



**THE DATASHEET OF
FP100R12N2T7BPSA1**

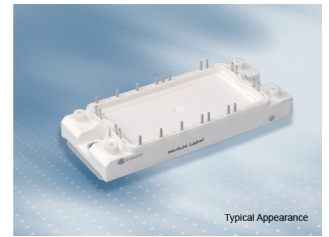


Preliminary datasheet

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

Features

- Electrical features
 - $V_{CES} = 1200\text{ V}$
 - $I_{C\text{nom}} = 100\text{ A} / I_{CRM} = 200\text{ A}$
 - 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

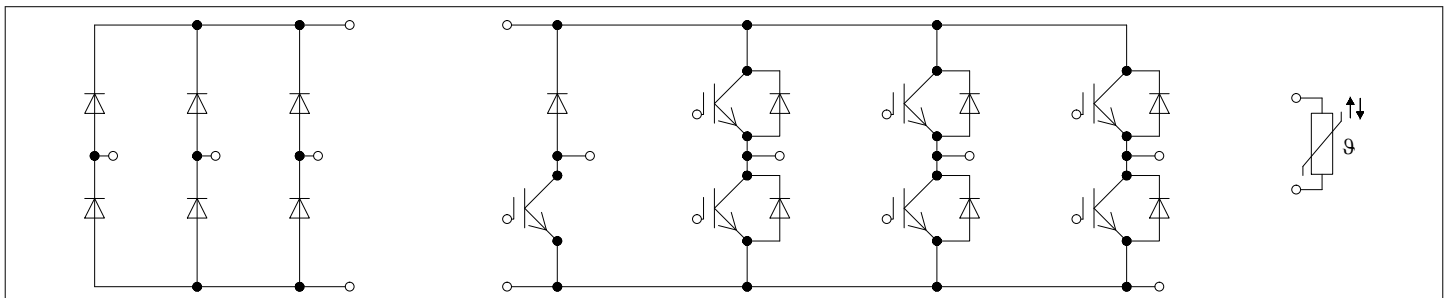


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1 Package

1 Package

Table 1 Insulation coordination

| Parameter | Symbol | Note or test condition | Values | Unit |
|------------------------------|-------------|--|-----------|------|
| Isolation test voltage | V_{ISOL} | RMS, $f = 50 \text{ Hz}$, $t = 1 \text{ min}$ | 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 | $R_{AA'+CC'}$ | $T_C = 25^\circ\text{C}$, per switch | | 2.5 | | mΩ |
| Module lead resistance, terminals - chip | $R_{CC'+EE'}$ | $T_C = 25^\circ\text{C}$, 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} | $T_{vj} = 25^\circ\text{C}$ | 1200 | V |
| Continous DC collector current | I_{CDC} | $T_{vj \text{ max}} = 175^\circ\text{C}$ $T_C = 95^\circ\text{C}$ | 100 | A |
| Repetitive peak collector current | I_{CRM} | $t_p = 1 \text{ ms}$ | 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 | $V_{CE\ sat}$ | $I_C = 100\ A, V_{GE} = 15\ V$ | $T_{vj} = 25\ ^\circ C$ | | 1.50 | TBD | V |
| | | | $T_{vj} = 125\ ^\circ C$ | | 1.64 | | |
| | | | $T_{vj} = 175\ ^\circ C$ | | 1.72 | | |
| Gate threshold voltage | V_{GEth} | $I_C = 2.5\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$ | 5.15 | 5.80 | 6.45 | V | |
| Gate charge | Q_G | $V_{GE} = \pm 15\ V, V_{CE} = 600\ V$ | | 1.8 | | μC | |
| Internal gate resistor | R_{Gint} | $T_{vj} = 25\ ^\circ C$ | | 1.5 | | Ω | |
| Input capacitance | C_{ies} | $f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$ | | 21.7 | | nF | |
| Reverse transfer capacitance | C_{res} | $f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$ | | 0.076 | | nF | |
| Collector-emitter cut-off current | I_{CES} | $V_{CE} = 1200\ V, V_{GE} = 0\ V$ | $T_{vj} = 25\ ^\circ C$ | | | 0.01 | mA |
| Gate-emitter leakage current | I_{GES} | $V_{CE} = 0\ V, V_{GE} = 20\ V, T_{vj} = 25\ ^\circ C$ | | | | 100 | nA |
| Turn-on delay time (inductive load) | t_{don} | $I_C = 100\ A, V_{CE} = 600\ V, V_{GE} = \pm 15\ V, R_{Gon} = 4.3\ \Omega$ | $T_{vj} = 25\ ^\circ C$ | | 0.171 | | μs |
| | | | $T_{vj} = 125\ ^\circ C$ | | 0.185 | | |
| | | | $T_{vj} = 175\ ^\circ C$ | | 0.190 | | |
| Rise time (inductive load) | t_r | $I_C = 100\ A, V_{CE} = 600\ V, V_{GE} = \pm 15\ V, R_{Gon} = 4.3\ \Omega$ | $T_{vj} = 25\ ^\circ C$ | | 0.050 | | μs |
| | | | $T_{vj} = 125\ ^\circ C$ | | 0.055 | | |
| | | | $T_{vj} = 175\ ^\circ C$ | | 0.058 | | |
| Turn-off delay time (inductive load) | t_{doff} | $I_C = 100\ A, V_{CE} = 600\ V, V_{GE} = \pm 15\ V, R_{Goff} = 4.3\ \Omega$ | $T_{vj} = 25\ ^\circ C$ | | 0.324 | | μs |
| | | | $T_{vj} = 125\ ^\circ C$ | | 0.433 | | |
| | | | $T_{vj} = 175\ ^\circ C$ | | 0.494 | | |
| Fall time (inductive load) | t_f | $I_C = 100\ A, V_{CE} = 600\ V, V_{GE} = \pm 15\ V, R_{Goff} = 4.3\ \Omega$ | $T_{vj} = 25\ ^\circ C$ | | 0.093 | | μs |
| | | | $T_{vj} = 125\ ^\circ C$ | | 0.183 | | |
| | | | $T_{vj} = 175\ ^\circ C$ | | 0.245 | | |
| Turn-on energy loss per pulse | E_{on} | $I_C = 100\ A, V_{CE} = 600\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 4.3\ \Omega, di/dt = 1450\ A/\mu s (T_{vj} = 175\ ^\circ C)$ | $T_{vj} = 25\ ^\circ C$ | | 10.4 | | mJ |
| | | | $T_{vj} = 125\ ^\circ C$ | | 15.3 | | |
| | | | $T_{vj} = 175\ ^\circ C$ | | 17.6 | | |
| Turn-off energy loss per pulse | E_{off} | $I_C = 100\ A, V_{CE} = 600\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 4.3\ \Omega, dv/dt = 2850\ V/\mu s (T_{vj} = 175\ ^\circ C)$ | $T_{vj} = 25\ ^\circ C$ | | 6.42 | | mJ |
| | | | $T_{vj} = 125\ ^\circ C$ | | 9.95 | | |
| | | | $T_{vj} = 175\ ^\circ C$ | | 12.3 | | |
| SC data | I_{SC} | $V_{GE} \leq 15\ V, V_{CC} = 800\ V, V_{CEmax} = V_{CES} - L_{sCE} * di/dt$ | $t_p \leq 8\ \mu s, T_{vj} = 150\ ^\circ C$ | | 370 | | A |
| | | | $t_p \leq 7\ \mu s, T_{vj} = 175\ ^\circ C$ | | 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, $\lambda_{grease} = 1 \text{ W}/(\text{m}^2\text{K})$ | | 0.135 | | K/W |
| Temperature under switching conditions | $T_{vj\text{ op}}$ | | -40 | | 175 | °C |

