FCC PART 74 and 80

TEST REPORT

For

Hytera Communications Corporation Limited

Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen, 518057 China

FCC ID: YAMPD98XUHF

Report Type:	**Product Type:**
Class II Permissive Change	Digital Portable Radio

Report Number:	RDG170907014-00A1
Report Date:	2017-09-28
Reviewed By:	Rocky Kang RF Engineer
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Hytera Communications Co., Ltd.*'s product, model number: *PD982 Ux (FCC ID: YAMPD98XUHF)* or the "EUT" in this report was a *Digital Portable Radio,* which was measured approximately: 14.1 cm (L) x6.2 cm (W) x 3.9 cm (H), rated input voltage: DC 7.2V rechargeable Li-ion battery or DC 12V from adapter.

Adapter Information:
Model: HKA01212010-XQ
Input: AC 100-240V, 50/60 Hz, 0.5A
Output: DC 12V, 1.0A

** All measurement and test data in this report was gathered from production sample serial number: 170907014 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2017-09-07.*

Objective

This test report is prepared on behalf of *Hytera Communications Corporation Limited* in accordance with Part 2, and Part 74, 80 of the Federal Communication Commissions rules.

This is a CIIPC application of the device; the difference between the original device and the current one are as follows:

(1) Add standard FCC Part 74, 80

(2) Change model number to PD982 Ux

Related Submittal(s)/Grant(s)

No Related Submittal(s)/Grant(s).

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 74 – Experimental Radio, Auxiliary, Special Broadcast and other Program Distributonal Service
Part 80 – Stantions in the Maritme Service

Applicable Standards: TIA 603-D.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter	uncertainty
Occupied Channel Bandwidth	±5%
RF output power, conducted	±1.5dB
Unwanted Emission, conducted	±1.5dB
All emissions, radiated	±4.88dB
Temperature	±1℃
Supply voltages	±0.4%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

Bay Area Compliance Laboratories Corp. (Shenzhen) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L2408). And accredited to ISO/IEC 17025 by NVLAP(Lab code: 200707-0), the FCC Designation No. CN5001 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Shenzhen) was registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a test mode which has been done in the factory.

EUT Exercise Software

No exercise software was used.

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

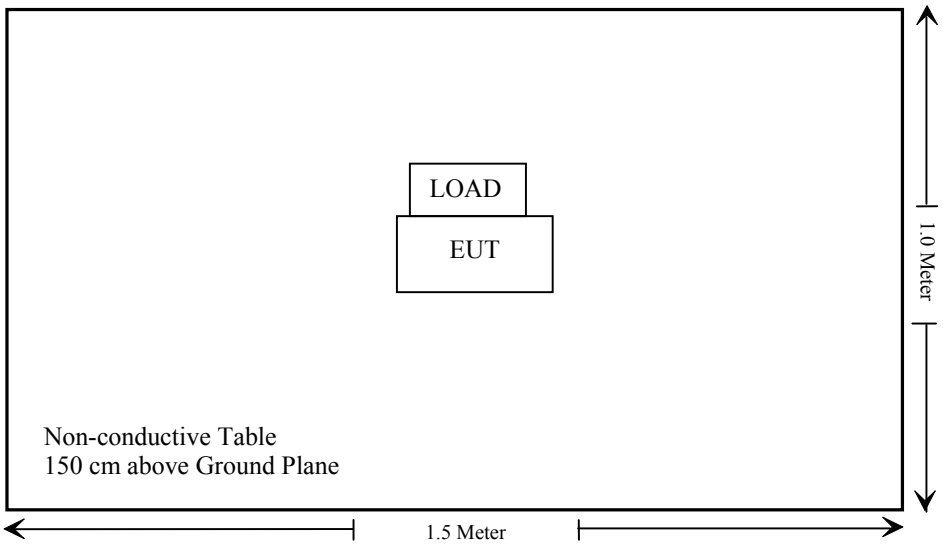
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
N/A	Load	N/A	N/A

External I/O Cable

Cable Description	Length (m)	From Port	To
N/A	N/A	N/A	N/A

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
FCC §1.1307(b) & §2.1093	RF Exposure	Compliance
§2.1046; §74.461; § 80.215	RF Output Power	Compliance
§2.1047; §74.463; §80.213	Modulation Characteristic	Compliance
§2.1049; §74.462; § 80.205; § 80.207	Occupied Bandwidth & Emission Mask	Compliance
§2.1051; §74.462; § 80.211	Spurious Emission at Antenna Terminal	Compliance
§2.1053; §74.462; § 80.211	Spurious Radiated Emissions	Compliance
§2.1055; §74.464; § 80.209	Frequency Stability	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2014-12-29	2017-12-28
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2017-04-24	2018-04-24
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-17	2017-12-16
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2017-02-14	2018-02-14
HP	Amplifier	HP8447E	1937A01046	2017-05-21	2017-11-19
Anritsu	Signal Generator	68369B	004114	2016-12-05	2017-12-05
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2016-12-07	2017-12-07
COM POWER	Dipole Antenna	AD-100	041000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	104PEA	218124002	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	RG-214	1	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	RG-214	2	2017-05-22	2017-11-22
RF Conducted Test					
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200120	2016-12-05	2017-12-05
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2016-11-22	2017-11-22
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
HP Agilent	RF Communication Test Set	HP8920	3325U00859	2017-05-07	2018-05-07
Ducommun technologies	RF Cable	RG-214	3	2017-05-22	2017-11-22
WEINSCHEL	30dB Attenuator	53-30-43	PG633	2017-05-22	2017-11-22

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1307(b) & §2.1093 - RF EXPOSURE

Applicable Standard

According to FCC §1.1307(b) and §2.1093, protable device should be subjected to routine environmental evaluation for RF exposure prior or equipment authorization or use.

Result: Compliance.

Please refer to SAR Report Number: RDG170907014-20A1.

FCC §2.1046 & §74.461 & §80.215 - RF OUTPUT POWER

Applicable Standard

FCC §2.1046, §74.461, § 80.215.

Test Procedure

Conducted RF Output Power:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

R B/W	Video B/W
100 kHz	300 kHz

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2017-09-26.

Test Mode: Transmitting

Test Result: Compliance. Please refer to following table.

Modulation	Channel Separation (kHz)	Frequency (MHz)	Power	Conducted Output Power (dBm)	Conducted Output Power (W)	Note
Analog	12.5	453.2125	High	35.83	3.83	For Part 74
			Low	30.45	1.11	
	25	453.2125	High	35.83	3.83	For Part 74
			Low	30.48	1.12	
		458.2125	High	35.79	3.79	For Part 80
			Low	30.54	1.13	
Digital	12.5	453.2125	High	35.83	3.83	For Part 74
			Low	30.49	1.12	

Note: The high rated power is 4W
The low rated power is 1W

FCC §2.1047 & §74.463 & §80.213 - MODULATION CHARACTERISTIC

Applicable Standard

FCC§2.1047, §74.463, §80.213:

(a) Equipment which utilizes voice modulated communication shall show the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz. for equipment which is required to have a low pass filter, the frequency response of the filter, or all of the circuitry installed between the modulation limited and the modulated stage shall be supplied.
(b) Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be suppliеqd.

Test Procedure

Test Method: TIA/EIA-603 2.2.3

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2017-09-19 and 2017-09-21.

Test Mode: Transmitting

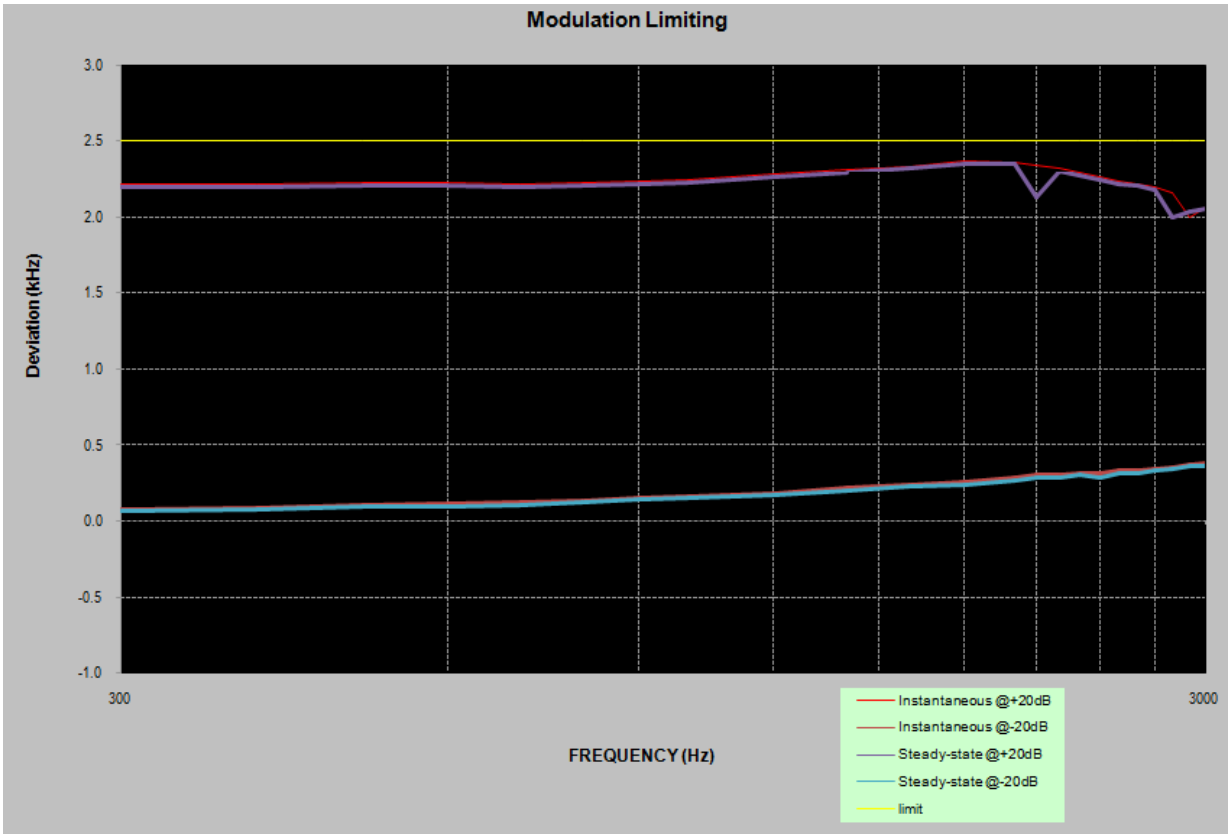
Result: Compliance.

