

NCC Test Report

Equipment : UNIT ASSY-BCM & RECEIVER
Brand Name : Continental
Model No. : 95400-G2540
Standard : LP0002 Section 3.4 (2016-08-23)
Operating Band : 433.92MHz
Operation : Manually operated within 5 sec
Applicant : 三陽工業股份有限公司
新竹縣湖口鄉鳳山村 1 鄰中華路 3 號
Manufacturer : Continental Automotive Components Malaysia
Sdn. Bhd.
2455, MK1, Tingkat Perusahaan 2A, Prai Industrial
Estate, 13600 Prai, Penang, Malaysia

The product sample received on Jul. 02, 2011 and completely tested on May 16, 2017. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:


Phoenix Chen
SPORTON INTERNATIONAL INC.

Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Testing Applied Standards	6
1.3	Testing Location Information	6
1.4	Measurement Uncertainty	6
2	TEST CONFIGURATION OF EUT.....	7
2.1	The Worst Case Modulation Configuration	7
2.2	Test Channel Frequencies Configuration.....	7
2.3	The Worst Case Measurement Configuration.....	7
2.4	Support Equipment.....	7
2.5	Test Setup Diagram	8
3	TRANSMITTER TEST RESULT	9
3.1	AC Power-line Conducted Emissions	9
3.2	Receiver Radiated Spurious Emissions	11
4	TEST EQUIPMENT AND CALIBRATION DATA	22

APPENDIX A. TEST PHOTOS

PHOTOGRAPHS OF EUT v01

Summary of Test Result

Conformance Test Specifications					
Report Clause	Ref. Std. Clause	Description	Measured	Limit	Result
1.1.2	-	Antenna Requirement	Antenna connector mechanism complied	LP0002-2.2	Complied
3.1	2.3	AC Power-line Conducted Emissions	N/A	LP0002-2.3	N/A
3.2	2.11	Receiver Radiated Unwanted Emissions	[dBuV/m at 3m]: 833.160 MHz 33.60 (Margin 12.40 dB) - PK	Restricted Bands: LP0002-2.8	Complied

Revision History

[illegible]

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information				
Frequency Range (MHz)	Modulation	Ch. Frequency (MHz)	Model	Channel Number
433.92	FSK	433.92	5WK50250	1
433.92 - 434.42	FSK	433.92 / 434.42	5WK50254	2

1.1.2 Antenna Information

Antenna Category	
☒	Integral antenna (antenna permanently attached)
☐	External antenna (dedicated antennas) ; Unique antenna connector

Antenna General Information			
No.	Ant. Cat.	Ant. Type	Gain (dBi)
1	Integral	omnidirectional	-18

1.1.3 Type of EUT

Type of EUT	
☒	Stand-alone
☐	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: ...
☐	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: ...
☐	Other:

1.1.4 EUT Operational Condition

Supply Voltage	☐ AC mains	☒ DC	
Type of DC Source	☐ External adapter	☒ Internal DC supply	☐ Battery

1.1.5 Table for Multiple Listing

	SKU 1	SKU 2
Equipment	RF Receiver	RF Receiver
Brand Name	Continental	Continental
Model No.	5WK50250	5WK50254
Layout	○	○
Modulation	○	○
Frequency Range	433.92 MHz	433.92 MHz 434.42 MHz
Channel	1	2
Output Power	N/A	N/A
Antenna	○	○
Housing	○	○

1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ NCC LP0002 (2016-08-23)
- ♦ ANSI C63.4-2014

1.3 Testing Location Information

Testing Location				
☒	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)		
		TEL : 886-3-327-3456 FAX : 886-3-327-0973		
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Radiated Emission	03CH03-HY	Morrison	22.5°C / 53.4%	16/May/2017

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Test Items	Uncertainty	Remark
Radiated Emission (30MHz ~ 1,000MHz)	2.1 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	2.6 dB	Confidence levels of 95%

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Modulation Used for Conformance Testing
Test Mode
FSK

2.2 Test Channel Frequencies Configuration

Test Channel Frequencies Configuration	
Test Mode	Test Channel Frequencies (MHz)
FSK	433.92

2.3 The Worst Case Measurement Configuration

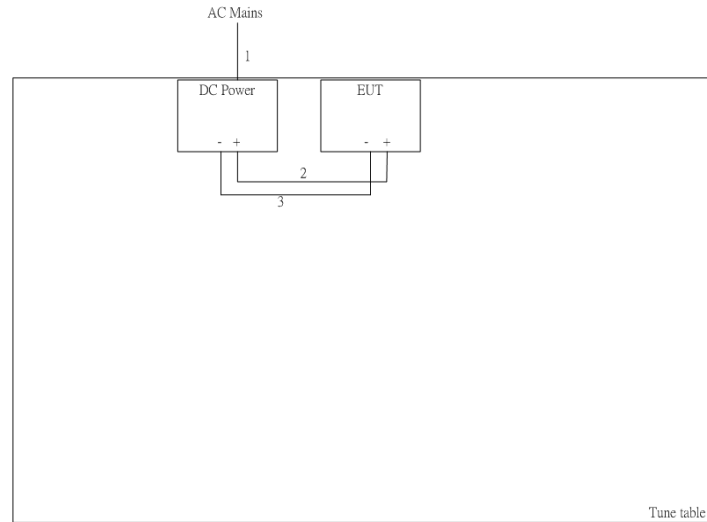
The Worst Case Mode for Following Conformance Tests	
Tests Item	Receiver Radiated Unwanted Emissions
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Pre-tested Mode	☒ SKU 1
	☒ SKU 2
SKU 1 configuration was pretested and found to be the worst case and measured during the test.	
Operating Mode	☒ 1. DC Source Mode (DC 3.3V)
	☒ 2. DC Source Mode (DC 5V)
Test Mode	FSK
Orthogonal Planes of EUT	Z Plane
	
