

Final datasheet

EasyPACK™ module with TRENCHSTOP™ IGBT7 and emitter controlled 7 diode and PressFIT / NTC

Features

- Electrical features
 - $V_{CES} = 1200\text{ V}$
 - $I_{C\text{ nom}} = 340\text{ A} / I_{CRM} = 680\text{ A}$
 - 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
 - Al_2O_3 substrate with low thermal resistance
 - High current pin
 - PressFIT contact technology
 - Rugged mounting due to integrated mounting clamps



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

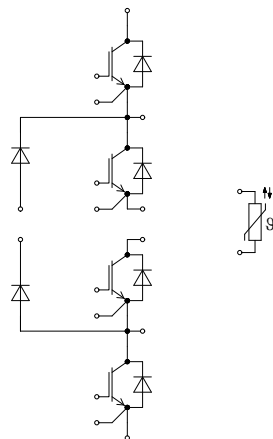


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1 Package

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		140	°C

Table 2 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray inductance module	L_{SCE}			18		nH
Module lead resistance, terminals - chip	$R_{AA'+CC'}$	$T_H = 25 \text{ °C}$, per switch		1.4		mΩ
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25 \text{ °C}$, per switch		1.2		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 / 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}		340	A
Continuous DC collector current	I_{CDC}	$T_{vj \text{ max}} = 175 \text{ °C}$ $T_H = 65 \text{ °C}$	225	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj \text{ op}}$	680	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	$V_{CE\ sat}$	$I_C = 340\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$		1.71	2.25	V
			$T_{vj} = 125\ ^\circ C$		1.91		
			$T_{vj} = 175\ ^\circ C$		2.00		
Gate threshold voltage	V_{GETh}	$I_C = 5.44\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$		4.85	5.5	6.15	V
Gate charge	Q_G	$V_{GE} = \pm 15\ V, V_{CC} = 600\ V, T_{vj} = 25\ ^\circ C$			5.01		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$			2.5		Ω
Input capacitance	C_{ies}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			38.6		nF
Reverse transfer capacitance	C_{res}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			0.247		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}	$I_C = 340\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Gon} = 0.11\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.327		μs
			$T_{vj} = 125\ ^\circ C$		0.366		
			$T_{vj} = 175\ ^\circ C$		0.388		
Rise time (inductive load)	t_r	$I_C = 340\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Gon} = 0.11\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.026		μs
			$T_{vj} = 125\ ^\circ C$		0.032		
			$T_{vj} = 175\ ^\circ C$		0.035		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 340\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Goff} = 2.4\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.510		μs
			$T_{vj} = 125\ ^\circ C$		0.570		
			$T_{vj} = 175\ ^\circ C$		0.600		
Fall time (inductive load)	t_f	$I_C = 340\ A, V_{CC} = 500\ V, V_{GE} = \pm 15\ V, R_{Goff} = 2.4\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.046		μs
			$T_{vj} = 125\ ^\circ C$		0.096		
			$T_{vj} = 175\ ^\circ C$		0.121		
Turn-on energy loss per pulse	E_{on}	$I_C = 340\ A, V_{CC} = 500\ V, L_\sigma = 9\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 0.11\ \Omega, di/dt = 9450\ A/\mu s (T_{vj} = 175\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		11.1		mJ
			$T_{vj} = 125\ ^\circ C$		13.5		
			$T_{vj} = 175\ ^\circ C$		15.4		
Turn-off energy loss per pulse	E_{off}	$I_C = 340\ A, V_{CC} = 500\ V, L_\sigma = 9\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 2.4\ \Omega, dv/dt = 8080\ V/\mu s (T_{vj} = 175\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		7.9		mJ
			$T_{vj} = 125\ ^\circ C$		12.7		
			$T_{vj} = 175\ ^\circ C$		15.3		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, $\lambda_{grease} = 5\ W/(m \cdot K)$			0.242		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 IGBT, T2 / T3

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		$T_{vj} = 25\,^{\circ}\text{C}$	1200	V
Implemented collector current	I_{CN}			340	A
Continuous DC collector current	I_{CDC}	$T_{vj\,max} = 175\,^{\circ}\text{C}$	$T_H = 65\,^{\circ}\text{C}$	235	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\,op}$		680	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	$V_{CE\,sat}$	$I_C = 340\,\text{A}$, $V_{GE} = 15\,\text{V}$	$T_{vj} = 25\,^{\circ}\text{C}$		1.71	2.25	V
			$T_{vj} = 125\,^{\circ}\text{C}$		1.91		
			$T_{vj} = 175\,^{\circ}\text{C}$		2.00		
Gate threshold voltage	V_{GETh}	$I_C = 5.44\,\text{mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25\,^{\circ}\text{C}$		4.85	5.5	6.15	V
Gate charge	Q_G	$V_{GE} = \pm 15\,\text{V}$, $V_{CC} = 600\,\text{V}$, $T_{vj} = 25\,^{\circ}\text{C}$			5.01		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\,^{\circ}\text{C}$			2.5		Ω
Input capacitance	C_{ies}	$f = 100\,\text{kHz}$, $T_{vj} = 25\,^{\circ}\text{C}$, $V_{CE} = 25\,\text{V}$, $V_{GE} = 0\,\text{V}$			38.6		nF
Reverse transfer capacitance	C_{res}	$f = 100\,\text{kHz}$, $T_{vj} = 25\,^{\circ}\text{C}$, $V_{CE} = 25\,\text{V}$, $V_{GE} = 0\,\text{V}$			0.247		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 1200\,\text{V}$, $V_{GE} = 0\,\text{V}$	$T_{vj} = 25\,^{\circ}\text{C}$			23	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 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Turn-on delay time (inductive load)	t_{don}	$I_C = 340 \text{ A}$, $V_{CC} = 500 \text{ V}$, $R_{\text{Gon}} = 0.47 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.370		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.410		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	0.430		
Rise time (inductive load)	t_r	$I_C = 340 \text{ A}$, $V_{CC} = 500 \text{ V}$, $R_{\text{Gon}} = 0.47 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.036		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.041		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	0.045		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 340 \text{ A}$, $V_{CC} = 500 \text{ V}$, $R_{\text{Goff}} = 9.1 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	1.080		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	1.150		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	1.200		
Fall time (inductive load)	t_f	$I_C = 340 \text{ A}$, $V_{CC} = 500 \text{ V}$, $R_{\text{Goff}} = 9.1 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.025		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.062		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	0.096		
Turn-on energy loss per pulse	E_{on}	$I_C = 340 \text{ A}$, $V_{CC} = 500 \text{ V}$, $L_\sigma = 9 \text{ nH}$, $R_{\text{Gon}} = 0.47 \Omega$, $di/dt = 7100 \text{ A}/\mu\text{s}$ ($T_{vj} = 175 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	11.7		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	12.5		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	13.8		
Turn-off energy loss per pulse	E_{off}	$I_C = 340 \text{ A}$, $V_{CC} = 500 \text{ V}$, $L_\sigma = 9 \text{ nH}$, $R_{\text{Goff}} = 9.1 \Omega$, $dv/dt = 5700 \text{ V}/\mu\text{s}$ ($T_{vj} = 175 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	10.5		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	14.3		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	17		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, $\lambda_{\text{grease}} = 5 \text{ W}/(\text{m}\cdot\text{K})$		0.225		K/W
Temperature under switching conditions	$T_{vj\text{op}}$		-40		175	$^\circ\text{C}$

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

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
Implemented forward current	I_{FN}		400	A

(table continues...)

Table 7 (continued) Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Repetitive peak forward current	I_{FRM}	$t_P = 1 \text{ ms}$	800	A
I^2t - value	I^2t	$t_P = 10 \text{ ms}, V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ °C}$	A^2s
			$T_{vj} = 175 \text{ °C}$	

Table 8 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 400 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	2.50	3.05	V
			$T_{vj} = 125 \text{ °C}$	2.18		
			$T_{vj} = 175 \text{ °C}$	1.98		
Peak reverse recovery current	I_{RM}	$V_{CC} = 500 \text{ V}, I_F = 400 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 7100 \text{ A}/\mu\text{s} (T_{vj} = 175 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	185		A
			$T_{vj} = 125 \text{ °C}$	290		
			$T_{vj} = 175 \text{ °C}$	340		
Recovered charge	Q_r	$V_{CC} = 500 \text{ V}, I_F = 400 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 7100 \text{ A}/\mu\text{s} (T_{vj} = 175 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	11.5		μC
			$T_{vj} = 125 \text{ °C}$	25.8		
			$T_{vj} = 175 \text{ °C}$	35.5		
Reverse recovery energy	E_{rec}	$V_{CC} = 500 \text{ V}, I_F = 400 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 7100 \text{ A}/\mu\text{s} (T_{vj} = 175 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	3.3		mJ
			$T_{vj} = 125 \text{ °C}$	7.89		
			$T_{vj} = 175 \text{ °C}$	11.4		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 5 \text{ W}/(\text{m}\cdot\text{K})$		0.293		K/W
Temperature under switching conditions	$T_{vj\text{op}}$		-40		175	°C

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

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
Implemented forward current	I_{FN}		300	A

(table continues...)

