

TEST REPORT

Applicant: BeiJing Stronglink Technology Co.,Ltd.
Address: A402, Building 8, No. 97, Changping Road, Shahe Town, Changping District, Beijing (Changping Demonstration Park)
Equipment Type: IIC MIFARE Module
Model Name: SL030_V3.1
Brand Name: Stronglink
Test Standard: ETSI EN 300 330 V2.1.1 (2017-02)
Test Date: Apr. 27, 2022 - Apr. 28, 2022
Date of Issue: May 12, 2022

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Xiong Chong

Checked by: Xia Long

Approved by: Liao Jianming
(Technical Director)

Xiong Chong

Xia Long

Jim Liao

Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>May 12, 2022</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Description	All measurement facilities used to collect the measurement data are located at Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	BeiJing Stronglink Technology Co.,Ltd.
Address	A402, Building 8, No. 97, Changping Road, Shahe Town, Changping District, Beijing (Changping Demonstration Park)

2.2 Manufacturer Information

Manufacturer	BeiJing Stronglink Technology Co.,Ltd.
Address	A402, Building 8, No. 97, Changping Road, Shahe Town, Changping District, Beijing (Changping Demonstration Park)

2.3 Factory Information

Factory	BeiJing Stronglink Technology Co.,Ltd.
Address	A402, Building 8, No. 97, Changping Road, Shahe Town, Changping District, Beijing (Changping Demonstration Park)

2.4 General Description for Equipment under Test (EUT)

EUT Name	IIC MIFARE Module
Model Name Under Test	SL030_V3.1
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Technical Information

Network and Wireless connectivity	NFC
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The requirement for the following technical information of the EUT was tested in this report:

Modulation Type	ASK
Frequency Range	13.56 MHz
Product Class	1
Receiver Categorization	3
Number of channel	1
Tested Channel	1
Antenna Type	PCB Antenna
About the Product	The equipment is IIC MIFARE Module, intended for used with information technology equipment. Only NFC was tested in this report.

Note: The above EUT information in section 2.4 and 2.5 was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

The EUT has been tested according to ETSI EN 300 330 V2.1.1 (2017-02).

No.	Identity	Document Title
1	ETSI EN 300 330 V2.1.1 (2017-02)	Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

3.2 Verdict

Report Section	Standard Rule	Description	Result
Transmitter requirements			
5.1.1	4.3.1	Permitted range of operating frequencies	Pass
5.1.2	4.3.2	Operating frequency ranges	Pass
5.1.3	4.3.3	Modulation bandwidth	Pass
5.1.4	4.3.4	Transmitter H-field requirements (only applies to product class 1 and class 2)	Pass
--	4.3.5	Transmitter RF carrier current (only applies to product class 3)	N/A
--	4.3.6	Transmitter radiated E-field (only applies to product class 4)	N/A
--	4.3.7	Transmitter conducted spurious emissions (only applies to product class 3 and their power or current level in an artificial antenna (conducted spurious emission))	N/A
5.1.5	4.3.8	Transmitter radiated spurious domain emission limits < 30 MHz	Pass
5.1.6	4.3.9	Transmitter radiated spurious domain emission limits > 30 MHz	Pass
--	4.3.10	Transmitter Frequency stability (only applies to channelized systems where channel limits are defined)	N/A
Receiver requirements			
5.2.1	4.4.2	Receiver spurious emissions	Pass
--	4.4.3	Adjacent channel selectivity (only for channelized systems in the 27 MHz range)	N/A
--	4.4.4	Receiver blocking or desensitization (only applicable for channelized systems where channel definitions are used.)	N/A

3.3 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
Radiated emissions (9 kHz–30 MHz)	4.28 dB
Radiated emissions (30 MHz-1 GHz)	4.80 dB
Radiated emissions (1 GHz-18 GHz)	4.88 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

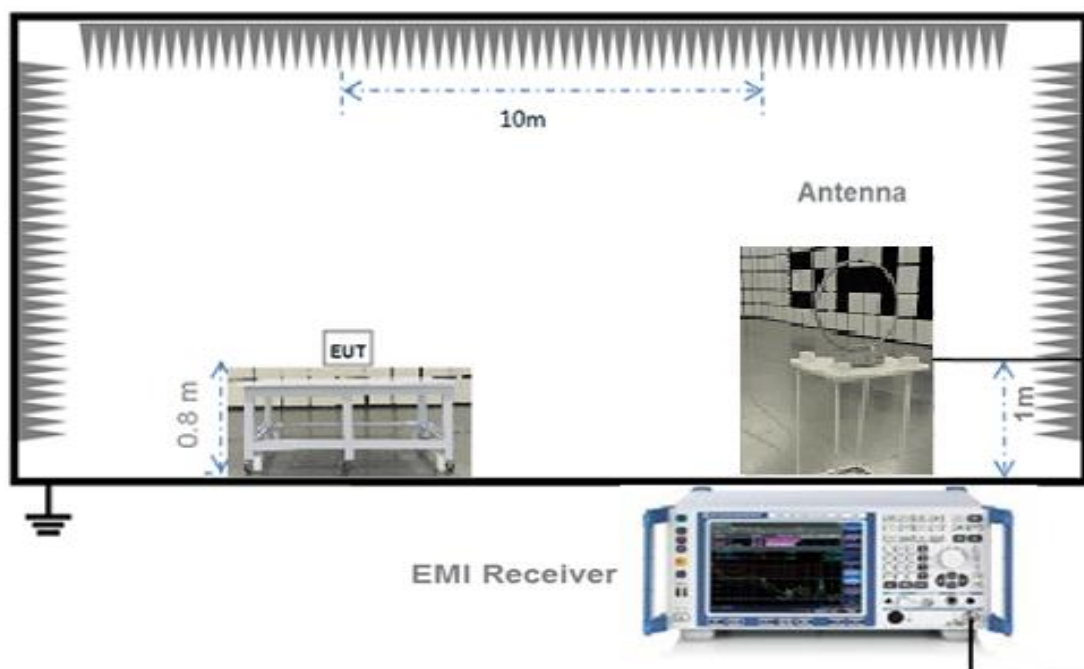
Relative Humidity	30% to 60%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
	LT (Low Temperature)	-25℃
	HT (High Temperature)	70℃
Working Voltage of the EUT	NV (Normal Voltage)	3.3 V
	LV (Low Voltage)	3.0 V
	HV (High Voltage)	3.5 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2021.10.10	2022.10.09
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2021.09.13	2022.09.12
EMI Receiver	KEYSIGHT	N9038A	MY55330120	2021.10.20	2022.10.19
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2021.06.04	2022.06.03
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2021.06.01	2022.05.31
Power Splitter	KMW	DCPD-LDC	1305003215	--	--
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	--	--
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2021.04.16	2024.04.15
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2021.08.20	2024.08.19
Temperature Chamber	AHK	SP20	1412	2021.11.30	2022.11.29
Anechoic Chamber	EMC TECHNOLOGY LTD	21.1m*11.6m*7.35m	N/A	2021.08.15	2024.08.14
Anechoic Chamber	CHANGNING	9m*6m*6m	N/A	2020.03.16	2023.03.15
Shielded Enclosure	YiHeng Electronic Co., Ltd	3.5m*3.1m*2.8m	N/A	2022.02.19	2025.02.18

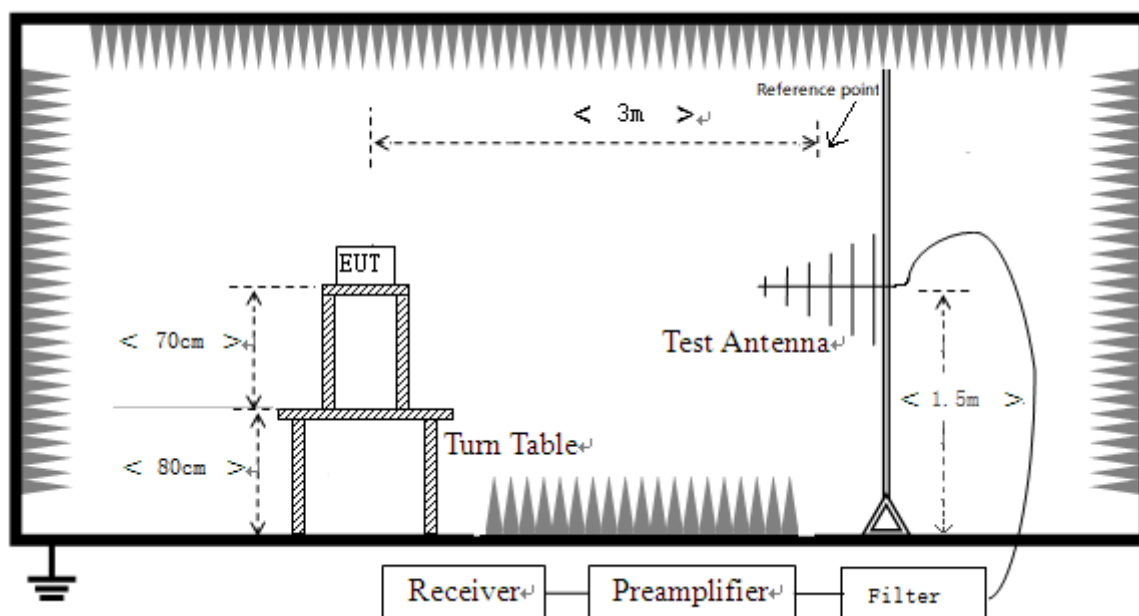
4.3 Description of Test Setup

4.3.2 For Radiated Test (Below 30 MHz)



(Diagram 1)

