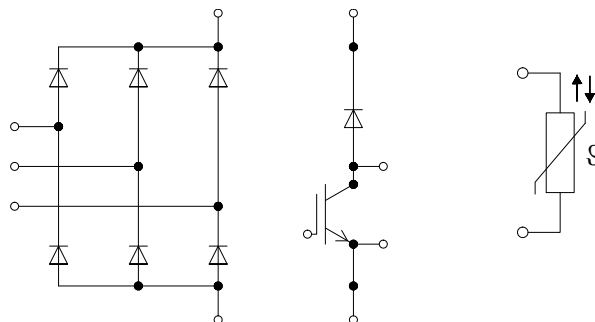
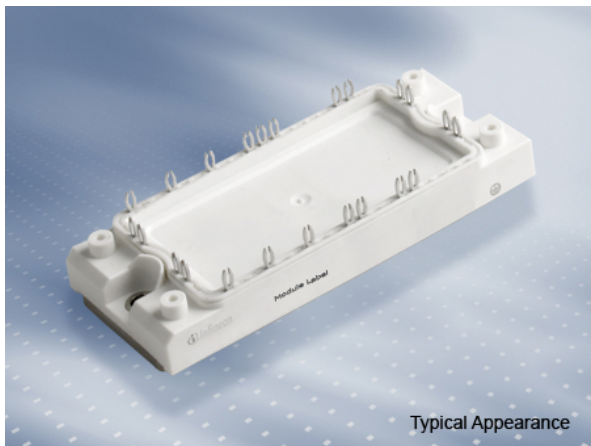


EconoPACK™2 モジュール 低損失 IGBT2 and エミッターコントロール diode内蔵 and PressFIT / NTCサーミスタ

EconoPACK™2 module with Low Loss IGBT2 and Emitter Controlled diode and PressFIT / NTC



$V_{CES} = 1600V$
 $I_{C\ nom} = 134A / I_{CRM} = 268A$

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

Typical Applications

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

機械的特性

- 低熱インピーダンスの Al_2O_3 DCB
- 高いパワー密度
- 絶縁されたベースプレート
- コンパクトデザイン
- PressFIT 接合 技術
- RoHS対応
- 標準ハウジング

Mechanical Features

- Al_2O_3 Substrate with Low Thermal Resistance
- High Power Density
- Isolated Base Plate
- Compact design
- PressFIT Contact Technology
- RoHS compliant
- Standard Housing

Module Label Code

Barcode Code 128



DMX - Code



Content of the Code

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

prepared by: CM	date of publication: 2014-08-29	
approved by: RS	revision: 3.0	UL approved (E83335)



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}	80	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}	134	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}	650 550	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	2100 1500	A^2s A^2s

電気的特性 / Characteristic Values

			min.	typ.	max.	
順電圧 Forward voltage	$T_{vj} = 150^{\circ}\text{C}, I_F = 150\text{ A}$	V_F		1,20		V
しきい値電圧 Threshold voltage	$T_{vj} = 150^{\circ}\text{C}$	V_{TO}		0,75		V
傾き抵抗 Slope resistance	$T_{vj} = 150^{\circ}\text{C}$	r_T		5,50		$\text{m}\Omega$
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}			0,65	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 $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$	R_{thCH}		0,155		K/W
動作温度 Temperature under switching conditions		$T_{vj\text{ op}}$	-40		150	$^{\circ}\text{C}$

