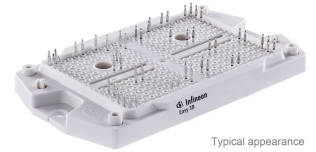


## EasyPACK™ module with TRENCHSTOP™ IGBT H3 and emitter controlled 7 diode and PressFIT / NTC

### 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

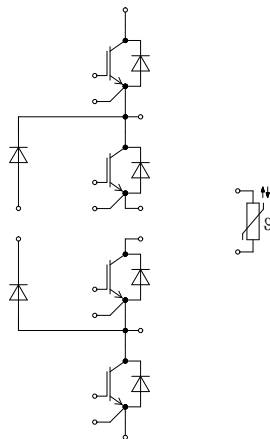
### Potential applications

- 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)	$\text{Al}_2\text{O}_3$	
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		$\mu C$
Internal gate resistor	$R_{Gint}$	$T_{vj} = 25\ ^\circ C$			3.3		$\Omega$
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		$\mu s$
			$T_{vj} = 125\ ^\circ C$		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		$\mu s$
			$T_{vj} = 125\ ^\circ C$		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		$\mu s$
			$T_{vj} = 125\ ^\circ C$		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		$\mu s$
			$T_{vj} = 125\ ^\circ C$		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	$I_{SC}$	$V_{GE} \leq 15\ V, V_{CC} = 800\ V, V_{CEmax} = V_{CES} - L_{sCE} * di/dt$	$t_p \leq 10\ \mu s, T_{vj} = 150\ ^\circ C$		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, $\lambda_{grease} = 3.3 \text{ W}/(\text{m}\cdot\text{K})$		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)	$t_{don}$	$I_C = 225\text{ A}, V_{CC} = 600\text{ V},$ $V_{GE} = \pm 15\text{ V}, R_{Gon} = 0.47\ \Omega$	$T_{vj} = 25\text{ °C}$	0.107		$\mu\text{s}$
			$T_{vj} = 125\text{ °C}$	0.117		
			$T_{vj} = 150\text{ °C}$	0.122		
Rise time (inductive load)	$t_r$	$I_C = 225\text{ A}, V_{CC} = 600\text{ V},$ $V_{GE} = \pm 15\text{ V}, R_{Gon} = 0.47\ \Omega$	$T_{vj} = 25\text{ °C}$	0.039		$\mu\text{s}$
			$T_{vj} = 125\text{ °C}$	0.048		
			$T_{vj} = 150\text{ °C}$	0.050		
Turn-off delay time (inductive load)	$t_{doff}$	$I_C = 225\text{ A}, V_{CC} = 600\text{ V},$ $V_{GE} = \pm 15\text{ V}, R_{Goff} = 0.47\ \Omega$	$T_{vj} = 25\text{ °C}$	0.290		$\mu\text{s}$
			$T_{vj} = 125\text{ °C}$	0.340		
			$T_{vj} = 150\text{ °C}$	0.360		
Fall time (inductive load)	$t_f$	$I_C = 225\text{ A}, V_{CC} = 600\text{ V},$ $V_{GE} = \pm 15\text{ V}, R_{Goff} = 0.47\ \Omega$	$T_{vj} = 25\text{ °C}$	0.041		$\mu\text{s}$
			$T_{vj} = 125\text{ °C}$	0.114		
			$T_{vj} = 150\text{ °C}$	0.139		
Turn-on energy loss per pulse	$E_{on}$	$I_C = 225\text{ A}, V_{CC} = 600\text{ V},$ $L_\sigma = 35\text{ nH}, V_{GE} = \pm 15\text{ V},$ $R_{Gon} = 0.47\ \Omega, di/dt =$ $4600\text{ A}/\mu\text{s} (T_{vj} = 150\text{ °C})$	$T_{vj} = 25\text{ °C}$	8.1		mJ
			$T_{vj} = 125\text{ °C}$	14.3		
			$T_{vj} = 150\text{ °C}$	16.4		
Turn-off energy loss per pulse	$E_{off}$	$I_C = 225\text{ A}, V_{CC} = 600\text{ V},$ $L_\sigma = 35\text{ nH}, V_{GE} = \pm 15\text{ V},$ $R_{Goff} = 0.47\ \Omega, dv/dt =$ $4200\text{ V}/\mu\text{s} (T_{vj} = 150\text{ °C})$	$T_{vj} = 25\text{ °C}$	9.25		mJ
			$T_{vj} = 125\text{ °C}$	17.5		
			$T_{vj} = 150\text{ °C}$	19.6		
SC data	$I_{SC}$	$V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V},$ $V_{CEmax} = V_{CES} - L_{SCE} * di/dt$	$t_p \leq 10\ \mu\text{s},$ $T_{vj} = 150\text{ °C}$	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	$T_{vj\ op}$			-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	$V_{RRM}$	$T_{vj} = 25\text{ °C}$	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	$I^2t$	$t_p = 10 \text{ ms}, V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ }^\circ\text{C}$	10900	$\text{A}^2\text{s}$
			$T_{vj} = 150 \text{ }^\circ\text{C}$	6280	

**Table 8 Characteristic values**

Parameter	Symbol	Note or test condition	Values			Unit	
			Min.	Typ.	Max.		
Forward voltage	$V_F$	$I_F = 300 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ }^\circ\text{C}$		1.72	2.10	V
			$T_{vj} = 125 \text{ }^\circ\text{C}$		1.59		
			$T_{vj} = 150 \text{ }^\circ\text{C}$		1.56		
Peak reverse recovery current	$I_{RM}$	$V_{CC} = 600 \text{ V}, I_F = 300 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 4800 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ }^\circ\text{C})$	$T_{vj} = 25 \text{ }^\circ\text{C}$		229		A
			$T_{vj} = 125 \text{ }^\circ\text{C}$		263		
			$T_{vj} = 150 \text{ }^\circ\text{C}$		272		
Recovered charge	$Q_r$	$V_{CC} = 600 \text{ V}, I_F = 300 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 4800 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ }^\circ\text{C})$	$T_{vj} = 25 \text{ }^\circ\text{C}$		20.5		$\mu\text{C}$
			$T_{vj} = 125 \text{ }^\circ\text{C}$		38.4		
			$T_{vj} = 150 \text{ }^\circ\text{C}$		44.5		
Reverse recovery energy	$E_{rec}$	$V_{CC} = 600 \text{ V}, I_F = 300 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 4800 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ }^\circ\text{C})$	$T_{vj} = 25 \text{ }^\circ\text{C}$		7.88		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$		14.2		
			$T_{vj} = 150 \text{ }^\circ\text{C}$		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	$T_{vjop}$		-40		150	$^\circ\text{C}$	

## 5 Diode, D2 / D3

**Table 9 Maximum rated values**

Parameter	Symbol	Note or test condition	Values	Unit	
Repetitive peak reverse voltage	$V_{RRM}$		$T_{vj} = 25 \text{ }^\circ\text{C}$	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	$I^2t$	$t_p = 10 \text{ ms}, V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ }^\circ\text{C}$	3320	$\text{A}^2\text{s}$
			$T_{vj} = 150 \text{ }^\circ\text{C}$	2110	

**Table 10** Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit	
			Min.	Typ.	Max.		
Forward voltage	$V_F$	$I_F = 200 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ }^\circ\text{C}$		1.72	2.10	V
			$T_{vj} = 125 \text{ }^\circ\text{C}$		1.59		
			$T_{vj} = 150 \text{ }^\circ\text{C}$		1.56		
Peak reverse recovery current	$I_{RM}$	$V_{CC} = 600 \text{ V}, I_F = 200 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 4300 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ }^\circ\text{C})$	$T_{vj} = 25 \text{ }^\circ\text{C}$		195		A
			$T_{vj} = 125 \text{ }^\circ\text{C}$		238		
			$T_{vj} = 150 \text{ }^\circ\text{C}$		248		
Recovered charge	$Q_r$	$V_{CC} = 600 \text{ V}, I_F = 200 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 4300 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ }^\circ\text{C})$	$T_{vj} = 25 \text{ }^\circ\text{C}$		14.1		$\mu\text{C}$
			$T_{vj} = 125 \text{ }^\circ\text{C}$		27.4		
			$T_{vj} = 150 \text{ }^\circ\text{C}$		31.3		
Reverse recovery energy	$E_{rec}$	$V_{CC} = 600 \text{ V}, I_F = 200 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 4300 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ }^\circ\text{C})$	$T_{vj} = 25 \text{ }^\circ\text{C}$		5.72		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$		11.1		
			$T_{vj} = 150 \text{ }^\circ\text{C}$		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	$T_{vj\ op}$		-40		150	$^\circ\text{C}$	

