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

Features

- Electrical features
  - V_{CES} = 1200 V
  - $I_{C\ nom}$ = 50 A / I_{CRM} = 100 A
  - Overload operation up to 175°C
  - Low $V_{CE,sat}$
  - TRENCHSTOP™ IGBT7
- Mechanical features
  - PressFIT contact technology
  - Al_2O_3 substrate with low thermal resistance
  - Compact design
  - 2.5 kV AC 1 minute insulation
  - High power density

Typical appearance

Potential applications

- Air conditioning
- Auxiliary inverters
- Motor drives
- Servo drives
- UPS systems

Product validation

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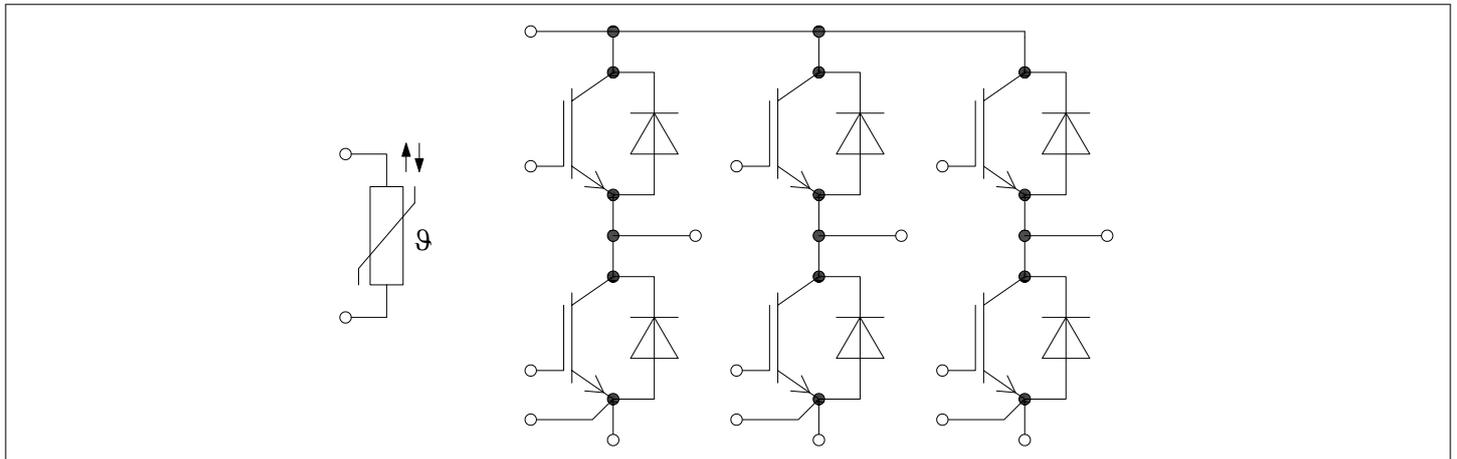
Description

Please read the sections "Important notice" and "Warnings" at the end of this document

Revision 1.00
2025-07-18

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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 Hz, t = 1 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}			40		nH
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	T_H = 25 °C, per switch		4		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 °C	1200	V
Continuous DC collector current	I_{CDC}	$T_{vj\ max}$ = 175 °C	T_H = 105 °C	50	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\ op}$		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 °C		1.50	1.80	V
			T_{vj} = 125 °C		1.64		
			T_{vj} = 175 °C		1.72		

(table continues...)

