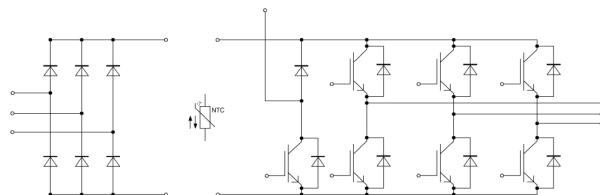
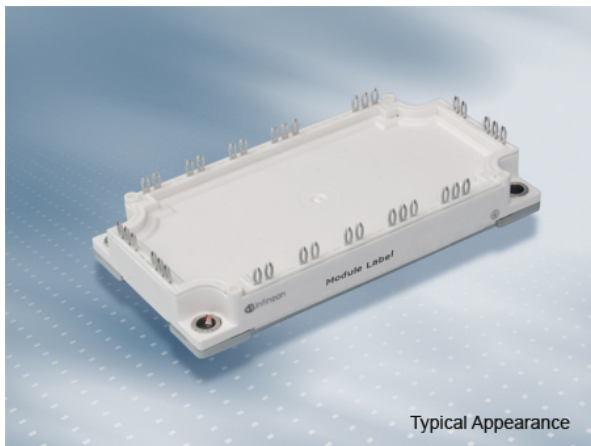


EconoPIM™3 モジュール 高速トレンチ/フィールドストップ IGBT4 and エミッターコントロール4 diode内蔵 and NTCサーミスタ

EconoPIM™3 module with fast Trench/Fieldstop IGBT4 and Emitter Controlled 4 diode and NTC



$V_{CES} = 1200V$

$I_{C\ nom} = 100A / I_{CRM} = 200A$

#### 一般応用

- スタティックインバーター
- モーター駆動
- サーボ駆動

#### 電気的特性

- 低スイッチング損失
- $T_{vj\ op} = 150^{\circ}C$
- 正温度特性を持った  $V_{CESat}$  飽和電圧
- 低  $V_{CESat}$  飽和電圧

#### 機械的特性

- 高いパワー/サーマルサイクル耐量
- 内蔵されたNTCサーミスタ
- 銅ベースプレート
- PressFIT 接合 技術
- 標準ハウジング

#### Typical Applications

- Auxiliary Inverters
- Motor Drives
- Servo Drives

#### Electrical Features

- Low Switching Losses
- $T_{vj\ op} = 150^{\circ}C$
- $V_{CESat}$  with positive Temperature Coefficient
- Low  $V_{CESat}$

#### Mechanical Features

- High Power and Thermal Cycling Capability
- Integrated NTC temperature sensor
- Copper Base Plate
- PressFIT Contact Technology
- 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: AS | date of publication: 2013-10-16 |                      |
| approved by: RS | revision: 3.0                   | UL approved (E83335) |

## IGBT- インバータ / IGBT, Inverter

### 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      | $T_C = 95^{\circ}\text{C}, T_{vj\text{ max}} = 175^{\circ}\text{C}$ | $I_{C\text{ nom}}$ | 100   | A |
| 繰り返しピークコレクタ電流<br>Repetitive peak collector current | $t_P = 1\text{ ms}$                                                 | $I_{CRM}$          | 200   | A |
| トータル損失<br>Total power dissipation                  | $T_C = 25^{\circ}\text{C}, T_{vj\text{ max}} = 175$                 | $P_{tot}$          | 515   | 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  | $I_C = 100\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 100\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 100\text{ A}, V_{GE} = 15\text{ V}$                                                      | $T_{vj} = 25^{\circ}\text{C}$<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                                   | $V_{GE} = -15\text{ V} \dots +15\text{ V}$                                                                                                                                                  |                                                                                                   | $Q_G$               | 0,80                 |      | $\mu\text{C}$                                   |
| 内蔵ゲート抵抗<br>Internal gate resistor                       | $T_{vj} = 25^{\circ}\text{C}$                                                                                                                                                               |                                                                                                   | $R_{Gint}$          | 7,5                  |      | $\Omega$                                        |
| 入力容量<br>Input capacitance                               | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                                                  |                                                                                                   | $C_{ies}$           | 6,30                 |      | nF                                              |
| 帰還容量<br>Reverse transfer capacitance                    | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                                                  |                                                                                                   | $C_{res}$           | 0,27                 |      | nF                                              |
| コレクタ・エミッタ間遮断電流<br>Collector-emitter cut-off current     | $V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$                                                                                                                  |                                                                                                   | $I_{CES}$           |                      | 1,0  | mA                                              |
| ゲート・エミッタ間漏れ電流<br>Gate-emitter leakage current           | $V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$                                                                                                                    |                                                                                                   | $I_{GES}$           |                      | 100  | nA                                              |
| ターンオン遅れ時間 (誘導負荷)<br>Turn-on delay time, inductive load  | $I_C = 100\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 1,6\ \Omega$                                                                                        | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{don}$           | 0,16<br>0,17<br>0,17 |      | $\mu\text{s}$<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           | $I_C = 100\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 1,6\ \Omega$                                                                                        | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_r$               | 0,03<br>0,04<br>0,04 |      | $\mu\text{s}$<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 | $I_C = 100\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 1,6\ \Omega$                                                                                       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{doff}$          | 0,33<br>0,43<br>0,45 |      | $\mu\text{s}$<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           | $I_C = 100\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 1,6\ \Omega$                                                                                       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_f$               | 0,08<br>0,15<br>0,17 |      | $\mu\text{s}$<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          | $I_C = 100\text{ A}, V_{CE} = 600\text{ V}, L_S = 40\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, di/dt = 3000\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Gon} = 1,6\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{on}$            | 5,50<br>8,50<br>9,50 |      | 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         | $I_C = 100\text{ A}, V_{CE} = 600\text{ V}, L_S = 40\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, du/dt = 3600\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Goff} = 1,6\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{off}$           | 5,50<br>8,50<br>9,50 |      | mJ<br>mJ<br>mJ                                  |
| 短絡電流<br>SC data                                         | $V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$<br>$V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$<br>$t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$                                 |                                                                                                   | $I_{SC}$            | 400                  |      | 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                                                                                                                                                                  |                                                                                                   | $R_{thJC}$          |                      | 0,29 | 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>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$                                              |                                                                                                   | $R_{thCH}$          | 0,13                 |      | K/W                                             |
| 動作温度<br>Temperature under switching conditions          |                                                                                                                                                                                             |                                                                                                   | $T_{vj\text{ op}}$  | -40                  | 150  | $^{\circ}\text{C}$                              |

prepared by: AS

date of publication: 2013-10-16

approved by: RS

revision: 3.0

## Diode、インバータ / Diode, Inverter

### 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      |                                                                                                                                                  | $I_F$     | 100          | A                                            |
| ピーク繰返し順電流<br>Repetitive peak forward current | $t_P = 1 \text{ ms}$                                                                                                                             | $I_{FRM}$ | 200          | 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>$V_R = 0 \text{ V}, t_P = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I^2t$    | 1550<br>1500 | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |

