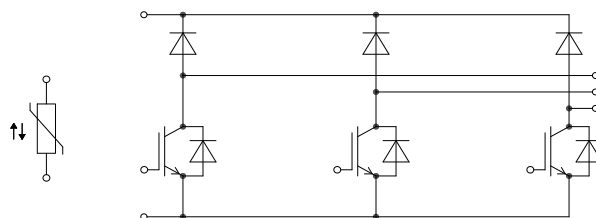
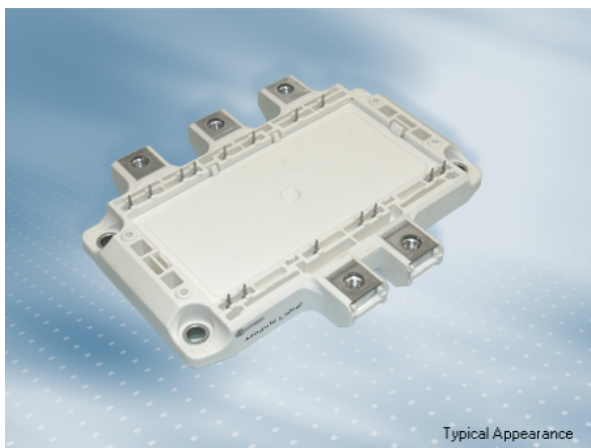


EconoPACK™4 モジュール トレンチ/フィールドストップ IGBT4 and エミッターコントロール diode内蔵 and NTCサーミスタ

EconoPACK™4 module with trench/fieldstop IGBT4 and Emitter Controlled Diode and NTC



$V_{CES} = 1200V$

$I_{C\ nom} = 200A / I_{CRM} = 400A$

### 一般応用

- 3レベル アプリケーション
- 高周波スイッチングアプリケーション
- チョッパアプリケーション
- モーター駆動
- ソーラーアプリケーション
- UPSシステム

### 電気的特性

- 拡張された動作温度  $T_{vj\ op}$
- トレンチ IGBT 4
- $T_{vj\ op} = 150^{\circ}C$
- 正温度特性を持った  $V_{CESat}$  飽和電圧

### 機械的特性

- 2.5 kV AC 1分 絶縁耐圧
- 強いメカニカルロバストネス
- 内蔵されたNTCサーミスタ
- 絶縁されたベースプレート
- 標準ハウジング

### Typical Applications

- 3-Level-Applications
- High Frequency Switching Application
- Chopper Applications
- Motor Drives
- Solar Applications
- UPS Systems

### Electrical Features

- Extended Operation Temperature  $T_{vj\ op}$
- Trench IGBT 4
- $T_{vj\ op} = 150^{\circ}C$
- $V_{CESat}$  with positive Temperature Coefficient

### Mechanical Features

- 2.5 kV AC 1min Insulation
- High mechanical robustness
- Integrated NTC temperature sensor
- Isolated Base Plate
- Standard Housing

## Module Label Code

### Barcode Code 128



### DMX - Code



### Content of the Code

| Content of the Code        | Digit   |
|----------------------------|---------|
| Module Serial Number       | 1 - 5   |
| Module Material Number     | 6 - 11  |
| Production Order Number    | 12 - 19 |
| Datecode (Production Year) | 20 - 21 |
| Datecode (Production Week) | 22 - 23 |

|                 |                                 |                      |
|-----------------|---------------------------------|----------------------|
| prepared by: KY | date of publication: 2013-11-11 |                      |
| approved by: MK | revision: 3.0                   | UL approved (E83335) |



**IGBT-ブレーキチョッパー / IGBT, Brake-Chopper**  
**最大定格 / Maximum Rated Values**

|  |  |                            |            |        |
|--|--|----------------------------|------------|--------|
| コレクタ・エミッタ間電圧<br>Collector-emitter voltage          | $T_{vj} = 25^{\circ}\text{C}$  | $V_{CES}$                  | 1200       | V      |
| 連続DCコレクタ電流<br>Continuous DC collector current      | $T_C = 95^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$<br>$T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{nom}}$<br>$I_C$ | 200<br>300 | A<br>A |
| 繰り返しピークコレクタ電流<br>Repetitive peak collector current | $t_P = 1\text{ ms}$  | $I_{CRM}$                  | 400        | A      |
| トータル損失<br>Total power dissipation                  | $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$   | $P_{\text{tot}}$           | 1100       | W      |
| ゲート・エミッタ間ピーク電圧<br>Gate-emitter peak voltage        |  | $V_{GES}$                  | +/-20      | V      |

