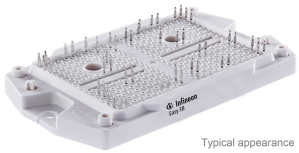
## Final datasheet

## EasyPACK™ module with active “Neutral Point Clamp 2” topology and PressFIT / NTC

### Features


Typical appearance

- Electrical features
  - $V_{CES}$ = 1200 V
  - $I_{C\ nom}$ = 500 A / $I_{CRM}$ = 1000 A
  - Ultra fast IGBT chips
  - Low inductive design
  - Low switching losses
  - Low $V_{CE,sat}$
  - Suitable Infineon gate drivers can be found under https://www.infineon.com/gdfinder
- Mechanical features
  - 2.5 kV AC 1 minute insulation
  - $Al_2O_3$ substrate with low thermal resistance
  - High current pin
  - PressFIT contact technology
  - Rugged mounting due to integrated mounting clamps

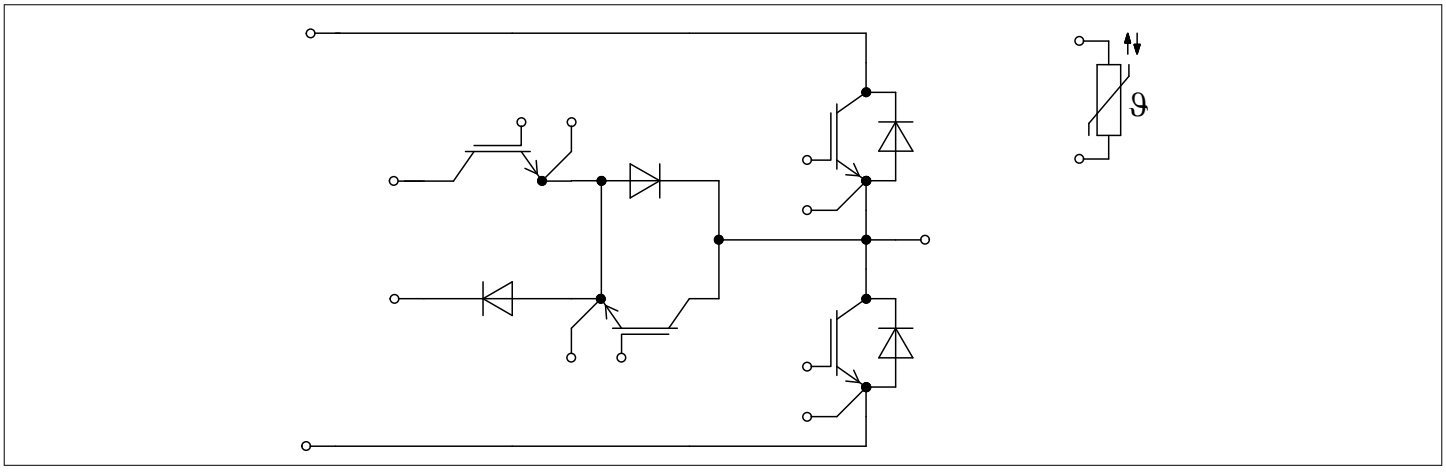
### Potential applications

- Three-level applications
- Solar applications

### 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 |
| Isolation test voltage NTC | $V_{ISOL(NTC)}$ | RMS, f = 50 Hz, *t* = 1 min | 2.5 | kV |
| Internal isolation | | basic insulation (class 1, IEC 61140) | $Al_2O_3$ | |
| Comparative tracking index | *CTI* | | > 400 | |
| 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 | $L_{sCE}$ | | | 15 | | nH |
| Module lead resistance, terminals - chip | $R_{CC'+EE'}$ | $T_H$ = 25 °C, per switch | | 1.3 | | mΩ |
| Storage temperature | $T_{stg}$ | | -40 | | 125 | °C |
| Mounting torque for module mounting | *M* | - Mounting according to valid application note; M5, Screw | 1.3 | | 1.5 | Nm |
| Weight | *G* | | | 78 | | g |

***Note**: The current under continuous operation is limited to 50 A rms per connector pin.*

# 2 IGBT, T1 / T2

**Table 3 Maximum rated values**

| Parameter | Symbol | Note or test condition | | Values | Unit |
|---|---|---|---|---|---|
| Collector-emitter voltage | $V_{CES}$ | | $T_{vj}$ = 25 °C | 1200 | V |
| Implemented collector current | $I_{CN}$ | | | 510 | A |
| Continuous DC collector current | $I_{CDC}$ | $T_{vj\,max}$ = 175 °C | $T_H$ = 65 °C | 315 | A |
| Repetitive peak collector current | $I_{CRM}$ | $t_p$ limited by $T_{vj\,op}$ | | 1020 | 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 | $V_{CE\,sat}$ | $I_C$ = 500 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25 °C | | 1.69 | 2.23 | V |
| | | | $T_{vj}$ = 125 °C | | 1.89 | | |
| | | | $T_{vj}$ = 175 °C | | 1.98 | | |
| Gate threshold voltage | $V_{GEth}$ | $I_C$ = 8.16 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25 °C | | 4.85 | 5.5 | 6.15 | V |
| Gate charge | $Q_G$ | $V_{GE}$ = ±15 V, $V_{CC}$ = 600 V, $T_{vj}$ = 25 °C | | | 7.52 | | µC |
| Internal gate resistor | $R_{Gint}$ | $T_{vj}$ = 25 °C | | | 1.7 | | Ω |
| Input capacitance | $C_{ies}$ | $f$ = 100 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 57.9 | | nF |
| Reverse transfer capacitance | $C_{res}$ | $f$ = 100 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 0.37 | | nF |
| Collector-emitter cut-off current | $I_{CES}$ | $V_{CE}$ = 1200 V, $V_{GE}$ = 0 V | $T_{vj}$ = 25 °C | | | 29 | µA |
| 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) | $t_{don}$ | $I_C$ = 500 A, $V_{CC}$ = 500 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 0.75 Ω | $T_{vj}$ = 25 °C | | 0.430 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.480 | | |
| | | | $T_{vj}$ = 175 °C | | 0.530 | | |
| Rise time (inductive load) | $t_r$ | $I_C$ = 500 A, $V_{CC}$ = 500 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 0.75 Ω | $T_{vj}$ = 25 °C | | 0.050 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.056 | | |
| | | | $T_{vj}$ = 175 °C | | 0.061 | | |
| Turn-off delay time (inductive load) | $t_{doff}$ | $I_C$ = 500 A, $V_{CC}$ = 500 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 11 Ω | $T_{vj}$ = 25 °C | | 1.700 | | µs |
| | | | $T_{vj}$ = 125 °C | | 1.790 | | |
| | | | $T_{vj}$ = 175 °C | | 1.850 | | |
| Fall time (inductive load) | $t_f$ | $I_C$ = 500 A, $V_{CC}$ = 500 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 11 Ω | $T_{vj}$ = 25 °C | | 0.043 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.044 | | |
| | | | $T_{vj}$ = 175 °C | | 0.060 | | |
| Turn-on energy loss per pulse | $E_{on}$ | $I_C$ = 500 A, $V_{CC}$ = 500 V, $L_\sigma$ = 10 nH, $V_{GE}$ = ±15 V, $R_{Gon}$ = 0.75 Ω, di/dt = 6890 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 28.2 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 30.7 | | |
| | | | $T_{vj}$ = 175 °C | | 31.2 | | |
| Turn-off energy loss per pulse | $E_{off}$ | $I_C$ = 500 A, $V_{CC}$ = 500 V, $L_\sigma$ = 10 nH, $V_{GE}$ = ±15 V, $R_{Goff}$ = 11 Ω, dv/dt = 4270 V/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 20.1 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 26.1 | | |
| | | | $T_{vj}$ = 175 °C | | 30.8 | | |
| Thermal resistance, junction to heat sink | $R_{thJH}$ | per IGBT, $\lambda_{grease}$ = 3.3 W/(m·K) | | | 0.170 | | K/W |

**(table continues...)**

**Table 4 (continued) Characteristic values**

| Parameter | Symbol | Note or test condition | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Temperature under switching conditions | $T_{vj\,op}$ | | -40 | | 175 | °C |

***Note**: Tvj op > 150 °C is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.*

## 3 Diode, D1 / D2

**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 |
| Continuous DC forward current | $I_F$ | | | 400 | A |
| Repetitive peak forward current | $I_{FRM}$ | $t_P$ = 1 ms | | 800 | A |
| $I^2t$ - value | $I^2t$ | $t_P$ = 10 ms, $V_R$ = 0 V | $T_{vj}$ = 125 °C | 19300 | $A^2s$ |
| | | | $T_{vj}$ = 175 °C | 16700 | |