Note: $T_{vj\text{ op}} > 150^\circ\text{C}$ 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} | $T_{vj} = 25^\circ\text{C}$ | 1200 | V | |
| Continuous DC forward current | I_F | | 100 | A | |
| Repetitive peak forward current | I_{FRM} | $t_P = 1 \text{ ms}$ | 200 | A | |
| I^2t - value | I^2t | $t_P = 10 \text{ ms}, V_R = 0 \text{ V}$ | $T_{vj} = 125^\circ\text{C}$ | 1000 | A^2s |
| | | | $T_{vj} = 175^\circ\text{C}$ | 930 | |

Table 6 Characteristic values

| Parameter | Symbol | Note or test condition | Values | | | Unit | |
|-------------------------------|----------|--|------------------------------|------|------|------|---------------|
| | | | Min. | Typ. | Max. | | |
| Forward voltage | V_F | $I_F = 100 \text{ A}, V_{GE} = 0 \text{ V}$ | $T_{vj} = 25^\circ\text{C}$ | | 1.72 | TBD | V |
| | | | $T_{vj} = 125^\circ\text{C}$ | | 1.59 | | |
| | | | $T_{vj} = 175^\circ\text{C}$ | | 1.52 | | |
| Peak reverse recovery current | I_{RM} | $V_R = 600 \text{ V}, I_F = 100 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 1450 \text{ A}/\mu\text{s} (T_{vj} = 175^\circ\text{C})$ | $T_{vj} = 25^\circ\text{C}$ | | 58.2 | | A |
| | | | $T_{vj} = 125^\circ\text{C}$ | | 74.3 | | |
| | | | $T_{vj} = 175^\circ\text{C}$ | | 82.4 | | |
| Recovered charge | Q_r | $V_R = 600 \text{ V}, I_F = 100 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 1450 \text{ A}/\mu\text{s} (T_{vj} = 175^\circ\text{C})$ | $T_{vj} = 25^\circ\text{C}$ | | 9.83 | | μC |
| | | | $T_{vj} = 125^\circ\text{C}$ | | 15.9 | | |
| | | | $T_{vj} = 175^\circ\text{C}$ | | 20.1 | | |

Table 6 Characteristic values (continued)

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

Note: $T_{vj\text{ op}} > 150\text{ °C}$ 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} | $T_{vj} = 25\text{ °C}$ | 1600 | V | |
| Maximum RMS forward current per chip | I_{FRMSM} | $T_C = 110\text{ °C}$ | 100 | A | |
| Maximum RMS current at rectifier output | I_{RMSM} | $T_C = 110\text{ °C}$ | 100 | A | |
| Surge forward current | I_{FSM} | $t_p = 10\text{ ms}$ | $T_{vj} = 25\text{ °C}$ | 745 | A |
| | | | $T_{vj} = 150\text{ °C}$ | 515 | |
| I^2t - value | I^2t | $t_p = 10\text{ ms}$ | $T_{vj} = 25\text{ °C}$ | 2780 | A ² s |
| | | | $T_{vj} = 150\text{ °C}$ | 1330 | |

