



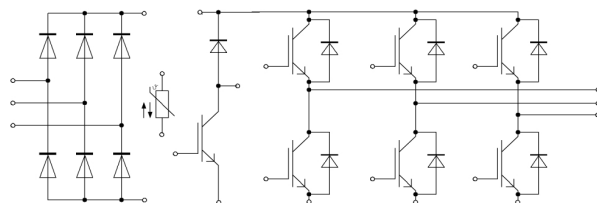
SmartPIM1 モジュール トレンチ/フィールドストップ IGBT4 and エミッターコントロール4 diode内蔵 and PressFIT / NTCサーミスタ

SmartPIM1 module with Trench/Fieldstop IGBT4 and Emitter Controlled 4 diode and PressFIT / NTC

暫定データ / Preliminary Data



Typical Appearance



$V_{CES} = 1200V$
 $I_{C\ nom} = 25A / I_{CRM} = 50A$

一般応用

- スタティックインバーター
- 空冷
- 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
- トレンチ IGBT 4
- $T_{vj\ op} = 150^{\circ}C$
- 低 V_{CEsat} 飽和電圧

機械的特性

- 低熱インピーダンスの Al_2O_3 DCB
- 丈夫な2重フレーム構造
- 丈夫な自動PressFITアセンブリー

Typical Applications

- Auxiliary Inverters
- Air Conditioning
- Motor Drives
- Servo Drives

Electrical Features

- Low Switching Losses
- Trench IGBT 4
- $T_{vj\ op} = 150^{\circ}C$
- Low V_{CEsat}

Mechanical Features

- Al_2O_3 Substrate with Low Thermal Resistance
- Rugged Duplex frame construction
- Rugged selfacting PressFIT assembly

Module Label Code

Barcode Code 128



DMX - 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} | 1200 | V |
| 連続DCコレクタ電流 Continuous DC collector current | $T_C = 100^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{nom}}$ I_C | 25 39 | 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} | 50 | 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} | 190 | 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 | $I_C = 25\text{A}, V_{GE} = 15\text{V}$ $I_C = 25\text{A}, V_{GE} = 15\text{V}$ $I_C = 25\text{A}, V_{GE} = 15\text{V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{sat}}$ | 1,85 2,15 2,25 | 2,25 | V V V |
| ゲート・エミッタ間しきい値電圧 Gate threshold voltage | $I_C = 0,80\text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | | V_{GEth} | 5,2 5,8 | 6,4 | V |
| ゲート電荷量 Gate charge | $V_{GE} = -15\text{V} \dots +15\text{V}$ | | Q_G | 0,20 | | 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} | 1,45 | | 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} | 0,05 | | nF |
| コレクタ・エミッタ間遮断電流 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 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 | $I_C = 25\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon} = 20\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{don} | 0,026 0,026 0,026 | | μs μs μs |
| ターンオン上昇時間 (誘導負荷) Rise time, inductive load | $I_C = 25\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon} = 20\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_r | 0,016 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 | $I_C = 25\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff} = 20\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{doff} | 0,19 0,28 0,30 | | μs μs μs |
| ターンオフ下降時間 (誘導負荷) Fall time, inductive load | $I_C = 25\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff} = 20\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_f | 0,18 0,21 0,22 | | μs μs μs |
| ターンオンスイッチング損失 Turn-on energy loss per pulse | $I_C = 25\text{A}, V_{CE} = 600\text{V}, L_S = 35\text{nH}$ $V_{GE} = \pm 15\text{V}, di/dt = 1700\text{A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Gon} = 20\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{on} | 1,60 2,40 2,60 | | mJ mJ mJ |
| ターンオフスイッチング損失 Turn-off energy loss per pulse | $I_C = 25\text{A}, V_{CE} = 600\text{V}, L_S = 35\text{nH}$ $V_{GE} = \pm 15\text{V}, du/dt = 3600\text{V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Goff} = 20\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{off} | 1,45 2,15 2,35 | | mJ mJ mJ |
| 短絡電流 SC data | $V_{GE} \leq 15\text{V}, V_{CC} = 800\text{V}$ $V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ | | I_{SC} | 90 | | 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} | 0,70 | 0,80 | 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} | 0,60 | | K/W |
| 動作温度 Temperature under switching conditions | | | $T_{vj\text{op}}$ | -40 | 150 | $^{\circ}\text{C}$ |

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|-----------------|---------------------------------|
| 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} | 1200 | V |
| 連続DC電流 Continuous DC forward current | | I_F | 25 | A |
| ピーク繰返し順電流 Repetitive peak forward current | $t_p = 1\text{ ms}$ | I_{FRM} | 50 | 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 | 90,0 75,0 | A^2s A^2s |

