

TEST REPORT

Title 47-Telecommunication

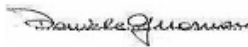
Chapter I - Federal Communications Commission


Subchapter A - General

Part 15 - Radio Frequency Devices

Subpart B - Unintentional Radiators

Report Reference No.: 335791-2TRFFCC

Tested by
(name, function and signature).....: D. Guarnone (project handler) 

Approved by
(name, function and signature).....: P.Barbieri (verifier) 

Date of issue.....: 2017-11-15

Testing Laboratory: **Nemko Spa**

Address.....: Via del Carroccio, 4 – 20853 Biassono (MB) – Italy

Testing location: Nemko Spa

Address.....: Via del Carroccio, 4 – 20853 Biassono (MB) – Italy

Registration number:: 481407

Applicant's name: **TEXA S.p.A.**

Address.....: Via 1 Maggio, 9 31050 Monastier di Treviso (TV) Italy

Test specification:

Standard: FCC CFR 47 Part 15 Subpart B

§15.107 – Conducted emission

§15.109 – Radiated emission

Test procedure.....: Nemko WM L0077, WM L0177 and WM L1002

Test Report Form No.: FCCTRF

TRF Originator: Nemko Spa

Master TRF: 2014-03

Nemko Spa, 20853 Biassono (MB), Italy. All rights reserved.

This publication may be reproduced in whole for non-commercial purposes as long as Nemko Spa is acknowledged as copyright owner and source of the material. Nemko Spa takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test item description : **RFID TOOL**

Trade Mark: TEXA

Manufacturer.....: TEXA S.p.A.

Address of manufacturer: Via 1 Maggio, 9 31050 Monastier di Treviso (TV) Italy

Model: Art. Nr 83 30 2 456 858

internal battery Li-ion 2500 mAh - 3,7 Vdc

Ratings.....: or by Optional USB external charger Model SMI10-5, Input: 100 ÷ 240 V - 50 ÷ 60 Hz - 0.3 A, Output: 5 Vdc - 2.0 A


This test report may not be partially reproduced, except with the prior written permission of Nemko Spa

The test report merely corresponds to the tested sample.

The phase of sampling / collection of equipment under test is carried out by the customer.

This Test Report, when bearing the Nemko name and logo is only valid when issued by a Nemko laboratory, or by a laboratory having special agreement with Nemko.

Test Report No. : 335791-2TRFFCC	2017-11-15 Date of issue
--	------------------------------------

Short description of the EuT	Copy of marking plate
<p>The tool will have a function to diagnose the wheel electronic unit (device inside a tyre that collect and send all the tyre related information, i.e. pressure, temperature ..). The tool will activate the sensor with OOK modulation at 125Khz and the sensor will send the data frame. The data frame could be sent with FSK or ASK modulation at 315.00 or 433.92. The 315.00 ISM frequency will only be used in Japan or USA, but all the tool will be able to read it. There will be only a single function and the tool will switch automatically between the 2 frequencies.</p>	
Number of tested samples:	1
Serial number:	1/3 (number assigned by Nemko Spa)
Internal operating frequency:	TX 125 kHz, receive 433 MHz, 315 MHz
Class:	B
Device type:	Mounted inside a motorcycle
Accessories and detachable parts included:	The E.U.T. is composed by a single unit
Equipment Class	CYY Communications Receiver used w/Pt 15 Transmitter
Other options included:	--
Testing	
Date of receipt of test sample:	2017-10-19
Testing commenced on:	2017-10-24
Testing concluded on:	2017-11-15
Possible test case verdicts:	
test case does not apply to the test object:	N (Not applicable)
test object does meet the requirement:	P (Pass)
test object does not meet the requirement:	F (Fail)
Symbols used in this test report	
<input checked="" type="checkbox"/> The crossed square indicates that the listed condition or equipment is applicable for this report. <input type="checkbox"/> The empty square indicates that the listed condition or equipment is not applicable for this report.	
Throughout this report point is used as decimal separator.	
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.	

Verdict according to the standards listed at page 5:	Pass
---	-------------

PROJECT HISTORY		
Report number	Modification to the report / comments	Date
335791-2TRFFCC	First release	2017-11-15
--	--	--
--	--	--
--	--	--
REMARKS		

PRODUCT VARIANTS		
Variant model	Difference against the main model	Additional test performed
REMARKS		

Contents

1	TEST STANDARDS	5
2	SUMMARY OF TEST RESULTS	5
3	EQUIPMENT UNDER TEST	6
3.1	POWER SUPPLY SYSTEM UTILISED	6
3.2	EUT OPERATION MODES	6
3.3	EUT CONFIGURATION MODES	6
3.4	INPUT/OUTPUT PORTS	7
3.5	EQUIPMENT USED DURING TEST	7
4	TEST ENVIRONMENT	8
4.1	ADDRESS OF THE TEST LABORATORY	8
4.2	ENVIRONMENTAL CONDITIONS	8
4.3	TEST EQUIPMENT USED FOR THE MONITORING OF THE ENVIRONMENTAL CONDITIONS	8
4.4	STATEMENT OF THE MEASUREMENT UNCERTAINTY	9
5	TEST CONDITIONS AND RESULTS	10
5.1	CLAUSE 15.107 – CONDUCTED LIMITS	10
5.2	CLAUSE 15.109 – RADIATED EMISSIONS	16
6	EUT PHOTOS	27

1 TEST STANDARDS

The tests were performed according to following standards and procedures.

