

TEST REPORT

No. AR19-0043846-01

performed in accordance with

FCC Rules: Code of Federal Regulations (CFR) no. 47
Part 15 Subpart C Section 15.247

PRODUCT	Radio module
MODEL(s) TESTED	ON3ELR/A
FCC ID	PMLON3ELRA
TRADE MARK(s)	NICE

APPLICANT	NICE S.p.A. ~ Via Pezza alta, 13 ~ I-31046 Rustignè di Oderzo (TV)
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Tested by	Robertino Torri <i>[Laboratory technician]</i>	
Approved by	Giovanni Di Turi <i>[Laboratory manager]</i>	

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2020-06-24	First edition Digital signed - AR19-0043846-01_TR_FCC 15.247_NICE_ON3ELR-A

The results of tests and checks reported in this Test Report refer exclusively to the samples tested and described in the Report itself.

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The authenticity of this Test Report and its contents can be verified by contacting IMQ S.p.A., responsible for this Test Report.

1. GENERAL DATA

SAMPLE		
Samples received on	2020-04-08	(Item(s) sampled and sent by applicant)
IMQ reference samples	BEM	99151
Samples tested No.	1	
Object under analysis recognition	Not carried out Except where stated, characteristics of products were taken from client description and were not verified by the laboratory	
Date of acceptance of test item	2020-04-08	
TEST LOCATION		
Testing dates	2020-04-14 ÷ 2020-04-15	
Testing laboratory.	IMQ S.p.A. - Via Quintiliano, 43 – I-20138 Milano	
Testing site	Via Quintiliano, 43 – I-20138 Milano	
ENVIRONMENTAL CONDITIONING		
Parameter	Measured	
Ambient Temperature	21.0 ÷ 23.0 °C	
Relative Humidity	47 ÷ 55 %	
Atmospheric Pressure	991 ÷ 1001 mbar	
The laboratory is monitored by a continuous environmental conditions measurements system. Temperature, humidity and pressure data are recorded on a weekly basis and stored in local archive.		
REMARKS		
Throughout this report a point is used as the decimal separator. The ability or reliability of this product to perform its intended function in a particular application has not been investigated. Unless otherwise specified, warnings, installation instruction and/or user manual provided with the sample have been checked in Italian or English version only. IMQ declines any responsibility derived from missing or wrong information provided aside by the applicant.		

2. REFERENCE DOCUMENT

	DOCUMENT	DATE	TITLE
☒	47 CFR Part 15	2015	Radio Frequency Device
☒	ANSI C63.4	2014	American National Standard for 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 of Procedures for Compliance Testing of Unlicensed Wireless Devices

3. EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL DATA (according to manufacturer declaration)

MODEL (basic)	Description
ON3ELR/A	Radio module
VARIANTS (derived)	Description
/	/

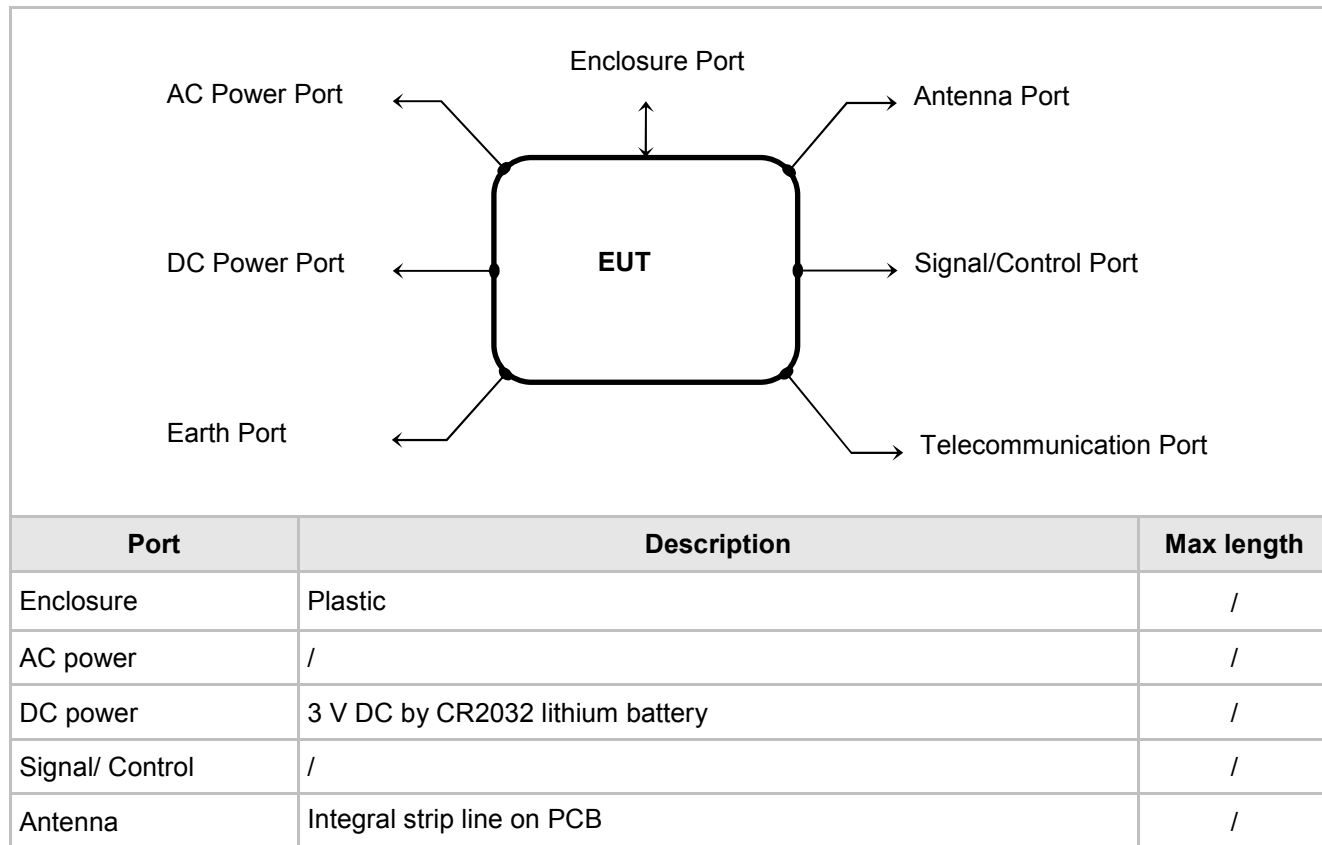
FCC ID	PMLON3ELRA
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Manufacturer	NICE S.p.A. ~ Via Pezza alta, 13 ~ I-31046 Rustignè di Oderzo (TV)
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Type of equipment	DTS - Digital transmission equipment
Operating frequency	915.77 MHz
Max RF radiated power	94.09 dBµV/m @3m
Modulation	CSS
Channel	1
Occupied bandwidth	> 500 kHz
Antenna	Integral strip line on PCB
Remarks	None

4. TEST CONFIGURATION OF EQUIPMENT UNDER TEST

EUT PORTS



STATE OF THE EUT DURING TESTS

Ref.	Transmission Mode	Description
#1	CW	Continuous unmodulated transmission mode (constant tone)
#2	Modulated	Continuous modulated transmission (PBRS9 duty cycle close to 100%)
#3	Normal operating	Receiving mode / Transmission only after BD encoding reception for acknowledge

SUPPORT EQUIPMENT

Defined as equipment needed for correct operation or loading of the EUT, but not considered as tested:

Equipment	Manufacturer	Model
/	/	/

ELECTROMAGNETICALLY RELEVANT COMPONENTS

Component	No.	Manufacturer	Model
PCB board	1	NICE	646-B – R02

RFI SUPPRESSION DEVICES

Component	No.	Manufacturer	Model
/	/	/	/

EMI PROTECTION DEVICES

Component	No.	Manufacturer	Model
/	/	/	/

EUT TECHNICAL DOCUMENTATION

Document	Reference
/	/

5. METHODS OF MEASUREMENT

All compliance measurements have been carried out using the procedures described in the standard ANSI C63.4-2014, ANSI C63.10-2013 and Section 15.31 of CFR47 Part 15 – Subpart A (General).

