

Final datasheet

EasyPACK™ 2B module with TRENCHSTOP™ 5 H5 and CoolSiC™ Schottky diode and PressFIT / NTC

Features

- Electrical features
 - $V_{CES} = 650 \text{ V}$
 - $I_{C \text{ nom}} = 40 \text{ A} / I_{CRM} = 80 \text{ A}$
 - CoolSiC™ Schottky diode gen 5
 - 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
 - Rugged mounting due to integrated mounting clamps
 - AlN substrate with low thermal resistance
 - Compact design
 - PressFIT contact technology



Typical appearance

Potential applications

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

Product validation

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

Description

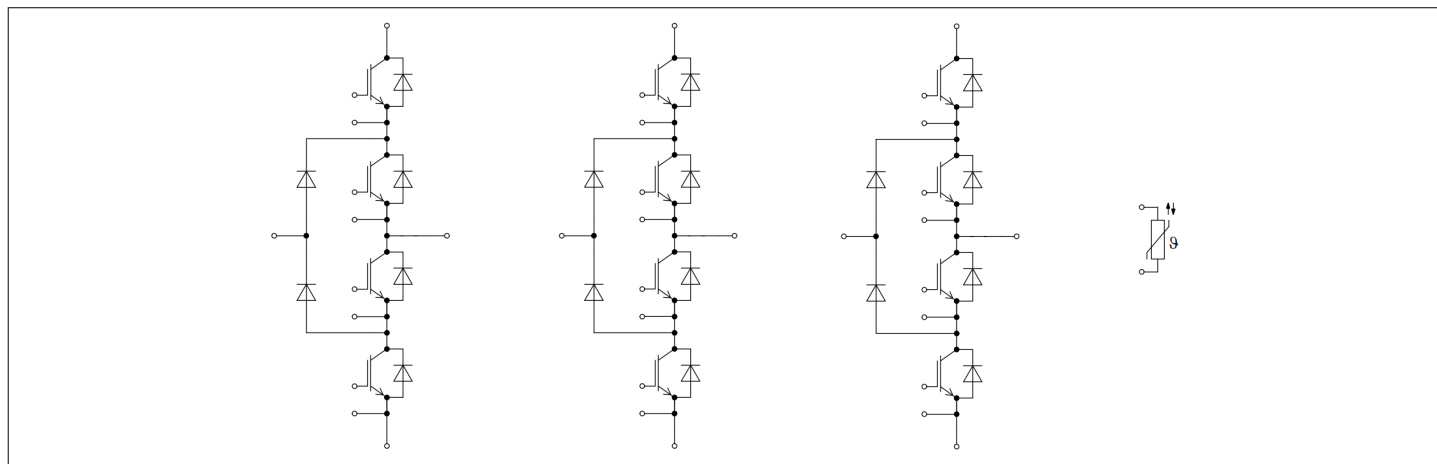


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1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f = 50 \text{ Hz}$, $t = 60 \text{ s}$	3.0	kV
Isolation test voltage NTC	$V_{ISOL(NTC)}$	RMS, $f = 50 \text{ Hz}$, $t = 60 \text{ s}$	3.0	kV
Internal isolation		basic insulation (class 1, IEC 61140)	AIN	
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}			36		nH
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25 \text{ °C}$, per switch		8.2		mΩ
Storage temperature	T_{stg}		-40		125	°C
Mounting force per clamp	F		40		80	N
Weight	G			42		g

Note: The current under continuous operation is limited to 25A rms per connector pin

2 IGBT, Inverter

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}			40	A
Continuous DC collector current	I_{CDC}	$T_{vj \text{ max}} = 175 \text{ °C}$	$T_H = 115 \text{ °C}$	20	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj \text{ op}}$		80	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	$V_{CE\ sat}$	$I_C = 20\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$		1.32	1.81	V
			$T_{vj} = 125\ ^\circ C$		1.39		
			$T_{vj} = 150\ ^\circ C$		1.41		
Gate threshold voltage	V_{GETh}	$I_C = 0.35\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$		3.85	4.60	5.35	V
Gate charge	Q_G	$V_{GE} = \pm 15\ V, V_{CC} = 300\ V$			0.152		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$			0		Ω
Input capacitance	C_{ies}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			1.94		nF
Reverse transfer capacitance	C_{res}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			0.007		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$			0.018	mA
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}	$I_C = 20\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 7.5\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.011		μs
			$T_{vj} = 125\ ^\circ C$		0.012		
			$T_{vj} = 150\ ^\circ C$		0.012		
Rise time (inductive load)	t_r	$I_C = 20\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 7.5\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.009		μs
			$T_{vj} = 125\ ^\circ C$		0.014		
			$T_{vj} = 150\ ^\circ C$		0.015		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 20\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 7.5\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.078		μs
			$T_{vj} = 125\ ^\circ C$		0.099		
			$T_{vj} = 150\ ^\circ C$		0.105		
Fall time (inductive load)	t_f	$I_C = 20\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 7.5\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.018		μs
			$T_{vj} = 125\ ^\circ C$		0.029		
			$T_{vj} = 150\ ^\circ C$		0.046		
Turn-on energy loss per pulse	E_{on}	$I_C = 20\ A, V_{CC} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 7.5\ \Omega, di/dt = 1100\ A/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		0.17		mJ
			$T_{vj} = 125\ ^\circ C$		0.2		
			$T_{vj} = 150\ ^\circ C$		0.21		
Turn-off energy loss per pulse	E_{off}	$I_C = 20\ A, V_{CC} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 7.5\ \Omega, dv/dt = 6250\ V/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		0.1		mJ
			$T_{vj} = 125\ ^\circ C$		0.2		
			$T_{vj} = 150\ ^\circ C$		0.22		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, $\lambda_{grease} = 1\ W/(m \cdot K)$			1.36		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 Diode, Inverter

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		$T_{vj} = 25\ ^\circ\text{C}$	650	V
Implemented forward current	I_{FN}			25	A
Continuous DC forward current	I_F			20	A
Repetitive peak forward current	I_{FRM}	$t_p = 1\ \text{ms}$		50	A
I^2t - value	I^2t	$t_p = 10\ \text{ms}, V_R = 0\ \text{V}$	$T_{vj} = 125\ ^\circ\text{C}$	55	A^2s
			$T_{vj} = 150\ ^\circ\text{C}$	50	

Table 6 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 20\ \text{A}, V_{GE} = 0\ \text{V}$	$T_{vj} = 25\ ^\circ\text{C}$	1.65	2.15	V
			$T_{vj} = 125\ ^\circ\text{C}$	1.55		
			$T_{vj} = 150\ ^\circ\text{C}$	1.50		
Peak reverse recovery current	I_{RM}	$V_{CC} = 300\ \text{V}, I_F = 20\ \text{A}, V_{GE} = -15\ \text{V}, -di_F/dt = 1100\ \text{A}/\mu\text{s} (T_{vj} = 150\ ^\circ\text{C})$	$T_{vj} = 25\ ^\circ\text{C}$	14		A
			$T_{vj} = 125\ ^\circ\text{C}$	18		
			$T_{vj} = 150\ ^\circ\text{C}$	20		
Recovered charge	Q_r	$V_{CC} = 300\ \text{V}, I_F = 20\ \text{A}, V_{GE} = -15\ \text{V}, -di_F/dt = 1100\ \text{A}/\mu\text{s} (T_{vj} = 150\ ^\circ\text{C})$	$T_{vj} = 25\ ^\circ\text{C}$	0.77		μC
			$T_{vj} = 125\ ^\circ\text{C}$	1.2		
			$T_{vj} = 150\ ^\circ\text{C}$	1.44		
Reverse recovery energy	E_{rec}	$V_{CC} = 300\ \text{V}, I_F = 20\ \text{A}, V_{GE} = -15\ \text{V}, -di_F/dt = 1100\ \text{A}/\mu\text{s} (T_{vj} = 150\ ^\circ\text{C})$	$T_{vj} = 25\ ^\circ\text{C}$	0.16		mJ
			$T_{vj} = 125\ ^\circ\text{C}$	0.22		
			$T_{vj} = 150\ ^\circ\text{C}$	0.27		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 1\ \text{W}/(\text{m}\cdot\text{K})$		1.78		K/W

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Temperature under switching conditions	$T_{vj\,op}$		-40		150	°C

4 IGBT, 3-Level

Table 7 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}			40	A
Continuous DC collector current	I_{CDC}	$T_{vj\,max} = 175\,^{\circ}\text{C}$	$T_H = 115\,^{\circ}\text{C}$	20	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\,op}$		80	A
Gate-emitter peak voltage	V_{GES}			± 20	V

