

Limited test report

REP015991-1TRFWL

Date of issue: October 13, 2023

Applicant:

Cubic Transportation System

Product:

Platform Validator

Model:

Validator 3

Model variant:

None

FCC ID:

LVCVAL3

IC Registration number:

4387A-VAL3

Specifications:

FCC Part 22 Subpart H

Cellular radiotelephone service. (Partial testing)

FCC Part 24 Subpart E

Personal communications services. (Partial testing)

FCC Part 90 Subpart R

Regulations Governing the Licensing and Use of Frequencies in the 763–775 and 793–805 MHz Bands

Lab and test locations

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FCC Site Number	Test Firm Registration Number: 392943; Designation Number: US5058
ISED Test Site	2040B-3
Tested by	Chenhao Ma, Wireless Test Technician
Reviewed by	James Cunningham, EMC/WL Manager
Review date	October 13, 2023
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

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Report reference ID: REP015991-1TRFWL

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Section 1. Report summary

1.1 Applicant

Company name:	Cubic Transportation Systems
Address:	9233 Balboa Ave.
City:	San Diego
Province/State:	CA
Postal/Zip code:	92123
Country:	United States

1.2 Manufacturer

Company name:	Cubic Transportation Systems
Address:	9233 Balboa Ave.
City:	San Diego
Province/State:	CA
Postal/Zip code:	92123
Country:	United States

1.3 Test specifications

FCC Part 22 Subpart H	Cellular radiotelephone service.
FCC Part 24 Subpart E	Personal communications services
FCC Part 27 Subpart C	Miscellaneous Wireless Communications Services
FCC Part 90 Subpart R	Regulations Governing the Licensing and Use of Frequencies in the 763–775 and 793–805 MHz Bands

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

The purpose of this test exercise is to spot check the transmitter fundamental emission power (ERP or EIRP) and harmonic spurious emissions. Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

1.5 Exclusions

None

1.6 Test report revision history

Revision #	Details of changes made to test report
REP015991-1TRFWL	Original report issued

Section 2. Summary of test results

2.1 FCC Part 22 Subpart H, test results

Part	Test description	Verdict
22.913(a)	Effective Radiated Power Limits	Pass
22.917(a)	Field strength of spurious radiation	Pass

Notes: ¹The EUT was partially tested per customer request.

2.2 FCC Part 24 Subpart E, test results

Part	Test description	Verdict
24.232(b)	Effective Radiated Power Limits	Pass
24.238(a)	Field strength of spurious radiation	Pass

Notes: ¹The EUT was partially tested per customer request.

2.3 FCC Part 90 subpart R, test results

Part	Test description	Verdict
90.541(d)	Transmitting power and antenna height limits	Pass
90.543	Emission limitations.	Pass

Notes: ¹The EUT was partially tested per customer request.

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	September 7, 2023
Nemko sample ID number	PRJ0040288

3.2 EUT information

Product name	Bus Validator
Model	Validator 3.0
Model variant	N/A
Part number	10055645

3.3 Technical information

Operating band	LTE Bands 2/4/5/12/13/14/71
Power requirements	24VDC (230VAC50Hz for AC/DC adapter) and PoE
Description/theory of operation	The device is to be used by public transit operators to collect fares for journeys through contactless media i.e. contactless bankcard (EMV), contactless token card (e.g. ISO14443 type A and B) and barcode (QR code on printed media or phone).
Operational frequencies band	NFC:13.56MHz, 2.4GHz and 5GHz Wi-Fi (802.11a/b/g/n/ac) and Bluetooth (5.0 including BLE), and 4G LTE capability.
Antenna gain	1.8 dBi
Software details	Validator 3 Qualification Software

3.4 Product description and theory of operation

- With the use of supporting devices, the EUT was exercising the main peripherals (Bluetooth, Wi-Fi, Cellular, sensors, LCD, NFC, audio, etc.) through an automated test script within the EUT software.
- The EUT setup in a configuration that was expected to produce the highest amplitude emissions relative to the limit and that satisfy normal operation/installation practice by the end user.
- The type and construction of cables used in the measurement set-up were consistent with normal or typical use.
- The EUT was setup in a manner that was consistent with its typical arrangement and use. The measurement arrangement of the EUT, local ancillary equipment and associated cabling was representative of normal practice.
- EUT LTE transmitter controlled via over-the-air connection to cellular communications test set.

EUT setup/configuration rationale:

- The EUT setup in a configuration that was expected to produce the highest amplitude emissions relative to the limit and that satisfy normal operation/installation practice by the end user.
- The type and construction of cables used in the measurement set-up were consistent with normal or typical use. Cables with mitigation features (for example, screening, tighter/more twists per length, ferrite beads) have been noted below:
 - None
- The EUT was setup in a manner that was consistent with its typical arrangement and use. The measurement arrangement of the EUT, local ancillary equipment and associated cabling was representative of normal practice. Any deviations from typical arrangements have been noted below:
 - None

3.5 EUT setup diagram

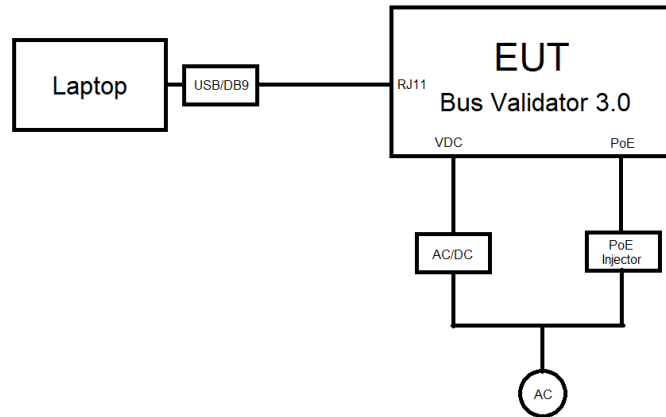


Figure 3.5-1: Setup diagram

3.6 EUT set up detail

Table 3.6-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number	Rev.
None				

Table 3.6-2: EUT interface ports

Description	Qty.
Serial	1
Ethernet	1
VDC Input	1

Table 3.6-3: Support equipment

Description	Brand name	Model/Part number	Serial number	Rev.
POE	StarTech	POEINJ1G	L4902V000010017200241	N/A
AC/DC power adapter	XP Power	VER36US240-JA	VER36US24JA	N/A
Laptop	Dell	Latitude 7480	ID IT2381	N/A
USB to DB9 adapter	FTDI	XCHIP1-X	N/A	N/A
PoE injector	StarTech.com	POEINJ1G	L4902V000010020500203	N/A

Table 3.6-4: Inter-connection cables

Cable description	From	To	Length (m)
VDC power	EUT	AC/DC power adapter	2.0
Serial Cable	EUT	Laptop	1.5
RJ11 to DB9	EUT	USB to DB9 adapter	>3.0

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ± 5 %, for which the equipment was designed.

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

Nemko USA Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4-2 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics, and limit modelling – Measurement instrumentation uncertainty. The expression of Uncertainty in EMC testing. Measurement uncertainty calculations assume a coverage factor of $K=2$ with 95% certainty.

Table 6.1-1: Measurement uncertainty calculations

Measurement		U_{CISPR} dB	U_{lab} dB
Conducted disturbance at AC mains and other port power using a V-AMN	9 kHz to 150 kHz	3.8	2.9
	150 kHz to 30 MHz	3.4	2.3
Conducted disturbance at telecommunication port using AAN	150 kHz to 30 MHz	5.0	4.3
Conducted disturbance at telecommunication port using CVP	150 kHz to 30 MHz	3.9	2.9
Conducted disturbance at telecommunication port using CP	150 kHz to 30 MHz	2.9	1.4
Conducted disturbance at telecommunication port using CP and CVP	150 kHz to 30 MHz	4.0	3.1
Radiated disturbance (electric field strength in a SAC)	30 MHz to 1 GHz	6.3	5.5
Radiated disturbance (electric field strength in a FAR)	1 GHz to 6 GHz	5.2	4.7
Radiated disturbance (electric field strength in a FAR)	6 GHz to 18 GHz	5.5	5.0

Notes: Compliance assessment:

If U_{lab} is less than or equal to U_{CISPR} then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit.
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{CISPR} then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{\text{lab}} - U_{\text{CISPR}})$, exceeds the disturbance limit.
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{\text{lab}} - U_{\text{CISPR}})$, exceeds the disturbance limit.

