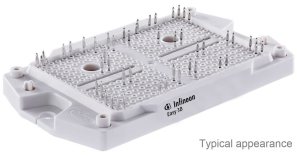
EasyPACK™ module with TRENCHSTOP™ IGBT7 and CoolSiC™ Schottky diode and PressFIT / NTC

Features


Typical appearance

- Electrical features
  - V_{CES} = 950 V
  - $I_{C\ nom}$ = 200 A / I_{CRM} = 300 A
  - CoolSiC™ Schottky diode gen 5
  - Low switching losses
  - TRENCHSTOP™ IGBT7
- Mechanical features
  - Integrated NTC temperature sensor
  - Al_2O_3 substrate with low thermal resistance
  - PressFIT contact technology
  - Compact design

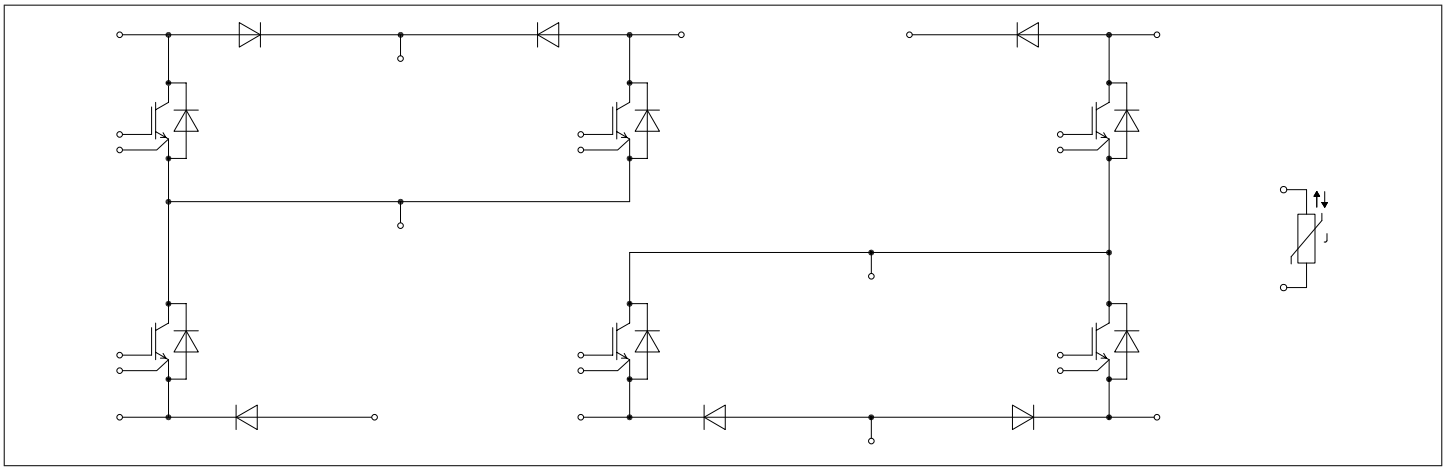
Potential applications

- Three-level applications
- Solar applications
- UPS systems

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	
Creepage distance	d_{Creep}	terminal to heatsink	11.2	mm
Creepage distance	d_{Creep}	terminal to terminal	6.8	mm
Clearance	d_{Clear}	terminal to heatsink	9.4	mm
Clearance	d_{Clear}	terminal to terminal	5.5	mm
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}				18		nH
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, Boost

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	120	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\,op}$		300	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 = 45 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.23	1.48	V
			T_{vj} = 125 °C		1.27		
			T_{vj} = 150 °C		1.27		
Gate threshold voltage	V_{GEth}	I_C = 3.25 mA, V_{CE} = V_{GE}, T_{vj} = 25 °C		4.35	5.10	5.85	V
Gate charge	Q_G	V_{GE} = ±15 V, V_{CC} = 600 V			0.45		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			12.6		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} = 950 V, V_{GE} = 0 V	T_{vj} = 25 °C			0.026	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 = 45 A, V_{CC} = 500 V, V_{GE} = ±15 V, R_{Gon} = 3.9 Ω	T_{vj} = 25 °C		0.068		µs
			T_{vj} = 125 °C		0.078		
			T_{vj} = 150 °C		0.080		
Rise time (inductive load)	t_r	I_C = 45 A, V_{CC} = 500 V, V_{GE} = ±15 V, R_{Gon} = 3.9 Ω	T_{vj} = 25 °C		0.007		µs
			T_{vj} = 125 °C		0.008		
			T_{vj} = 150 °C		0.009		
Turn-off delay time (inductive load)	t_{doff}	I_C = 45 A, V_{CC} = 500 V, V_{GE} = ±15 V, R_{Goff} = 1.5 Ω	T_{vj} = 25 °C		0.198		µs
			T_{vj} = 125 °C		0.263		
			T_{vj} = 150 °C		0.280		
Fall time (inductive load)	t_f	I_C = 45 A, V_{CC} = 500 V, V_{GE} = ±15 V, R_{Goff} = 1.5 Ω	T_{vj} = 25 °C		0.043		µs
			T_{vj} = 125 °C		0.089		
			T_{vj} = 150 °C		0.097		
Turn-on energy loss per pulse	E_{on}	I_C = 45 A, V_{CC} = 500 V, L_σ = 35 nH, V_{GE} = ±15 V, R_{Gon} = 3.9 Ω, di/dt = 4000 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		0.473		mJ
			T_{vj} = 125 °C		0.544		
			T_{vj} = 150 °C		0.557		
Turn-off energy loss per pulse	E_{off}	I_C = 45 A, V_{CC} = 500 V, L_σ = 35 nH, V_{GE} = ±15 V, R_{Goff} = 1.5 Ω, dv/dt = 3200 V/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		1.14		mJ
			T_{vj} = 125 °C		1.95		
			T_{vj} = 150 °C		2.19		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, λ_{grease} = 3.3 W/(m·K)			0.433		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, Reverse

