
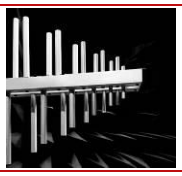
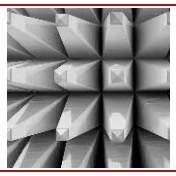

CETECOM™

CETECOM ICT Services

consulting - testing - certification

TEST REPORT

Test report no.: 1-6160/13-01-21-A

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-00

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-00

Applicant

Pegatron Corporation
5F, No. 76, Ligong Street Beitou District
11261 Taipei City / TAIWAN
Fax: +88 68 99 48 82 38
Contact: Brian Chen
e-mail: brian3_chen@pegatroncorp.com
Phone: +88 64 37 02 22 33

Manufacturer

Pegatron Corporation
5F, No. 76, Ligong Street Beitou District
11261 Taipei City / TAIWAN

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 8	Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	**Car Media System**
Model name:	**SDIS1**
FCC ID:	**VUISDIS1**
IC	**7582A-SDIS1**
Frequency:	ISM band 2400 to 2483.5 MHz
Technology tested:	Bluetooth® +EDR
Antenna:	Integrated antenna
Power supply:	12.0V DC by car battery
Temperature range:	-20°C to +55°C

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorised:

cn=Stefan Boes, o=CETECOM ICT Services GmbH, ou=BOE-111011, email=Stefan.Boes@cetecom.com, c=DE
2014.11.20 13:21:19 +01'00'

Stefan Bös
Professional
Radio Communications & EMC

Test performed:

cn=Tobias Wittenmeier, o=CETECOM ICT Services GmbH, ou=WIT-111222, email=tobias.wittenmeier@cetecom.com, c=DE
2014.12.11 11:33:03 +01'00'

Tobias Wittenmeier
Experienced
Radio Communications & EMC

1 Table of contents

2 General information

2.1 Notes and disclaimer

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This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2013-08-21
Date of receipt of test item:	2014-10-13
Start of test:	2014-10-15
End of test:	2014-10-29
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	-/-	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 8	01.12.2010	Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

4 Test environment

Temperature:	T_{nom}	+22 °C	during room temperature tests
	T_{max}	+55 °C	during high temperature tests
	T_{min}	-20 °C	during low temperature tests
Relative humidity content:		55 %	
Barometric pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	12.0 V	DC by car battery
	V_{max}	13.2 V	
	V_{min}	10.8 V	

5 Test item

Kind of test item	**:**	**Car Media System**
Type identification	**:**	**SDIS1**
S/N serial number	**:**	**No information available**
HW hardware status	**:**	**C101**
SW software status	**:**	**SDIS1R_0.344_dev_AU_ER_sdis1_er-userdebug**
Frequency band [MHz]	**:**	**ISM band 2400 to 2483.5 MHz**
Type of radio transmission **Use of frequency spectrum**	**:** **:**	**FHSS**
Type of modulation	**:**	**QPSK, pi/4DQPSK, 8DPSK**
Number of channels	**:**	**79**
Antenna	**:**	**Integrated antenna**
Power supply	**:**	**12.0 V DC by car battery**
Temperature range	**:**	**-20°C to +55 °C**

5.1 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup- and EUT-photos are included in test report: 1-6160/13-01-01_AnnexA
1-6160/13-01-01_AnnexB
1-6160/13-01-01_AnnexD

6 Test laboratories sub-contracted

None

7 Summary of measurement results

☒ **No deviations from the technical specifications were ascertained**

☐ There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8, Annex 8	Passed	2014-11-20	Reduced test according customer test list

Test specification clause	Test case	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Remark
§15.247(b)(4) RSS 210 / A8.4(2)	Antenna gain	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☐	☐	☒	☐	Not applicable for FHSS!
§15.247(a)(1) RSS 210 / A8.1(b)	Carrier frequency separation	Nominal	Nominal	GFSK	☐	☐	☐	☒	-/-
§15.247(a)(1) RSS 210 / A8.1(d)	Number of hopping channels	Nominal	Nominal	GFSK	☐	☐	☐	☒	-/-
§15.247(a)(1) (iii) RSS 210 / A8.3(1)	Time of occupancy (dwell time)	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☐	☐	☐	☒	-/-
§15.247(a)(1) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 20 dB bandwidth	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☒ ☒ ☒	-/-
§15.247(b)(1) RSS-210 / A8.4(2)	Maximum output power	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☒ ☒ ☒	-/-
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☒ ☒ ☒	-/-
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.109 RSS-Gen	RX spurious emissions radiated	Nominal	Nominal	-/-	☒	☐	☐	☐	complies
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.107(a) §15.207	Conducted emissions < 30 MHz	Nominal	Nominal	GFSK	☐	☐	☐	☒	-/-

Note: NA = Not Applicable; NP = Not Performed

8 Additional comments

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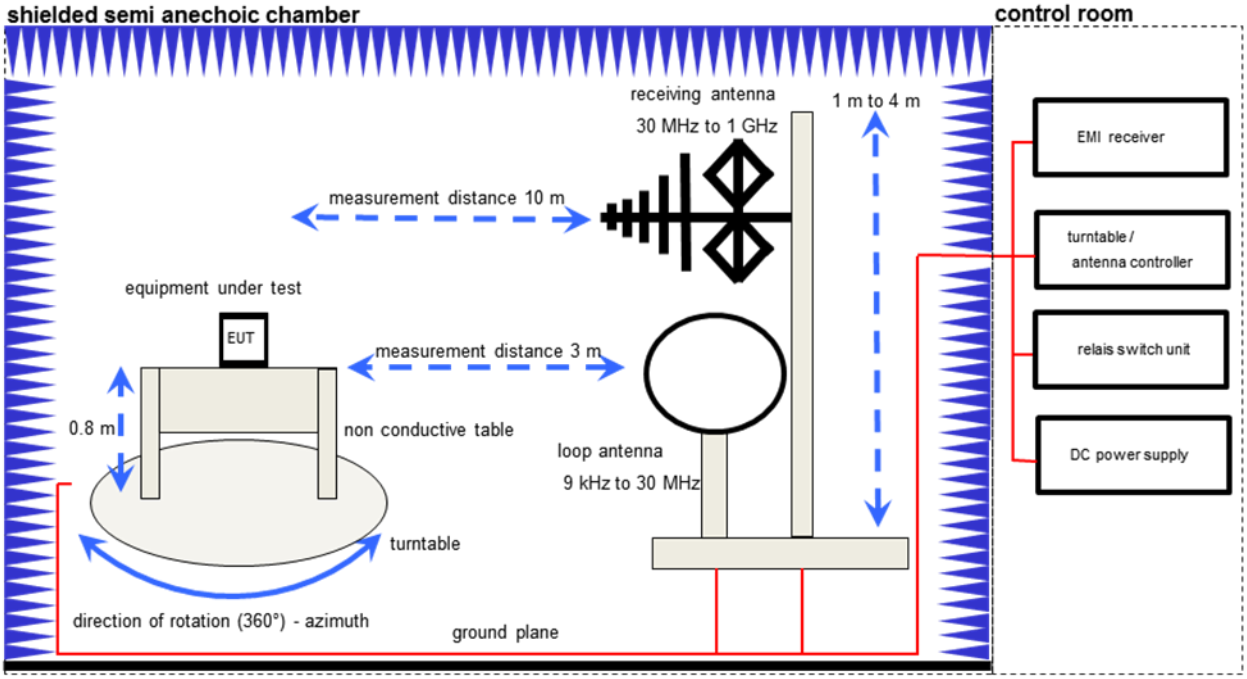
Reference documents:	Main Test Report No. RF140815C17-2
Special test descriptions:	Delta test only acc. customers demand
Configuration descriptions:	TX tests: were performed with x-DH5 packets and static PRBS pattern payload. RX/Standby tests: BT test mode enabled, scan enabled, TX Idle
Test mode:	☒ Bluetooth Test mode loop back enabled (EUT is controlled over CBT/CMU)
	☐ Special software is used. EUT is transmitting pseudo random data by itself

9 Description of test setup

9.1 Radiated measurements

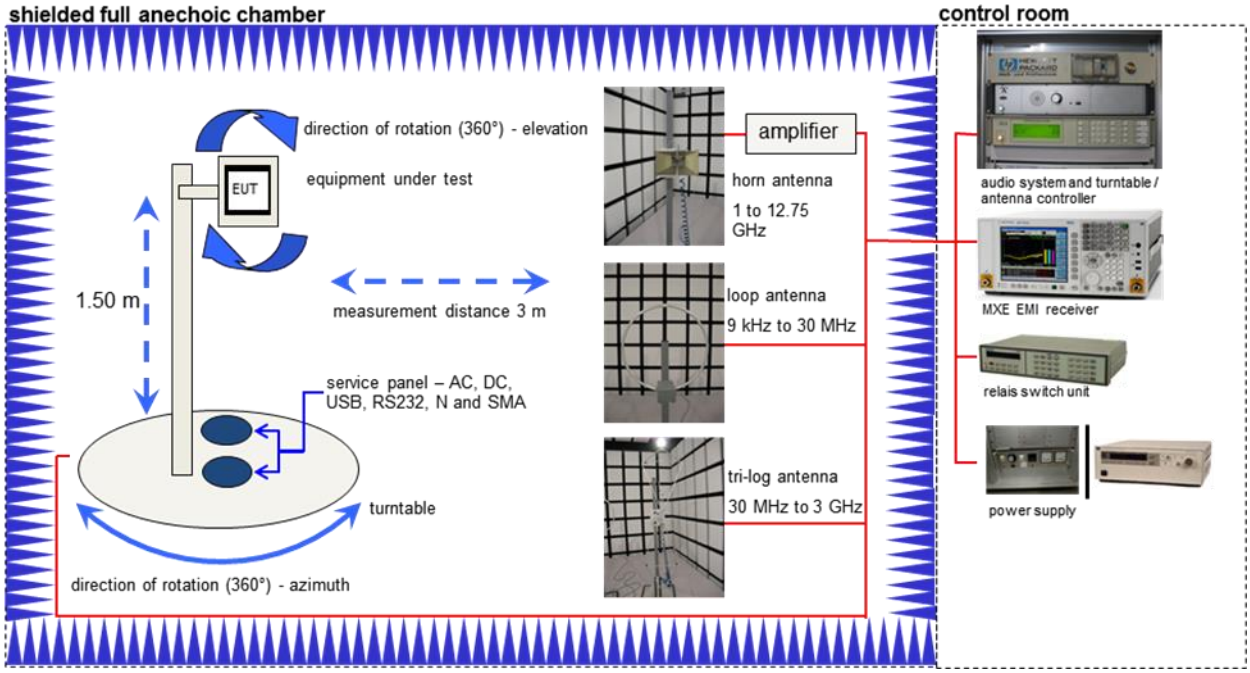
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Software	EMC32 V.| 9.12.05	R&S	-/-	-/-
Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368
DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580
EMI Test Receiver	ESCI 3	R&S	100083	300003312
Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379
Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745
Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746
Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787
Test Receiver	ESH2	R&S	871921/095	300002505
EMI Test Receiver 9 kHz - 3 GHz incl. Preselector	ESPI3	R&S	101713	300004059

9.2 Radiated measurements chamber C



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854
Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351
Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789
Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032
Active Loop Antenna	6502	EMCO	8905-2342	300000256
Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997
Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143

9.3 Radiated measurements 12.75 GHz to 26 GHz

Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787
Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442
Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268
Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

10 Measurement results

10.1 Antenna gain

Measurement:

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal Bluetooth® devices, the GFSK modulation is used.

Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	3 MHz
Resolution bandwidth:	3 MHz
Span:	5 MHz
Trace-Mode:	Max hold

Limits:

FCC	IC
Antenna Gain	
6 dBi	

Results:

T_{nom}	V_{nom}	lowest channel 2402 MHz	middle channel 2441 MHz	highest channel 2480 MHz
Conducted peak power [dBm] Measured with GFSK modulation		-1.5	-2.0	-2.8
Radiated peak power [dBm] Measured with GFSK modulation		0.5	0.6	-0.7
Gain [dBi] Calculated		2.0	2.6	2.1

Verdict: **Passed**

10.2 Maximum output power

Description:

Measurement of the maximum output power conducted and radiated according the **FCC requirements**. The measurements are performed using the data rate producing the highest conducted output power. The duty cycle is measured before and the resulting correction factor is added to every measurement as offset value. You can see the offset values in the plots.

Measurement:

Measurement parameter	
According to DTS clause: 9.2.2.5	
Detector:	RMS
Sweep time:	See Plots.
Resolution bandwidth:	500 kHz
Video bandwidth:	3 MHz
Span:	40 MHz
Integration bandwidth:	99% power - bandwidth (OBW)
Trace-Mode:	Max hold (allow trace to fully stabilize)
Measurement function:	Channel power with OBW

Limits:

FCC	
Maximum Output Power	
Conducted: 1.0 W – Antenna Gain max. 6 dBi	

Results:

GFSK	Maximum Output Power [dBm]		
Frequency	2412 MHz	2441 MHz	2480 MHz
Output power conducted including DC corr.	-6.13	-6.08	-6.24
8DPSK	**Maximum Output Power [dBm]**		
Frequency	2402 MHz	2441 MHz	2480 MHz
Output power conducted including DC corr.	-3.92	-3.79	-3.65
Measurement uncertainty	± 1.5 dB (cond.)		

Maximum output power radiated: -3.65 dBm + 2.6 dBi = -1.05 dBm EIRP

Result: **Passed**

Description:

Measurement of the maximum output power conducted and radiated according the **Canadian requirements**. The measurements are performed using the data rate producing the highest conducted output power.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	10 MHz
Span:	15 MHz
Integration bandwidth:	75 % power - bandwidth (DTS BW)
Trace-Mode:	Max hold (allow trace to fully stabilize)
Measurement function:	Channel power with DTS BW

Limits:

	IC
Maximum Output Power	
Conducted: 1.0 W – Antenna Gain max. 6 dBi	

Results:

GFSK	Maximum Output Power [dBm]		
Frequency	2402 MHz	2441 MHz	2480 MHz
Peak output power conducted	-5.03	-5.24	-5.41
8DPSK	**Maximum Output Power [dBm]**		
Frequency	2402 MHz	2441 MHz	2480 MHz
Peak output power conducted	-2.38	-2.20	-2.35
Measurement uncertainty	± 1.5 dB (cond.)		

Maximum output power radiated: -2.20 dBm + 2.6 dBi = 0.4 dBm EIRP

Result: **Passed**

10.3 Band edge compliance radiated

Description:

Measurement of the radiated band edge compliance. The EUT is turned in the position that results in the maximum level at the band edge. Then a sweep over the corresponding restricted band is performed. The EUT is set to single channel mode and the transmit channel is channel 00 for the lower restricted band and channel 78 for the upper restricted band. The measurement is repeated for all modulations. Measurement distance is 3m.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	1 MHz Peak / 10 Hz AVG
Resolution bandwidth:	1 MHz
Span:	Lower Band: 2370 – 2400 MHz Upper Band: 2480 – 2500 MHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
Band edge compliance radiated	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).	
54 dBµV/m AVG 74 dBµV/m Peak	

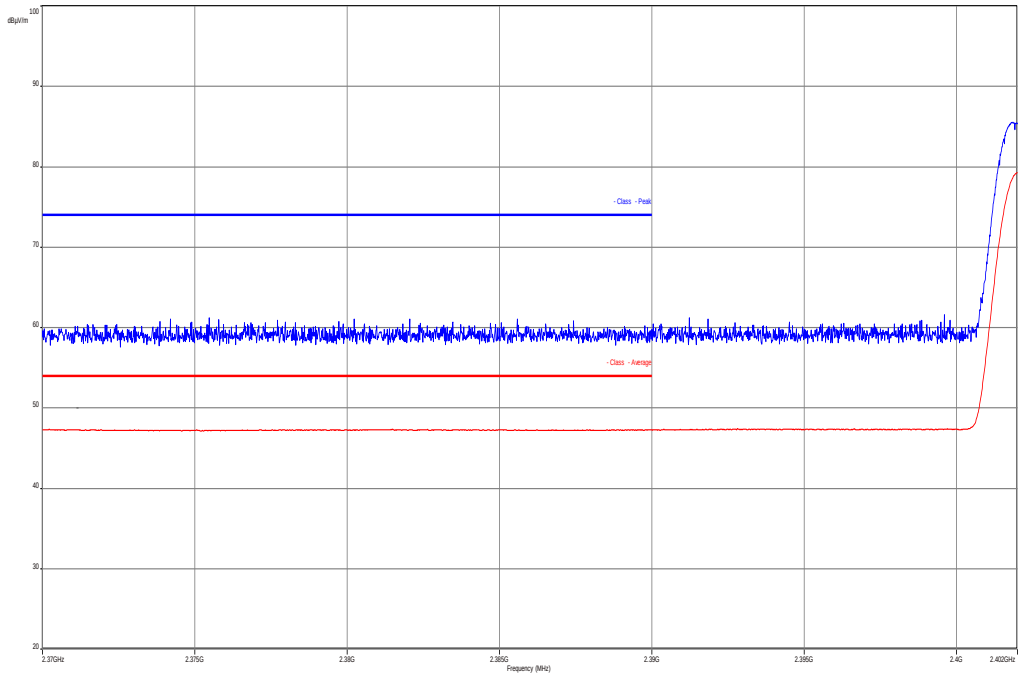
Results:

Scenario	Band edge compliance radiated [dBµV/m]		
Modulation	GFSK	Pi/4 DQPSK	8DPSK
Lower restricted band	< 54 AVG / < 74 PP	< 54 AVG / < 74 PP	< 54 AVG / < 74 PP
Upper restricted band	< 54 AVG / < 74 PP	< 54 AVG / < 74 PP	< 54 AVG / < 74 PP
Measurement uncertainty	± 3 dB		

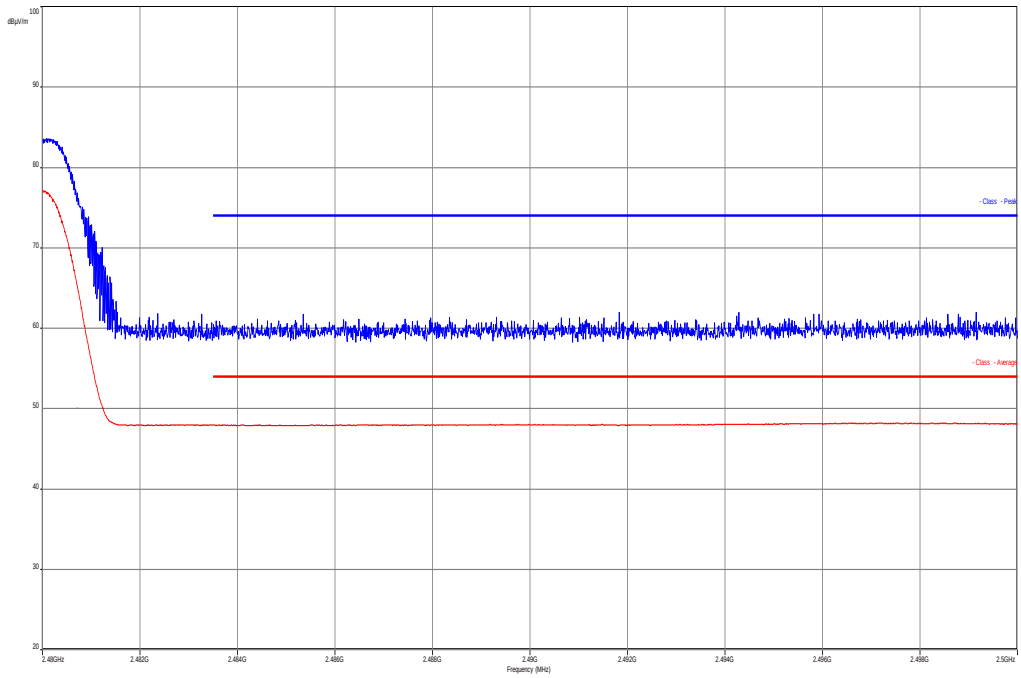
Verdict: Passed

Plots:

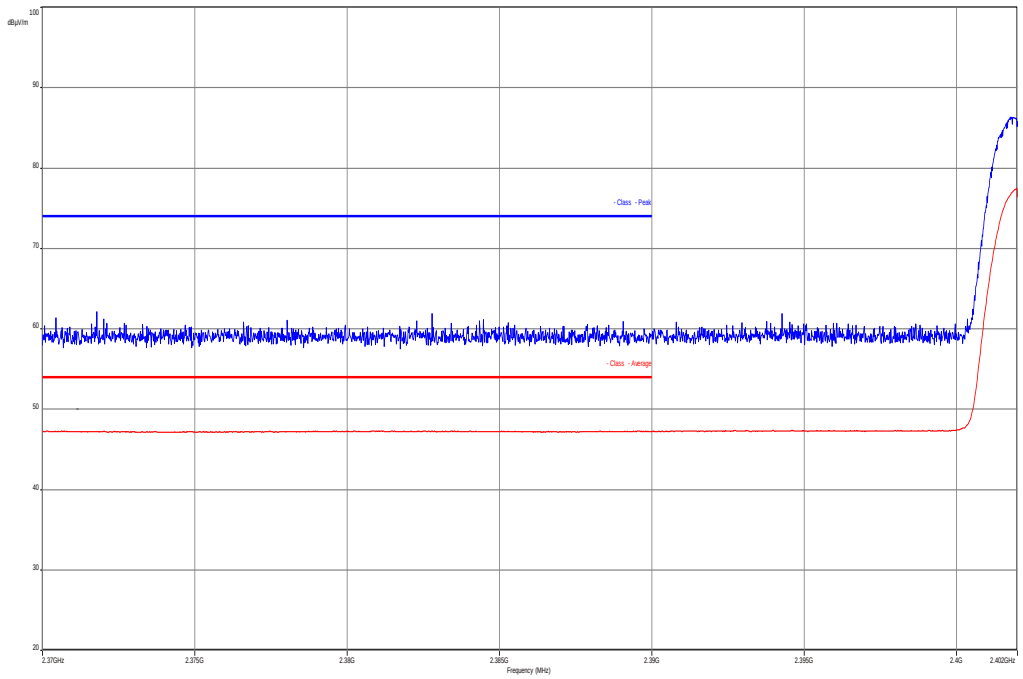
Plot 1: Lower band edge, GFSK modulation, vertical & horizontal polarization



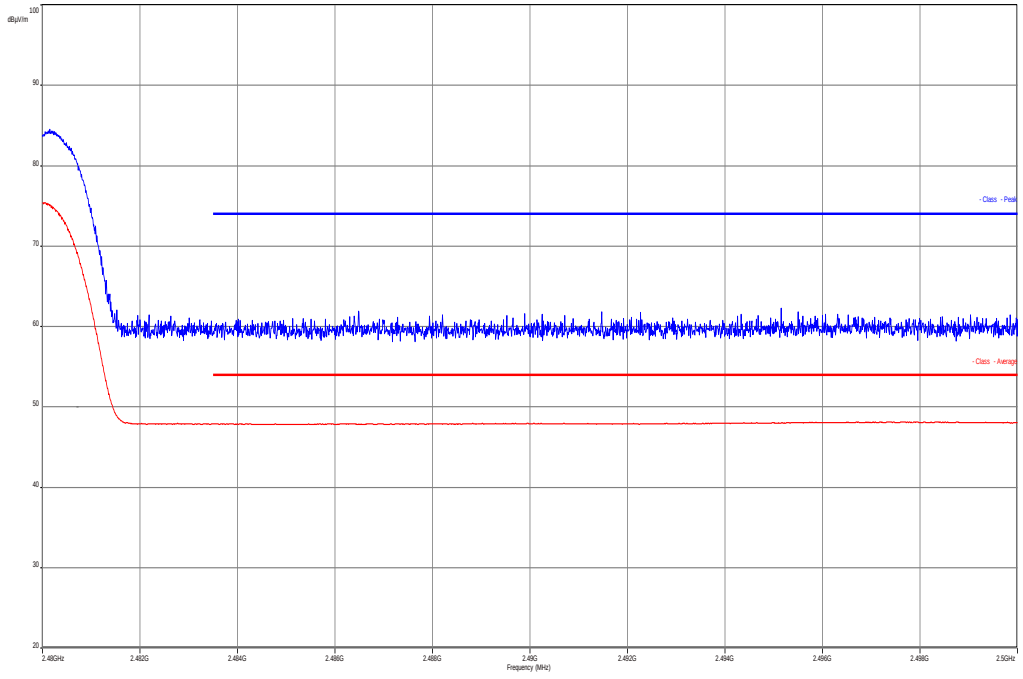
Plot 2: Upper band edge, GFSK modulation, vertical & horizontal polarization



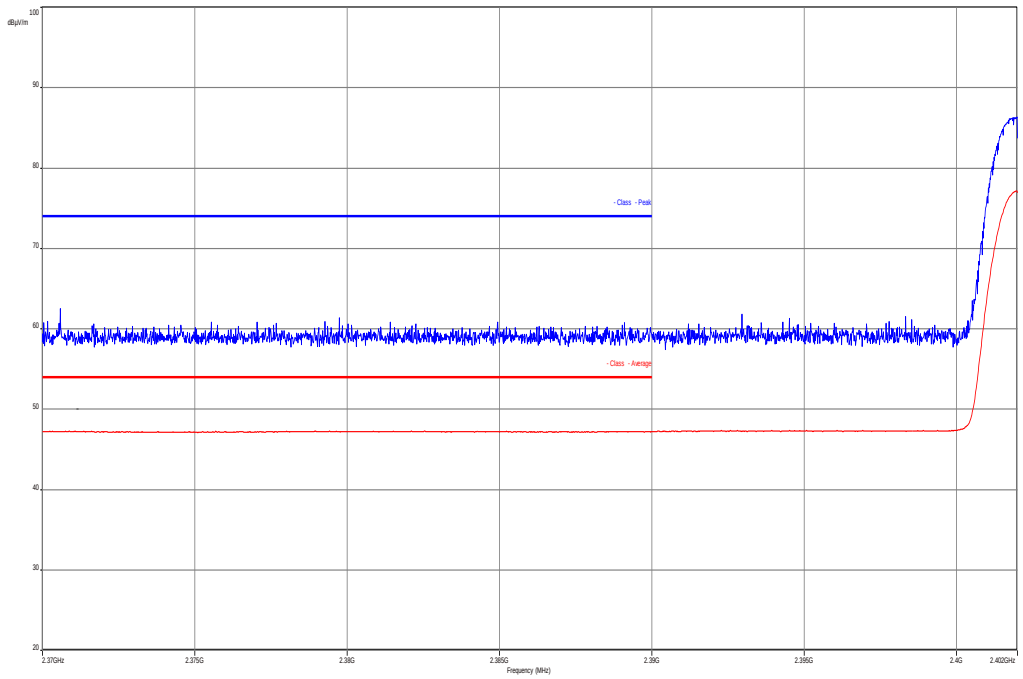
Plot 3: Lower band edge, Pi/4 DQPSK modulation, vertical & horizontal polarization



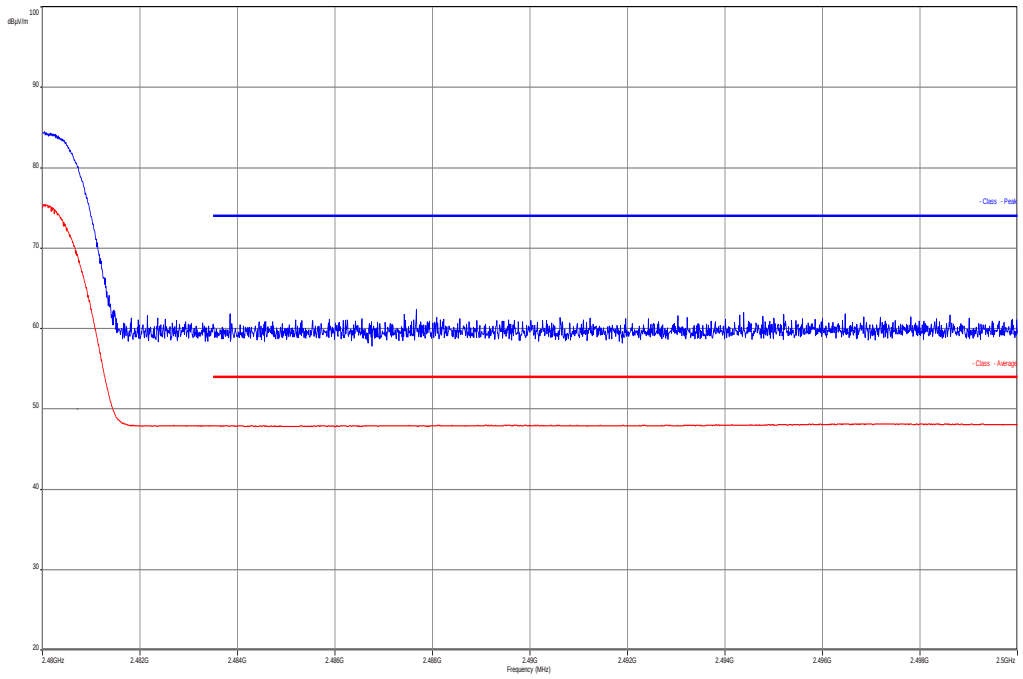
Plot 4: Upper band edge, Pi/4 DQPSK modulation, vertical & horizontal polarization



Plot 5: Lower band edge, 8 DPSK modulation, vertical & horizontal polarization



Plot 6: Upper band edge, 8 DPSK modulation, vertical & horizontal polarization



10.4 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The EUT is set to single channel mode and the transmit channel is channel 00, channel 39 and channel 78. The measurement is performed in the mode with the highest output power.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	3 x RBW Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 26 GHz
Trace-Mode:	Max Hold
Measured Modulation:	☒ GFSK ☒ Pi/4 DQPSK ☒ 8DPSK

The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

Limits:

FCC	IC	
TX spurious emissions radiated		
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
§15.209		
Frequency (MHz)	Field strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results:

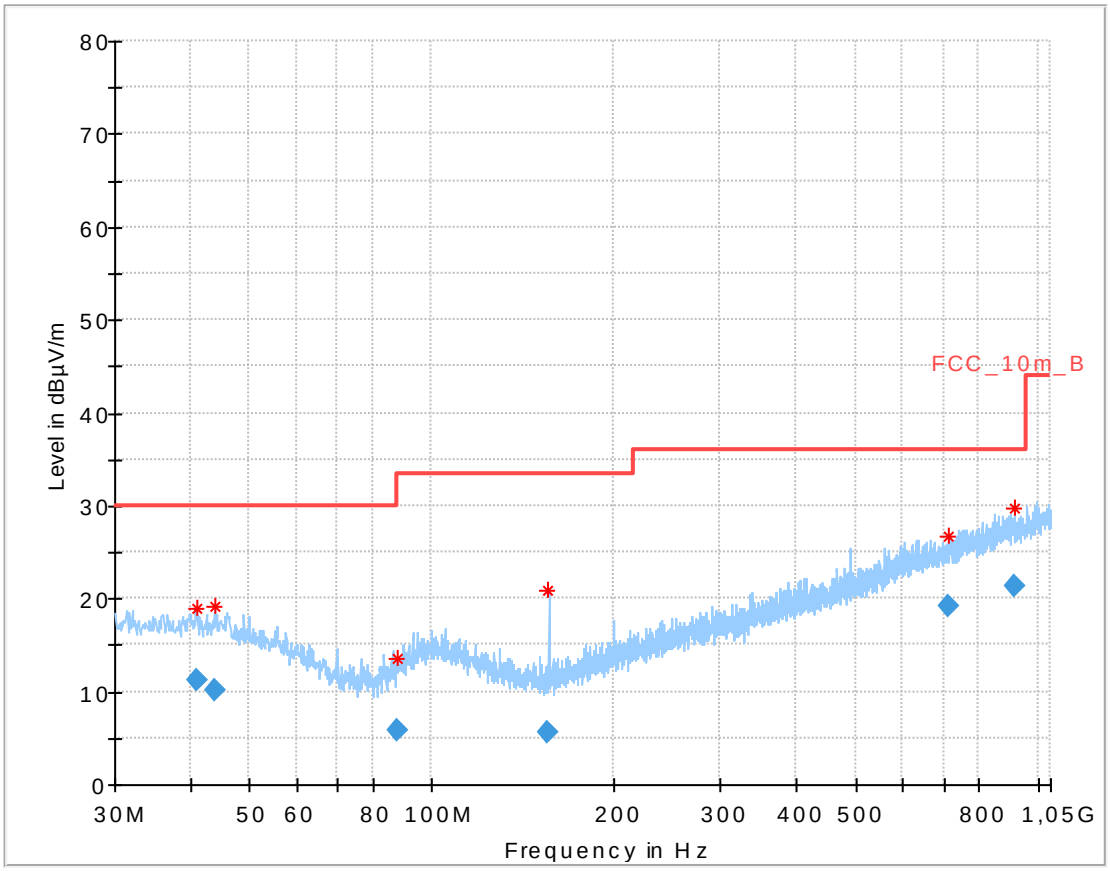
TX spurious emissions radiated [dBµV/m]								
2402 MHz			2441 MHz			2480 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
All peak emissions above 1 GHz are more Than 6 dB below the average limit			All peak emissions above 1 GHz are more Than 6 dB below the average limit			All peak emissions above 1 GHz are more Than 6 dB below the average limit		
Measurement uncertainty			± 3 dB					

Verdict: **Passed**

Note: The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

Plots GFSK:

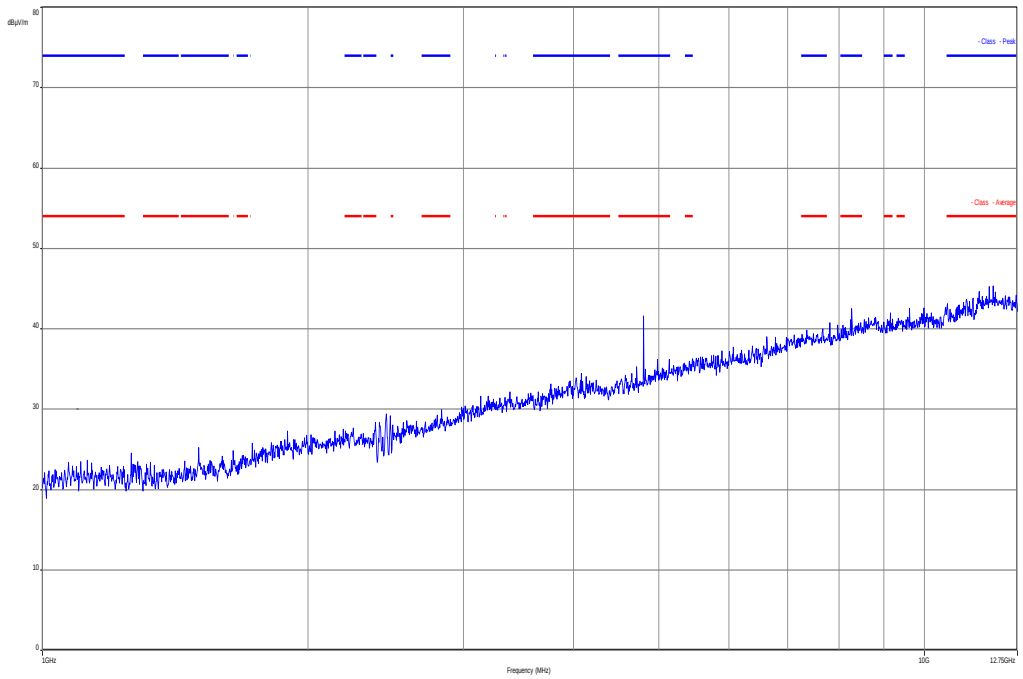
Plot 1: 30 MHz to 1 GHz, TX mode, channel 00, vertical & horizontal polarization



