Test Report

47 CFR FCC Part 15 subpart C
Intentional Radiators

Report reference no. .....:	28111932_009
FCC Designation Number.....:	IT0008
FCC Test Firm Registration #.....:	804595
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Approved by (name + signature).....:	Giovanni Molteni \ TM
Date of issue.....:	October, 19th 2018
Total number of pages.....:	81 Pages
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Applicant's name.....:	Siemens AG Industry Sector
Address .....:	Postfach 48 48 90026 NÜRNBERG - GERMANY
Test item description .....:	Wireless Reader
Trade Mark.....:	SIEMENS
Manufacturer .....:	Siemens AG Industry Sector
Model/Type reference .....:	SIMATIC RF615R SIMATIC RF610R
FCC id.....:	NXW-RF615R NXW-RF610R
Ratings .....:	20-30 V Supplied by an external power supply (100-240V 50/60 Hz)
Sample.....:	
Samples received on.....:	21/Aug/2018
TUV reference samples.....:	180514 (sampled by the customer)
Samples tested n.....:	1
Testing.....:	
Start Date: .....:	07/Sept/2018
End Date: .....:	14/Sept/2018

SUMMARY

1. Reference Standards		2.
Standard	**Description**	
FCC Part 15 (Subpart C)	§15.247 Operation within the bands 902-928 MHz, 2400-2483,5 MHz, and 5725-5850 MHz.	
FCC Part 15 (Subpart C)	§15.207 Conducted Limits	
FCC Part 15 (Subpart C)	§15.209 Radiated emission limits; general requirements	
FCC Part 15 (Subpart C)	§15.203 Antenna Requirement	
ANSI C63.4:2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	
ANSI C63.10:2013	American National Standard for Testing Unlicensed Wireless Devices	

3. Summary of testing		
§ 15.203 § 15.247 (b)(4)(i)	Antenna Requirements	PASS
§ 15.207 (a)	Power Line Conducted Emission	PASS
§ 15.209 (a) (f)	Radiated Emission	PASS
§ 15.247 (d)	Out-of-band emissions	PASS
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edges	PASS
§ 15.247 (a)	Frequency Hopping Spread Spectrum Specifications	
§ 15.247(a)	20 dB Bandwidth	PASS
§ 15.247(a)(1)	Carrier frequency (Hopping Channel) Separation	PASS
§ 15.247(a)(1)(iii)	Number of Hopping Channels Used	PASS
§ 15.247(a)(1)(iii)	Time occupancy (Dwell Time) of Each Ch. within a 0,4 x Nch (sec) Period	PASS
§ 15.247(a)(2)	6dB Minimum Bandwidth	N.A.[1]
§ 15.247(b)	Maximum Peak Output Power	
§ 15.247(b) (1)	Peak Output Power, radiated (ElRP)	PASS
§ 15.247(b) (3)	RF power output, radiated (EIRP)	N.A.[1]
§ 15.247(b) (4)	Antenna gain	
§ 15.247(c)	Operation with directional antenna gains greater than 6 dBi	N.A.
§ 15.247 (e)	Power Spectral Density	N.A.[1]
§ 15.247 (f)	Hybrid systems	N.A.
§ 15.247 (g)	FHSS Transmission characteristics	PASS
§ 15.247 (h)	Recognition of occupied channel and multiple transmission system	N.A
§ 15.247(i) (§ 47CFR 1.1307(b)(1))	RF humane exposure	PASS

Note 1	Not applicable for DSS equipment

Possible test case verdicts:	
- test case does not apply to the test object .. :	N/A
- test object does meet the requirement ..... :	PASS
- test object does not meet the requirement .. :	FAIL

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

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"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

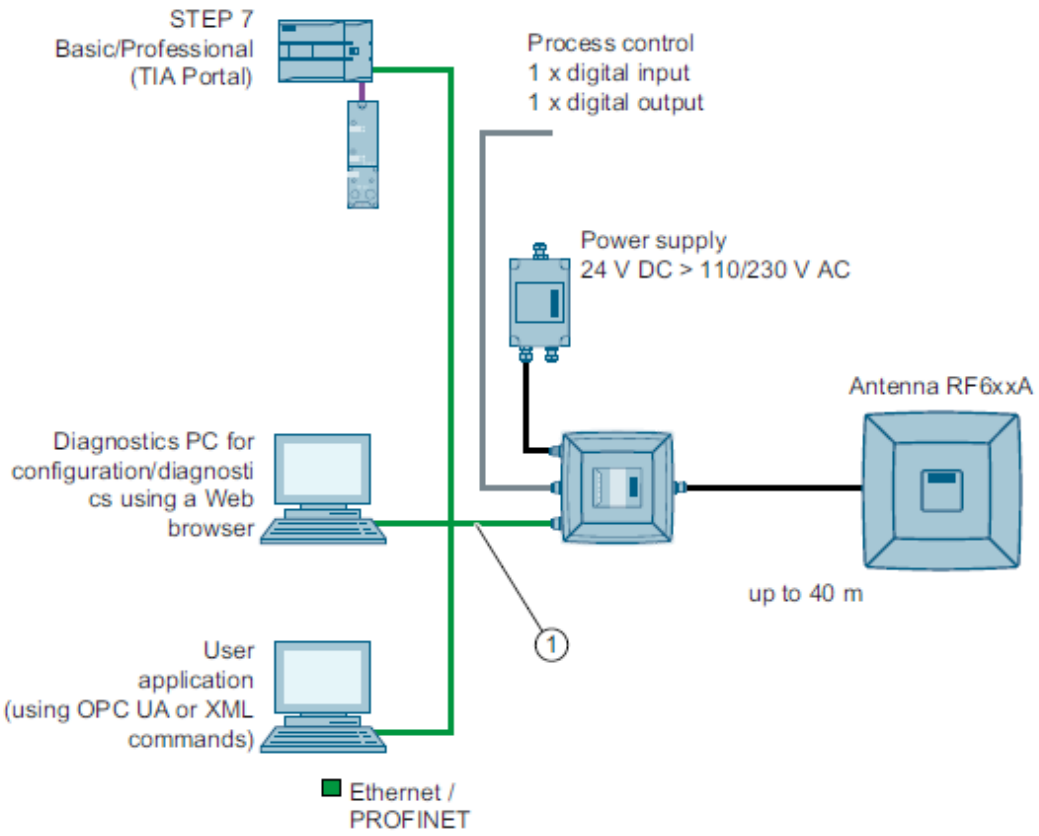
Throughout this report a comma is used as the decimal separator.

4. General product information

SIMATIC RF615R / RF610R

RF615R reader is suitable for applications in production logistics and distribution. It is characterized by a very compact design - with reduced transmit power - an internal antenna and a POE (Power over Ethernet) power supply.

It is integrated for distribution via Ethernet with the XML protocol or OPC UA. PROFINET is available for integration in production logistics. It is equipped with an integrated antenna and has a connector for an external antenna.



SIMATIC RF610R (variant)

The UHF RFID Readers RF610R and RF615R utilize the identical HW and SW plattforms, whereby RF615R employs all components and interfaces whereas for the RF610R the circuitry and connectors have been omitted in comparison to the RF615R, as follows:

- Circuitry and connector for Digital-IO (blue colour) are not available
- Circuitry for Antenna Switch is not mounted
- Circuitry and connector for external Antenna and Antenna control are not mounted

From a technical point of view these modifications neither effect the radio profile nor are the EMC properties worsened of the RF610R in comparison to the RF615R.

5. General Chipset information

Type of equipment	Radio module
Operating frequency	902 ÷ 928 MHz
Equipment Class	DSS
Max radiated power	127,55 dBµV/m (QP level at 3m. distance)
Modulation	GFSK
Channel Spacing	500kHz
Channel bandwidth	75kHz
Number of channels	50

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	**902.750**	2	903.250	3	903.750	4	904.250
5	904.750	6	905.250	7	905.750	8	906.250
9	906.750	10	907.250	11	907.750	12	908.250
13	908.750	14	909.250	15	909.750	16	910.250
17	910.750	18	911.250	19	911.750	20	912.250
21	912.750	22	913.250	23	913.750	24	914.250
25	914.750	26	**915.250**	27	915.750	28	916.250
29	916.750	30	917.250	31	917.750	32	918.250
33	918.750	34	919.250	35	919.750	36	920.250
37	920.750	38	921.250	39	921.750	40	922.250
41	922.750	42	923.250	43	923.750	44	924.250
45	924.750	46	925.250	47	925.750	48	926.250
49	926.750	50	**927.250**				

6. General Antennas information	
Internal Antenna antenna gain in the frequency band 902 to 928 MHz: 0dBi	External Antenna RF650A model: antenna Gain in the frequency band 902 to 928 MHz: +3.5dBi

7. Photographic documentation

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8. Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	Wireless Reader	Siemens AG Industry Sector	RF615R	---
AE	PC	Lenovo	T430	Used to set RF module

Note:

* Use :

EUT - Equipment Under Test,
AE - Auxiliary/Associated Equipment, or
SIM - Simulator (Not Subjected to Test)

No other Auxiliary/Associated Equipment was connected/installed on the EUT

9. Input/Output Ports

CONNECTIONS

Port		Description	Connection	Dimensions/lenght
1	Enclosure	Non-conductive surface	Closed by pressure	---
2	AC Power Port	AC	External power supply 100-240V 50760Hz	<1m
3	DC Power Port	DC	⎓ 20-30 V Supplied by an external power supply	<3m
4	LAN	WN	Industrial Ethernet, M12	---
5	Analogue/digital data ports	I/O	RS 422 Data line	>3m

*Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
WN = Wired Network

10. Power Interface						
Mode #	**Voltage (V)**	**Current (A)**	**Power (W)**	**Frequency (DC/AC-Hz)**	**Phases (#)**	**Comments**
Rated	120V	---	---	AC-60Hz	1	---

11. EUT Operation Modes	
Operation mode	**Description**
#1	Continuous Modulated RF Transmission (at selected channel) External Antenna RF650A selected Power setting during tests: +25dBm
#2	Continuous Modulated RF Transmission (at selected channel) Internal Antenna selected Power setting during tests: +24dBm
#3	Continuous Modulated RF Transmission (at selected channel) External Antenna RF650A selected Power setting during tests: +25dBm Conducted test on antenna connector
#4	Equipment in transmission/reception mode (continuous reading to associated TAG) Radiated test

12. EUT Configuration Modes	
Mode #	**Description**
#1	EUT configured to transmit on external antenna model RF650A.
#2	EUT configured to transmit on internal antenna.

12. Test Conditions and Results

12.1 TEST: Antenna requirements			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	21°C	
	Relative Humidity (%)	56%	
	Air pressure (hPa)	1020	
—	Power supply and Frequency	Application Point	
Fully configured sample tested at the power line frequency	120V ~ 60Hz	AC Mains	
Equipment mode:	Operation mode	----	
FCC Standard	§15.203 § 15.247 (B)(4)(I)		

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

Antenna specifications	
N° of authorized antenna types	2 (external antennas)
Antenna type	model RF650A (+3.5dBi)
Maximum total gain	+3.5dBi
External power amplifiers	Not present

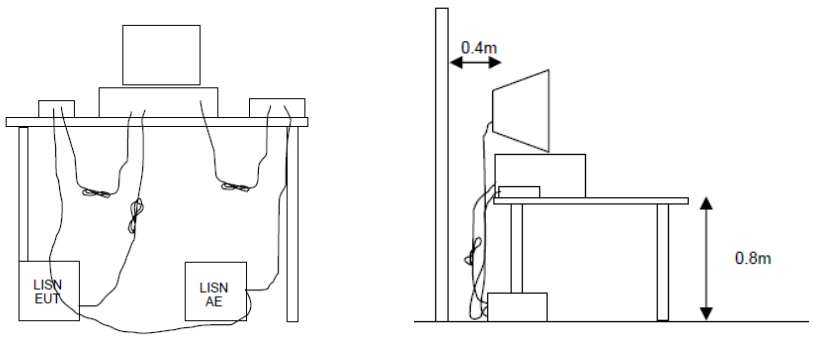
12.2 TEST: AC Power Conducted Emission			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	21°C	
	Relative Humidity (%)	56%	
	Air pressure (hPa)	1020	
—	Power supply and Frequency	Application Point	
Fully configured sample tested at the power line frequency	120V ~ 60Hz	AC Mains	
Equipment mode: #2	Operation mode	#4	
FCC Standard	§15.207		

Frequency (MHz)	Quasi-peak (dBuV)	Average (dBuV)	Result
0,15-0,5	66 to 56	56 to 46	PASS
0,5-5	56	46	PASS
5-30	60	50	PASS

Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

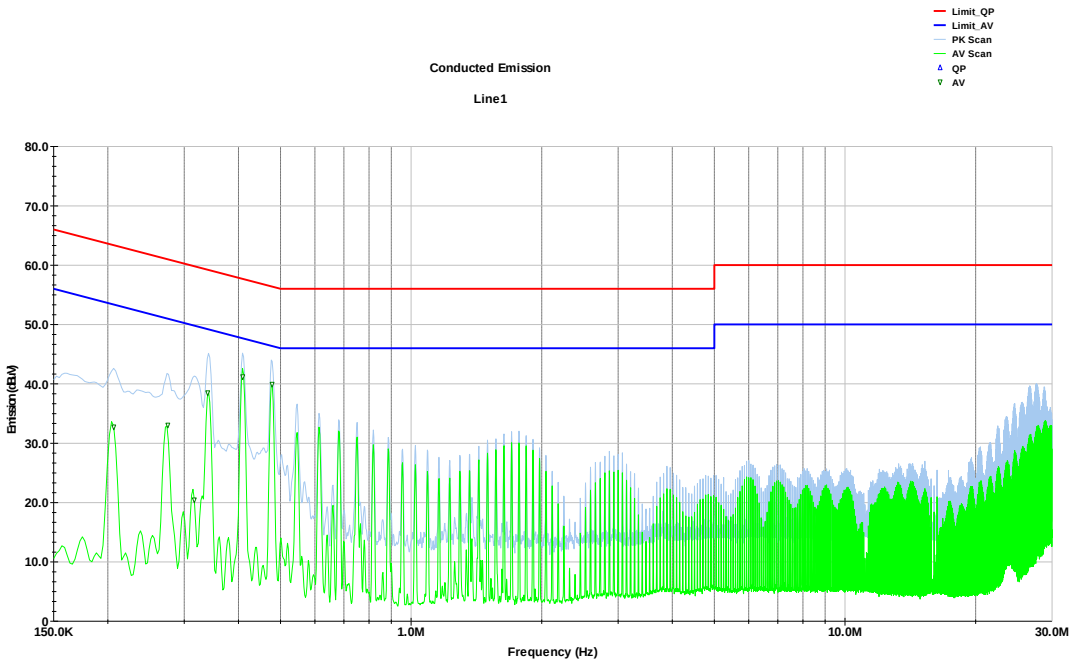
Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

Further information to test setup



Test Equipment Used					
Description	Manufacturer	Model	TUV Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESR3	87020864	11/2017	11/2018
LISN	R&S	ENV216	87020993	01/2018	01/2020

Graphical representation of Mains Terminal Disturbance Voltage Measurement
Operation Mode: #4
Low Channel (902.75MHz)
Phase



Final Measurement - Table representation of Mains Terminal Disturbance Voltage Measurement

Operation Mode: #4

Low Channel (902.75MHz)

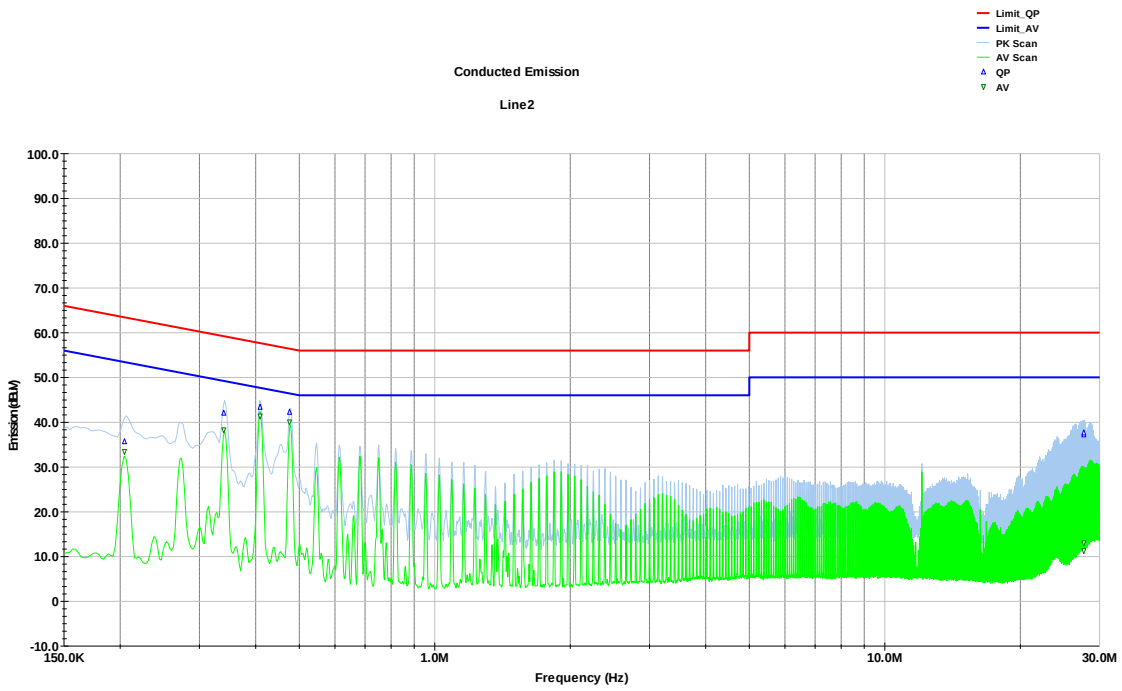
Phase

Test Results

Tested Port	Line	Frequency (MHz)	Quasi-Peak			Average Value			Factor total Line P (dB)
			Value (dBµV)	Limit (dBµV)	Margin (dB)	Value (dBµV)	Limit (dBµV)	Margin (dB)	
AC Mains	P	0.206	34.97	63.36	-28.38	32.67	53.36	-20.69	9.581
AC Mains	P	0.276	34.97	60.95	-25.98	32.97	50.95	-17.98	9.581
AC Mains	P	0.316	31.34	59.80	-28.46	20.42	49.80	-29.38	9.582
AC Mains	P	0.340	42.66	59.20	-16.54	38.44	49.20	-10.76	9.582
AC Mains	P	0.409	43.31	57.67	-14.35	41.17	47.67	-6.49	9.583
AC Mains	P	0.478	42.32	56.37	-14.05	39.93	46.37	-6.44	9.584

Note: Factor total = Lisn factor + Cable factor

Graphical representation of Mains Terminal Disturbance Voltage Measurement
Operation Mode: #4
Neutral



Final Measurement - Table representation of Mains Terminal Disturbance Voltage Measurement

Operation Mode: #4

Neutral

Test Results

Tested Port	Line	Frequency (MHz)	Quasi-Peak			Average Value			Factor total Line N (dB)
			Value (dBµV)	Limit (dBµV)	Margin (dB)	Value (dBµV)	Limit (dBµV)	Margin (dB)	
AC Mains	N	0.204	35.69	63.44	-27.75	33.48	53.44	-19.96	9.571
AC Mains	N	0.340	42.00	59.20	-17.20	38.34	49.20	-10.86	9.582
AC Mains	N	0.409	43.30	57.67	-14.37	41.33	47.67	-6.34	9.583
AC Mains	N	0.476	42.27	56.41	-14.14	40.02	46.41	-6.39	9.584
AC Mains	N	27.598	37.28	60.00	-22.72	13.02	50.00	-36.98	9.845
AC Mains	N	27.736	37.65	60.00	-22.35	11.21	50.00	-38.79	9.845

Note: Factor total = Lisn factor + Cable factor

12.3 TEST: Radiated Emission			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	22°C	
	Relative Humidity (%)	54%	
	Air pressure (hPa)	1020	
—	Power supply and Frequency	Application Point	
Fully configured sample tested at the power line frequency	120V ~ 60Hz	Enclosure	
Equipment mode: #1 #2	Operation mode	#1 #2	
FCC Standard	§15.205; §15.209; §15.247		

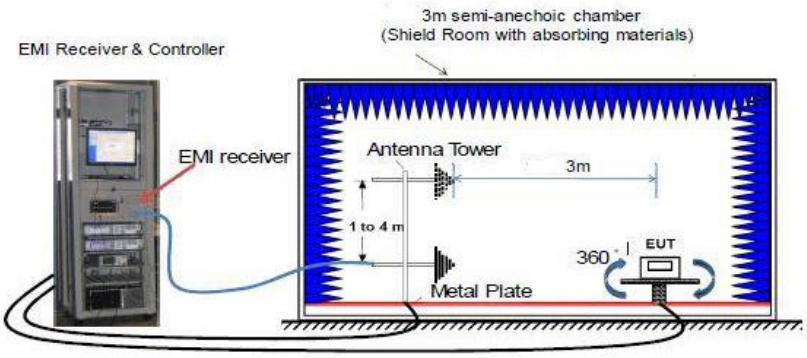
Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

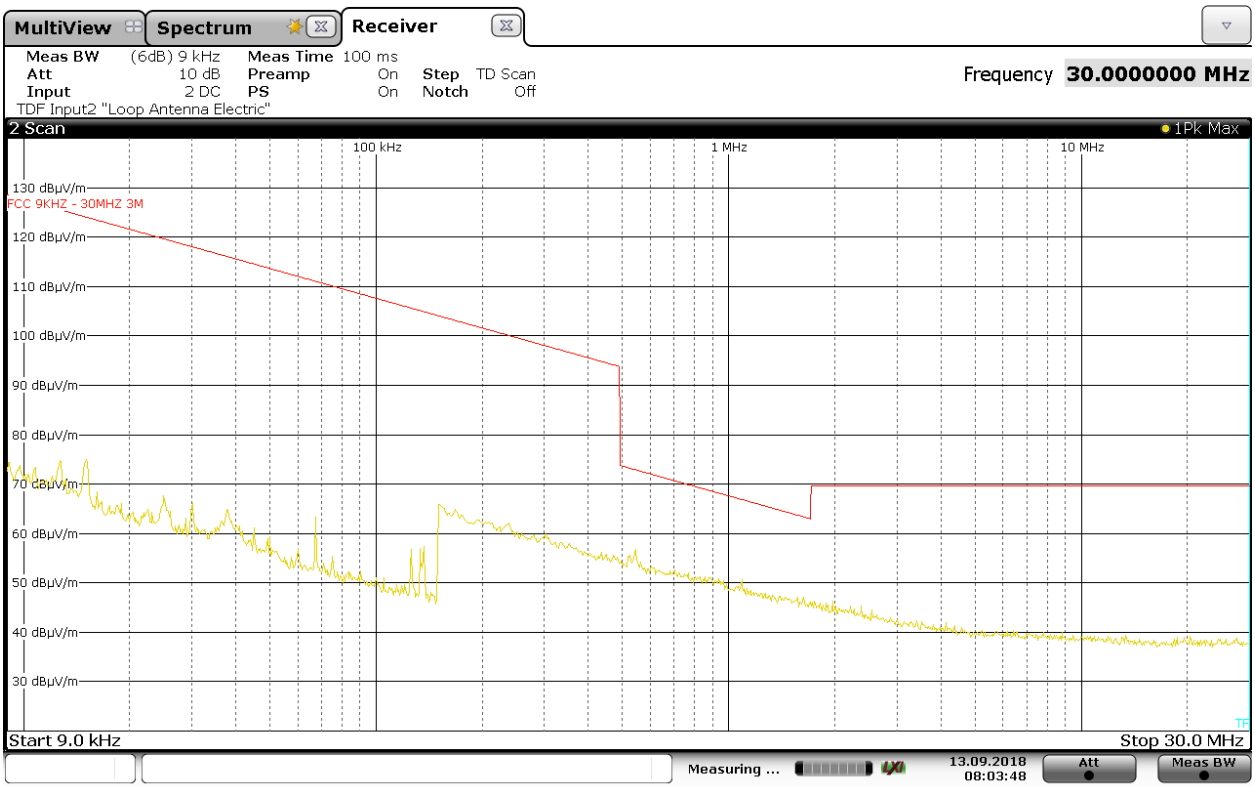
Remark: In accordance with part 15.31 (f) (2), where the measurement distance was specified to be 30 or 300 meters, a correction factor was applied in order to permit measurement to be performed at a separation distance. The applied formula for limits at 3 meter is:Extrapolation (dB) = 40log (300meter / 3meter) = +80db Extrapolation (dB) = 40log (30meter / 3meter) = +40db