V-AMN: V type artificial mains network

AAN: Asymmetric artificial network

CP: Current probe

CVP: Capacitive voltage probe

SAC: Semi-anechoic chamber

FAR: Fully anechoic room

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: Equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI Test Receiver	Rohde & Schwarz	ESU40	E1121	08-23-2023	08-23-2024
System controller	Sunol Sciences	SC104V	E1191	NCR	NCR
DRG Horn (medium)	ETS-Lindgren	3117-PA	E1160	13-02-2023	13-02-2024
Antenna, DRWG	EMCO	3115	0529	NCR	NCR
Wideband radio comm tester	Rohde & Schwarz	CMW500	E1161	NCR	NCR
High Pass Filter	Wainwright Instruments	WHKX12-900-1000-1500	E1211	NCR	NCR
Notch filter	Micro-Tonics	BRM50702-02	E1142	NCR	NCR
Tunable Notch	K&L	3TNF-1000/2000-N/N	1059	VOU	VOU
Cellular communications test set	Rohde & Schwarz	CMW500	E1161	NCR	NCR

Note: NCR - no calibration required, VOU - verify on use

Section 8. Testing data

8.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

8.1.1 Definitions and limits

FCC §22.913 Effective radiated power limits.

The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(a) Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 W (57 dBm). However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

- (1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,
- (2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 W (60 dBm). The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 W (38.45 dBm).

FCC §24.50 Power limits and duty cycle.

(c) The following power and antenna height requirements apply to stations transmitting in the 600 MHz band and the 698–746 MHz band:

(9) Control and mobile stations in the 698–746 MHz band are limited to 30 watts ERP.

(d) The following power and antenna height requirements apply to stations transmitting in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz and 2180–2200 MHz bands:

(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band and mobile and portable stations operating in the 1695–1710 MHz and 1755–1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710–1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

FCC §90.541 Transmitting power and antenna height limits.

The transmitting power and antenna height of base, mobile, portable and control stations operating in the 769–775 MHz and 799–805 MHz frequency bands must not exceed the maximum limits in this section. Power limits are listed in effective radiated power (ERP).

(d) The transmitting power of a portable (hand-held) unit must not exceed 3 watts ERP.

FCC §24.232(c) Power and antenna height limits.

Mobile and portable stations are limited to 2 W (33 dBm) EIRP, and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

8.1.2 Test summary

Verdict	Pass		
Test date	September 5, 2023	Temperature	22 °C
Test engineer	Chenhao Ma. Wireless technician	Air pressure	1004 mbar
Test location	3m semi anechoic chamber	Relative humidity	55.2 %

8.1.3 Observations settings and special notes

Measurements were performed as field strength in dBμV/m at 3m measurement distance and converted to EIRP or ERP appropriately. EIRP = field strength – 97.38. ERP = field strength – 95.23.

Table 8.1-1: EIRP measurement results for LTE band 2

Frequency, MHz	Measured level, dBμV/m @ 3m	Calculated EIRP, dBm	EIRP limit, dBm	Margin, dB
1880	118.96	23.73	33.01	9.28

Table 8.1-2: EIRP measurement results for LTE band 4

Frequency, MHz	Measured level, dBμV/m @ 3m	Measured EIRP, dBm	EIRP limit, dBm	Margin, dB
1732.5	120.44	25.21	30	4.79

Table 8.1-3: ERP measurement results for band 5

Frequency, MHz	Measured level, dBμV/m @ 3m	Measured ERP, dBm	EIRP limit, dBm	Margin, dB
836.5	117.41	20.03	N/A	N/A

Table 8.1-4: ERP measurement results for band12

Frequency, MHz	Measured level, dBμV/m @ 3m	Measured ERP, dBm	EIRP limit, dBm	Margin, dB
707.5	122.45	25.07	44.77	19.70

Table 8.1-5: ERP measurement results for band13

Frequency, MHz	Measured level, dBμV/m @ 3m	Measured ERP, dBm	EIRP limit, dBm	Margin, dB
782	117.66	20.28	44.77	24.49

Table 8.1-6: ERP measurement results for band14

Frequency, MHz	Measured level, dBμV/m @ 3m	Measured ERP, dBm	EIRP limit, dBm	Margin, dB
793	122.45	25.07	34.77	9.07

Table 8.1-7: ERP measurement results for band71

Frequency, MHz	Measured level, dBμV/m @ 3m	Measured EIRP, dBm	EIRP limit, dBm	Margin, dB
680.5	121.54	24.16	44.77	20.61

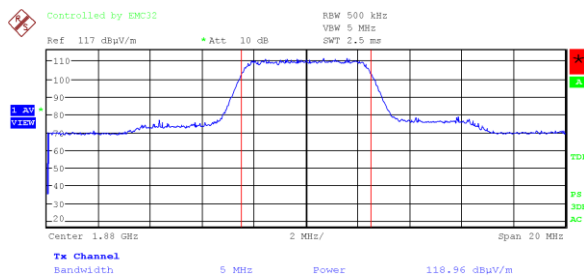


Figure 8.1-1: EIRP test data band 2

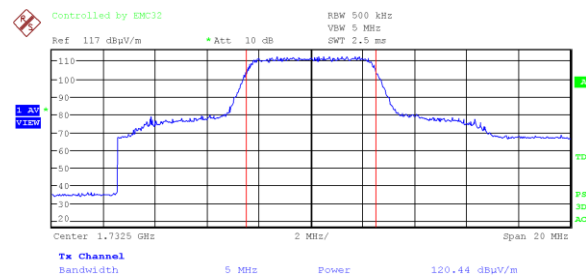


Figure 8.1-2: EIRP test data band 4

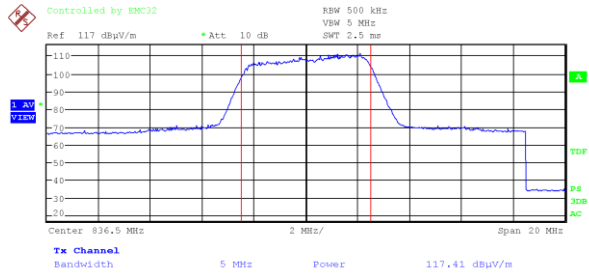


Figure 8.1-3: ERP test data band 5

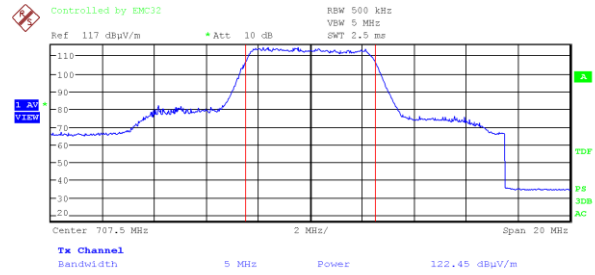


Figure 8.1-4: ERP test data band 12

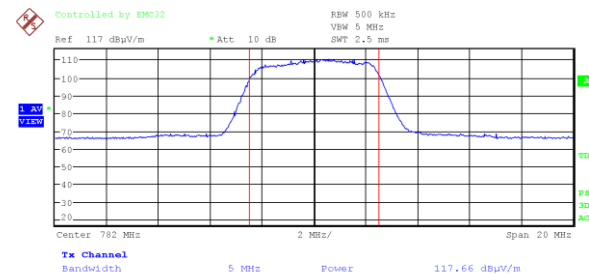


Figure 8.1-5: ERP test data band 13

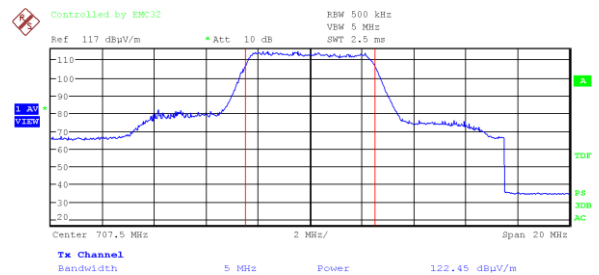


Figure 8.1-6: ERP test data band 14

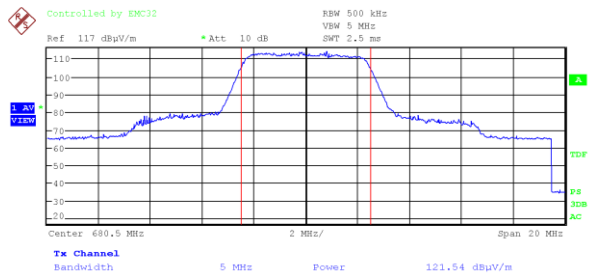


Figure 8.1-7: ERP test data band 71

8.2 Field Strength of spurious radiation

8.2.1 Definitions and limits

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log_{10}(P)$ dB or -13 dBm.

