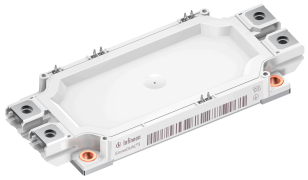
Final datasheet

EconoDUAL™3 module with TRENCHSTOP™IGBT7 and emitter controlled 7 diode and NTC



Features

- Electrical features
  - V_{CES} = 1700 V
  - $I_{C\ nom}$ = 225 A / I_{CRM} = 450 A
  - Integrated temperature sensor
  - High current density
  - Low $V_{CE,sat}$
  - Overload operation up to 175°C
  - TRENCHSTOP™ IGBT7
  - $V_{CE,sat}$ with positive temperature coefficient
  - Suitable Infineon gate drivers can be found under https://www.infineon.com/gdfinder
- Mechanical features
  - High power density
  - Isolated base plate
  - PressFIT contact technology
  - Standard housing

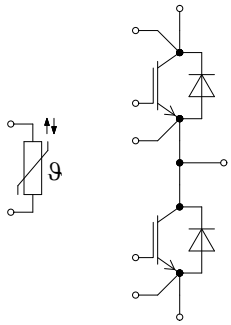
Potential applications

- High-power converters
- Medium-voltage converters
- Motor drives
- Wind turbines

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	3.4	kV
Isolation test voltage NTC	$V_{ISOL(NTC)}$	RMS, f = 50 Hz, *t* = 1 min	3.4	kV
Material of module baseplate			Cu	
Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Creepage distance	$d_{Creep\ nom}$	terminal to baseplate, nom.	> 15	mm
Creepage distance	$d_{Creep\ min}$	terminal to baseplate, min.	14.7	mm
Creepage distance	$d_{Creep\ nom}$	terminal to terminal, nom.	> 19.3	mm
Creepage distance	$d_{Creep\ min}$	terminal to terminal, min.	19.3	mm
Clearance	$d_{Clear\ nom}$	terminal to baseplate, nom.	> 12.5	mm
Clearance	$d_{Clear\ min}$	terminal to baseplate, min.	12.5	mm
Clearance	$d_{Clear\ nom}$	terminal to terminal, nom.	> 10	mm
Clearance	$d_{Clear\ min}$	terminal to terminal, min.	9.6	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}				20		nH
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	T_C = 25 °C, per switch			1		mΩ
Storage temperature	T_{stg}			-40		125	°C
Mounting torque for module mounting	*M*	- Mounting according to valid application note	M5, Screw	3		6	Nm
Terminal connection torque	*M*	- Mounting according to valid application note	M6, Screw	3		6	Nm
Weight	*G*				345		g

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	1700	V
Continuous DC collector current	I_{CDC}	$T_{vj\,max}$ = 175 °C	T_C = 100 °C	225	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\,op}$		450	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 = 225 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.70	1.85	V
			T_{vj} = 125 °C		1.95		
			T_{vj} = 150 °C		2.05		
			T_{vj} = 175 °C		2.10		
Gate threshold voltage	V_{GEth}	I_C = 4.62 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} = 900 V, T_{vj} = 25 °C			2.1		µC
Internal gate resistor	R_{Gint}	T_{vj} = 25 °C			1		Ω
Input capacitance	C_{ies}	f = 100 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			22.9		nF
Reverse transfer capacitance	C_{res}	f = 100 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			0.08		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} = 1700 V, V_{GE} = 0 V	T_{vj} = 25 °C			5	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 = 225 A, V_{CC} = 900 V, V_{GE} = ±15 V, R_{Gon} = 1.5 Ω	T_{vj} = 25 °C		0.110		µs
			T_{vj} = 125 °C		0.120		
			T_{vj} = 150 °C		0.125		
			T_{vj} = 175 °C		0.130		
Rise time (inductive load)	t_r	I_C = 225 A, V_{CC} = 900 V, V_{GE} = ±15 V, R_{Gon} = 1.5 Ω	T_{vj} = 25 °C		0.025		µs
			T_{vj} = 125 °C		0.030		
			T_{vj} = 150 °C		0.032		
			T_{vj} = 175 °C		0.034		

(table continues...)

Table 4 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Turn-off delay time (inductive load)	t_{doff}	I_C = 225 A, V_{CC} = 900 V, V_{GE} = ±15 V, R_{Goff} = 6.2 Ω	T_{vj} = 25 °C		0.467		µs
			T_{vj} = 125 °C		0.553		
			T_{vj} = 150 °C		0.570		
			T_{vj} = 175 °C		0.586		
Fall time (inductive load)	t_f	I_C = 225 A, V_{CC} = 900 V, V_{GE} = ±15 V, R_{Goff} = 6.2 Ω	T_{vj} = 25 °C		0.271		µs
			T_{vj} = 125 °C		0.494		
			T_{vj} = 150 °C		0.567		
			T_{vj} = 175 °C		0.640		
Turn-on energy loss per pulse	E_{on}	I_C = 225 A, V_{CC} = 900 V, L_σ = 25 nH, V_{GE} = ±15 V, R_{Gon} = 1.5 Ω, di/dt = 5100 A/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		28.2		mJ
			T_{vj} = 125 °C		49.4		
			T_{vj} = 150 °C		55.5		
			T_{vj} = 175 °C		61.5		
Turn-off energy loss per pulse	E_{off}	I_C = 225 A, V_{CC} = 900 V, L_σ = 25 nH, V_{GE} = ±15 V, R_{Goff} = 6.2 Ω, dv/dt = 3500 V/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		37.3		mJ
			T_{vj} = 125 °C		59.4		
			T_{vj} = 150 °C		65.5		
			T_{vj} = 175 °C		71.5		
SC data	I_{SC}	V_{GE} = 15 V, V_{CC} = 1000 V, V_{CEmax}=V_{CES}-L_{sCE}*di/dt	t_P ≤ 8 µs, T_{vj}=150 °C		870		A
			t_P ≤ 6 µs, T_{vj}=175 °C		840		
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.145	K/W
Thermal resistance, case to heat sink	R_{thCH}	per IGBT, λ_{grease} = 1 W/(m·K)			0.027		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		175	°C