Additional test requirements have been adopted according to the reference Section indicated in the § 6 of this test report.

FREQUENCY RANGE INVESTIGATED

Radiated emission tests: from 9 kHz to tenth harmonic of fundamental.

6. SUMMARY OF TEST RESULTS

POSSIBLE TEST CASE VERDICTS:	
Test object meets the requirement	PASS
Test object does not meet the requirement	FAIL
Test case does not apply to the test object	N.A.
Test not performed	N.P.

CFR47 Part 15	TITLE	RESULT
§ 15.203, § 15.247 (b)(4)(i)	Antenna Requirements	PASS
§ 15.207 (a)	Conducted Emission	N.A.
§ 15.209 (a) (f)	Radiated Emission	PASS
§ 15.247 (a)	Frequency Hopping Spread Spectrum Specifications	
§ 15.247(a)	20 dB Bandwidth	N.A. ¹
§ 15.247(a)(1)	Carrier frequency (Hopping Channel) Separation	N.A. ¹
§ 15.247(a)(1)(iii)	Number of Hopping Channels Used	N.A. ¹
§ 15.247(a)(1)(iii)	Channel occupancy time	N.A. ¹
§ 15.247(a)(2)	6dB Minimum Bandwidth	PASS
§ 15.247(b)	Maximum Peak Output Power	
§ 15.247(b) (1)	Peak Output Power	N.A.
§ 15.247(b) (3)	RF power output, radiated (EIRP)	PASS
§ 15.247(b) (4)	Antenna gain	N.A.
§ 15.247(c)	Operation with directional antenna gains greater than 6 dBi	N.A.
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edges	PASS
§ 15.247 (d)	Radiated Emission	PASS
§ 15.247 (e)	Power Spectral Density	PASS
§ 15.247 (f)	Hybrid systems	N.A. ¹
§ 15.247 (g)	FHSS Transmission characteristics	N.A. ¹
§ 15.247 (h)	Recognition of occupied channel and multiple transmission	N.A. ¹
§ 15.247(i), § 47CFR 1.1307(b)(1)	RF humane exposure	PASS
Note 1	Not applicable for DTS equipment	

7. TEST RESULTS

7.1 ANTENNA REQUIREMENTS

TEST REQUIREMENT

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.

Testing dates	2020-04-14
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Antenna specifications

N° of authorized antenna types	1
Antenna type	Integral strip line on PCB
Connector type	/
Maximum total gain	/
External power amplifiers	Not present

Note: equipment for professionals uses

TEST RESULT

The EUT meets the requirements of section 15.203 and 15.204

7.2 RADIATED DISTURBANCES

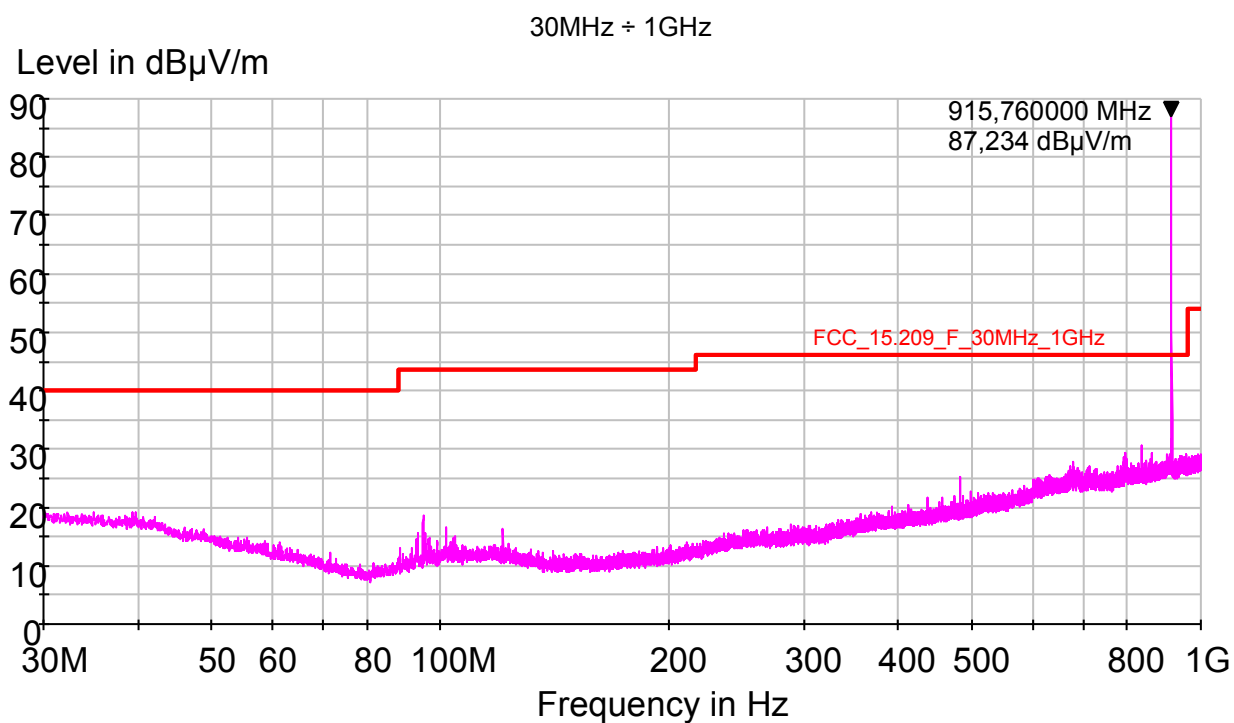
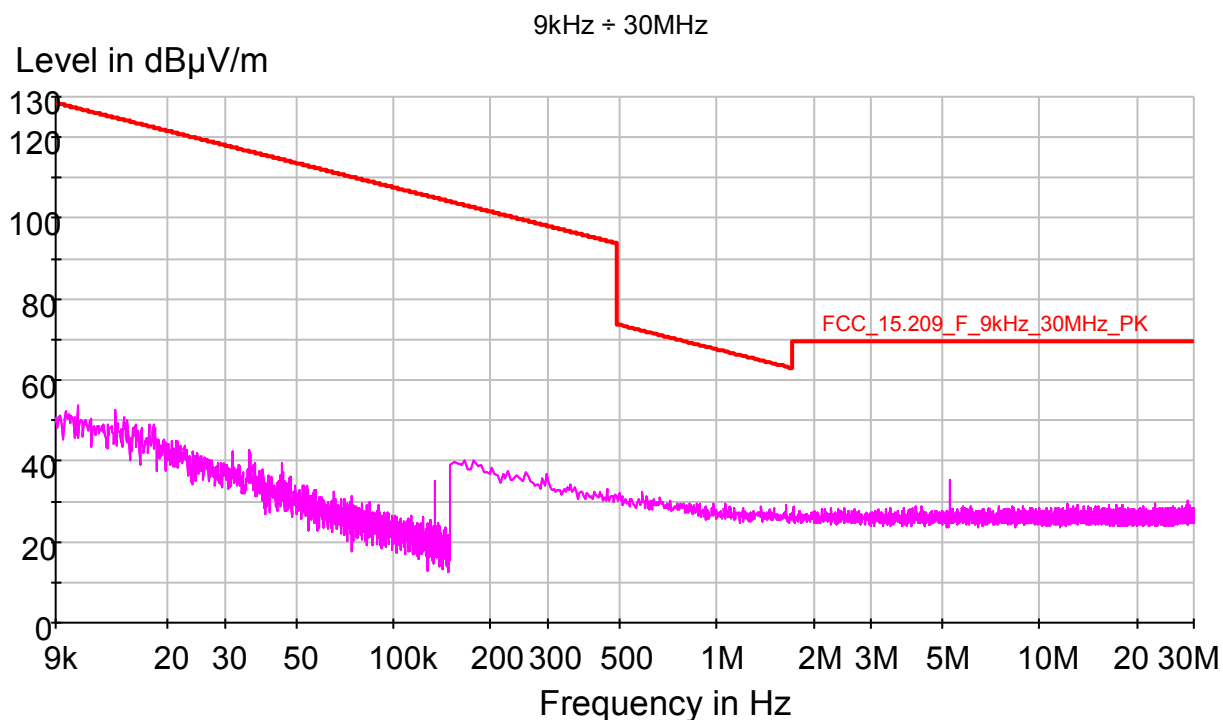
TEST REQUIREMENT	
Test setup	ANSI C63.4
Test method	ANSI C63.10 clauses 6.3, 6.4 and 6.6
Test facility	Semi-anechoic chamber
Test distance	3 meters
Frequency range	9 kHz to tenth harmonic of fundamental
IF bandwidth (below 30 MHz)	9 kHz
IF bandwidth (below 1,000 MHz)	120 kHz
IF bandwidth (above 1,000 MHz)	1 MHz
EMC class	B
EUT operating condition	#1
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) = $40\log(300\text{meter} / 3\text{meter}) = +80\text{db}$; Extrapolation (dB) = $40\log(30\text{meter} / 3\text{meter}) = +40\text{db}$	
Testing dates	2020-04-14 ÷ 2020-04-15

