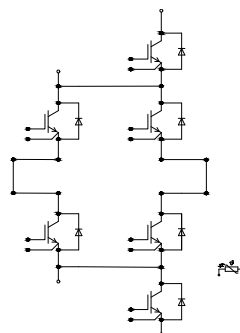
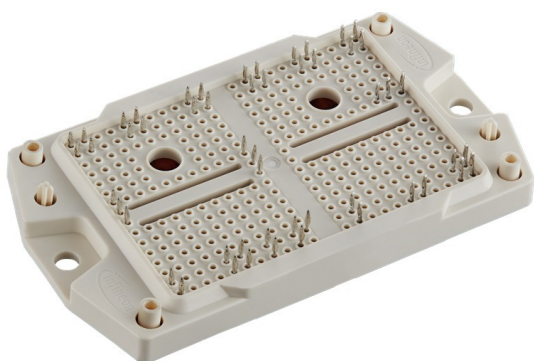


EasyPACK™ モジュール TRENCHSTOP™ IGBT7とエミッターコントロール 7 ダイオード内蔵 とPressFIT / NTCサーミスタ

EasyPACK™ module with TRENCHSTOP™ IGBT7 and Emitter Controlled 7 diode and PressFIT / NTC



$V_{CES} = 950V$

$I_{C\ nom} = 400A / I_{CRM} = 800A$

アプリケーションの可能性

- 3レベル アプリケーション
- ソーラーアプリケーション

電気的特性

- トレンチ IGBT 7
- 低スイッチング損失
- 高い電流密度

機械的特性

- PressFIT 接合 技術
- 内蔵されたNTCサーミスタ

Potential Applications

- 3-level-applications
- Solar applications

Electrical Features

- Trenchstop™ IGBT7
- Low switching losses
- High current density

Mechanical Features

- PressFIT contact technology
- Integrated NTC temperature sensor

Module Label Code

Barcode Code 128



0000012345600000000000

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

IGBT, T1 / T4 / IGBT, T1 / T4

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}	950	V
コレクタ電流 Implemented collector current		I_{CN}	400	A
連続DCコレクタ電流 Continuous DC collector current	$T_H = 65^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	I_{CDC}	235	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}	800	A
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	$I_C = 150\text{ A}$ $V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,40 1,48 1,50	1,61	V V V
ゲート・エミッタ間しきい値電圧 Gate threshold voltage	$I_C = 6,50\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		V_{Geth}	4,35	5,10	5,85 V
ゲート電荷量 Gate charge	$V_{GE} = -15 / 15\text{ V}, V_{CE} = 600\text{ V}$		Q_G	0,90		μC
内蔵ゲート抵抗 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}	0,75		Ω
入力容量 Input capacitance	$f = 100\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{ies}	25,2		nF
帰還容量 Reverse transfer capacitance	$f = 100\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{res}	0,078		nF
コレクタ・エミッタ間遮断電流 Collector-emitter cut-off current	$V_{CE} = 950\text{ V}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	I_{CES}		0,07	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	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{don}	0,089 0,092 0,093		μs μs μs
ターンオン上昇時間 (誘導負荷) Rise time, inductive load	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_r	0,022 0,026 0,027		μs μs μs
ターンオフ遅れ時間 (誘導負荷) Turn-off delay time, inductive load	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{doff}	0,27 0,34 0,36		μs μs μs
ターンオフ下降時間 (誘導負荷) Fall time, inductive load	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_f	0,041 0,075 0,088		μs μs μs
ターンオンスイッチング損失 Turn-on energy loss per pulse	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}, L\sigma = 35\text{ nH}$ $di/dt = 5800\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Gon} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{on}	5,00 7,05 7,50		mJ mJ mJ
ターンオフスイッチング損失 Turn-off energy loss per pulse	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}, L\sigma = 35\text{ nH}$ $du/dt = 4000\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Goff} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{off}	4,30 7,16 8,00		mJ mJ mJ
短絡電流 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 600\text{ V}$ $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ $t_P \leq 0\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$		I_{SC}	1200		A
ジャンクション・ヒートシンク間熱抵抗 Thermal resistance, junction to heatsink	IGBT部 (1 素子当り) / per IGBT		R_{thJH}	0,224		K/W
動作温度 Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

IGBT, T2 / T3 / IGBT, T2 / T3

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}	950	V
コレクタ電流 Implemented collector current		I_{CN}	400	A
連続DCコレクタ電流 Continuous DC collector current	$T_H = 65^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	I_{CDC}	380	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}	800	A
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	$I_C = 150\text{ A}$ $V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,07 1,04 1,02	1,14	V V V
ゲート・エミッタ間しきい値電圧 Gate threshold voltage	$I_C = 6,50\text{ mA}, V_{CE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$		V_{Geth}	4,15	4,90	5,65 V
ゲート電荷量 Gate charge	$V_{GE} = -15 / 15\text{ V}, V_{CE} = 600\text{ V}$		Q_G	4,10		μC
内蔵ゲート抵抗 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}	0,75		Ω
入力容量 Input capacitance	$f = 100\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{ies}	49,2		nF
帰還容量 Reverse transfer capacitance	$f = 100\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{res}	0,228		nF
コレクタ・エミッタ間遮断電流 Collector-emitter cut-off current	$V_{CE} = 950\text{ V}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	I_{CES}		0,07	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	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{don}	0,189 0,191 0,192		μs μs μs
ターンオン上昇時間 (誘導負荷) Rise time, inductive load	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_r	0,026 0,032 0,034		μs μs μs
ターンオフ遅れ時間 (誘導負荷) Turn-off delay time, inductive load	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{doff}	0,76 0,92 0,94		μs μs μs
ターンオフ下降時間 (誘導負荷) Fall time, inductive load	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_f	0,23 0,44 0,49		μs μs μs
ターンオンスイッチング損失 Turn-on energy loss per pulse	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}, L\sigma = 35\text{ nH}$ $di/dt = 5200\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Gon} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{on}	3,10 4,00 4,30		mJ mJ mJ
ターンオフスイッチング損失 Turn-off energy loss per pulse	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}, L\sigma = 35\text{ nH}$ $du/dt = 1200\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Goff} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{off}	24,5 35,3 37,9		mJ mJ mJ
短絡電流 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 600\text{ V}$ $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ $t_P \leq 0\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$		I_{SC}	1200		A
ジャンクション・ヒートシンク間熱抵抗 Thermal resistance, junction to heatsink	IGBT部 (1 素子当り) / per IGBT		R_{thJH}	0,200		K/W
動作温度 Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

IGBT, T5 / T6 / IGBT, T5 / T6

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}	950	V
コレクタ電流 Implemented collector current		I_{CN}	200	A
連続DCコレクタ電流 Continuous DC collector current	$T_H = 65^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	I_{CDC}	140	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}	400	A
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	$I_C = 150\text{ A}$ $V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$		1,68 1,88 1,92	V V V
ゲート・エミッタ間しきい値電圧 Gate threshold voltage	$I_C = 3,25\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		V_{Geth}	4,35	5,10	5,85 V
ゲート電荷量 Gate charge	$V_{GE} = -15 / 15\text{ V}, V_{CE} = 600\text{ V}$		Q_G		0,45	μC
内蔵ゲート抵抗 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}		1,5	Ω
入力容量 Input capacitance	$f = 100\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{ies}		12,6	nF
帰還容量 Reverse transfer capacitance	$f = 100\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{res}		0,039	nF
コレクタ・エミッタ間遮断電流 Collector-emitter cut-off current	$V_{CE} = 950\text{ V}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	I_{CES}			0,05 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	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{don}		0,086 0,095 0,096	μs μs μs
ターンオン上昇時間 (誘導負荷) Rise time, inductive load	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_r		0,02 0,022 0,023	μs μs μs
ターンオフ遅れ時間 (誘導負荷) Turn-off delay time, inductive load	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{doff}		0,18 0,22 0,23	μs μs μs
ターンオフ下降時間 (誘導負荷) Fall time, inductive load	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_f		0,032 0,089 0,112	μs μs μs
ターンオンスイッチング損失 Turn-on energy loss per pulse	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}, L\sigma = 35\text{ nH}$ $di/dt = 5300\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Gon} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{on}		5,00 6,43 6,79	mJ mJ mJ
ターンオフスイッチング損失 Turn-off energy loss per pulse	$I_C = 150\text{ A}, V_{CE} = 500\text{ V}, L\sigma = 35\text{ nH}$ $du/dt = 6000\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Goff} = 3,9\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{off}		3,73 6,35 7,26	mJ mJ mJ
短絡電流 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 600\text{ V}$ $V_{CE\max} = V_{CES} - L_{sCE} \cdot di/dt$ $t_P \leq 0\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$		I_{SC}		600	A
ジャンクション・ヒートシンク間熱抵抗 Thermal resistance, junction to heatsink	IGBT部 (1 素子当り) / per IGBT		R_{thJH}		0,340	K/W
動作温度 Temperature under switching conditions			$T_{vj\text{ op}}$	-40		150 $^{\circ}\text{C}$

ダイオード, D1 / D4 / Diode, D1 / D4

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}	950	V
順電流 Implemented forward current		I_{FN}	200	A
連続DC電流 Continuous DC forward current		I_F	150	A
ピーク繰返し順電流 Repetitive peak forward current	$t_P = 1\text{ ms}$	I_{FRM}	400	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	1620 1530	A^2s A^2s

電気的特性 / Characteristic Values

			min.	typ.	max.	
順電圧 Forward voltage	$I_F = 150\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 150\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 150\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_F	2,33 2,12 2,08	2,58	V V V
ピーク逆回復電流 Peak reverse recovery current	$I_F = 150\text{ A}, -di_F/dt = 5300\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 500\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	I_{RM}	119 173 189		A A A
逆回復電荷量 Recovered charge	$I_F = 150\text{ A}, -di_F/dt = 5300\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 500\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	Q_r	5,84 11,6 14,0		μC μC μC
逆回復損失 Reverse recovery energy	$I_F = 150\text{ A}, -di_F/dt = 5300\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 500\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{rec}	1,70 3,62 4,53		mJ mJ mJ
ジャンクション・ヒートシンク間熱抵抗 Thermal resistance, junction to heatsink	/Diode (1 素子当り) / per diode		R_{thJH}	0,460		K/W
動作温度 Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

ダイオード, D2 / D3 / Diode, D2 / D3

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}	950	V
順電流 Implemented forward current		I_{FN}	200	A
連続DC電流 Continuous DC forward current		I_F	150	A
ピーク繰返し順電流 Repetitive peak forward current	$t_P = 1\text{ ms}$	I_{FRM}	400	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	1620 1530	A^2s A^2s

電気的特性 / Characteristic Values

			min.	typ.	max.	
順電圧 Forward voltage	$I_F = 150\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 150\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 150\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_F	2,33 2,12 2,08	2,58	V V V
ピーク逆回復電流 Peak reverse recovery current	$I_F = 150\text{ A}, -di_F/dt = 5200\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 500\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	I_{RM}	154 189 200		A A A
逆回復電荷量 Recovered charge	$I_F = 150\text{ A}, -di_F/dt = 5200\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 500\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	Q_r	6,65 14,9 20,0		μC μC μC
逆回復損失 Reverse recovery energy	$I_F = 150\text{ A}, -di_F/dt = 5200\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 500\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{rec}	2,39 6,24 7,49		mJ mJ mJ
ジャンクション・ヒートシンク間熱抵抗 Thermal resistance, junction to heatsink	/Diode (1 素子当り) / per diode		R_{thJH}	0,552		K/W
動作温度 Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

ダイオード、D5-D6 / Diode, D5-D6

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}	950	V
順電流 Implemented forward current		I_{FN}	200	A
連続DC電流 Continuous DC forward current		I_F	150	A
ピーク繰返し順電流 Repetitive peak forward current	$t_P = 1\text{ ms}$	I_{FRM}	400	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	1620 1530	A^2s A^2s

電気的特性 / Characteristic Values

			min.	typ.	max.	
順電圧 Forward voltage	$I_F = 150\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 150\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 150\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_F	2,33 2,12 2,08	2,58	V V V
ピーク逆回復電流 Peak reverse recovery current	$I_F = 150\text{ A}, -di_F/dt = 5800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 500\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	I_{RM}	145 189 205		A A A
逆回復電荷量 Recovered charge	$I_F = 150\text{ A}, -di_F/dt = 5800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 500\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	Q_r	7,70 15,0 18,7		μC μC μC
逆回復損失 Reverse recovery energy	$I_F = 150\text{ A}, -di_F/dt = 5800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 500\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{rec}	2,59 5,01 6,44		mJ mJ mJ
ジャンクション・ヒートシンク間熱抵抗 Thermal resistance, junction to heatsink	/Diode (1 素子当り) / per diode		R_{thJH}	0,490		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	$T_{NTC} = 25^{\circ}\text{C}$	R_{25}		5,00		k Ω
R100の偏差 Deviation of R100	$T_{NTC} = 100^{\circ}\text{C}, R_{100} = 493\text{ }\Omega$	$\Delta R/R$	-5		5	%
損失 Power dissipation	$T_{NTC} = 25^{\circ}\text{C}$	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.

