

# Vertex S

## TRANSPARENT BACKSHEET MODULE

### Preliminary

PRODUCT: TSM-DE09C.07

PRODUCT RANGE: 380-405W

## 405W

MAXIMUM POWER OUTPUT

## 0~+5W

POSITIVE POWER TOLERANCE

## 21.1%

MAXIMUM EFFICIENCY



### Smaller panels, bigger power generation

- Small-format panels allow high power generation in limited space configurations.
- Up to 405W, 21.1% module efficiency with high density interconnect technology.
- Multi-busbar technology for better light trapping effect, lower series resistance and improved current collection.
- Reduce installation cost with higher power bin and efficiency.
- Boost performance in warm weather with lower temperature coefficient (-0.34%) and operating temperature.

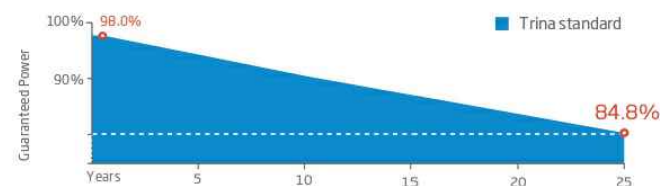
### Universal solution for residential and C&I rooftops

- Designed for compatibility with existing mainstream optimizers, inverters and mounting systems.
- Perfect size and light weight for easy handling and transportation
- Diverse installation application, Flexible for system deployment.

### High Reliability

- 25 year product warranty.
- 25 year performance warranty with lowest degradation.
- Ensured PID resistance through cell process and module material control.
- Mechanical performance up to 6000 Pa positive load and 4000 Pa negative load.

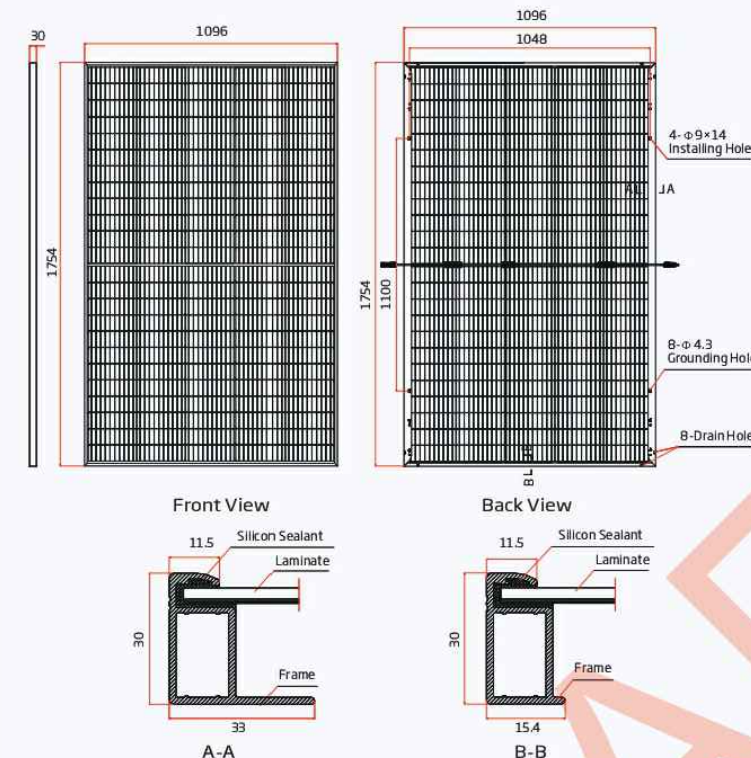
### Trina Solar's Backsheet Performance Warranty



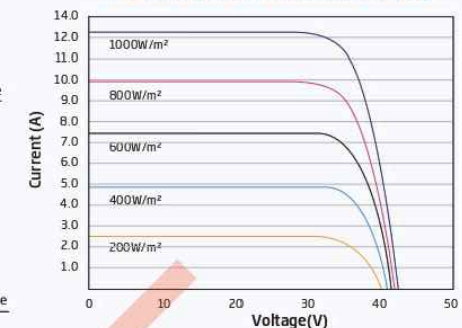
## Vertex S

### TRANSPARENT BACKSHEET MODULE

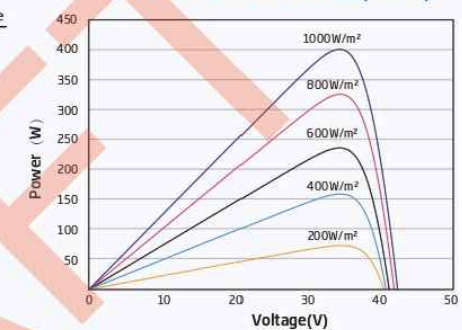
### DIMENSIONS OF PV MODULE(mm)



### I-V CURVES OF PV MODULE(400 W)



### P-V CURVES OF PV MODULE(400W)



### ELECTRICAL DATA (STC)

Peak Power Watts-P <sub>MAX</sub> (Wp)*	380	385	390	395	400	405
Power Tolerance-P <sub>MAX</sub> (W)			0 ~ +5			
Maximum Power Voltage-V <sub>MPP</sub> (V)	33.4	33.6	33.8	34.0	34.2	34.4
Maximum Power Current-I <sub>MPP</sub> (A)	11.38	11.46	11.54	11.62	11.70	11.77
Open Circuit Voltage-V <sub>OC</sub> (V)	40.4	40.6	40.8	41.0	41.2	41.4
Short Circuit Current-I <sub>SC</sub> (A)	12.00	12.07	12.14	12.21	12.28	12.34
Module Efficiency-η <sub>m</sub> (%)	19.8	20.0	20.3	20.5	20.8	21.1

\*STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5. \*Measuring tolerance: ±3%.

### Electrical characteristics with different power bin (reference to 10% Irradiance ratio)

Total Equivalent power -P <sub>MAX</sub> (Wp)	407	412	417	423	428	433
Maximum Power Voltage-V <sub>MPP</sub> (V)	33.4	33.6	33.8	34.0	34.2	34.4
Maximum Power Current-I <sub>MPP</sub> (A)	12.19	12.26	12.34	12.44	12.51	12.59
Open Circuit Voltage-V <sub>OC</sub> (V)	40.4	40.6	40.8	41.0	41.2	41.4
Short Circuit Current-I <sub>SC</sub> (A)	12.92	13.00	13.08	13.20	13.25	13.36
Irradiance ratio (rear/front)	10%					

Power Bifaciality: 70±5%.

### ELECTRICAL DATA (NOCT)

Maximum Power-P <sub>MAX</sub> (Wp)	286	290	294	298	302	305
Maximum Power Voltage-V <sub>MPP</sub> (V)	31.4	31.6	31.8	31.9	32.1	32.4
Maximum Power Current-I <sub>MPP</sub> (A)	9.12	9.18	9.24	9.32	9.38	9.42
Open Circuit Voltage-V <sub>OC</sub> (V)	38.0	38.2	38.4	38.6	38.8	38.9
Short Circuit Current-I <sub>SC</sub> (A)	9.67	9.73	9.78	9.84	9.90	9.94

NOCT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

### MECHANICAL DATA

Solar Cells	Mono
No. of cells	120 cells
Module Dimensions	1754×1096×30 mm (69.06×43.15×1.18 inches)
Weight	21.0 kg (46.3 lb)
Glass	3.2 mm (0.13 inches), High Transmission, AR Coated Heat Strengthened Glass
Encapsulant material	EVA/POE
Backsheet	Transparent
Frame	30mm(1.18 inches) Anodized Aluminium Alloy
J-Box	IP68 rated
Cables	Photovoltaic Technology Cable 4.0mm² (0.006 inches²), Portrait: 280/280 mm(11.02/11.02 inches) Length can be customized
Connector	MC4 EV02 / TS4*

\*Please refer to regional datasheet for specified connector.

### TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43°C (±2°C)
Temperature Coefficient of P <sub>MAX</sub>	-0.34%/°C
Temperature Coefficient of V <sub>OC</sub>	-0.25%/°C
Temperature Coefficient of I <sub>SC</sub>	0.04%/°C

### MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC (IEC)
	1500V DC (UL)
Max Series Fuse Rating	20A

### WARRANTY

25 year Product Workmanship Warranty
25 year Power Warranty
2% first year degradation
0.55% Annual Power degradation

(Please refer to product warranty for details)

### PACKAGING CONFIGURATION

Modules per box: 36 pieces
Modules per 40' container: 828 pieces

### Comprehensive Products and System Certificates



IEC61215/IEC61730/IEC61701/IEC62716/UL61730  
 ISO 9001: Quality Management System  
 ISO 14001: Environmental Management System  
 ISO14064: Greenhouse Gases Emissions Verification  
 ISO45001: Occupational Health and Safety Management System

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CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

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Version number: TSM\_EN\_2022\_PA1

www.trinasolar.com





# IQ8 and IQ8+ Microinverters

Our newest IQ8 Microinverters are the industry’s first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.



Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the Enphase IQ Battery, Enphase IQ Gateway, and the Enphase App monitoring and analysis software.



IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.



Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.



IQ8 Series Microinverters are UL Listed as PV Rapid Shut Down Equipment and conform with various regulations, when installed according to manufacturer’s instructions.

### Easy to install

- Lightweight and compact with plug-n-play connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

### High productivity and reliability

- Produce power even when the grid is down
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

### Microgrid-forming

- Complies with the latest advanced grid support
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) requirements

# IQ8 and IQ8+ Microinverters

INPUT DATA (DC)		IQ8-60-2-US	IQ8PLUS-72-2-US
Commonly used module pairings <sup>1</sup>	W	235 – 350	235 – 440
Module compatibility		60-cell/120 half-cell	60-cell/120 half-cell and 72-cell/144 half-cell
MPPT voltage range	V	27 – 37	29 – 45
Operating range	V	25 – 48	25 – 58
Min/max start voltage	V	30 / 48	30 / 58
Max input DC voltage	V	50	60
Max DC current <sup>2</sup> [module Isc]	A	15	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		IQ8-60-2-US	IQ8PLUS-72-2-US
Peak output power	VA	245	300
Max continuous output power	VA	240	290
Nominal (L-L) voltage/range <sup>3</sup>	V	240 / 211 – 264	
Max continuous output current	A	1.0	1.21
Nominal frequency	Hz	60	
Extended frequency range	Hz	50 – 68	
Max units per 20 A (L-L) branch circuit <sup>4</sup>		16	13
Total harmonic distortion		<5%	
Overvoltage class AC port		III	
AC port backfeed current	mA	30	
Power factor setting		1.0	
Grid-tied power factor (adjustable)		0.85 leading – 0.85 lagging	
Peak efficiency	%	97.5	97.6
CEC weighted efficiency	%	97	97
Night-time power consumption	mW	60	
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (HxWxD)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")	
Weight		1.08 kg (2.38 lbs)	
Cooling		Natural convection – no fans	
Approved for wet locations		Yes	
Acoustic noise at 1 m		<60 dBA	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01  This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.	