Final_Result

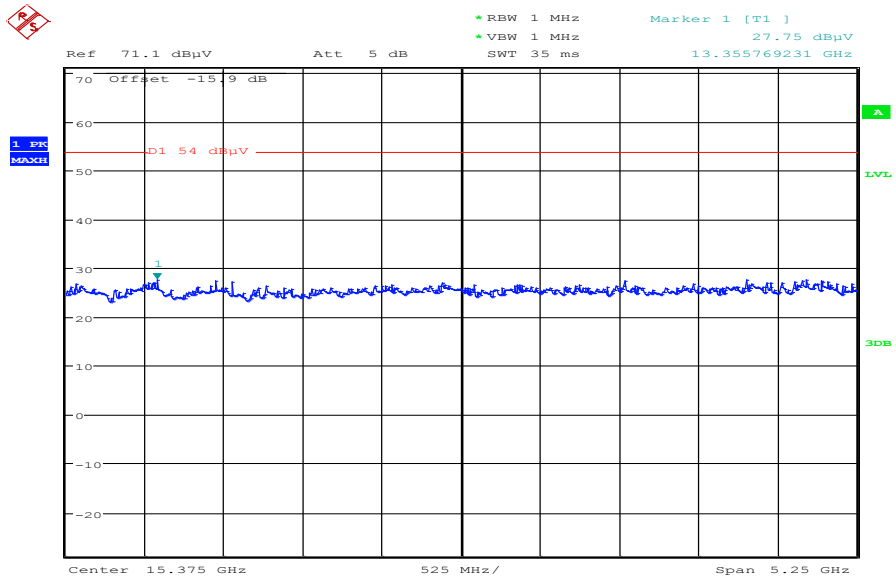
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.143650	11.12	30.00	18.88	1000.0	120.000	170.0	V	295	14.0
43.986150	10.19	30.00	19.81	1000.0	120.000	100.0	H	25	13.9
87.454050	5.87	30.00	24.13	1000.0	120.000	98.0	H	295	9.9
155.628450	5.51	33.50	27.99	1000.0	120.000	98.0	V	90	9.0
714.522000	19.29	36.00	16.71	1000.0	120.000	98.0	H	0	21.9
916.012500	21.43	36.00	14.57	1000.0	120.000	98.0	V	115	24.2

Plot 2: 1 GHz to 12.75 GHz, TX mode, channel 00, vertical & horizontal polarization



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: 12.75 GHz to 18 GHz, TX mode, channel 00, vertical & horizontal polarization



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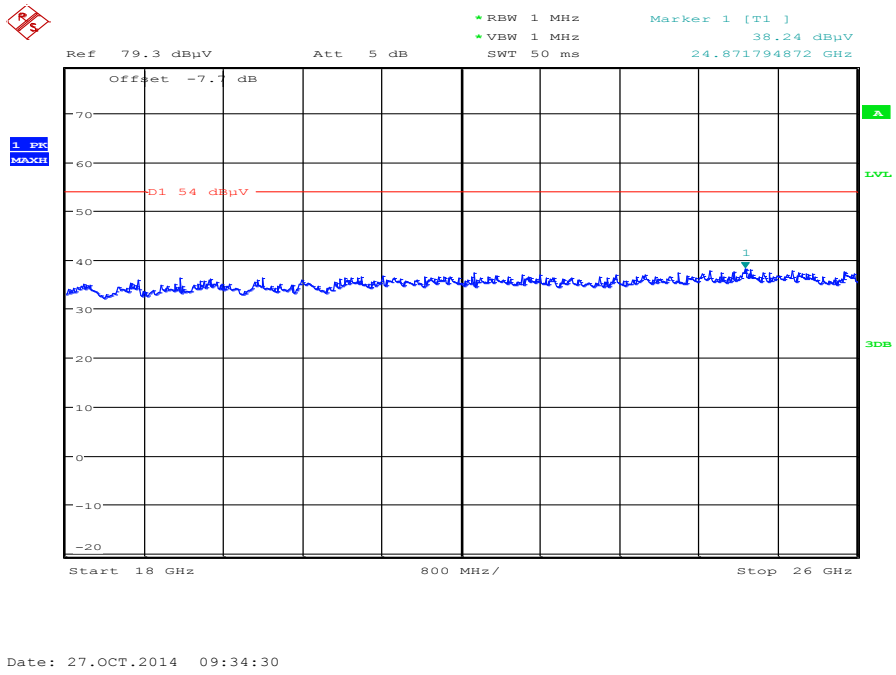
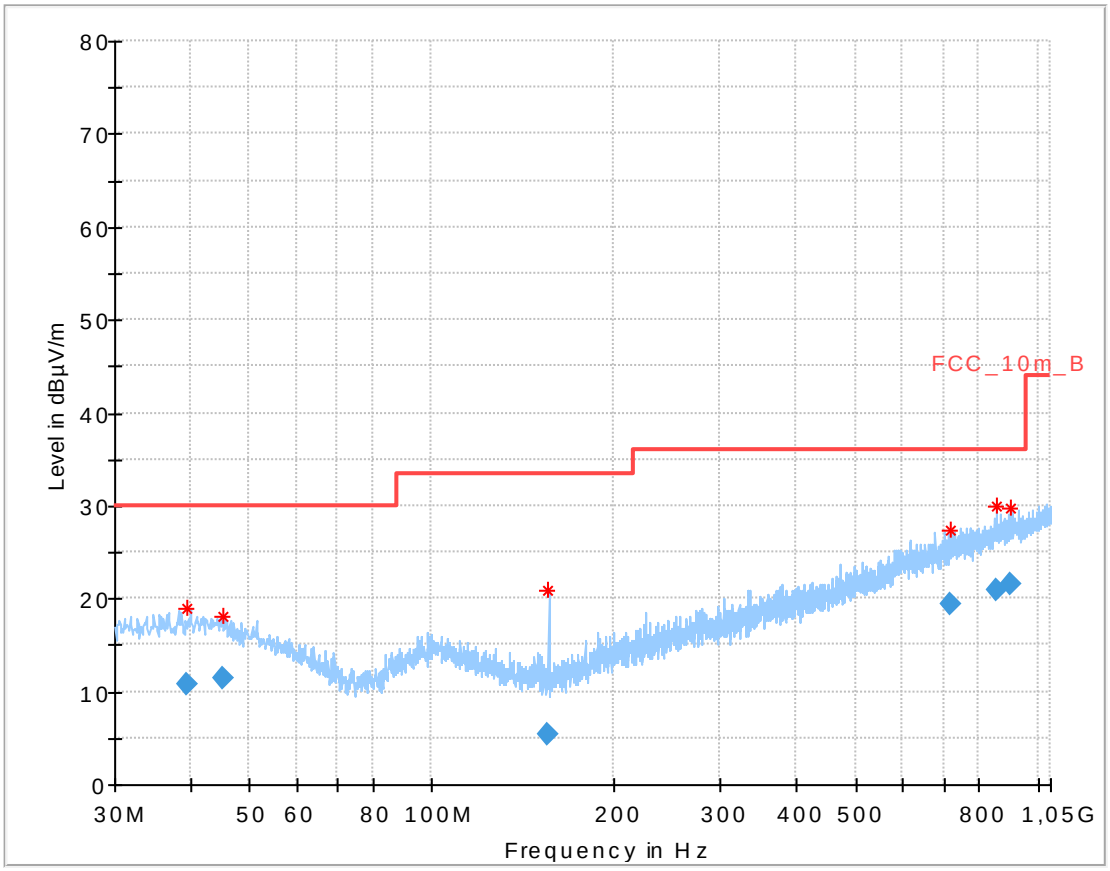
Plot 4: 18 GHz to 26 GHz, TX mode, channel 00, vertical & horizontal polarization



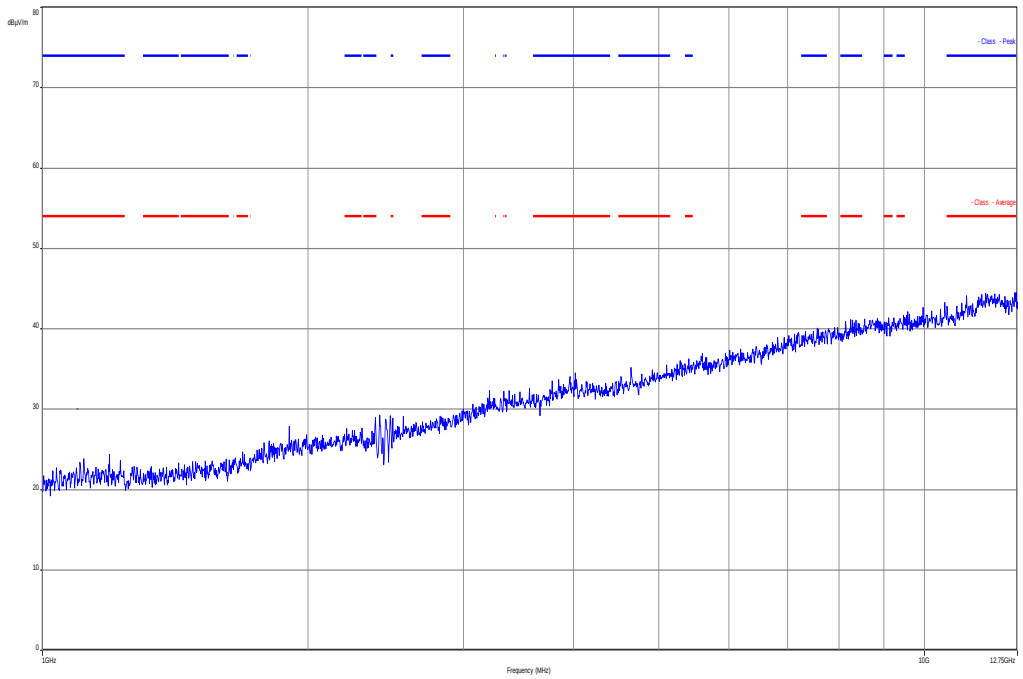
Plot 5: 30 MHz to 1 GHz, TX mode, channel 39, vertical & horizontal polarization



Final_Result

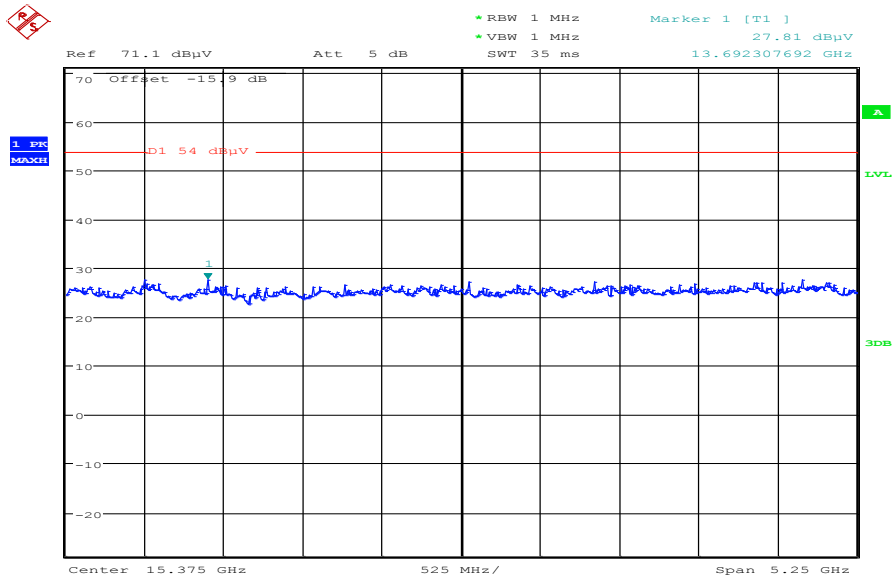
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
39.359100	10.70	30.00	19.30	1000.0	120.000	170.0	H	25	14.0
45.177900	11.42	30.00	18.58	1000.0	120.000	98.0	V	295	13.8
155.501850	5.46	33.50	28.04	1000.0	120.000	170.0	V	295	9.0
719.904600	19.38	36.00	16.62	1000.0	120.000	170.0	H	205	22.0
855.852000	20.93	36.00	15.07	1000.0	120.000	170.0	V	179	23.5
904.242750	21.51	36.00	14.49	1000.0	120.000	170.0	H	295	24.1

Plot 6: 1 GHz to 12.75 GHz, TX mode, channel 39, vertical & horizontal polarization



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 7: 12.75 GHz to 18 GHz, TX mode, channel 39, vertical & horizontal polarization



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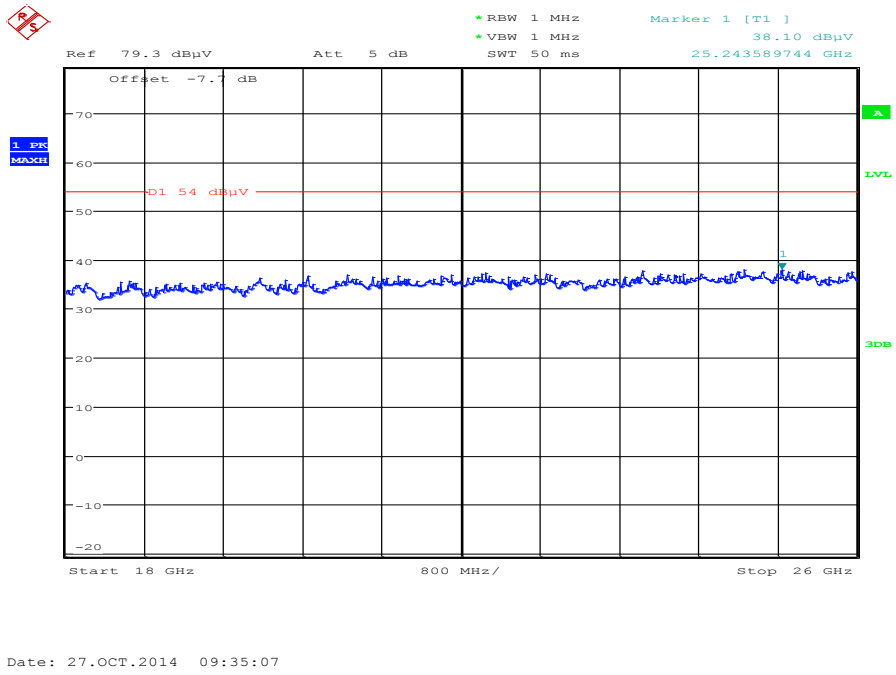
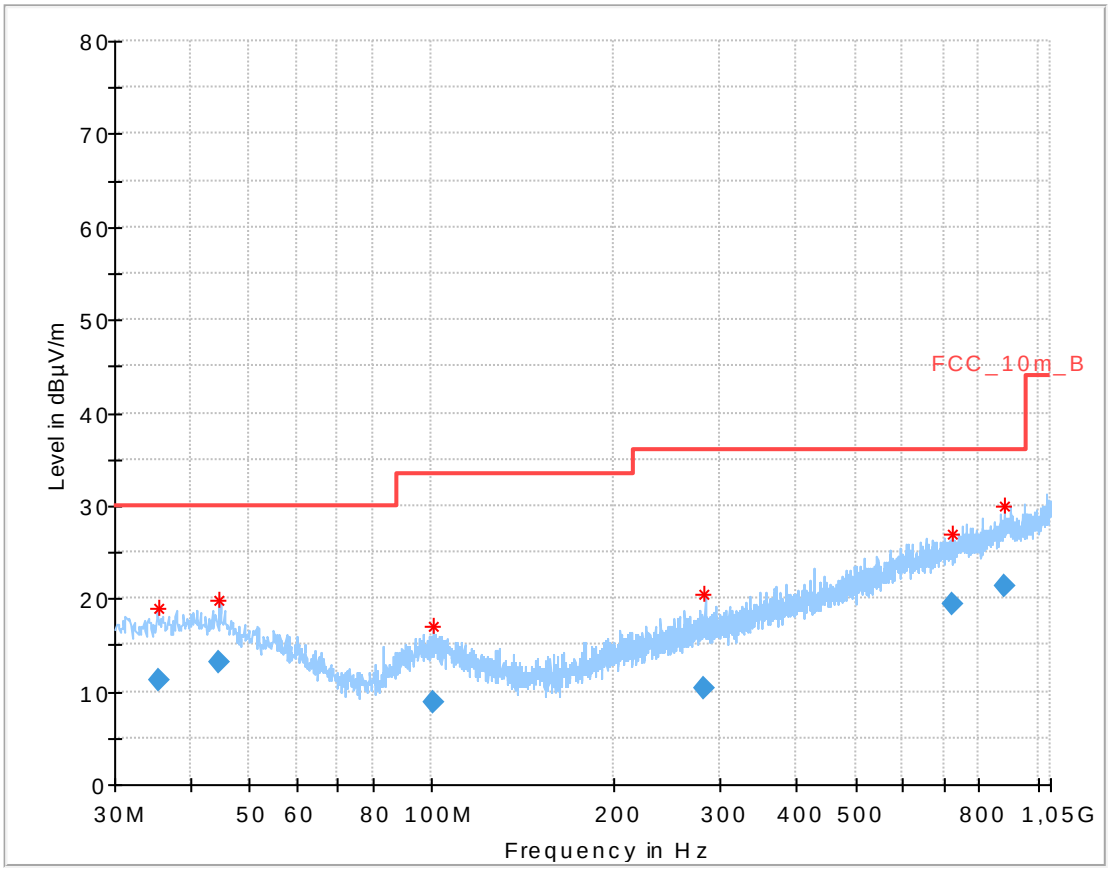
Plot 8: 18 GHz to 26 GHz, TX mode, channel 39, vertical & horizontal polarization