Table 9 (continued) Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Continuous DC forward current	I_F		250	A
Repetitive peak forward current	I_{FRM}	$t_P = 1 \text{ ms}$	500	A
I^2t - value	I^2t	$t_P = 10 \text{ ms}, V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ °C}$	A^2s
			$T_{vj} = 175 \text{ °C}$	
			9240	
			8070	

Table 10 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 250 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.62	1.93	V
			$T_{vj} = 125 \text{ °C}$	1.50		
			$T_{vj} = 175 \text{ °C}$	1.42		
Peak reverse recovery current	I_{RM}	$V_{CC} = 500 \text{ V}, I_F = 250 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 7100 \text{ A}/\mu\text{s} (T_{vj} = 175 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	195		A
			$T_{vj} = 125 \text{ °C}$	265		
			$T_{vj} = 175 \text{ °C}$	307		
Recovered charge	Q_r	$V_{CC} = 500 \text{ V}, I_F = 250 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 7100 \text{ A}/\mu\text{s} (T_{vj} = 175 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	17.5		μC
			$T_{vj} = 125 \text{ °C}$	34.7		
			$T_{vj} = 175 \text{ °C}$	46.1		
Reverse recovery energy	E_{rec}	$V_{CC} = 500 \text{ V}, I_F = 250 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 7100 \text{ A}/\mu\text{s} (T_{vj} = 175 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	5.2		mJ
			$T_{vj} = 125 \text{ °C}$	11.6		
			$T_{vj} = 175 \text{ °C}$	15.7		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 5 \text{ W}/(\text{m}\cdot\text{K})$		0.298		K/W
Temperature under switching conditions	$T_{vj op}$		-40		175	°C

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

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

(table continues...)

Table 11 (continued) Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Implemented forward current	I_{FN}		300	A
Repetitive peak forward current	I_{FRM}	$t_P = 1 \text{ ms}$	600	A
I^2t - value	I^2t	$t_P = 10 \text{ ms}, V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ °C}$	A^2s
			$T_{vj} = 175 \text{ °C}$	
			3850	
			3300	

Table 12 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 300 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	2.50	3.05	V
			$T_{vj} = 125 \text{ °C}$	2.18		
			$T_{vj} = 175 \text{ °C}$	1.98		
Peak reverse recovery current	I_{RM}	$V_{CC} = 500 \text{ V}, I_F = 300 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 9450 \text{ A}/\mu\text{s} (T_{vj} = 175 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	182		A
			$T_{vj} = 125 \text{ °C}$	276		
			$T_{vj} = 175 \text{ °C}$	329		
Recovered charge	Q_r	$V_{CC} = 500 \text{ V}, I_F = 300 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 9450 \text{ A}/\mu\text{s} (T_{vj} = 175 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	9		μC
			$T_{vj} = 125 \text{ °C}$	20		
			$T_{vj} = 175 \text{ °C}$	28		
Reverse recovery energy	E_{rec}	$V_{CC} = 500 \text{ V}, I_F = 300 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 9450 \text{ A}/\mu\text{s} (T_{vj} = 175 \text{ °C})$	$T_{vj} = 25 \text{ °C}$	2.62		mJ
			$T_{vj} = 125 \text{ °C}$	6.41		
			$T_{vj} = 175 \text{ °C}$	9.33		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 5 \text{ W}/(\text{m}\cdot\text{K})$		0.420		K/W
Temperature under switching conditions	$T_{vj \text{ op}}$		-40		175	°C

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

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

(table continues...)

Table 13 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Deviation of R_{100}	$\Delta R/R$	$T_{NTC} = 100\text{ °C}$, $R_{100} = 493\ \Omega$	-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

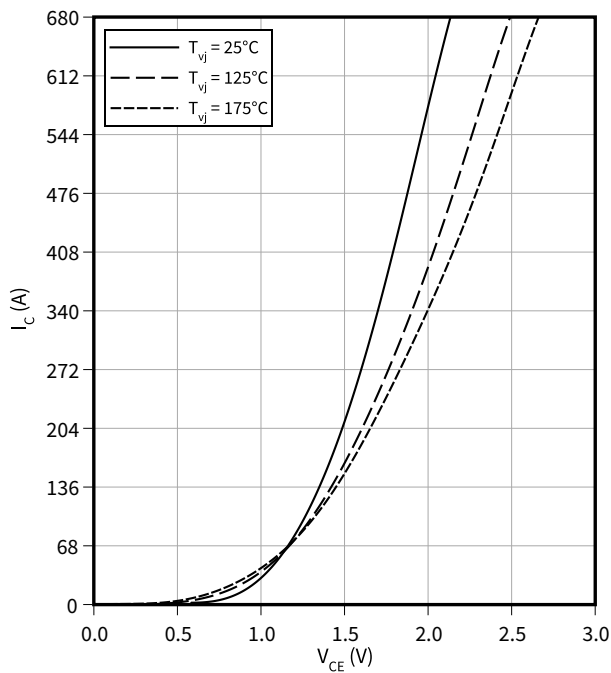
Note: For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4