(1) No enforced DC/AC ratio. See the compatibility calculator at <https://link.enphase.com/module-compatibility> (2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.



# Enphase IQ Combiner 4/4C

X-IQ-AM1-240-4  
X-IQ-AM1-240-4C



The **Enphase IQ Combiner 4/4C** with Enphase IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

### Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), included only with IQ Combiner 4C
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

### Simple

- Centered mounting brackets support single stud mounting
- Supports bottom, back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80A total PV or storage branch circuits

### Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKU's
- UL listed

## Enphase IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 (X-IQ-AM1-240-4)	IQ Combiner 4 with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the IQ Battery system and IQ System Controller 2 and to deflect heat.
IQ Combiner 4C (X-IQ-AM1-240-4C)	IQ Combiner 4C with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat.
ACCESSORIES AND REPLACEMENT PARTS (not included, order separately)	
Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan for Ensemble sites - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit support Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C
X-IQ-NA-HD-125A	Hold down kit for Eaton circuit breaker with screws.
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Gateway breaker included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (53.5 cm) with mounting brackets.
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1



To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)



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# Enphase IQ Battery 10T

The **Enphase IQ Battery 10T** all-in-one AC-coupled storage system is **reliable, smart, simple**, and **safe**. It is comprised of three base IQ Battery 3T storage units, has a total usable energy capacity of 10.08 kWh and twelve embedded grid-forming microinverters with 3.84 kW power rating. It provides backup capability and installers can quickly design the right system size to meet the needs of both new and retrofit solar customers.



### Reliable

- Proven high reliability IQ series microinverters
- Ten-years limited warranty, extendable to 15 years<sup>4</sup>
- Three independent IQ Battery base units
- Twelve embedded IQ8X-BAT microinverters
- Passive cooling (no moving parts/fans)

### Smart

- Grid-forming capability for backup operation
- Remote software and firmware upgrade
- Mobile app-based monitoring and control
- Support for self consumption
- Utility time of use (TOU) optimization

### Simple

- Fully integrated AC battery system
- Quick and easy plug-and-play installation
- Interconnects with standard household AC wiring

### Safe

- Safety tested battery cells and module
- Lithium iron phosphate (LFP) chemistry for maximum safety and longevity

## Enphase IQ Battery 10T

MODEL NUMBER	
ENCHARGE-10T-1P-NA	IQ Battery 10T battery storage system with integrated Enphase IQ series microinverters and battery management unit (BMU). Includes: - Three IQ Battery 3T base units (B03-T01-US00-1-3) - One IQ Battery 10T cover kit with cover, wall mounting bracket, and interconnect cable for wiring between batteries (B10T-C-1290-O)
OUTPUT (AC)	
@ 240 VAC <sup>1</sup>	
Rated (continuous) output power	3.84 kVA
Peak output power	5.76 kVA (10 seconds)
Nominal voltage / range	240 / 211 – 264 VAC
Nominal frequency / range	60 / 57 – 63 Hz
Rated output current	16 A
Peak output current	24.6A (10 seconds)
Power factor (adjustable)	0.85 leading ... 0.85 lagging
Maximum units per 20 A branch circuit	1 unit (single phase)
Interconnection	Single-phase
Maximum AC short circuit fault current over 3 cycles	69.6 Arms
Round trip efficiency <sup>2</sup>	89%
BATTERY	
Total capacity	10.5 kWh
Usable capacity	10.08 kWh
Round trip efficiency	96%
Nominal DC voltage	67.2 V
Maximum DC voltage	75.6 V
Ambient operating temperature range	-15° C to 55° C (5° F to 131° F) non-condensing
Optimum operating temperature range	0° C to 30° C (32° F to 86° F)
Chemistry	Lithium iron phosphate (LFP)
MECHANICAL DATA	
Dimensions (WxHxD)	1283 x 775 x 188 mm (50.5 x 30.5 x 7.4 in)
Weight	Three individual 40.5 kg (89.3 lbs) base units plus 22.1 kg (48.7 lbs) cover and mounting bracket; total 143.6 kg (316.5 lbs)
Enclosure	Outdoor – NEMA type 3R
IQ8X-BAT microinverter enclosure	NEMA type 6
Cooling	Natural convection – No fans
Altitude	Up to 2500 meters (8200 feet)
Mounting	Wall mount
FEATURES AND COMPLIANCE	
Compatibility	Compatible with grid-tied PV systems. Compatible with Enphase M215/M250 and IQ Series Micros, Enphase IQ System Controller, and Enphase IQ Gateway for backup operation.
Communication	Wireless 2.4 GHz
Services	Backup, self-consumption, TOU, Demand Charge, NEM Integrity
Monitoring	Enphase Installer Platform monitoring options; API integration
Compliance	UL 9540, UN 38.3, UL 1998, UL 991, NEMA Type 3R, AC156 EMI: 47 CFR, Part 15, Class B, ICES 003 Cell Module: UL 1973, UN 38.3 Inverters: UL 62109-1, IEC 62109-2, UL 1741SA, CAN/CSA C22.2 No. 107.1-16, and IEEE 1547
LIMITED WARRANTY	
Limited Warranty	>70% capacity, up to 10 years or 4000 cycles <sup>3</sup> , extendable to 15 years <sup>4</sup>

1. Supported in both grid-connected and backup operation.  
2. AC to Battery to AC at 50% power rating.  
3. Whichever occurs first. Restrictions apply.  
4. Terms and conditions apply.



# Enphase IQ System Controller 2

The **Enphase IQ System Controller 2** connects the home to grid power, the IQ Battery system, and solar PV. It provides microgrid interconnection device (MID) functionality by automatically detecting and seamlessly transitioning the home energy system from grid power to backup power in the event of a grid failure. It consolidates interconnection equipment into a single enclosure and streamlines grid independent capabilities of PV and storage installations by providing a consistent, pre-wired solution for residential applications.



### Reliable

- Durable NEMA type 3R enclosure
- Ten-year limited warranty

### Smart

- Controls safe connectivity to the grid
- Automatically detects grid outages
- Provides seamless transition to backup

### Simple

- Connects to the load or service equipment<sup>1</sup> side of the main load panel
- Centered mounting brackets support single stud mounting
- Supports conduit entry from the bottom, bottom left side, and bottom right side
- Supports whole home and partial home backup and subpanel backup
- Up to 200A main breaker support
- Includes neutral-forming transformer for split phase 120/240V backup operation
- IQ System Controller supports backward compatibility with older generation of PV microinverters (M215, M250 and S series), making it simple for home owners to upgrade their systems
- Easy integration with generator from major manufacturers

1. IQ System Controller 2 is not suitable for use as service equipment in Canada.

To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)



## Enphase IQ System Controller 2

MODEL NUMBER		
EP200G101-M240US01	Enphase IQ System Controller 2 with neutral-forming transformer (NFT), Microgrid Interconnect Device (MID), breakers, and screws. Streamlines grid-independent capabilities of PV and battery installations.	
ACCESSORIES and REPLACEMENT PARTS		
EP200G-NA-XA-E3	Replacement IQ System Controller 2 printed circuit board	
EP200G-NA-HD-200A	Eaton type BR circuit breaker hold-down screw kit, BRHDK125	
CT-200-SPLIT	200 A split core current transformers for Generator metering (+/- 2.5%)	
Circuit breakers (as needed) <sup>2,3</sup>	Not included, must order separately: • BRK-20A-2P-240V-B: Circuit breaker, 2 pole, 20A, 10kAIC, BR220B • BRK-30A-2P-240V: Circuit breaker, 2 pole, 30A, 10kAIC, BR230B • BRK-40A-2P-240V: Circuit breaker, 2 pole, 40A, 10kAIC, BR240B • BRK-60A-2P-240V: Circuit breaker, 2 pole, 60A, 10kAIC, BR260 • BRK-80A-2P-240V: Circuit breaker, 2 pole, 80A, 10kAIC, BR280	
• BRK-100A-2P-240V: Main breaker, 2 pole, 100A, 25kAIC, CSR2100		
• BRK-125A-2P-240V: Main breaker, 2 pole, 125A, 25kAIC, CSR2125N		
• BRK-150A-2P-240V: Main breaker, 2 pole, 150A, 25kAIC, CSR2150N		
• BRK-175A-2P-240V: Main breaker, 2 pole, 175A, 25kAIC, CSR2175N		
• BRK-200A-2P-240V: Main breaker, 2 pole, 200A, 25kAIC, CSR2200N		
EP200G-HNDL-R1	IQ System Controller 2 installation handle kit (order separately)	
EP200G-LITKIT	IQ System Controller 2 literature kit, including labels, feed-through headers, screws, filler plates, and QIG	
BRK-20A40A-2P-240V	2 pole, 20A/40A, 10kAIC, BQC220240	
ELECTRICAL SPECIFICATIONS		
Assembly rating	Continuous operation at 100% of its rating	
Nominal voltage / range (L-L)	240 VAC / 100 - 310 VAC	
Voltage measurement accuracy	±1% V nominal (±1.2V L-N and ±2.4V L-L)	
Auxiliary contact for load control, excess PV control, and generator two-wire control	24V, 1A	
Nominal frequency / range	60 Hz / 56 - 63 Hz	
Frequency measurement accuracy	±0.1 Hz	
Maximum continuous current rating	160A	
Maximum input overcurrent protection device	200A	
Maximum output overcurrent protection device	200A	
Maximum overcurrent protection device rating for Generator circuit <sup>4</sup>	80A	
Maximum overcurrent protection device rating for storage branch circuit <sup>4</sup> (the storage branch circuit can be replaced with PV)	80A	
Maximum overcurrent protection device rating for IQ8 PV combiner branch circuit <sup>4</sup>	80A	
Neutral Forming Transformer (NFT)	• Breaker rating (pre-installed): 40A between L1 and Neutral; 40A between L2 and Neutral • Continuous rated power: 3600VA • Maximum continuous unbalance current: 30A @ 120V • Peak rated power: 8800VA for 30 seconds • Peak unbalanced current: 80A @ 120V for 30 seconds	
MECHANICAL DATA		
Dimensions (WxHxD)	50cm x 91.6cm x 24.6cm (19.7 in x 36 in x 9.7 in)	
Weight	39.4 kg (87 lbs)	
Ambient temperature range	-40° C to +50° C (-40° F to 122° F)	
Cooling	Natural convection, plus heat shield	
Enclosure environmental rating	Outdoor, NEMA type 3R, polycarbonate construction	
Altitude	To 2500 meters (8200 feet)	
WIRE SIZES		
Connections (All lugs are rated to 90C)	• Main lugs and backup load lugs • CSR breaker bottom wiring lugs • BR breakers (wire provided) • AC combiner lugs, Encharge lugs, and generator lugs • Neutral (large lugs)	Cu/Al: 1 AWG – 300 KCMIL Cu/Al: 2 AWG – 300 KCMIL 6 AWG 14 AWG – 2 AWG Cu/Al: 6 AWG - 300 KCMIL
Neutral and ground bars	Large holes (5/16-24 UNF) Small holes (10-32 UNF)	14 AWG – 1/0 AWG 14 AWG – 6 AWG
COMPLIANCE		
Compliance	UL 1741, UL 1741 SA, UL 1741 PCS, UL1998, UL869A <sup>5</sup> , UL67 <sup>5</sup> , UL508 <sup>5</sup> , UL50E <sup>5</sup> CSA 22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003, AC156. IQ System Controller 2 is approved for Use as Service Equipment in the United States <sup>5</sup> .	