Further information to test setup.
For frequencies above 1GHz, the anechoic material is also placed on the metallic floor between EUT and Antenna

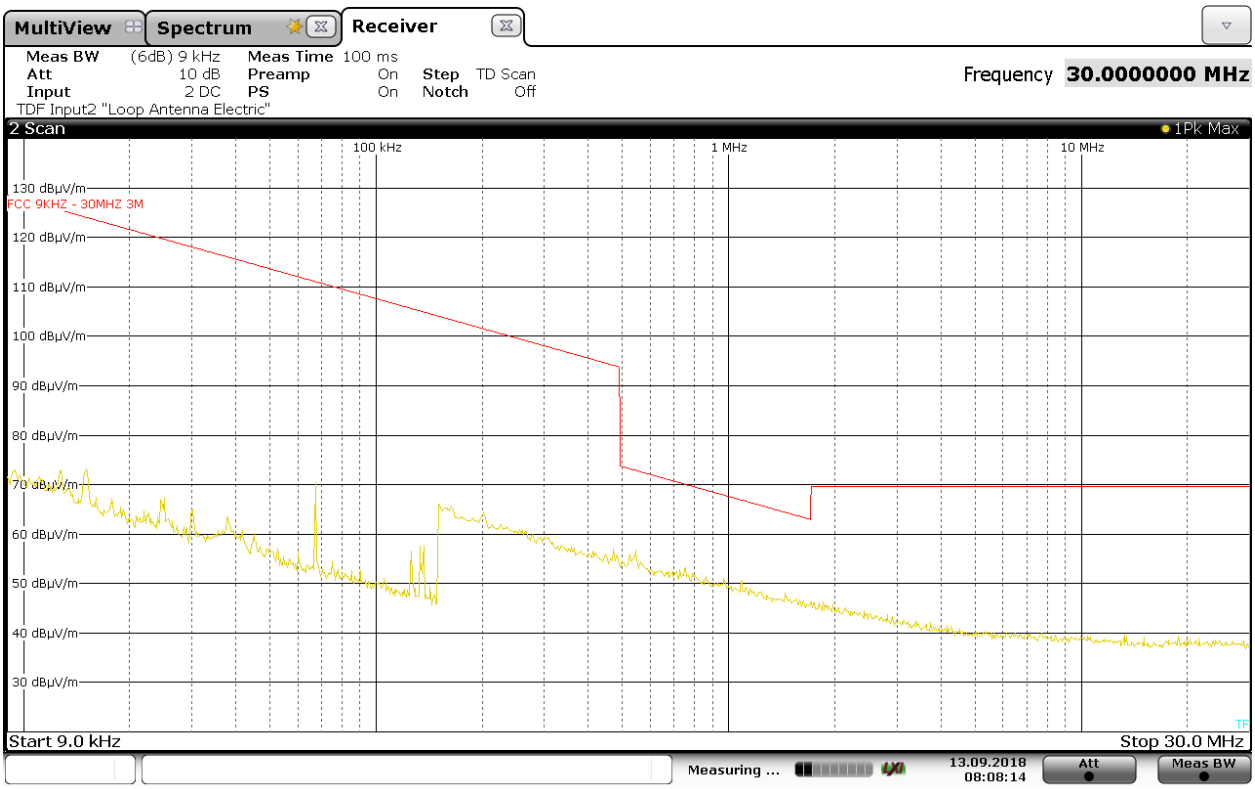


Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
CSSA	ETS Lindgren	FACT3	87020484	07/2017	07/2019
EMI Test Receiver	R&S	ESW44	87020967	06/2018	06/2019
Loop Antenna	EMCO	6512	87020465	02/2017	02/2020
Antenna BiConiLog	ETS Lindgren	3142E	87020457	04/2017	04/2020
Antenna Horn with Preamplifier	ETS Lindgren	3117-PA	87020458	04/2017	04/2020
Highpass Filter	Wainwright Instr.	WHKX10-1170-1300	87020800	05/2018	05/2019

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 9kHz – 30MHz
Low Channel (902.75MHz)

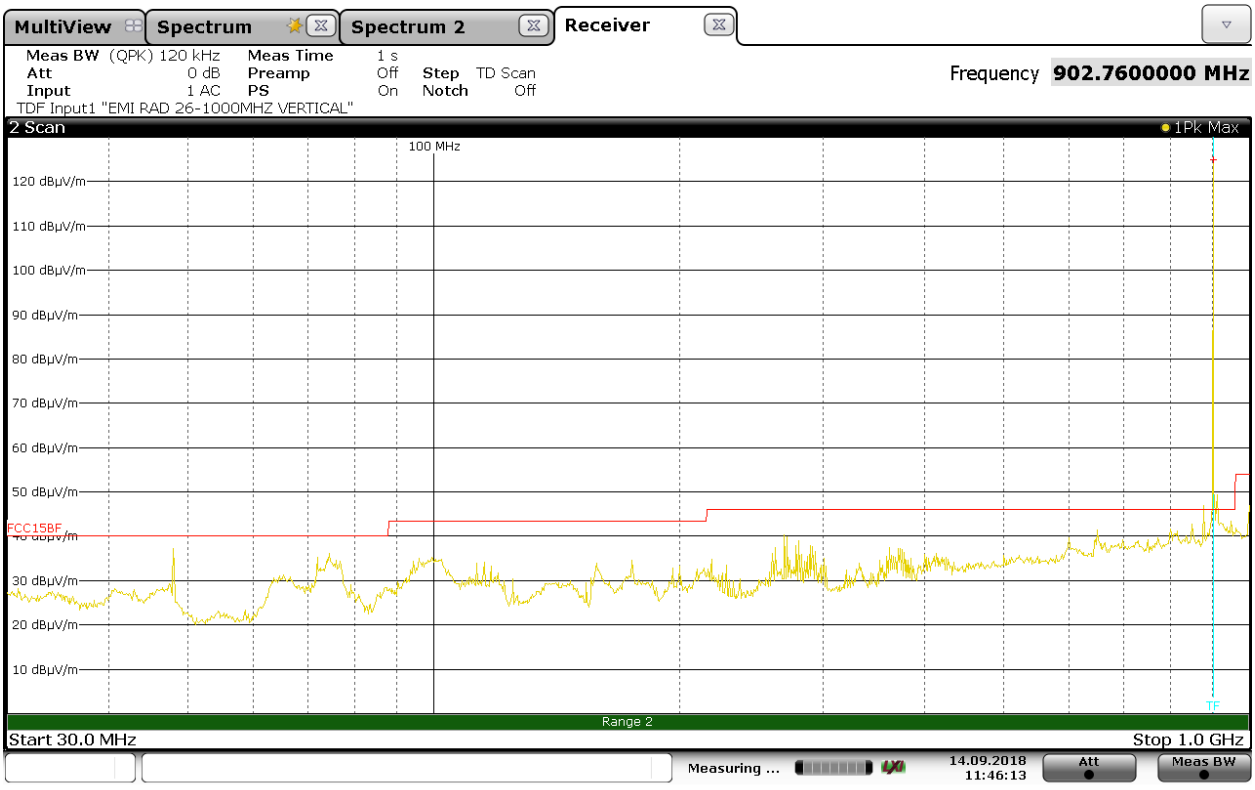


Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 9kHz – 30MHz
Middle Channel (915.25MHz)



Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 150kHz – 30MHz
High Channel (927.25MHz)

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 30MHz – 1GHz
Antenna Polarization: Vertical
Low Channel (902.75MHz)

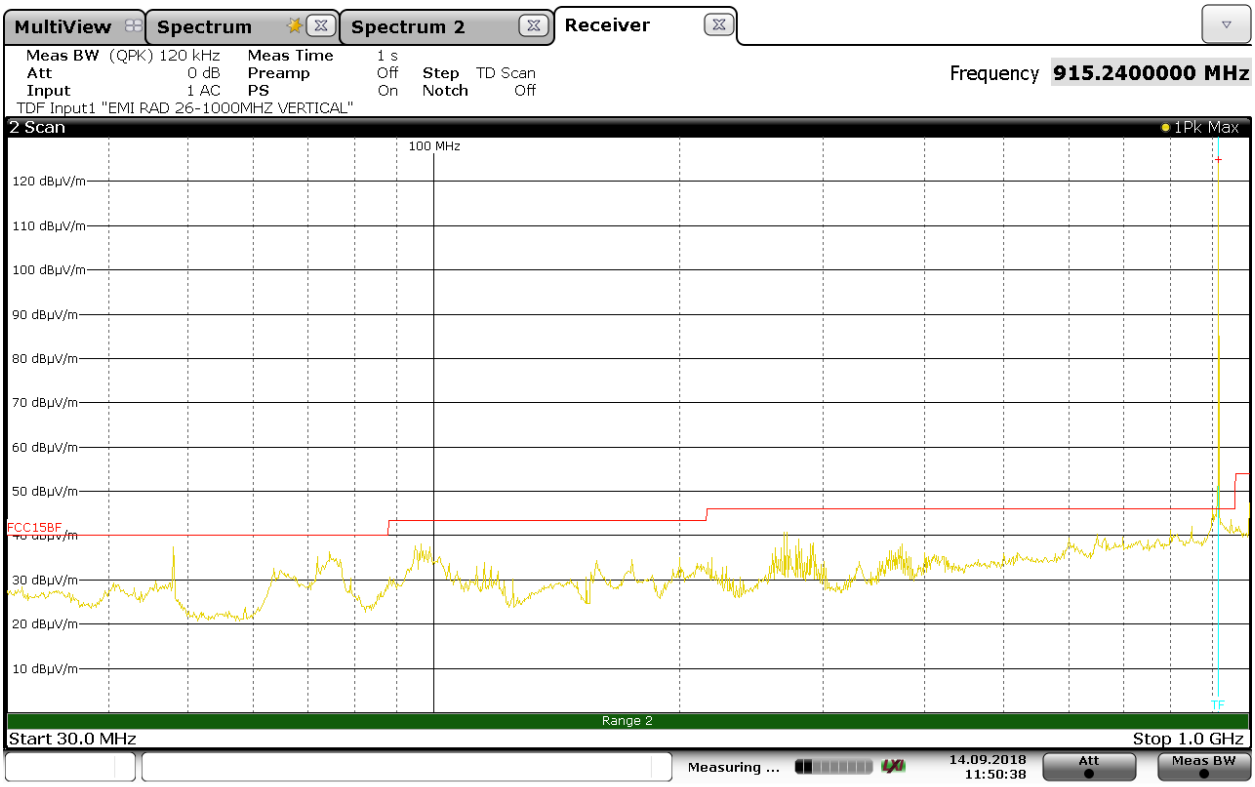


QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
902,75 (fundamental)	95,58	25,30	4,07	Not present	**124,95**

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 30MHz – 1GHz
Antenna Polarization: Horizontal
Low Channel (902.75MHz)

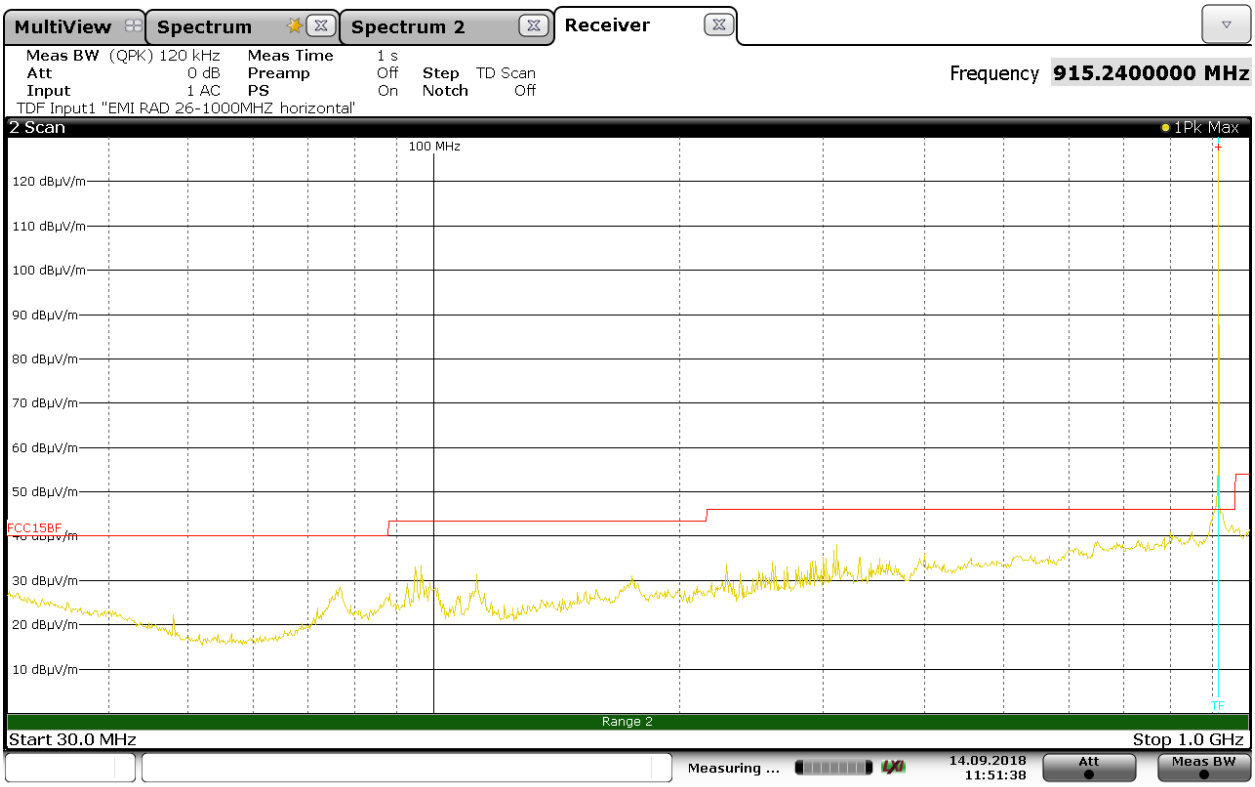
QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
902,75 (fundamental)	98,01	25,30	4,07	Not present	**127,47**

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 30MHz – 1GHz
Antenna Polarization: Vertical
Middle Channel (915.25MHz)



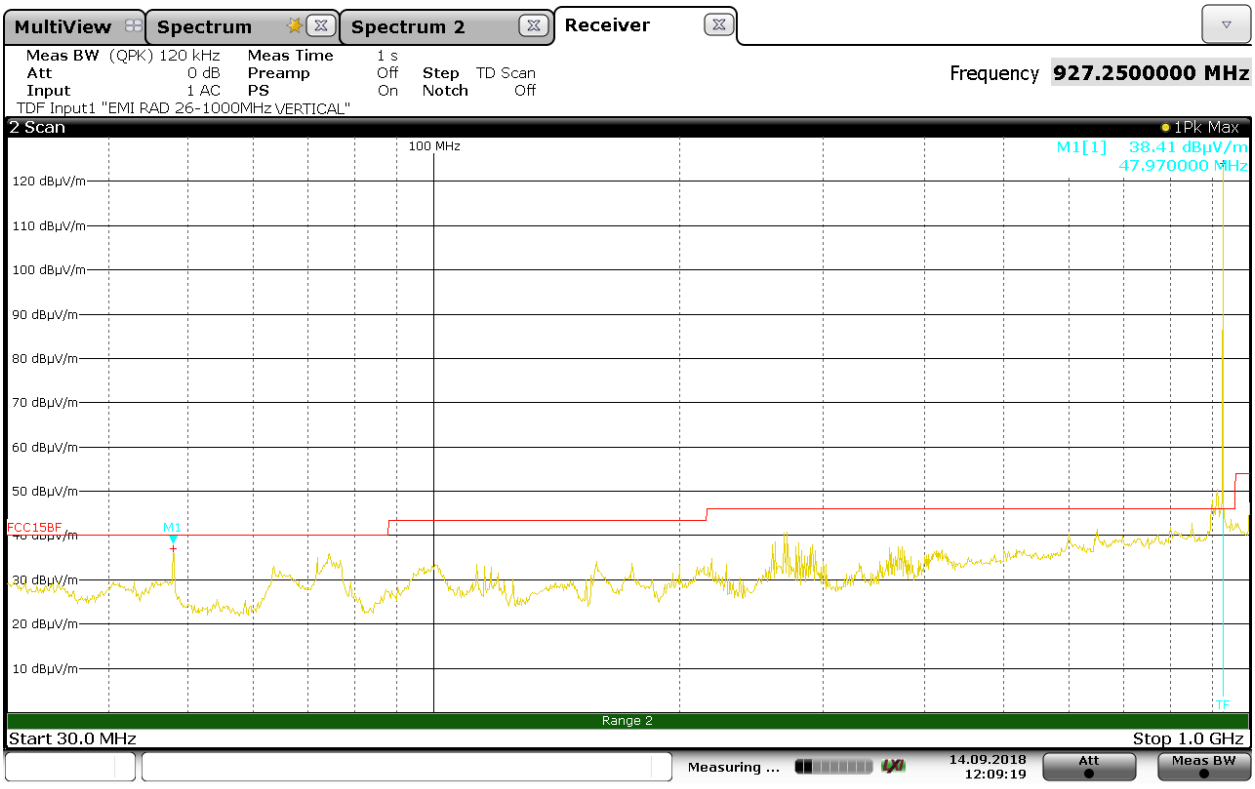
QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
915,25 (fundamental)	95,68	25,30	4,07	Not present	**125,05**

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 30MHz – 1GHz
Antenna Polarization: Horizontal
Middle Channel (915.25MHz)



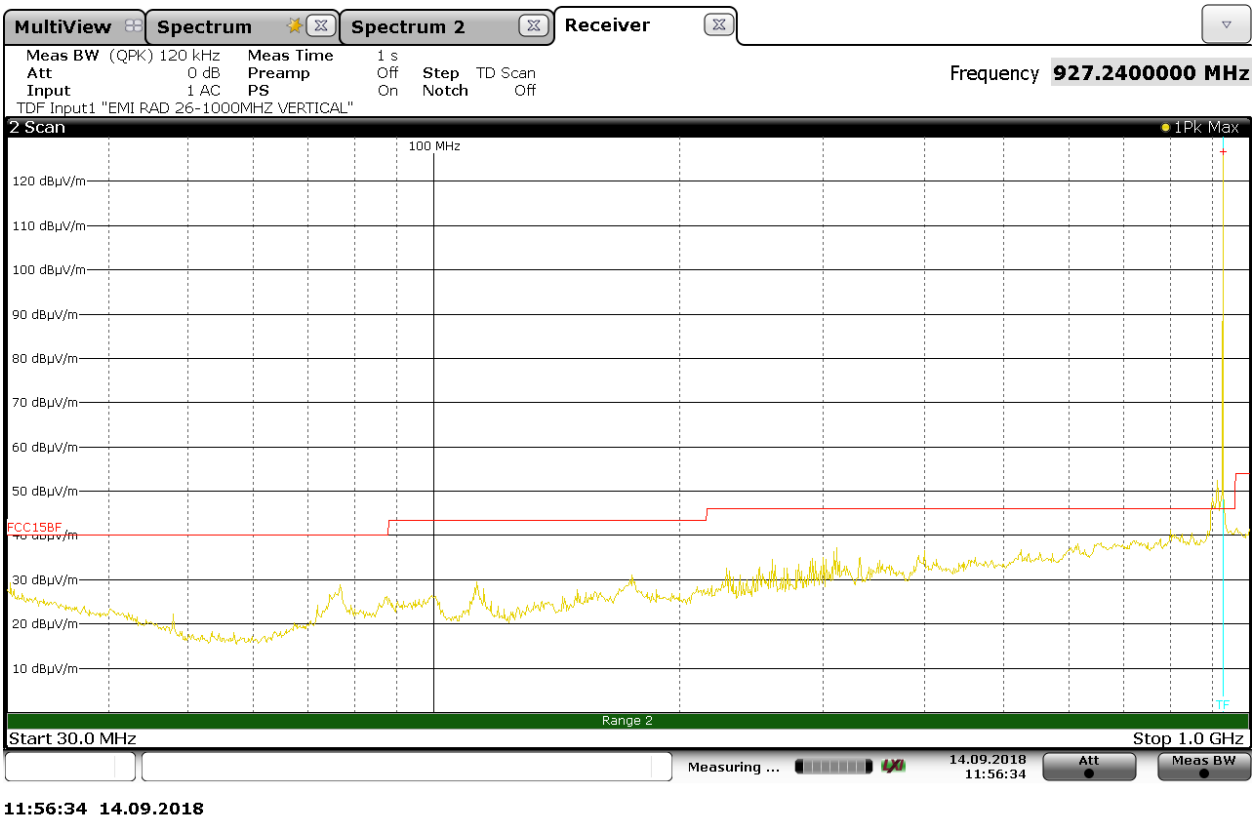
QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
915,25 (fundamental)	98,18	25,30	4,07	Not present	**127,55**

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 30MHz – 1GHz
Antenna Polarization: Vertical
High Channel (927.25MHz)



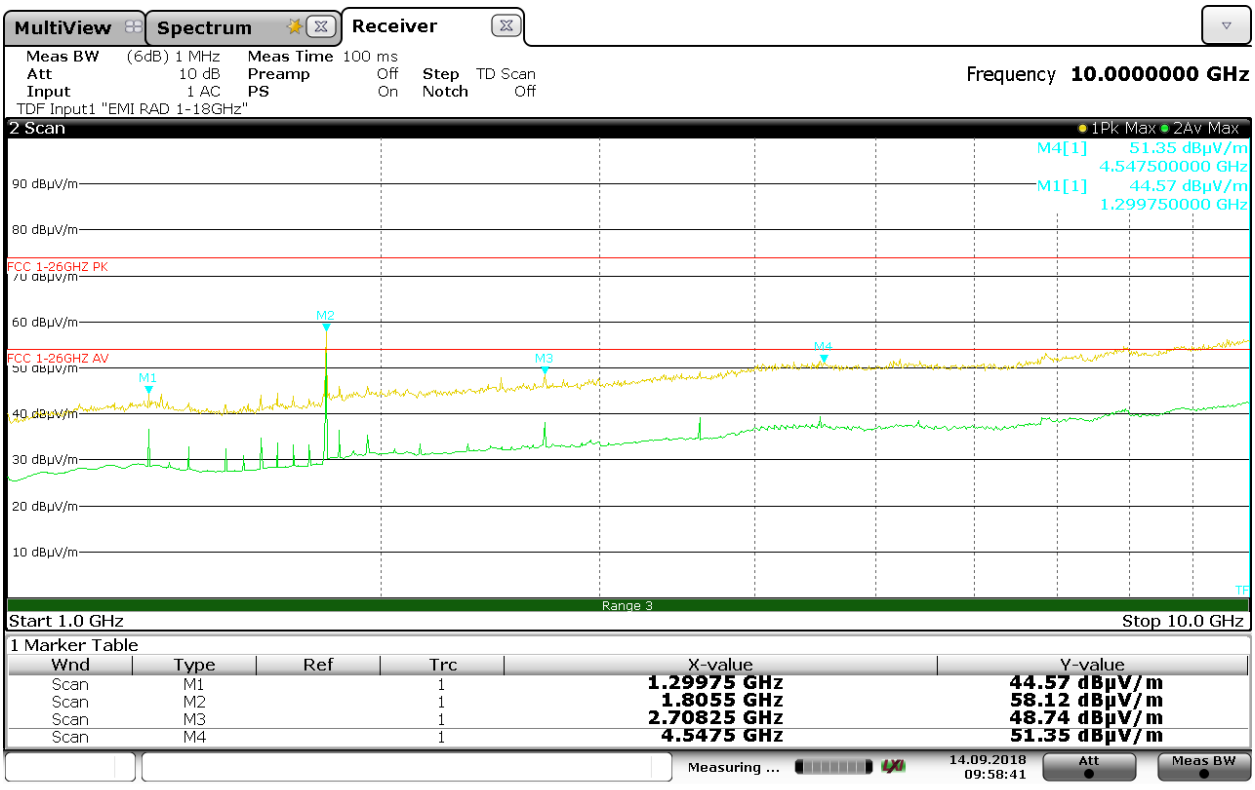
QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
47,97	14,22	21,90	0,95	Not present	**37,07**
927,25 (fundamental)	94,66	25,34	4,13	Not present	**124,13**

