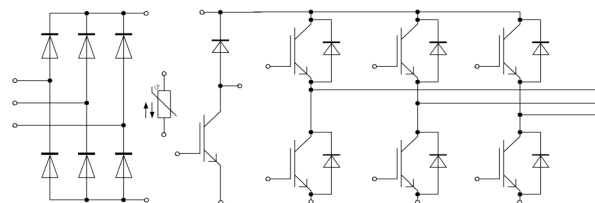
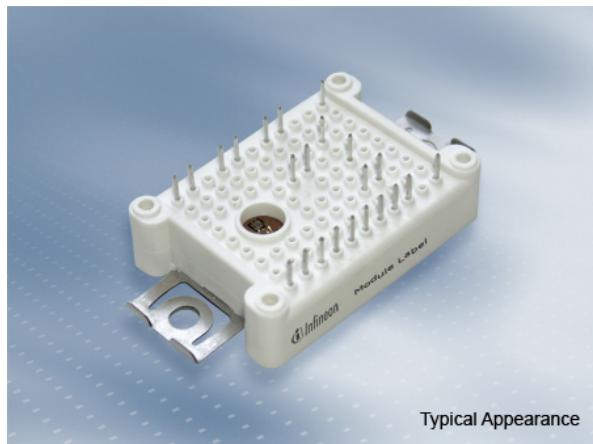


EasyPIM™ モジュール 高速トレンチ/フィールドストップ IGBT3 and エミッターコントロール3 diode内蔵 and PressFIT / NTCサーミスタ

EasyPIM™ module with Trench/Fieldstop IGBT3 and Emitter Controlled 3 diode and PressFIT / NTC

暫定データ / Preliminary Data



$V_{CES} = 600V$

$I_{C\ nom} = 15A / I_{CRM} = 30A$

一般応用

- スタティックインバーター
- 空冷
- モーター駆動

Typical Applications

- Auxiliary Inverters
- Air Conditioning
- Motor Drives

電気的特性

- 低スイッチング損失
- 低 V_{CEsat} 飽和電圧
- トレンチ IGBT 3
- 正温度特性を持った V_{CEsat} 飽和電圧

Electrical Features

- Low Switching Losses
- Low V_{CEsat}
- Trench IGBT 3
- V_{CEsat} with positive Temperature Coefficient

機械的特性

- 低熱インピーダンスの Al_2O_3 DCB
- コンパクトデザイン
- PressFIT 接合 技術
- 固定用クランプによる強固なマウンティング

Mechanical Features

- Al_2O_3 Substrate with Low Thermal Resistance
- Compact design
- PressFIT Contact Technology
- Rugged mounting due to integrated mounting clamps

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: DK | date of publication: 2013-11-05 | |
| approved by: MB | revision: 2.0 | UL approved (E83335) |



暫定データ
Preliminary Data

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 Collector-emitter voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{CES} | 600 | V |
| 連続DCコレクタ電流 Continuous DC collector current | $T_C = 80^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{nom}}$ I_C | 15 22 | A A |
| 繰り返しピークコレクタ電流 Repetitive peak collector current | $t_P = 1\text{ ms}$ | I_{CRM} | 30 | A |
| トータル損失 Total power dissipation | $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | P_{tot} | 81,0 | W |
| ゲート・エミッタ間ピーク電圧 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 Collector-emitter saturation voltage | $I_C = 15\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 15\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 15\text{ A}, V_{GE} = 15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{sat}}$ | 1,55 1,70 1,80 | 2,00 | V V V | |
| ゲート・エミッタ間しきい値電圧 Gate threshold voltage | $I_C = 0,20\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | | V_{GEth} | 4,9 | 5,8 | 6,5 | V |
| ゲート電荷量 Gate charge | $V_{GE} = -15\text{ V} \dots +15\text{ V}$ | | Q_G | 0,15 | | | μC |
| 内蔵ゲート抵抗 Internal gate resistor | $T_{vj} = 25^{\circ}\text{C}$ | | R_{Gint} | 0,0 | | | Ω |
| 入力容量 Input capacitance | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$ | | C_{ies} | 0,83 | | | nF |
| 帰還容量 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} | 0,026 | | | nF |
| コレクタ・エミッタ間遮断電流 Collector-emitter cut-off current | $V_{CE} = 600\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$ | | I_{CES} | | | 1,0 | mA |
| ゲート・エミッタ間漏れ電流 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) Turn-on delay time, inductive load | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 22\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{don} | 0,014 0,014 0,014 | | | μs μs μs |
| ターンオン上昇時間 (誘導負荷) Rise time, inductive load | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 22\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_r | 0,011 0,015 0,015 | | | μs μs μs |
| ターンオフ遅れ時間 (誘導負荷) Turn-off delay time, inductive load | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 22\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{doff} | 0,11 0,13 0,14 | | | μs μs μs |
| ターンオフ下降時間 (誘導負荷) Fall time, inductive load | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 22\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_f | 0,085 0,11 0,12 | | | μs μs μs |
| ターンオンスイッチング損失 Turn-on energy loss per pulse | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}, L_S = 50\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 1600\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Gon} = 22\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{on} | 0,25 0,32 0,36 | | | mJ mJ mJ |
| ターンオフスイッチング損失 Turn-off energy loss per pulse | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}, L_S = 50\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 4100\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Goff} = 22\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{off} | 0,34 0,44 0,46 | | | mJ mJ mJ |
| 短絡電流 SC data | $V_{GE} \leq 15\text{ V}, V_{CC} = 360\text{ V}$ $V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$ | $t_P \leq 8\ \mu\text{s}, T_{vj} = 25^{\circ}\text{C}$ $t_P \leq 6\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ | I_{SC} | 100 75 | | | A A |
| ジャンクション・ケース間熱抵抗 Thermal resistance, junction to case | IGBT部 (1素子当り) / per IGBT | | R_{thJC} | 1,65 | 1,85 | | K/W |
| ケース・ヒートシンク間熱抵抗 Thermal resistance, case to heatsink | IGBT部 (1素子当り) / per IGBT $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$ | | R_{thCH} | 1,30 | | | K/W |
| 動作温度 Temperature under switching conditions | | | $T_{vj\text{op}}$ | -40 | 150 | | $^{\circ}\text{C}$ |

| | |
|-----------------|---------------------------------|
| prepared by: DK | date of publication: 2013-11-05 |
| approved by: MB | revision: 2.0 |



