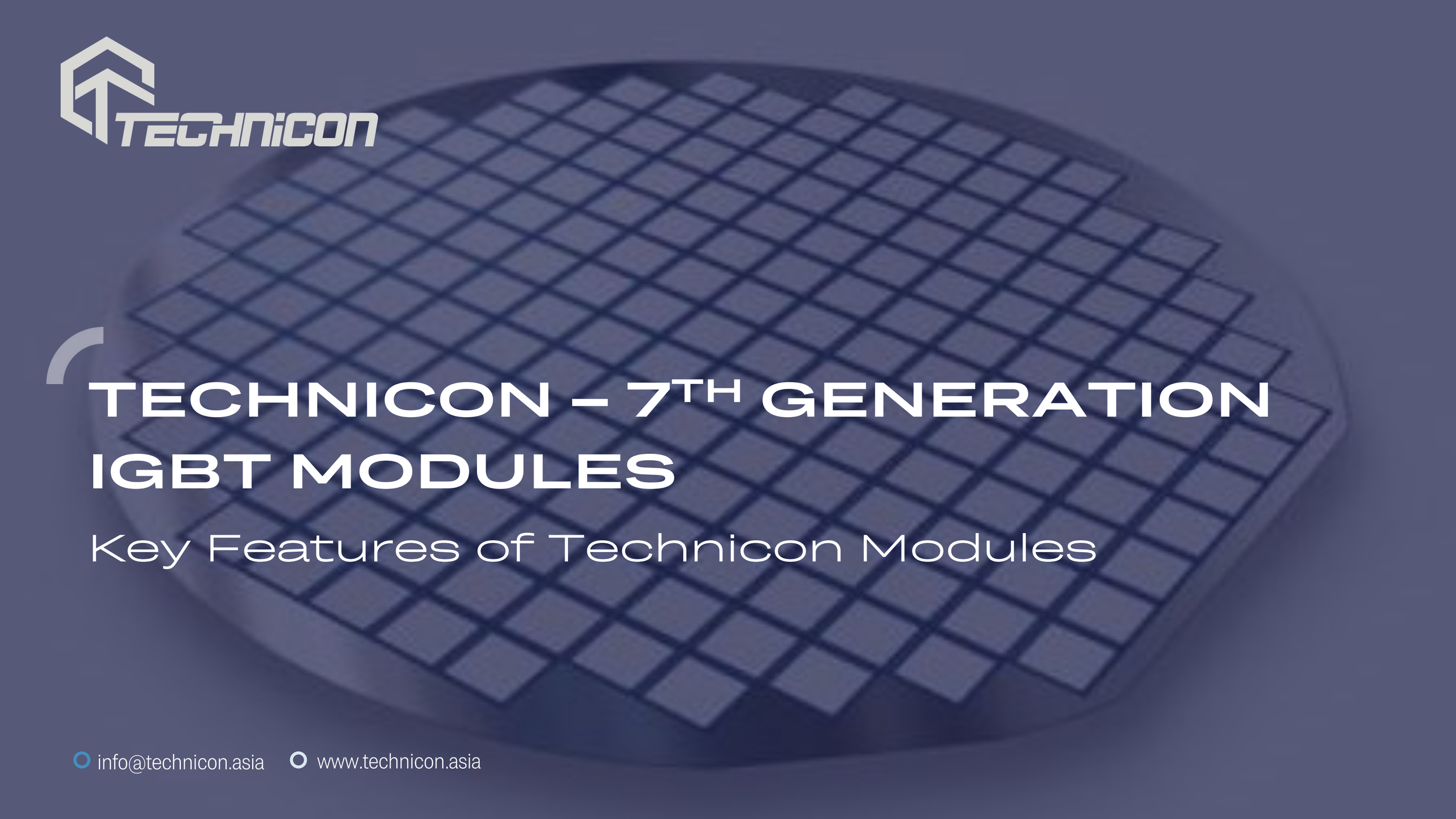


TECHNICON – 7TH GENERATION IGBT MODULES

Key Features of Technicon Modules

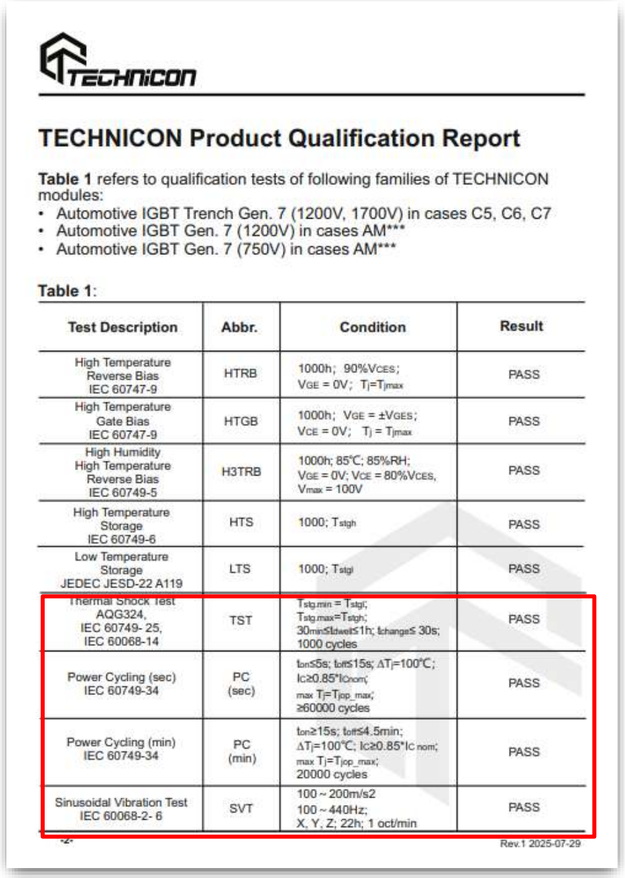
info@technicon.asia www.technicon.asia

POWERING THE FUTURE WITH TECHNICON

High-performance power modules for industrial and automotive applications

Technicon is a global power module brand for those who value reliability, quality, and expert support

Quality standards & test standards for automotive products are used for the production of our modules in case C5 (ED3)



