ETSI EN 300 113 V3.1.1 (2020-06)

TEST REPORT

For

Quanshun Communication Technology Co., Ltd

Quanshun Bldg., Daxiamei, Nan'an, Quanzhou, Fujian, China

Tested Model: D30
Series Model: D3X, D33, D35, D36, D37, D38, D39

Report Type:	**Product Type:**
Original Report	DMR Digital Portable Radio

Project Engineer:	Stone Zhang
Report Number:	RXM210414051-01B
Report Date:	2021-06-29
Reviewed By:	Oscar Ye EMC Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road,Kunshan,Jiangsu province,China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Quanshun Communication Technology Co., Ltd
Tested Model:	D30
Series Model:	D3X, D33 ,D35, D36, D37, D38, D39
Product Type:	DMR Digital Portable Radio
Power Supply:	DC 7.4V from battery; DC 5V/12V charging by adapter
Rated Power:	H: 5.0W, L: 1.0W
Operating Frequency Band:	400 MHz-470 MHz
Modulation Mode:	4FSK
Channel Spacing:	12.5 kHz
Antenna Type:	Monopole antenna
*Maximum Antenna Gain:	0.0 dBi

Adapter-1 Information:
Model: GQ05A-050100-ZG
Input: AC 100-240V~50/60Hz, 0.15A
Output: DC 5.0V, 1.0A, 5.0W

Adapter-2 Information:
Model: GQ24-120200-AG
Input: AC 100-240V~50/60Hz,1.0A, Max
Output: DC 12.0V, 2.0A, 24.0W

**Note: The maximum antenna gain was declared by the applicant.*

Note: The difference between tested model and series model was explained in the attached declaration letter.

**All measurement and test data in this report was gathered from production sample serial number: RXM210414051-1 (Assigned by BACL, Kunshan). The EUT was received on 2021-04-14.*

Objective

This report is prepared on behalf of *Quanshun Communication Technology Co., Ltd* in accordance with ETSI EN 300 113 V3.1.1 (2020-06), Land Mobile Service; Radio equipment intended for the transmission of data (and/or speech) using constant or non-constant envelope modulation and having an antenna connector; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU.

The objective is to determine the compliance of the EUT with ETSI EN 300 113 V3.1.1 (2020-06).

Related Submittal(s)/Grant(s)

No related submittal(s).

Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 113 V3.1.1 (2020-06).

Measurement uncertainty

According to the requirements of ETSI EN 300 113, F_{lab} (the value of the measurement uncertainty according to the requirements of ETSI TR 100 028) shall be, for each measurement, equal to or lower than the figure in the following table:

SN	Parameter	Flab	Maximum allowable uncertainty
1	Radio Frequency	0.082×10^{-6}	1×10^{-7}
2	RF Power (up to 160W)	0.61dB	0,75dB
3	Radiated RF Power	3.58dB	6dB
4	adjacent channel power	0.93dB	5dB
5	Conducted spurious emission of transmitter valid up to 12,75 GHz	2.47dB	4dB
6	Conducted spurious emission of receiver, valid up to 12,75 GHz	2.47dB	7dB
7	Two-signal measurement, valid up to 4 GHz	3.10dB	4dB
8	Three-signal measurement	1.2dB	3dB
9	Radiated emission of the transmitter, valid up to 4 GHz	3.62dB	6dB
10	Radiated emission of receiver, valid up to 4 GHz	3.62dB	6dB
11	Transmitter attack time	11.10%	20%
12	Transmitter release time	13.90%	20%
13	Transmitter transient frequency(frequency difference)	161Hz	250Hz
14	Transmitter intermodulation	1.59dB	3dB
15	Receiver desensitization (duplex operation)	0.5 dB	0.5 dB
16	Temperature	1℃	1℃
17	Humidity	5 %	10 %

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing in a test mode.

EUT Exercise Software

No exercise software was used.

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Huaxiang	50OhmCoaxial load	4.3/10TF20-8	17011301
BOLD	Earphone	/	/

External I/O Cable

Cable Description	Length (m)	From/Port	To
Audio Cable	1.0	EUT	Earphone

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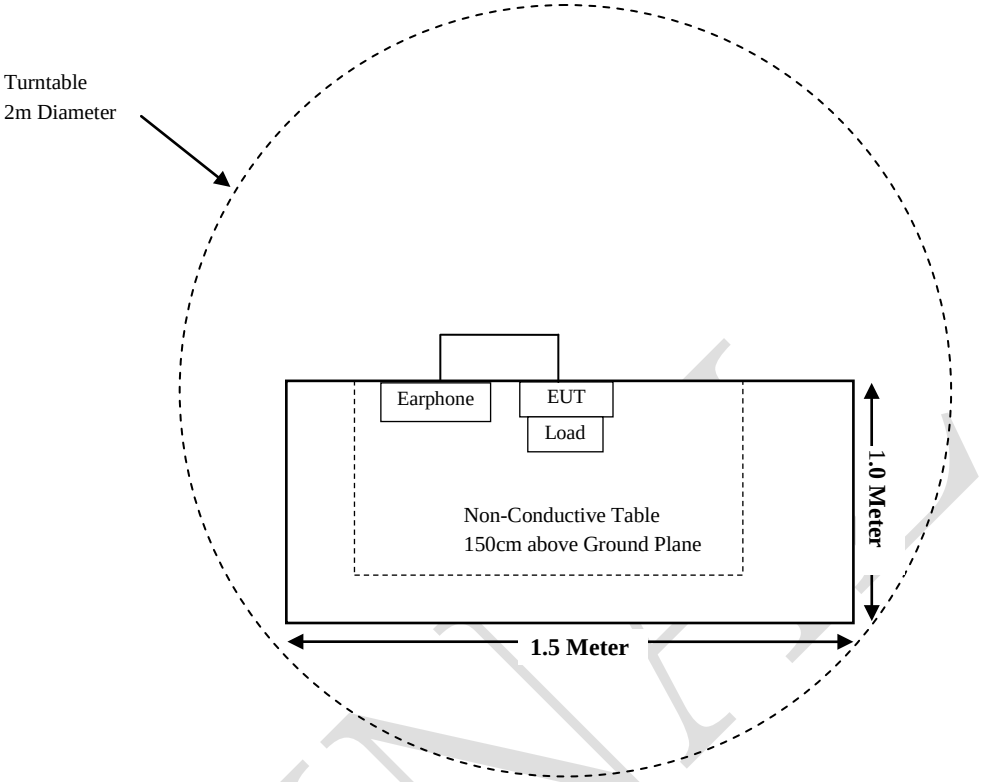
Block Diagram of Test Setup

For radiated emissions(Below 1GHz & Above 1GHz):



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SUMMARY OF TEST RESULTS

ETSI EN 300 113 V3.1.1 (2020-06)	Description of Test	Test Result
§ 7.1	Transmitter frequency error	Compliant
§ 7.2	Transmitter power (conducted)	Compliant
§ 7.3	Transmitter maximum effective radiated power	Not Applicable (See Note 1)
§ 7.4	Transmitter adjacent and alternate channel power	Compliant
§ 7.5	Transmitter unwanted emissions in the spurious domain	Compliant
§ 7.6	Transmitter intermodulation attenuation	Not Applicable (See Note 2)
§ 7.7	Transmitter attack time	Compliant
§ 7.8	Transmitter release time	Compliant
§ 7.9	Transient behaviour of the transmitter	Compliant
§ 8.1	Receiver maximum useable sensitivity (conducted)	Compliant
§ 8.2	Receiver maximum useable sensitivity (field strength)	Not Applicable (See Note 1)
§ 8.4	Receiver error behaviour at high input levels	Compliant
§ 8.5	Receiver co-channel rejection	Compliant
§ 8.6	Receiver adjacent channel selectivity	Compliant
§ 8.7	Receiver spurious response rejection	Compliant
§ 8.8	Receiver intermodulation response rejection	Compliant
§ 8.9	Receiver blocking or desensitization	Compliant
§ 8.10	Receiver spurious radiations	Compliant
§ 9.1	Receiver desensitization (with simultaneous transmission and reception)	Not Applicable (See Note 3)
§ 9.2	Receiver spurious response rejection (with simultaneous transmission and reception)	Not Applicable (See Note 3)

Note1: The EUT has an external antenna connector.
Note2: The EUT doesn't apply in base stations.
Note3: The EUT doesn't belong to Duplex equipment.

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TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2020-11-27	2021-11-26
HP	Signal Generator	N5183A	MY51040755	2020-11-27	2021-11-26
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2020-08-05	2023-08-04
Sunol Sciences	Bilog antenna	JB3	A060217	2020-11-28	2023-11-27
Sonoma Instrunent	Pre-amplifier	310N	171205	2020-08-14	2021-08-13
Rohde & Schwarz	CE Test software	EMC32	100357	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-8	008	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-7	007	2020-08-15	2021-08-14
Radiated Emission Test（Chamber 2#）					
HP	Signal Generator	N5183A	MY51040755	2020-11-27	2021-11-26
Rohde & Schwarz	EMI Test Receiver	ESU40	100207/040	2021-04-01	2022-03-31
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2020-07-15	2023-07-14
ETS-LINDGREN	Horn Antenna	3115	6229	2020-01-07	2023-01-06
A.H.Systems,inc	Amplifier	PAM-0118P	512	2020-08-14	2021-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-6	006	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-16	016	2020-08-15	2021-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048/027	2020-11-27	2021-11-26
Rohde & Schwarz	EMI Test Receiver	ESIB26	100146	2020-11-27	2021-11-26
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2020-07-28	2021-07-27
Aeroflex	Digital Radio tester	3920	100636779	2020-06-23	2021-06-22
Aeroflex	Digital Radio tester	3920	100636779	2021-06-23	2022-06-22
Rohde & Schwarz	SMBV100A Vector Signal Generator	SMBV100A	261558	2020-07-28	2021-07-27
Rohde & Schwarz	SMB 100A Signal Generator	SMB100A	110390	2020-07-28	2021-07-27
NJTY	Digital Multimeter	DT-830L	061	2020-11-12	2021-11-11
EAST	Regulated DC Power Supply	MCH-303D-II	14070562	2020-10-10	2021-10-09
BACL	Temperature & Humidity Chamber	BTH-150	30023	2020-11-25	2021-11-24
Quanshun	RF Cable	Quanshun C01	C01	Each Time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

ETSI EN 300 113 V3.1.1 (2020-06) §7.1 - FREQUENCY ERROR

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) §7.1.1, The frequency error of the transmitter is the difference between the measured carrier frequency in the absence of modulation (or with modulation, provided that the presence of modulation allows sufficiently accurate measurement of the carrier frequency) and the nominal frequency of the transmitter.

Limits

The frequency error shall not exceed the values given in table 2, under normal and extreme test conditions, or in any intermediate set of conditions. However, for practical reasons the measurement shall be performed only at nominal and extreme test conditions.

Table 2: Frequency error

Channel separation (kHz)	Frequency error limit (kHz)				
	below 47 MHz	47 MHz to 137 MHz	above 137 MHz to 300 MHz	above 300 MHz to 500 MHz	above 500 MHz to 1 000 MHz
20 and 25	±0,60	±1,35	±2,00	±2,00 (see note 2)	±2,50 (see note 2)
12,5	±0,60	±1,00	±1,00 (B) ±1,50 (M)	±1,00 (B) ±1,50 (M) (see note 2)	No value specified

NOTE 1: For handportable stations having integral power supplies, these limits only apply to the reduced extreme temperature range 0 °C to +40 °C.
NOTE 2: However for the full extreme temperature conditions (see clause 5.4.1), exceeding the reduced extreme temperature range above, the following frequency error limits apply:
±2,50 kHz between 300 MHz and 500 MHz;
±3,00 kHz between 500 MHz and 1 000 MHz.
NOTE 3: (B) base station.
NOTE 4: (M)mobile station.

Method of measurement

The equipment shall operate in continuous transmission mode during the time necessary to perform the measurement of the frequency.

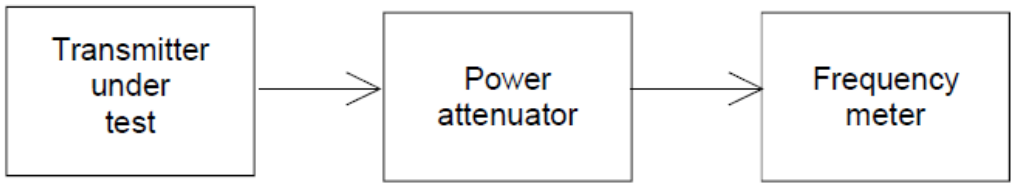

Figure 3: Measurement arrangement

The equipment shall be connected to the artificial antenna (see clause 6.7) using measurement arrangement in figure 3.
The carrier frequency shall be measured in the absence of modulation. The measurement shall be made under normal test conditions (see clause 5.3) and extreme test conditions (see clauses 5.4.1 and 5.4.2). The transmitter shall be set in continuous transmission mode. If this is not possible, the measurement shall be carried out in a period shorter than the duration of the transmitted burst. It may be necessary to extend the duration of the burst.

Test Data

Environmental Conditions

Temperature:	24.3 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang on 2021-06-25.

Test mode: Transmitting

Test Result: Compliant

Frequency: 400.025MHz						
Reference Frequency (MHz)	**Channel Separation (kHz)**	**Temperature (℃)**	**Power Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (kHz)**	**Limit (kHz)**
Normal test condition						
400.025	12.5	25	7.4	400.02558	0.58	±1.5
Extreme test condition						
400.025	12.5	T_{min} = -30	V_{max} =7.4	400.02545	0.45	±2.5
		T_{min} = -30	V_{min} =6.0	400.02551	0.51	
		T_{max} = +40	V_{max} =7.4	400.02549	0.49	
		T_{max} = +40	V_{min} =6.0	400.02556	0.56	

Frequency: 435.000 MHz						
Reference Frequency (MHz)	**Channel Separation (kHz)**	**Temperature (℃)**	**Power Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (kHz)**	**Limit (kHz)**
Normal test condition						
435.000	12.5	25	7.4	435.00087	0.87	±1.5
Extreme test condition						
435.000	12.5	T_{min} = -30	V_{max} =7.4	435.00082	0.82	±2.5
		T_{min} = -30	V_{min} =6.0	435.00085	0.85	
		T_{max} = +40	V_{max} =7.4	435.00072	0.72	
		T_{max} = +40	V_{min} =6.0	435.00079	0.79	

Frequency: 469.975MHz						
Reference Frequency (MHz)	**Channel Separation (kHz)**	**Temperature (℃)**	**Power Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (kHz)**	**Limit (kHz)**
Normal test condition						
469.975	12.5	25	7.4	469.97587	0.87	±1.5
Extreme test condition						
469.975	12.5	T_{min} = -30	V_{max} =7.4	469.97575	0.75	±2.5
		T_{min} = -30	V_{min} =6.0	469.97581	0.81	
		T_{max} = +40	V_{max} =7.4	469.97572	0.72	
		T_{max} = +40	V_{min} =6.0	469.97577	0.77	

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ETSI EN 300 113 V3.1.1 (2020-06) §7.2 - TRANSMITTER POWER (CONDUCTED)

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) §7.2.1.1, the transmitter power (conducted) is the mean power delivered to the artificial antenna during a radio frequency cycle.