## 6 Diode, D5 / D6

**Table 11** Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit	
Repetitive peak reverse voltage	$V_{RRM}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	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	$I^2t$	$t_p = 10 \text{ ms}, V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ }^\circ\text{C}$	10900	$\text{A}^2\text{s}$
			$T_{vj} = 150 \text{ }^\circ\text{C}$	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		$\mu\text{C}$
			$T_{vj} = 125 \text{ °C}$		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	$T_{vj\text{ op}}$			-40		150	$^{\circ}\text{C}$

## 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		k $\Omega$
Deviation of $R_{100}$	$\Delta R/R$	$T_{NTC} = 100 \text{ °C}, R_{100} = 493 \text{ }\Omega$	-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

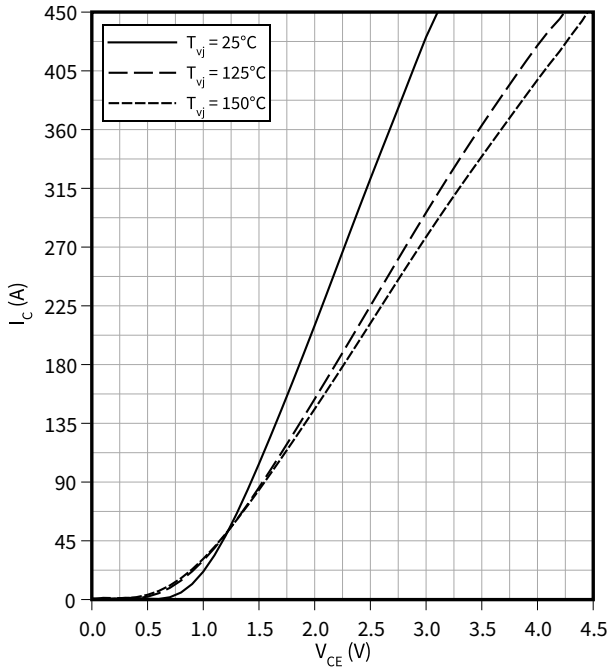
Note: Specification according to the valid application note.

## 8 Characteristics diagrams

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

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

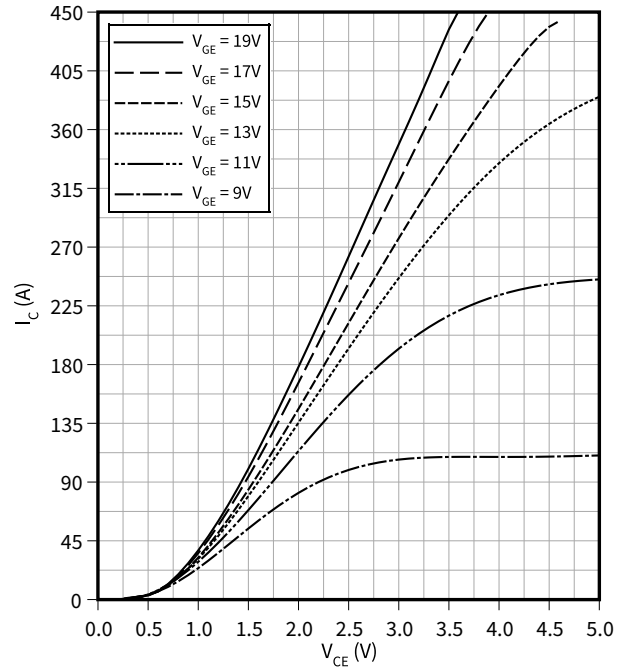
$$V_{GE} = 15 \text{ V}$$



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

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

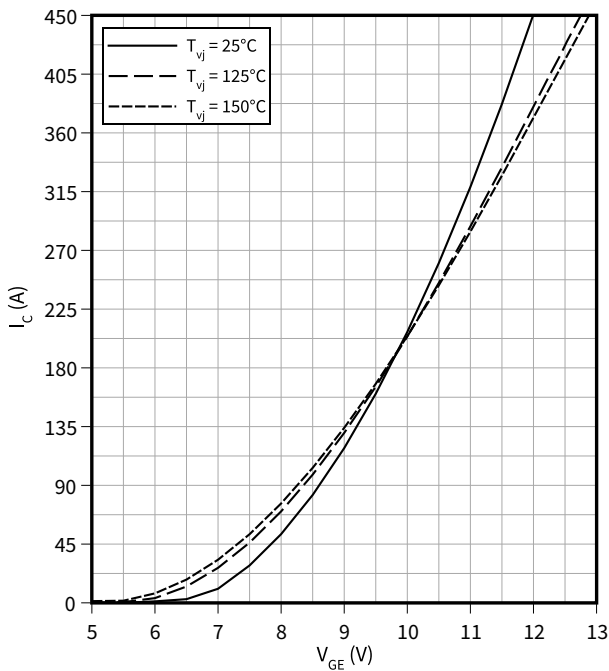
$$T_{vj} = 150 \text{ °C}$$



**Transfer characteristic (typical), IGBT, T1 / T4**

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

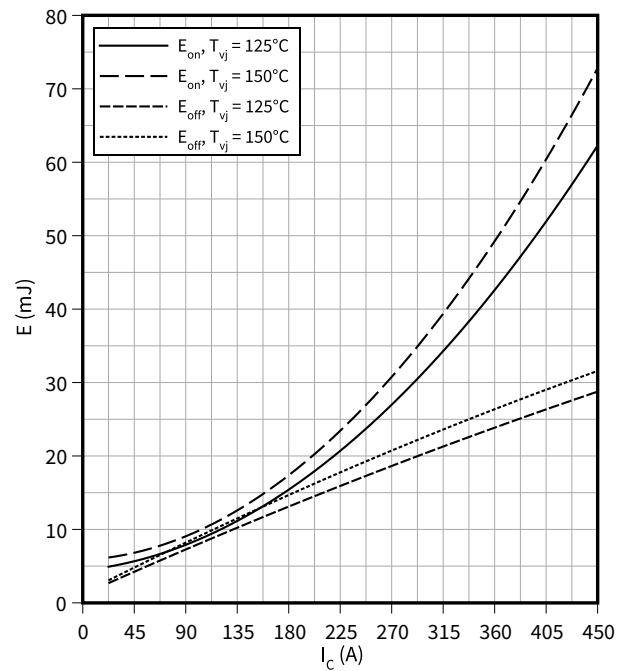
$$V_{CE} = 20 \text{ V}$$



**Switching losses (typical), IGBT, T1 / T4**

$$E = f(I_C)$$

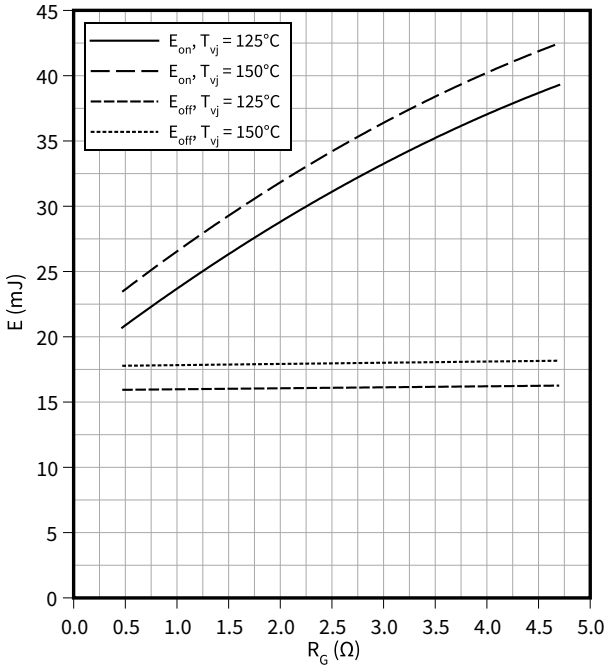
$$R_{Goff} = 0.47 \text{ } \Omega, R_{Gon} = 0.47 \text{ } \Omega, V_{GE} = \pm 15 \text{ V}, V_{CC} = 600 \text{ V}$$