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			75	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		150	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	453	A^2s
			T_{vj} = 175 °C	392	

Table 6 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 75 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		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, λ_{grease} = 3.3 W/(m·K)			0.933		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, Boost

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

(table continues...)

Table 7 (continued) Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Continuous DC forward current	I_F			60	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		120	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	472	A^2s
			T_{vj} = 150 °C	450	

Table 8 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 45 A, V_{GE} = 0 V	T_{vj} = 25 °C		1.38	1.58	V
			T_{vj} = 125 °C		1.52		
			T_{vj} = 150 °C		1.60		
Peak reverse recovery current	I_{RM}	V_{CC} = 500 V, I_F = 45 A, V_{GE}=-15 V, -di$_F$/dt = 4000 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		46.2		A
			T_{vj} = 125 °C		46.2		
			T_{vj} = 150 °C		46.2		
Recovered charge	Q_r	V_{CC} = 500 V, I_F = 45 A, V_{GE}=-15 V, -di$_F$/dt = 4000 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		1.27		µC
			T_{vj} = 125 °C		1.27		
			T_{vj} = 150 °C		1.27		
Reverse recovery energy	E_{rec}	V_{CC} = 500 V, I_F = 45 A, V_{GE}=-15 V, -di$_F$/dt = 4000 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		0.128		mJ
			T_{vj} = 125 °C		0.128		
			T_{vj} = 150 °C		0.128		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, λ_{grease} = 3.3 W/(m·K)			0.689		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		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

(table continues...)

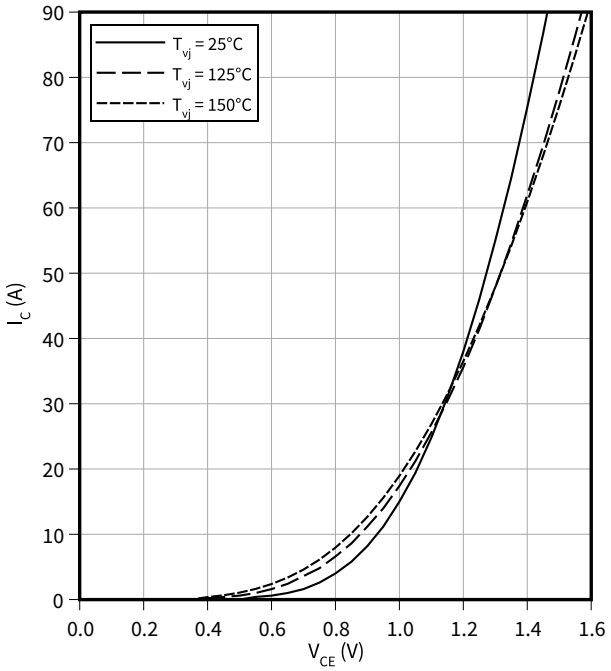
Table 9 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
B-value	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2\text{-}1/(298{,}15\ K))]$		3411		K
B-value	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2\text{-}1/(298{,}15\ K))]$		3433		K

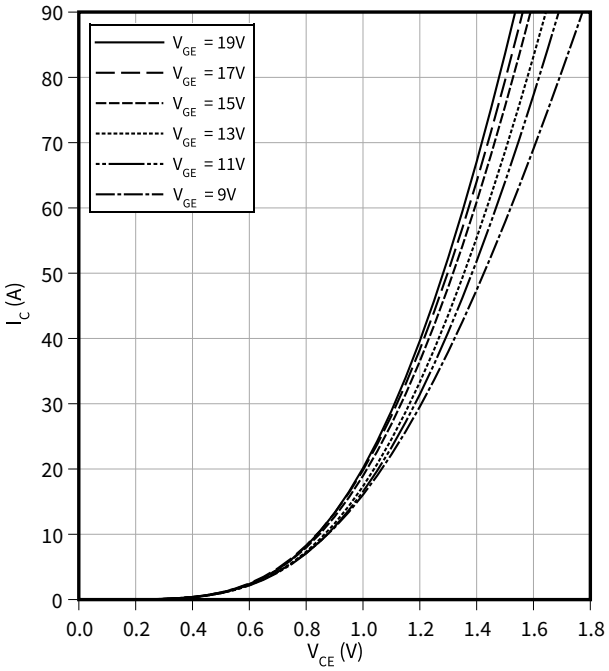
Note: Specification according to the valid application note.

