Test Report

Verified code:488893

Report No.:E20211115129001-4

Customer:	Comba Telecom Network Systems Limited
Address:	Flat/Rm 10, 3/F, Bio-Informatics Ctr, 2 Science Park West Avenue, HK Science Park, Pak ShekKok, N.T. Hong Kong
Sample Name:	Public Safety UHF DAS Remote Unit
Sample Model:	RH45V2F-A-48/ RH45V2F-A-AC
Receive Sample Date:	2021-11-22
Test Date:	2021-11-22 ~ 2021-12-15
Reference Document:	FCC PART 90 §90.223-RF exposure
Test Result:	Pass
FCC ID:	PX8RH45V2F-A

Prepared By: Yansha Reviewed By: Zhao Zetian Approved By: Xiao Liang

GUANGZHOU GRG METROLOGY & TEST CO., LTD

Issued Date: 2022-01-20

Statement

1. The report is invalid without "special seal for inspection and testing"; some copies are invalid; The report is invalid if it is altered or missing; The report is invalid without the signature of the person who prepared, reviewed and approved it.

2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.

3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.

4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.

5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

6. The test report without CMA approval mark is only used for scientific research, teaching, internal quality control and other purposes.

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———— The following blanks ————

1 Applicant information

1.1 Client information

Name:	Comba Telecom Network Systems Limited
Address:	Flat/Rm 10, 3/F, Bio-Informatics Ctr, 2 Science Park West Avenue, HK Science Park, Pak ShekKok, N.T. Hong Kong

1.2 Manufacturer and Factory

Name:	Comba Network Systems Company Limited
Address:	No.10 Shenzhou Road, Guangzhou Science City, Guangzhou 510663, Guangdong, P.R. China
Factory:	Comba Telecom Technology (Guangzhou) Ltd.
Address:	No.6 Jinbi Road, Economics and Technology Development District, Guangzhou Guangdong China

2 General description of EUT

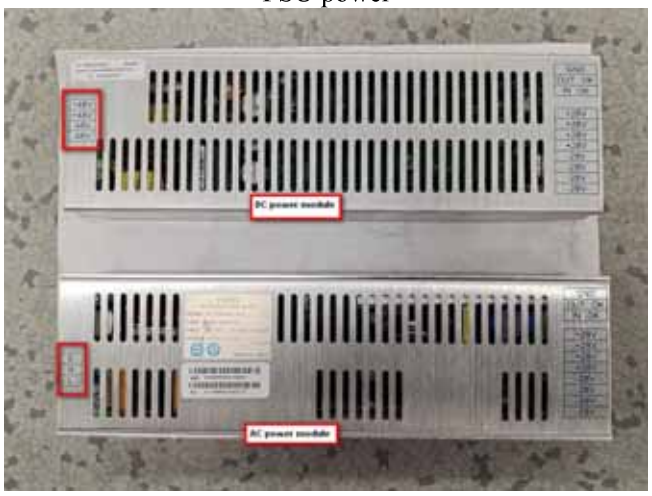
2.1 Basic description of EUT

Product Name:	Public Safety UHF DAS Remote Unit
Product Model:	RH45V2F-A-48
Adding Model:	RH45V2F-A-AC
Trade Name:	Comba
Power Supply:	Typical DC input power: DC -48V and Typical output power: DC -28V Or Typical AC input power: AC 110V, 50/60Hz and Typical output power: DC -28V
Power cord:	AC power cord (4m)
Frequency Band:	Downlink: 450MHz ~ 512MHz, Uplink: 450MHz ~ 512MHz
Nominal Output Power:	Master Unit and System: Downlink: 36dBm; Uplink: 30dBm
Nominal Gain:	Master Unit: Downlink: 102dB, Uplink: 102dB System Gain: Downlink: 105dB, Uplink: 102dB
EUT Operating Temperature:	-33°C to +55°C
Operating Humidity:	5% to 95%
Antenna Type:	N/A

NOTE 1: The device is a Narrowband device, which belongs to Class A signal booster.

NOTE 2: The device provides two PSU power supply modes by manufacturer's statement, oneTypical is DC-48V input, the other Typical is AC 110V, 50Hz / 60Hz input. Except for the different PSU power supply mode input and arrester, the power supply output to the device is the same, all other electrical parameters have the same circuit schematic, components, cirtical components and also the same construction.please see the following the differences below:

PSU power



Arrester

NOTE 3: The device is an outdoor device,the device does not provide antenna by Manufacturer's statement, butit is required that the Antenna gain shall not exceed 0 dBi for Downlink and Uplink when the project is used by Manufacturer's statement.

NOTE 4: According to the device signal flow, the device supports independent uplink and downlink input /output, and system uplink output. Therefore, this report provides single device uplink and downlink test and system uplink test.

3 Assessment result summary

Item	Assessment Requirement	Assessment Method
RF exposure	FCC PART 90§90.223	FCC PART 1.1307(b) FCC PART 2.1091 FCC PART 2.1093

4 Radio frequency radiation exposure

4.1 Applicable Standard

According to the requirements of FCC PART 90§90.223, the test method of RF exposure is based on FCC PART 1.1307(b), FCC PART 2.1091 and FCC PART 2.1093, so RF exposure is calculated.

4.2 Limits for Maximum Permissible Exposure (MPE)

The limits are shown in Table 4-1.

Table 4-1 Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m_2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f_2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

Note: f=frequency in MHz; *=Plane-wave equivalent power density

Prediction of MPE limit at given distance, equations from OET Bulletin 65, Edition 97-01:

$S = (P * G) / (4 * \pi * R^2)$ (where PG = EIRP) Where:

S = power density

P= power input to antenna

G= numeric gain of the antenna

R= distance to the center of radiation of the antenna

4.3 Test results

Devices that operate under CFR47 Part 90 are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if they operate at frequencies of 1.5 GHz or below and limit for power density for general population/uncontrolled exposure is f/1500 W/m^2. The nominal output power by manufacturer statement is 36dBm±1dB for Downlink and 30dBm±1dB for Uplink, the sum of antenna gain and cable loss is 0dBi for Downlink and uplink, Therefore, in this report, according to "the output power capability of a signal booster must be designed for deployments providing a radial power not exceeding 5 watts ERP for eachtransmitted channel" in FCC part 90.219 (E) (1) requirement, MPE is evaluated with a maximum output power of 5W, that is, the maximum output power of downlink is 37dBm, so it has the following assessment:

NOTE: RU has no uplink output power, onlyuplink input power.

4.3.1 Downlink

Prediction frequency (MHz):	450
Maximum peak output power at antenna input terminal (dBm):	37.0
Maximum peak output power at antenna input terminal (W):	5
Maximum antenna gain (dBi):	0
Maximum RF output power (W):	5.0
MPE limit for uncontrolled exposure at predication frequency (W/ m²): S= f/1500=450/1500	0.3

R1= $\sqrt{\frac{PG}{4\pi S}} = \sqrt{\frac{5}{0.3 * 4 * 3.14}} \approx 1.151\text{m}$

Conversely, when R>1.151m, and S< $\frac{PG}{4\pi R^2} = \frac{5}{4 * 3.14 * 1.151\hat{}2} \approx 0.3(\text{W/m}^2)$

4.4 Conclusion

The above all,when the sum of antenna gain and cable loss is 0dBi for downlink and the shortest distance from the human specific is 1.151m, the device is compliant with the requirement MPE limit for uncontrolled exposure.

