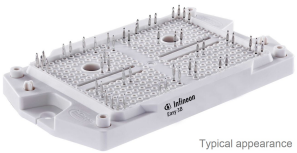
EasyBRIDGE module with TRENCHSTOP™ IGBT7 and CoolSiC™ Schottky diode and PressFIT / NTC

Features


Typical appearance

- Electrical features
  - V_{CES} = 1200 V
  - $I_{C\ nom}$ = 60 A / I_{CRM} = 120 A
  - CoolSiC™ Schottky diode gen 5
  - High dynamic robustness
  - Suitable Infineon gate drivers can be found under https://www.infineon.com/gdfinder
- Mechanical features
  - Compact design
  - Rugged mounting due to integrated mounting clamps
  - PressFIT contact technology
  - Integrated NTC temperature sensor
  - Al_2O_3 substrate with low thermal resistance

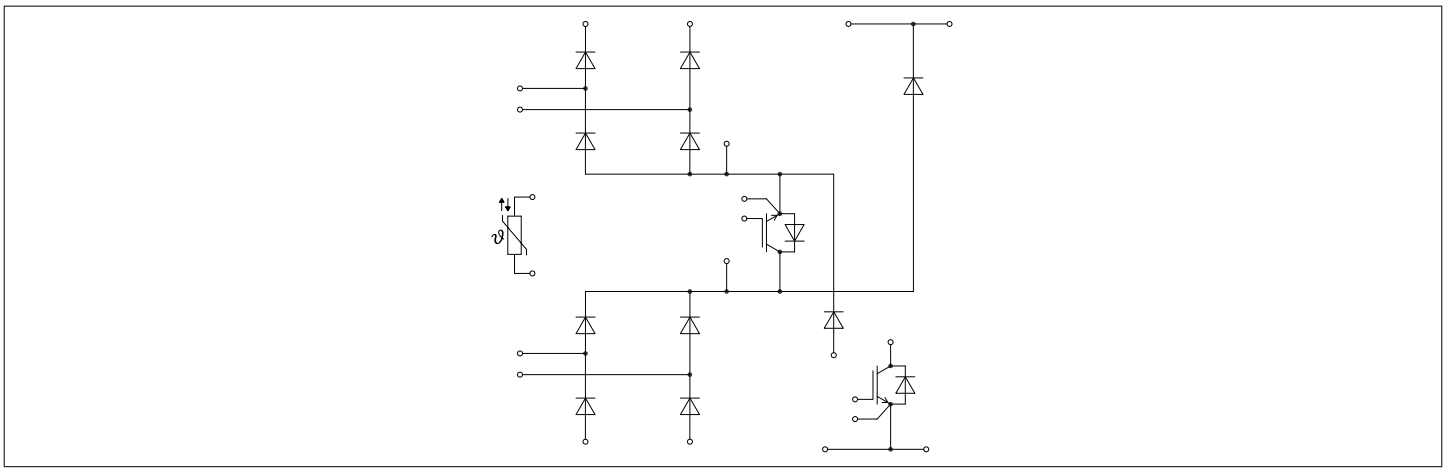
Potential applications

- DC charger for EV

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 Hz, *t* = 1 min	3.2	kV
Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Comparative tracking index	*CTI*		> 400	
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}			32		nH
Module lead resistance, terminals - chip	$R_{AA'+CC'}$	T_H = 25 °C, per switch		8		mΩ
Storage temperature	T_{stg}		-40		125	°C
Mounting torque for module mounting	*M*	- Mounting according to valid application note; M5, Screw	1.3		1.5	Nm
Weight	*G*			78		g

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

2 IGBT, T1

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		T_{vj} = 25 °C	950	V
Implemented collector current	I_{CN}			200	A
Continuous DC collector current	I_{CDC}	$T_{vj\,max}$ = 175 °C	T_H = 65 °C	135	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 4 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\,sat}$	I_C = 200 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.30	1.40	V
			T_{vj} = 125 °C		1.35		
			T_{vj} = 150 °C		1.35		
Gate threshold voltage	V_{GEth}	I_C = 3.25 mA, V_{CE} = 20 V, T_{vj} = 25 °C		4.15	4.90	5.65	V
Gate charge	Q_G	V_{GE} = ±15 V, V_{CC} = 600 V			2.05		µC
Internal gate resistor	R_{Gint}	T_{vj} = 25 °C			1.5		Ω
Input capacitance	C_{ies}	f = 100 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			24.6		nF
Reverse transfer capacitance	C_{res}	f = 100 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			0.114		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} = 950 V, V_{GE} = 0 V	T_{vj} = 25 °C			0.025	mA
Gate-emitter leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25 °C				100	nA
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, λ_{grease} = 1 W/(m·K)			0.635		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		150	°C

3 IGBT, T2

Table 5 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 = 65 °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 6 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		
Gate threshold voltage	V_{GEth}	I_C = 1.27 mA, V_{CE} = V_{GE}, T_{vj} = 25 °C		5.15	5.80	6.45	V

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Gate charge	Q_G	V_{GE} = ±15 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
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, λ_{grease} = 1 W/(m·K)			0.900		K/W
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.