The rated output power is the carrier power (conducted) of the equipment declared by the manufacturer.

If the equipment is designed to operate with different transmitter powers, the rated power for each level, or range of levels, shall be declared by the manufacturer. The power adjustment control shall not be accessible to the user.

The requirements of the present document shall be met for all power levels at which the transmitter is intended to operate.

Limits

The transmitter power (conducted) under the specified conditions of measurement (see clause 7.2.2) and at normal test conditions (see clause 5.3), shall be within ± 1,5 dB of the rated carrier power (conducted).

The transmitter power (conducted) under extreme test conditions shall be within +2,0 dB and -3,0 dB of the rated output power.

It is assumed that the appropriate National Administration will state the maximum permitted transmitter output power.

Method of measurement

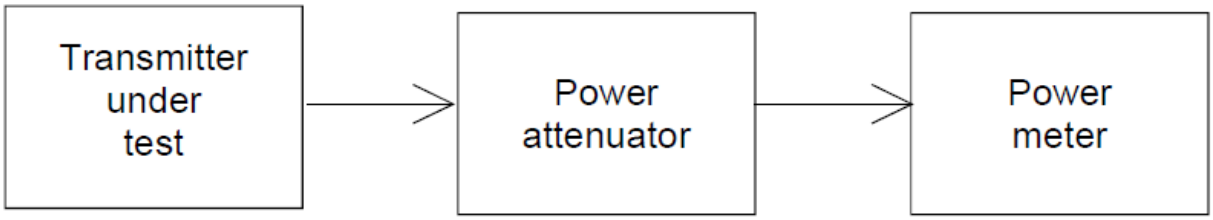

Figure 4: Measurement arrangement

For practical reasons, measurements shall be performed only at the lowest and highest power level at which the transmitter is intended to operate. The measurement arrangement in figure 4 shall be used.

The measurement shall be performed preferably in the absence of modulation.

When it is not possible to measure it in the absence of modulation, this fact shall be stated in test reports (see clause 6.11).

The transmitter shall be set in continuous transmission mode. If this is not possible, the measurements shall be carried out in a period shorter than the duration of the transmitted burst.

The transmitter shall be connected to an artificial antenna (see clause 6.7) and the power delivered to this artificial antenna shall be measured.

The measurement shall be made under normal test conditions (see clause 5.3) and extreme test conditions (see clauses 5.4.1 and 5.4.2 applied simultaneously).

Test Data

Environmental Conditions

Temperature:	26.4 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang on 2021-06-25.

Test Mode: Transmitting

Test Result: Pass

Highest RF output power (conducted) for Low channel: 400.025MHz

Test Conditions		Measured Power (dBm)	Rated Power (dBm)	Limit (dB)
Temperature (℃)	Power Supply (V_{DC})			
T_{nor} = 25	V_{nor} =7.4	36.20	37	±1.5
T_{min} = -30	V_{min} =6.0	36.45	37	-3.0,+2.0
	V_{max} =7.4	36.51	37	-3.0,+2.0
T_{max} = +40	V_{min} =6.0	35.89	37	-3.0,+2.0
	V_{max} =7.4	35.94	37	-3.0,+2.0

Lowest RF output power (conducted) for Low channel: 400.025MHz

Test Conditions		Measured Power (dBm)	Rated Power (dBm)	Limit (dB)
Temperature (℃)	Power Supply (V_{DC})			
T_{nor} = 25	V_{nor} =7.4	30.19	30	±1.5
T_{min} = -30	V_{min} =6.0	30.44	30	-3.0,+2.0
	V_{max} =7.4	30.48	30	-3.0,+2.0
T_{max} = +40	V_{min} =6.0	29.88	30	-3.0,+2.0
	V_{max} =7.4	29.92	30	-3.0,+2.0

Highest RF output power (conducted) for Middle channel: 435.000MHz

Test Conditions		Measured Power (dBm)	Rated Power (dBm)	Limit (dB)
Temperature (℃)	Power Supply (V_{DC})			
T_{nor} = 25	V_{nor} =7.4	36.05	37	±1.5
T_{min} = -30	V_{min} =6.0	36.31	37	-3.0,+2.0
	V_{max} =7.4	36.37	37	-3.0,+2.0
T_{max} = +40	V_{min} =6.0	35.75	37	-3.0,+2.0
	V_{max} =7.4	35.79	37	-3.0,+2.0

Lowest RF output power (conducted) for Middle channel: 435.000MHz

Test Conditions		Measured Power (dBm)	Rated Power (dBm)	Limit (dB)
Temperature (℃)	Power Supply (V_{DC})			
T_{nor} = 25	V_{nor} =7.4	29.11	30	±1.5
T_{min} = -30	V_{min} =6.0	29.35	30	-3.0,+2.0
	V_{max} =7.4	29.40	30	-3.0,+2.0
T_{max} = +40	V_{min} =6.0	28.83	30	-3.0,+2.0
	V_{max} =7.4	28.86	30	-3.0,+2.0

Highest RF output power (conducted) for High channel: 469.975MHz

Test Conditions		Measured Power (dBm)	Rated Power (dBm)	Limit (dB)
Temperature (℃)	Power Supply (V_{DC})			
T_{nor} = 25	V_{nor} =7.4	36.48	37	±1.5
T_{min} = -30	V_{min} =6.0	36.73	37	-3.0,+2.0
	V_{max} =7.4	36.78	37	-3.0,+2.0
T_{max} = +40	V_{min} =6.0	36.19	37	-3.0,+2.0
	V_{max} =7.4	36.23	37	-3.0,+2.0

Lowest RF output power (conducted) for High channel: 469.975MHz

Test Conditions		Measured Power (dBm)	Rated Power (dBm)	Limit (dB)
Temperature (℃)	Power Supply (V_{DC})			
T_{nor} = 25	V_{nor} =7.4	29.70	30	±1.5
T_{min} = -30	V_{min} =6.0	29.98	30	-3.0,+2.0
	V_{max} =7.4	30.03	30	-3.0,+2.0
T_{max} = +40	V_{min} =6.0	29.40	30	-3.0,+2.0
	V_{max} =7.4	29.43	30	-3.0,+2.0

ETSI EN 300 113 V3.1.1 (2020-06) §7.4 - ADJACENT AND ALTERNATE CHANNEL POWER

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) § 7.4, the adjacent channel power is that part of the total power output of a transmitter under defined conditions of modulation, which falls within a specified pass-band centred on the nominal frequency of either of the adjacent channels. This power is the sum of the mean power produced by the modulation, hum and noise of the transmitter.

The alternate channel power is that part of the total power output of a transmitter under defined conditions of modulation, which falls within a specified pass-band centred on the nominal frequency of either of the alternate channels. This power is the sum of the mean power produced by the modulation, hum and noise of the transmitter.

Limits

For a channel separation of 12,5 kHz, 20 kHz and 25 kHz, the adjacent channel power and the alternate channel power shall not exceed a value of 60,0 dB below the transmitter power (conducted) without the need to be below 0,2 µW (-37 dBm).

Method of Measurement

This test measures the power transmitted in the adjacent channel(s) during continuous modulation. This measurement is complemented by adjacent channel transient power measurements.

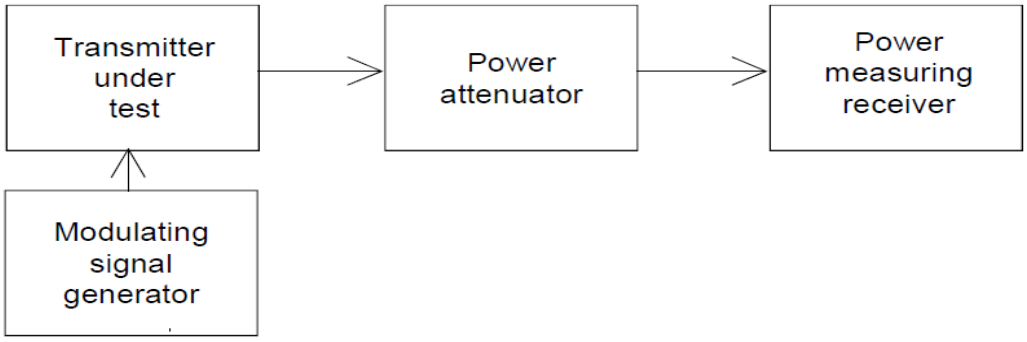

Figure 7: Measurement arrangement

During the test, the transmitter shall be set in continuous transmission mode. If this is not possible, the measurements shall be carried out in a period shorter than the duration of the transmitted burst. Averaging measurements with 100 samples are possible for constant and non-constant envelope modulated equipment.

The measurement arrangement in figure 7 shall be used.

The adjacent channel power may be measured, as follows, with a power measuring receiver which conforms to annex C (referred to in the present clause as the "receiver"):

a) the transmitter shall be operated at the carrier power determined in clause 7.2 under normal test conditions (see clause 5.3). The output of the transmitter shall be linked to the input of the "receiver" by a connecting device such that the impedance presented to the transmitter is 50 Ω and the level at the "receiver input" is appropriate;

b) with the transmitter unmodulated, the tuning of the "receiver" shall be adjusted so that a maximum response is obtained. This is the 0 dB response point. The "receiver" attenuator setting and the reading of the meter shall be recorded. If an unmodulated carrier cannot be obtained, then the measurement shall be made with the transmitter modulated with the normal test signal D-M2, D-M4, D-M5 or D-M7 as appropriate, according to clause 6.3, in which case this fact shall be recorded in test reports;

c) the frequency of the "receiver" shall be adjusted above the carrier so that the "receiver" -6 dB response nearest to the transmitter carrier frequency is located at a displacement from the nominal carrier frequency as given in table 3;

Table 3: Frequency displacement

Channel separation (kHz)	Specified necessary bandwidth (kHz)	Adjacent channel displacement of the -6 dB point from the nominal carrier frequency (kHz)	Alternate channel displacement of the -6 dB point from the nominal carrier frequency (kHz)
12,5	8,5	8,25	20,75
20	14	13	33
25	16	17	42

d) the transmitter shall be modulated by a normal test signal D-M2, D-M4, D-M5, or D-M7 as appropriate, according to clause 6.3;

e) the "receiver" variable attenuator shall be adjusted to obtain the same meter reading as in step b), or a known relation to it;

f) the ratio of the adjacent channel power to the carrier power is the difference between the attenuator settings in steps b) and e), corrected for any differences in the reading of the meter.

For each adjacent channel, the adjacent channel power shall be recorded:

• the measurement shall be repeated with the frequency of the "receiver" adjusted below the carrier so that the "receiver" -6 dB response nearest to the transmitter carrier frequency is located at a displacement from the nominal carrier frequency as given in table 3;

• the adjacent channel power of the equipment under test shall be expressed as the higher of the two values recorded in step f) for the upper and lower channels nearest to the channel considered;

• the test shall be repeated for the alternate channel;

• when it is not possible to perform the measurement of frequency error in the absence of modulation (see clause 7.1), this measurement shall be repeated under extreme test conditions (see clauses 5.4.1 and 5.4.2 applied simultaneously).

Alternatively, if a spectrum analyser is being used (see annex C) that is capable of measuring rms adjacent channel power automatically, the adjacent channel power (in dB) may be measured directly with the transmitter modulated by normal test signal D-M2, D-M4, D-M5, or D-M7 as appropriate, according to clause 6.3. The spectrum analyser should use a measurement method without frequency weighting and should not use an accelerated method. The adjacent channel power ratio is the value of the measurement results showing the smallest difference between the power in the pass-band and the power in either adjacent channel.

For automated spectrum analyser measurements the following settings shall be used:
• resolution bandwidth: 500 Hz
• video bandwidth: 5 000 Hz
• video average: off
• detector mode: rms
• up to 100 individual reading may be averaged, however video average shall not be used

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Test Data

Environmental Conditions

Temperature:	25.3 ℃
Relative Humidity:	52 %
ATM Pressure:	101.7 kPa

The testing was performed by Stone Zhang on 2021-06-22.

Test Mode: Transmitting

Test Result: Pass

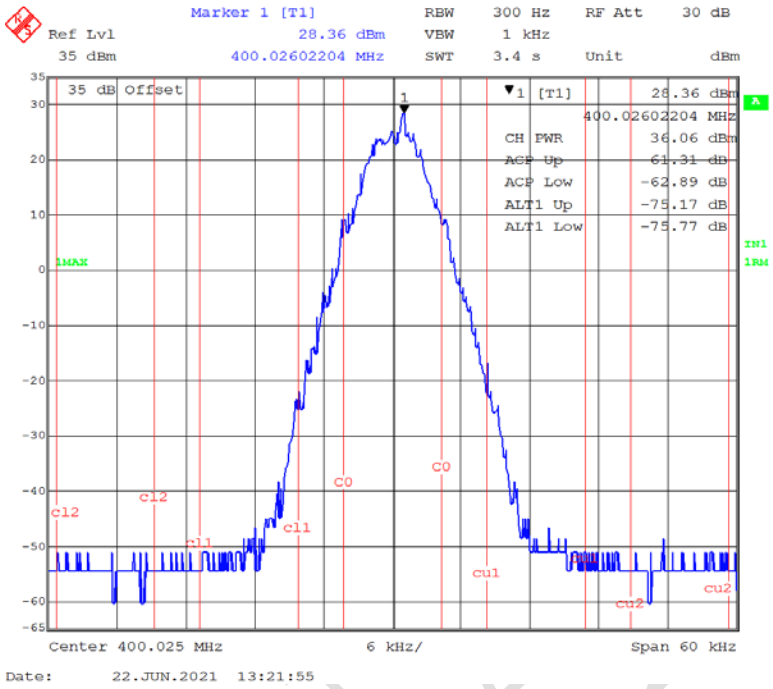
For Highest output power:

Channel Separation	f_c (MHz)		Adjacent Channel Power Ratio (dB)	Limit (dB)	Alternate Channel Power Ratio (dB)	Limit (dB)
12.5kHz (UHF)	400.025	Upper Channel	-61.31	≤ -60	-75.17	≤ -60
		Lower Channel	-62.89	≤ -60	-75.77	≤ -60
	435.000	Upper Channel	-60.56	≤ -60	-75.84	≤ -60
		Lower Channel	-63.64	≤ -60	-75.74	≤ -60
	469.975	Upper Channel	-64.67	≤ -60	-74.54	≤ -60
		Lower Channel	-61.51	≤ -60	-74.23	≤ -60

