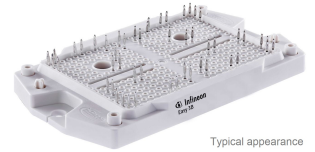


EasyPACK™ module with TRENCHSTOP™ IGBT H3 and emitter controlled 7 diode and PressFIT / NTC**Features**

- Electrical features
 - $V_{CES} = 1200\text{ V}$
 - $I_{C\text{ nom}} = 225\text{ A} / I_{CRM} = 450\text{ A}$
 - Low switching losses
 - High-speed IGBT H3
- Mechanical features
 - Compact design
 - PressFIT contact technology
 - Integrated NTC temperature sensor
 - High power density



Typical appearance

Potential applications

- Energy storage systems
- Solar applications
- Three-level applications

Product validation

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

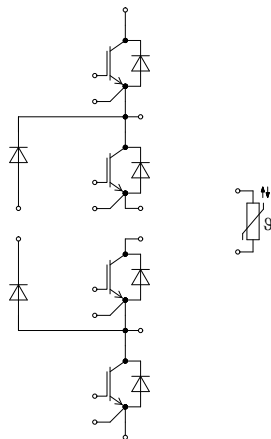
Description

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1 Package

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	
Comparative tracking index	CTI		> 400	
Relative thermal index (electrical)	RTI	housing	140	°C

Table 2 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray inductance module	L_{sCE}			21		nH
Module lead resistance, terminals - chip	$R_{AA'+CC'}$	$T_H = 25 \text{ °C}$, per switch		2.3		mΩ
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25 \text{ °C}$, per switch		1.7		mΩ
Storage temperature	T_{stg}		-40		125	°C
Mounting torque for module mounting	M	- Mounting according to valid application note	M5, Screw	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 / T4

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		$T_{vj} = 25 \text{ °C}$	1200	V
Implemented collector current	I_{CN}			225	A
Continuous DC collector current	I_{CDC}	$T_{vj \text{ max}} = 175 \text{ °C}$	$T_H = 65 \text{ °C}$	175	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj \text{ op}}$		450	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	$V_{CE\ sat}$	$I_C = 225\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$		2.07	2.55	V
			$T_{vj} = 125\ ^\circ C$		2.50		
			$T_{vj} = 150\ ^\circ C$		2.60		
Gate threshold voltage	V_{GETh}	$I_C = 7.8\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$		5.25	5.80	6.35	V
Gate charge	Q_G	$V_{GE} = \pm 15\ V$			1.73		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$			3.3		Ω
Input capacitance	C_{ies}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			13.1		nF
Reverse transfer capacitance	C_{res}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			0.72		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 1200\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$			1	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}	$I_C = 225\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Gon} = 0.47\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.107		μs
			$T_{vj} = 125\ ^\circ C$		0.115		
			$T_{vj} = 150\ ^\circ C$		0.118		
Rise time (inductive load)	t_r	$I_C = 225\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Gon} = 0.47\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.030		μs
			$T_{vj} = 125\ ^\circ C$		0.035		
			$T_{vj} = 150\ ^\circ C$		0.037		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 225\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Goff} = 0.47\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.300		μs
			$T_{vj} = 125\ ^\circ C$		0.329		
			$T_{vj} = 150\ ^\circ C$		0.346		
Fall time (inductive load)	t_f	$I_C = 225\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Goff} = 0.47\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.040		μs
			$T_{vj} = 125\ ^\circ C$		0.129		
			$T_{vj} = 150\ ^\circ C$		0.148		
Turn-on energy loss per pulse	E_{on}	$I_C = 225\ A, V_{CC} = 600\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 0.47\ \Omega, di/dt = 6100\ A/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		11.8		mJ
			$T_{vj} = 125\ ^\circ C$		20.7		
			$T_{vj} = 150\ ^\circ C$		23.4		
Turn-off energy loss per pulse	E_{off}	$I_C = 225\ A, V_{CC} = 600\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 0.47\ \Omega, dv/dt = 4500\ V/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		8.67		mJ
			$T_{vj} = 125\ ^\circ C$		15.9		
			$T_{vj} = 150\ ^\circ C$		17.8		
SC data	I_{SC}	$V_{GE} \leq 15\ V, V_{CC} = 800\ V, V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_P \leq 10\ \mu s, T_{vj} = 150\ ^\circ C$		900		A

(table continues...)

Table 4 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, $\lambda_{grease} = 3.3 \text{ W/(m}\cdot\text{K)}$		0.218		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

3 IGBT, T2 / T3

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		$T_{vj} = 25 \text{ °C}$	1200	V
Implemented collector current	I_{CN}			225	A
Continuous DC collector current	I_{CDC}	$T_{vj\text{ max}} = 175 \text{ °C}$	$T_H = 65 \text{ °C}$	180	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\text{ op}}$		450	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	$V_{CE\text{ sat}}$	$I_C = 225 \text{ A}, V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ °C}$		2.07	2.55	V
			$T_{vj} = 125 \text{ °C}$		2.50		
			$T_{vj} = 150 \text{ °C}$		2.60		
Gate threshold voltage	V_{GEth}	$I_C = 7.8 \text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25 \text{ °C}$		5.25	5.80	6.35	V
Gate charge	Q_G	$V_{GE} = \pm 15 \text{ V}$			1.73		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25 \text{ °C}$			3.3		Ω
Input capacitance	C_{ies}	$f = 100 \text{ kHz}, T_{vj} = 25 \text{ °C}, V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$			13.1		nF
Reverse transfer capacitance	C_{res}	$f = 100 \text{ kHz}, T_{vj} = 25 \text{ °C}, V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$			0.72		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 1200 \text{ V}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$			1	mA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0 \text{ V}, V_{GE} = 20 \text{ V}, T_{vj} = 25 \text{ °C}$				100	nA

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Turn-on delay time (inductive load)	t_{don}	$I_C = 225 \text{ A}$, $V_{CC} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 0.47 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.107		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.117		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.122		
Rise time (inductive load)	t_r	$I_C = 225 \text{ A}$, $V_{CC} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 0.47 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.039		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.048		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.050		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 225 \text{ A}$, $V_{CC} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 0.47 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.290		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.340		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.360		
Fall time (inductive load)	t_f	$I_C = 225 \text{ A}$, $V_{CC} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 0.47 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.041		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.114		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.139		
Turn-on energy loss per pulse	E_{on}	$I_C = 225 \text{ A}$, $V_{CC} = 600 \text{ V}$, $L_\sigma = 35 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 0.47 \Omega$, $di/dt =$ $4600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	8.1		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	14.3		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	16.4		
Turn-off energy loss per pulse	E_{off}	$I_C = 225 \text{ A}$, $V_{CC} = 600 \text{ V}$, $L_\sigma = 35 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 0.47 \Omega$, $dv/dt =$ $4200 \text{ V}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	9.25		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	17.5		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	19.6		
SC data	I_{SC}	$V_{GE} \leq 15 \text{ V}$, $V_{CC} = 800 \text{ V}$, $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_p \leq 10 \mu\text{s}$, $T_{vj} = 150 \text{ }^\circ\text{C}$	900		A
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, $\lambda_{grease} = 3.3 \text{ W}/(\text{m}\cdot\text{K})$		0.212		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	$^\circ\text{C}$

4 Diode, D1 / D4

Table 7 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25 \text{ }^\circ\text{C}$	1200	V
Continuous DC forward current	I_F		300	A
Repetitive peak forward current	I_{FRM}	$t_p = 1 \text{ ms}$	600	A

(table continues...)

