TOMMATECH GmbH

GERMAN-based company

PANEL

Catalogue

Garching - Munich Production Center / Germany

Antalya Production Center / Türkiye

Contents

TOMMATECH GmbH

GERMAN-based company

In an increasingly complex world, we continuously adapt to changes and actively encourage all our partners to embrace our long-term goals and values through goal-oriented communication and a deep mutual understanding of our mission. In this way, we aim to provide a valuable contribution for future generations.

Technology

Vision:

Our vision is to be a leader in the development of advanced solar energy technologies that maximize energy efficiency, protect the ecological balance, restore harmony between humans and nature, and accelerate the global transition to renewable energy in order to achieve the set climate goals.

Mission:

We focus on continuous innovation and research to develop modern solar technology and integrate it efficiently into smart home systems, enabling our customers to benefit from connected and sustainable energy use.

Today:

Many customers are already benefiting from our modern installations, which we have seamlessly integrated into their homes. This optimizes energy consumption, allowing customers to save money immediately and reduce their carbon footprint.

Optimization

"Through intelligent optimization solutions, we achieve the most efficient use of solar energy worldwide, actively supporting the achievement of climate neutralty."

"We are committed to developing and implementing advanced automation and control technologies to optimize energy consumption in households and businesses while significantly reducing operating costs."

Our customers' current energy optimization systems have already achieved significant improvements in emissions.

Manufacturing

We aim to be a leading manufacturer of solar technologies, setting industry standards for quality and sustainability.

We are committed to producing high-quality and innovative solar products that meet the needs of the present while addressing future challenges. Through continuous improvements and investments in our production processes, we strive to maximize efficiency and minimize environmental impact.

Our customers are already benefiting from the advanced solar products manufactured in our state-of-the-art facilities. These products are not only efficient and reliable but also leading in terms of sustainability and environmental protection. The continuous optimization of our production processes guarantees products that are both economically and ecologically advantageous.

Milestones

We are pioneering solar techno- logy that plays a crucial role in contributing to energy indepenence and climate resilience.

We drive transformative change in the global use of solar energy. By developing technologies that enable significant improvements in performance and ease of use, we are setting new standards.

Customers worldwide are using our technology, and together we are accelerating the transition to renewable energy while achieving both economic and ecological benefits.

Automation

To drive the integration of intelligent automation solutions that make the interaction between solar technologies and end users seamless and intuitive.

To develop automation systems that not only operate smoothly but also adapt to consumer needs. These systems aim to optimize energy consumption, enhance operational efficiency, and accelerate the adoption of renewable technologies.

Our customers are enjoying the convenience and efficiency that our intelligent automation solutions bring to their daily lives. These technologies simplify the control of their energy supply, reduce costs, and support the transition to a more environmentally friendly future.

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TOMMATECH GmbH

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2014 60+ 2

Transparency

Vision:

We aim to create an atmosphere of openness where everyone from our customers to our employees feels secure and well-informed.

Mission:

Clear information, no secrets that's our motto. Whether it's about the production of our products or how they function, we keep you constantly updated. We believe that well informed people make better decisions.

Today:

Our customers and partners benefit from our transparent business management. We ensure complete openness at every stage of our processes, from development to product delivery. This practice of open communication allows our stakeholders to make informed decisions and strengthens trust in long-term collaboration with our company.

Experience

We want every interaction with our company to be a positive experience for customers and partners. Our products and services should not only be reliable and innovative but also inspire enthusiasm.

Our goal is to provide each customer and partner with a personalized and valuable experience. With our extensive experience in solar technology, we know what works and we use that knowledge to exceed your expectations and make the transition to sustainable energy easier for you.

Our customers benefit directly from our many years of experience in solar technology. We deliver tailored solutions that are reliable and efficient, supporting every step of the journey toward sustainable energy. Our team ensures a seamless experience through professional advice and assistance.

Commitment

Our vision is to be a leader in the solar industry through our unwavering commitment to quality and sustainability. We strive to improve in every aspect every day from product development to our services.

Our primary goal is to consistently exceed our customers' expectations. We are committed to the highest quality and continuous improvement of our products and services. Our dedication to sustainability and ethical business practices is unwavering and guides all our actions.

Our customers and partners can rely on our strong commitment. We employ innovative and sustainable technologies to ensure that our solutions are not only efficient but also environmentally friendly. Every project is executed with the highest standards of quality and a focus on long-term customer satisfaction.

Home Solution

We aim to transform every home into an eco-friendly energy source. Our vision is to offer advanced solar solutions that are easy to integrate and optimize household energy consumption while contributing to global sustainability.

Our goal is to develop customized solar solutions tailored to the specific needs and conditions of each household. We are committed to providing our custmers with the best combination of efficiency, ease of use, and economic benefit, making the transition to renewable energy simple and appealing.

Our Home Solution products enable customers to meet their energy needs sustainably while saving costs. Homes equipped with our technology benefit from intelligent energy management and a reduced carbon footprint. Our solutions are not only environmentally friendly but also user-friendly, allowing every household to fully harness the advantages of modern solar technology.

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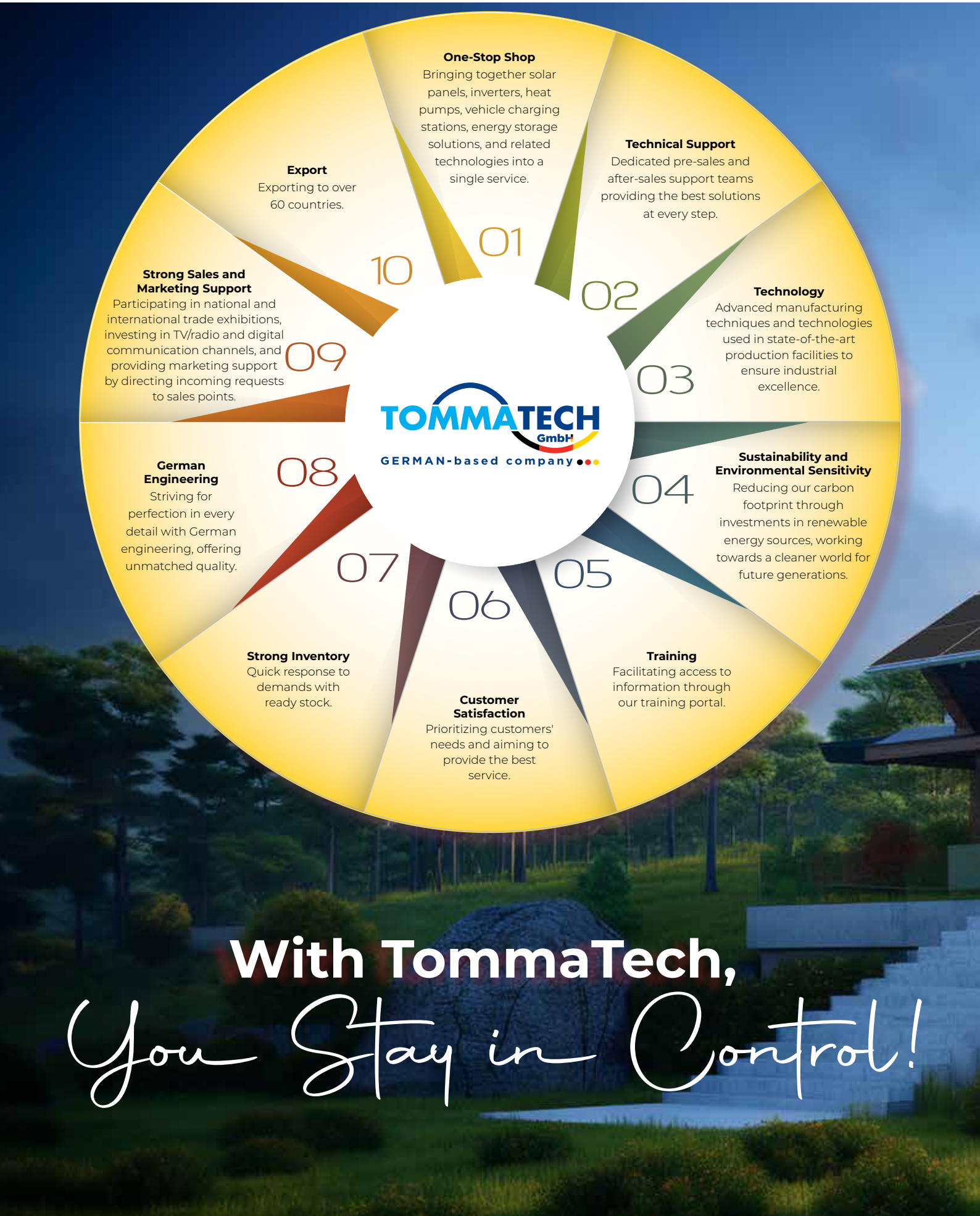

With TommaTech,

You Stay in Control!

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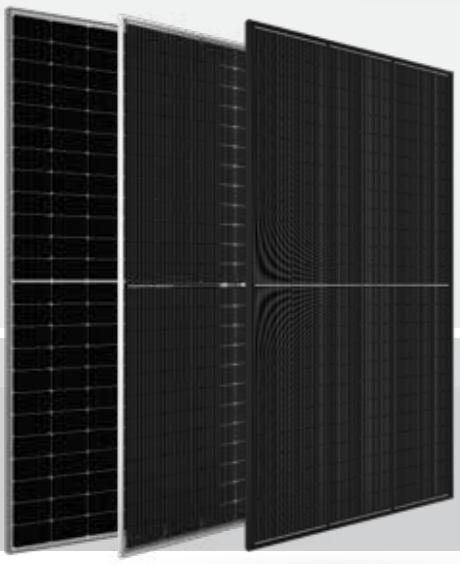
M10 PERC MONOCRYSTALLINE

144PM10 - 530-550Wp

144PMB10 - 530-550Wp

144PMFB10 - 530-550Wp



M10 TOPCON

108TN10 - 415-450Wp

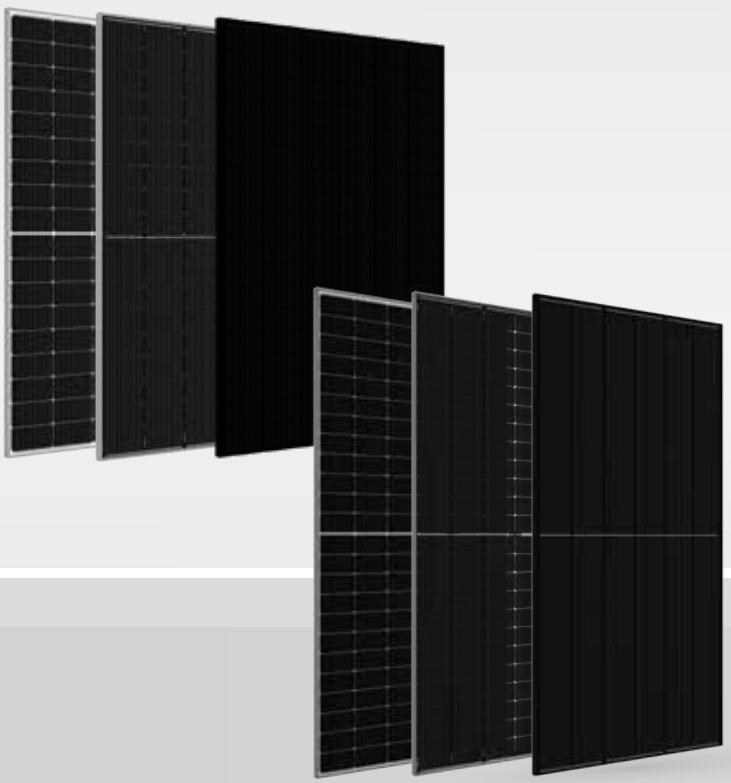
108TNB10 - 415-450Wp

108TNFB10 - 415-450Wp

144TN10 - 570-595Wp

144TNB10 - 570-595Wp

144TNFB10 - 570-595Wp



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M12 PERC MONOCRYSTALLINE

108PM12 - 530-550Wp

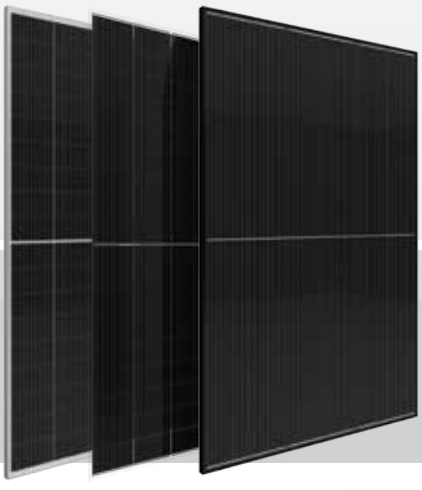
108PMB12 - 530-550Wp

108PMFB12 - 530-550Wp

132PM12 - 650-675Wp

132PMB12 - 650-675Wp

132PMFB12 - 650-675Wp



WHAT IS A SOLAR PANEL?

With the rapid increase in the use of primary energy sources and global carbon emissions in recent years, the importance of renewable energy sources has grown steadily. Among these, solar energy stands out as one of the most important. When converted into electricity through solar panel systems, it can meet a wide range of needs—from daily household electricity consumption to industrial applications, business operations, and agricultural irrigation.

A solar panel, also known as a photovoltaic (PV) panel, is a system that converts sunlight into electricity using semiconductor silicon cells. These cells absorb sunlight (photons) and convert it into electrical energy through the photovoltaic effect. Solar panel systems are capable of powering electrical devices in homes, offices, factories, agricultural fields, and even in off-grid locations such as countryside houses, caravans, boats, and yachts—anywhere electricity is needed most.

