Lab Code: 200707-0

FCC PART 90

TEST REPORT

For

Hytera Communications Corporation Ltd.

Hyt Tower, Hi-Tech Industrial Park North, Nanshan District, Shenzhen, China

FCC ID: YAMX1PVHF

Report Type:	Product Type:
Original Report	Digital Portable Radio

Test Engineer:	Tiger Ye
Report Number:	RSZ121203005-00B
Report Date:	2013-03-21
Reviewed By:	Alvin Huang RF Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP*, or any agency of the Federal Government.
* This report may contain data that are not covered by the NVLAP accreditation and shall be marked with an asterisk "★"

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Hytera Communications Corporation Ltd.*'s product, model number: *X1p VHF (FCC ID: YAMX1PVHF)* (the "EUT") in this report was a *Digital Portable Radio*, which was measured approximately: 12.8 cm (L) x 6.5 cm (W) x 2.5 cm (H), rated input voltage: DC 7.4 V Li-ion battery.

The table is the related accessories list.

Accessory Name		Model	Description
Antenna	Antenna1	AN0140H01	136-145MHz
	Antenna2	AN0148H03	144-154MHz
	Antenna3	AN0158H02	153-164MHz
	Antenna4	AN0168H01	163-174MHz
Battery	Thin Battery	BL1103	Li-ion Battery;7.4V 1100 mAh
	Thicker Battery	BL1809	Li-ion Battery;7.4V 1800 mAh
Body Worn	Belt Clip	PCN005	/
	Portable Charger	CH04L01	/
Earphone	Earphone 1	EWN07	Digital Wireless Covert Earpiece With in-Line Controller (Neckloop Sensor)
	Earphone 2	EWN08	Digital Wireless Covert Earpiece (Flatpack Sensor)
	Earphone 3	EAN19	3-wire Surveillance Earpiece with Transparent Acoustic Tube (Beige)
	Earphone 4	EAN21	3-wire Surveillance Earpiece with Transparent Acoustic Tube(Beige)
	Earphone 5	ESN14	Detachable Earpiece with Transparent Acoustic Tube,contains two parts,one is ACN-02,the other is ES-01
	Earphone 6	EAN22	Detachable Earpiece with Transparent Acoustic Tube,contains two parts,one is ACN-02,the other is ES-02
	Earphone 7	EHN20	Remote Swivel Earset,contains two parts,one is ACN-02,the other is EH-02
	Earphone 8	EHN21	Remote C-Earset,contains two parts,one is ACN-02,the other is EH-01
	Earphone 9	ACN-02	PTT&MIC cable(for use with Receive-Only Earpiece)
	Earphone 10	EH-01	Receive—Only C Style Earloop(for use with PTT&MIC cable)
	Earphone 11	EH-02	Receive—Only Ajustable Earhook with Swivel Speaker(for use with PTT&MIC cable)
	Earphone 12	ES-02	Receive-Only Earpiece with Transparent Acoustic Tube
	Earphone 13	ES-01	Receiver - Only Earpiece (for use with PTT&MIC cable)
Note: the Manufacturer is Hytera Communications Co., Ltd.			

** All measurement and test data in this report was gathered from production sample serial number: 1212005 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2012-12-03.*

Objective

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

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS submission with FCC ID: YAMX1PVHF.

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 90 – Private Land Mobile Radio Service

Applicable Standards: TIA 603-D and ANSI 63.4-2009.

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) 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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).

The current scope of accreditations can be found at http://ts.nist.gov/Standards/scopes/2007070.htm.

SYSTEM TEST CONFIGURATION

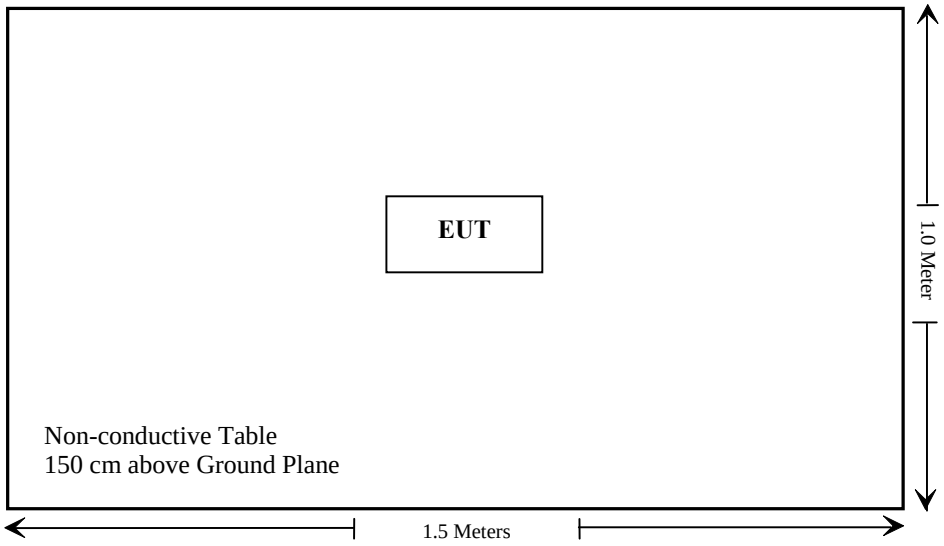
Description of Test Configuration

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

Equipment Modifications

No modification was made to the EUT tested.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

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

Note: The uncertainty of any RF tests which use conducted method measurement is 0.96 dB.

The uncertainty of any radiation emissions measurement is 4.0 dB.

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 rountine environmental evaluation for RF exposure prior or equipment authorization or use.

Result: Compliance.

Please refer to SAR Report Number: R1212077-FCC-SAR.

FCC §2.1046 & §90.205- RF OUTPUT POWER

Applicable Standard

FCC §2.1046 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

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

Test Data

Environmental Conditions

Temperature:	20~25 ℃
Relative Humidity:	50~56 %
ATM Pressure:	100.0~100.1 kPa

The testing was performed by Tiger Ye from 2013-02-21 to 2013-03-18.

Test Mode: Transmitting

Test Result: Compliance. Please refer to following table.

Modulation	Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (W)	Power level
Analog Modulation (FM/12.5kHz)	136.015	37.19	5.24	High Power
		29.80	0.95	Low Power
	141.135	37.22	5.27	High Power
		29.82	0.96	Low Power
	144.985	37.20	5.25	High Power
		29.77	0.95	Low Power
	144.015	37.16	5.20	High Power
		29.71	0.94	Low Power
	148.015	37.18	5.22	High Power
		29.68	0.93	Low Power
	153.965	37.21	5.26	High Power
		29.66	0.92	Low Power
	153.035	37.21	5.26	High Power
		29.79	0.95	Low Power
	158.520	37.22	5.27	High Power
		29.75	0.94	Low Power
	163.980	37.25	5.31	High Power
		29.73	0.94	Low Power
	163.020	37.15	5.19	High Power
		29.81	0.96	Low Power
	168.510	37.21	5.26	High Power
		29.80	0.95	Low Power
	173.970	37.16	5.20	High Power
		29.68	0.93	Low Power

Modulation	Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (W)	Power level
Digital Modulation (4FSK/12.5kHz)	136.015	37.22	5.27	High Power
		29.81	0.96	Low Power
	141.135	37.14	5.18	High Power
		29.83	0.96	Low Power
	144.985	37.15	5.19	High Power
		29.69	0.93	Low Power
	144.015	37.16	5.20	High Power
		29.71	0.94	Low Power
	148.015	37.20	5.25	High Power
		29.72	0.94	Low Power
	153.965	37.23	5.28	High Power
		29.68	0.93	Low Power
	153.035	37.18	5.22	High Power
		29.80	0.95	Low Power
	158.520	37.17	5.21	High Power
		29.79	0.95	Low Power
	163.980	37.19	5.24	High Power
		29.71	0.94	Low Power
	163.020	37.23	5.28	High Power
		29.78	0.95	Low Power
	168.510	37.23	5.28	High Power
		29.81	0.96	Low Power
	173.970	37.18	5.22	High Power
		29.73	0.94	Low Power

The antenna specification as below:

Model	Frequency Range(MHz)	Antenna Gain	Measurement
AN0140H01	136-145	-11.0dBi @136MHz -11.0dBi @139MHz -11.0dBi @142MHz -11.0dBi @145MHz	Length：90mm Diameter： Top Diameter： 9.46mm, Bottom Diameter： 11.5mm
AN0148H03	144-154	-11.5dBi @144MHz -11.0dBi @147MHz -10.0dBi @150MHz -9.5 dBi @154MHz	
AN0158H02	153-164	-8.0 dBi @153MHz -7.5 dBi @157MHz -7.5 dBi @160MHz -7.5 dBi @164MHz	
AN0168H01	163-174	-7.0 dBi @163MHz -6.5 dBi @167MHz -6.5 dBi @170MHz -6.7 dBi @174MHz	

Note: ERP= Conducted output power (dBm) +antenna gain (dBi)-2.15

FCC §2.1047 & §90.207 - MODULATION CHARACTERISTIC

Applicable Standard

FCC§2.1047 & §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 Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
HP	RF Communication Test Set	8920	3438A05201	2012-06-14	2013-06-13
LEADER	MILLIVOLTMETER	LMV-181A	6041126	2012-05-09	2013-05-08

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

Test Procedure

Test Method: TIA/EIA-603 2.2.3

Test Data

Environmental Conditions

Temperature:	25℃
Relative Humidity:	50 %
ATM Pressure:	100.0 kPa

The testing was performed by Tiger Ye on 2013-02-20.