***Note**: T_{vjop} > 150 °C is only 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	1700	V
Continuous DC forward current	I_F			225	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		450	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	4660	A^2s
			T_{vj} = 175 °C	3860	

Table 6 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 225 A, V_{GE} = 0 V	T_{vj} = 25 °C		2.35	2.50	V
			T_{vj} = 125 °C		2.25		
			T_{vj} = 150 °C		2.20		
			T_{vj} = 175 °C		2.10		
Peak reverse recovery current	I_{RM}	V_{CC} = 900 V, I_F = 225 A, V_{GE} = -15 V, -di$_F$/dt = 6700 A/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		332		A
			T_{vj} = 125 °C		356		
			T_{vj} = 150 °C		360		
			T_{vj} = 175 °C		363		
Recovered charge	Q_r	V_{CC} = 900 V, I_F = 225 A, V_{GE} = -15 V, -di$_F$/dt = 6700 A/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		30.4		µC
			T_{vj} = 125 °C		57.2		
			T_{vj} = 150 °C		66		
			T_{vj} = 175 °C		75.3		
Reverse recovery energy	E_{rec}	V_{CC} = 900 V, I_F = 225 A, V_{GE} = -15 V, -di$_F$/dt = 6700 A/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		16.1		mJ
			T_{vj} = 125 °C		33		
			T_{vj} = 150 °C		38.7		
			T_{vj} = 175 °C		44.4		
Thermal resistance, junction to case	R_{thJC}	per diode				0.237	K/W
Thermal resistance, case to heat sink	R_{thCH}	per diode, λ_{grease} = 1 W/(m·K)			0.03		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		175	°C

***Note**: T_{vjop} > 150 °C is only 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_{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	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2\text{-}1/(298{,}15\ K))]$		3375		K
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

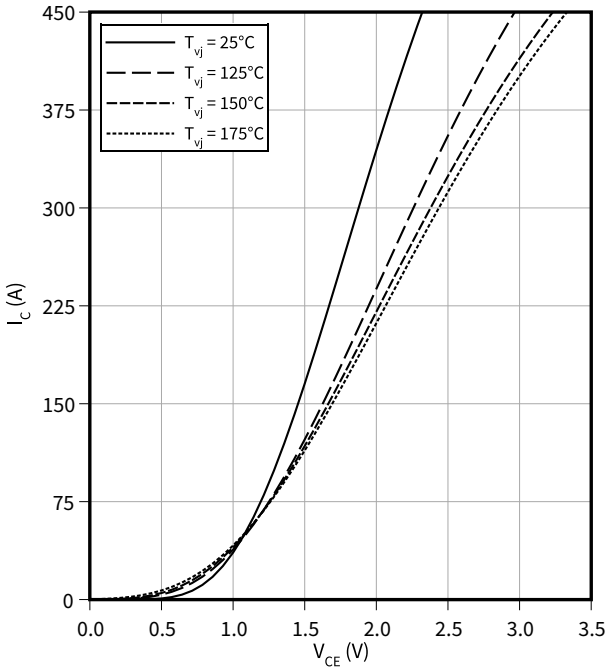
***Note**: For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4*

