FCC PART 22 and 90

TEST REPORT

For

Hytera Communications Corporation Limited

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

FCC ID: YAMPD71XISVHF

Report Type:	**Product Type:**
Original Report	Is Digital Radio

Report Number:	RDG161020007-00
Report Date:	2017-01-11
Reviewed By:	Oscar Ye Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Hytera Communications Corporation Limited*'s product, model number: *PD712IS VHF(FCC ID: YAMPD71XISVHF)* or the "EUT" in this report was a *Is Digital Radio*, which was measured approximately: 141mm (L) x55mm (W) x39mm (H), rated input voltage: DC 7.4V rechargeable Li-ion battery or DC 12.0V charging from adapter.

Note: The series product, model PD715IS VHF, PD716IS VHF, PD718IS VHF and PD712IS VHF, they have the same appearance, PCB, Material to the testing product's model, and only named differently. PD712IS VHF was selected for fully testing, which was explained in the attached product similarity declaration letter.

** All measurement and test data in this report was gathered from production sample serial number: 161020007 (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2016-10-20.*

Objective

This test report is prepared on behalf of *Hytera Communications Corporation Limited* in accordance with Part 2, Part 22 and Part 90 of the Federal Communication Commissions rules.

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 22 – Public Mobile Service
Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA 603-D.

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

Measurement Uncertainty

Item		Uncertainty
RF conducted test with spectrum		±0.9dB
Radiated emission	30MHz~1GHz	±5.91dB
	Above 1G	±4.92dB
Temperature		±1.0℃
Humidity		±6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

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.

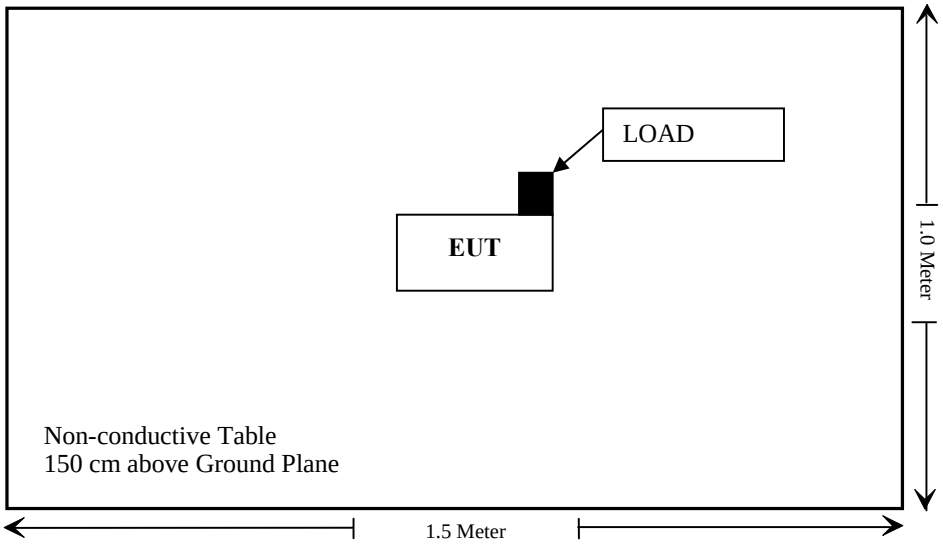
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
N/A	50 ohm Load	N/A	N/A

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§1.1307(b), §2.1093	RF Exposure	Compliance
§2.1046; § 22.727; §90.205	RF Output Power	Compliance
§2.1047;§90.207	Modulation Characteristic	Compliance
§2.1049;§22.357;§ 22.731; §90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliance
§2.1051; §22.861;§90.210	Spurious Emission at Antenna Terminal	Compliance
§2.1053; §22.861;§90.210	Spurious Radiated Emissions	Compliance
§2.1055; § 22.355;§90.213	Frequency Stability	Compliance
§90.214	Transient Frequency Behavior	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sonoma Instrunent	Amplifier	330	171377	2016-12-12	2017-12-12
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-25
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2016-01-09	2019-01-08
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-09-08	2017-09-08
EMCO	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-25
ETS	Horn Antenna	3115	6229	2016-01-11	2017-01-10
ETS	Horn Antenna	3115	9311-4159	2016-01-11	2017-01-10
R&S	Auto test Software	EMC32	V 09.10.0	NCR	NCR
haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-12
haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-12
haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-7	007	2016-12-12	2017-12-12
HP	Signal Generator	8341B	2624A00116	2016-08-29	2017-08-29
RF Conducted test					
BACL	TS 8997 Cable-01	T-KS-EMC086	T-KS-EMC086	2016-12-09	2017-12-08
BACL	RF cable	KS-LAB-012	KS-LAB-012	2016-12-15	2017-12-14
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-21
HEWLETT PACKARD	RF Communications Test SET	8920A	3438A05201	2016-09-21	2017-09-21
HONOVA	Power Splitter	ZFRSC-14-S+	019411452	2016-06-12	2017-06-12
N/A	30dB Attenuator	100W 30dB	N/A	2016-06-18	2017-06-18

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) 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 operates Part 90 should be subjected to routine environmental evaluation for RF exposure prior or equipment authorization or use.

Result: Compliance.

Please refer to SAR Report Number: RDG161020007-20A

FCC §2.1046 & § 22.727& §90.205 - RF OUTPUT POWER

Applicable Standard

FCC §2.1046, § 22.727 and §90.205

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:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Poboo Li on 2017-01-05.

Test Mode: Transmitting

Test Result: Compliance. Please refer to following table.

Mode	Frequency Spacing (kHz)	Frequency (MHz)	Power level	Output (dBm)	Output Power (W)	Note
Analog	12.5	136.025	High	30.24	1.06	For federal
			Low	26.98	0.50	
		151.85	High	30.49	1.12	For Part 22&90
			Low	27.30	0.54	
		155.7525	High	30.48	1.12	For Part 90
			Low	27.43	0.55	
		161.61	High	30.37	1.09	For Part 22&90
			Low	27.05	0.51	
		173.97	High	30.38	1.09	For federal
			Low	27.03	0.50	
Digital	12.5	136.025	High	30.13	1.03	For federal
			Low	26.84	0.48	
		151.85	High	30.27	1.06	For Part 22&90
			Low	27.16	0.52	
		155.7525	High	30.31	1.07	For Part 90
			Low	27.27	0.53	
		161.61	High	30.24	1.06	For Part 22&90
			Low	27.08	0.51	
		173.97	High	30.25	1.06	For federal
			Low	26.90	0.49	

Note: The High rated power is 1W
The Low rated power is 0.5W

FCC §2.1047 & §90.207 - MODULATION CHARACTERISTIC

Applicable Standard

FCC§2.1047 and §90.207:

(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 supplied.

Test Procedure

Test Method: TIA/EIA-603 2.2.3

Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Poboo Li on 2017-01-06.

Test Mode: Transmitting

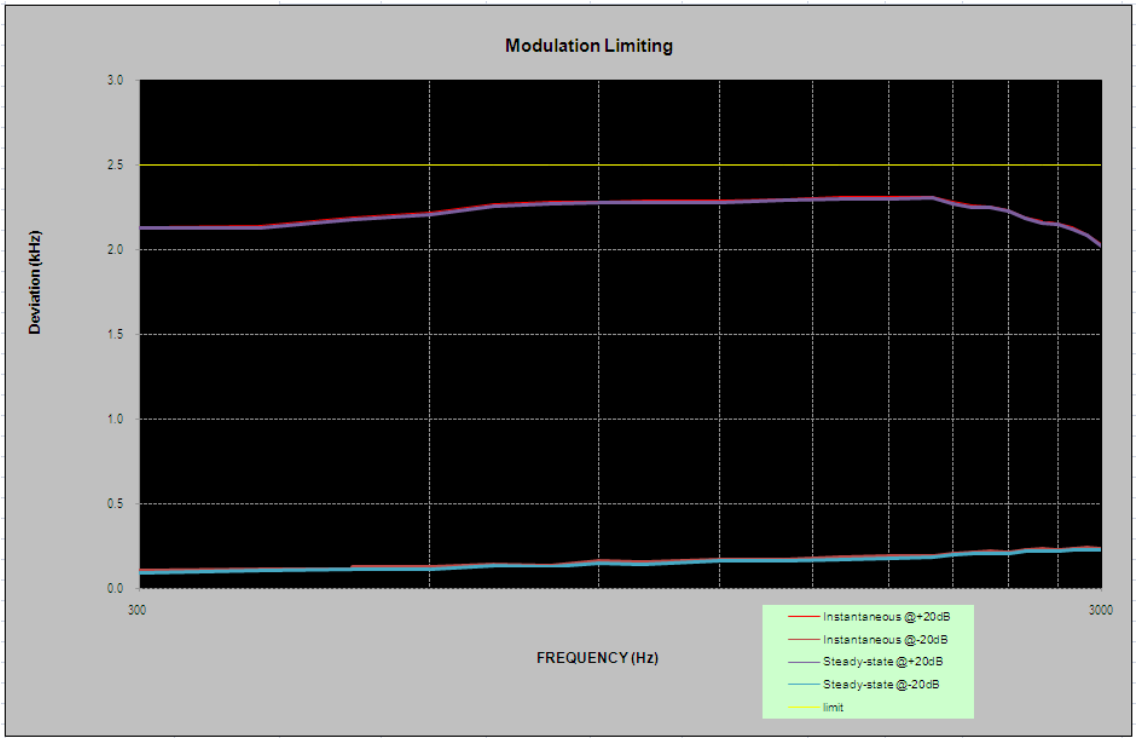
Result: Compliance.