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 30MHz – 1GHz
Antenna Polarization: Horizontal
High Channel (927.25MHz)



QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
927,25 (fundamental)	96,88	25,34	4,13	Not present	**126,35**

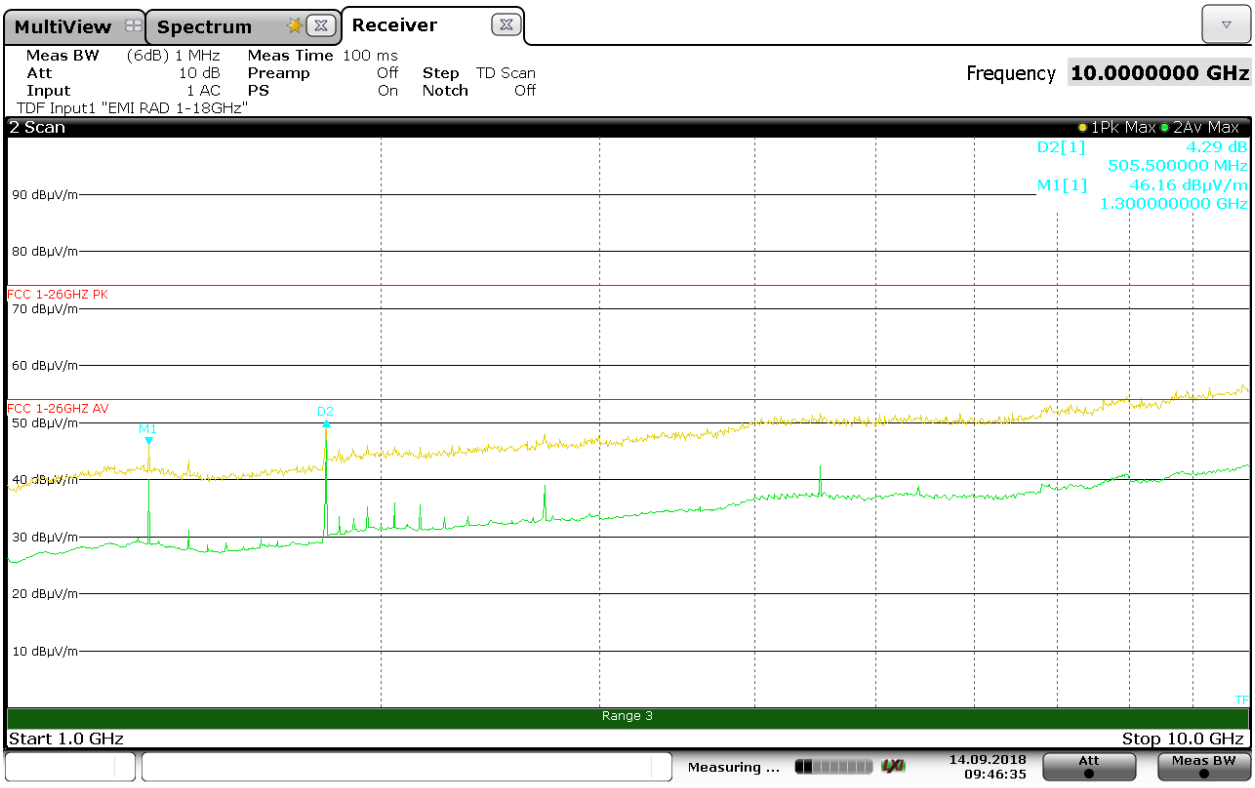
Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 1GHz – 10GHz
Antenna Polarization: Vertical
Low Channel (902.75MHz)



PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**	**/**	**(dBµV/m)**	**(dB)**
1299,75	55,19	28,43	44,50	5,45	**44,57**	no	104,95*	60,38
1805,50	66,00	30,60	44,50	6,02	**58,12**	no	104,95*	46,83
2708,25	53,50	32,64	44,80	7,40	**48,74**	yes	74,00	25,26
4547,50	49,89	33,89	43,60	11,15	**51,35**	yes	74,00	22,65
*=fundamental level (QP) in Vertical polarization – 20dB								

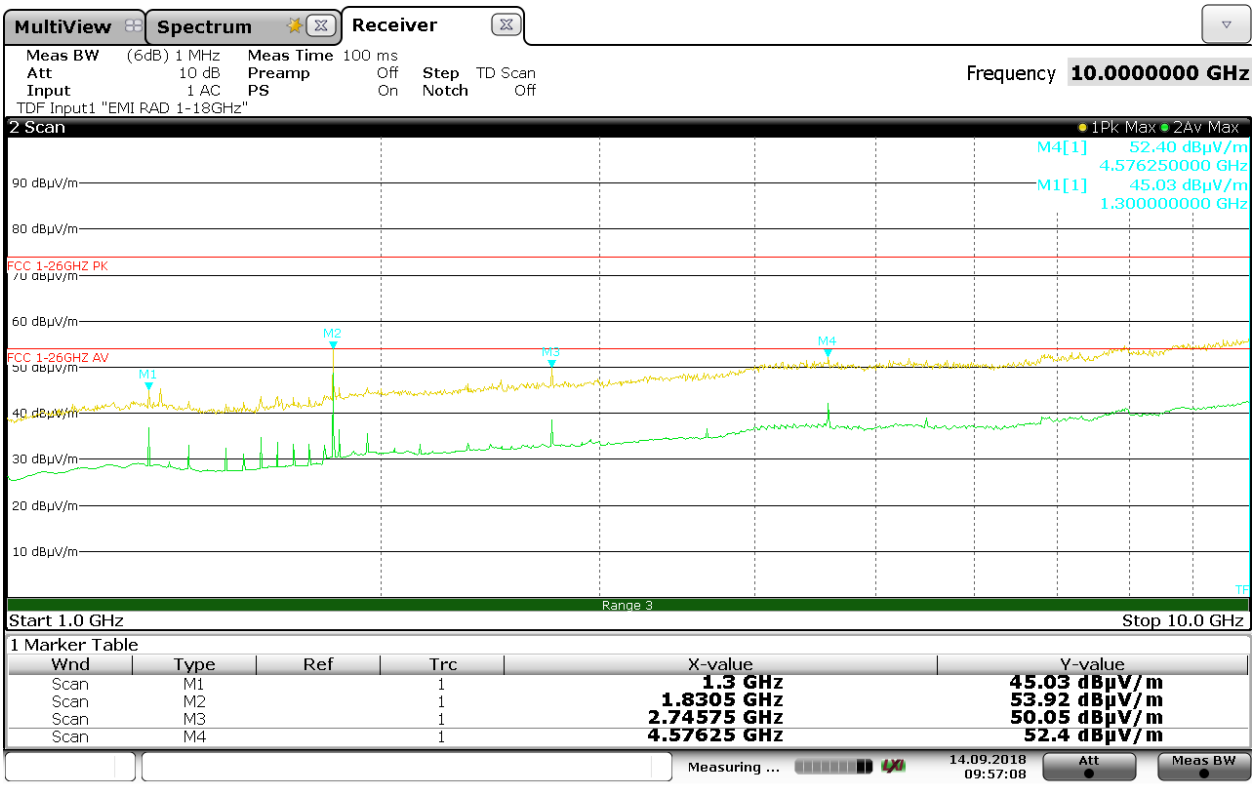
AVERAGE RESULT (RBW=1MHz)								
Frequency	Reading value	Antenna Factor	Pre-Amp. Gain	Cable Loss	Correcting reading	Restricted band	AV Limit	Margin
(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dBµV/m)	/	(dBµV/m)	(dB)
1805,55	61,53	30,60	44,50	6,02	**53,65**	no	54,00	0,35
N.B. = all others peak levels measured are under par.15.209 average limit (54 dBµV/m)								

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 1GHz – 10GHz
Antenna Polarization: Horizontal
Low Channel (902.75MHz)



PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**		**(dBµV/m)**	**(dB)**
1300,00	56,78	28,43	44,50	5,45	**46,16**	yes	74,00	27,84
1805,50	58,33	30,60	44,50	6,02	**50,45**	no	107,47*	57,02
*=fundamental level (QP) in Horizontal polarization – 20dB Note = all peak levels measured are under par.15.209 average limit (54 dBµV/m)								

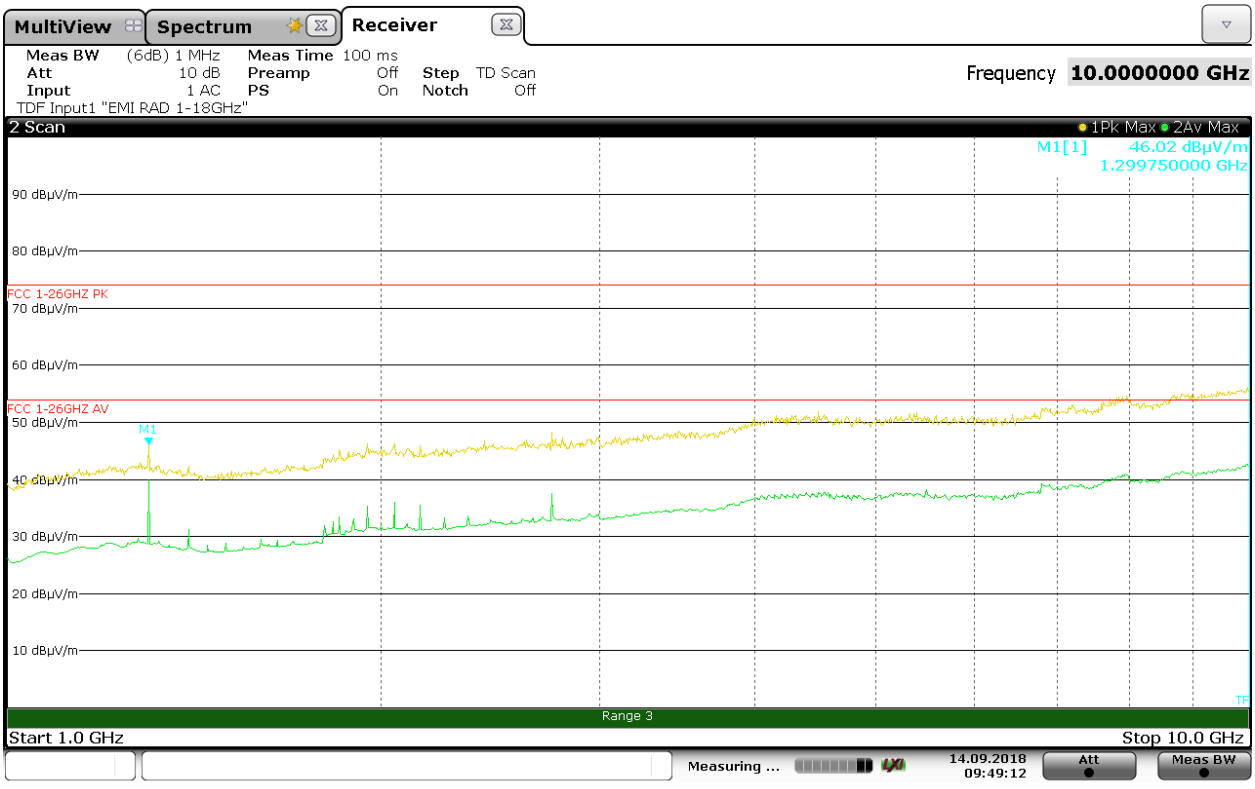
Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 1GHz – 10GHz
Antenna Polarization: Vertical
Middle Channel (915.25MHz)



PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**	**/**	**(dBµV/m)**	**(dB)**
1300,00	55,65	28,43	44,50	5,45	**45,03**	yes	74,00	47,77
1830,50	62,24	30,14	44,50	6,04	**53,92**	no	74,00	27,81
2745,75	54,83	32,62	44,80	7,40	**50,05**	yes	105,05*	55,00
4576,25	51,04	33,81	43,60	11,15	**52,40**	yes	74,00	28,74

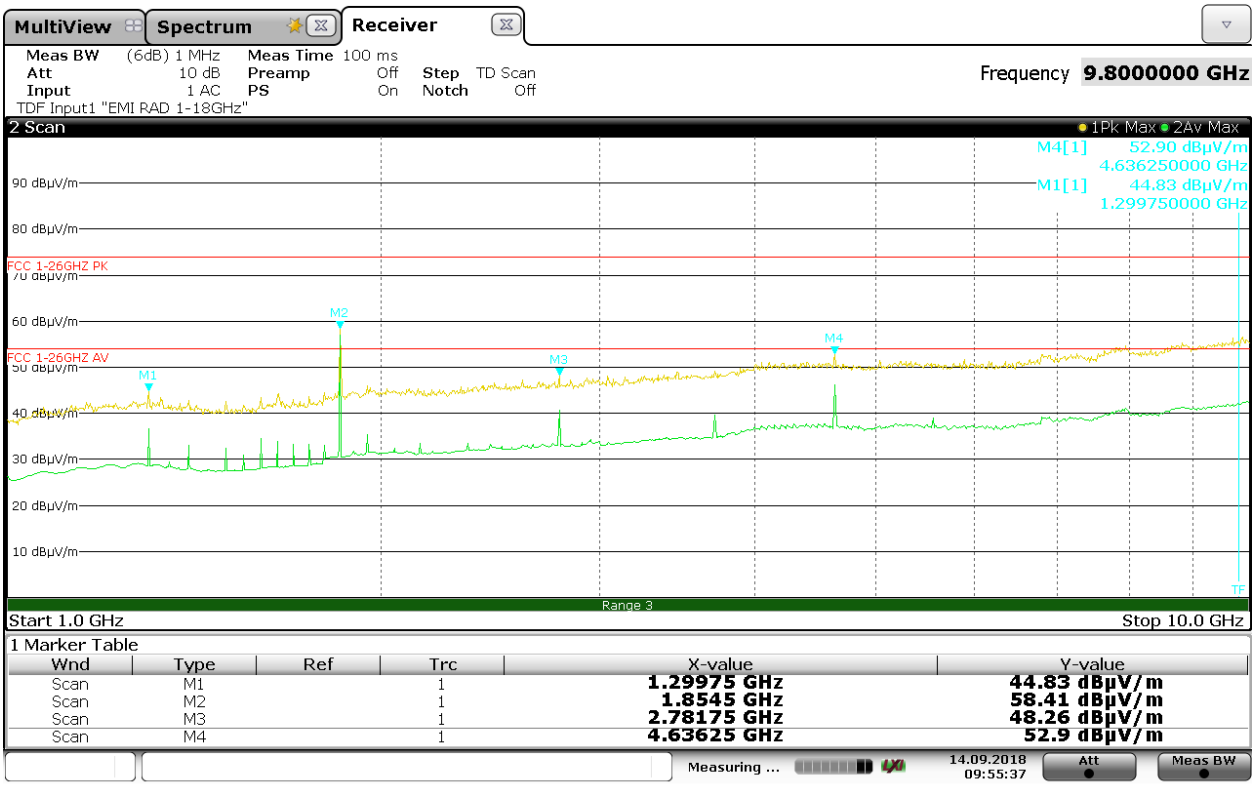
*=fundamental level (QP) in Vertical polarization – 20dB
N.B. = all peak levels measured are under par.15.209 average limit (54 dBµV/m)

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 1GHz – 10GHz
Antenna Polarization: Horizontal
Middle Channel (915.25MHz)



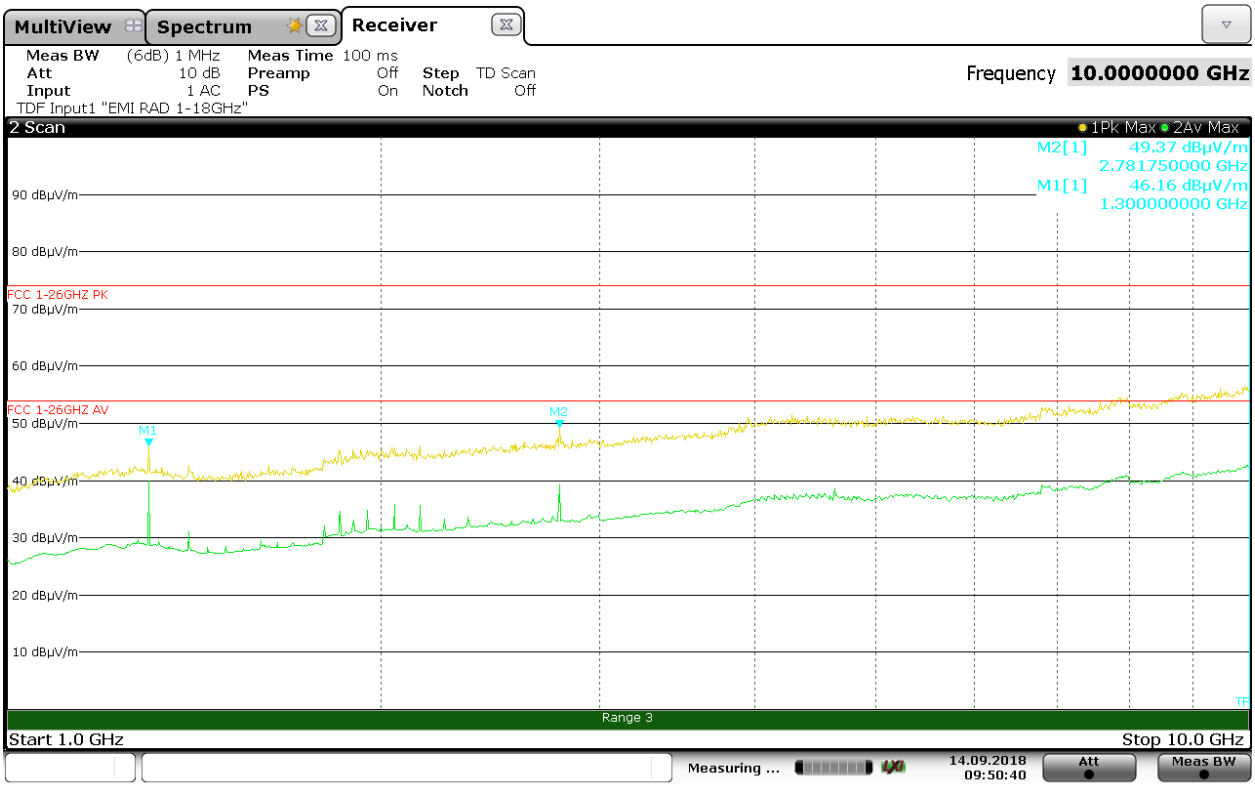
PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**	**/**	**(dBµV/m)**	**(dB)**
1299,75	56,64	28,43	44,50	5,45	**46,02**	no	107,55	61,53
N.B. = all peak levels measured are under par.15.209 average limit (54 dBµV/m)								

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 1GHz – 10GHz
Antenna Polarization: Vertical
High Channel (927.25MHz)



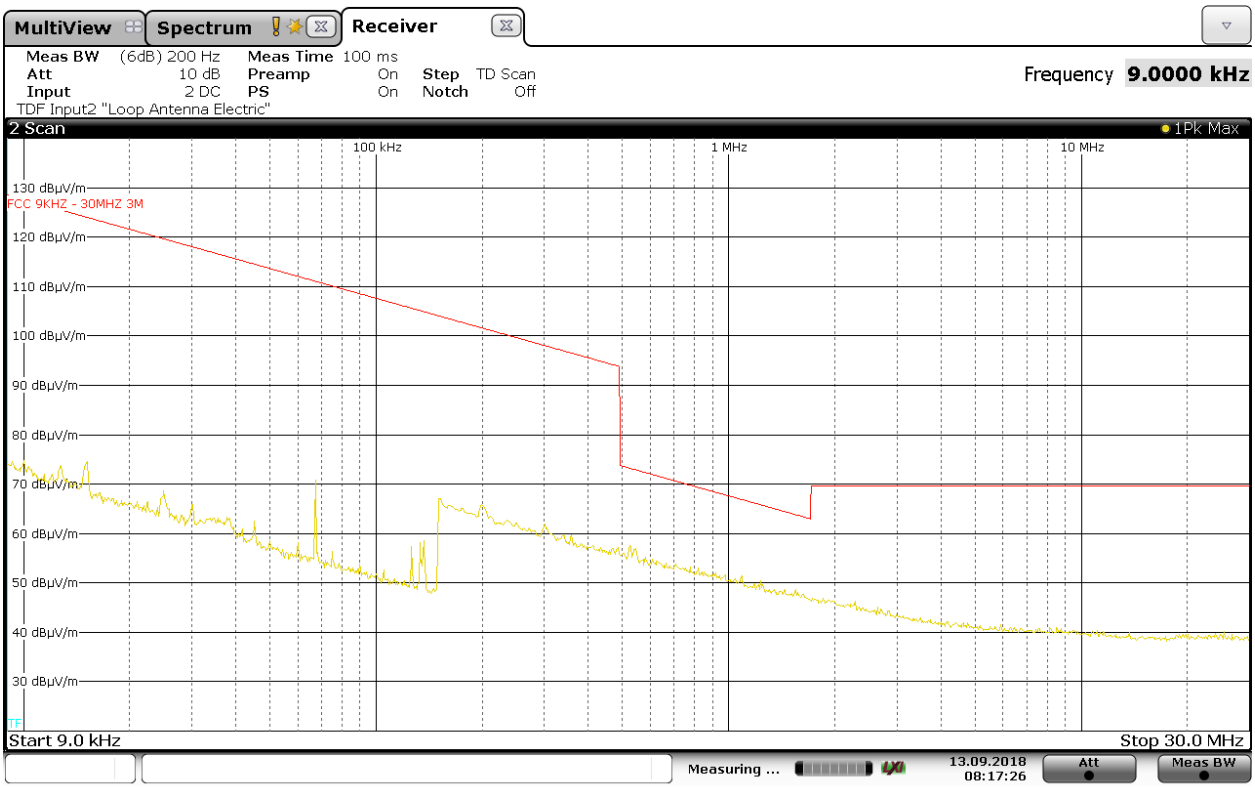
PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**	**/**	**(dBµV/m)**	**(dB)**
1299,75	55,45	28,43	44,50	5,45	**44,83**	no	104,13*	59,30
1854,50	66,25	30,60	44,50	6,06	**58,41**	no	104,13*	45,72
2781,75	52,74	32,84	44,80	7,48	**48,26**	yes	74,00	25,74
4636,25	51,82	33,82	43,60	11,15	**52,90**	yes	74,00	21,10
*=fundamental level (QP) in Vertical polarization – 20dB								