**電気的特性 / Characteristic Values**

|   |   |   | min.               | typ.                    | max. |             |   |
|---|---|---|--------------------|-------------------------|------|-------------|---|
| コレクタ・エミッタ間飽和電圧<br>Collector-emitter saturation voltage  | $I_C = 200\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 200\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 200\text{ A}, V_{GE} = 15\text{ V}$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{sat}}$ | 1,75<br>2,05<br>2,10    | 2,10 | V<br>V<br>V |   |
| ゲート・エミッタ間しきい値電圧<br>Gate threshold voltage               | $I_C = 3,80\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$  |   | $V_{GEth}$         | 5,2                     | 5,8  | 6,4         | V   |
| ゲート電荷量<br>Gate charge                                   | $V_{GE} = -15\text{ V} \dots +15\text{ V}$  |   | $Q_G$              | 1,65                    |      |             | $\mu\text{C}$                                   |
| 内蔵ゲート抵抗<br>Internal gate resistor                       | $T_{vj} = 25^{\circ}\text{C}$   |   | $R_{Gint}$         | 3,8                     |      |             | $\Omega$  |
| 入力容量<br>Input capacitance                               | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$  |   | $C_{ies}$          | 12,5                    |      |             | nF  |
| 帰還容量<br>Reverse transfer capacitance                    | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$  |   | $C_{res}$          | 0,54                    |      |             | nF  |
| コレクタ・エミッタ間遮断電流<br>Collector-emitter cut-off current     | $V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$  |   | $I_{CES}$          |                         |      | 0,015       | mA  |
| ゲート・エミッタ間漏れ電流<br>Gate-emitter leakage current           | $V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$  |   | $I_{GES}$          |                         |      | 400         | nA  |
| ターンオン遅れ時間 (誘導負荷)<br>Turn-on delay time, inductive load  | $I_C = 200\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 1,0\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{don}$          | 0,185<br>0,20<br>0,205  |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| ターンオン上昇時間 (誘導負荷)<br>Rise time, inductive load           | $I_C = 200\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 1,0\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_r$              | 0,037<br>0,044<br>0,046 |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| ターンオフ遅れ時間 (誘導負荷)<br>Turn-off delay time, inductive load | $I_C = 200\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 1,0\ \Omega$   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{doff}$         | 0,365<br>0,455<br>0,475 |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| ターンオフ下降時間 (誘導負荷)<br>Fall time, inductive load           | $I_C = 200\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 1,0\ \Omega$   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_f$              | 0,044<br>0,072<br>0,078 |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| ターンオンスイッチング損失<br>Turn-on energy loss per pulse          | $I_C = 200\text{ A}, V_{CE} = 600\text{ V}, L_S = 30\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, di/dt = 4250\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Gon} = 1,0\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{on}$           | 12,0<br>19,5<br>21,5    |      |             | mJ<br>mJ<br>mJ                                  |
| ターンオフスイッチング損失<br>Turn-off energy loss per pulse         | $I_C = 200\text{ A}, V_{CE} = 600\text{ V}, L_S = 30\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, du/dt = 3550\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Goff} = 1,0\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{off}$          | 14,0<br>21,0<br>23,0    |      |             | mJ<br>mJ<br>mJ                                  |
| 短絡電流<br>SC data   | $V_{GE} \leq 15\text{ V}, V_{CC} = 600\text{ V}$<br>$V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$                             |   | $I_{SC}$           | 900                     |      |             | A   |
| ジャンクション・ケース間熱抵抗<br>Thermal resistance, junction to case | IGBT部 ( 1素子当り ) / per IGBT  |   | $R_{thJC}$         |                         |      | 0,135       | K/W   |
| ケース・ヒートシンク間熱抵抗<br>Thermal resistance, case to heatsink  | IGBT部 ( 1素子当り ) / per IGBT<br>$\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$                                |   | $R_{thCH}$         | 0,0645                  |      |             | K/W   |
| 動作温度<br>Temperature under switching conditions          |   |   | $T_{vj\text{op}}$  | -40                     |      | 150         | $^{\circ}\text{C}$                              |

|                 |                                 |
|-----------------|---------------------------------|
| prepared by: KY | date of publication: 2013-11-11 |
| approved by: MK | revision: 3.0                   |



**Diode、ブレーキチョッパー / Diode, Brake-Chopper**  
**最大定格 / Maximum Rated Values**

|  |  |           |              |  |
|--|--|-----------|--------------|--|
| ピーク繰返し逆電圧<br>Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$  | $V_{RRM}$ | 1200         | V  |
| 連続DC電流<br>Continuous DC forward current      |  | $I_F$     | 200          | A  |
| ピーク繰返し順電流<br>Repetitive peak forward current | $t_p = 1\text{ ms}$  | $I_{FRM}$ | 400          | A  |
| 電流二乗時間積<br>$I^2t$ - value                    | $V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$<br>$V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I^2t$    | 7500<br>6500 | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |

**電気的特性 / Characteristic Values**

|   |   |   | min.               | typ.                 | max.  |   |
|---|---|---|--------------------|----------------------|-------|---|
| 順電圧<br>Forward voltage                                  | $I_F = 200\text{ A}, V_{GE} = 0\text{ V}$<br>$I_F = 200\text{ A}, V_{GE} = 0\text{ V}$<br>$I_F = 200\text{ A}, V_{GE} = 0\text{ V}$             | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_F$              | 1,65<br>1,65<br>1,65 | 2,10  | V<br>V<br>V                                     |
| ピーク逆回復電流<br>Peak reverse recovery current               | $I_F = 200\text{ A}, -di_F/dt = 4250\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$                                 | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $I_{RM}$           | 185<br>210<br>215    |       | A<br>A<br>A                                     |
| 逆回復電荷量<br>Recovered charge                              | $I_F = 200\text{ A}, -di_F/dt = 4250\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$                                 | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $Q_r$              | 18,0<br>35,0<br>40,0 |       | $\mu\text{C}$<br>$\mu\text{C}$<br>$\mu\text{C}$ |
| 逆回復損失<br>Reverse recovery energy                        | $I_F = 200\text{ A}, -di_F/dt = 4250\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$                                 | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{rec}$          | 8,30<br>15,5<br>17,5 |       | mJ<br>mJ<br>mJ                                  |
| ジャンクション・ケース間熱抵抗<br>Thermal resistance, junction to case | /Diode ( 1 素子当り ) / per diode   |   | $R_{thJC}$         |                      | 0,215 | K/W   |
| ケース・ヒートシンク間熱抵抗<br>Thermal resistance, case to heatsink  | /Diode ( 1 素子当り ) / per diode<br>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ |   | $R_{thCH}$         | 0,0755               |       | K/W   |
| 動作温度<br>Temperature under switching conditions          |   |   | $T_{vj\text{ op}}$ | -40                  | 150   | $^{\circ}\text{C}$                              |

