

EasyPACK™ module with Trench/Fieldstop IGBT H3 and rapid diode and PressFIT / NTC

Features

- Electrical features
 - $V_{CES} = 650\text{ V}$
 - $I_{C\text{nom}} = 150\text{ A} / I_{CRM} = 300\text{ A}$
 - Increased blocking voltage capability up to 650 V
 - Low inductive design
 - Low switching losses
 - Low $V_{CE,sat}$
- Mechanical features
 - Al_2O_3 substrate with low thermal resistance
 - Compact design
 - PressFIT contact technology
 - Rugged mounting due to integrated mounting clamps



Potential applications

- Three-level applications
- Motor drives
- Solar applications
- UPS systems

Product validation

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

Description

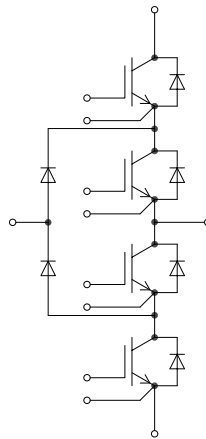


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1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f = 50 \text{ Hz}$, $t = 1 \text{ min}$	3.0	kV
Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Creepage distance	d_{Creep}	terminal to heatsink	11.5	mm
Creepage distance	d_{Creep}	terminal to terminal	6.3	mm
Clearance	d_{Clear}	terminal to heatsink	10.0	mm
Clearance	d_{Clear}	terminal to terminal	5.0	mm
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}			15		nH
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25^\circ\text{C}$, per switch		2.8		mΩ
Storage temperature	T_{stg}		-40		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

2 IGBT, T1 / T4

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		$T_{vj} = 25^\circ\text{C}$	650	V
Implemented collector current	I_{CN}			150	A
Continuous DC collector current	I_{CDC}	$T_{vj \text{ max}} = 175^\circ\text{C}$	$T_H = 65^\circ\text{C}$	85	A
Repetitive peak collector current	I_{CRM}	$t_p = 1 \text{ ms}$		300	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	$V_{CE\ sat}$	$I_C = 150\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$		1.68	2.00	V
			$T_{vj} = 125\ ^\circ C$		1.86		
			$T_{vj} = 150\ ^\circ C$		1.89		
Gate threshold voltage	V_{GEth}	$I_C = 2.4\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$		5.05	5.75	6.45	V
Gate charge	Q_G	$V_{GE} = \pm 15\ V, V_{CE} = 400\ V$			1.6		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$			0		Ω
Input capacitance	C_{ies}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 650\ V, V_{GE} = 0\ V$			9.4		nF
Reverse transfer capacitance	C_{res}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 650\ V, V_{GE} = 0\ V$			0.28		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$			0.009	mA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 650\ V, V_{GE} = 0\ V, T_{vj} = 25\ ^\circ C$				100	nA
Turn-on delay time (inductive load)	t_{don}	$I_C = 150\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 7.5\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.057		μs
			$T_{vj} = 125\ ^\circ C$		0.059		
			$T_{vj} = 150\ ^\circ C$		0.059		
Rise time (inductive load)	t_r	$I_C = 150\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 7.5\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.075		μs
			$T_{vj} = 125\ ^\circ C$		0.076		
			$T_{vj} = 150\ ^\circ C$		0.076		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 150\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 7.5\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.329		μs
			$T_{vj} = 125\ ^\circ C$		0.359		
			$T_{vj} = 150\ ^\circ C$		0.362		
Fall time (inductive load)	t_f	$I_C = 150\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 7.5\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.024		μs
			$T_{vj} = 125\ ^\circ C$		0.061		
			$T_{vj} = 150\ ^\circ C$		0.077		
Turn-on energy loss per pulse	E_{on}	$I_C = 150\ A, V_{CE} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 7.5\ \Omega, di/dt = 1800\ A/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		5.77		mJ
			$T_{vj} = 125\ ^\circ C$		6.97		
			$T_{vj} = 150\ ^\circ C$		7.21		
Turn-off energy loss per pulse	E_{off}	$I_C = 150\ A, V_{CE} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 7.5\ \Omega, dv/dt = 3600\ V/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		2.53		mJ
			$T_{vj} = 125\ ^\circ C$		3.46		
			$T_{vj} = 150\ ^\circ C$		3.79		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT			0.771		K/W
Temperature under switching conditions	$T_{vj\ op}$			-40		150	$^\circ C$

3 IGBT, T2 / T3

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Collector-emitter voltage	V_{CES}	$T_{vj} = 25\text{ °C}$	650	V
Implemented collector current	I_{CN}		150	A
Continuous DC collector current	I_{CDC}	$T_{vj\text{ max}} = 175\text{ °C}$ $T_H = 65\text{ °C}$	85	A
Repetitive peak collector current	I_{CRM}	$t_p = 1\text{ ms}$	300	A
Gate-emitter peak voltage	V_{GES}		±20	V

Table 6 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\text{ sat}}$	$I_C = 150\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25\text{ °C}$	1.45	1.90	V
			$T_{vj} = 125\text{ °C}$	1.61		
			$T_{vj} = 150\text{ °C}$	1.68		
Gate threshold voltage	V_{GEth}	$I_C = 2.4\text{ mA}, V_{CE} = 20\text{ V}, T_{vj} = 25\text{ °C}$	5.05	5.75	6.45	V
Gate charge	Q_G	$V_{GE} = \pm 15\text{ V}, V_{CE} = 400\text{ V}$		1.6		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\text{ °C}$		0		Ω
Input capacitance	C_{ies}	$f = 100\text{ kHz}, T_{vj} = 25\text{ °C}, V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}$		9.2		nF
Reverse transfer capacitance	C_{res}	$f = 100\text{ kHz}, T_{vj} = 25\text{ °C}, V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}$		0.29		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}$ $T_{vj} = 25\text{ °C}$			0.009	mA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25\text{ °C}$			100	nA
Turn-on delay time (inductive load)	t_{don}	$I_C = 150\text{ A}, V_{CE} = 300\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Gon} = 1.5\text{ }\Omega$	$T_{vj} = 25\text{ °C}$	0.015		μs
			$T_{vj} = 125\text{ °C}$	0.017		
			$T_{vj} = 150\text{ °C}$	0.017		
Rise time (inductive load)	t_r	$I_C = 150\text{ A}, V_{CE} = 300\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Gon} = 1.5\text{ }\Omega$	$T_{vj} = 25\text{ °C}$	0.022		μs
			$T_{vj} = 125\text{ °C}$	0.028		
			$T_{vj} = 150\text{ °C}$	0.029		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 150\text{ A}, V_{CE} = 300\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Goff} = 1.5\text{ }\Omega$	$T_{vj} = 25\text{ °C}$	0.186		μs
			$T_{vj} = 125\text{ °C}$	0.211		
			$T_{vj} = 150\text{ °C}$	0.216		
Fall time (inductive load)	t_f	$I_C = 150\text{ A}, V_{CE} = 300\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Goff} = 1.5\text{ }\Omega$	$T_{vj} = 25\text{ °C}$	0.094		μs
			$T_{vj} = 125\text{ °C}$	0.133		
			$T_{vj} = 150\text{ °C}$	0.147		

(table continues...)
Datasheet

Table 6 (continued) **Characteristic values**

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Turn-on energy loss per pulse	E_{on}	$I_C = 150\text{ A}$, $V_{CE} = 300\text{ V}$, $L_\sigma = 35\text{ nH}$, $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 1.5\ \Omega$, $di/dt = 4500\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ }^\circ\text{C}$)	$T_{vj} = 25\text{ }^\circ\text{C}$	0.341		mJ
			$T_{vj} = 125\text{ }^\circ\text{C}$	0.629		
			$T_{vj} = 150\text{ }^\circ\text{C}$	0.719		
Turn-off energy loss per pulse	E_{off}	$I_C = 150\text{ A}$, $V_{CE} = 300\text{ V}$, $L_\sigma = 35\text{ nH}$, $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 1.5\ \Omega$, $dv/dt = 3900\text{ V}/\mu\text{s}$ ($T_{vj} = 150\text{ }^\circ\text{C}$)	$T_{vj} = 25\text{ }^\circ\text{C}$	3.5		mJ
			$T_{vj} = 125\text{ }^\circ\text{C}$	4.66		
			$T_{vj} = 150\text{ }^\circ\text{C}$	4.98		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT		0.771		K/W
Temperature under switching conditions	$T_{vj\text{op}}$		-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		100	A	
Repetitive peak forward current	I_{FRM}	$t_p = 1\text{ ms}$	200	A	
I^2t - value	I^2t	$V_R = 0\text{ V}$, $t_p = 10\text{ ms}$	$T_{vj} = 125\text{ }^\circ\text{C}$	1750	A^2s
			$T_{vj} = 150\text{ }^\circ\text{C}$	1650	

Table 8 **Characteristic values**

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 100\text{ A}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ }^\circ\text{C}$	1.55	1.95	V
			$T_{vj} = 125\text{ }^\circ\text{C}$	1.50		
			$T_{vj} = 150\text{ }^\circ\text{C}$	1.45		
Peak reverse recovery current	I_{RM}	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 4400\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ }^\circ\text{C}$)	$T_{vj} = 25\text{ }^\circ\text{C}$	92.4		A
			$T_{vj} = 125\text{ }^\circ\text{C}$	102		
			$T_{vj} = 150\text{ }^\circ\text{C}$	106		

(table continues...)