Table 7 (continued) Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
I^2t - value	I^2t	$t_P = 10 \text{ ms}, V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ °C}$	A^2s
			$T_{vj} = 150 \text{ °C}$	
			10900	
			6280	

Table 8 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 300 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.72	2.10	V
			$T_{vj} = 125 \text{ °C}$	1.59		
			$T_{vj} = 150 \text{ °C}$	1.56		
Peak reverse recovery current	I_{RM}	$V_{CC} = 600 \text{ V}, I_F = 300 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 4800 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	229		A
			$T_{vj} = 125 \text{ °C}$	263		
			$T_{vj} = 150 \text{ °C}$	272		
Recovered charge	Q_r	$V_{CC} = 600 \text{ V}, I_F = 300 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 4800 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	20.5		μC
			$T_{vj} = 125 \text{ °C}$	38.4		
			$T_{vj} = 150 \text{ °C}$	44.5		
Reverse recovery energy	E_{rec}	$V_{CC} = 600 \text{ V}, I_F = 300 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 4800 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	7.88		mJ
			$T_{vj} = 125 \text{ °C}$	14.2		
			$T_{vj} = 150 \text{ °C}$	16.2		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 3.3 \text{ W}/(\text{m}\cdot\text{K})$		0.354		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}	$T_{vj} = 25 \text{ °C}$	1200	V
Continuous DC forward current	I_F		200	A
Repetitive peak forward current	I_{FRM}	$t_P = 1 \text{ ms}$	400	A
I^2t - value	I^2t	$t_P = 10 \text{ ms}, V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ °C}$	A^2s
			$T_{vj} = 150 \text{ °C}$	
			3320	
			2110	

Table 10 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 200 \text{ A}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.72	2.10	V
			$T_{vj} = 125 \text{ °C}$	1.59		
			$T_{vj} = 150 \text{ °C}$	1.56		
Peak reverse recovery current	I_{RM}	$V_{CC} = 600 \text{ V}$, $I_F = 200 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 4300 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	195		A
			$T_{vj} = 125 \text{ °C}$	238		
			$T_{vj} = 150 \text{ °C}$	248		
Recovered charge	Q_r	$V_{CC} = 600 \text{ V}$, $I_F = 200 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 4300 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	14.1		μC
			$T_{vj} = 125 \text{ °C}$	27.4		
			$T_{vj} = 150 \text{ °C}$	31.3		
Reverse recovery energy	E_{rec}	$V_{CC} = 600 \text{ V}$, $I_F = 200 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 4300 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	5.72		mJ
			$T_{vj} = 125 \text{ °C}$	11.1		
			$T_{vj} = 150 \text{ °C}$	12.5		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 3.3 \text{ W}/(\text{m}\cdot\text{K})$		0.415		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}		$T_{vj} = 25 \text{ °C}$	1200	V
Continuous DC forward current	I_F			300	A
Repetitive peak forward current	I_{FRM}	$t_p = 1 \text{ ms}$		600	A
I^2t - value	I^2t	$t_p = 10 \text{ ms}$, $V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ °C}$	10900	A^2s
			$T_{vj} = 150 \text{ °C}$	6280	

Table 12 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 300 \text{ A}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.72	2.10	V
			$T_{vj} = 125 \text{ °C}$	1.59		
			$T_{vj} = 150 \text{ °C}$	1.56		
Peak reverse recovery current	I_{RM}	$V_{CC} = 600 \text{ V}$, $I_F = 300 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 6200 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	244		A
			$T_{vj} = 125 \text{ °C}$	263		
			$T_{vj} = 150 \text{ °C}$	272		
Recovered charge	Q_r	$V_{CC} = 600 \text{ V}$, $I_F = 300 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 6200 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	20.4		μC
			$T_{vj} = 125 \text{ °C}$	38.4		
			$T_{vj} = 150 \text{ °C}$	44.5		
Reverse recovery energy	E_{rec}	$V_{CC} = 600 \text{ V}$, $I_F = 300 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 6200 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	6.87		mJ
			$T_{vj} = 125 \text{ °C}$	13		
			$T_{vj} = 150 \text{ °C}$	14.8		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 3.3 \text{ W}/(\text{m} \cdot \text{K})$		0.399		K/W
Temperature under switching conditions	$T_{vj op}$		-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

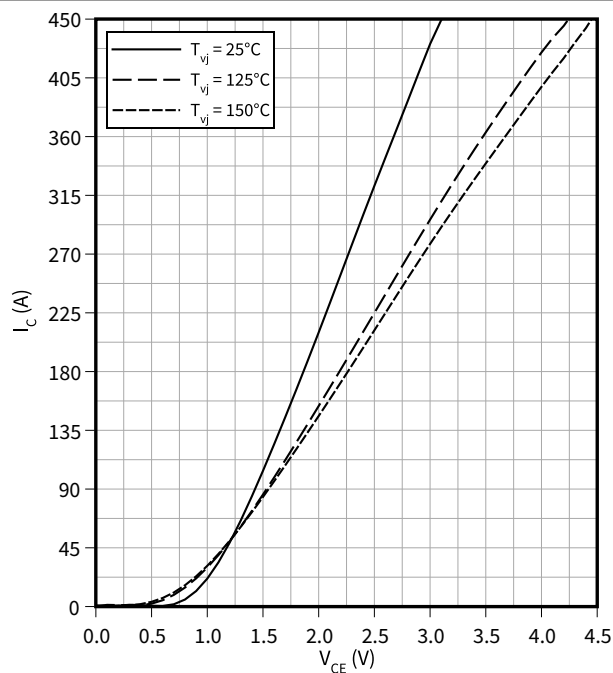
Note: Specification according to the valid application note.