6 Characteristics diagrams

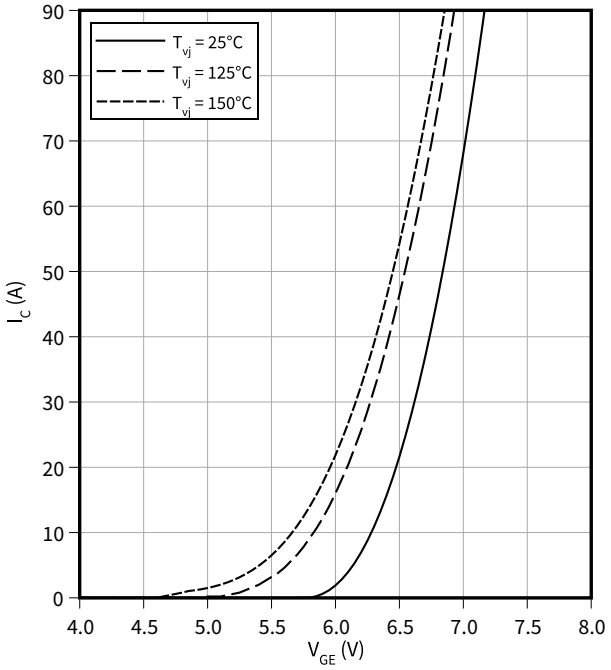
Output characteristic (typical), IGBT, Boost
$I_C = f(V_{CE})$
V_{GE} = 15 V



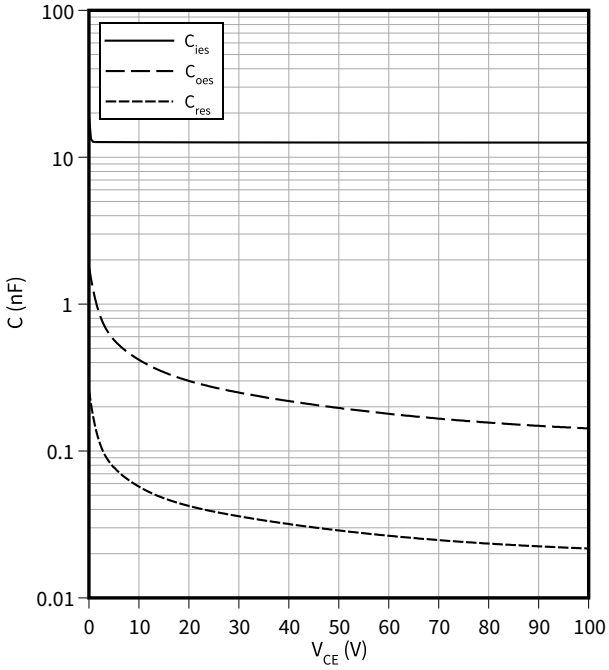
Output characteristic field (typical), IGBT, Boost
$I_C = f(V_{CE})$
T_{vj} = 150 °C



Transfer characteristic (typical), IGBT, Boost
$I_C = f(V_{GE})$
V_{CE} = 20 V



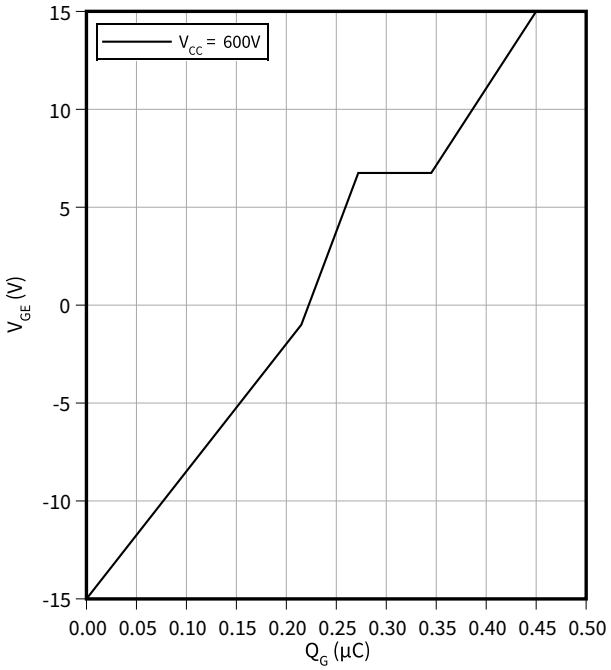
Capacity characteristic (typical), IGBT, Boost
$C = f(V_{CE})$
f = 100 kHz, V_{GE} = 0 V, T_{vj} = 25 °C