電気的特性 / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|--------------------|----------------------|------|---|
| 順電圧 Forward voltage | $I_F = 25\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 25\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 25\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | V_F | 1,75 1,75 1,75 | 2,25 | V V V |
| ピーク逆回復電流 Peak reverse recovery current | $I_F = 25\text{ A}, -di_F/dt = 1700\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | I_{RM} | 48,0 50,0 52,0 | | A A A |
| 逆回復電荷量 Recovered charge | $I_F = 25\text{ A}, -di_F/dt = 1700\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | Q_r | 2,50 4,40 4,90 | | μC μC μC |
| 逆回復損失 Reverse recovery energy | $I_F = 25\text{ A}, -di_F/dt = 1700\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{rec} | 0,95 1,75 2,05 | | 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} | 1,00 | 1,10 | 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} | 0,80 | | 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 | $T_C = 100^{\circ}\text{C}$ | I_{FRMSM} | 50 | A |
| 整流出力の最大実効電流 Maximum RMS current at rectifier output | $T_C = 100^{\circ}\text{C}$ | I_{RMSM} | 50 | 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} | 450 370 | 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 | 1000 685 | A^2s A^2s |

電気的特性 / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|--|--------------------|------|------|--------------------|
| 順電圧 Forward voltage | $T_{vj} = 150^{\circ}\text{C}, I_F = 25\text{ A}$ | | V_F | 0,90 | | V |
| 逆電流 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 Thermal resistance, junction to case | /Diode (1 素子当り) / per diode | | R_{thJC} | 0,95 | 1,05 | 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} | 0,85 | | 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} | 1200 | V |
| 連続DCコレクタ電流 Continuous DC collector current | $T_C = 100^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{nom}}$ I_C | 25 39 | 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} | 50 | 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} | 190 | 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 | $I_C = 25\text{A}, V_{GE} = 15\text{V}$ $I_C = 25\text{A}, V_{GE} = 15\text{V}$ $I_C = 25\text{A}, V_{GE} = 15\text{V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{sat}}$ | 1,85 2,15 2,25 | 2,25 | V V V | |
| ゲート・エミッタ間しきい値電圧 Gate threshold voltage | $I_C = 0,80\text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | | V_{GEth} | 5,2 | 5,8 | 6,4 | V |
| ゲート電荷量 Gate charge | $V_{GE} = -15\text{V} \dots +15\text{V}$ | | Q_G | 0,20 | | | 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} | 1,45 | | | 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} | 0,05 | | | nF |
| コレクタ・エミッタ間遮断電流 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 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 | $I_C = 25\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon} = 68\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{don} | 0,08 0,08 0,08 | | | μs μs μs |
| ターンオン上昇時間 (誘導負荷) Rise time, inductive load | $I_C = 25\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon} = 68\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_r | 0,042 0,051 0,053 | | | μs μs μs |
| ターンオフ遅れ時間 (誘導負荷) Turn-off delay time, inductive load | $I_C = 25\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff} = 68\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{doff} | 0,34 0,44 0,46 | | | μs μs μs |
| ターンオフ下降時間 (誘導負荷) Fall time, inductive load | $I_C = 25\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff} = 68\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_f | 0,18 0,215 0,225 | | | μs μs μs |
| ターンオンスイッチング損失 Turn-on energy loss per pulse | $I_C = 25\text{A}, V_{CE} = 600\text{V}, L_S = 35\text{nH}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon} = 68\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{on} | 3,90 5,00 5,40 | | | mJ mJ mJ |
| ターンオフスイッチング損失 Turn-off energy loss per pulse | $I_C = 25\text{A}, V_{CE} = 600\text{V}, L_S = 35\text{nH}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff} = 68\Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{off} | 1,50 2,20 2,40 | | | mJ mJ mJ |
| 短絡電流 SC data | $V_{GE} \leq 15\text{V}, V_{CC} = 800\text{V}$ $V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ | | I_{SC} | 90 | | | 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} | 0,70 | 0,80 | | 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} | 0,60 | | | K/W |
| 動作温度 Temperature under switching conditions | | | $T_{vj\text{op}}$ | -40 | 150 | | $^{\circ}\text{C}$ |

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|-----------------|---------------------------------|
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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} | 1200 | 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 | 16,0 14,0 | 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 | 1,75 1,75 1,75 | 2,25 | V V V |
| ピーク逆回復電流 Peak reverse recovery current | $I_F = 10\text{ A}, -di_F/dt = 500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | I_{RM} | 12,0 10,0 8,00 | | A A A |
| 逆回復電荷量 Recovered charge | $I_F = 10\text{ A}, -di_F/dt = 500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | Q_r | 0,90 1,70 1,90 | | μC μC μC |
| 逆回復損失 Reverse recovery energy | $I_F = 10\text{ A}, -di_F/dt = 500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{rec} | 0,24 0,52 0,59 | | 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} | 1,50 | 1,65 | 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} | 1,20 | | K/W |
| 動作温度 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 Rated resistance | $T_C = 25^{\circ}\text{C}$ | | R_{25} | 5,00 | | $\text{k}\Omega$ |
| 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 | | 12,7 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 | | 8,5 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'} | | 4,00 6,00 | mΩ |
| 保存温度 Storage temperature | | T _{stg} | -40 | | 125 °C |
| 取り付けネジ締め付けトルク Mounting torque for modul mounting | 取り付けネジ M6 適切なアプリケーションノートによるマウンティング Screw M6 - Mounting according to valid application note | M | 8,00 | - | 9,00 Nm |
| 質量 Weight | | G | | 34 | g |