prepared by: CM	date of publication: 2014-08-29
approved by: RS	revision: 3.0



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

コレクタ・エミッタ間電圧 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	$T_C = 80^{\circ}\text{C}, T_{vj\max} = 125^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\max} = 125^{\circ}\text{C}$	$I_{C\text{nom}}$ I_C	75 125	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}	150	A
トータル損失 Total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj\max} = 125^{\circ}\text{C}$	P_{tot}	400	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	$I_C = 75\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 75\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$V_{CE\text{sat}}$	2,10 2,40	2,60	V V	
ゲート・エミッタ間しきい値電圧 Gate threshold voltage	$I_C = 3,00\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{G\text{Eth}}$	4,5	5,5	6,5	V
ゲート電荷量 Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		Q_G	0,80		μC	
内蔵ゲート抵抗 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{G\text{int}}$	5,0		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}	5,10		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}	0,33		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}		100	nA	
ターンオン遅れ時間 (誘導負荷) Turn-on delay time, inductive load	$I_C = 75\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{on}} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\text{on}}$	0,09 0,10		μs μs	
ターンオン上昇時間 (誘導負荷) Rise time, inductive load	$I_C = 75\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{on}} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	t_r	0,05 0,05		μs μs	
ターンオフ遅れ時間 (誘導負荷) Turn-off delay time, inductive load	$I_C = 75\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{off}} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\text{off}}$	0,40 0,45		μs μs	
ターンオフ下降時間 (誘導負荷) Fall time, inductive load	$I_C = 75\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{off}} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	t_f	0,03 0,06		μs μs	
ターンオンスイッチング損失 Turn-on energy loss per pulse	$I_C = 75\text{ A}, V_{CE} = 600\text{ V}, L_S = 30\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 1700\text{ A}/\mu\text{s}$ $R_{G\text{on}} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{on}	7,00 8,80		mJ mJ	
ターンオフスイッチング損失 Turn-off energy loss per pulse	$I_C = 75\text{ A}, V_{CE} = 600\text{ V}, L_S = 30\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 4600\text{ V}/\mu\text{s}$ $R_{G\text{off}} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{off}	5,50 8,60		mJ mJ	
短絡電流 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 900\text{ V}$ $V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$	$t_P \leq 10\ \mu\text{s}, T_{vj} = 125^{\circ}\text{C}$	I_{SC}	540		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}		0,25	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}	0,16		K/W	
動作温度 Temperature under switching conditions			$T_{vj\text{op}}$	-40	125	$^{\circ}\text{C}$	

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

ピーク繰返し逆電圧 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	35	A
ピーク繰返し順電流 Repetitive peak forward current	$t_P = 1\text{ ms}$	I_{FRM}	70	A
電流二乗時間積 I^2t - value	$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$	I^2t	310	A^2s

電気的特性 / Characteristic Values

			min.	typ.	max.	
順電圧 Forward voltage	$I_F = 35\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 35\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	V_F	1,85 1,75	2,30	V V
ピーク逆回復電流 Peak reverse recovery current	$I_F = 35\text{ A}, -di_F/dt = 1300\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	I_{RM}	60,0 65,0		A A
逆回復電荷量 Recovered charge	$I_F = 35\text{ A}, -di_F/dt = 1300\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	Q_r	3,50 7,50		μC μC
逆回復損失 Reverse recovery energy	$I_F = 35\text{ A}, -di_F/dt = 1300\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{rec}	1,30 2,80		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}		0,80	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 $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}	0,42		K/W
動作温度 Temperature under switching conditions			$T_{vj\text{ op}}$	-40	125	$^{\circ}\text{C}$

prepared by: CM	date of publication: 2014-08-29
approved by: RS	revision: 3.0



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
ベースプレート材質 Material of module baseplate			Cu		
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		10,0		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		7,5		mm
相対トラッキング指数 Comperative tracking index		CTI	> 200		
			min.	typ.	max.
ケース・ヒートシンク間熱抵抗 Thermal resistance, case to heatsink	/モジュール / per module $\lambda_{\text{Paste}} = 1 \text{ W/(m}\cdot\text{K)} / \lambda_{\text{grease}} = 1 \text{ W/(m}\cdot\text{K)}$	R _{thCH}	0,02		K/W
内部インダクタンス Stray inductance module		L _{sCE}	50		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 _{AA+CC'}	0,80		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 M5 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 M5 - Mounting according to valid application note	M	3,00	6,00	Nm
質量 Weight		G	180		g

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°C	R ₂₅	5,00		kΩ
R100の偏差 Deviation of R100	T _C = 100°C, R ₁₀₀ = 493 Ω	ΔR/R	-5	5	%
損失 Power dissipation	T _C = 25°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

