

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
 - 3.2 kV AC 1 minute insulation
 - High current pin
 - PressFIT contact technology
 - Rugged mounting due to integrated mounting clamps
 - Al_2O_3 substrate with low thermal resistance



Typical appearance

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

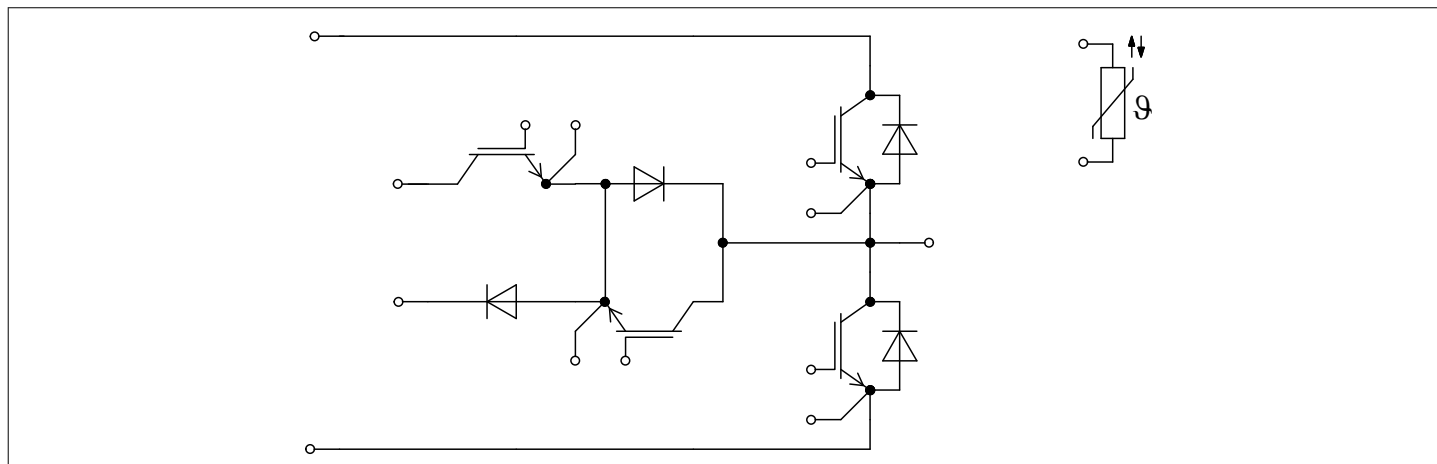


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1 Package

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
Isolation test voltage NTC	$V_{ISOL(NTC)}$	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}			15		nH
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25 \text{ °C}$, per switch		1.6		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}	$T_{vj \text{ max}} = 175 \text{ °C}$	$T_H = 65 \text{ °C}$	325	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	$V_{GE} = \pm 15\ V, V_{CC} = 600\ V$			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}	$V_{CE} = 1200\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$			22	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}	$I_C = 500\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Gon} = 0.68\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.410		μs
			$T_{vj} = 125\ ^\circ C$		0.460		
			$T_{vj} = 175\ ^\circ C$		0.480		
Rise time (inductive load)	t_r	$I_C = 500\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Gon} = 0.68\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.037		μs
			$T_{vj} = 125\ ^\circ C$		0.041		
			$T_{vj} = 175\ ^\circ C$		0.044		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 500\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Goff} = 6.8\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.010		μs
			$T_{vj} = 125\ ^\circ C$		0.014		
			$T_{vj} = 175\ ^\circ C$		0.015		
Fall time (inductive load)	t_f	$I_C = 500\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Goff} = 6.8\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.027		μs
			$T_{vj} = 125\ ^\circ C$		0.055		
			$T_{vj} = 175\ ^\circ C$		0.082		
Turn-on energy loss per pulse	E_{on}	$I_C = 500\ A, V_{CC} = 500\ V, L_\sigma = 10\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 0.68\ \Omega, di/dt = 11300\ A/\mu s (T_{vj} = 175\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		18.3		mJ
			$T_{vj} = 125\ ^\circ C$		19.9		
			$T_{vj} = 175\ ^\circ C$		21.7		
Turn-off energy loss per pulse	E_{off}	$I_C = 500\ A, V_{CC} = 500\ V, L_\sigma = 10\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 6.8\ \Omega, dv/dt = 5400\ V/\mu s (T_{vj} = 175\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		16.3		mJ
			$T_{vj} = 125\ ^\circ C$		22.6		
			$T_{vj} = 175\ ^\circ C$		26.6		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, $\lambda_{grease} = 3.3\ W/(m \cdot K)$			0.157		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 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
Implemented forward current	I_{FN}			300	A
Continuous DC forward current	I_F			165	A
Repetitive peak forward current	I_{FRM}	$t_P = 1\text{ ms}$		600	A
I^2t - value	I^2t	$t_P = 10\text{ ms}, V_R = 0\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$	1920	A^2s
			$T_{vj} = 175^{\circ}\text{C}$	1310	

Table 6 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 300\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$		2.50	V
			$T_{vj} = 125^{\circ}\text{C}$		2.18	
			$T_{vj} = 175^{\circ}\text{C}$		1.98	
Peak reverse recovery current	I_{RM}	$V_{CC} = 500\text{ V}, I_F = 300\text{ A}, V_{GE} = -15\text{ V}, -di_F/dt = 5290\text{ A}/\mu\text{s} (T_{vj} = 175^{\circ}\text{C})$	$T_{vj} = 25^{\circ}\text{C}$		115	A
			$T_{vj} = 125^{\circ}\text{C}$		190	
			$T_{vj} = 175^{\circ}\text{C}$		240	
Recovered charge	Q_r	$V_{CC} = 500\text{ V}, I_F = 300\text{ A}, V_{GE} = -15\text{ V}, -di_F/dt = 5290\text{ A}/\mu\text{s} (T_{vj} = 175^{\circ}\text{C})$	$T_{vj} = 25^{\circ}\text{C}$		7.1	μC
			$T_{vj} = 125^{\circ}\text{C}$		17.8	
			$T_{vj} = 175^{\circ}\text{C}$		23.1	
Reverse recovery energy	E_{rec}	$V_{CC} = 500\text{ V}, I_F = 300\text{ A}, V_{GE} = -15\text{ V}, -di_F/dt = 5290\text{ A}/\mu\text{s} (T_{vj} = 175^{\circ}\text{C})$	$T_{vj} = 25^{\circ}\text{C}$		2.14	mJ
			$T_{vj} = 125^{\circ}\text{C}$		5.3	
			$T_{vj} = 175^{\circ}\text{C}$		8.08	

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 3.3 \text{ W/(m} \cdot \text{K)}$		0.370		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		175	°C

Note: $T_{vj\text{ op}} > 150^\circ\text{C}$ is 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}	$T_{vj\text{ max}} = 150^\circ\text{C}$	$T_H = 65^\circ\text{C}$	180	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\text{ op}}$		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	$V_{CE\text{ sat}}$	$I_C = 400 \text{ A}, V_{GE} = 15 \text{ V}$	$T_{vj} = 25^\circ\text{C}$		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	5.10	5.85	V
Gate charge	Q_G	$V_{GE} = \pm 15 \text{ V}, V_{CC} = 600 \text{ V}$			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}	$V_{CE} = 950 \text{ V}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25^\circ\text{C}$			120	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}	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 3.9 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.094		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.096		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.097		
Rise time (inductive load)	t_r	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 3.9 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.055		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.058		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.059		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 22 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.760		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.800		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.820		
Fall time (inductive load)	t_f	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 22 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.055		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.056		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.063		
Turn-on energy loss per pulse	E_{on}	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $L_\sigma = 40 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 3.9 \Omega$, $di/dt =$ $5290 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	23.5		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	24.4		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	24.9		
Turn-off energy loss per pulse	E_{off}	$I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$, $L_\sigma = 40 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 22 \Omega$, $dv/dt = 4270$ $\text{V}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	17.1		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	18.9		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	21.2		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, $\lambda_{\text{grease}} = 3.3 \text{ W}/(\text{m}\cdot\text{K})$		0.269		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
Implemented forward current	I_{FN}		500	A
Continuous DC forward current	I_F		185	A
Repetitive peak forward current	I_{FRM}	$t_p = 1 \text{ ms}$	1000	A

(table continues...)