Test Mode: Transmitting

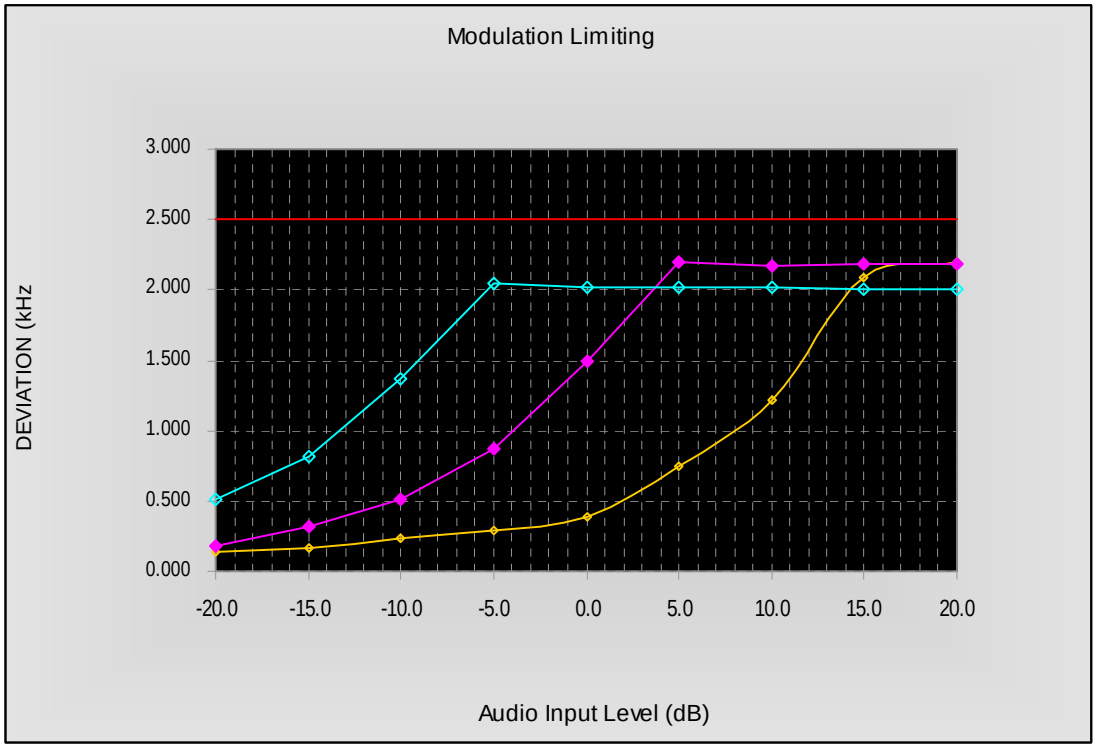
Result: Compliance.

Analog Modulation:

MODULATION LIMITING

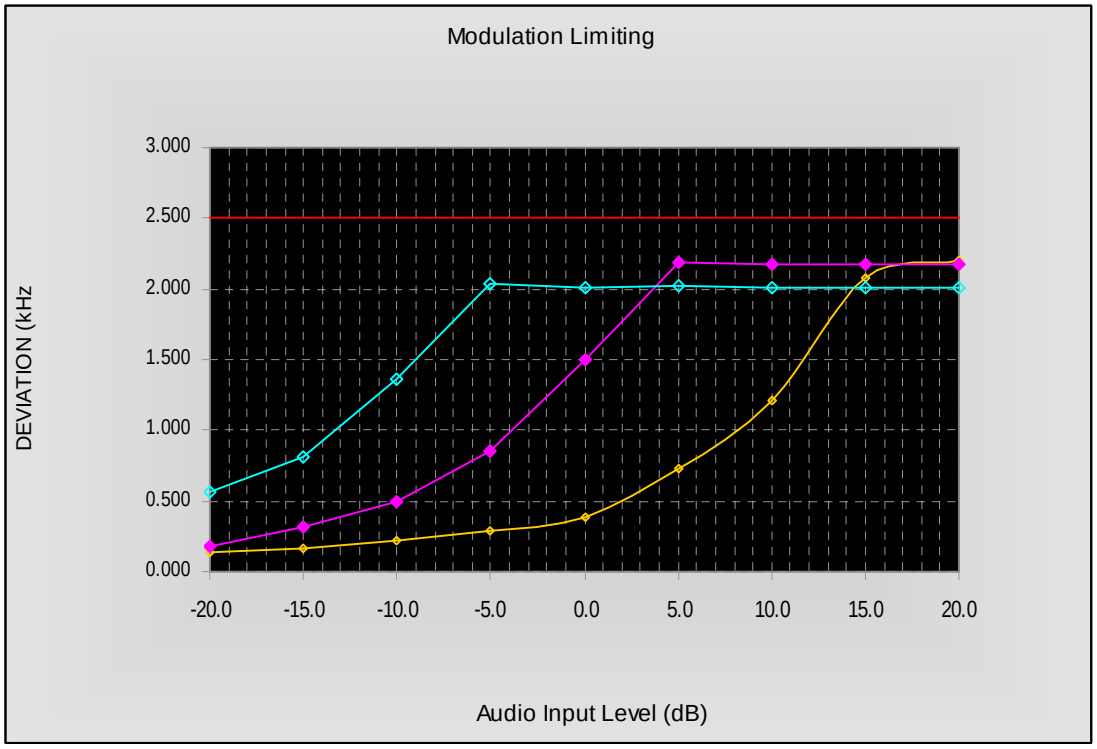
Carrier Frequency: 156.000 MHz, Channel Separation=12.5 kHz, Low Power

Audio Input Level [dB]	Frequency Deviation (kHz)			Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
20.0	2.192	2.181	2.005	2.5
15.0	2.086	2.182	2.002	2.5
10.0	1.211	2.168	2.011	2.5
5.0	0.740	2.193	2.020	2.5
0.0	0.391	1.500	2.011	2.5
-5.0	0.282	0.868	2.043	2.5
-10.0	0.232	0.511	1.360	2.5
-15.0	0.164	0.321	0.821	2.5
-20.0	0.132	0.185	0.508	2.5



Carrier Frequency: 156.000 MHz, Channel Separation=12.5 kHz, High Power

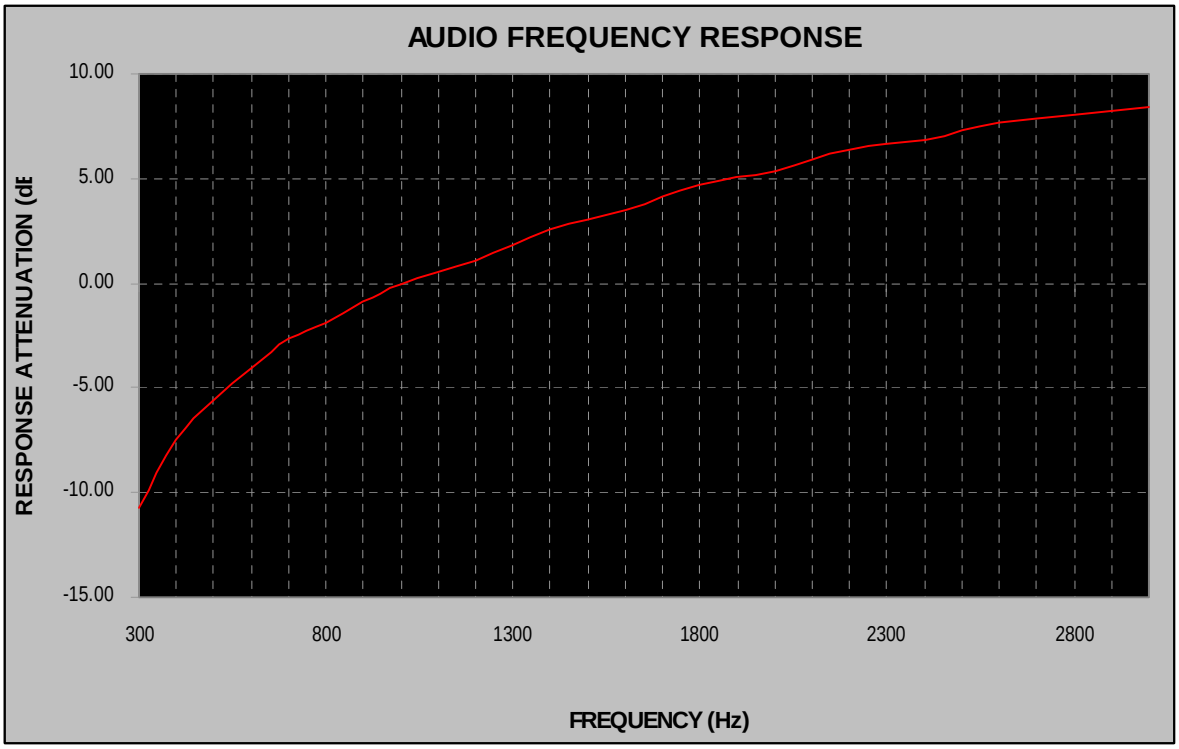
Audio Input Level [dB]	Frequency Deviation (kHz)			Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
20.0	2.200	2.182	2.008	2.5
15.0	2.081	2.175	2.008	2.5
10.0	1.213	2.179	2.015	2.5
5.0	0.735	2.193	2.018	2.5
0.0	0.381	1.500	2.013	2.5
-5.0	0.295	0.862	2.044	2.5
-10.0	0.222	0.501	1.366	2.5
-15.0	0.170	0.311	0.813	2.5
-20.0	0.133	0.177	0.564	2.5