Table 8 (continued) **Characteristic values**

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Recovered charge	Q_r	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 4400\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ }^\circ\text{C}$)	$T_{vj} = 25\text{ }^\circ\text{C}$	3.93		μC
			$T_{vj} = 125\text{ }^\circ\text{C}$	7.53		
			$T_{vj} = 150\text{ }^\circ\text{C}$	8.78		
Reverse recovery energy	E_{rec}	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 4400\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ }^\circ\text{C}$)	$T_{vj} = 25\text{ }^\circ\text{C}$	0.859		mJ
			$T_{vj} = 125\text{ }^\circ\text{C}$	1.65		
			$T_{vj} = 150\text{ }^\circ\text{C}$	1.94		
Thermal resistance, junction to heat sink	R_{thJH}	per diode		0.975		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	$^\circ\text{C}$

5 Diode, D2 / D3

Table 9 **Maximum rated values**

Parameter	Symbol	Note or test condition	Values	Unit	
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25\text{ }^\circ\text{C}$	650	V	
Continuous DC forward current	I_F		100	A	
Repetitive peak forward current	I_{FRM}	$t_p = 1\text{ ms}$	200	A	
I^2t - value	I^2t	$V_R = 0\text{ V}$, $t_p = 10\text{ ms}$	$T_{vj} = 125\text{ }^\circ\text{C}$	1750	A^2s
			$T_{vj} = 150\text{ }^\circ\text{C}$	1650	

Table 10 **Characteristic values**

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 100\text{ A}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ }^\circ\text{C}$	1.55	1.95	V
			$T_{vj} = 125\text{ }^\circ\text{C}$	1.50		
			$T_{vj} = 150\text{ }^\circ\text{C}$	1.45		
Peak reverse recovery current	I_{RM}	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 4400\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ }^\circ\text{C}$)	$T_{vj} = 25\text{ }^\circ\text{C}$	92.4		A
			$T_{vj} = 125\text{ }^\circ\text{C}$	102		
			$T_{vj} = 150\text{ }^\circ\text{C}$	106		

(table continues...)

Table 10 (continued) **Characteristic values**

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Recovered charge	Q_r	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 4400\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	3.93		μC
			$T_{vj} = 125\text{ °C}$	7.53		
			$T_{vj} = 150\text{ °C}$	8.78		
Reverse recovery energy	E_{rec}	$I_F = 100\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 4400\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	0.859		mJ
			$T_{vj} = 125\text{ °C}$	1.65		
			$T_{vj} = 150\text{ °C}$	1.94		
Thermal resistance, junction to heat sink	R_{thJH}	per diode		0.975		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	$^{\circ}\text{C}$

6 Diode, D5 / D6

Table 11 **Maximum rated values**

Parameter	Symbol	Note or test condition	Values	Unit	
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25\text{ °C}$	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	$V_R = 0\text{ V}$, $t_p = 10\text{ ms}$	$T_{vj} = 125\text{ °C}$	2120	A^2s
			$T_{vj} = 150\text{ °C}$	1810	

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}	$I_F = 150\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 1800\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	41.8		A
			$T_{vj} = 125\text{ °C}$	69.7		
			$T_{vj} = 150\text{ °C}$	75.4		

(table continues...)

Table 12 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Recovered charge	Q_r	$I_F = 150 \text{ A}$, $V_R = 300 \text{ V}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 1800 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	4.93		μC
			$T_{vj} = 125 \text{ }^\circ\text{C}$	8.81		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	9.27		
Reverse recovery energy	E_{rec}	$I_F = 150 \text{ A}$, $V_R = 300 \text{ V}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 1800 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.426		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	1.02		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	1.22		
Thermal resistance, junction to heat sink	R_{thJH}	per diode		0.888		K/W
Temperature under switching conditions	$T_{vj\text{op}}$		-40		150	$^\circ\text{C}$

7 NTC-Thermistor

Table 13 Characteristic values

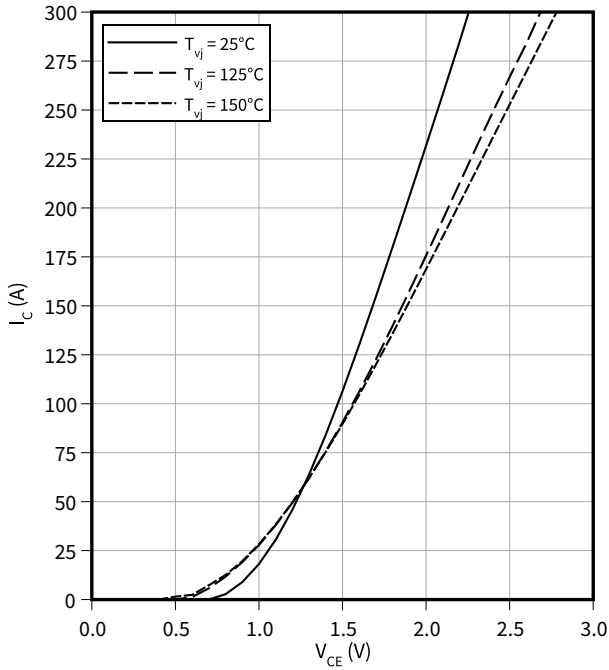
Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	R_{25}	$T_{NTC} = 25 \text{ }^\circ\text{C}$		5		k Ω
Deviation of R_{100}	$\Delta R/R$	$T_{NTC} = 100 \text{ }^\circ\text{C}$, $R_{100} = 493 \text{ } \Omega$	-5		5	%
Power dissipation	P_{25}	$T_{NTC} = 25 \text{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

Note: Specification according to the valid application note.

8 Characteristics diagrams

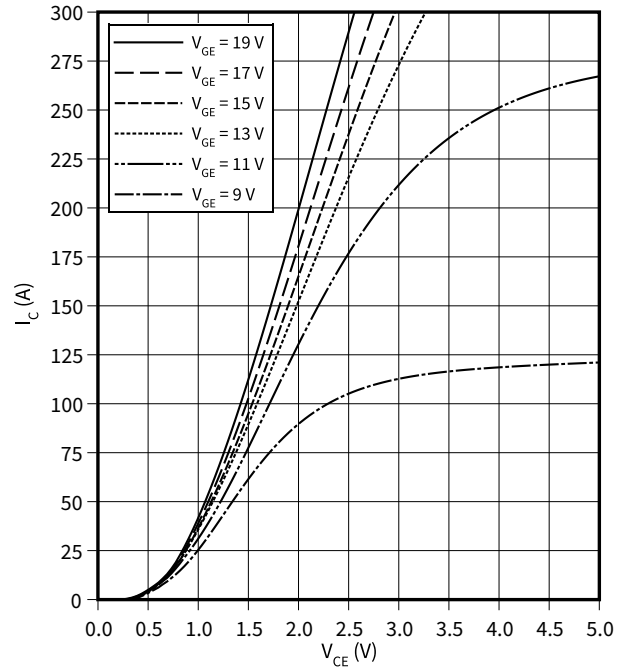
Output characteristic (typical), IGBT, T1 / T4