8.2.2 Test summary

Verdict	Pass		
Test date	September 5, 2023	Temperature	22 °C
Test engineer	Chenhao Ma. Wireless test technician	Air pressure	1004 mbar
Test location	3m semi anechoic chamber	Relative humidity	55.2 %

8.2.3 Observations settings and special notes

The Spectrum was searched from 1 GHz to the 10th Harmonic. Measurements below 1 GHz were not performed as the purpose of the testing is to verify harmonic emissions which are all at frequencies above 1 GHz.

All measurements were performed using a Peak and Average Detector with 1 MHz RBW above 1 GHz at 3 meters. The limit of -13 dBm converts to a field strength limit of 82.23 dB μ V/m at 3 meters. Plots below illustrate the limits of FCC Part 15.209 which are well below the 82.23 dB μ V/m required limit. All measurements are significantly below this 82.23 dB μ V/m limit.

Notch and high pass filters were used as required to avoid the transmitter fundamental emission overloading the measurement equipment.

Markers on the plots indicate the intentional downlink signal from the communications test set and the intentional uplink signal from the EUT and are excluded from evaluation against the limits.

8.2.4 Test Data

Full Spectrum

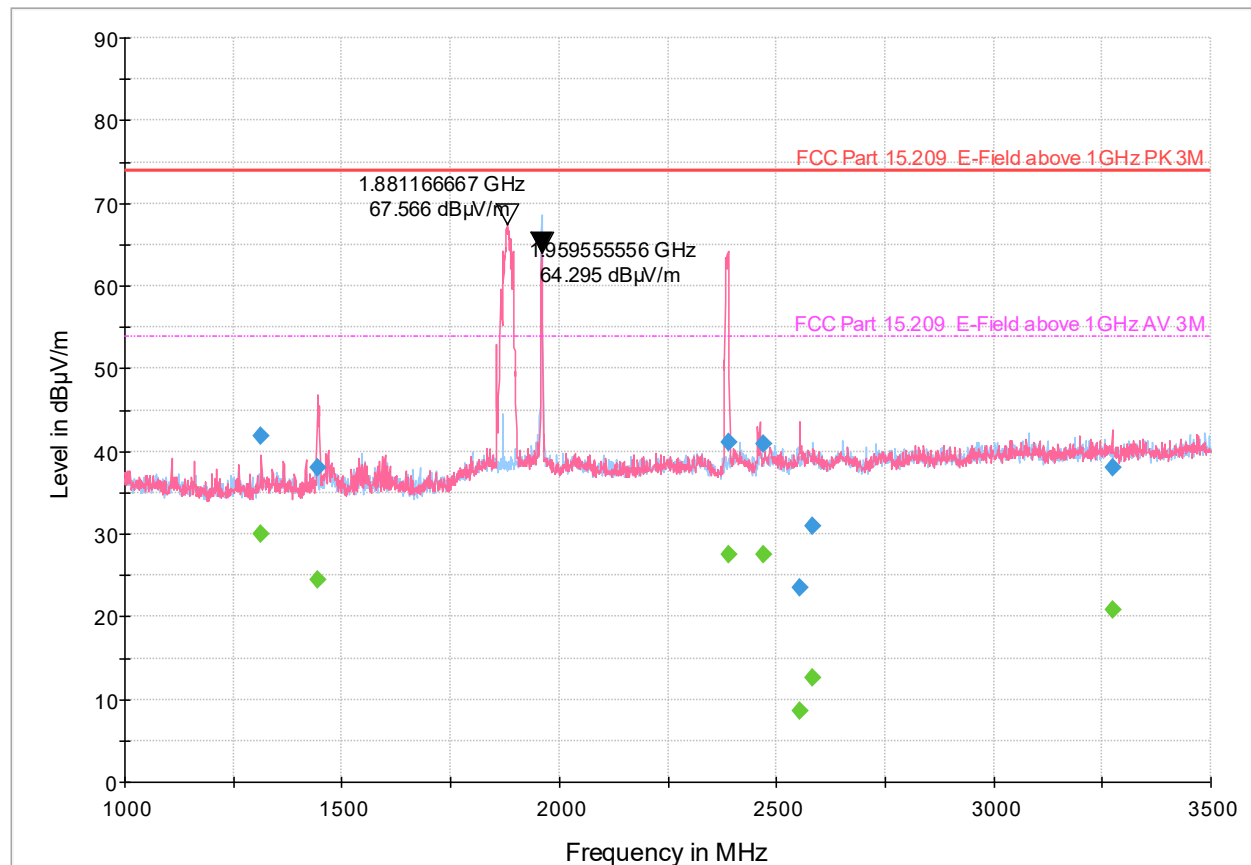


Figure 8.2-1 Spurious emission 1-3.5GHz LTE band 2

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1314.100000	41.92	---	73.90	31.98	5000.0	1000.000	104.0	V	33.0	-10.4
1314.100000	---	29.97	53.90	23.93	5000.0	1000.000	104.0	V	33.0	-10.4
1444.833333	---	24.47	53.90	29.43	5000.0	1000.000	200.0	V	148.0	-10.0
1444.833333	38.01	---	73.90	35.89	5000.0	1000.000	200.0	V	148.0	-10.0
2391.788889	---	27.45	53.90	26.45	5000.0	1000.000	203.0	V	232.0	-4.3
2391.788889	41.02	---	73.90	32.88	5000.0	1000.000	203.0	V	232.0	-4.3
2469.200000	---	27.48	53.90	26.42	5000.0	1000.000	275.0	V	168.0	-4.0
2469.200000	40.96	---	73.90	32.94	5000.0	1000.000	275.0	V	168.0	-4.0
2552.555556	---	8.60	53.90	45.30	5000.0	1000.000	247.0	V	0.0	-3.7
2552.555556	23.51	---	73.90	50.39	5000.0	1000.000	247.0	V	0.0	-3.7
2581.577778	31.01	---	73.90	42.89	5000.0	1000.000	151.0	H	312.0	-3.8
2581.577778	---	12.58	53.90	41.32	5000.0	1000.000	151.0	H	312.0	-3.8
3275.677778	---	20.82	53.90	33.08	5000.0	1000.000	136.0	V	334.0	-1.7
3275.677778	38.12	---	73.90	35.79	5000.0	1000.000	136.0	V	334.0	-1.7