Audio Frequency Response

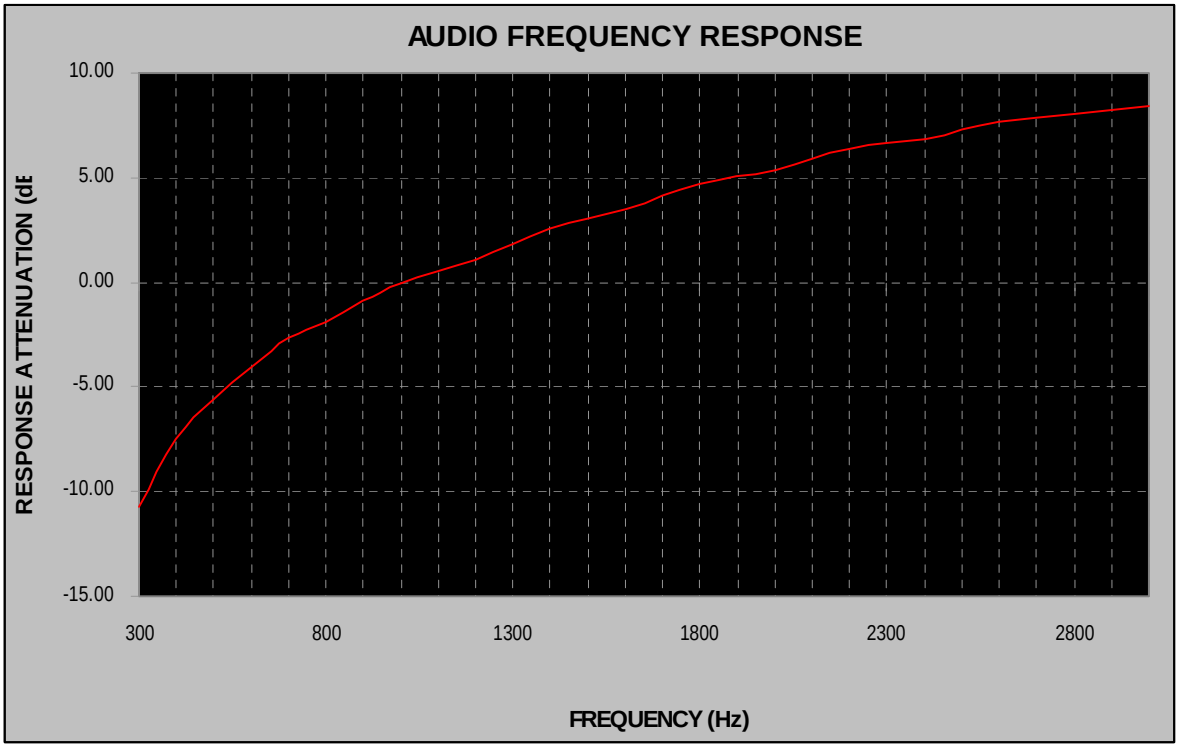
Carrier Frequency: 156.000 MHz, Channel Separation=12.5 kHz, Low Power

Audio Frequency (Hz)	Response Attenuation (dB)
300	-8.62
400	-6.31
500	-4.42
600	-3.30
700	-2.30
800	-1.63
900	-0.51
1000	0.00
1200	1.60
1400	2.98
1600	3.65
1800	4.72
2000	5.42
2200	6.38
2400	6.72
2600	7.55
2800	7.82
3000	8.20



Carrier Frequency: 156.000 MHz, Channel Separation=12.5 kHz, High Power

Audio Frequency (Hz)	Response Attenuation (dB)
300	-10.66
400	-7.50
500	-5.64
600	-4.04
700	-2.64
800	-1.89
900	-0.86
1000	0.00
1200	1.08
1400	2.62
1600	3.46
1800	4.72
2000	5.33
2200	6.38
2400	6.84
2600	7.71
2800	8.09
3000	8.44

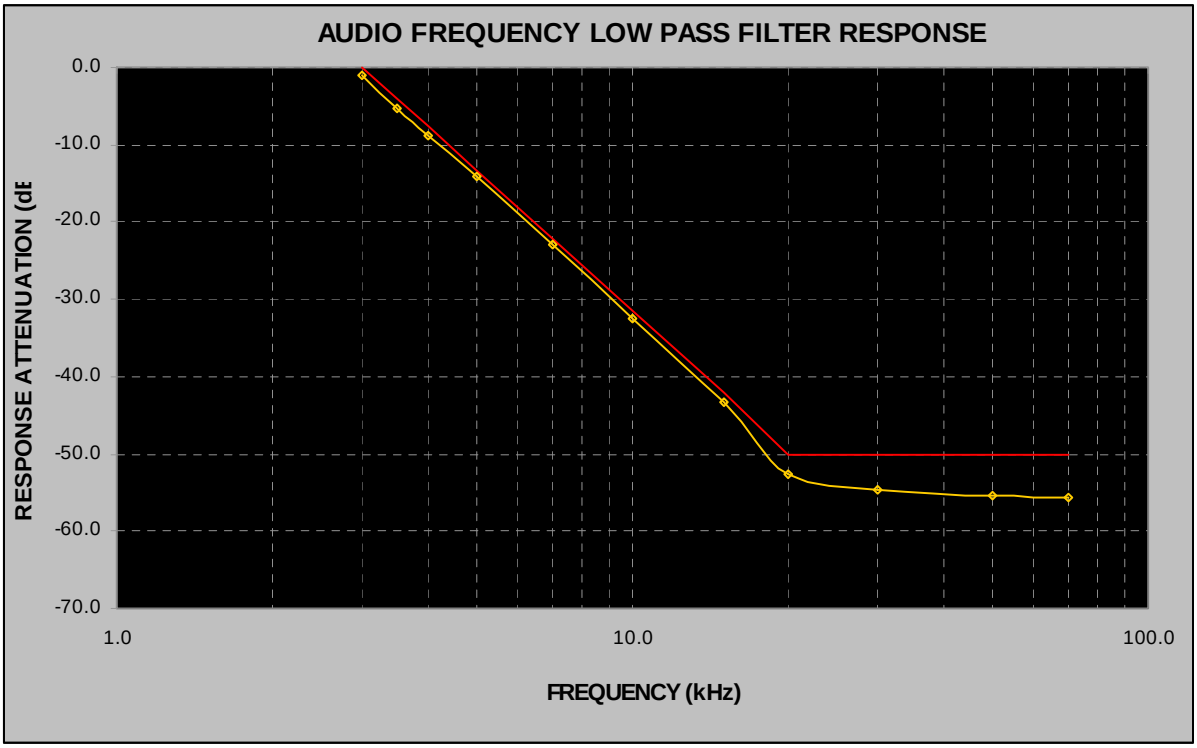


Audio Frequency Low Pass Filter Response

Analog Modulation:

Carrier Frequency: 156.000 MHz, Channel Separation=12.5 kHz

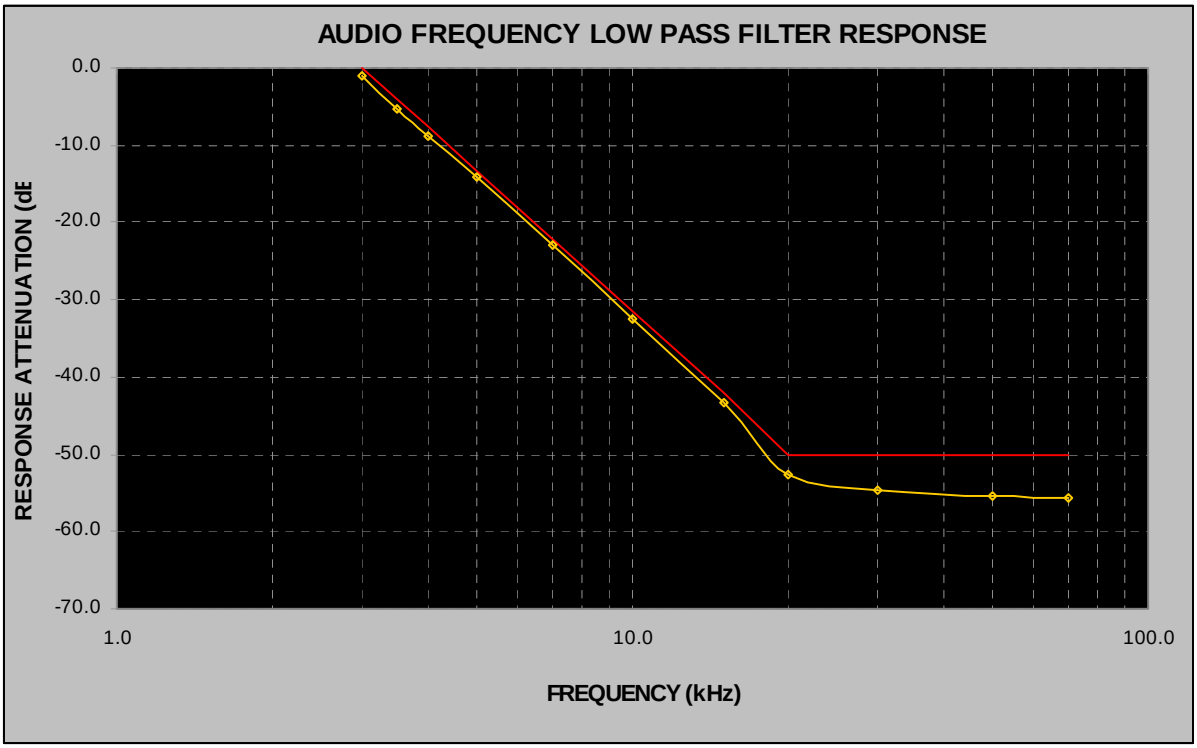
Audio Frequency (kHz)	Response Attenuation (dB)	FCC Limit (dB)
3.0	-1.0	0.0
3.5	-5.3	-4.0
4.0	-8.8	-7.5
5.0	-14.2	-13.3
7.0	-23.0	-22.1
10.0	-32.5	-31.4
15.0	-43.4	-42.0
20.0	-52.7	-50.0
30.0	-54.6	-50.0
50.0	-55.5	-50.0
70.0	-55.6	-50.0



Digital Modulation:

Carrier Frequency: 156.000 MHz, Channel Separation=12.5 kHz

Audio Frequency (kHz)	Response Attenuation (dB)	FCC Limit (dB)
3.0	-0.9	0.0
3.5	-5.5	-4.0
4.0	-8.5	-7.5
5.0	-14.0	-13.3
7.0	-23.0	-22.1
10.0	-33.2	-31.4
15.0	-43.4	-42.0
20.0	-52.5	-50.0
30.0	-54.6	-50.0
50.0	-55.5	-50.0
70.0	-55.8	-50.0



FCC §2.1049, §90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK

Applicable Standard

FCC §2.1049, §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:

50+10logP=50+10 log (1.574) = 51.97 dB

Emission Mask B. 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) For any frequency removed from the center of the assigned channel by more than 50 percent up to and including 100 percent of the authorized bandwidth, at least 25 dB.

2) On any frequency removed from the center of the assigned channel by more than 100 percent up to and including 250 percent, at least 35 dB.

3) On any frequency removed from the center of the assigned channel by more than 250 percent at least:

43+10logP=43+10log (1.622) = 45.10 dB

The resolution bandwidth was 300 Hz or greater for measuring up to 250 kHz from the edge of the authorized frequency segment, and 30 kHz or greater for measuring more than 250 kHz from the authorized frequency segment.

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
HP	RF Communication Test Set	8920	3438A05201	2012-06-14	2013-06-13

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

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 300 Hz and the spectrum was recorded in the frequency band ±35 kHz from the carrier frequency.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	50 %
ATM Pressure:	100.0 kPa

The testing was performed by Tiger Ye on 2013-02-20.

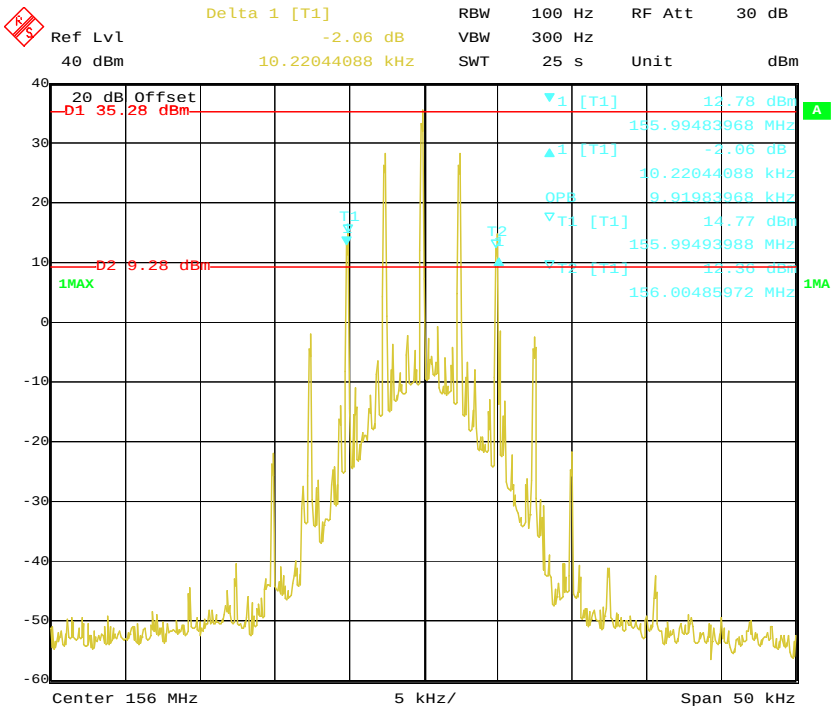
Modulation	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)	Power Level
Analog Modulation (12.5kHz)	9.92	10.22	High Power
	9.92	10.22	Low Power
Digital Modulation	7.52	9.22	High Power
	7.01	9.12	Low Power

Note:

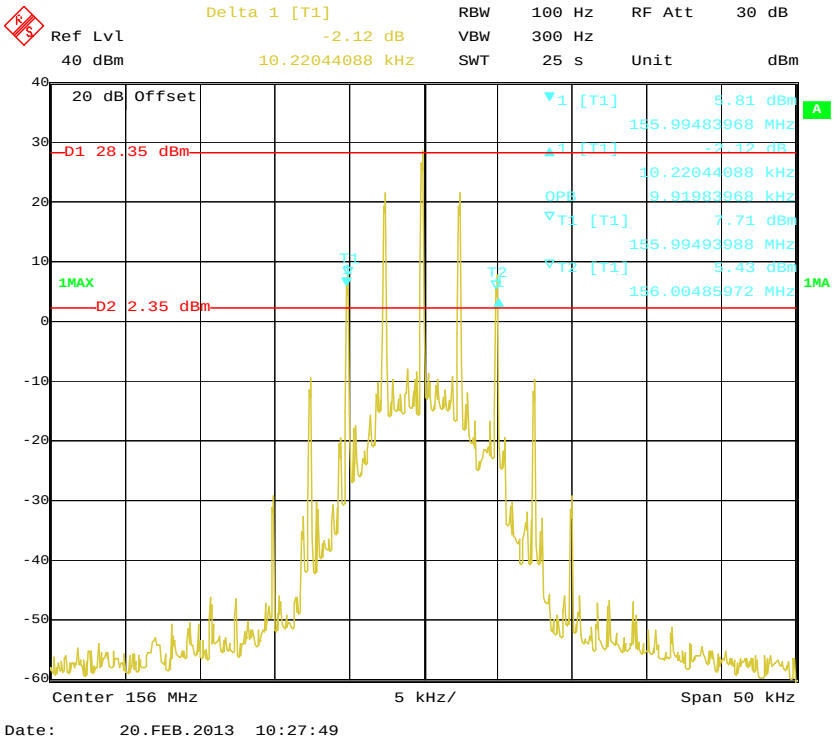
Characteristic of P25 phase 2 systems:

The system uses 4FSK modulation which sends 4800symbols/sec with each symbol conveying 2 bits of information for a data rate of 9600 bps in a 12.5kHz channel, which is equivalent to 4800bps per 6.25kHz.Phase 2 P25 system use two-slot TDMA systems, that provides 2 voice paths in a 12.5 kHz channel, which is equivalent to one voice per 6.25kHz, thus meeting the a “one voice path per 6.25 kHz” efficiency standard.