### 電気的特性 / Characteristic Values

|                                                         |                                                                                                                                                     |                                                                                                   | min.        | typ.                 | max. |                                                 |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------|----------------------|------|-------------------------------------------------|
| 順電圧<br>Forward voltage                                  | $I_F = 100 \text{ A}, V_{GE} = 0 \text{ V}$<br>$I_F = 100 \text{ A}, V_{GE} = 0 \text{ V}$<br>$I_F = 100 \text{ A}, V_{GE} = 0 \text{ V}$           | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_F$       | 1,70<br>1,65<br>1,65 | 2,15 | V<br>V<br>V                                     |
| ピーク逆回復電流<br>Peak reverse recovery current               | $I_F = 100 \text{ A}, -di_F/dt = 3000 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600 \text{ V}$<br>$V_{GE} = -15 \text{ V}$      | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $I_{RM}$    | 115<br>125<br>130    |      | A<br>A<br>A                                     |
| 逆回復電荷量<br>Recovered charge                              | $I_F = 100 \text{ A}, -di_F/dt = 3000 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600 \text{ V}$<br>$V_{GE} = -15 \text{ V}$      | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $Q_r$       | 9,50<br>17,5<br>20,5 |      | $\mu\text{C}$<br>$\mu\text{C}$<br>$\mu\text{C}$ |
| 逆回復損失<br>Reverse recovery energy                        | $I_F = 100 \text{ A}, -di_F/dt = 3000 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600 \text{ V}$<br>$V_{GE} = -15 \text{ V}$      | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{rec}$   | 3,50<br>6,00<br>7,50 |      | 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                                                                                                                       |                                                                                                   | $R_{thJC}$  |                      | 0,50 | 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>$\lambda_{Paste} = 1 \text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$ |                                                                                                   | $R_{thCH}$  | 0,225                |      | K/W                                             |
| 動作温度<br>Temperature under switching conditions          |                                                                                                                                                     |                                                                                                   | $T_{vj op}$ | -40                  | 150  | $^{\circ}\text{C}$                              |

## Diode、整流器 / Diode, Rectifier

### 最大定格 / Maximum Rated Values

|                                                        |                                                                                                           |             |              |                                              |
|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------|--------------|----------------------------------------------|
| ピーク繰返し逆電圧<br>Repetitive peak reverse voltage           | $T_{vj} = 25^{\circ}\text{C}$                                                                             | $V_{RRM}$   | 1600         | V                                            |
| 最大実効順電流/chip<br>Maximum RMS forward current per chip   | $T_C = 80^{\circ}\text{C}$                                                                                | $I_{FRMSM}$ | 100          | A                                            |
| 整流出力の最大実効電流<br>Maximum RMS current at rectifier output | $T_C = 80^{\circ}\text{C}$                                                                                | $I_{RMSM}$  | 150          | A                                            |
| サージ順電流<br>Surge forward current                        | $t_p = 10 \text{ ms}, T_{vj} = 25^{\circ}\text{C}$<br>$t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I_{FSM}$   | 1150<br>880  | A<br>A                                       |
| 電流二乗時間積<br>$I^2t$ - value                              | $t_p = 10 \text{ ms}, T_{vj} = 25^{\circ}\text{C}$<br>$t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I^2t$      | 6600<br>3850 | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |

### 電気的特性 / Characteristic Values

|                                                         |                                                                                                                                                     |             | min. | typ. | max. |                    |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------|------|------|--------------------|
| 順電圧<br>Forward voltage                                  | $T_{vj} = 150^{\circ}\text{C}, I_F = 100 \text{ A}$                                                                                                 | $V_F$       |      | 1,00 |      | V                  |
| 逆電流<br>Reverse current                                  | $T_{vj} = 150^{\circ}\text{C}, V_R = 1600 \text{ V}$                                                                                                | $I_R$       |      | 1,00 |      | mA                 |
| 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                                                                                                                       | $R_{thJC}$  |      |      | 0,40 | 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>$\lambda_{Paste} = 1 \text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$ | $R_{thCH}$  |      | 0,18 |      | K/W                |
| 動作温度<br>Temperature under switching conditions          |                                                                                                                                                     | $T_{vj op}$ | -40  |      | 150  | $^{\circ}\text{C}$ |

|                 |                                 |
|-----------------|---------------------------------|
| prepared by: AS | date of publication: 2013-10-16 |
| approved by: RS | revision: 3.0                   |