Graphical representation of Radiated Emission Measurement
Operation Mode: #1
Frequency: 1GHz – 10GHz
Antenna Polarization: Horizontal
High Channel (927.25MHz)

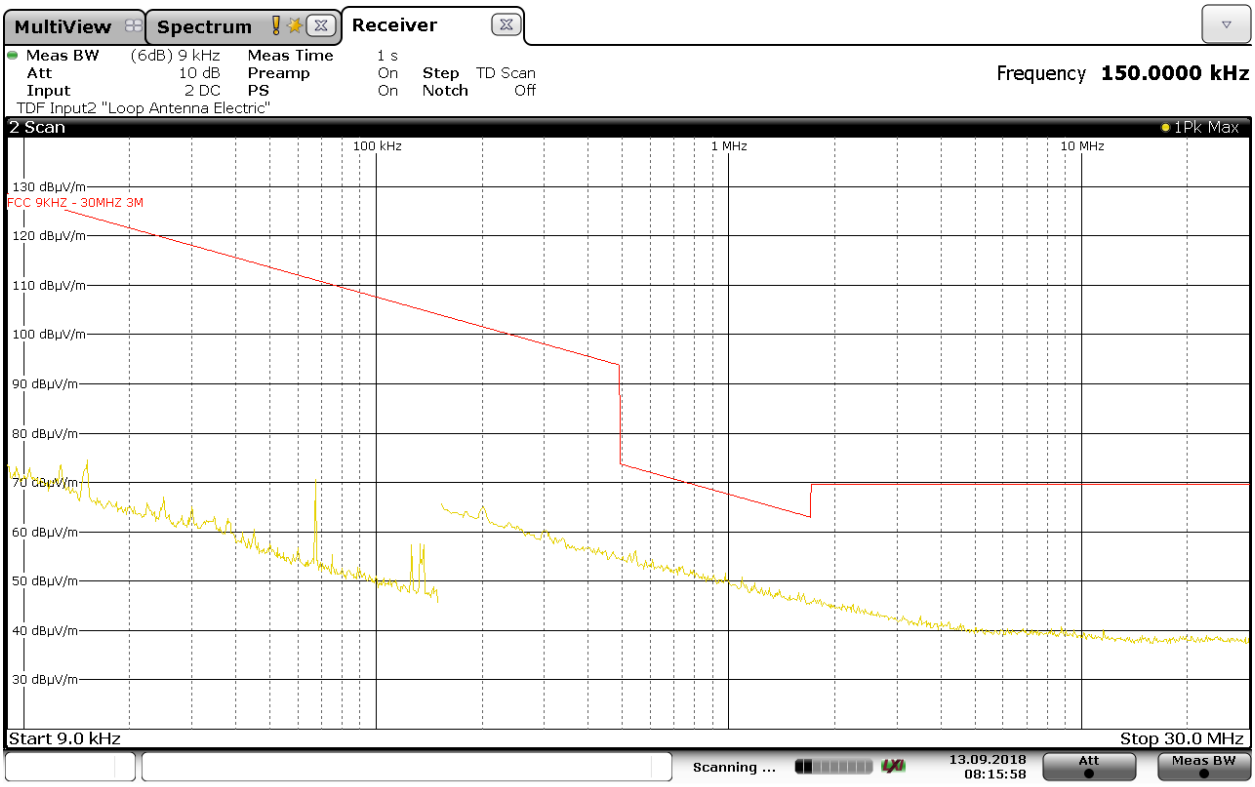


PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**	**/**	**(dBµV/m)**	**(dB)**
1300,00	56,78	28,43	44,50	5,45	**46,16**	yes	74,00	27,84
2781,75	53,85	32,84	44,80	7,48	**49,37**	yes	74,00	24,63
N.B. = all peak levels measured are under par.15.209 average limit (54 dBµV/m)								

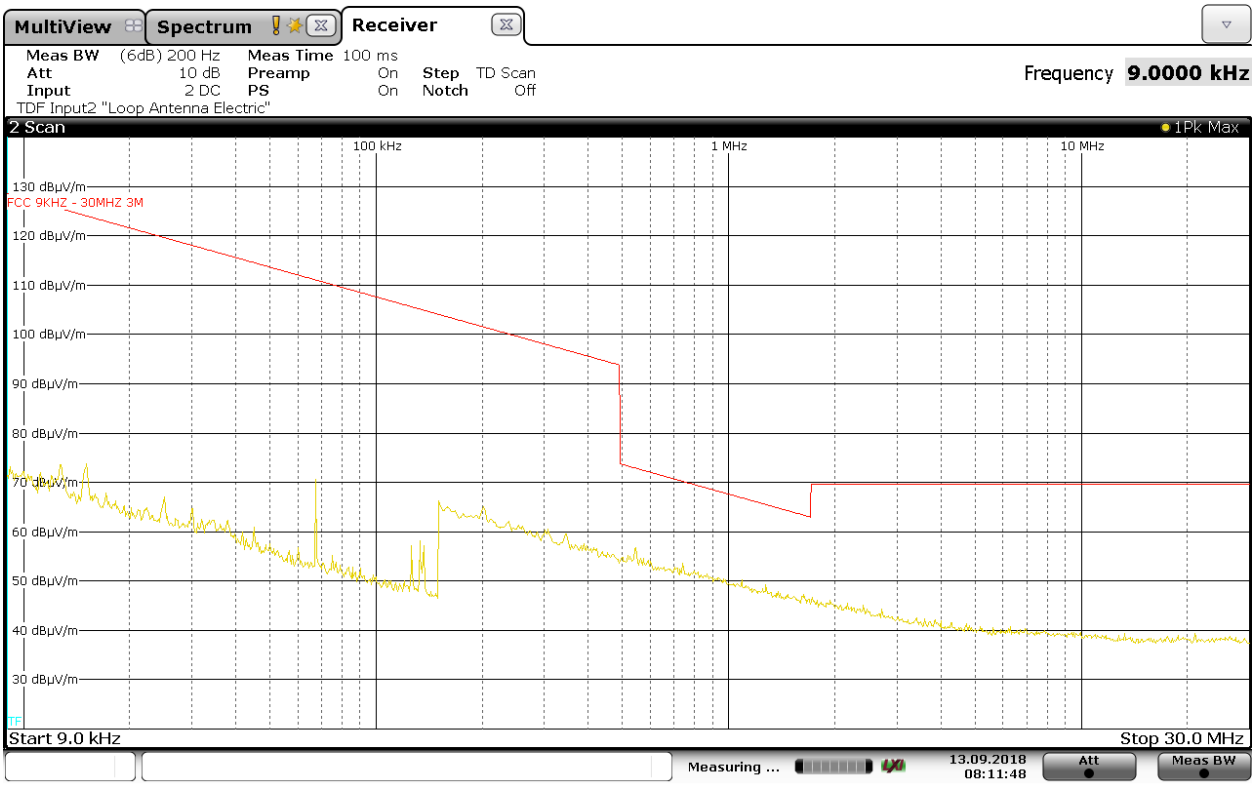
Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 9kHz – 30MHz
Low Channel (902.75MHz)



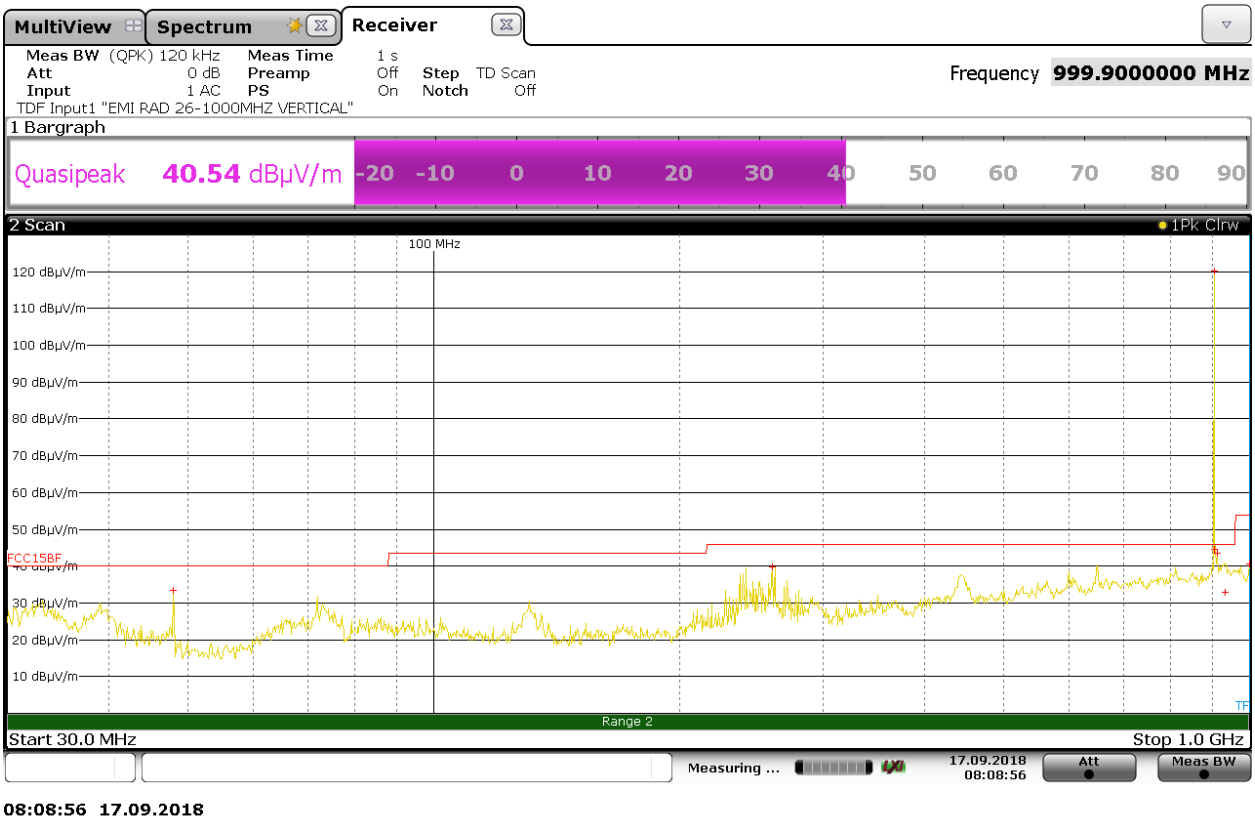
Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 9kHz – 30MHz
Middle Channel (915.25MHz)



Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 9kHz – 30MHz
High Channel (927.25MHz)

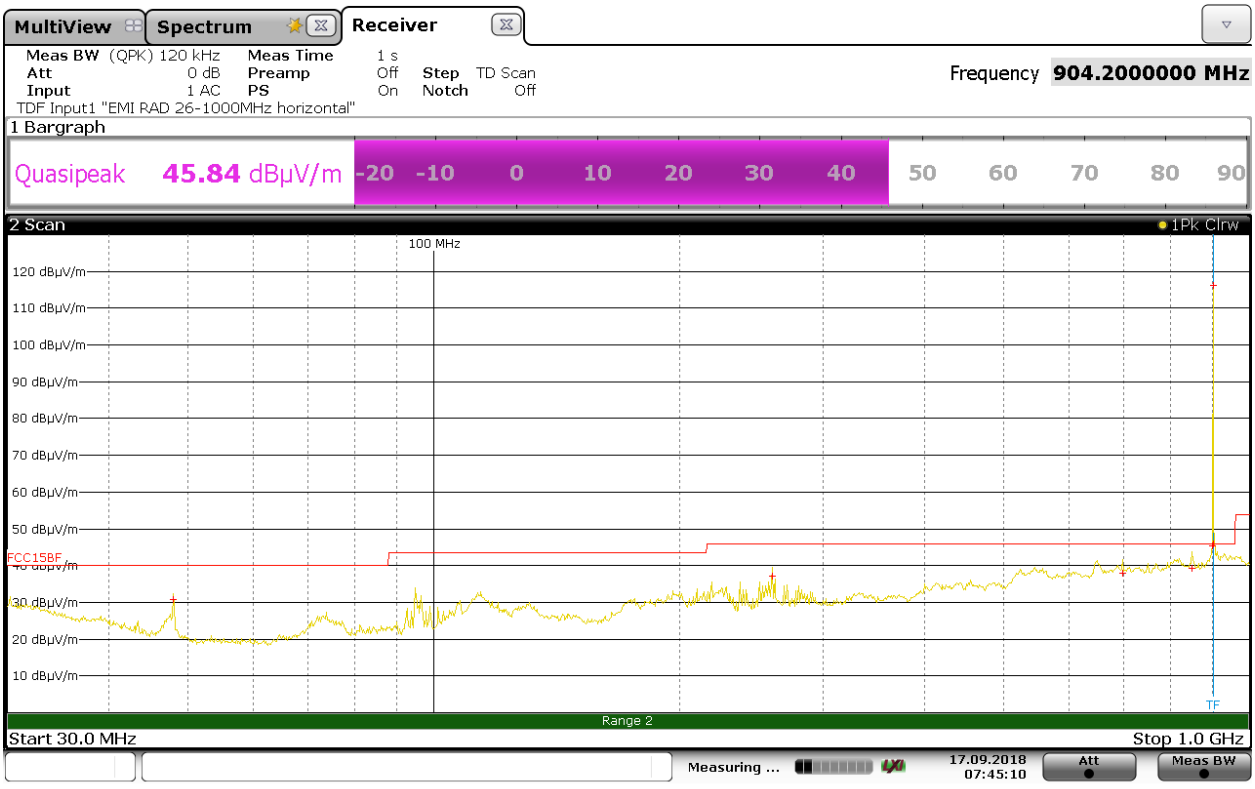


Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 30MHz – 1GHz
Antenna Polarization: Vertical
Low Channel (902.75MHz)



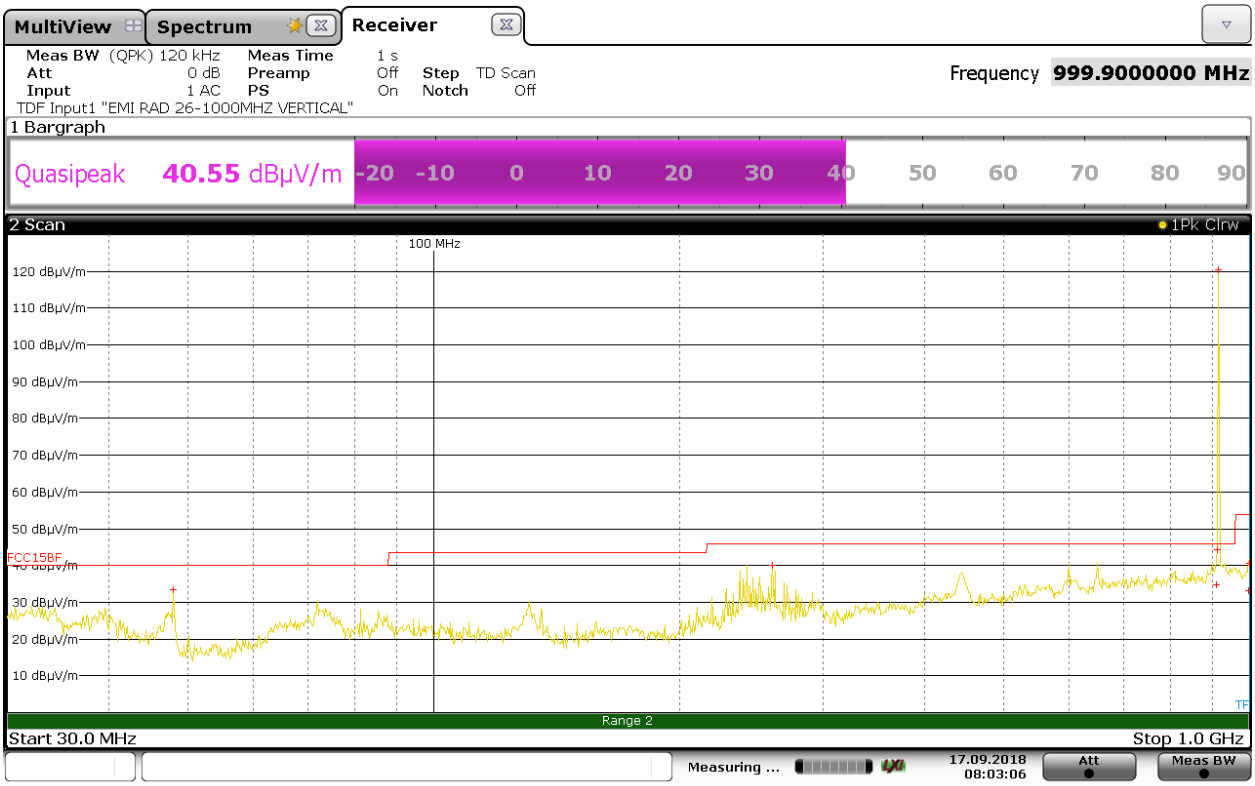
QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
902,75 (fundamental)	90,72	25,30	4,07	Not present	**120,09**

Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 30MHz – 1GHz
Antenna Polarization: Horizontal
Low Channel (902.75MHz)



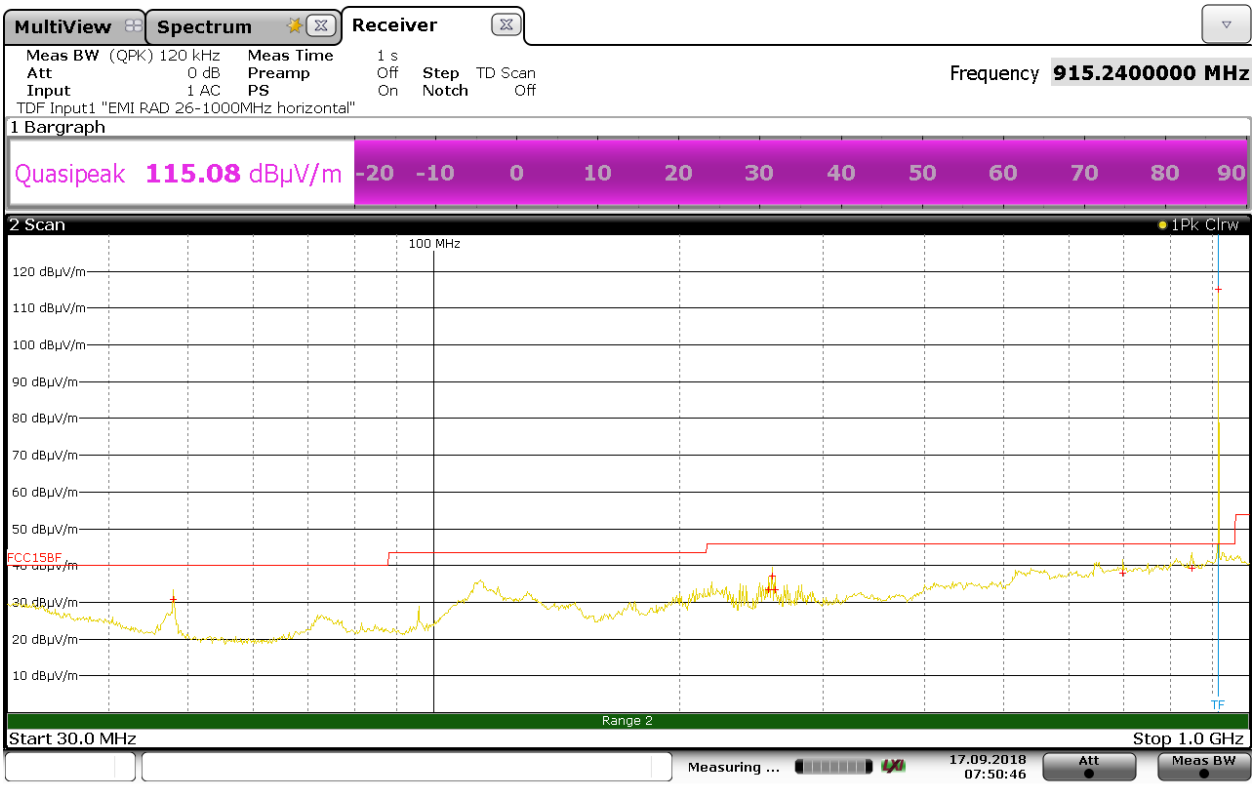
QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
902,75 (fundamental)	86,79	25,30	4,07	Not present	**116,16**

Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 30MHz – 1GHz
Antenna Polarization: Vertical
Middle Channel (915.25MHz)



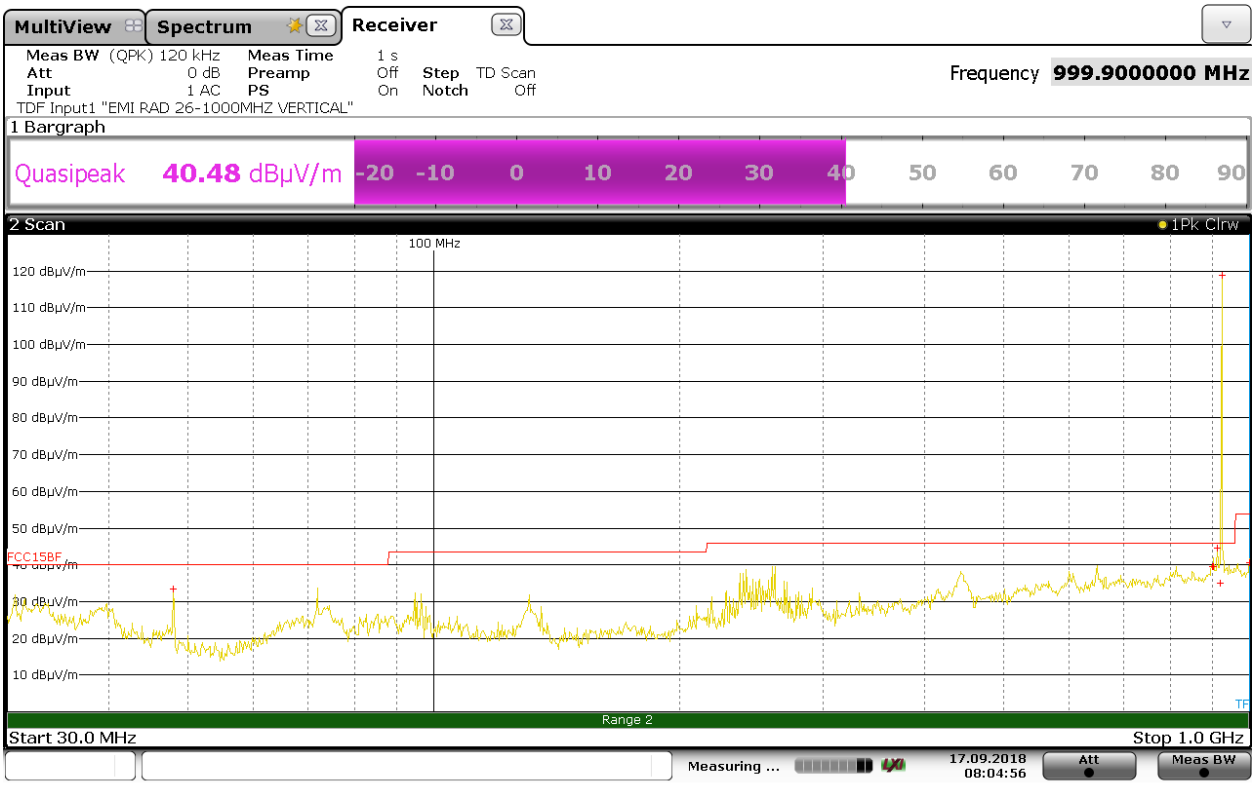
QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
915,25 (fundamental)	91,17	25,30	4,07	Not present	**120,54**

Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 30MHz – 1GHz
Antenna Polarization: Horizontal
Middle Channel (915.25MHz)