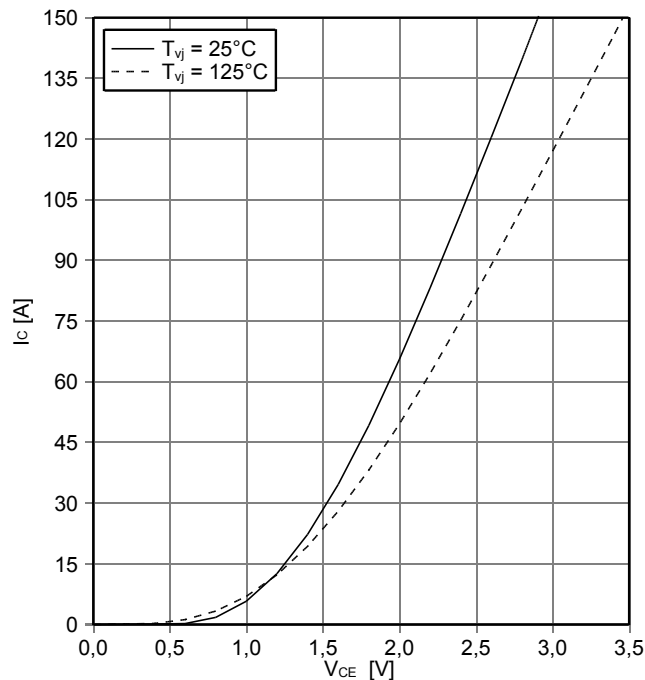
適切なアプリケーションノートによる仕様
Specification according to the valid application note.

prepared by: CM	date of publication: 2014-08-29
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IGBT-モジュール IGBT-Module **DDB6U134N16RR_B11**

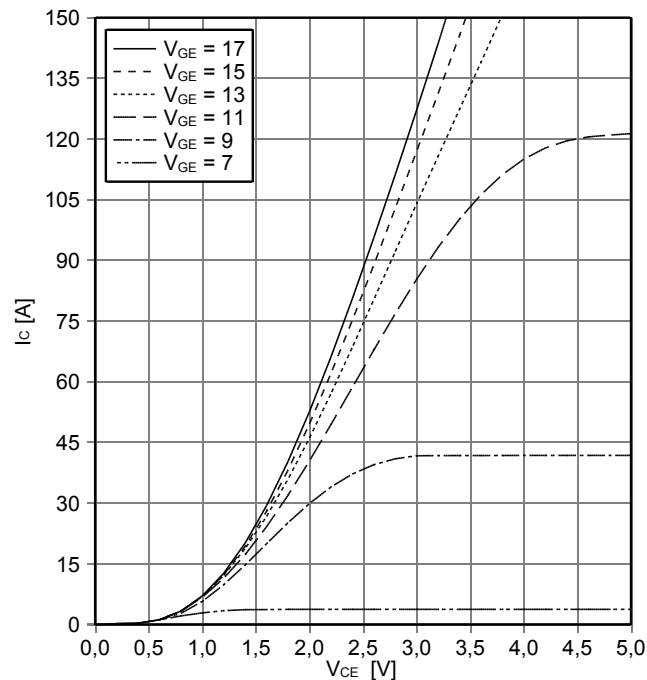
出力特性 IGBT-ブレーキチョッパー (Typical)
output characteristic IGBT, Brake-Chopper (typical)

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



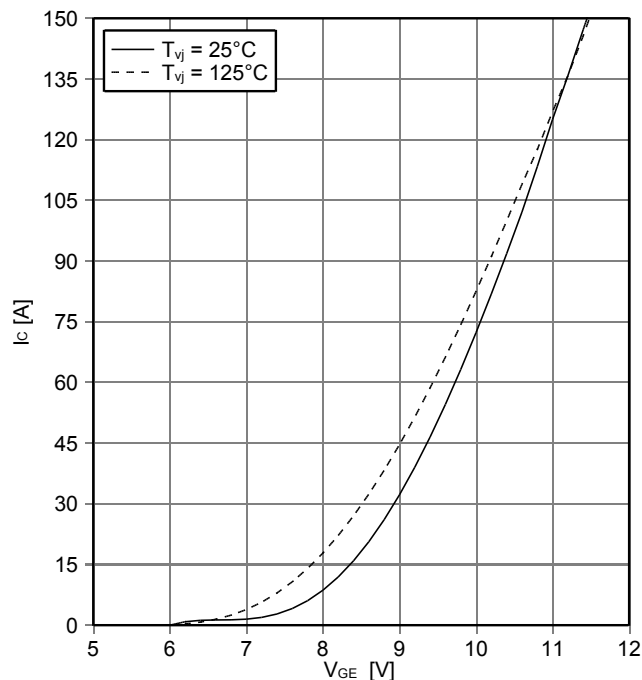
出力特性 IGBT-ブレーキチョッパー (Typical)
output characteristic IGBT, Brake-Chopper (typical)

