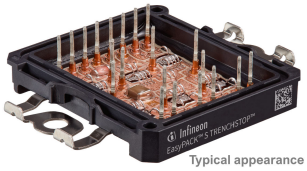
Final datasheet

EasyPACK™ module with TRENCHSTOP™ IGBT7/4 and emitter controlled 7 diode and NTC

Features


Typical appearance

- Electrical features
  - V_{CES} = 1200 V
  - $I_{C\ nom}$ = 35 A / I_{CRM} = 70 A
  - Low switching losses
  - Low $V_{CE,sat}$
  - TRENCHSTOP™ IGBT4
  - TRENCHSTOP™ IGBT7
  - $V_{CE,sat}$ with positive temperature coefficient
  - Suitable Infineon gate drivers can be found under https://www.infineon.com/gdfinder
- Mechanical features
  - Al_2O_3 substrate with low thermal resistance
  - High current pin
  - PressFIT contact technology
  - Rugged mounting due to integrated mounting clamps
  - Integrated NTC temperature sensor

Potential applications

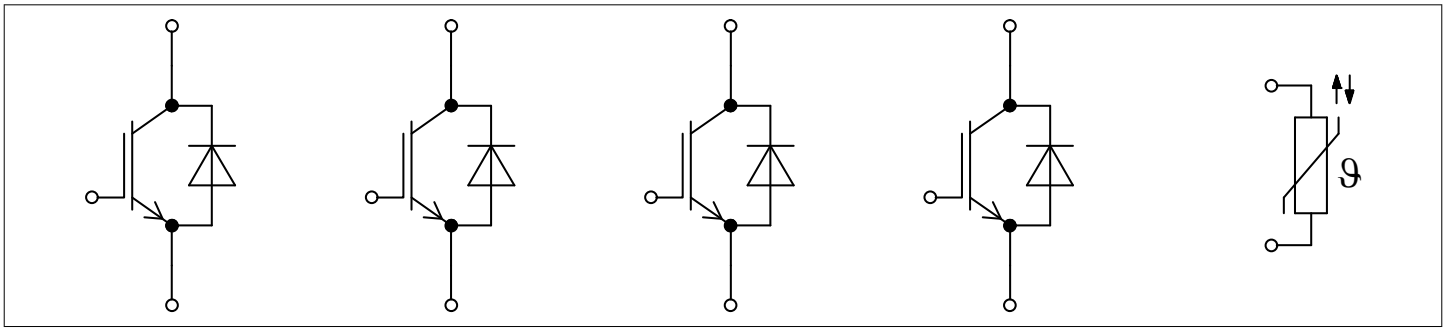
- Automotive applications
- PTC heater
- (Hybrid) electrical vehicles (H)EV
- Module for resistive-capacitive load

Product validation

- Qualified according to AQG 324, release no.: 03.1/2021

Description

Final datasheet



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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	4.0	kV
Isolation test voltage NTC	$V_{ISOL(NTC)}$	RMS, f = 50 Hz, *t* = 1 min	1.0	kV
Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Comparative tracking index	*CTI*		600	
Relative thermal index (electrical)	*RTI*	housing	200	°C

Table 2 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray inductance module	L_{sCE}			10		nH
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	T_H = 25 °C, per switch		2.6		mΩ
Storage temperature	T_{stg}		-40		125	°C
Mounting force per clamp	*F*		20		30	N
Weight	*G*			10		g

***Note**: The current up to 50A per pin is limited by the interaction of the pins with the PCB design and cooling conditions.*

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	1200	V
Continuous DC collector current	I_{CDC}	$T_{vj\,max}$ = 175 °C	T_H = 80 °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		
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
Gate charge	Q_G	V_{GE} = ±15 V, V_{CC} = 600 V, T_{vj} = 25 °C			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			3	µA
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} = 15 V, R_{Gon} = 5.1 Ω	T_{vj} = 25 °C		0.046		µs
			T_{vj} = 125 °C		0.048		
			T_{vj} = 175 °C		0.049		
Rise time (inductive load)	t_r	I_C = 50 A, V_{CC} = 600 V, V_{GE} = 15 V, R_{Gon} = 5.1 Ω	T_{vj} = 25 °C		0.035		µs
			T_{vj} = 125 °C		0.041		
			T_{vj} = 175 °C		0.042		
Turn-off delay time (inductive load)	t_{doff}	I_C = 50 A, V_{CC} = 600 V, V_{GE} = 15 V, R_{Goff} = 5.1 Ω	T_{vj} = 25 °C		0.241		µs
			T_{vj} = 125 °C		0.330		
			T_{vj} = 175 °C		0.370		
Fall time (inductive load)	t_f	I_C = 50 A, V_{CC} = 600 V, V_{GE} = 15 V, R_{Goff} = 5.1 Ω	T_{vj} = 25 °C		0.128		µs
			T_{vj} = 125 °C		0.210		
			T_{vj} = 175 °C		0.271		
Turn-on energy loss per pulse	E_{on}	I_C = 50 A, V_{CC} = 600 V, L_σ = 15 nH, V_{GE} = 15 V, R_{Gon} = 5.1 Ω, di/dt = 1030 A/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		3		mJ
			T_{vj} = 125 °C		3.04		
			T_{vj} = 175 °C		3.13		
Turn-off energy loss per pulse	E_{off}	I_C = 50 A, V_{CC} = 600 V, L_σ = 15 nH, V_{GE} = 15 V, R_{Goff} = 5.1 Ω, dv/dt = 2700 V/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		3.3		mJ
			T_{vj} = 125 °C		5.25		
			T_{vj} = 175 °C		6.45		
SC data	I_{SC}	V_{GE} = 15 V, V_{CC} = 800 V, V_{CEmax}=V_{CES}-L_{sCE}*di/dt	t_P = 8 µs, T_{vj} = 150 °C		190		A

(table continues...)

Table 4 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, λ_{grease} = 5 W/(m·K)		0.789	0.883	K/W
Temperature under switching conditions	$T_{vj\,op}$		-40		175	°C

***Note**: The electrical characterization was performed using an external discrete Schottky diode IDWD40G120C5 as a freewheeling diode. It should be noted that commutation takes place between this module and the external FWD.*

3 IGBT, T2-T4

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		T_{vj} = 25 °C	1200	V
Implemented collector current	I_{CN}			35	A
Continuous DC collector current	I_{CDC}	$T_{vj\,max}$ = 150 °C	T_H = 65 °C	30	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\,op}$		70	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 = 35 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.85	2.25	V
			T_{vj} = 125 °C		2.15		
			T_{vj} = 150 °C		2.25		
Gate threshold voltage	V_{GEth}	I_C = 1.2 mA, V_{CE} = V_{GE}, T_{vj} = 25 °C		5.25	5.80	6.35	V
Gate charge	Q_G	V_{GE} = ±15 V, V_{CC} = 600 V, T_{vj} = 25 °C			0.22		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			1.95		nF
Reverse transfer capacitance	C_{res}	f = 100 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			0.1		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} = 1200 V, V_{GE} = 0 V	T_{vj} = 25 °C			4	µA