8 Characteristics diagrams

Output characteristic (typical), IGBT, T1 / T4

$$I_C = f(V_{CE})$$

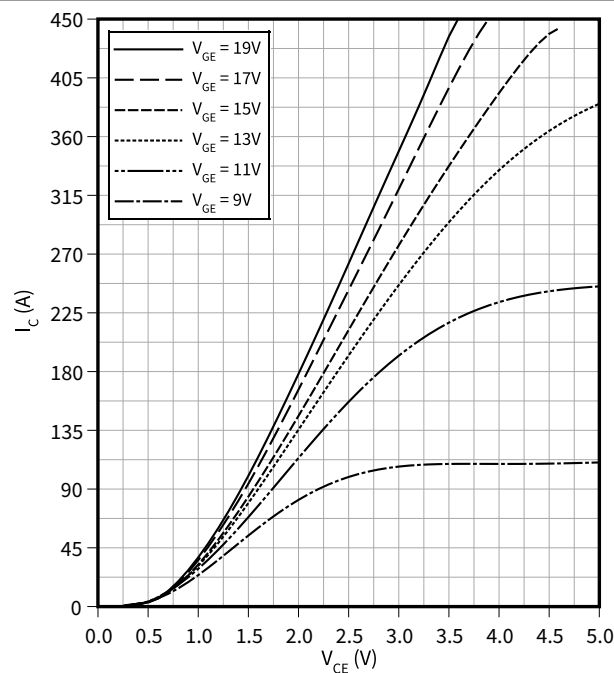
$$V_{GE} = 15 \text{ V}$$



Output characteristic field (typical), IGBT, T1 / T4

$$I_C = f(V_{CE})$$

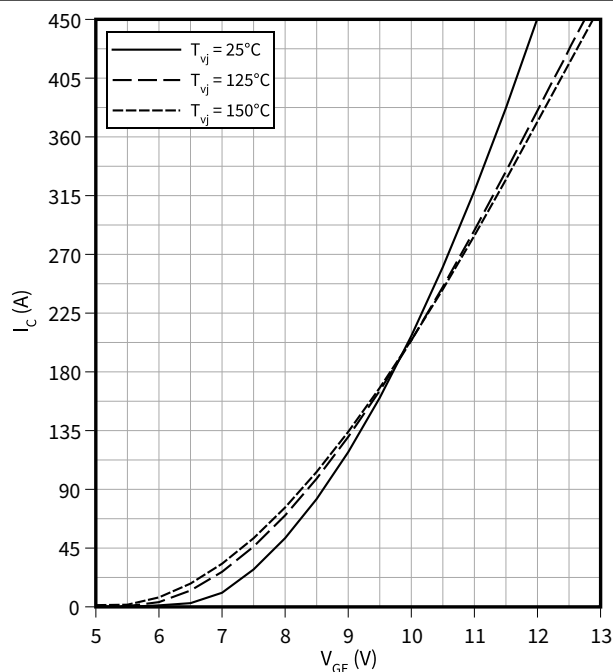
$$T_{vj} = 150 \text{ °C}$$



Transfer characteristic (typical), IGBT, T1 / T4

$$I_C = f(V_{GE})$$

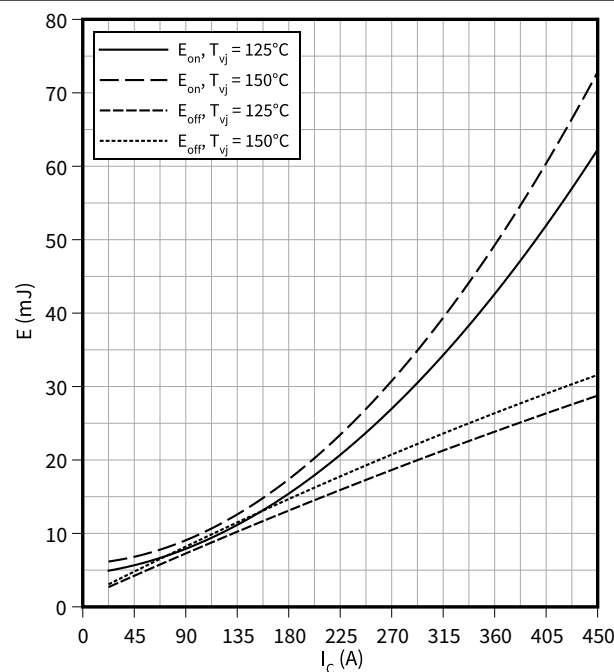
$$V_{CE} = 20 \text{ V}$$



Switching losses (typical), IGBT, T1 / T4

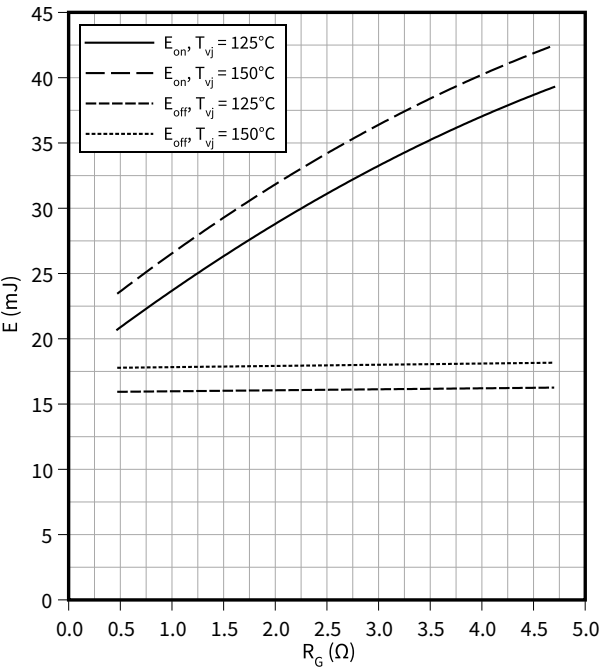
$$E = f(I_C)$$

$$R_{Goff} = 0.47 \text{ } \Omega, R_{Gon} = 0.47 \text{ } \Omega, V_{GE} = \pm 15 \text{ V}, V_{CC} = 600 \text{ V}$$



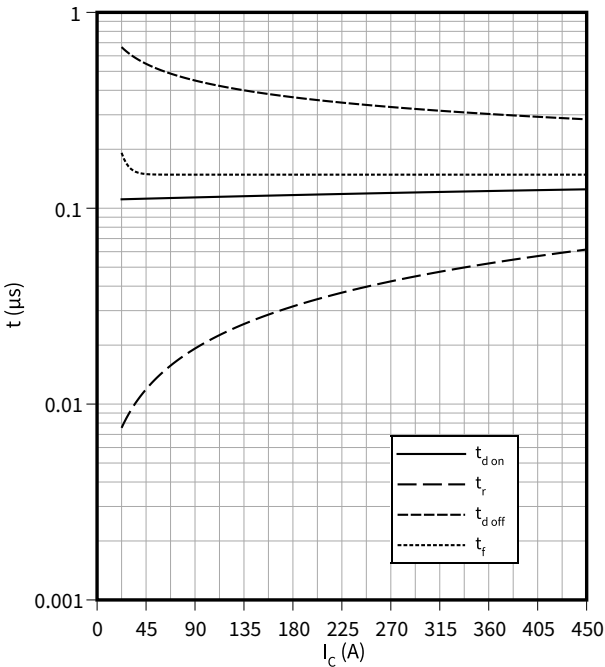
Switching losses (typical), IGBT, T1 / T4

$E = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 225\text{ A}$, $V_{CC} = 600\text{ V}$



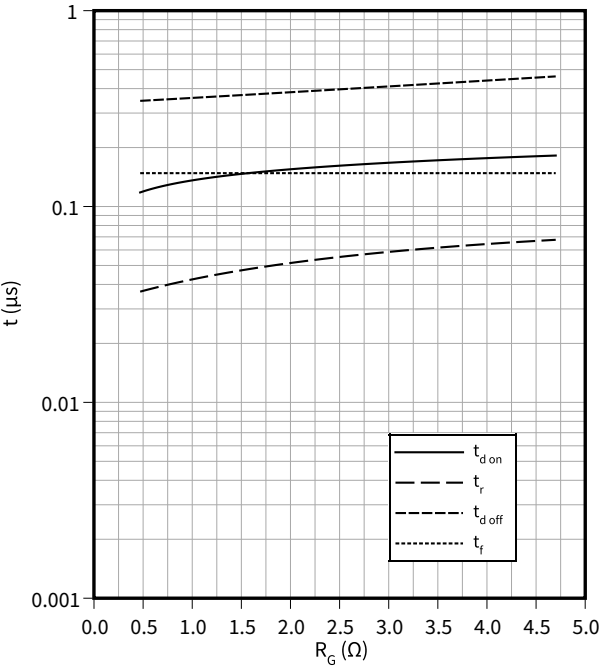
Switching times (typical), IGBT, T1 / T4

$t = f(I_C)$
 $R_{Goff} = 0.47\text{ }\Omega$, $R_{Gon} = 0.47\text{ }\Omega$, $V_{GE} = \pm 15\text{ V}$, $V_{CC} = 600\text{ V}$, $T_{vj} = 150\text{ }^\circ\text{C}$



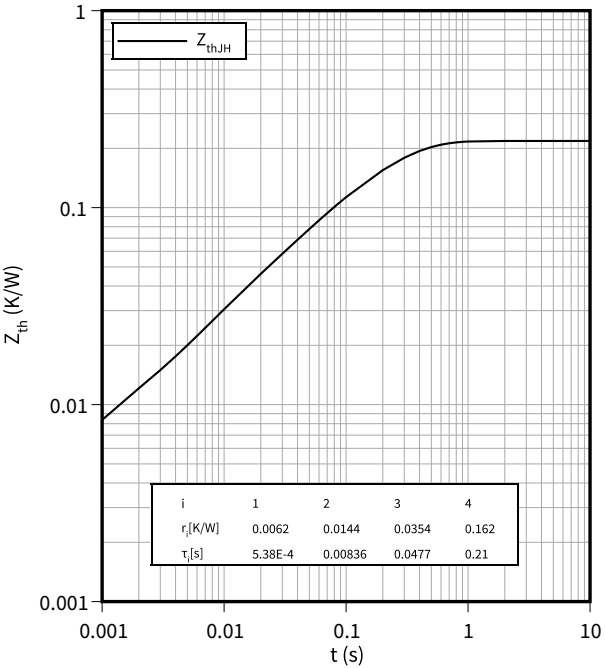
Switching times (typical), IGBT, T1 / T4