**Switching losses (typical), IGBT, T1 / T4**

$E = f(R_G)$

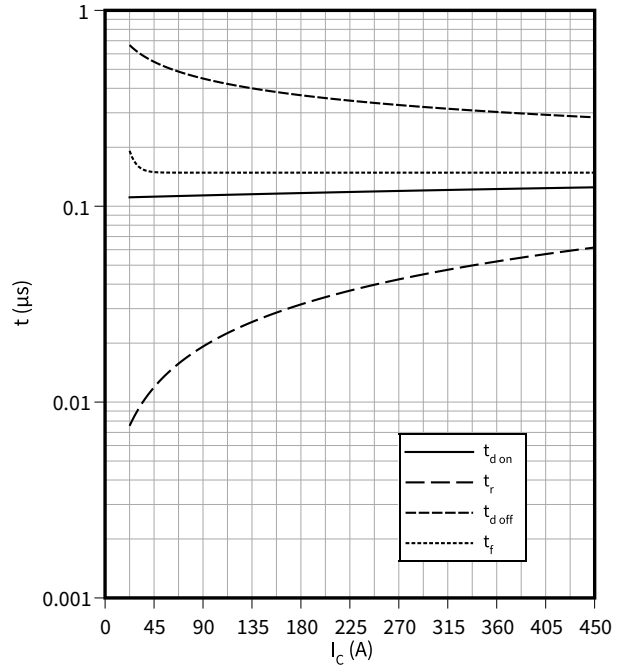
$V_{GE} = \pm 15 \text{ V}$ ,  $I_C = 225 \text{ A}$ ,  $V_{CC} = 600 \text{ V}$



**Switching times (typical), IGBT, T1 / T4**

$t = f(I_C)$

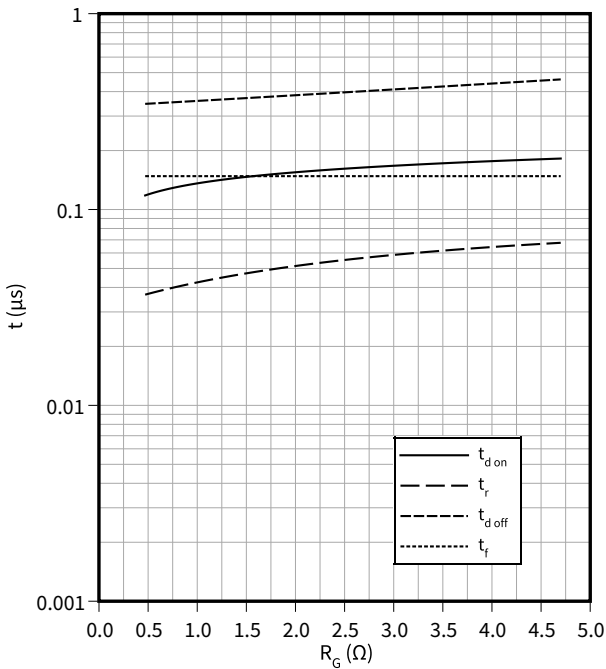
$R_{Goff} = 0.47 \Omega$ ,  $R_{Gon} = 0.47 \Omega$ ,  $V_{GE} = \pm 15 \text{ V}$ ,  $V_{CC} = 600 \text{ V}$ ,  $T_{vj} = 150 \text{ °C}$



**Switching times (typical), IGBT, T1 / T4**

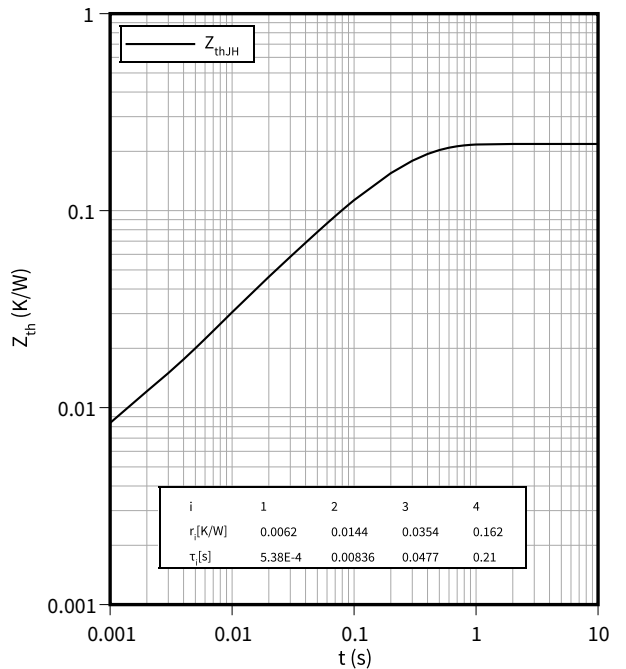
$t = f(R_G)$

$V_{GE} = \pm 15 \text{ V}$ ,  $I_C = 225 \text{ A}$ ,  $V_{CC} = 600 \text{ V}$ ,  $T_{vj} = 150 \text{ °C}$



**Transient thermal impedance, IGBT, T1 / T4**

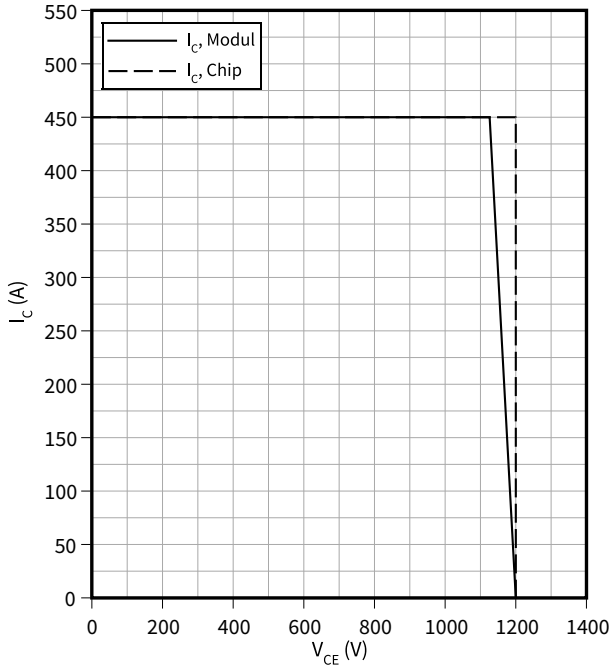
$Z_{th} = f(t)$



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

$I_C = f(V_{CE})$

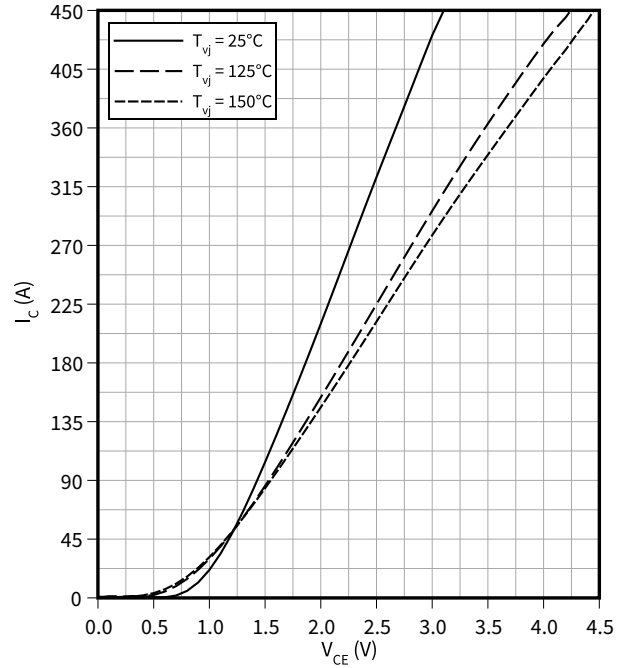
$R_{Goff} = 0.47 \Omega$ ,  $V_{GE} = \pm 15 V$ ,  $T_{vj} = 150 \text{ }^\circ\text{C}$



