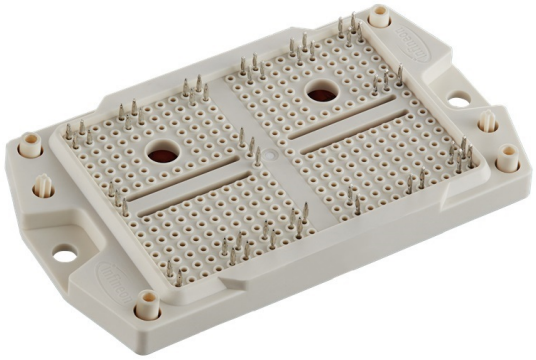
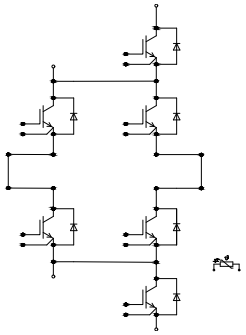
EasyPACK™ モジュール TRENCHSTOP™IGBT7とエミッターコントロール 7 ダイオード内蔵 とPressFIT / NTCサーミスタ

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

Potential Applications
- 3-level-applications
- Solar applications

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

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

機械的特性
- PressFIT 接合 技術
- 内蔵されたNTCサーミスタ

Mechanical Features
- PressFIT contact technology
- Integrated NTC temperature sensor

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

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°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°C, $T_{vj\,max}$ = 175°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 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 A V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		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 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	4,35	5,10	5,85	V
ゲート電荷量 Gate charge	V_{GE} = -15 / 15 V, V_{CE} = 600 V		Q_G		0,90		µC
内蔵ゲート抵抗 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		0,75		Ω
入力容量 Input capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		25,2		nF
帰還容量 Reverse transfer capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 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 V, V_{GE} = 0 V	T_{vj} = 25°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 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 = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		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 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		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 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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 A, V_{CE} = 500 V, Lσ = 35 nH di/dt = 5800 A/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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 A, V_{CE} = 500 V, Lσ = 35 nH du/dt = 4000 V/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		4,30 7,16 8,00		mJ mJ mJ
短絡電流 SC data	V_{GE} ≤ 15 V, V_{CC} = 600 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 0 µs, T_{vj} = 150°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			$T_{vj\,op}$	-40		150	°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°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°C, $T_{vj\,max}$ = 175°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 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 A, V_{GE} = 15 V	$V_{CE\,sat}$		1,07 1,04 1,02	1,14	V V V
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C					
ゲート・エミッタ間しきい値電圧 Gate threshold voltage	I_C = 6,50 mA, V_{CE} = 20 V, T_{vj} = 25°C	V_{GEth}	4,15	4,90	5,65	V
ゲート電荷量 Gate charge	V_{GE} = -15 / 15 V, V_{CE} = 600 V	Q_G		4,10		µC
内蔵ゲート抵抗 Internal gate resistor	T_{vj} = 25°C	R_{Gint}		0,75		Ω
入力容量 Input capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}		49,2		nF
帰還容量 Reverse transfer capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 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 V, V_{GE} = 0 V, T_{vj} = 25°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 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 = 150 A, V_{CE} = 500 V, V_{GE} = -15 / 15 V, R_{Gon} = 3,9 Ω	$t_{d\,on}$		0,189 0,191 0,192		µs µs µs
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C					
ターンオン上昇時間（誘導負荷） Rise time, inductive load	I_C = 150 A, V_{CE} = 500 V, V_{GE} = -15 / 15 V, R_{Gon} = 3,9 Ω	t_r		0,026 0,032 0,034		µs µs µs
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C					
ターンオフ遅れ時間（誘導負荷） Turn-off delay time, inductive load	I_C = 150 A, V_{CE} = 500 V, V_{GE} = -15 / 15 V, R_{Goff} = 3,9 Ω	$t_{d\,off}$		0,76 0,92 0,94		µs µs µs
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C					
ターンオフ下降時間（誘導負荷） Fall time, inductive load	I_C = 150 A, V_{CE} = 500 V, V_{GE} = -15 / 15 V, R_{Goff} = 3,9 Ω	t_f		0,23 0,44 0,49		µs µs µs
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C					
ターンオンスイッチング損失 Turn-on energy loss per pulse	I_C = 150 A, V_{CE} = 500 V, Lσ = 35 nH, di/dt = 5200 A/µs (T_{vj} = 150°C), V_{GE} = -15 / 15 V, R_{Gon} = 3,9 Ω	E_{on}		3,10 4,00 4,30		mJ mJ mJ
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C					
ターンオフスイッチング損失 Turn-off energy loss per pulse	I_C = 150 A, V_{CE} = 500 V, Lσ = 35 nH, du/dt = 1200 V/µs (T_{vj} = 150°C), V_{GE} = -15 / 15 V, R_{Goff} = 3,9 Ω	E_{off}		24,5 35,3 37,9		mJ mJ mJ
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C					
短絡電流 SC data	V_{GE} ≤ 15 V, V_{CC} = 600 V, V_{CEmax} = V_{CES} -L_{sCE} ·di/dt, t_P ≤ 0 µs, T_{vj} = 150°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		$T_{vj\,op}$	-40		150	°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°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°C, $T_{vj\,max}$ = 175°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 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 A V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,68 1,88 1,92	1,98	V V V
ゲート・エミッタ間しきい値電圧 Gate threshold voltage	I_C = 3,25 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	4,35	5,10	5,85	V
ゲート電荷量 Gate charge	V_{GE} = -15 / 15 V, V_{CE} = 600 V		Q_G		0,45		µC
内蔵ゲート抵抗 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1,5		Ω
入力容量 Input capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		12,6		nF
帰還容量 Reverse transfer capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 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 V, V_{GE} = 0 V	T_{vj} = 25°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 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 = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		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 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		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 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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 A, V_{CE} = 500 V, Lσ = 35 nH di/dt = 5300 A/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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 A, V_{CE} = 500 V, Lσ = 35 nH du/dt = 6000 V/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		3,73 6,35 7,26		mJ mJ mJ
短絡電流 SC data	V_{GE} ≤ 15 V, V_{CC} = 600 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 0 µs, T_{vj} = 150°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			$T_{vj\,op}$	-40		150	°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°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 ms	I_{FRM}	400	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	1620 1530	A²s A²s

電気的特性 / Characteristic Values

			min.	typ.	max.	
順電圧 Forward voltage	I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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 A, - di_F/dt = 5300 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		119 173 189		A A A
逆回復電荷量 Recovered charge	I_F = 150 A, - di_F/dt = 5300 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		5,84 11,6 14,0		µC µC µC
逆回復損失 Reverse recovery energy	I_F = 150 A, - di_F/dt = 5300 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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			$T_{vj\,op}$	-40		150	°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°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 ms	I_{FRM}	400	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	1620 1530	A²s A²s

電気的特性 / Characteristic Values

			min.	typ.	max.	
順電圧 Forward voltage	I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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 A, - di_F/dt = 5200 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		154 189 200		A A A
逆回復電荷量 Recovered charge	I_F = 150 A, - di_F/dt = 5200 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		6,65 14,9 20,0		µC µC µC
逆回復損失 Reverse recovery energy	I_F = 150 A, - di_F/dt = 5200 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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			$T_{vj\,op}$	-40		150	°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°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 ms	I_{FRM}	400	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	1620 1530	A²s A²s

電気的特性 / Characteristic Values

			min.	typ.	max.	
順電圧 Forward voltage	I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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 A, - di_F/dt = 5800 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		145 189 205		A A A
逆回復電荷量 Recovered charge	I_F = 150 A, - di_F/dt = 5800 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		7,70 15,0 18,7		µC µC µC
逆回復損失 Reverse recovery energy	I_F = 150 A, - di_F/dt = 5800 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°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			$T_{vj\,op}$	-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_{NTC} = 25°C	R_{25}		5,00		kΩ
R100の偏差 Deviation of R100	T_{NTC} = 100°C, R_{100} = 493 Ω	ΔR/R	-5		5	%
損失 Power dissipation	T_{NTC} = 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

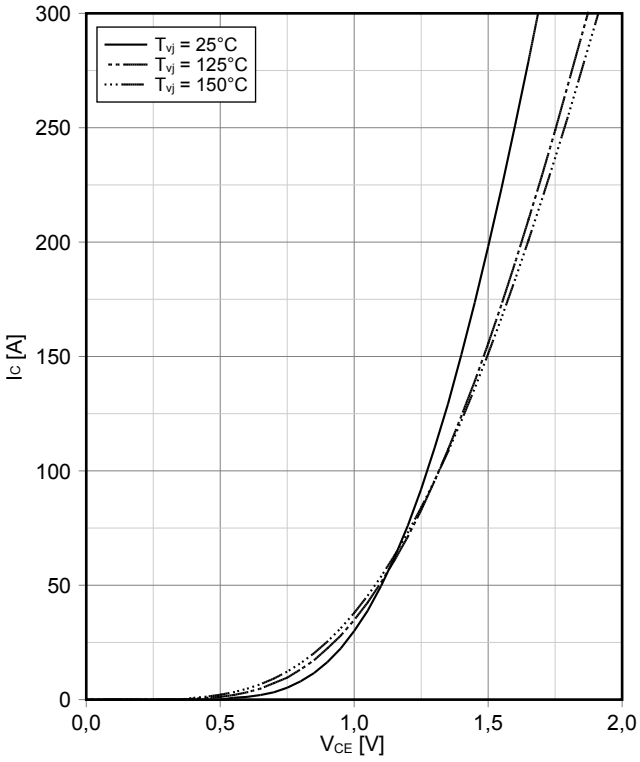
適切なアプリケーションノートによる仕様
Specification according to the valid application note.

モジュール / Module

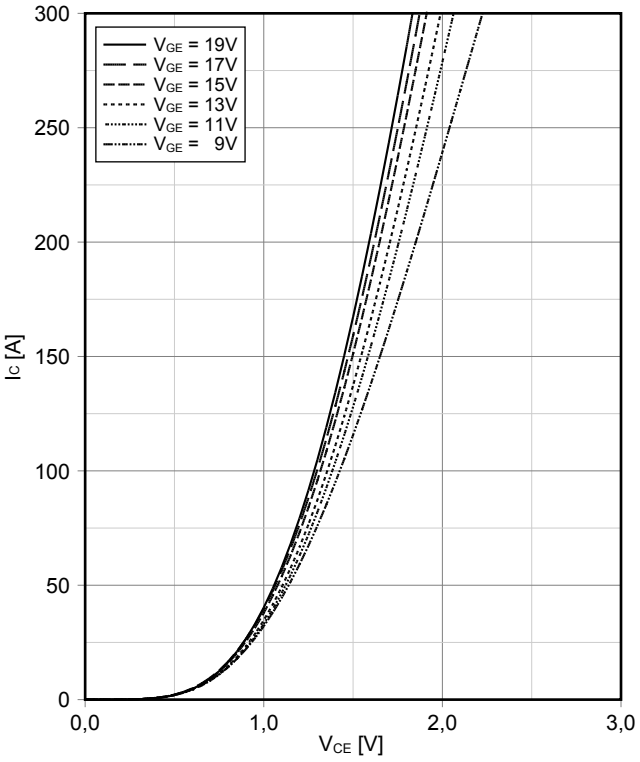
絶縁耐圧 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		3,2		kV
内部絶縁 Internal isolation	基礎絶縁 (クラス1, IEC 61140) basic insulation (class 1, IEC 61140)			Al_2O_3		
沿面距離 Creepage distance	連絡方法 - ヒートシンク / terminal to heatsink 連絡方法 - 連絡方法 / terminal to terminal			9,6 5,8		mm
空間距離 Clearance	連絡方法 - 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 λ_{Paste} = 3.3 W/(m·K) gemessen
IGBT- and diode- RthJH parameters measured with thermal grease of λ_{paste} = 3.3 W/(m·K)

