HT Solar Enerji A.Ş.
Aydınlı Sb Dist, 1. Sokak No:1 - 34957
Tuzla/İstanbul/Türkiye
Tel: +90 216 504 72 73

Company website:
www.ht-saae.com
www.htsolar.com.tr

Shanghai Aerospace Automobile
Electromechanical Co., Ltd.

Add: F19, South Tower of Astronaut Building,
No 222, Caoxi Rd,
Shanghai 200235,China, 200235

Tel:0086-21-64828990-6312
0081-03-5645-0881
Fax:0086-21-64518393

HT-SAAE

SOLAR MODULE

HIGHWAY

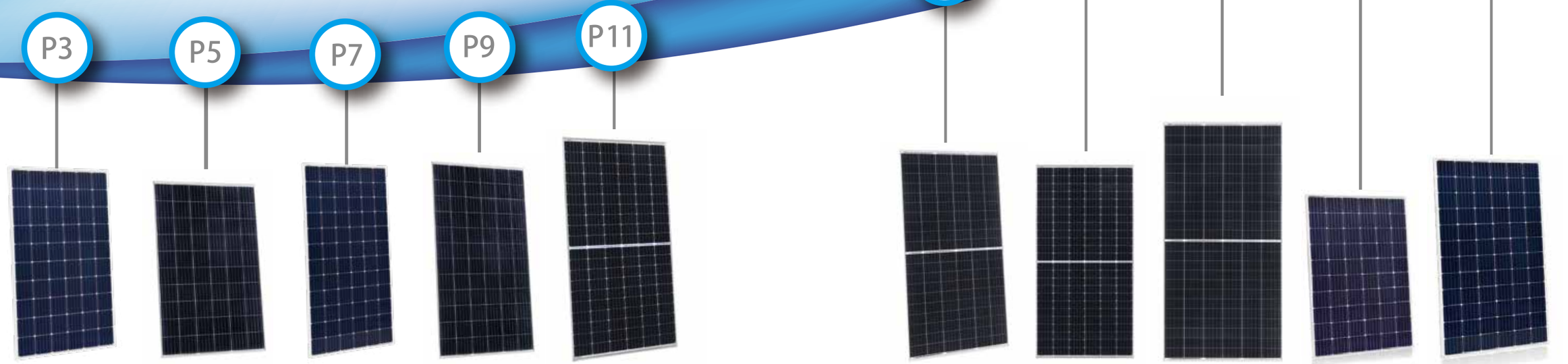
SUSTAINING INNOVATION
SINCE 1960S

Shanghai Aerospace Automobile Electromechanical Co., Ltd

CONTENTS

HIGHWAY

ABOUT HT-SAAE



HIGHWAY

Silicon

ORISI Silicon Co.,Ltd

Shanghai Shenzhou New Energy Development Co., Ltd

Wafers

Lianyungang Shenzhou New Energy Co., Ltd

Solar Cells

Shanghai Solar Energy S&T Co., Ltd

PV Modules

HT Solar Enerji A.Ş.

PV Systems

HT-SAAE

HT-SAAE
A Large Scale
State-Owned Company

Shanghai Aerospace Automobile Electromechanical Co. Ltd.,(HT-SAAE) belongs to China Aerospace Science & Technology Corporation, and Shanghai Academy of Spaceflight Technology. HT-SAAE started its research on solar technology application in space since 1960's.

As a large scale state-owned company, HT-SAAE owns a vertically-integrated industry chain from silicon ingots, wafers, cells, solar modules to solar systems and its subsidiaries have formed three main industry bases in Inner Mongolia,Shanghai and Jiangsu.

Since the beginning of 21st century, we have undertaken around 600 solar PV systems, including the "Bright Project" in west of China, The roof-top solar system for 2010 World EXPO. Solar plant in Jia Yuguan, China and solar plants in Italy and Germany.

HT Solar Energy was established in 2016 located in İstanbul, Turkey as a subsidiary of HT-SAAE for producing solar cells and HT-SAAE PV modules & systems. HT Solar Energy has totally 600 MW module production capacity and 300 MW solar cell production capacity.

HT-SAAE

Reliable State-owned Enterprise Deliver Solar Power since 1960s

HIGHWAY

Highway Module

HT60-156M
HT60-156M(V)

* V means 1500V module

295W-315W

Comprehensive and first-rate certification system

IEC61215:2016,IEC61730:2016 Latest Standard

ISO9001, ISO14001 and OHSAS18001,meeting the highest international standards

Strict quality control

IEC 61215:2016
IEC 61730:2016

Advanced surface treatment , less surface reflection and 5BB cell design can reduce the series resistance and improve the module

19.4%
Module Efficiency

Designed for high voltage systems of up to 1500 VDC, increasing the string length of solar systems and saving on BoS costs

1000Pa

Certified to withstand dynamic mechanical load 1000 Pascal

Pkw

Higher module's output power

PID

PID resistant

NH3

Ammonia corrosion resistant
Salt Mist Corrosion resistant

Microcrack resistant
Triple EL tested of high quality control.

Entire module certified to with stand extreme wind (2400 Pa) and snow loads (5400 Pa)

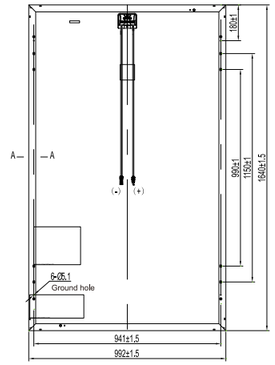
ISO

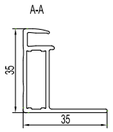
Strict quality control, meeting the highest international standards: ISO 9001, ISO14001

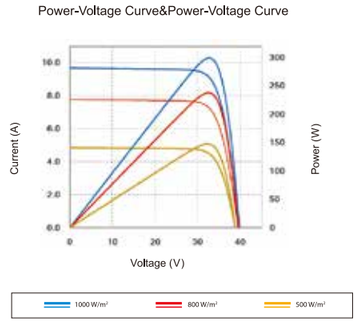
2%

All the modules are sorted and packaged by amperage, reducing mismatch losses and maximizing system output.