5 Characteristics diagrams

Output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

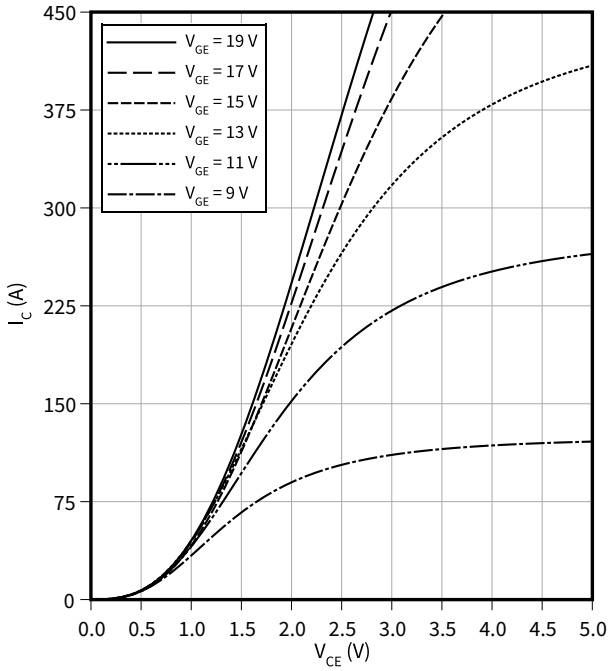
V_{GE} = 15 V



Output characteristic field (typical), IGBT, Inverter

$I_C = f(V_{CE})$

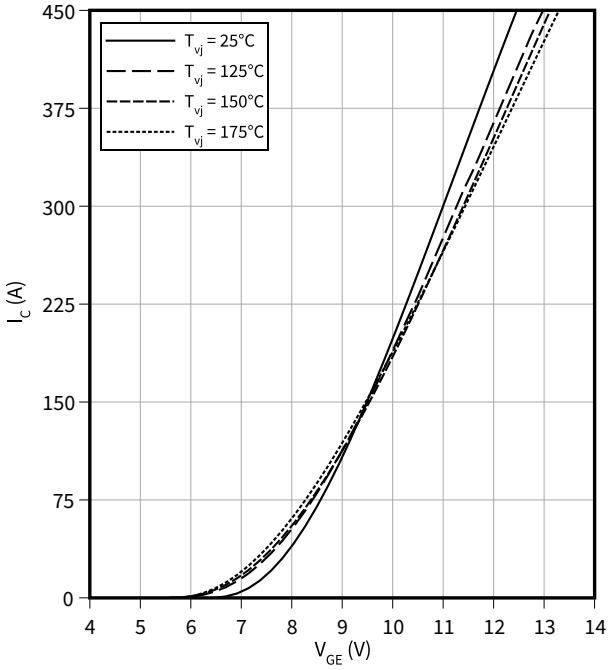
T_{vj} = 175 °C



Transfer characteristic (typical), IGBT, Inverter

$I_C = f(V_{GE})$

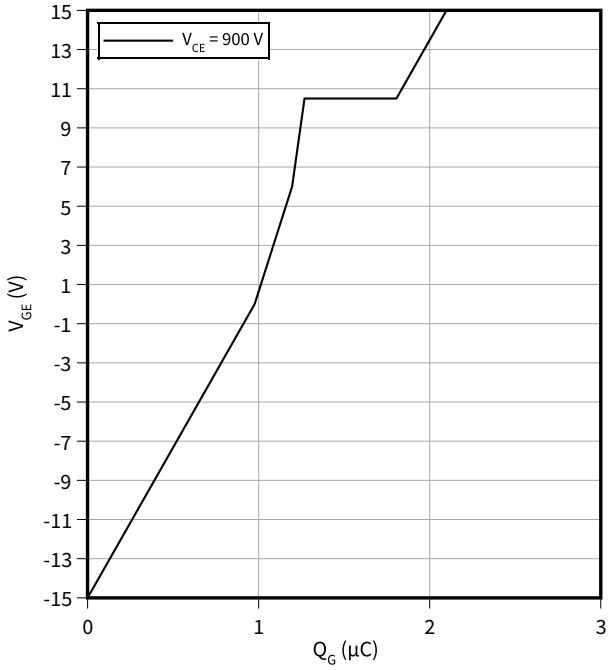
V_{CE} = 20 V



Gate charge characteristic (typical), IGBT, Inverter

$V_{GE} = f(Q_G)$

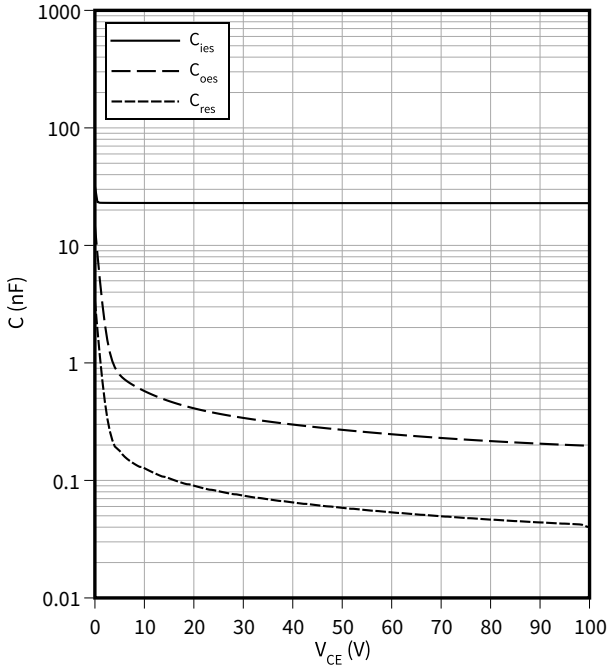
I_C = 225 A, T_{vj} = 25 °C



Capacity characteristic (typical), IGBT, Inverter

$C = f(V_{CE})$

