

Final datasheet

EasyPACK™ module with TRENCHSTOP™ 5 and RAPID 1 diode and PressFIT / pre-applied thermal interface material / NTC

Features

- Electrical features
 - $V_{CES} = 650\text{ V}$
 - $I_{C\text{ nom}} = 150\text{ A} / I_{CRM} = 300\text{ A}$
 - Low switching losses
 - Increased blocking voltage capability up to 650 V
 - Suitable Infineon gate drivers can be found under <https://www.infineon.com/gdfinder>
- Mechanical features
 - Al_2O_3 substrate with low thermal resistance
 - Compact design
 - PressFIT contact technology
 - Rugged mounting due to integrated mounting clamps
 - Pre-applied thermal interface material



Typical appearance

Potential applications

- UPS systems
- Three-level applications

Product validation

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

Description

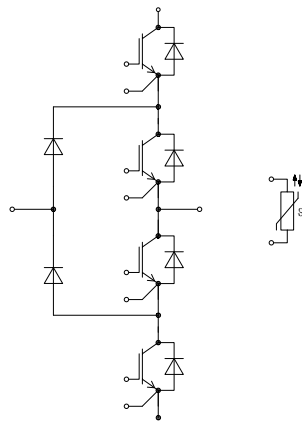


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1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f = 50 \text{ Hz}$, $t = 1 \text{ min}$	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		> 200	
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}			19		nH
Module lead resistance, terminals - chip	$R_{AA'+CC'}$	$T_H = 25 \text{ °C}$, per switch		0.9		mΩ
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25 \text{ °C}$, per switch		1.1		mΩ
Storage temperature	T_{stg}		-40		125	°C
Maximum baseplate operation temperature	T_{BPmax}				125	°C
Mounting force per clamp	F		40		80	N
Weight	G			39		g

Note: The current under continuous operation is limited to 25A rms per connector pin.
Storage and shipment of modules with TIM => see AN 2012-07

2 IGBT, T1 / T4

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		$T_{vj} = 25 \text{ °C}$	650	V
Implemented collector current	I_{CN}			200	A
Continuous DC collector current	I_{CDC}	$T_{vj \text{ max}} = 175 \text{ °C}$	$T_H = 65 \text{ °C}$	105	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj \text{ op}}$		400	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	$V_{CE\ sat}$	$I_C = 150\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$		1.30	1.67	V
			$T_{vj} = 125\ ^\circ C$		1.38		
			$T_{vj} = 150\ ^\circ C$		1.40		
Gate threshold voltage	V_{GETh}	$I_C = 2\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$		3.25	4	4.75	V
Gate charge	Q_G	$V_{GE} = \pm 15\ V, V_{CC} = 400\ V$			0.84		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$			0		Ω
Input capacitance	C_{ies}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			14.3		nF
Reverse transfer capacitance	C_{res}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			0.05		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$			45	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}	$I_C = 150\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 15\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.070		μs
			$T_{vj} = 125\ ^\circ C$		0.066		
			$T_{vj} = 150\ ^\circ C$		0.064		
Rise time (inductive load)	t_r	$I_C = 150\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 15\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.043		μs
			$T_{vj} = 125\ ^\circ C$		0.046		
			$T_{vj} = 150\ ^\circ C$		0.049		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 150\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 39\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.630		μs
			$T_{vj} = 125\ ^\circ C$		0.650		
			$T_{vj} = 150\ ^\circ C$		0.660		
Fall time (inductive load)	t_f	$I_C = 150\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 39\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.028		μs
			$T_{vj} = 125\ ^\circ C$		0.031		
			$T_{vj} = 150\ ^\circ C$		0.035		
Turn-on energy loss per pulse	E_{on}	$I_C = 150\ A, V_{CC} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 15\ \Omega, di/dt = 2900\ A/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		3.22		mJ
			$T_{vj} = 125\ ^\circ C$		3.86		
			$T_{vj} = 150\ ^\circ C$		3.98		
Turn-off energy loss per pulse	E_{off}	$I_C = 150\ A, V_{CC} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 39\ \Omega, dv/dt = 4020\ V/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		2.6		mJ
			$T_{vj} = 125\ ^\circ C$		2.89		
			$T_{vj} = 150\ ^\circ C$		3.03		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, Valid with IFX pre-applied Thermal Interface Material, $\lambda_{grease} = 1\ W/(m \cdot K)$				0.655	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		150	°C

3 IGBT, T2 / T3

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		$T_{vj} = 25\ ^\circ\text{C}$	650	V
Implemented collector current	I_{CN}			200	A
Continuous DC collector current	I_{CDC}	$T_{vj\ max} = 175\ ^\circ\text{C}$	$T_H = 65\ ^\circ\text{C}$	105	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\ op}$		400	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	$V_{CE\ sat}$	$I_C = 150\ \text{A}, V_{GE} = 15\ \text{V}$	$T_{vj} = 25\ ^\circ\text{C}$		1.30	1.67	V
			$T_{vj} = 125\ ^\circ\text{C}$		1.38		
			$T_{vj} = 150\ ^\circ\text{C}$		1.40		
Gate threshold voltage	V_{GEth}	$I_C = 2\ \text{mA}, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ\text{C}$		3.25	4	4.75	V
Gate charge	Q_G	$V_{GE} = \pm 15\ \text{V}, V_{CC} = 400\ \text{V}$			0.84		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ\text{C}$			0		Ω
Input capacitance	C_{ies}	$f = 100\ \text{kHz}, T_{vj} = 25\ ^\circ\text{C}, V_{CE} = 25\ \text{V}, V_{GE} = 0\ \text{V}$			14.3		nF
Reverse transfer capacitance	C_{res}	$f = 100\ \text{kHz}, T_{vj} = 25\ ^\circ\text{C}, V_{CE} = 25\ \text{V}, V_{GE} = 0\ \text{V}$			0.05		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650\ \text{V}, V_{GE} = 0\ \text{V}$	$T_{vj} = 25\ ^\circ\text{C}$			45	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
Turn-on delay time (inductive load)	t_{don}	$I_C = 150\ \text{A}, V_{CC} = 300\ \text{V}, V_{GE} = \pm 15\ \text{V}, R_{Gon} = 15\ \Omega$	$T_{vj} = 25\ ^\circ\text{C}$		0.068		μs
			$T_{vj} = 125\ ^\circ\text{C}$		0.064		
			$T_{vj} = 150\ ^\circ\text{C}$		0.064		

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rise time (inductive load)	t_r	$I_C = 150 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 15 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.045		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.052		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.052		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 150 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 39 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.640		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.660		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.680		
Fall time (inductive load)	t_f	$I_C = 150 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 39 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.028		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.033		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	0.038		
Turn-on energy loss per pulse	E_{on}	$I_C = 150 \text{ A}$, $V_{CC} = 300 \text{ V}$, $L_\sigma = 35 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 15 \Omega$, $di/dt = 2600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	3.1		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	3.61		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	3.61		
Turn-off energy loss per pulse	E_{off}	$I_C = 150 \text{ A}$, $V_{CC} = 300 \text{ V}$, $L_\sigma = 35 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 39 \Omega$, $dv/dt = 4000 \text{ V}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	2.6		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	2.99		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	3.08		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, Valid with IFX pre-applied Thermal Interface Material, $\lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$			0.655	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}		$T_{vj} = 25 \text{ }^\circ\text{C}$	650	V
Continuous DC forward current	I_F			150	A
Repetitive peak forward current	I_{FRM}	$t_P = 1 \text{ ms}$		300	A
I^2t - value	I^2t	$t_P = 10 \text{ ms}$, $V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ }^\circ\text{C}$	760	A^2s
			$T_{vj} = 150 \text{ }^\circ\text{C}$	680	

Table 8 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 150 \text{ A}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.50	2.05	V
			$T_{vj} = 125 \text{ °C}$	1.48		
			$T_{vj} = 150 \text{ °C}$	1.47		
Peak reverse recovery current	I_{RM}	$V_{CC} = 300 \text{ V}$, $I_F = 150 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	63		A
			$T_{vj} = 125 \text{ °C}$	92		
			$T_{vj} = 150 \text{ °C}$	97		
Recovered charge	Q_r	$V_{CC} = 300 \text{ V}$, $I_F = 150 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	4.44		μC
			$T_{vj} = 125 \text{ °C}$	8.69		
			$T_{vj} = 150 \text{ °C}$	9.95		
Reverse recovery energy	E_{rec}	$V_{CC} = 300 \text{ V}$, $I_F = 150 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	0.55		mJ
			$T_{vj} = 125 \text{ °C}$	1.27		
			$T_{vj} = 150 \text{ °C}$	1.5		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, Valid with IFX pre-applied Thermal Interface Material, $\lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$			1.00	K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

5 Diode, D2 / D3

Table 9 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		$T_{vj} = 25 \text{ °C}$	650	V
Continuous DC forward current	I_F			150	A
Repetitive peak forward current	I_{FRM}	$t_p = 1 \text{ ms}$		300	A
I^2t - value	I^2t	$t_p = 10 \text{ ms}$, $V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ °C}$	760	A^2s
			$T_{vj} = 150 \text{ °C}$	680	