Worst Planes of EUT	V

2.4 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
-	-	-	-	-

2.5 Test Setup Diagram

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length(m)
1	AC line	No	1.5m
2	DC Power line	No	1.5m
3	DC Power line	No	1.5m

3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

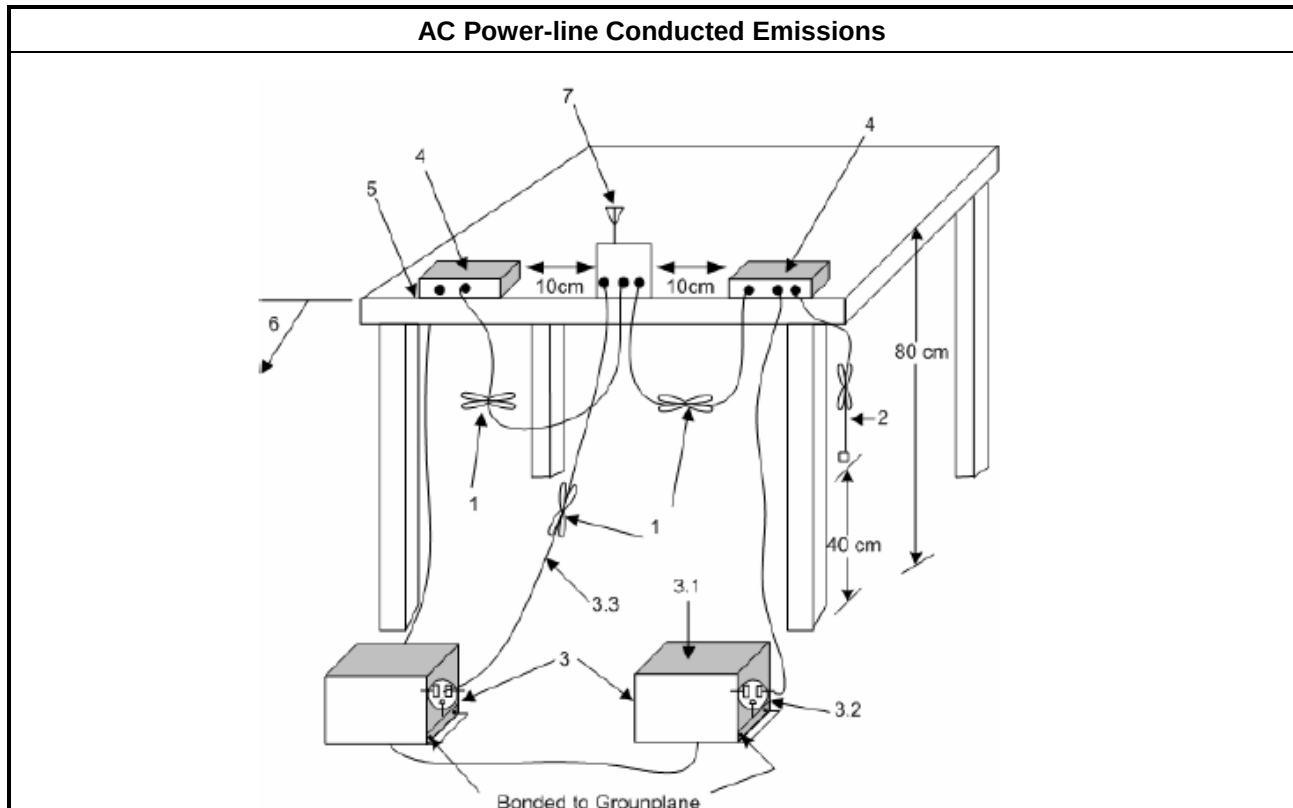
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
☒ Refer as ANSI C63.4-2013, clause 6.2 for AC power-line conducted emissions.

3.1.4 Test Setup





3.1.5 Test Result of AC Power-line Conducted Emissions

Please refer to LP0002-2.3 which states, "Measurements to demonstrate compliance with the conducted limits are not required for devices employ DC power source for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines". Therefore, for this device, AC Power Line Conducted Emissions investigation is not required.

3.2 Receiver Radiated Spurious Emissions

3.2.1 Receiver in Radiated Spurious Emissions Limit

Restricted Spurious Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

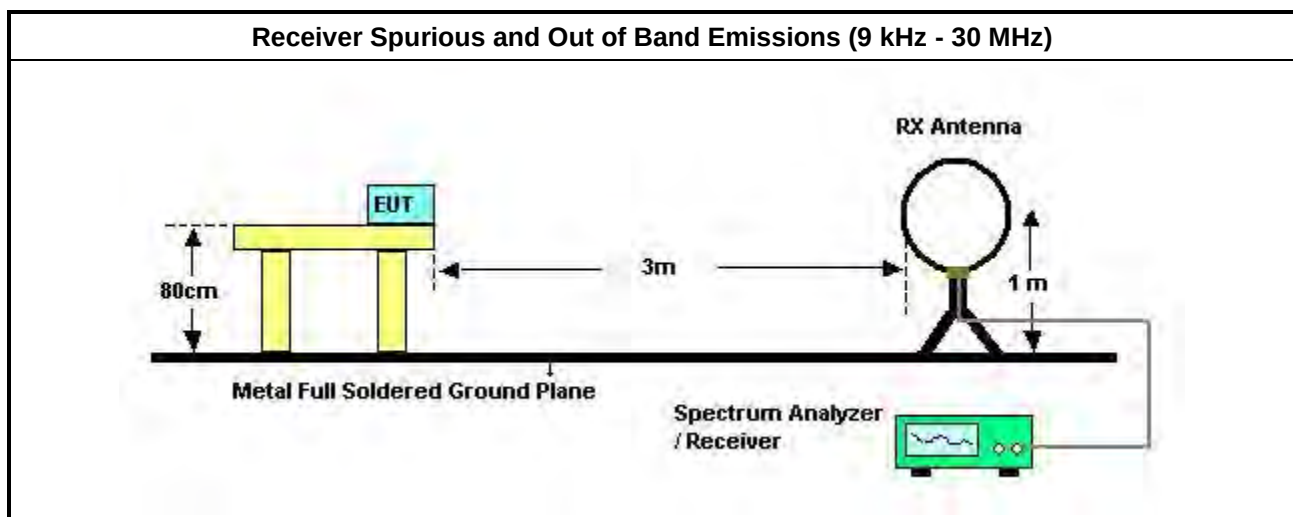
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