Analog Modulation:

MODULATION LIMITING

Carrier Frequency: 453.2125 MHz, Channel Separation=12.5 kHz

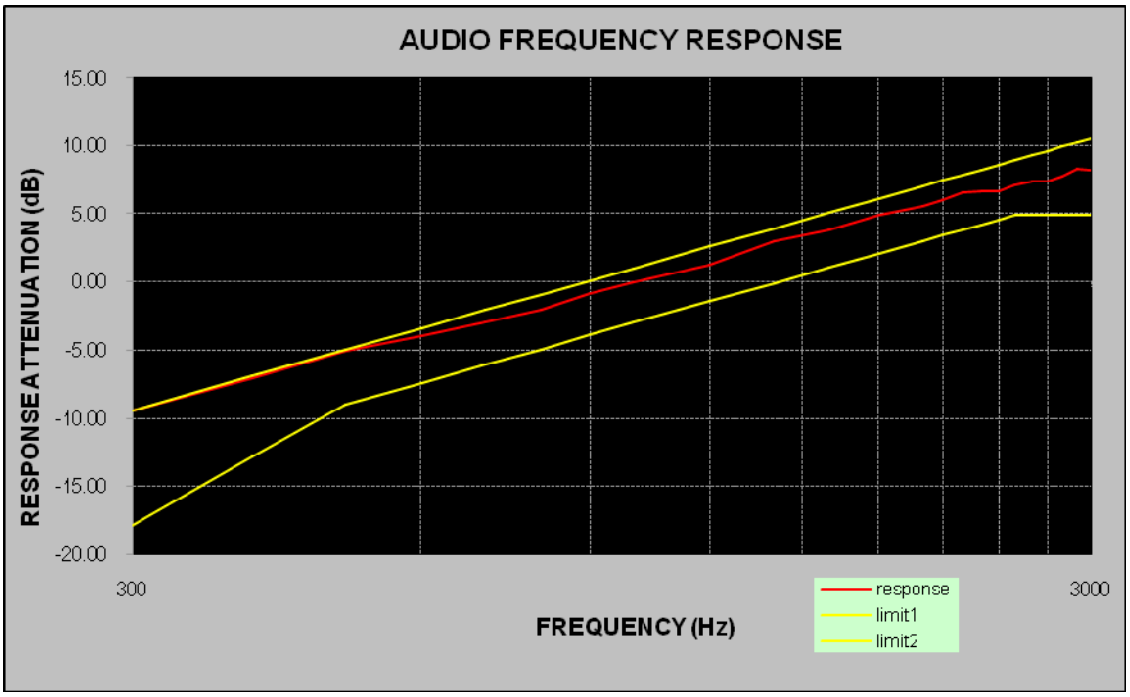
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	2.219	0.077	2.203	0.062	2.5
400	2.221	0.085	2.202	0.072	2.5
500	2.229	0.101	2.205	0.091	2.5
600	2.224	0.111	2.205	0.099	2.5
700	2.215	0.124	2.201	0.107	2.5
800	2.223	0.132	2.212	0.119	2.5
900	2.232	0.152	2.219	0.139	2.5
1000	2.250	0.166	2.224	0.153	2.5
1200	2.287	0.185	2.263	0.172	2.5
1400	2.309	0.223	2.294	0.204	2.5
1600	2.331	0.234	2.325	0.224	2.5
1800	2.371	0.257	2.351	0.241	2.5
2000	2.364	0.287	2.354	0.263	2.5
2100	2.341	0.301	2.132	0.287	2.5
2200	2.318	0.305	2.302	0.286	2.5
2300	2.291	0.318	2.279	0.302	2.5
2400	2.264	0.312	2.249	0.285	2.5
2500	2.238	0.329	2.221	0.315	2.5
2600	2.213	0.334	2.207	0.316	2.5
2700	2.198	0.342	2.182	0.331	2.5
2800	2.165	0.352	2.000	0.346	2.5
2900	2.003	0.373	2.035	0.361	2.5
3000	2.065	0.385	2.052	0.362	2.5


Modulation Limiting
Deviation (kHz)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
300
3000
FREQUENCY (Hz)
Instantaneous @+20dB
Instantaneous @-20dB
Steady-state @+20dB
Steady-state @-20dB
limit

Audio Frequency Response

Carrier Frequency: 453.2125 MHz, Channel Separation=12.5 kHz

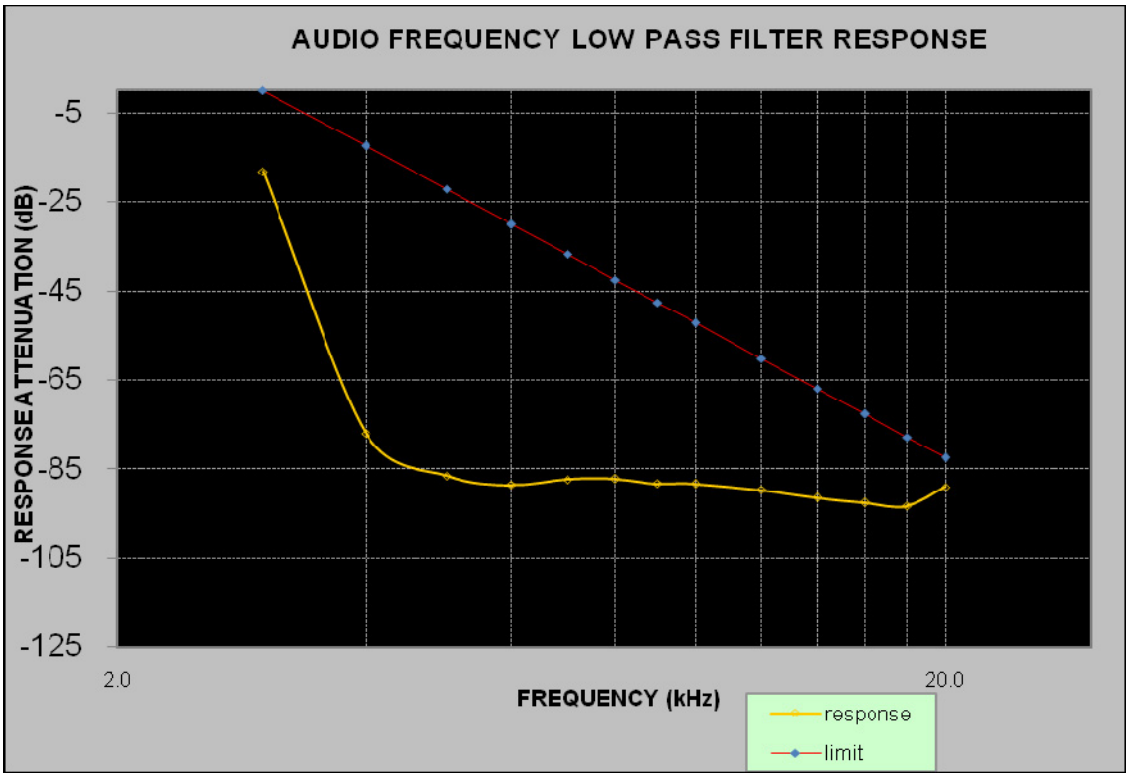
Audio Frequency (Hz)	Response Attenuation (dB)
300	-9.47
400	-7.09
500	-5.10
600	-3.93
700	-3.00
800	-2.00
900	-0.84
1000	0.00
1200	1.24
1400	2.97
1600	3.84
1800	4.95
2000	5.58
2100	5.99
2200	6.58
2300	6.67
2400	6.67
2500	7.10
2600	7.35
2700	7.41
2800	7.71
2900	8.25
3000	8.19


AUDIO FREQUENCY RESPONSE
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
RESPONSE ATTENUATION (dB)
300
3000
FREQUENCY (Hz)
response
limit1
limit2

Audio frequency lows pass filter response

Carrier Frequency: 453.2125 MHz, Channel Separation=12.5 kHz

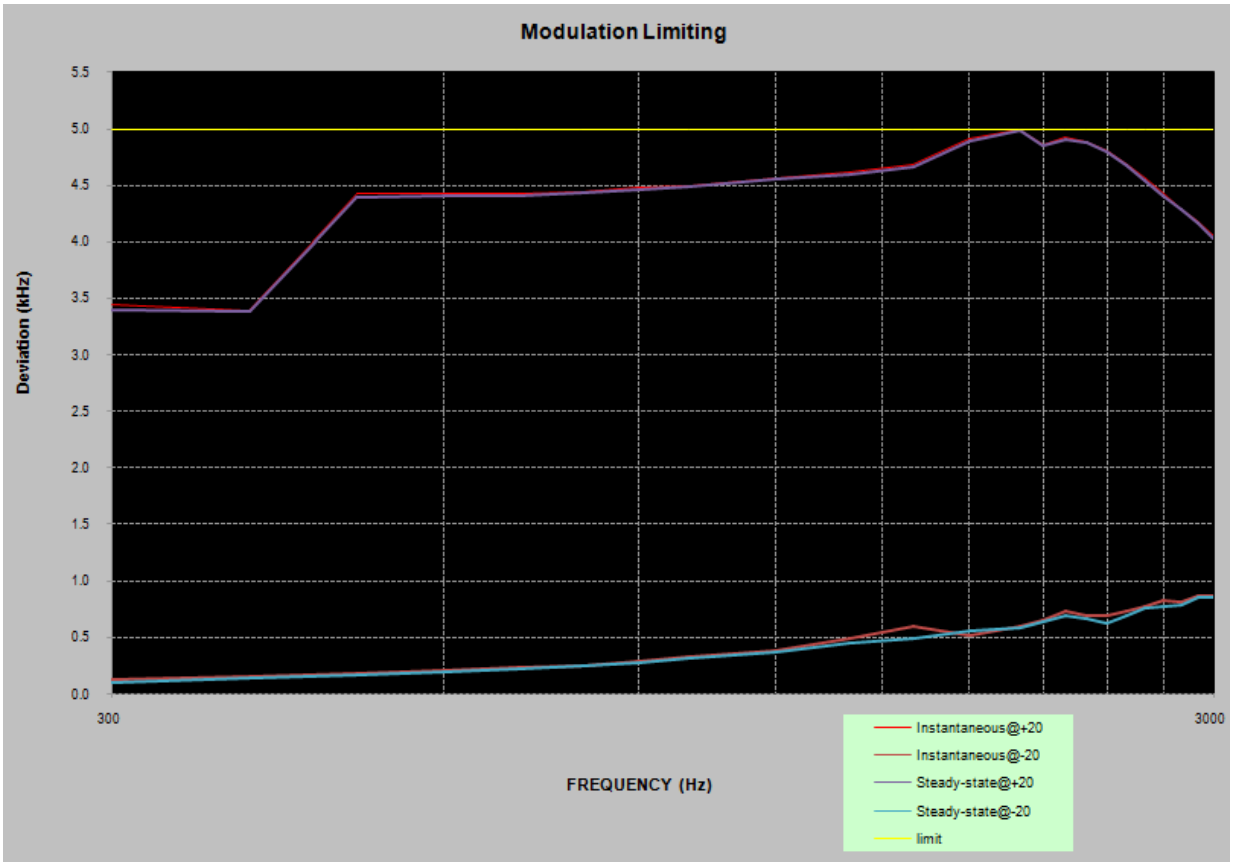
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-18.2	0.0
4.0	-77.1	-12.5
5.0	-86.5	-22.2
6.0	-88.6	-30.1
7.0	-87.4	-36.8
8.0	-87.3	-42.6
9.0	-88.3	-47.7
10.0	-88.4	-52.3
12.0	-89.7	-60.2
14.0	-91.5	-66.9
16.0	-92.6	-72.7
18.0	-93.3	-77.8
20.0	-89.1	-82.5