Table 9 (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
			$T_{vj} = 150 \text{ °C}$	
			4500	
			3740	

Table 10 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 500 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$		2.60	V
			$T_{vj} = 125 \text{ °C}$		2.40	
			$T_{vj} = 150 \text{ °C}$		2.35	
Peak reverse recovery current	I_{RM}	$V_{CC} = 500 \text{ V}, I_F = 500 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 11300 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ °C})$	$T_{vj} = 25 \text{ °C}$		251	A
			$T_{vj} = 125 \text{ °C}$		383	
			$T_{vj} = 150 \text{ °C}$		419	
Recovered charge	Q_r	$V_{CC} = 500 \text{ V}, I_F = 500 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 11300 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ °C})$	$T_{vj} = 25 \text{ °C}$		15	μC
			$T_{vj} = 125 \text{ °C}$		31.5	
			$T_{vj} = 150 \text{ °C}$		37.7	
Reverse recovery energy	E_{rec}	$V_{CC} = 500 \text{ V}, I_F = 500 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 11300 \text{ A}/\mu\text{s} (T_{vj} = 150 \text{ °C})$	$T_{vj} = 25 \text{ °C}$		3.79	mJ
			$T_{vj} = 125 \text{ °C}$		9.67	
			$T_{vj} = 150 \text{ °C}$		11.8	
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 3.3 \text{ W}/(\text{m} \cdot \text{K})$		0.294		K/W
Temperature under switching conditions	$T_{vj op}$		-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		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

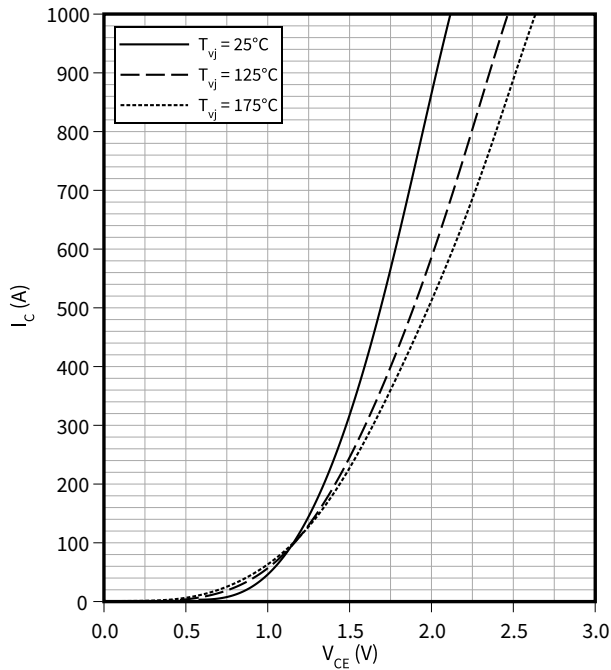
Note: For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4

7 Characteristics diagrams

Output characteristic (typical), IGBT, T1 / T2

$I_C = f(V_{CE})$

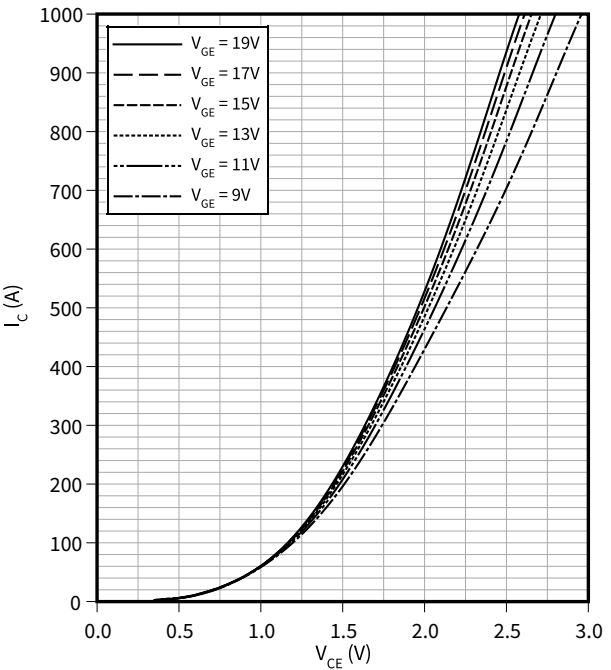
$V_{GE} = 15\text{ V}$



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

$I_C = f(V_{CE})$

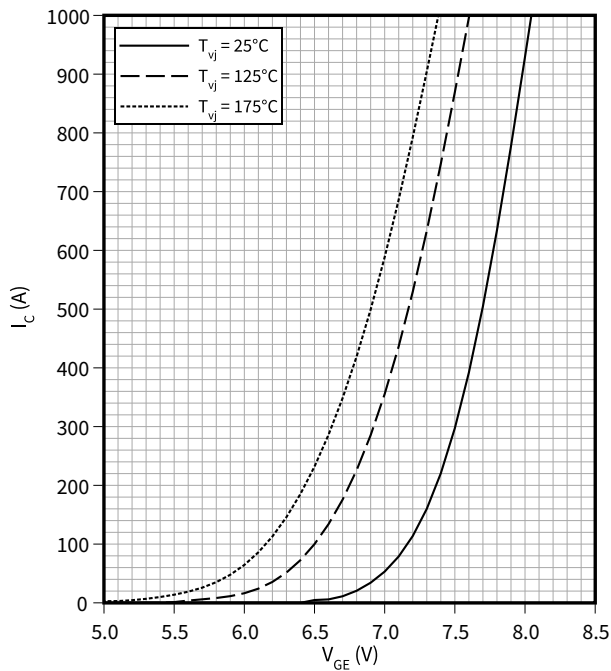
$T_{vj} = 175^\circ\text{C}$



Transfer characteristic (typical), IGBT, T1 / T2

$I_C = f(V_{GE})$

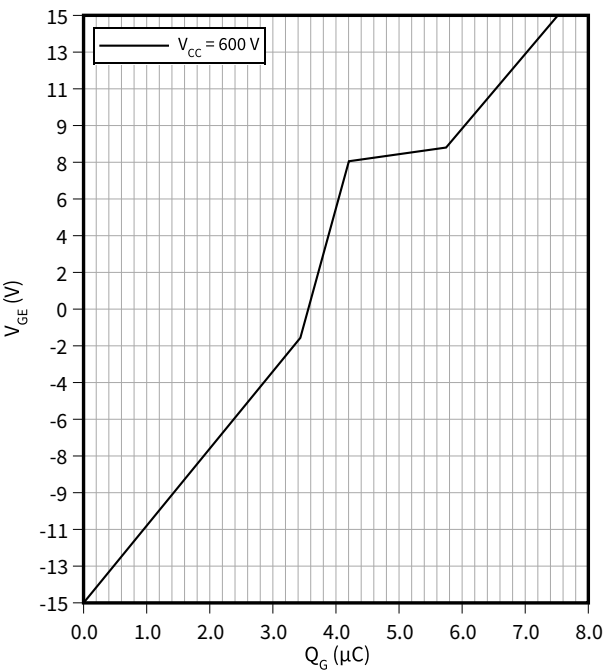
$V_{CE} = 20\text{ V}$



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

$V_{GE} = f(Q_G)$

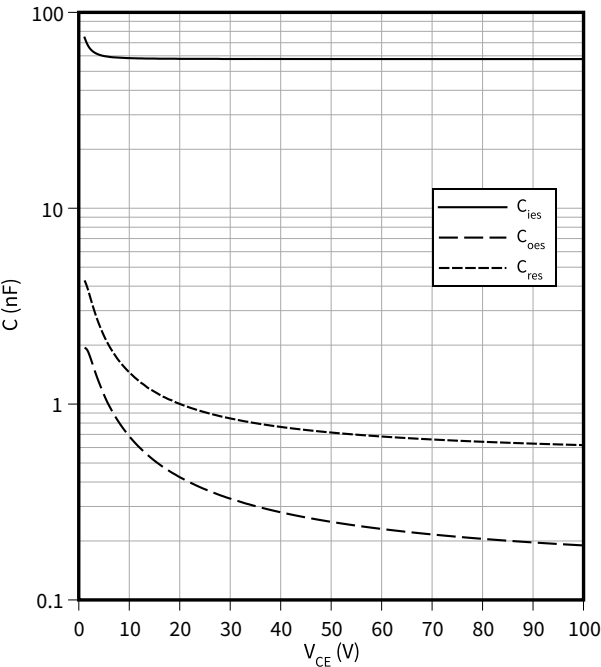
$I_C = 500\text{ A}, T_{vj} = 25^\circ\text{C}$



