

RADIO TEST REPORT

For

Guangzhou SOUTH Surveying & Mapping Instrument Co., Ltd.

GNSS RECEIVER

Test Model: GALAXY G6

Additional Model: G6, T68, R8, TX20, G1, T66, R6, K9mini, K98mini, K5plus,
K58plus, TX10

Prepared for : Guangzhou SOUTH Surveying & Mapping Instrument Co., Ltd.
Address : Room 301 South Building, No.24-26 Keyun Road, Tian He
District, Guangzhou

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : December 28, 2015
Number of tested samples : 1
Serial number : Prototype
Date of Test : December 28, 2015 ~ May 26, 2016
Date of Report : May 28, 2016

RADIO TEST REPORT
FCC Part 90**Report Reference No. : LCS1603080654E**

Date of Issue : May 28, 2016

Testing Laboratory Name..... : Shenzhen LCS Compliance Testing Laboratory Ltd.Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue,
Bao'an District, Shenzhen, Guangdong, ChinaTesting Location/ Procedure..... : Full application of Harmonised standards ☒
Partial application of Harmonised standards ☐
Other standard testing method ☐**Applicant's Name..... : Guangzhou SOUTH Surveying & Mapping Instrument Co., Ltd.**

Address : Room 301 South Building, No.24-26 Keyun Road, Tian He District, Guangzhou

Test Specification

Standard : FCC Part 90/FCC Part 2/FCC Part 15B

Test Report Form No. : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

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Test Item Description. : GNSS RECEIVER

Trade Mark..... : SOUTH

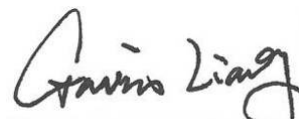
Test Model : GALAXY G6

Ratings : DC 7.4V by Lithium ion polymer battery(6800mAh)
Recharge Voltage: DC 8.4V/2A**Result : Positive****Compiled by:**

Kyle Yin/ File administrators

Supervised by:

Glin Lu/ Technique principal

Approved by:

Gavin Liang/ Manager

RADIO -- TEST REPORT**Test Report No. : LCS1603080654E**May 28, 2016
Date of issue

Test Model..... : GALAXY G6

EUT..... : GNSS RECEIVER

Applicant..... : Guangzhou SOUTH Surveying & Mapping Instrument Co., Ltd.

Address..... : Room 301 South Building, No.24-26 Keyun Road, Tian He District, Guangzhou

Telephone..... : /

Fax..... : /

Manufacturer..... : Guangzhou SOUTH Surveying & Mapping Instrument Co., Ltd.

Address..... : Room 301 South Building, No.24-26 Keyun Road, Tian He District, Guangzhou

Telephone..... : /

Fax..... : /

Factory..... : Guangzhou SOUTH Surveying & Mapping Instrument Co., Ltd.

Address..... : Room 301 South Building, No.24-26 Keyun Road, Tian He District, Guangzhou

Telephone..... : /

Fax..... : /

Test Result**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	: GNSS RECEIVER
Test Model	: GALAXY G6
Additional Model	: Galaxy T68, R8, TX20, G1
Model Declaration	: PCB board, structure and internal of the related model(s) are the same, So no additional models were tested.
Power Supply	: DC 7.4V by Lithium ion polymer battery(6800mAh) Recharged by DC 8.4V/2A
Hardware Version	: GALAXY1.4
Software Version	: 1.05.150827.RG60GL.img
Frequency Range	: 460 MHz - 470 MHz
Channel Separation	: 12.5KHz & 25KHz
Emission Designator	: 11K0G1D for GMSK Modulation at 12.5KHz Channel Separation 16K0G1D for GMSK Modulation at 25KHz Channel Separation
Antenna Description	: External, 5.0dBi (Max)

1.2. Objective

The tests were performed according to following standards:

[FCC Rules Part 90: 2015](#): PRIVATE LAND MOBILE RADIO SERVICES.

[47 CFR FCC Part 15 Subpart B: 2015](#) - Unintentional Radiators

[FCC Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[TIA/EIA 603 D: June 2014](#): Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Description of Test Facility

CNAS Registration Number. is L4595.

FCC Registration Number. is 899208.

Industry Canada Registration Number. is 9642A-1.

VCCI Registration Number. is C-4260 and R-3804.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001.

1.5. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
DEE VAN ENTERPRISE CO.,LTD.	Charger	DSA-60PFC-12	N/A	DOC

1.6. External I/O

I/O Port Description	Quantity	Cable
USB Port	1	N/A
SIM Card Slot	1	N/A
TF Card Slot	1	N/A
Earphone Port	1	N/A

1.7. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Frequency Range	Uncertainty	Note
Radiation Uncertainty	9KHz~30MHz	3.10dB	(1)
	30MHz~200MHz	2.96dB	(1)
	200MHz~1000MHz	3.10dB	(1)
	1GHz~26.5GHz	3.80dB	(1)
	26.5GHz~40GHz	3.90dB	(1)
Conduction Uncertainty	150kHz~30MHz	1.63dB	(1)
Power disturbance	30MHz~300MHz	1.60dB	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.8. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