4 Diode, D1 / D2

Table 7 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			25	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		50	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	80	A^2s
			T_{vj} = 150 °C	70	

Table 8 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 25 A, V_{GE} = 0 V	T_{vj} = 25 °C		1.83	2.30	V
			T_{vj} = 125 °C		1.70		
			T_{vj} = 175 °C		1.63		

(table continues...)

Table 8 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance, junction to heat sink	R_{thJH}	per diode, λ_{grease} = 1 W/(m·K)		2.05		K/W
Temperature under switching conditions	$T_{vj\,op}$		-40		175	°C

Note: Tvj op > 150°C is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.

5 Diode, D3 / D4

Table 9 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			150	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		300	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	8630	A^2s
			T_{vj} = 150 °C	7860	

Table 10 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 150 A	T_{vj} = 25 °C		1.05	1.40	V
			T_{vj} = 150 °C		0.98		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, λ_{grease} = 1 W/(m·K)			0.490		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		150	°C

6 Diode, D5-D12

Table 11 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		T_{vj} = 25 °C	1200	V

(table continues...)

Table 11 (continued) Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Maximum RMS forward current per chip	I_{FRMSM}	T_H = 60 °C		60	A
Maximum RMS current at rectifier output	I_{RMSM}	T_H = 60 °C		60	A
I^2t - value	I^2t	t_P = 10 ms	T_{vj} = 125 °C	1030	A^2s
			T_{vj} = 150 °C	940	

Table 12 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 60 A	T_{vj} = 25 °C		1.40	1.75	V
			T_{vj} = 125 °C		1.71		
			T_{vj} = 150 °C		1.85		
Reverse current	I_r	T_{vj} = 150 °C, V_R = 1200 V			0.15		mA
Thermal resistance, junction to heat sink	R_{thJH}	per diode, λ_{grease} = 1 W/(m·K)			0.790		K/W
Temperature under switching conditions	$T_{vj, op}$			-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 °C		5		kΩ
Deviation of R_{100}	$\Delta R/R$	T_{NTC} = 100 °C, R_{100} = 493 Ω	-5		5	%
Power dissipation	P_{25}	T_{NTC} = 25 °C			20	mW
B-value	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2-1/(298{,}15\ K))]$		3375		K
B-value	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2-1/(298{,}15\ K))]$		3411		K
B-value	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2-1/(298{,}15\ K))]$		3433		K

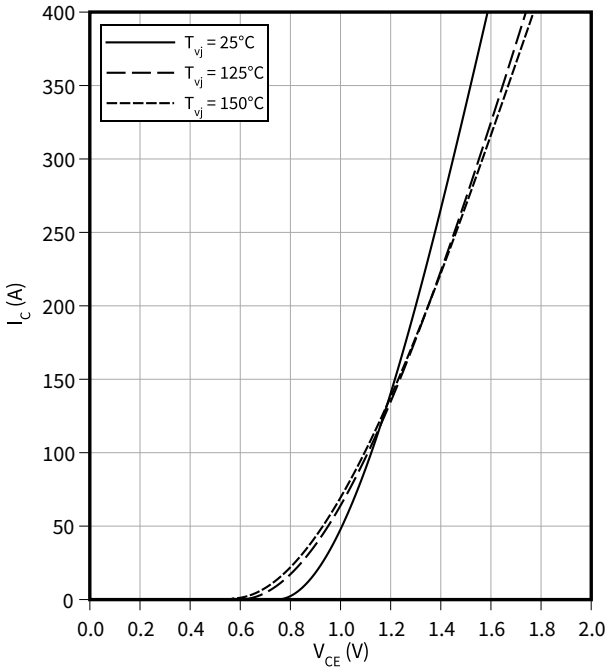
Note: For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4.

