

EasyPIM™ module with fast Trench/Fieldstop IGBT3 and emitter controlled 3 diode and PressFIT / NTC

Features

- Electrical features
 - $V_{CES} = 650\text{ V}$
 - $I_{C\text{ nom}} = 50\text{ A} / I_{CRM} = 100\text{ A}$
 - Trench IGBT 3
 - Low switching losses
- Mechanical features
 - Al_2O_3 substrate with low thermal resistance
 - Compact design
 - PressFIT contact technology
 - Rugged mounting due to integrated mounting clamps



Typical appearance

Potential applications

- Air conditioning

Product validation

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

Description

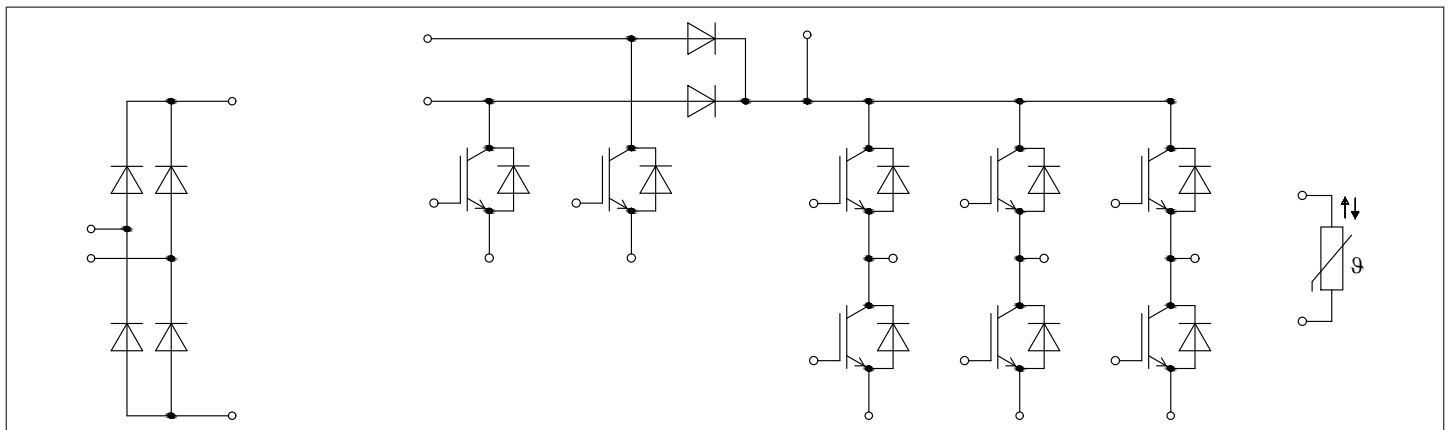


Table of contents

	Description	1
	Features	1
	Potential applications	1
	Product validation	1
	Table of contents	2
1	Package	3
2	IGBT, Inverter	3
3	Diode, Inverter	5
4	Diode, Rectifier	6
5	IGBT, Boost	6
6	Diode, Boost	8
7	Diode, Reverse	9
8	NTC-Thermistor	9
9	Characteristics diagrams	10
10	Circuit diagram	19
11	Package outlines	20
12	Module label code	21
	Revision history	22
	Disclaimer	23

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
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}			30		nH
Module lead resistance, terminals - chip	$R_{AA'+CC'}$	$T_H = 25^\circ\text{C}$, per switch		6		mΩ
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25^\circ\text{C}$, per switch		5		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 25 A 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}		$T_{vj} = 25^\circ\text{C}$	650	V
Implemented collector current	I_{CN}			50	A
Continuous DC collector current	I_{CDC}	$T_{vj \max} = 175^\circ\text{C}$	$T_H = 65^\circ\text{C}$	45	A
Repetitive peak collector current	I_{CRM}	$t_P = 1 \text{ ms}$		100	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	$V_{CE\ sat}$	$I_C = 50\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$		1.45	1.90	V
			$T_{vj} = 125\ ^\circ C$		1.60		
			$T_{vj} = 150\ ^\circ C$		1.70		
Gate threshold voltage	V_{GEth}	$I_C = 0.8\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$		5.05	5.80	6.45	V
Gate charge	Q_G	$V_{GE} = \pm 15\ V, V_{CE} = 400\ V$			0.5		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$			0		Ω
Input capacitance	C_{ies}	$f = 1000\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			3.1		nF
Reverse transfer capacitance	C_{res}	$f = 1000\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			0.095		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}	$I_C = 50\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 8.2\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.029		μs
			$T_{vj} = 125\ ^\circ C$		0.030		
			$T_{vj} = 150\ ^\circ C$		0.031		
Rise time (inductive load)	t_r	$I_C = 50\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 8.2\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.059		μs
			$T_{vj} = 125\ ^\circ C$		0.060		
			$T_{vj} = 150\ ^\circ C$		0.061		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 50\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 8.2\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.180		μs
			$T_{vj} = 125\ ^\circ C$		0.210		
			$T_{vj} = 150\ ^\circ C$		0.220		
Fall time (inductive load)	t_f	$I_C = 50\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 8.2\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.110		μs
			$T_{vj} = 125\ ^\circ C$		0.140		
			$T_{vj} = 150\ ^\circ C$		0.150		
Turn-on energy loss per pulse	E_{on}	$I_C = 50\ A, V_{CE} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 8.2\ \Omega, di/dt = 550\ A/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		1.37		mJ
			$T_{vj} = 125\ ^\circ C$		1.78		
			$T_{vj} = 150\ ^\circ C$		1.89		
Turn-off energy loss per pulse	E_{off}	$I_C = 50\ A, V_{CE} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 8.2\ \Omega, dv/dt = 4000\ V/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		1.17		mJ
			$T_{vj} = 125\ ^\circ C$		1.57		
			$T_{vj} = 150\ ^\circ C$		1.66		
SC data	I_{SC}	$V_{GE} \leq 15\ V, V_{CC} = 360\ V, V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_p \leq 6\ \mu s, T_{vj} = 150\ ^\circ C$		250		A
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT			1.02		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
Continuous DC forward current	I_F		50	A
Repetitive peak forward current	I_{FRM}	$t_p = 1\ \text{ms}$	100	A
I^2t - value	I^2t	$V_R = 0\ \text{V}, t_p = 10\ \text{ms}$	$T_{vj} = 125\ ^\circ\text{C}$	A^2s
			$T_{vj} = 150\ ^\circ\text{C}$	

Table 6 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 50\ \text{A}, V_{GE} = 0\ \text{V}$	$T_{vj} = 25\ ^\circ\text{C}$	1.56	1.95	V
			$T_{vj} = 125\ ^\circ\text{C}$	1.49		
			$T_{vj} = 150\ ^\circ\text{C}$	1.45		
Peak reverse recovery current	I_{RM}	$I_F = 50\ \text{A}, V_R = 300\ \text{V}, V_{GE} = -15\ \text{V}, -di_F/dt = 550\ \text{A}/\mu\text{s} (T_{vj} = 150\ ^\circ\text{C})$	$T_{vj} = 25\ ^\circ\text{C}$	34		A
			$T_{vj} = 125\ ^\circ\text{C}$	48		
			$T_{vj} = 150\ ^\circ\text{C}$	53		
Recovered charge	Q_r	$I_F = 50\ \text{A}, V_R = 300\ \text{V}, V_{GE} = -15\ \text{V}, -di_F/dt = 550\ \text{A}/\mu\text{s} (T_{vj} = 150\ ^\circ\text{C})$	$T_{vj} = 25\ ^\circ\text{C}$	2.4		μC
			$T_{vj} = 125\ ^\circ\text{C}$	4.4		
			$T_{vj} = 150\ ^\circ\text{C}$	5.1		
Reverse recovery energy	E_{rec}	$I_F = 50\ \text{A}, V_R = 300\ \text{V}, V_{GE} = -15\ \text{V}, -di_F/dt = 550\ \text{A}/\mu\text{s} (T_{vj} = 150\ ^\circ\text{C})$	$T_{vj} = 25\ ^\circ\text{C}$	0.62		mJ
			$T_{vj} = 125\ ^\circ\text{C}$	1.11		
			$T_{vj} = 150\ ^\circ\text{C}$	1.28		
Thermal resistance, junction to heat sink	R_{thJH}	per diode		1.45		K/W
Temperature under switching conditions	$T_{vj\ op}$		-40		150	°C

