

**IGBT- インバータ / IGBT, Inverter**  
**最大定格 / Maximum Rated Values**

**暫定データ**  
**Preliminary Data**

|                                                    |                                                                                                                                             |                             |          |        |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------|--------|
| 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      | $T_C = 100^{\circ}\text{C}, T_{vj\text{ max}} = 175^{\circ}\text{C}$<br>$T_C = 25^{\circ}\text{C}, T_{vj\text{ max}} = 175^{\circ}\text{C}$ | $I_{C\text{ nom}}$<br>$I_C$ | 10<br>20 | A<br>A |
| 繰り返しピークコレクタ電流<br>Repetitive peak collector current | $t_P = 1\text{ ms}$                                                                                                                         | $I_{CRM}$                   | 20       | A      |
| トータル損失<br>Total power dissipation                  | $T_C = 25^{\circ}\text{C}, T_{vj\text{ max}} = 175^{\circ}\text{C}$                                                                         | $P_{tot}$                   | 105      | 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  | $I_C = 10\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 10\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 10\text{ A}, V_{GE} = 15\text{ V}$                                                             | $T_{vj} = 25^{\circ}\text{C}$<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    | 2,25 | V<br>V<br>V                                     |
| ゲート・エミッタ間しきい値電圧<br>Gate threshold voltage               | $I_C = 0,30\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$                                                                                                                            |                                                                                                   | $V_{GEth}$          | 5,2                     | 5,8  | 6,4 V                                           |
| ゲート電荷量<br>Gate charge                                   | $V_{GE} = -15\text{ V} \dots +15\text{ V}$                                                                                                                                                      |                                                                                                   | $Q_G$               | 0,09                    |      | $\mu\text{C}$                                   |
| 内蔵ゲート抵抗<br>Internal gate resistor                       | $T_{vj} = 25^{\circ}\text{C}$                                                                                                                                                                   |                                                                                                   | $R_{Gint}$          | 0,0                     |      | $\Omega$                                        |
| 入力容量<br>Input capacitance                               | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                                                      |                                                                                                   | $C_{ies}$           | 0,60                    |      | nF                                              |
| 帰還容量<br>Reverse transfer capacitance                    | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                                                      |                                                                                                   | $C_{res}$           | 0,024                   |      | 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           | $V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$                                                                                                                        |                                                                                                   | $I_{GES}$           |                         | 400  | nA                                              |
| ターンオン遅れ時間 (誘導負荷)<br>Turn-on delay time, inductive load  | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 47\text{ }\Omega$                                                                                        | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{don}$           | 0,045<br>0,045<br>0,045 |      | $\mu\text{s}$<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           | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 47\text{ }\Omega$                                                                                        | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_r$               | 0,044<br>0,061<br>0,063 |      | $\mu\text{s}$<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 | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 47\text{ }\Omega$                                                                                       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{doff}$          | 0,18<br>0,245<br>0,275  |      | $\mu\text{s}$<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           | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 47\text{ }\Omega$                                                                                       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_f$               | 0,165<br>0,215<br>0,225 |      | $\mu\text{s}$<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          | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}, L_S = 50\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, di/dt = 500\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Gon} = 47\text{ }\Omega$   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{on}$            | 0,90<br>1,35<br>1,55    |      | 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         | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}, L_S = 50\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, du/dt = 3500\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Goff} = 47\text{ }\Omega$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{off}$           | 0,55<br>0,80<br>0,87    |      | 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>$t_P \leq 10\text{ }\mu\text{s}, T_{vj} = 150^{\circ}\text{C}$                               |                                                                                                   | $I_{SC}$            | 35                      |      | 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                                                                                                                                                                      |                                                                                                   | $R_{thJC}$          | 1,25                    | 1,40 | 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>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$                                                  |                                                                                                   | $R_{thCH}$          | 1,15                    |      | K/W                                             |
| 動作温度<br>Temperature under switching conditions          |                                                                                                                                                                                                 |                                                                                                   | $T_{vj\text{ op}}$  | -40                     | 150  | $^{\circ}\text{C}$                              |

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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<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      |                                                                                                                                              | $I_F$     | 10           | A                                            |
| ピーク繰返し順電流<br>Repetitive peak forward current | $t_P = 1\text{ ms}$                                                                                                                          | $I_{FRM}$ | 20           | 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>$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I^2t$    | 16,0<br>14,0 | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |

電気的特性 / Characteristic Values

|                                                         |                                                                                                                                                   |                                                                                                   |                    | min. | typ.                 | max. |                                                 |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------|------|----------------------|------|-------------------------------------------------|
| 順電圧<br>Forward voltage                                  | $I_F = 10\text{ A}, V_{GE} = 0\text{ V}$<br>$I_F = 10\text{ A}, V_{GE} = 0\text{ V}$<br>$I_F = 10\text{ A}, V_{GE} = 0\text{ V}$                  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_F$              |      | 1,75<br>1,75<br>1,75 | 2,25 | V<br>V<br>V                                     |
| ピーク逆回復電流<br>Peak reverse recovery current               | $I_F = 10\text{ A}, -di_F/dt = 500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<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>$T_{vj} = 150^{\circ}\text{C}$ | $I_{RM}$           |      | 12,0<br>10,0<br>8,00 |      | A<br>A<br>A                                     |
| 逆回復電荷量<br>Recovered charge                              | $I_F = 10\text{ A}, -di_F/dt = 500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<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>$T_{vj} = 150^{\circ}\text{C}$ | $Q_r$              |      | 0,90<br>1,70<br>1,90 |      | $\mu\text{C}$<br>$\mu\text{C}$<br>$\mu\text{C}$ |
| 逆回復損失<br>Reverse recovery energy                        | $I_F = 10\text{ A}, -di_F/dt = 500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<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>$T_{vj} = 150^{\circ}\text{C}$ | $E_{rec}$          |      | 0,24<br>0,52<br>0,59 |      | 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                                                                                                                     |                                                                                                   | $R_{thJC}$         |      | 1,75                 | 1,90 | 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>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ |                                                                                                   | $R_{thCH}$         |      | 1,30                 |      | K/W                                             |
| 動作温度<br>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<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   | $T_C = 80^{\circ}\text{C}$                                                                              | $I_{FRMSM}$ | 30         | A                                            |
| 整流出力の最大実効電流<br>Maximum RMS current at rectifier output | $T_C = 80^{\circ}\text{C}$                                                                              | $I_{RMSM}$  | 30         | A                                            |
| サージ順電流<br>Surge forward current                        | $t_P = 10\text{ ms}, T_{vj} = 25^{\circ}\text{C}$<br>$t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I_{FSM}$   | 300<br>245 | 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>$t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I^2t$      | 450<br>300 | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |

電気的特性 / Characteristic Values

|                                                         |                                                                                                                                                   |  |                    | min. | typ. | max. |                    |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------|------|------|------|--------------------|
| 順電圧<br>Forward voltage                                  | $T_{vj} = 150^{\circ}\text{C}, I_F = 10\text{ A}$                                                                                                 |  | $V_F$              |      | 0,80 |      | 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                                                                                                                     |  | $R_{thJC}$         |      | 1,20 | 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>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ |  | $R_{thCH}$         |      | 1,15 |      | K/W                |
| 動作温度<br>Temperature under switching conditions          |                                                                                                                                                   |  | $T_{vj\text{ op}}$ | -40  |      | 150  | $^{\circ}\text{C}$ |

|                 |                                 |
|-----------------|---------------------------------|
| prepared by: DK | date of publication: 2013-11-05 |
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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<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      | $T_C = 100^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$<br>$T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{nom}}$<br>$I_C$ | 10<br>20 | A<br>A |
| 繰り返しピークコレクタ電流<br>Repetitive peak collector current | $t_P = 1\text{ ms}$                                                                                                           | $I_{CRM}$                  | 20       | A      |
| トータル損失<br>Total power dissipation                  | $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$                                                                  | $P_{\text{tot}}$           | 105      | 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  | $I_C = 10\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 10\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 10\text{ A}, V_{GE} = 15\text{ V}$                               | $T_{vj} = 25^{\circ}\text{C}$<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    | 2,25 | V<br>V<br>V                                     |
| ゲート・エミッタ間しきい値電圧<br>Gate threshold voltage               | $I_C = 0,30\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$                                                                                              |                                                                                                   | $V_{GEth}$         | 5,2                     | 5,8  | 6,4 V                                           |
| ゲート電荷量<br>Gate charge                                   | $V_{GE} = -15\text{ V} \dots +15\text{ V}$                                                                                                                        |                                                                                                   | $Q_G$              | 0,09                    |      | $\mu\text{C}$                                   |
| 内蔵ゲート抵抗<br>Internal gate resistor                       | $T_{vj} = 25^{\circ}\text{C}$                                                                                                                                     |                                                                                                   | $R_{Gint}$         | 0,0                     |      | $\Omega$                                        |
| 入力容量<br>Input capacitance                               | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                        |                                                                                                   | $C_{ies}$          | 0,60                    |      | nF                                              |
| 帰還容量<br>Reverse transfer capacitance                    | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                        |                                                                                                   | $C_{res}$          | 0,024                   |      | 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           | $V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$                                                                                          |                                                                                                   | $I_{GES}$          |                         | 400  | nA                                              |
| ターンオン遅れ時間 (誘導負荷)<br>Turn-on delay time, inductive load  | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 47\text{ }\Omega$                                                          | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{don}$          | 0,045<br>0,045<br>0,045 |      | $\mu\text{s}$<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           | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 47\text{ }\Omega$                                                          | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_r$              | 0,044<br>0,061<br>0,063 |      | $\mu\text{s}$<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 | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 47\text{ }\Omega$                                                         | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{doff}$         | 0,18<br>0,245<br>0,275  |      | $\mu\text{s}$<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           | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 47\text{ }\Omega$                                                         | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_f$              | 0,165<br>0,215<br>0,225 |      | $\mu\text{s}$<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          | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}, L_S = 50\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 47\text{ }\Omega$                                      | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{on}$           | 0,90<br>1,35<br>1,55    |      | 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         | $I_C = 10\text{ A}, V_{CE} = 600\text{ V}, L_S = 50\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 47\text{ }\Omega$                                     | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{off}$          | 0,55<br>0,80<br>0,87    |      | 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>$t_P \leq 10\text{ }\mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ |                                                                                                   | $I_{SC}$           | 35                      |      | 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                                                                                                                                        |                                                                                                   | $R_{thJC}$         | 1,25                    | 1,40 | 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>$\lambda_{\text{Paste}} = 1\text{ W/(m}\cdot\text{K)}$ / $\lambda_{\text{grease}} = 1\text{ W/(m}\cdot\text{K)}$                    |                                                                                                   | $R_{thCH}$         | 1,15                    |      | K/W                                             |
| 動作温度<br>Temperature under switching conditions          |                                                                                                                                                                   |                                                                                                   | $T_{vj\text{op}}$  | -40                     | 150  | $^{\circ}\text{C}$                              |