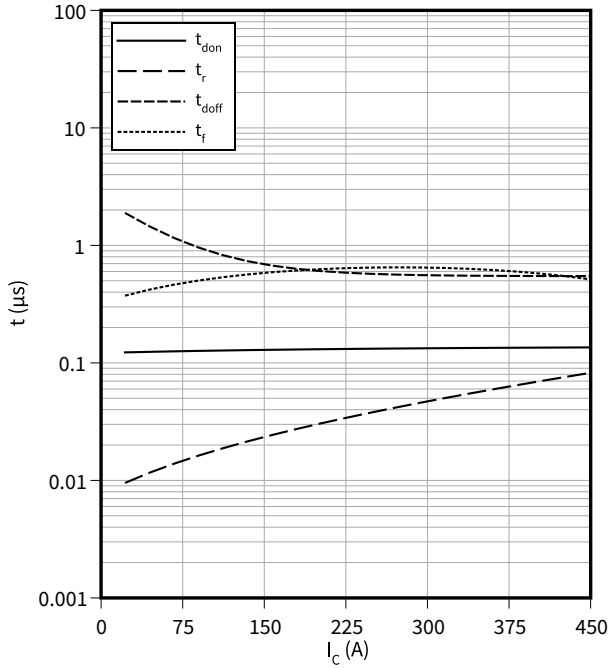
$f = 100\ kHz$, $V_{GE} = 0\ V$, $T_{vj} = 25\ °C$



Switching times (typical), IGBT, Inverter

$t = f(I_C)$

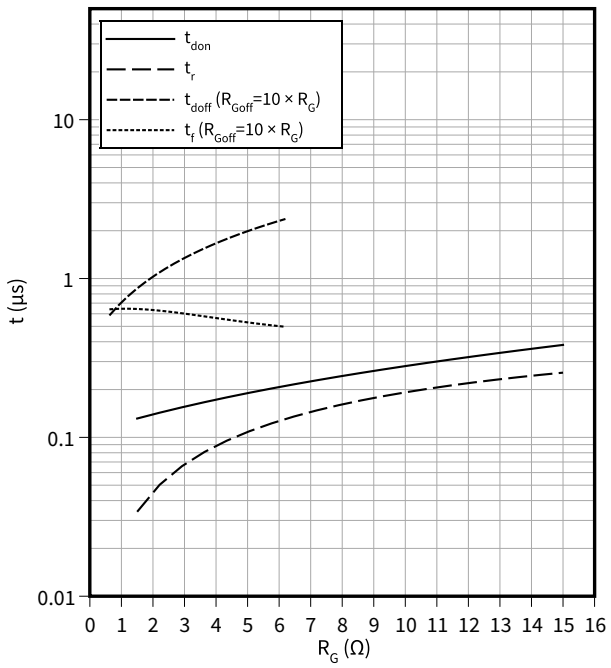
$R_{Goff} = 6.2\ \Omega$, $R_{Gon} = 1.5\ \Omega$, $V_{GE} = \pm 15\ V$, $V_{CC} = 900\ V$, $T_{vj} = 175\ °C$



Switching times (typical), IGBT, Inverter

$t = f(R_G)$

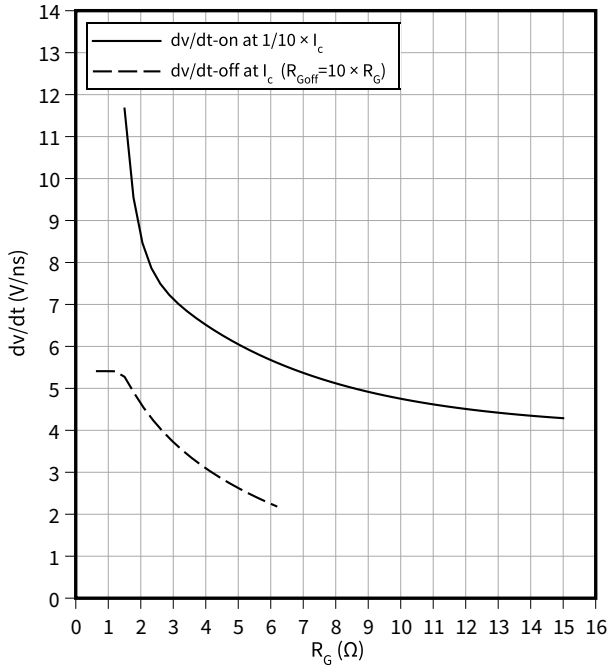
$V_{GE} = \pm 15\ V$, $I_C = 225\ A$, $V_{CC} = 900\ V$, $T_{vj} = 175\ °C$



Voltage slope (typical), IGBT, Inverter

$dv/dt = f(R_G)$

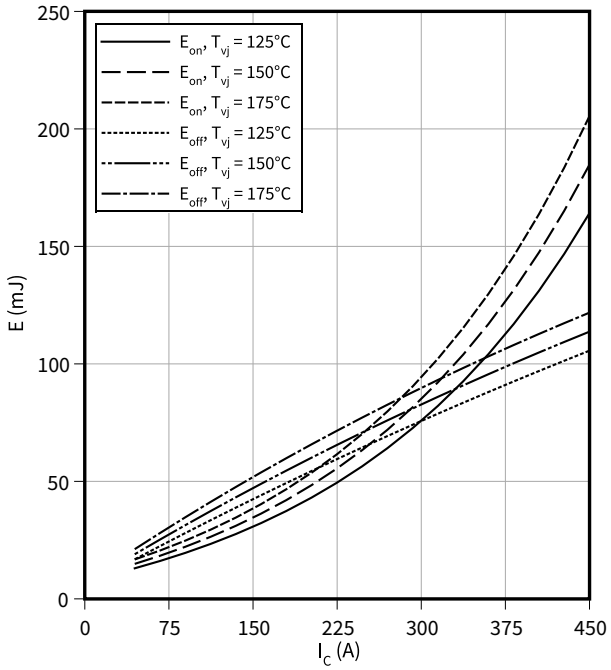
$V_{GE} = \pm 15\ V$, $I_C = 225\ A$, $V_{CC} = 900\ V$, $T_{vj} = 25\ °C$