Engineering Drawing







I-V Curves

Electrical Charateristricts

Module	HT60-156M / HT60-156M(V)				
Maximum Power at STC(Pmax)	295W	300W	305W	310W	315W
Open-Circuit Voltage(Voc)	39.7V	39.9V	40.1V	40.3V	40.5V
Short-Circuit Current(Isc)	9.64A	9.71A	9.78A	9.85A	9.92A
Optimum Operating Voltage (Vmp)	32.4V	32.8V	33.2V	33.6V	34.0V
Optimum Operating Current(Imp)	9.12A	9.16A	9.21A	9.25A	9.29A
Module Efficiency	18.1%	18.4%	18.8%	19.1%	19.4%
Power Tolerance	0 ~ +5W				
Maximum System Voltage	1000V/1500V DC(IEC)				
Maximum Series Fuse Rating	15A				
Operating Temperature	-40 ℃ to + 85 ℃				

STC:Irradiance 1000W/m², module temperature 25, AM=1.5
Optional black frame or white frame module according to customer requirements

NOCT

Module	HT60-156M / HT60-156M(V)				
Maximum Power	218W	221W	225W	229W	232W
Open Circuit Voltage （Voc）	37.0V	37.2V	37.4V	37.6V	37.8V
Short Circuit Current (Isc)	7.79A	7.84A	7.90A	7.96A	8.01A
Maximum Power Voltage (Vmp)	30.2V	30.5V	30.9V	31.3V	31.7V
Maximum Circuit Current (Imp)	7.21A	7.24A	7.27A	7.31A	7.33A
NOCT	44 ℃ ± 2 ℃				

NOCT: Irradiance 800W/m², ambient temperature 20 ℃, wind speed 1 m/s

Mechanical Characteristics

Solar Cells	Monocrystalline 156.75 × 156.75mm
No.of Cells	60 (6 × 10)
Dimensions	1640 × 992 × 35mm (64.6 × 39 × 1.4in)
Weight	18.5kg（40.8lbs）
Front Glass	High transmission tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP67
Cable	4mm² (IEC)
Connectors	MC4/MC4 Compatible
Packaging Configuration	30pcs/box, 910pcs/40'HQ Container

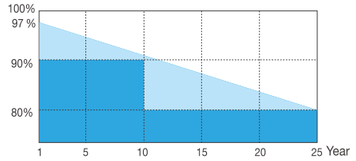
Temperature Characteristics

Temperature Coefficient of Pmax	γ (Pm)	-0.39%/K
Temperature Coefficient of Voc	β (Voc)	-0.29%/K
Temperature Coefficient of Isc	α (Isc)	0.049%/K

Warranty

10ys 10-year product warranty

25ys 25-year warranty on power output



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The module recycling should be carried out by the professional institutions at the the end of module life cycle

HT-SAAE

Reliable State-owned Enterprise Deliver Solar Power since 1960s

HIGHWAY

Highway Module

HT60-156P
HT60-156P(V)

* V means 1500V module

270W-290W

IEC 61215:2016
IEC 61730:2016

Advanced surface treatment, less surface reflection and 5BB cell design can reduce the series resistance and improve the module

17.8%
Module Efficiency

Designed for high voltage systems of up to 1500 VDC, increasing the string length of solar systems and saving on BoS costs

1000Pa
Certified to withstand dynamic mechanical load 1000 Pascal

Pkw
Higher module's output power

PID
PID resistant

NH3
Ammonia corrosion resistant
Salt Mist Corrosion resistant

Microcrack resistant
Triple EL tested of high quality control.

Entire module certified to with stand extreme wind (2400 Pa) and snow loads (5400 Pa)

ISO
Strict quality control, meeting the highest international standards: ISO 9001, ISO14001

2%
All the modules are sorted and packaged by amperage, reducing mismatch losses and maximizing system output.

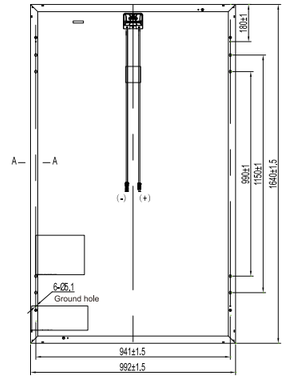
Comprehensive and first-rate certification system

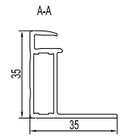
IEC61215:2016,IEC61730:2016 Latest Standard

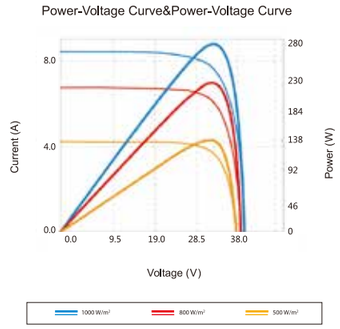
ISO9001, ISO14001 and OHSAS18001,meeting the highest international standards

Strict quality control

Engineering Drawing







I-V Curves

Electrical Charateristricts

Module	HT60-156P/ HT60-156P(V)				
Maximum Power at STC(Pmax)	270W	275W	280W	285W	290W
Open-Circuit Voltage(Voc)	38.0V	38.2V	38.4V	39.2V	39.4V
Short-Circuit Current(Isc)	9.11A	9.18A	9.25A	9.42A	9.49A
Optimum Operating Voltage (Vmp)	32.1V	32.5V	32.9V	32.4V	32.8V
Optimum Operating Current(Imp)	8.42A	8.47A	8.52A	8.81A	8.86A
Module Efficiency	16.6%	16.9%	17.2%	17.5%	17.8%
Power Tolerance	0 ~ +5W				
Maximum System Voltage	1000V/1500V DC(IEC)				
Maximum Series Fuse Rating	15A				
Operating Temperature	-40 ℃ to + 85 ℃				

STC:Irradiance 1000W/m², module temperature 25, AM=1.5
Optional black frame or white frame module according to customer requirements

NOCT

Module	HT60-156P / HT60-156P(V)				
Maximum Power	198W	202W	206W	209W	213W
Open Circuit Voltage （Voc）	35.2V	35.4V	35.6V	36.3V	36.5V
Short Circuit Current (Isc)	7.36A	7.42A	7.47A	7.61A	7.67A
Maximum Power Voltage (Vmp)	29.7V	30.1V	30.4V	30.0V	30.4V
Maximum Circuit Current (Imp)	6.68A	6.72A	6.75A	6.98A	7.02A
NOCT	44 ℃ ± 2 ℃				

NOCT: Irradiance 800W/m², ambient temperature 20℃, wind speed 1 m/s

Mechanical Characteristics

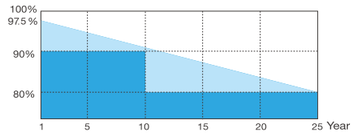
Solar Cells	Polycrystalline 156.75 × 156.75mm
No.of Cells	60 (6 × 10)
Dimensions	1640 × 992 × 35mm (64.6 × 39 × 1.4in)
Weight	18.5kg（40.8lbs）
Front Glass	High transmission tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP67
Cable	4mm² (IEC)
Connectors	MC4/MC4 Compatible
Packaging Configuration	30pcs/box, 910pcs/40'HQ Container

Temperature Characteristics

Temperature Coefficient of Pmax	γ (Pm)	-0.41%/K
Temperature Coefficient of Voc	β (Voc)	-0.32%/K
Temperature Coefficient of Isc	α (Isc)	0.05%/K

Warranty

10ys 10-year product warranty
25ys 25-year warranty on power output



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HT-SAAE

Reliable State-owned Enterprise Deliver Solar Power since 1960s

HIGHWAY

Highway Module

HT72-156M
HT72-156M(V)

* V means 1500V module

355W-380W

Comprehensive and first-rate certification system

IEC61215:2016,IEC61730:2016 Latest Standard

ISO9001, ISO14001 and OHSAS18001,meeting the highest international standards

Strict quality control

IEC 61215:2016
IEC 61730:2016

Advanced surface treatment , less surface reflection and 5BB cell design can reduce the series resistance and improve the module

19.6%
Module Efficiency

Designed for high voltage systems of up to 1500 VDC, increasing the string length of solar systems and saving on BoS costs

1000Pa

Certified to withstand dynamic mechanical load 1000 Pascal

Pkw

Higher module's output power

PID

PID resistant

NH3

Ammonia corrosion resistant
Salt Mist Corrosion resistant

Microcrack resistant
Triple EL tested of high quality control.