Gate charge characteristic (typical), IGBT, Boost

$V_{GE} = f(Q_G)$

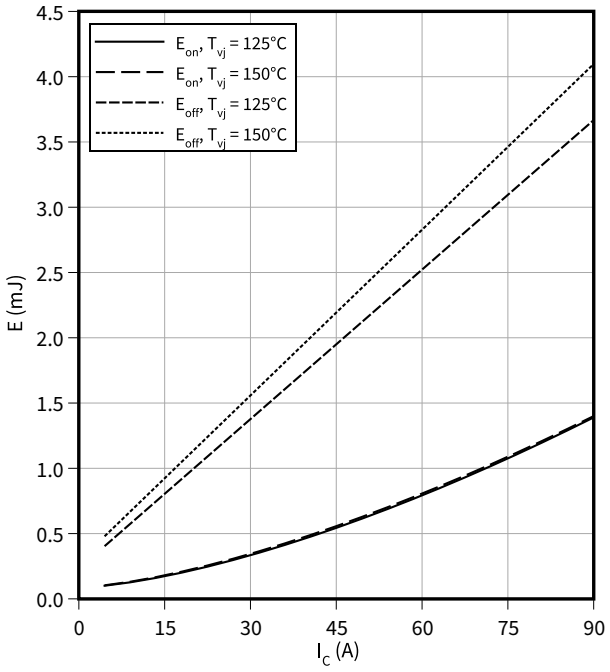
$I_C = 200\ A$, $T_{vj} = 25\ °C$



Switching losses (typical), IGBT, Boost

$E = f(I_C)$

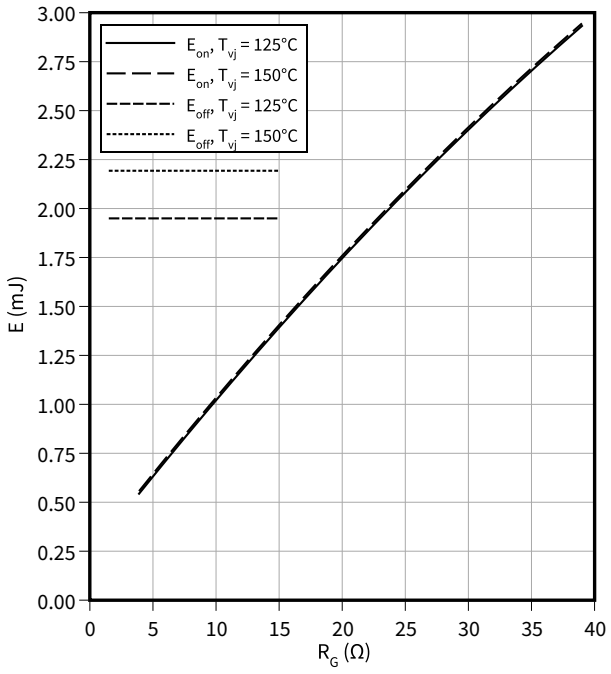
$R_{Goff} = 1.5\ \Omega$, $R_{Gon} = 3.9\ \Omega$, $V_{CC} = 500\ V$, $V_{GE} = \pm 15\ V$



Switching losses (typical), IGBT, Boost

$E = f(R_G)$

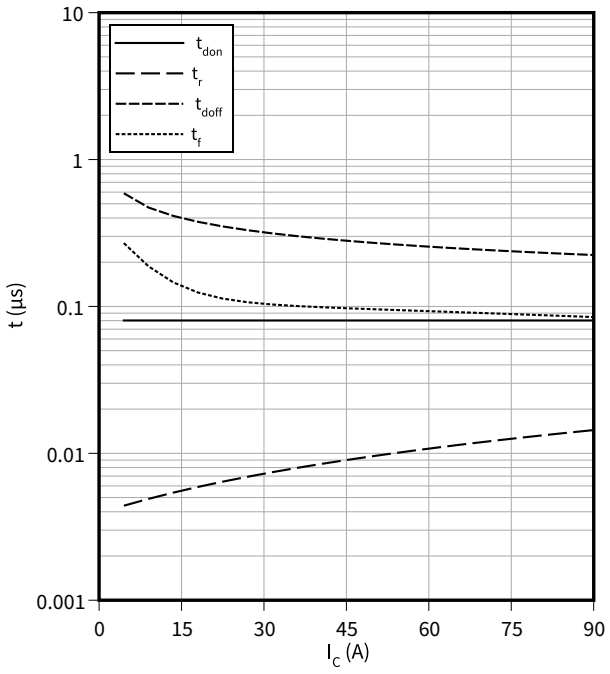
$I_C = 45\ A$, $V_{CC} = 500\ V$, $V_{GE} = \pm 15\ V$



Switching times (typical), IGBT, Boost

$t = f(I_C)$

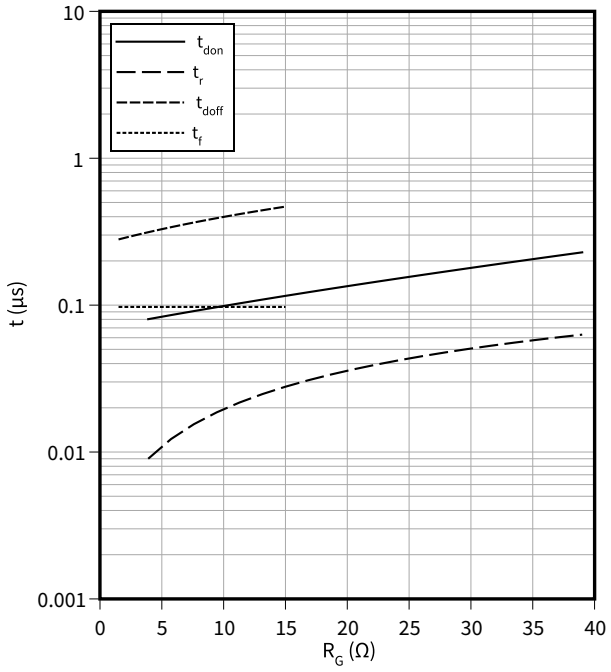
$R_{Goff} = 1.5\ \Omega$, $R_{Gon} = 3.9\ \Omega$, $V_{CC} = 500\ V$, $V_{GE} = \pm 15\ V$, $T_{vj} = 150\ °C$