**Table 6 Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Forward voltage | $V_F$ | $I_F$ = 400 A, $V_{GE}$ = 0 V | $T_{vj}$ = 25 °C | | 1.72 | 2.10 | V |
| | | | $T_{vj}$ = 125 °C | | 1.59 | | |
| | | | $T_{vj}$ = 175 °C | | 1.52 | | |
| Peak reverse recovery current | $I_{RM}$ | $V_{CC}$ = 500 V, $I_F$ = 400 A, $V_{GE}$ = -15 V, -di$_F$/dt = 5030 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 150 | | A |
| | | | $T_{vj}$ = 125 °C | | 252 | | |
| | | | $T_{vj}$ = 175 °C | | 316 | | |
| Recovered charge | $Q_r$ | $V_{CC}$ = 500 V, $I_F$ = 400 A, $V_{GE}$ = -15 V, -di$_F$/dt = 5030 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 21.5 | | µC |
| | | | $T_{vj}$ = 125 °C | | 46.3 | | |
| | | | $T_{vj}$ = 175 °C | | 62.4 | | |
| Reverse recovery energy | $E_{rec}$ | $V_{CC}$ = 500 V, $I_F$ = 400 A, $V_{GE}$ = -15 V, -di$_F$/dt = 5030 A/µs ($T_{vj}$ = 175 °C) | $T_{vj}$ = 25 °C | | 6.13 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 16.2 | | |
| | | | $T_{vj}$ = 175 °C | | 23.1 | | |
| Thermal resistance, junction to heat sink | $R_{thJH}$ | per diode, $\lambda_{grease}$ = 3.3 W/(m·K) | | | 0.251 | | K/W |

**(table continues...)**

**Table 6 (continued) Characteristic values**

| Parameter | Symbol | Note or test condition | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Temperature under switching conditions | $T_{vj\,op}$ | | -40 | | 175 | °C |

***Note**: Tvj op > 150 °C is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.*

## 4 IGBT, T3 / T4

**Table 7 Maximum rated values**

| Parameter | Symbol | Note or test condition | | Values | Unit |
|---|---|---|---|---|---|
| Collector-emitter voltage | $V_{CES}$ | | $T_{vj}$ = 25 °C | 950 | V |
| Implemented collector current | $I_{CN}$ | | | 400 | A |
| Continuous DC collector current | $I_{CDC}$ | $T_{vj\,max}$ = 150 °C | $T_H$ = 65 °C | 200 | A |
| Repetitive peak collector current | $I_{CRM}$ | $t_p$ limited by $T_{vj\,op}$ | | 800 | A |
| Gate-emitter peak voltage | $V_{GES}$ | | | ±20 | V |

**Table 8 Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Collector-emitter saturation voltage | $V_{CE\,sat}$ | $I_C$ = 400 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25 °C | | 1.85 | 2.25 | V |
| | | | $T_{vj}$ = 125 °C | | 2.10 | | |
| | | | $T_{vj}$ = 150 °C | | 2.15 | | |
| Gate threshold voltage | $V_{GEth}$ | $I_C$ = 6.5 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25 °C | | 4.35 | 5.1 | 5.85 | V |
| Gate charge | $Q_G$ | $V_{GE}$ = ±15 V, $V_{CC}$ = 600 V, $T_{vj}$ = 25 °C | | | 0.9 | | µC |
| Internal gate resistor | $R_{Gint}$ | $T_{vj}$ = 25 °C | | | 0.75 | | Ω |
| Input capacitance | $C_{ies}$ | $f$ = 100 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 25.2 | | nF |
| Reverse transfer capacitance | $C_{res}$ | $f$ = 100 kHz, $T_{vj}$ = 25 °C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | | 0.078 | | nF |
| Collector-emitter cut-off current | $I_{CES}$ | $V_{CE}$ = 950 V, $V_{GE}$ = 0 V | $T_{vj}$ = 25 °C | | | 93 | µA |
| Gate-emitter leakage current | $I_{GES}$ | $V_{CE}$ = 0 V, $V_{GE}$ = 20 V, $T_{vj}$ = 25 °C | | | | 100 | nA |

**(table continues...)**

**Table 8 (continued) Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Turn-on delay time (inductive load) | $t_{don}$ | $I_C$ = 400 A, $V_{CC}$ = 500 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 3.6 Ω | $T_{vj}$ = 25 °C | | 0.073 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.080 | | |
| | | | $T_{vj}$ = 150 °C | | 0.082 | | |
| Rise time (inductive load) | $t_r$ | $I_C$ = 400 A, $V_{CC}$ = 500 V, $V_{GE}$ = ±15 V, $R_{Gon}$ = 3.6 Ω | $T_{vj}$ = 25 °C | | 0.055 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.057 | | |
| | | | $T_{vj}$ = 150 °C | | 0.061 | | |
| Turn-off delay time (inductive load) | $t_{doff}$ | $I_C$ = 400 A, $V_{CC}$ = 500 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 15 Ω | $T_{vj}$ = 25 °C | | 0.540 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.570 | | |
| | | | $T_{vj}$ = 150 °C | | 0.600 | | |
| Fall time (inductive load) | $t_f$ | $I_C$ = 400 A, $V_{CC}$ = 500 V, $V_{GE}$ = ±15 V, $R_{Goff}$ = 15 Ω | $T_{vj}$ = 25 °C | | 0.040 | | µs |
| | | | $T_{vj}$ = 125 °C | | 0.068 | | |
| | | | $T_{vj}$ = 150 °C | | 0.086 | | |
| Turn-on energy loss per pulse | $E_{on}$ | $I_C$ = 400 A, $V_{CC}$ = 500 V, $L_\sigma$ = 40 nH, $V_{GE}$ = ±15 V, $R_{Gon}$ = 3.6 Ω, di/dt = 5030 A/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 26.4 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 29 | | |
| | | | $T_{vj}$ = 150 °C | | 29 | | |
| Turn-off energy loss per pulse | $E_{off}$ | $I_C$ = 400 A, $V_{CC}$ = 500 V, $L_\sigma$ = 40 nH, $V_{GE}$ = ±15 V, $R_{Goff}$ = 15 Ω, dv/dt = 6220 V/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 12.9 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 16.8 | | |
| | | | $T_{vj}$ = 150 °C | | 18.3 | | |
| Thermal resistance, junction to heat sink | $R_{thJH}$ | per IGBT, $\lambda_{grease}$ = 3.3 W/(m·K) | | | 0.278 | | K/W |
| Temperature under switching conditions | $T_{vj\,op}$ | | | -40 | | 150 | °C |

# 5 Diode, D3 / D4

**Table 9 Maximum rated values**

| Parameter | Symbol | Note or test condition | | Values | Unit |
|---|---|---|---|---|---|
| Repetitive peak reverse voltage | $V_{RRM}$ | | $T_{vj}$ = 25 °C | 950 | V |
| Continuous DC forward current | $I_F$ | | | 300 | A |
| Repetitive peak forward current | $I_{FRM}$ | $t_P$ = 1 ms | | 600 | A |
| $I^2t$ - value | $I^2t$ | $t_P$ = 10 ms, $V_R$ = 0 V | $T_{vj}$ = 125 °C | 3590 | $A^2s$ |
| | | | $T_{vj}$ = 150 °C | 3190 | |

**Table 10 Characteristic values**

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Forward voltage | $V_F$ | $I_F$ = 300 A, $V_{GE}$ = 0 V | $T_{vj}$ = 25 °C | | 2.60 | 2.90 | V |
| | | | $T_{vj}$ = 125 °C | | 2.40 | | |
| | | | $T_{vj}$ = 150 °C | | 2.35 | | |
| Peak reverse recovery current | $I_{RM}$ | $V_{CC}$ = 500 V, $I_F$ = 300 A, $V_{GE}$=-15 V, -di$_F$/dt = 6890 A/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 131 | | A |
| | | | $T_{vj}$ = 125 °C | | 175 | | |
| | | | $T_{vj}$ = 150 °C | | 185 | | |
| Recovered charge | $Q_r$ | $V_{CC}$ = 500 V, $I_F$ = 300 A, $V_{GE}$=-15 V, -di$_F$/dt = 6890 A/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 7.5 | | µC |
| | | | $T_{vj}$ = 125 °C | | 17.9 | | |
| | | | $T_{vj}$ = 150 °C | | 20.5 | | |
| Reverse recovery energy | $E_{rec}$ | $V_{CC}$ = 500 V, $I_F$ = 300 A, $V_{GE}$=-15 V, -di$_F$/dt = 6890 A/µs ($T_{vj}$ = 150 °C) | $T_{vj}$ = 25 °C | | 1.98 | | mJ |
| | | | $T_{vj}$ = 125 °C | | 5.11 | | |
| | | | $T_{vj}$ = 150 °C | | 6.07 | | |
| Thermal resistance, junction to heat sink | $R_{thJH}$ | per diode, $\lambda_{grease}$ = 3.3 W/(m·K) | | | 0.435 | | K/W |
| Temperature under switching conditions | $T_{vj\,op}$ | | | -40 | | 150 | °C |

# 6 NTC-Thermistor

**Table 11 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 | $B_{25/50}$ | $R_2 = R_{25} \exp[B_{25/50}(1/T_2\text{-}1/(298{,}15\ K))]$ | | 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 |