暫定データ
Preliminary Data

Diode、インバータ / Diode, Inverter
最大定格 / Maximum Rated Values

| | | | | |
|--|--|-----------|--------------|--|
| ピーク繰返し逆電圧 Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{RRM} | 600 | V |
| 連続DC電流 Continuous DC forward current | | I_F | 15 | A |
| ピーク繰返し順電流 Repetitive peak forward current | $t_P = 1\text{ ms}$ | I_{FRM} | 30 | A |
| 電流二乗時間積 I^2t - value | $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | I^2t | 22,5 20,5 | A^2s A^2s |

電気的特性 / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|--------------------|----------------------|------|---|
| 順電圧 Forward voltage | $I_F = 15\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 15\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 15\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | V_F | 1,60 1,55 1,50 | 2,00 | V V V |
| ピーク逆回復電流 Peak reverse recovery current | $I_F = 15\text{ A}, -di_F/dt = 1600\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | I_{RM} | 23,0 25,0 26,0 | | A A A |
| 逆回復電荷量 Recovered charge | $I_F = 15\text{ A}, -di_F/dt = 1600\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | Q_r | 0,80 1,40 1,70 | | μC μC μC |
| 逆回復損失 Reverse recovery energy | $I_F = 15\text{ A}, -di_F/dt = 1600\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{rec} | 0,16 0,28 0,37 | | mJ mJ mJ |
| ジャンクション・ケース間熱抵抗 Thermal resistance, junction to case | /Diode (1 素子当り) / per diode | | R_{thJC} | 2,25 | 2,50 | K/W |
| ケース・ヒートシンク間熱抵抗 Thermal resistance, case to heatsink | /Diode (1 素子当り) / per diode $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ | | R_{thCH} | 1,40 | | K/W |
| 動作温度 Temperature under switching conditions | | | $T_{vj\text{ op}}$ | -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 Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{RRM} | 1600 | V |
| 最大実効順電流/chip Maximum RMS forward current per chip | $T_C = 80^{\circ}\text{C}$ | I_{FRMSM} | 30 | A |
| 整流出力の最大実効電流 Maximum RMS current at rectifier output | $T_C = 80^{\circ}\text{C}$ | I_{RMSM} | 30 | A |
| サージ順電流 Surge forward current | $t_p = 10\text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | I_{FSM} | 300 245 | A A |
| 電流二乗時間積 I^2t - value | $t_p = 10\text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | I^2t | 450 300 | A^2s A^2s |

電気的特性 / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|-------|--------------------|------|------|--------------------|
| 順電圧 Forward voltage | $T_{vj} = 150^{\circ}\text{C}, I_F = 15\text{ A}$ | V_F | | 0,85 | | V |
| 逆電流 Reverse current | $T_{vj} = 150^{\circ}\text{C}, V_R = 1600\text{ V}$ | I_R | | 2,00 | | mA |
| ジャンクション・ケース間熱抵抗 Thermal resistance, junction to case | /Diode (1 素子当り) / per diode | | R_{thJC} | 1,20 | 1,35 | K/W |
| ケース・ヒートシンク間熱抵抗 Thermal resistance, case to heatsink | /Diode (1 素子当り) / per diode $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ | | R_{thCH} | 1,15 | | K/W |
| 動作温度 Temperature under switching conditions | | | $T_{vj\text{ op}}$ | | | $^{\circ}\text{C}$ |

| | |
|-----------------|---------------------------------|
| prepared by: DK | date of publication: 2013-11-05 |
| approved by: MB | revision: 2.0 |