7 Characteristics diagrams

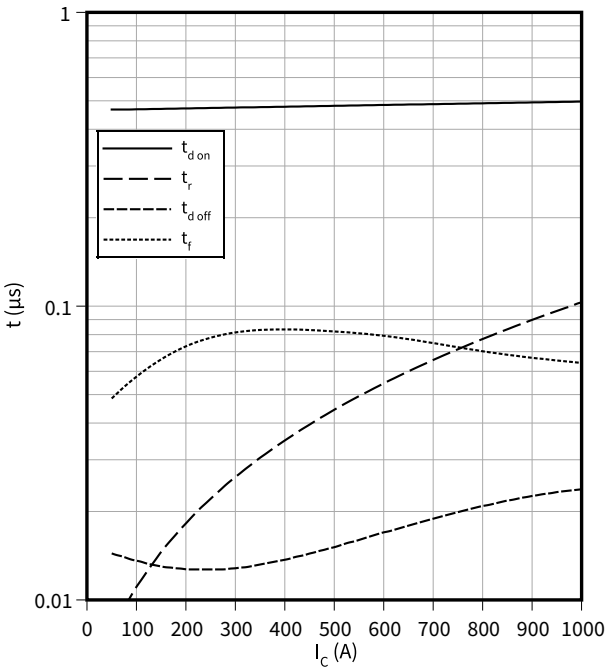
Capacity characteristic (typical), IGBT, T1 / T2

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



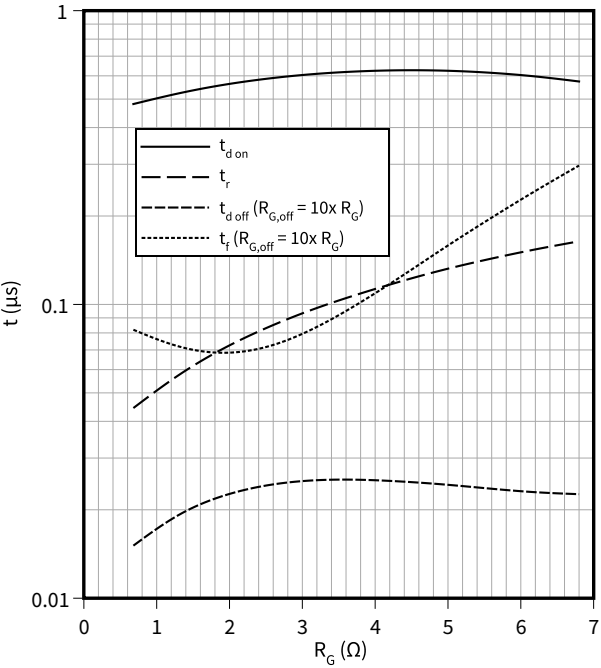
Switching times (typical), IGBT, T1 / T2

$t = f(I_C)$
 $R_{Goff} = 6.8 \text{ } \Omega$, $R_{Gon} = 0.68 \text{ } \Omega$, $V_{GE} = \pm 15 \text{ V}$, $V_{CC} = 500 \text{ V}$, $T_{vj} = 175 \text{ }^{\circ}\text{C}$



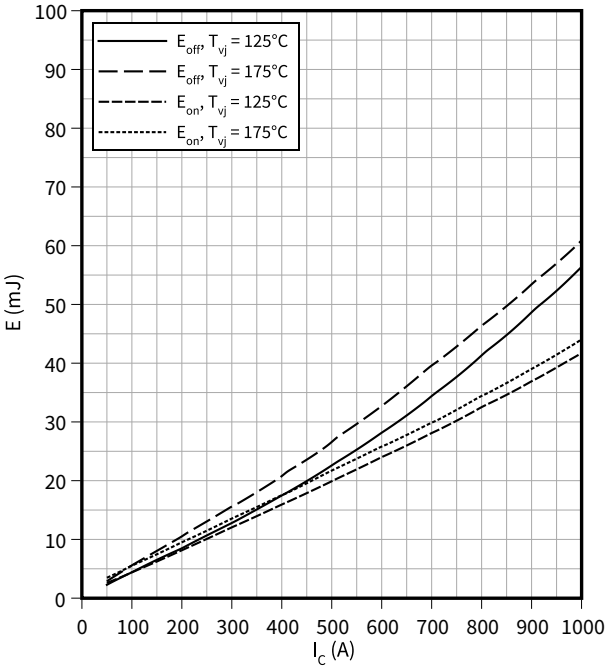
Switching times (typical), IGBT, T1 / T2

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



Switching losses (typical), IGBT, T1 / T2

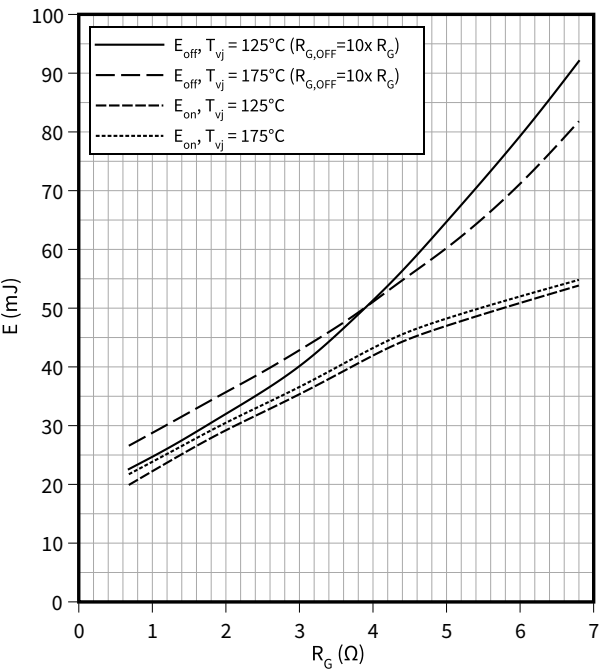
$E = f(I_C)$
 $R_{Goff} = 6.8 \text{ } \Omega$, $R_{Gon} = 0.68 \text{ } \Omega$, $V_{CC} = 500 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$



7 Characteristics diagrams

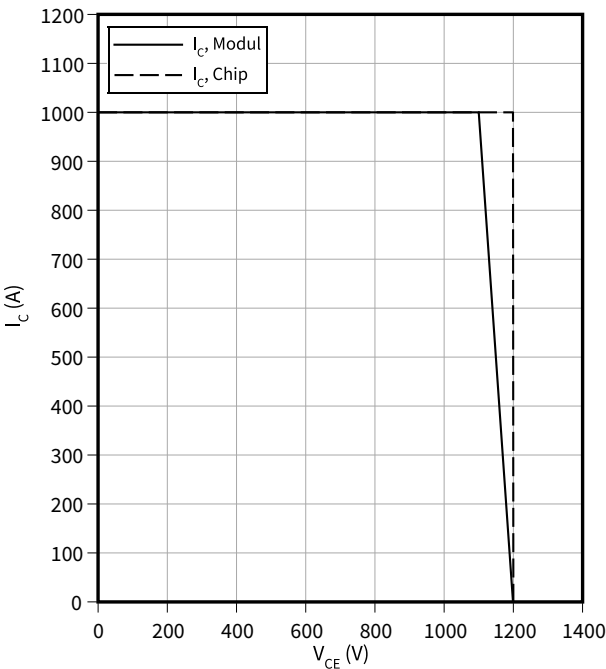
Switching losses (typical), IGBT, T1 / T2