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

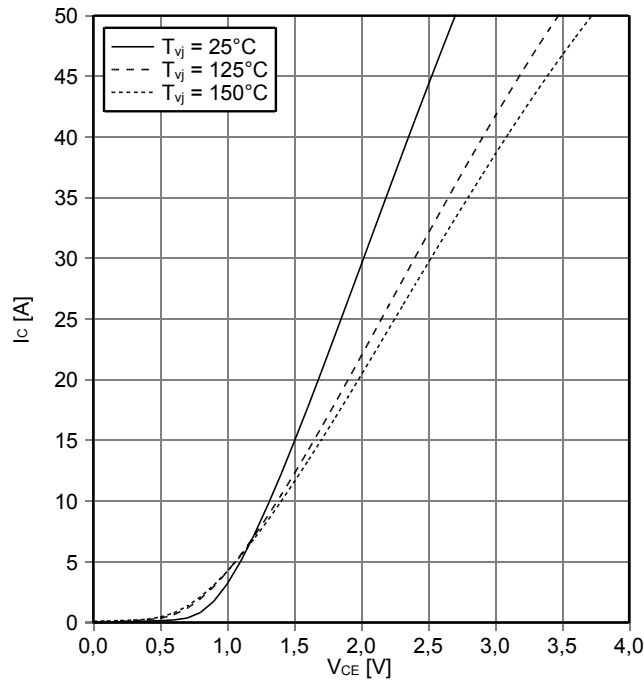
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暫定データ
Preliminary Data

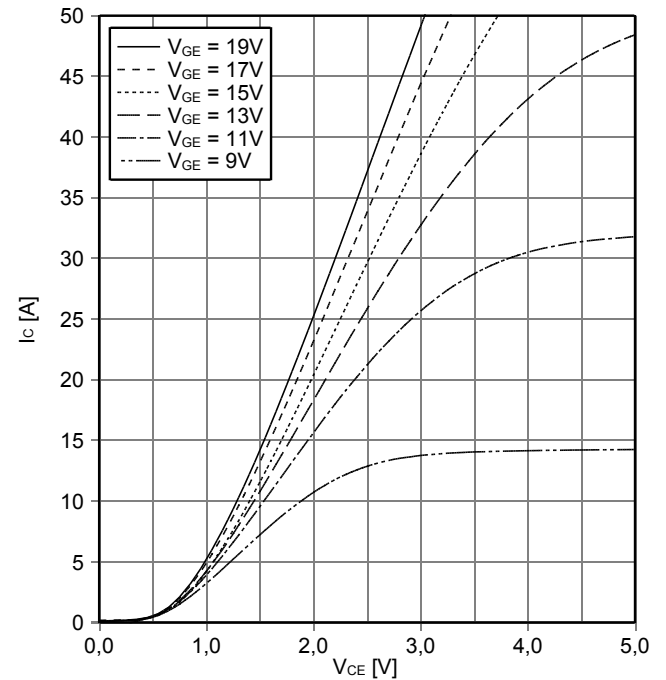
出力特性 IGBT- インバータ (Typical)
output characteristic IGBT, Inverter (typical)

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



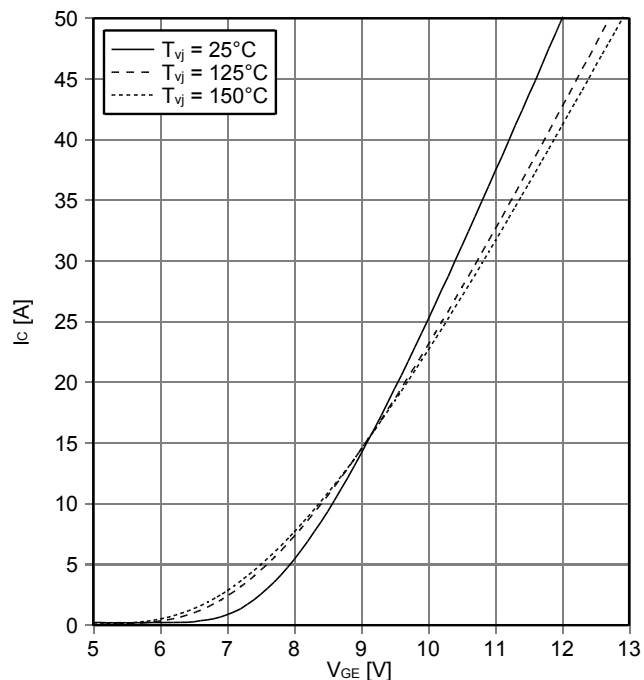
出力特性 IGBT- インバータ (Typical)
output characteristic IGBT, Inverter (typical)

