FCC (USA)/ISED (Canada) TEST REPORT

FCC 47 CFR Part 15D

Unlicensed Personal Communications Service Devices

Industry Canada RSS-213

2 GHz License-exempt Personal Communications Service Devices (LE-PCS)

Report Reference No:	LIG20230928-01
Testing Laboratory:	ElectroMagnetic Investigations, LLC
Address:	8531 NE Cornell Road. Suite 600, Hillsboro, OR, USA
Accreditation:	A2LA Accredited Testing Laboratory
Applicant's name:	Lightspeed Technologies, Inc.
Address:	11509 SW Herman Rd.
	Tualatin, OR 97062
	United States
Testing specification	
Standard:	FCC 47 CFR Part 15D
	FCC 47 CFR Part 15C
	FCC 47 CFR Part 15B
	RSS-213, Issue 3, 2015-03
	RSS-Gen, Issue 5, 2018-04
	ANSI C63.17 :2013
	ANSI C63.4 :2014
Equipment Under test (EUT):	Rogue Base
Serial Number:	03-CMT-Z-S2342-00116
Product description:	DECT Mic
Model No.	CMT
Additional Model(s):	N/A
Hardware version:	
Firmware / Software version:	7.1.00
FCC ID:	ORV-LSCMT
IC ID	1732B-LSCMT
Test result:	Passed

Possible test case verdicts

Neither assessed nor tested:	N/N
Required by standard but not applicable:	N/A
Required by standard but not tested:	NOT PERFORMED
Not required by standard:	N/R
EUT meets the requirement:	P (Pass)
EUT does not meet the requirement:	F (Fail)

Testing

Test Lab Temperature:	20 – 28 C
Test Lab Humidity:	30 – 38 %
Date EUT received:	October 25, 2023
Date(s) of performance of tests:	October 25, 2023 to November 22, 2023
Complied by:	Ryan Benitez 
Tested by:	Ryan Benitez 
Approved by:	Henry Benitez 
Date of issue:	January 16, 2024
Total number of pages:	75

General remarks

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

This report shall not be reproduced, except in full, without written approval of the issuing test laboratory.

Revision History

Version	Date Issued	Description of Revision

Authorizations

FCC (USA): Accepted by FCC for performance of radiated emissions and conducted emissions measurements. FCC ID: US1092.

Industry Canada: Accepted by Industry Canada for performance of radiated emissions and conducted emissions measurements. ISED Canada CAB ID US0203.

European Union (CE): ElectroMagnetic Investigations, LLC is equipped and capable of performing EMC CE compliance testing to European Union EMC CE requirements for Information Technology Equipment (ITE), Measurement, Control and Laboratory Equipment (MCL), and other equipment.

American Association of Lab Accreditations (A2LA): ElectroMagnetic Investigations is accredited to perform the tests contained within this report to the standards listed.

Certificate #2569.01

Report Index

1 Equipment (Test item) description

Description:	DECT Microphone
Model:	CMT
Additional Model(s):	None
Brand Name(s):	Lightspeed Technologies, Inc.
Serial number:	03-CMT-Z-S2342-00116
Hardware version:	
Software / Firmware version:	7.1.00
FCC-ID:	ORV-LSCMT
IC:	1732B-LSC25
Equipment type:	End product
Radio type:	DECT portable part
Number of radios:	1 DECT transceiver built into device
Radio technology:	DECT 6.0
Operating frequency range:	1921.536 – 1928.448 MHz
Assigned frequency band:	1920 – 1930 MHz
Number of RF channels:	5
Supported slots:	even and odd
Number of time slots:	12 x Tx + 12 x Rx = 24

Channels	F_0	CH:0 / 1928.448 MHz
	F_1	CH:1 / 1926.720 MHz
	F_2	CH:2 / 1924.992 MHz
	F_3	CH:3 / 1923.264 MHz
	F_4	CH:4 / 1921.536 MHz
Main test frequencies	F_{low}	CH:4 / 1921.536 MHz
	F_{mid}	CH:2 / 1924.992 MHz
	F_{high}	CH:0 / 1928.448 MHz

Modulations	GFSK
Emissions designator	F7D
Nominal emission bandwidth	1.42 MHz
Channel spacing	1728 kHz
Spectrum access	Listen before transmit
Nominal lower threshold	N/A
Nominal upper threshold	-60 dBm
Number of antennas	1

Antenna	Type	Bent Monopole
	Gain	1921.536 MHz -4.9 dBi
		1924.992 MHz -4.31 dBi
		1928.448 MHz -4.45 dBi
Manufacturer	Lightspeed Technologies, Inc. 11509 SW Herman Rd. Tualatin, OR 97062 United States	
Power supply	V_{nom}	3.7 V DC Battery operated
	V_{min}	N/A
	V_{max}	N/A
Charger	Model	FSC
	Vendor	Lightspeed
	Input	5 V DC
	Output	3.7 V DC
Temperature	T_{nom}	20 C
	T_{min}	-20 C
	T_{max}	50 C

1.1 Photos – Equipment external

See dedicated report

1.2 Photos – Equipment internal

See dedicated report

1.3 Photos – Test setup

See dedicated report

1.4 Supporting equipment used during testing

Product type*	Device	Manufacturer	Model No.	Comments
None				

*Note: Use the following abbreviations:
AE : Auxiliary/Associated Equipment
SIM : Simulator (Not Subject to Test)
CABL : Connecting cables

1.5 Test modes

Mode #	Description	
TDMA	General conditions:	EUT powered by a laboratory power supply. Active connection to companion device.
	Radio conditions:	Mode = Transmit mode Modulation = GFSK Duty cycle = 1/24 Power level = Maximum
Receive	General conditions:	EUT powered by a laboratory power supply.
	Radio conditions:	Mode = standalone receive Modulation = GFSK
AC-Powerline	General conditions:	Active data connection between EUT and companion device. EUT connected to AM main via AC/DC Adaptor
	Radio conditions:	Mode = Transmit mode Modulation = GFSK Duty cycle = 1/24 Power level = Maximum

1.6 Test equipment used during testing

Conducted				
Description	Manufacturer	Model	Cal. Date	Cal. Due
Analyzer	Agilent	E4440A	2023/05/13	2024/05/13
DECT Tester	R&S	CMD60	2023/03/16	2024/03/16
Signal generator	R&S	SME06	2021/09/03	2026/09/03
Signal generator	R&S	SME06	Cal on use	Cal on use
Signal generator	R&S	SME03	Cal on use	Cal on use
Signal generator	Anritsu	68369A	2023/09/14	2026/09/14
Signal generator	Marconi	2412	Cal on use	Cal on use
Pulse generator	Agilent	81104A	Cal on use	Cal on use
Coupler	Narda	4222-16	2022/12/05	2023/12/05

Radiated spurious emissions				
Description	Manufacturer	Model	Cal. Date	Cal. Due
Analyzer	Agilent	E4440A	2023/05/13	2024/05/13
Analyzer	Agilent	E4443A	2023/01/30	2026/01/30
Antenna	Com-Power	AC-220	2021/08/30	2024/02/30
Antenna	Com-Power	AHA-118	2021/08/24	2024/02/24
Antenna	Com-Power	AH-1840	2022/11/11	2027/11/11
Pre-Amp	Amplifier Research	LN1000	2023/02/18	2024/02/18

AC powerline conducted emissions				
Description	Manufacturer	Model	Cal. Date	Cal. Due
Analyzer	Agilent	E4443A	2023/01/30	2026/01/30
LISN	Fischer Custom Communications	FCC-50-50-04-02	2020/12/08	2025/12/08

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBµV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric field strength to voltage that can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

Reading on analyzer (dBµV) + A.F. (dB) = Net field strength (dBµV/m)

Measurement Uncertainty:

Test Measurement uncertainties (k=2.05):
Radiated Field strength at 3m measured with:
Bilog Antenna (30 MHz – 1 GHz)…… ±5.6 dB
Horn Antenna (1-18 GHz) …… ±4.0 dB

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

Limit (dBµV/m) = 20*log(µV/m)

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A positive margin indicates the emission was below the limit. A negative margin indicates that the emission exceeds the emission was below the limit.

Example only:

Reading + A.F. =	Net Reading	:	FCC limit – Net reading =	Margin
21.5 dBµV + 26 db =	47.5 dBµV/m	:	57.0 dBµV/m – 47.5 dBµV/m =	9.5 dB

2 Result summary

FCC 47 CFR Part 15D, 15C, IC RSS-213. IC RSS-Gen					
Section	Requirement - Test	FCC	IC	ANSI	Result
3.1	Channel Frequencies	15.303	RSS-213 5.1	---	PASS
3.2	AC power line conducted emissions	15.107(a) 15.207(a)	RSS-213 5.4 RSS-Gen 7.2 / 8.8	C63.4 7	PASS
3.3	Antenna Requirement	15.317, 15.203	RSS-GEN 6.8	---	PASS
3.4	Digital modulation	15.319(b)	RSS -213 5.1	6.1.4	PASS
3.5	Occupied Bandwidth	N/A	RSS-GEN 6.7	6.1.3	PASS
3.6	Emission Bandwidth	15.323(a)	RSS-213 5.5	6.1.3	PASS
3.7	Peak Transmit Power and Antenna Gain	15.319(c)(e) 15.31(e)	RSS-213 5.6 RSS-GEN 8.3	6.1.2	PASS
3.8	Power Spectral Density	15.319(d)	RSS-213 5.7	6.1.5	PASS
3.9	Frequency stability	15.323(f)	RSS-213 5.3	6.2.2	PASS
3.10	In-band unwanted emissions	15.323(d)	RSS-213 5.8.2	6.1.6.1	PASS
3.11	Out-of-band-emissions	15.323(d)	RSS-213 5.8.1	6.1.6.2	PASS
3.12	Spurious Emissions (Radiated)	15.319(g) 15.109(a) 15.209(a)	RSS-GEN 7.3 / 8.9	C63.4	PASS
3.13	Automatic discontinuation of transmission	15.319(f)	RSS-213 5.2	---	PASS
3.14	Radiofrequency radiation exposure	15.319(i)	RSS-102	---	N/A
3.15	Monitoring threshold	15.323(c)(2)(5)(9)	RSS-213 5.2 (2)(5)(9)	7.3.1	N/A
3.16	LIC confirmation	15.323(c)(5)	RSS-213 5.2 (5)	7.3.2	PASS
3.17	LIC selection	15.323(c)(5)	RSS-213 5.2 (5)	7.3.2	PASS
3.18	Monitoring antenna	15.323(c)(8)	RSS-213 5.2 (8)	4	PASS
3.19	Monitoring time	15.323(c)(1)	RSS-213 5.2 (1)	7.3.3	PASS
3.20	Monitoring bandwidth	15.323(c)(7)	RSS-213 5.2 (7)	7.4	PASS
3.21	Monitoring reaction time	15.323(c)(7)	RSS-213 5.2 (7)	7.5	PASS
N/A	Access criteria test interval	15.323(c)(4)(6)	RSS-213 5.2 (6)	---	PASS
3.22	Access criteria functional test	15.323(c)(4)(6)	RSS-213 5.2 (6)	8.1.2 or 8.1.3	PASS
3.23	Acknowledgments	15.323(c)(4)	RSS-213 5.2 (4)	8.1 or 8.2	PASS

3.24	Maximum transmit duration	15.323(c)(3)	RSS-213 5.2 (3)	8.2.2	PASS
3.25	Maximum spectrum occupancy	15.323(c)(5)	RSS-213 5.2 (5)	---	PASS
N/A	Duplex connections	15.323(c)(10)	RSS-213 5.2 (10)	8.3	N/A
N/A	Alternative monitoring interval	15.323(c)(11)	RSS-213 5.2 (11)	8.4	N/A
3.26	Fair access	FCC 15.323(c)(12)	IC RSS-213 5.2(5)	---	PASS
3.27	Frame period and jitter	15.323(e)	RSS-213 5.2 (13)	6.2.3	PASS
3.28	Frame repetition stability	15.323(e)	RSS-213 5.2 (13)	6.2.2	PASS

3 Test conditions and results

3.1 Channel Frequencies

FCC 15.303, RSS-213 Issue 3, clause 5.1:

Within 1920 – 1930 MHz band for isochronous devices.

UPCS Channel	Frequency (MHz)
Upper Band Edge	1930.000
0 (Highest)	1928.448
1	1926.720
2	1924.992
3	1923.264
4 (Lowest)	1921.536
Lower Band Edge	1920.000

3.2 Test conditions and results – AC power line conducted emissions

Conducted emissions acc. to FCC 47 CFR 15D / IC RSS-213				Verdict: PASS
EUT requirement rule parts and clause		Reference		
		FCC 15.107(a), FCC 15.207(a) RSS-213 5.4, RSS-Gen 7.2 / 8.8		
Test according referenced standards		Reference Method		
		ANSI C63.4		
Fully configured sample scanned over the following frequency range		Frequency range		
		0.15 MHz to 30 MHz		
Points of Application		Application Interface		
AC Mains		LISN		
EUT test mode		AC-Powerline		
Limits and results				
Frequency [MHz]	Quasi-Peak [dBµV]	Result	Average [dBµV]	Result
0.15 to 0.5	66 to 56*	PASS	56 to 46*	PASS
0.5 to 5	56	PASS	46	PASS
5 to 30	60	PASS	50	PASS
Comments: *Limit decreases linearly with the logarithm of the frequency.				

Conducted Emissions Measurement System uncertainty (k=2.05)…… ±3.7 dB
Sample conducted emissions measurement:
RF Reading from Spectrum Analyzer (dBuV) + Cable Loss Factor (dB) + LISN Factor (dB) = Final Conducted Emission Level (dBuV).

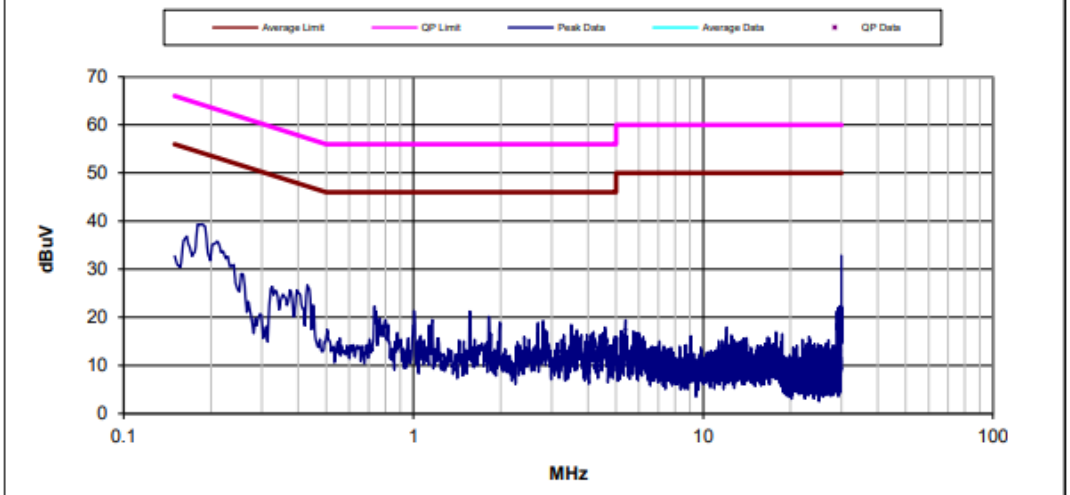
Line

CONDUCTED EMISSIONS DATA SHEET

Revision 11
6/30/2021

Customer:	Lightspeed Technologies	Job Reference#:	LIG20230928
Contact:	Rob D'Angelo	Date:	12/7/2023
DUT:	Rogue Mic	Temperature (ºC):	19.8
Serial Number:	03-CMT-Z-S2340-00002	Relative Humidity (%):	42
Voltage/Freq:	120 V 50 Hz	Barometric Pressure:	30
Tested by:	Ryan Benitez	Location:	Hillsboro
Product Standards:	EN55011:2016+A2:2021 Class A/CISPR 11Ed6.2B:2019 Class A		
	N/A		
Test Standard:	FCC Part 15 Class B		

TEST RESULTS	TEST TYPE	LINE	RUN #
Pass	Compliance	Line	1



COMMENTS	SIGNATURE
120 V 60 Hz;	Ryan Benitez

Peak Data			Average Data			QP Data		
Freq (MHz)	Amplitude (dBµV)	Margin (dB)	Amplitude (dBµV)	Limit (dBmV)	Margin (dB)	Amplitude (dBµV)	Limit (dBmV)	Margin (dB)
0.19	40.15	23.98	21.34	54.12	32.78	35.55	64.12	28.58
0.32	30.96	28.67	11.50	49.63	38.13	22.75	59.63	36.88
0.43	29.08	28.14	12.33	47.21	34.88	22.85	57.21	34.37
0.73	22.92	33.08	7.34	46.00	38.66	15.86	56.00	40.14
1.00	23.55	32.45	5.71	46.00	40.29	14.27	56.00	41.74
30.00	33.56	22.44	4.41	46.00	41.59	32.32	56.00	23.68

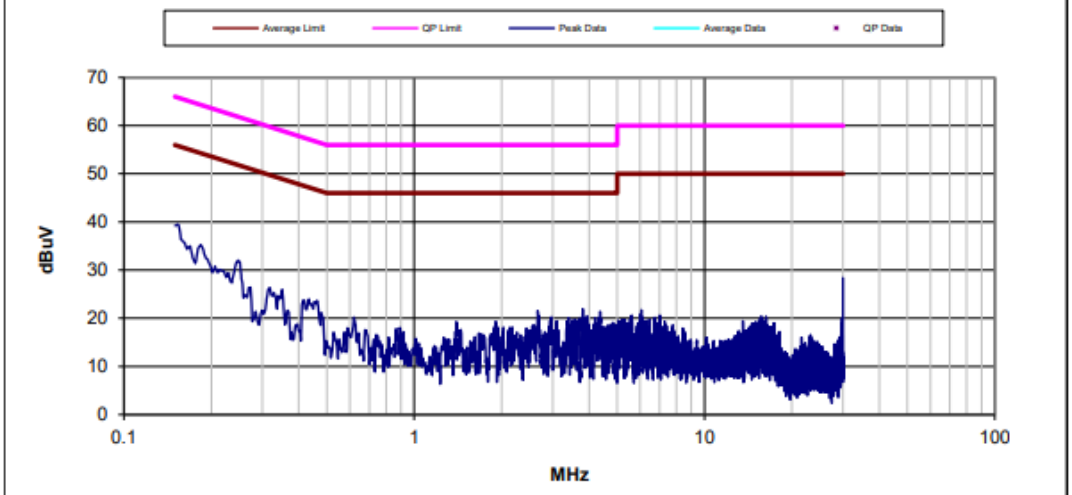
Neutral

CONDUCTED EMISSIONS DATA SHEET

Revision 11
6/30/2021

Customer:	Lightspeed Technologies	Job Reference#:	LIG20230928
Contact:	Rob D'Angelo	Date:	12/7/2023
DUT:	Rogue Mic	Temperature (ºC):	19.8
Serial Number:	03-CMT-Z-S2340-00002	Relative Humidity (%):	42
Voltage/Freq:	120 V 50 Hz	Barometric Pressure:	30
Tested by:	Ryan Benitez	Location:	Hillsboro
Product Standards:	EN55011:2016+A2:2021 Class A/CISPR 11Ed6.2B:2019 Class A		
	N/A		
Test Standard:	FCC Part 15 Class B		

TEST RESULTS	TEST TYPE	LINE	RUN #
Pass	Compliance	Neutral	1



COMMENTS	SIGNATURE
120 V 60 Hz;	Ryan Benitez

Peak Data			Average Data			QP Data		
Freq (MHz)	Amplitude (dBµV)	Margin (dB)	Amplitude (dBµV)	Limit (dBmV)	Margin (dB)	Amplitude (dBµV)	Limit (dBmV)	Margin (dB)
0.15	41.84	23.94	0.30	55.78	55.48	36.94	65.78	28.84
0.44	29.17	27.99	-8.99	47.16	56.15	24.99	57.16	32.16
2.66	22.89	33.11	-19.11	46.00	65.11	16.55	56.00	39.46
3.82	22.18	33.82	-18.31	46.00	64.31	16.45	56.00	39.55
4.40	23.05	32.95	-18.20	46.00	64.20	17.25	56.00	38.75
30.00	31.76	28.24	-19.82	50.00	69.82	28.83	60.00	31.17

3.3 Test conditions and results – Antenna requirement

Antenna requirement acc. to FCC 47 CFR 15D / IC RSS-GEN	Verdict: PASS
EUT requirement rule parts and clause	Reference
	FCC 15.317, FCC 15.203, RSS-GEN 6.8
Test according to measurement reference	Reference
	Visual inspection & declaration

Requirements

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.

