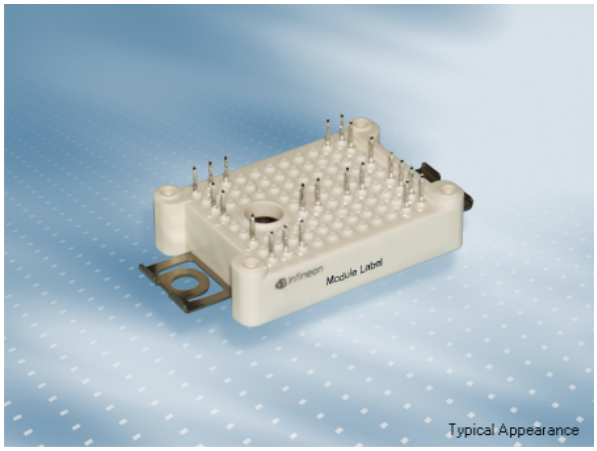
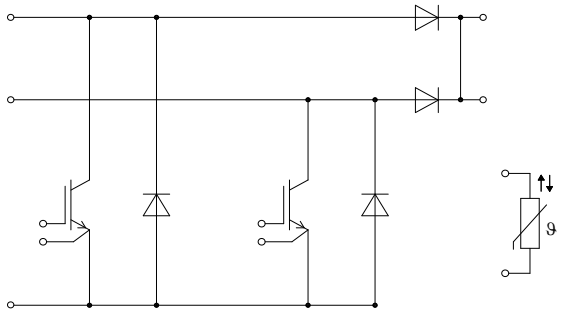
テクニカルインフォメーション / Technical Information

IGBT-モジュール
IGBT-Module

DF200R12W1H3_B27





V_{CES} = 1200V
$I_{C\ nom}$ = 30A / I_{CRM} = 60A

一般応用
- ソーラーアプリケーション

Typical Applications
- Solar Applications

電気的特性
- 低スイッチング損失

Electrical Features
- Low Switching Losses

機械的特性
- 低熱インピーダンスの Al_2O_3　DCB
- 内蔵されたNTCサーミスタ
- コンパクトデザイン
- PressFIT 接合 技術

Mechanical Features
- Al_2O_3 Substrate with Low Thermal Resistance
- Integrated NTC temperature sensor
- Compact design
- PressFIT Contact Technology

Module Label Code

Barcode Code 128

Sample
00000123456000000000000

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: CM	date of publication: 2014-06-13	
approved by: AKDA	revision: 3.0	UL approved (E83335)

逆極性保護diodeA / Inverse-polarity protection diode A

最大定格 / Maximum Rated Values

ピーク繰返し逆電圧 Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1200	V
最大実効順電流/chip Maximum RMS forward current per chip	T_C = 80°C	I_{FRMSM}	50	A
整流出力の最大実効電流 Maximum RMS current at rectifier output	T_C = 80°C	I_{RMSM}	60	A
サージ順電流 Surge forward current	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I_{FSM}	360 290	A A
電流二乗時間積 I²t - value	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I²t	650 420	A²s A²s

電気的特性 / Characteristic Values

			min.	typ.	max.	
順電圧 Forward voltage	T_{vj} = 150°C, I_F = 30 A	V_F		0,95		V
傾き抵抗 Slope resistance	T_{vj} = 150°C	r_T		0,10		mΩ
逆電流 Reverse current	T_{vj} = 150°C, V_R = 1200 V	I_R		0,10		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}		0,80	0,90	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 λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)	R_{thCH}		0,80		K/W
動作温度 Temperature under switching conditions		$T_{vj\,op}$	-40		125	°C