モジュール / Module

絶縁耐圧 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V _{ISOL}	3,2	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		9,6 5,8	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		8,8 4,7	mm
相対トラッキング指数 Comperative tracking index		CTI	> 400	
相対温度指数 (電気) RTI Elec.	住宅 housing	RTI	140	°C
min. typ. max.				
内部インダクタンス Stray inductance module		L _{sCE}		15 nH
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 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 - Mounting according to valid application note	M	1,30	1,50 Nm
質量 Weight		G		78 g

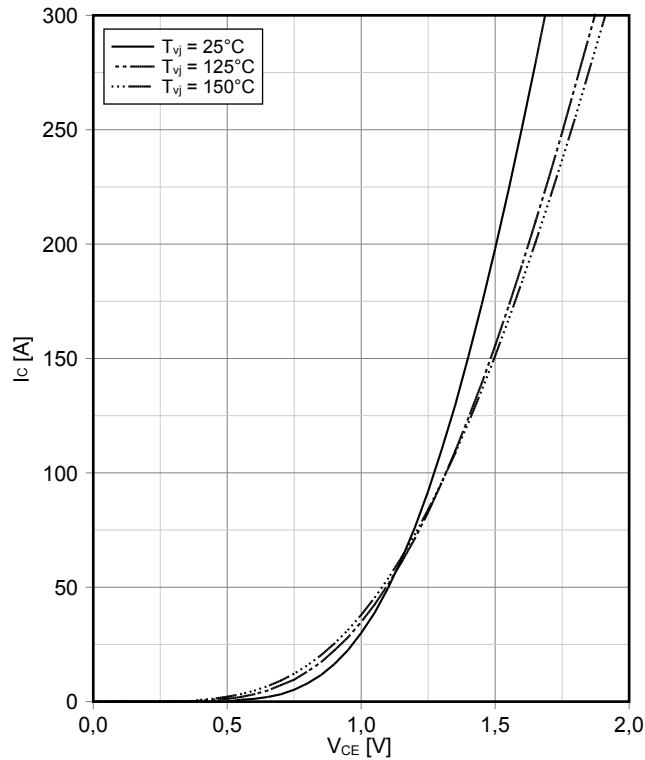
Der Strom im Dauerbetrieb ist auf 25 A effektiv pro Anschlusspin begrenzt.

The current under continuous operation is limited to 25 A rms per connector pin.

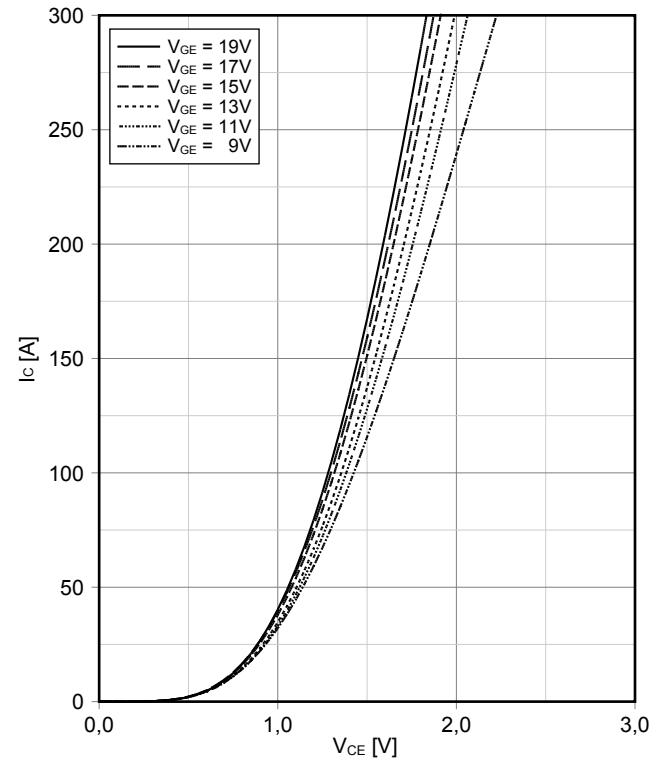
IGBT- und Dioden-RthJH-Parameter mit einer Wärmeleitpaste $\lambda_{\text{paste}} = 3.3 \text{ W/(m}\cdot\text{K)}$ gemessen

IGBT- and diode- RthJH parameters measured with thermal grease of $\lambda_{\text{paste}} = 3.3 \text{ W/(m}\cdot\text{K)}$

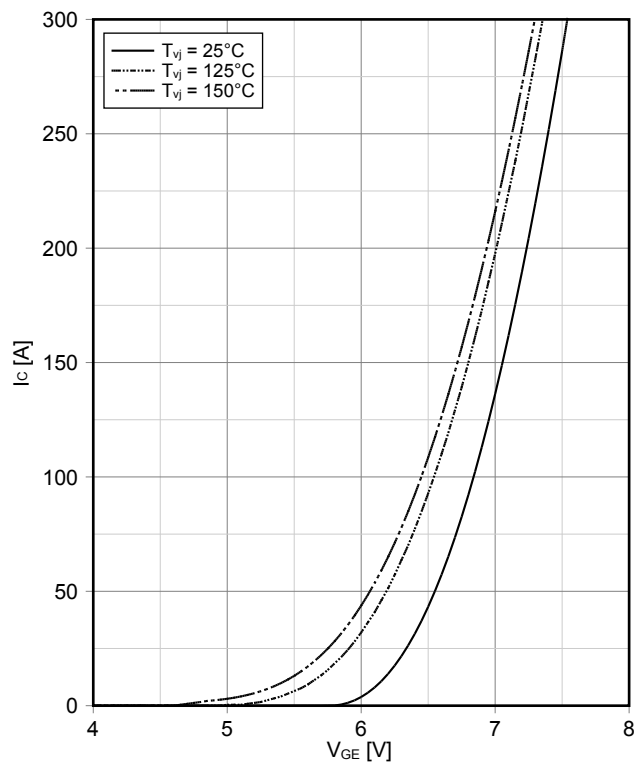
出力特性 IGBT, T1 / T4 (Typical)
output characteristic IGBT, T1 / T4 (typical)
 $I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}$



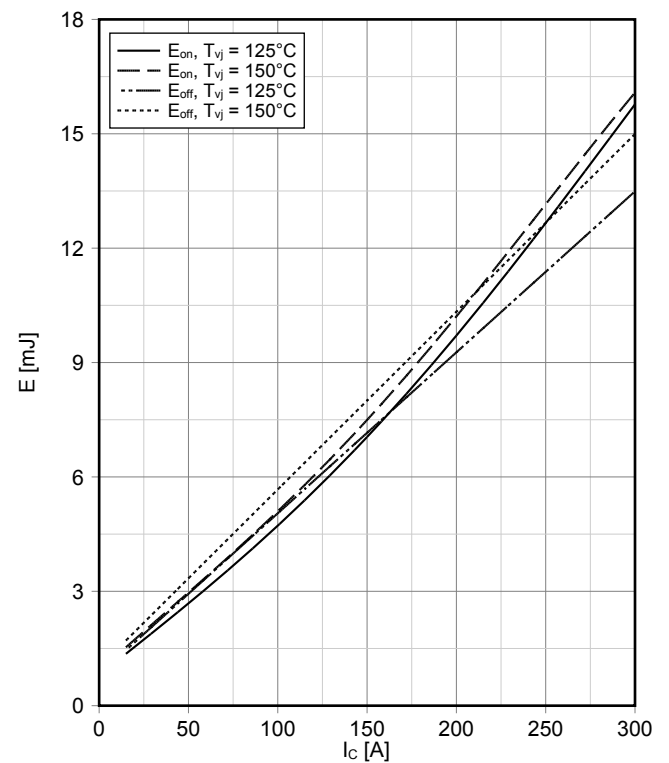
出力特性 IGBT, T1 / T4 (Typical)
output characteristic IGBT, T1 / T4 (typical)
 $I_C = f(V_{CE})$
 $T_{vj} = 150^\circ\text{C}$



伝達特性 IGBT, T1 / T4 (Typical)
transfer characteristic IGBT, T1 / T4 (typical)
 $I_C = f(V_{GE})$
 $V_{CE} = 20\text{ V}$

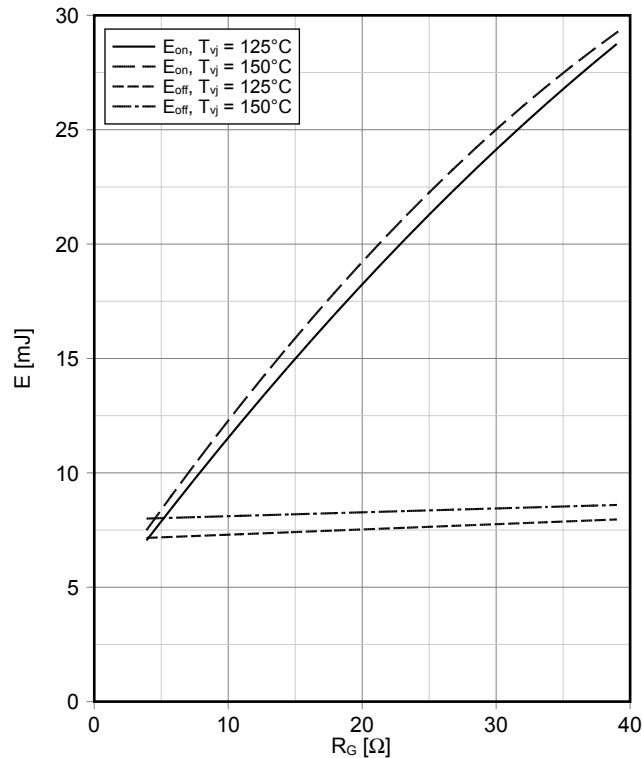


スイッチング損失 IGBT, T1 / T4 (Typical)
switching losses IGBT, T1 / T4 (typical)
 $E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 3,9\ \Omega$, $R_{Goff} = 3,9\ \Omega$, $V_{CE} = 500\text{ V}$



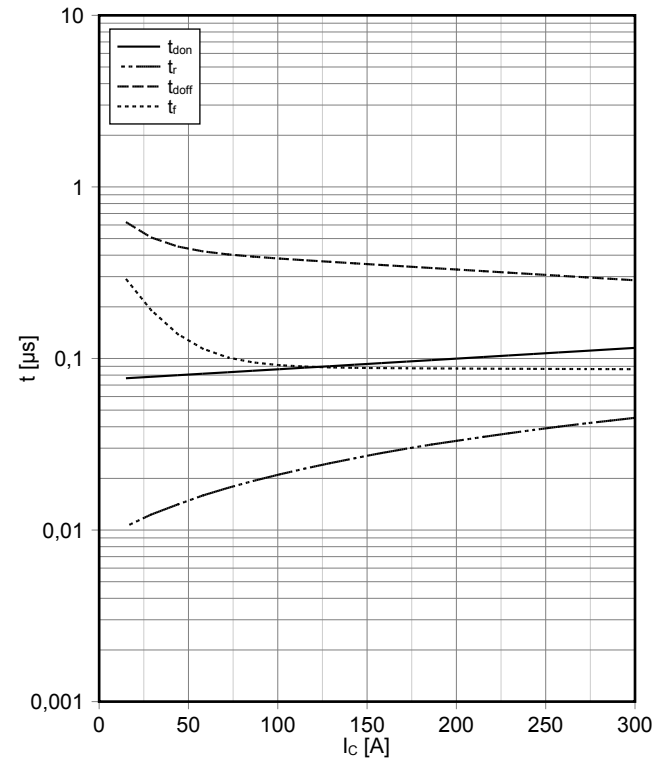
スイッチング損失 IGBT, T1 / T4 (Typical) switching losses IGBT, T1 / T4 (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}$, $I_C = 150 \text{ A}$, $V_{CE} = 500 \text{ V}$