8 Characteristics diagrams

Output characteristic (typical), IGBT, T1 / T4

$I_C = f(V_{CE})$

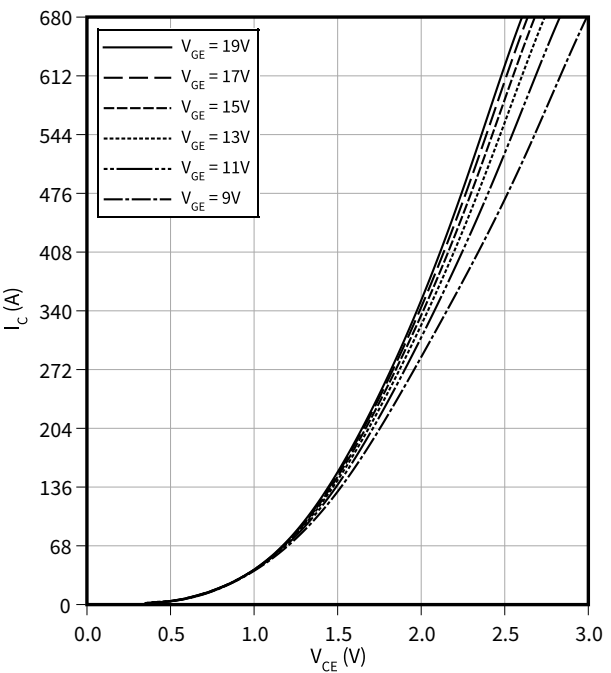
$V_{GE} = 15\text{ V}$



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

$I_C = f(V_{CE})$

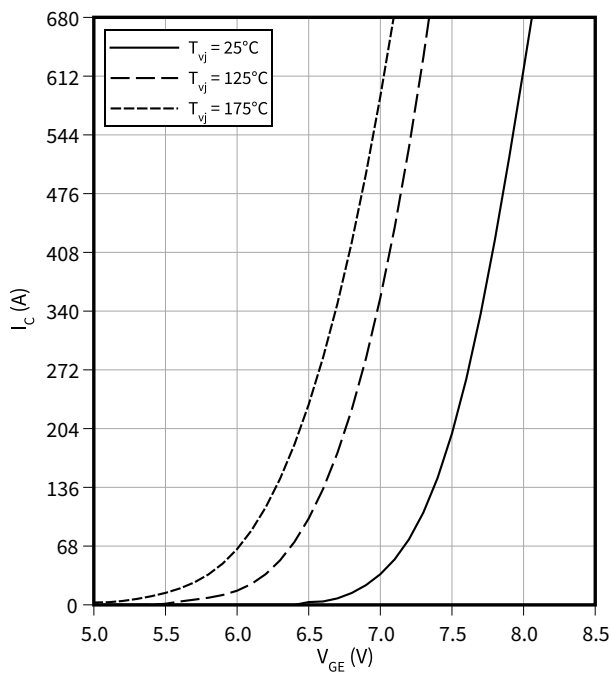
$T_{vj} = 175^\circ\text{C}$



Transfer characteristic (typical), IGBT, T1 / T4

$I_C = f(V_{GE})$

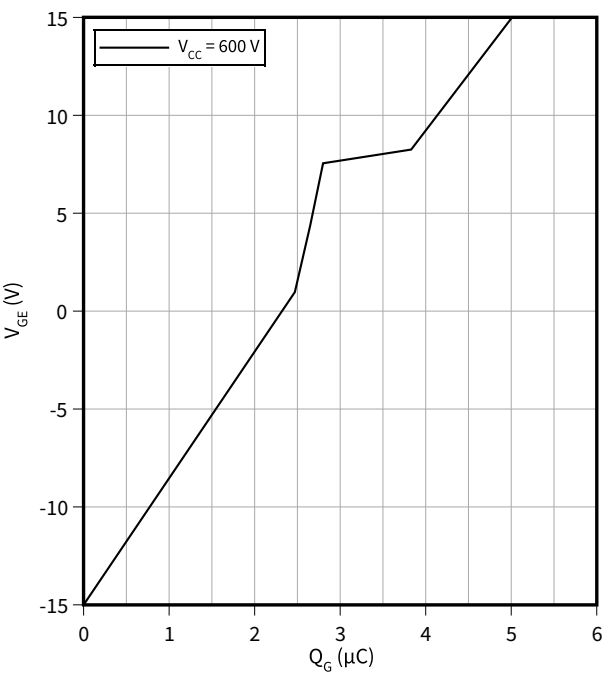
$V_{CE} = 20\text{ V}$



Gate charge characteristic (typical), IGBT, T1 / T4

$V_{GE} = f(Q_G)$

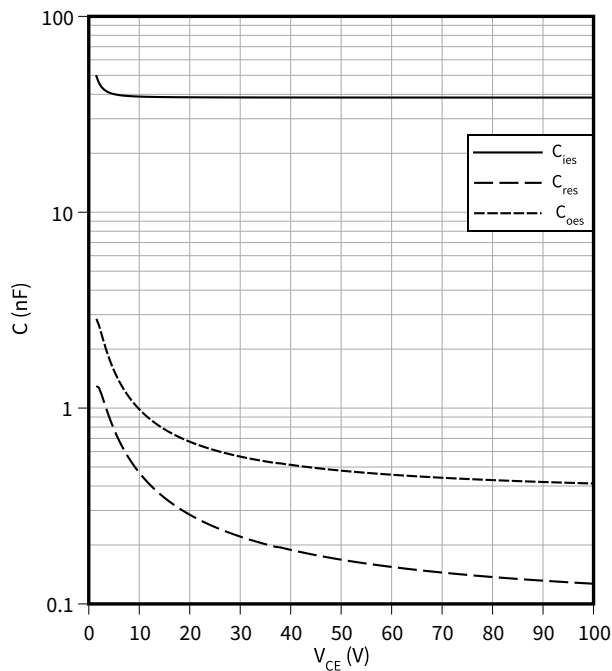
$I_C = 340\text{ A}, T_{vj} = 25^\circ\text{C}$



8 Characteristics diagrams

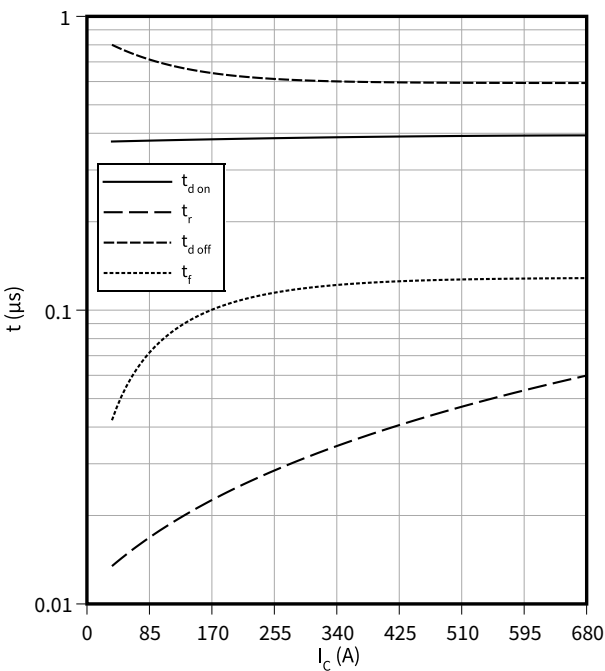
Capacity characteristic (typical), IGBT, T1 / T4

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



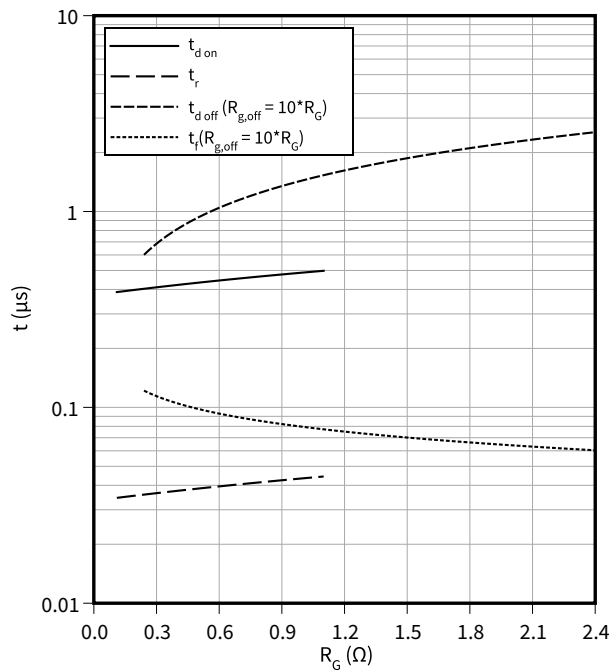
Switching times (typical), IGBT, T1 / T4

$t = f(I_C)$
 $R_{Goff} = 2.4 \text{ } \Omega$, $R_{Gon} = 0.11 \text{ } \Omega$, $V_{GE} = \pm 15 \text{ V}$, $V_{CC} = 500 \text{ V}$, $T_{vj} = 175 \text{ }^{\circ}\text{C}$



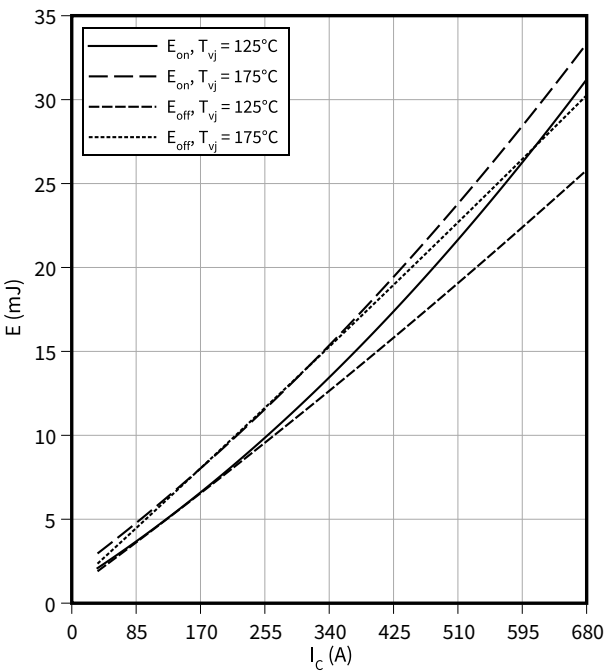
Switching times (typical), IGBT, T1 / T4

$t = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}$, $I_C = 340 \text{ A}$, $V_{CC} = 500 \text{ V}$, $T_{vj} = 175 \text{ }^{\circ}\text{C}$



Switching losses (typical), IGBT, T1 / T4

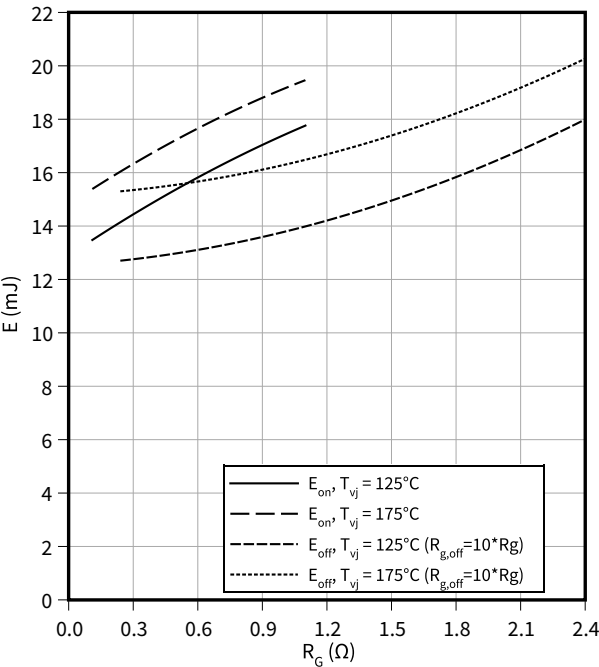
$E = f(I_C)$
 $R_{Goff} = 2.4 \text{ } \Omega$, $R_{Gon} = 0.11 \text{ } \Omega$, $V_{CC} = 500 \text{ V}$, $\pm 15 \text{ V}$



8 Characteristics diagrams

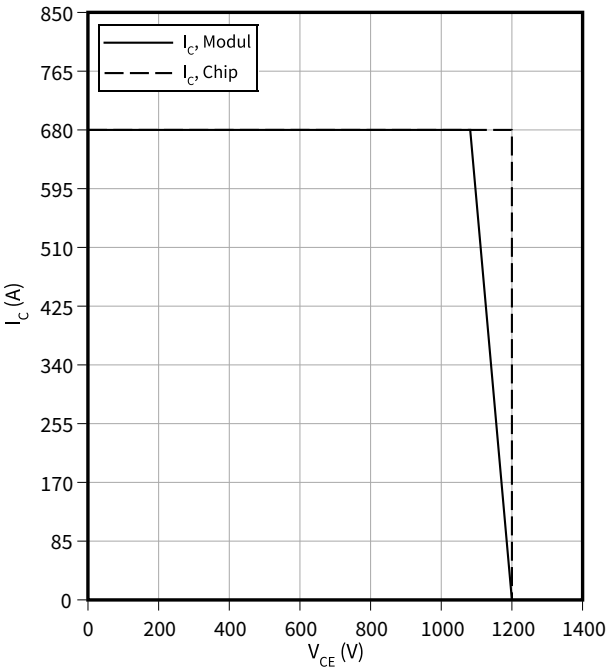
Switching losses (typical), IGBT, T1 / T4