8 Characteristics diagrams

Output characteristic (typical), IGBT, T1

$I_C = f(V_{CE})$

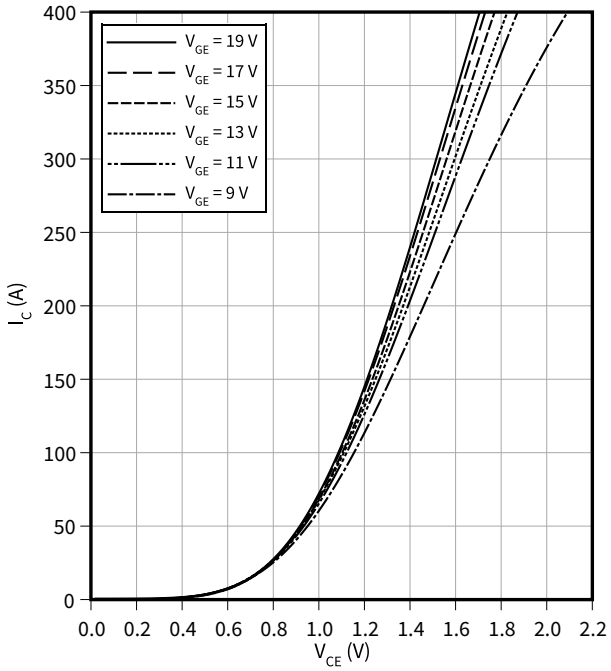
V_{GE} = 15 V



Output characteristic field (typical), IGBT, T1

$I_C = f(V_{CE})$

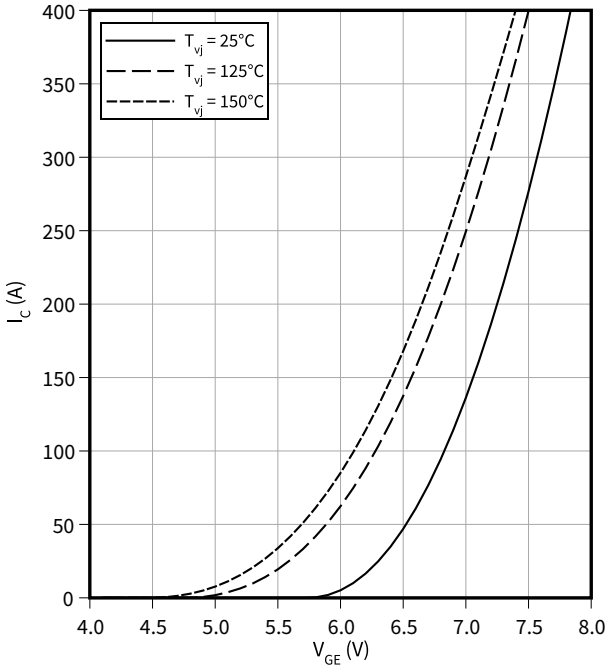
V_{GE} = 15 V, T_{vj} = 150 °C



Transfer characteristic (typical), IGBT, T1

$I_C = f(V_{GE})$

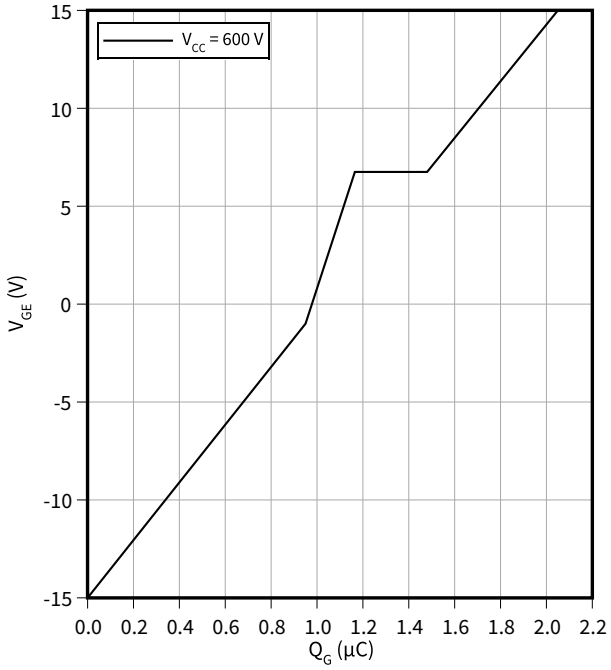
V_{CE} = 20 V



Gate charge characteristic (typical), IGBT, T1

$V_{GE} = f(Q_G)$

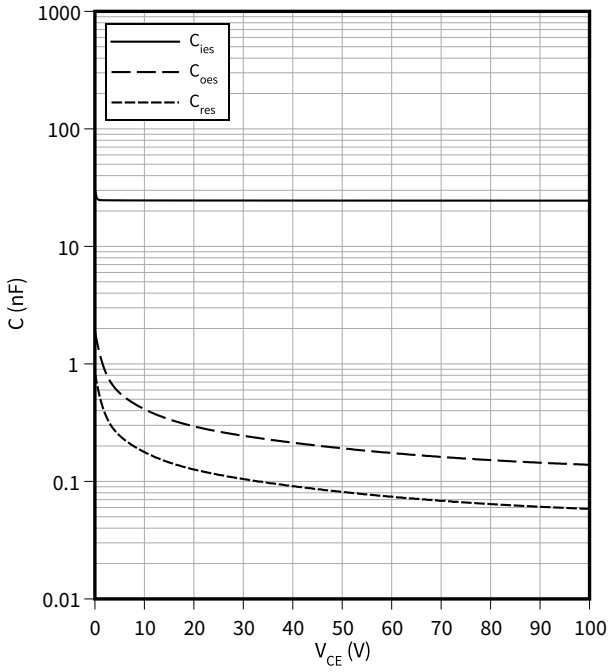
I_C = 200 A, T_{vj} = 25 °C



Capacity characteristic (typical), IGBT, T1

