

NCC TEST REPORT

Equipment : Remote Keyless Entry Transmitter
Brand Name : MOBASE ELECTRONICS CO., LTD.
Model Name : SYEC4FOB1608
Applicant/ : Mobase Electronics Co., LTD.
Manufacturer : 100, Saneop-ro 156beon-gil, Gwonseon-gu, Suwon-si,
Gyeonggi-do, South Korea
Standard : LP0002 Section 3.4 (2018-01-10)

The product was received on Jan. 06, 2020, and testing was started from Jan. 09, 2020 and completed on Jan. 15, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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



Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Test Condition	6
1.3	Testing Applied Standards	6
1.4	Testing Location Information	6
1.5	Measurement Uncertainty	7
2	TEST CONFIGURATION OF EUT.....	8
2.1	The Worst Case Modulation Configuration	8
2.2	Test Channel Frequencies Configuration.....	8
2.3	The Worst Case Measurement Configuration	8
2.4	Accessories	9
2.5	Test Setup Diagram	9
3	TRANSMITTER TEST RESULT	10
3.1	AC Power-line Conducted Emissions	10
3.2	Emission Bandwidth	12
3.3	Fundamental Emissions	14
3.4	Transmitter Radiated Unwanted Emissions	16
3.5	Operation Restriction.....	26
3.6	Receiver Radiated Spurious Emissions	28
4	TEST EQUIPMENT AND CALIBRATION DATA.....	35

APPENDIX A. TEST PHOTOS

PHOTOGRAPHS OF EUT v02

History of this test report

[illegible]

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	2.2	Antenna Requirement	PASS	-
3.1	2.3	AC Power-line Conducted Emissions	Not Required	-
3.2	3.4.2.2	Emission Bandwidth	PASS	-
3.3	3.4.2.5(1)	Fundamental Emissions	PASS	-
3.4	3.4.2.5(1)	Transmitter Radiated Unwanted Emissions	PASS	-
3.5	3.4.2.4	Operation Restriction	PASS	-
3.6	2.11	Receiver Radiated Unwanted Emissions	PASS	-

Declaration of Conformity:

The judgment of conformity in the report is based on the measurement results excluding the measurement uncertainty.

Comments and Explanations:

None.

Reviewed by: Sam Tsai

Report Producer: Yunha Liou

1 General Description

There is FSK tag(125kHz) function in EUT and it shall be able to wake up the system to complete the pairing, and does not intentionally transmit.

1.1 Information

1.1.1 RF General Information

RF General Information			
Modulation	Ch. Frequency (MHz)	Channel Number	Fundamental Field Strength (dBuV/m)
FSK	433.92	1	79.66
Note 1: Field strength performed average level at 3m.			

1.1.2 Antenna Information

Antenna Category	
☐	Equipment placed on the market without antennas
☒	Integral antenna (antenna permanently attached)
☐	Temporary RF connector provided
☒	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.
☐	External antenna (dedicated antennas)

No.	Brand	Model Name	Ant. Cat.	Ant. Type	Antenna gain(dBi)
1	MOBASE ELECTRONICS CO., LTD.	ANT01	Integral	PCB Antenna	-25.36

1.1.3 Type of EUT

Operational Condition	
EUT Power Type	From Battery
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:

1.2 Test Condition

Condition Item	Abbreviation/Remark	Remark
-	Tnom	20°C
-	Vnom	3V

1.2.1 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
☐ Operated normally mode for worst duty cycle	
☒ Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	Duty Cycle Correction Factor [dB] – (20 log x)
☒ 100%	0

1.3 Testing Applied Standards

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

- ♦ LP0002 (2018-01-10)
- ♦ ANSI C63.10-2013
- ♦ ANSI C63.4-2014

1.4 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
☐	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)	
		TEL : 886-3-656-9065	FAX : 886-3-656-9085

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH06-HY	Gary	23.1~24.3°C/ 58~65%	15/Jan/2020
Radiated Emission	03CH01-HY	Edward	21.5~22.9°C / 51~53%	09/Jan/2020~ 15/Jan/2020

1.5 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
Conducted Emission (150kHz ~ 30MHz)	3.54 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	1.6 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.9 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.3 dB	Confidence levels of 95%
Temperature	0.7 °C	Confidence levels of 95%
Humidity	4 %	Confidence levels of 95%

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Modulation Used for Conformance Testing	
Test Mode	Field Strength (dBuV/m at 3 m)
FSK	79.66

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

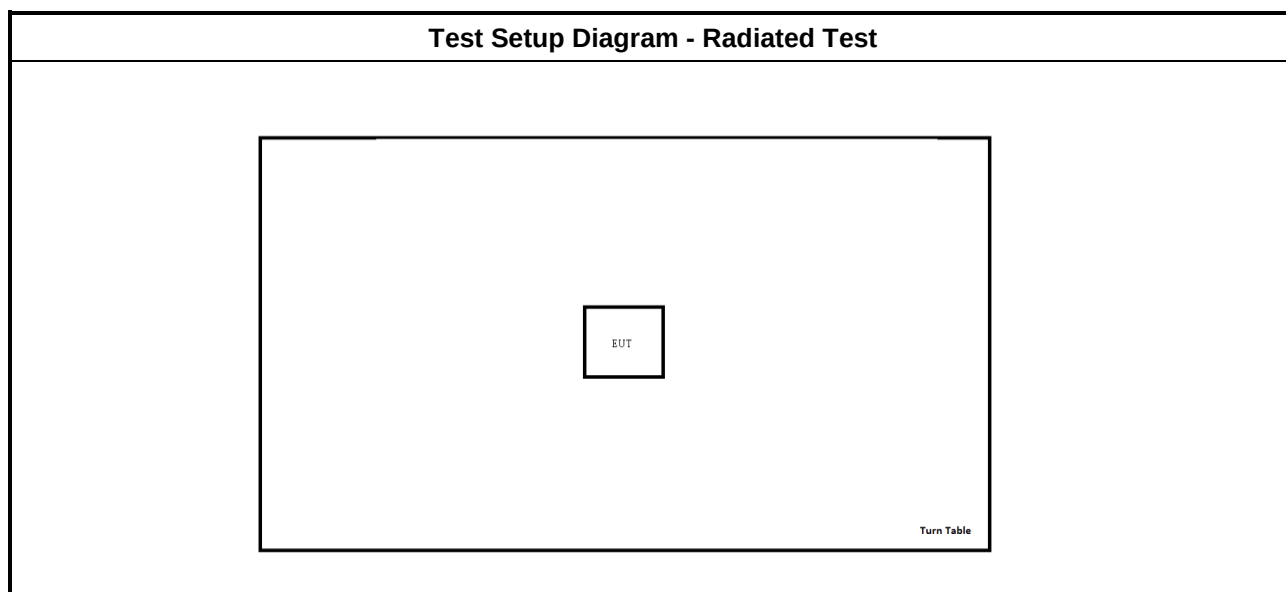
The Worst Case Mode for Following Conformance Tests			
Tests Item	Emission Bandwidth, Fundamental Emissions, Radiated Unwanted Emissions		
Test Condition	Radiated measurement		
User Position	☐ EUT will be placed in fixed position.		
	☐ EUT will be placed in mobile position and operating multiple positions.		
	☒ EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions.		
Operating Mode	1. DC Power supply ; FSK 433.92MHz(TX Only)		
	2. DC Power supply ; FSK 125kHz(RX only)		
Test Mode	FSK		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT	V		

The Worst Case Mode for Following Conformance Tests	
Tests Item	Operation Restriction (silent time and operated time)
Test Condition	Radiated measurement
Test Mode	Operated normally mode for worst duty cycle condition.

2.4 Accessories

Accessories				
Battery	Brand Name	Panasonic	Model Name	CR2032
	Power Rating	O/P:3 V	Type	Li-ion, Yes

2.5 Test Setup Diagram



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.		