5 APPENDIX A. PHOTOGRAPHS OF EUT

5.1 Master Unit (MU)

5.1.1 External photos

Top surface

Front surface-1

Front surface-2

Side surface-1

Side surface-2

Behind surface

Bottom surface

5.1.2 Internal photos

MU Inside

5.1.2.1 PA-3035AG00

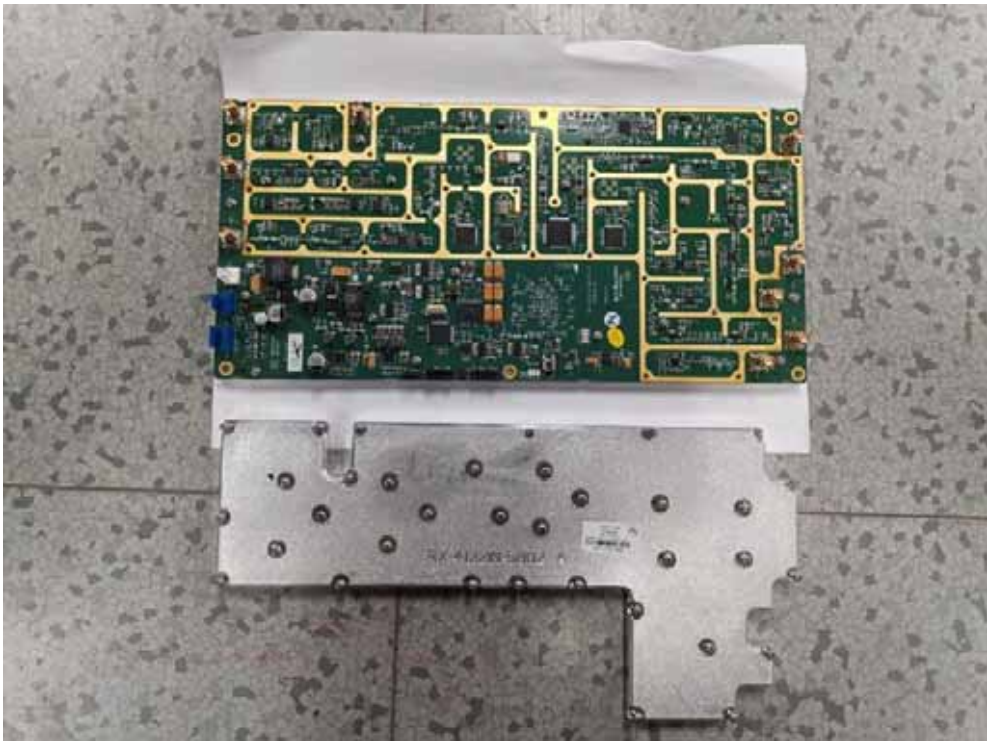
5.1.2.2 PA-3645AG00


JQL
KM10A3-CB
21030367


JQL
JID0450T0512
KM10A3-CB
210303870


JQL
JID0450T0512
KM10A3-CB
210303870

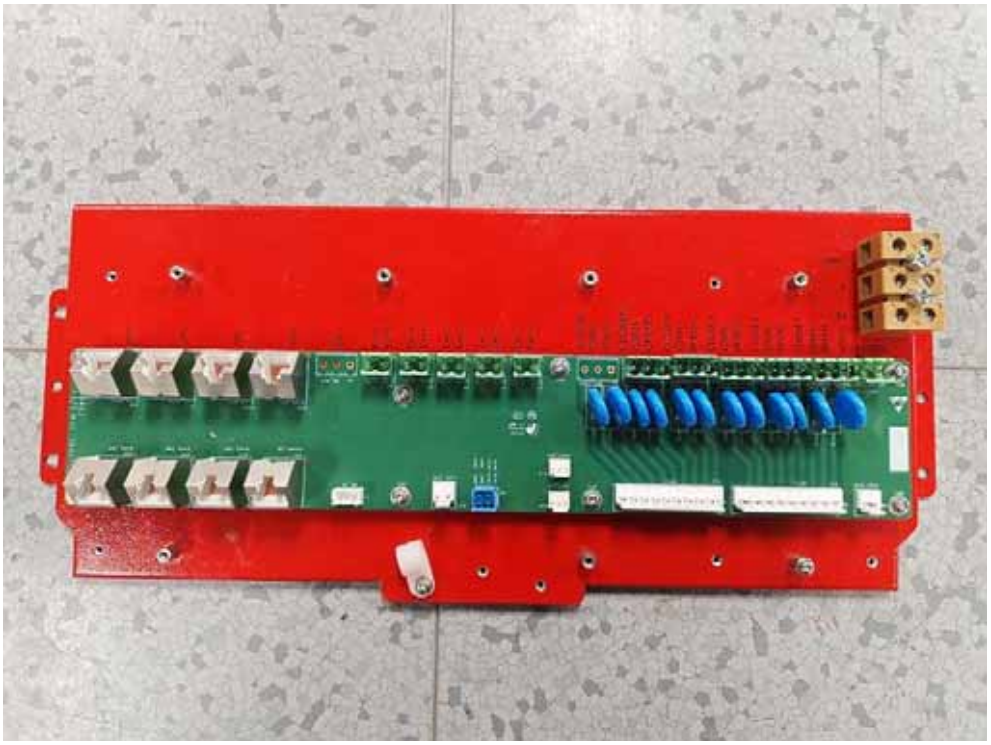
5.1.2.3 RX-4122IN02

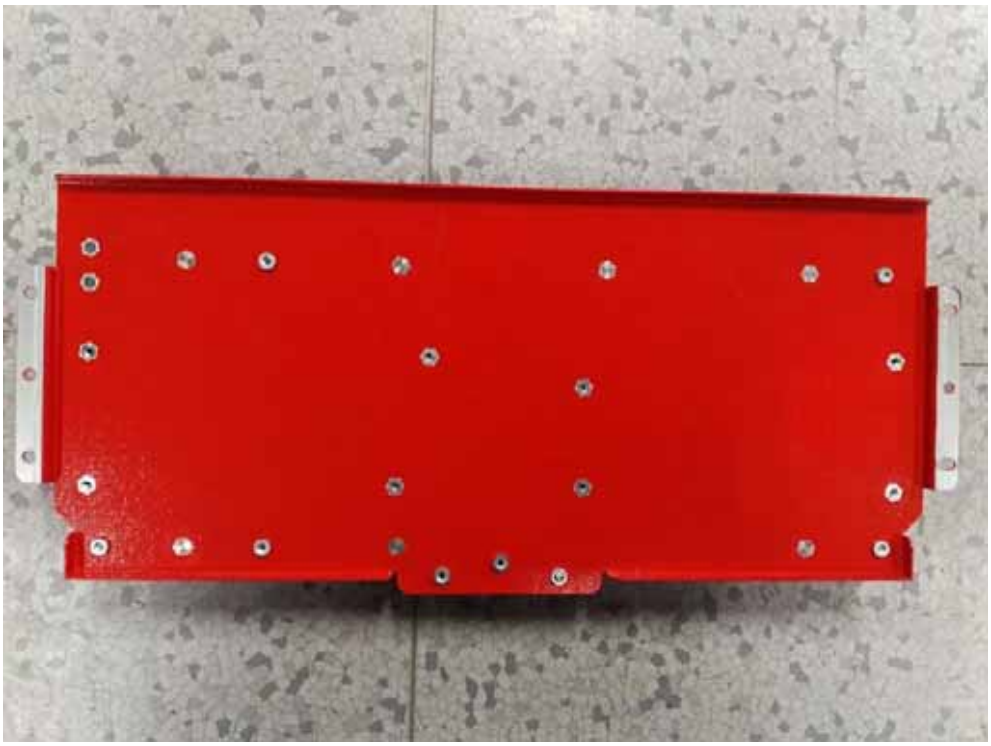


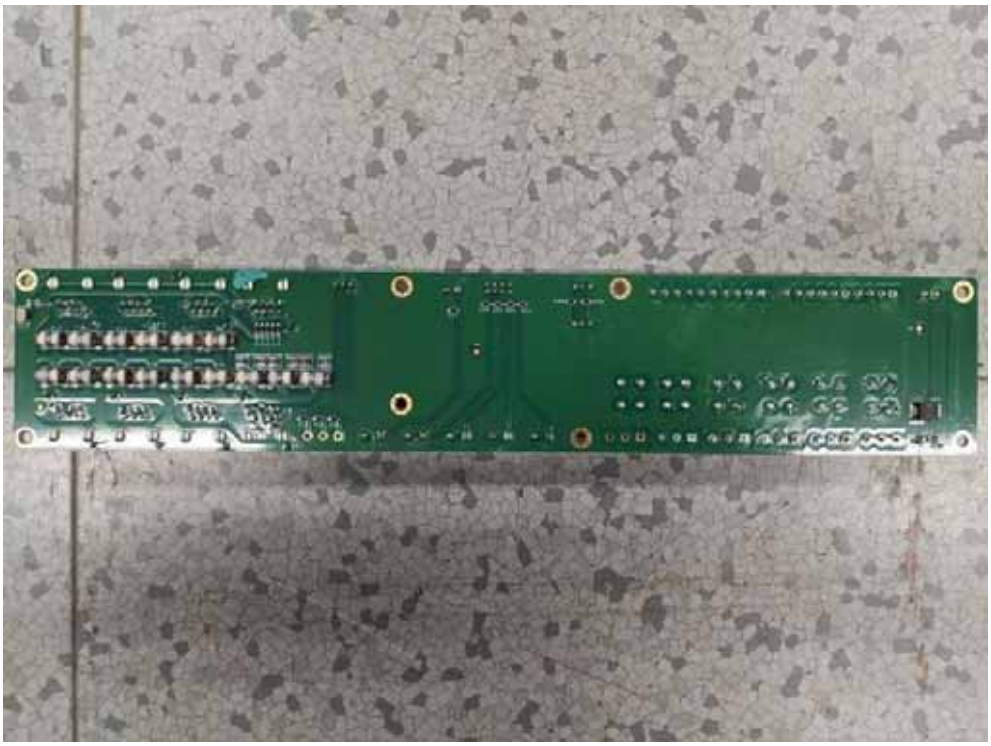
5.1.2.4 RX-4122JK-3002


RU01-CMU V1.0.01
CPLD V1.0.01

5.1.2.5 RX-4122JK01-3001

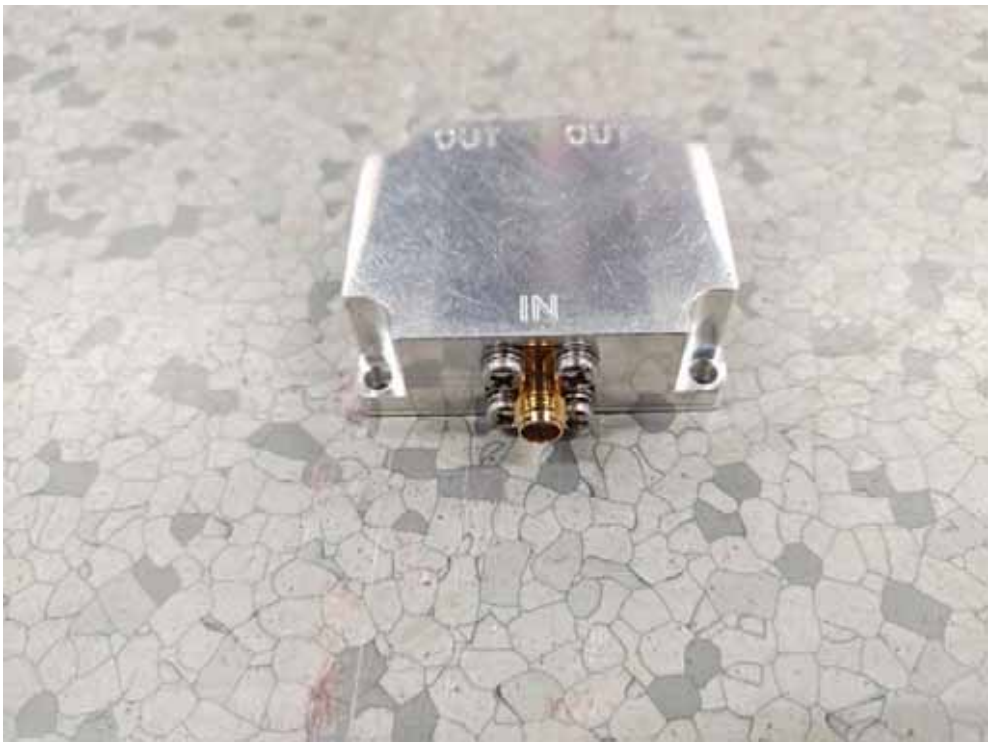






5.1.2.6 PS-2I1O


OUT
OUT


OUT
OUT
IN

5.1.2.7 Power module

5.1.2.7.1 PD-482450E0(28V)


VAPEL SWITCHING POWER SUPPLY
MODEL: PD-482450E0(28V)
INPUT: 36-72V 23A MAX
OUTPUT: 28V 0—15A
MADE IN CHINA
SIZE 20080500027700
NO 2104001346021S