HOW DOES A SOLAR CELL WORK?

Solar cells are semiconductor materials that convert sunlight directly into electrical energy. The primary material used in cell production is silicon. On the surface of each cell are busbars—thin conductive lines that collect and transmit the generated electricity. Thanks to modern technology, cells with 10, 12, 16, or even 18 busbars are currently produced. In the near future, we expect to see cells with 20, 22, or even 24 busbars for even better performance.

WHY SHOULD I GENERATE ELECTRICITY WITH A SOLAR PANEL?

In addition to being an environmentally friendly energy source, solar energy systems can also be considered an important investment tool. Once the required energy amount for your home or business is calculated, solar panels designed to meet your needs, followed by project planning and installation, will result in significant savings on one of your largest expenses—your electricity bill—and help you stay one step ahead of your competitors. Additionally, the key benefits of solar panel systems include their quiet operation, ability to increase the value of the building they are installed on, and their capacity to generate electricity anywhere the sun shines, all of which make them a highly beneficial choice for you.

WHERE ARE TOMMATECH PANELS USED?

They are used in factories, residential buildings, workplaces, containers, and agricultural irrigation projects.

PRODUCT ADVANTAGES

- Tommatech Solar panel production and product diversity in the World Solar Energy Production ranking in the Middle Eastand insurance that many producers cannot have in the European market in terms of both product quality and certification policies.

- High panel efficiency guarantees high power output.
- Special coating on the glass reduces surface dust.
- High panel efficiency even at sunrise, sunset and cloudy weather.
- 2400 Pa wind load, 5400 Pa snow load resistance capacity.
- It is the company that can provide the highest insurance damage limit (50,000,000 USD). It is far ahead of other stakeholders in the sector.
- Our company, which does not compromise on quality, has a serious sales point in Turkey and abroad with its business philosophy based on trust network.

TOMMATECH M10 PERC MONOCRYSTALLINE SOLAR PANELS

144PM10 550-530Wp Perc Monocrystalline Solar Panels

› Developed for use in both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Multi-busbar cell technology minimizes electrical losses.
› PERC technology enhances cell efficiency.
› Half-cut cell design reduces efficiency loss in partial shading conditions.
› Special coated glass maintains performance under low irradiation.
› Provides high durability against wind and snow loads in line with international standards.
› Designed for easy installation.
› These panels are engineered to maximize the efficiency of solar energy systems while offering a robust and long-lasting solution.

Product Specifications

High Conversion Efficiency

Self-Cleaning And Anti-Reflection Glass

Outstanding Low Irradiation Glass

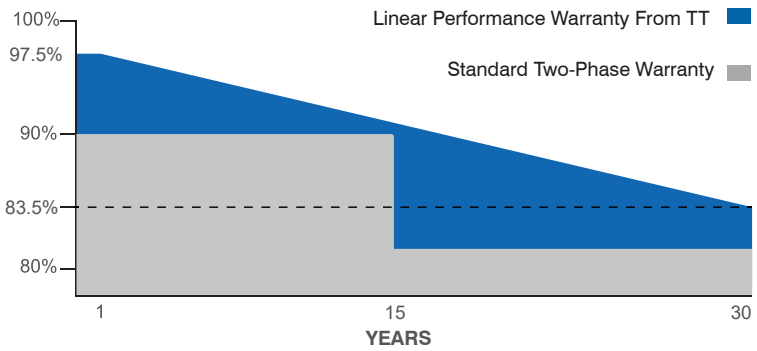
Excellent Durability

Easy Installation

0~+5W Positive Power Tolerance

15 Years Product Warranty

30 Years Performance Warranty



30 Years Performance Warranty

15 Years Product Warranty

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
IEC 61701 SALT MIST CORROSION
IEC 62716 AMMONIA CORROSION
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT530 144PM10	TT535 144PM10	TT540 144PM10	TT545 144PM10	TT550 144PM10
Peak Power (Pmax)	530 Wp	535 Wp	540 Wp	545 Wp	550 Wp
Module Efficiency	20.50	20.70	20.89	21.09	21.28
Maximum Power Voltage (Vmp)	41.60	41.80	42.00	42.20	42.40
Maximum Power Current (Imp)	12.75	12.80	12.86	12.92	12.98
Open Circuit Voltage (Voc)	49.40	49.60	49.80	50.00	50.20
Short Circuit Current (Isc)	13.58	13.63	13.70	13.76	13.82
Power Tolerance	0~+5W				
Maximum System Voltage	1500V DC				
Operating Temperature	-40 ~ +85°C				
Protection Class	Class II				
Maximum Series Fuse Rating	25A				
MECHANICAL SPECIFICATIONS					
Cell Dimensions(mm)	182x91				
Cells per Module(pcs)	144 (6x24)				
Weight(kg)	29.0				
Panel Dimensions(mm)	2278x1134x35				
Max. Wind/Snow Load(Pa)	2400/5400				
Junction Box	IP68				
Junction Box Cable Length(mm)	300-1600				

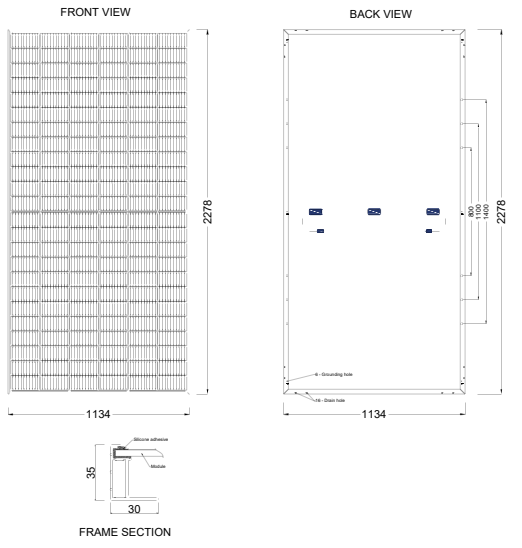
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.050%/°C
Temp. Coeff. of (Voc)	-0.270%/°C
Temp. Coeff. of (Pmax)	-0.350%/°C

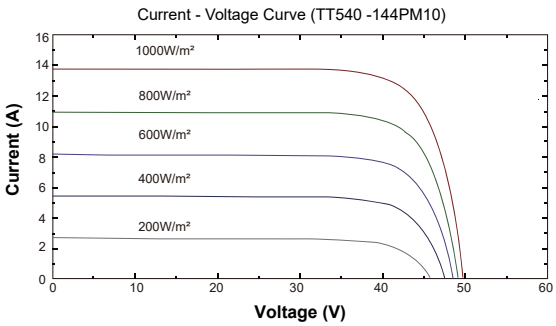
PACKING CONFIGURATION

Container	40' GP
Pieces per Pallet	31
Pieces per Container	620
Pallet Per Container	20

PHYSICAL CHARACTERISTICS

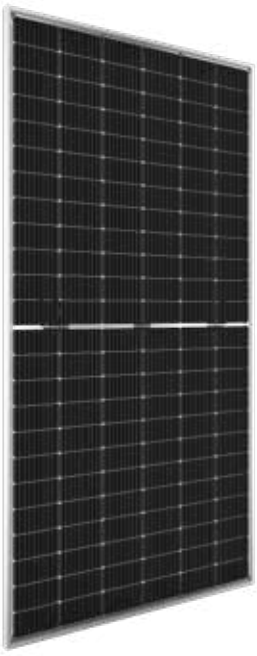


ELECTRICAL CHARACTERISTICS



TOMMATECH M10 PERC MONOCRYSTALLINE SOLAR PANELS

144PMB10 550-530Wp Bifacial Perc Monocrystalline Solar Panels



› Developed for use in both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Multi-busbar cell technology minimizes electrical losses and delivers high energy efficiency.
› PERC technology increases cell performance, while the bifacial cell structure allows for additional power generation from the rear side of the panels.
› Half-cut cell design ensures minimal efficiency loss in case of shading.
› Built to withstand high wind and snow loads in accordance with international standards.
› Easy installation enables seamless integration into a wide range of applications.
› These panels are an effective solution for solar energy projects, offering high efficiency and long-term durability.

Product Specifications

High Conversion Efficiency

Self-Cleaning And Anti-Reflection Glass

Outstanding Low Irradiation Glass

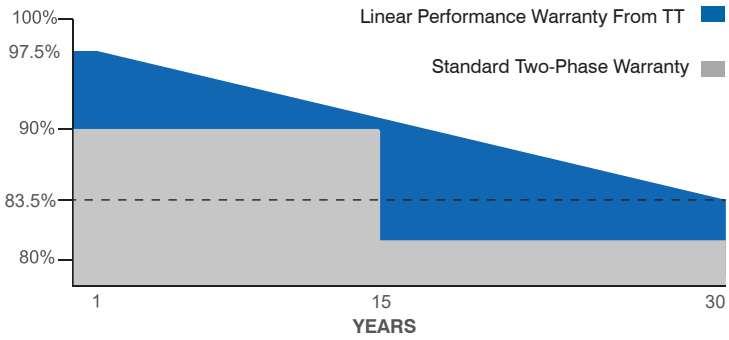
Excellent Durability

Easy Installation

0~+5W Positive Power Tolerance

15 Years Product Warranty

30 Years Performance Warranty



30 Years Performance Warranty

15 Years Product Warranty

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT530 144PMB10	TT535 144PMB10	TT540 144PMB10	TT545 144PMB10	TT550 144PMB10
Peak Power (Pmax)	530 Wp	535 Wp	540 Wp	545 Wp	550 Wp
Module Efficiency	20.50	20.70	20.89	21.09	21.28
Maximum Power Voltage (Vmp)	41.60	41.80	42.00	42.20	42.40
Maximum Power Current (Imp)	12.75	12.80	12.86	12.92	12.98
Open Circuit Voltage (Voc)	49.40	49.60	49.80	50.00	50.20
Short Circuit Current (Isc)	13.58	13.63	13.70	13.76	13.82
Power Tolerance	0~+5W				
Maximum System Voltage	1500V DC				
Operating Temperature	-40 ~ +85°C				
Protection Class	Class II				
Maximum Series Fuse Rating	25A				
MECHANICAL SPECIFICATIONS					
Cell Dimensions(mm)	182x91				
Cells per Module(pcs)	144 (6x24)				
Weight(kg)	29.0				
Panel Dimensions(mm)	2278x1134x35				
Max. Wind/Snow Load(Pa)	2400/5400				
Junction Box	IP68				
Junction Box Cable Length(mm)	300-1600				

REARSIDE POWER GAIN

Rear Power Gain	%5	10%	15%	20%	20%
Maximum Power (Pmax)	562	589	615	642	642
Short Circuit Current (Isc)	14.99	16.48	17.97	19.54	19.54
Open Circuit Voltage (Voc)	50.00	50.00	50.00	50.00	50.00
Maximum Power Current (Imp)	13.4	14.08	14.72	15.36	15.36
Maximum Power Voltage (Vmp)	41.9	41.9	41.9	41.9	41.9

(535W Front Power Referenced)

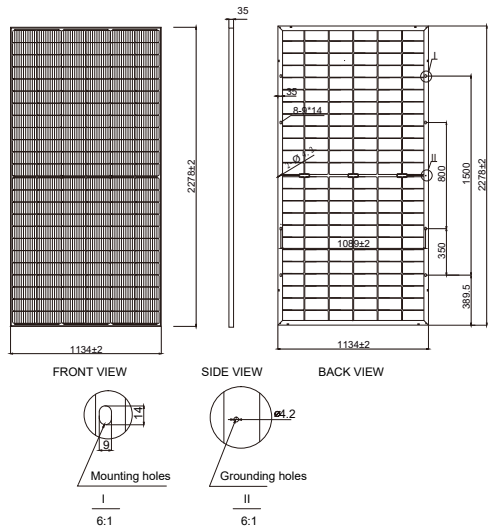
PACKING CONFIGURATION

Container	40' GP
Pieces per Pallet	31
Pieces per Container	620
Pallet Per Container	20

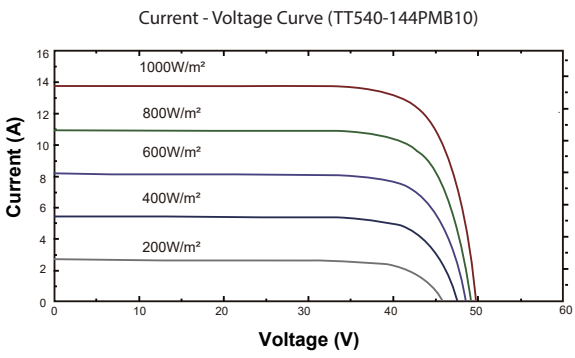
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.050%/°C
Temp. Coeff. of (Voc)	-0.270%/°C
Temp. Coeff. of (Pmax)	-0.350%/°C

PHYSICAL CHARACTERISTICS



ELECTRICAL CHARACTERISTICS



TOMMATECH M10 PERC MONOCRYSTALLINE SOLAR PANELS

144PMFB10 550-530Wp Dark Series Perc Monocrystalline Solar Panels

› Developed for both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Multi-busbar cell technology reduces electrical losses for improved efficiency.
› PERC technology enhances cell performance.
› Half-cut cell design ensures minimal efficiency loss in shaded conditions.
› Special coated glass maintains performance even under low light conditions.
› Built to meet high durability standards against wind and snow loads.
› Designed for easy installation across various applications.
› Engineered to enhance solar system efficiency while providing a robust and reliable solution.
› Sleek black design offers a modern and aesthetically pleasing appearance.