LIMITS		
Band of operations	Peak (dB μ V/m)	Average Limit (dB μ V/m)
Restricted bands (§ 15.205)	74	54
Others bands	According to 15.209	According to 15.209

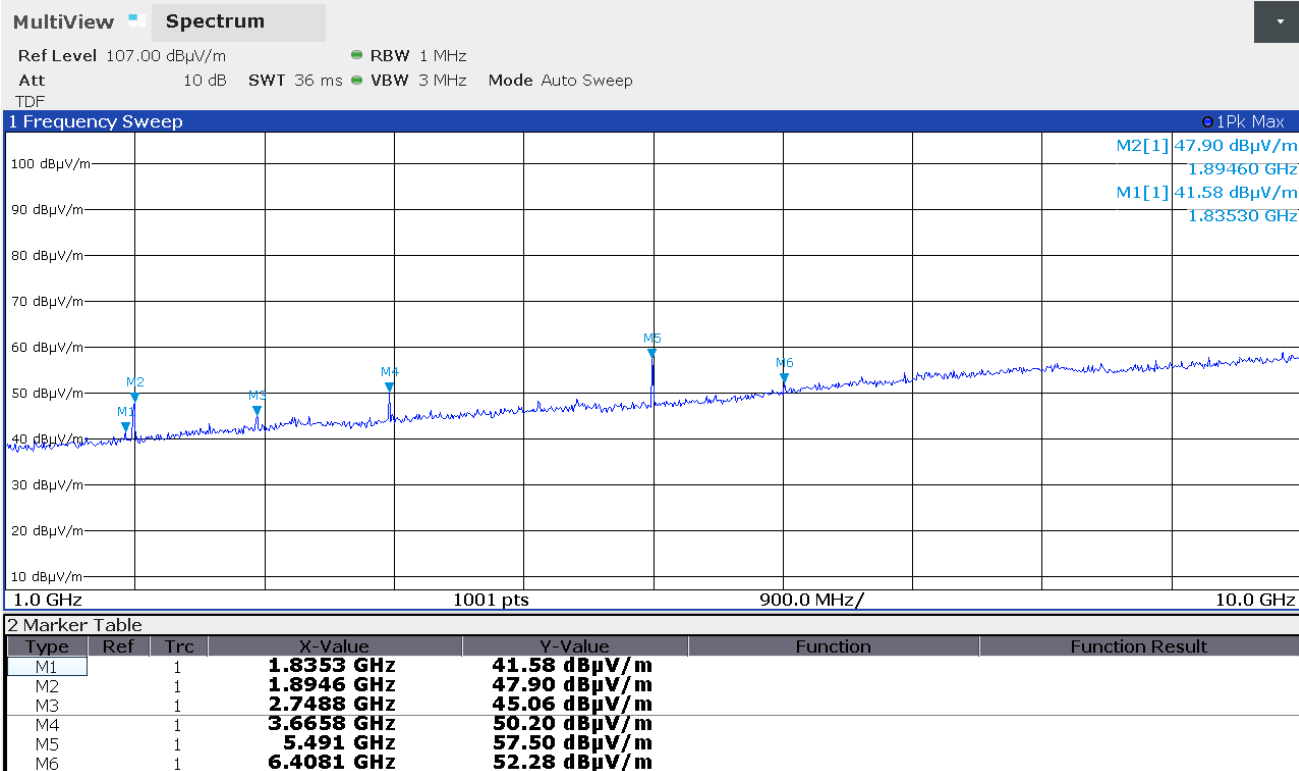
TEST PROCEDURE
1) The EUT was placed on turntable which is 0.8 m above the ground plane 2) The turntable shall rotate from 0° to 360° degrees to determine the position of maximum emission level. 3) The EUT is positioned 3 m away from the receiving antenna, which varied from 1 to 4 m to find the highest emission. 4) The measurements were made with the detector set to PEAK and AVerage amplitude within a bandwidth of 100 kHz below 1000 MHz and 1 MHz above 1000 MHz. 5) The receiving antenna was positioned in both horizontal and vertical polarization and EUT antenna was positioned to maximise emissions. 6) The measurements with Quasi-Peak detector, below 1000 MHz are performed only for frequencies for which the Peak values are $\geq$ (Q.P. limit - 6 dB). 7) The measurements with AVerage detector, above 1000 MHz are performed only for frequencies for which the Peak values are $\geq$ to AVerage limit.

TEST RESULT
The EUT has been tested in 3 orthogonal axes at the frequencies lowest, middle and highest for each modulation. The results reported are worst case. The measurement of spurious emission of EUT in receiver mode is deemed to be fulfilled as no limits are exceeded in transmitter mode (condition considered more burdensome). The EUT meets the requirements of sections 15.205 (b), 15.209 and 15.247.

