

EasyPACK™ module with TRENCHSTOP™ 5 and Emitter Controlled 3 diode and PressFIT / NTC**Features**

- Electrical features
 - $V_{CES} = 650\text{ V}$
 - $I_{C\text{ nom}} = 200\text{ A} / I_{CRM} = 400\text{ A}$
 - Low switching losses
- Mechanical features
 - Al_2O_3 substrate with low thermal resistance
 - Compact design
 - PressFIT contact technology
 - Integrated NTC temperature sensor
 - High power density

**Potential applications**

- Solar applications
- 3-level-applications

Product validation

- Qualified for industrial applications according to the relevant tests of IEC 60747, 60749 and 60068

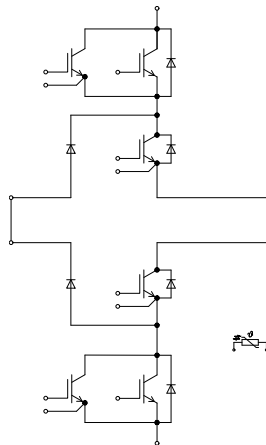
Description

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1 Package

1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f = 50 \text{ Hz}$, $t = 1 \text{ min}$	3.2	kV
Internal Isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Creepage distance	d_{Creep}	terminal to heatsink	11.2	mm
Creepage distance	d_{Creep}	terminal to terminal	6.8	mm
Clearance	d_{Clear}	terminal to heatsink	9.4	mm
Clearance	d_{Clear}	terminal to terminal	5.5	mm
Comparative tracking index	CTI		> 400	
RTI Elec.	RTI	housing	140	°C

Table 2 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray inductance module	L_{sCE}			12		nH
Storage temperature	T_{stg}		-40		125	°C
Mounting torque for modul mounting	M	- Mounting according to valid application note	1.3		1.5	Nm
Weight	G			78		g

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

2 IGBT, T1.1 / T1.2 / T4.1 / T4.2

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Collector-emitter voltage	V_{CES}	$T_{vj} = 25 \text{ °C}$	650	V
Implemented collector current	I_{CN}		200	A
Continous DC collector current	I_{CDC}	$T_{vj \text{ max}} = 175 \text{ °C}$ $T_H = 65 \text{ °C}$	130	A
Repetitive peak collector current	I_{CRM}	$t_P = 1 \text{ ms}$	400	A
Gate-emitter peak voltage	V_{GES}		±20	V

Table 4 **Characteristic values**

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\ sat}$	$I_C = 100\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$		1.17	1.50	V
			$T_{vj} = 125\ ^\circ C$		1.20		
			$T_{vj} = 150\ ^\circ C$		1.21		
Gate threshold voltage	V_{GEth}	$I_C = 2\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$		3.25	4	4.75	V
Gate charge	Q_G	$V_{GE} = \pm 15\ V, V_{CE} = 400\ V$			0.84		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$			0		Ω
Input capacitance	C_{ies}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			14.3		nF
Reverse transfer capacitance	C_{res}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			0.05		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$			0.019	mA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0\ V, V_{GE} = 20\ V, T_{vj} = 25\ ^\circ C$				100	nA
Turn-on delay time (inductive load)	t_{don}	$I_C = 100\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 4.7\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.022		μs
			$T_{vj} = 125\ ^\circ C$		0.021		
			$T_{vj} = 150\ ^\circ C$		0.021		
Rise time (inductive load)	t_r	$I_C = 100\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 4.7\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.013		μs
			$T_{vj} = 125\ ^\circ C$		0.015		
			$T_{vj} = 150\ ^\circ C$		0.015		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 100\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 4.7\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.117		μs
			$T_{vj} = 125\ ^\circ C$		0.145		
			$T_{vj} = 150\ ^\circ C$		0.158		
Fall time (inductive load)	t_f	$I_C = 100\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 4.7\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.044		μs
			$T_{vj} = 125\ ^\circ C$		0.046		
			$T_{vj} = 150\ ^\circ C$		0.047		
Turn-on energy loss per pulse	E_{on}	$I_C = 100\ A, V_{CE} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 4.7\ \Omega, di/dt = 12.5\ kA/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		1		mJ
			$T_{vj} = 125\ ^\circ C$		1.4		
			$T_{vj} = 150\ ^\circ C$		1.49		
Turn-off energy loss per pulse	E_{off}	$I_C = 100\ A, V_{CE} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 4.7\ \Omega, dv/dt = 4400\ V/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		0.78		mJ
			$T_{vj} = 125\ ^\circ C$		1.28		
			$T_{vj} = 150\ ^\circ C$		1.4		
Thermal resistance, junction to heatsink	R_{thJH}	per IGBT, $\lambda_{grease} = 3.3\ W/(m^*K)$			0.478		K/W
Temperature under switching conditions	$T_{vj\ op}$			-40		150	$^\circ C$

3 IGBT, T2 / T3

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		$T_{vj} = 25\text{ °C}$	650	V
Implemented collector current	I_{CN}			300	A
Continuous DC collector current	I_{CDC}	$T_{vj\text{ max}} = 175\text{ °C}$	$T_H = 65\text{ °C}$	255	A
Repetitive peak collector current	I_{CRM}	$t_P = 1\text{ ms}$		600	A
Gate-emitter peak voltage	V_{GES}			± 20	V

Table 6 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\text{ sat}}$	$I_C = 100\text{ A}$, $V_{GE} = 15\text{ V}$	$T_{vj} = 25\text{ °C}$		0.88	1.13	V
			$T_{vj} = 125\text{ °C}$		0.80		
			$T_{vj} = 150\text{ °C}$		0.77		
Gate threshold voltage	V_{GEth}	$I_C = 4\text{ mA}$, $V_{CE} = 20\text{ V}$, $T_{vj} = 25\text{ °C}$		4.25	5	5.75	V
Gate charge	Q_G	$V_{GE} = \pm 15\text{ V}$, $V_{CE} = 400\text{ V}$			3.7		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\text{ °C}$			0		Ω
Input capacitance	C_{ies}	$f = 100\text{ kHz}$, $T_{vj} = 25\text{ °C}$, $V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$			47.1		nF
Reverse transfer capacitance	C_{res}	$f = 100\text{ kHz}$, $T_{vj} = 25\text{ °C}$, $V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$			0.168		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650\text{ V}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$			0.019	mA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0\text{ V}$, $V_{GE} = 20\text{ V}$, $T_{vj} = 25\text{ °C}$				100	nA
Turn-on delay time (inductive load)	t_{don}	$I_C = 100\text{ A}$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 6.8\text{ }\Omega$	$T_{vj} = 25\text{ °C}$		0.128		μs
			$T_{vj} = 125\text{ °C}$		0.108		
			$T_{vj} = 150\text{ °C}$		0.103		
Rise time (inductive load)	t_r	$I_C = 100\text{ A}$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 6.8\text{ }\Omega$	$T_{vj} = 25\text{ °C}$		0.025		μs
			$T_{vj} = 125\text{ °C}$		0.030		
			$T_{vj} = 150\text{ °C}$		0.031		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 100\text{ A}$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 6.8\text{ }\Omega$	$T_{vj} = 25\text{ °C}$		0.693		μs
			$T_{vj} = 125\text{ °C}$		0.821		
			$T_{vj} = 150\text{ °C}$		0.853		

Table 6 Characteristic values (continued)

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Fall time (inductive load)	t_f	$I_C = 100 \text{ A}$, $V_{CE} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 6.8 \Omega$	$T_{vj} = 25 \text{ °C}$	0.129		μs
			$T_{vj} = 125 \text{ °C}$	0.213		
			$T_{vj} = 150 \text{ °C}$	0.234		
Turn-on energy loss per pulse	E_{on}	$I_C = 100 \text{ A}$, $V_{CE} = 300 \text{ V}$, $L_\sigma = 35 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 6.8 \Omega$, $di/dt = 2700 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	1.06		mJ
			$T_{vj} = 125 \text{ °C}$	1.44		
			$T_{vj} = 150 \text{ °C}$	1.54		
Turn-off energy loss per pulse	E_{off}	$I_C = 100 \text{ A}$, $V_{CE} = 300 \text{ V}$, $L_\sigma = 35 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 6.8 \Omega$, $dv/dt = 760 \text{ V}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	5.24		mJ
			$T_{vj} = 125 \text{ °C}$	8.18		
			$T_{vj} = 150 \text{ °C}$	8.84		
Thermal resistance, junction to heatsink	R_{thJH}	per IGBT, $\lambda_{grease} = 3.3 \text{ W}/(\text{m}^2\text{K})$		0.300		K/W
Temperature under switching conditions	$T_{vj op}$		-40		150	°C