Analog Modulation:

MODULATION LIMITING

Carrier Frequency: 155.7525 MHz, Channel Separation=12.5 kHz

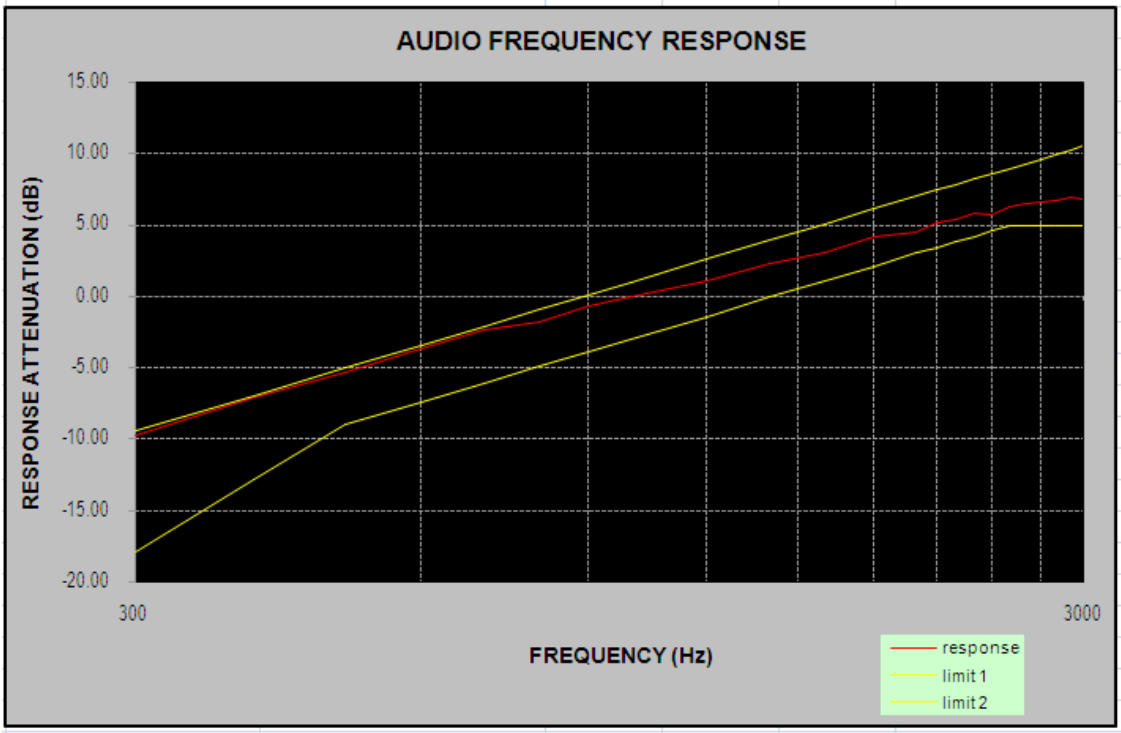
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	2.138	0.106	2.126	0.095	2.500
400	2.139	0.117	2.125	0.105	2.500
500	2.190	0.129	2.176	0.117	2.500
600	2.217	0.130	2.209	0.117	2.500
700	2.270	0.144	2.255	0.138	2.500
800	2.282	0.136	2.267	0.129	2.500
900	2.288	0.165	2.281	0.154	2.500
1000	2.289	0.155	2.279	0.144	2.500
1200	2.293	0.172	2.280	0.162	2.500
1400	2.302	0.173	2.295	0.166	2.500
1600	2.311	0.186	2.299	0.175	2.500
1800	2.310	0.196	2.298	0.182	2.500
2000	2.315	0.194	2.305	0.185	2.500
2100	2.283	0.207	2.273	0.198	2.500
2200	2.266	0.215	2.252	0.210	2.500
2300	2.259	0.222	2.246	0.210	2.500
2400	2.236	0.218	2.224	0.206	2.500
2500	2.195	0.231	2.187	0.223	2.500
2600	2.167	0.234	2.156	0.219	2.500
2700	2.157	0.231	2.151	0.222	2.500
2800	2.134	0.235	2.122	0.226	2.500
2900	2.092	0.246	2.082	0.232	2.500
3000	2.036	0.237	2.024	0.231	2.500


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

Audio Frequency Response

Carrier Frequency: 155.7525 MHz, Channel Separation=12.5 kHz

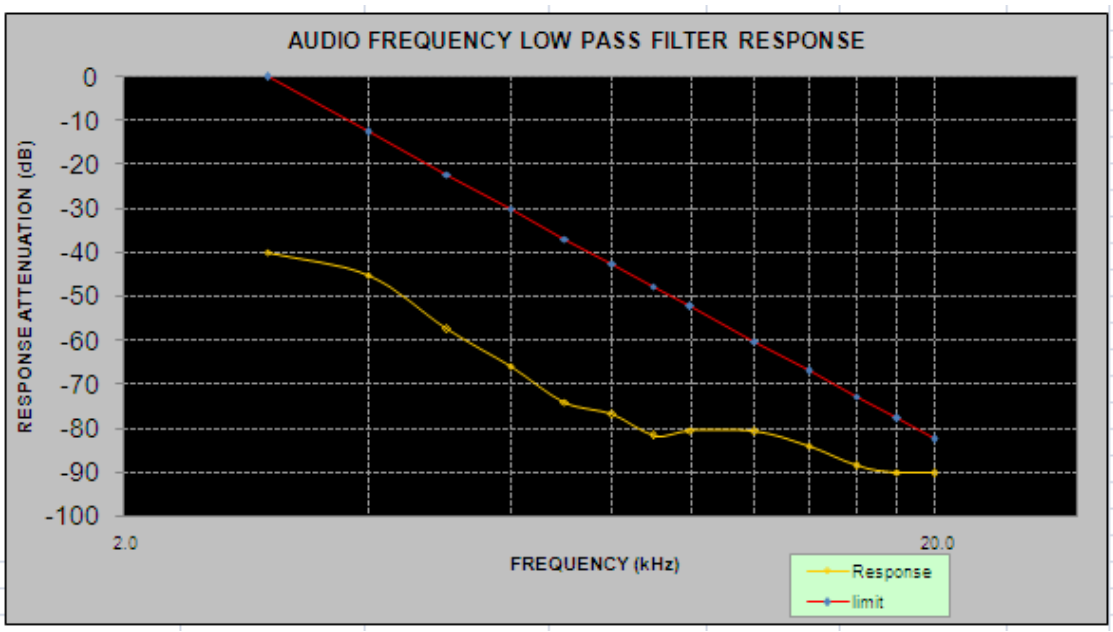
Audio Frequency (Hz)	Response Attenuation (dB)
300	-9.74
400	-7.13
500	-5.29
600	-3.66
700	-2.32
800	-1.77
900	-0.74
1000	0.00
1200	1.02
1400	2.27
1600	3.11
1800	4.15
2000	4.49
2100	5.11
2200	5.39
2300	5.78
2400	5.66
2500	6.26
2600	6.44
2700	6.53
2800	6.71
2900	6.89
3000	6.79


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

Audio frequency lows pass filter response

Carrier Frequency: 155.7525 MHz, Channel Separation=12.5 kHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-39.9	0.0
4.0	-45.1	-12.5
5.0	-57.5	-22.2
6.0	-65.9	-30.1
7.0	-74.0	-36.8
8.0	-76.9	-42.6
9.0	-81.7	-47.7
10.0	-80.5	-52.3
12.0	-80.8	-60.2
14.0	-84.0	-66.9
16.0	-88.6	-72.7
18.0	-90.0	-77.8
20.0	-90.3	-82.5



FCC §2.1049 & §22.357 & § 22.731 §90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK

Applicable Standard

FCC §2.1049, §22.357, § 22.73, §90.209 and §90.210

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.

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:	27 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Poboo Li on 2017-01-07.

Modulation	Frequency (MHz)	Channel space (kHz)	Power Level	99% Occupied Bandwidth (kHz)	26 dB Emissions Bandwidth (kHz)	Note
Analog	151.85	12.5	High	9.86	10.46	Part 22
			Low	9.86	10.46	
	155.7525	12.5	High	9.86	10.46	Part 90
			Low	9.86	10.46	
	161.61	12.5	High	9.98	10.46	Part 22
			Low	9.98	10.46	
Digital	151.85	12.5	High	7.45	9.62	Part 22
			Low	7.21	9.62	
	155.7525	12.5	High	7.21	9.62	Part 90
			Low	7.33	9.26	
	161.61	12.5	High	7.45	9.74	Part 22
			Low	7.70	9.86	

Note: Emission bandwidth was based on calculation method instead of measurement.

Emission Designator Per CFR 47 §2.201& §2.202&, $B_n = 2M + 2D$

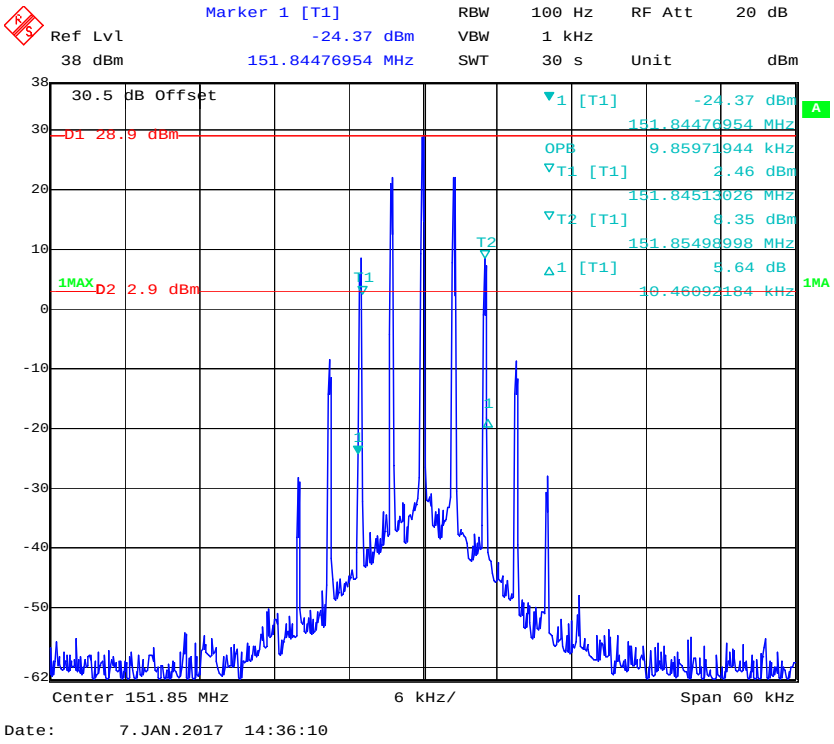
For FM Mode (Channel Spacing: 12.5 kHz)

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.

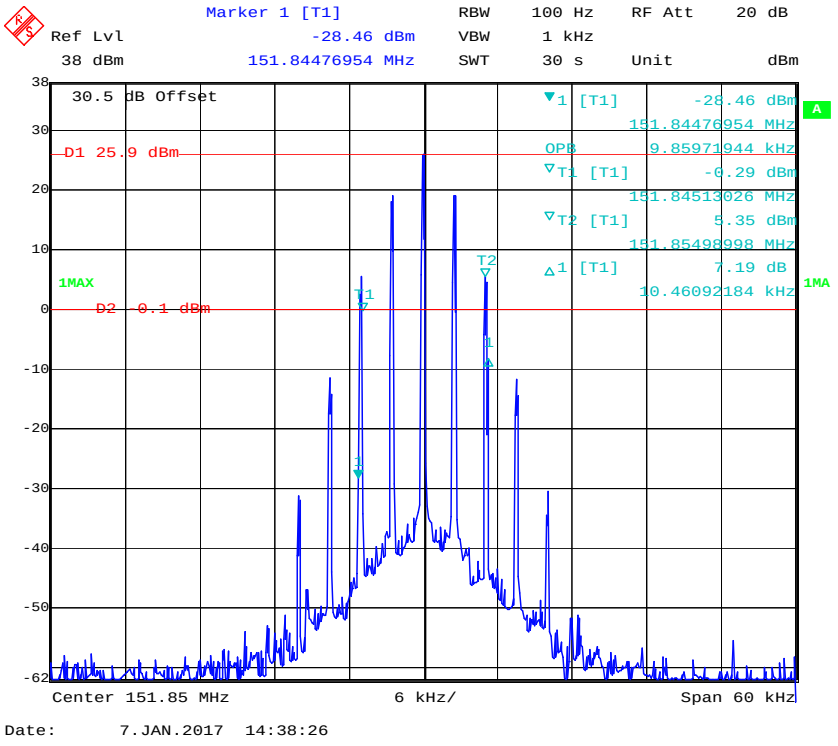
For Digital Mode (Channel Spacing: 12.5 kHz)
Emission Designator 7K60F1D and 7K60F1E
The 99% energy rule (title 47CFR 2.1049) was used for digital mode. It basically states that 99% of the modulation energy falls within X kHz, in this case, 7.70 kHz. The emission mask was obtained from 47CFR 90.210(d).
F1D and F1E portion of the designator indicates digital information.
Therefore, the entire designator for 12.5 kHz channel spacing digital mode is 7K60F1D and 7K60F1E.