Table 8.2-1 Spurious emission data 1-3.5GHz LTE band 2

Full Spectrum

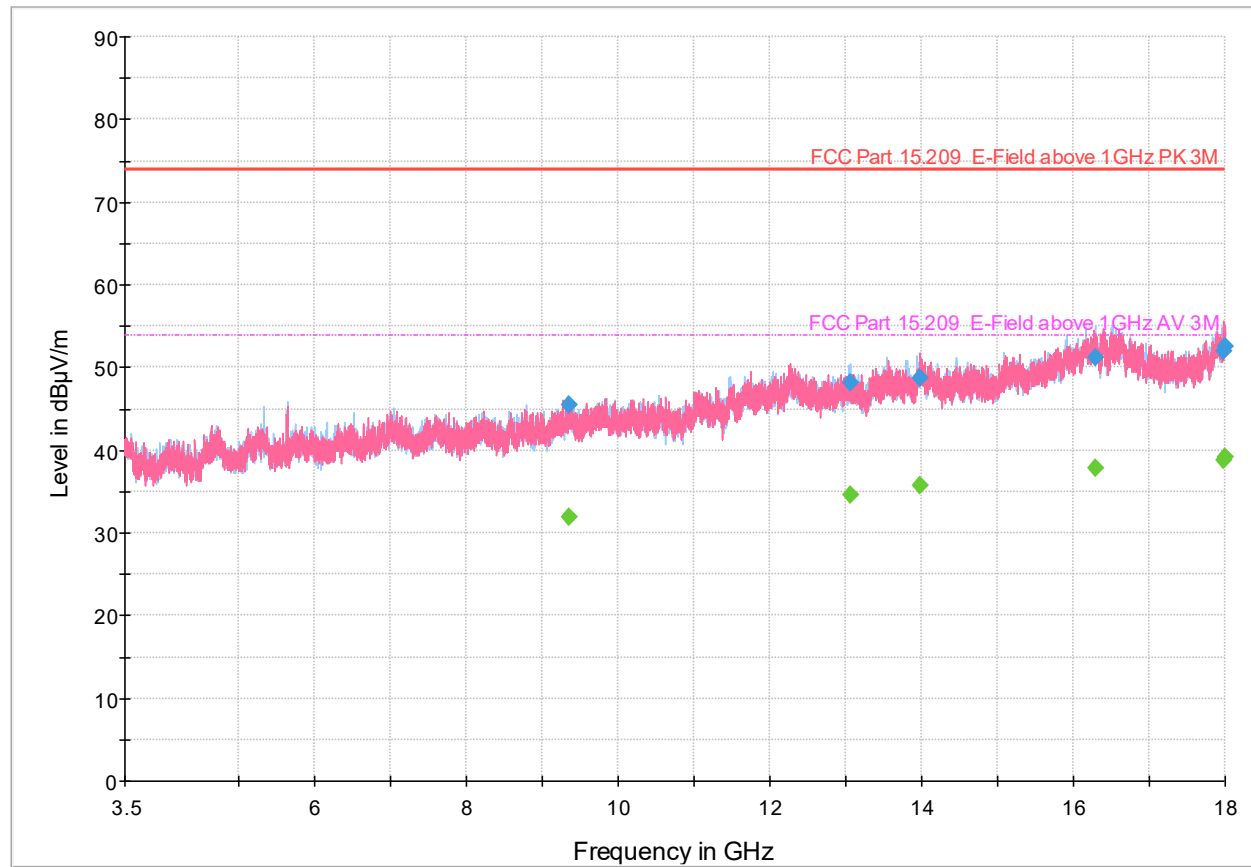


Figure 8.2-2 Spurious emission 3.5-18GHz LTE band 2

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9348.422222	45.46	---	73.90	28.44	5000.0	1000.000	194.0	V	235.0	9.1
9348.422222	---	31.82	53.90	22.08	5000.0	1000.000	194.0	V	235.0	9.1
13070.622222	---	34.50	53.90	19.40	5000.0	1000.000	128.0	H	137.0	16.1
13070.622222	48.17	---	73.90	25.73	5000.0	1000.000	128.0	H	137.0	16.1
13982.944444	---	35.65	53.90	18.25	5000.0	1000.000	270.0	V	103.0	17.5
13982.944444	48.79	---	73.90	25.11	5000.0	1000.000	270.0	V	103.0	17.5
16285.255556	51.29	---	73.90	22.61	5000.0	1000.000	388.0	H	214.0	22.7
16285.255556	---	37.83	53.90	16.07	5000.0	1000.000	388.0	H	214.0	22.7
17984.777778	---	38.80	53.90	15.10	5000.0	1000.000	219.0	V	10.0	24.3
17984.777778	51.93	---	73.90	21.97	5000.0	1000.000	219.0	V	10.0	24.3
17991.177778	---	39.15	53.90	14.75	5000.0	1000.000	327.0	V	173.0	24.7
17991.177778	52.53	---	73.90	21.37	5000.0	1000.000	327.0	V	173.0	24.7

Table 8.2-2 Spurious emission data 3.5-18GHz LTE band 2

Full Spectrum

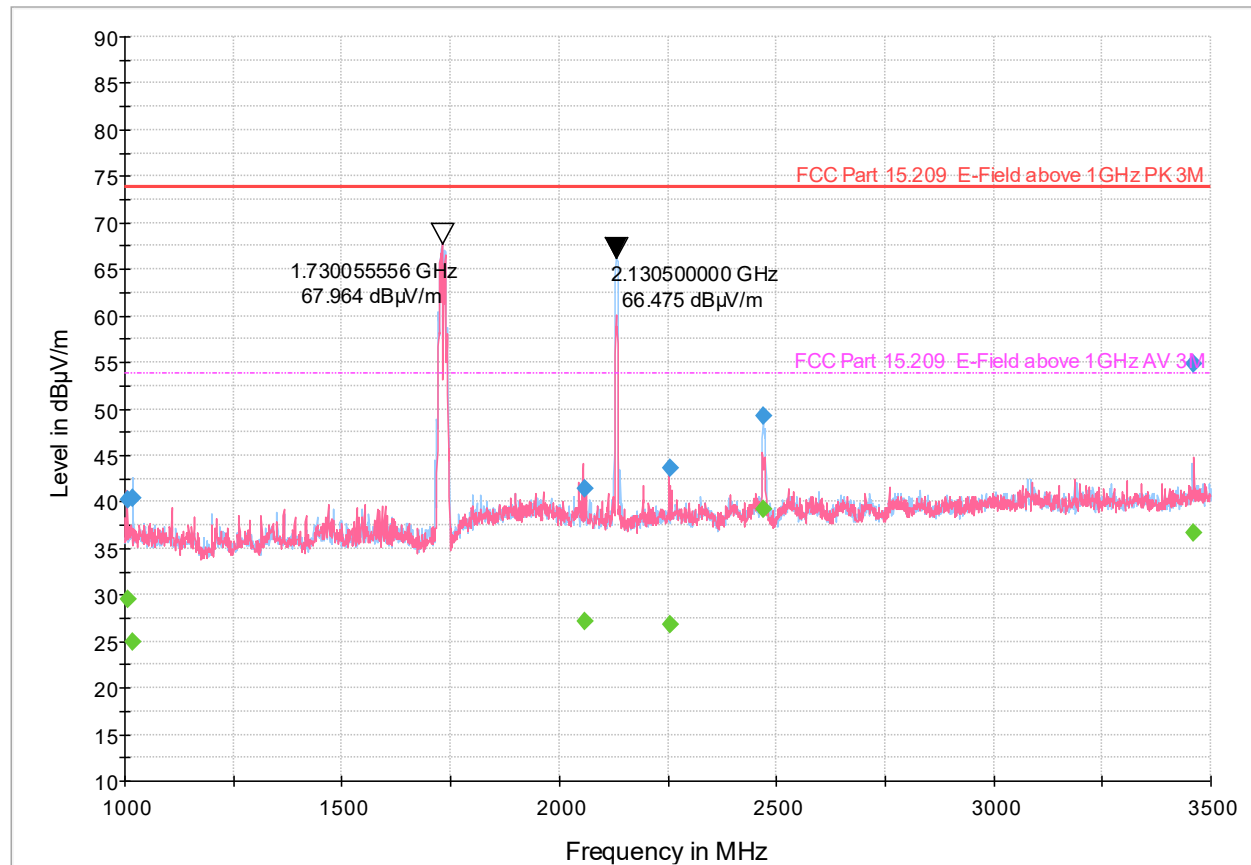


Figure 8.2-3 Spurious emission 1-3.5GHz LTE band 4

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1005.800000	40.27	---	73.90	33.63	5000.0	1000.000	192.0	V	323.0	-10.5
1005.800000	---	29.59	53.90	24.31	5000.0	1000.000	192.0	V	323.0	-10.5
1017.544444	---	24.96	53.90	28.94	5000.0	1000.000	269.0	H	0.0	-10.7
1017.544444	40.34	---	73.90	33.56	5000.0	1000.000	269.0	H	0.0	-10.7
2060.000000	41.41	---	73.90	32.49	5000.0	1000.000	137.0	V	20.0	-5.9
2060.000000	---	27.08	53.90	26.82	5000.0	1000.000	137.0	V	20.0	-5.9
2254.988889	43.60	---	73.90	30.30	5000.0	1000.000	100.0	V	202.0	-5.3
2254.988889	---	26.88	53.90	27.02	5000.0	1000.000	100.0	V	202.0	-5.3
2469.955556	49.31	---	73.90	24.59	5000.0	1000.000	269.0	H	137.0	-4.0
2469.955556	---	39.17	53.90	14.73	5000.0	1000.000	269.0	H	137.0	-4.0
3460.822222	---	36.64	53.90	17.26	5000.0	1000.000	203.0	V	146.0	-1.0
3460.822222	54.83	---	73.90	19.08	5000.0	1000.000	203.0	V	146.0	-1.0