4 Diode, D1 / D4

Table 7 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25 \text{ °C}$	650	V
Implemented forward current	I_{FN}		225	A
Continuous DC forward current	I_F		100	A
Repetitive peak forward current	I_{FRM}	$t_P = 1 \text{ ms}$	450	A
I^2t - value	I^2t	$V_R = 0 \text{ V}$, $t_P = 10 \text{ ms}$	$T_{vj} = 125 \text{ °C}$	3030
			$T_{vj} = 150 \text{ °C}$	2760

Table 8 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 100 \text{ A}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.26	1.55	V
			$T_{vj} = 125 \text{ °C}$	1.16		
			$T_{vj} = 150 \text{ °C}$	1.11		

Table 8 Characteristic values (continued)

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Peak reverse recovery current	I_{RM}	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	105		A
			$T_{vj} = 125\text{ °C}$	141		
			$T_{vj} = 150\text{ °C}$	151		
Recovered charge	Q_r	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	5.94		μC
			$T_{vj} = 125\text{ °C}$	11.6		
			$T_{vj} = 150\text{ °C}$	13.5		
Reverse recovery energy	E_{rec}	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	1.3		mJ
			$T_{vj} = 125\text{ °C}$	2.58		
			$T_{vj} = 150\text{ °C}$	3.01		
Thermal resistance, junction to heatsink	R_{thJH}	per diode, $\lambda_{grease} = 3.3\text{ W}/(\text{m}^2\text{K})$		0.431		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

5 Diode, D2 / D3

Table 9 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		$T_{vj} = 25\text{ }^{\circ}\text{C}$	650	V
Implemented forward current	I_{FN}			225	A
Continous DC forward current	I_F			100	A
Repetitive peak forward current	I_{FRM}	$t_P = 1\text{ ms}$		450	A
I^2t - value	I^2t	$V_R = 0\text{ V}$, $t_P = 10\text{ ms}$	$T_{vj} = 125\text{ }^{\circ}\text{C}$	3030	A^2s
			$T_{vj} = 150\text{ }^{\circ}\text{C}$	2760	

Table 10 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 100\text{ A}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$	1.26	1.55	V
			$T_{vj} = 125\text{ °C}$	1.16		
			$T_{vj} = 150\text{ °C}$	1.11		

Table 10 Characteristic values (continued)

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Peak reverse recovery current	I_{RM}	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	105		A
			$T_{vj} = 125\text{ °C}$	141		
			$T_{vj} = 150\text{ °C}$	151		
Recovered charge	Q_r	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	5.94		μC
			$T_{vj} = 125\text{ °C}$	11.6		
			$T_{vj} = 150\text{ °C}$	13.5		
Reverse recovery energy	E_{rec}	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	1.3		mJ
			$T_{vj} = 125\text{ °C}$	2.58		
			$T_{vj} = 150\text{ °C}$	3.01		
Thermal resistance, junction to heatsink	R_{thJH}	per diode, $\lambda_{grease} = 3.3\text{ W}/(\text{m}^2\text{K})$		0.390		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

6 Diode, D5 / D6

Table 11 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		$T_{vj} = 25\text{ }^{\circ}\text{C}$	650	V
Implemented forward current	I_{FN}			300	A
Continous DC forward current	I_F			100	A
Repetitive peak forward current	I_{FRM}	$t_P = 1\text{ ms}$		600	A
I^2t - value	I^2t	$V_R = 0\text{ V}$, $t_P = 10\text{ ms}$	$T_{vj} = 125\text{ }^{\circ}\text{C}$	6610	A^2s
			$T_{vj} = 150\text{ }^{\circ}\text{C}$	6050	

Table 12 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 100\text{ A}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$	1.19	1.47	V
			$T_{vj} = 125\text{ °C}$	1.07		
			$T_{vj} = 150\text{ °C}$	1.02		

Table 12 Characteristic values (continued)

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Peak reverse recovery current	I_{RM}	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 12.5\text{ kA}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	135		A
			$T_{vj} = 125\text{ °C}$	186		
			$T_{vj} = 150\text{ °C}$	199		
Recovered charge	Q_r	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 12.5\text{ kA}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	5.05		μC
			$T_{vj} = 125\text{ °C}$	12		
			$T_{vj} = 150\text{ °C}$	14.4		
Reverse recovery energy	E_{rec}	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 12.5\text{ kA}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	0.931		mJ
			$T_{vj} = 125\text{ °C}$	2.64		
			$T_{vj} = 150\text{ °C}$	3.26		
Thermal resistance, junction to heatsink	R_{thJH}	per diode, $\lambda_{grease} = 3.3\text{ W}/(\text{m}^2\text{K})$		0.479		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

7 NTC-Thermistor

Table 13 Characteristic values

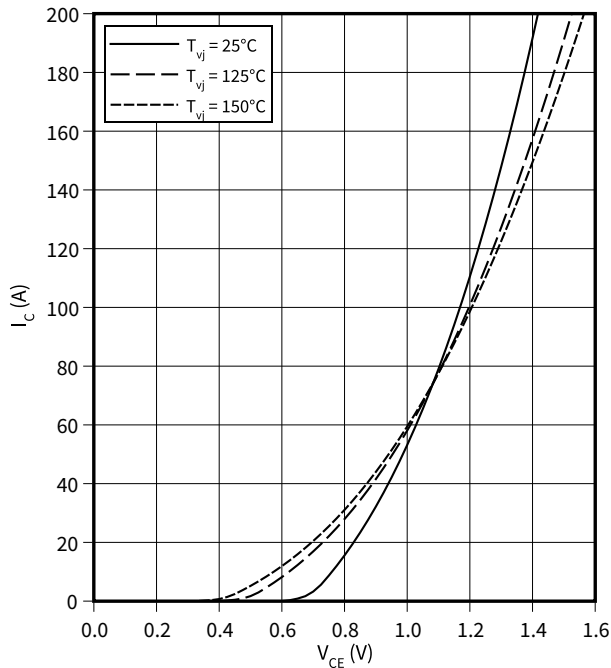
Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	R_{25}	$T_{NTC} = 25\text{ °C}$		5		kΩ
Deviation of R_{100}	$\Delta R/R$	$T_{NTC} = 100\text{ °C}$, $R_{100} = 493\text{ Ω}$	-5		5	%
Power dissipation	P_{25}	$T_{NTC} = 25\text{ °C}$			20	mW
B-value	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298,15\text{ K}))]$		3375		K
B-value	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298,15\text{ K}))]$		3411		K
B-value	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2 - 1/(298,15\text{ K}))]$		3433		K

Note: Specification according to the valid application note.

8 Characteristics diagrams

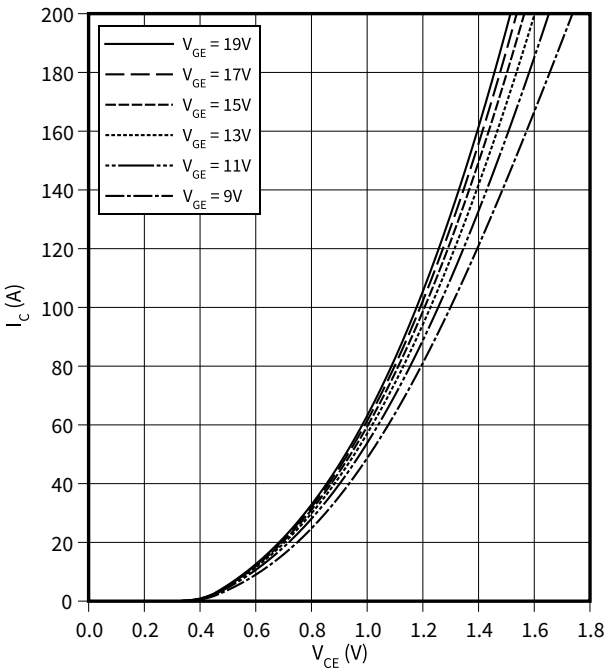
output characteristic (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2

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



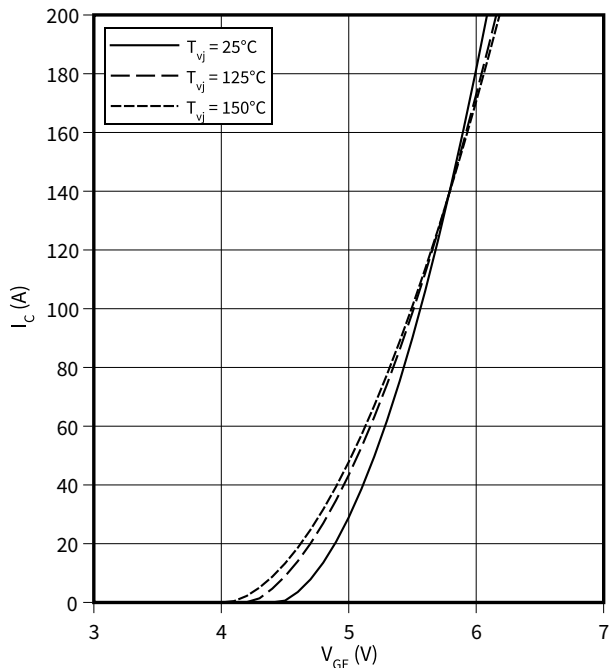
output characteristic (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2