Analog Modulation:

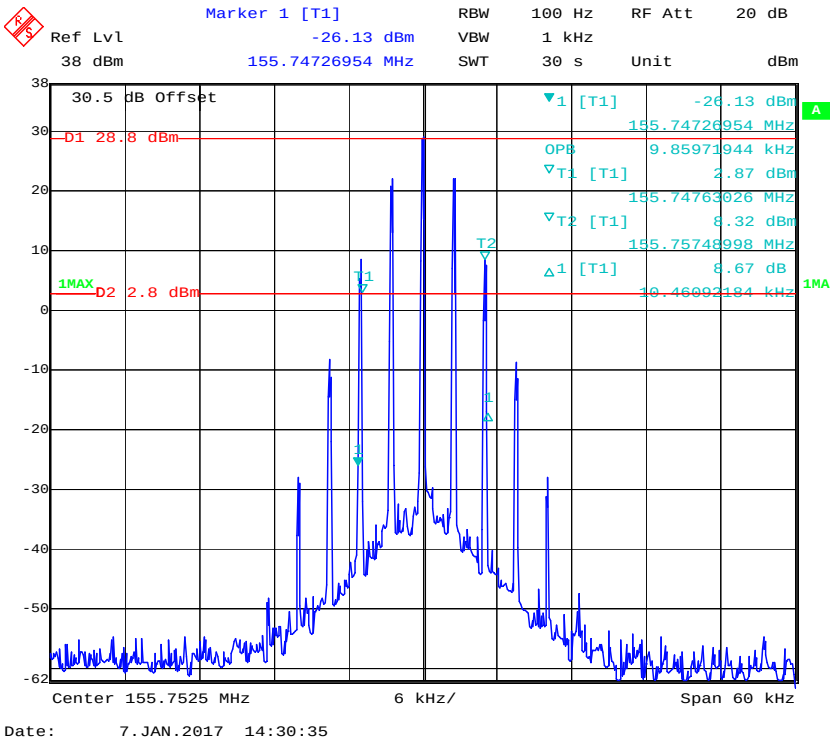
Frequency 151.85 MHz: 99% Occupied & 26 dB Bandwidth, High Power--- Part 22



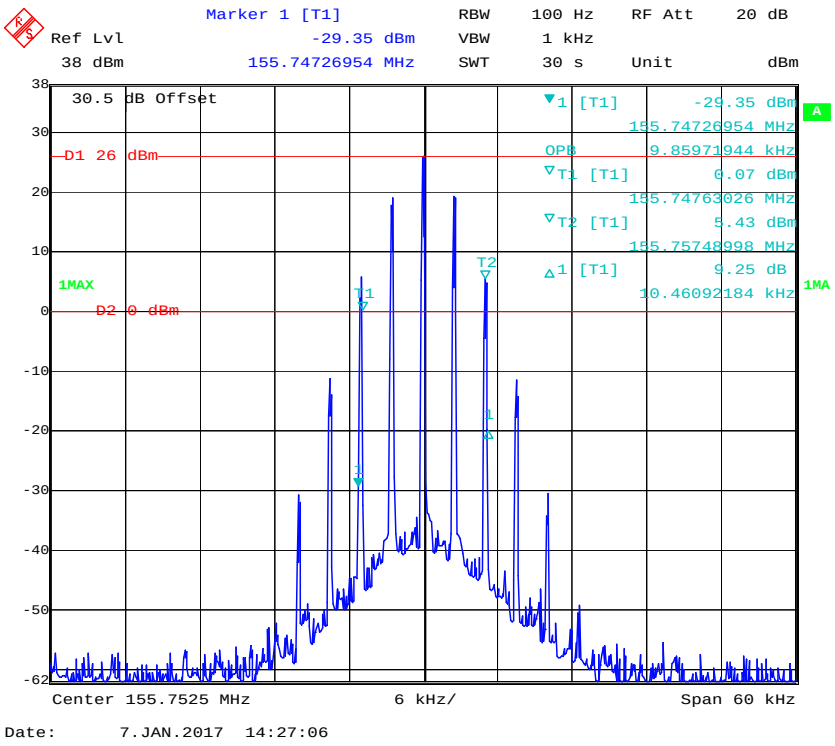
Frequency 151.85 MHz: 99% Occupied & 26 dB Bandwidth, Low Powe--- Part 22



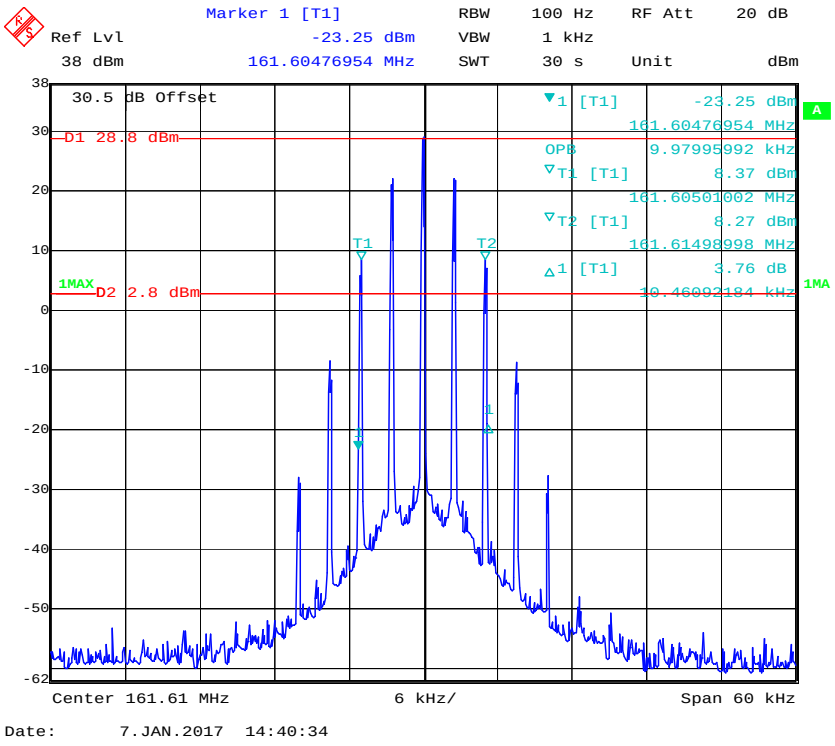
Frequency 155.7525 MHz: 99% Occupied & 26 dB Bandwidth, High Power--- Part 90



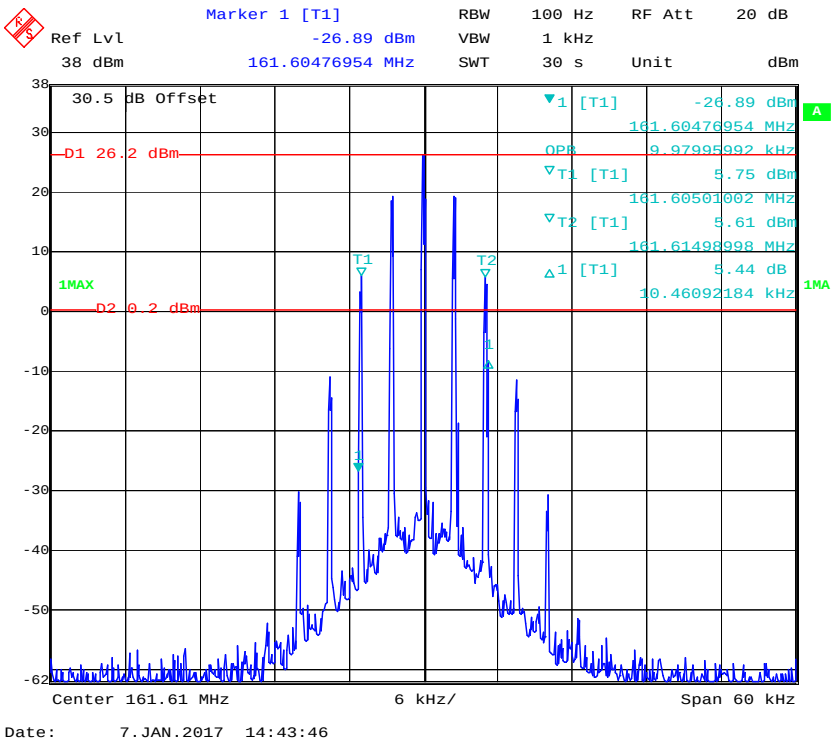
Frequency 155.7525 MHz: 99% Occupied & 26 dB Bandwidth, Low Powe--- Part 90



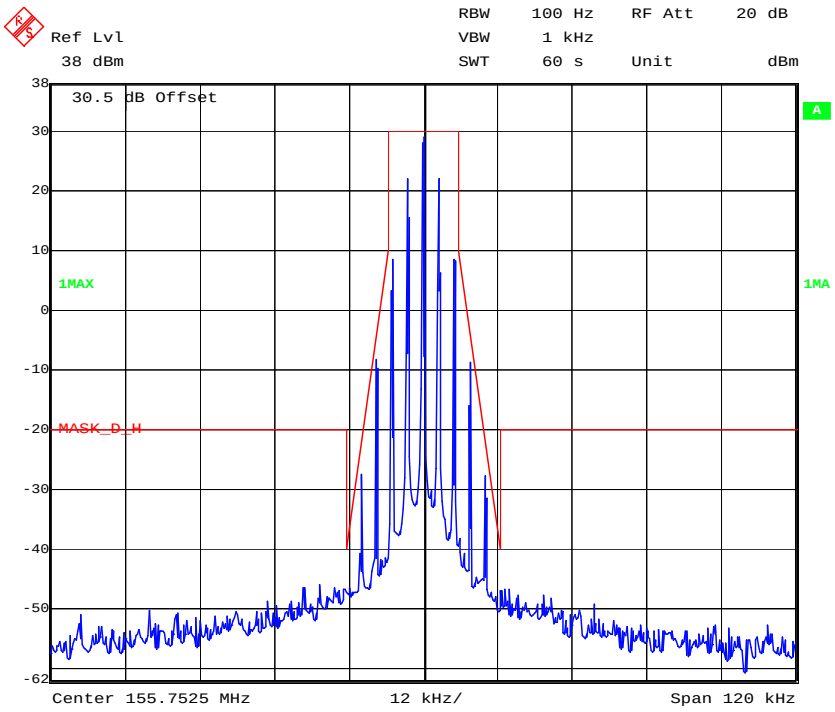
Frequency 161.61 MHz: 99% Occupied & 26 dB Bandwidth, High Power--- Part 22