Product Specifications

High Conversion Efficiency

Self-Cleaning And Anti-Reflection Glass

Outstanding Low Irradiation Glass

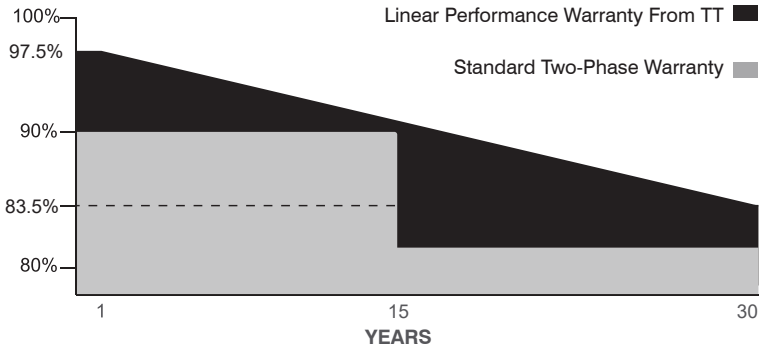
Excellent Durability

Easy Installation

0~+5W Positive Power Tolerance

15 Years Product Warranty

30 Years Performance Warranty



30 Years Performance Warranty **15 Years Product Warranty**

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
IEC 61701 SALT MIST CORROSION
IEC 62716 AMMONIA CORROSION
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT530 144PMFB10	TT535 144PMFB10	TT540 144PMFB10	TT545 144PMFB10	TT550 144PMFB10
Peak Power (Pmax)	530 Wp	535 Wp	540 Wp	545 Wp	550 Wp
Module Efficiency	20.50	20.70	20.89	21.09	21.28
Maximum Power Voltage (Vmp)	41.60	41.80	42.00	42.20	42.40
Maximum Power Current (Imp)	12.75	12.80	12.86	12.92	12.98
Open Circuit Voltage (Voc)	49.40	49.60	49.80	50.00	50.20
Short Circuit Current (Isc)	13.58	13.63	13.70	13.76	13.82
Power Tolerance	0~+5W				
Maximum System Voltage	1500V DC				
Operating Temperature	-40 ~ +85°C				
Protection Class	Class II				
Maximum Series Fuse Rating	25A				
MECHANICAL SPECIFICATIONS					
Cell Dimensions(mm)	182x91				
Cells per Module(pcs)	144 (6x24)				
Weight(kg)	29.0				
Panel Dimensions(mm)	2278x1134x35				
Max. Wind/Snow Load(Pa)	2400/5400				
Junction Box	IP68				
Junction Box Cable Length(mm)	300-1600				

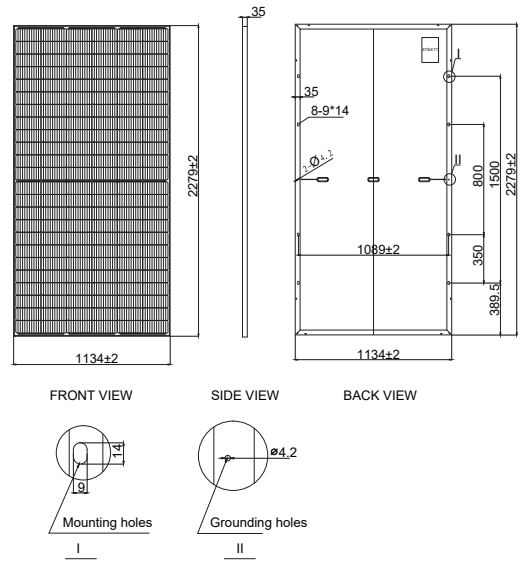
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.050%/°C
Temp. Coeff. of (Voc)	-0.270%/°C
Temp. Coeff. of (Pmax)	-0.350%/°C

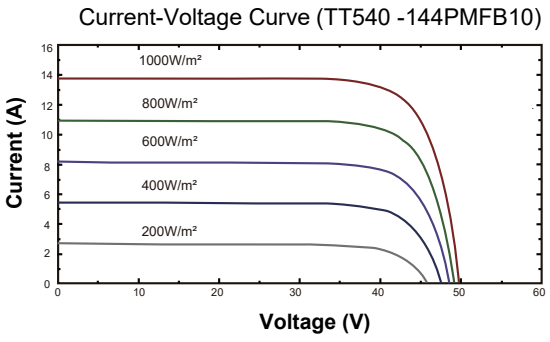
PACKING CONFIGURATION

Container	40' GP
Pieces per Pallet	31
Pieces per Container	620
Pallet Per Container	20

PHYSICAL CHARACTERISTICS



ELECTRICAL CHARACTERISTICS



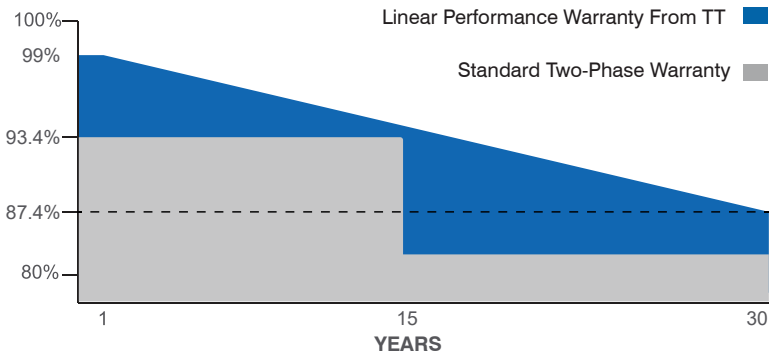
TOMMATECH M10 TOPCON SOLAR PANELS

108TN10 450-415Wp Topcon N-Type Solar Panels

› Panels made with TOPCon monocrystalline cells convert sunlight with high efficiency, significantly boosting energy output.
› Multi-busbar technology minimizes electrical losses within the panels.
› Designed for long-lasting performance, the panels are resistant to environmental factors.
› Suitable for both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Special coated glass ensures stable performance even under low irradiation conditions.
› Built to withstand high wind and snow loads, meeting international durability standards.
› Easy to install and adaptable to various application areas.

Product Specifications

- **High Conversion Efficiency**
- **Self-Cleaning And Anti-Reflection Glass**
- **Outstanding Low Irradiation Glass**
- **Excellent Durability**
- **Easy Installation**
- **0~+5W Positive Power Tolerance**
- **15 Years Product Warranty**
- **30 Years Performance Warranty**



30 Years Performance Warranty
15 Years Product Warranty

IEC 61215, IEC 61730-1, IEC 61730-2
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT415 108TN10	TT420 108TN10	TT425 108TN10	TT430 108TN10	TT435 108TN10	TT440 108TN10	TT445 108TN10	TT450 108TN10
Peak Power (Pmax)	415 Wp	420 Wp	425 Wp	430 Wp	435 Wp	440 Wp	445 Wp	450 Wp
Module Efficiency	21.25	21.51	21.76	22.02	22.28	22.53	22.79	23.04
Maximum Power Voltage (Vmp)	31.74	31.94	32.14	32.34	32.54	32.74	32.94	33.14
Maximum Power Current (Imp)	13.08	13.15	13.23	13.30	13.37	13.44	13.51	13.58
Open Circuit Voltage (Voc)	37.71	37.91	38.11	38.31	38.51	38.71	38.91	39.11
Short Circuit Current (Isc)	13.88	13.95	14.03	14.10	14.17	14.24	14.31	14.38
Power Tolerance	0~+5W							
Maximum System Voltage	1500V DC							
Operating Temperature	-40 ~ +85°C							
Protection Class	Class II							
Maximum Series Fuse Rating	25A							
MECHANICAL SPECIFICATIONS								
Cell Dimensions(mm)	182x91							
Cells per Module(pcs)	108 (6x18)							
Weight(kg)	21.45							
Panel Dimensions(mm)	1722x1134x30							
Max. Wind/Snow Load(Pa)	2400/5400							
Junction Box	IP68							
Junction Box Cable Length(mm)	300-1600							

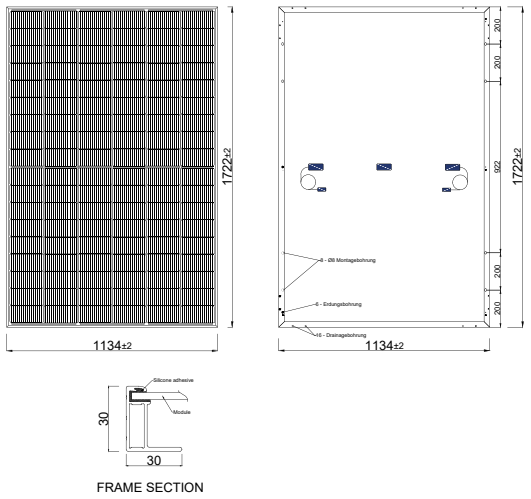
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.040%/°C
Temp. Coeff. of (Voc)	-0.260%/°C
Temp. Coeff. of (Pmax)	-0.30%/°C

PACKING CONFIGURATION

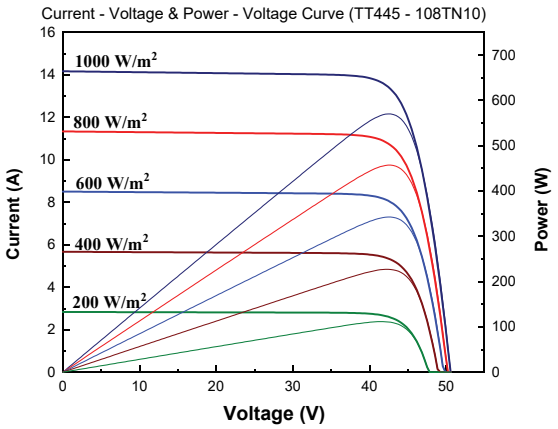
Container	40' HC
Pieces per Pallet	35
Pieces per Container	910
Pallet Per Container	26

PHYSICAL CHARACTERISTICS



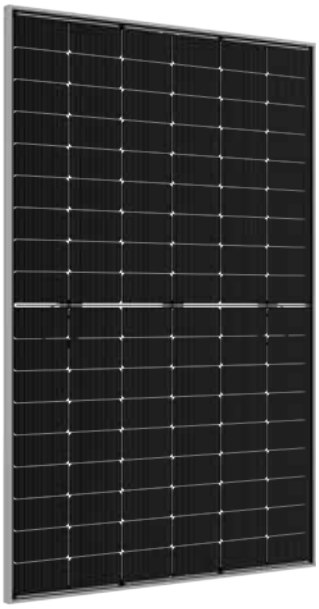
FRAME SECTION

ELECTRICAL CHARACTERISTICS



TOMMATECH M10 TOPCON SOLAR PANELS

108TNB10 450-415Wp Bifacial Topcon N-Type Solar Panels



› Panels produced with TOPCon monocrystalline cells convert sunlight with exceptional efficiency, significantly increasing energy output.
› Multi-busbar technology minimizes electrical losses across the panel.
› Thanks to the bifacial cell structure, additional power is generated from the rear side of the panels.
› The panels are highly resistant to environmental conditions and offer long-lasting, reliable performance.
› Suitable for both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Special coated glass maintains panel performance even under low light conditions.
› Built to withstand high wind and snow loads, in compliance with international standards.
› Simple installation allows for easy integration across a wide range of applications.

Product Specifications

High Conversion Efficiency

Self-Cleaning And Anti-Reflection Glass

Outstanding Low Irradiation Glass

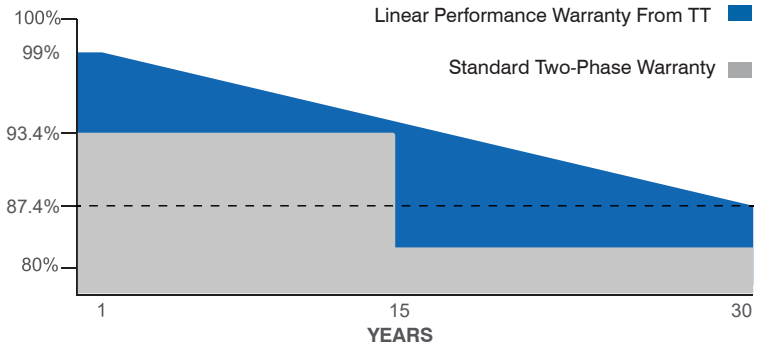
Excellent Durability

Easy Installation

0~+5W Positive Power Tolerance

15 Years Product Warranty

30 Years Performance Warranty



30 Years Performance Warranty

15 Years Product Warranty

IEC 61215, IEC 61730-1, IEC 61730-2
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT415 108TNB10	TT420 108TNB10	TT425 108TNB10	TT430 108TNB10	TT435 108TNB10	TT440 108TNB10	TT445 108TNB10	TT450 108TNB10
Peak Power (Pmax)	415 Wp	420 Wp	425 Wp	430 Wp	435 Wp	440 Wp	445 Wp	450 Wp
Module Efficiency	21.25	21.51	21.76	22.02	22.28	22.53	22.79	23.04
Maximum Power Voltage (Vmp)	31.74	31.94	32.14	32.34	32.54	32.74	32.94	33.14
Maximum Power Current (Imp)	13.08	13.15	13.23	13.30	13.37	13.44	13.51	13.58
Open Circuit Voltage (Voc)	37.71	37.91	38.11	38.31	38.51	38.71	38.91	39.11
Short Circuit Current (Isc)	13.88	13.95	14.03	14.10	14.17	14.24	14.31	14.38
Power Tolerance	0~+5W							
Maximum System Voltage	1500V DC							
Operating Temperature	-40 ~ +85°C							
Protection Class	Class II							
Maximum Series Fuse Rating	25A							
MECHANICAL SPECIFICATIONS								
Cell Dimensions(mm)	182x91							
Cells per Module(pcs)	108 (6x18)							
Weight(kg)	21.45							
Panel Dimensions(mm)	1722x1134x30							
Max. Wind/Snow Load(Pa)	2400/5400							
Junction Box	IP68							
Junction Box Cable Length(mm)	300-1600							