TECHNICON

TECHNICON Product Qualification Report

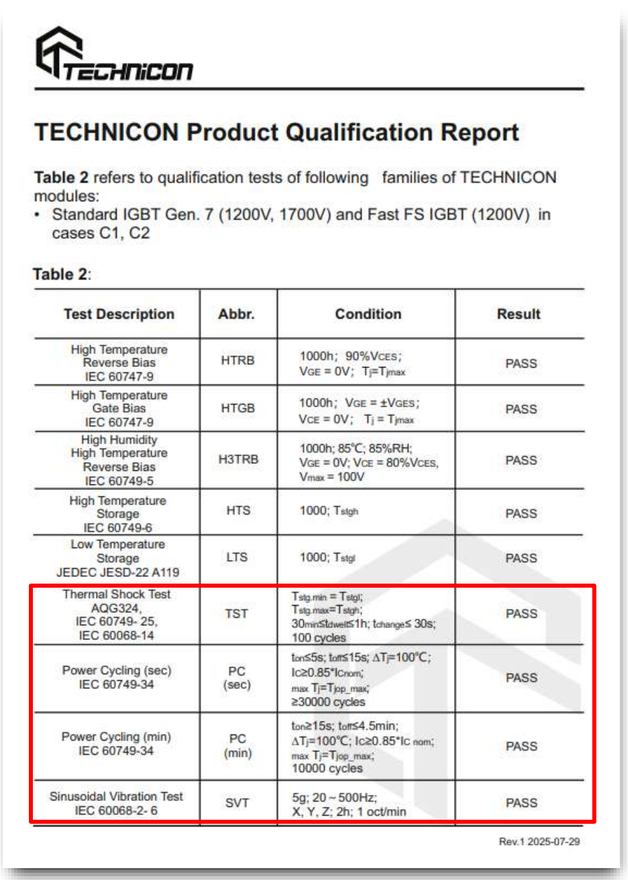
Table 1 refers to qualification tests of following families of TECHNICON modules:

- Automotive IGBT Trench Gen. 7 (1200V, 1700V) in cases C5, C6, C7
- Automotive IGBT Gen. 7 (1200V) in cases AM***
- Automotive IGBT Gen. 7 (750V) in cases AM***

Table 1:

Test Description	Abbr.	Condition	Result
High Temperature Reverse Bias IEC 60747-9	HTRB	1000h; 90%V_{CES}; V_{GE} = 0V; T_j=T_{jmax}	PASS
High Temperature Gate Bias IEC 60747-9	HTGB	1000h; V_{GE} = ±V_{GES}; V_{CE} = 0V; T_j = T_{jmax}	PASS
High Humidity High Temperature Reverse Bias IEC 60749-5	H3TRB	1000h; 85°C; 85%RH; V_{GE} = 0V; V_{CE} = 80%V_{CES}, V_{max} = 100V	PASS
High Temperature Storage IEC 60749-6	HTS	1000; T_{stgh}	PASS
Low Temperature Storage JEDEC JESD-22 A119	LTS	1000; T_{stgl}	PASS
Thermal Shock Test AQG324, IEC 60749- 25, IEC 60068-14	TST	$T_{stg,min}$ = T_{stgl}; $T_{stg,max}$=T_{stgh}; 30min≤t_{dwell}≤1h; t_{change}≤ 30s; 1000 cycles	PASS
Power Cycling (sec) IEC 60749-34	PC (sec)	t_{on}≤5s; t_{off}≤15s; ΔTj=100°C; Ic≥0.85*I_{Cnom}; $_{max}$ T_j=T_{jop_max}; ≥60000 cycles	PASS
Power Cycling (min) IEC 60749-34	PC (min)	t_{on}≥15s; t_{off}≤4.5min; ΔTj=100°C; Ic≥0.85*$I_{C\ nom}$; $_{max}$ T_j=T_{jop_max}; 20000 cycles	PASS
Sinusoidal Vibration Test IEC 60068-2- 6	SVT	100 ~ 200m/s2 100 ~ 440Hz; X, Y, Z; 22h; 1 oct/min	PASS

Rev.1 2025-07-29



TECHNICON

TECHNICON Product Qualification Report

Table 2 refers to qualification tests of following families of TECHNICON modules:

- Standard IGBT Gen. 7 (1200V, 1700V) and Fast FS IGBT (1200V) in cases C1, C2

Table 2:

Test Description	Abbr.	Condition	Result
High Temperature Reverse Bias IEC 60747-9	HTRB	1000h; 90%V_{CES}; V_{GE} = 0V; T_j=T_{jmax}	PASS
High Temperature Gate Bias IEC 60747-9	HTGB	1000h; V_{GE} = ±V_{GES}; V_{CE} = 0V; T_j = T_{jmax}	PASS
High Humidity High Temperature Reverse Bias IEC 60749-5	H3TRB	1000h; 85°C; 85%RH; V_{GE} = 0V; V_{CE} = 80%V_{CES}, V_{max} = 100V	PASS
High Temperature Storage IEC 60749-6	HTS	1000; T_{stgh}	PASS
Low Temperature Storage JEDEC JESD-22 A119	LTS	1000; T_{stgl}	PASS
Thermal Shock Test AQG324, IEC 60749- 25, IEC 60068-14	TST	$T_{stg,min}$ = T_{stgl}; $T_{stg,max}$=T_{stgh}; 30min≤t_{dwell}≤1h; t_{change}≤ 30s; 100 cycles	PASS
Power Cycling (sec) IEC 60749-34	PC (sec)	t_{on}≤5s; t_{off}≤15s; ΔTj=100°C; Ic≥0.85*I_{Cnom}; $_{max}$ T_j=T_{jop_max}; ≥30000 cycles	PASS
Power Cycling (min) IEC 60749-34	PC (min)	t_{on}≥15s; t_{off}≤4.5min; ΔTj=100°C; Ic≥0.85*$I_{C\ nom}$; $_{max}$ T_j=T_{jop_max}; 10000 cycles	PASS
Sinusoidal Vibration Test IEC 60068-2- 6	SVT	5g; 20 ~ 500Hz; X, Y, Z; 2h; 1 oct/min	PASS

Rev.1 2025-07-29

QUALITY AND TRANSPARENCY GUARANTEES

WE GUARANTEE:

- A timely PCN submission about upcoming product changes
- That all the parameters mentioned in a datasheet correspond with the characteristics of our products

All parameters are checked twice –
in the laboratory and in the field

100% label compliance =
declared data correspond with content of product

TECHNICON Product Qualification Report

Description

This product qualification report describes the characteristics of the product with respect to quality and reliability.