MODULATION LIMITING

Carrier Frequency: 453.2125 MHz, Channel Separation= 25 kHz

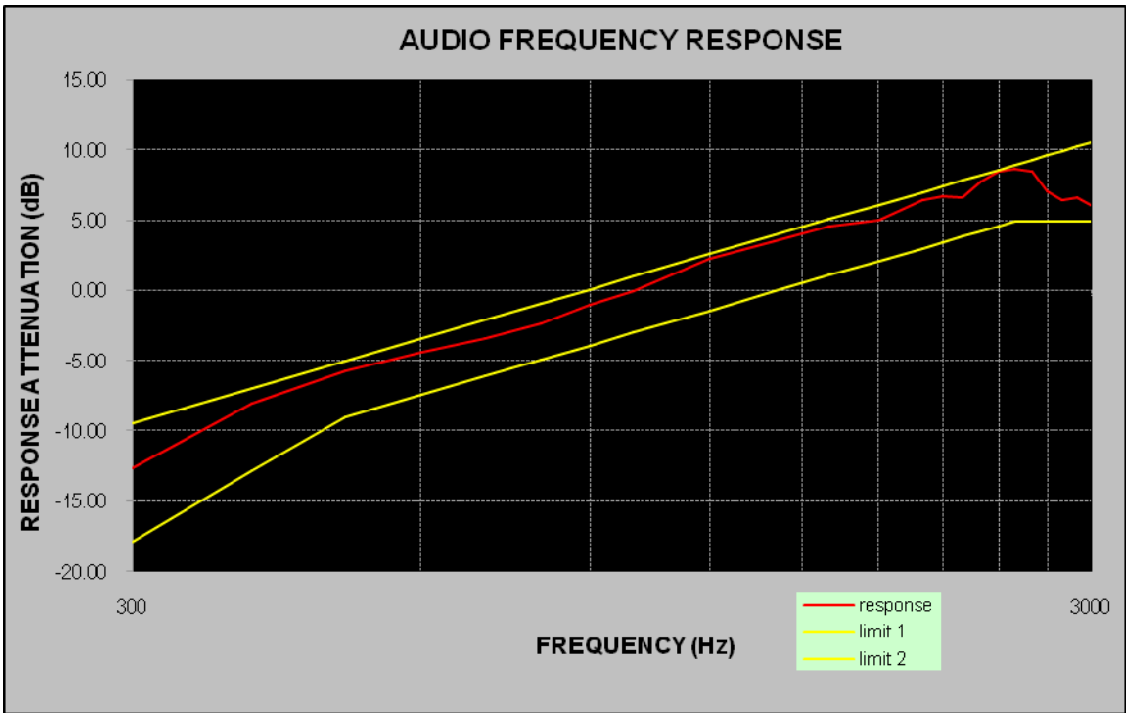
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	3.448	0.125	3.402	0.103	5.000
400	3.392	0.152	3.383	0.138	5.000
500	4.423	0.184	4.401	0.166	5.000
600	4.427	0.212	4.412	0.202	5.000
700	4.428	0.235	4.410	0.225	5.000
800	4.443	0.257	4.431	0.246	5.000
900	4.485	0.293	4.467	0.281	5.000
1000	4.492	0.336	4.483	0.321	5.000
1200	4.568	0.384	4.551	0.370	5.000
1400	4.616	0.488	4.593	0.451	5.000
1600	4.686	0.602	4.661	0.491	5.000
1800	4.907	0.517	4.891	0.563	5.000
2000	4.995	0.602	4.987	0.583	5.000
2100	4.854	0.653	4.846	0.642	5.000
2200	4.925	0.738	4.903	0.691	5.000
2300	4.884	0.689	4.879	0.672	5.000
2400	4.805	0.689	4.797	0.631	5.000
2500	4.688	0.735	4.672	0.701	5.000
2600	4.558	0.772	4.546	0.765	5.000
2700	4.425	0.834	4.409	0.781	5.000
2800	4.292	0.812	4.283	0.795	5.000
2900	4.187	0.869	4.168	0.854	5.000
3000	4.052	0.873	4.034	0.862	5.000


Modulation Limiting
Deviation (kHz)
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
300
3000
FREQUENCY (Hz)
Instantaneous@+20
Instantaneous@-20
Steady-state@+20
Steady-state@-20
limit

Audio Frequency Response

Carrier Frequency: 453.2125 MHz, Channel Separation= 25 kHz

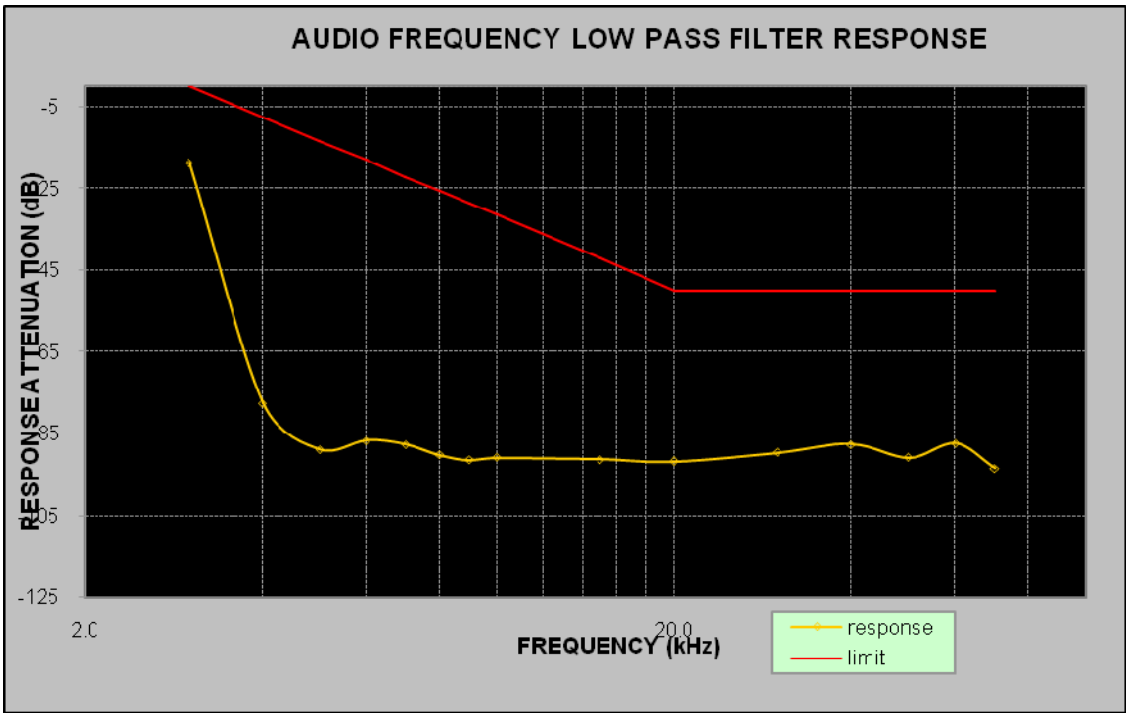
Audio Frequency (Hz)	Response Attenuation(dB)
300	-12.62
400	-8.05
500	-5.73
600	-4.41
700	-3.41
800	-2.34
900	-1.05
1000	0.00
1200	2.27
1400	3.50
1600	4.58
1800	4.97
2000	6.40
2100	6.66
2200	6.58
2300	7.79
2400	8.48
2500	8.62
2600	8.49
2700	7.09
2800	6.44
2900	6.63
3000	6.07


AUDIO FREQUENCY RESPONSE
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
RESPONSE ATTENUATION (dB)
300
3000
FREQUENCY (Hz)
response
limit 1
limit 2

Audio frequency lows pass filter response

Carrier Frequency: 453.2125 MHz, Channel Separation= 25 kHz

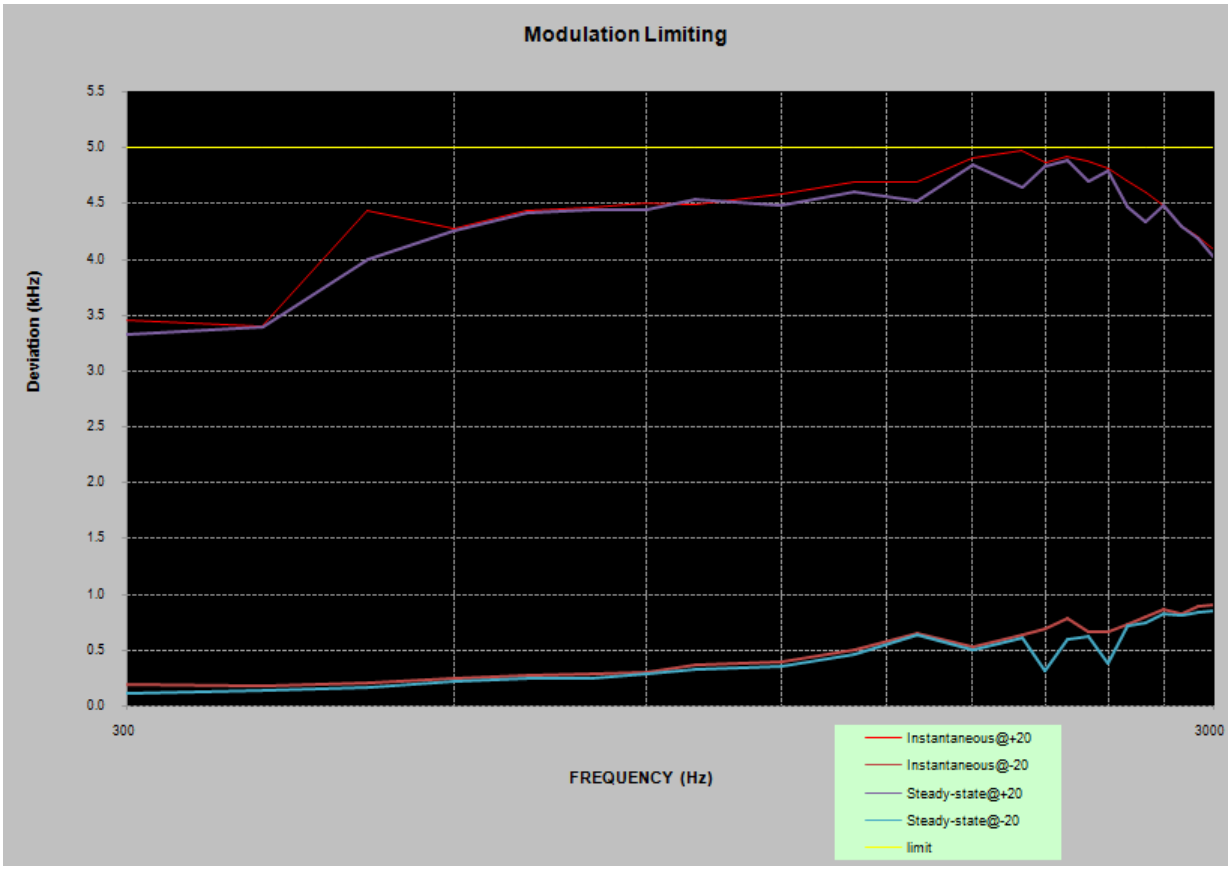
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-18.6	0.0
4.0	-77.5	-7.5
5.0	-88.9	-13.3
6.0	-86.7	-18.1
7.0	-87.7	-22.1
8.0	-90.2	-25.6
9.0	-91.4	-28.6
10.0	-90.8	-31.4
15.0	-91.3	-41.9
20.0	-91.8	-50.0
30.0	-89.6	-50.0
40.0	-87.6	-50.0
50.0	-90.8	-50.0
60.0	-87.3	-50.0
70.0	-93.4	-50.0