Switching times (typical), IGBT, Boost

$t = f(R_G)$

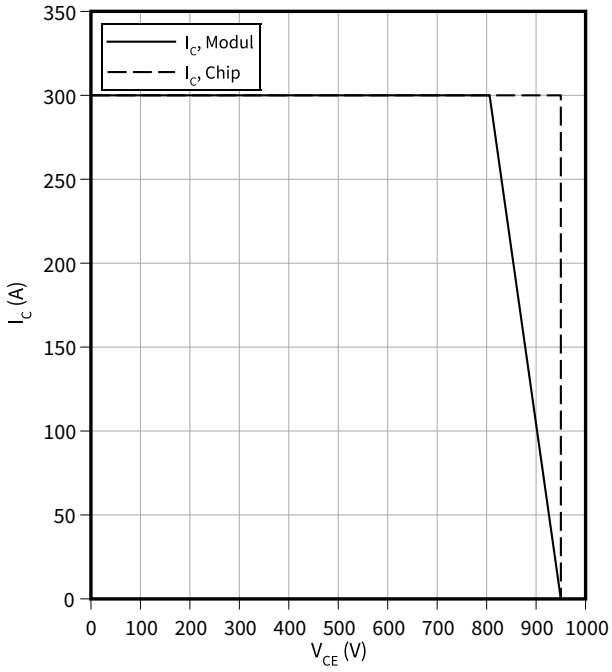
I_C = 45 A, V_{CC} = 500 V, V_{GE} = ± 15 V, T_{vj} = 150 °C



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

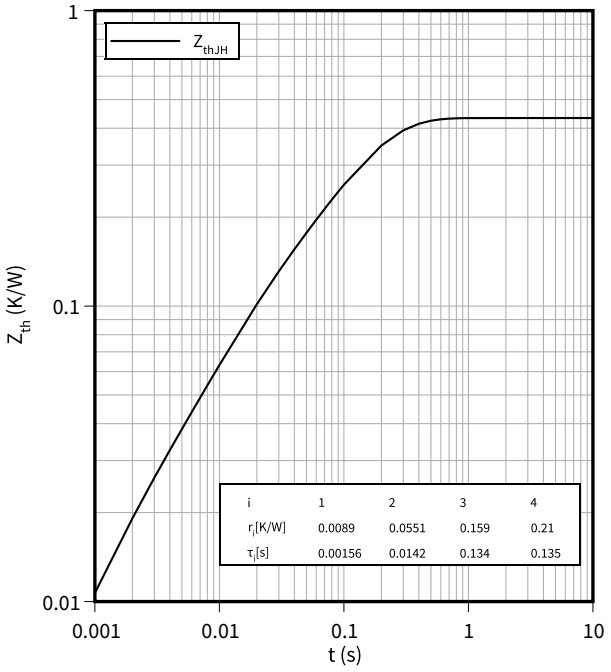
$I_C = f(V_{CE})$

R_{Goff} = 1.5 Ω, V_{GE} = ±15 V, T_{vj} = 150 °C



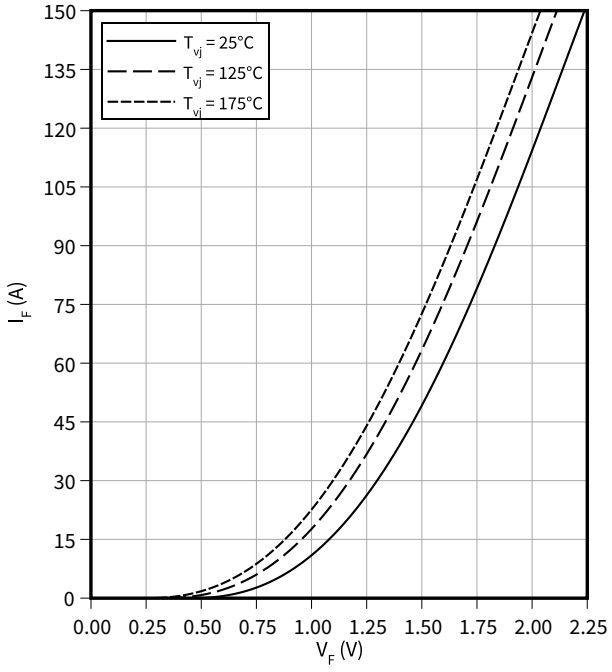
Transient thermal impedance , IGBT, Boost