## 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      | $T_C = 95^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{ nom}}$ | 50    | A |
| 繰り返しピークコレクタ電流<br>Repetitive peak collector current | $t_P = 1\text{ ms}$                                          | $I_{CRM}$          | 100   | A |
| トータル損失<br>Total power dissipation                  | $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175$                 | $P_{\text{tot}}$   | 280   | 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  | $I_C = 50\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 50\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 50\text{ A}, V_{GE} = 15\text{ V}$                                       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{ sat}}$ | 1,85<br>2,15<br>2,25 | 2,15 | V<br>V<br>V                                     |
| ゲート・エミッタ間しきい値電圧<br>Gate threshold voltage               | $I_C = 1,60\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$                                                                                                      |                                                                                                   | $V_{GEth}$          | 5,2                  | 5,8  | 6,4 V                                           |
| ゲート電荷量<br>Gate charge                                   | $V_{GE} = -15\text{ V} \dots +15\text{ V}$                                                                                                                                |                                                                                                   | $Q_G$               | 0,38                 |      | $\mu\text{C}$                                   |
| 内蔵ゲート抵抗<br>Internal gate resistor                       | $T_{vj} = 25^{\circ}\text{C}$                                                                                                                                             |                                                                                                   | $R_{Gint}$          | 4,0                  |      | $\Omega$                                        |
| 入力容量<br>Input capacitance                               | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                                |                                                                                                   | $C_{ies}$           | 2,80                 |      | nF                                              |
| 帰還容量<br>Reverse transfer capacitance                    | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                                |                                                                                                   | $C_{res}$           | 0,10                 |      | nF                                              |
| コレクタ・エミッタ間遮断電流<br>Collector-emitter cut-off current     | $V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$                                                                                                |                                                                                                   | $I_{CES}$           |                      | 1,0  | mA                                              |
| ゲート・エミッタ間漏れ電流<br>Gate-emitter leakage current           | $V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$                                                                                                  |                                                                                                   | $I_{GES}$           |                      | 100  | nA                                              |
| ターンオン遅れ時間 (誘導負荷)<br>Turn-on delay time, inductive load  | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 15\text{ }\Omega$                                                                  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{d\text{ on}}$   | 0,16<br>0,17<br>0,17 |      | $\mu\text{s}$<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           | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 15\text{ }\Omega$                                                                  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_r$               | 0,03<br>0,04<br>0,04 |      | $\mu\text{s}$<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 | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 15\text{ }\Omega$                                                                 | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{d\text{ off}}$  | 0,33<br>0,43<br>0,45 |      | $\mu\text{s}$<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           | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 15\text{ }\Omega$                                                                 | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_f$               | 0,08<br>0,15<br>0,17 |      | $\mu\text{s}$<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          | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}, L_S = 20\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 15\text{ }\Omega$                                              | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{on}$            | 5,70<br>7,70<br>8,40 |      | 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         | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}, L_S = 20\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 15\text{ }\Omega$                                             | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{off}$           | 2,80<br>4,30<br>4,80 |      | mJ<br>mJ<br>mJ                                  |
| 短絡電流<br>SC data                                         | $V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$<br>$V_{CE\text{ max}} = V_{CES} - L_{SCE} \cdot di/dt$<br>$t_P \leq 10\text{ }\mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ |                                                                                                   | $I_{SC}$            | 180                  |      | 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                                                                                                                                                |                                                                                                   | $R_{thJC}$          |                      | 0,54 | 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>$\lambda_{\text{Paste}} = 1\text{ W/(m}\cdot\text{K)} / \lambda_{\text{grease}} = 1\text{ W/(m}\cdot\text{K)}$                              |                                                                                                   | $R_{thCH}$          | 0,245                |      | K/W                                             |
| 動作温度<br>Temperature under switching conditions          |                                                                                                                                                                           |                                                                                                   | $T_{vj\text{ op}}$  | -40                  | 150  | $^{\circ}\text{C}$                              |

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## 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      |                                                                                                                                              | $I_F$     | 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>80,0 | $\text{A}^2\text{s}$<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 | 2,15 | V<br>V<br>V                                     |
| ピーク逆回復電流<br>Peak reverse recovery current               | $I_F = 25\text{ A}, -di_F/dt = 1200\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$                                    | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $I_{RM}$           | 39,0<br>40,0<br>41,0 |      | A<br>A<br>A                                     |
| 逆回復電荷量<br>Recovered charge                              | $I_F = 25\text{ A}, -di_F/dt = 1200\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$                                    | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $Q_r$              | 2,40<br>4,10<br>4,40 |      | $\mu\text{C}$<br>$\mu\text{C}$<br>$\mu\text{C}$ |
| 逆回復損失<br>Reverse recovery energy                        | $I_F = 25\text{ A}, -di_F/dt = 1200\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$                                    | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{rec}$          | 0,90<br>1,50<br>1,70 |      | 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                                                                                                                     |                                                                                                   | $R_{thJC}$         |                      | 1,35 | 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>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ |                                                                                                   | $R_{thCH}$         | 0,61                 |      | K/W                                             |
| 動作温度<br>Temperature under switching conditions          |                                                                                                                                                   |                                                                                                   | $T_{vj\text{ op}}$ | -40                  | 150  | $^{\circ}\text{C}$                              |

## 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 | $T_C = 100^{\circ}\text{C}, R_{100} = 493\text{ }\Omega$      | $\Delta R/R$ | -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.

|                 |                                 |
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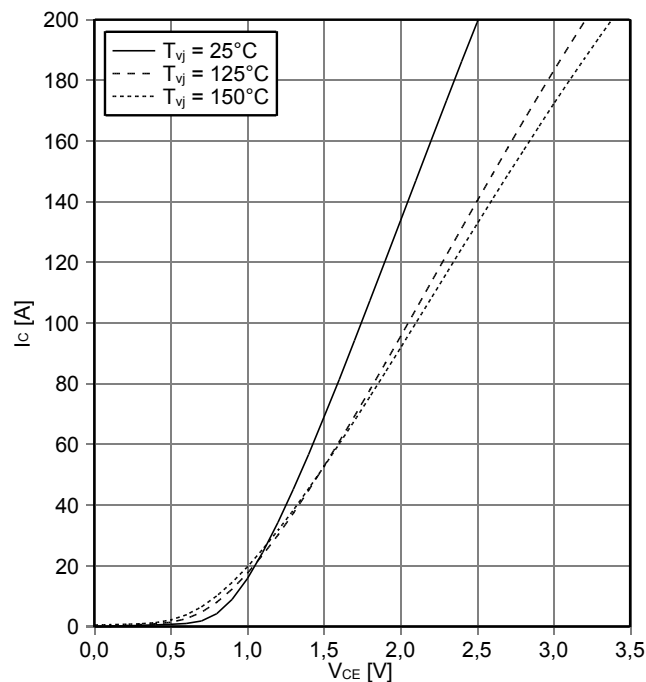
## モジュール / Module