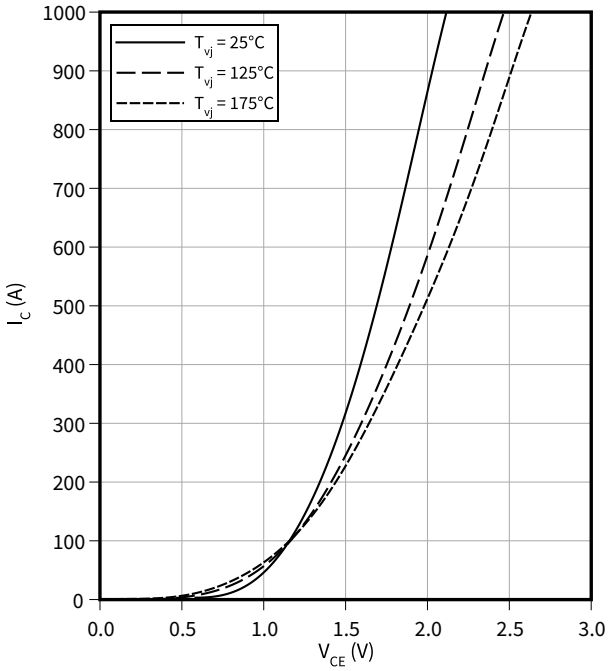
***Note**: For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4.*

# 7 Characteristics diagrams

**Output characteristic (typical), IGBT, T1 / T2**

$I_C = f(V_{CE})$

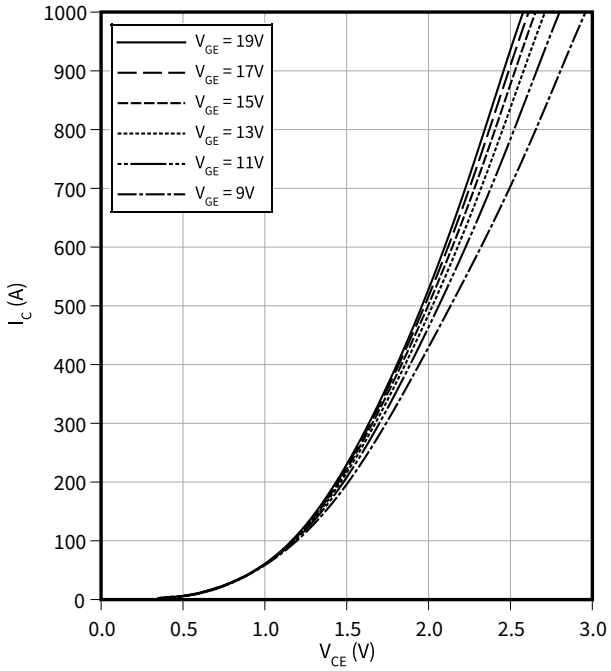
$V_{GE}$ = 15 V




**Output characteristic field (typical), IGBT, T1 / T2**

$I_C = f(V_{CE})$

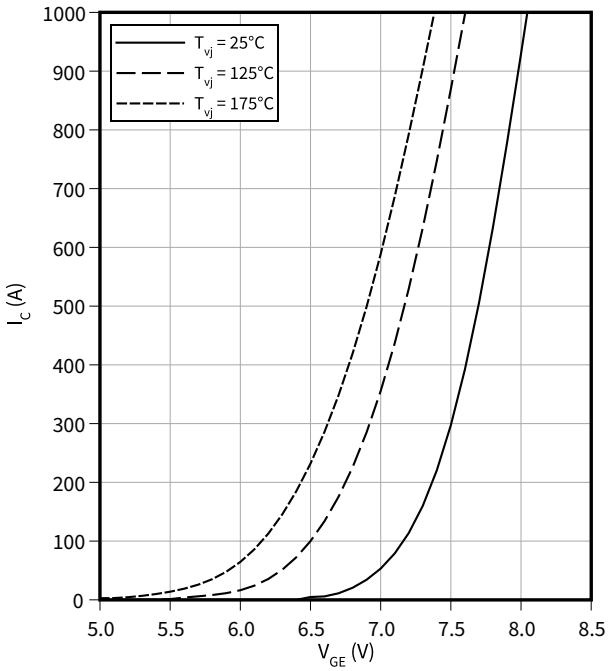
$T_{vj}$ = 175 °C




**Transfer characteristic (typical), IGBT, T1 / T2**

$I_C = f(V_{GE})$

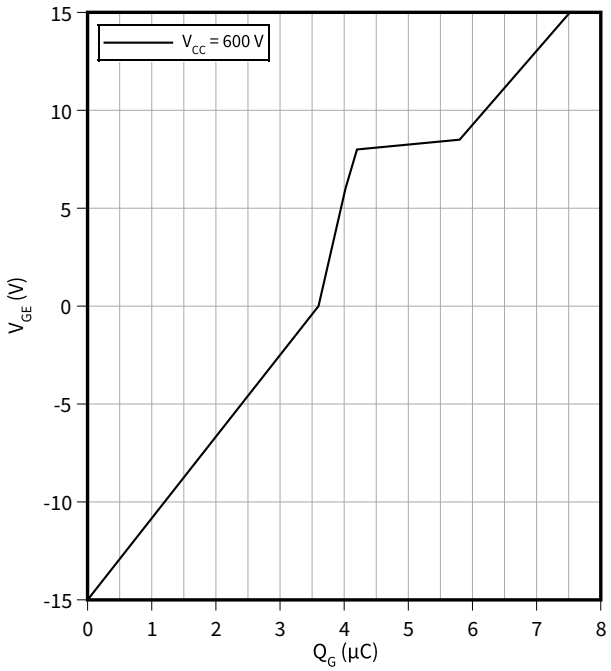
$V_{CE}$ = 20 V




**Gate charge characteristic (typical), IGBT, T1 / T2**

$V_{GE} = f(Q_G)$

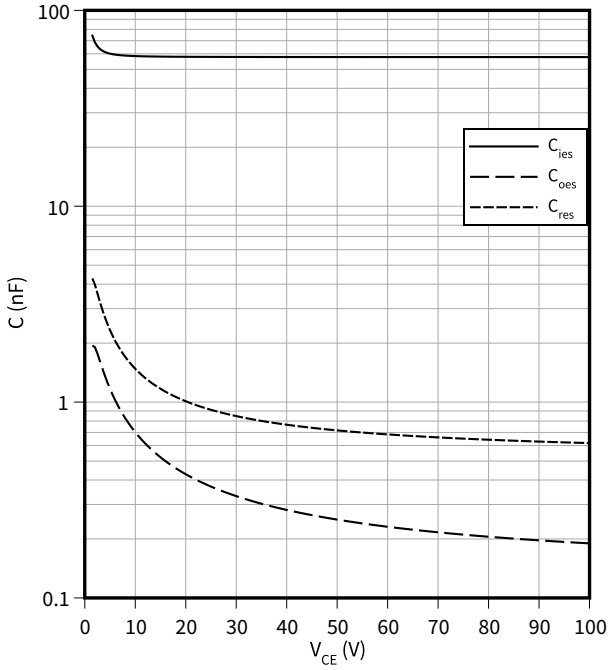
$I_C$ = 500 A, $T_{vj}$ = 25 °C



### Capacity characteristic (typical), IGBT, T1 / T2

$C = f(V_{CE})$

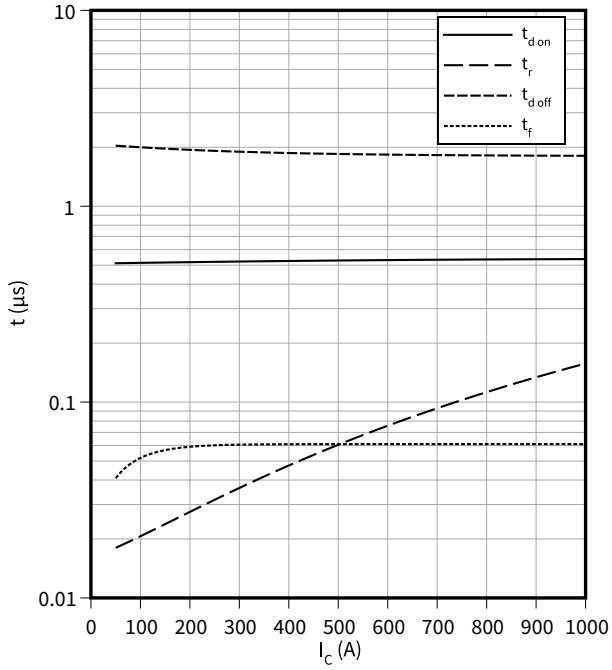
$f = 100\ kHz$, $V_{GE} = 0\ V$, $T_{vj} = 25\ °C$