When an antenna conducted measurement is used to determine the RF output power of the device, the effective gain of the antenna intended for the device must be stated based on measurement or on data from the measured RF output power before using the power limits.

Results

Antenna No.	Type	Antenna gain [dBi]	Antenna gain in excess of 3 dBi
0	internal	-4.31	0

Comment:

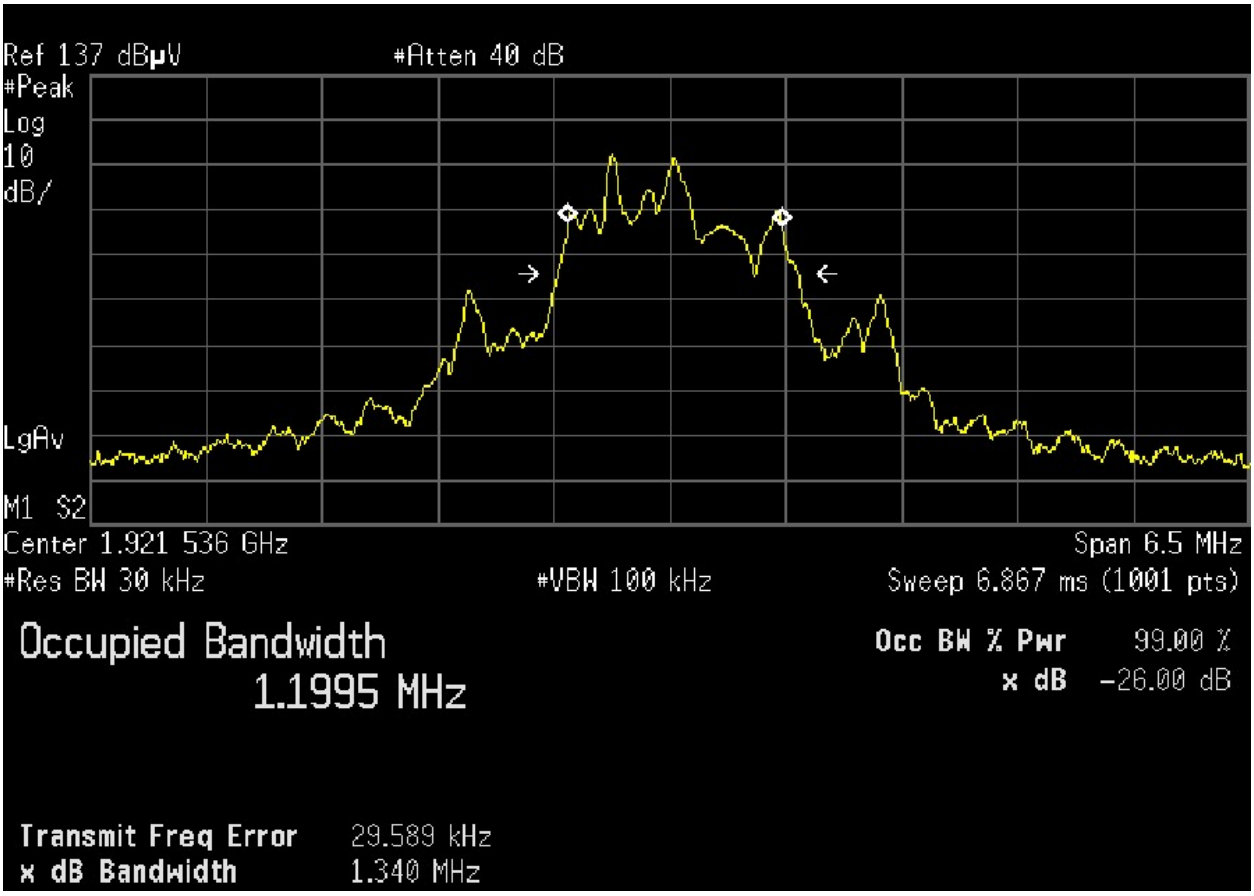
3.4 Test conditions and results – Digital modulation

Antenna requirement acc. to FCC 47 CFR 15D / IC RSS-213	Verdict: Pass
EUT requirement rule parts and clause	Reference
	FCC 15.319(b), IC RCC-213 5.1
Test according to measurement reference	Reference Method
	Declaration
Requirements	
All transmission must use only digital modulation techniques.	
Results	
The test sample is an isochronous digital modulated device that operates in 1920-1930 MHz band. This device is based on DECT technology described in European Standards EN 300 175-2 and EN 300 175-3, now operating in frequency channels mentioned above. The operating modes are MC/TDMA/TDD (Multi carrier / Time Division Multiple Access / Time Division Duplex) using Digital GFSK modulation. For further details see operational description provided by manufacturer.	

3.5 Test conditions and results – Occupied bandwidth

Occupied Bandwidth acc. to IC RSS-GEN		Verdict: PASS
Test according to measurement reference	Reference Method	
	IC RSS-GEN 6.7	
Tested frequencies	F_{mid}	
EUT test mode	TDMA	
Limits		
0.05 MHz <= Occupied Bandwidth < 2.5 MHz		
Test results		
Channel	Center frequency [MHz]	Occupied Bandwidth [MHz]
F_{LOW}	1921.536	1.1995
F_{MID}	1924.992	1.1983
F_{HIGH}	1928.448	1.2022
Comments:		

F_{LOW}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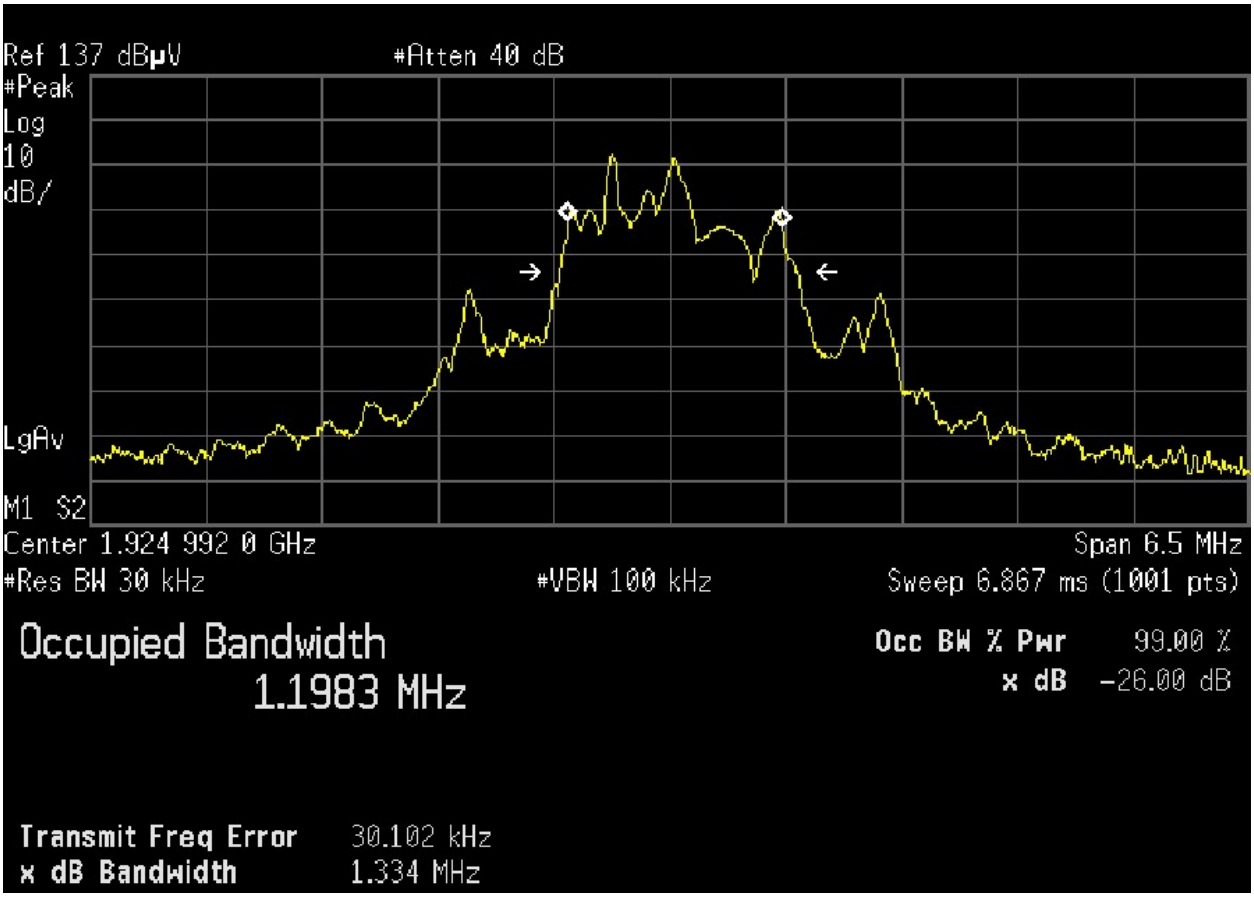
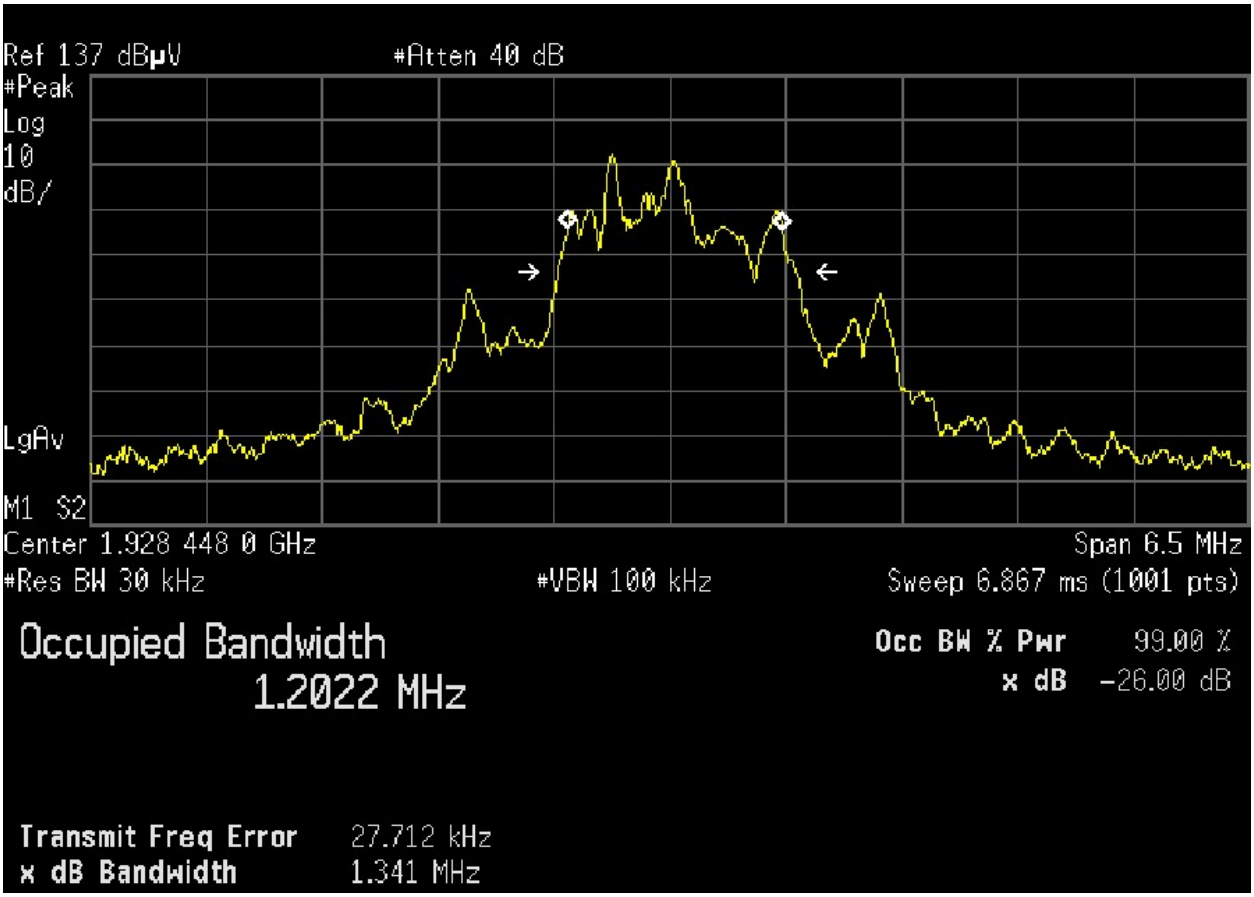
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
Center 1.921 536 GHz
Span 6.5 MHz
#Res BW 30 kHz
#VBW 100 kHz
Sweep 6.867 ms (1001 pts)
Occupied Bandwidth
1.1995 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 29.589 kHz
x dB Bandwidth 1.340 MHz

F_{MID}


Ref 137 dBµV
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
Center 1.924 992 0 GHz
Span 6.5 MHz
#Res BW 30 kHz
#VBW 100 kHz
Sweep 6.867 ms (1001 pts)
Occupied Bandwidth
1.1983 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 30.102 kHz
x dB Bandwidth 1.334 MHz

F_{HIGH}

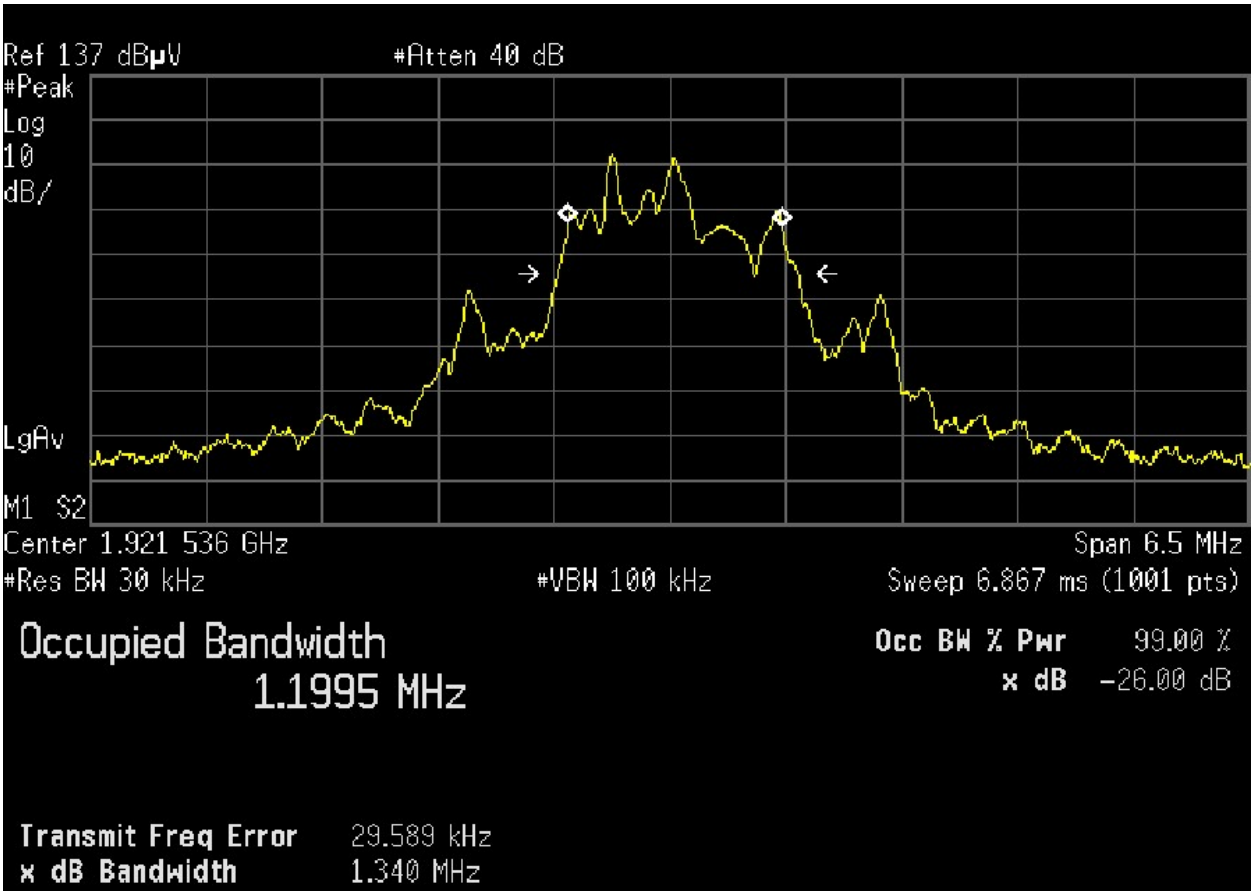

Ref 137 dBµV
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
Center 1.928 448 0 GHz
Span 6.5 MHz
#Res BW 30 kHz
#VBW 100 kHz
Sweep 6.867 ms (1001 pts)
Occupied Bandwidth
1.2022 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 27.712 kHz
x dB Bandwidth 1.341 MHz

3.6 Test conditions and results – Emission Bandwidth

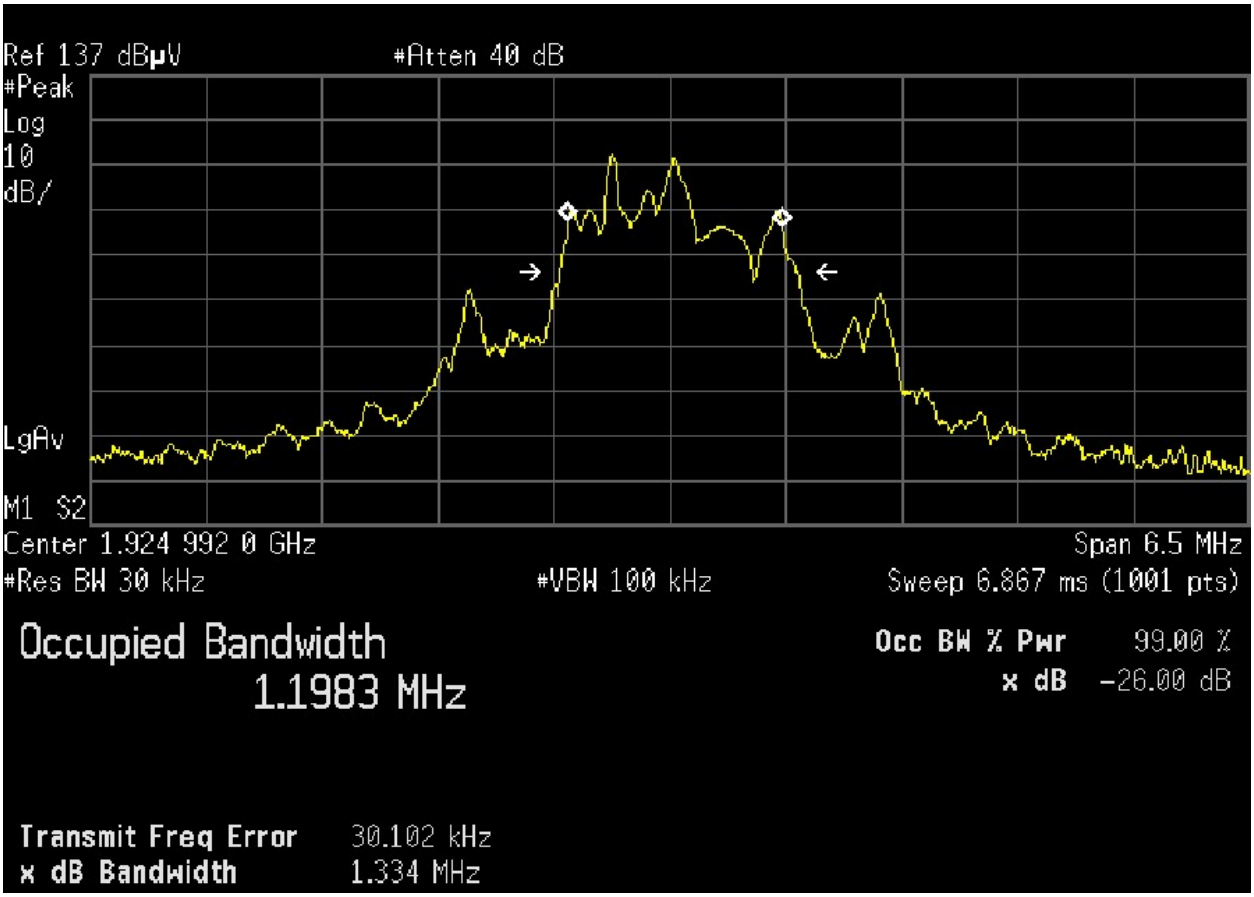
Emission Bandwidth acc. to FCC 47 CFR 15D and RSS-213	Verdict: PASS
Test according to measurement reference	Reference
	FCC 15.323(a), IC RSS-213 5.5
Test according to measurement reference	Reference Method
	ANSI C63.17 6.1.3
Tested frequencies	F_{low} / F_{high}
EUT test mode	TDMA
Limits	
0.05 MHz ≤ Emission Bandwidth < 2.5 MHz	