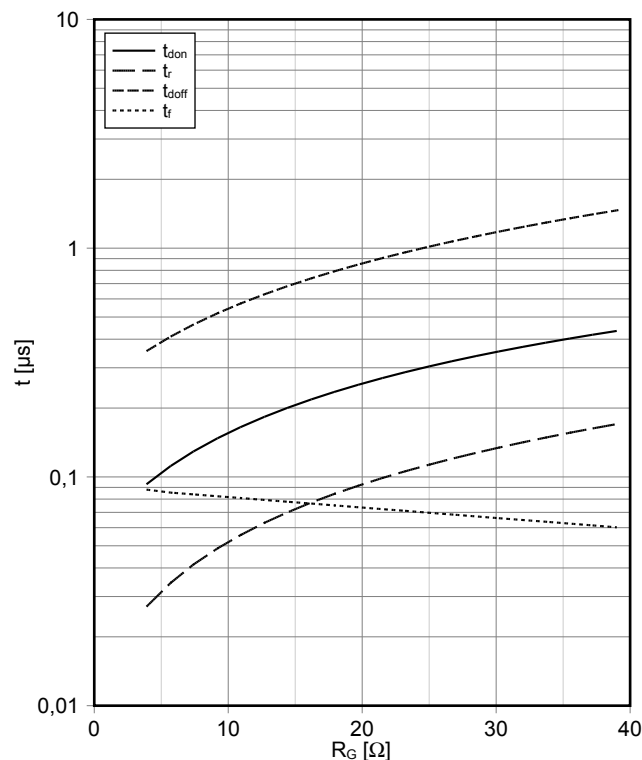
??? IGBT, T1 / T4 (Typical) switching times IGBT, T1 / T4 (typical)

$t_{don} = f(I_C)$, $t_r = f(I_C)$, $t_{doff} = f(I_C)$, $t_f = f(I_C)$
 $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 3,9 \Omega$, $R_{Goff} = 3,9 \Omega$, $V_{CE} = 500 \text{ V}$, $T_{vj} = 150 \text{ °C}$



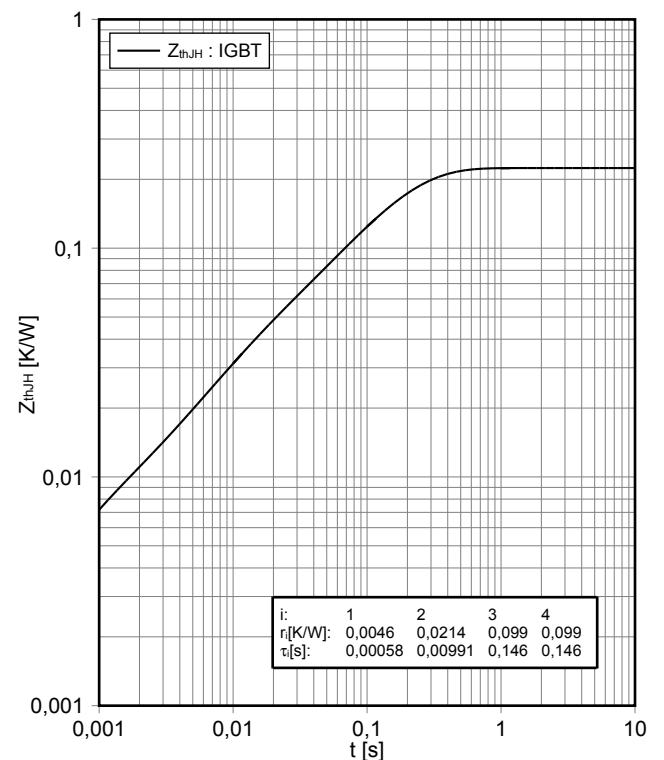
??? IGBT, T1 / T4 (Typical) switching times IGBT, T1 / T4 (typical)

$t_{don} = f(R_G)$, $t_r = f(R_G)$, $t_{doff} = f(R_G)$, $t_f = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}$, $I_C = 150 \text{ A}$, $V_{CE} = 500 \text{ V}$, $T_{vj} = 150 \text{ °C}$



過渡熱インピーダンス IGBT, T1 / T4 transient thermal impedance IGBT, T1 / T4

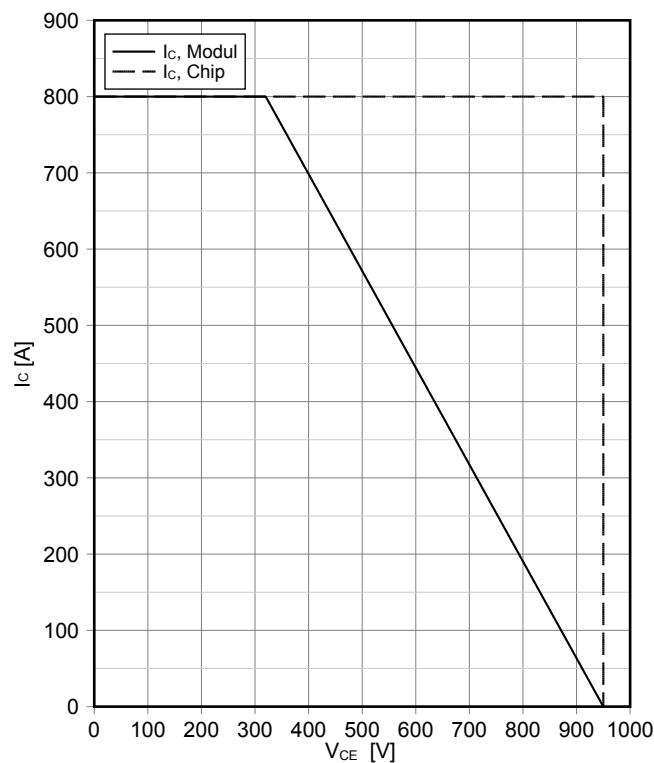
$Z_{thJH} = f(t)$



逆バイアス安全動作領域 IGBT, T1 / T4 (RBSOA)
reverse bias safe operating area IGBT, T1 / T4 (RBSOA)

$I_C = f(V_{CE})$

$V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 3,9 \Omega$, $T_{vj} = 150^\circ\text{C}$

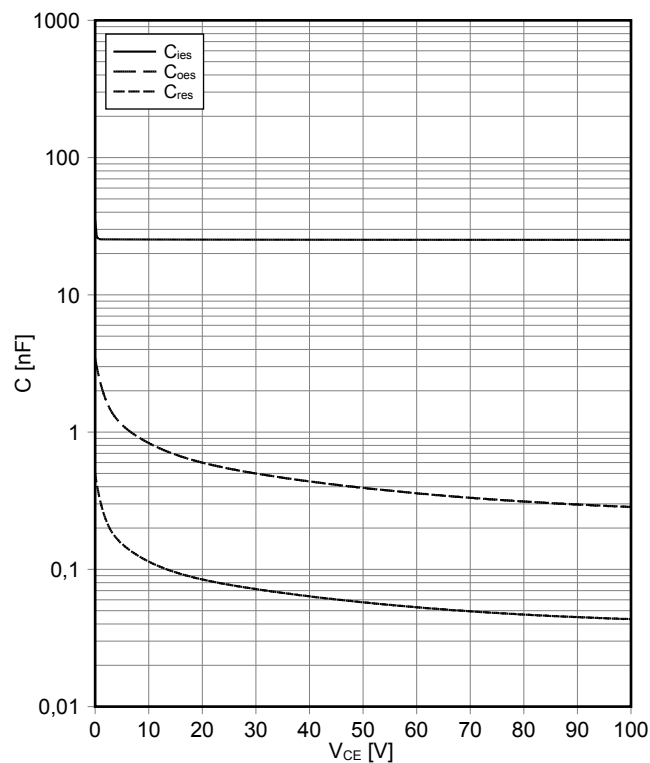


容量特性 IGBT, T1 / T4 (Typical)

capacity characteristic IGBT, T1 / T4 (typical)

$C = f(V_{CE})$

$V_{GE} = 0 \text{ V}$, $T_{vj} = 25^\circ\text{C}$, $f = 100\text{kHz}$

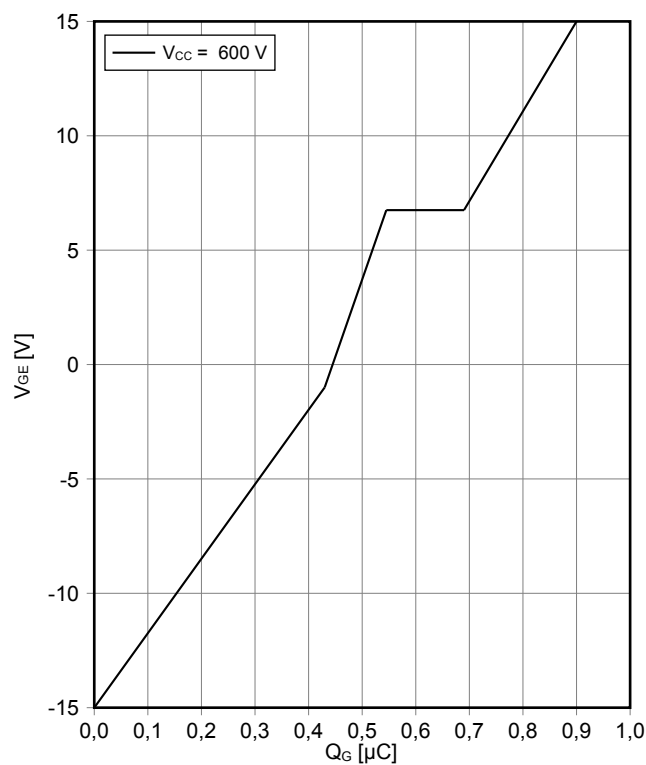


ゲート充電特性 IGBT, T1 / T4 (典型)

gate charge characteristic IGBT, T1 / T4 (typical)

$V_{GE} = f(Q_G)$

$I_C = 400 \text{ A}$, $T_{vj} = 25^\circ\text{C}$

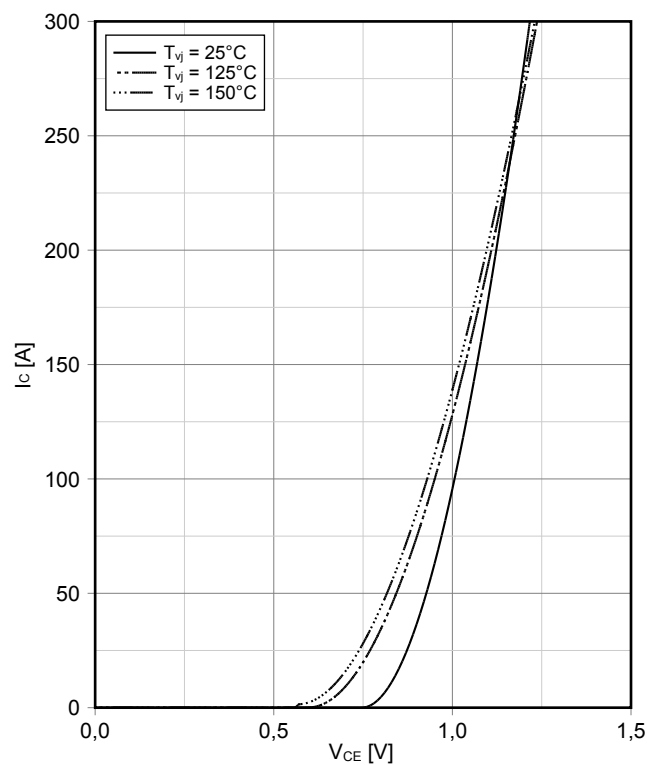


出力特性 IGBT, T2 / T3 (Typical)

output characteristic IGBT, T2 / T3 (typical)

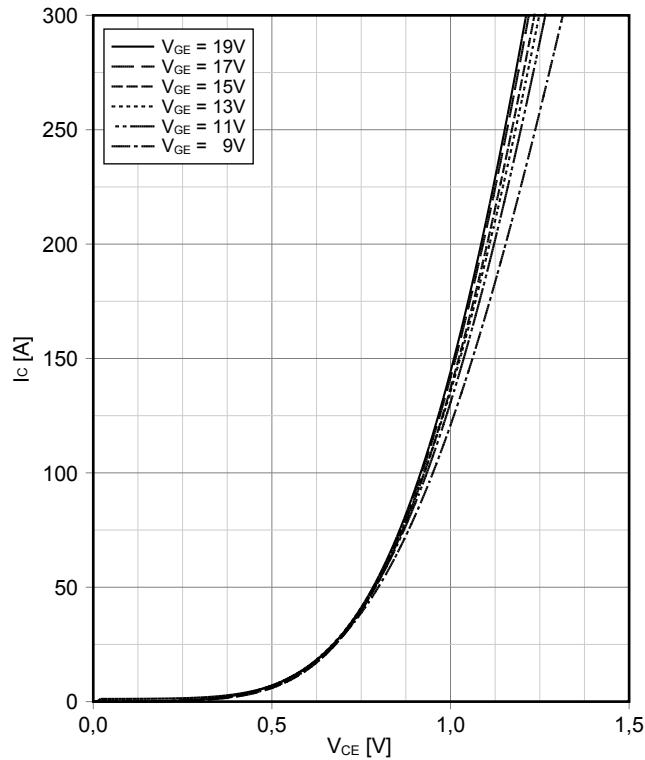
$I_C = f(V_{CE})$

$V_{GE} = 15 \text{ V}$



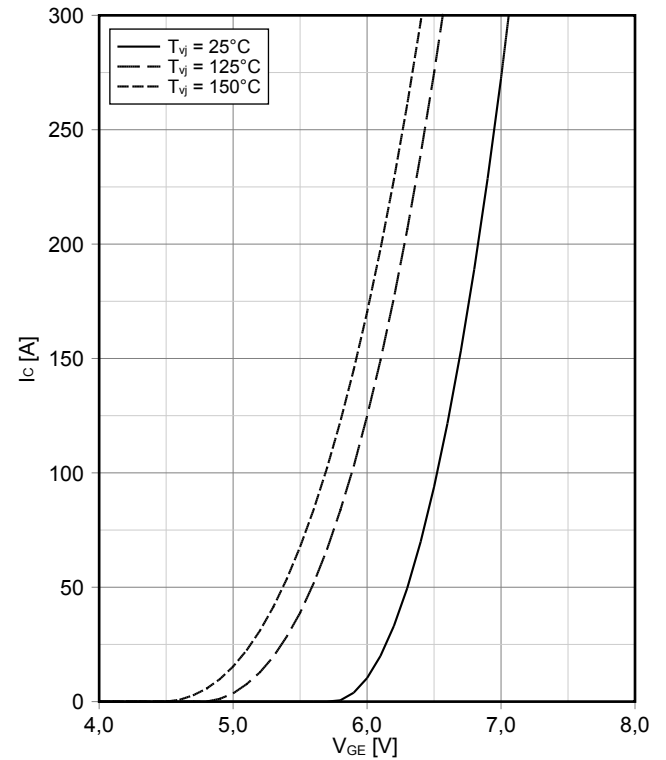
出力特性 IGBT, T2 / T3 (Typical)
output characteristic IGBT, T2 / T3 (typical)