REARSIDE POWER GAIN

Rear Power Gain	%5	10%	15%	20%	20%
Maximum Power (Pmax)	467.25	489.50	511.75	534.00	556.25
Short Circuit Current (Isc)	15.03	15.75	16.46	17.18	17.89
Open Circuit Voltage (Voc)	38.71	38.91	38.91	38.91	38.91
Maximum Power Current (Imp)	14.19	14.86	15.54	16.21	16.89
Maximum Power Voltage (Vmp)	32.94	32.94	32.94	32.94	32.94

(445W Front Power Referenced)

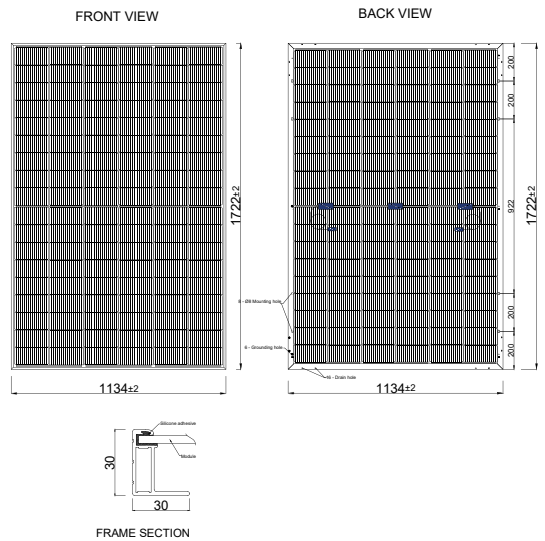
PACKING CONFIGURATION

Container	40' HC
Pieces per Pallet	35
Pieces per Container	910
Pallet Per Container	26

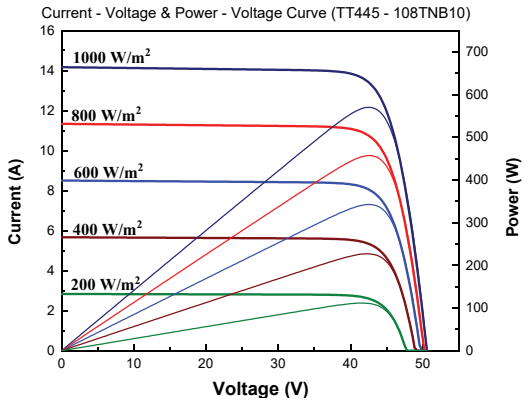
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.040%/°C
Temp. Coeff. of (Voc)	-0.260%/°C
Temp. Coeff. of (Pmax)	-0.30%/°C

PHYSICAL CHARACTERISTICS

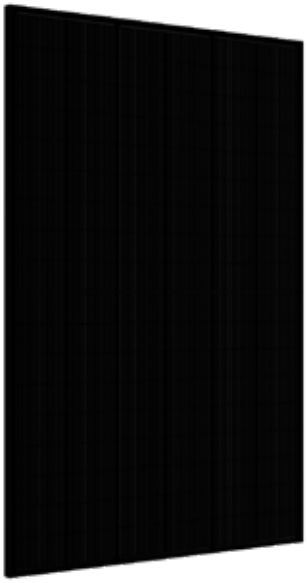


ELECTRICAL CHARACTERISTICS



TOMMATECH M10 TOPCON SOLAR PANELS

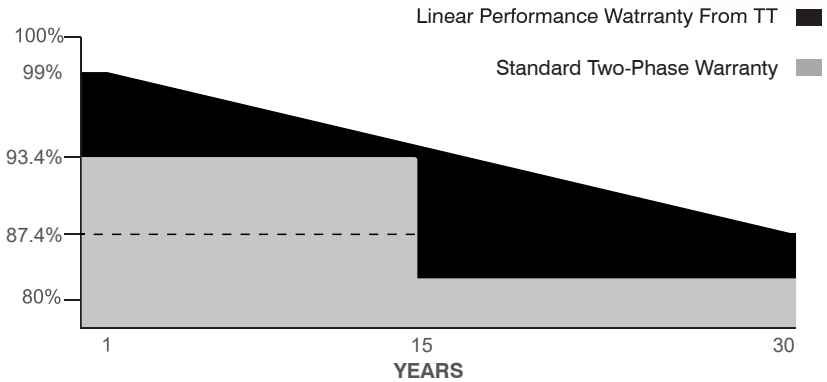
108TNFB10 450-415Wp Dark Series Topcon N-Type Solar Panels



› Panels produced with TOPCon monocrystalline cells convert sunlight with high efficiency, significantly increasing energy output.
› Multi-busbar technology reduces electrical losses within the panel, enhancing overall performance.
› Designed to withstand environmental stress, these panels offer long-term reliability and durability.
› Suitable for both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Thanks to specially coated glass, the panels maintain strong performance even in low-light conditions.
› Built to endure high wind and snow loads, in line with international standards.
› Quick and easy installation, adaptable to various applications.
› The sleek black design offers a modern and aesthetically refined appearance.

Product Specifications

- **High Conversion Efficiency**
- **Self-Cleaning And Anti-Reflection Glass**
- **Outstanding Low Irradiation Glass**
- **Excellent Durability**
- **Easy Installation**
- **0~+5W Positive Power Tolerance** (0~+5W)
- **15 Years Product Warranty** (15)
- **30 Years Performance Warranty** (30)



30 Years Performance Warranty **15 Years Product Warranty**

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
IEC 61701 SALT MIST CORROSION
IEC 62716 AMMONIA CORROSION
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT415 108TNFB10	TT420 108TNFB10	TT425 108TNFB10	TT430 108TNFB10	TT435 108TNFB10	TT440 108TNFB10	TT445 108TNFB10	TT450 108TNFB10
Peak Power (Pmax)	415 Wp	420 Wp	425 Wp	430 Wp	435 Wp	440 Wp	445 Wp	450 Wp
Module Efficiency	21.25	21.51	21.76	22.02	22.28	22.53	22.79	23.04
Maximum Power Voltage (Vmp)	31.74	31.94	32.14	32.34	32.54	32.74	32.94	33.14
Maximum Power Current (Imp)	13.08	13.15	13.23	13.30	13.37	13.44	13.51	13.58
Open Circuit Voltage (Voc)	37.71	37.91	38.11	38.31	38.51	38.71	38.91	39.11
Short Circuit Current (Isc)	13.88	13.95	14.03	14.10	14.17	14.24	14.31	14.38
Power Tolerance	0~+5W							
Maximum System Voltage	1500V DC							
Operating Temperature	-40 ~ +85°C							
Protection Class	Class II							
Maximum Series Fuse Rating	25A							
MECHANICAL SPECIFICATIONS								
Cell Dimensions(mm)	182x91							
Cells per Module(pcs)	108 (6x18)							
Weight(kg)	21.45							
Panel Dimensions(mm)	1722x1134x30							
Max. Wind/Snow Load(Pa)	2400/5400							
Junction Box	IP68							
Junction Box Cable Length(mm)	300-1600							

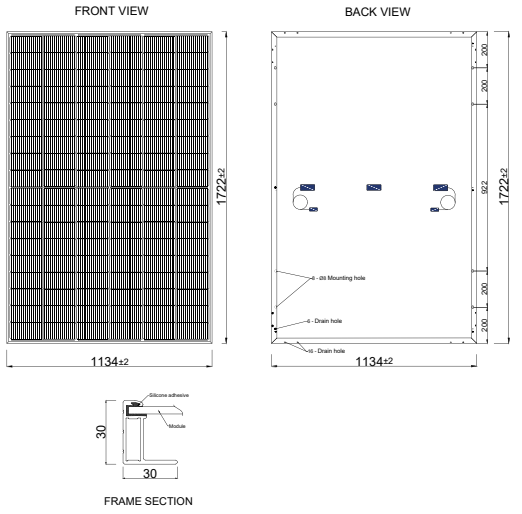
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.040%/°C
Temp. Coeff. of (Voc)	-0.260%/°C
Temp. Coeff. of (Pmax)	-0.30%/°C

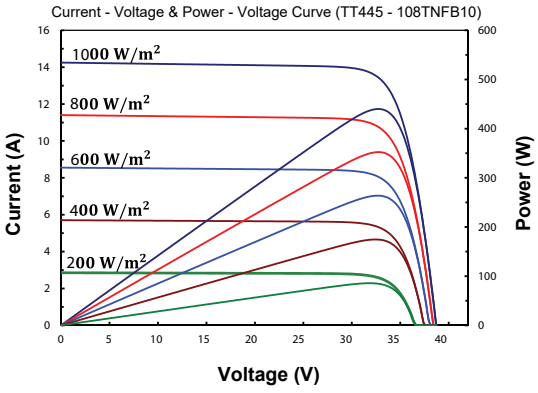
PACKING CONFIGURATION

Container	40' HC
Pieces per Pallet	35
Pieces per Container	910
Pallet Per Container	26

PHYSICAL CHARACTERISTICS



ELECTRICAL CHARACTERISTICS



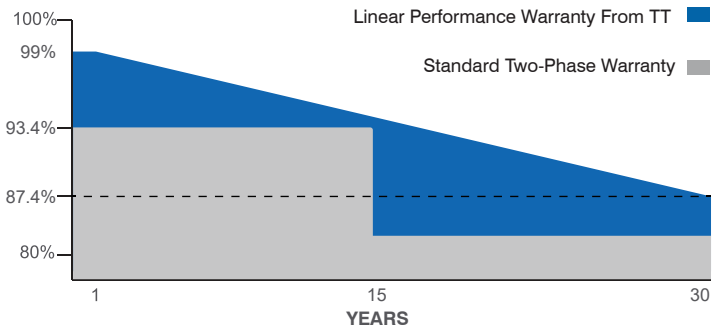
TOMMATECH M10 TOPCON SOLAR PANELS

144TN10 595-570Wp Topcon N-Type Solar Panels

› Panels produced with TOPCon monocrystalline cells convert sunlight with high efficiency, significantly enhancing energy generation.
› Multi-busbar technology minimizes electrical losses across the panel, improving output.
› Designed for resistance to environmental factors, ensuring long-lasting and reliable operation.
› Suitable for both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Special coated glass helps maintain consistent performance even under low irradiation conditions.
› Built to endure high wind and snow loads, meeting international durability standards.
› Easy to install and easily adaptable to various application areas.

Product Specifications

- **High Conversion Efficiency**
- **Self-Cleaning And Anti-Reflection Glass**
- **Outstanding Low Irradiation Glass**
- **Excellent Durability**
- **Easy Installation**
- **0~+5W Positive Power Tolerance** (0~+5W)
- **15 Years Product Warranty** (15)
- **30 Years Performance Warranty** (30)



30 Years Performance Warranty 15 Years Product Warranty

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT570 144TN10	TT575 144TN10	TT580 144TN10	TT585 144TN10	TT590 144TN10	TT595 144TN10
Peak Power (Pmax)	570 Wp	575 Wp	580 Wp	585 Wp	590 Wp	595 Wp
Module Efficiency	22.07	22.26	22.45	22.65	22.84	23.03
Maximum Power Voltage (Vmp)	42.55	42.75	42.95	43.15	43.35	43.55
Maximum Power Current (Imp)	13.40	13.46	13.51	13.56	13.62	13.67
Open Circuit Voltage (Voc)	50.58	50.78	50.98	51.18	51.38	51.58
Short Circuit Current (Isc)	14.17	14.23	14.31	14.38	14.45	14.53
Power Tolerance	0~+5W					
Maximum System Voltage	1500V DC					
Operating Temperature	-40 ~ +85°C					
Protection Class	Class II					
Maximum Series Fuse Rating	25A					
MECHANICAL SPECIFICATIONS						
Cell Dimensions(mm)	182 x 91					
Cells per Module(pcs)	144 (6x24)					
Weight(kg)	29.0					
Panel Dimensions(mm)	2278x1134x35					
Max. Wind/Snow Load(Pa)	2400/5400					
Junction Box	IP68					
Junction Box Cable Length(mm)	300-1600					

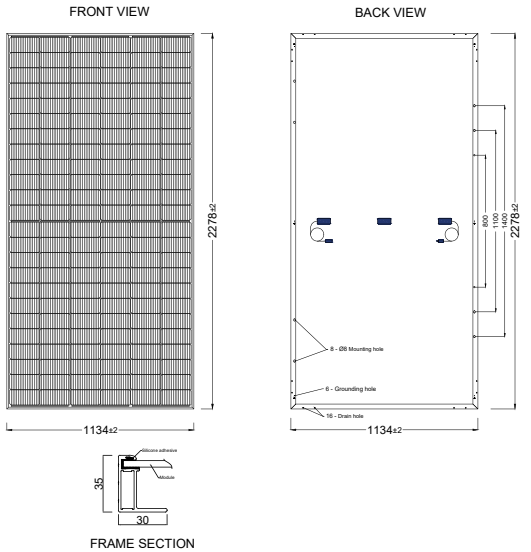
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.040%/°C
Temp. Coeff. of (Voc)	-0.260%/°C
Temp. Coeff. of (Pmax)	-0.30%/°C