|                                                             |                                                                                                                                         |                                              |                                |                  |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------|------------------|
| 絶縁耐圧<br>Isolation test voltage                              | RMS, f = 50 Hz, t = 1 min.                                                                                                              | V <sub>ISOL</sub>                            | 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)                                                                         |                                              | Al <sub>2</sub> O <sub>3</sub> |                  |
| 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                                                              |                                              | 10,0                           | 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                                                              |                                              | 7,5                            | mm               |
| 相対トラッキング指数<br>Comperative tracking index                    |                                                                                                                                         | CTI                                          | > 200                          |                  |
|                                                             |                                                                                                                                         |                                              |                                |                  |
| ケース・ヒートシンク間熱抵抗<br>Thermal resistance, case to heatsink      | /モジュール / per module<br>$\lambda_{\text{Paste}} = 1 \text{ W/(m}\cdot\text{K)} / \lambda_{\text{grease}} = 1 \text{ W/(m}\cdot\text{K)}$ | R <sub>thCH</sub>                            | min. 0,009                     | typ. max. K/W    |
| 内部インダクタンス<br>Stray inductance module                        |                                                                                                                                         | L <sub>sCE</sub>                             | 40                             | nH               |
| パワーターミナル・チップ間抵抗<br>Module lead resistance, terminals - chip | T <sub>C</sub> = 25°C, /スイッチ / per switch                                                                                               | R <sub>CC'+EE'</sub><br>R <sub>AA'+CC'</sub> | 4,00<br>3,00                   | mΩ               |
| 最大ジャンクション温度<br>Maximum junction temperature                 | インバータ、ブレーキチョッパ / inverter,<br>brake-chopper<br>整流器 / rectifier                                                                          | T <sub>vj max</sub>                          |                                | 175 °C<br>150 °C |
| 動作温度<br>Temperature under switching conditions              | インバータ、ブレーキチョッパ / inverter,<br>brake-chopper<br>整流器 / rectifier                                                                          | T <sub>vj op</sub>                           | -40<br>-40                     | 150 °C<br>150 °C |
| 保存温度<br>Storage temperature                                 |                                                                                                                                         | T <sub>stg</sub>                             | -40                            | 125 °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        |
| 質量<br>Weight                                                |                                                                                                                                         | G                                            | 300                            | g                |

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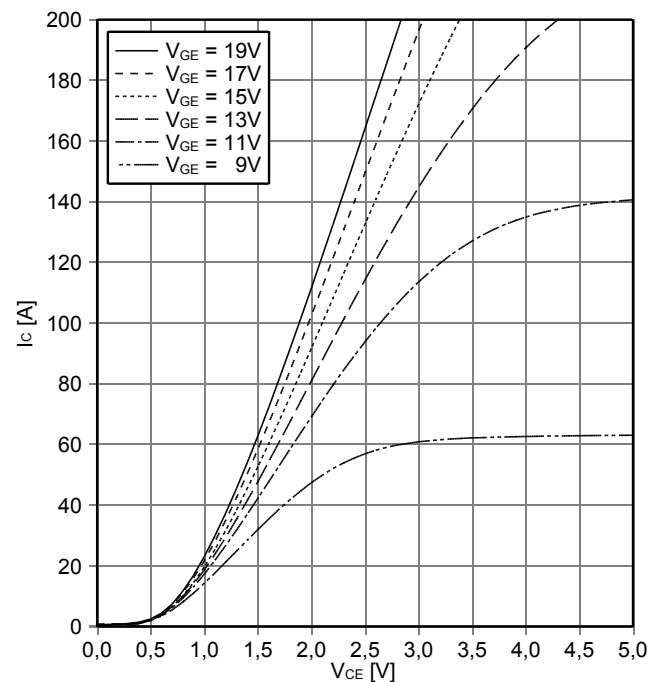
出力特性 IGBT- インバータ (Typical)  
output characteristic IGBT, Inverter (typical)

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



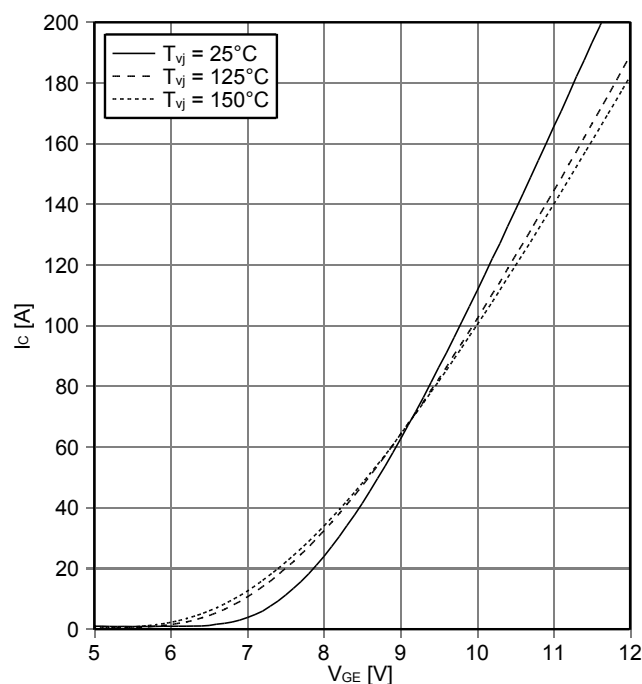
出力特性 IGBT- インバータ (Typical)  
output characteristic IGBT, Inverter (typical)

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



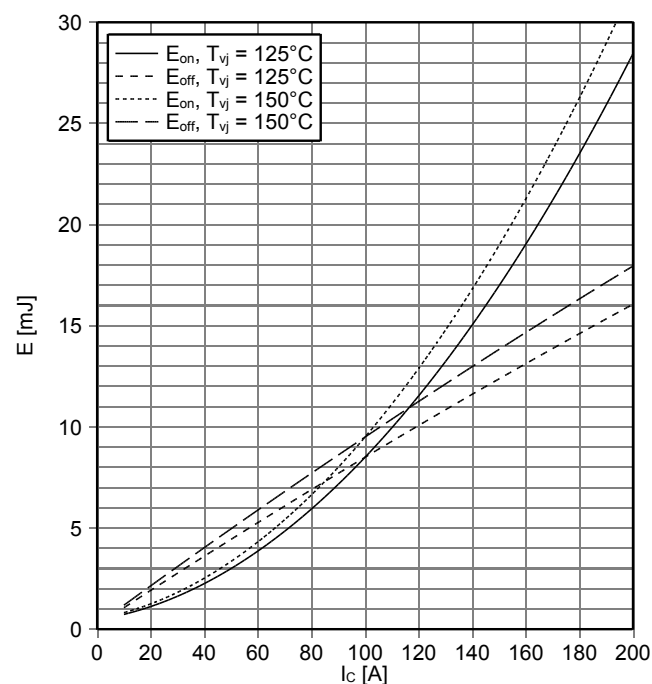
伝達特性 IGBT- インバータ (Typical)  
transfer characteristic IGBT, Inverter (typical)

