RAK7249 WisGate Edge Max

Technical report of tests

Contents

Experimentation processes

This document aims to explain the experiments developed to test the gateway and the boost, the configuration and assembly of the gateway and finally you will find documentation about the product. Table of tests:

Processes	1	2	3
What is/are the objectives of the experiment?	To test that the RMM V2.4 signals could be detected by the RAK gateway and sent to the cloud using 3G	To test that 24V power supply boost to the range 42-57V required to power the RAK gateway	To test the consistency of the Chirpstack's ability to receive data over 5 days from the RAK gateway
Null Hypothesis	RMM V2.4 signals could be detected by RAK gateway and sent to the cloud using 3G at 90% consistency (every 10 minutes over 5 days)	Over 5 days when RAK gateway is connected with the boost module, RAK never turns off	Chirpstack receives data from RAK gateway at 90% consistency over 5 days (every 10 minutes over 5 days)
Alternative Hypothesis	RMM V2.4 signals could be detected by RAK gateway and sent to the cloud using 3G less than 90% consistency (every 10 minutes over 5 days)	Over 5 days when RAK gateway is connected with the boost module, RAK requires at least 12W or more at one or more point in time	Chirpstack receives data from RAK gateway at less than 90% consistency over 5 days (every 10 minutes over 5 days)
Design of the Experiment	RMM V2.4 is connected with the lighting system (LED modules + battery + SRNE) and communications system (RAK gateway + boost module) and data flux should be visualized in Chirpstack	RAK gateway is connected with the Boost module and power output should be measured in the tester	Chirpstack server to be connected to RAK gateway and monitored for data consistency over 5 days
Resources needed	RAK gateway RMM V2.4 LED modules Battery SIARQ Office HR: Víctor Lucas, Sara Puig	RAK gateway Boost module (boost, POE injector, IP67 Ethernet connector, waterproof enclosure) Tester SIARQ Office HR: Jordi Binefa, Sarai Garrido	RAK gateway Boost module (boost, POE injector, IP67 Ethernet connector, waterproof enclosure), Chirpstack server HR: Víctor Lucas, Sara Puig
How will you monitor this experiment?	Daily review of the data received and identify if there are errors of a dip in the consistency rate of 90% during the 5 days.	Pictures of the results	Daily review of the data received and identify if there are errors in the data received during 5 days.
Inputs that go into the final report	Methodological Approach Data results Hypothesis analysis	Methodological Approach Data results Pictures/Video of tester measurements Hypothesis analysis	Methodological Approach Data results Hypothesis analysis
Analysis of results	If Chripstack captures data flux at a rate of 90% and above over the 5 day experiment then null hypothesis is valid.	If none of the readings were lost then null hypothesis is valid	If Chirpstack captures data flux at a rate of 90% and above over the 5 day experiment then null hypothesis is valid.

Process 1

This process consists on testing that the RMM V2.4 can send data to the RAK gateway and that the RAK gateway running 3G is able to send the data to the Cloud. See figures 1 and 2.

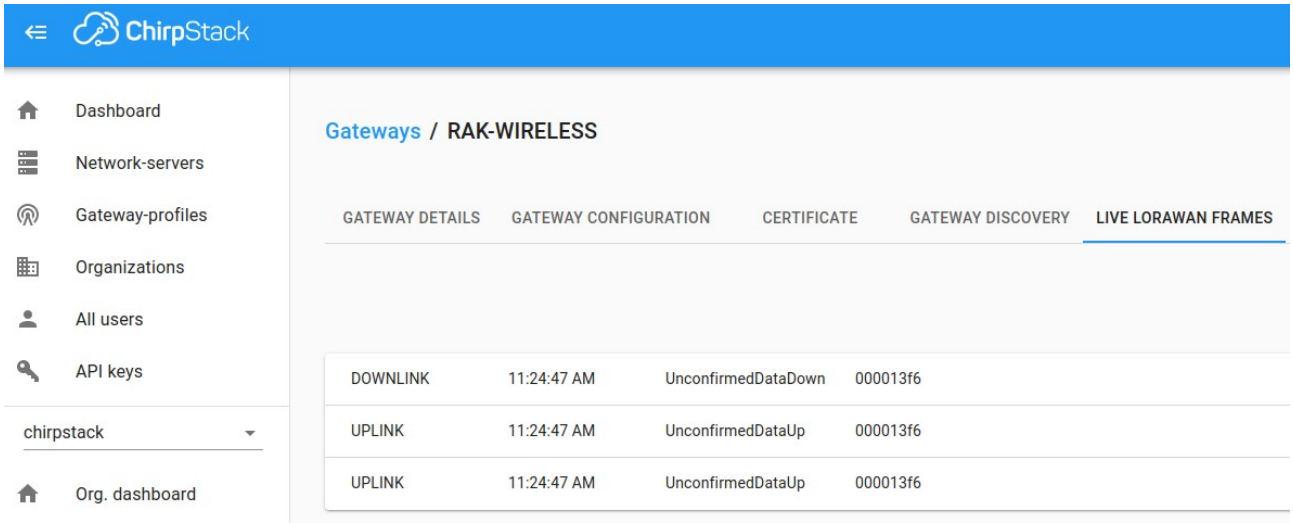


Figure 1

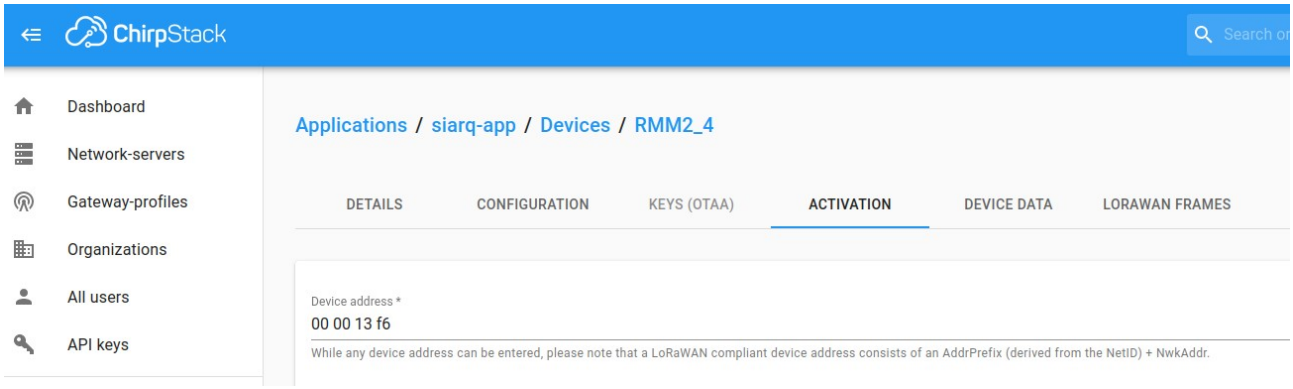


Figure 2

Finally we can see data in grafana.