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



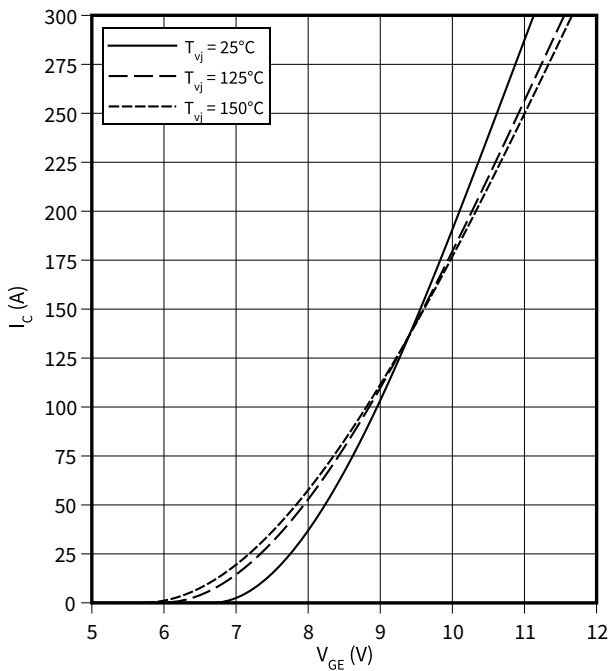
Output characteristic field (typical), IGBT, T1 / T4

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



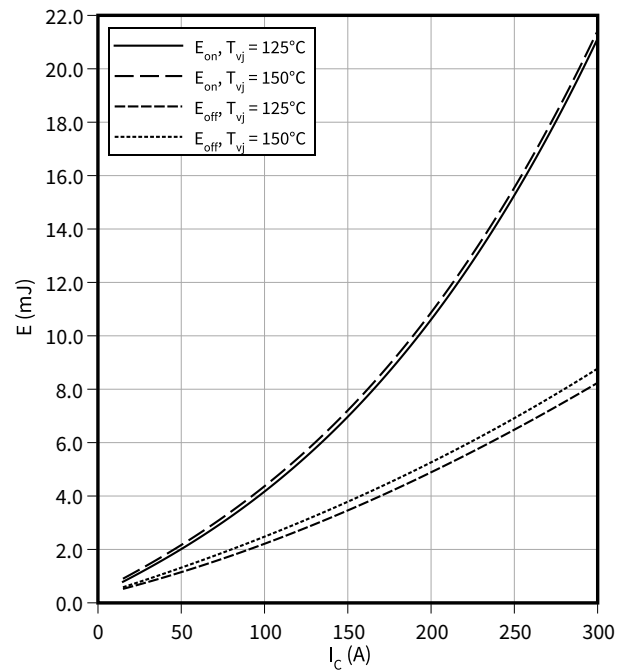
Transfer characteristic (typical), IGBT, T1 / T4

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



Switching losses (typical), IGBT, T1 / T4

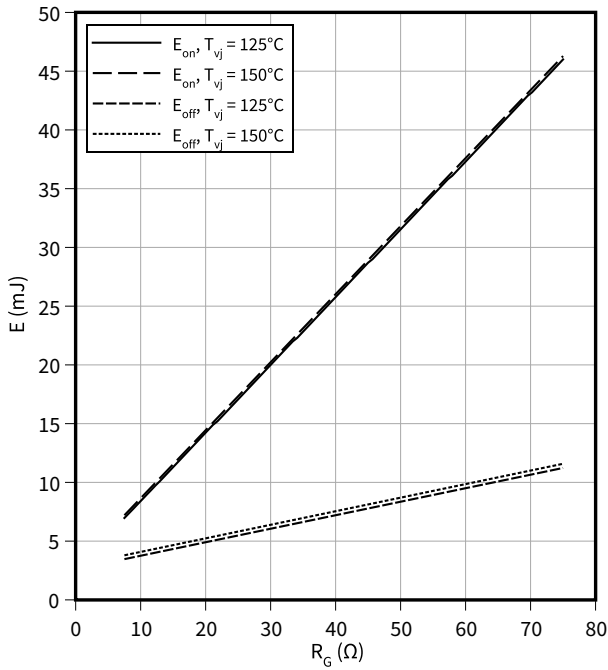
$E = f(I_C)$
 $R_{Goff} = 7.5 \text{ } \Omega$, $R_{Gon} = 7.5 \text{ } \Omega$, $V_{CE} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$



Switching losses (typical), IGBT, T1 / T4

$E = f(R_G)$

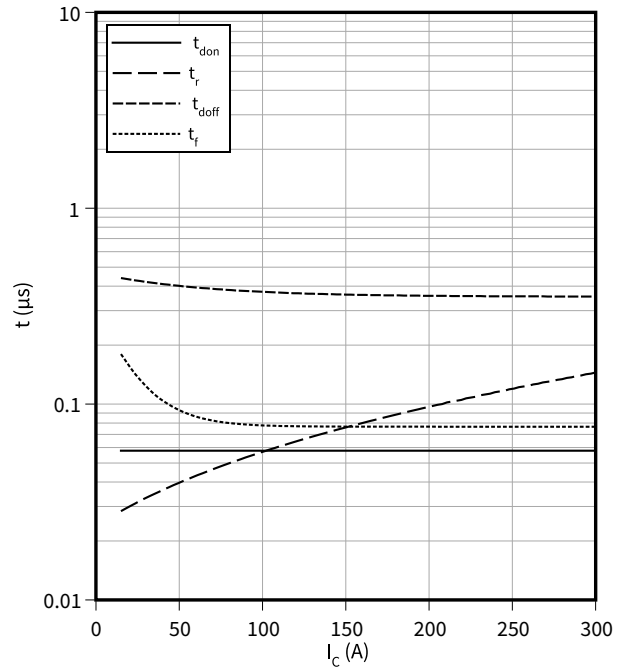
$I_C = 150 \text{ A}, V_{CE} = 300 \text{ V}, V_{GE} = \pm 15 \text{ V}$



Switching times (typical), IGBT, T1 / T4

$t = f(I_C)$

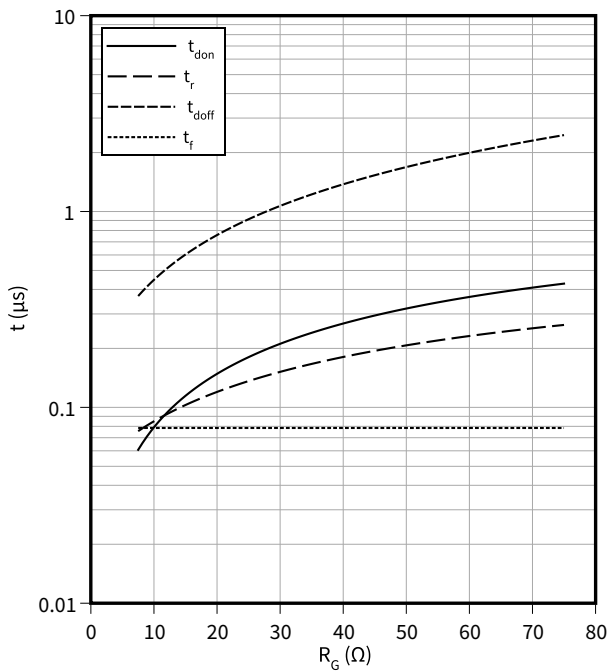
$R_{Goff} = 7.5 \Omega, R_{Gon} = 7.5 \Omega, V_{CE} = 300 \text{ V}, V_{GE} = \pm 15 \text{ V}, T_{vj} = 150 \text{ °C}$



Switching times (typical), IGBT, T1 / T4

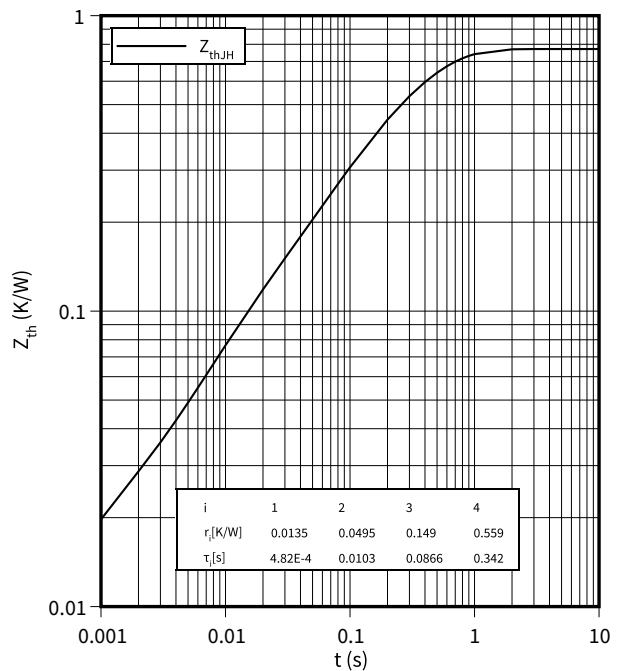
$t = f(R_G)$

$I_C = 150 \text{ A}, V_{CE} = 300 \text{ V}, V_{GE} = \pm 15 \text{ V}, T_{vj} = 150 \text{ °C}$