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

$I_C = f(V_{CE})$

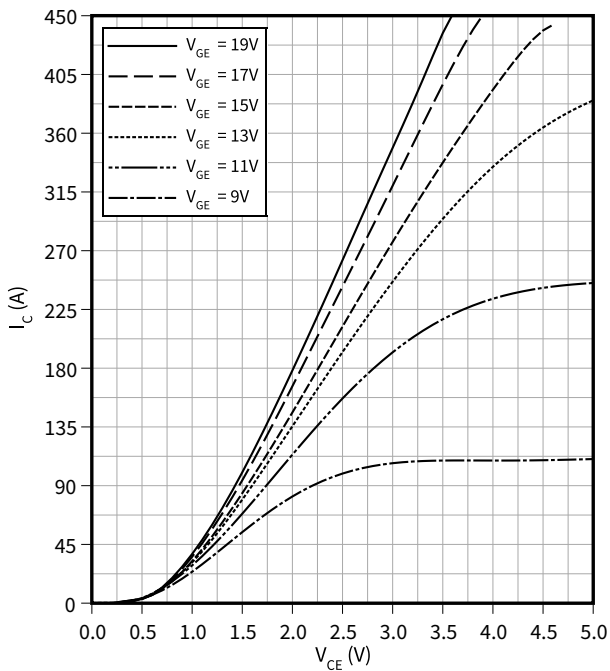
$V_{GE} = 15 V$



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

$I_C = f(V_{CE})$

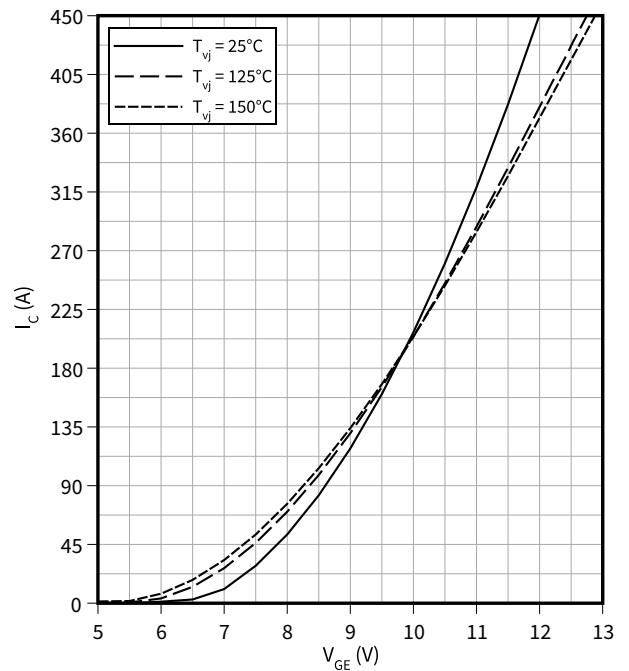
$T_{vj} = 150 \text{ }^\circ\text{C}$



**Transfer characteristic (typical), IGBT, T2 / T3**

$I_C = f(V_{GE})$

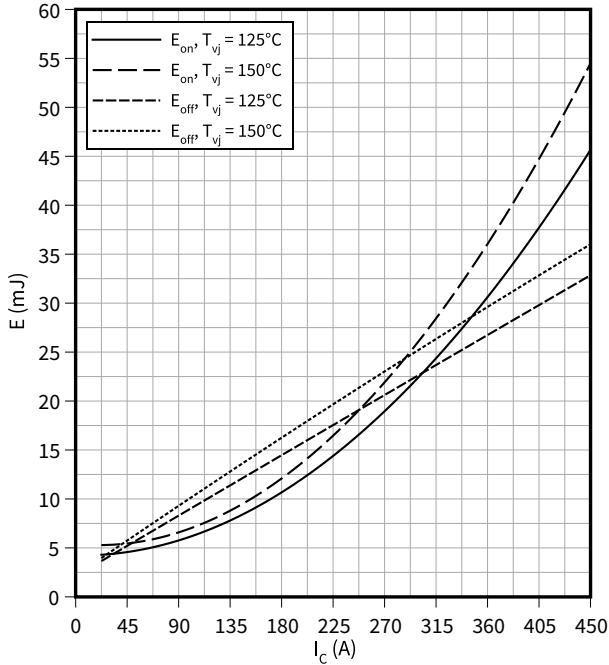
$V_{CE} = 20 V$



**Switching losses (typical), IGBT, T2 / T3**

$E = f(I_C)$

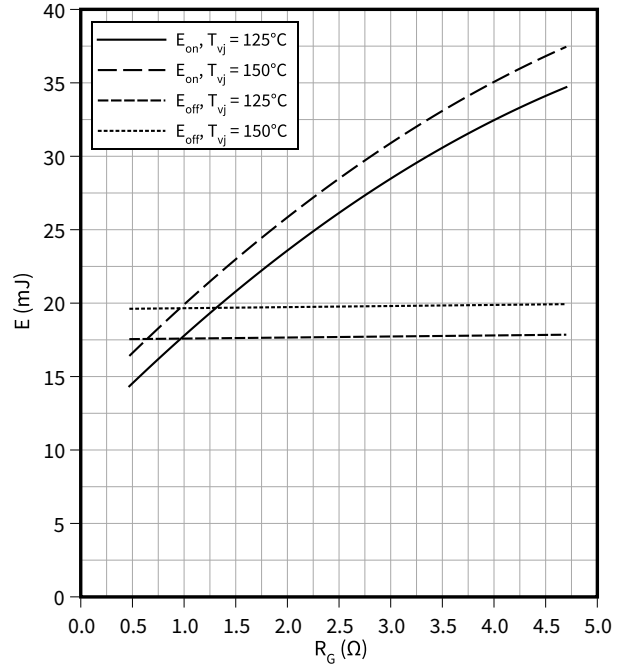
$R_{Goff} = 0.47 \Omega$ ,  $R_{Gon} = 0.47 \Omega$ ,  $V_{GE} = \pm 15 \text{ V}$ ,  $V_{CC} = 600 \text{ V}$



**Switching losses (typical), IGBT, T2 / T3**

$E = f(R_G)$

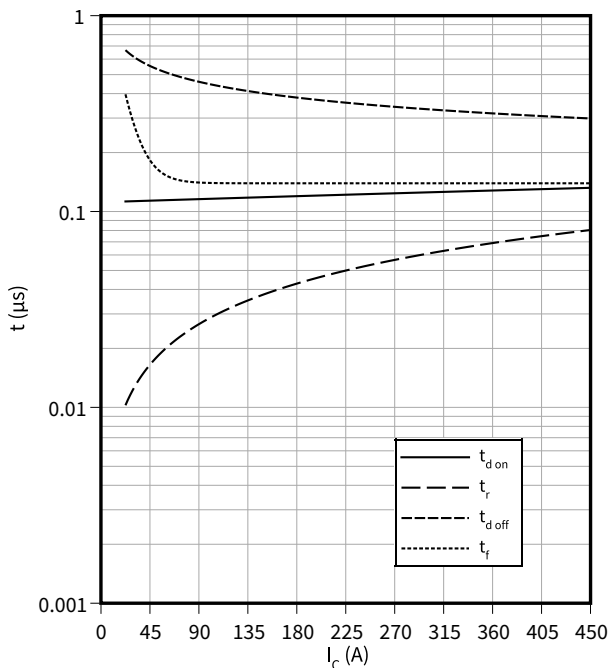
$I_C = 225 \text{ A}$ ,  $V_{CC} = 600 \text{ V}$ ,  $V_{GE} = -15 / 15 \text{ V}$