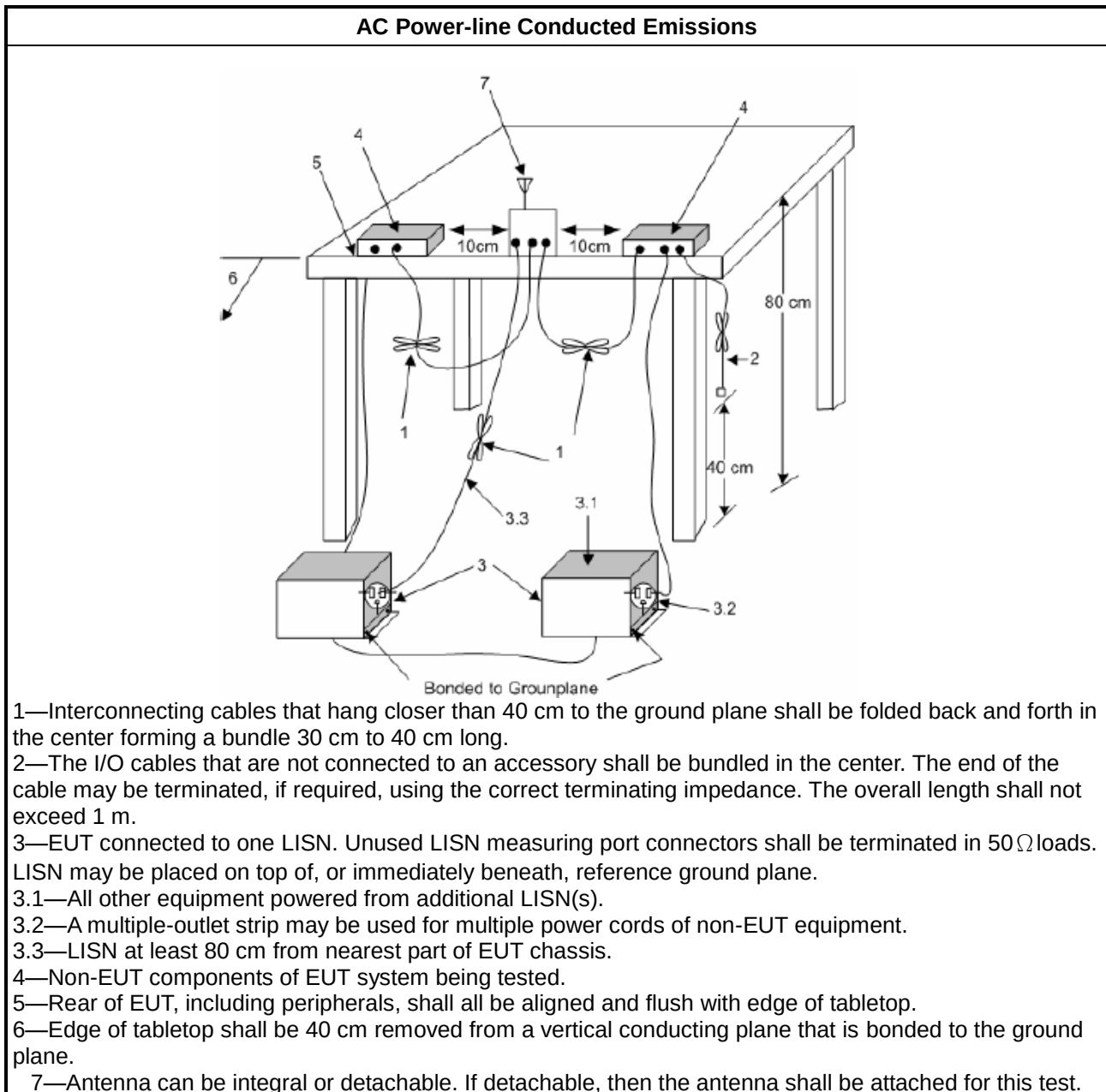
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

Test Method
☒ Refer as ANSI C63.10-2013, 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 Section 3.4 (2018-01-10) which states, "Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power 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.

Therefore, for this device, AC Power Line Conducted Emissions investigation is not required.

3.2 Emission Bandwidth

3.2.1 Emission Bandwidth Limit

Emission Bandwidth Limit	
☒	Emission bandwidth falls completely within authorized band.
☒	$F_c(70\sim 900\text{MHz}): BW \leq f_c \times 0.25\%$
☐	$F_c(>900\text{MHz}): BW \leq f_c \times 0.5\%$

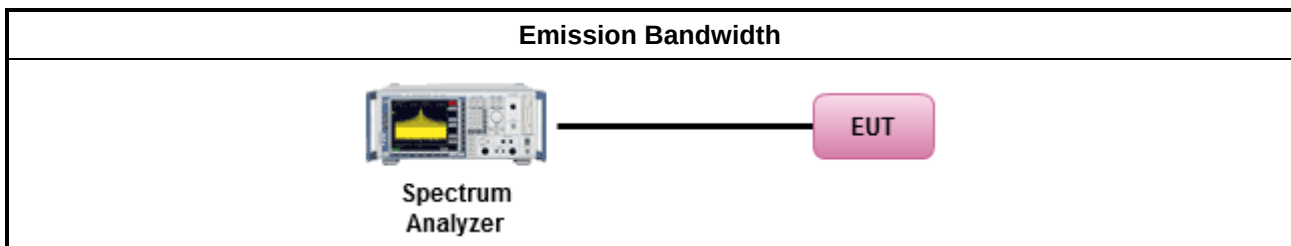
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

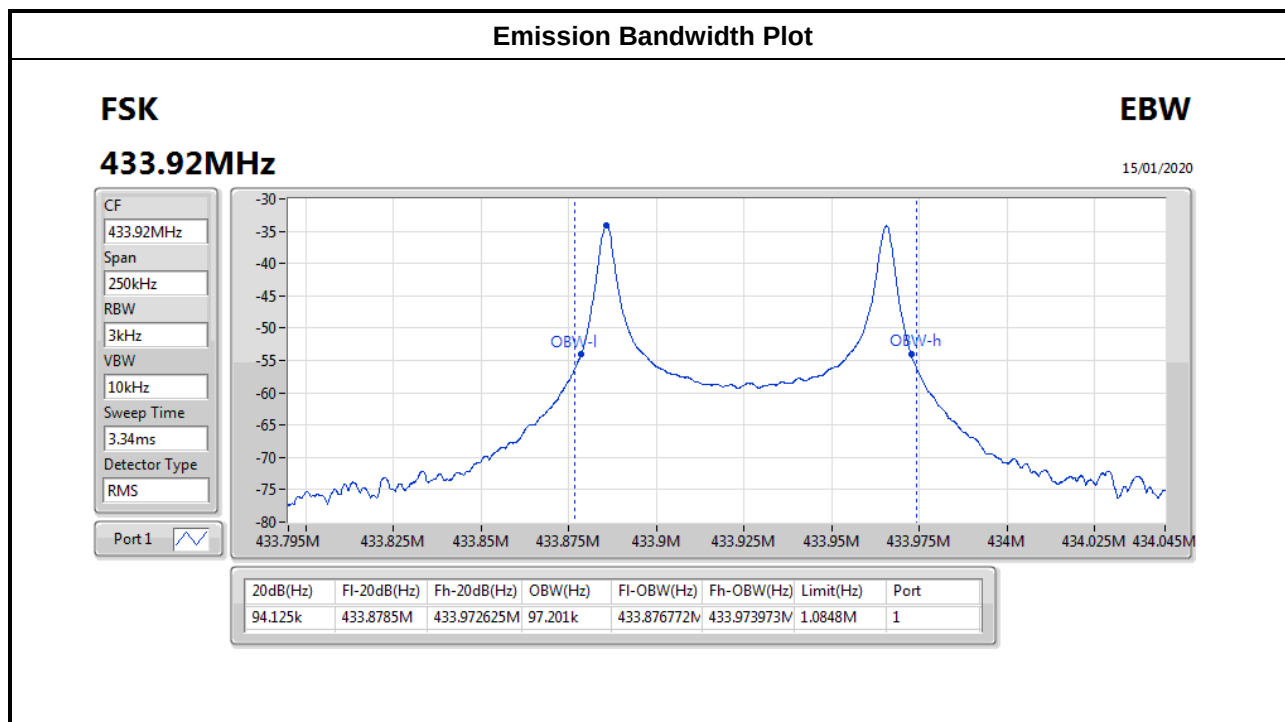
Test Method	
☒	Refer as ANSI C63.10, clause 6.9.3 for 20 dB emission bandwidth and 99% occupied bandwidth measurement.