$t = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 225\text{ A}$, $V_{CC} = 600\text{ V}$, $T_{vj} = 150\text{ }^\circ\text{C}$



Transient thermal impedance , IGBT, T1 / T4

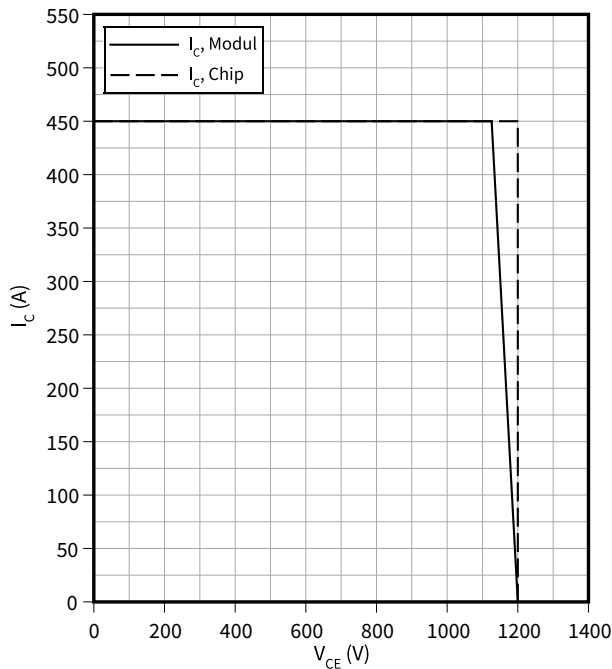
$Z_{th} = f(t)$



8 Characteristics diagrams

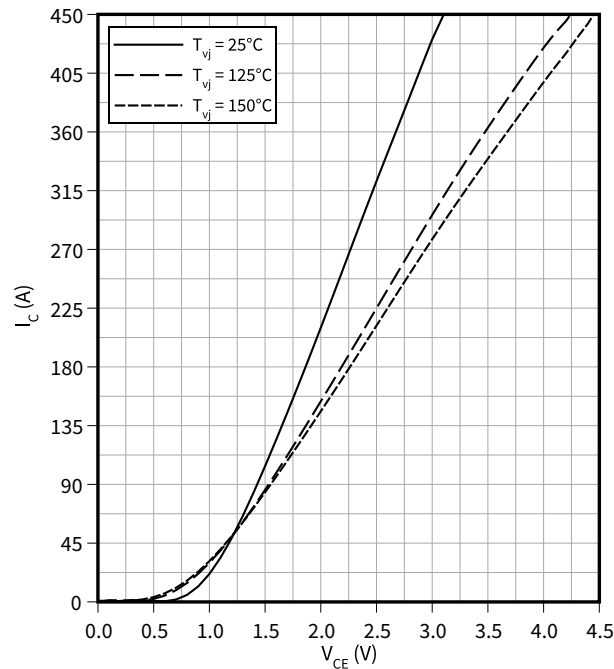
Reverse bias safe operating area (RBSOA), IGBT, T1 / T4

$I_C = f(V_{CE})$
 $R_{Goff} = 0.47 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



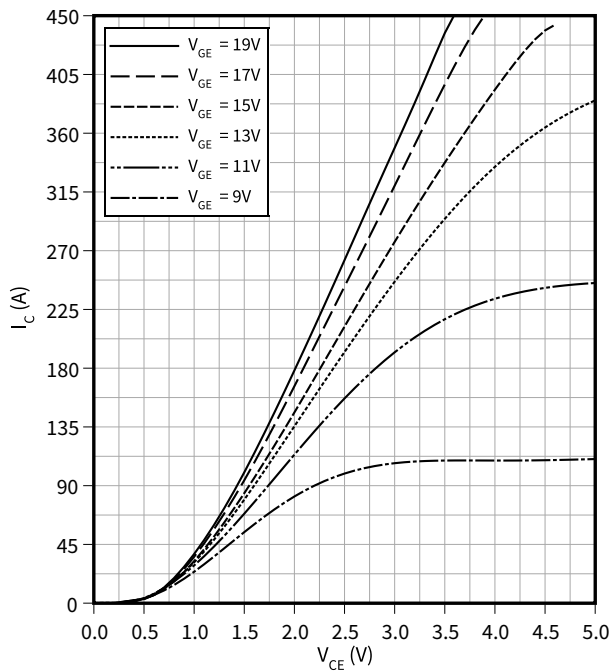
Output characteristic (typical), IGBT, T2 / T3

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



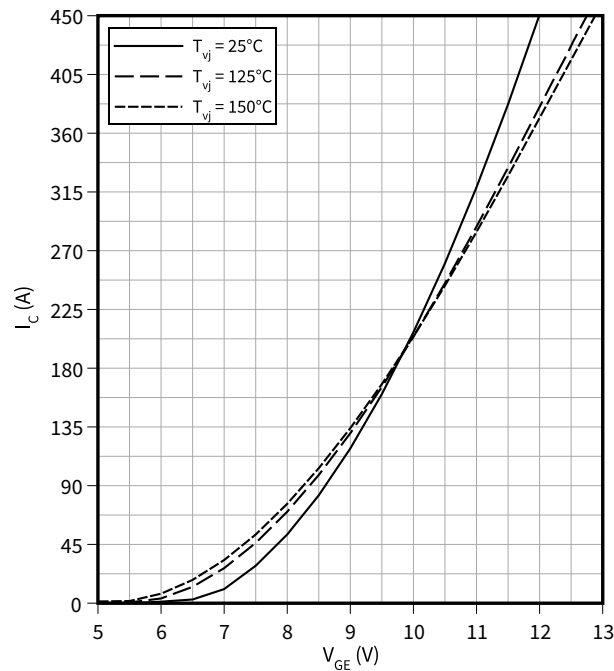
Output characteristic field (typical), IGBT, T2 / T3

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



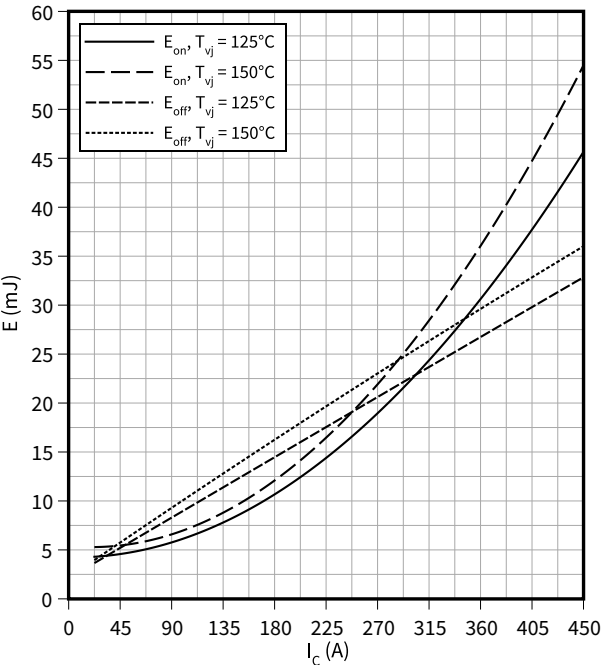
Transfer characteristic (typical), IGBT, T2 / T3