Table 8 Characteristic values

| Parameter | Symbol | Note or test condition | Values | | | Unit |
|--------------------------------------|------------|---|--------|-------|-------|------|
| | | | Min. | Typ. | Max. | |
| Forward voltage | V_F | $I_F = 100\text{ A}$, $T_{vj} = 150\text{ °C}$ | | 1.16 | | V |
| Reverse current | I_r | $T_{vj} = 150\text{ °C}$, $V_R = 1600\text{ V}$ | | 1 | | mA |
| Thermal resistance, junction to case | R_{thJC} | per diode | | | 0.697 | K/W |
| Thermal resistance, case to heatsink | R_{thCH} | per diode, $\lambda_{grease} = 1\text{ W}/(\text{m}^*\text{K})$ | | 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} | $T_{vj} = 25\text{ °C}$ | 1200 | V |
| Continuous DC collector current | I_{CDC} | $T_{vj\ max} = 175\text{ °C}$ $T_C = 115\text{ °C}$ | 50 | A |
| Repetitive peak collector current | I_{CRM} | $t_P = 1\text{ ms}$ | 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 | $V_{CE\ sat}$ | $I_C = 50\text{ A}, V_{GE} = 15\text{ V}$ | $T_{vj} = 25\text{ °C}$ | 1.50 | TBD | V |
| | | | $T_{vj} = 125\text{ °C}$ | 1.64 | | |
| | | | $T_{vj} = 175\text{ °C}$ | 1.72 | | |
| Gate threshold voltage | V_{GEth} | $I_C = 1.28\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25\text{ °C}$ | 5.15 | 5.80 | 6.45 | V |
| Gate charge | Q_G | $V_{GE} = \pm 15\text{ V}, V_{CE} = 600\text{ V}$ | | 0.92 | | µC |
| Internal gate resistor | R_{Gint} | $T_{vj} = 25\text{ °C}$ | | 0 | | Ω |
| Input capacitance | C_{ies} | $f = 100\text{ kHz}, T_{vj} = 25\text{ °C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$ | | 11.1 | | nF |
| Reverse transfer capacitance | C_{res} | $f = 100\text{ kHz}, T_{vj} = 25\text{ °C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$ | | 0.039 | | nF |
| Collector-emitter cut-off current | I_{CES} | $V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}$ | | | 0.008 | 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} | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Gon} = 8.2\text{ }\Omega$ | $T_{vj} = 25\text{ °C}$ | 0.060 | | µs |
| | | | $T_{vj} = 125\text{ °C}$ | 0.062 | | |
| | | | $T_{vj} = 175\text{ °C}$ | 0.063 | | |
| Rise time (inductive load) | t_r | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Gon} = 8.2\text{ }\Omega$ | $T_{vj} = 25\text{ °C}$ | 0.036 | | µs |
| | | | $T_{vj} = 125\text{ °C}$ | 0.040 | | |
| | | | $T_{vj} = 175\text{ °C}$ | 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} | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Goff} = 8.2\ \Omega$ | $T_{vj} = 25\text{ }^\circ\text{C}$ | 0.290 | | μs |
| | | | $T_{vj} = 125\text{ }^\circ\text{C}$ | 0.380 | | |
| | | | $T_{vj} = 175\text{ }^\circ\text{C}$ | 0.420 | | |
| Fall time (inductive load) | t_f | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Goff} = 8.2\ \Omega$ | $T_{vj} = 25\text{ }^\circ\text{C}$ | 0.110 | | μs |
| | | | $T_{vj} = 125\text{ }^\circ\text{C}$ | 0.200 | | |
| | | | $T_{vj} = 175\text{ }^\circ\text{C}$ | 0.270 | | |
| Turn-on energy loss per pulse | E_{on} | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}, L_\sigma = 35\text{ nH}, V_{GE} = \pm 15\text{ V}, R_{Gon} = 8.2\ \Omega, di/dt = 800\text{ A}/\mu\text{s} (T_{vj} = 175\text{ }^\circ\text{C})$ | $T_{vj} = 25\text{ }^\circ\text{C}$ | 5.35 | | mJ |
| | | | $T_{vj} = 125\text{ }^\circ\text{C}$ | 7.04 | | |
| | | | $T_{vj} = 175\text{ }^\circ\text{C}$ | 8 | | |
| Turn-off energy loss per pulse | E_{off} | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}, L_\sigma = 35\text{ nH}, V_{GE} = \pm 15\text{ V}, R_{Goff} = 8.2\ \Omega, dv/dt = 2900\text{ V}/\mu\text{s} (T_{vj} = 175\text{ }^\circ\text{C})$ | $T_{vj} = 25\text{ }^\circ\text{C}$ | 3.33 | | mJ |
| | | | $T_{vj} = 125\text{ }^\circ\text{C}$ | 5.32 | | |
| | | | $T_{vj} = 175\text{ }^\circ\text{C}$ | 6.58 | | |
| SC data | I_{SC} | $V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}, V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$ | $t_P \leq 8\ \mu\text{s}, T_{vj} = 150\text{ }^\circ\text{C}$ | 190 | | A |
| | | | $t_P \leq 7\ \mu\text{s}, T_{vj} = 175\text{ }^\circ\text{C}$ | 180 | | |
| Thermal resistance, junction to case | R_{thJC} | per IGBT | | | 0.580 | K/W |
| Thermal resistance, case to heatsink | R_{thCH} | per IGBT, $\lambda_{grease} = 1\text{ W}/(\text{m} \cdot \text{K})$ | | 0.147 | | K/W |
| Temperature under switching conditions | T_{vjop} | | -40 | | 175 | $^\circ\text{C}$ |

Note: $T_{vjop} > 150\text{ }^\circ\text{C}$ 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} | $T_{vj} = 25\text{ }^\circ\text{C}$ | 1200 | V |
| Continuous DC forward current | I_F | | 35 | A |
| Repetitive peak forward current | I_{FRM} | $t_P = 1\text{ ms}$ | 70 | A |

Table 11 Maximum rated values (continued)

| Parameter | Symbol | Note or test condition | Values | Unit | |
|--------------------------|------------------|--|--------------------------|------|------------------|
| I ² t - value | I ² t | t _p = 10 ms, V _R = 0 V | T _{vj} = 150 °C | 125 | A ² s |
| | | | 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, λ _{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 | ΔR/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)**

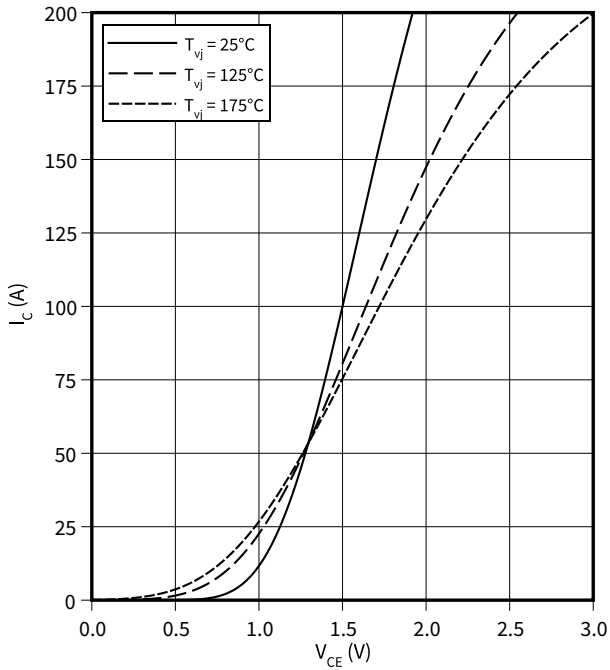
| Parameter | Symbol | Note or test condition | Values | | | Unit |
|-----------|--------------|---|--------|------|------|------|
| | | | Min. | Typ. | Max. | |
| B-value | $B_{25/50}$ | $R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$ | | 3375 | | K |
| B-value | $B_{25/80}$ | $R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298,15 \text{ K}))]$ | | 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: *Specification according to the valid application note.*