$Z_{th} = f(t)$



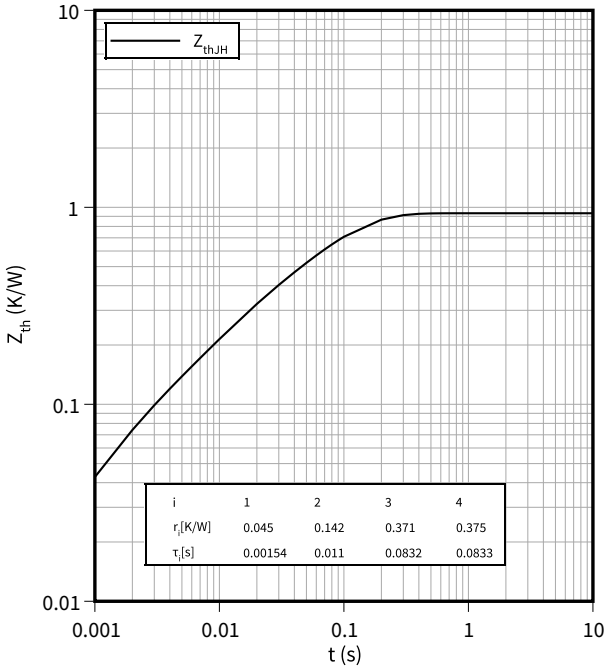
Forward characteristic (typical), Diode, Reverse

$I_F = f(V_F)$



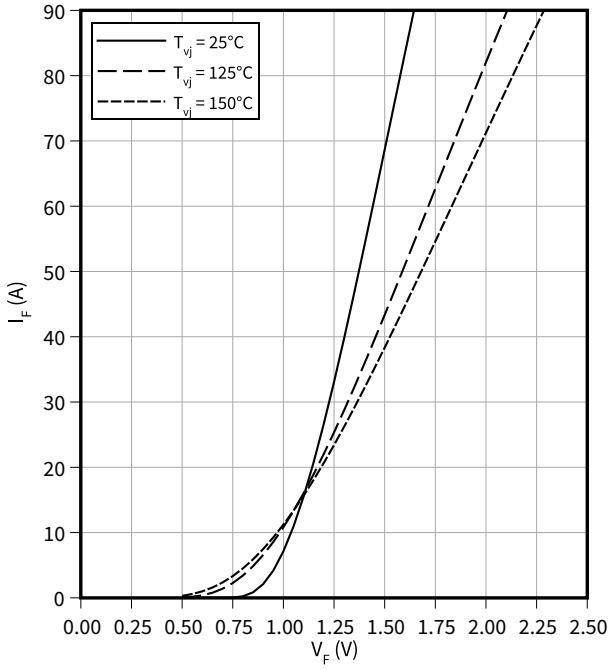
Transient thermal impedance, Diode, Reverse

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, Boost

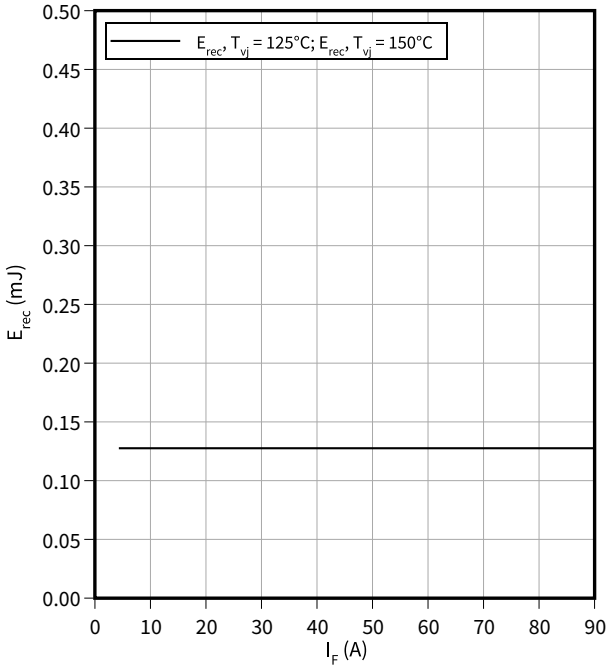
$I_F = f(V_F)$



Switching losses (typical), Diode, Boost

$E_{rec} = f(I_F)$

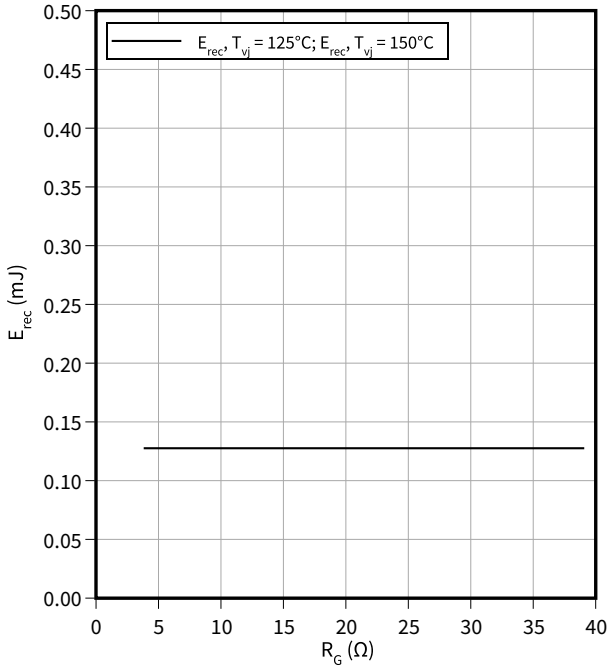
$R_{Gon} = 3.9\ \Omega$, $V_{CC} = 500\ V$