Table 10 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 150 \text{ A}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.50	2.05	V
			$T_{vj} = 125 \text{ °C}$	1.48		
			$T_{vj} = 150 \text{ °C}$	1.47		
Peak reverse recovery current	I_{RM}	$V_{CC} = 300 \text{ V}$, $I_F = 150 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	63		A
			$T_{vj} = 125 \text{ °C}$	92		
			$T_{vj} = 150 \text{ °C}$	97		
Recovered charge	Q_r	$V_{CC} = 300 \text{ V}$, $I_F = 150 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	4.44		μC
			$T_{vj} = 125 \text{ °C}$	8.69		
			$T_{vj} = 150 \text{ °C}$	9.95		
Reverse recovery energy	E_{rec}	$V_{CC} = 300 \text{ V}$, $I_F = 150 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	0.55		mJ
			$T_{vj} = 125 \text{ °C}$	1.27		
			$T_{vj} = 150 \text{ °C}$	1.5		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, Valid with IFX pre-applied Thermal Interface Material, $\lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$			1.00	K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

6 Diode, D5 / D6

Table 11 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		$T_{vj} = 25 \text{ °C}$	650	V
Continuous DC forward current	I_F			150	A
Repetitive peak forward current	I_{FRM}	$t_p = 1 \text{ ms}$		300	A
I^2t - value	I^2t	$t_p = 10 \text{ ms}$, $V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ °C}$	760	A^2s
			$T_{vj} = 150 \text{ °C}$	680	

Table 12 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 150 \text{ A}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.50	2.05	V
			$T_{vj} = 125 \text{ °C}$	1.48		
			$T_{vj} = 150 \text{ °C}$	1.47		
Peak reverse recovery current	I_{RM}	$V_{CC} = 300 \text{ V}$, $I_F = 150 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2900 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	67		A
			$T_{vj} = 125 \text{ °C}$	98		
			$T_{vj} = 150 \text{ °C}$	105		
Recovered charge	Q_r	$V_{CC} = 300 \text{ V}$, $I_F = 150 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2900 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	35		μC
			$T_{vj} = 125 \text{ °C}$	75		
			$T_{vj} = 150 \text{ °C}$	87		
Reverse recovery energy	E_{rec}	$V_{CC} = 300 \text{ V}$, $I_F = 150 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2900 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	0.54		mJ
			$T_{vj} = 125 \text{ °C}$	1.26		
			$T_{vj} = 150 \text{ °C}$	1.55		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, Valid with IFX pre-applied Thermal Interface Material, $\lambda_{grease} = 1 \text{ W}/(\text{m} \cdot \text{K})$			1.00	K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

7 NTC-Thermistor

Table 13 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	R_{25}	$T_{NTC} = 25 \text{ °C}$		5		kΩ
Deviation of R_{100}	$\Delta R/R$	$T_{NTC} = 100 \text{ °C}$, $R_{100} = 493 \text{ Ω}$	-5		5	%
Power dissipation	P_{25}	$T_{NTC} = 25 \text{ °C}$			20	mW
B-value	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$		3375		K
B-value	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298,15 \text{ K}))]$		3411		K
B-value	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2 - 1/(298,15 \text{ K}))]$		3433		K

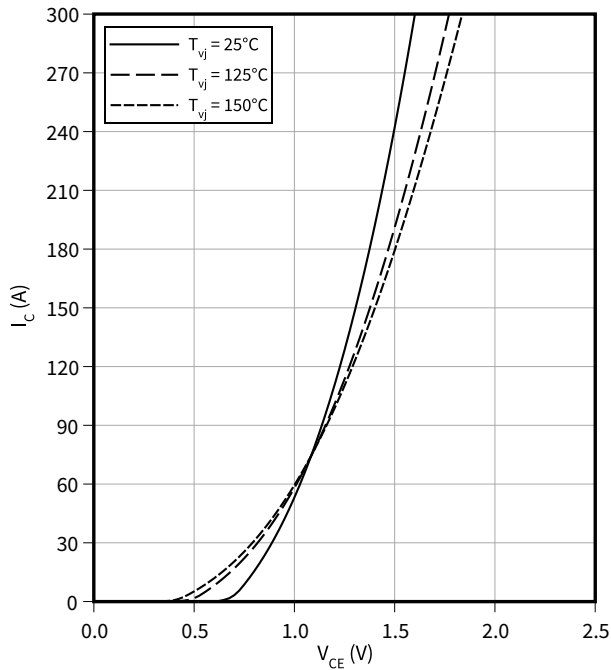
Note: For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4.