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Emission Bandwidth Result			
Modulation Mode	Frequency (MHz)	99% Bandwidth (kHz)	20dB BW (kHz)
FSK	433.92	97.20	94.13
Limit		N/A	1.0848MHz
Result		Complied	



3.3 Fundamental Emissions

3.3.1 Fundamental Emissions Limit

For manually operated within 5 sec, activated automatically within 5 sec, periodic transmissions		
Frequency Band (MHz)	Fundamental Limit (uV/m) at 3m	Fundamental Limit (dBuV/m) at 3m
40.66-40.70	2250	67
70-130	1250	61.9
130-174	1250-3750(**)	61.9-71.5
174-260	3750	71.5
260-470	3750-12500(**)	71.5-81.9
Above 470	12500	81.9
**1. Linear interpolations. Based on the average value of the measured emissions.		

For periodic transmissions (lower field strength)		
Frequency Band (MHz)	Fundamental Limit (uV/m) at 3m	Fundamental Limit (dBuV/m) at 3m
40.66-40.70	1000	60
70-130	500	54
130-174	500-1500(**)	54-63.5
174-260	1500	63.5
260-470	1500-5000(**)	63.5-74
Above 470	5000	74
** 1. Linear interpolations. Based on the average value of the measured emissions.		

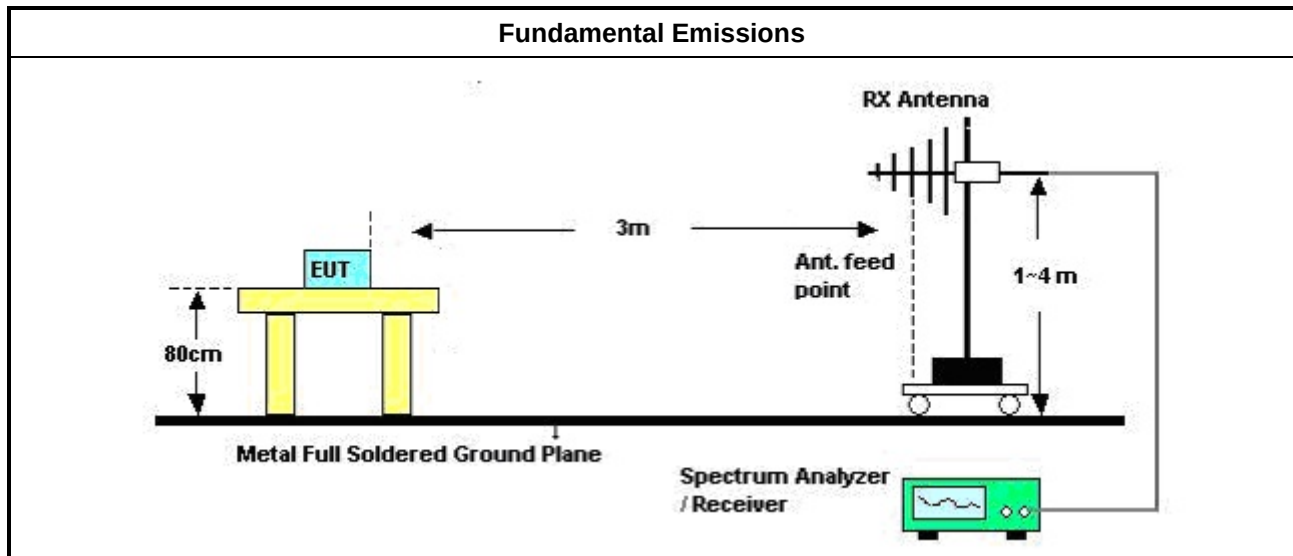
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

☒	For the transmitter emissions shall be measured using following options below:
☐	Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW) – Duty cycle $\geq$ 100%.
☒	Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions. Adjusted by a “duty cycle correction factor”, derived from $20\log$ (dwell time/100 ms). Average emission = peak emission + 20 log (duty cycle).
☒	Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
☒	For radiated measurement, refer as ANSI C63.10, clause 6.5 for radiated emissions

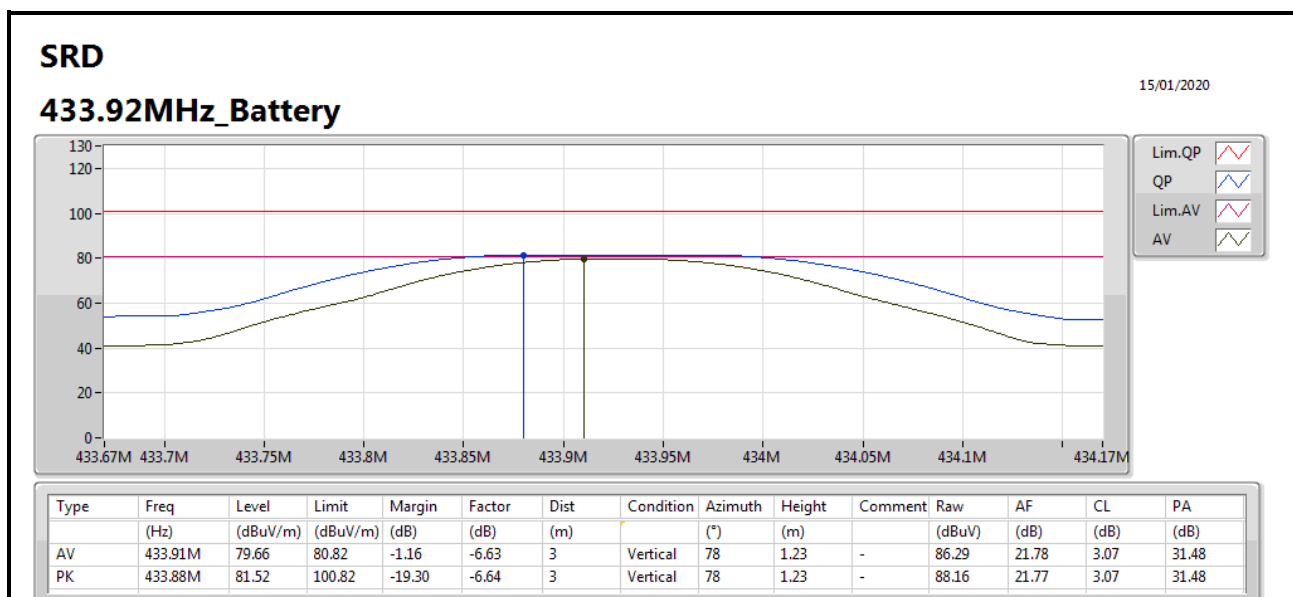
3.3.4 Test Setup



3.3.5 Test Result of Fundamental Emissions

Field Strength of Fundamental Emissions Result					
Modulation Mode	Frequency (MHz)	Fundamental (dBuV/m)@3m	Margin (dB)	Limit (dBuV/m)@3m	Type
FSK	433.91	79.66	-1.16	80.82	Average
FSK	433.88	81.52	-19.30	100.82	Peak
Result		Complied			

Note 1: Measurement worst emissions of receive antenna polarization Vertical
 Note 2: If duty cycle < 100%, average emission = peak emission + 20 log (duty cycle).



3.4 Transmitter Radiated Unwanted Emissions

3.4.1 Transmitter Radiated Unwanted Emissions Limit

For manually operated within 5 sec, activated automatically within 5 sec, periodic transmissions		
Unwanted emissions limit follow this table or the general limits LP0002 2.8, whichever limit permits higher field strength.		
Frequency Band (MHz)	Spurious Limit (uV/m) at 3m	Spurious Limit (dBuV/m) at 3m
40.66-40.70	225	47
70-130	125	41.9
130-174	125-375(**)	41.9-51.5
174-260	375	51.5
260-470	375-1250(**)	51.5-61.9
Above 470	1250	61.9
**1. Linear interpolations. Based on the average value of the measured emissions.		