2. Compatible with BRHDK125 Hold-Down Kit to comply with 2017 NEC 710.15E for back-fed circuit breakers.

3. The IQ System Controller 2 is rated 22 kAIC

4. Not included. Installer must provide properly rated breaker per circuit breaker list above.

5. Sections from these standards were used during the safety evaluation and included in the UL 1741 listing.

To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)

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Enphase P/N: EP200G-NA-02-RSD  
IMO P/N: SI16-PEL64R-2-ENP



Key Features

- Enclosed Solar Isolator
- 600VDC, 16A
- IP66 / NEMA 4X Protection Rating
- 2 Pole, 1 String
- Grey/Black Enclosure Cover & Handle

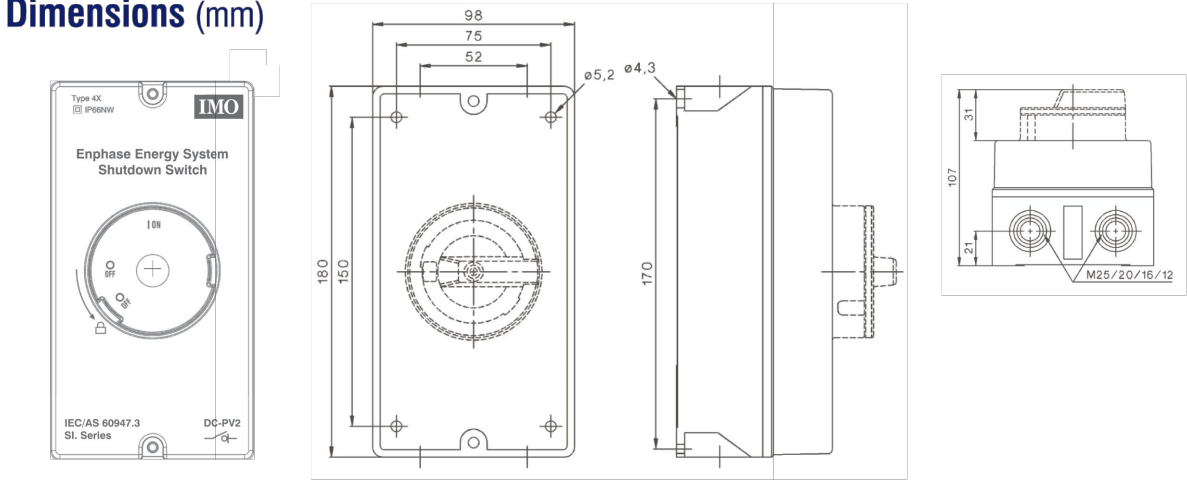


Technical Data for DC

Main Contacts	DC	Units	SI16 DC-PV1 (acc. to IEC 60947-3)	SI16 (acc. to UL508I)
Rated Thermal Current I <sub>th</sub>		A	16	
Rated Insulation Voltage UI <sup>1)</sup>		V	1000	
Rated Insulation Voltage UI <sup>2)</sup>		V	1500	
Distance of Contacts (per pole)		mm	8	
Rated Operational Current I <sub>e</sub>	300V	A	16	16
	350V	A	16	16
	400V	A	16	16
	500V	A	16	16
	600V	A	16	16
Rated Conditional Short Circuit Current		kA <sub>ref</sub>	5	
Max. Fuse Size	gL (gG)	A	40	
Mechanical Life		Ops	10,000	
Rated Short-time Withstand Current (1s) I <sub>sw</sub>		A	800	
Short Circuit Making Capacity I <sub>sc</sub>		A	800	
Size of Terminal Screw			M4 Pz2	
Cable Cross Sections (solid or stranded)		mm / AWG	4 - 16 / 12-10	
Tightening Torque		Nm / lb.in	1.7 - 1.8 / 9 - 16	
Maximum Operation Ambient Temperature		°C	-40 to +45	
Maximum Storage Ambient Temperature		°C	-50 to +90	
Power Loss at I <sub>emax</sub>		(A) / W	(16) / 1	

Contact Resistance per pole 1.75mΩ  
1) Suitable at overvoltage category I to III, pollution degree 3 (standard-industry): Uimp = 8kV.  
2) Suitable at overvoltage category I to III, pollution degree 2 (min. IP55): Uimp = 8kV.

Dimensions (mm)





# Installing the Enphase Ensemble™ Communications Kit

The Enphase Ensemble Communications Kit (COMMS-KIT-01) contains a wireless USB adapter to install in an Enphase IQ Combiner™ or near an Enphase IQ Envoy™. The kit enables wireless communication between the Enphase IQ Envoy or Enphase IQ Combiner™ and Enphase Encharge™ storage as well as Enphase Enpower™ Microgrid Interconnection Device (MID). Note that you must install the Ensemble Communications Kit to enable complete functionality of the Ensemble energy management system. The kit includes a 2.4 GHz wireless radio.

Read and follow all warnings and instructions in this Guide. If you do not fully understand any of the concepts, terminology, or hazards outlined in these instructions, refer installation to a qualified electrician or installer. These instructions are not meant to be a complete explanation of a renewable energy system. All installations must comply with national and local electrical codes. Professional installation is recommended.

## SAFETY

### IMPORTANT SAFETY INSTRUCTIONS SAVE THESE INSTRUCTIONS

This guide contains important instructions that you must follow during installation of the Enphase Ensemble Communications Kit.

### Safety and Advisory Symbols

	<b>DANGER:</b> This indicates a hazardous situation, which if not avoided, will result in death or serious injury.
	<b>WARNING:</b> This indicates a situation where failure to follow instructions may be a safety hazard or cause equipment malfunction. Use extreme caution and follow instructions carefully.
	<b>NOTE:</b> This indicates information particularly important for optimal system operation. Follow instructions carefully.

### Safety Instructions

	<b>DANGER:</b> Risk of electric shock. Risk of fire. Do not attempt to repair the Enphase Ensemble Communications Kit. It contains no user-serviceable parts. If the equipment fails, contact Enphase Customer Support for assistance or replacement equipment (enphase.com/en-us/support/contact).
	<b>DANGER:</b> Risk of electric shock. Do not use Enphase equipment in a manner not specified by the manufacturer. Doing so may cause death or injury to persons, or damage to equipment.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Only qualified personnel should troubleshoot, install, or add parts to the IQ Combiner or IQ Envoy.
	<b>DANGER:</b> Risk of electric shock. All sources to equipment being serviced must be disconnected external to the device. In particular, the storage system may energize conductors, so storage circuits must ALWAYS be isolated via circuit breaker or disconnect before working on any portion of the system.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Only use electrical system components approved for wet locations.



	<b>DANGER:</b> Risk of electric shock. Risk of fire. Ensure that all wiring is correct and that none of the wires are pinched or damaged.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Do not work alone. Someone should be in the range of your voice or close enough to come to your aid when you work with or near electrical equipment. Remove rings, bracelets, necklaces, watches etc. when working with batteries, photovoltaic modules or other electrical equipment.
	<b>DANGER:</b> Risk of electric shock. Risk of fire. Before making any connections verify that the circuit breakers are in the off position. Double check all wiring before applying power.
	<b>WARNING:</b> Before installing or using the IQ Combiner, read all instructions and cautionary markings in the technical description and on the equipment.
	<b>NOTE:</b> Using unapproved attachments or accessories could result in damage or injury.

## INSTALLATION

**DANGER!** Risk of electric shock. Always de-energize the IQ Combiner if planning to remove the deadfront during the following procedure.

**DANGER!** Risk of electric shock. All sources to equipment being serviced must be disconnected external to the device. In particular, the storage system may energize conductors, so storage circuits must ALWAYS be isolated via circuit breaker or disconnect before working on any portion of the system

### 1 Preparation

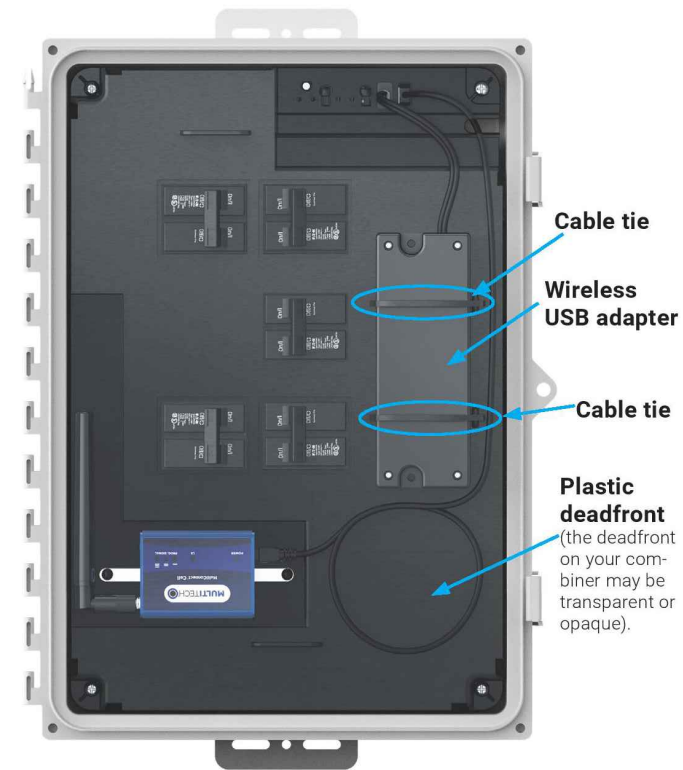
The IQ Envoy gateway requires the Ensemble Communications Kit to communicate with the Encharge batteries and Enpower.