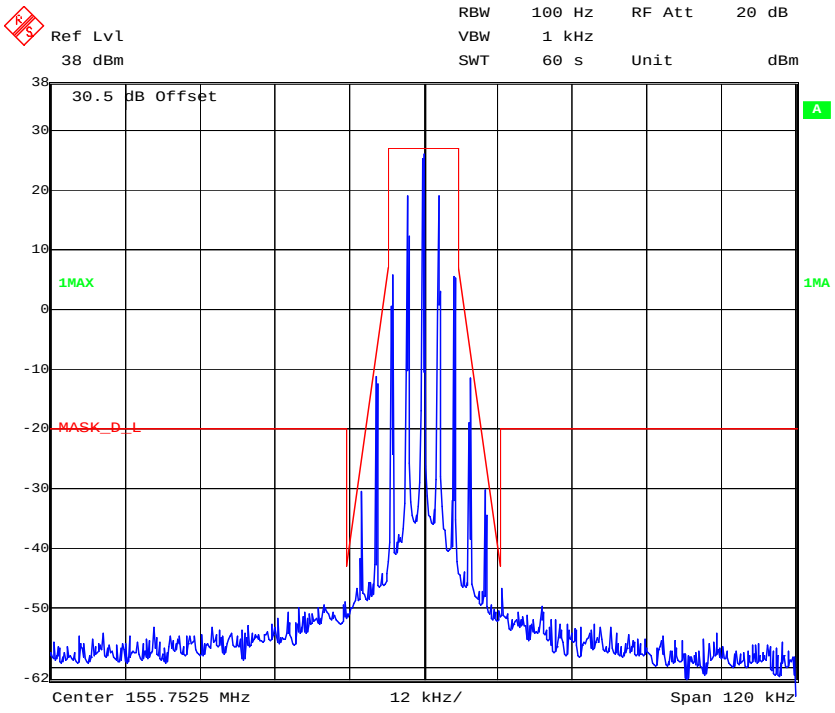
Frequency 161.61 MHz: 99% Occupied & 26 dB Bandwidth,Low Power--- Part 22



Frequency 155.7525 MHz: Emission Mask, High Power

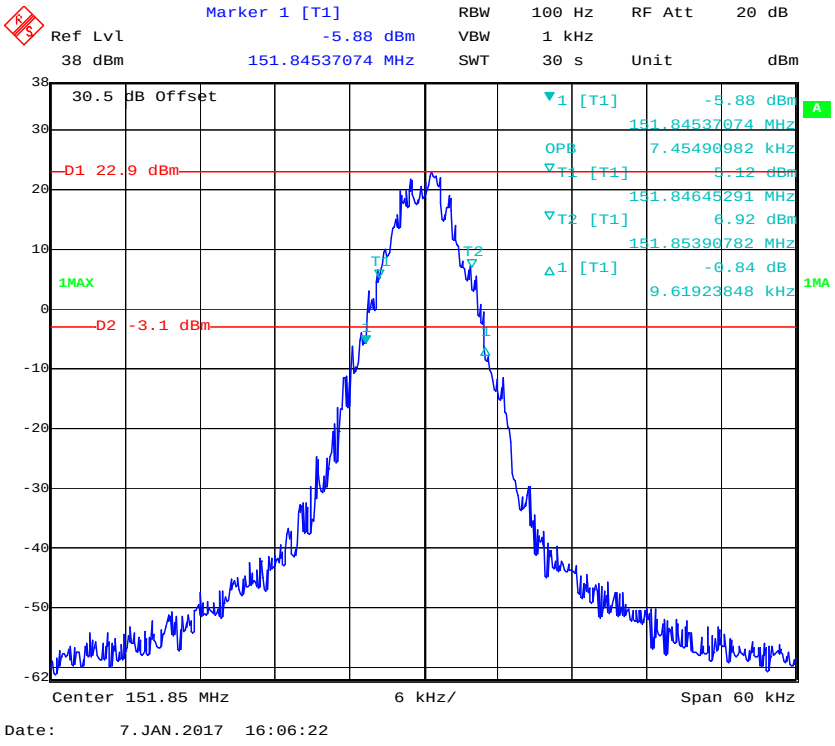


Frequency 155.7525 MHz: Emission Mask, Low Power

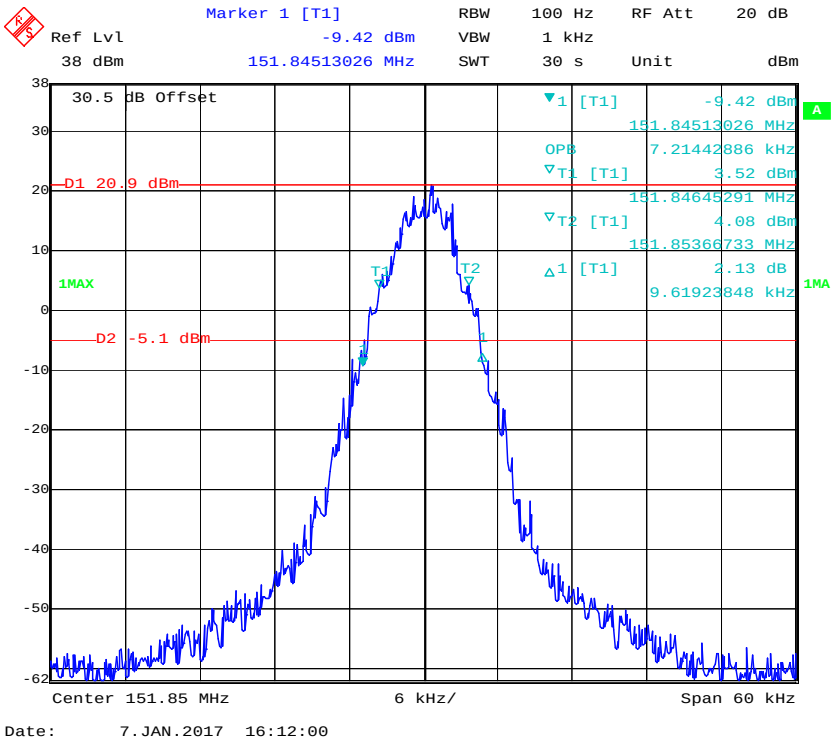


Digital Modulation:

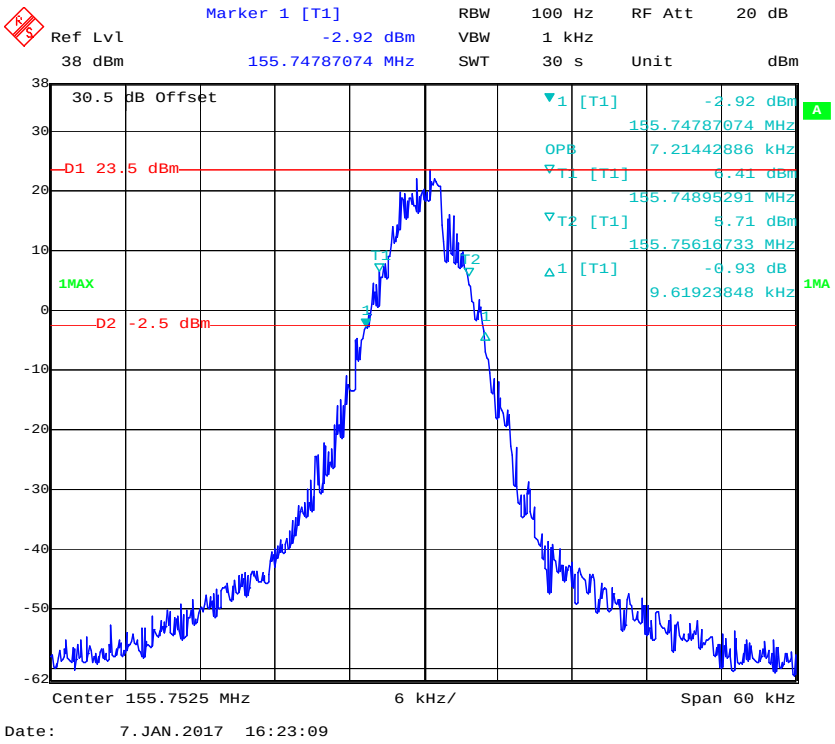
Frequency 151.85 MHz: 99% Occupied & 26 dB Bandwidth, High Power--- Part 22



Frequency 151.85 MHz: 99% Occupied & 26 dB Bandwidth with Low Power--- Part 22



Frequency 155.7525 MHz: 99% Occupied & 26 dB Bandwidth, High Power--- Part 90



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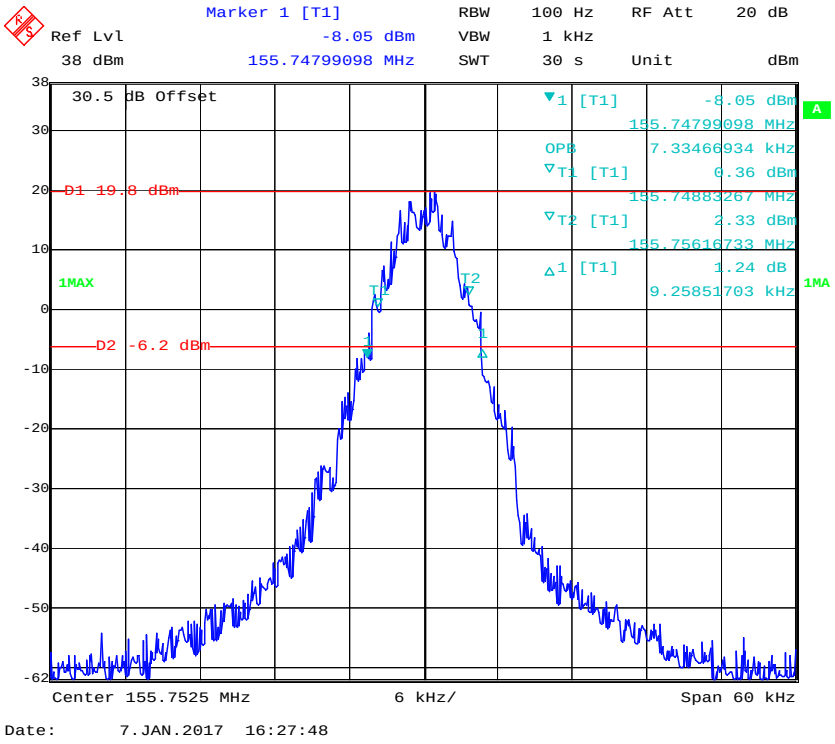

