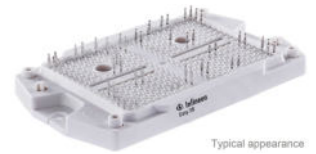


Final datasheet

EasyPACK™ module with active “Neutral Point Clamp 2” topology and PressFIT / NTC

Features

- Electrical features
 - $V_{CES} = 1200\text{ V}$
 - $I_{C\text{ nom}} = 500\text{ A} / I_{CRM} = 1000\text{ A}$
 - Ultra fast IGBT chips
 - Low inductive design
 - Low switching losses
 - Low $V_{CE,sat}$
 - Suitable Infineon gate drivers can be found under <https://www.infineon.com/gdfinder>
- Mechanical features
 - 2.5 kV AC 1 minute insulation
 - Al_2O_3 substrate with low thermal resistance
 - High current pin
 - PressFIT contact technology
 - Rugged mounting due to integrated mounting clamps



Potential applications

- Three-level applications
- Solar applications

Product validation

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

Description

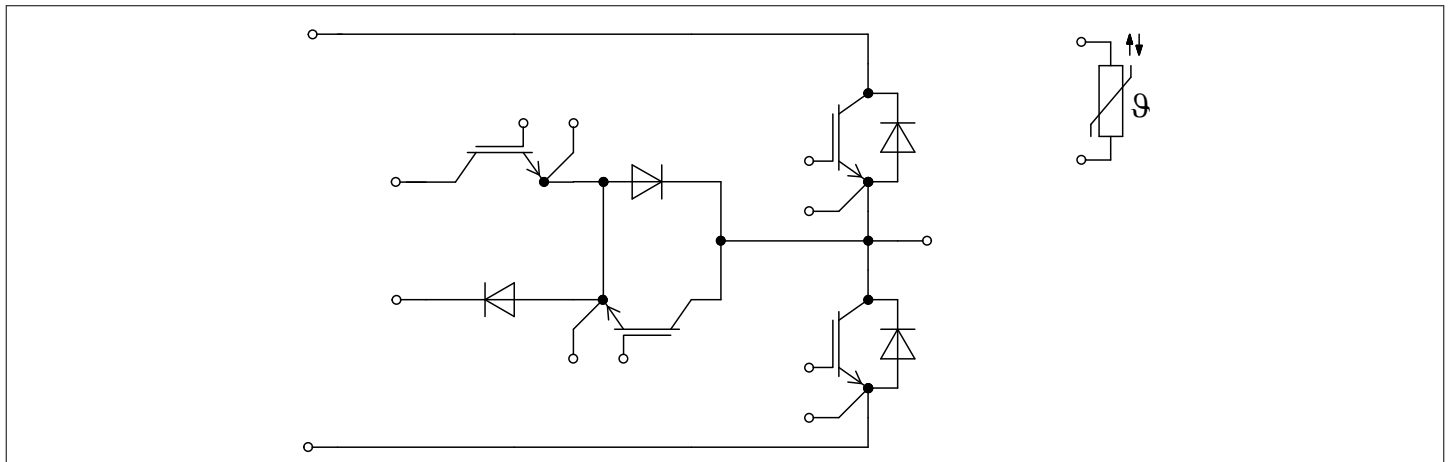




Table of contents

	Description	1
	Features	1
	Potential applications	1
	Product validation	1
	Table of contents	2
1	Package	3
2	IGBT, T1 / T2	3
3	Diode, D1 / D2	5
4	IGBT, T3 / T4	6
5	Diode, D3 / D4	7
6	NTC-Thermistor	8
7	Characteristics diagrams	9
8	Circuit diagram	17
9	Package outlines	18
10	Module label code	19
	Revision history	20
	Disclaimer	21

1 Package

1 Package

Table 1 **Insulation coordination**

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f = 50 \text{ Hz}$, $t = 1 \text{ min}$	2.5	kV
Isolation test voltage NTC	$V_{ISOL(NTC)}$	RMS, $f = 50 \text{ Hz}$, $t = 1 \text{ min}$	2.5	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}			15		nH
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25 \text{ °C}$, per switch		1.3		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 50 A rms per connector pin.

2 IGBT, T1 / T2

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}			510	A
Continuous DC collector current	I_{CDC}	$T_{vj \text{ max}} = 175 \text{ °C}$	$T_H = 65 \text{ °C}$	315	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj \text{ op}}$		1020	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	$V_{CE\ sat}$	$I_C = 500\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$		1.69	2.23	V
			$T_{vj} = 125\ ^\circ C$		1.89		
			$T_{vj} = 175\ ^\circ C$		1.98		
Gate threshold voltage	V_{GETh}	$I_C = 8.16\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$		4.85	5.5	6.15	V
Gate charge	Q_G	$V_{GE} = \pm 15\ V, V_{CC} = 600\ V, T_{vj} = 25\ ^\circ C$			7.52		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$			1.7		Ω
Input capacitance	C_{ies}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			57.9		nF
Reverse transfer capacitance	C_{res}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			0.37		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 1200\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$			29	μA
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}	$I_C = 500\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Gon} = 0.75\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.430		μs
			$T_{vj} = 125\ ^\circ C$		0.480		
			$T_{vj} = 175\ ^\circ C$		0.530		
Rise time (inductive load)	t_r	$I_C = 500\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Gon} = 0.75\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.050		μs
			$T_{vj} = 125\ ^\circ C$		0.056		
			$T_{vj} = 175\ ^\circ C$		0.061		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 500\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Goff} = 11\ \Omega$	$T_{vj} = 25\ ^\circ C$		1.700		μs
			$T_{vj} = 125\ ^\circ C$		1.790		
			$T_{vj} = 175\ ^\circ C$		1.850		
Fall time (inductive load)	t_f	$I_C = 500\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Goff} = 11\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.043		μs
			$T_{vj} = 125\ ^\circ C$		0.044		
			$T_{vj} = 175\ ^\circ C$		0.060		
Turn-on energy loss per pulse	E_{on}	$I_C = 500\ A, V_{CC} = 500\ V, L_\sigma = 10\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 0.75\ \Omega, di/dt = 6890\ A/\mu s (T_{vj} = 175\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		28.2		mJ
			$T_{vj} = 125\ ^\circ C$		30.7		
			$T_{vj} = 175\ ^\circ C$		31.2		
Turn-off energy loss per pulse	E_{off}	$I_C = 500\ A, V_{CC} = 500\ V, L_\sigma = 10\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 11\ \Omega, dv/dt = 4270\ V/\mu s (T_{vj} = 175\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		20.1		mJ
			$T_{vj} = 125\ ^\circ C$		26.1		
			$T_{vj} = 175\ ^\circ C$		30.8		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, $\lambda_{grease} = 3.3\ W/(m \cdot K)$			0.170		K/W

(table continues...)

Table 4 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Temperature under switching conditions	$T_{vj\ op}$		-40		175	°C

Note: $T_{vj\ op} > 150\ ^\circ\text{C}$ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

3 Diode, D1 / D2

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		$T_{vj} = 25\ ^\circ\text{C}$	1200	V
Continuous DC forward current	I_F			400	A
Repetitive peak forward current	I_{FRM}	$t_P = 1\ \text{ms}$		800	A
I^2t - value	I^2t	$t_P = 10\ \text{ms}, V_R = 0\ \text{V}$	$T_{vj} = 125\ ^\circ\text{C}$	19300	A^2s
			$T_{vj} = 175\ ^\circ\text{C}$	16700	