$I_C = f(V_{CE})$
 $T_{vj} = 125^\circ\text{C}$



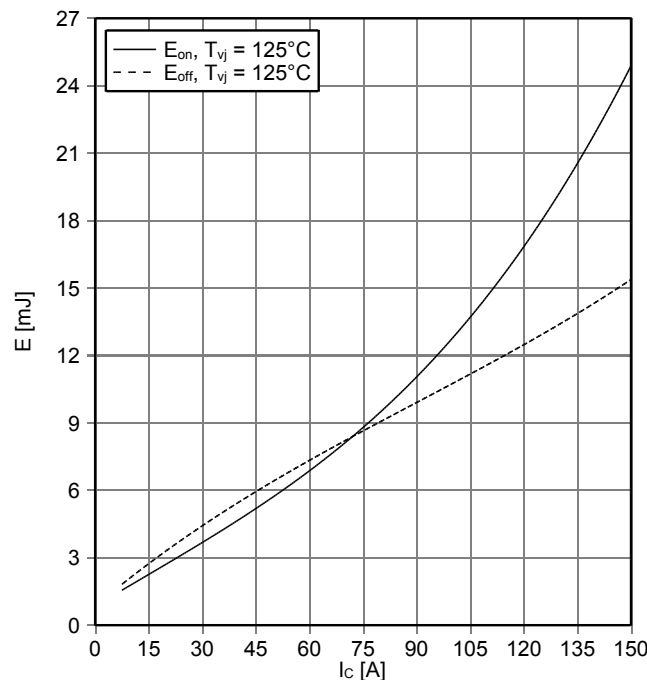
伝達特性 IGBT-ブレーキチョッパー (Typical)
transfer characteristic IGBT, Brake-Chopper (typical)

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



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

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 10\ \Omega$, $R_{Goff} = 10\ \Omega$, $V_{CE} = 600\text{ V}$



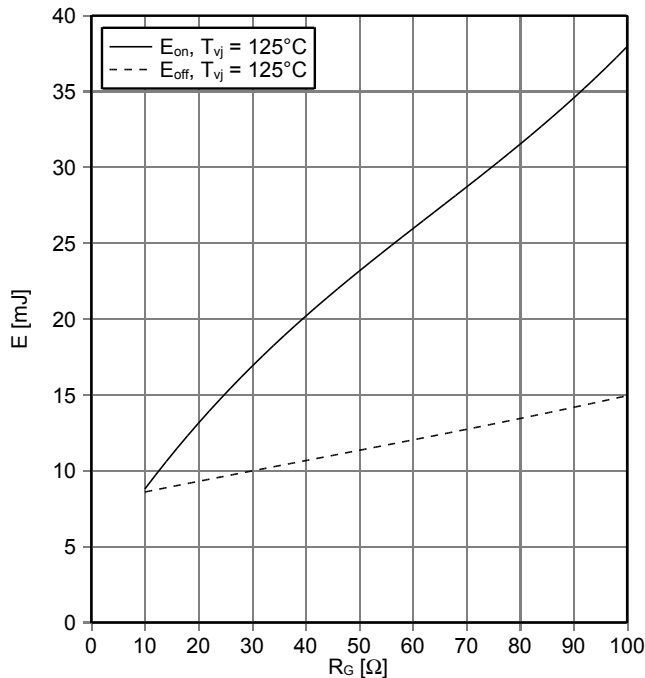
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IGBT-モジュール
IGBT-Module **DDB6U134N16RR_B11**