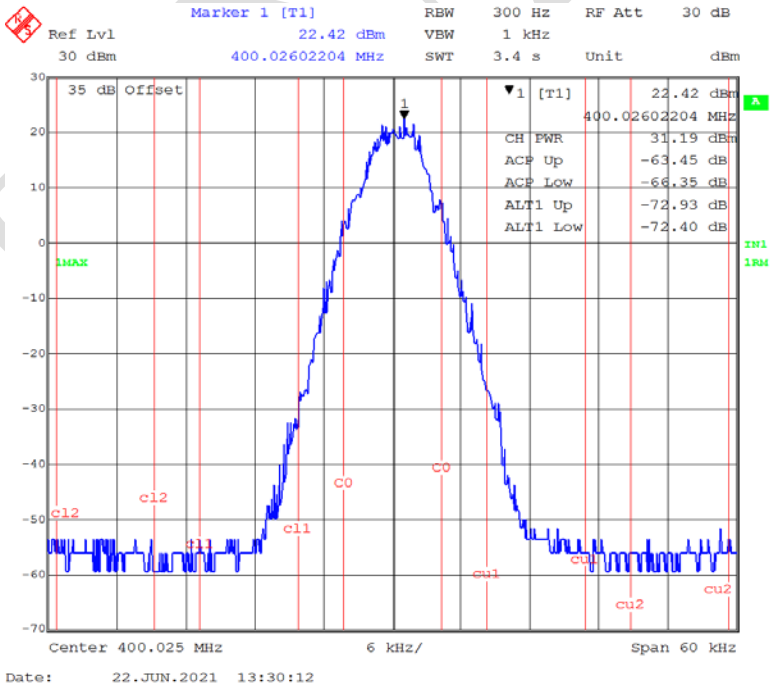
For Lowest output power:

Channel Separation	f_c (MHz)		Adjacent Channel Power Ratio (dB)	Limit (dB)	Alternate Channel Power Ratio (dB)	Limit (dB)
12.5kHz (UHF)	400.025	Upper Channel	-63.45	≤ -60	-72.93	≤ -60
		Lower Channel	-66.35	≤ -60	-72.40	≤ -60
	435.000	Upper Channel	-63.74	≤ -60	-75.03	≤ -60
		Lower Channel	-60.37	≤ -60	-75.17	≤ -60
	469.975	Upper Channel	-62.65	≤ -60	-73.22	≤ -60
		Lower Channel	-61.92	≤ -60	-73.34	≤ -60

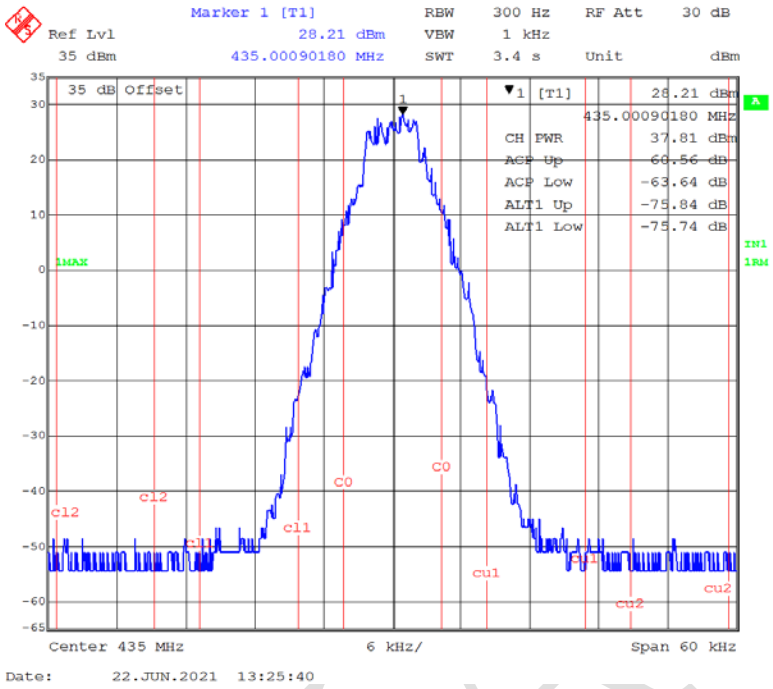
400.025MHz, Highest Output Power, 12.5 kHz



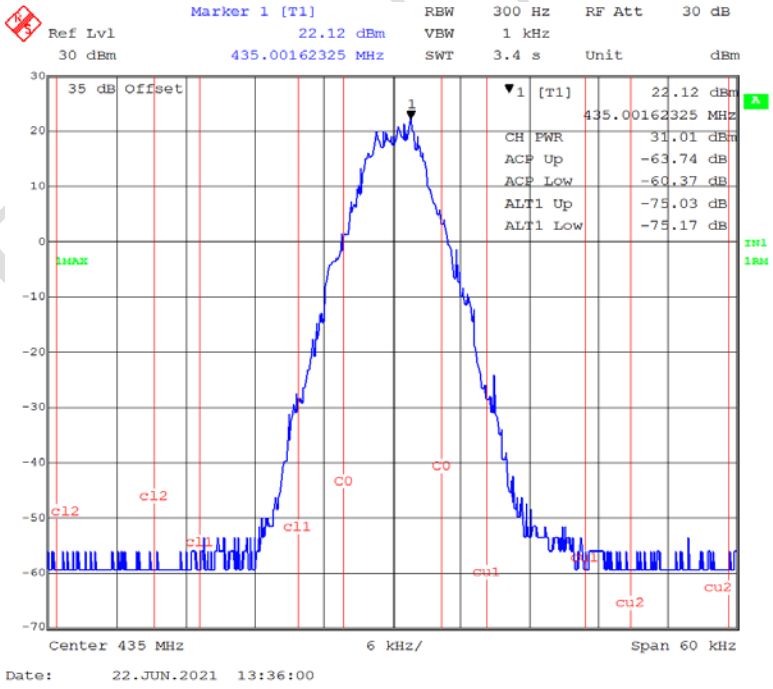
400.025MHz, Lowest Output Power, 12.5 kHz



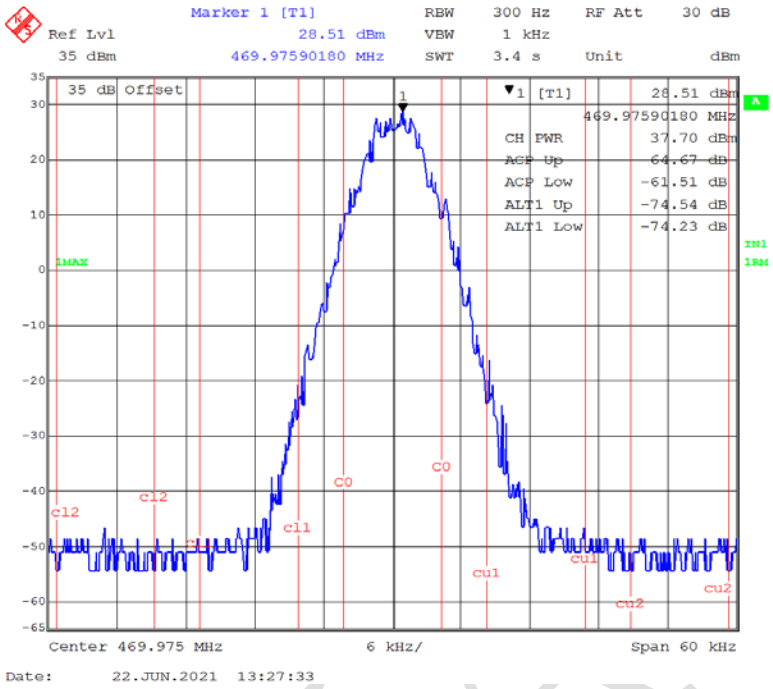
435.000MHz, Highest Output Power, 12.5 kHz



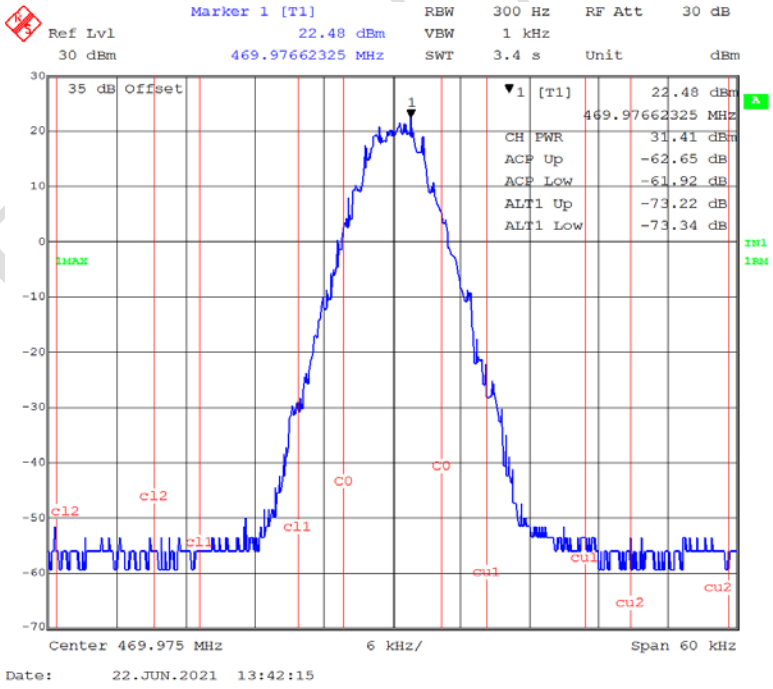
435.000MHz, Lowest Output Power, 12.5 kHz



469.975MHz, Highest Output Power, 12.5 kHz



469.975MHz, Lowest Output Power, 12.5 kHz



ETSI EN 300 113 V3.1.1 (2020-06) §7.5 – UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

Applicable Standard

Spurious emissions are emissions at frequencies other than those of the carrier and sidebands associated with normal modulation.

The level of spurious emissions shall be measured by either:

a) their power level in a specified load (conducted spurious emission); and

b) their effective radiated power when radiated by the cabinet and structure of the equipment (cabinet radiation);or

c) their effective radiated power when radiated by the cabinet and by the integral antenna, in the case of handportable equipment fitted with such an antenna and no external RF connector.

NOTE: There only two options allowed either both a) and b) or only c).

Limits

The power of any spurious emission shall not exceed the values given in tables 4 and 5.

Table 4: Conducted emissions

Frequency range	Tx operating	Tx standby
9 kHz to 1 GHz	0,25 µW (-36 dBm)	2,0 nW (-57 dBm)
above 1 GHz to 4 GHz or above 1 GHz to 12,75 GHz	1,00 µW (-30 dBm)	20 nW (-47 dBm)

Table 5: Radiated emissions

Frequency range	Tx operating	Tx standby
30 MHz to 1 GHz	0,25 µW (-36 dBm)	2,0 nW (-57 dBm)
above 1 GHz to 4 GHz or above 1 GHz to 12,75 GHz	1,00 µW (-30 dBm)	20 nW (-47 dBm)

In the case of radiated measurements for handportable stations the following conditions apply:

• for equipment with an internal integral antenna, the normal antenna shall remain connected;

• for equipment with an external antenna socket, an artificial load shall be connected to the socket for the test.

In the case of equipment measured as non-constant envelope modulation equipment, the reference bandwidths used shall be as stated in tables 6a, 6b and 6c.

Table 6a: Reference bandwidths to be used for the measurement of spurious emissions outside the frequency offsets specified in tables 6b and 6c

Frequency range	RBW
9 kHz to 150 kHz	1 kHz
150 kHz to 30 MHz	10 kHz
30 MHz to 1 GHz	100 kHz
1 GHz to 12,75 GHz	1 MHz

Table 6b: Reference bandwidths to be used close to the wanted emission for equipment operating below 1 GHz

Frequency offset from carrier	RBW
250 % of the CSP to 100 kHz	1 kHz
100 kHz to 500 kHz	10 kHz

Table 6c: Reference bandwidths to be used close to the wanted emission for equipment operating above 1 GHz

Frequency offset from carrier	RBW
250 % of the CSP to 100 kHz	1 kHz
100 kHz to 500 kHz	30 kHz
500 kHz to 1 MHz	300 kHz

Best measurement practice:

The resolution bandwidth of the measuring receiver should be equal to the reference bandwidth as given in the tables above. To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be different from the reference bandwidth. When the resolution bandwidth is smaller than the reference bandwidth, the result should be integrated over the reference bandwidth. When the resolution bandwidth is greater than the reference bandwidth, the result for broadband spurious emissions should be normalized to the bandwidth ratio. For discrete spurious emissions, normalization is not applicable, while integration over the reference bandwidth is still applicable.

Method of Measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §7.5.2 & §7.5.3.

Test Data

Environmental Conditions

Temperature:	25.7~26.3 °C
Relative Humidity:	54~57 %
ATM Pressure:	101.3~101.9 kPa

The testing was performed by Stone Zhang from 2021-06-22 to 2021-06-29.

Test mode: Transmitting

Test Result: Pass

Note1: For radiated emission was tested at high rated power, which was the worst case.
Note2: For conducted spurious emissions were tested at high rated power, there was a band reject filter between the EUT and test equipment when testing.
Note3: For standby mode, please see the following section 8.10 test results because the standby mode is receiver mode.