$E = f(R_G)$
 $I_C = 340\text{ A}$, $V_{CC} = 500\text{ V}$, $\pm 15\text{ V}$



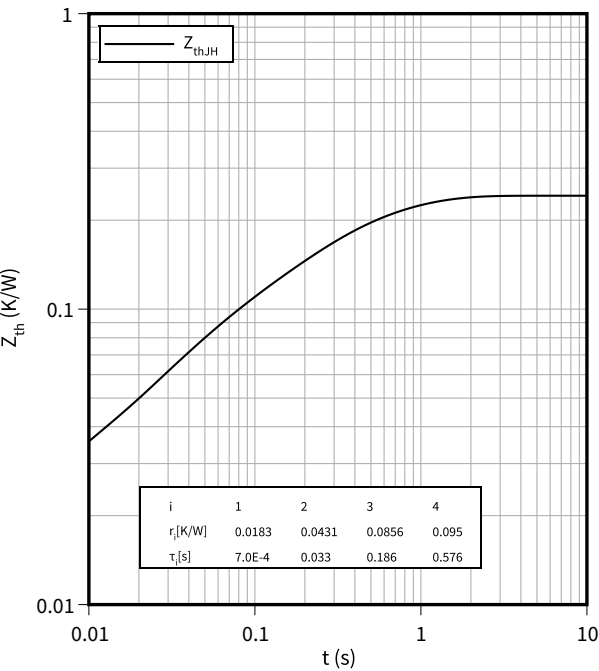
Reverse bias safe operating area (RBSOA), IGBT, T1 / T4

$I_C = f(V_{CE})$
 $R_{Goff} = 2.4\text{ }\Omega$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 175\text{ }^\circ\text{C}$



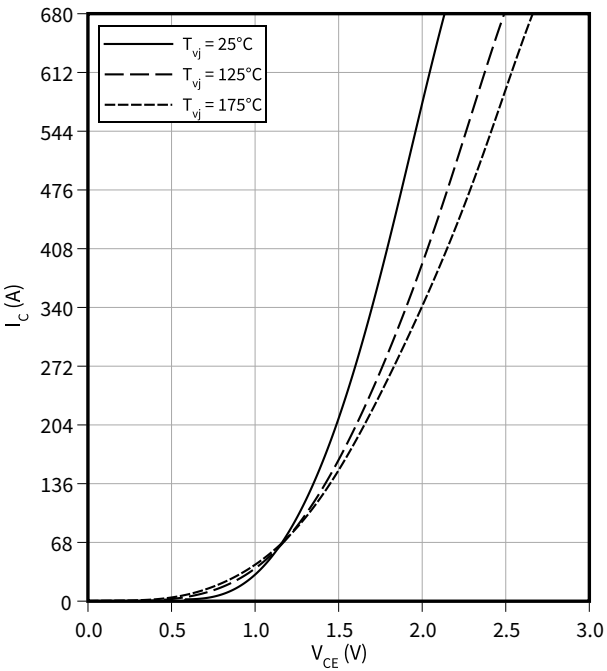
Transient thermal impedance, IGBT, T1 / T4

$Z_{th} = f(t)$



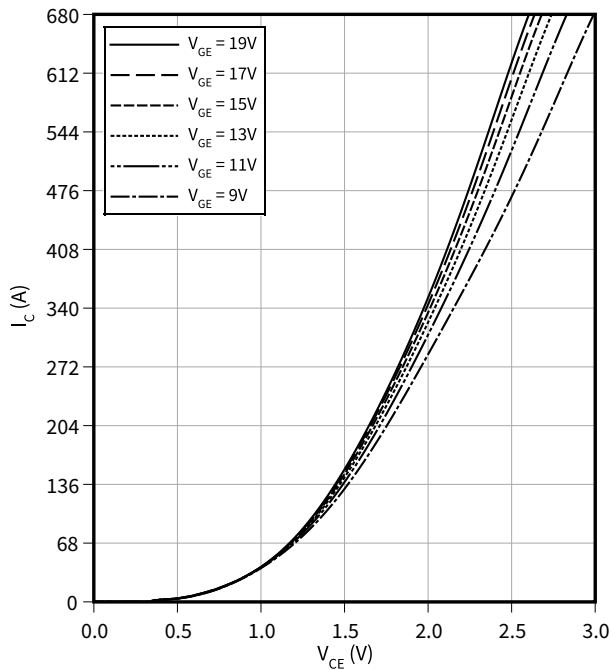
Output characteristic (typical), IGBT, T2 / T3

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



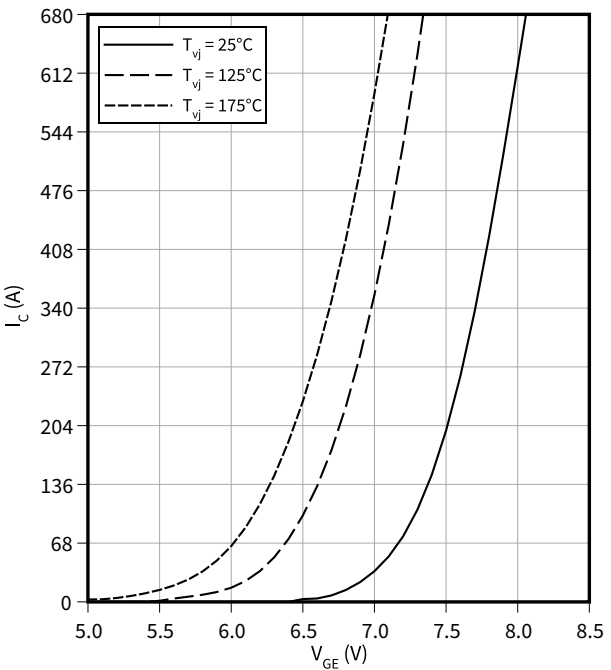
Output characteristic field (typical), IGBT, T2 / T3

$I_C = f(V_{CE})$
 $T_{vj} = 175\text{ °C}$



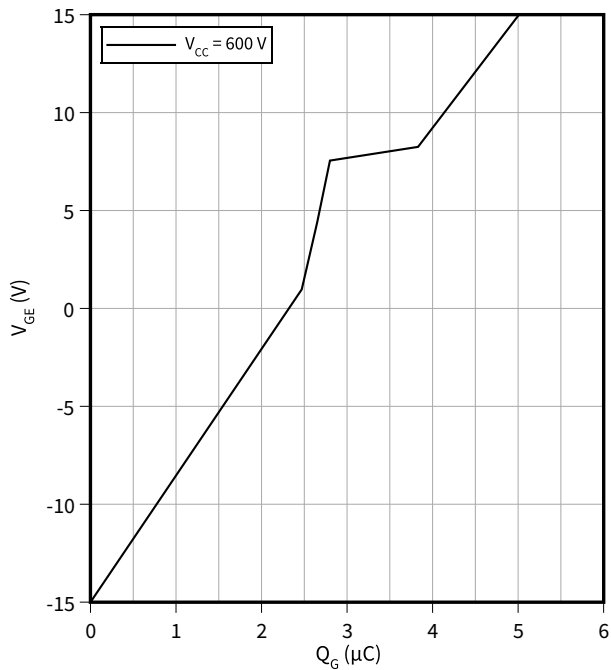
Transfer characteristic (typical), IGBT, T2 / T3

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



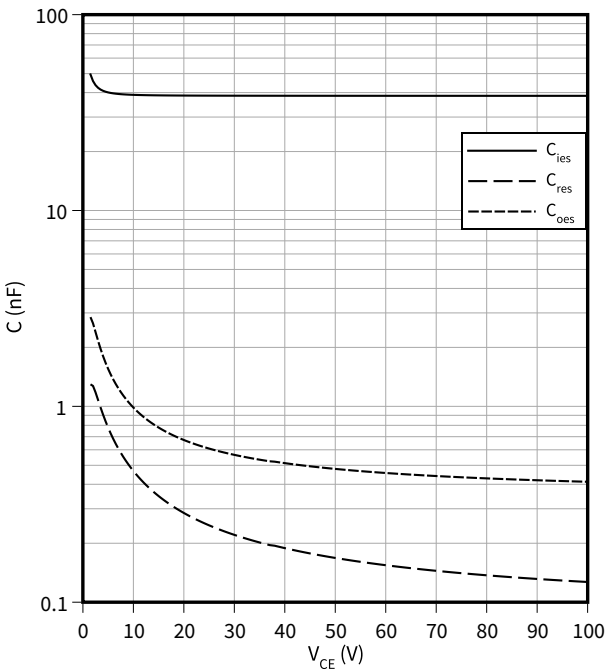
Gate charge characteristic (typical), IGBT, T2 / T3

$V_{GE} = f(Q_G)$
 $I_C = 340\text{ A}$, $T_{vj} = 25\text{ °C}$



Capacity characteristic (typical), IGBT, T2 / T3

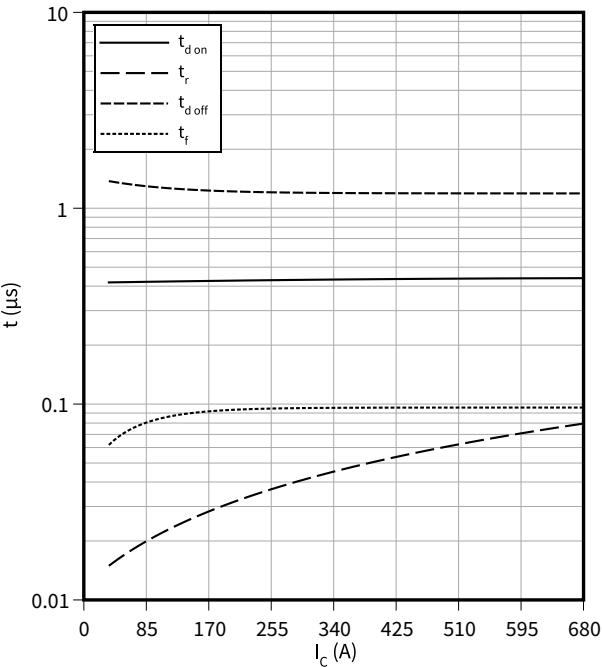
$C = f(V_{CE})$
 $f = 100\text{ kHz}$, $V_{GE} = 0\text{ V}$, $T_{vj} = 25\text{ °C}$