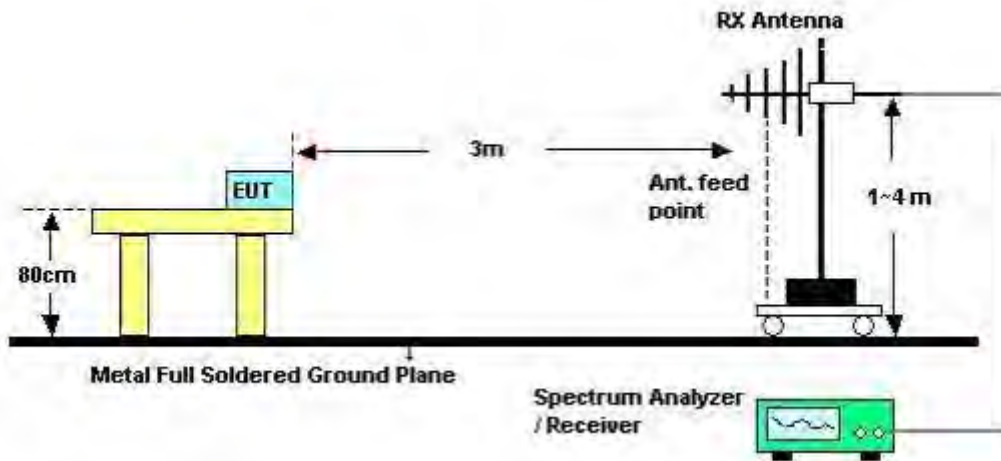
3.2.3 Test Procedures

Test Method	
☒	The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is higher, without exceeding 40 GHz.
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
☒	For radiated measurement, refer as KDB558074, clause 12.2.7.
☒	Refer as ANSI C63.4, clause 8.3.1.1 and 8.3.2.1 for radiated emissions from below 30 MHz.
☒	Refer as ANSI C63.4, clause 8.3.1.1 and 8.3.2.1 for radiated emissions from 30 MHz-1 GHz. For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the QP-Limit so that the QP level does not need to be reported in addition.
☒	Refer as ANSI C63.4, clause 8.3.1.2 and 8.3.2.2 for radiated emissions from above 1 GHz. For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
☒	All amplitude of spurious emissions that are attenuated by more than 30 dB below the permissible value has no need to be reported.

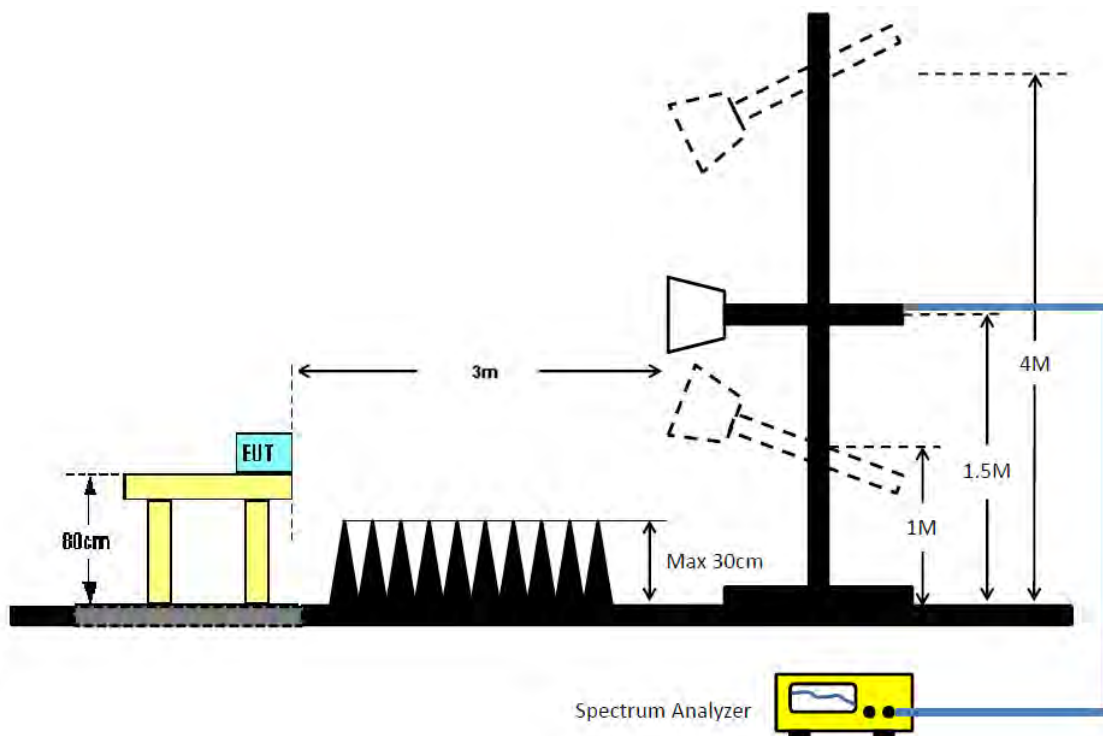
3.2.4 Test Setup



Receiver Radiated Unwanted Emissions (below 1GHz)