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
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 = 35 A, V_{CC} = 600 V, V_{GE} = 15 V, R_{Gon} = 12 Ω	T_{vj} = 25 °C		0.061		µs
			T_{vj} = 125 °C		0.056		
			T_{vj} = 150 °C		0.055		
Rise time (inductive load)	t_r	I_C = 35 A, V_{CC} = 600 V, V_{GE} = 15 V, R_{Gon} = 12 Ω	T_{vj} = 25 °C		0.055		ns
			T_{vj} = 125 °C		0.057		
			T_{vj} = 150 °C		0.058		
Turn-off delay time (inductive load)	t_{doff}	I_C = 35 A, V_{CC} = 600 V, V_{GE} = 15 V, R_{Goff} = 12 Ω	T_{vj} = 25 °C		0.204		µs
			T_{vj} = 125 °C		0.286		
			T_{vj} = 150 °C		0.307		
Fall time (inductive load)	t_f	I_C = 35 A, V_{CC} = 600 V, V_{GE} = 15 V, R_{Goff} = 12 Ω	T_{vj} = 25 °C		0.174		µs
			T_{vj} = 125 °C		0.248		
			T_{vj} = 150 °C		0.274		
Turn-on energy loss per pulse	E_{on}	I_C = 35 A, V_{CC} = 600 V, L_σ = 15 nH, V_{GE} = 15 V, R_{Gon} = 12 Ω, di/dt = 500 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		2.05		mJ
			T_{vj} = 125 °C		2.21		
			T_{vj} = 150 °C		2.27		
Turn-off energy loss per pulse	E_{off}	I_C = 35 A, V_{CC} = 600 V, L_σ = 15 nH, V_{GE} = 15 V, R_{Goff} = 12 Ω, dv/dt = 3100 V/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		2.19		mJ
			T_{vj} = 125 °C		3.41		
			T_{vj} = 150 °C		3.84		
SC data	I_{SC}	V_{GE} = 15 V, V_{CC} = 800 V, V_{CEmax}=V_{CES}-L_{sCE}*di/dt	t_P ≤ 12 µs, T_{vj} = 125 °C		160		A
			t_P ≤ 10 µs, T_{vj} = 150 °C		130		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, λ_{grease} = 5 W/(m·K)			0.841	0.931	K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		150	°C

***Note**: The electrical characterization was performed using an external discrete Schottky diode IDWD40G120C5 as a freewheeling diode. It should be noted that commutation takes place between this module and the external FWD.*

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 °C	1200	V
Continuous DC forward current	I_F			10	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		20	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	24.5	A^2s
			T_{vj} = 150 °C	22.8	

Table 8 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 10 A, V_{GE} = 0 V	T_{vj} = 25 °C		1.72	2.10	V
			T_{vj} = 125 °C		1.59		
			T_{vj} = 150 °C		1.56		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, λ_{grease} = 5 W/(m·K)			2.82	3.30	K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		150	°C

5 NTC-Thermistor

Table 9 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	R_{25}	T_{NTC} = 25 °C		10		kΩ
Deviation of R_{100}	$\Delta R/R$	T_{NTC} = 100 °C, R_{100} = 977 Ω	-5		5	%
Power dissipation	P_{25}	T_{NTC} = 25 °C			20	mW
B-value	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2-1/(298{,}15\ K))]$		3447		K
B-value	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2-1/(298{,}15\ K))]$		3487		K
B-value	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2-1/(298{,}15\ K))]$		3510		K

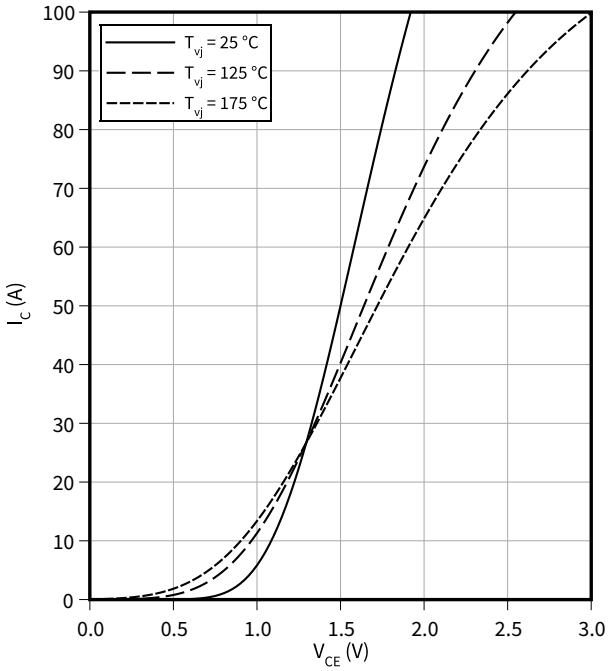
***Note**: For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4*