暫定データ
Preliminary Data

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 Collector-emitter voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{CES} | 600 | V |
| 連続DCコレクタ電流 Continuous DC collector current | $T_C = 80^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{nom}}$ I_C | 15 22 | A A |
| 繰り返しピークコレクタ電流 Repetitive peak collector current | $t_P = 1\text{ ms}$ | I_{CRM} | 30 | A |
| トータル損失 Total power dissipation | $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | P_{tot} | 81,0 | W |
| ゲート・エミッタ間ピーク電圧 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 Collector-emitter saturation voltage | $I_C = 15\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 15\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 15\text{ A}, V_{GE} = 15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{sat}}$ | 1,55 1,70 1,80 | 2,00 | V V V | |
| ゲート・エミッタ間しきい値電圧 Gate threshold voltage | $I_C = 0,20\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | | V_{GEth} | 4,9 | 5,8 | 6,5 | V |
| ゲート電荷量 Gate charge | $V_{GE} = -15\text{ V} \dots +15\text{ V}$ | | Q_G | 0,15 | | | μC |
| 内蔵ゲート抵抗 Internal gate resistor | $T_{vj} = 25^{\circ}\text{C}$ | | R_{Gint} | 0,0 | | | Ω |
| 入力容量 Input capacitance | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$ | | C_{ies} | 0,83 | | | nF |
| 帰還容量 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} | 0,026 | | | nF |
| コレクタ・エミッタ間遮断電流 Collector-emitter cut-off current | $V_{CE} = 600\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$ | | I_{CES} | | | 1,0 | mA |
| ゲート・エミッタ間漏れ電流 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) Turn-on delay time, inductive load | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 30\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{don} | 0,018 0,018 0,018 | | | μs μs μs |
| ターンオン上昇時間 (誘導負荷) Rise time, inductive load | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 30\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_r | 0,015 0,02 0,021 | | | μs μs μs |
| ターンオフ遅れ時間 (誘導負荷) Turn-off delay time, inductive load | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 30\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{doff} | 0,13 0,16 0,18 | | | μs μs μs |
| ターンオフ下降時間 (誘導負荷) Fall time, inductive load | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 30\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_f | 0,085 0,11 0,12 | | | μs μs μs |
| ターンオンスイッチング損失 Turn-on energy loss per pulse | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}, L_S = \text{t.b.d. nH}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 30\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{on} | 0,29 0,37 0,39 | | | mJ mJ mJ |
| ターンオフスイッチング損失 Turn-off energy loss per pulse | $I_C = 15\text{ A}, V_{CE} = 300\text{ V}, L_S = \text{t.b.d. nH}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 30\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{off} | 0,34 0,44 0,46 | | | mJ mJ mJ |
| 短絡電流 SC data | $V_{GE} \leq 15\text{ V}, V_{CC} = 360\text{ V}$ $V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$ | $t_P \leq 8\ \mu\text{s}, T_{vj} = 25^{\circ}\text{C}$ $t_P \leq 6\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ | I_{SC} | 100 75 | | | A A |
| ジャンクション・ケース間熱抵抗 Thermal resistance, junction to case | IGBT部 (1素子当り) / per IGBT | | R_{thJC} | 1,65 | 1,85 | | K/W |
| ケース・ヒートシンク間熱抵抗 Thermal resistance, case to heatsink | IGBT部 (1素子当り) / per IGBT $\lambda_{\text{Paste}} = 1\text{ W/(m}\cdot\text{K)} / \lambda_{\text{grease}} = 1\text{ W/(m}\cdot\text{K)}$ | | R_{thCH} | 1,30 | | | K/W |
| 動作温度 Temperature under switching conditions | | | $T_{vj\text{op}}$ | -40 | 150 | | $^{\circ}\text{C}$ |

| | |
|-----------------|---------------------------------|
| prepared by: DK | date of publication: 2013-11-05 |
| approved by: MB | revision: 2.0 |



暫定データ
Preliminary Data

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 Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{RRM} | 600 | V |
| 連続DC電流 Continuous DC forward current | | I_F | 10 | A |
| ピーク繰返し順電流 Repetitive peak forward current | $t_P = 1\text{ ms}$ | I_{FRM} | 20 | A |
| 電流二乗時間積 I^2t - value | $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | I^2t | 12,5 9,50 | A^2s A^2s |

電気的特性 / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|-------------|----------------------|------|---|
| 順電圧 Forward voltage | $I_F = 10\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 10\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 10\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | V_F | 1,60 1,55 1,50 | 2,00 | V V V |
| ピーク逆回復電流 Peak reverse recovery current | $I_F = 10\text{ A}, -di_F/dt = 1500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | I_{RM} | 18,0 19,0 21,0 | | A A A |
| 逆回復電荷量 Recovered charge | $I_F = 10\text{ A}, -di_F/dt = 1500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | Q_r | 0,50 0,85 1,10 | | μC μC μC |
| 逆回復損失 Reverse recovery energy | $I_F = 10\text{ A}, -di_F/dt = 1500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{rec} | 0,11 0,20 0,26 | | mJ mJ mJ |
| ジャンクション・ケース間熱抵抗 Thermal resistance, junction to case | /Diode (1 素子当り) / per diode | | R_{thJC} | 2,90 | 3,20 | K/W |
| ケース・ヒートシンク間熱抵抗 Thermal resistance, case to heatsink | /Diode (1 素子当り) / per diode $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ | | R_{thCH} | 1,40 | | K/W |
| 動作温度 Temperature under switching conditions | | | $T_{vj op}$ | -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 Rated resistance | $T_C = 25^{\circ}\text{C}$ | | R_{25} | 5,00 | | k Ω |
| R100の偏差 Deviation of R100 | $T_C = 100^{\circ}\text{C}, R_{100} = 493\ \Omega$ | | $\Delta R/R$ | -5 | 5 | % |
| 損失 Power dissipation | $T_C = 25^{\circ}\text{C}$ | | P_{25} | | 20,0 | mW |
| B-定数 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 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 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.

| | |
|-----------------|---------------------------------|
| prepared by: DK | date of publication: 2013-11-05 |
| approved by: MB | revision: 2.0 |



暫定データ
Preliminary Data

モジュール / Module

| | | | | | |
|---|--|--|--------------------------------|--------------|--------|
| 絶縁耐圧 Isolation test voltage | RMS, f = 50 Hz, t = 1 min. | V _{ISOL} | 2,5 | | kV |
| 内部絶縁 Internal isolation | 基礎絶縁 (クラス1, IEC 61140) basic insulation (class 1, IEC 61140) | | Al ₂ O ₃ | | |
| 沿面距離 Creepage distance | 連絡方法 - ヒートシンク / terminal to heatsink 連絡方法 - 連絡方法 / terminal to terminal | | 11,5 6,3 | | mm |
| 空間距離 Clearance | 連絡方法 - ヒートシンク / terminal to heatsink 連絡方法 - 連絡方法 / terminal to terminal | | 10,0 5,0 | | mm |
| 相対トラッキング指数 Comperative tracking index | | CTI | > 200 | | |
| | | | min. | typ. | max. |
| 内部インダクタンス Stray inductance module | | L _{sCE} | | 30 | nH |
| パワーターミナル・チップ間抵抗 Module lead resistance, terminals - chip | T _c = 25°C, /スイッチ / per switch | R _{CC'+EE'} R _{AA'+CC'} | | 8,00 6,00 | mΩ |
| 保存温度 Storage temperature | | T _{stg} | -40 | | 125 °C |
| Anpresskraft für mech. Bef. pro Feder mounting force per clamp | | F | 20 | - | 50 N |
| 質量 Weight | | G | | 24 | g |