The qualification sample selection was done on production lots, which w... manufactured and tested on standard production processes and me... defined requirements.

The qualification test results of those products as outlined in th... are based on IEC standards for target applications and may refe... existing qualification results of similar products. Such referencing ... by the structural similarity of the products.

Qualification Assessment

Qualified according to IEC Standard and assessed as PASS

The following tests are minimum requirements for the product releas... of Silicon based power modules. They are being executed for release ... and re-qualification of new and/or re-developed modules. The scope of ... testing might be extended by further product-specific reliability tests.

-1-

Rev.1 2025-07-29

Product Change Notification (PCN)

Product group: Power modules
No: PN 25-001
Revision: 0
Subject for change: Datasheet for TE450GB12C2R7-CA has been changed
Date: 22.07.2025

Dear valued partner,

Thank you for using TECHNICON products. Within our continuous improvement activities we are working to enhance performance, quality and reliability of our products. This notification is to inform you of a minor change in module design or technical documentation.

We kindly ask you to review the information below and respond with your approval by signing the attached form and returning it to your Technicon representative before **29 August 2025**

Subject of change:
Datasheet for module TE450GB12C2R7-CA.

TECHNICON products:
Module IGBT TE450GB12C2R7-CA

Description of change:
Thermal resistance "case-sink" $R_{th(c-s)}$ for module with pre-applied TIM was added to datasheet TE450GB12C2R7-CA.

Reason for change:
Routine improvement of technical documentation

Impact of change:
No impact: no change of product characteristics

Identification of change: Datasheet rev.02 2025-07-07

Time schedule for change: CW 31 / 2025

Qualification: N.A.

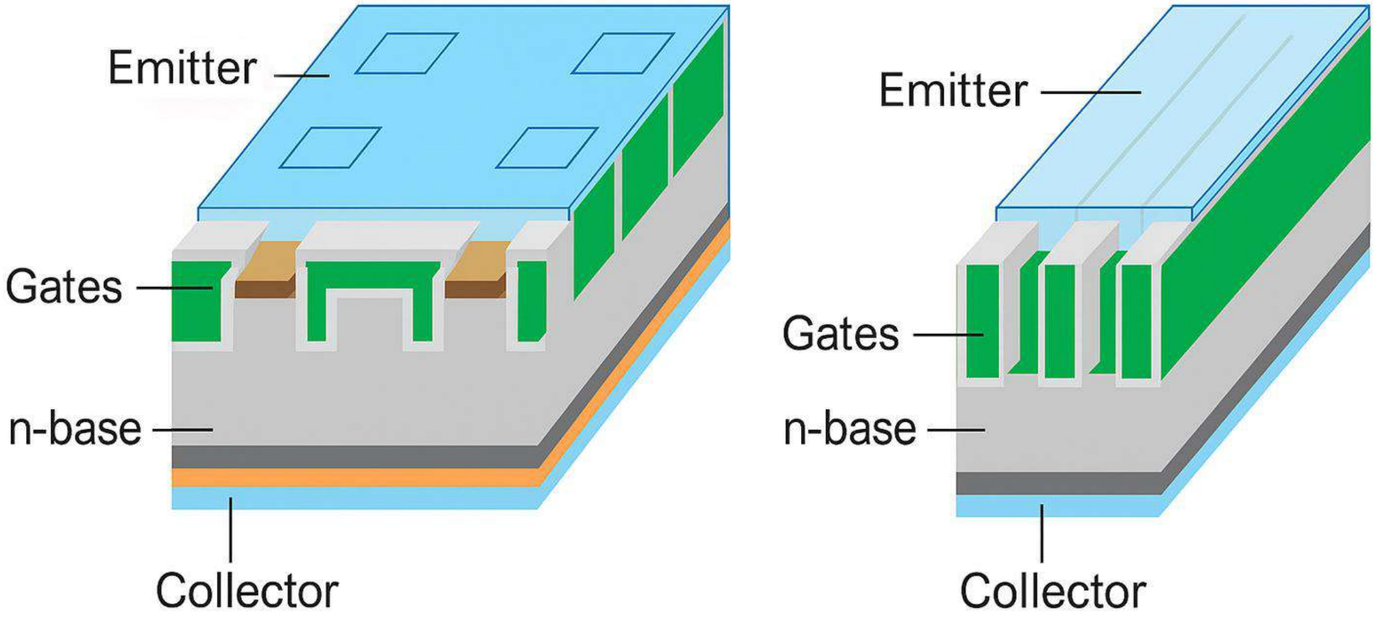
Supporting documentation: updated datasheet

KEY FEATURES OF GEN. 7 TECHNOLOGY

The launch of 7th generation chips marked a significant advancement in IGBT technology.

Gen. 7 IGBT chips use a striped gate with high cell density, consisting of alternating active and passive trenches.

This increases carrier concentration near the emitter and greatly enhances conductivity in the drift region.



Cell structure of Trench IGBT of the 4th and 7th generations

KEY FEATURES OF GEN. 7 TECHNOLOGY

- **Higher power density** → >30% improvement over Trench 4
- **Lower static losses (VCE_sat)** → >20% lower vs. Trench 4
- **Comparable dynamic losses** to Trench 4
- **Enhanced climate resistance** (H3TRB test, 2018 standard)
- **Tjmax = 175°C** – overload mode allowed without loss of reliability
- **Short-circuit rating = 8 µs at Tj= 150°C**

Main Applications:

- Medium & high power industrial drives (100 kW to MW range)
- Submersible pump drives (1200V/450A/600A)
- Marine propulsion systems
- General purpose drives

OUTPUT CHARACTERISTICS

Static Losses Vce(sat)

FF450R12ME4P_B11 (Trench 4)

Charakteristische Werte / Characteristic Values				min.	typ.	max.	
Kollektor-Emitter-Sättigungsspannung Collector-emitter saturation voltage	I_C = 450 A, V_{GE} = 15 V I_C = 450 A, V_{GE} = 15 V I_C = 450 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,75 2,00 2,05	2,10	V V V

FF450R12ME7_B11 (Trench 7)