MODULATION LIMITING

Carrier Frequency: 458.2125 MHz, Channel Separation= 25 kHz

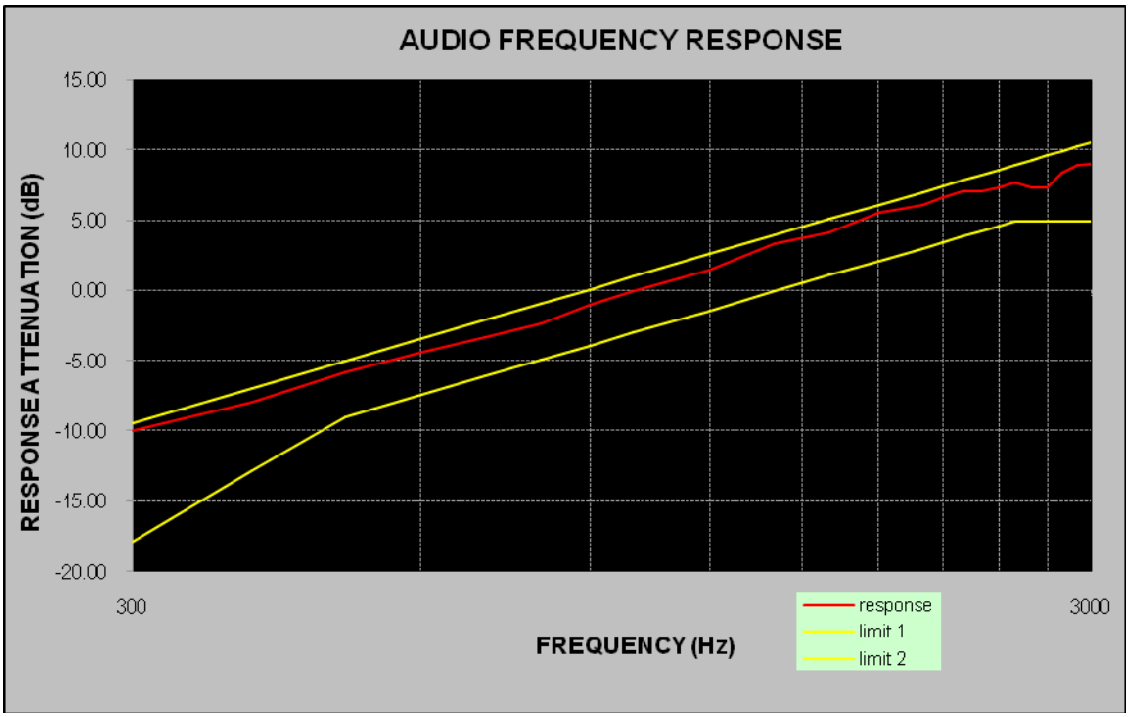
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	3.452	0.186	3.325	0.105	5.000
400	3.401	0.176	3.387	0.134	5.000
500	4.428	0.196	4.000	0.167	5.000
600	4.278	0.238	4.251	0.209	5.000
700	4.433	0.268	4.419	0.246	5.000
800	4.456	0.279	4.438	0.237	5.000
900	4.496	0.301	4.436	0.285	5.000
1000	4.486	0.359	4.536	0.321	5.000
1200	4.579	0.396	4.482	0.346	5.000
1400	4.685	0.495	4.598	0.456	5.000
1600	4.687	0.652	4.526	0.631	5.000
1800	4.897	0.529	4.842	0.492	5.000
2000	4.968	0.628	4.638	0.605	5.000
2100	4.867	0.685	4.824	0.313	5.000
2200	4.916	0.785	4.889	0.596	5.000
2300	4.879	0.657	4.689	0.619	5.000
2400	4.813	0.659	4.796	0.375	5.000
2500	4.698	0.731	4.468	0.716	5.000
2600	4.596	0.788	4.326	0.746	5.000
2700	4.467	0.865	4.481	0.824	5.000
2800	4.305	0.825	4.285	0.813	5.000
2900	4.206	0.895	4.185	0.834	5.000
3000	4.086	0.896	4.019	0.851	5.000


Modulation Limiting
Deviation (kHz)
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
300
3000
FREQUENCY (Hz)
Instantaneous@+20
Instantaneous@-20
Steady-state@+20
Steady-state@-20
limit

Audio Frequency Response

Carrier Frequency: 458.2125 MHz, Channel Separation= 25 kHz

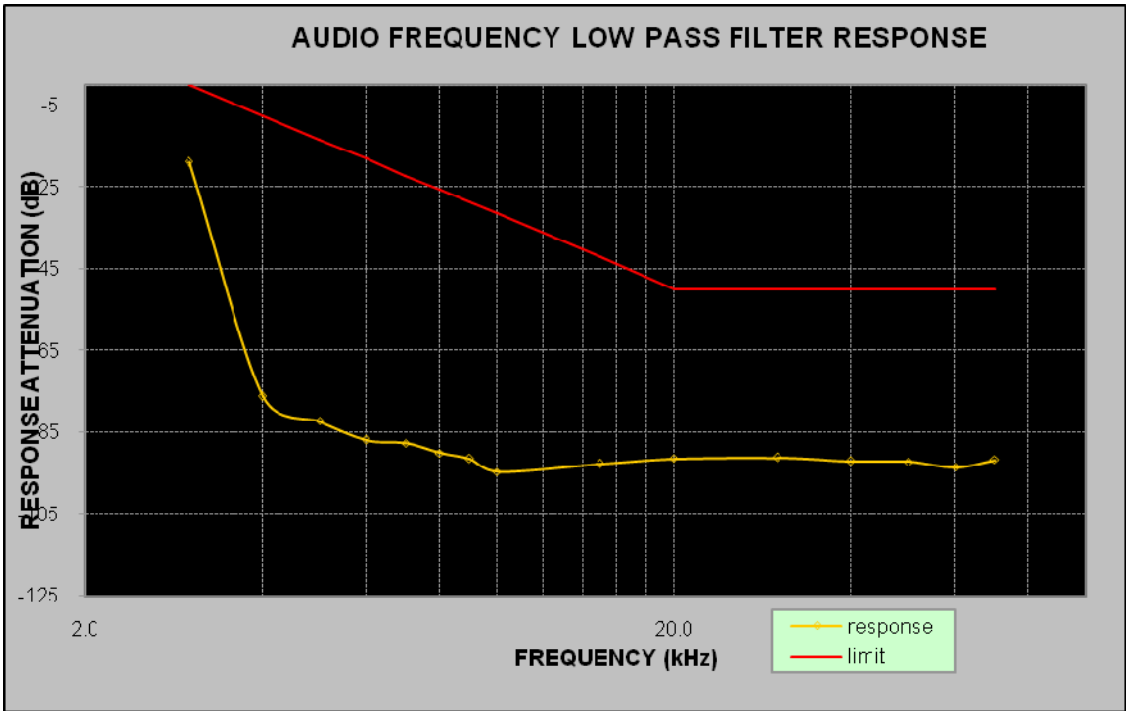
Audio Frequency (Hz)	Response Attenuation(dB)
300	-10.01
400	-7.94
500	-5.83
600	-4.38
700	-3.36
800	-2.35
900	-1.04
1000	0.00
1200	1.43
1400	3.33
1600	4.11
1800	5.56
2000	6.03
2100	6.60
2200	7.05
2300	7.10
2400	7.29
2500	7.67
2600	7.28
2700	7.35
2800	8.35
2900	8.90
3000	9.00


AUDIO FREQUENCY RESPONSE
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
RESPONSE ATTENUATION (dB)
300
3000
FREQUENCY (Hz)
response
limit 1
limit 2

Audio frequency lows pass filter response

Carrier Frequency: 458.2125 MHz, Channel Separation= 25 kHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-18.8	0.0
4.0	-76.2	-7.5
5.0	-82.3	-13.3
6.0	-86.9	-18.1
7.0	-87.6	-22.1
8.0	-90.1	-25.6
9.0	-91.5	-28.6
10.0	-94.6	-31.4
15.0	-92.7	-41.9
20.0	-91.4	-50.0
30.0	-91.2	-50.0
40.0	-92.1	-50.0
50.0	-92.3	-50.0
60.0	-93.6	-50.0
70.0	-91.7	-50.0



FCC §2.1049 & §74.462 & § 80.205 & § 80.207 – OCCUPIED BANDWIDTH & EMISSION MASK

Applicable Standard

FCC §2.1049, §74.462, § 80.205, § 80.207

Emission Mask D - 12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

1) For any frequency removed from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0, 0dB.

2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.626 kHz but no more than 12.5 kHz, at least 7.27 (f_d –2.88 kHz) dB.

3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz at least: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

Emission Mask B - 25 kHz channel bandwidth equipment. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 100 Hz and the spectrum was recorded in the frequency band ±50 kHz from the carrier frequency.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

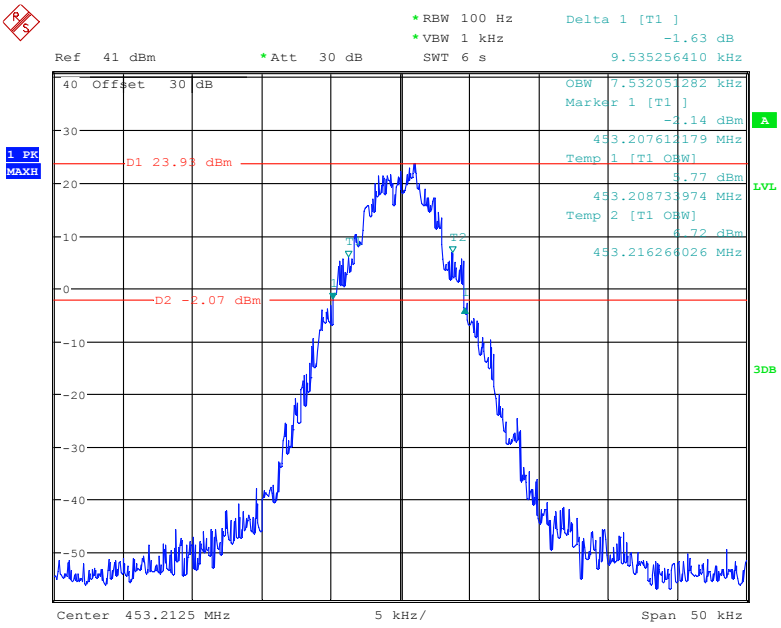
The testing was performed by Simon Wang on 2017-09-19.

Modulation	Channel Separation (kHz)	Frequency (MHz)	Power Level	99% Occupied Bandwidth (kHz)	26 dB Emissions Bandwidth (kHz)	Note
Digital	12.5	453.2125	High	7.53	9.21	For Part 74
	12.5		Low	7.53	9.54	

For Digital Mode (Channel Spacing: 12.5 kHz)
Emission Designator 7K60FXD and 7K60FXW
The 99% energy rule (title 47CFR 2.1049) was used for digital mode. It basically states that 99% of the modulation energy falls within X kHz, in this case, 7.53 kHz. The emission mask was obtained from 47CFR 90.210(d).
F1D and F1E portion of the designator indicates digital information.
Therefore, the entire designator for 12.5 kHz channel spacing digital mode is 7K60FXD and 7K60FXW.