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



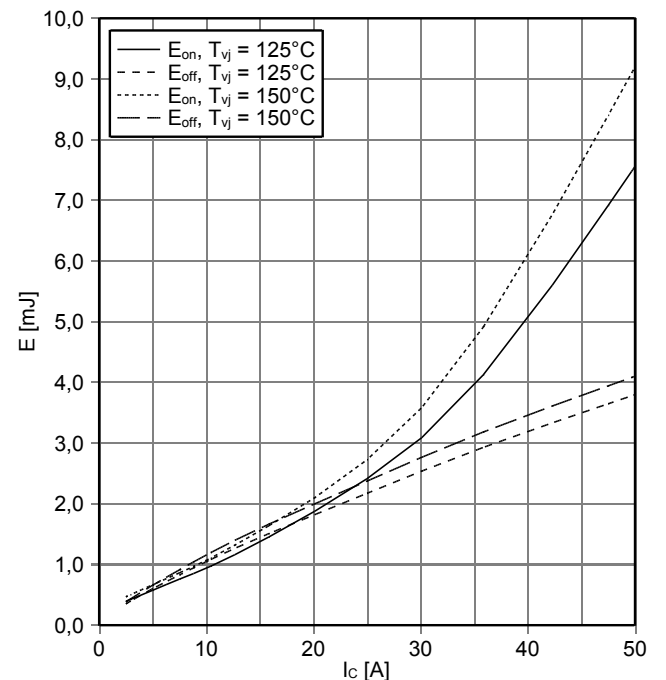
伝達特性 IGBT- インバータ (Typical)
transfer characteristic IGBT, Inverter (typical)

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



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

$E_{on} = f(I_C), E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}, R_{Gon} = 20\ \Omega, R_{Goff} = 20\ \Omega, V_{CE} = 600\text{ V}$



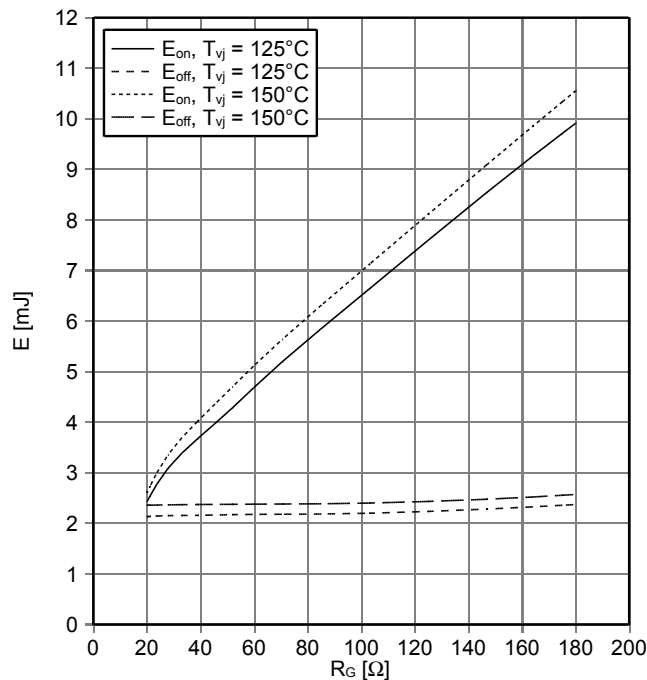
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|-----------------|---------------------------------|
| prepared by: DK | date of publication: 2013-11-05 |
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Preliminary Data

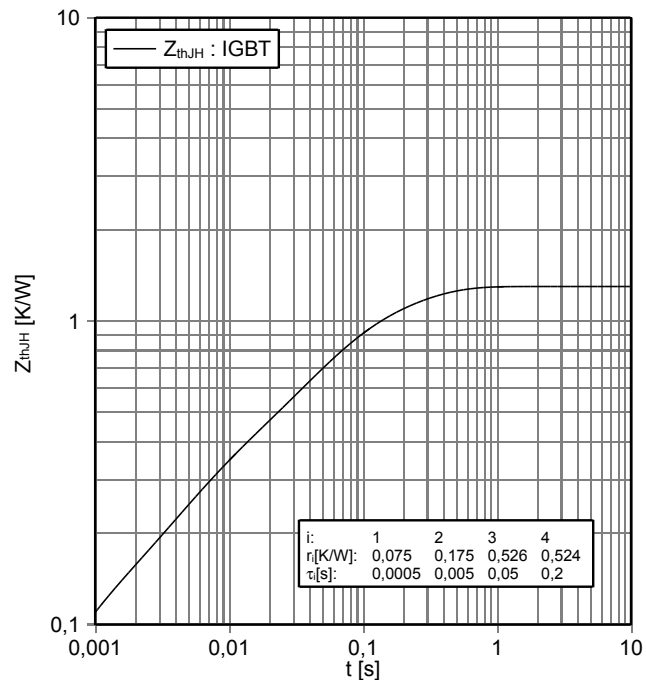
スイッチング損失 IGBT- インバータ (Typical)
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 25\text{ A}$, $V_{CE} = 600\text{ V}$