Der Strom im Dauerbetrieb ist auf 25 A effektiv pro Anschlusspin begrenzt
The current under continuous operation is limited to 25 A rms per connector pin

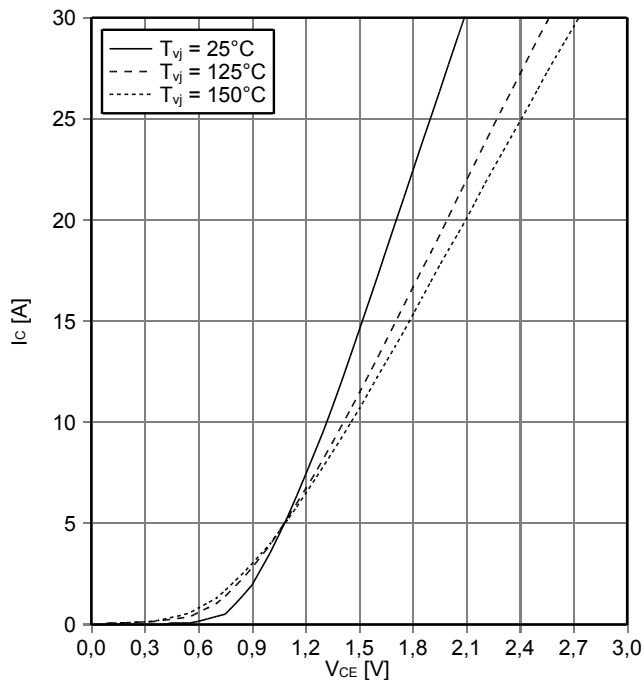
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暫定データ
Preliminary Data

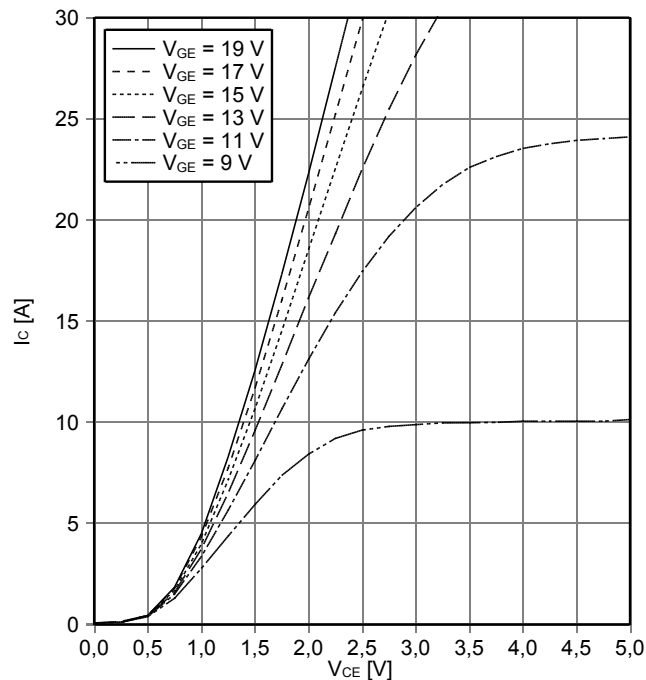
出力特性 IGBT- インバータ (Typical)
output characteristic IGBT, Inverter (typical)

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



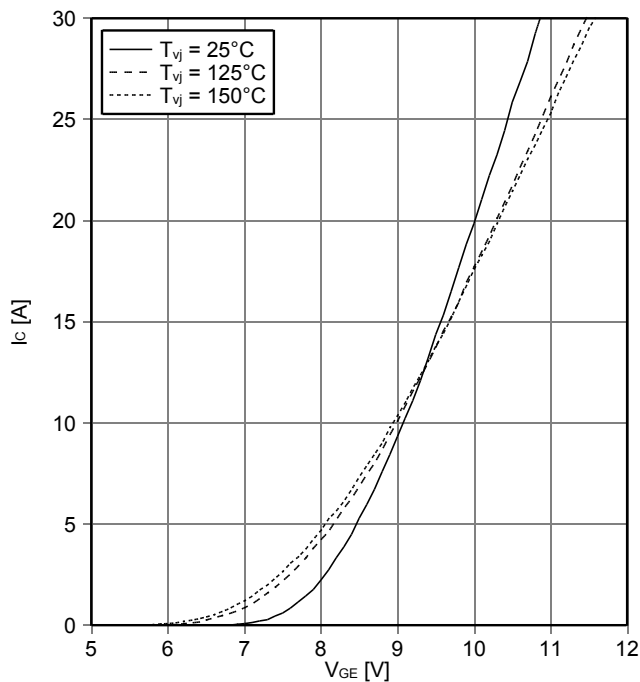
出力特性 IGBT- インバータ (Typical)
output characteristic IGBT, Inverter (typical)