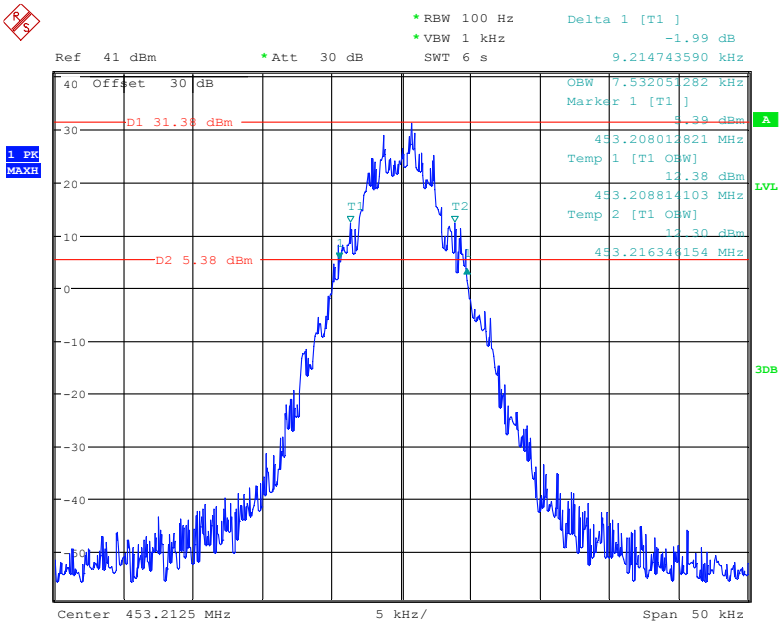
Digital Modulation, 12.5 kHz:

Frequency 453.2125 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



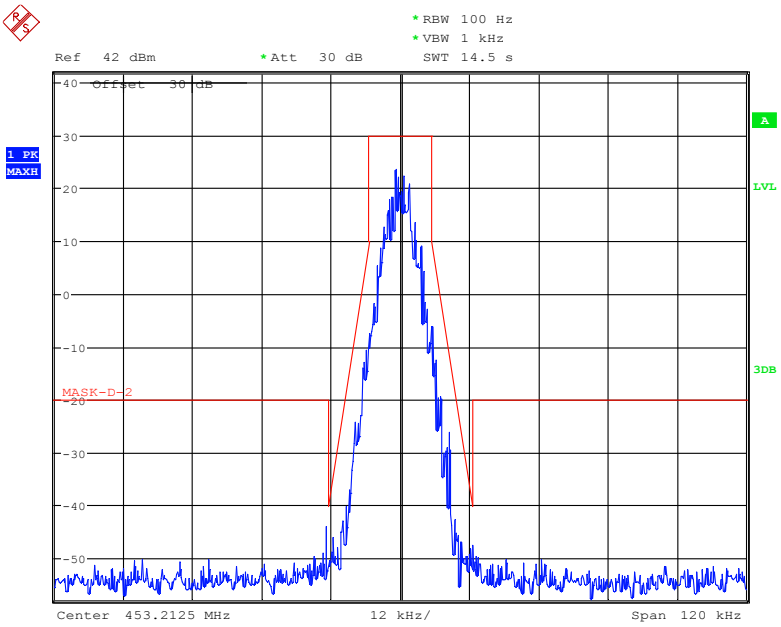
Date: 19.SEP.2017 11:49:17

Frequency 453.2125 MHz: 99% Occupied & 26 dB Bandwidth, High Power



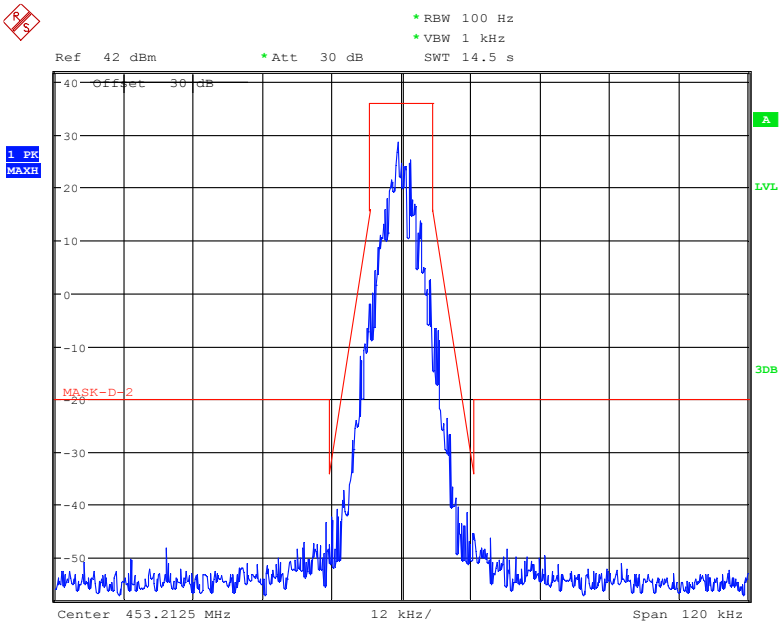
Date: 19.SEP.2017 11:54:21

Frequency 453.2125 MHz: Emission Mask D, Low Power



Date: 19.SEP.2017 14:56:52

Frequency 453.2125 MHz: Emission Mask D, High Power



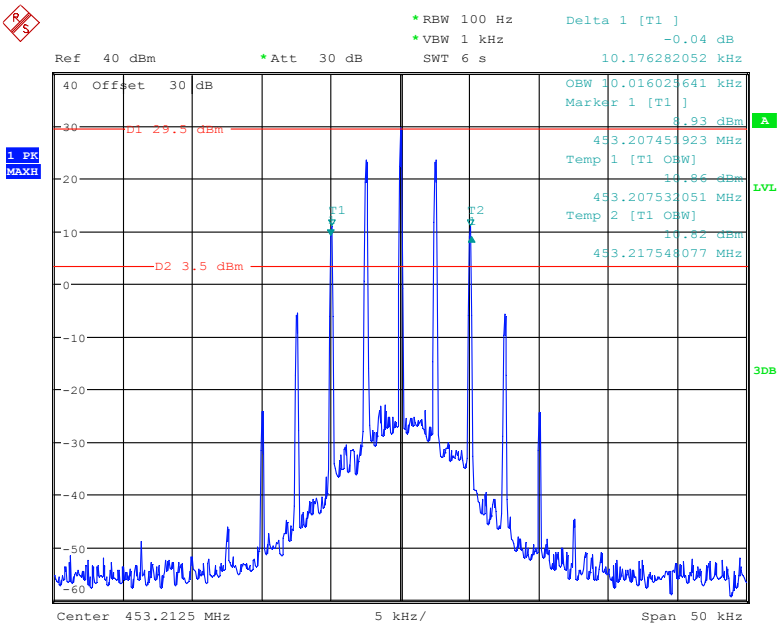
Date: 19.SEP.2017 14:53:15

Modulation	Channel Separation (kHz)	Frequency (MHz)	Power Level	99% Occupied Bandwidth (kHz)	26 dB Emissions Bandwidth (kHz)	Note
Analog	12.5	453.2125	High	10.02	10.18	For Part 74
	12.5		Low	10.02	10.18	

For FM Mode (Channel Spacing: 12.5 kHz)
Emission Designator 11K0F3E In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation. BW = 2(M+D) = 2(3.0 kHz + 2.5 kHz) = 11 kHz → 11K0*
F3E portion of the designator represents an FM voice transmission Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

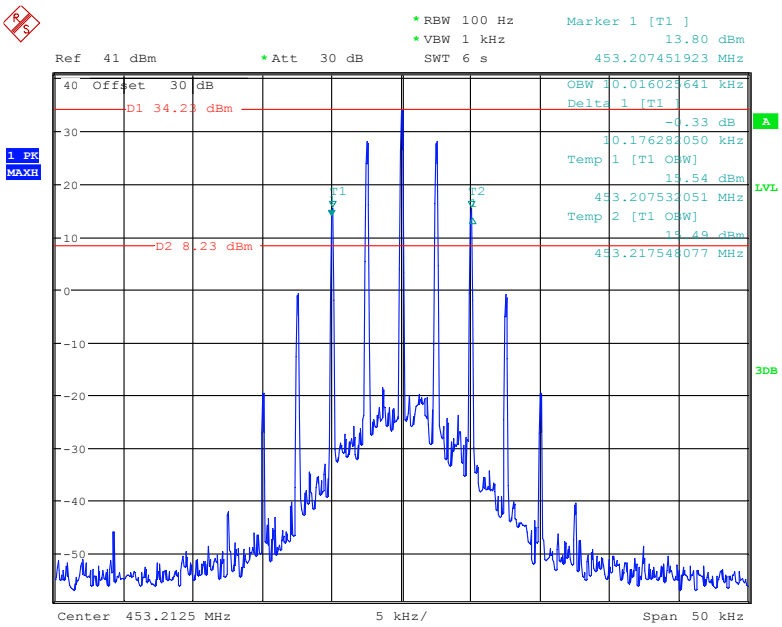
Analog Modulation, 12.5 kHz:

Frequency 453.2125 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



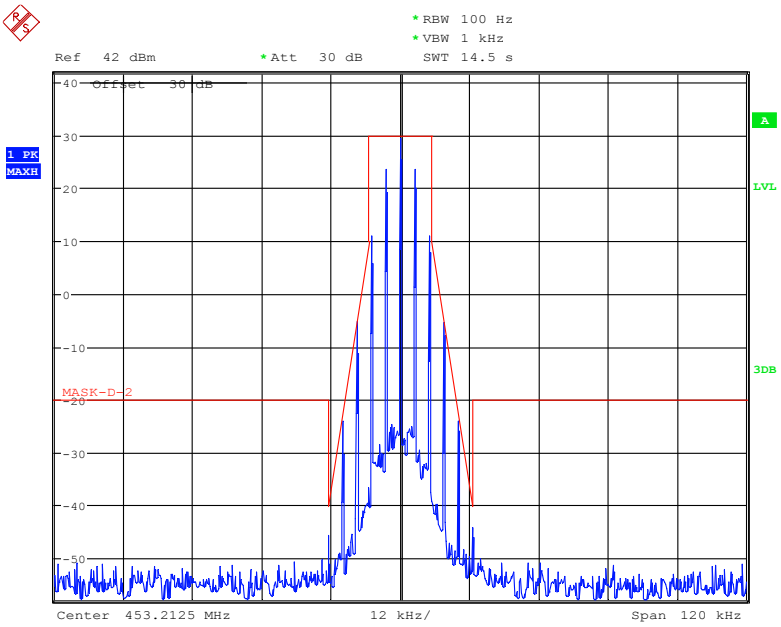
Date: 19.SEP.2017 13:34:59

Frequency 453.2125 MHz: 99% Occupied & 26 dB Bandwidth, High Power



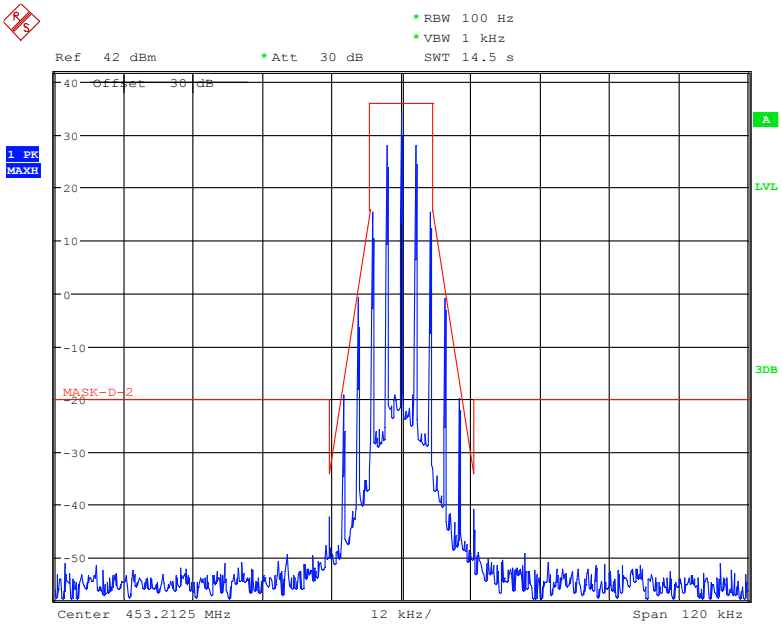
Date: 19.SEP.2017 13:22:56

Frequency 453.2125 MHz: Emission Mask D, Low Power



Date: 19.SEP.2017 14:25:45

Frequency 453.2125 MHz: Emission Mask D, High Power



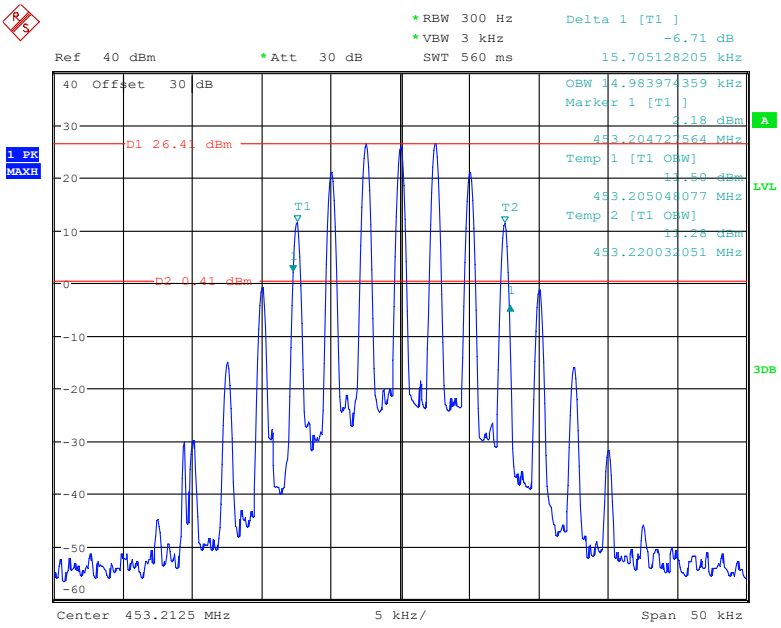
Date: 19.SEP.2017 14:27:46

Modulation	Channel Separation (kHz)	Frequency (MHz)	Power Level	99% Occupied Bandwidth (kHz)	26 dB Emissions Bandwidth (kHz)	Note
Analog	25	453.2125	High	15.14	15.63	For Part 74
	25		Low	14.98	15.71	
	25	458.2125	High	14.90	15.63	For Part 80
	25		Low	15.14	15.63	

For FM Mode (Channel Spacing: 25 kHz)
Emission Designator 16K0F3E In this case, the maximum modulating frequency is 5.0 kHz with a 3.0 kHz deviation. BW = 2(M+D) = 2(5.0 kHz + 3.0 kHz) = 16 kHz → 16K0*
F3E portion of the designator represents an FM voice transmission Therefore, the entire designator for 25 kHz channel spacing FM mode is 16K0F3E.