6 Characteristics diagrams

Output characteristic (typical), IGBT, T1

$I_C = f(V_{CE})$

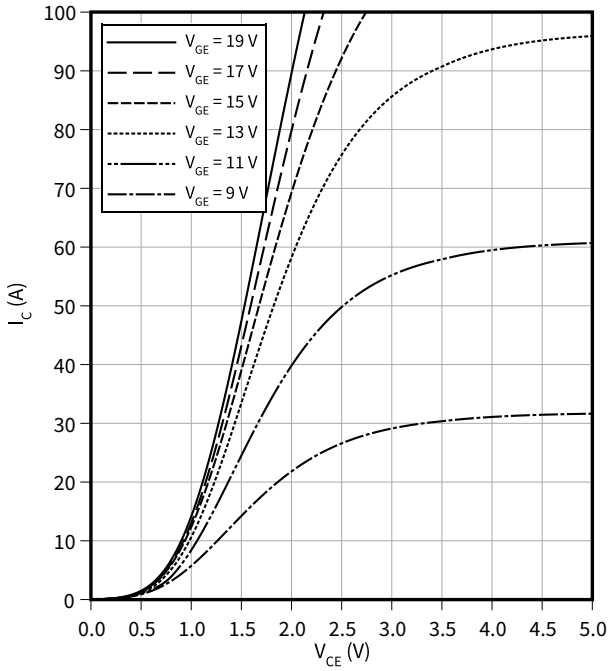
$V_{GE} = 15$ V



Output characteristic field (typical), IGBT, T1

$I_C = f(V_{CE})$

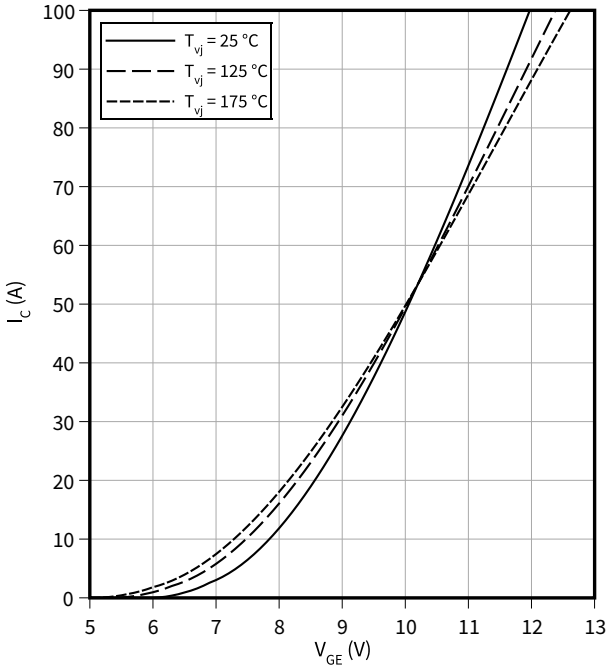
$T_{vj} = 175$ °C



Transfer characteristic (typical), IGBT, T1

$I_C = f(V_{GE})$

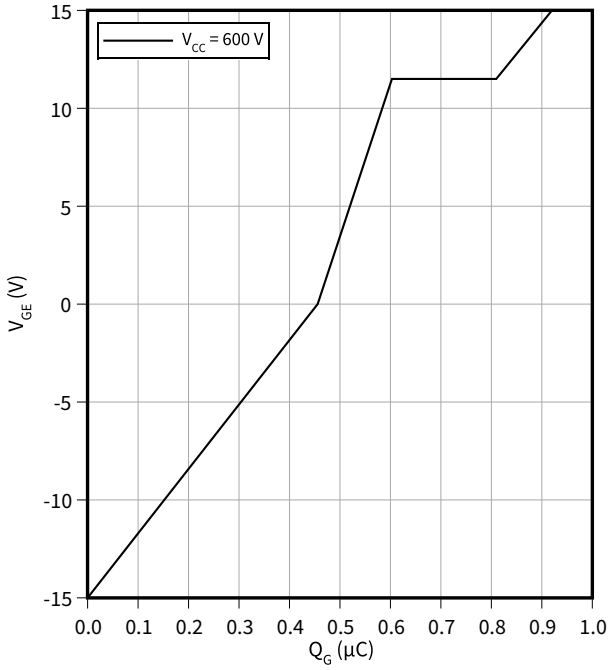
$V_{CE} = 20$ V



Gate charge characteristic (typical), IGBT, T1

$V_{GE} = f(Q_G)$

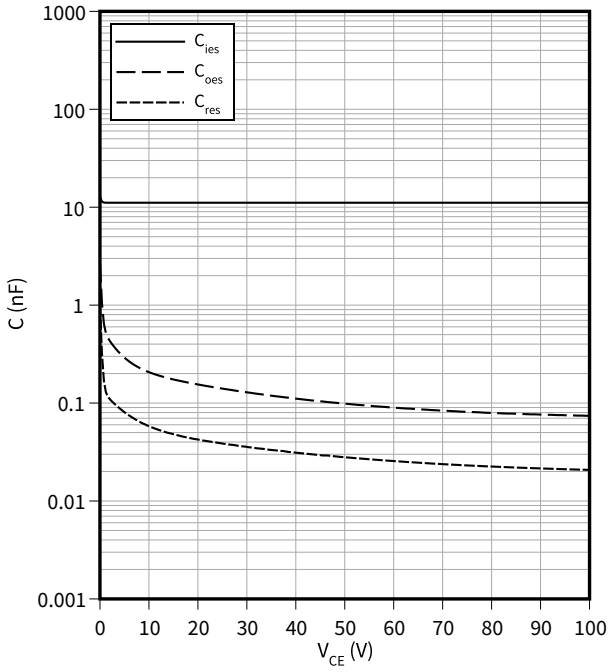
$T_{vj} = 25$ °C, $I_C = 50$ A



Capacity characteristic (typical), IGBT, T1

$C = f(V_{CE})$

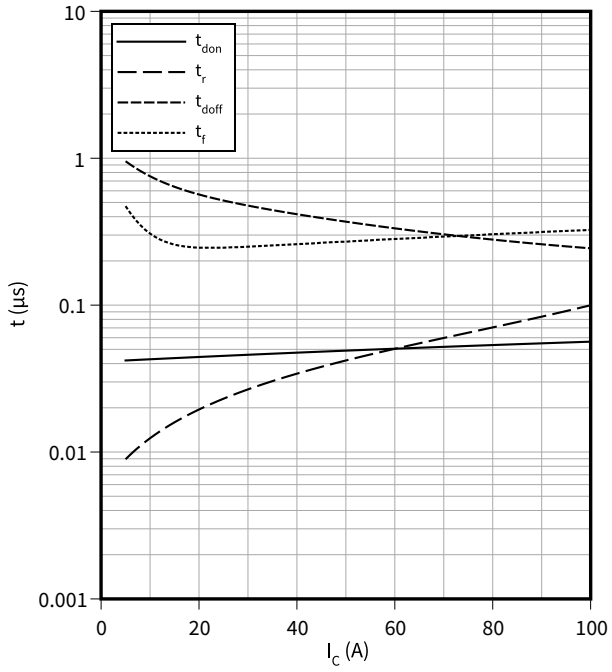
$f = 100\ kHz$, $V_{GE} = 0\ V$, $T_{vj} = 25\ °C$



Switching times (typical), IGBT, T1

$t = f(I_C)$

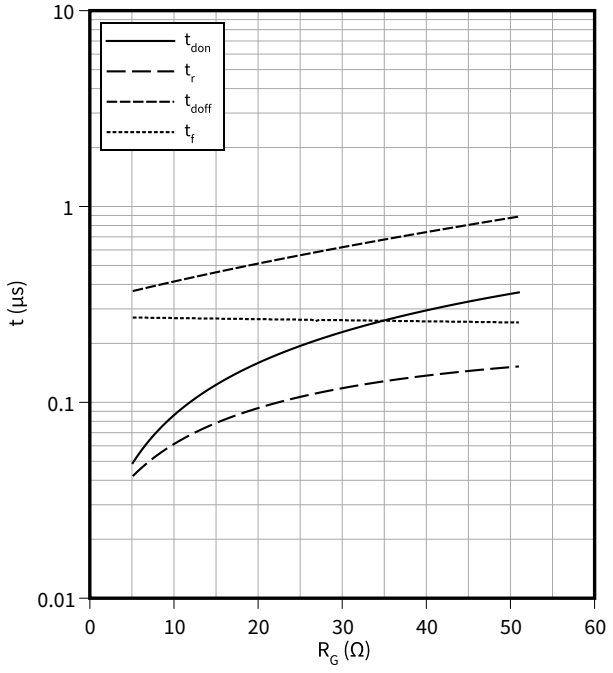
$R_{Goff} = 5.1\ \Omega$, $R_{Gon} = 5.1\ \Omega$, $V_{GE} = \pm 15\ V$, $V_{CC} = 600\ V$