Transient thermal impedance, IGBT, T1 / T4

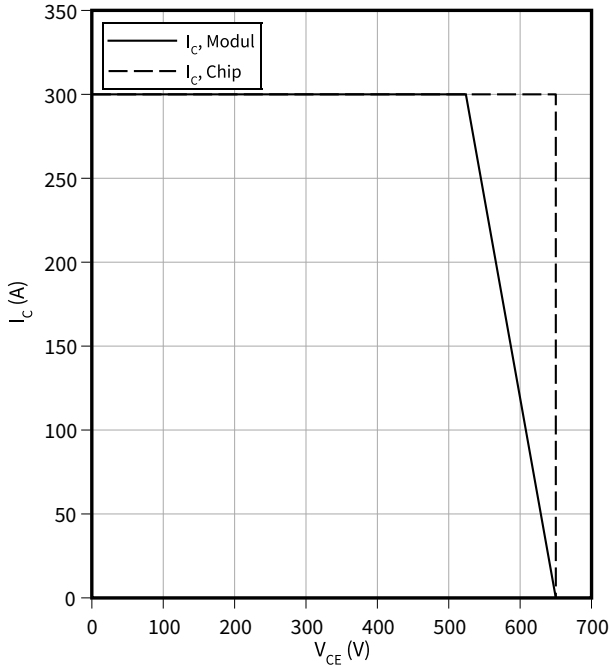
$Z_{th} = f(t)$



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

$I_C = f(V_{CE})$

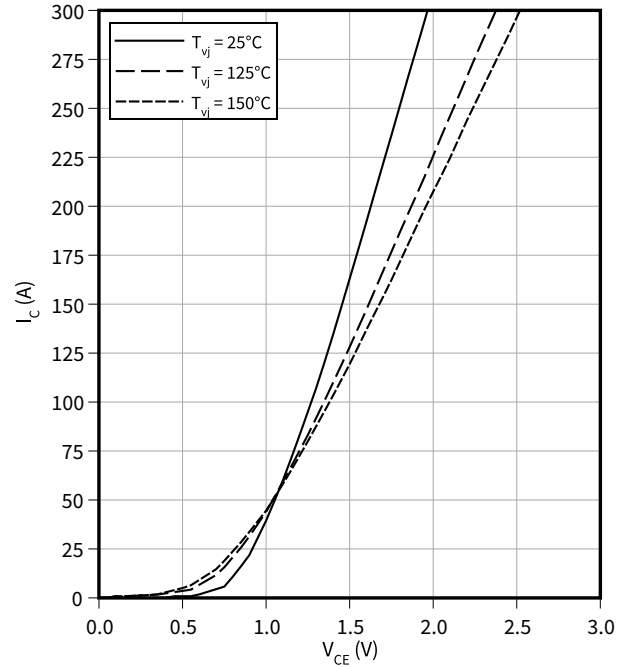
$R_{Goff} = 7.5 \Omega, V_{GE} = \pm 15 V, T_{vj} = 150 \text{ }^\circ\text{C}$