8 Characteristics diagrams

Output characteristic (typical), IGBT, T1 / T4

$I_C = f(V_{CE})$

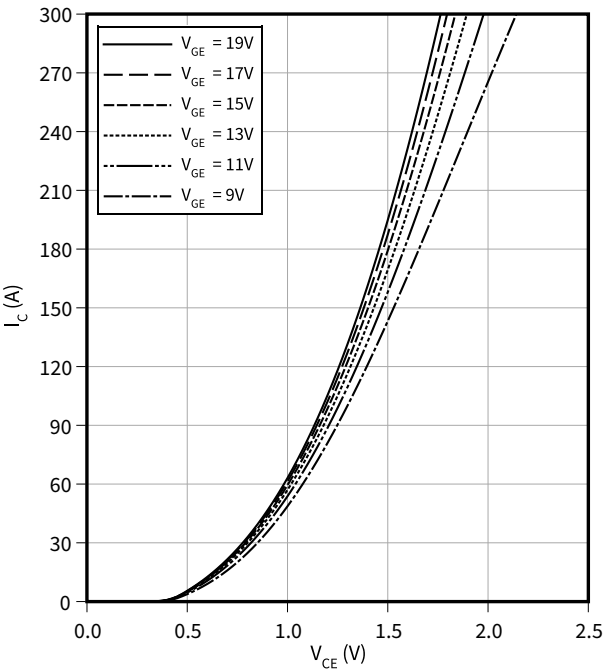
$V_{GE} = 15\text{ V}$



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

$I_C = f(V_{CE})$

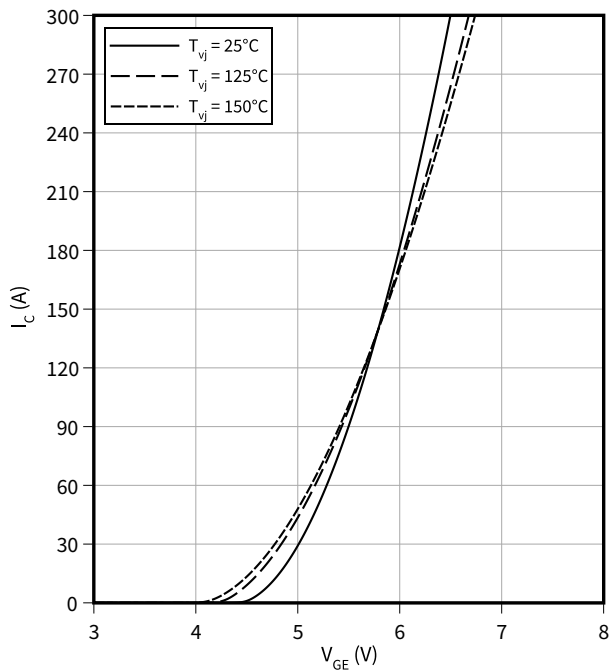
$T_{vj} = 150\text{ }^\circ\text{C}$



Transfer characteristic (typical), IGBT, T1 / T4

$I_C = f(V_{GE})$

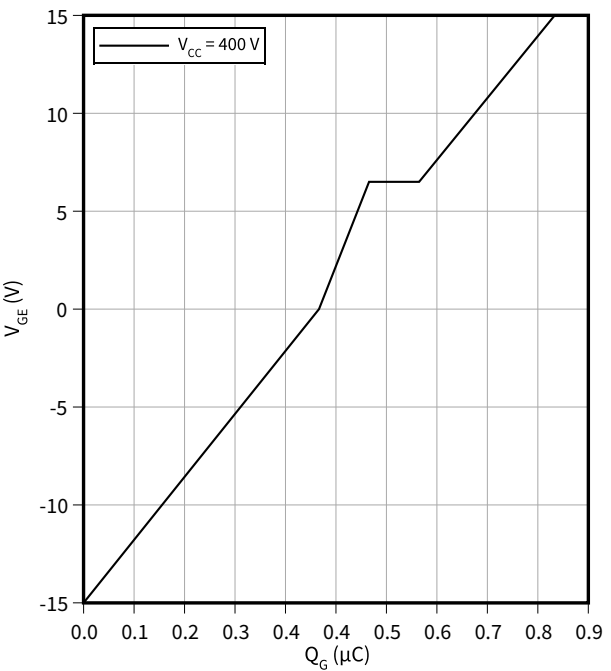
$V_{CE} = 20\text{ V}$



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

$V_{GE} = f(Q_G)$

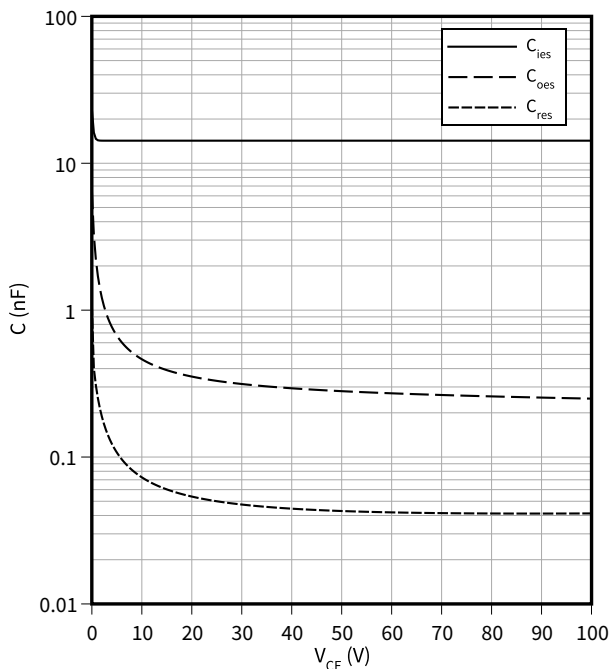
$I_C = 150\text{ A}, T_{vj} = 25\text{ }^\circ\text{C}$



8 Characteristics diagrams

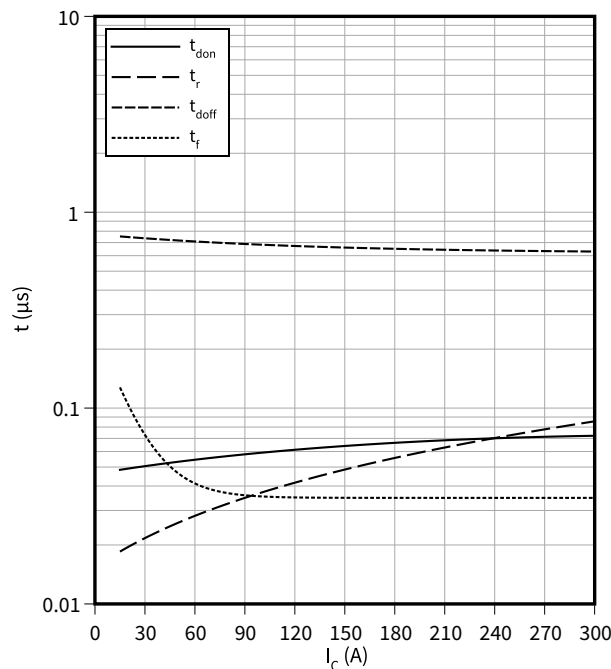
Capacity characteristic (typical), IGBT, T1 / T4

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



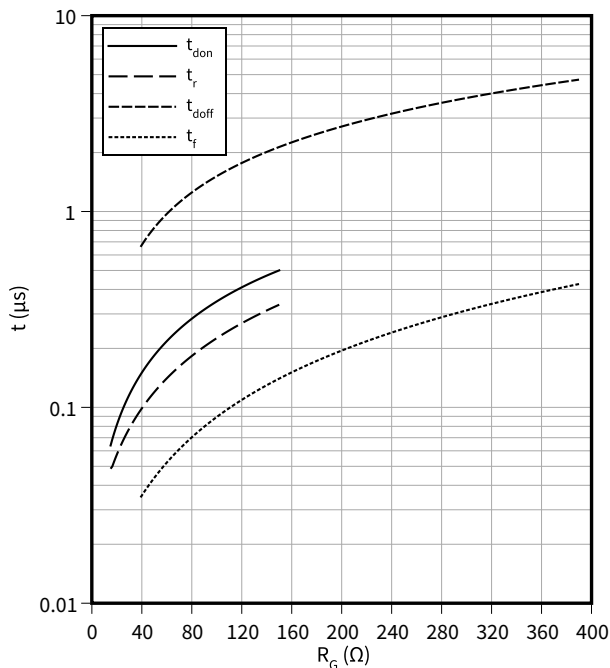
Switching times (typical), IGBT, T1 / T4

$t = f(I_C)$
 $R_{Goff} = 39 \text{ } \Omega$, $R_{Gon} = 15 \text{ } \Omega$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 150 \text{ }^{\circ}\text{C}$



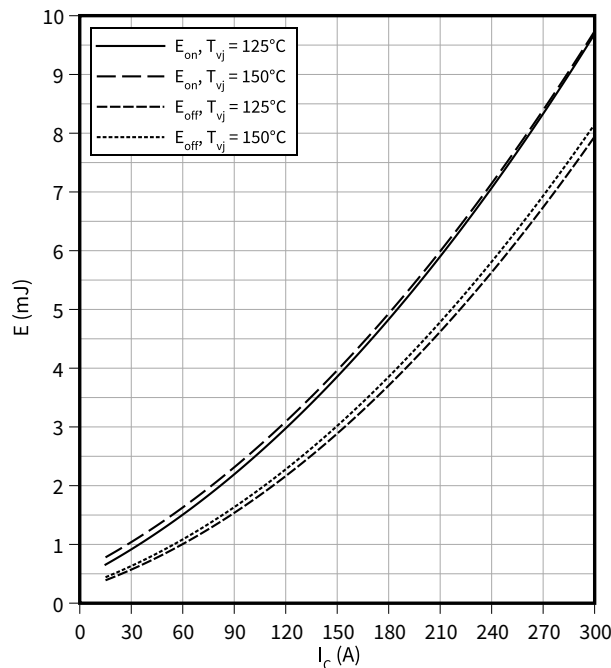
Switching times (typical), IGBT, T1 / T4

$t = f(R_G)$
 $I_C = 150 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 150 \text{ }^{\circ}\text{C}$



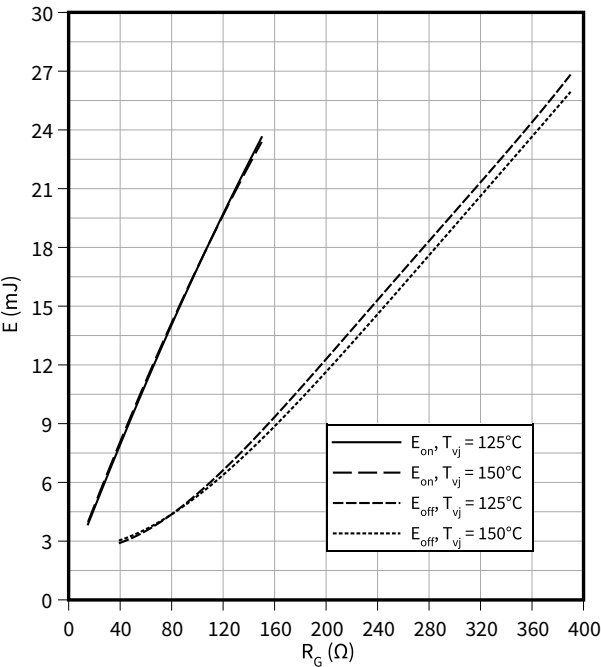
Switching losses (typical), IGBT, T1 / T4

$E = f(I_C)$
 $R_{Goff} = 39 \text{ } \Omega$, $R_{Gon} = 15 \text{ } \Omega$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$



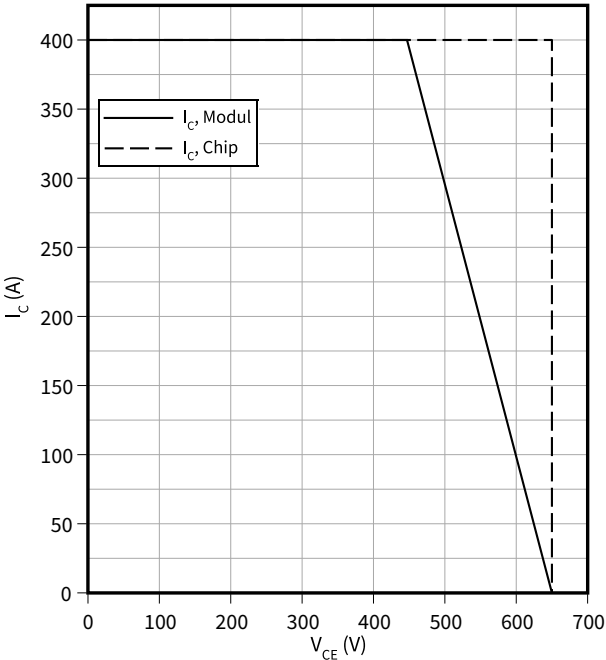
Switching losses (typical), IGBT, T1 / T4

$E = f(R_G)$
 $I_C = 150\text{ A}$, $V_{CC} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$