4.3.3 For Radiated Test (30 MHz-1 GHz)



(Diagram 2)

4.4 Receiver categorization

Technologies	Receiver spurious emission	Adjacent channel selectivity	Blocking or desensitization
tagging systems	yes	no (note 2)	no (note 1)
systems in the 27 MHz range	yes	yes	yes
all others	yes	no (note 2)	yes

NOTE 1: Blocking or desensitization not needed because of the physical co-location of RX to TX in tagging systems where the RX and TX operate simultaneously. The TX signal is used for the RX baseband mixing. The TX signal at the RX input is about 90 dB above the receiver sensitivity or tagging signal level the receiver (see ETSI TR 103 059 [i.9], figure 8). Furthermore given the very short communication ranges for most applications (e.g. NFC, RFID), a given interference blocking signal will have to be about 90 dB higher as the transmitter signal at the transceiver antenna, which is unlikely to happen.

NOTE 2: This requirement can only be required where a frequency plan with standard channel spacing is consistently used, for example in the 27 MHz band.

4.5 Product classes

Product Class	Description of transmitter	Antenna to be tested	Frequency range	Loop antenna area	Length of antenna (= maximum dimension of the antenna)	Customization of antenna design allowed	Transmitter carrier output limits	Spurious emissions limits
1	Inductive loop coil transmitter	Integral antenna (antenna type 1) or dedicated antenna supplied with the equipment (antenna type 2); (see note 1)	9 kHz to 30 MHz	< 30 m ²	< $\lambda/4$ (75 metres/f where f is in MHz) or < 30 m, whichever is shorter	No	H-field at 10 m (see clause 4.3.4.3)	H-field at 10 m (see clauses 4.3.8.3 and 4.3.9.3)
2	Inductive loop coil transmitter	Two representative antennas supplied with the equipment (see note 2)	9 kHz to 30 MHz	< 30 m ² (see note 3)	< $\lambda/4$ (75 metres/f where f is in MHz) or < 30 m, whichever is shorter	Yes (see note 3)	H-field at 10 m (see clause 4.3.4.3)	H-field at 10 m (see clauses 4.3.8.3 and 4.3.9.3)
3	Customized, large size loop antennas only	Test without an antenna by using an artificial antenna	9 kHz to 135 kHz	> 30 m ²	n.a.	Yes	Current in artificial antenna (see note 4 and clauses 4.3.4.3 and 4.3.6.3)	Current in artificial antenna (see note 4 and clauses 4.3.7.3 and 4.3.19.3)
4	E-field transmitter	Each type of antenna to be used	9 kHz to 30 MHz	n.a.	n.a.	n.a.	H-field at 10 m (see clause 4.3.6.3)	H-field at 10 m (see clauses 4.3.8.3 and 4.3.9.3)

NOTE 1: Where a manufacturer provides a range of standard antennas, the equipment will be tested as Product Class 1 equipment, with the antenna(s) attached.

The measurements shall be repeated for each antenna.

NOTE 2: The two antennas shall meet the manufacturer's design rules published in the equipment manual and shall have maximum and minimum loop areas respectively. Both antennas shall have the maximum magnetic dipole moment as declared by the manufacturer.

NOTE 3: Customization is only allowed according to the manufacturer's antenna design rules published in the equipment manual.

NOTE 4: ON-site measurements may be required.

4.6 Measuring receiver

Frequency	Detector type	Measurement receiver bandwidth	Spectrum analyzer bandwidth
9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz
150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 kHz
30 MHz ≤ f < 1 GHz	Quasi Peak	120 kHz	100 kHz

NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.

4.7 Short Range Devices within the 9 kHz to 30 MHz permitted frequency bands

	Frequency Bands/frequencies	Applications
Transmit and Receive	9 kHz to 90 kHz	Inductive devices, Generic use
Transmit and Receive	90 kHz to 119 kHz	Inductive devices, Generic use
Transmit and Receive	119 kHz to 140 kHz	Inductive devices, Generic use
Transmit and Receive	140 kHz to 148,5 kHz	Inductive devices, Generic use
Transmit and Receive	148,5 kHz to 5 MHz	Inductive devices, Generic use
Transmit and Receive	400 kHz to 600 kHz	RFID only
Transmit and Receive	5 MHz to 30 MHz	Inductive devices, Generic use
Transmit and Receive	3 155 kHz to 3 400 kHz	Inductive devices, Generic use
Transmit and Receive	984 kHz to 7 484 kHz (Note 3, Centre frequency is 4 234 kHz)	Inductive devices, Railway applications
Transmit and Receive	4 516 kHz	Inductive devices, Railway applications
Transmit and Receive	6 765 kHz to 6 795 kHz	Inductive devices, Generic use
Transmit and Receive	7 400 kHz to 8 800 kHz	Inductive devices, Generic use
Transmit and Receive	10 200 kHz to 11,000 MHz	Inductive devices, Generic use
Transmit and Receive	11,810 MHz to 15,310 MHz (Centre frequency is 13,56 MHz)	RFID only
Transmit and Receive	12,5 MHz to 20 MHz	Inductive devices, Wireless healthcare
Transmit and Receive	13,553 MHz to 13,567 MHz	Inductive devices, Generic use
Transmit and Receive	26,957 MHz to 27,283 MHz	Inductive devices, Generic use
Transmit and Receive	27,090 MHz to 27,100 MHz	Inductive devices, Railway applications

NOTE 1: In addition, it should be noted that other frequency bands may be available in a country within the frequency range 9 kHz to 30 MHz.

NOTE 2: On non-harmonised parameters, national administrations may impose certain conditions such as the type of modulation, frequency, channel/frequency separations, maximum transmitter radiated power, duty cycle, and the inclusion of an automatic transmitter shut-off facility, as a condition for the issue of an Individual Rights for use of spectrum or General Authorization, or as a condition for use under "licence exemption" as it is in most cases for Short Range Devices.

NOTE 3: Transmitting only on receipt of a Balise/Eurobalise tele-powering signal from a train.

5. Test Type and Test Results

5.1. Transmitter Parameters

5.1.1. Permitted range of operating frequencies

5.1.1.1. Limit

The permitted range of operating frequency for intentional emissions shall be from 9 kHz to 30 MHz.

5.1.1.2. Test Setup

The section 4.3.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.1.3. Test Procedure

The permitted range of operating frequencies is the frequency range over which the equipment is authorized to operate.

If more than one modulation scheme can be generated by the EUT, then for each modulation scheme and one typical set of modulation parameters the maximum and minimum frequencies shall be measured and recorded separately.

5.1.1.4. Test Result

Please refer to ANNEX A.1.

5.1.2. Operating frequency ranges

5.1.2.1. Limit

The operating frequency ranges for intentional emissions shall be entirely within the frequency bands in table in section 4.7.

5.1.2.2. Test Setup

The section 4.3.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.2.3. Test Procedure

The operating frequency range (OFR) is the frequency range over which the EUT is transmitting. The operating frequency range of the EUT is determined by the lowest (fL) and highest frequency (fH) as occupied by the power envelope. With the centre frequency of the OFR as: $f_C = (f_H + f_L)/2$. An EUT could have more than one operating frequency range.

5.1.2.4. Test Result

Please refer to ANNEX A.2.

5.1.3. Modulation bandwidth

5.1.3.1. Limit

The modulation bandwidth shall be within the assigned frequency band or $\pm 7.5\%$ of the carrier frequency whichever is the smallest. For RFID and EAS Systems, the modulation bandwidth shall be within the transmitter emission boundary of figures I.1, I.2, I.3 and I.4. For further information, see CEPT/ERC/REC 70-03 [i.1] or ERC/ECC/CEPT Decisions as implemented through National Radio Interfaces (NRI) and additional NRI as relevant.

5.1.3.2. Test Setup

The section 4.3.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.3.3. Test Procedure

The transmitter shall be connected to an artificial antenna or if the transmitter has an integral antenna a test fixture shall be used. The RF output of the equipment shall be connected to a spectrum analyser via a $50\ \Omega$ variable attenuator.