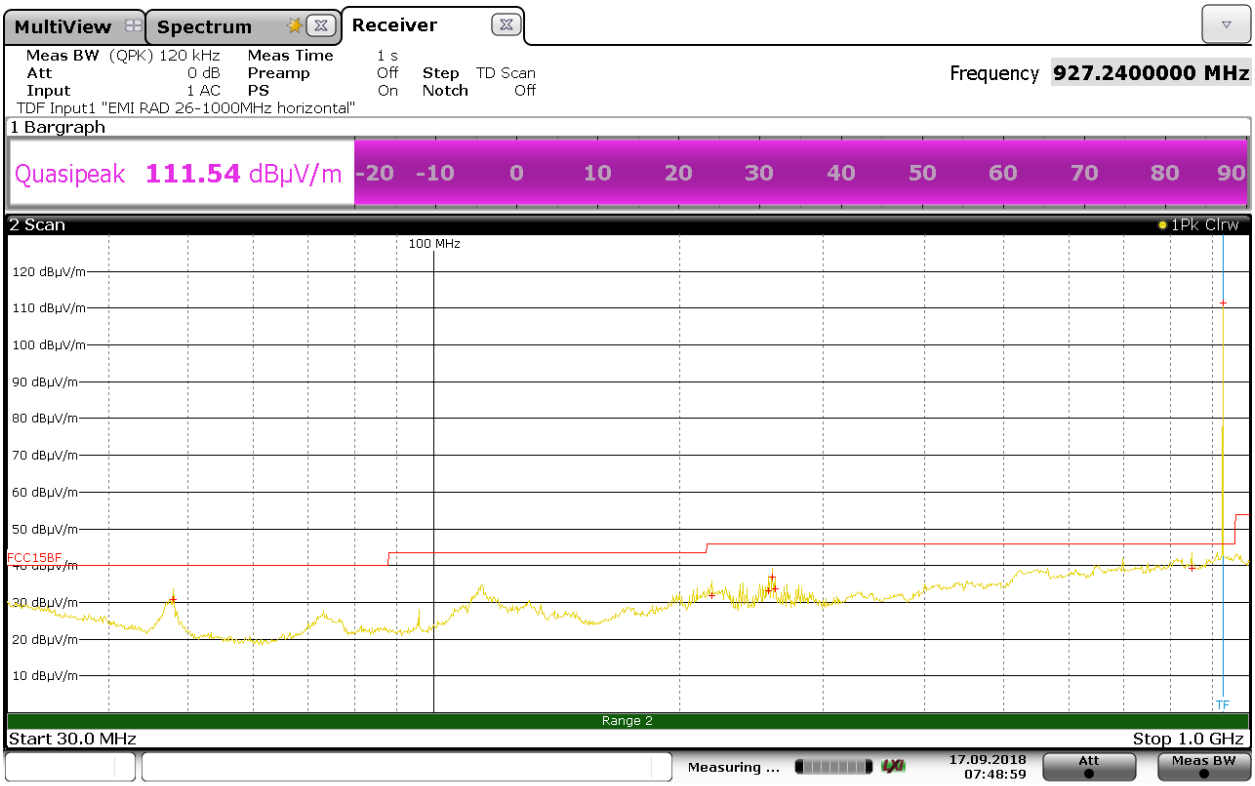
QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
915,25 (fundamental)	85,64	25,30	4,07	Not present	**115,01**

Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 30MHz – 1GHz
Antenna Polarization: Vertical
High Channel (927.25MHz)



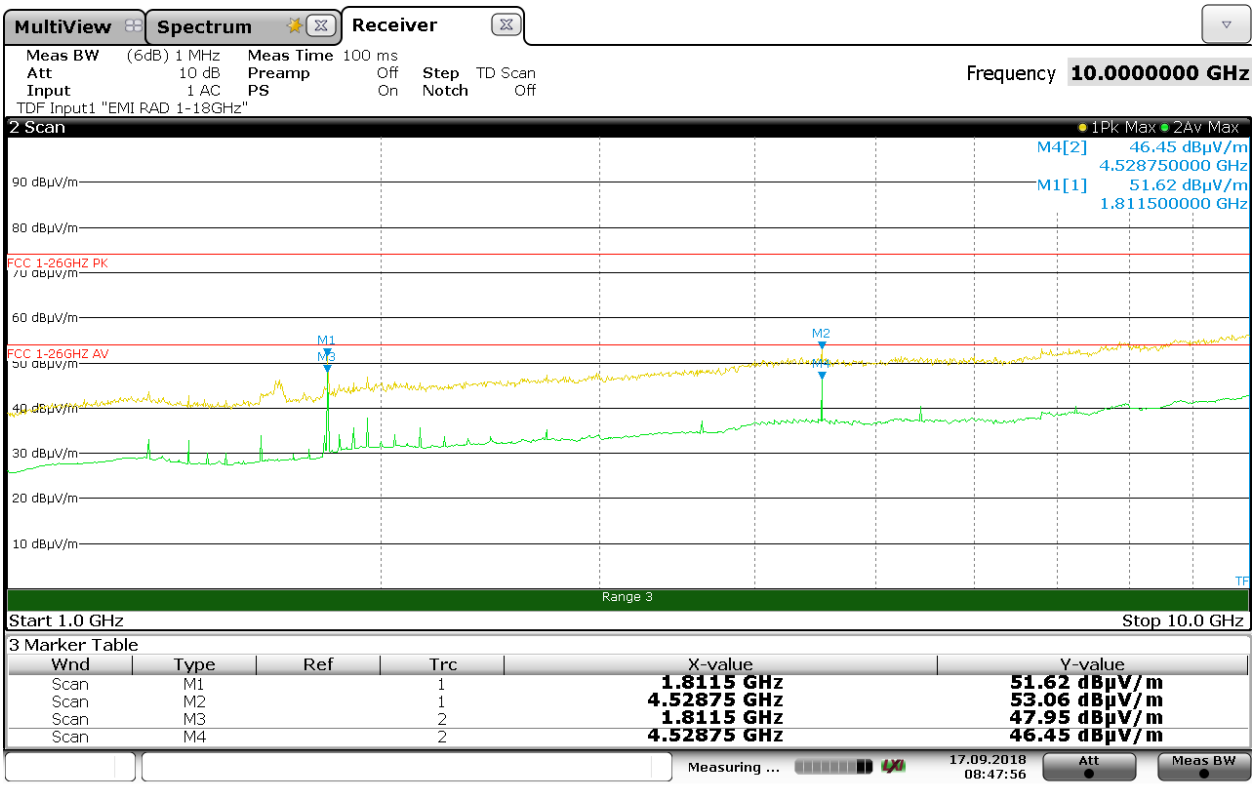
QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
927,25 (fundamental)	89,36	25,34	4,13	Not present	**118,83**

Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 30MHz – 1GHz
Antenna Polarization: Horizontal
High Channel (927.25MHz)



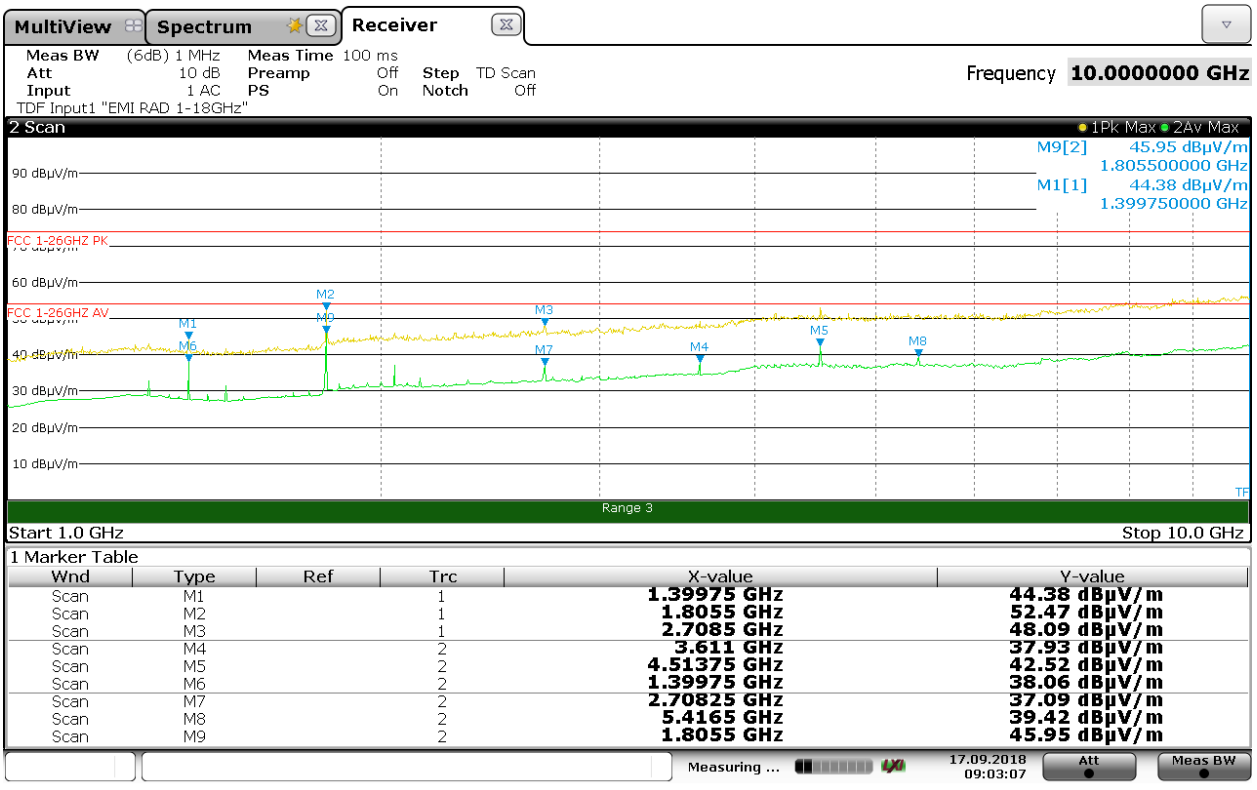
QUASI-PEAK RESULT (RBW=120kHz)					
Frequency	**Reading value**	**Antenna Factor**	**Cable Loss**	**Pre-Amp. Gain**	**Correcting reading**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**
927,25 (fundamental)	84,83	25,34	4,13	Not present	**114,30**

Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 1GHz – 10GHz
Antenna Polarization: Vertical
Low Channel (902.75MHz)



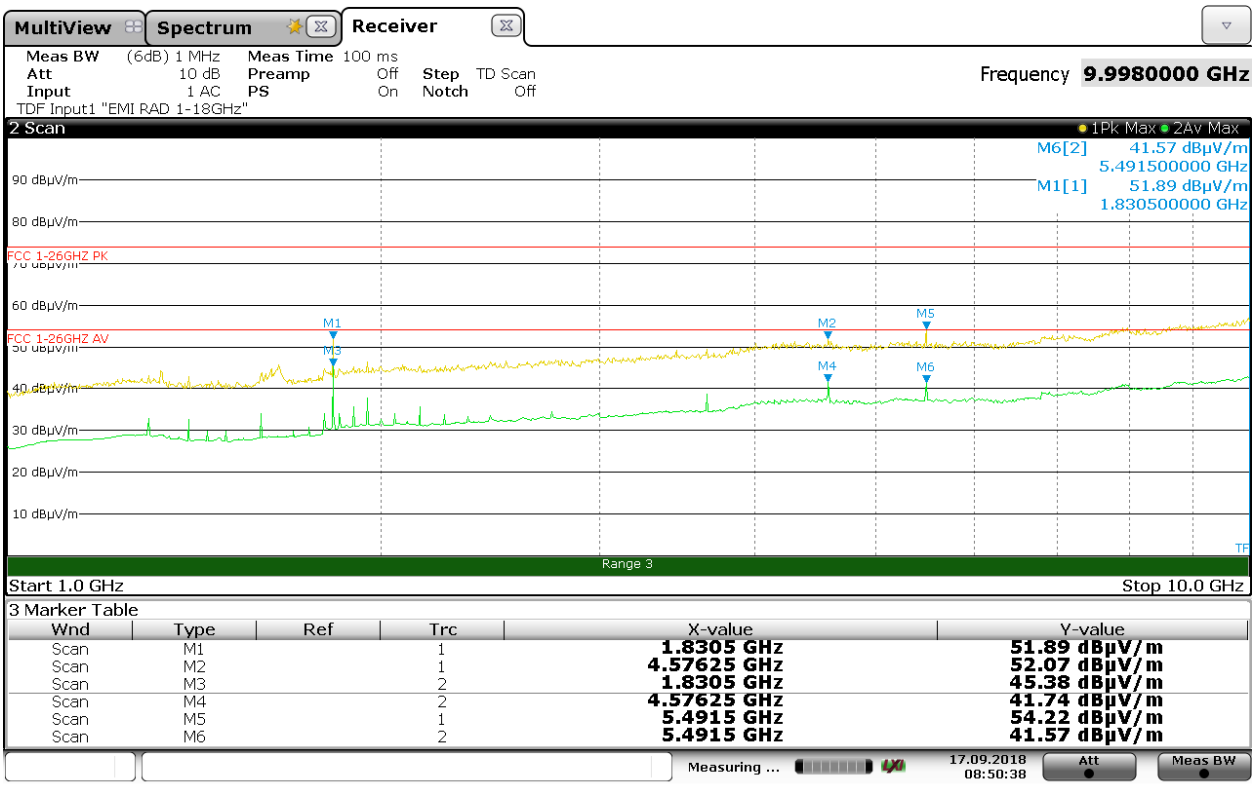
PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**	**/**	**(dBµV/m)**	**(dB)**
1811,50	59,50	30,60	44,50	6,02	**51,62**	no	100,09*	48,47
4528,75	51,62	33,89	43,60	11,15	**53,06**	yes	74,00	20,74
*=fundamental level (QP) in Vertical polarization – 20dB N.B. = all peak levels measured are under par.15.209 average limit (54 dBµV/m)								

Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 1GHz – 10GHz
Antenna Polarization: Horizontal
Low Channel (902.75MHz)



PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**		**(dBµV/m)**	**(dB)**
1805,50	52,47	30,60	44,50	6,02	**52,47**	no	96,16*	43,69
*=fundamental level (QP) in Horizontal polarization – 20dB N.B. = all peak levels measured are under par.15.209 average limit (54 dBµV/m)								

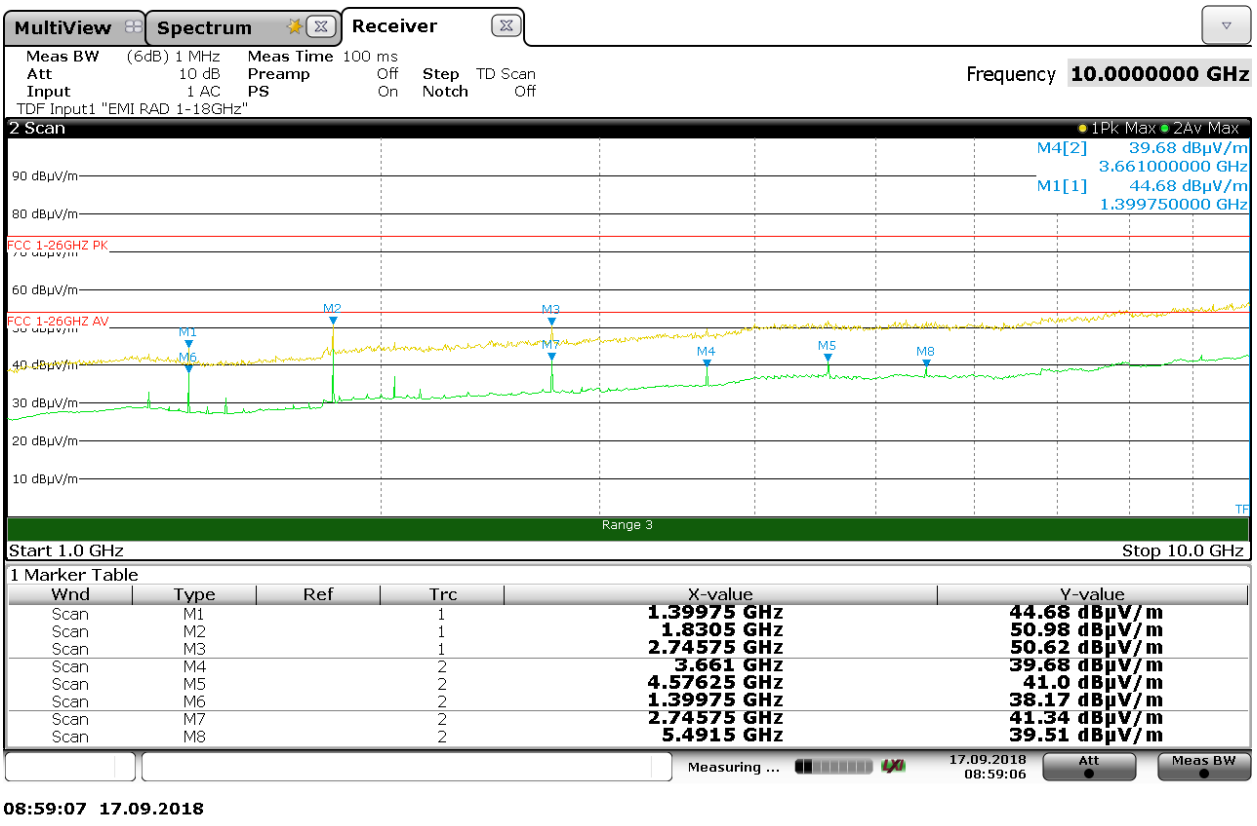
Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 1GHz – 10GHz
Antenna Polarization: Vertical
Middle Channel (915.25MHz)



PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**	**/**	**(dBµV/m)**	**(dB)**
1830,50	60,21	30,14	44,50	6,04	**51,89**	no	100,54*	48,65
4576,25	50,71	33,81	43,60	11,15	**52,07**	yes	74,00	21,93
5491,50	51,68	34,59	43,40	11,35	**54,22**	no	100,54*	46,47
*=fundamental level (QP) in Vertical polarization – 20dB								

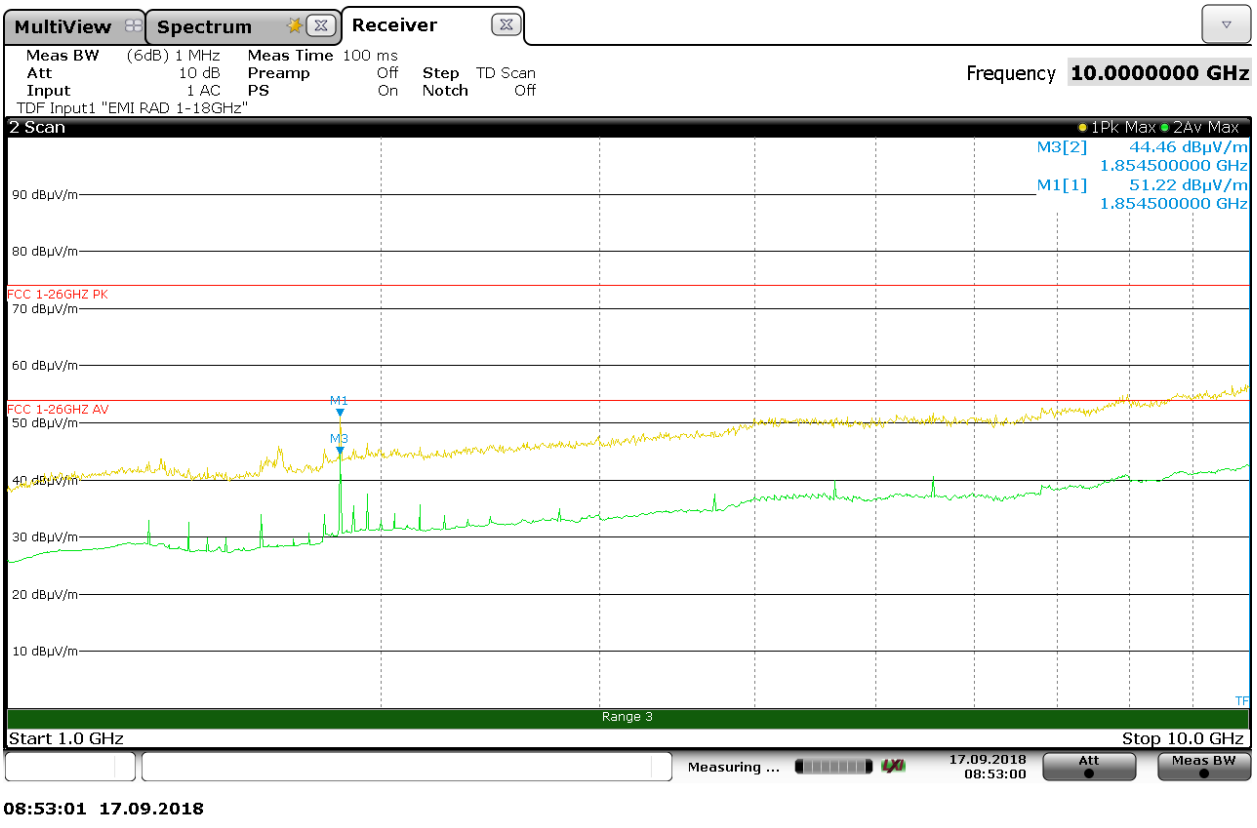
AVERAGE RESULT (RBW=1MHz)								
Frequency	Reading value	Antenna Factor	Pre-Amp. Gain	Cable Loss	Correcting reading	Restricted band	AV Limit	Margin
(MHz)	(dBµV)	(dB3/m)	(dB)	(dB)	(dBµV/m)	/	(dBµV/m)	(dB)
5491,50	39,03	34,59	43,40	11,35	**41,57**	no	54,00	12,43
N.B. = all others peak levels measured are under par.15.209 average limit (54 dBµV/m)								

Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 1GHz – 10GHz
Antenna Polarization: Horizontal
Middle Channel (915.25MHz)



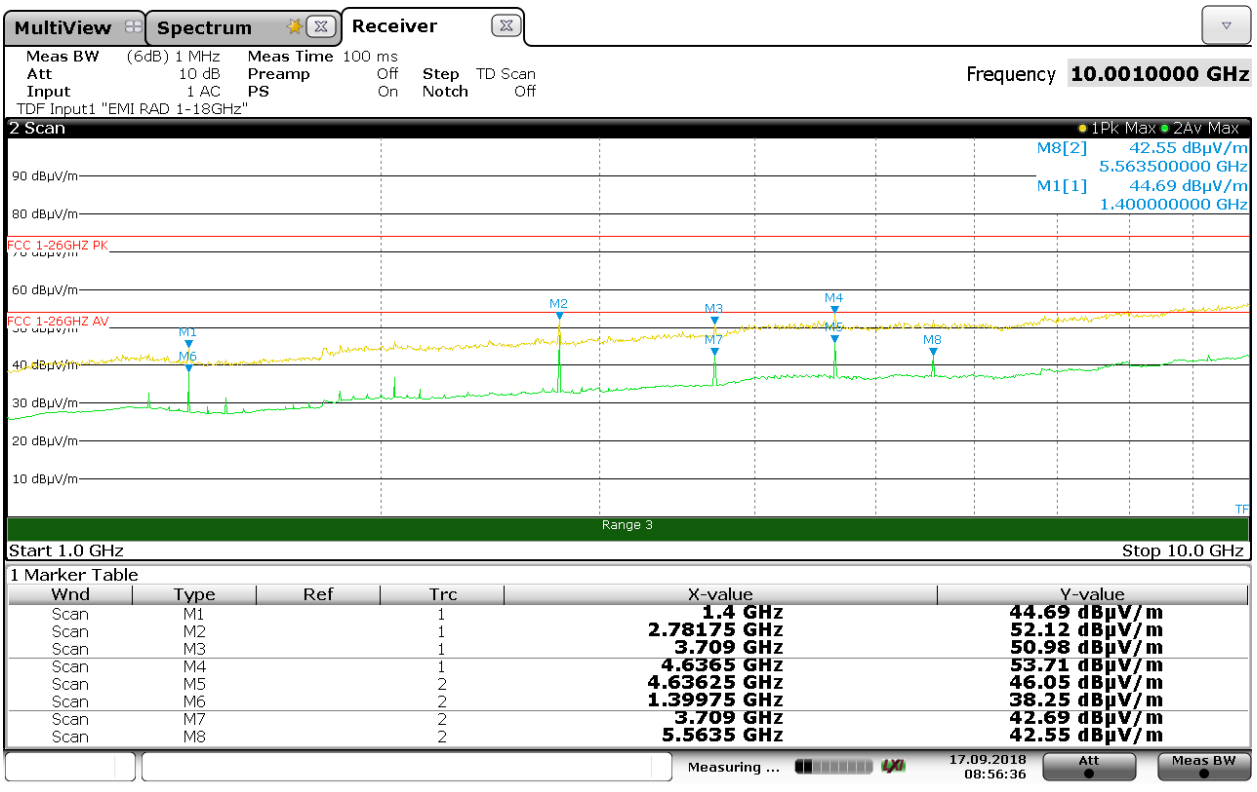
PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**	**/**	**(dBµV/m)**	**(dB)**
1830,50	59,30	30,14	44,50	6,04	**50,98**	no	95,01*	44,03
2745,75	55,40	32,62	44,80	7,40	**50,62**	yes	74,00	23,38
*=fundamental level (QP) in Horizontal polarization – 20dB								

Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 1GHz – 10GHz
Antenna Polarization: Vertical
High Channel (927.25MHz)



PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB3/m)**	**(dB)**	**(dB)**	**(dBµV/m)**	**/**	**(dBµV/m)**	**(dB)**
1854,50	59,06	30,60	44,50	6,06	**51,22**	no	98,83*	47,61
*=fundamental level (QP) in Vertical polarization – 20dB								

Graphical representation of Radiated Emission Measurement
Operation Mode: #2
Frequency: 1GHz – 10GHz
Antenna Polarization: Horizontal
High Channel (927.25MHz)



PEAK RESULT (RBW=1MHz)								
Frequency	**Reading value**	**Antenna Factor**	**Pre-Amp. Gain**	**Cable Loss**	**Correcting reading**	**Restricted band**	**PK Limit (AV Limit + 20dB)**	**Margin**
(MHz)	**(dBµV)**	**(dB/m)**	**(dB)**	**(dB)**	**(dBµV/m)**	**/**	**(dBµV/m)**	**(dB)**
2781,75	56,60	32,84	44,80	7,48	**52,12**	yes	74,00	21,88
3709,00	52,16	33,10	43,50	9,22	**50,98**	yes	74,00	23,02
4636,25	33,82	33,82	43,60	11,15	**53,71**	yes	74,00	20,29
*=fundamental level (QP) in Horizontal polarization – 20dB								

AVERAGE RESULT (RBW=1MHz)								
Frequency	Reading value	Antenna Factor	Pre-Amp. Gain	Cable Loss	Correcting reading	Restricted band	AV Limit	Margin
(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dBµV/m)	/	(dBµV/m)	(dB)
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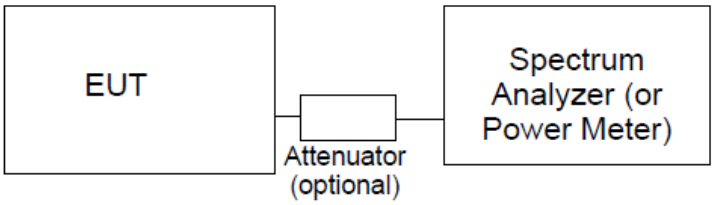
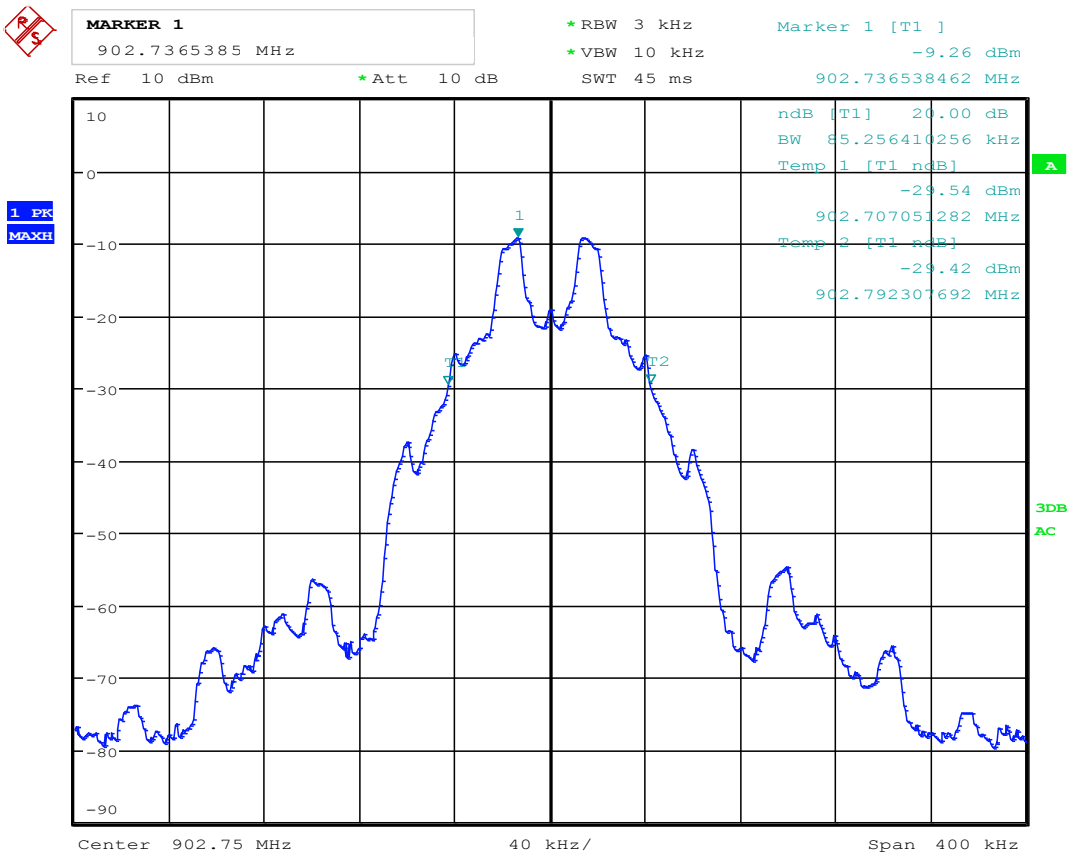
N.B. = all peak levels measured are under par.15.209 average limit (54 dBµV/m)								

12.4 TEST: 20dB Bandwidth		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C
	Relative Humidity (%)	30 to 60 %
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	24°C
	Relative Humidity (%)	48%
	Air pressure (hPa)	1020
—	Power Supply & Frequency	Application Point
Fully configured sample tested at the power line frequency	120V ~ 60Hz	RF Connector
Equipment mode: #1	Operation mode	#3
FCC Standard	§15.247 (A)	
Limit: None; for reporting purpose only		
Further information to test setup		

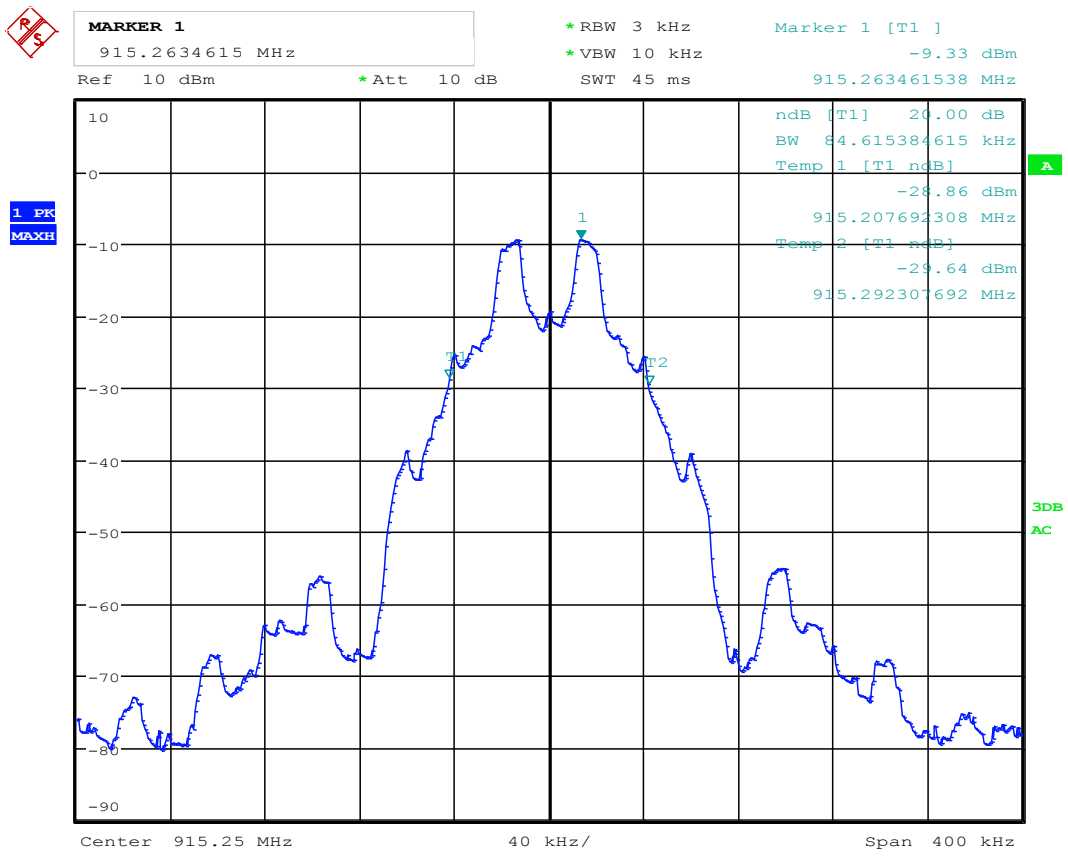
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESU40	87020455	04/2018	04/2019

Graphical representation of 20dB Bandwidth
Operation Mode: #3
Plot n°1



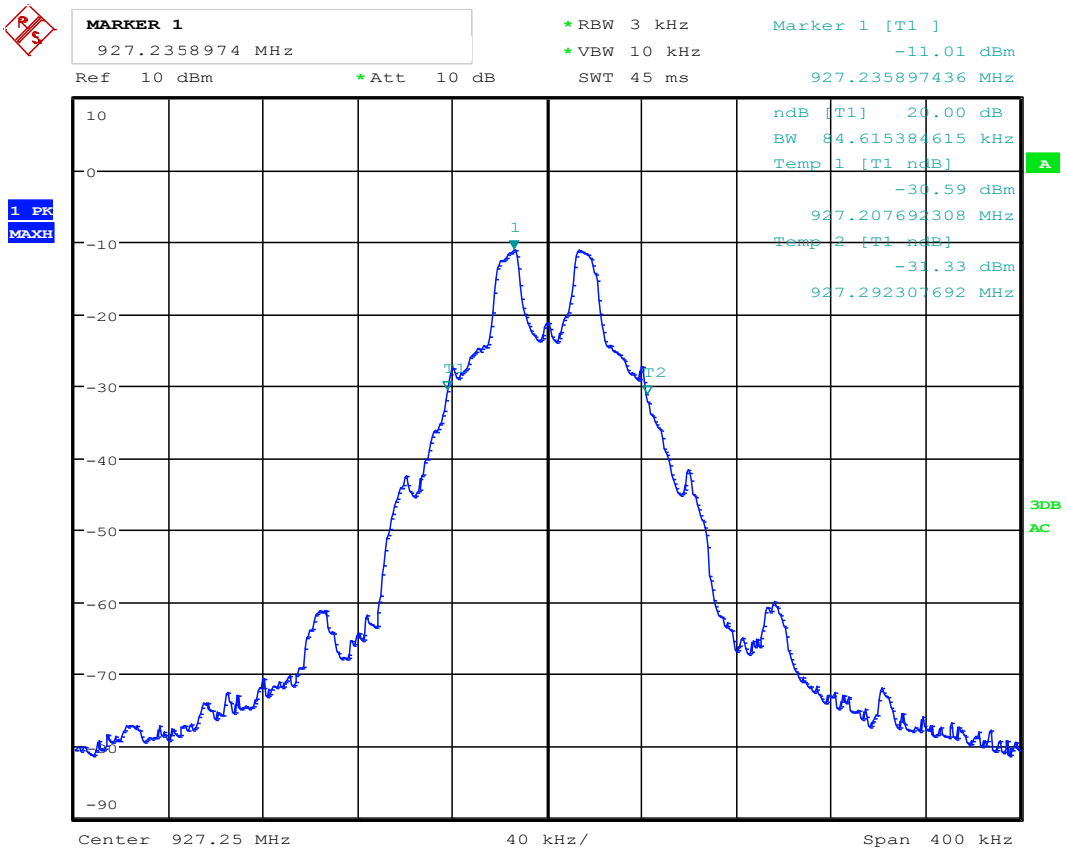
Channel (No.)	Frequency (MHz)	Channel Bandwidth at -20dB (kHz)	Limit (kHz)	Plot (No.)
1 (Low)	**902,75**	**85,25**	**------**	**1**

Graphical representation of 20dB Bandwidth
Operation Mode: #3
Plot n°2



Channel (No.)	Frequency (MHz)	Channel Bandwidth at -20dB (kHz)	Limit (kHz)	Plot (No.)
25 (Middle)	915,25	84,61	------	2

Graphical representation of 20dB Bandwidth
Operation Mode: #3
Plot n°3



Channel (No.)	Frequency (MHz)	Channel Bandwidth at -20dB (kHz)	Limit (kHz)	Plot (No.)
50 (High)	**927,25**	**84,61**	**------**	**3**

12.5 TEST: RF power output			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	22,5°C	
	Relative Humidity (%)	51%	
	Air pressure (hPa)	1020	
—	Power Supply & Frequency	Application Point	
Fully configured sample tested at the power line frequency	120V ~ 60Hz	RF Connector	
Equipment mode: #1	Operation mode	#1,#3	
FCC Standard	§15.247 (B) (2)		

(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

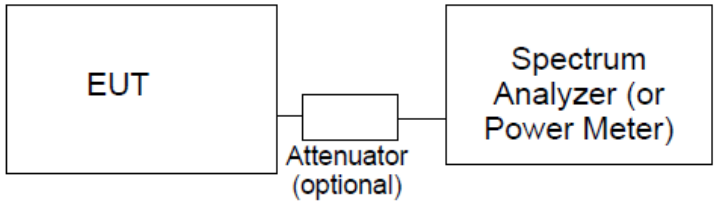
(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

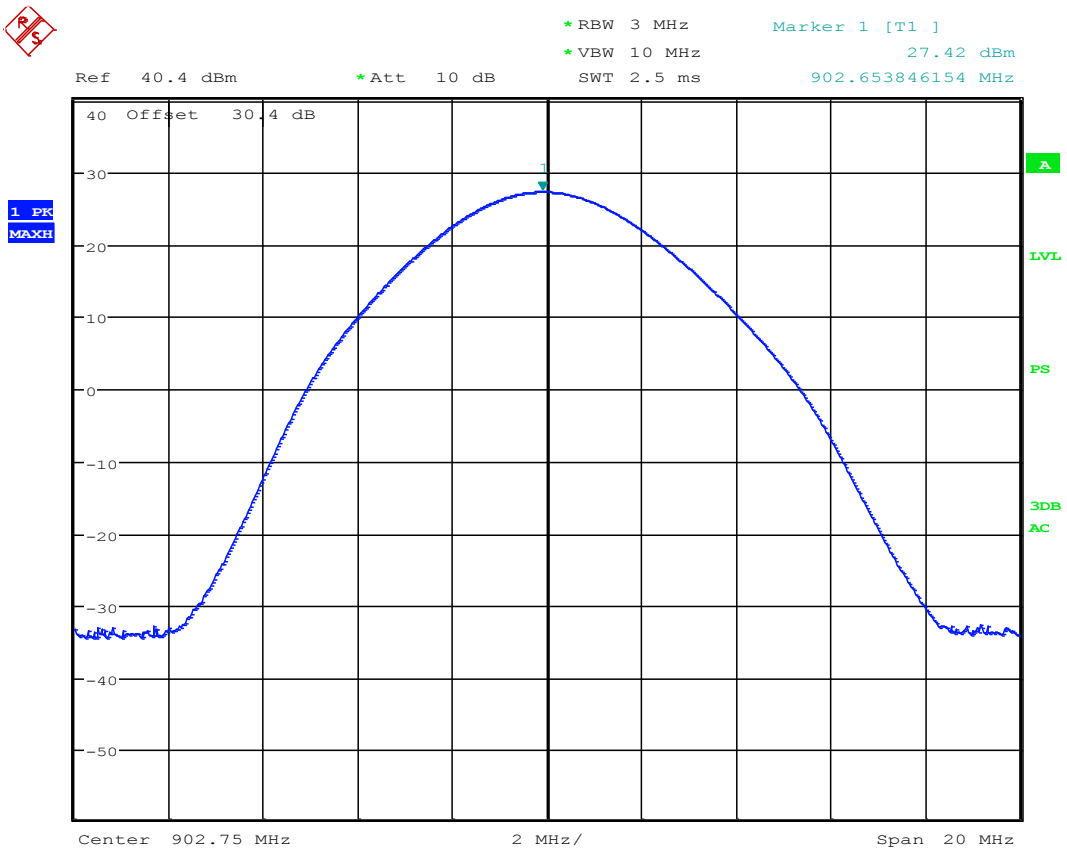
(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Further information to test setup



Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESU40	87020455	04/2018	04/2019

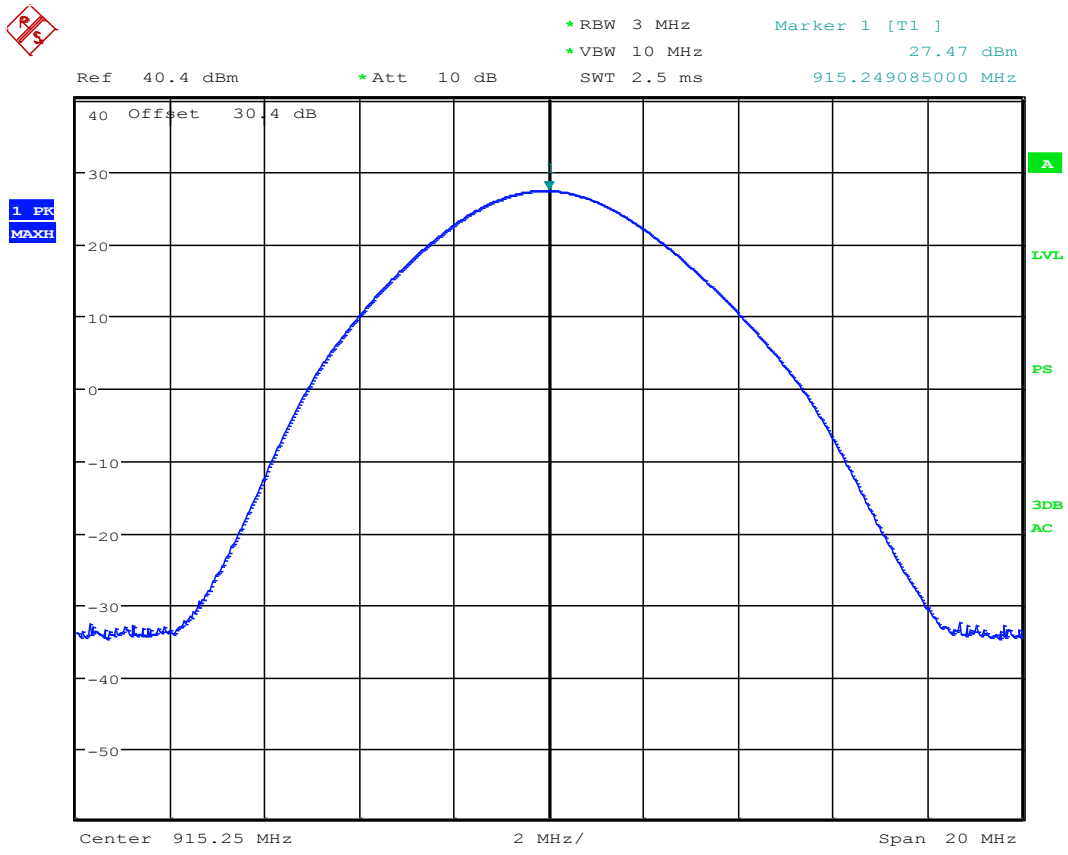
Graphical representation of RF power output
Operation Mode: #3
Plot n°1



Channel (No.)	Frequency (MHz)	Conducted Output Power		Limit (W)
		(dBm)	(mW)	
1 (Low)	902,75	27,42	552,07	1

Measured Radiated ERP					
Channel (No.)	Frequency (MHz)	Max. Radiated Output Power (at 3m. distance)	ERP		Limit (W)
		(dBµV/m)	(dBm)	(mW)	
1 (Low)	902,75	127,47	30,09	1021,59	4

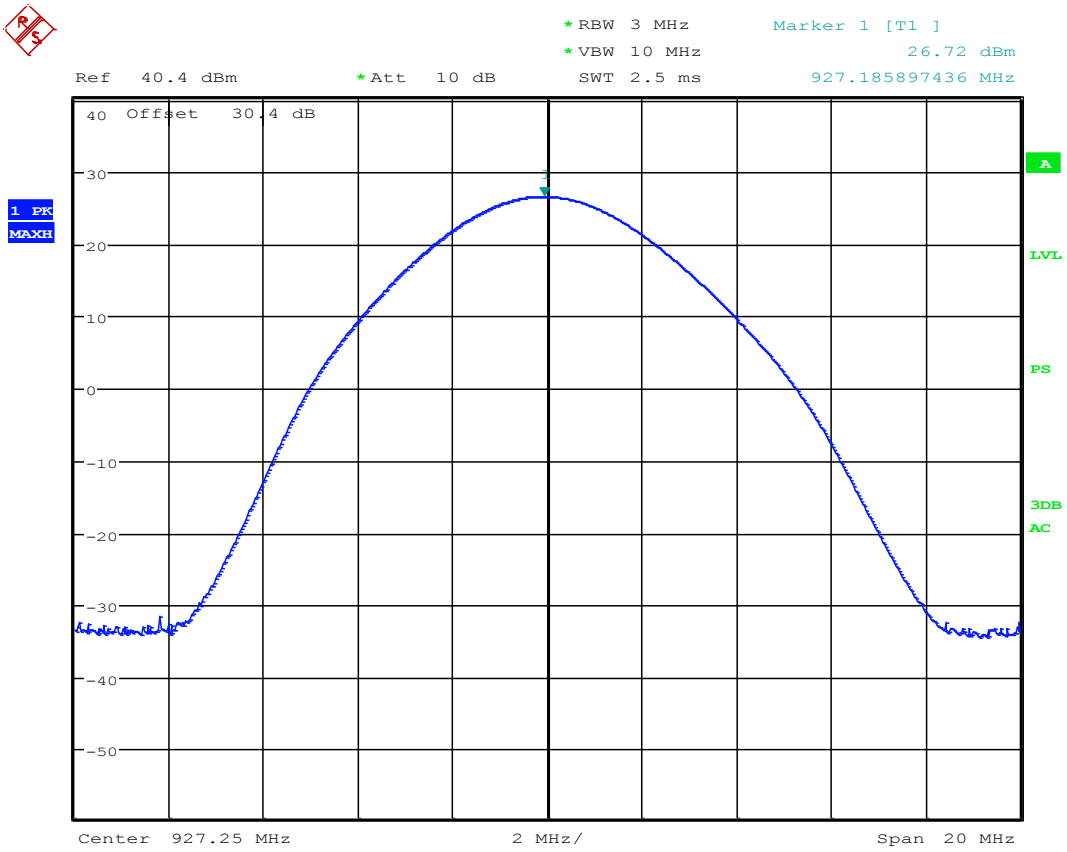
Graphical representation of RF power output
Operation Mode: #3
Plot n°2