**Switching times (typical), IGBT, T2 / T3**

$t = f(I_C)$

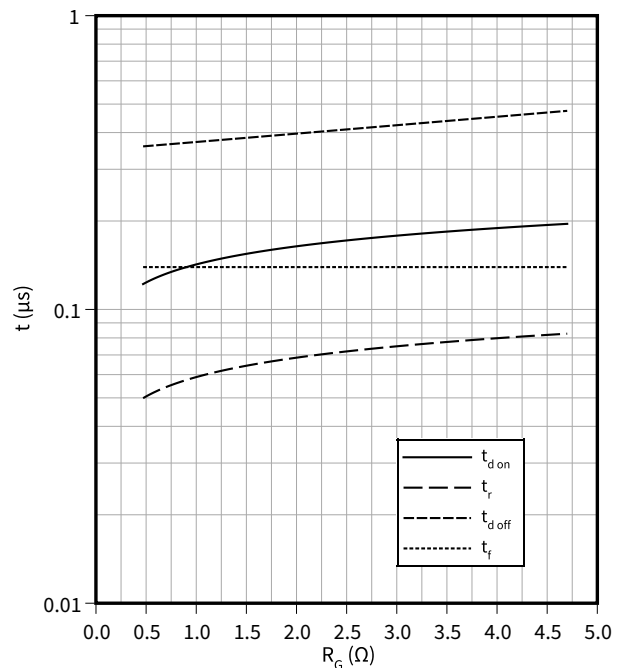
$R_{Goff} = 0.47 \Omega$ ,  $R_{Gon} = 0.47 \Omega$ ,  $V_{GE} = \pm 15 \text{ V}$ ,  $V_{CC} = 600 \text{ V}$ ,  $T_{vj} = 150 \text{ °C}$



**Switching times (typical), IGBT, T2 / T3**

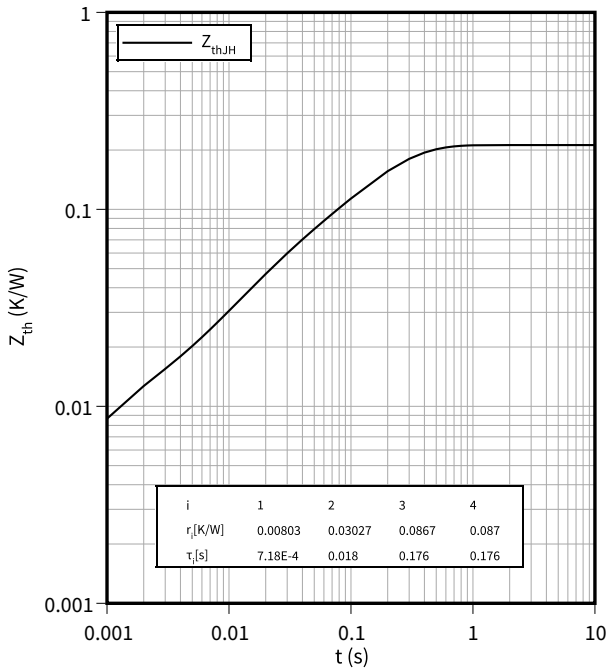
$t = f(R_G)$

$V_{GE} = \pm 15 \text{ V}$ ,  $I_C = 225 \text{ A}$ ,  $V_{CC} = 600 \text{ V}$ ,  $T_{vj} = 150 \text{ °C}$