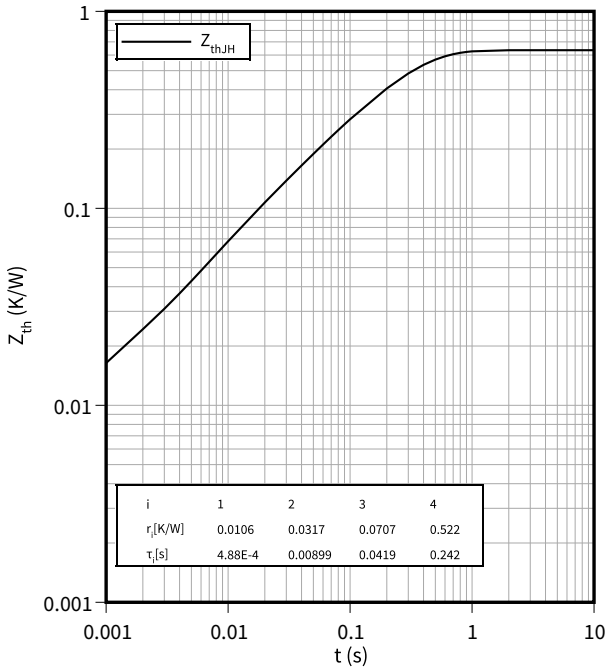
$C = f(V_{CE})$

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



Transient thermal impedance, IGBT, T1

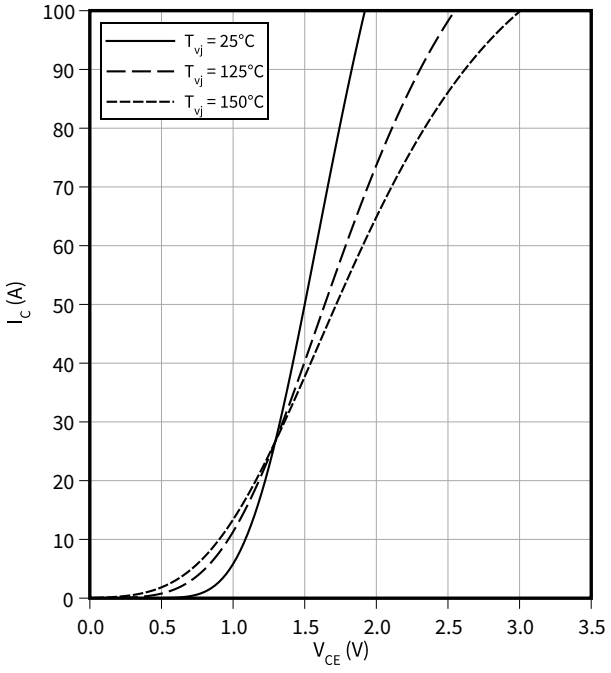
$Z_{th} = f(t)$



Output characteristic (typical), IGBT, T2

$I_C = f(V_{CE})$

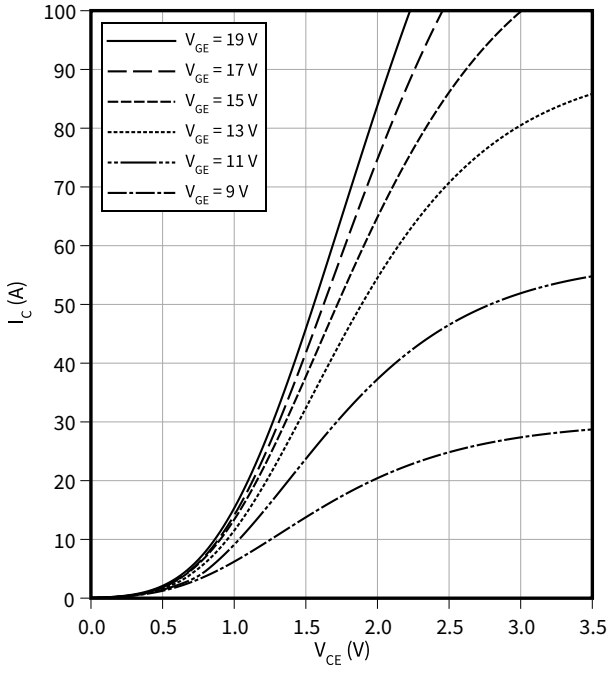
$V_{GE} = 15\ V$



Output characteristic field (typical), IGBT, T2

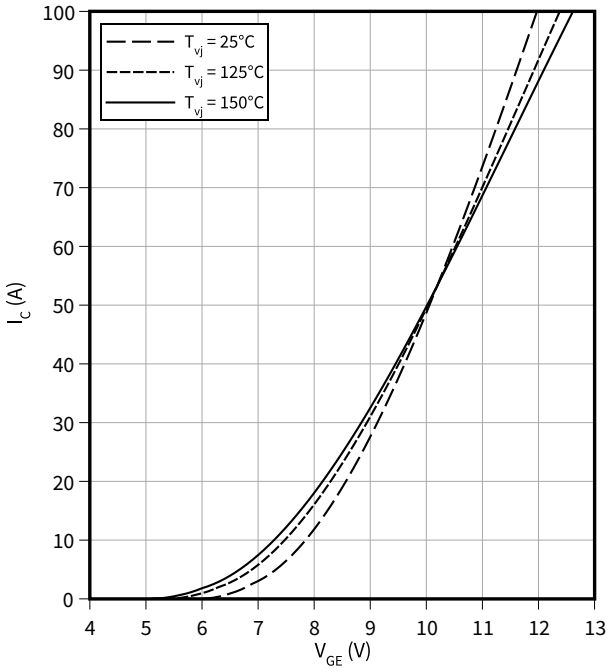
$I_C = f(V_{CE})$

$T_{vj} = 175\ °C$



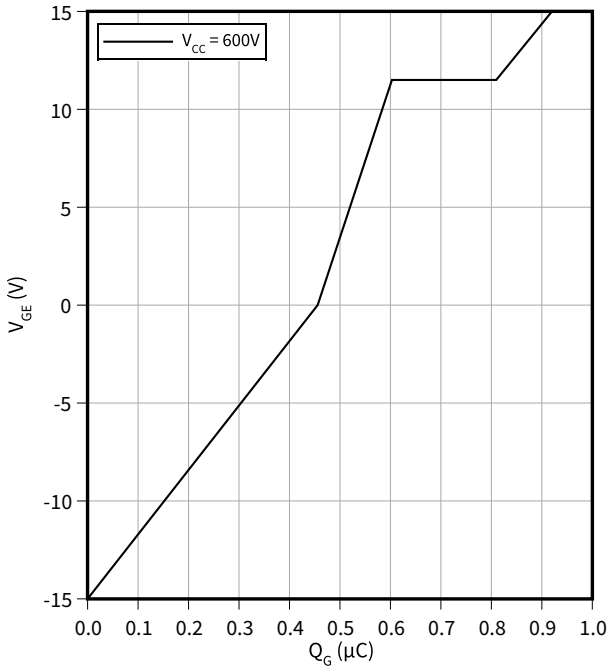
Transfer characteristic (typical), IGBT, T2