NEMKO WM L0177: General routines for using instruments at Nemko

NEMKO WM L1002: Measurement Uncertainty - Policy and Statement

NEMKO WM L0077: General routines to perform EMC tests

FCC CFR 47 Part 15 Subpart B

Code of Federal Regulations – Title 47 – Part 15 Radio Frequency Devices – Subpart B Unintentional radiation

The main standard above contains references to other standards, which are listed below.

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’

2 SUMMARY OF TEST RESULTS

FCC Part 15 Subpart B requirements			
Part	Test description	Frequency range	Verdict
§15.107	Conducted emission	150 kHz to 30 MHz	P
§15.109	Radiated emission	30 MHz to 9000 MHz	P
GENERAL REMARKS			

3 EQUIPMENT UNDER TEST

3.1 Power supply system utilised

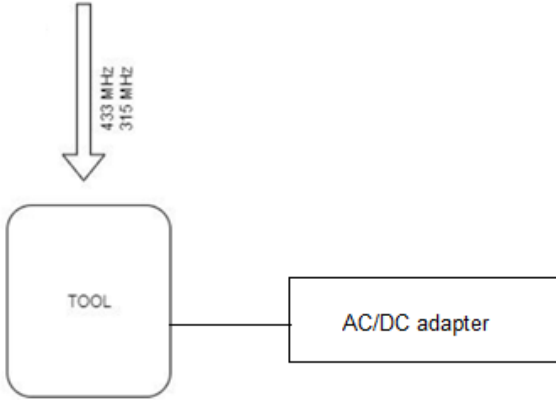
Power supply voltage:	<input type="checkbox"/>	230V/50 Hz / 1 ϕ	<input checked="" type="checkbox"/>	115V/60Hz / 1 ϕ
	<input type="checkbox"/>	400V/50 Hz 3PE	<input type="checkbox"/>	400V/50 Hz 3NPE
	<input type="checkbox"/>	12 VDC	<input type="checkbox"/>	13.5 V DC

3.2 EuT operation modes

Mode	Description
1	Normal working with the radio modules in RX mode 315 MHz
2	Normal working with the radio modules in RX mode 433.92 MHz

3.3 EuT configuration modes

The EuT was configured to measure its highest possible radiation level. The test modes selected are according to EuT instruction manual.

Mode	Description
1	

3.4 Input/Output Ports

Port	Name	Type*	Cable Max. >3m	Cable Shielded	Description
0	Enclosure	N/E	—	—	—
1	USB	DC+I/O	<input type="checkbox"/>	<input type="checkbox"/>	Multi wires cable
<p>*Note:</p> <p>AC = AC Power Port DC = DC Power Port N/E = Non-Electrical</p> <p>I/O = Signal/Control Input or Output Port TP = Telecommunication Ports</p>					

3.5 Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	RFID tool	TEXA S.p.A.	Art. Nr 83 30 2 456 858	—
AE	Battery charger	CUI INC	SMI10-5	—
AE	Tyre sensor	TEXA S.p.A	TPS KEY	—
<p>Note: * Use</p> <p>EUT - Equipment Under Test</p> <p>AE - Auxiliary/Associated Equipment (Not Subjected to Test)</p> <p>SIM - Simulator (Not Subjected to Test)</p>				

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

Nemko Spa
Via del Carroccio, 4
20853 Biassono (MB) - Italy

Tests site/benches are in accordance with applicable standard/s, and have been utilized by Nemko Spa testing engineer(s).

4.2 Environmental conditions

Unless different values are declared in the test case, following ambient conditions apply for the tests:

Ambient temperature: 18±33 °C

Relative Humidity: 30±60 %

Atmospheric pressure: 980±1060 hPa

4.3 Test equipment used for the monitoring of the environmental conditions

Equipment	Manufacturer	Model	Serial N°
Thermohygrometer data loggers	Testo	175-H2	20012380/305
Thermohygrometer data loggers	Testo	175-H2	38203337/703
Baarometer	MSR	MSR145B	330080

4.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16-4-2 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements” and is documented in the Nemko Spa Technical Procedure WML1002. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device. Hereafter the best measurement capability for Nemko Spa laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Disturbance 3m, 10m Chamber	Antenna distance 1m, 3m, 10m (30÷200) MHz	5.0 dB	(1)
	Antenna distance 1m, 3m, 10m (0.2÷6) GHz	5.2 dB	(1)
	Antenna distance 1m, 3m (6÷18) GHz	5.8 dB	(1)
	Antenna distance 1m, 3m (18÷40) GHz	7.2 dB	(1)
Conducted Disturbance	9 kHz ÷ 150 kHz with AMN	3.8 dB	(1)
	150 kHz ÷ 30 MHz with AMN	3.4 dB	(1)
	150 kHz ÷ 30 MHz with AAN	4.6 dB	(1)
	9 kHz ÷ 30 MHz with voltage probe	2.9 dB	(1)
	9 kHz ÷ 30 MHz with current probe	2.9 dB	(1)

NOTES:

(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %;

5 TEST CONDITIONS AND RESULTS

5.1 Clause 15.107 – Conducted limits

5.1.1 Photo documentation of the test set-up



5.1.2 Test method

Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks (LISN). Conducted voltage measurements on mains lines were made at the output of the LISN.

5.1.3 Limits for AC mains port

Except for Class A digital devices, for equipment 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 50µH/50ohms 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 band edges.