4 Diode, Rectifier

Table 7 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25\text{ °C}$		1200	V
Maximum RMS forward current per chip	I_{FRMSM}	$T_H = 80\text{ °C}$		50	A
Maximum RMS current at rectifier output	I_{RMSM}	$T_H = 80\text{ °C}$		50	A
Surge forward current	I_{FSM}	$t_p = 10\text{ ms}$	$T_{vj} = 25\text{ °C}$	493	A
			$T_{vj} = 150\text{ °C}$	378	
I^2t - value	I^2t	$t_p = 10\text{ ms}$	$T_{vj} = 25\text{ °C}$	1210	A ² s
			$T_{vj} = 150\text{ °C}$	714	

Table 8 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 50\text{ A}$	$T_{vj} = 150\text{ °C}$		0.98		V
Reverse current	I_r	$T_{vj} = 150\text{ °C}$, $V_R = 1200\text{ V}$			0.1		mA
Thermal resistance, junction to heat sink	R_{thJH}	per diode			1.43		K/W
Temperature under switching conditions	$T_{vj, op}$			-40		150	°C

5 IGBT, Boost

Table 9 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}			75	A
Continuous DC collector current	I_{CDC}	$T_{vj\text{ max}} = 175\text{ °C}$	$T_H = 80\text{ °C}$	40	A
Repetitive peak collector current	I_{CRM}	$t_p = 1\text{ ms}$		150	A
Gate-emitter peak voltage	V_{GES}			±20	V

Table 10 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\ sat}$	$I_C = 40\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$		1.28	1.66	V
			$T_{vj} = 125\ ^\circ C$		1.35		
			$T_{vj} = 150\ ^\circ C$		1.37		
Gate threshold voltage	V_{GEth}	$I_C = 0.75\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$		3.85	4.60	5.35	V
Gate charge	Q_G	$V_{GE} = \pm 15\ V, V_{CE} = 400\ V$			0.326		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$			0		Ω
Input capacitance	C_{ies}	$f = 1000\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			4.11		nF
Reverse transfer capacitance	C_{res}	$f = 1000\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			0.014		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$			0.021	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}	$I_C = 40\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 6.2\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.026		μs
			$T_{vj} = 125\ ^\circ C$		0.028		
			$T_{vj} = 150\ ^\circ C$		0.029		
Rise time (inductive load)	t_r	$I_C = 40\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 6.2\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.020		μs
			$T_{vj} = 125\ ^\circ C$		0.021		
			$T_{vj} = 150\ ^\circ C$		0.021		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 40\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 6.2\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.108		μs
			$T_{vj} = 125\ ^\circ C$		0.130		
			$T_{vj} = 150\ ^\circ C$		0.135		
Fall time (inductive load)	t_f	$I_C = 40\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 6.2\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.007		μs
			$T_{vj} = 125\ ^\circ C$		0.011		
			$T_{vj} = 150\ ^\circ C$		0.013		
Turn-on energy loss per pulse	E_{on}	$I_C = 40\ A, V_{CE} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 6.2\ \Omega, di/dt = 1150\ A/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		0.82		mJ
			$T_{vj} = 125\ ^\circ C$		1.2		
			$T_{vj} = 150\ ^\circ C$		1.28		
Turn-off energy loss per pulse	E_{off}	$I_C = 40\ A, V_{CE} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 6.2\ \Omega, dv/dt = 6500\ V/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		0.26		mJ
			$T_{vj} = 125\ ^\circ C$		0.36		
			$T_{vj} = 150\ ^\circ C$		0.39		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT			1.40		K/W
Temperature under switching conditions	$T_{vj\ op}$			-40		150	$^\circ C$

6 Diode, Boost

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
Implemented forward current	I_{FN}			75	A
Continuous DC forward current	I_F			40	A
Repetitive peak forward current	I_{FRM}	$t_P = 1\text{ ms}$		150	A
I^2t - value	I^2t	$V_R = 0\text{ V}, t_P = 10\text{ ms}$	$T_{vj} = 125\text{ °C}$	320	A^2s
			$T_{vj} = 150\text{ °C}$	280	

Table 12 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 40\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$		1.28	V
			$T_{vj} = 125\text{ °C}$		1.20	
			$T_{vj} = 150\text{ °C}$		1.16	
Peak reverse recovery current	I_{RM}	$I_F = 40\text{ A}, V_R = 300\text{ V}, V_{GE} = -15\text{ V}, -di_F/dt = 1150\text{ A}/\mu s (T_{vj} = 150\text{ °C})$	$T_{vj} = 25\text{ °C}$		25.6	A
			$T_{vj} = 125\text{ °C}$		33.3	
			$T_{vj} = 150\text{ °C}$		36.4	
Recovered charge	Q_r	$I_F = 40\text{ A}, V_R = 300\text{ V}, V_{GE} = -15\text{ V}, -di_F/dt = 1150\text{ A}/\mu s (T_{vj} = 150\text{ °C})$	$T_{vj} = 25\text{ °C}$		1.25	μC
			$T_{vj} = 125\text{ °C}$		2.62	
			$T_{vj} = 150\text{ °C}$		3.04	
Reverse recovery energy	E_{rec}	$I_F = 40\text{ A}, V_R = 300\text{ V}, V_{GE} = -15\text{ V}, -di_F/dt = 1150\text{ A}/\mu s (T_{vj} = 150\text{ °C})$	$T_{vj} = 25\text{ °C}$		0.2	mJ
			$T_{vj} = 125\text{ °C}$		0.43	
			$T_{vj} = 150\text{ °C}$		0.52	
Thermal resistance, junction to heat sink	R_{thJH}	per diode			1.52	K/W
Temperature under switching conditions	$T_{vj\text{ op}}$			-40	150	°C

7 Diode, Reverse

Table 13 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			10	A
Repetitive peak forward current	I_{FRM}	$t_P = 1\text{ ms}$		20	A
I^2t - value	I^2t	$V_R = 0\text{ V}, t_P = 10\text{ ms}$	$T_{vj} = 125\text{ °C}$	12.5	A^2s
			$T_{vj} = 150\text{ °C}$	9.5	

Table 14 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 10\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$	1.60	2.00	V
			$T_{vj} = 125\text{ °C}$	1.55		
			$T_{vj} = 150\text{ °C}$	1.52		
Thermal resistance, junction to heat sink	R_{thJH}	per diode		3.92		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

8 NTC-Thermistor

Table 15 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

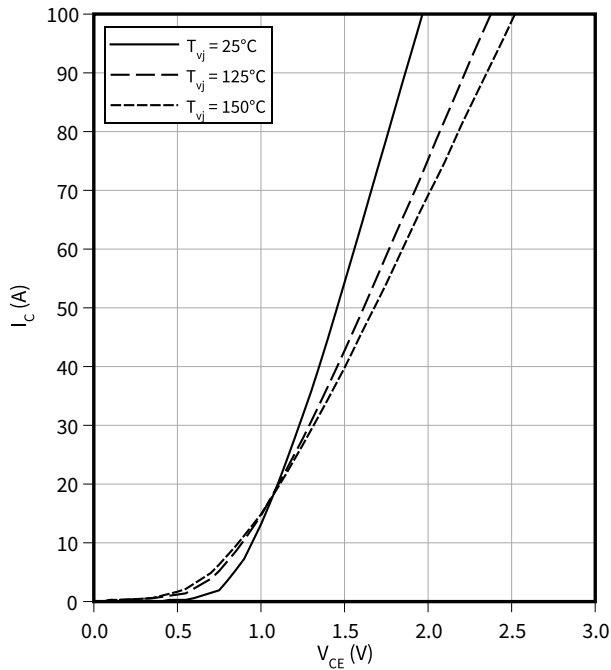
Note: Specification according to the valid application note.