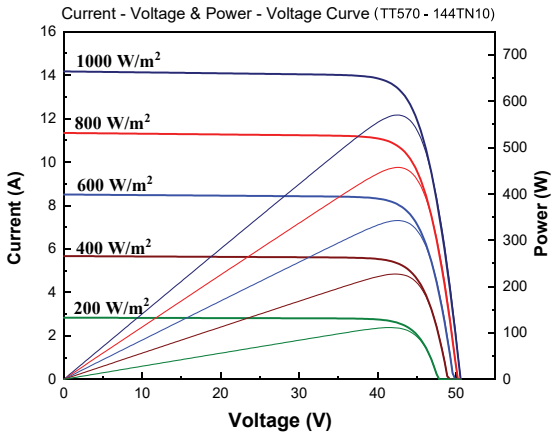
PACKING CONFIGURATION

Container	40' GP
Pieces per Pallet	31
Pieces per Container	620
Pallet Per Container	20

PHYSICAL CHARACTERISTICS

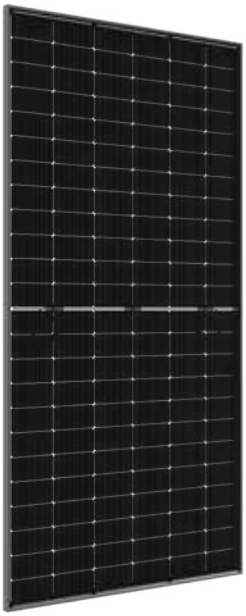


ELECTRICAL CHARACTERISTICS



TOMMATECH M10 TOPCON TOPCON SOLAR PANELS

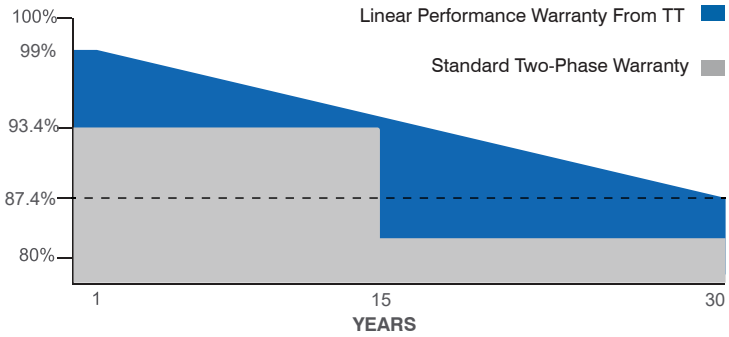
144TNB10 595-570Wp Bifacial Topcon N-Type Solar Panels



› Panels produced with TOPCon monocrystalline cells convert sunlight with high efficiency, significantly increasing energy output.
› Multi-busbar technology minimizes electrical losses across the panel.
› The bifacial cell structure allows for additional power generation from the rear side of the panel.
› Built to withstand environmental challenges, these panels offer long-lasting and reliable performance.
› Suitable for both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Special coated glass helps maintain strong performance even under low-light conditions.
› Engineered to meet high standards of resistance against wind and snow loads.
› Quick and flexible installation, suitable for various application areas.

Product Specifications

- **High Conversion Efficiency**
- **Self-Cleaning And Anti-Reflection Glass**
- **Outstanding Low Irradiation Glass**
- **Excellent Durability**
- **Easy Installation**
- **0~+5W Positive Power Tolerance** (0~+5W)
- **15 Years Product Warranty** (15)
- **30 Years Performance Warranty** (30)



30 Years Performance Warranty 15 Years Product Warranty

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT570 144TNB10	TT575 144TNB10	TT580 144TNB10	TT585 144TNB10	TT590 144TNB10	TT595 144TNB10
Peak Power (Pmax)	570 Wp	575 Wp	580 Wp	585 Wp	590 Wp	595 Wp
Module Efficiency	22.07	22.26	22.45	22.65	22.84	23.03
Maximum Power Voltage (Vmp)	42.55	42.75	42.95	43.15	43.35	43.55
Maximum Power Current (Imp)	13.40	13.46	13.51	13.56	13.62	13.67
Open Circuit Voltage (Voc)	50.58	50.78	50.98	51.18	51.38	51.58
Short Circuit Current (Isc)	14.17	14.23	14.31	14.38	14.45	14.53
Power Tolerance	0~+5W					
Maximum System Voltage	1500V DC					
Operating Temperature	-40 ~ +85°C					
Protection Class	Class II					
Maximum Series Fuse Rating	25A					
MECHANICAL SPECIFICATIONS						
Cell Dimensions(mm)	182 x 91					
Cells per Module(pcs)	144 (6x24)					
Weight(kg)	29.0					
Panel Dimensions(mm)	2278x1134x35					
Max. Wind/Snow Load(Pa)	2400/5400					
Junction Box	IP68					
Junction Box Cable Length(mm)	300-1600					

REARSIDE POWER GAIN

Rear Power Gain	%5	10%	15%	20%	20%
Maximum Power (Pmax)	598.50	627.00	655.50	684.00	712.50
Short Circuit Current (Isc)	14.86	15.55	16.24	16.92	17.61
Open Circuit Voltage (Voc)	50.68	50.77	50.86	50.94	16.68
Maximum Power Current (Imp)	14.06	14.72	15.37	16.03	42.71
Maximum Power Voltage (Vmp)	42.57	42.60	42.65	42.68	51.02

(570W Front Power Referenced)

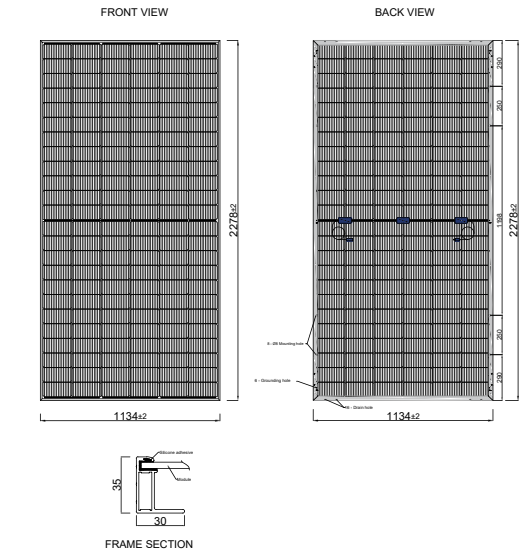
PACKING CONFIGURATION

Container	40' GP
Pieces per Pallet	31
Pieces per Container	620
Pallet Per Container	20

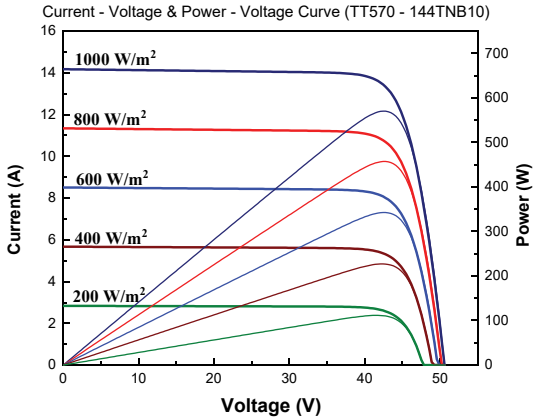
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.040%/°C
Temp. Coeff. of (Voc)	-0.260%/°C
Temp. Coeff. of (Pmax)	-0.30%/°C

PHYSICAL CHARACTERISTICS



ELECTRICAL CHARACTERISTICS



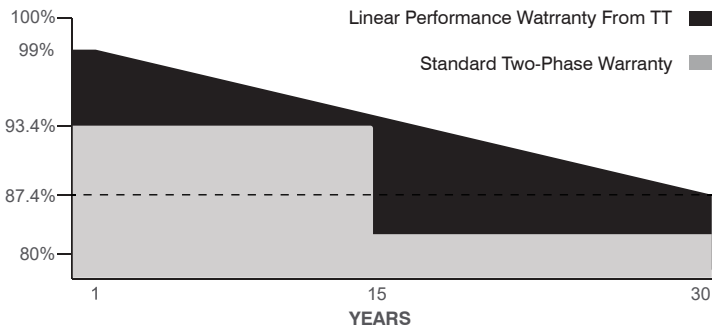
TOMMATECH M10 TOPCON SOLAR PANELS

144TNFB10 595-570Wp Dark Series Topcon N-Type Solar Panels

› Panels produced with TOPCon monocrystalline cells convert sunlight with high efficiency, significantly enhancing energy output.
› Multi-busbar technology minimizes electrical losses within the panel.
› Designed for resistance to environmental factors, ensuring long-lasting, reliable performance.
› Suitable for both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Special coated glass ensures stable performance even under low light conditions.
› Built to meet high resistance standards against wind and snow loads.
› Easy installation, suitable for a wide range of application areas.
› The elegant black design provides a sleek and aesthetically refined appearance.

Product Specifications

- **High Conversion Efficiency**
- **Self-Cleaning And Anti-Reflection Glass**
- **Outstanding Low Irradiation Glass**
- **Excellent Durability**
- **Easy Installation**
- **0~+5W Positive Power Tolerance**
- **15 Years Product Warranty**
- **30 Years Performance Warranty**



30 Years Performance Warranty **15 Years Product Warranty**

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT570 144TNFB10	TT575 144TNFB10	TT580 144TNFB10	TT585 144TNFB10	TT590 144TNFB10	TT595 144TNFB10
Peak Power (Pmax)	570 Wp	575 Wp	580 Wp	585 Wp	590 Wp	595 Wp
Module Efficiency	22.07	22.26	22.45	22.65	22.84	23.03
Maximum Power Voltage (Vmp)	42.55	42.75	42.95	43.15	43.35	43.55
Maximum Power Current (Imp)	13.40	13.46	13.51	13.56	13.62	13.67
Open Circuit Voltage (Voc)	50.58	50.78	50.98	51.18	51.38	51.58
Short Circuit Current (Isc)	14.17	14.23	14.31	14.38	14.45	14.53
Power Tolerance	0~+5W					
Maximum System Voltage	1500V DC					
Operating Temperature	-40 ~ +85°C					
Protection Class	Class II					
Maximum Series Fuse Rating	25A					
MECHANICAL SPECIFICATIONS						
Cell Dimensions(mm)	182 x 91					
Cells per Module(pcs)	144 (6x24)					
Weight(kg)	29.0					
Panel Dimensions(mm)	2278x1134x35					
Max. Wind/Snow Load(Pa)	2400/5400					
Junction Box	IP68					
Junction Box Cable Length(mm)	300-1600					

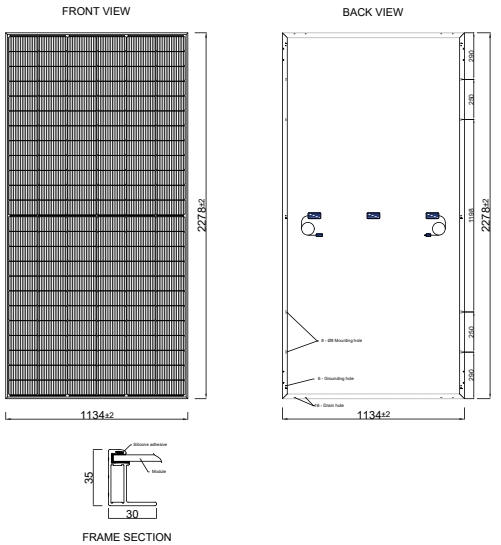
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.040%/°C
Temp. Coeff. of (Voc)	-0.260%/°C
Temp. Coeff. of (Pmax)	-0.30%/°C

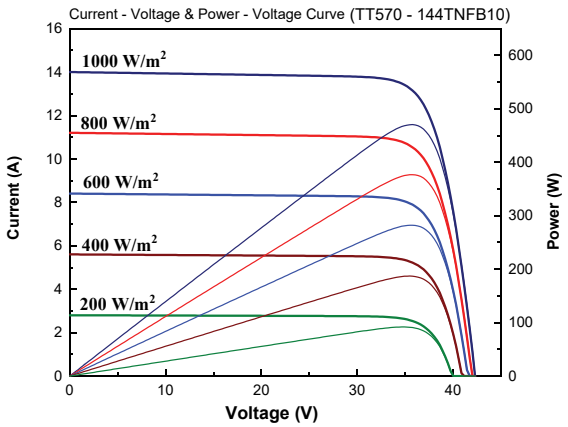
PACKING CONFIGURATION

Container	40' GP
Pieces per Pallet	31
Pieces per Container	620
Pallet Per Container	20

PHYSICAL CHARACTERISTICS

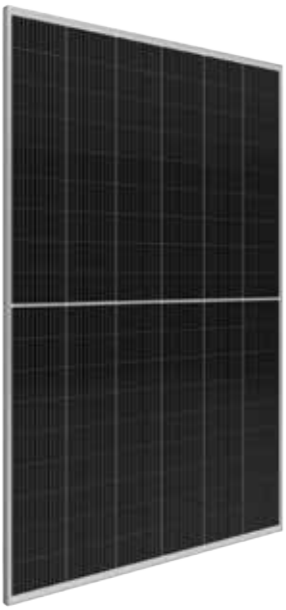


ELECTRICAL CHARACTERISTICS



TOMMATECH M12 PERC MONOCRYSTALLINE SOLAR PANELS

108PM12 550-530Wp Perc Monocrystalline Solar Panels



› Developed for use in both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Multi-busbar cell technology minimizes electrical losses across the panel.
› PERC technology increases overall cell efficiency.
› Half-cut cell design helps reduce performance loss in partially shaded conditions.
› Special coated glass ensures consistent performance under low-light conditions.
› Built to withstand high wind and snow loads, meeting rigorous international standards.
› Offers easy installation, adaptable to a wide variety of applications.
› Designed to maximize system efficiency and provide a durable, long-term solution for solar energy needs.