For periodic transmissions (lower field strength)		
Unwanted emissions limit follow this table or the general limits LP0002 2.8, whichever limit permits higher field strength.		
Frequency Band (MHz)	Spurious Limit (uV/m) at 3m	Spurious Limit (dBuV/m) at 3m
40.66-40.70	100	40
70-130	50	34
130-174	50-150(**)	34-43.5
174-260	150	43.5
260-470	150-500(**)	43.5-54
Above 470	500	54
** 1. Linear interpolations Based on the average value of the measured emissions.		

3.4.2 Measuring Instruments

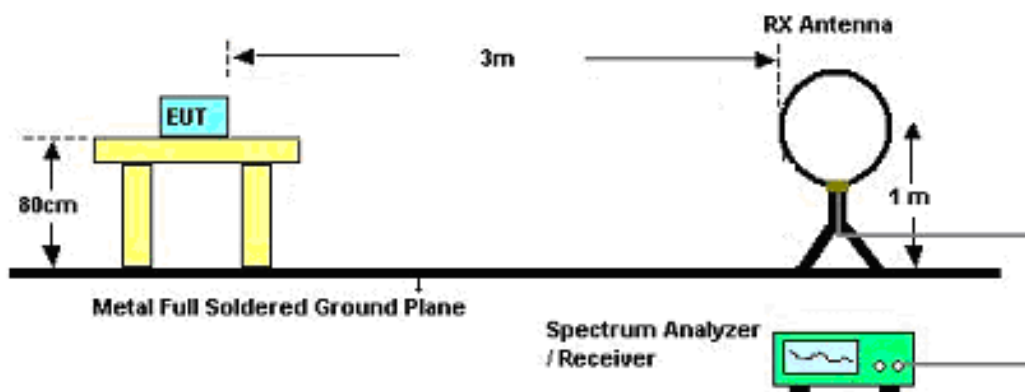
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method – General Information	
☒	The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
☐	Refer as ANSI C63.10, clause 6.10.3 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
☒	For the transmitter unwanted emissions shall be measured using following options below:
☐	Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW) – Duty cycle $\geq$ 100%.
☒	Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions. Adjusted by a “duty cycle correction factor”, derived from $20\log$ (dwell time/100 ms). Average emission = peak emission + 20 log (duty cycle).
☒	Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
☒	For the transmitter bandedge emissions shall be measured using following options below:
☒	Refer as ANSI C63.10, clause 6.10 for band-edge testing.
☐	Refer as ANSI C63.10, clause 6.10.6.2 for marker-delta method for band-edge measurements.
☒	For radiated measurement.
☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
☒	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz and test distance is 3m.
☒	The any unwanted emissions level shall not exceed the fundamental emission level.
☒	All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

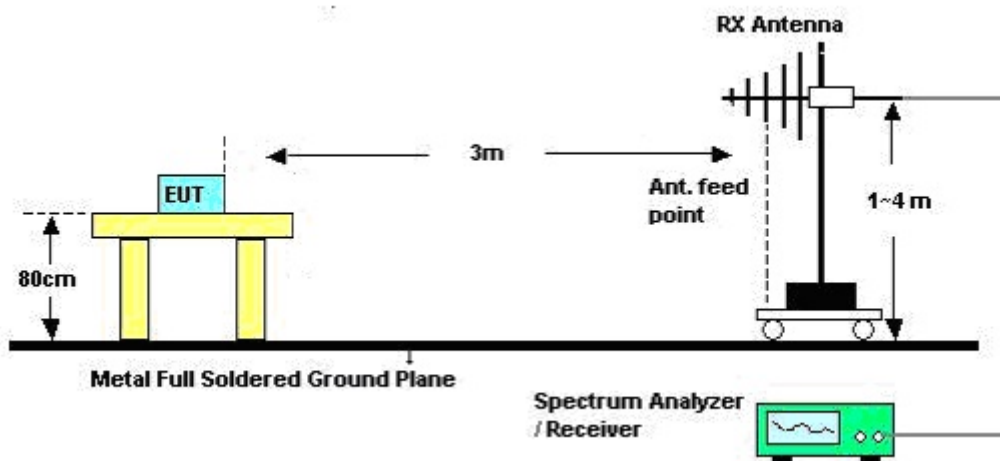
3.4.4 Test Setup

Transmitter Spurious and Out of Band Emissions (9 kHz - 30 MHz)

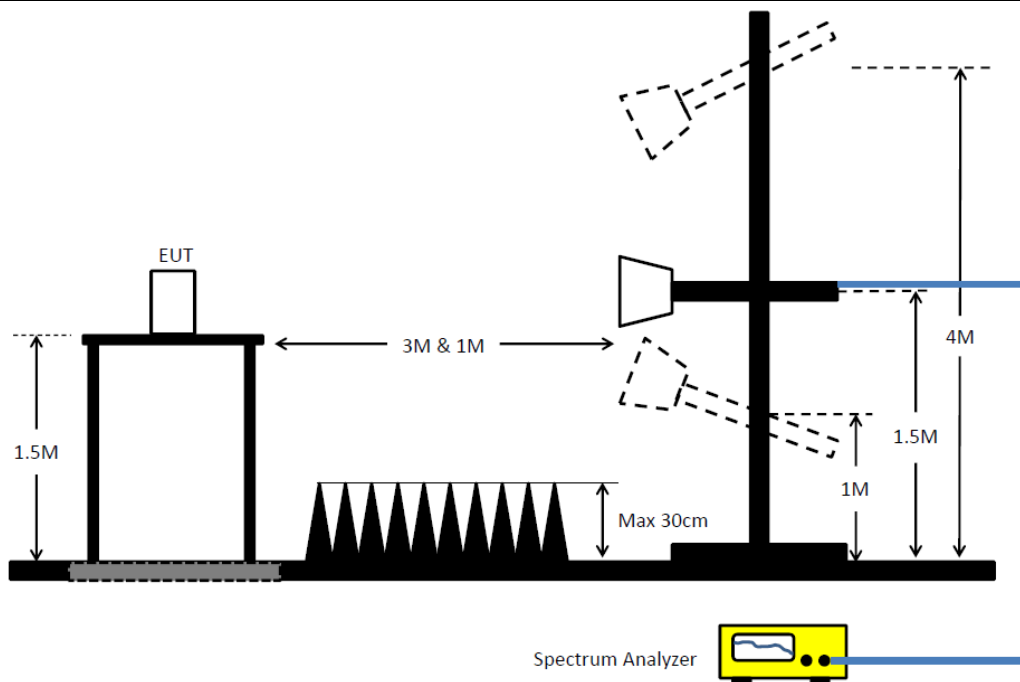


Magnetic field tests shall be performed in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna.

Transmitter Radiated Unwanted Emissions (below 1GHz)



Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna.