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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<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      |                                                                                                                                                  | $I_F$     | 10           | A                                            |
| ピーク繰返し順電流<br>Repetitive peak forward current | $t_P = 1 \text{ ms}$                                                                                                                             | $I_{FRM}$ | 20           | 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>$V_R = 0 \text{ V}, t_P = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I^2t$    | 16,0<br>14,0 | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |

電気的特性 / Characteristic Values

|                                                         |                                                                                                                                                     |                                                                                                   | min.        | typ.                 | max. |                                                 |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------|----------------------|------|-------------------------------------------------|
| 順電圧<br>Forward voltage                                  | $I_F = 10 \text{ A}, V_{GE} = 0 \text{ V}$<br>$I_F = 10 \text{ A}, V_{GE} = 0 \text{ V}$<br>$I_F = 10 \text{ A}, V_{GE} = 0 \text{ V}$              | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_F$       | 1,75<br>1,75<br>1,75 | 2,25 | V<br>V<br>V                                     |
| ピーク逆回復電流<br>Peak reverse recovery current               | $I_F = 10 \text{ A}, -di_F/dt = 500 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600 \text{ V}$                                    | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $I_{RM}$    | 12,0<br>10,0<br>8,00 |      | A<br>A<br>A                                     |
| 逆回復電荷量<br>Recovered charge                              | $I_F = 10 \text{ A}, -di_F/dt = 500 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600 \text{ V}$                                    | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $Q_r$       | 0,90<br>1,70<br>1,90 |      | $\mu\text{C}$<br>$\mu\text{C}$<br>$\mu\text{C}$ |
| 逆回復損失<br>Reverse recovery energy                        | $I_F = 10 \text{ A}, -di_F/dt = 500 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600 \text{ V}$                                    | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{rec}$   | 0,24<br>0,52<br>0,59 |      | 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                                                                                                                       |                                                                                                   | $R_{thJC}$  | 1,75                 | 1,90 | 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>$\lambda_{Paste} = 1 \text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$ |                                                                                                   | $R_{thCH}$  | 1,30                 |      | K/W                                             |
| 動作温度<br>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<br>Rated resistance    | $T_C = 25^{\circ}\text{C}$                                     | $R_{25}$     |      | 5,00 |      | k $\Omega$ |
| R100の偏差<br>Deviation of R100 | $T_C = 100^{\circ}\text{C}, R_{100} = 493 \Omega$              | $\Delta R/R$ | -5   |      | 5    | %          |
| 損失<br>Power dissipation      | $T_C = 25^{\circ}\text{C}$                                     | $P_{25}$     |      |      | 20,0 | mW         |
| B-定数<br>B-value              | $R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$  | $B_{25/50}$  |      | 3375 |      | K          |
| B-定数<br>B-value              | $R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15 \text{ K}))]$  | $B_{25/80}$  |      | 3411 |      | K          |
| B-定数<br>B-value              | $R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15 \text{ K}))]$ | $B_{25/100}$ |      | 3433 |      | K          |

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

|                 |                                 |
|-----------------|---------------------------------|
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暫定データ  
Preliminary Data

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            |
| 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 |                                              | 11,5<br>6,3                    | 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 |                                              | 10,0<br>5,0                    | mm            |
| 相対トラッキング指数<br>Comperative tracking index                          |                                                                            | CTI                                          | > 200                          |               |
|                                                                   |                                                                            |                                              |                                |               |
| 内部インダクタンス<br>Stray inductance module                              |                                                                            | L <sub>sCE</sub>                             | min. 30                        | typ. max. 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> | 8,00<br>6,00                   | 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<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<br>150 °C |
| 保存温度<br>Storage temperature                                       |                                                                            | T <sub>stg</sub>                             | -40                            | 125 °C        |
| Anpresskraft für mech. Bef. pro Feder<br>mounting force per clamp |                                                                            | F                                            | 20                             | - 50 N        |
| 質量<br>Weight                                                      |                                                                            | G                                            | 24                             | g             |

