



FCC PART 90

TEST REPORT

For

Shenzhen HQT Science&Technology Co., Ltd.

5/F, East of Building M-8, Central Zone, Hi-tech Industrial Park,
Nanshan District, Shenzhen, Guangdong, China

FCC ID: P6NTH-8000U2

Report Type: Original Report	Product Type: Two-way radio
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Report Number: RSZ120917550-00	
Report Date: 2012-10-25	
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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*, NIST, 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 *Shenzhen HQT Science&Technology Co., Ltd.*'s product, model number: *TH-8000 (FCC ID: P6NTH-8000U2)* (the "EUT") in this report was a *Two-way radio*, which was measured approximately 12.0 cm (H) x 5.5 cm (W) x 3.4 cm (D), rated input voltage: DC 7.4 V Li-poly rechargeable battery.

Technical specifications:

Frequency range: 450-520 MHz

Output power: 1.047 W (Low); 4.742 W (High) (Conducted power)

Modulation: FM

Frequency spacing: 12.5 kHz

** All measurement and test data in this report was gathered from production sample serial number: 1209038 (Assigned by BACL, Shenzhen). The EUT was received on 2012-09-17.*

Objective

This test report is prepared on behalf of *Shenzhen HQT Science&Technology Co., Ltd.* in accordance with Part 2, 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 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

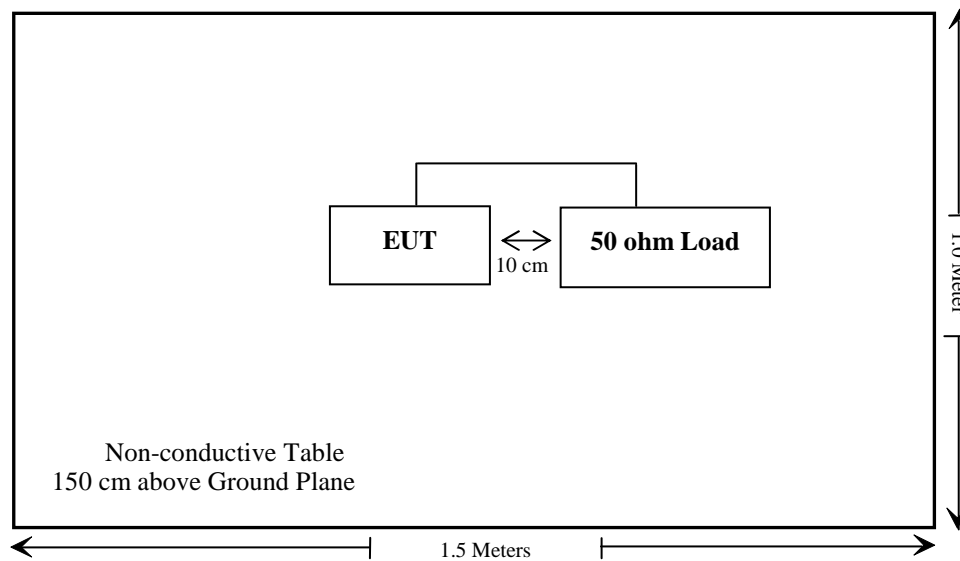
Description of Test Configuration

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

Equipment Modifications

No Equipment Modifications.

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; §90.205	RF Output Power	Compliance
§2.1047; §90.207	Modulation Characteristic	Compliance
§2.1049; §90.209; §90.210	Authorized 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, portable 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: RSZ120917550-20.

FCC §2.1046 & §90.205- RF OUTPUT POWER

Applicable Standard

FCC §2.1046 and §90.205.

Test Procedure

Conducted RF Output Power:

TIA-603-D section 2.2.1

Radiated method:

TIA 603-D section 2.2.17

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

Spectrum Analyzer setting:

<i>RBW</i>	<i>Video B/W</i>
<i>100 kHz</i>	<i>300 kHz</i>

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2012-11-27
HP	Synthesized Sweeper	8341B	2624A00116	2012-04-11	2013-04-10
COM POWER	Dipole Antenna	AD-100	041000	2012-06-06	2013-06-05

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.1 kPa

The testing was performed by Jimmy Xiao on 2012-09-20.

Test Mode: Transmitting

Test Result: Compliance. Please refer to following table.

Conducted Power:

Frequency Spacing (kHz)	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Power level
12.5	450.5	30.40	1.096	Low
12.5	450.5	36.68	4.656	High
12.5	485	31.07	1.279	Low
12.5	485	36.76	4.742	High
12.5	519.5	30.20	1.047	Low
12.5	519.5	36.44	4.406	High

ERP:

Frequency (MHz)	Receiver Reading (dBµV/m)	TurnTable Angle Degree	Rx Antenna		Absolute Level (dBm)	Absolute Level (W)
			Height (m)	Polar (H/V)		
450.5 MHz-Low power						
450.5	109.43	180	1.9	V	24.96	0.313
485.0 MHz-Low power						
485.0	110.62	180	1.9	V	25.13	0.326
519.5 MHz-Low power						
519.5	109.47	180	1.9	V	25.02	0.318
450.5 MHz-High power						
450.5	116.10	180	1.9	V	31.56	1.432
485.0 MHz-High power						
485.0	115.67	180	1.9	V	31.48	1.406
519.5 MHz-High power						
519.5	115.78	180	1.9	V	31.51	1.416

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 Procedure

Test Method: TIA/EIA-603 2.2.3

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
HP	RF Communications Test Set	HP8920A	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 the NIST.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.1 kPa