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



スイッチング損失 IGBT- インバータ (Typical)  
switching losses IGBT, Inverter (typical)

$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15 \text{ V}$ ,  $R_{Gon} = 1.6 \Omega$ ,  $R_{Goff} = 1.6 \Omega$ ,  $V_{CE} = 600 \text{ V}$



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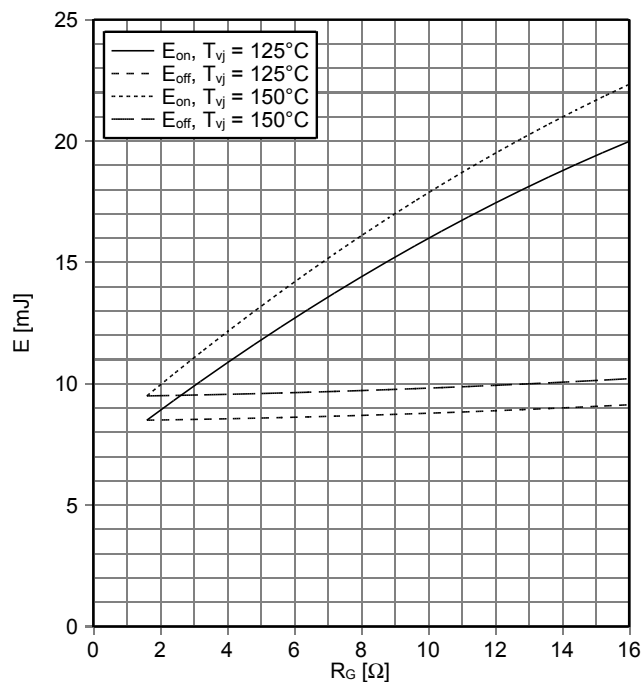
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スイッチング損失 IGBT- インバータ (Typical)  
switching losses IGBT, Inverter (typical)

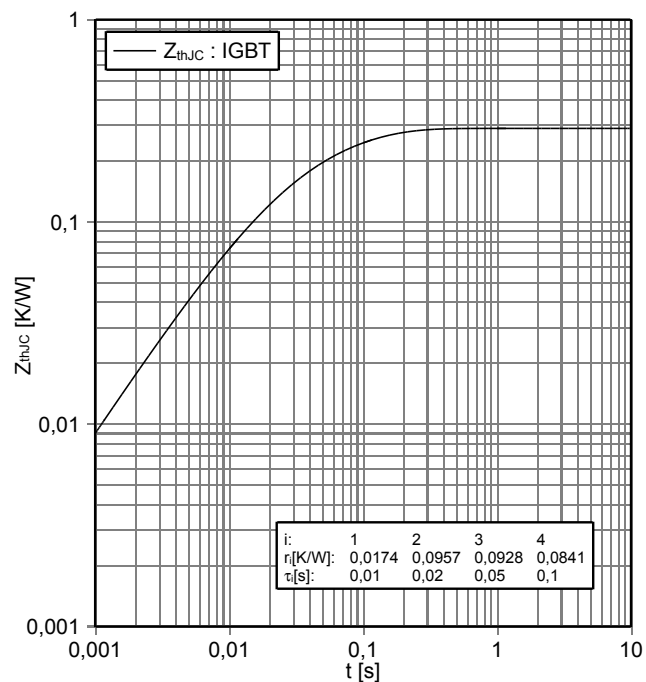
$E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$

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



過渡熱インピーダンス IGBT- インバータ  
transient thermal impedance IGBT, Inverter

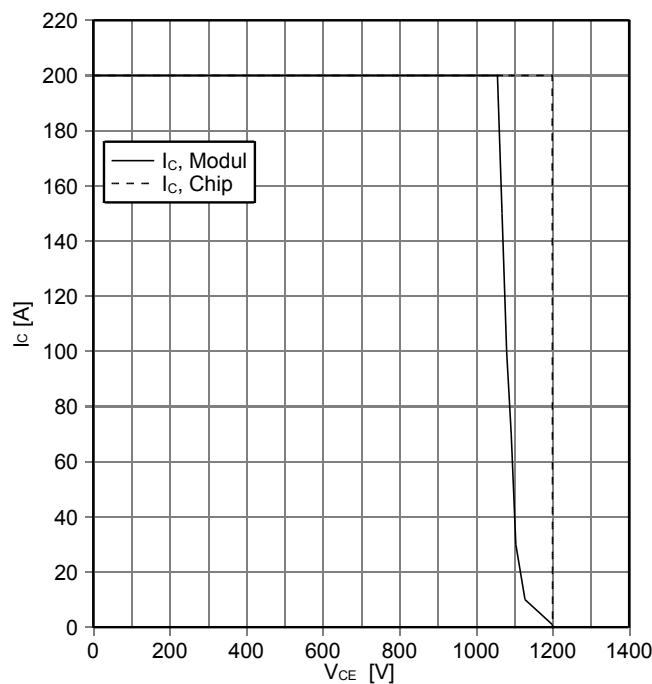
$Z_{thJC} = f(t)$



逆バイアス安全動作領域 IGBT- インバータ (RBSOA)  
reverse bias safe operating area IGBT, Inverter (RBSOA)