Table 4 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Gate threshold voltage	V_{GEth}	$I_C = 1.28$ mA, $V_{CE} = V_{GE}$, $T_{vj} = 25$ °C		5.15	5.80	6.45	V
Gate charge	Q_G	$V_{GE} = \pm15$ V, $V_{CC} = 600$ V			0.92		µC
Internal gate resistor	R_{Gint}	$T_{vj} = 25$ °C			0		Ω
Input capacitance	C_{ies}	$f = 100$ kHz, $T_{vj} = 25$ °C, $V_{CE} = 25$ V, $V_{GE} = 0$ V			11.1		nF
Reverse transfer capacitance	C_{res}	$f = 100$ kHz, $T_{vj} = 25$ °C, $V_{CE} = 25$ V, $V_{GE} = 0$ V			0.039		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 1200$ V, $V_{GE} = 0$ V	$T_{vj} = 25$ °C			0.0079	mA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0$ V, $V_{GE} = 20$ V, $T_{vj} = 25$ °C				100	nA
Turn-on delay time (inductive load)	t_{don}	$I_C = 50$ A, $V_{CC} = 600$ V, $V_{GE} = \pm15$ V, $R_{Gon} = 5.1$ Ω	$T_{vj} = 25$ °C		0.018		µs
			$T_{vj} = 125$ °C		0.030		
			$T_{vj} = 175$ °C		0.035		
Rise time (inductive load)	t_r	$I_C = 50$ A, $V_{CC} = 600$ V, $V_{GE} = \pm15$ V, $R_{Gon} = 5.1$ Ω	$T_{vj} = 25$ °C		0.021		µs
			$T_{vj} = 125$ °C		0.024		
			$T_{vj} = 175$ °C		0.025		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 50$ A, $V_{CC} = 600$ V, $V_{GE} = \pm15$ V, $R_{Goff} = 5.1$ Ω	$T_{vj} = 25$ °C		0.270		µs
			$T_{vj} = 125$ °C		0.325		
			$T_{vj} = 175$ °C		0.360		
Fall time (inductive load)	t_f	$I_C = 50$ A, $V_{CC} = 600$ V, $V_{GE} = \pm15$ V, $R_{Goff} = 5.1$ Ω	$T_{vj} = 25$ °C		0.120		µs
			$T_{vj} = 125$ °C		0.187		
			$T_{vj} = 175$ °C		0.264		
Turn-on energy loss per pulse	E_{on}	$I_C = 50$ A, $V_{CC} = 600$ V, $L_\sigma = 35$ nH, $V_{GE} = \pm15$ V, $R_{Gon} = 5.1$ Ω, di/dt = 1650 A/µs ($T_{vj} = 175$ °C)	$T_{vj} = 25$ °C		2.41		mJ
			$T_{vj} = 125$ °C		4.3		
			$T_{vj} = 175$ °C		5.45		
Turn-off energy loss per pulse	E_{off}	$I_C = 50$ A, $V_{CC} = 600$ V, $L_\sigma = 35$ nH, $V_{GE} = \pm15$ V, $R_{Goff} = 5.1$ Ω, dv/dt = 2900 V/µs ($T_{vj} = 175$ °C)	$T_{vj} = 25$ °C		1.9		mJ
			$T_{vj} = 125$ °C		4.72		
			$T_{vj} = 175$ °C		6.12		
SC data	I_{SC}	$V_{GE} \leq 15$ V, $V_{CC} = 800$ V, $V_{CEmax} = V_{CES} - L_{sCE}$*di/dt	$t_P \leq 8$ µs, $T_{vj} = 150$ °C		185		A
			$t_P \leq 7$ µs, $T_{vj} = 175$ °C		175		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, $\lambda_{grease} = 4.3$ W/(m·K)			0.651		K/W

(table continues...)

Table 4   (continued) Characteristic values

Parameter	Symbol	Note or test condition	Min.	Typ.	Max.	Unit
Temperature under switching conditions	$T_{vj\ op}$		-40		175	°C

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

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 °C	1200	V
Continuous DC forward current	I_F			50	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		100	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	300	A^2s
			T_{vj} = 175 °C	250	

Table 6   Characteristic values

Parameter	Symbol	Note or test condition		Min.	Typ.	Max.	Unit
Forward voltage	V_F	I_F = 50 A, V_{GE} = 0 V	T_{vj} = 25 °C		1.72	2.10	V
			T_{vj} = 125 °C		1.59		
			T_{vj} = 175 °C		1.52		
Peak reverse recovery current	I_{RM}	V_{CC} = 600 V, I_F = 50 A, V_{GE} = -15 V, -di$_F$/dt = 1650 A/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		42.5		A
			T_{vj} = 125 °C		53		
			T_{vj} = 175 °C		60.5		
Recovered charge	Q_r	V_{CC} = 600 V, I_F = 50 A, V_{GE} = -15 V, -di$_F$/dt = 1650 A/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		3.74		µC
			T_{vj} = 125 °C		8.19		
			T_{vj} = 175 °C		10.4		
Reverse recovery energy	E_{rec}	V_{CC} = 600 V, I_F = 50 A, V_{GE} = -15 V, -di$_F$/dt = 1650 A/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		1.72		mJ
			T_{vj} = 125 °C		3.06		
			T_{vj} = 175 °C		3.73		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, λ_{grease} = 4.3 W/(m·K)			1.02		K/W

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Temperature under switching conditions	$T_{\text{vj op}}$		-40		175	°C

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

4 NTC-Thermistor

Table 7 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	R_{25}	$T_{\text{NTC}} = 25\,°C$		5		kΩ
Deviation of R_{100}	$\Delta R/R$	$T_{\text{NTC}} = 100\,°C$, $R_{100} = 493\,\Omega$	-5		5	%
Power dissipation	P_{25}	$T_{\text{NTC}} = 25\,°C$			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.*