+48V
+48V
-48V
-48V

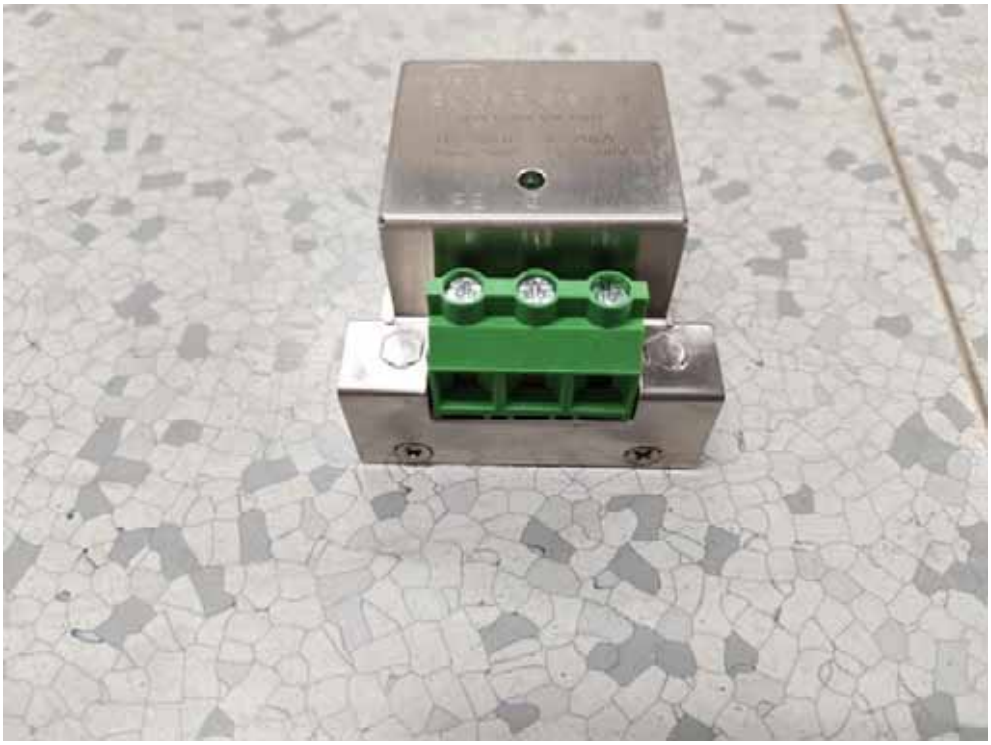

-28V
-28V
-28V
-28V
+28V
+28V
+28V
GND
OUT OK
IN OK

5.1.2.7.2 PC-922430E0(28V)


GND
OUT OK
IN OK
+28V
-28V

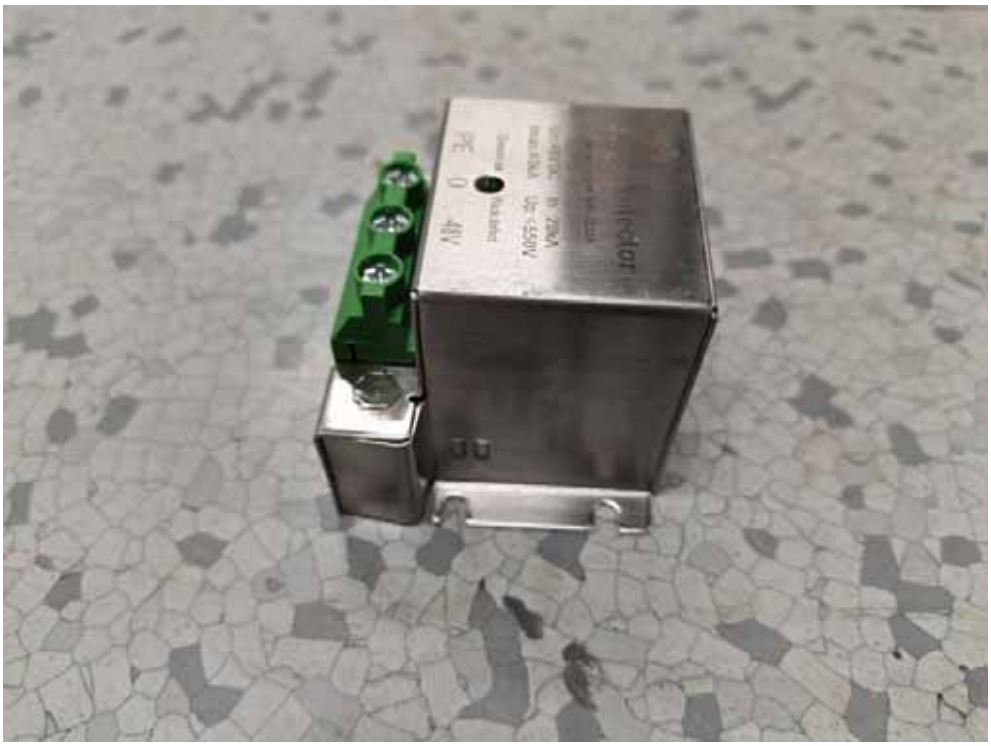
5.1.2.8 Arrester

5.1.2.8.1 PA20-48V-JX03A




Surge Protector


Q.C.
PASSED

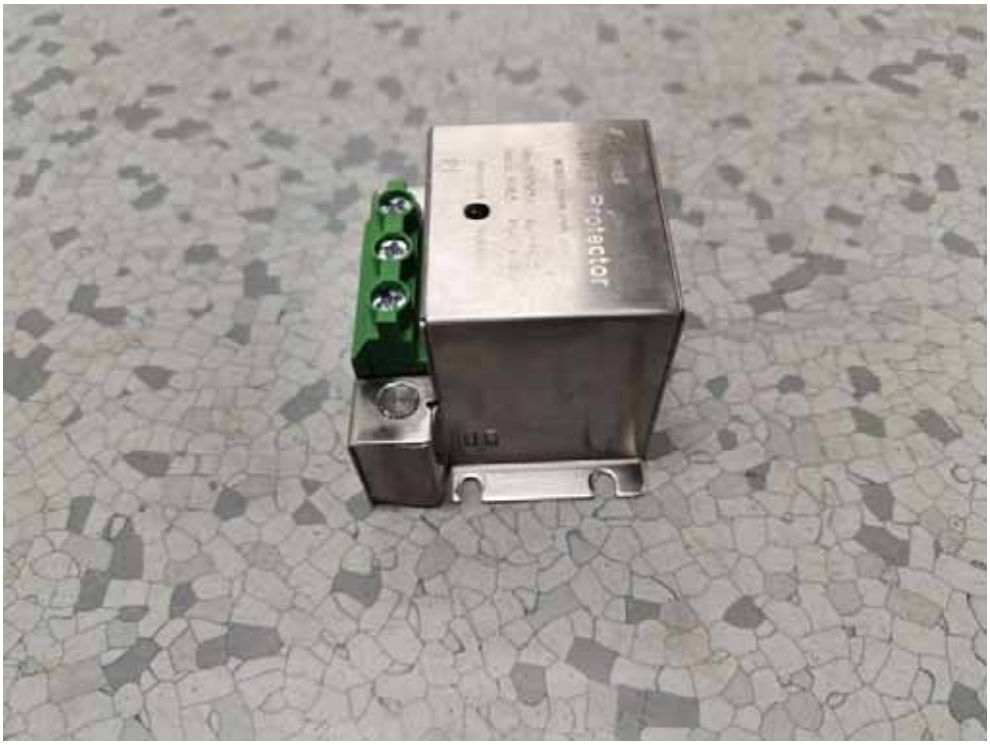


5.1.2.8.2 PA20-220V-JX04A


Surge Protector


Surge Protector


Surge Protector
L
N
PE


Protector

5.2 Remote Unit (MU)

5.2.1 External photos