The transmitter shall be operated at the nominal carrier power or field strength measured under normal test conditions.

The measurements shall be made during normal and extreme test conditions. During extreme test conditions, both extreme temperature and voltage apply simultaneously

5.1.3.4. Test Result

Please refer to ANNEX A.3.

5.1.4. Transmitter radiated H-field

5.1.4.1. Limit

The frequency ranges and limits shown in flow table.

H-field limits at 10 m

Frequency range (MHz)	H-field strength limit (H_f) dB μ A/m at 10 m or specified in mW e.r.p.
$0,009 \leq f < 0,090$	72 descending 3 dB/oct above 0,03 MHz or according to note 1 (see note 5)
$0,09 \leq f < 0,119$	42
$0,119 \leq f < 0,135$	66 descending 3 dB/oct above 0,119 MHz or according to note 1 (see notes 3 and 5)
$0,135 \leq f < 0,140$	42
$0,140 \leq f < 0,1485$	37,7
$0,1485 \leq f < 30$	-5 (see note 4)
$0,315 \leq f < 0,600$	-5
$3,155 \leq f < 3,400$	13,5
4,234	9 (see note 9)
4,516	7
$7,400 \leq f < 8,800$	9
$10,2 \leq f < 11,00$	9
$12,5 \leq f \leq 20$	-7
$6,765 \leq f \leq 6,795$	42 (see notes 3 and 7)
$26,957 \leq f \leq 27,283$	42 (see note 3)
$13,410 \leq f \leq 13,553$, $13,567 \leq f \leq 13,710$	9 (see note 6)
$13,110 \leq f \leq 13,410$, $13,710 \leq f \leq 14,010$	-3,5 (see note 6)
$12,660 \leq f \leq 13,110$, $14,010 \leq f \leq 14,460$	-10 (see note 6)
$11,810 \leq f \leq 12,660$, $14,460 \leq f \leq 15,310$	-16 (see note 6)
$13,460 \leq f \leq 13,553$, $13,567 \leq f \leq 13,660$	27 (see note 6)
$13,360 \leq f \leq 13,460$, $13,660 \leq f \leq 13,760$	Linear transition from 27 to -3,5 (see note 6)
$13,110 \leq f \leq 13,360$, $13,760 \leq f \leq 14,010$	-3,5 (see note 6)
$12,660 \leq f \leq 13,110$, $14,010 \leq f \leq 14,460$	-5 (see note 6)
$13,553 \leq f \leq 13,567$	42 (see note 3) or 60 (see notes 2 and 3)
27,095	42
26,995, 27,045, 27,095, 27,145, 27,195 (see note 8)	100 mW
<p>NOTE 1: For the frequency ranges 9 kHz to 135 kHz, the following additional restrictions apply to limits above 42 dBμA/m:</p> <ul style="list-style-type: none"> - for loop coil antennas with an area $\geq 0,16 \text{ m}^2$ this table and table B.1 with the antenna limitations apply; - for loop coil antennas with an area between $0,05 \text{ m}^2$ and $0,16 \text{ m}^2$ table B.1 applies with a correction factor. The limit is: table value + $10 \times \log(\text{area}/0,16 \text{ m}^2)$; - for loop coil antennas with an area $< 0,05 \text{ m}^2$ the limit is 10 dB below table B.1. <p>NOTE 2: For RFID (incl. NFC) and EAS applications only.</p> <p>NOTE 3: Spectrum mask limit, see annex I.</p> <p>NOTE 4: For further information see annex G.</p> <p>NOTE 5: Limit is 42 dBμA/m for the following spot frequencies: 60 kHz \pm 250 Hz, 66,6 kHz \pm 750 Hz, 75 kHz \pm 250 Hz, 77,5 kHz \pm 250 Hz, and 129,1 kHz \pm 500 Hz.</p> <p>NOTE 6: Only in conjunction with spectrum mask, see annex I.</p> <p>NOTE 7: The frequency range 6,765 MHz - 6,795 MHz is not a harmonised ISM frequency band according article 5.138 of the ITU Radio Regulations [i.13].</p> <p>NOTE 8: Center frequencies for channelized systems by using $\leq 10 \text{ kHz}$ bandwidth.</p> <p>NOTE 9: The limit is valid in the range 984 kHz - 7 484 kHz for Transmitting only on receipt of a Balise/Eurobalise tele-powering signal from a train.</p>	

5.1.4.2. Test Setup

The section 4.3.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.4.3. Test Procedure

The conformance tests for Transmitter radiated H-field shall be as defined in clause 6.2.4 of the present document. Conformance shall be established under test conditions to be declared by the manufacturer according to clause 4.1. The interpretation of the results for the measurements uncertainty shall be as given in clause 5.13.

5.1.4.4. Test Result

Please refer to ANNEX A.4.

5.1.5. Transmitter radiated spurious domain emission limits < 30 MHz

5.1.5.1. Limit

Limits for transmitters spurious emissions in the range from 9 kHz to 30 MHz

Limits for measurements at 10 m distance:

State	Frequency $9\text{ KHz} \leq f < 10\text{MHz}$	Frequency $10\text{ MHz} \leq f < 30\text{MHz}$
Transmit	27 dB μ A/m at 9 kHz descending 3 dB/oct	-3.5 dB μ A/m
Standby	5.5 dB μ A/m at 9 kHz descending 3 dB/oct	-25 dB μ A/m

5.1.5.2. Test Setup

The section 4.3.2 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.5.3. Test Procedure

The conformance tests for transmitter radiated spurious domain emission limits < 30 MHz shall be as defined in clause 6.2.8 of the present document. Conformance shall be established under test conditions to be declared by the manufacturer according to clause 4.1. The interpretation of the results for the measurements uncertainty shall be as given in clause 5.13.

5.1.5.4. Test Result

Please refer to ANNEX A.5.

5.1.6. Transmitter radiated spurious domain emission limits > 30 MHz

5.1.6.1. Limit

Limits for transmitters spurious emissions in the range from 30 MHz to 1000 MHz

The power of any radiated emission shall not exceed the values as below.

State	47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequency between 30 MHz to 1000 MHz
Operating	4 nW e.r.p	250 nW e.r.p
Standby	2 nW e.r.p	2 nW e.r.p

Note 1: The test limit has been transformed to the limit at 3m.

5.1.6.2. Test Setup

The section 4.3.2 (Diagram 2) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.6.3. Test Procedure

The conformance tests for transmitter radiated spurious domain emission limits > 30 MHz shall be as defined in clause 6.2.9 of the present document. Conformance shall be established under test conditions to be declared by the manufacturer according to clause 4.1. The interpretation of the results for the measurements uncertainty shall be as given in clause 5.13.

5.1.6.4. Test Result

Please refer to ANNEX A.6.

5.2. Receiver Parameters

5.2.1. Receiver Spurious Emissions

5.2.1.1. Limit

5.2.1.2. Limits for transmitters spurious emissions in the range from 9 kHz to 30 MHz

Limits for measurements at 10 m distance:

Frequency $9\text{ KHz} \leq f < 10\text{MHz}$	Frequency $10\text{ MHz} \leq f < 30\text{MHz}$
5.5dB μ A/m at 9kHz descending 3 dB/oct	-25 dB μ A/m

5.2.1.3. Limits for transmitters spurious emissions in the range from 30 MHz to 1000 MHz

The measured values shall not exceed 2 nW e.r.p.

5.2.1.4. Test Setup

See 4.3.1 and 4.3.2 (Diagram 1 and 2) for test setup description for the radiated test. The photo of test setup please refer to ANNEX B.

5.2.1.5. Test Procedure

The measurements of the radiated spurious emissions were made on an anechoic chamber. The spurious emissions produced by the equipment were measured at the distance of 3m. The spurious emissions are measured with a shielded loop antenna connected to a measurement receiver.

5.2.1.6. Test Result

Please refer to ANNEX A.7.