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\,sat}$	I_C = 450 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.50	1.75	V
			T_{vj} = 125 °C		1.65		
			T_{vj} = 175 °C		1.75		

TE450GB12C5R7-CA (MPT – Trench 7)

Characteristic Values				min.	typ.	max.	
Collector-emitter Saturation Voltage[1)]	IC = 450A, VGE = 15V	Tvj = 25°C Tvj = 150°C Tvj = 175°C	VCEsat	1.40	1.51 1.71 1.79	1.70	V

Chip level	IFX IGBT4 (1200V/450A)	IFX IGBT7 (1200V/450A)	Technicon (1200V/450A)
VCE (25°C)	1.8 V	1.50 V	1.51 V
VCE (150°C)	2.05 V	1.7 2V	1.71 V

TECHNICON GEN. 7: Test Results

Modules were tested in a 630A submersible pump drive (2 × IGBT 1200V/600A per phase)

Test Conditions:

- Output voltage: 380V AC
- Output current: 630A (~315A per IGBT)
- PWM frequency: 5 kHz

Test №1 – Full Load Test (Measurement of heatsink temperature Ts)

Type IGBT	Package	Manufacturer	Maximum heatsink temperature Ts_max (°C), referred to ambient temperature Ta = 50°C	T_in - T_out (VFD), (°C)
FF600R12KE7	62 mm	INFINEON	92.1	16.2
TE600GB12C2R7-CA	62 mm	TECHNICON	94.5	18.6
FF600R12KE4	62 mm	INFINEON	97.4	30.5
DFI600HF12I4ME1	EconoDUAL	LEAPERS	97.9	19.6
GD600HFY120C2S	62 mm	STARPOWER	99.2	20.8
GT600HF120T9H	EconoDUAL	SILVERMICRO	100.1	33.2
GD600HFY120C6S	EconoDUAL	STARPOWER	101.5	34.8
SPS600B12D3L4	EconoDUAL	SPS	103.8	32.4

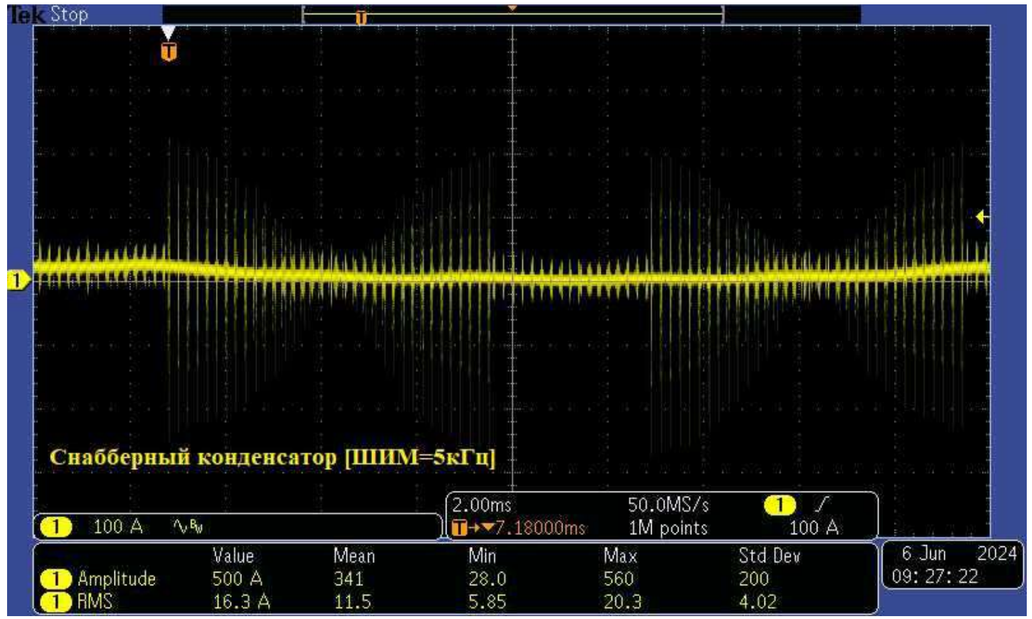
TECHNICON GEN. 7: Test Results

Test №2 – Snubber Capacitor Current
(Iout = 630A, Fsw = = 5 kHz, compared to reference module FF600R12KE4)

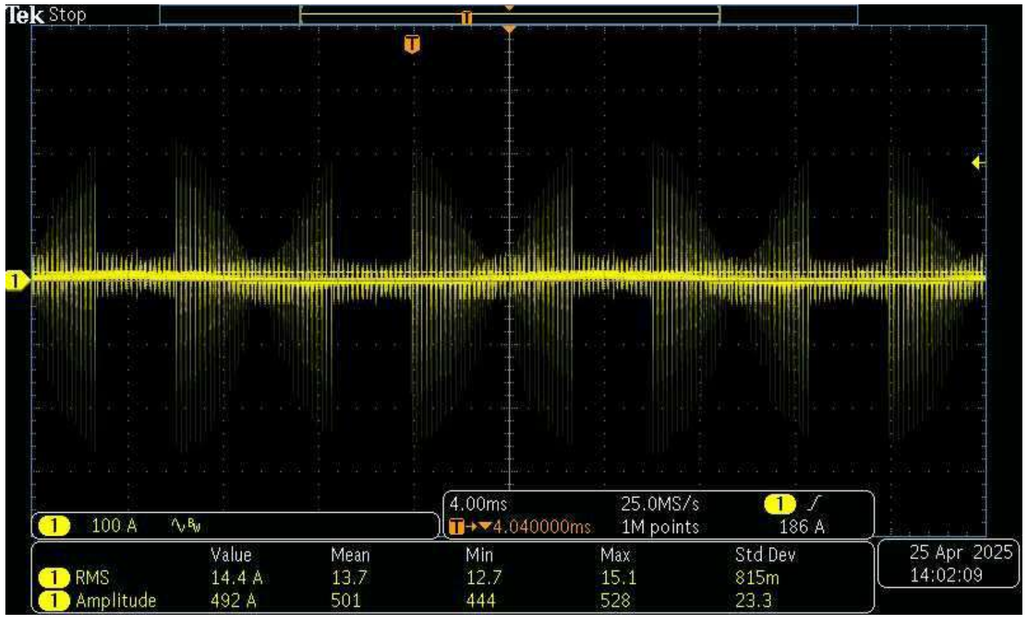
This test indirectly indicates the match of dynamic parameters between IGBT and FWD.