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



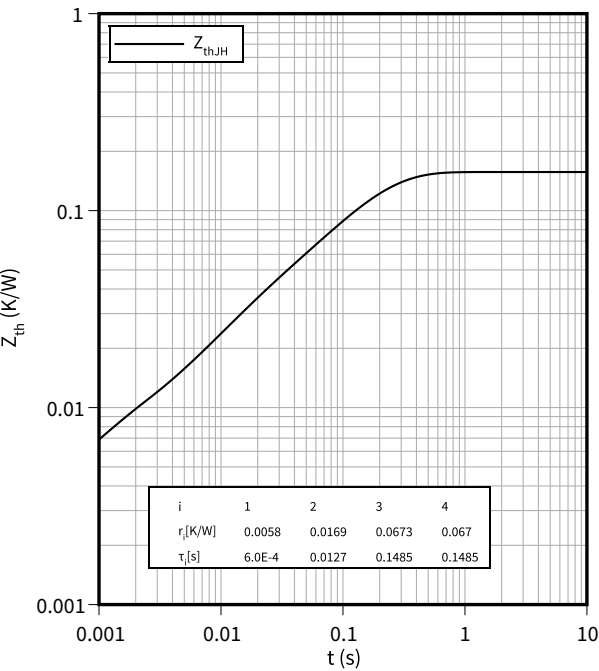
Reverse bias safe operating area (RBSOA), IGBT, T1 / T2

$I_C = f(V_{CE})$
 $R_{Goff} = 6.8\ \Omega$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 175\text{ °C}$



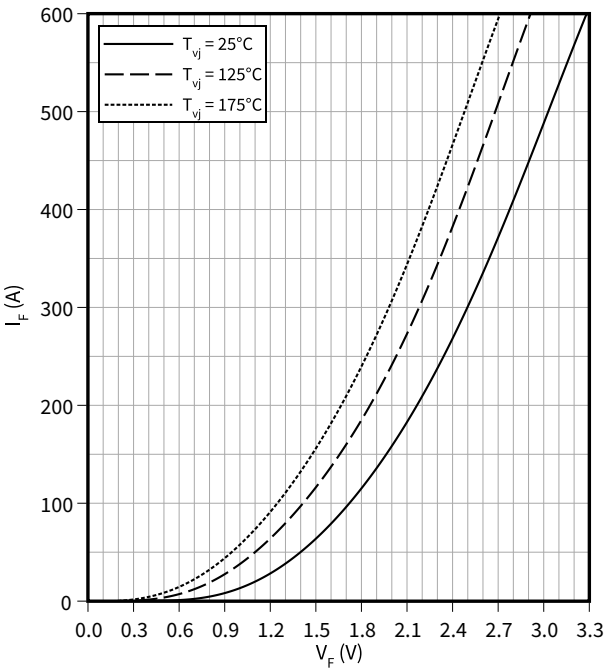
Transient thermal impedance, IGBT, T1 / T2

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, D1 / D2

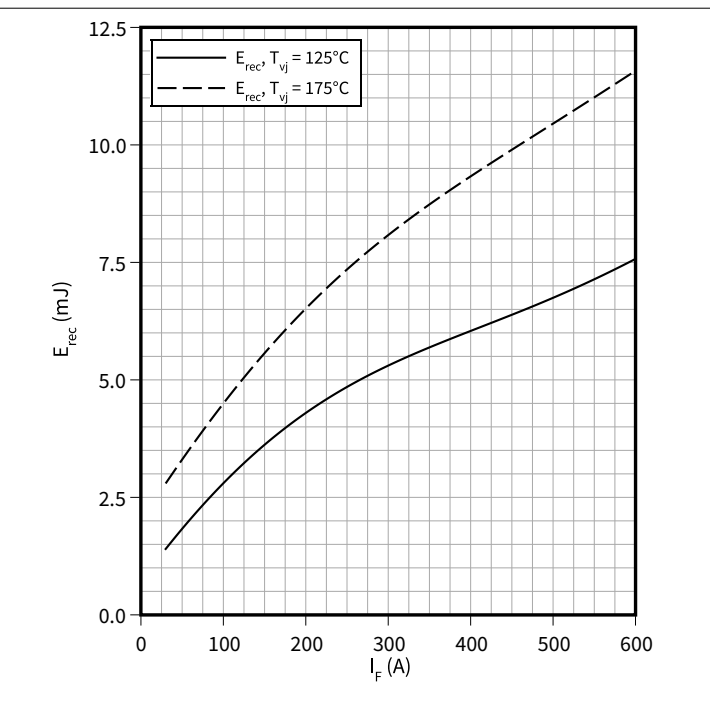
$I_F = f(V_F)$



7 Characteristics diagrams

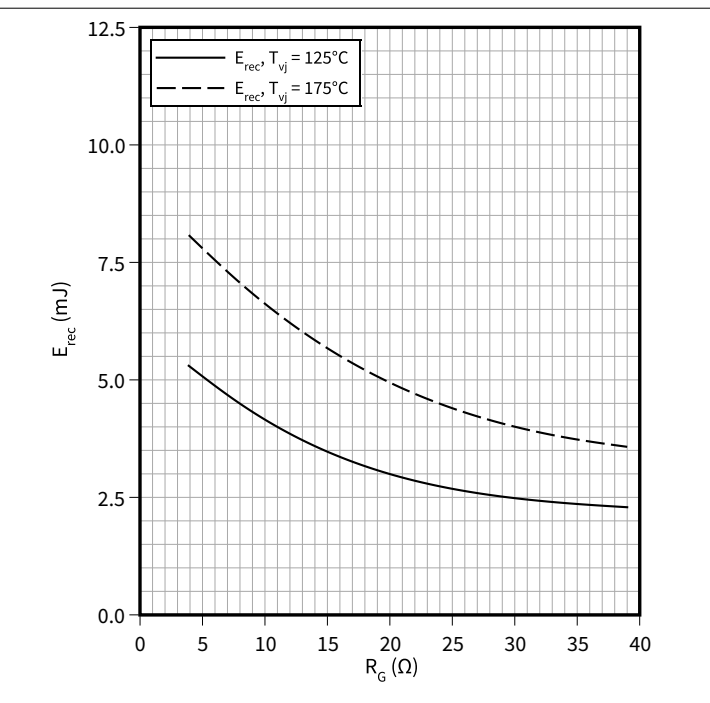
Switching losses (typical), Diode, D1 / D2

$E_{rec} = f(I_F)$
 $R_{Gon} = 3.9 \Omega, V_{CE} = 500 V$



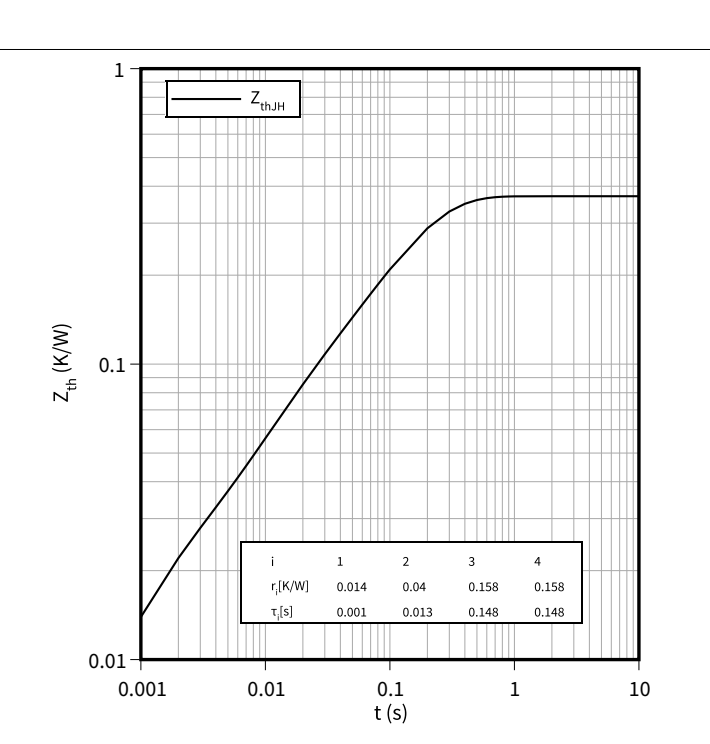
Switching losses (typical), Diode, D1 / D2