Product Specifications

High Conversion Efficiency

Self-Cleaning And Anti-Reflection Glass

Outstanding Low Irradiation Glass

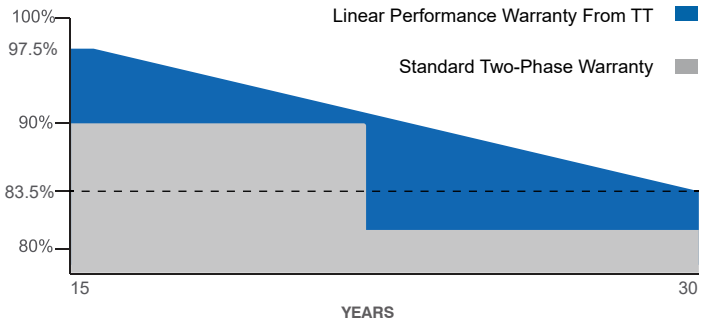
Excellent Durability

Easy Installation

0~+5W Positive Power Tolerance

15 Years Product Warranty

30 Years Performance Warranty



30 Years Performance Warranty 12 Years Product Warranty

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT530 108PM12	TT535 108PM12	TT540 108PM12	TT545 108PM12	TT550 108PM12
Peak Power (Pmax)	530 Wp	535 Wp	540 Wp	545 Wp	550 Wp
Module Efficiency	20.70	20.90	21.09	21.29	21.48
Maximum Power Voltage (Vmp)	30.7	30.9	31.1	31.3	31.5
Maximum Power Current (Imp)	17.27	17.31	17.36	17.42	17.46
Open Circuit Voltage (Voc)	37.0	37.2	37.5	37.7	37.9
Short Circuit Current (Isc)	18.28	18.33	18.38	18.45	18.49
Power Tolerance	0~+5W				
Maximum System Voltage	1500V DC				
Operating Temperature	-40 ~ +85°C				
Protection Class	Class II				
Maximum Series Fuse Rating	25A				
MECHANICAL SPECIFICATIONS					
Cell Dimensions(mm)	210x105				
Cells per Module(pcs)	108 (6x18)				
Weight(kg)	28.5				
Panel Dimensions(mm)	1965x1303x35				
Max. Wind/Snow Load(Pa)	2400/5400				
Junction Box	IP68				
Junction Box Cable Length(mm)	300-1600				

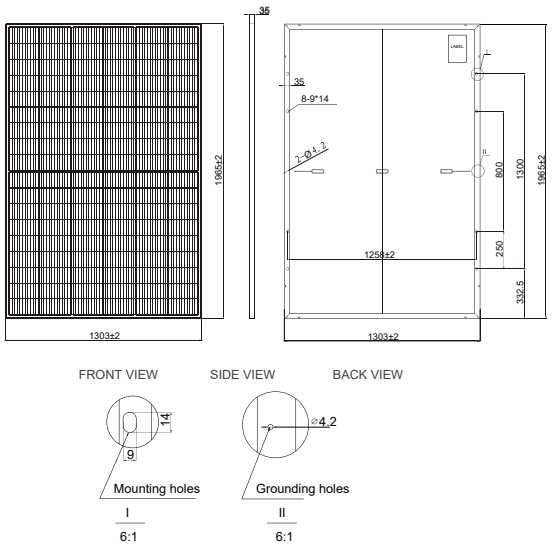
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.05%/°C
Temp. Coeff. of (Voc)	-0.27%/°C
Temp. Coeff. of (Pmax)	-0.35%/°C

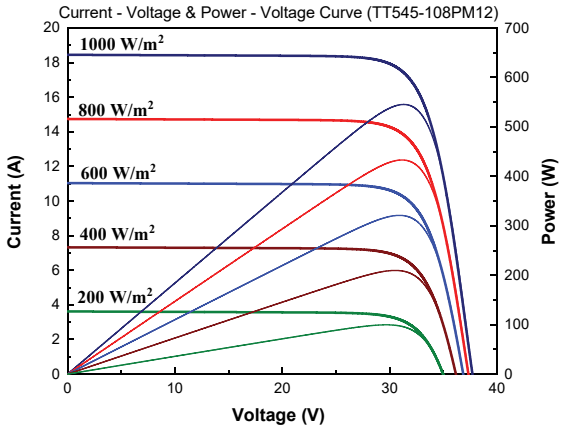
PACKING CONFIGURATION

Container	40' GP
Pieces per Pallet	31
Pieces per Container	480
Pallet Per Container	16

PHYSICAL CHARACTERISTICS



ELECTRICAL CHARACTERISTICS



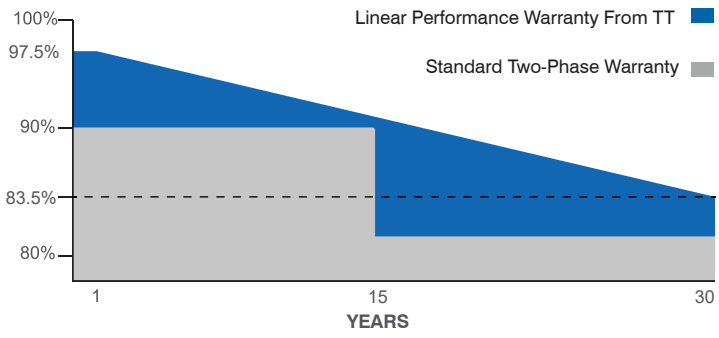
TOMMATECH M12 PERC MONOCRYSTALLINE SOLAR PANELS

108PMB12 550-530Wp Bifacial Perc Monocrystalline Solar Panels

› Developed for both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Multi-busbar cell technology minimizes electrical losses and ensures high energy efficiency.
› PERC technology improves cell performance, while the bifacial cell design enables extra energy generation from the rear side of the panel.
› Half-cut cell construction ensures minimal power loss in shaded conditions.
› Designed to meet high durability standards against wind and snow loads.
› Allows for easy installation and seamless integration across a wide range of applications.
› These panels offer a highly efficient and reliable solution, making them ideal for solar energy projects that demand long-term performance.

Product Specifications

- **High Conversion Efficiency**
- **Self-Cleaning And Anti-Reflection Glass**
- **Outstanding Low Irradiation Glass**
- **Excellent Durability**
- **Easy Installation**
- **0~+5W Positive Power Tolerance**
- **15 Years Product Warranty**
- **30 Years Performance Warranty**



IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
IEC 61701 SALT MIST CORROSION
IEC 62716 AMMONIA CORROSION
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT530 108PMB12	TT535 108PMB12	TT540 108PMB12	TT545 108PMB12	TT550 108PMB12
Peak Power (Pmax)	530 Wp	535 Wp	540 Wp	545 Wp	550 Wp
Module Efficiency	20.70	20.90	21.09	21.29	21.48
Maximum Power Voltage (Vmp)	30.7	30.9	31.1	31.3	31.5
Maximum Power Current (Imp)	17.27	17.31	17.36	17.42	17.46
Open Circuit Voltage (Voc)	37.0	37.2	37.5	37.7	37.9
Short Circuit Current (Isc)	18.28	18.33	18.38	18.45	18.49
Power Tolerance	0~+5W				
Maximum System Voltage	1500V DC				
Operating Temperature	-40 ~ +85°C				
Protection Class	Class II				
Maximum Series Fuse Rating	25A				
MECHANICAL SPECIFICATIONS					
Cell Dimensions(mm)	210x105				
Cells per Module(pcs)	108 (6x18)				
Weight(kg)	28.5				
Panel Dimensions(mm)	1965x1303x35				
Max. Wind/Snow Load(Pa)	2400/5400				
Junction Box	IP68				
Junction Box Cable Length(mm)	300-1600				

REARSIDE POWER GAIN

Rear Power Gain	%5	10%	15%	20%	20%
Maximum Power (Pmax)	572.25	599.50	626.75	654.00	681.25
Short Circuit Current (Isc)	19.34	20.24	21.13	22.03	22.93
Open Circuit Voltage (Voc)	37.78	37.86	37.93	38.00	38.06
Maximum Power Current (Imp)	18.26	19.11	19.96	20.82	21.67
Maximum Power Voltage (Vmp)	31.34	31.37	31.39	31.42	31.44

(545W Front Power Referenced)

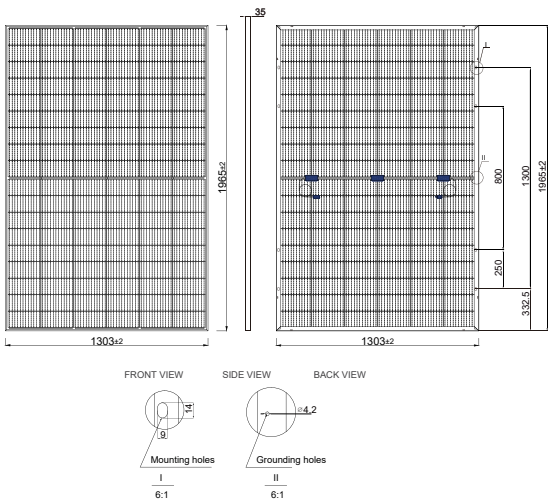
PACKING CONFIGURATION

Container	40' GP
Pieces per Pallet	31
Pieces per Container	403
Pallet Per Container	13

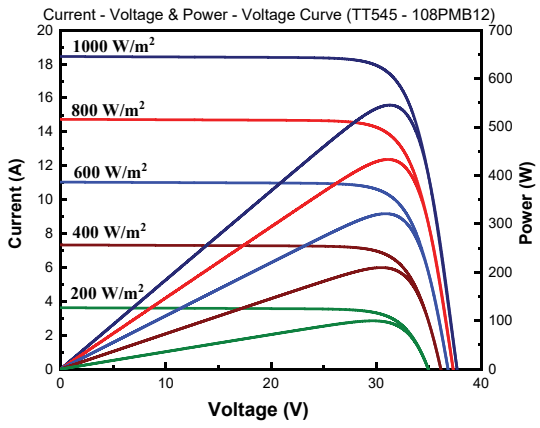
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.05%/°C
Temp. Coeff. of (Voc)	-0.27%/°C
Temp. Coeff. of (Pmax)	-0.35%/°C

PHYSICAL CHARACTERISTICS



ELECTRICAL CHARACTERISTICS



TOMMATECH M12 PERC MONOCRYSTALLINE SOLAR PANELS

108PMFB12 550-530Wp Dark Series Perc Monocrystalline Solar Panels

› Designed for use in both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Multi-busbar cell technology minimizes electrical losses and boosts overall efficiency.
› PERC technology enhances cell performance.
› Half-cut cell design ensures minimal efficiency loss in shaded conditions.
› Special coated glass helps maintain performance even under low-light conditions.
› Engineered to withstand high wind and snow loads according to international standards.
› Allows for quick and easy installation in various application areas.
› Developed to increase the efficiency of solar power systems and provide a durable, long-term solution.
› The elegant black design delivers a sleek and modern aesthetic.

Product Specifications

High Conversion Efficiency

Self-Cleaning And Anti-Reflection Glass

Outstanding Low Irradiation Glass

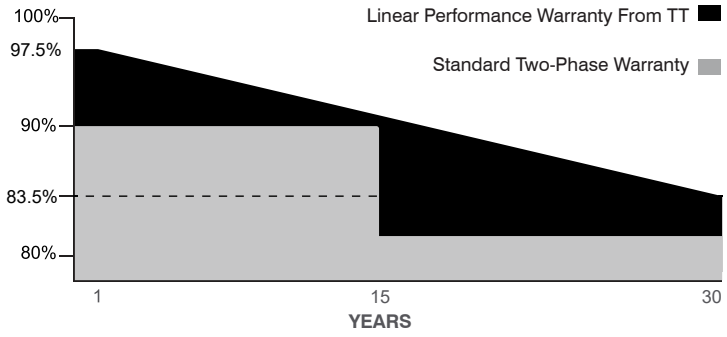
Excellent Durability

Easy Installation

0~+5W Positive Power Tolerance

15 Years Product Warranty

30 Years Performance Warranty



30 Years Performance Warranty

15 Years Product Warranty

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
IEC 61701 SALT MIST CORROSION
IEC 62716 AMMONIA CORROSION
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT530 108PMFB12	TT535 108PMFB12	TT540 108PMFB12	TT545 108PMFB12	TT550 108PMFB12
Peak Power (Pmax)	530 Wp	535 Wp	540 Wp	545 Wp	550 Wp
Module Efficiency	20.70	20.90	21.09	21.29	21.48
Maximum Power Voltage (Vmp)	30.7	30.9	31.1	31.3	31.5
Maximum Power Current (Imp)	17.27	17.31	17.36	17.42	17.46
Open Circuit Voltage (Voc)	37.0	37.2	37.5	37.7	37.9
Short Circuit Current (Isc)	18.28	18.33	18.38	18.45	18.49
Power Tolerance	0~+5W				
Maximum System Voltage	1500V DC				
Operating Temperature	-40 ~ +85°C				
Protection Class	Class II				
Maximum Series Fuse Rating	25A				
MECHANICAL SPECIFICATIONS					
Cell Dimensions(mm)	210x105				
Cells per Module(pcs)	108 (6x18)				
Weight(kg)	28.5				
Panel Dimensions(mm)	1965x1303x35				
Max. Wind/Snow Load(Pa)	2400/5400				
Junction Box	IP68				
Junction Box Cable Length(mm)	300-1600				