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



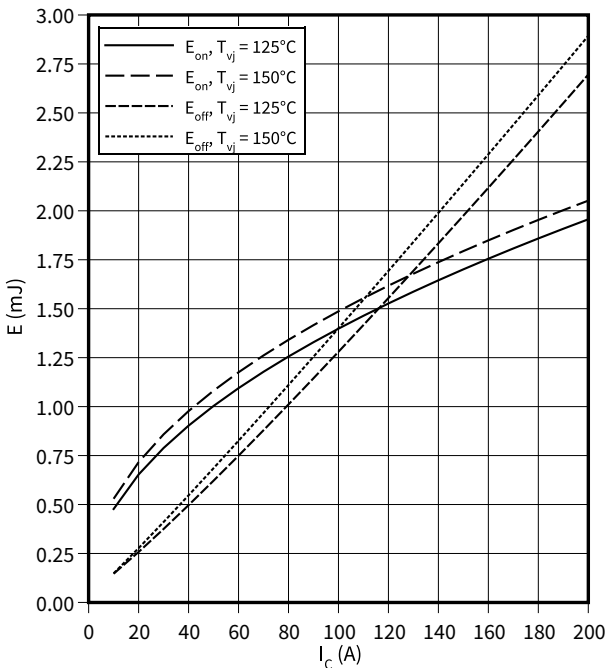
transfer characteristic (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2

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



switching losses (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2

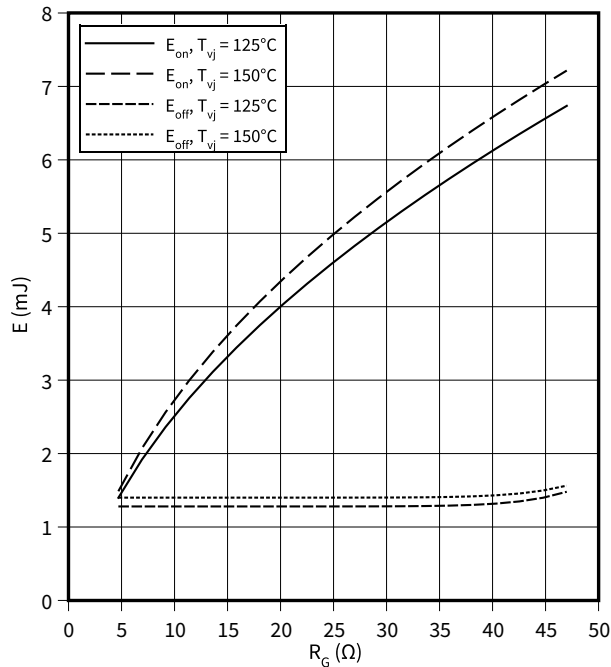
$E = f(I_C)$
 $R_{Goff} = 4.7\text{ }\Omega$, $R_{Gon} = 4.7\text{ }\Omega$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$



8 Characteristics diagrams

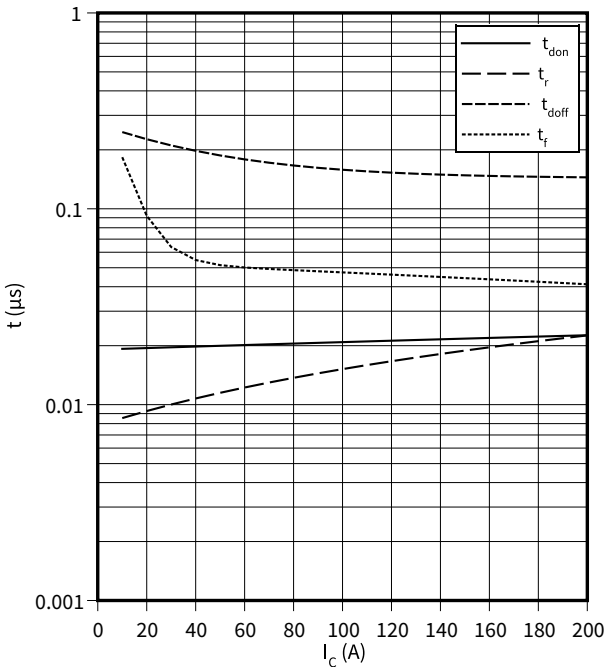
switching losses (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2

$E = f(R_G)$
 $I_C = 100\text{ A}$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$



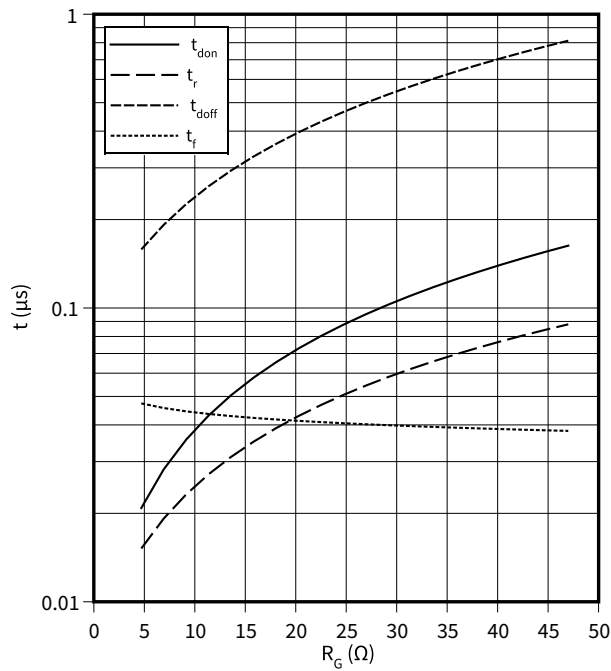
switching times (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2

$t = f(I_C)$
 $R_{Goff} = 4.7\text{ }\Omega$, $R_{Gon} = 4.7\text{ }\Omega$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 150\text{ }^\circ\text{C}$



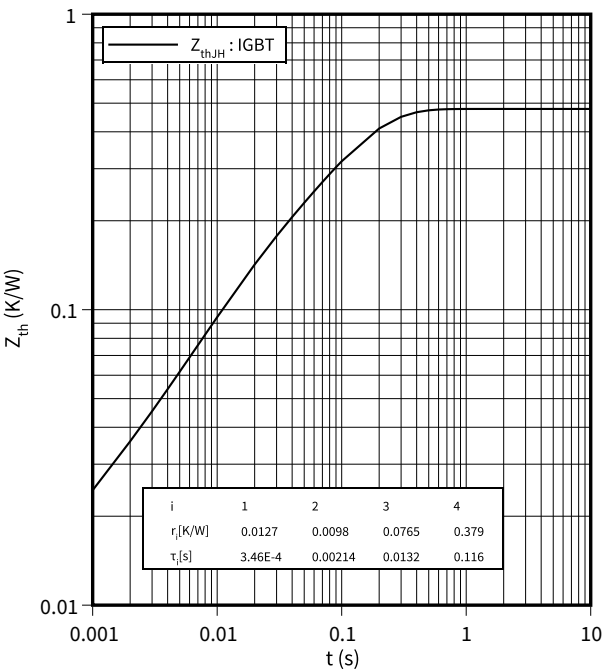
switching times (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2