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



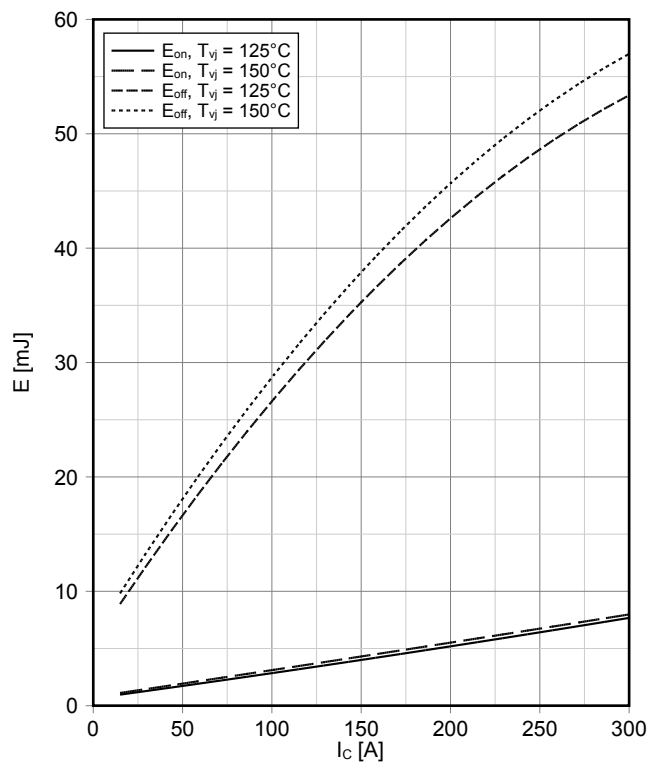
伝達特性 IGBT, T2 / T3 (Typical)
transfer characteristic IGBT, T2 / T3 (typical)

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



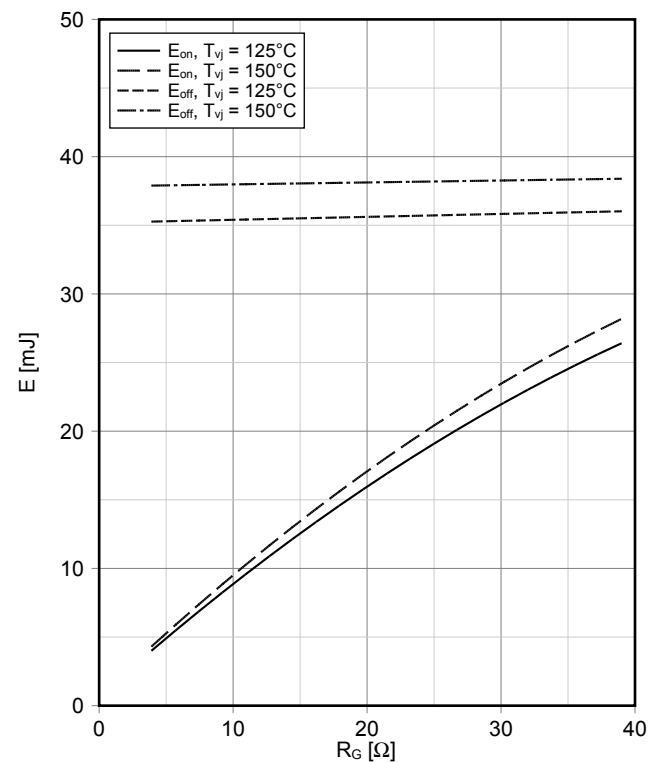
スイッチング損失 IGBT, T2 / T3 (Typical)
switching losses IGBT, T2 / T3 (typical)

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 3.9\ \Omega$, $R_{Goff} = 3.9\ \Omega$, $V_{CE} = 500\text{ V}$



スイッチング損失 IGBT, T2 / T3 (Typical)
switching losses IGBT, T2 / T3 (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 150\text{ A}$, $V_{CE} = 500\text{ V}$

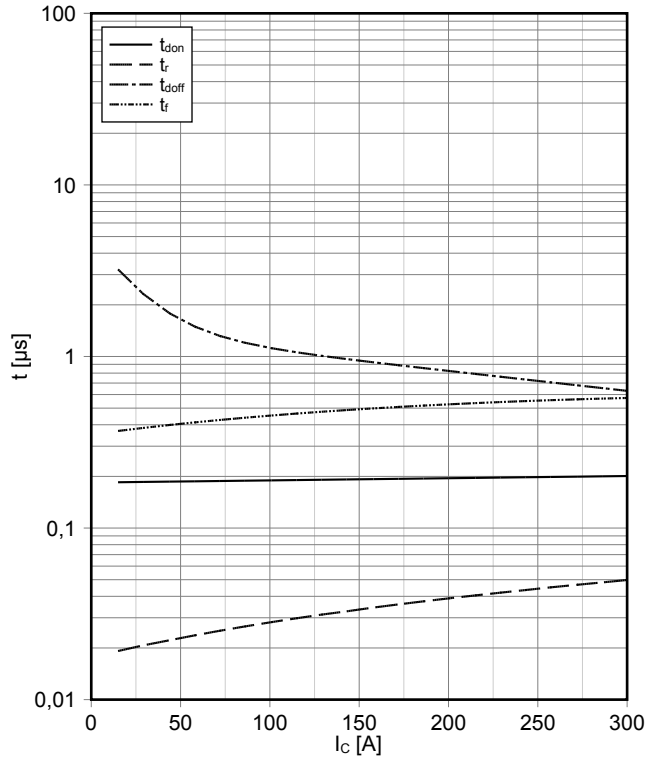


??? IGBT, T2 / T3 (Typical)

switching times IGBT, T2 / T3 (typical)

$t_{don} = f(I_C)$, $t_r = f(I_C)$, $t_{doff} = f(I_C)$, $t_f = f(I_C)$

$V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 3,9 \Omega$, $R_{Goff} = 3,9 \Omega$, $V_{CE} = 500 \text{ V}$, $T_{vj} = 150^\circ \text{ C}$

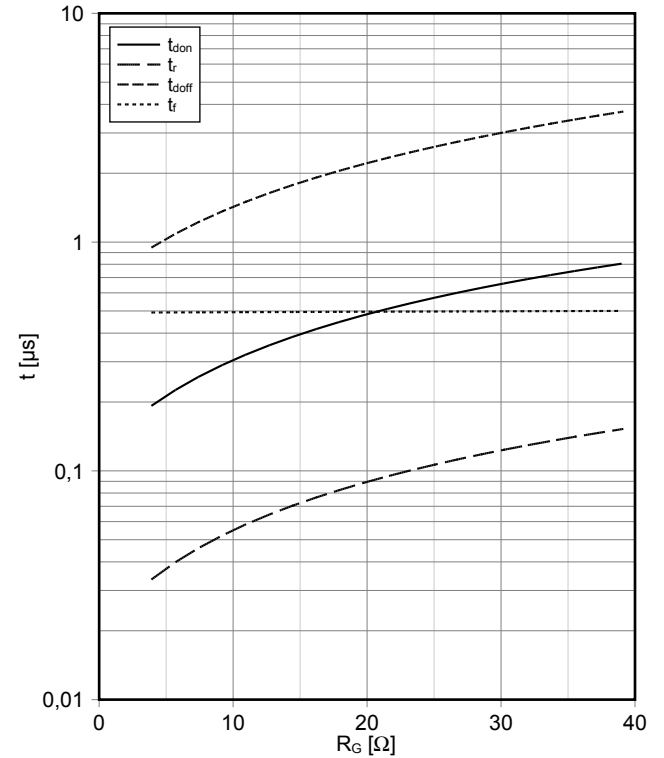


??? IGBT, T2 / T3 (Typical)

switching times IGBT, T2 / T3 (typical)

$t_{don} = f(R_G)$, $t_r = f(R_G)$, $t_{doff} = f(R_G)$, $t_f = f(R_G)$

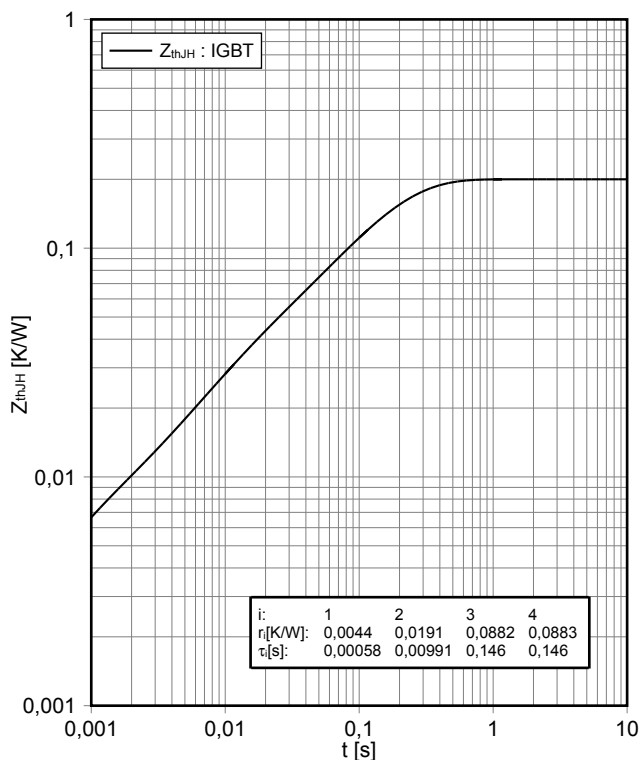
$V_{GE} = \pm 15 \text{ V}$, $I_C = 300 \text{ A}$, $V_{CE} = 500 \text{ V}$, $T_{vj} = 150^\circ \text{ C}$



過渡熱インピーダンス IGBT, T2 / T3

transient thermal impedance IGBT, T2 / T3

$Z_{thJH} = f(t)$

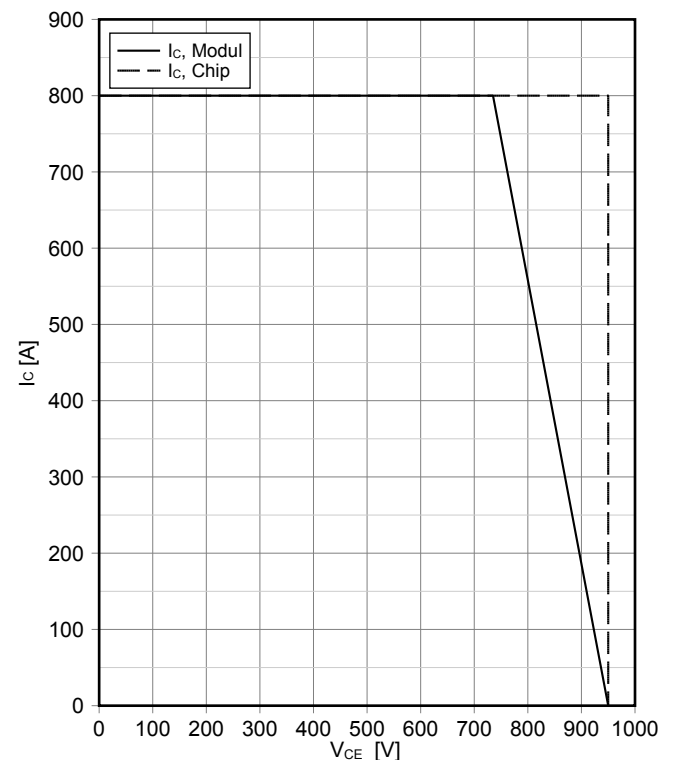


逆バイアス安全動作領域 IGBT, T2 / T3 (RBSOA)