IGBT、チョッパー / IGBT-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°C	V_{CES}	1200		V
コレクタ電流 Implemented collector current		I_{CN}	100		A
連続DCコレクタ電流 Continuous DC collector current	T_C = 80°C, $T_{vj\,max}$ = 175°C T_C = 25°C, $T_{vj\,max}$ = 175°C	$I_{C\,nom}$ I_C	30 50		A A
繰り返しピークコレクタ電流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}	200		A
トータル損失 Total power dissipation	T_C = 25°C, $T_{vj\,max}$ = 175°C	P_{tot}	375		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 = 30 A, V_{GE} = 15 V I_C = 30 A, V_{GE} = 15 V I_C = 30 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,30 1,35 1,35	1,45	V V V
ゲート・エミッタ間しきい値電圧 Gate threshold voltage	I_C = 1,00 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	5,0	5,8	6,5	V
ゲート電荷量 Gate charge	V_{GE} = -15 V ... +15 V		Q_G		0,80		µC
内蔵ゲート抵抗 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		0,0		Ω
入力容量 Input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		2,00		nF
帰還容量 Reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		0,064		nF
コレクタ・エミッタ間遮断電流 Collector-emitter cut-off current	V_{CE} = 1200 V, V_{GE} = 0 V, T_{vj} = 25°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 V, V_{GE} = 20 V, T_{vj} = 25°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 = 30 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Gon} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,03 0,03 0,03		µs µs µs
ターンオン上昇時間 (誘導負荷) Rise time, inductive load	I_C = 30 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Gon} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,01 0,01 0,01		µs µs µs
ターンオフ遅れ時間 (誘導負荷) Turn-off delay time, inductive load	I_C = 30 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Goff} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,30 0,40 0,44		µs µs µs
ターンオフ下降時間 (誘導負荷) Fall time, inductive load	I_C = 30 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Goff} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,014 0,03 0,035		µs µs µs
ターンオンスイッチング損失 Turn-on energy loss per pulse	I_C = 30 A, V_{CE} = 600 V, L_S = 40 nH V_{GE} = ±15 V, di/dt = 3000 A/µs (T_{vj} = 150°C) R_{Gon} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		0,80 1,65 1,90		mJ mJ mJ
ターンオフスイッチング損失 Turn-off energy loss per pulse	I_C = 30 A, V_{CE} = 600 V, L_S = 40 nH V_{GE} = ±15 V, du/dt = 2800 V/µs (T_{vj} = 150°C) R_{Goff} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		1,30 2,00 2,40		mJ mJ mJ
短絡電流 SC data	V_{GE} ≤ 15 V, V_{CC} = 800 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 10 µs, T_{vj} = 150°C	I_{SC}		360		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}		0,35	0,40	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 λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)	R_{thCH}		0,35		K/W
動作温度 Temperature under switching conditions		$T_{vj\,op}$	-40		150	°C

Diode-、チョッパー / Diode-Chopper

最大定格 / Maximum Rated Values

ピーク繰返し逆電圧 Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1200		V
連続DC電流 Continuous DC forward current		I_F	30		A
ピーク繰返し順電流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	30		A
電流二乗時間積 I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C V_R = 0 V, t_P = 10 ms, T_{vj} = 150°C	I²t	1050 985		A²s A²s

電気的特性 / Characteristic Values

			min.	typ.	max.	
順電圧 Forward voltage	I_F = 30 A, V_{GE} = 0 V I_F = 30 A, V_{GE} = 0 V I_F = 30 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		1,70 1,40 1,30	2,05	V V V
ピーク逆回復電流 Peak reverse recovery current	I_F = 30 A, - di_F/dt = 3000 A/µs (T_{vj}=150°C) V_R = 600 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		60,0 90,0 100		A A A
逆回復電荷量 Recovered charge	I_F = 30 A, - di_F/dt = 3000 A/µs (T_{vj}=150°C) V_R = 600 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		2,50 6,00 7,00		µC µC µC
逆回復損失 Reverse recovery energy	I_F = 30 A, - di_F/dt = 3000 A/µs (T_{vj}=150°C) V_R = 600 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		1,25 3,20 3,80		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}		0,50	0,60	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 λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		0,55		K/W
動作温度 Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