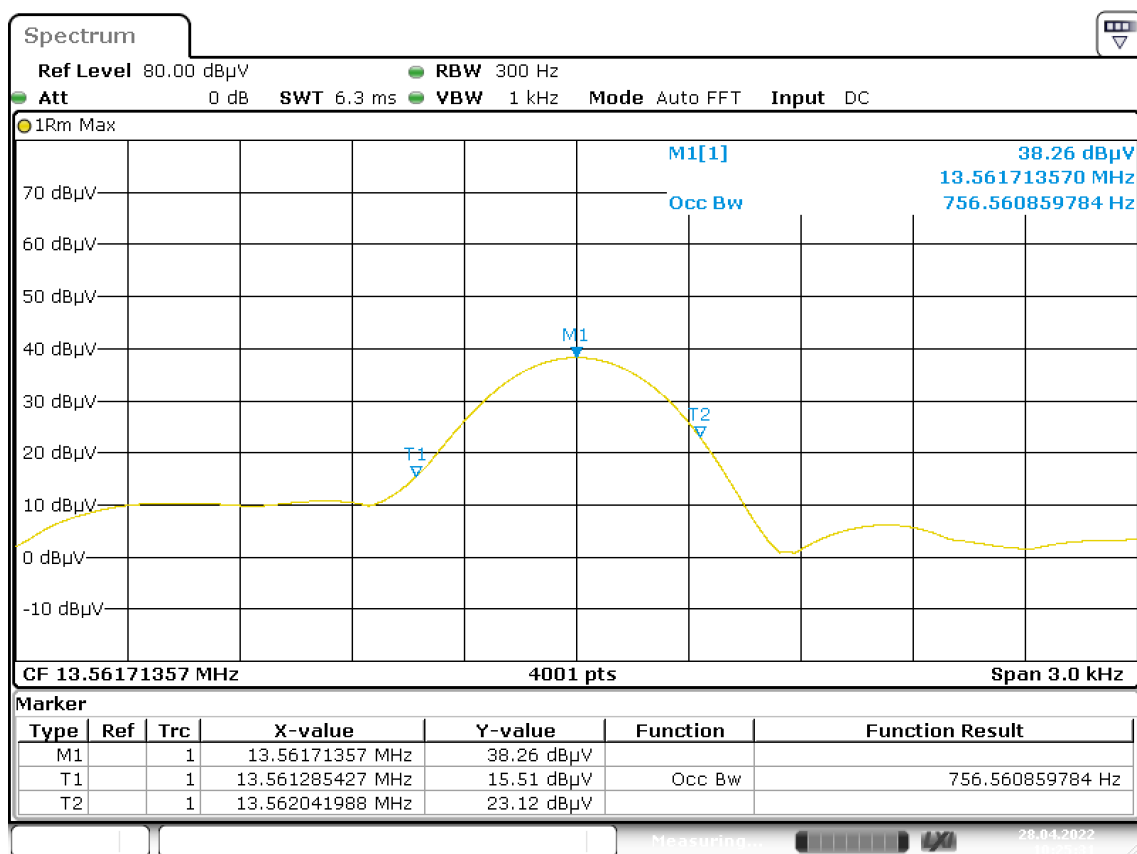
ANNEX A TEST RESULT

A.1 Permitted range of operating frequencies

Test Data

Test Method	Modulation	Test Conditions		operating frequencies (kHz)	limit
<input checked="" type="checkbox"/> Radiated <input type="checkbox"/> Conducted	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	NT	NV	13561.71357	13553 kHz to 13567 kHz
Test Result				Pass	

Test Plot



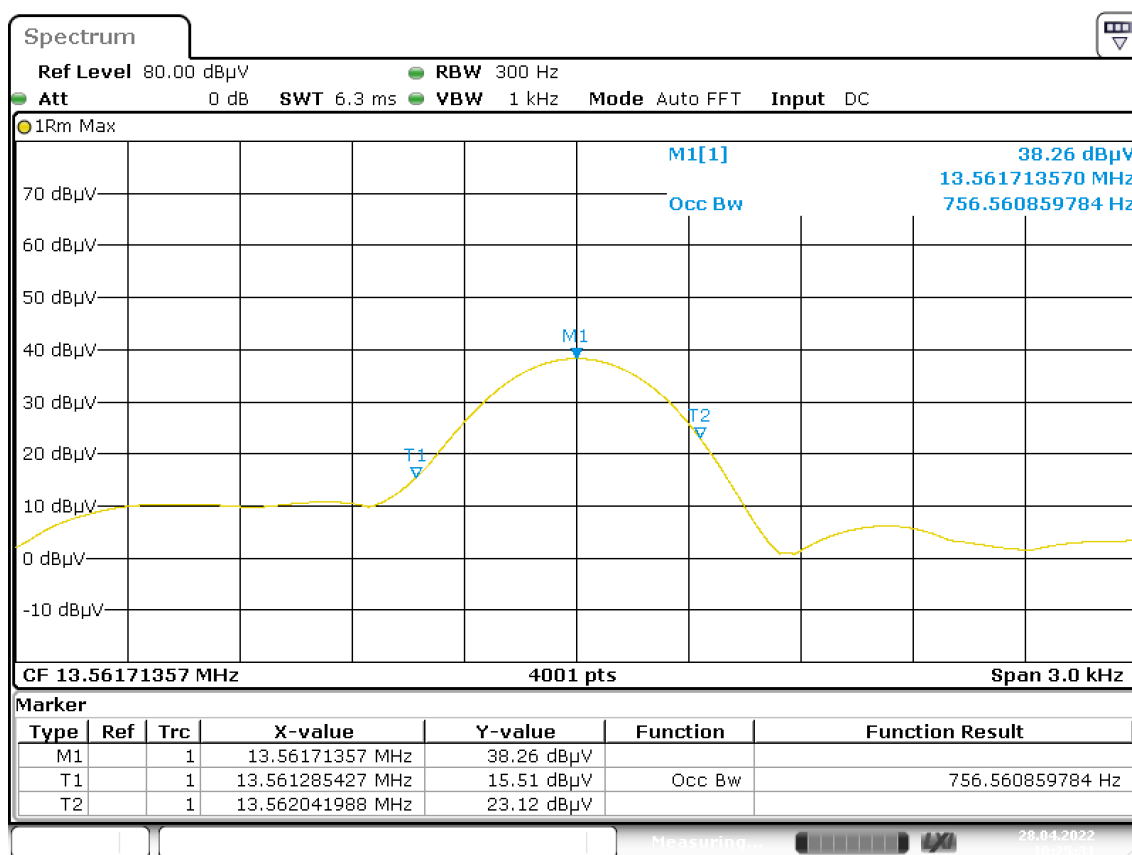
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A.2 Operating frequency ranges

Test Data and Plot

Test Conditions		Frequency band			
		Measured (kHz)			Limit
		Low frequency	High frequency	F _c	
NT	NV	13561.28543	13562.04199	13561.66371	13553 kHz to 13567 kHz
Test Result		Pass			

Test Plot



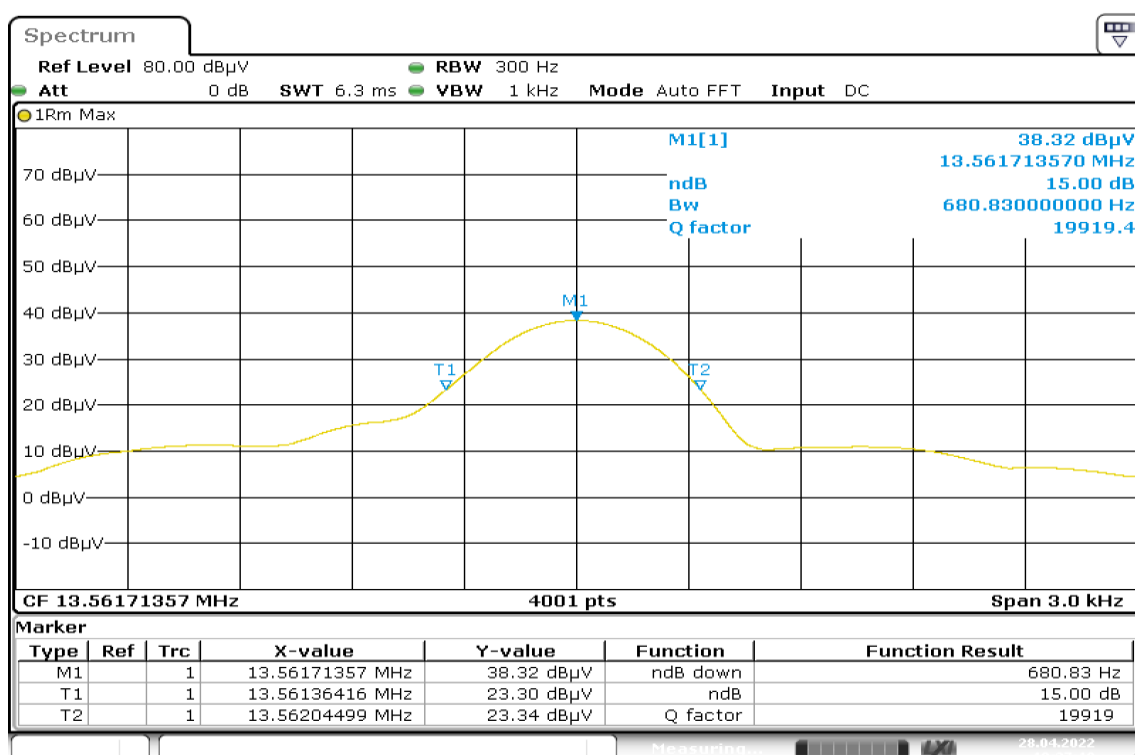
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A.3 Modulation bandwidth