Test results			
Channel	Center frequency [MHz]	Mode	Emission Bandwidth [MHz]
F_{low}	1921.536	-26 dB	1.340
F_{MID}	1924.992	-26 dB	1.334
F_{HIGH}	1928.448	-26 dB	1.341
Comments:			

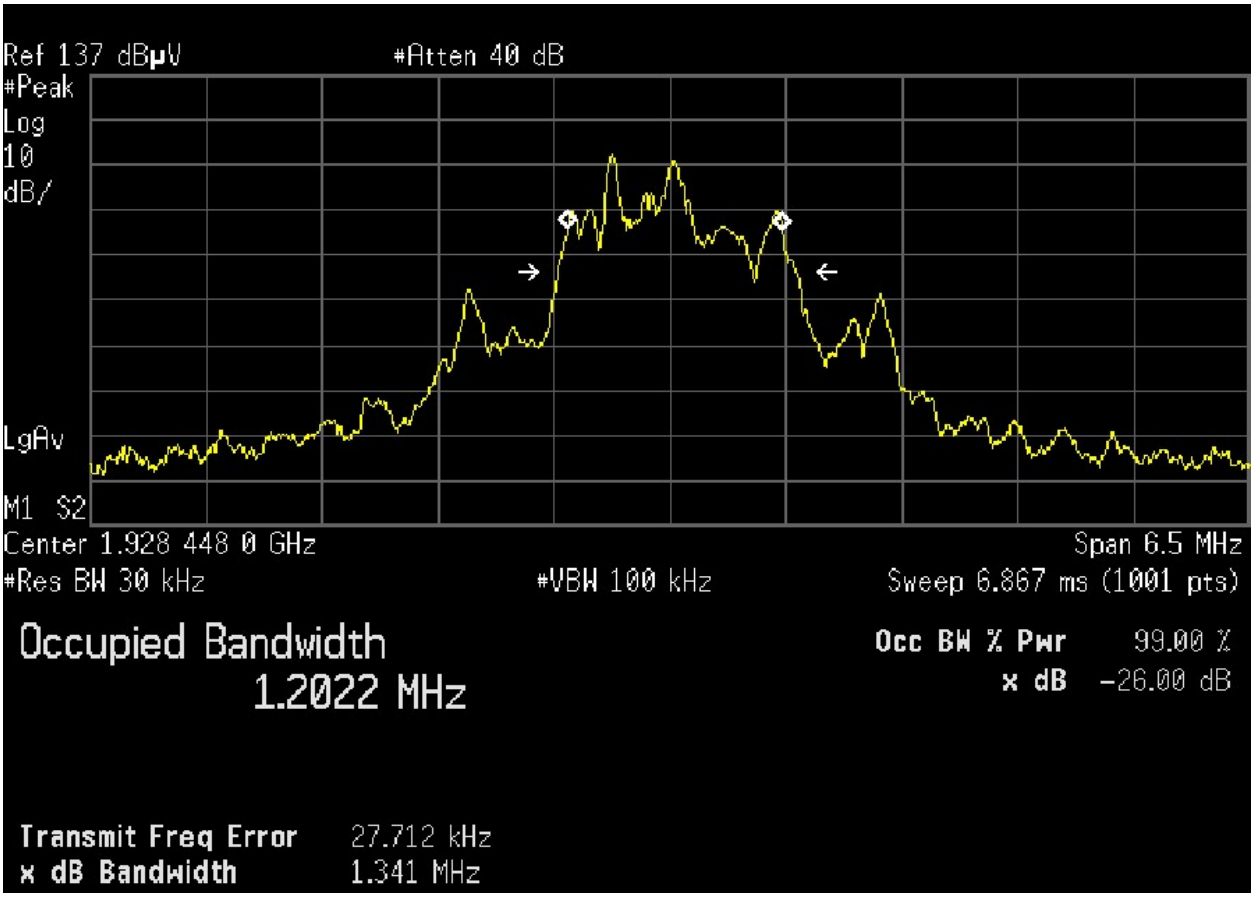
F_{LOW}


Ref 137 dBµV
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
Center 1.921 536 GHz
Span 6.5 MHz
#Res BW 30 kHz
#VBW 100 kHz
Sweep 6.867 ms (1001 pts)
Occupied Bandwidth
1.1995 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 29.589 kHz
x dB Bandwidth 1.340 MHz

F_{MID}


Ref 137 dBµV
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
Center 1.924 992 0 GHz
Span 6.5 MHz
#Res BW 30 kHz
#VBW 100 kHz
Sweep 6.867 ms (1001 pts)
Occupied Bandwidth
1.1983 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 30.102 kHz
x dB Bandwidth 1.334 MHz

F_{HIGH}

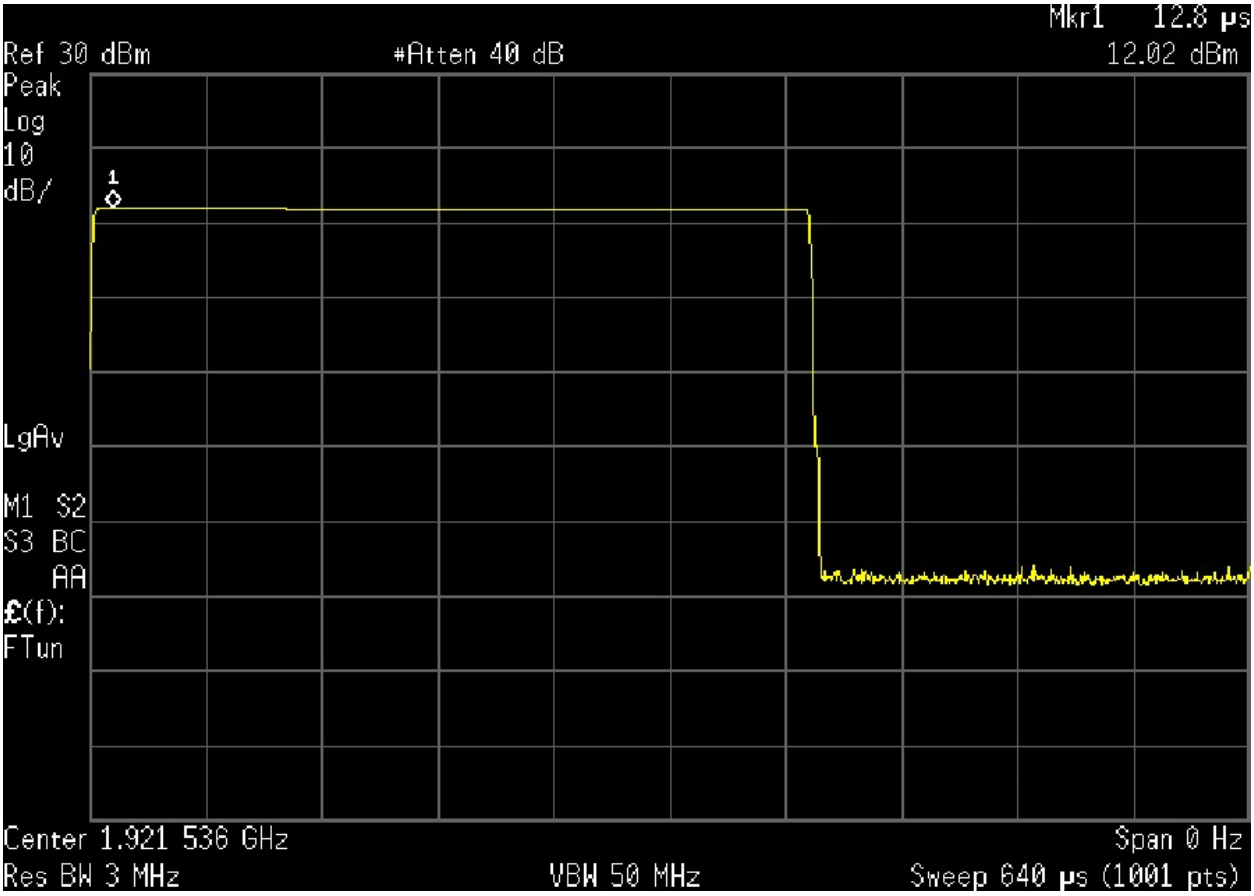

Ref 137 dBµV
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
Center 1.928 448 0 GHz
Span 6.5 MHz
#Res BW 30 kHz
#VBW 100 kHz
Sweep 6.867 ms (1001 pts)
Occupied Bandwidth
1.2022 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 27.712 kHz
x dB Bandwidth 1.341 MHz

3.7 Test conditions and results – Peak transmit power

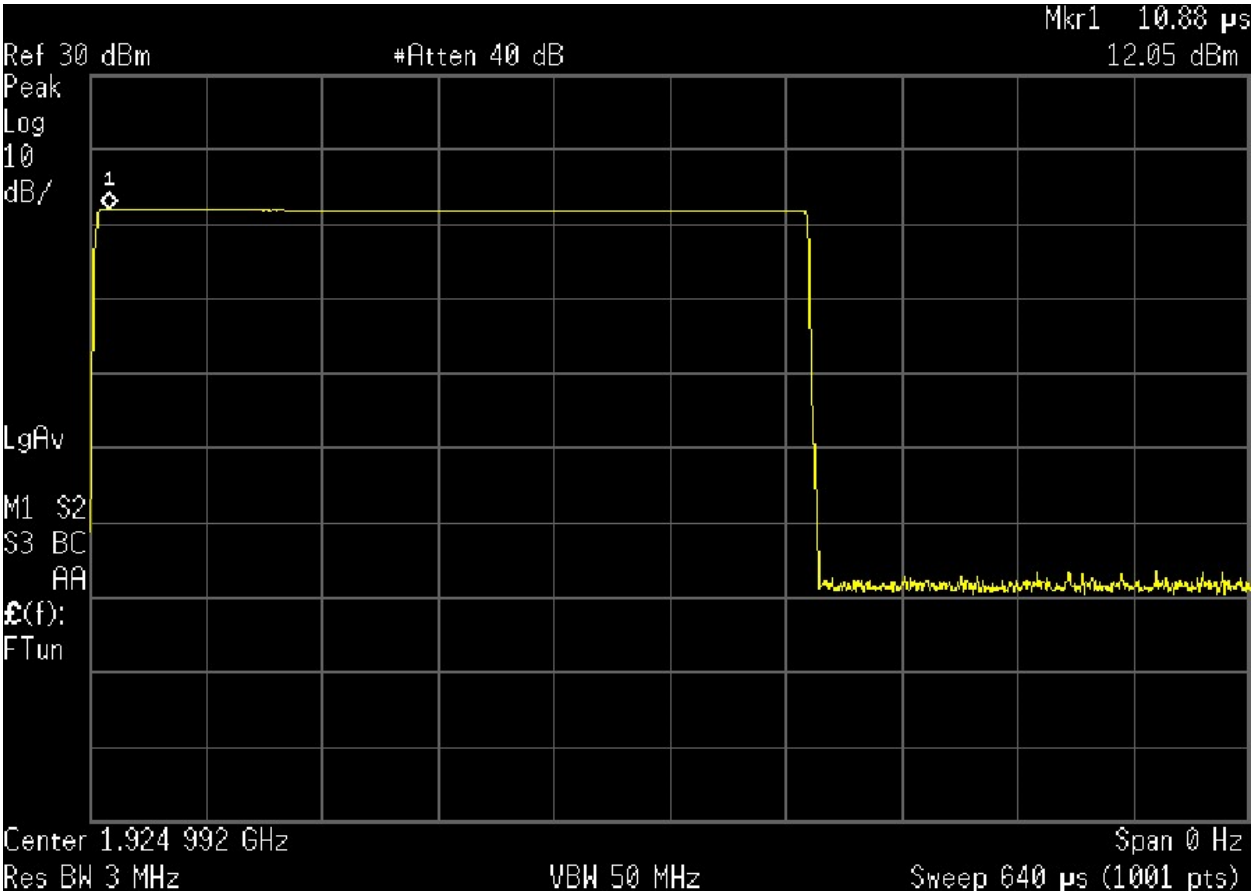
Peak transmit power acc. to FCC 47 CFR 15D / ICC RSS-213	Verdict: PASS
EUT requirement rule parts and clause	Reference
	FCC 15.319(c),(e), IC RSS-213 5.6, IC RSS-GEN 8.3
Test according to measurement reference	Reference Method
	ANSI C63.17 6.1.2
Tested frequencies	F_{LOW} / F_{MID} / F_{HIGH}
EUT test mode	TDMA
Antenna excess gain	0 dB
Limits	
Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in hertz. The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.	

Test results – FCC					
Channel	Frequency [MHz]	Peak Power [dBm]	Excess gain [dB]	Limit [dBm]	Margin [dB]
F_{LOW}	1921.536	12.02	0	20.63	8.61
F_{MID}	1924.992	12.05	0	20.62	8.57
F_{HIGH}	1928.448	12.07	0	20.63	8.56
Test results – IC					
F_{LOW}	1921.536	12.02	0	20.39	8.37
F_{MID}	1924.992	12.05	0	20.39	8.34
F_{HIGH}	1928.448	12.07	0	20.39	8.32
Comments:					

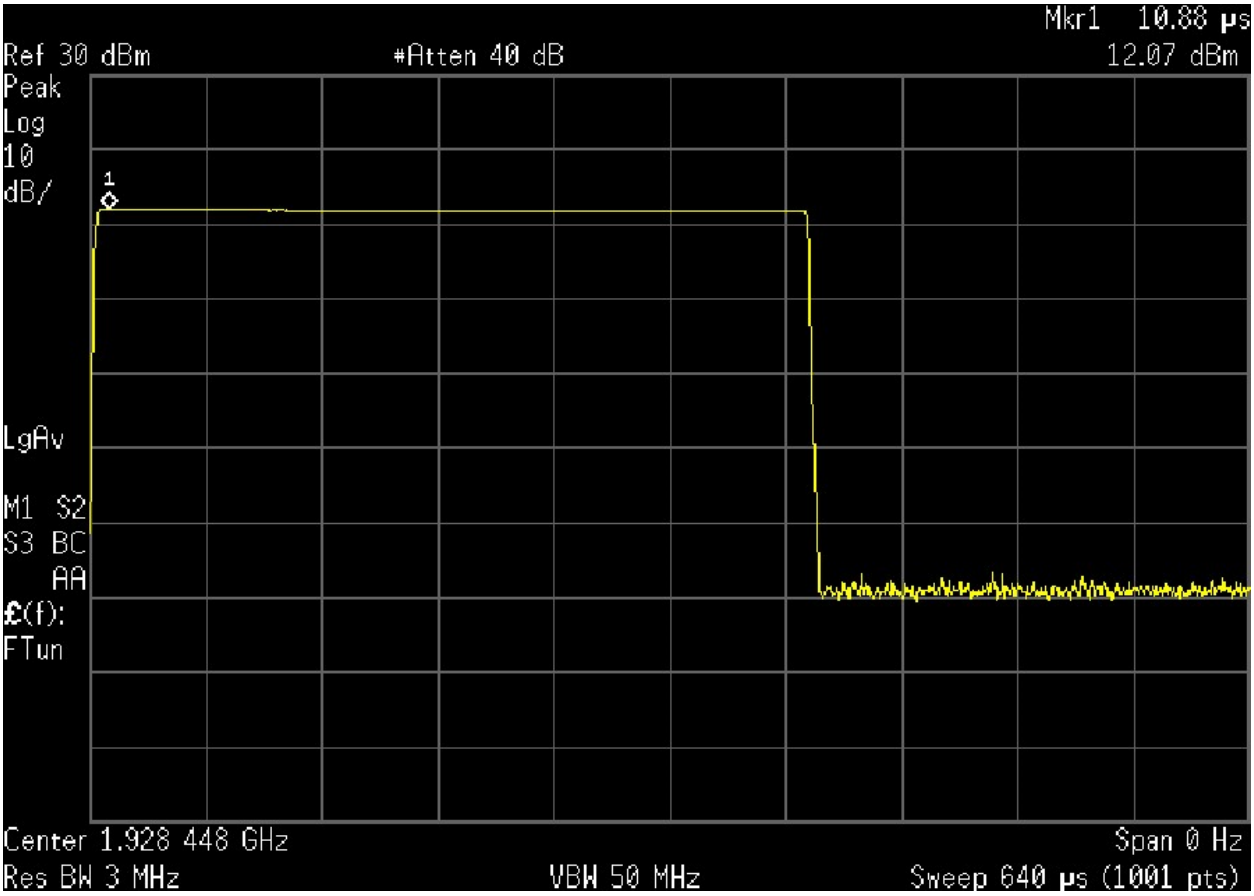
F_{LOW}


Mkr1 12.8 µs
Ref 30 dBm
#Atten 40 dB
12.02 dBm
Peak
Log
10
dB/
1
LgAv
M1 S2
S3 BC
AA
£(f):
FTun
Center 1.921 536 GHz
Span 0 Hz
Res BW 3 MHz
VBW 50 MHz
Sweep 640 µs (1001 pts)

F_{MID}


Mkr1 10.88 µs
Ref 30 dBm
#Atten 40 dB
12.05 dBm
Peak
Log
10
dB/
1
LgAv
M1 S2
S3 BC
AA
£(f):
FTun
Center 1.924 992 GHz
Span 0 Hz
Res BW 3 MHz
VBW 50 MHz
Sweep 640 µs (1001 pts)