NTC-サーミスタ / NTC-Thermistor

電気的特性 / Characteristic Values

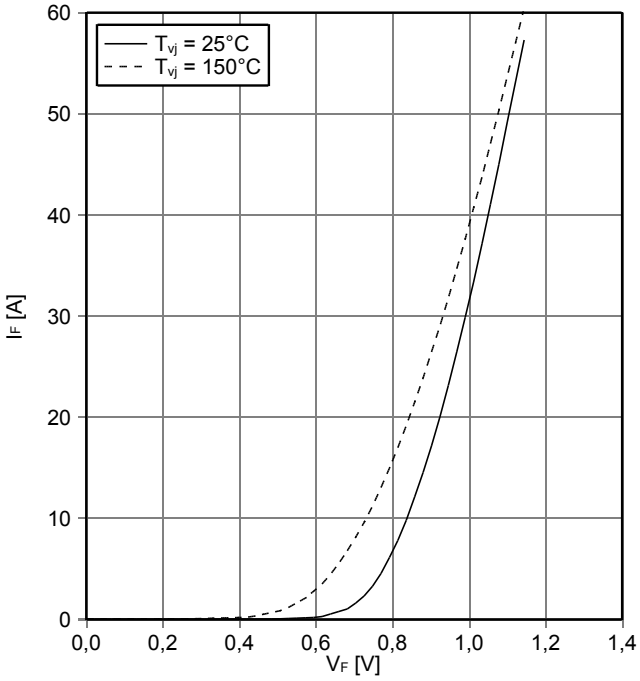
			min.	typ.	max.	
定格抵抗値 Rated resistance	T_C = 25°C	R_{25}		5,00		kΩ
R100の偏差 Deviation of R100	T_C = 100°C, R_{100} = 493 Ω	ΔR/R	-5		5	%
損失 Power dissipation	T_C = 25°C	P_{25}			20,0	mW
B-定数 B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15\ K))]$	$B_{25/50}$		3375		K
B-定数 B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15\ K))]$	$B_{25/80}$		3411		K
B-定数 B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15\ K))]$	$B_{25/100}$		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.

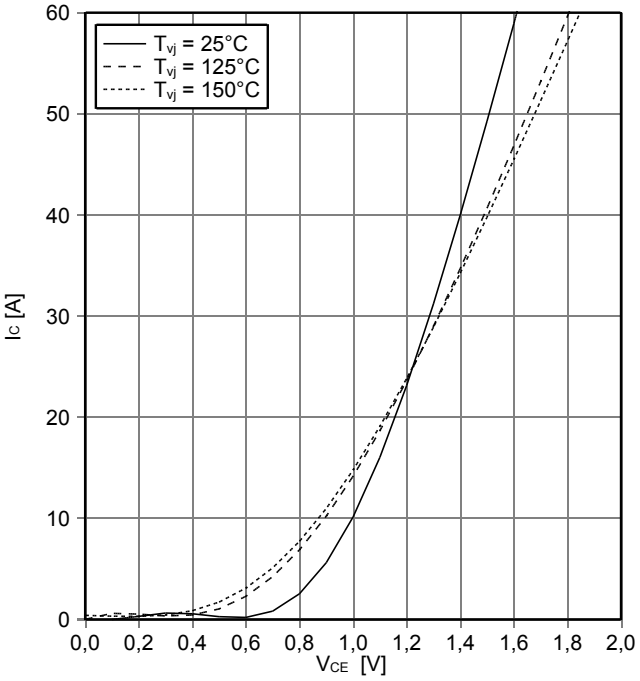
モジュール / Module

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_2O_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	$R_{CC'+EE'}$		5,00		mΩ
最大ジャンクション温度 Maximum junction temperature	インバータ、ブレーキチョッパー / inverter, brake-chopper 整流器 / rectifier	$T_{vj\ max}$			175 150	°C °C
動作温度 Temperature under switching conditions	インバータ、ブレーキチョッパー / inverter, brake-chopper 整流器 / rectifier	$T_{vj\ op}$	-40 -40		150 125	°C °C
保存温度 Storage temperature		T_{stg}	-40		125	°C
質量 Weight		G		24		g

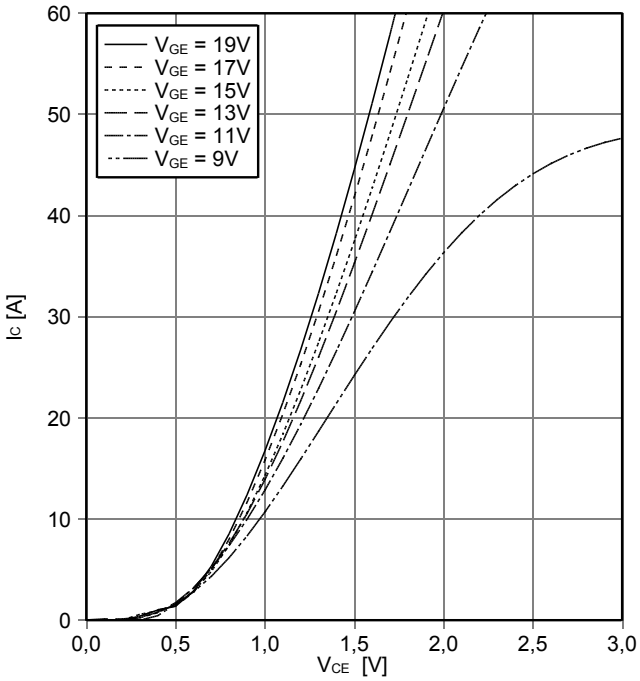
順方向特性 逆極性保護diodeA （典型)
forward characteristic of Inverse-polarity protection diode A (typical)
$I_F = f(V_F)$