Table 8.2-3 Spurious emission data 1-3.5GHz LTE band4

Full Spectrum

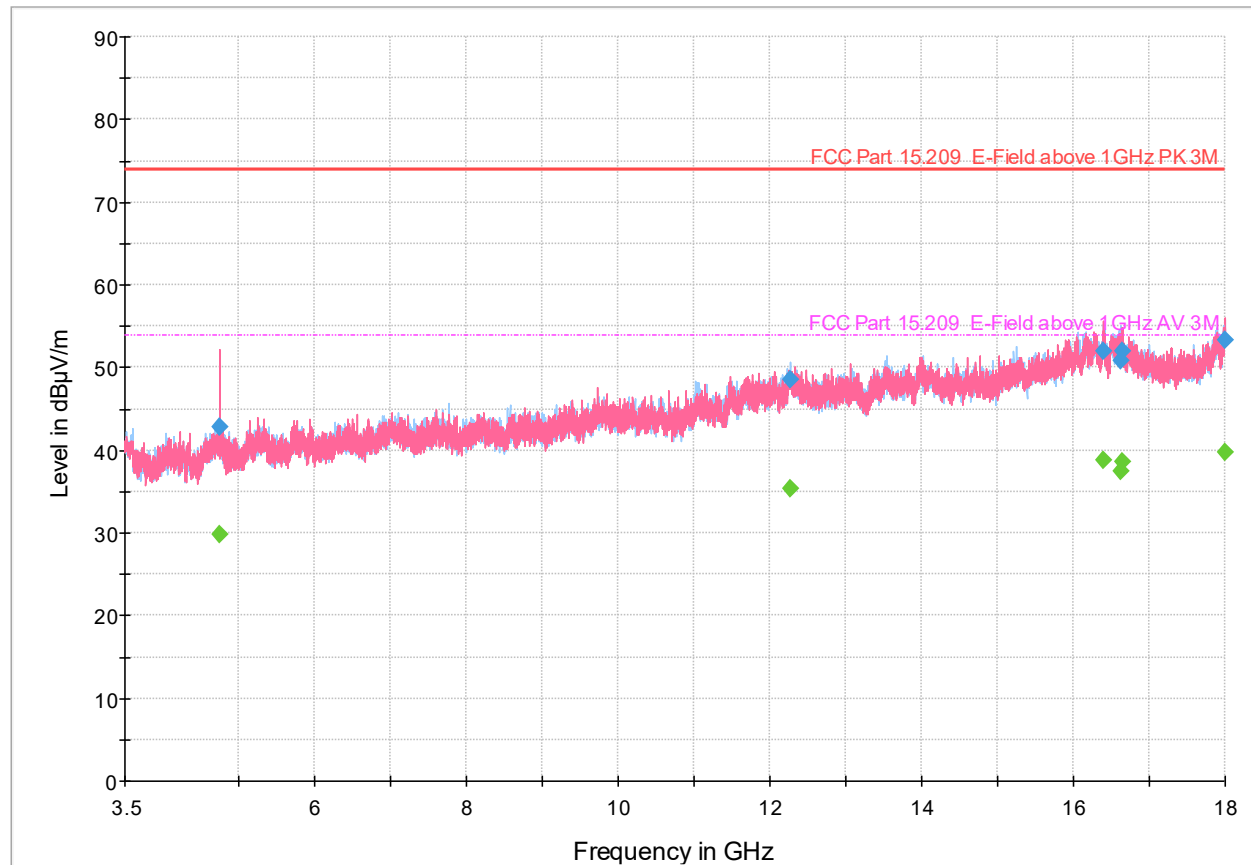


Figure 8.2-4 Spurious emission-3.5-18GHz LTE band 4

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4756.055556	42.82	---	73.90	31.08	5000.0	1000.000	232.0	V	36.0	1.9
4756.055556	---	29.90	53.90	24.00	5000.0	1000.000	232.0	V	36.0	1.9
12264.244444	---	35.41	53.90	18.49	5000.0	1000.000	353.0	H	56.0	15.5
12264.244444	48.48	---	73.90	25.42	5000.0	1000.000	353.0	H	56.0	15.5
16397.133333	---	38.85	53.90	15.05	5000.0	1000.000	307.0	V	67.0	22.8
16397.133333	52.01	---	73.90	21.89	5000.0	1000.000	307.0	V	67.0	22.8
16628.522222	50.78	---	73.90	23.12	5000.0	1000.000	313.0	H	185.0	22.9
16628.522222	---	37.47	53.90	16.43	5000.0	1000.000	313.0	H	185.0	22.9
16647.333333	---	38.68	53.90	15.22	5000.0	1000.000	301.0	V	218.0	23.4
16647.333333	51.98	---	73.90	21.92	5000.0	1000.000	301.0	V	218.0	23.4
17994.766667	---	39.76	53.90	14.14	5000.0	1000.000	339.0	V	0.0	25.0
17994.766667	53.27	---	73.90	20.63	5000.0	1000.000	339.0	V	0.0	25.0