Channel (No.)	Frequency (MHz)	Conducted Output Power		Limit (W)
		(dBm)	(mW)	
25 (Middle)	915,25	27,47	558,47	1

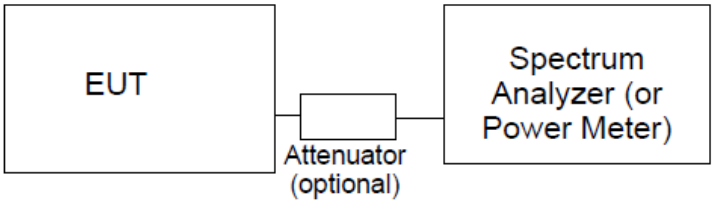
Measured Radiated ERP					
hannel (No.)	Frequency (MHz)	Max. Radiated Output Power (at 3m. distance)	ERP		Limit (W)
		(dBµV/m)	(dBm)	(mW)	
25 (Middle)	915,25	127,55	30,17	1040,58	4

Graphical representation of RF power output
Operation Mode: #3
Plot n°3



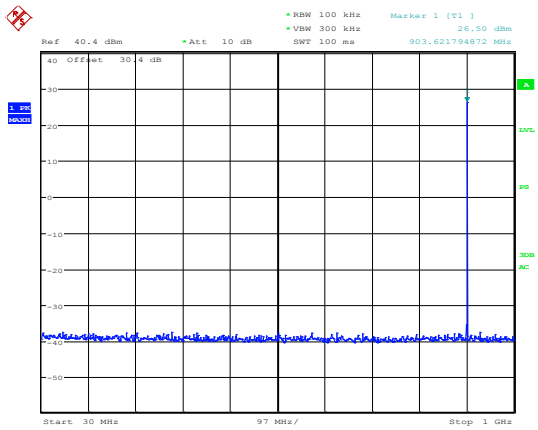
Channel (No.)	Frequency (MHz)	Conducted Output Power		Limit (W)
		(dBm)	(mW)	
50 (High)	927,25	26,72	469,89	1

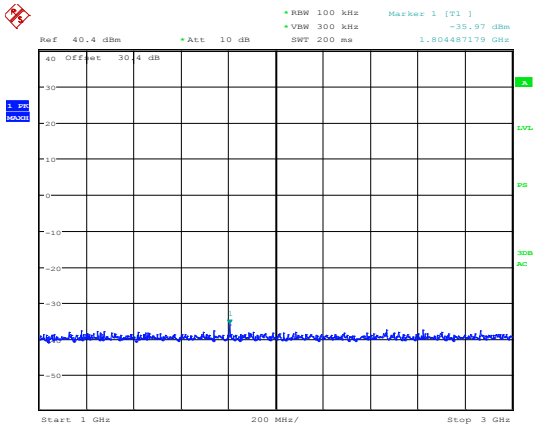
Measured Radiated ERP					
Channel (No.)	Frequency (MHz)	Max. Radiated Output Power (at 3m. distance)	ERP		Limit (W)
		(dBµV/m)	(dBm)	(mW)	
50 (High)	927,25	126,35	28,97	789,36	4

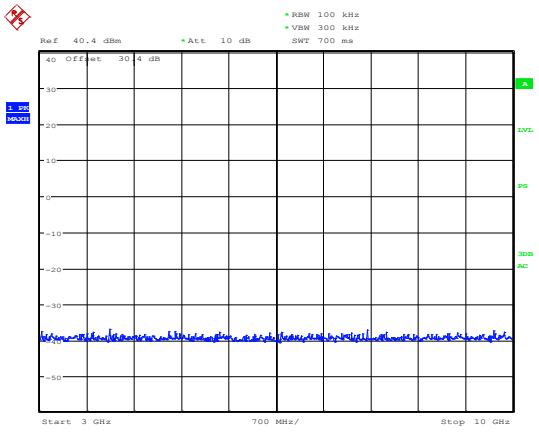
12.6 TEST: Out-of-band emissions			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	22°C	
	Relative Humidity (%)	50%	
	Air pressure (hPa)	1020	
—	Power Supply & Frequency	Application Point	
Fully configured sample tested at the power line frequency	120V ~ 60Hz	RF Connector	
Equipment mode: #1	Operation mode	#1, #3	
FCC Standard	§15.247 (D)		
(d) 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §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)).			
Further information to test setup			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESU40	87020455	04/2018	04/2019
Highpass Filter	Wainwright Instr.	WHKX10-1170-1300	87020800	05/2018	05/2019

Graphical representation of Antenna Port Spurious Emission - Conducted
Operation Mode: #3
Frequency: 30 ÷ 10000MHz
Low Channel







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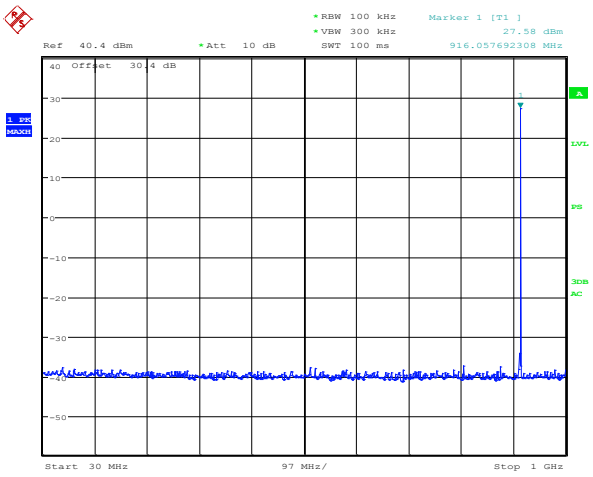
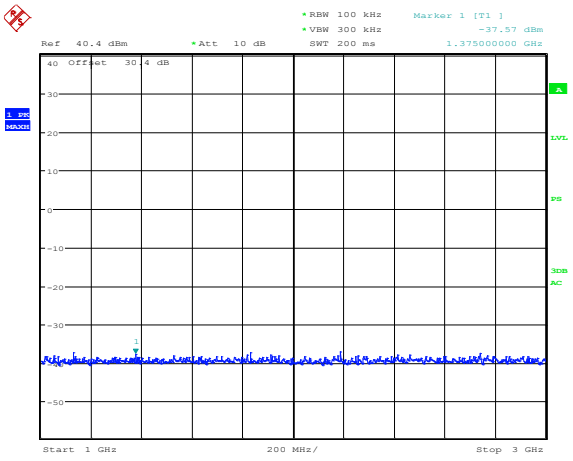
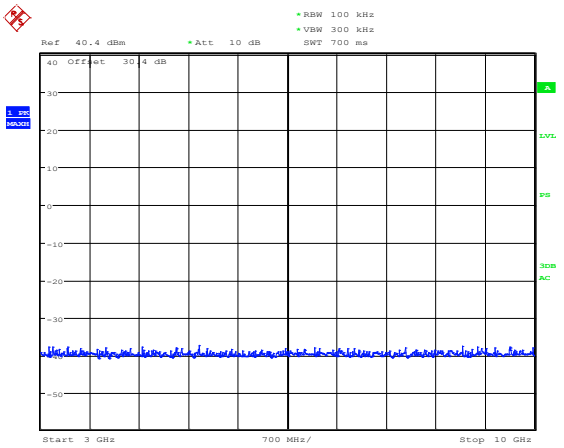
Frequency (MHz)	Measured power (dBm)	Fundamental Level (dBm)	Difference (dB)	Peak Limit at PK power –20 dB (dBm)	Margin (dB)
1804,48	**-35,97**	**+26,50**	**62,47**	**+6,50**	**42,47**

Graphical representation of Antenna Port Spurious Emission - Conducted
Operation Mode: #3
Frequency: 30 ÷ 10000MHz
Middle Channel







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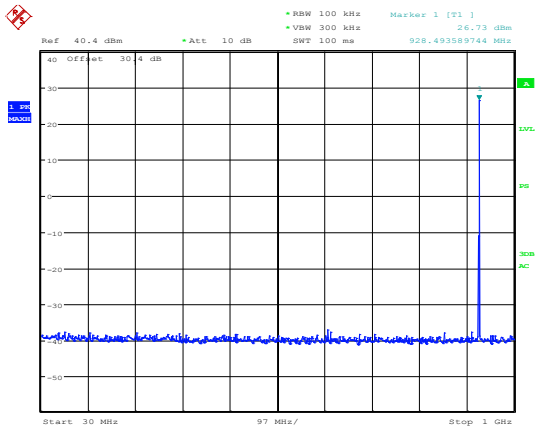
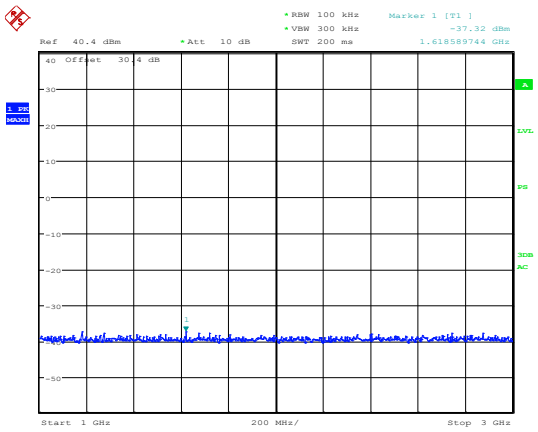
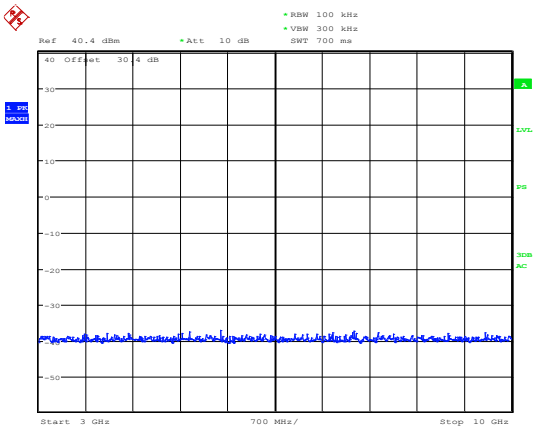
Frequency (MHz)	Measured pow er (dBm)	Fundamental Level (dBm)	Difference (dB)	Peak Limit at PK pow er –20 dB (dBm)	Margin (dB)
1375,00	**-37,57**	**+27,58**	**65,15**	**+7,58**	**45,15**

Graphical representation of Antenna Port Spurious Emission - Conducted
Operation Mode: #3
Frequency: 30 ÷ 10000MHz
High Channel







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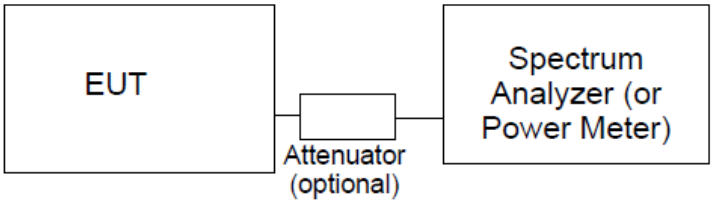
Frequency (MHz)	Measured power (dBm)	Fundamental Level (dBm)	Difference Peak / band edge (dB)	Peak Limit at PK power –20 dB (dBm)	Margin (dB)
1618,58	**-37,32**	**+26,73**	**64,05**	**+6,73**	**44,05**

12.7 TEST: 100 kHz Bandwidth of Frequency Band Edges			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	21°C	
	Relative Humidity (%)	52%	
	Air pressure (hPa)	1020	
—	Power Supply & Frequency	Application Point	
Fully configured sample tested at the power line frequency	120V ~ 60Hz	RF Connector	
Equipment mode: #1	Operation mode	#3, #4	
FCC Standard	§15.247 (D)		

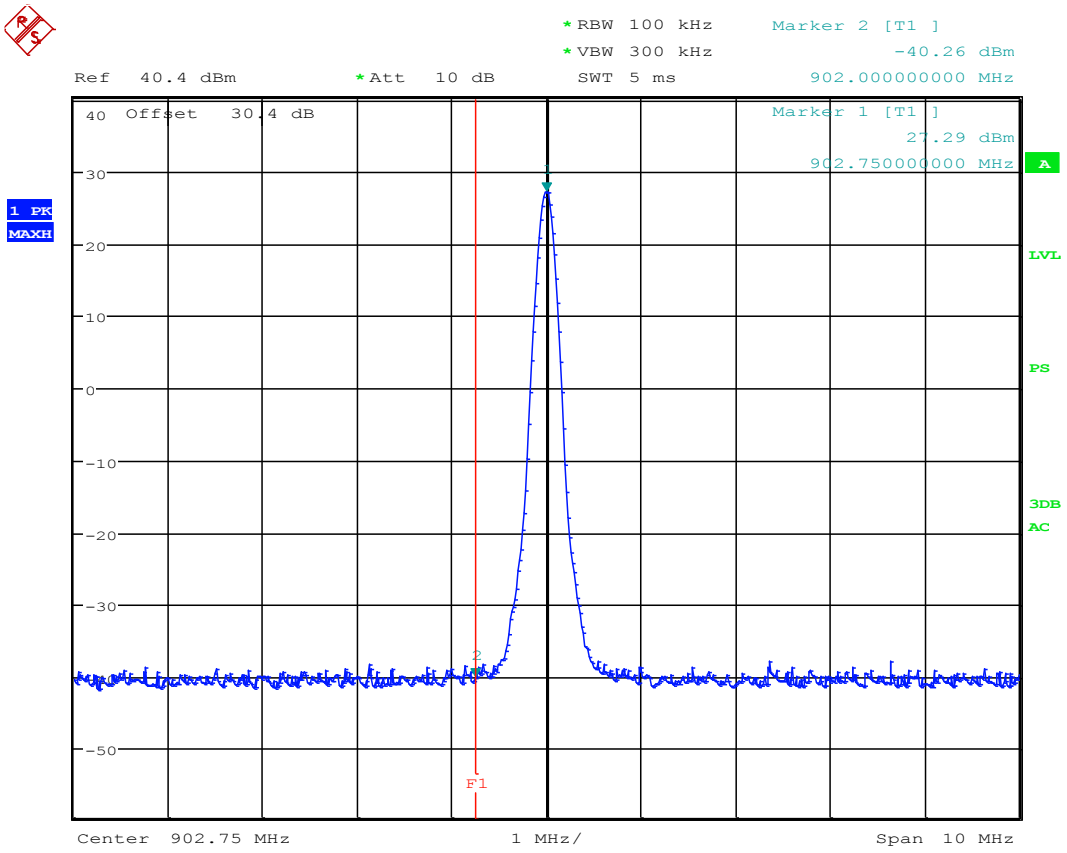
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §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)).

Further information to test setup (conducted)



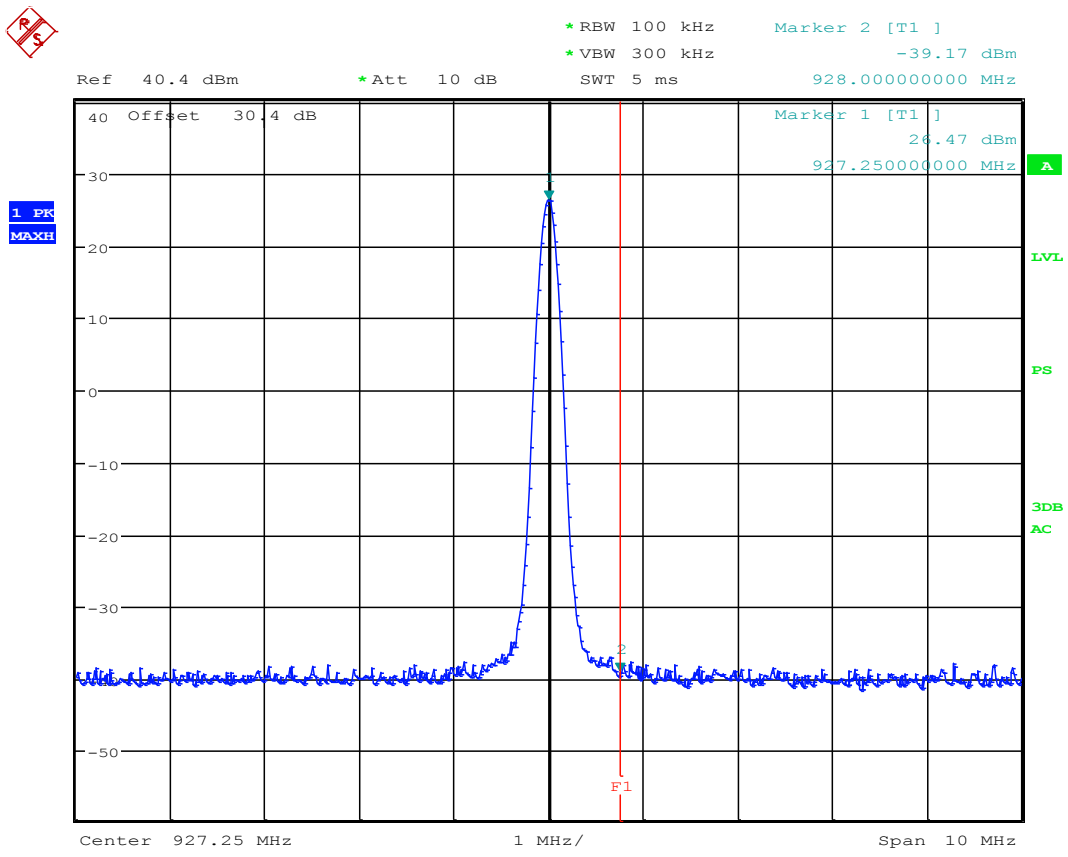
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESU40	87020455	04/2018	04/2019

Graphical representation of 100 kHz Bandwidth of Frequency Band Edges - Conducted
Operation Mode: #3
Low Channel



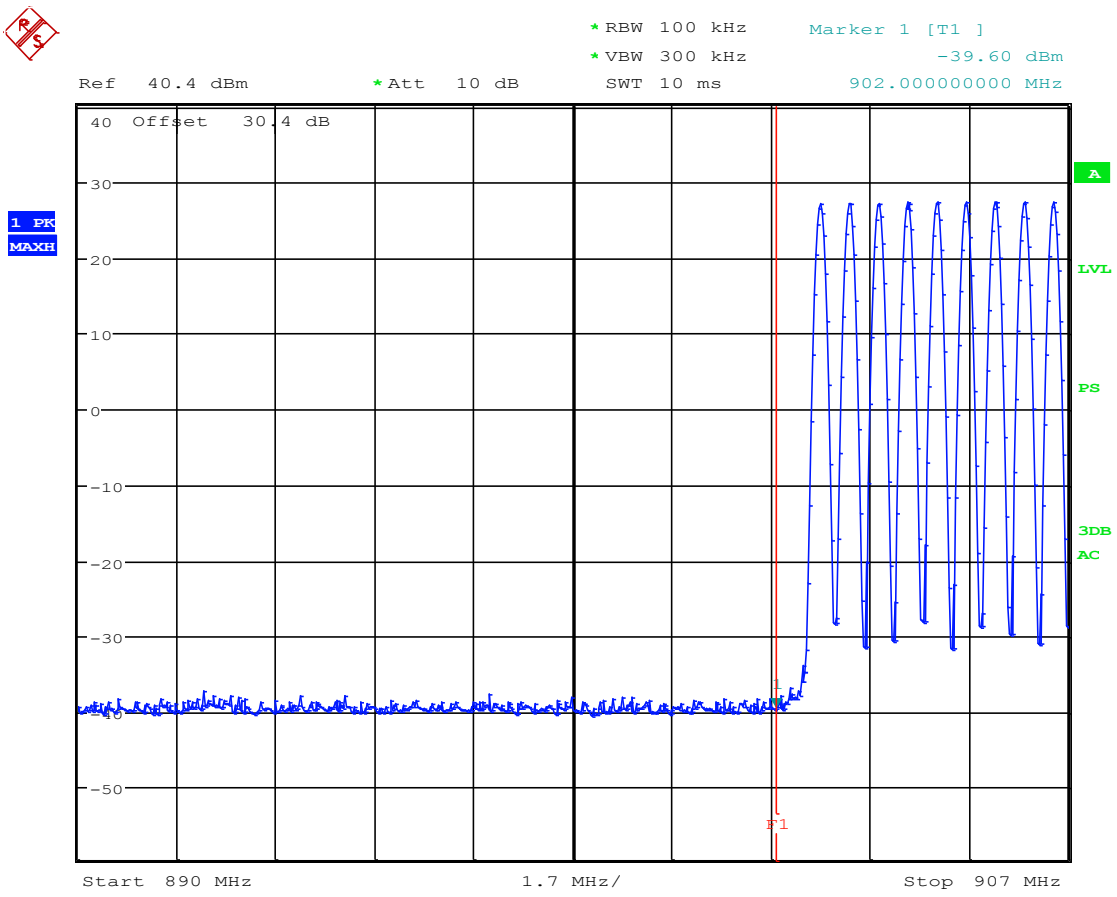
Measured power (dBm)	Measured power at the band edge (dBm)	Difference Peak / band edge (dB)	Peak Limit at PK power –20 dB (dBm)	Margin (dB)
+27,29	**-40,26**	**67,55**	**+7,29**	**47,55**

Graphical representation of 100 kHz Bandwidth of Frequency Band Edges - Conducted
Operation Mode: #3
High Channel



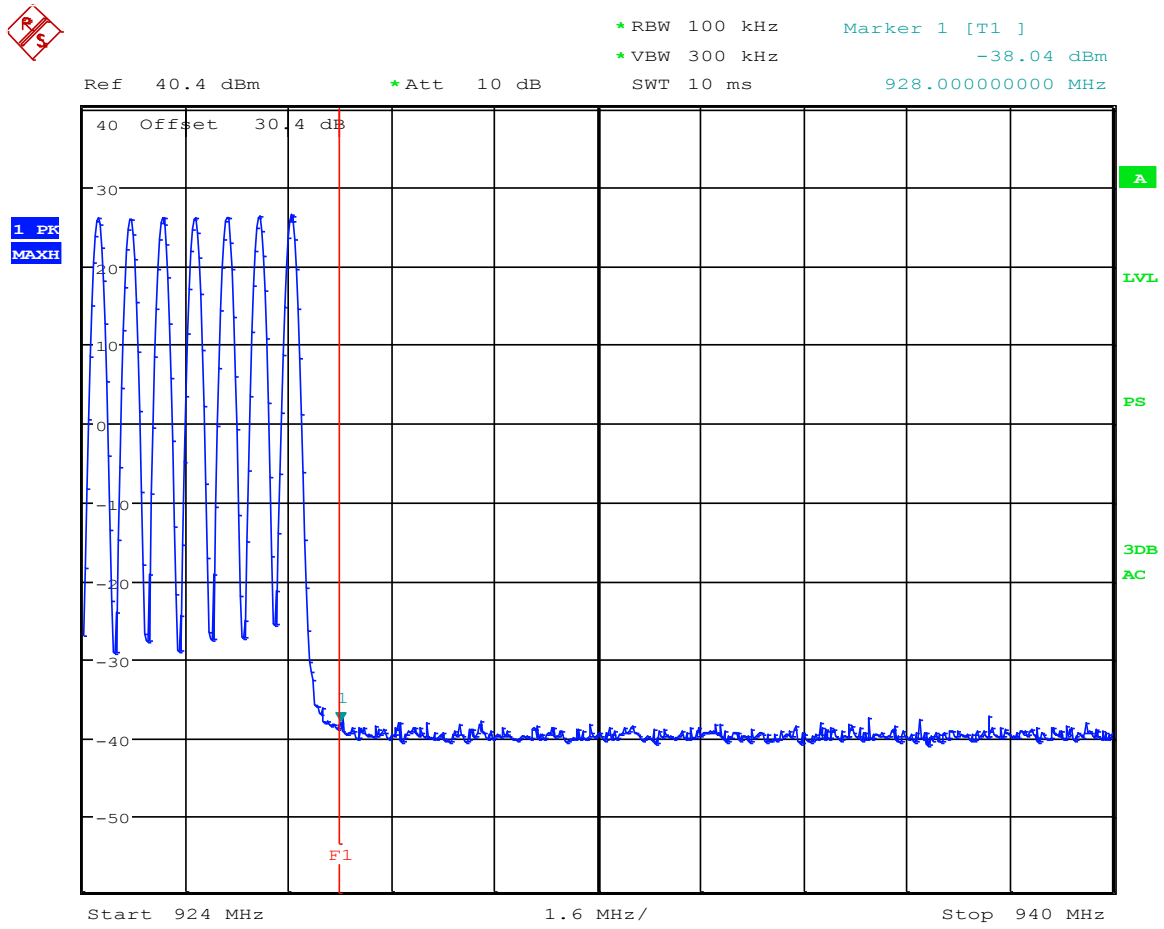
Measured power (dBm)	Measured power at the band edge (dBm)	Difference Peak / band edge (dB)	Peak Limit at PK power –20 dB (dBm)	Margin (dB)
+26,47	**-39,17**	**65,64**	**+6,47**	**45,64**