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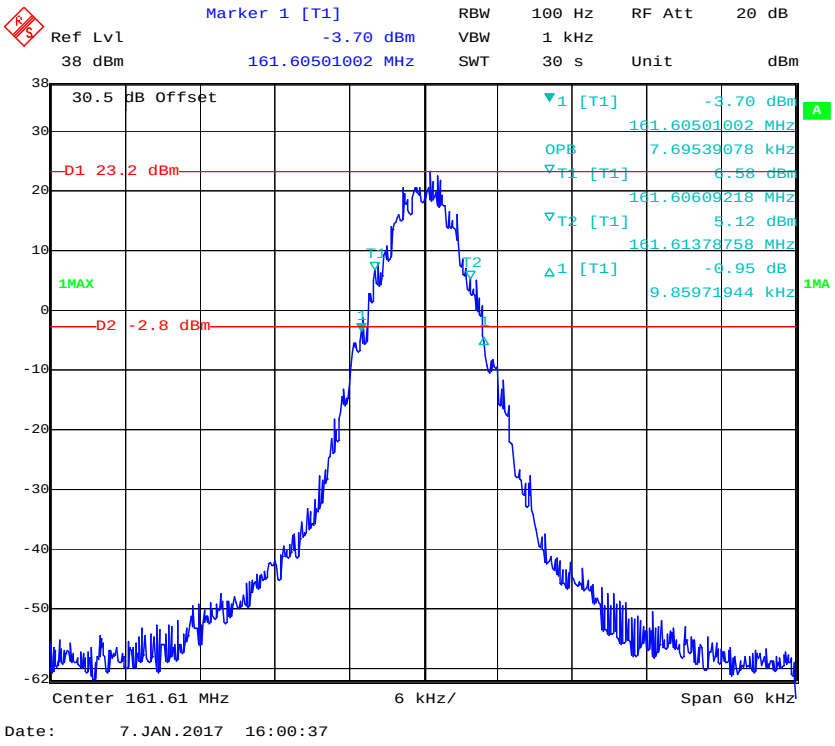
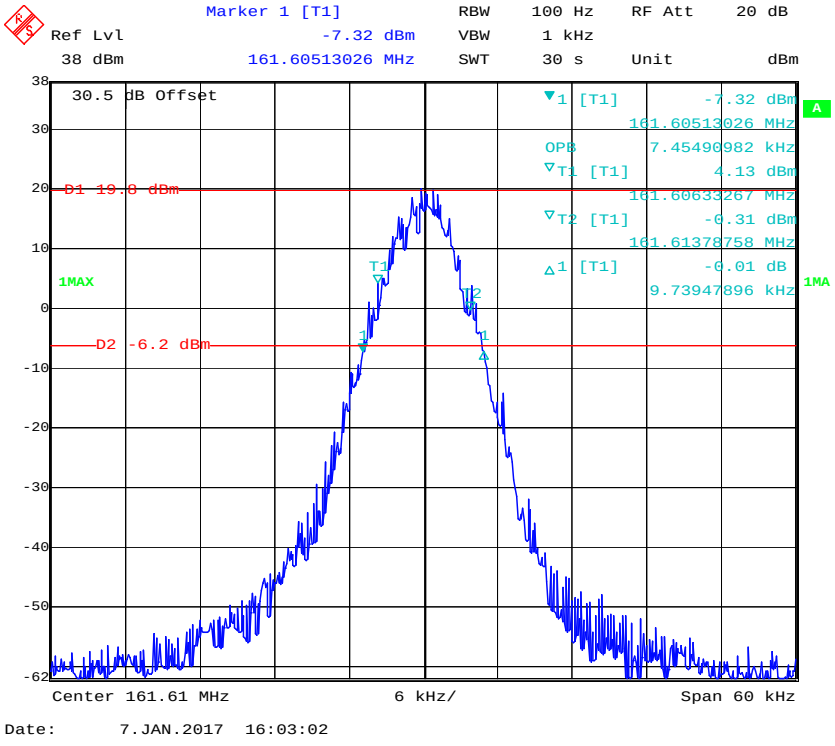
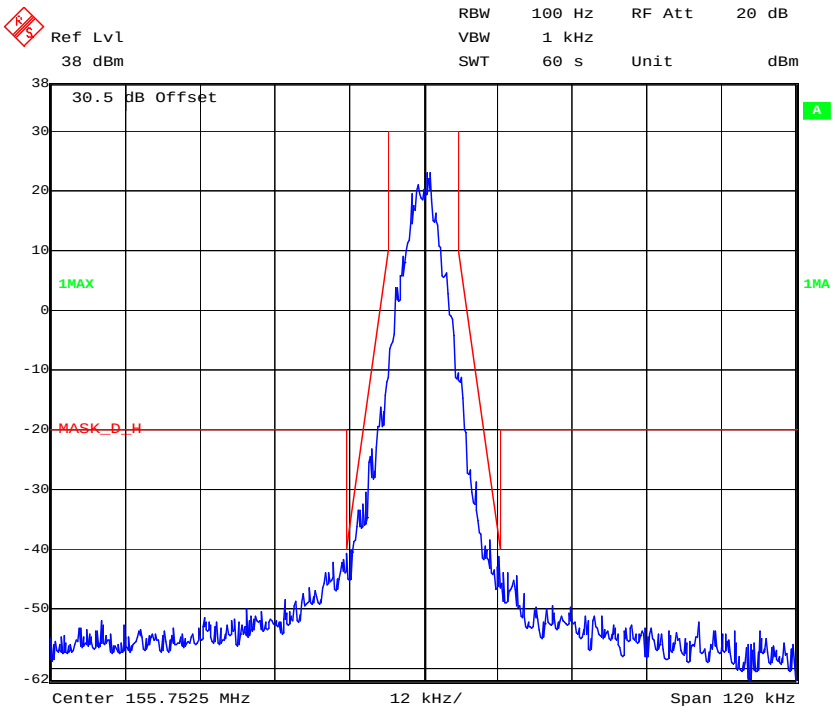


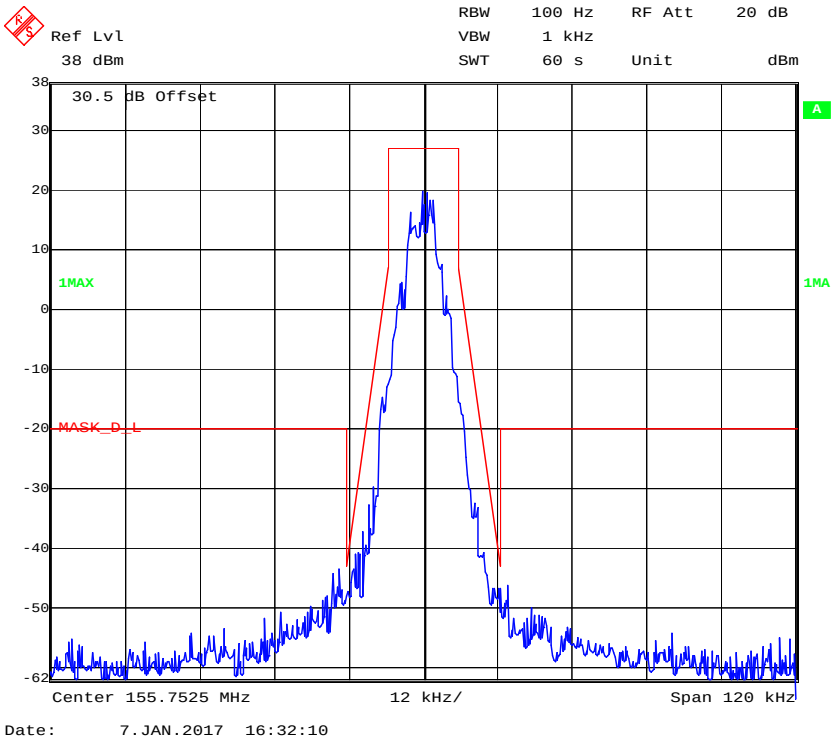
Frequency 161.61 MHz: 99% Occupied & 26 dB Bandwidth with Low Power--- Part 22



Frequency 155.7525 MHz: Emission Mask, High Power



Frequency 155.7525 MHz: Emission Mask, Low Power



FCC §2.1051 & §22.861 & §90.210 - 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.

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

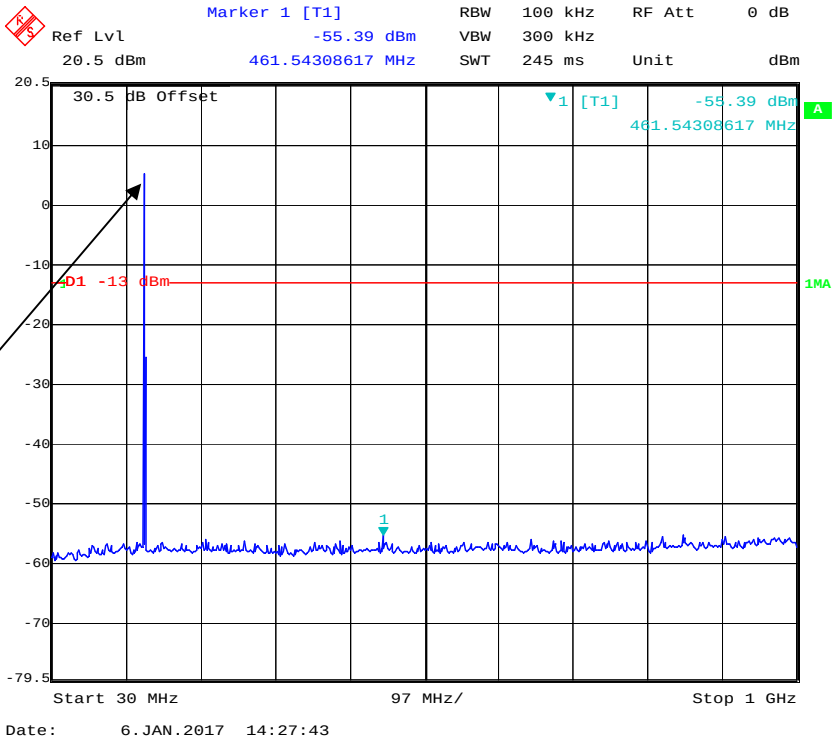
Temperature:	25 ℃
Relative Humidity:	55 %
ATM Pressure:	103.0 kPa

The testing was performed by Poboo Li on 2017-01-06.