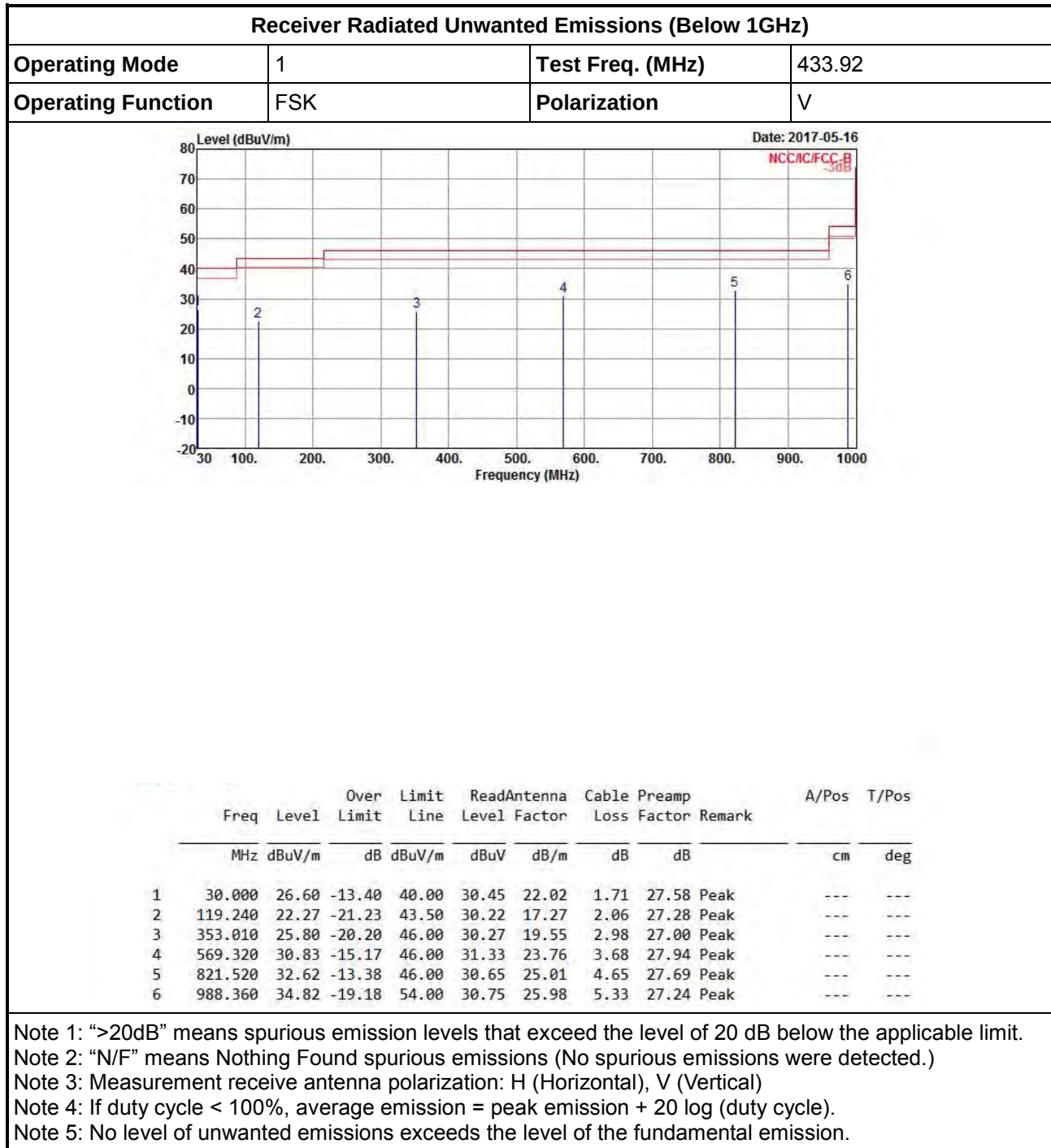
Receiver Radiated Unwanted Emissions (above 1GHz)



3.2.5 Receiver Radiated Unwanted Emissions (Below 30MHz)

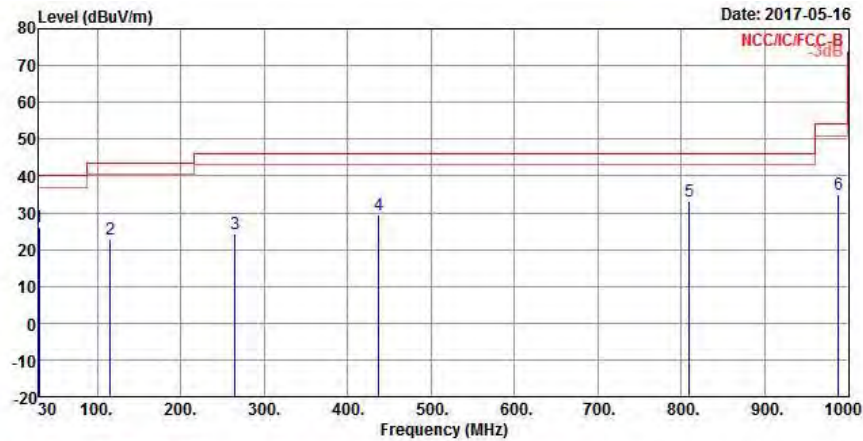
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported. Any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