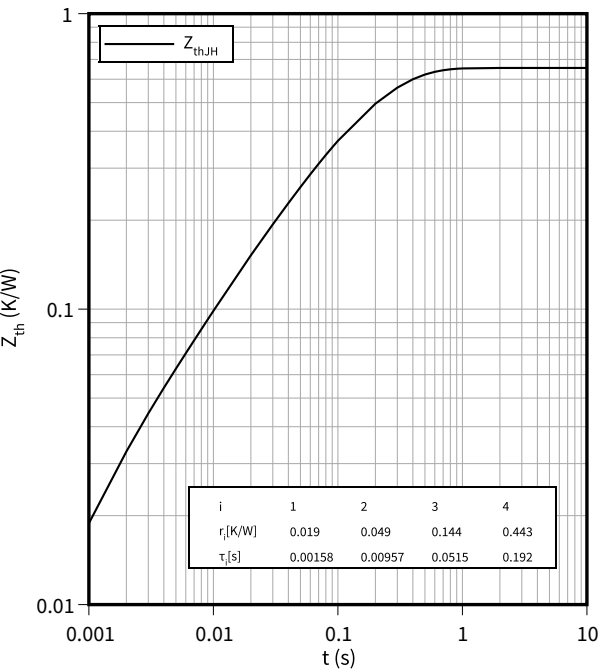
Reverse bias safe operating area (RBSOA), IGBT, T1 / T4

$I_C = f(V_{CE})$
 $R_{Goff} = 39\text{ }\Omega$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 150\text{ }^\circ\text{C}$



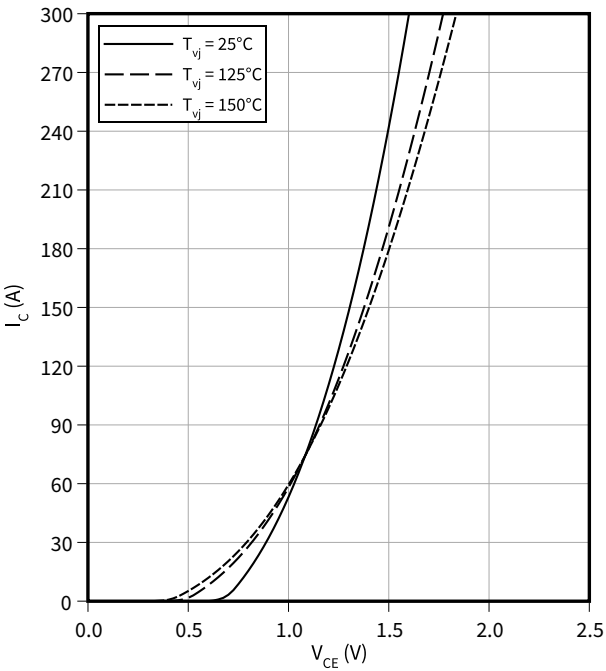
Transient thermal impedance, IGBT, T1 / T4

$Z_{th} = f(t)$



Output characteristic (typical), IGBT, T2 / T3

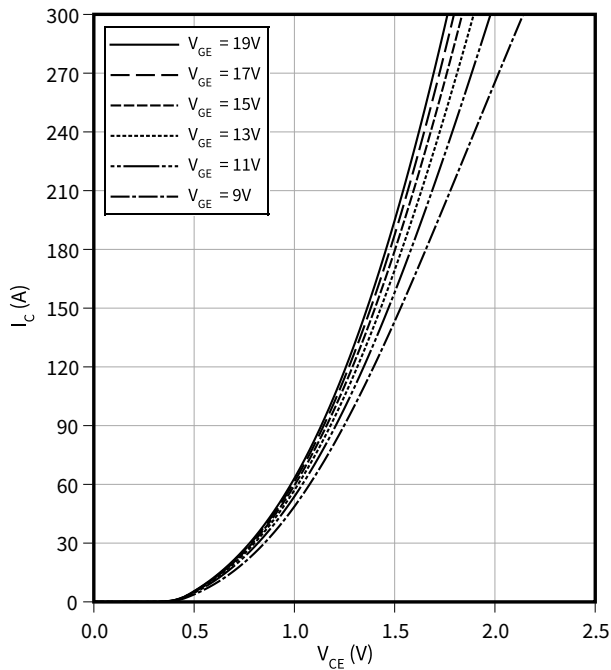
$I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}$



8 Characteristics diagrams

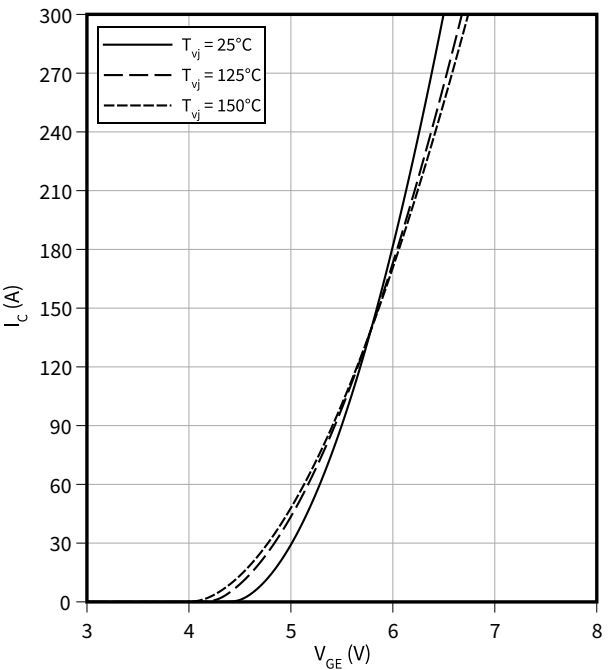
Output characteristic field (typical), IGBT, T2 / T3

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



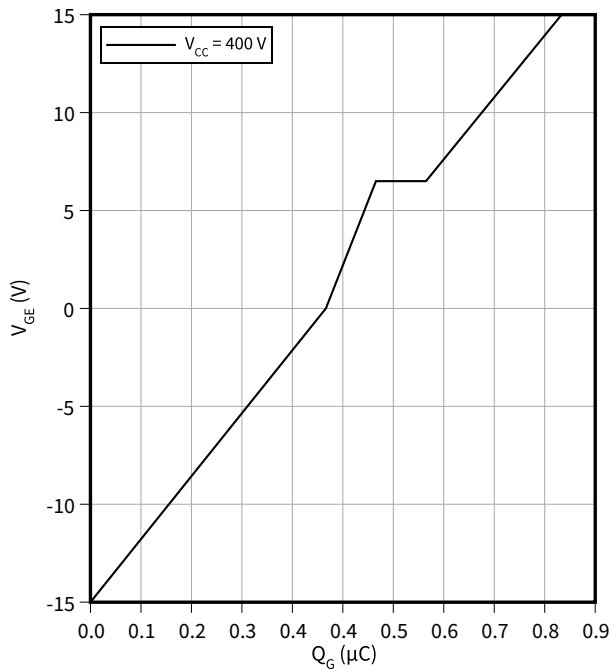
Transfer characteristic (typical), IGBT, T2 / T3

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



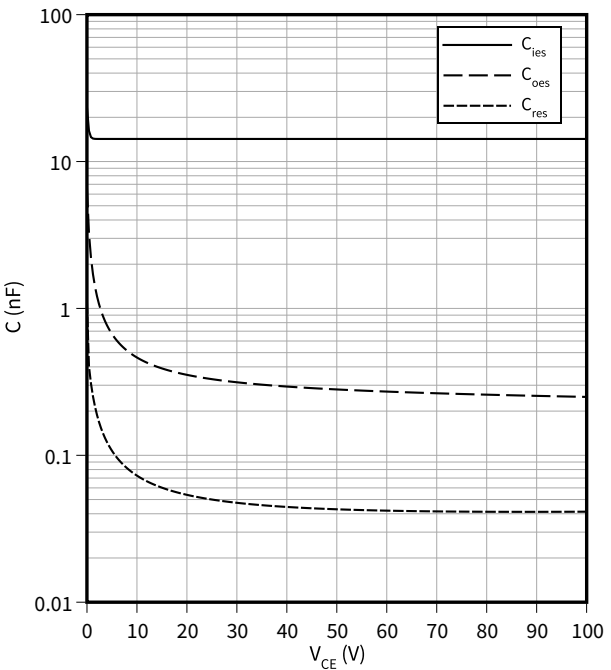
Gate charge characteristic (typical), IGBT, T2 / T3