Switching times (typical), IGBT, T1

$t = f(R_G)$

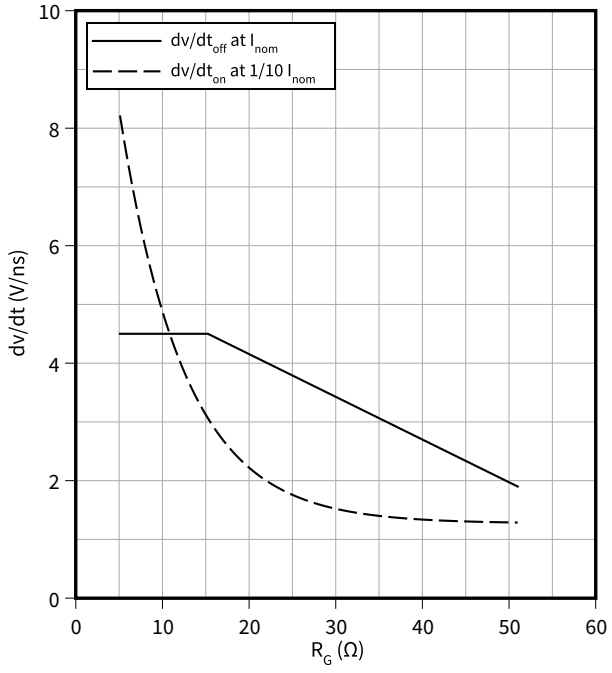
$V_{GE} = \pm 15\ V$, $I_C = 50\ A$, $V_{CC} = 600\ V$



Voltage slope (typical), IGBT, T1

$dv/dt = f(R_G)$

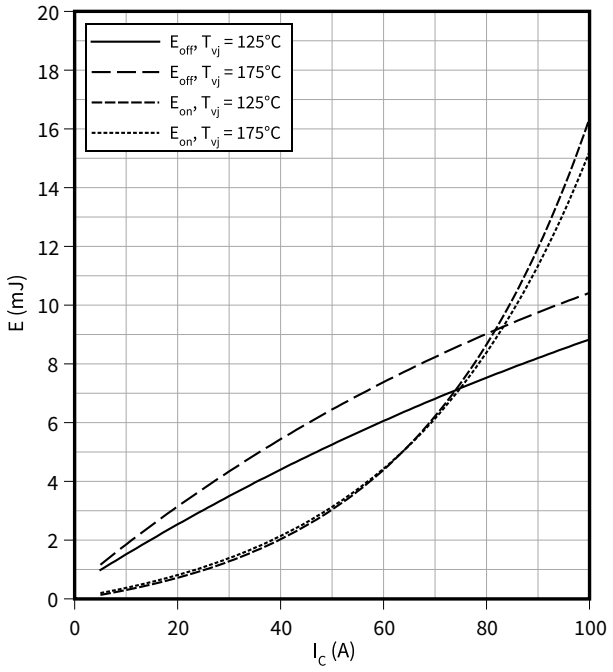
$I_C = 50\ A$, $V_{CC} = 600\ V$, $V_{GE} = \pm 15\ V$, $T_{vj} = 25\ °C$



Switching losses (typical), IGBT, T1

$E = f(I_C)$

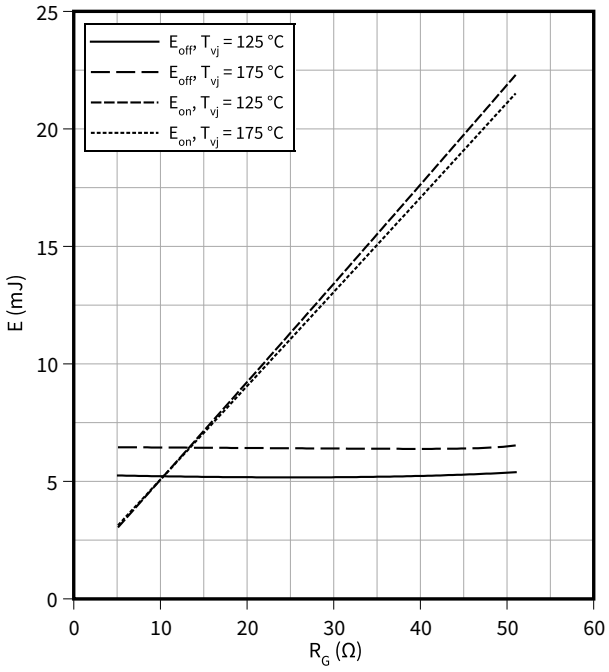
$R_{Goff} = 5.1\ \Omega$, $R_{Gon} = 5.1\ \Omega$, $V_{GE} = \pm 15\ V$, $V_{CC} = 600\ V$



Switching losses (typical), IGBT, T1

$E = f(R_G)$

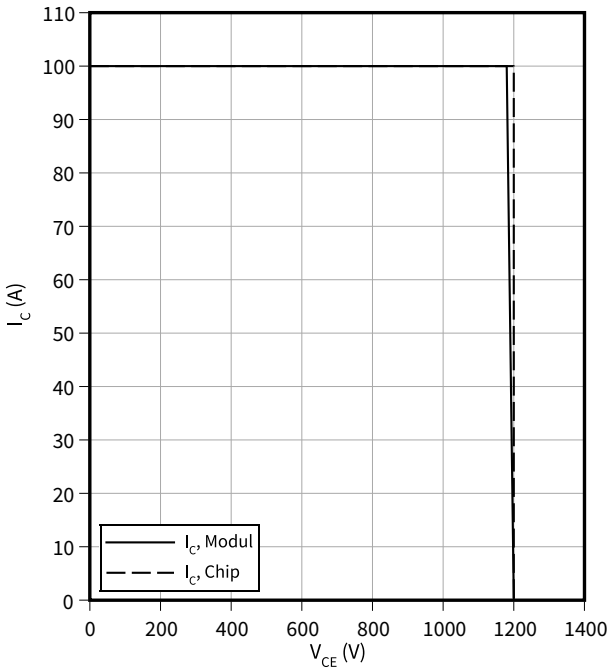
$V_{GE} = \pm 15\ V$, $I_C = 50\ A$, $V_{CC} = 600\ V$