- A) You must install the Ensemble Communications Kit before commissioning the Ensemble system.
- B) If you plan to remove deadfront, check that the IQ Combiner is de-energized.

### 2 Install the Communications Adapter

The kit includes the wireless USB adapter with USB cable (for power and communications) and tie wraps. To install the adapter adjacent to an Enphase IQ Envoy or in an Enphase IQ Combiner, do the following:

- A) If installing in an IQ Combiner, open the enclosure door.
- B) Select or locate the installation position for the adapter:
  - For IQ Combiner (Model X-IQ-AM1-240-B), place the adapter on the bottom interior surface of the enclosure, taking care to allow room for the door to close completely.
  - For IQ Combiner 3 and IQ Combiner 3C (Models X-IQ-AM1-240-3 and Model X-IQ-AM1-240-3C), place the adapter on the front side of the deadfront on the right side (see image to the right).
  - For the IQ Combiner+ (Model X-IQ-AM1-240-2), place the adapter on the front side of the deadfront on the left side.
  - For IQ Envoy (Model ENV-IQ-AM1-240), select a mounting location near the IQ Envoy, so that the USB cable can reach between the IQ Envoy and the adapter.
- C) Plug the free end of the USB cable into a USB port on the IQ Envoy.
- D) If installing in an IQ Combiner, use the tie wraps and adhesive patch to hold the adapter in place in the designated location. Either weave the tie wraps through the openings in the dead front, or use the adhesive patch to hold the adapter in place. You can use both, if needed.
- E) If installing the adapter with an IQ Envoy not housed in an Enphase Combiner, you can use screws to mount the adapter to the wall or a board. Use one screw in each of the two recesses of the adapter. To avoid damaging adapter housing, do not over tighten the screws



IQ Combiner 3C-ES with Ensemble Communications Kit installed

### 3 Upgrade the IQ Envoy Software

You must upgrade the IQ Envoy software to version 6.0.x or higher to work with the COMMS-KIT-01 and other Ensemble components.

A ) Download the Enphase Installer Toolkit version 3.x mobile app from the iOS App Store or Android Play Store and open it to log in to your Enlighten account. With this app, you can connect to the IQ Envoy to track system installation progress.

You may also download the app from the Enphase website at [enphase.com/toolkit](https://enphase.com/toolkit).

B ) Log into the Enphase Installer Toolkit on your mobile device and download the latest version of Envoy software. To do so, go to the **Settings** tab in the installer toolkit and use the **Update Now** button under **Envoy Software** as shown.

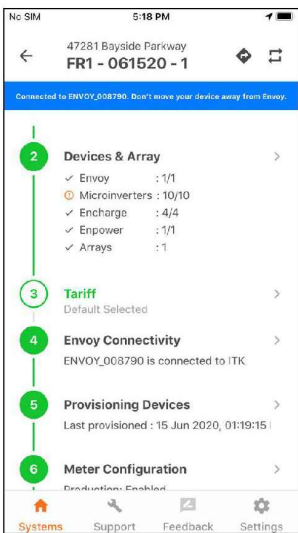
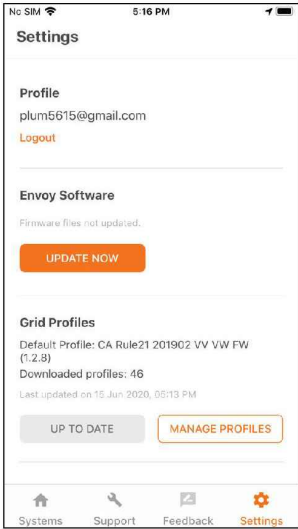
C ) Use the Installer Toolkit app v3.x app from the iOS App store or the Android Play store and follow the commissioning procedure for Ensemble installation sites as documented in the *Enphase Ensemble 1.0 Commissioning Guide* ([enphase.com/ensemble-commissioning](https://enphase.com/ensemble-commissioning)) to ensure the Encharge batteries and the Enpower are connected to the Envoy. Ensure that you have updated the Envoy software as part of Step 3B above.

The image to the left shows Envoy Connectivity.

**Note:** The Envoy software update process may take up to 25 minutes. During the software update, the LEDs on the Envoy flash green one at a time from right to left. During this time the Envoy will reboot multiple times. All four LEDs flash red when the Envoy reboots.

D ) During provisioning of devices, with your mobile device in hand, walk from the IQ Envoy toward the Encharge and Enpower. This helps to ensure that all devices are provisioned over using Bluetooth Low Energy (BLE).

- Starting near the IQ Envoy, walk to the Enpower and Encharge units. Installer Toolkit shows the Enpower and Encharge units as **Not Discovered** while the circle next to these devices spins indicating that Installer Toolkit is trying to discover the devices using Bluetooth.
- Wait near the Enpower and Encharge units until Installer Toolkit shows them as **Waiting for Provisioning**.
- Return to the IQ Envoy. All devices should show as **Waiting for Acknowledgment**. Installer Toolkit is waiting for Envoy to confirm communication with the Encharge units and Enpower.
- Wait until all devices show as **Provisioned**.
- Provisioning is complete. The Enpower and Encharge units are ready to communicate with the IQ Envoy.



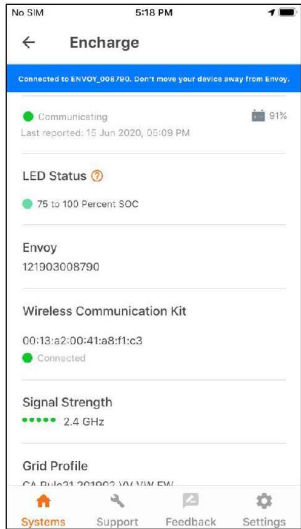
### 4 Verifying Wireless Communication After Commissioning

After commissioning you can verify wireless communication between IQ Envoy and other Ensemble components using the Enphase Installer Toolkit mobile app.

A ) Navigate to **Devices & Array** -> **Encharge** or **Enpower**-> <serial number>.

B ) You should be able to see the signal strength of the communication between the COMMS-KIT-01 and Encharge/Enpower devices under Wireless Communication Kit as shown.

**Note:** Three or more bars (out of five) represent a good communication level.





# SAFETY WARNINGS

## Radio Frequency (RF) Safety

To avoid possible radio frequency (RF) interference, follow any special regulations for using radio equipment, and follow the safety advice listed here:

- Operating the device close to other electronic equipment may cause interference if the equipment is inadequately protected.
- Observe any warning signs and the manufacturer recommendations. Different industries and businesses restrict the use of cellular devices. Respect restrictions on the use of radio equipment in fuel depots, chemical plants, or where blasting operations are in process. Follow restrictions for any environment where you operate the device.
- Do not place the antenna outdoors, unless in an outdoor-rated enclosure.
- Switch OFF your wireless device when in an aircraft. Failing to observe this restriction may lead to suspension or denial of cellular services to the offender, legal action, or both.
- Switch OFF your wireless device when around gasoline or diesel fuel pumps and before filling your vehicle with fuel.
- Switch OFF your wireless device in hospitals and any other place where medical equipment may be in use
- Refer to Potential Interference with Pacemakers and Other Medical Devices.

## Potential Interference with Pacemakers and Other Medical Devices

Radio frequency energy (RF) from cellular devices can interact with some electronic devices, causing electromagnetic interference (EMI). The FDA helped develop a detailed test method to measure EMI of implanted cardiac pacemakers and defibrillators from cellular devices. This test method is part of the Association for the Advancement of Medical Instrumentation (AAMI) standard. This standard allows manufacturers to ensure that cardiac pacemakers and defibrillators are safe from cellular device EMI.

The FDA continues to monitor cellular devices for interactions with other medical devices. If harmful interference occurs, the FDA will assess the interference and work to resolve the problem.

## Precautions for Pacemaker Wearers

EMI can affect a pacemaker in one of three ways:

- Stop the pacemaker from delivering the stimulating pulses that regulate the heart’s rhythm.
- Cause the pacemaker to deliver the pulses irregularly.
- Cause the pacemaker to ignore the heart’s own rhythm and deliver pulses at a fixed rate.

Based on current research, cellular devices do not pose a significant health problem for most pacemaker wearers. However, people with pacemakers may want to take simple precautions to avoid EMI from cellular devices:

- Keep the device on the opposite the side of the body from the pacemaker to add extra distance between the pacemaker and the device.
- Avoid placing a turned-on device next to the pacemaker (for example, don’t carry the device in a shirt or jacket pocket directly over the pacemaker).

## Antenna

The antenna intended for use with this unit meets the requirements for mobile operating configurations and for fixed mounted operations, as defined in 2.1091 and 1.1307 of the FCC rules for satisfying RF exposure compliance.



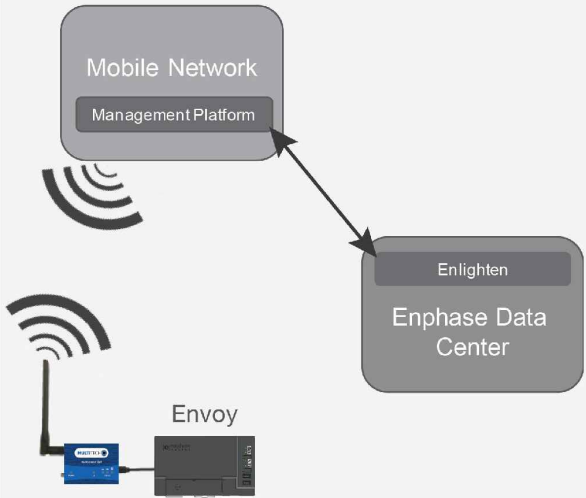
## QUICK INSTALL GUIDE



# Enphase Mobile Connect Installation Guide

This guide provides instructions on how to install Enphase Mobile Connect™ with the Enphase Envoy-S™ and the Enphase IQ Envoy™. This guide is intended for use by professional installation personnel. For details about the Envoy-S or IQ Envoy, refer to the Installation and Operation Manual.