9 Characteristics diagrams

Output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

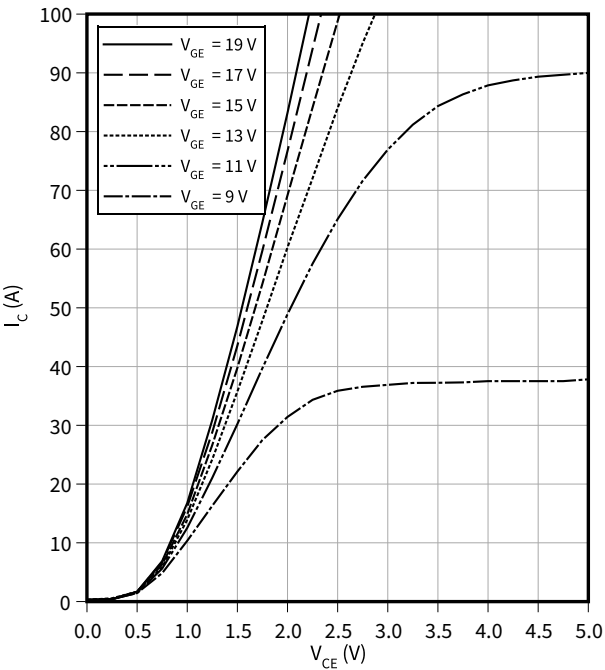
$V_{GE} = 15\text{ V}$



Output characteristic field (typical), IGBT, Inverter

$I_C = f(V_{CE})$

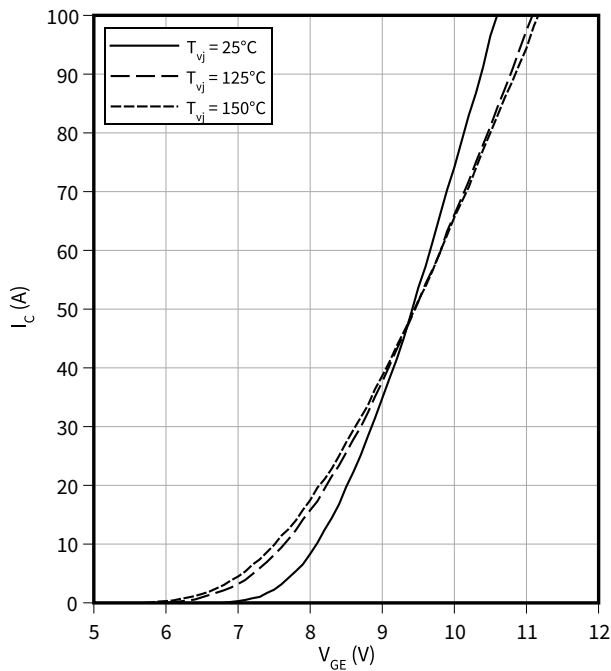
$T_{vj} = 150^\circ\text{C}$



Transfer characteristic (typical), IGBT, Inverter

$I_C = f(V_{GE})$

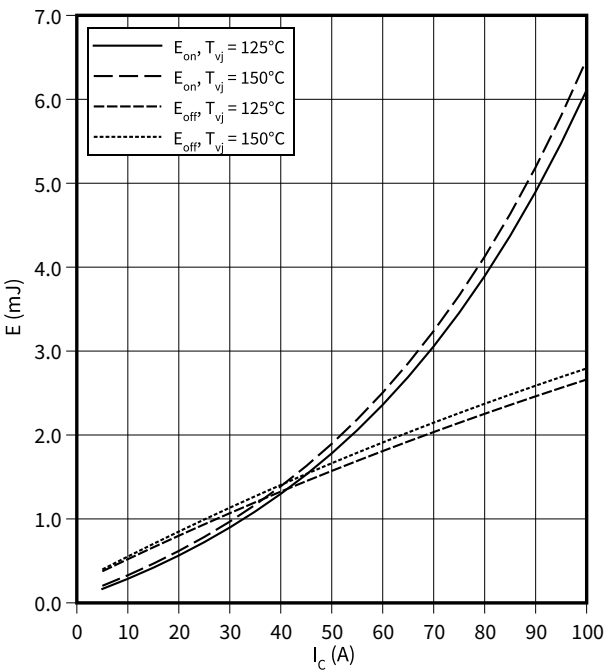
$V_{CE} = 20\text{ V}$



Switching losses (typical), IGBT, Inverter

$E = f(I_C)$

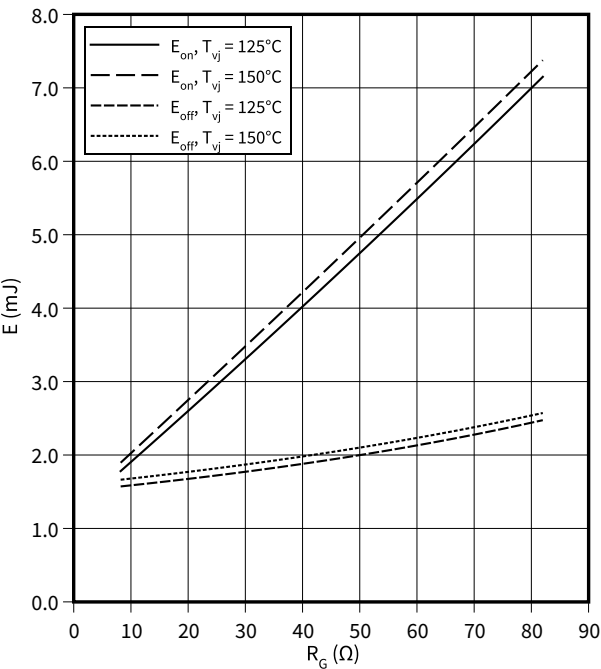
$R_{Goff} = 8.2\ \Omega$, $R_{Gon} = 8.2\ \Omega$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$



9 Characteristics diagrams

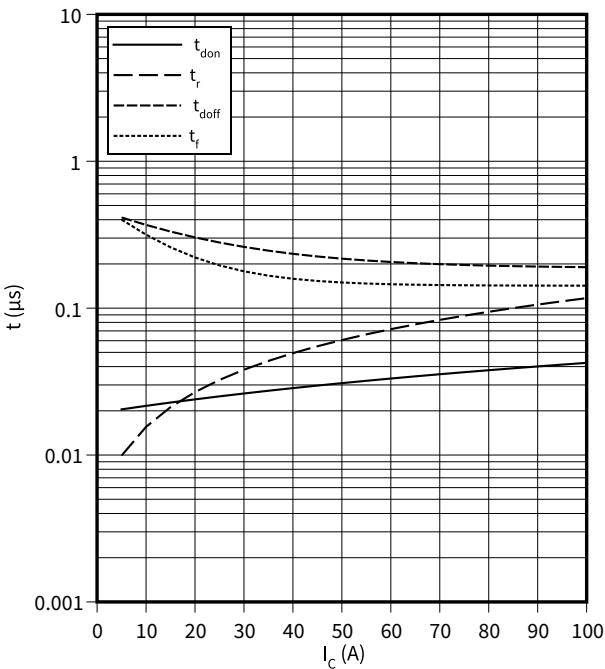
Switching losses (typical), IGBT, Inverter

$E = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 50\text{ A}$, $V_{CE} = 300\text{ V}$



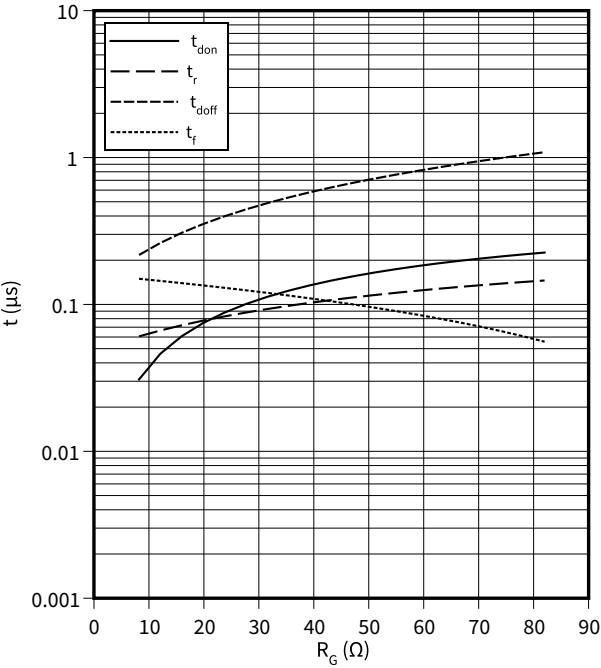
Switching times (typical), IGBT, Inverter

$t = f(I_C)$
 $R_{Goff} = 8.2\ \Omega$, $R_{Gon} = 8.2\ \Omega$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 150\text{ °C}$