Frequency (MHz)	Receiver Reading (dBμV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN 300 113	
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable (dB)	Antenna Gain (dBd/dBi)		Limit (dBm)	Margin (dB)
Transmitting Mode, Low Channel: 400.025MHz										
800.05	57.63	358	150	H	-40.59	0.62	-1.25	-42.46	-36	6.46
800.05	58.58	84	150	V	-39.84	0.62	-1.25	-41.71	-36	5.71
1200.08	65.89	295	150	H	-47.88	0.80	7.36	-41.32	-30	11.32
1200.08	67.14	155	150	V	-46.63	0.80	7.36	-40.07	-30	10.07
Transmitting Mode, High Channel: 469.975MHz										
939.95	54.33	178	200	H	-43.48	0.64	-1.11	-45.23	-36	9.23
939.95	54.23	78	200	V	-40.00	0.64	-1.11	-41.75	-36	5.75
1409.93	67.75	275	150	H	-46.44	0.82	7.95	-39.31	-30	9.31
1409.93	66.52	219	150	V	-47.67	0.82	7.95	-40.54	-30	10.54

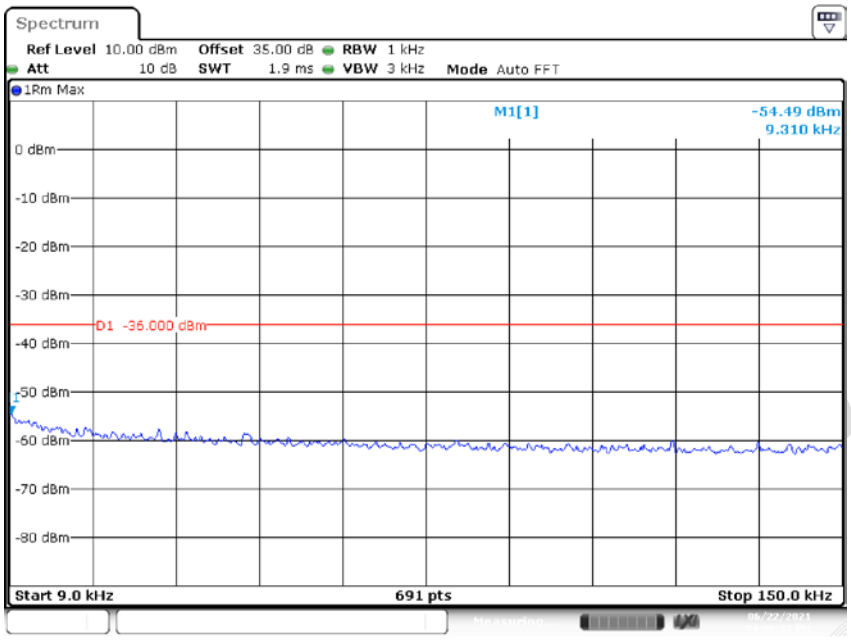
Note:
1) Absolute Level = Submitted Level - Cable Loss + Antenna Gain
2) Margin = Limit - Absolute Level
3) The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.

FINAL

Conducted Emissions - Transmitting Mode:

Frequency: 400.025MHz

9kHz~150kHz



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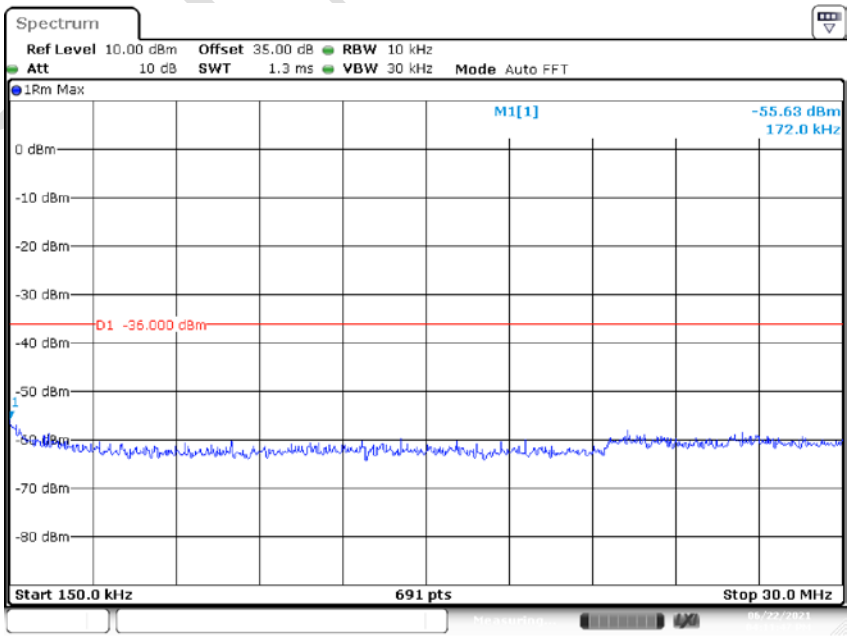
150kHz~30MHz



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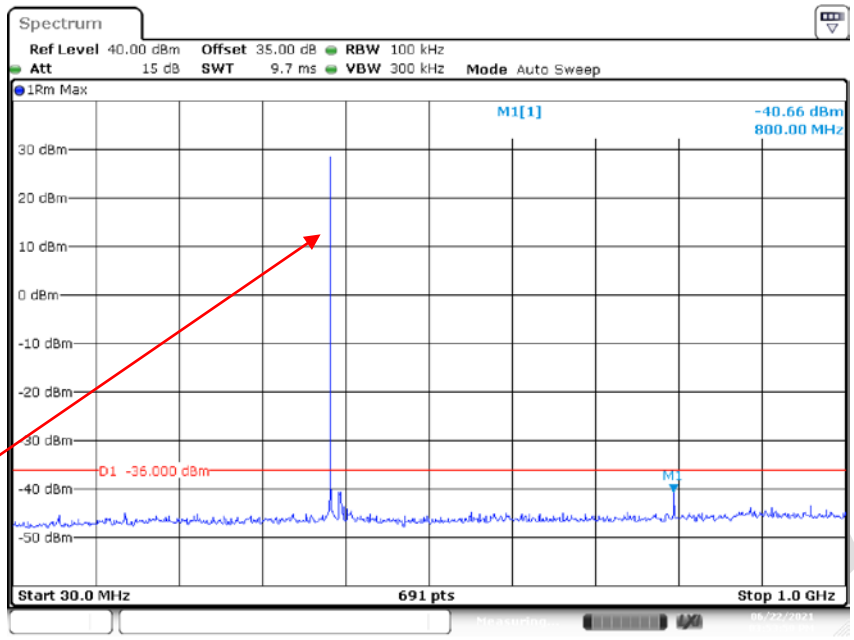
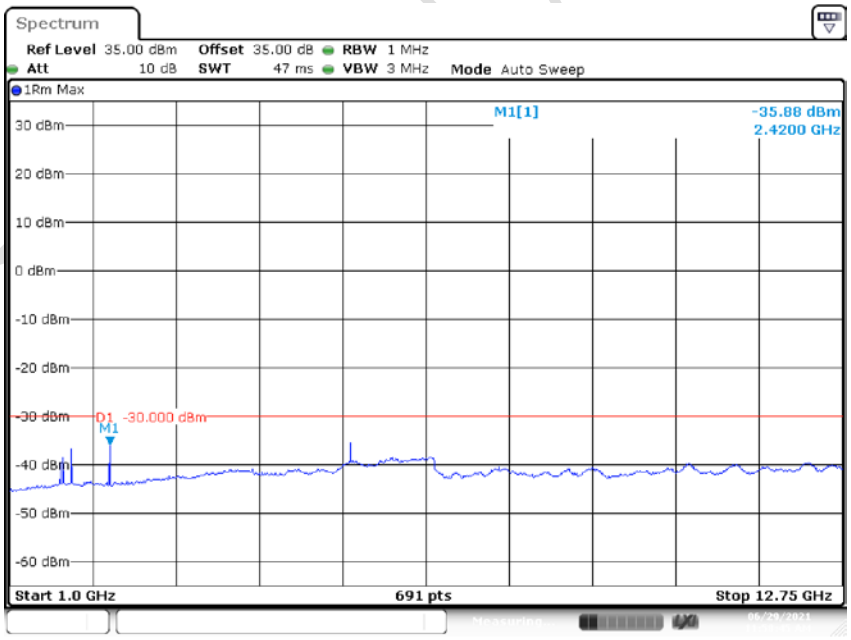
30MHz ~1GHz



Fundamental

Date: 22.JUN.2021 15:53:50

1GHz~12.75GHz



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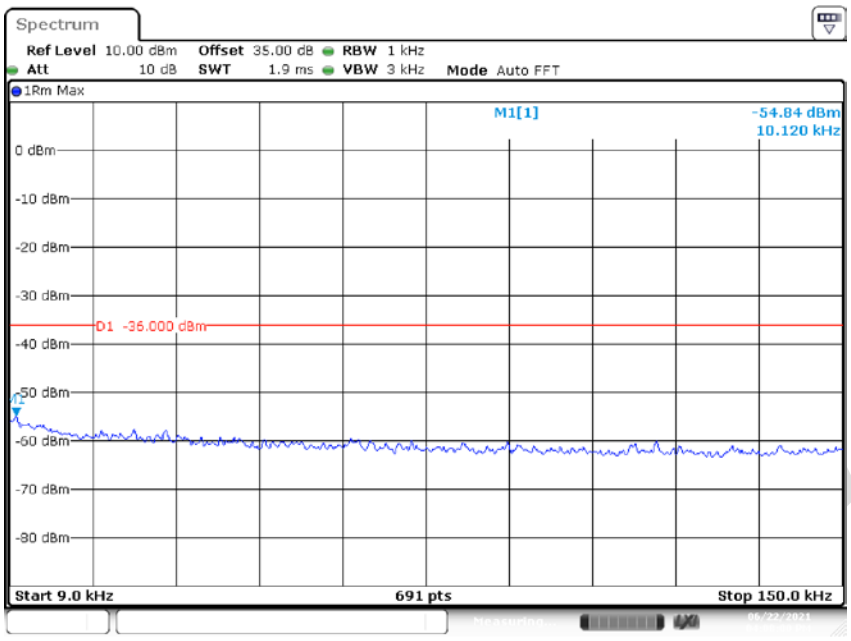
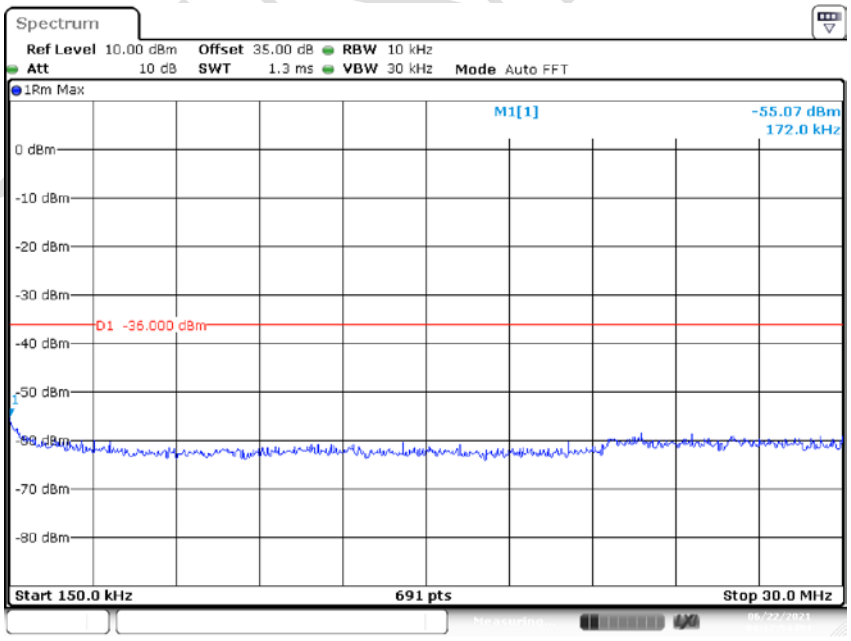
Frequency: 469.975 MHz

9kHz~150kHz



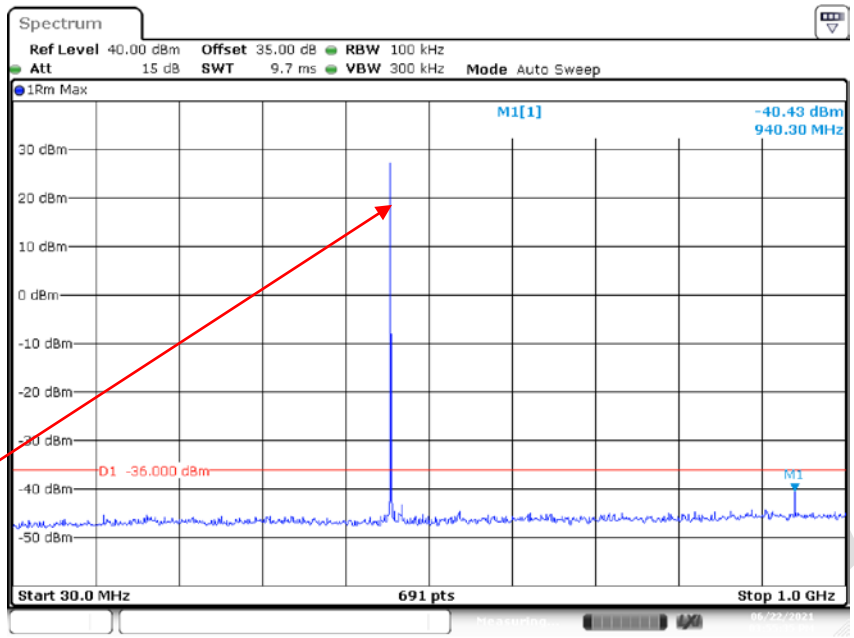
Date: 22.JUN.2021 16:07:59

150kHz~30MHz



Date: 22.JUN.2021 16:12:53

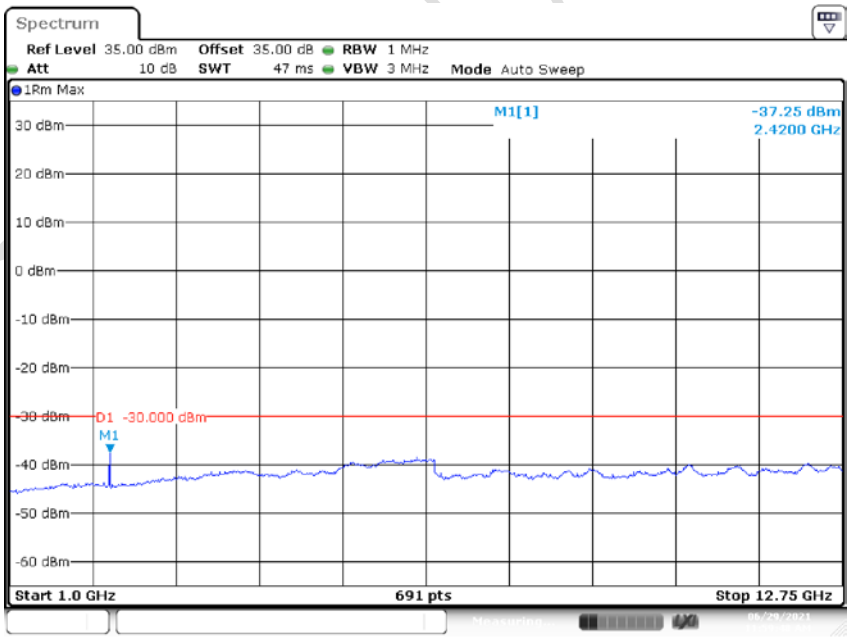
30MHz ~1GHz



Fundamental

Date: 22.JUN.2021 15:55:36

1GHz~12.75GHz



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ETSI EN 300 113 V3.1.1 (2020-06) §7.7 - TRANSMITTER ATTACK TIME

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) §7.7.1, The transmitter attack time (ta) is the time which elapses between the initiation of the "transmitter on" function (Txon, see definitions in clause 7.9.1) and:

a) the moment when the transmitter output power has reached a level 1 dB below or 1,5 dB above the steady state power (Pc) and maintains a level within +1,5 dB/-1 dB from Pc thereafter as seen on the measuring equipment or in the plot of power as a function of time; or

b) the moment after which the frequency of the carrier always remains within ±1 kHz of its steady state frequency, Fc, as seen on the measuring equipment or the plot of frequency as a function of time;

whichever occurs later (see clause 7.9, figures 12 and 13).