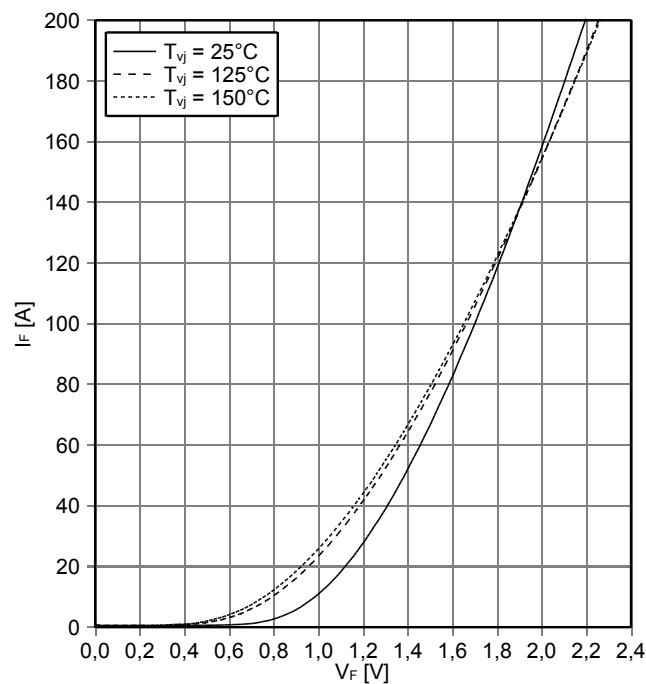
$I_C = f(V_{CE})$

$V_{GE} = \pm 15 \text{ V}$ ,  $R_{Goff} = 1.6 \Omega$ ,  $T_{vj} = 150^\circ\text{C}$



順電圧特性 Diode、インバータ (typical)  
forward characteristic of Diode, Inverter (typical)

$I_F = f(V_F)$



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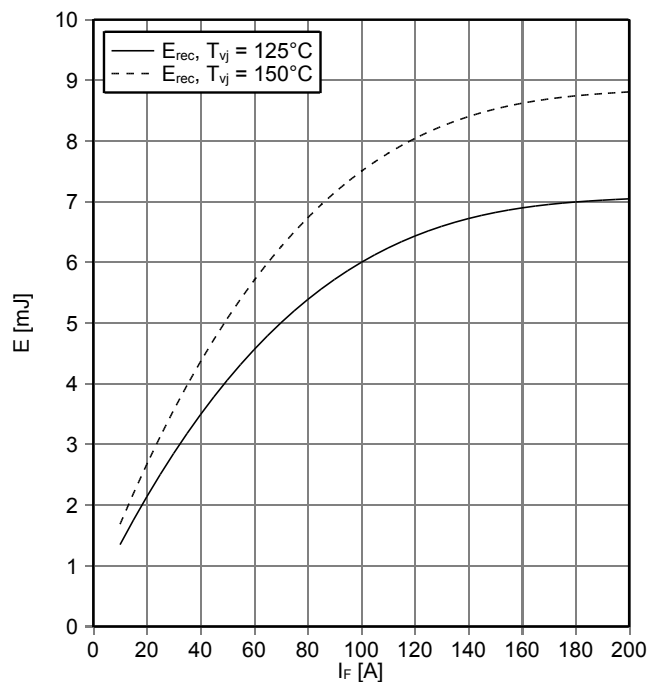
date of publication: 2013-10-16

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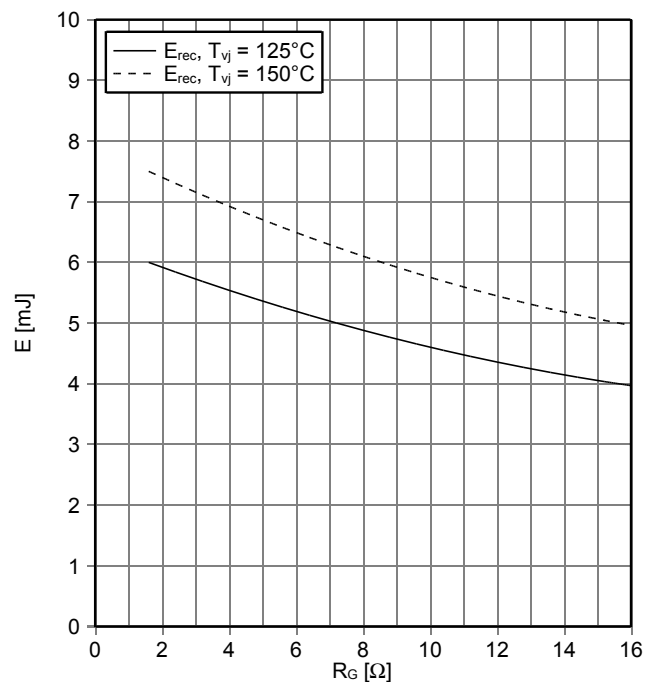
スイッチング損失 Diode、インバータ (Typical)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$   
 $R_{Gon} = 1.6 \Omega$ ,  $V_{CE} = 600 V$



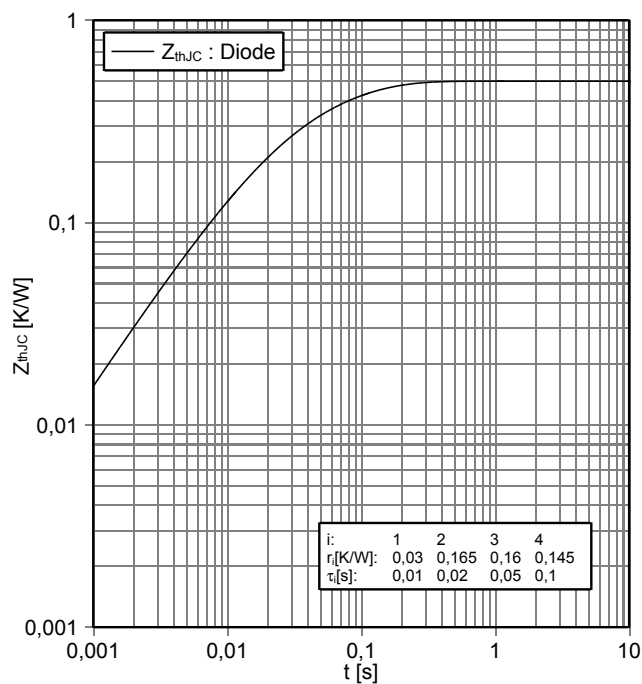
スイッチング損失 Diode、インバータ (Typical)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$   
 $I_F = 100 A$ ,  $V_{CE} = 600 V$