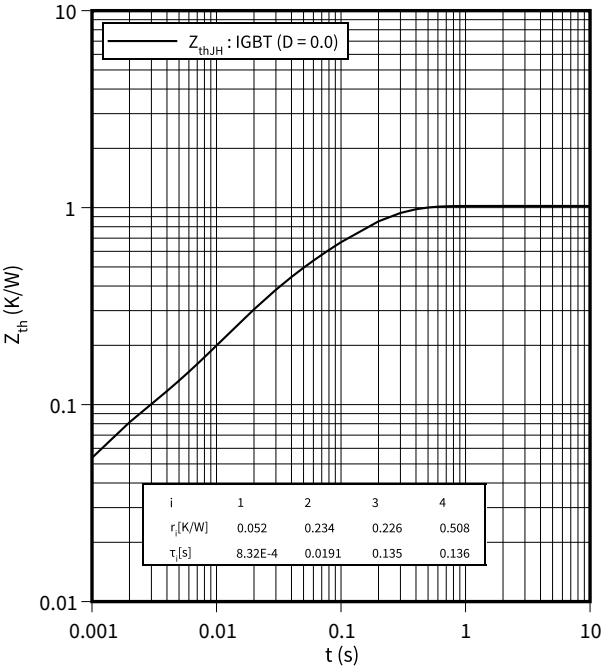
Switching times (typical), IGBT, Inverter

$t = f(R_G)$
 $I_C = 50\text{ A}$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 150\text{ °C}$



Transient thermal impedance , IGBT, Inverter

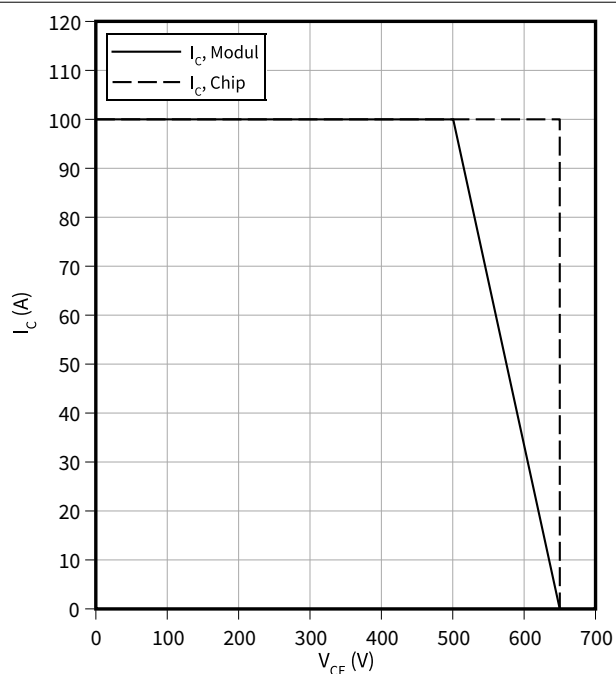
$Z_{th} = f(t)$



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

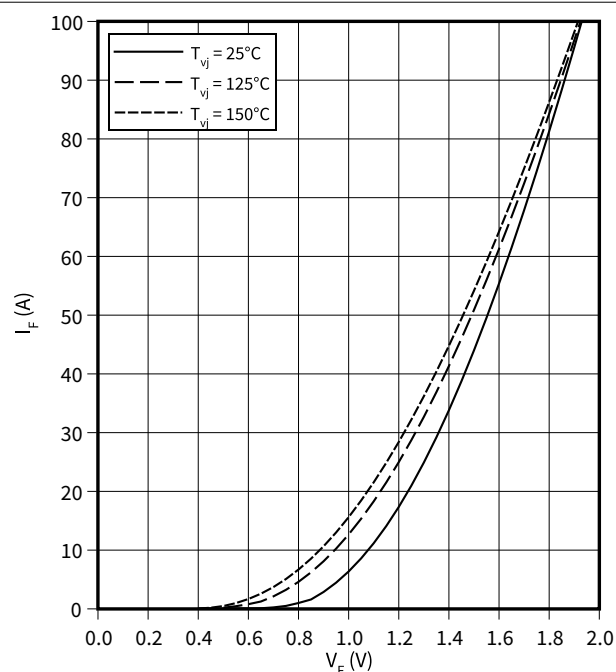
$$I_C = f(V_{CE})$$

$$R_{Goff} = 8.2 \, \Omega, V_{GE} = \pm 15 \, V, T_{vj} = 150 \, ^\circ C$$



Forward characteristic (typical), Diode, Inverter

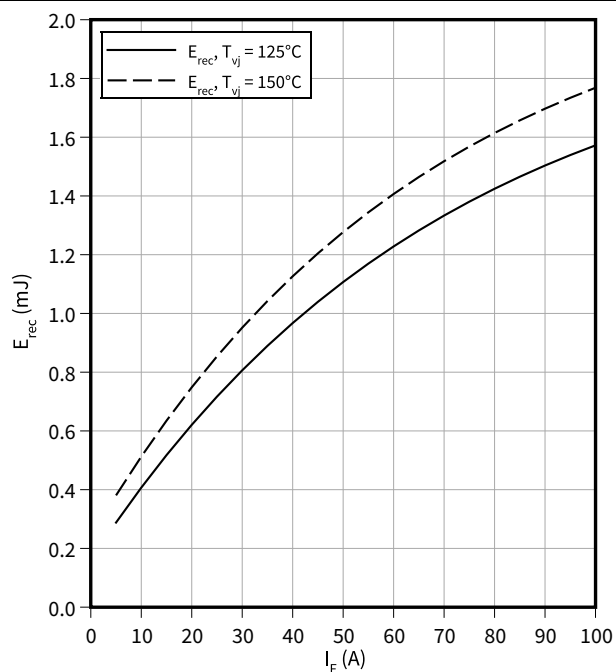
$$I_F = f(V_F)$$



Switching losses (typical), Diode, Inverter

$$E_{rec} = f(I_F)$$

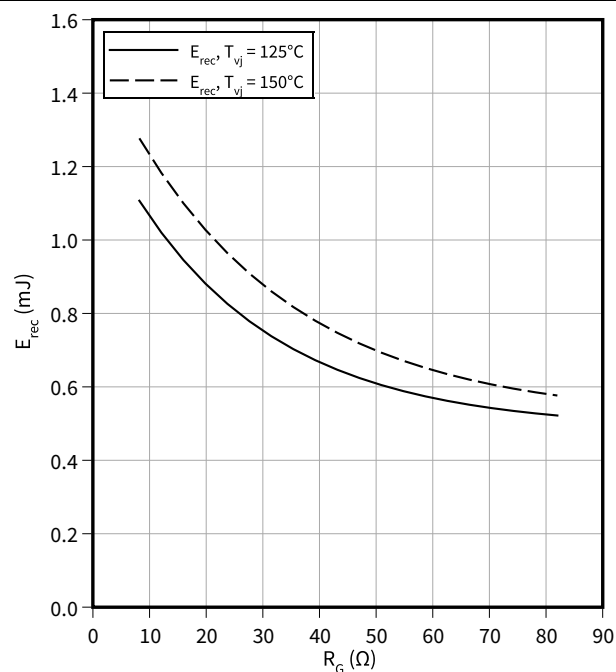
$$V_{CE} = 300 \, V, R_{Gon} = 8.2 \, \Omega$$