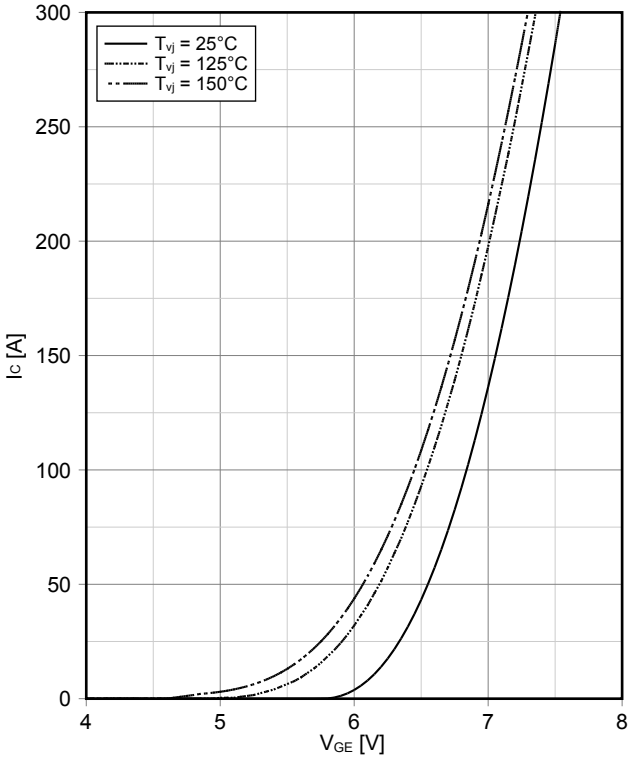
出力特性 IGBT, T1 / T4 (Typical)
output characteristic IGBT, T1 / T4 (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



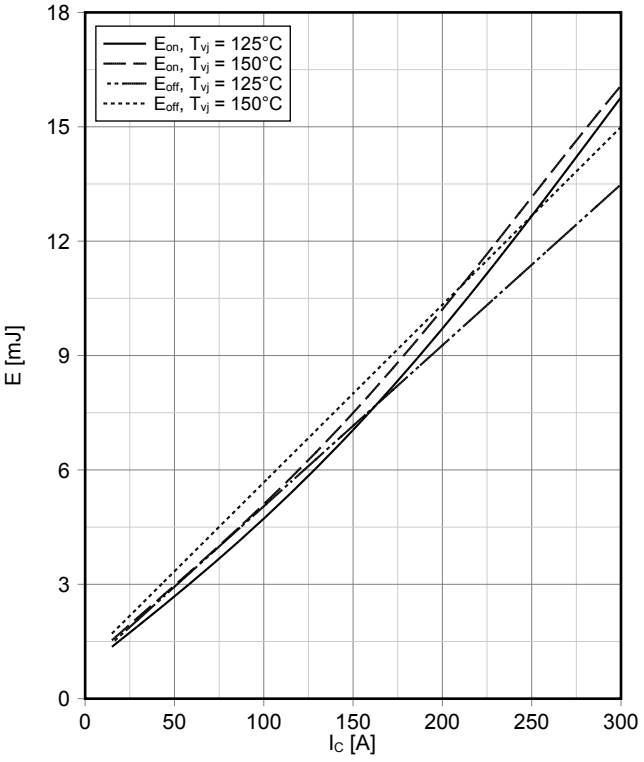
出力特性 IGBT, T1 / T4 (Typical)
output characteristic IGBT, T1 / T4 (typical)
$I_C = f(V_{CE})$
T_{vj} = 150°C



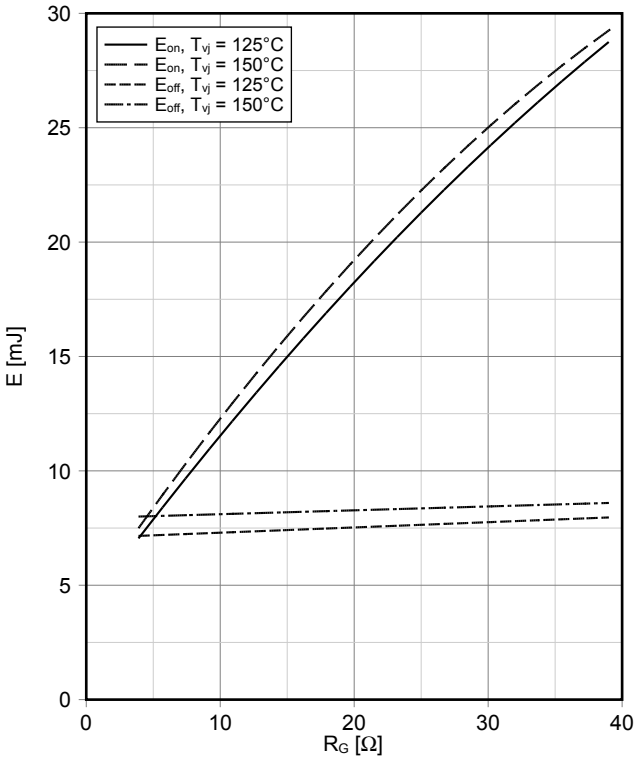
伝達特性 IGBT, T1 / T4 (Typical)
transfer characteristic IGBT, T1 / T4 (typical)
$I_C = f(V_{GE})$
V_{CE} = 20 V



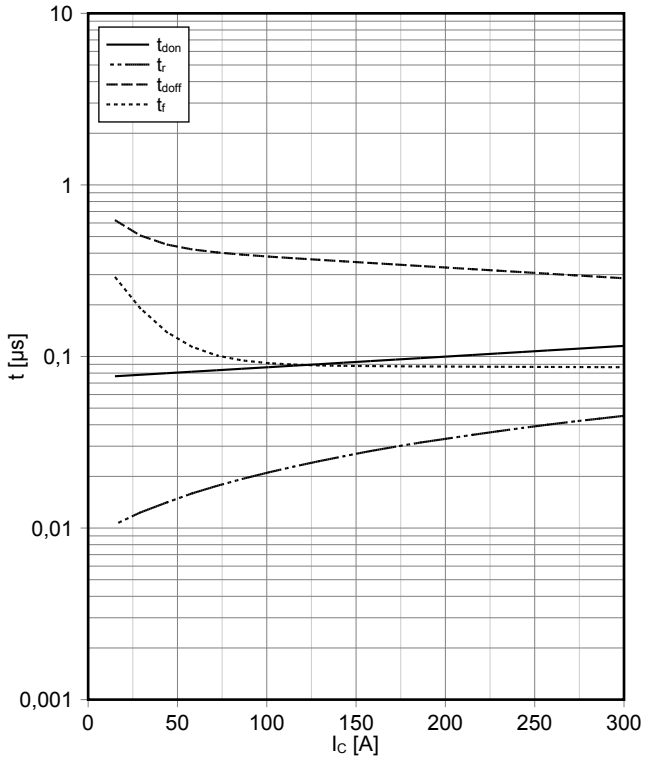
スイッチング損失 IGBT, T1 / T4 (Typical)
switching losses IGBT, T1 / T4 (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 3,9 Ω, R_{Goff} = 3,9 Ω, V_{CE} = 500 V



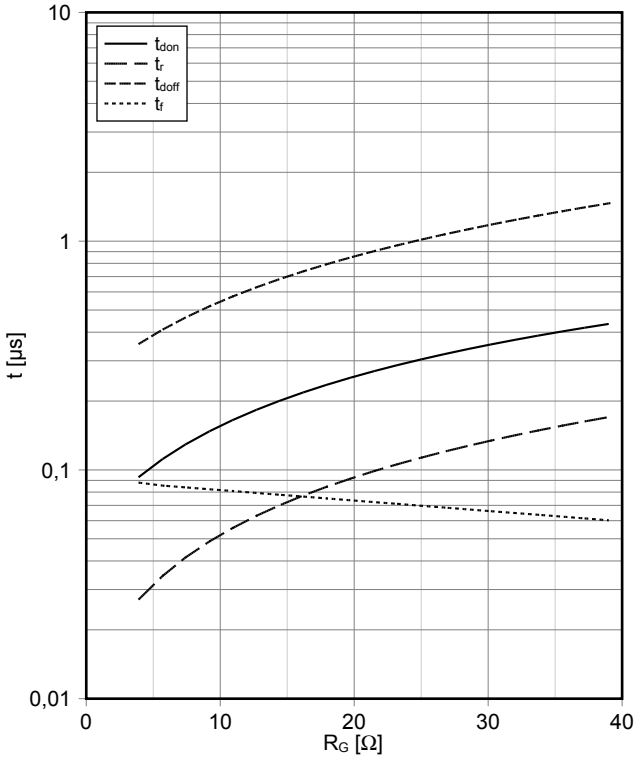
スイッチング損失 IGBT, T1 / T4 (Typical)
switching losses IGBT, T1 / T4 (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 150 A, V_{CE} = 500 V



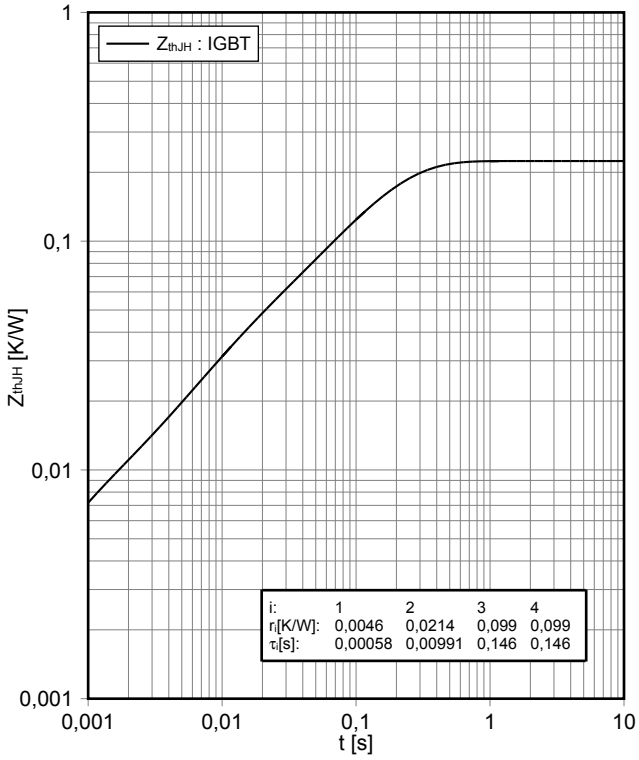
??? IGBT, T1 / T4 (Typical)
switching times IGBT, T1 / T4 (typical)
$t_{don} = f(I_C)$, $t_r = f(I_C)$, $t_{doff} = f(I_C)$, $t_f = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 3,9 Ω, R_{Goff} = 3,9 Ω, V_{CE} = 500 V, T_{vj} = 150 °C



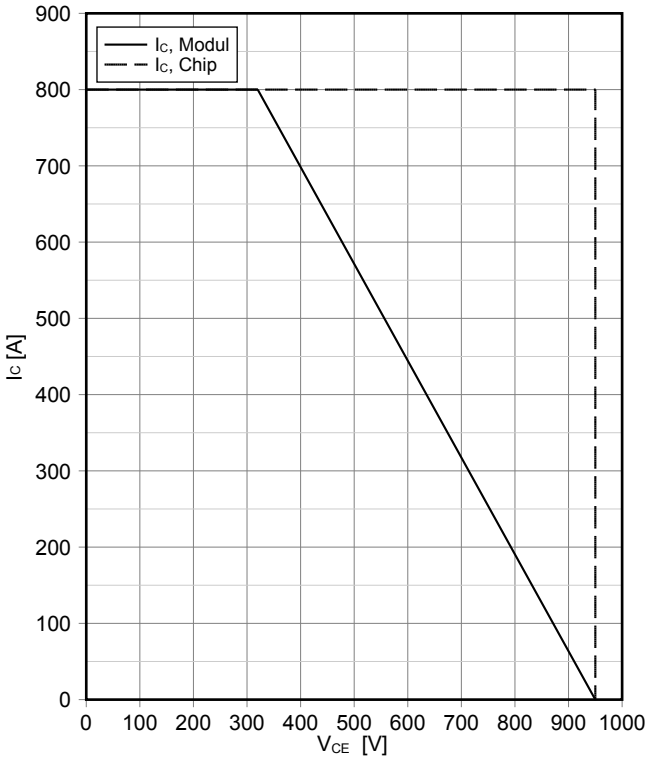
??? IGBT, T1 / T4 (Typical)
switching times IGBT, T1 / T4 (typical)
$t_{don} = f(R_G)$, $t_r = f(R_G)$, $t_{doff} = f(R_G)$, $t_f = f(R_G)$
V_{GE} = ±15 V, I_C = 150 A, V_{CE} = 500 V, T_{vj} = 150 °C