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



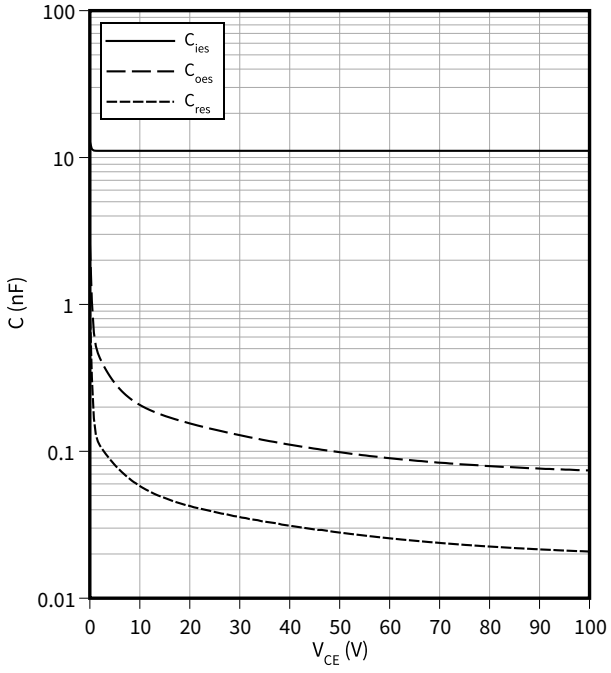
Gate charge characteristic (typical), IGBT, T2

$V_{GE} = f(Q_G)$
$I_C = 50$ A, $T_{vj} = 25$ °C



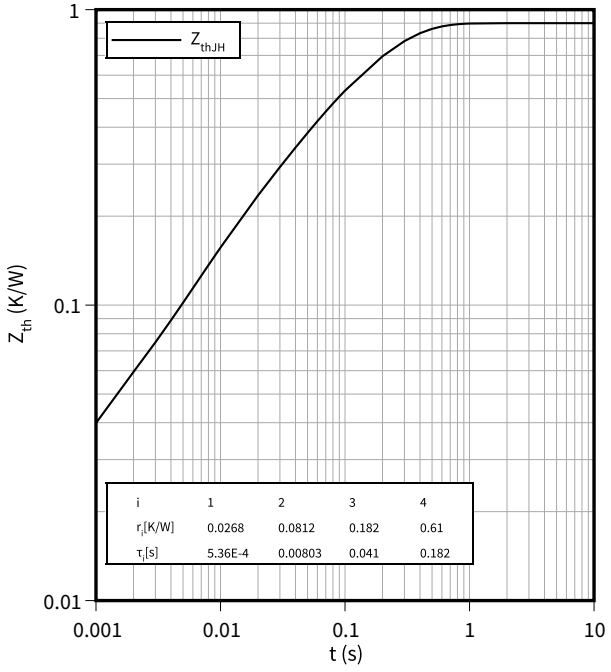
Capacity characteristic (typical), IGBT, T2