$V_{GE} = f(Q_G)$
 $I_C = 150\text{ A}$, $T_{vj} = 25\text{ °C}$



Capacity characteristic (typical), IGBT, T2 / T3

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

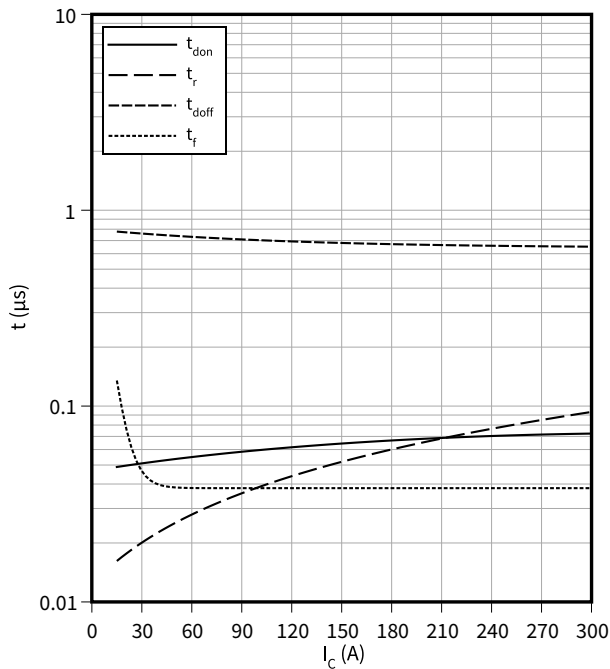


8 Characteristics diagrams

Switching times (typical), IGBT, T2 / T3

$t = f(I_C)$

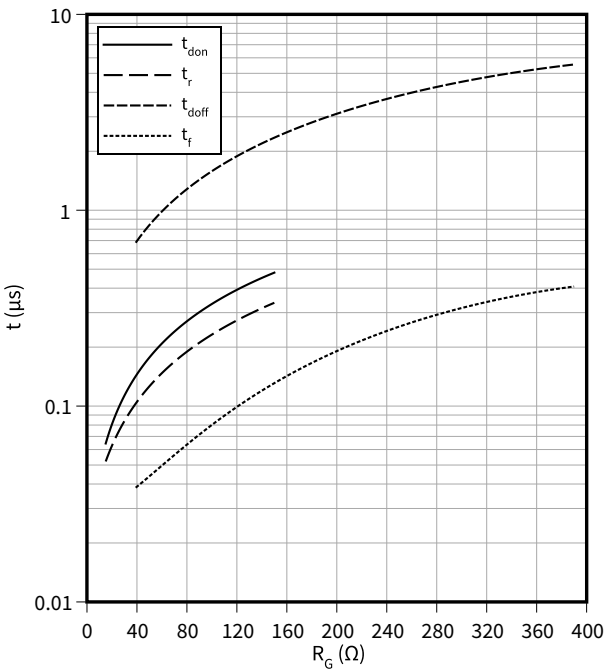
$R_{Goff} = 39 \Omega$, $R_{Gon} = 15 \Omega$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



Switching times (typical), IGBT, T2 / T3

$t = f(R_G)$

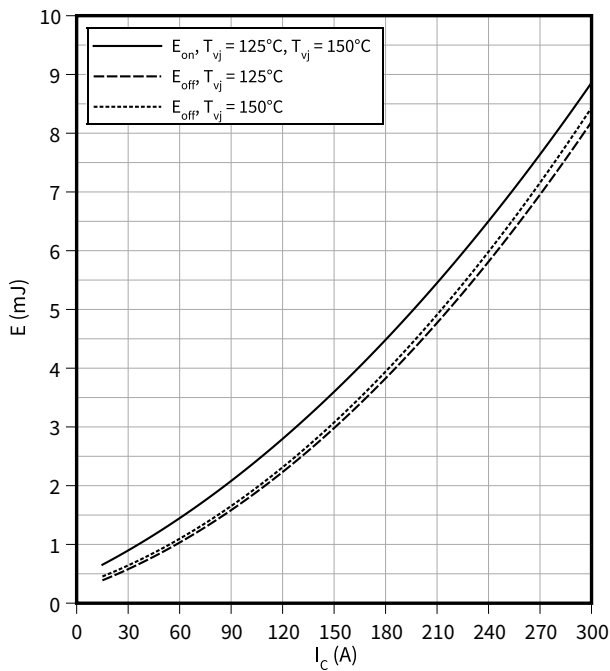
$I_C = 150 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



Switching losses (typical), IGBT, T2 / T3

$E = f(I_C)$

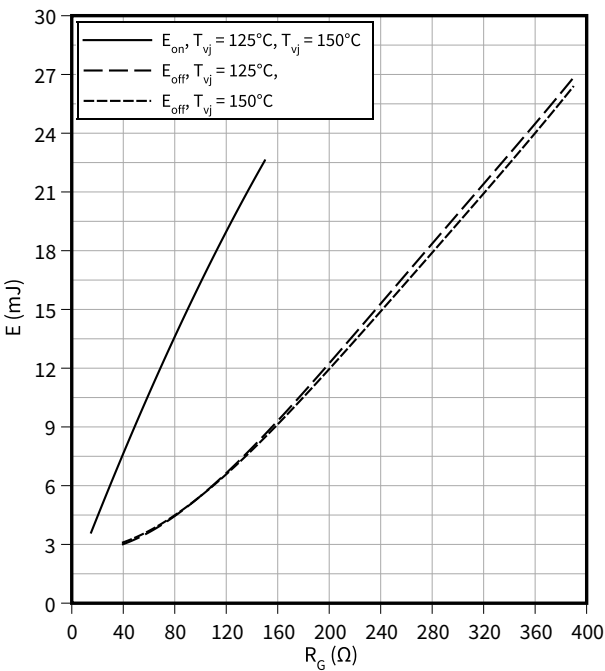
$R_{Goff} = 39 \Omega$, $R_{Gon} = 15 \Omega$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$



Switching losses (typical), IGBT, T2 / T3

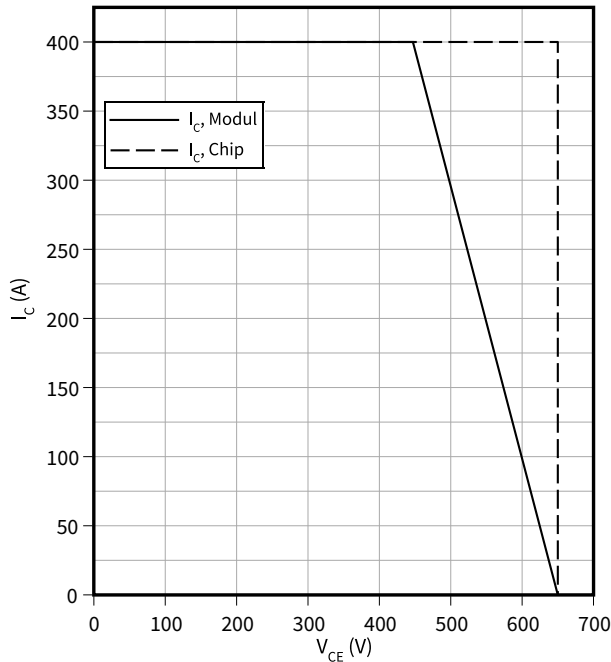
$E = f(R_G)$

$I_C = 150 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$



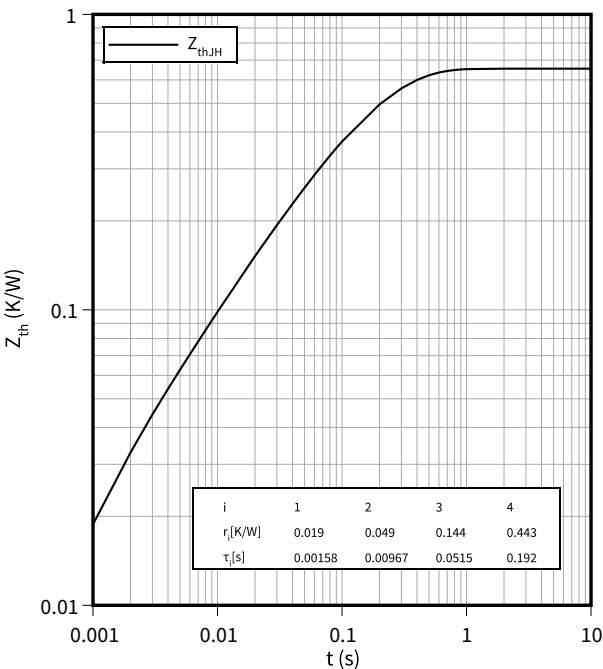
Reverse bias safe operating area (RBSOA), IGBT, T2 / T3

$I_C = f(V_{CE})$
 $R_{Goff} = 39 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 150 \text{ }^\circ\text{C}$



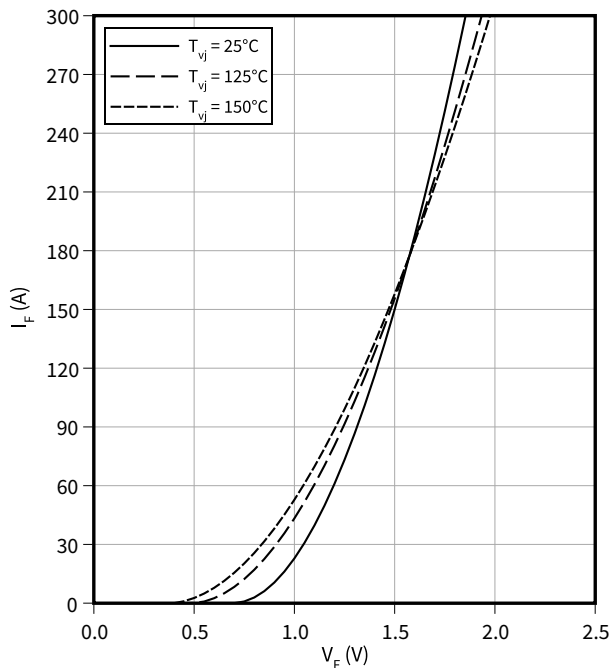
Transient thermal impedance, IGBT, T2 / T3