The measured value of t_a is t_{am}; its limit is t_{al}.

The choice of conditions for b), above, is made in order to make the method of measurement easier to perform and to have good repeatability. It is expected that under these conditions, in the worst case, the frequency of the carrier will be within the frequency tolerance of the steady state, dfe, a few ms after the end of the attack time as defined in b) above.

NOTE: Limitations of the transmitter attack and release times (clauses 7.7 and 7.8) are intended to improve the spectrum efficiency. The attack and release times can also be used to allow the definition of the timings in the protocols.

Limits

The transmitter attack time for constant envelope transmissions shall not exceed 25 ms ($t_{am} \leqslant t_{al}$).

For constant envelope transmissions a limit at +4 dB above the steady state power shall not be exceeded during the transmitter attack time.

Method of measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §7.7.2

Test Data

Environmental Conditions

Temperature:	25.7 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

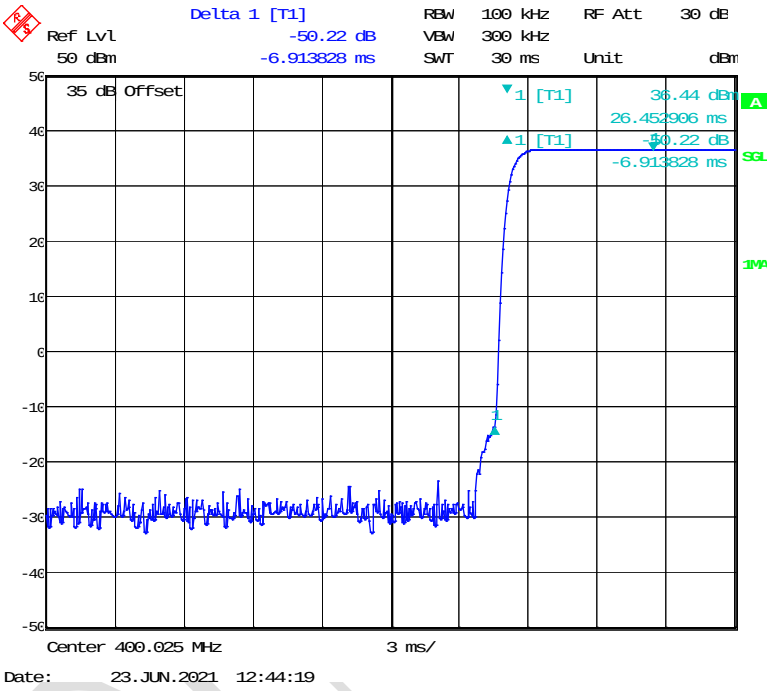
The testing was performed by Stone Zhang on 2021-06-23.

Test Mode: Transmitting

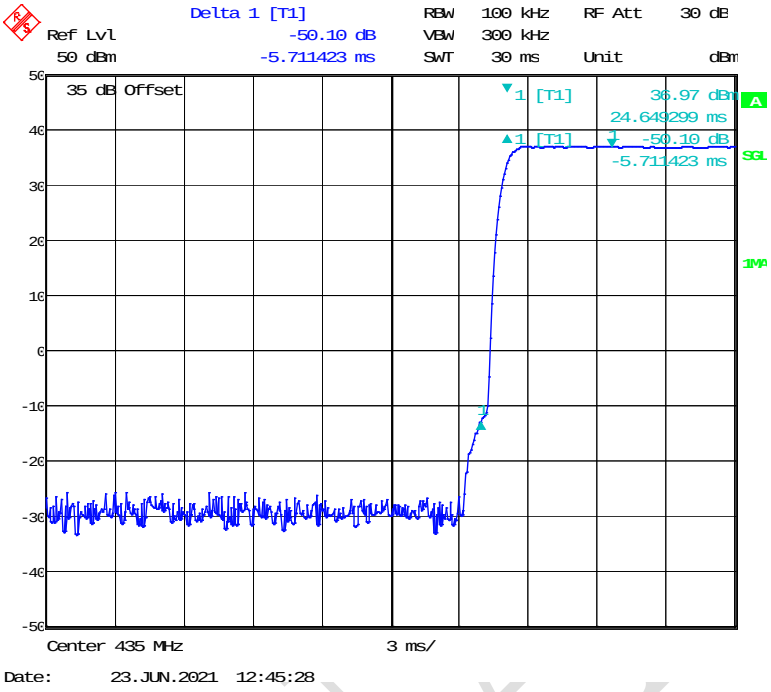
FINAL

Channel Separation	Channel	f_c (MHz)	T_{am} (ms)	T_{al} (ms)
12.5kHz (UHF)	Low	400.025	6.91	25
	Middle	435.000	5.71	25
	High	469.975	10.46	25

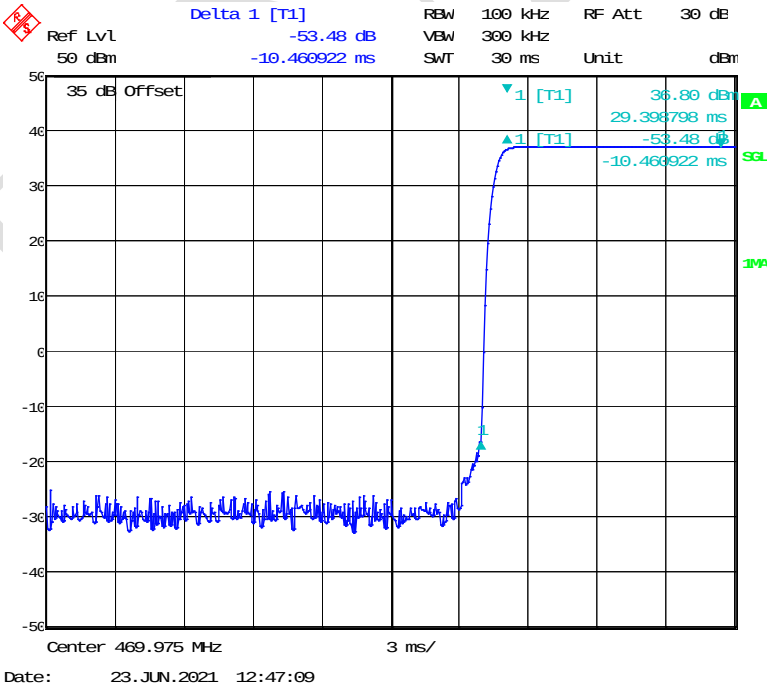
Attack time, 400.025MHz



Attack time, 435.000MHz



Attack time, 469.975MHz



ETSI EN 300 113 V3.1.1 (2020-06) §7.8 -TRANSMITTER RELEASE TIME

Applicable Standard

This measurement only applies to transmitters intended for constant envelope transmissions. The transmitter release time (t_r) is the time which elapses between the initiation of the "transmitter off" function (Tx_{off}, see definitions in clause 7.9.1) and the moment when the transmitter output power has reduced to a level 50 dB below the steady state power (P_c) and remains below this level thereafter as seen on the measuring equipment or in the plot of power as a function of time (see clause 7.9, figure 14).

The measured value of t_r is t_{rm}; its limit is t_{rl}.

NOTE: Limitations of the transmitter attack and release times (clauses 7.7 and 7.8) are intended to improve the spectrum efficiency. The attack and release times can also be used to allow the definition of the timings in the protocols.

Limts

For constant envelope transmissions the transmitter release time shall not exceed 20 ms ($t_{rm} \leq t_{rl}$).

Method of measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §7.8.2

Test Data

Environmental Conditions

Temperature:	26.3 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang on 2021-06-23.

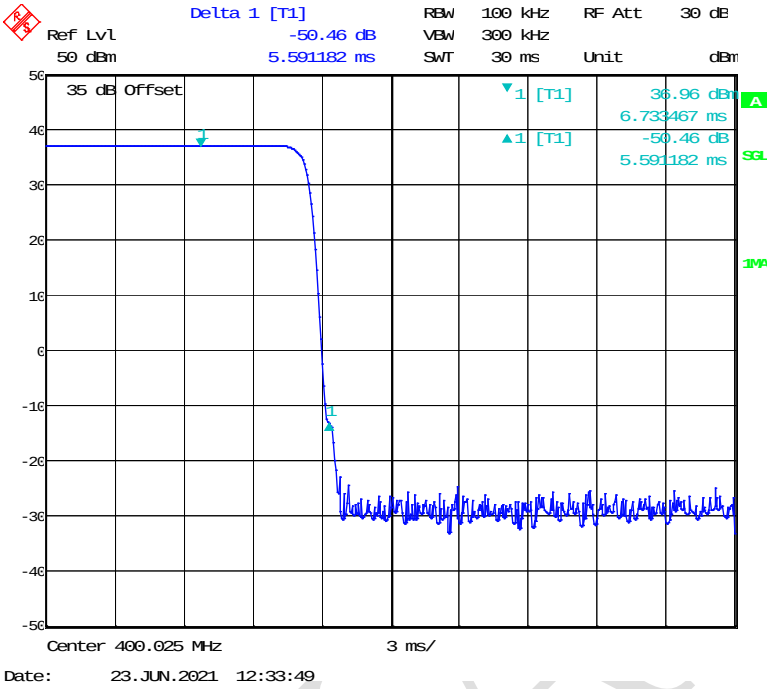
Test Mode: Transmitting

Test Result: Compliant

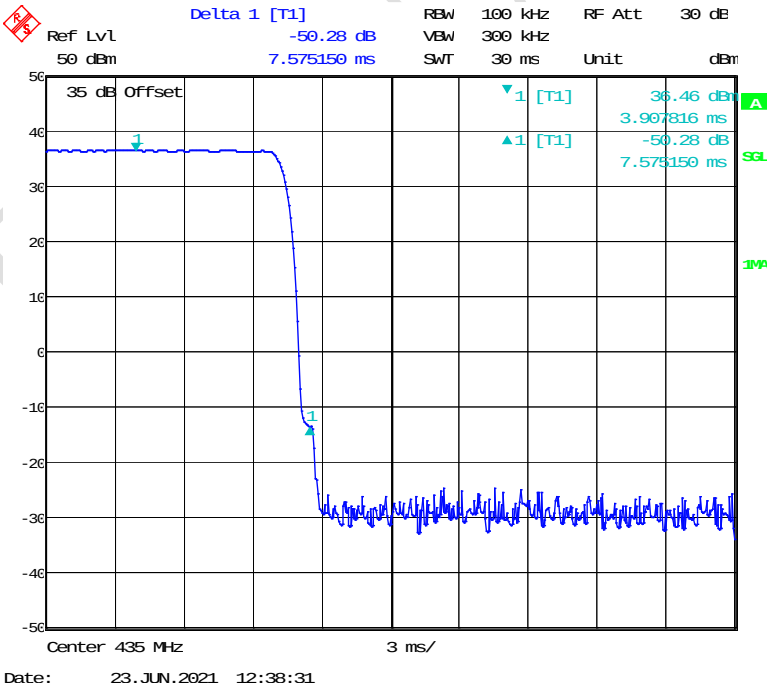
Channel Separation	Channel	f_c (MHz)	T_{rm} (ms)	T_{rl} (ms)
12.5kHz (UHF)	Low	400.025	5.59	20
	Middle	435.000	7.58	20
	High	469.975	8.54	20

FINAL

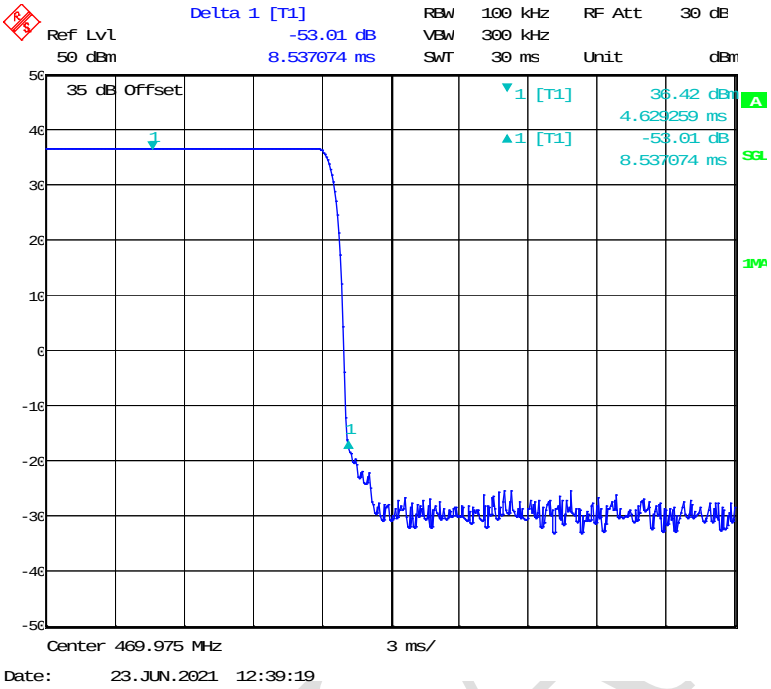
Release time, 400.025MHz



Release time, 435.000MHz



Release time, 469.975MHz



ETSI EN 300 113 V3.1.1 (2020-06) §7.9 – TRANSIENT BEHAVIOUR OF THE TRANSMITTER

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) §7.9.1

Limits

Transients may occur very often in some types of equipment (e.g. packet data systems) and are a potential source of interference for equipment operating both in adjacent channels and much further away in the spectrum. The effects of transients can be very different from case to case because there are a number of possible mechanisms relating to such phenomena. For that reason, the method of measurement provided in the present document is expected to capture events that may have a high probability of happening, but some other unacceptable effects of transients may require specific methods to be detected and measured. The method and limits provided in the present document are therefore the result of a compromise between an acceptable level of confidence and an acceptable complexity of the measurement.

1) Time domain analysis of power and frequency for constant envelope transmissions

When appropriate, the plots of carrier power (conducted) and carrier frequency as a function of time, covering in an appropriate way the transients, shall be included in test reports.

At any time when the carrier power is above P_c - 30 dB, the carrier frequency shall remain within half a channel separation (df_c) from the steady carrier frequency (F_c).

In case of equipment operating with channel separation of 12,5 kHz, the slopes of the plots "power as a function of time" corresponding to both attack and release times, shall be such that:

- $t_p \geq 0{,}10$ ms and $t_d \geq 0{,}10$ ms, for attack and release time;
- between the P_c - 30 dB point and the P_c - 6 dB point, both in the case of attack and release time, the sign of the slope shall not change.