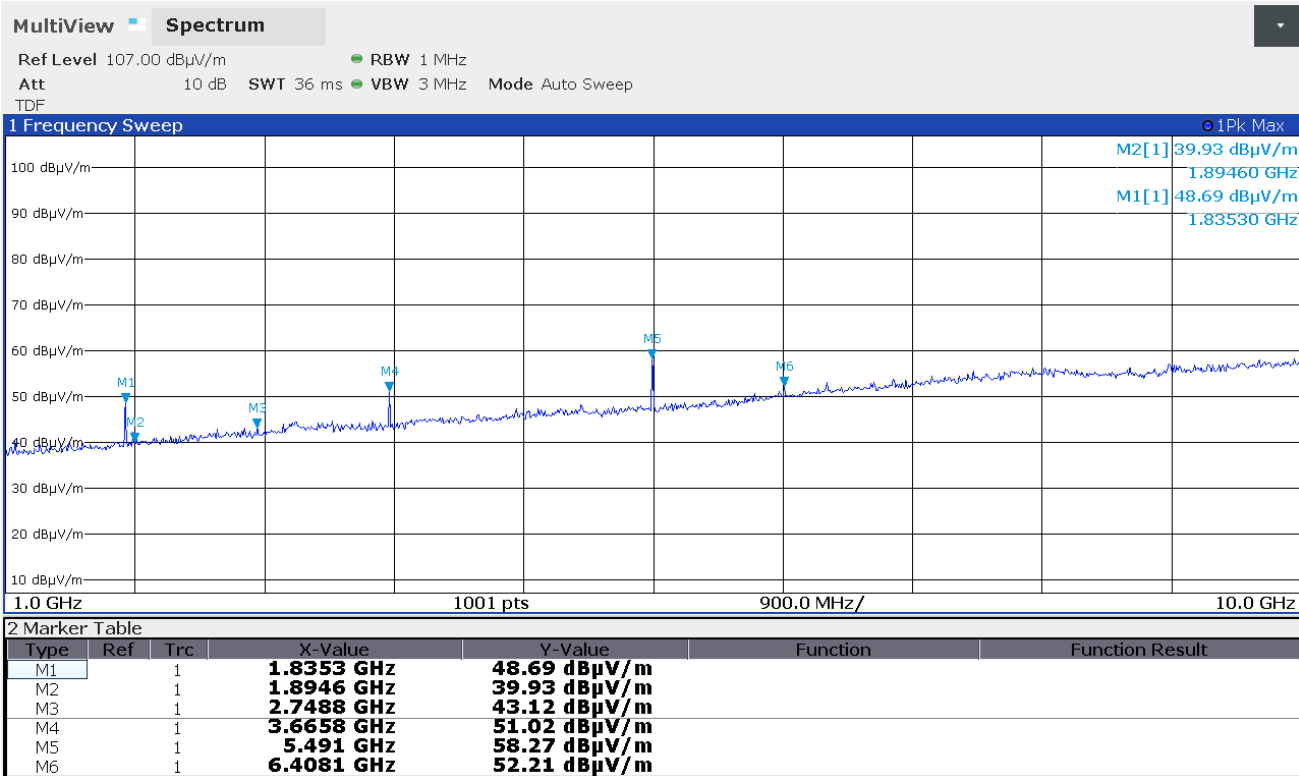
Worst case measurement result (Horizontal and Vertical)



1GHz ÷ 10GHz - HORIZONTAL



1GHz ÷ 10GHz - VERTICAL



Tabular worst case measurement result >1,000 MHz

Frequency (GHz)	PK (dB μ V/m)	PK Limit (dB μ V/m)	AV (dB μ V/m)	AV Limit (dB μ V/m)	PK Margin (dB)
1.8353	48.69	74.09	---	---	25.40
1.8946	47.90	74.09	---	---	26.19
2.7488	45.06	74	/	54	28.94
3.6658	51.02	74	/	54	22.98
5.4910	58.27	74.09	---	---	15.82
6.4081	52.28	74.09	---	---	21.81

7.3 6 dB BANDWIDTH

TEST REQUIREMENT

Spectrum analyzer settings

Test setup	ANSI C63.4
Test method	ANSI C63.10 clause 11.8.1
Span	2 MHz
Resolution bandwidth (RBW)	100 kHz
Video bandwidth (VBW)	300 kHz
Sweep time (SWT)	2,5 ms
Detector function	Peak
Trace	max hold
Attenuator	/
Deviation to test procedure	None
EUT operating condition	#2
Remark	None
Testing dates	2020-04-14

TEST RESULT

The EUT meets the requirements of sections 15.247 (a) (2)

TEST PROCEDURE

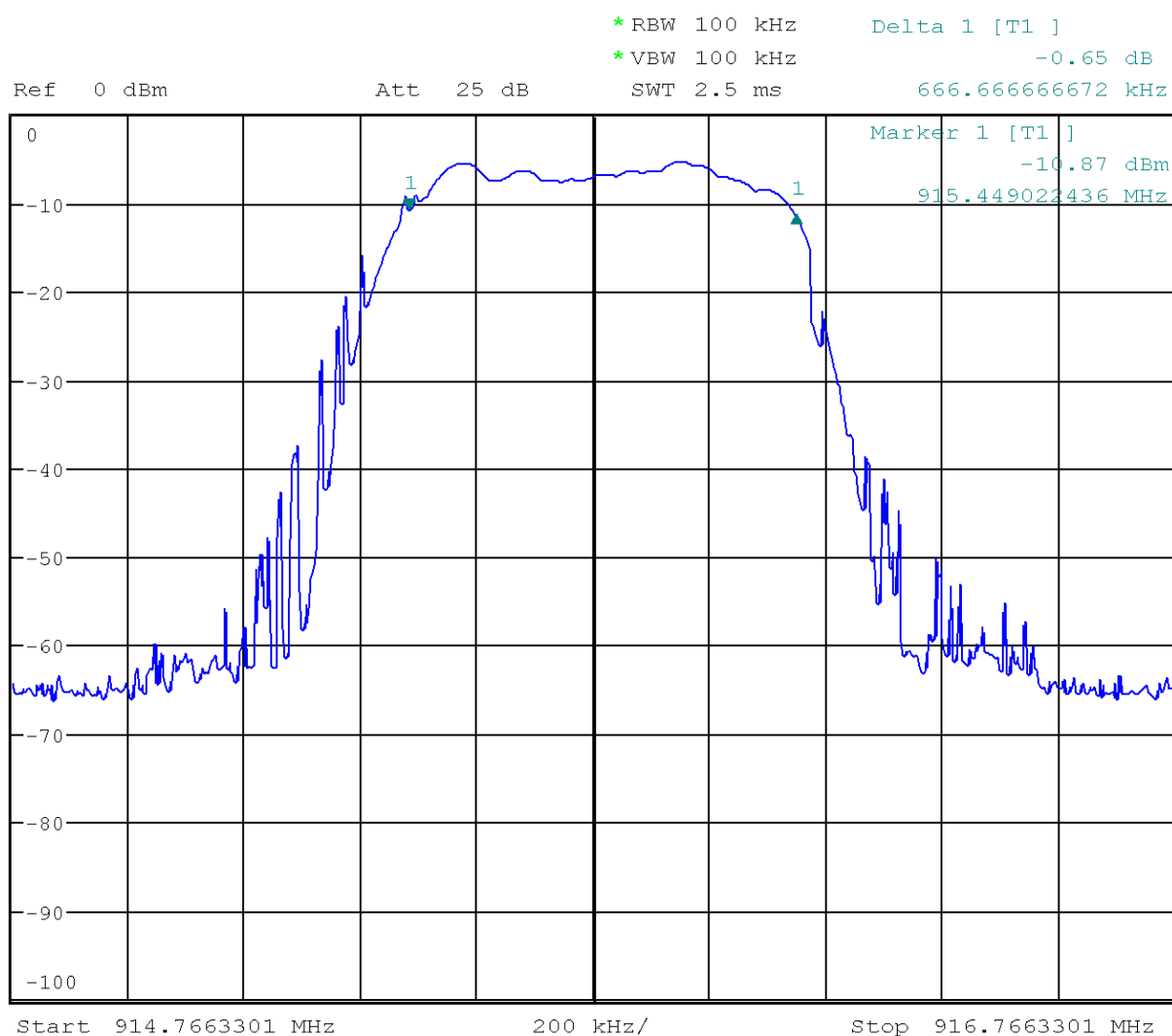
The EUT is set to transmit has its maximum data rate.