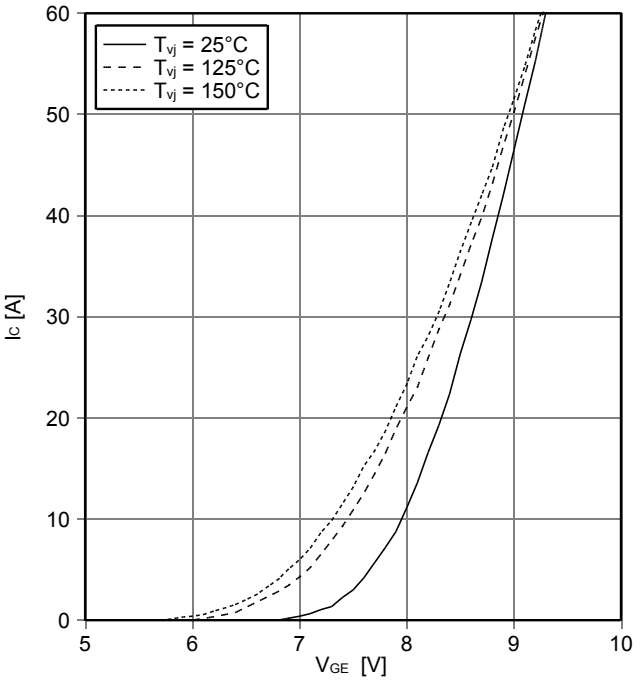
出力特性 IGBT、チョッパー (Typical)
output characteristic IGBT-Chopper (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



出力特性 IGBT、チョッパー (Typical)
output characteristic IGBT-Chopper (typical)
$I_C = f(V_{CE})$
T_{vj} = 150°C



伝達特性 IGBT、チョッパー (Typical)
transfer characteristic IGBT-Chopper (typical)
$I_C = f(V_{GE})$
V_{CE} = 20 V