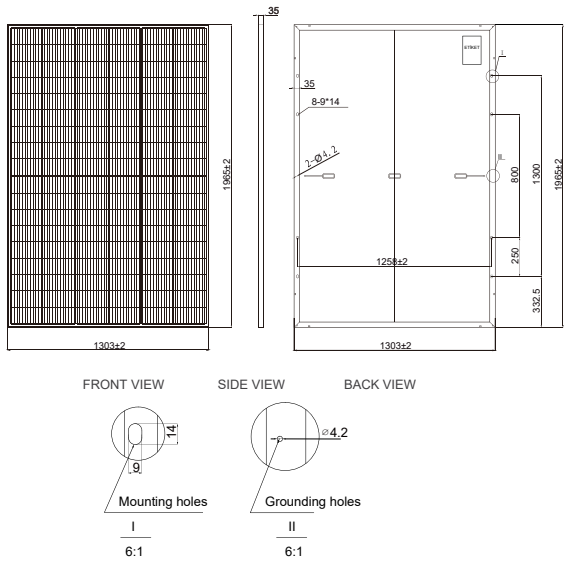
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.05%/°C
Temp. Coeff. of (Voc)	-0.27%/°C
Temp. Coeff. of (Pmax)	-0.35%/°C

PACKING CONFIGURATION

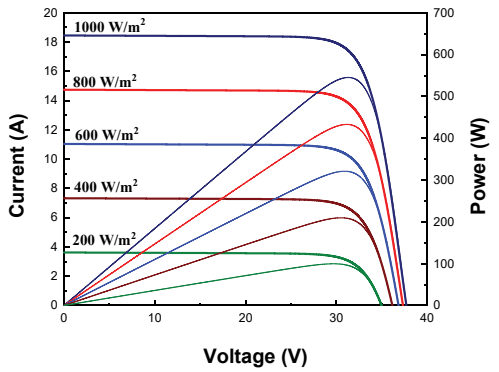
Container	40' GP
Pieces per Pallet	31
Pieces per Container	480
Pallet Per Container	16

PHYSICAL CHARACTERISTICS



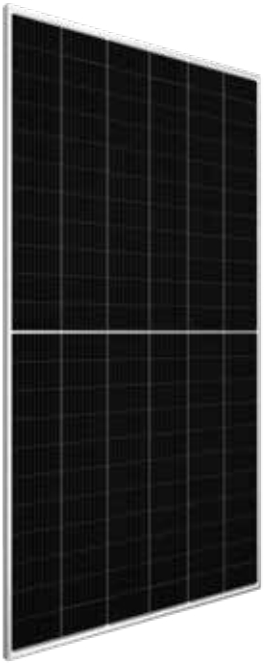
ELECTRICAL CHARACTERISTICS

Current - Voltage & Power - Voltage Curve (TT540-108PMFB12)



TOMMATECH M12 PERC MONOCRYSTALLINE SOLAR PANELS

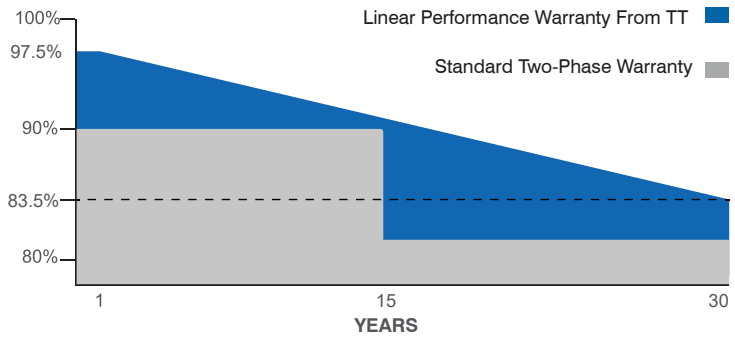
132PM12 675-650Wp Perc Monocrystalline Solar Panels



› Developed for use in both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Multi-busbar cell technology minimizes electrical losses and enhances efficiency.
› PERC technology improves overall cell performance.
› Half-cut cell technology ensures minimal power loss in shaded conditions.
› Special coated glass maintains performance under low irradiation conditions.
› Designed to meet high standards of resistance to wind and snow loads.
› Offers easy and flexible installation.
› These panels are engineered to maximize solar system efficiency and deliver a durable, long-lasting solution.

Product Specifications

- **High Conversion Efficiency**
- **Self-Cleaning And Anti-Reflection Glass**
- **Outstanding Low Irradiation Glass**
- **Excellent Durability**
- **Easy Installation**
- **0~+5W Positive Power Tolerance** (0~+5W)
- **15 Years Product Warranty** (15)
- **30 Years Performance Warranty** (30)



30 Years Performance Warranty 15 Years Product Warranty

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
IEC 61701 SALT MIST CORROSION
IEC 62716 AMMONIA CORROSION
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT650 132PM12	TT655 132PM12	TT660 132PM12	TT665 132PM12	TT670 132PM12	TT675 132PM12
Peak Power (Pmax)	650 Wp	655 Wp	660 Wp	665 Wp	670Wp	675Wp
Module Efficiency	20.92	21.09	21.25	21.41	21.57	21.73
Maximum Power Voltage (Vmp)	37.50	37.70	31.90	38.10	38.30	38.50
Maximum Power Current (Imp)	17.34	17.38	17.42	17.46	17.50	17.54
Open Circuit Voltage (Voc)	45.20	45.40	45.60	45.80	46.00	46.20
Short Circuit Current (Isc)	18.35	18.39	18.44	18.48	18.51	18.56
Power Tolerance	0~+5W					
Maximum System Voltage	1500V DC					
Operating Temperature	-40 ~ +85°C					
Protection Class	Class II					
Maximum Series Fuse Rating	25A					
MECHANICAL SPECIFICATIONS						
Cell Dimensions(mm)	210x105					
Cells per Module(pcs)	132 (6x22)					
Weight(kg)	34.5					
Panel Dimensions(mm)	2384x1303x35					
Max. Wind/Snow Load(Pa)	2400/5400					
Junction Box	IP68					
Junction Box Cable Length(mm)	300-1600					

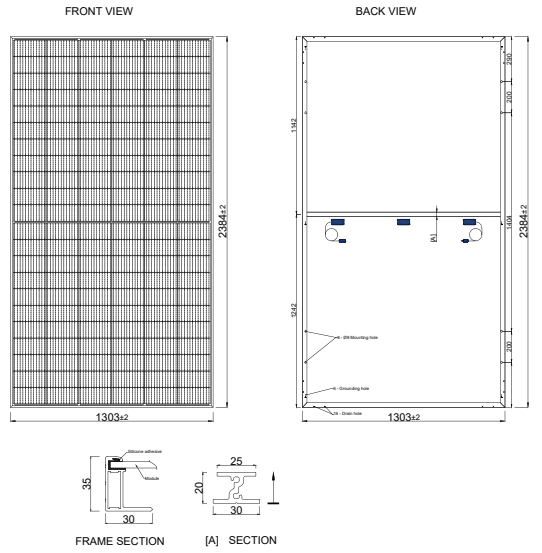
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.040%/°C
Temp. Coeff. of (Voc)	-0.260%/°C
Temp. Coeff. of (Pmax)	-0.340%/°C

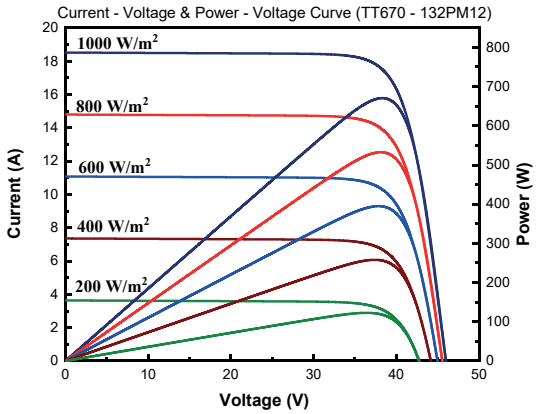
PACKING CONFIGURATION

Container	40' GP
Pieces per Pallet	31
Pieces per Container	527
Pallet Per Container	17

PHYSICAL CHARACTERISTICS

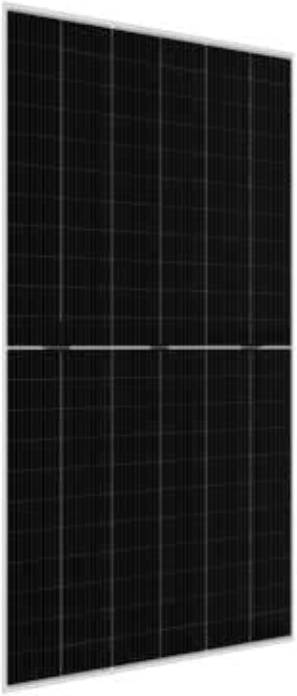


ELECTRICAL CHARACTERISTICS



TOMMATECH M12 PERC MONOCRYSTALLINE SOLAR PANELS

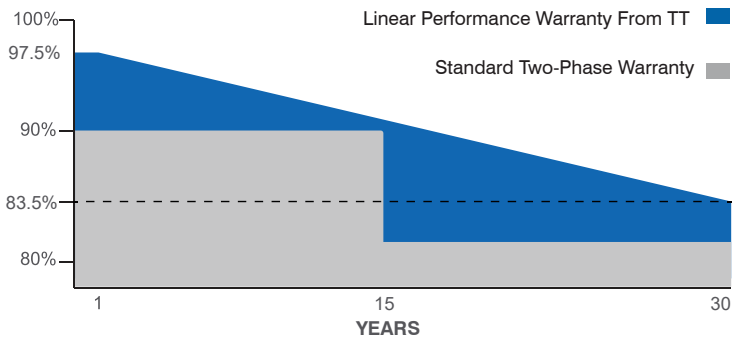
132PMB12 675-650Wp Bifacial Perc Monocrystalline Solar Panels



› Developed for use in both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Multi-busbar cell technology minimizes electrical losses, ensuring high energy efficiency.
› PERC technology boosts cell performance, while the bifacial cell design enables additional power generation from the rear side of the panel.
› Half-cut cell structure reduces efficiency loss in cases of shading.
› Designed to meet high durability standards against wind and snow loads.
› Enables easy installation, with flexible integration into various application areas.
› These panels offer a highly efficient and durable solution, making them an excellent choice for solar energy projects.

Product Specifications

- **High Conversion Efficiency**
- **Self-Cleaning And Anti-Reflection Glass**
- **Outstanding Low Irradiation Glass**
- **Excellent Durability**
- **Easy Installation**
- **0~+5W Positive Power Tolerance**
- **15 Years Product Warranty**
- **30 Years Performance Warranty**



30 Years Performance Warranty 15 Years Product Warranty

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
IEC 61701 SALT MIST CORROSION
IEC 62716 AMMONIA CORROSION
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT650 132PMB12	TT655 132PMB12	TT660 132PMB12	TT665 132PMB12	TT670 132PMB12	TT675 132PMB12
Peak Power (Pmax)	650 Wp	655 Wp	660 Wp	665 Wp	670Wp	675Wp
Module Efficiency	20.92	21.09	21.25	21.41	21.57	21.73
Maximum Power Voltage (Vmp)	37.50	37.70	31.90	38.10	38.30	38.50
Maximum Power Current (Imp)	17.34	17.38	17.42	17.46	17.50	17.54
Open Circuit Voltage (Voc)	45.20	45.40	45.60	45.80	46.00	46.20
Short Circuit Current (Isc)	18.35	18.39	18.44	18.48	18.51	18.56
Power Tolerance	0~+5W					
Maximum System Voltage	1500V DC					
Operating Temperature	-40 ~ +85°C					
Protection Class	Class II					
Maximum Series Fuse Rating	25A					
MECHANICAL SPECIFICATIONS						
Cell Dimensions(mm)	210x105					
Cells per Module(pcs)	132 (6x22)					
Weight(kg)	34.5					
Panel Dimensions(mm)	2384x1303x35					
Max. Wind/Snow Load(Pa)	2400/5400					
Junction Box	IP68					
Junction Box Cable Length(mm)	300-1600					

REARSIDE POWER GAIN

Rear Power Gain	%5	10%	15%	20%	20%
Maximum Power (Pmax)	693	726	759	792	825
Short Circuit Current (Isc)	19.32	20.24	21.05	21.96	22.88
Open Circuit Voltage (Voc)	45.60	45.60	45.80	45.80	45.80
Maximum Power Current (Imp)	18.19	19.06	19.82	20.68	21.54
Maximum Power Voltage (Vmp)	38.10	38.10	38.30	38.30	38.30

(660W Front Power Referenced)

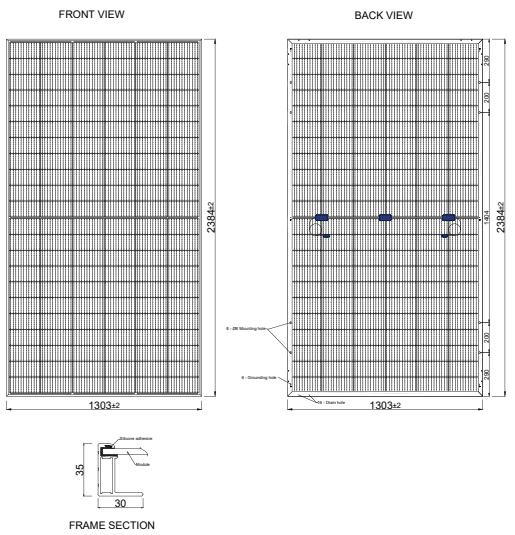
PACKING CONFIGURATION

Container	40' GP
Pieces per Pallet	31
Pieces per Container	527
Pallet Per Container	17

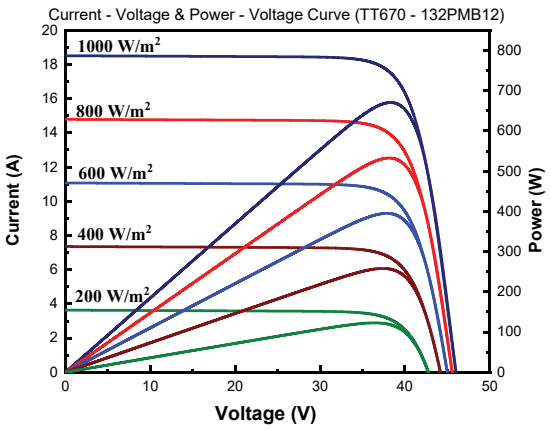
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.040%/°C
Temp. Coeff. of (Voc)	-0.260%/°C
Temp. Coeff. of (Pmax)	-0.340%/°C

PHYSICAL CHARACTERISTICS



ELECTRICAL CHARACTERISTICS



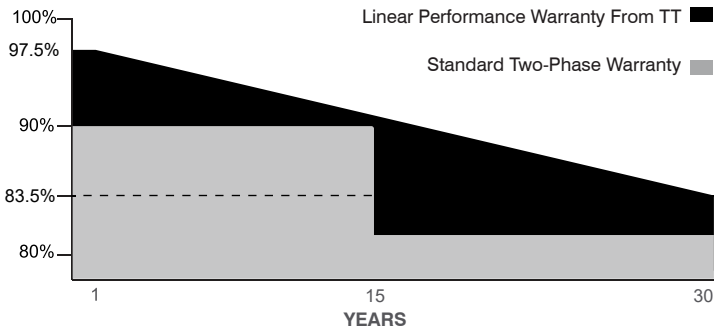
TOMMATECH M12 PERC MONOCRYSTALLINE SOLAR PANELS

132PMFB12 675-650Wp Dark Series Perc Monocrystalline Solar Panels

› Developed for use in both on-grid (grid-connected) and off-grid (standalone) solar energy systems.
› Multi-busbar cell technology minimizes electrical losses and enhances performance.
› PERC technology increases cell efficiency.
› Half-cut cell design helps reduce power loss in shaded conditions.
› Special coated glass maintains performance even under low-light conditions.
› Built to meet high resistance standards for wind and snow loads.
› Offers easy installation across a wide range of applications.
› Designed to increase the efficiency of solar power systems and provide a durable, long-term solution.
› The sleek black design delivers a stylish and aesthetically refined appearance.