Switching losses (typical), Diode, Boost

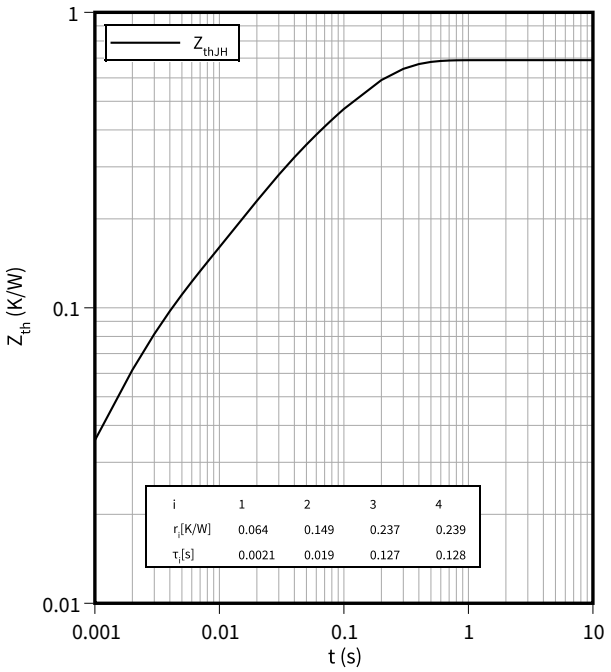
$E_{rec} = f(R_G)$

$I_F = 45\ A$, $V_{CC} = 500\ V$



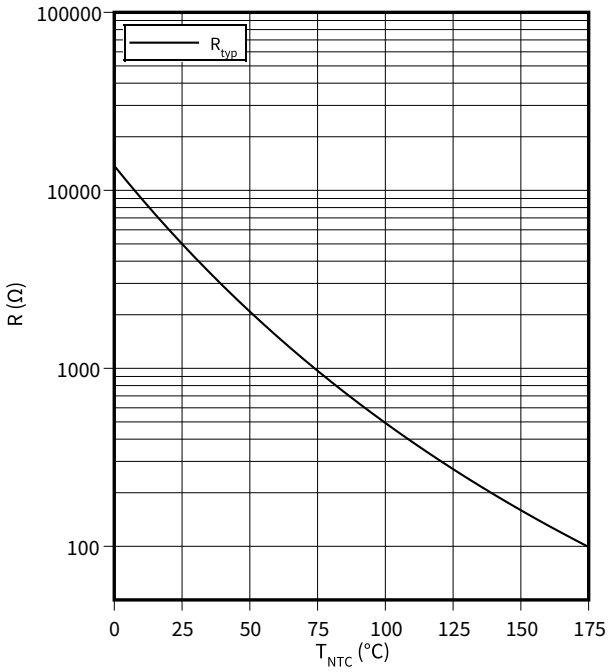
Transient thermal impedance, Diode, Boost