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56*	59 to 46*
0.50 to 5	56	46
5 to 30	60	50

*The limits decrease linearly with the logarithm of the frequency

For a Class A digital device 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 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 to 0.50	79	66
0.50 to 30	73	60

5.1.4 Test result

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Frequency range:	0.15MHz - 30MHz
Kind of test site:	Shielded room
Remarks:	

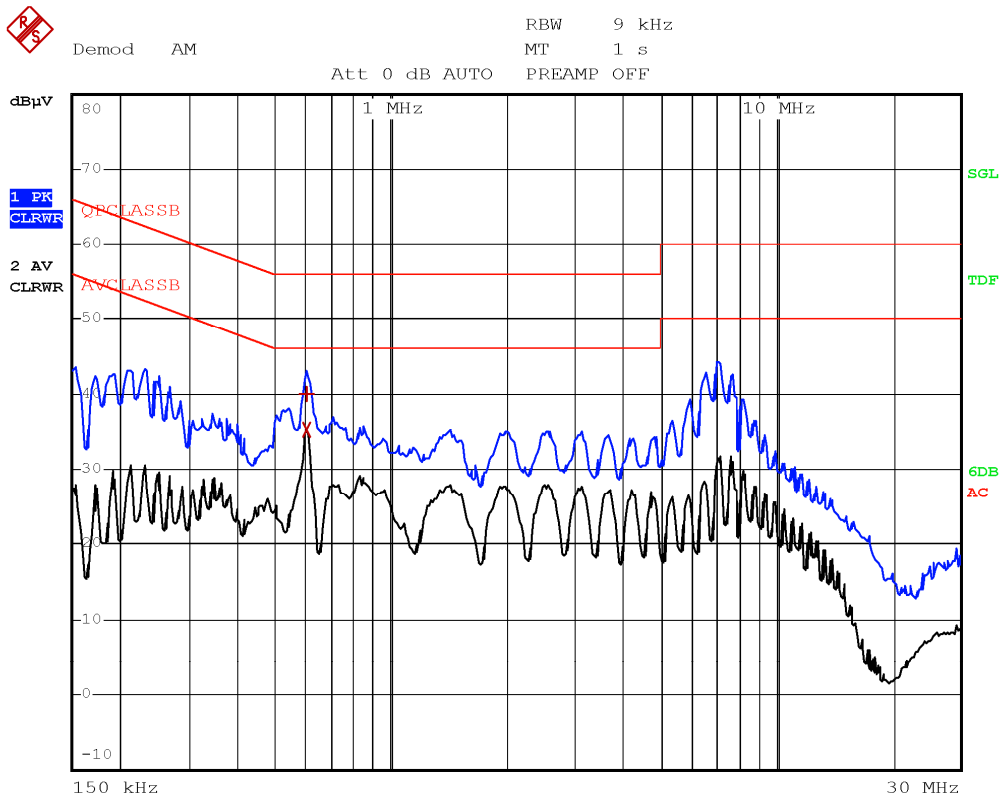
5.1.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°	Next Cal
EMI receiver 20 Hz ÷ 8 GHz	R&S	ESU8	100202	11/2018
LISN 9 kHz ÷ 30 MHz	R&S	ESH2-Z5	872 460/041	09/2018
Shielded room	Siemens	Conducted emission test room	1862	NCR

5.1.6 Test protocol

Test point: Neutral line
 Operation mode: 1
 Configuration mode: 1
 Remarks:

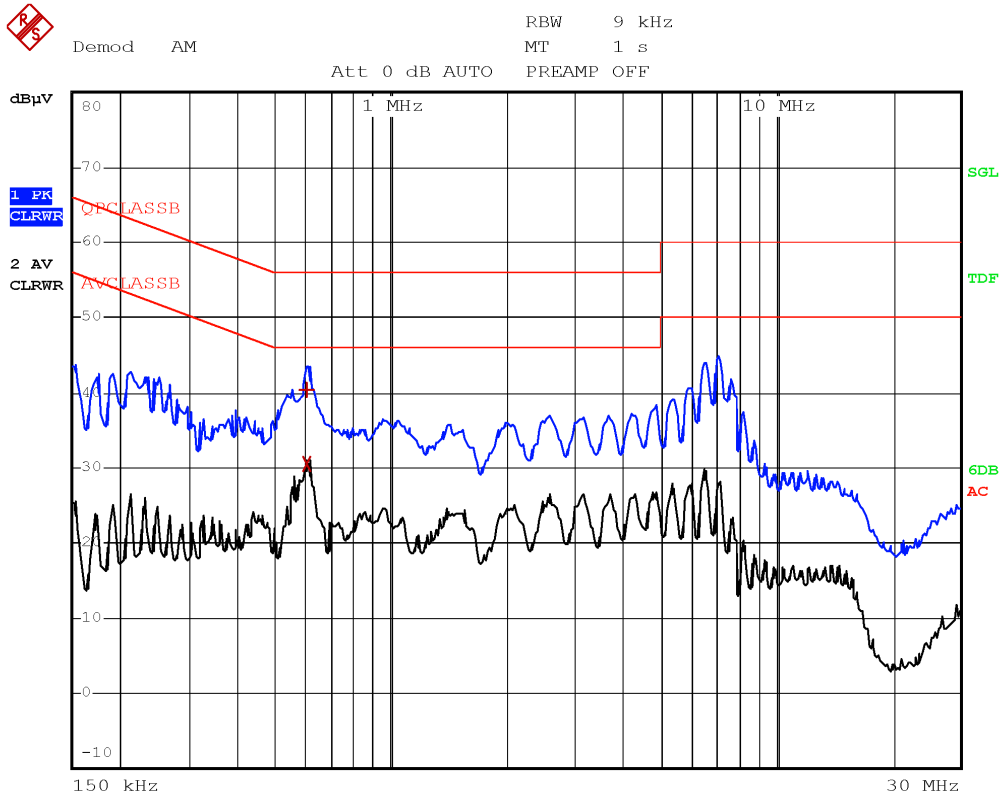
Verdict: Pass



Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.6020	35.2	46.0	-10.8	AV
0.6060	39.9	56.0	-16.1	QP