Entire module certified to with stand extreme wind (2400 Pa) and snow loads (5400 Pa)

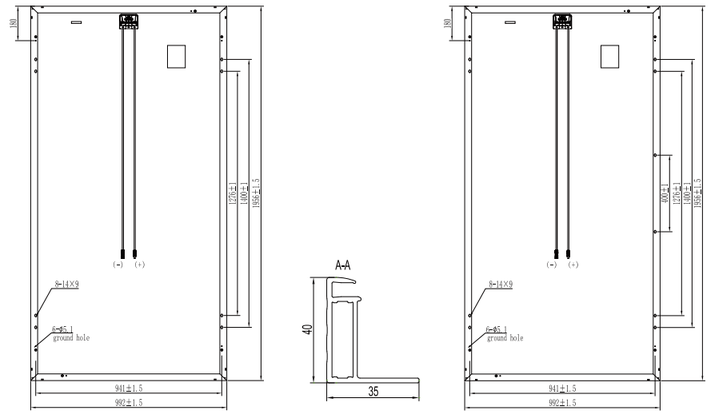
ISO

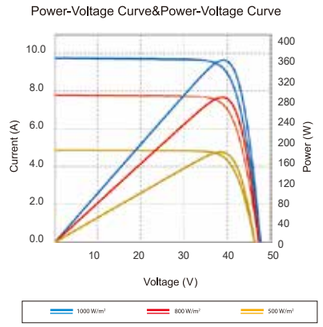
Strict quality control, meeting the highest international standards: ISO 9001, ISO14001

2%

All the modules are sorted and packaged by amperage, reducing mismatch losses and maximizing system output.

Engineering Drawing





I-V Curves

Electrical Charateristricts

Module	HT72-156M/ HT72-156M(V)					
Maximum Power at STC(Pmax)	355W	360W	365W	370W	375W	380W
Open-Circuit Voltage(Voc)	47.5V	47.7V	47.9V	48.1V	48.3V	48.5V
Short-Circuit Current(Isc)	9.69A	9.76A	9.83A	9.90A	9.97A	10.04A
Optimum Operating Voltage (Vmp)	38.7V	39.1V	39.5A	39.9V	40.3V	40.7V
Optimum Operating Current(Imp)	9.19A	9.23A	9.26A	9.30A	9.33A	9.36A
Module Efficiency	18.3%	18.6%	18.8%	19.1%	19.3%	19.6%
Power Tolerance	0 ~ +5W					
Maximum System Voltage	1000V/1500V DC(IEC)					
Maximum Series Fuse Rating	15A					
Operating Temperature	-40 ℃ to + 85 ℃					

STC:Irradiance 1000W/m², module temperature 25, AM=1.5
Optional black frame or white frame module according to customer requirements

NOCT

Module	HT72-156M / HT72-156M(V)					
Maximum Power	262W	266W	269W	273W	277W	280W
Open Circuit Voltage （Voc）	44.4V	44.6V	44.8V	45.0V	45.1V	45.3V
Short Circuit Current (Isc)	7.83A	7.88A	7.94A	8.00A	8.05A	8.11A
Maximum Power Voltage (Vmp)	36.1V	36.5V	36.9V	37.2V	37.6V	38.0V
Maximum Circuit Current (Imp)	7.25A	7.28A	7.30A	7.33A	7.35A	7.38A
NOCT	44 ℃ ± 2 ℃					

NOCT: Irradiance 800W/m², ambient temperature 20℃, wind speed 1 m/s

Mechanical Characteristics

Solar Cells	Monocrystalline 156.75 × 156.75mm
No.of Cells	72 (6 × 12)
Dimensions	1956 × 992 × 40mm (77.0 × 39.1 × 1.6in)
Weight	21.5kg（47.4lbs）
Front Glass	High transmission tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP67
Cable	4mm² (IEC)
Connectors	MC4/MC4 Compatible
Packaging Configuration	26pcs/box, 672pcs/40'HQ Container

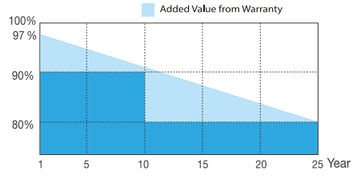
Temperature Characteristics

Temperature Coefficient of Pmax	γ (Pm)	-0.39%/K
Temperature Coefficient of Voc	β (Voc)	-0.29%/K
Temperature Coefficient of Isc	α (Isc)	0.049%/K

Warranty

10ys 10-year product warranty

25ys 25-year warranty on power output



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HT-SAAE

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HIGHWAY

Highway Module

HT72-156P
HT72-156P(V)

* V means 1500V module

325W-350W

Comprehensive and first-rate certification system

IEC61215:2016,IEC61730:2016 Latest Standard

ISO9001, ISO14001 and OHSAS18001,meeting the highest international standards

Strict quality control

IEC 61215:2016
IEC 61730:2016

Advanced surface treatment, less surface reflection and 5BB cell design can reduce the series resistance and improve the module

18.0%
Module Efficiency

Designed for high voltage systems of up to 1500 VDC, increasing the string length of solar systems and saving on BoS costs

1000Pa
Certified to withstand dynamic mechanical load 1000 Pascal

Pkw
Higher module's output power

PID
PID resistant

NH3
Ammonia corrosion resistant
Salt Mist Corrosion resistant

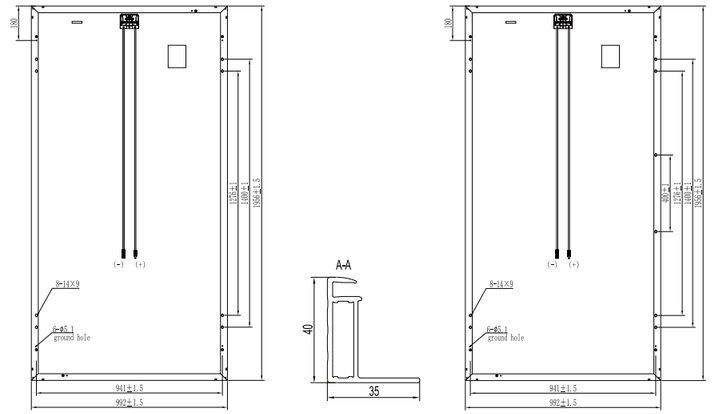
Microcrack resistant
Triple EL tested of high quality control.