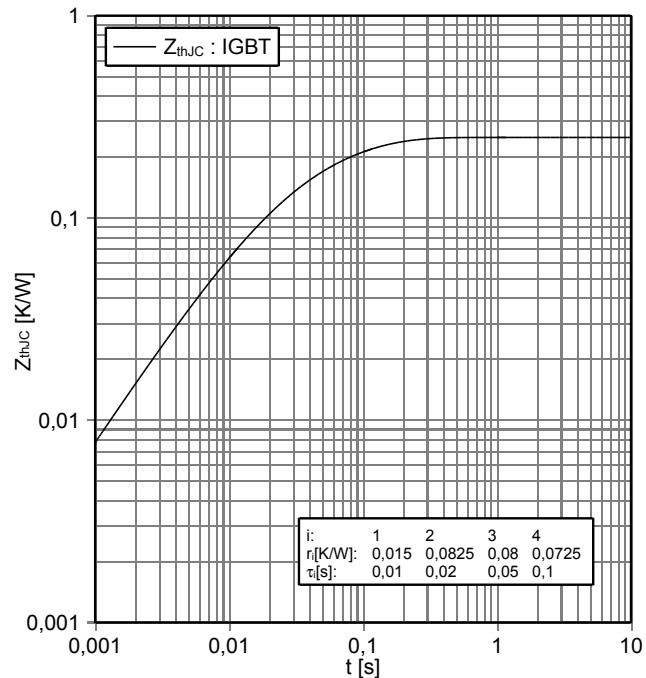
スイッチング損失 IGBT-ブレーキチョッパー (Typical)
switching losses IGBT, Brake-Chopper (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 75\text{ A}$, $V_{CE} = 600\text{ V}$