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



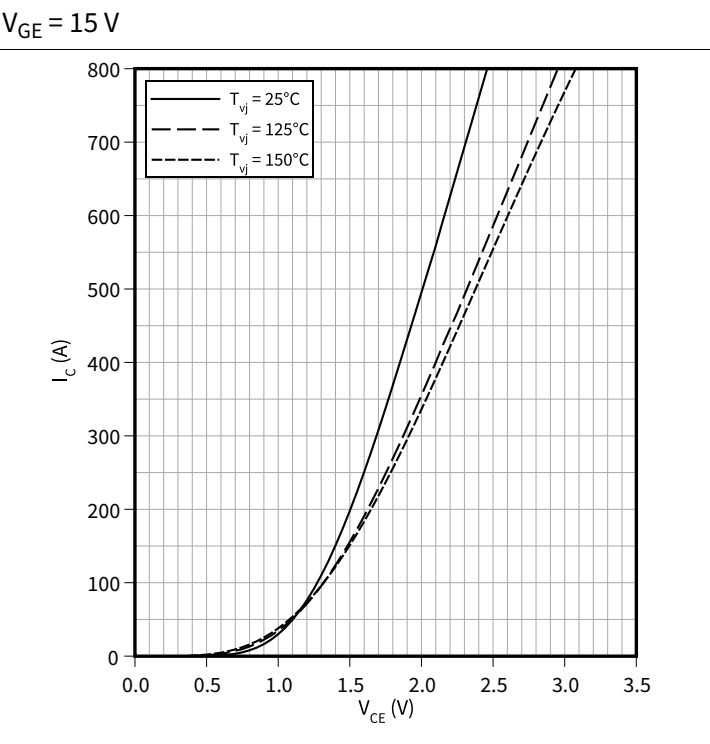
Transient thermal impedance, Diode, D1 / D2

$Z_{th} = f(t)$



Output characteristic (typical), IGBT, T3 / T4

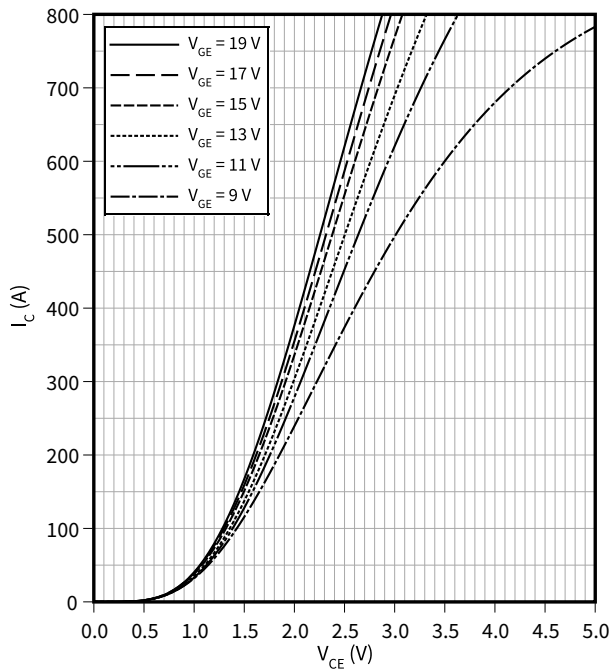
$I_C = f(V_{CE})$
 $V_{GE} = 15 V$



7 Characteristics diagrams

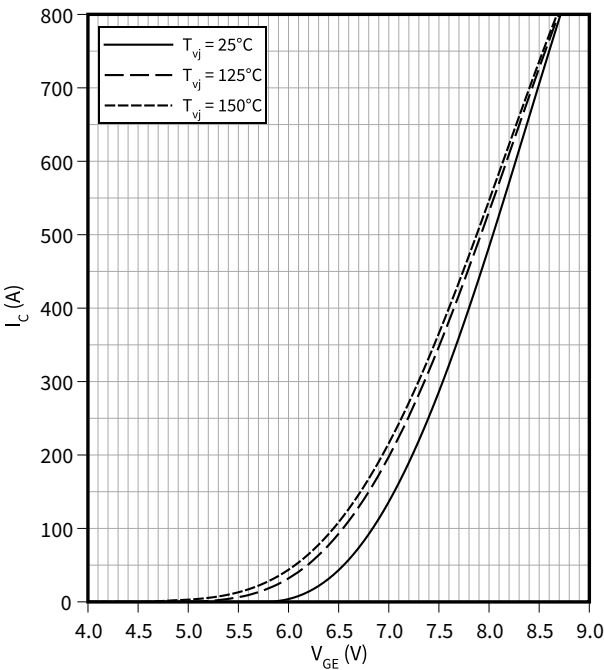
Output characteristic field (typical), IGBT, T3 / T4

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



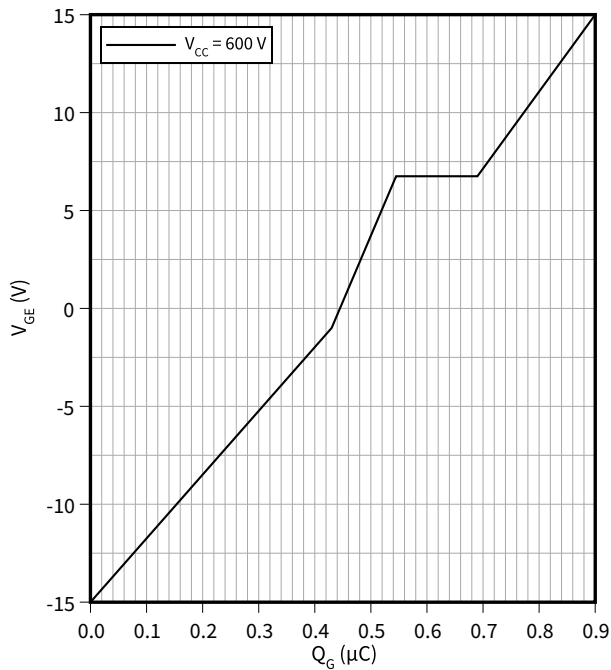
Transfer characteristic (typical), IGBT, T3 / T4

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



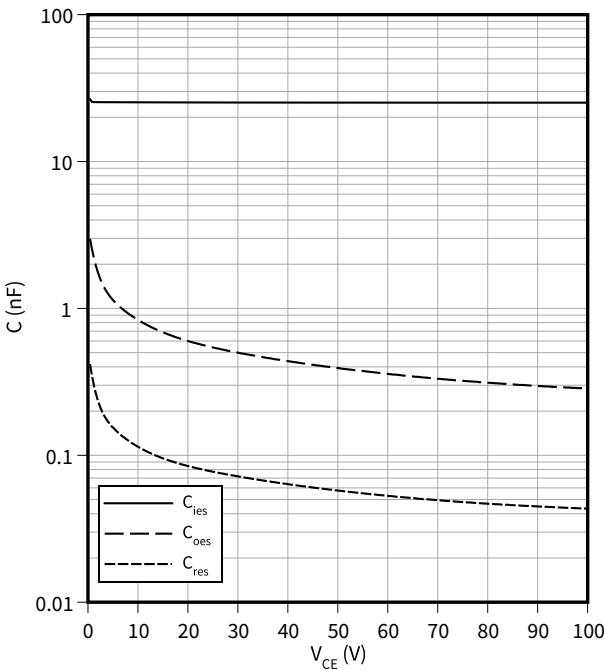
Gate charge characteristic (typical), IGBT, T3 / T4