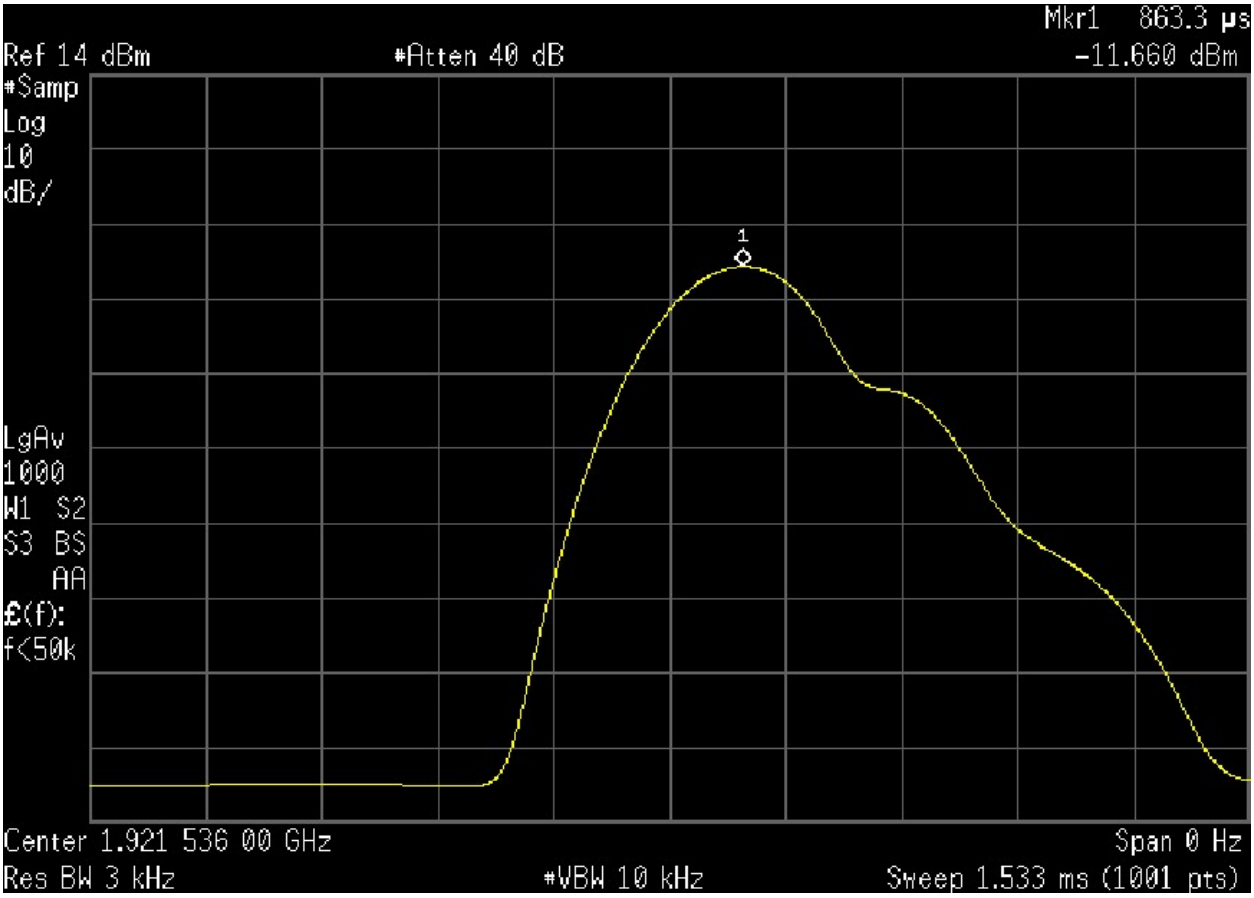
F_{HIGH}


Mkr1 10.88 µs
Ref 30 dBm
#Atten 40 dB
12.07 dBm
Peak
Log
10
dB/
1
LgAv
M1 S2
S3 BC
AA
£(f):
FTun
Center 1.928 448 GHz
Span 0 Hz
Res BW 3 MHz
VBW 50 MHz
Sweep 640 µs (1001 pts)

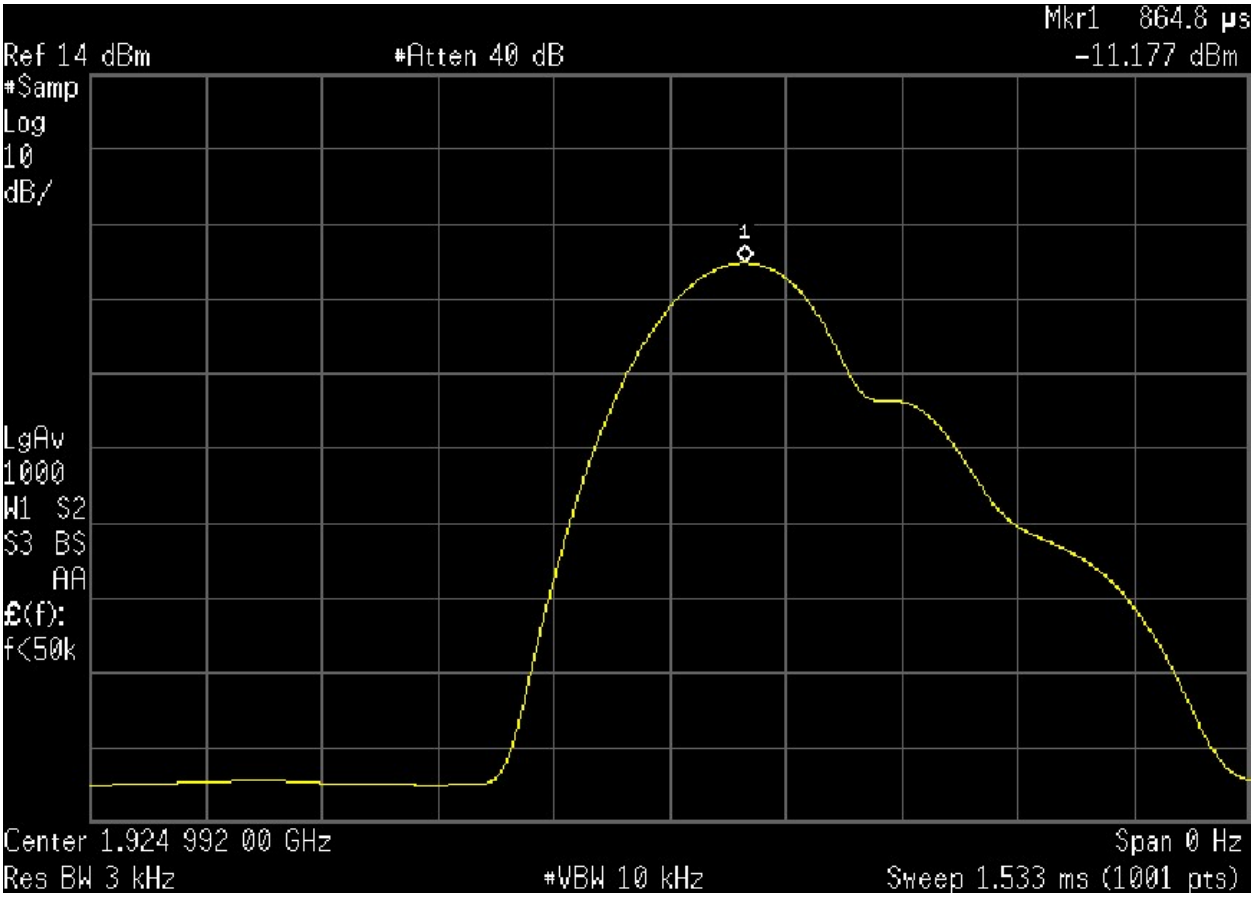
3.8 Test conditions and results – Power spectral density

Power spectral density acc. to FCC 47 CFR 15D / IC RSS-213				Verdict: PASS
EUT requirement rule parts and clause	Reference			
	FCC 15.319(d) / IC RSS-213 5.7			
Test according to measurement reference	Reference Method			
	ANSI C63.17 6.1.5			
Tested frequencies	F_{low} / F_{high}			
EUT test mode	TDMA			
Limits				
≤ mW (4.77 dBm) / 3 kHz				
Test results				
Channel	Frequency [MHz]	Peak Density [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
F_{LOW}	1921.536	-11.660	4.77	16.430
F_{MID}	1924.992	-11.177	4.77	15.947
F_{HIGH}	1928.448	-11.152	4.77	15.922
Comments:				

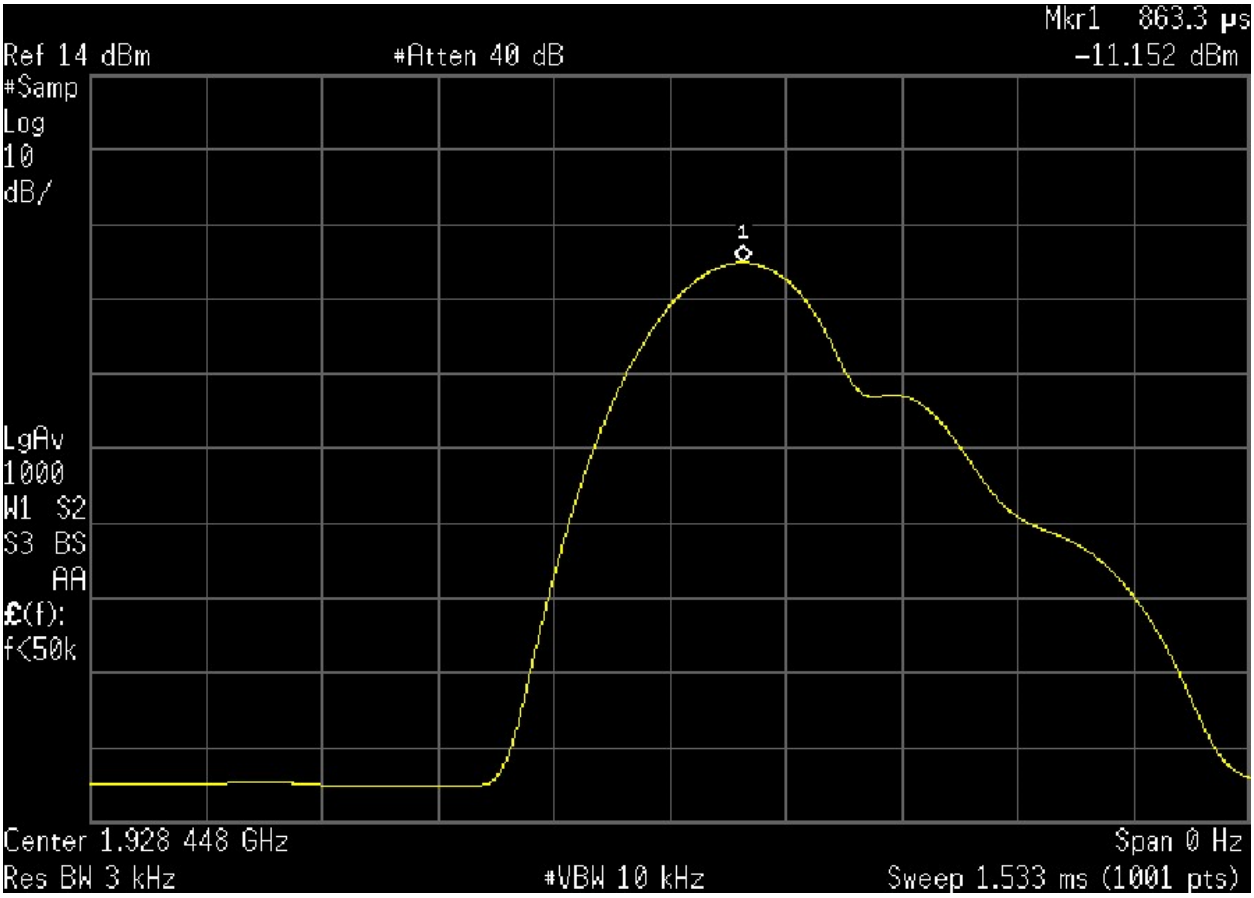
F_{LOW}


Mkr1 863.3 µs
Ref 14 dBm
#Atten 40 dB
-11.660 dBm
#Samp
Log
10
dB/
1
LgAv
1000
W1 S2
S3 BS
AA
£(f):
f<50k
Center 1.921 536 00 GHz
Span 0 Hz
Res BW 3 kHz
#VBW 10 kHz
Sweep 1.533 ms (1001 pts)

F_{MID}


Mkr1 864.8 µs
Ref 14 dBm
#Atten 40 dB
-11.177 dBm
#Samp
Log
10
dB/
1
LgAv
1000
W1 S2
S3 BS
AA
£(f):
f<50k
Center 1.924 992 00 GHz
Span 0 Hz
Res BW 3 kHz
#VBW 10 kHz
Sweep 1.533 ms (1001 pts)

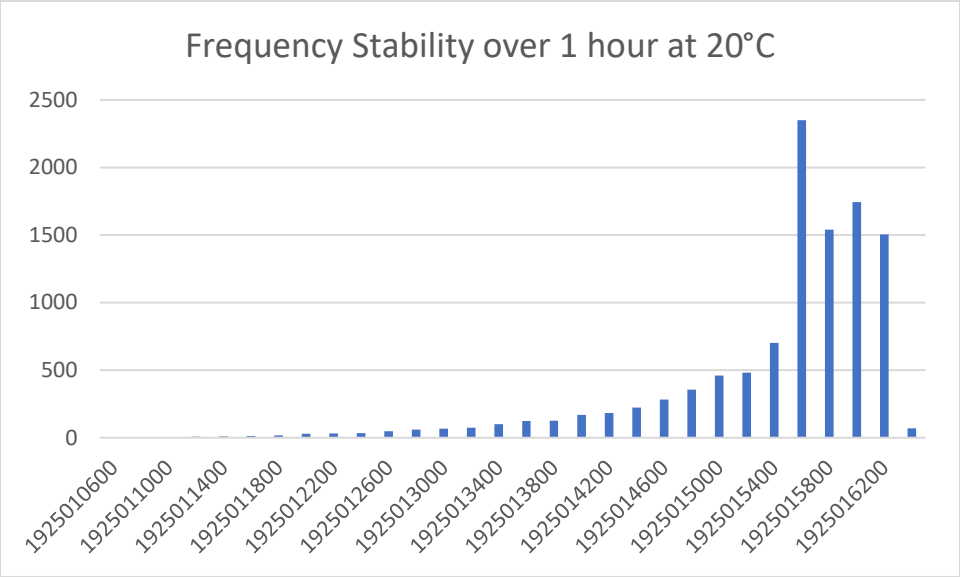
F_{HIGH}


Mkr1 863.3 µs
Ref 14 dBm
#Atten 40 dB
-11.152 dBm
#Samp
Log
10
dB/
1
LgAv
1000
W1 S2
S3 BS
AA
£(f):
f<50k
Center 1.928 448 GHz
Span 0 Hz
Res BW 3 kHz
#VBW 10 kHz
Sweep 1.533 ms (1001 pts)

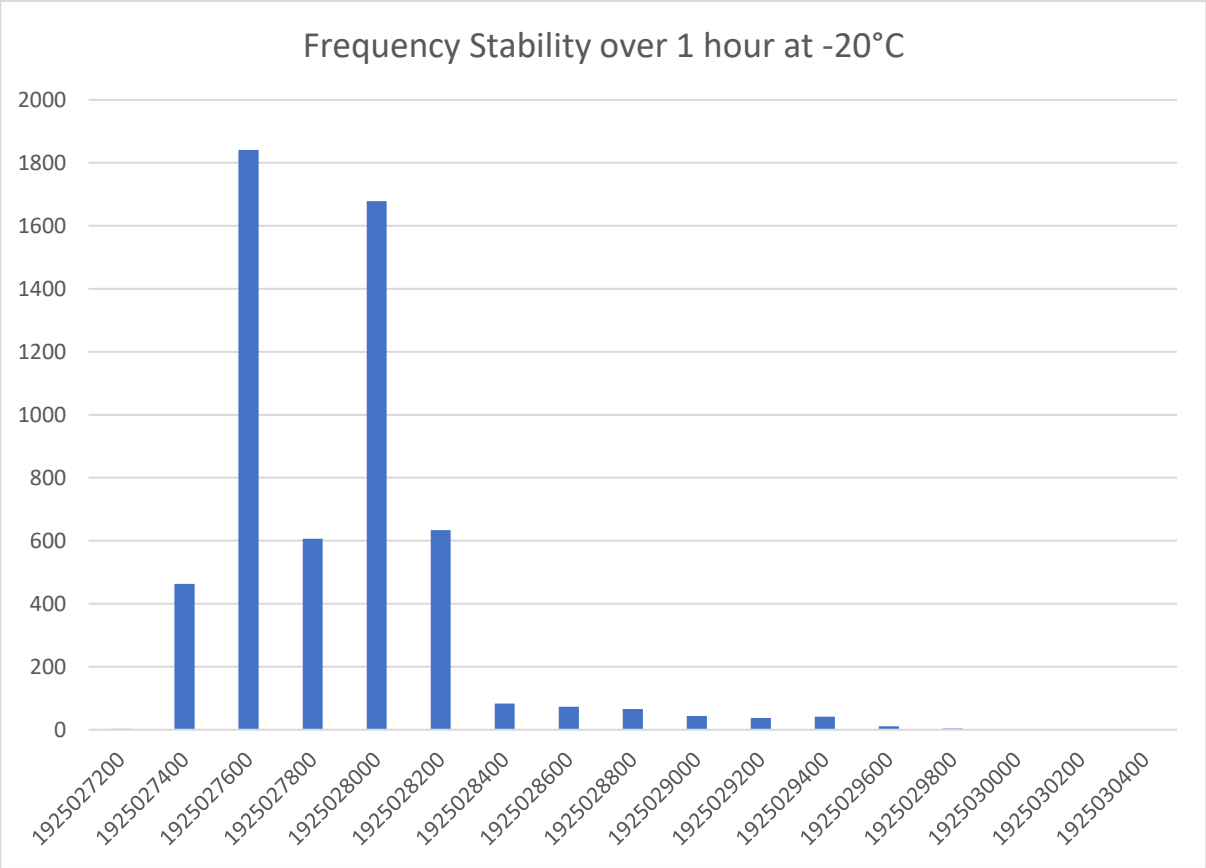
3.9 Test conditions and results – Frequency stability

Frequency stability acc. to FCC 47 CFR 15D / IC RSS-213				Verdict: PASS
EUT requirement rule parts and clause	Reference			
	FCC 15.323(f) / IC RSS213 5.3			
Test according to measurement reference	Reference Method			
	ANSI C63.17 6.2.1			
Tested frequencies	F_{mid}			
EUT test mode	TDMA			
Limits				
± 10 ppm / hour				
Test results				
Voltage	Temperature	Maximum Frequency deviation [ppm]	Limit [ppm]	Verdict
Nominal	+20 °C	2.597	±10	PASS
Nominal	-20 °C	1.350	±10	PASS
Nominal	+50 °C	3.324	±10	PASS
Comments:				