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

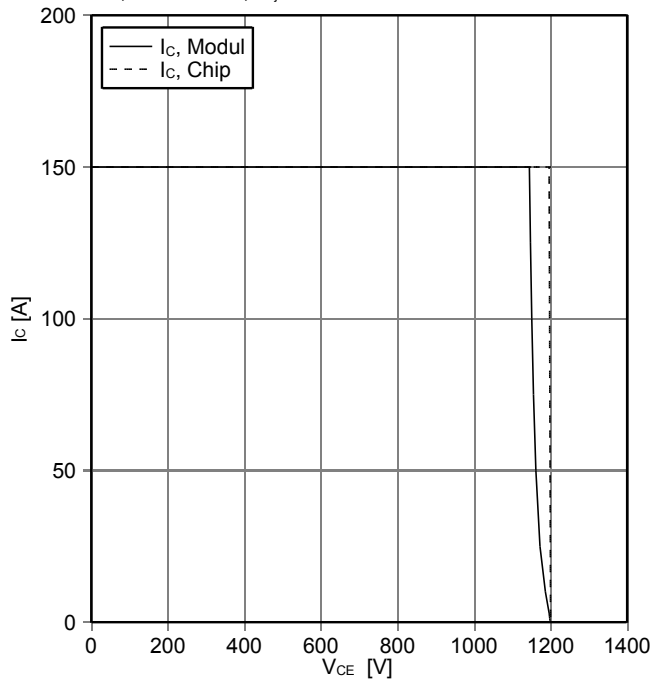
$Z_{thJC} = f(t)$



i:	1	2	3	4
r_i [K/W]:	0,015	0,0825	0,08	0,0725
τ_i [s]:	0,01	0,02	0,05	0,1

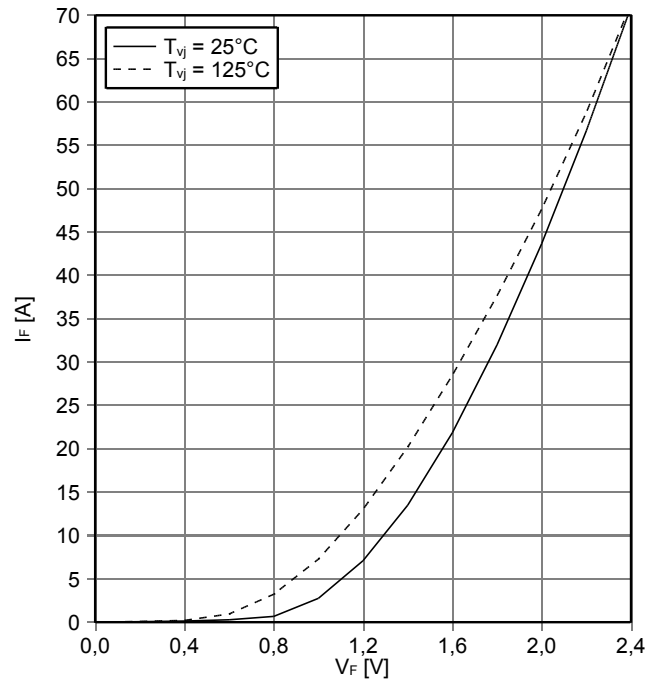
逆バイアス安全動作領域 IGBT-ブレーキチョッパー (RBSOA)
reverse bias safe operating area IGBT, Brake-Chopper (RBSOA)

$I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 10\ \Omega$, $T_{vj} = 125^\circ\text{C}$



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

$I_F = f(V_F)$



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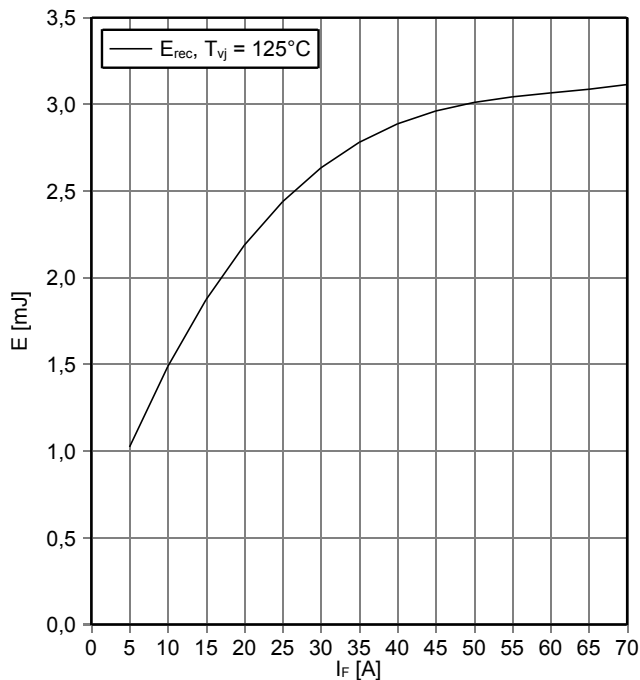


IGBT-モジュール
IGBT-Module

DDB6U134N16RR_B11

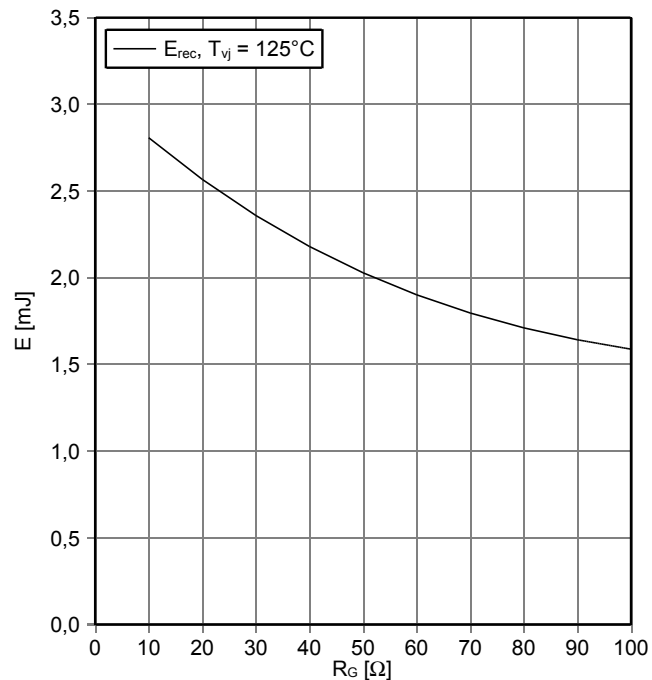
スイッチング損失 Diode、ブレーキチョッパー (Typical)
switching losses Diode, Brake-Chopper (typical)