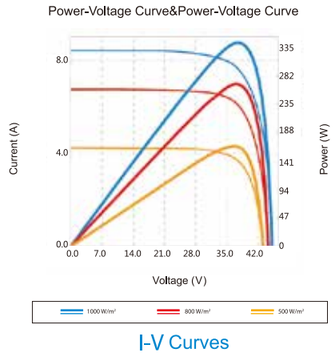
Entire module certified to with stand extreme wind (2400 Pa) and snow loads (5400 Pa)

ISO
Strict quality control, meeting the highest international standards: ISO 9001, ISO14001

2%
All the modules are sorted and packaged by amperage, reducing mismatch losses and maximizing system output.

Engineering Drawing





I-V Curves

Electrical Charateristricts

Module	HT72-156P / HT72-156P(V)					
Maximum Power at STC(Pmax)	325W	330W	335W	340W	345W	350W
Open-Circuit Voltage(Voc)	45.8V	46.0V	46.2V	46.8V	47.0V	47.2V
Short-Circuit Current(Isc)	9.19A	9.26A	9.33A	9.49A	9.56A	9.63A
Optimum Operating Voltage (Vmp)	38.6V	38.9V	39.3V	38.4V	38.8V	39.2V
Optimum Operating Current(Imp)	8.44A	8.49A	8.54A	8.86A	8.90A	8.95A
Module Efficiency	16.8%	17.0%	17.3%	17.5%	17.8%	18.0%
Power Tolerance	0 ~ +5W					
Maximum System Voltage	1000V/1500V DC(IEC)					
Maximum Series Fuse Rating	15A					
Operating Temperature	-40 ℃ to + 85 ℃					

STC:Irradiance 1000W/m², module temperature 25, AM=1.5
Optional black frame or white frame module according to customer requirements

NOCT

Module	HT72-156P / HT72-156P(V)					
Maximum Power	239W	242W	246W	250W	253W	257W
Open Circuit Voltage （Voc）	42.5V	42.7V	42.9V	43.5V	43.6V	43.8V
Short Circuit Current (Isc)	7.43A	7.48A	7.54A	7.67A	7.72A	7.78A
Maximum Power Voltage (Vmp)	35.8V	36.2V	36.5V	35.6V	36.0V	36.3V
Maximum Circuit Current (Imp)	6.67A	6.70A	6.74A	7.01A	7.04A	7.07A
NOCT	44 ℃ ± 2 ℃					

NOCT: Irradiance 800W/m², ambient temperature 20℃, wind speed 1 m/s

Mechanical Characteristics

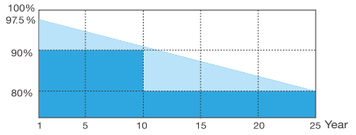
Solar Cells	Polycrystalline 156.75 × 156.75mm
No.of Cells	72 (6 × 12)
Dimensions	1956 × 992 × 40mm (77.0 × 39.1 × 1.6in)
Weight	21.5kg（47.4lbs）
Front Glass	High transmission tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP67
Cable	4mm² (IEC)
Connectors	MC4/MC4 Compatible
Packaging Configuration	26pcs/box, 672pcs/40'HQ Container

Temperature Characteristics

Temperature Coefficient of Pmax	γ (Pm)	-0.41%/K
Temperature Coefficient of Voc	β (Voc)	-0.32%/K
Temperature Coefficient of Isc	α (Isc)	0.05%/K

Warranty

10ys 10-year product warranty
25ys 25-year warranty on power output



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HIGHWAY

Half-Cut Module

HT60-156M-C
HT60-156M(V)-C

* V means 1500V module

290W-310W

Half cut cell technology can reduce the internal power loss and improve component overall power.Excellent heat dissipation avoids hot spot production.

10YS Products Wa ranty

IEC IEC 61215:2016 IEC 61730:2016

25YS Warranty on power output

19.4% Module Efficiency

EL Microcrack resistant Double glass structure enhance reliability, triple EL tested of high quality control.

Advanced surface treatment, lower surface reflection and 5BB cell design can reduce the series resistance and improve the

2% All the modules are sorted and packaged by amperage, reducing mismatch losses and maximizing system output.

Designed for high voltage systems of up to 1500 VDC, increasing the string length of solar systems and saving on BoS

ISO Strict quality control, meeting the highest international standards: ISO 9001, ISO14001

PID PID resistant

5W Positive tolerance 0~+5w guaranteed

Comprehensive and first-rate certification system

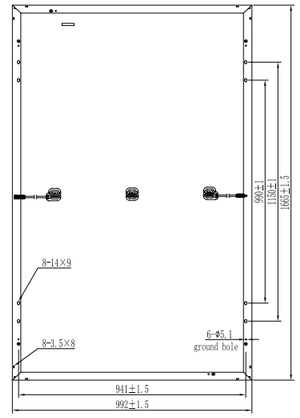
IEC61215:2016,IEC61730:2016 Latest Standard

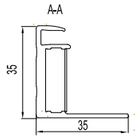
ISO9001, ISO14001 and OHSAS18001,meeting the highest international standards

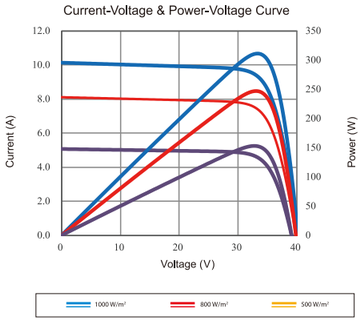
Strict quality control

TÜVRheinland CERTIFIED

Engineering Drawing







I-V Curves

Electrical Charateristricts

Module	HT60-156M-C/HT60-156M(V)-C				
Maximum Power at STC(Pmax)	300W	305W	310W	315W	320W
Open-Circuit Voltage(Voc)	39.8V	40.0V	40.2V	40.4V	40.6V
Short-Circuit Current(Isc)	9.90A	10.00A	10.12A	10.23A	10.34A
Optimum Operating Voltage (Vmp)	32.9V	33.1V	33.3V	33.5V	33.7V
Optimum Operating Current(Imp)	9.13A	9.23A	9.32A	9.42A	9.51A
Module Efficiency	18.2%	18.5%	18.8%	19.1%	19.4%
Power Tolerance	0 ~ +5W				
Maximum System Voltage	1000V/1500V DC(IEC)				
Maximum Series Fuse Rating	15A				
Operating Temperature	-40 ℃ to + 85 ℃				

STC:Irradiance 1000W/m², module temperature 25, AM=1.5
Optional black frame or white frame module according to customer requirements

NOCT

Module	HT60-156M-C/HT60-156M(V)-C				
Maximum Power	222W	226W	230W	233W	237W
Open Circuit Voltage （Voc）	37.6V	37.8V	38.0V	38.2V	38.4V
Short Circuit Current (Isc)	7.99A	8.07A	8.17A	8.26A	8.35A
Maximum Power Voltage (Vmp)	31.1V	31.3V	31.5V	31.7V	31.8V
Maximum Circuit Current (Imp)	7.14A	7.22A	7.30A	7.35A	7.45A
NOCT	44 ℃ ± 2 ℃				