In case of equipment operating with channel separation of 20 kHz or 25 kHz, the slopes of the plots "power as a function of time" corresponding to both attack and release times, shall be such that:

- $t_p \geq 0{,}05$ ms and $t_d \geq 0{,}05$ ms, for attack and release time;
- between the P_c - 30 dB point and the P_c - 6 dB point, both in the case of attack and release time, the sign of the slope shall not change.

2) Adjacent and alternate channel transient power

a) Equipment measured as constant envelope angle modulation equipment

The transient power, in the adjacent channels shall not exceed a value of:

- 60,0 dB below the transmitter power (conducted) without the need to be below 2 µW (-27,0 dBm), for channel separations of 20 kHz and 25 kHz;
- 50,0 dB below the transmitter power (conducted) without the need to be below 2 µW (-27,0 dBm), for a channel separation of 12,5 kHz.

b) Equipment measured as non-constant envelope modulation equipment

Figure 1 shows the position of adjacent and alternate channels with respect to the wanted channel.

The transient power, in the adjacent channels shall not exceed a value of:

- 60,0 dB below the transmitter power (conducted) without the need to be below 2 µW (-27,0 dBm), for channel separations of 20 kHz and 25 kHz;
- 50,0 dB below the transmitter power (conducted) without the need to be below 2 µW (-27,0 dBm), for a channel separation of 12,5 kHz.

The transient power, in the alternate channels shall not exceed a value of:

- 65,0 dB below the transmitter power (conducted) without the need to be below 2 µW (-27,0 dBm), for channel separations of 20 kHz and 25 kHz;
- 60,0 dB below the transmitter power (conducted) without the need to be below 2 µW (-27,0 dBm), for a channel separation of 12,5 kHz.

For measurements at 100 kHz and 1 MHz (from the wanted channel), the transient power shall not exceed a value:

- 65,0 dB below the transmitter power (conducted) without the need to be below 2 µW (-27,0 dBm), for channel separations of 20 kHz and 25 kHz;
- 60,0 dB below the transmitter power (conducted) without the need to be below 2 µW (-27,0 dBm), for a channel separation of 12,5 kHz.

NOTE: The transmitter power (conducted) is measured in clause 7.2; it is the mean power for constant envelope modulation and the peak envelope power for non constant envelope modulation.

Method of measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §7.9.3

Test Data

Environmental Conditions

Temperature:	24.9 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang on 2021-06-25.

Test Result: Pass

UHF:

Adjacent and alternate channel transient power

High power level:

Fc (MHz)	Channel Spacing (kHz)	Displacement from f_c (kHz)	Measured (dB)	limit (dB)
400.025	12.5	±8.5	63	⩾50
		±25	72	⩾60
		±100	70	⩾60
		±1000	80	⩾60
469.975	12.5	±8.5	62	⩾50
		±25	75	⩾60
		±100	71	⩾60
		±1000	79	⩾60

High power level:

f_c (MHz)	Attack time (ms)	Limit (ms)	Release time (ms)	Limit (ms)
400.025	0.5	0.1	0.62	0.1
469.975	0.5	0.1	0.62	0.1

Low power level:

Fc (MHz)	Channel Spacing (kHz)	Displacement from f_c (kHz)	Measured (dB)	limit (dB)
400.025	12.5	±8.5	64	⩾50
		±25	72	⩾60
		±100	74	⩾60
		±1000	81	⩾60
469.975	12.5	±8.5	69	⩾50
		±25	76	⩾60
		±100	81	⩾60
		±1000	80	⩾60

Low power level:

f_c (MHz)	Attack time (ms)	Limit (ms)	Release time (ms)	Limit (ms)
400.025	0.4	0.1	0.58	0.1
469.975	0.4	0.1	0.58	0.1

FINAL

ETSI EN 300 113 V3.1.1 (2020-06) § 8.1 – MAXIMUM USABLE SENSITIVITY (CONDUCTED)

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.1.1, the maximum usable sensitivity (conducted) is the minimum level of signal at the receiver input, produced by a signal at the nominal frequency of the receiver, modulated with the normal test signal (see clause 6.3), which will, without interference, produce after demodulation a data signal with a specified bit error ratio or a specified successful message ratio. The specified bit error ratio is 10^{-2}. The specified successful message ratio is 80 %.

The equipment (transmission and/or reception) under test shall be operated in its normal transmission mode (which may be continuous or discontinuous).

Limits

The maximum usable sensitivity shall not exceed the values given in table 9 under normal test conditions, and the values in table 9 plus 6 dB under extreme test conditions.

Table 9: Sensitivity levels (mean power) for different channel bandwidths and gross (on-air) bit rates

Channel BW	Data Rate	Sensitivity
12,5 kHz	9,6 kbit/s or less	-110 dBm
	more than 9,6 kbits to 16 kbit/s	-105 dBm
	more than 16 kbits to 38,4 kbit/s	-98 dBm
	greater than 38,4 kbit/s	-93 dBm
20 kHz and 25 kHz	9,6 kbit/s or less	-110 dBm
	more than 9,6 kbit/s to 38,4 kbit/s	-105 dBm
	more than 38,4 kbits to 76,8 kbit/s	-98 dBm
	greater than 76,8 kbit/s	-93 dBm

Method of measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.1.2

Test Data

Environmental Conditions

Temperature:	26.3 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang on 2021-06-25.

Test Mode: Receiving

Test Result: Compliant

UHF:

400.025MHz

Test Conditions		Measured Sensitivity (dBm)	Limit (dBm)
Temperature (℃)	**Power Supply (V_{DC})**		
T_{nor} = 25	V_{nor} =7.4	-126	-110
T_{min} = -30	V_{min} =6.0	-124	-104
	V_{max} =7.4	-123	
T_{max} = +40	V_{min} =6.0	-125	
	V_{max} =7.4	-123	

435.000MHz

Test Conditions		Measured Sensitivity (dBm)	Limit (dBm)
Temperature (℃)	**Power Supply (V_{DC})**		
T_{nor} = 25	V_{nor} =7.4	-127	-110
T_{min} = -30	V_{min} =6.0	-125	-104
	V_{max} =7.4	-126	
T_{max} = +40	V_{min} =6.0	-124	
	V_{max} =7.4	-125	

469.975MHz

Test Conditions		Measured Sensitivity (dBm)	Limit (dBm)
Temperature (℃)	**Power Supply (V_{DC})**		
T_{nor} = 25	V_{nor} =7.4	-123	-110
T_{min} = -30	V_{min} =6.0	-125	-104
	V_{max} =7.4	-124	
T_{max} = +40	V_{min} =6.0	-126	
	V_{max} =7.4	-123	

FINAL

ETSI EN 300 113 V3.1.1 (2020-06) §8.4 - ERROR BEHAVIOUR AT HIGH INPUT LEVELS

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.4.1, the error behaviour (performance) at high input levels (noise free operation) is defined by the bit error ratio (continuous bit stream) or by the number of messages lost or corrupted when the level of the wanted signal is significantly above the maximum usable sensitivity.

The equipment (transmission and/or reception) under test shall be operated in its normal transmission mode (which may be continuous or discontinuous).

Limits

The bit error ratio (continuous bit streams) shall not exceed 10^{-4}.

The number of messages or packets not correctly received (lost or corrupted) shall not exceed 1.

Method of measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.4.2

Test Data

Environmental Conditions

Temperature:	26.2 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang on 2021-06-25.

Test mode: Transmitting

Test Result: Compliant

Frequency(MHz)	High input levels	Bit error ratio	Limit
400.025	30 dB above the wanted signal	0	10^{-4}
	-10dBm	0	
435.000	30 dB above the wanted signal	0	
	-10dBm	0	
469.975	30 dB above the wanted signal	0	
	-10dBm	0	

FINAL

ETSI EN 300 113 V3.1.1 (2020-06) §8.5 – CO-CHANNEL REJECTION

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.5.1, the co-channel rejection is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due the presence of an unwanted modulated signal, both signals being at the nominal frequency of the receiver.

The equipment (transmission and/or reception) under test shall be operated in its normal transmission mode (which may be continuous or discontinuous).

Limits

The value of the co-channel rejection ratio, expressed in dB, at the signal displacements given in the method of measurement, shall be between the values given in table 11.

Table 11: Co-channel limits (mean power) for different channel bandwidths and gross (on-air) bit rates

Channel BW	Data Rate	Sensitivity
12,5 kHz	9,6 kbit/s or less	between 12,0 dB and 0 dB
	more than 9,6 kbits to 16 kbit/s	between 17,0 dB and 0 dB
	more than 16 kbits to 38,4 kbit/s	between 24,0 dB and 0 dB
	greater than 38,4 kbit/s	between 29,0 dB and 0 dB
20 kHz and 25 kHz	9,6 kbit/s or less	between 8,0 dB and 0 dB
	more than 9,6 kbit/s to 38,4 kbit/s	between 12,0 dB and 0 dB
	more than 38,4 kbits to 76,8 kbit/s	between 19,0 dB and 0 dB
	greater than 76,8 kbit/s	between 24,0 dB and 0 dB

Method of measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.5.2

Test Data

Environmental Conditions

Temperature:	26.2 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang on 2021-06-25.

Test Mode: Receiving

Test Result: Pass

Carrier Frequency: 400.025MHz, Channel Spacing: 12.5 kHz

Test Condition		Measurement Offset (kHz)	Measured Value (dB)	Limit (dB)
Temperature (℃)	Voltage (V_{DC})			
25	7.4	-1.5	-9	-12≤Limit≤0
		0	-7	
		1.5	-7	

Carrier Frequency: 435.000 MHz, Channel Spacing: 12.5 kHz

Test Condition		Measurement Offset (kHz)	Measured Value (dB)	Limit (dB)
Temperature (℃)	Voltage (V_{DC})			
25	7.4	-1.5	-8.5	-12≤Limit≤0
		0	-8	
		1.5	-9	

Carrier Frequency: 469.975MHz, Channel Spacing: 12.5 kHz

Test Condition		Measurement Offset (kHz)	Measured Value (dB)	Limit (dB)
Temperature (℃)	Voltage (V_{DC})			
25	7.4	-1.5	-9	-12≤Limit≤0
		0	-9	
		1.5	-9.5	

FINAL

ETSI EN 300 113 V3.1.1 (2020-06) §8.6 – ADJACENT CHANNEL SELECTIVITY

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.6.1, the adjacent channel selectivity is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted signal which differs in frequency from the wanted signal by an amount equal to the adjacent channel separation for which the equipment is intended.

The equipment (transmission and/or reception) under test shall be operated in its normal transmission mode (which may be continuous or discontinuous).

Limits

The minimum adjacent channel rejection shall be such that, under the specified test conditions, the given degradation shall not be exceeded for levels of the unwanted signal up to the values given in table 12.

Table 12: Adjacent channel selectivity (unwanted signal levels)

	Channel separation	
	12,5 kHz	20/25 kHz
normal test conditions	-47,0 dBm	-37,0 dBm
extreme test conditions	-51,0 dBm	-41,0 dBm

Method of measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.6.2

Test Data

Environmental Conditions

Temperature:	25.4 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang on 2021-06-25.

Test Mode: Receiving

Test Result: Pass

UHF:

Carrier Frequency: 400.025 MHz, Channel Spacing: 12.5 kHz

Test Conditions		Measured Channel (dBm)	Measured Result (dBm)	Limit (dBm)
Temperature (^{O}C)	Power Supply (V_{DC})			
T_{nor} = +25	Vnor = 7.4	Upper Channel	-42	-47
		Lower Channel	-43	
T_{min} = -30	Vmin =6.0	Upper Channel	-43	-51
		Lower Channel	-45	
	Vmax = 7.4	Upper Channel	-46	
		Lower Channel	-44	
T_{max} = +40	Vmin =6.0	Upper Channel	-45	
		Lower Channel	-45	
	Vmax = 7.4	Upper Channel	-45	
		Lower Channel	-44	

Carrier Frequency: 435.000 MHz, Channel Spacing: 12.5 kHz

Test Conditions		Measured Channel (dBm)	Measured Result (dBm)	Limit (dBm)
Temperature (^{O}C)	Power Supply (V_{DC})			
T_{nor} = +25	Vnor = 7.4	Upper Channel	-44	-47
		Lower Channel	-43	
T_{min} = -30	Vmin =6.0	Upper Channel	-43	-51
		Lower Channel	-44	
	Vmax = 7.4	Upper Channel	-43	
		Lower Channel	-45	
T_{max} = +40	Vmin =6.0	Upper Channel	-45	
		Lower Channel	-45	
	Vmax = 7.4	Upper Channel	-44	
		Lower Channel	-44	

Carrier Frequency: 469.975 MHz, Channel Spacing: 12.5 kHz

Test Conditions		Measured Channel (dBm)	Measured Result (dBm)	Limit (dBm)
Temperature (^{O}C)	Power Supply (V_{DC})			
T_{nor} = +25	Vnor = 7.4	Upper Channel	-43	-47
		Lower Channel	-43	
T_{min} = -30	Vmin =6.0	Upper Channel	-45	-51
		Lower Channel	-44	
	Vmax = 7.4	Upper Channel	-46	
		Lower Channel	-46	
T_{max} = +40	Vmin =6.0	Upper Channel	-43	
		Lower Channel	-45	
	Vmax = 7.4	Upper Channel	-43	
		Lower Channel	-46	

ETSI EN 300 113 V3.1.1 (2020-06) §8.7 – SPURIOUS RESPONSE REJECTION

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.7.1, the spurious response rejection is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted modulated signal at any other frequency, at which a response is obtained.

The equipment (transmission and/or reception) under test shall be operated in its normal transmission mode (which may be continuous or discontinuous).

Limits

At any frequency separated from the nominal frequency of the receiver by two channels or more, the spurious response rejection shall be such that under the specified test conditions, the given degradation shall not be exceeded for levels of the unwanted signal up to -37 dBm.

Method of measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.7.2 ~ §8.7.6

FINAL

Test Data

Environmental Conditions

Temperature:	26.4 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang on 2021-06-25.

Test Mode: Receiving

Test Result: Pass

Channel spacing(Hz)	Carrier Frequency (MHz)	Measured Result (dBm)	Limit (dBm)
12.5k (UHF)	400.025	-26	-37
	435.000	-25	-37
	469.975	-26	-37

FINAL

ETSI EN 300 113 V3.1.1 (2020-06) §8.8 - INTERMODULATION RESPONSE REJECTION

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.8.1, the intermodulation response rejection is a measure of the capability of the receiver to receive a wanted modulated signal, without exceeding a given degradation due to the presence of two or more unwanted signals with a specific frequency relationship to the wanted signal frequency.

The equipment (transmission and/or reception) under test shall be operated in its normal transmission mode (which may be continuous or discontinuous).