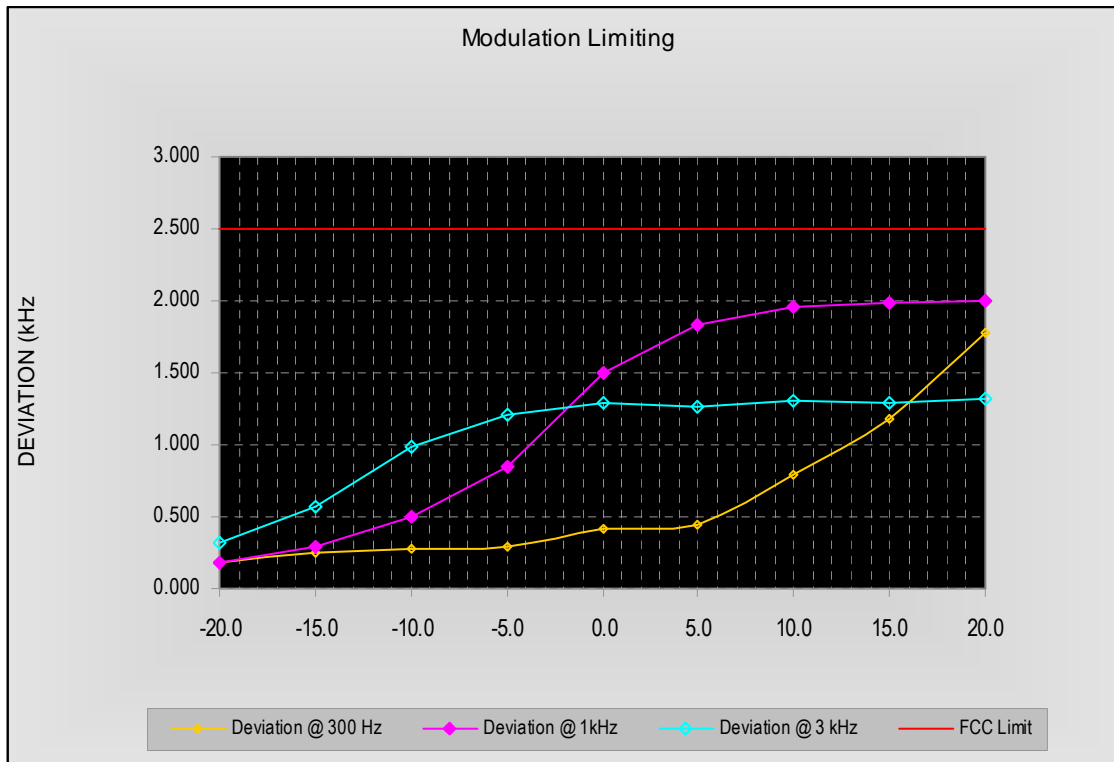
The testing was performed by Jimmy Xiao on 2012-09-20.

Test Mode: Transmitting

MODULATION LIMITING

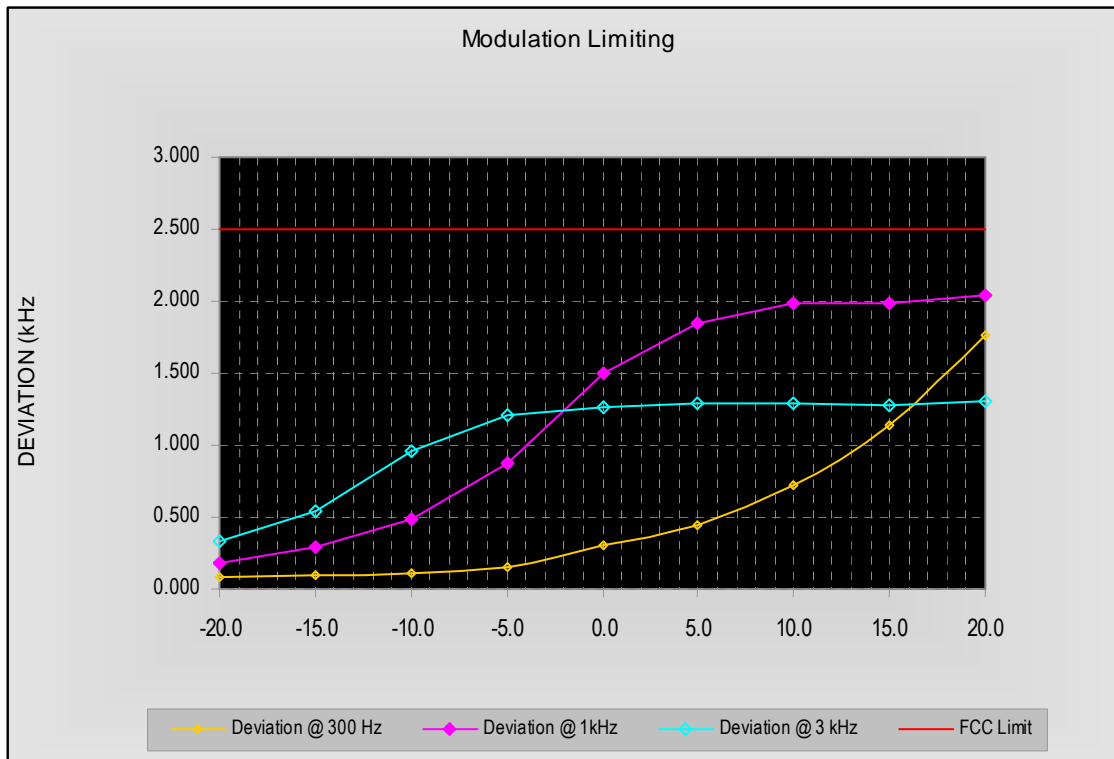
Carrier Frequency: 485 MHz-Low Power, Channel Separation = 12.5 kHz

Audio Input Level [dBm]	Frequency Deviation (kHz)			FCC Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
20.0	1.772	2.004	1.314	2.5
15.0	1.182	1.992	1.287	2.5
10.0	0.786	1.952	1.303	2.5
5.0	0.442	1.827	1.262	2.5
0.0	0.412	1.500	1.285	2.5
-5.0	0.285	0.843	1.205	2.5
-10.0	0.281	0.501	0.985	2.5
-15.0	0.253	0.291	0.570	2.5
-20.0	0.185	0.178	0.325	2.5