Table 8 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\,sat}$	$I_C = 20\,\text{A}$, $V_{GE} = 15\,\text{V}$	$T_{vj} = 25\,^{\circ}\text{C}$		1.32	1.81	V
			$T_{vj} = 125\,^{\circ}\text{C}$		1.39		
			$T_{vj} = 150\,^{\circ}\text{C}$		1.41		
Gate threshold voltage	V_{GEth}	$I_C = 0.35\,\text{mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25\,^{\circ}\text{C}$		3.85	4.60	5.35	V
Gate charge	Q_G	$V_{GE} = \pm 15\,\text{V}$, $V_{CC} = 300\,\text{V}$			0.152		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\,^{\circ}\text{C}$			0		Ω
Input capacitance	C_{ies}	$f = 100\,\text{kHz}$, $T_{vj} = 25\,^{\circ}\text{C}$, $V_{CE} = 25\,\text{V}$, $V_{GE} = 0\,\text{V}$			1.94		nF
Reverse transfer capacitance	C_{res}	$f = 100\,\text{kHz}$, $T_{vj} = 25\,^{\circ}\text{C}$, $V_{CE} = 25\,\text{V}$, $V_{GE} = 0\,\text{V}$			0.007		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650\,\text{V}$, $V_{GE} = 0\,\text{V}$	$T_{vj} = 25\,^{\circ}\text{C}$			0.018	mA
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}	$I_C = 20\,\text{A}$, $V_{CC} = 300\,\text{V}$, $V_{GE} = \pm 15\,\text{V}$, $R_{Gon} = 3.9\,\Omega$	$T_{vj} = 25\,^{\circ}\text{C}$		0.011		μs
			$T_{vj} = 125\,^{\circ}\text{C}$		0.012		
			$T_{vj} = 150\,^{\circ}\text{C}$		0.012		

(table continues...)

Table 8 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rise time (inductive load)	t_r	$I_C = 20\text{ A}$, $V_{CC} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 3.9\ \Omega$	$T_{vj} = 25\text{ °C}$	0.005		μs
			$T_{vj} = 125\text{ °C}$	0.006		
			$T_{vj} = 150\text{ °C}$	0.006		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 20\text{ A}$, $V_{CC} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 3.9\ \Omega$	$T_{vj} = 25\text{ °C}$	0.069		μs
			$T_{vj} = 125\text{ °C}$	0.085		
			$T_{vj} = 150\text{ °C}$	0.091		
Fall time (inductive load)	t_f	$I_C = 20\text{ A}$, $V_{CC} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 3.9\ \Omega$	$T_{vj} = 25\text{ °C}$	0.021		μs
			$T_{vj} = 125\text{ °C}$	0.052		
			$T_{vj} = 150\text{ °C}$	0.065		
Turn-on energy loss per pulse	E_{on}	$I_C = 20\text{ A}$, $V_{CC} = 300\text{ V}$, $L_\sigma = 35\text{ nH}$, $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 3.9\ \Omega$, $di/dt = 3500\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	0.08		mJ
			$T_{vj} = 125\text{ °C}$	0.09		
			$T_{vj} = 150\text{ °C}$	0.09		
Turn-off energy loss per pulse	E_{off}	$I_C = 20\text{ A}$, $V_{CC} = 300\text{ V}$, $L_\sigma = 35\text{ nH}$, $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 3.9\ \Omega$, $dv/dt = 6210\text{ V}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	0.11		mJ
			$T_{vj} = 125\text{ °C}$	0.19		
			$T_{vj} = 150\text{ °C}$	0.21		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$		1.36		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

5 Diode, 3-Level

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			20	A
Repetitive peak forward current	I_{FRM}	$t_P = 1\text{ ms}$		40	A
I^2t - value	I^2t	$t_P = 10\text{ ms}$, $V_R = 0\text{ V}$	$T_{vj} = 125\text{ °C}$	65	A^2s
			$T_{vj} = 150\text{ °C}$	65	

Table 10 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 20 \text{ A}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.45	1.85	V
			$T_{vj} = 125 \text{ °C}$	1.60		
			$T_{vj} = 150 \text{ °C}$	1.65		
Peak reverse recovery current	I_{RM}	$V_{CC} = 300 \text{ V}$, $I_F = 20 \text{ A}$, $V_{GE} = 15 \text{ V}$, $-di_F/dt = 3500 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	19		A
			$T_{vj} = 125 \text{ °C}$	17		
			$T_{vj} = 150 \text{ °C}$	16		
Recovered charge	Q_r	$V_{CC} = 300 \text{ V}$, $I_F = 20 \text{ A}$, $V_{GE} = 15 \text{ V}$, $-di_F/dt = 3500 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	0.13		μC
			$T_{vj} = 125 \text{ °C}$	0.12		
			$T_{vj} = 150 \text{ °C}$	0.12		
Reverse recovery energy	E_{rec}	$V_{CC} = 300 \text{ V}$, $I_F = 20 \text{ A}$, $V_{GE} = 15 \text{ V}$, $-di_F/dt = 3500 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	0.015		mJ
			$T_{vj} = 125 \text{ °C}$	0.015		
			$T_{vj} = 150 \text{ °C}$	0.015		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, $\lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$		1.92		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

6 NTC-Thermistor

Table 11 Characteristic values

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

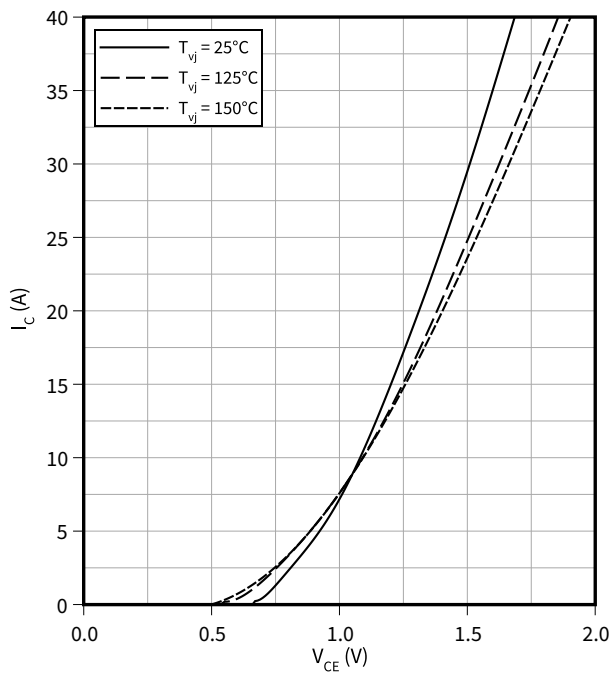
Note: For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4.