Test point: Phase line
 Operation mode: 1
 Configuration mode: 1
 Remarks:

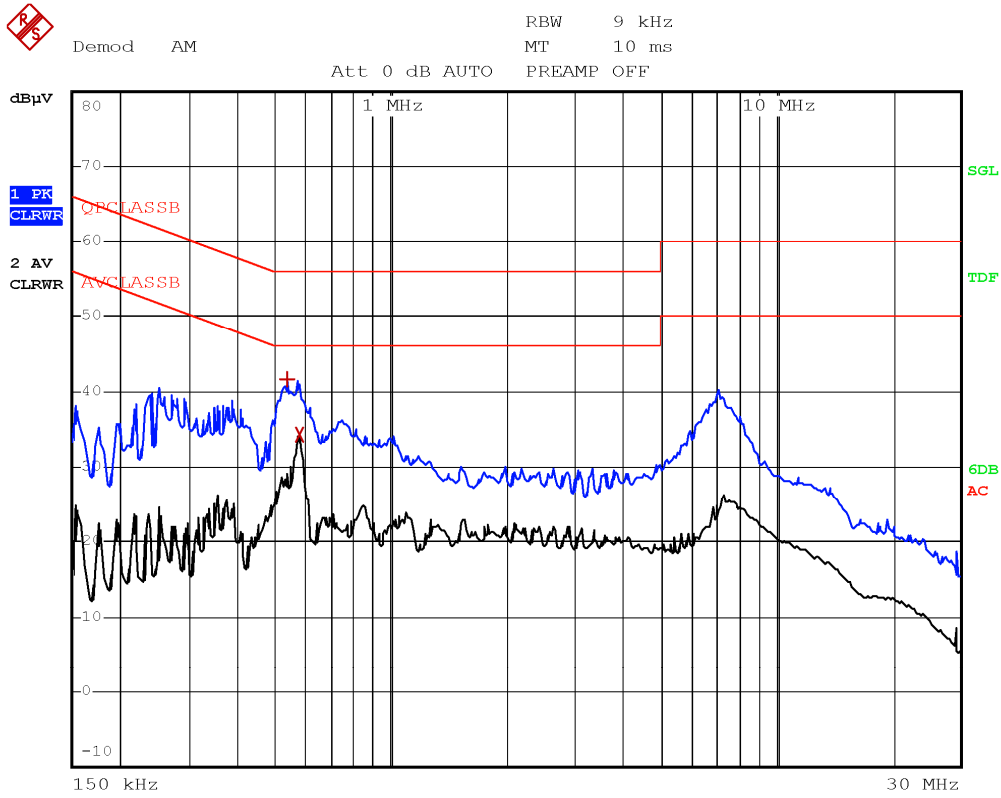
Verdict: Pass



Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.6060	40.4	56.0	-15.6	QP
0.6060	30.4	46.0	-15.6	AV

Test point: Neutral line
 Operation mode: 2
 Configuration mode: 1
 Remarks:

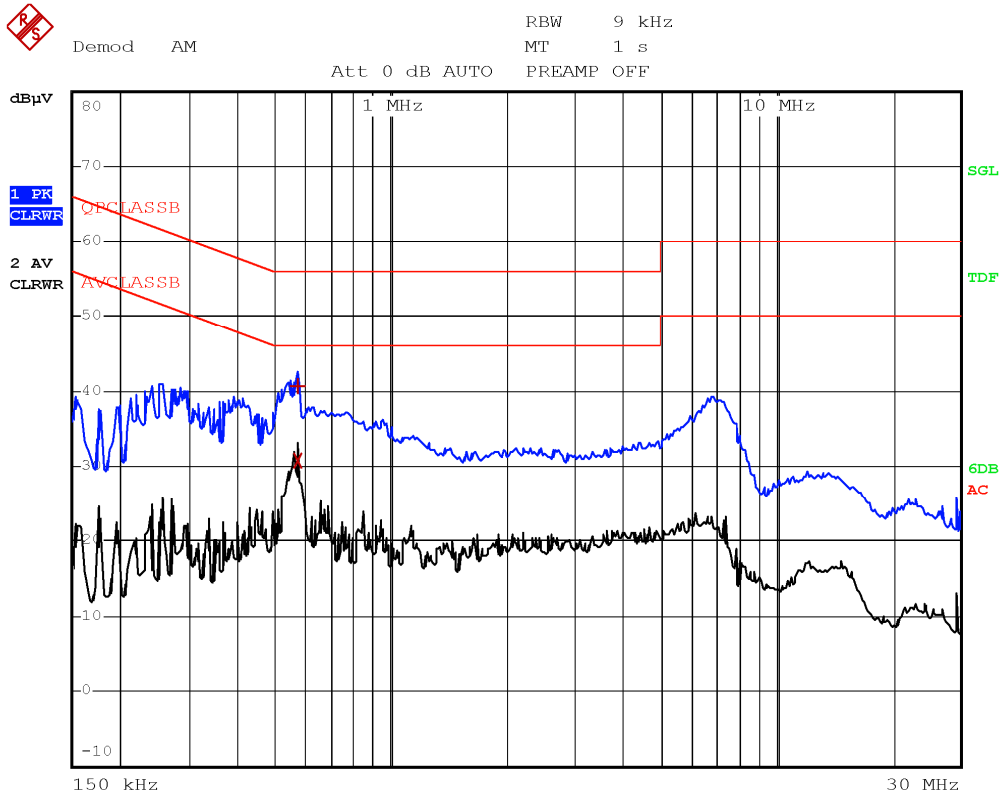
Verdict: Pass



Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.5380	41.6	56.0	-14.4	QP
0.5780	34.3	46.0	-11.7	AV