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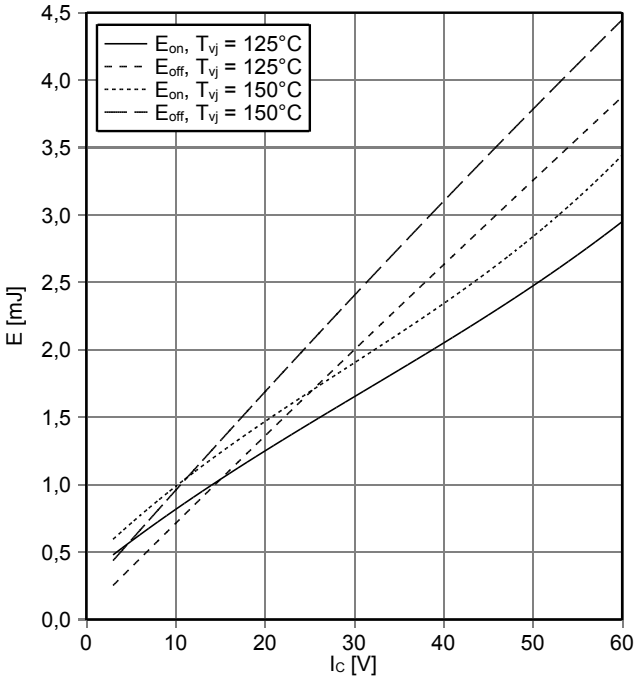
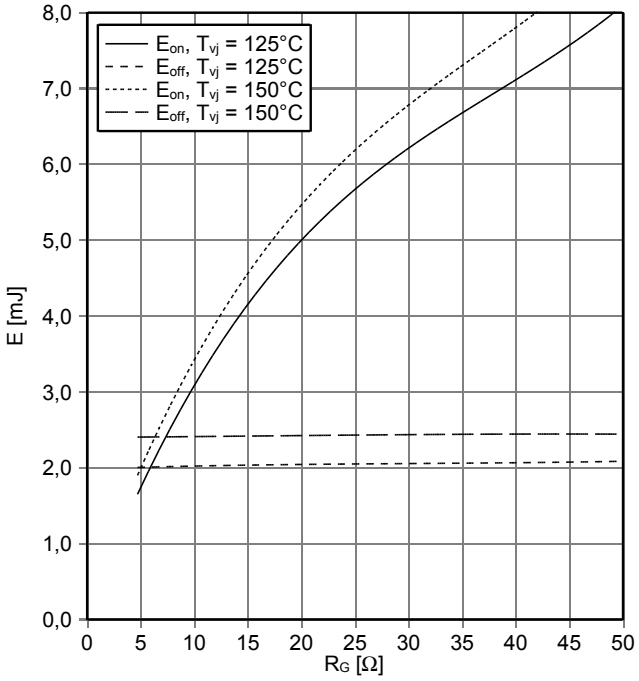
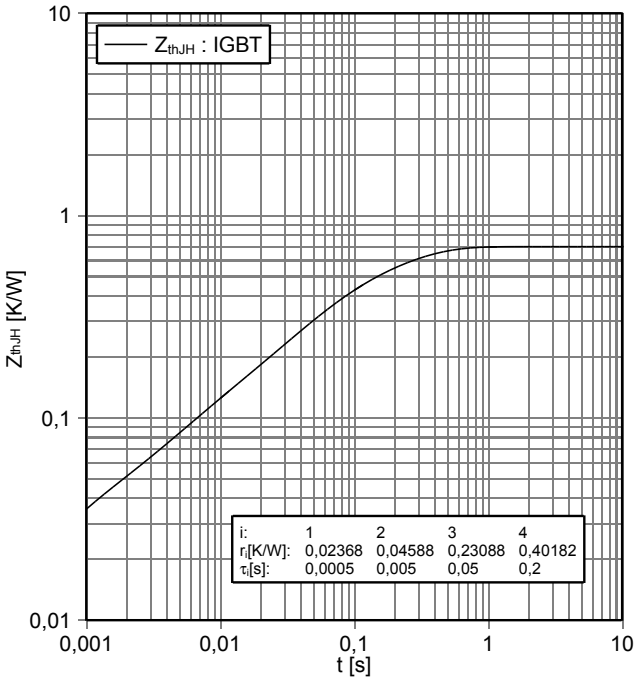
スイッチング損失 IGBT、チョッパー (Typical)
switching losses IGBT-Chopper (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 4.7 Ω, R_{Goff} = 4.7 Ω, V_{CE} = 600 V



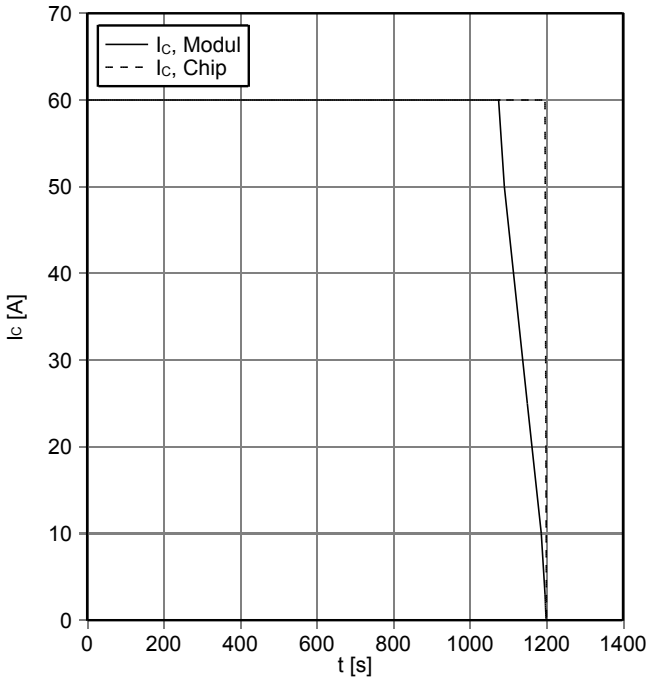
スイッチング損失 IGBT、チョッパー (Typical)
switching losses IGBT-Chopper (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 30 A, V_{CE} = 600 V