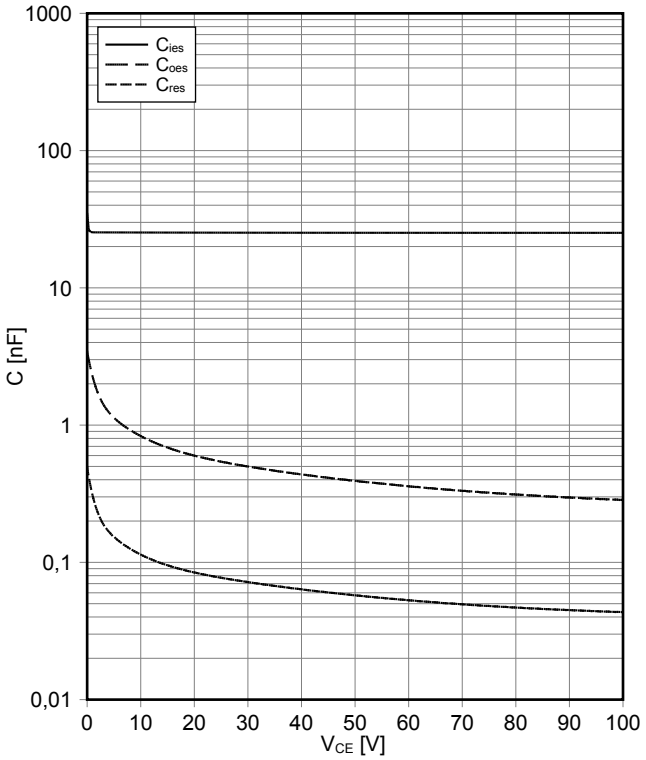
過渡熱インピーダンス IGBT, T1 / T4
transient thermal impedance IGBT, T1 / T4
$Z_{thJH} = f(t)$



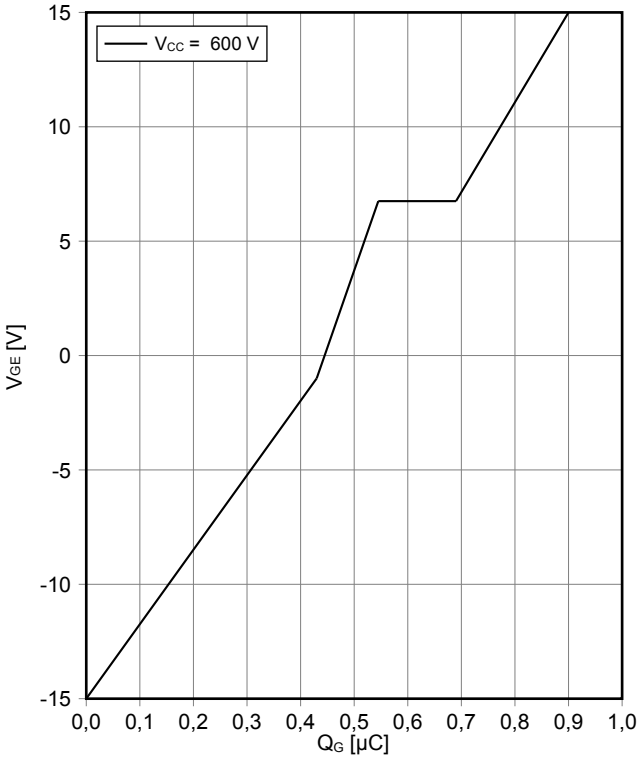
逆バイアス安全動作領域 IGBT, T1 / T4 （ RBSOA ））
reverse bias safe operating area IGBT, T1 / T4 (RBSOA)
$I_C = f(V_{CE})$
V_{GE} = ±15 V, R_{Goff} = 3,9 Ω, T_{vj} = 150°C



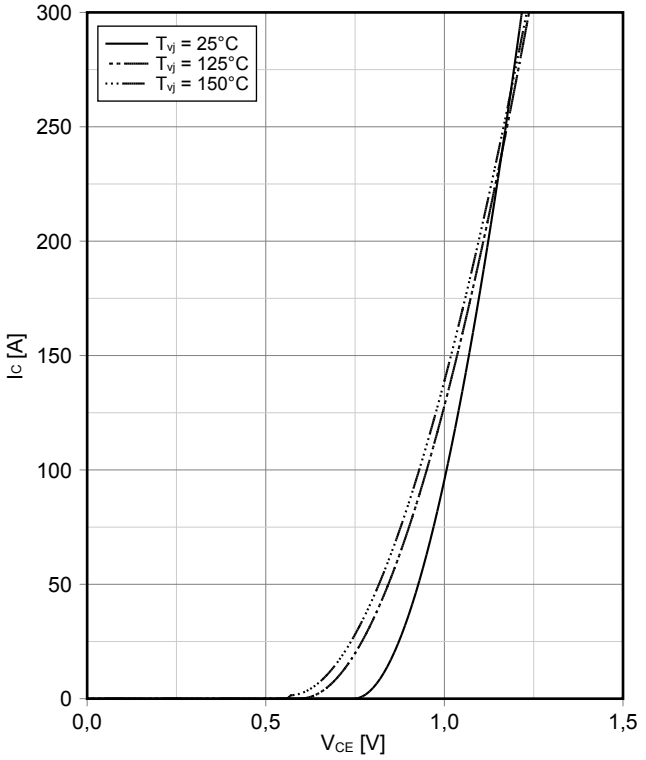
容量特性 IGBT, T1 / T4 (Typical)
capacity characteristic IGBT, T1 / T4 (typical)
$C = f(V_{CE})$
V_{GE} = 0 V, T_{vj} = 25°C, f = 100kHz



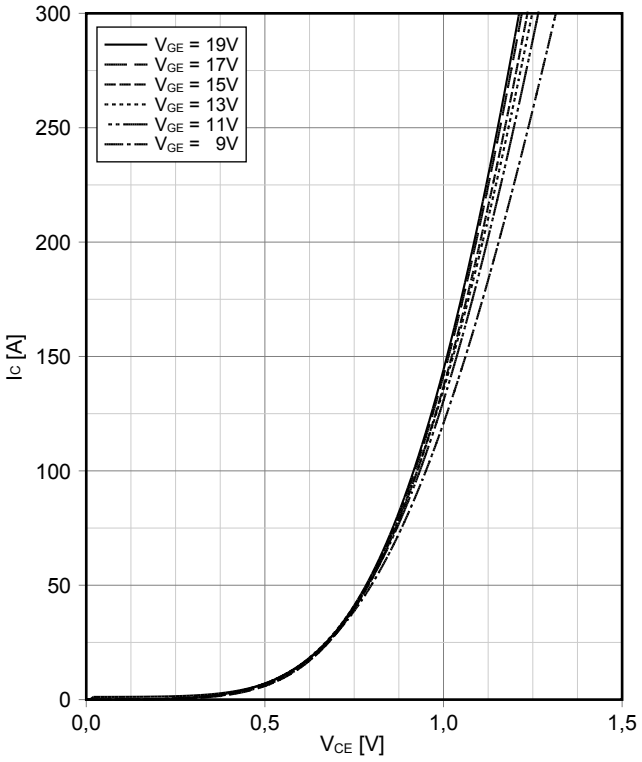
ゲート充電特性 IGBT, T1 / T4 （ 典型）
gate charge characteristic IGBT, T1 / T4 (typical)
$V_{GE} = f(Q_G)$
I_C = 400 A, T_{vj} = 25°C



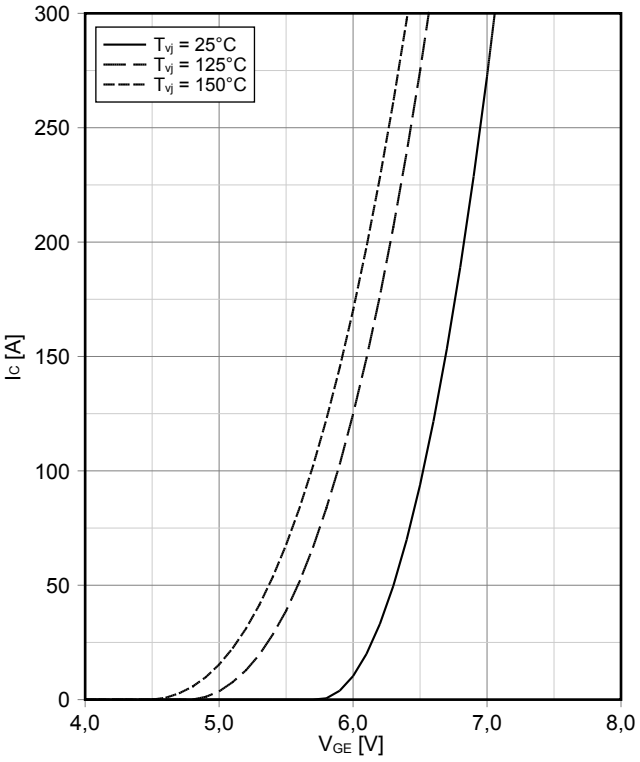
出力特性 IGBT, T2 / T3 (Typical)
output characteristic IGBT, T2 / T3 (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



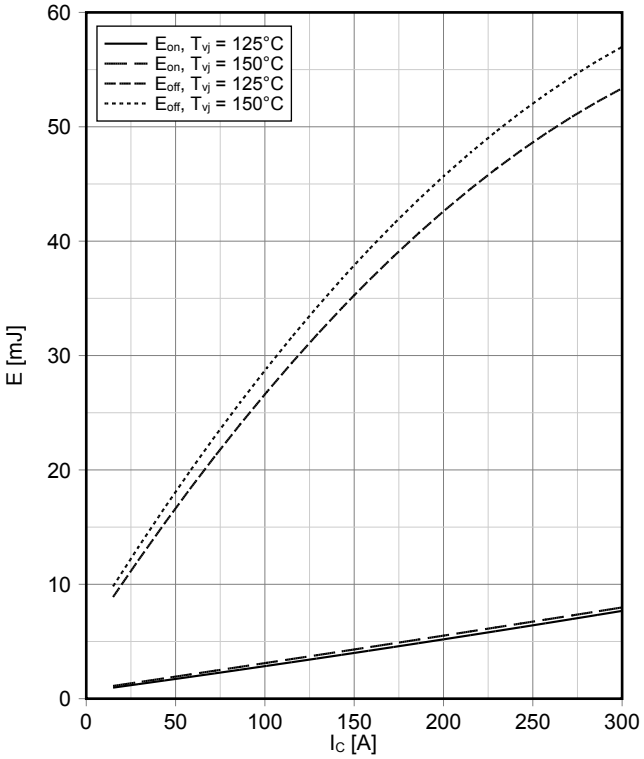
出力特性 IGBT, T2 / T3 (Typical)
output characteristic IGBT, T2 / T3 (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150°C$