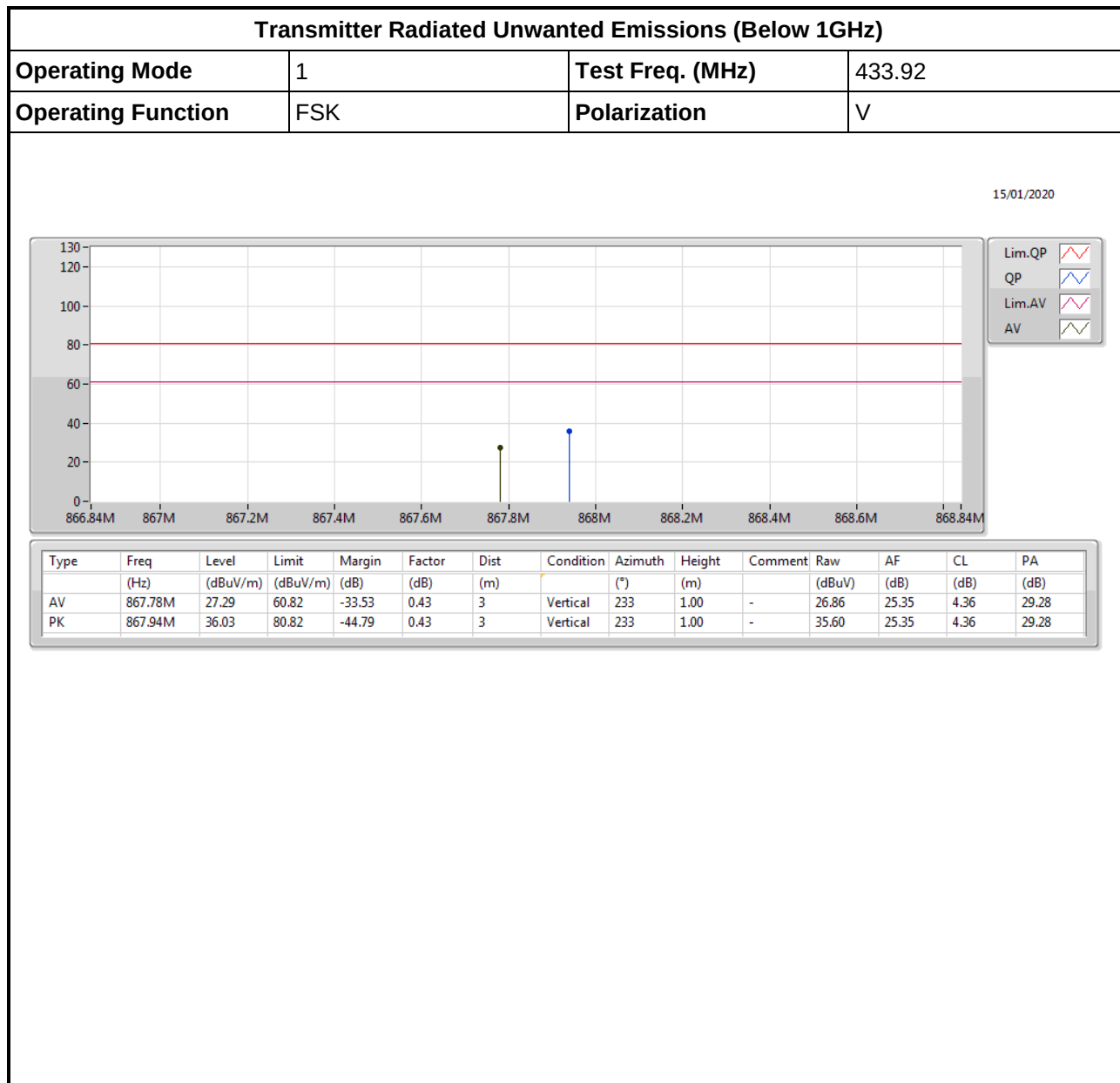
Transmitter Radiated Unwanted Emissions (Above 1GHz)


Electric field tests shall be performed in the frequency range of 1 GHz to 10th harmonic of highest fundamental frequency or 40 GHz using a calibrated horn antenna.

3.4.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

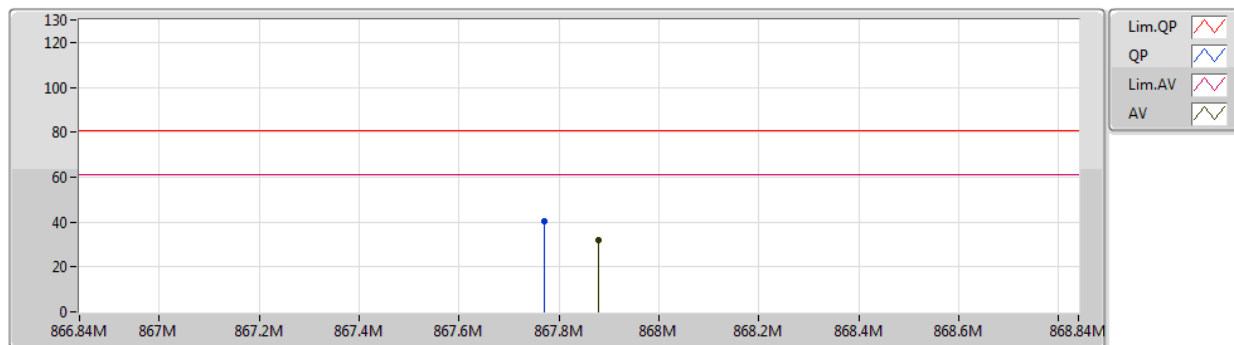
3.4.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)



Transmitter Radiated Unwanted Emissions (Below 1GHz)

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

15/01/2020

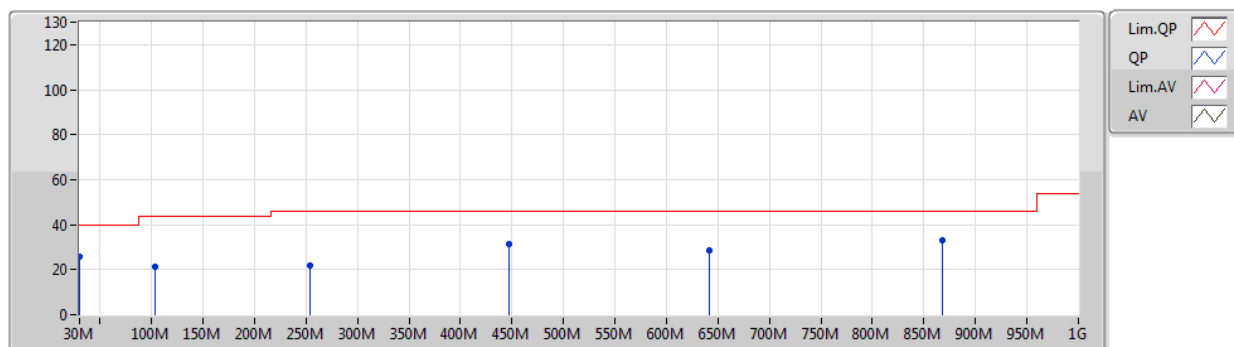


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	867.88M	31.72	60.82	-29.10	0.43	3	Horizontal	114	1.00	-	31.29	25.35	4.36	29.28
PK	867.77M	40.60	80.82	-40.22	0.43	3	Horizontal	114	1.00	-	40.17	25.35	4.36	29.28

Transmitter Radiated Unwanted Emissions (Below 1GHz)

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

15/01/2020

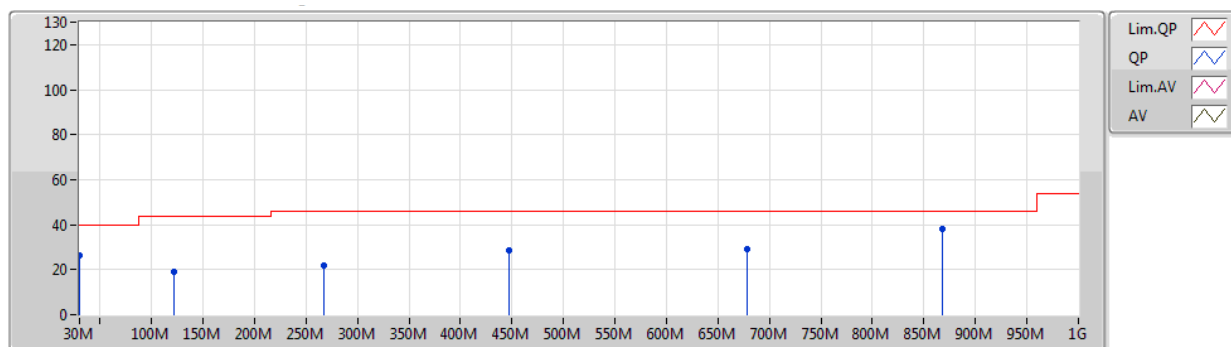


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	30M	25.67	40.00	-14.33	-7.25	3	Vertical	360	1.00	-	32.92	23.65	0.90	31.80
PK	103.1M	21.45	43.50	-22.05	-13.89	3	Vertical	360	1.00	-	35.34	16.22	1.70	31.81
PK	253.52M	21.82	46.00	-24.18	-11.18	3	Vertical	360	1.00	-	33.00	18.15	2.32	31.65
PK	447.52M	31.24	46.00	-14.76	-6.33	3	Vertical	360	1.00	-	37.57	21.95	3.18	31.46
PK	641.52M	28.53	46.00	-17.47	-1.42	3	Vertical	360	1.00	-	29.95	24.29	3.90	29.61
PK	867.86M	33.10	46.00	-12.90	0.43	3	Vertical	360	1.00	-	32.67	25.35	4.36	29.28

Transmitter Radiated Unwanted Emissions (Below 1GHz)