Carrier Frequency: 485 MHz-High Power, Channel Separation = 12.5 kHz

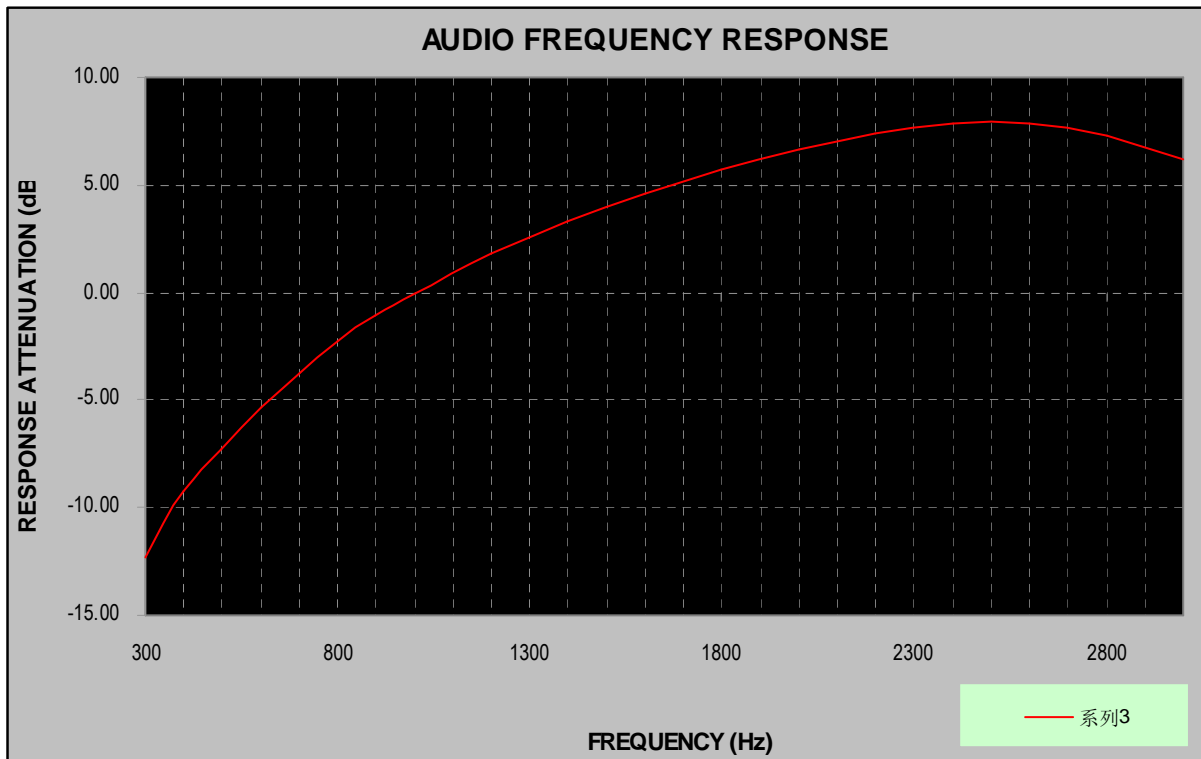
Audio Input Level [dBm]	Frequency Deviation (kHz)			FCC Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
20.0	1.761	2.039	1.310	2.5
15.0	1.141	1.985	1.279	2.5
10.0	0.718	1.986	1.295	2.5
5.0	0.442	1.848	1.292	2.5
0.0	0.305	1.500	1.266	2.5
-5.0	0.157	0.878	1.205	2.5
-10.0	0.108	0.493	0.958	2.5
-15.0	0.102	0.288	0.546	2.5
-20.0	0.085	0.174	0.328	2.5



Audio Frequency Response

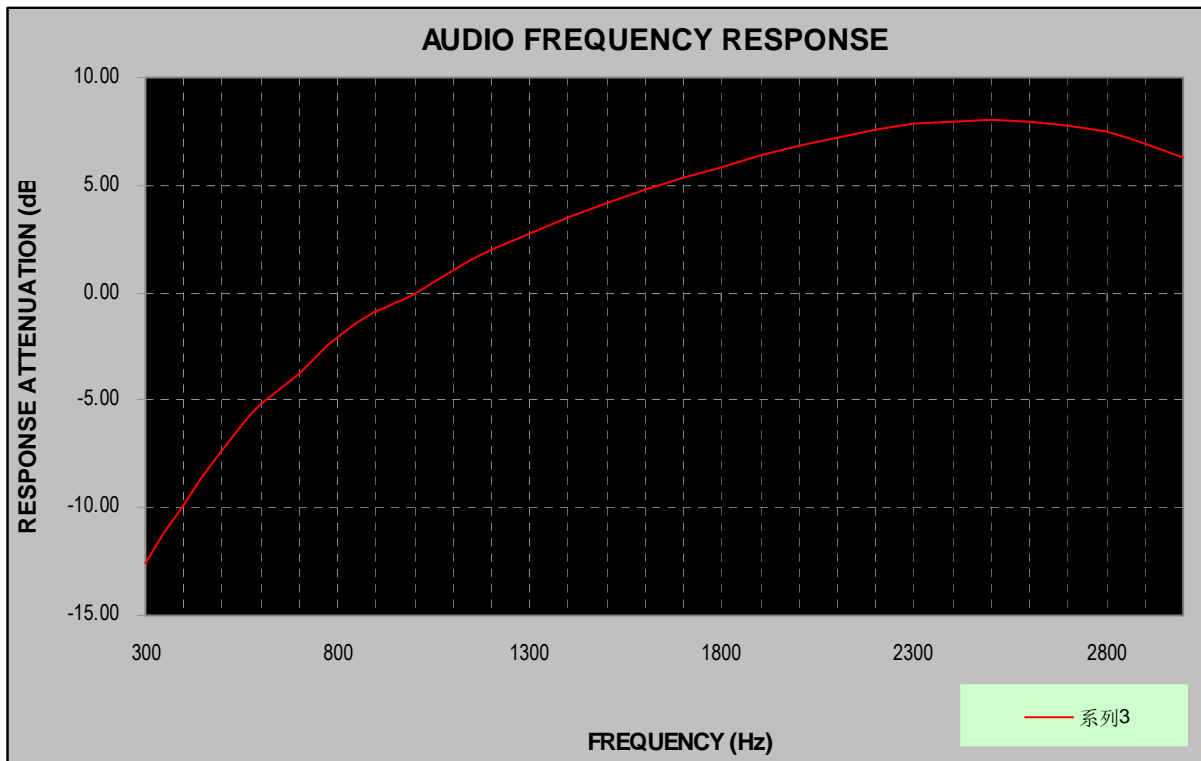
Carrier Frequency: 485 MHz-Low Power, Channel Separation = 12.5 kHz