Switching losses (typical), Diode, Inverter

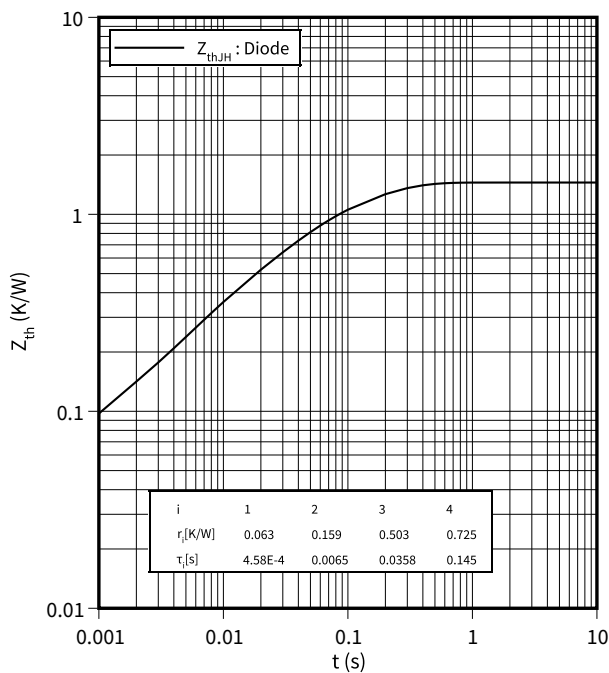
$$E_{rec} = f(R_G)$$

$$V_{CE} = 300 \, V, I_F = 50 \, A$$



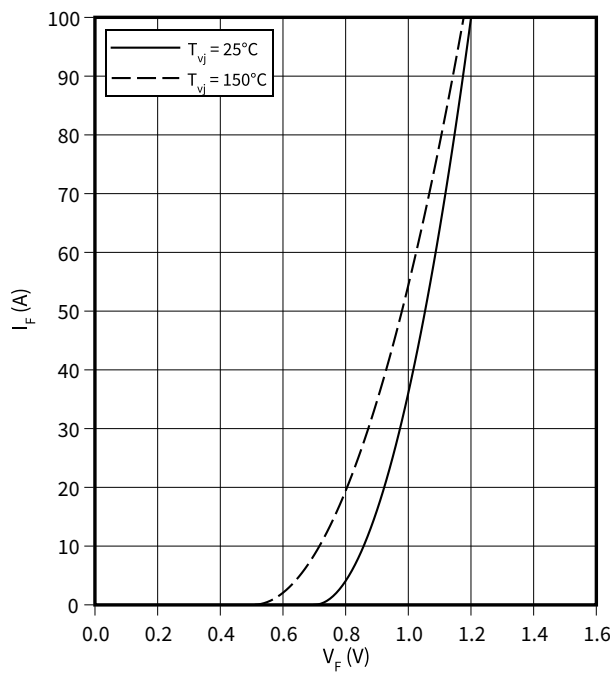
Transient thermal impedance, Diode, Inverter

$Z_{th} = f(t)$



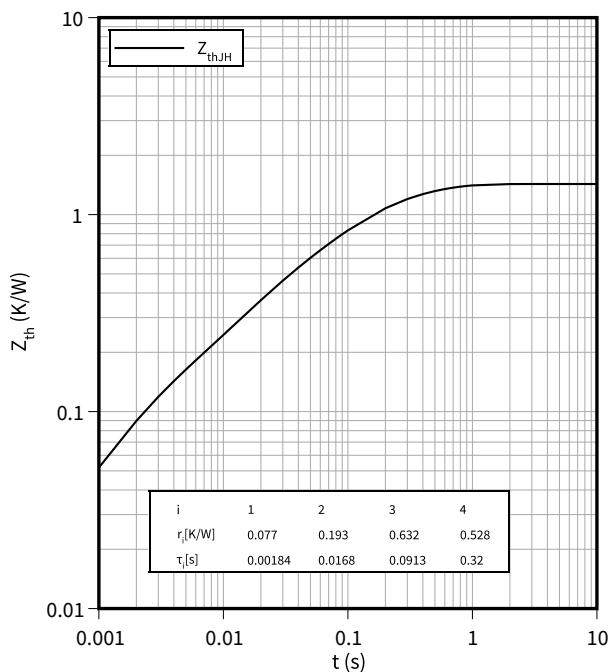
Forward characteristic (typical), Diode, Rectifier

$I_F = f(V_F)$



Transient thermal impedance, Diode, Rectifier

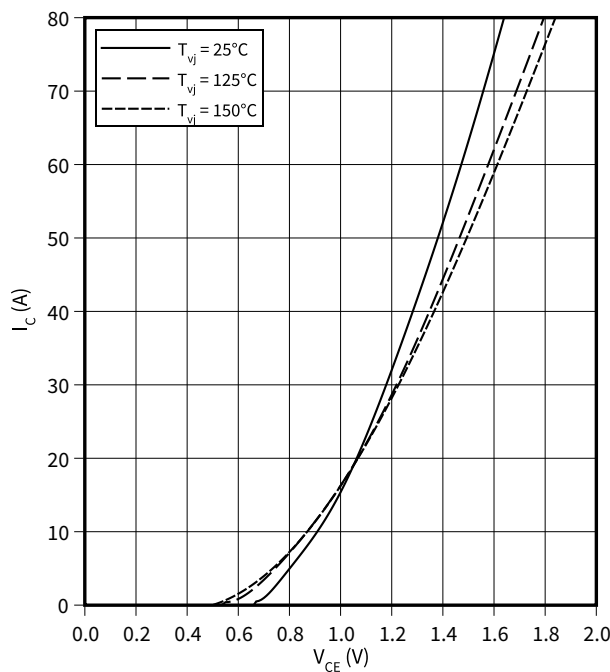
$Z_{th} = f(t)$



Output characteristic (typical), IGBT, Boost

$I_C = f(V_{CE})$

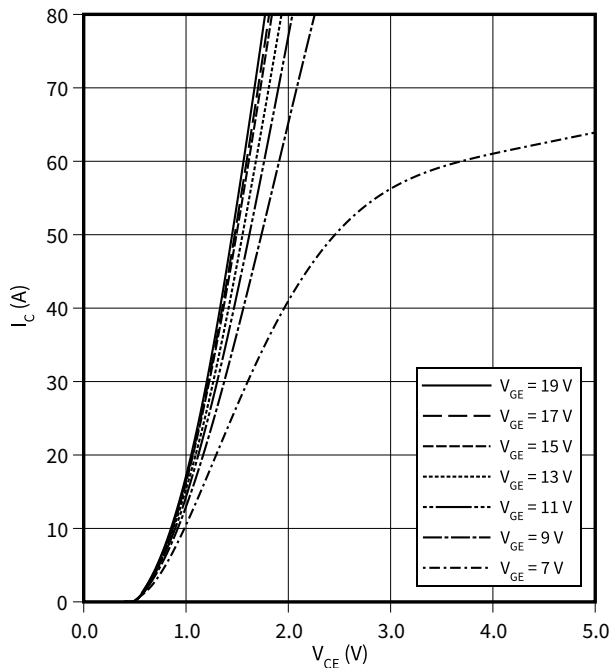
$V_{GE} = 15 \text{ V}$



9 Characteristics diagrams

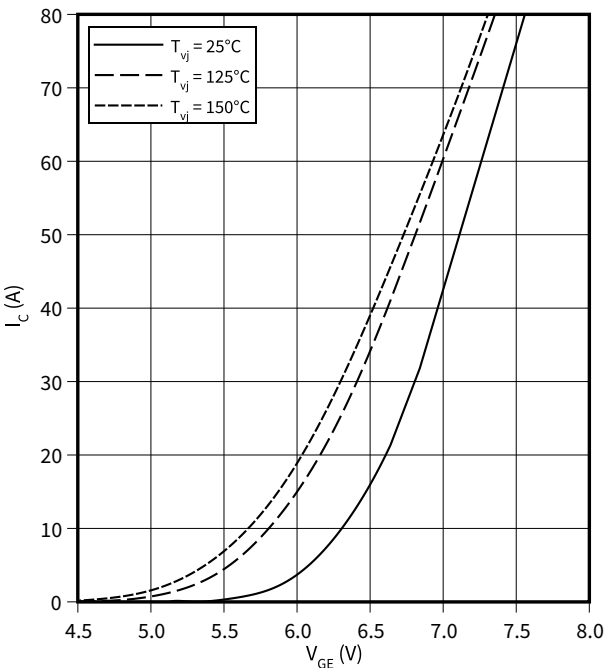
Output characteristic field (typical), IGBT, Boost

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



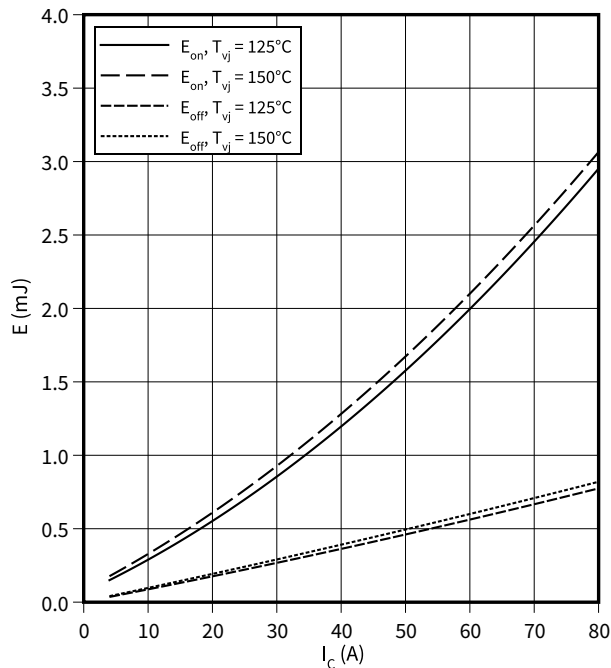
Transfer characteristic (typical), IGBT, Boost