## How Mobile Connect Works



Enphase Mobile Connect is a modem package that connects to the Enphase Envoy-S or IQ Envoy, and eliminates the need for an on-site Internet connection to monitor an Enphase Microinverter System. The addition of Mobile Connect to an Enphase System enables greater installation flexibility and provides reliable system monitoring independent of the Internet service on site.

Enphase Mobile Connect is pre-configured for data service and becomes activated when connected to the Envoy.

The Envoy collects module-level and system-level production data, and, if configured, consumption data, at pre-defined periods of time, typically at 15-minute intervals.

The report setting for an Envoy with Mobile Connect is **low bandwidth mode**, which transmits data to Enlighten four times a day. The transmission times occur within a five-minute window, at 3 am (03:00), 9 am (09:00), 3 pm (15:00), 9 pm (21:00). After transmission, the data may take several minutes to display in Enlighten.

## About Enphase Mobile Connect

The Envoy paired with Mobile Connect provides plug and play connectivity to the Enphase Enlighten™ monitoring platform. Mobile Connect includes the following:

- MultiTech 4G LTE Category M1 cellular modem (**CELLMODEM-M1**) or 4G cellular modem, MultiTech Cell 100 Series LAT1 (**CELLMODEM-03**) or 3G cellular modem MultiTech Cell 100 Series MTC-H5 (**CELLMODEM-01**)
- Five-year M2M data plan, upgradeable to 12 year plan (add 7 years) available for purchase
- SIM card - industrial grade, pre-configured, tested, and installed
- Antenna (some models have two antennas)
- USB Y to mini-USB or USB to mini-USB cable. The Envoy connects to the modem using a USB cable. The USB cable also powers the modem.
- Mounting hardware
- Four round plastic feet to allow use as a free-standing modem

Mobile Connect is available in regions where there is adequate (non-roaming) cellular service in the installation area, including the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands.

The basic Mobile Connect plan is available for systems of up to 60 microinverters. To monitor systems of more than 60 microinverters, additional charges apply.

The Enphase Mobile Connect modem cannot be transferred to a second Envoy after initial installation. Any attempt to do so will deactivates the modem.

## Installation Guidelines

- Enphase recommends that you install the Envoy-S or IQ Envoy and Mobile Connect modem in a non-metal enclosure. **For outdoor installations, you must use an outdoor rated enclosure.** The Envoy data sheets and installation guides list acceptable enclosure types.
- If you use a metal enclosure, you must install a dome antenna on the outside of the unit. Contact Enphase Customer Support for suggested dome antenna models.
- Orient the antenna for best reception, typically, a vertical alignment.
- Although Mobile Connect comes with an antenna, you can use other compatible antennas. Contact Enphase Customer Support for suggested antenna models.

## INSTALLATION

### A. Updating the Envoy to 4.9 (or Later)


The newest Mobile Connect modem (CELLMODEM-M1) requires that the Envoy be updated to Envoy release 4.9 (or later). **Other models do not requires this update.**



1. Download the Enphase Installer Toolkit mobile app and open it to log in to your Enlighten account. With this app, you can connect to the IQ Envoy to track system installation progress. To download, go to [enphase.com/toolkit](http://enphase.com/toolkit) or scan the QR code at right.
2. Log into Enphase Installer Toolkit on your mobile device to download the latest version of Envoy software. To do so, go to the **Envoy Resources** screen in the Installer Toolkit **Settings**.
3. Turn on the circuit feeding the Envoy.
4. On the Envoy, if the AP Mode LED is not lit, press the AP Mode button.

5. On your mobile device, go to Settings and join the Wi-Fi network "Envoy\_#####" (where "#####" represents the final six digits of the Envoy serial number).
6. The app informs you if the software on the Envoy is not the latest version by displaying the Envoy Software Update message. If the app displays this message, follow the on-screen instructions to update the Envoy.
7. For a short period (5-10 minutes), you must keep your mobile device near the Envoy. Follow the on-screen instructions while the update takes place.

The update may take up to 20 minutes. The Envoy reboots several times during the update and the LEDs light up in varied sequences until the update is complete.

All four LEDs flash amber during boot up (approximately 3 minutes). When boot up is complete, the Envoy's Device Communications LED  lights solid amber, indicating that devices are not yet detected.



## B. Mounting the Modem

Mount the modem, either on a wall using the slide-in tab, or attach the rubber feet and place on a flat surface.

### Using a Mounting Tab

1. Locate the groove on the back of the device.
2. Slide the mounting rod into the groove.
3. Place the modem on the mounting surface.
4. Secure to the surface using the holes at each end of the mounting rod.

### Mount the Modem on a Flat Surface

You can also rest the modem on a flat, stable surface after applying the four adhesive plastic feet.

## C. Connecting the Modem

1. Connect one antenna to the connector labeled **CELL** on the modem. If your modem has a second antenna, connect the second antenna to the connector labeled **AUX**.
2. Connect the USB cable:
  - a. First, connect the USB cable to the USB port(s) on the Envoy.
  - b. Then, connect the mini-USB connector to the Mobile Connect modem.

The power LED lights when the modem has power. After about two minutes, the Link Status LED flashes to indicate a network connection. The Signal LEDs indicate signal strength according to the Signal LED table.

No additional configuration is needed. The Envoy automatically starts reporting to Enlighten via the cellular modem.

For the Envoy-S or IQ Envoy, check the Network Communication LED to verify connectivity to Enlighten. Refer to the **Enphase Envoy-S or IQ Envoy Quick Install Guide** for LED status indications.




**WARNING: If you have already installed and connected the cellular modem to the Envoy, do NOT move the modem to another Envoy. This deactivates the modem.**

## D. Checking Connection Status and Cellular Signal Strength

An Envoy with Mobile Connect automatically reports to Enlighten. When the Envoy establishes an Internet connection through the cellular modem, the Envoy Network Communications LED  lights solid green in the Envoy-S.

You can use the Enphase Installer Toolkit to check the modem status and cellular signal strength. The Envoy's AP (Access Point) Wi-Fi network allows you to connect your mobile device (smart phone or tablet) to the IQ Envoy.

1. On the Envoy, the AP Mode LED  lights solid green when the network is available. If the AP Mode LED is not lit, press the **AP Mode** button.
2. On your mobile device, go to **Settings** and join the Wi-Fi network "Envoy\_nnnnnn" (where "nnnnn" represents the final six digits of the IQ Envoy serial number).
3. Launch Installer Toolkit and tap Connect to Envoy.
4. Tap **Network**.
5. Under **Network Configuration**, tap **Cellular**.

The app displays Connection Status and an indication of signal strength.

6. Check the connection status and verify that signal strength is **at least two bars** for adequate data transmission.

## Checking the MultiTech Status LEDs

This MultiTech modem has the following status LEDs

- Power
- LS
- Signal

The following tables list LED indicator status. The LEDs may be difficult to see if you view them from an angle. View the LEDs straight on.

### Power

LED	Indicates
Off	DC power not present
On	DC power present

### LS (Link Status)

LED	Indicates
Lit solid	The modem is not registered to the cellular network.
Flashing	The modem is registered to the cellular network.

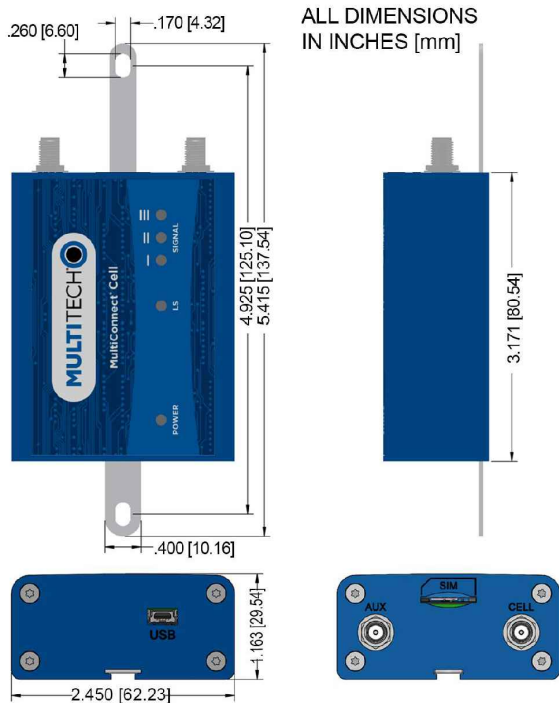
### Signal

LEDs	Description	Indicates
  	All off	Very weak signal
  	Bar 1 ON	Weak signal
  	Bar 1 and 2 ON	Good signal
  	Bar 1, 2, and 3 ON	Very good signal

## Troubleshooting

Issue	Action
No communication with Enlighten after connecting the cellular modem to the Envoy.	<ol style="list-style-type: none"><li>1. Disconnect the USB cable.</li><li>2. Power cycle the Envoy.</li><li>3. Wait until the Envoy boots completely.</li><li>4. Reconnect the cellular modem USB cable.</li></ol>
I want to disconnect the modem and re-use it at a different site.	Moving the modem to a different Envoy deactivates the modem. Contact Enphase Customer Support if you need to re-install the modem at a different site.

## MultiTech Modem Dimensions



# REGULATORY NOTICES

### FCC - Antenna - Wireless Products only

The antenna intended for use with this unit meets the requirements for mobile operating configurations and for fixed mounted operations, as defined in 2.1091 and 1.1307 of the FCC rules for satisfying RF exposure compliance. If an alternate antenna is used, please consult user documentation for required antenna specifications.

### FCC - 47 CFR Part 15 Regulation

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the 47 CFR rules. Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.



**WARNING:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### Industry Canada Class B Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement Canadien sur le matériel brouilleur.