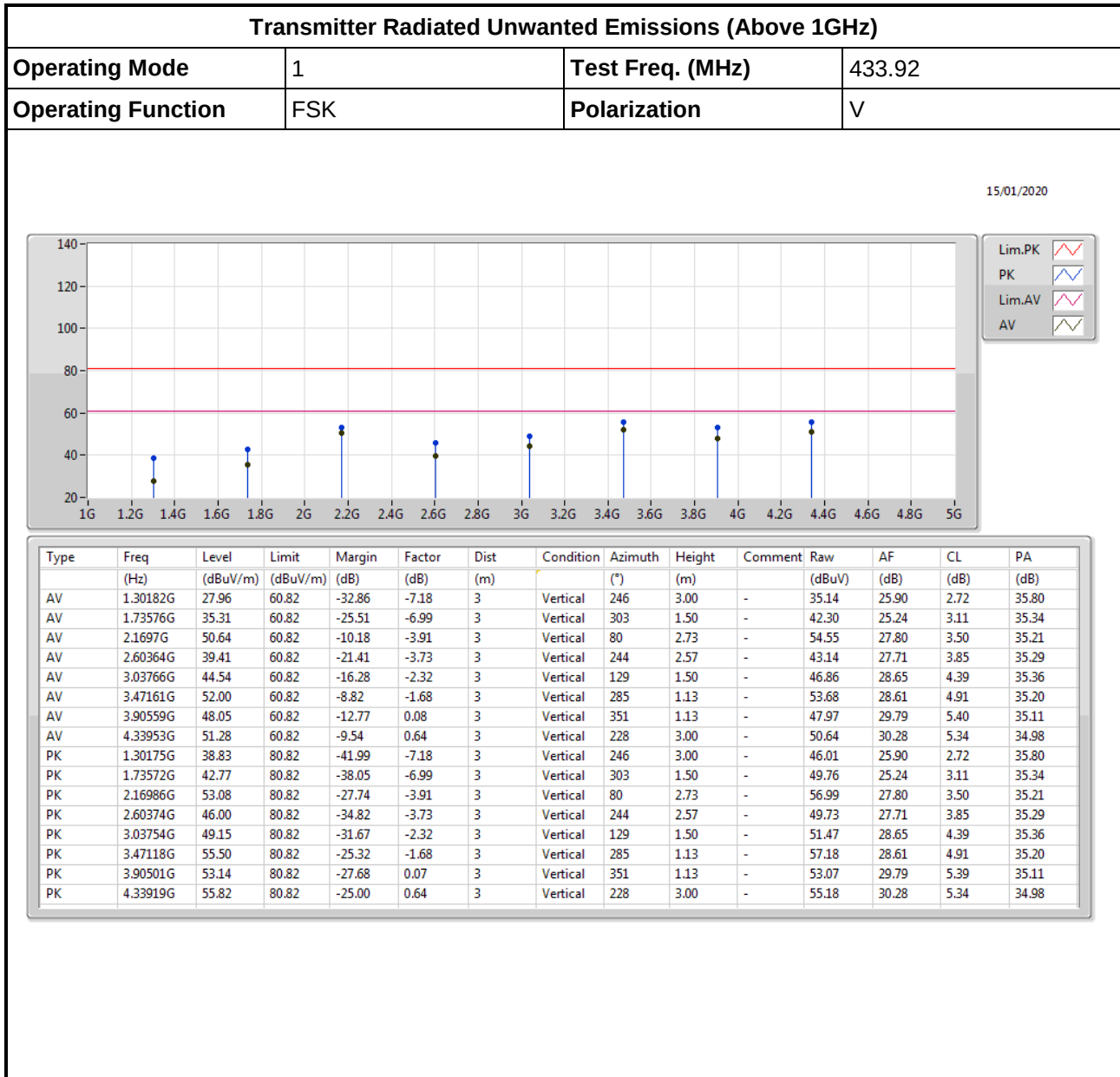
Operating Mode	1	Test Freq. (MHz)	433.92
Operating Function	FSK	Polarization	H

15/01/2020



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	30M	26.20	40.00	-13.80	-7.25	3	Horizontal	0	1.00	-	33.45	23.65	0.90	31.80
PK	121.38M	19.13	43.50	-24.37	-13.09	3	Horizontal	0	1.00	-	32.22	16.98	1.71	31.78
PK	267.58M	21.92	46.00	-24.08	-10.89	3	Horizontal	0	1.00	-	32.81	18.33	2.41	31.63
PK	447.52M	28.67	46.00	-17.33	-6.33	3	Horizontal	0	1.00	-	35.00	21.95	3.18	31.46
PK	678.07M	28.98	46.00	-17.02	-1.70	3	Horizontal	0	1.00	-	30.68	24.06	3.78	29.54
PK	867.86M	38.19	46.00	-7.81	0.43	3	Horizontal	0	1.00	-	37.76	25.35	4.36	29.28

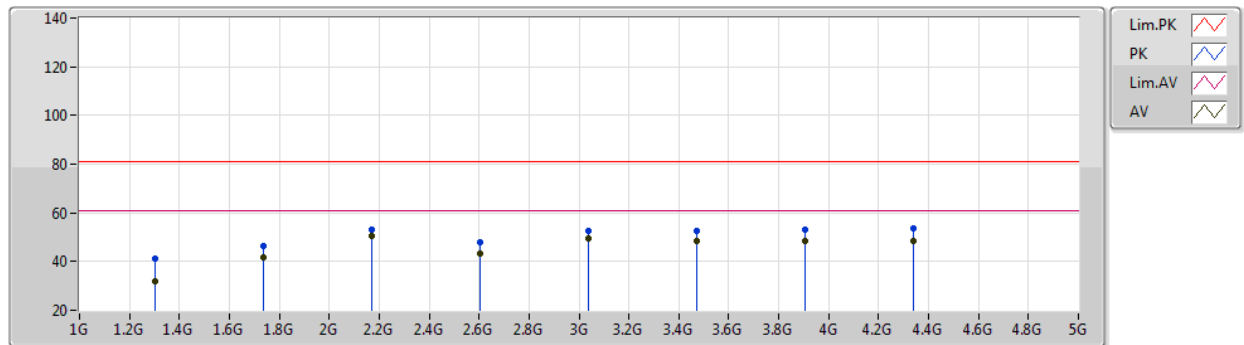
3.4.7 Transmitter Radiated Unwanted Emissions (Above 1GHz)



Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

15/01/2020



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	1.30184G	32.13	60.82	-28.69	-7.18	3	Horizontal	347	1.50	-	39.31	25.90	2.72	35.80
AV	1.73574G	41.68	60.82	-19.14	-6.99	3	Horizontal	163	1.50	-	48.67	25.24	3.11	35.34
AV	2.16971G	50.45	60.82	-10.37	-3.91	3	Horizontal	130	1.72	-	54.36	27.80	3.50	35.21
AV	2.60366G	43.07	60.82	-17.75	-3.73	3	Horizontal	169	1.71	-	46.80	27.71	3.85	35.29
AV	3.03763G	49.25	60.82	-11.57	-2.32	3	Horizontal	206	2.66	-	51.57	28.65	4.39	35.36
AV	3.47161G	48.48	60.82	-12.34	-1.68	3	Horizontal	360	2.67	-	50.16	28.61	4.91	35.20
AV	3.90553G	48.37	60.82	-12.45	0.07	3	Horizontal	137	1.79	-	48.30	29.79	5.39	35.11
AV	4.33957G	48.55	60.82	-12.27	0.64	3	Horizontal	141	1.00	-	47.91	30.28	5.34	34.98
PK	1.30165G	41.05	80.82	-39.77	-7.18	3	Horizontal	347	1.50	-	48.23	25.90	2.72	35.80
PK	1.73592G	46.59	80.82	-34.23	-6.99	3	Horizontal	163	1.50	-	53.58	25.24	3.11	35.34
PK	2.16948G	52.90	80.82	-27.92	-3.92	3	Horizontal	130	1.72	-	56.82	27.79	3.50	35.21
PK	2.60387G	47.78	80.82	-33.04	-3.73	3	Horizontal	169	1.71	-	51.51	27.71	3.85	35.29
PK	3.03721G	52.61	80.82	-28.21	-2.33	3	Horizontal	206	2.66	-	54.94	28.65	4.39	35.37
PK	3.47172G	52.50	80.82	-28.32	-1.67	3	Horizontal	360	2.67	-	54.17	28.62	4.91	35.20
PK	3.90579G	52.93	80.82	-27.89	0.08	3	Horizontal	137	1.79	-	52.85	29.79	5.40	35.11
PK	4.33972G	53.72	80.82	-27.10	0.64	3	Horizontal	141	1.00	-	53.08	30.28	5.34	34.98

3.5 Operation Restriction

3.5.1 Operation Restriction Limit

Operation Restriction Limit	
☒	Manually operated: manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 sec of being released.
☐	Activated automatically: transmitter activated automatically shall cease transmission within 5 sec after activation.
☐	Periodic transmissions: permitted with total transmission time of 2 sec per hour or less.
☐	Periodic transmissions (lower field strength): each transmission is not greater than 1 sec and the silent period between transmissions is at least 30 times the duration of the transmission but in no case less than 10 sec.