Switching losses (typical), IGBT, Inverter

$E = f(I_C)$

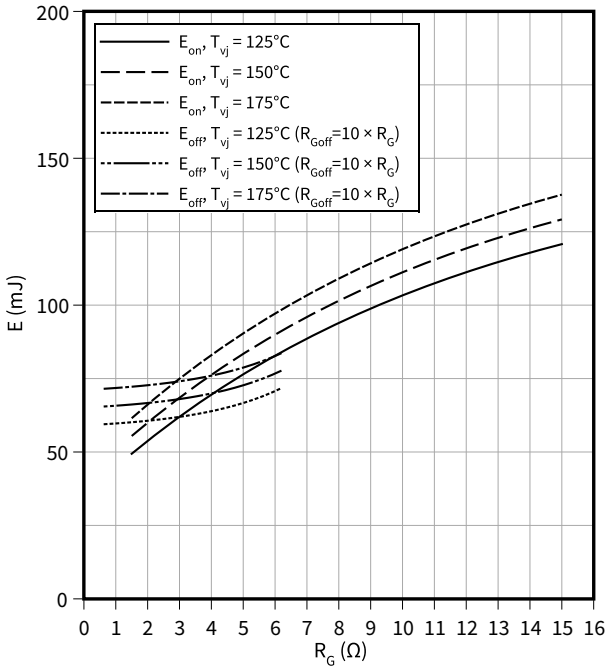
$R_{Goff} = 6.2\ \Omega$, $R_{Gon} = 1.5\ \Omega$, $V_{GE} = \pm 15$ V, $V_{CC} = 900$ V



Switching losses (typical), IGBT, Inverter

$E = f(R_G)$

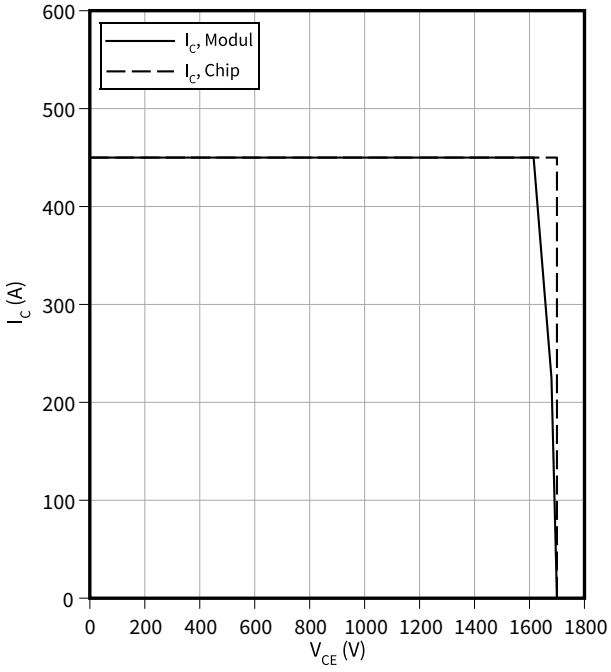
$V_{GE} = \pm 15$ V, $I_C = 225$ A, $V_{CC} = 900$ V