Audio Frequency (Hz)	Response Attenuation (dB)
300	-12.32
400	-9.27
500	-7.25
600	-5.32
700	-3.72
800	-2.27
900	-1.05
1000	0.00
1200	1.84
1400	3.35
1600	4.65
1800	5.75
2000	6.66
2200	7.40
2400	7.83
2600	7.85
2800	7.34
3000	6.23



Carrier Frequency: 485 MHz-High Power, Channel Separation = 12.5 kHz

Audio Frequency (Hz)	Response Attenuation (dB)
300	-12.54
400	-9.84
500	-7.41
600	-5.19
700	-3.72
800	-2.11
900	-0.88
1000	0.00
1200	2.02
1400	3.46
1600	4.76
1800	5.85
2000	6.82
2200	7.59
2400	7.95
2600	7.99
2800	7.46
3000	6.30



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 5.625 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) 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) 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 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 Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
HP	RF Communications Test Set	HP8920A	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 the NIST.

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.1 kPa

The testing was performed by Jimmy Xiao on 2012-09-21.

Result: Compliance. Please refer to the following table and plot.

Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)	Power level
485	5.51	10.02	High

Emission Designator:

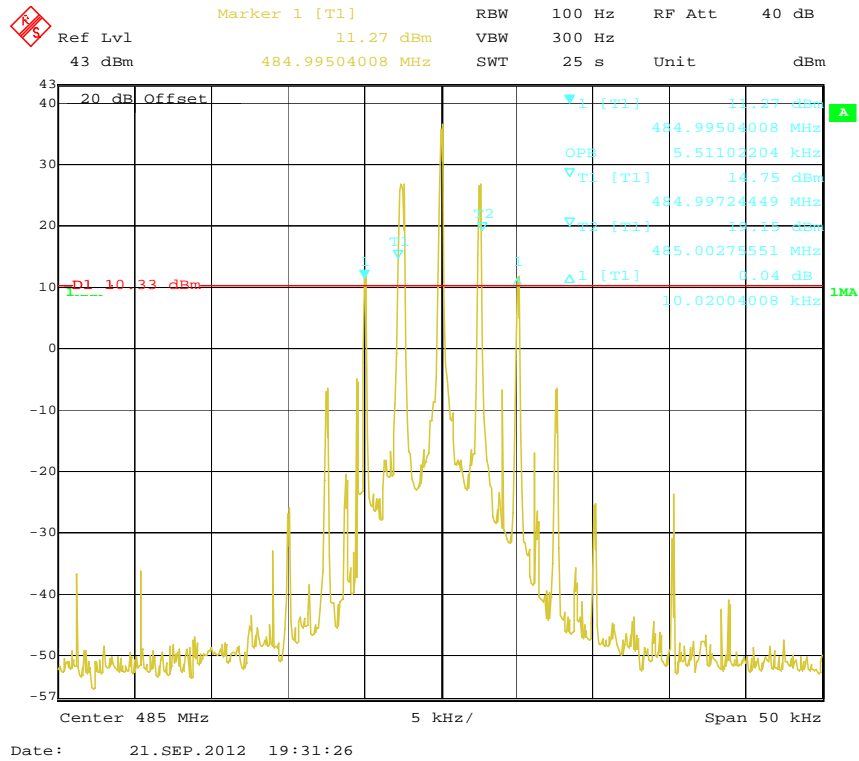
$B_n = 2M + 2DK$

Where $M = 3$ kHz, $D = 2.04$ kHz, $K = 1$

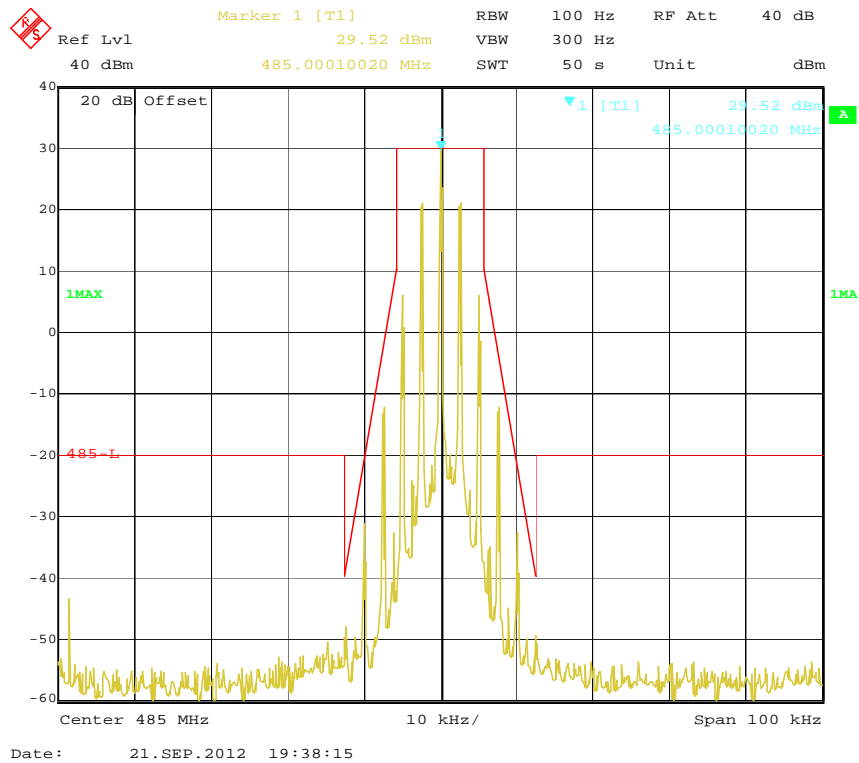
$B_n = 2*3 + 2*2.04 = 10.08$ kHz

Type of emission: 10K1F3E

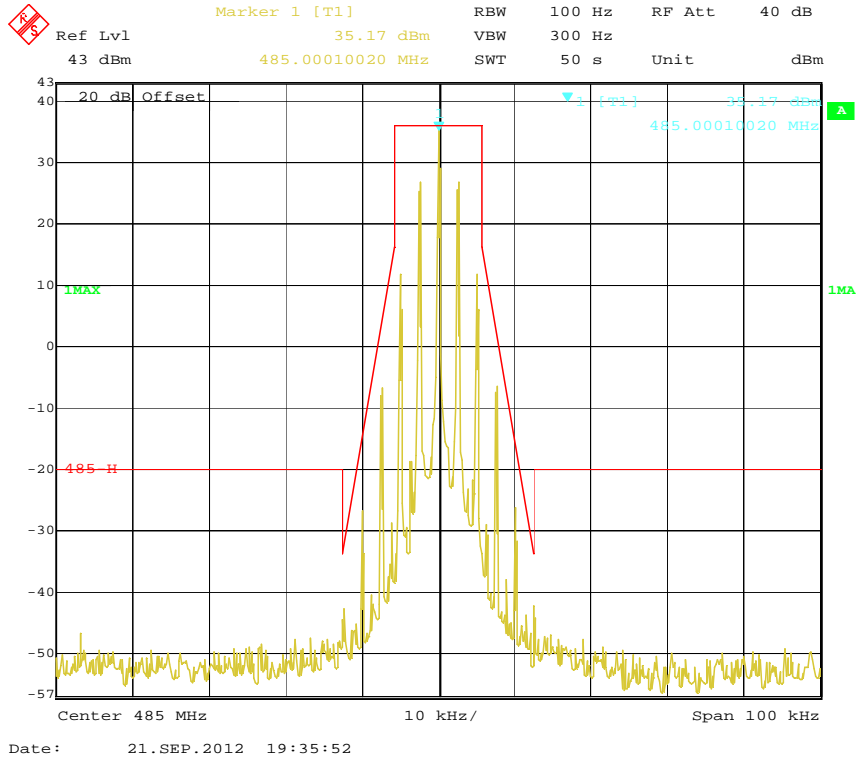
99% Occupied Bandwidth & 26 dB Bandwidth (485 MHz)-High Power



Emission Mask D, 485.0 MHz-Low Power



Emission Mask D, 485.0 MHz-High 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 5.625 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) 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) 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 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 Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data**Environmental Conditions**

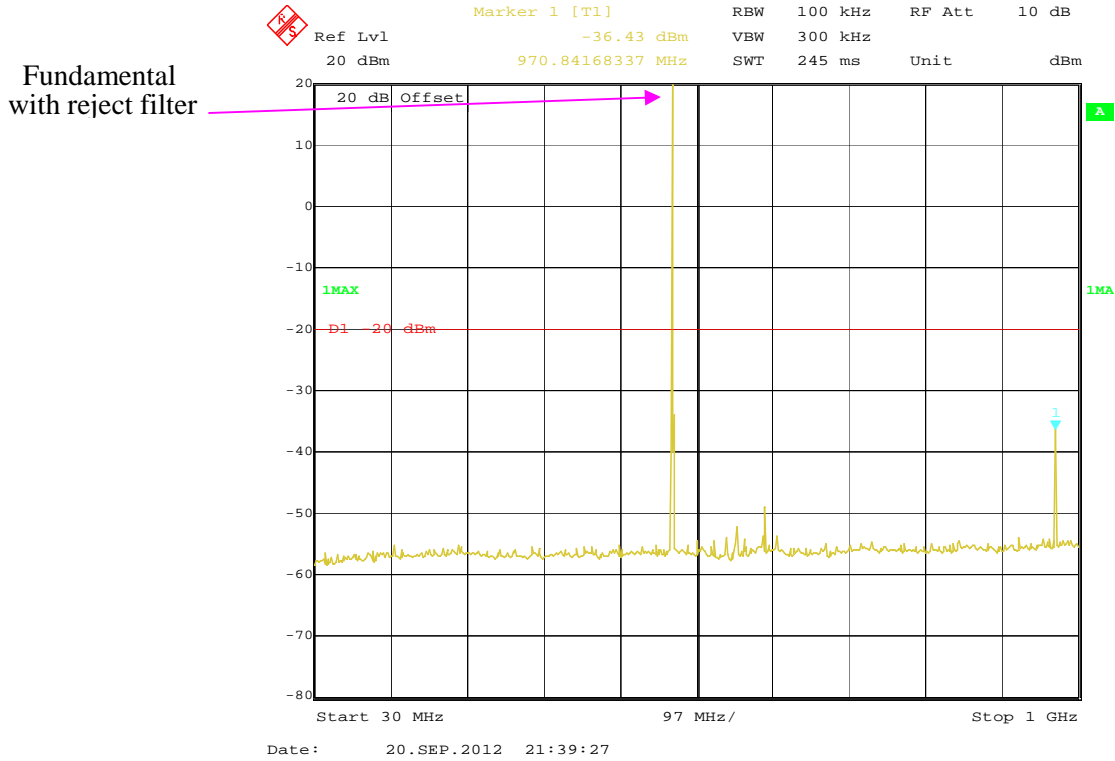
Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.1 kPa

The testing was performed by Jimmy Xiao on 2012-09-20.