8 Characteristics diagrams

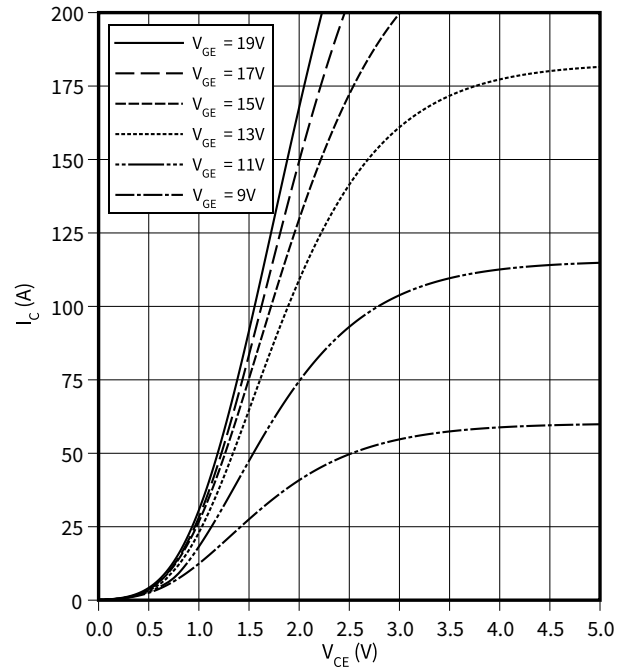
output characteristic (typical), IGBT, Inverter

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



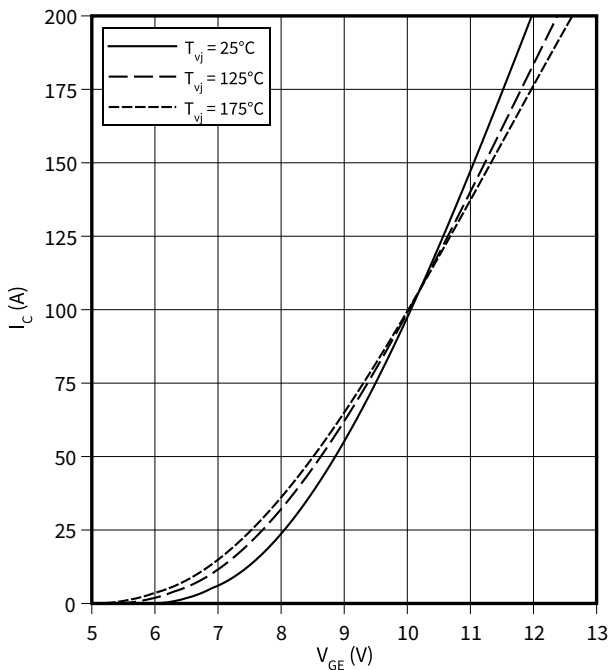
output characteristic (typical), IGBT, Inverter

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



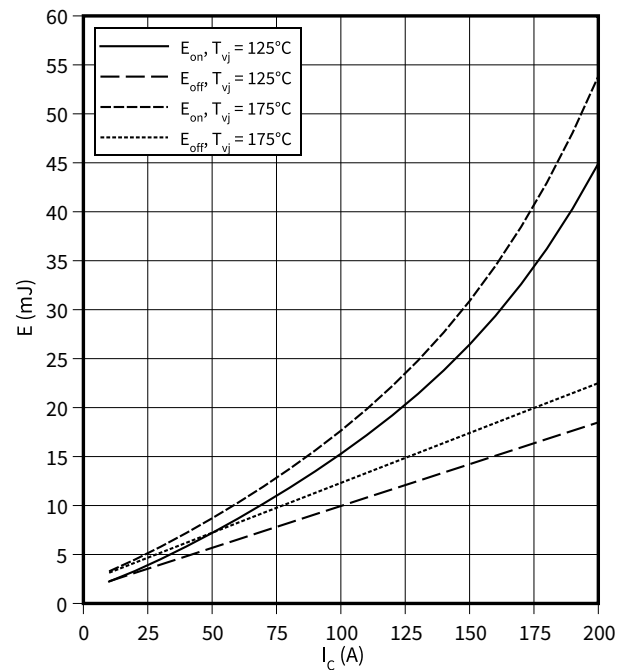
transfer characteristic (typical), IGBT, Inverter

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



switching losses (typical), IGBT, Inverter

$E = f(I_C)$
 $R_{Goff} = 4.3\ \Omega$, $R_{Gon} = 4.3\ \Omega$, $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$