### Switching times (typical), IGBT, T1 / T2

$t = f(I_C)$

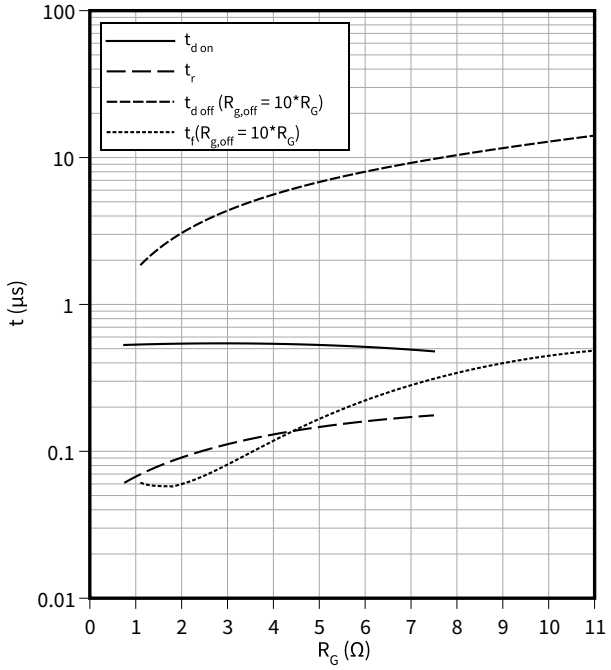
$R_{Goff} = 11\ \Omega$, $R_{Gon} = 0.75\ \Omega$, $V_{GE} = \pm 15\ V$, $V_{CC} = 500\ V$, $T_{vj} = 175\ °C$




### Switching times (typical), IGBT, T1 / T2

$t = f(R_G)$

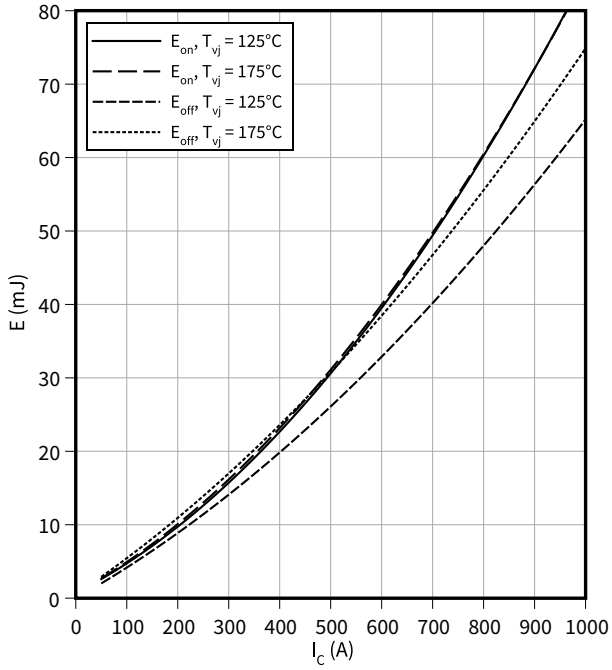
$V_{GE} = \pm 15\ V$, $I_C = 500\ A$, $V_{CC} = 500\ V$, $T_{vj} = 175\ °C$




### Switching losses (typical), IGBT, T1 / T2

$E = f(I_C)$

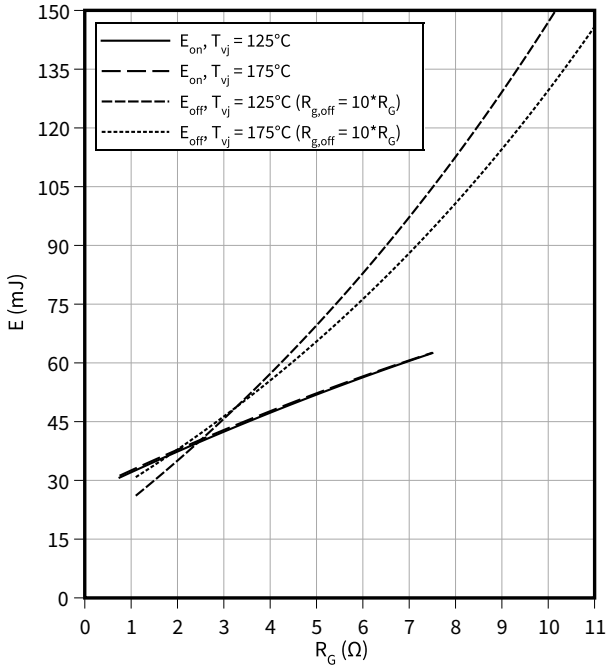
$R_{Goff} = 11\ \Omega$, $R_{Gon} = 0.75\ \Omega$, $V_{CC} = 500\ V$, $V_{GE} = \pm 15\ V$



### Switching losses (typical), IGBT, T1 / T2

$E = f(R_G)$

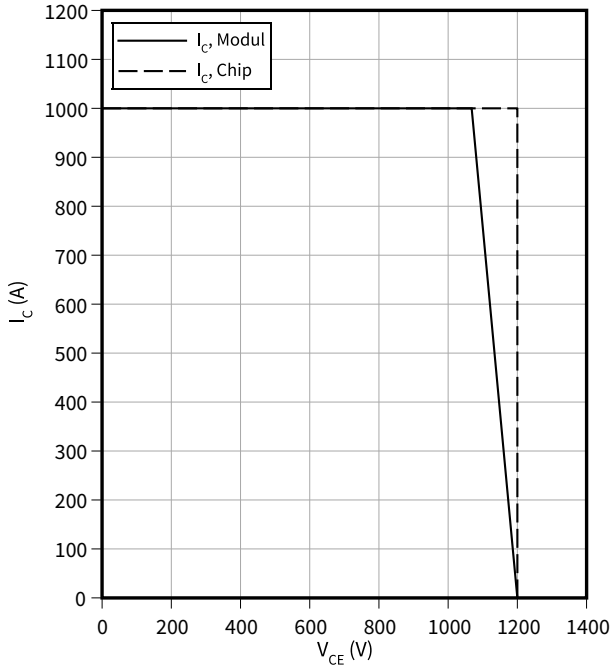
$V_{CC}$ = 500 V, $V_{GE}$ = ± 15 V, $I_C$ = 500 A