過渡熱インピーダンス IGBT、チョッパー
transient thermal impedance IGBT-Chopper
$Z_{thJH} = f(t)$



逆バイアス安全動作領域 IGBT、チョッパー（RBSOA）
reverse bias safe operating area IGBT-Chopper (RBSOA)
$I_C = f(V_{CE})$
V_{GE} = ±15 V, R_{Goff} = 4.7 Ω, T_{vj} = 150°C



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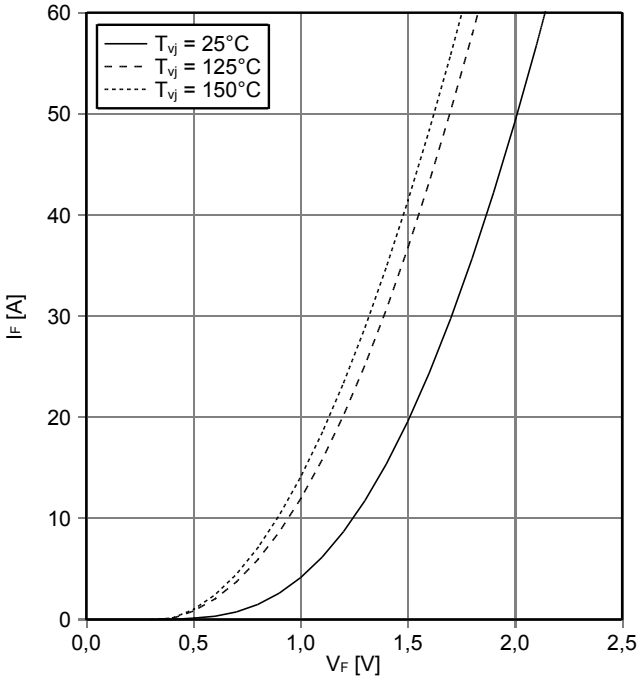
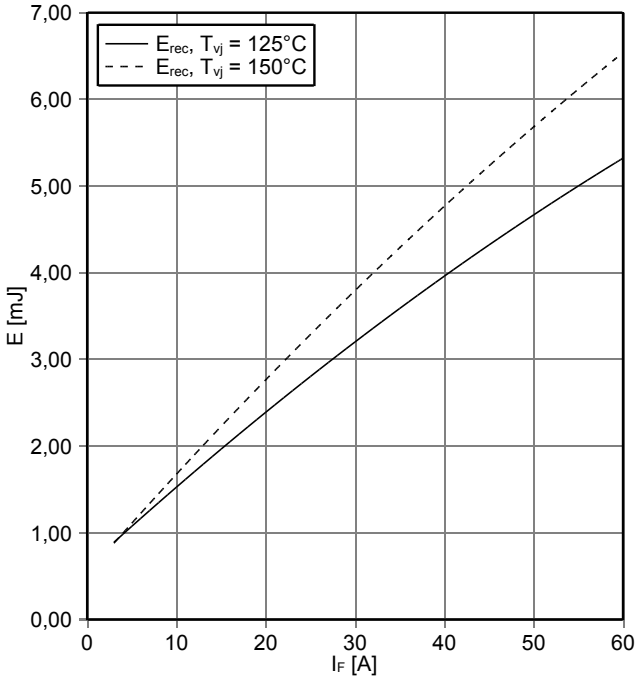
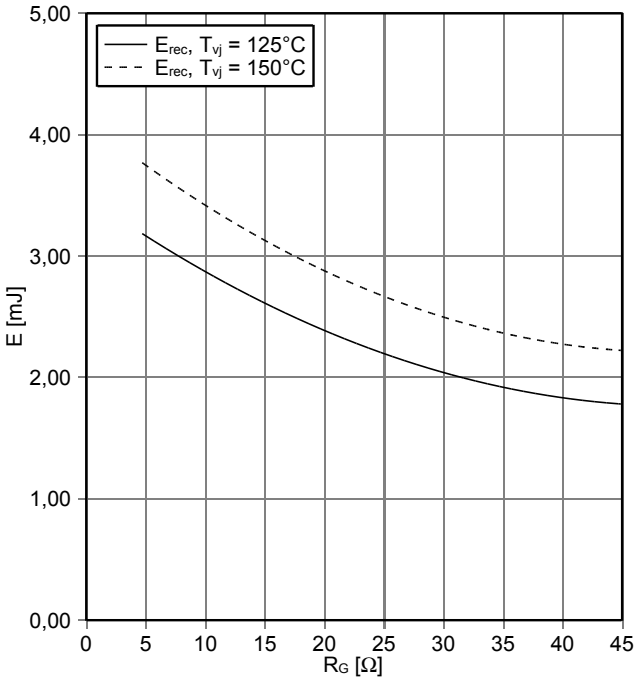
順電圧特性 Diode-、チョッパー (typical)
forward characteristic of Diode-Chopper (typical)
$I_F = f(V_F)$