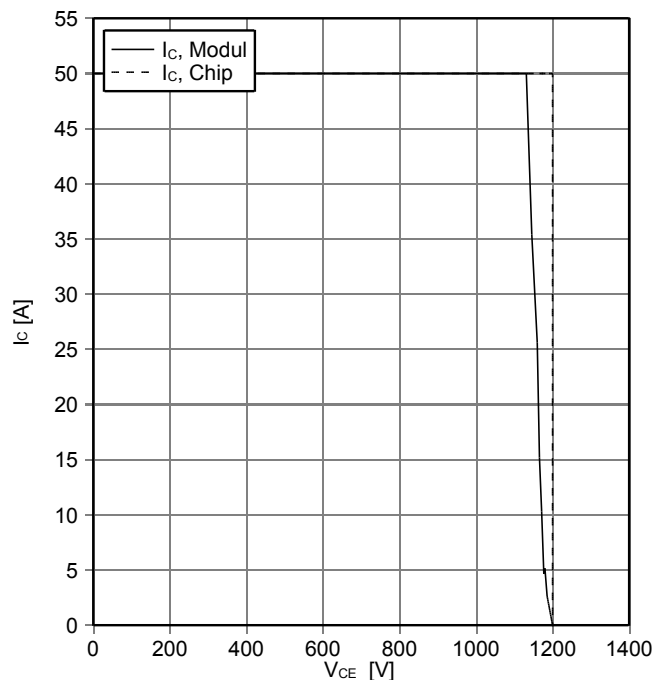
過渡熱インピーダンス IGBT- インバータ
transient thermal impedance IGBT, Inverter

$Z_{thJH} = f(t)$



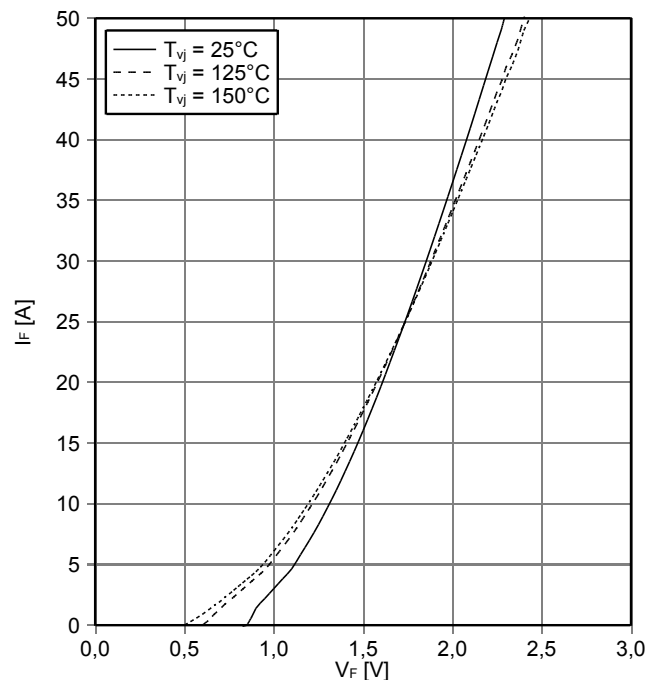
逆バイアス安全動作領域 IGBT- インバータ (RBSOA)
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 20\ \Omega$, $T_{vj} = 150^\circ\text{C}$



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

$I_F = f(V_F)$



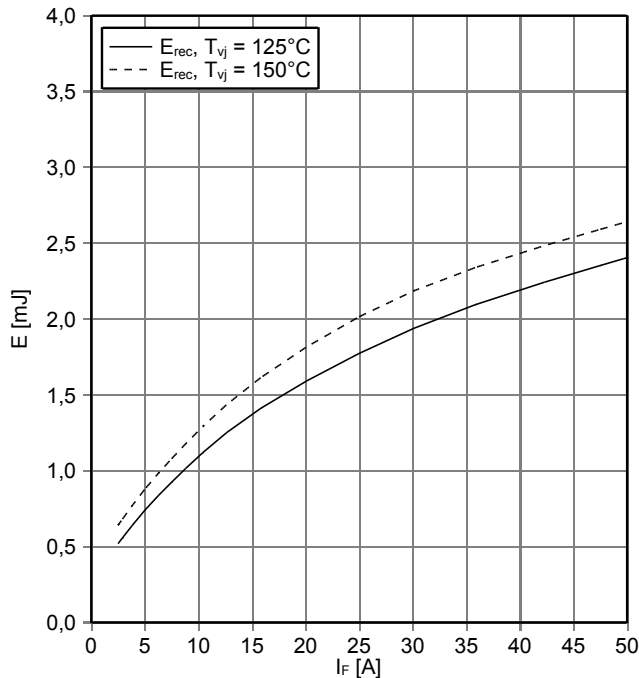
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| prepared by: DK | date of publication: 2013-11-05 |
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暫定データ
Preliminary Data