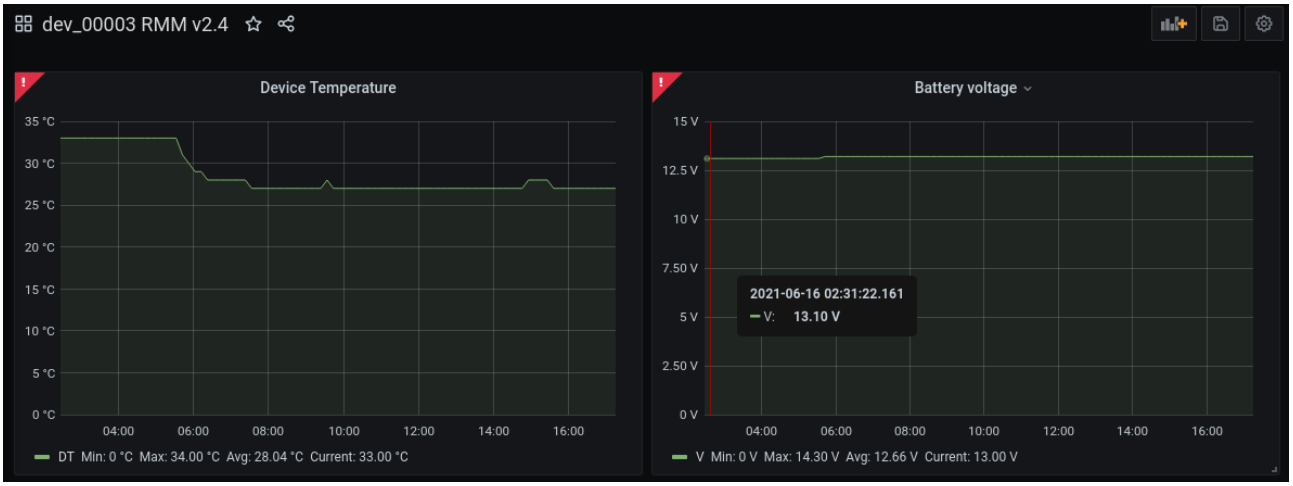


Figure 3

Process 2

This process consists on testing that we can go beyond the 24V offered by the power supply in our case (the battery in yours) to reach the 42-57V needed to power the RAK gateway. The following resources were used for this test: a RAK gateway(1), a Boost module which allows to increase the tension(2), a tester(3) and a power supply(4).

Figure 4

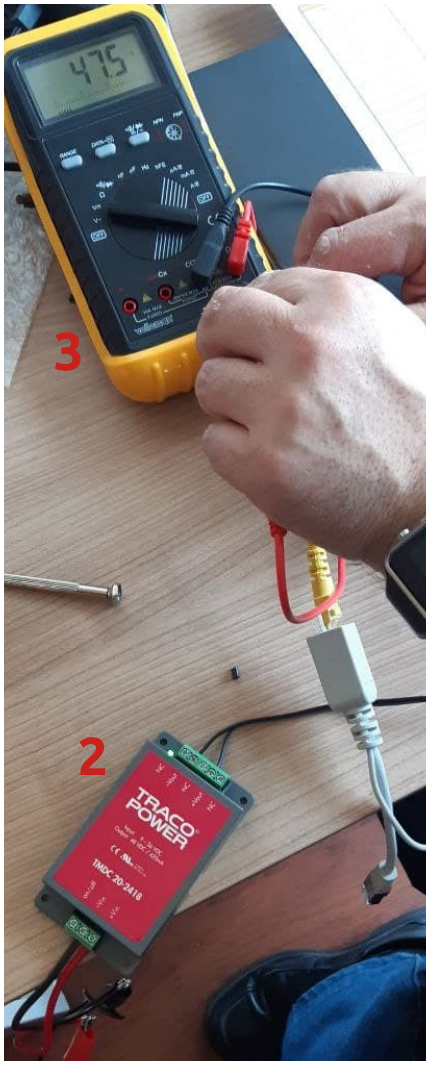


Figure 5

Figure 6

The first part of test in figure 7, consists on connecting the power supply to the boost, the boost connected to the PoE splitter and checking the voltage on the Ethernet cable.

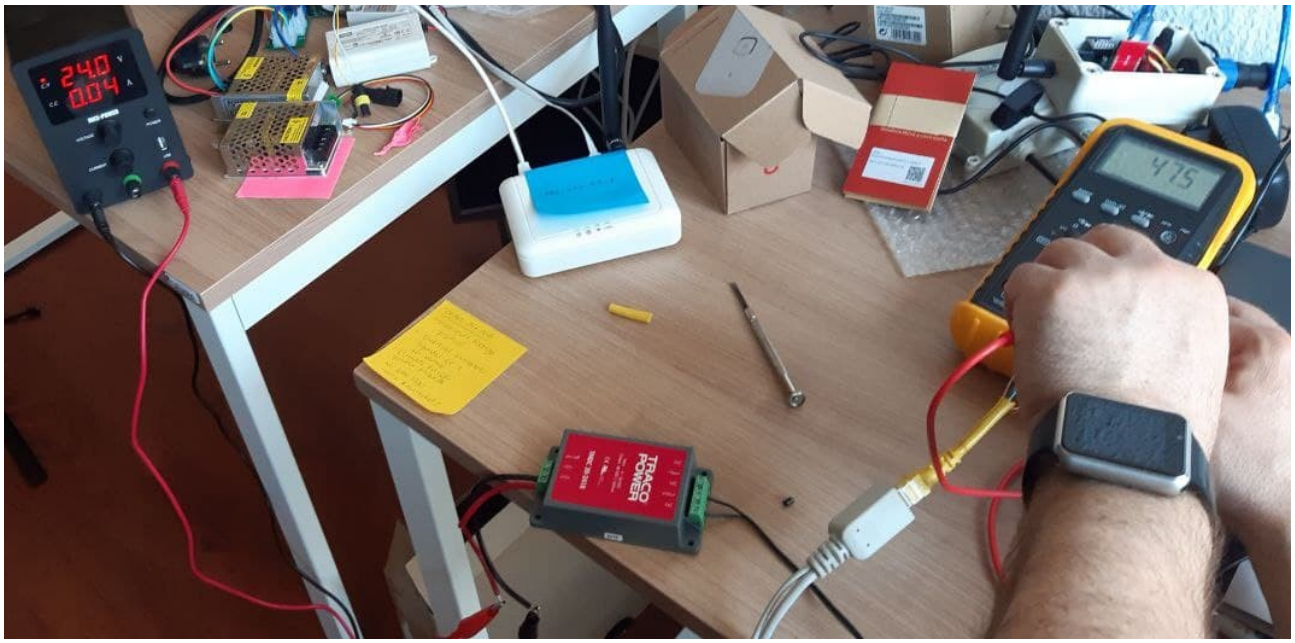


Figure 7

After checking that the voltage with the boost was between 42-57V, we moved on to the second part of the test in figure 8, connecting the gateway.