### Reverse bias safe operating area (RBSOA), IGBT, T1 / T2

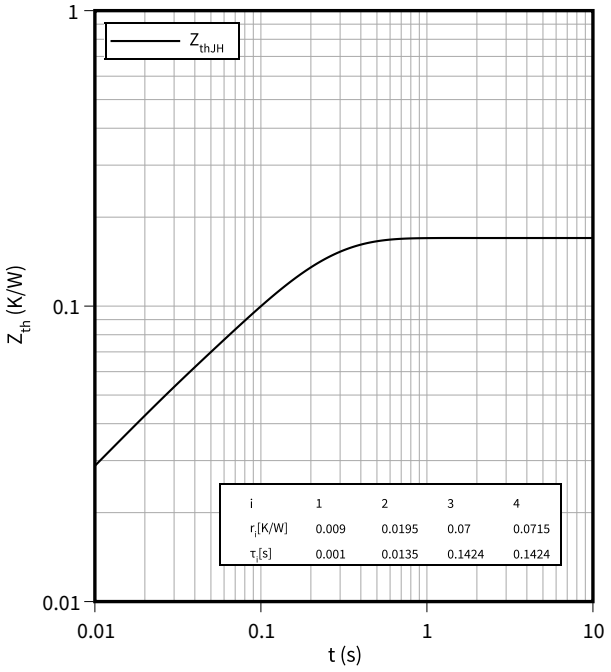
$I_C = f(V_{CE})$

$R_{Goff}$ = 7.5 Ω, $V_{GE}$ = ±15 V, $T_{vj}$ = 175 °C



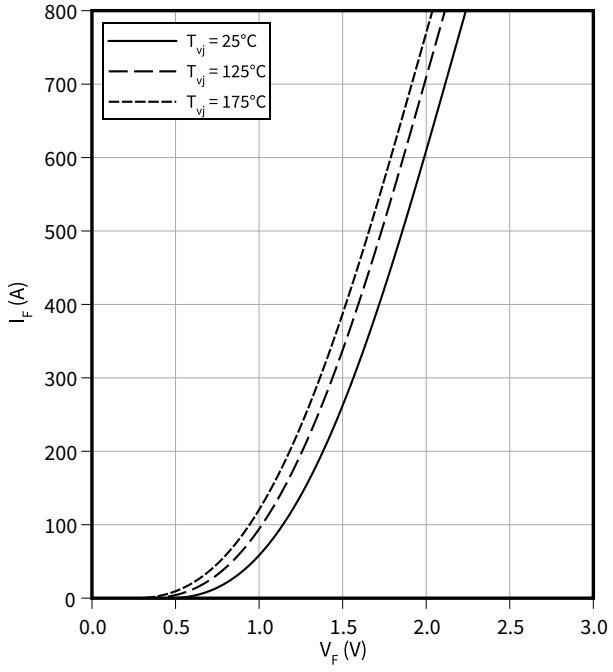

### Transient thermal impedance, IGBT, T1 / T2

$Z_{th} = f(t)$




### Forward characteristic (typical), Diode, D1 / D2

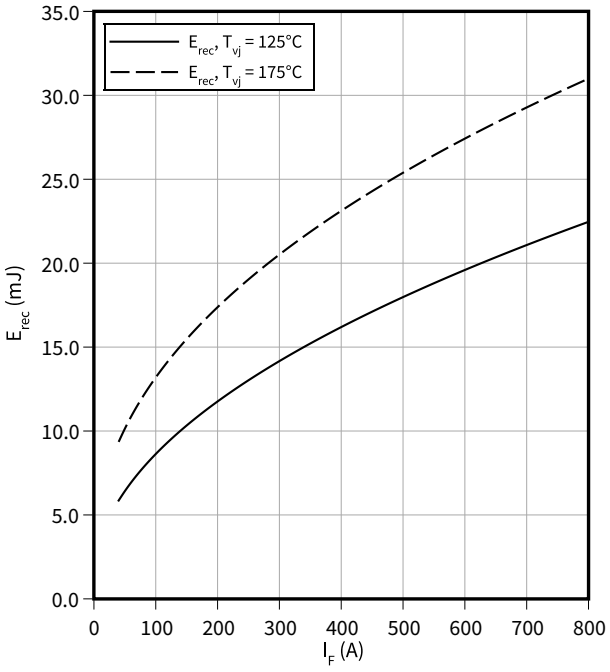
$I_F = f(V_F)$



### Switching losses (typical), Diode, D1 / D2

$E_{rec} = f(I_F)$

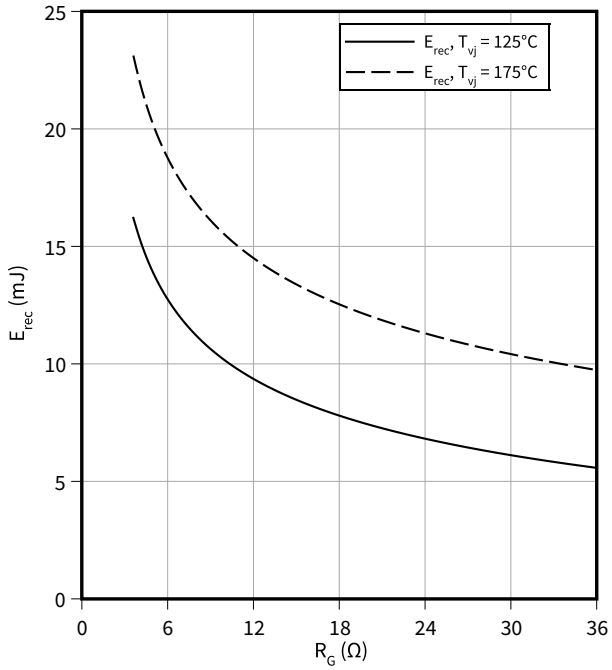
$V_{CE} = 500\ V$, $R_G = 3.6\ \Omega$




### Switching losses (typical), Diode, D1 / D2

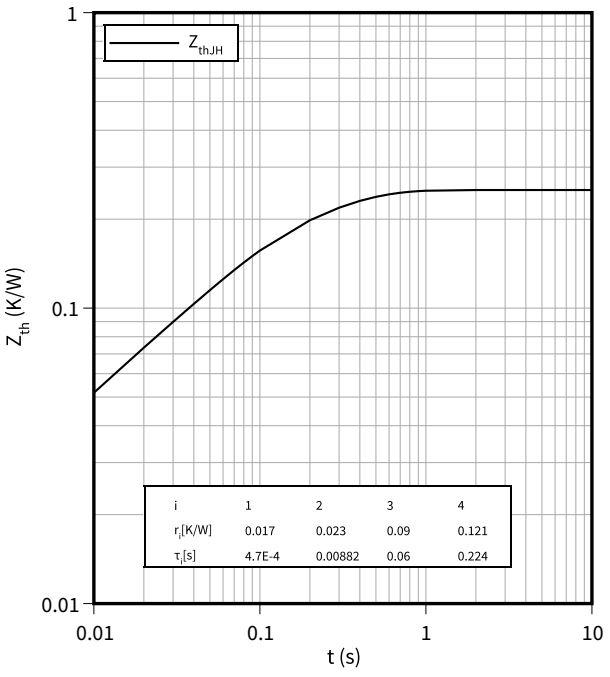
$E_{rec} = f(R_G)$

$V_{CE} = 500\ V$, $I_F = 400\ A$




### Transient thermal impedance, Diode, D1 / D2

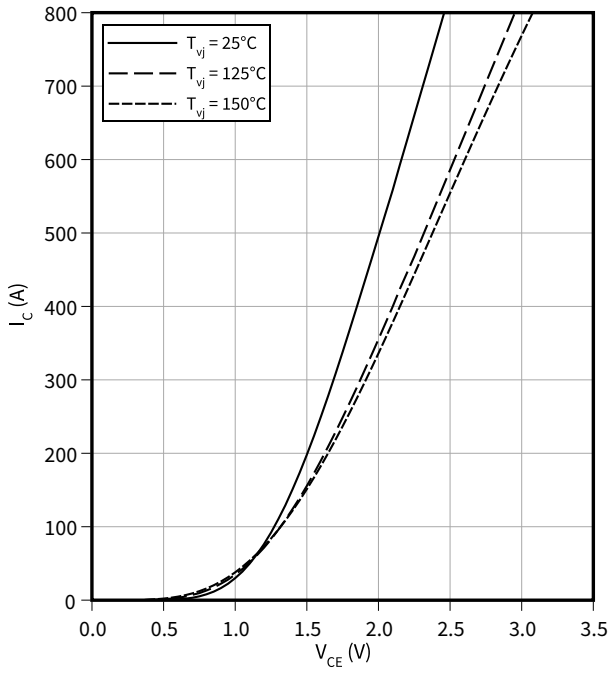
$Z_{th} = f(t)$




### Output characteristic (typical), IGBT, T3 / T4

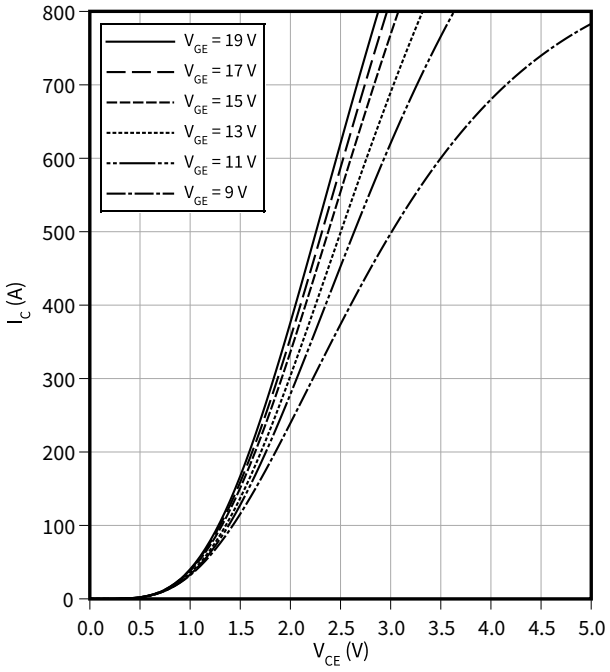
$I_C = f(V_{CE})$

$V_{GE} = 15\ V$



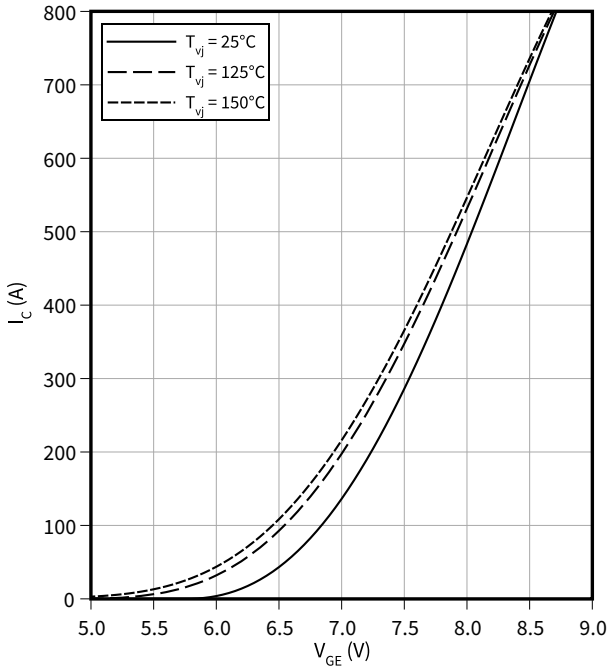
### Output characteristic field (typical), IGBT, T3 / T4