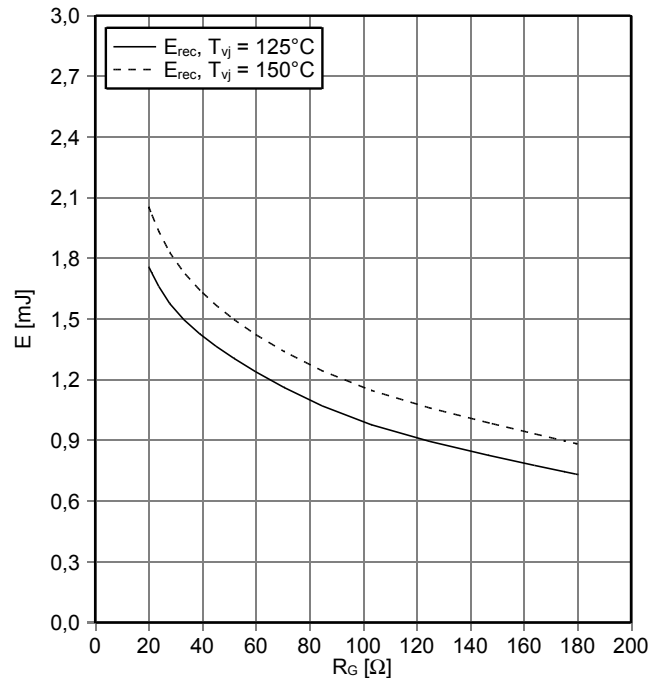
スイッチング損失 Diode、インバータ (Typical)
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$
 $R_{Gon} = 20 \Omega, V_{CE} = 600 V$



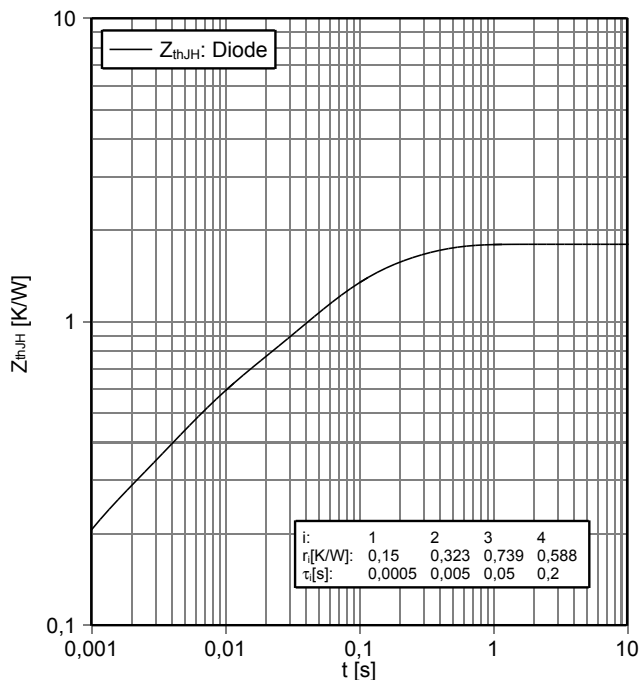
スイッチング損失 Diode、インバータ (Typical)
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_{Gc})$
 $I_F = 25 A, V_{CE} = 600 V$



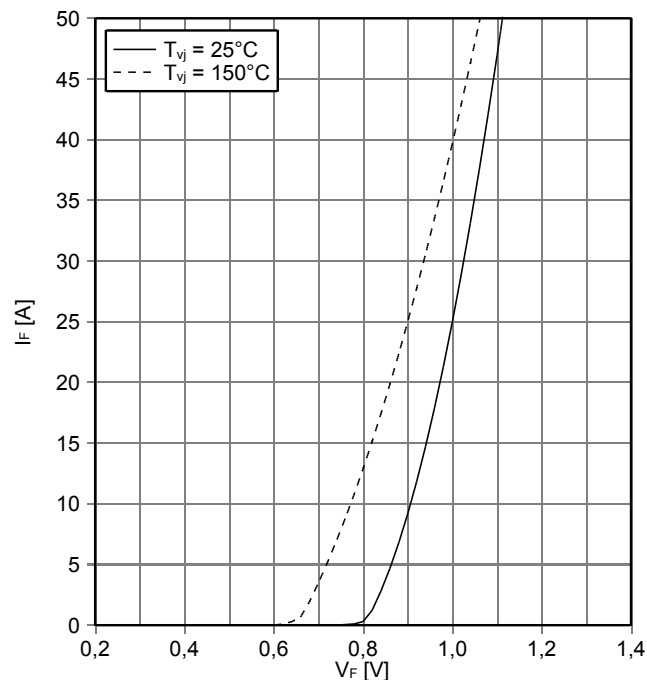
過渡熱インピーダンス Diode、インバータ
transient thermal impedance Diode, Inverter