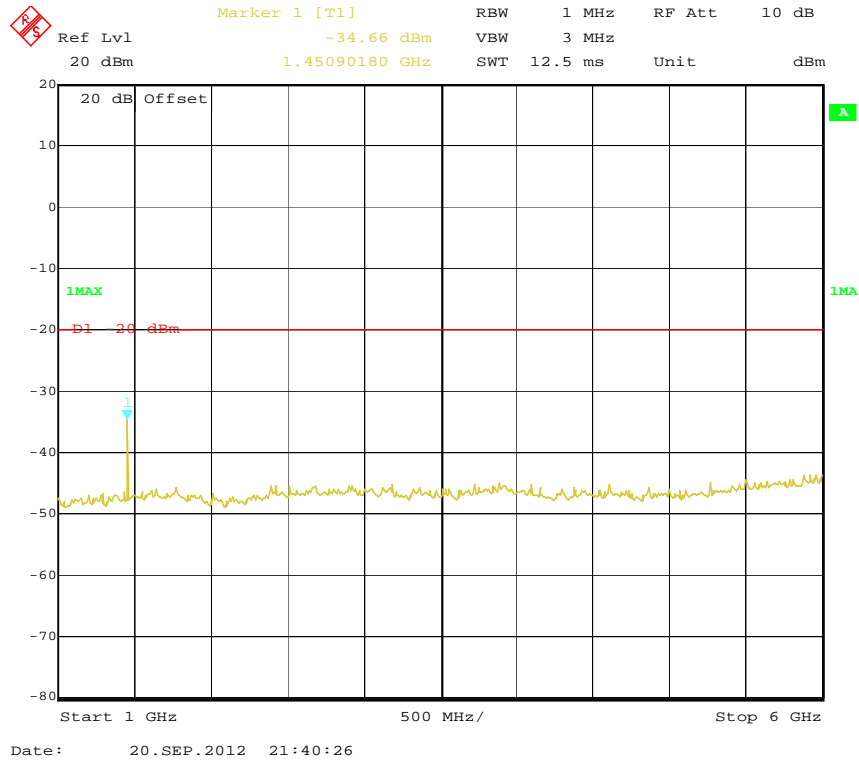
Test Mode: Transmitting

Please refer to the following plots.

30 MHz - 1 GHz (485.0 MHz)-High power



1 GHz - 6 GHz (485.0 MHz)- High power



FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053 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 tenth 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 lg (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB = 43 + 10 Log₁₀ (power out in Watts)

Spurious attenuation limit in dB = 50 + 10 Log₁₀ (power out in Watts) for EUT with a 12.5 kHz channel bandwidth.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2012-11-30
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2012-03-17	2013-03-16
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
Mini-Circuits	Amplifier	ZVA-213+	N/A	2011-11-24	2012-11-23
HP	Signal Generator	HP8657A	2849U00982	2011-10-21	2012-10-20
HP	Amplifier	8447E	1937A01057	2011-11-24	2012-11-23
HP	Synthesized Sweeper	8341B	2624A00116	2012-04-11	2013-04-10
COM POWER	Dipole Antenna	AD-100	041000	2012-06-06	2013-06-05
A.H. System	Horn Antenna	SAS-200/571	135	2012-02-11	2013-02-10

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.1 kPa

The testing was performed by Jimmy Xiao on 2012-09-20.

Test Mode: Transmitting

30 MHz to 10th harmonic of the fundamental frequency

Frequency (MHz)	Receiver Reading (dBµV/m)	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)
Channel (485.0 MHz) High power										
970	51.79	180	1.9	H	-45.9	0.71	0.00	-46.61	-20	26.61
970	49.48	210	1.5	V	-47.1	0.71	0.00	-47.81	-20	27.81
2425	37.82	196	1.6	V	-58.5	1.54	10.50	-49.54	-20	29.54
2425	41.45	28	1.4	H	-59.3	1.54	10.50	-50.34	-20	30.34
3880	36.18	116	1.7	V	-59.1	3.20	10.40	-51.90	-20	31.90
3880	36.87	32	1.8	H	-59.2	3.20	10.40	-52.00	-20	32.00
1455	38.63	285	1.6	H	-63.4	0.91	9.40	-54.91	-20	34.91
1455	35.29	114	1.8	V	-65.7	0.91	9.40	-57.21	-20	37.21

Note:

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit - Absolute Level

FCC §2.1055 & §90.213- FREQUENCY STABILITY

Applicable Standard

FCC §2.1055 & §90.213

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC 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 AC 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.

The frequency stability shall be measured with variation of primary supply voltage as follows:

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value.

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Hewlett-Packard	Frequency Counter	5342A	2317A08289	2012-04-15	2013-04-14
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2010-11-24	2011-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.1 kPa

The testing was performed by Jimmy Xiao on 2012-09-21.

Test Mode: Transmitting

For Narrow Band:

Reference Frequency: 485.0 MHz, channel Separation :12.5 kHz				
Test Environment		Frequency Measure with Time Elapsed		
Temperature (□)	Power Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)	Limit (ppm)
Frequency Stability versus Temperature				
50	7.4	484.999831	0.348	2.5
40	7.4	484.999824	0.363	2.5
30	7.4	484.999839	0.332	2.5
20	7.4	484.999848	0.313	2.5
10	7.4	484.999867	0.274	2.5
0	7.4	484.999892	0.223	2.5
-10	7.4	484.999875	0.258	2.5
-20	7.4	484.999815	0.381	2.5
-30	7.4	484.999896	0.214	2.5
Frequency Stability versus Voltage				
20	6.3	484.999856	0.297	2.5

Note: the battery operation end point is 6.3V which is specified by manufacturer.

FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

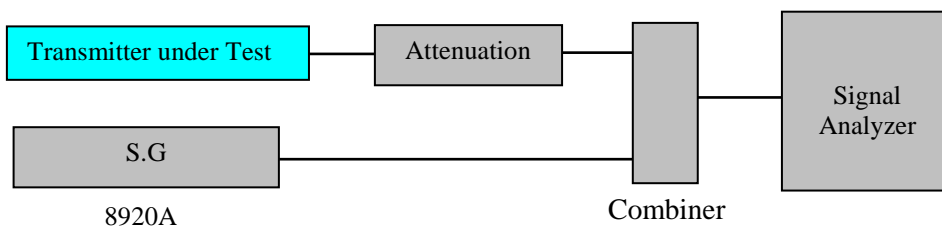
Applicable Standard

Regulations: FCC §90.214

Test method: ANSI/TIA-603-D 2010, section 2.2.19.2

Test Procedure

TIA-603-D 2.2.19.2



Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
HP	RF Communications Test Set	HP8920A	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 the NIST.

Test Data

Environmental Conditions

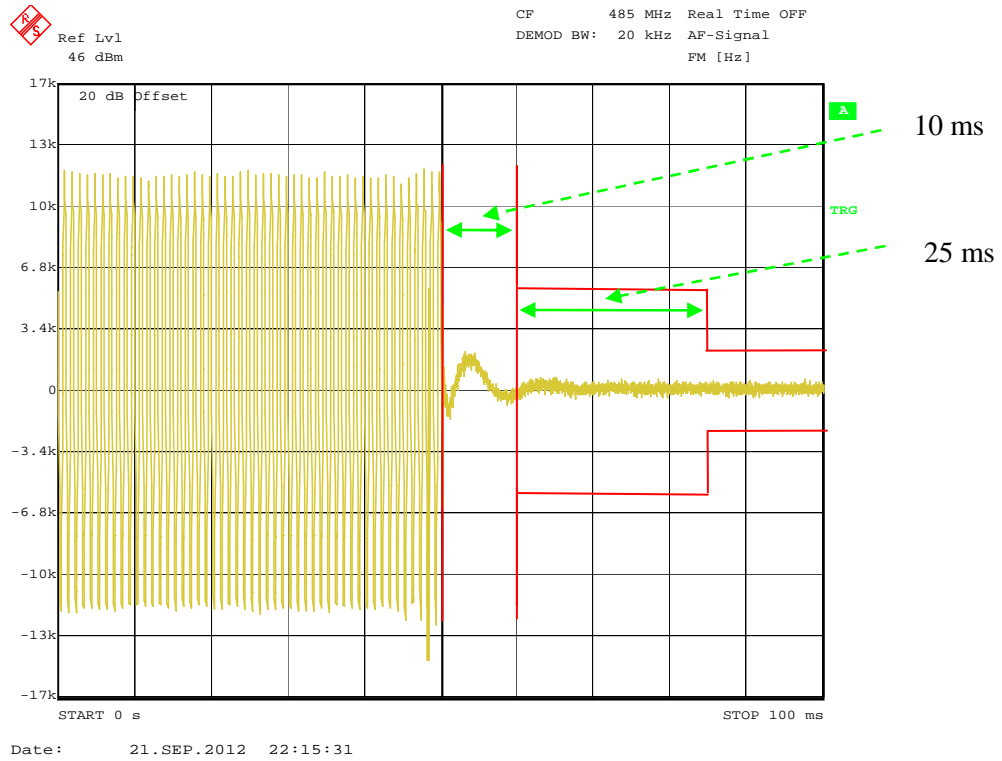
Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.1 kPa

The testing was performed by Jimmy Xiao on 2012-09-21.

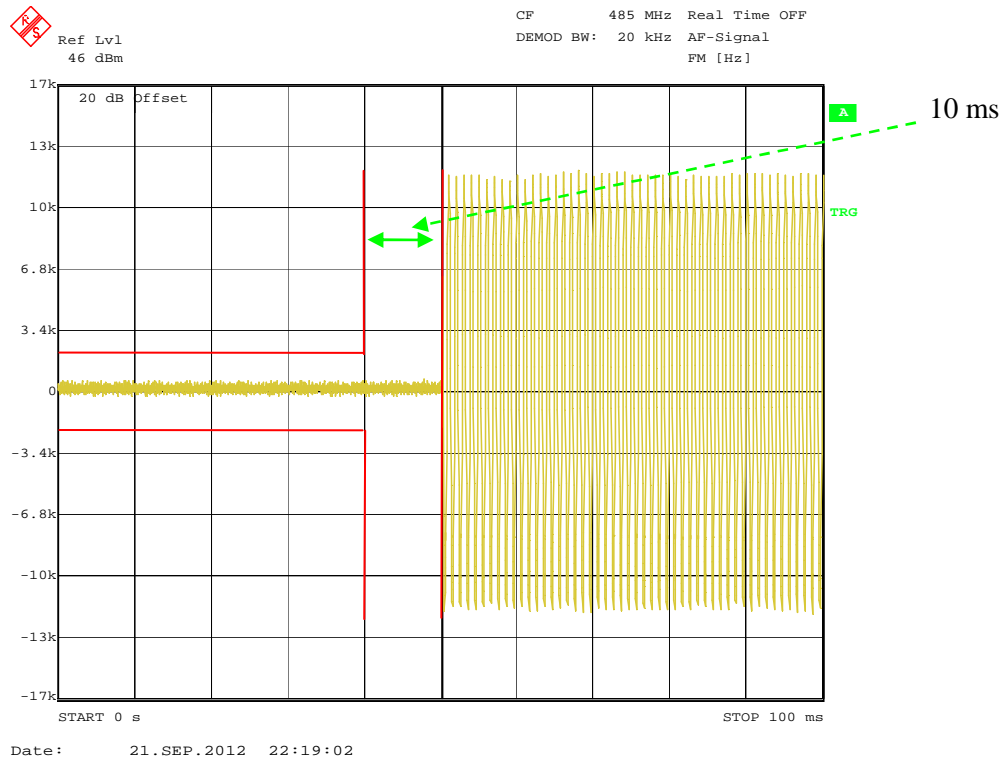
Operation Frequency (MHz)	Channel Separation (kHz)	Time Period (ms)	Maximum frequency difference (kHz)	Result
485.0	12.5	< 10(t ₁)	± 12.5	Pass
		< 25(t ₂)	± 6.25	
		< 10(t ₃)	± 12.5	

Please refer to the following plots.