7 Characteristics diagrams

Output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

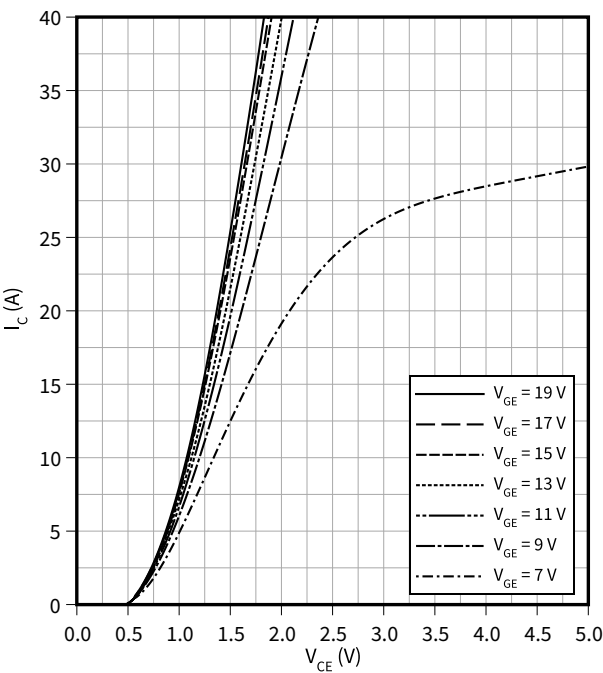
$V_{GE} = 15\text{ V}$



Output characteristic field (typical), IGBT, Inverter

$I_C = f(V_{CE})$

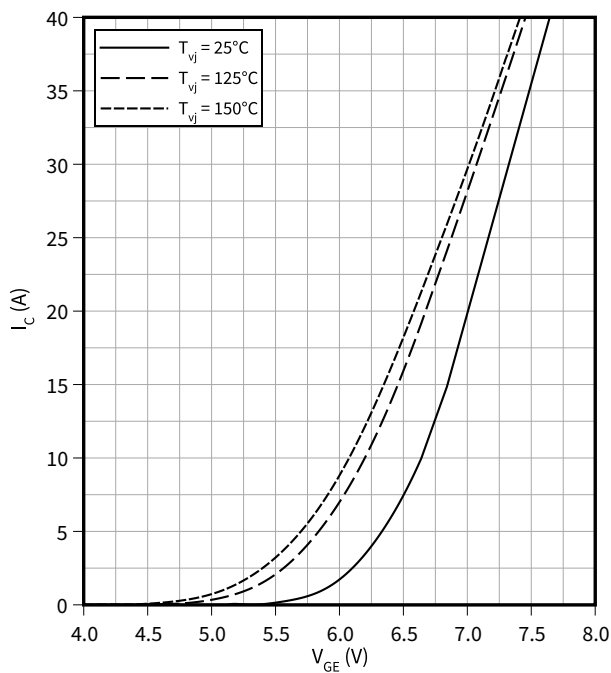
$T_{vj} = 150^\circ\text{C}$



Transfer characteristic (typical), IGBT, Inverter

$I_C = f(V_{GE})$

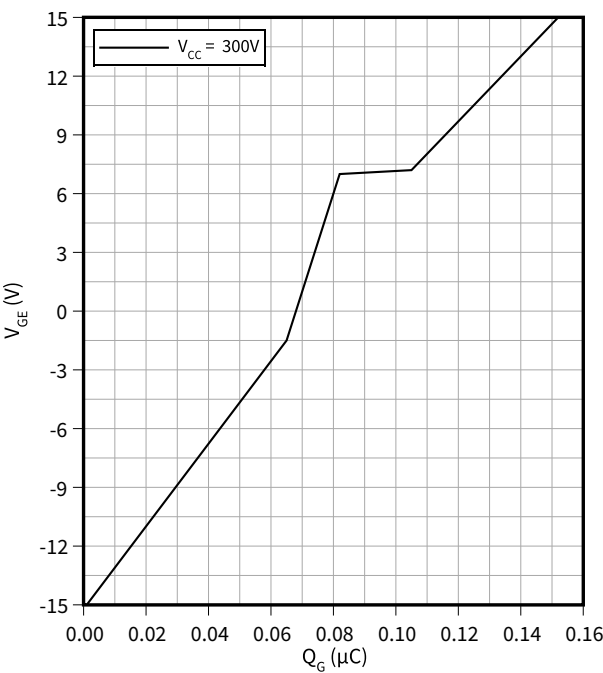
$V_{CE} = 20\text{ V}$



Gate charge characteristic (typical), IGBT, Inverter

$V_{GE} = f(Q_G)$

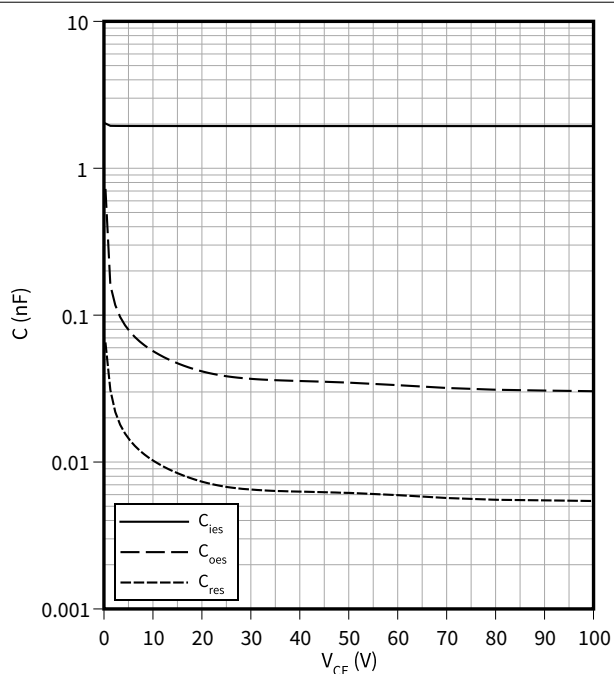
$I_C = 20\text{ A}, T_{vj} = 25^\circ\text{C}$



Capacity characteristic (typical), IGBT, Inverter

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

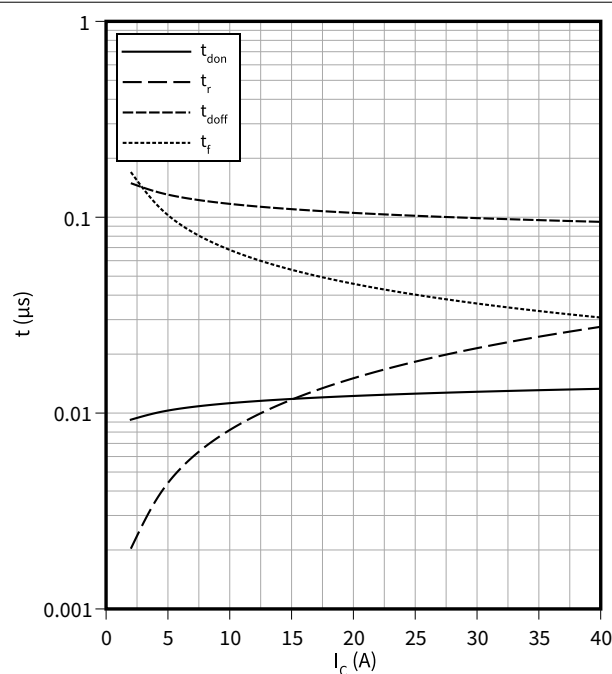
$f = 100 \text{ kHz}$, $V_{GE} = 0 \text{ V}$, $T_{vj} = 25^\circ\text{C}$



Switching times (typical), IGBT, Inverter

$$t = f(I_C)$$

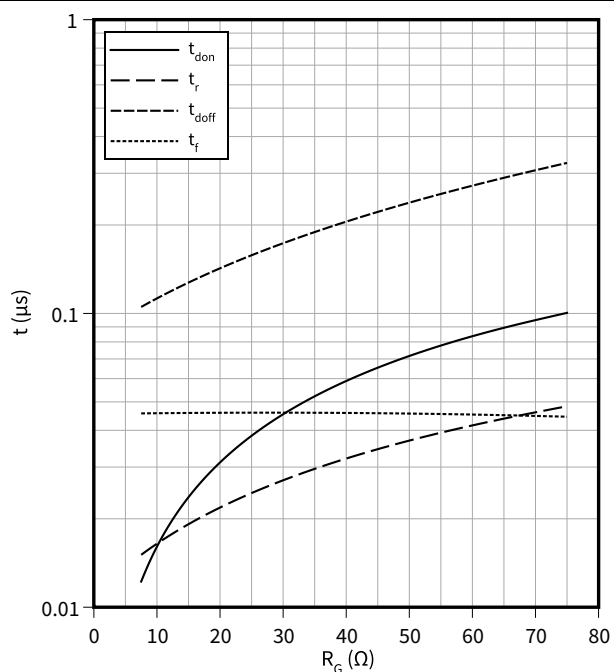
$R_{Goff} = 7.5 \Omega$, $R_{Gon} = 7.5 \Omega$, $V_{CC} = 300 \text{ V}$, $V_{GE} = -15 / 15 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



Switching times (typical), IGBT, Inverter

$$t = f(R_G)$$

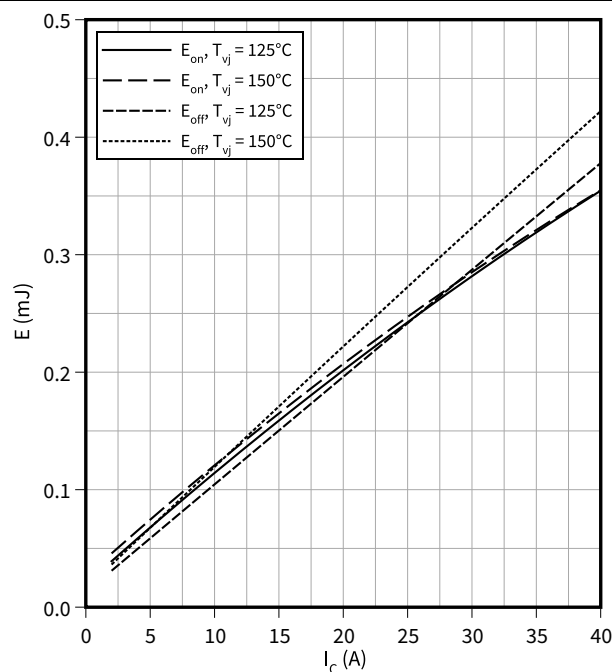
$I_C = 20 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = -15 / 15 \text{ V}$, $T_{vj} = 150^\circ\text{C}$