8 Characteristics diagrams

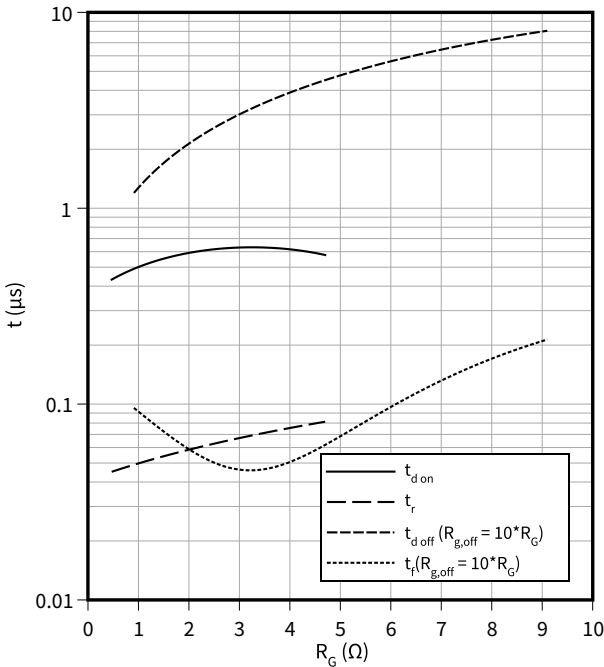
Switching times (typical), IGBT, T2 / T3

$t = f(I_C)$
 $R_{Goff} = 9.1 \Omega$, $R_{Gon} = 0.47 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $V_{CC} = 500 \text{ V}$, $T_{vj} = 175^\circ\text{C}$



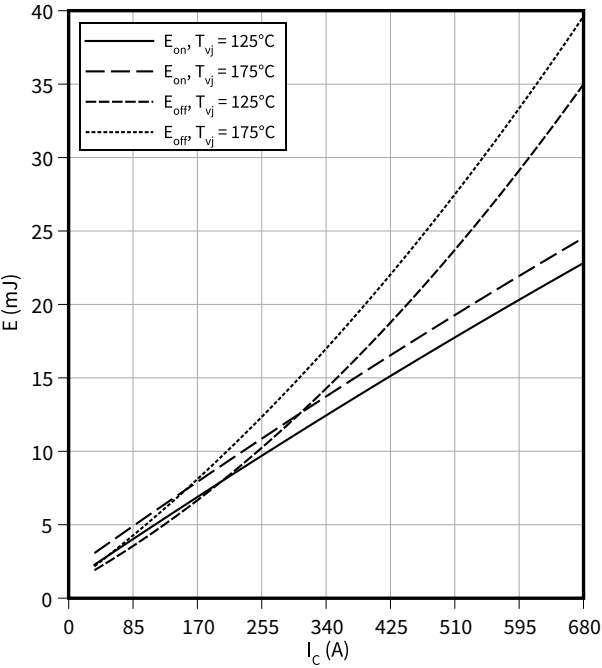
Switching times (typical), IGBT, T2 / T3

$t = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}$, $I_C = 340 \text{ A}$, $V_{CC} = 500 \text{ V}$, $T_{vj} = 175^\circ\text{C}$



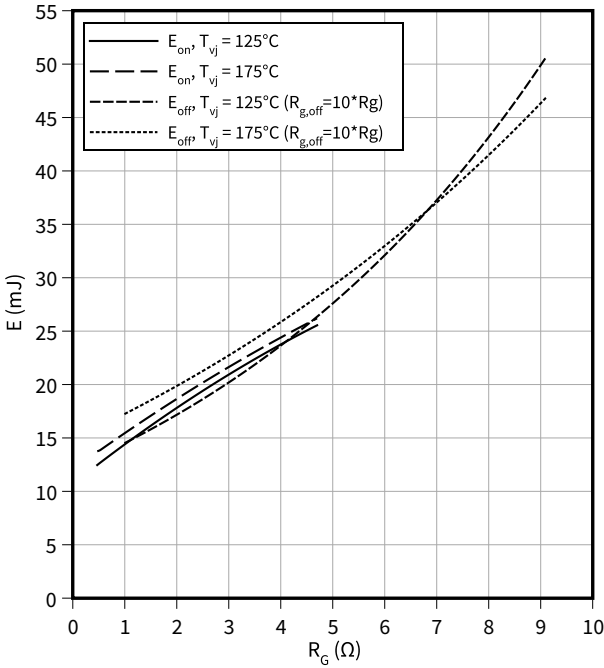
Switching losses (typical), IGBT, T2 / T3

$E = f(I_C)$
 $R_{Goff} = 9.1 \Omega$, $R_{Gon} = 0.47 \Omega$, $V_{CC} = 500 \text{ V}$, $\pm 15 \text{ V}$



Switching losses (typical), IGBT, T2 / T3

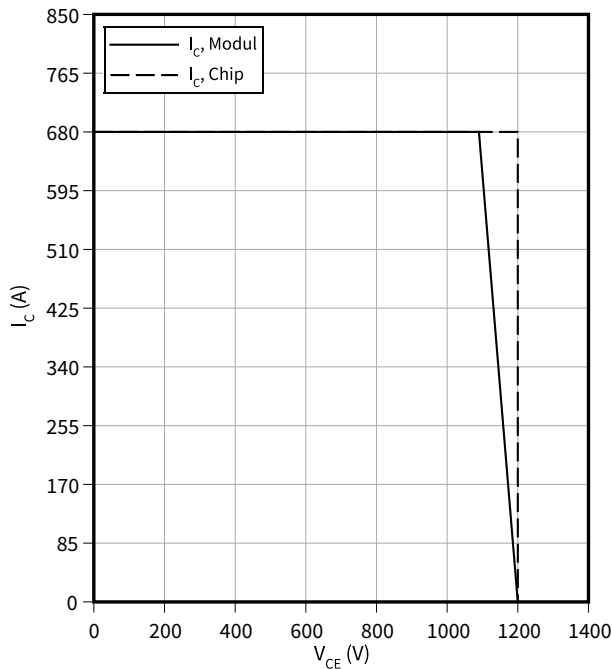
$E = f(R_G)$
 $I_C = 340 \text{ A}$, $V_{CC} = 500 \text{ V}$, $\pm 15 \text{ V}$



8 Characteristics diagrams

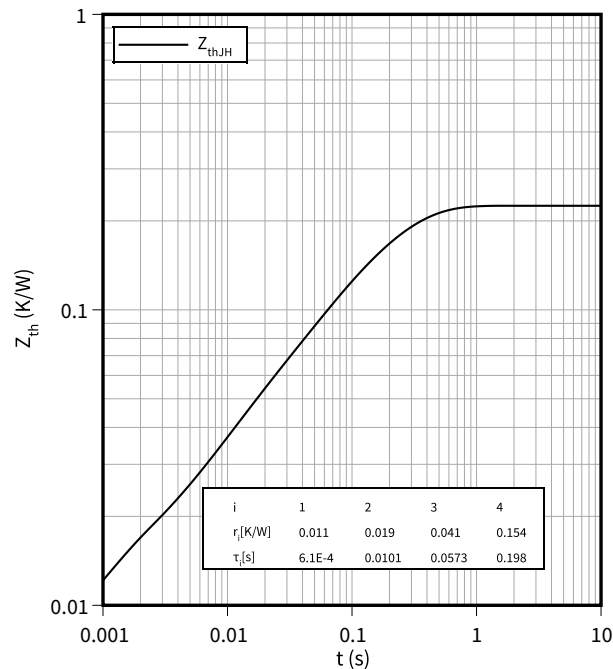
Reverse bias safe operating area (RBSOA), IGBT, T2 / T3

$I_C = f(V_{CE})$
 $R_{Goff} = 9.1 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 175 \text{ }^\circ\text{C}$



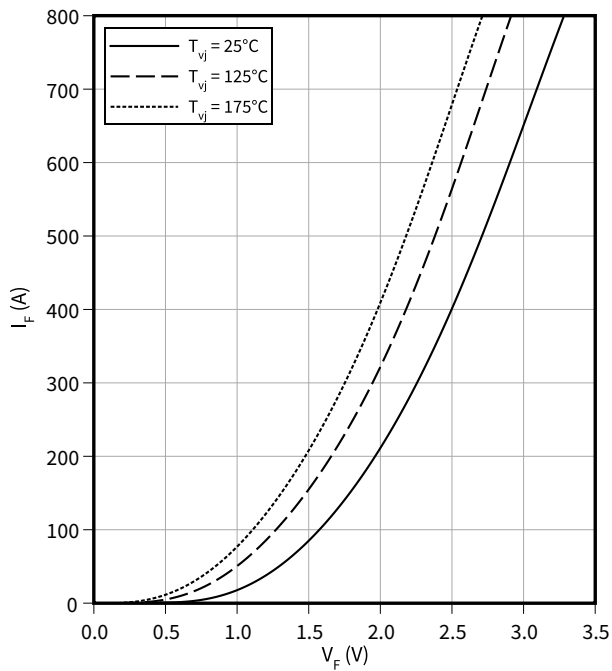
Transient thermal impedance, IGBT, T2 / T3