NOCT: Irradiance 800W/m², ambient temperature 20℃, wind speed 1 m/s

Mechanical Characteristics

Solar Cells	Monocrystalline 156.75*78.375mm
No.of Cells	120 (6 ×20)
Dimensions	1665mm×992mm×35mm (66.0×39×1.4in)
Weight	18.0kg（39.7lbs）
Front Glass	High transmission tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP67
Cable	4mm² (IEC)
Packaging Configuration	30pcs/box, 910pcs/40'HQ Container

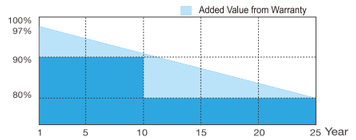
Temperature Characteristics

Temperature Coefficient of Pmax	γ (Pm)	-0.39%/K
Temperature Coefficient of Voc	β (Voc)	-0.29%/K
Temperature Coefficient of Isc	α (Isc)	0.049%/K

Warranty

10ys 10-year product warranty

25ys 25-year warranty on power output



Information Box

HT Solar Enerji A.Ş.
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Tuzla/Istanbul/Türkiye
Tel: +90 216 504 72 73

Company website:
www.ht-saae.com
www.htsolar.com.tr

The module recycling should be carried out by the professional institutions at the the end of module life cycle

HT-SAAE

Reliable State-owned Enterprise Deliver Solar Power since 1960s

HIGHWAY

Half-Cut Module

HT60-156P-C

HT60-156P(V)-C

* V means 1500V module

275W-300W

Half cut cell technology can reduce the internal power loss and improve component overall power.Excellent heat dissipation avoids hot spot production.

10YS Products Warranty

IEC IEC 61215:2016
IEC 61730:2016

25YS Warranty on power output

18.2%
Module Efficiency

EL Microcrack resistant
Double glass structure enhance reliability, triple EL tested of high quality control.

Advanced surface treatment, lower surface reflection and 5BB cell design can reduce the series resistance and improve the

All the modules are sorted and packaged by amperage, reducing mismatch losses and maximizing system output.

Designed for high voltage systems of up to 1500 VDC, increasing the string length of solar systems and saving on BoS

ISO Strict quality control, meeting the highest international standards: ISO 9001, ISO14001

PID PID resistant

5W Positive tolerance 0~+5w guaranteed

Comprehensive and first-rate certification system

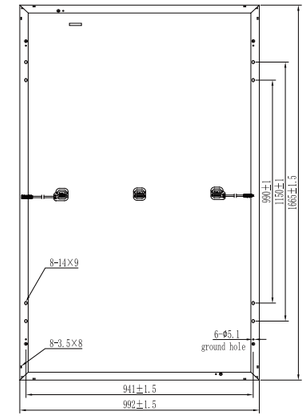
IEC61215:2016,IEC61730:2016 Latest Standard

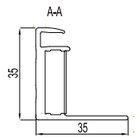
ISO9001, ISO14001 and OHSAS18001,meeting the highest international standards

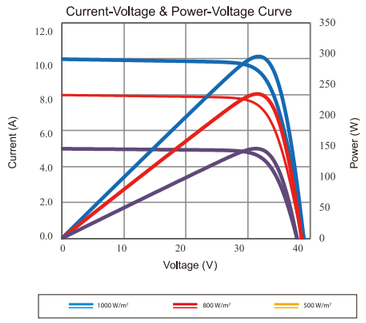
Strict quality control

TÜVRheinland CERTIFIED

Engineering Drawing







I-V Curves

Electrical Charateristricts

Module	HT60-156P-C/HT60-156P(V)-C					
Maximum Power at STC(Pmax)	275W	280W	285W	290W	295W	300W
Open-Circuit Voltage(Voc)	38.2V	38.4V	38.6V	38.8V	39.0V	39.2V
Short-Circuit Current(Isc)	9.49A	9.60A	9.73A	9.86A	9.97A	10.08A
Optimum Operating Voltage (Vmp)	31.0V	31.2V	31.4V	31.6V	31.8V	32.0V
Optimum Operating Current(Imp)	8.89A	8.99A	9.10A	9.20A	9.30A	9.38A
Module Efficiency	16.6%	17.0%	17.3%	17.6%	17.9%	18.2%
Power Tolerance	0 ~ +5W					
Maximum System Voltage	1000V/1500V DC(IEC)					
Maximum Series Fuse Rating	15A					
Operating Temperature	-40 ℃ to + 85 ℃					

STC:Irradiance 1000W/m², module temperature 25, AM=1.5
Optional black frame or white frame module according to customer requirements

NOCT

Module	HT60-156P-C/HT60-156P(V)-C					
Maximum Power	203W	207W	210W	214W	218W	221W
Open Circuit Voltage （Voc）	35.9V	36.1V	36.3V	36.4V	36.6V	36.8V
Short Circuit Current (Isc)	7.66A	7.75A	7.86A	7.96A	8.05A	8.14A
Maximum Power Voltage (Vmp)	29.1V	29.3V	29.5V	29.7V	29.9V	30.1V
Maximum Circuit Current (Imp)	6.98A	7.06A	7.12A	7.21A	7.29A	7.34A
NOCT	44 ℃ ± 2 ℃					

NOCT: Irradiance 800W/m², ambient temperature 20℃, wind speed 1 m/s

Mechanical Characteristics

Solar Cells	Polycrystalline 156.75*78.375mm
No.of Cells	120 (6 ×20)
Dimensions	1665mm×992mm×35mm (66.0×39×1.4in)
Weight	18.0kg （39.7lbs）
Front Glass	High transmission tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP67
Cable	4mm² (IEC)
Packaging Configuration	30pcs/box, 910pcs/40'HQ Container

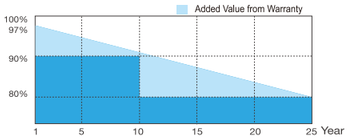
Temperature Characteristics

Temperature Coefficient of Pmax	γ (Pm)	-0.39%/K
Temperature Coefficient of Voc	β (Voc)	-0.29%/K
Temperature Coefficient of Isc	α (Isc)	0.049%/K

Warranty

10ys 10-year product warranty

25ys 25-year warranty on power output



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HT-SAAE

Reliable State-owned Enterprise Deliver Solar Power since 1960s

HIGHWAY

Half-Cut Module

HT72-156M-C
HT72-156M(V)-C

V means 1500V module

360W-385W

Half cut cell technology can reduce the internal power loss and improve component overall power.Excellent heat dissipation avoids hot spot production.

10YS Products Warranty

IEC 61215:2016
IEC 61730:2016

25YS Warranty on power output

19.5%
Module Efficiency

EL Microcrack resistant
Double glass structure enhance reliability, triple EL tested of high quality control.