Product Specifications

- **High Conversion Efficiency**
- **Self-Cleaning And Anti-Reflection Glass**
- **Outstanding Low Irradiation Glass**
- **Excellent Durability**
- **Easy Installation**
- **0~+5W Positive Power Tolerance** (0~+5W)
- **15 Years Product Warranty** (15)
- **30 Years Performance Warranty** (30)



30 Years Performance Warranty **15 Years Product Warranty**

IEC 61215, IEC 61730-1, IEC 61730-2
IEC 62804 PID (POTENTIAL INDUCED DEGRADATION)
IEC 61701 SALT MIST CORROSION
IEC 62716 AMMONIA CORROSION
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

MODEL TYPE	TT650 132PMFB12	TT655 132PMFB12	TT660 132PMFB12	TT665 132PMFB12	TT670 132PMFB12	TT675 132PMFB12
Peak Power (Pmax)	650 Wp	655 Wp	660 Wp	665 Wp	670Wp	675Wp
Module Efficiency	20.92	21.09	21.25	21.41	21.57	21.73
Maximum Power Voltage (Vmp)	37.50	37.70	31.90	38.10	38.30	38.50
Maximum Power Current (Imp)	17.34	17.38	17.42	17.46	17.50	17.54
Open Circuit Voltage (Voc)	45.20	45.40	45.60	45.80	46.00	46.20
Short Circuit Current (Isc)	18.35	18.39	18.44	18.48	18.51	18.56
Power Tolerance	0~+5W					
Maximum System Voltage	1500V DC					
Operating Temperature	-40 ~ +85°C					
Protection Class	Class II					
Maximum Series Fuse Rating	25A					
MECHANICAL SPECIFICATIONS						
Cell Dimensions(mm)	210x105					
Cells per Module(pcs)	132 (6x22)					
Weight(kg)	34.5					
Panel Dimensions(mm)	2384x1303x35					
Max. Wind/Snow Load(Pa)	2400/5400					
Junction Box	IP68					
Junction Box Cable Length(mm)	300-1600					

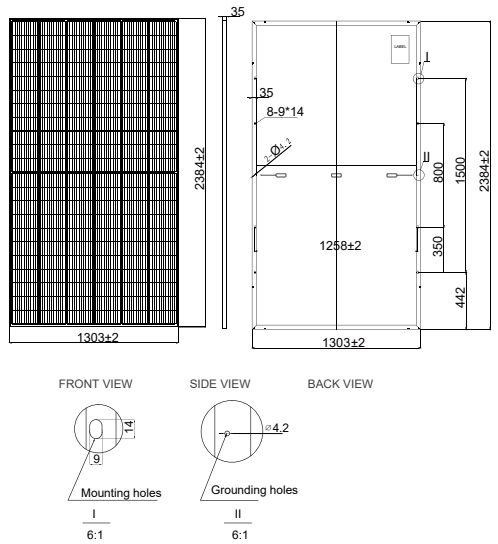
TEMPERATURE CHARACTERISTICS

Temp. Coeff. of (Isc)	0.040%/°C
Temp. Coeff. of (Voc)	-0.260%/°C
Temp. Coeff. of (Pmax)	-0.340%/°C

PACKING CONFIGURATION

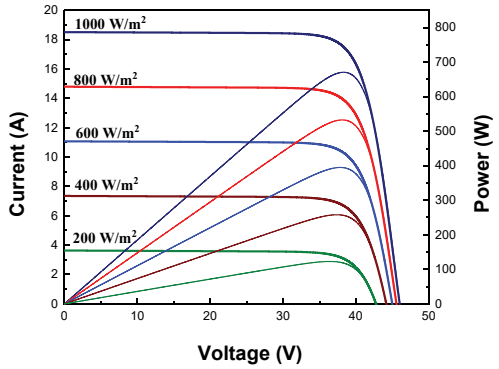
Container	40' GP
Pieces per Pallet	31
Pieces per Container	527
Pallet Per Container	17

PHYSICAL CHARACTERISTICS



ELECTRICAL CHARACTERISTICS

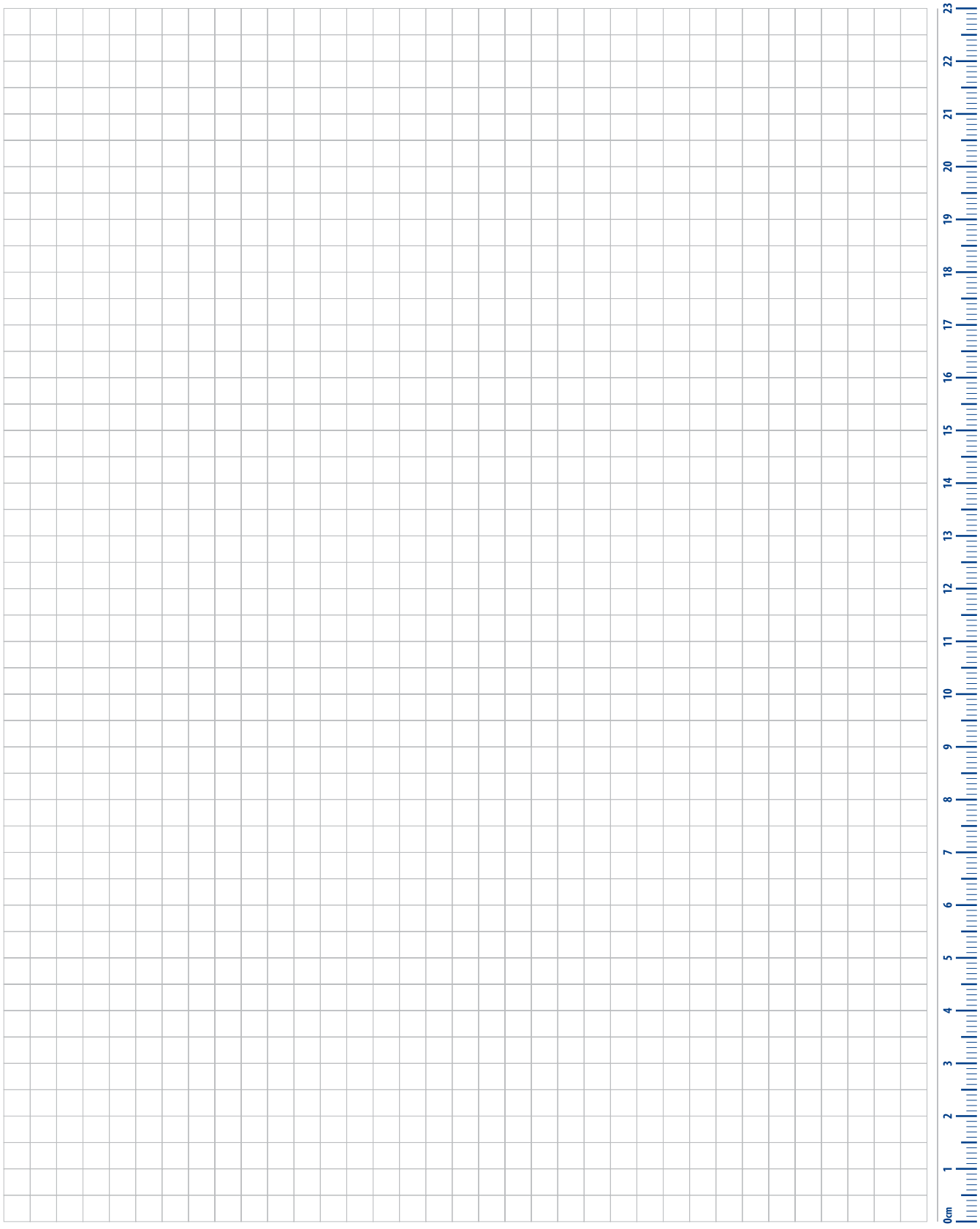
Current - Voltage & Power - Voltage Curve (TT670-132PMFB12)



TOMMATECH GmbH

GERMAN-based company

Date:.....



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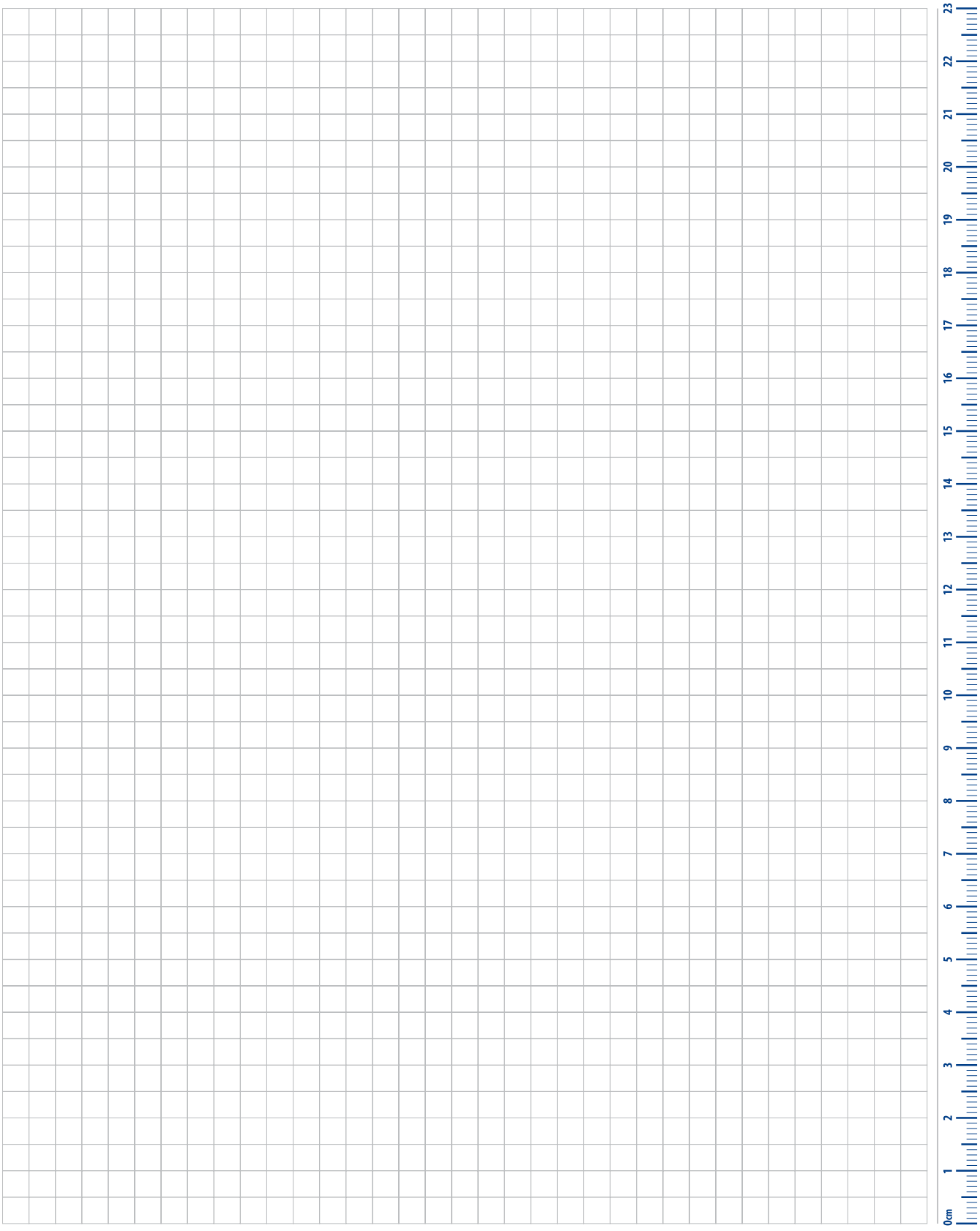
TOMMATECH GmbH

GERMAN-based company

Date:.....



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