$E_{rec} = f(I_F)$
 $R_{Gon} = 10 \Omega, V_{CE} = 600 V$



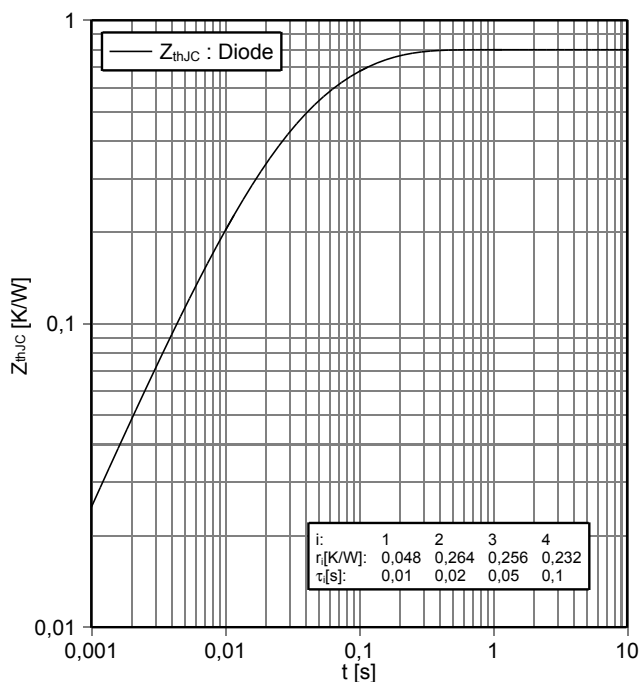
スイッチング損失 Diode、ブレーキチョッパー (Typical)
switching losses Diode, Brake-Chopper (typical)

$E_{rec} = f(R_G)$
 $I_F = 35 A, V_{CE} = 600 V$



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

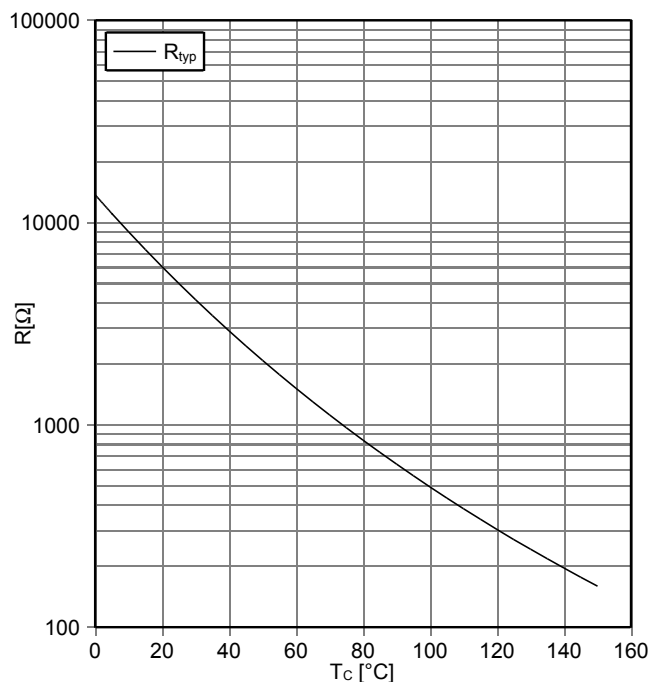
$Z_{thJC} = f(t)$



i:	1	2	3	4
r _i [K/W]:	0,048	0,264	0,256	0,232
τ _i [s]:	0,01	0,02	0,05	0,1

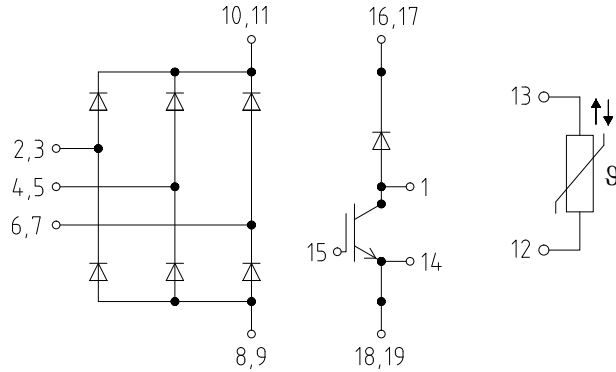
NTC-サーミスタ サーミスタの温度特性
NTC-Thermistor-temperature characteristic (typical)