Table 8.2-4 Spurious emission data 3.5-18GHz LTE band4

Full Spectrum

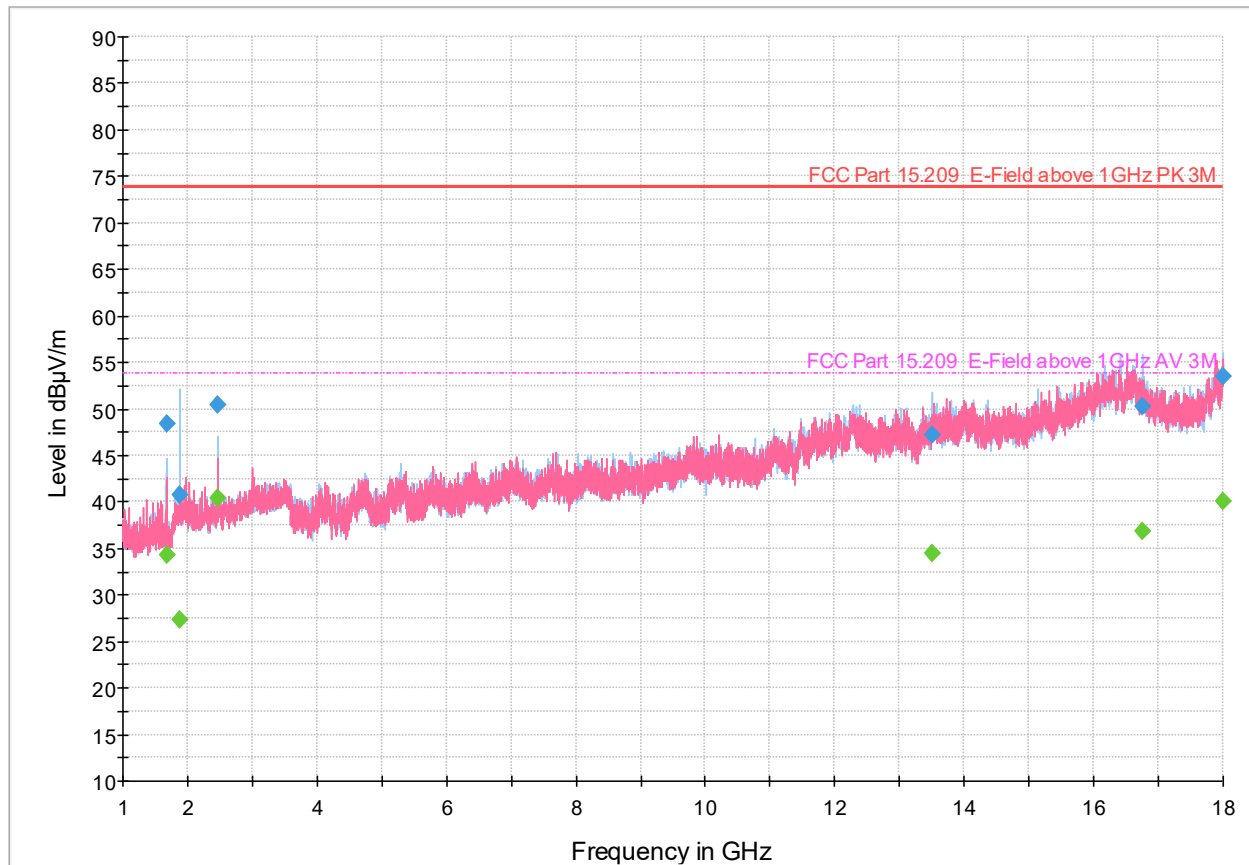


Figure 8.2-5 Spurious emission-1-18GHz LTE band 5

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1676.733333	---	34.36	53.90	19.54	5000.0	1000.000	121.0	H	215.0	-9.8
1676.733333	48.33	---	73.90	25.57	5000.0	1000.000	121.0	H	215.0	-9.8
1874.777778	40.69	---	73.90	33.21	5000.0	1000.000	204.0	H	337.0	-6.1
1874.777778	---	27.34	53.90	26.56	5000.0	1000.000	204.0	H	337.0	-6.1
2469.555556	---	40.38	53.90	13.52	5000.0	1000.000	275.0	H	142.0	-4.0
2469.555556	50.42	---	73.90	23.48	5000.0	1000.000	275.0	H	142.0	-4.0
13493.577778	---	34.42	53.90	19.48	5000.0	1000.000	225.0	H	29.0	17.0
13493.577778	47.23	---	73.90	26.67	5000.0	1000.000	225.0	H	29.0	17.0
16748.822222	50.32	---	73.90	23.58	5000.0	1000.000	135.0	H	314.0	22.6
16748.822222	---	36.91	53.90	16.99	5000.0	1000.000	135.0	H	314.0	22.6
17997.455556	---	40.00	53.90	13.90	5000.0	1000.000	227.0	H	57.0	25.1
17997.455556	53.45	---	73.90	20.45	5000.0	1000.000	227.0	H	57.0	25.1

Table 8.2-5 Spurious emission data 3.5-18GHz LTE band 5

Full Spectrum

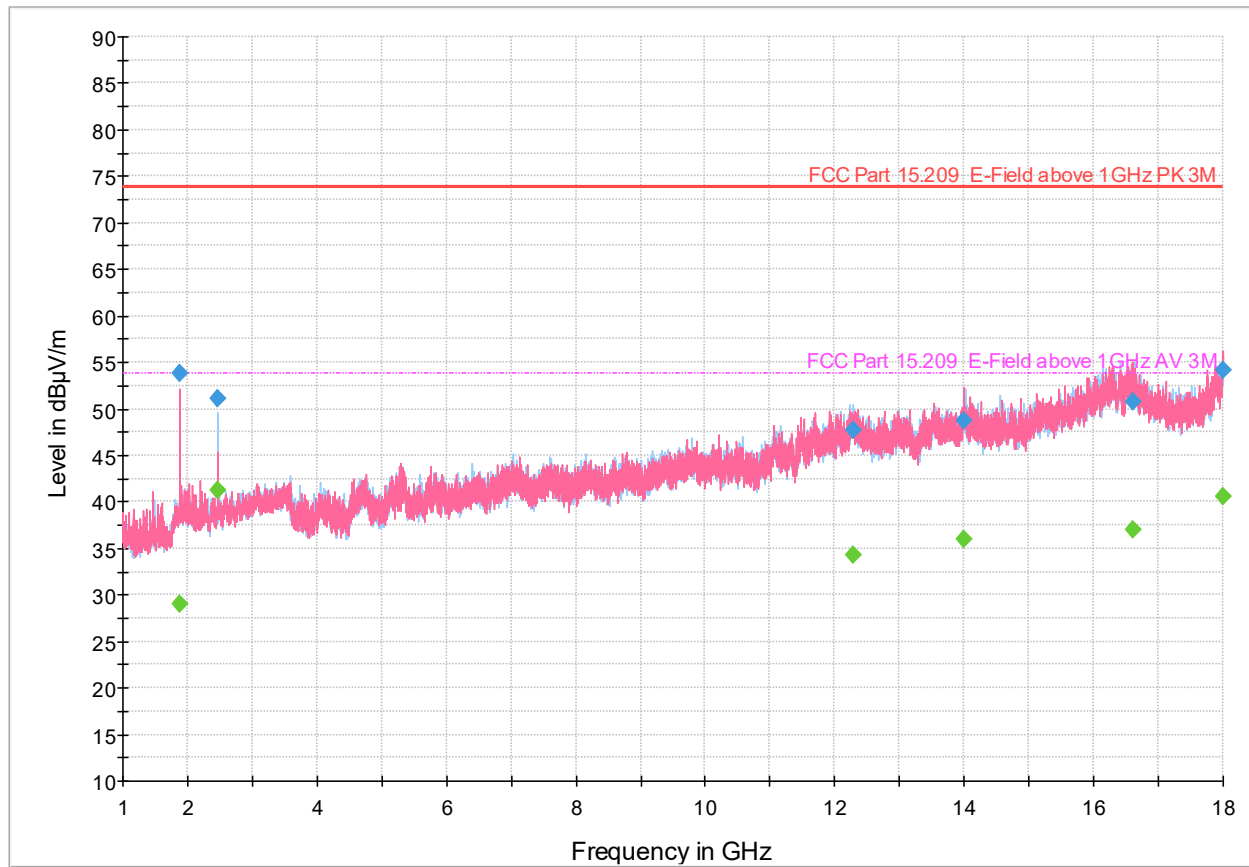


Figure 8.2-6 Spurious emission-1-18GHz LTE band 12

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1878.477778	53.79	---	73.90	20.11	5000.0	1000.000	314.0	V	71.0	-6.1
1878.477778	---	29.06	53.90	24.84	5000.0	1000.000	314.0	V	71.0	-6.1
2470.100000	51.13	---	73.90	22.77	5000.0	1000.000	400.0	H	138.0	-4.0
2470.100000	---	41.23	53.90	12.67	5000.0	1000.000	400.0	H	138.0	-4.0
12280.988889	47.64	---	73.90	26.26	5000.0	1000.000	115.0	H	55.0	15.3
12280.988889	---	34.34	53.90	19.56	5000.0	1000.000	115.0	H	55.0	15.3
13998.311111	---	35.98	53.90	17.92	5000.0	1000.000	144.0	V	103.0	17.5
13998.311111	48.81	---	73.90	25.09	5000.0	1000.000	144.0	V	103.0	17.5
16614.066667	50.76	---	73.90	23.14	5000.0	1000.000	232.0	V	294.0	22.5
16614.066667	---	37.05	53.90	16.85	5000.0	1000.000	232.0	V	294.0	22.5
17998.911111	---	40.59	53.90	13.31	5000.0	1000.000	371.0	V	282.0	25.2
17998.911111	54.21	---	73.90	19.69	5000.0	1000.000	371.0	V	282.0	25.2