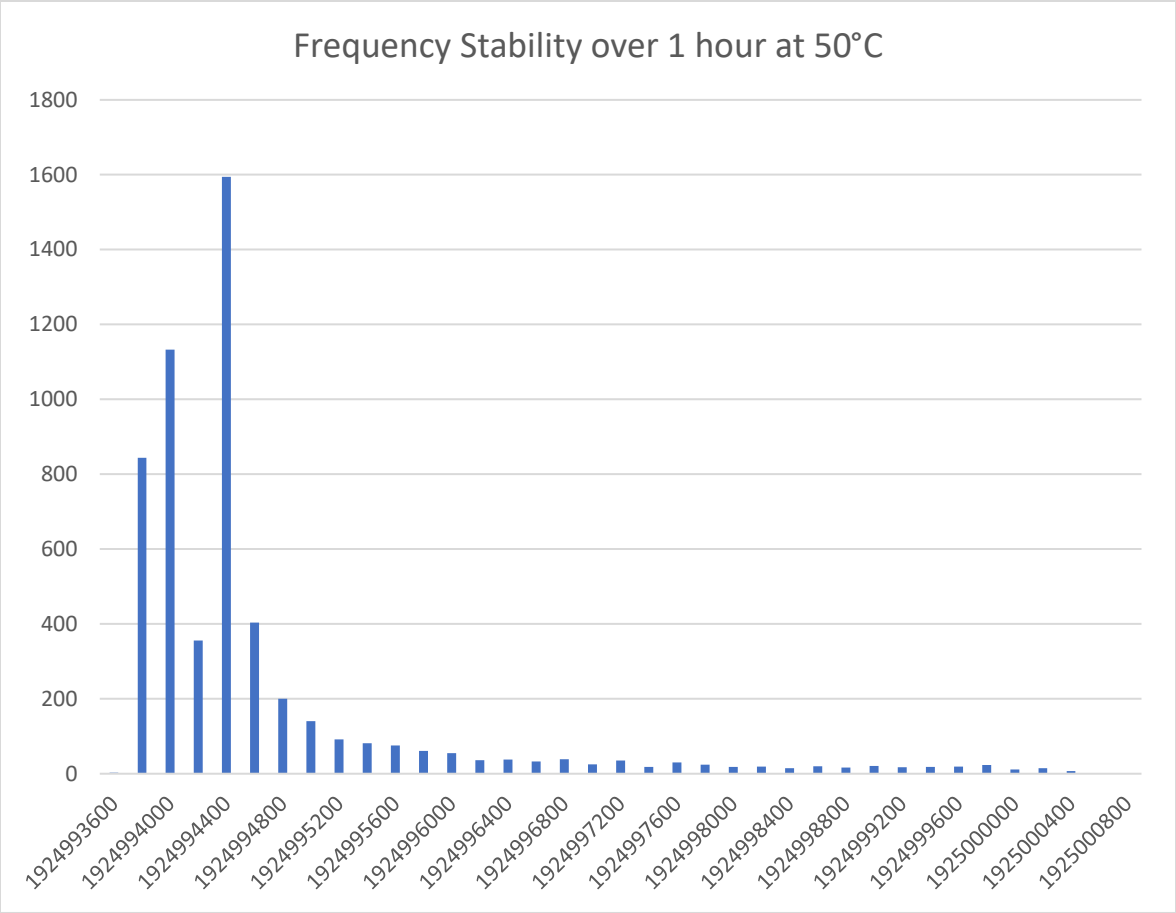
+20°C


Frequency Stability over 1 hour at 20°C
2500
2000
1500
1000
500
0
1925010600
1925011000
1925011400
1925011800
1925012200
1925012600
1925013000
1925013400
1925013800
1925014200
1925014600
1925015000
1925015400
1925015800
1925016200

-20°C


Frequency Stability over 1 hour at -20°C
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1925027200
1925027400
1925027600
1925027800
1925028000
1925028200
1925028400
1925028600
1925028800
1925029000
1925029200
1925029400
1925029600
1925029800
1925030000
1925030200
1925030400

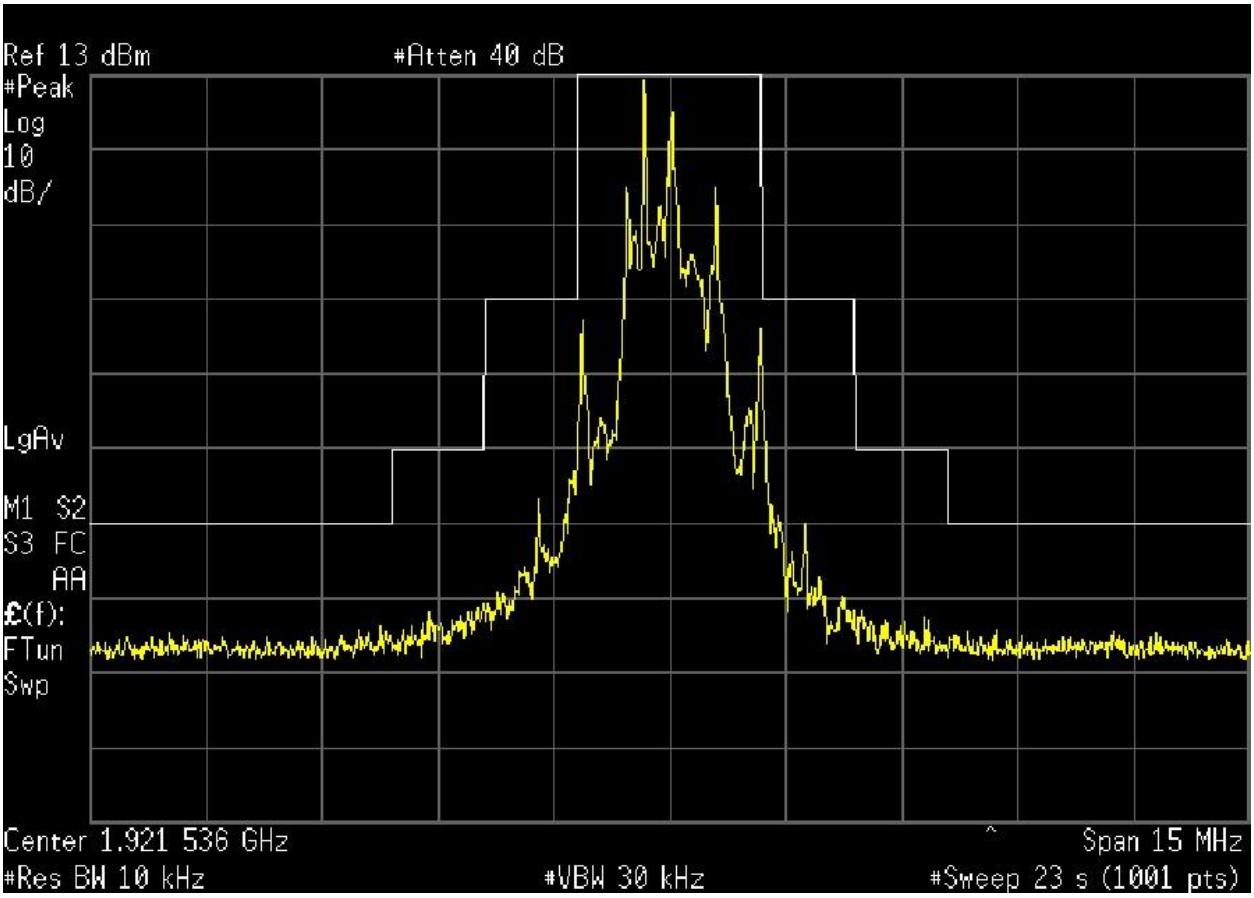
+50°C


Frequency Stability over 1 hour at 50°C
1800
1600
1400
1200
1000
800
600
400
200
0
1924993600
1924994000
1924994400
1924994800
1924995200
1924995600
1924996000
1924996400
1924996800
1924997200
1924997600
1924998000
1924998400
1924998800
1924999200
1924999600
1925000000
1925000400
1925000800

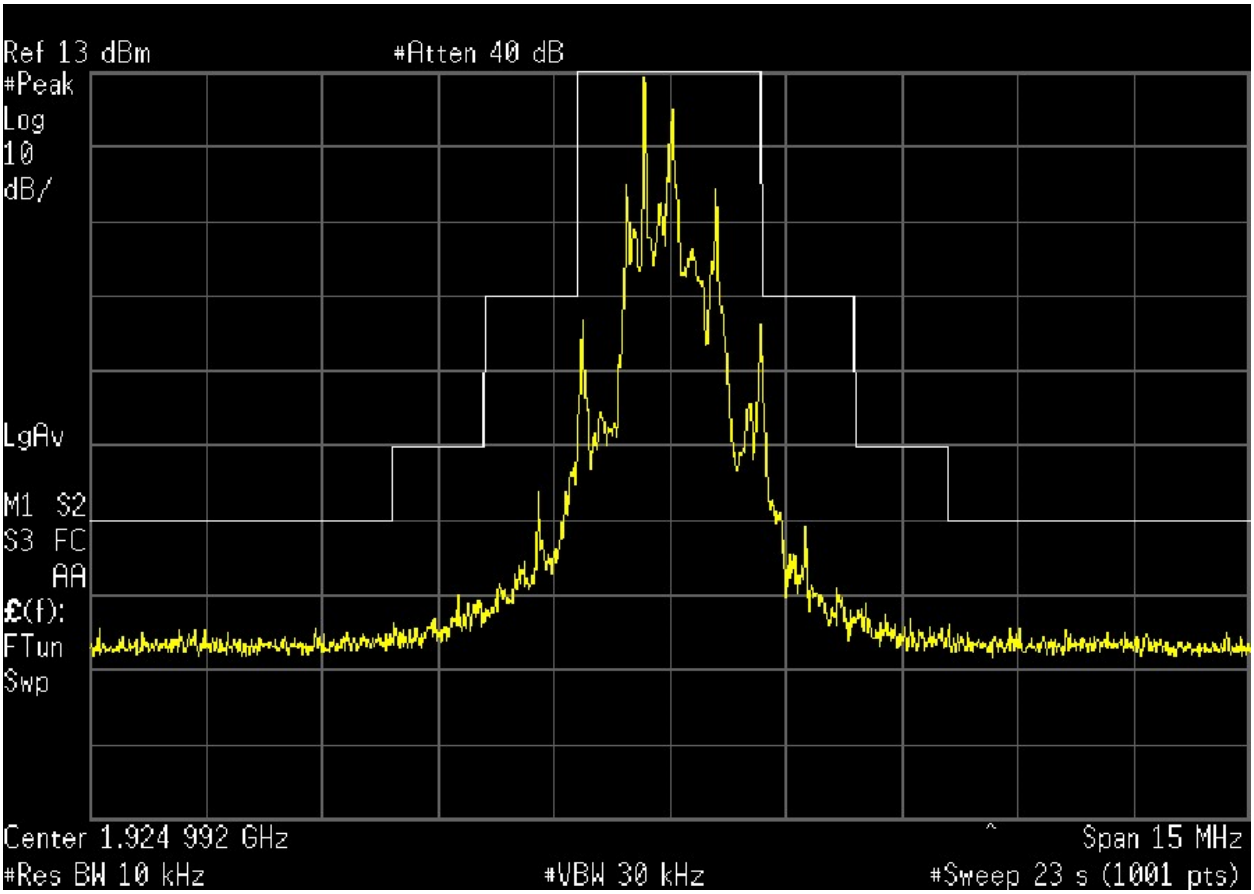
3.10 Test conditions and results – Transmitter in-band unwanted emissions

In-band unwanted emissions acc. to FCC 47 CFR 15D / IC RSS-213		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 15.323(d) / IC RSS-213 5.8.2	
Test according to measurement reference	Reference Method	
	ANSI C63.17 6.1.6.1	
Tested frequencies	F_{low} / F_{high}	
Test frequency range	1920 – 1930 MHz	
Limits		
Frequency range [MHz]	Detector	Limit [dBc]
UPCS Band Edge to (F_C – 3B)	Peak	-60
(F_C – 3B) to (F_C – 2B)	Peak	-50
(F_C – 2B) to (F_C – 1B)	Peak	-30
(F_C + 1B) to (F_C + 2B)	Peak	-30
(F_C + 2B) to (F_C + 3B)	Peak	-50
(F_C + 3B) to UPCS Band Edge	Peak	-60
B = occupied bandwidth of selected channel F_C = Center frequency of selected channel		
Test results		
Channel	Frequency [MHz]	Verdict
F_{LOW}	1921.536	Pass
F_{MID}	1924.992	Pass
F_{HIGH}	1928.448	Pass
Comments: The limit calculation was done with the Canadian limit because it is worst case		

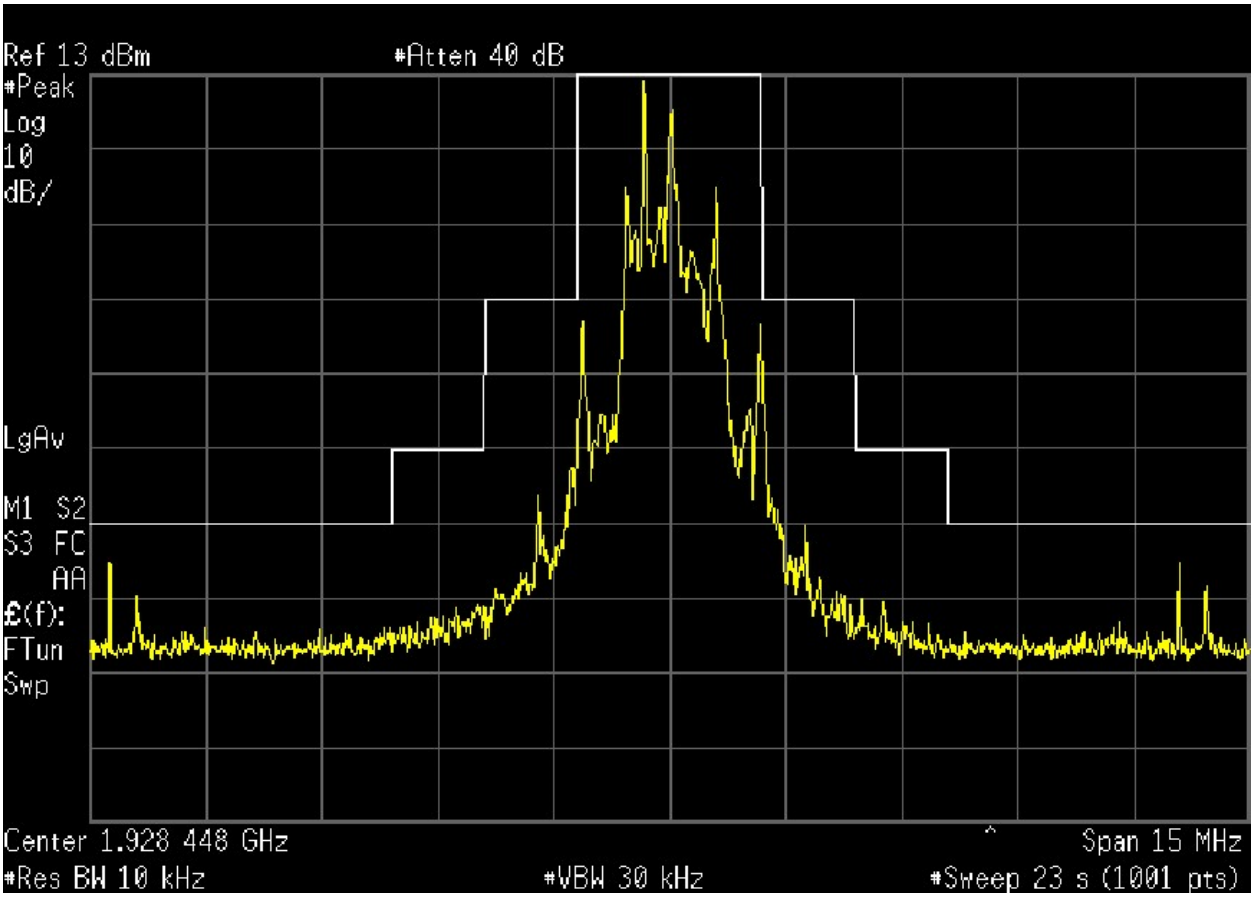
F_{LOW}


Ref 13 dBm
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 1.921 536 GHz
Span 15 MHz
#Res BW 10 kHz
#VBW 30 kHz
#Sweep 23 s (1001 pts)

F_{MID}


Ref 13 dBm
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 1.924 992 GHz
Span 15 MHz
#Res BW 10 kHz
#VBW 30 kHz
#Sweep 23 s (1001 pts)

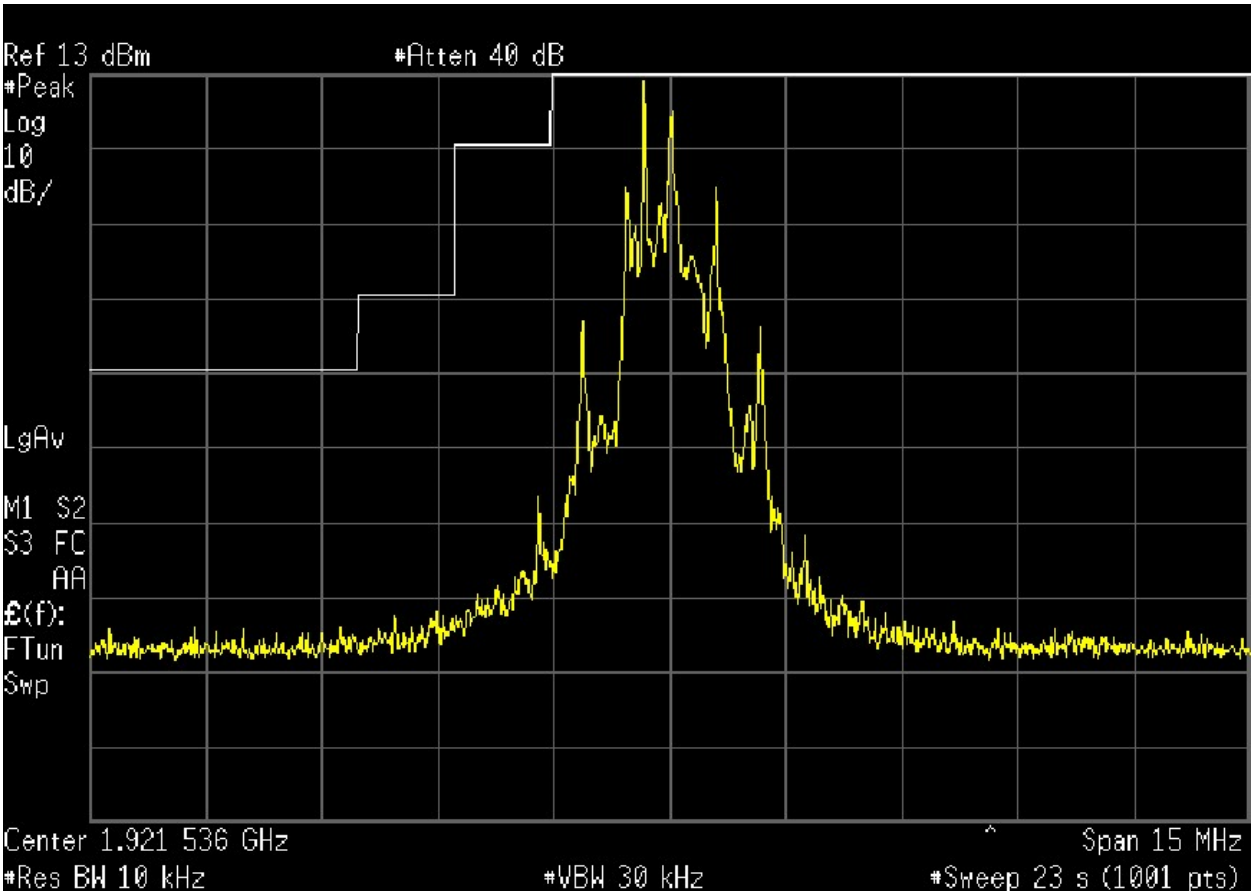
F_{HIGH}


Ref 13 dBm
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 1.928 448 GHz
Span 15 MHz
#Res BW 10 kHz
#VBW 30 kHz
#Sweep 23 s (1001 pts)