5 Characteristics diagrams

Output characteristic (typical), IGBT, Inverter
$I_C = f(V_{CE})$

$V_{GE} = 15$ V
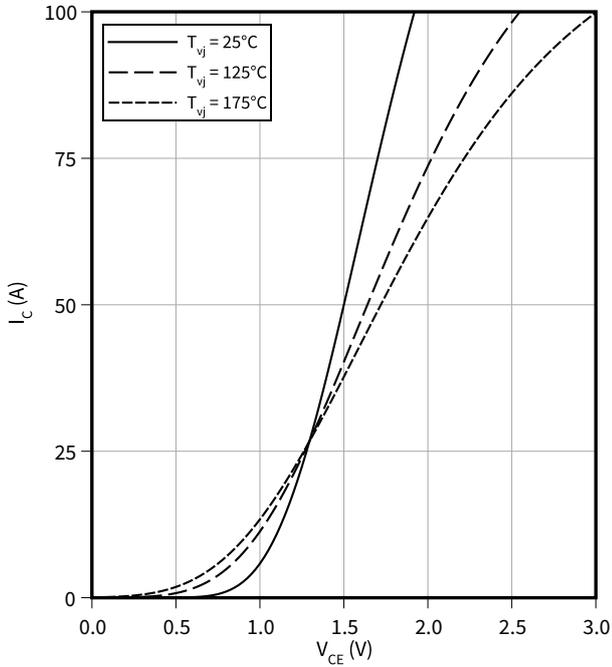
Output characteristic field (typical), IGBT, Inverter
$I_C = f(V_{CE})$

$T_{vj} = 175$ °C
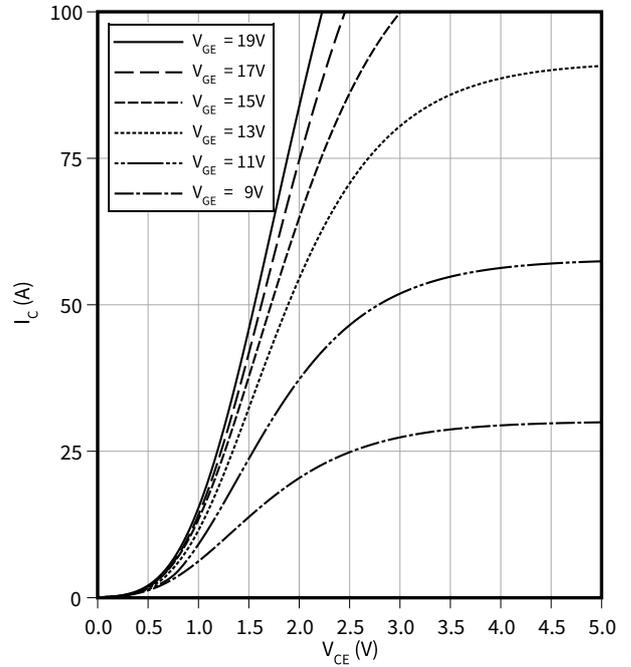
Transfer characteristic (typical), IGBT, Inverter
$I_C = f(V_{GE})$

$V_{CE} = 20$ V
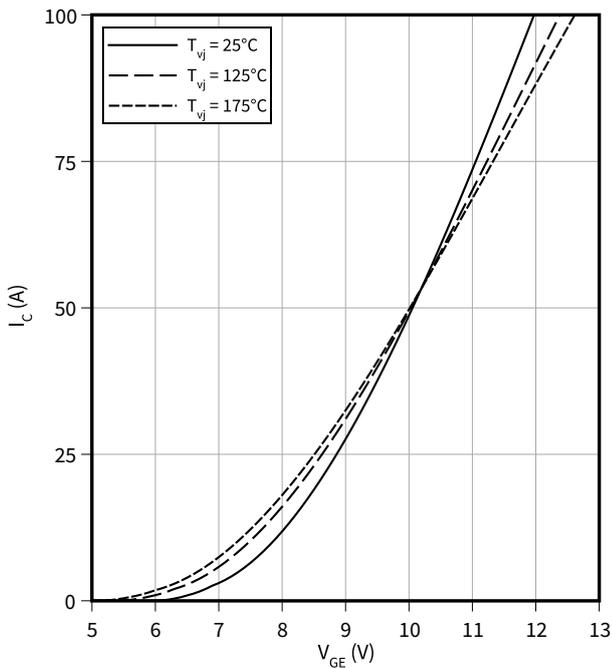
Gate charge characteristic (typical), IGBT, Inverter
$V_{GE} = f(Q_G)$

$I_C = 50$ A, $T_{vj} = 25$ °C

Capacity characteristic (typical), IGBT, Inverter

$C = f(V_{CE})$

$T_{vj} = 25\ °C$, $V_{GE} = 0\ V$, $f = 100\ kHz$
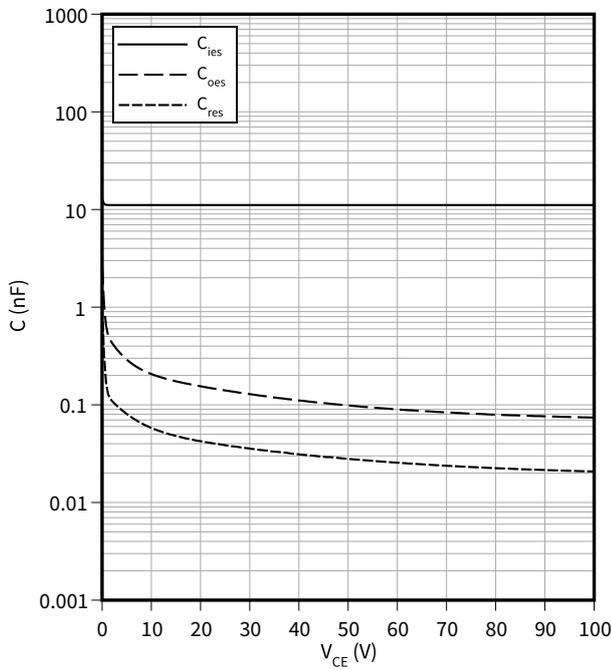
Switching times (typical), IGBT, Inverter