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

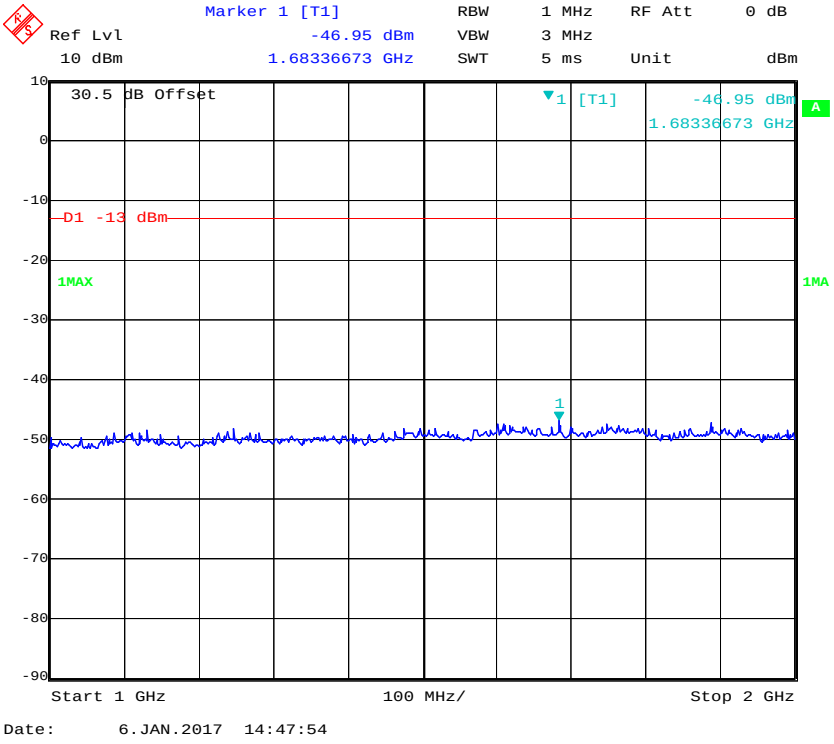
Analog Modulation:

30MHz – 1 GHz, Spacing Channel 12.5 kHz, 151.85 MHz--- Part 22

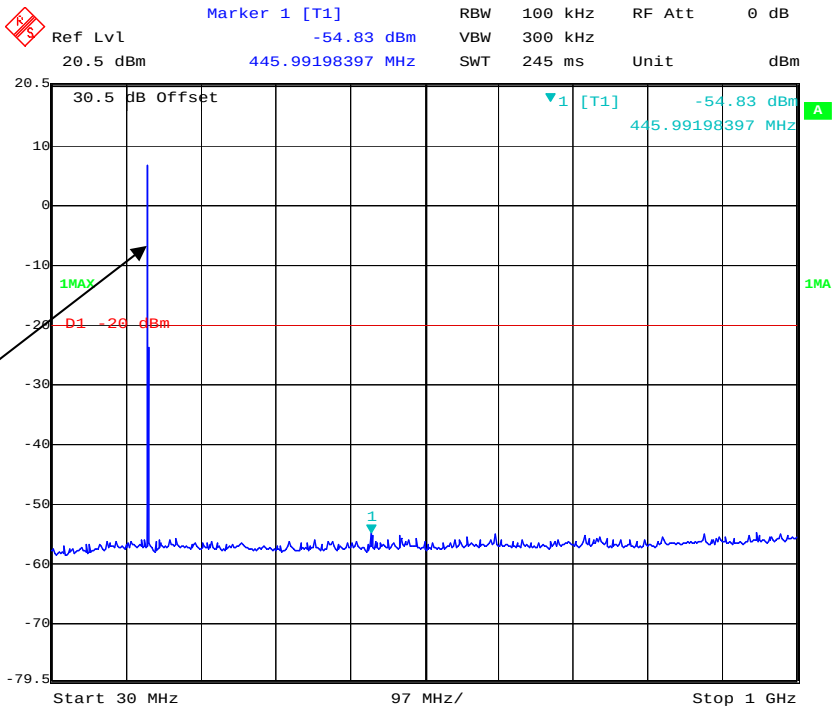


Fund.test with notch filter

1 GHz – 2GHz, Spacing Channel 12.5 kHz, 151.85 MHz--- Part 22

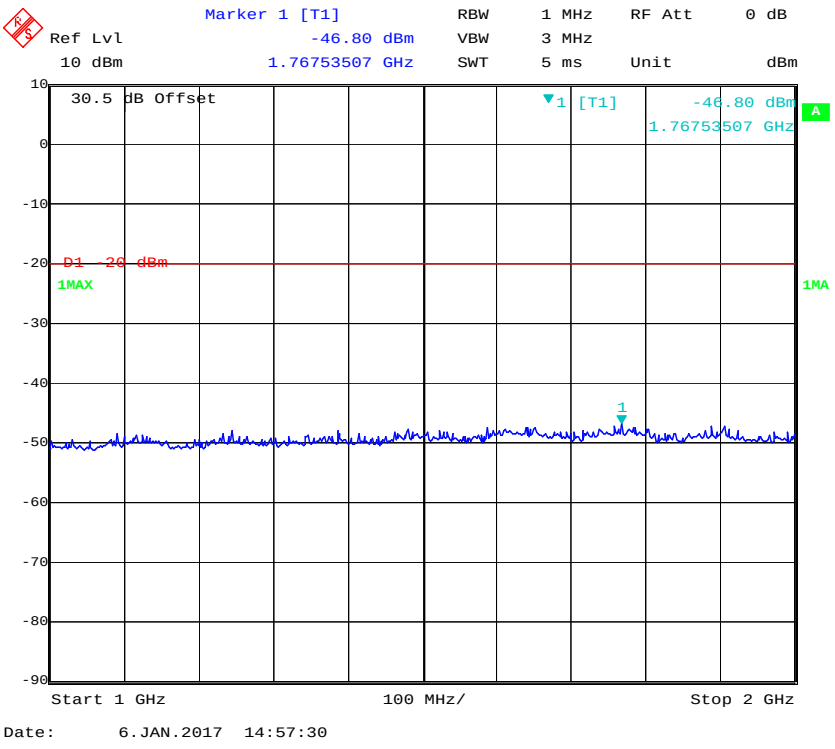


30MHz – 1 GHz, Spacing Channel 12.5 kHz, 155.7525 MHz--- Part 90

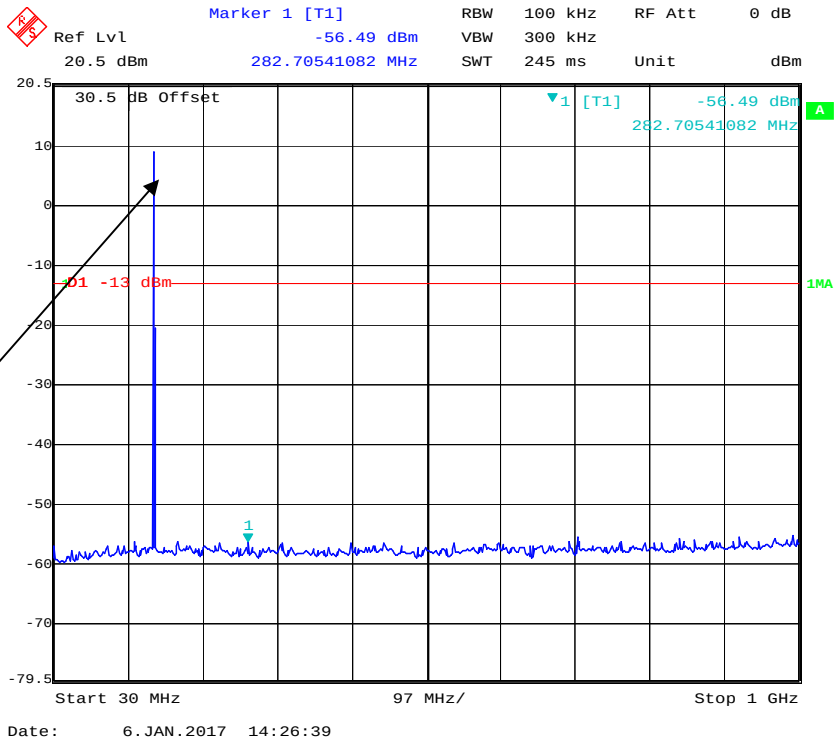


Fund.test with notch filter

1 GHz – 2 GHz, Spacing Channel 12.5 kHz, 155.7525 MHz --- Part 90

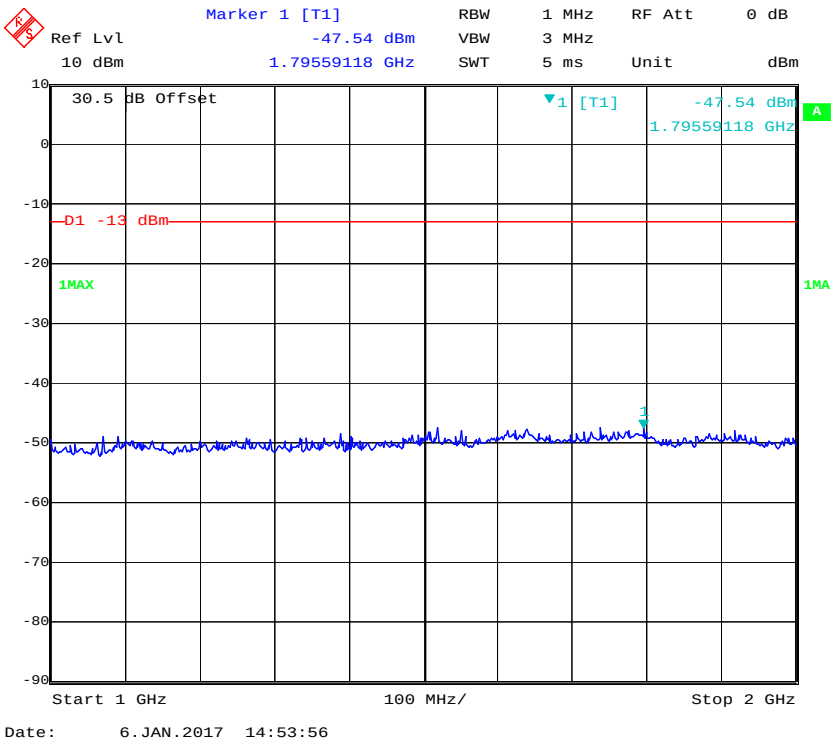


30MHz – 1 GHz, Spacing Channel 12.5 kHz, 161.61 MHz--- Part 22



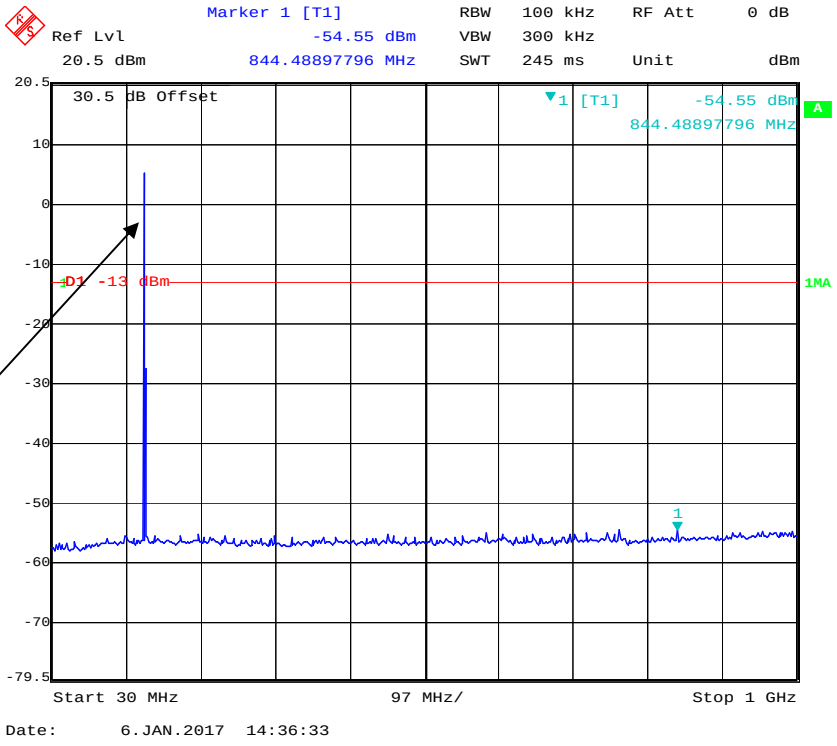
Fund.test with notch filter

1 GHz – 2GHz, Spacing Channel 12.5 kHz, 161.61 MHz--- Part 22



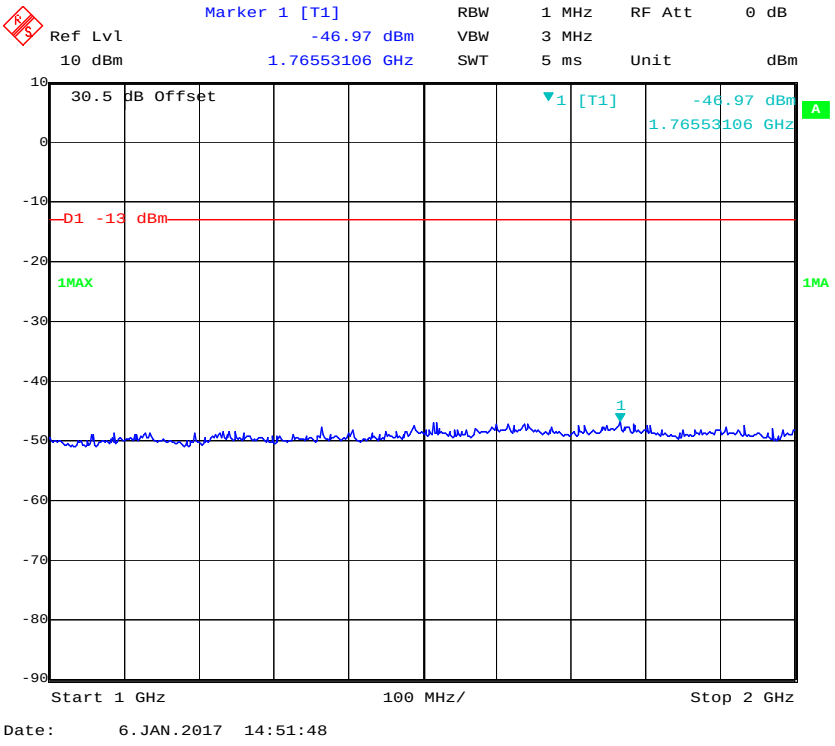
Digital Modulation:

30MHz - 1 GHz, 151.85 MHz--- Part 22

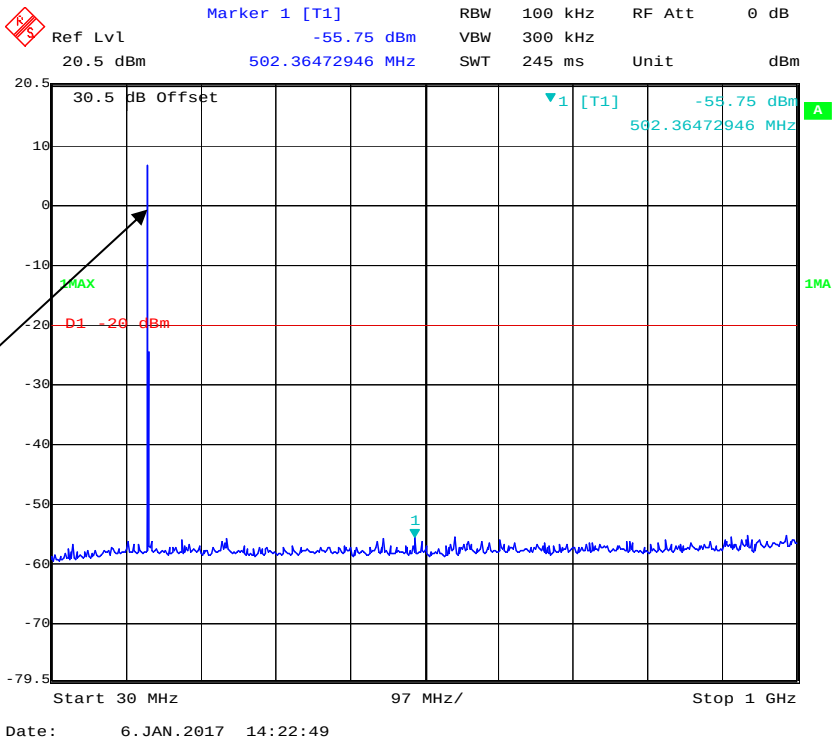


Fund.test with notch filter

1 GHz – 2 GHz, 151.85MHz --- Part 22

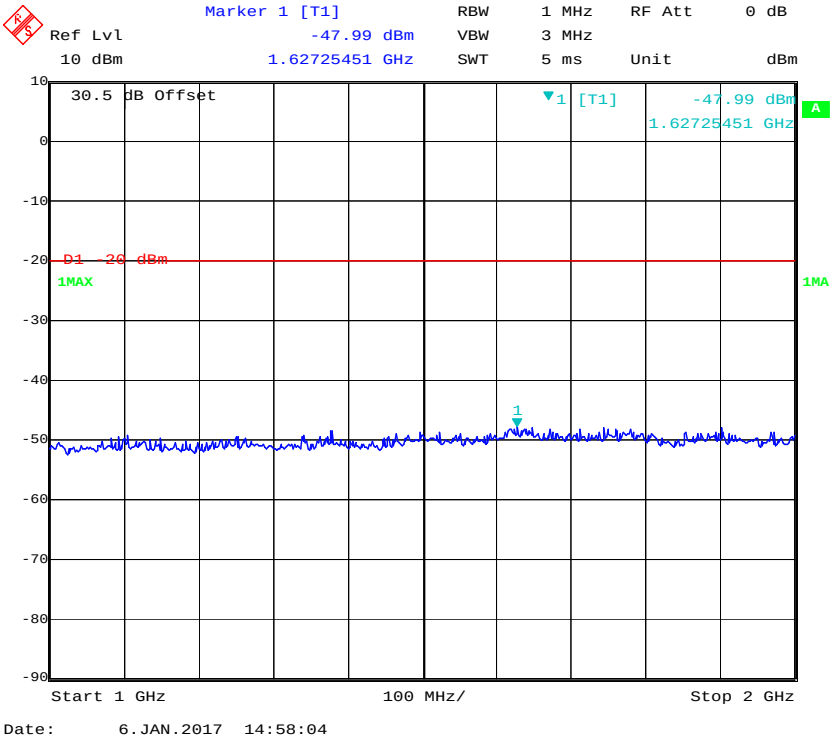


30MHz - 1 GHz, 155.7525MHz--- Part 90

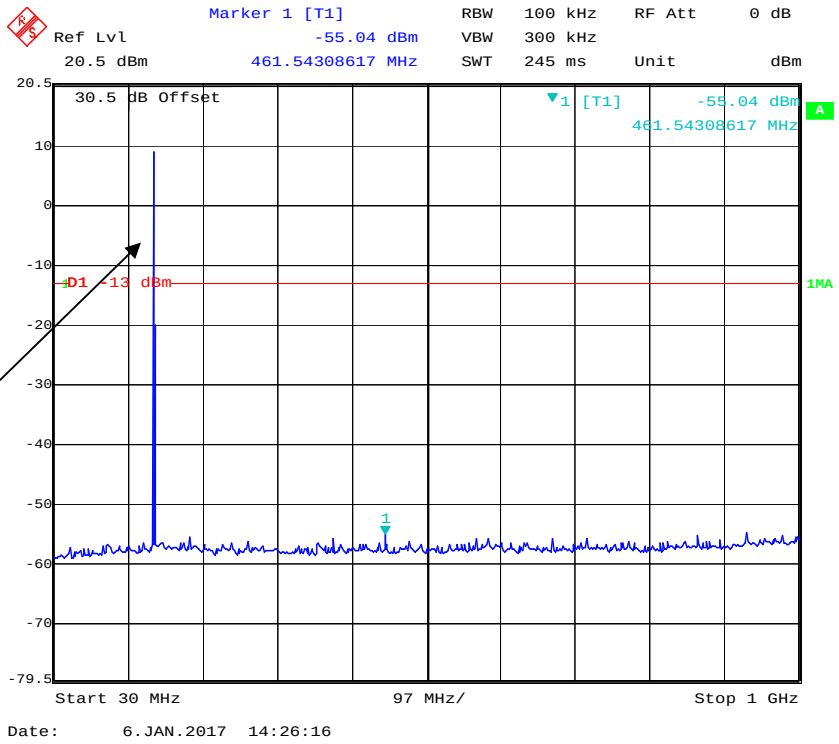


Fund.test with notch filter

1 GHz – 2 GHz, 155.7525MHz --- Part 90

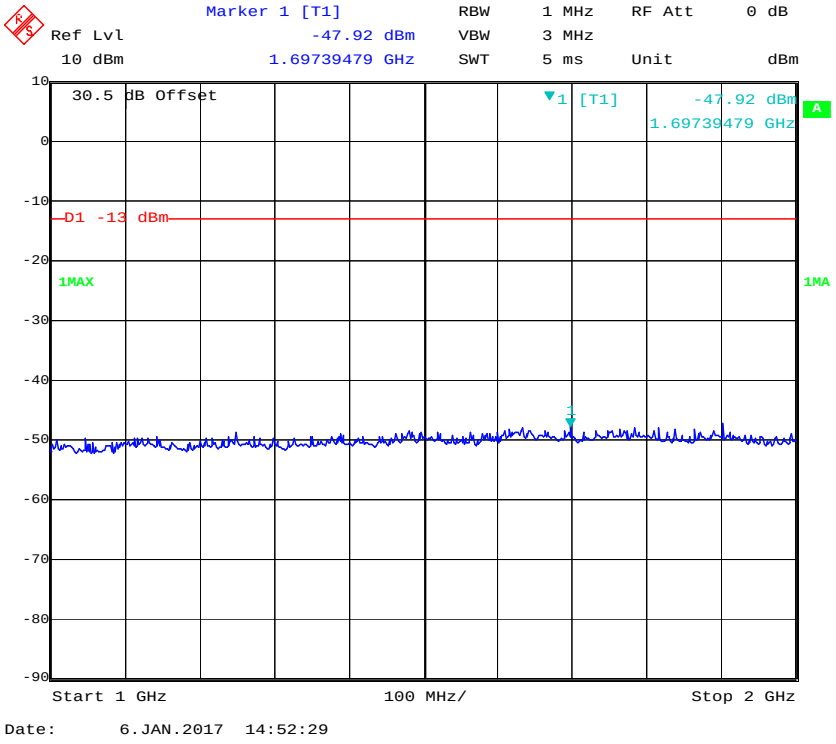


30MHz - 1 GHz, 161.61MHz--- Part 22



Fund.test with notch filter

1 GHz – 2 GHz, 161.61MHz --- Part 22



FCC §2.1053 & §22.861 &§90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053, §22.861 and §90.210

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.

Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Layne Li on 2017-01-06.