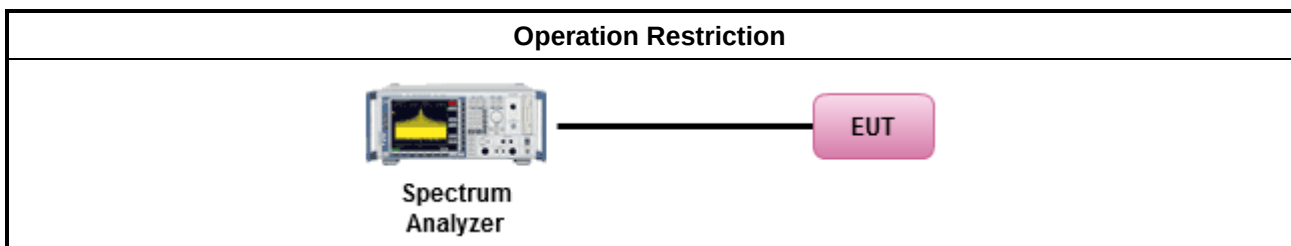
3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report. Activated automatically within 5 sec

3.5.3 Test Procedures

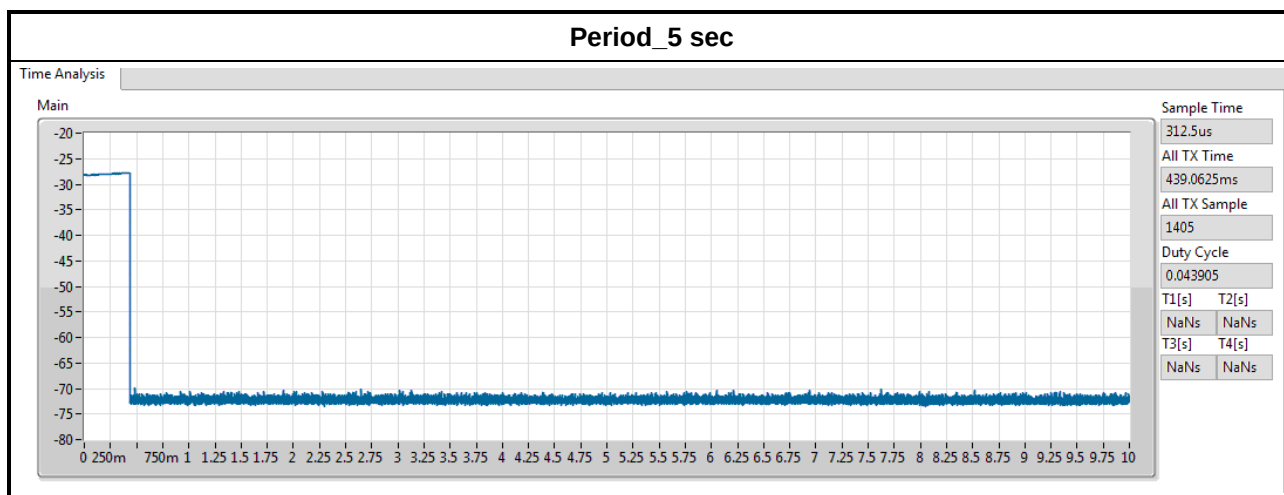
Test Method
☒ Refer as ANSI C63.10, clause 7.4 for periodic operation measurement.

3.5.4 Test Setup



3.5.5 Test Result of Operation Restriction

Operation Condition	Pulse Duration (s)	Limits (s)
Transmission time (TX-on)	0.439	5.00



3.6 Receiver Radiated Spurious Emissions

3.6.1 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.

3.6.2 Measuring Instruments

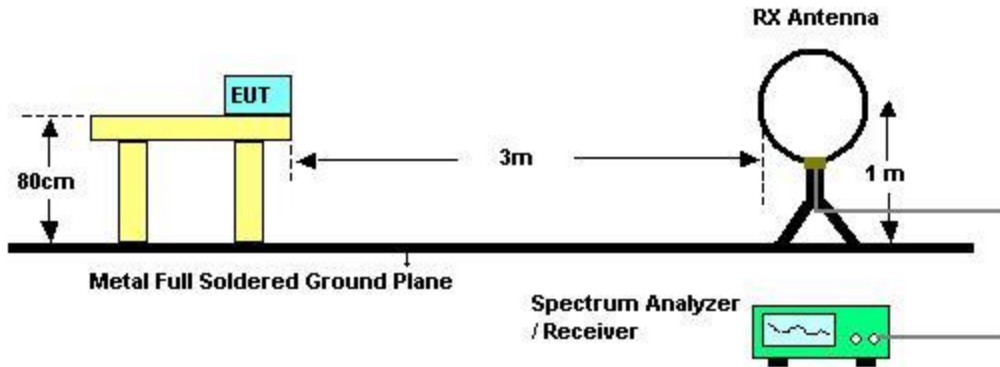
Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

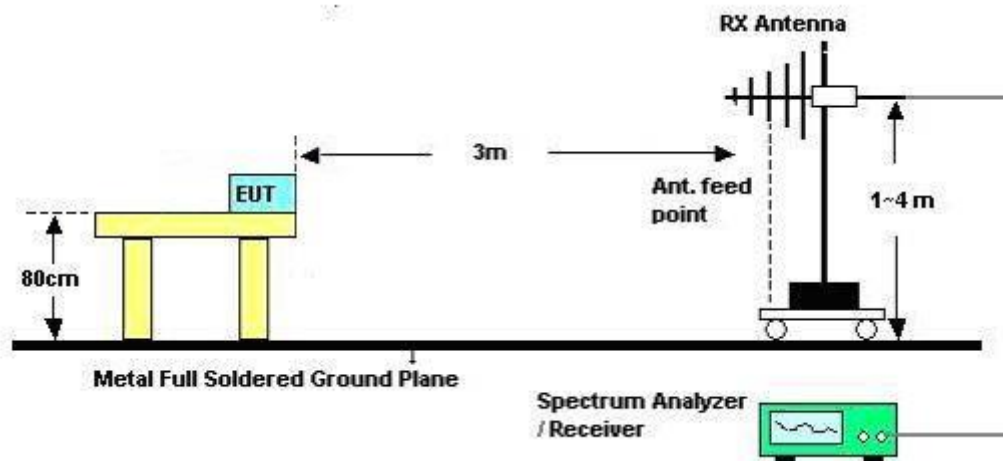
Test Method	
☒	The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever 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.