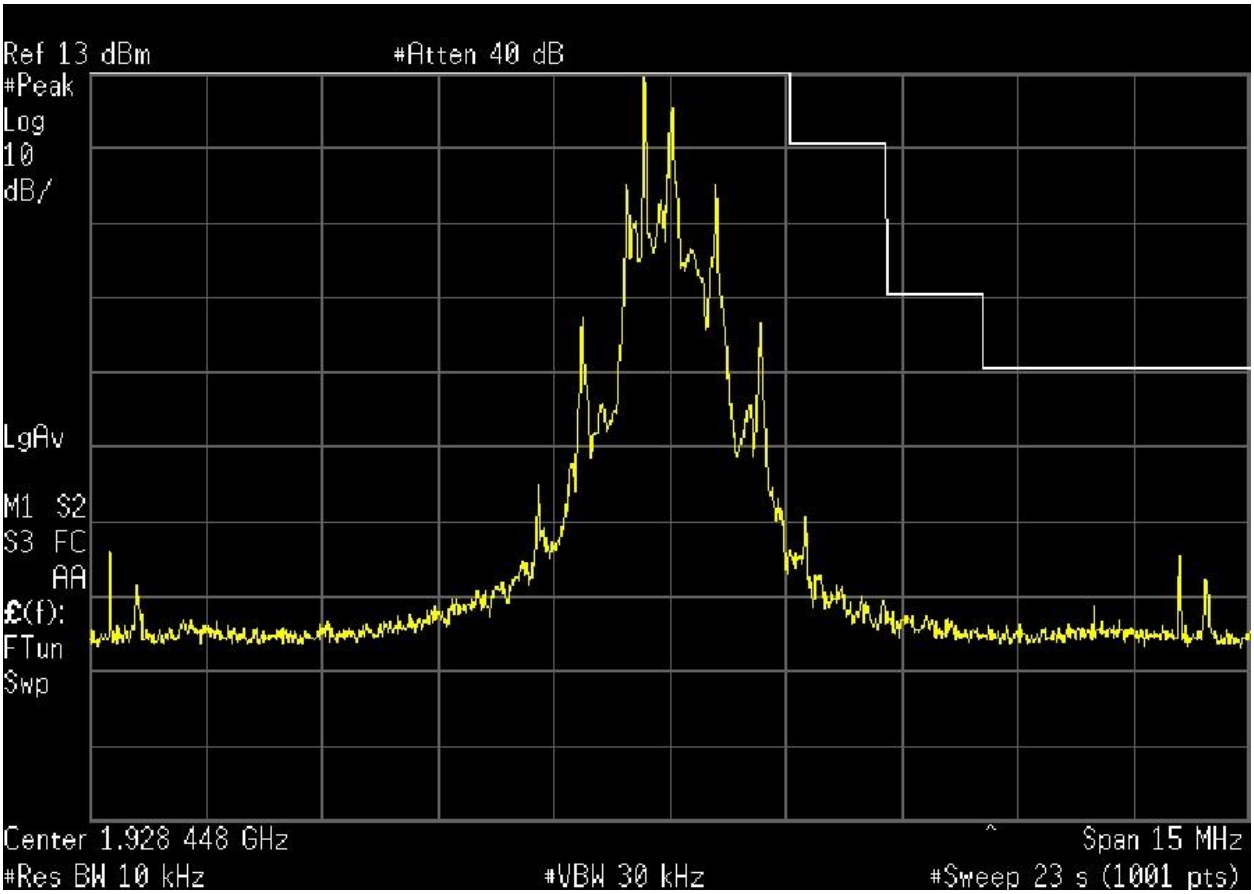
3.11 Test conditions and results – Transmitter out-of-band emissions

Out-of-band emissions acc. to FCC 47 CFR 15D / IC RSS-213			Verdict: PASS
EUT requirement rule parts and clause		Reference	
		FCC 15.323(d) / IC RSS-213 5.8.1	
Test according to measurement reference		Reference Method	
		ANSI C63.17 6.1.6	
Tested frequencies		F_{low} / F_{high}	
Test frequency range		30 MHz – 10th Harmonic	
Limits			
Frequency range [MHz]	Detector	Limit	Limit Distance [meters]
30 – 88	Quasi-Peak	100 µV/m (40 dBµV/m)	3
88 – 216	Quasi-Peak	150 µV/m (43.5 dBµV/m)	3
216 – 960	Quasi-Peak	200 µV/m (46 dBµV/m)	3
960 – 1000	Quasi-Peak	500 µV/m (54 dBµV/m)	3
1000 – 1917.5	Average	500 µV/m (54 dBµV/m)	3
Below 1917.5	Peak	-39.5 dBm *	N/A
1917.5 - 1918.75	Peak	-29.5 dBm *	N/A
1918.75 – 1920	Peak	-9.5 dBm *	N/A
1930 – 1931.25	Peak	-9.5 dBm *	N/A
1931.25 – 1932.5	Peak	-29.5 dBm *	N/A
Above 1932.5	Peak	-39.5 dBm *	N/A
1932.5 - 20000	Average	500 µV/m (54 dBµV/m)	3
Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)). When average radiated emission measurements are specified, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. *Measurement is performed with conducted measurement setup			
Comments:			

F_{LOW}


Ref 13 dBm
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 1.921 536 GHz
Span 15 MHz
#Res BW 10 kHz
#VBW 30 kHz
#Sweep 23 s (1001 pts)

F_{HIGH}


Ref 13 dBm
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 1.928 448 GHz
Span 15 MHz
#Res BW 10 kHz
#VBW 30 kHz
#Sweep 23 s (1001 pts)

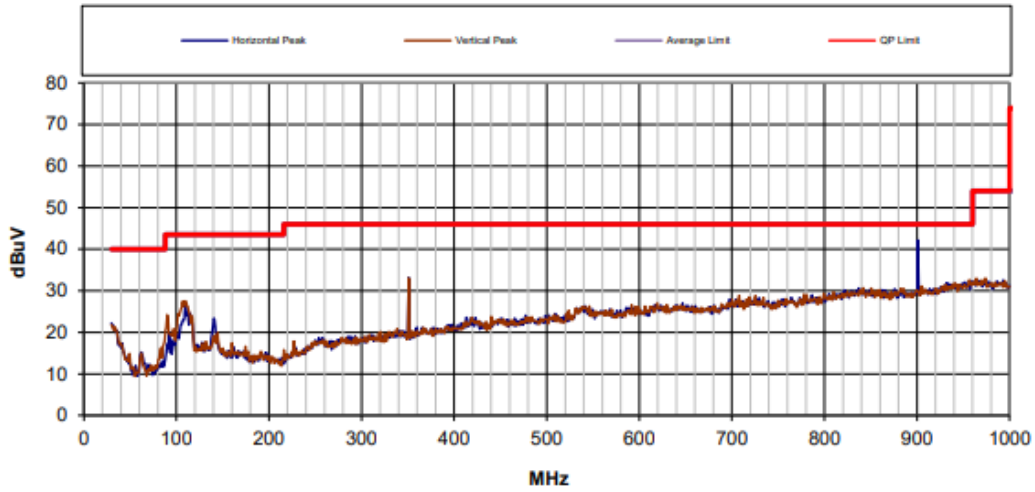
Channel: 0

RADIATED EMISSIONS DATA SHEET

Revision 11
6/30/2021

Customer:	Lightspeed Technologies	Job Reference#:	LIG20230928
Contact:	Rob D'Angelo	Date:	11/20/2023
DUT:	Rogue Mic	Temperature (°C):	22
Serial Number:	03-CMT-Z-S2340-00002	Relative Humidity (%):	30
Voltage/Freq:	Battery	Barometric Pressure:	30
Tested by:	Ryan Benitez	Location:	Hillsboro
Product Standards:	FCC Part 15 Subpart D		
	N/A		
Test Standard:	FCC Part 15.209		

TEST RESULTS	TEST TYPE	DISTANCE	RUN #
Pass	Compliance	3 meters	1



COMMENTS	SIGNATURE
Mic Ch: LOW	Ryan Benitez

Horizontal

Freq (MHz)	Peak (dBµV)	QP (dBµV)	Factors (dB)	Peak Limit (dBµV)	QP Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	QP Margin (dB)
30.16	21.39	16.91	23.40	40.00	40.00	73°/374cm	18.61	23.09
109.93	24.91	19.04	16.70	43.52	43.52	68°/161cm	18.61	24.48
351.11	21.67	17.23	20.93	46.02	46.02	293°/400cm	24.35	28.79
901.39	29.30	24.84	31.75	46.02	46.02	315°/175cm	16.72	21.18

Vertical

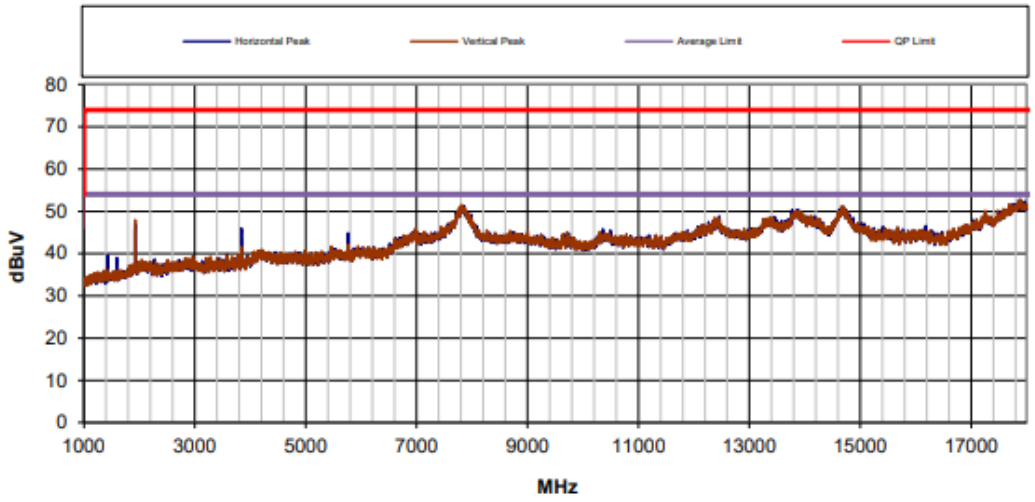
Freq (MHz)	Peak (dBµV)	QP (dBµV)	Factors (dB)	Peak Limit (dBµV)	QP Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	QP Margin (dB)
30.16	22.28	16.91	23.40	40.00	40.00	203°/275cm	17.72	23.09
109.55	27.70	21.90	16.67	43.52	43.52	316°/400cm	15.82	21.62
351.11	21.41	17.36	20.93	46.02	46.02	275°/375cm	24.61	28.66
973.66	31.63	27.36	34.14	53.98	53.98	67°/198cm	22.35	26.62

RADIATED EMISSIONS DATA SHEET

Revision 11
6/30/2021

Customer:	Lightspeed Technologies	Job Reference#:	LIG20230928
Contact:	Rob D'Angelo	Date:	11/20/2023
DUT:	Rogue Mic	Temperature (ºC):	22
Serial Number:	03-CMT-Z-S2340-00002	Relative Humidity (%):	30
Voltage/Freq:	Battery	Barometric Pressure:	30
Tested by:	Ryan Benitez	Location:	Hillsboro
Product Standards:	FCC Part 15 Subpart D		
	N/A		
Test Standard:	FCC Part 15.209		

TEST RESULTS	TEST TYPE	DISTANCE	RUN #
Pass	Compliance	3 meters	1



COMMENTS

Mic Ch:0

SIGNATURE

Ryan Benitez

Horizontal

Freq (MHz)	Peak (dBµV)	Final (dBµV)	Factors (dB)	Peak Limit (dBµV)	Final Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Final Margin (dB)
1921.20	45.30	20.92	-10.09	73.98	53.98	21º/101cm	28.68	33.06
7861.01	40.61	38.58	10.62	73.98	53.98	315º/149cm	33.37	15.40
12459.00	43.82	39.09	7.22	73.98	53.98	315º/152cm	30.16	14.89
13876.08	42.30	39.19	9.38	73.98	53.98	207º/149cm	31.68	14.79
14684.90	48.40	42.73	11.92	73.98	53.98	260º/101cm	25.58	11.25
17872.01	48.73	44.21	17.54	73.98	53.98	-1º/168cm	25.25	9.77

Vertical

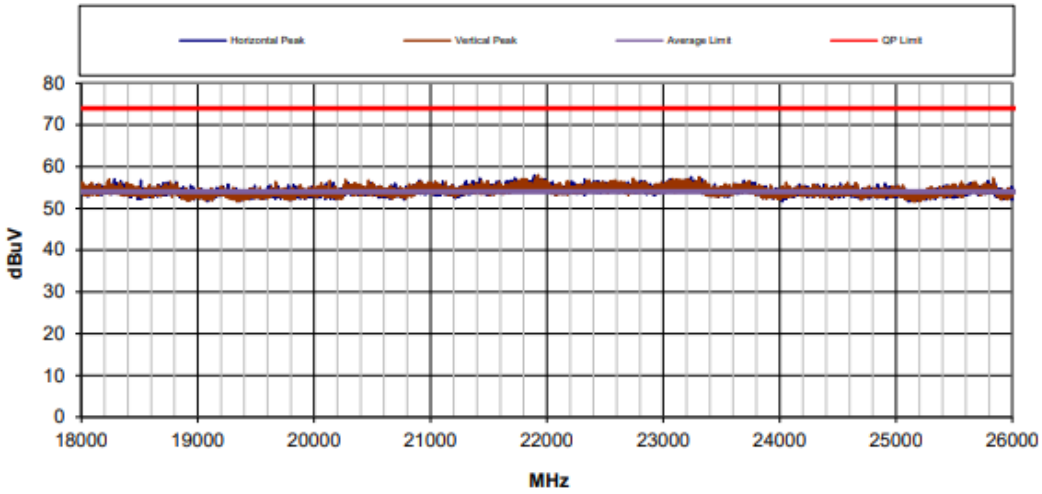
Freq (MHz)	Peak (dBµV)	Final (dBµV)	Factors (dB)	Peak Limit (dBµV)	Final Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Final Margin (dB)
1921.22	46.21	20.95	-10.09	73.98	53.98	234º/199cm	27.77	33.03
7817.15	44.11	38.99	10.78	73.98	53.98	316º/174cm	29.87	14.99
12377.87	40.78	38.56	7.04	73.98	53.98	154º/176cm	33.20	15.42
13918.43	40.17	38.44	9.37	73.98	53.98	22º/175cm	33.81	15.54
14667.70	44.85	42.72	11.94	73.98	53.98	0º/100cm	29.13	11.26
17897.73	50.16	44.25	17.72	73.98	53.98	122º/100cm	23.82	9.73

RADIATED EMISSIONS DATA SHEET

Revision 11
6/30/2021

Customer:	Lightspeed Technologies	Job Reference#:	LIG20230928
Contact:	Rob D'Angelo	Date:	11/21/2023
DUT:	Rogue Mic	Temperature (°C):	22
Serial Number:	03-CMT-Z-S2340-00002	Relative Humidity (%):	30
Voltage/Freq:	Battery	Barometric Pressure:	30
Tested by:	Ryan Benitez	Location:	Hillsboro
Product Standards:	FCC Part 15 Subpart D		
	N/A		
Test Standard:	FCC Part 15.209		

TEST RESULTS	TEST TYPE	DISTANCE	RUN #
Pass	Compliance	3 meters	1



COMMENTS	SIGNATURE
Mic CH:0	Ryan Benitez

Horizontal

Freq (MHz)	Peak (dBµV)	Average (dBµV)	Factors (dB)	Peak Limit (dBµV)	Average Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Average Margin (dB)
18284.57	41.67	38.95	10.61	73.98	53.98	202°/100cm	32.31	15.03
21422.64	44.40	39.35	9.09	73.98	53.98	248°/175cm	29.58	14.63
21725.64	44.72	39.77	9.56	73.98	53.98	68°/101cm	29.26	14.21
21893.46	42.57	39.96	9.02	73.98	53.98	0°/175cm	31.41	14.02
22324.43	41.94	39.17	8.87	73.98	53.98	221°/100cm	32.04	14.81
23238.97	42.93	39.90	9.64	73.98	53.98	112°/199cm	31.05	14.08

Vertical

Freq (MHz)	Peak (dBµV)	Average (dBµV)	Factors (dB)	Peak Limit (dBµV)	Average Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Average Margin (dB)
21905.31	41.73	40.04	8.96	73.98	53.98	145°/155cm	32.25	13.94
21923.68	44.88	40.18	8.92	73.98	53.98	22°/176cm	29.10	13.80
22737.67	44.49	39.20	8.65	73.98	53.98	176°/100cm	29.49	14.78
23085.07	41.44	39.62	9.42	73.98	53.98	0°/199cm	32.54	14.36
23310.37	42.06	39.35	9.41	73.98	53.98	145°/100cm	31.92	14.63
25833.72	41.38	39.01	9.43	73.98	53.98	221°/199cm	32.60	14.97

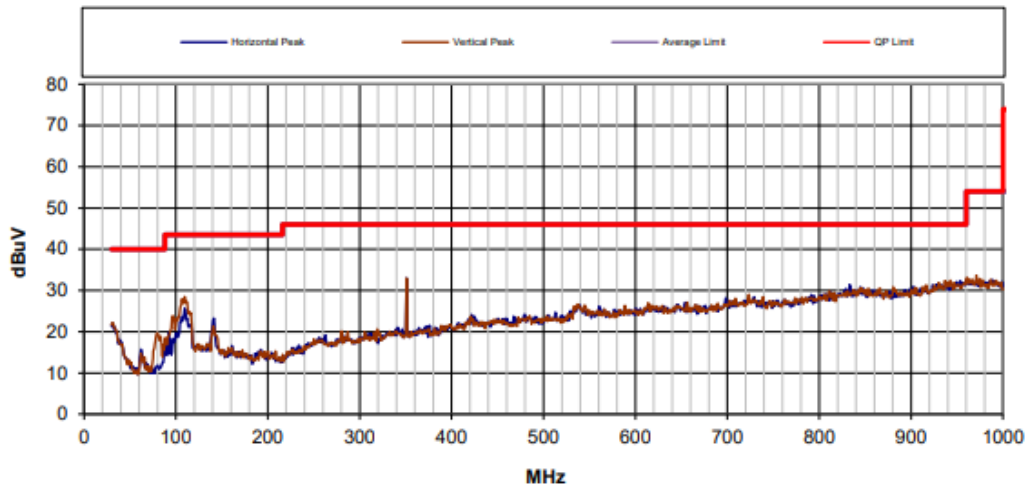
Channel: 4

RADIATED EMISSIONS DATA SHEET

Revision 11
6/30/2021

Customer:	Lightspeed Technologies	Job Reference#:	LIG20230928
Contact:	Rob D'Angelo	Date:	11/20/2023
DUT:	Rogue Mic	Temperature (°C):	22
Serial Number:	03-CMT-Z-S2340-00002	Relative Humidity (%):	30
Voltage/Freq:	Battery	Barometric Pressure:	30
Tested by:	Ryan Benitez	Location:	Hillsboro
Product Standards:	FCC Part 15 Subpart D		
	N/A		
Test Standard:	FCC Part 15.209		

TEST RESULTS	TEST TYPE	DISTANCE	RUN #
Pass	Compliance	3 meters	3



COMMENTS

Mic Ch: HIGH

SIGNATURE

Ryan Benitez

Horizontal

Freq (MHz)	Peak (dBµV)	QP (dBµV)	Factors (dB)	Peak Limit (dBµV)	QP Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	QP Margin (dB)
30.72	21.49	16.79	23.25	40.00	40.00	158°/225cm	18.51	23.21
109.62	25.38	18.97	16.67	43.52	43.52	316°/400cm	18.14	24.55
351.07	21.19	17.40	20.93	46.02	46.02	315°/330cm	24.83	28.62
988.08	31.51	27.09	34.17	53.98	53.98	293°/324cm	22.47	26.89

Vertical

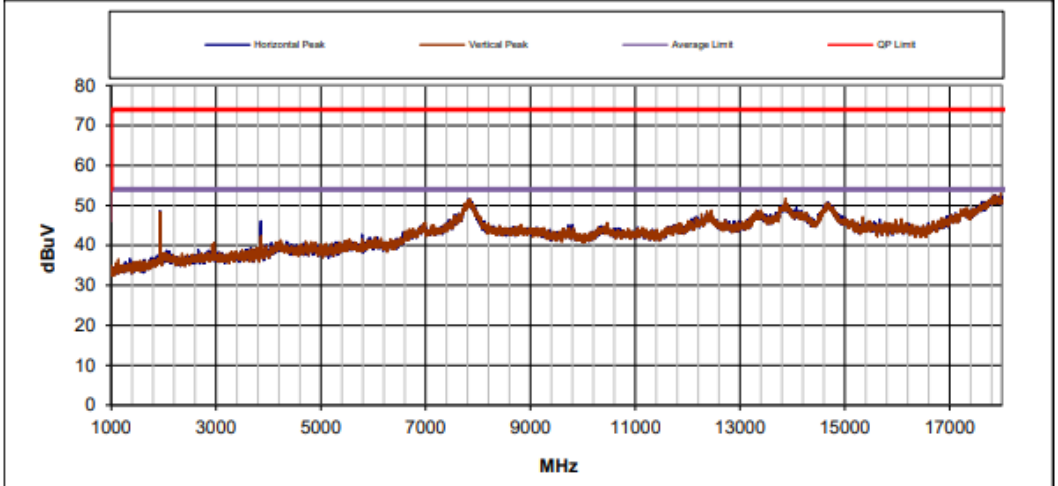
Freq (MHz)	Peak (dBµV)	QP (dBµV)	Factors (dB)	Peak Limit (dBµV)	QP Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	QP Margin (dB)
31.38	22.58	16.64	22.88	40.00	40.00	233°/131cm	17.42	23.36
109.39	27.08	21.96	16.65	43.52	43.52	202°/399cm	16.44	21.56
351.09	21.56	16.88	20.93	46.02	46.02	158°/261cm	24.46	29.14
970.57	32.11	27.55	34.19	53.98	53.98	203°/101cm	21.87	26.43