$t = f(I_C)$

$R_{Goff} = 5.1\ Ω$, $R_{Gon} = 5.1\ Ω$, $V_{GE} = ±15\ V$, $V_{CC} = 600\ V$, $T_{vj} = 175\ °C$
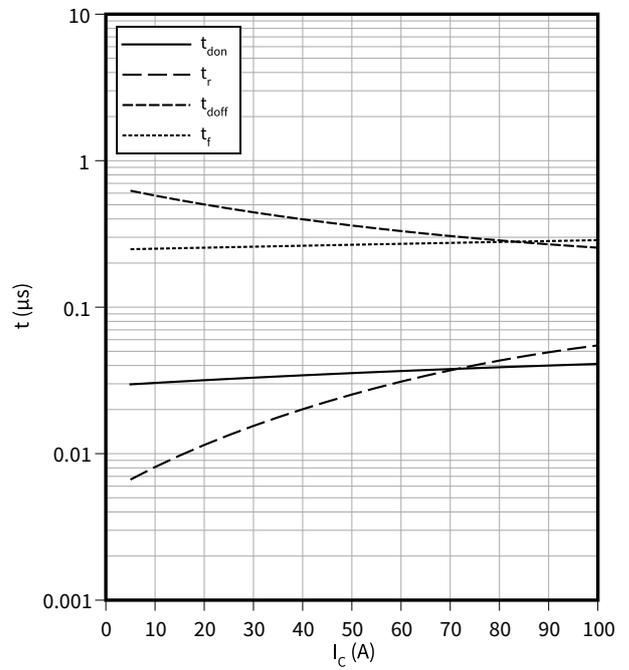
Switching times (typical), IGBT, Inverter

$t = f(R_G)$

$V_{GE} = ±15\ V$, $I_C = 50\ A$, $V_{CC} = 600\ V$, $T_{vj} = 175\ °C$
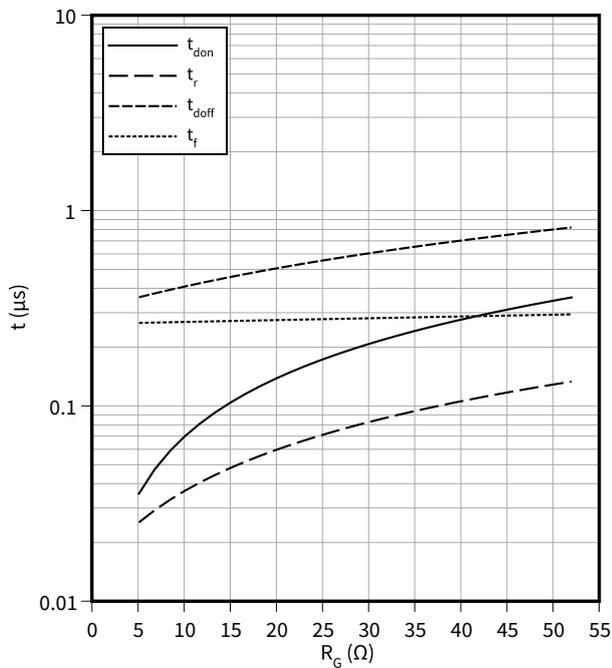
Voltage slope (typical), IGBT, Inverter

$dv/dt = f(R_G)$

$I_C = 50\ A$, $V_{CC} = 600\ V$, $V_{GE} = ±15\ V$, $T_{vj} = 25\ °C$

Switching losses (typical), IGBT, Inverter

$E = f(I_C)$

$R_{Goff} = 5.1\ \Omega$, $R_{Gon} = 5.1\ \Omega$, $V_{GE} = \pm15\ V$, $V_{CC} = 600\ V$
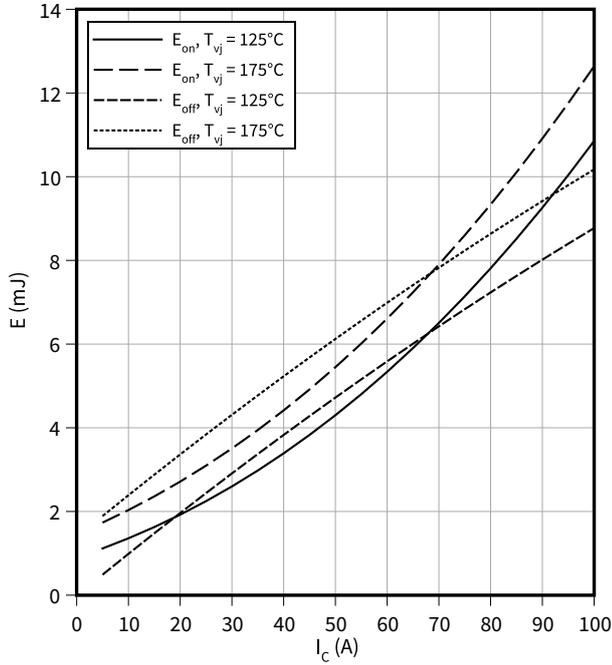
Switching losses (typical), IGBT, Inverter