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



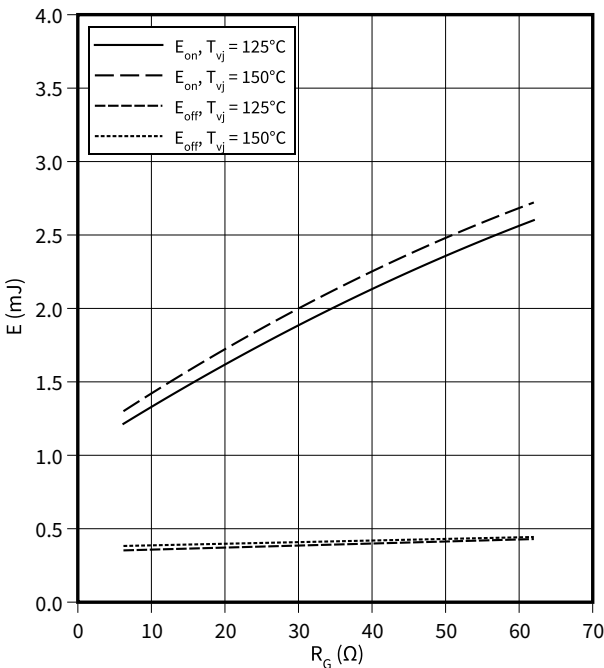
Switching losses (typical), IGBT, Boost

$E = f(I_C)$
 $R_{Goff} = 6.2\text{ }\Omega$, $R_{Gon} = 6.2\text{ }\Omega$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$



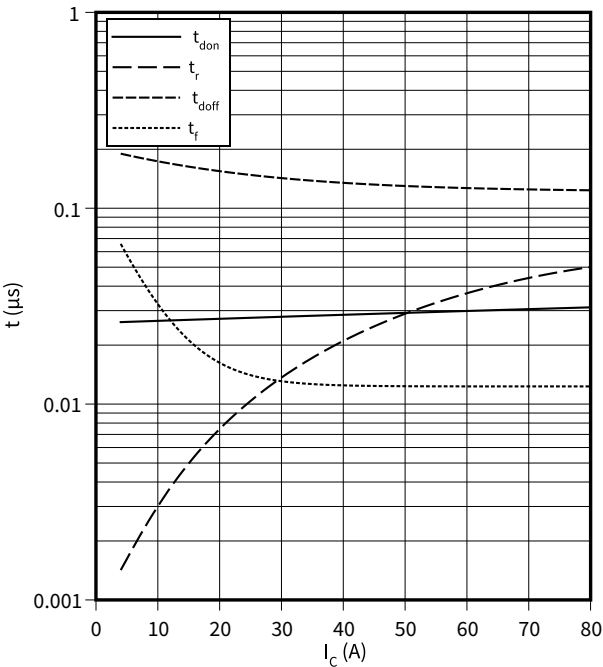
Switching losses (typical), IGBT, Boost

$E = f(R_G)$
 $I_C = 40\text{ A}$, $V_{CE} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$



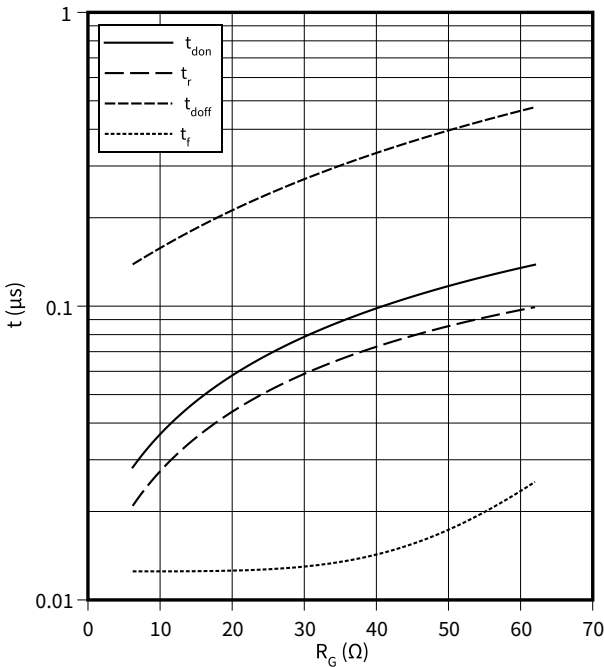
Switching times (typical), IGBT, Boost

$t = f(I_C)$
 $R_{Goff} = 6.2 \, \Omega$, $R_{Gon} = 6.2 \, \Omega$, $V_{CE} = 300 \, V$, $V_{GE} = \pm 15 \, V$, $T_{vj} = 150 \, ^\circ C$



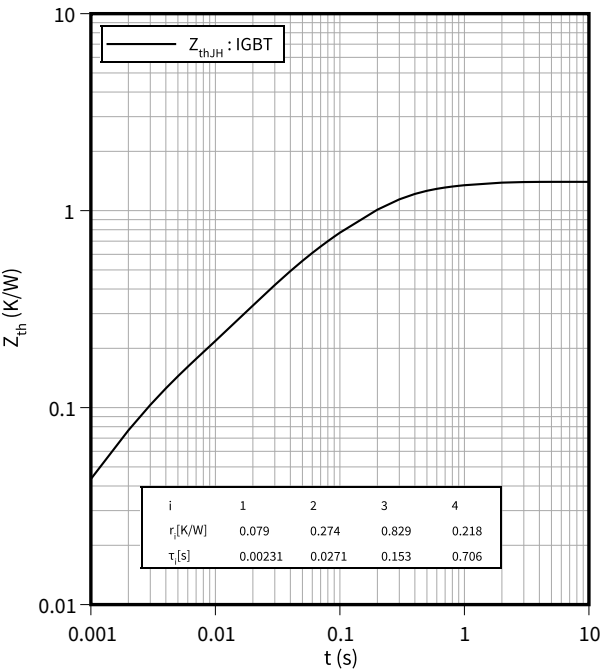
Switching times (typical), IGBT, Boost

$t = f(R_G)$
 $I_C = 40 \, A$, $V_{CE} = 300 \, V$, $V_{GE} = \pm 15 \, V$, $T_{vj} = 150 \, ^\circ C$



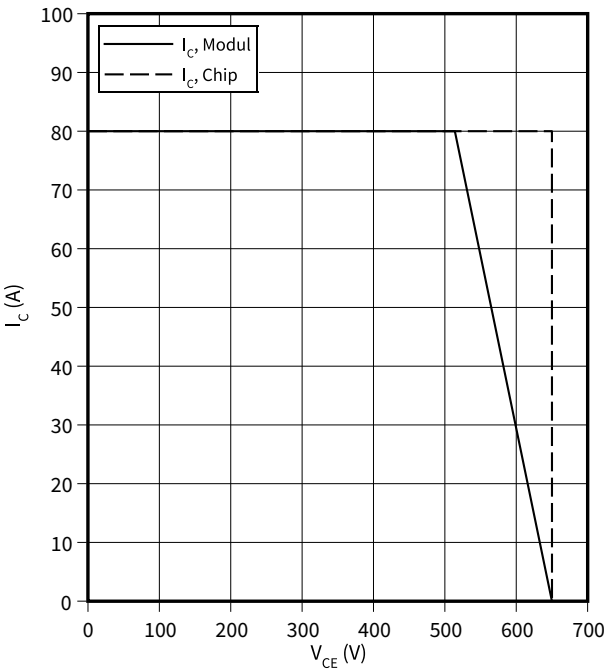
Transient thermal impedance , IGBT, Boost