RADIATED EMISSIONS DATA SHEET

Revision 11
6/30/2021

Customer:	Lightspeed Technologies	Job Reference#:	LIG20230928
Contact:	Rob D'Angelo	Date:	11/20/2023
DUT:	Rogue Mic	Temperature (ºC):	22
Serial Number:	03-CMT-Z-S2340-00002	Relative Humidity (%):	30
Voltage/Freq:	Battery	Barometric Pressure:	30
Tested by:	Ryan Benitez	Location:	Hillsboro
Product Standards:	FCC Part 15 Subpart D		
	N/A		
Test Standard:	FCC Part 15.209		

TEST RESULTS	TEST TYPE	DISTANCE	RUN #
Pass	Compliance	3 meters	3



COMMENTS

Mic Ch:4

SIGNATURE

Ryan Benitez

Horizontal

Freq (MHz)	Peak (dBµV)	Final (dBµV)	Factors (dB)	Peak Limit (dBµV)	Final Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Final Margin (dB)
1928.12	41.85	21.13	-10.01	73.98	53.98	221º/100cm	32.13	32.85
3856.24	45.62	23.47	-6.17	73.98	53.98	77º/101cm	28.36	30.51
7817.69	40.98	39.00	10.78	73.98	53.98	135º/150cm	33.00	14.98
13843.10	44.99	39.42	9.37	73.98	53.98	0º/153cm	28.99	14.56
14670.93	47.84	42.80	11.93	73.98	53.98	0º/179cm	26.14	11.18
17859.38	46.40	44.15	17.54	73.98	53.98	120º/200cm	27.58	9.83

Vertical

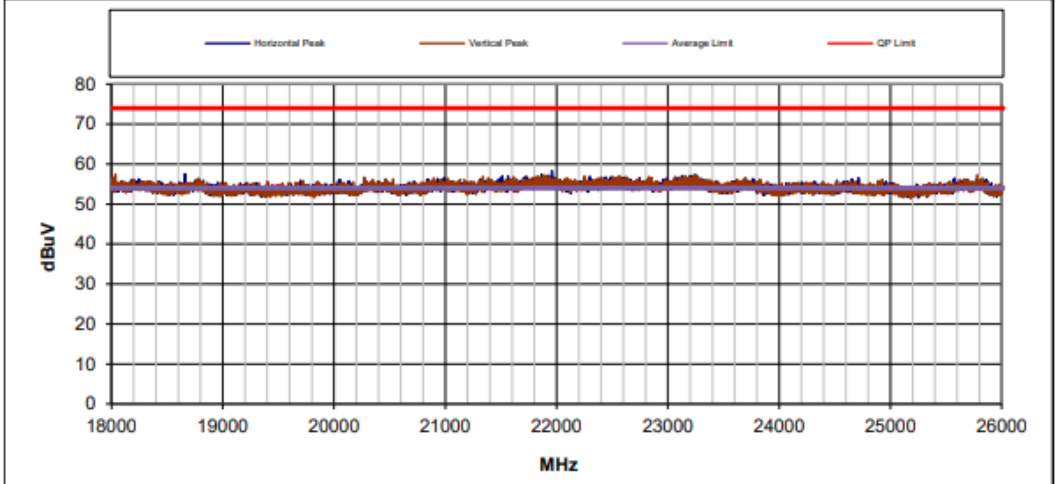
Freq (MHz)	Peak (dBµV)	Final (dBµV)	Factors (dB)	Peak Limit (dBµV)	Final Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Final Margin (dB)
1928.13	46.50	21.33	-10.01	73.98	53.98	189º/123cm	27.48	32.65
7850.78	40.58	38.76	10.73	73.98	53.98	90º/175cm	33.40	15.22
12451.89	40.87	39.19	7.19	73.98	53.98	208º/153cm	33.11	14.79
13870.32	45.39	39.25	9.37	73.98	53.98	21º/144cm	28.59	14.73
14650.52	47.92	42.57	11.98	73.98	53.98	90º/144cm	26.06	11.41
17976.89	46.89	44.03	17.80	73.98	53.98	316º/152cm	27.09	9.95

RADIATED EMISSIONS DATA SHEET

Revision 11
6/30/2021

Customer:	Lightspeed Technologies	Job Reference#:	LIG20230928
Contact:	Rob D'Angelo	Date:	11/21/2023
DUT:	Rogue Mic	Temperature (ºC):	22
Serial Number:	03-CMT-Z-S2340-00002	Relative Humidity (%):	30
Voltage/Freq:	Battery	Barometric Pressure:	30
Tested by:	Ryan Benitez	Location:	Hillsboro
Product Standards:	FCC Part 15 Subpart D		
	N/A		
Test Standard:	FCC Part 15.209		

TEST RESULTS	TEST TYPE	DISTANCE	RUN #
Pass	Compliance	3 meters	3



COMMENTS	SIGNATURE
Mic CH: 4	Ryan Benitez

Horizontal

Freq (MHz)	Peak (dBµV)	Average (dBµV)	Factors (dB)	Peak Limit (dBµV)	Average Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Average Margin (dB)
18662.98	40.05	38.39	10.31	73.98	53.98	203º/123cm	33.93	15.59
21513.46	43.51	38.87	9.09	73.98	53.98	247º/175cm	30.47	15.11
21563.06	44.27	39.37	9.16	73.98	53.98	41º/200cm	29.71	14.61
21861.21	45.36	39.86	9.24	73.98	53.98	158º/174cm	28.62	14.12
21958.66	44.57	39.78	8.85	73.98	53.98	67º/200cm	29.41	14.20
23252.76	42.28	39.71	9.58	73.98	53.98	145º/175cm	31.70	14.27

Vertical

Freq (MHz)	Peak (dBµV)	Average (dBµV)	Factors (dB)	Peak Limit (dBµV)	Average Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Average Margin (dB)
18038.47	43.69	38.61	11.48	73.98	53.98	48º/100cm	30.29	15.37
21900.85	42.86	39.99	8.97	73.98	53.98	293º/200cm	31.12	13.99
22253.14	42.74	39.17	8.80	73.98	53.98	124º/100cm	31.24	14.81
22556.70	44.58	39.54	8.91	73.98	53.98	139º/175cm	29.40	14.44
23253.22	45.00	39.73	9.58	73.98	53.98	-1º/175cm	28.98	14.25
25784.93	41.06	39.30	9.55	73.98	53.98	157º/125cm	32.92	14.68

3.12 Test conditions and results – Receiver spurious emissions

Receiver spurious emissions acc. to IC RSS-213				Verdict: PASS
EUT requirement rule parts and clause	Reference			
	IC RSS-GEN 7.3 / 8.9			
Test according to measurement reference	Reference Method			
	ANSI C63.4			
Tested frequencies	Scan (All)			
Test frequency range	30 MHz – 5th Harmonic			
EUT test mode	Receive			
Limits				
Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/m]	Limit Distance [meters]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
>1000	Average	500	54	3
Comments: *Physical distance between EUT and measurement antenna. **Emission level corresponds to ambient noise floor.				

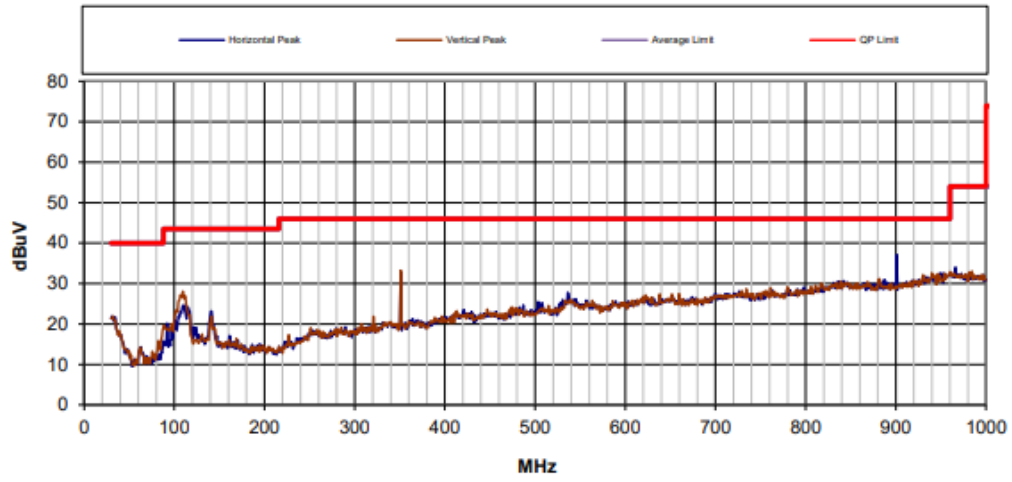
Channel: 2

RADIATED EMISSIONS DATA SHEET

Revision 11
6/30/2021

Customer:	Lightspeed Technologies	Job Reference#:	LIG20230928
Contact:	Rob D'Angelo	Date:	11/20/2023
DUT:	Rogue Mic	Temperature (ºC):	22
Serial Number:	03-CMT-Z-S2340-00002	Relative Humidity (%):	30
Voltage/Freq:	Battery	Barometric Pressure:	30
Tested by:	Ryan Benitez	Location:	Hillsboro
Product Standards:	FCC Part 15 Subpart D		
	N/A		
Test Standard:	FCC Part 15.209		

TEST RESULTS	TEST TYPE	DISTANCE	RUN #
Pass	Compliance	3 meters	2



COMMENTS

Mic Ch: MID

SIGNATURE

Ryan Benitez

Horizontal

Freq (MHz)	Peak (dBµV)	QP (dBµV)	Factors (dB)	Peak Limit (dBµV)	QP Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	QP Margin (dB)
30.74	20.30	16.78	23.25	40.00	40.00	157º/400cm	19.70	23.22
110.31	19.42	15.07	16.71	43.52	43.52	157º/155cm	24.10	28.45
351.11	20.61	17.12	20.93	46.02	46.02	315º/325cm	25.41	28.90
901.39	29.44	24.90	31.75	46.02	46.02	50º/274cm	16.58	21.12

Vertical

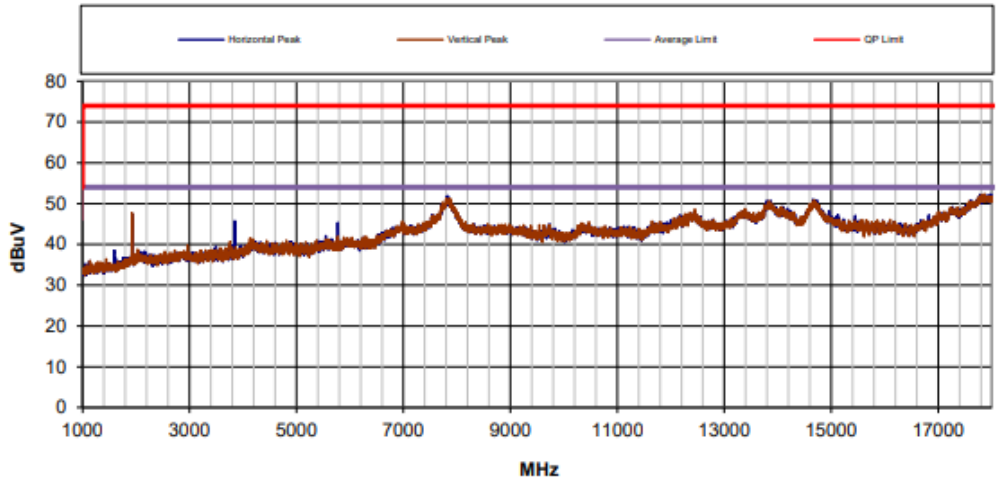
Freq (MHz)	Peak (dBµV)	QP (dBµV)	Factors (dB)	Peak Limit (dBµV)	QP Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	QP Margin (dB)
32.01	22.13	16.32	22.39	40.00	40.00	190º/375cm	17.87	23.68
109.38	27.48	22.01	16.65	43.52	43.52	40º/399cm	16.04	21.51
351.10	21.08	17.63	20.93	46.02	46.02	67º/183cm	24.94	28.39
984.47	31.02	27.06	34.17	53.98	53.98	26º/297cm	22.96	26.92

RADIATED EMISSIONS DATA SHEET

Revision 11
6/30/2021

Customer:	Lightspeed Technologies	Job Reference#:	LIG20230928
Contact:	Rob D'Angelo	Date:	11/20/2023
DUT:	Rogue Mic	Temperature (°C):	22
Serial Number:	03-CMT-Z-S2340-00002	Relative Humidity (%):	30
Voltage/Freq:	Battery	Barometric Pressure:	30
Tested by:	Ryan Benitez	Location:	Hillsboro
Product Standards:	FCC Part 15 Subpart D		
	N/A		
Test Standard:	FCC Part 15.209		

TEST RESULTS	TEST TYPE	DISTANCE	RUN #
Pass	Compliance	3 meters	2



COMMENTS	SIGNATURE
Mic Ch:2	Ryan Benitez

Horizontal

Freq (MHz)	Peak (dBµV)	Final (dBµV)	Factors (dB)	Peak Limit (dBµV)	Final Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Final Margin (dB)
1924.65	42.34	21.03	-10.05	73.98	53.98	175°/102cm	31.64	32.95
3849.30	42.88	23.10	-6.19	73.98	53.98	302°/200cm	31.10	30.88
7832.89	40.54	38.92	10.80	73.98	53.98	0°/152cm	33.44	15.06
13801.87	42.15	39.67	9.30	73.98	53.98	142°/199cm	31.83	14.31
14662.71	45.92	42.71	11.95	73.98	53.98	95°/169cm	28.06	11.27
17983.40	46.47	44.02	17.88	73.98	53.98	21°/143cm	27.51	9.96

Vertical

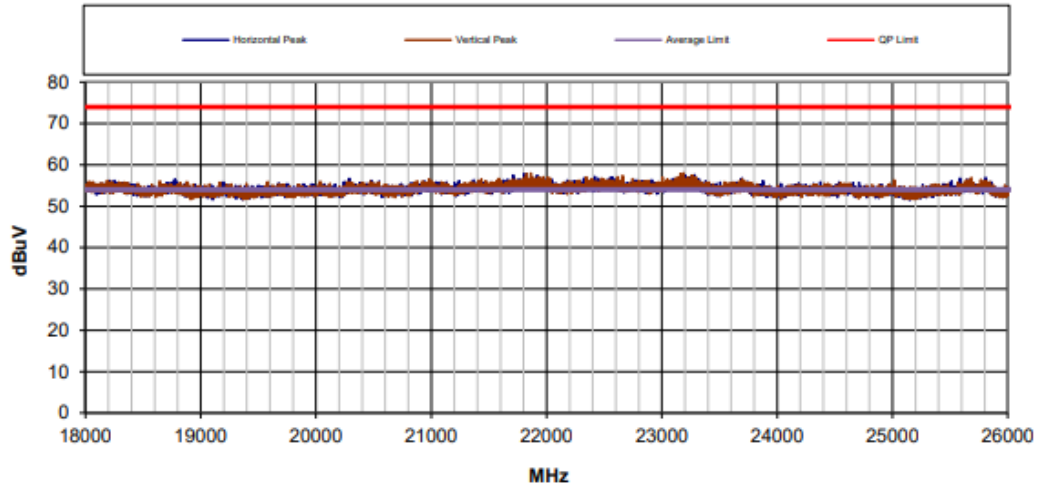
Freq (MHz)	Peak (dBµV)	Final (dBµV)	Factors (dB)	Peak Limit (dBµV)	Final Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Final Margin (dB)
1924.65	46.99	21.21	-10.05	73.98	53.98	162°/153cm	26.99	32.77
7873.79	40.95	38.42	10.44	73.98	53.98	288°/200cm	33.03	15.56
12453.57	44.54	39.24	7.19	73.98	53.98	260°/199cm	29.44	14.74
13833.99	42.46	39.48	9.37	73.98	53.98	194°/198cm	31.52	14.50
14687.66	44.01	42.74	11.91	73.98	53.98	288°/149cm	29.97	11.24
17867.56	50.75	44.18	17.54	73.98	53.98	162°/125cm	23.23	9.80

RADIATED EMISSIONS DATA SHEET

Revision 11
6/30/2021

Customer:	Lightspeed Technologies	Job Reference#:	LIG20230928
Contact:	Rob D'Angelo	Date:	11/21/2023
DUT:	Rogue Mic	Temperature (ºC):	22
Serial Number:	03-CMT-Z-S2340-00002	Relative Humidity (%):	30
Voltage/Freq:	Battery	Barometric Pressure:	30
Tested by:	Ryan Benitez	Location:	Hillsboro
Product Standards:	FCC Part 15 Subpart D		
	N/A		
Test Standard:	FCC Part 15.209		

TEST RESULTS	TEST TYPE	DISTANCE	RUN #
Pass	Compliance	3 meters	2



COMMENTS	SIGNATURE
Mic CH: 2	Ryan Benitez

Horizontal

Freq (MHz)	Peak (dBµV)	Average (dBµV)	Factors (dB)	Peak Limit (dBµV)	Average Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Average Margin (dB)
21709.93	43.17	39.45	9.55	73.98	53.98	315º/100cm	30.81	14.53
21803.63	42.93	40.00	9.62	73.98	53.98	202º/153cm	31.05	13.98
21922.47	42.70	40.14	8.92	73.98	53.98	315º/200cm	31.28	13.84
22419.50	42.81	39.50	9.03	73.98	53.98	113º/155cm	31.17	14.48
23200.77	42.38	40.09	9.78	73.98	53.98	203º/101cm	31.60	13.89
23283.26	42.59	39.67	9.47	73.98	53.98	293º/101cm	31.39	14.31

Vertical

Freq (MHz)	Peak (dBµV)	Average (dBµV)	Factors (dB)	Peak Limit (dBµV)	Average Limit (dBµV)	Turntable (deg) / Height (cm)	Peak Margin (dB)	Average Margin (dB)
21830.67	42.56	39.82	9.43	73.98	53.98	68º/175cm	31.42	14.16
21864.65	44.89	39.84	9.21	73.98	53.98	203º/198cm	29.09	14.14
22616.89	43.33	39.22	8.74	73.98	53.98	280º/100cm	30.65	14.76
22659.82	41.54	38.98	8.70	73.98	53.98	99º/100cm	32.44	15.00
23189.31	43.00	39.98	9.76	73.98	53.98	316º/199cm	30.98	14.00
23258.41	42.99	39.77	9.56	73.98	53.98	35º/125cm	30.99	14.21

3.13 Test conditions and results – Automatic discontinuation of transmission

Automatic discontinuation of transmission acc. to FCC 15D / RSS-213	Verdict: PASS
EUT requirement rule parts and clause	Reference
	IC RSS-213 5.2
Test according to measurement reference	Reference Method
	ANSI C63.4
EUT equipment type	Scan (All)
Requirements	
The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. This is not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.	