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



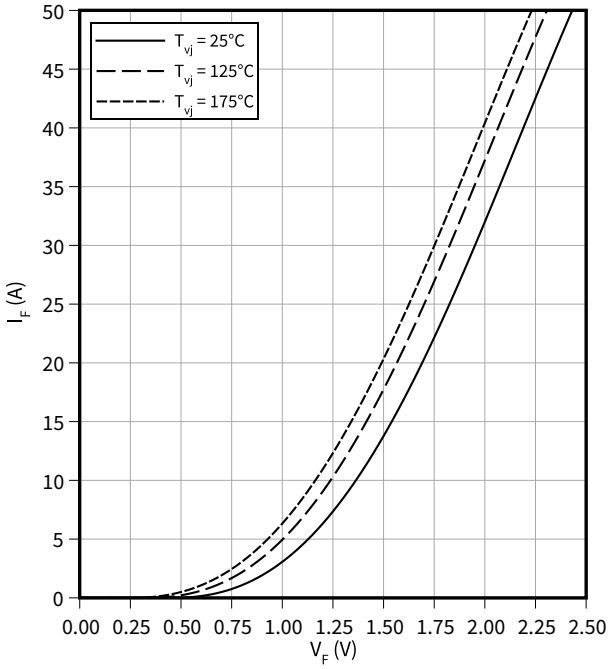
Transient thermal impedance, IGBT, T2

$Z_{th} = f(t)$



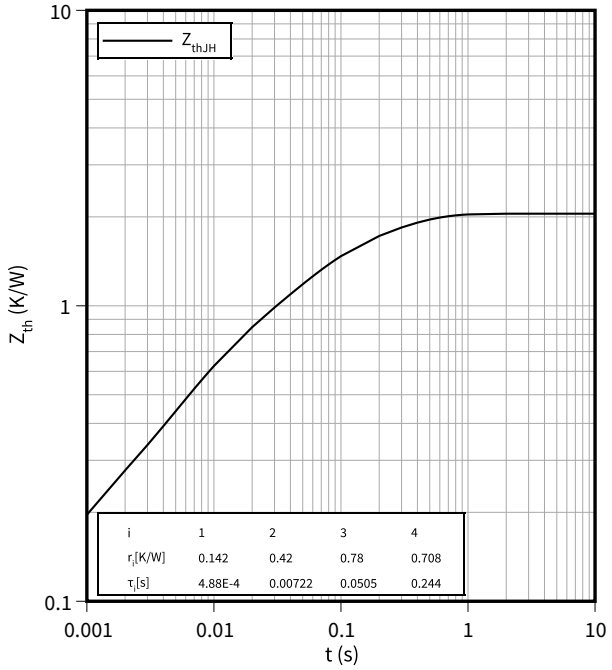
Forward characteristic (typical), Diode, D1 / D2

$I_F = f(V_F)$



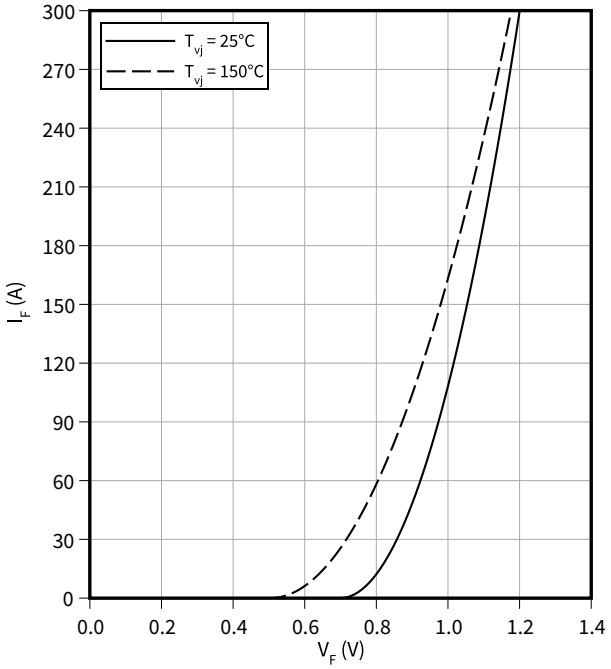
Transient thermal impedance, Diode, D1 / D2

$Z_{th} = f(t)$



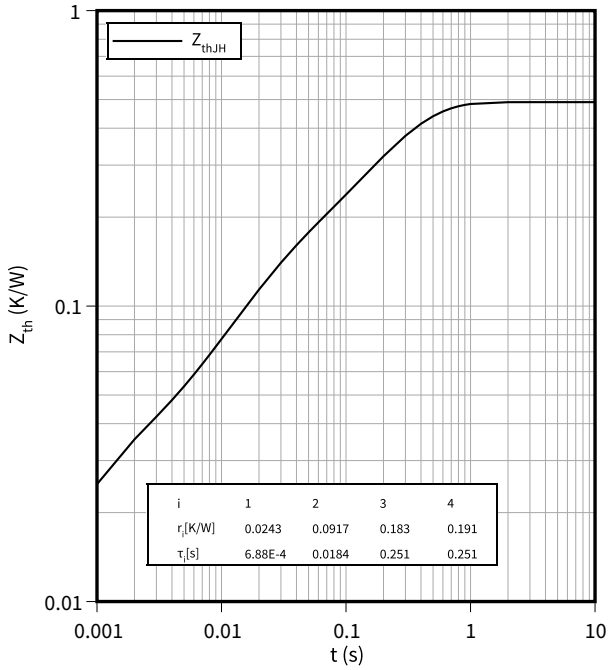
Forward characteristic (typical), Diode, D3 / D4

$I_F = f(V_F)$



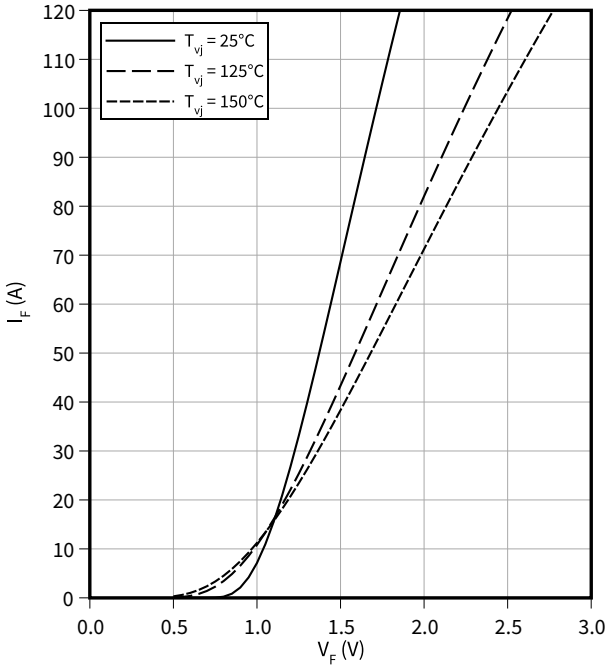
Transient thermal impedance, Diode, D3 / D4