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



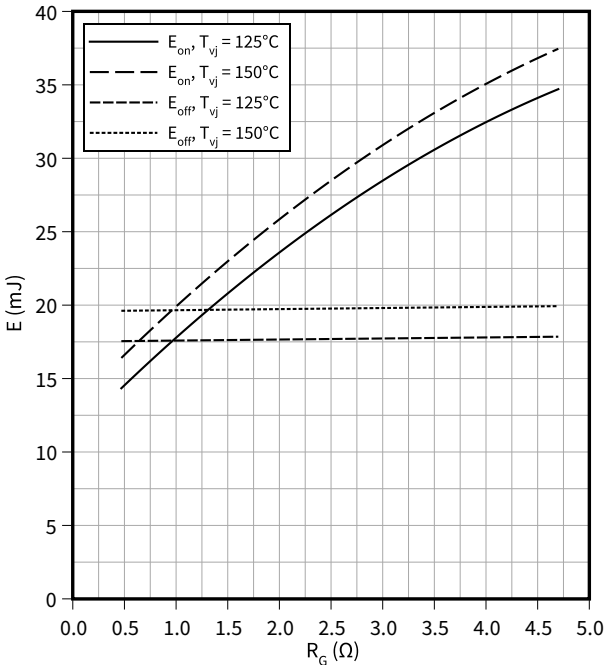
Switching losses (typical), IGBT, T2 / T3

$E = f(I_C)$
 $R_{Goff} = 0.47 \Omega$, $R_{Gon} = 0.47 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $V_{CC} = 600 \text{ V}$



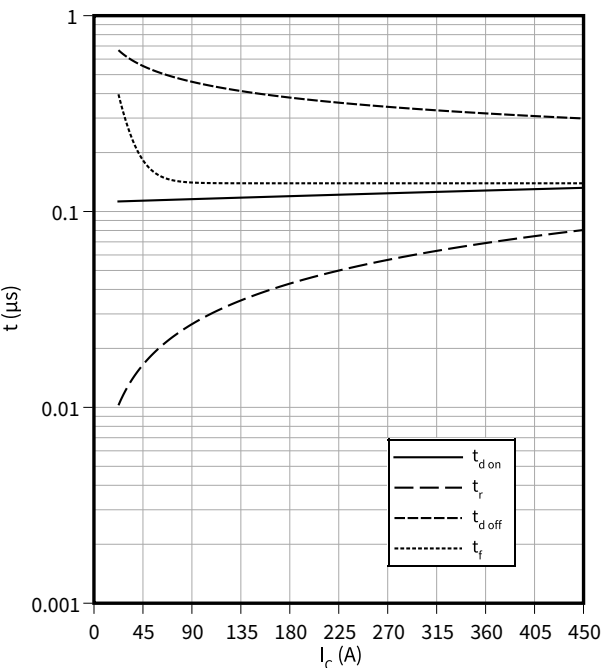
Switching losses (typical), IGBT, T2 / T3

$E = f(R_G)$
 $I_C = 225 \text{ A}$, $V_{CC} = 600 \text{ V}$, $V_{GE} = -15 / 15 \text{ V}$



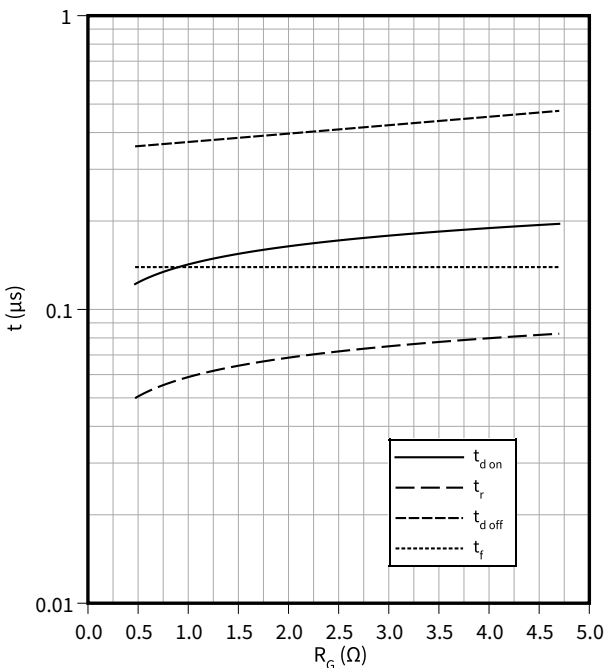
Switching times (typical), IGBT, T2 / T3

$t = f(I_C)$
 $R_{Goff} = 0.47 \Omega$, $R_{Gon} = 0.47 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $V_{CC} = 600 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



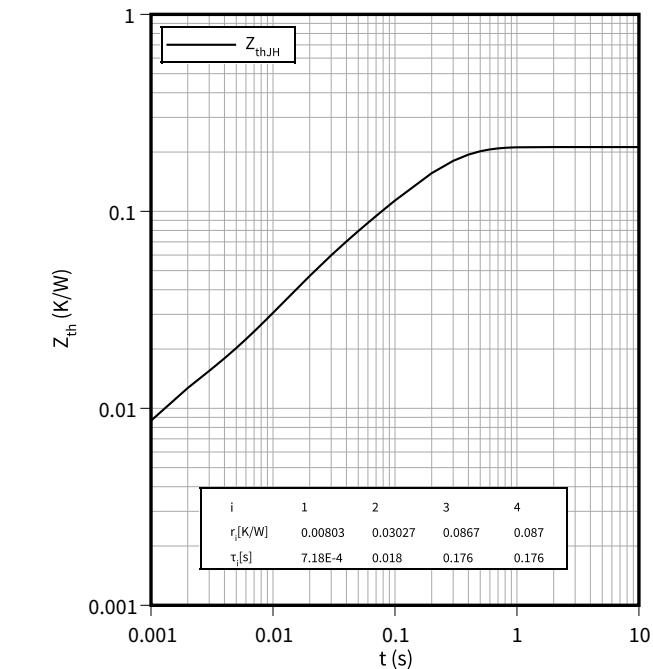
Switching times (typical), IGBT, T2 / T3

$t = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}$, $I_C = 225 \text{ A}$, $V_{CC} = 600 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