Test point: Phase line
 Operation mode: 1
 Configuration mode: 1
 Remarks:

Verdict: Pass



Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.5700	40.6	56.0	-15.4	QP
0.5700	30.8	46.0	-15.2	AV

5.2 Clause 15.109 – Radiated emissions

5.2.1 Photo documentation of the test set-up



5.2.2 Test method

Measurements were made on a semi anechoic chamber. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 or 10 meters with the receive antenna located at a fixed height (from 1 to 4 meter) in both horizontal and vertical polarities. Final measurements (quasi-peak) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

5.1.3 Limits for enclosure

Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)
30–88	100	40.0
88–216	150	43.5
216–960	200	46.0
Above 960	500	54.0

The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Frequency of emission (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)
30–88	90	39.0
88–216	150	43.5
216–960	210	46.4
Above 960	300	49.5

5.1.4 Test result

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Frequency range:	30MHz - 6000MHz
Kind of test site:	Semi anechoic chamber
Measurement distance:	3 m
<p>Remarks: for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown as follow:</p> <p>If the unintentional radiator operates at frequency upper than 1.705 MHz and lowers than 108 MHz the upper frequency of measurement range is 1000 MHz.</p> <p>If the unintentional radiator operates at frequency upper than 108 MHz and lowers than 500 MHz the upper frequency of measurement range is 2000 MHz.</p> <p>If the unintentional radiator operates at frequency upper than 500 MHz and lowers than 1000 MHz the upper frequency of measurement range is 5000 MHz.</p> <p>If the unintentional radiator operates at frequency above 1000 MHz the upper frequency of measurement range is 5th harmonic of the highest frequency or 40 GHz, whichever is lower.</p>	

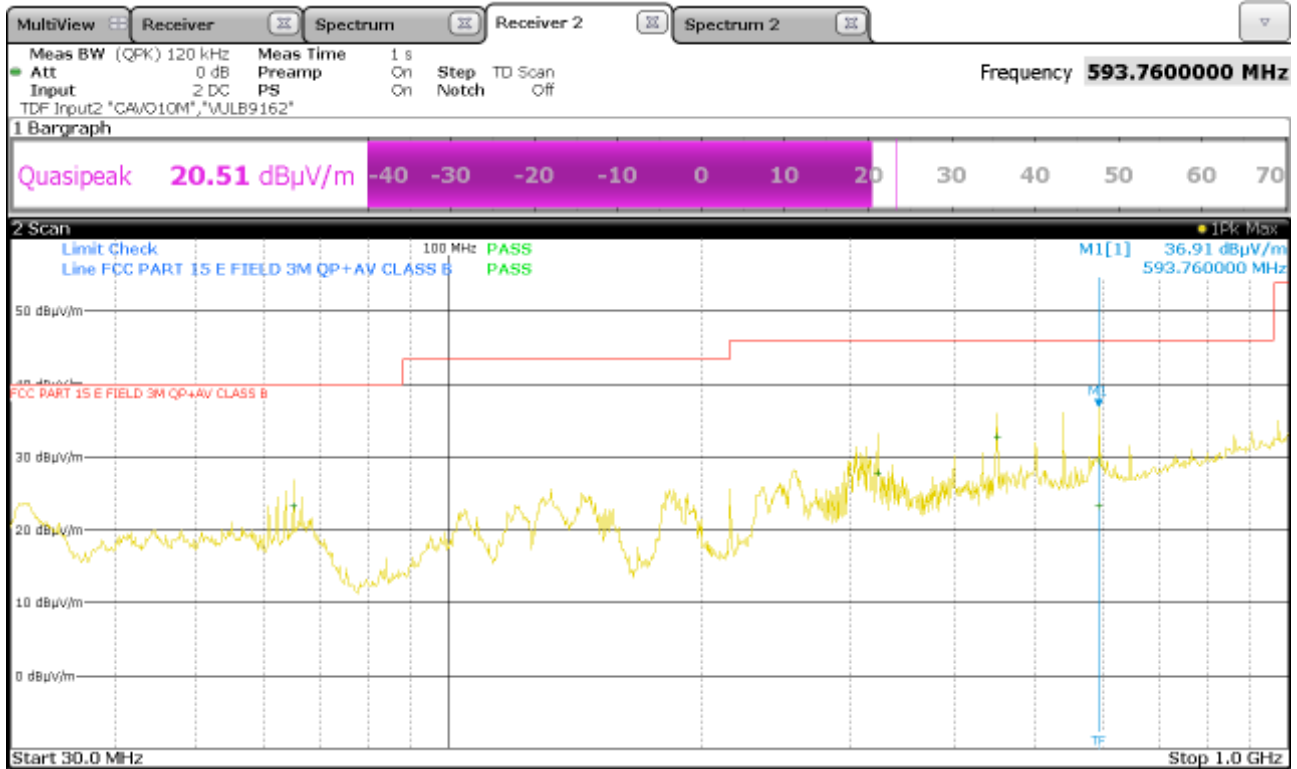
5.1.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°	Next cal.
Trilog Broadband Antenna 25 ÷ 8000 MHz	Schwarzbeck	VULB 9162	9162-025	07/2018
Bilog antenna 1 ÷ 18 GHz	Schwarzbeck	STLP 9148-123	123	06/2018
Broadband preamplifier	Schwarzbeck	BBV 9718	9718-137	12/2017
EMI receiver 20 Hz ÷ 8 GHz	R&S	ESU8	100202	11/2018
Turn-table	R&S	HCT	835 803/03	NCR
Antenna mast	R&S	HCM	836 529/05	NCR
Controller	R&S	HCC	836 620/7	NCR
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	10/2018
Shielded room	Siemens	10m control room	1947	NCR