1.9. Description Of Test Modes

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

EUT operation mode no.	Description of operation mode	Additional information
Op 1	GMSK+BW12.5KHz+TX	The equipment is set with GMSK modulation and 12.5KHz bandwidth at maximum rated power for transmitter, powered by DC 7.40V
Op 2	GMSK+BW12.5KHz+TX	The equipment is set with GMSK modulation and 12.5KHz bandwidth at minimum rated power for transmitter, powered by DC 7.40V
Op 3	GMSK+BW25KHz+TX	The equipment is set with GMSK modulation and 25KHz bandwidth at maximum rated power for transmitter, powered by DC 7.40V
Op 4	GMSK+BW25KHz+TX	The equipment is set with GMSK modulation and 25KHz bandwidth at minimum rated power for transmitter, powered by DC 7.40V
Op 5	GMSK+BW12.5KHz+TX	The equipment is set with GMSK modulation and 12.5KHz bandwidth at maximum rated power for transmitter, powered by DC 7.40V from AC power adapter
Op 6	GMSK+BW12.5KHz+TX	The equipment is set with GMSK modulation and 12.5KHz bandwidth at minimum rated power for transmitter, powered by DC 7.40V from AC power adapter
Op 7	GMSK+BW25KHz+TX	The equipment is set with GMSK modulation and 25KHz bandwidth at maximum rated power for transmitter, powered by DC 7.40V from AC power adapter
Op 8	GMSK+BW25KHz+TX	The equipment is set with GMSK modulation and 25KHz bandwidth at minimum rated power for transmitter, powered by DC 7.40V from AC power adapter
Op 9	GMSK+BW12.5KHz+RX	The equipment is set with GMSK modulation and 12.5KHz bandwidth at, powered by DC 7.40V
Op 10	GMSK+BW25KHz+RX	The equipment is set with GMSK modulation and 25KHz bandwidth at, powered by DC 7.40V
Op 11	GMSK+BW12.5KHz+RX	The equipment is set with GMSK modulation and 12.5KHz bandwidth at, powered by DC 7.40V from AC power adapter
Op 12	GMSK+BW25KHz+RX	The equipment is set with GMSK modulation and 25KHz bandwidth at, powered by DC 7.40V from AC power adapter

Test frequency list

Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)
GMSK	12.5KHz	Ch1	460.125
		Ch2	465.125
		Ch3	469.125
	25KHz	Ch4	460.125
		Ch5	465.125
		Ch6	469.125

2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in engineering mode.

2.2. EUT Exercise Software

N/A.

2.3. Special Accessories

N/A.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Configuration of Test Setup

Please refer to the test setup photo.

3. SUMMARY OF TEST RESULT

Test specification clause	Test case	Verdict
FCC Part 15.107	Conducted Emission	PASS
FCC Part 90.205	Maximum Transmitter Power	PASS
FCC Part 90.207	Modulation Characteristic	N/A
FCC Part 90.209	Occupied Bandwidth	PASS
FCC Part 90.210	Emission Mask	PASS
FCC Part 90.213	Frequency Stability	PASS
FCC Part 90.214	Transmitter Frequency Behavior	PASS
FCC Part 90.210	Transmitter Radiated Spurious Emission	PASS
FCC Part 90.210	Spurious Emission On Antenna Port	PASS

Remark:

1. The measurement uncertainty is not included in the test result.

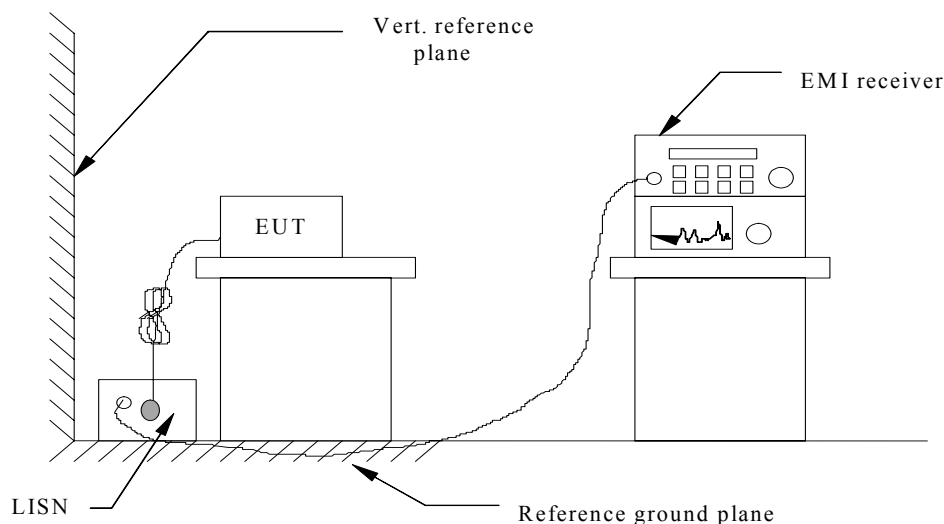
4. TEST CONDITIONS AND RESULTS

4.1. Conducted Emissions Test

TEST APPLICABLE

The EUT was tested according to ANSI C63.4 - 2014. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 u Henry as specified by section 5.1 of ANSI C63.4 - 2014. Cables and peripherals were moved to find the maximum emission levels for each frequency.