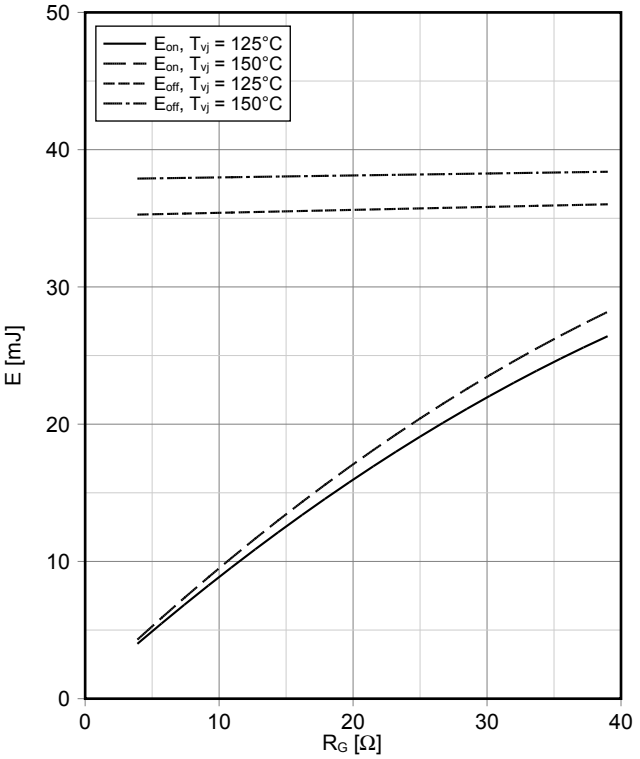
伝達特性 IGBT, T2 / T3 (Typical)
transfer characteristic IGBT, T2 / T3 (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20\ V$



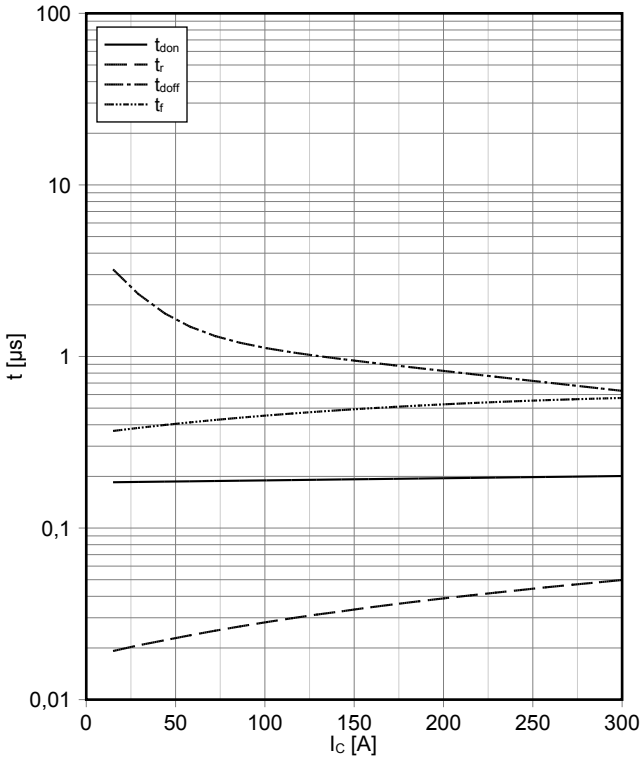
スイッチング損失 IGBT, T2 / T3 (Typical)
switching losses IGBT, T2 / T3 (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm 15\ V$, $R_{Gon} = 3{,}9\ \Omega$, $R_{Goff} = 3{,}9\ \Omega$, $V_{CE} = 500\ V$



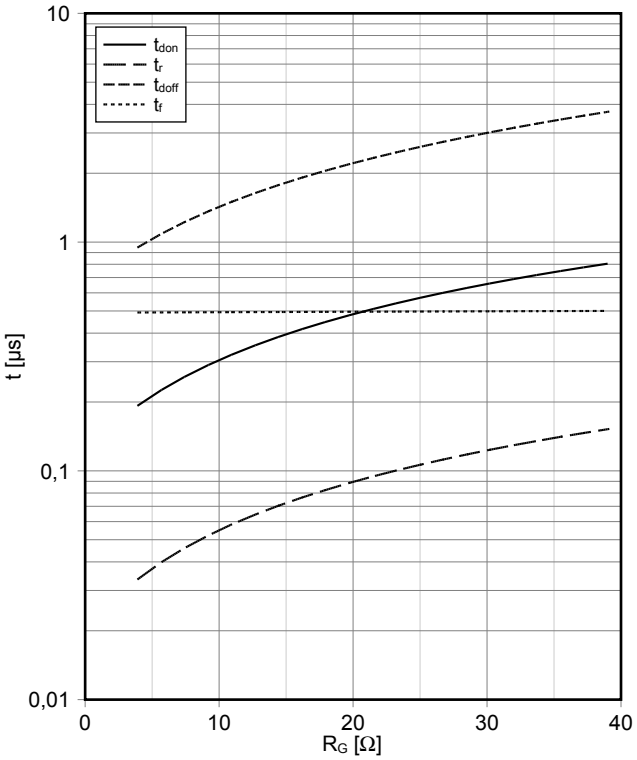
スイッチング損失 IGBT, T2 / T3 (Typical)
switching losses IGBT, T2 / T3 (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm 15\ V$, $I_C = 150\ A$, $V_{CE} = 500\ V$



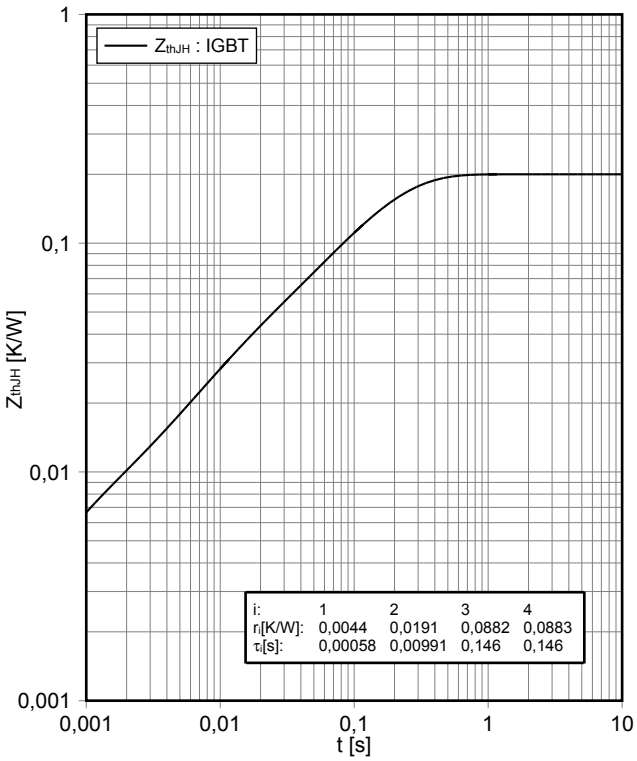
??? IGBT, T2 / T3 (Typical)
switching times IGBT, T2 / T3 (typical)
$t_{don} = f(I_C)$, $t_r = f(I_C)$, $t_{doff} = f(I_C)$, $t_f = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 3,9 Ω, R_{Goff} = 3,9 Ω, V_{CE} = 500 V, T_{vj} = 150 °C



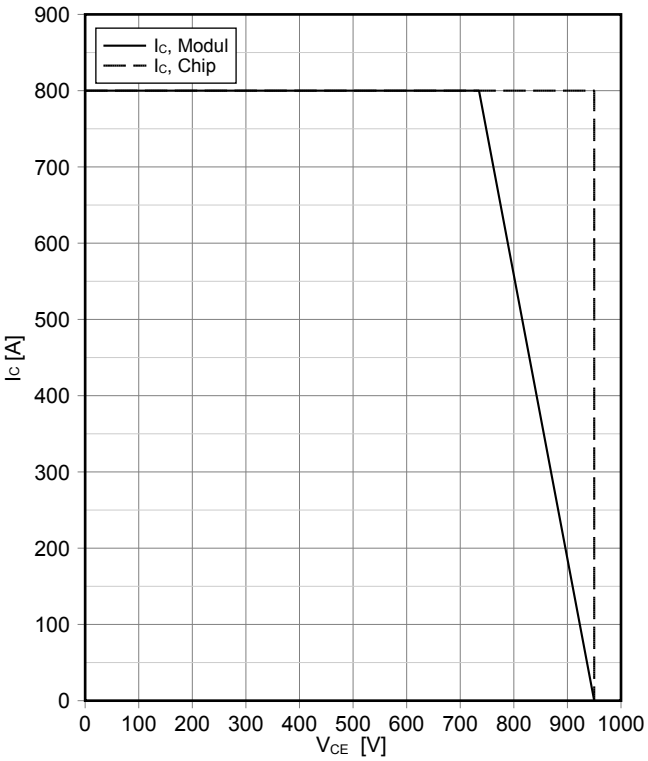
??? IGBT, T2 / T3 (Typical)
switching times IGBT, T2 / T3 (typical)
$t_{don} = f(R_G)$, $t_r = f(R_G)$, $t_{doff} = f(R_G)$, $t_f = f(R_G)$
V_{GE} = ±15 V, I_C = 300 A, V_{CE} = 500 V, T_{vj} = 150 °C



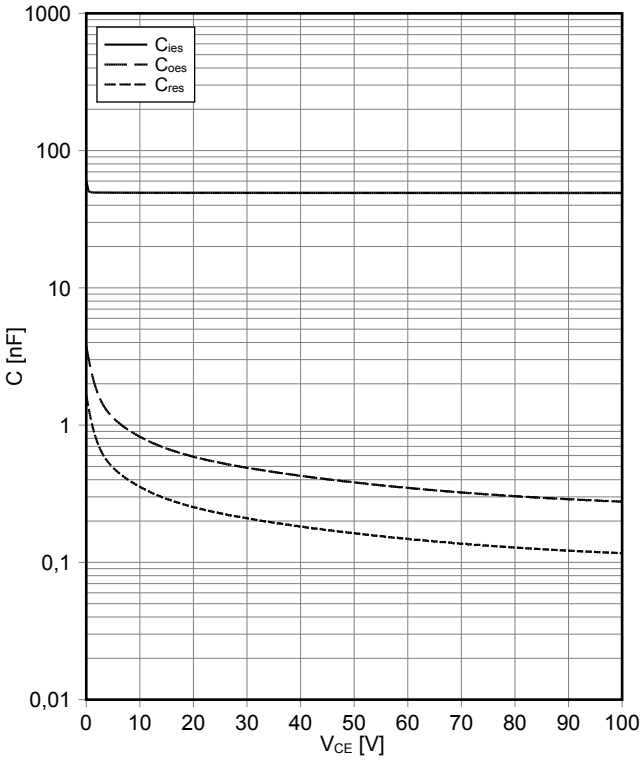
過渡熱インピーダンス IGBT, T2 / T3
transient thermal impedance IGBT, T2 / T3
$Z_{thJH} = f(t)$



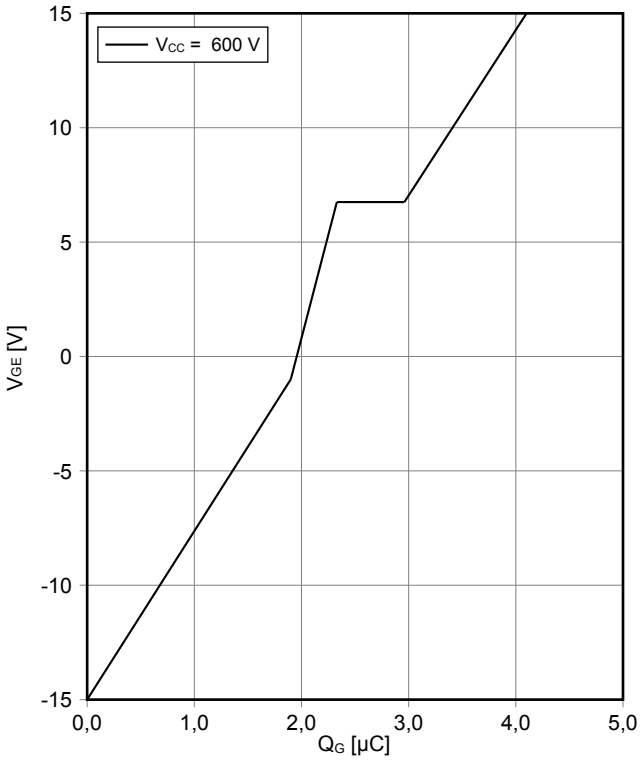
逆バイアス安全動作領域 IGBT, T2 / T3（RBSOA）)
reverse bias safe operating area IGBT, T2 / T3 (RBSOA)
$I_C = f(V_{CE})$
V_{GE} = ±15 V, R_{Goff} = 3,9 Ω, T_{vj} = 150°C