Result		
Test	Reaction	Verdict
Power removed: EUT	A	PASS
Power removed: Companion device	A	PASS
Switch -off: EUT	A	PASS
Switch -off: Companion device	A	PASS
Hook-on: EUT	N/A	N/A
Hook-on: Companion device	N/A	N/A
Comments: A – Cease of all transmissions B – EUT transmits control and signaling information C – Companion device transmits control and signaling information N/A – Not applicable		

3.14 Test conditions and results – Radiofrequency radiation exposure

Radiofrequency radiation exposure acc. to FCC 47 CFR 15D / IC RSS-213		Verdict: N/A
EUT requirement rule parts and clause	Reference	
	FCC 15.319(i) / IC RSS-102	
Requirements		
FCC: Unlicensed PCS devices are subject to the radiofrequency radiation exposure requirements specified in §§1.1307(b), 2.1091 and 2.1093. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for thus statement must be submitted to the Commission upon request. IC: Category I and Category II equipment shall comply with the applicable requirements of RSS-102.		
Result		
Reference		Verdict
RF Exposure is addressed in a separate exhibit.		N/A

3.15 Test conditions and results – Monitoring threshold

Monitoring threshold acc. to FCC 47 CFR 15D / IC RSS-213	Verdict: N/A
EUT requirement rule parts and clause	Reference FCC 15.323(c)(2),(5),(9) / IC RSS-213 5.2 (2)(5)(9)
Test according to referenced standards	Reference Method ANSI C63.17 7.3.4
Number of duplex channels used	5 carrier with 12 duplex timeslots = 60 duplex channels

Requirements

The monitoring threshold must not be more than 30 dB above the thermal noise power (KTB) of a bandwidth equivalent to the emission/occupied bandwidth of the device.

Devices that have a power output lower than the maximum permitted under this standard may increase their detection threshold by 1 dB for each 1 dB that the transmitter power is below the maximum permitted.

IC: If access to spectrum is not available as determined by the above, a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with a power level below a monitoring threshold of 50 dB above the terminal noise power determined for the occupied bandwidth may be accessed.

$$T_u[\text{dBm}] = -174 + 10 * \log_{10}(\text{Bandwidth [Hz]})\ M_U + P_{MAX}[\text{dBm}] - P_{EUT}[\text{dBm}]$$
$$T_L[\text{dBm}] = -174 + 10 * \log_{10}(\text{Bandwidth [Hz]})\ M_L + P_{MAX}[\text{dBm}] - P_{EUT}[\text{dBm}]$$

With M_U = 50 dB and M_L = 30 dB, P_{MAX} as given under “Peak transmit power” and bandwidth as emission or occupied bandwidth. The power threshold limit is given by T_U+U_M (U_M = 6 dB).

Comments:

3.16 Test conditions and results – LIC confirmation

LIC confirmation acc. to FCC 47 CFR 15D / IC RSS-213		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 15.323(c)(5) / IC RSS-213 5.2(5)	
Test according to referenced standards	Reference Method	
	ANSI C63.17 7.3.2	
Requirements		
A device utilizing the provisions of FCC 47 CFR 15.323(c)(5) / IC RSS-213(b)(5) must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 millisecond frame period) immediately preceding actual channel access, that the detected power of the selection time and spectrum windows is no higher than the previously detected value.		
Test Result		
Evaluation		Verdict
The requirement is verified using the “Monitoring time” and “LIC Selection” test.		PASS
Comments:		

3.17 Test conditions and results – LIC selection

LIC confirmation acc. to FCC 47 CFR 15D / IC RSS-213			Verdict: PASS
EUT requirement rule parts and clause	Reference		
	FCC 15.323(c)(5) / IC RSS-213 5.2 (5)		
Test according to referenced standards	Reference Method		
	ANSI C63.17 7.3.3		
Requirements			
FCC: if access to spectrum is not available as determined by the above, and a minimum of 20 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power levels may be accessed. IC: If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with a power level below a monitoring threshold of 50 dB above the thermal noise power determined for the occupied bandwidth may be accessed.			
Test Result			
Interferer Level f_1	Interferer Level f_2	Communication channel	Verdict
$T_L + U_M + 7$ dB	$T_L + U_M$	f_2	PASS
$T_L + U_M$	$T_L + U_M + 7$ dB	f_1	PASS
$T_L + U_M + 1$ dB	$T_L + U_M - 6$ dB	f_2	PASS
$T_L + U_M - 6$ dB	$T_L + U_M + 1$ dB	f_1	PASS
Comments: T_L corresponds to the lower threshold power value			

3.18 Test conditions and results – Monitoring antenna

Monitoring antenna acc. to FCC 47 CFR 15D / IC RSS-213		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 15.319(c)(8) / IC RSS-213 5.2(8)	
Test according to referenced standards	Reference Method	
	ANSI C63.17 4.6	
Monitoring antenna	The same as transmitting antenna	
Requirements		
The monitoring system shall use the same antenna used for transmission, or antenna that yields equivalent reception at the location.		
Results		
Connection status		Verdict
N/A (monitoring antenna identical to transmitting antenna)		PASS
Comments:		

3.19 Test conditions and results – Monitoring time

Monitoring Time acc. to FCC 47 CFR 15D / IC RSS-213			Verdict: PASS
EUT requirement rule parts and clause	Reference		
	FCC 15.323(c)(1) / IC RSS-213 5.2(1)		
Test according to referenced standards	Reference Method		
	ANSI C63.17 7.3.4		
Requirements			
Immediately prior to initiating transmission, devices must monitor the combined time and spectrum windows in which they intend to transmit for a period of at least 10 milliseconds for systems designed to use a 10 millisecond or shorter frame period or at least 20 milliseconds for systems designed to use a 20 millisecond frame period.			
Test results			
Initial transmit channel	Interferer level	Final transmit channel	Verdict
F_1	$T_U + U_M + 20$ dB	F_2	PASS
F_2	$T_U + U_M + 20$ dB	F_1	PASS
Comments:			

3.20 Test conditions and results – Monitoring bandwidth

Monitoring bandwidth acc. to FCC 47 CFR 15D / IC RSS-213			Verdict: PASS
EUT requirement rule parts and clause	Reference		
	FCC 15.323(c)(7) / IC RSS-213 5.2(7)		
Test according to referenced standards	Reference Method		
	ANSI C63.17 7.4		
Requirements			
The monitoring system bandwidth must be equal or greater than the emission bandwidth of the intended transmission.			
Test results			
Initial transmit channel	Interferer level	Transmission status	Verdict
F_{LOW} + 30% BW	$T_U + U_M$ + 10 dB	None	PASS
F_{LOW} - 30% BW	$T_U + U_M$ + 10 dB	None	PASS
F_{HIGH} + 30% BW	$T_U + U_M$ + 10 dB	None	PASS
F_{HIGH} - 30% BW	$T_U + U_M$ + 10 dB	None	PASS
Comments:			

3.21 Test conditions and results – Monitoring reaction time

Monitoring reaction time acc. to FCC 47 CFR 15D / IC RSS-213	Verdict: Pass
EUT requirement rule parts and clause	Reference
	FCC 15.323(c)(7) / IC RSS-213 5.2(7)
Test according to referenced standards	Reference Method
	ANSI C63.17 7.5
Requirements	
The monitor shall have a maximum reaction time less than 50xSQRT (1.25/emission(occupied) bandwidth in MHz) microseconds for signal at the applicable threshold level but shall not be required to be less than 50 microseconds. If a signal is detected that is 6 dB or more above the applicable threshold level the maximum reaction time shall be 35xSQRT (1.25/emission(occupied) bandwidth in MHz) microseconds but shall not be required to be less than 35 microseconds.	

Test results				
Channel	Pulse width	Level	Connection possible	Result
F_{LOW}	50	$T_L + U_M + 0$ dB	No	PASS
F_{MID}	50	$T_L + U_M + 0$ dB	No	PASS
F_{HIGH}	50	$T_L + U_M + 0$ dB	No	PASS
F_{LOW}	35	$T_L + U_M + 6$ dB	No	PASS
F_{MID}	35	$T_L + U_M + 6$ dB	No	PASS
F_{HIGH}	35	$T_L + U_M + 6$ dB	No	PASS

3.22 Random Waiting

Random Waiting acc. to FCC 47 CFR 15D / IC RSS-213	Verdict: PASS
EUT requirement rule parts and clause	Reference
	FCC 15.323(c)(6) / IC RSS-213 5.2(6)
Test according to referenced standards	Reference Method
	ANSI C63.17 8.1.2 / 8.1.3
Option implemented	No
Requirements	
If the selected combined time and spectrum windows are unavailable the device may either monitor and select different windows or seek to use the same window after waiting an amount of time randomly chosen from a uniform distribution between 10 and 150 milliseconds commencing from the time when the channel becomes available.	

Test results – Access criteria functional test option not implemented			
Initial channel / timeslot	Interferer level	Final Channel / timeslot	Verdict
F_1 / Slot 2	0	F_1 / Slot 2	PASS
F_1 / Slot 2	$T_U + U_M$	F_1 / Slot 4	PASS
Comments:			

3.23 Test conditions and results – Acknowledgements

Acknowledgements acc. to FCC 47 CFR 15D / IC RSS-213		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 15.323(c)(4) / IC RSS-213 5.2(4)	
Test according to referenced standards	Reference Method	
	ANSI C63.17 8.2.1	
EUT can initiate a communication session	No	
Requirements		
Once access to specific combined time and spectrum windows is obtained an acknowledgement from a system participant must be received by the initial transmitter within one second or transmission must cease. Periodic acknowledgements must be received at least every 30 seconds or transmission must cease.		
Test results		
Maximum initial transmission [s]	Transmission time limit [s]	Verdict
1	30	PASS
Time needed to cease Traffic Channel [s]	Transmission time limit [s]	Verdict
4	30	PASS
Comments:		

3.24 Maximum transmit duration

Maximum transmit duration acc. to FCC 47 CFR 15D / IC RSS-213		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 15.323(c)(3) / IC RSS-213 5.2(3)	
Requirements		
If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitoring time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum window by an EUT or group of cooperative EUTs continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.		
Test results		
Measured Maximum Transmission Duration (minutes)	Limit (minutes)	Verdict
475	480	PASS
Comments:		

3.25 Test conditions and results – Maximum spectral occupancy

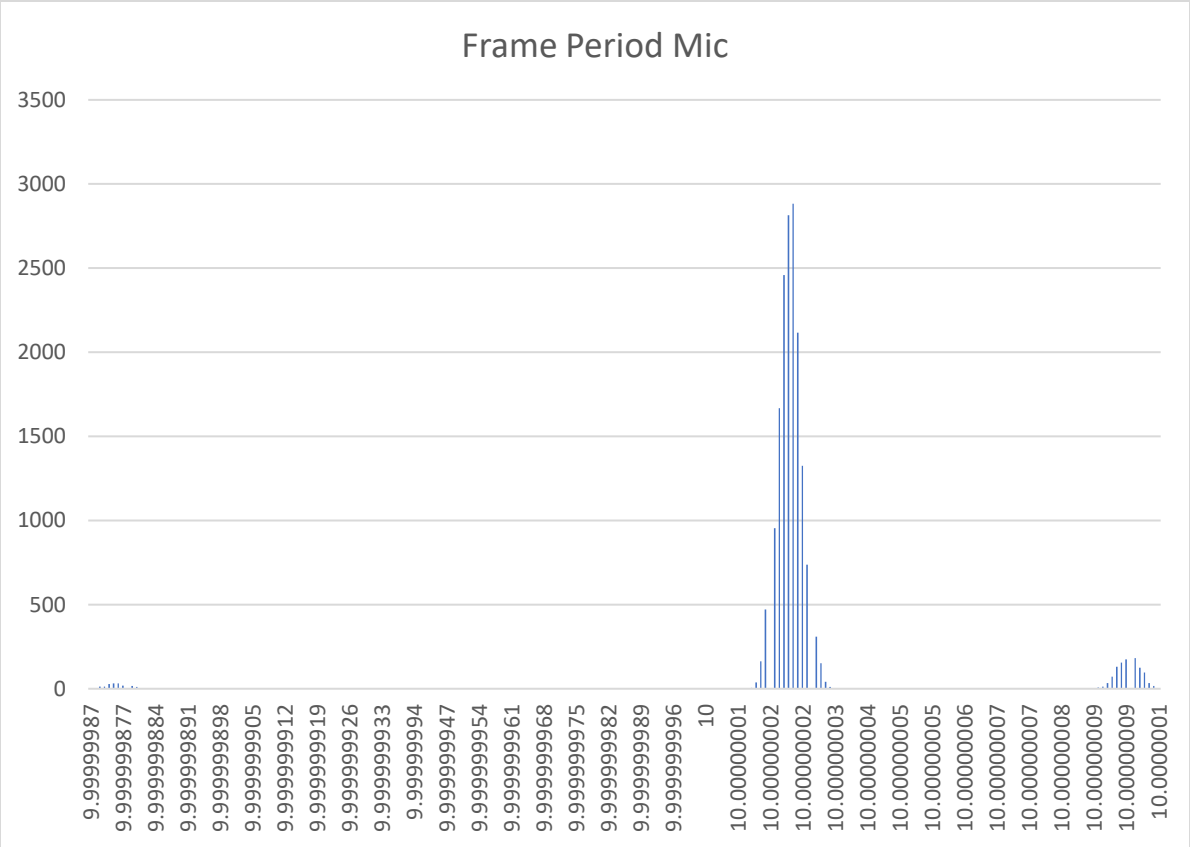
Maximum spectral occupancy acc. to FCC 47 CFR 15D / IC RSS-213		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 15.323(c)(5) / IC RSS-213 5.2(5)	
Test according to referenced standards	Reference Method	
	Customer declaration	
Requirements		
Once access to specific combined time and spectrum windows is obtained an acknowledgement from a system participant must be received by the initial transmitter within one second or transmission muse cease. Periodic acknowledgements must be received at least every 30 seconds or transmission must cease.		
Test result		
Evaluation		Verdict
According to the technical documentation the total number of time and spectrum windows is: 5 x 12 = 60 According to customer declaration the total number of concurrent time and spectrum windows is: 12 The number of concurrent allocated time and spectrum windows is less than one third of the total time and spectrum windows of the EUT		PASS
Comments:		

3.26 Test conditions and results – Fair access

Fair access acc. to FCC 47 CFR 15D / IC RSS-213	Verdict: PASS
EUT requirement rule parts and clause	Reference
	FCC 15.323(c)(12) / IC RSS-213 4.3.4(b)(12)
Test according to measurement reference	Reference Method
	Customer declaration
Requirements	
The provisions of FCC 47 CFR 15.323(c)(10), IC RSS-213(b)(10) or FCC 47 CFR 15.323(c)(12), IC RSS – 213(b)(12) shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.	
Declaration	
The manufacturer declares that the device does not work in a mode which denies fair access to spectrum for other participants.	

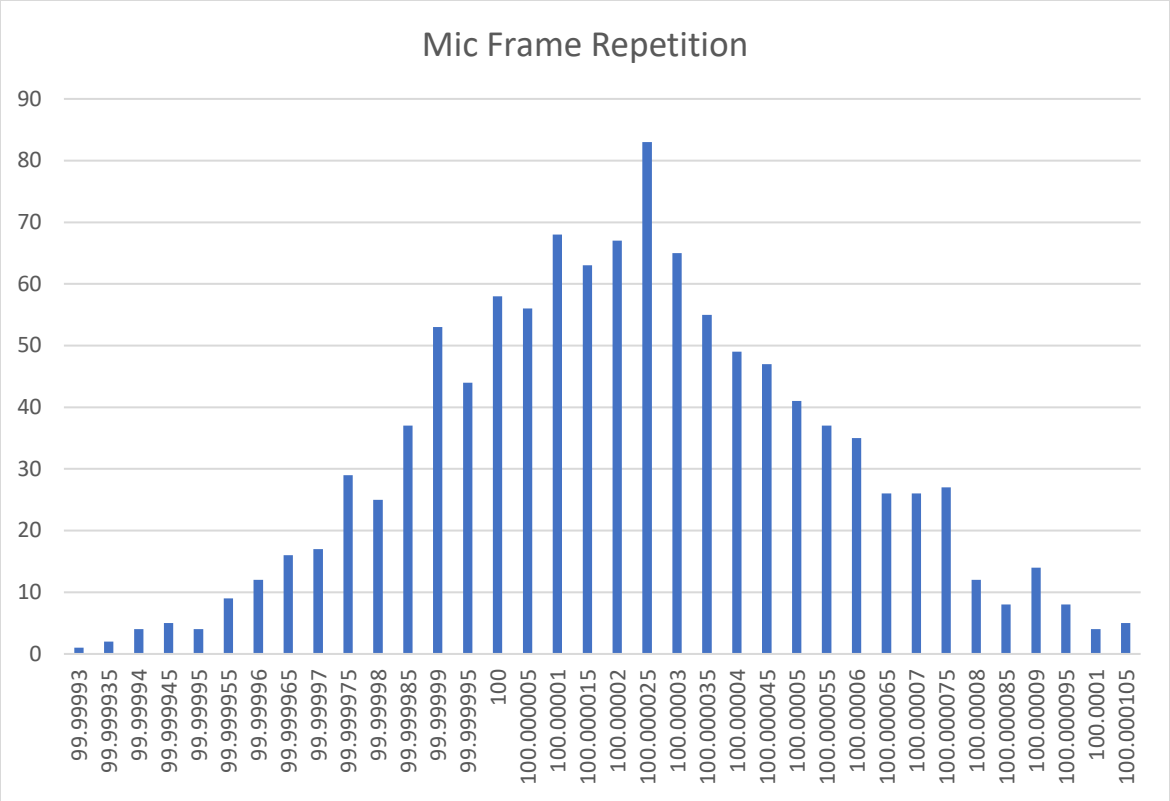
3.27 Test conditions and results – Frame period and jitter

Frame period and jitter acc. to FCC 47 CFR 15D / IC RSS-213		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 15.323(e) / IC RSS-213 5.2(13)	
Test according to referenced standards	Reference Method	
	ANSI C63.17 6.2.3	
Requirements		
The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in the sub-band shall be 20 milliseconds/X where X is a positive whole number. The jitter (time-related, abrupt, spurious variations in the duration of the duration of the frame interval) introduced at the two ends of a communication link shall not exceed 25 microseconds for any two consecutive transmissions.		
Test results – Frame period		
Mean value [ms]	Divider X (10 ms/X)	Verdict
10.00000002	1	PASS
Test results – Jitter		
Maximum difference between frames [µs]	Limit [µs]	Verdict
0.000231	25	PASS
Comments:		


Frame Period Mic
3500
3000
2500
2000
1500
1000
500
0
9.99999987
9.99999877
9.99999884
9.99999891
9.99999898
9.99999905
9.99999912
9.99999919
9.99999926
9.99999933
9.99999994
9.99999947
9.99999954
9.99999961
9.99999968
9.99999975
9.99999982
9.99999989
9.99999996
10
10.00000001
10.00000002
10.00000002
10.00000003
10.00000004
10.00000005
10.00000005
10.00000006
10.00000007
10.00000007
10.00000008
10.00000009
10.00000009
10.0000001

3.28 Test conditions and results – Frame and repetition stability

Frame and TDMA repetition stability acc. to FCC 47 CFR 15D / IC RSS-213			Verdict: PASS
EUT requirement rule parts and clause	Reference		
	FCC 15.323(e) / IC RSS-213 5.2(13)		
Test according to referenced standards	Reference Method		
	ANSI C63.17 6.2.2		
Access scheme used	Time Division Multiple Access		
Requirements			
Each device that implements time division for the purpose of maintaining a duplex connection on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 50 parts per million (ppm). Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 10 ppm.			
Test results			
Access scheme	Error [ppm]	Limit [ppm]	Verdict
Time Division multiple Access	0.89999982	10	PASS
Comments:			


Mic Frame Repetition
90
80
70
60
50
40
30
20
10
0
99.99993
99.999935
99.99994
99.999945
99.99995
99.999955
99.99996
99.999965
99.99997
99.999975
99.99998
99.999985
99.99999
99.999995
100
100.000005
100.00001
100.000015
100.00002
100.000025
100.00003
100.000035
100.00004
100.000045
100.00005
100.000055
100.00006
100.000065
100.00007
100.000075
100.00008
100.000085
100.00009
100.000095
100.0001
100.000105

END OF REPORT