Figure 8

Process 3

This process consists on testing that Chirpstack can receive data from the gateway via 3G.

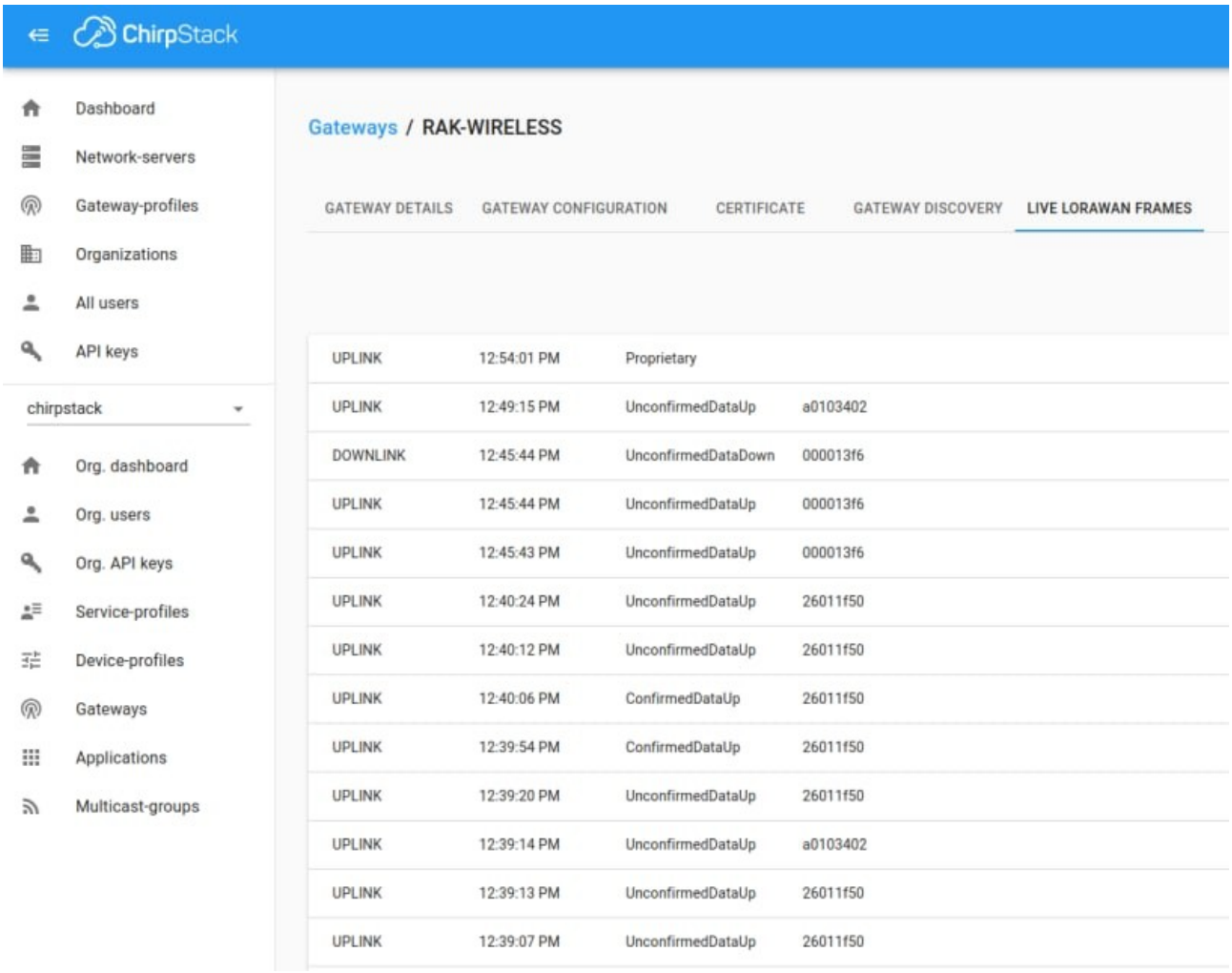


Figure 9

Summary of results

As we have seen in the tests, we obtain the following results:

Process 1: We receive the data from the RMM V2.4 and it can be plotted on grafana.

Process 2: The voltage given by the boost is appropriate for the gateway to work normally.

Process 3: We receive data in the gateway working with 3G.

RAK7429 Installation

Follow the steps below to make the gateway work with a 3G card.

Inserting SIM Card

Open the box by removing all screws, one will be right under the GPS Antenna port which will have to be pushed back.

Figure 10

Figure 11

Figure 12

Once it's open locate the SIM slot and insert the card, make sure it clicks and is properly placed. After finishing close and re-screw the box.

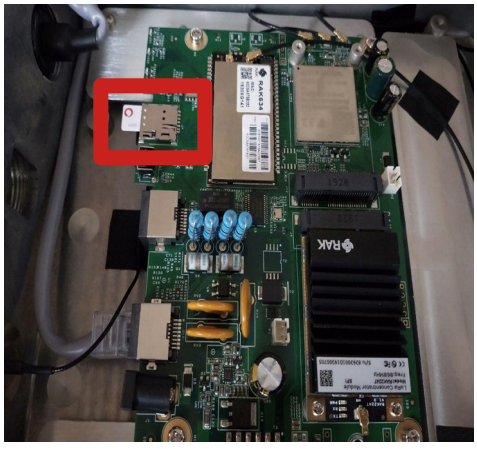


Figure 13

Figure 14

Figure 15

Attach the antennas

Before powering on the gateway all five antennas (LoRa, WiFi, LTE-DIV, LTE-MAIN, GPS) should be installed. Every antenna is properly labeled and so is their port, the LTE antennas are interchangeable.

Figure 16

Figure 17

Power on the Gateway

The gateway will automatically turn on once it starts receiving power, to provide it you will need an Ethernet cable with one end connected to the ETH port and another to the PoE injector.