$Z_{th} = f(t)$



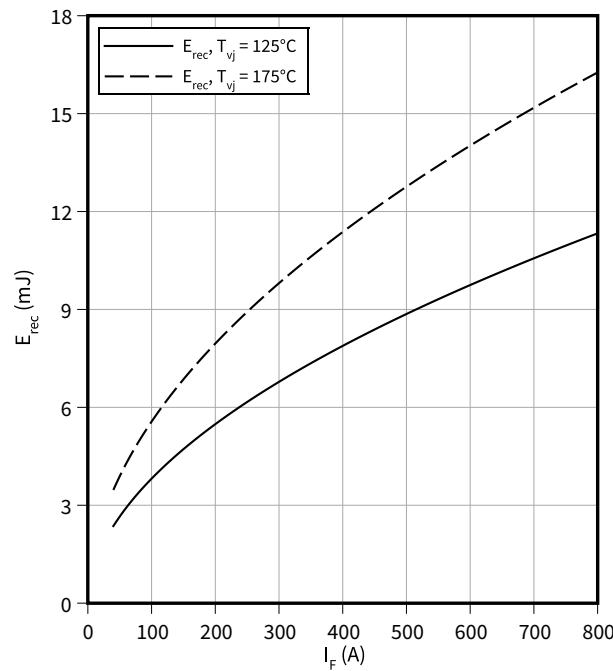
Forward characteristic (typical), Diode, D1 / D4

$I_F = f(V_F)$



Switching losses (typical), Diode, D1 / D4

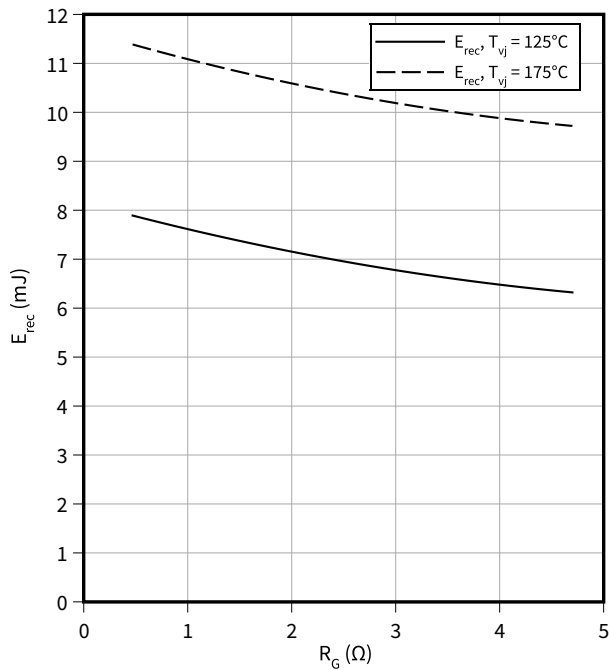
$E_{rec} = f(I_F)$
 $R_{Gon} = 0.47 \Omega$, $V_{CC} = 500 \text{ V}$



8 Characteristics diagrams

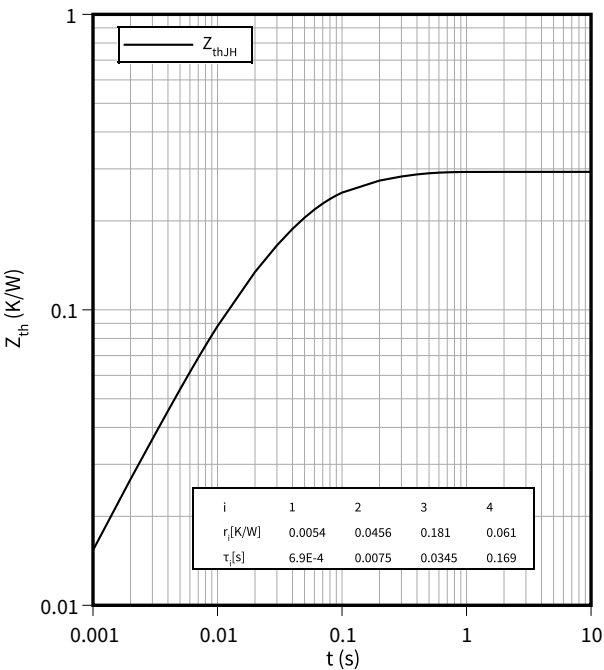
Switching losses (typical), Diode, D1 / D4

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



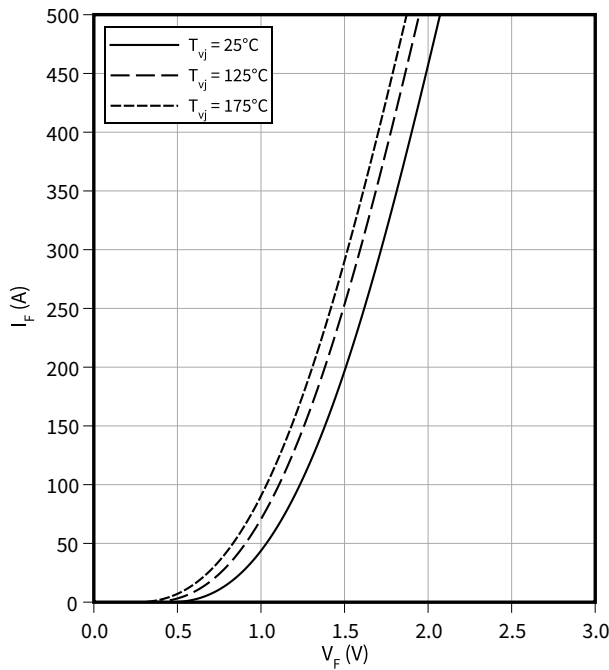
Transient thermal impedance, Diode, D1 / D4

$Z_{th} = f(t)$



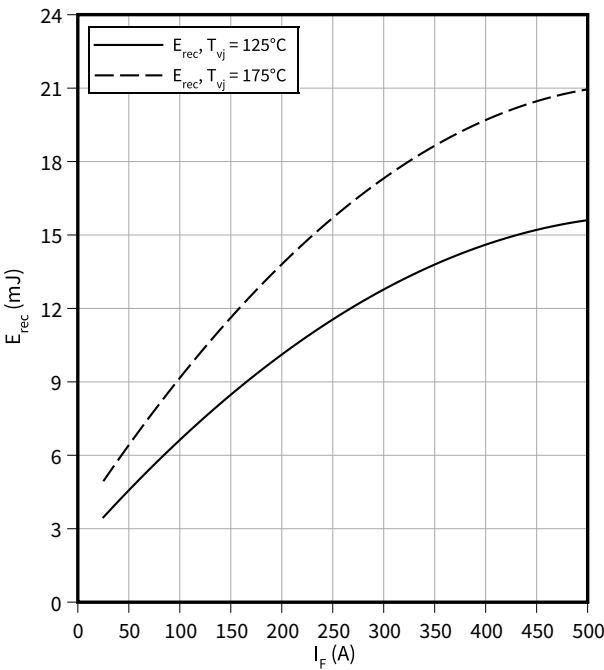
Forward characteristic (typical), Diode, D2 / D3

$I_F = f(V_F)$



Switching losses (typical), Diode, D2 / D3

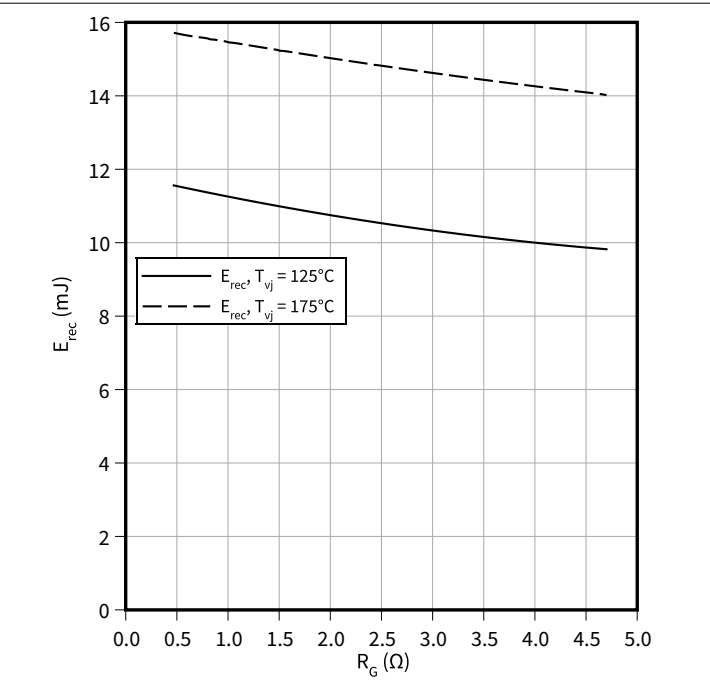
$E_{rec} = f(I_F)$
 $R_{Gon} = 0.47\ \Omega$, $V_{CC} = 500\text{ V}$