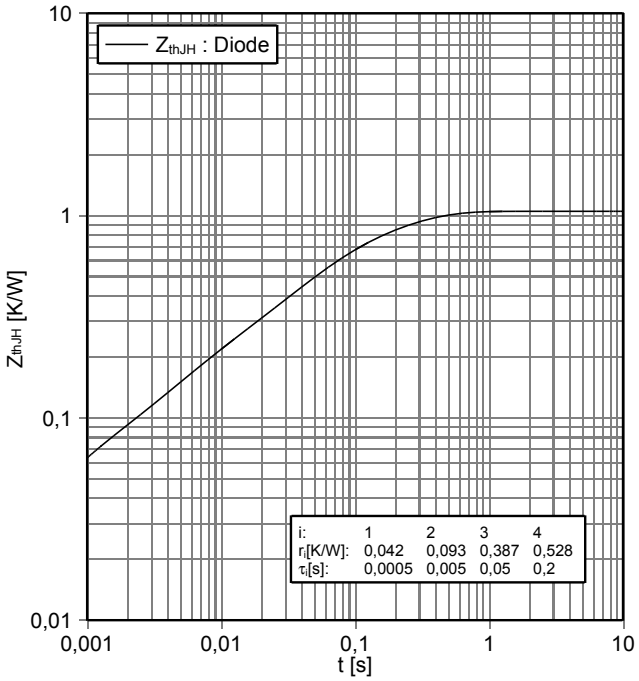
スイッチング損失 Diode-、チョッパー (Typical)
switching losses Diode-Chopper (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 4.7\ \Omega$, $V_{CE} = 600$ V



スイッチング損失 Diode-、チョッパー (Typical)
switching losses Diode-Chopper (typical)
$E_{rec} = f(R_G)$
$I_F = 30$ A, $V_{CE} = 600$ V



過渡熱インピーダンス Diode-、チョッパー
transient thermal impedance Diode-Chopper
$Z_{thJH} = f(t)$



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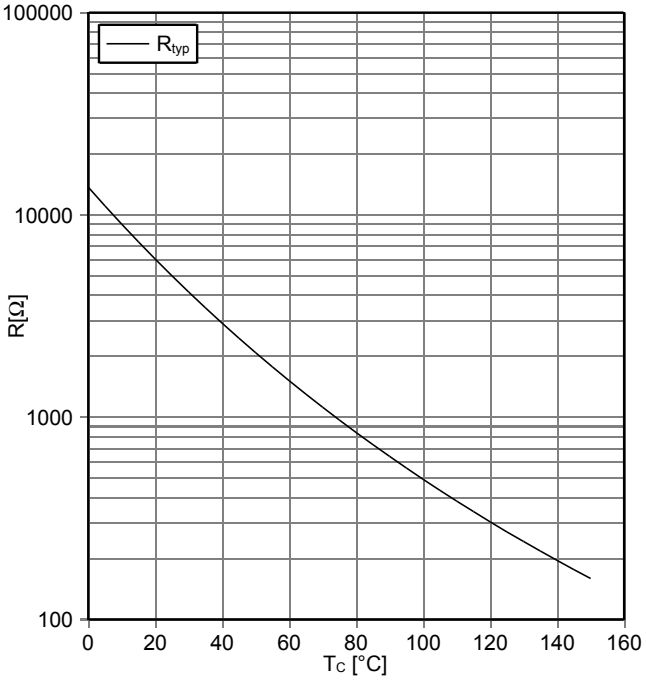
NTC-サーミスタ サーミスタの温度特性
NTC-Thermistor-temperature characteristic (typical)
R = f (T)