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



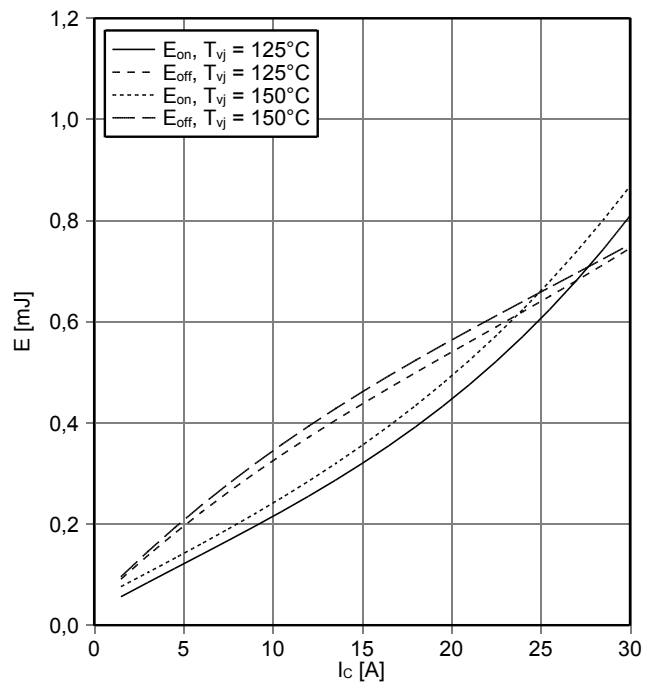
伝達特性 IGBT- インバータ (Typical)
transfer characteristic IGBT, Inverter (typical)

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



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

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 22\ \Omega$, $R_{Goff} = 22\ \Omega$, $V_{CE} = 300\text{ V}$



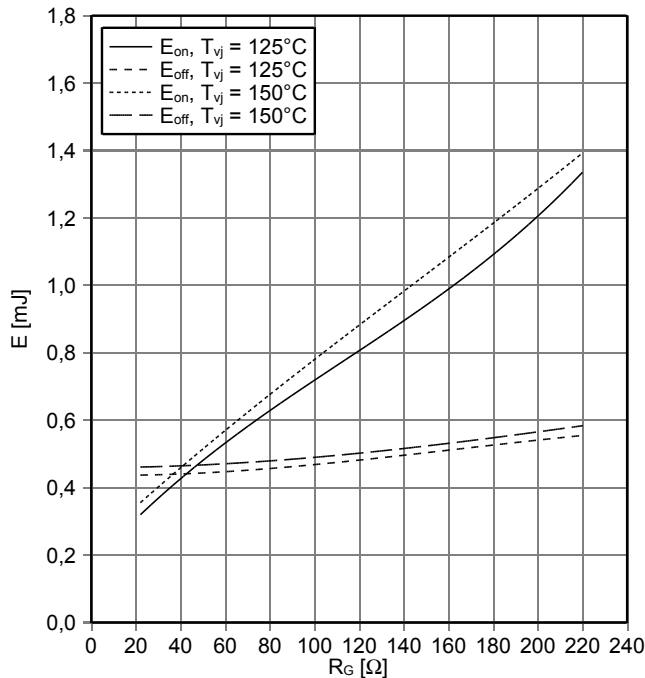
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Preliminary Data

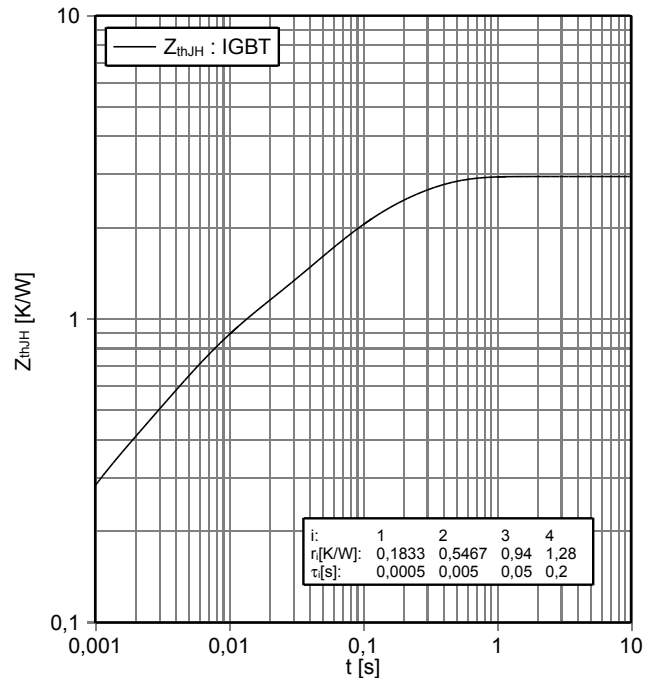
スイッチング損失 IGBT- インバータ (Typical)
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 15\text{ A}$, $V_{CE} = 300\text{ V}$



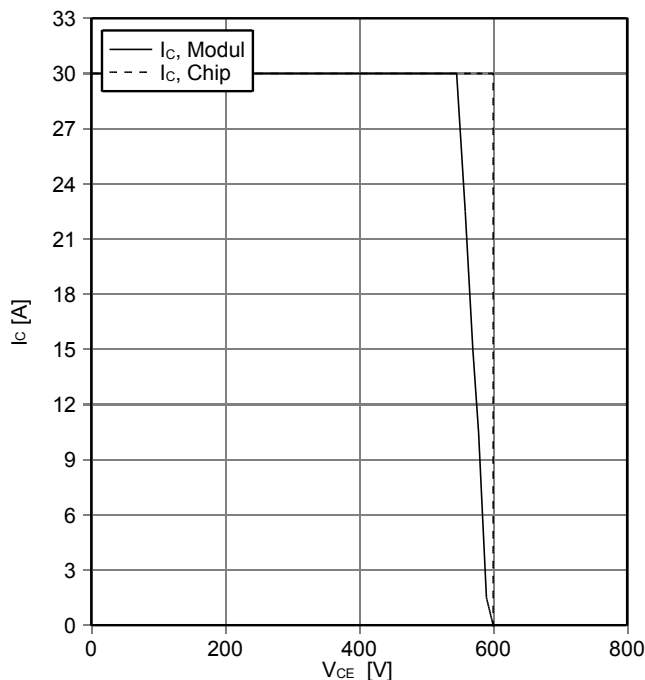
過渡熱インピーダンス IGBT- インバータ
transient thermal impedance IGBT, Inverter