8 Characteristics diagrams

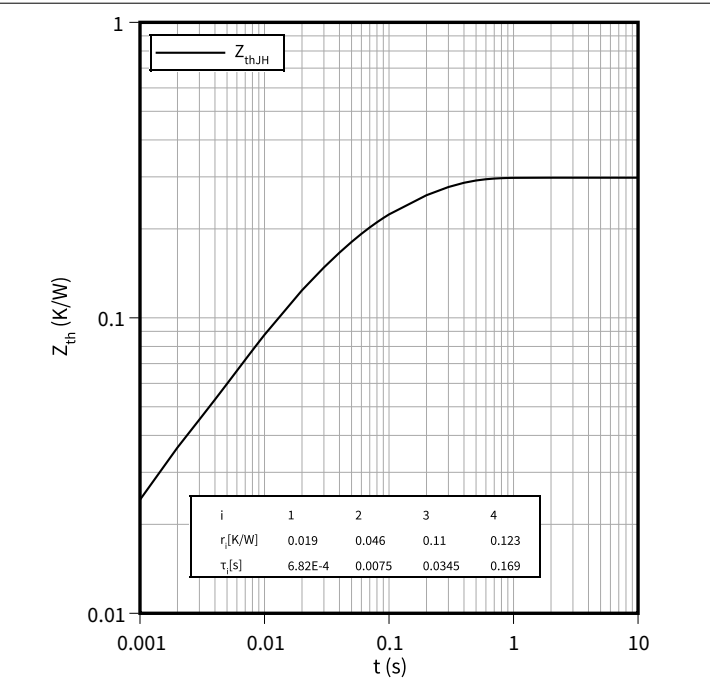
Switching losses (typical), Diode, D2 / D3

$E_{rec} = f(R_G)$
 $I_F = 250\text{ A}, V_{CC} = 500\text{ V}$



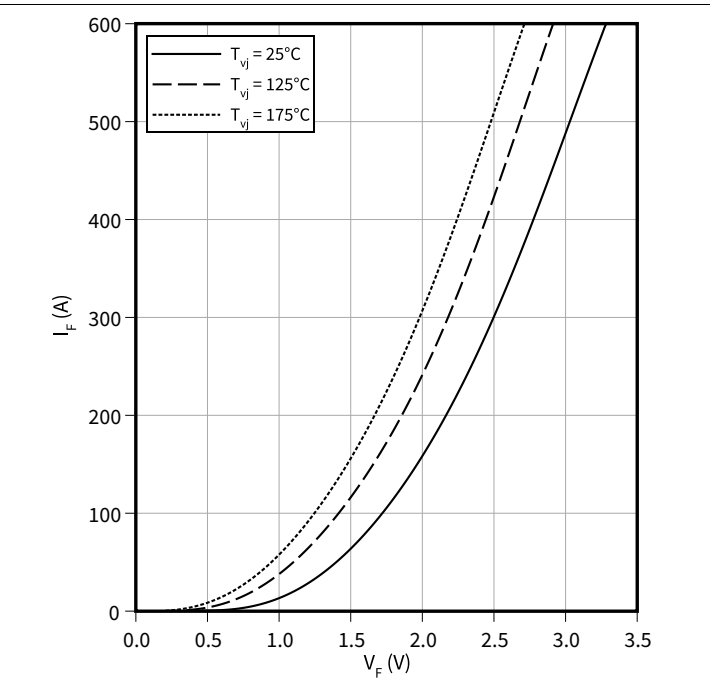
Transient thermal impedance, Diode, D2 / D3

$Z_{th} = f(t)$



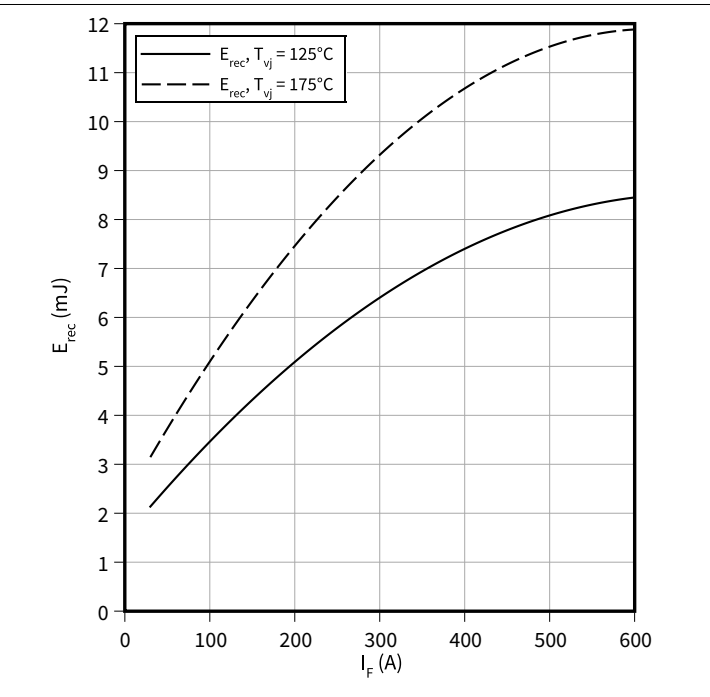
Forward characteristic (typical), Diode, D5 / D6

$I_F = f(V_F)$



Switching losses (typical), Diode, D5 / D6

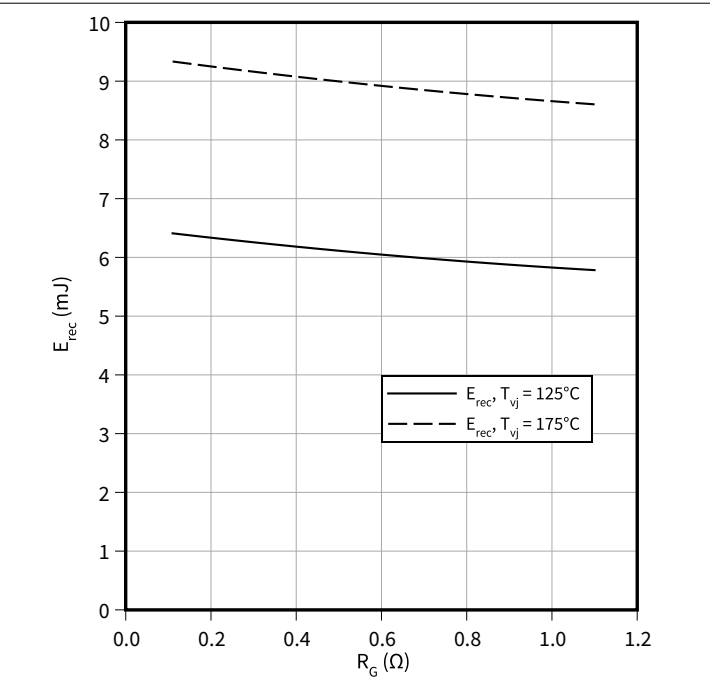
$E_{rec} = f(I_F)$
 $R_{Gon} = 0.11\ \Omega, V_{CC} = 500\text{ V}$



8 Characteristics diagrams

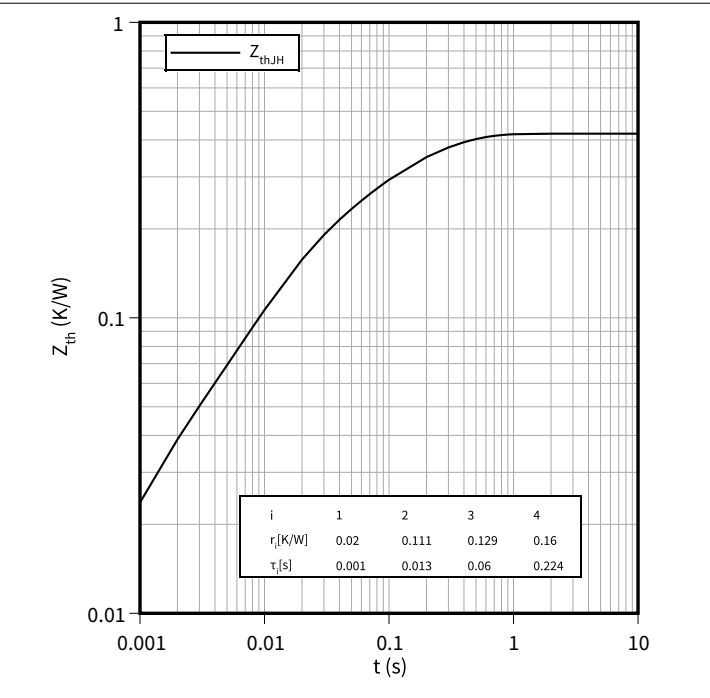
Switching losses (typical), Diode, D5 / D6