$R = f(T)$

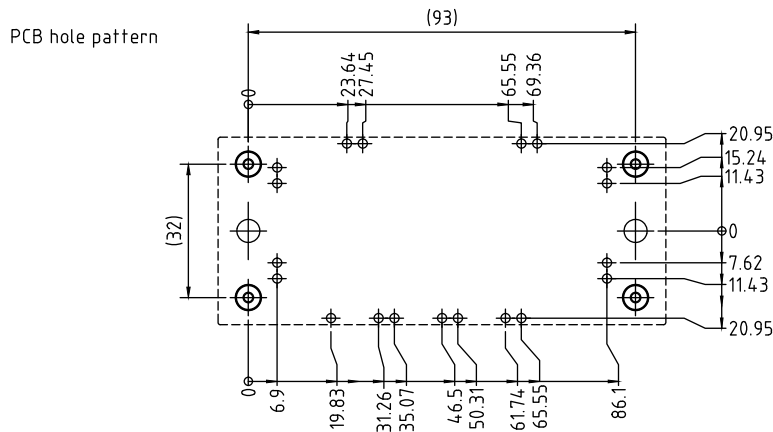
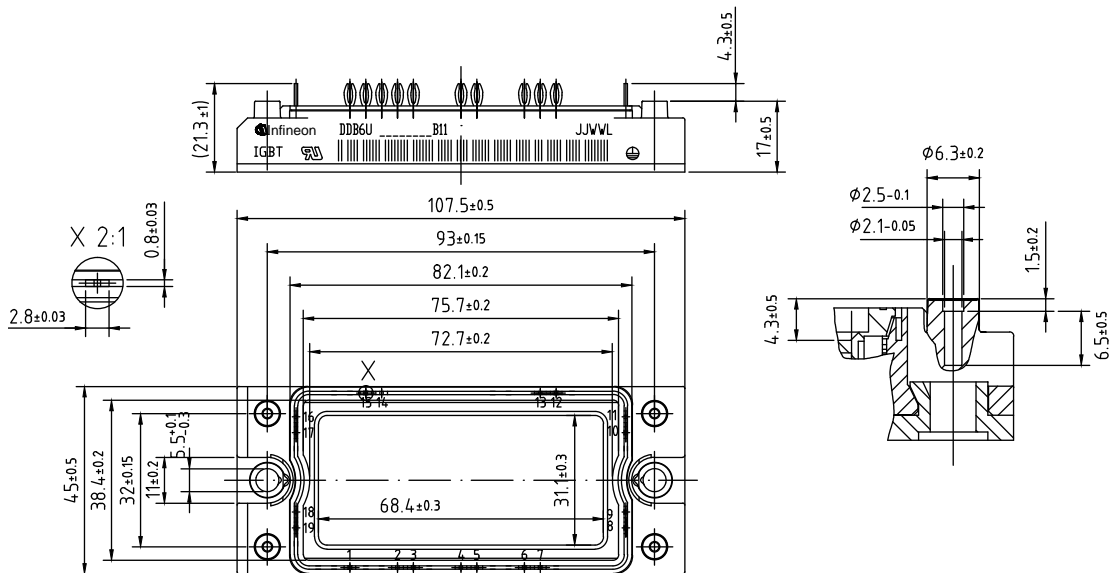


prepared by: CM	date of publication: 2014-08-29
approved by: RS	revision: 3.0

回路図 / circuit_diagram_headline



パッケージ概要 / package outlines



- Tolerance of PCB hole pattern ⊕ 0.1
- hole specifications see AN 2007-09
- Diameters of plated holes \varnothing 2.14mm - 2.29mm
- Diameter of drill \varnothing 2.35mm

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