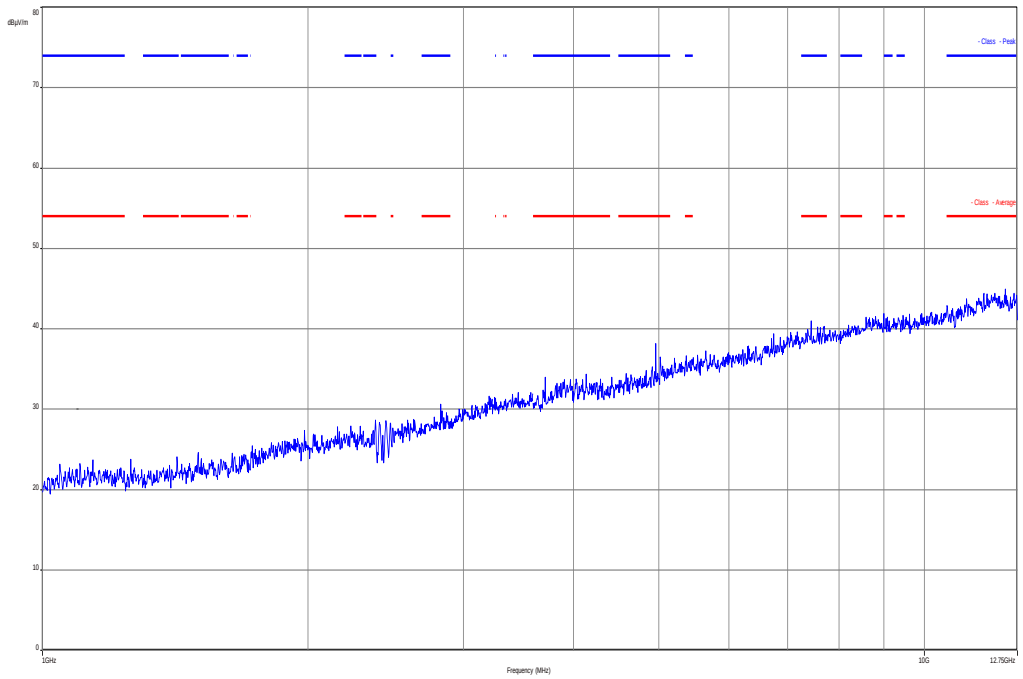
Plot 9: 30 MHz to 1 GHz, TX mode, channel 78, vertical & horizontal polarization



Final_Result

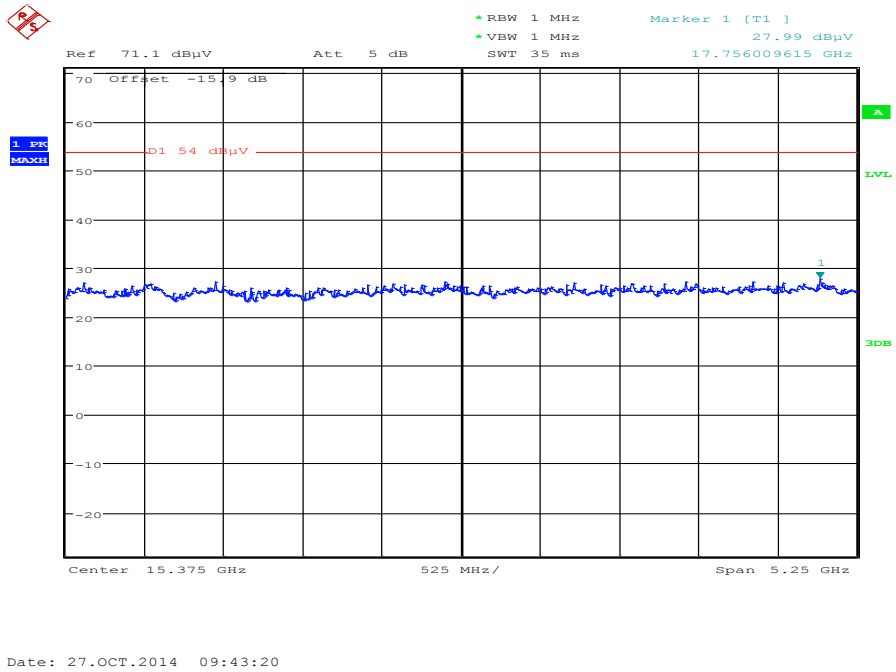
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.383500	11.23	30.00	18.77	1000.0	120.000	170.0	H	115	13.8
44.551500	13.23	30.00	16.77	1000.0	120.000	101.0	V	0	13.9
101.007750	8.84	33.50	24.66	1000.0	120.000	170.0	V	180	12.1
282.307050	10.37	36.00	25.63	1000.0	120.000	170.0	V	0	14.1
721.316250	19.39	36.00	16.61	1000.0	120.000	170.0	H	-24	22.0
882.359100	21.42	36.00	14.58	1000.0	120.000	170.0	H	205	23.9

Plot 10: 1 GHz to 12.75 GHz, TX mode, channel 78, vertical & horizontal polarization



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: 12.75 GHz to 18 GHz, TX mode, channel 78, vertical & horizontal polarization



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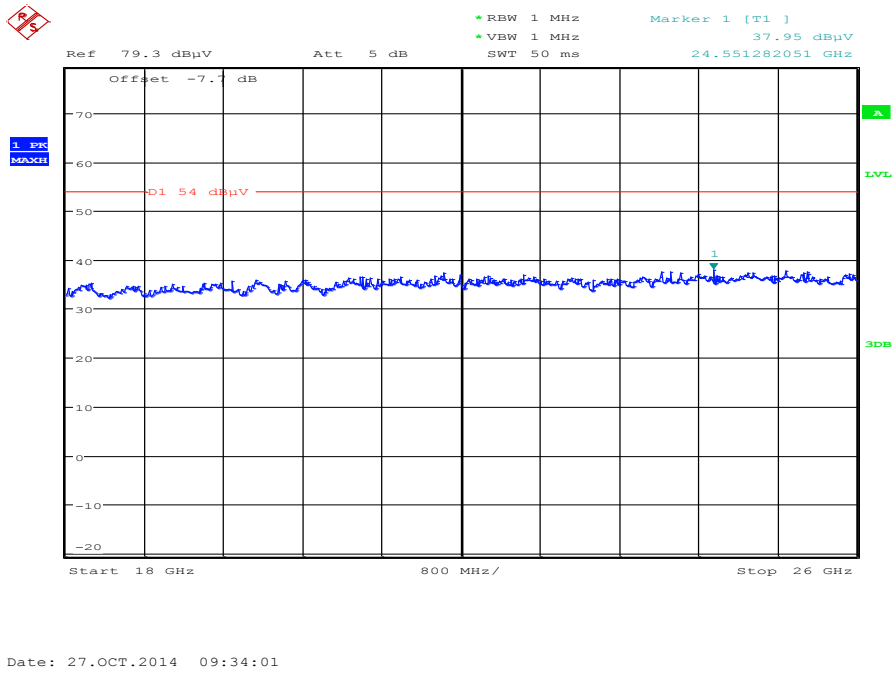
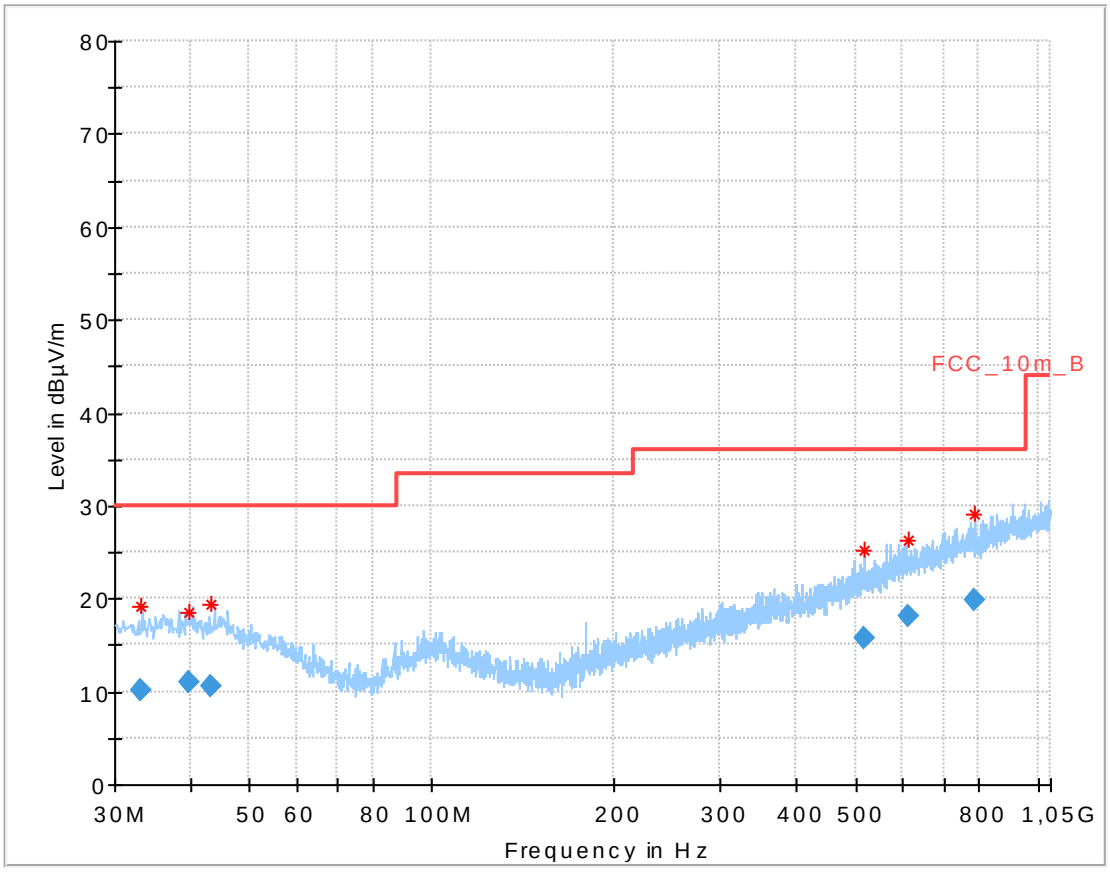
Plot 12: 18 GHz to 26 GHz, TX mode, channel 78, vertical & horizontal polarization



Plots pi/4DQPSK:

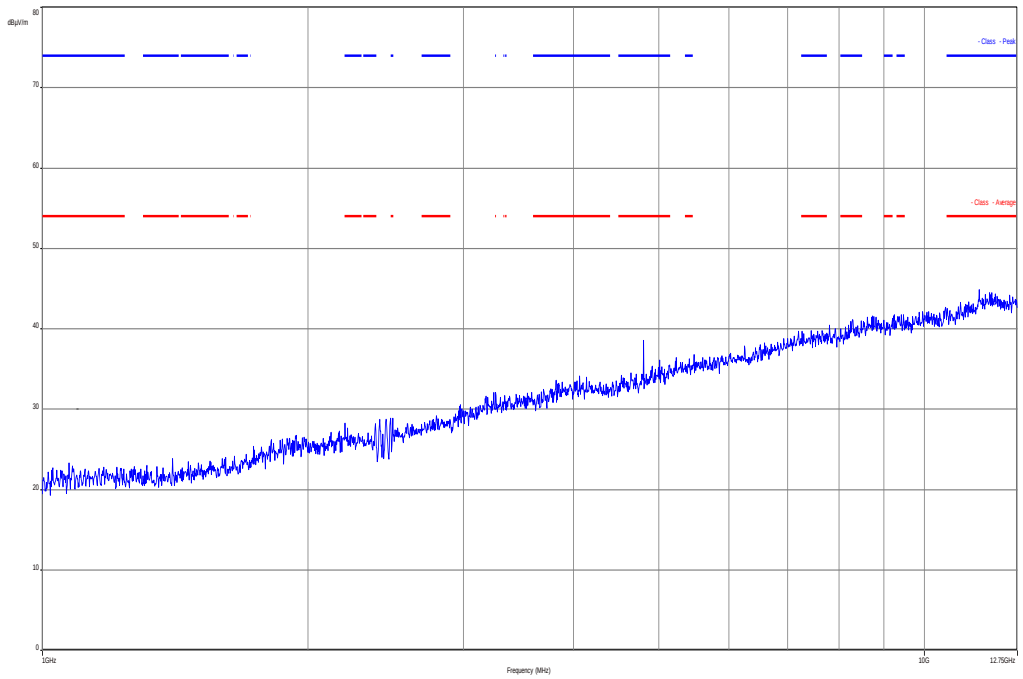
Plot 1: 30 MHz to 1 GHz, TX mode, channel 00, vertical & horizontal polarization



Final_Result

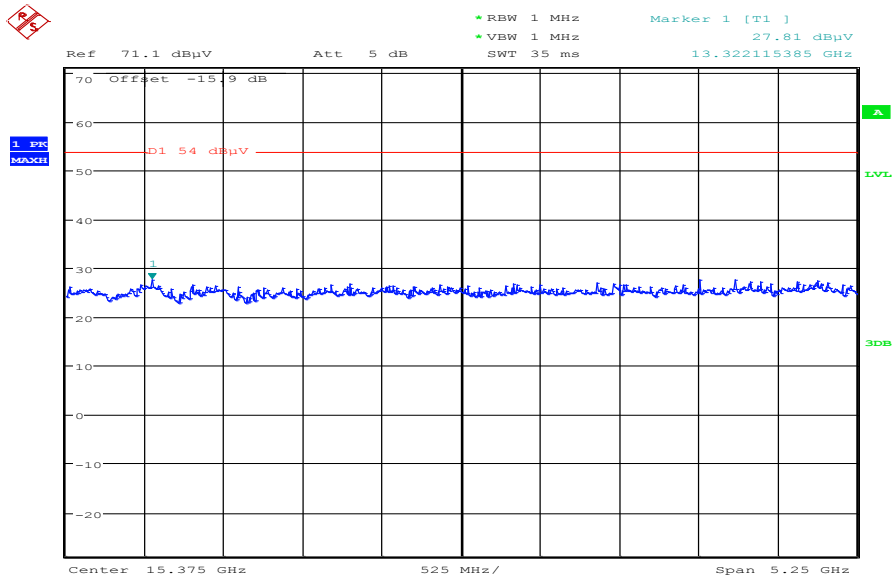
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
33.122100	10.21	30.00	19.79	1000.0	120.000	101.0	H	-25	13.6
39.834300	10.94	30.00	19.06	1000.0	120.000	170.0	V	245	14.0
43.333500	10.52	30.00	19.48	1000.0	120.000	100.0	V	270	13.9
516.343500	15.79	36.00	20.21	1000.0	120.000	170.0	V	90	18.9
609.416250	18.14	36.00	17.86	1000.0	120.000	98.0	H	25	20.8
787.906500	19.90	36.00	16.10	1000.0	120.000	170.0	V	0	22.7

Plot 2: 1 GHz to 12.75 GHz, TX mode, channel 00, vertical & horizontal polarization



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: 12.75 GHz to 18 GHz, TX mode, channel 00, vertical & horizontal polarization