Top surface

Front surface-1

Front surface-2

Side surface-1

Side surface-2

Behind surface

Bottom surface

5.2.2 Internal photos

RU Inside

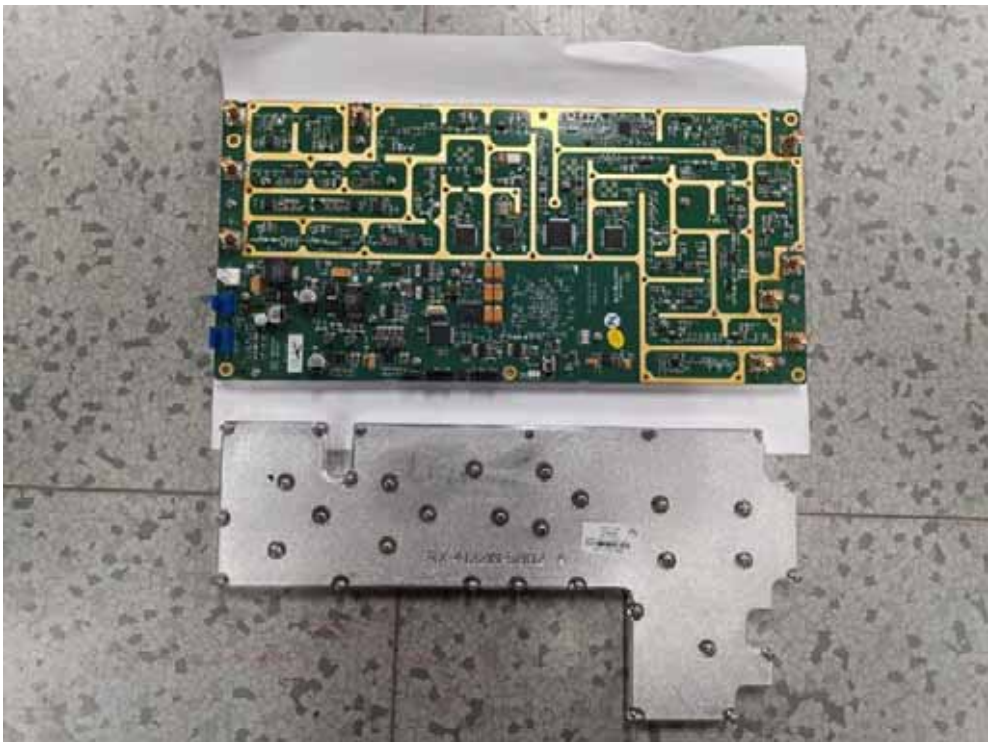
5.2.2.1 PA-3645AG00


JQL
KM10A3-CB
210303670


JQL
KM10A3-CB
210303670


JQL
1 JID0450T0512 2
KM10A3-CB
210303870
3

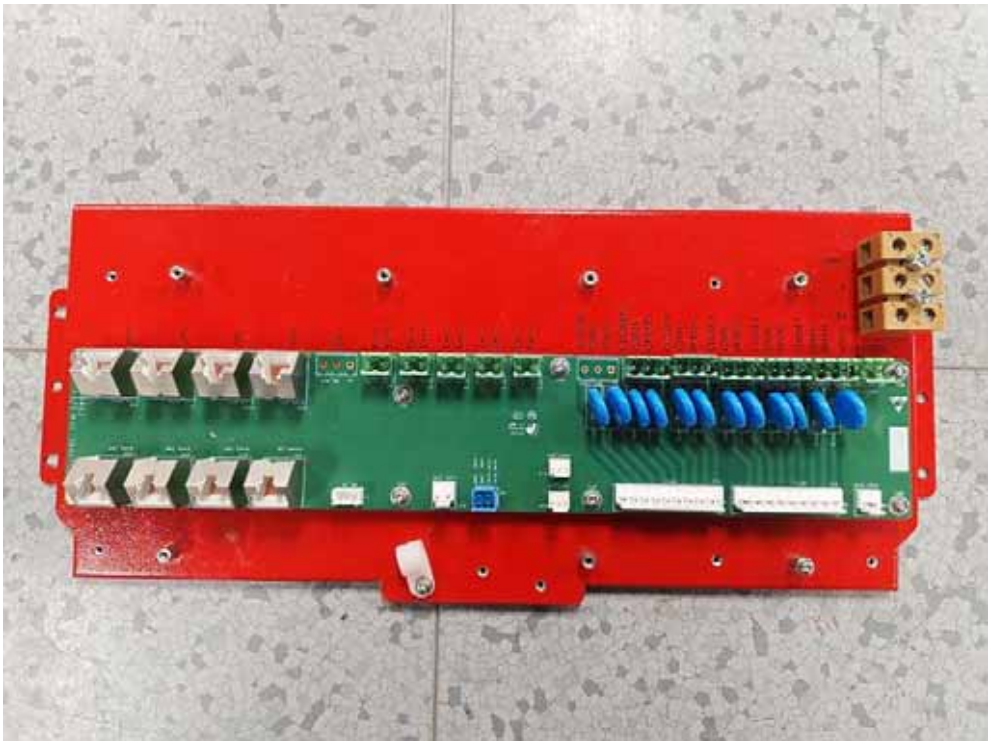
5.2.2.2 RX-4122IN02



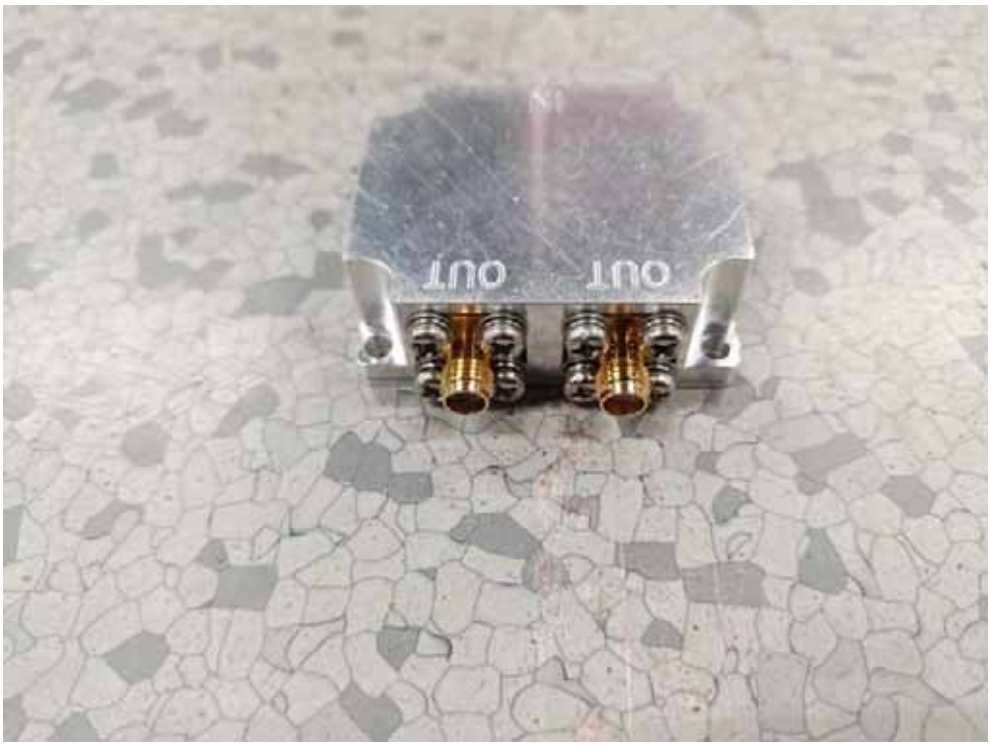
5.2.2.3 RX-4122JK-3002

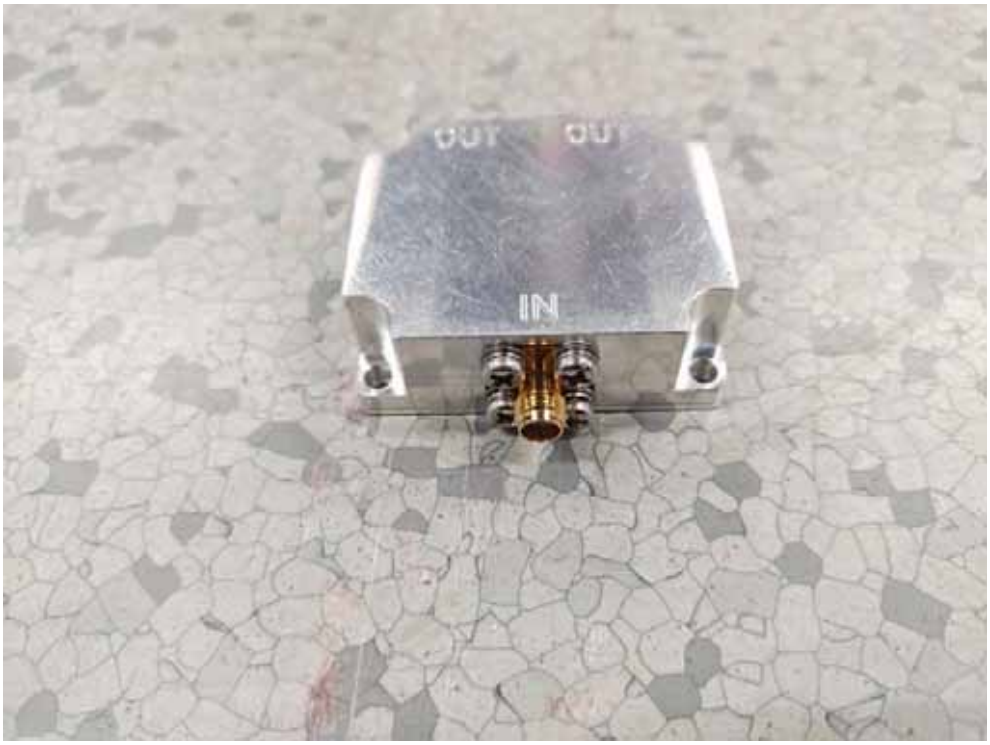