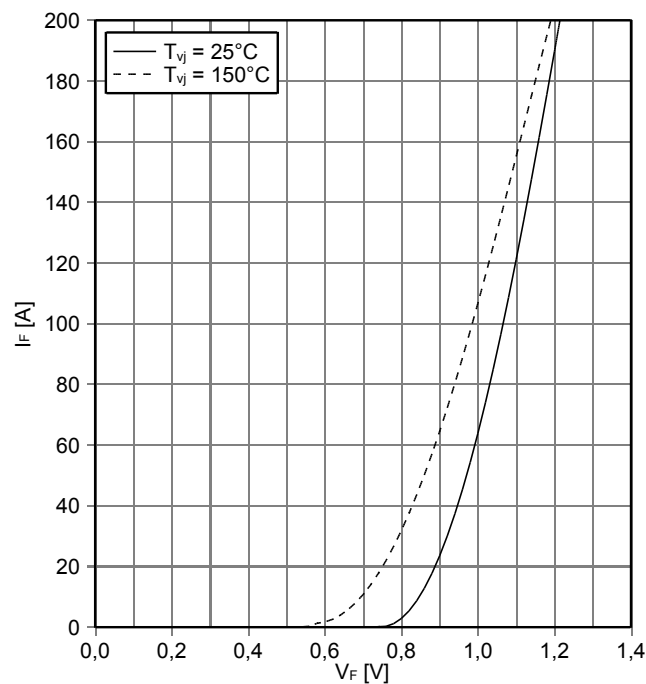
過渡熱インピーダンス Diode、インバータ  
transient thermal impedance Diode, Inverter

$Z_{thJC} = f(t)$



順方向特性 Diode、整流器 (典型)  
forward characteristic of Diode, Rectifier (typical)

$I_F = f(V_F)$



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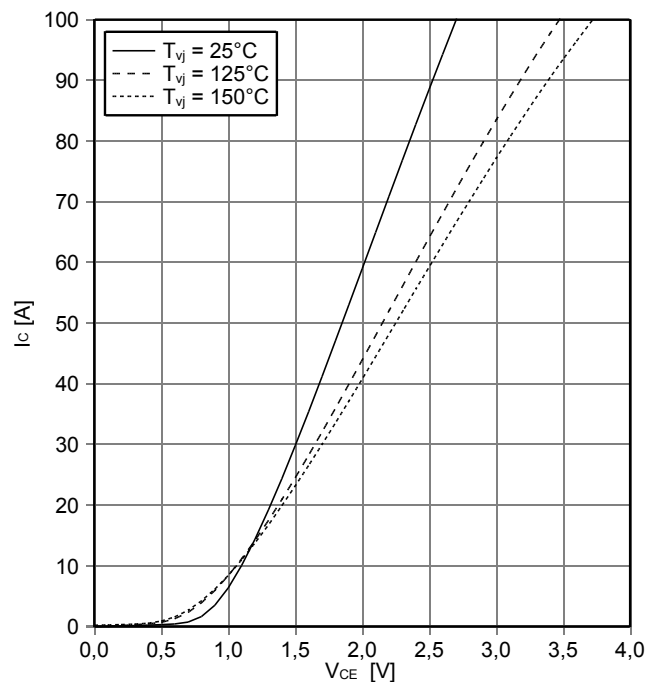
date of publication: 2013-10-16

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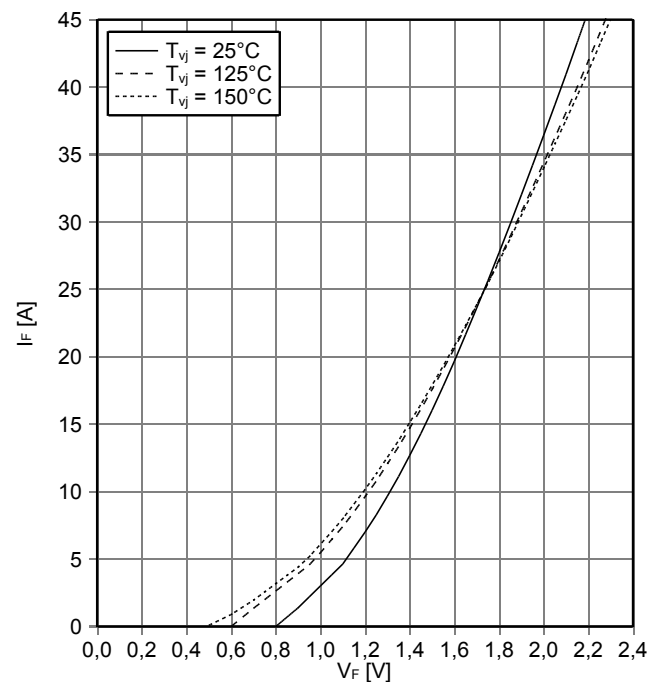
出力特性 IGBT-ブレーキチョッパー (Typical)  
output characteristic IGBT, Brake-Chopper (typical)

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



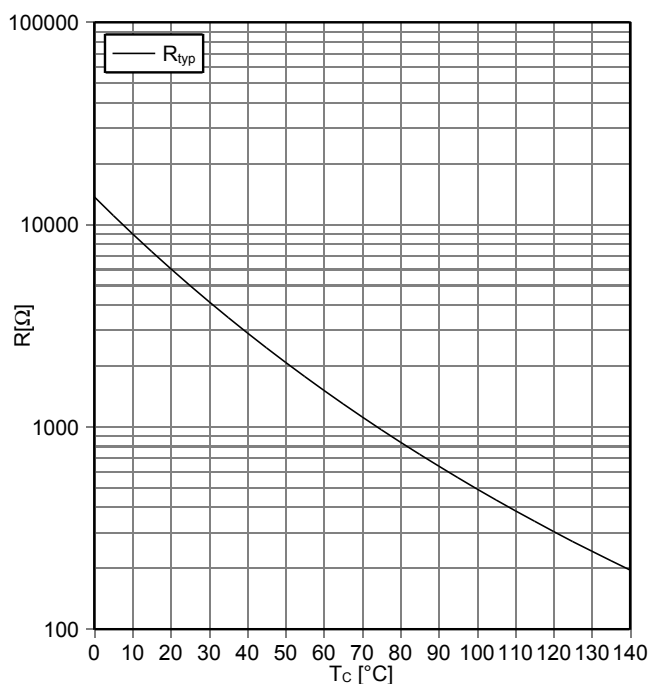
順電圧特性 Diode、ブレーキチョッパー ( typical)  
forward characteristic of Diode, Brake-Chopper (typical)