This device complies with Industry Canada RSS Appliance radio exempt from licensing. The operation is permitted for the following two conditions:

1. the device may not cause harmful interference, and
2. the user of the device must accept any interference suffered, even if the interference is likely to jeopardize the operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

### Industry Canada and FCC

This device complies with Industry Canada license-exempt RSS standard(s) and part 15 of the FCC rules. Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme avec Industrie Canada RSS exemptes de licence standard (s) et la partie 15 des règles de la FCC. Son fonctionnement est soumis aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

### EMC, Safety, and R&TTE Directive Compliance

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 2004/108/EC of 15 December 2004 on the approximation of the laws of Member States relating to electromagnetic compatibility;

and

Council Directive 2006/95/EC of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;

and

Council Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment;

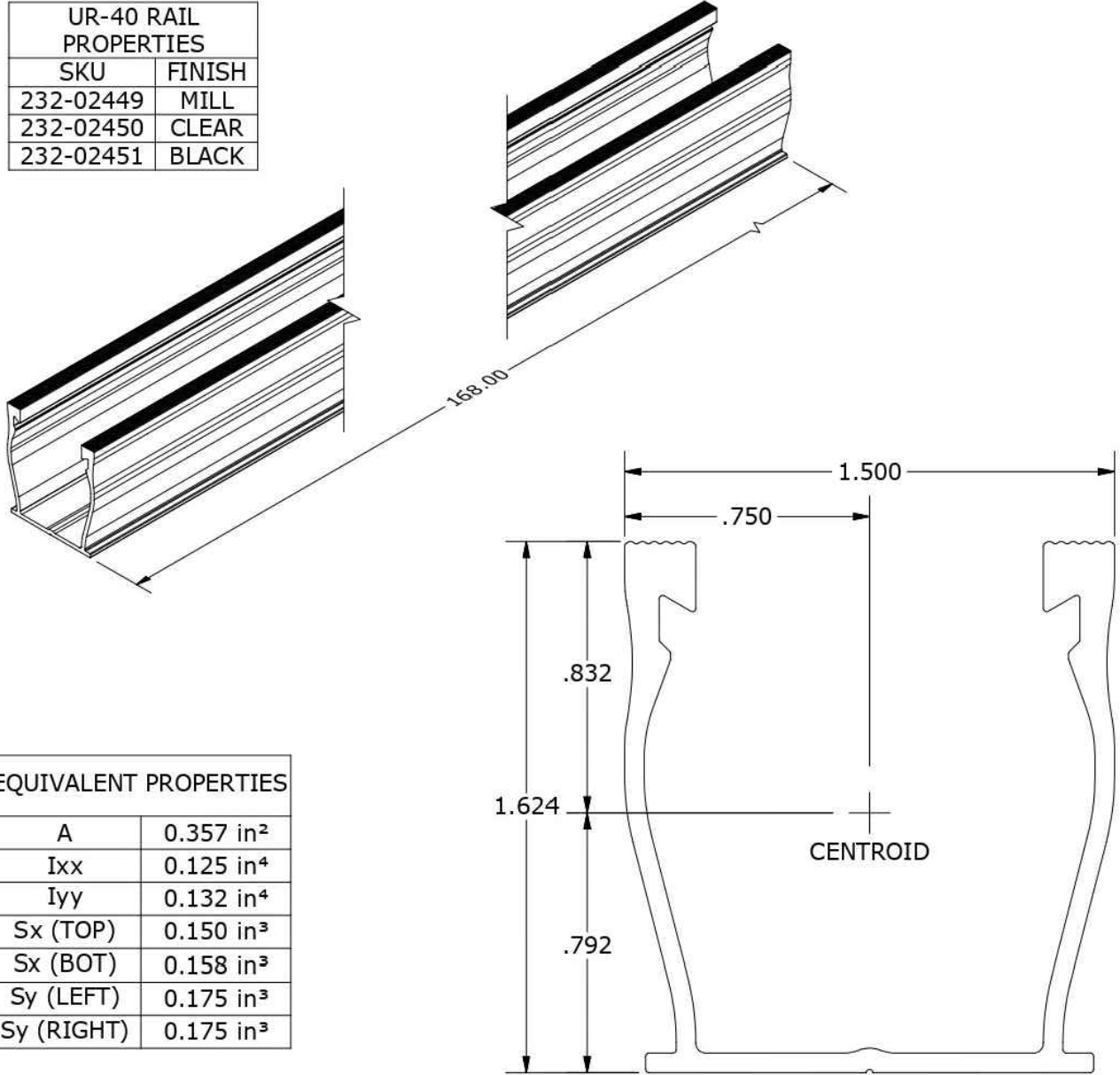
and

Council Directive 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.



DESCRIPTION:	DRAWN BY:	<div>SnapNrack™ Solar Mounting Solutions</div> <div>595 MARKET STREET, 20TH FLOOR • SAN FRANCISCO, CA 94105 USA PHONE (415) 580-8900 • FAX (415) 580-8902</div> <div>THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY. ANY REPRODUCTION, DISCLOSURE, OR USE THEREOF IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF SUNRUN SOUTH LLC.</div>
SNAPNRACK, UR-40 RAIL	mwatkins	
PART NUMBER(S):	REVISION:	
232-02449, 232-02450, 232-02451	B	

UR-40 RAIL PROPERTIES	
SKU	FINISH
232-02449	MILL
232-02450	CLEAR
232-02451	BLACK



EQUIVALENT PROPERTIES	
A	0.357 in <sup>2</sup>
Ixx	0.125 in <sup>4</sup>
Iyy	0.132 in <sup>4</sup>
Sx (TOP)	0.150 in <sup>3</sup>
Sx (BOT)	0.158 in <sup>3</sup>
Sy (LEFT)	0.175 in <sup>3</sup>
Sy (RIGHT)	0.175 in <sup>3</sup>

ALL DIMENSIONS IN INCHES

MATERIALS:	6000 SERIES ALUMINUM	OPTIONS:
DESIGN LOAD (LBS):	N/A	CLEAR / BLACK ANODIZED
ULTIMATE LOAD (LBS):	N/A	MILL FINISH
TORQUE SPECIFICATION:	N/A LB-FT	BUNDLES OF 144
CERTIFICATION:	UL 2703, FILE E359313	BOXES OF 8
WEIGHT (LBS):	5.85	

SNAPNRACK UR SPEEDSEAL FOOT FOR COMPOSTION ROOF MOUNTING

MODULE HEIGHT OFF ROOF, RANGE:

UR-40: 3<sup>3</sup>/<sub>8</sub>" - 4<sup>3</sup>/<sub>8</sub>"

UR-60: 4" - 5"

REFER TO SNAPNRACK ENGINEERING CHARTS FOR APPLICABLE RAIL SPANS.

5/16"Ø S.S. LAG SCREW MUST EMBED A MIN. OF 2 1/2" INTO STRUCTURAL MEMBER

REFER TO SNAPNRACK INSTALLATION MANUAL FOR 5/16"Ø HARDWARE TORQUE SPECIFICATIONS

STRUCTURAL MEMBER SPECIFICATIONS:

MINIMUM WOOD GRADE = SPF #2

MINIMUM SPECIFIC GRAVITY = 0.42

ALLOWABLE FASTENER UPLIFT = 820 LBS

ALLOWABLE FASTENER LATERAL = 250 LBS

MINIMUM FASTENER EDGE DISTANCE = 0.5"

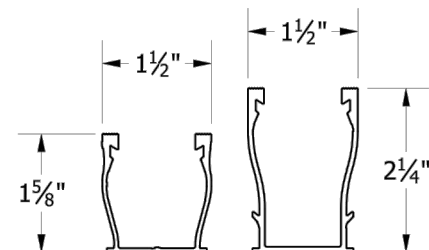
MINIMUM FASTENER END DISTANCE = 2.2"

SNAPNRACK, ULTRA RAIL MOUNT, TAPPED

SNAPNRACK, ULTRA RAIL MOUNT, THRU

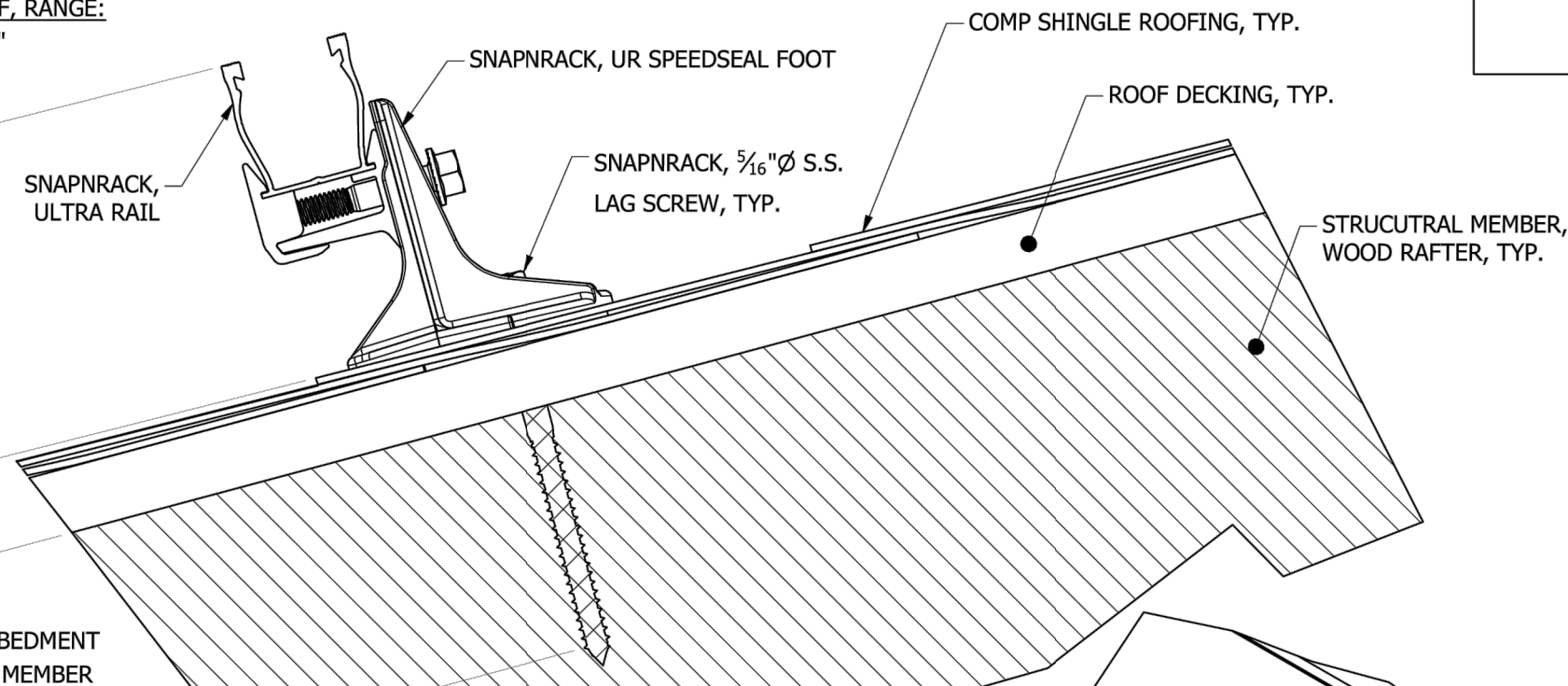
SNAPNRACK, SPEEDSEAL FOOT, BASE, SEALING