Table 6 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 400\ \text{A}, V_{GE} = 0\ \text{V}$	$T_{vj} = 25\ ^\circ\text{C}$	1.72	2.10	V
			$T_{vj} = 125\ ^\circ\text{C}$	1.59		
			$T_{vj} = 175\ ^\circ\text{C}$	1.52		
Peak reverse recovery current	I_{RM}	$V_{CC} = 500\ \text{V}, I_F = 400\ \text{A}, V_{GE} = -15\ \text{V}, -di_F/dt = 5030\ \text{A}/\mu\text{s} (T_{vj} = 175\ ^\circ\text{C})$	$T_{vj} = 25\ ^\circ\text{C}$	150		A
			$T_{vj} = 125\ ^\circ\text{C}$	252		
			$T_{vj} = 175\ ^\circ\text{C}$	316		
Recovered charge	Q_r	$V_{CC} = 500\ \text{V}, I_F = 400\ \text{A}, V_{GE} = -15\ \text{V}, -di_F/dt = 5030\ \text{A}/\mu\text{s} (T_{vj} = 175\ ^\circ\text{C})$	$T_{vj} = 25\ ^\circ\text{C}$	21.5		μC
			$T_{vj} = 125\ ^\circ\text{C}$	46.3		
			$T_{vj} = 175\ ^\circ\text{C}$	62.4		
Reverse recovery energy	E_{rec}	$V_{CC} = 500\ \text{V}, I_F = 400\ \text{A}, V_{GE} = -15\ \text{V}, -di_F/dt = 5030\ \text{A}/\mu\text{s} (T_{vj} = 175\ ^\circ\text{C})$	$T_{vj} = 25\ ^\circ\text{C}$	6.13		mJ
			$T_{vj} = 125\ ^\circ\text{C}$	16.2		
			$T_{vj} = 175\ ^\circ\text{C}$	23.1		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 3.3\ \text{W}/(\text{m}\cdot\text{K})$		0.251		K/W

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Temperature under switching conditions	$T_{vj\,op}$		-40		175	°C

Note: $T_{vj\,op} > 150\,^{\circ}\text{C}$ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

4 IGBT, T3 / T4

Table 7 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		$T_{vj} = 25\,^{\circ}\text{C}$	950	V
Implemented collector current	I_{CN}			400	A
Continuous DC collector current	I_{CDC}	$T_{vj\,max} = 150\,^{\circ}\text{C}$	$T_H = 65\,^{\circ}\text{C}$	200	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\,op}$		800	A
Gate-emitter peak voltage	V_{GES}			± 20	V

Table 8 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\,sat}$	$I_C = 400\,\text{A}$, $V_{GE} = 15\,\text{V}$	$T_{vj} = 25\,^{\circ}\text{C}$		1.85	2.25	V
			$T_{vj} = 125\,^{\circ}\text{C}$		2.10		
			$T_{vj} = 150\,^{\circ}\text{C}$		2.15		
Gate threshold voltage	V_{GETh}	$I_C = 6.5\,\text{mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25\,^{\circ}\text{C}$		4.35	5.1	5.85	V
Gate charge	Q_G	$V_{GE} = \pm 15\,\text{V}$, $V_{CC} = 600\,\text{V}$, $T_{vj} = 25\,^{\circ}\text{C}$			0.9		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\,^{\circ}\text{C}$			0.75		Ω
Input capacitance	C_{ies}	$f = 100\,\text{kHz}$, $T_{vj} = 25\,^{\circ}\text{C}$, $V_{CE} = 25\,\text{V}$, $V_{GE} = 0\,\text{V}$			25.2		nF
Reverse transfer capacitance	C_{res}	$f = 100\,\text{kHz}$, $T_{vj} = 25\,^{\circ}\text{C}$, $V_{CE} = 25\,\text{V}$, $V_{GE} = 0\,\text{V}$			0.078		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 950\,\text{V}$, $V_{GE} = 0\,\text{V}$	$T_{vj} = 25\,^{\circ}\text{C}$			93	μA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0\,\text{V}$, $V_{GE} = 20\,\text{V}$, $T_{vj} = 25\,^{\circ}\text{C}$				100	nA

(table continues...)

Table 8 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Turn-on delay time (inductive load)	t_{don}	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 3.6 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.073		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.080		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.082		
Rise time (inductive load)	t_r	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 3.6 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.055		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.057		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.061		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 15 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.540		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.570		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.600		
Fall time (inductive load)	t_f	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 15 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.040		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.068		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.086		
Turn-on energy loss per pulse	E_{on}	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $L_\sigma = 40 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 3.6 \Omega$, $di/dt =$ $5030 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	26.4		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	29		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	29		
Turn-off energy loss per pulse	E_{off}	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $L_\sigma = 40 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 15 \Omega$, $dv/dt = 6220$ $\text{V}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	12.9		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	16.8		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	18.3		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, $\lambda_{\text{grease}} = 3.3 \text{ W}/(\text{m}\cdot\text{K})$		0.278		K/W
Temperature under switching conditions	$T_{vj\text{op}}$		-40		150	$^\circ\text{C}$

5 Diode, D3 / D4

Table 9 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		$T_{vj} = 25 \text{ }^\circ\text{C}$	950	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	$t_P = 10 \text{ ms}$, $V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ }^\circ\text{C}$	3590	A^2s
			$T_{vj} = 150 \text{ }^\circ\text{C}$	3190	

Table 10 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 300 \text{ A}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	2.60	2.90	V
			$T_{vj} = 125 \text{ °C}$	2.40		
			$T_{vj} = 150 \text{ °C}$	2.35		
Peak reverse recovery current	I_{RM}	$V_{CC} = 500 \text{ V}$, $I_F = 300 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 6890 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	131		A
			$T_{vj} = 125 \text{ °C}$	175		
			$T_{vj} = 150 \text{ °C}$	185		
Recovered charge	Q_r	$V_{CC} = 500 \text{ V}$, $I_F = 300 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 6890 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	7.5		μC
			$T_{vj} = 125 \text{ °C}$	17.9		
			$T_{vj} = 150 \text{ °C}$	20.5		
Reverse recovery energy	E_{rec}	$V_{CC} = 500 \text{ V}$, $I_F = 300 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 6890 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	1.98		mJ
			$T_{vj} = 125 \text{ °C}$	5.11		
			$T_{vj} = 150 \text{ °C}$	6.07		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 3.3 \text{ W}/(\text{m} \cdot \text{K})$		0.435		K/W
Temperature under switching conditions	$T_{vj \text{ op}}$		-40		150	°C

6 NTC-Thermistor

Table 11 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	R_{25}	$T_{NTC} = 25 \text{ °C}$		5		k Ω
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

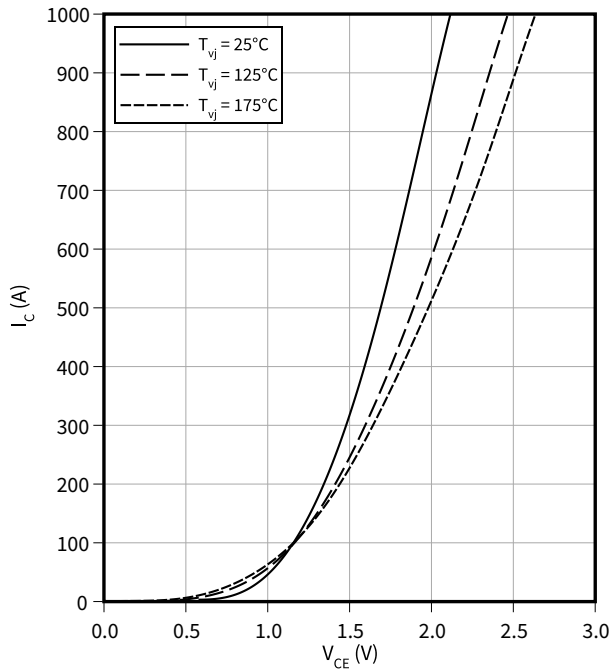
Note: For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4.