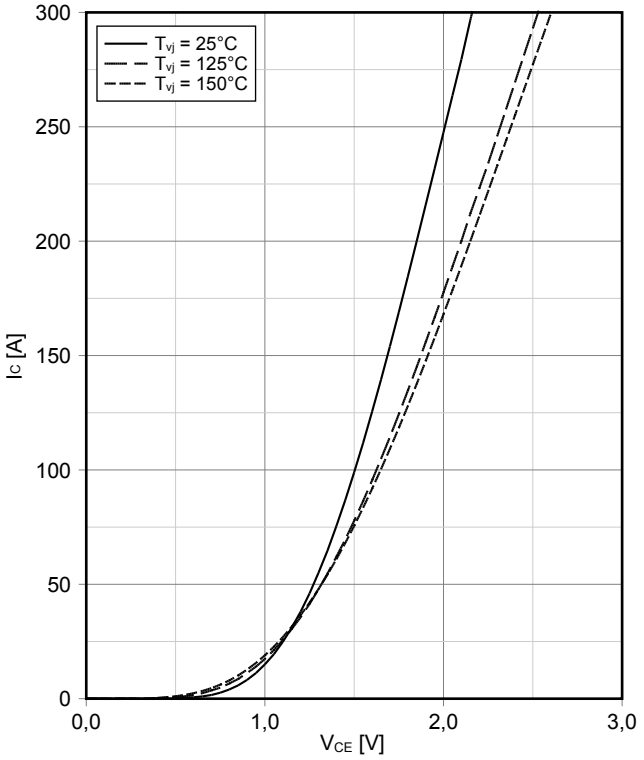
容量特性 IGBT, T2 / T3 (Typical)
capacity characteristic IGBT, T2 / T3 (typical)
$C = f(V_{CE})$
V_{GE} = 0 V, T_{vj} = 25°C, f = 100kHz



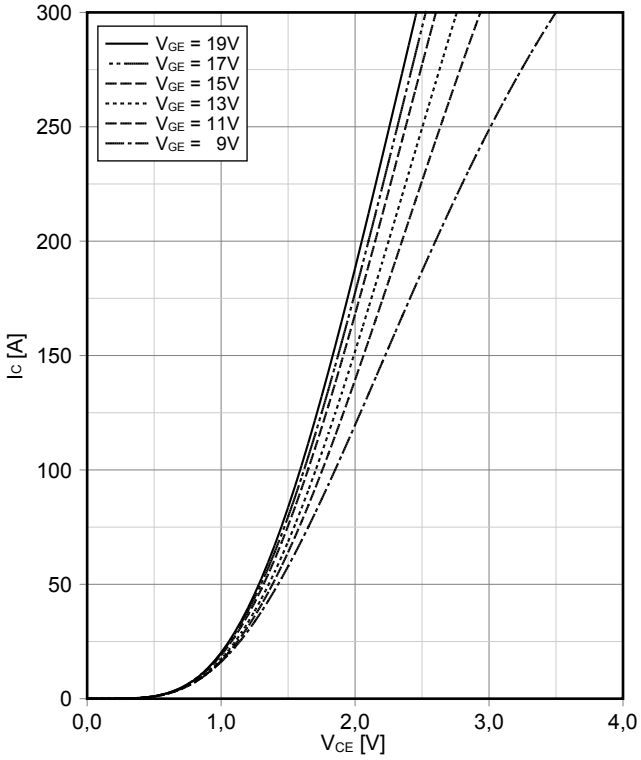
ゲート充電特性 IGBT, T2 / T3 （典型）
gate charge characteristic IGBT, T2 / T3 (typical)
$V_{GE} = f(Q_G)$
I_C = 400 A, T_{vj} = 25°C



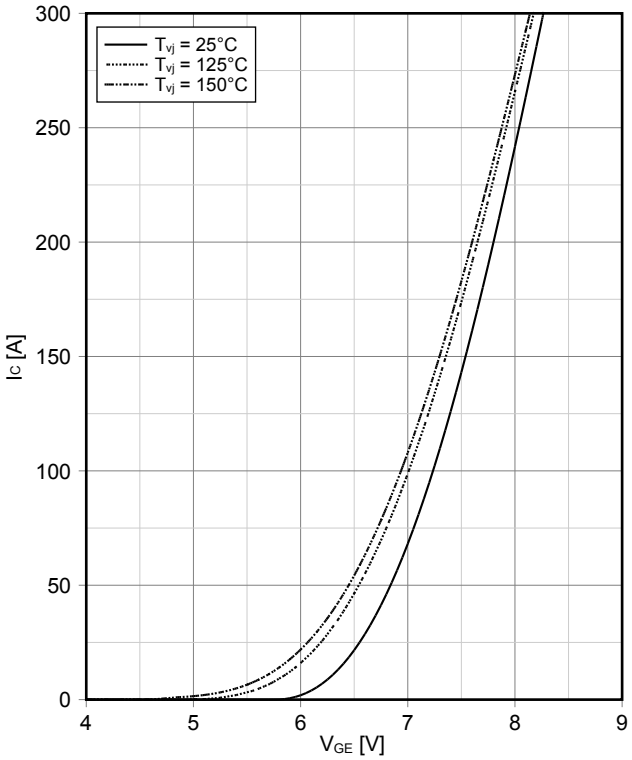
出力特性 IGBT, T5 / T6 (Typical)
output characteristic IGBT, T5 / T6 (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



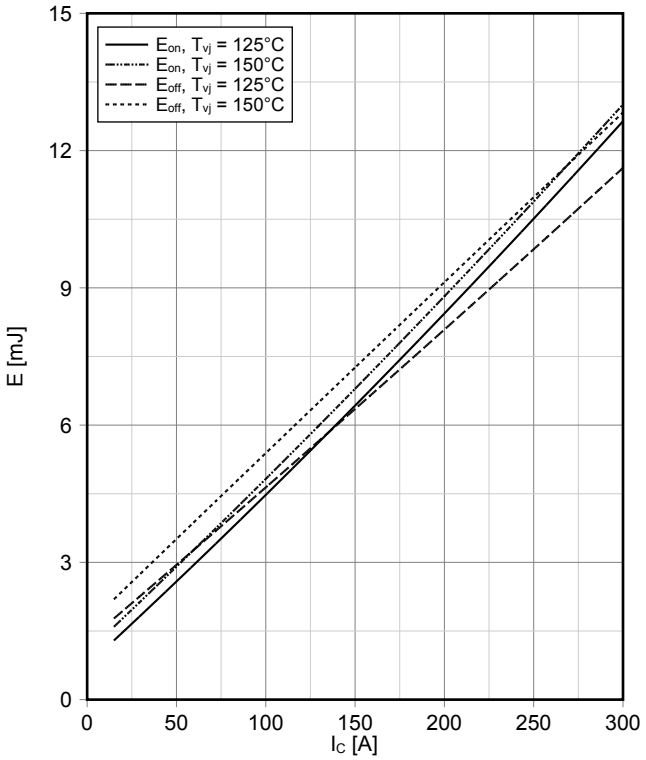
出力特性 IGBT, T5 / T6 (Typical)
output characteristic IGBT, T5 / T6 (typical)
$I_C = f(V_{CE})$
T_{vj} = 150°C



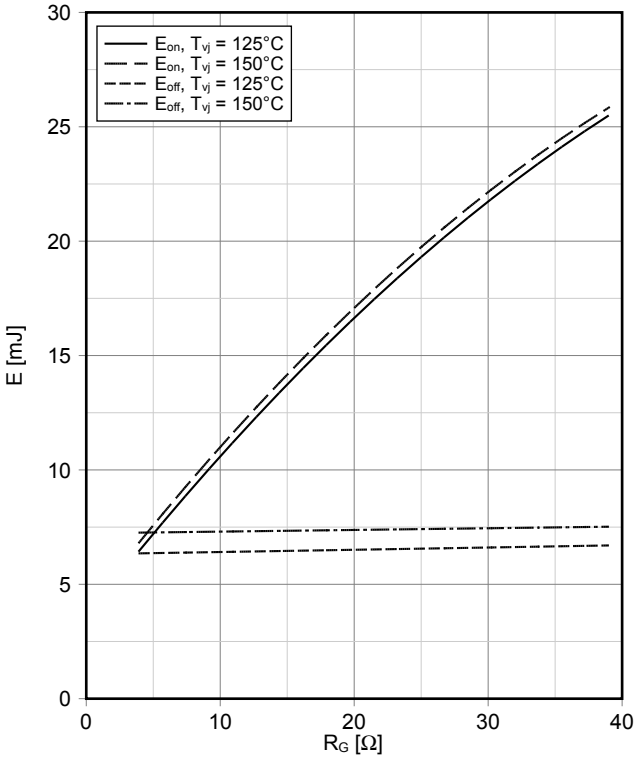
伝達特性 IGBT, T5 / T6 (Typical)
transfer characteristic IGBT, T5 / T6 (typical)
$I_C = f(V_{GE})$
V_{CE} = 20 V



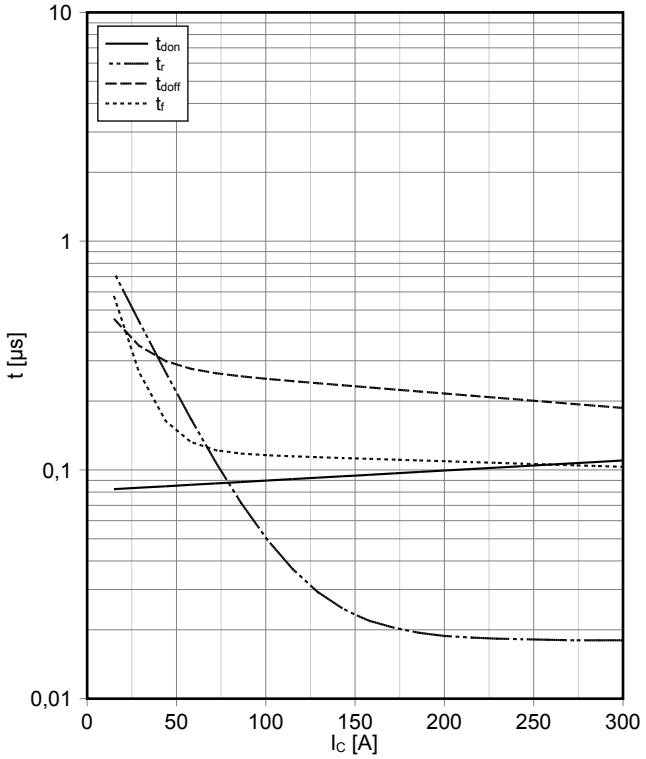
スイッチング損失 IGBT, T5 / T6 (Typical)
switching losses IGBT, T5 / T6 (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 3,9 Ω, R_{Goff} = 3,9 Ω, V_{CE} = 500 V