3.6.4 Test Setup

Receiver Spurious and Out of Band Emissions (9 kHz - 30 MHz)



Receiver Radiated Unwanted Emissions (below 1GHz)



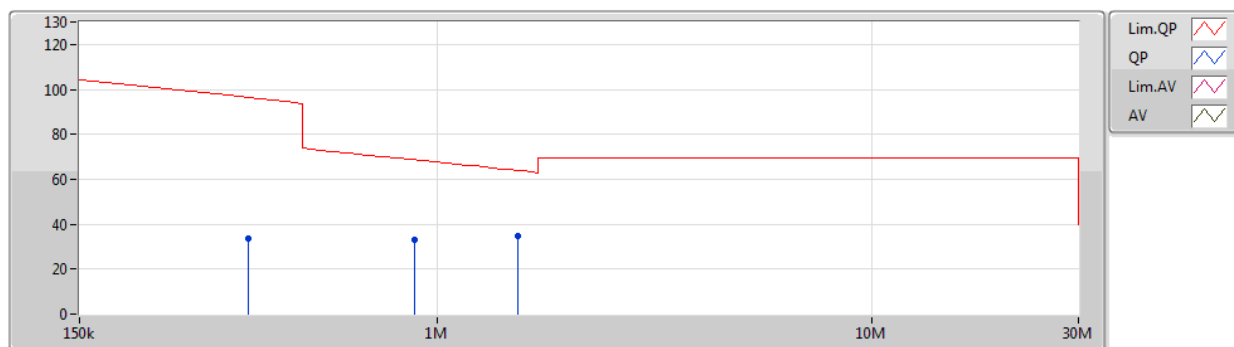
3.6.5 Receiver Radiated Unwanted Emissions (Below 30MHz)



Receiver Radiated Unwanted Emissions (Below 30MHz)

Operating Mode	2	Test Freq. (kHz)	125
Operating Function	FSK	Polarization	V

09/01/2020

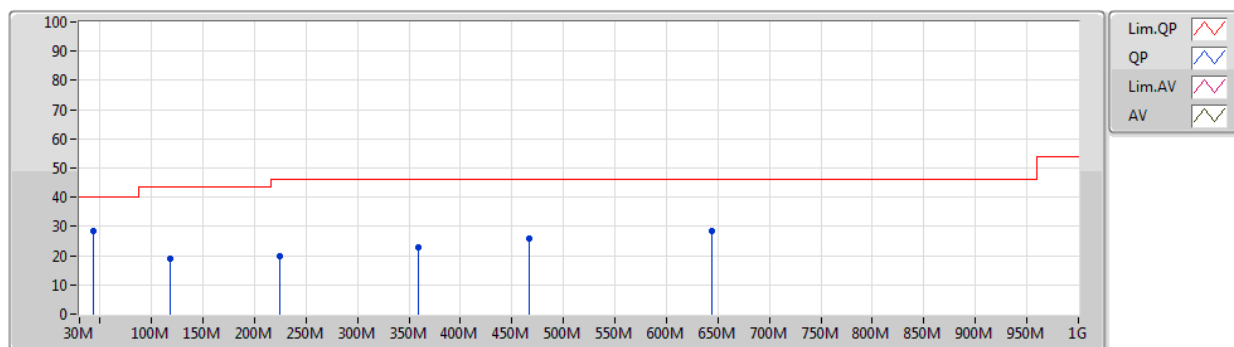


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	366.304k	33.40	96.32	-62.92	20.13	3	Horizontal	360	1.00	-	13.27	20.10	0.03	-
PK	885.435k	33.19	68.68	-35.49	20.17	3	Horizontal	360	1.00	-	13.02	20.06	0.11	-
PK	1.534M	34.60	63.92	-29.32	20.31	3	Horizontal	360	1.00	-	14.29	20.10	0.21	-

Receiver Radiated Unwanted Emissions (Above 30MHz)

Operating Mode	2	Test Freq. (kHz)	125
Operating Function	FSK	Polarization	V

09/01/2020

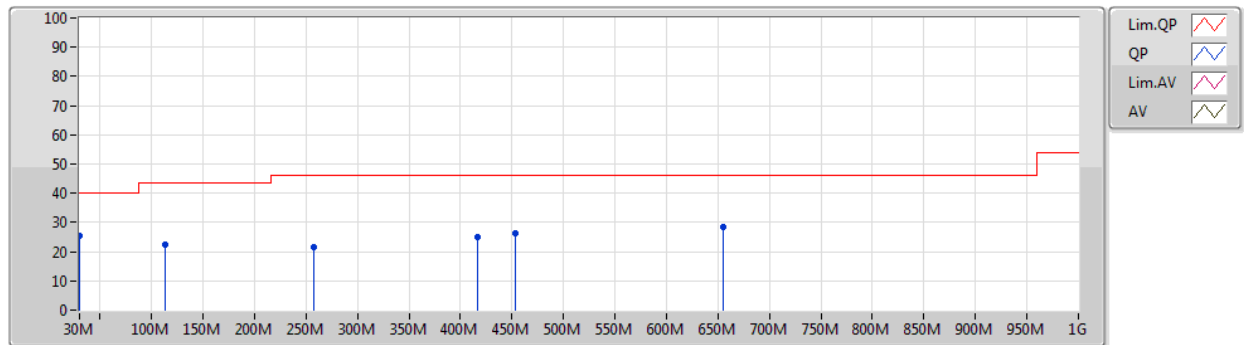


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	44.06M	28.56	40.00	-11.44	-14.26	3	Vertical	0	1.00	-	42.82	16.26	1.30	31.82
PK	118.57M	19.00	43.50	-24.50	-13.08	3	Vertical	0	1.00	-	32.08	17.00	1.70	31.78
PK	224M	19.75	46.00	-26.25	-14.73	3	Vertical	0	1.00	-	34.48	14.70	2.25	31.68
PK	358.96M	22.66	46.00	-23.34	-9.21	3	Vertical	0	1.00	-	31.87	19.71	2.64	31.56
PK	467.2M	25.83	46.00	-20.17	-5.85	3	Vertical	0	1.00	-	31.68	22.39	3.20	31.44
PK	644.33M	28.65	46.00	-17.35	-1.42	3	Vertical	0	1.00	-	30.07	24.26	3.93	29.61

Receiver Radiated Unwanted Emissions (Above 30MHz)

Operating Mode	2	Test Freq. (kHz)	125
Operating Function	FSK	Polarization	H

09/01/2020



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	30M	25.36	40.00	-14.64	-7.25	3	Horizontal	360	1.00	-	32.61	23.65	0.90	31.80
PK	112.94M	22.25	43.50	-21.25	-12.99	3	Horizontal	360	1.00	-	35.24	17.10	1.70	31.79
PK	257.74M	21.66	46.00	-24.34	-10.48	3	Horizontal	360	1.00	-	32.14	18.81	2.35	31.64
PK	416.59M	25.01	46.00	-20.99	-6.83	3	Horizontal	360	1.00	-	31.84	21.72	2.93	31.48
PK	453.14M	26.24	46.00	-19.76	-6.18	3	Horizontal	360	1.00	-	32.42	22.08	3.20	31.46
PK	655.58M	28.27	46.00	-17.73	-1.53	3	Horizontal	360	1.00	-	29.80	24.10	3.96	29.59

4 Test Equipment and Calibration Data

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	10Hz~40GHz	13/Mar/2019	12/Mar/2020

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH01-HY	30MHz ~ 1GHz 3m	29/Aug/2019	28/Aug/2020
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH01-HY	1GHz ~ 18GHz 3m	29/Aug/2019	28/Aug/2020
PreAmplifier	COM-POWER	PA-103	161050	1 MHz ~ 1.0GHz	17/Jul/2019	16/Jul/2020
Microwave Preamplifier	Agilent	8449B	3008A02602	1GHz ~ 26.5GHz	27/Mar/2019	26/Mar/2020
Spectrum Analyzer	R&S	FSV40	101407	10Hz ~ 40GHz	10/Sep/2019	09/Sep/2020
RF Cable-R03m	Jye Bao	RG142	CB019	9kHz ~ 1GHz	16/Dec/2019	15/Dec/2020
RF Cable-HIGH	SUHNER	SUCOFLEX 104	SN805196/4+M Y39495	1 GHz ~ 18 GHz	13/Mar/2019	12/Mar/2020
Bilog Antenna & 5db Attenuator	SCHAFFNER/MTJ	CBL6112D / MTJ6102-05	2678 / 001	30MHz ~ 2GHz	06/Jul/2019	05/Jul/2020
EMI Test Receiver	R&S	ESU-26	100422	20Hz ~ 26.5GHz	23/Oct/2019	22/Oct/2020
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	15/Mar/2019	14/Mar/2020
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170339	18GHz ~ 40GHz	19/Apr/2019	18/Apr/2020
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D-1130	1GHz ~ 18GHz	04/Nov/2019	03/Nov/2020