Test Data

Test Conditions		Frequency band		
		Measured (kHz)		limit
		Low frequency	High frequency	
NT	NV	13561.36416	13562.04499	Smallest (assigned frequency band, $\pm 7.5\%$ of the carrier frequency)
Test Result		Pass		

Test Plot



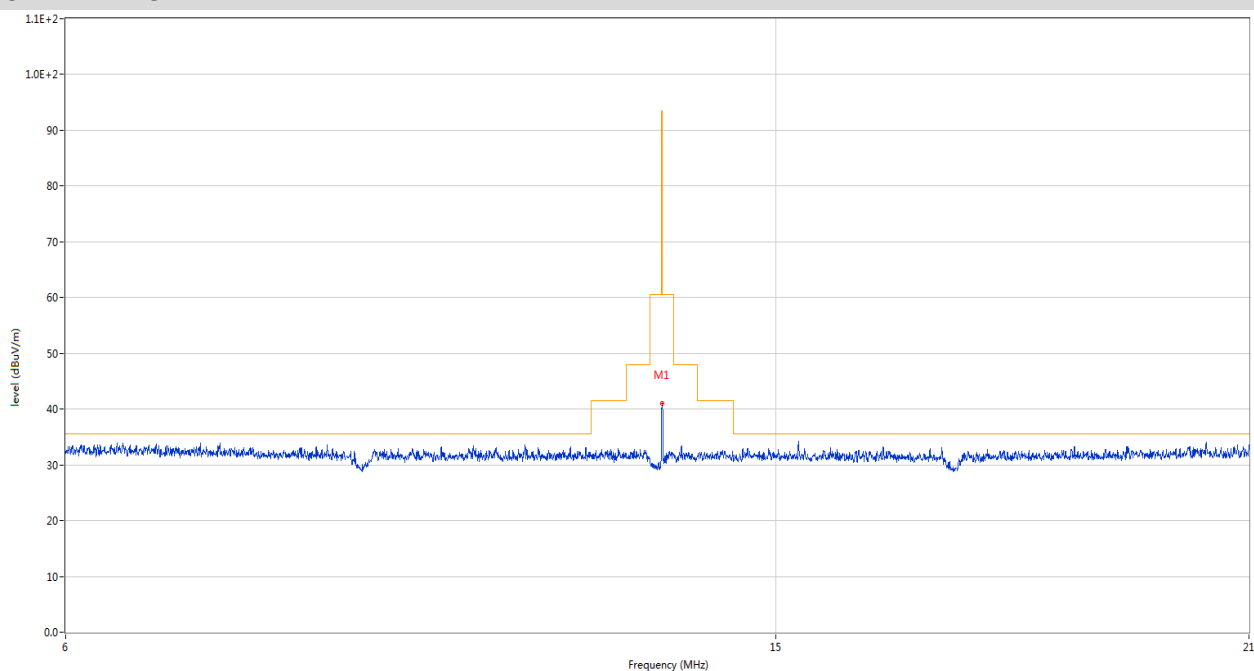
Date: 28.APR.2022 10:27:10

A.4 Transmitter radiated H-field

Test Data and Plot

Field Strength of Fundamental Emissions Value						
Frequency (MHz)	Field Strength @10m (dBuV/m)	Field Strength @10m (dBuA/m)	Limit @10m (dBuA/m)	Margin @10m (dB)	Antenna	Verdict
13.560	41.08	-10.42	42	52.42	Vertical	Pass

OPERATING ANT-V



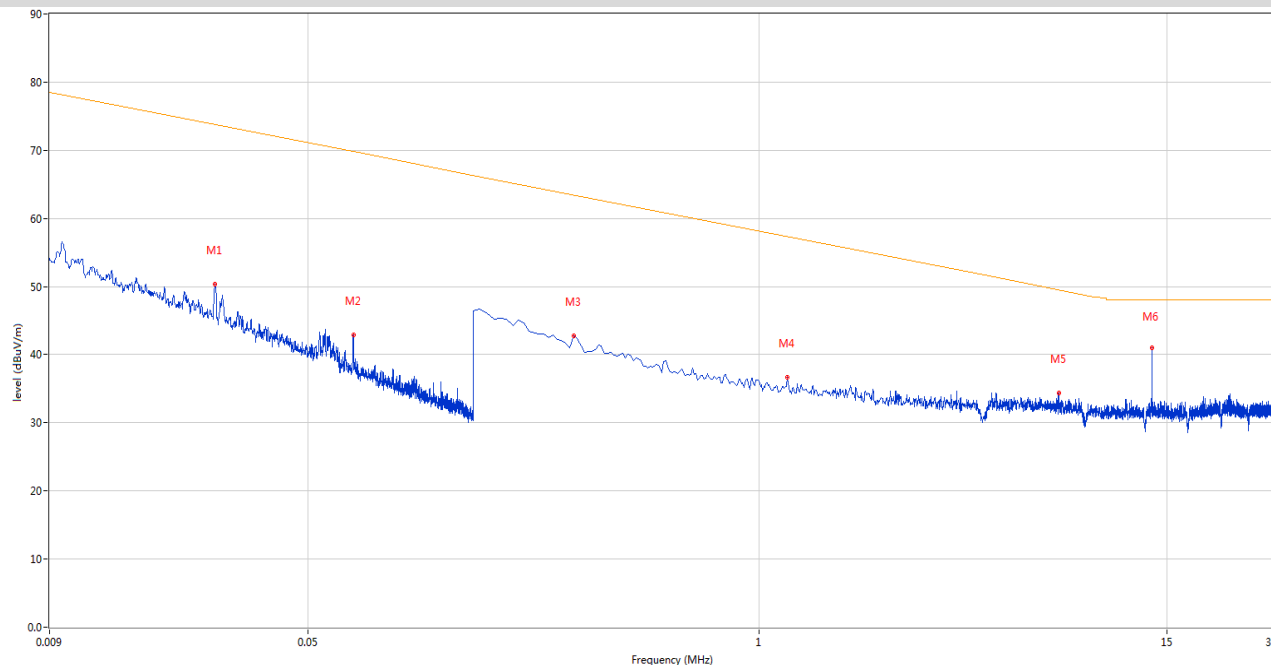
Note: For measuring equipment calibrated in dB μ V, the reading should be reduced by 51.5 dB to be converted to dB μ A/m.

A.5 Transmitter radiated spurious domain emission limits < 30 MHz

Note: This frequency which near 13.560 MHz with circle should be ignored because they are NFC carrier frequency.

Transmitters spurious emissions in the range from 9 kHz to 30 MHz

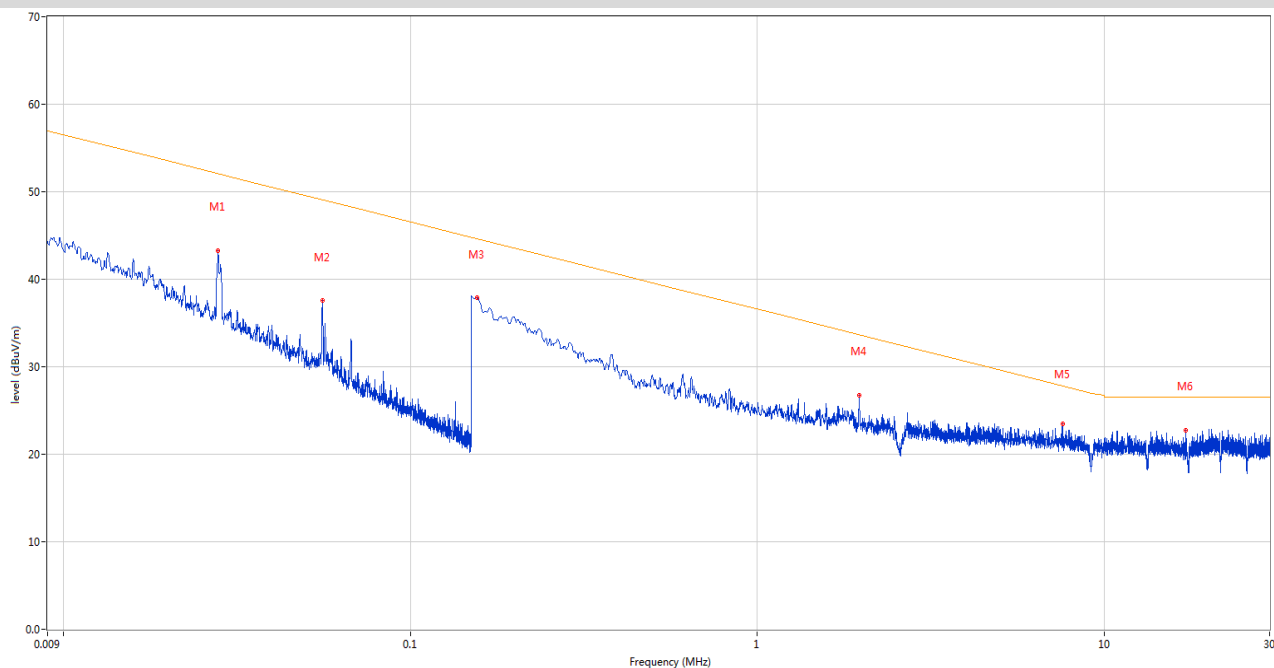
OPERATING ANT-V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.027	49.97	20.26	73.8	-23.83	Peak	35.00	100	Vertical	Pass
2	0.068	42.87	20.17	69.8	-26.93	Peak	114.00	100	Vertical	Pass
3	0.292	42.78	20.14	63.4	-20.62	Peak	140.00	100	Vertical	Pass
4	1.202	36.67	20.52	57.3	-20.63	Peak	193.00	100	Vertical	Pass
5	7.292	34.42	20.82	49.5	-15.08	Peak	343.00	100	Vertical	Pass
6	13.560	40.95	20.86	48.0	-7.05	Peak	360.00	100	Vertical	N/A

Note: For measuring equipment calibrated in dB μ V, the reading should be reduced by 51.5 dB to be converted to dB μ A/m.