$t = f(R_G)$
 $I_C = 100\text{ A}$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 150\text{ }^\circ\text{C}$



transient thermal impedance, IGBT, T1.1 / T1.2 / T4.1 / T4.2

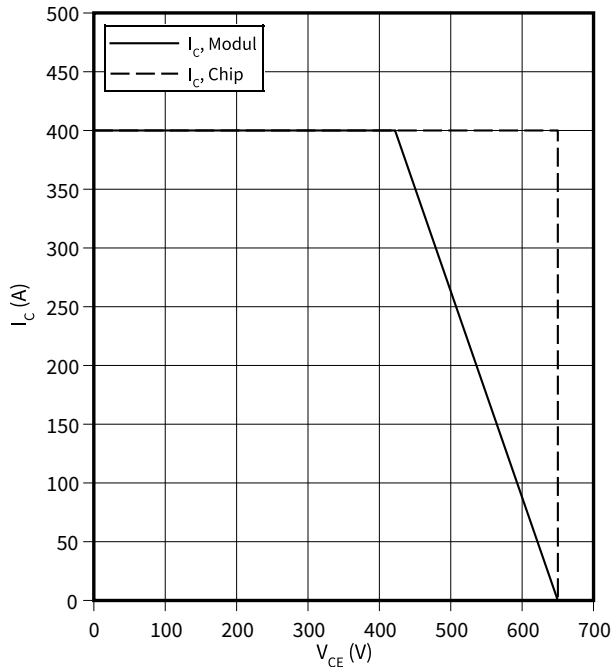
$Z_{th} = f(t)$



8 Characteristics diagrams

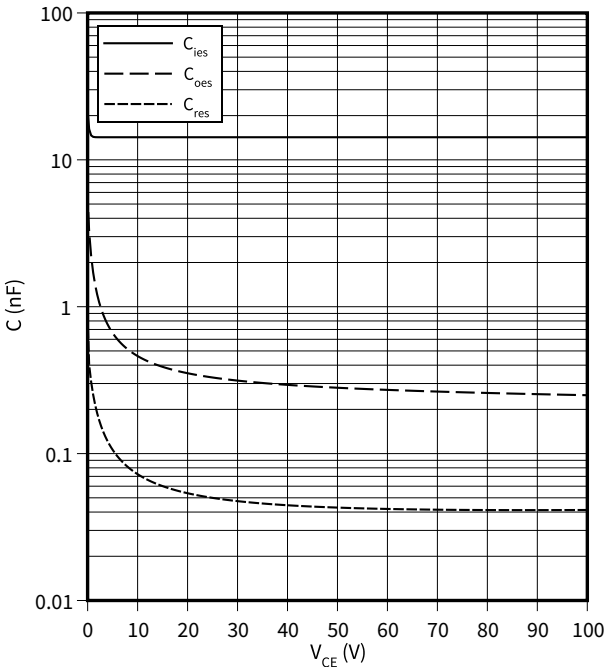
reverse bias safe operating area (RBSOA), IGBT, T1.1 / T1.2 / T4.1 / T4.2

$I_C = f(V_{CE})$
 $R_{Goff} = 4.7 \, \Omega$, $V_{GE} = \pm 15 \, V$, $T_{vj} = 150 \, ^\circ C$



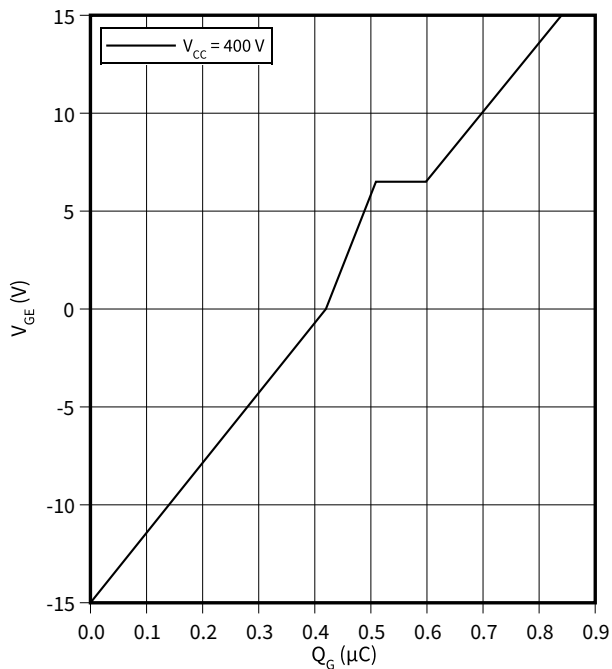
capacity characteristic (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2

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



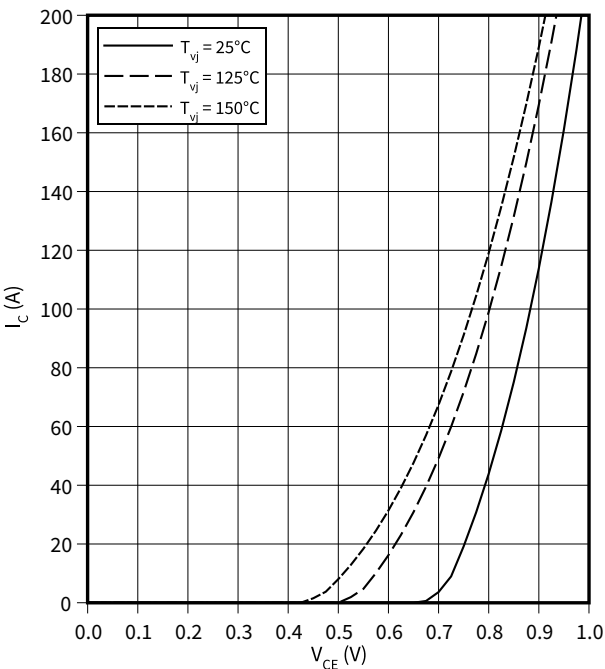
gate charge characteristic (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2

$V_{GE} = f(Q_G)$
 $I_C = 200 \, A$, $T_{vj} = 25 \, ^\circ C$



output characteristic (typical), IGBT, T2 / T3

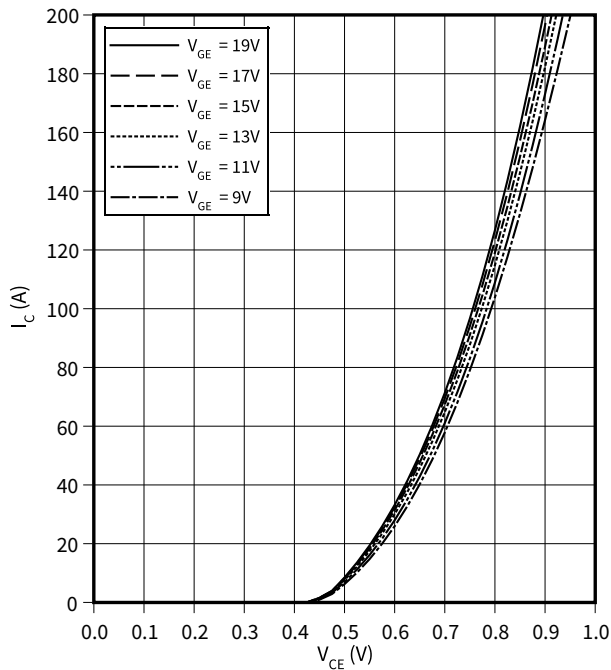
$I_C = f(V_{CE})$
 $V_{GE} = 15 \, V$



8 Characteristics diagrams

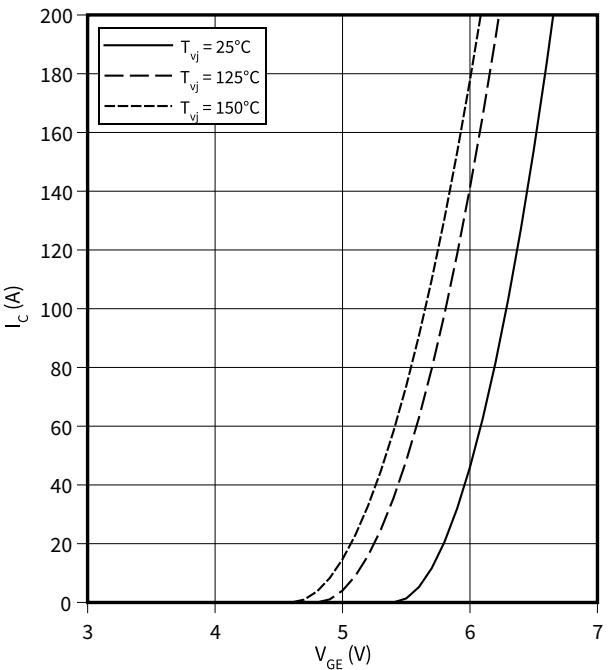
output characteristic (typical), IGBT, T2 / T3

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



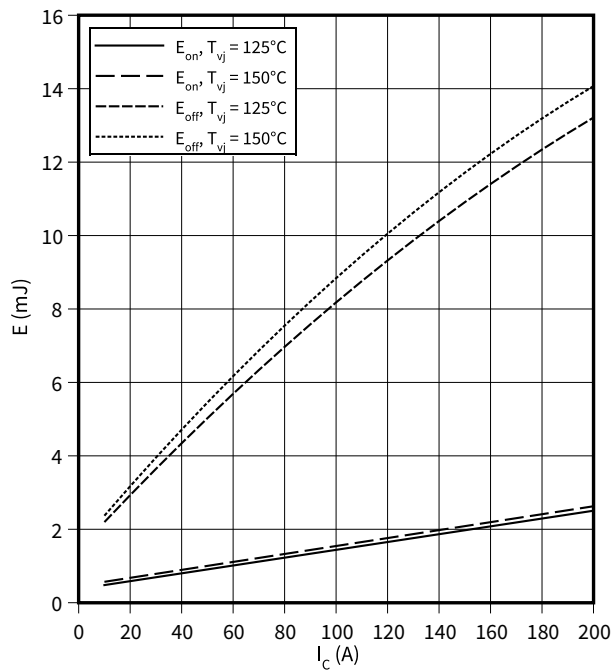
transfer characteristic (typical), IGBT, T2 / T3