$Z_{thJH} = f(t)$



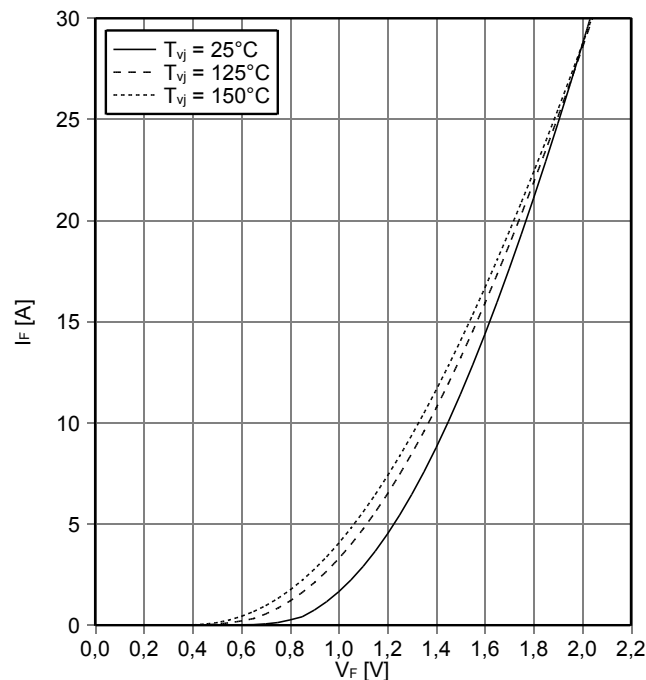
逆バイアス安全動作領域 IGBT- インバータ (RBSOA)
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 22\ \Omega$, $T_{vj} = 150^\circ\text{C}$



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

$I_F = f(V_F)$



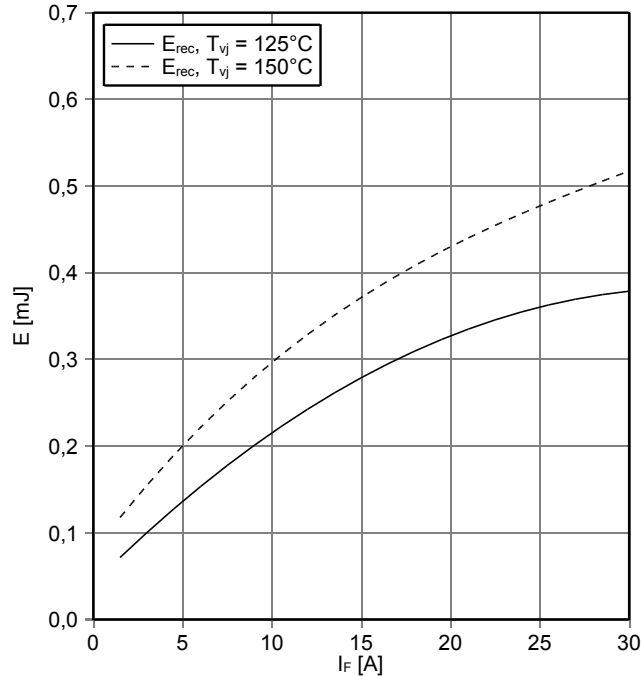
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暫定データ
Preliminary Data

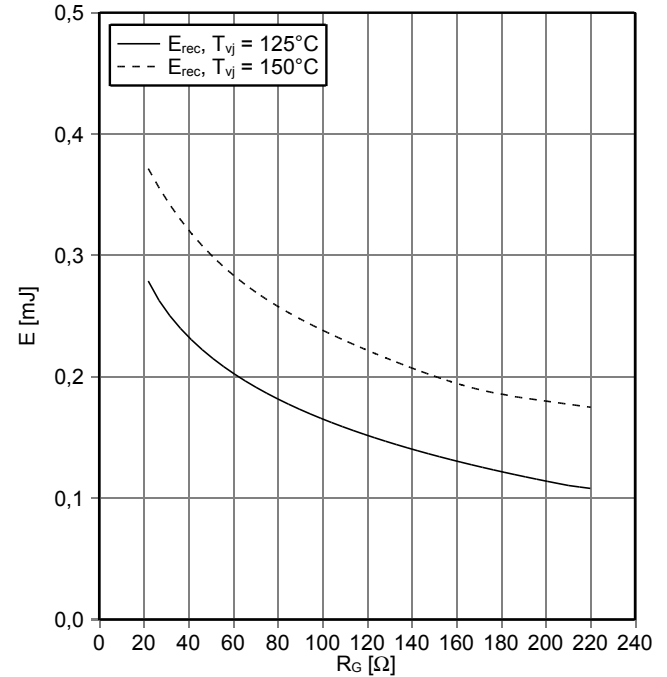
スイッチング損失 Diode、インバータ (Typical)
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$
 $R_{Gon} = 22 \Omega, V_{CE} = 300 V$