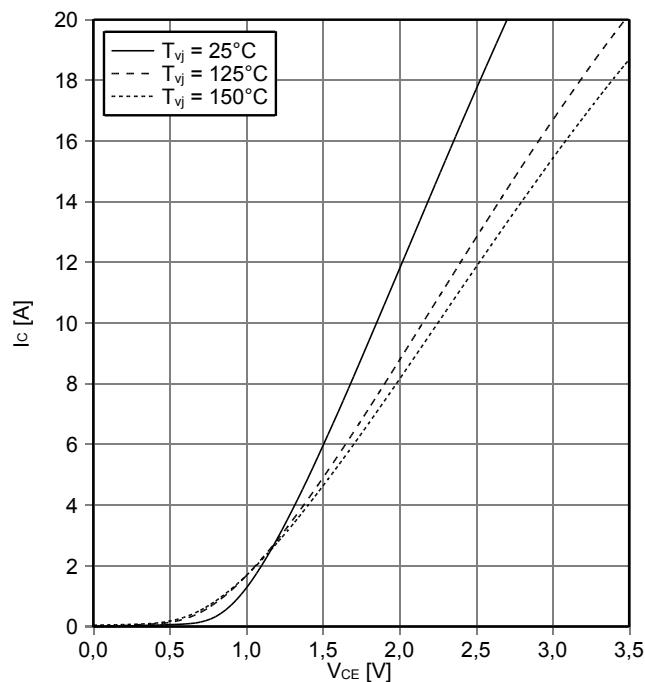
Der Strom im Dauerbetrieb ist auf 25A effektiv pro Anschlusspin begrenzt.  
The current under continuous operation is limited to 25A rms per connector pin.

|                 |                                 |
|-----------------|---------------------------------|
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暫定データ  
Preliminary Data

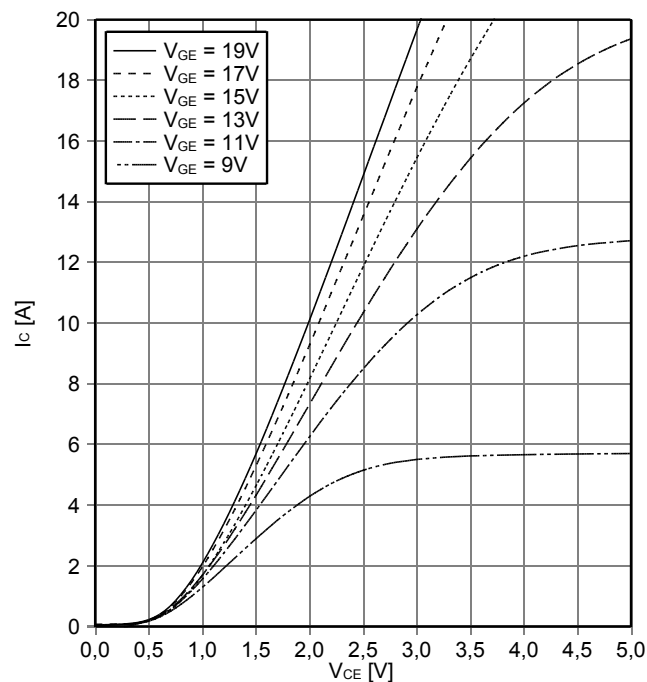
出力特性 IGBT- インバータ (Typical)  
output characteristic IGBT, Inverter (typical)

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



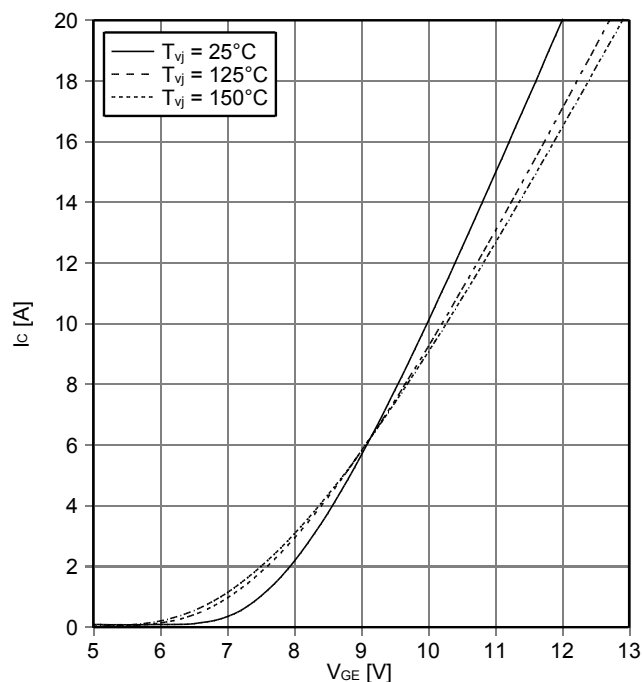
出力特性 IGBT- インバータ (Typical)  
output characteristic IGBT, Inverter (typical)

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



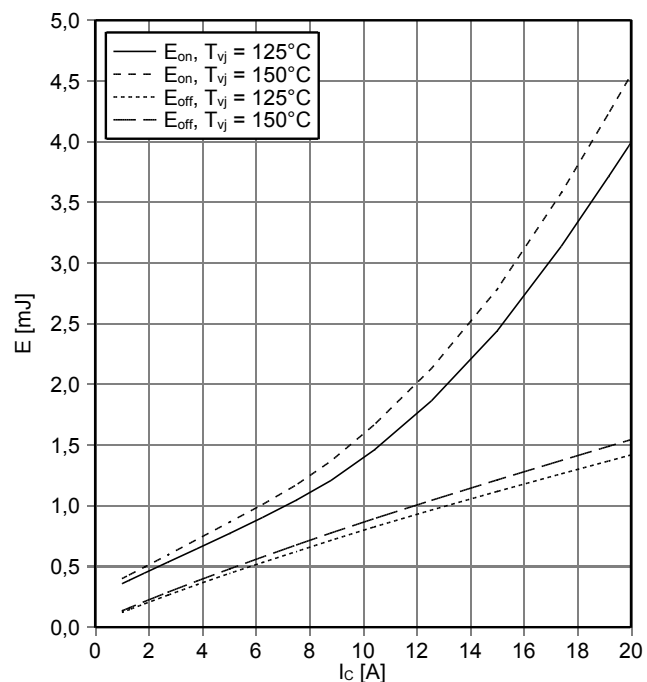
伝達特性 IGBT- インバータ (Typical)  
transfer characteristic IGBT, Inverter (typical)