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



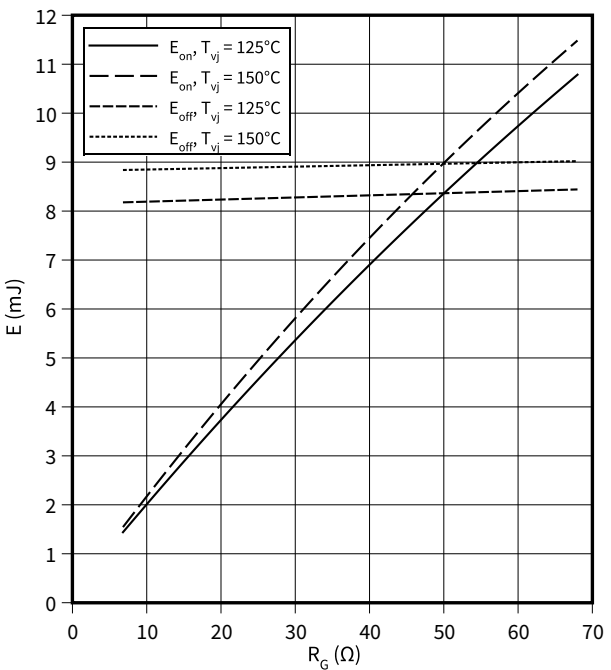
switching losses (typical), IGBT, T2 / T3

$E = f(I_C)$
 $R_{Goff} = 6.8\text{ }\Omega$, $R_{Gon} = 6.8\text{ }\Omega$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$



switching losses (typical), IGBT, T2 / T3

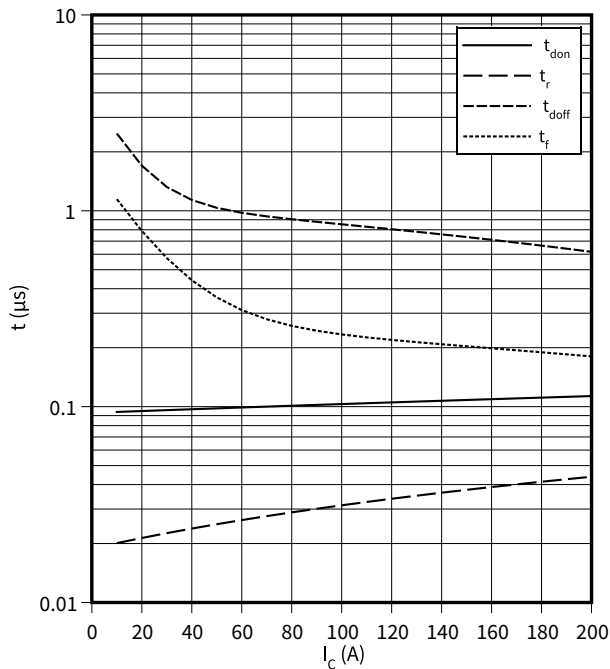
$E = f(R_G)$
 $I_C = 100\text{ A}$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$



8 Characteristics diagrams

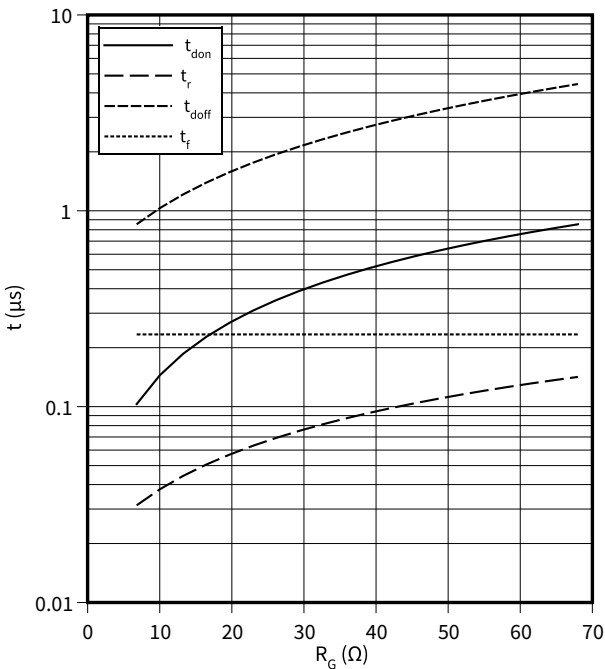
switching times (typical), IGBT, T2 / T3

$t = f(I_C)$
 $R_{Goff} = 6.8 \Omega$, $R_{Gon} = 6.8 \Omega$, $V_{CE} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 150 \text{ }^\circ\text{C}$



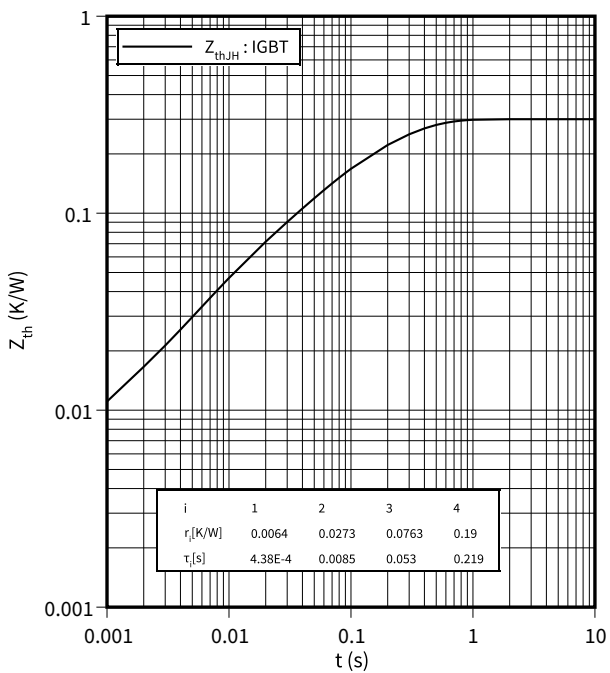
switching times (typical), IGBT, T2 / T3

$t = f(R_G)$
 $I_C = 100 \text{ A}$, $V_{CE} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 150 \text{ }^\circ\text{C}$



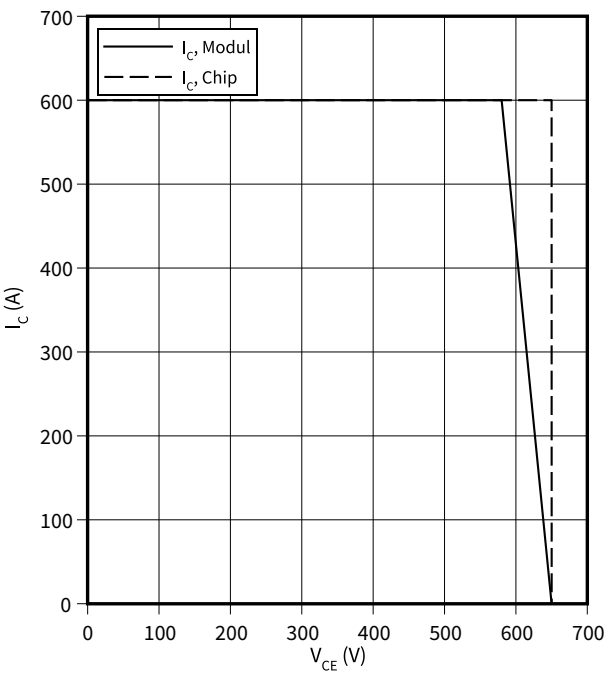
transient thermal impedance , IGBT, T2 / T3

$Z_{th} = f(t)$



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

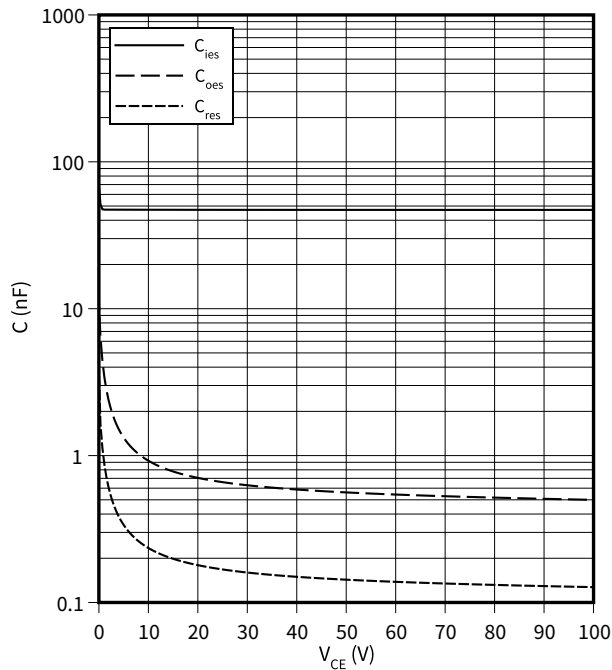
$I_C = f(V_{CE})$
 $R_{Goff} = 6.8 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 150 \text{ }^\circ\text{C}$