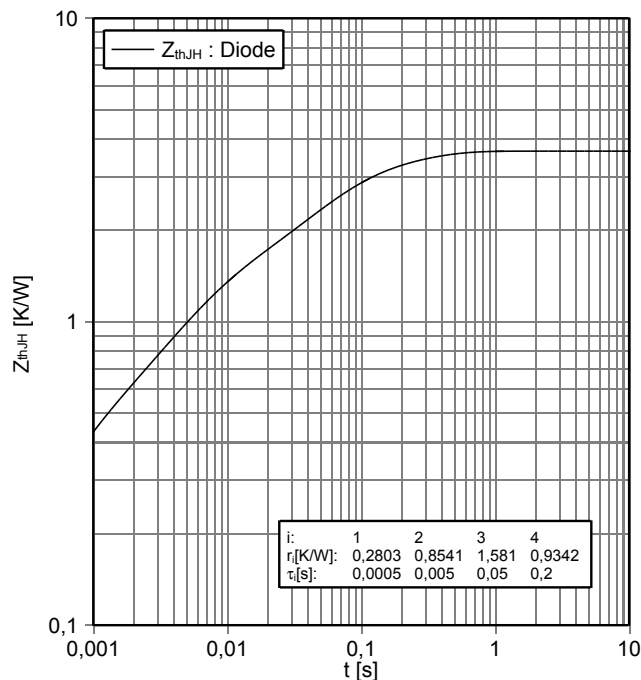
スイッチング損失 Diode、インバータ (Typical)
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$
 $I_F = 15 A, V_{CE} = 300 V$



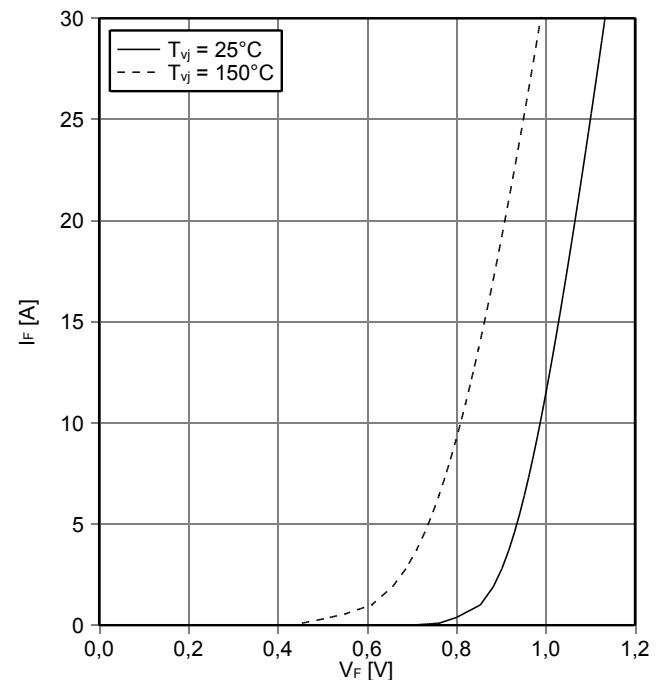
過渡熱インピーダンス Diode、インバータ
transient thermal impedance Diode, Inverter

$Z_{thJH} = f(t)$



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

$I_F = f(V_F)$



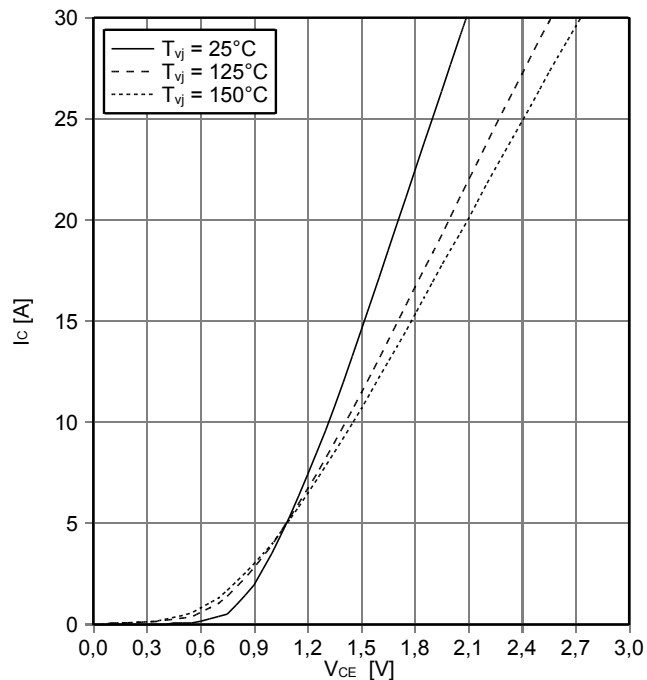
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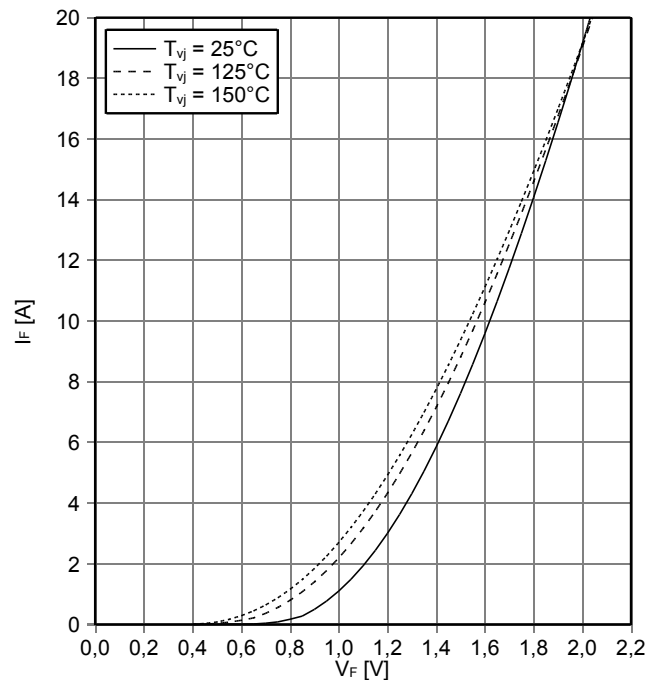
出力特性 IGBT-ブレーキチョッパー (Typical)
output characteristic IGBT, Brake-Chopper (typical)