STANDBY ANT-V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.028	43.27	10.69	52.1	-8.83	Peak	9.00	100	Vertical	Pass
2	0.056	37.06	10.61	49.1	-12.04	Peak	60.00	100	Vertical	Pass
3	0.156	37.92	10.30	44.7	-6.78	Peak	351.00	100	Vertical	Pass
4	1.966	26.72	9.98	33.7	-6.98	Peak	344.00	100	Vertical	Pass
5	7.581	23.51	10.03	27.8	-4.29	Peak	157.00	100	Vertical	Pass
6	17.150	22.71	10.16	26.5	-3.79	Peak	316.00	100	Vertical	Pass

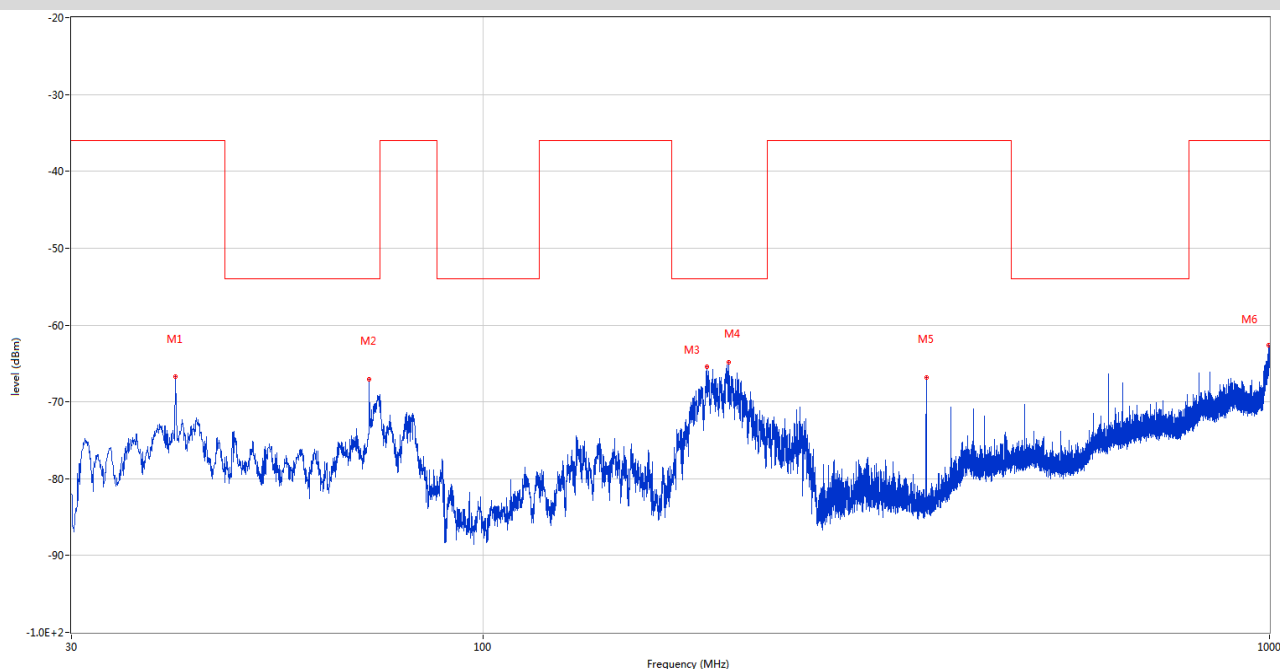
Note: For measuring equipment calibrated in dB μ V, the reading should be reduced by 51.5 dB to be converted to dB μ V/m.