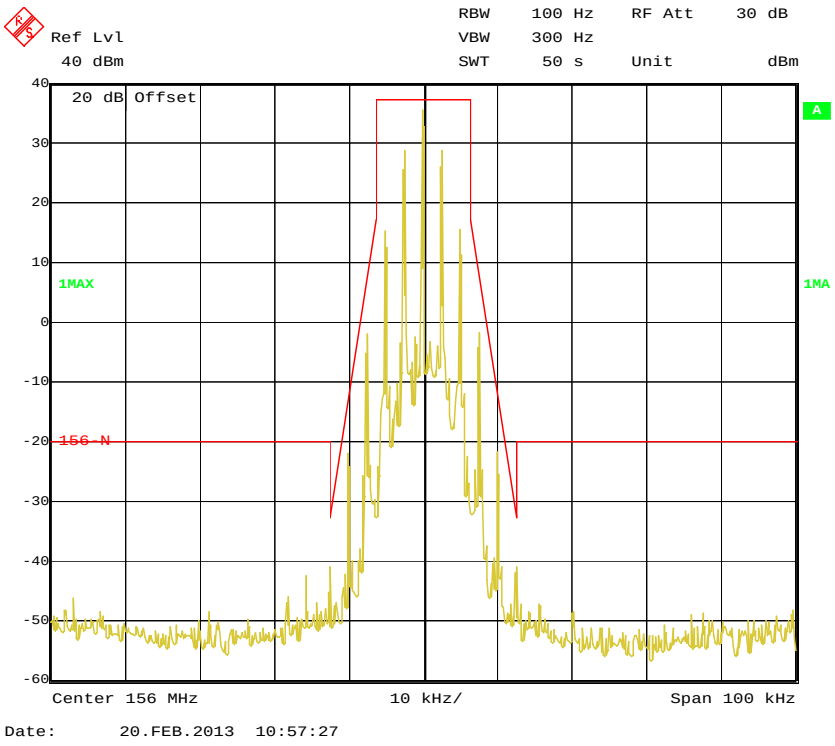
Analog Modulation: 99% Occupied & 26 dB Bandwidth with High Power



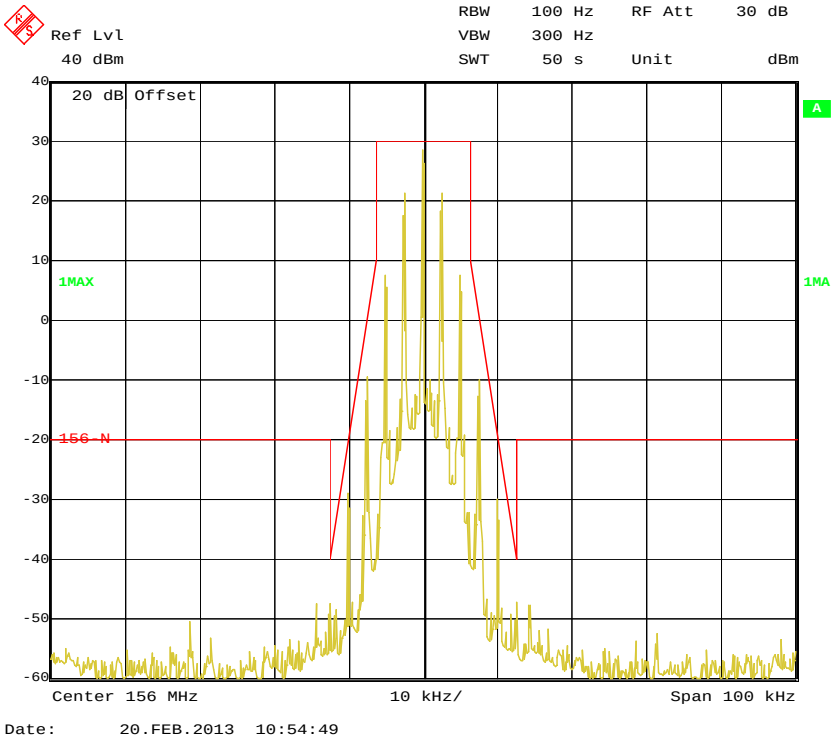
Analog Modulation: 99% Occupied & 26 dB Bandwidth with Low Power



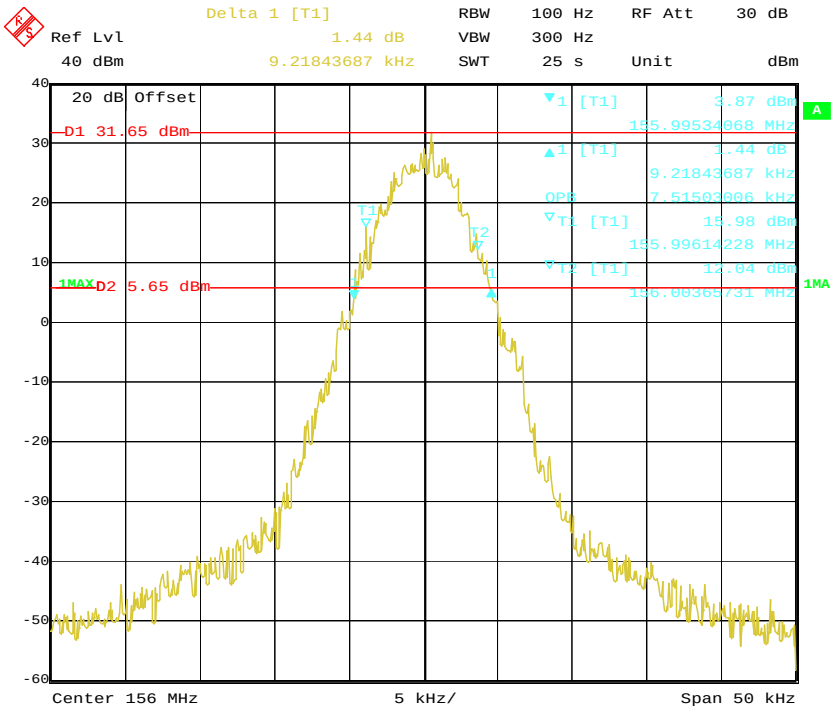
Analog Modulation: Emission Mask with High Power



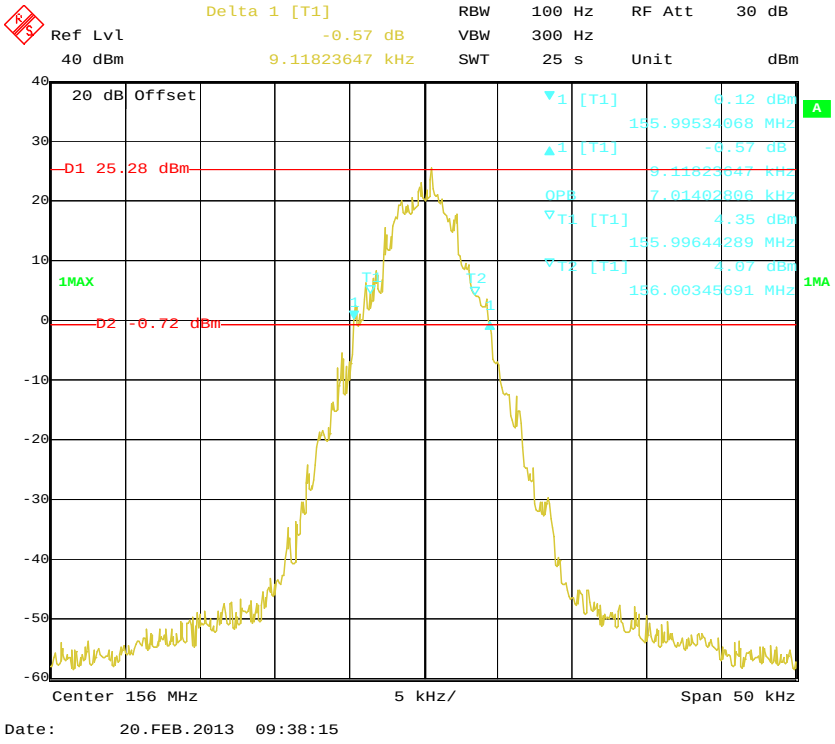
Analog Modulation: Emission Mask with Low Power



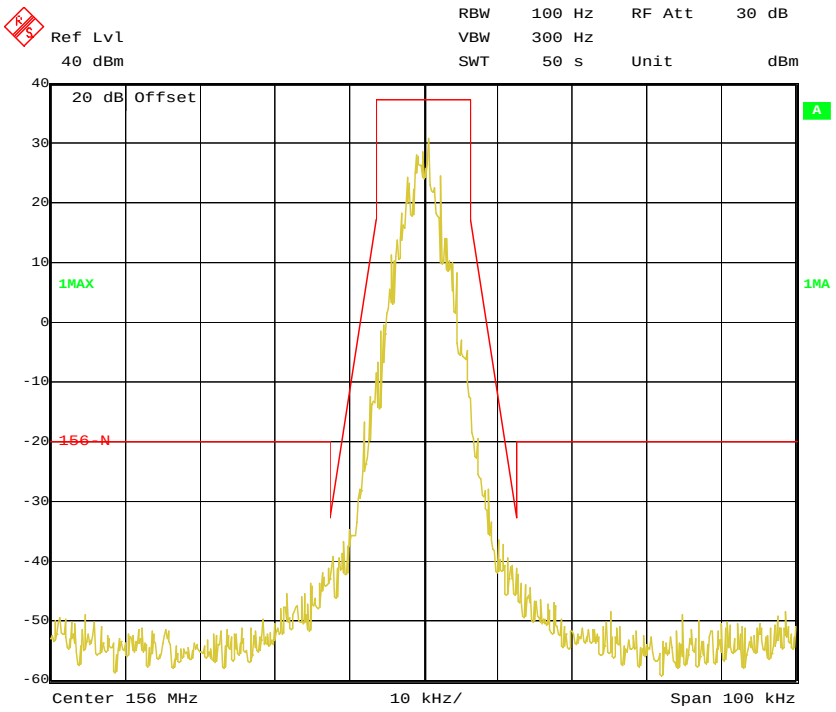
Digital Modulation: 99% Occupied & 26 dB Bandwidth with High Power