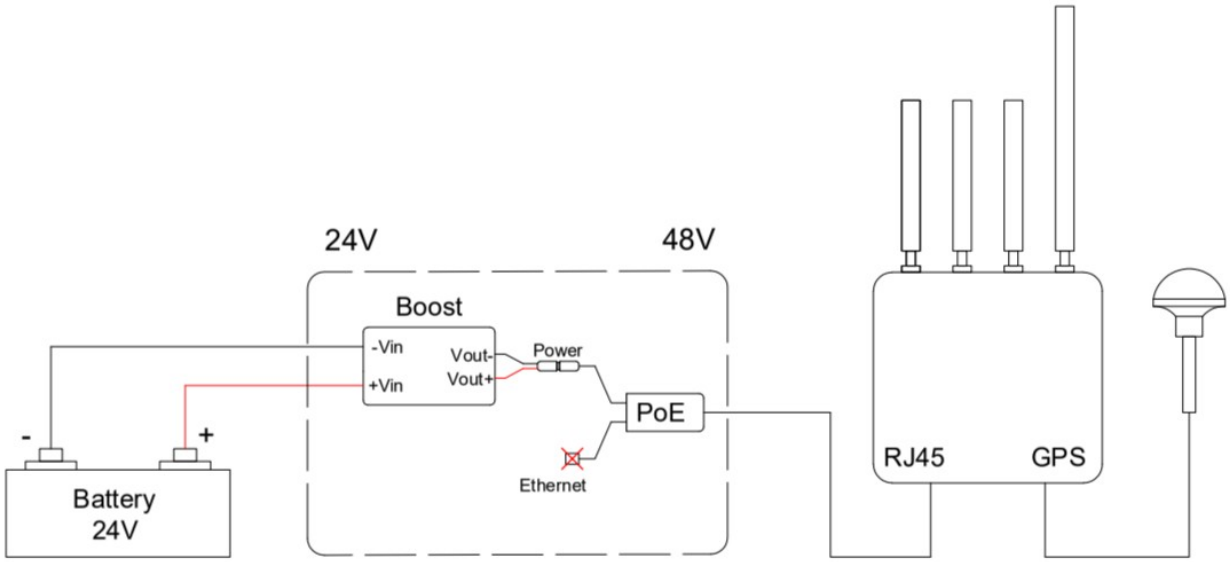


Figure 18

The RJ45 entrance needs to be protected with IP67 connector attached directly to the enclosure as well as to the end or to the beginning of the Ethernet cable.

Figure 19

Figure 20

Connecting the Gateway

A few moments after the gateway is turned on an SSID named like "RAK7249_XXXX" will appear on your PC's Wi-Fi Network List.

Join the network and input the IP Address: 192.168.230.1 in your Web browser, you should see the same Log-in Page shown in the following image. Login credentials provided below:

- Username: root
- Password: root

Figure 21

Configure the SIM Card

Go into Network → Cellular Interface and make sure the LTE Network is enabled. If it is enter your SIM credentials. APN, User and Password will depend on the card company.

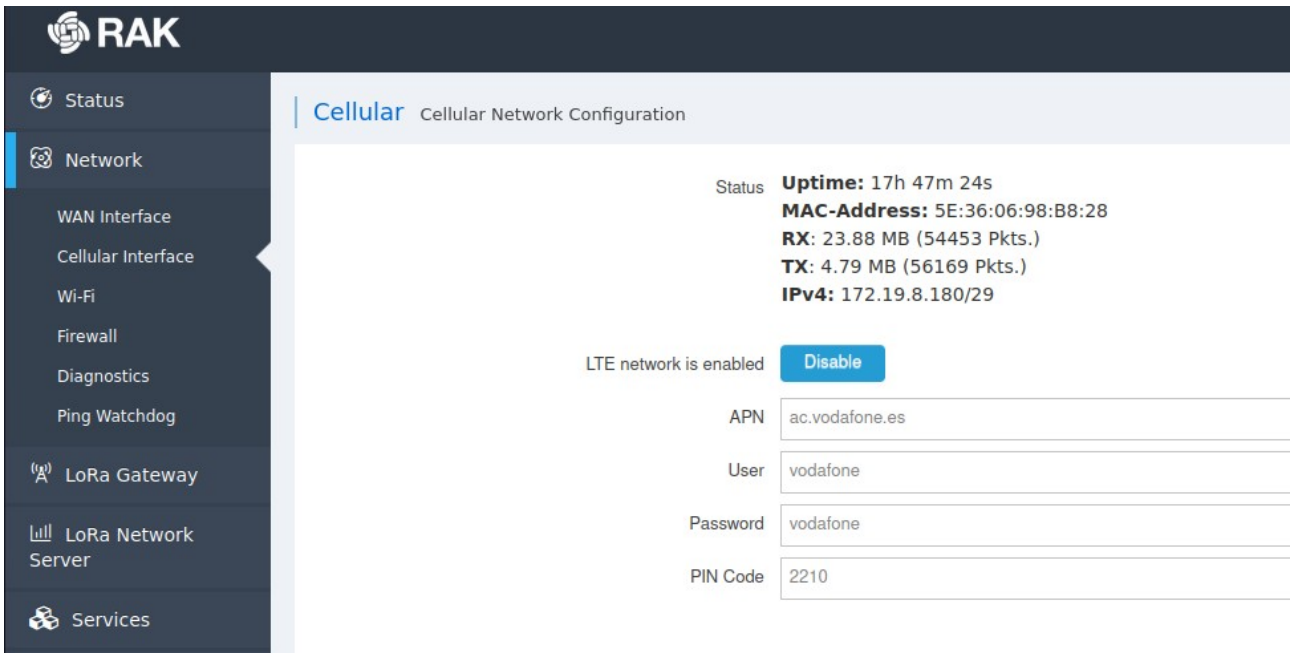


Figure 22

Product information

Boost

Allows to increase the tension. See the product specifications and our 3D model in figures 23, 24, 25, 26 and 27.

TRACO POWER

DC/DC Converter — **TMDC 20 Series, 20 Watt**

- **Fully encapsulated low profile plastic case**
- **Ultra wide 4:1 input voltage range**
- **Operating temperature range –40°C to +90°C**
- **I/O isolation 2500 VDC**
- **Excellent efficiency up to 91 %**
- **Input filter to meet EN 55022, class A**
- **Optional DIN-Rail mount adapter**
- **No minimum load required**
- **Power good LED indicator and remote on/off function**
- **3-year product warranty**

UL 62368-1 IEC 62368-1

The TMDC 20 Series is a range of encapsulated high performance DC/DC converter modules. With a very high efficiency of up to 91% and the use of highest grade components these 20 W converters are made for a reliable operation in the temperature range of -40°C up to 90°C. They come in chassis mount version with screw terminal block. The 8 models have a wide 4:1 input voltage range and a tight output voltage regulation. They do not need a minimum load and offer a high efficiency also at low load conditions. They feature a remote control input and a green power good LED which indicates the presence of the output voltage. Protection against overload and short circuit are standard features of these converters. EMC characteristics and safety certifications are aligned for the operation in industrial environment.