**Diode、リバーズ / Diode, Reverse**  
**最大定格 / Maximum Rated Values**

|  |  |           |              |  |
|--|--|-----------|--------------|--|
| ピーク繰返し逆電圧<br>Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$  | $V_{RRM}$ | 1200         | V  |
| 連続DC電流<br>Continuous DC forward current      |  | $I_F$     | 25           | A  |
| ピーク繰返し順電流<br>Repetitive peak forward current | $t_p = 1\text{ ms}$  | $I_{FRM}$ | 50           | A  |
| 電流二乗時間積<br>$I^2t$ - value                    | $V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$<br>$V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I^2t$    | 90,0<br>75,0 | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |

**電気的特性 / Characteristic Values**

|   |   |   | min.               | typ.                 | max. |                    |
|---|---|---|--------------------|----------------------|------|--------------------|
| 順電圧<br>Forward voltage                                  | $I_F = 25\text{ A}, V_{GE} = 0\text{ V}$<br>$I_F = 25\text{ A}, V_{GE} = 0\text{ V}$<br>$I_F = 25\text{ A}, V_{GE} = 0\text{ V}$                | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_F$              | 1,75<br>1,75<br>1,75 | 2,25 | V<br>V<br>V        |
| ジャンクション・ケース間熱抵抗<br>Thermal resistance, junction to case | /Diode ( 1 素子当り ) / per diode   |   | $R_{thJC}$         |                      | 1,30 | K/W                |
| ケース・ヒートシンク間熱抵抗<br>Thermal resistance, case to heatsink  | /Diode ( 1 素子当り ) / per diode<br>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ |   | $R_{thCH}$         | 0,125                |      | K/W                |
| 動作温度<br>Temperature under switching conditions          |   |   | $T_{vj\text{ op}}$ | -40                  | 150  | $^{\circ}\text{C}$ |

|                 |                                 |
|-----------------|---------------------------------|
| prepared by: KY | date of publication: 2013-11-11 |
| approved by: MK | revision: 3.0                   |



**NTC-サーミスタ / NTC-Thermistor**

**電気的特性 / Characteristic Values**

|                              |  |              | min. | typ. | max. |            |
|------------------------------|--|--------------|------|------|------|------------|
| 定格抵抗値<br>Rated resistance    | $T_C = 25^\circ\text{C}$                                       | $R_{25}$     |      | 5,00 |      | k $\Omega$ |
| R100の偏差<br>Deviation of R100 | $T_C = 100^\circ\text{C}, R_{100} = 493 \Omega$                | $\Delta R/R$ | -5   |      | 5    | %          |
| 損失<br>Power dissipation      | $T_C = 25^\circ\text{C}$                                       | $P_{25}$     |      |      | 20,0 | mW         |
| B-定数<br>B-value              | $R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$  | $B_{25/50}$  |      | 3375 |      | K          |
| B-定数<br>B-value              | $R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15 \text{ K}))]$  | $B_{25/80}$  |      | 3411 |      | K          |
| B-定数<br>B-value              | $R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15 \text{ K}))]$ | $B_{25/100}$ |      | 3433 |      | K          |

適切なアプリケーションノートによる仕様  
Specification according to the valid application note.

**モジュール / Module**

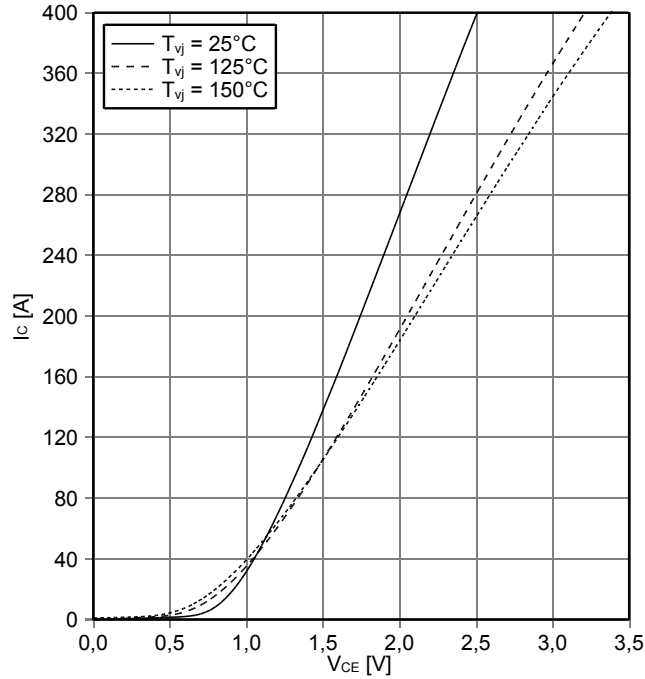
|   |  |             |      |                         |      |                  |
|---|--|-------------|------|-------------------------|------|------------------|
| 絶縁耐圧<br>Isolation test voltage                              | RMS, f = 50 Hz, t = 1 min.   | $V_{ISOL}$  |      | 2,5                     |      | kV               |
| ベースプレート材質<br>Material of module baseplate                   |  |             |      | Cu                      |      |                  |
| 内部絶縁<br>Internal isolation                                  | 基礎絶縁 (クラス1, IEC 61140)<br>basic insulation (class 1, IEC 61140)                                  |             |      | $\text{Al}_2\text{O}_3$ |      |                  |
| 沿面距離<br>Creepage distance                                   | 連絡方法 - ヒートシンク / terminal to heatsink<br>連絡方法 - 連絡方法 / terminal to terminal                       |             |      | 15,0<br>12,5            |      | mm               |
| 空間距離<br>Clearance   | 連絡方法 - ヒートシンク / terminal to heatsink<br>連絡方法 - 連絡方法 / terminal to terminal                       |             |      | 11,0<br>7,0             |      | mm               |
| 相対トラッキング指数<br>Comperative tracking index                    |  | CTI         |      | > 200                   |      |                  |
|   |  |             | min. | typ.                    | max. |                  |
| 内部インダクタンス<br>Stray inductance module                        |  | $L_{SCE}$   |      | 20                      |      | nH               |
| パワーターミナル・チップ間抵抗<br>Module lead resistance, terminals - chip | $T_C = 25^\circ\text{C}, / \text{スイッチ} / \text{per switch}$                                      | $R_{CC+EE}$ |      | 1,40                    |      | m $\Omega$       |
| 保存温度<br>Storage temperature                                 |  | $T_{stg}$   | -40  |                         | 125  | $^\circ\text{C}$ |
| 取り付けネジ締め付けトルク<br>Mounting torque for modul mounting         | 取り付けネジ M5<br>適切なアプリケーションノートによるマウンティング<br>Screw M5 - Mounting according to valid application note | M           | 3,00 | -                       | 6,00 | Nm               |
| 主端子ネジ締め付けトルク<br>Terminal connection torque                  | 取り付けネジ M6<br>適切なアプリケーションノートによるマウンティング<br>Screw M6 - Mounting according to valid application note | M           | 3,0  | -                       | 6,0  | Nm               |
| 質量<br>Weight  |  | G           |      | 400                     |      | g                |