3.2.6 Test Result of Receiver Radiated Unwanted Emissions (Below 1GHz)



Receiver Radiated Unwanted Emissions (Below 1GHz)

Operating Mode	1	Test Freq. (MHz)	433.92
Operating Function	FSK	Polarization	H

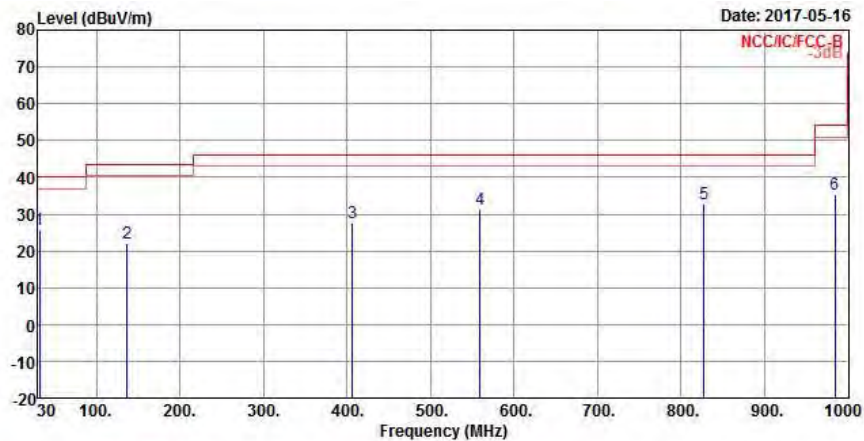


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Preamp Loss	Factor	Remark	A/Pos	T/Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	30.000	26.30	-13.70	40.00	30.15	22.02	1.71	27.58 Peak	---	---
2	115.360	22.95	-20.55	43.50	31.05	17.18	2.02	27.30 Peak	---	---
3	264.740	24.37	-21.63	46.00	30.41	18.32	2.40	26.76 Peak	---	---
4	437.400	29.38	-16.62	46.00	31.93	21.60	3.34	27.49 Peak	---	---
5	809.880	32.96	-13.04	46.00	31.11	24.90	4.67	27.72 Peak	---	---
6	988.360	34.92	-19.08	54.00	30.85	25.98	5.33	27.24 Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: If duty cycle < 100%, average emission = peak emission + 20 log (duty cycle).
 Note 5: No level of unwanted emissions exceeds the level of the fundamental emission.

Receiver Radiated Unwanted Emissions (Below 1GHz)

Operating Mode	2	Test Freq. (MHz)	433.92
Operating Function	FSK	Polarization	V



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	Remark	A/Pos	T/Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	31.940	25.66	-14.34	40.00	30.31	21.19	1.74	27.58	Peak	---
2	136.700	22.05	-21.45	43.50	30.59	16.40	2.26	27.20	Peak	---
3	406.360	27.58	-18.42	46.00	30.76	21.03	3.11	27.32	Peak	---
4	559.620	31.32	-14.68	46.00	31.79	23.79	3.67	27.93	Peak	---
5	827.340	32.84	-13.16	46.00	30.81	25.06	4.64	27.67	Peak	---
6	984.480	35.35	-18.65	54.00	31.35	25.96	5.30	27.26	Peak	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

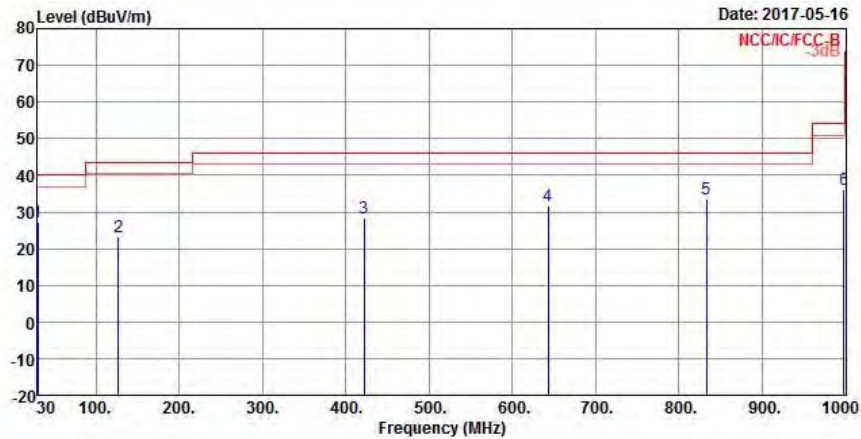
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 4: If duty cycle < 100%, average emission = peak emission + 20 log (duty cycle).

Note 5: No level of unwanted emissions exceeds the level of the fundamental emission.