Models

Order Code	Input Voltage Range	Output Voltage nom.	Output Current max.	Efficiency typ.
TMDC 20-2411	9 - 36 VDC (24 VDC nom.)	5.1 VDC	4'000 mA	90 %
TMDC 20-2412		12 VDC	1'670 mA	91 %
TMDC 20-2415		24 VDC	835 mA	91 %
TMDC 20-2418		48 VDC	420 mA	89 %
TMDC 20-4811	18 - 75 VDC (48 VDC nom.)	5.1 VDC	4'000 mA	90 %
TMDC 20-4812		12 VDC	1'670 mA	91 %
TMDC 20-4815		24 VDC	835 mA	91 %
TMDC 20-4818		48 VDC	420 mA	89 %

Options

TMP-MK1	- Optional DIN-Rail Mounting Kit: www.tracopower.com/products/tmp-mk1.pdf

www.tracopower.com — January 27, 2021 — Page 1 / 4

Figure 23

Input Specifications

Input Current	- At no load	24 Vin models:	70 mA typ.
		48 Vin models:	35 mA typ.
	- At full load	24 Vin models:	931 mA typ.
		48 Vin models:	466 mA typ.
Surge Voltage		24 Vin models:	50 VDC max. (100 ms max.)
		48 Vin models:	100 VDC max. (100 ms max.)
Under Voltage Lockout		24 Vin models:	7.5 VDC typ.
		48 Vin models:	16 VDC typ.
Recommended Input Fuse			(The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Pi-Type

Output Specifications

Voltage Set Accuracy			±2% max.
Regulation	- Input Variation (Vmin - Vmax)		0.5% max.
	- Load Variation (0 - 100%)		0.5% max.
Ripple and Noise (20 MHz Bandwidth)		5.1 Vout models:	100 mVp-p max.
		12 Vout models:	150 mVp-p max.
		24 Vout models:	150 mVp-p max.
		48 Vout models:	200 mVp-p max.
Capacitive Load		5.1 Vout models:	6'800 µF max.
		12 Vout models:	1'160 µF max.
		24 Vout models:	300 µF max.
		48 Vout models:	75 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			30 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			150% typ. of Iout max.
Overvoltage Protection			120% typ. of Vout nom. (By Zener diode)
Transient Response	- Response Deviation		5% max. (75% to 100% Load Step)
	- Response Time		250 µs typ. (75% to 100% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	CSA-C22.2, No 60950-1 EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1
	- Certification Documents	www.tracopower.com/overview/tmdc20
Pollution Degree		PD 2

EMC Specifications

EMI Emissions			EN 61000-6-4 (Generic Industrial) EN 61204-3 (Low Voltage Power Supplies)
	- Conducted Emissions		EN 55032 class A (internal filter) FCC Part 15 class A (internal filter)
	- Radiated Emissions		EN 55032 class A (with external filter) FCC Part 15 class A (with external filter)
		External filter proposal:	www.tracopower.com/overview/tmdc20

All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.

Figure 24

EMS Immunity			EN 55024 (IT Equipment)
	- Electrostatic Discharge	Air:	EN 61000-4-2, ±8 kV, perf. criteria A
		Contact:	EN 61000-4-2, ±4 kV, perf. criteria A
	- RF Electromagnetic Field		EN 61000-4-3, 10 V/m, perf. criteria A
	- EFT (Burst) / Surge		EN 61000-4-4, ±2 kV, perf. criteria A
			EN 61000-4-5, ±2 kV, perf. criteria A
	- Conducted RF Disturbances		EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous:	EN 61000-4-8, 30 A/m, perf. criteria A

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	–40°C to +90°C
	- Case Temperature	+95°C max.
	- Storage Temperature	–50°C to +125°C
Power Derating	- High Temperature	10 %/K above 85°C
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote	On: 3.5 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit
	- Off Idle Input Current	3 mA typ.
	- Remote Pin Input Current	-0.5 to 0.5 mA
Altitude During Operation		6'000 m max.
Switching Frequency		285 kHz typ. (PWM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	2'500 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	2'200 pF max.
Reliability	- Calculated MTBF	775'200 h (MIL-HDBK-217F, ground benign)
Housing Material		Plastic resin (UL 94 V-0 rated)
Connection Type		Screw Terminal
Weight		107 g
Thermal Impedance		3.9 K/W
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf Exemptions: 6c, 7c-I

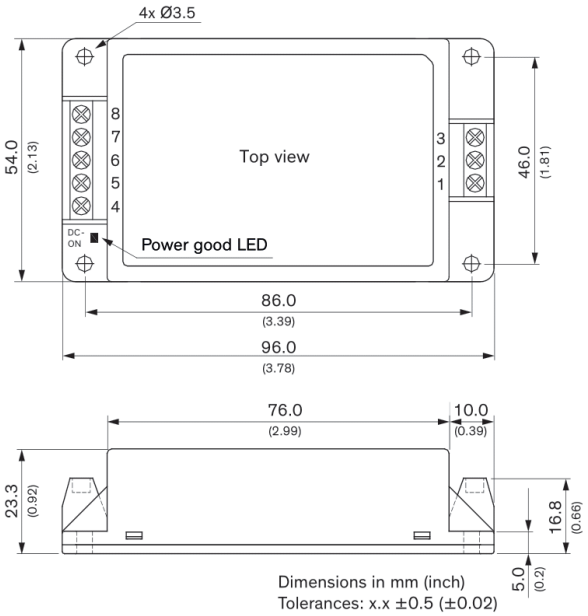
Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tmdc20

All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.

Figure 25

Outline Dimensions



Pinout	
Pin*	**Function**
1	Remote
2	–Vin (GND)
3	+Vin (Vcc)
4	NC
5	–Vout
6	NC
7	+Vout
8	NC

NC: Not Connected

* Wires 1.5 mm² max.