|                 |                                 |
|-----------------|---------------------------------|
| prepared by: KY | date of publication: 2013-11-11 |
| approved by: MK | revision: 3.0                   |



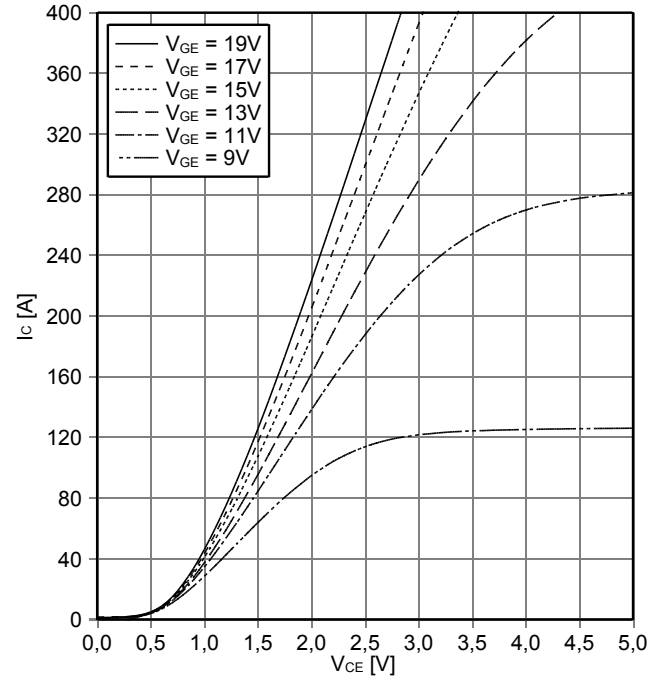
出力特性 IGBT-ブレーキチョッパー (Typical)  
output characteristic IGBT, Brake-Chopper (typical)

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



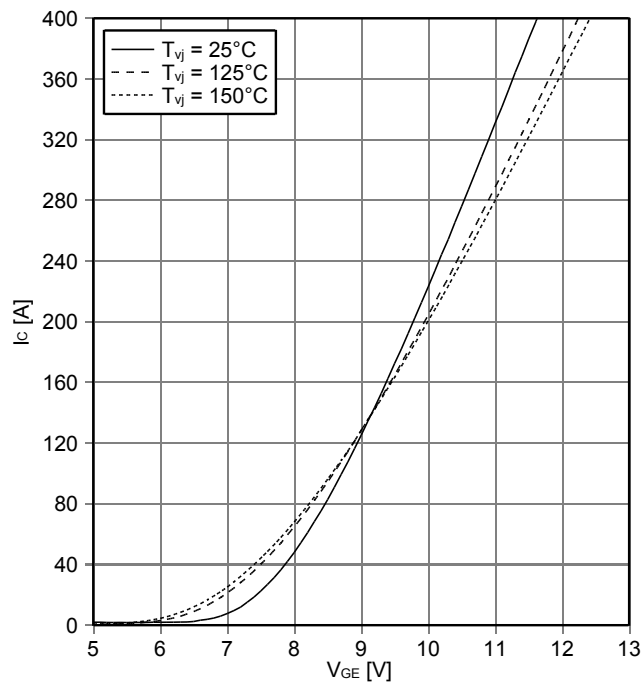
出力特性 IGBT-ブレーキチョッパー (Typical)  
output characteristic IGBT, Brake-Chopper (typical)

$I_C = f(V_{CE})$   
 $T_{vj} = 150^\circ\text{C}$



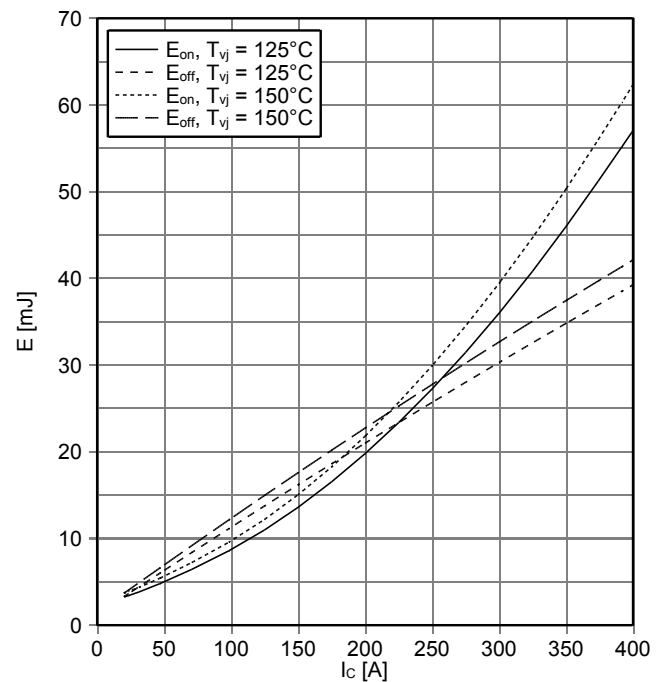
伝達特性 IGBT-ブレーキチョッパー (Typical)  
transfer characteristic IGBT, Brake-Chopper (typical)