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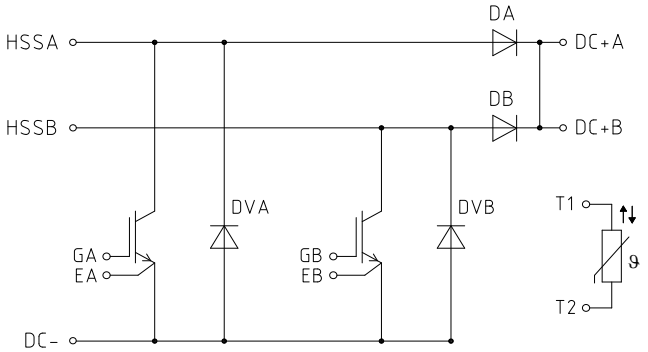
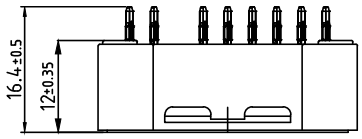
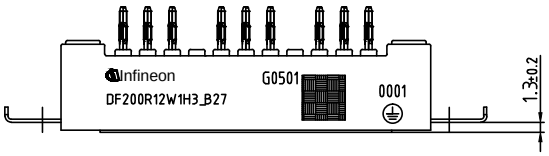
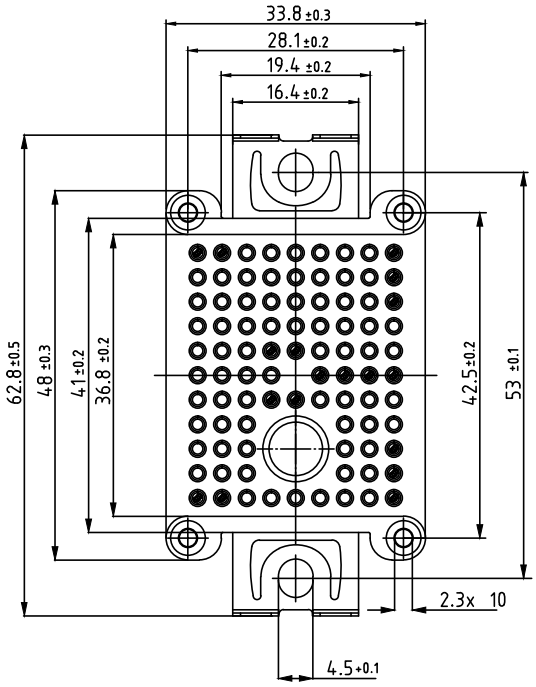
回路図 / circuit_diagram_headline



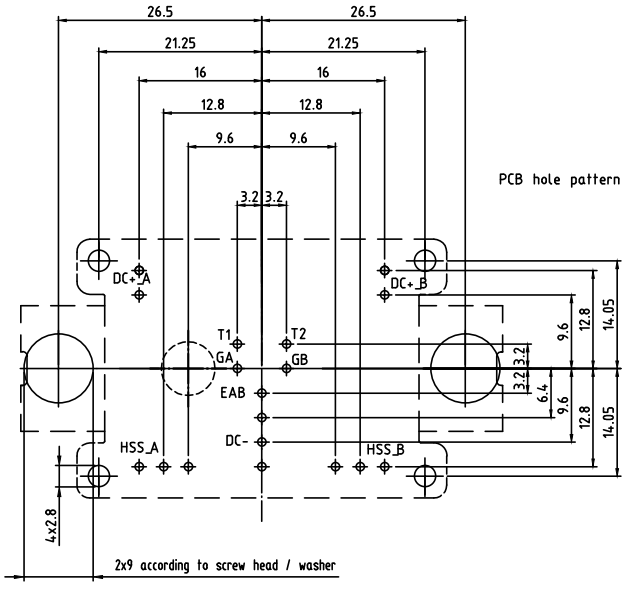
パッケージ概要 / package outlines







- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern ⌖ ø0.1
- Hole specification for contacts see AN 2009-01
- Diameters of drill ø 1.15mm
  and copper thickness in hole 25-50µm



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