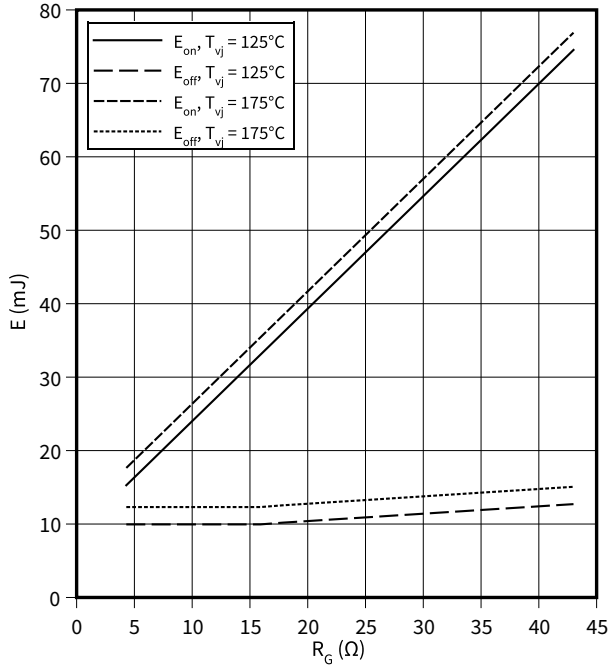


8 Characteristics diagrams

switching losses (typical), IGBT, Inverter

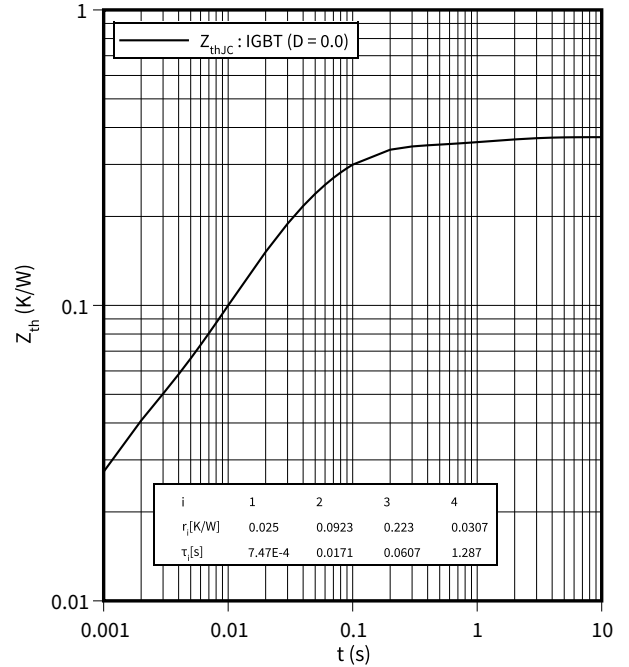
$E = f(R_G)$

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



transient thermal impedance, IGBT, Inverter

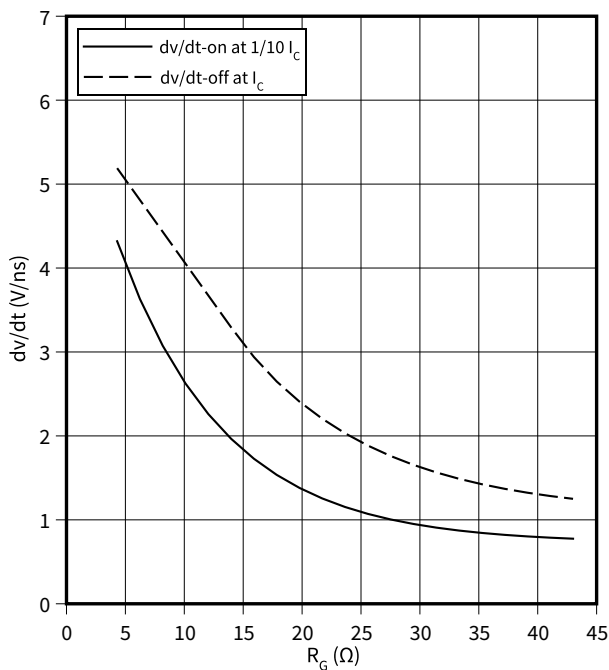
$Z_{th} = f(t)$



Voltage slope (typical), IGBT, Inverter

$dv/dt = f(R_G)$

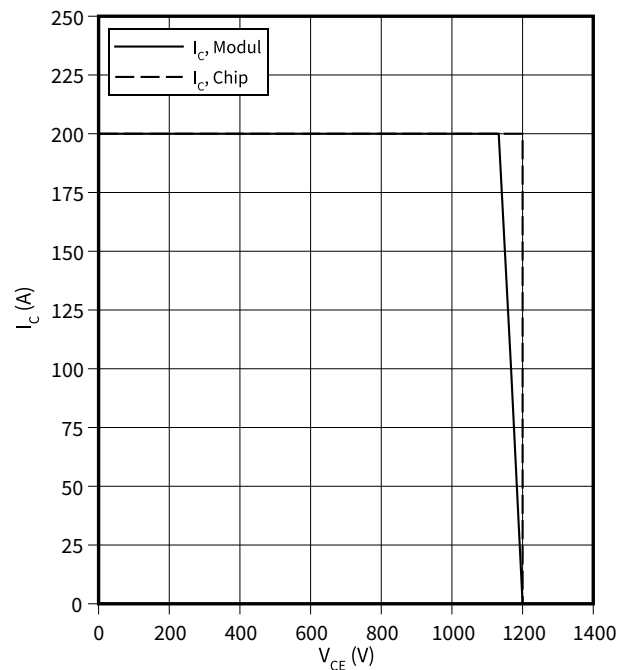
$I_C = 100 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 25 \text{ °C}$



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

$I_C = f(V_{CE})$

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

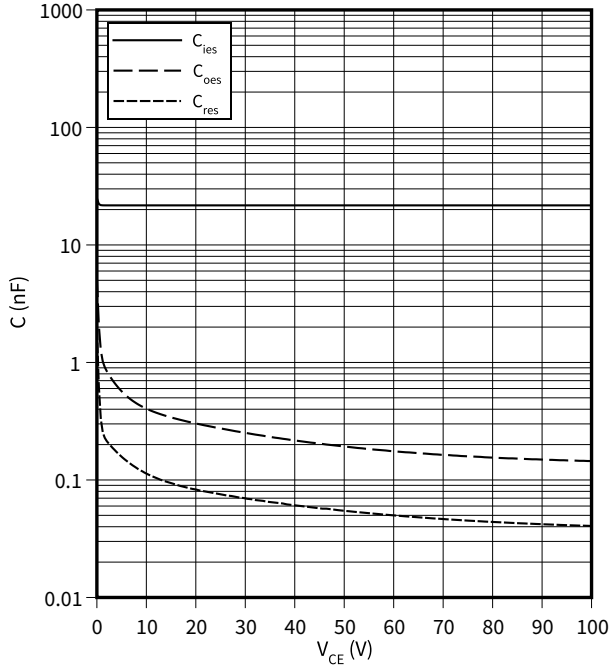


8 Characteristics diagrams

capacity characteristic (typical), IGBT, Inverter

$C = f(V_{CE})$

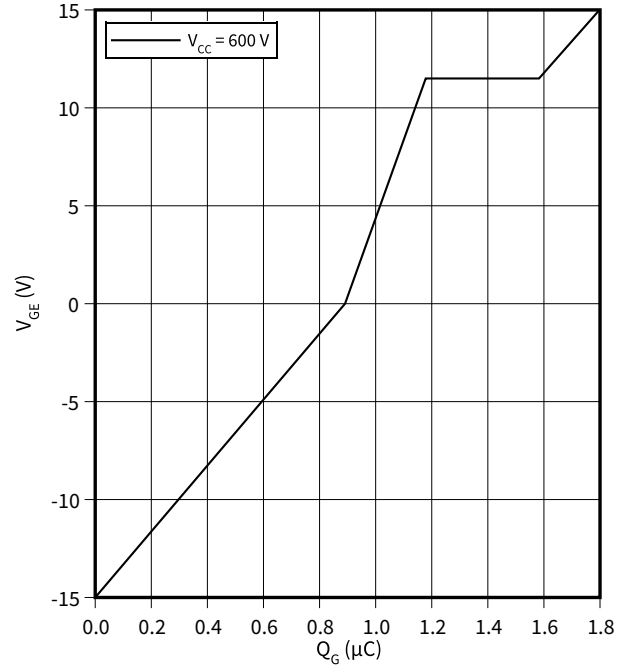
$f = 100 \text{ kHz}, V_{GE} = 0 \text{ V}, T_{vj} = 25 \text{ }^\circ\text{C}$