$Z_{thJH} = f(t)$



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

$I_F = f(V_F)$



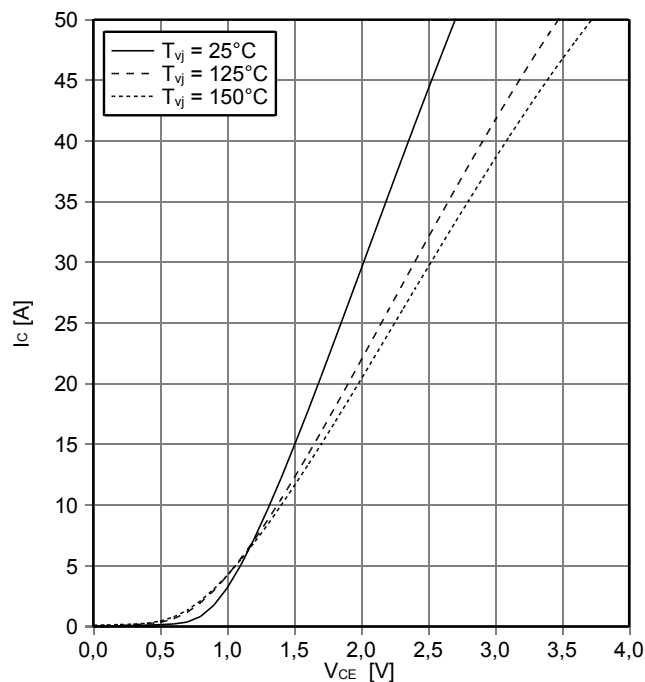
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Preliminary Data

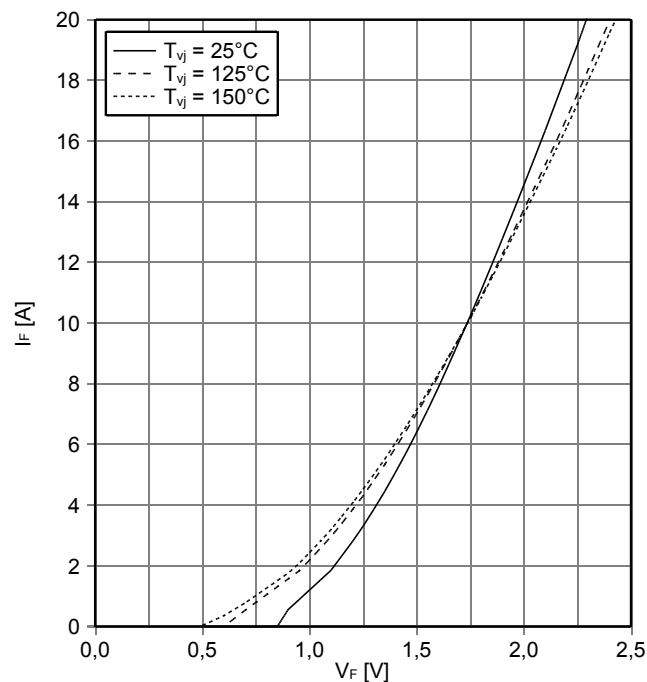
出力特性 IGBT-ブレーキチョッパー (Typical)
output characteristic IGBT, Brake-Chopper (typical)

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



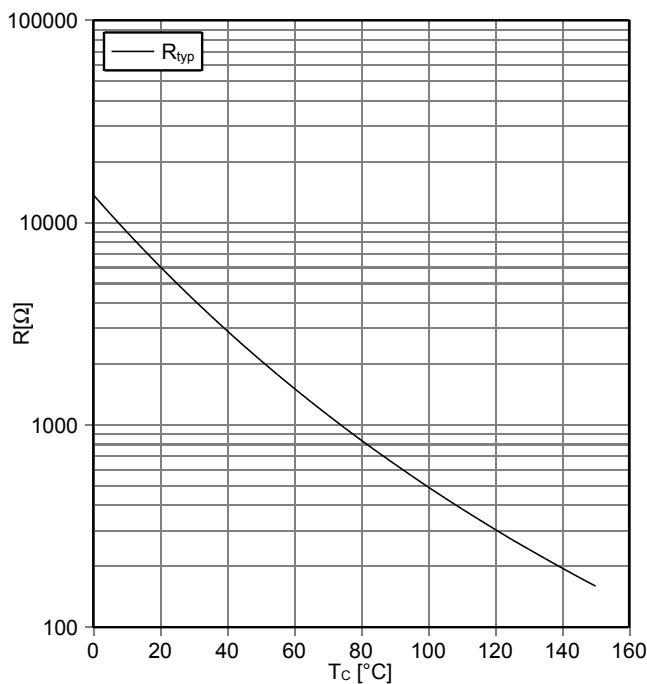
順電圧特性 Diode、ブレーキチョッパー (typical)
forward characteristic of Diode, Brake-Chopper (typical)