$I_F = f(V_F)$



NTC-サーミスタ サーミスタの温度特性  
NTC-Thermistor-temperature characteristic (typical)

$R = f(T)$



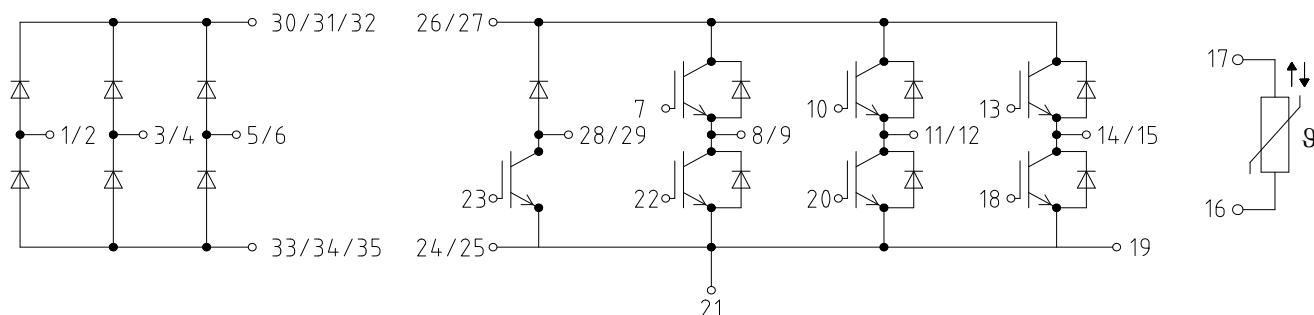
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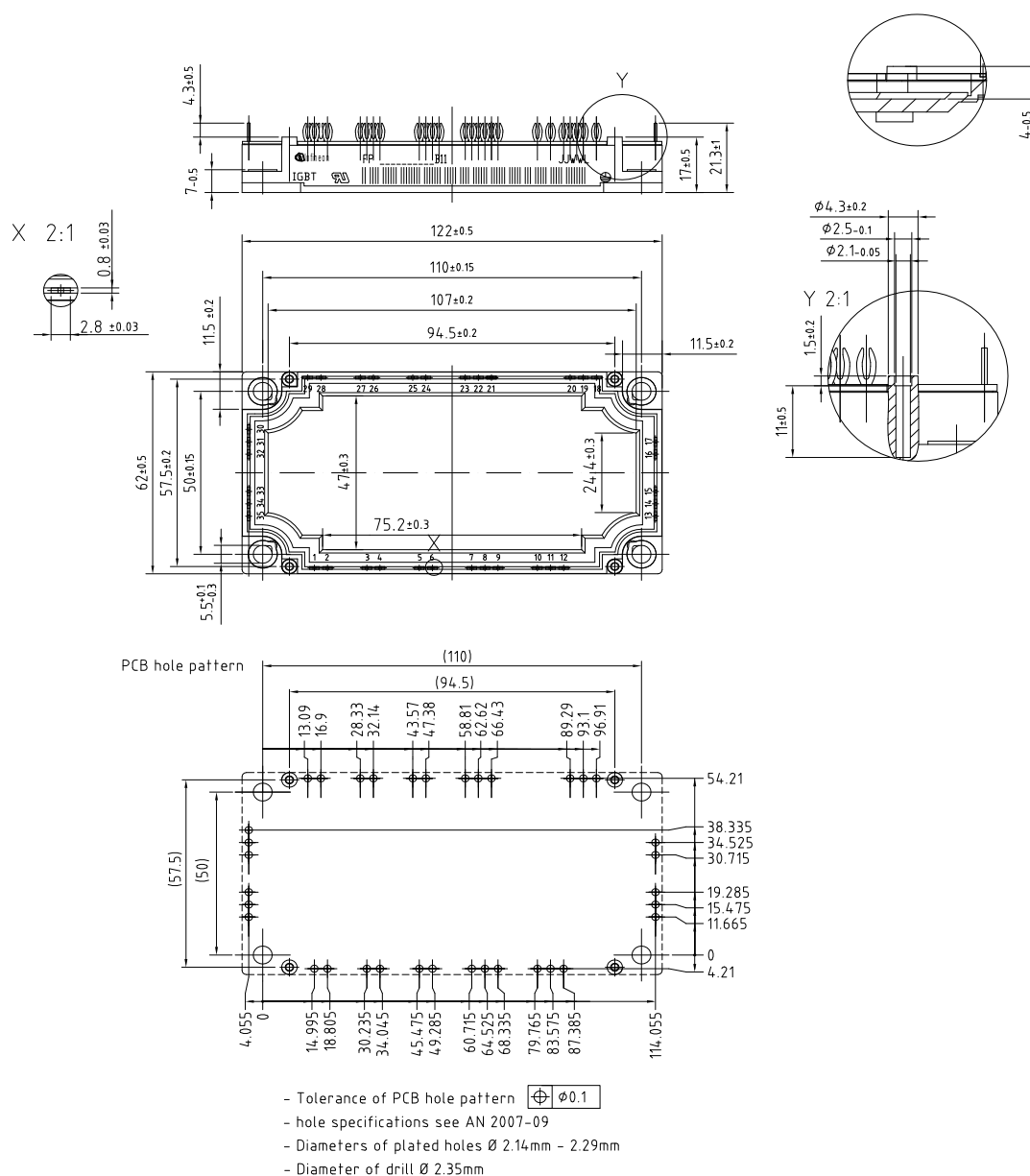
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## 回路図 / circuit\_diagram\_headline



## パッケージ概要 / package outlines



|                 |                                 |
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- 品質契約
- アプリケーションの共同評価

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This product data sheet is describing the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its characteristics. The information in the valid application- and assembly notes of the module must be considered.

Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of our product, please contact the sales office, which is responsible for you ( see www.infineon.com ). For those that are specifically interested we may provide application notes.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the Product in aviation applications, in health or live endangering or life support applications, please notify. Please note, that for any such applications we urgently recommend

- to perform joint Risk and Quality Assessments;
- the conclusion of Quality Agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery depended on the realization of any such measures.

If and to the extent necessary, please forward equivalent notices to your customers.

Changes of this product data sheet are reserved.

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