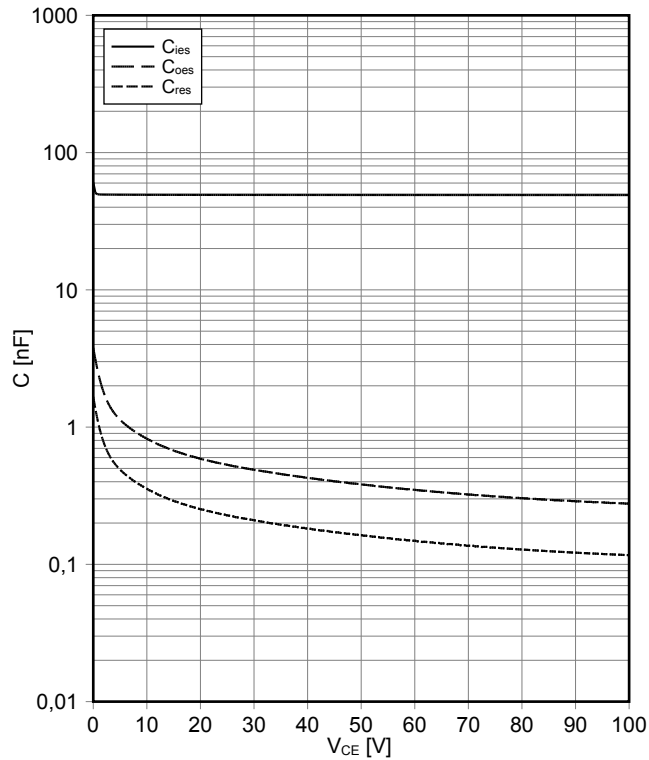
reverse bias safe operating area IGBT, T2 / T3 (RBSOA)

$I_C = f(V_{CE})$

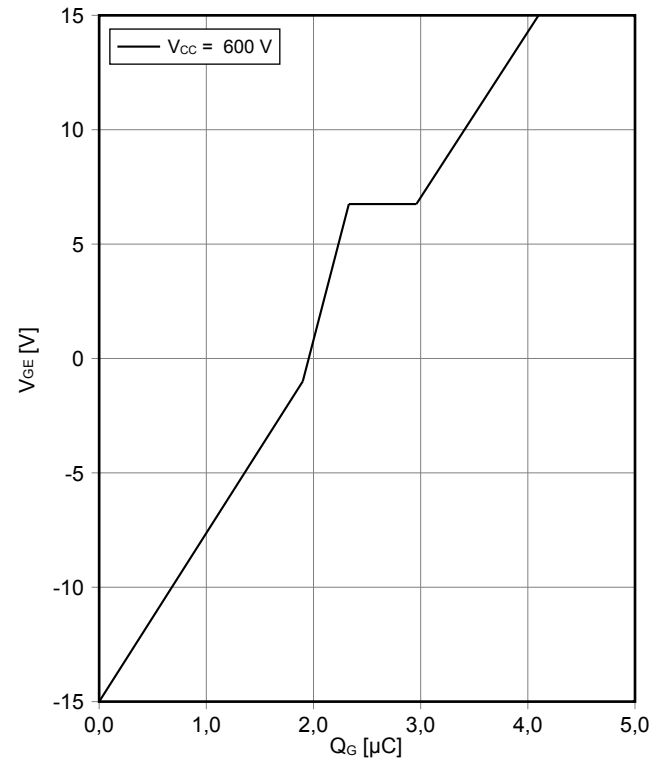
$V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 3,9 \Omega$, $T_{vj} = 150^\circ \text{ C}$



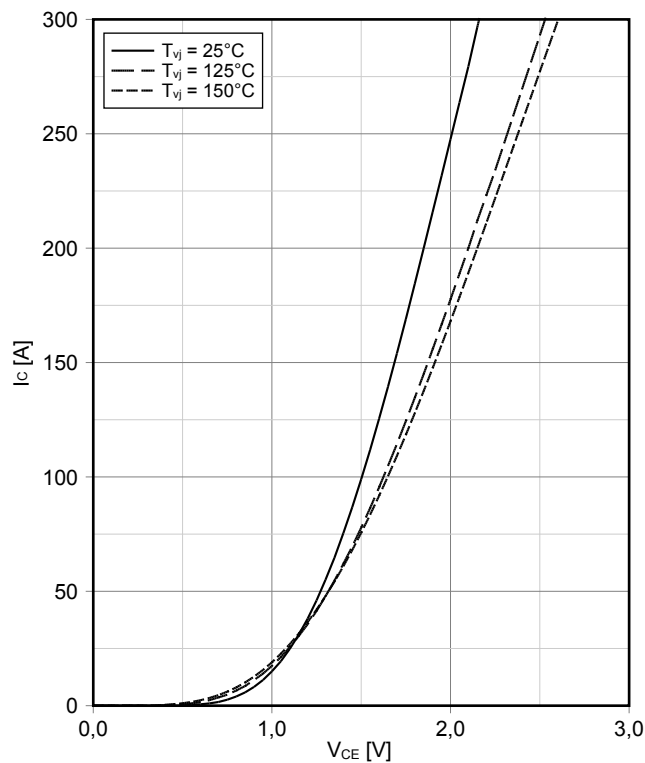
容量特性 IGBT, T2 / T3 (Typical)
capacity characteristic IGBT, T2 / T3 (typical)
 $C = f(V_{CE})$
 $V_{GE} = 0\text{ V}$, $T_{vj} = 25^\circ\text{C}$, $f = 100\text{ kHz}$



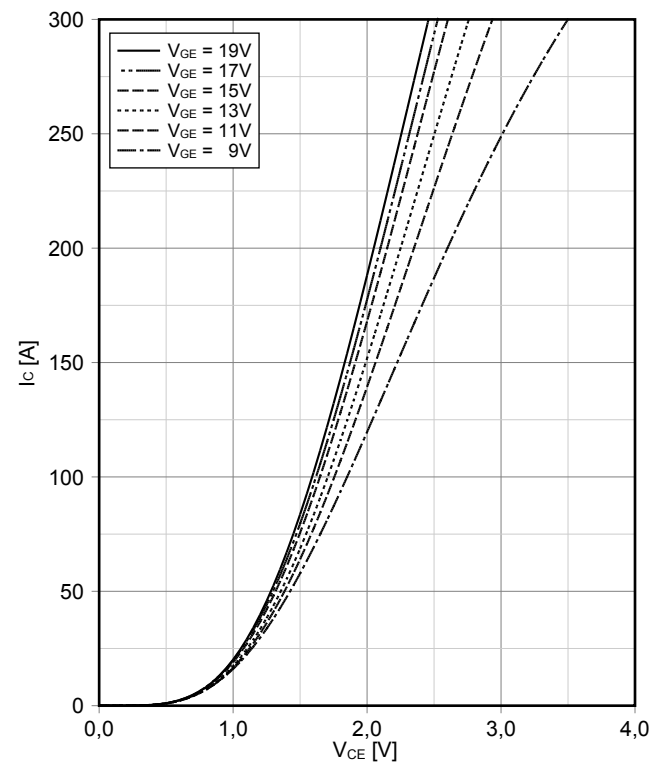
ゲート充電特性 IGBT, T2 / T3 (典型)
gate charge characteristic IGBT, T2 / T3 (typical)
 $V_{GE} = f(Q_G)$
 $I_C = 400\text{ A}$, $T_{vj} = 25^\circ\text{C}$



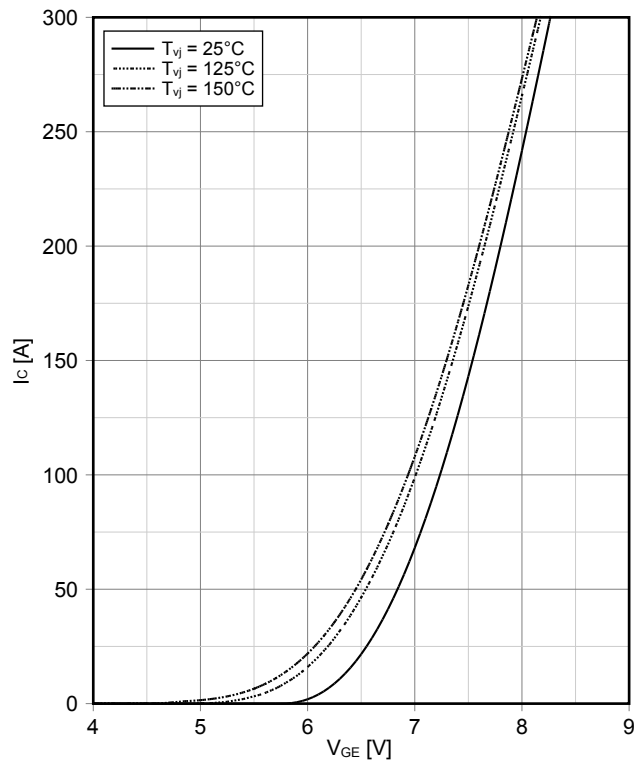
出力特性 IGBT, T5 / T6 (Typical)
output characteristic IGBT, T5 / T6 (typical)
 $I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}$



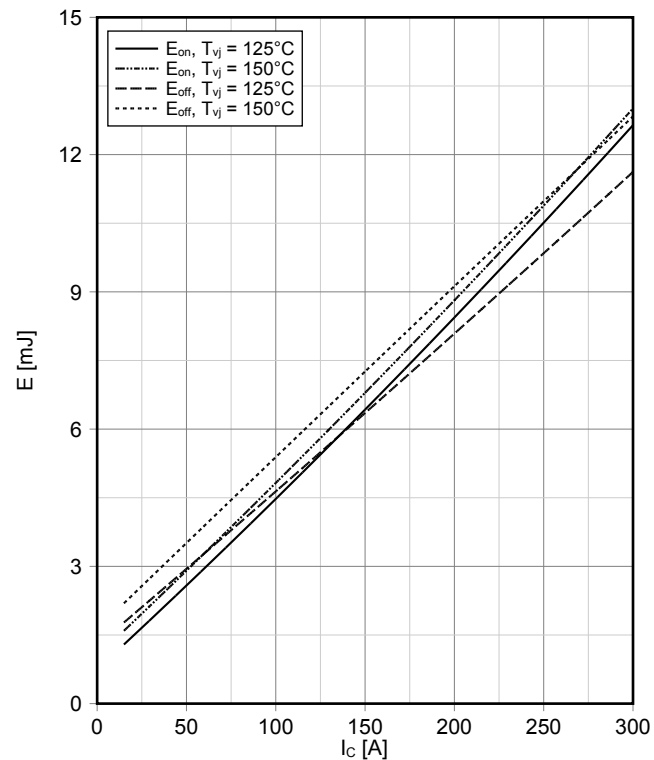
出力特性 IGBT, T5 / T6 (Typical)
output characteristic IGBT, T5 / T6 (typical)
 $I_C = f(V_{CE})$
 $T_{vj} = 150^\circ\text{C}$



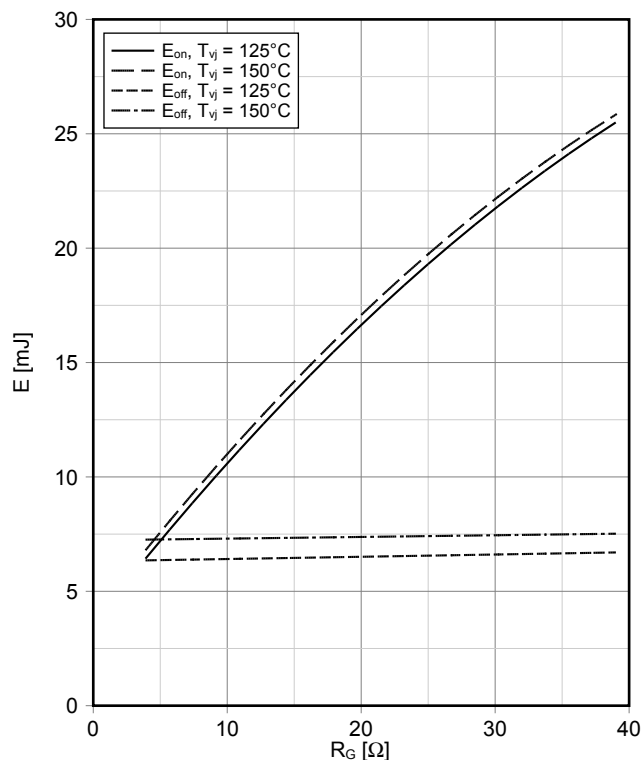
伝達特性 IGBT, T5 / T6 (Typical)
transfer characteristic IGBT, T5 / T6 (typical)
 $I_C = f(V_{GE})$
 $V_{CE} = 20 \text{ V}$