The Channel bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

MEASUREMENTS RESULTS

Channel (No.)	Frequency (MHz)	Channel Bandwidth (kHz)	Plot (No.)
01	915.77	666.667	1

Plot 1



7.4 MAXIMUM PEAK OUTPUT POWER (DE FACTO EIRP)

TEST REQUIREMENT

Spectrum analyzer settings

Test setup	ANSI C63.4
Test method	ANSI C63.10 clause 11.9.1.1
RBW / VBW	10 MHz / 10 MHz
Detector function	Peak
Test distance	3 meters (for radiated measurement)
EUT operating condition	#1
Testing dates	2020-04-14

TEST RESULT

The EUT meets the requirements of sections 15.247 (b) (3)

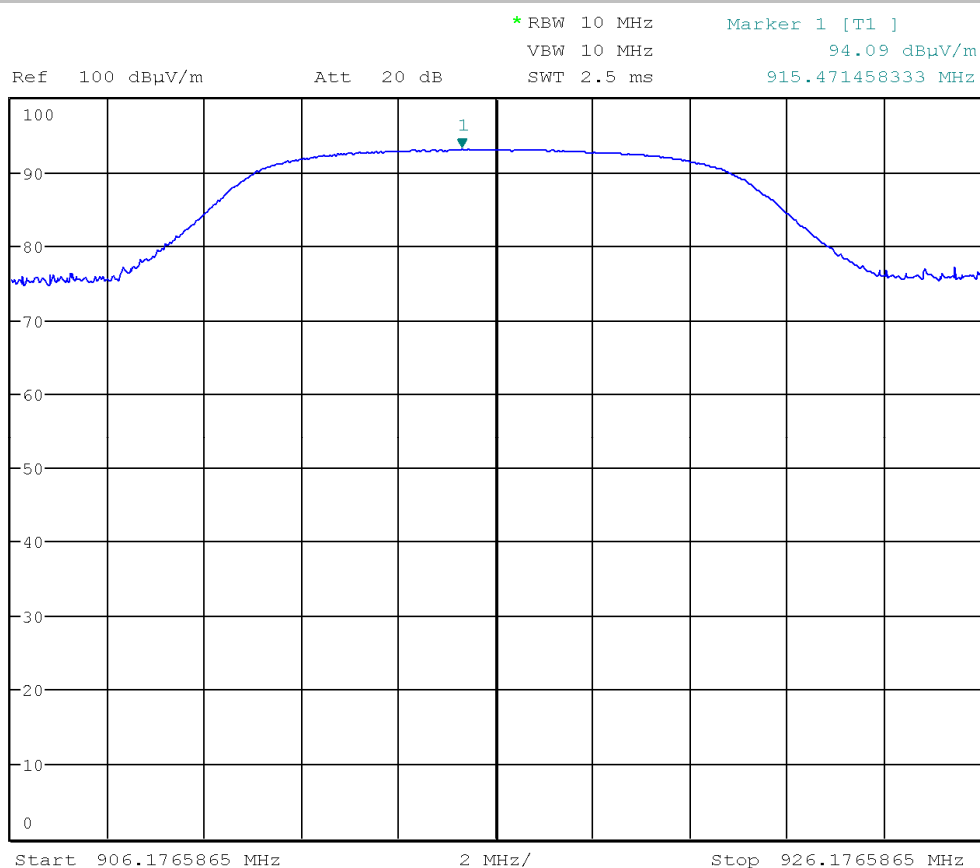
LIMITS

1 Watt (30dBm)

RADIATED MEASUREMENTS RESULTS (DE FACTO EIRP)

Frequency (MHz)	Reading Power (dBμV/m)	Reading Power (dBm)	Antenna gain (dBi)	Conducted power (dBm)	Conducted power (W)
915.77	94.09	-1.14	-2.15	-3.29	0.0005

Plot 1



7.5 BAND-EDGE COMPLIANCE OF RF RADIATED EMISSIONS

TEST REQUIREMENT	
Spectrum analyzer settings	
Test setup	ANSI C63.4
Test method	ANSI C63.10 clauses 11.13.3.2 and 11.13.3.5
Span	Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation
Resolution bandwidth (RBW)	1 MHz (100 kHz band-edge)
Video bandwidth (VBW)	1 MHz (100 kHz band-edge)
Sweep time (SWT)	Auto
Detector function	Peak
Trace	Max hold
Attenuator	/
Deviation to test procedure	None
EUT operating condition	#1
Remark	None
Testing dates	2020-04-14

TEST RESULT

The EUT meets the requirements of sections 15.247 (d)
All out of band spurious emissions are more 20 dB below the in band power of the fundamental.

LIMITS

-20 dB below peak output power

TEST PROCEDURE

Only for measuring emissions up to 2 MHz removed from the band-edge the "delta" technique for Radiated emissions was used.

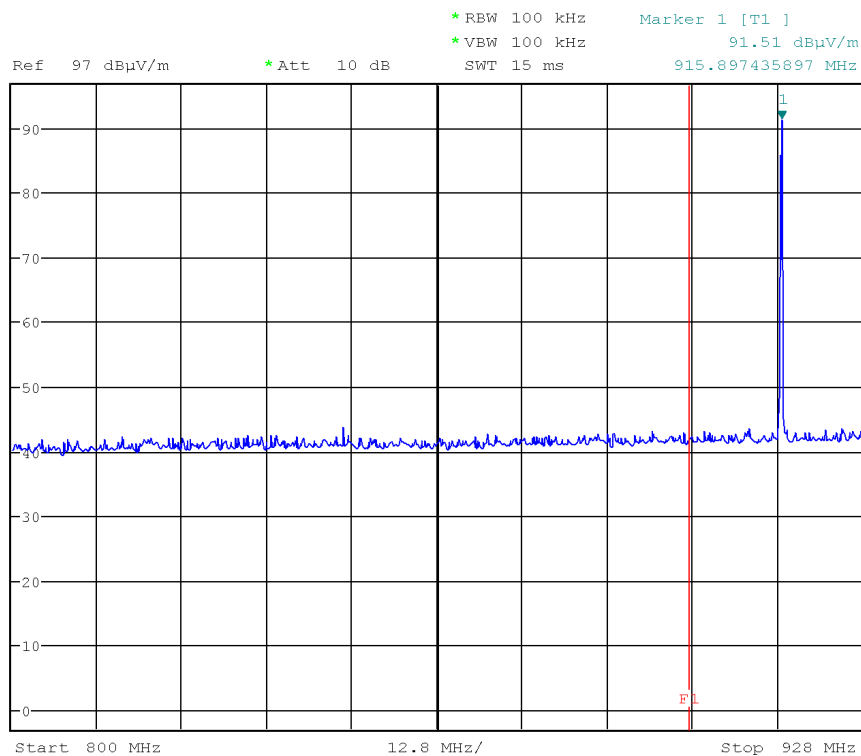
Delta technique: The transmitter output was connected to the spectrum analyser through a test fixture (radio frequency coupling device associated with the dedicated antenna of the equipment under test)

Once the trace is stabilized, by the marker the emission at the band edge (or on the highest modulation product outside of the band, if this level is greater than that at the band edge) was set.