Figure 26

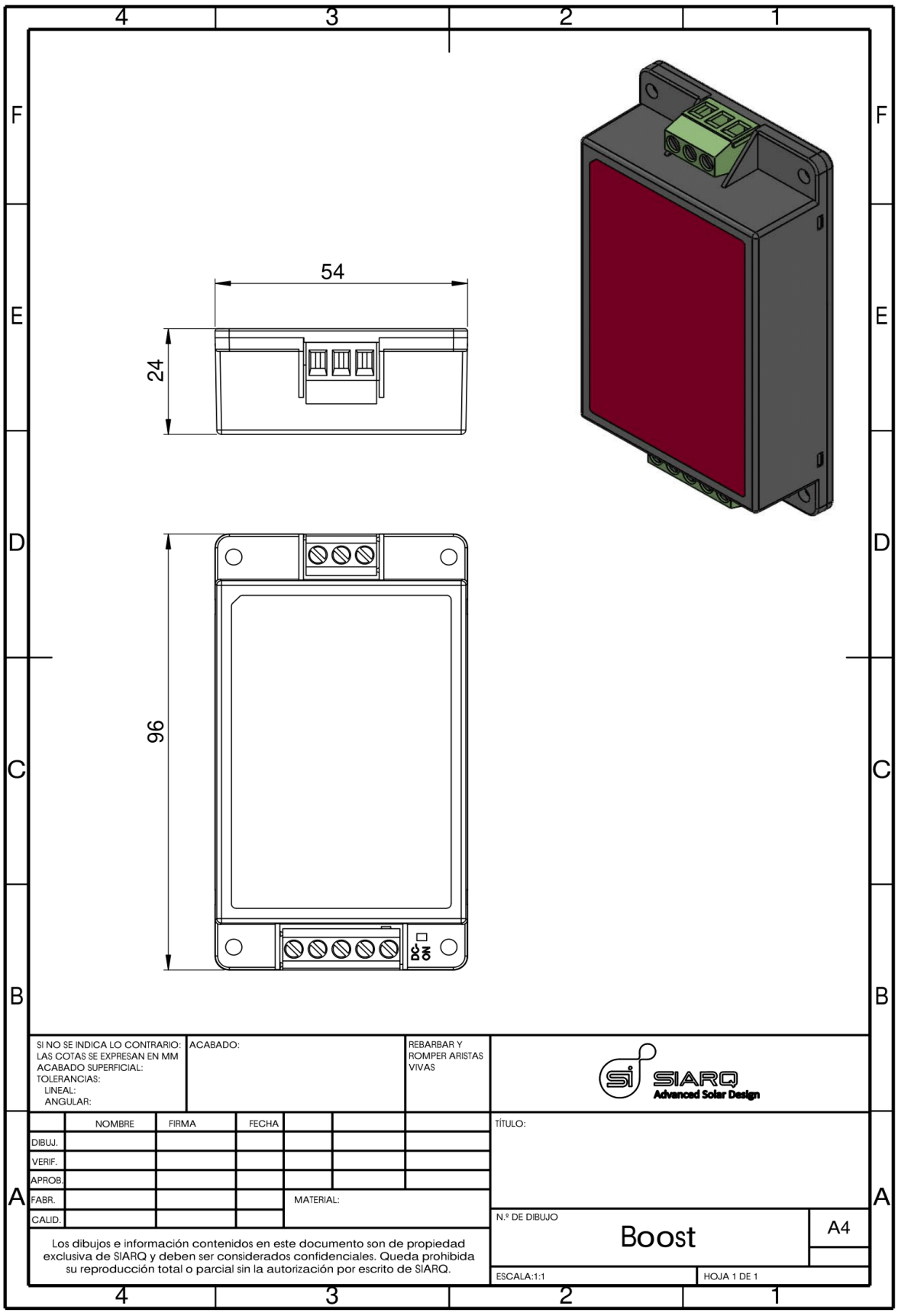

4
3
2
1
F
E
D
C
B
A
54
24
96
DC
ON
SI NO SE INDICA LO CONTRARIO:
LAS COTAS SE EXPRESAN EN MM
ACABADO SUPERFICIAL:
TOLERANCIAS:
LINEAL:
ANGULAR:
ACABADO:
REBARBAR Y
ROMPER ARISTAS
VIVAS
SIARQ
Advanced Solar Design
NOMBRE
FIRMA
FECHA
DIBUJ.
VERIF.
APROB.
FABR.
CALID.
MATERIAL:
TÍTULO:
N.º DE DIBUJO
Boost
A4
ESCALA:1:1
HOJA 1 DE 1
Los dibujos e información contenidos en este documento son de propiedad exclusiva de SIARQ y deben ser considerados confidenciales. Queda prohibida su reproducción total o parcial sin la autorización por escrito de SIARQ.

Figure 27

PoE Splitter

Cable with an Ethernet input and two outputs: one for data and the other for the power. See the product specifications and our 3D model in figures 28 and 29.