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



Capacity characteristic (typical), IGBT, T3 / T4

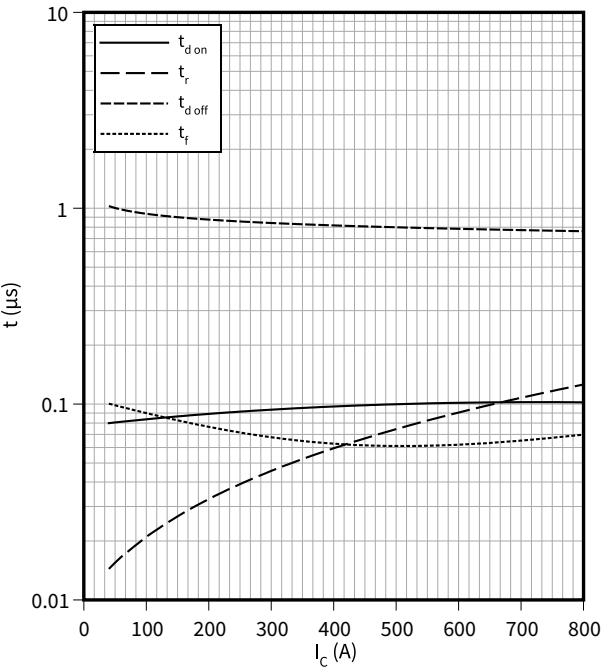
$C = f(V_{CE})$
 $f = 100\text{ kHz}$, $V_{GE} = 0\text{ V}$, $T_{vj} = 25\text{ °C}$



7 Characteristics diagrams

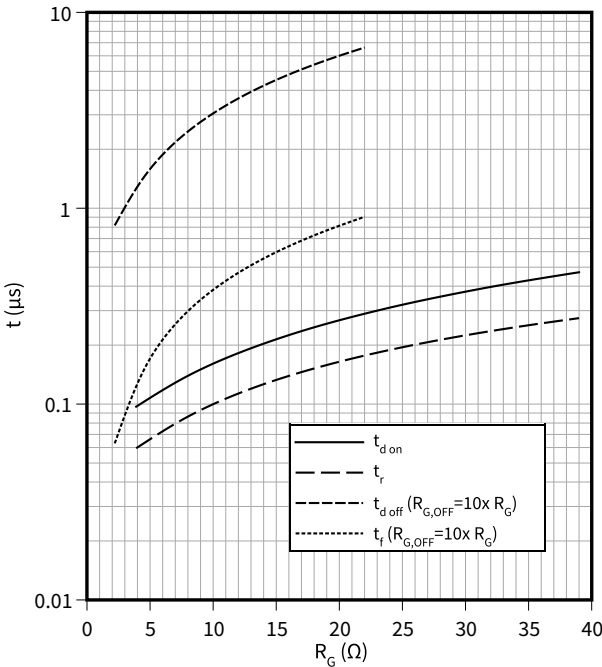
Switching times (typical), IGBT, T3 / T4

$t = f(I_C)$
 $R_{Goff} = 22 \Omega$, $R_{Gon} = 3.9 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $V_{CC} = 500 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



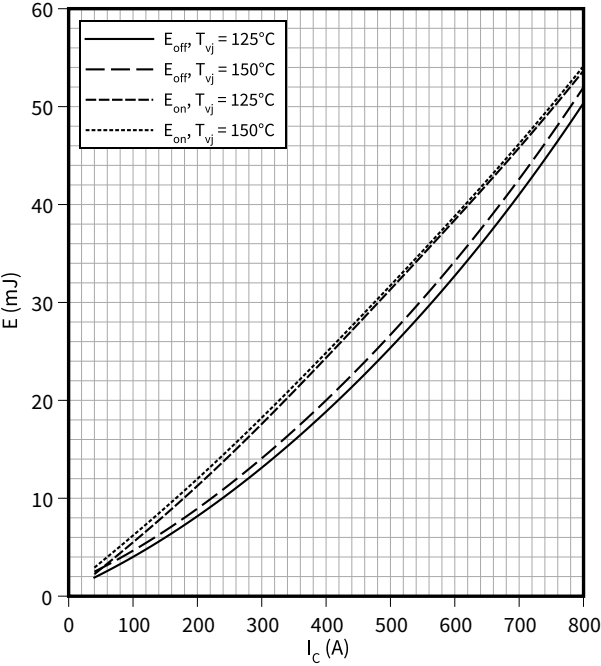
Switching times (typical), IGBT, T3 / T4

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



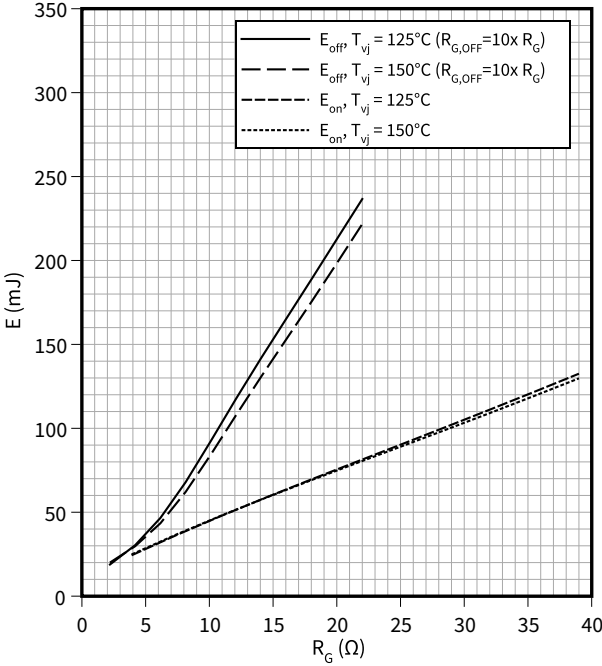
Switching losses (typical), IGBT, T3 / T4

$E = f(I_C)$
 $R_{Goff} = 22 \Omega$, $R_{Gon} = 3.9 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $V_{CC} = 500 \text{ V}$



Switching losses (typical), IGBT, T3 / T4

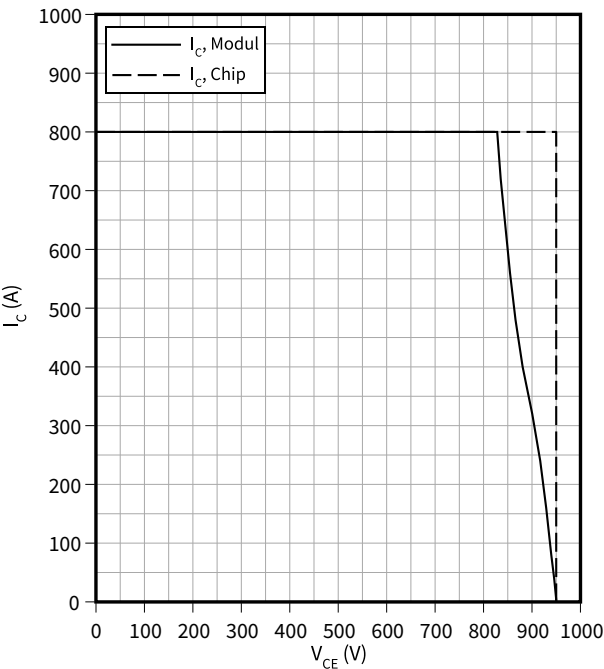
$E = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}$, $I_C = 400 \text{ A}$, $V_{CC} = 500 \text{ V}$



7 Characteristics diagrams

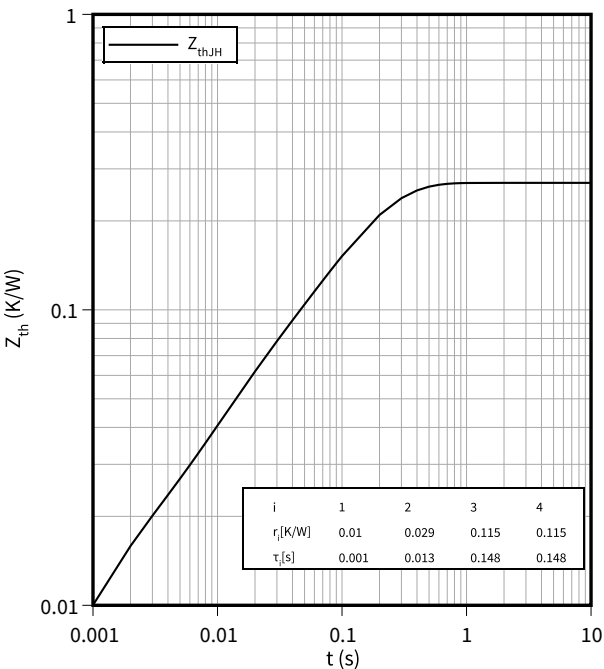
Reverse bias safe operating area (RBSOA), IGBT, T3 / T4