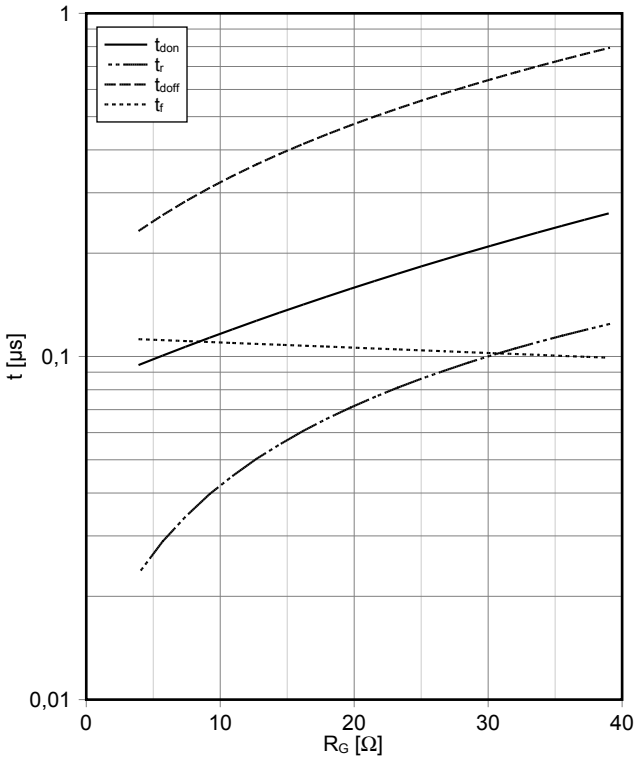
スイッチング損失 IGBT, T5 / T6 (Typical)
switching losses IGBT, T5 / T6 (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 150 A, V_{CE} = 500 V



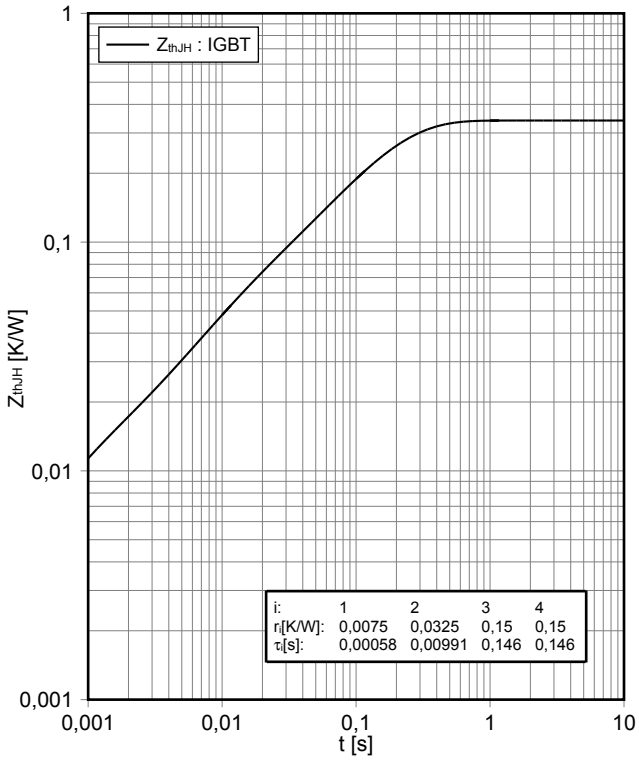
??? IGBT, T5 / T6 (Typical)
switching times IGBT, T5 / T6 (typical)
$t_{don} = f(I_C)$, $t_r = f(I_C)$, $t_{doff} = f(I_C)$, $t_f = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 3,9 Ω, R_{Goff} = 3,9 Ω, V_{CE} = 500 V, T_{vj} = 150 °C



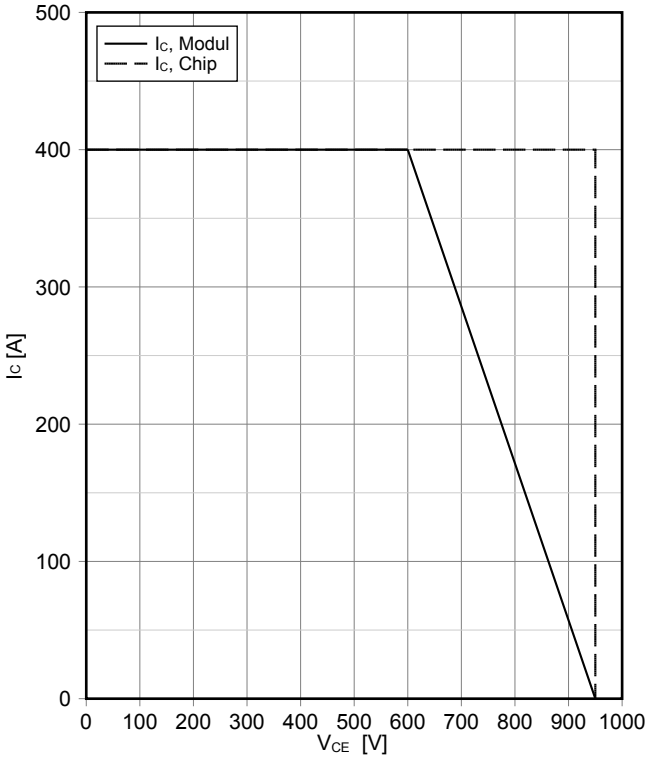
??? IGBT, T5 / T6 (Typical)
switching times IGBT, T5 / T6 (typical)
t_{don} = f (R_G), t_r = f (R_G), t_{doff} = f (R_G), t_f = f (R_G)
V_{GE} = ±15 V, I_C = 150 A, V_{CE} = 500 V, T_{vj} = 150 °C



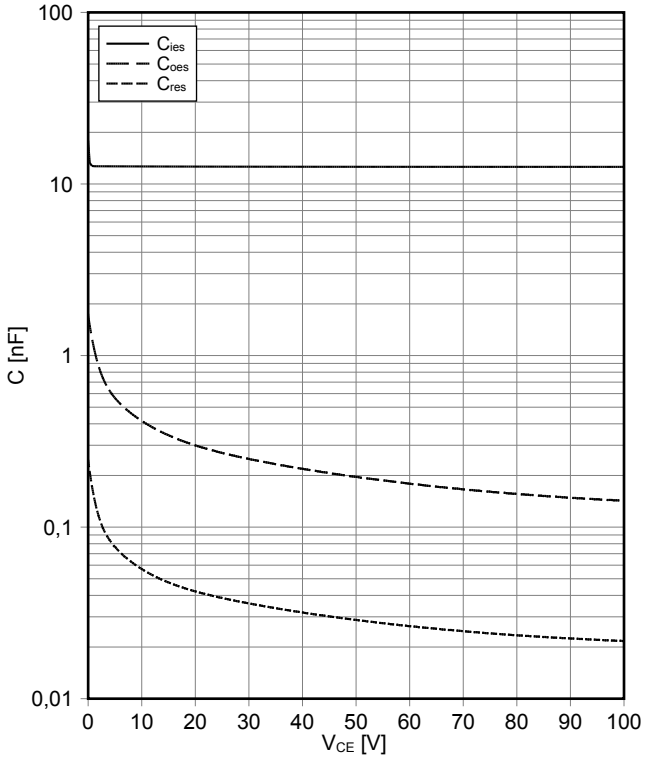
過渡熱インピーダンス IGBT, T5 / T6
transient thermal impedance IGBT, T5 / T6
Z_{thJH} = f (t)



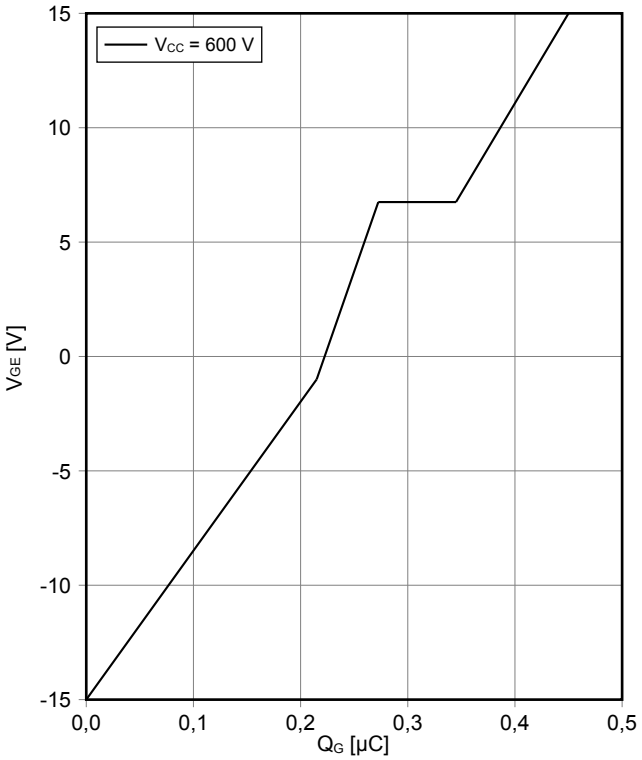
逆バイアス安全動作領域 IGBT, T5 / T6 （ RBSOA ）)
reverse bias safe operating area IGBT, T5 / T6 (RBSOA)
I_C = f (V_{CE})
V_{GE} = ±15 V, R_{Goff} = 3,9 Ω, T_{vj} = 150°C



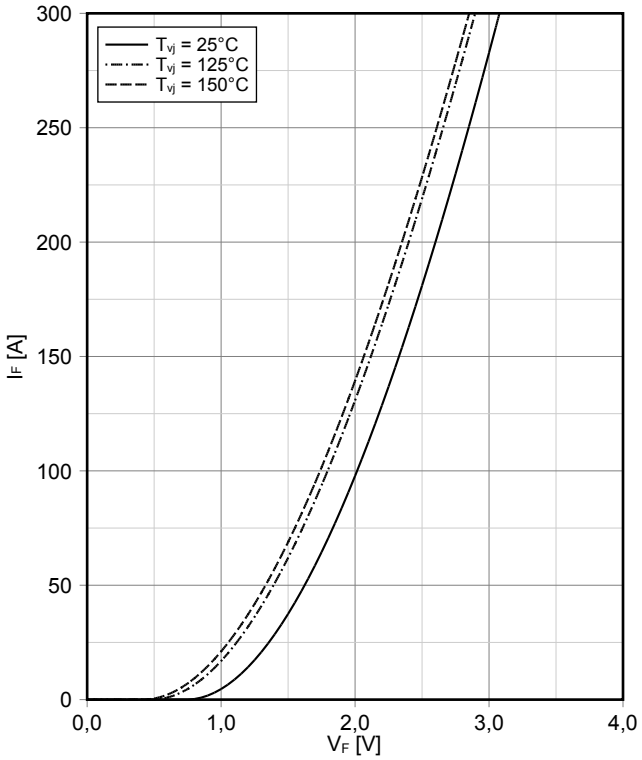
容量特性 IGBT, T5 / T6 (Typical)
capacity characteristic IGBT, T5 / T6 (typical)
C = f(V_{CE})
V_{GE} = 0 V, T_{vj} = 25°C, f = 100kHz



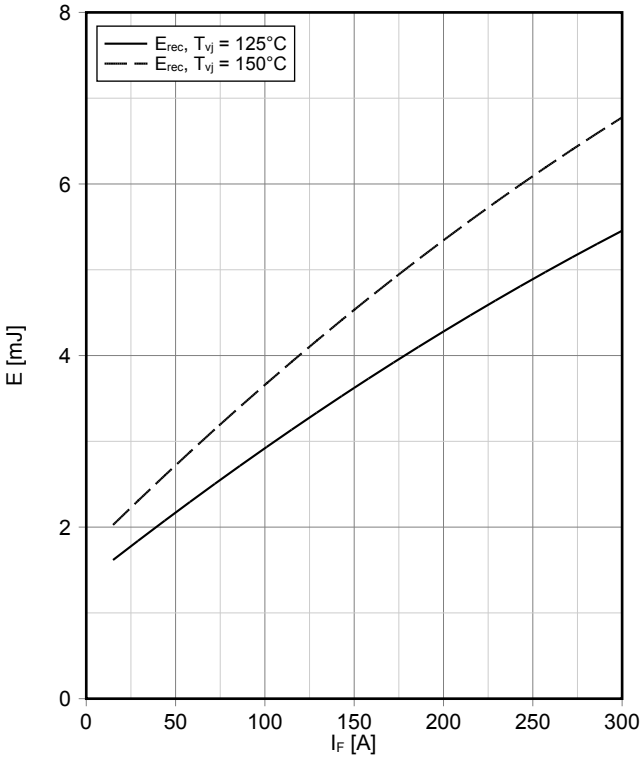
ゲート充電特性 IGBT, T5 / T6 （典型）
gate charge characteristic IGBT, T5 / T6 (typical)
$V_{GE} = f(Q_G)$
I_C = 200 A, T_{vj} = 25°C