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



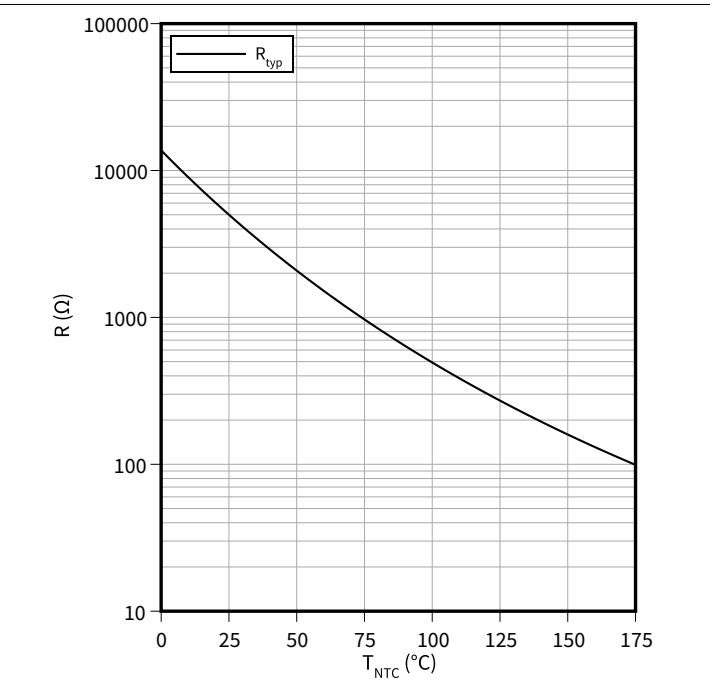
Transient thermal impedance, Diode, D5 / D6

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



9 Circuit diagram

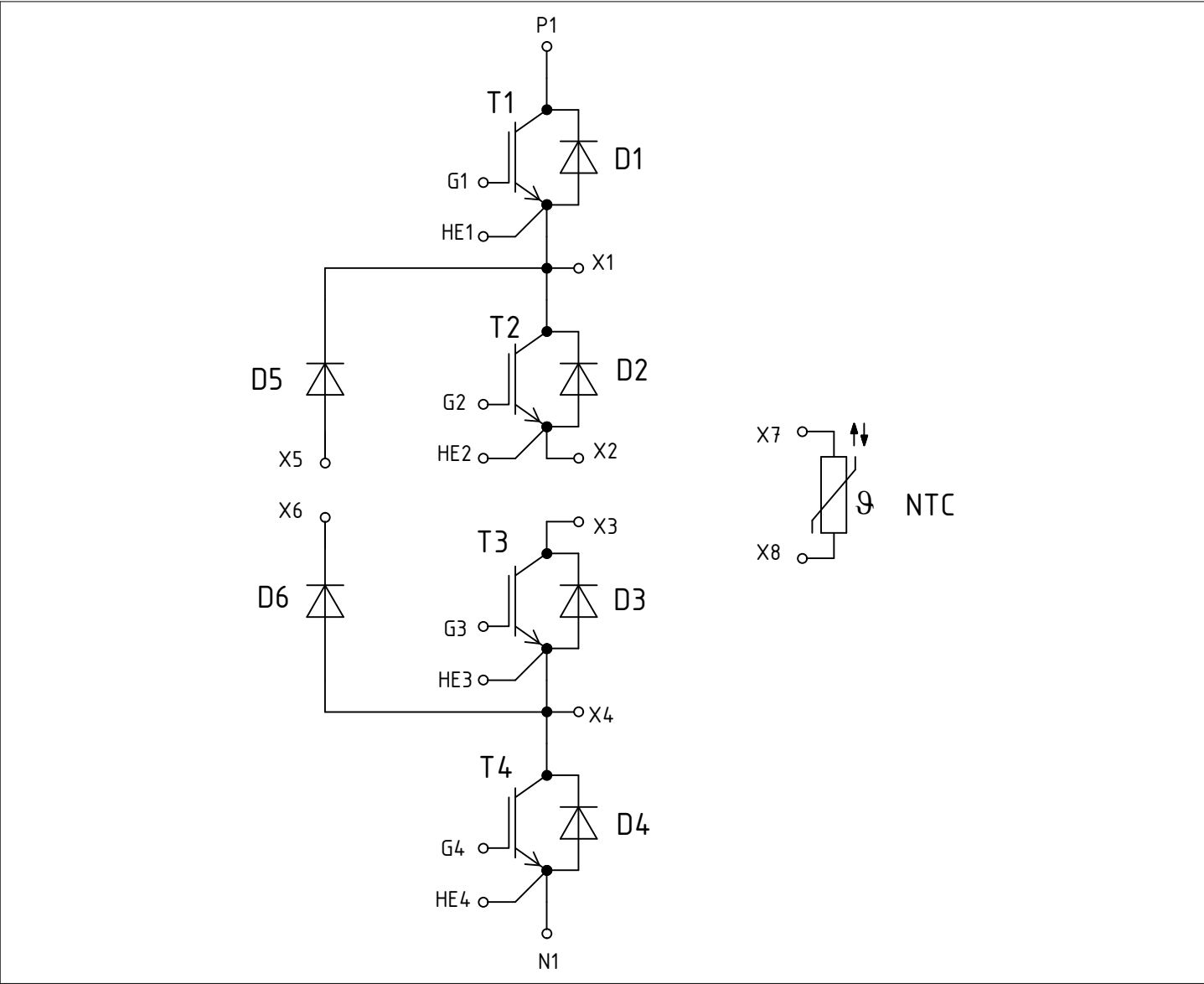


Figure 1

10 Package outlines

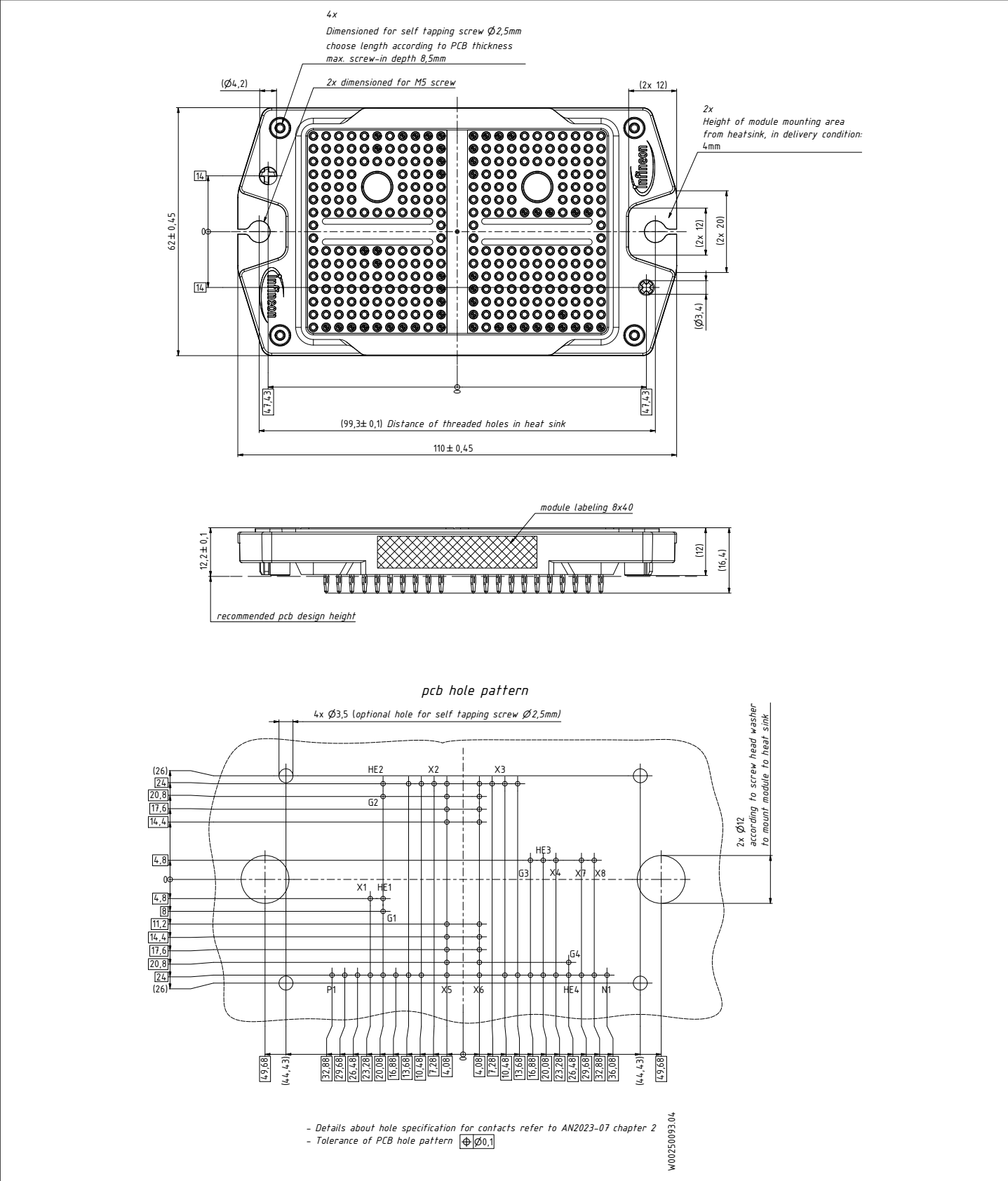


Figure 2

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

Revision history

Document version	Date of release	Description of changes
0.10	2024-08-09	Initial version
1.00	2024-12-04	Final datasheet
1.10	2025-02-18	Compare to 1.00, the following has been changed: 1, D5/D6 Rth change to 0.42 as does the diagram 2. Rth λgrease change to 5 as we are using new thermal grease 3. T1-T4 H7 Cres change to 0.247 so does the diagram due to the error in the original data Others stays the same as 1.00

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Edition 2025-02-18

Published by

Infineon Technologies AG
81726 Munich, Germany

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Document reference
IFX-ABK797-003

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