$E = f(R_G)$

$I_C = 50\ A$, $V_{CC} = 600\ V$, $V_{GE} = \pm15\ V$
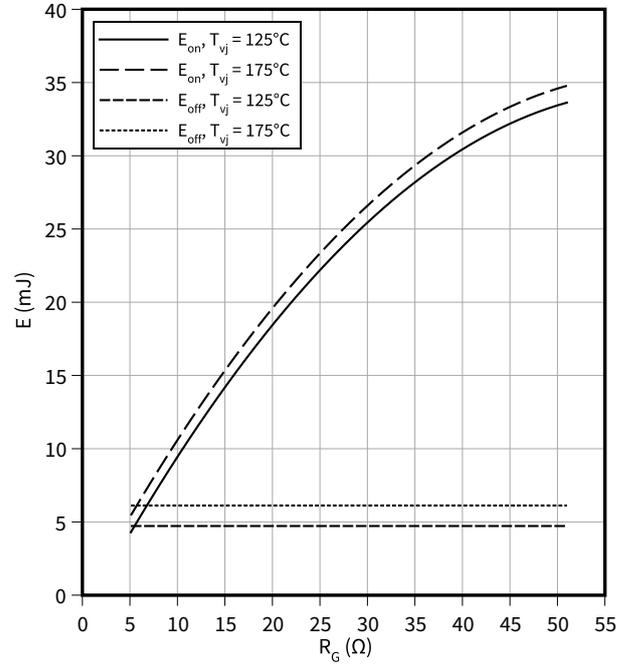
Reverse bias safe operating area (RBSOA), IGBT, Inverter

$I_C = f(V_{CE})$

$R_{Goff} = 5.1\ \Omega$, $V_{GE} = \pm15\ V$, $T_{vj} = 175\ °C$
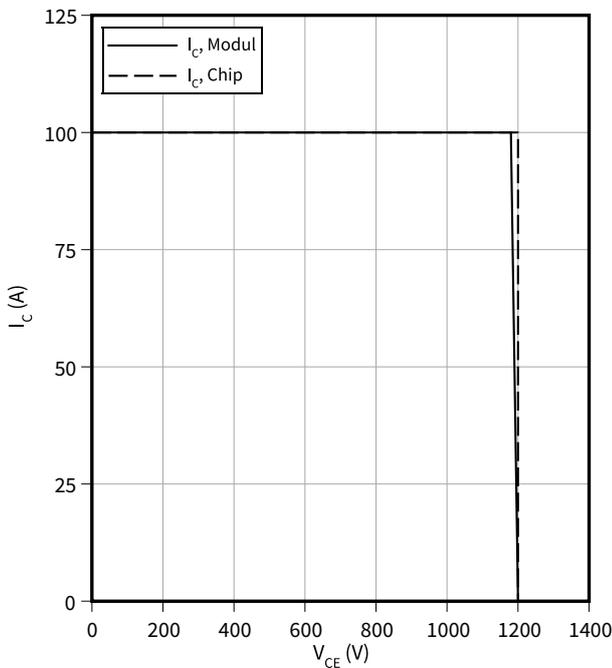
Transient thermal impedance, IGBT, Inverter

$Z_{th} = f(t)$

i	1	2	3	4
r_i[K/W]	0.0525	0.122	0.326	0.151
τ_i[s]	5.69E-4	0.0107	0.0516	0.172

Forward characteristic (typical), Diode, Inverter

$I_F = f(V_F)$
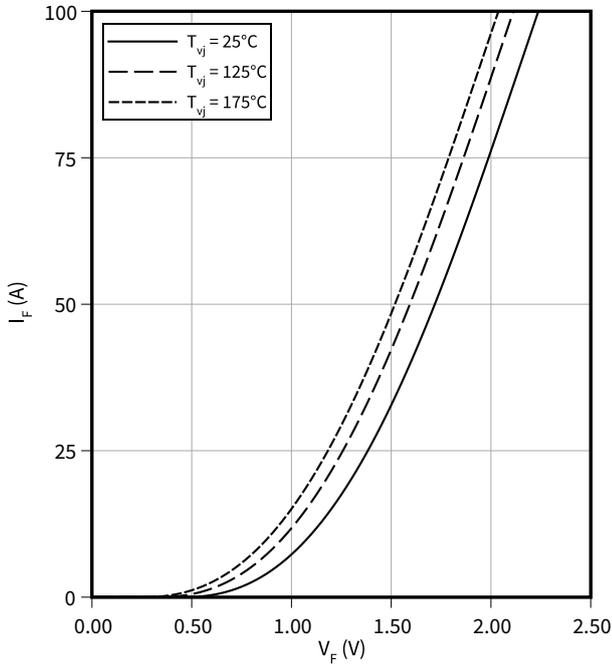
Switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$