Test Mode: Transmitting

30MHz - 2GHz:

Frequency (MHz)	Receiver Reading (dBμV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
Analog Modulation 151.85MHz—Part 22										
911.10	33.35	74	1.5	H	-66.8	0.27	5.05	-62.02	-13	49.02
911.10	30.60	221	1.2	V	-66.1	0.27	5.05	-61.32	-13	48.32
1062.95	45.67	195	1.9	H	-59.3	0.29	7.08	-52.51	-13	39.51
1062.95	44.29	110	1.5	V	-62.5	0.29	7.08	-55.71	-13	42.71
Analog Modulation 155.7525MHz—Part 90										
934.52	33.05	212	1.5	H	-67.1	0.27	5.05	-62.32	-20	42.32
934.52	30.40	359	1.4	V	-66.3	0.27	5.05	-61.52	-20	41.52
1090.27	46.07	325	1.7	H	-58.9	0.29	7.08	-52.11	-20	32.11
1090.27	44.79	141	1.6	V	-62.0	0.29	7.08	-55.21	-20	35.21
Digital Modulation 151.85MHz—Part 22										
911.10	33.05	127	1.6	H	-67.1	0.27	5.05	-62.32	-13	49.32
911.10	31.30	336	1.4	V	-65.4	0.27	5.05	-60.62	-13	47.62
1062.95	47.07	148	1.3	H	-57.9	0.29	7.08	-51.11	-13	38.11
1062.95	46.59	253	1.7	V	-60.2	0.29	7.08	-53.41	-13	40.41
Digital Modulation 155.7525MHz—Part 90										
934.52	32.65	333	2.0	H	-67.5	0.27	5.05	-62.72	-20	42.72
934.52	30.40	246	1.8	V	-66.3	0.27	5.05	-61.52	-20	41.52
1090.27	47.27	16	1.5	H	-57.7	0.29	7.08	-50.91	-20	30.91
1090.27	45.99	251	2.3	V	-60.8	0.29	7.08	-54.01	-20	34.01

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

FCC §2.1055 & § 22.355 & §90.213 - FREQUENCY STABILITY

Applicable Standard

FCC §2.1055, § 22.355 and §90.213

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:	27 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Poboo Li on 2017-01-07.

Test Mode: Transmitting

For Analog Modulation

Part 22：

Reference Frequency: 151.85 MHz, Limit: ±5.0 ppm			
Test Environment		**Frequency Measure with Time Elapsed**	
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
Frequency Stability versus Input Temperature			
50	7.4	151.849946	-0.356
40	7.4	151.849969	-0.204
30	7.4	151.849954	-0.303
20	7.4	151.849962	-0.250
10	7.4	151.849958	-0.277
0	7.4	151.849970	-0.198
-10	7.4	151.849955	-0.296
-20	7.4	151.849943	-0.375
-30	7.4	151.849951	-0.323
Frequency Stability versus Input Voltage			
20	6.3	151.849956	-0.290

Part 90：

Reference Frequency: 155.7525MHz, Limit: ±5.0 ppm			
Test Environment		**Frequency Measure with Time Elapsed**	
Temperature (℃)	**Power Supplied (V_{DC})**	**Measured Frequency error (MHz)**	**Frequency Error (ppm)**
Frequency Stability versus Input Temperature			
50	7.4	155.752463	-0.238
40	7.4	155.752479	-0.135
30	7.4	155.752483	-0.109
20	7.4	155.752475	-0.161
10	7.4	155.752467	-0.212
0	7.4	155.752458	-0.270
-10	7.4	155.752472	-0.180
-20	7.4	155.752446	-0.347
-30	7.4	155.752452	-0.308
Frequency Stability versus Input Voltage			
20	6.3	155.75247	-0.193

For Digital Modulation
Part 22:

Reference Frequency: 151.85 MHz, Limit: ±5.0 ppm			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	7.4	151.849937	-0.415
40	7.4	151.849962	-0.250
30	7.4	151.849942	-0.382
20	7.4	151.849953	-0.310
10	7.4	151.849959	-0.270
0	7.4	151.849944	-0.369
-10	7.4	151.849939	-0.402
-20	7.4	151.849948	-0.342
-30	7.4	151.849935	-0.428
Frequency Stability versus Input Voltage			
20	6.3	151.849948	-0.342

Part 90:

Reference Frequency: 155.7525 MHz, Limit: ±5 ppm, 12.5 kHz			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Power Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	7.4	155.752461	-0.250
40	7.4	155.752457	-0.276
30	7.4	155.752478	-0.141
20	7.4	155.752463	-0.238
10	7.4	155.752455	-0.289
0	7.4	155.752443	-0.366
-10	7.4	155.752458	-0.270
-20	7.4	155.752449	-0.327
-30	7.4	155.752452	-0.308
Frequency Stability versus Input Voltage			
20	6.3	155.752458	-0.270

FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

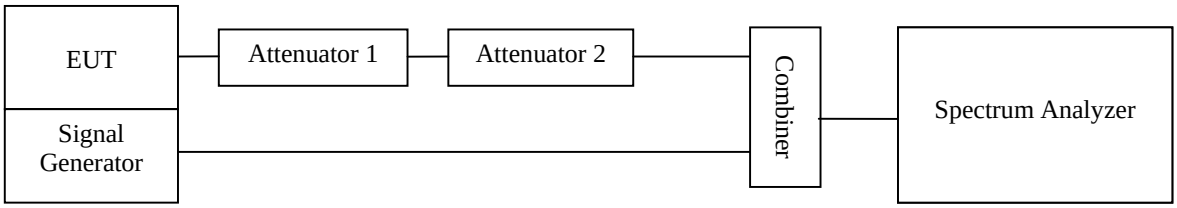
Applicable Standard

Regulations: FCC §90.214
Test method: ANSI/TIA-603-D 2010, section 2.2.19.3

Test Procedure

a) Connect the EUT and test equipment as shown on the following block diagram.
b) Set the Spectrum Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.
c) Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at ±12.5 kHz deviation and set its output level to -100dBm.
d) Turn on the transmitter.
e) Supply sufficient attenuation via the RF attenuator to provide an input level to the Spectrum Analyzer that is 40 dB below the maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on the Spectrum Analyzer as P_0.
f) Turn off the transmitter.
g) Adjust the RF level of the signal generator to provide RF power equal to P_0. This signal generator RF level shall be maintained throughout the rest of the measurement.
h) Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30 dB when the transmitter is turned on.
i) Adjust the vertical amplitude control of the spectrum analyzer to display the 1000 Hz at ±4 divisions vertically centered on the display. Set trigger mode of the Spectrum Analyzer to "Video", and tune the "trigger level" on suitable level. Then set the "tiger offset" to -10ms for turn on and -15ms for turn off.
j) Turn on the transmitter and the transient wave will be captured on the screen of Spectrum Analyzer. Observe the stored display. The instant when the 1 kHz test signal is completely suppressed is considered to be t_{on}. The trace should be maintained within the allowed divisions during the period t_1 and t_2.

k) Then turn off the transmitter, and another transient wave will be captured on the screen of Spectrum Analyzer. The trace should be maintained within the allowed divisions during the period t_3.



Test Data

Environmental Conditions

Temperature:	27 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

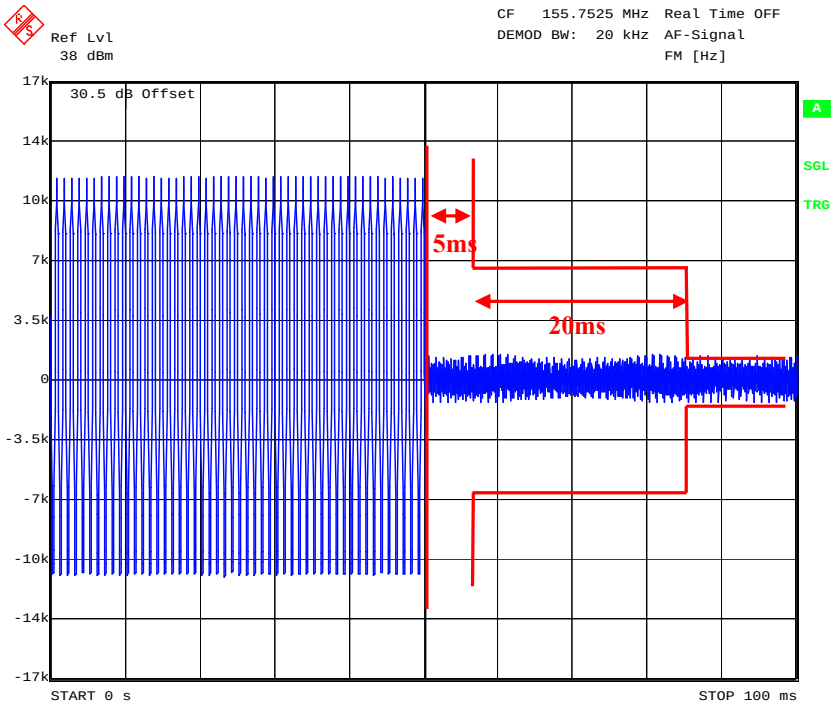
The testing was performed by Poboo Li on 2017-01-07.

Channel Separation (kHz)	Transient Period (ms)	Transient Frequency	Result
12.5	5 (t1)	<+/-12.5 kHz	Pass
	20(t2)	<+/-6.25 kHz	
	5 (t3)	<+/-12.5 kHz	

Please refer to the following plots.

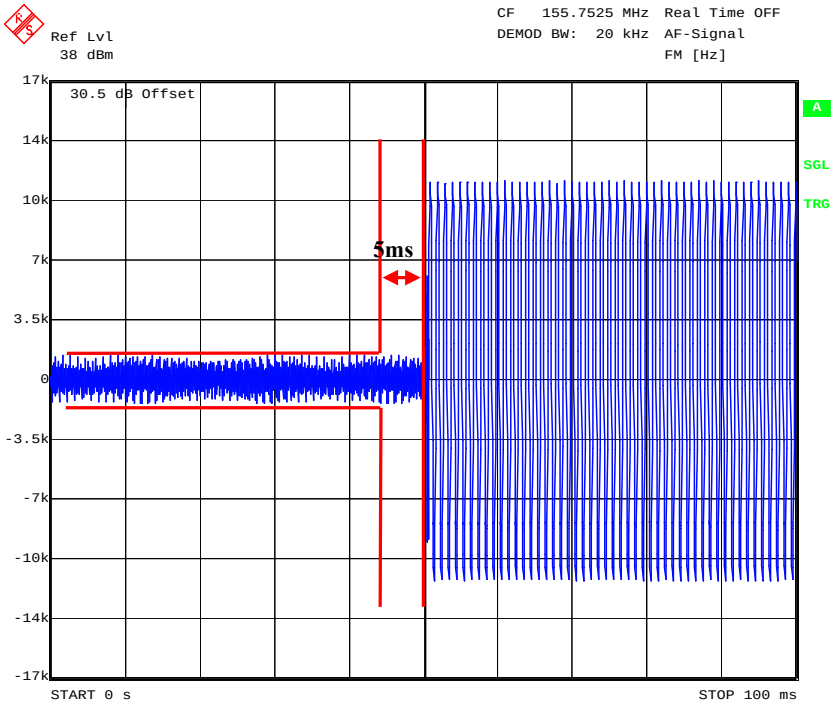
Channel Spacing 12.5 kHz

Turn on



Date: 7.JAN.2017 17:02:13

Turn off



Date: 7.JAN.2017 17:00:58

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