Benefits of lower snubber current:

- Better dynamic parameter matching
- Lower snubber temperature
- Lower switching voltage spikes
- Reduced EMI



FF600R12KE4: Is_rms = 16,3A



TE600GB12C2R7: Is_rms = 14,4A

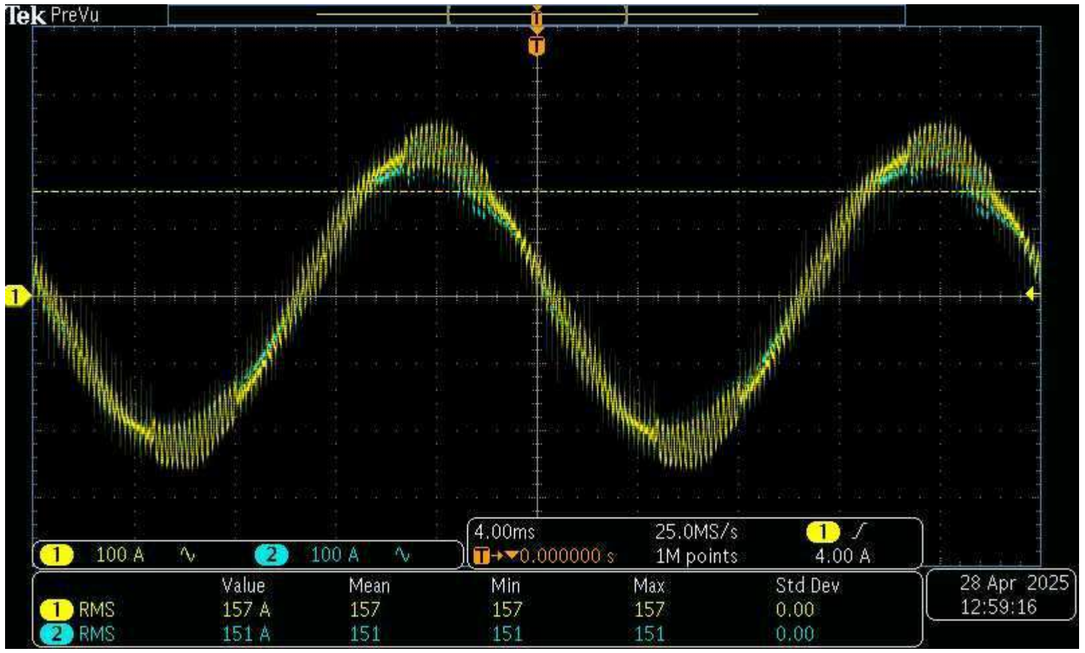
TECHNICON GEN. 7: Test Results

Test №3 – Current Sharing in Parallel Modules TE600GB12C2R7
(Iout = 315A (50%), 630A (100%), Fsw = 5 kHz)

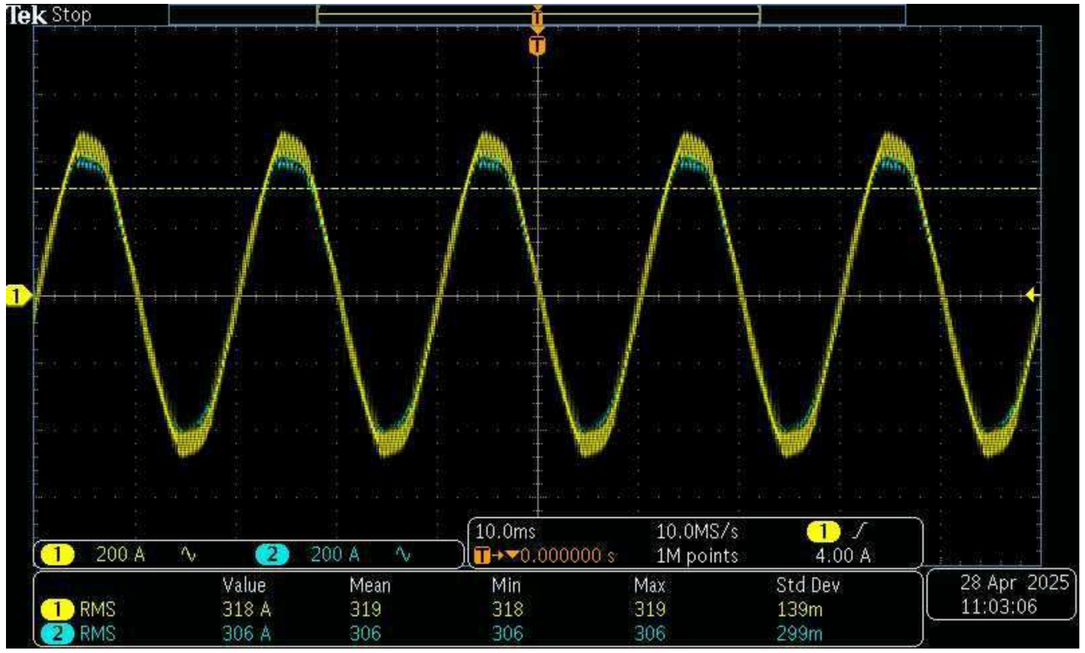
Feature: Adoption for parallel connection (Vf selection)

This test evaluates consistency of static and dynamic parameters within the same BIN group and batch.