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



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

$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15 \text{ V}$ ,  $R_{Gon} = 47 \text{ } \Omega$ ,  $R_{Goff} = 47 \text{ } \Omega$ ,  $V_{CE} = 600 \text{ V}$



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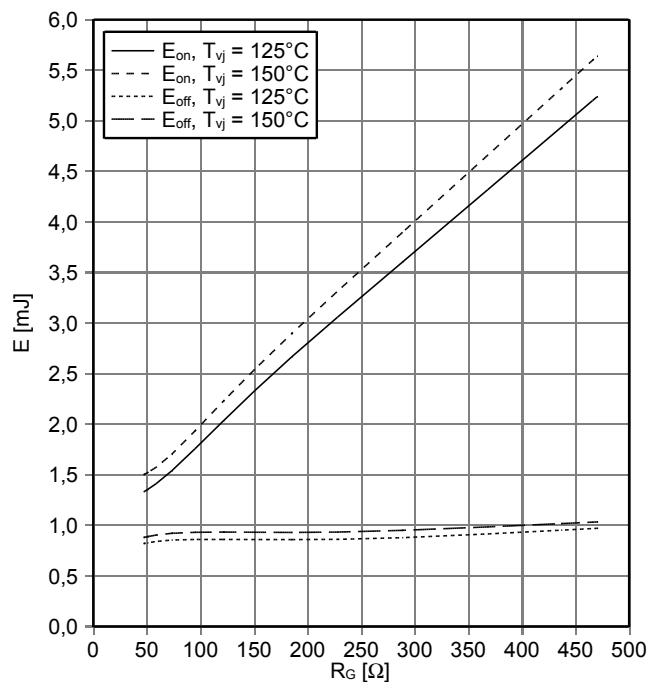
approved by: MB

revision: 2.0

暫定データ  
Preliminary Data

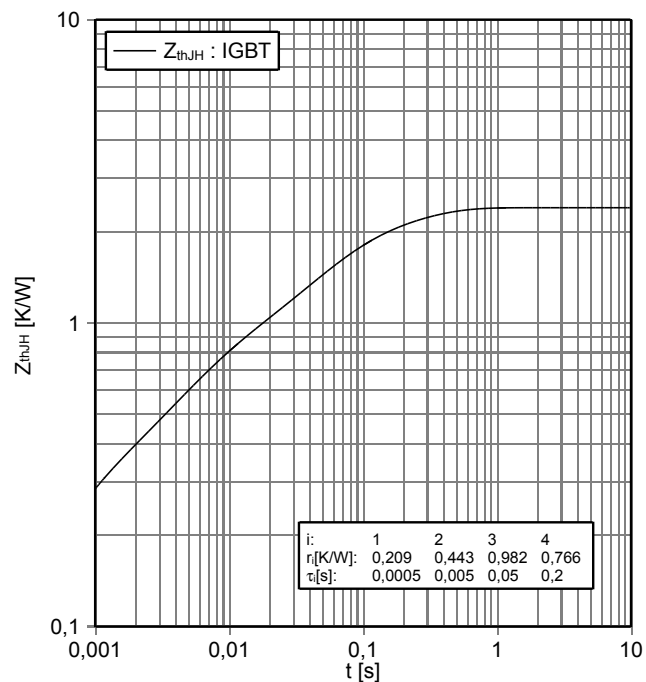
スイッチング損失 IGBT- インバータ (Typical)  
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$   
 $V_{GE} = \pm 15 \text{ V}$ ,  $I_C = 10 \text{ A}$ ,  $V_{CE} = 600 \text{ V}$



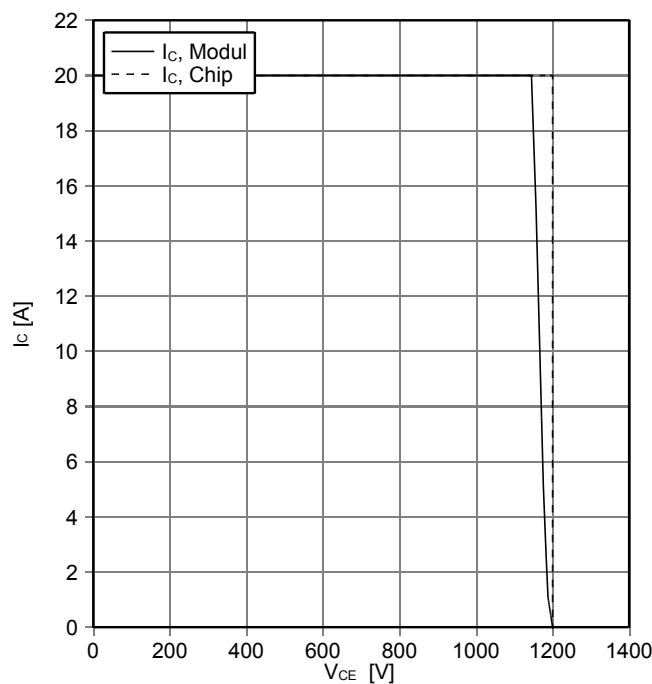
過渡熱インピーダンス IGBT- インバータ  
transient thermal impedance IGBT, Inverter