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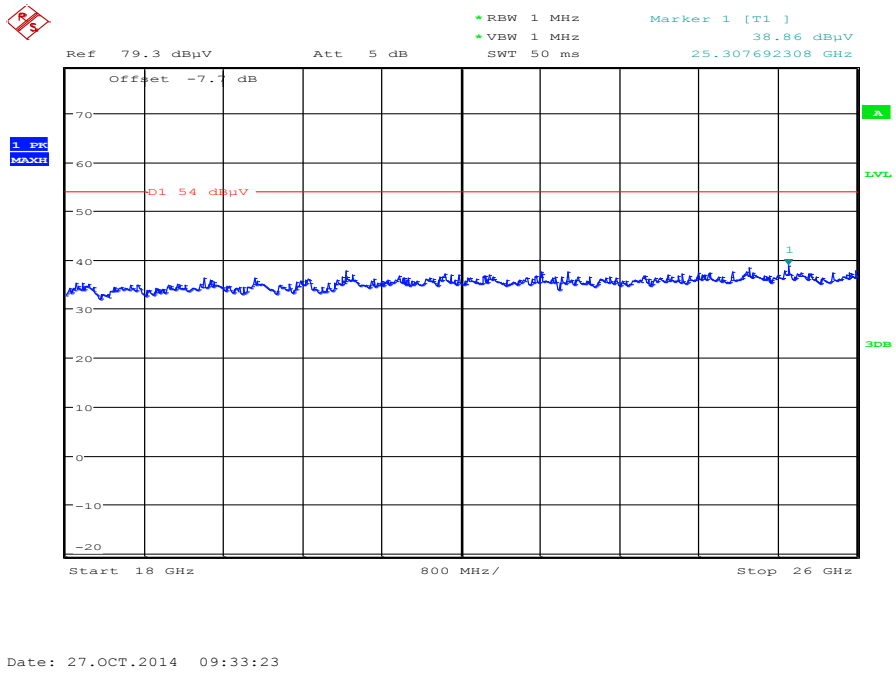
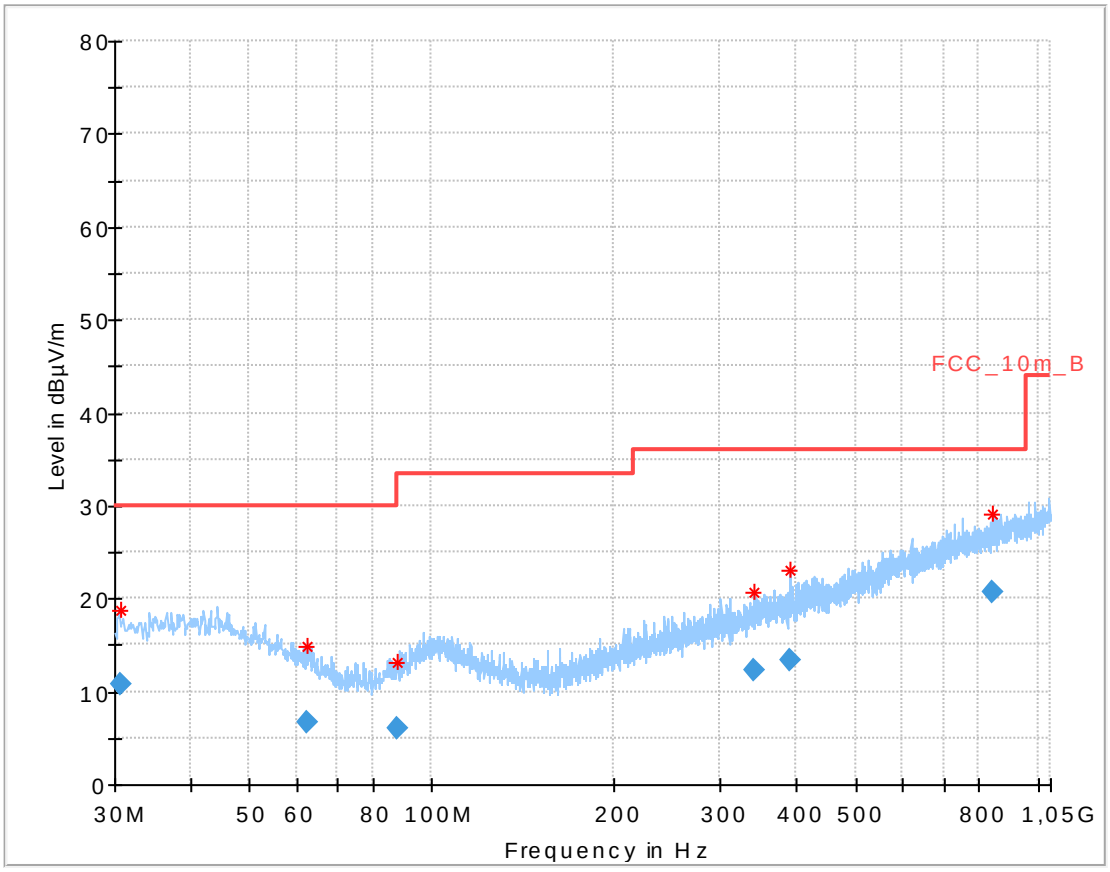
Plot 4: 18 GHz to 26 GHz, TX mode, channel 00, vertical & horizontal polarization



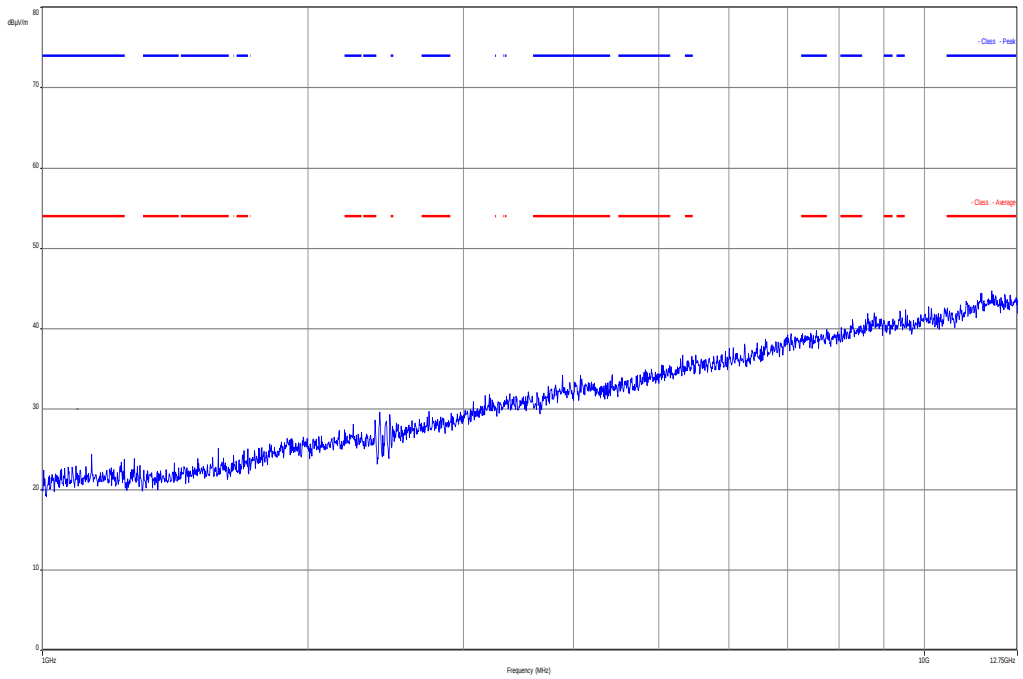
Plot 5: 30 MHz to 1 GHz, TX mode, channel 39, vertical & horizontal polarization



Final_Result

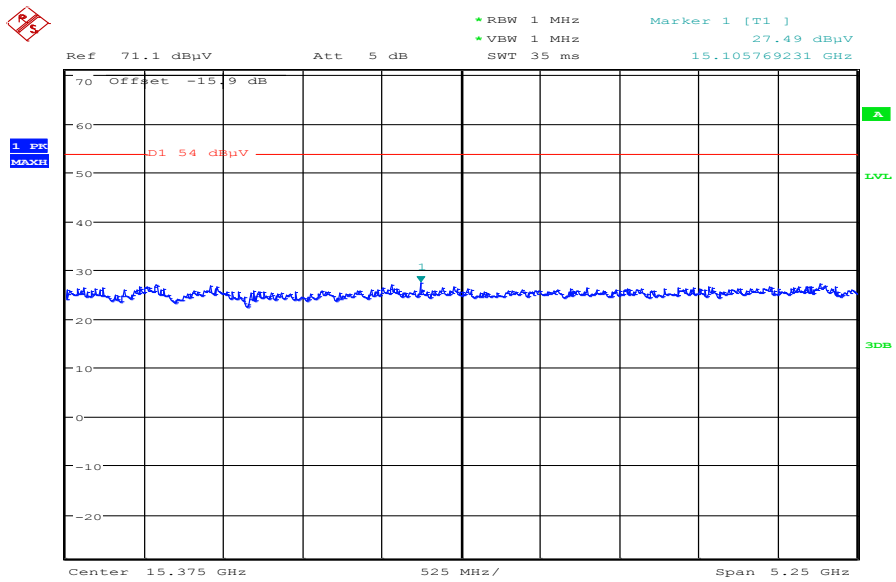
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.617438	10.88	30.00	19.12	1000.0	120.000	101.0	V	205	13.4
62.519400	6.72	30.00	23.28	1000.0	120.000	170.0	H	25	10.0
87.454350	6.13	30.00	23.87	1000.0	120.000	170.0	H	0	9.9
339.163350	12.36	36.00	23.64	1000.0	120.000	170.0	H	156	15.7
389.870250	13.30	36.00	22.70	1000.0	120.000	170.0	H	155	16.7
844.872750	20.79	36.00	15.21	1000.0	120.000	170.0	V	90	23.4

Plot 6: 1 GHz to 12.75 GHz, TX mode, channel 39, vertical & horizontal polarization



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 7: 12.75 GHz to 18 GHz, TX mode, channel 39, vertical & horizontal polarization



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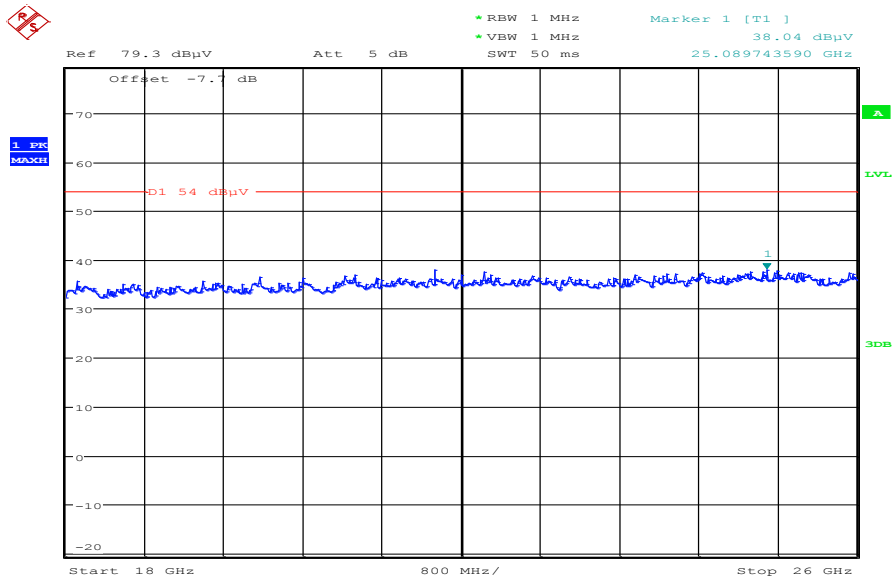
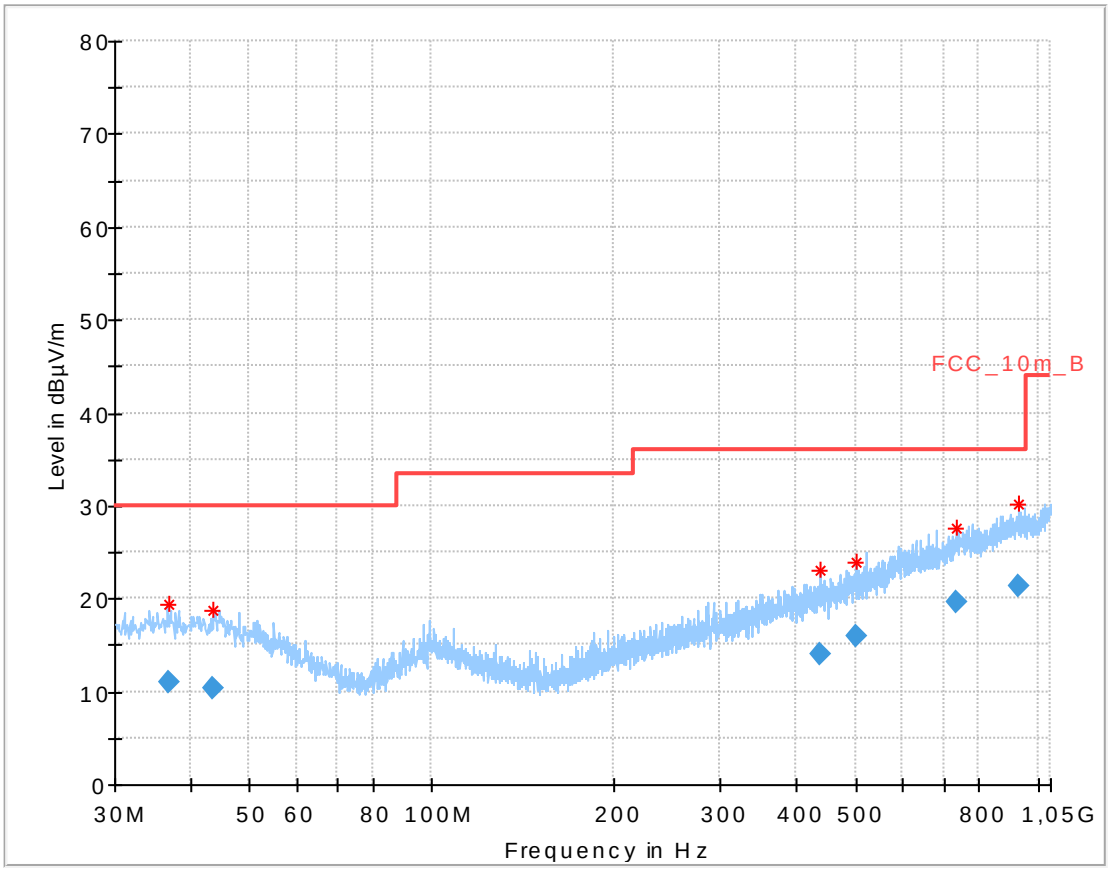
Plot 8: 18 GHz to 26 GHz, TX mode, channel 39, vertical & horizontal polarization



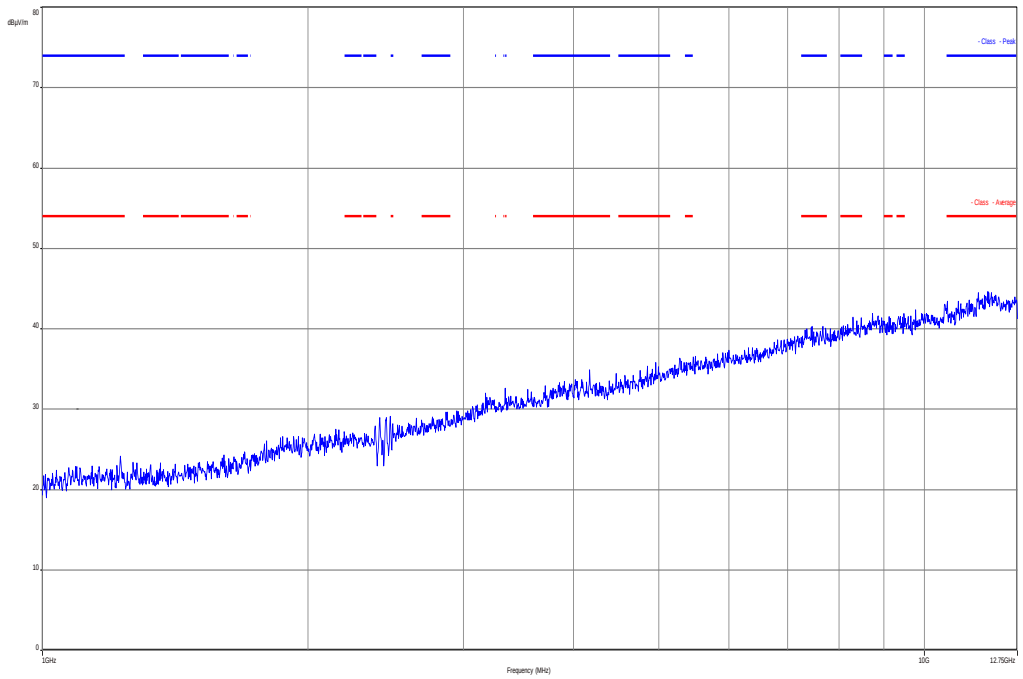
Plot 9: 30 MHz to 1 GHz, TX mode, channel 78, vertical & horizontal polarization



Final_Result

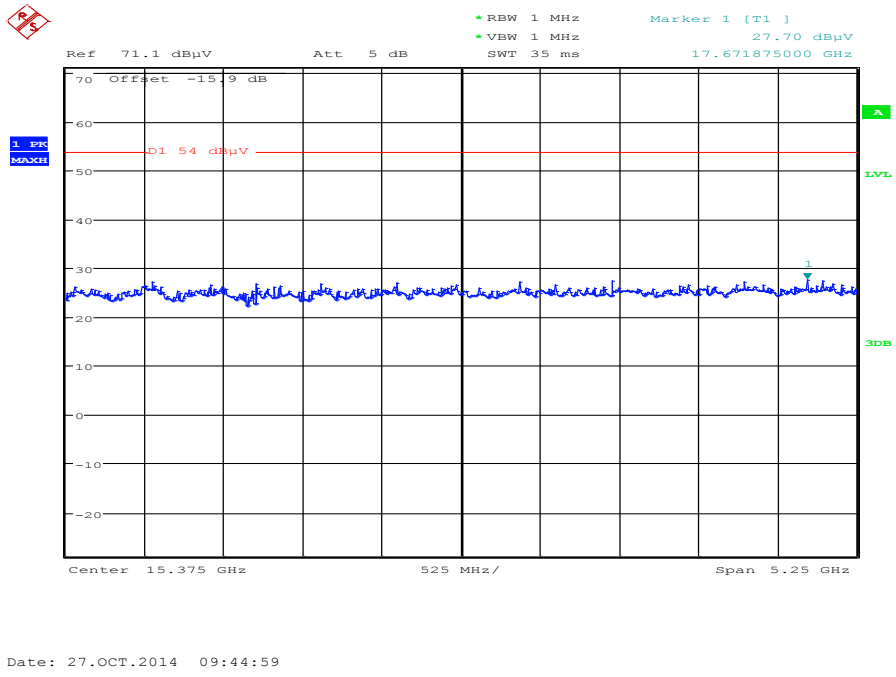
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
36.748950	11.01	30.00	18.99	1000.0	120.000	100.0	H	25	13.9
43.717200	10.29	30.00	19.71	1000.0	120.000	101.0	H	-25	13.9
438.802500	14.09	36.00	21.91	1000.0	120.000	170.0	H	205	17.4
501.108000	16.03	36.00	19.97	1000.0	120.000	170.0	H	270	18.7
734.685000	19.68	36.00	16.32	1000.0	120.000	170.0	V	245	22.3
928.126800	21.44	36.00	14.56	1000.0	120.000	170.0	H	245	24.2