TEST CONFIGURATION



TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4-2014.
- 2 Support equipment, if needed, was placed as per ANSI C63.4-2014.
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4-2014.
- 4 If a EUT received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipment received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

Conducted Power Line Emission Limit

For intentional device, according to § 15.207(a) and RSS-Gen Section 7.2.4 for AC Power Conducted Emission Limits is as following:

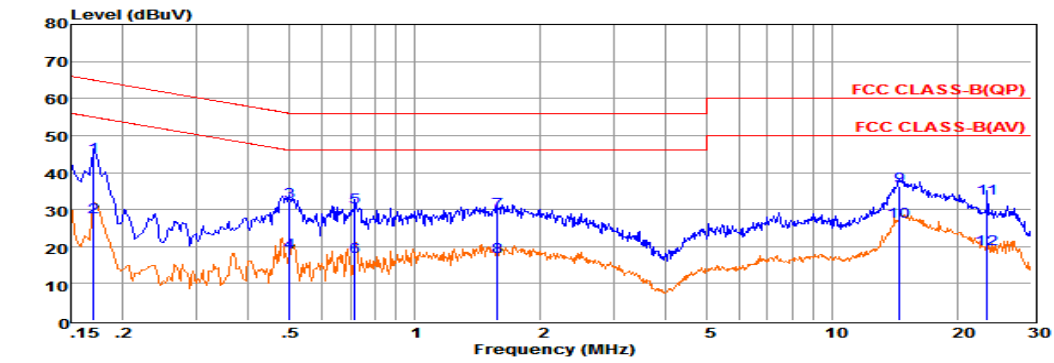
Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

Remark: we tested modes Op 5 to Op 8 and Op 11 to Op 12 at both AC power 120V/60Hz and AC 240V/50Hz, recorded worst case at Op 5.

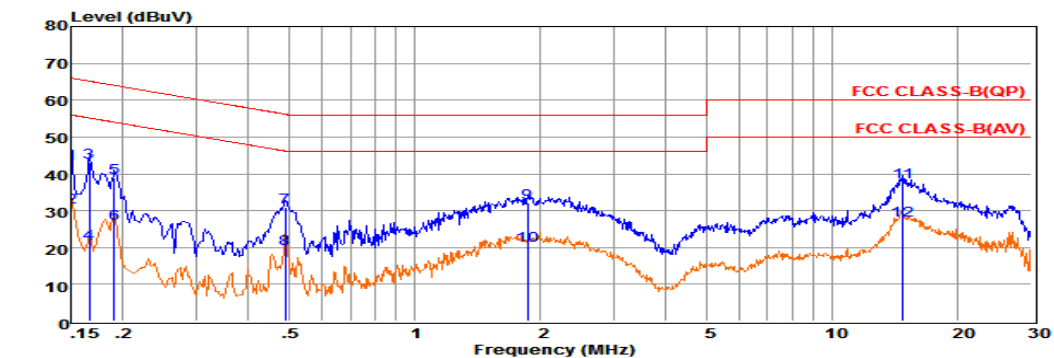
Test Result for Line Power Input AC 120V/60Hz



Env. Ins: 24*/56%
 EUT: GNSS RECEIVER
 M/N: Galaxy G6
 Power Rating: AC 120V/60Hz
 Test Mode: TX-High Channel (Radio)
 Operator: Aking
 Memo:
 Pol: NEUTRAL

	Freq	Reading	LisnFac	CabLos	Atten_Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.17034	24.76	9.65	0.02	10.00	44.43	64.94	-20.51	QP
2	0.17044	8.29	9.65	0.02	10.00	27.96	54.94	-26.98	Average
3	0.50203	12.38	9.62	0.04	10.00	32.04	56.00	-23.96	QP
4	0.50213	-1.09	9.62	0.04	10.00	18.57	46.00	-27.43	Average
5	0.71977	11.07	9.63	0.04	10.00	30.74	56.00	-25.26	QP
6	0.71987	-2.44	9.63	0.04	10.00	17.23	46.00	-28.77	Average
7	1.57670	9.68	9.63	0.05	10.00	29.36	56.00	-26.64	QP
8	1.57770	-2.56	9.63	0.05	10.00	17.12	46.00	-28.88	Average
9	14.51711	16.39	9.74	0.10	10.00	36.23	60.00	-23.77	QP
10	14.51811	6.85	9.74	0.10	10.00	26.69	50.00	-23.31	Average
11	23.51115	13.20	9.82	0.13	10.00	33.15	60.00	-26.85	QP
12	23.51215	-0.72	9.82	0.13	10.00	19.23	50.00	-30.77	Average

Remarks: 1. Measured = Reading + Lisn Factor + Cable Loss + Atten_Fac.
 2. The emission levels that are 20dB below the official limit are not reported.