Figure 28

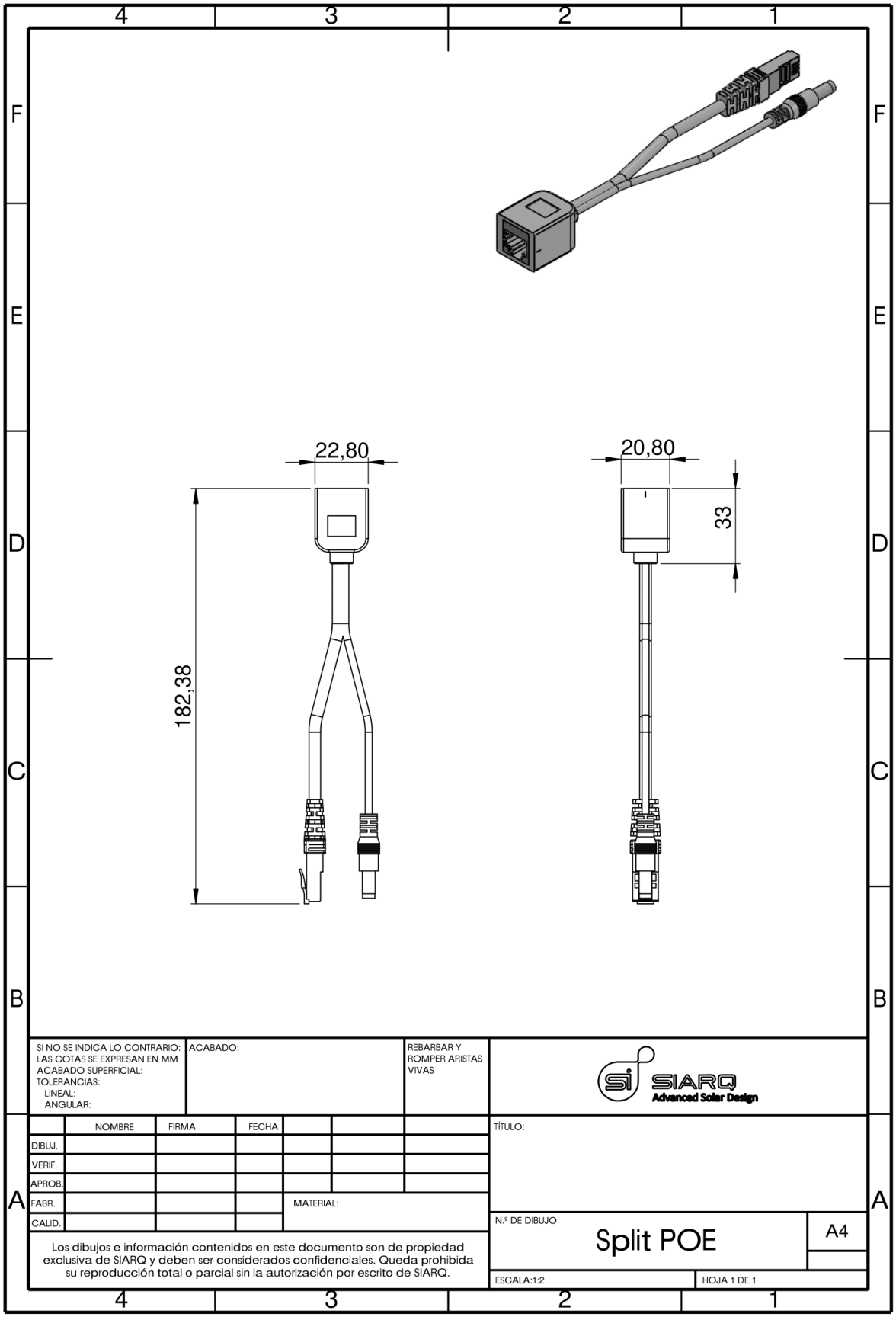
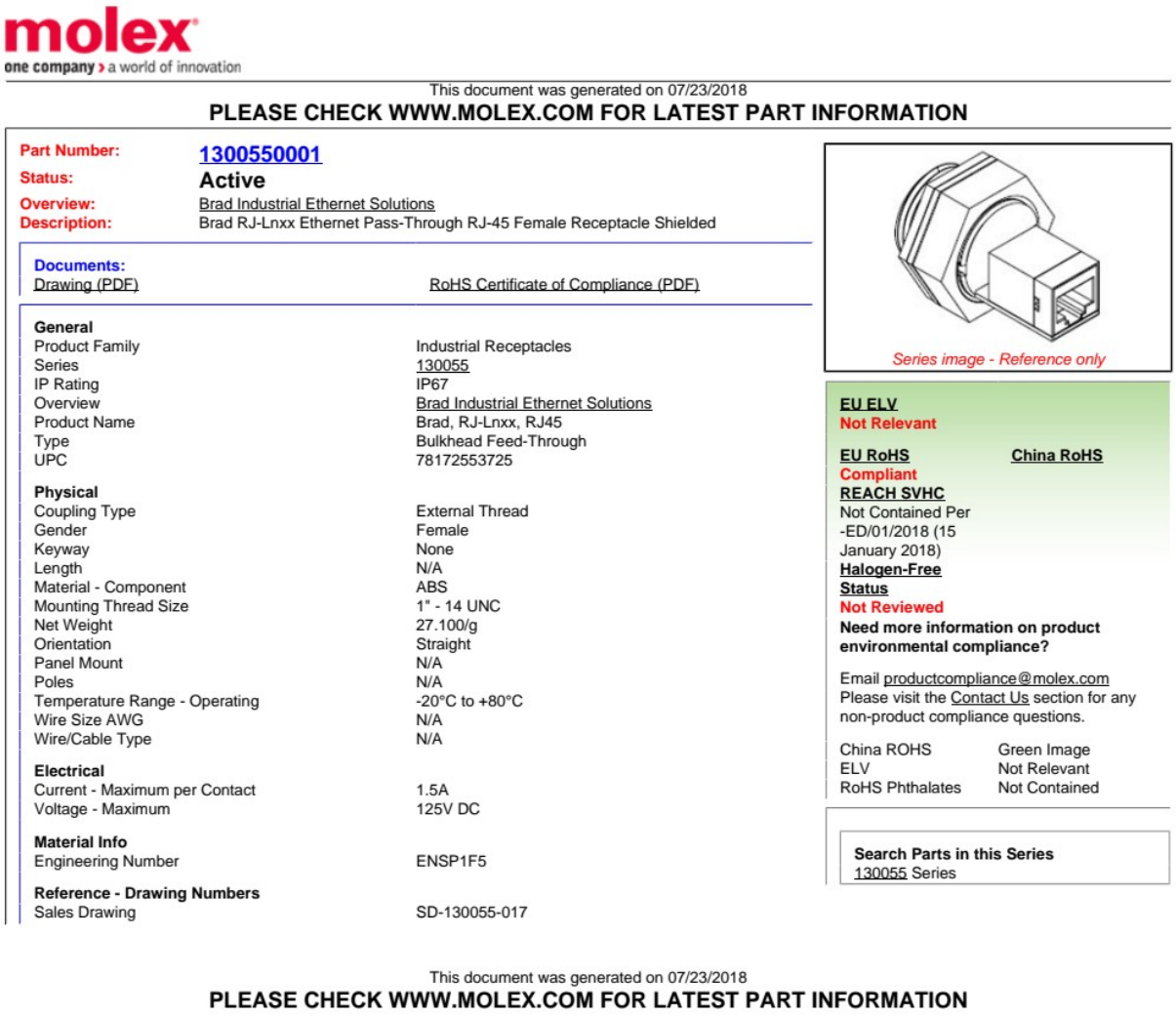

4
3
2
1
F
E
D
C
B
A
22,80
20,80
33
182,38
SI NO SE INDICA LO CONTRARIO:
LAS COTAS SE EXPRESAN EN MM
ACABADO SUPERFICIAL:
TOLERANCIAS:
LINEAL:
ANGULAR:
ACABADO:
REBARBAR Y
ROMPER ARISTAS
VIVAS
SIARQ
Advanced Solar Design
NOMBRE
FIRMA
FECHA
DIBUJ.
VERIF.
APROB.
FABR.
CALID.
MATERIAL:
TÍTULO:
N.º DE DIBUJO
Split POE
A4
ESCALA:1:2
HOJA 1 DE 1
Los dibujos e información contenidos en este documento son de propiedad exclusiva de SIARQ y deben ser considerados confidenciales. Queda prohibida su reproducción total o parcial sin la autorización por escrito de SIARQ.