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



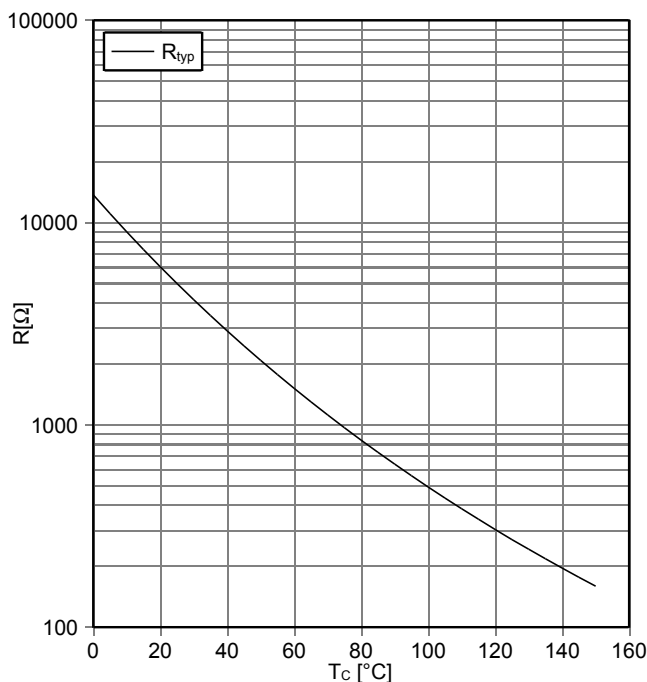
順電圧特性 Diode、ブレーキチョッパー (typical)
forward characteristic of Diode, Brake-Chopper (typical)

$I_F = f(V_F)$



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

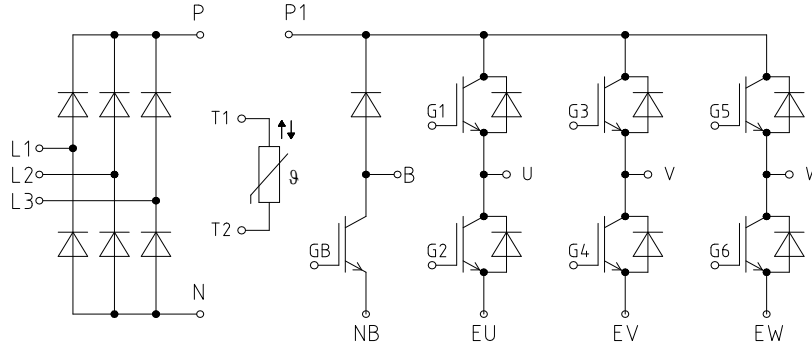
$R = f(T)$



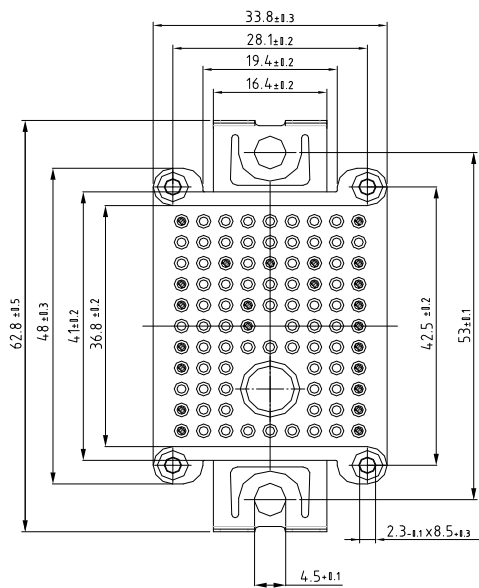
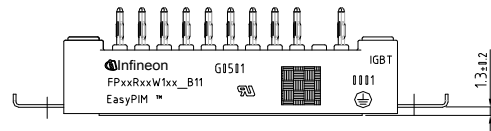
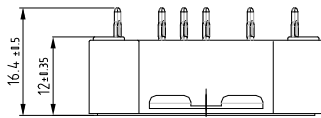
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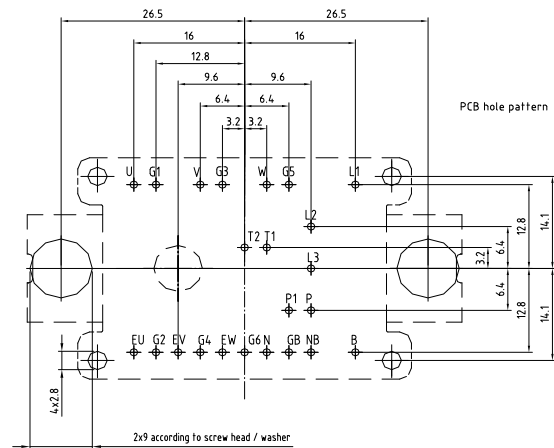
回路図 / circuit_diagram_headline



パッケージ概要 / package outlines



- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern $\pm \phi 0.1$
- Hole specification for contacts see AN 2119-01:
Diameters of drill $\phi 1.15$ mm
and copper thickness in hole 25-50 μ m



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