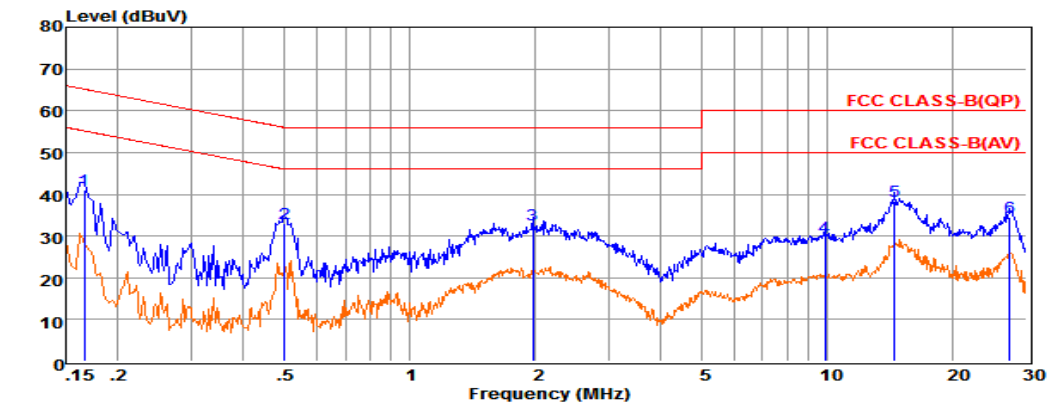


Env. Ins: 24*/56%
 EUT: GNSS RECEIVER
 M/N: Galaxy G6
 Power Rating: AC 120V/60Hz
 Test Mode: TX-High Channel (Radio)
 Operator: Aking
 Memo:
 Pol: LINE

	Freq	Reading	LisnFac	CabLos	Atten_Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.15000	23.25	9.57	0.02	10.00	42.84	66.00	-23.16	QP
2	0.15010	11.22	9.57	0.02	10.00	30.81	55.99	-25.18	Average
3	0.16589	23.46	9.59	0.02	10.00	43.07	65.16	-22.09	QP
4	0.16599	1.46	9.59	0.02	10.00	21.07	55.16	-34.09	Average
5	0.19039	19.36	9.62	0.02	10.00	39.00	64.02	-25.02	QP
6	0.19049	6.85	9.62	0.02	10.00	26.49	54.02	-27.53	Average
7	0.48890	11.12	9.62	0.04	10.00	30.78	56.19	-25.41	QP
8	0.48900	0.11	9.62	0.04	10.00	19.77	46.18	-26.41	Average
9	1.85815	12.49	9.64	0.05	10.00	32.18	56.00	-23.82	QP
10	1.85915	0.98	9.64	0.05	10.00	20.67	46.00	-25.33	Average
11	14.74970	17.82	9.71	0.10	10.00	37.63	60.00	-22.37	QP
12	14.75070	7.56	9.71	0.10	10.00	27.37	50.00	-22.63	Average

Remarks: 1. Measured = Reading + Lisn Factor + Cable Loss + Atten_Fac.
 2. The emission levels that are 20dB below the official limit are not reported.

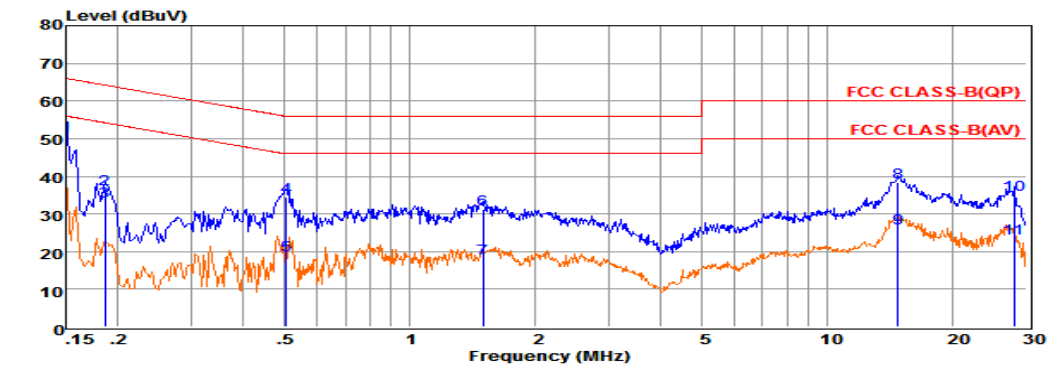
Test Result for Line Power Input AC 240V/60Hz



Env. Ins: 24*/56%
 EUT: GNSS RECEIVER
 M/N: Galaxy G6
 Power Rating: AC 240V/60Hz
 Test Mode: TX-High Channel (Radio)
 Operator: Aking
 Memo:
 Pol: LINE

	Freq	Reading	LisnFac	CabLos	Atten_Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.16589	21.43	9.59	0.02	10.00	41.04	65.16	-24.12	QP
2	0.50203	13.20	9.62	0.04	10.00	32.86	56.00	-23.14	QP
3	1.96966	12.92	9.64	0.05	10.00	32.61	56.00	-23.39	QP
4	9.86064	10.00	9.69	0.08	10.00	29.77	60.00	-30.23	QP
5	14.51711	18.54	9.71	0.10	10.00	38.35	60.00	-21.65	QP
6	27.41598	14.73	9.71	0.14	10.00	34.58	60.00	-25.42	QP

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss+Atten_Fac.
 2. The emission levels that are 20dB below the official limit are not reported.