$Z_{thJH} = f(t)$



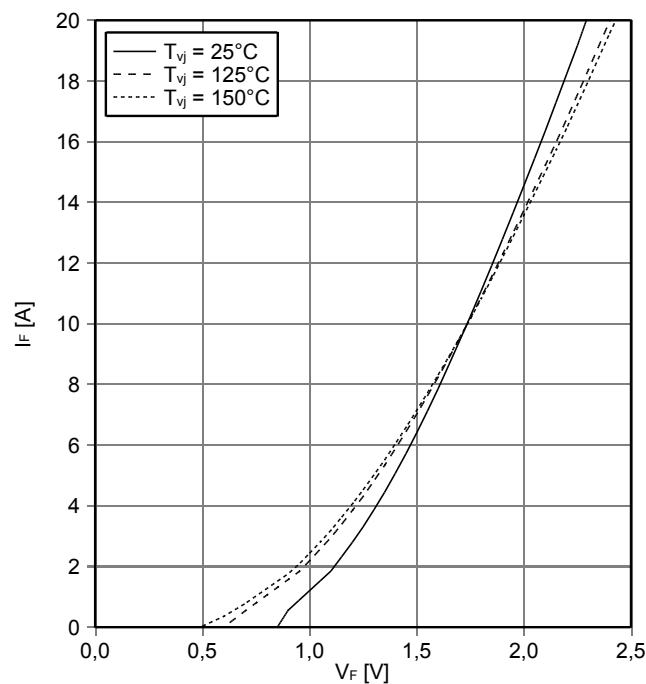
逆バイアス安全動作領域 IGBT- インバータ (RBSOA)  
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$   
 $V_{GE} = \pm 15 \text{ V}$ ,  $R_{Goff} = 47 \Omega$ ,  $T_{vj} = 150^\circ\text{C}$



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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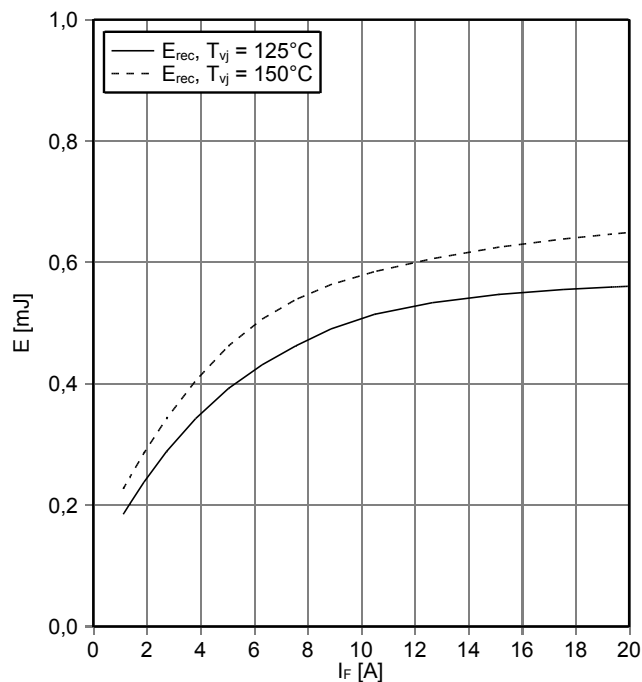
approved by: MB

revision: 2.0

暫定データ  
Preliminary Data

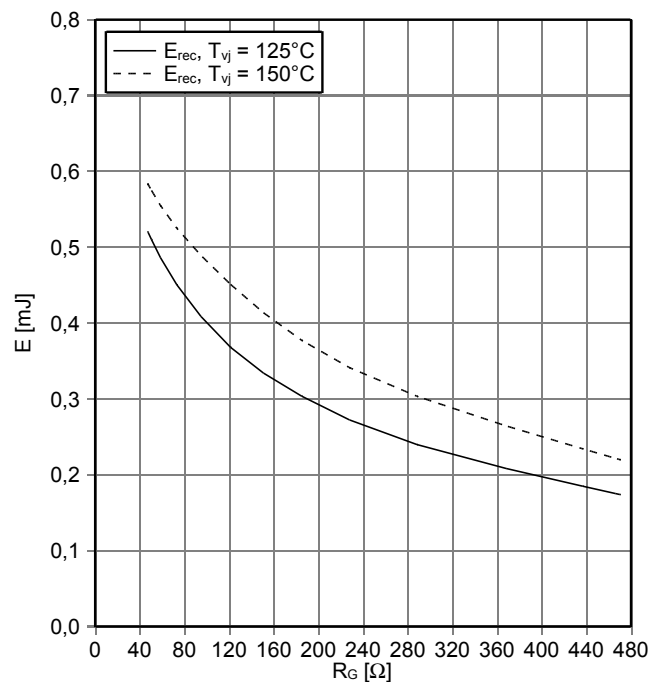
スイッチング損失 Diode、インバータ (Typical)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$   
 $R_{Gon} = 47 \Omega$ ,  $V_{CE} = 600 V$