Limits

The intermodulation response rejection of the equipment shall be such that under the specified test conditions, the given degradation shall not be exceeded for levels of the unwanted signal up to -37 dBm for base stations and -42 dBm for mobile and handportable stations.

Method of measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.8.2.

Test Data

Environmental Conditions

Temperature:	25.5 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang on 2021-06-25.

Test Mode: Receiving

Test Result: Pass

Channel spacing(Hz)	Carrier Frequency (MHz)	Measured Result (dBm)	Limit (dBm)
12.5k (UHF)	400.025	-33	-42
	435.000	-31	
	469.975	-33	

FINAL

ETSI EN 300 113 V3.1.1 (2020-06) §8.9 - BLOCKING OR DESENSITIZATION

Applicable Standard

Blocking is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted input signal at any frequencies other than those of the spurious responses or the adjacent channels.

The equipment (transmission and/or reception) under test shall be operated in its normal transmission mode (which may be continuous or discontinuous).

Limits

The blocking level, for any frequency within the specified ranges, shall not be less than -23 dBm except at frequencies on which spurious responses are found, clause 8.7.

Method of measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.9.2.

Test Data

Environmental Conditions

Temperature:	24.9 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang on 2021-06-25.

Test Mode: Receiving

Test Result: Pass

FINAL

Carrier Frequency: 400.025 MHz, Channel Spacing: 12.5 kHz

Carrier Frequency (MHz)	Frequency offset (MHz)	Measured Result (dBm)	Limit (dBm)
400.025	-10	-15	-23
	-5	-14	
	-2	-15	
	-1	-16	
	+10	-14	
	+5	-16	
	+2	-15	
	+1	-15	

Carrier Frequency: 435.000 MHz, Channel Spacing: 12.5 kHz

Carrier Frequency (MHz)	Frequency offset (MHz)	Measured Result (dBm)	Limit (dBm)
435.000	-10	-14	-23
	-5	-16	
	-2	-12	
	-1	-15	
	+10	-14	
	+5	-15	
	+2	-13	
	+1	-14	

Carrier Frequency: 469.975 MHz, Channel Spacing: 12.5 kHz

Carrier Frequency (MHz)	Frequency offset (MHz)	Measured Result (dBm)	Limit (dBm)
469.975	-10	-14	-23
	-5	-15	
	-2	-13	
	-1	-15	
	+10	-15	
	+5	-17	
	+2	-15	
	+1	-16	

ETSI EN 300 113 V3.1.1 (2020-06) §8.10 – SPURIOUS RADIATIONS

Applicable Standard

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.10.1, Spurious radiations from the receiver are emissions at any frequency, radiated by the equipment and its antenna.

The level of spurious radiations shall be measured by either:

a) their power level in a specified load (conducted spurious emission); and

b) their effective radiated power when radiated by the cabinet and structure of the equipment (cabinet radiation); or

c) their effective radiated power when radiated by the cabinet and by the integral antenna, in the case of handportable equipment fitted with such an antenna and no external RF connector.

Limits

The power of any spurious radiation shall not exceed the values given in tables 13 and 14.

Table 13: Conducted components

Frequency range	Limit
9 kHz to 1 GHz	2,0 nW (-57 dBm)
above 1 GHz to 4 GHz or above 1 GHz to 12,75 GHz	20,0 nW (-47 dBm)

Table 14: Radiated components

Frequency range	Limit
30 MHz to 1 GHz	2,0 nW (-57 dBm)
above 1 GHz to 4 GHz	20,0 nW (-47 dBm)

In the case of radiated measurements for handportable stations the following conditions apply:

- for equipment having an external antenna connector, an artificial load shall be connected to the socket during the test;
- for equipment having no external antenna connector, the normal integral antenna shall be used.

Table 15: Reference bandwidths to be used for the measurement of spurious radiations

Frequency range	RBW
9 kHz to 150 kHz	1 kHz
150 kHz to 30 MHz	10 kHz
30 MHz to 1 GHz	100 kHz
1 GHz to 12,75 GHz	1 MHz

Method of Measurement

According to ETSI EN 300 113 V3.1.1 (2020-06) §8.10.2&§8.10.3

FINAL

Test Data

Environmental Conditions

Temperature:	24.5 ℃
Relative Humidity:	57 %
ATM Pressure:	101.0 kPa

The testing was performed by Stone Zhang from 2021-06-22 to 2021-06-29.

Test mode: Receiving

Test Result: Pass

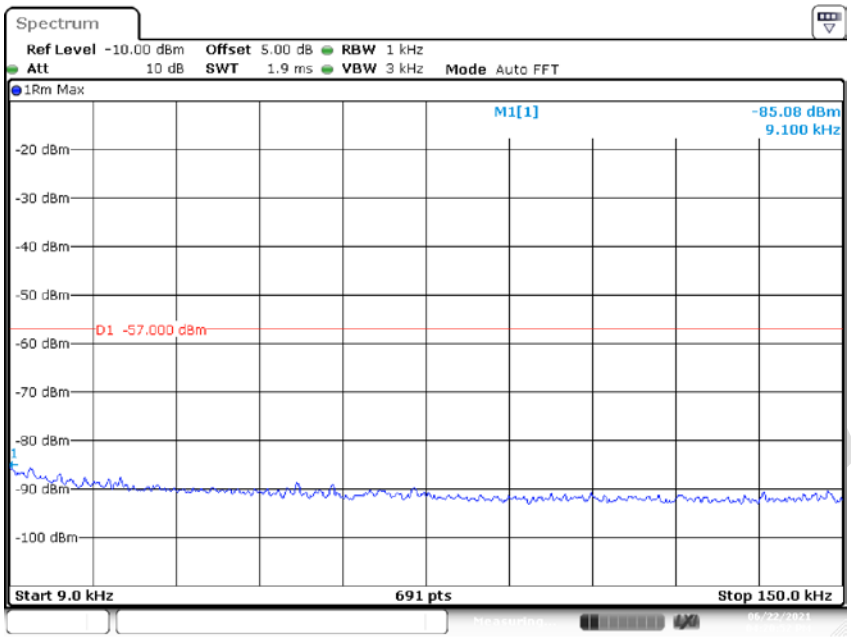
Frequency (MHz)	Receiver Reading (dBμV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN 300 113	
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable (dB)	Antenna Gain (dBd/dBi)		Limit (dBm)	Margin (dB)
Low Channel-400.025 MHz										
693.96	37.46	26	150	H	-62.19	0.62	-1.68	-64.49	-57	7.49
693.96	38.59	236	150	V	-61.06	0.62	-1.68	-63.36	-57	6.36
1598.95	46.66	44	150	H	-67.04	0.83	8.36	-59.51	-47	12.51
1598.95	46.81	58	150	V	-66.89	0.83	8.36	-59.36	-47	12.36
High Channel-469.975 MHz										
693.91	37.18	199	150	H	-62.47	0.62	-1.68	-64.77	-57	7.77
693.91	38.64	150	150	V	-61.01	0.62	-1.68	-63.31	-57	6.31
1596.25	46.40	232	150	H	-67.30	0.83	8.36	-59.77	-47	12.77
1596.25	46.36	344	150	V	-67.34	0.83	8.36	-59.81	-47	12.81

Note:
1) Absolute Level = Submitted Level - Cable Loss + Antenna Gain
2) Margin = Limit - Absolute Level

Conducted Emission – Receiver mode

Normal condition-Low Channel: 400.025 MHz

9kHz-150kHz



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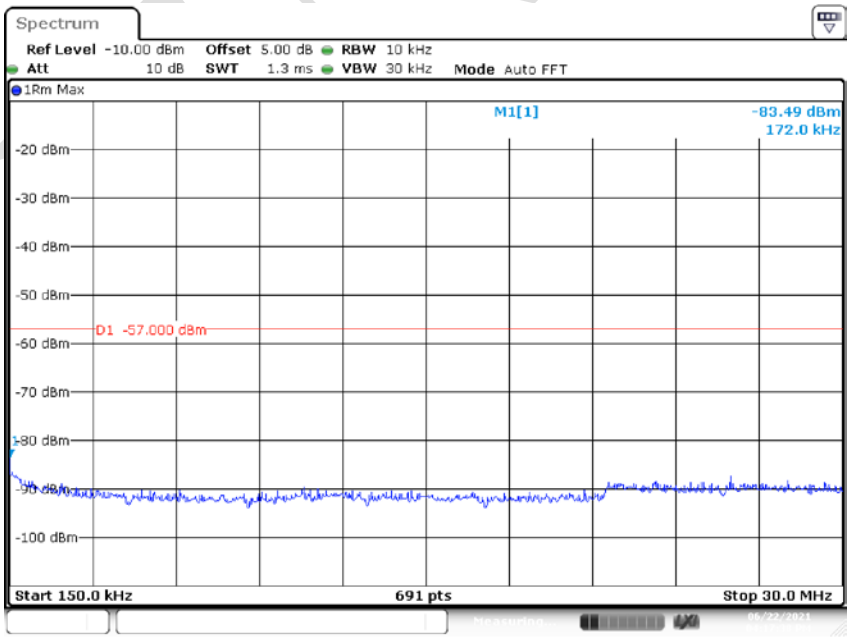
150kHz-30MHz



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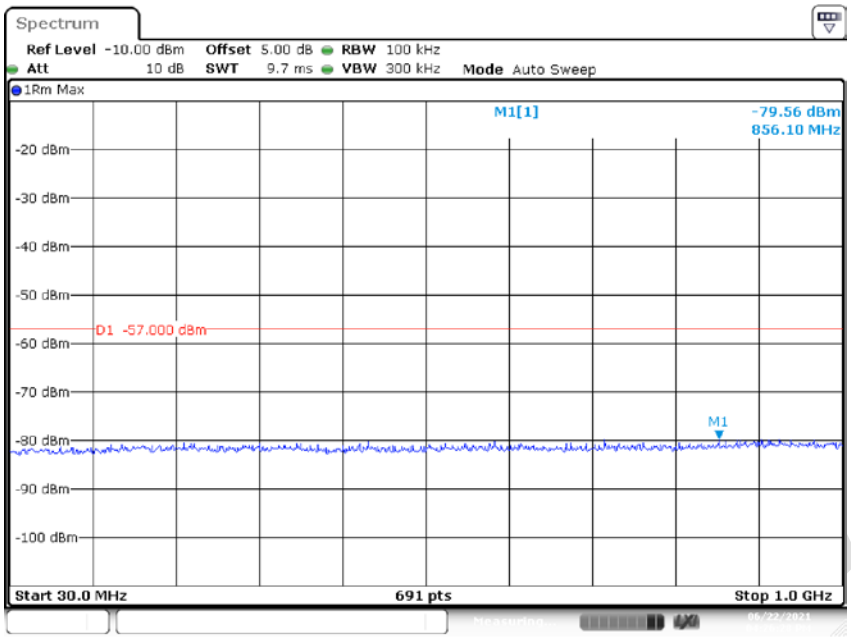
30MHz-1GHz



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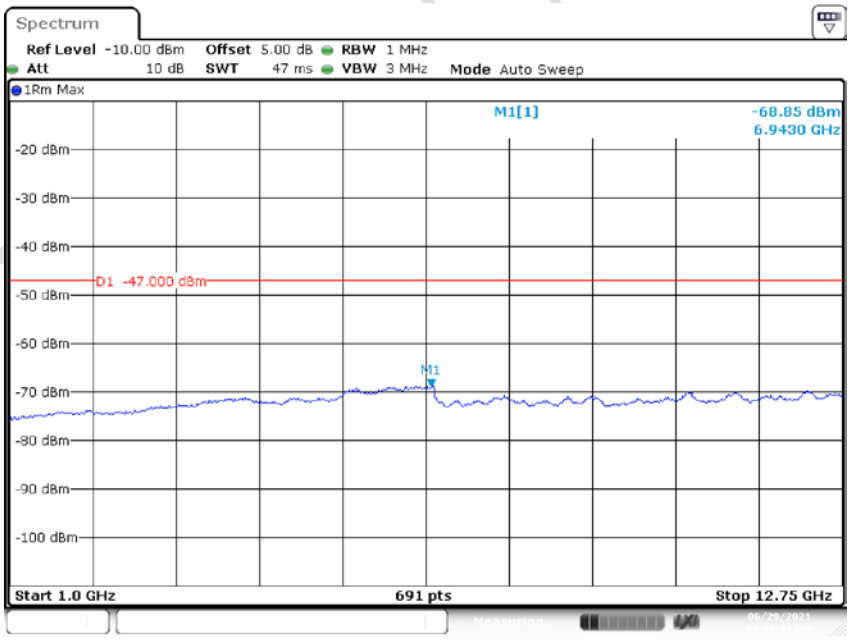
1GHz-12.75GHz



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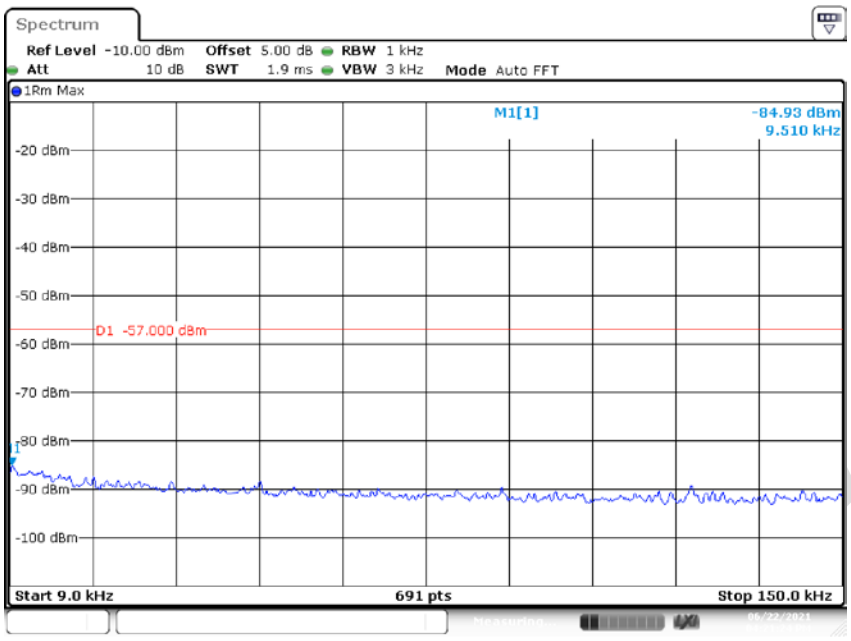
Normal condition-Middle Channel: 435.000 MHz