Plot 10: 1 GHz to 12.75 GHz, TX mode, channel 78, vertical & horizontal polarization

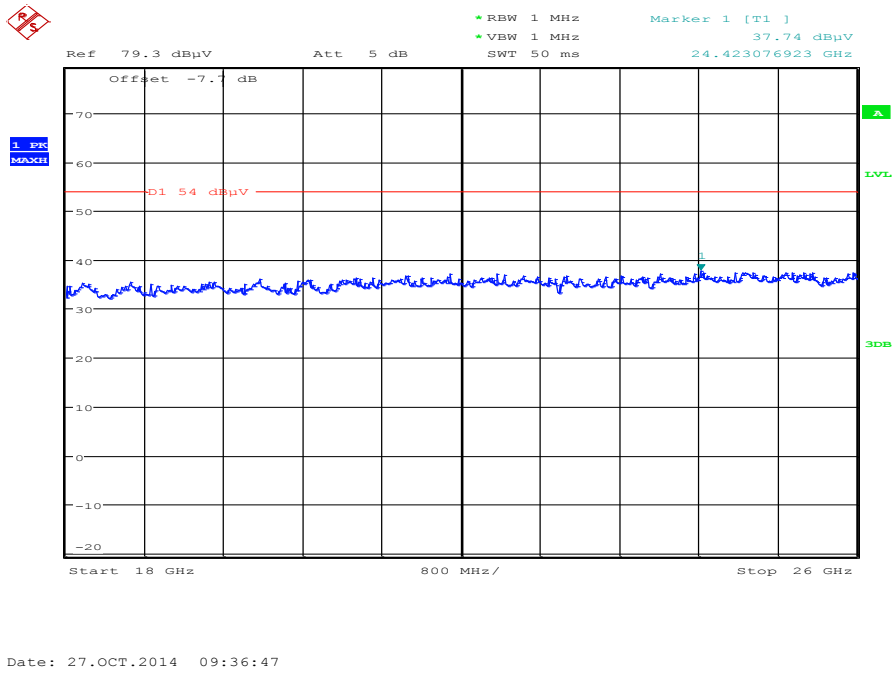


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: 12.75 GHz to 18 GHz, TX mode, channel 78, vertical & horizontal polarization

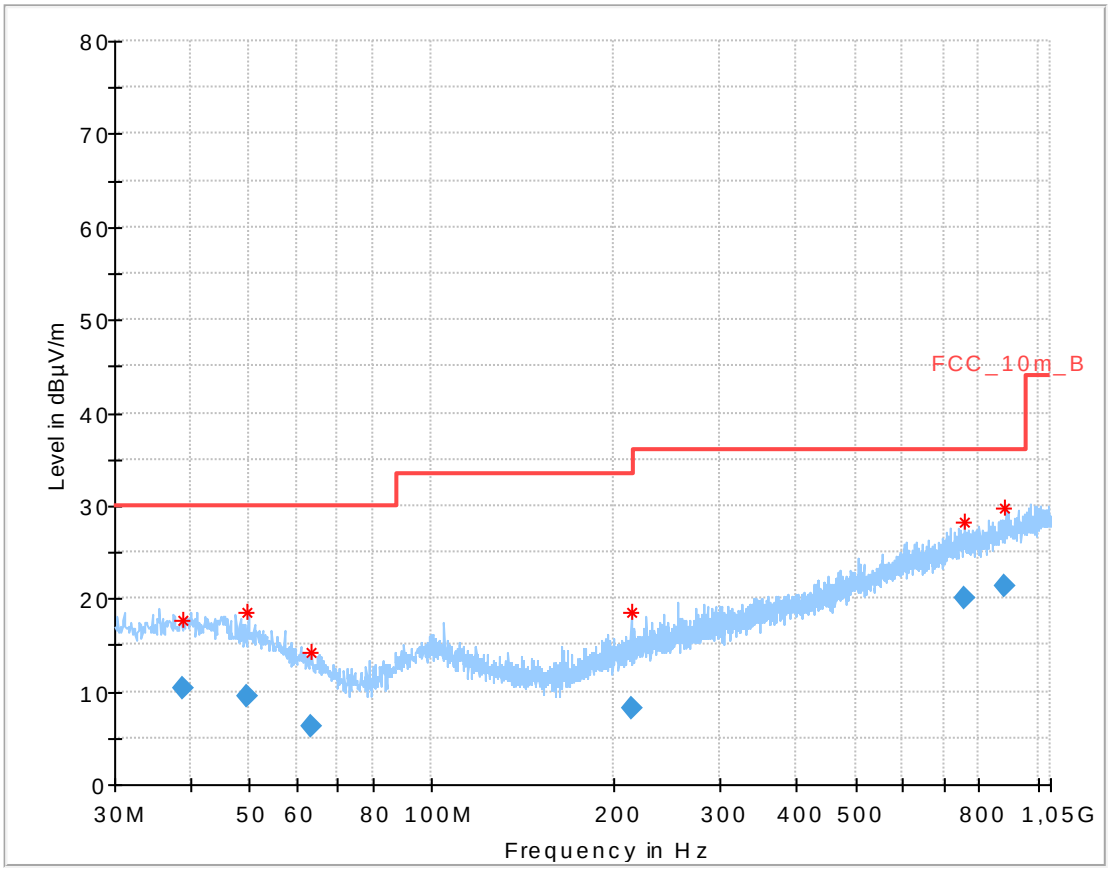


Plot 12: 18 GHz to 26 GHz, TX mode, channel 78, vertical & horizontal polarization



Plots 8DPSK:

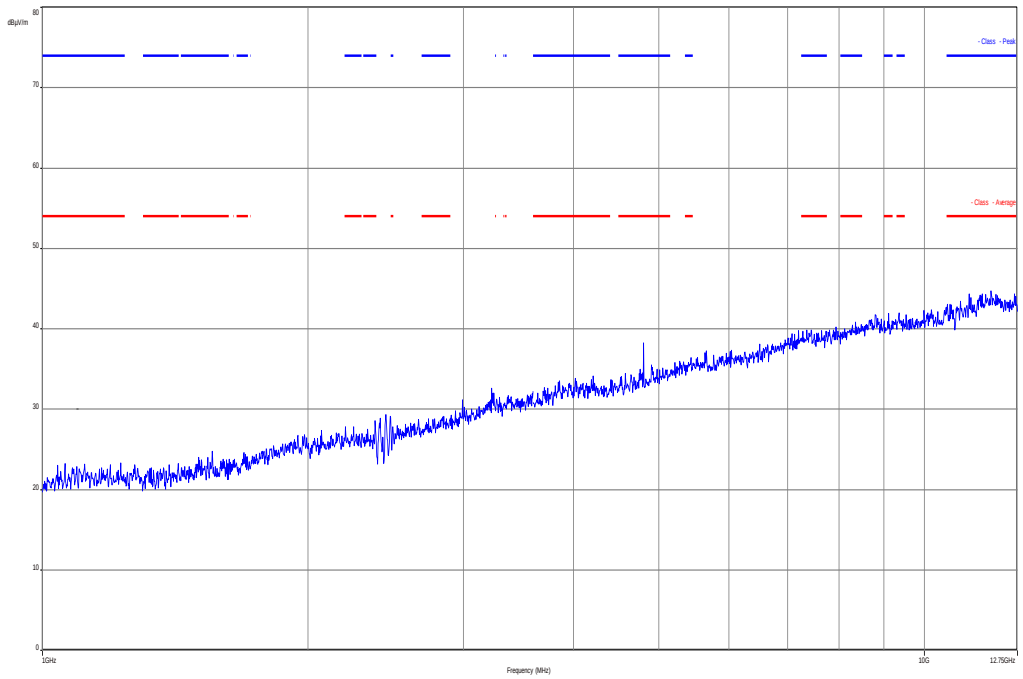
Plot 1: 30 MHz to 1 GHz, TX mode, channel 00, vertical & horizontal polarization



Final_Result

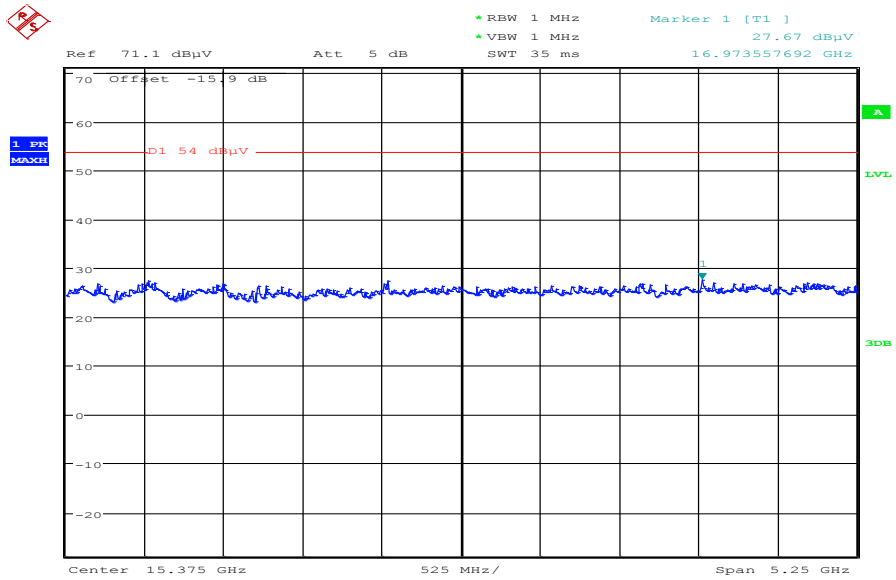
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
38.814300	10.45	30.00	19.55	1000.0	120.000	170.0	H	-25	14.0
49.532850	9.41	30.00	20.59	1000.0	120.000	170.0	H	246	12.8
63.338700	6.33	30.00	23.67	1000.0	120.000	101.0	H	205	9.8
213.453900	8.21	33.50	25.29	1000.0	120.000	98.0	H	181	12.2
758.813250	20.02	36.00	15.98	1000.0	120.000	98.0	V	115	22.7
884.587050	21.35	36.00	14.65	1000.0	120.000	170.0	V	269	23.9

Plot 2: 1 GHz to 12.75 GHz, TX mode, channel 00, vertical & horizontal polarization



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: 12.75 GHz to 18 GHz, TX mode, channel 00, vertical & horizontal polarization



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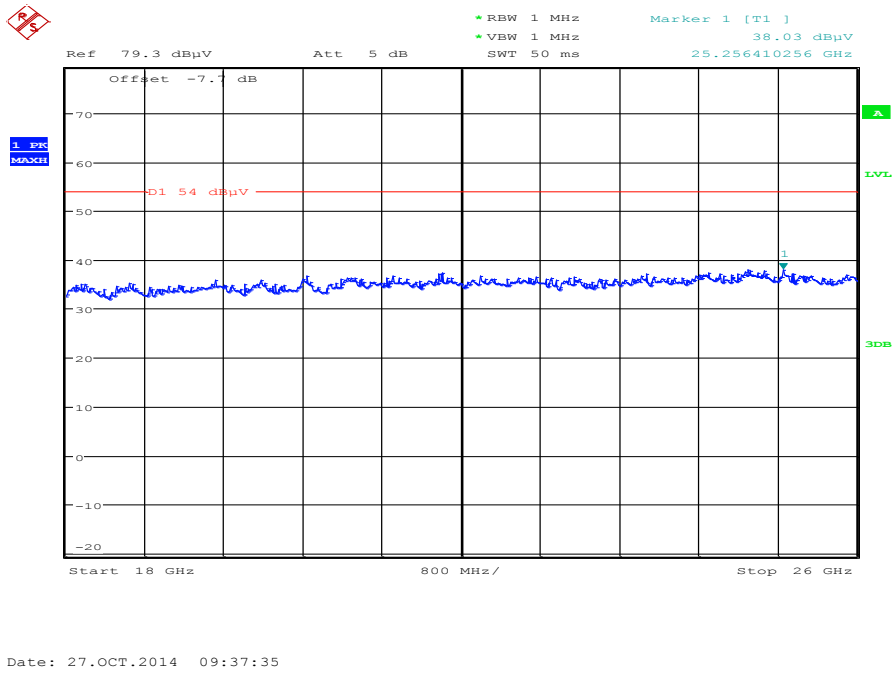
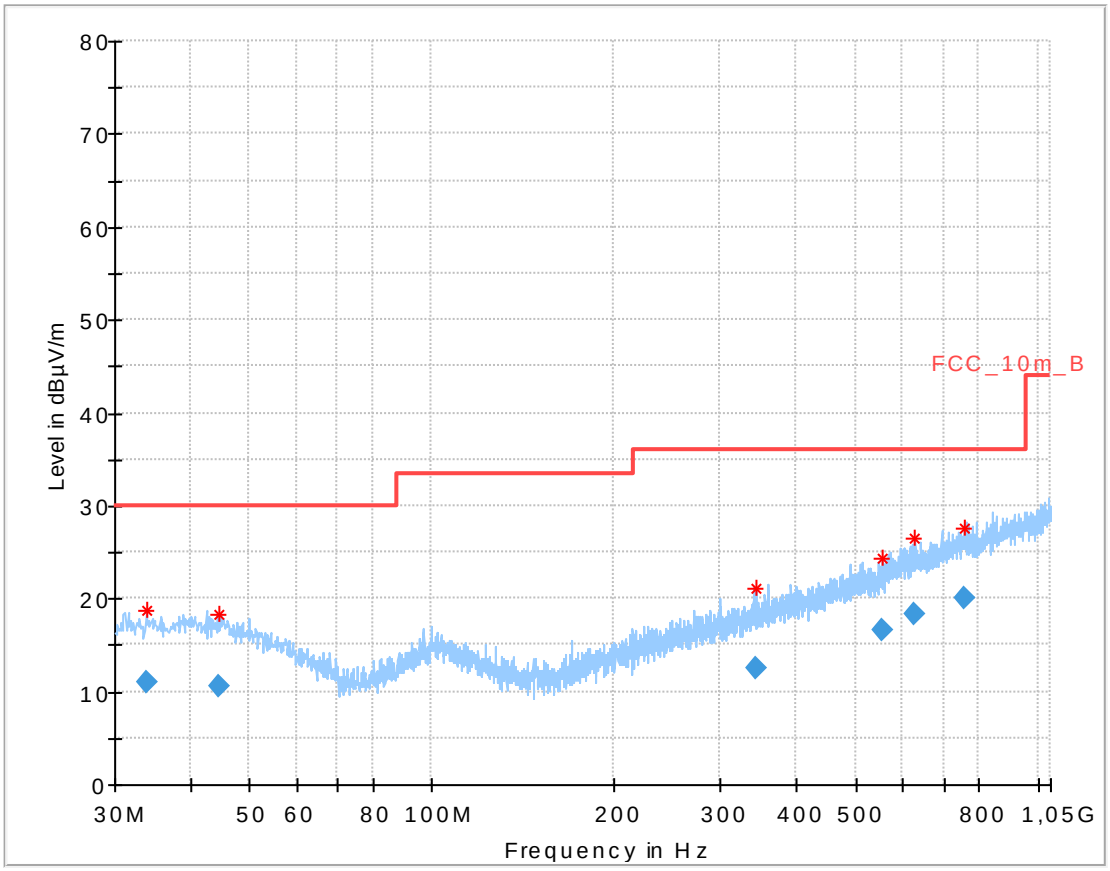
Plot 4: 18 GHz to 26 GHz, TX mode, channel 00, vertical & horizontal polarization