$Z_{th} = f(t)$



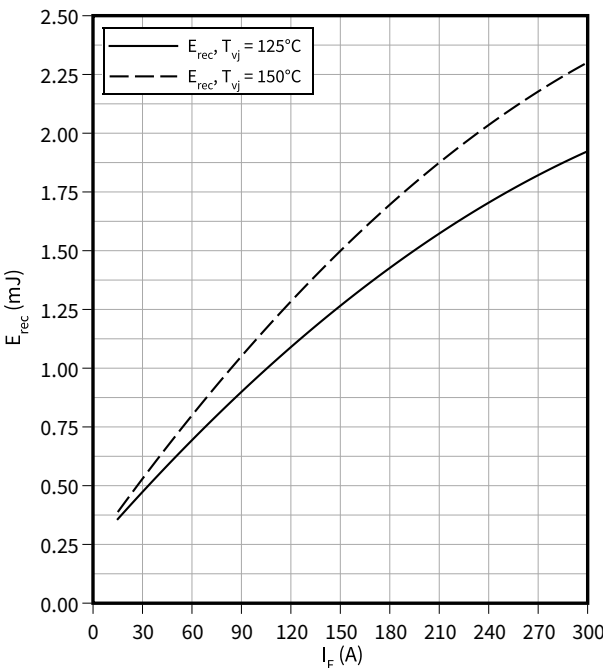
Forward characteristic (typical), Diode, D1 / D4

$I_F = f(V_F)$



Switching losses (typical), Diode, D1 / D4

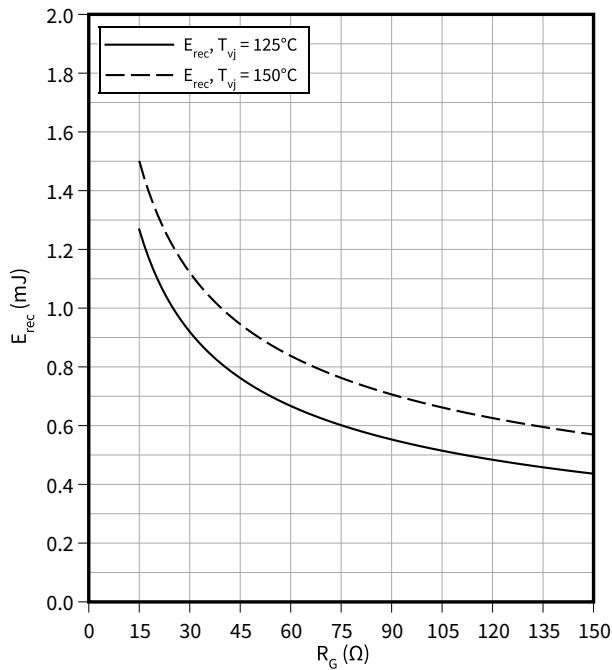
$E_{rec} = f(I_F)$
 $V_{CE} = 300 \text{ V}$, $R_{Gon} = 15$



8 Characteristics diagrams

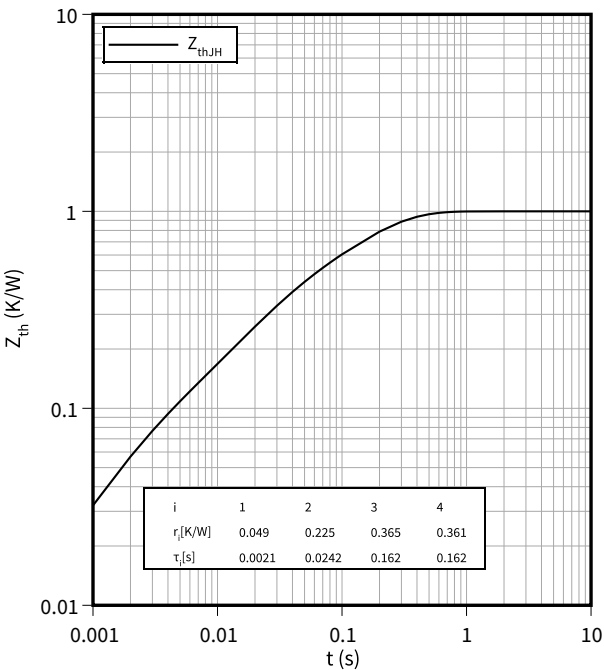
Switching losses (typical), Diode, D1 / D4

$E_{rec} = f(R_G)$
 $V_{CE} = 300\text{ V}, I_F = 150\text{ A}$



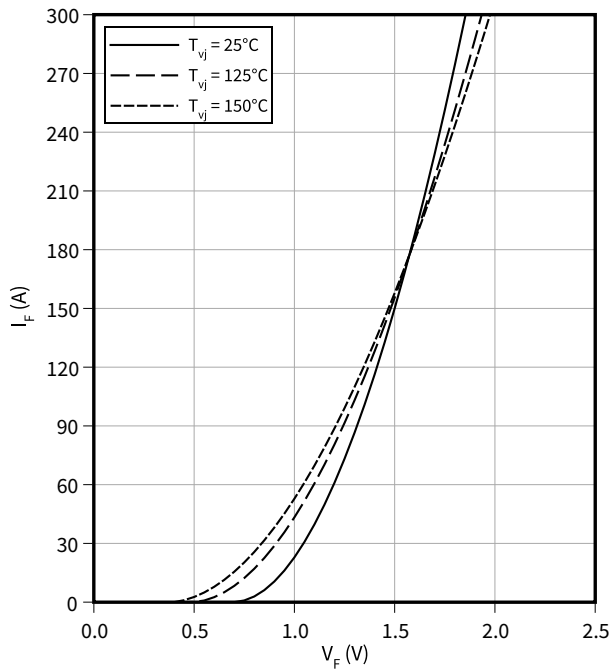
Transient thermal impedance, Diode, D1 / D4

$Z_{th} = f(t)$



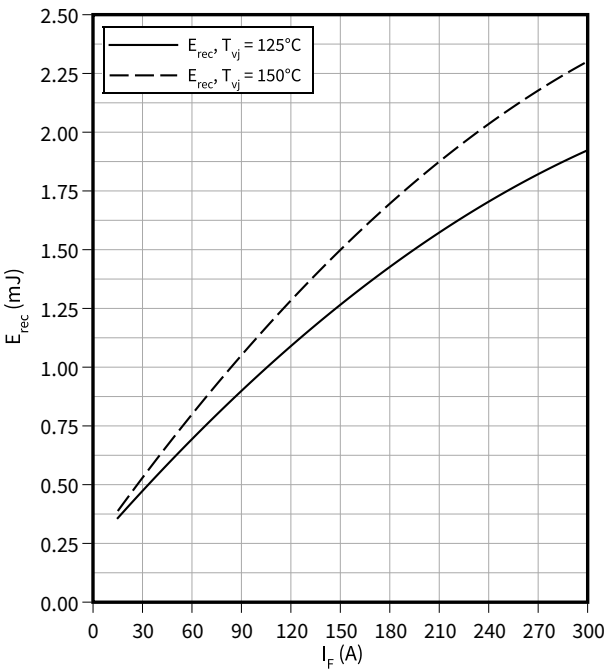
Forward characteristic (typical), Diode, D2 / D3

$I_F = f(V_F)$



Switching losses (typical), Diode, D2 / D3

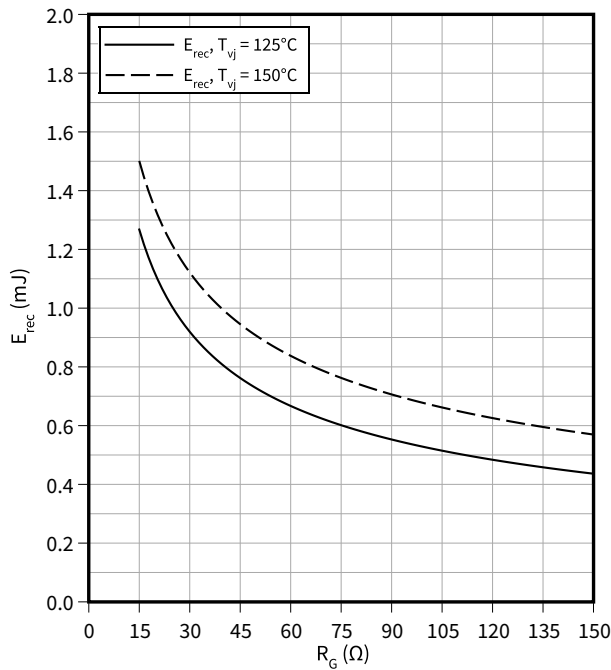
$E_{rec} = f(I_F)$
 $V_{CE} = 300\text{ V}, R_{Gon} = 15$