gate charge characteristic (typical), IGBT, Inverter

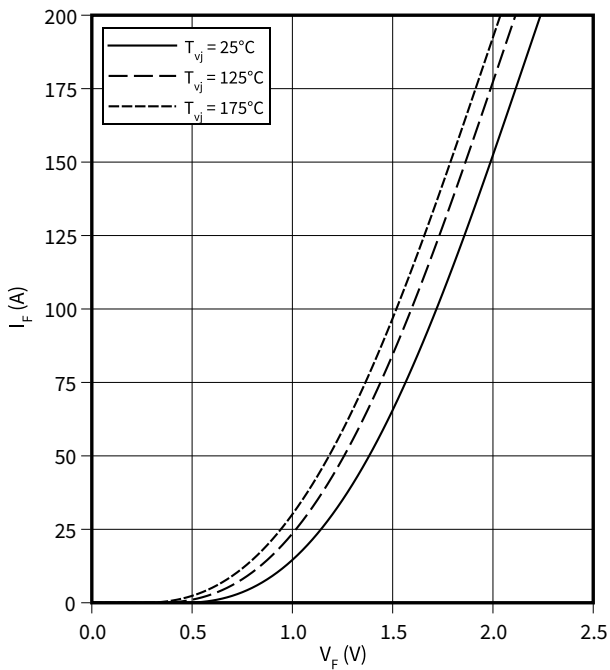
$V_{GE} = f(Q_G)$

$I_C = 100 \text{ A}, T_{vj} = 25 \text{ }^\circ\text{C}$



forward characteristic of (typical), Diode, Inverter

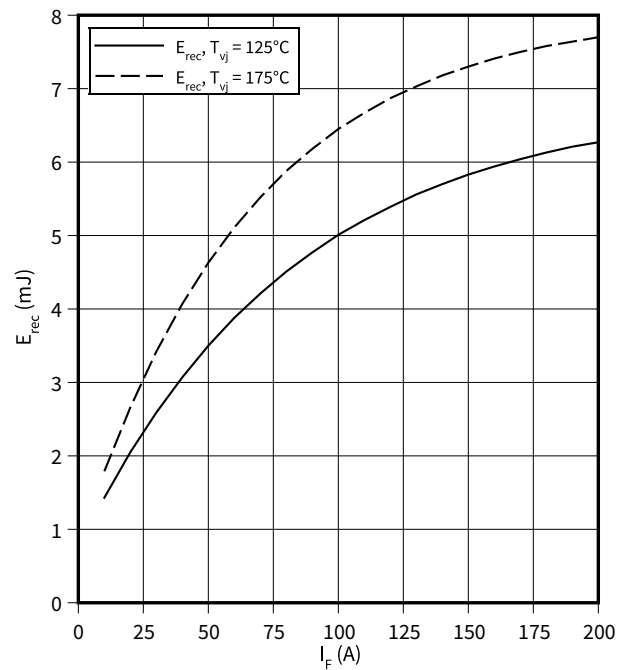
$I_F = f(V_F)$



switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$

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

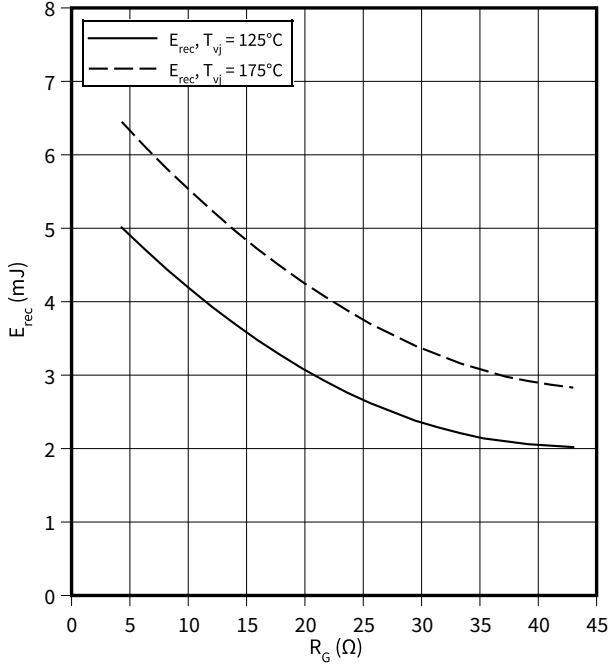


8 Characteristics diagrams

switching losses (typical), Diode, Inverter

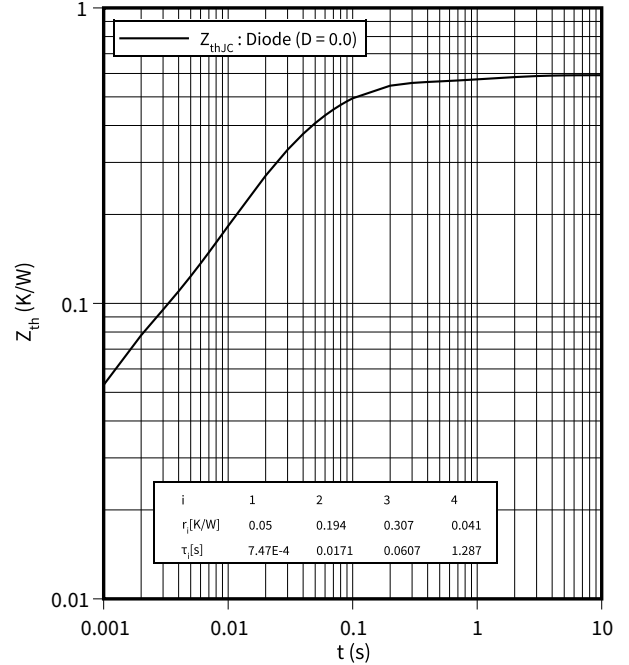
$E_{rec} = f(R_G)$

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