$I_C = f(V_{CE})$
 $R_{Goff} = 22 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



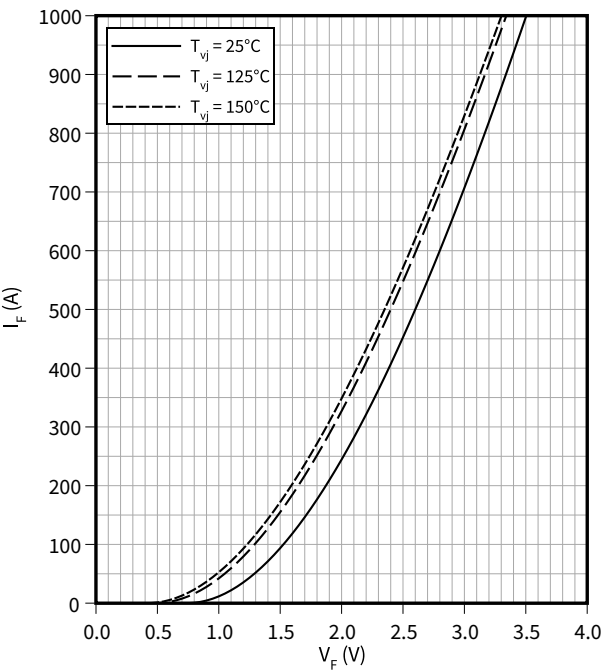
Transient thermal impedance, IGBT, T3 / T4

$Z_{th} = f(t)$



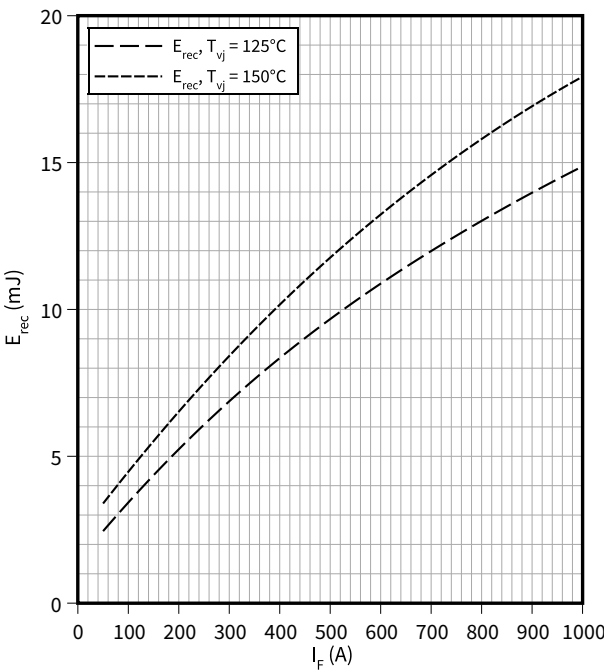
Forward characteristic (typical), Diode, D3 / D4

$I_F = f(V_F)$



Switching losses (typical), Diode, D3 / D4

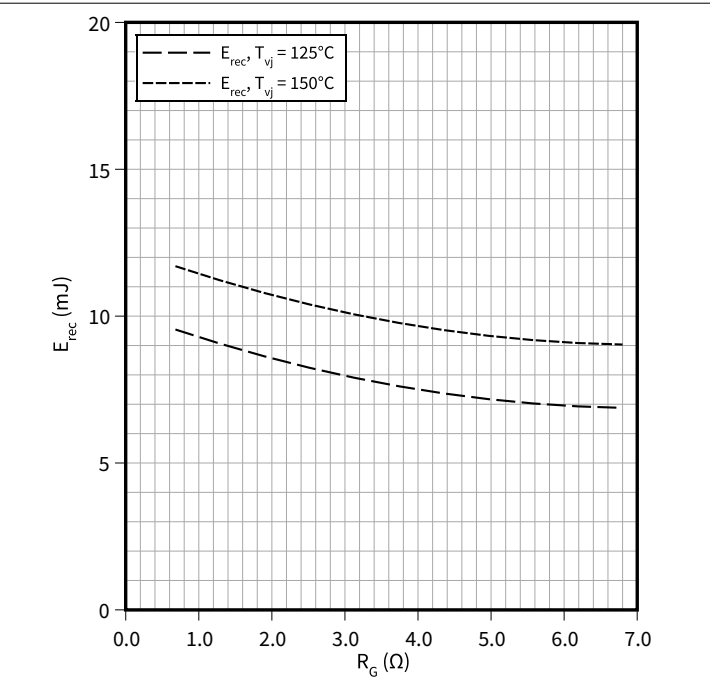
$E_{rec} = f(I_F)$
 $R_{Gon} = 0.68 \Omega$, $V_{CE} = 500 \text{ V}$



7 Characteristics diagrams

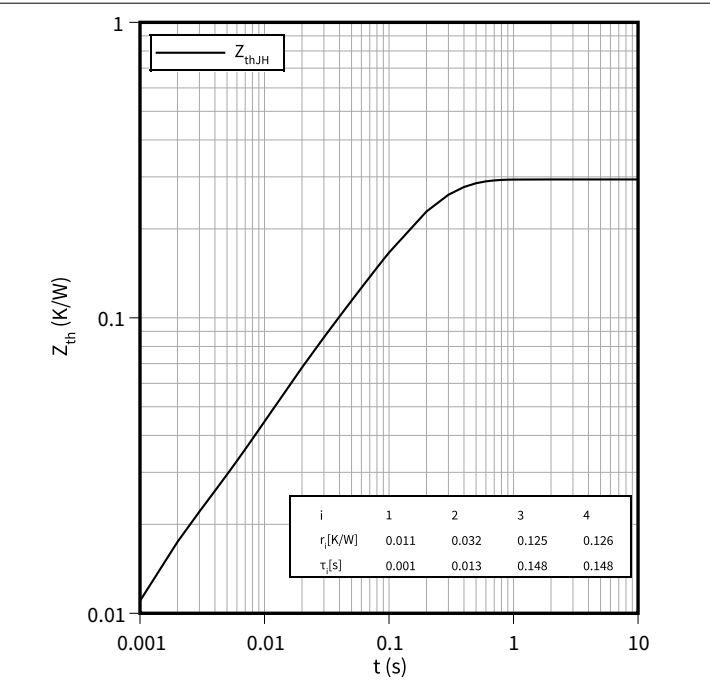
Switching losses (typical), Diode, D3 / D4

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



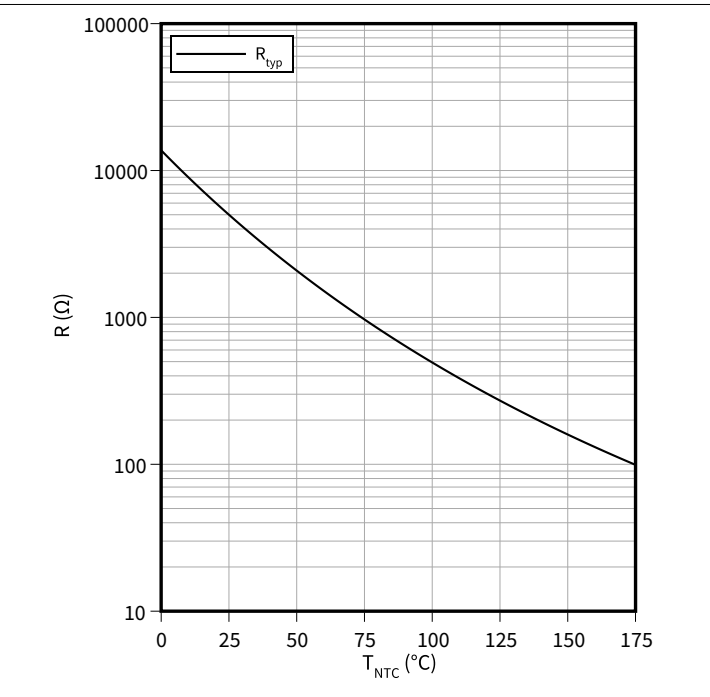
Transient thermal impedance, Diode, D3 / D4