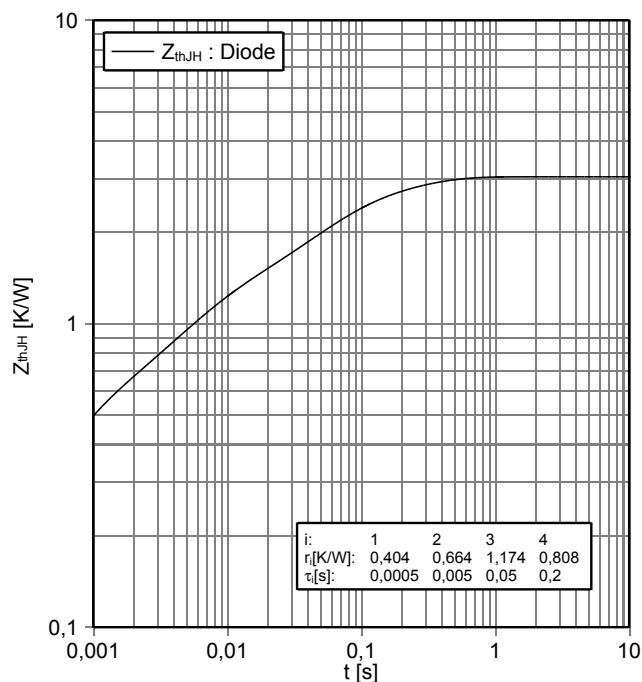
スイッチング損失 Diode、インバータ (Typical)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$   
 $I_F = 10 A$ ,  $V_{CE} = 600 V$



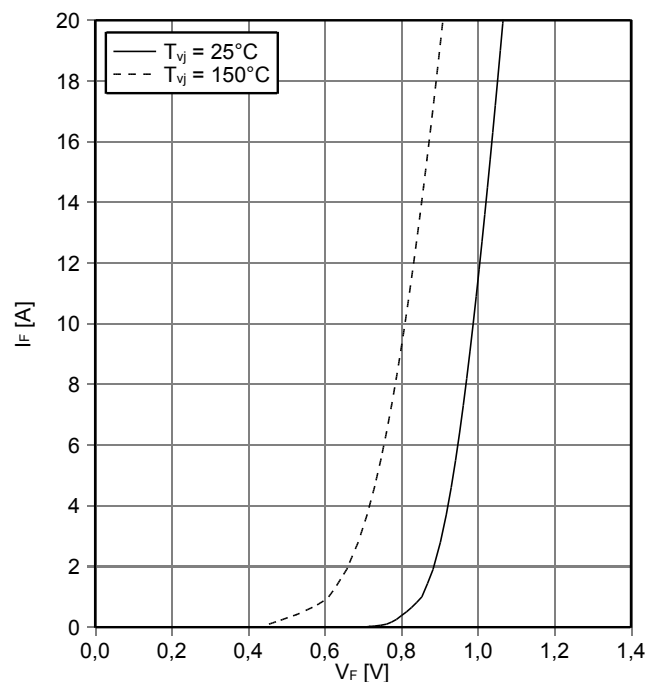
過渡熱インピーダンス Diode、インバータ  
transient thermal impedance Diode, Inverter

$Z_{thJH} = f(t)$



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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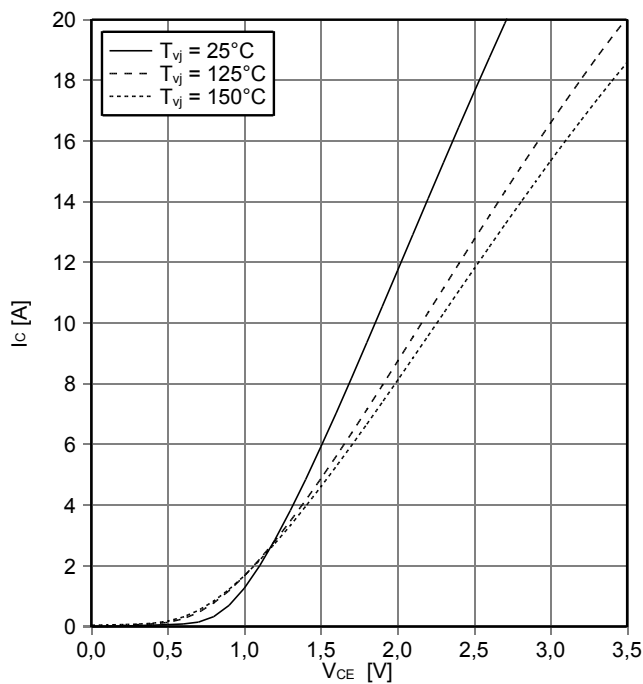
approved by: MB