Figure 29

Ethernet connector

Connector with IP67 protection, to connect with an Ethernet cable the gateway with our Boost model. See the product specifications in figures 30 and 31.



molex
one company > a world of innovation

This document was generated on 07/23/2018
PLEASE CHECK WWW.MOLEX.COM FOR LATEST PART INFORMATION

Part Number: 1300550001
Status: Active
Overview: Brad Industrial Ethernet Solutions
Description: Brad RJ-Lnxx Ethernet Pass-Through RJ-45 Female Receptacle Shielded

Documents:
Drawing (PDF) RoHS Certificate of Compliance (PDF)

General	
Product Family	Industrial Receptacles
Series	130055
IP Rating	IP67
Overview	Brad Industrial Ethernet Solutions
Product Name	Brad, RJ-Lnxx, RJ45
Type	Bulkhead Feed-Through
UPC	78172553725
Physical	
Coupling Type	External Thread
Gender	Female
Keyway	None
Length	N/A
Material - Component	ABS
Mounting Thread Size	1" - 14 UNC
Net Weight	27.100/g
Orientation	Straight
Panel Mount	N/A
Poles	N/A
Temperature Range - Operating	-20°C to +80°C
Wire Size AWG	N/A
Wire/Cable Type	N/A
Electrical	
Current - Maximum per Contact	1.5A
Voltage - Maximum	125V DC
Material Info	
Engineering Number	ENSP1F5
Reference - Drawing Numbers	
Sales Drawing	SD-130055-017

Series image - Reference only

EU ELV
Not Relevant

EU RoHS
Compliant
China RoHS

REACH SVHC
Not Contained Per -ED/01/2018 (15 January 2018)
Halogen-Free Status
Not Reviewed

Need more information on product environmental compliance?

Email productcompliance@molex.com
Please visit the Contact Us section for any non-product compliance questions.

China ROHS	Green Image
ELV	Not Relevant
RoHS Phthalates	Not Contained

Search Parts in this Series
130055 Series

This document was generated on 07/23/2018
PLEASE CHECK WWW.MOLEX.COM FOR LATEST PART INFORMATION

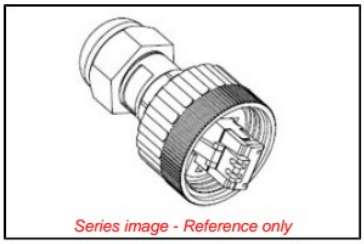
Figure 30

molex
one company > a world of innovation

This document was generated on 07/06/2016

PLEASE CHECK WWW.MOLEX.COM FOR LATEST PART INFORMATION

Part Number: 1300570001
Status: Active
Overview: Brad® Industrial Ethernet Solutions
Description: Brad® RJ-Lnxx®, Threaded, RJ-45 Ethernet Field-Attachable Connector for Stranded Core Cable



Series image - Reference only

Documents:
Drawing (PDF) | RoHS Certificate of Compliance (PDF)

General	
Product Family	Field Attachable / Accessories
Series	130057
IP Rating	IP67
Overview	Brad® Industrial Ethernet Solutions
Product Name	Brad®, RJ-Lnxx®
Type	Field Attachable Connector
UPC	78678848445
Physical	
Cable Diameter	N/A
Coupling Type	Internal Thread
Diagnostics / LEDs	No
Diagnostics Port	No
Gender	Male
Keyway	None
Material - Connector Body	Polycarbonate
Material - Contact	Copper
Material - Coupling Nut	ABS
Material - Plating Mating	n/a
Net Weight	22.960/g
Orientation	Straight
Poles	N/A
Temperature Range - Operating	-20°C to +80°C
Wire Size AWG	N/A
Electrical	
Current - Maximum per Contact	4.0A
Voltage - Maximum	250V
Material Info	
Old Part Number	ENQAM315
Reference - Drawing Numbers	
Sales Drawing	SD-130057-001

EU ELV
Not Relevant

EU RoHS | **China RoHS**
Not Relevant

REACH SVHC
Not Relevant

Halogen-Free Status
Not Relevant

Need more information on product environmental compliance?

Email productcompliance@molex.com
Please visit the Contact Us section for any non-product compliance questions.

China ROHS	Not Relevant
ELV	Not Relevant

Search Parts in this Series
130057 Series

This document was generated on 07/06/2016

PLEASE CHECK WWW.MOLEX.COM FOR LATEST PART INFORMATION

Figure 31

Boost module

This is our enclosure that includes the Boost connected to the PoE splitter. It has 3 connectors one to connect the Ethernet cable (cable not included) to the gateway and the other two are MC4 which will go to the positive and negative of the battery. See figures 32 and 33.

Figure 32

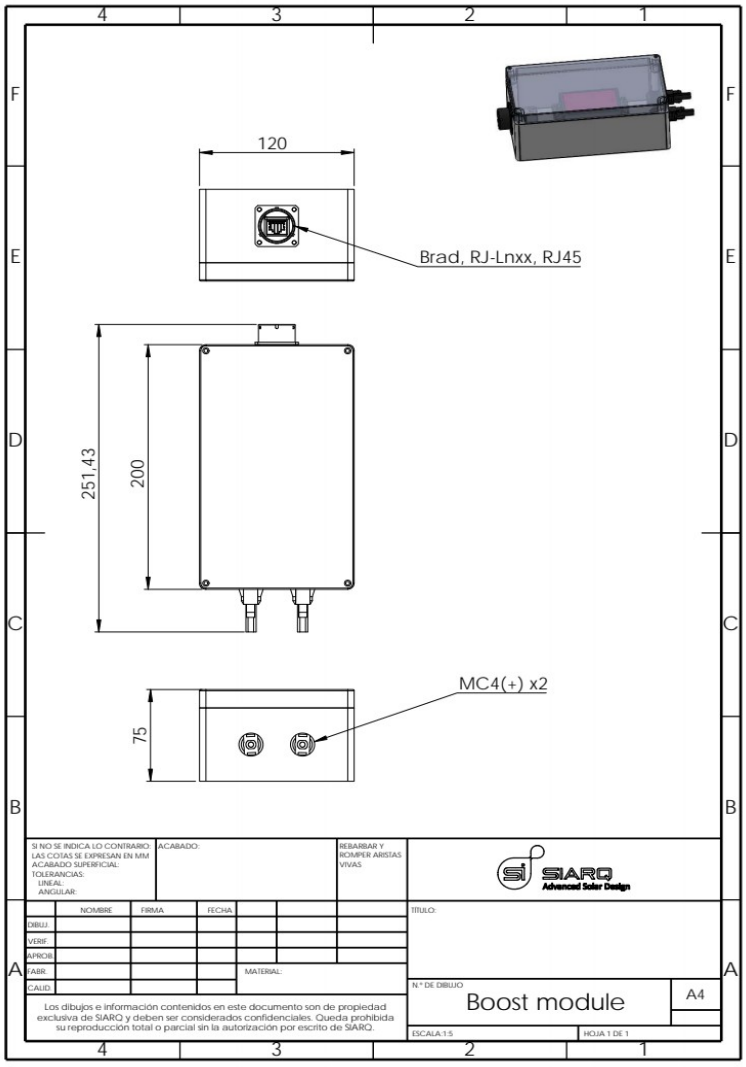


Figure 33