At different load levels (50% and 100%), module selection guarantees minimum current imbalance and reliable operation of parallel IGBTs



Iout = 50%



Iout = 100%

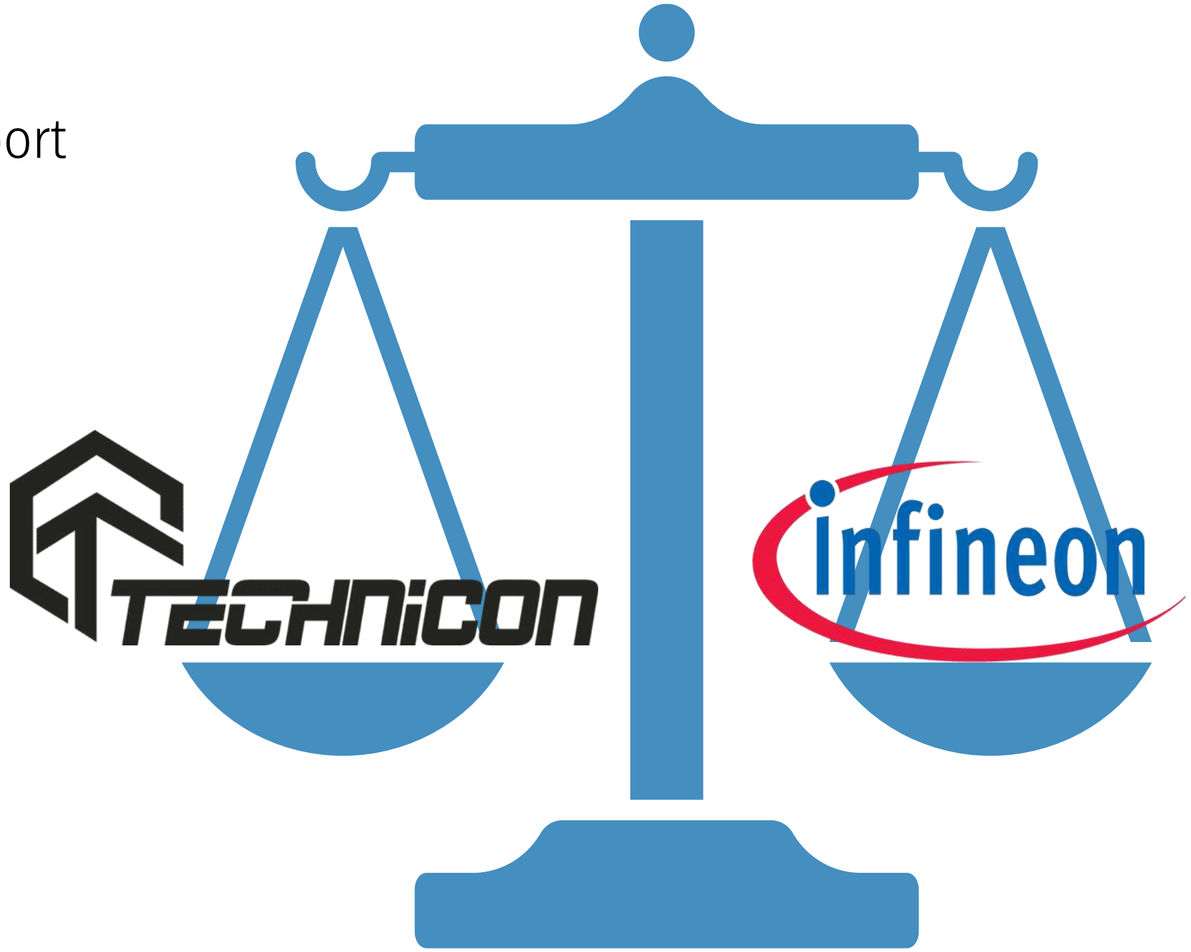
A WEIGHTY CHOICE IN FAVOR OF TECHNICON

You get Technicon modules —
with documentation, testing, and support
like a global brand

We don’t look for someone to blame—we look for solutions! We work as if we were doing it for ourselves—with attention to detail and true respect for the craft, **answering all technical questions within 48 hours**

Technicon — more than just an alternative
It’s protection for your project and your deadlines

Trusted by top oil and gas companies — tested in submersible pump drive applications



TECHNICON IGBT: Product Line

- **Packages:** 34/62mm, ED3 and HPD
- **Voltage:** 1200V, 1700V
- **Current:** 100 – 1000A

Options:

- Pre-applied thermal interface material
- Parameter selection for parallel operation

TECHNICON

C2 series package: 1200V 300A IGBT module

Equivalent Circuit Schem

Features:

- IGBT 1200V/300A
- Planar Field Stop Fast IGBT technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High RBSOA capability
- Ultra Low dynamic losses

Options:

- pre-applied TIM (option +M01)

Typical Applications:

- Inductive Heating
- Welding
- High Frequency Switching Appli

-1-

TECHNICON

C5 series package: 1200V 450A IGBT module

Equival Circuit Sch

Features:

- Trenchgate Gen.7 IGBT technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High RBSOA capability
- Low static losses: $V_{CE(sat)}$ = 1,5V@25°C
- Low dynamic losses

Options:

- Pre-applied TIM (option +M01)
- Adoption for parallel connection (Vf selection)

Typical Applicat

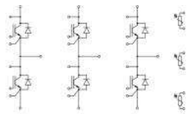
- Motor Drives
- Solar Applications
- UPS Systems
- Energy Stores

-1-

TECHNICON

TE450GD12C6R7

C6 series package: 1200V 450A IGBT module



Equivalent Circuit Schematic

Features:

- Trenchgate Gen.7 IGBT technology
- VCE(sat) with positive temperature coefficient
- High RBSOA capability
- Low static losses: $V_{CE(sat)}$ = 1,53V@25C
- Low dynamic losses
- 6 us short circuit capability
- Fast and soft reverse-recovery FWD
- Si_3N_4 DBC substrate for high thermocycling capability

TECHNICON IGBT Power Modules in C6 (HPD) case provides ultra low conduction loss as well as short circuit ruggedness. They are designed for e-transport applications such as hybrid and electric vehicle.

Typical Applications:

- Hybrid and electric vehicles
- Motor drives

-1-

Rev.1 2025-10-13

TECHNICON

TE450GB12C2R4-CA1

1	2	3	4	5	6	7	8	9	10
TE	450	G	B	12	C2	R	4	C	A1

1. TE: Technicon
2. Rated current: Ic_nom
3. Type: G = IGBT
   S = SiC
   H = Hybrid
4. Configuration: B = half-bridge
   D = 6-pack
5. Rated voltage: VCE/100
6. Case: C2 = 62 mm
   C1 = 34 mm
   C5 = ED3
   C6 = HPD
7. Special mark: R = Adopted for Russia
8. IGBT technology: 4 = Trench 4
   7 = Trench 7
   5 = Fast Field-Stop
9. Special mark: C = Customized
10. Selected for parallel connection, Vf groups: A1, A2, A3.
    Please refer to «**Technicon AN 02-2025: Parallel connection of IGBT**»

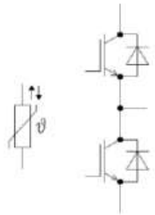
Option M01: pre-applied thermal interface P12 (λ=0.8 W/m*K), M01 is marked on packaging box only!