$Z_{th} = f(t)$



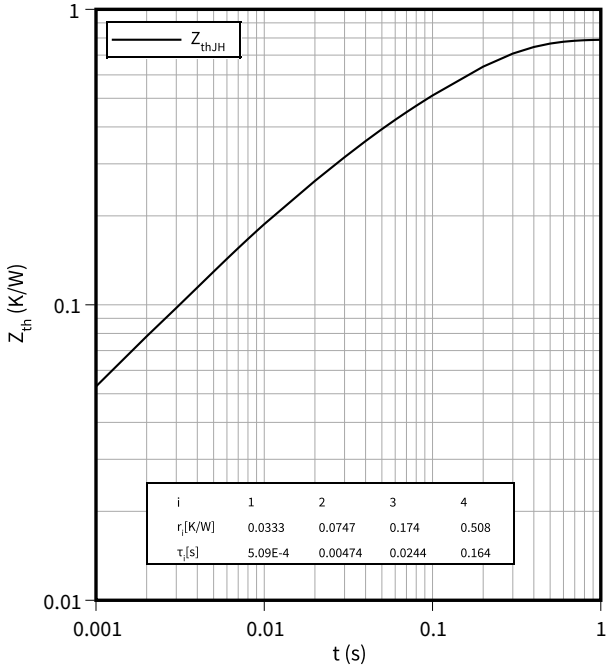
Forward characteristic (typical), Diode, D5-D12

$I_F = f(V_F)$



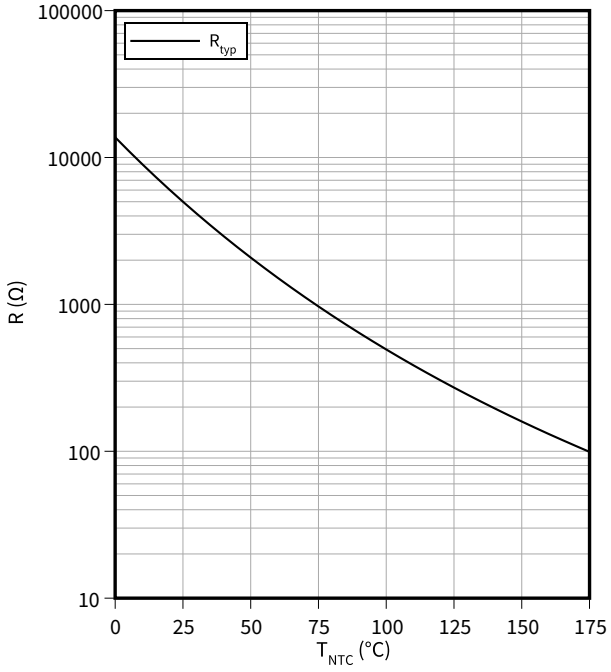
Transient thermal impedance, Diode, D5-D12