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



7 Circuit diagram

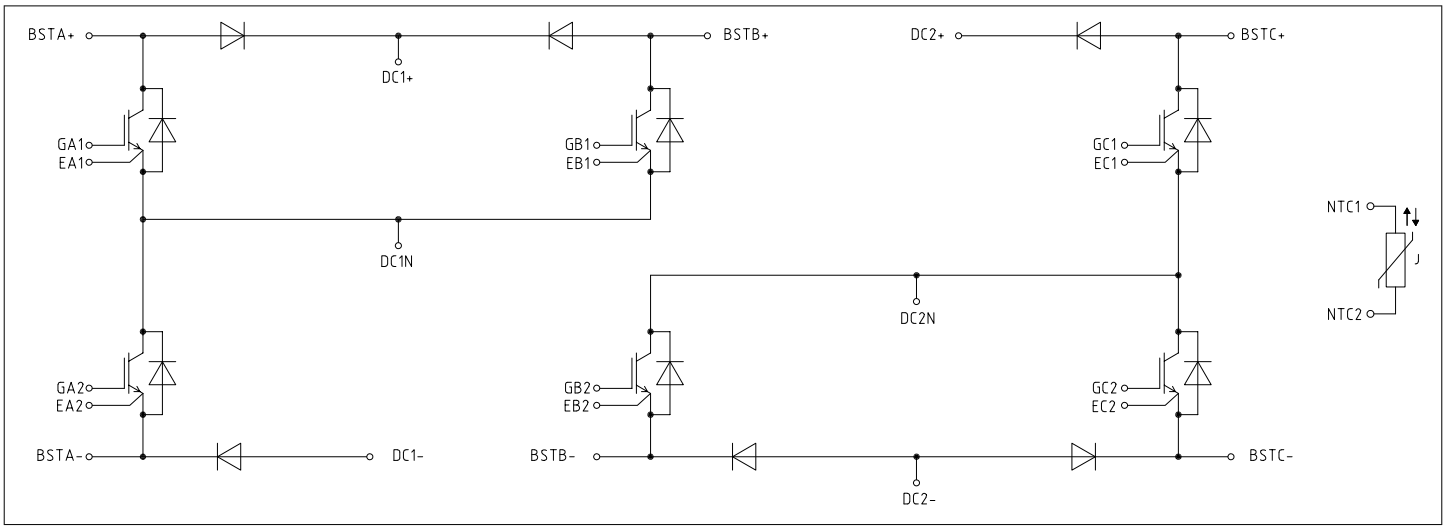


Figure 1

8 Package outlines

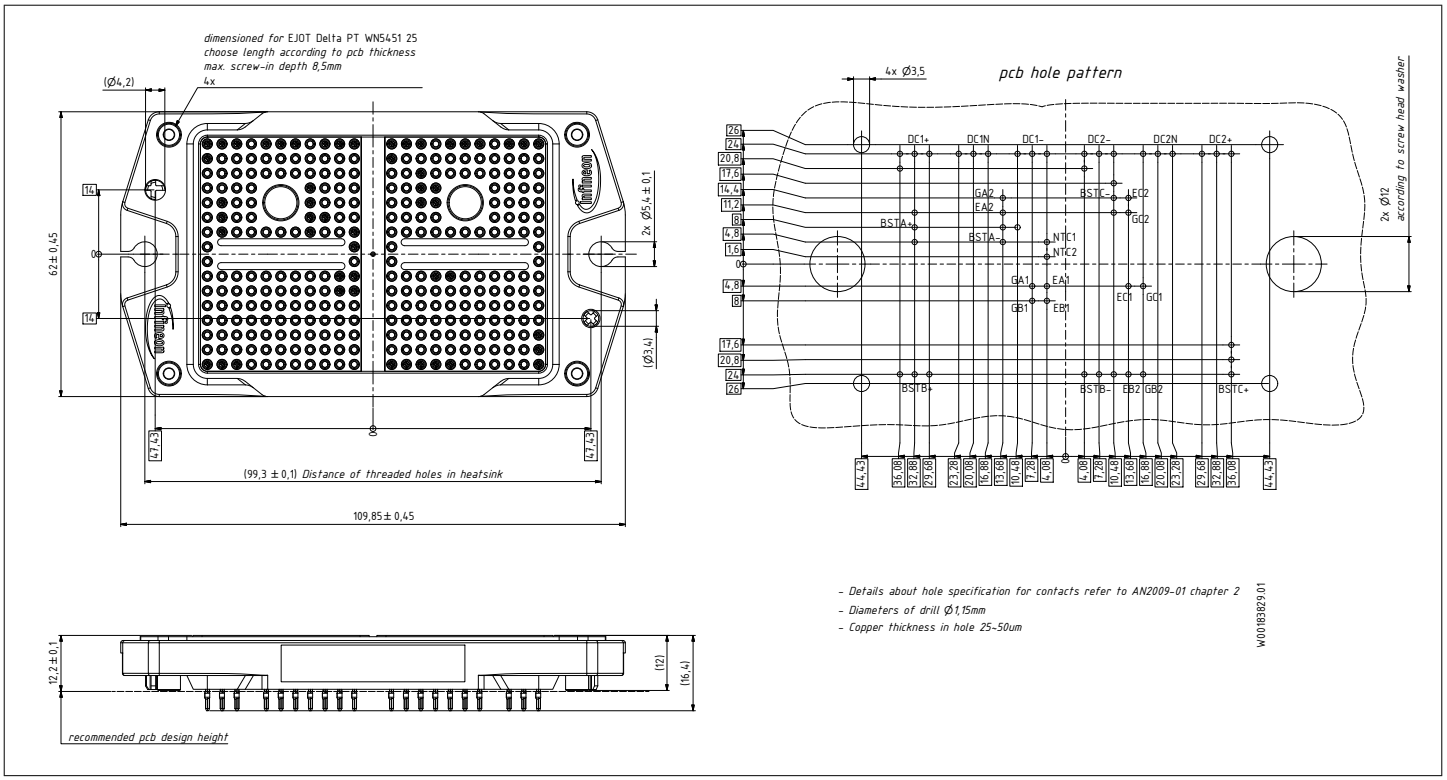


Figure 2

9 Module label code

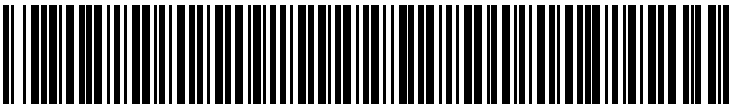
Module label code			
Code format	Data Matrix		Barcode Code128
Encoding	ASCII text		Code Set A
Symbol size	16x16		23 digits
Standard	IEC24720 and IEC16022		IEC8859-1
Code content	*Content* Module serial number Module material number Production order number Date code (production year) Date code (production 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	2022-04-29	Initial version
1.00	2022-08-24	Final datasheet

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Edition 2022-08-24

Published by

Infineon Technologies AG

81726 Munich, Germany

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IFX-ABD624-002

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Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

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Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

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Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

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