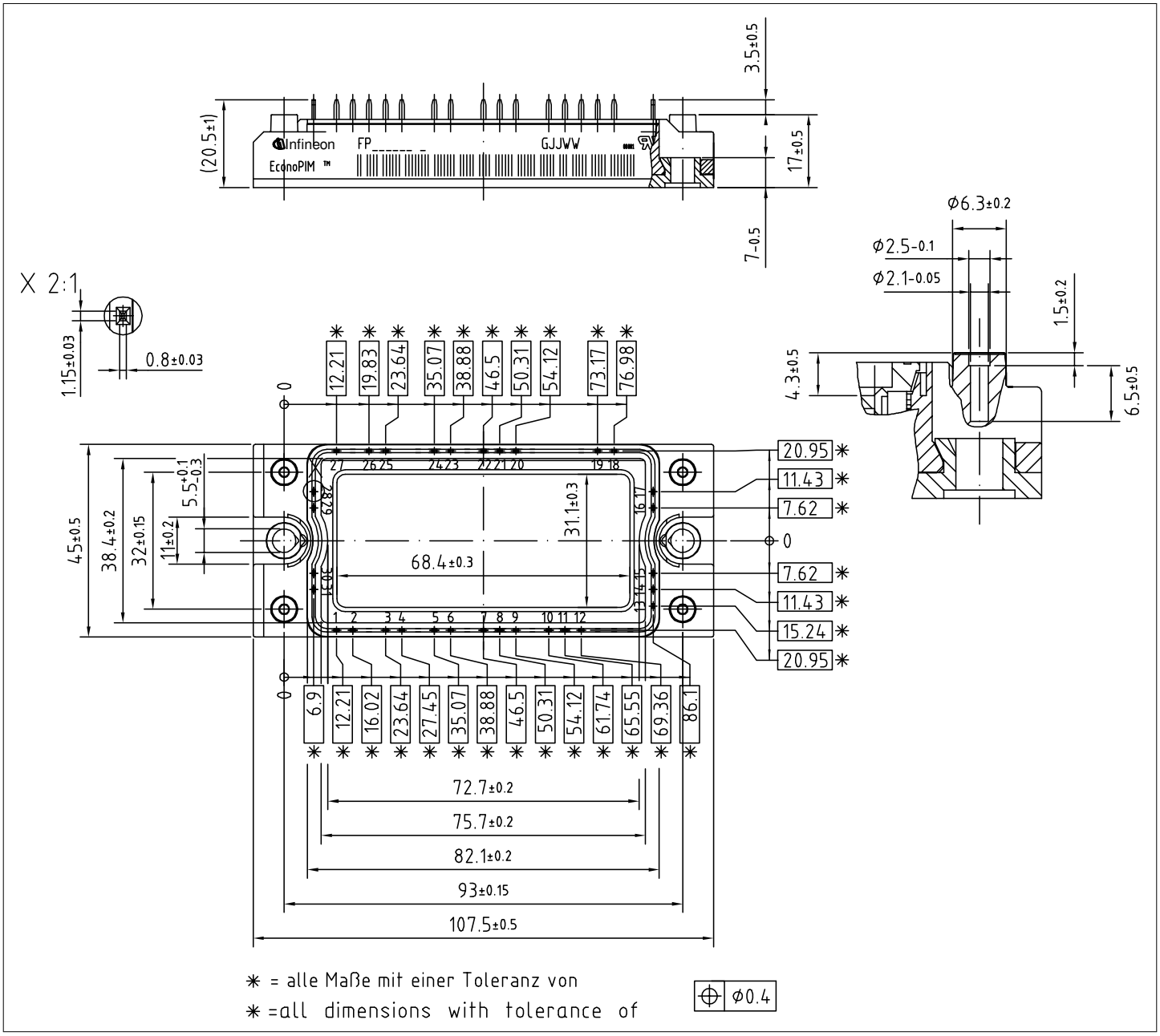



**Figure 3**

# 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 | 71549142846550549911530 | | 71549142846550549911530 |

**Figure 4**

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