**Transient thermal impedance, IGBT, T2 / T3**

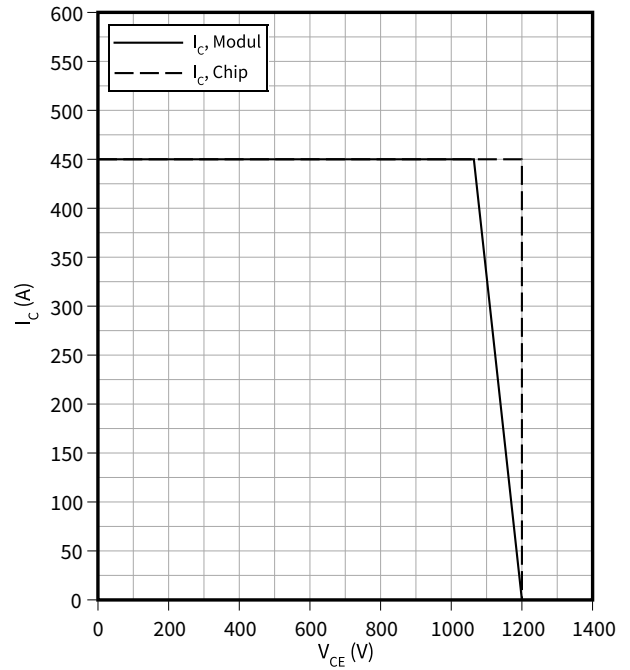
$Z_{th} = f(t)$



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

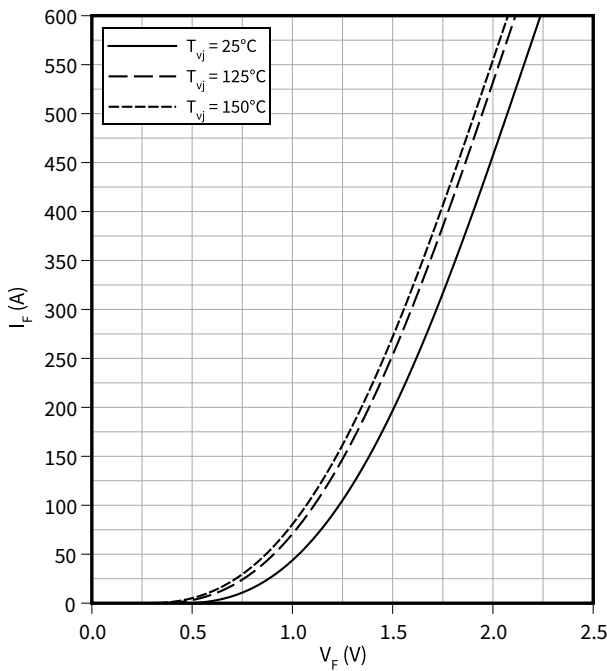
$I_C = f(V_{CE})$

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



**Forward characteristic (typical), Diode, D1 / D4**

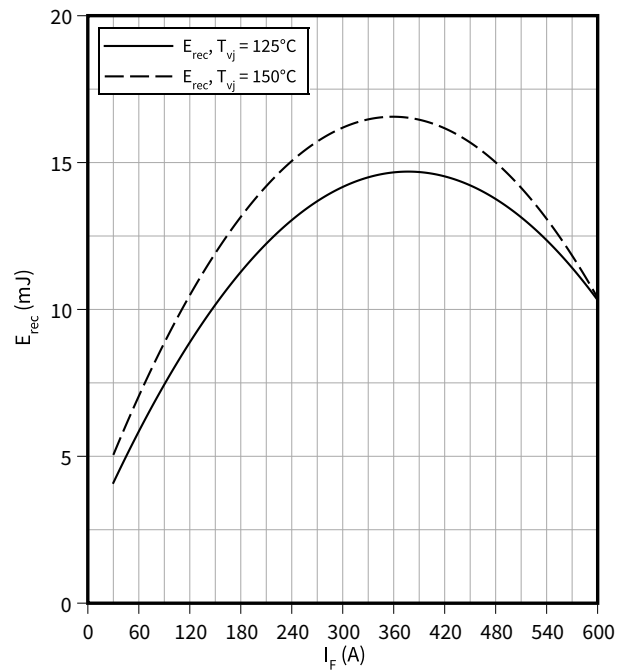
$I_F = f(V_F)$



**Switching losses (typical), Diode, D1 / D4**

$E_{rec} = f(I_F)$

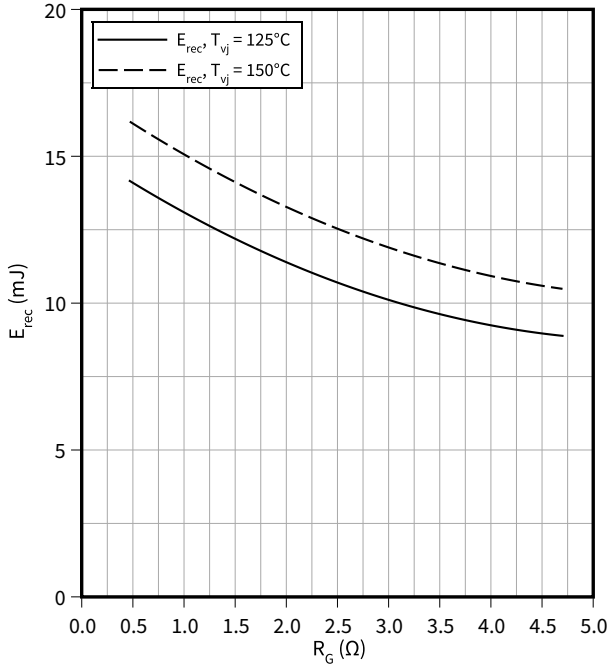
$R_G = 0.47 \Omega, V_{CC} = 600 V$



**Switching losses (typical), Diode, D1 / D4**

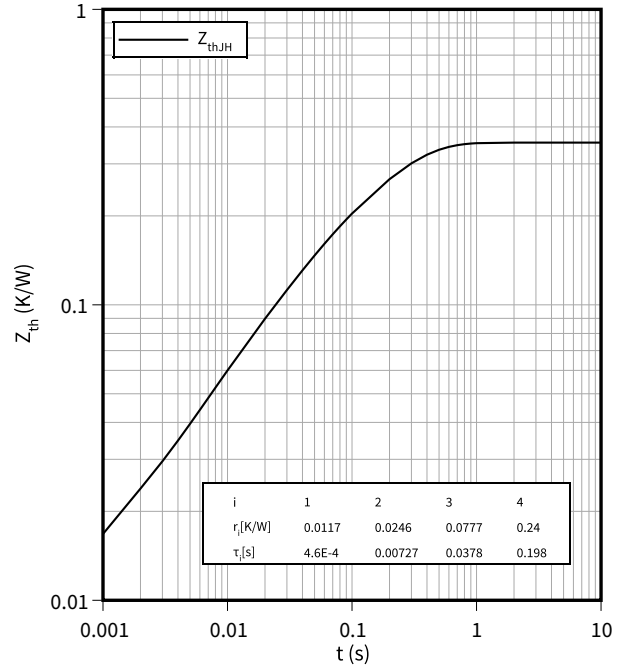
$E_{rec} = f(R_G)$

$I_F = 300 \text{ A}, V_{CC} = 600 \text{ V}$



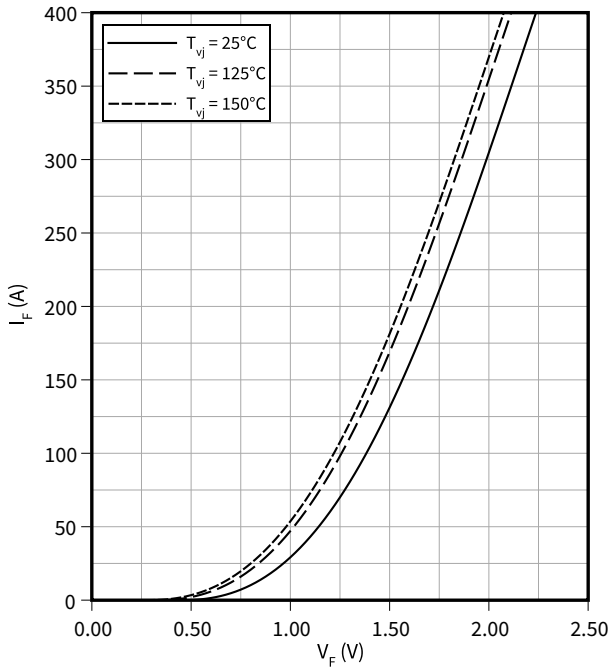
**Transient thermal impedance, Diode, D1 / D4**

$Z_{th} = f(t)$



**Forward characteristic (typical), Diode, D2 / D3**

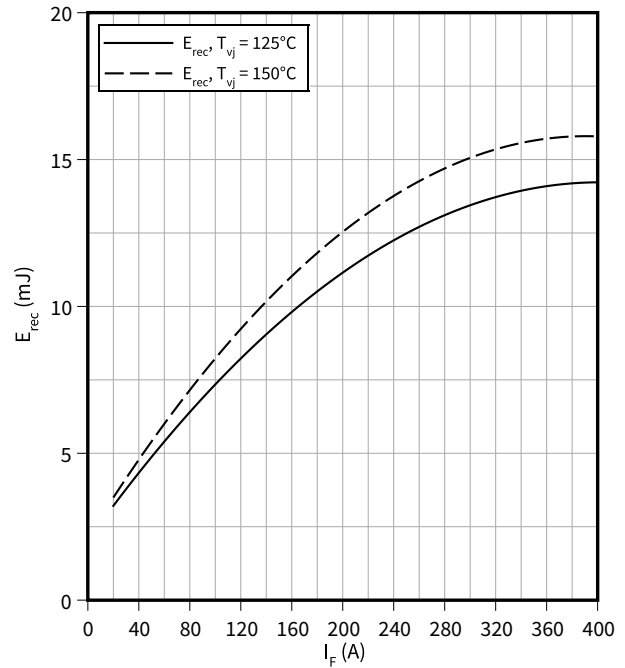
$I_F = f(V_F)$



**Switching losses (typical), Diode, D2 / D3**

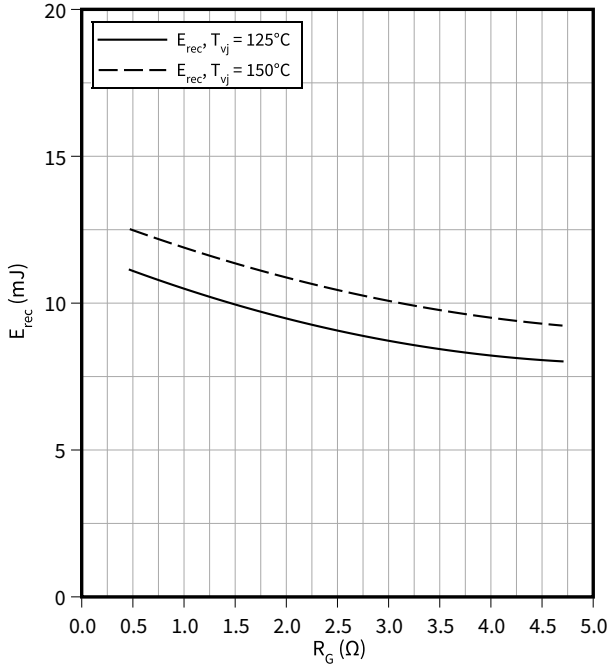
$E_{rec} = f(I_F)$

$R_{Gon} = 0.47 \text{ } \Omega, V_{CC} = 600 \text{ V}$



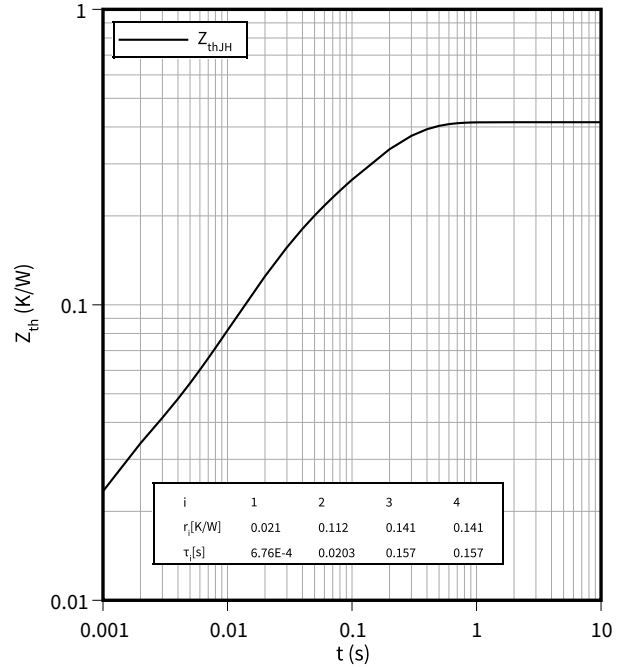
**Switching losses (typical), Diode, D2 / D3**