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

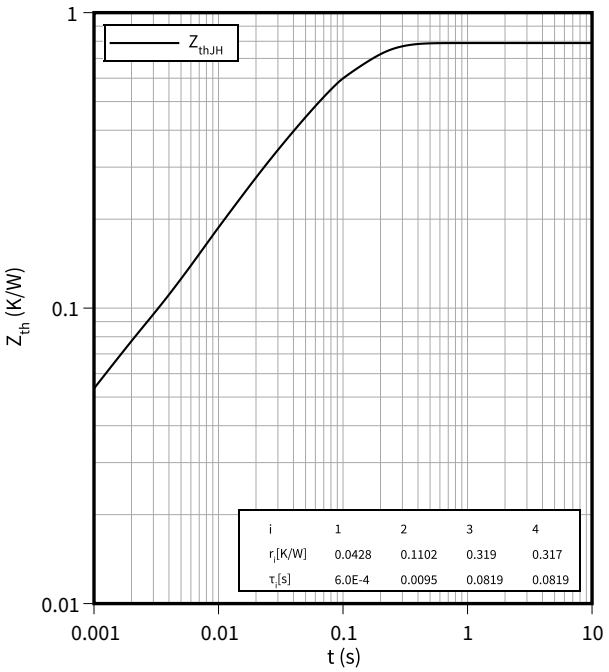
$I_C = f(V_{CE})$

$R_{Goff} = 5.1\ \Omega$, $V_{GE} = \pm 15\ V$, $T_{vj} = 175\ °C$



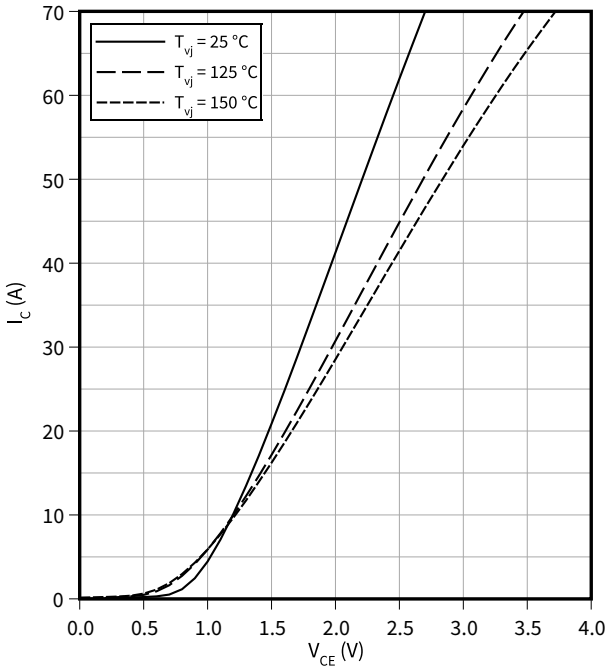
Transient thermal impedance, IGBT, T1

$Z_{th} = f(t)$



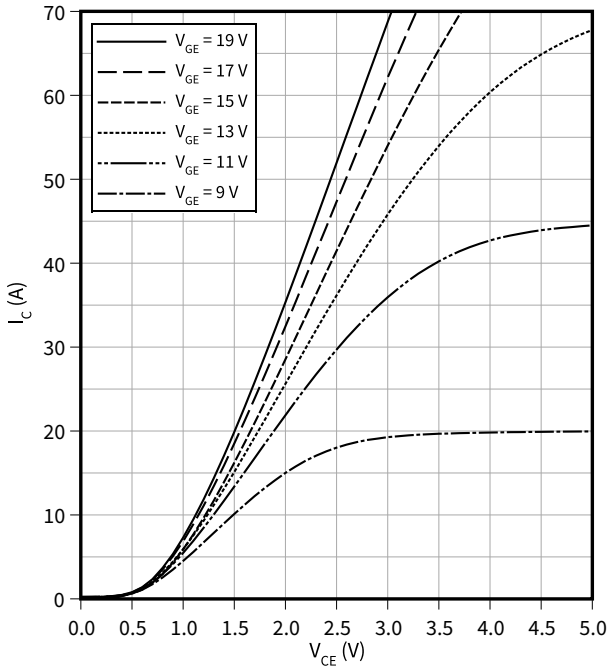
Output characteristic (typical), IGBT, T2-T4

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



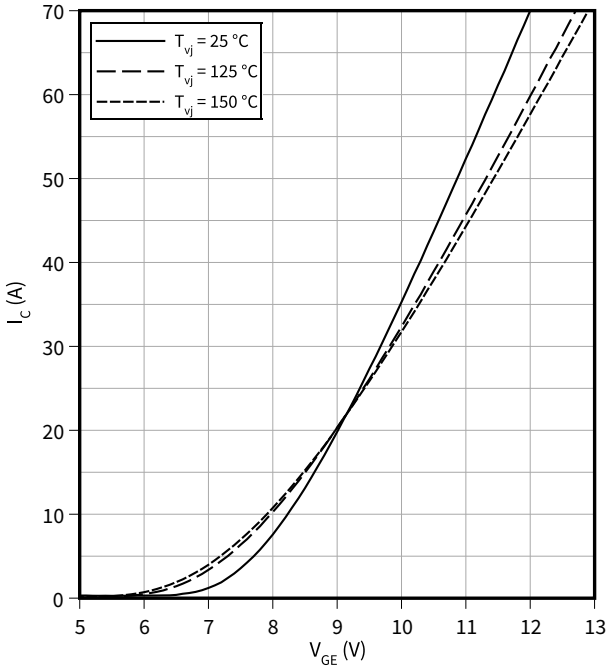
Output characteristic field (typical), IGBT, T2-T4

$I_C = f(V_{CE})$
$T_{vj} = 150$ °C



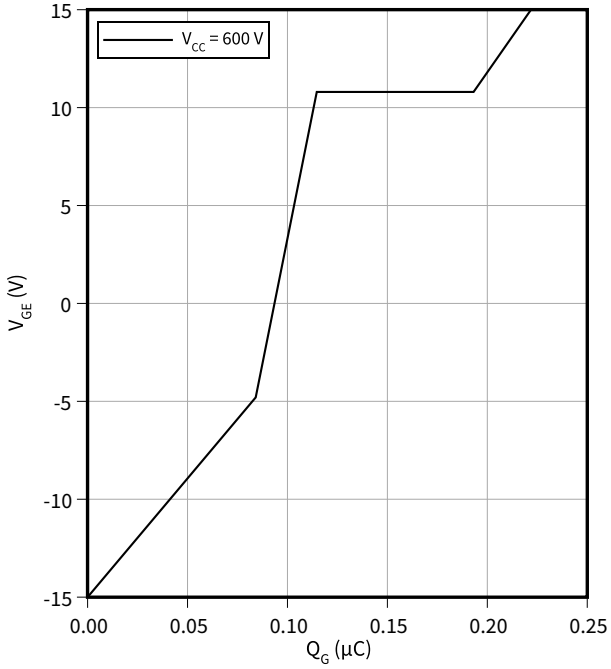
Transfer characteristic (typical), IGBT, T2-T4

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



Gate charge characteristic (typical), IGBT, T2-T4

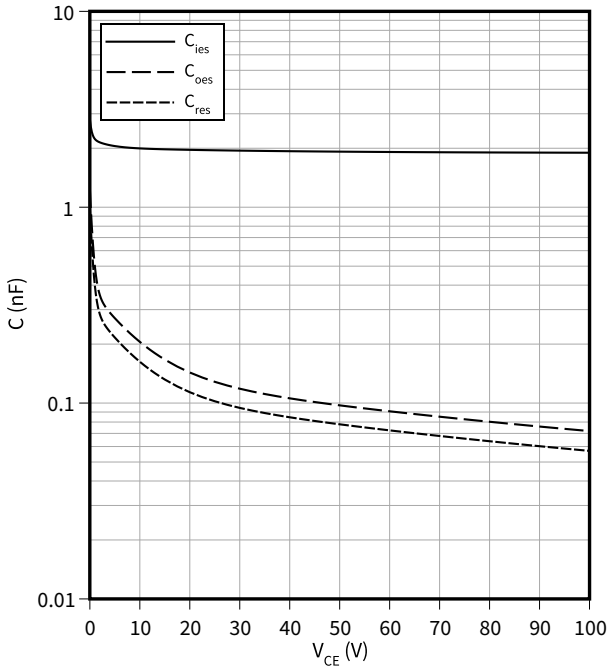
$V_{GE} = f(Q_G)$
$I_C = 35$ A, $T_{vj} = 25$ °C