$R_{Gon} = 5.1 \ \Omega, V_{CC} = 600 \ V$
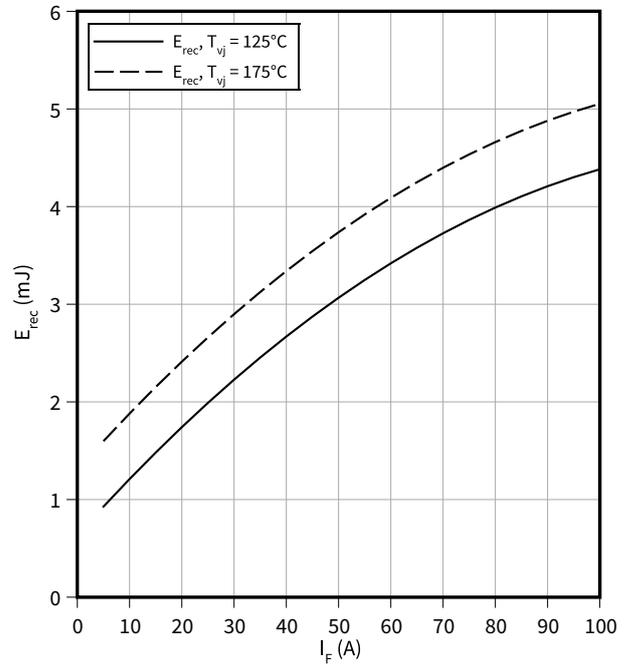
Switching losses (typical), Diode, Inverter

$E_{rec} = f(R_G)$

$I_F = 50 \ A, V_{CC} = 600 \ V$
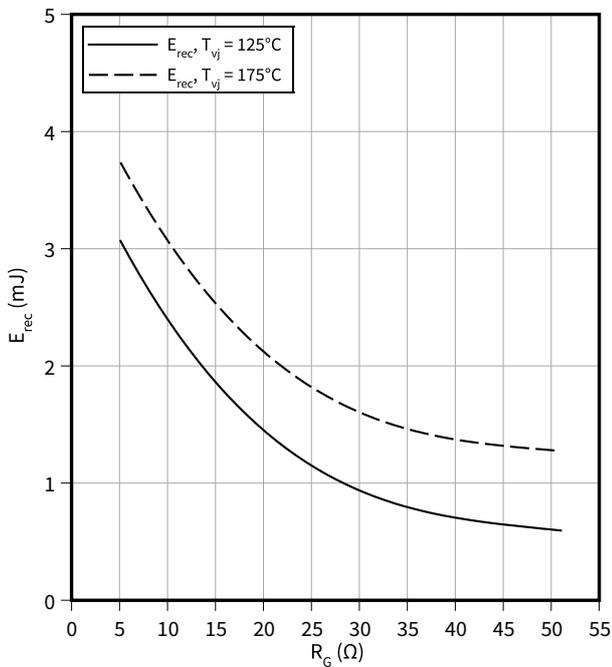
Transient thermal impedance, Diode, Inverter