Receiver Radiated Unwanted Emissions (Below 1GHz)

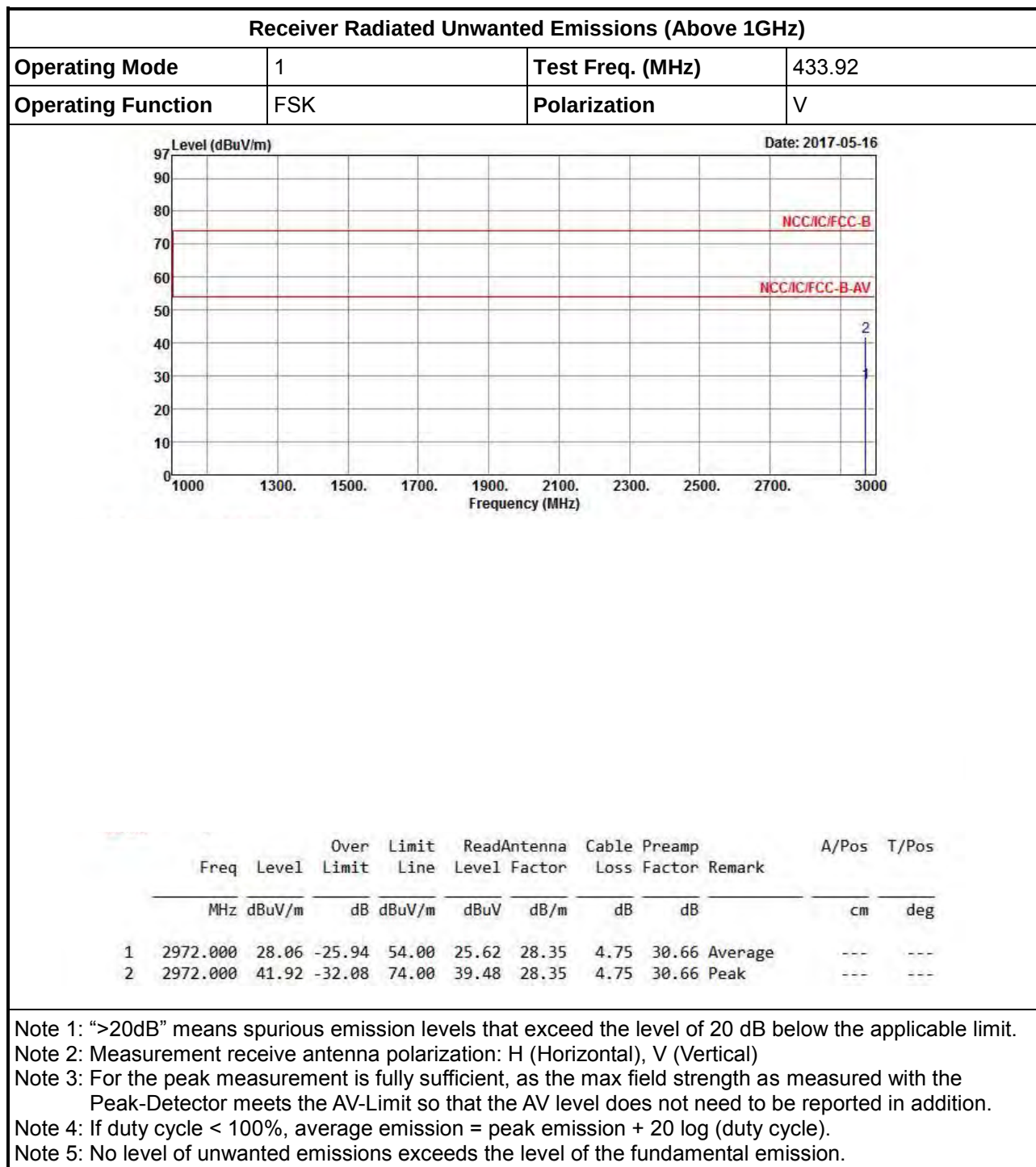
Operating Mode	2	Test Freq. (MHz)	433.92
Operating Function	FSK	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	30.000	27.17	-12.83	40.00	31.02	22.02	1.71	27.58	Peak	---	---
2	127.000	23.12	-20.38	43.50	31.02	17.05	2.30	27.25	Peak	---	---
3	421.880	28.19	-17.81	46.00	31.07	21.31	3.22	27.41	Peak	---	---
4	643.040	31.79	-14.21	46.00	31.67	23.97	4.12	27.97	Peak	---	---
5	833.160	33.60	-12.40	46.00	31.52	25.11	4.63	27.66	Peak	---	---
6	998.060	36.09	-17.91	54.00	31.85	26.04	5.42	27.22	Peak	---	---

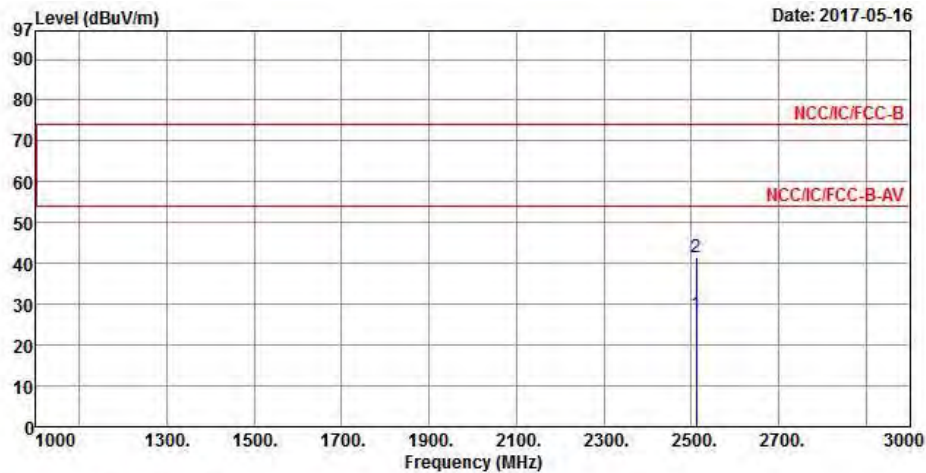
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: If duty cycle < 100%, average emission = peak emission + 20 log (duty cycle).
Note 5: No level of unwanted emissions exceeds the level of the fundamental emission.