Switching losses (typical), IGBT, Inverter

$$E = f(I_C)$$

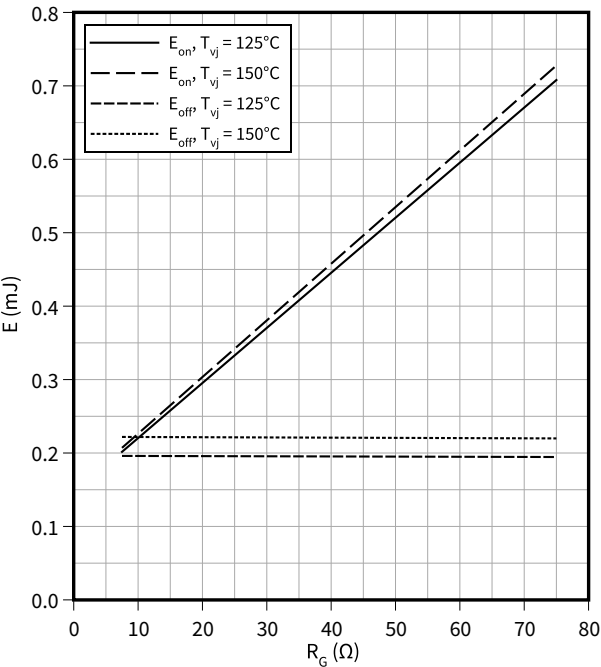
$R_{Goff} = 7.5 \Omega$, $R_{Gon} = 7.5 \Omega$, $V_{CC} = 300 \text{ V}$, $V_{GE} = -15 / 15 \text{ V}$



7 Characteristics diagrams

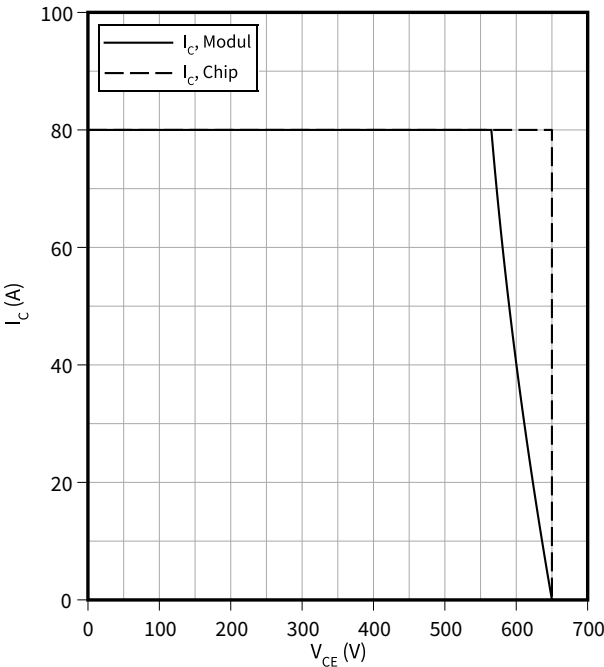
Switching losses (typical), IGBT, Inverter

$E = f(R_G)$
 $I_C = 20\text{ A}$, $V_{CC} = 300\text{ V}$, $V_{GE} = -15 / 15\text{ V}$



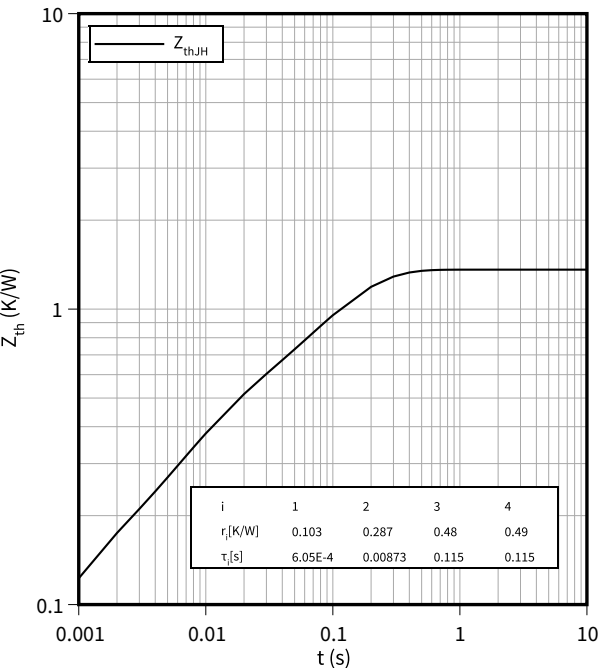
Reverse bias safe operating area (RBSOA), IGBT, Inverter

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



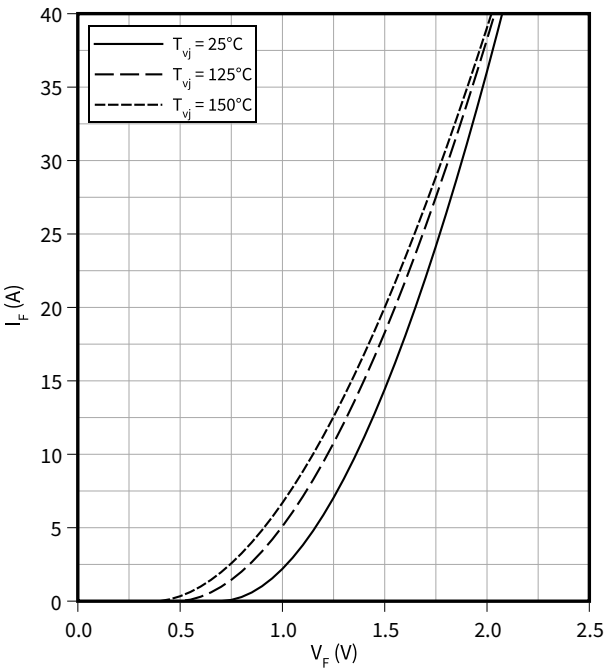
Transient thermal impedance, IGBT, Inverter

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, Inverter

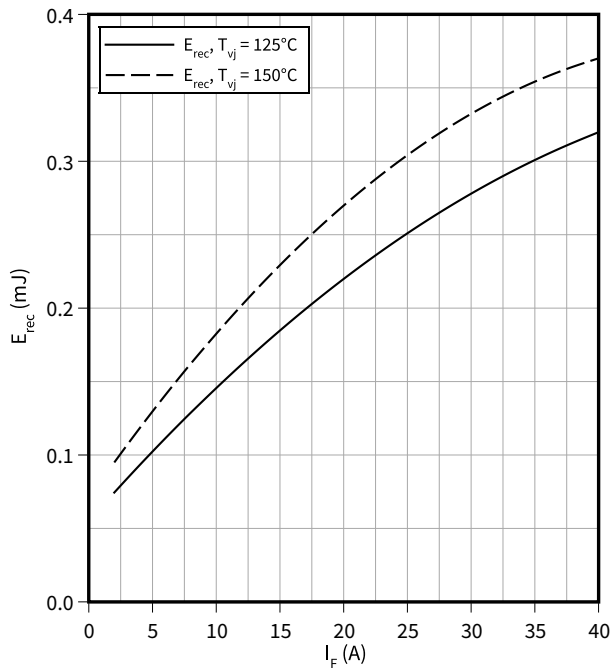
$I_F = f(V_F)$



7 Characteristics diagrams

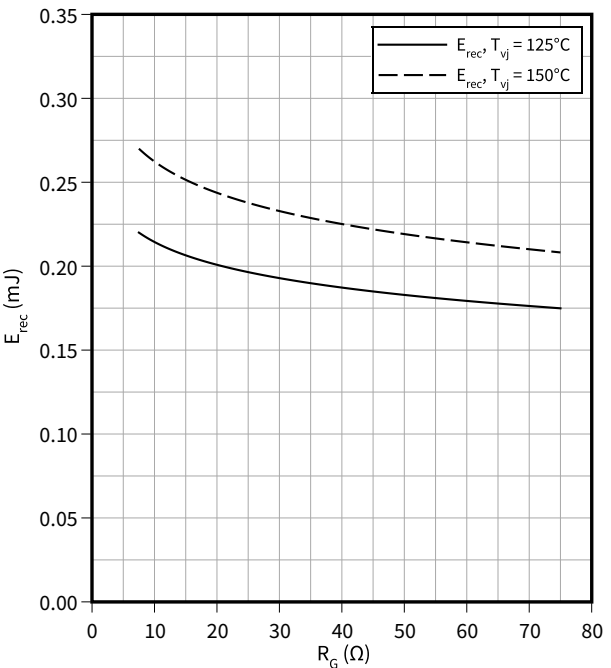
Switching losses (typical), Diode, Inverter