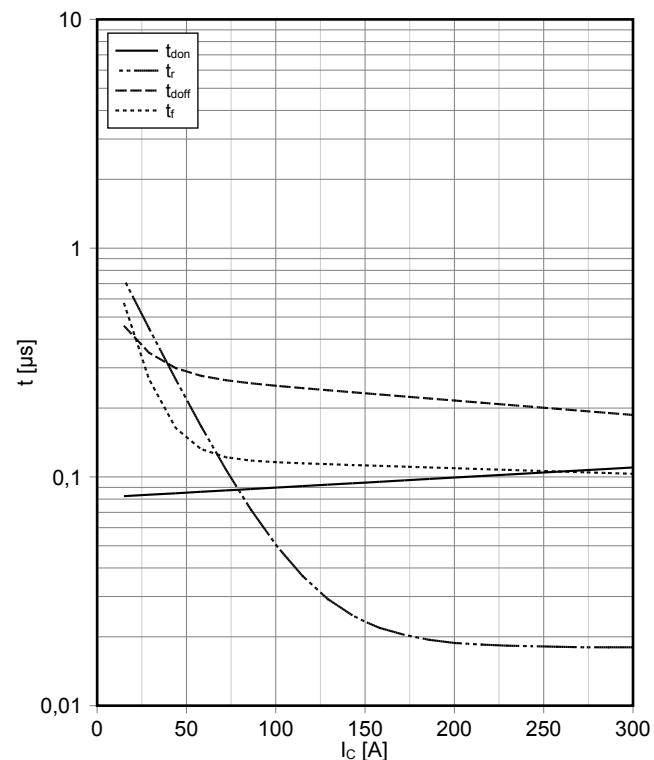
スイッチング損失 IGBT, T5 / T6 (Typical)
switching losses IGBT, T5 / T6 (typical)
 $E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 3,9 \Omega$, $R_{Goff} = 3,9 \Omega$, $V_{CE} = 500 \text{ V}$



スイッチング損失 IGBT, T5 / T6 (Typical)
switching losses IGBT, T5 / T6 (typical)
 $E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}$, $I_C = 150 \text{ A}$, $V_{CE} = 500 \text{ V}$



??? IGBT, T5 / T6 (Typical)
switching times IGBT, T5 / T6 (typical)
 $t_{don} = f(I_C)$, $t_r = f(I_C)$, $t_{doff} = f(I_C)$, $t_f = f(I_C)$
 $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 3,9 \Omega$, $R_{Goff} = 3,9 \Omega$, $V_{CE} = 500 \text{ V}$, $T_{vj} = 150^\circ\text{C}$

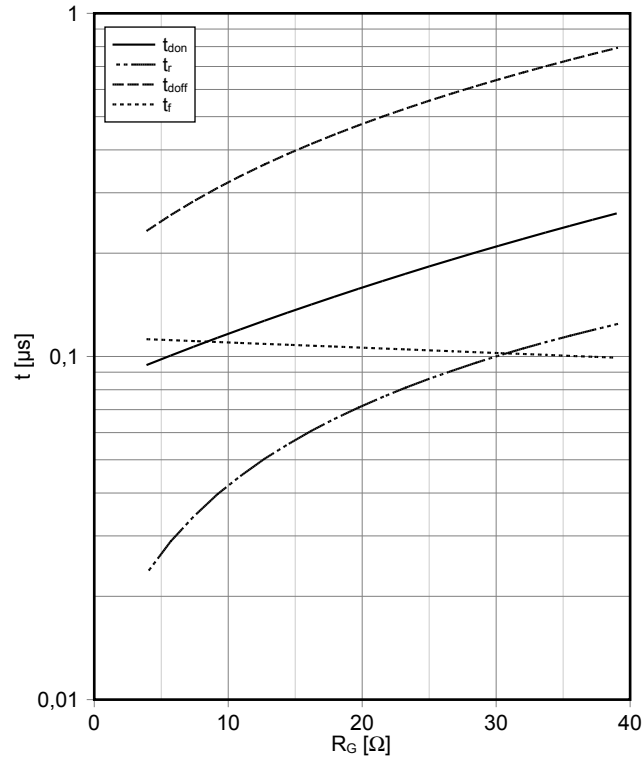


??? IGBT, T5 / T6 (Typical)

switching times IGBT, T5 / T6 (typical)

$t_{don} = f(R_G)$, $t_r = f(R_G)$, $t_{doff} = f(R_G)$, $t_f = f(R_G)$

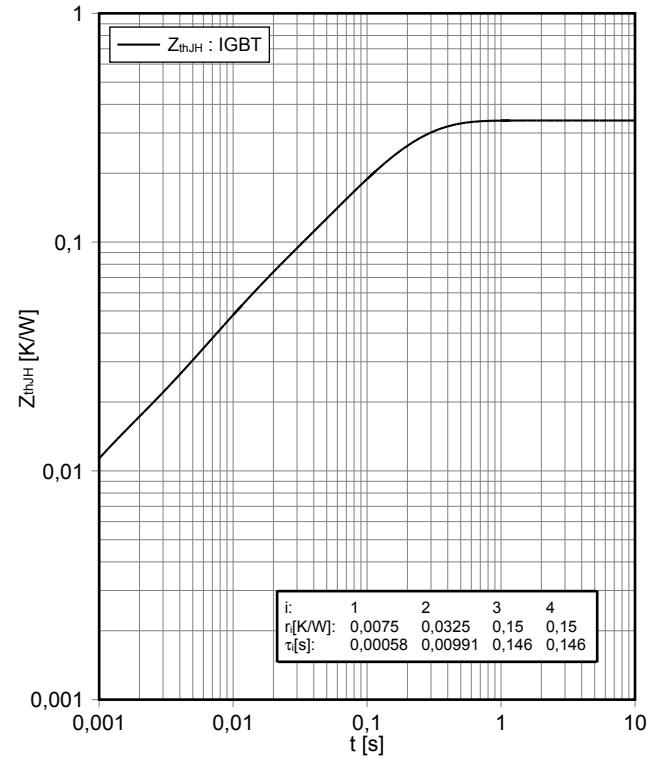
$V_{GE} = \pm 15 \text{ V}$, $I_C = 150 \text{ A}$, $V_{CE} = 500 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



過渡熱インピーダンス IGBT, T5 / T6

transient thermal impedance IGBT, T5 / T6

$Z_{thJH} = f(t)$

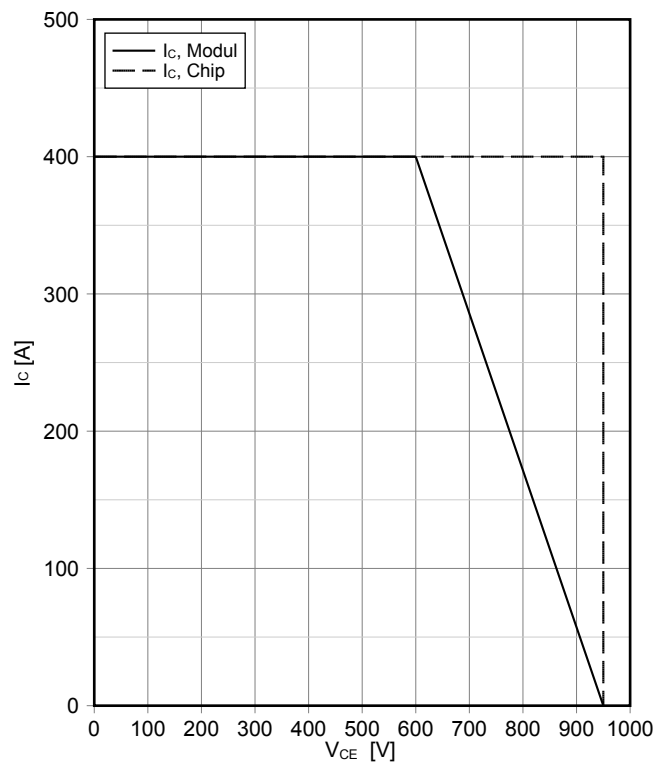


逆バイアス安全動作領域 IGBT, T5 / T6 (RBSOA)

reverse bias safe operating area IGBT, T5 / T6 (RBSOA)

$I_C = f(V_{CE})$

$V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 3,9 \Omega$, $T_{vj} = 150^\circ\text{C}$

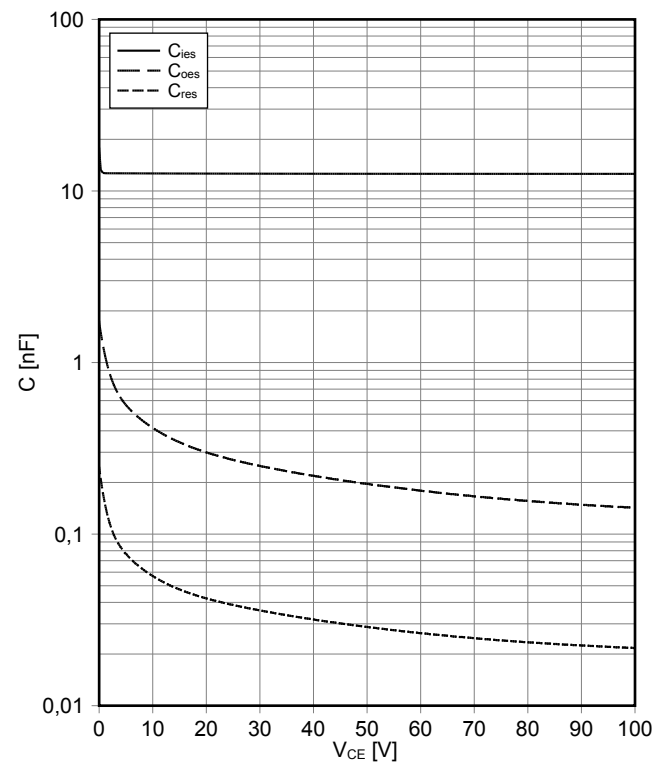


容量特性 IGBT, T5 / T6 (Typical)

capacity characteristic IGBT, T5 / T6 (typical)

$C = f(V_{CE})$

$V_{GE} = 0 \text{ V}$, $T_{vj} = 25^\circ\text{C}$, $f = 100\text{kHz}$

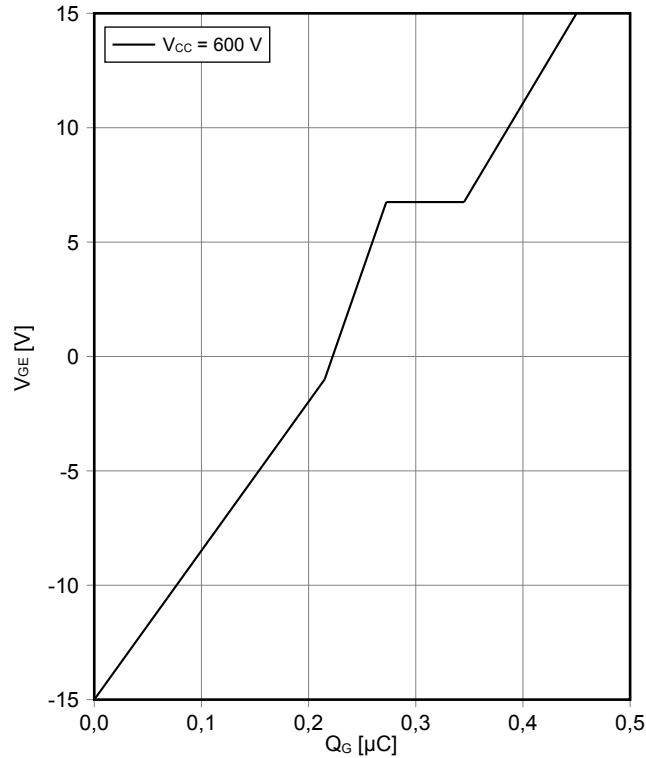


ゲート充電特性 IGBT, T5 / T6 (典型)

gate charge characteristic IGBT, T5 / T6 (typical)