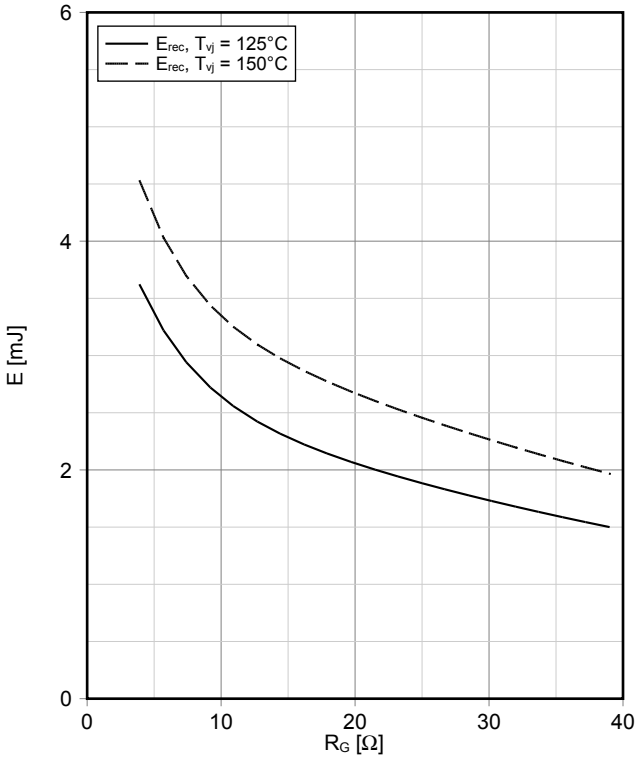
順電圧特性 ダイオード, D1 / D4 （typical)
forward characteristic of Diode, D1 / D4 (typical)
$I_F = f(V_F)$



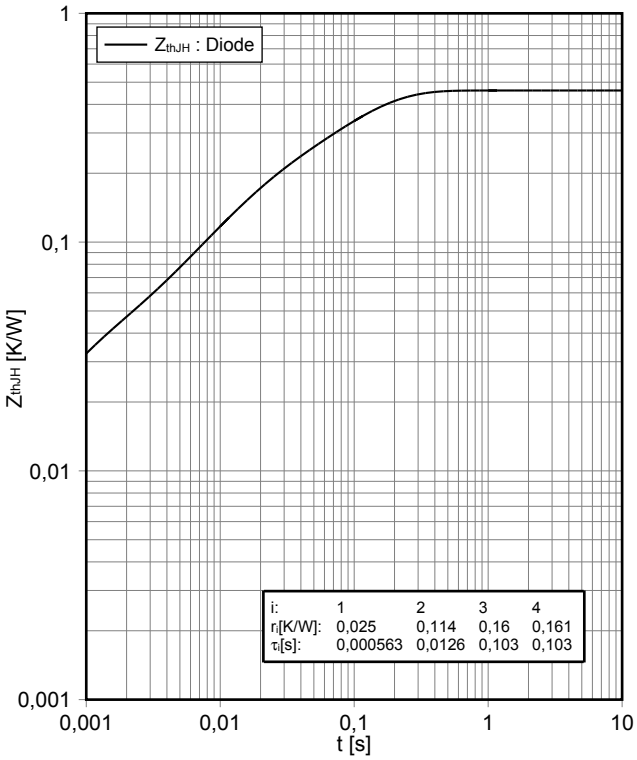
スイッチング損失 ダイオード, D1 / D4 (Typical)
switching losses Diode, D1 / D4 (typical)
$E_{rec} = f(I_F)$
R_{Gon} = 3,9 Ω, V_{CE} = 500 V



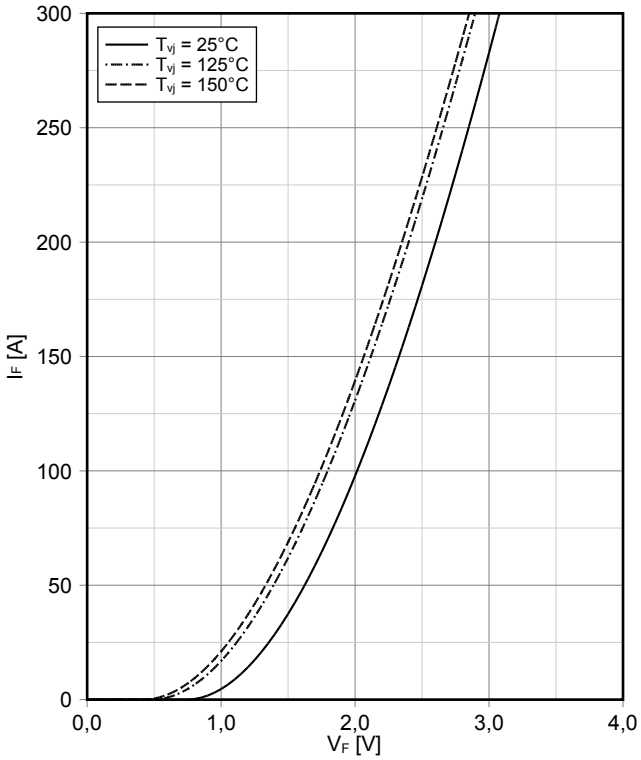
スイッチング損失 ダイオード, D1 / D4 (Typical)
switching losses Diode, D1 / D4 (typical)
$E_{rec} = f(R_G)$
I_F = 150 A, V_{CE} = 500 V



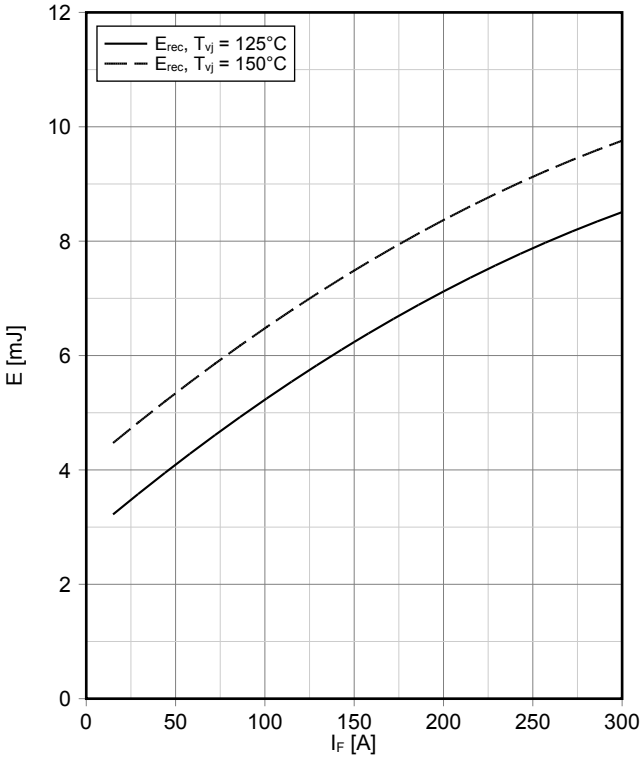
過渡熱インピーダンス ダイオード, D1 / D4
transient thermal impedance Diode, D1 / D4
$Z_{thJH} = f(t)$



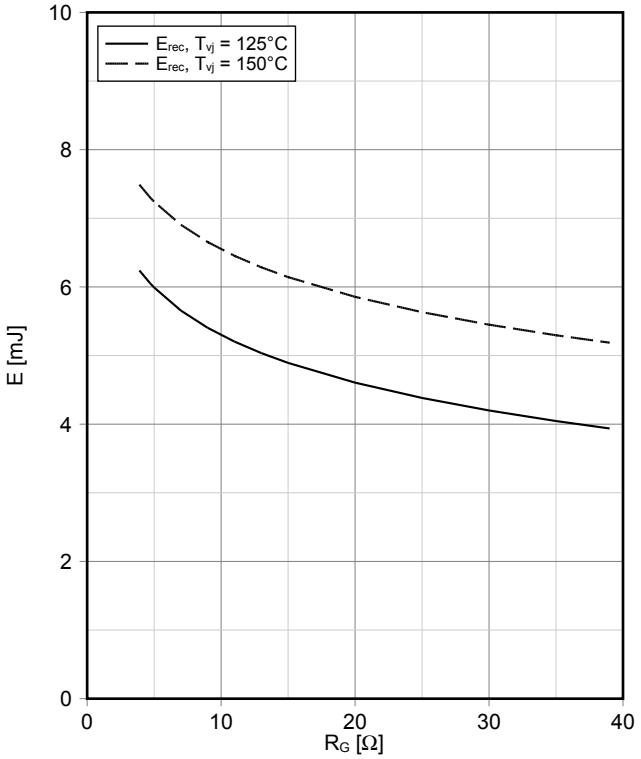
順電圧特性 ダイオード, D2 / D3 （typical)
forward characteristic of Diode, D2 / D3 (typical)
$I_F = f(V_F)$



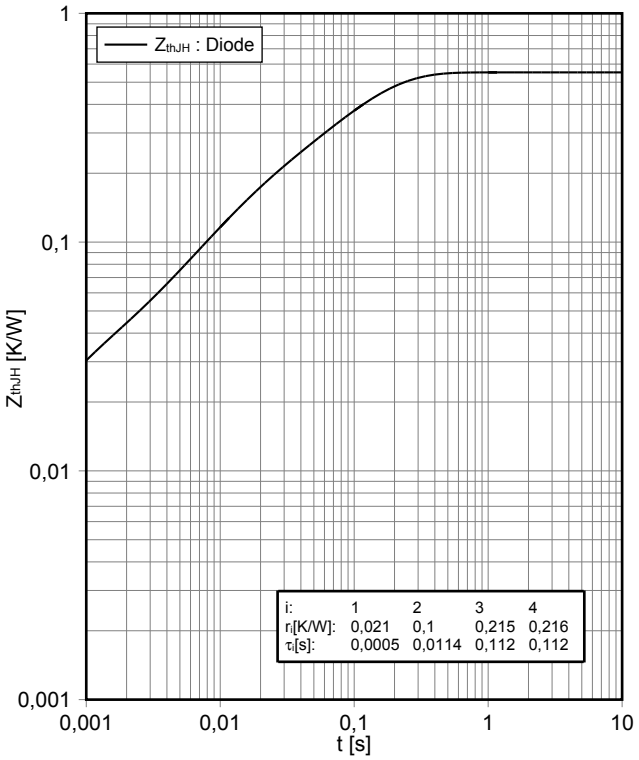
スイッチング損失 ダイオード, D2 / D3 (Typical)
switching losses Diode, D2 / D3 (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 3{,}9\ \Omega$, $V_{CE} = 500$ V