Table 8.2-6 Spurious emission-data 1-18GHz LTE band 12

Full Spectrum

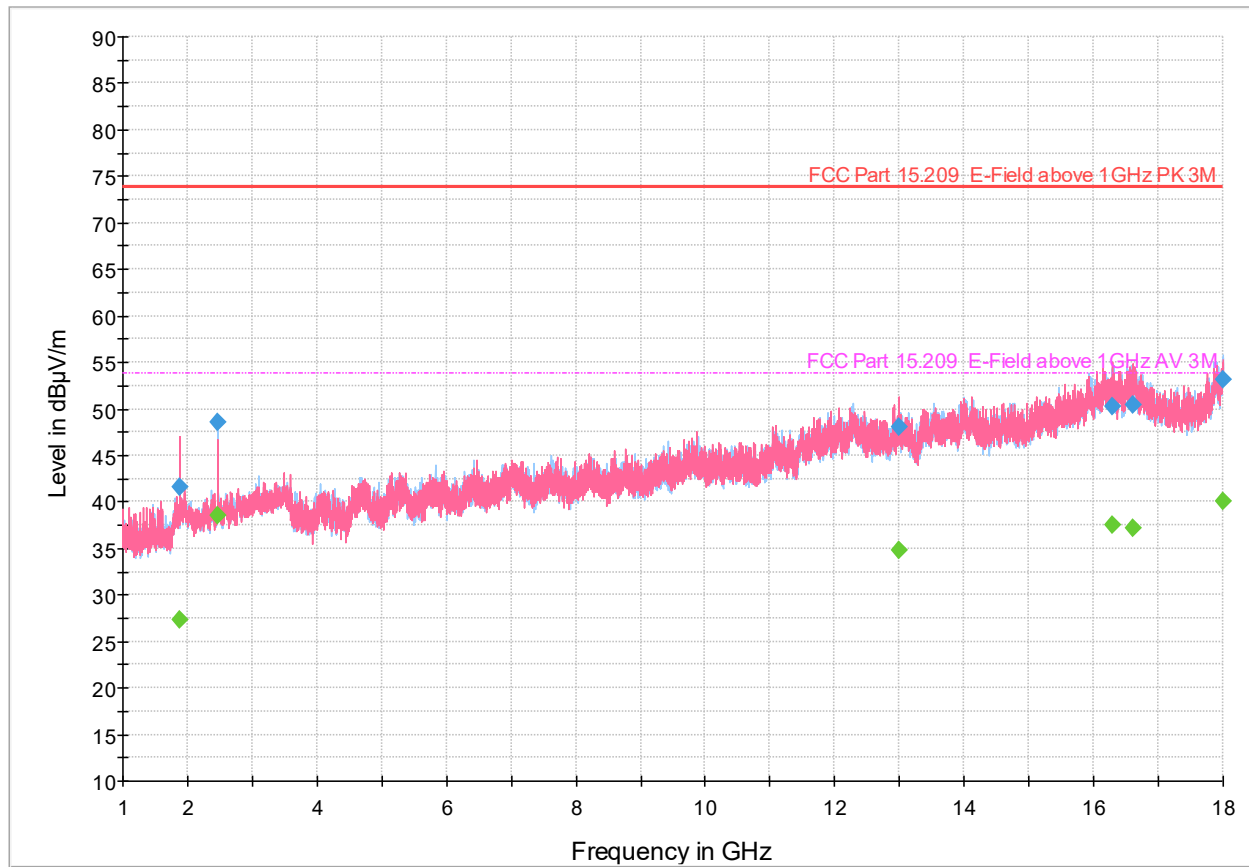


Figure 8.2-7 Spurious emission 1-18GHz LTE band 13

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1873.977778	41.61	---	73.90	32.29	5000.0	1000.000	176.0	V	0.0	-6.1
1873.977778	---	27.30	53.90	26.60	5000.0	1000.000	176.0	V	0.0	-6.1
2469.955556	---	38.52	53.90	15.38	5000.0	1000.000	387.0	H	129.0	-4.0
2469.955556	48.63	---	73.90	25.27	5000.0	1000.000	387.0	H	129.0	-4.0
12989.911111	48.06	---	73.90	25.84	5000.0	1000.000	224.0	V	75.0	15.9
12989.911111	---	34.88	53.90	19.02	5000.0	1000.000	224.0	V	75.0	15.9
16291.166667	---	37.43	53.90	16.47	5000.0	1000.000	277.0	V	341.0	22.7
16291.166667	50.25	---	73.90	23.65	5000.0	1000.000	277.0	V	341.0	22.7
16603.744444	50.51	---	73.90	23.39	5000.0	1000.000	104.0	V	239.0	22.2
16603.744444	---	37.20	53.90	16.70	5000.0	1000.000	104.0	V	239.0	22.2
17998.600000	---	40.10	53.90	13.80	5000.0	1000.000	288.0	H	20.0	25.2
17998.600000	53.14	---	73.90	20.76	5000.0	1000.000	288.0	H	20.0	25.2

Table 8.2-7 Spurious emission-data 1-18GHz LTE band13

Full Spectrum

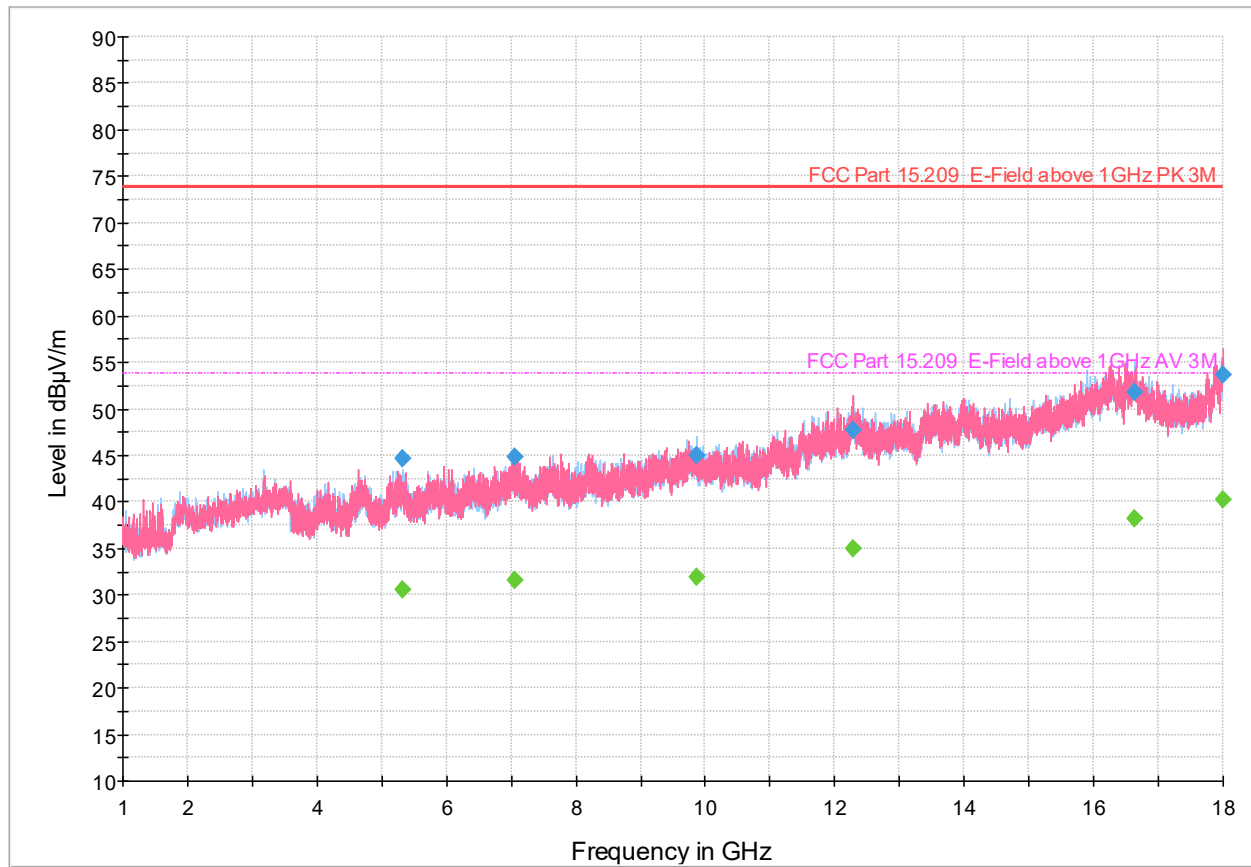


Figure 8.2-8 Spurious emission-1-18GHz LTE band 14

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5324.466667	---	30.62	53.90	23.28	5000.0	1000.000	235.0	H	356.0	3.1
5324.466667	44.61	---	73.90	29.29	5000.0	1000.000	235.0	H	356.0	3.1
7066.711111	44.82	---	73.90	29.08	5000.0	1000.000	274.0	H	33.0	4.8
7066.711111	---	31.55	53.90	22.35	5000.0	1000.000	274.0	H	33.0	4.8
9866.766667	44.96	---	73.90	28.94	5000.0	1000.000	194.0	H	0.0	10.6
9866.766667	---	31.90	53.90	22.00	5000.0	1000.000	194.0	H	0.0	10.6
12273.355556	47.76	---	73.90	26.14	5000.0	1000.000	310.0	V	186.0	15.4
12273.355556	---	34.89	53.90	19.01	5000.0	1000.000	310.0	V	186.0	15.4
16625.911111	51.74	---	73.90	22.16	5000.0	1000.000	260.0	H	33.0	22.9
16625.911111	---	38.26	53.90	15.64	5000.0	1000.000	260.0	H	33.0	22.9
17998.800000	---	40.19	53.90	13.71	5000.0	1000.000	258.0	V	350.0	25.2
17998.800000	53.57	---	73.90	20.33	5000.0	1000.000	258.0	V	350.0	25.2