3.2.7 Test Result of Receiver Radiated Unwanted Emissions (Above 1GHz)



Receiver Radiated Unwanted Emissions (Above 1GHz)

Operating Mode	1	Test Freq. (MHz)	433.92
Operating Function	FSK	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	2512.000	27.54	-26.46	54.00	26.45	27.52	4.35	30.78 Average	---	---
2	2512.000	41.55	-32.45	74.00	40.46	27.52	4.35	30.78 Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

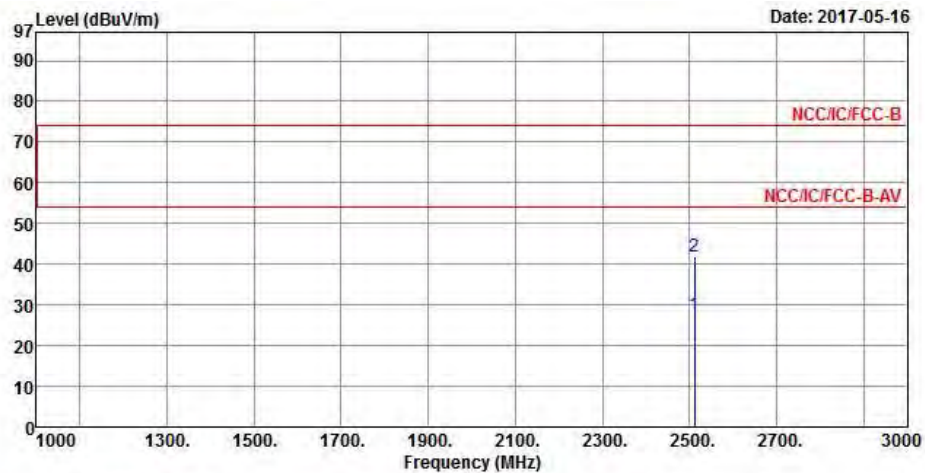
Note 3: For the peak measurement is fully sufficient, as the max strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 4: If duty cycle < 100%, average emission = peak emission + 20 log (duty cycle).

Note 5: No level of unwanted emissions exceeds the level of the fundamental emission.

Receiver Radiated Unwanted Emissions (Above 1GHz)

Operating Mode	2	Test Freq. (MHz)	433.92
Operating Function	FSK	Polarization	V



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	2512.000	27.66	-26.34	54.00	26.57	27.52	4.35	30.78 Average	---	---
2	2512.000	41.71	-32.29	74.00	40.62	27.52	4.35	30.78 Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

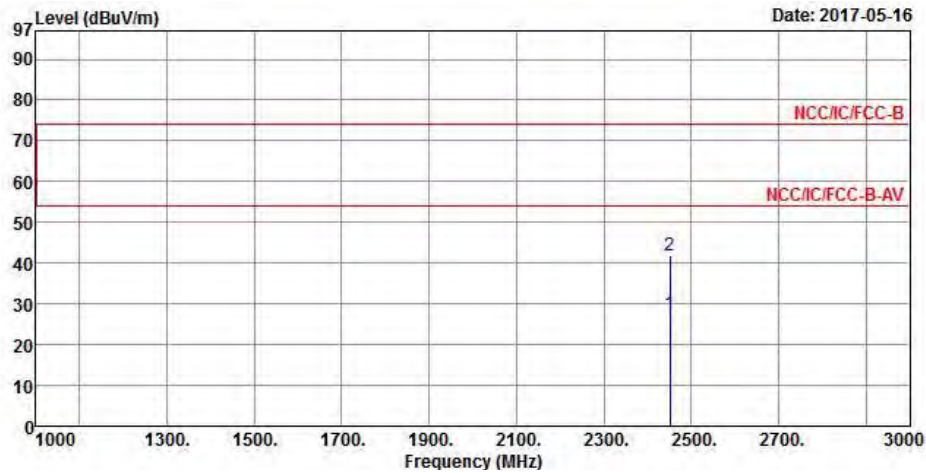
Note 3: For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 4: If duty cycle < 100%, average emission = peak emission + 20 log (duty cycle).

Note 5: No level of unwanted emissions exceeds the level of the fundamental emission.

Receiver Radiated Unwanted Emissions (Above 1GHz)

Operating Mode	2	Test Freq. (MHz)	433.92
Operating Function	FSK	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	2452.000	27.39	-26.61	54.00	26.52	27.38	4.29	30.80 Average	---	---
2	2452.000	41.81	-32.19	74.00	40.94	27.38	4.29	30.80 Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 3: For the peak measurement is fully sufficient, as the max strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 4: If duty cycle < 100%, average emission = peak emission + 20 log (duty cycle).

Note 5: No level of unwanted emissions exceeds the level of the fundamental emission.