8 Characteristics diagrams

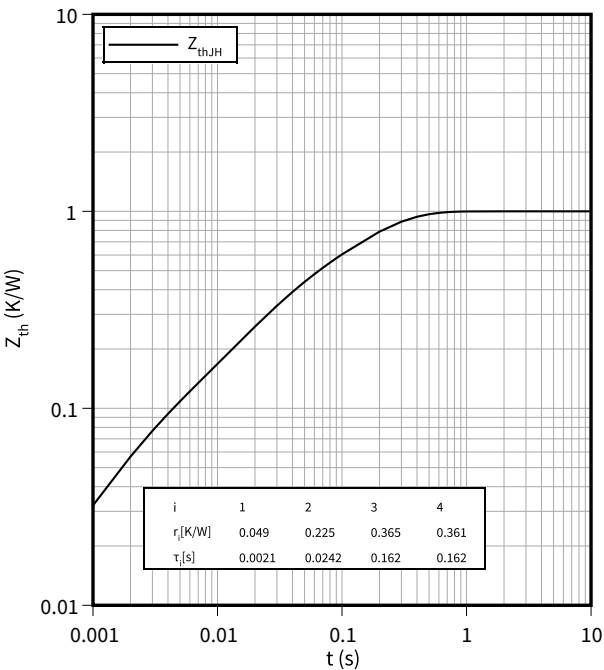
Switching losses (typical), Diode, D2 / D3

$E_{rec} = f(R_G)$
 $V_{CE} = 300\text{ V}, I_F = 150\text{ A}$



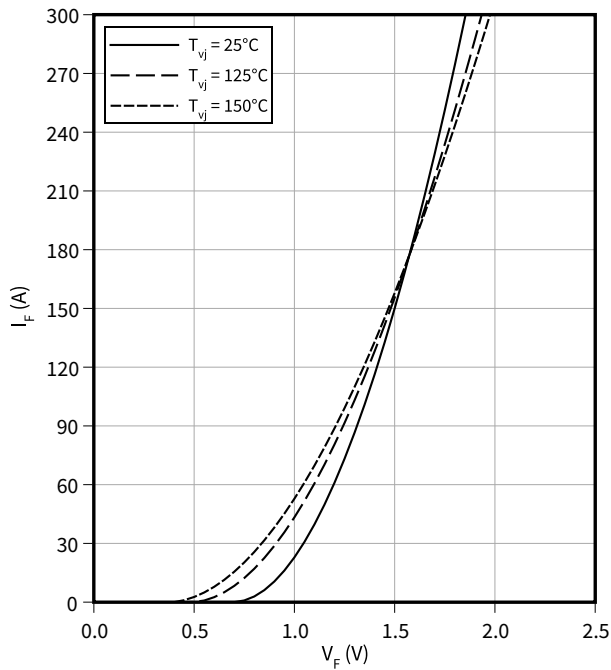
Transient thermal impedance, Diode, D2 / D3

$Z_{th} = f(t)$



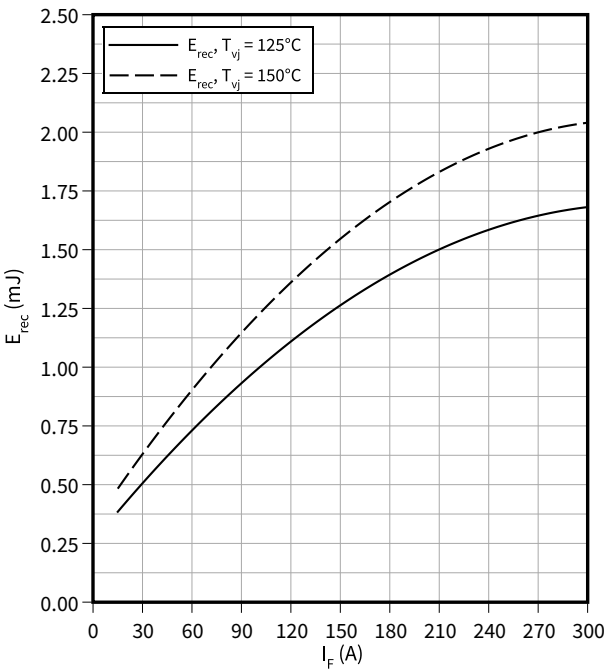
Forward characteristic (typical), Diode, D5 / D6

$I_F = f(V_F)$



Switching losses (typical), Diode, D5 / D6

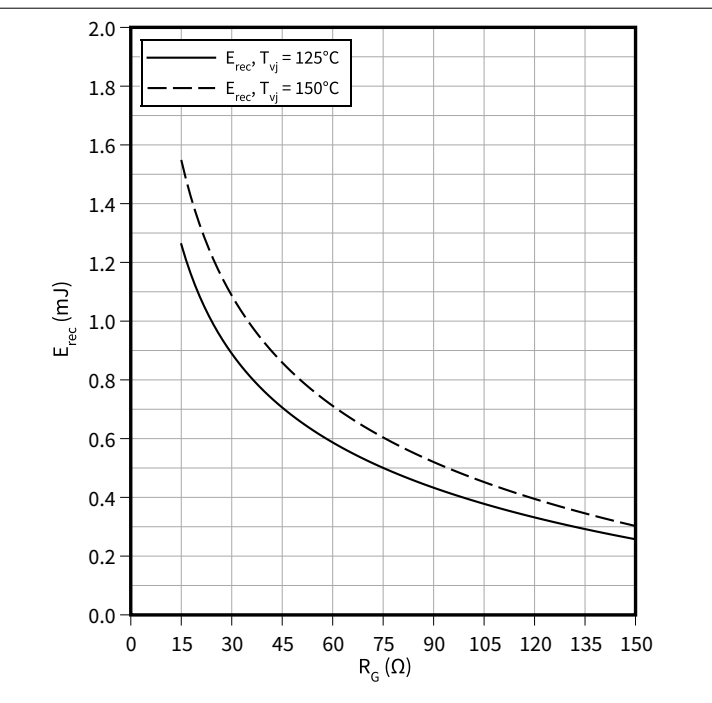
$E_{rec} = f(I_F)$
 $V_{CE} = 300\text{ V}, R_{Gon} = 15$



8 Characteristics diagrams

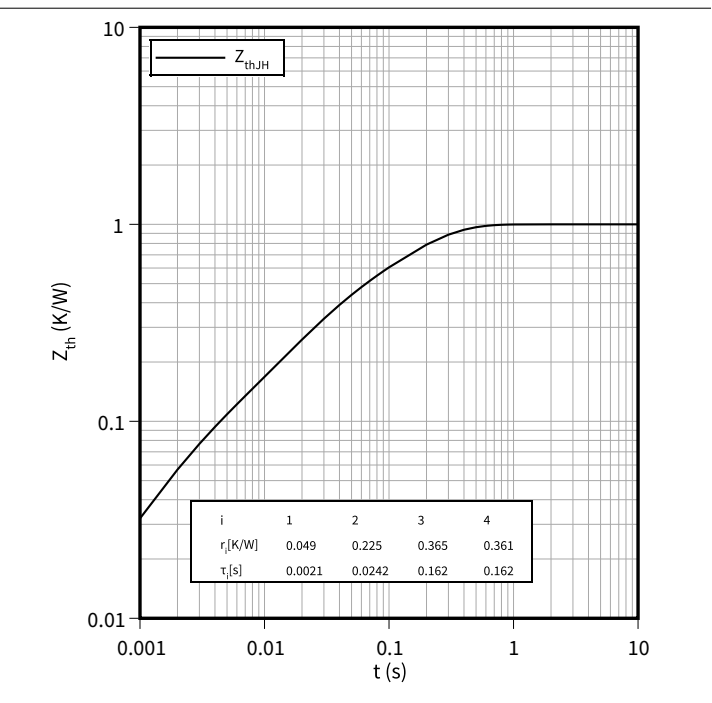
Switching losses (typical), Diode, D5 / D6