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



スイッチング損失 IGBT-ブレーキチョッパー (Typical)  
switching losses IGBT, Brake-Chopper (typical)

$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Gon} = 1\ \Omega$ ,  $R_{Goff} = 1\ \Omega$ ,  $V_{CE} = 600\text{ V}$



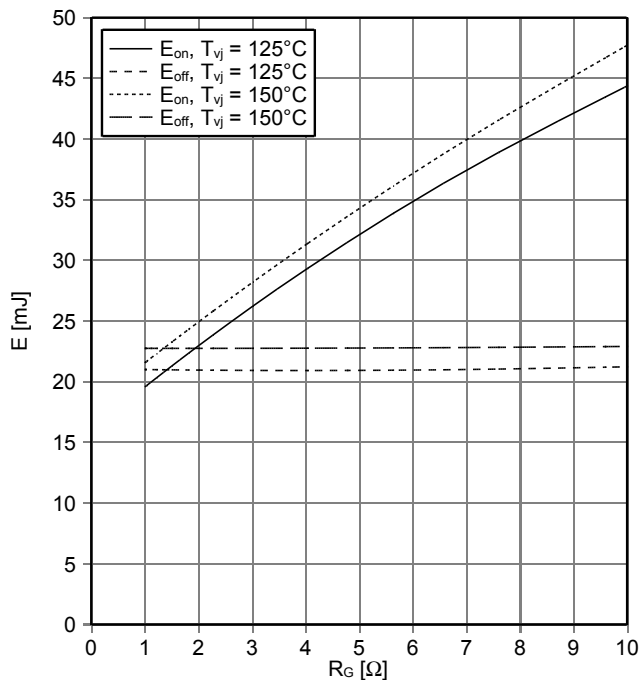
prepared by: KY  
approved by: MK

date of publication: 2013-11-11  
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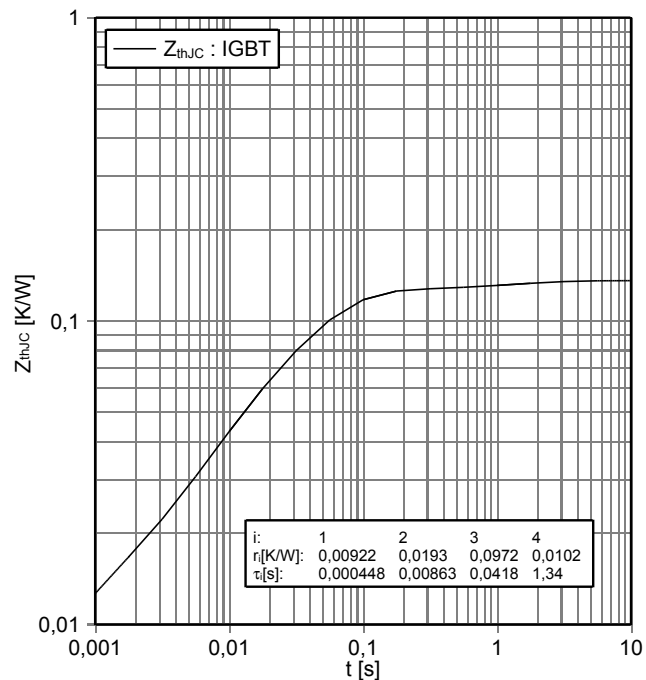
スイッチング損失 IGBT-ブレーキチョッパー (Typical)  
switching losses IGBT, Brake-Chopper (typical)

$E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $I_C = 200\text{ A}$ ,  $V_{CE} = 600\text{ V}$



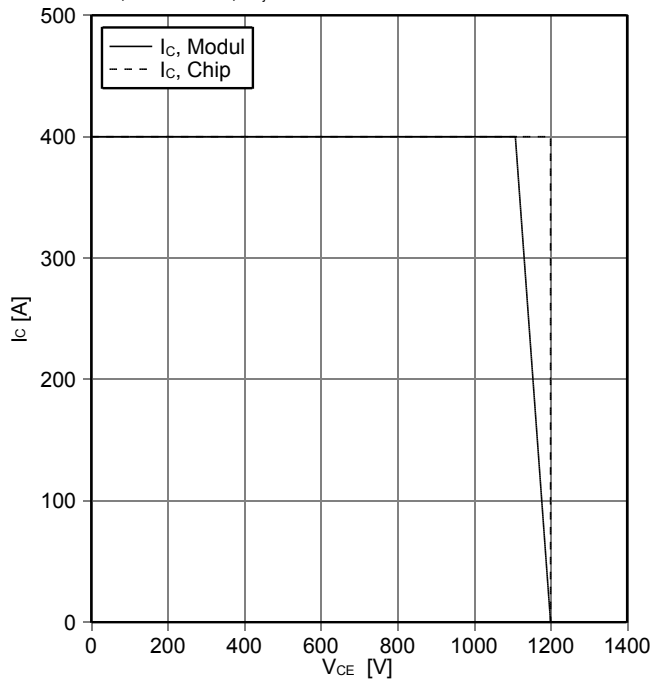
過渡熱インピーダンス IGBT-ブレーキチョッパー  
transient thermal impedance IGBT, Brake-Chopper