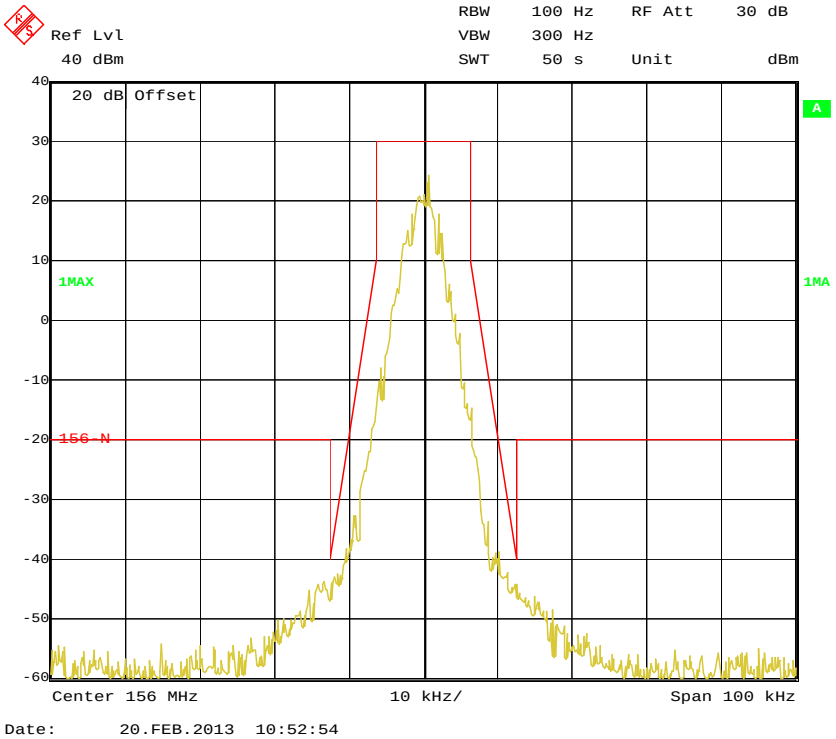
Digital Modulation: 99% Occupied & 26 dB Bandwidth with Low Power



Digital Modulation: Emission Mask with High Power



Digital Modulation: Emission Mask with Low Power



FCC §2.1051 & §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+10logP=50+10log (P) dB

Emission Mask B. 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) For any frequency removed from the center of the assigned channel by more than 50 percent up to and including 100 percent of the authorized bandwidth, at least 25 dB.

2) On any frequency removed from the center of the assigned channel by more than 100 percent up to and including 250 percent, at least 35 dB.

3) On any frequency removed from the center of the assigned channel by more than 250 percent at least:

43+10logP=43+10log (P) dB

The resolution bandwidth was 300 Hz or greater for measuring up to 250 kHz from the edge of the authorized frequency segment, and 30 kHz or greater for measuring more than 250 kHz from the authorized frequency segment.

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

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

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 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	56 %
ATM Pressure:	100.1 kPa

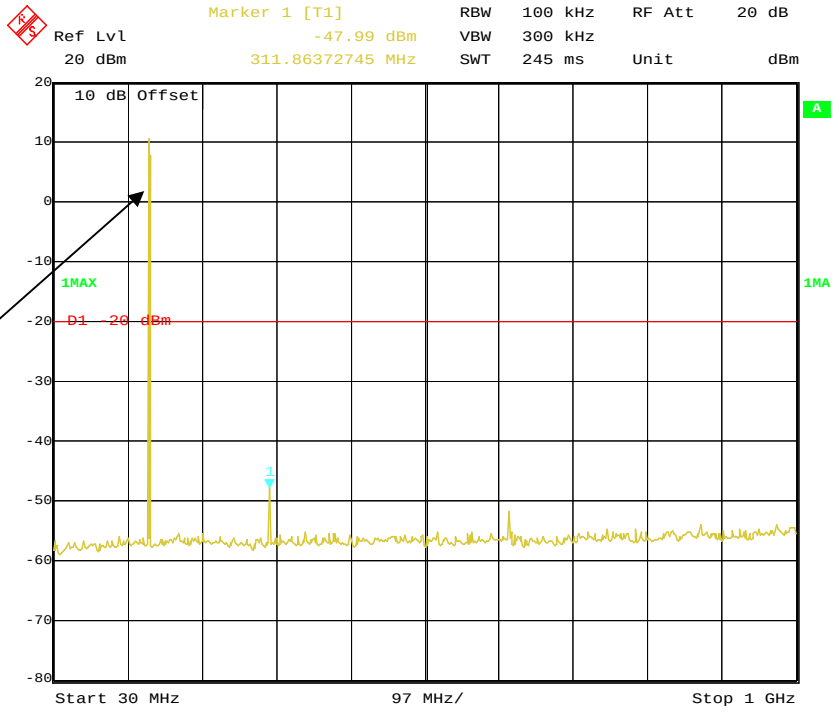
The testing was performed by Tiger Ye on 2013-02-21.

Test Mode: Transmitting

Please refer to the following plots.

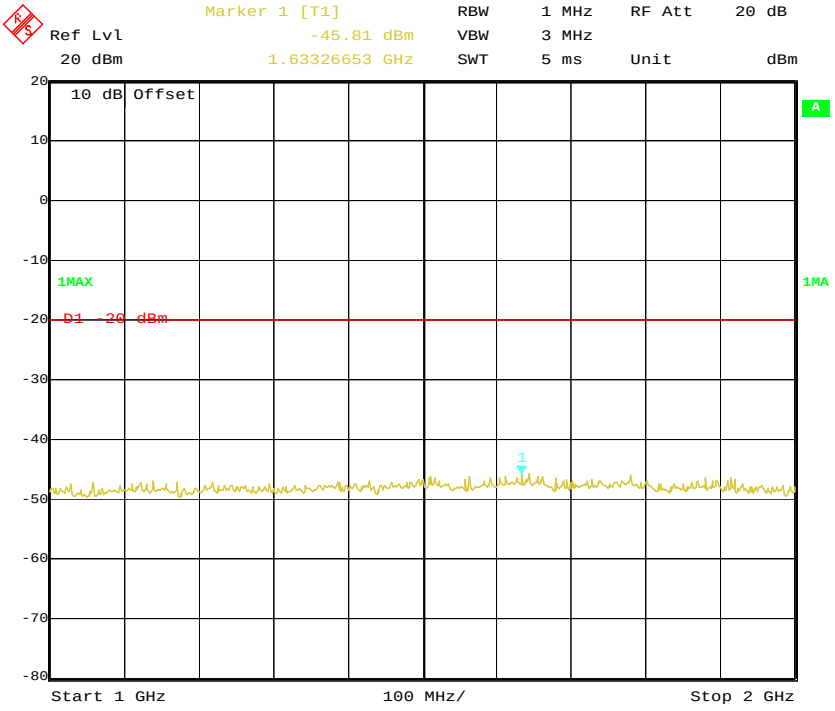
Analog Modulation (156.0 MHz):

30 MHz – 1 GHz, Spacing Channel 12.5 kHz



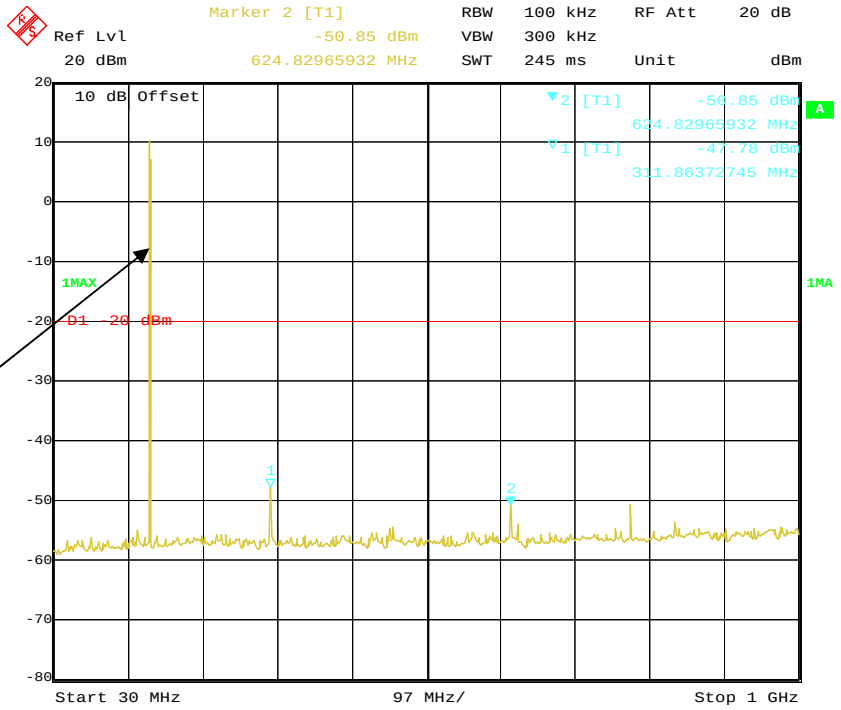
Fundamental test with Band Reject Filter