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



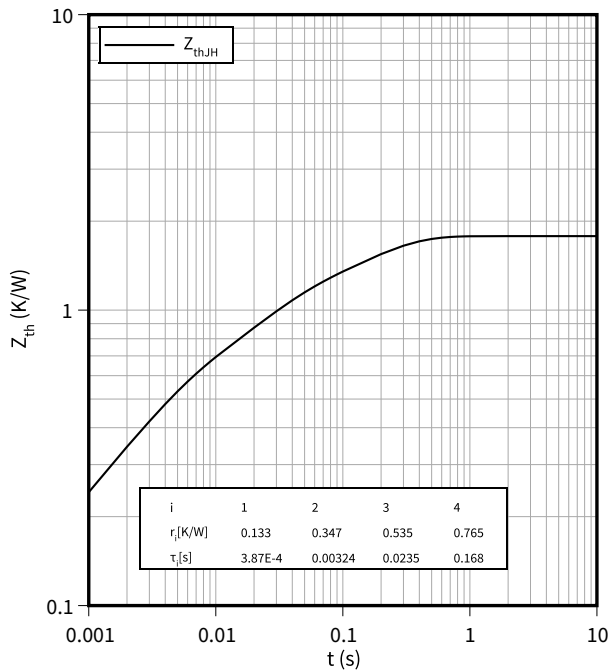
Switching losses (typical), Diode, Inverter

$E_{rec} = f(R_G)$
 $V_{CE} = 300 V, I_F = 20 A$



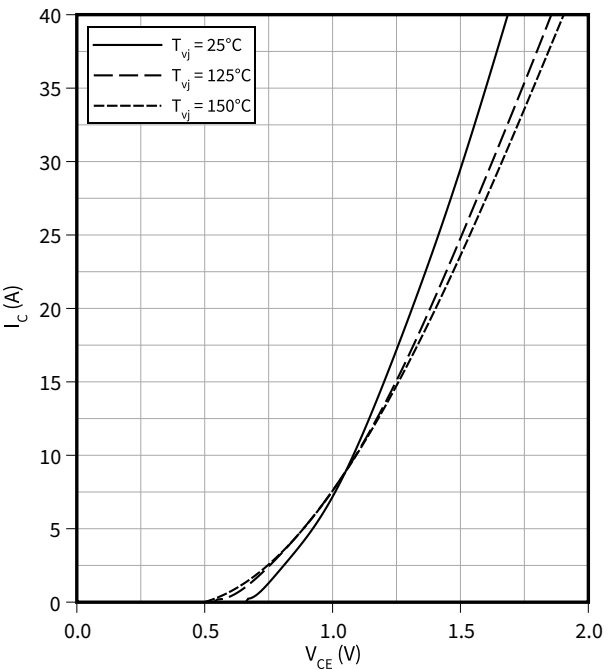
Transient thermal impedance, Diode, Inverter

$Z_{th} = f(t)$



Output characteristic (typical), IGBT, 3-Level

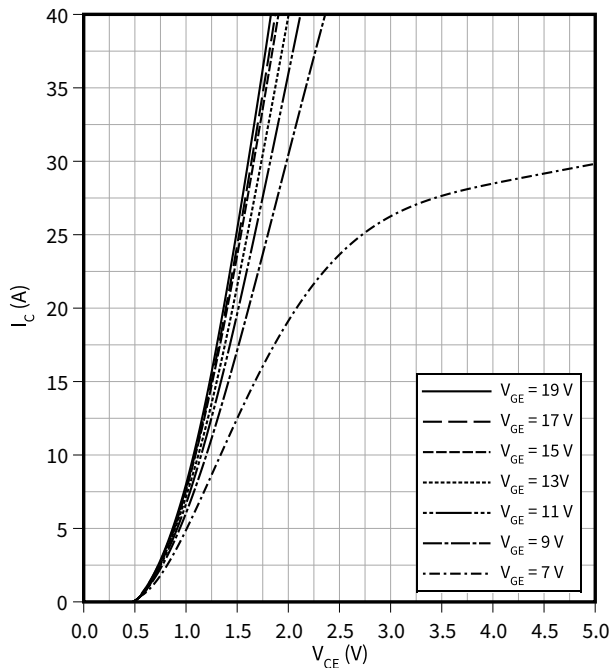
$I_C = f(V_{CE})$
 $V_{GE} = 15 V$



7 Characteristics diagrams

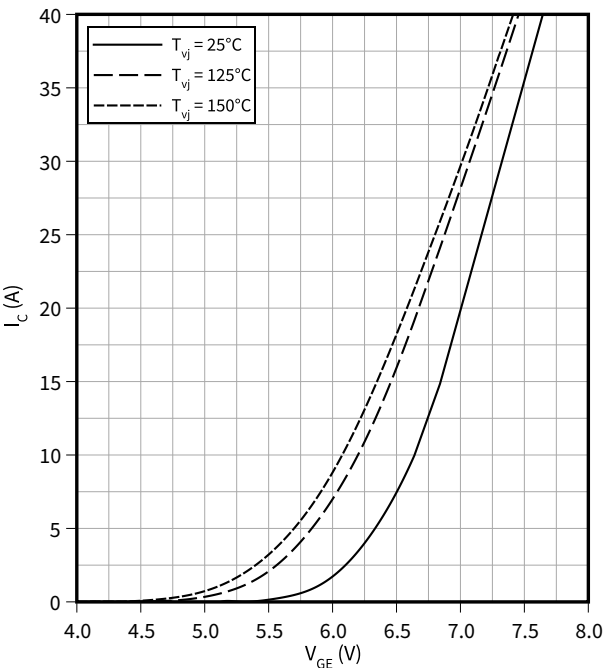
Output characteristic field (typical), IGBT, 3-Level

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



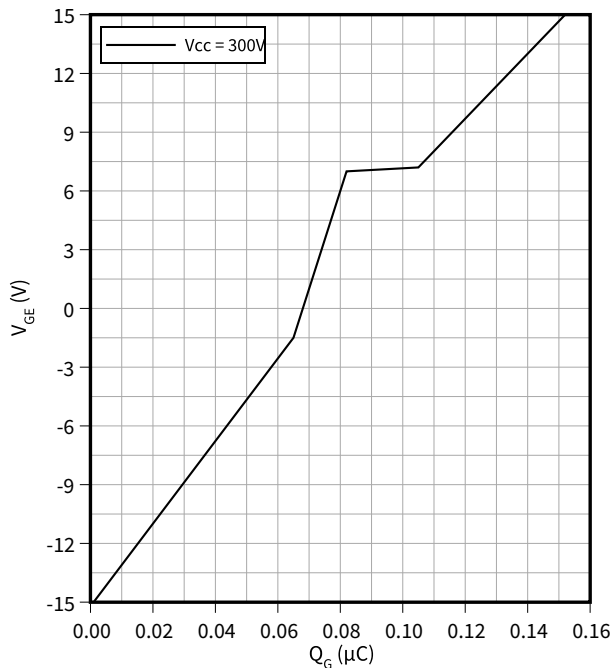
Transfer characteristic (typical), IGBT, 3-Level

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



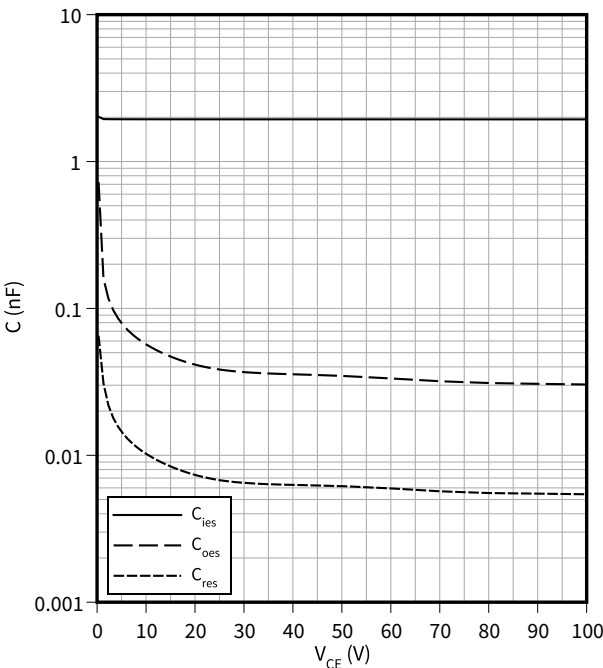
Gate charge characteristic (typical), IGBT, 3-Level