Advanced surface treatment, lower surface reflection and 5BB cell design can reduce the series resistance and improve the

All the modules are sorted and packaged by amperage, reducing mismatch losses and maximizing system output.

Designed for high voltage systems of up to 1500 VDC, increasing the string length of solar systems and saving on BoS

ISO Strict quality control, meeting the highest international standards: ISO 9001, ISO14001

PID resistant

5W Positive tolerance 0~+5w guaranteed

Comprehensive and first-rate certification system

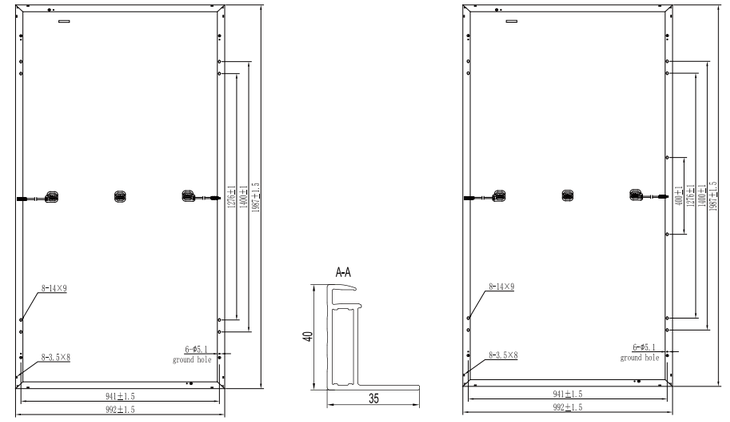
IEC61215:2016,IEC61730:2016 Latest Standard

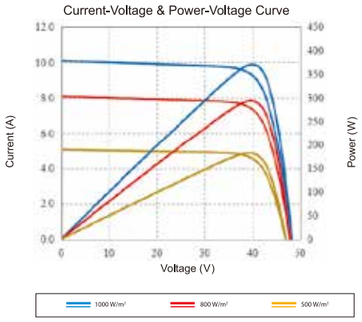
ISO9001, ISO14001 and OHSAS18001,meeting the highest international standards

Strict quality control

TÜVRheinland CERTIFIED

Engineering Drawing





I-V Curves

Electrical Charateristricts

Module	HT72-156M-C/HT72-156M(V)-C					
Maximum Power at STC(Pmax)	360W	365W	370W	375W	380W	385W
Open-Circuit Voltage(Voc)	47.8V	48.0V	48.2V	48.4V	48.6V	48.8V
Short-Circuit Current(Isc)	9.90A	9.99A	10.08A	10.17A	10.26A	10.35A
Optimum Operating Voltage (Vmp)	39.6V	39.8V	40.0V	40.2V	40.4V	40.6V
Optimum Operating Current(Imp)	9.10A	9.18A	9.26A	9.34A	9.42A	9.50A
Module Efficiency	18.3%	18.5%	18.8%	19.0%	19.3%	19.5%
Power Tolerance	0 ~ +5W					
Maximum System Voltage	1000V/1500V DC(IEC)					
Maximum Series Fuse Rating	15A					
Operating Temperature	-40 ℃ to + 85 ℃					

STC:Irradiance 1000W/m², module temperature 25, AM=1.5
Optional black frame or white frame module according to customer requirements

NOCT

Module	HT72-156M-C/HT72-156M(V)-C					
Maximum Power	267W	270W	274W	278W	281W	285W
Open Circuit Voltage （Voc）	45.2V	45.4V	45.5V	45.7V	45.9V	46.1V
Short Circuit Current (Isc)	7.99A	8.07A	8.14A	8.21A	8.28A	8.36A
Maximum Power Voltage (Vmp)	37.4V	37.6V	37.8V	38.0V	38.2V	38.4V
Maximum Circuit Current (Imp)	7.14A	7.18A	7.25A	7.32A	7.36A	7.42A
NOCT	44 ℃ ± 2 ℃					

NOCT: Irradiance 800W/m², ambient temperature 20℃, wind speed 1 m/s

Mechanical Characteristics

Solar Cells	Monocrystalline 156.75*78.375mm
No.of Cells	144 (6 ×24)
Dimensions	1987mm×992mm×40mm (78.2 × 39.1 × 1.6in)
Weight	23.0kg (50.7lbs)
Front Glass	High transmission tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP67
Cable	4㎜² (IEC)
Packaging Configuration	26pcs/box, 672 pcs/40'HQ Container

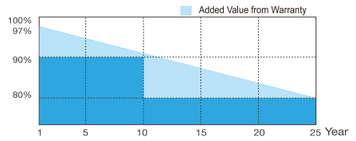
Temperature Characteristics

Temperature Coefficient of Pmax	γ (Pm)	-0.39%/K
Temperature Coefficient of Voc	β (Voc)	-0.29%/K
Temperature Coefficient of Isc	α (Isc)	0.049%/K

Warranty

10ys 10-year product warranty

25ys 25-year warranty on power output



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HT-SAAE

Reliable State-owned Enterprise Deliver Solar Power since 1960s

HIGHWAY

Half-Cut Module

HT72-156P-C
HT72-156P(V)-C

* V means 1500V module

330W-355W

Half cut cell technology can reduce the internal power loss and improve component overall power.Excellent heat dissipation avoids hot spot production.

10YS Products Warranty

IEC 61215:2016
IEC 61730:2016

25YS Warranty on power output

18.0%
Module Efficiency

EL Microcrack resistant
Double glass structure enhance reliability, triple EL tested of high quality control.

Advanced surface treatment, lower surface reflection and 5BB cell design can reduce the series resistance and improve the

I-V 2% All the modules are sorted and packaged by amperage, reducing mismatch losses and maximizing system output.

Designed for high voltage systems of up to 1500 VDC, increasing the string length of solar systems and saving on BoS

ISO Strict quality control, meeting the highest international standards: ISO 9001, ISO14001

PID PID resistant

5W Positive tolerance 0~+5w guaranteed

Comprehensive and first-rate certification system

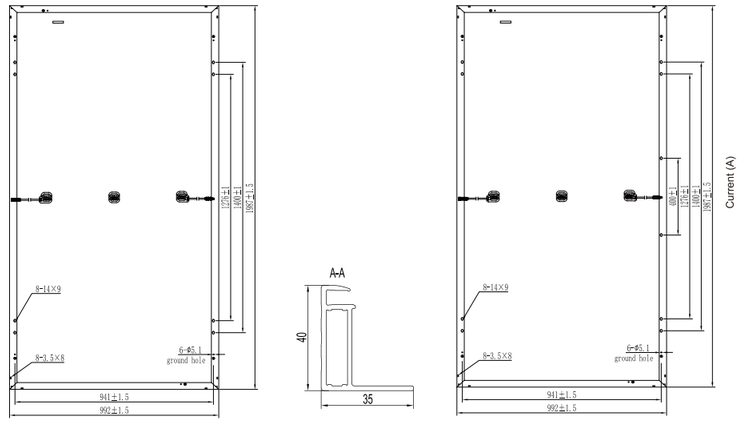
IEC61215:2016,IEC61730:2016 Latest Standard