Version 4.0 / Sept. 2025

TECHNICON IGBT GEN.7: Pre-applied TIM option

TECHNICON TE600GB12C5R7-CA

C5 series package: 1200V 600A IGBT module Datasheet



Equivalent Circuit Schematic

Features:

- Trenchgate Gen.7 IGBT technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High RBSOA capability
- Low static losses: $V_{CE(sat)}$ = 1,5V@25°C
- Low dynamic losses

Options:

- Pre-applied TIM (option +M01)
- Adoption for parallel connection (Vf selection)

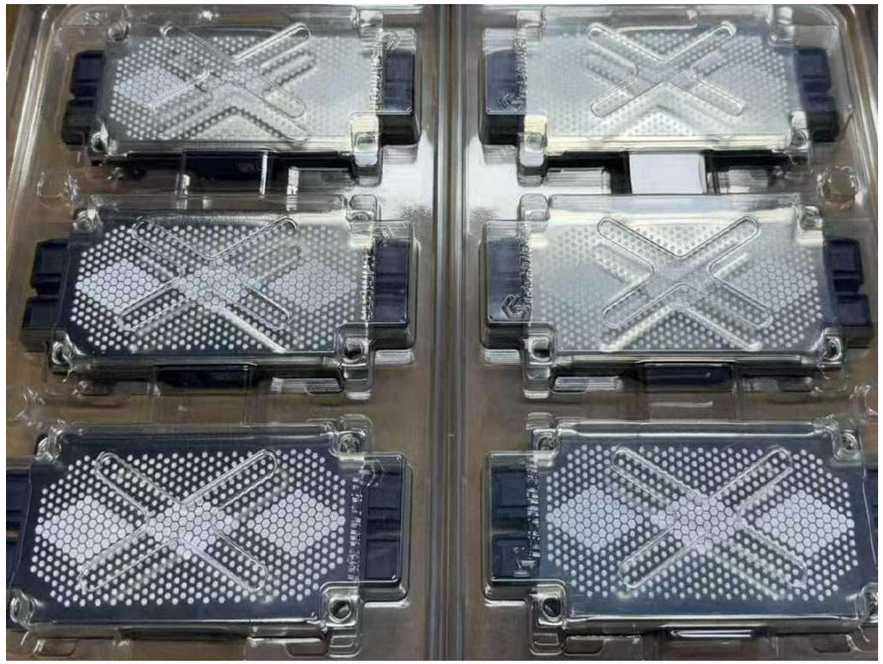
Typical Applications:

- Motor Drives
- Solar Applications
- UPS Systems
- Energy Storage

-1- Rev.1 2024-12-***

Modules supplied with factory-applied thermal paste

- Simplifies and lowers cost of installation
- Eliminates the thermal paste application step
- Ensures consistent and stable thermal performance
- High-quality Wacker P12 paste (recommended by world leaders)
- Proven long-term thermal stability
- Special blister prevents paste damage during shipping and facilitates module handling

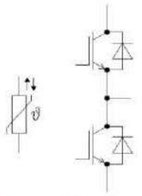


TECHNICON IGBT GEN.7: Technical Documentation

TECHNICON TE600GB12C5R7-CA

C5 series package: 1200V 600A IGBT module

Datasheet

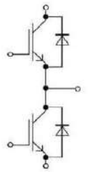


Equivalent Circuit Schematic

TECHNICON TE600GB12C2R7-CA

C2 series package: 1200V 600A IGBT module

Datasheet



Equivalent Circuit Schematic

Available documentation:

- Technical specifications (Datasheet)
- Mounting instructions
- Parallel connection of IGBT
- Product Change Notification (PCN)

TECHNICON

IGBT Modules Technicon: ED3, 34mm, 62mm

Mounting Instructions
Version 1.0 / December 2024

1. Preparation, Surface Specifications

To obtain maximum thermal conductivity
To ensure long-term reliable electrical co
all times and should never be touched by

The heat sink must fulfil the following

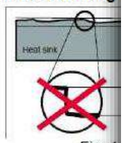


Fig. 1-

TECHNICON

Technicon AN 02-2025: Parallel connection of IGBT

REV.02, December 2024

General considerations

Parallel connection of IGBTs is used to increase total power of converter if the performance o
single element is insufficient. This starts at the microscopic level with several 100.000 individua
IGBT cells, then further in module by parallel connection of the chips and continues at circuit
level by parallel connection of modules and entire inverter units.

Parallel connection of single switches allows covering wide power range with minimum
nomenclature of power modules. Optimal utilization of parallel power switch units is achieved
only with ideal static (i.e. during conduction period) and dynamic (i.e. during switching cycle)
symmetry of currents in parallel nets. Main factors affecting the parallel use of IGBT is shown
in Table 1.