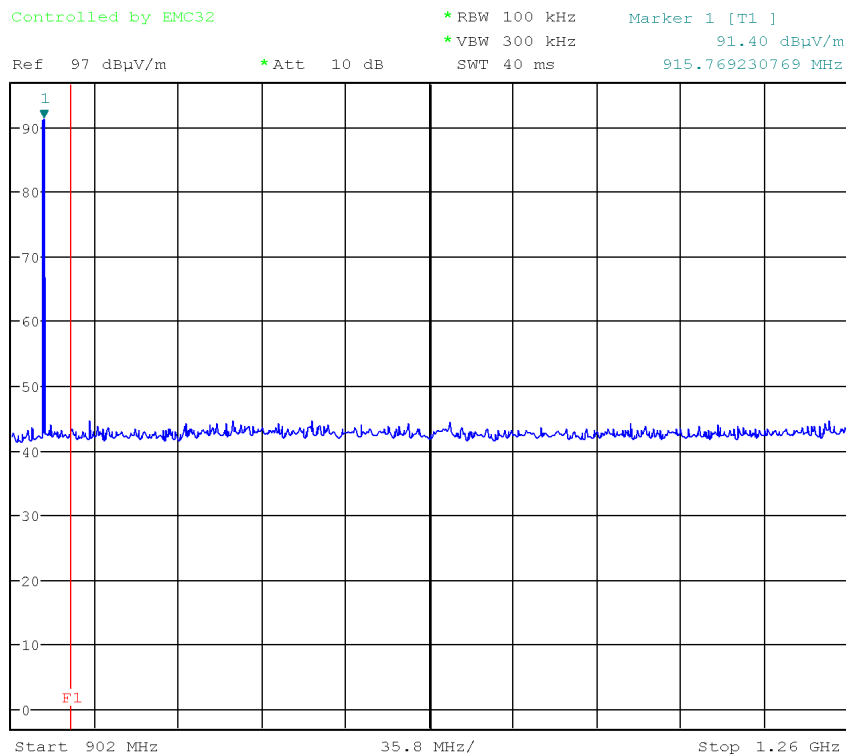
The "n" by the marker-delta function and the marker-to-peak function the peak of the in-band emission was selected. The marker-delta value displayed was compared with the limit specified in this Section

MEASUREMENTS RESULTS

Lower Band-edge compliance



UpperBand-edge compliance



7.6 RADIATED EMISSIONS OUTSIDE THE BAND

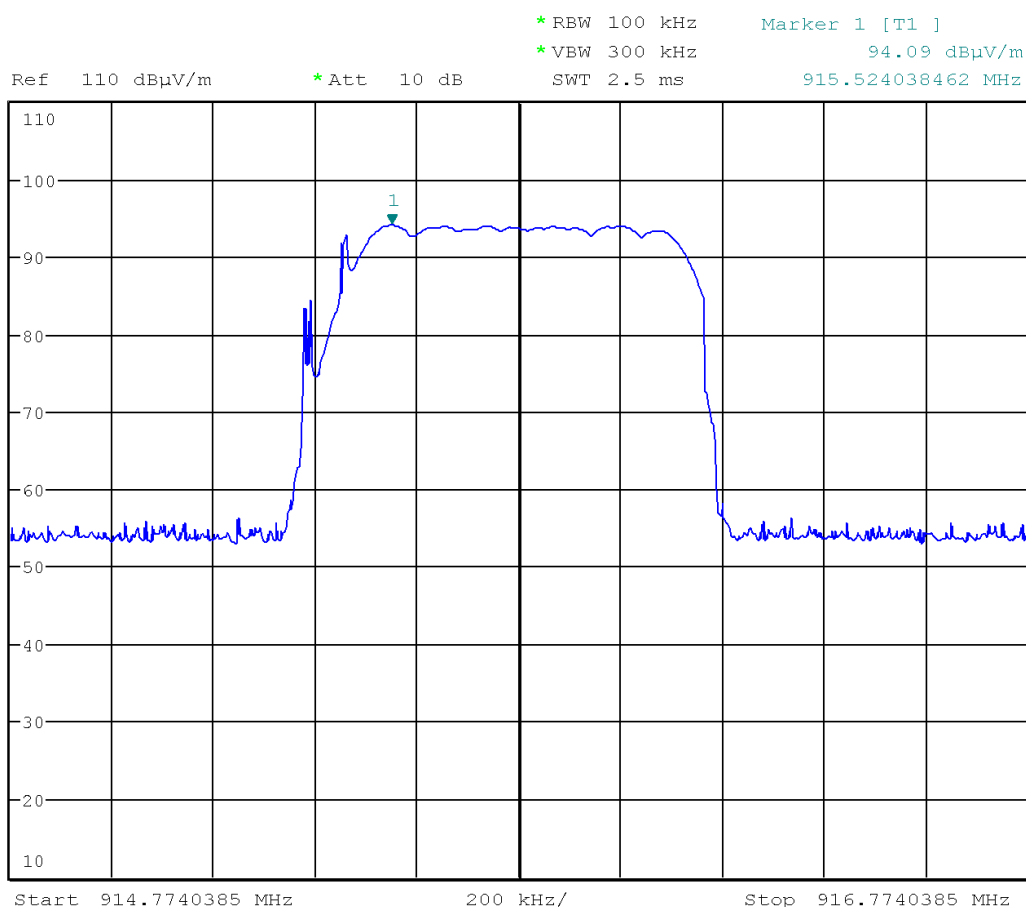
TEST REQUIREMENT	
Spectrum analyzer settings	
Test setup	ANSI C63.4
Test method	ANSI C63.10 clauses 11.11 and 11.12
Span	/
Resolution bandwidth (RBW)	100 kHz
Video bandwidth (VBW)	300 kHz
Sweep time (SWT)	as necessary to capture the entire dwell time
Detector function	Peak
Trace	Max hold
Deviation to test procedure	None
EUT operating condition	#1
Remark	None
Testing dates	2020-04-14 ÷ 2020-04-15

TEST RESULT
The EUT meets the requirements of sections 15.247 (d) All out of band spurious emissions are more 20 dB below the in band power of the fundamental. No significant spurious emissions above 18GHz.