1 GHz – 2 GHz, Spacing Channel 12.5 kHz



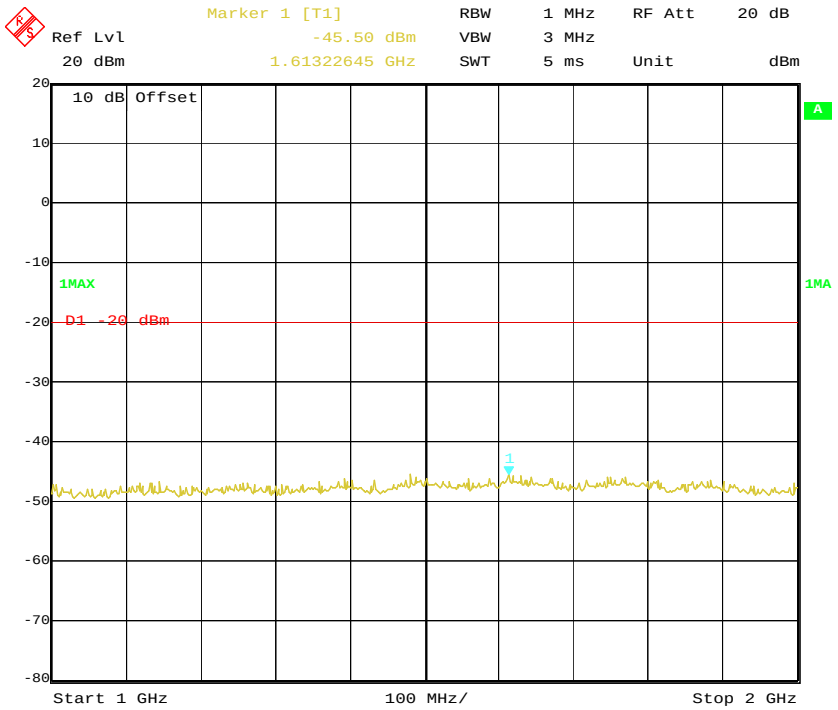
Digital Modulation (156.0 MHz):

30 MHz - 1 GHz



Fundamental test with Band Reject Filter

1 GHz – 2 GHz



FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053 and §90.210

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2014-11-30
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
HP	Signal Generator	8657A	3217A04699	2012-12-19	2013-12-18
A.H. System	Horn Antenna	SAS-200/571	135	2012-02-11	2015-02-10
HP	Synthesized Sweeper	8341B	2624A00116	2012-05-17	2013-05-16

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

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 =43+10 Log_{10} (power out in Watts)
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:	25℃
Relative Humidity:	56 %
ATM Pressure:	100.1 kPa

The testing was performed by Tiger Ye on 2013-02-21.

Test Mode: Transmitting

30MHz-2GHz:

Frequency (MHz)	Receiver Reading (dBμV)	TurnTable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 90	
			Height (m)	Polar (H / V)	SG Level (dBm)	Cable loss(dB)	Antenna Gain(dB)		Limit (dBm)	Margin (dB)
Analog Modulation (156.0MHz), Channel Spacing 12.5 kHz										
623.6	61.23	212	1.4	H	-35.8	0.58	0	-36.38	-20	16.38
311.3	60.05	75	1.6	V	-37.0	0.37	0	-37.37	-20	17.37
623.6	58.71	280	1.4	V	-38.3	0.58	0	-38.88	-20	18.88
311.3	57.85	3	1.5	H	-39.1	0.37	0	-39.47	-20	19.47
780.7	45.16	168	1.3	H	-51.8	0.66	0	-52.46	-20	32.46
780.7	44.80	237	1.1	V	-52.2	0.66	0	-52.86	-20	32.86
1560.0	40.38	35	1.9	V	-61.6	0.95	9.4	-53.15	-20	33.15
1210.4	37.58	173	1.2	H	-60.9	0.8	8.5	-53.20	-20	33.20
1210.4	37.35	141	1.1	V	-63.6	0.8	8.5	-55.90	-20	35.90
1560.0	38.82	33	1.4	H	-64.8	0.95	9.4	-56.35	-20	36.35
Digital Modulation (156.0MHz), Channel Spacing 12.5 kHz										
311.3	59.29	315	1.6	V	-37.7	0.37	0	-38.07	-20	18.07
623.6	59.44	138	1.1	V	-37.6	0.58	0	-38.18	-20	18.18
623.6	55.96	48	1.4	H	-41.0	0.58	0	-41.58	-20	21.58
311.3	50.68	229	1.9	H	-46.3	0.37	0	-46.67	-20	26.67
780.7	47.90	159	1.9	V	-49.1	0.66	0	-49.76	-20	29.76
1210.4	40.71	77	1.2	H	-57.7	0.8	8.5	-50.00	-20	30.00
1560.0	39.66	292	1.0	V	-62.4	0.95	9.4	-53.95	-20	33.95
1210.4	37.99	103	1.2	V	-62.9	0.8	8.5	-55.20	-20	35.20
780.7	42.25	332	1.9	H	-54.8	0.66	0	-55.46	-20	35.46
1560.0	36.57	306	1.2	H	-67.1	0.95	9.4	-58.65	-20	38.65

Remark:	
(1)	Absolute level (dBm) = Substituted SG level -Cable loss + Antenna Gain
(2)	Measuring frequencies from 30 MHz to the 2 GHz.
(3)	Margin=Limit-Absolute Level

FCC §2.1055 & §90.213- FREQUENCY STABILITY

Applicable Standard

FCC §2.1055 & §90.213

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Hewlett-Packard	Frequency Counter	5343A	2232A00827	2012-04-15	2013-04-14
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2012-11-02	2013-11-01

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

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:	23~25 ℃
Relative Humidity:	48~52 %
ATM Pressure:	100.1 kPa

The testing was performed by Tiger Ye on 2012-12-20 and 2013-01-25.

Test Mode: Transmitting

For Analog Modulation (Channel Spacing 12.5 kHz)

Reference Frequency: 156.0 MHz, Limit: ±5 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	155.999957	0.273
40	7.4	155.999965	0.225
30	7.4	155.999977	0.145
20	7.4	155.999970	0.193
10	7.4	155.999958	0.269
0	7.4	155.999960	0.254
-10	7.4	155.999958	0.270
-20	7.4	155.999960	0.254
-30	7.4	155.999979	0.138
Frequency Stability versus Input Voltage			
20	6.3	155.999951	0.314
20	6.2	155.999946	0.346

For Digital Modulation (Channel Spacing 12.5 kHz)

Reference Frequency: 156.0 MHz, Limit: ±5 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	155.999948	0.332
40	7.4	155.999959	0.260
30	7.4	155.999952	0.305
20	7.4	155.999950	0.321
10	7.4	155.999938	0.398
0	7.4	155.999931	0.444
-10	7.4	155.999960	0.257
-20	7.4	155.999949	0.325
-30	7.4	155.999938	0.399
Frequency Stability versus Input Voltage			
20	6.3	155.999936	0.412
20	6.2	155.999941	0.378

FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

Applicable Standard

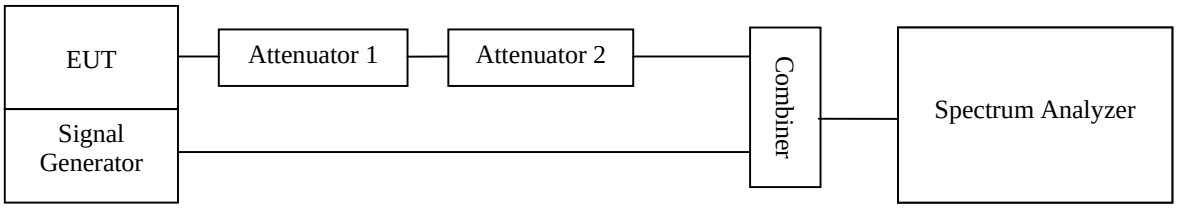
Regulations: FCC §90.214
Test method: ANSI/TIA-603-D 2010, section 2.2.19.3

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
HP	RF Communication Test Set	8920	3438A05201	2012-06-14	2013-06-13
Agilent	VECTOR SIGNAL ANALYZER	89441A	75182	2012-05-12	2013-05-11

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:	25 ℃
Relative Humidity:	50 %
ATM Pressure:	100.0 kPa

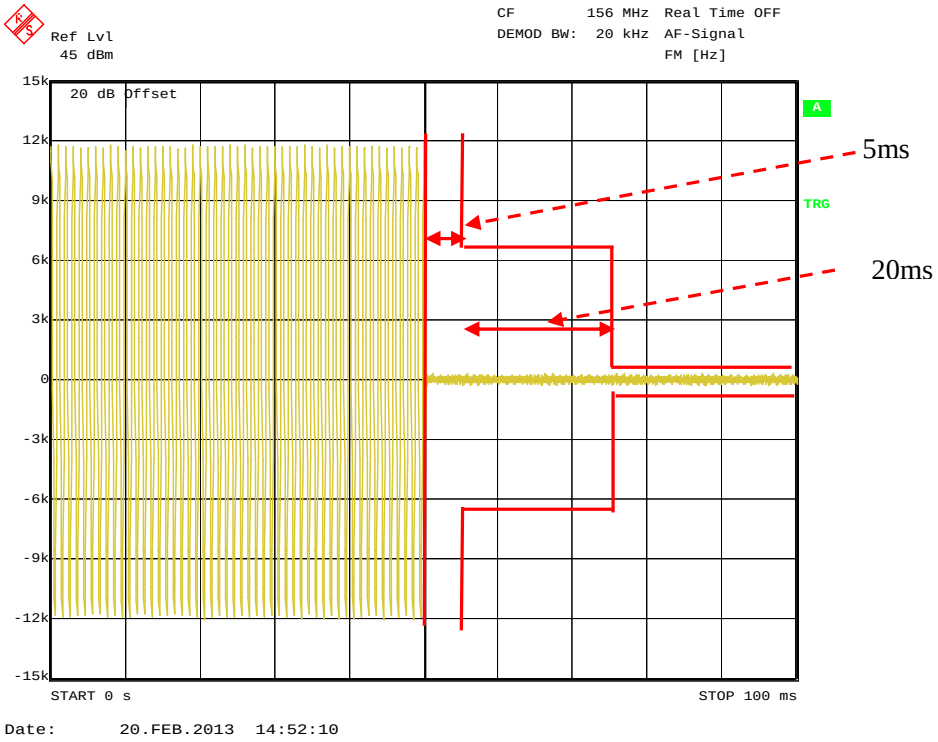
The testing was performed by Tiger Ye on 2013-02-20.