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

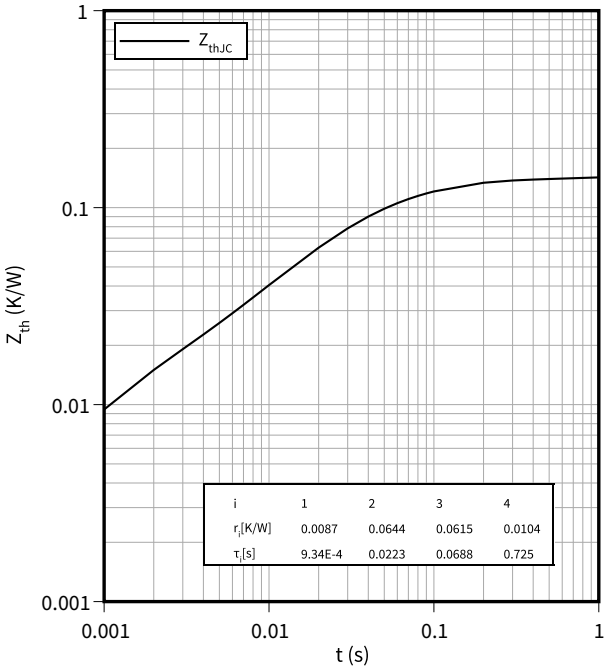
$I_C = f(V_{CE})$

$R_{Goff} = 6.2\ \Omega$, $V_{GE} = \pm 15$ V, $T_{vj} = 175$ °C



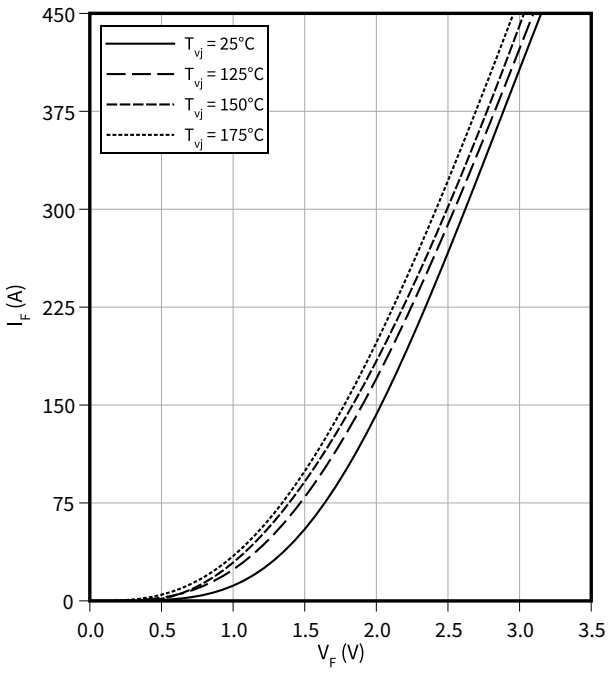
Transient thermal impedance, IGBT, Inverter

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, Inverter

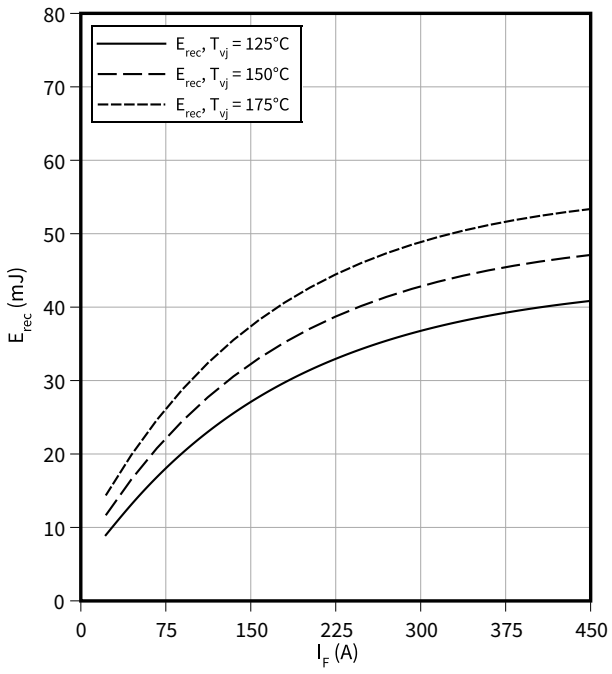
$I_F = f(V_F)$



Switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$

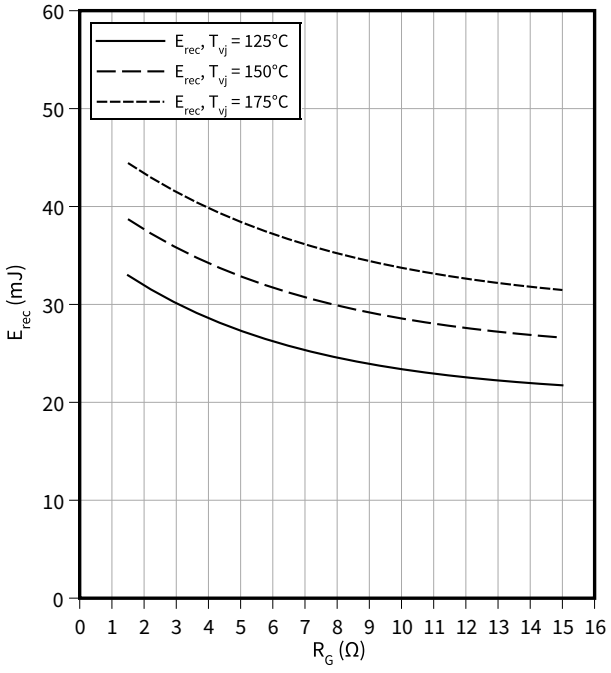
$R_{Gon} = 1.5\ \Omega$, $V_{CC} = 900\ V$