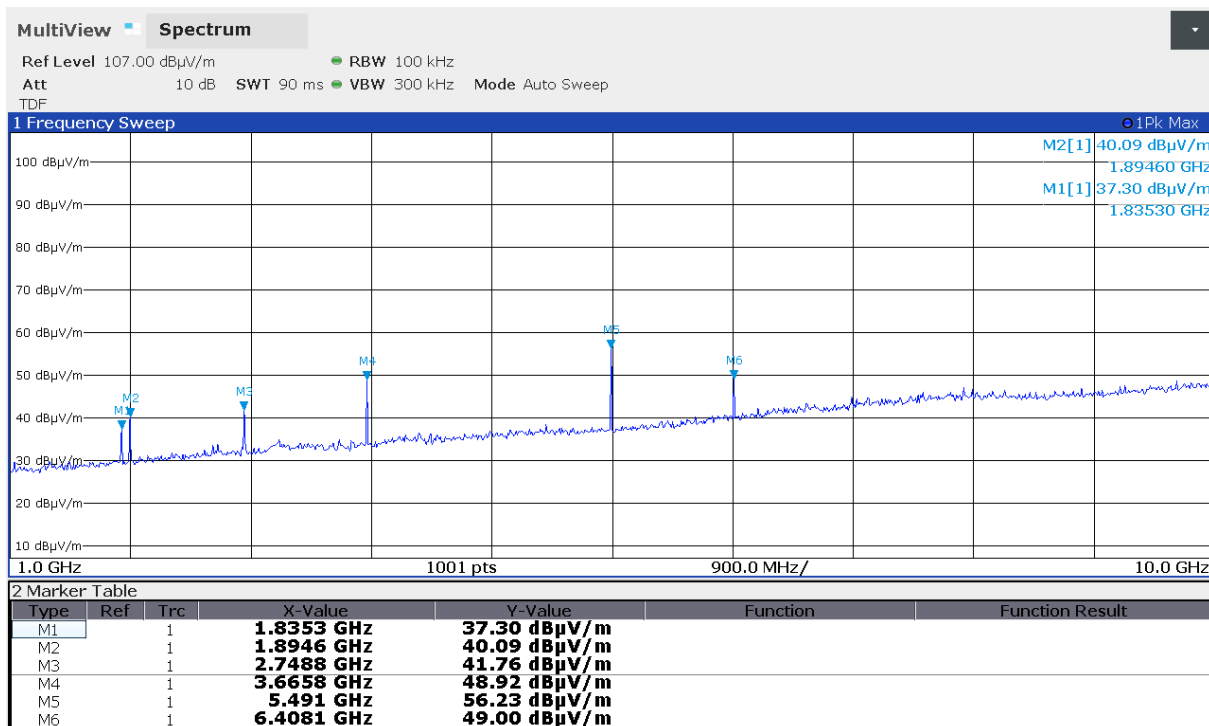
LIMITS
-20 dB below peak output power

TEST PROCEDURE
As the conducted measurement cannot performed because the transmitter antenna is integrated has been carried out radiated measurement, according to KDB 558074 measurements guidance for DTS equipment. The field strength levels shall be converted to equivalent conducted power levels for comparison to the applicable output power limit refer to KDB 412172. The measure has been executed with the lowest transmit channel, the highest transmit channel and one located somewhere in the middle of the band.

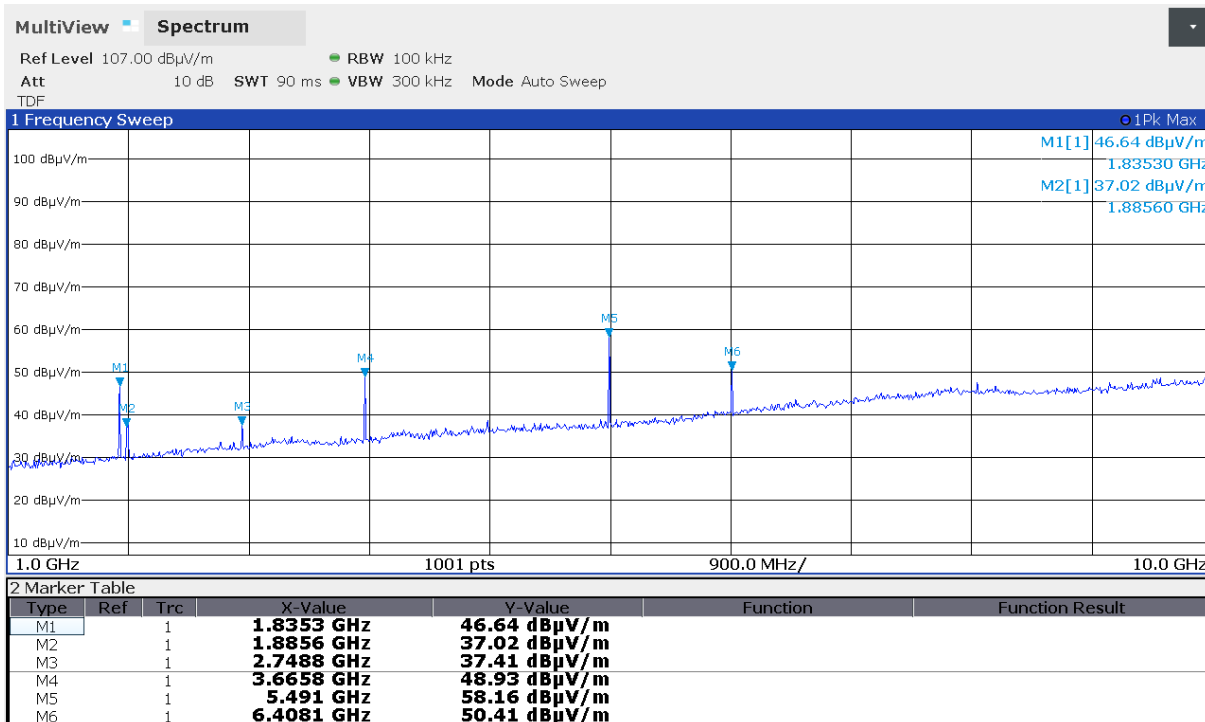
MEASUREMENTS RESULTS



1GHz ÷ 10GHz - Horizontal



1GHz ÷ 10GHz - Vertical



Tabular worst case measurement result >1,000 MHz

Frequency (GHz)	PK (dBμV/m)	PK Limit (dBμV/m)	AV (dBμV/m)	AV Limit (dBμV/m)	PK Margin (dB)
0.91577	94.09	---	---	---	---
1.8353	46.64	74.09	---	---	27.45
1.8946	40.09	74.09	---	---	34.00
2.7488	41.76	74	/	54	32.24
3.6658	48.93	74	/	54	25.07
5.4910	58.16	74.09	---	---	15.93
6.4081	50.41	74.09	---	---	23.68

7.7 TRANSMITTER POWER SPECTRAL DENSITY

TEST REQUIREMENT	
Spectrum analyzer settings	
Test setup	ANSI C63.4
Test method	ANSI C63.10 clause 11.10.2
Span	1.5 MHz
Resolution bandwidth (RBW)	3 kHz
Video bandwidth (VBW)	10 kHz
Sweep time (SWT)	500 s
Detector function	Peak
Trace	Max hold
Attenuator	/
Deviation to test procedure	None
EUT operating condition	#2
Remark	None
Testing dates	2020-04-14