RU01-CMU V1.0.01
CPLD V1.0.01

5.2.2.4 RX-4122JK01-3001

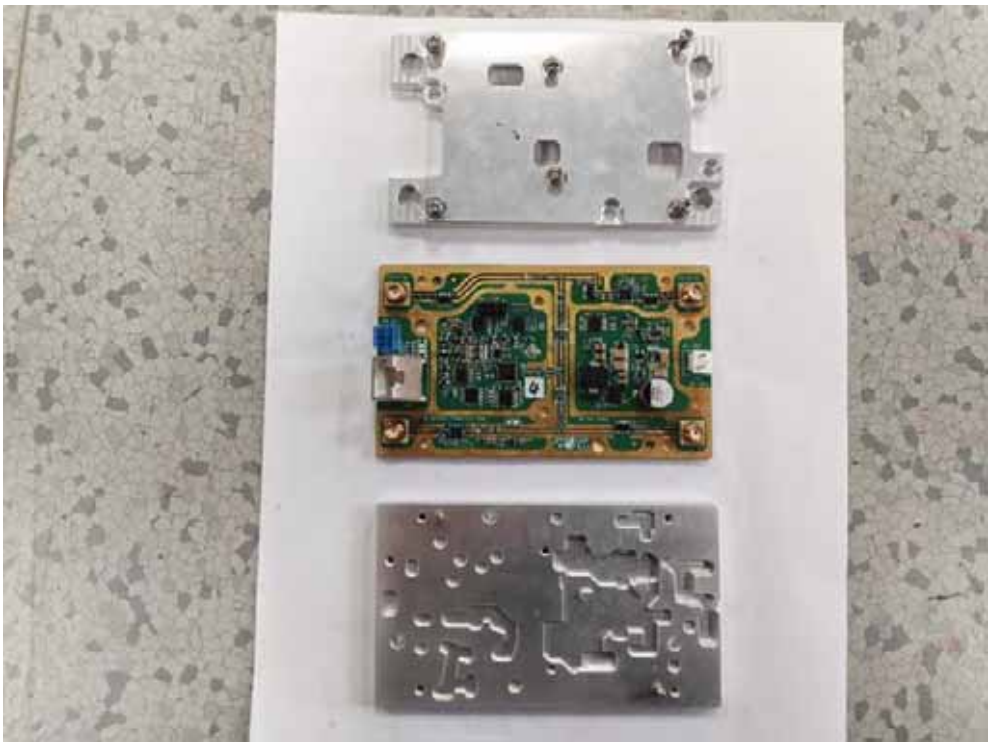


5.2.2.5 PS-2I1O


OUT
OUT


IN

5.2.2.6 ROU-3X11WA01

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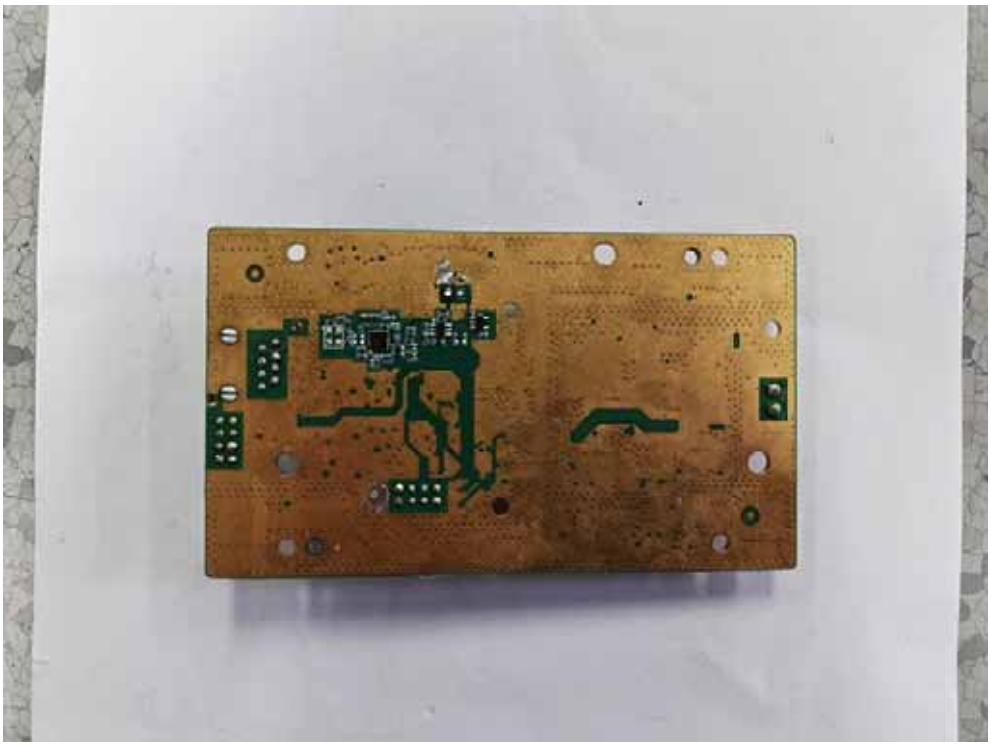

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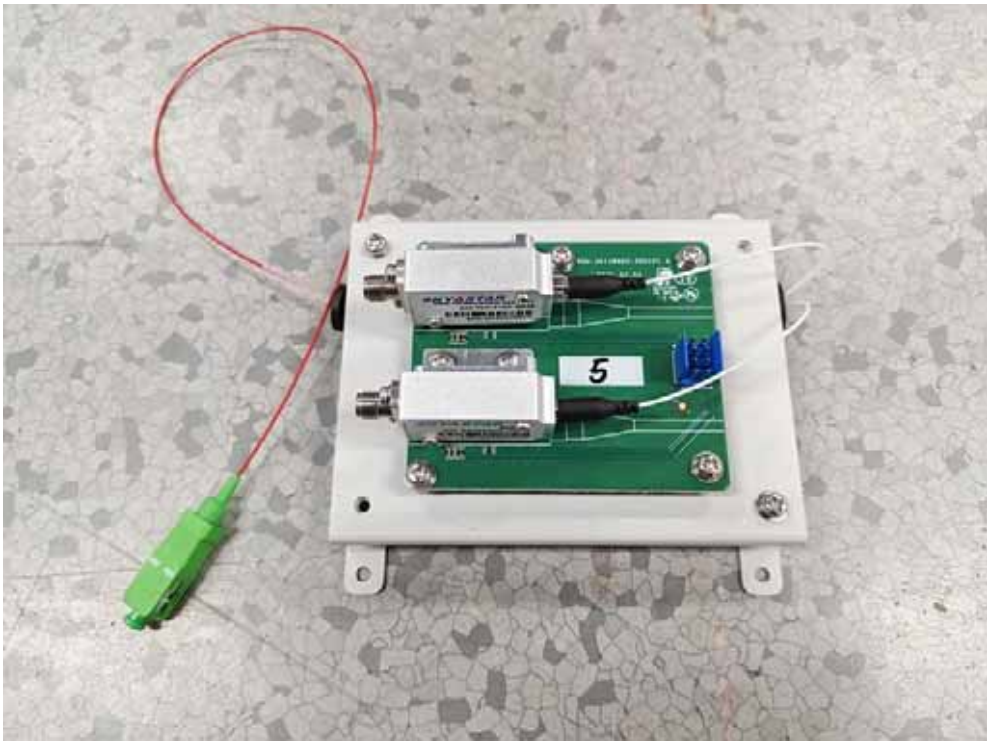
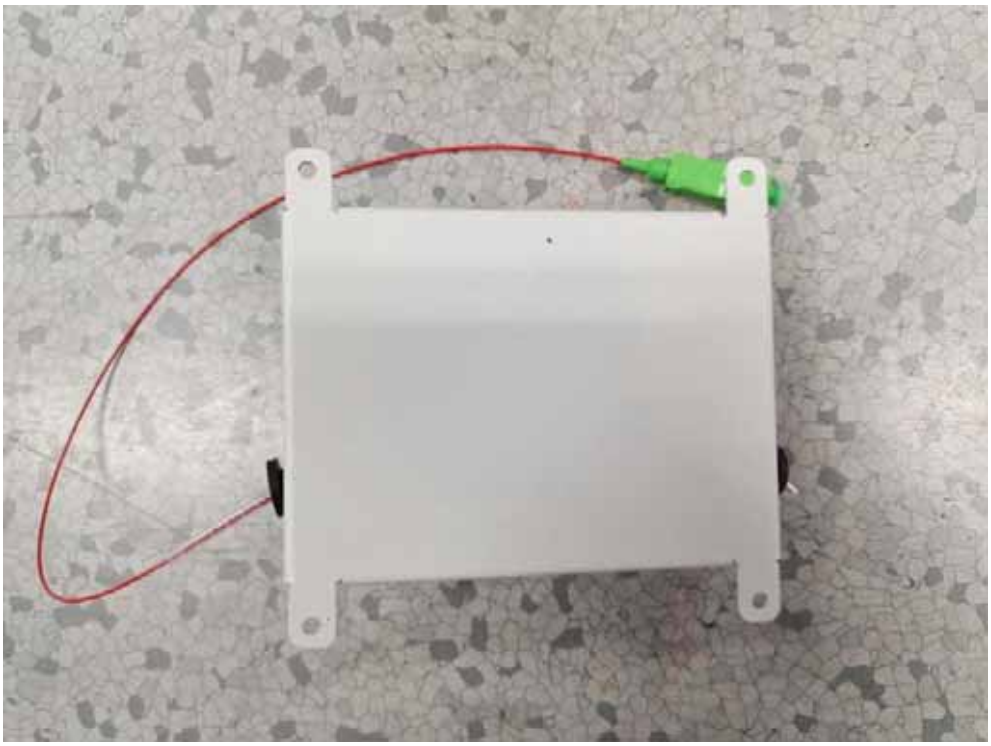
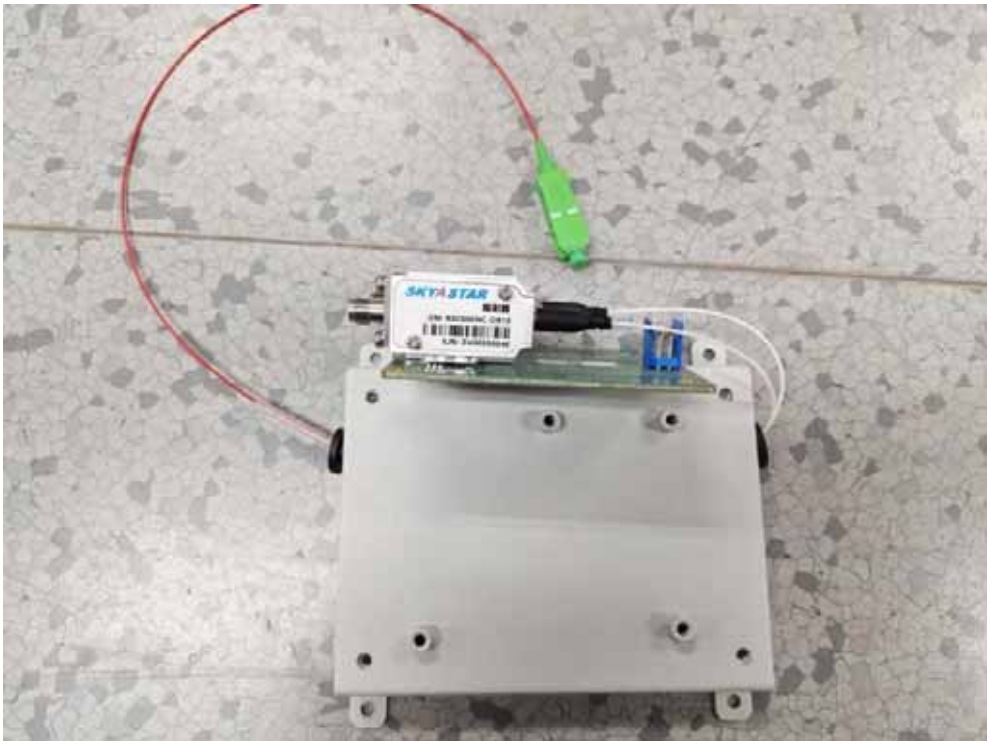
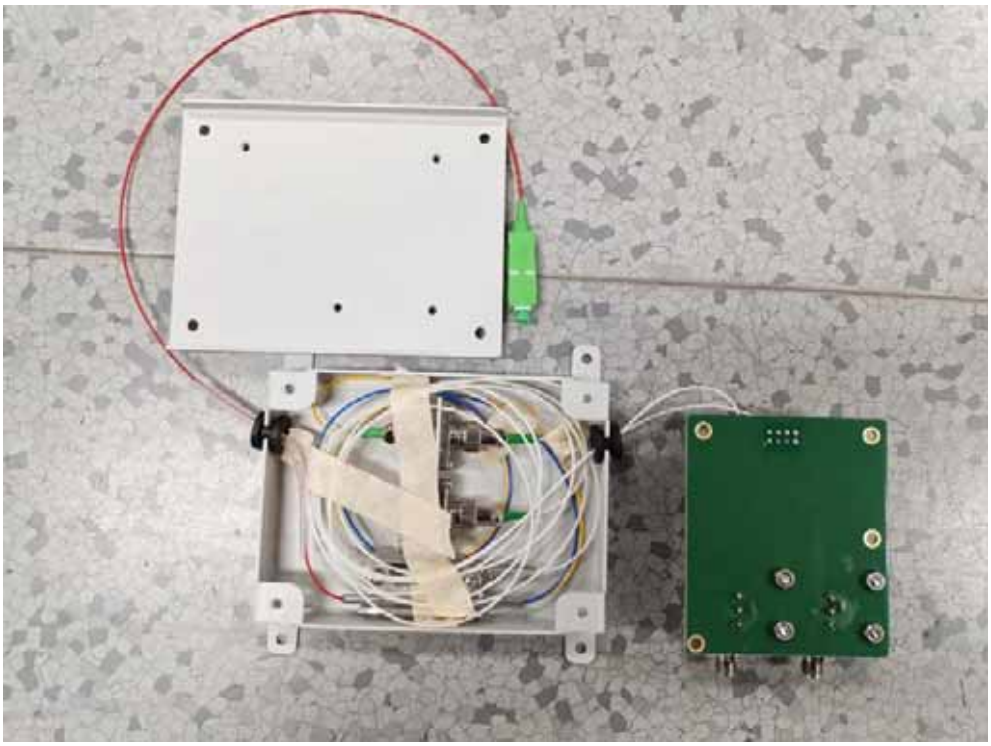