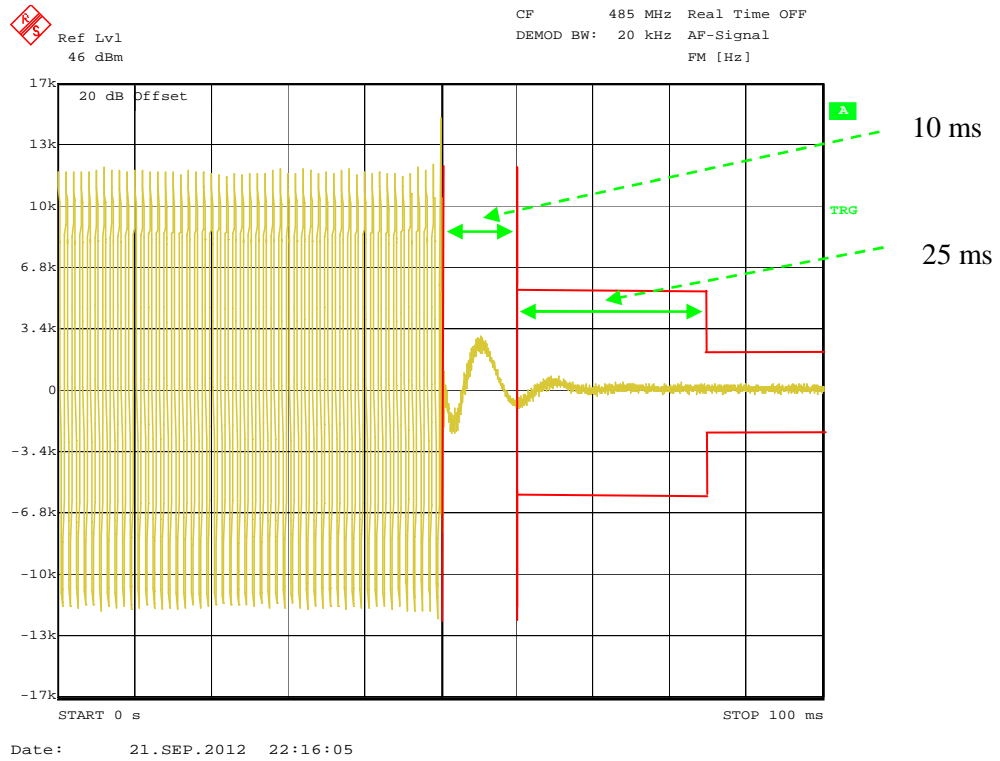
Turn on (Frequency at 485.0 MHz, Low Power)



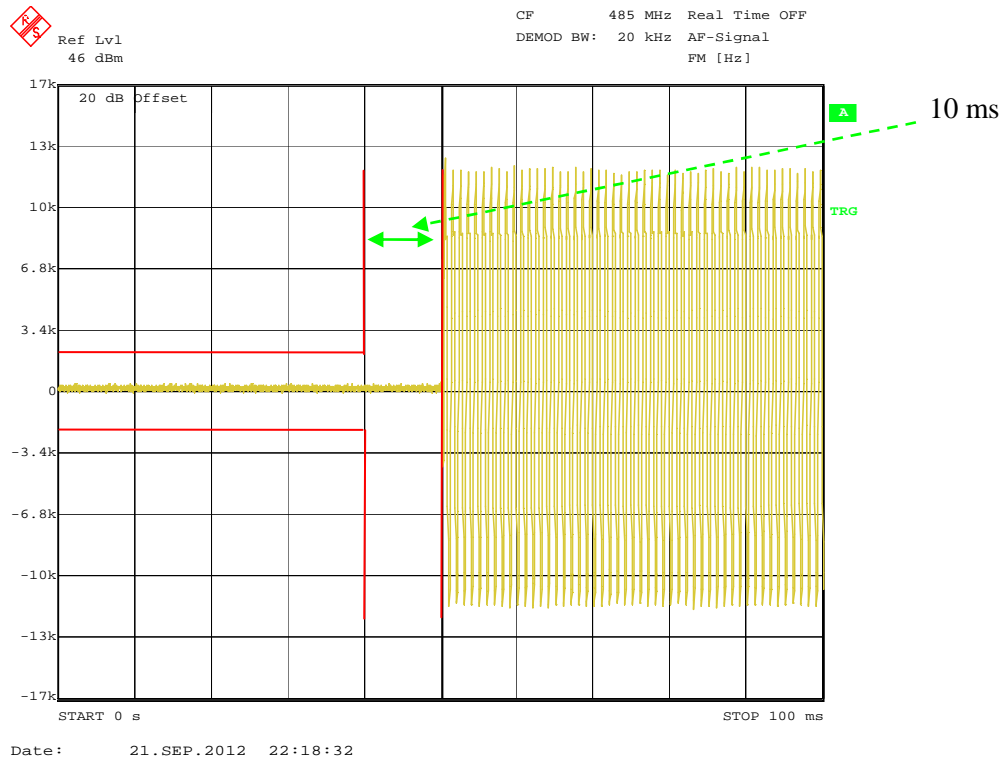
Turn off (Frequency at 485.0 MHz, Low Power)



Turn on (Frequency at 485.0 MHz, High Power)



Turn off (Frequency at 485.0 MHz, High Power)



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