Switching losses (typical), Diode, Inverter

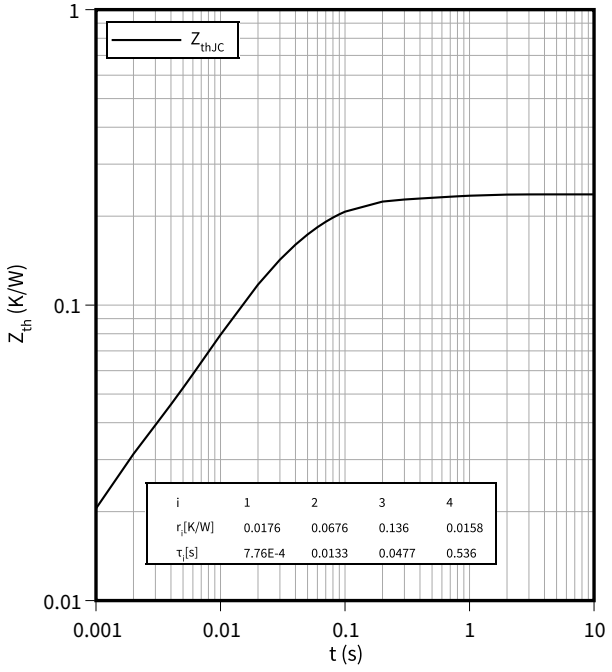
$E_{rec} = f(R_G)$

$I_F = 225\ A$, $V_{CC} = 900\ V$



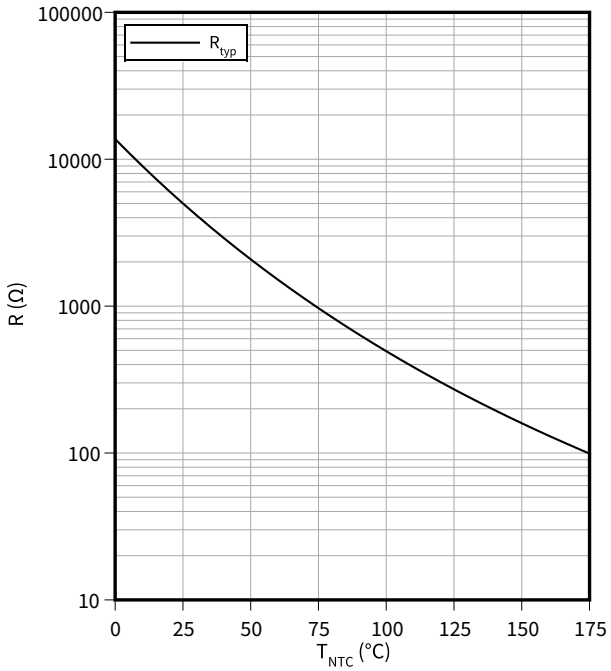
Transient thermal impedance, Diode, Inverter