8 Characteristics diagrams

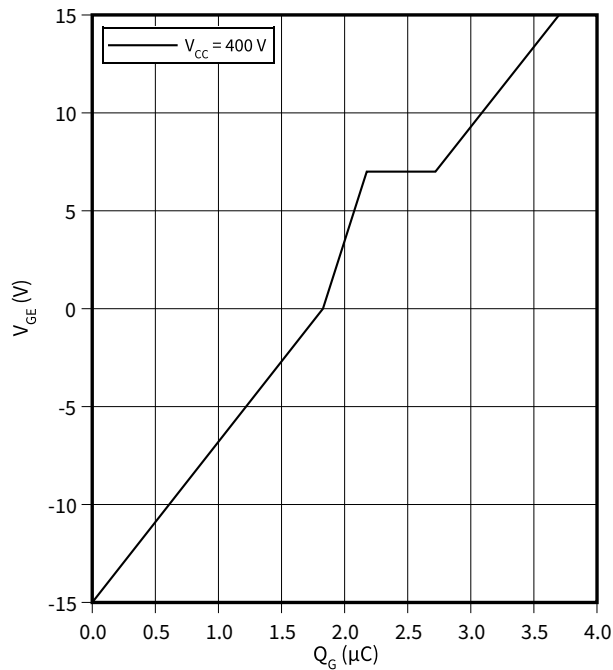
capacity characteristic (typical), IGBT, T2 / T3

$C = f(V_{CE})$
 $f = 100\text{ kHz}$, $V_{GE} = 0\text{ V}$, $T_{vj} = 25\text{ °C}$



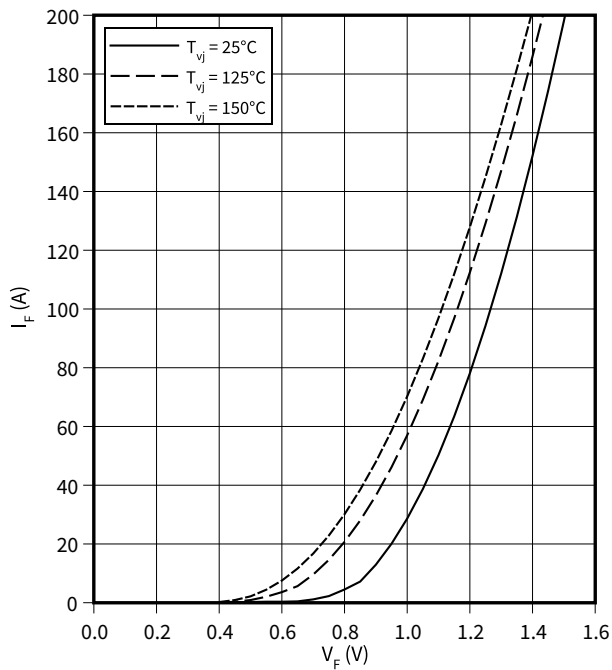
gate charge characteristic (typical), IGBT, T2 / T3

$V_{GE} = f(Q_G)$
 $I_C = 200\text{ A}$, $T_{vj} = 25\text{ °C}$



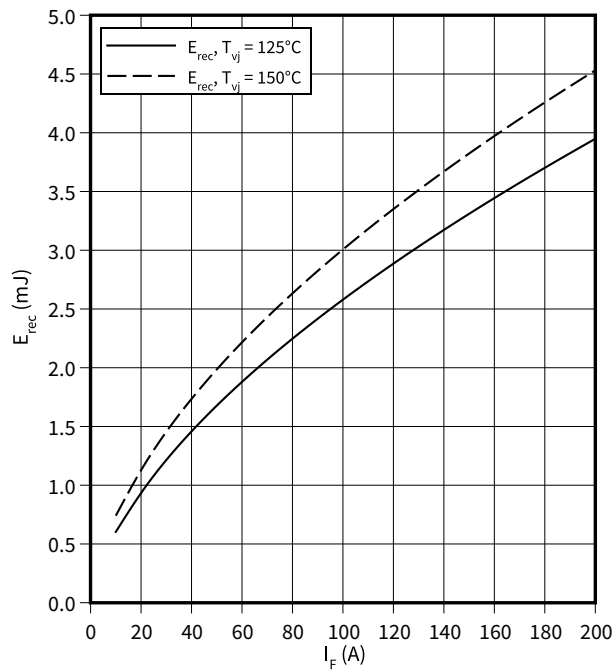
forward characteristic (typical), Diode, D1 / D4

$I_F = f(V_F)$



switching losses (typical), Diode, D1 / D4

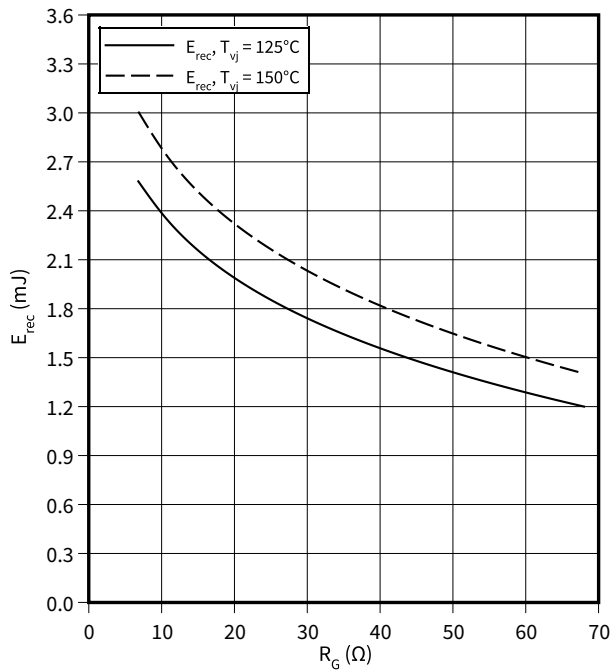
$E_{rec} = f(I_F)$
 $R_{Gon} = 6.8\text{ }\Omega$, $V_{CE} = 300\text{ V}$



8 Characteristics diagrams

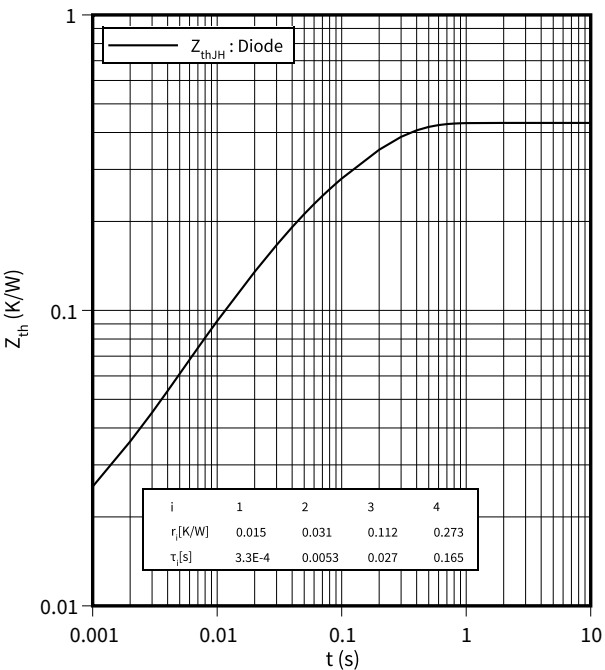
switching losses (typical), Diode, D1 / D4