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



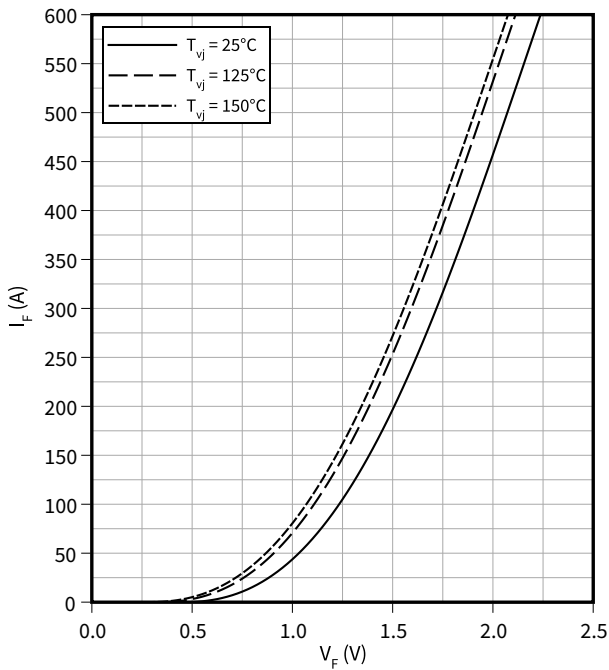
**Transient thermal impedance, Diode, D2 / D3**

$Z_{th} = f(t)$



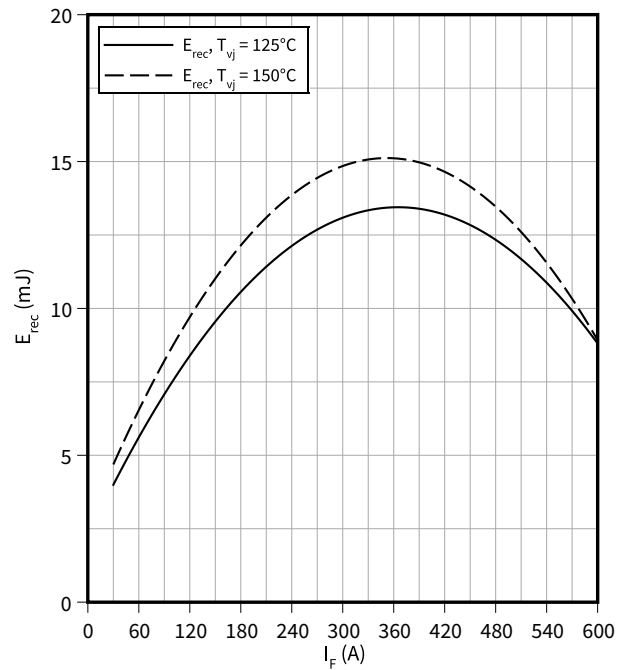
**Forward characteristic (typical), Diode, D5 / D6**

$I_F = f(V_F)$



**Switching losses (typical), Diode, D5 / D6**

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

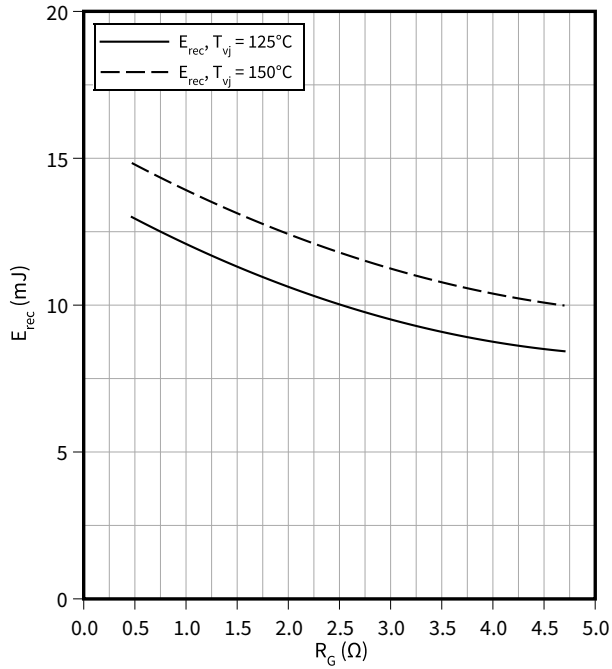




**Switching losses (typical), Diode, D5 / D6**

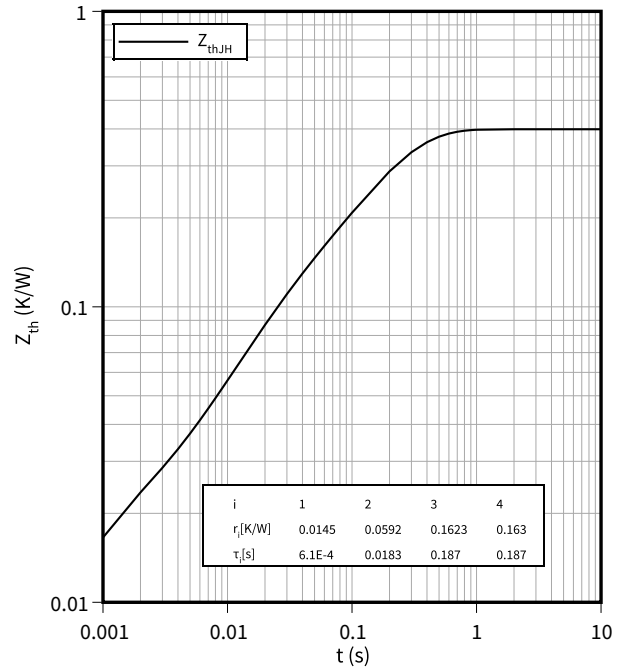
$E_{rec} = f(R_G)$

$I_F = 300\text{ A}, V_{CC} = 600\text{ V}$



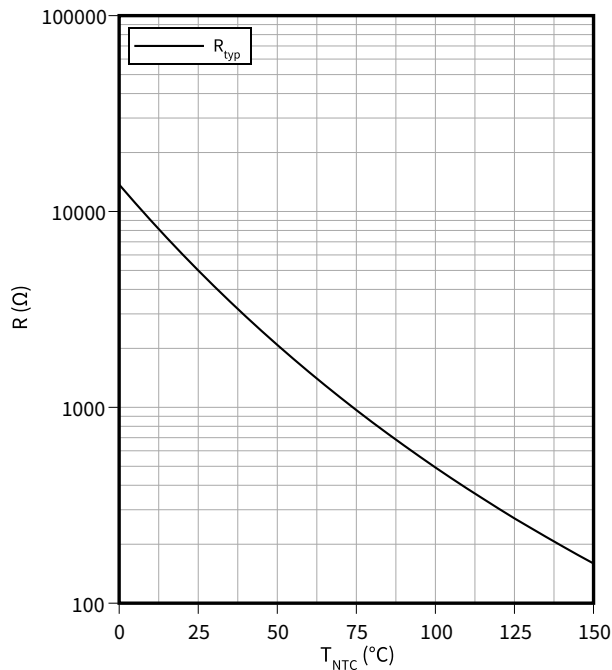
**Transient thermal impedance, Diode, D5 / D6**