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



6 Circuit diagram

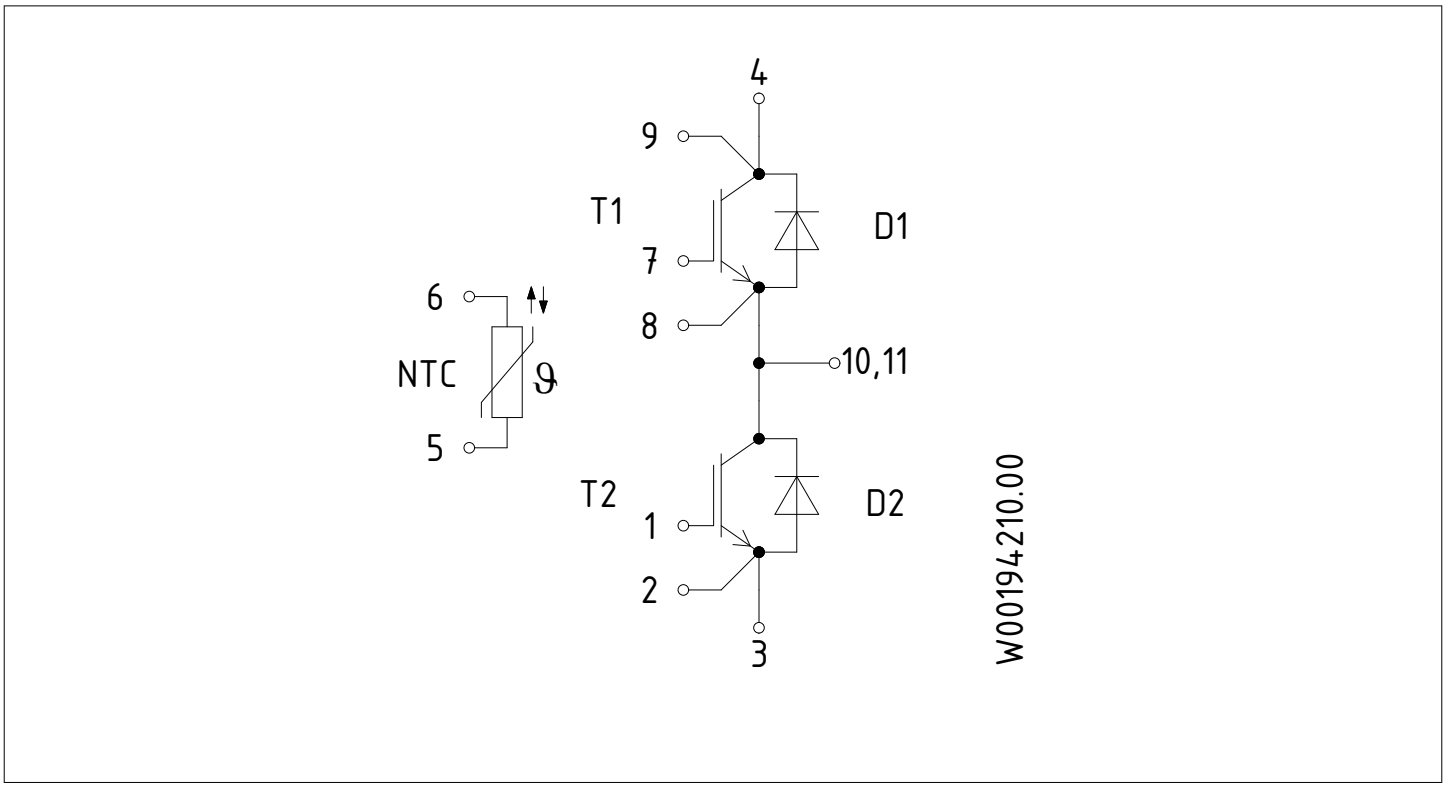


Figure 1

7 Package outlines

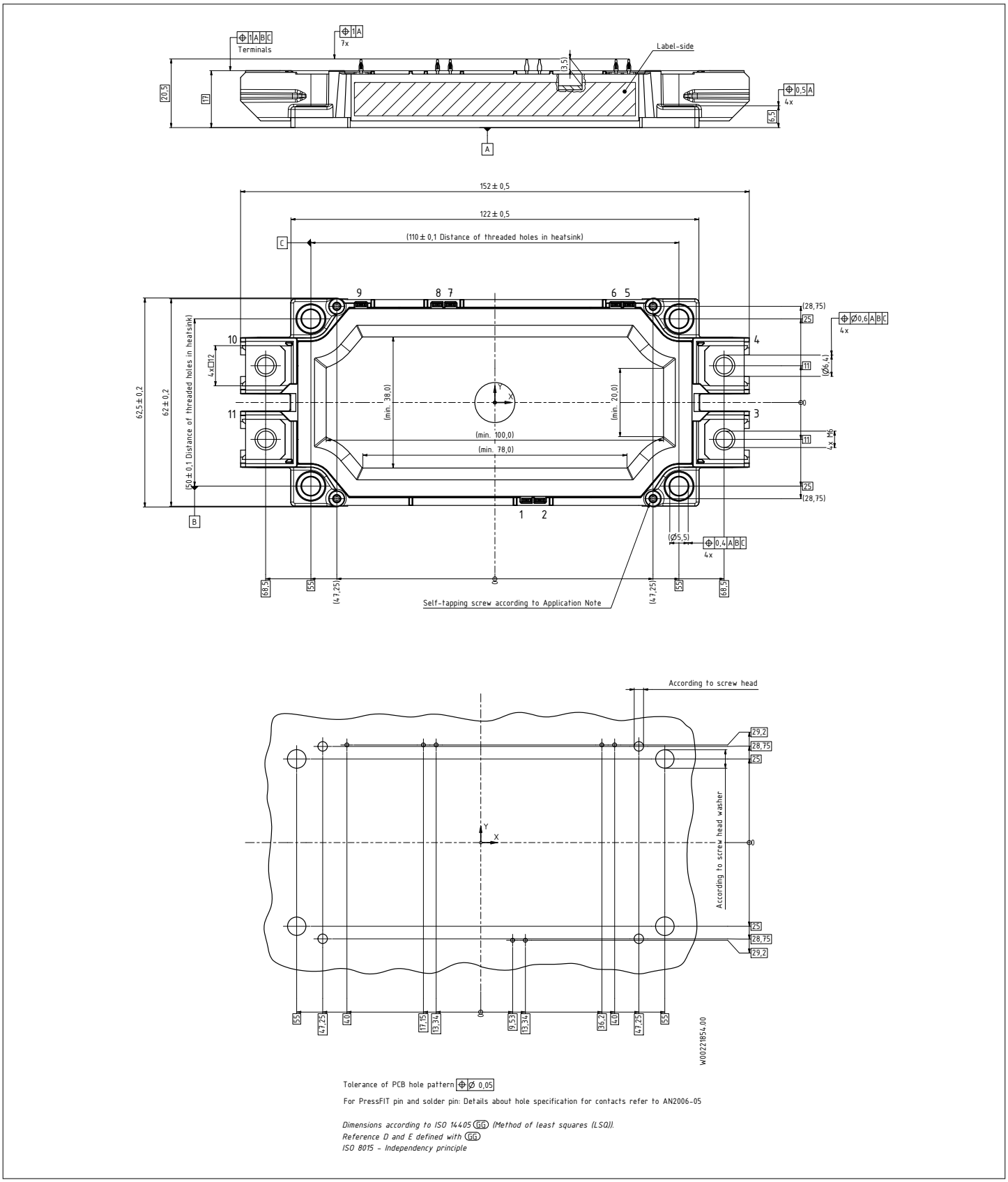


Figure 2

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	7154914284655054991530		7154914284655054991530

Figure 3

Revision history

Document revision	Date of release	Description of changes
1.00	2022-03-10	Initial version
1.10	2022-03-18	Final datasheet
1.20	2024-03-07	Final datasheet
1.30	2025-08-06	Final datasheet

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Edition 2025-08-06

Published by

Infineon Technologies AG

81726 Munich, Germany

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IFX-ABB532-004

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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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