$Z_{thJC} = f(t)$



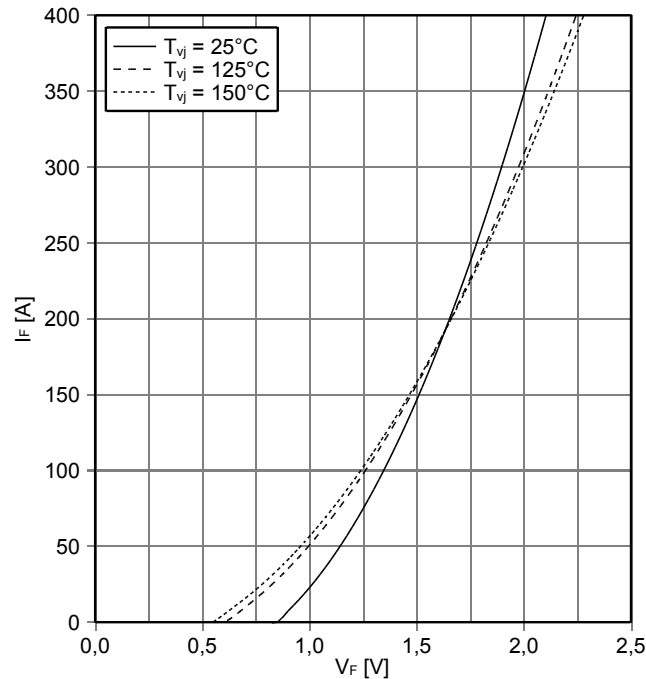
逆バイアス安全動作領域 IGBT-ブレーキチョッパー (RBSOA)  
reverse bias safe operating area IGBT, Brake-Chopper (RBSOA)

$I_C = f(V_{CE})$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Goff} = 1\ \Omega$ ,  $T_{vj} = 150^\circ\text{C}$



順電圧特性 Diode、ブレーキチョッパー (typical)  
forward characteristic of Diode, Brake-Chopper (typical)

$I_F = f(V_F)$

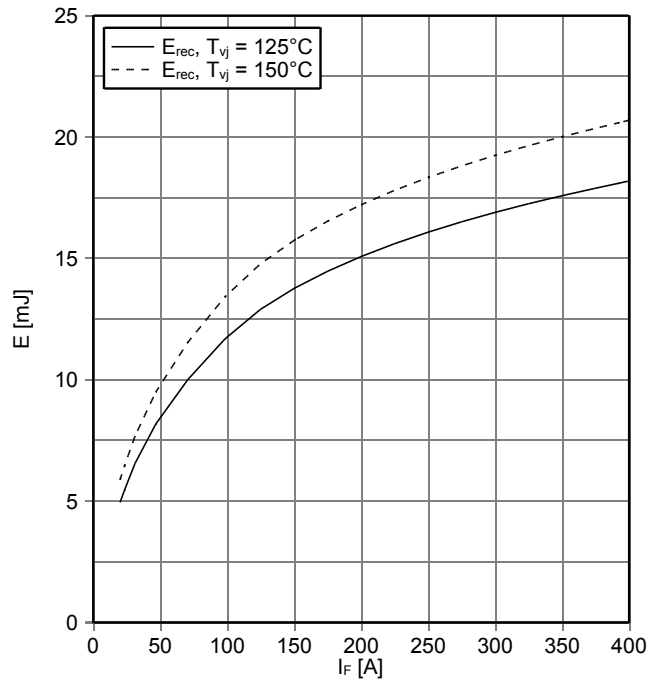


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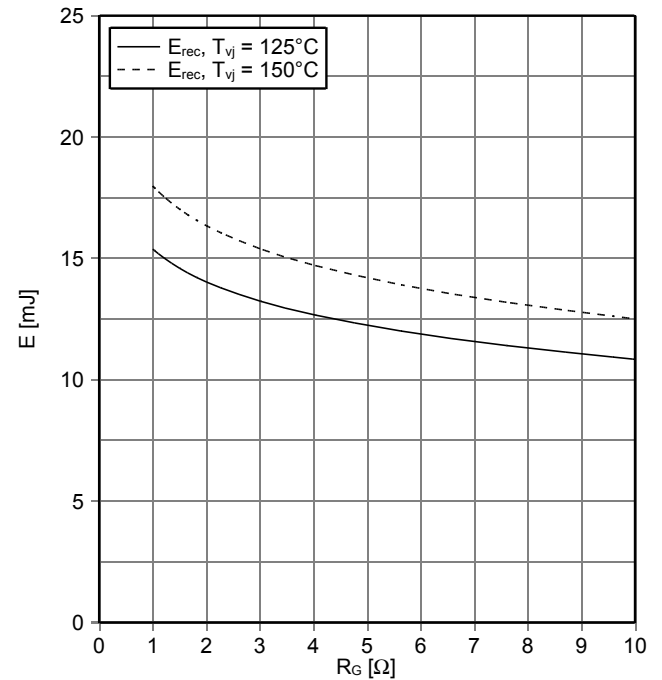
スイッチング損失 Diode、ブレーキチョッパー (Typical)  
switching losses Diode, Brake-Chopper (typical)