$V_{GE} = f(Q_G)$
 $I_C = 20\text{ A}$, $T_{vj} = 25\text{ °C}$



Capacity characteristic (typical), IGBT, 3-Level

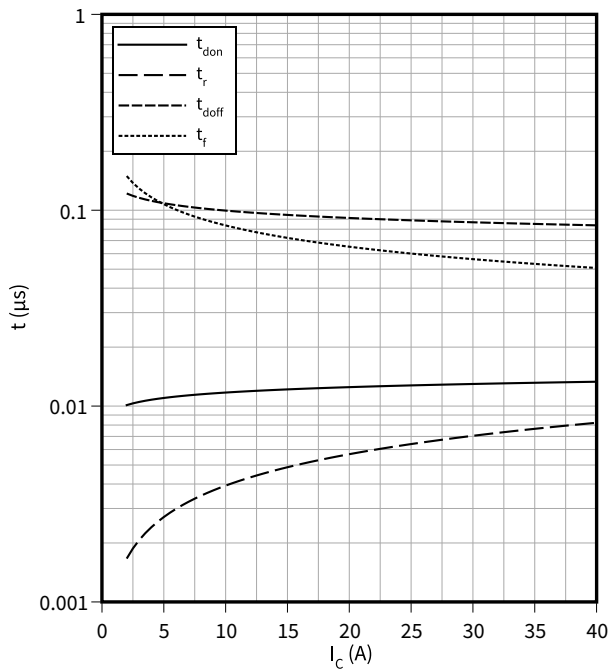
$C = f(V_{CE})$
 $f = 100\text{ kHz}$, $V_{GE} = 0\text{ V}$, $T_{vj} = 25\text{ °C}$



7 Characteristics diagrams

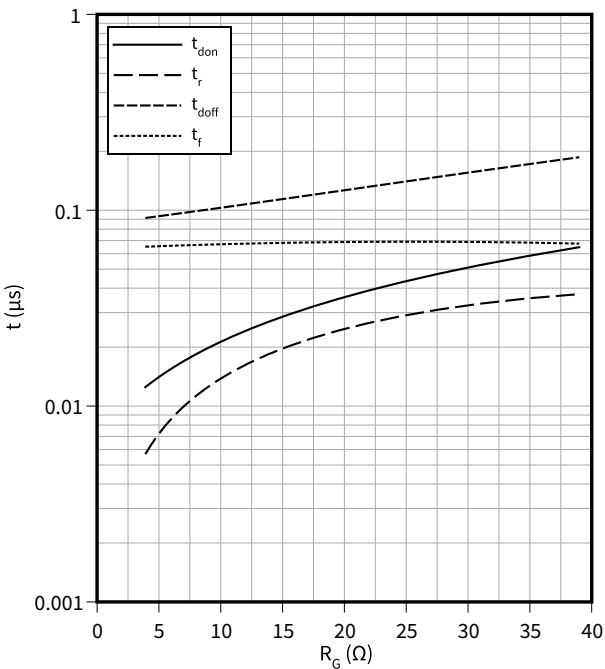
Switching times (typical), IGBT, 3-Level

$t = f(I_C)$
 $R_{Goff} = 3.9 \, \Omega$, $R_{Gon} = 3.9 \, \Omega$, $V_{CC} = 300 \, V$, $V_{GE} = -15 / 15 \, V$, $T_{vj} = 150 \, ^\circ C$



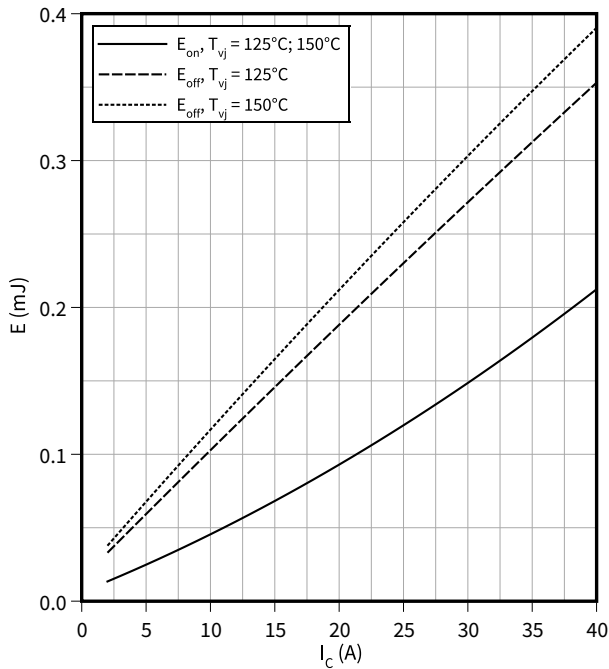
Switching times (typical), IGBT, 3-Level

$t = f(R_G)$
 $I_C = 20 \, A$, $V_{CC} = 300 \, V$, $V_{GE} = -15 / 15 \, V$, $T_{vj} = 150 \, ^\circ C$



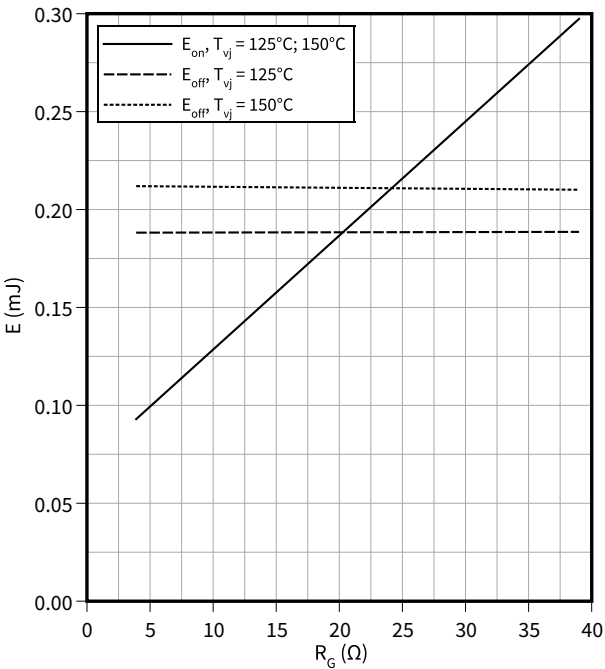
Switching losses (typical), IGBT, 3-Level

$E = f(I_C)$
 $R_{Goff} = 3.9 \, \Omega$, $R_{Gon} = 3.9 \, \Omega$, $V_{CC} = 300 \, V$, $V_{GE} = -15 / 15 \, V$



Switching losses (typical), IGBT, 3-Level

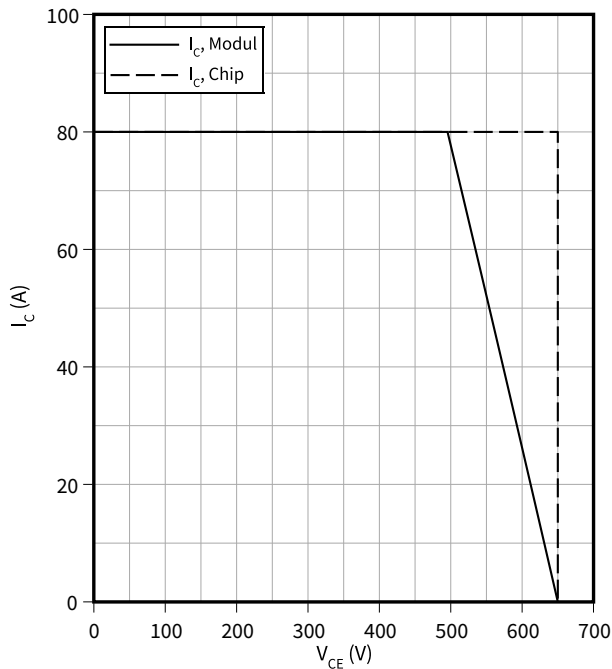
$E = f(R_G)$
 $I_C = 20 \, A$, $V_{CC} = 300 \, V$, $V_{GE} = -15 / 15 \, V$