5.1.6 Test protocol

Antenna polarization: Horizontal
 Operation mode: 1
 Configuration mode: 1
 Remarks:

Verdict: Pass



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
65.2500	23.3	40.0	-16.7	QP
324.0000	27.8	46.0	-18.2	QP
450.0000	32.9	46.0	-13.2	QP
593.7600	23.3	46.0	-22.8	QP

Antenna polarization: Vertical
 Operation mode: 1
 Configuration mode: 1
 Remarks:

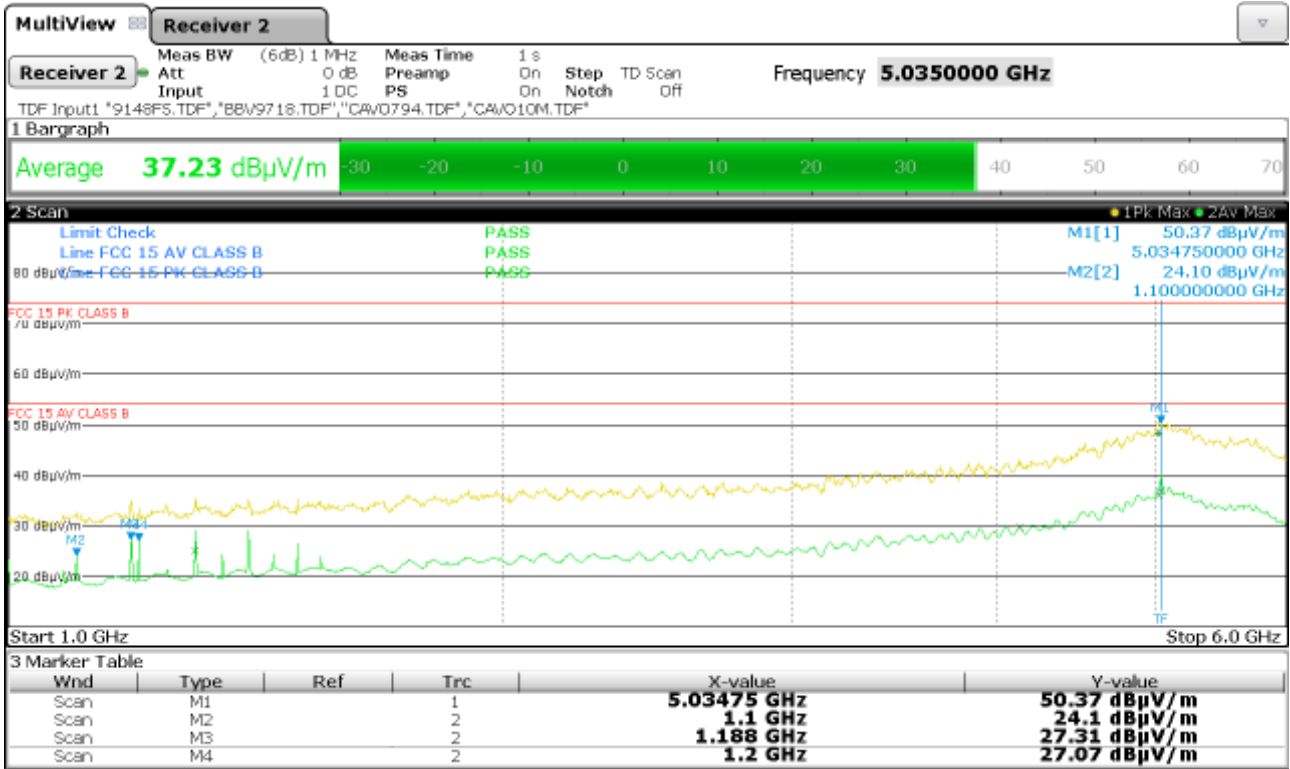
Verdict: Pass



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
31.0800	32.3	40.0	-7.7	QP
55.1100	21.4	40.0	-18.6	QP
65.2500	28.2	40.0	-11.8	QP
108.0000	32.0	43.5	-11.5	QP
122.3400	28.5	43.5	-15.0	QP
216.0000	32.5	46.0	-13.5	QP
450.0000	37.5	46.0	-8.5	QP
539.9700	35.6	46.0	-10.5	QP

Antenna polarization: Horizontal
 Operation mode: 1
 Configuration mode: 1
 Remarks:

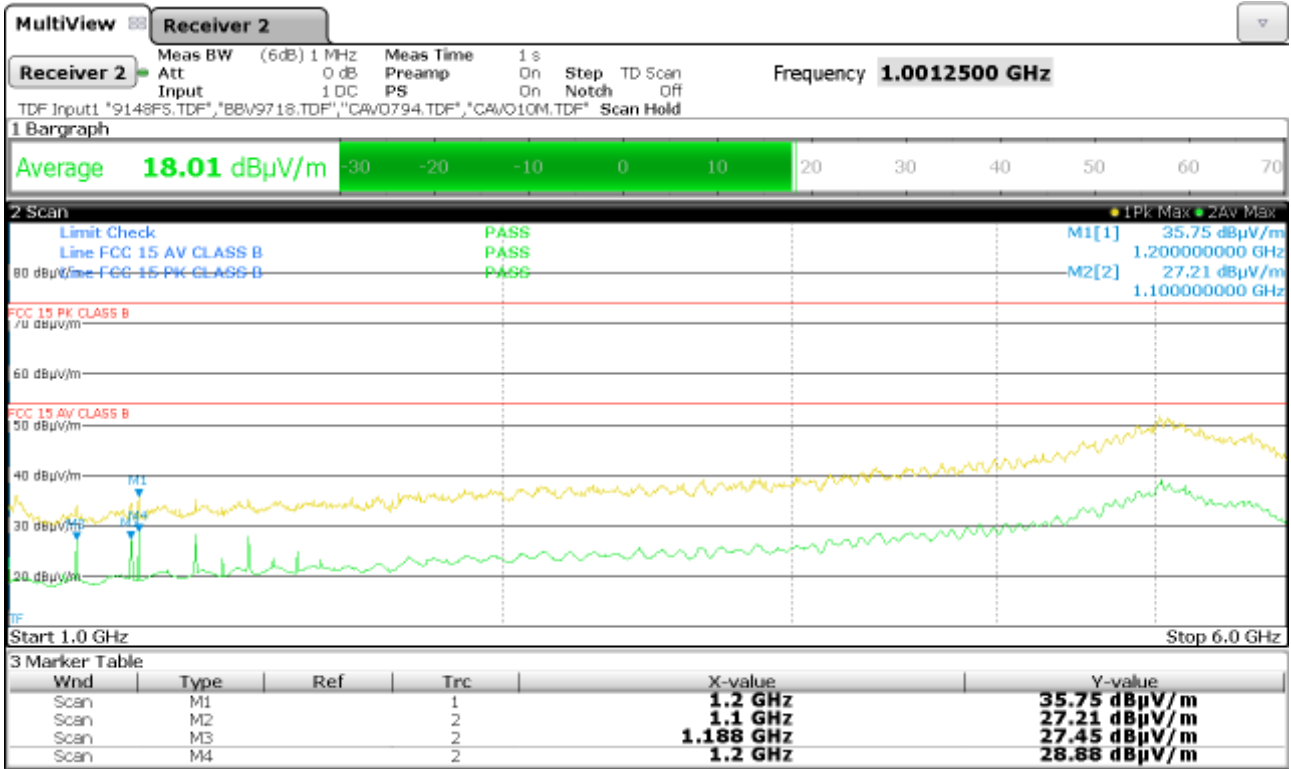
Verdict: Pass



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1300.0000	25.1	54.0	-28.9	AV
4128.0000	29.7	54.0	-24.3	AV
5014.7500	36.1	54.0	-17.9	AV
5035.0000	36.7	54.0	-17.3	AV

Antenna polarization: Vertical
 Operation mode: 1
 Configuration mode: 1
 Remarks:

Verdict: Pass



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1100.0000	19.7	54.0	-34.3	AV
4054.7500	28.4	54.0	-25.6	AV
5012.0000	34.8	54.0	-19.2	AV
5035.0000	34.8	54.0	-19.2	AV

Antenna polarization: Horizontal
 Operation mode: 2
 Configuration mode: 1
 Remarks:

Verdict: Pass



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
65.2500	23.4	40.0	-16.6	QP
324.0000	29.0	46.0	-17.0	QP
486.3600	25.2	46.0	-20.8	QP
539.9400	32.2	46.0	-13.8	QP

Antenna polarization: Vertical
 Operation mode: 2
 Configuration mode: 1
 Remarks:

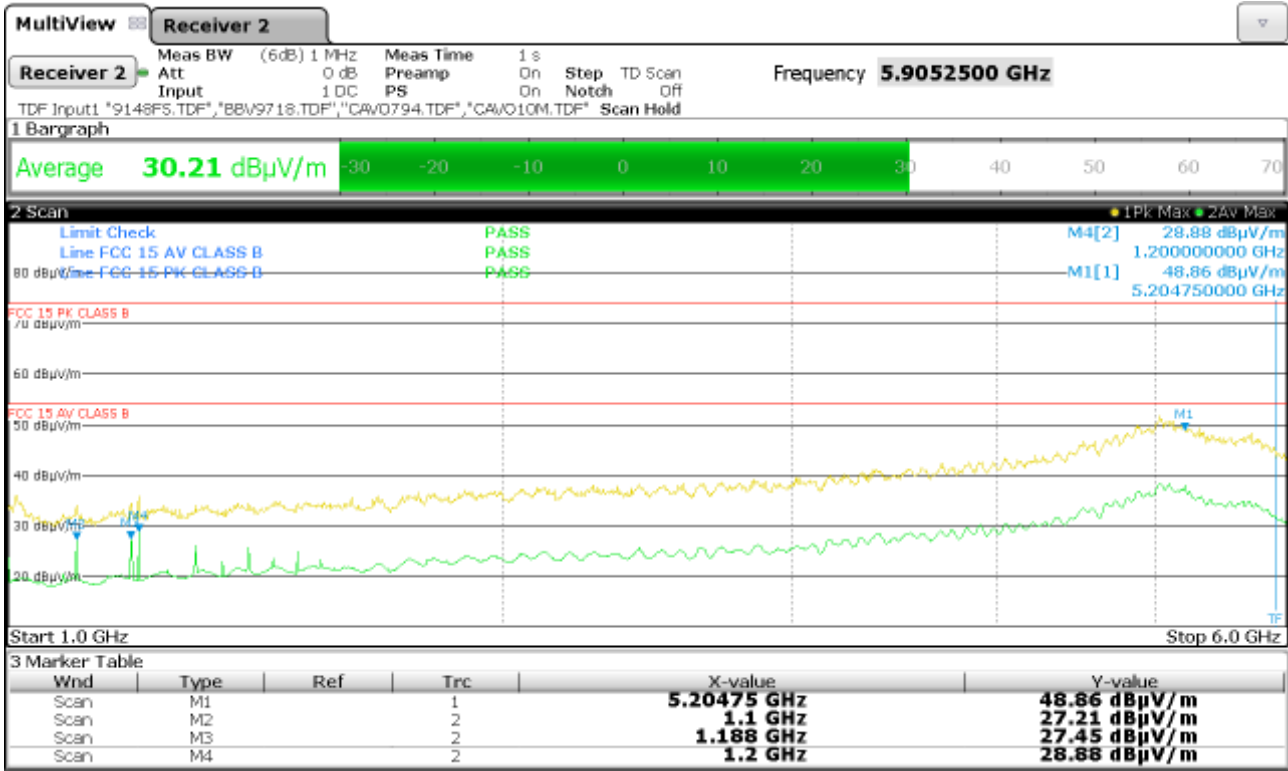
Verdict: Pass



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.8700	31.0	40.0	-9.0	QP
56.5500	21.7	40.0	-18.3	QP
65.2200	29.0	40.0	-11.0	QP
108.0000	32.5	43.5	-11.0	QP
163.9200	28.7	43.5	-14.8	QP
215.9700	32.3	43.5	-11.2	QP
450.0000	37.1	46.0	-8.9	QP
540.0300	34.8	46.0	-11.2	QP

Antenna polarization: Horizontal
 Operation mode: 2
 Configuration mode: 1
 Remarks:

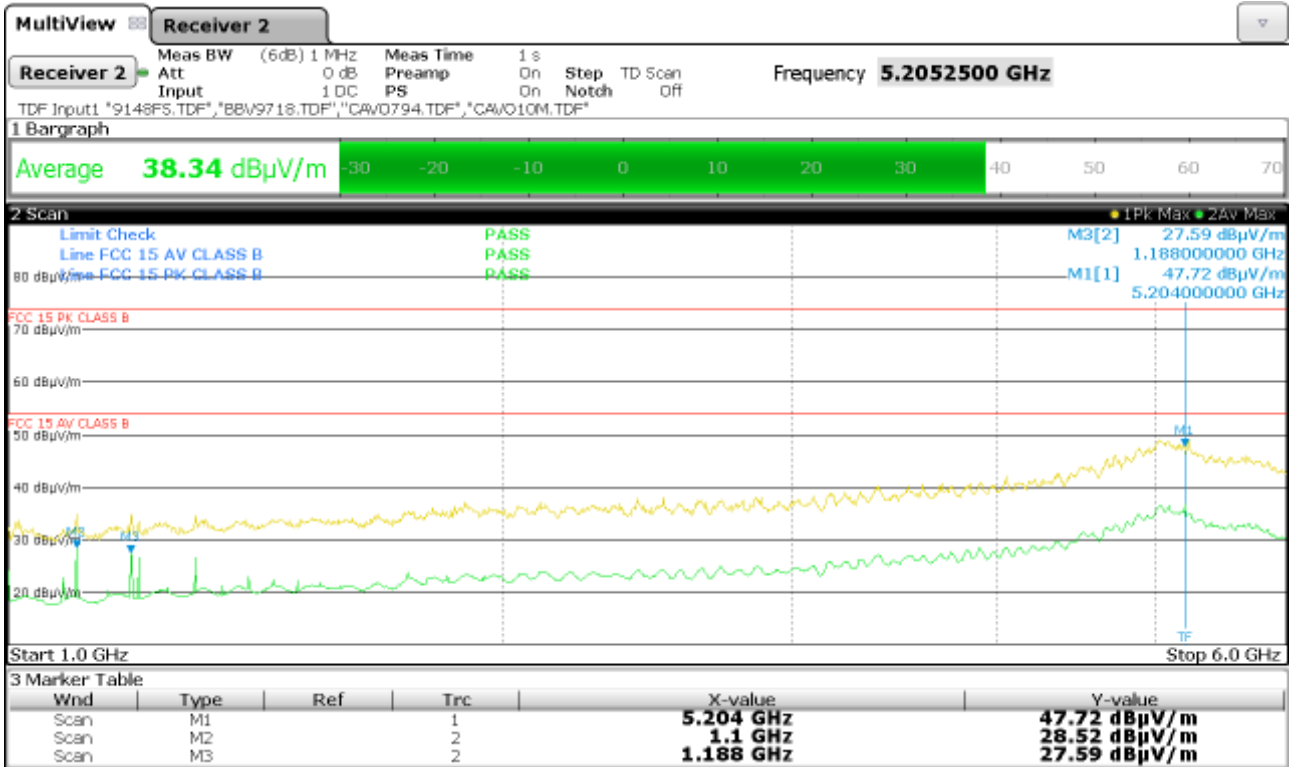
Verdict: Pass



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1300.0000	25.1	54.0	-28.9	AV
4128.0000	29.7	54.0	-24.3	AV
5014.7500	36.1	54.0	-17.9	AV
5035.0000	36.7	54.0	-17.3	AV

Antenna polarization: Vertical
 Operation mode: 2
 Configuration mode: 1
 Remarks:

Verdict: Pass



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1100.0000	19.7	54.0	-34.3	AV
4054.7500	28.4	54.0	-25.6	AV
5012.0000	34.8	54.0	-19.2	AV
5035.0000	34.8	54.0	-19.2	AV

6 EUT PHOTOS





Auxiliary/Associated Equipment (Not Subjected to Test)



Auxiliary/Associated Equipment (Not Subjected to Test)

End of report