$E_{rec} = f(R_G)$
 $V_{CE} = 300\text{ V}, I_F = 100\text{ A}$



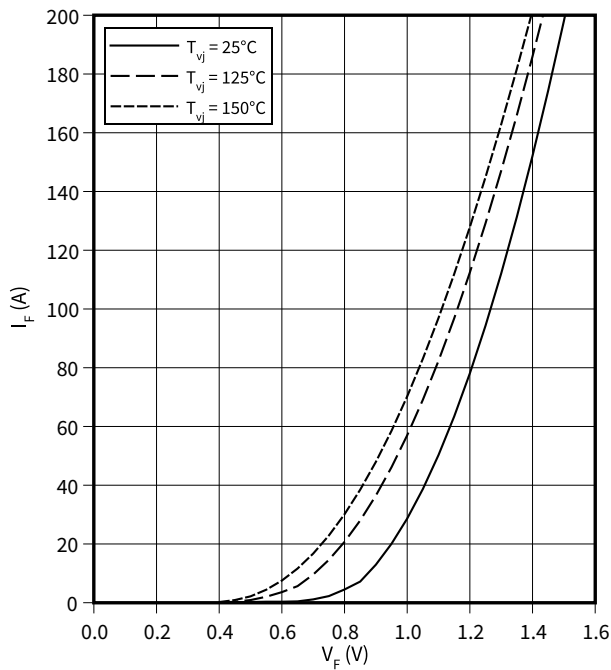
transient thermal impedance, Diode, D1 / D4

$Z_{th} = f(t)$



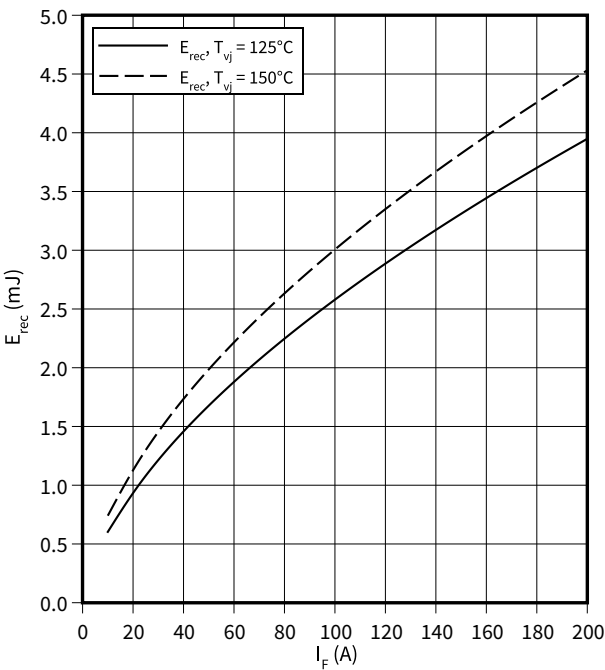
forward characteristic (typical), Diode, D2 / D3

$I_F = f(V_F)$



switching losses (typical), Diode, D2 / D3

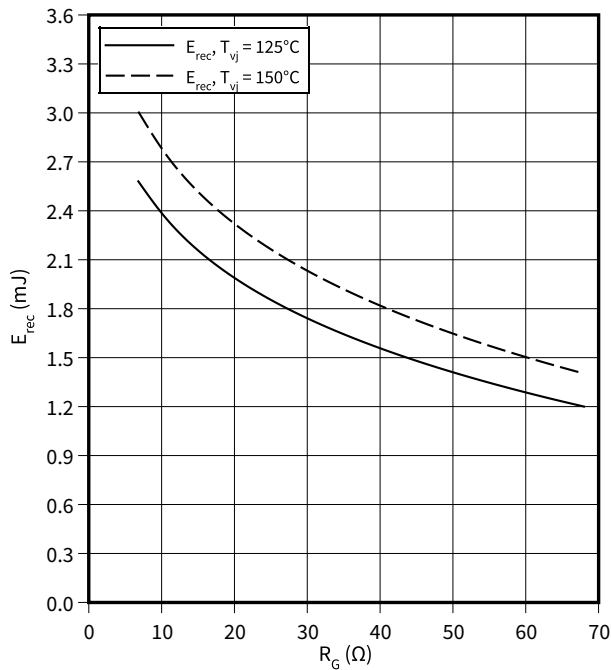
$E_{rec} = f(I_F)$
 $R_{Gon} = 6.8\ \Omega, V_{CE} = 300\text{ V}$



8 Characteristics diagrams

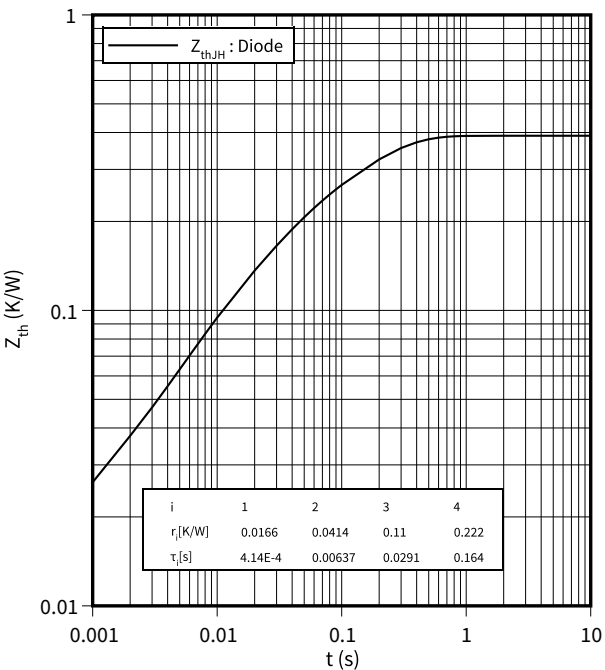
switching losses (typical), Diode, D2 / D3

$E_{rec} = f(R_G)$
 $V_{CE} = 300\text{ V}, I_F = 100\text{ A}$



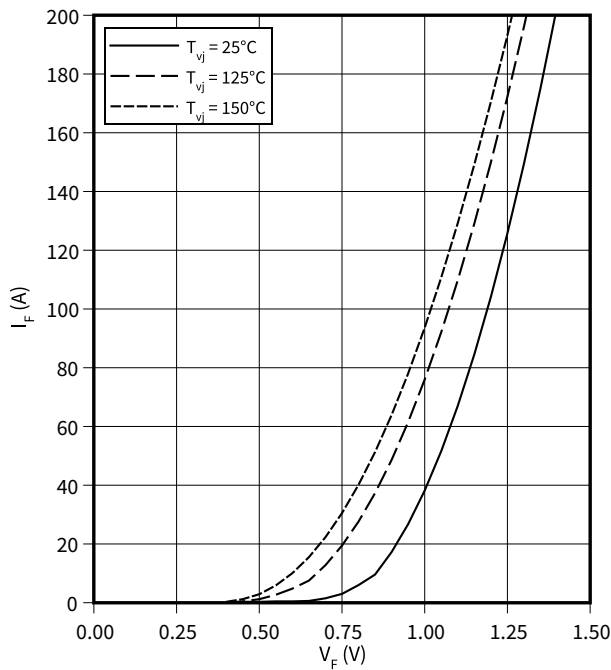
transient thermal impedance , Diode, D2 / D3

$Z_{th} = f(t)$



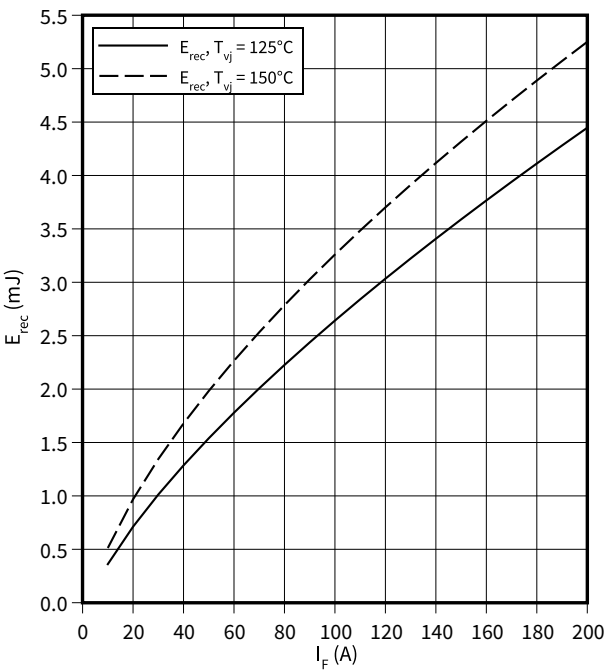
forward characteristic of (typical), Diode, D5 / D6