TEST RESULT
The EUT meets the requirements of sections 15.247 (e)

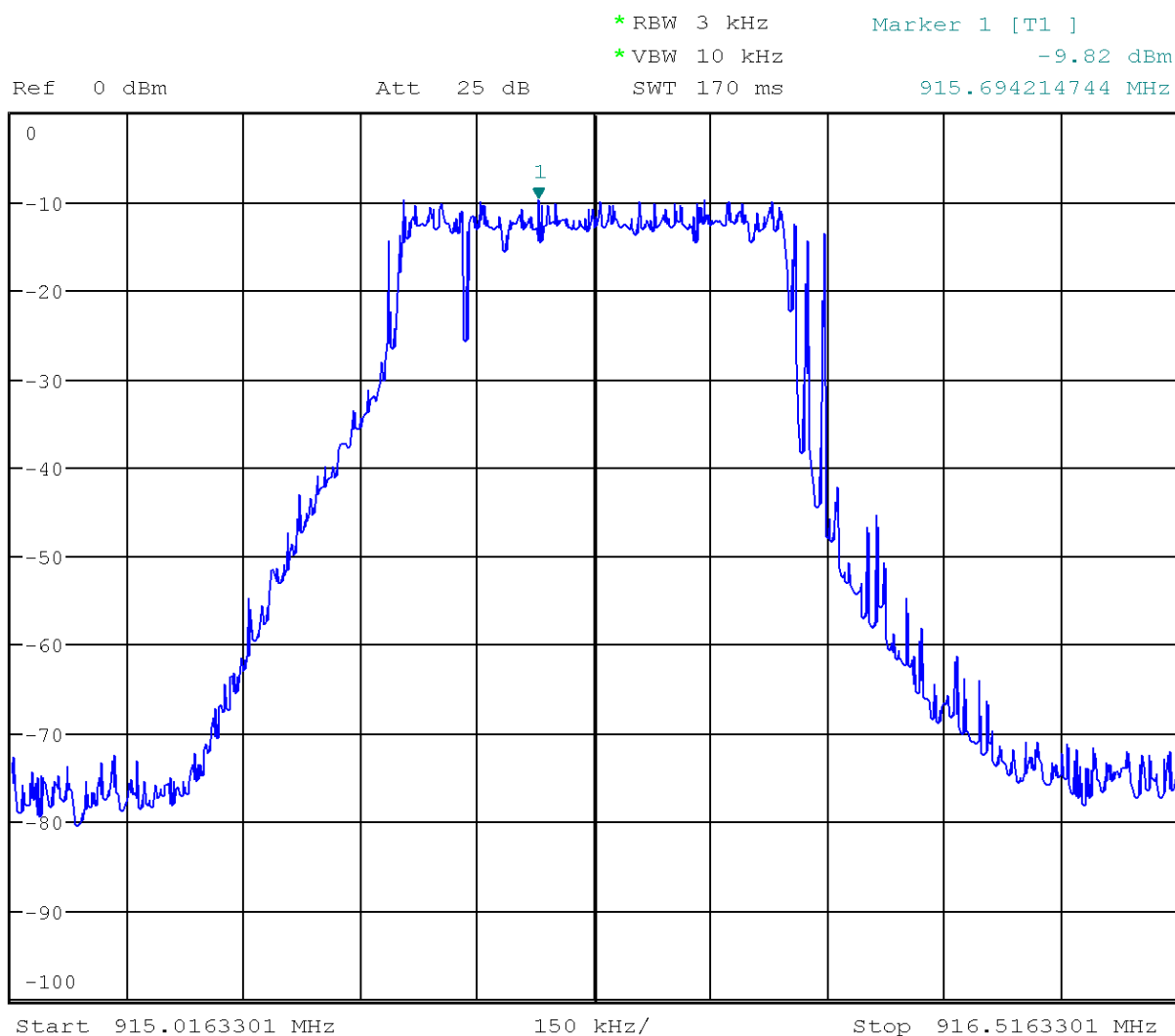
LIMITS
8 dBm in 3 kHz bandwidth.

TEST PROCEDURE
After trace stabilisation, the marker shall be set on the signal peak. The indicated level is the power spectral density.

MEASUREMENTS RESULTS

Channel (No.)	Frequency (MHz)	Reading Power (dBm)	Limit (dBm)	Plot (No.)
01	915.77	-9.82	8	1

Plot 1



8. MEASUREMENTS AND TESTS UNCERTAINTY

Unless otherwise stated the uncertainties for the tests and measurements are evaluated in according to IMQ Operational Instruction IO-LAB-001 and IO-LAB-004. and requirement of NIST Technical Note 1297 and NIS 81: 1994 "The Treatment of Uncertainty in EMC Measurements"

The expanded uncertainty was calculated for all measurements and tests listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainty in EMC Measurements", with UKAS document LAB 34 and is documented in the quality system accordance to ISO/IEC 17025.

Internal Procedure PG-037 ensures that the requirements for traceability of calibrations, of all test equipment requiring calibration, and calibration intervals are met.

Methods/Standard	Parameter	Expanded Uncertainty	Unit	Confidence level
Continuous disturbance	QP detector 9 – 150 kHz	2.4	dB	95%
	QP detector 150 k – 30 MHz	2.2	dB	95%
	QP detector using Voltage Probe	1.5	dB	95%
	QP detector using ISN	2.5	dB	95%
	QP detector using Current Probe	1.8	dB	95%
Radiated disturbance	QP detector (30 MHz - 100 MHz) H polarization	4.0	dB	95%
	QP detector (30 MHz - 100 MHz) V polarization	3.9	dB	95%
	QP detector (100 MHz - 200 MHz) H polarization	2.9	dB	95%
	QP detector (100 MHz - 200 MHz) V polarization	4.0	dB	95%
	QP detector (200 MHz - 1000 MHz) H polarization	3.5	dB	95%
	QP detector (200 MHz - 1000 MHz) V polarization	3.4	dB	95%
	P detector 1-6 GHz	4.3	dB	95%
	P detector 6-18 GHz	4.8	dB	95%
	P detector 18-26 GHz	4.9	dB	95%
	P detector 26-40 GHz	5.2	dB	95%

9. LIST OF MEASURING EQUIPMENT AND CALIBRATION INFORMATION

Instrument	Manufacturer	Model	IMQ Ref.	Calibration	
				Last date	Due date
Shielded anechoic chamber	--	--	P02386	/	/
EMI RECEIVER	RHODE & SCHWARZ	ESU8	S05562	2019-07-31	2020-07-31
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSP40	S03629	2019-11-06	2020-11-30
LOOP ANTENNA	ROHDE & SCHWARZ	HFH2-Z2E	S08326	2019-12-05	2020-12-31
LOG ANTENNA	ARA	LPB-2513	S02385	2017-06-08	2020-06-30
ANTENNA HORN	SCHWARZBECK	BBHA9120D	S03463	2017-07-21	2020-07-31
PRE-AMPLIFIER	HP	HP 8439 B	S03542	2019-03-27	2020-04-31(*)
SOFTWARE	ROHDE & SCHWARZ	EMC 32 Vers. 8.30	W-00124-K1	/	/

Note

(*) used before due date - Some calibration intervals may be extended, based on sufficient calibration data and experience of use (see IEC60501:2015 clause 8.3)

END OF TEST REPORT