7 Characteristics diagrams

Output characteristic (typical), IGBT, T1 / T2

$I_C = f(V_{CE})$

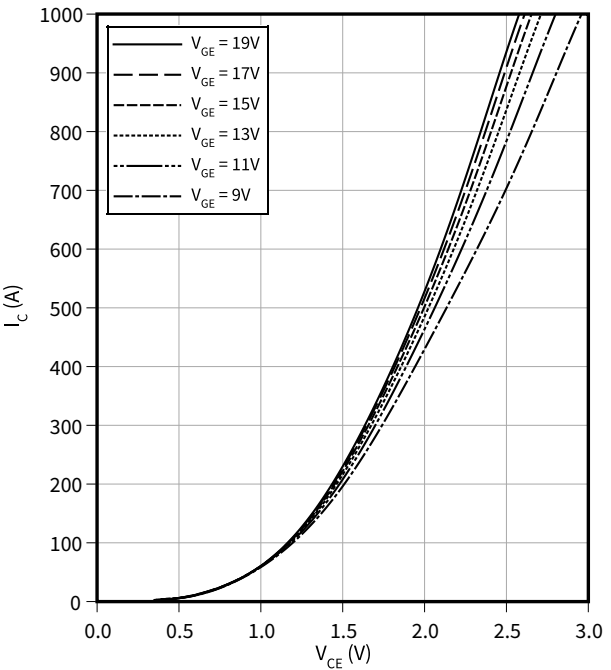
$V_{GE} = 15\text{ V}$



Output characteristic field (typical), IGBT, T1 / T2

$I_C = f(V_{CE})$

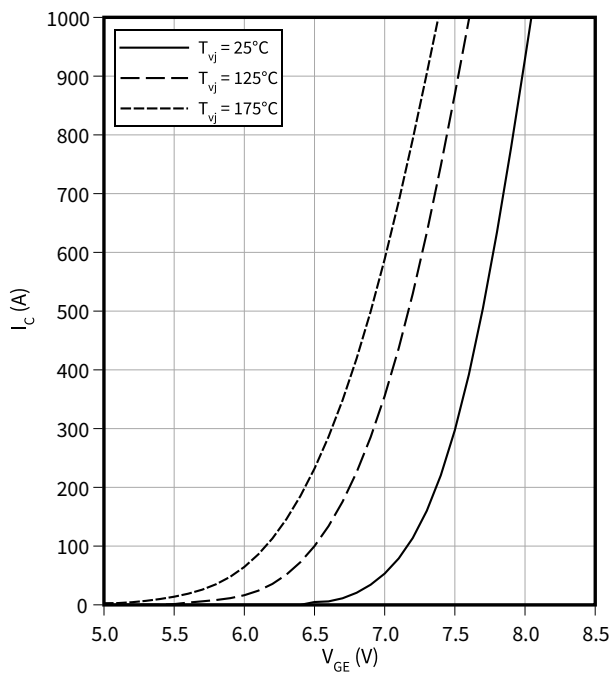
$T_{vj} = 175^\circ\text{C}$



Transfer characteristic (typical), IGBT, T1 / T2

$I_C = f(V_{GE})$

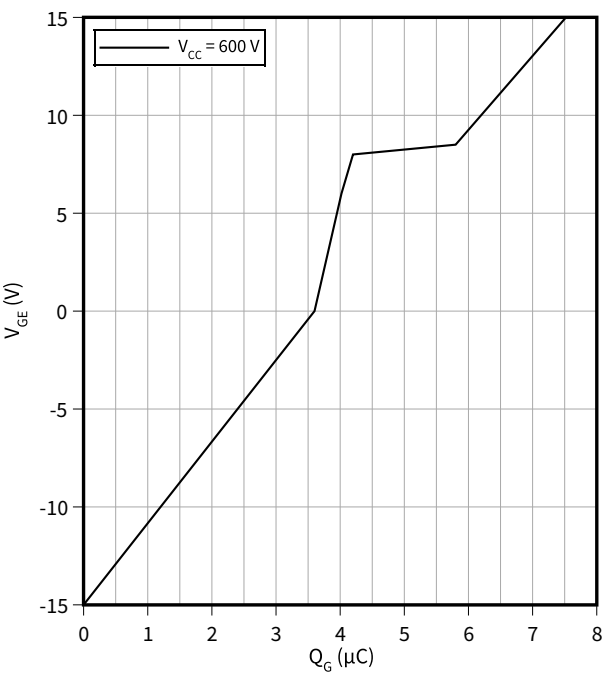
$V_{CE} = 20\text{ V}$



Gate charge characteristic (typical), IGBT, T1 / T2

$V_{GE} = f(Q_G)$

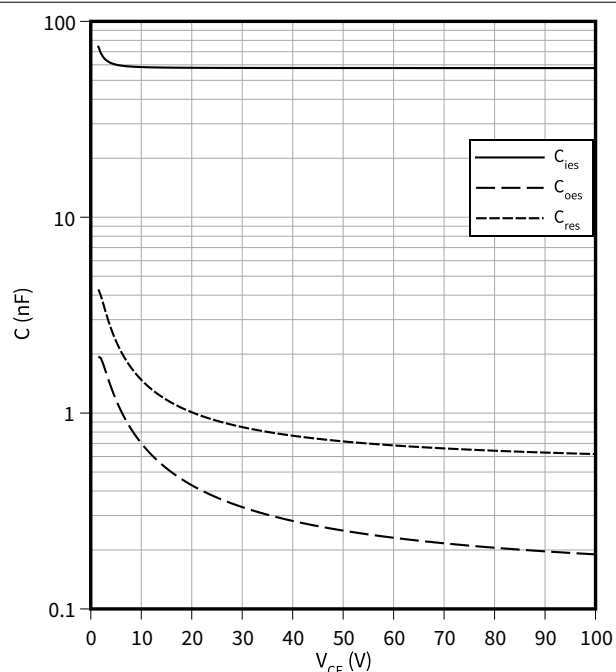
$I_C = 500\text{ A}, T_{vj} = 25^\circ\text{C}$



Capacity characteristic (typical), IGBT, T1 / T2

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

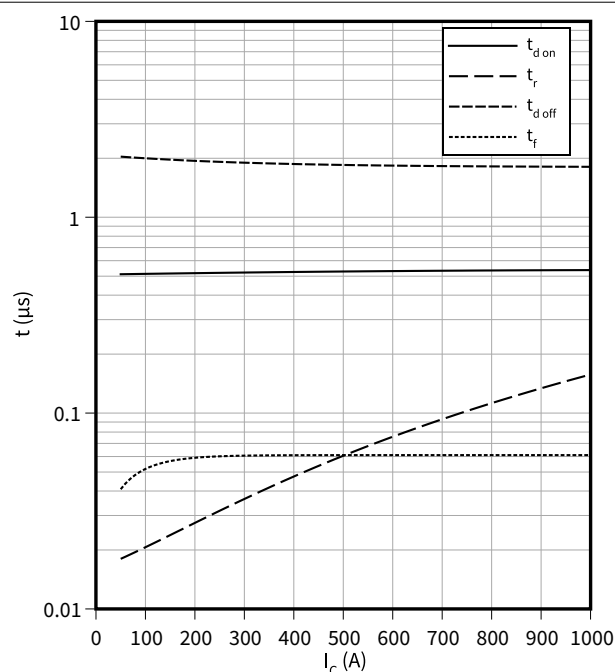
$f = 100 \text{ kHz}$, $V_{GE} = 0 \text{ V}$, $T_{vj} = 25^\circ \text{C}$



Switching times (typical), IGBT, T1 / T2

$$t = f(I_C)$$

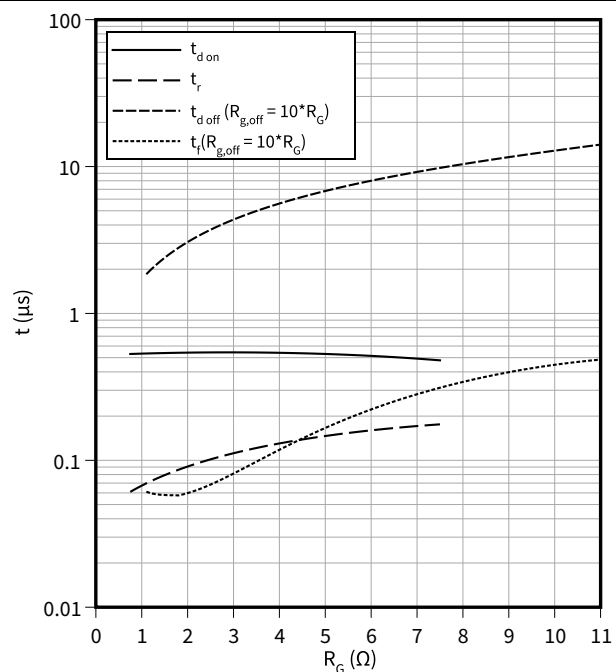
$R_{Goff} = 11 \Omega$, $R_{Gon} = 0.75 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $V_{CC} = 500 \text{ V}$, $T_{vj} = 175^\circ \text{C}$