Capacity characteristic (typical), IGBT, T2-T4

$C = f(V_{CE})$

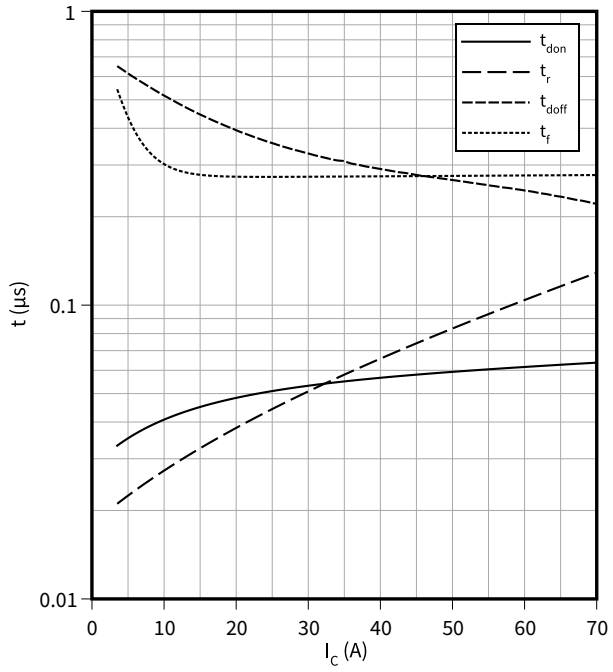
$f = 100\ kHz$, $V_{GE} = 0\ V$, $T_{vj} = 25\ °C$



Switching times (typical), IGBT, T2-T4

$t = f(I_C)$

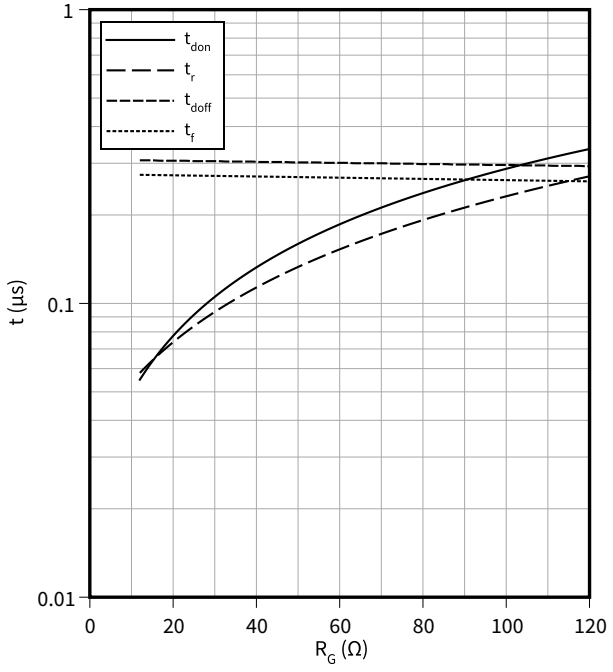
$R_{Goff} = 12\ \Omega$, $R_{Gon} = 12\ \Omega$, $V_{GE} = \pm 15\ V$, $V_{CC} = 600\ V$



Switching times (typical), IGBT, T2-T4

$t = f(R_G)$

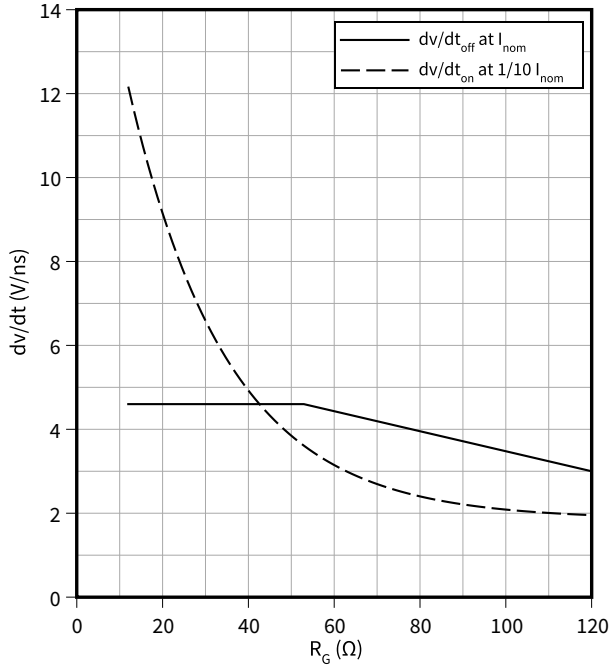
$V_{GE} = \pm 15\ V$, $I_C = 35\ A$, $V_{CC} = 600\ V$



Voltage slope (typical), IGBT, T2-T4

$dv/dt = f(R_G)$

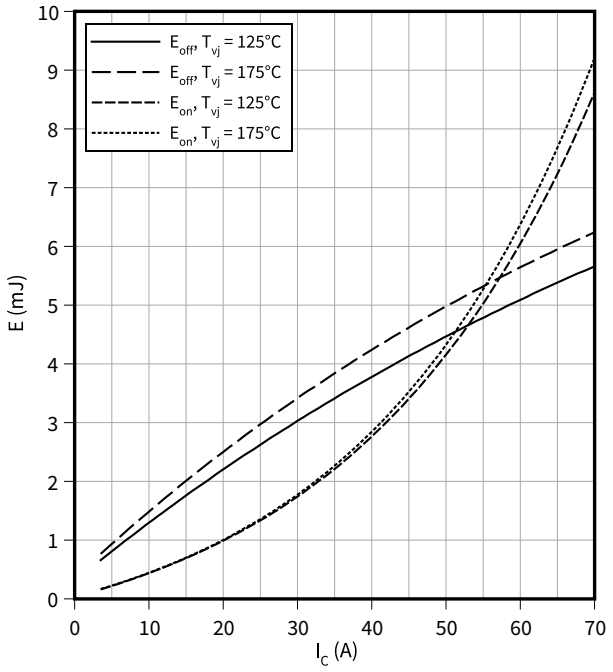
$I_C = 35\ A$, $V_{CC} = 600\ V$, $V_{GE} = \pm 15\ V$, $T_{vj} = 25\ °C$



Switching losses (typical), IGBT, T2-T4

$E = f(I_C)$

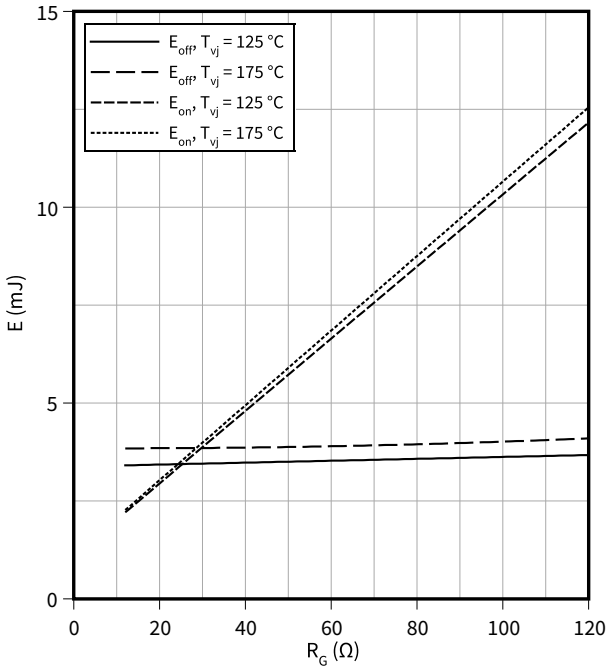
$R_{Goff} = 12\ \Omega$, $R_{Gon} = 12\ \Omega$, $V_{GE} = \pm 15\ V$, $V_{CC} = 600\ V$