Transient thermal impedance , IGBT, T2 / T3

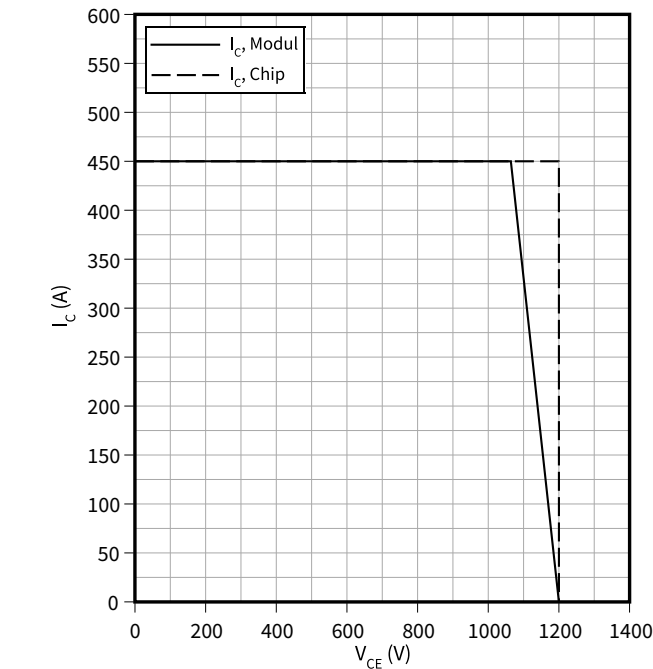
$Z_{th} = f(t)$



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

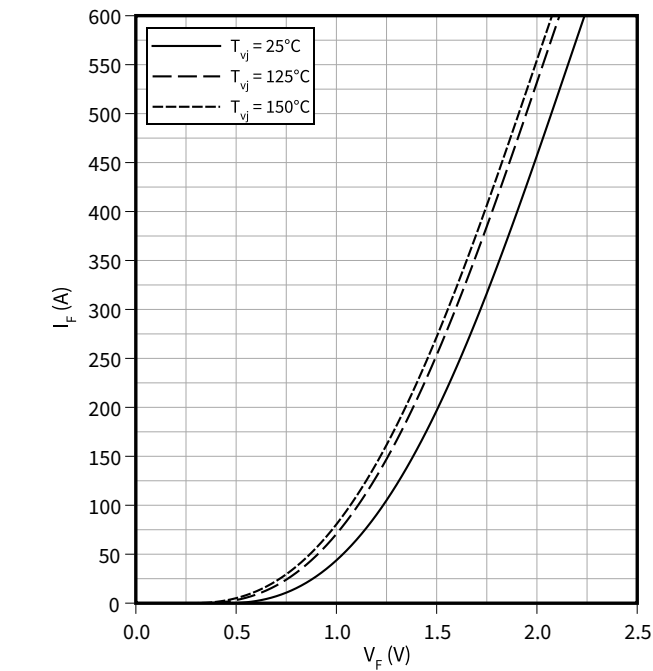
$I_C = f(V_{CE})$

$R_{Goff} = 0.47 \Omega, V_{GE} = \pm 15 V, T_{vj} = 150 \text{ }^\circ\text{C}$



Forward characteristic (typical), Diode, D1 / D4

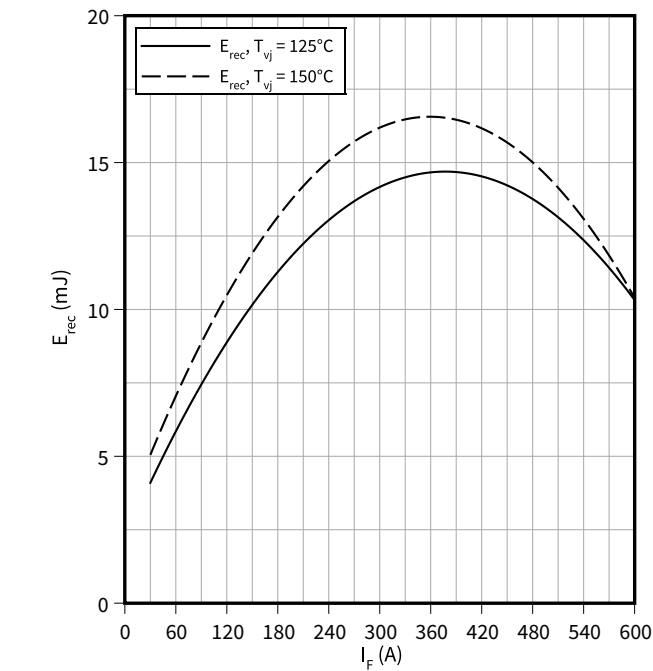
$I_F = f(V_F)$



Switching losses (typical), Diode, D1 / D4

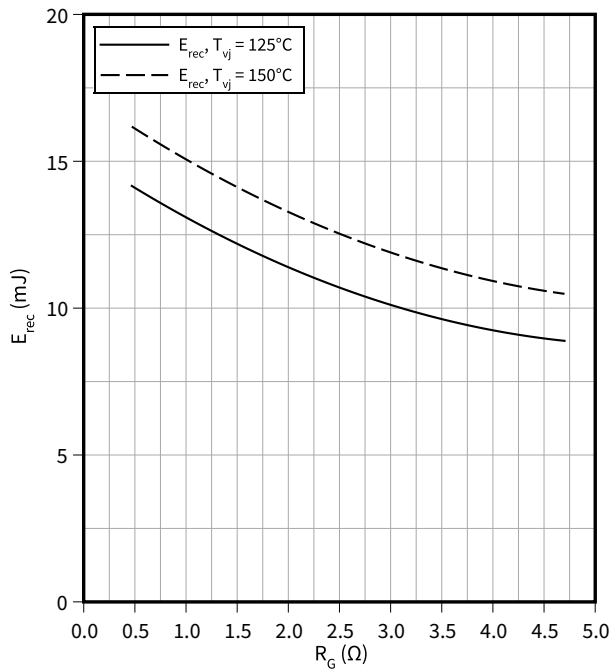
$E_{rec} = f(I_F)$

$R_G = 0.47 \Omega, V_{CC} = 600 V$



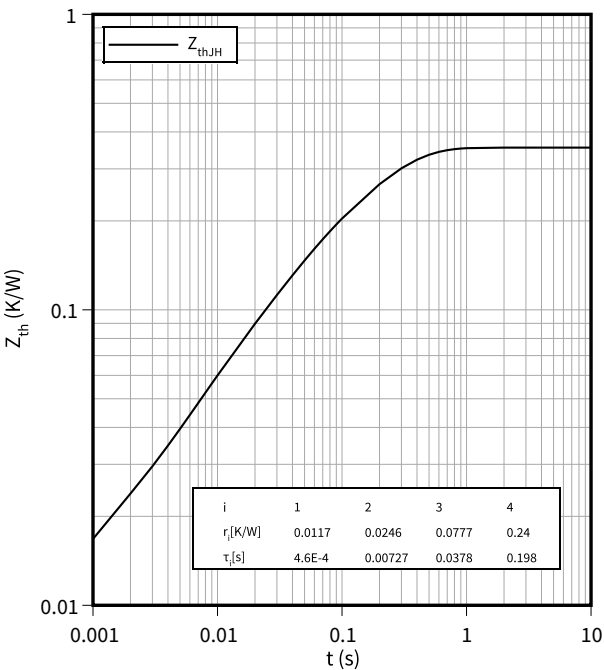
Switching losses (typical), Diode, D1 / D4

$E_{rec} = f(R_G)$
 $I_F = 300\text{ A}$, $V_{CC} = 600\text{ V}$



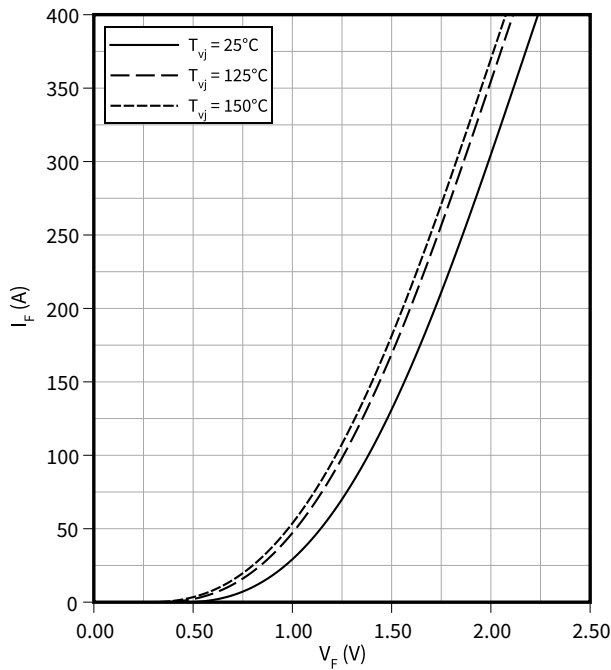
Transient thermal impedance, Diode, D1 / D4