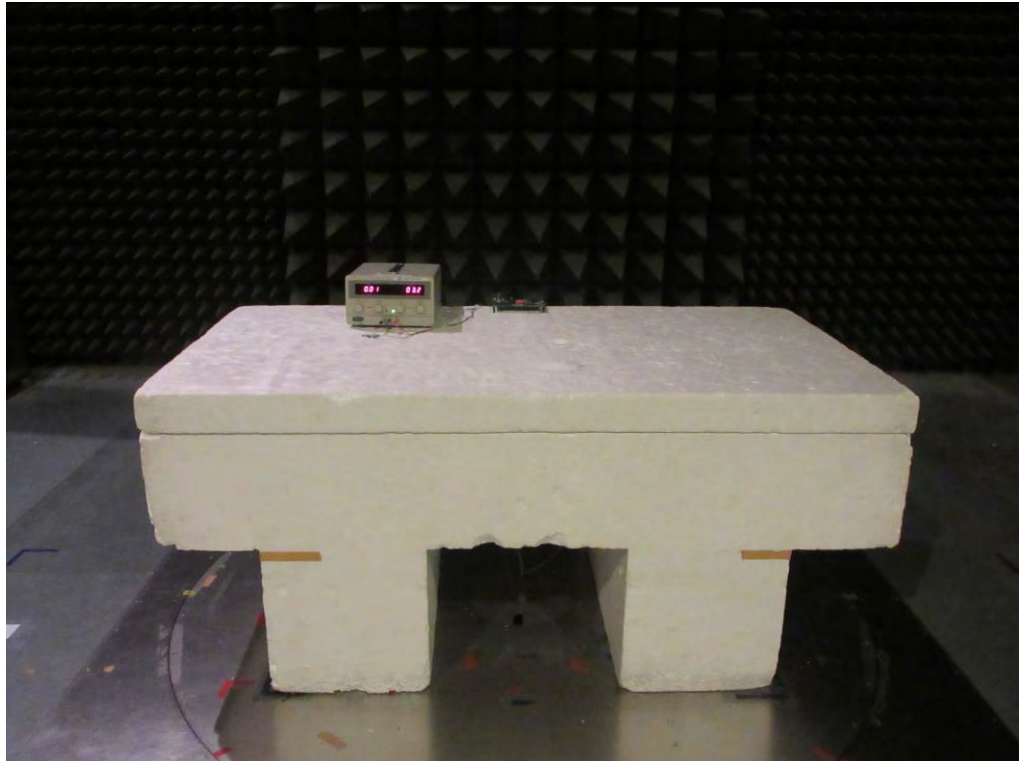
4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	27/Nov/2016	26/Nov/2017
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	1GHz ~ 18GHz 3m	27/Nov/2016	26/Nov/2017
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	15/May/2017	14/May/2018
Amplifier	Keysight	83017A	MY53270197	1GHz ~ 26.5GHz	29/Aug/2016	28/Aug/2017
Spectrum	R&S	FSV40	101515	9kHz ~ 40GHz	28/Nov/2016	27/Nov/2017
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	26/Jan/2017	25/Jan/2018
RF Cable-high	SUHNER	SUCOFLEX106	CB222	1GHz ~ 40GHz	26/Jan/2017	25/Jan/2018
Bilog Antenna	SCHAFFNER	CBL 6112B	2723	30MHz ~ 1GHz	01/Oct/2016	30/Sep/2017
Horn Antenna	SCHWARZBECK	BBHA9120D	1531	1GHz ~ 18GHz	25/Apr/2017	24/Apr/2018
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	02/Mar/2017	01/Mar/2018
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	27/Jul/2016	26/Jul/2017

1. Photographs of Radiated Emissions Test Configuration

For radiated emissions 30MHz~1GHz

Front view

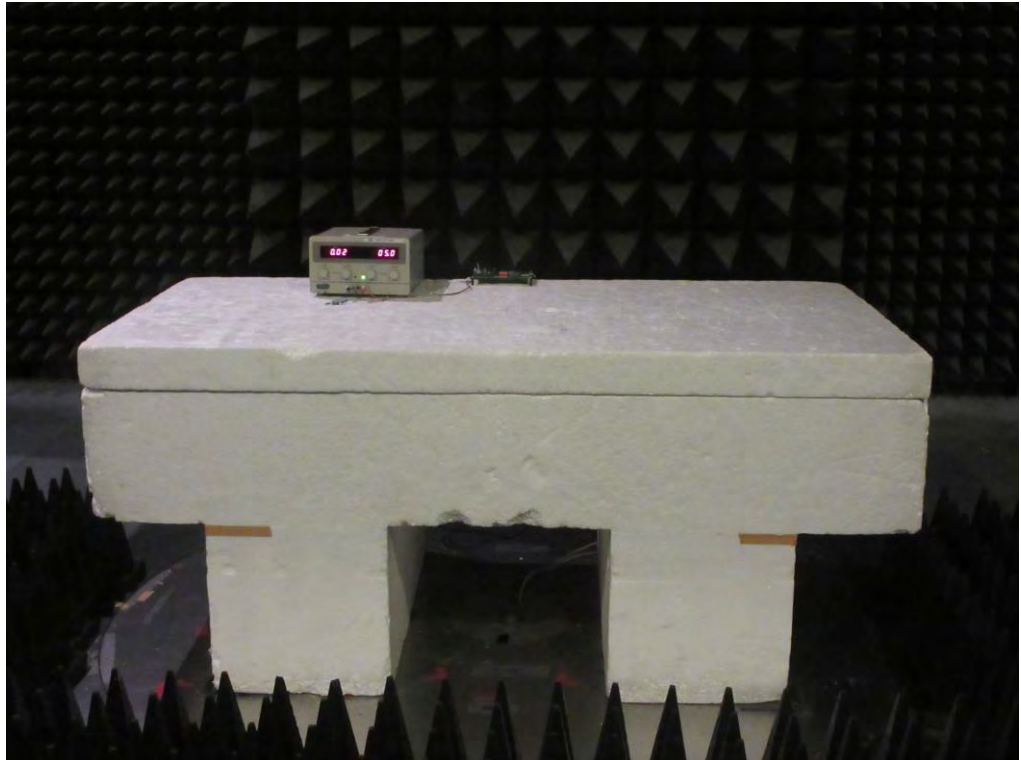


Rear view



For radiated emissions above 1GHz

Front view



Rear view