$E_{rec} = f(I_F)$   
 $R_{Gon} = 1 \Omega, V_{CE} = 600 V$



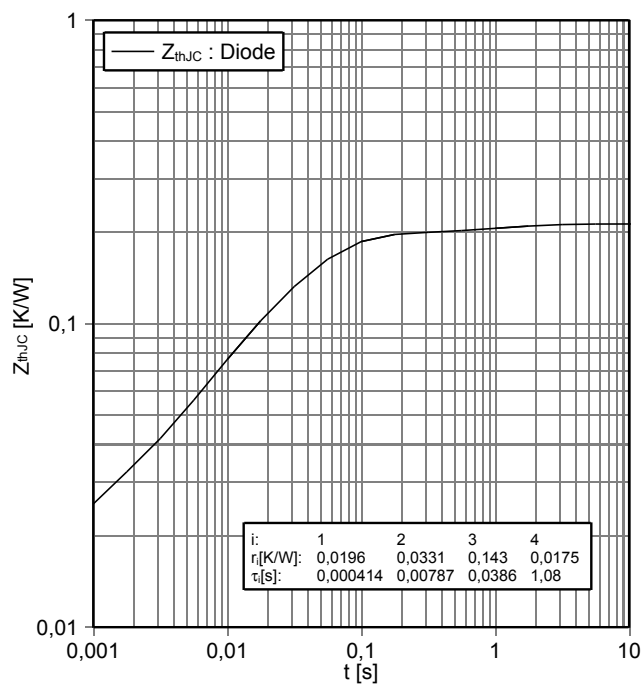
スイッチング損失 Diode、ブレーキチョッパー (Typical)  
switching losses Diode, Brake-Chopper (typical)

$E_{rec} = f(R_G)$   
 $I_F = 200 A, V_{CE} = 600 V$



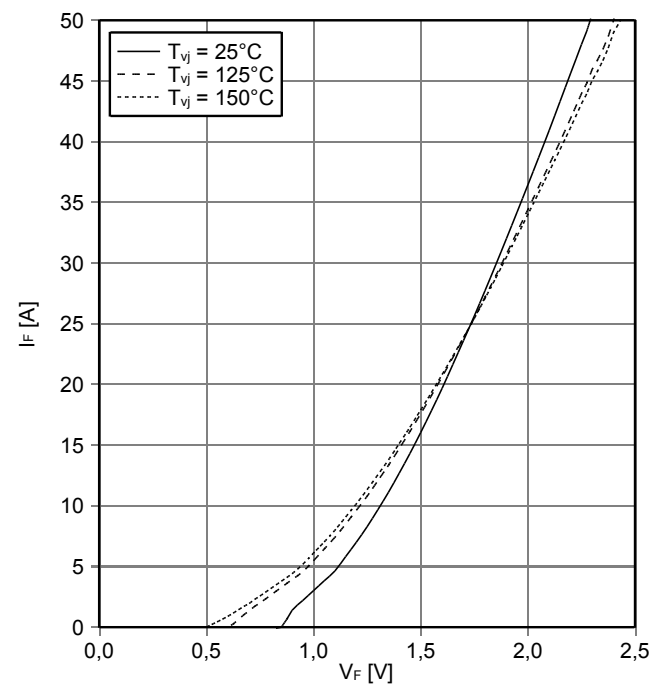
過渡熱インピーダンス Diode、ブレーキチョッパー  
transient thermal impedance Diode, Brake-Chopper

$Z_{thJC} = f(t)$



順電圧特性 Diode、リバース ( typical)  
forward characteristic of Diode, Reverse ( typical)

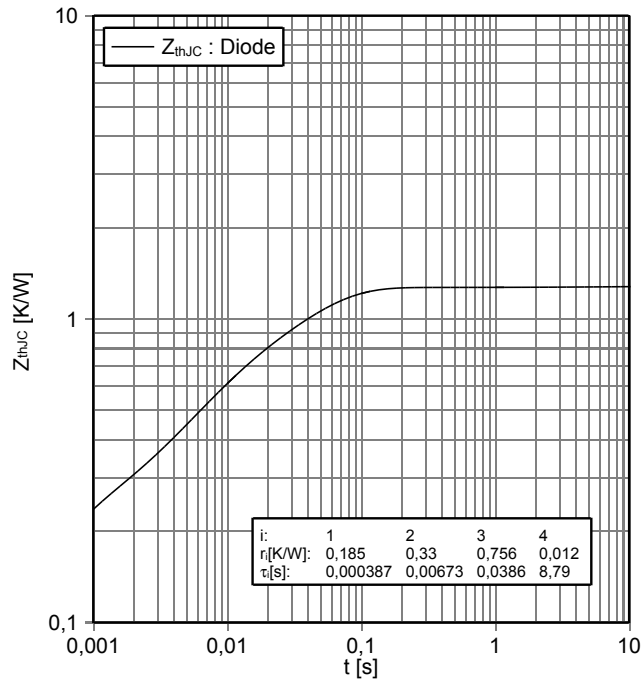
$I_F = f(V_F)$



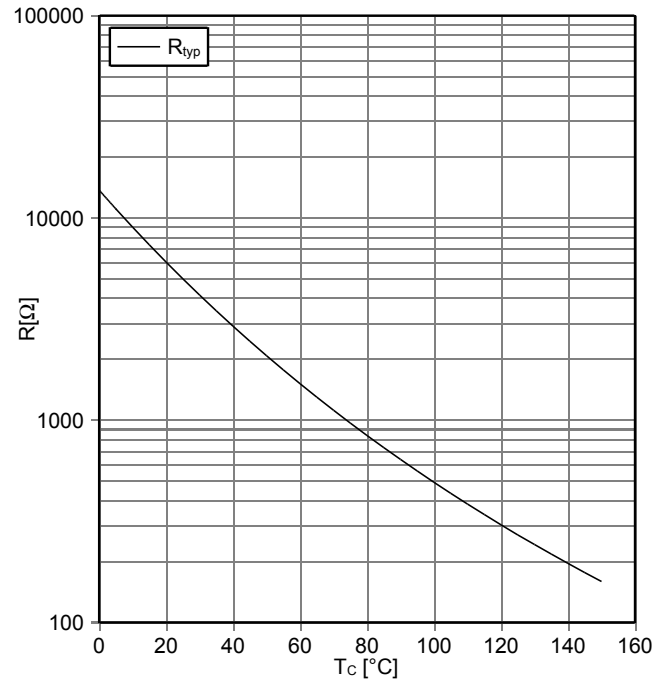
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過渡熱インピーダンス Diode、リバース  
transient thermal impedance Diode, Reverse  
 $Z_{thJC} = f(t)$