$Z_{th} = f(t)$



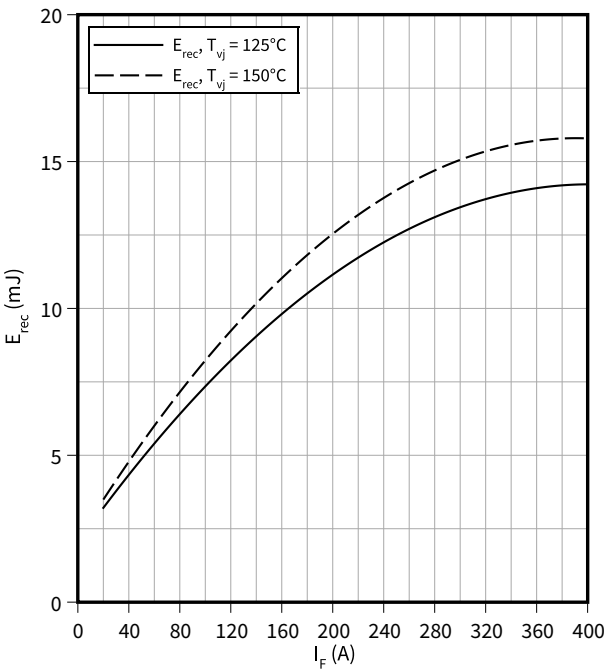
Forward characteristic (typical), Diode, D2 / D3

$I_F = f(V_F)$



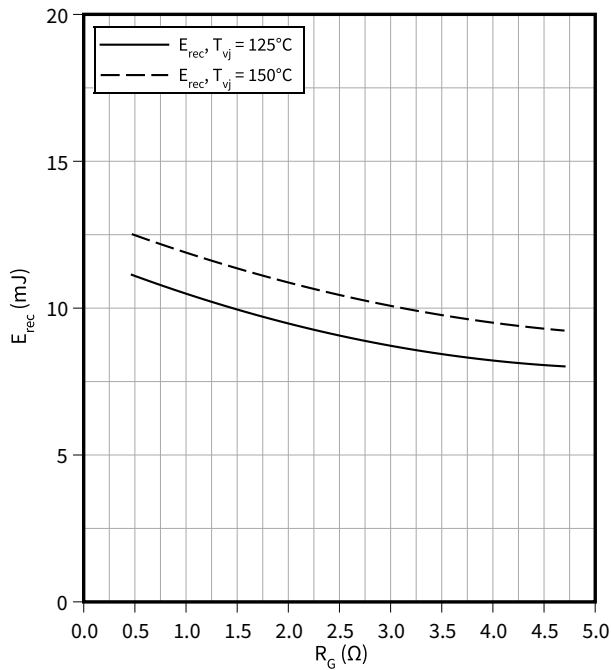
Switching losses (typical), Diode, D2 / D3

$E_{rec} = f(I_F)$
 $R_{Gon} = 0.47\text{ Ω}$, $V_{CC} = 600\text{ V}$



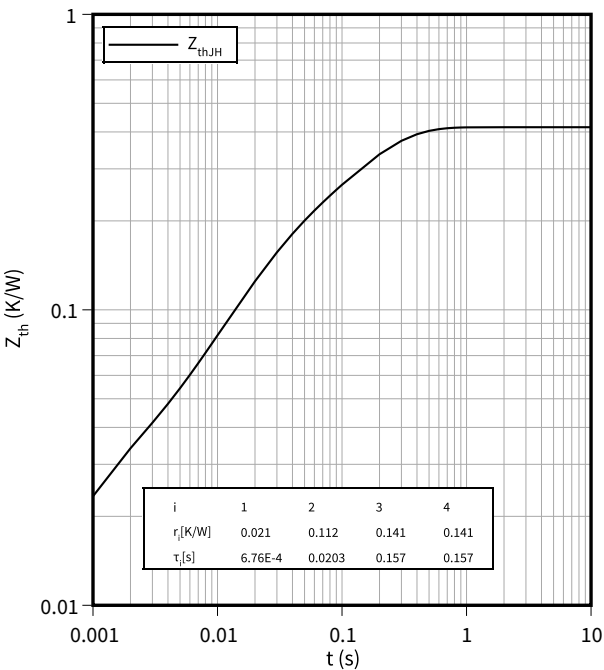
Switching losses (typical), Diode, D2 / D3

$E_{rec} = f(R_G)$
 $I_F = 200\text{ A}$, $V_{CC} = 600\text{ V}$



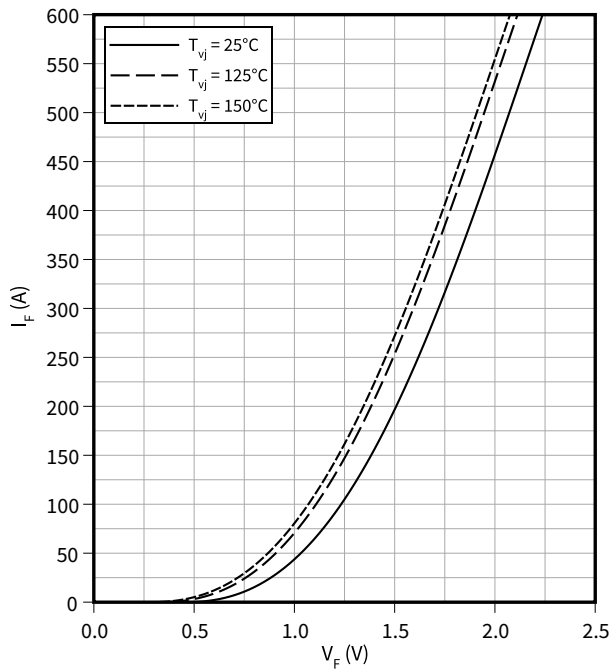
Transient thermal impedance, Diode, D2 / D3

$Z_{th} = f(t)$



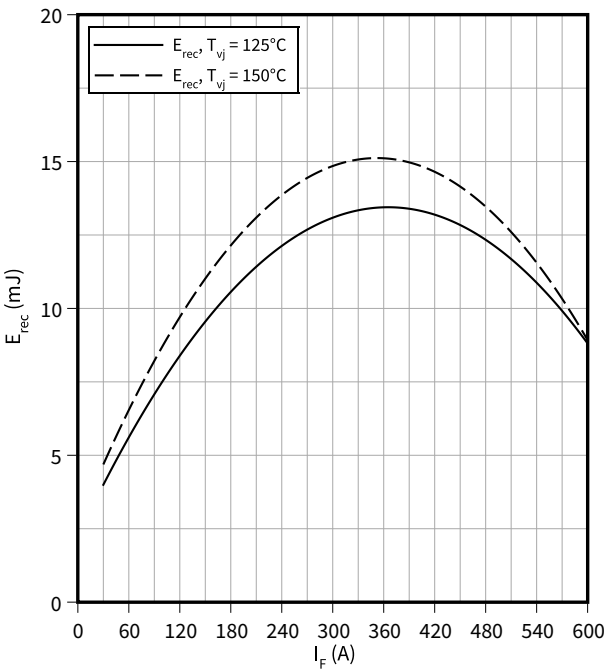
Forward characteristic (typical), Diode, D5 / D6

$I_F = f(V_F)$



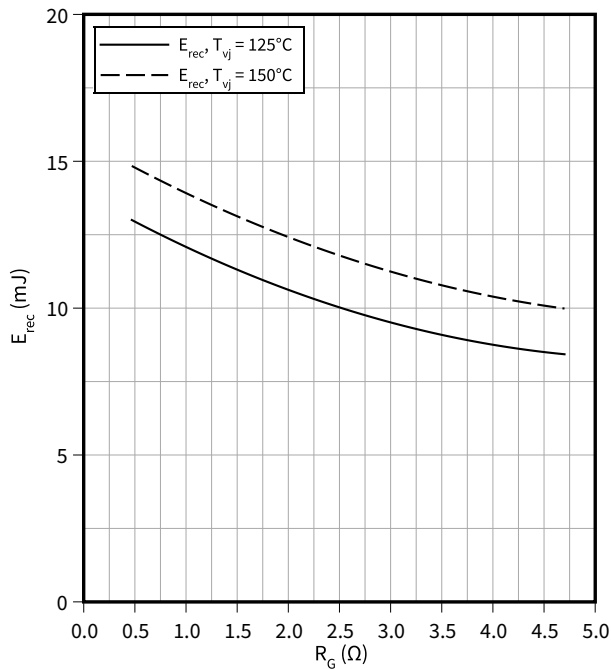
Switching losses (typical), Diode, D5 / D6