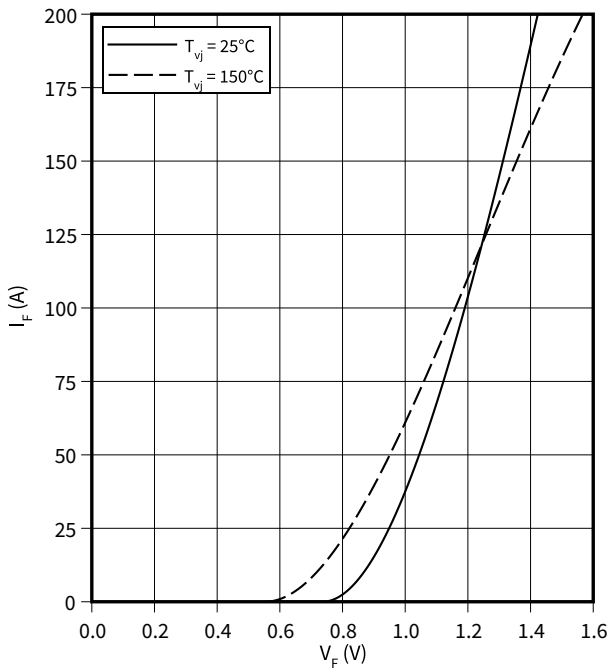
transient thermal impedance, Diode, Inverter

$Z_{th} = f(t)$



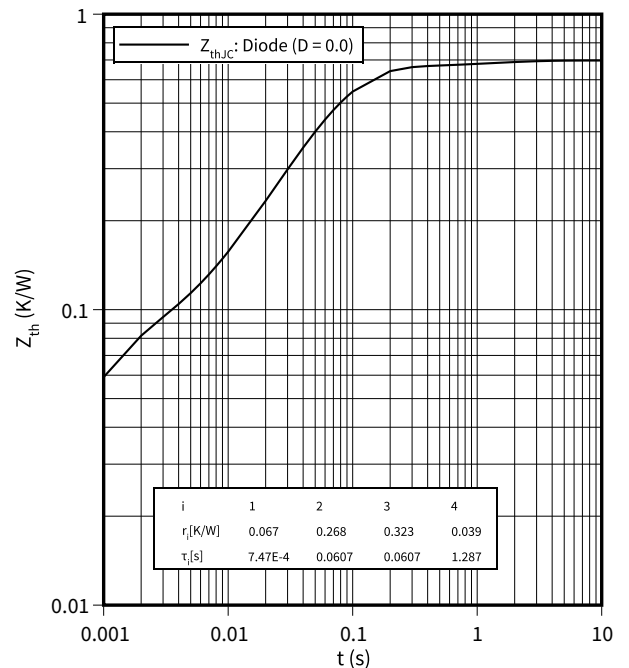
forward characteristic of (typical), Diode, Rectifier

$I_F = f(V_F)$



transient thermal impedance, Diode, Rectifier

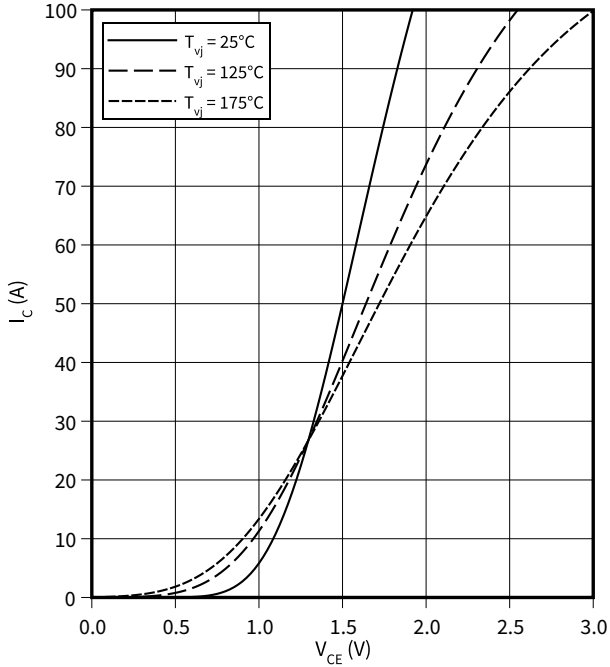
$Z_{th} = f(t)$



8 Characteristics diagrams

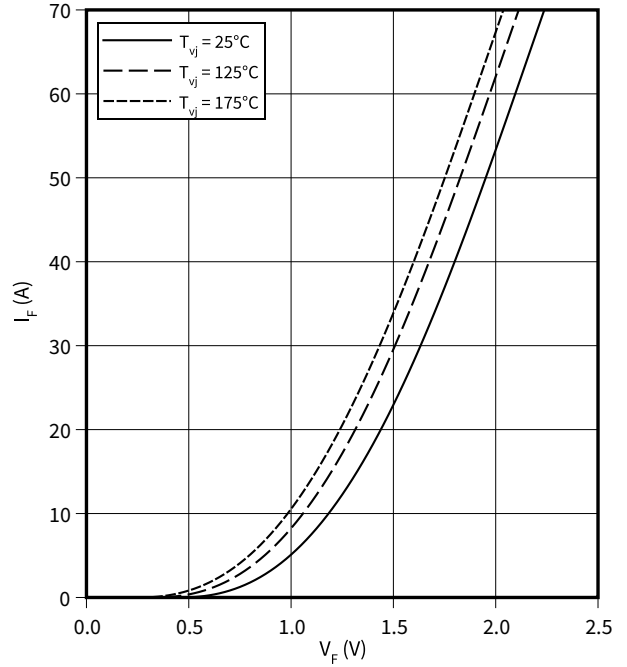
output characteristic (typical), IGBT, Brake-Chopper

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



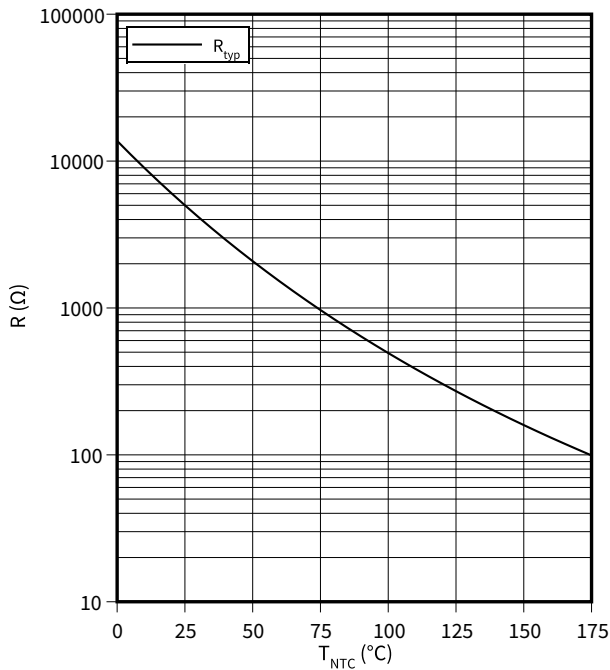
forward characteristic of (typical), Diode, Brake-Chopper