Env. Ins: 24*/56%
 EUT: GNSS RECEIVER
 M/N: Galaxy G6
 Power Rating: AC 240V/60Hz
 Test Mode: TX-High Channel (Radio)
 Operator: Aking
 Memo:
 Pol: NEUTRAL

	Freq	Reading	LisnFac	CabLos	Atten_Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.15000	31.10	9.70	0.02	10.00	50.82	66.00	-15.18	QP
2	0.18639	16.87	9.62	0.02	10.00	36.51	64.20	-27.69	QP
3	0.18649	13.78	9.62	0.02	10.00	33.42	54.19	-20.77	Average
4	0.50469	14.80	9.62	0.04	10.00	34.46	56.00	-21.54	QP
5	0.50479	-0.73	9.62	0.04	10.00	18.93	46.00	-27.07	Average
6	1.49533	11.50	9.63	0.05	10.00	31.18	56.00	-24.82	QP
7	1.49633	-1.63	9.63	0.05	10.00	18.05	46.00	-27.95	Average
8	14.74970	18.38	9.74	0.10	10.00	38.22	60.00	-21.78	QP
9	14.75070	6.38	9.74	0.10	10.00	26.22	50.00	-23.78	Average
10	28.00321	15.07	9.84	0.14	10.00	35.05	60.00	-24.95	QP
11	28.00421	3.58	9.84	0.14	10.00	23.56	50.00	-26.44	Average

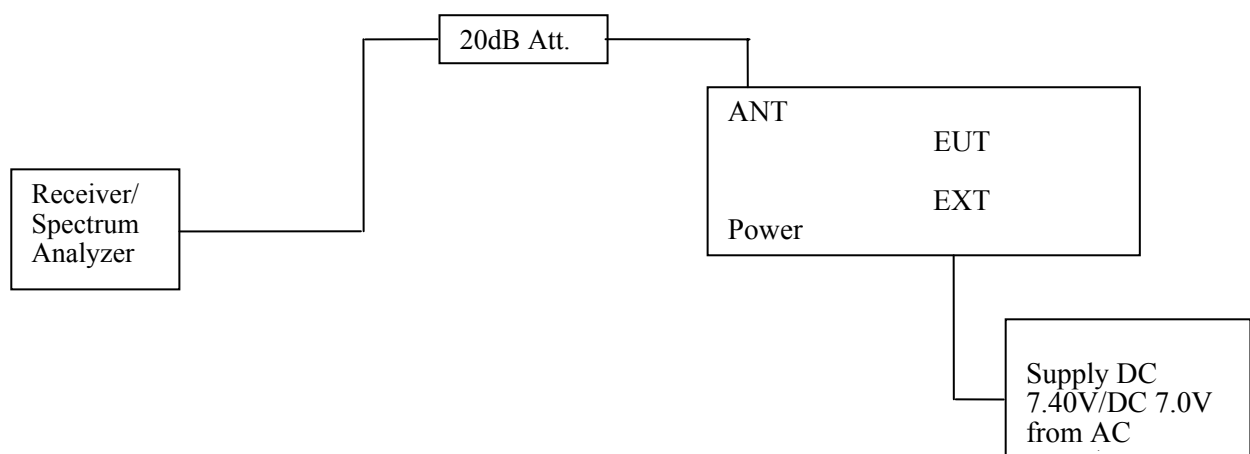
Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss+Atten_Fac.
 2. The emission levels that are 20dB below the official limit are not reported.

4.2. Occupied Bandwidth and Emission Mask Test

TEST APPLICABLE

- (a). Occupied Bandwidth: The EUT was connected to the audio signal generator and the spectrum analyzer via the main RF connector, and through an appropriate attenuator. The EUT was controlled to transmit its maximum power. Then the bandwidth of 99% power can be measured by the spectrum analyzer.
- (b). Emission Mask B: For transmitters that are equipped with an audio low-pass filter pursuant to §90.211(a), the power of any emission must be below the unmodulated carrier power (P) as follows:
- (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
 - (2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
 - (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB.
- (c). 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) On any frequency from the centre of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : Zero dB.
 - (2) On any frequency removed from the centre 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 $7.27(f_d - 2.88 \text{ kHz})$ dB.
 - (3) On any frequency removed from the centre 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 CONFIGURATION



TEST PROCEDURE

- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
- 2 Set EUT as normal operation.
- 3 Set SPA Centre Frequency = fundamental frequency, RBW=300Hz, VBW= 3 KHz, span =50 KHz for channel bandwidth 12.5 KHz and 100 KHz for channel bandwidth 25 KHz.
- 4 Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth and 26dB Occupied Bandwidth.

- 5 Set SPA Centre Frequency=fundamental frequency, set =300Hz, VBW=1 KHz, span=50 KHz for 12.5 KHz channel spacing, set =300Hz, VBW=1 KHz, span=150 KHz for 25 KHz channel spacing.