Switching times (typical), IGBT, T1 / T2

$$t = f(R_G)$$

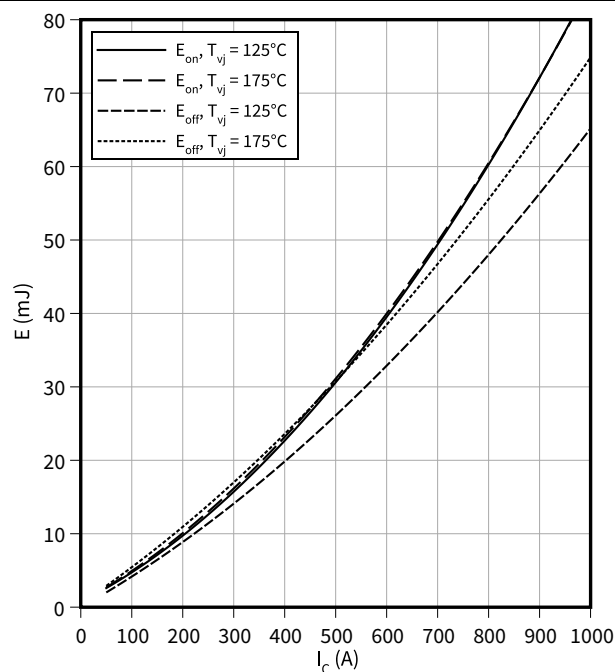
$V_{GE} = \pm 15 \text{ V}$, $I_C = 500 \text{ A}$, $V_{CC} = 500 \text{ V}$, $T_{vj} = 175^\circ \text{C}$



Switching losses (typical), IGBT, T1 / T2

$$E = f(I_C)$$

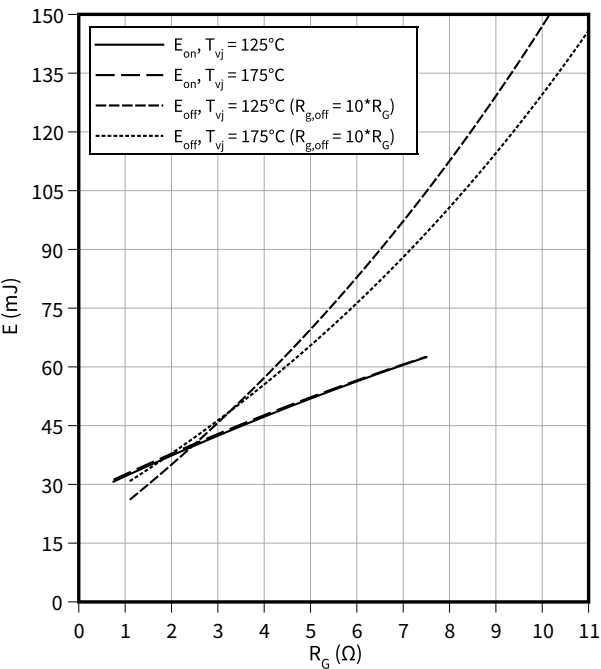
$R_{Goff} = 11 \Omega$, $R_{Gon} = 0.75 \Omega$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$



7 Characteristics diagrams

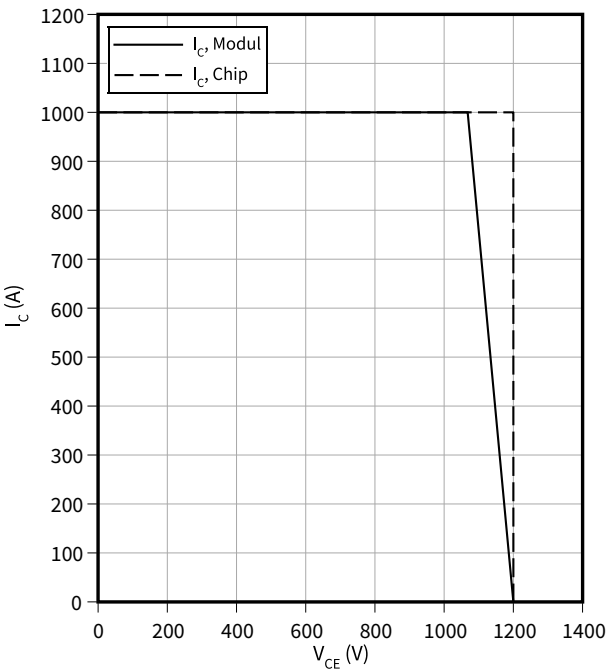
Switching losses (typical), IGBT, T1 / T2

$E = f(R_G)$
 $V_{CC} = 500\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $I_C = 500\text{ A}$



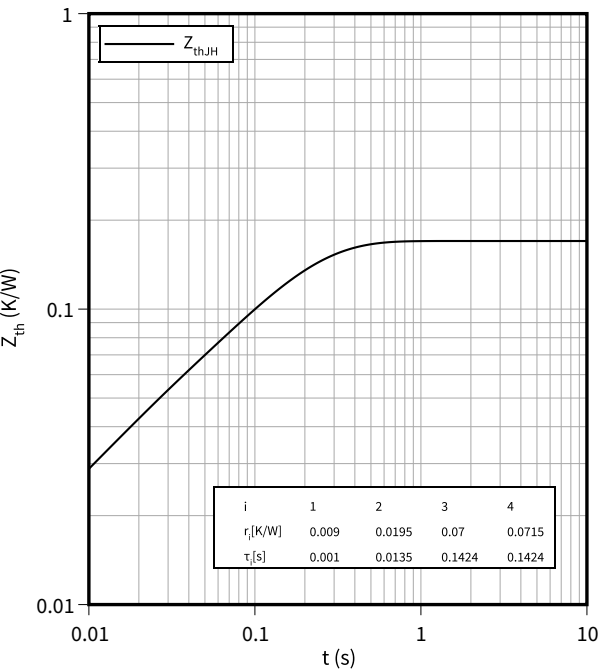
Reverse bias safe operating area (RBSOA), IGBT, T1 / T2

$I_C = f(V_{CE})$
 $R_{Goff} = 7.5\ \Omega$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 175^\circ\text{C}$



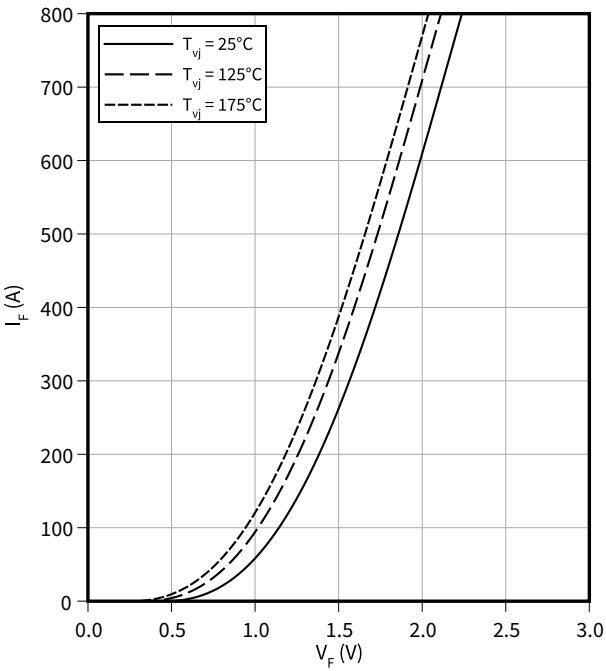
Transient thermal impedance, IGBT, T1 / T2