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



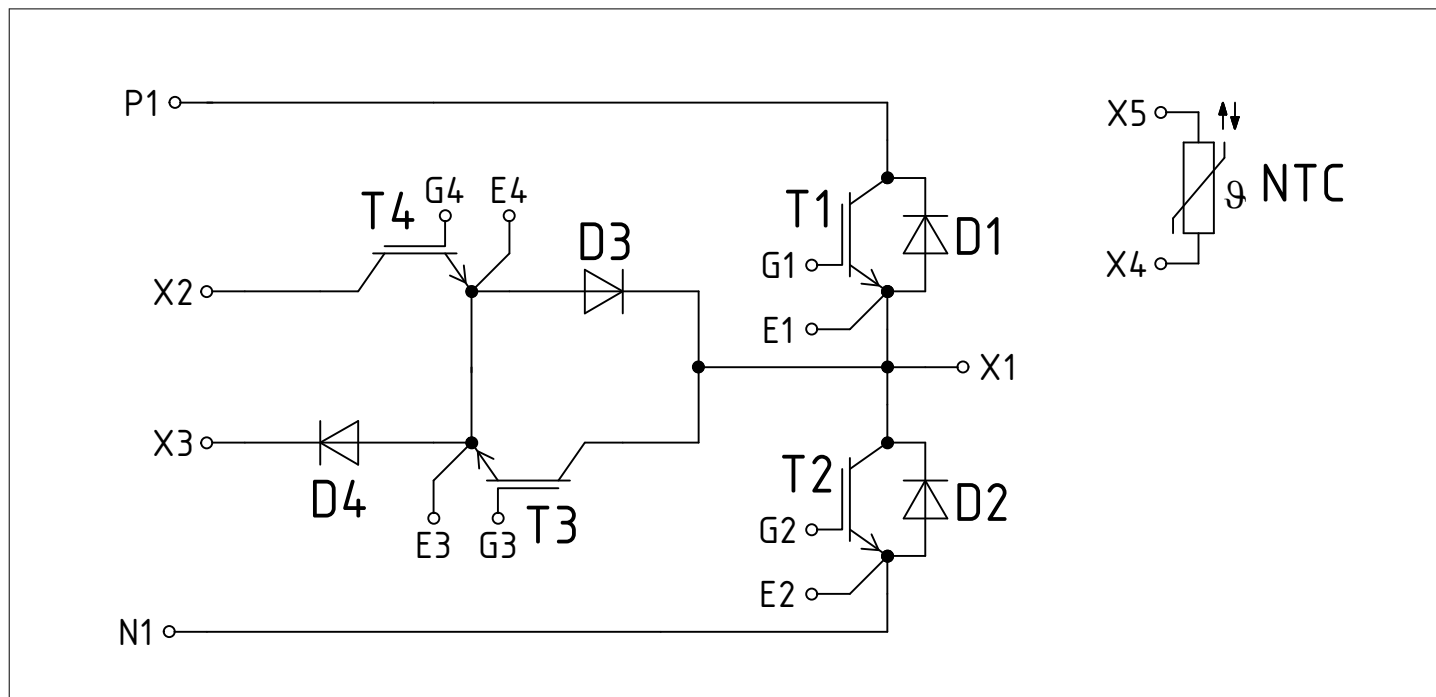


Figure 1

9 Package outlines

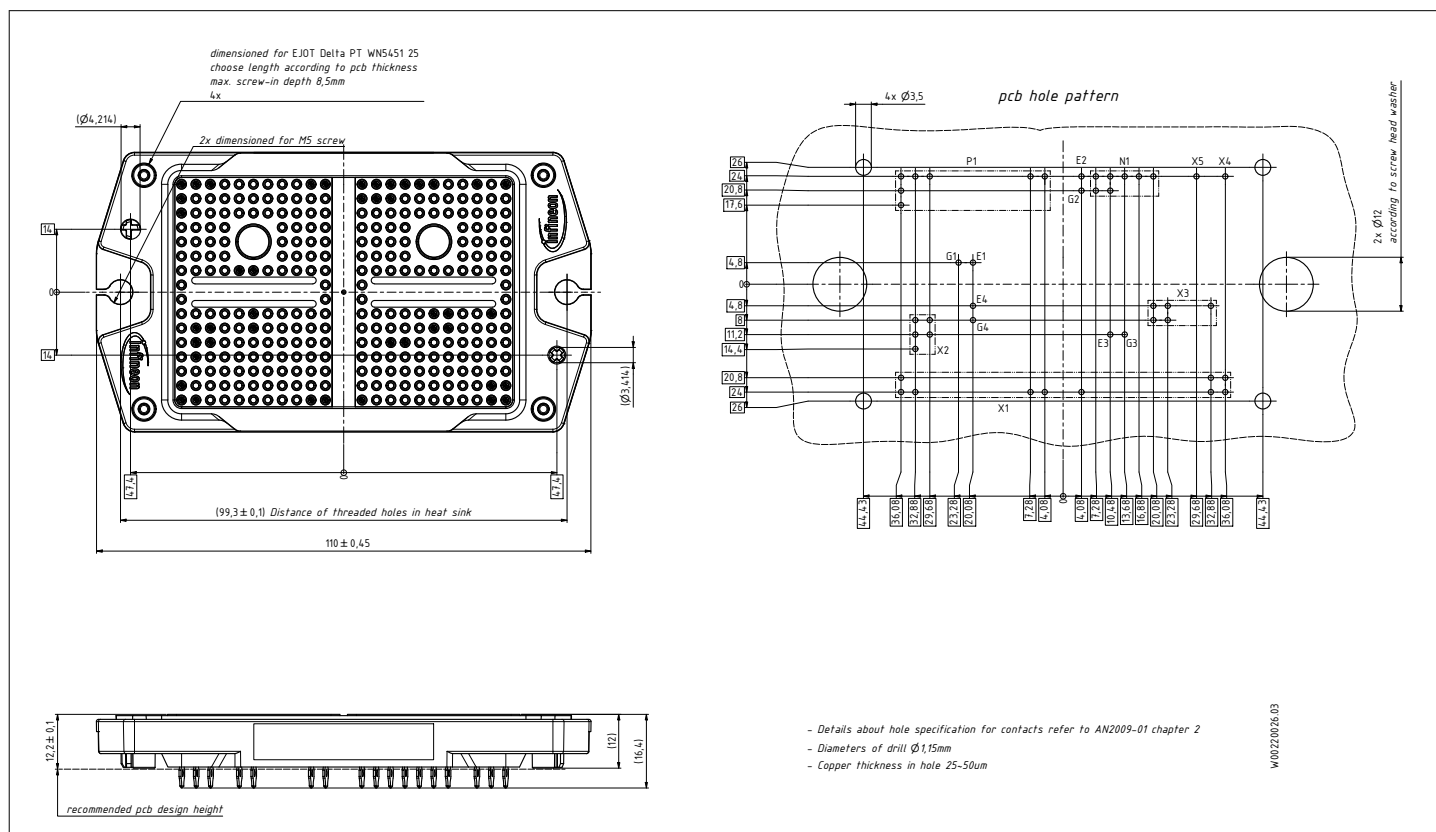


Figure 2

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	 71549142846550549911530  71549142846550549911530		

Figure 3



Revision history

Revision history

Document revision	Date of release	Description of changes
0.10	2023-03-21	Initial version
1.00	2024-02-29	Final datasheet

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