Graphical representation of 100 kHz Bandwidth of Frequency Band Edges - Conducted
Operation Mode: #4 (hopping)
Low Channel

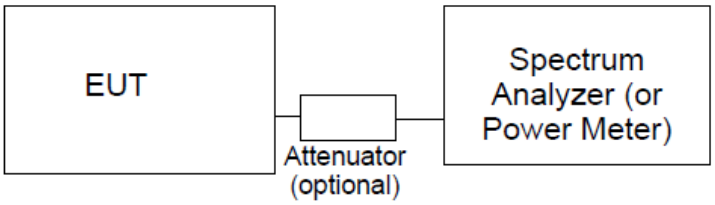


Measured power (dBm)	Measured power at the band edge (dBm)	Difference Peak / band edge (dB)	Peak Limit at PK power –20 dB (dBm)	Margin (dB)
+27,29	**-39,60**	**66,89**	**+7,29**	**46,89**

Graphical representation of 100 kHz Bandwidth of Frequency Band Edges - Conducted
Operation Mode: #4 (hopping)
High Channel

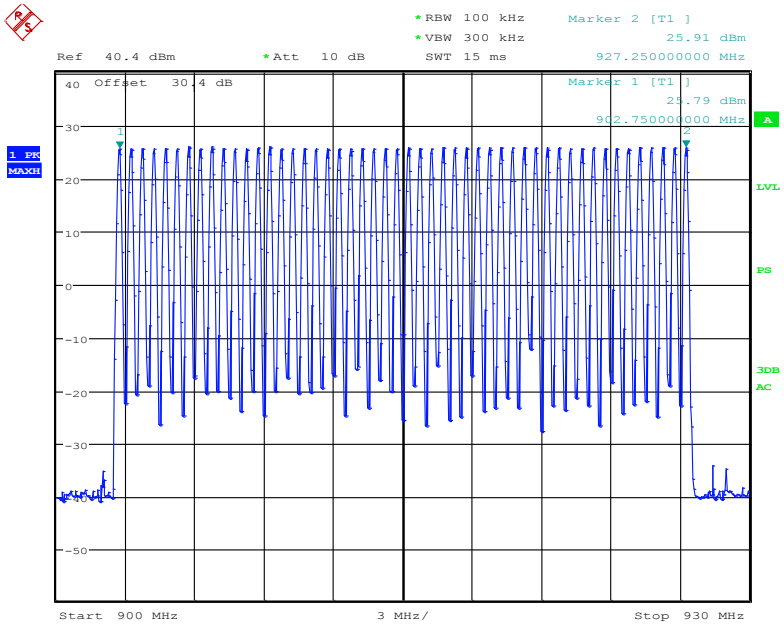


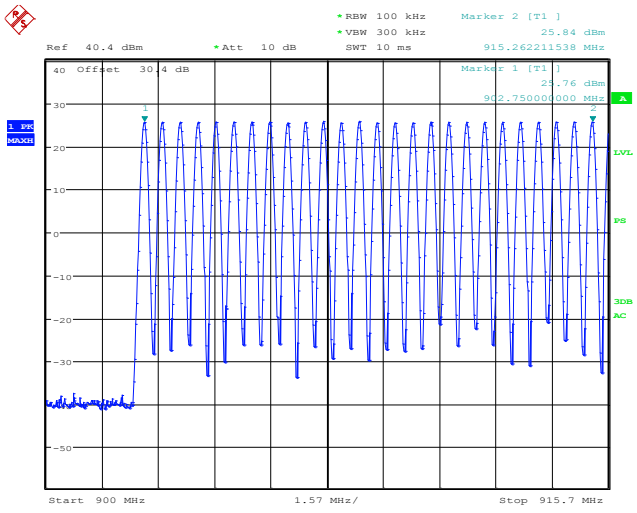
Measured power (dBm)	Measured power at the band edge (dBm)	Difference Peak / band edge (dB)	Peak Limit at PK power –20 dB (dBm)	Margin (dB)
+26,47	**-38,04**	**64,51**	**+6,47**	**44,51**

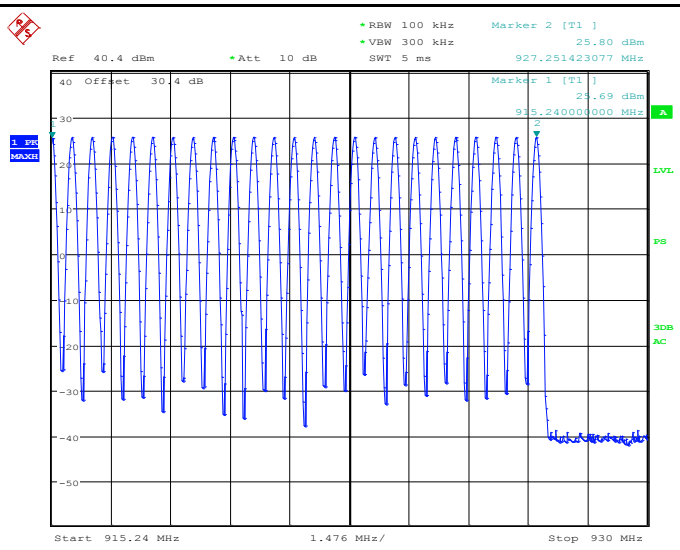
12.8 TEST: Number of Hopping frequencies		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C
	Relative Humidity (%)	30 to 60 %
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	22°C
	Relative Humidity (%)	36%
	Air pressure (hPa)	1033
—	Power Supply & Frequency	Application Point
Fully configured sample tested at the power line frequency	120V ~ 60Hz	RF connector
Equipment mode: #1	Operation mode	#4
FCC Standard	§15.247 (A) (1) (III)	
For FHSs in the band 902-928 MHz: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20-second period. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10-second period. The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.		
Further information to test setup		

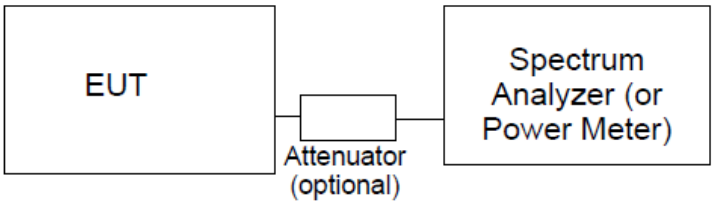
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESR3	87020864	11/2017	11/2018

Graphical rapresentation
Operation Mode: #4
Number of Hopping Frequencies: 50



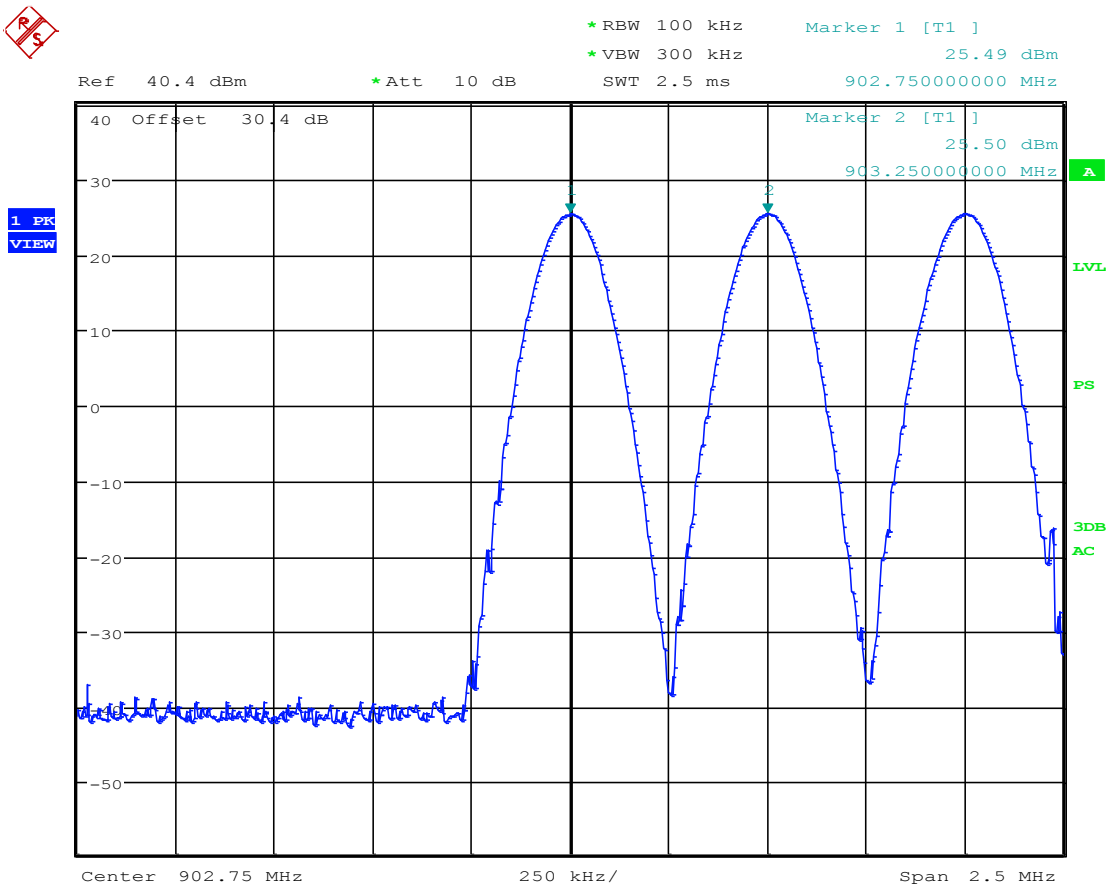




12.9 TEST: Carrier frequency separation		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C
	Relative Humidity (%)	30 to 60 %
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	23°C
	Relative Humidity (%)	36%
	Air pressure (hPa)	1033
—	Power Supply & Frequency	Application Point
Fully configured sample tested at the power line frequency	120V ~ 60Hz	RF connector
Equipment mode: #1	Operation mode	#4
FCC Standard	§15.247 (A) (1)	
FHSs shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.		
Further information to test setup		

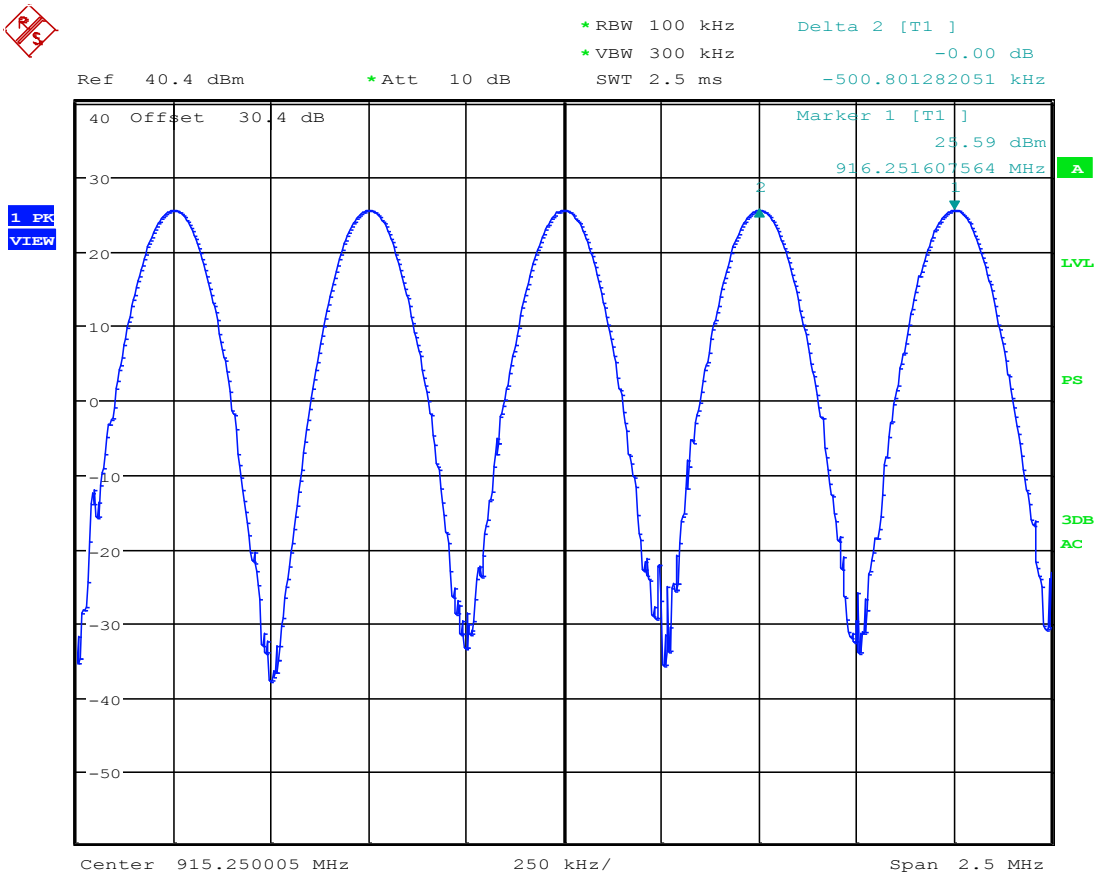
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESR3	87020864	11/2017	11/2018

Graphical representation of carrier frequency separation
Operation Mode: #4
Plot n°1



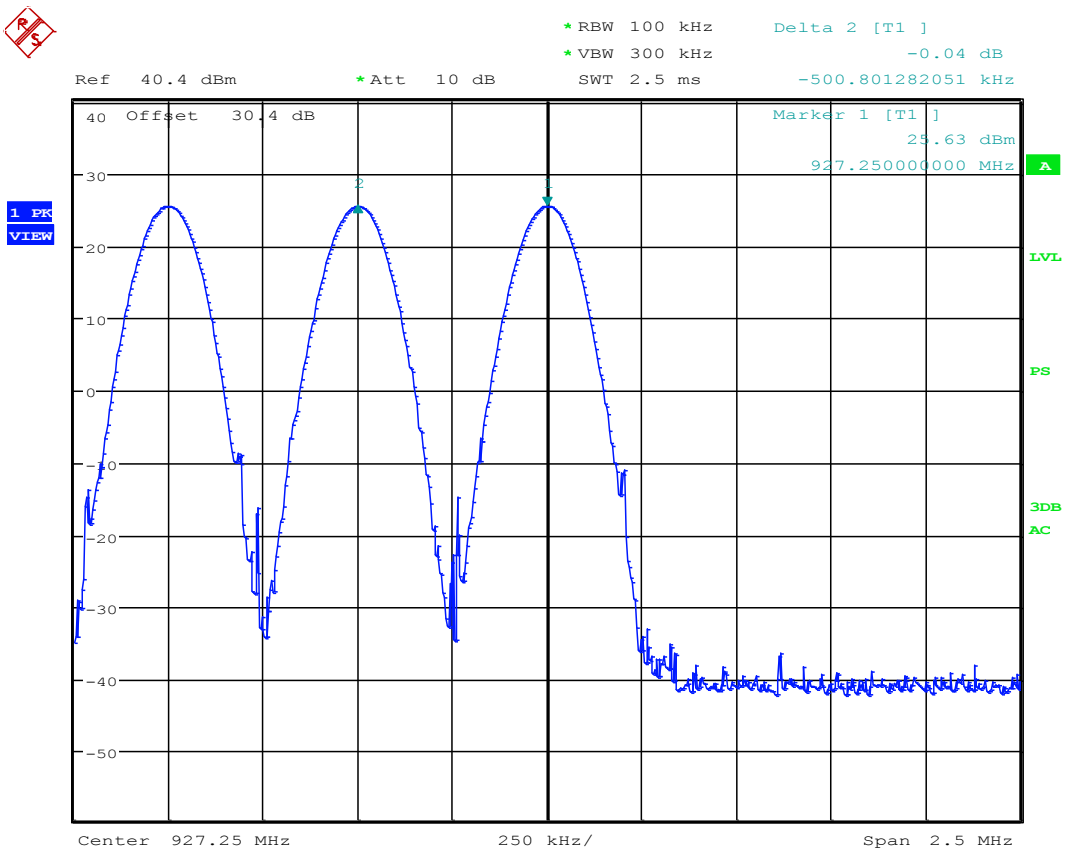
Channel (No.)	Carrier frequency separation (kHz)	Limit (kHz)	Plot (No.)
1 (Low)	**500,00**	**≥20dB bandwidth: 85,25 kHz**	**1**

Graphical representation of carrier frequency separation
Operation Mode: #4
Plot n°2

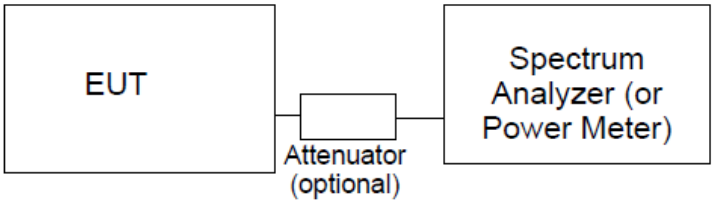


Channel (No.)	Carrier frequency separation (kHz)	Limit (kHz)	Plot (No.)
25 (Middle)	500,80	≥20dB bandwidth: 84,61 kHz	2

Graphical representation of carrier frequency separation
Operation Mode: #4
Plot n°3



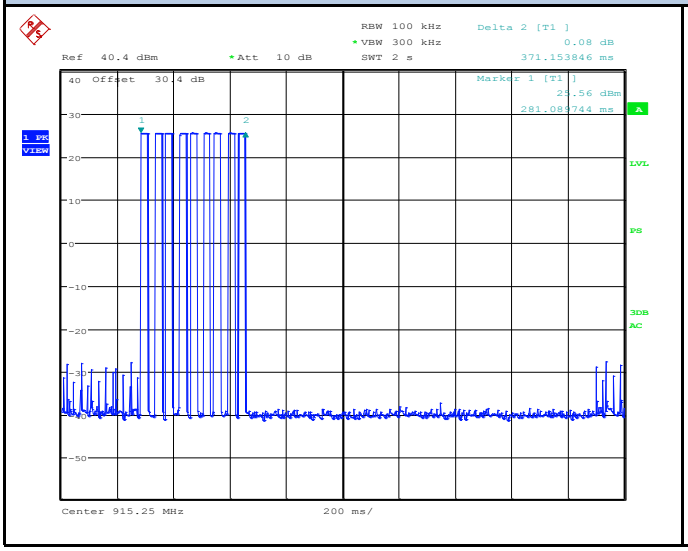
Channel (No.)	Carrier frequency separation (kHz)	Limit (kHz)	Plot (No.)
50 (High)	500,80	≥20dB bandwidth: 84,61 kHz	3

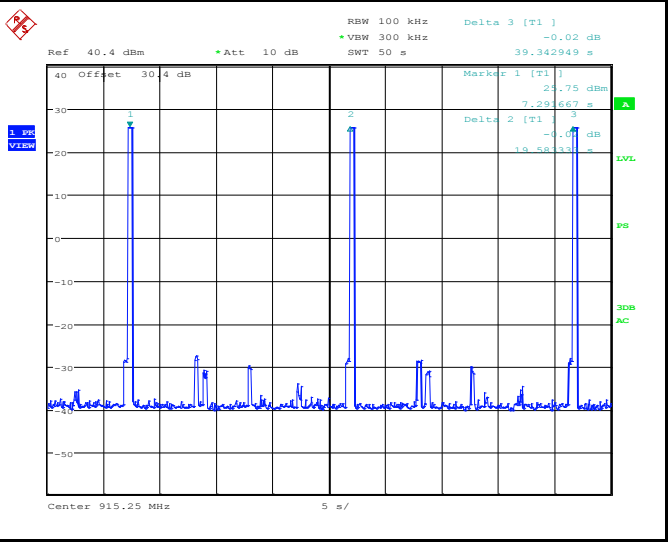
12.10 TEST: Average time of occupancy			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	23°C	
	Relative Humidity (%)	36%	
	Air pressure (hPa)	1033	
—	Power Supply & Frequency	Application Point	
Fully configured sample tested at the power line frequency	120V ~ 60Hz	RF connector	
Equipment mode: #1	Operation mode	#4	
FCC Standard	§15.247 (A) (1) (III)		
For FHSs in the band 902-928 MHz: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20-second period. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10-second period. The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.			
Further information to test setup			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESR3	87020864	11/2017	11/2018

Average time of occupancy (ms)	Time between next hop (s)	Limit of hopping period (s)	Limit of Average time of occupancy (ms) in a period of 20s	Plot (No.)
281,08	39,34	20	400	1÷2

Plot n°1 and n°2





12.11 TEST: RF Exposure Requirements			PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	---	
	Relative Humidity (%)	---	
	Air pressure (hPa)	1020	
—	Power Supply & Frequency	Application Point	
Fully configured sample tested at the power line frequency	120V ~ 60Hz	Enclosure	
Equipment mode: #1	Operation mode	#1	
FCC Standard	§ 1.1310 (1) (B)		
Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines § 1.1310, table (1) (b)			
EUT classification (fixed, mobile or portable devices)	Fixed equipment used in Uncontrolled Exposure environment		
Limits Freq. Range 300÷1500MHz	f/1500 (Power Density (mW/cm^2))		
Power Density (mW/cm^2)	$S = P * G / 4\pi r^2$		

Note:
P = Conducted Power (mW); G = Numeric Gain ($10^{(dBi/10)}$); r = distance (cm)

CH	Frequency	Conducter output power	Conducter output power (P)	Numeric gain (G)	Distance (r)	Power Density (S) (mW/cm^2)	Limits (f/1500)
	(MHz)	(dBm)	(mW)	dB	(cm)		
Low	902,75	27,42	552,07	2,239	20	0,2458	0,602
Middle	915,25	27,47	558,47	2,239	20	0,2487	0,610
High	927,25	26,72	469,89	2,239	20	0,248	0,618
	VERDICT						
	The EUT Radiated Power density at evaluation distance is WHITIN THE LIMIT at the distance of 20cm. The EUT Radiated Power density is OUT OF THE LIMIT if the distance is < 13,53cm						

END OF TEST REPORT