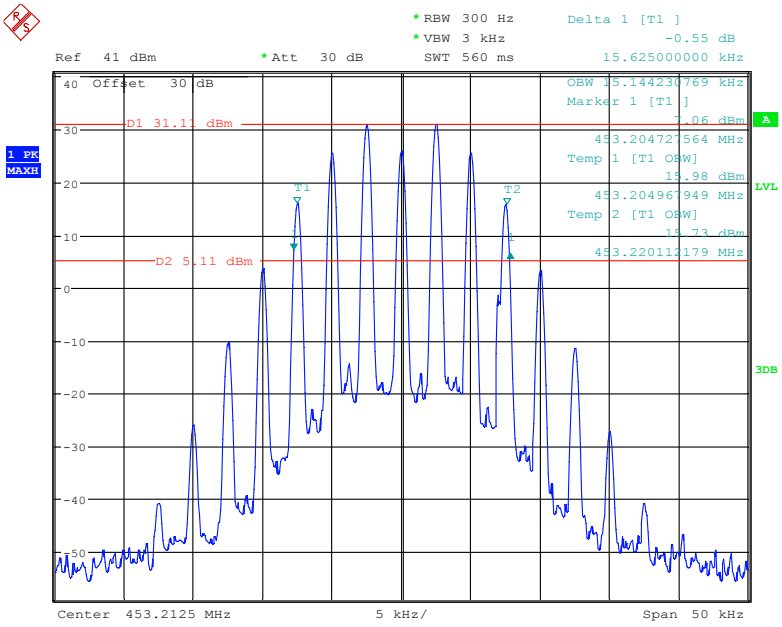
Analog Modulation, 25 kHz:

Frequency 453.2125 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



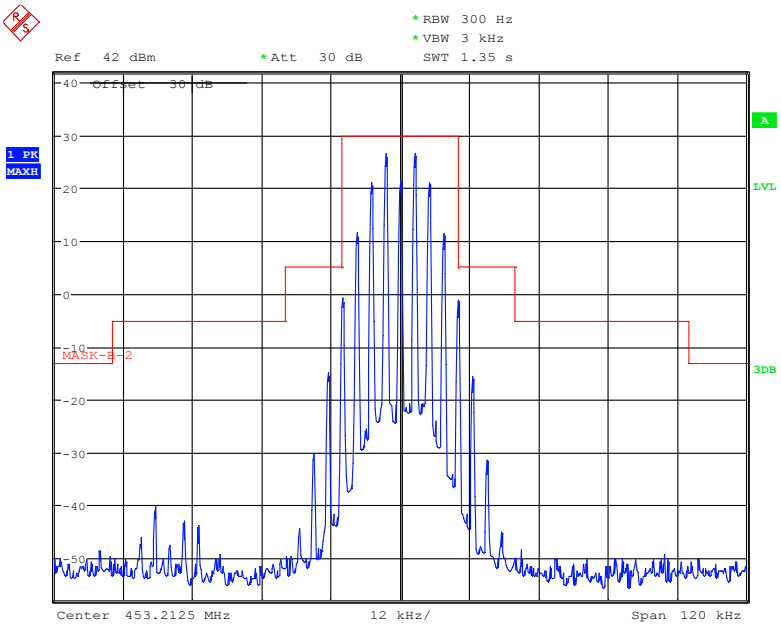
Date: 19.SEP.2017 13:46:01

Frequency 453.2125 MHz: 99% Occupied & 26 dB Bandwidth, High Power



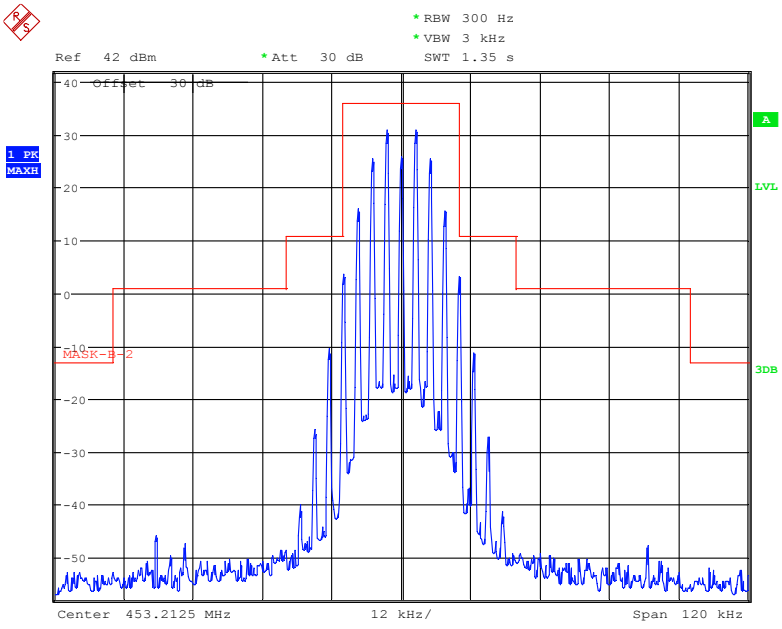
Date: 19.SEP.2017 13:47:48

Frequency 453.2125 MHz: Emission Mask B, Low Power



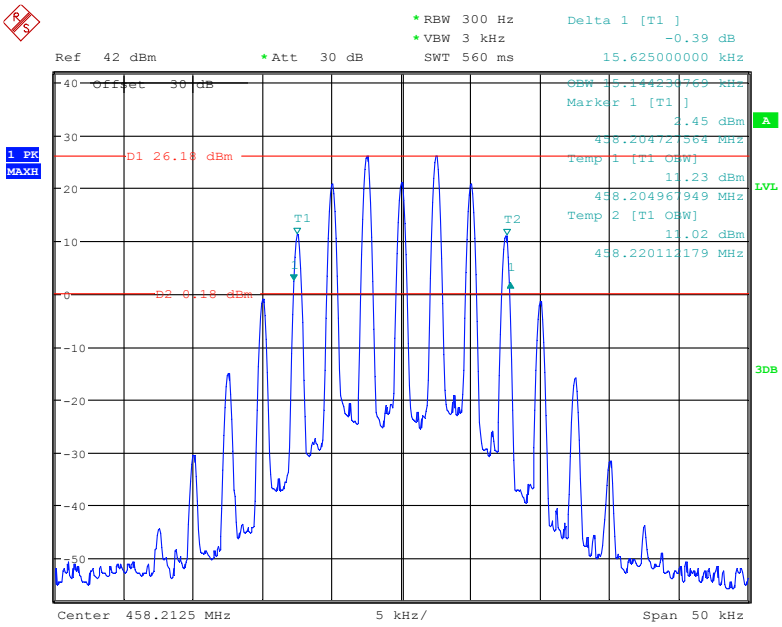
Date: 19.SEP.2017 14:08:20

Frequency 453.2125 MHz: Emission Mask B, High Power



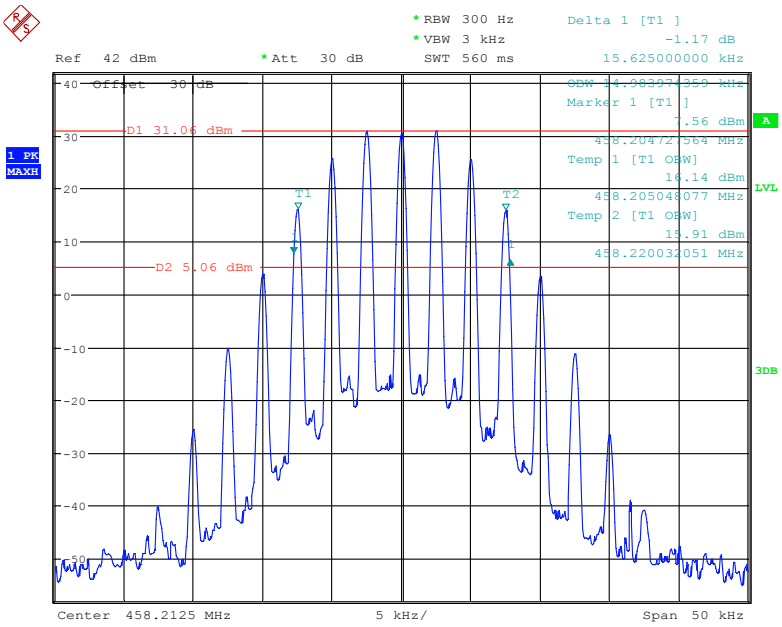
Date: 19.SEP.2017 14:10:53

Frequency 458.2125 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



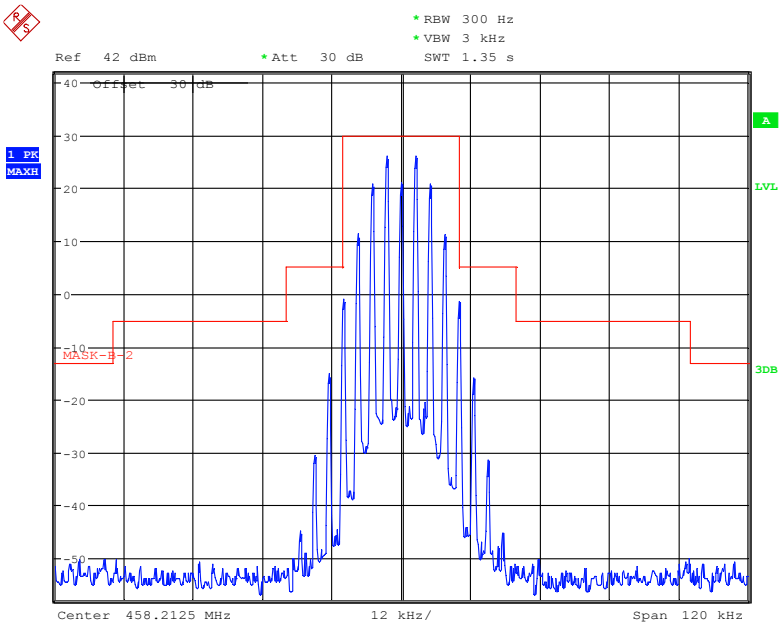
Date: 19.SEP.2017 13:58:43

Frequency 458.2125 MHz: 99% Occupied & 26 dB Bandwidth, High Power



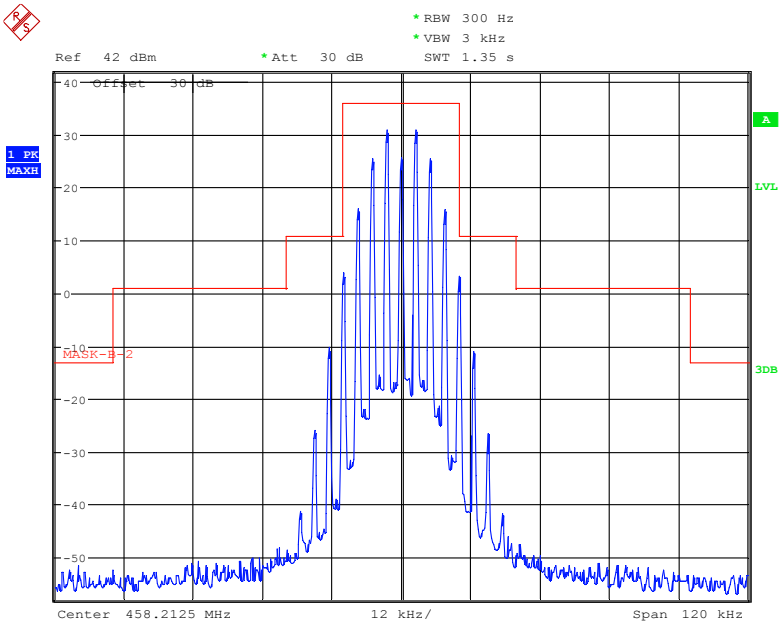
Date: 19.SEP.2017 14:00:08

Frequency 458.2125 MHz: Emission Mask B, Low Power



Date: 19.SEP.2017 14:17:15

Frequency 458.2125 MHz: Emission Mask B, High Power



Date: 19.SEP.2017 14:18:57

FCC §2.1051 & §74.462 & § 80.211 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

1) For any frequency removed from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0, 0 dB.

2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.626 kHz but no more than 12.5 kHz, at least 7.27 (f_d –2.88 kHz) dB.

3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

Emission Mask B - 25 kHz channel bandwidth equipment. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100kHz for below 1GHz, and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Test Data

Environmental Conditions

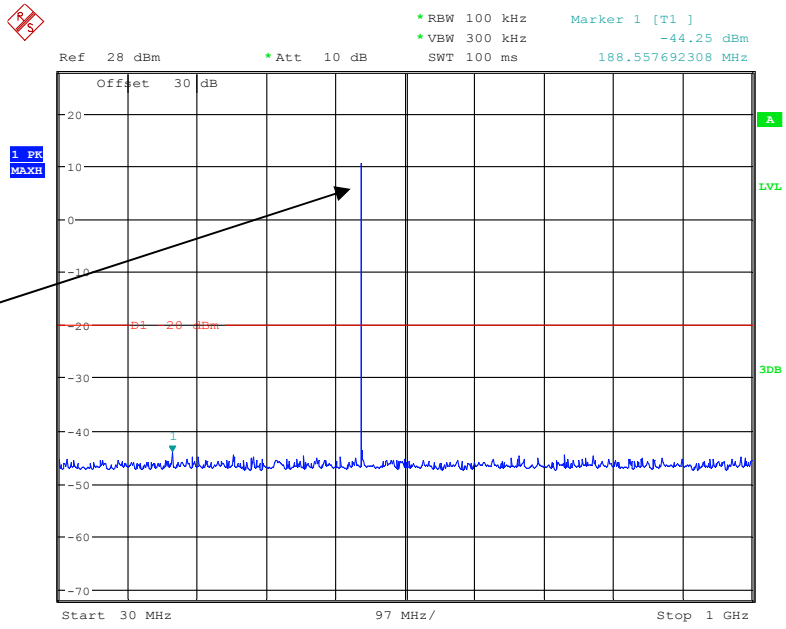
Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2017-09-19.

Test Mode: Transmitting, please refer to the following plots.

Digital Modulation:

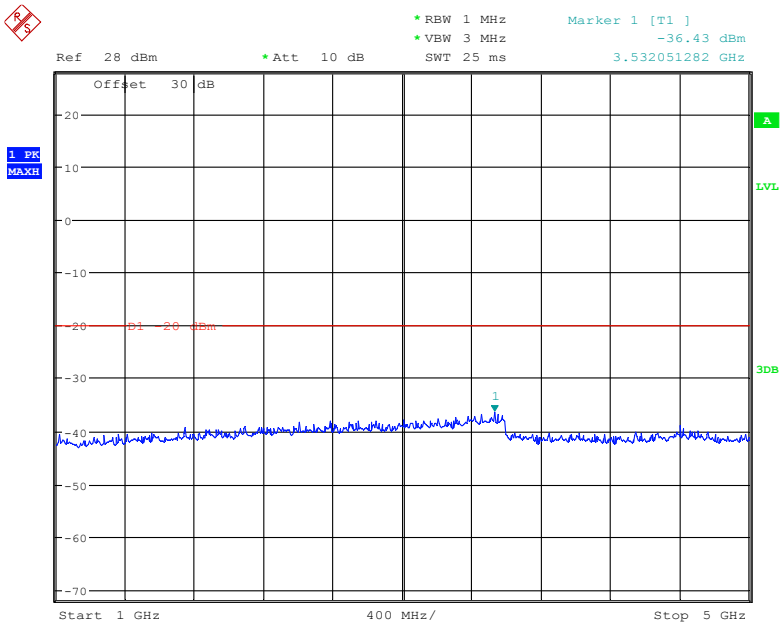
30MHz – 1 GHz, Channel Spacing 12.5 kHz, 453.2125 MHz



Fund.test with notch

Date: 19.SEP.2017 15:15:24

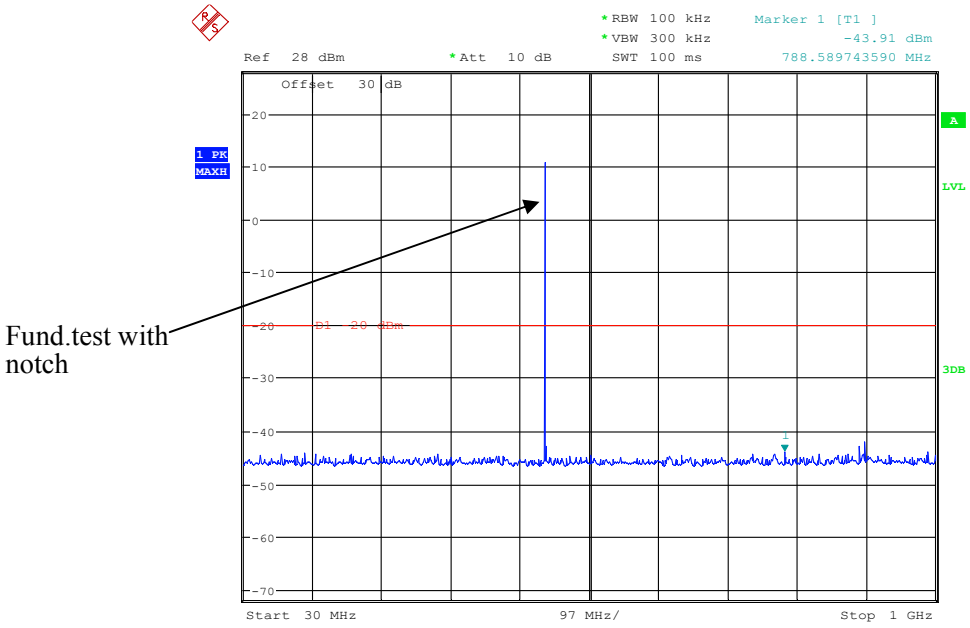
1 GHz – 5 GHz, Channel Spacing 12.5 kHz, 453.2125 MHz



Date: 19.SEP.2017 15:14:25

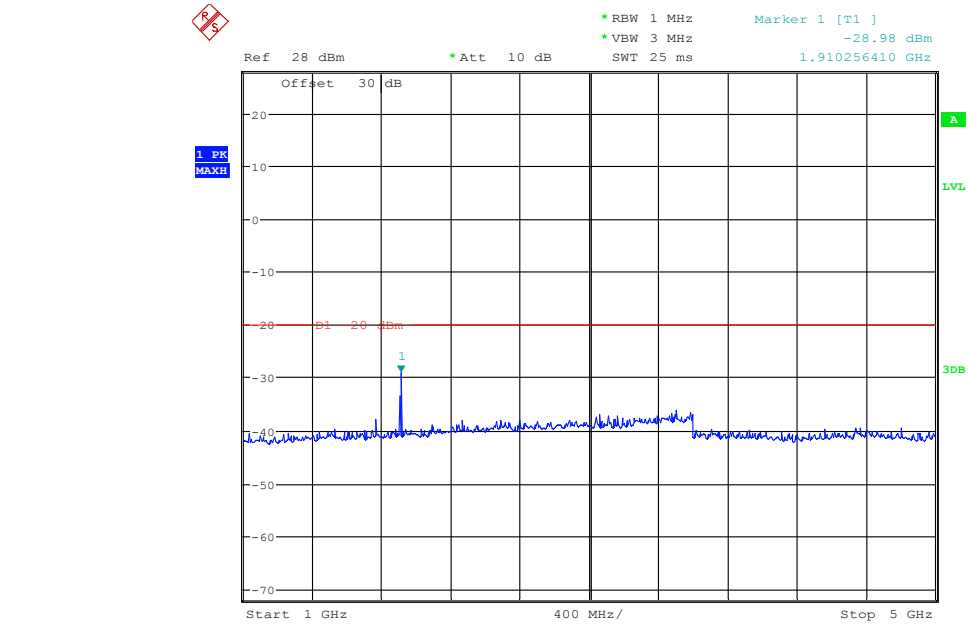
Analog Modulation:

30MHz – 1 GHz, Channel Spacing 12.5 kHz, 453.2125 MHz



Date: 19.SEP.2017 15:04:36

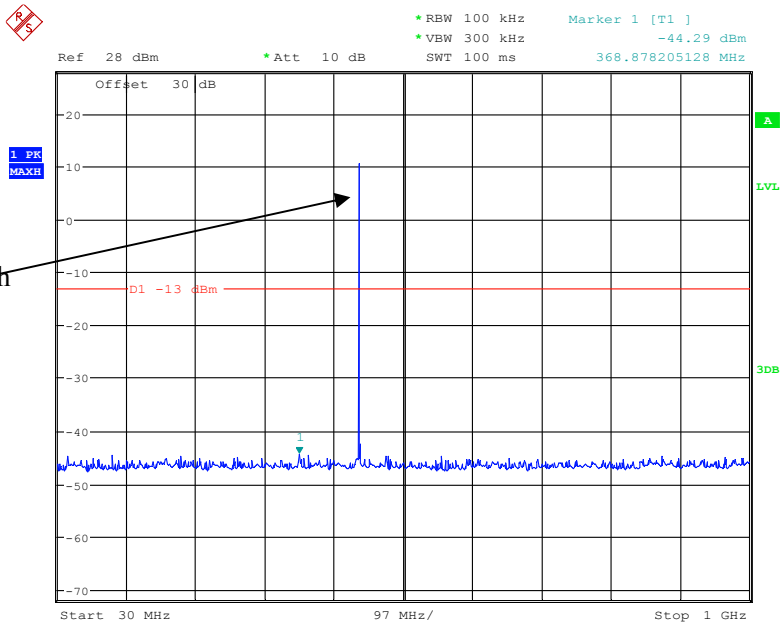
1 GHz – 5 GHz, Channel Spacing 12.5 kHz, 453.2125 MHz