$Z_{th} = f(t)$



**Temperature characteristic (typical), NTC-Thermistor**

$R = f(T_{NTC})$



## 9 Circuit diagram

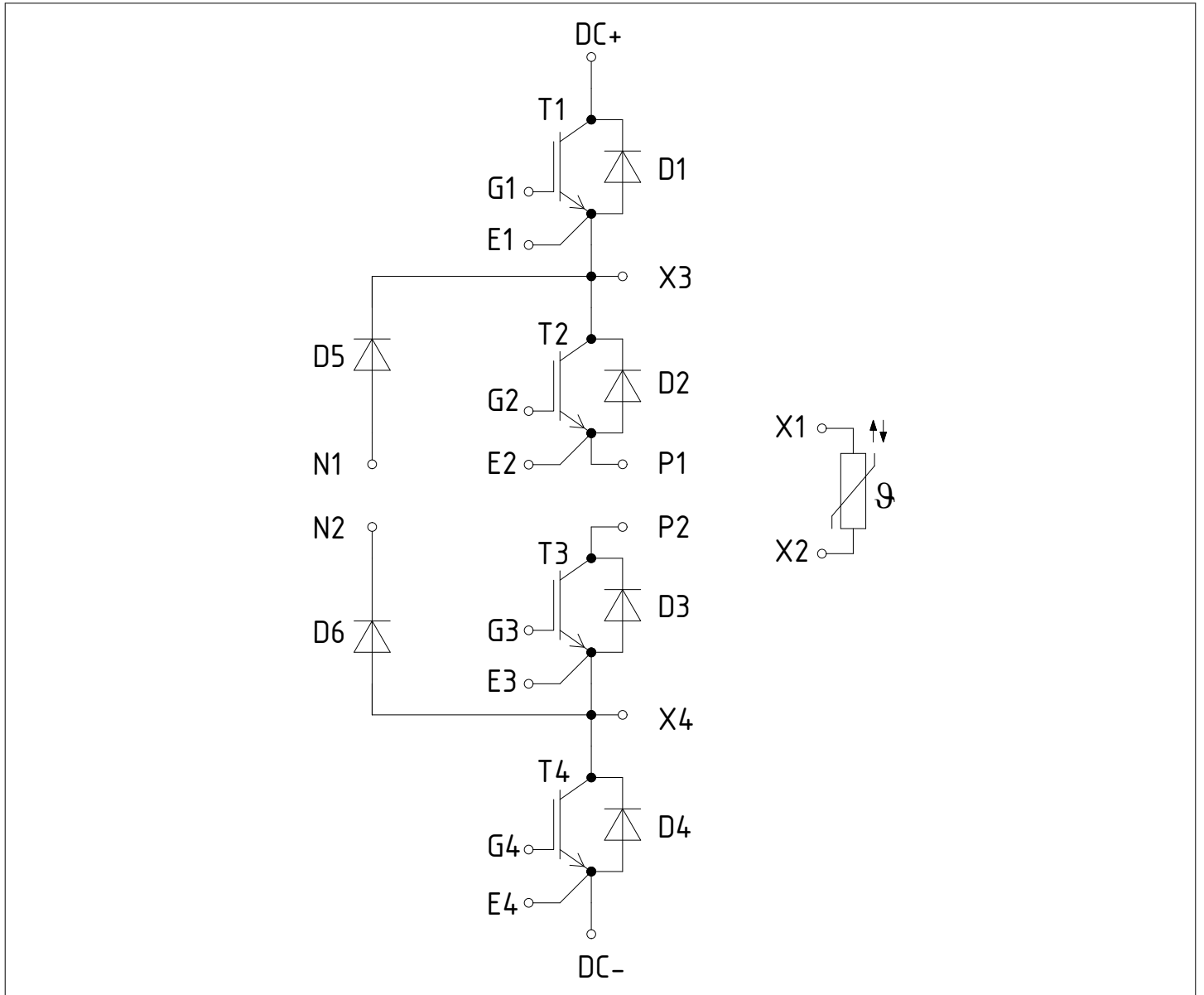


Figure 1

10 Package outlines

10 Package outlines

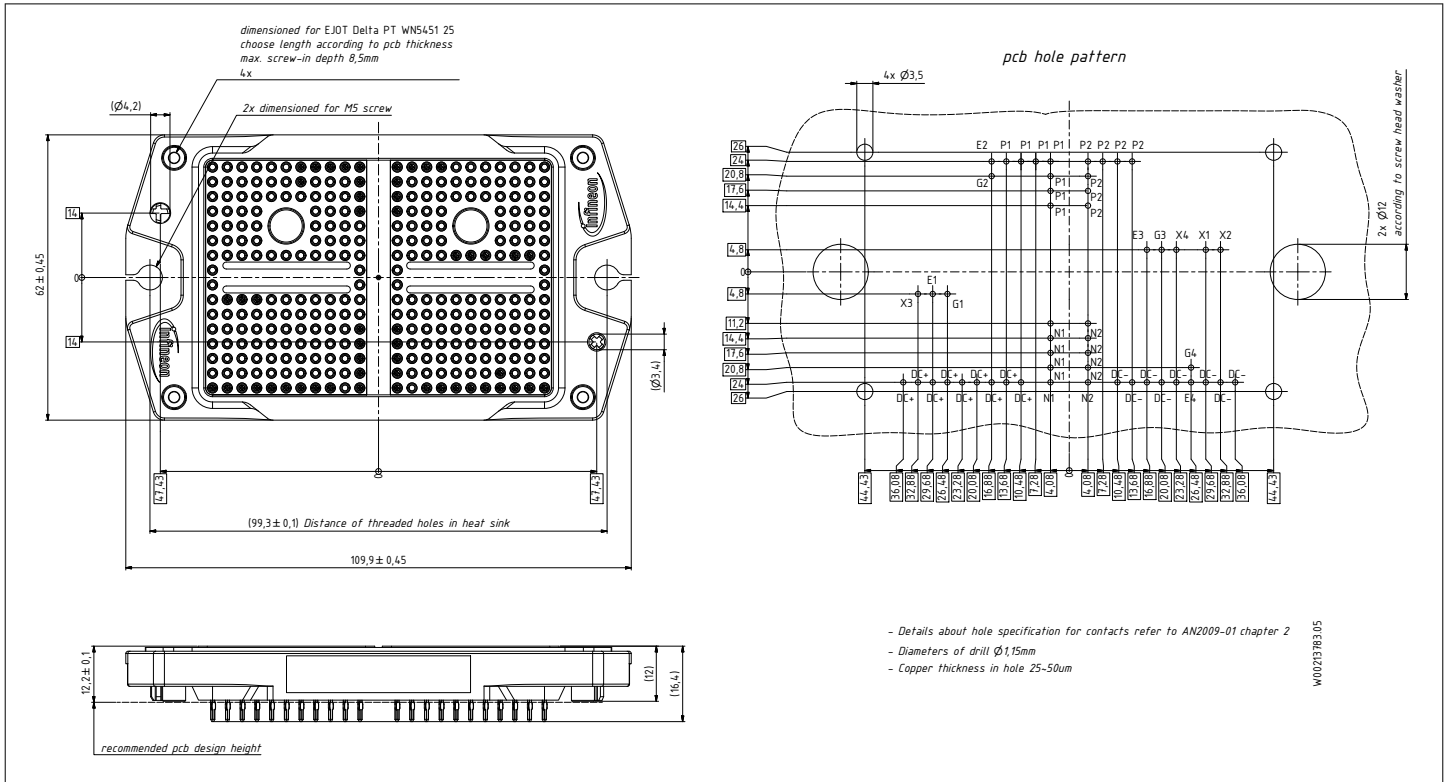


Figure 2

11 Module label code


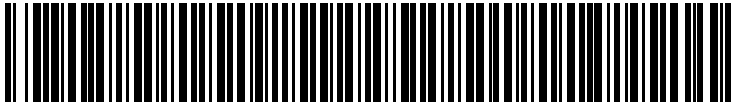
Module label code			
Code format	Data Matrix	Barcode Code128	
Encoding	ASCII text	Code Set A	
Symbol size	16x16	23 digits	
Standard	IEC24720 and IEC16022	IEC8859-1	
Code content	<i>Content</i>	<i>Digit</i>	<i>Example</i>
	Module serial number	1 - 5	71549
	Module material number	6 - 11	142846
	Production order number	12 - 19	55054991
	Date code (production year)	20 - 21	15
	Date code (production week)	22 - 23	30
Example	 		
	71549142846550549911530		71549142846550549911530

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