$Z_{th} = f(t)$



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

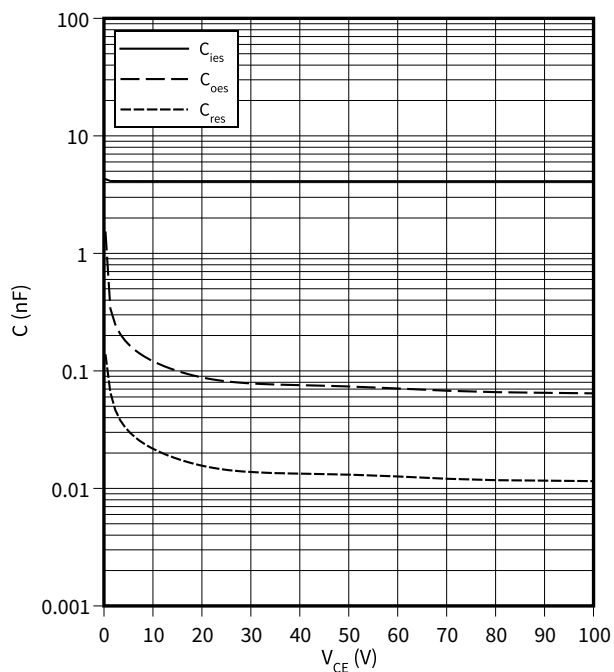
$I_C = f(V_{CE})$
 $R_{Goff} = 6.2 \, \Omega$, $V_{GE} = \pm 15 \, V$, $T_{vj} = 150 \, ^\circ C$



Capacity characteristic (typical), IGBT, Boost

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

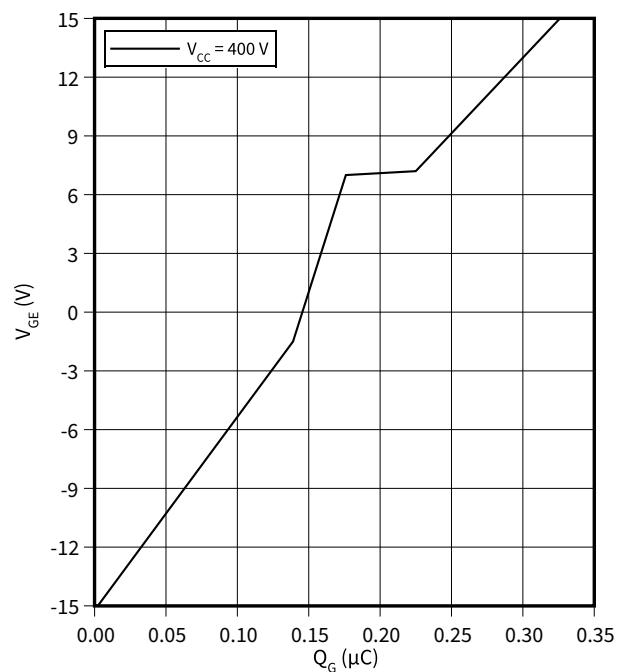
$f = 1000 \text{ kHz}$, $V_{GE} = 0 \text{ V}$, $T_{vj} = 25 \text{ °C}$



Gate charge characteristic (typical), IGBT, Boost

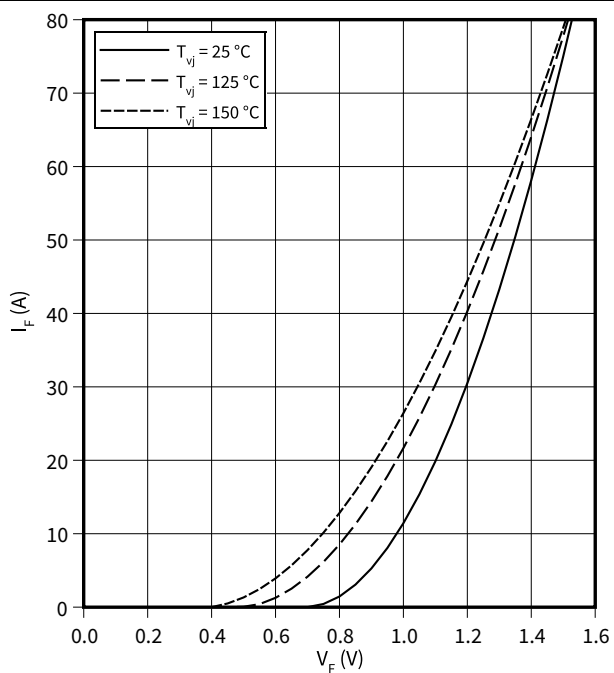
$$V_{GE} = f(Q_G)$$

$I_C = 75 \text{ A}$, $T_{vj} = 25 \text{ °C}$



Forward characteristic (typical), Diode, Boost

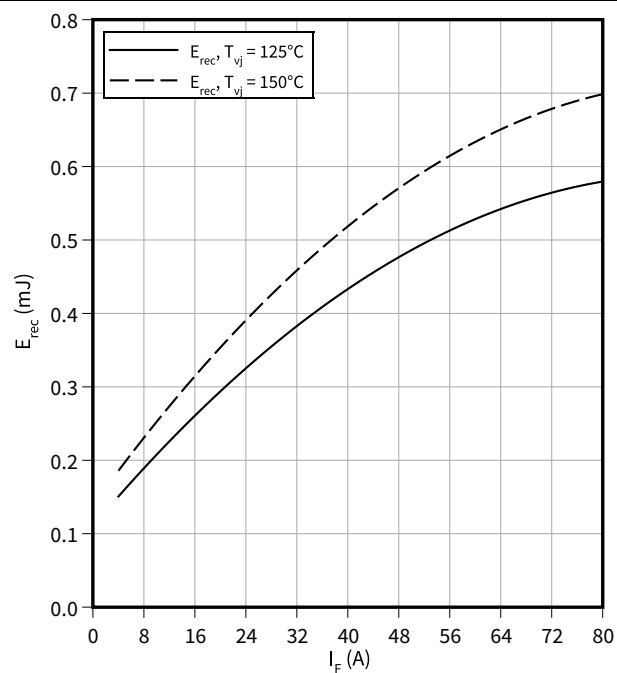
$$I_F = f(V_F)$$



Switching losses (typical), Diode, Boost

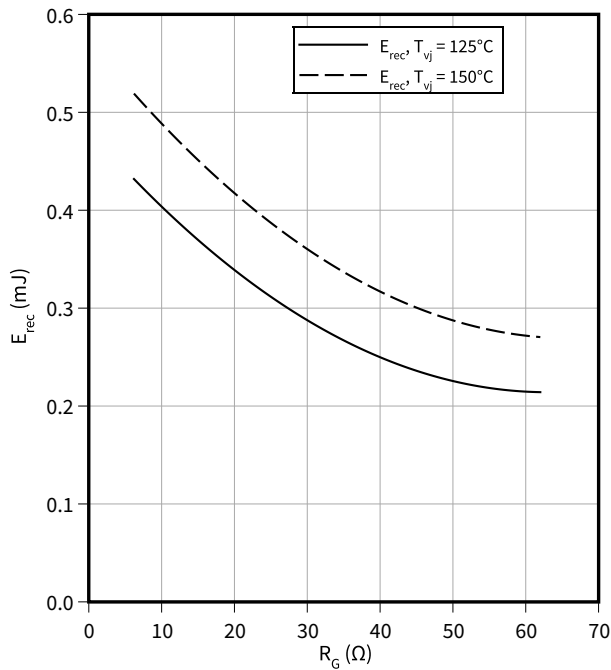
$$E_{rec} = f(I_F)$$

$V_{CE} = 300 \text{ V}$, $R_{Gon} = 6.2 \Omega$



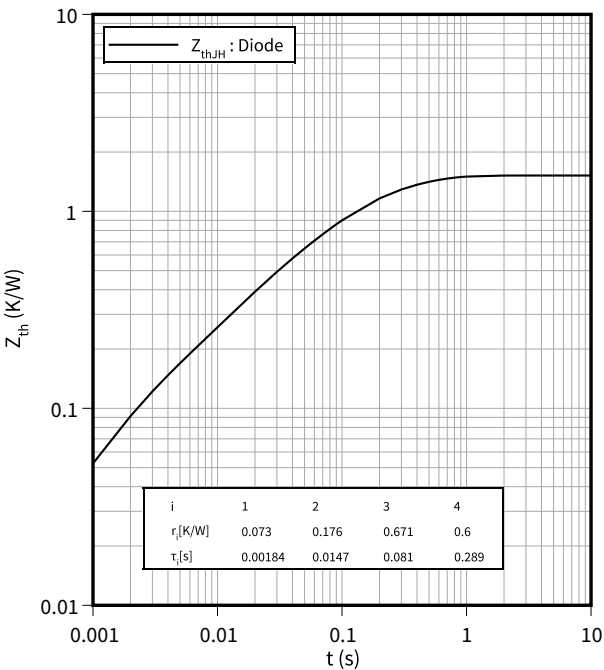
Switching losses (typical), Diode, Boost