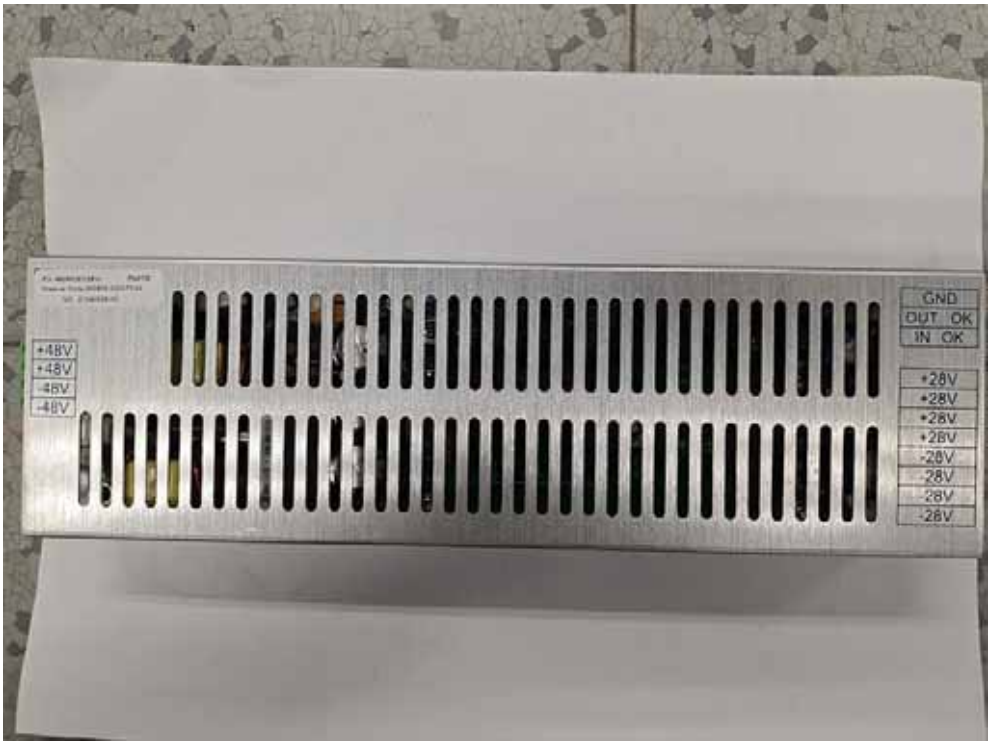



SKYASTAR



5.2.2.8 Power module

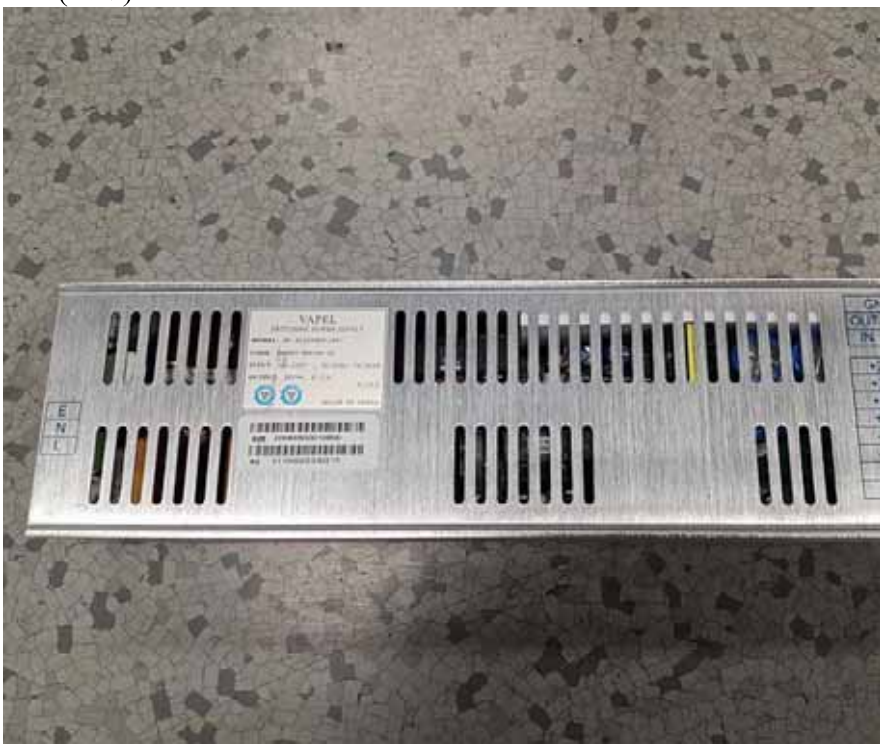
5.2.2.8.1 PD-482450E0(28V)




VAPEL SWITCHING POWER SUPPLY
MODEL: PD-482450E0(28V)
INPUT: 36-72V 23A MAX
OUTPUT: 28V 0—15A
MADE IN CHINA
SIZE 2008050002770O
NO 2104001346021S