revision: 2.0

暫定データ  
Preliminary Data

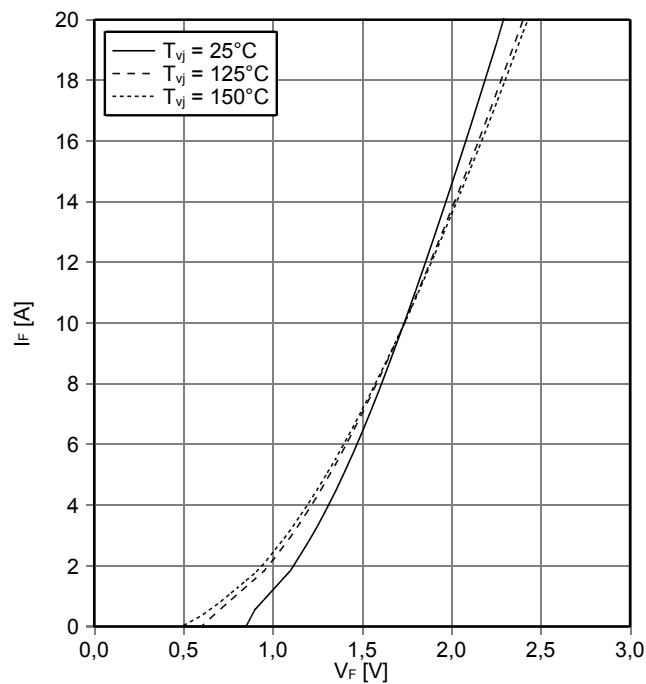
出力特性 IGBT-ブレーキチョッパー (Typical)  
output characteristic IGBT, Brake-Chopper (typical)

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



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)

$R = f(T)$

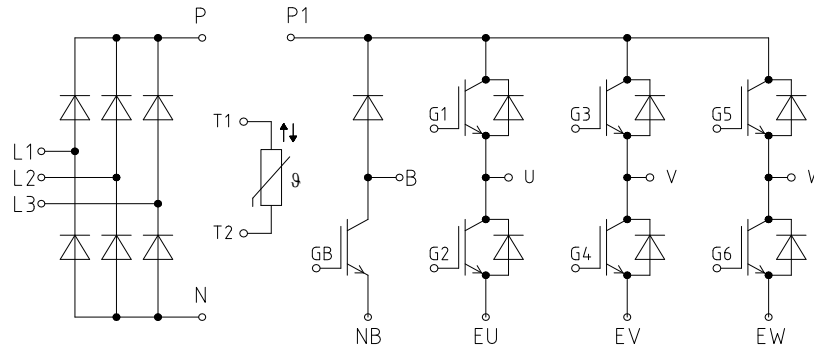


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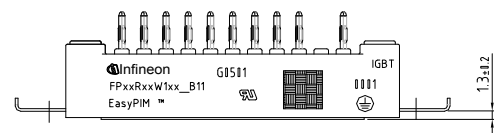
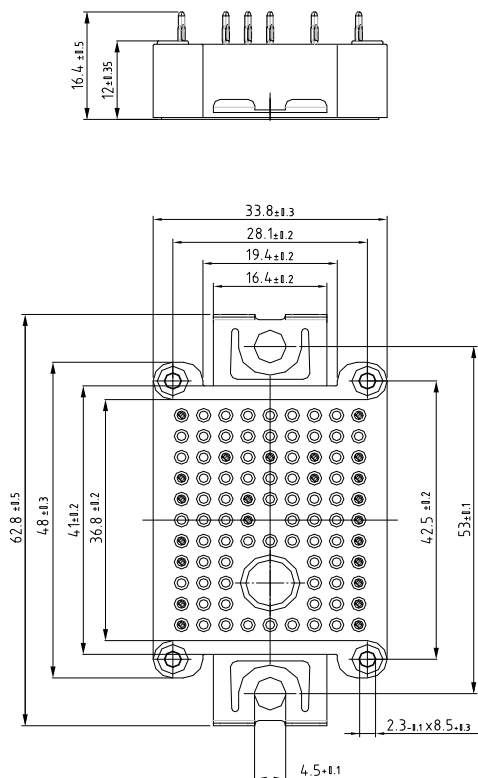
date of publication: 2013-11-05  
revision: 2.0

暫定データ  
Preliminary Data

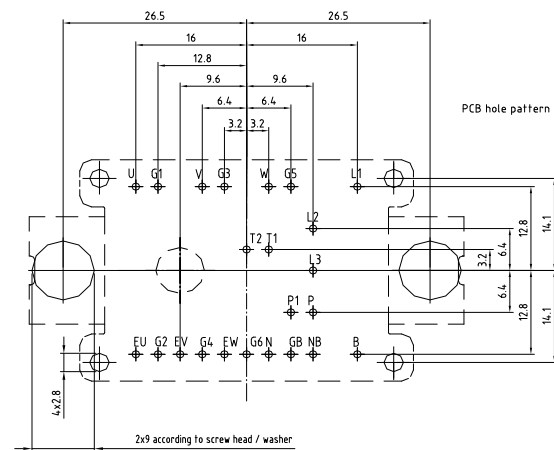
回路図 / circuit\_diagram\_headline



パッケージ概要 / package outlines



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



|                 |                                 |
|-----------------|---------------------------------|
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| approved by: MB | revision: 2.0                   |

## 暫定データ Preliminary Data

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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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- 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.

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