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



9 Circuit diagram

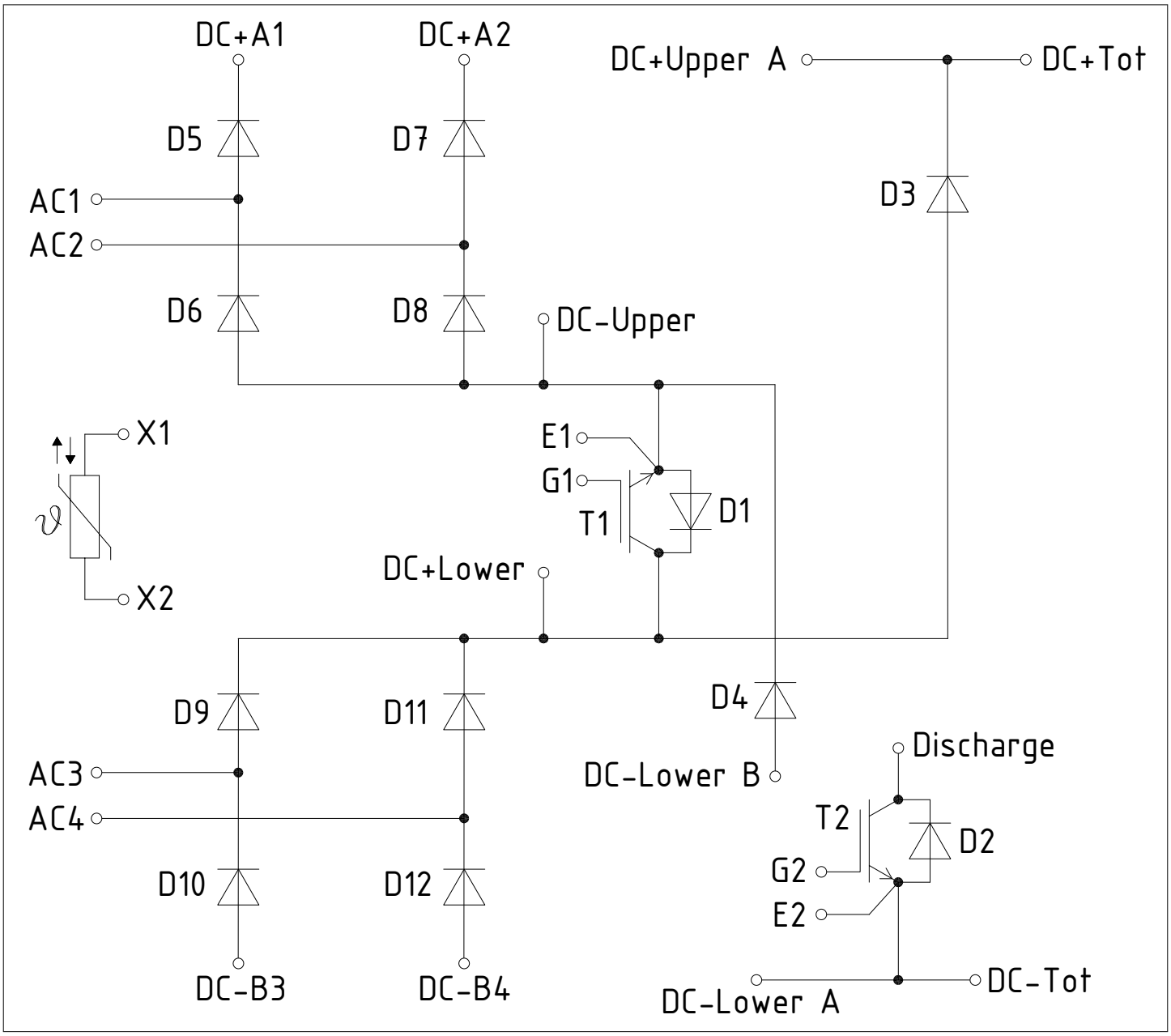


Figure 1

10 Package outlines

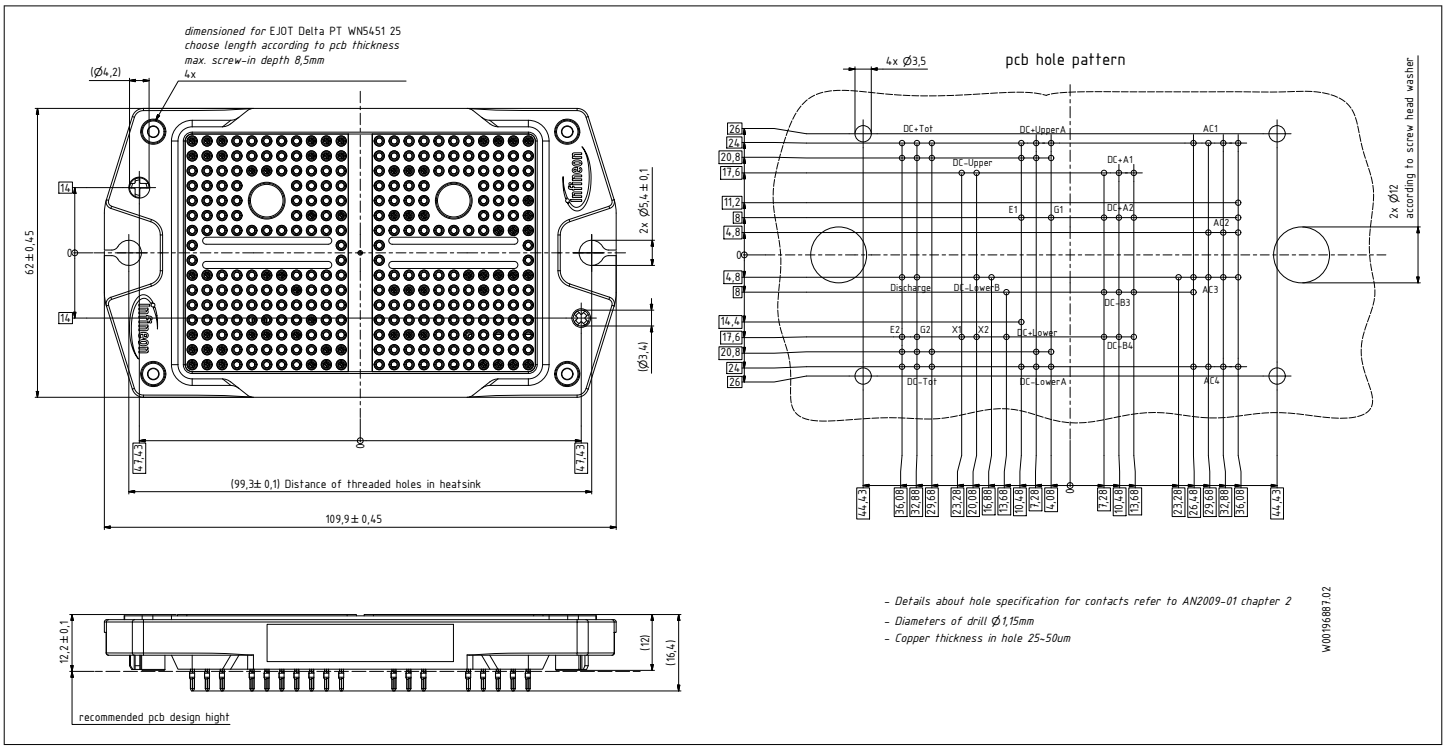


Figure 2

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	*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
0.10	2022-02-03	Initial version
1.00	2023-07-28	Final datasheet

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