$I_C = f(V_{CE})$
$T_{vj} = 150\ °C$



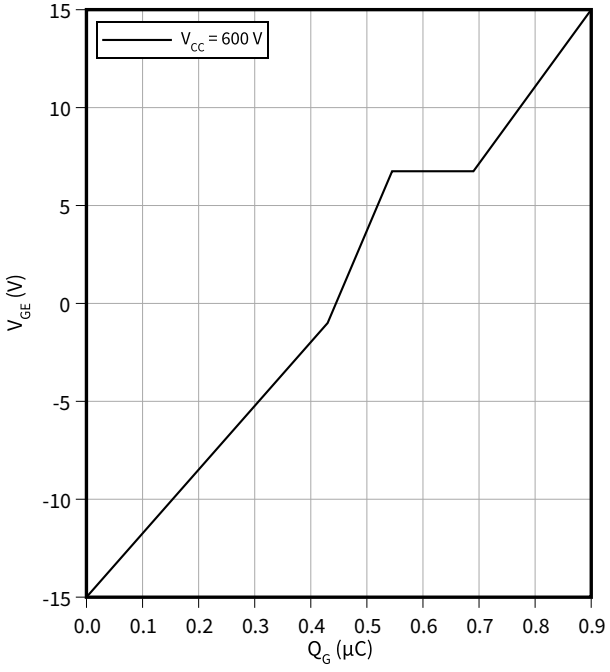

### Transfer characteristic (typical), IGBT, T3 / T4

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



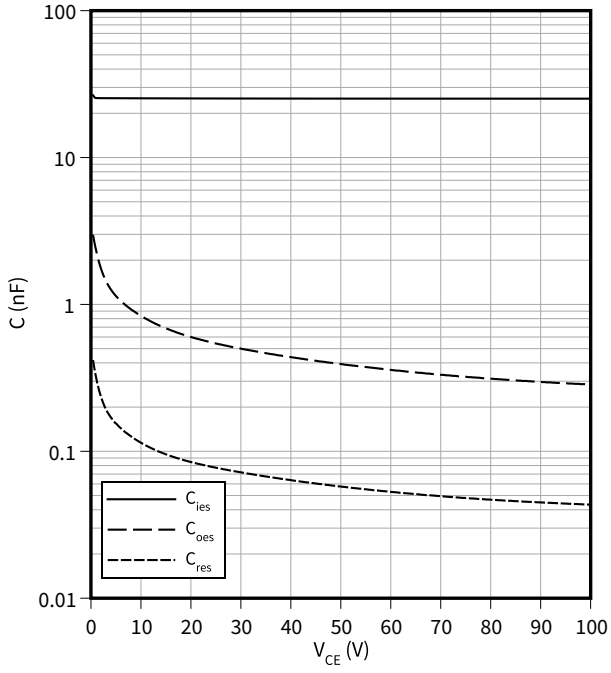

### Gate charge characteristic (typical), IGBT, T3 / T4

$V_{GE} = f(Q_G)$
$I_C = 400\ A,\ T_{vj} = 25\ °C$




### Capacity characteristic (typical), IGBT, T3 / T4

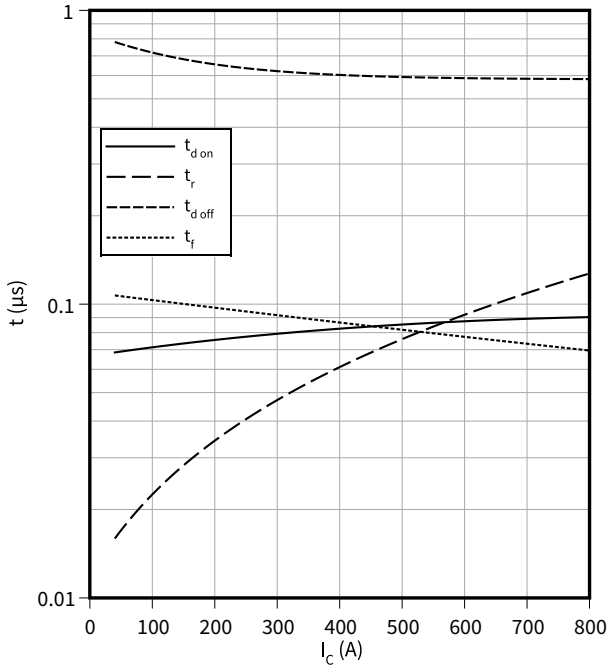
$C = f(V_{CE})$
$f = 100\ kHz,\ V_{GE} = 0\ V,\ T_{vj} = 25\ °C$



### Switching times (typical), IGBT, T3 / T4

$t = f(I_C)$

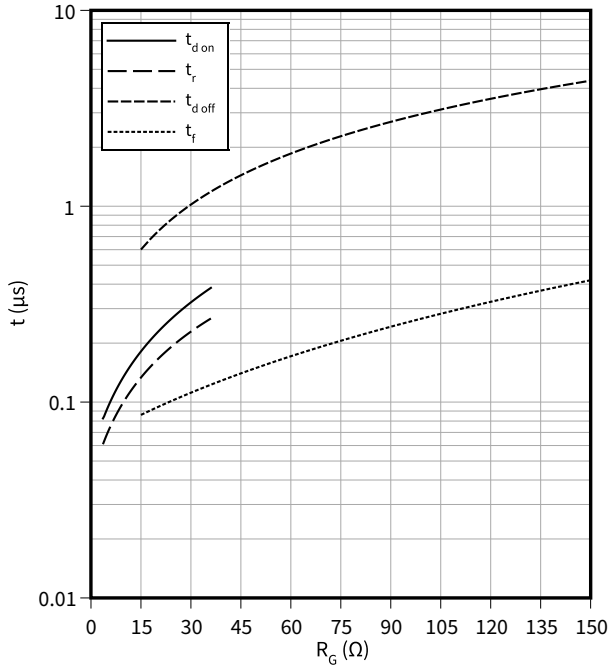
$R_{Goff}$ = 15 Ω, $R_{Gon}$ = 3.6 Ω, $V_{CC}$ = 500 V, $V_{GE}$ = ± 15 V, $T_{vj}$ = 150 °C




### Switching times (typical), IGBT, T3 / T4

$t = f(R_G)$

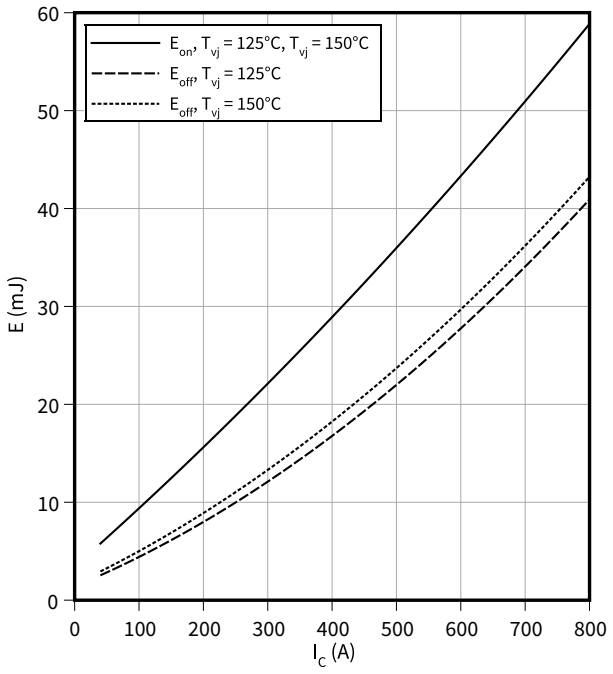
$V_{GE}$ = ±15 V, $I_C$ = 400 A, $V_{CC}$ = 500 V, $T_{vj}$ = 150 °C




### Switching losses (typical), IGBT, T3 / T4

$E = f(I_C)$

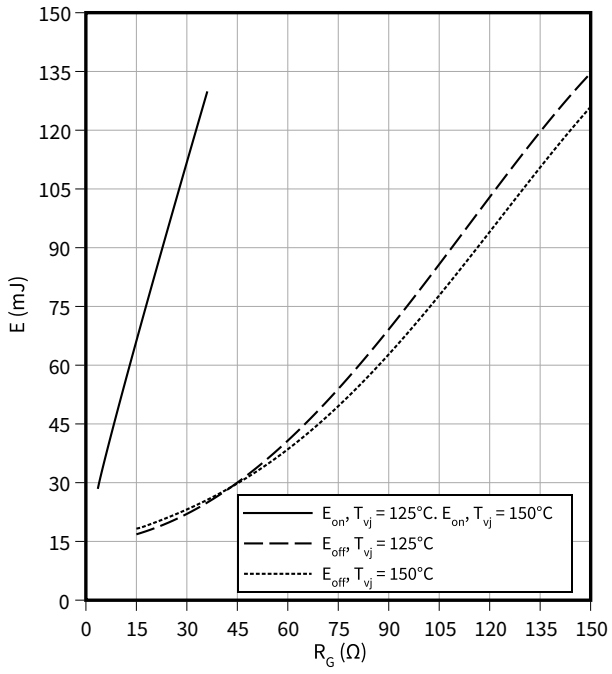
$R_{Goff}$ = 15 Ω, $R_{Gon}$ = 3.6 Ω, $V_{CC}$ = 500 V, $V_{GE}$ = ± 15 V