Output characteristic (typical), IGBT, T2 / T3

$I_C = f(V_{CE})$

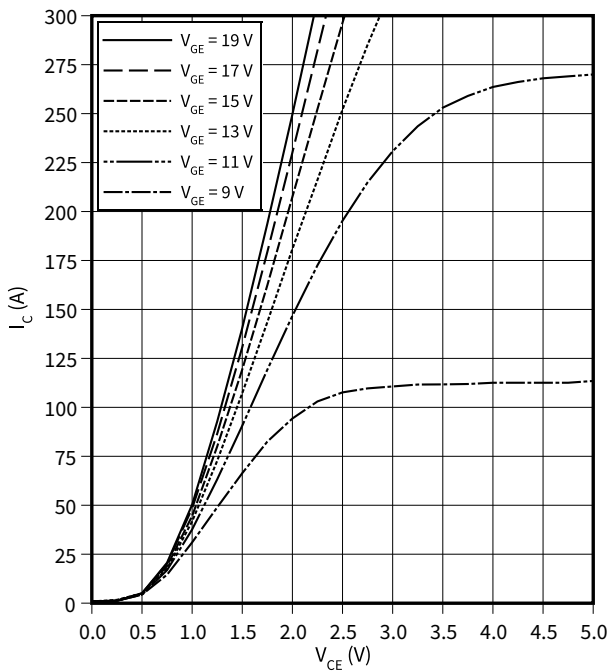
$V_{GE} = 15 V$



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

$I_C = f(V_{CE})$

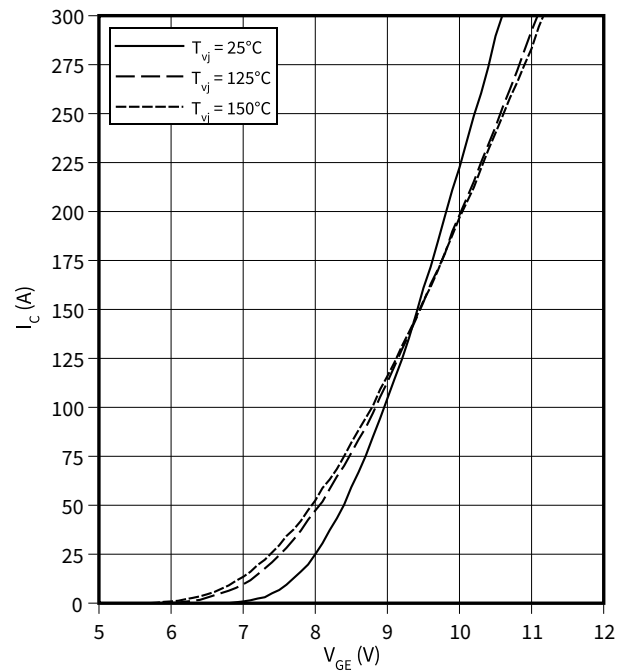
$T_{vj} = 150 \text{ }^\circ\text{C}$



Transfer characteristic (typical), IGBT, T2 / T3

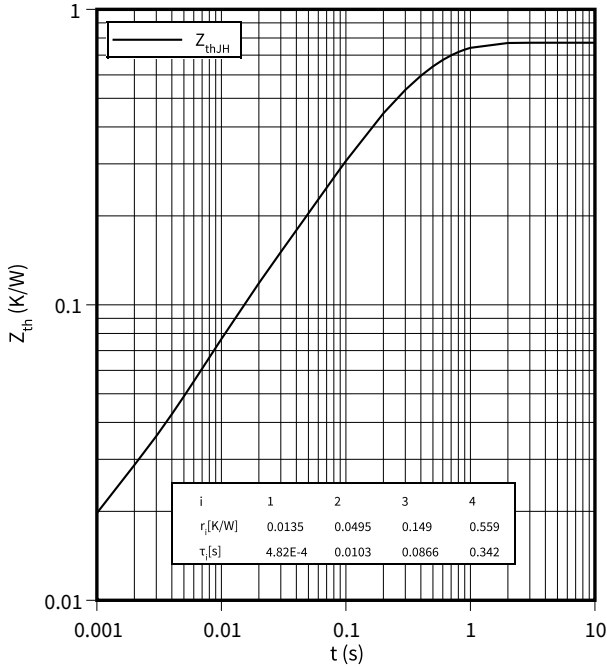
$I_C = f(V_{GE})$

$V_{CE} = 20 V$



Transient thermal impedance, IGBT, T2 / T3

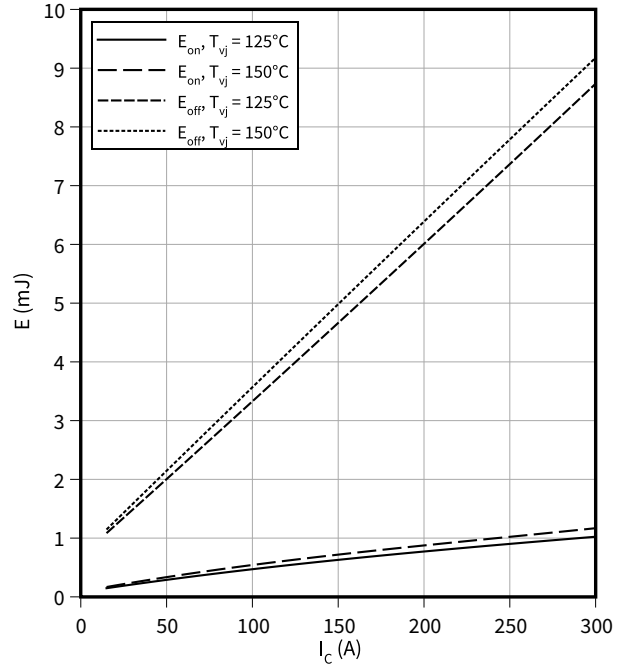
$Z_{th} = f(t)$



Switching losses (typical), IGBT, T2 / T3

$E = f(I_C)$

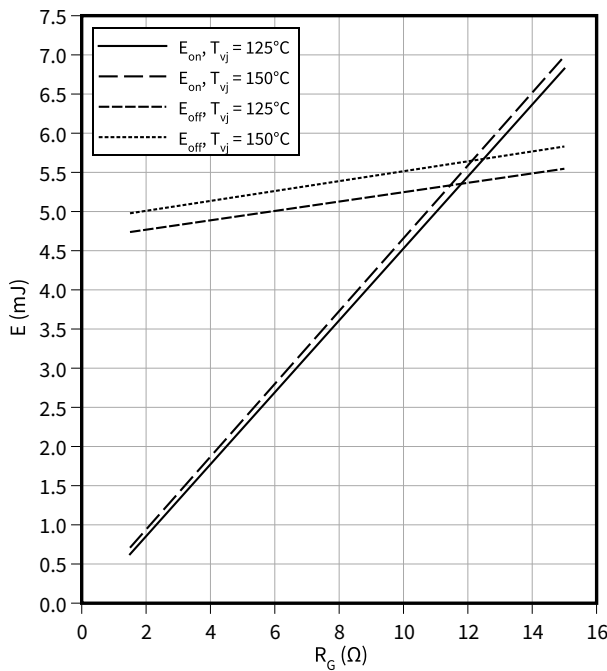
$R_{Goff} = 1.5 \Omega, R_{Gon} = 1.5 \Omega, V_{GE} = \pm 15 V, V_{CE} = 300 V$



Switching losses (typical), IGBT, T2 / T3

$E = f(R_G)$

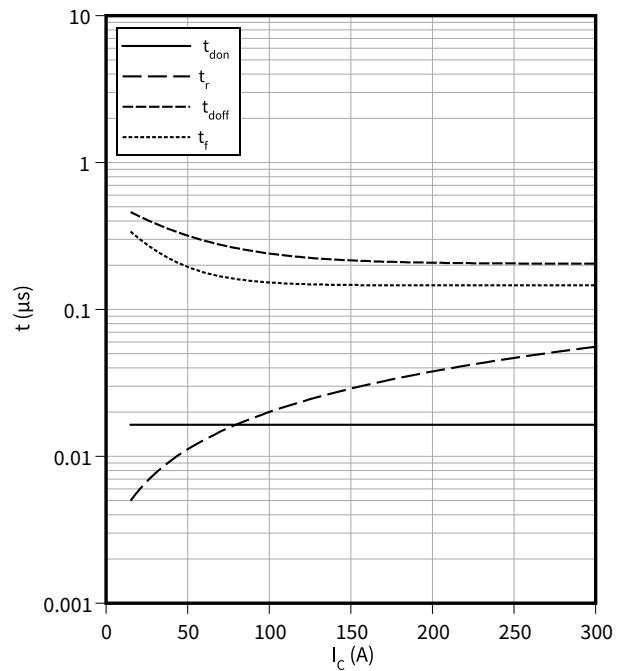
$V_{GE} = \pm 15 V, I_C = 150 A, V_{CE} = 300 V$



Switching times (typical), IGBT, T2 / T3

$t = f(I_C)$

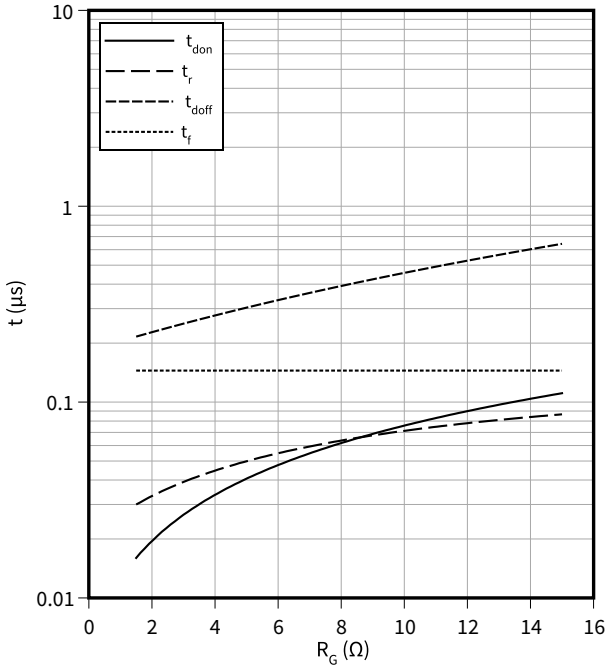
$R_{Goff} = 1.5 \Omega, R_{Gon} = 1.5 \Omega, V_{GE} = \pm 15 V, V_{CE} = 300 V, T_{vj} = 150 \text{ }^\circ\text{C}$



Switching times (typical), IGBT, T2 / T3

$t = f(R_G)$

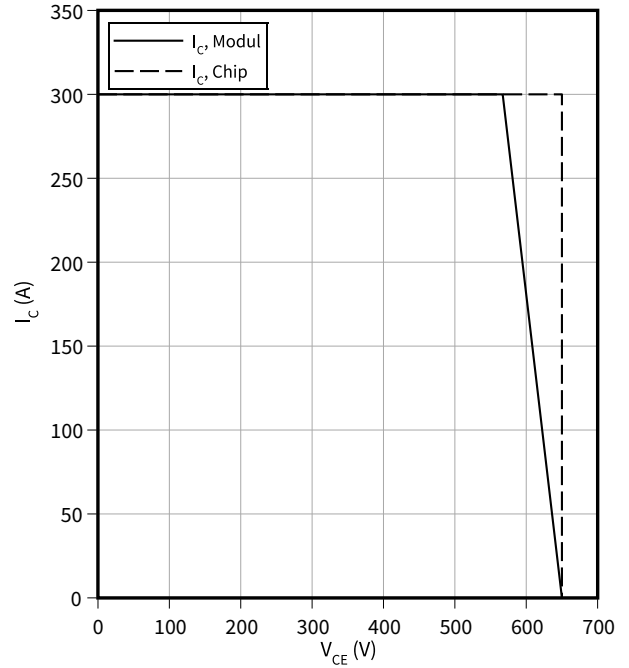
$V_{GE} = \pm 15 \text{ V}, I_C = 150 \text{ A}, V_{CE} = 300 \text{ V}, T_{vj} = 150 \text{ }^\circ\text{C}$



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

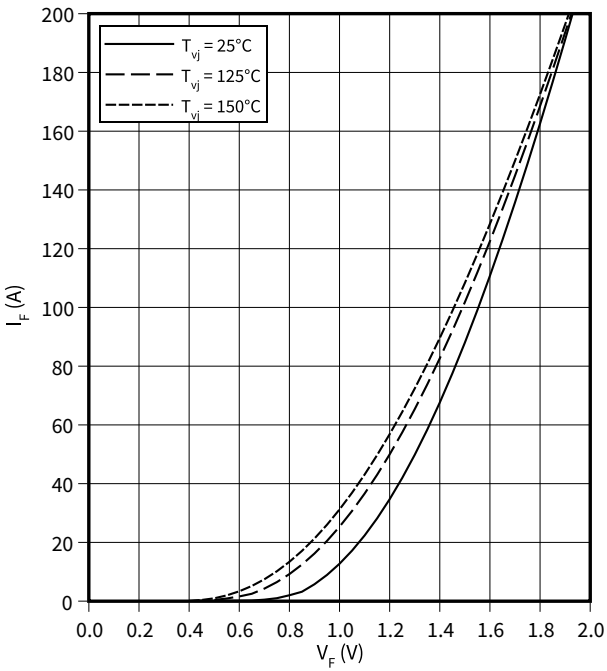
$I_C = f(V_{CE})$

$R_{Goff} = 1.5 \text{ } \Omega, V_{GE} = \pm 15 \text{ V}, T_{vj} = 150 \text{ }^\circ\text{C}$