$Z_{th} = f(t)$

i	1	2	3	4
r_i[K/W]	0.128	0.179	0.456	0.257
τ_i[s]	4.06E-4	0.00655	0.0357	0.13
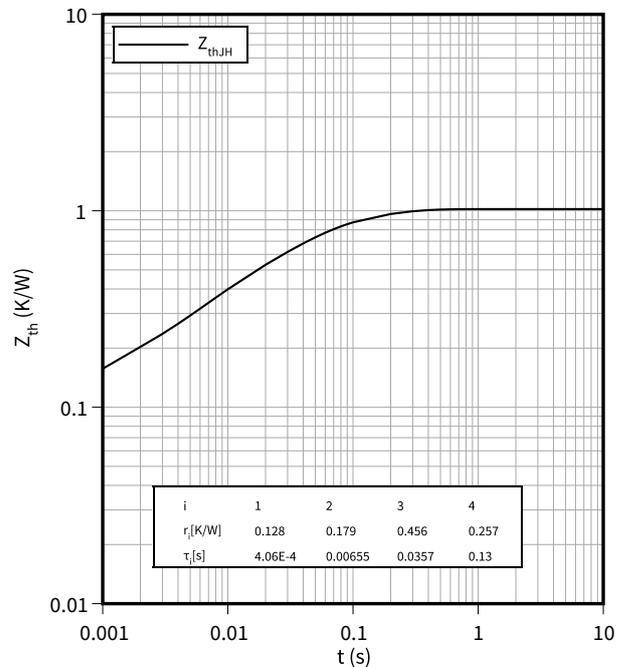
Temperature characteristic (typical), NTC-Thermistor
$R = f(T_{NTC})$
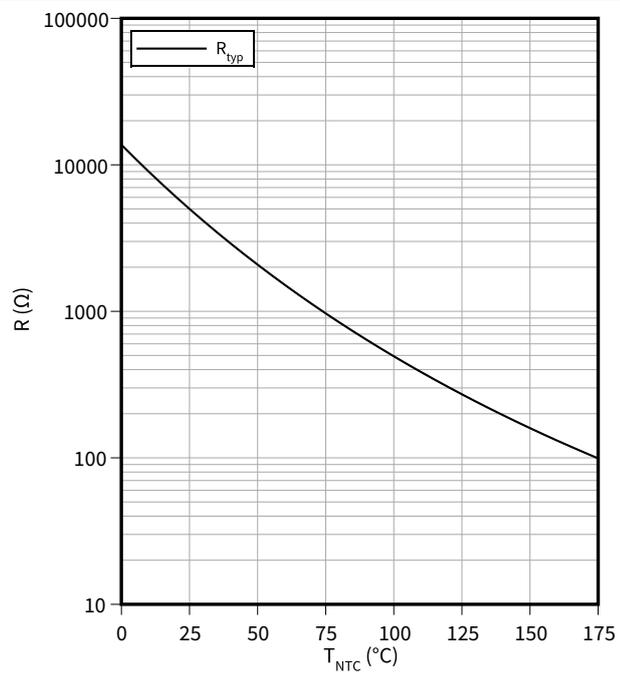
6 Circuit diagram
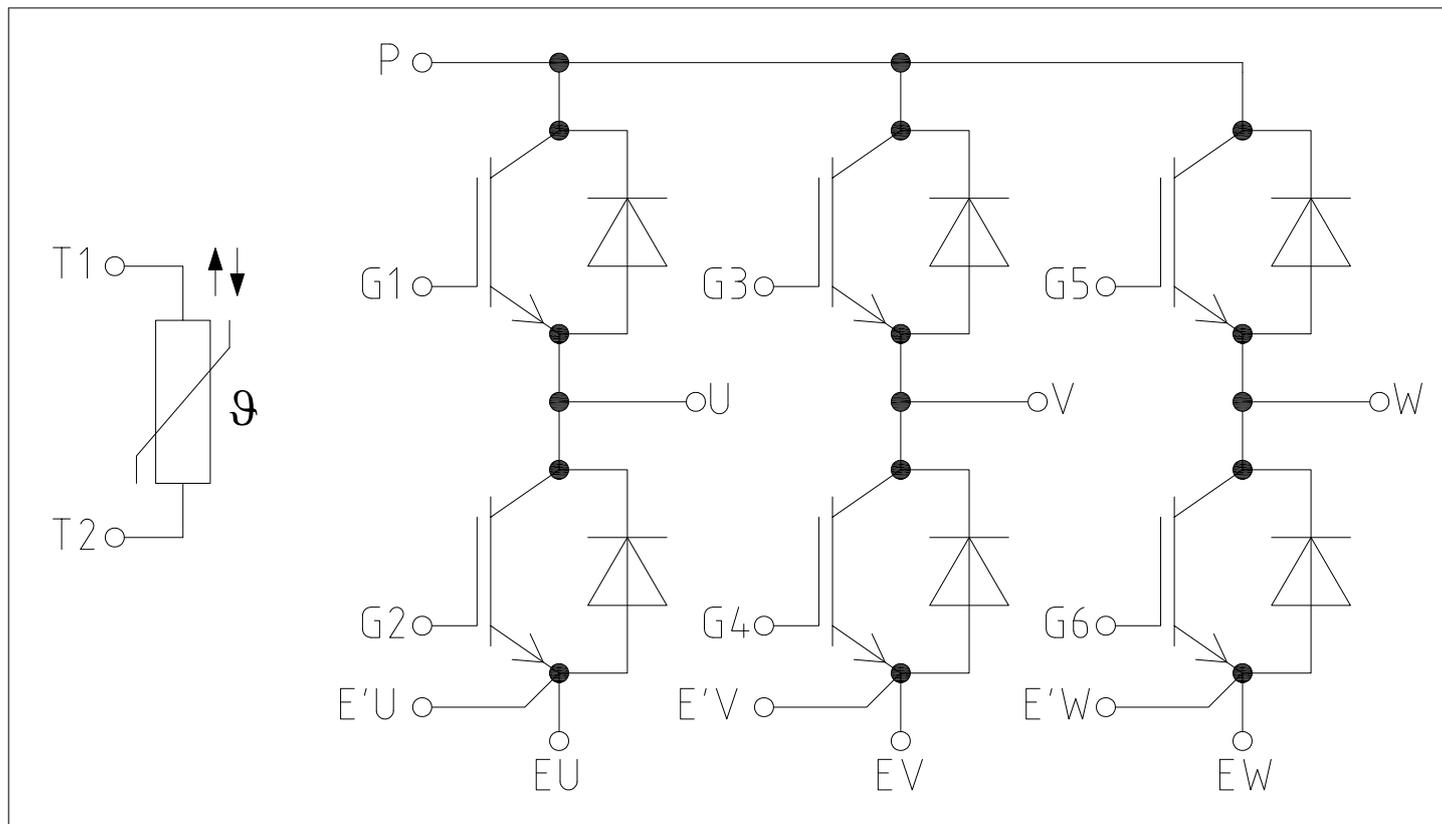
Figure 1