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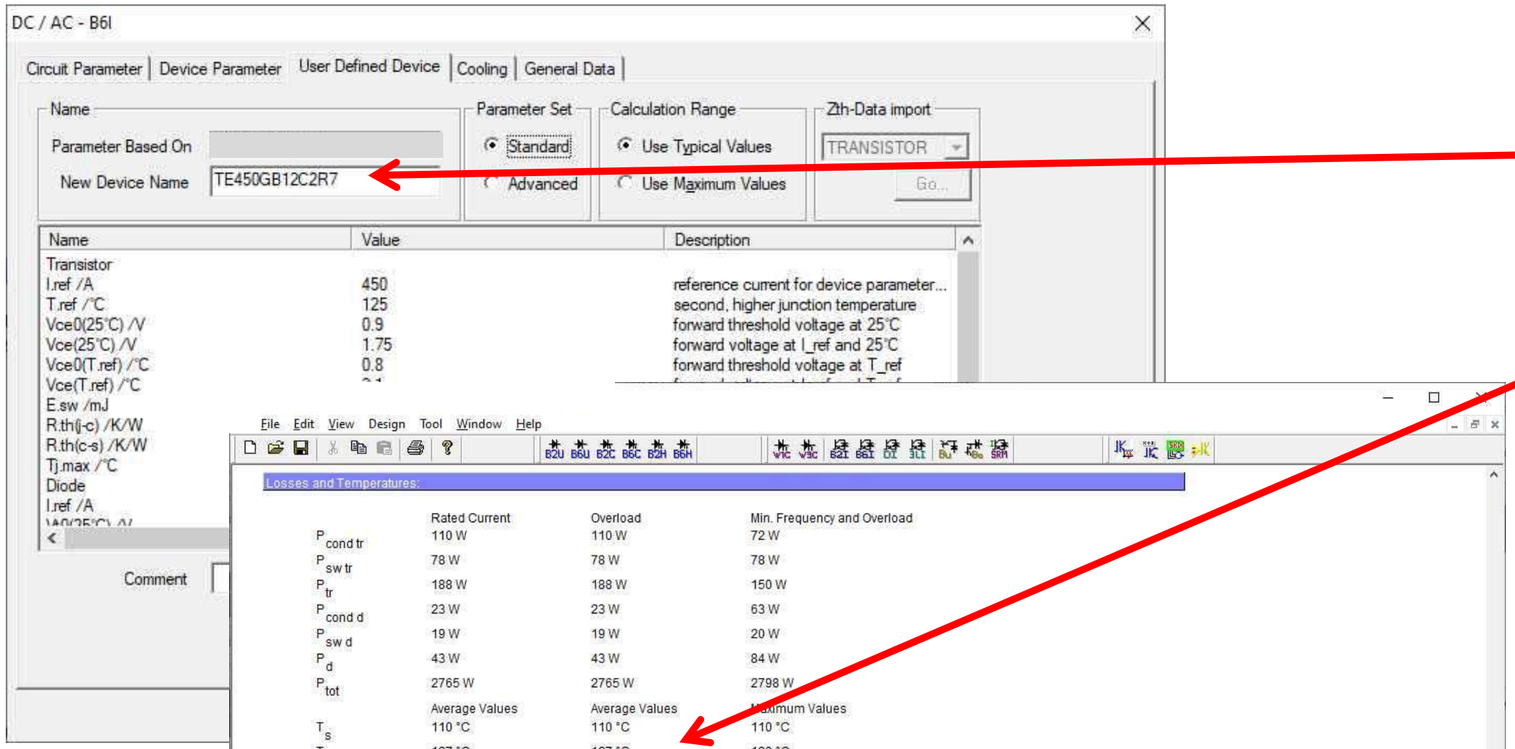
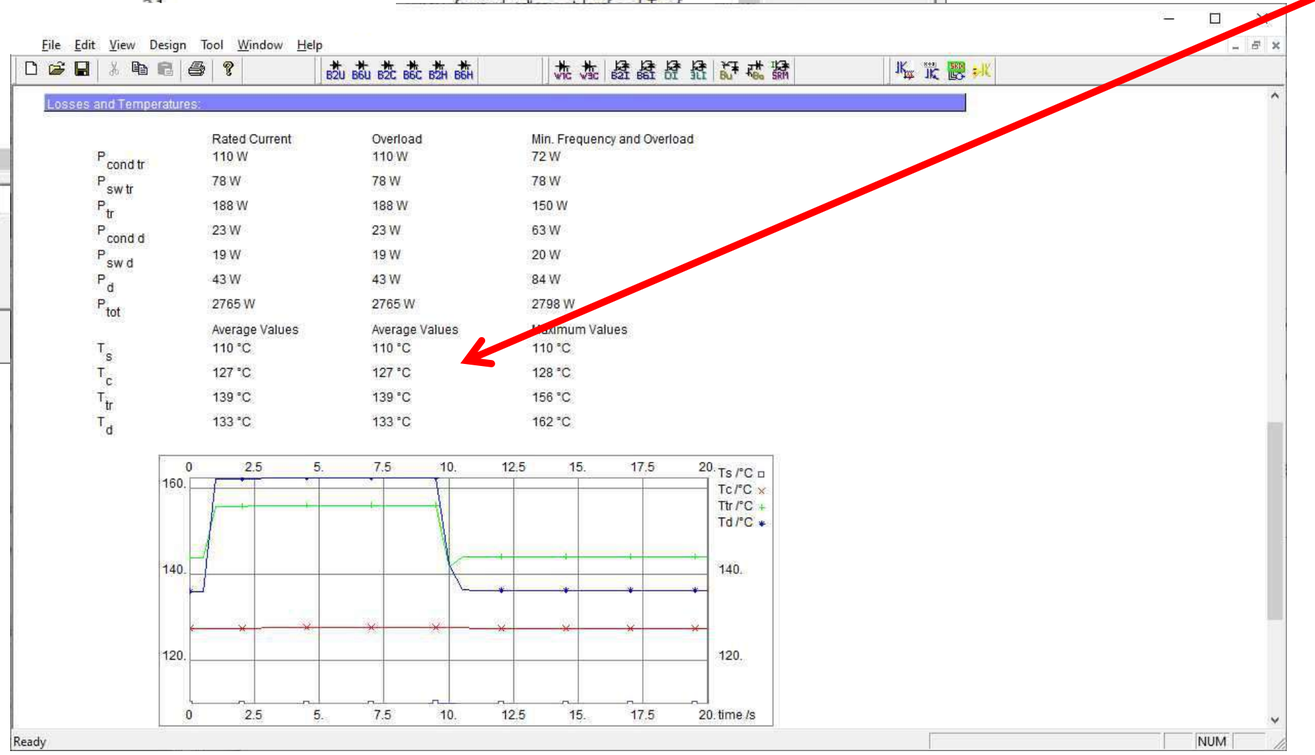
Product Change Notification (PCN)

Product group: Power modules
No: PN 25-002
Revision: 0
Subject for change: Datasheet for TE300GB12C2R7-CA has been issued
Date: 04.08.2025

Dear valued partner,

TECHNICON IGBT GEN.7: Thermal Calculation





- Thermal models have been developed for all Technicon IGBT modules.
- Simulation results closely match measured data.

WHY INDUSTRY LEADERS CHOOSE TECHNICON

The choice of those responsible for results and deadlines:

- Reliable performance at high temperatures
- Minimal static losses and stable thermal characteristics
- Current balancing in modules during parallel operation
- The full range: 1200V, 1700V
- Packages: 34/62mm, ED3 and HPD
- Current: 100 – 1000A

CONTACT US

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info@technicon.asia

Technical support will respond to you within 48 hours

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