TEST RESULTS

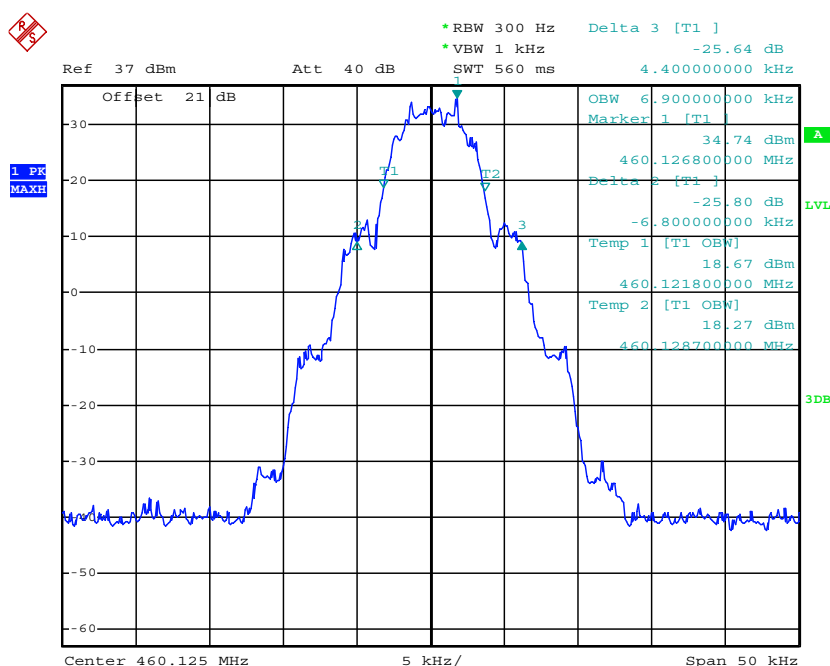
Remark: We tested Op 1 to Op 8, recorded worst case at Op 1 and Op 3.

4.2.1 Occupied Bandwidth

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)	
					99%	26dB
GMSK	12.5KHz	Op 1	Ch1	460.125	6.90	11.20
			Ch2	465.125	7.20	9.80
			Ch3	469.125	7.10	10.00
	25KHz	Op 3	Ch4	460.125	14.20	18.60
			Ch5	465.125	14.00	18.40
			Ch6	469.125	14.00	19.00
Limit			11.25KHz for 12.5KHz Channel Separation			
			20KHz for 25KHz Channel Separation			
Test Results			PASS			

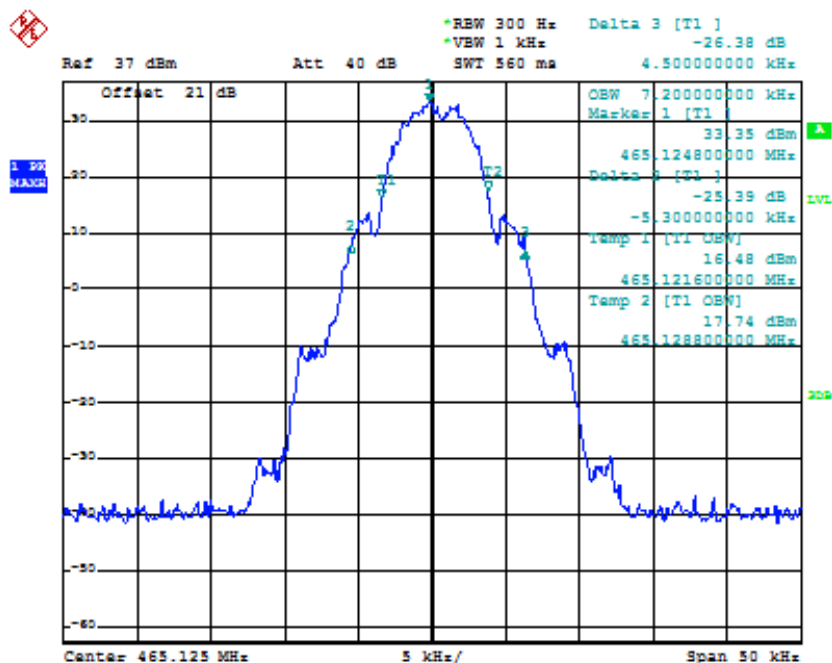
Plots of 99% and 26dB Bandwidth Measurement

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)		Limit (KHz)	Results
					99%	26dB		
GMSK	12.5 KHz	Op 1	Ch1	460.125	6.90	11.20	11.25	PASS