9kHz-150kHz



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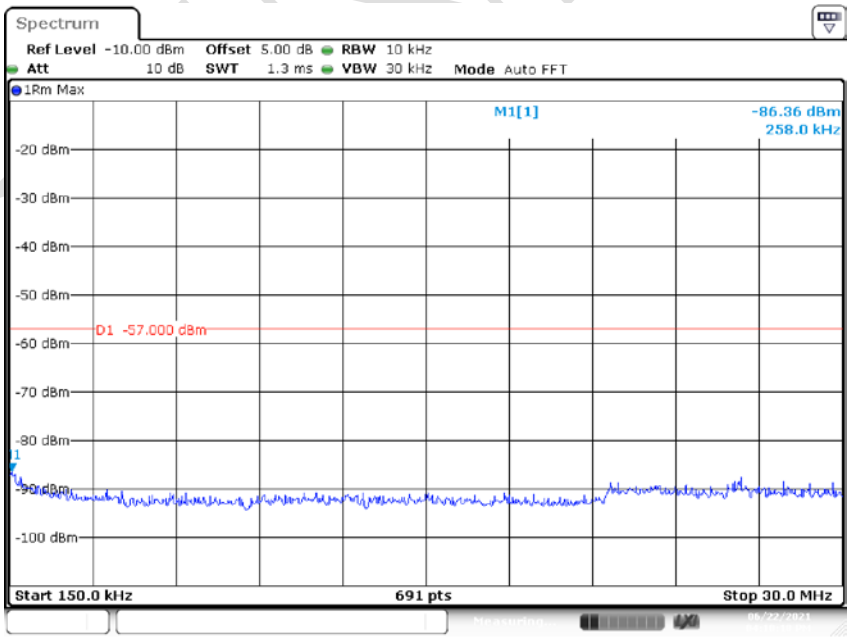
150kHz-30MHz



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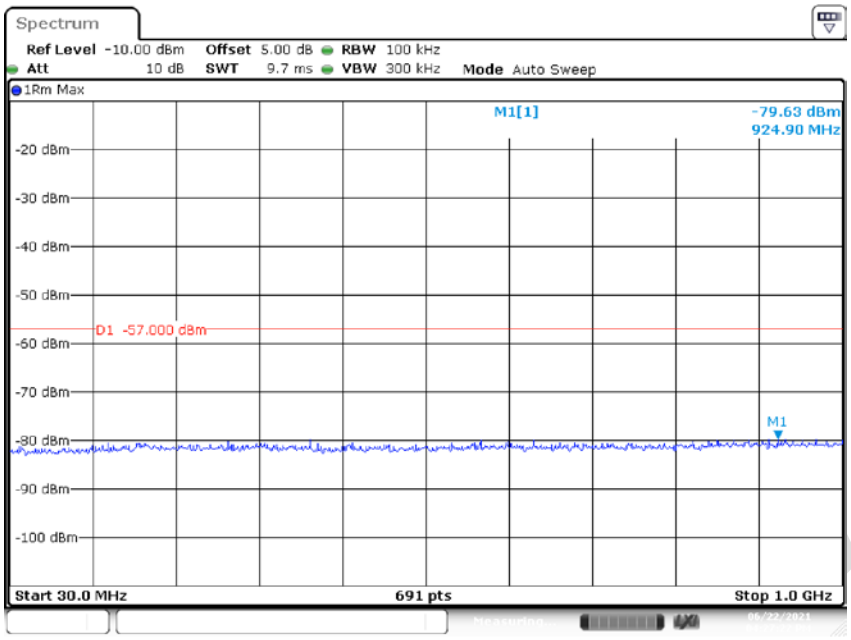
30MHz-1GHz



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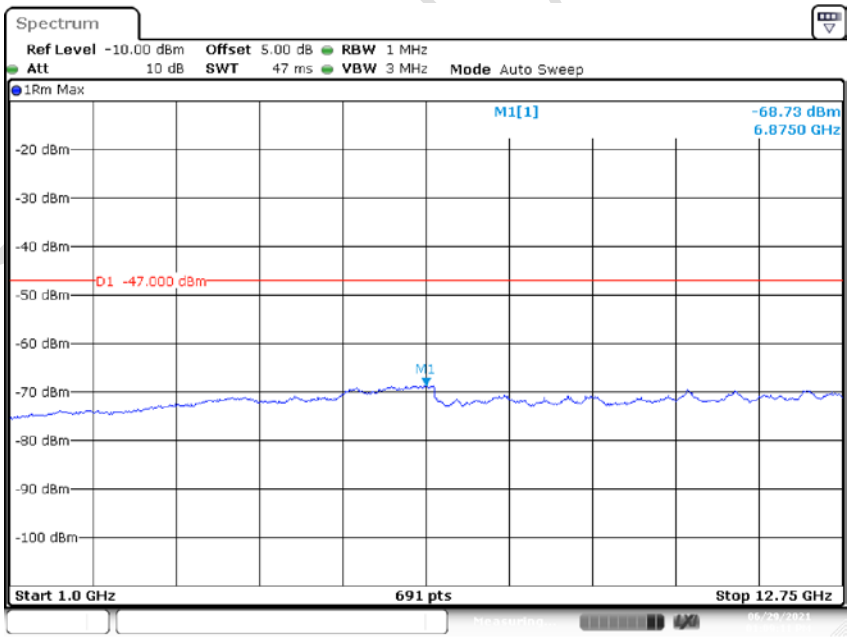
1GHz-12.75GHz



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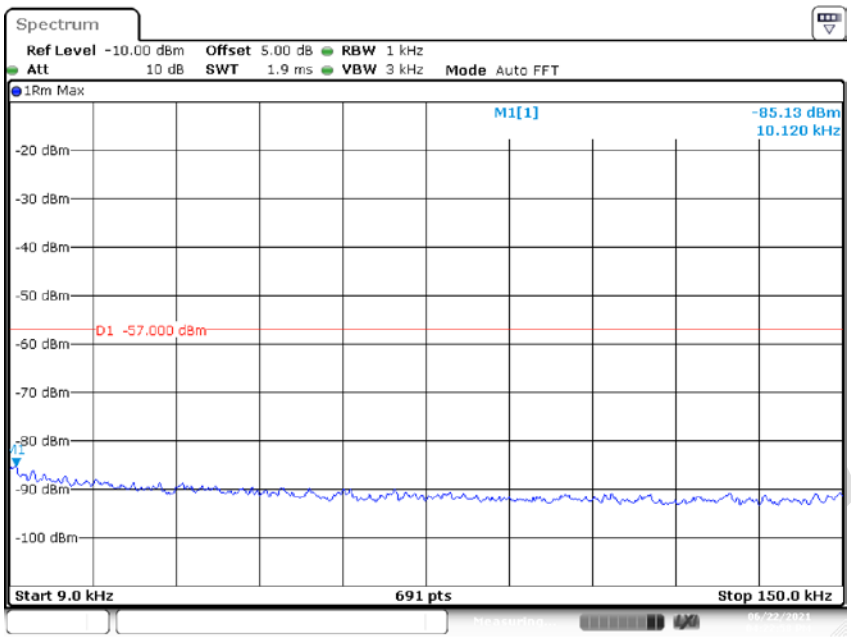
Normal condition-High Channel: 469.975 MHz

9kHz-150kHz



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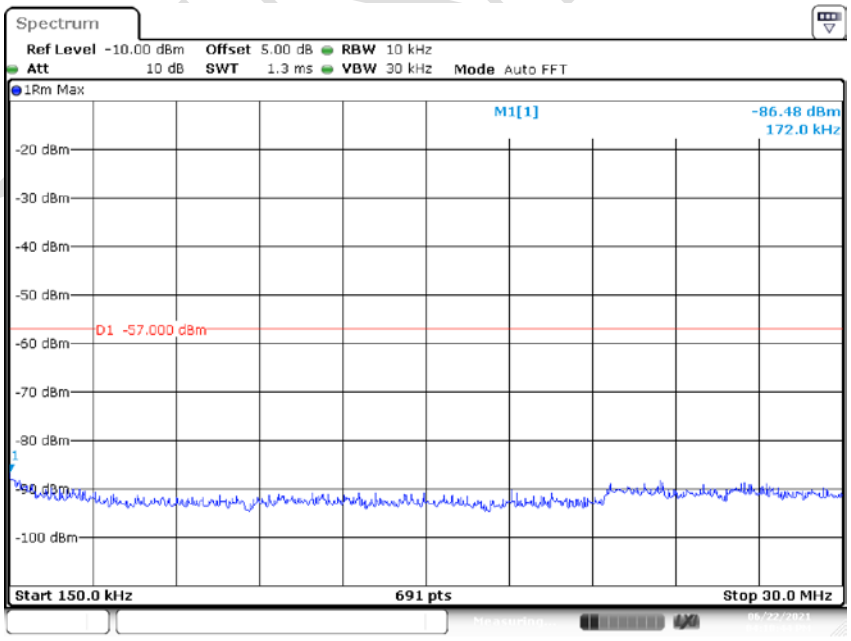
150kHz-30MHz



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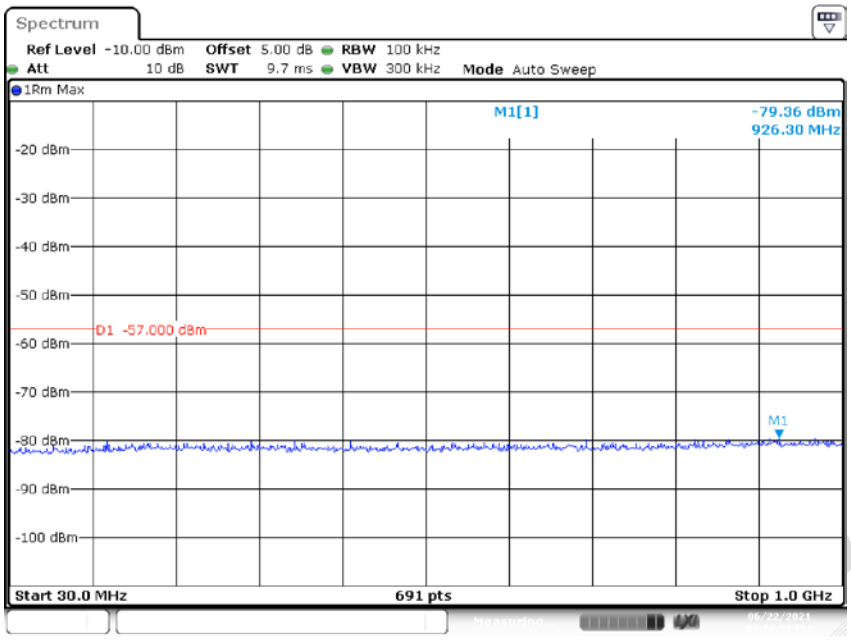
30MHz-1GHz



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1GHz-12.75GHz

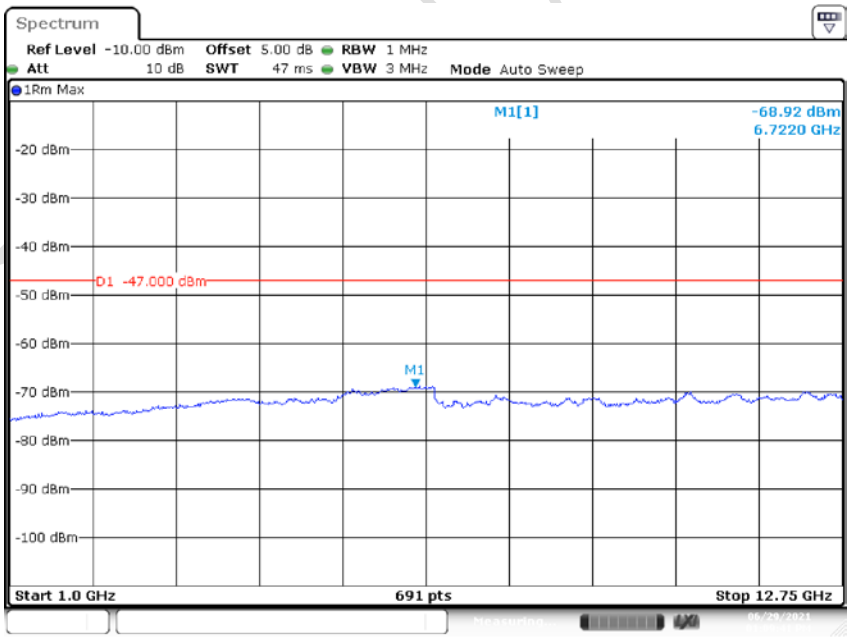

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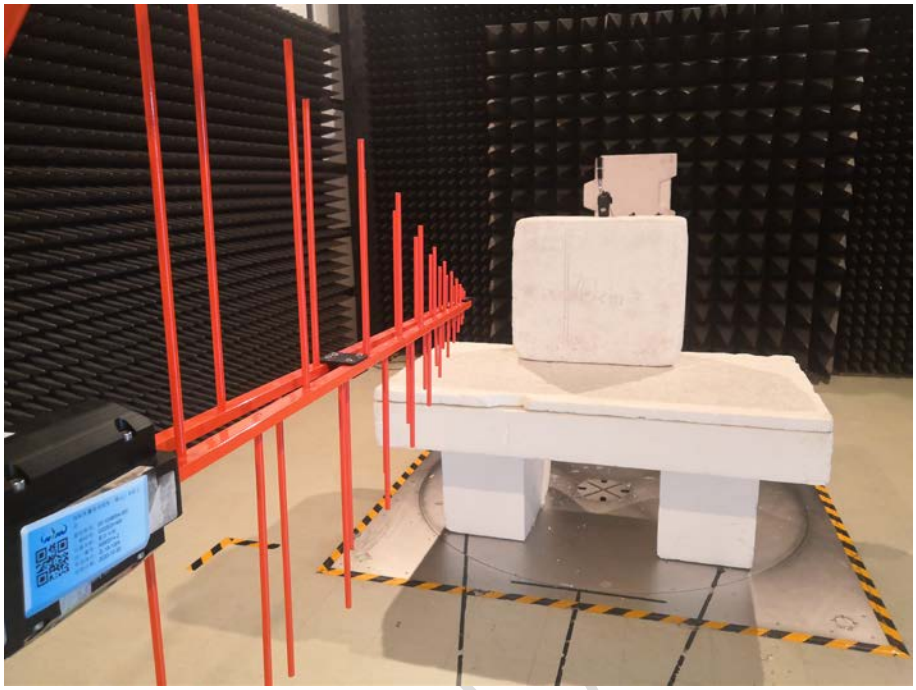
EXHIBIT B- EUT PHOTOGRAPHS

Refer to report No. RXM210414051-01A

FINAL

EXHIBIT B – TEST SETUP PHOTOGRAPHS

Radiated Spurious Emissions View (Below 1 GHz)



Radiated Spurious Emissions View (Above 1 GHz)

Declarations

1: BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

2: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

3: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

4: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

5: This report cannot be reproduced except in full, without prior written approval of the Company.

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******* END OF REPORT *******