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.

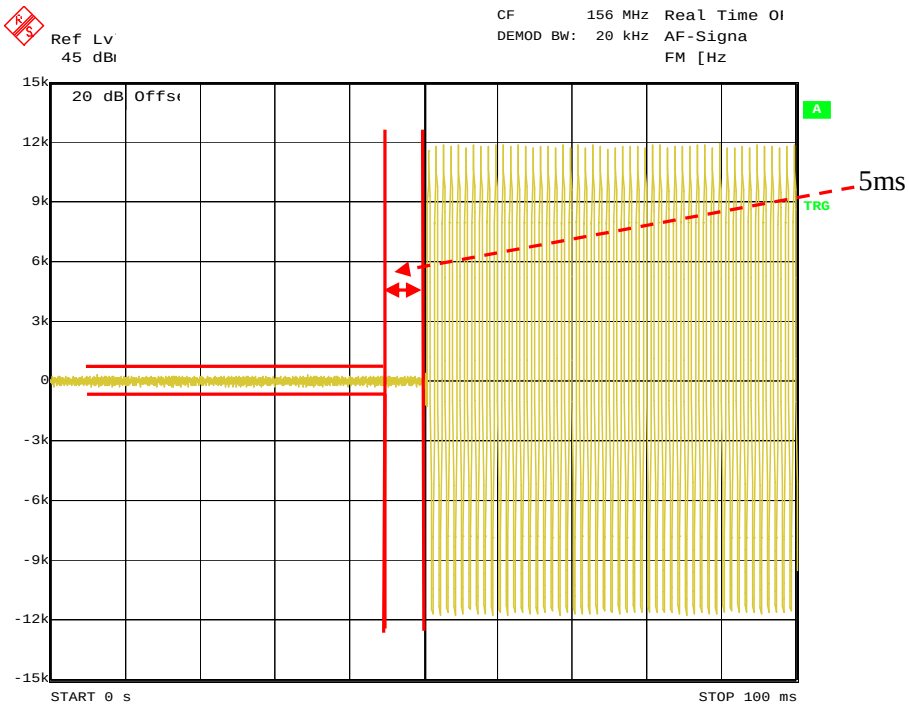
Channel Spacing 12.5 kHz (FM):

Turn on



Date: 20.FEB.2013 14:52:10

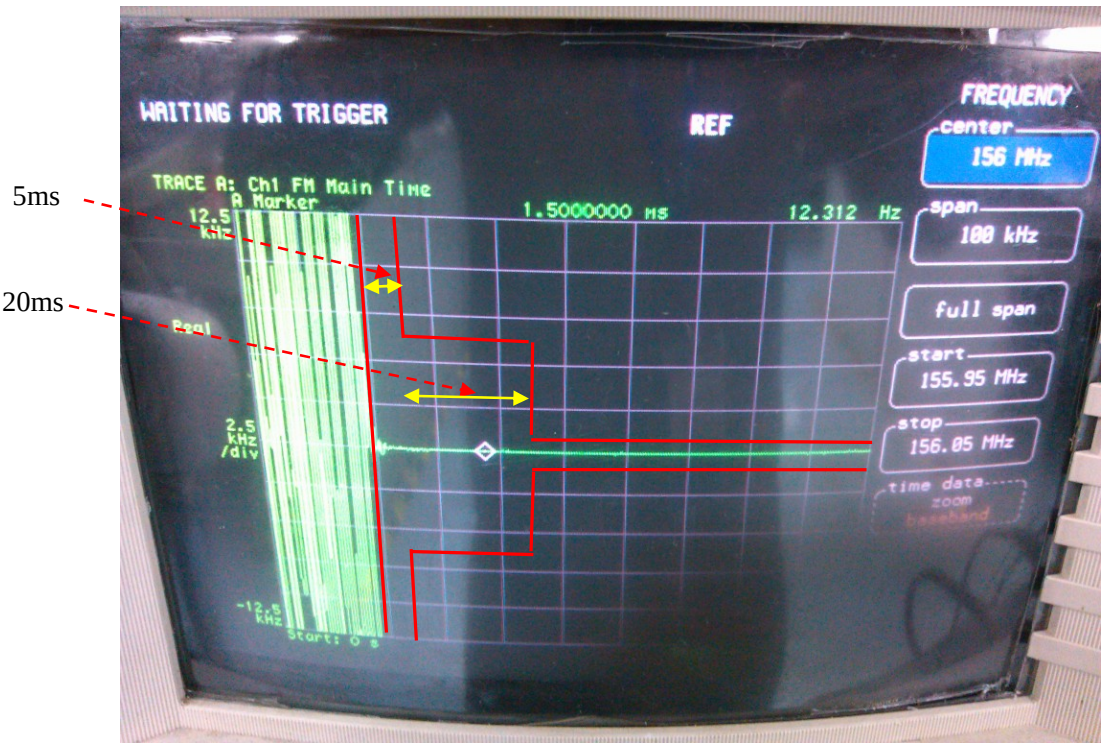
Turn off



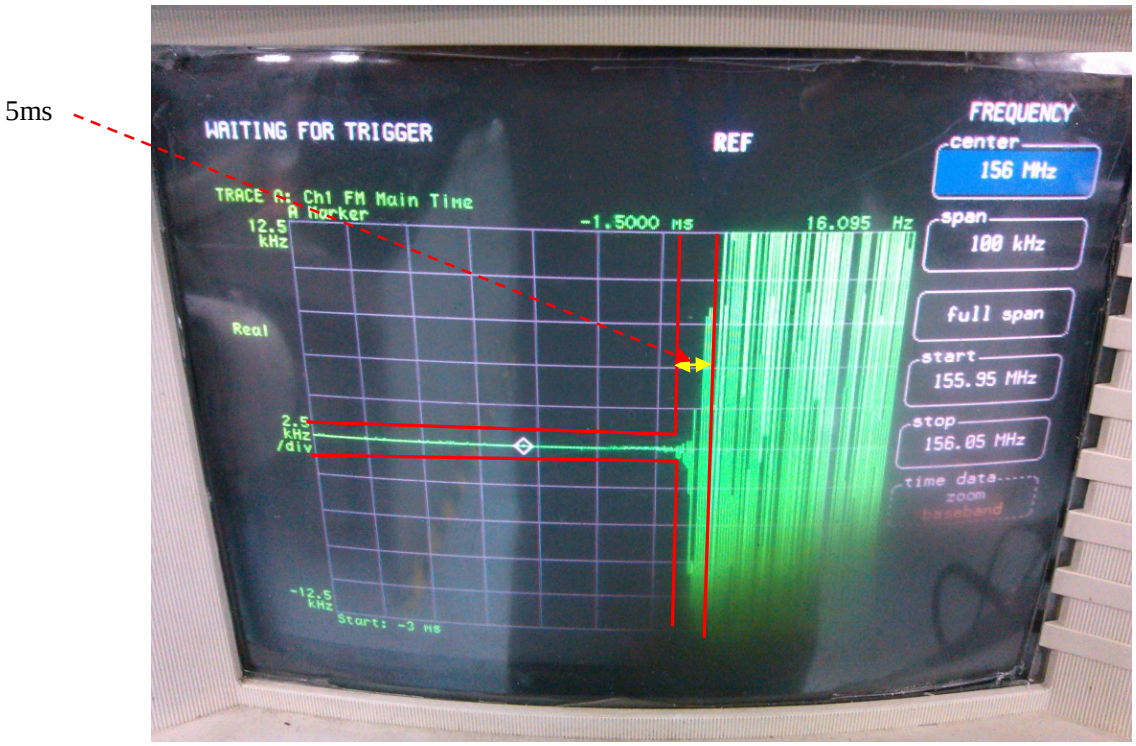
Date: 20.FEB.2013 14:55:37

Channel Spacing 12.5 kHz (4FSK):

Turn on



Turn off



******* End of Report *******