$E_{rec} = f(R_G)$
 $V_{CE} = 300\text{ V}, I_F = 50\text{ A}$



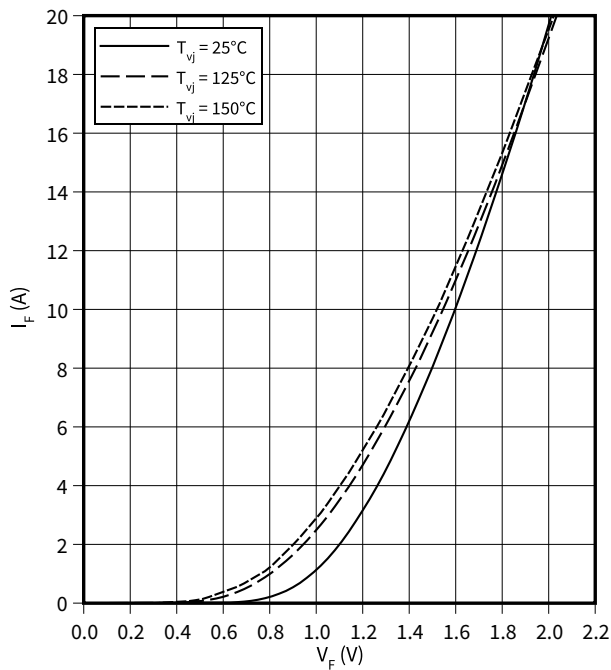
Transient thermal impedance, Diode, Boost

$Z_{th} = f(t)$



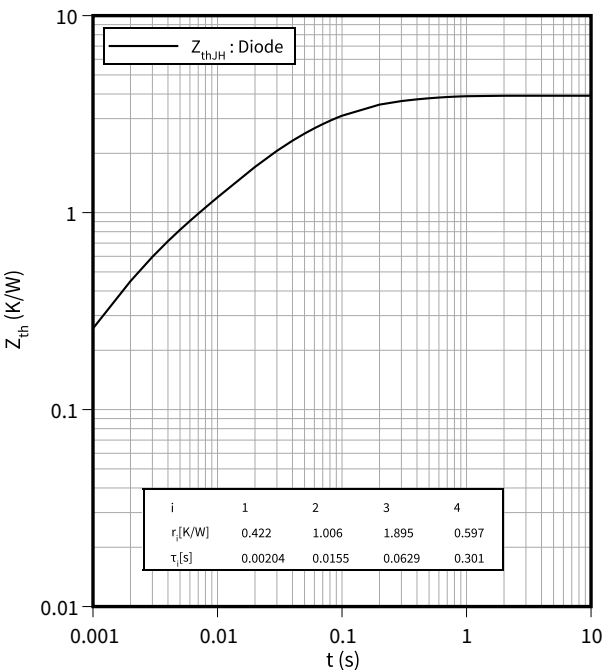
Forward characteristic (typical), Diode, Reverse

$I_F = f(V_F)$



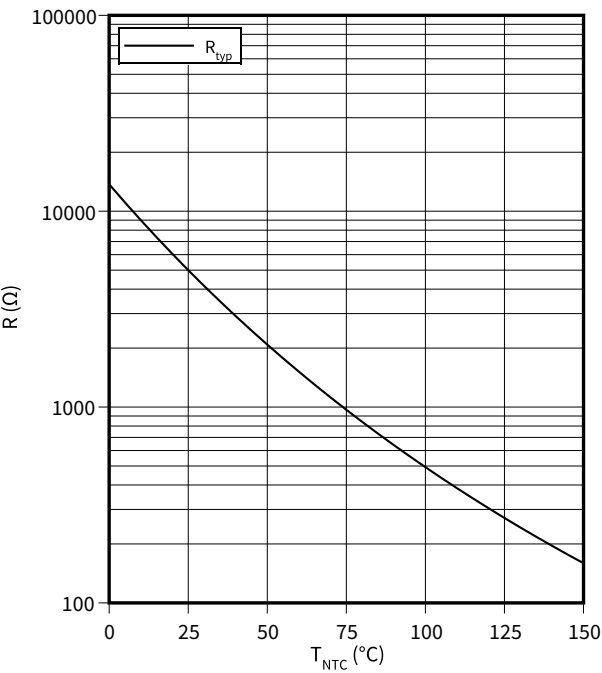
Transient thermal impedance, Diode, Reverse

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



11 Package outlines

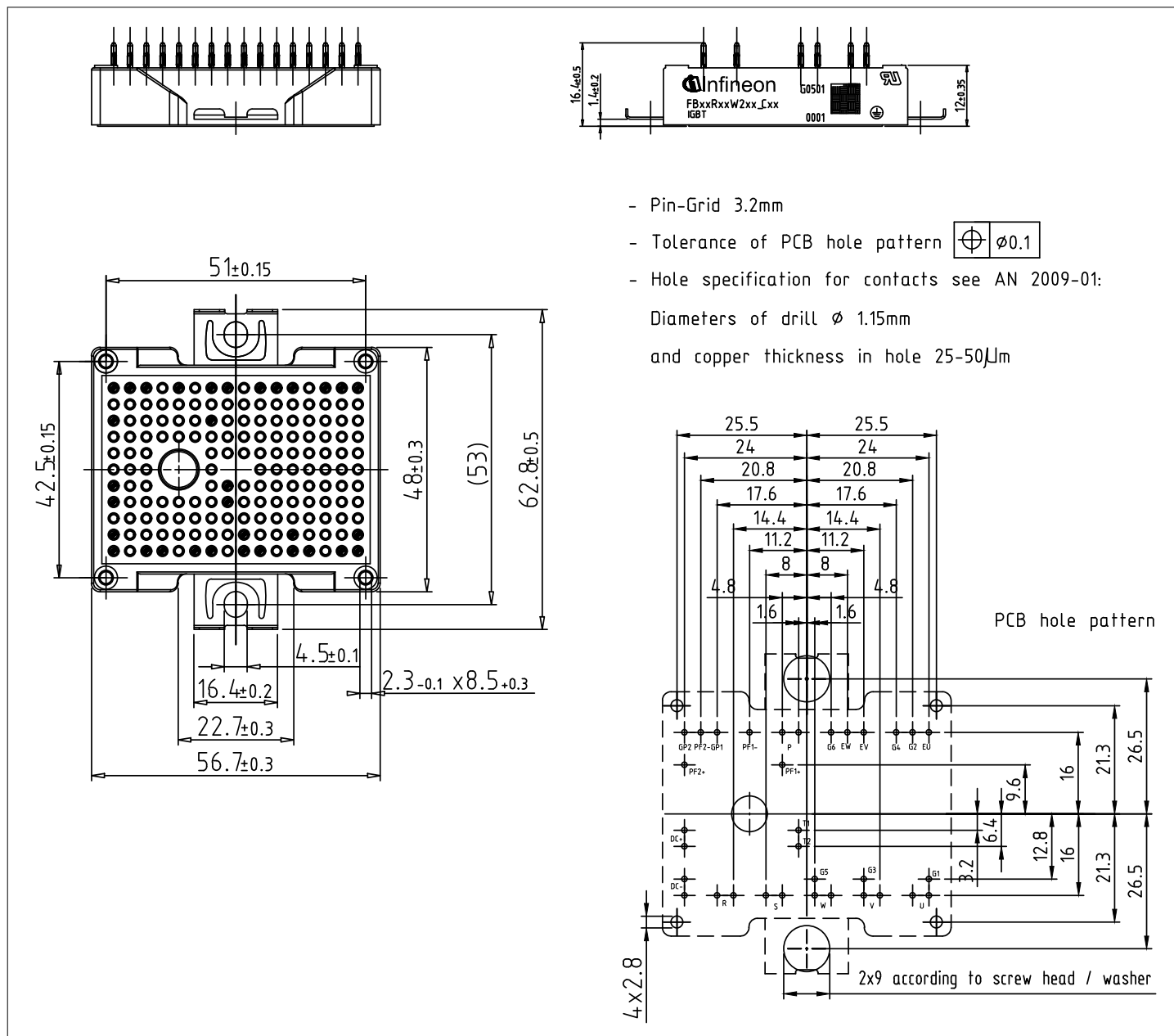


Figure 2

12 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

Document version	Date of release	Description of changes
0.10	2021-07-29	Initial version
1.00	2021-12-03	Final datasheet
1.10	2022-01-19	Final datasheet updated to V1.10

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