+48V
+48V
-48V
-48V

1.1.1.1.1 PC-922430E0(28V)

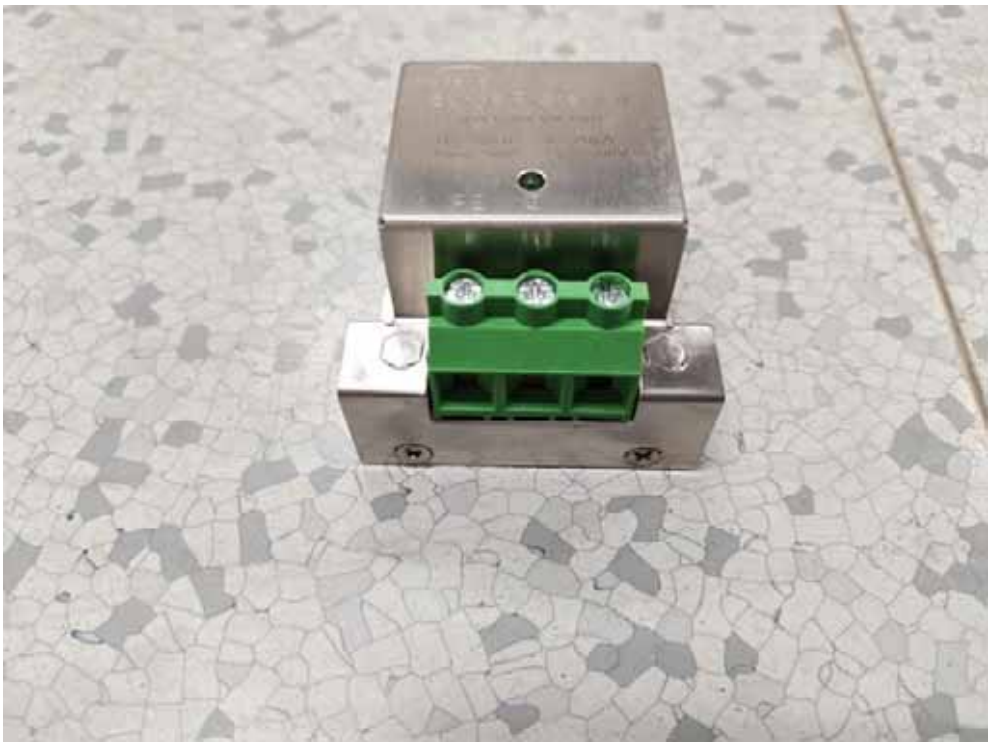


5.2.2.8.2


VAPEL
MADE IN CHINA
E
N
L
SIZE 200805000100900
NO 21100002330215

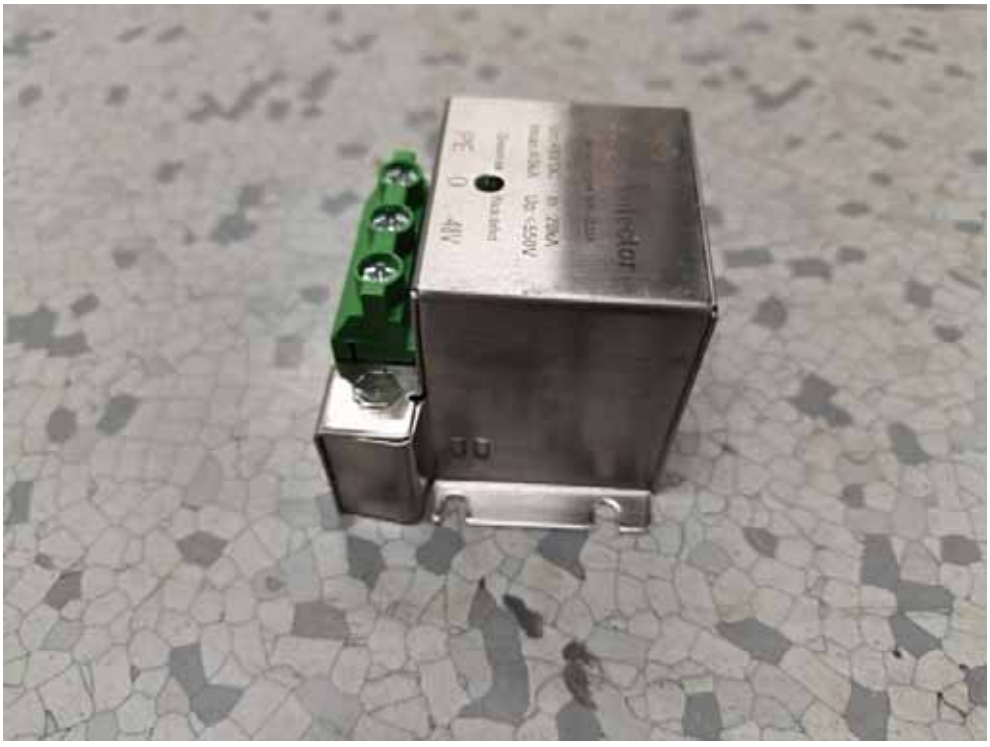
5.2.2.9 Arrester

5.2.2.9.1 PA20-48V-JX03A



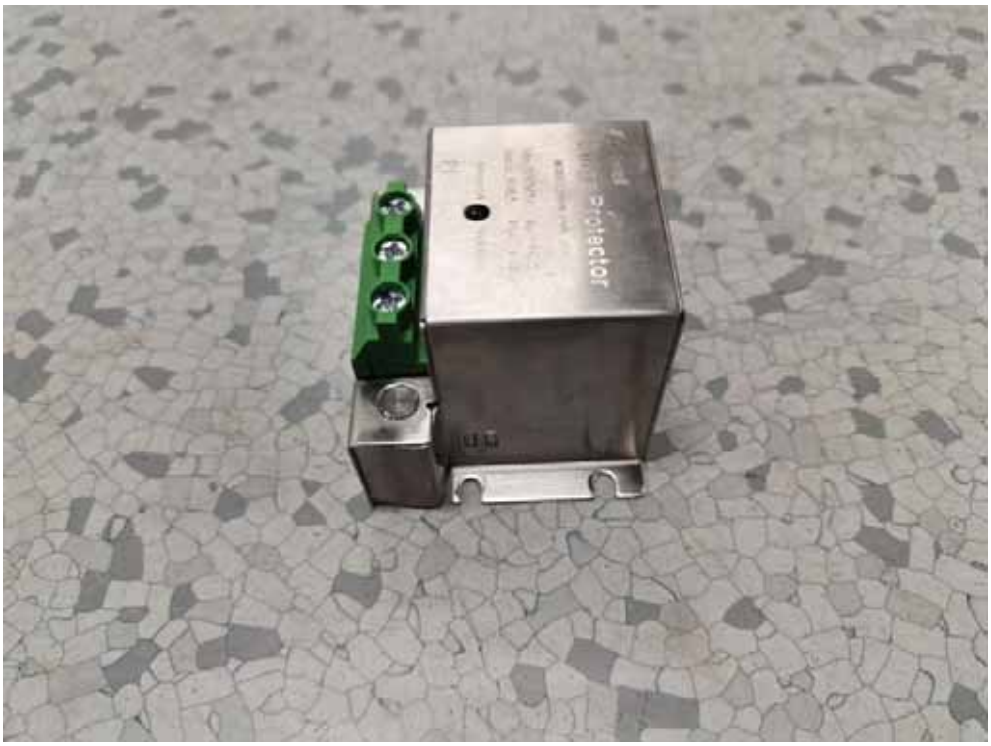

Surge Protector


O.C.
PASSED



5.2.2.9.2 PA20-220V-JX04A


Surge Protector
L
N
PE


protector

5.3 Optical Expansion Unit (FOU)

5.3.1 External photos

Top surface

Front surface-1

Front surface-2

Side surface-1

Side surface-2

Behind surface