Switching losses (typical), IGBT, T2-T4

$E = f(R_G)$

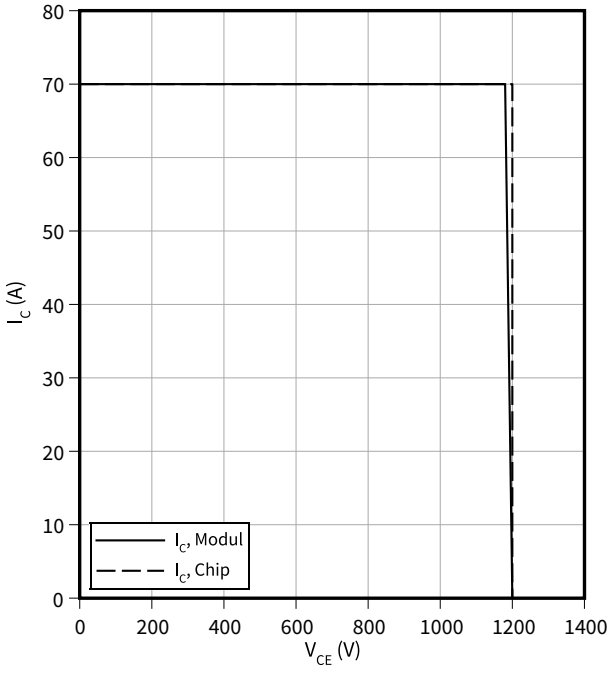
$V_{GE} = \pm 15\ V$, $I_C = 35\ A$, $V_{CC} = 600\ V$



Reverse bias safe operating area (RBSOA), IGBT, T2-T4

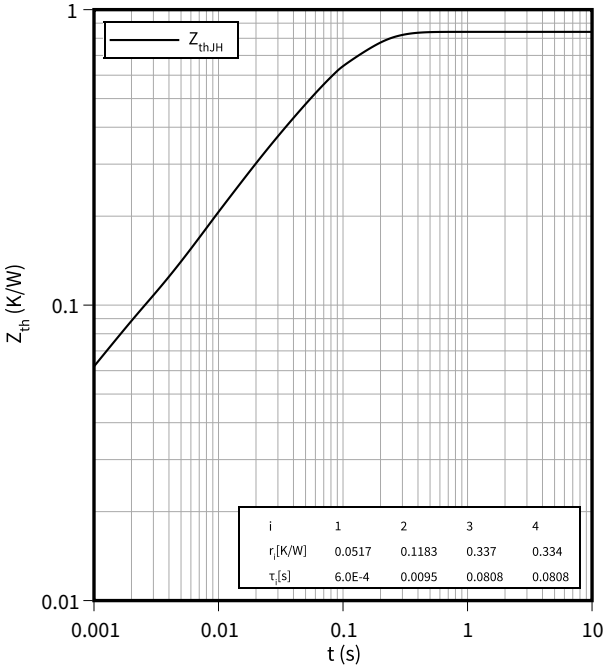
$I_C = f(V_{CE})$

$R_{Goff} = 12\ \Omega$, $V_{GE} = \pm 15\ V$, $T_{vj} = 150\ °C$



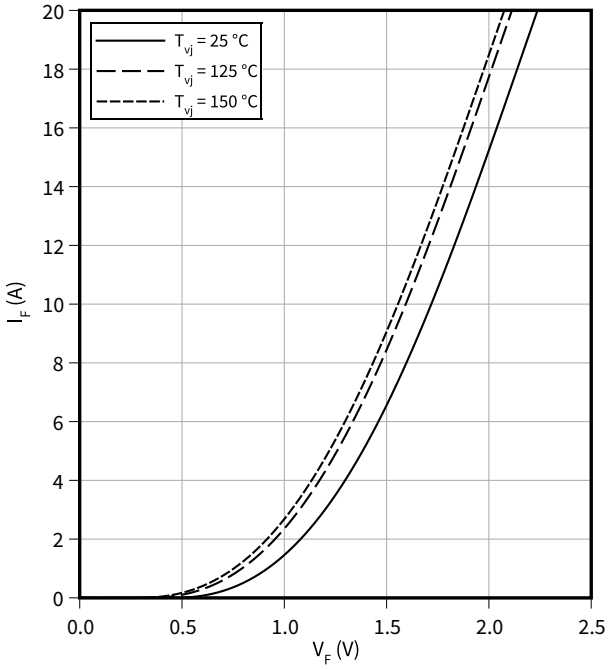
Transient thermal impedance, IGBT, T2-T4

$Z_{th} = f(t)$



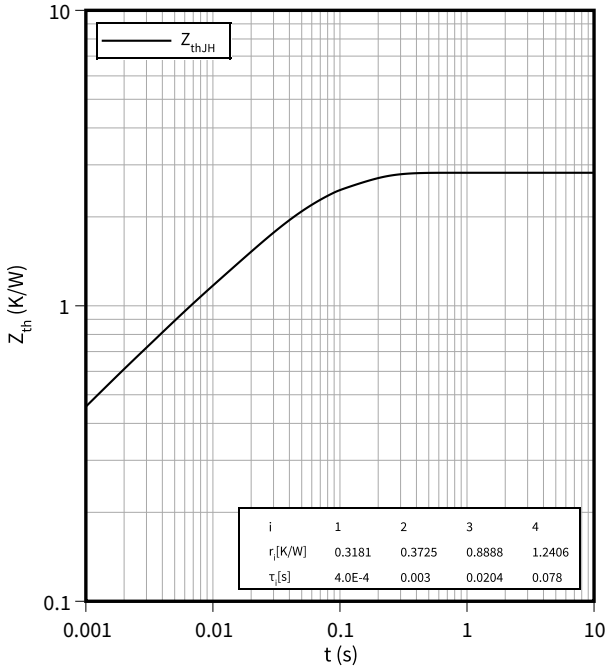
Forward characteristic (typical), Diode, D1-D4

$I_F = f(V_F)$



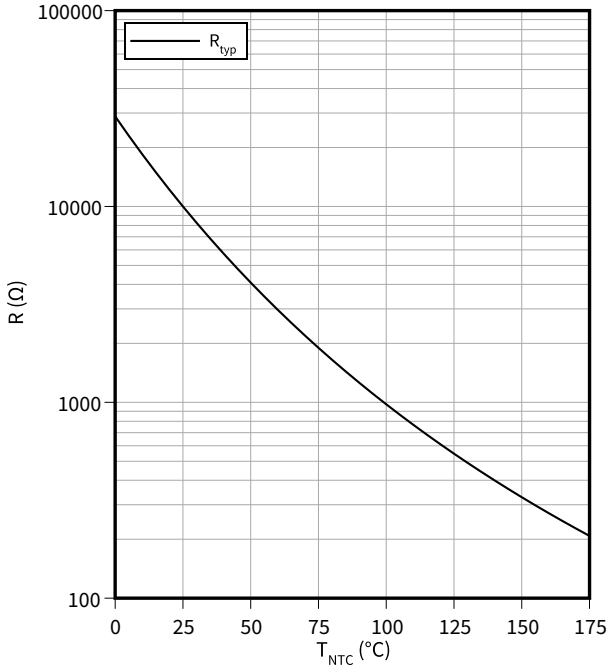
Transient thermal impedance, Diode, D1-D4