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, D1 / D2

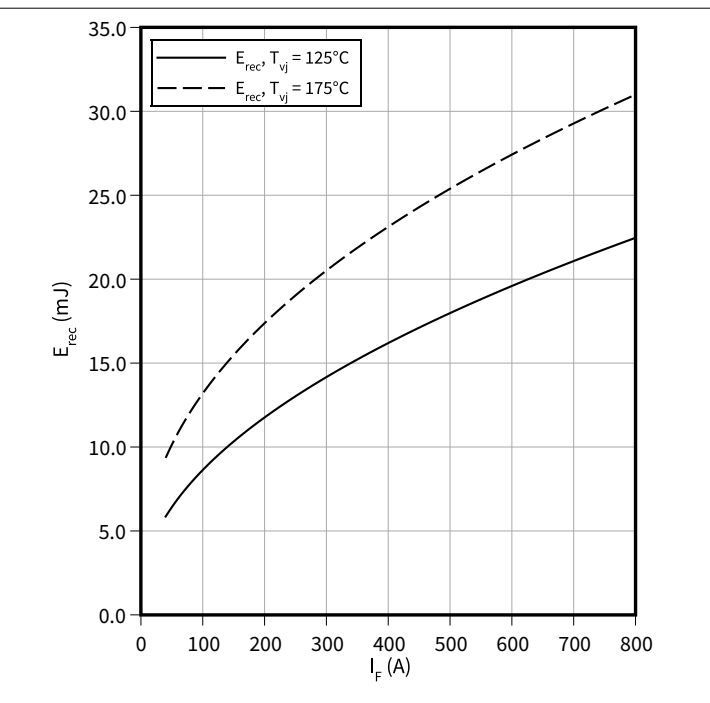
$I_F = f(V_F)$



7 Characteristics diagrams

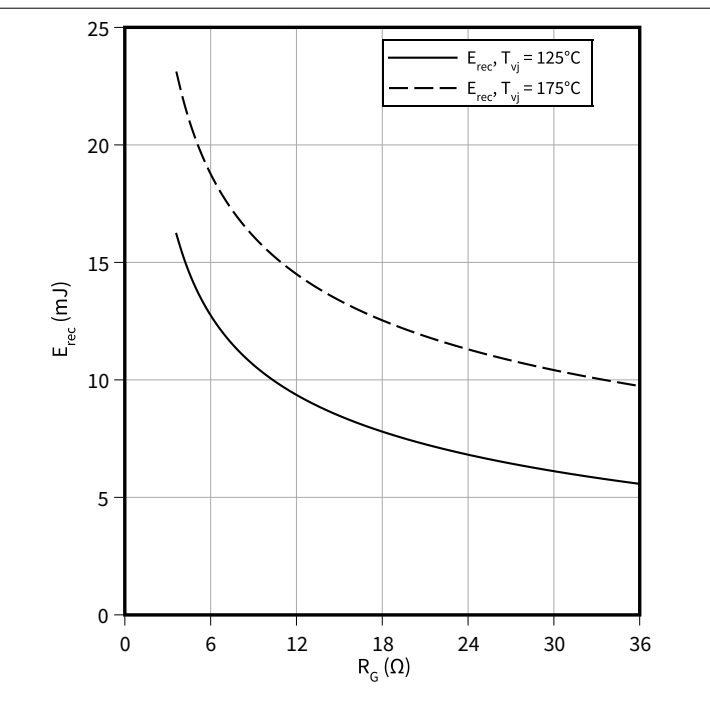
Switching losses (typical), Diode, D1 / D2

$E_{rec} = f(I_F)$
 $V_{CE} = 500\text{ V}, R_G = 3.6\ \Omega$



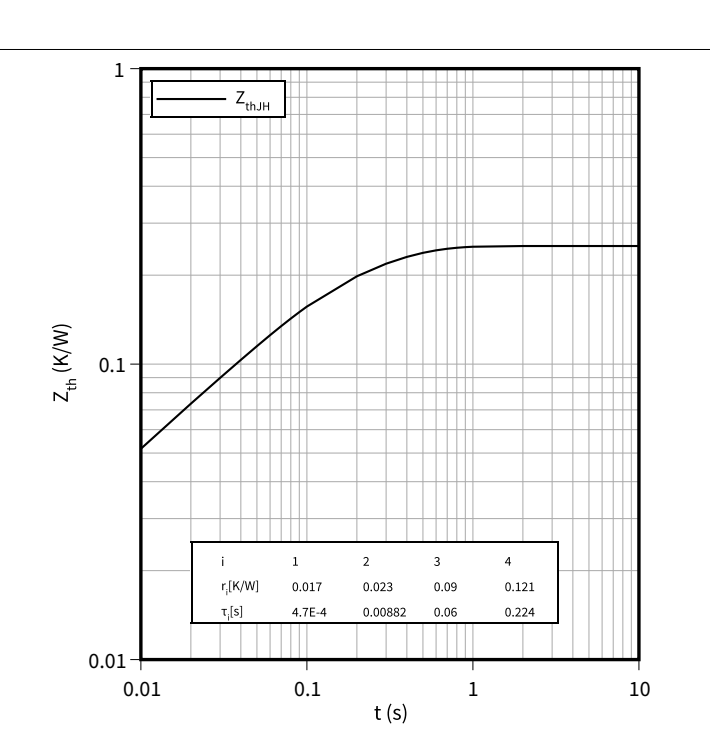
Switching losses (typical), Diode, D1 / D2

$E_{rec} = f(R_G)$
 $V_{CE} = 500\text{ V}, I_F = 400\text{ A}$



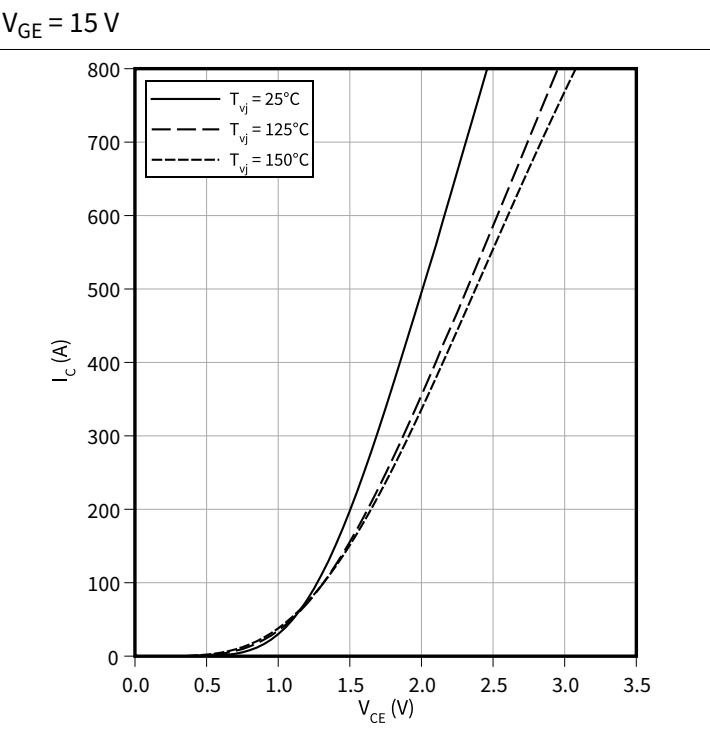
Transient thermal impedance, Diode, D1 / D2

$Z_{th} = f(t)$



Output characteristic (typical), IGBT, T3 / T4

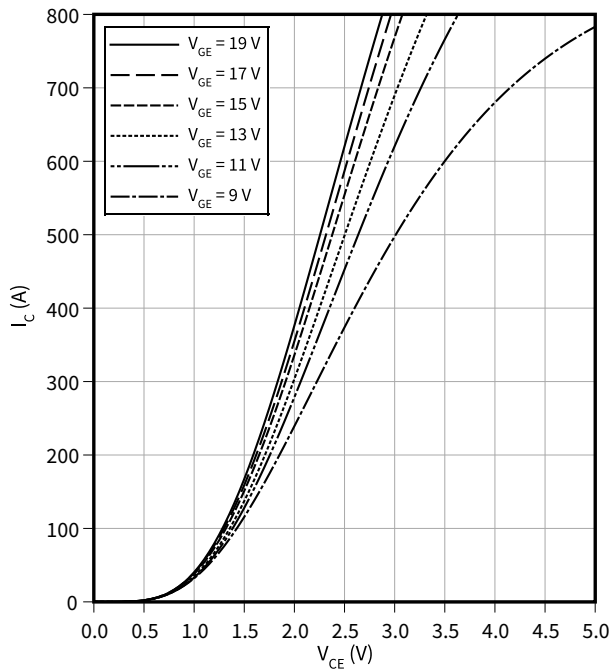
$I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}$