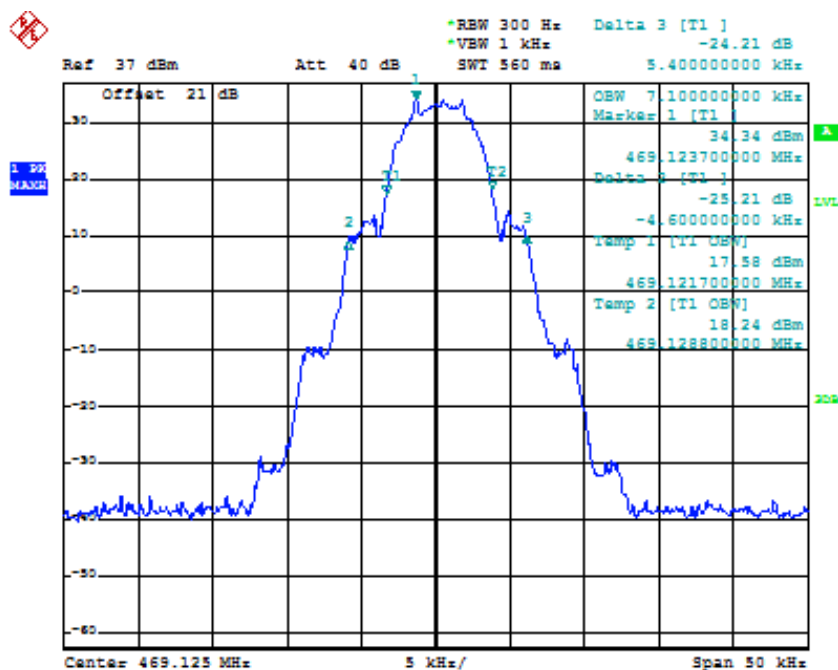
Date: 16.MAY.2016 13:26:40

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)		Limit (KHz)	Results
					99%	26dB		
GMSK	12.5 KHz	Op 1	Ch2	465.125	7.20	9.80	11.25	PASS



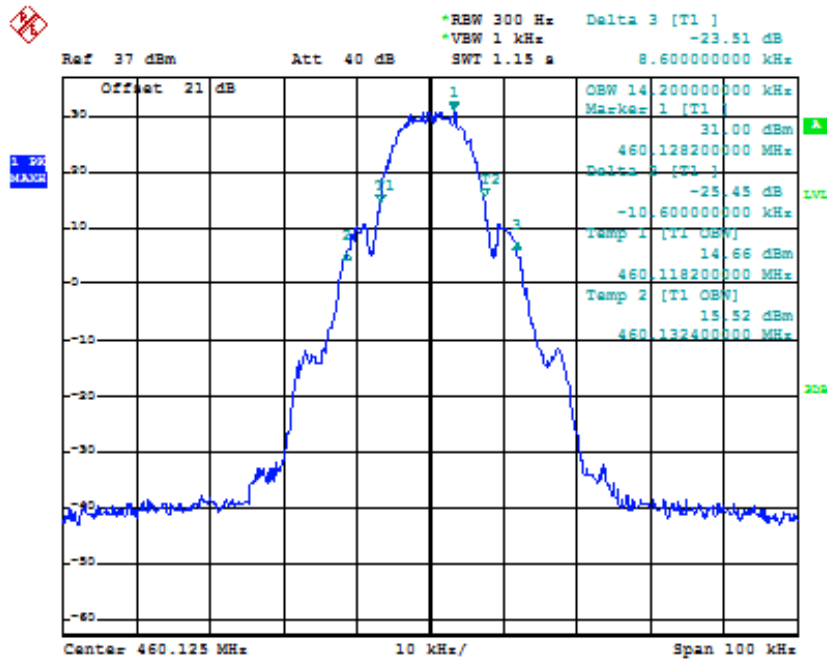
Date: 16.MAY.2016 13:25:37

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)		Limit (KHz)	Results
					99%	26dB		
GMSK	12.5 KHz	Op 1	Ch3	469.125	7.10	10.00	11.25	PASS



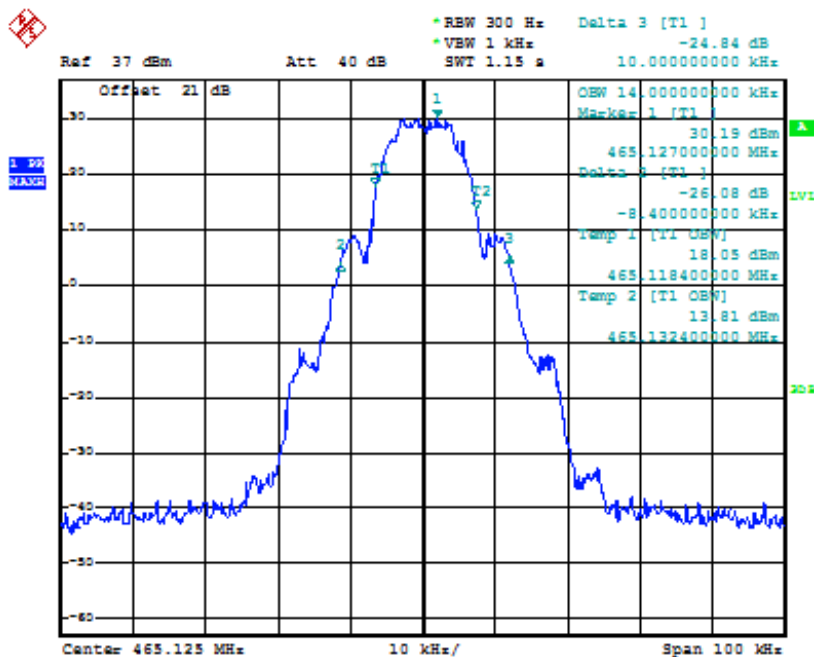
Date: 16.MAY.2016 13:24:21

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)		Limit (KHz)	Results
					99%	26dB		
GMSK	25 KHz	Op 3	Ch4	460.125	14.20	19.20	20	PASS