7 Characteristics diagrams

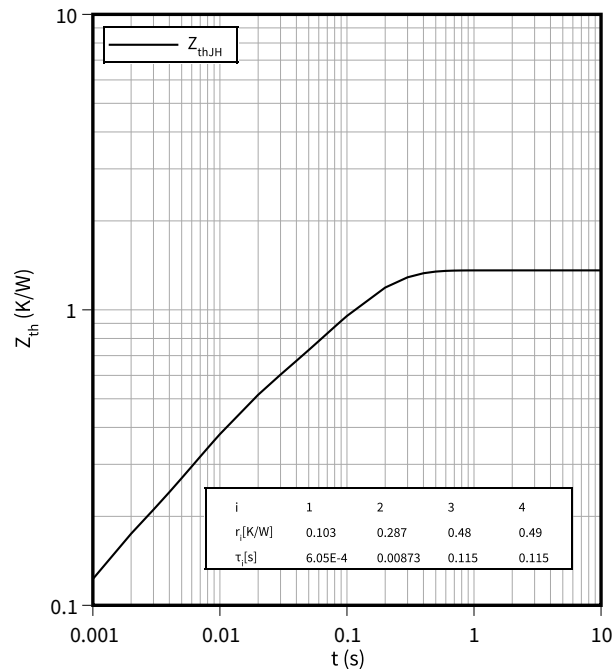
Reverse bias safe operating area (RBSOA), IGBT, 3-Level

$I_C = f(V_{CE})$
 $R_{Goff} = 3.9 \, \Omega$, $V_{GE} = \pm 15 \, V$, $T_{vj} = 150 \, ^\circ C$



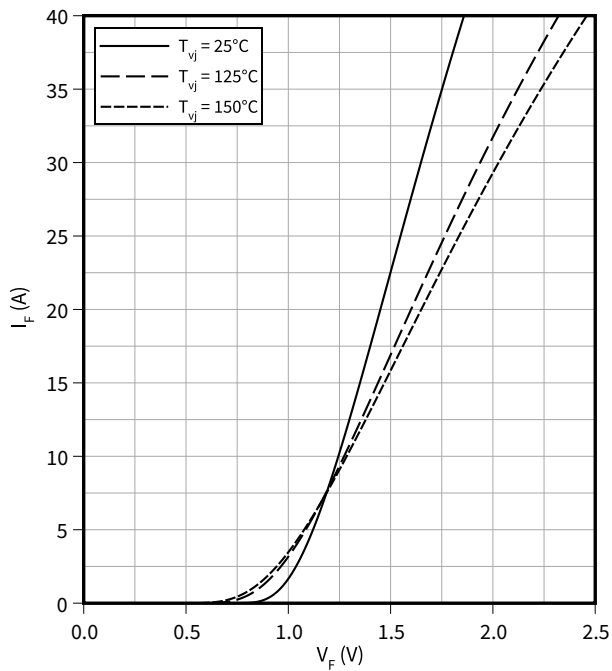
Transient thermal impedance, IGBT, 3-Level

$Z_{th} = f(t)$



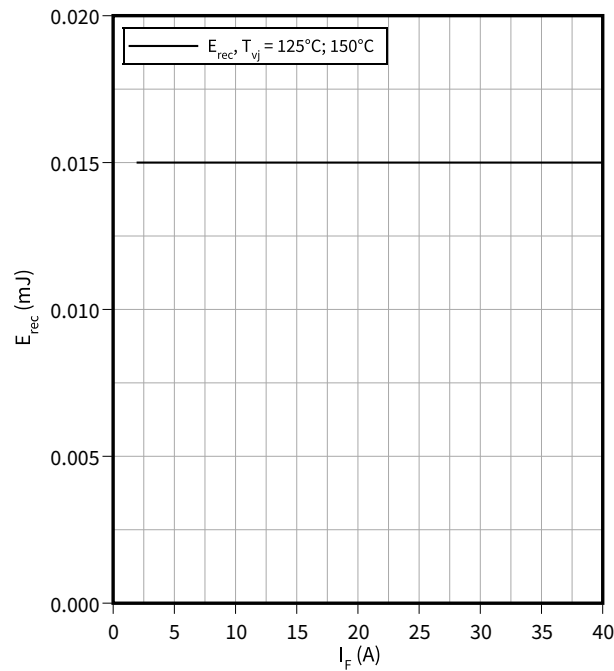
Forward characteristic (typical), Diode, 3-Level

$I_F = f(V_F)$



Switching losses (typical), Diode, 3-Level

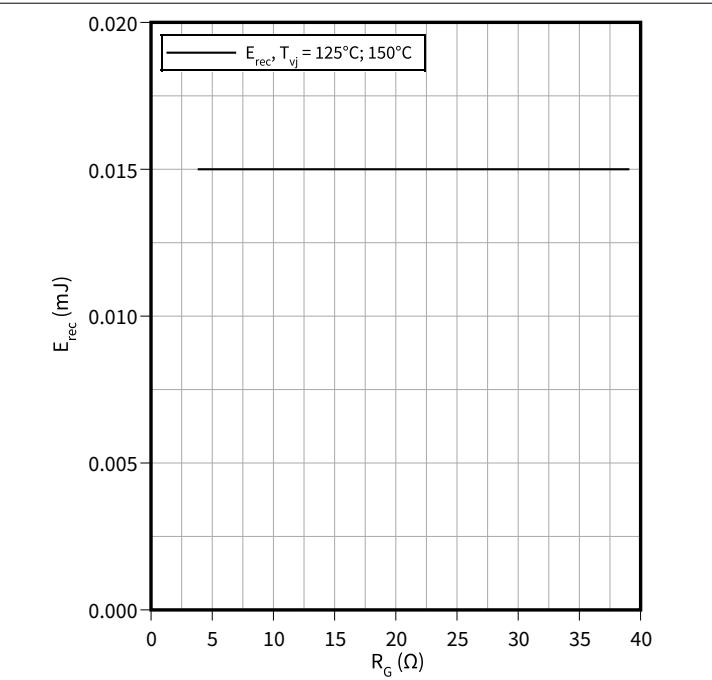
$E_{rec} = f(I_F)$
 $R_{Gon} = 3.9 \, \Omega$, $V_{CE} = 300 \, V$



7 Characteristics diagrams

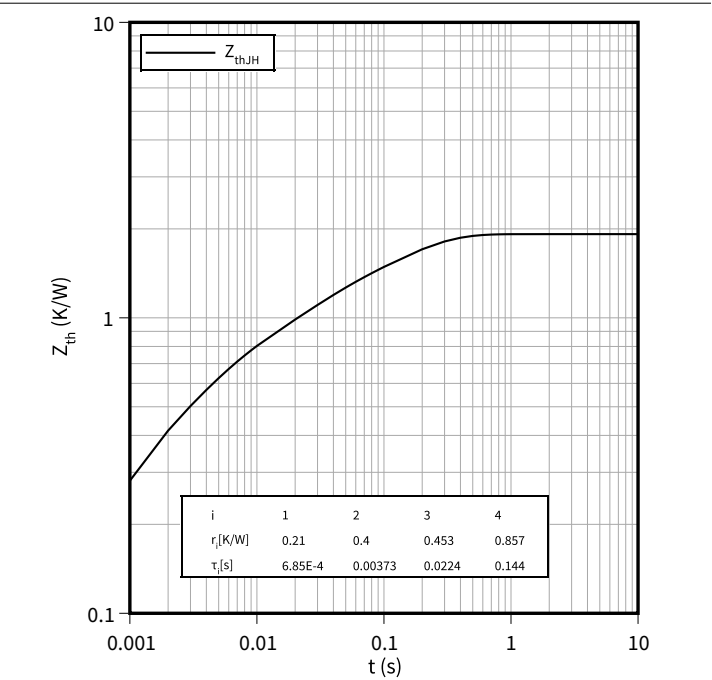
Switching losses (typical), Diode, 3-Level