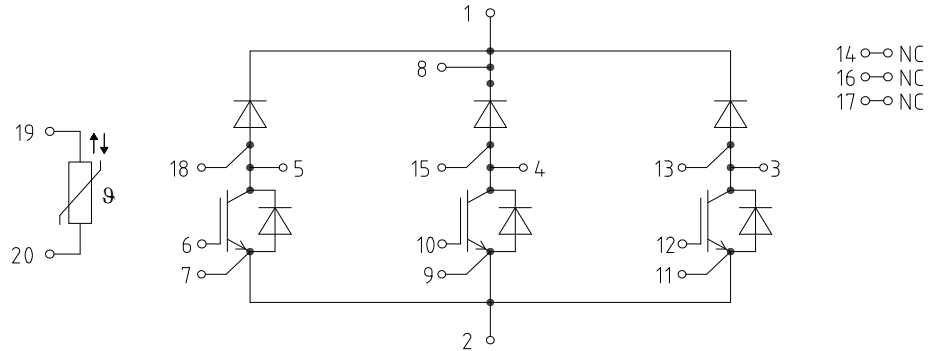
NTC-サーミスタ サーミスタの温度特性  
NTC-Thermistor-temperature characteristic (typical)  
 $R = f(T)$



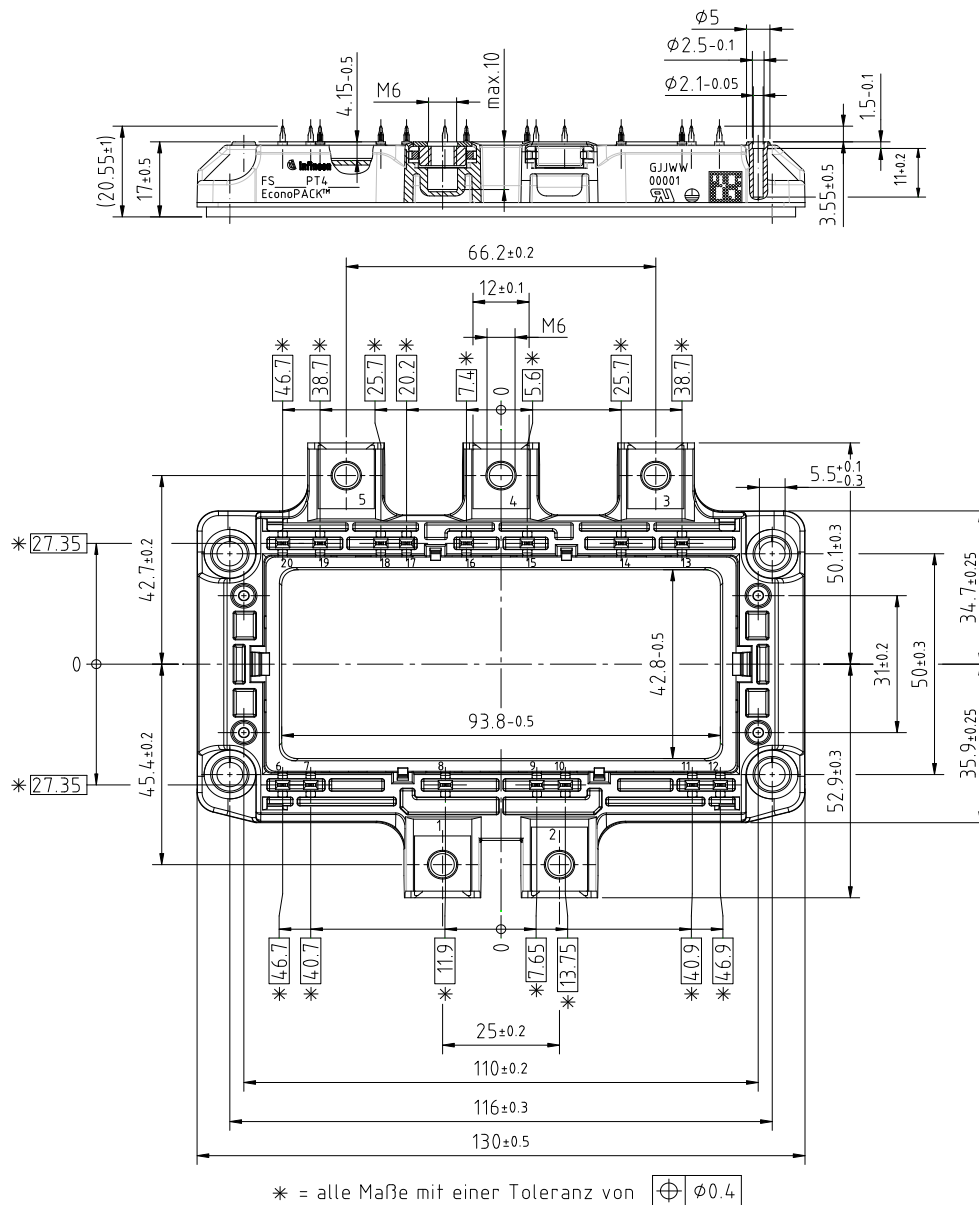
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回路図 / circuit\_diagram\_headline



パッケージ概要 / package outlines



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