$I_F = f(V_F)$



switching losses (typical), Diode, D5 / D6

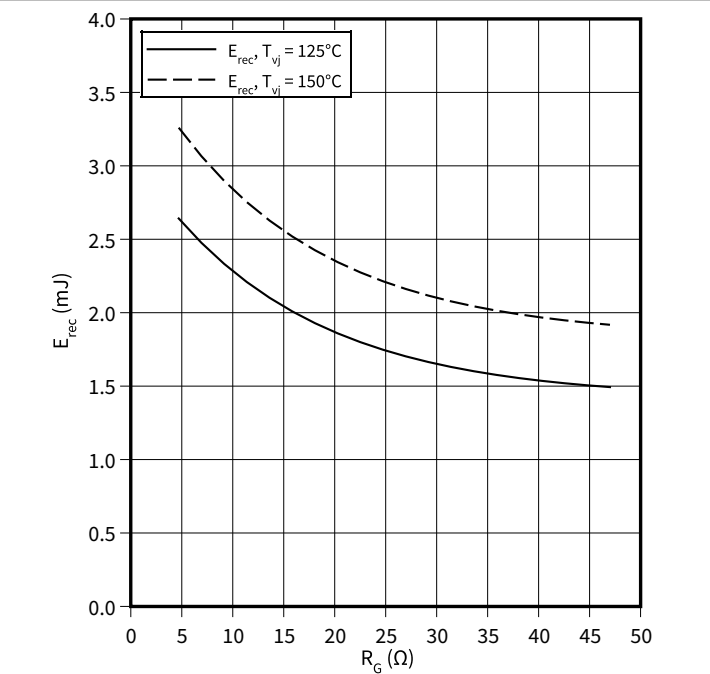
$E_{rec} = f(I_F)$
 $R_{Gon} = 4.7\ \Omega, V_{CE} = 300\text{ V}$



8 Characteristics diagrams

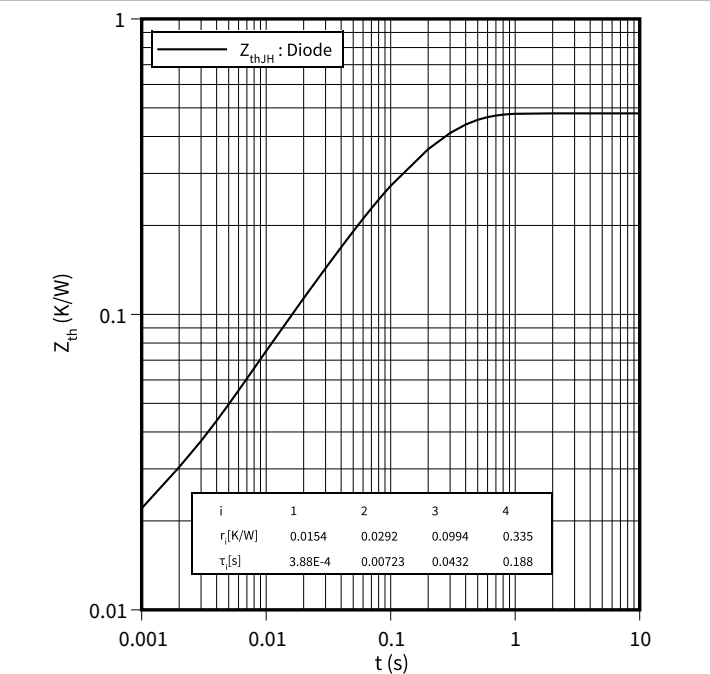
switching losses (typical), Diode, D5 / D6

$E_{rec} = f(R_G)$
 $V_{CE} = 300\text{ V}, I_F = 100\text{ A}$



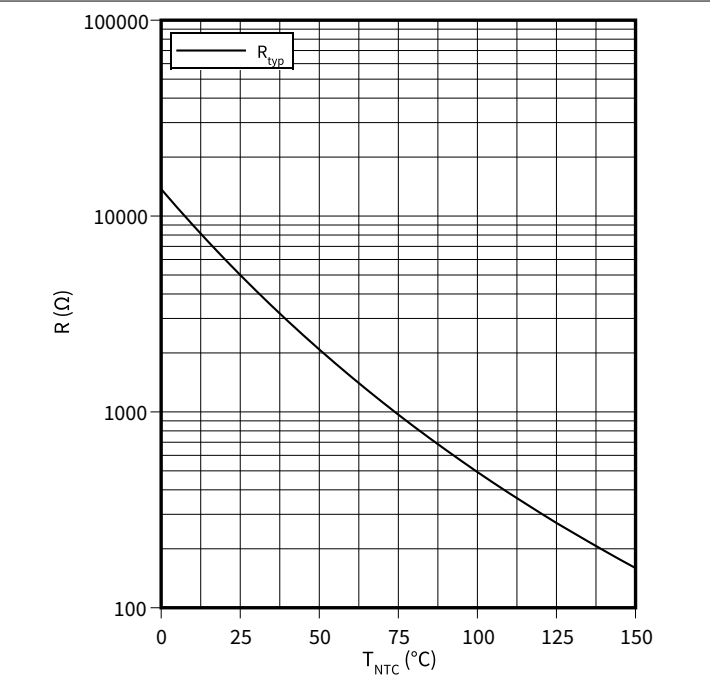
transient thermal impedance , Diode, D5 / D6

$Z_{th} = f(t)$



temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



9 Circuit diagram

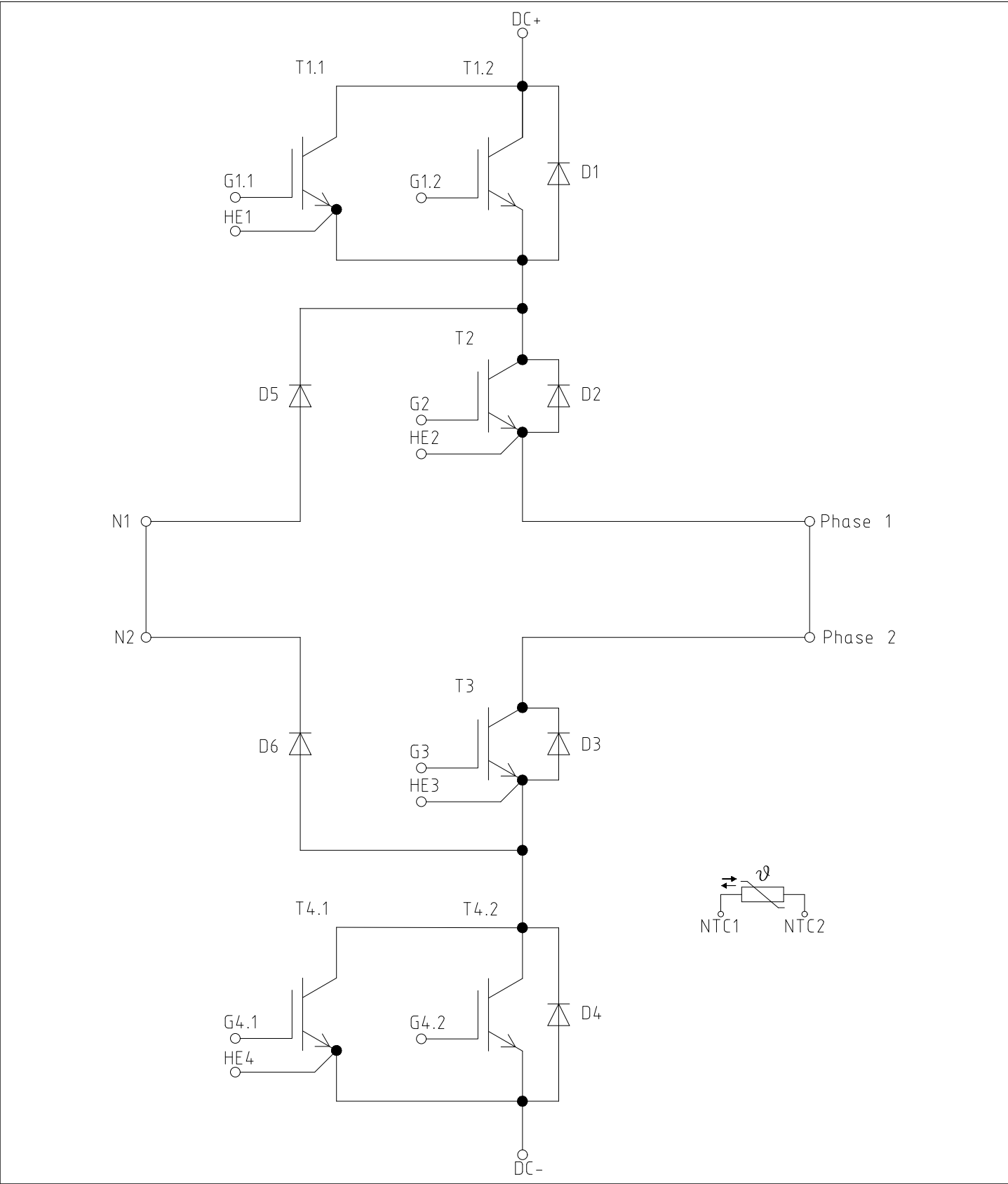


Figure 2

Revision history

Document revision	Date of release	Description of changes
0.10	2021-04-28	Target datasheet
1.00	2021-06-25	Final datasheet

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Edition 2021-06-25

Published by

Infineon Technologies AG
81726 Munich, Germany

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Document reference
IFX-AAS474-002

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