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



7 Circuit diagram

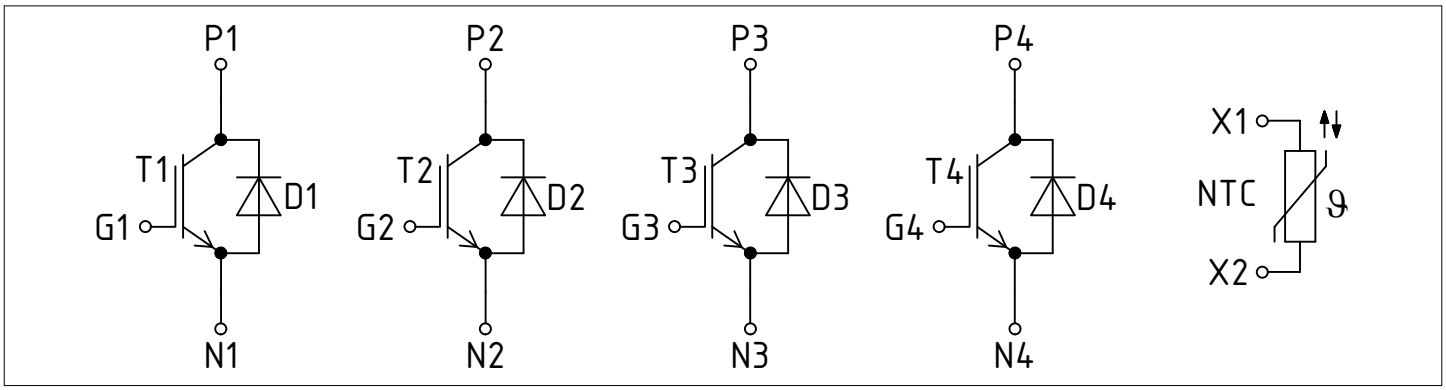


Figure 1

8 Package outlines

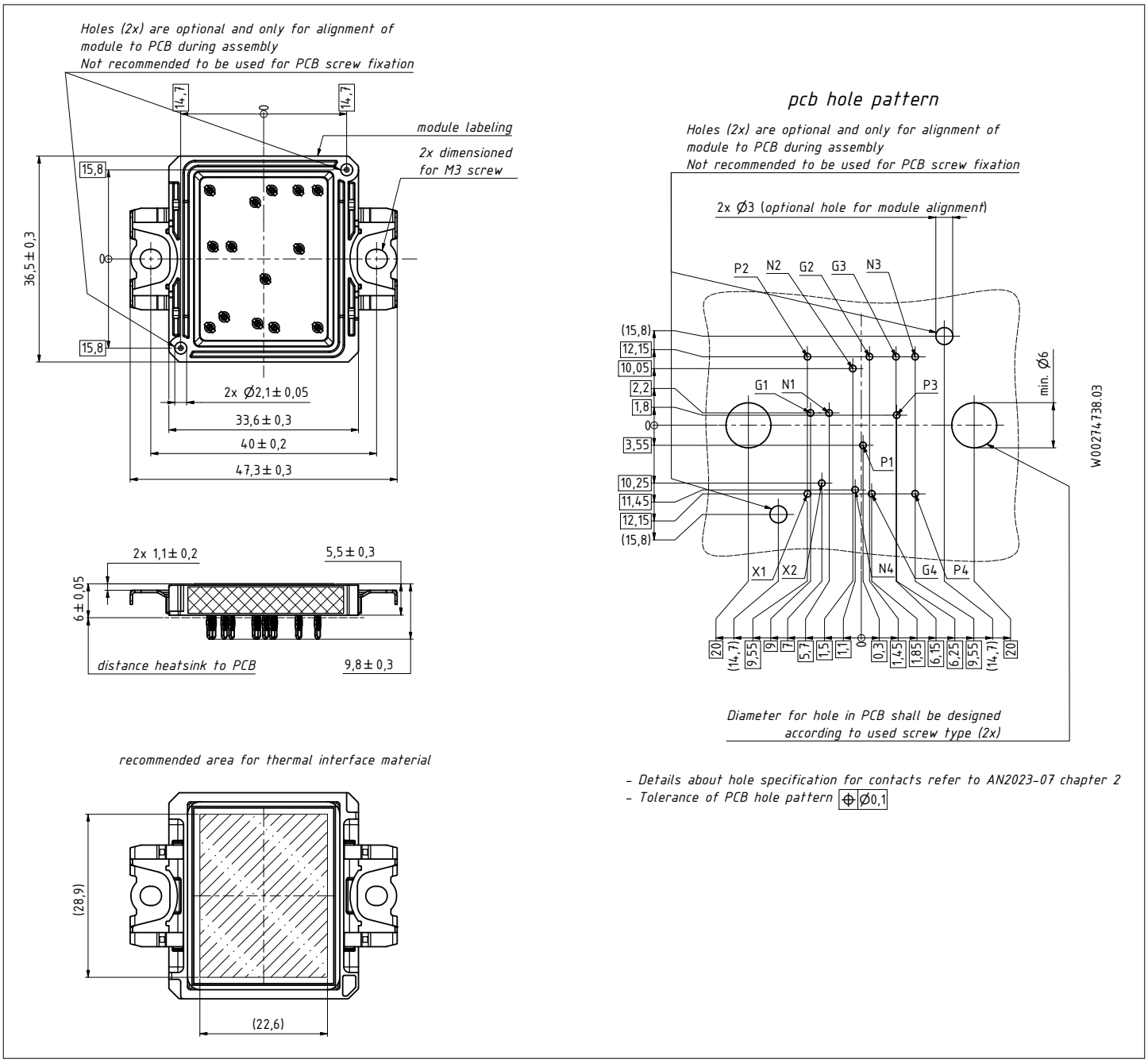


Figure 2

9 Module label code

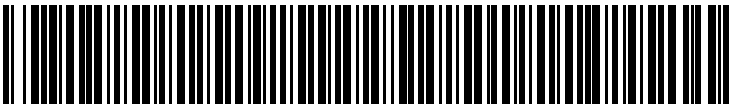
Module label code			
Code format	Data Matrix		Barcode Code128
Encoding	ASCII text		Code Set A
Symbol size	16x16		23 digits
Standard	IEC24720 and IEC16022		IEC8859-1
Code content	*Content* Module serial number Module material number Production order number Date code (production year) Date code (production week)	*Digit* 1 – 5 6 - 11 12 - 19 20 – 21 22 – 23	*Example* 71549 142846 55054991 15 30
Example	 7154914284655054991530	 7154914284655054991530	

Figure 3

Revision history

Document revision	Date of release	Description of changes
0.10	2025-11-13	Target datasheet
0.20	2026-03-03	Preliminary datasheet
1.00	2026-04-08	Final datasheet
1.01	2026-04-14	Correction of RTI

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