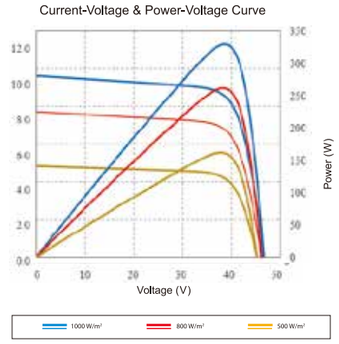
ISO9001, ISO14001 and OHSAS18001,meeting the highest international standards

Strict quality control

TÜVRheinland CERTIFIED

Engineering Drawing





I-V Curves

Electrical Charateristricts

Module	HT72-156P-C/HT72-156P(V)-C					
Maximum Power at STC(Pmax)	330W	335W	340W	345W	350W	355W
Open-Circuit Voltage(Voc)	46.1V	46.3V	46.5V	46.8V	47.0V	47.2V
Short-Circuit Current(Isc)	9.44A	9.53A	9.63A	9.72A	9.81A	9.91A
Optimum Operating Voltage (Vmp)	38.1V	38.3V	38.6V	38.9V	39.2V	39.5V
Optimum Operating Current(Imp)	8.67A	8.76A	8.82A	8.88A	8.94A	9.00A
Module Efficiency	16.7%	17.0%	17.3%	17.5%	17.8%	18.0%
Power Tolerance	0 ~ +5W					
Maximum System Voltage	1000V/1500V DC(IEC)					
Maximum Series Fuse Rating	15A					
Operating Temperature	-40 ℃ to + 85 ℃					

STC:Irradiance 1000W/m², module temperature 25, AM=1.5
Optional black frame or white frame module according to customer requirements

NOCT

Module	HT72-156P-C/HT72-156P(V)-C					
Maximum Power	243W	247W	251W	254W	258W	262W
Open Circuit Voltage （Voc）	43.3V	43.5V	43.7V	44.0V	44.1V	44.3V
Short Circuit Current (Isc)	7.62A	7.70A	7.78A	7.85A	7.92A	8.00A
Maximum Power Voltage (Vmp)	35.8V	36.0V	36.3V	36.5V	36.8V	37.1V
Maximum Circuit Current (Imp)	6.79A	6.86A	6.91A	6.96A	7.01A	7.06A
NOCT	44 ℃ ± 2 ℃					

NOCT: Irradiance 800W/m², ambient temperature 20℃, wind speed 1 m/s

Mechanical Characteristics

Solar Cells	Polycrystalline 156.75*78.375mm
No.of Cells	144 (6 ×24)
Dimensions	1987mm×992mm×40mm (78.2 × 39.1 × 1.6in)
Weight	23.0kg (50.7lbs)
Front Glass	High transmission tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP67
Cable	4㎟ (IEC)
Packaging Configuration	26pcs/box, 672 pcs/40'HQ Container

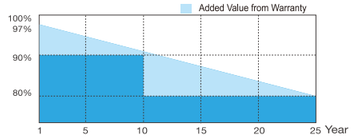
Temperature Characteristics

Temperature Coefficient of Pmax	γ (Pm)	-0.39%/K
Temperature Coefficient of Voc	β (Voc)	-0.29%/K
Temperature Coefficient of Isc	α (Isc)	0.049%/K

Warranty

10ys 10-year product warranty

25ys 25-year warranty on power output



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HT-SAAE

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HIGHWAY

Double- Glass Module

HT60-156M(PD)-BF
HT60-156M(PDV)-BF

295W-320W

* V means 1500V module

Comprehensive and first-rate certification system

IEC61215:2016,IEC61730:2016 Latest Standard

ISO9001, ISO14001 and OHSAS18001,meeting the highest international standards

Strict quality control

IEC 61215:2016
IEC 61730:2016

Advanced surface treatment, less surface reflection and 5BB cell design can reduce the series resistance and improve the module efficiency

19.4 %
Module Efficiency

Designed for high voltage systems of up to 1500 VDC, increasing the string length of solar systems and saving on BoS costs

1000Pa
Certified to withstand dynamic mechanical load 1000 Pascal

Pkw
Higher module's output power

PID
PID resistant

NH3
Ammonia corrosion resistant
Salt Mist Corrosion resistant

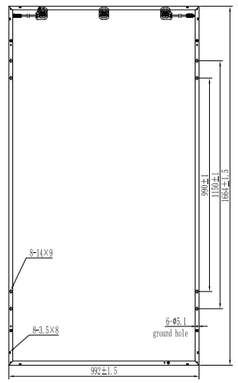
Microcrack resistant
Triple EL tested of high quality control.

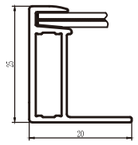
Entire module certified to with stand extreme wind (2400 Pa) and snow loads (5400 Pa)

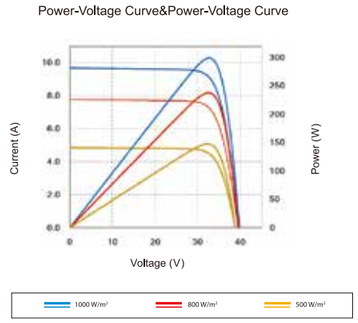
ISO
Strict quality control, meeting the highest internationai standards: ISO 9001, ISO14001 and OHSAS18001

2%
All the modules are sorted and packaged by amperage, reducing mismatch losses and maximizing system output.

Engineering Drawing







I-V Curves

Electrical Characteristics(STC)

Module	HT60-156M(PD)-BF / HT60-156M(PDV)-BF					
Maximum Power at STC(Pmax)	295W	300W	305W	310W	315W	320 W
Open-Circuit Voltage(Voc)	39.4V	39.7V	39.9V	40.2V	40.4V	40.6V
Short-Circuit Current(Isc)	9.85A	9.95A	10.05A	10.14A	10.23A	10.35A
Optimum Operating Voltage (Vmp)	32.3V	32.5V	32.7V	32.9V	33.1V	33.3V
Optimum Operating Current(Imp)	9.15A	9.24A	9.34A	9.44A	9.53A	9.63A
Module Efficiency	17.9%	18.2%	18.5%	18.8%	19.1%	19.4%
Power Tolerance	0 ~ +5W					
Maximum System Voltage	1000V/1500V DC(IEC)					
Maximum Series Fuse Rating	15A					
Operating Temperature	-40 ℃ to + 85 ℃					