$I_F = f(V_F)$



temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



9 Circuit diagram

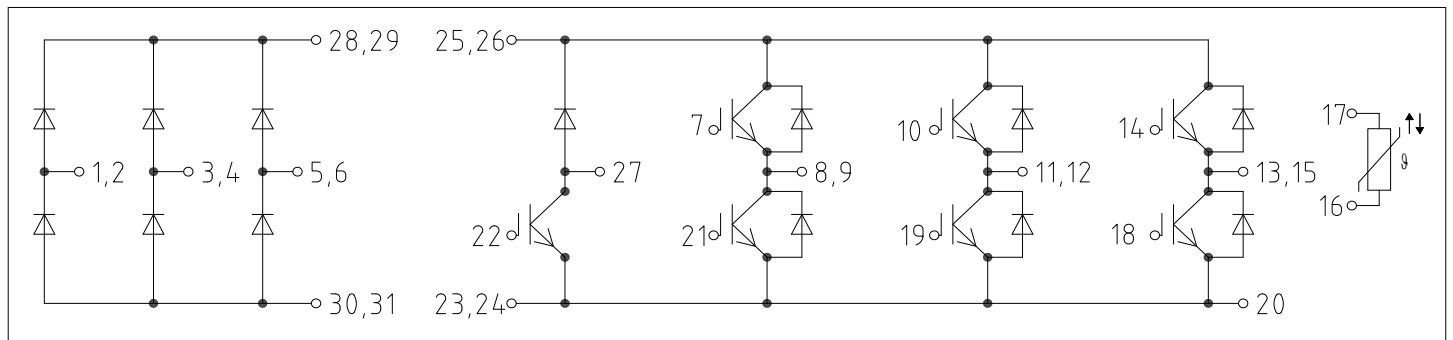


Figure 2

10 Package outlines

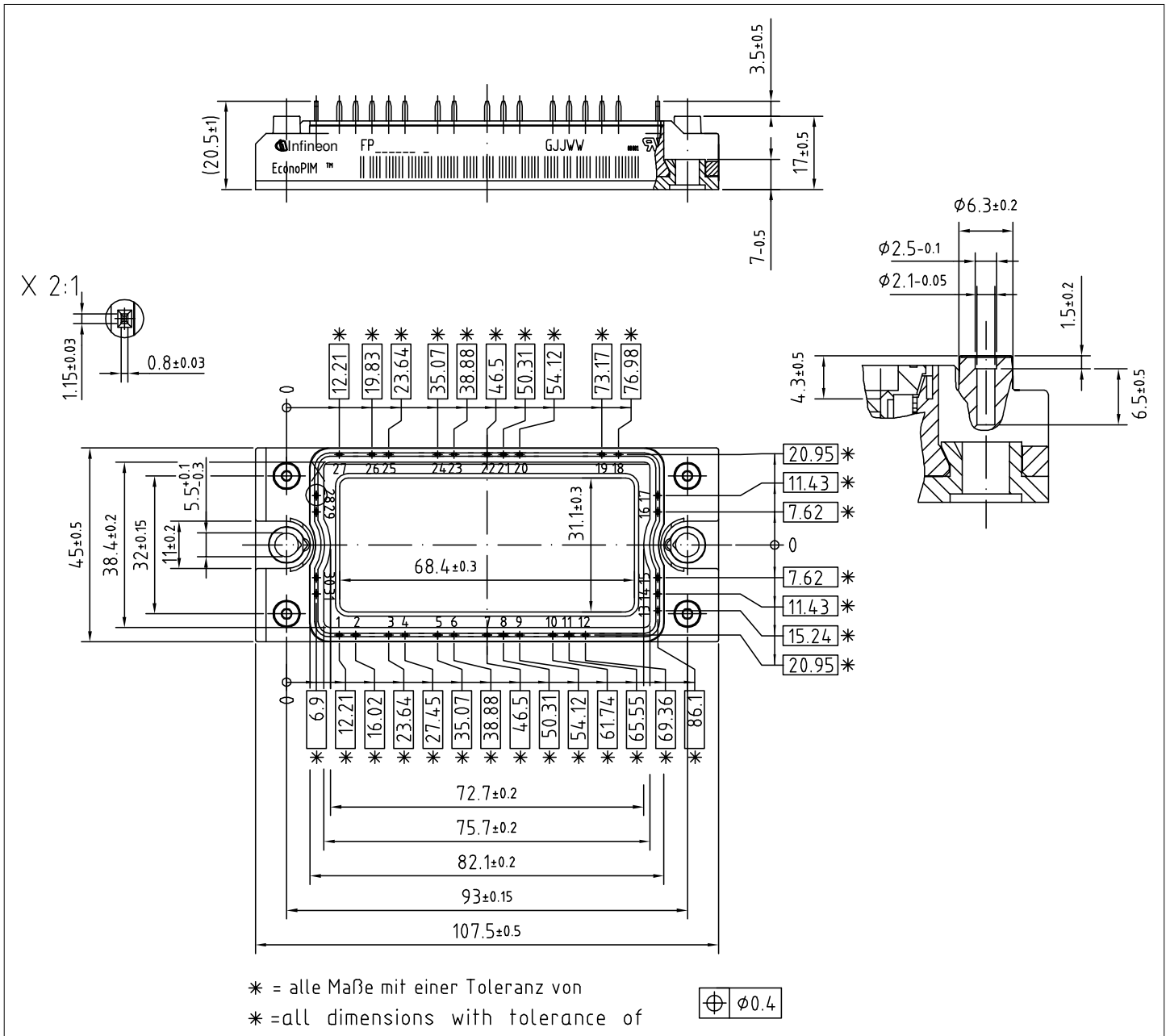


Figure 3

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 | Digit | Example |
| | 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 |   | | |
| | 71549142846550549911530 | | 71549142846550549911530 |

Figure 4

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