7 Characteristics diagrams

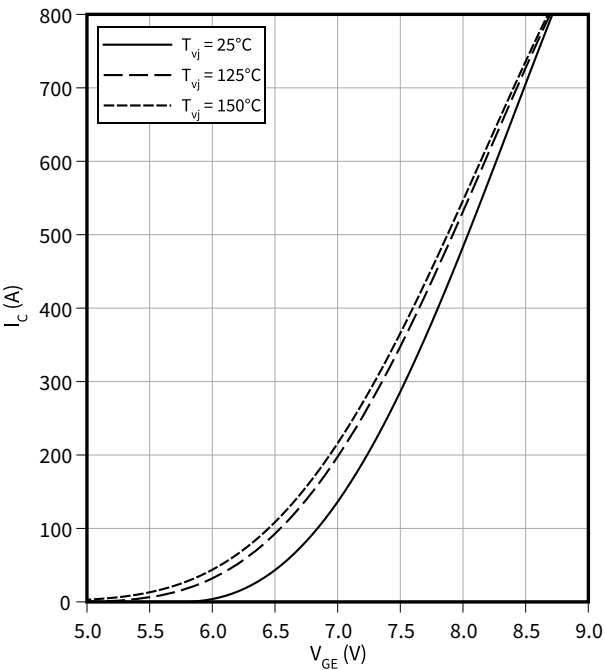
Output characteristic field (typical), IGBT, T3 / T4

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



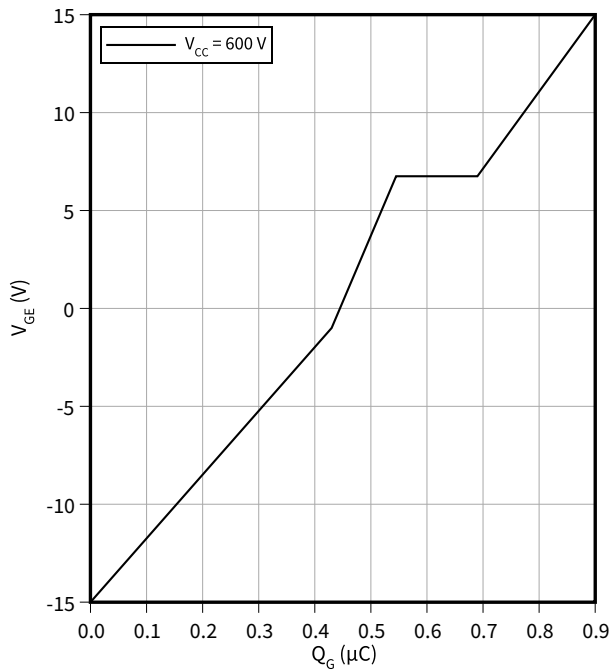
Transfer characteristic (typical), IGBT, T3 / T4

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



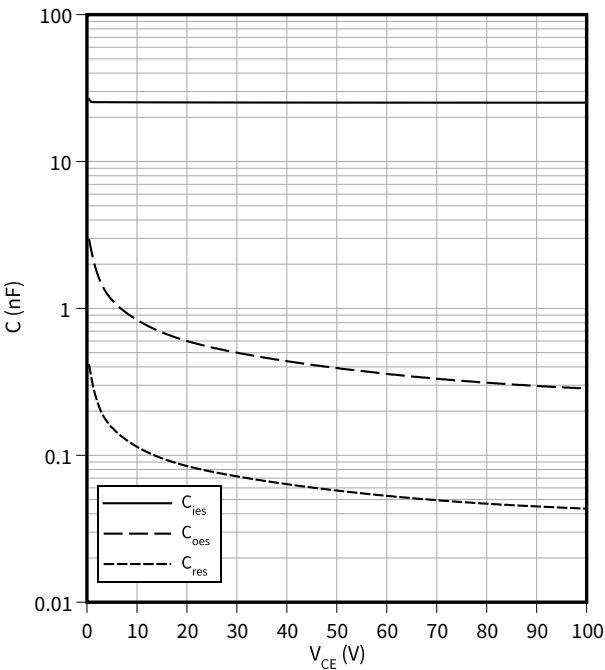
Gate charge characteristic (typical), IGBT, T3 / T4

$V_{GE} = f(Q_G)$
 $I_C = 400\text{ A}$, $T_{vj} = 25\text{ °C}$



Capacity characteristic (typical), IGBT, T3 / T4

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

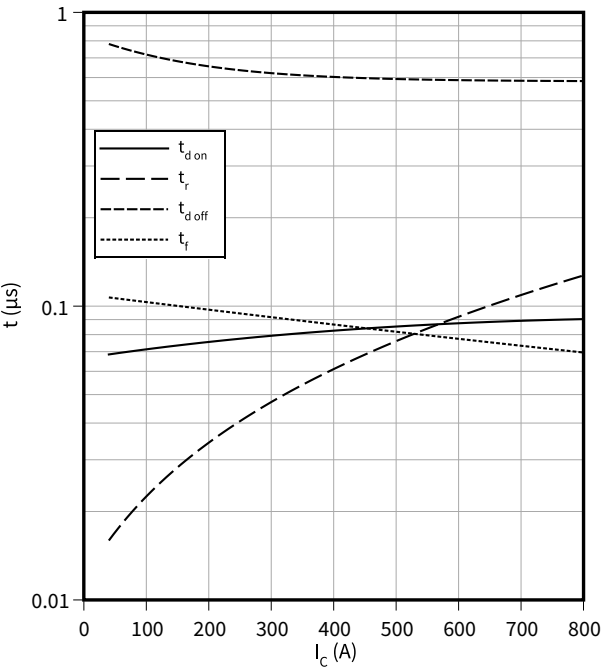


7 Characteristics diagrams

Switching times (typical), IGBT, T3 / T4

$t = f(I_C)$

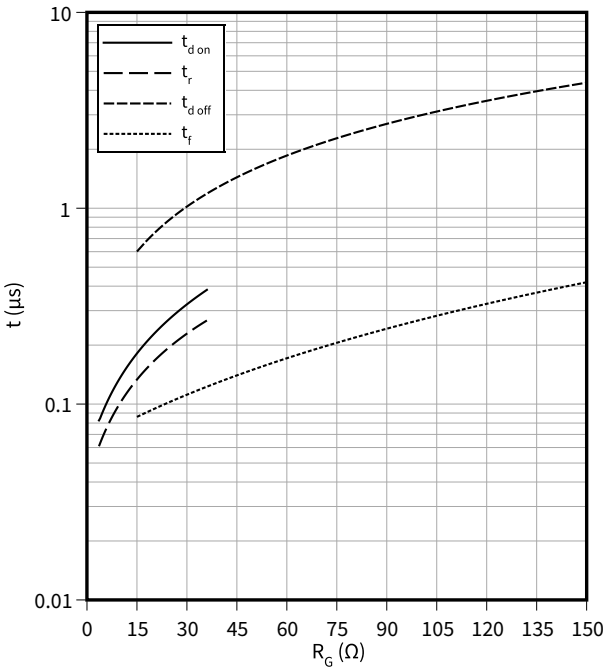
$R_{Goff} = 15 \Omega$, $R_{Gon} = 3.6 \Omega$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



Switching times (typical), IGBT, T3 / T4

$t = f(R_G)$

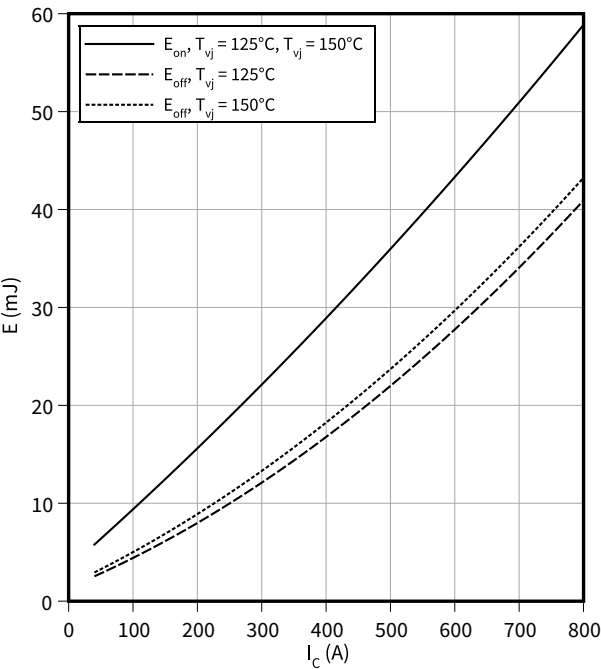
$V_{GE} = \pm 15 \text{ V}$, $I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