STC:Irradiance 1000W/m² , module temperature 25, AM=1.5

Optional black frame or white frame module according to customer requirements

NOCT

Module	HT60-156M(PD)-BF / HT60-156M(PDV)-BF					
Maximum Power	219W	223W	227W	230W	234W	238W
Open Circuit Voltage(Voc)	37.3V	37.6V	37.8V	38.1V	38.3V	38.5V
Short Circuit Current (Isc)	7.95A	8.03A	8.11A	8.18A	8.26A	8.35A
Maximum Power Voltage (Vmp)	30.6V	30.8V	31.0V	31.2V	31.4V	31.5V
Maximum Circuit Current (Imp)	7.16A	7.24A	7.32A	7.37A	7.45A	7.56A
NOCT	44 ℃ ± 2 ℃					

NOCT: Irradiance 800W/m², ambient temperature 20℃, wind speed 1 m/s

Mechanical Characteristics

Solar Cells	Monocrystalline silicon156.75X156.75mm
No.of Cells	60(6X10)
Dimensions	1664X992X25mm (65.5X39X1.0in)
Weight	24.5kg
Junction Box	IP67
Area	1.65 ㎡
Packaging	40pcs/pallet,880pcs/40'HQ Container,1280pcs/17.5m flatcar

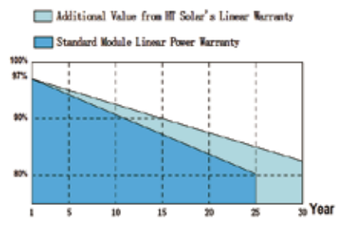
Temperature Characteristics

Temperature Coefficient of Pmax	γ (Pm)	-0.39%/K
Temperature Coefficient of Voc	β (Voc)	-0.29%/K
Temperature Coefficient of Isc	α (Isc)	0.049%/K

Warranty

10ys 10-year product warranty

30ys 30-year warranty on power output



Information Box

HT Solar Enerji A.Ş.
Aydınlı Sb Dist, 1. Sokak No:1 - 34957
Tuzla/Istanbul/Türkiye
Tel: +90 216 504 72 73

Company website:
www.ht-saae.com
www.htsolar.com.tr

The module recycling should be carried out by the professional institutions at the the end of module life cycle

HT-SAAE

Reliable State-owned Enterprise Deliver Solar Power since 1960s

Comprehensive and first-rate certification system

IEC61215:2016,IEC61730:2016 Latest Standard

ISO9001, ISO14001 and OHSAS18001,meeting the highest international standards

Strict quality control

HIGHWAY

Double- Glass Module

HT72-156M(PD)-BF
HT72-156M(PDV)-BF

360W-385W

* V means 1500V module

IEC 61215:2016
IEC 61730:2016

Advanced surface treatment, less surface reflection and 5BB cell design can reduce the series resistance and improve the module efficiency

19.6 %
Module Efficiency

Designed for high voltage systems of up to 1500 VDC, increasing the string length of solar systems and saving on BoS costs

1000Pa
Certified to withstand dynamic mechanical load 1000 Pascal

Pkw
Higher module's output power

PID
PID resistant

NH3
Ammonia corrosion resistant
Salt Mist Corrosion resistant

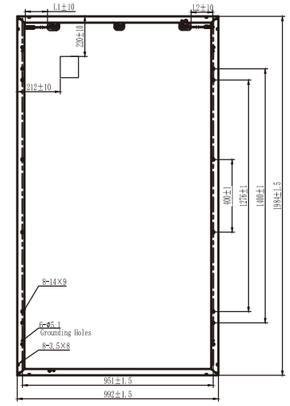
Microcrack resistant
Triple EL tested of high quality control.

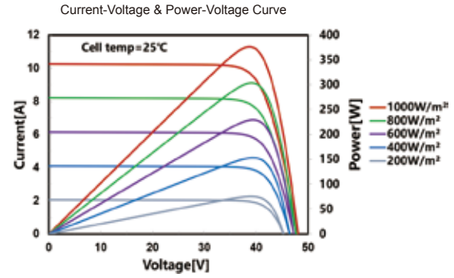
Entire module certified to with stand extreme wind (2400 Pa) and snow loads (5400 Pa)

ISO
Strict quality control, meeting the highest international standards: ISO 9001, ISO14001 and OHSAS18001

2%
All the modules are sorted and packaged by amperage, reducing mismatch losses and maximizing system output.

Engineering Drawing





I-V Curves

Electrical Characteristics(STC)

Module	HT72-156M(PD)-BF / HT72-156M(PDV)-BF					
Maximum Power at STC(Pmax)	360W	365W	370W	375W	380W	385W
Open-Circuit Voltage(Voc)	47.5V	47.7V	47.9V	48.1V	48.3V	48.5V
Short-Circuit Current(Isc)	9.98A	10.07A	10.16A	10.25A	10.34A	10.43A
Optimum Operating Voltage (Vmp)	38.7V	38.9V	39.1V	39.3V	39.5V	39.7V
Optimum Operating Current(Imp)	9.31A	9.39A	9.47A	9.55A	9.63A	9.71A
Module Efficiency	18.3%	18.5%	18.8%	19.1%	19.3%	19.6%
Power Tolerance	0 ~ +5W					
Maximum System Voltage	1000V/1500V DC(IEC)					
Maximum Series Fuse Rating	15A					
Operating Temperature	-40 ℃ to + 85 ℃					

STC:Irradiance 1000W/m², module temperature 25, AM=1.5

Optional black frame or white frame module according to customer requirements

NOCT

Module	HT72-156M(PD)-BF / HT72-156M(PDV)-BF					
Maximum Power	268W	271W	275W	279W	282W	286W
Open Circuit Voltage(Voc)	45.0V	45.2V	45.4V	45.6V	45.8V	45.9V
Short Circuit Current (Isc)	8.06A	8.13A	8.20A	8.27A	8.35A	8.42A
Maximum Power Voltage (Vmp)	36.7V	36.8V	37.0V	37.2V	37.4V	37.6V
Maximum Circuit Current (Imp)	7.30A	7.36A	7.43A	7.50A	7.54A	7.61A
NOCT	44 ℃ ± 2 ℃					

NOCT: Irradiance 800W/m², ambient temperature 20℃, wind speed 1 m/s

Mechanical Characteristics

Solar Cells	Monocrystalline silicon156.75X156.75mm
No.of Cells	72(6X12)
Dimensions	1984X992X25mm (78.1X39X1.0in)
Weight	32kg
Junction Box	IP67
Area	1.97 ㎡
Packaging	40pcs/pallet,880pcs/40'HQ Container,1280pcs/17.5m flatcar

Temperature Characteristics

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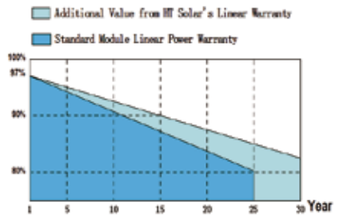

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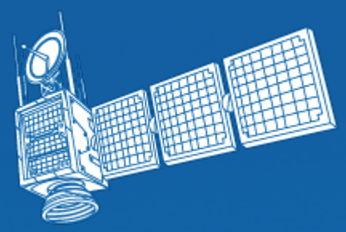

HIGHWAY