$E_{rec} = f(R_G)$
 $V_{CE} = 300\text{ V}, I_F = 150\text{ A}$



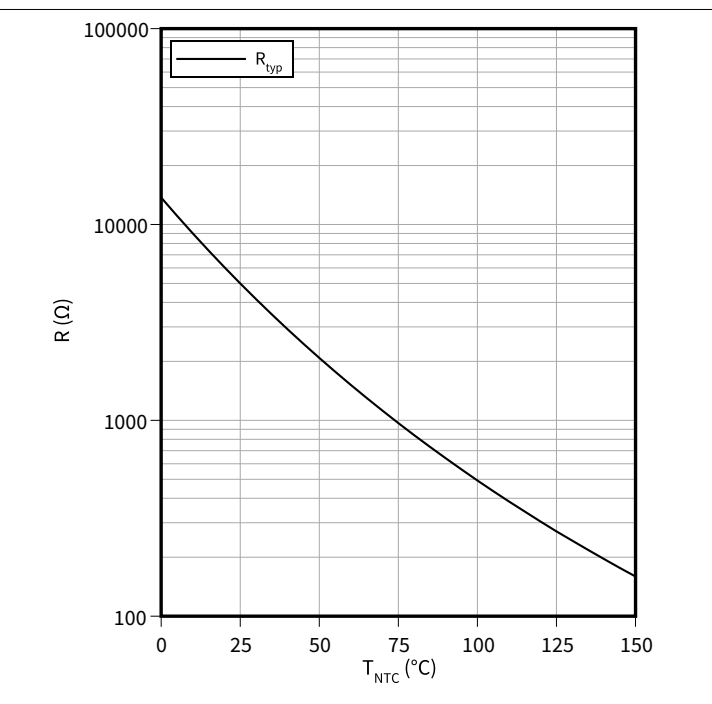
Transient thermal impedance, Diode, D5 / D6

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



9 Circuit diagram

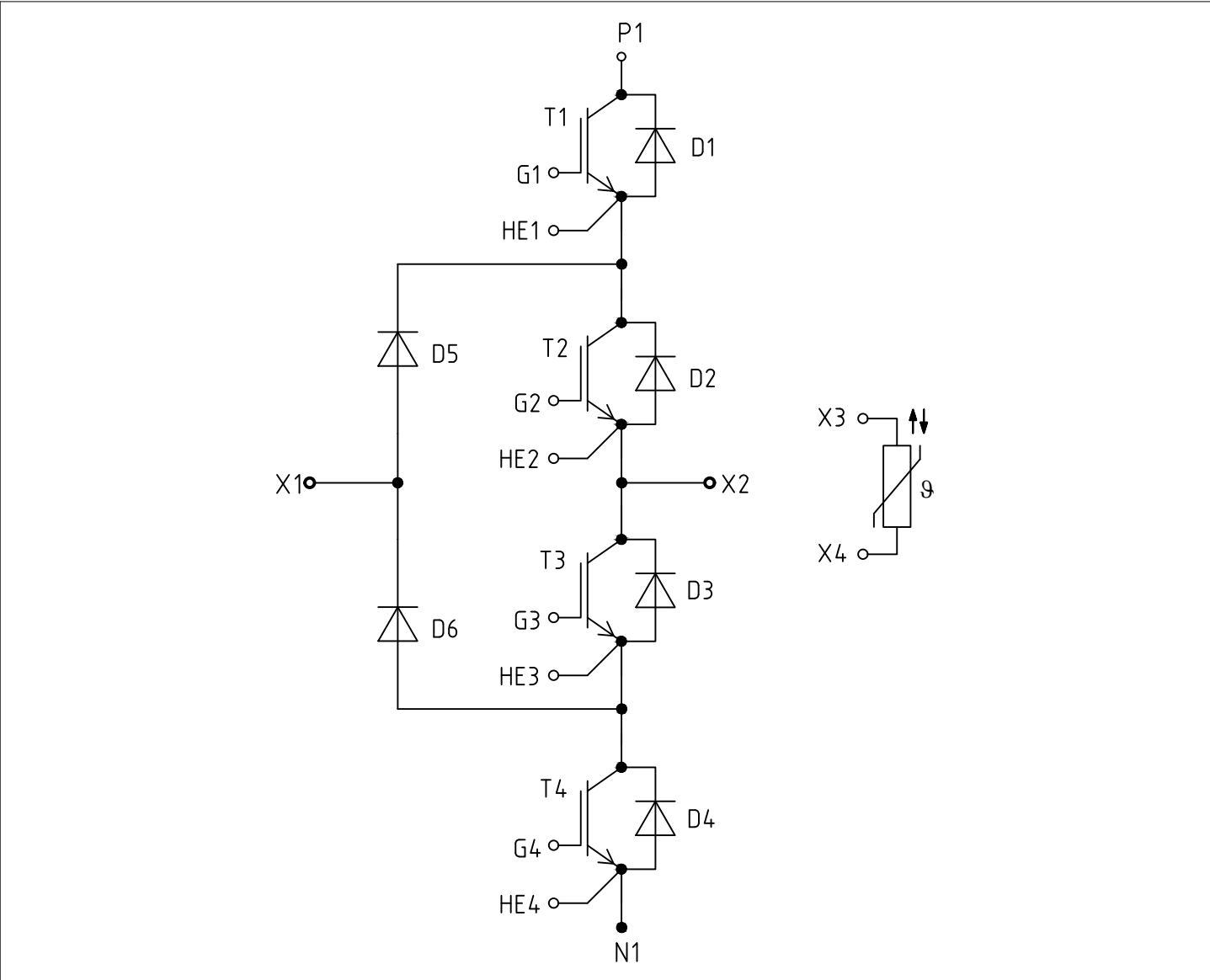


Figure 1

10 Package outlines

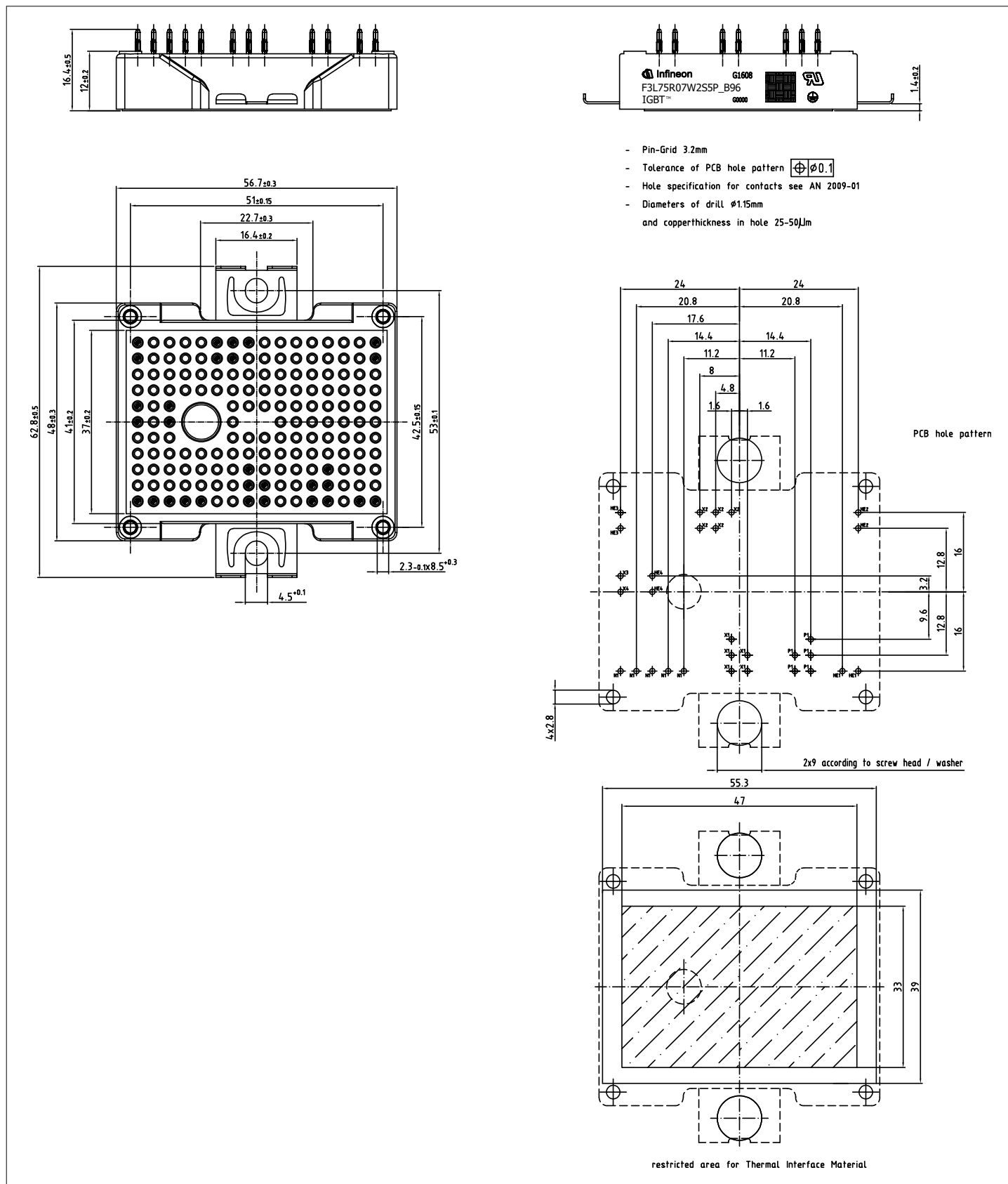


Figure 2

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

Document version	Date of release	Description of changes
0.10	2023-09-29	Initial version
1.00	2023-12-07	Final datasheet

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