A.6 Transmitter radiated spurious domain emission limits > 30 MHz

Transmitter spurious emissions in the range from 30 MHz to 1 GHz

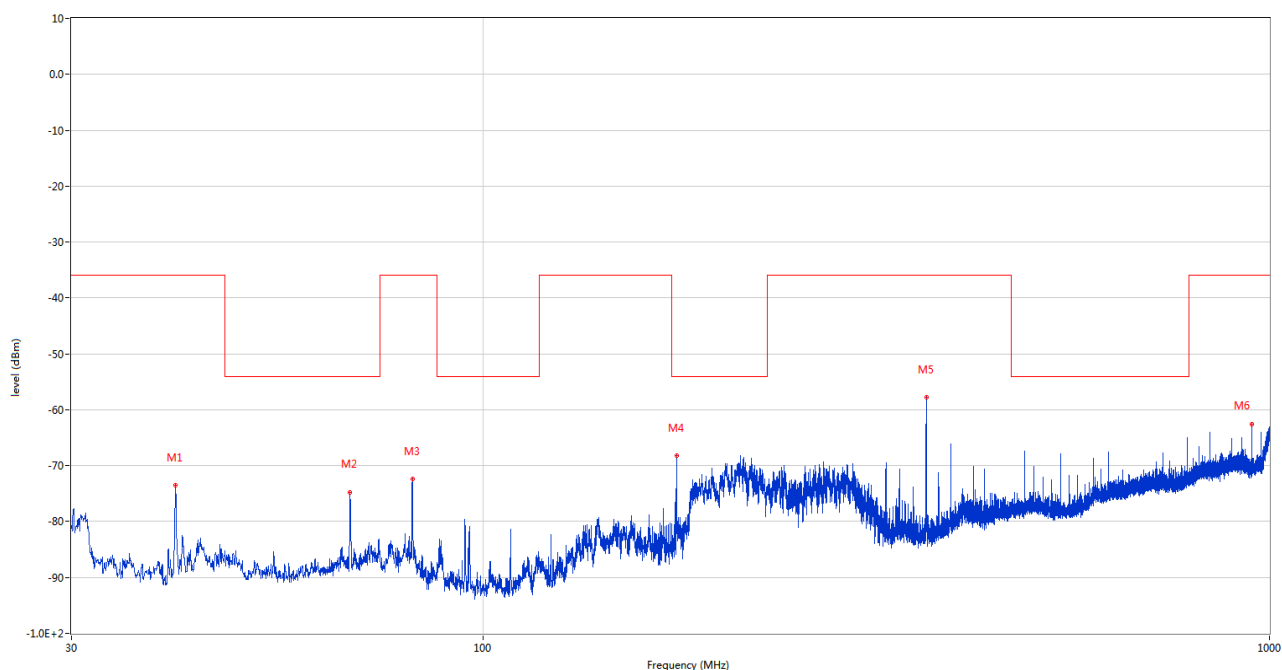
Test Data and Plot

OPERATING ANT-V



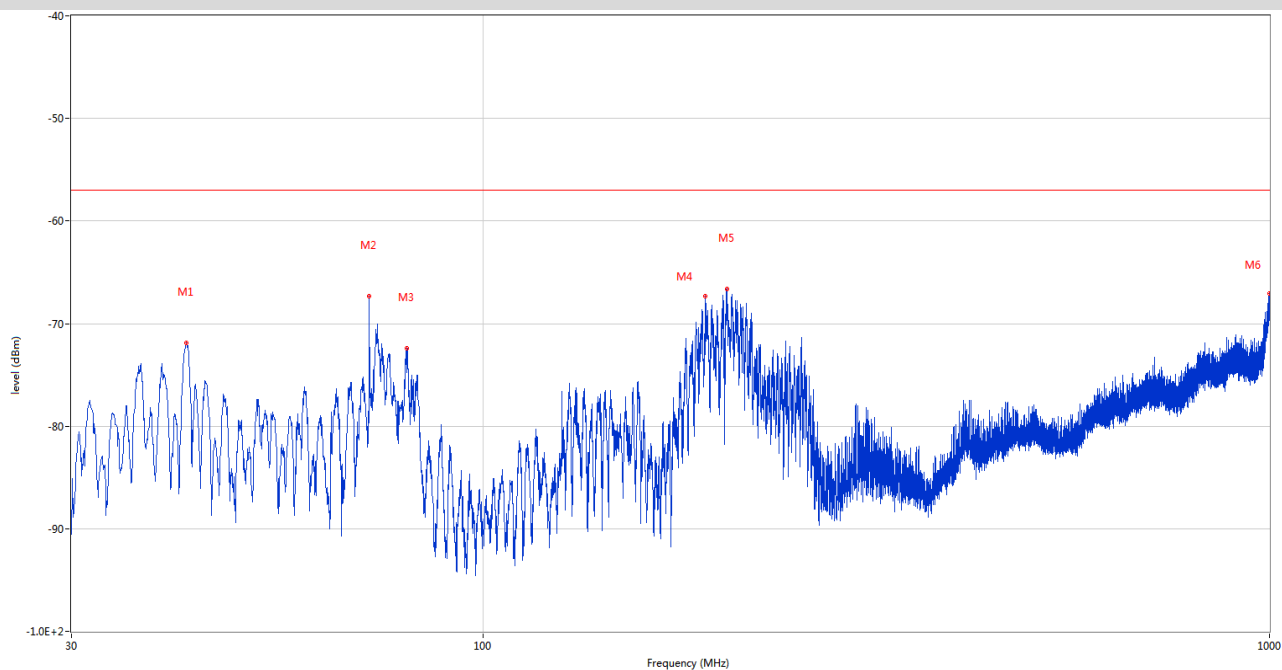
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
40.670	-66.76	-18.45	-36.0	-30.76	211.00	Vertical	Vertical	Pass
71.710	-67.02	-16.48	-54.0	-13.02	10.00	Vertical	Vertical	Pass
192.524	-65.39	-15.75	-54.0	-11.39	22.00	Vertical	Vertical	Pass
205.279	-64.89	-16.50	-54.0	-10.89	22.00	Vertical	Vertical	Pass
366.154	-66.78	-13.01	-36.0	-30.78	141.00	Vertical	Vertical	Pass
998.642	-62.59	5.76	-36.0	-26.59	353.00	Vertical	Vertical	Pass

OPERATING ANT-H



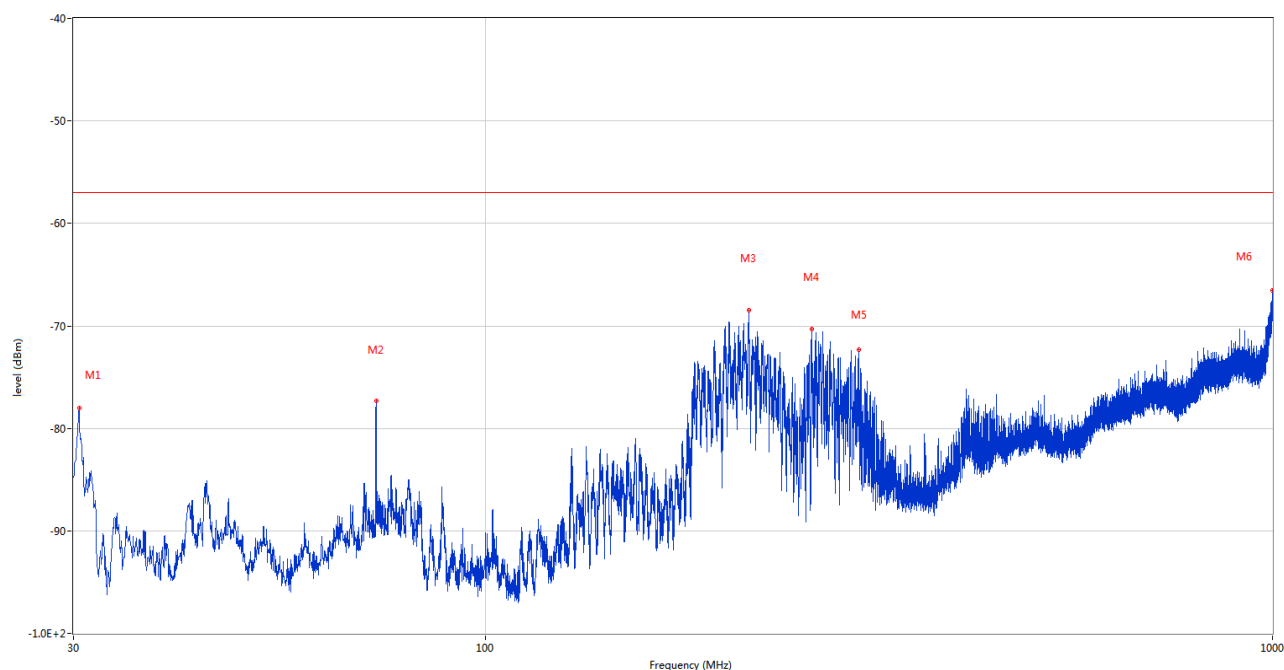
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
40.670	-73.56	-18.45	-36.0	-37.56	146.00	Horizontal	Vertical	Pass
67.830	-74.73	-16.82	-54.0	-20.73	108.00	Horizontal	Vertical	Pass
81.362	-72.35	-19.43	-36.0	-36.35	154.00	Horizontal	Vertical	Pass
176.324	-68.19	-16.41	-54.0	-14.19	360.00	Horizontal	Vertical	Pass
366.154	-57.73	-13.01	-36.0	-21.73	142.00	Horizontal	Vertical	Pass
949.318	-62.54	-0.04	-36.0	-26.54	170.00	Horizontal	Vertical	Pass

STANDBY ANT-V



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
42.028	-71.89	-17.48	-57.0	-14.89	158.00	Vertical	Vertical	Pass
71.758	-67.36	-16.47	-57.0	-10.36	40.00	Vertical	Vertical	Pass
80.052	-72.37	-18.71	-57.0	-15.37	360.00	Vertical	Vertical	Pass
191.942	-67.35	-15.69	-57.0	-10.35	321.00	Vertical	Vertical	Pass
204.406	-66.64	-16.54	-57.0	-9.64	1.00	Vertical	Vertical	Pass
999.854	-67.05	6.10	-57.0	-10.05	117.00	Vertical	Vertical	Pass

STANDBY ANT-H



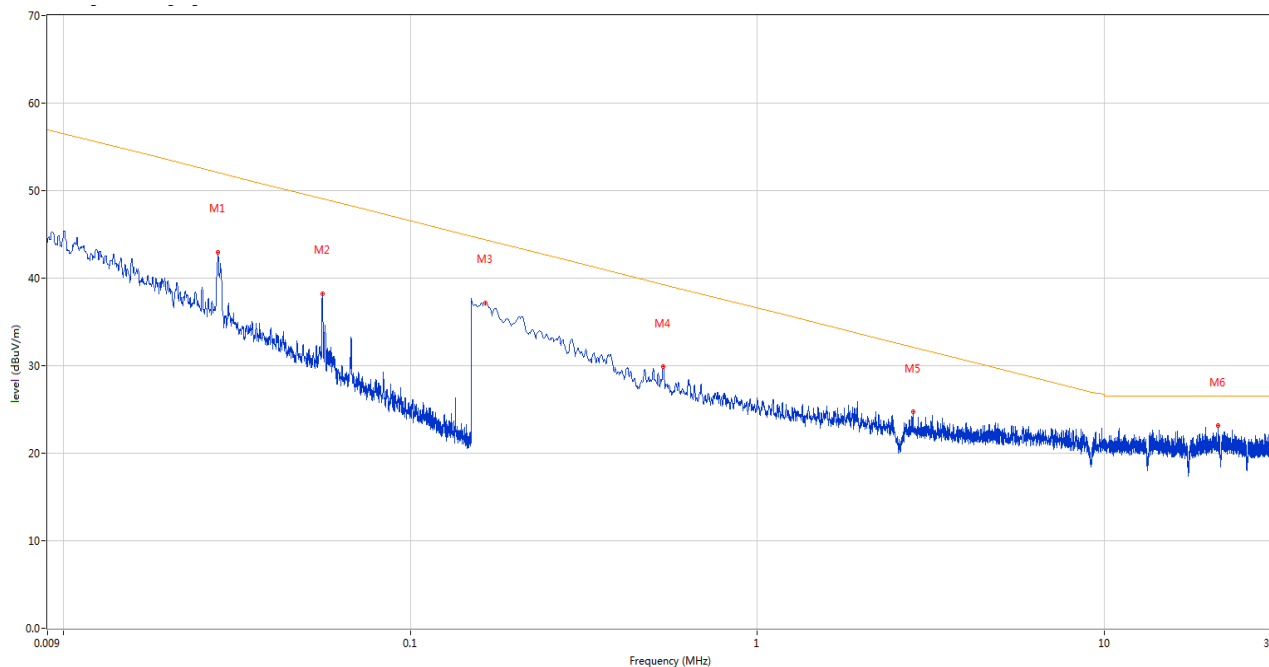
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
30.485	-77.99	-19.41	-57.0	-20.99	251.00	Horizontal	Vertical	Pass
72.680	-77.34	-16.65	-57.0	-20.34	43.00	Horizontal	Vertical	Pass
216.240	-68.51	-15.72	-57.0	-11.51	66.00	Horizontal	Vertical	Pass
259.939	-70.30	-15.47	-57.0	-13.30	98.00	Horizontal	Vertical	Pass
297.962	-72.30	-12.74	-57.0	-15.30	251.00	Horizontal	Vertical	Pass
999.370	-66.56	5.97	-57.0	-9.56	231.00	Horizontal	Vertical	Pass