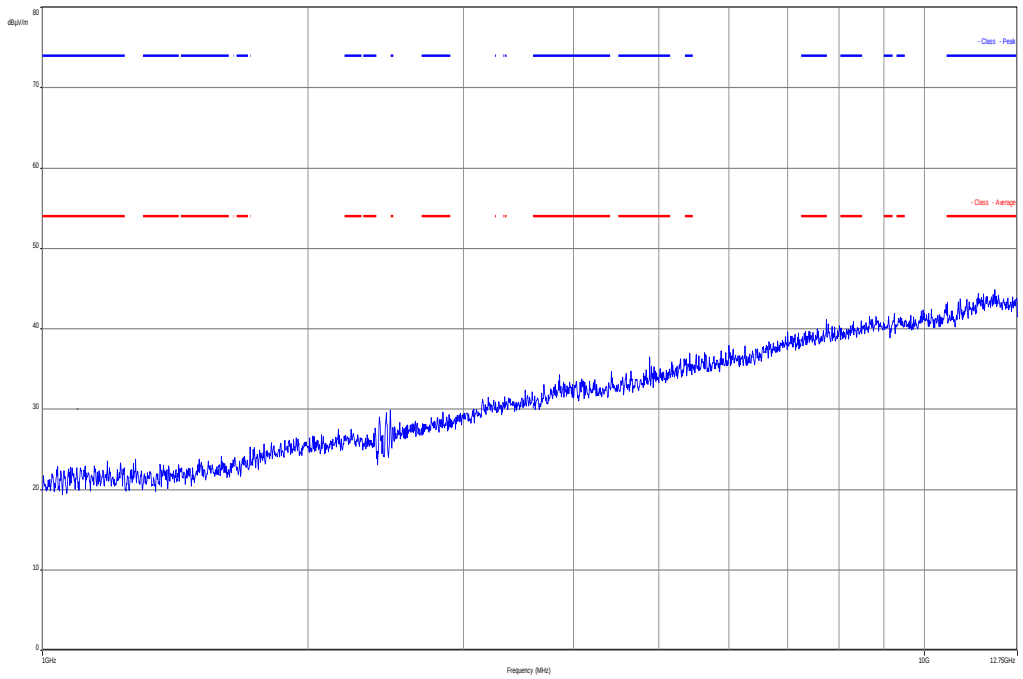
Plot 5: 30 MHz to 1 GHz, TX mode, channel 39, vertical & horizontal polarization



Final_Result

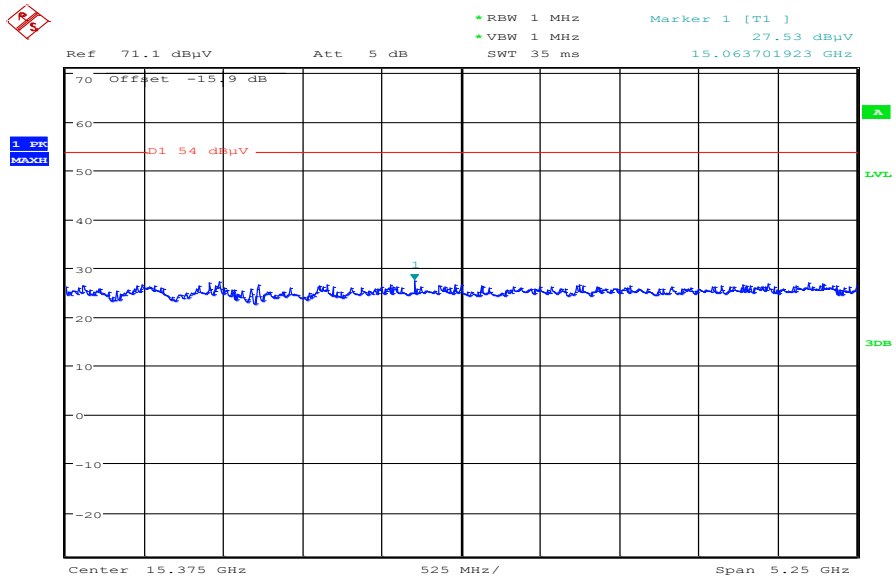
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
33.988650	10.95	30.00	19.05	1000.0	120.000	170.0	V	115	13.7
44.473050	10.67	30.00	19.33	1000.0	120.000	170.0	V	65	13.9
342.111900	12.40	36.00	23.60	1000.0	120.000	170.0	H	115	15.8
553.200750	16.51	36.00	19.49	1000.0	120.000	170.0	V	245	19.4
627.902250	18.24	36.00	17.76	1000.0	120.000	170.0	V	25	20.9
757.057650	20.03	36.00	15.97	1000.0	120.000	170.0	H	270	22.7

Plot 6: 1 GHz to 12.75 GHz, TX mode, channel 39, vertical & horizontal polarization



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 7: 12.75 GHz to 18 GHz, TX mode, channel 39, vertical & horizontal polarization



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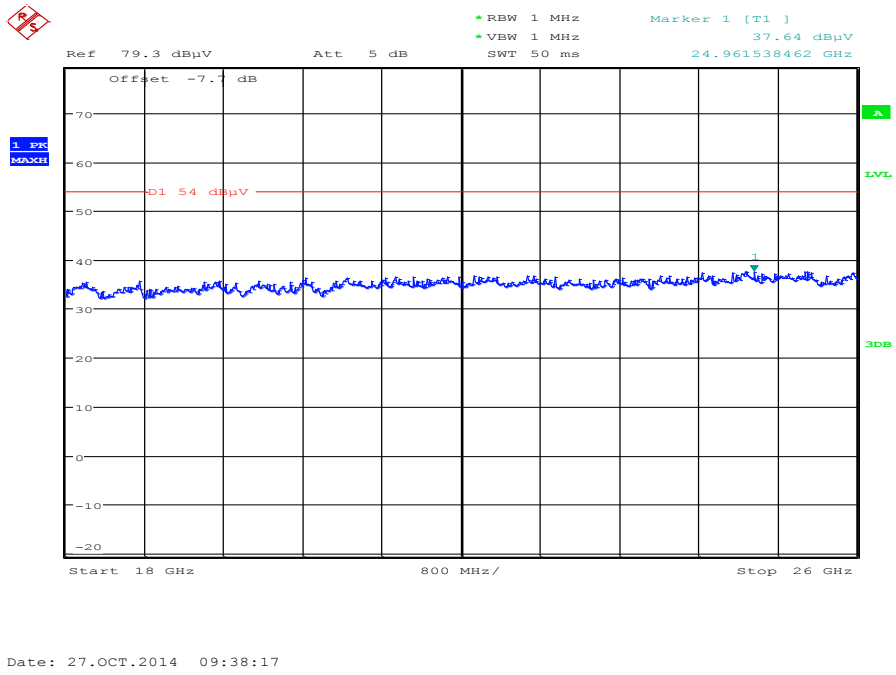
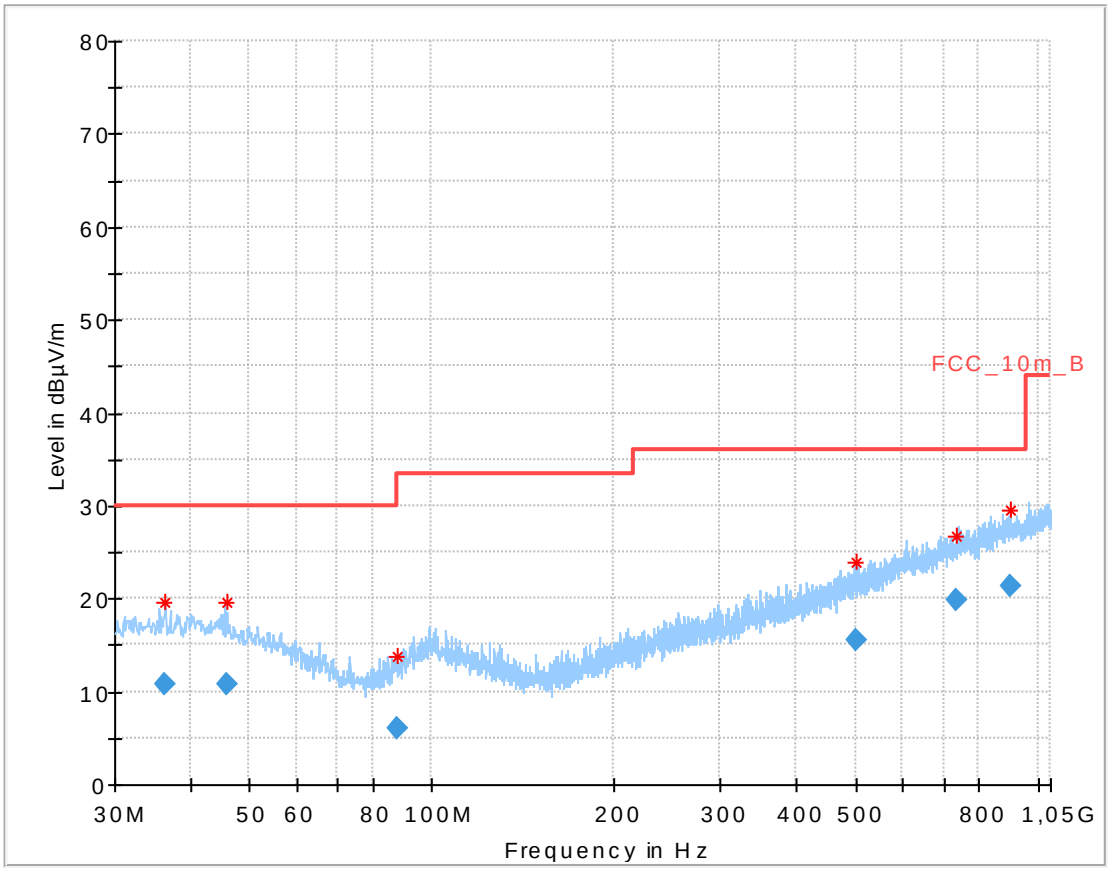
Plot 8: 18 GHz to 26 GHz, TX mode, channel 39, vertical & horizontal polarization



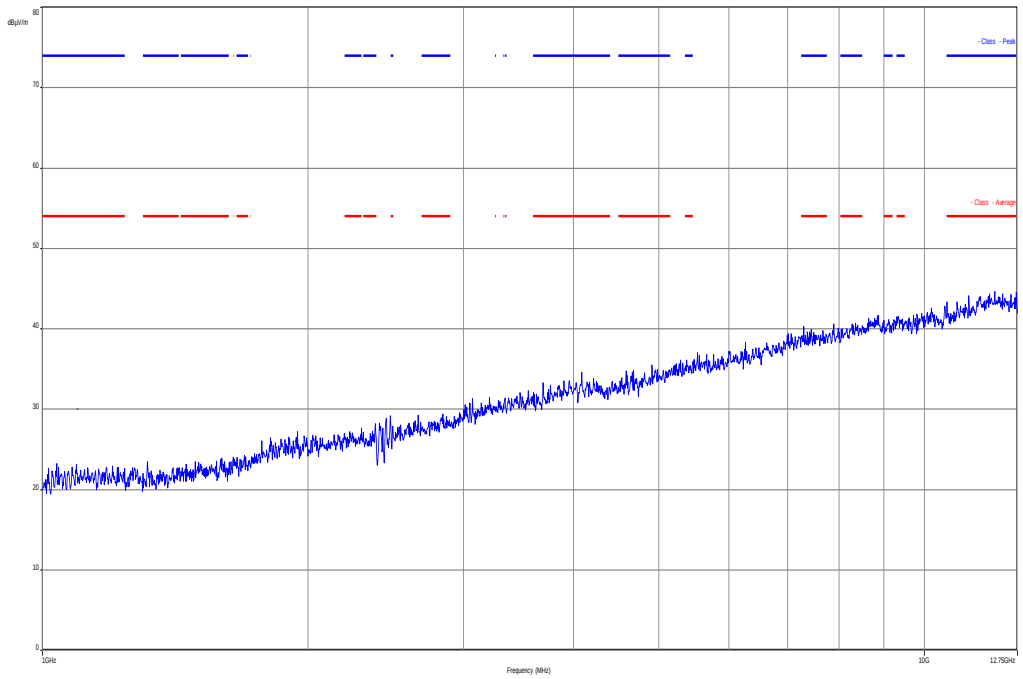
Plot 9: 30 MHz to 1 GHz, TX mode, channel 78, vertical & horizontal polarization



Final_Result

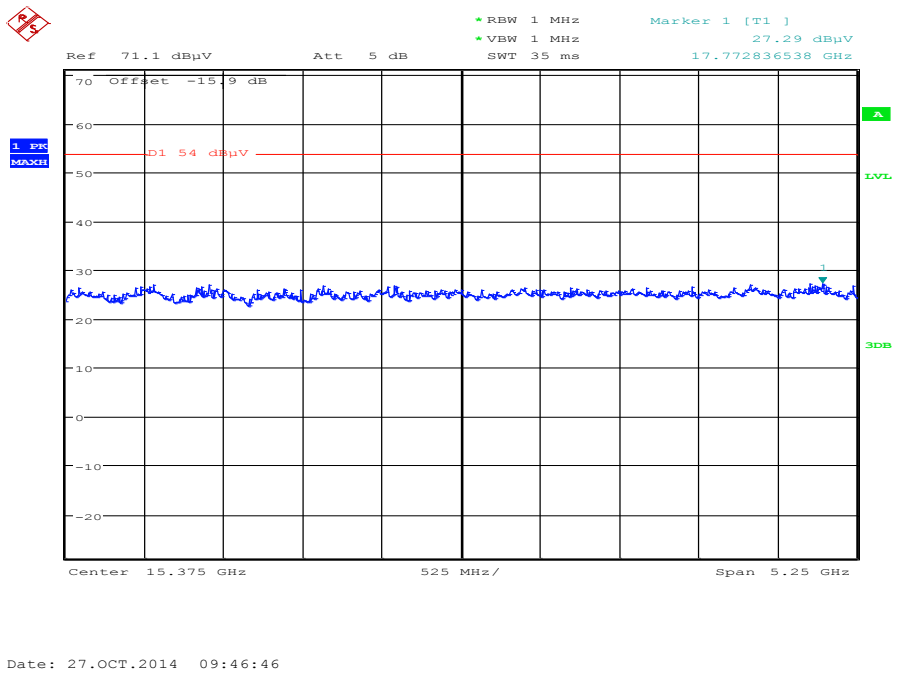
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
36.216000	10.86	30.00	19.14	1000.0	120.000	101.0	H	115	13.9
45.964950	10.74	30.00	19.26	1000.0	120.000	170.0	V	295	13.6
87.792600	6.14	30.00	23.86	1000.0	120.000	170.0	V	25	9.9
503.620500	15.42	36.00	20.58	1000.0	120.000	170.0	H	205	18.8
735.107550	19.74	36.00	16.26	1000.0	120.000	98.0	V	155	22.4
904.038150	21.41	36.00	14.59	1000.0	120.000	170.0	H	115	24.1

Plot 10: 1 GHz to 12.75 GHz, TX mode, channel 78, vertical & horizontal polarization

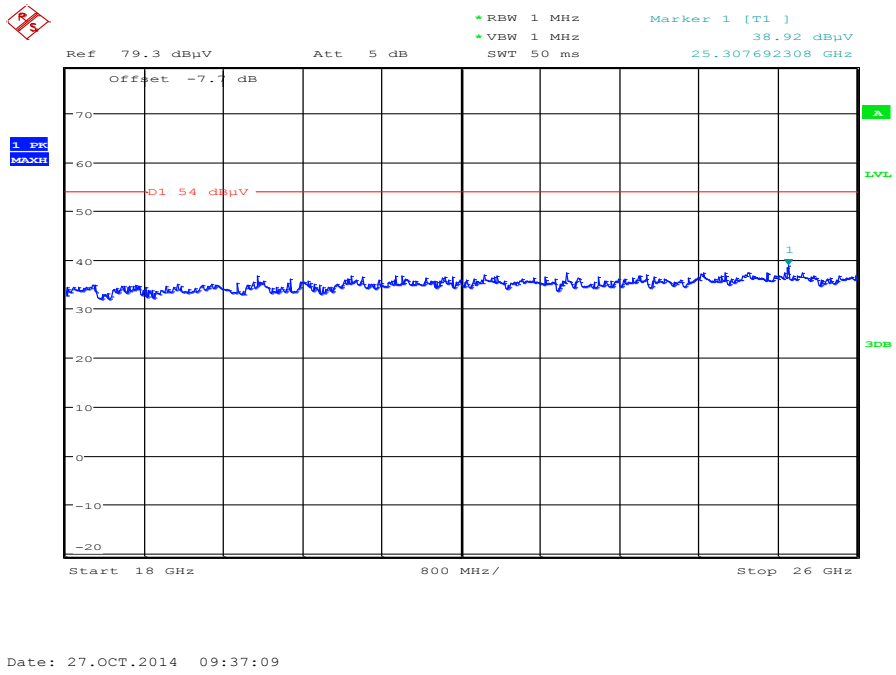


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: 12.75 GHz to 18 GHz, TX mode, channel 78, vertical & horizontal polarization



Plot 12: 18 GHz to 26 GHz, TX mode, channel 78, vertical & horizontal polarization



10.5 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode. The EUT is detached so all oscillators are active.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi peak
Sweep time:	Auto
Video bandwidth:	3 x RBW Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 26 GHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
RX Spurious Emissions Radiated		
Frequency (MHz)	Field strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results:

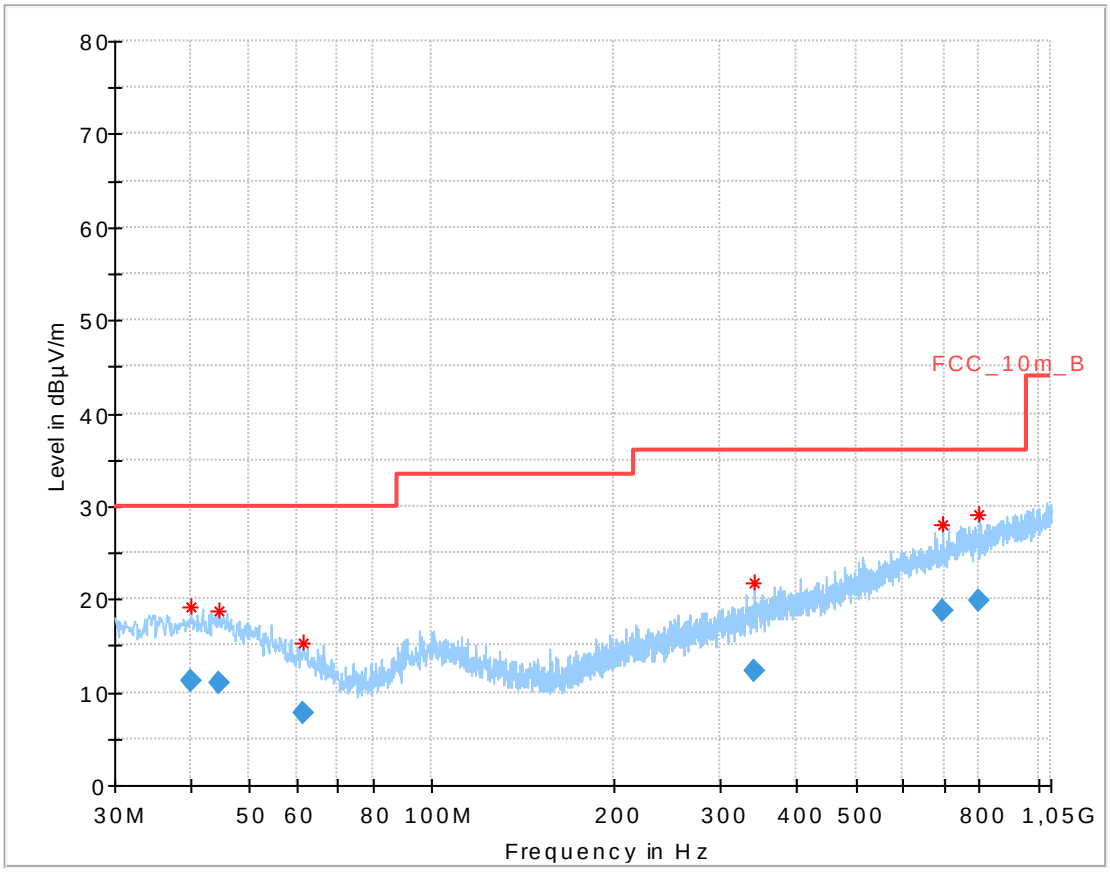
RX spurious emissions radiated [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
All peak emissions above 1 GHz are more Than 6 dB below the average limit		
Measurement uncertainty	±3 dB	

Verdict: **Passed**

Note: The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

Plots:

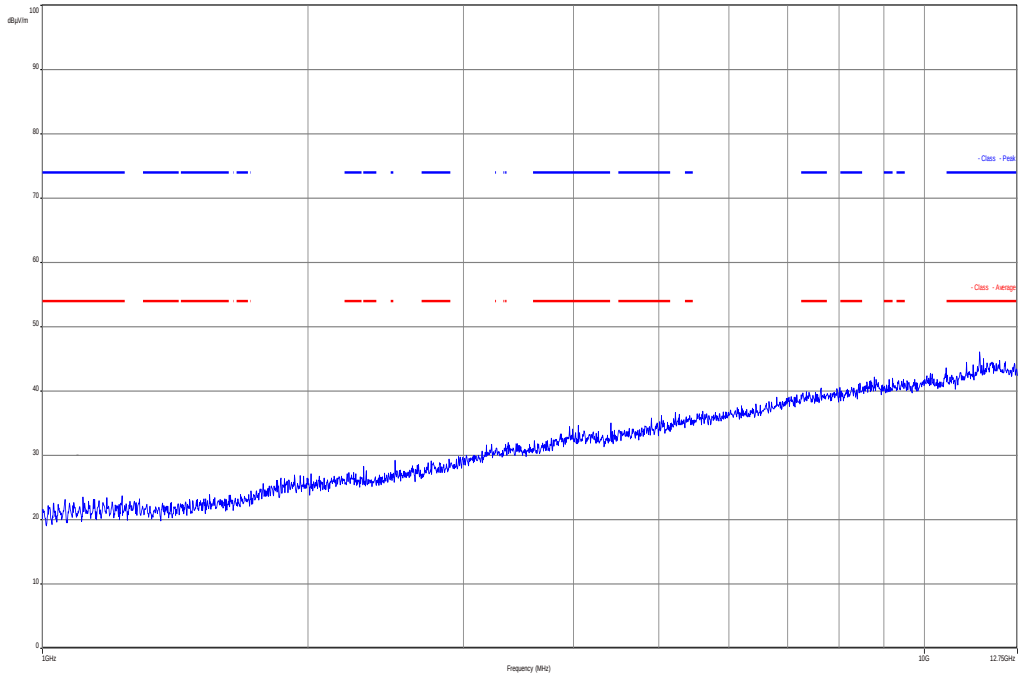
Plot 1: 30 MHz to 1 GHz, RX mode, vertical & horizontal polarization



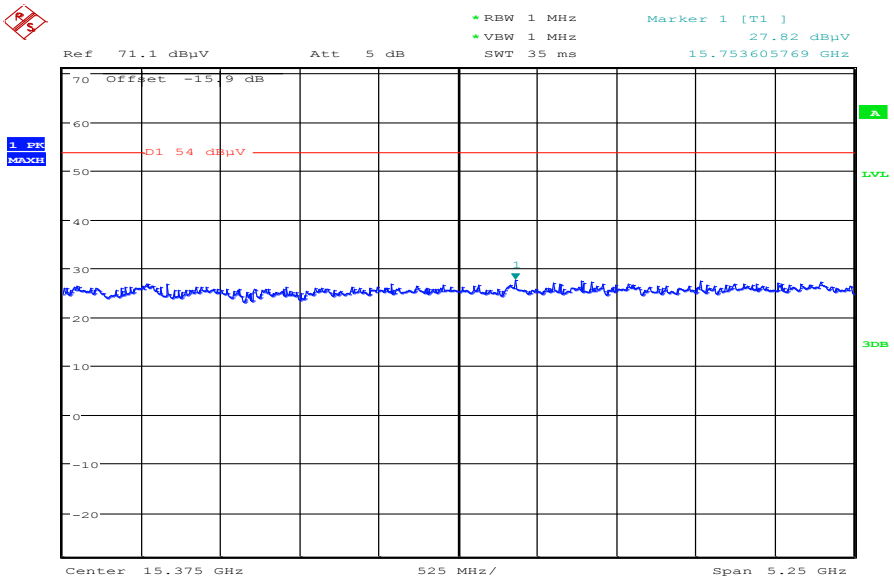
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
40.113000	11.32	30.00	18.68	1000.0	120.000	98.0	V	115	14.0
44.423400	11.07	30.00	18.93	1000.0	120.000	101.0	V	295	13.9
61.165650	7.72	30.00	22.28	1000.0	120.000	170.0	V	0	10.3
339.074250	12.30	36.00	23.70	1000.0	120.000	170.0	H	156	15.7
694.604550	18.84	36.00	17.16	1000.0	120.000	98.0	H	245	21.5
801.178500	19.92	36.00	16.08	1000.0	120.000	98.0	H	0	22.7

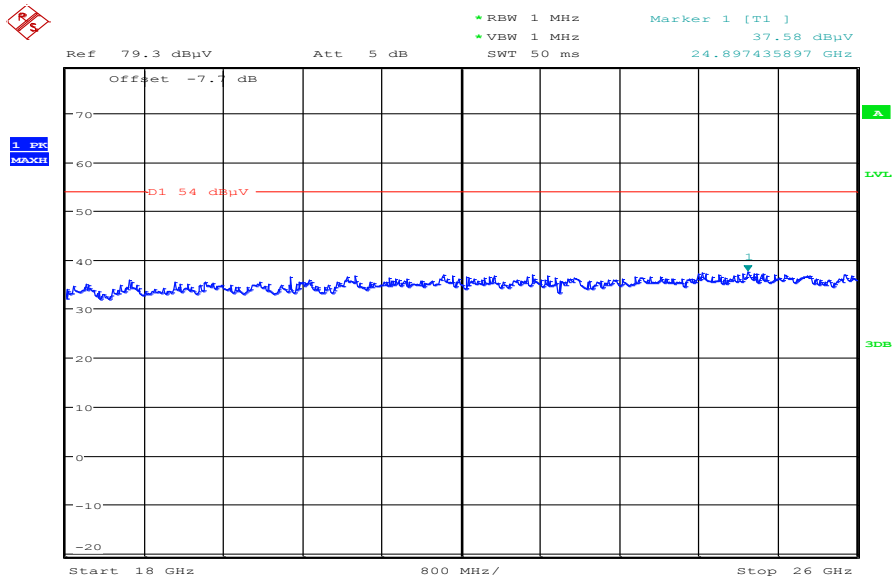
Plot 2: 1 GHz to 12.75 GHz, RX mode, vertical & horizontal polarization



Plot 3: 12.75 GHz to 18 GHz, RX mode, vertical & horizontal polarization



Plot 4: 18 GHz to 26 GHz, RX mode, vertical & horizontal polarization



Date: 27.OCT.2014 09:39:03

10.6 Spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to single channel mode and the transmit channel is channel 39. This measurement is representative for all channels and modes. If critical peaks are found channel 00 and channel 78 will be measured too. The measurement is performed in the mode with the highest output power. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi peak
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
TX spurious emissions radiated < 30 MHz		
Frequency (MHz)	Field strength (dBµV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

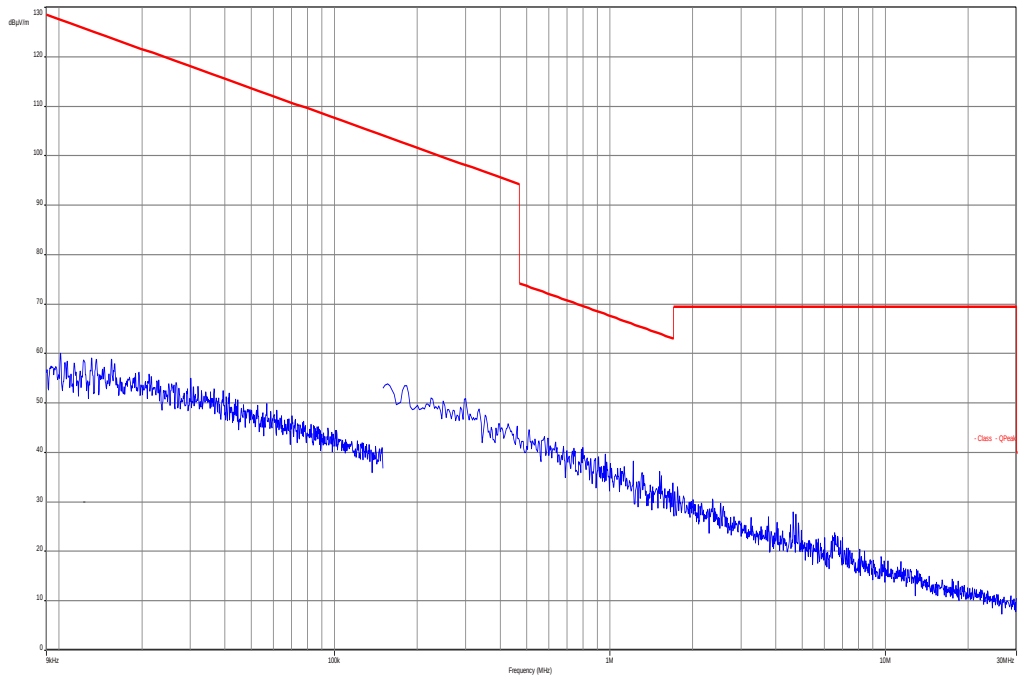
Results:

TX spurious emissions radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No peaks detected		
Measurement uncertainty	± 3 dB	

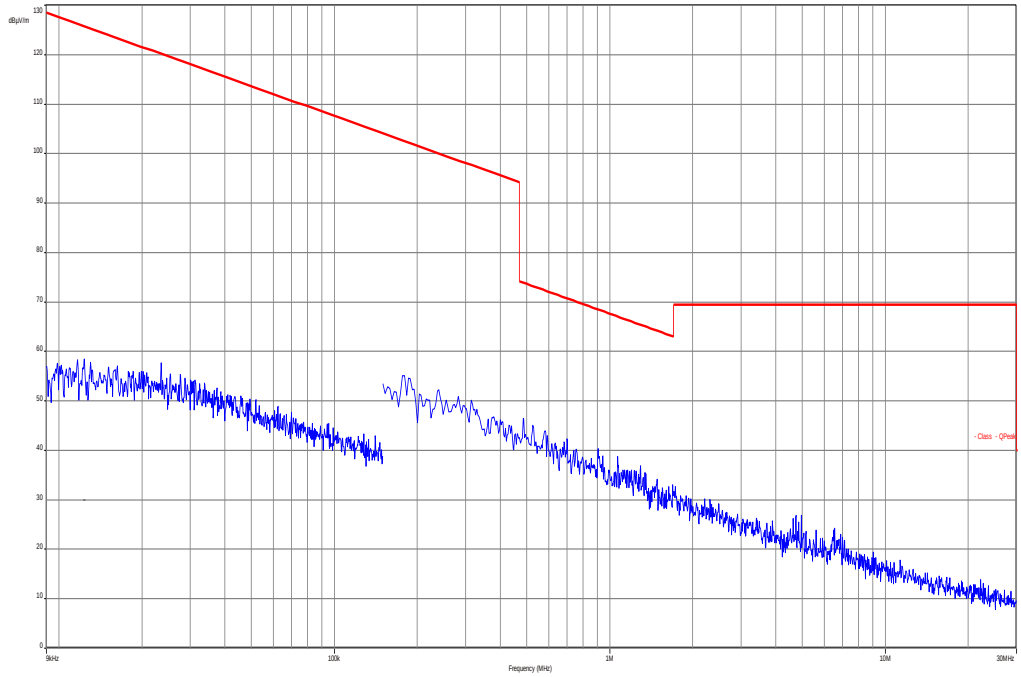
Result: **Passed**

Plots:

Plot 1: 9 kHz to 30 MHz, TX mode



Plot 4: 9 kHz to 30 MHz, RX mode



11 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
4	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
5	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
6	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
7	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	22.04.2014	22.04.2016
8	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	22.01.2014	22.01.2015
9	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
10	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKl!	08.05.2013	08.05.2015
11	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
12	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
13	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	30.01.2014	30.01.2016
14	9	Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155	ne		
15	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
16	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
17	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
18	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
19	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKl!	14.10.2011	14.10.2015
20	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	13.03.2014	13.03.2015
21	n. a.	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000037	300004509	ne		
22	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
23	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
24	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
25	n. a.	Broadband Low Noise Amplifier 18-50 GHz	CBL18503070-XX	CERNEX	19338	300004273	ne		
26	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.10.2014	22.01.2016
27	A031	Std. Gain Horn Antenna 26.5 to 40.0 GHz	637	Narda	GB42110541	300000510	k	19.07.2013	19.07.2015

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkI!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

12 Observations

No observations except those reported with the single test cases have been made.

Annex A Document history

Version	Applied changes	Date of release
	Initial release	2014-11-13
-A	FCC-number and IC-number corrected	2014-11-20

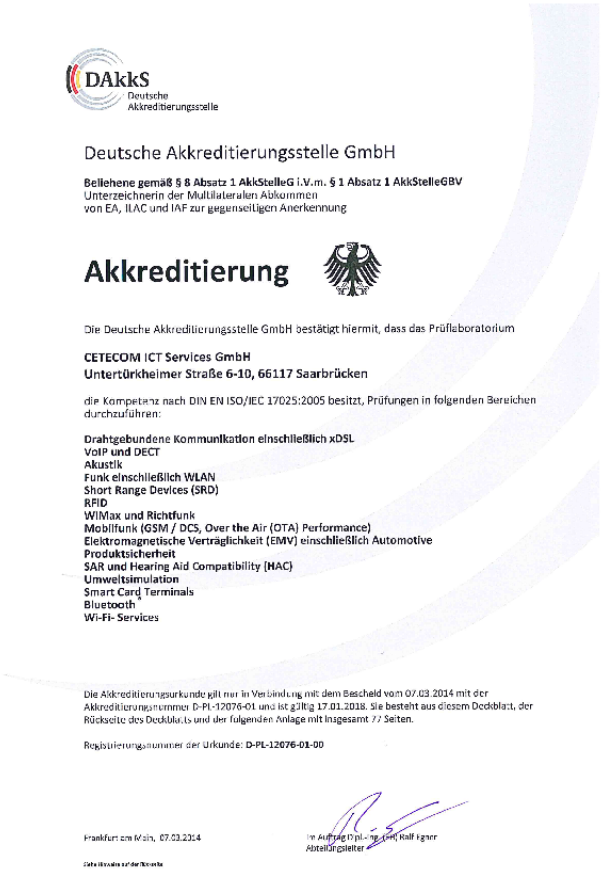
Annex B Further information

Glossary

AVG	-	Average
DUT	-	Device under test
EMC	-	Electromagnetic Compatibility
EN	-	European Standard
EUT	-	Equipment under test
ETSI	-	European Telecommunications Standard Institute
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	Not applicable
PP	-	Positive peak
QP	-	Quasi peak
S/N	-	Serial number
SW	-	Software

Annex C Accreditation Certificate

Front side of certificate



DAkkS
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Unterzeichnerin der Multilateralen Abkommen
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Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10, 66117 Saarbrücken

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VoIP und DECT
Akustik
Funk einschließlich WLAN
Short Range Devices (SRD)
RFID
WiMax und Richtfunk
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Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
Produktsicherheit
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Frankfurt am Main, 07.03.2014

Im Auftrag Dipl.-Ing. (FH) Ralf Egner
Abteilungsleiter

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Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

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