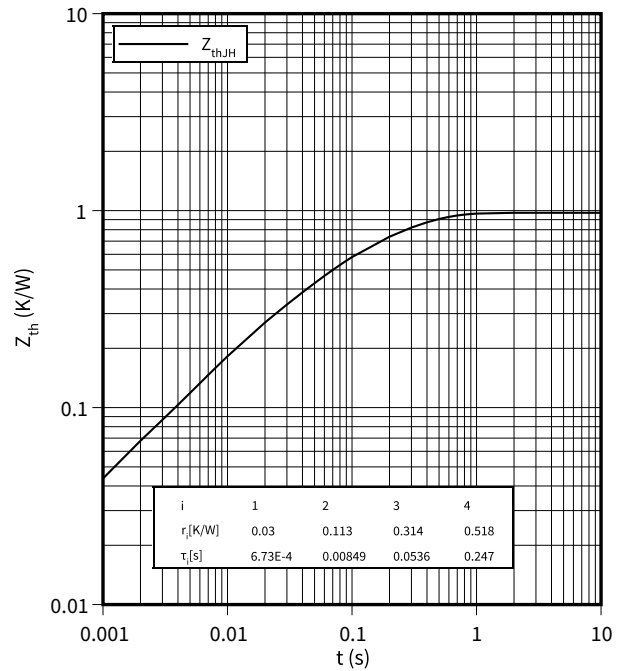
Forward characteristic (typical), Diode, D1 / D4

$I_F = f(V_F)$



Transient thermal impedance, Diode, D1 / D4

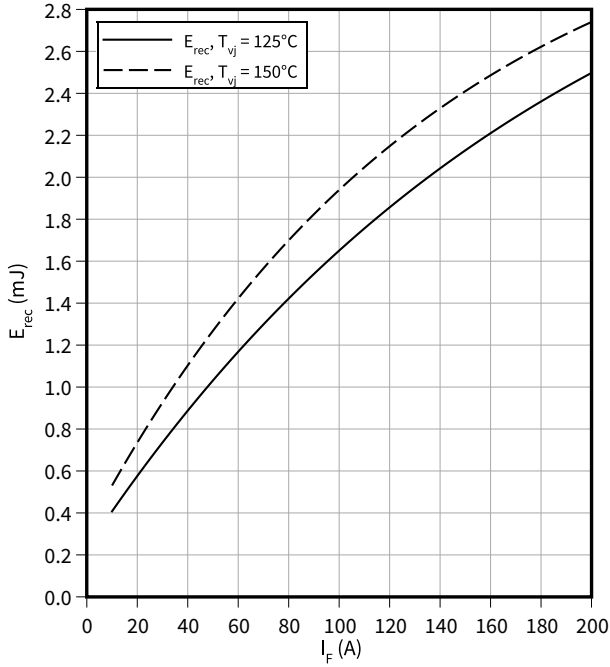
$Z_{th} = f(t)$



Switching losses (typical), Diode, D1 / D4

$E_{rec} = f(I_F)$

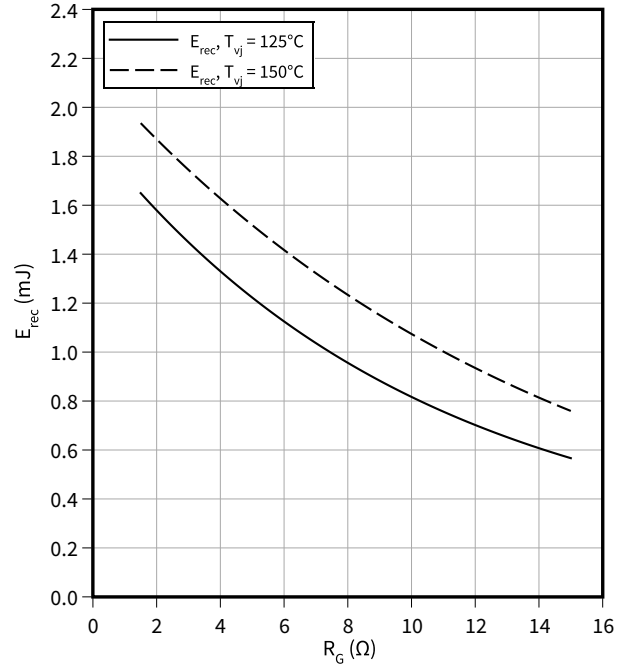
$R_{Gon} = 1.5 \Omega, V_R = 300 V$



Switching losses (typical), Diode, D1 / D4

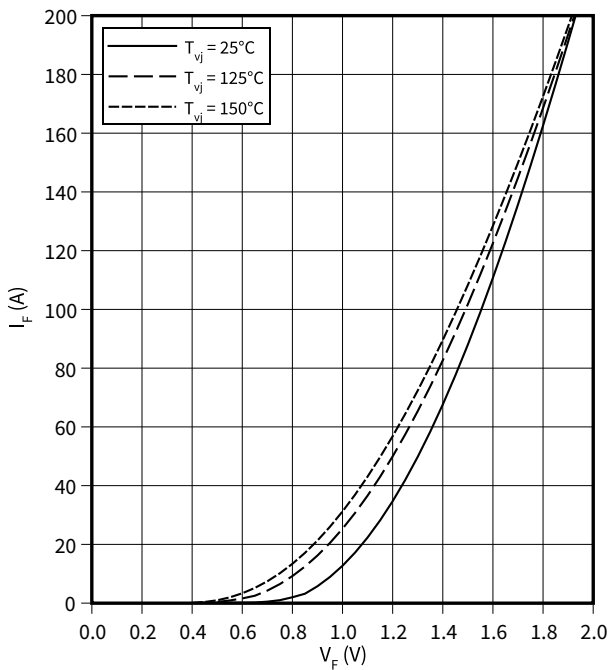
$E_{rec} = f(R_G)$

$I_F = 100 A, V_R = 300 V$



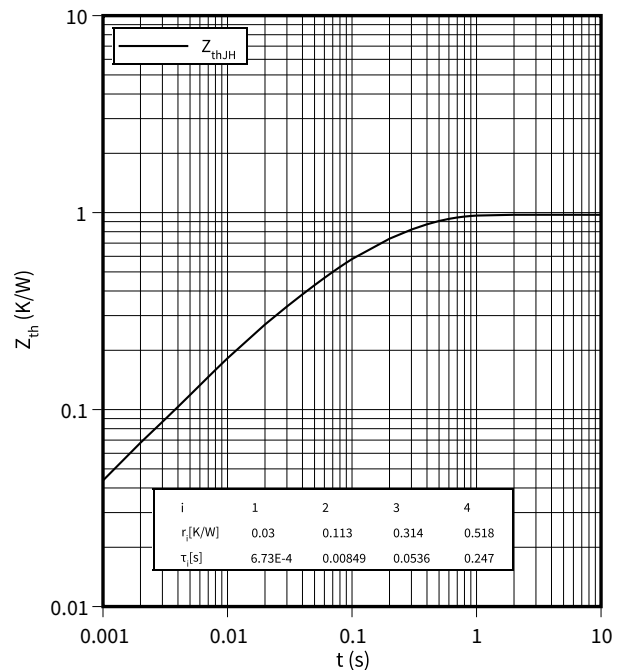
Forward characteristic (typical), Diode, D2 / D3

$I_F = f(V_F)$



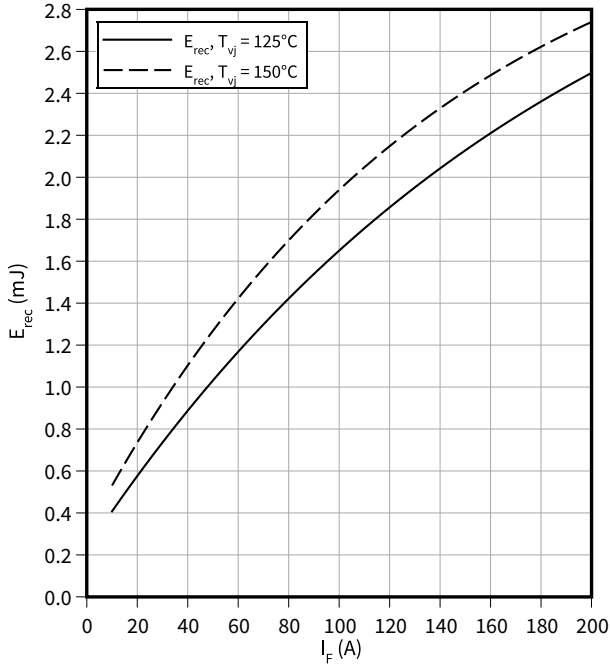
Transient thermal impedance, Diode, D2 / D3