$V_{GE} = f(Q_G)$

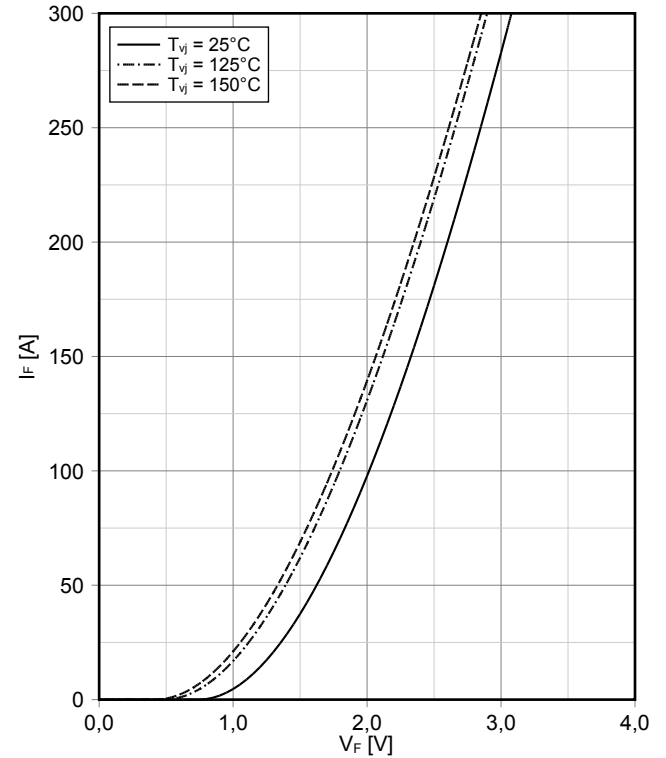
$I_C = 200\text{ A}$, $T_{vj} = 25^\circ\text{C}$



順電圧特性 ダイオード, D1 / D4 (typical)

forward characteristic of Diode, D1 / D4 (typical)

$I_F = f(V_F)$

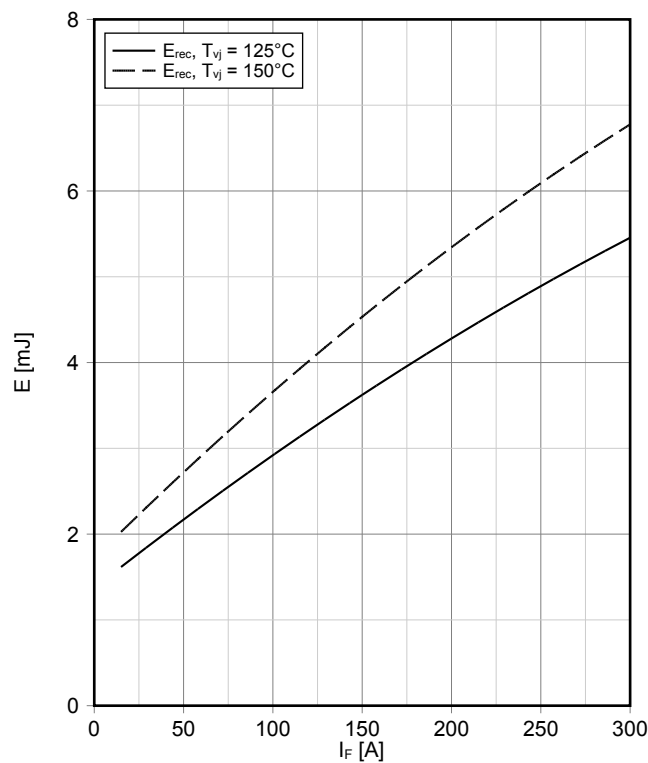


スイッチング損失 ダイオード, D1 / D4 (Typical)

switching losses Diode, D1 / D4 (typical)

$E_{rec} = f(I_F)$

$R_{Gon} = 3,9\text{ }\Omega$, $V_{CE} = 500\text{ V}$

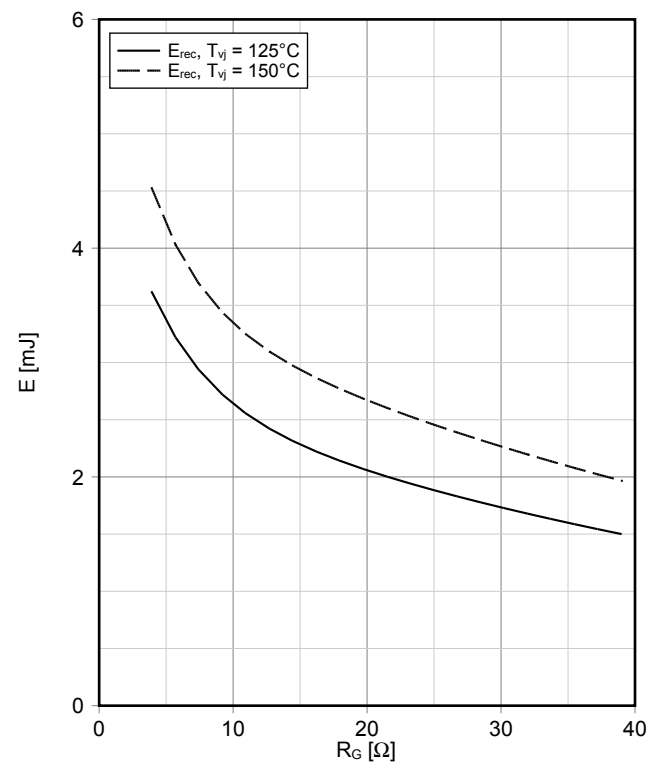


スイッチング損失 ダイオード, D1 / D4 (Typical)

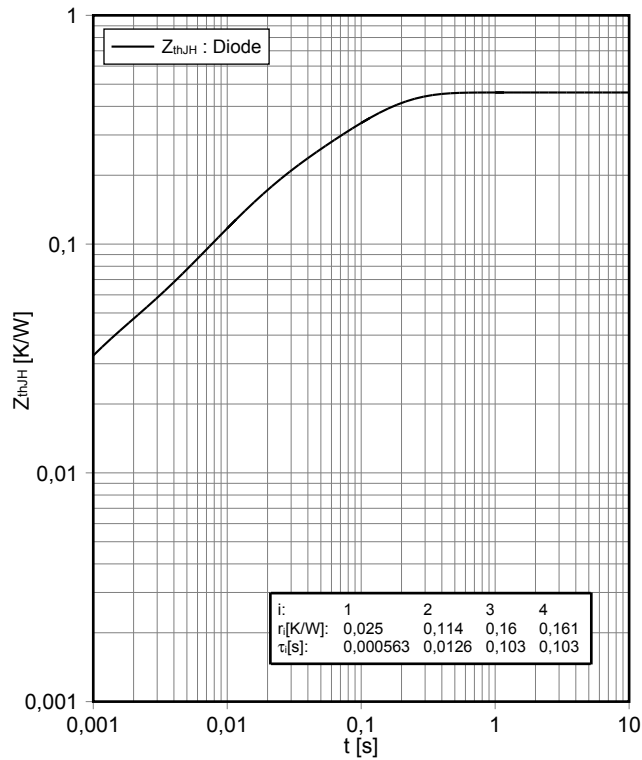
switching losses Diode, D1 / D4 (typical)

$E_{rec} = f(R_G)$

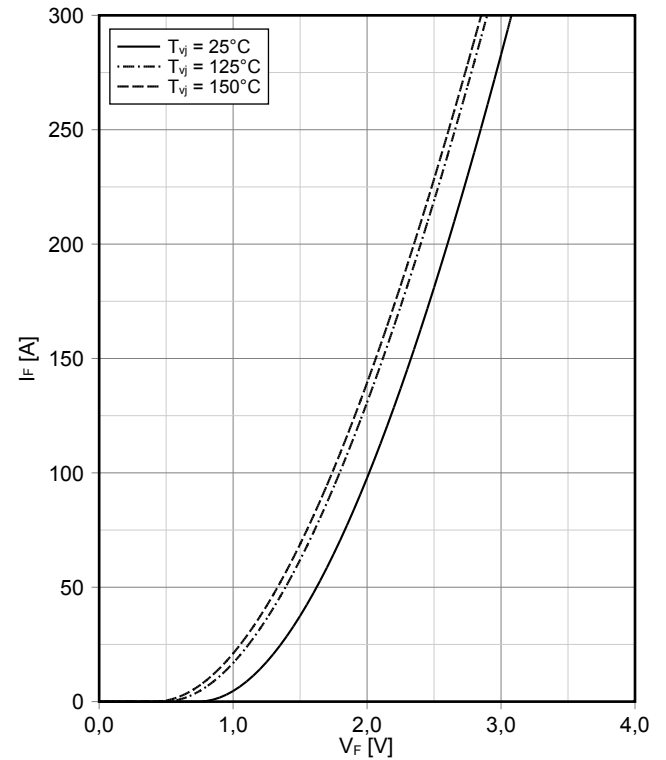
$I_F = 150\text{ A}$, $V_{CE} = 500\text{ V}$



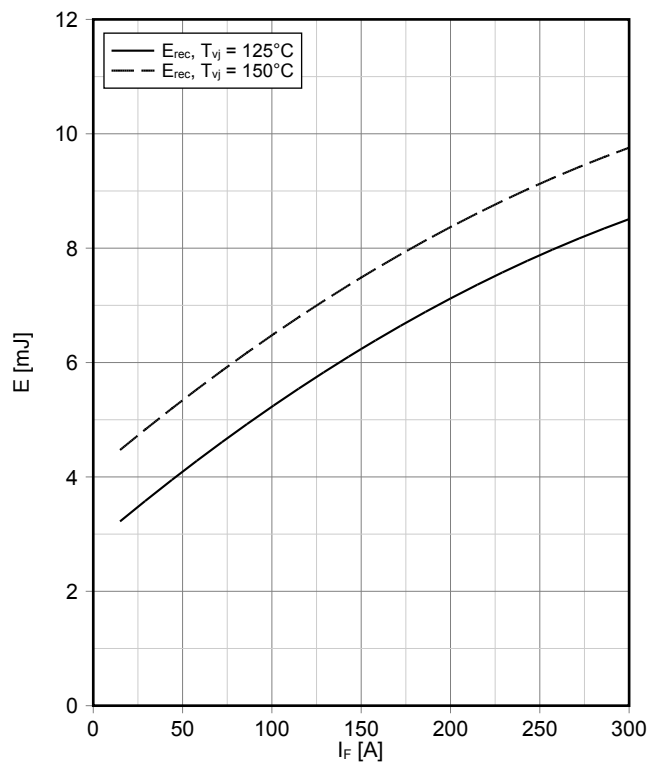
過渡熱インピーダンス ダイオード, D1 / D4
transient thermal impedance Diode, D1 / D4
 $Z_{thJH} = f(t)$



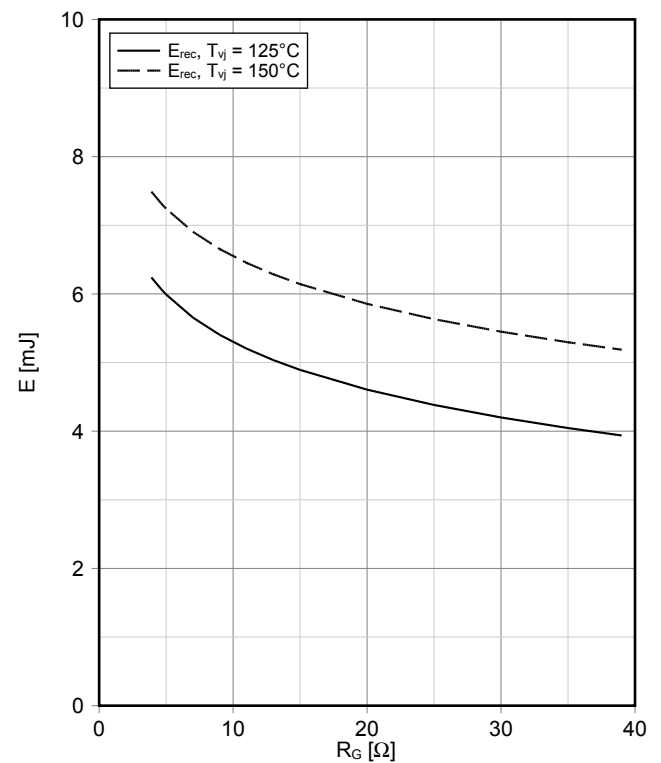
順電圧特性 ダイオード, D2 / D3 (typical)
forward characteristic of Diode, D2 / D3 (typical)
 $I_F = f(V_F)$



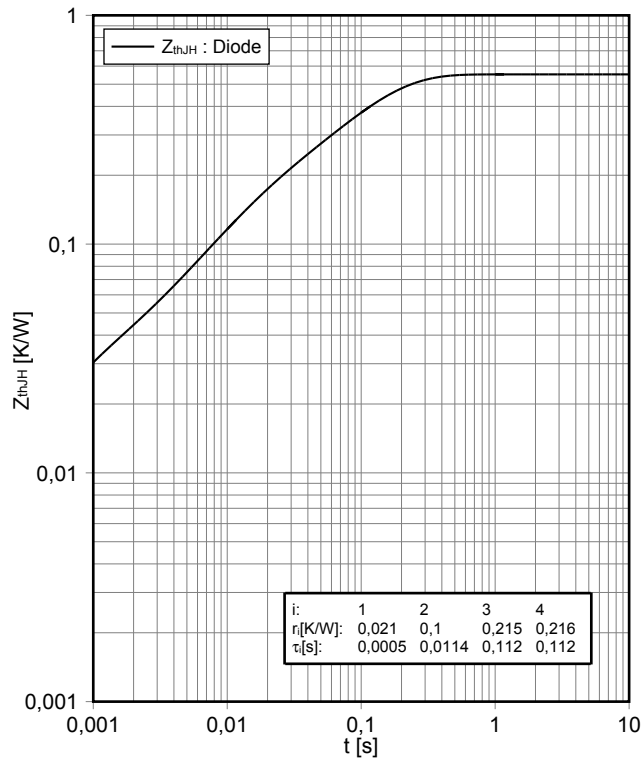
スイッチング損失 ダイオード, D2 / D3 (Typical)
switching losses Diode, D2 / D3 (typical)
 $E_{rec} = f(I_F)$
 $R_{Gon} = 3,9 \Omega$, $V_{CE} = 500 V$