Switching losses (typical), IGBT, T3 / T4

$E = f(I_C)$

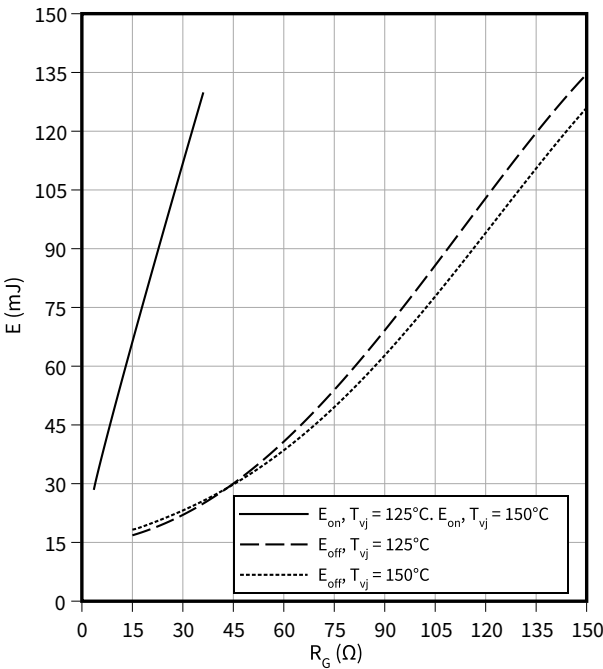
$R_{Goff} = 15 \Omega$, $R_{Gon} = 3.6 \Omega$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$



Switching losses (typical), IGBT, T3 / T4

$E = f(R_G)$

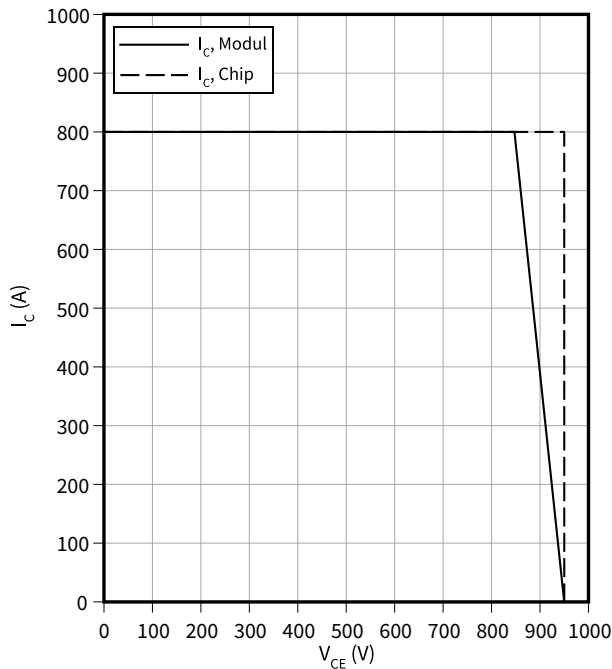
$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$



7 Characteristics diagrams

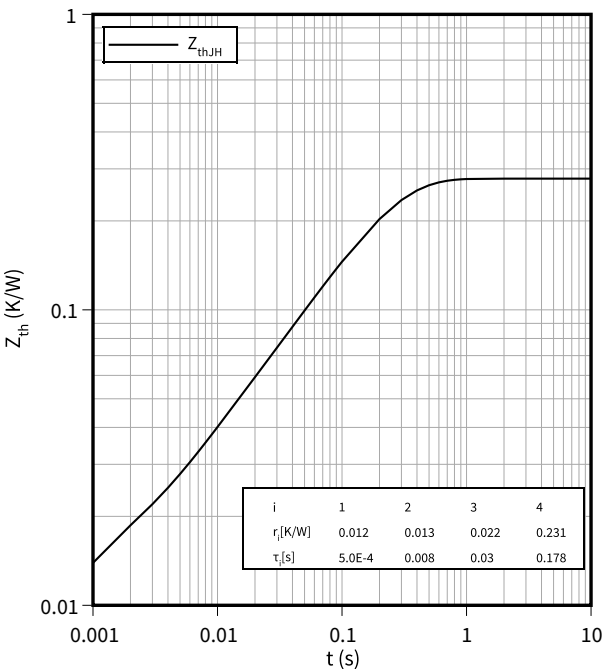
Reverse bias safe operating area (RBSOA), IGBT, T3 / T4

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



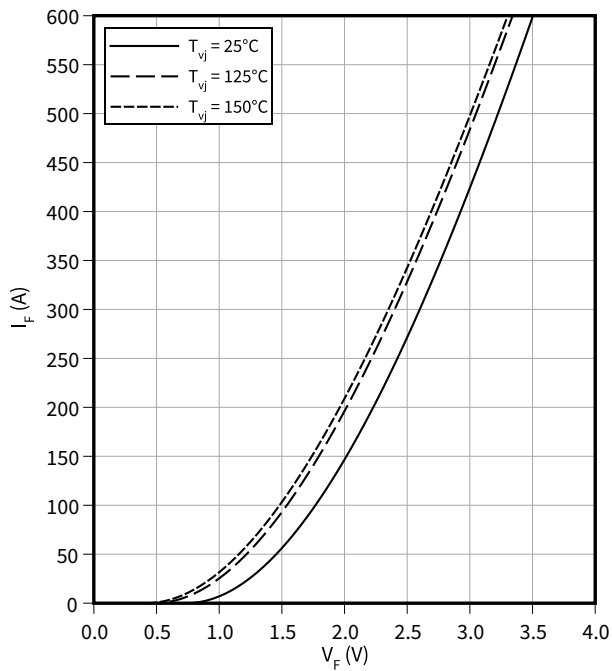
Transient thermal impedance, IGBT, T3 / T4

$Z_{th} = f(t)$



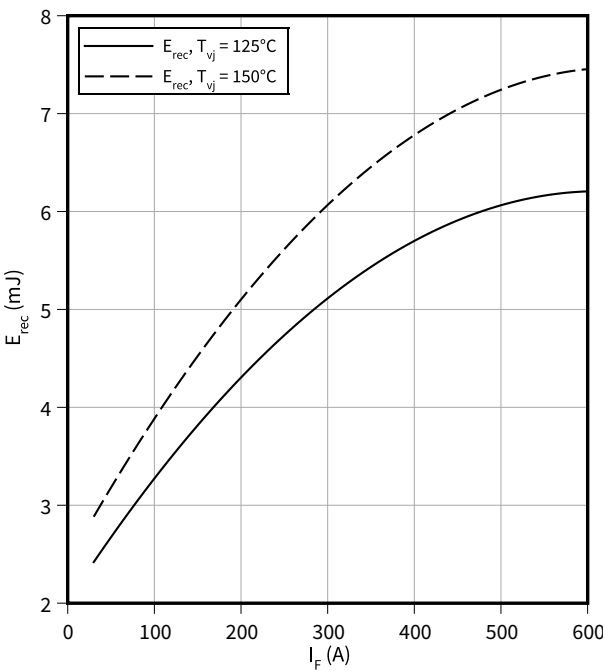
Forward characteristic (typical), Diode, D3 / D4