EXPLODED

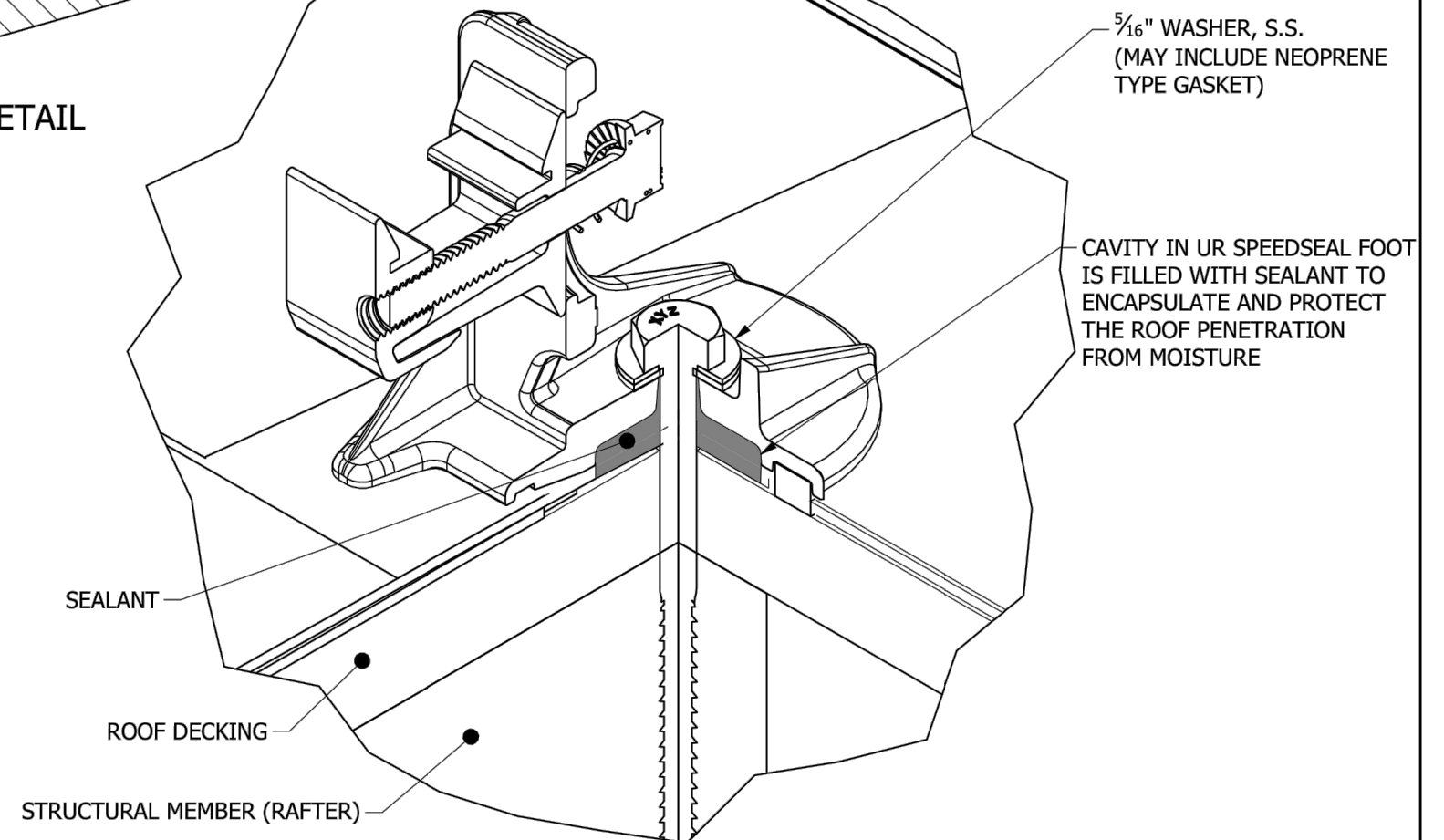
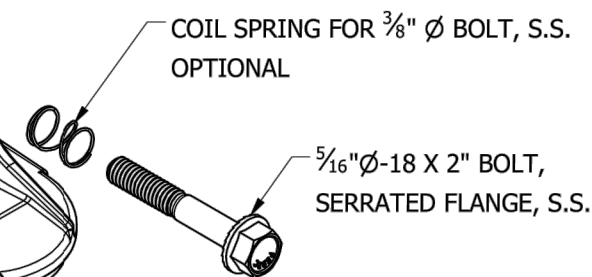


UR-40 RAIL | UR-60 RAIL

FOR USE WITH SNAPNRACK ULTRA SERIES RAILS



PENETRATION DETAIL



BIN:

8

REVISION:

1	3/10/2020	NEW DETAIL	MJA
2	6/5/2020	DIE CAST	BDP
3	7/22/2020	NAME UPDATE	MJA
4	10/2/2020	MIAMI-DADE	MJA

SnapNrack™  
Solar Mounting Solutions

Sunrun South LLC

595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA  
PHONE (415) 580-6900 • FAX (415) 580-6902

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DESIGNER: M.AFFENTRANGER

DRAFTER: M.AFFENTRANGER

APPROVED BY: B.PETERSON

SCALE: DNS

DATE: 10/2/2020

DRAWING NUMBER:  
SNR-DC-00438


DESCRIPTION:

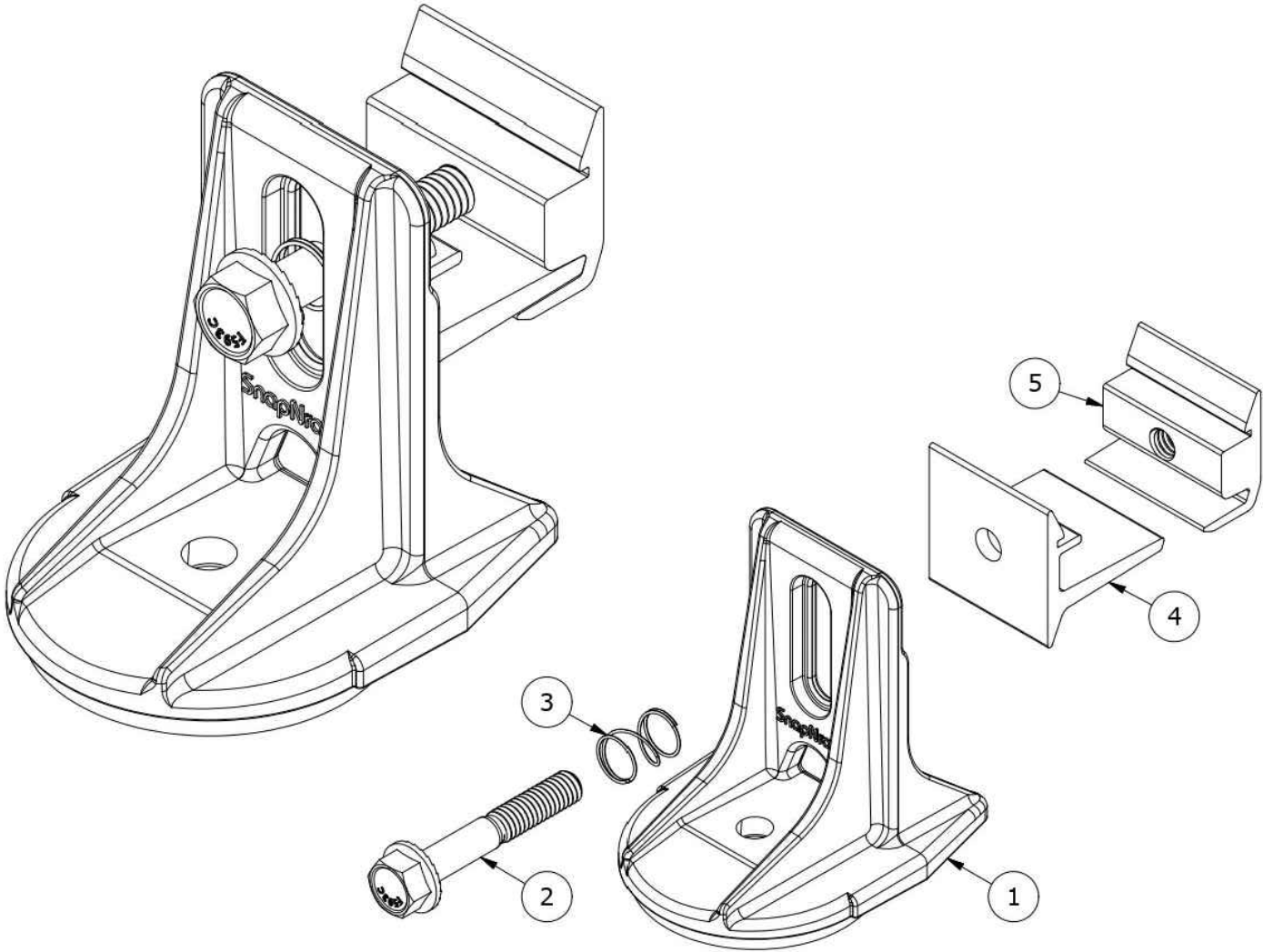
ULTRA RAIL, ATTACHMENT DETAIL, UR SPEEDSEAL FOOT TO RAFTER

REV:


4

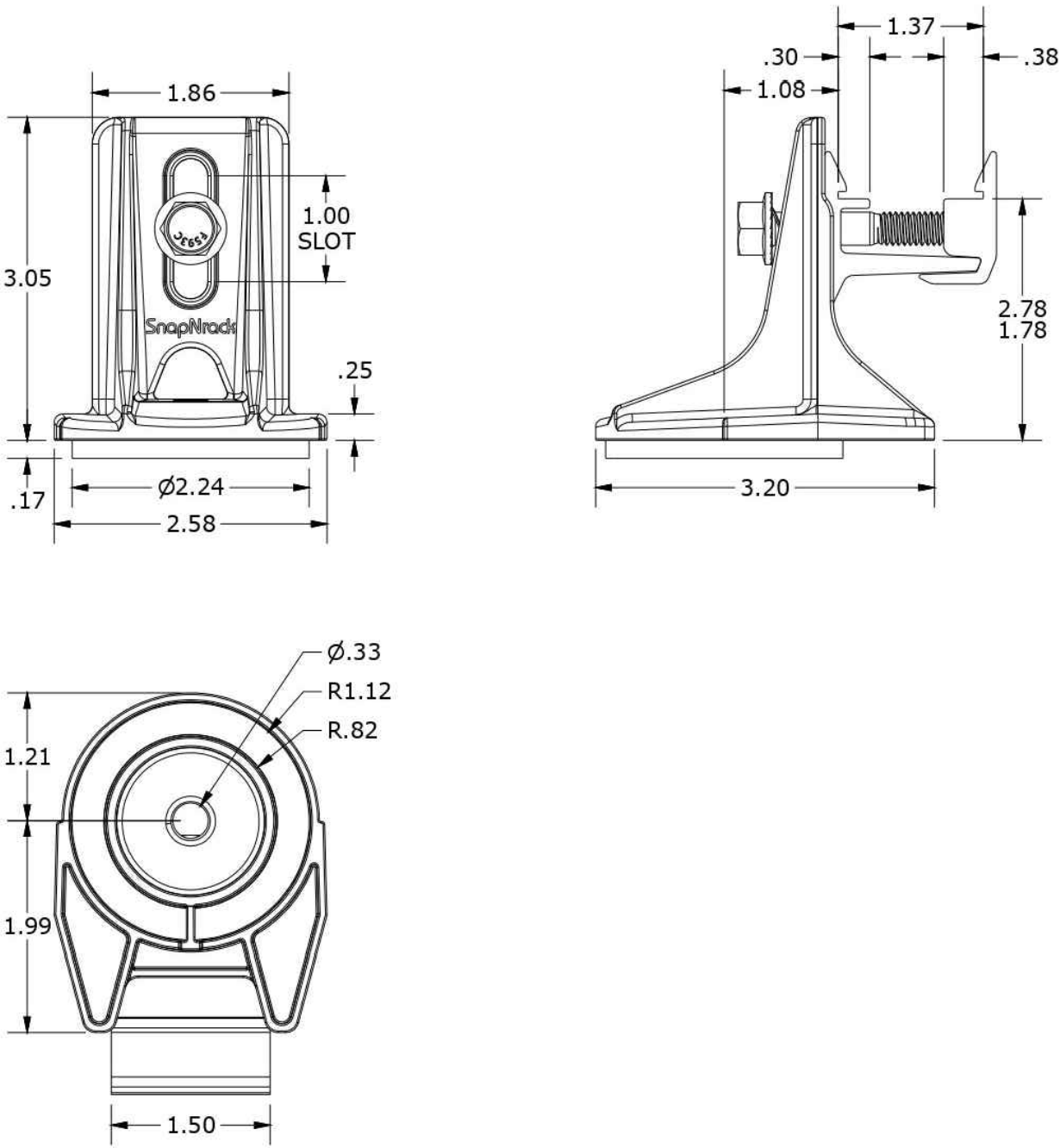


DESCRIPTION:	DRAWN BY:	
SNAPNRACK, ULTRA RAIL SPEEDSEAL™ FOOT	mwatkins	
PART NUMBER(S):	REVISION:	
242-02163, 242-02167	A	595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA PHONE (415) 580-6900 • FAX (415) 580-6902 <small>THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY. ANY REPRODUCTION, DISCLOSURE, OR USE THEREOF IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF SUNRUN SOUTH LLC.</small>



PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	SNAPNRACK, SPEEDSEAL FOOT, BASE, SEALING, SILVER / BLACK
2	1	BOLT, FLANGE, SERRATED, 5/16IN-18 X 2IN, SS
3	1	SNAPNRACK, RL UNIVERSAL, MOUNT SPRING, SS
4	1	SNAPNRACK, ULTRA RAIL MOUNT THRU PRC, CLEAR / BLACK
5	1	SNAPNRACK, ULTRA RAIL MOUNT TAPPED PRC, CLEAR / BLACK
MATERIALS:	DIE CAST A380 ALUMINUM, 6000 SERIES ALUMINUM, STAINLESS STEEL	
DESIGN LOAD (LBS):	802 UP, 1333 DOWN, 357 SIDE	OPTIONS:
ULTIMATE LOAD (LBS):	2118 UP, 4006 DOWN, 1331 SIDE	CLEAR / BLACK
TORQUE SPECIFICATION:	12 LB-FT	
CERTIFICATION:	UL 2703, FILE E359313; WIND-DRIVEN RAIN TEST FROM SUBJECT UL 2582	
WEIGHT (LBS):	0.45	

DESCRIPTION:	DRAWN BY:	
SNAPNRACK, ULTRA RAIL SPEEDSEAL™ FOOT	mwatkins	
PART NUMBER(S):	REVISION:	
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ALL DIMENSIONS IN INCHES



# SnapNrack UL 2703 Fire Classification

March 2019

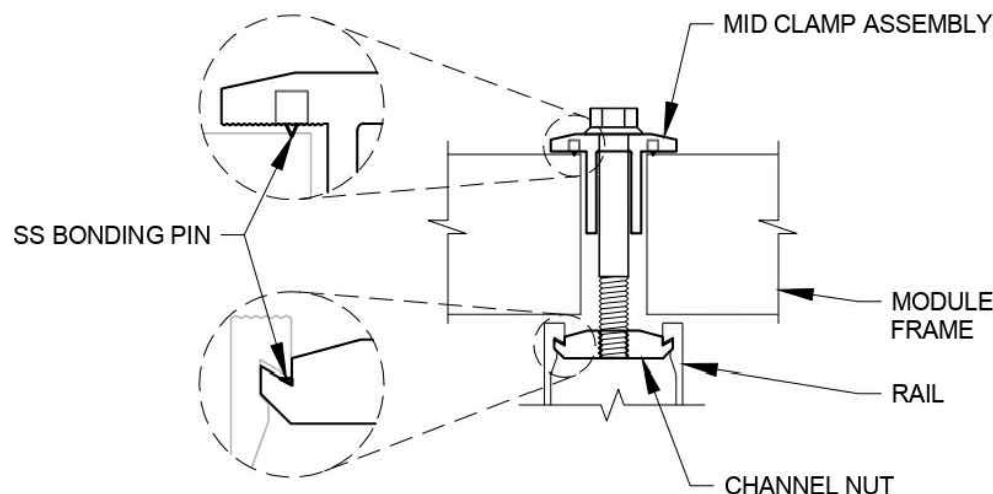
As of January 1st, 2015 many jurisdictions are now enforcing codes based upon updates to the International Building Code (IBC) and UL Standards 1703 (modules) and 2703 (mounting systems). The language included in the 2012 IBC requires that the combination of roof mounted solar modules and racking components is to be considered a system (IBC Section 1509.7.2). Additionally, it requires that this system shall meet or exceed the fire classification of the roof assembly.

The objective is to ensure that the PV system does not adversely affect the fire rating of the roof. Roof surface fire ratings are classified either A, B, or C; Class A being the most resistant to the spread of flame.

Since the physical characteristics of the PV module (material, thickness of glass, etc) also potentially affect how a fire will act, modules are now tested and assigned a “type” based upon these characteristics and spread of flame test results. There are 15 total module types, Types 1, 2 and 3 represent differences in the module composition and Types 4 – 15 are the same module compositions as Types 1 – 3 with differing fire test performance.

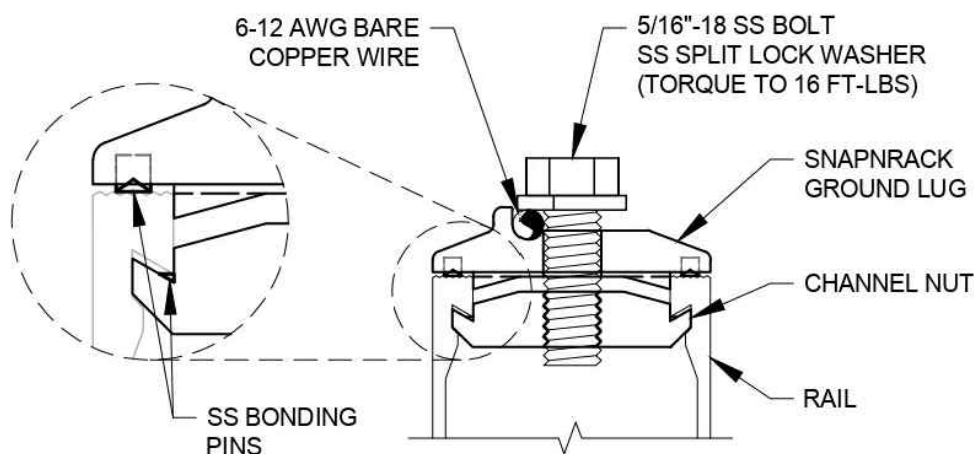
SnapNrack Series 100, Ultra Rail and RL systems have been Certified for a Class A fire rating with Type 1 and Type 2 modules, in accordance with the standards set forth in UL1703/2703 and IBC 2012. In order to maintain this classification, the SnapNrack mounting systems must be installed per the UL-approved [Installation Manuals](#). Because the test was conducted with the modules at 5 inches from the roof surface (worst case scenario), there is no restriction to the standoff height.

*Attachment 1* is the SnapNrack QIMS File which is accessed through the UL Online Certification Directory, or available here: [SnapNrack QIMS File](#).



NOTE:

1. ADJUSTABLE END CLAMPS USE SAME BONDING PIN DESIGN TO BOND MODULES TO RAIL



NOTE:

1. ALL HARDWARE IS INCLUDED FROM MANUFACTURER
2. A MINIMUM OF ONE GROUND LUG IS TO BE INSTALLED ON EVERY CONTINUOUS ROW OF MODULES
3. GROUND LUG MAY BE INSTALLED IN EITHER RAIL CHANNEL
4. GROUND LUG MAY BE INSTALLED SO GROUND WIRE IS PARALLEL OR PERPENDICULAR TO RAIL
5. ENSURE SPLIT LOCK WASHER IS INSTALLED ON TOP OF COPPER WIRE

ASSEMBLER:

INSPECTOR:

DESCRIPTION:  
SNAPNRACK MOUNTING SYSTEM  
GROUNDING DETAILS

PART NUMBER:

SCALE:

DNS

DRAWN BY: MIKE WATKINS

APPROVED BY: CODY NORMAN

REVISION:

G 1/11/2016 NEW ITEM

SnapNrack™  
Solar Mounting Solutions

Sunrun South LLC

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[contact@snapnrack.com](mailto:contact@snapnrack.com)