$E_{rec} = f(I_F)$
 $R_G = 0.47\ \Omega$, $V_{CC} = 600\text{ V}$



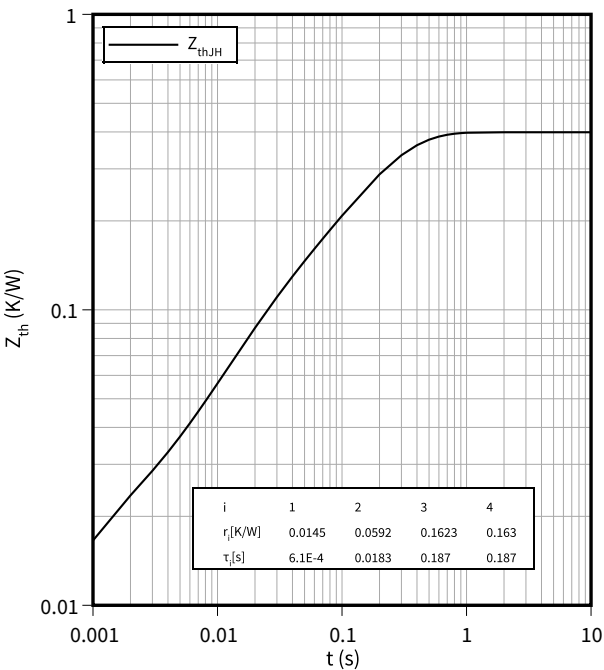
Switching losses (typical), Diode, D5 / D6

$E_{rec} = f(R_G)$
 $I_F = 300\text{ A}, V_{CC} = 600\text{ V}$



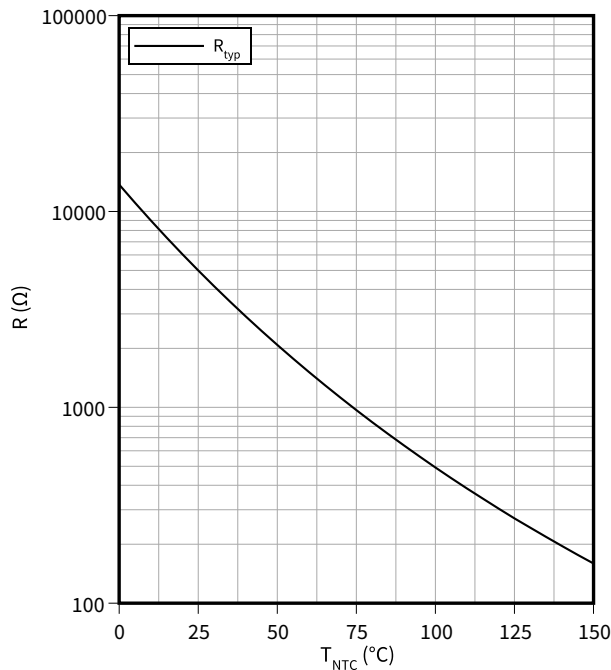
Transient thermal impedance, Diode, D5 / D6

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



9 **Circuit diagram**

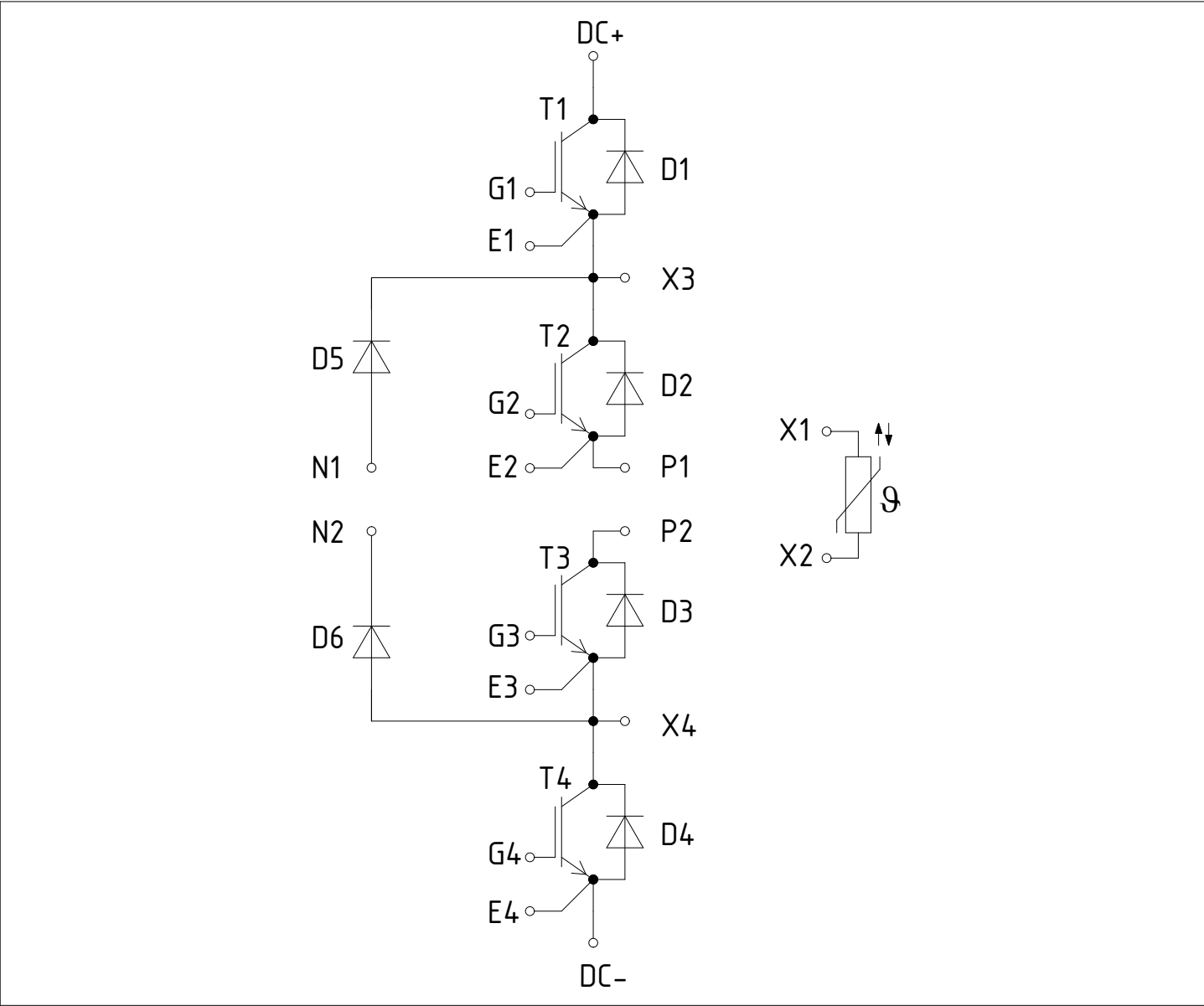


Figure 1

Figure 2

11 **Module label code**

Figure 3

Revision history

Document version	Date of release	Description of changes
0.10	2022-09-16	Initial version
1.00	2023-02-13	Final datasheet

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