$I_F = f(V_F)$



Switching losses (typical), Diode, D3 / D4

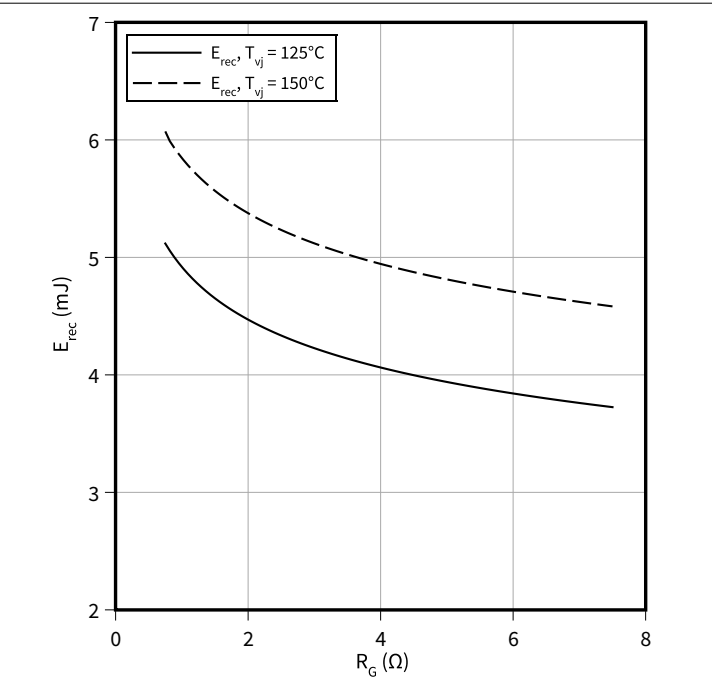
$E_{rec} = f(I_F)$
 $V_{CE} = 500 \text{ V}$, $R_G = 0.75 \Omega$



7 Characteristics diagrams

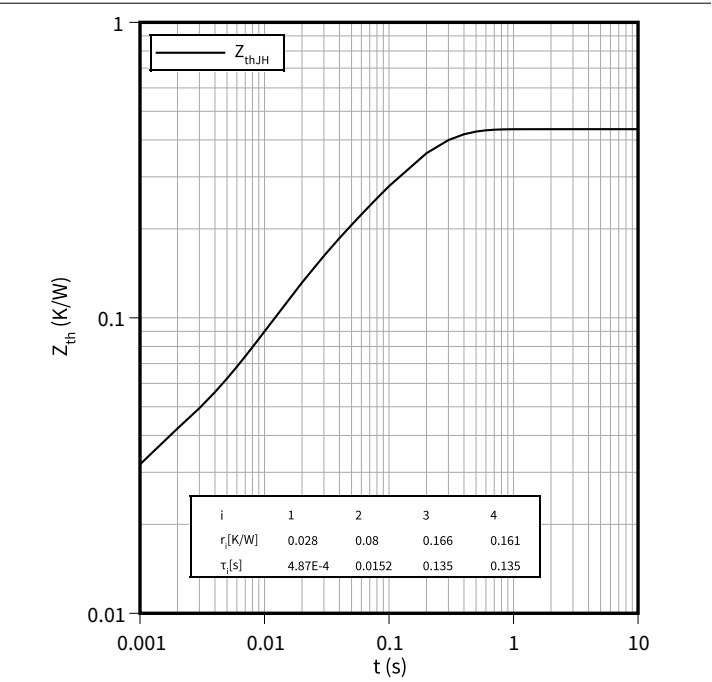
Switching losses (typical), Diode, D3 / D4

$E_{rec} = f(R_G)$
 $V_{CE} = 500\text{ V}, I_F = 300\text{ A}$



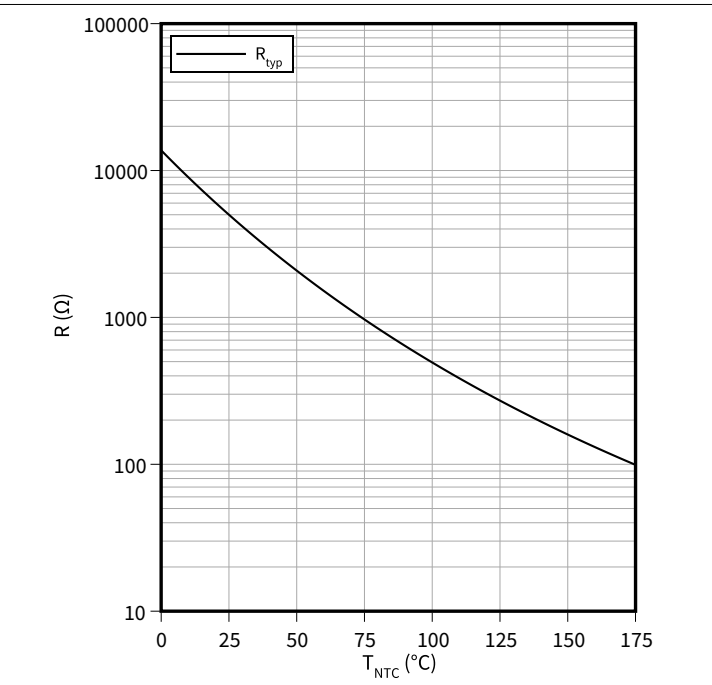
Transient thermal impedance, Diode, D3 / D4

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



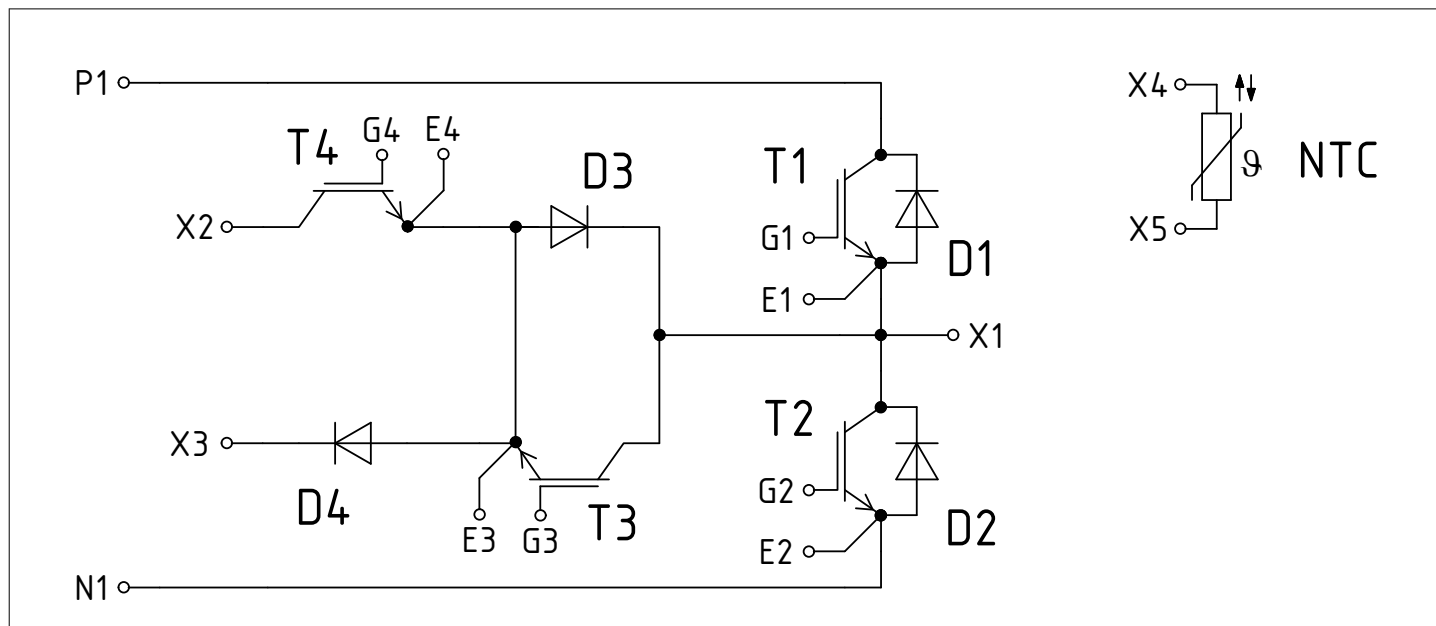


Figure 1

Figure 2

10 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	Content	Digit	Example
	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	 7154914284655054991153071549142846550549911530		

Figure 3



Revision history

Revision history

Document version	Date of release	Description of changes
0.10	2024-04-15	Initial version
1.00	2024-08-30	Final datasheet

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