$Z_{th} = f(t)$



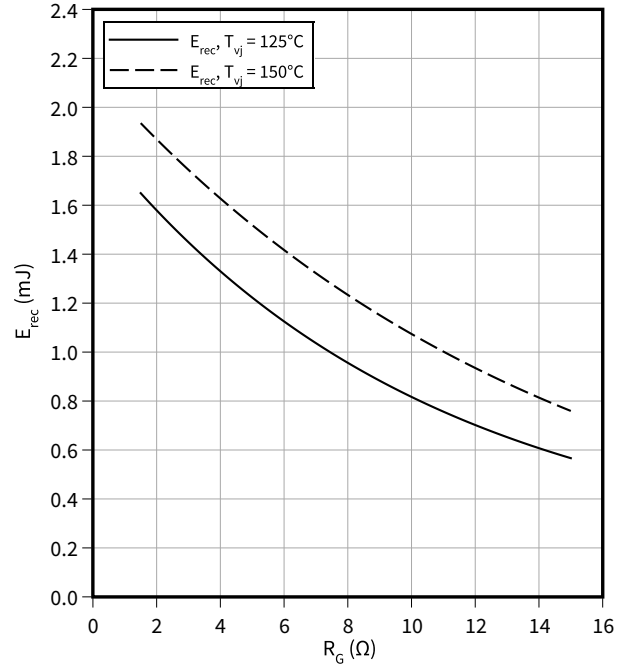
Switching losses (typical), Diode, D2 / D3

$E_{rec} = f(I_F)$
 $R_{Gon} = 1.5 \Omega, V_R = 300 V$



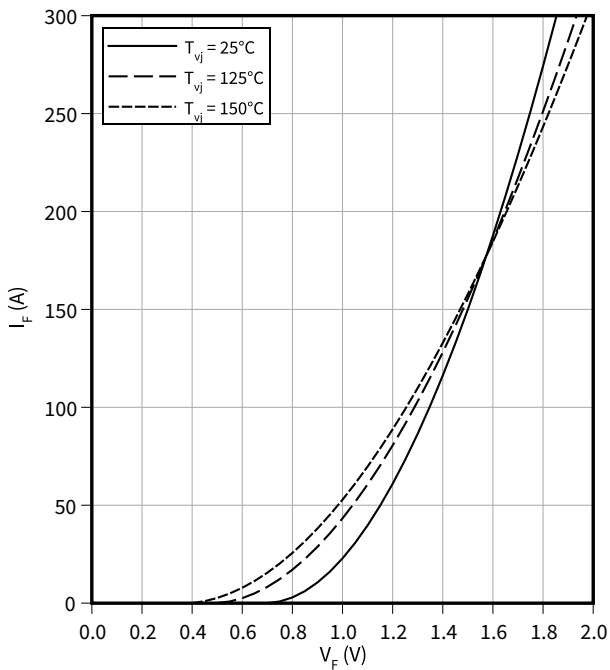
Switching losses (typical), Diode, D2 / D3

$E_{rec} = f(R_G)$
 $I_F = 100 A, V_R = 300 V$



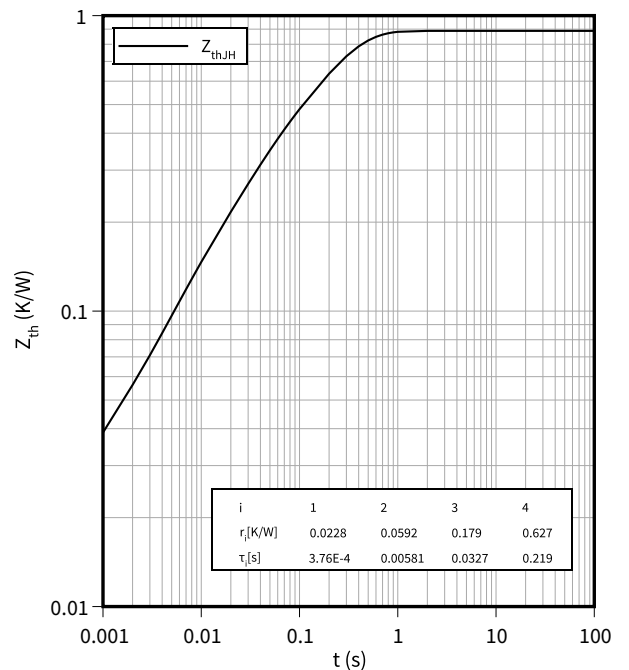
Forward characteristic (typical), Diode, D5 / D6

$I_F = f(V_F)$



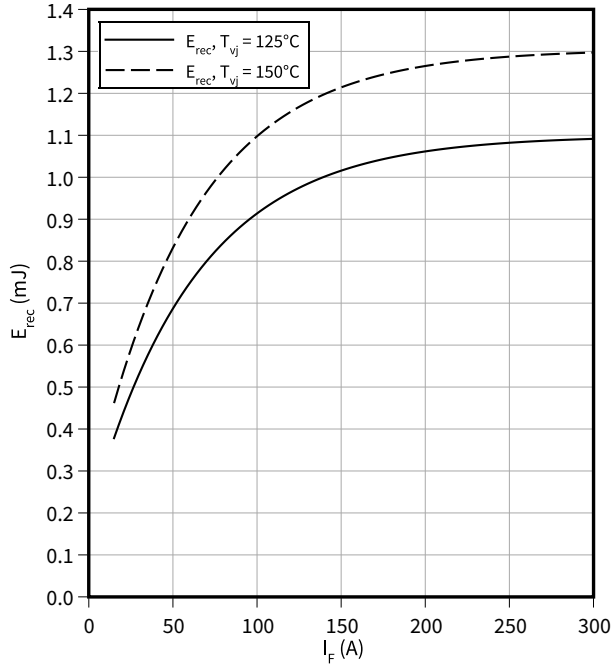
Transient thermal impedance, Diode, D5 / D6

$Z_{th} = f(t)$



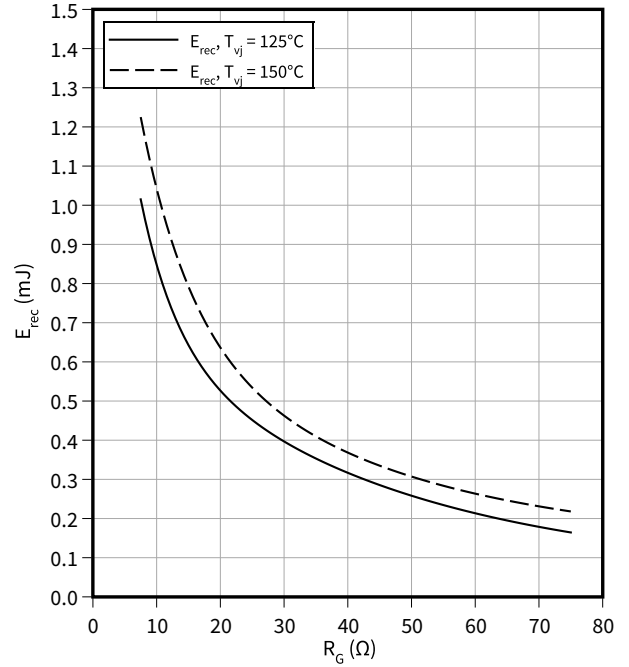
Switching losses (typical), Diode, D5 / D6

$E_{rec} = f(I_F)$
 $R_{Gon} = 7.5 \Omega, V_R = 300 V$



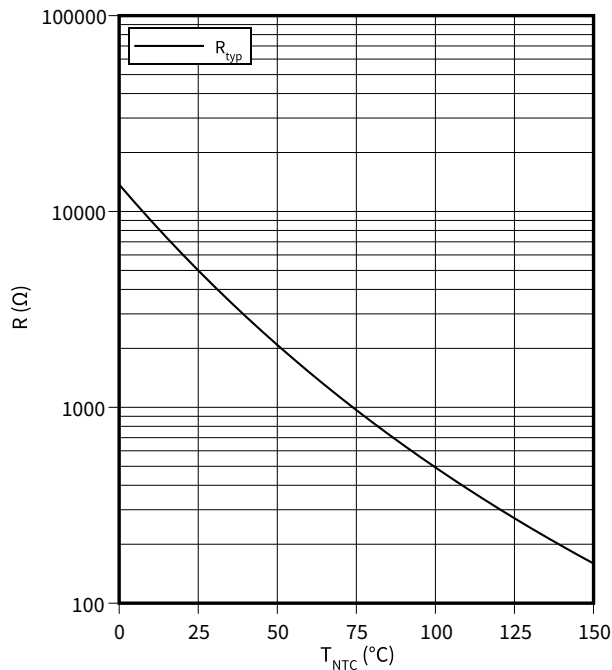
Switching losses (typical), Diode, D5 / D6

$E_{rec} = f(R_G)$
 $I_F = 150 A, V_R = 300 V$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