Date: 19.SEP.2017 15:06:08

Analog Modulation:

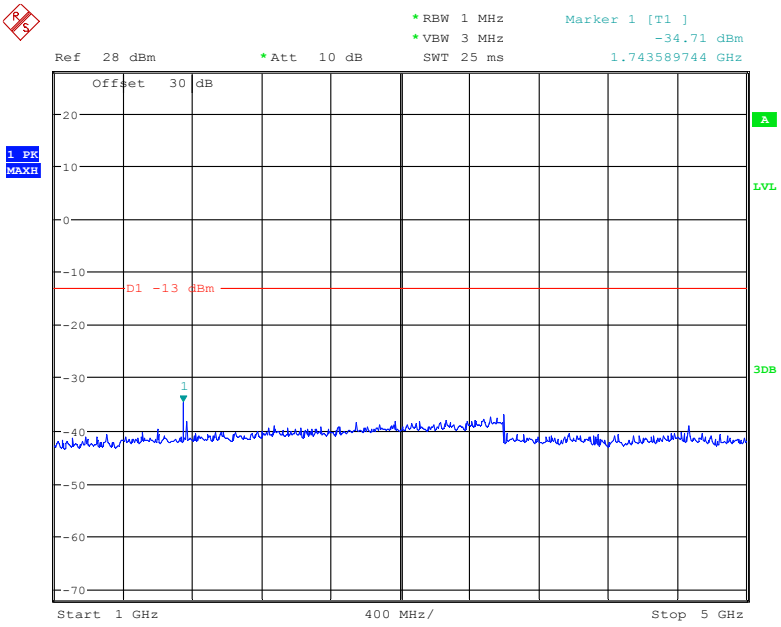
30MHz – 1 GHz, Channel Spacing 25 kHz, 453.2125 MHz



Fund.test with notch

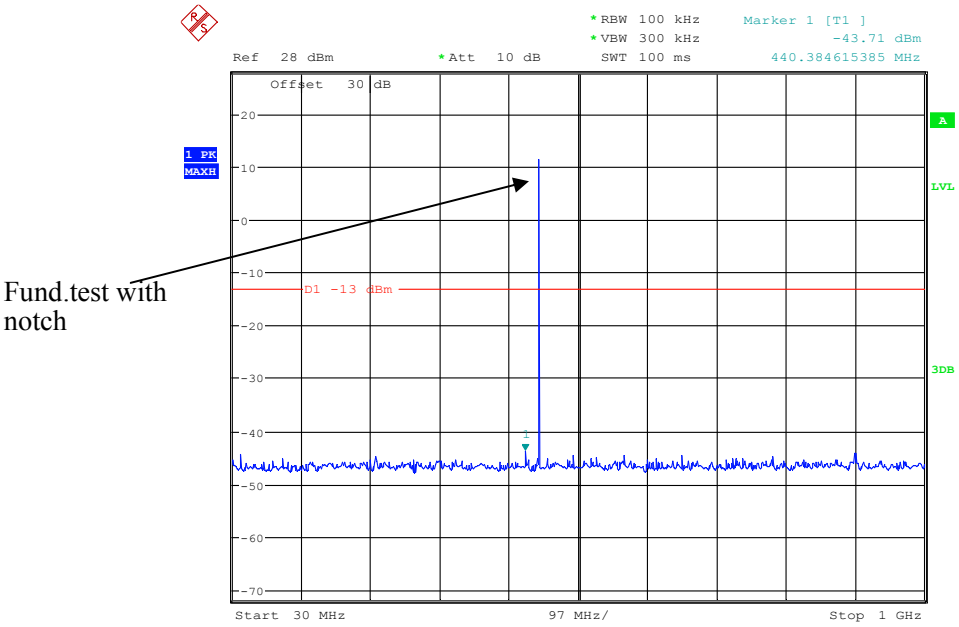
Date: 19.SEP.2017 15:21:21

1 GHz – 5 GHz, Channel Spacing 25 kHz, 453.2125 MHz



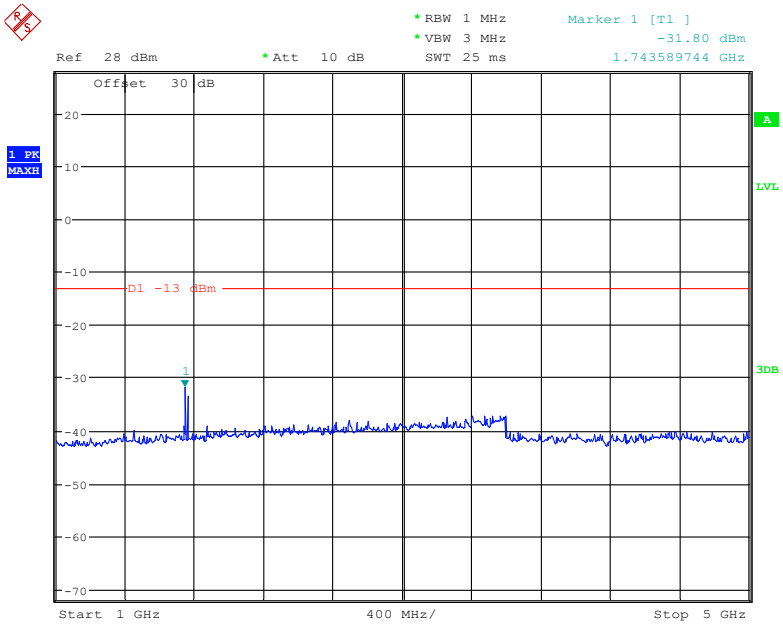
Date: 19.SEP.2017 15:22:42

30MHz – 1 GHz, Channel Spacing 25 kHz, 458.2125 MHz



Date: 19.SEP.2017 15:25:49

1 GHz – 5 GHz, Channel Spacing 25 kHz, 458.2125 MHz



Date: 19.SEP.2017 15:26:53

FCC §2.1053 & §74.462 & § 80.211 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053, §74.462, § 80.211

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT .The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =10 1g (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB =50+10 Log_{10} (power out in Watts) for EUT with a 12.5 kHz channel bandwidth.

Spurious attenuation limit in dB =43 + 10 log (P) for EUT with a 25 kHz channel bandwidth.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2017-09-26.

Test Mode: Transmitting

30MHz - 5GHz:

Frequency (MHz)	Receiver Reading (dBμV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
Analog 453.2125MHz, 12.5 kHz										
906.43	43.52	117	1.2	H	-53.5	0.7	0	-54.2	-20	34.2
906.43	42.95	73	1.3	V	-54.1	0.7	0	-54.8	-20	34.8
1359.64	43.01	208	1.6	H	-64.9	1.60	8.30	-58.20	-20	38.20
1359.64	43.71	345	1.1	V	-64.5	1.60	8.30	-57.80	-20	37.80
1812.85	42.79	353	1.6	H	-63.6	1.30	8.50	-56.40	-20	36.40
1812.85	42.84	208	2.1	V	-63.2	1.30	8.50	-56.00	-20	36.00
Analog 453.2125MHz, 25 kHz										
906.43	44.87	130	1.7	H	-52.1	0.7	0	-52.8	-13	39.8
906.43	45.01	223	2.1	V	-52	0.7	0	-52.7	-13	39.7
1359.64	43.51	173	2.3	H	-64.4	1.60	8.30	-57.70	-13	44.7
1359.64	43.59	279	1.4	V	-64.6	1.60	8.30	-57.90	-13	44.9
1812.85	43.43	273	1.9	H	-63.0	1.30	8.50	-55.80	-13	42.8
1812.85	42.74	359	1.5	V	-63.3	1.30	8.50	-56.10	-13	43.1
Analog 458.2125MHz, 25 kHz										
916.43	45.51	206	1.1	H	-51.5	0.71	0	-52.21	-13	39.21
916.43	46.07	293	1.1	V	-50.9	0.71	0	-51.61	-13	38.61
1374.64	43.51	81	1.3	H	-64.3	1.60	8.30	-57.60	-13	44.6
1374.64	43.84	65	1.6	V	-64.3	1.60	8.30	-57.60	-13	44.6
1832.85	42.36	256	2.1	H	-63.7	1.30	8.50	-56.50	-13	43.5
1832.85	42.57	265	2.4	V	-63.1	1.30	8.50	-55.90	-13	42.9

Frequency (MHz)	Receiver Reading (dBμV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
Digital 453.2125MHz, 12.5 kHz										
906.43	43.81	157	1.1	H	-53.2	0.7	0	-53.9	-20	33.9
906.43	43.16	46	2.5	V	-53.8	0.7	0	-54.5	-20	34.5
1359.64	43.1	326	1.4	H	-64.9	1.60	8.30	-58.20	-20	38.20
1359.64	43.64	127	1.9	V	-64.6	1.60	8.30	-57.90	-20	37.90
1812.85	43.64	226	2.3	H	-62.8	1.30	8.50	-55.60	-20	35.60
1812.85	43.18	91	1.3	V	-62.9	1.30	8.50	-55.70	-20	35.70

Note:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

FCC §2.1055 & §74.464 & § 80.209 - FREQUENCY STABILITY

Applicable Standard

FCC §2.1055, §74.464, § 80.209

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2017-09-25.

Test Mode: Transmitting

Digital Modulation, Reference Frequency: 453.2125 MHz, Limit: ±5 ppm,12.5 kHz			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	7.20	453.212456	-0.09708
40	7.20	453.212448	-0.11474
30	7.20	453.212479	-0.04634
20	7.20	453.212468	-0.07061
10	7.20	453.212449	-0.11253
0	7.20	453.212489	-0.02427
-10	7.20	453.212469	-0.0684
-20	7.20	453.212458	-0.09267
-30	7.20	453.212428	-0.15887
Frequency Stability versus Input Voltage			
20	6.80	453.212475	-0.05516

Analog Modulation, Reference Frequency: 453.2125 MHz, Limit: ±5 ppm,12.5 kHz			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	7.20	453.212479	-0.04634
40	7.20	453.212456	-0.09708
30	7.20	453.212436	-0.14121
20	7.20	453.212487	-0.02868
10	7.20	453.212468	-0.07061
0	7.20	453.212491	-0.01986
-10	7.20	453.212463	-0.08164
-20	7.20	453.212446	-0.11915
-30	7.20	453.212452	-0.10591
Frequency Stability versus Input Voltage			
20	6.80	453.212442	-0.12798

Analog Modulation, Reference Frequency: 453.2125 MHz, Limit: ±5 ppm, 25 kHz			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	7.20	453.212469	-0.0684
40	7.20	453.212428	-0.15887
30	7.20	453.212467	-0.07281
20	7.20	453.212491	-0.01986
10	7.20	453.212426	-0.16328
0	7.20	453.212461	-0.08605
-10	7.20	453.212486	-0.03089
-20	7.20	453.212462	-0.08385
-30	7.20	453.212475	-0.05516
Frequency Stability versus Input Voltage			
20	6.80	453.212461	-0.08605

Analog Modulation, Reference Frequency: 458.2125 MHz, Limit: ±5 ppm, 25 kHz			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	7.20	458.212469	-0.06765
40	7.20	458.212434	-0.14404
30	7.20	458.212464	-0.07857
20	7.20	458.212477	-0.0502
10	7.20	458.212486	-0.03055
0	7.20	458.212496	-0.00873
-10	7.20	458.212463	-0.08075
-20	7.20	458.212435	-0.14186
-30	7.20	458.212464	-0.07857
Frequency Stability versus Input Voltage			
20	6.80	458.212471	-0.06329

******* END OF REPORT *******