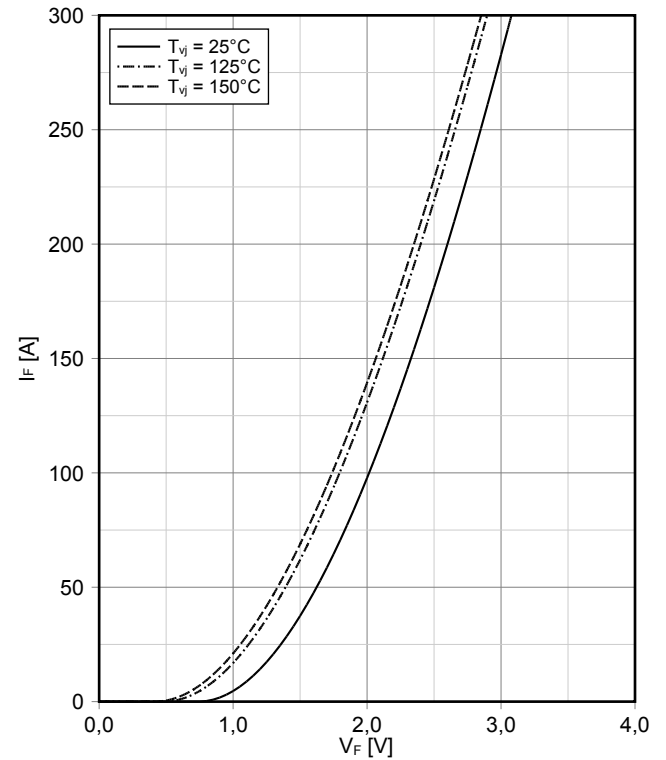
スイッチング損失 ダイオード, D2 / D3 (Typical)
switching losses Diode, D2 / D3 (typical)
 $E_{rec} = f(R_G)$
 $I_F = 150 A$, $V_{CE} = 500 V$



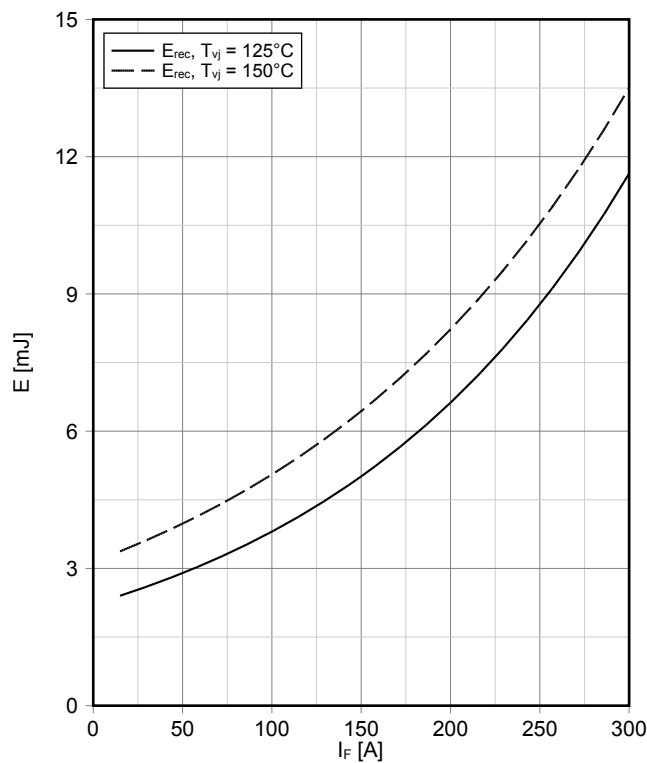
過渡熱インピーダンス ダイオード, D2 / D3
transient thermal impedance Diode, D2 / D3
 $Z_{thJH} = f(t)$



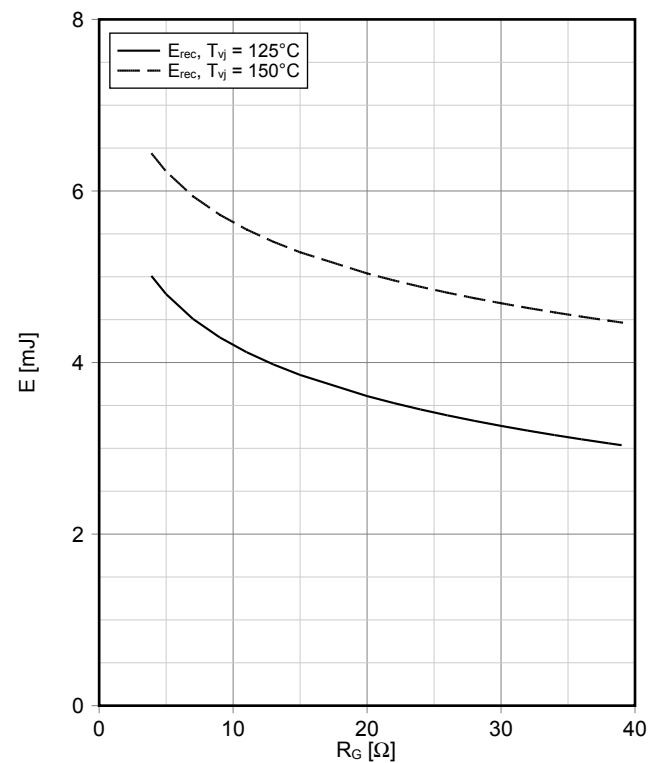
順電圧特性 ダイオード, D5-D6 (typical)
forward characteristic of Diode, D5-D6 (typical)
 $I_F = f(V_F)$



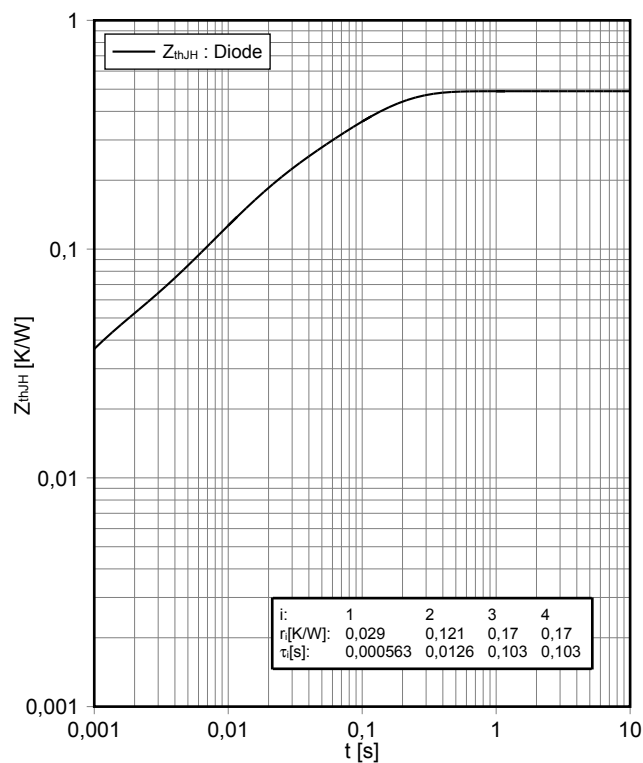
スイッチング損失 ダイオード, D5-D6 (Typical)
switching losses Diode, D5-D6 (typical)
 $E_{rec} = f(I_F)$
 $R_{Gon} = 3,9 \Omega$, $V_{CE} = 500 V$



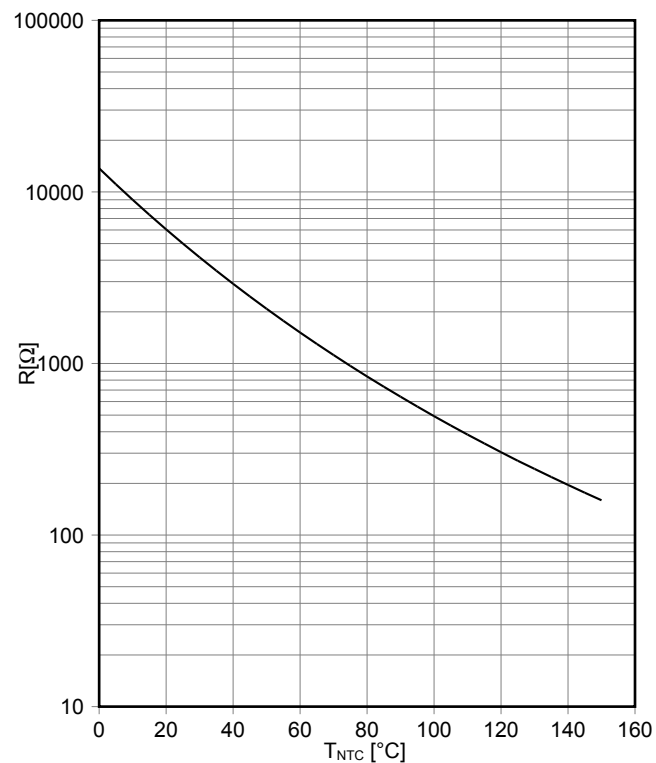
スイッチング損失 ダイオード, D5-D6 (Typical)
switching losses Diode, D5-D6 (typical)
 $E_{rec} = f(R_G)$
 $I_F = 150 A$, $V_{CE} = 500 V$



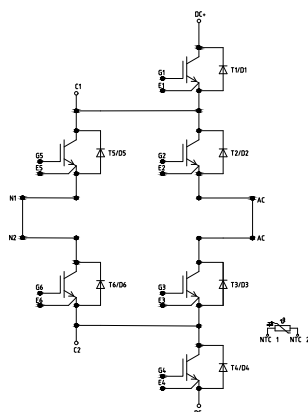
過渡熱インピーダンス ダイオード、D5-D6
transient thermal impedance Diode, D5-D6
 $Z_{thJH} = f(t)$



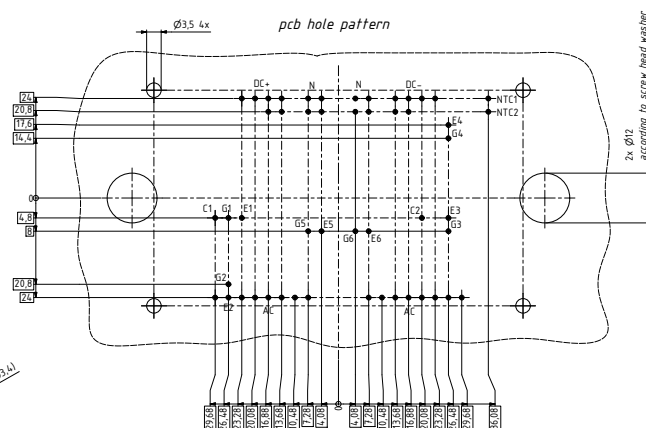
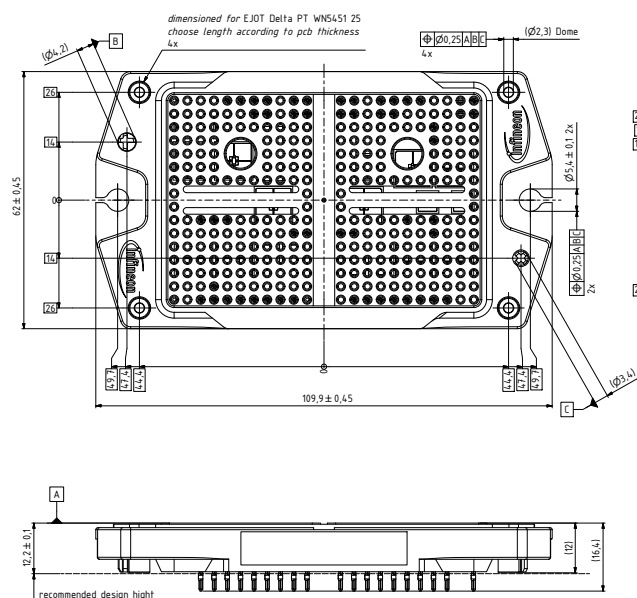
NTC-サーミスタ サーミスタの温度特性
NTC-Thermistor-temperature characteristic (typical)
 $R = f(T_{NTC})$



回路図 / Circuit diagram



パッケージ概要 / Package outlines



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