$E_{rec} = f(R_G)$
 $V_{CE} = 300\text{ V}, I_F = 20\text{ A}$



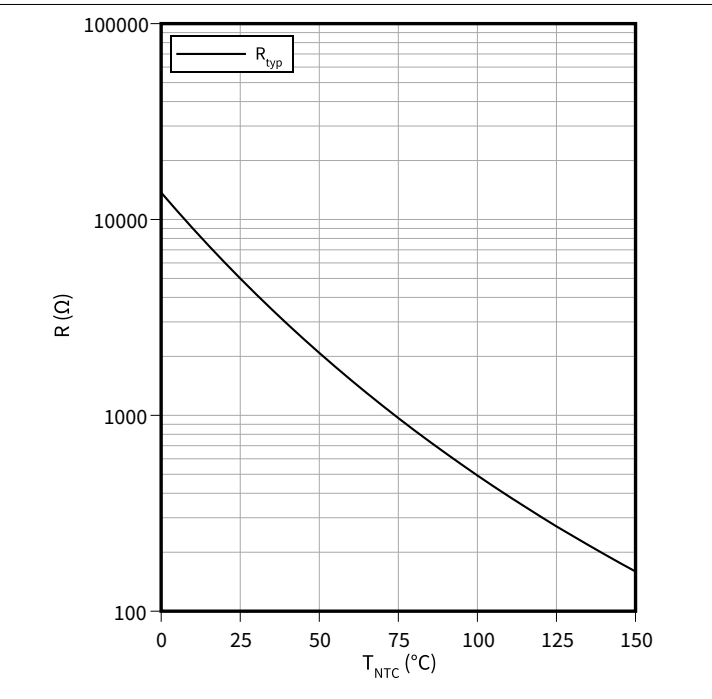
Transient thermal impedance, Diode, 3-Level

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



8 Circuit diagram

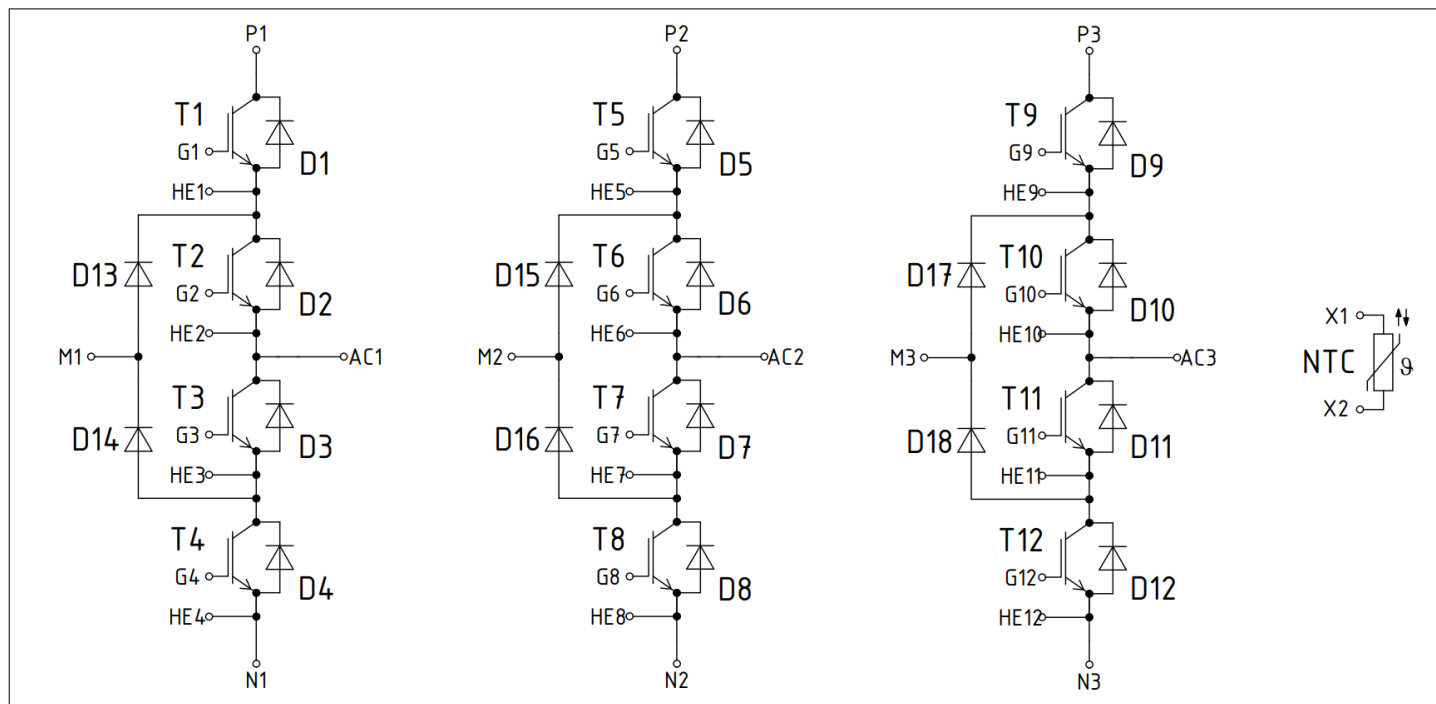


Figure 1

9 Package outlines

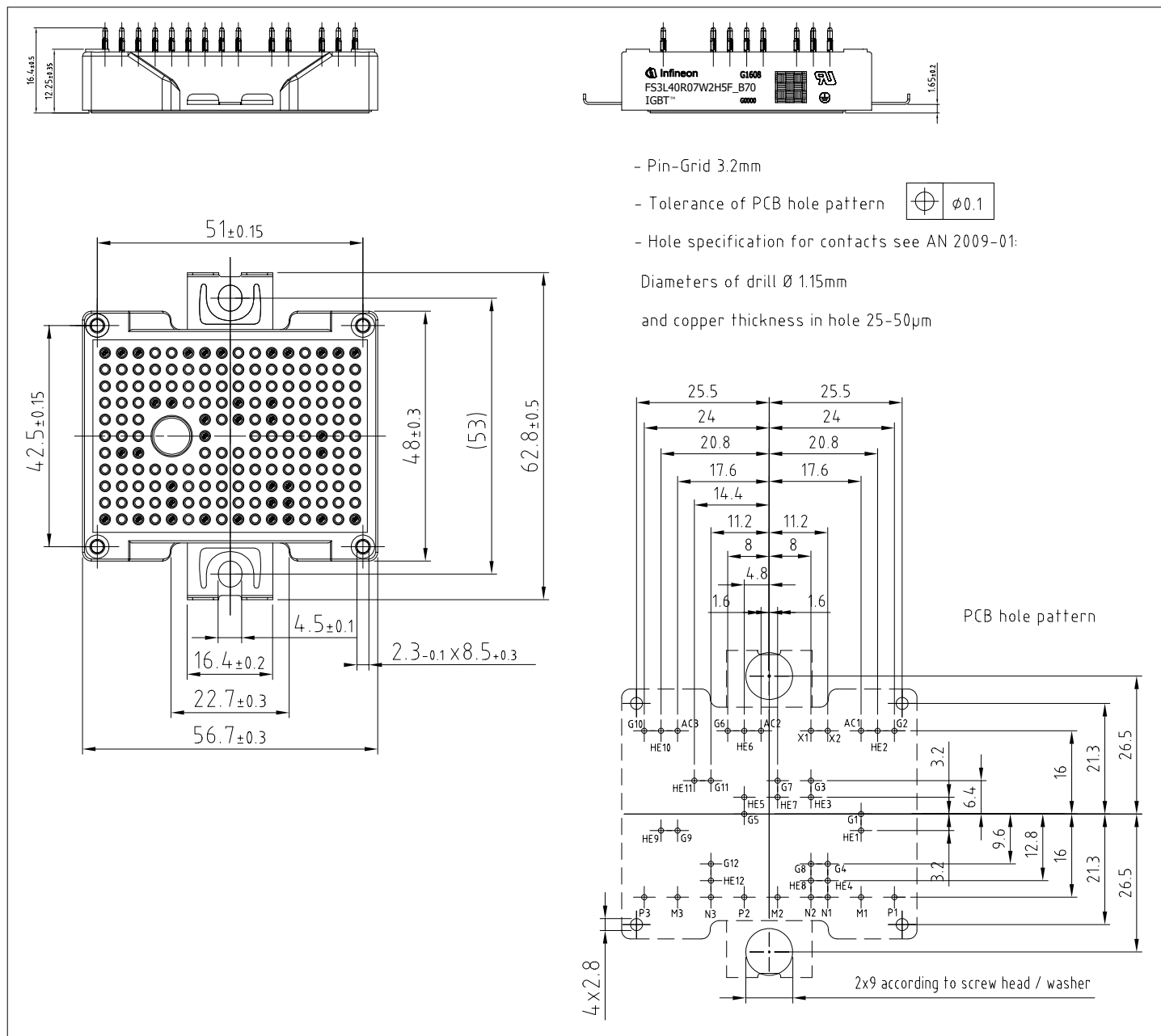


Figure 2

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	2023-10-04	Initial version
1.00	2024-04-09	Final datasheet

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