### Switching losses (typical), IGBT, T3 / T4

$E = f(R_G)$

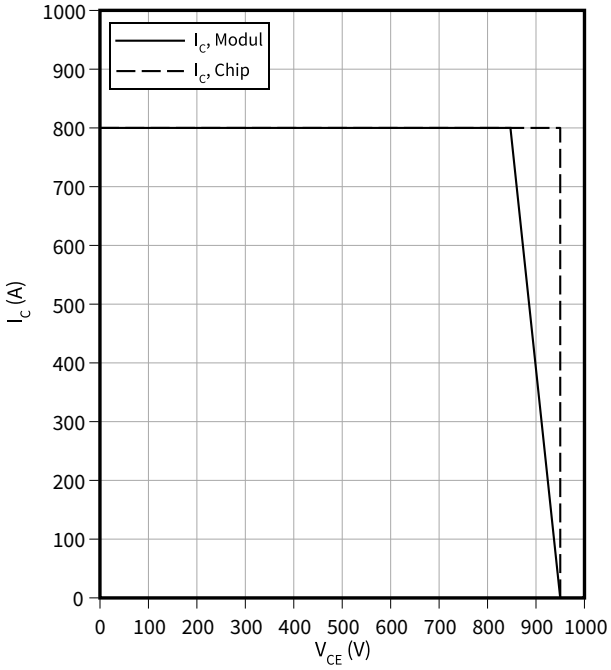
$I_C$ = 400 A, $V_{CC}$ = 500 V, $V_{GE}$ = ± 15 V