Table 8.2-8 Spurious emission-data 1-18GHz LTE band 14

Full Spectrum

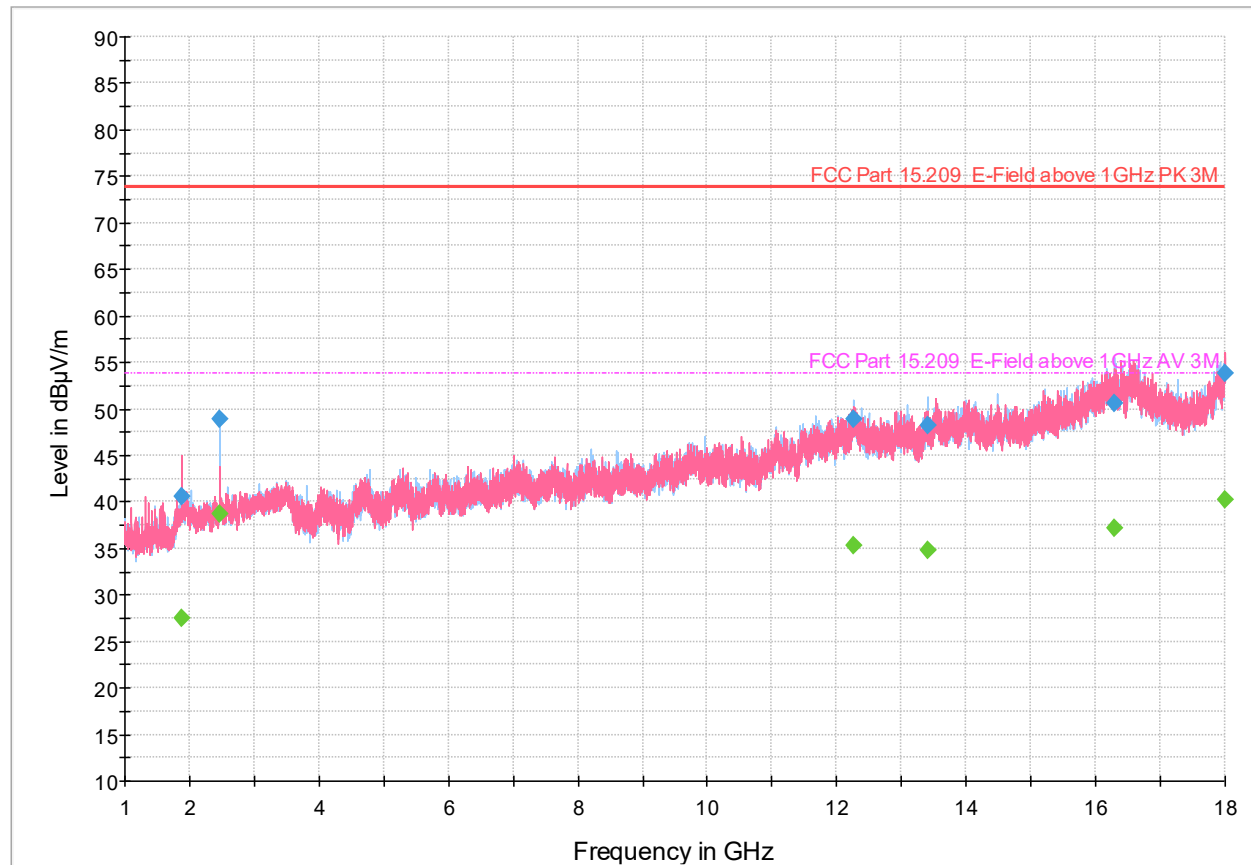


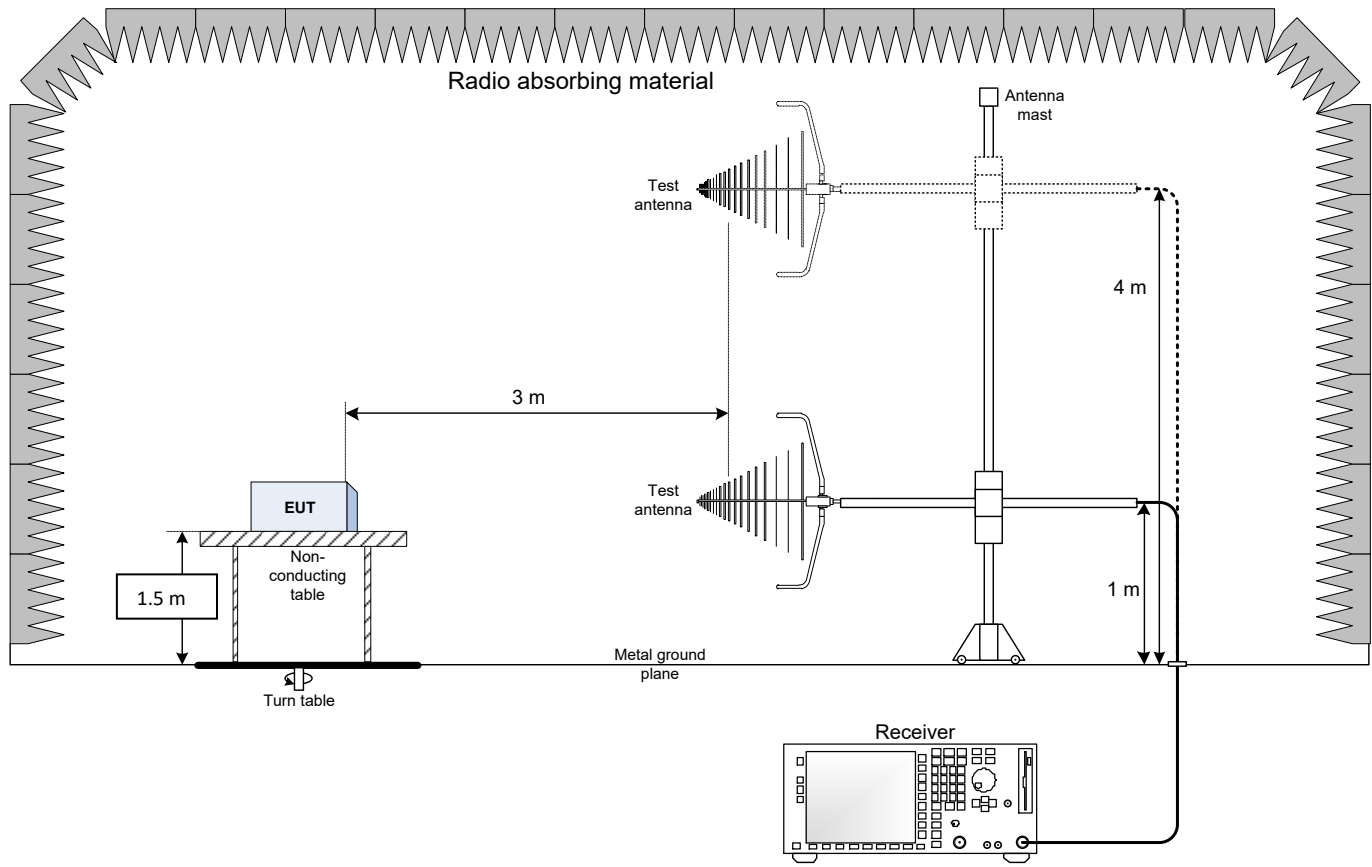
Figure 8.2-9 Spurious emission 1-18GHz LTE band 71

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1875.322222	40.62	---	73.90	33.28	5000.0	1000.000	135.0	V	32.0	-6.1
1875.322222	---	27.47	53.90	26.43	5000.0	1000.000	135.0	V	32.0	-6.1
2471.555556	48.86	---	73.90	25.04	5000.0	1000.000	399.0	H	138.0	-4.0
2471.555556	---	38.74	53.90	15.16	5000.0	1000.000	399.0	H	138.0	-4.0
12257.522222	---	35.33	53.90	18.57	5000.0	1000.000	124.0	H	78.0	15.6
12257.522222	48.92	---	73.90	24.98	5000.0	1000.000	124.0	H	78.0	15.6
13398.122222	48.21	---	73.90	25.69	5000.0	1000.000	311.0	H	114.0	16.5
13398.122222	---	34.77	53.90	19.13	5000.0	1000.000	311.0	H	114.0	16.5
16289.144444	50.59	---	73.90	23.31	5000.0	1000.000	277.0	H	199.0	22.7
16289.144444	---	37.23	53.90	16.67	5000.0	1000.000	277.0	H	199.0	22.7
17999.022222	---	40.29	53.90	13.61	5000.0	1000.000	380.0	V	180.0	25.2
17999.022222	53.82	---	73.90	20.08	5000.0	1000.000	380.0	V	180.0	25.2

Table 8.2-9 Spurious emission-data 1-18GHz LTE band 71

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up



End of report