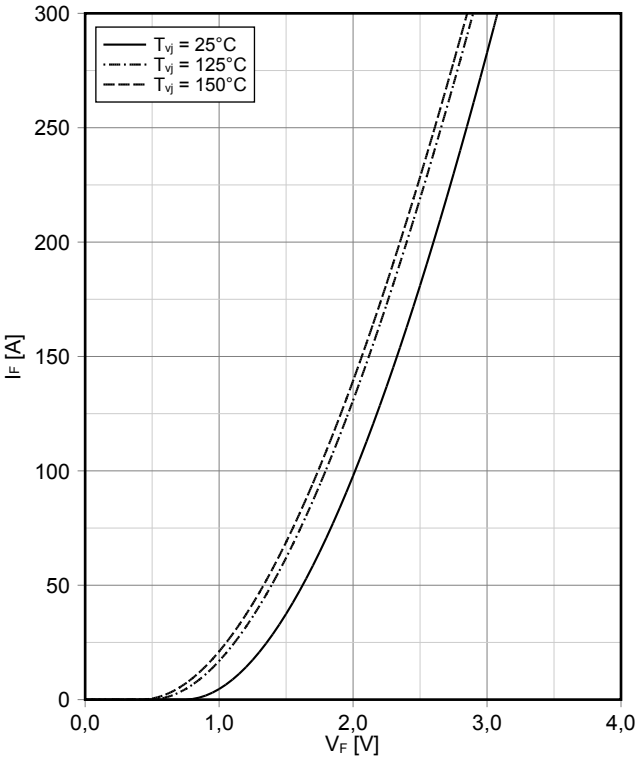
スイッチング損失 ダイオード, D2 / D3 (Typical)
switching losses Diode, D2 / D3 (typical)
$E_{rec} = f(R_G)$
$I_F = 150$ A, $V_{CE} = 500$ V



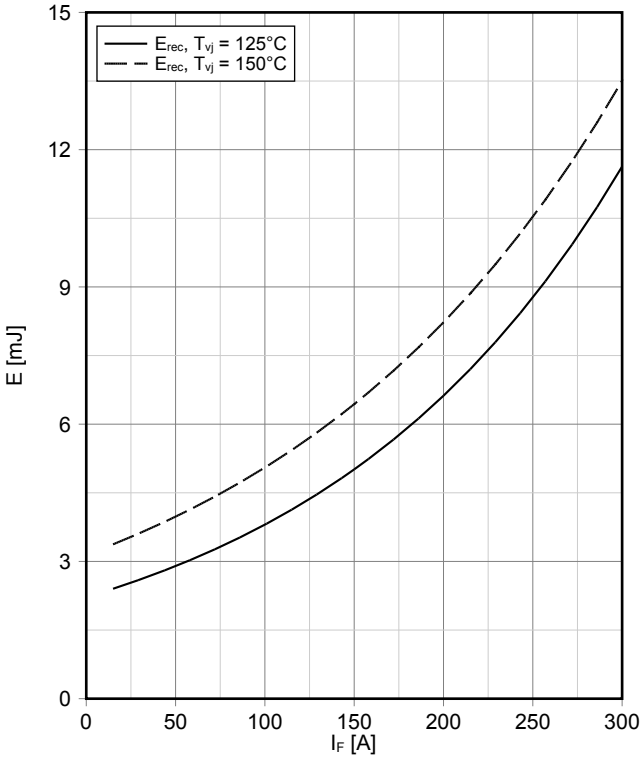
過渡熱インピーダンス ダイオード, D2 / D3
transient thermal impedance Diode, D2 / D3
$Z_{thJH} = f(t)$



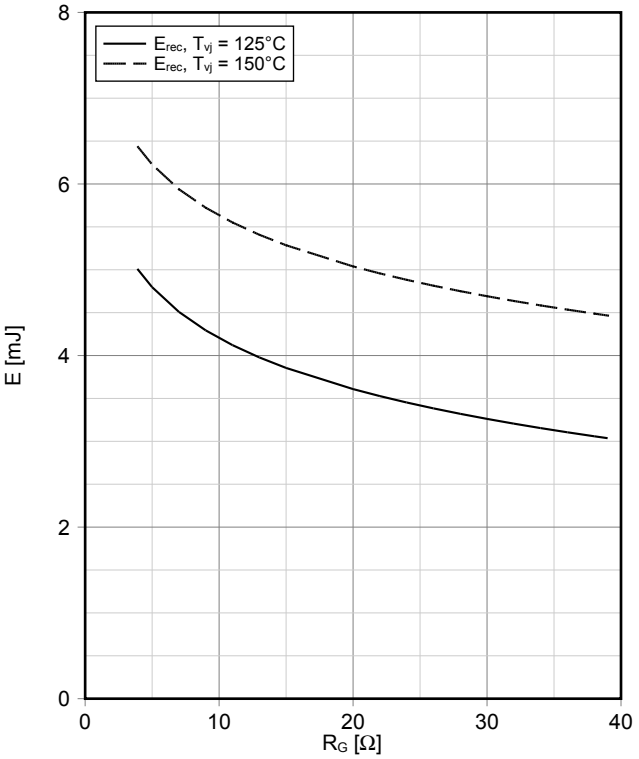
順電圧特性 ダイオード、D5-D6 (typical)
forward characteristic of Diode, D5-D6 (typical)
$I_F = f(V_F)$



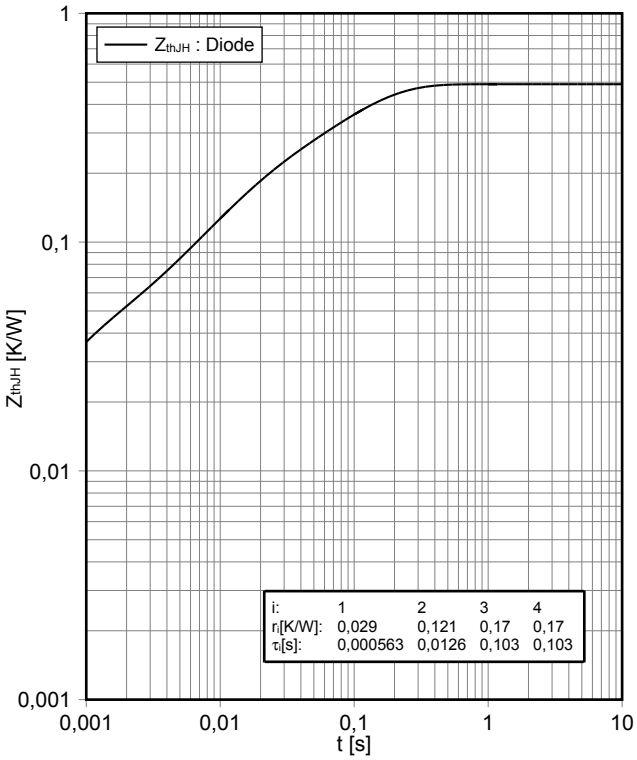
スイッチング損失 ダイオード、D5-D6 (Typical)
switching losses Diode, D5-D6 (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 3{,}9\ \Omega$, $V_{CE} = 500$ V



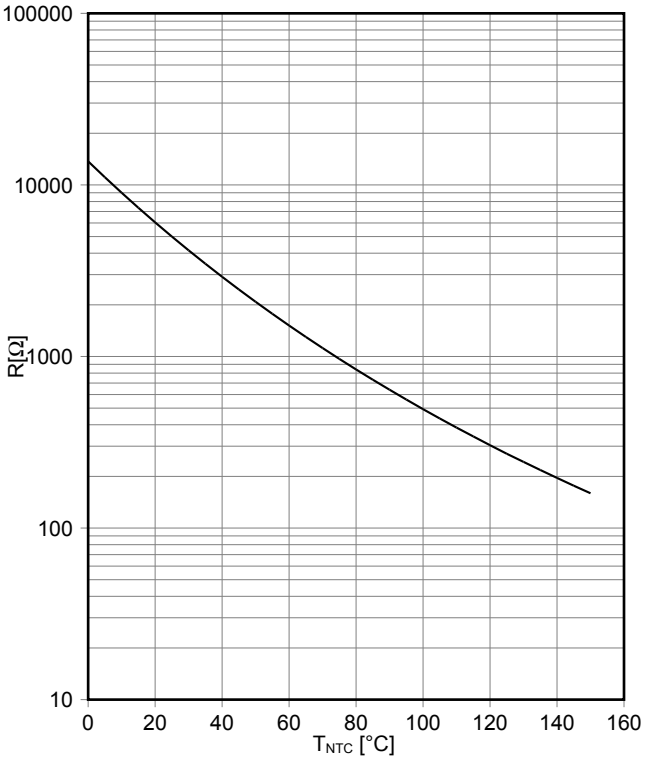
スイッチング損失 ダイオード、D5-D6 (Typical)
switching losses Diode, D5-D6 (typical)
$E_{rec} = f(R_G)$
$I_F = 150$ A, $V_{CE} = 500$ V



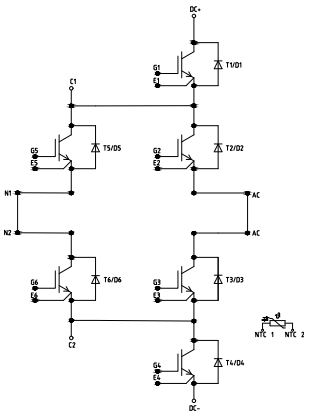
過渡熱インピーダンス ダイオード、D5-D6
transient thermal impedance Diode, D5-D6
$Z_{thJH} = f(t)$



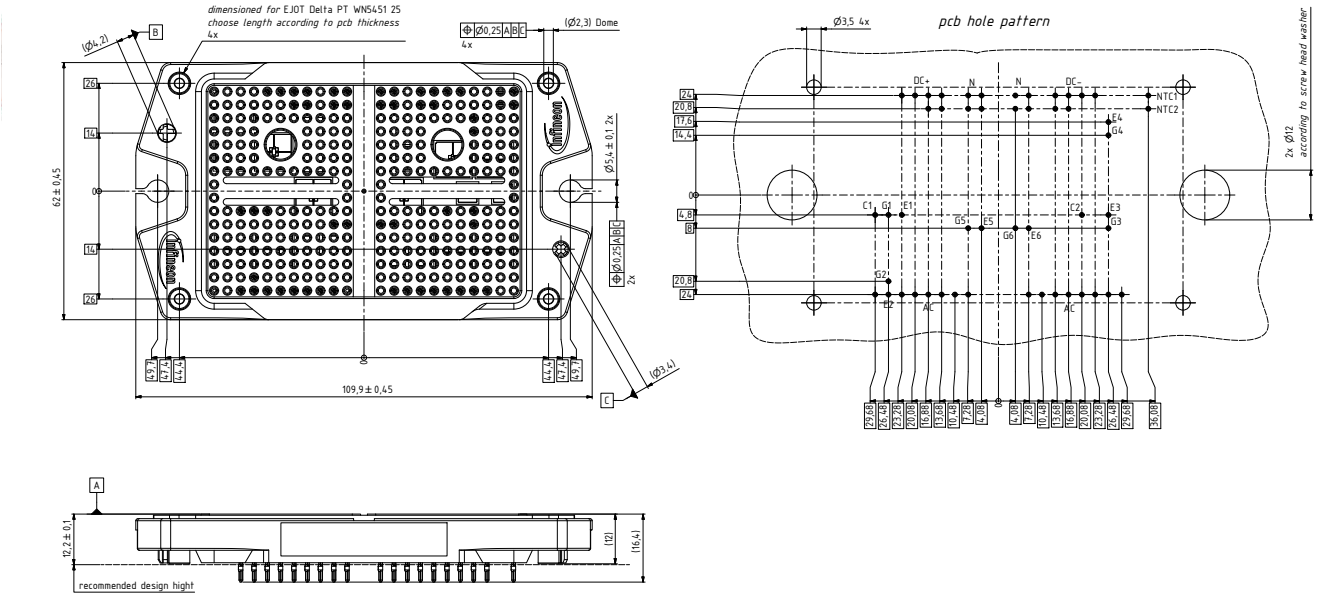
NTC-サーミスタ サーミスタの温度特性
NTC-Thermistor-temperature characteristic (typical)
$R = f(T_{NTC})$



回路図 / Circuit diagram



パッケージ概要 / Package outlines



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