7   Package outlines

- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern $\oplus$ ø0.1
- Hole specification for contacts see AN 2009-01:
  Diameters of drill ø 1.15mm
  and copper thickness in hole 25-50μm

PCB hole pattern

2x9 according to screw head / washer
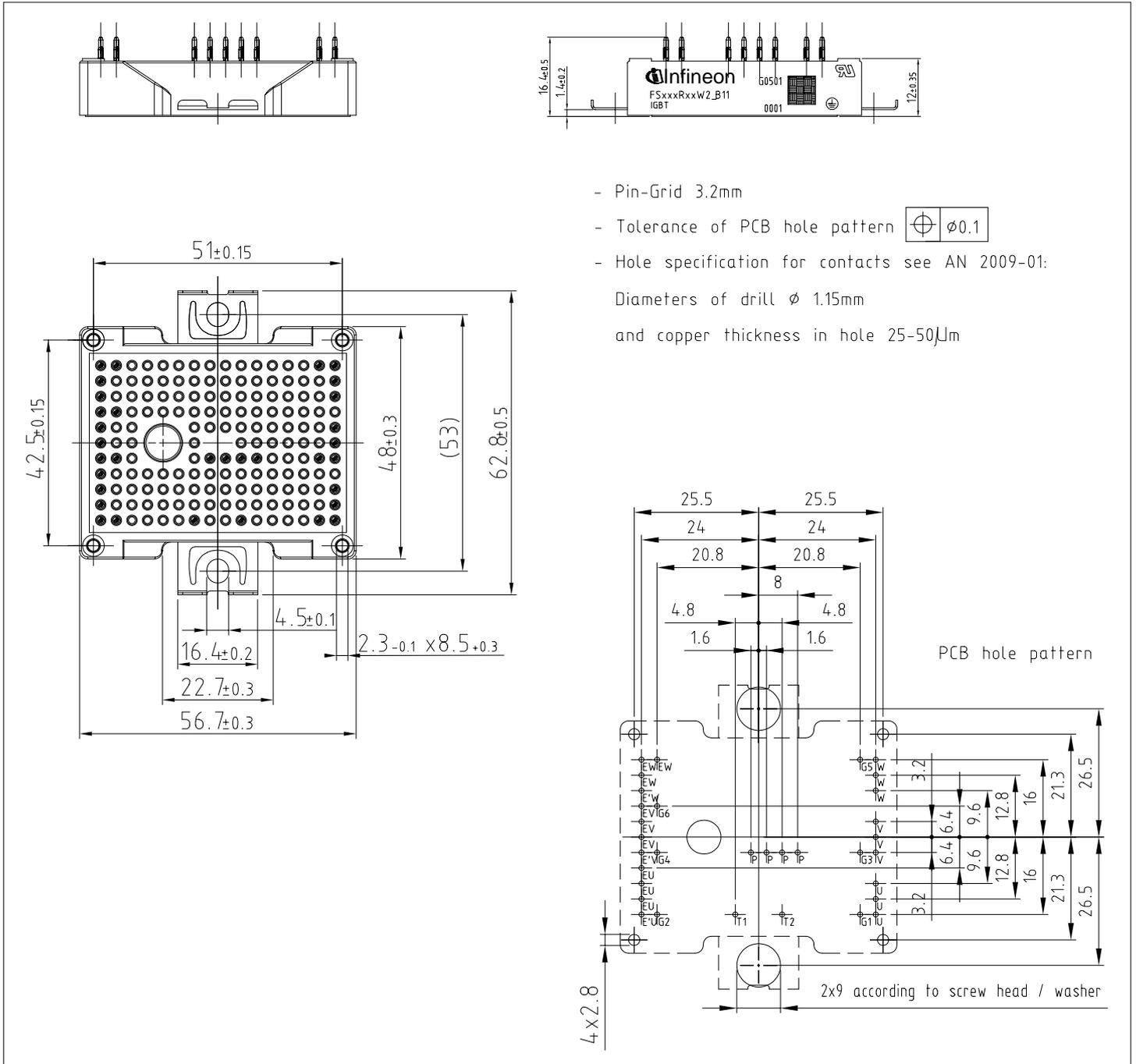
Figure 2

8   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* Module serial number Module material number Production order number Date code (production year) Date code (production week)	*Digit* 1 – 5 6 - 11 12 - 19 20 – 21 22 – 23	*Example* 71549 142846 55054991 15 30
Example	 71549142846550549911530		71549142846550549911530

Figure 3

Revision history

Document revision	Date of release	Description of changes
V1.0	2019-03-28	Target datasheet
V2.0	2019-12-13	Preliminary datasheet
n/a	2020-09-01	Datasheet migrated to a new system with a new layout and new revision number schema: target or preliminary datasheet = 0.xy; final datasheet = 1.xy
1.00	2025-07-18	Final datasheet

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