### Reverse bias safe operating area (RBSOA), IGBT, T3 / T4

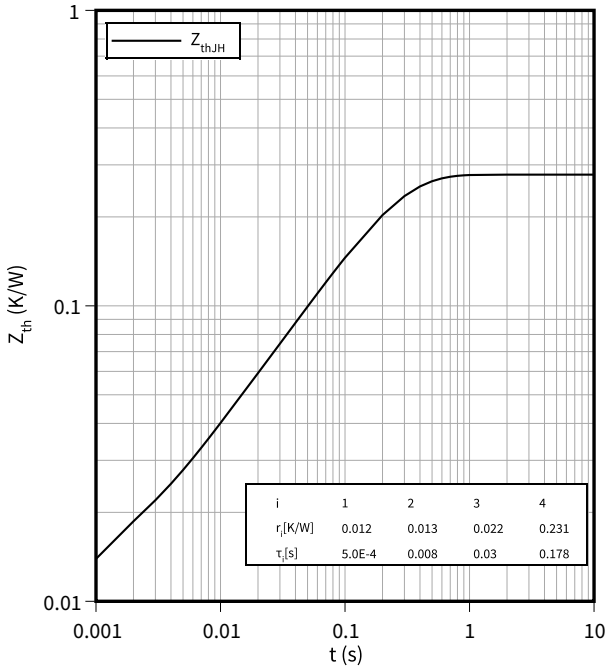
$I_C = f(V_{CE})$

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



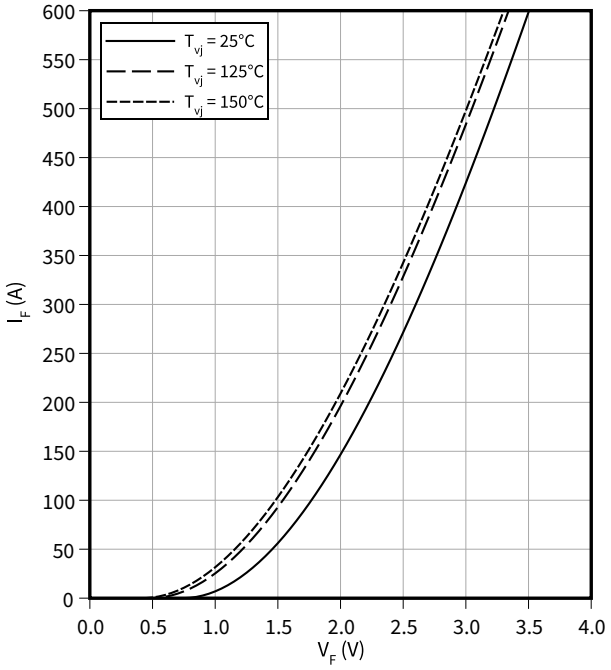

### Transient thermal impedance, IGBT, T3 / T4

$Z_{th} = f(t)$




### Forward characteristic (typical), Diode, D3 / D4

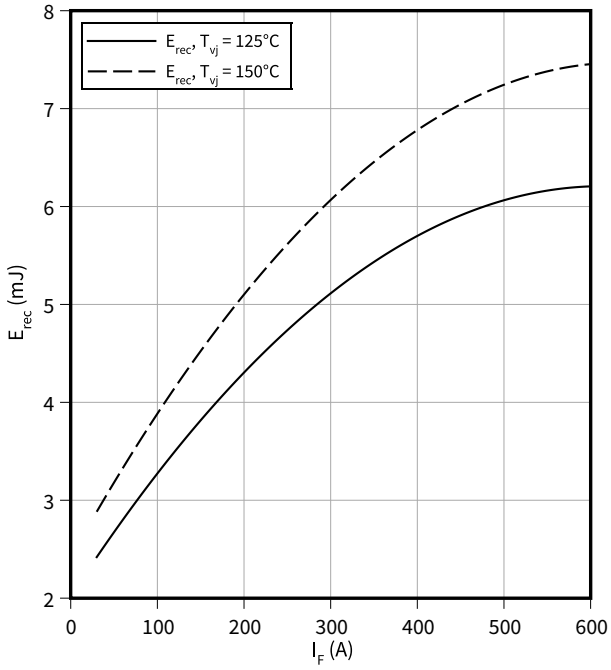
$I_F = f(V_F)$




### Switching losses (typical), Diode, D3 / D4

$E_{rec} = f(I_F)$

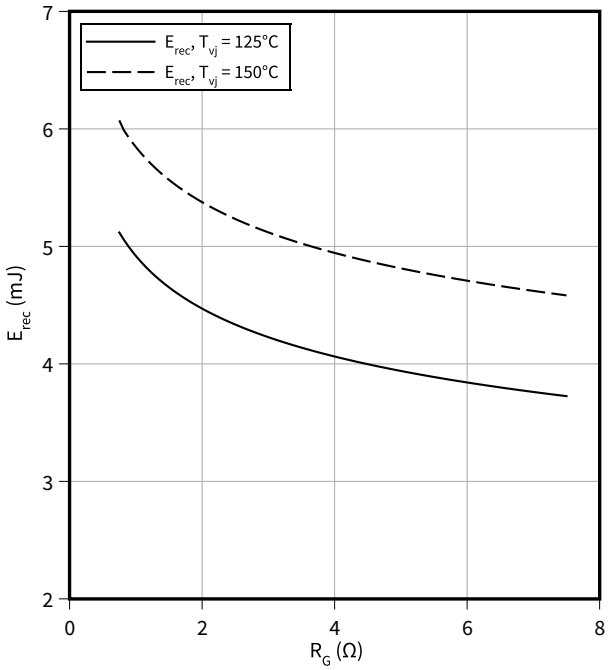
$V_{CE} = 500$ V, $R_G = 0.75\ \Omega$



### Switching losses (typical), Diode, D3 / D4

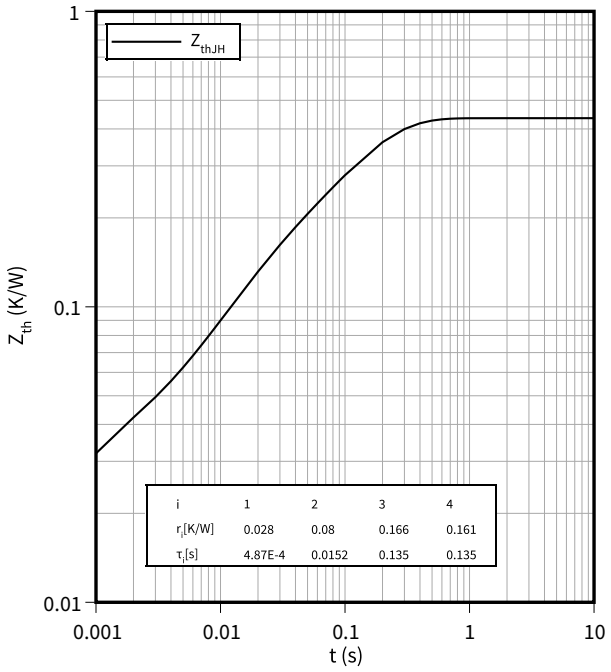
$E_{rec} = f(R_G)$

$V_{CE} = 500\ V$, $I_F = 300\ A$



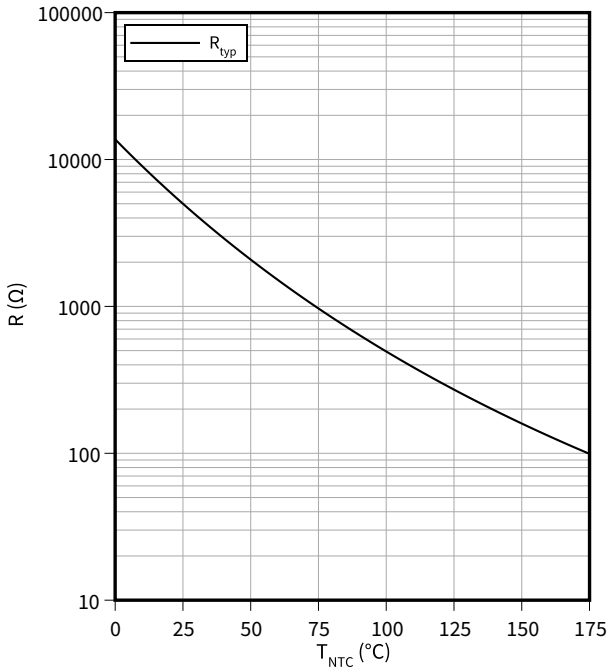

### Transient thermal impedance, Diode, D3 / D4

$Z_{th} = f(t)$




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

$R = f(T_{NTC})$



# 8 Circuit diagram

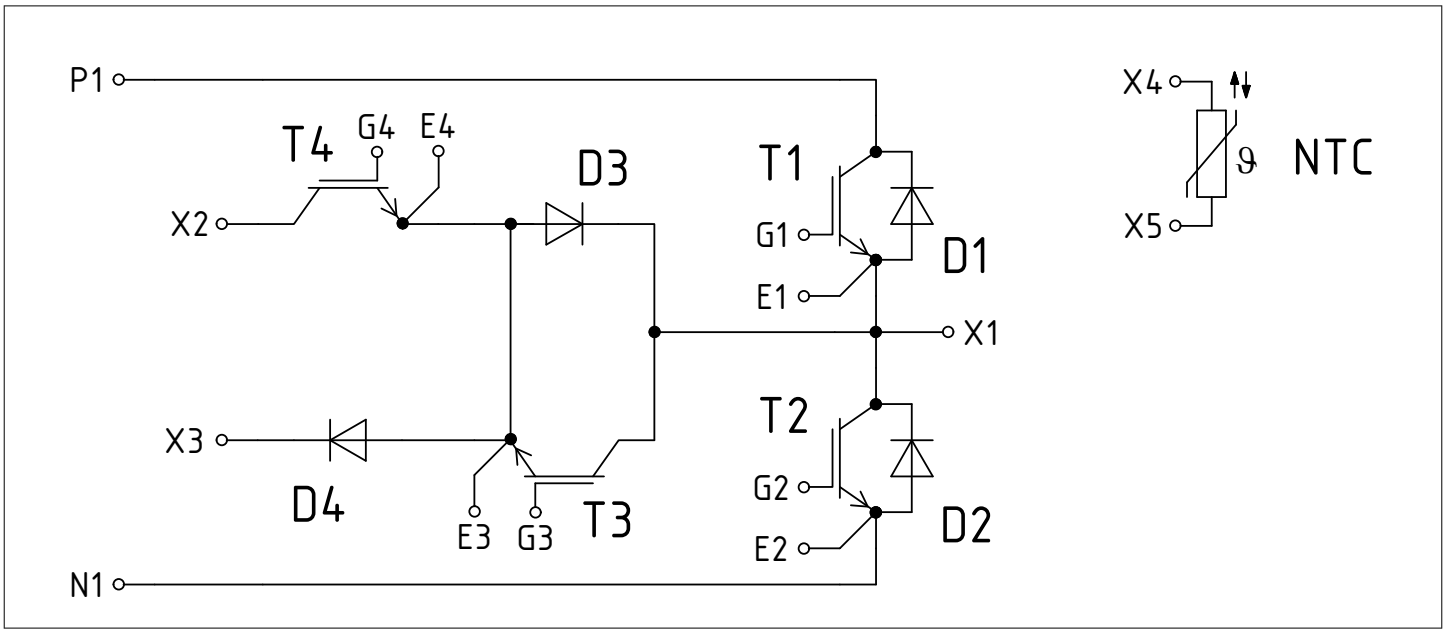



**Figure 1**

# 9 Package outlines

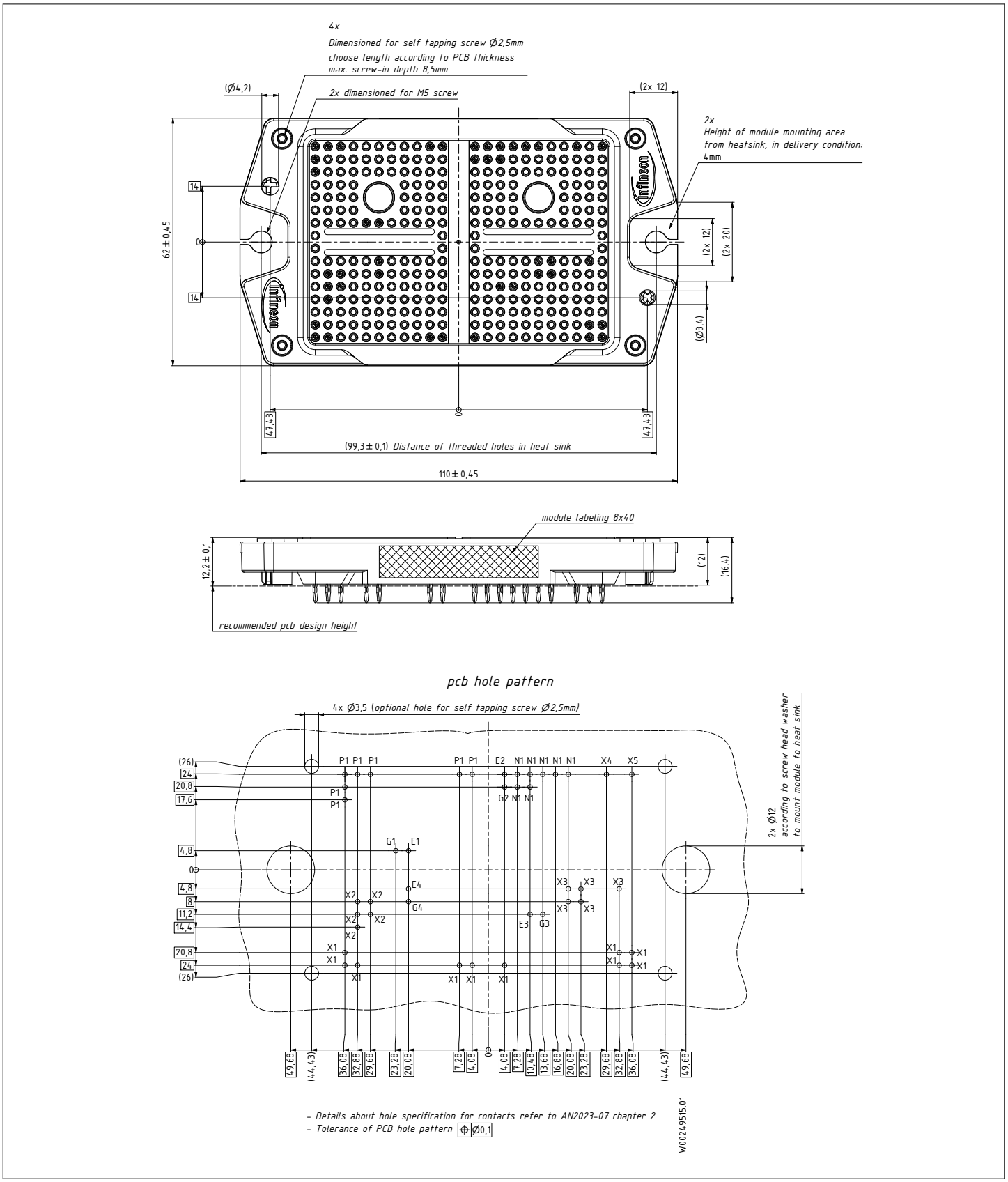



**Figure 2**

# 10 Module label code

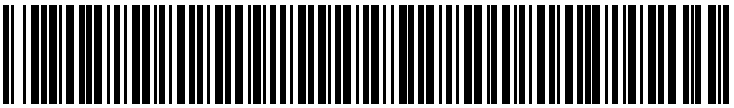
| Module label code | | | |
|---|---|---|---|
| Code format | Data Matrix | | Barcode Code128 |
| Encoding | ASCII text | | Code Set A |
| Symbol size | 16x16 | | 23 digits |
| Standard | IEC24720 and IEC16022 | | IEC8859-1 |
| Code content | *Content*<br>Module serial number<br>Module material number<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 3**

# Revision history

| Document version | Date of release | Description of changes |
|---|---|---|
| 0.10 | 2024-04-15 | Initial version |
| 1.00 | 2024-08-30 | Final datasheet |

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