9 Circuit diagram

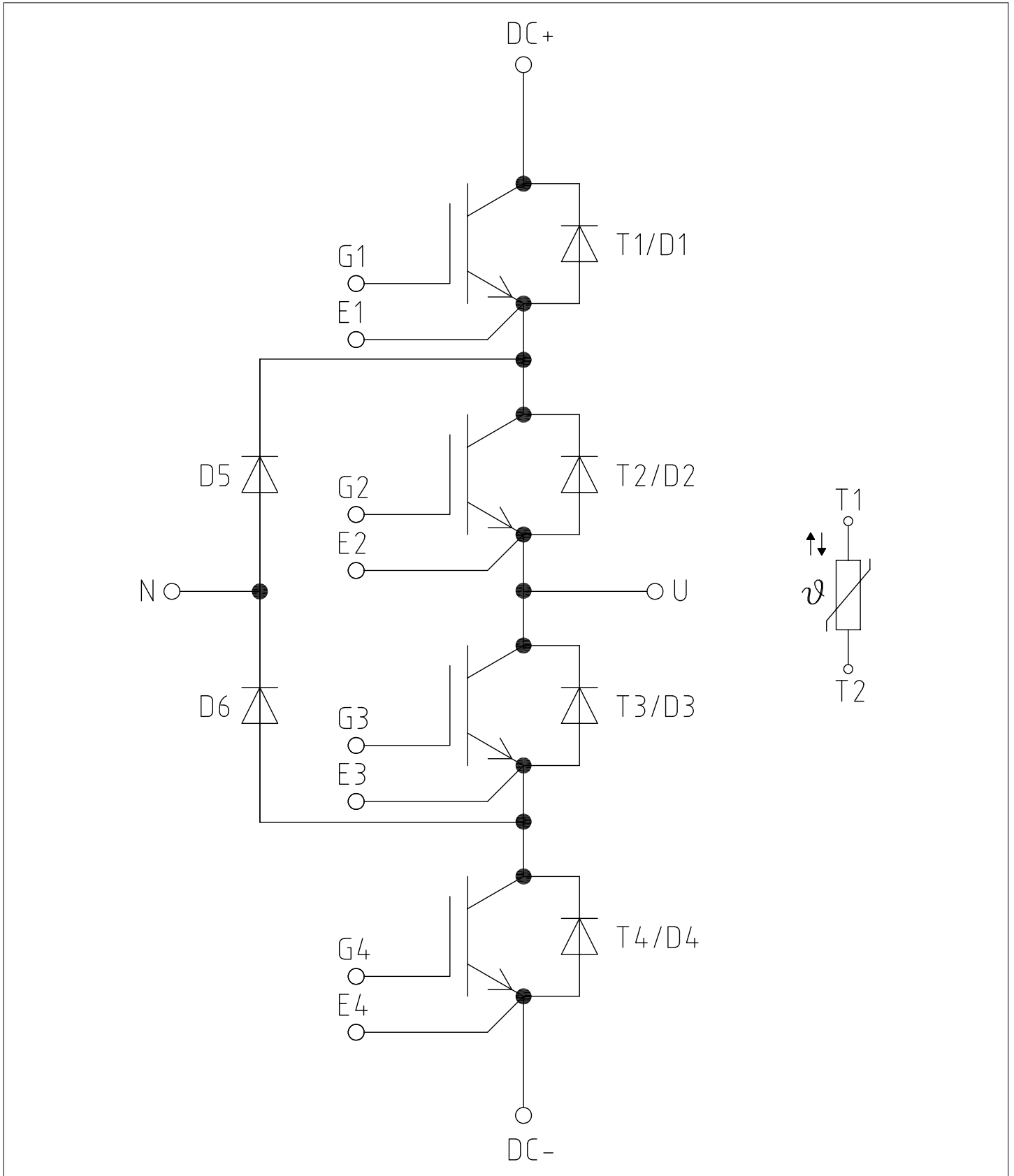


Figure 1

10 Package outlines

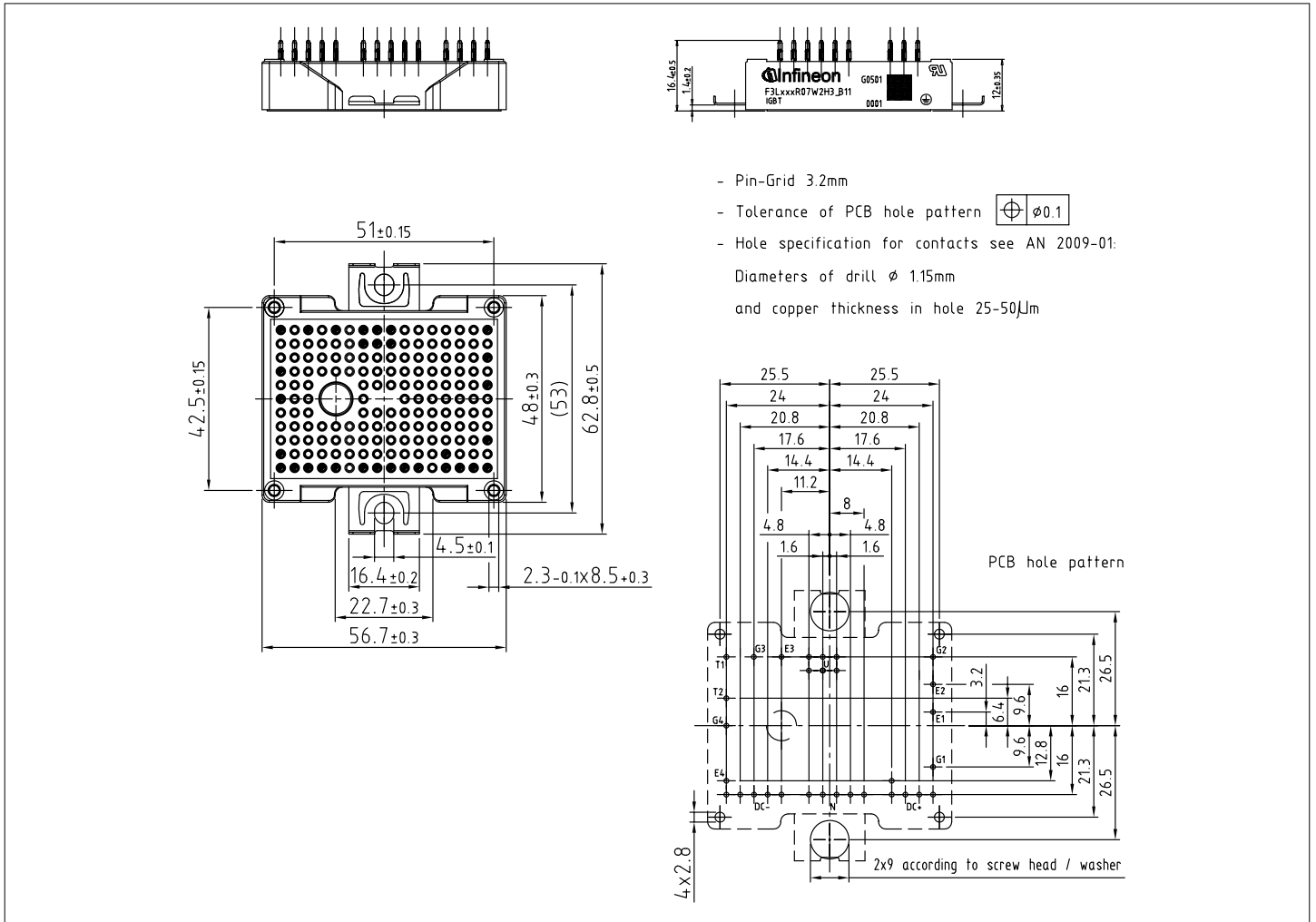


Figure 2

11 Module label code


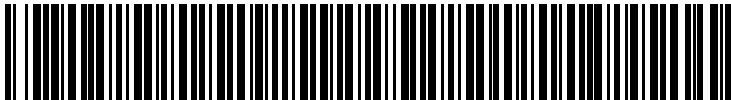
Module label code			
Code format	Data Matrix	Barcode Code128	
Encoding	ASCII text	Code Set A	
Symbol size	16x16	23 digits	
Standard	IEC24720 and IEC16022	IEC8859-1	
Code content	<i>Content</i>	<i>Digit</i>	<i>Example</i>
	Module serial number	1 - 5	71549
	Module material number	6 - 11	142846
	Production 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 revision	Date of release	Description of changes
0.10	2021-08-24	Initial version
1.00	2021-12-13	Final datasheet

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Document reference

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