$I_F = f(V_F)$



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

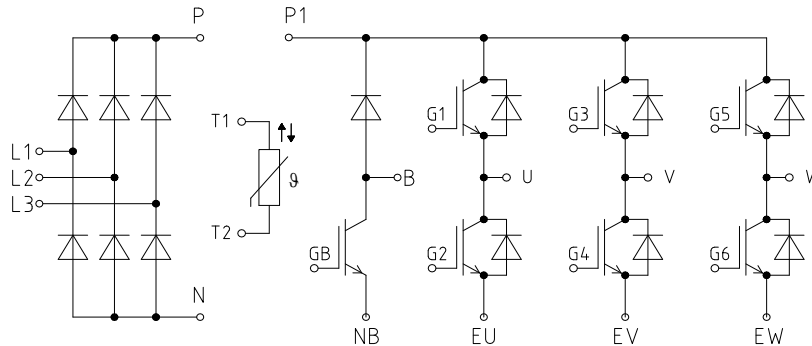
$R = f(T)$



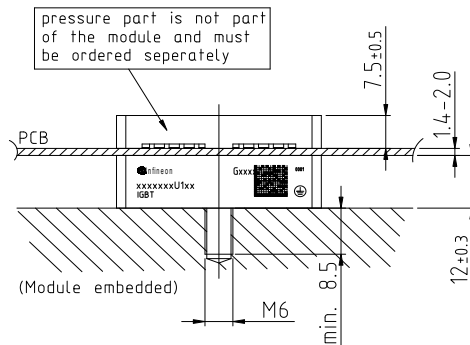
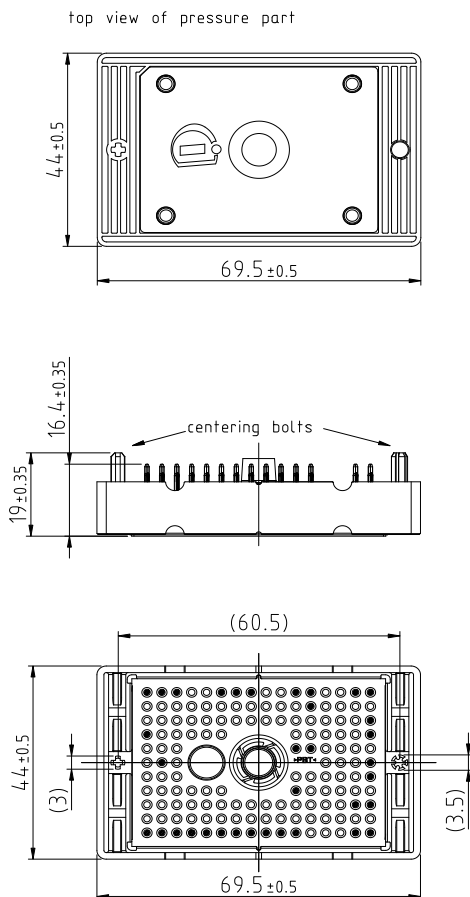
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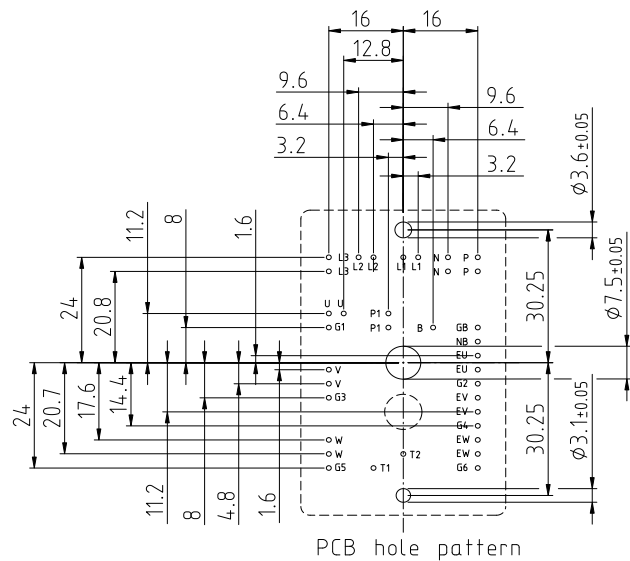
回路図 / circuit_diagram_headline



パッケージ概要 / package outlines



- Recommended screw:
M6 counter sunk (acc. to ISO14581 or DIN7991)
- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern $\pm \phi 0.1$
- Hole specification for contacts see AN 2009-09
Diameters of plated holes $\phi 1.0\text{mm}^{+0.09}_{-0.06}$
Diameters of drill $\phi 1.15\text{mm}$



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