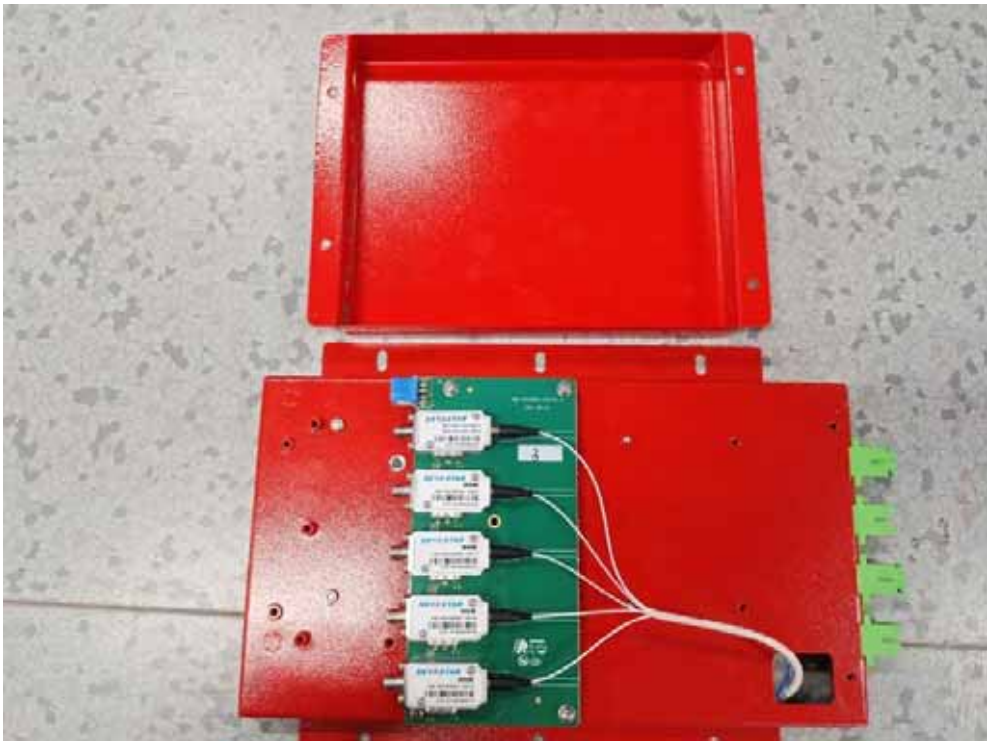
Bottom surface

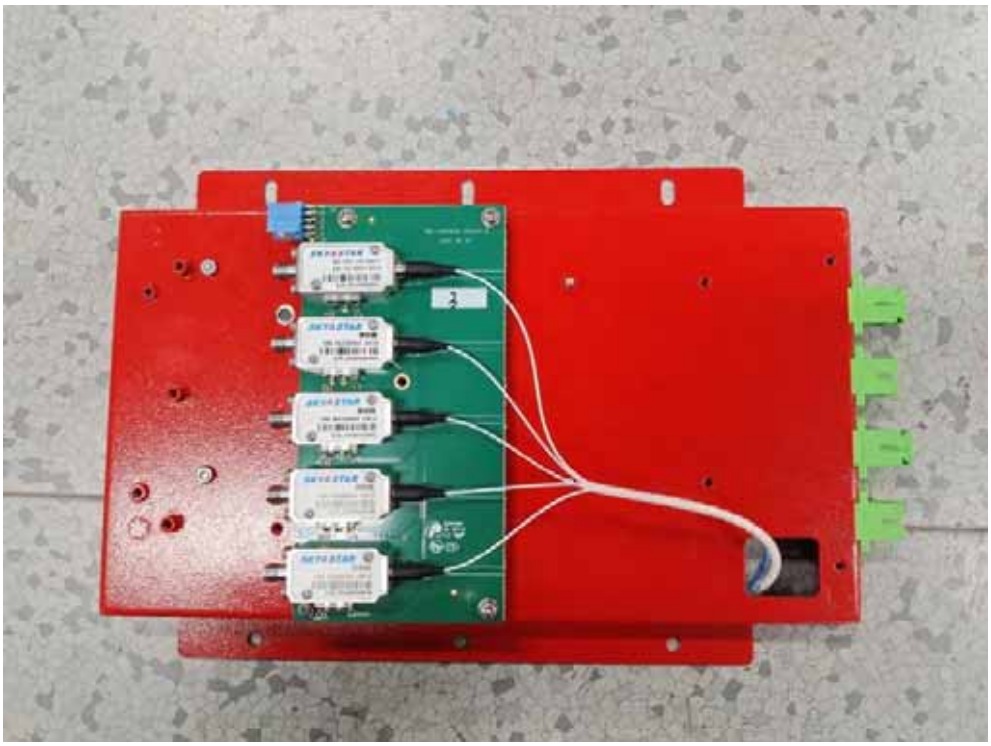
5.3.2 Internal photos

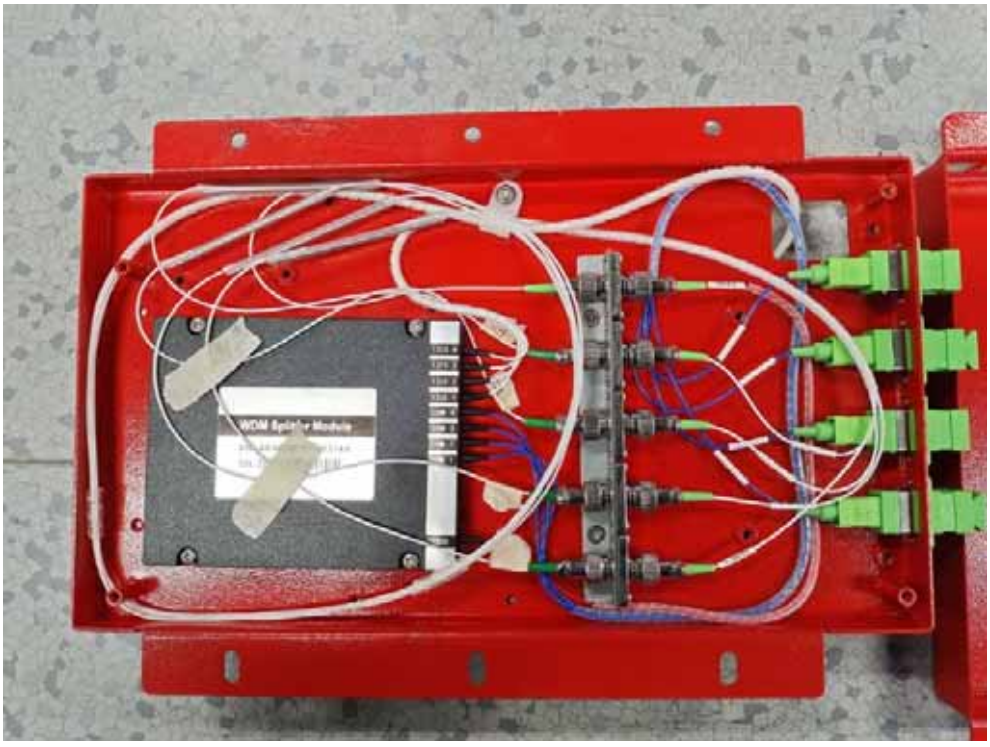
FOU Inside-1

FOU Inside-2

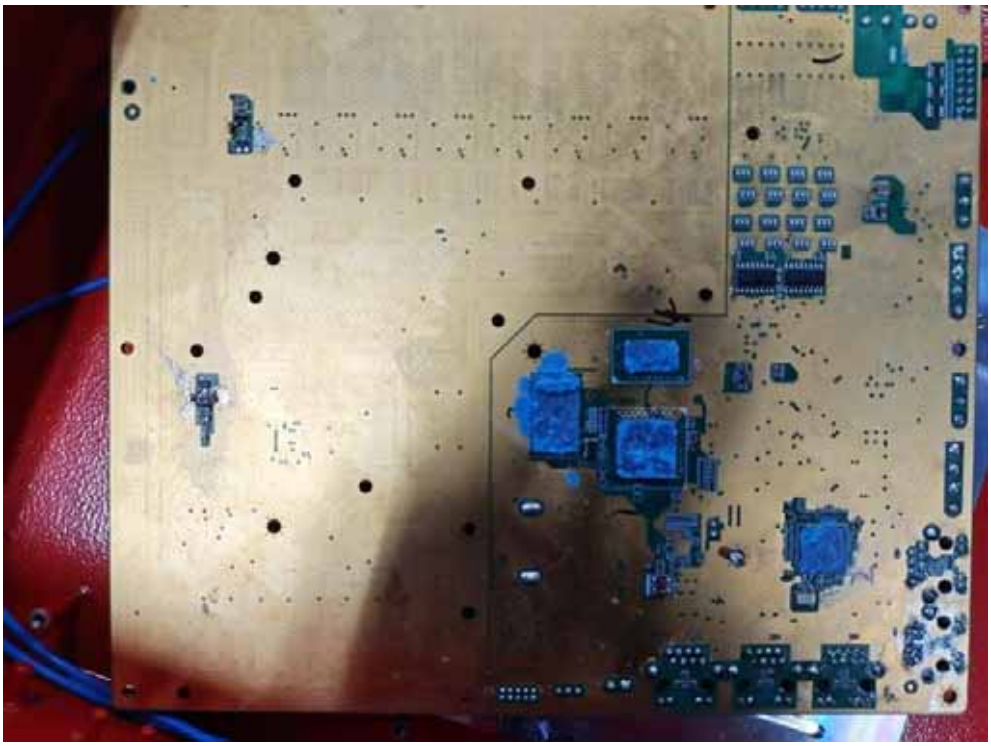
5.3.2.1 MOU-5X44WA01






WDM Splitter Module

5.3.2.2 MOU-5X88WA01



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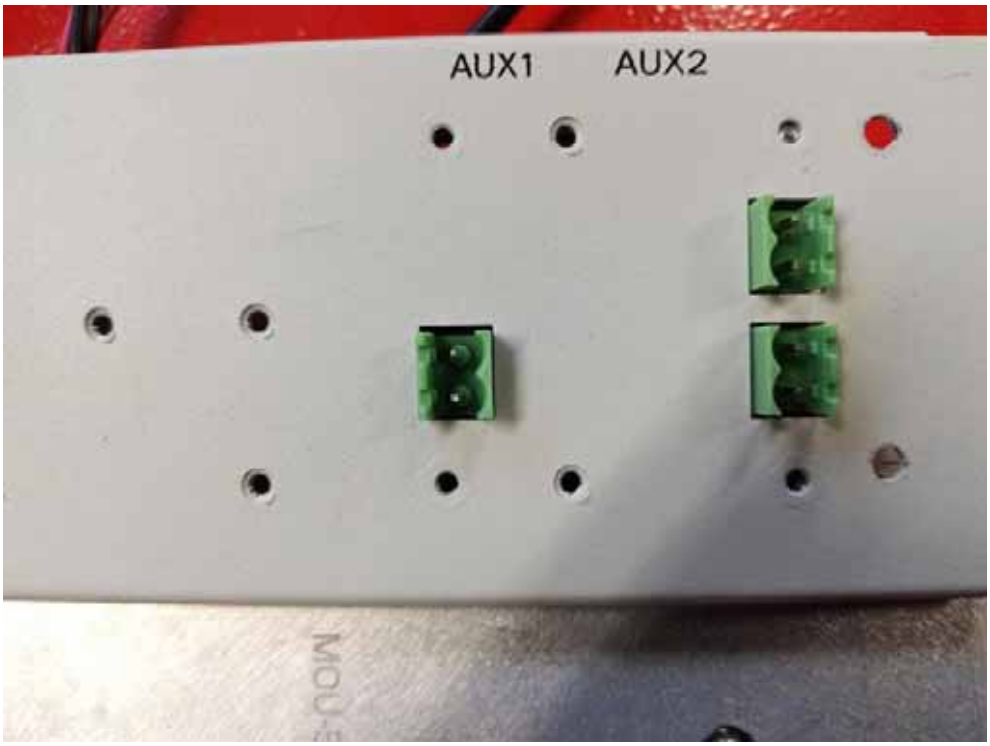
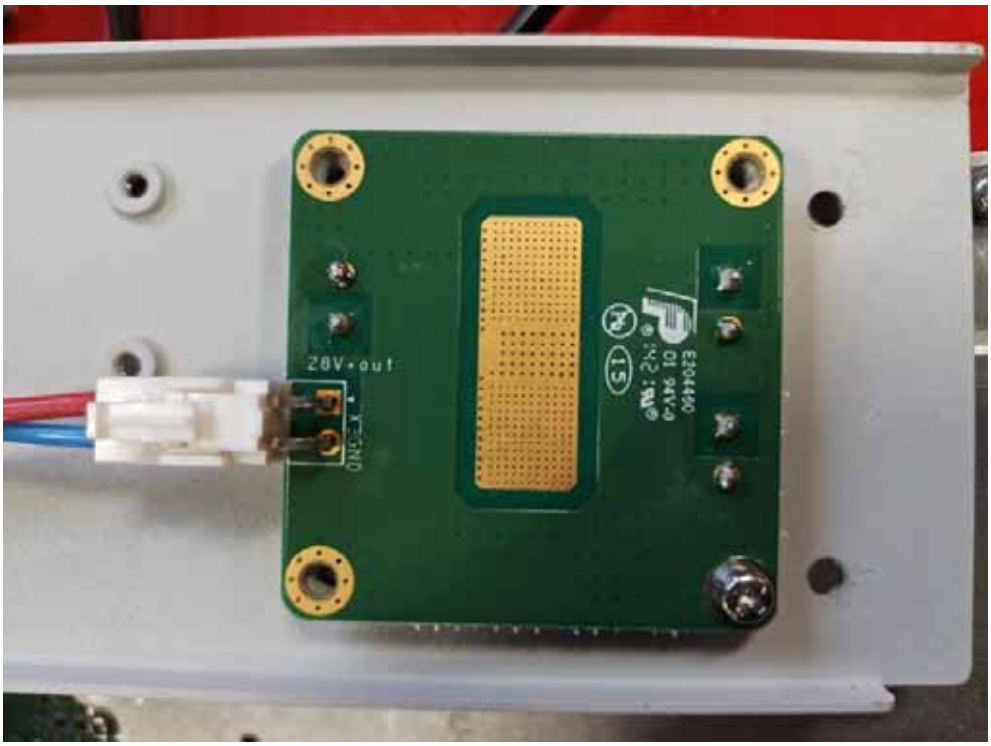
5.3.2.4 PNDAS-00EPW-3001





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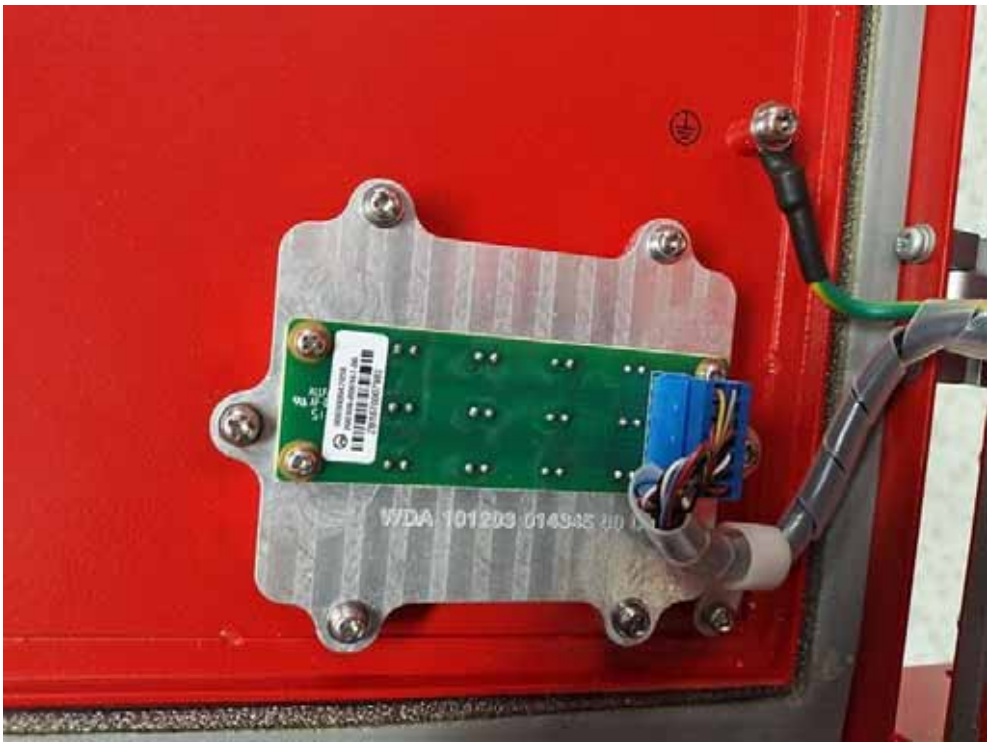

———- End of Report ———