A.7 Receiver spurious emissions

Receiver spurious emissions in the range from 9 kHz to 30 MHz

Test Data and Plot

RX ANT-V



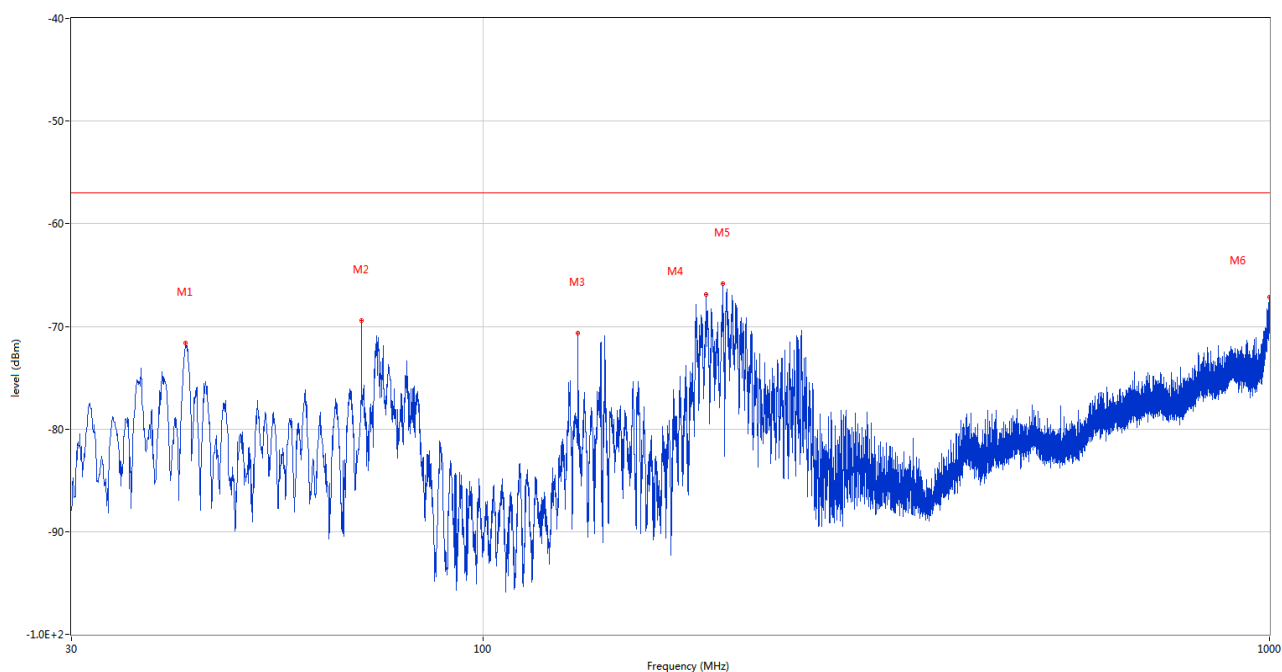
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.028	43.00	10.69	52.1	-9.10	Peak	203.00	100	Vertical	Pass
2	0.056	37.94	10.61	49.1	-11.16	Peak	123.00	100	Vertical	Pass
3	0.165	37.17	10.29	44.4	-7.23	Peak	290.00	100	Vertical	Pass
4	0.537	29.89	10.11	39.3	-9.41	Peak	263.00	100	Vertical	Pass
5	2.811	24.72	9.96	32.1	-7.38	Peak	140.00	100	Vertical	Pass
6	21.306	23.13	10.15	26.5	-3.37	Peak	79.00	100	Vertical	Pass

Note: For measuring equipment calibrated in dBμV, the reading should be reduced by 51.5 dB to be converted to dBμA/m.

Receiver spurious emissions in the range from 30 MHz to 1 GHz

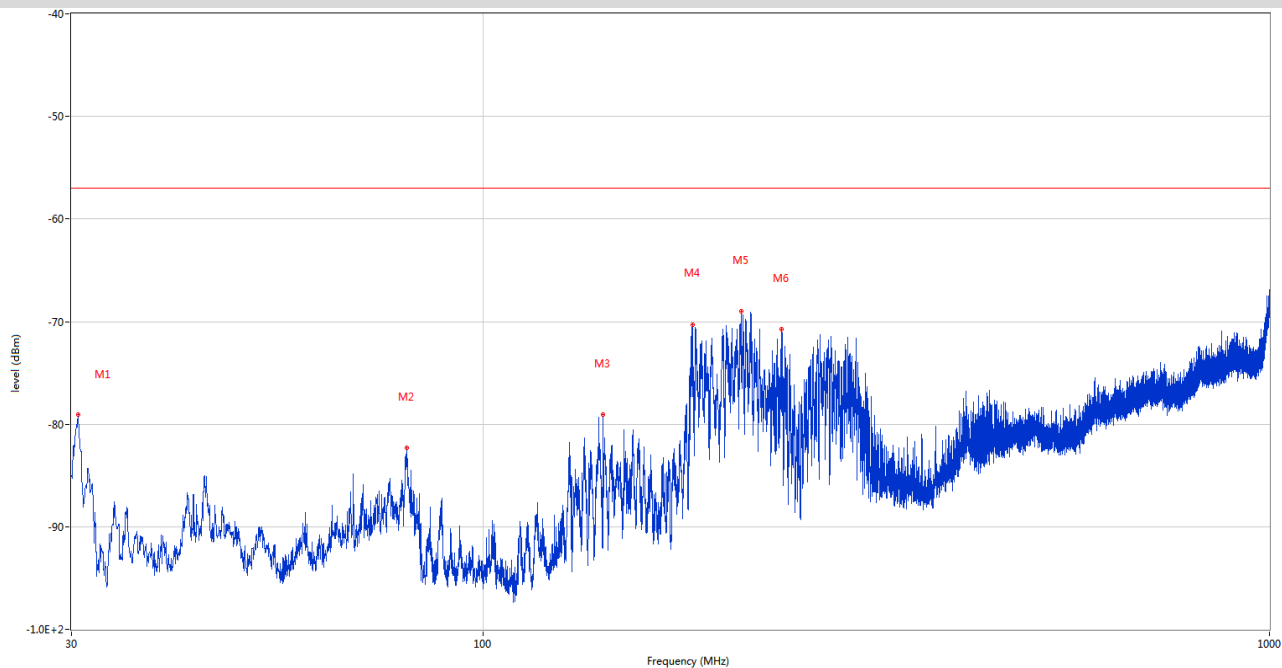
Test Data and Plots

RX ANT-V



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
41.931	-71.62	-17.54	-57.0	-14.62	82.00	Vertical	Vertical	Pass
70.109	-69.42	-16.57	-57.0	-12.42	117.00	Vertical	Vertical	Pass
132.141	-70.68	-19.08	-57.0	-13.68	94.00	Vertical	Vertical	Pass
192.232	-66.86	-15.72	-57.0	-9.86	30.00	Vertical	Vertical	Pass
201.835	-65.82	-16.82	-57.0	-8.82	0.00	Vertical	Vertical	Pass
999.127	-67.14	5.90	-57.0	-10.14	105.00	Vertical	Vertical	Pass

RX ANT-H



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
30.582	-79.10	-19.42	-57.0	-22.10	36.00	Horizontal	Vertical	Pass
80.052	-82.27	-18.71	-57.0	-25.27	36.00	Horizontal	Vertical	Pass
142.229	-79.03	-17.52	-57.0	-22.03	288.00	Horizontal	Vertical	Pass
184.618	-70.26	-15.06	-57.0	-13.26	87.00	Horizontal	Vertical	Pass
213.039	-68.99	-15.96	-57.0	-11.99	222.00	Horizontal	Vertical	Pass
239.811	-70.76	-15.14	-57.0	-13.76	75.00	Horizontal	Vertical	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2240685-AE-6.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2240685-AW-3.PDF”.

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