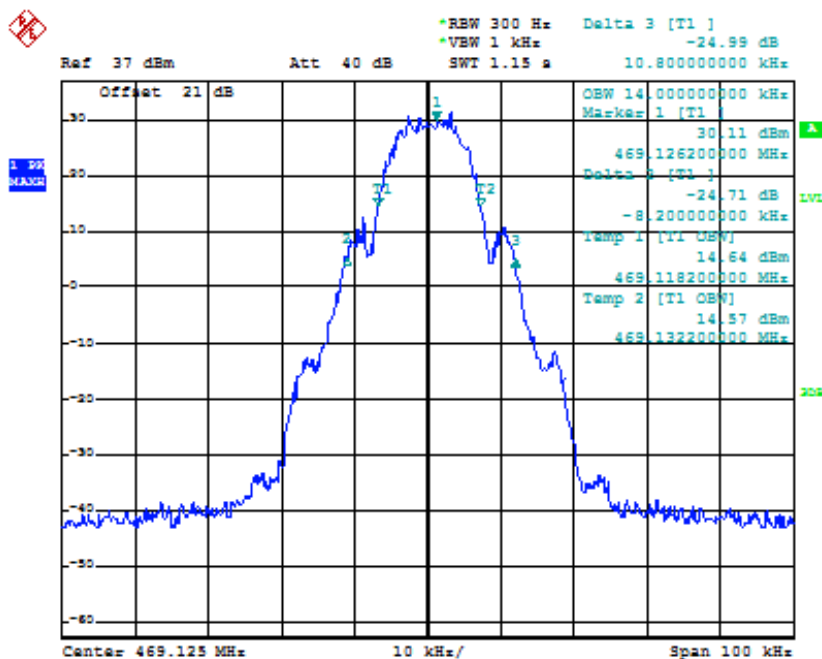
Date: 16.MAY.2016 13:34:38

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)		Limit (KHz)	Results
					99%	26dB		
GMSK	25 KHz	Op 3	Ch5	465.125	14.00	18.40	20	PASS



Date: 16.MAY.2016 13:36:13

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)		Limit (KHz)	Results
					99%	26dB		
GMSK	25 KHz	Op 3	Ch6	469.125	14.00	19.00	20	PASS



Date: 16.MAY.2016 13:37:47

4.2.2 Emission Mask

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Applicable Mask	RBW (Hz)
GMSK	12.5 KHz	Op 1	Ch1	460.125	D	300
			Ch2	465.125	D	300
			Ch3	469.125	D	300
	25 KHz	Op 3	Ch4	460.125	B	300
			Ch5	465.125	B	300
			Ch6	469.125	B	300
Test Results			PASS			

Plots of Emission Mask Measurement

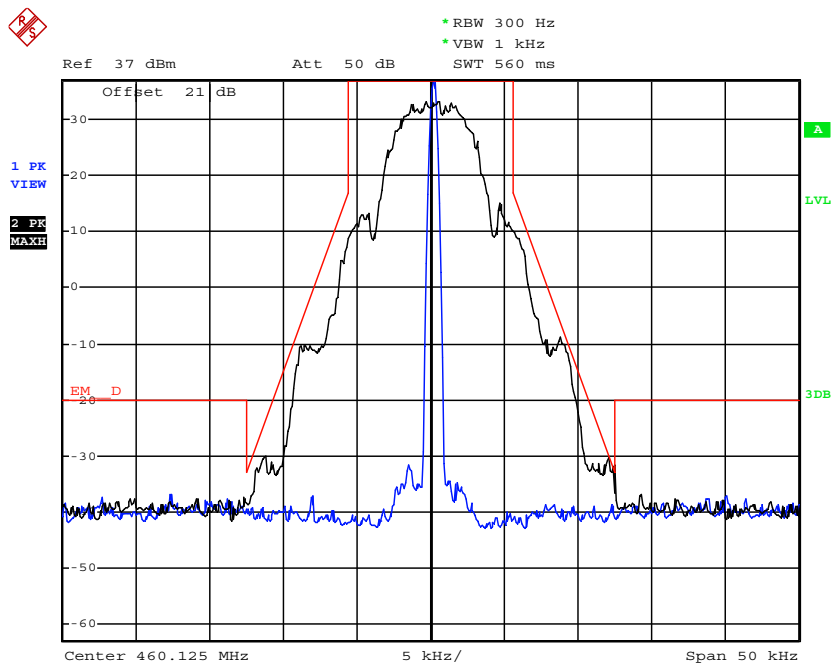
Referred as the attached plot hereinafter

Note:

The Black curve represents unmodulated signal.

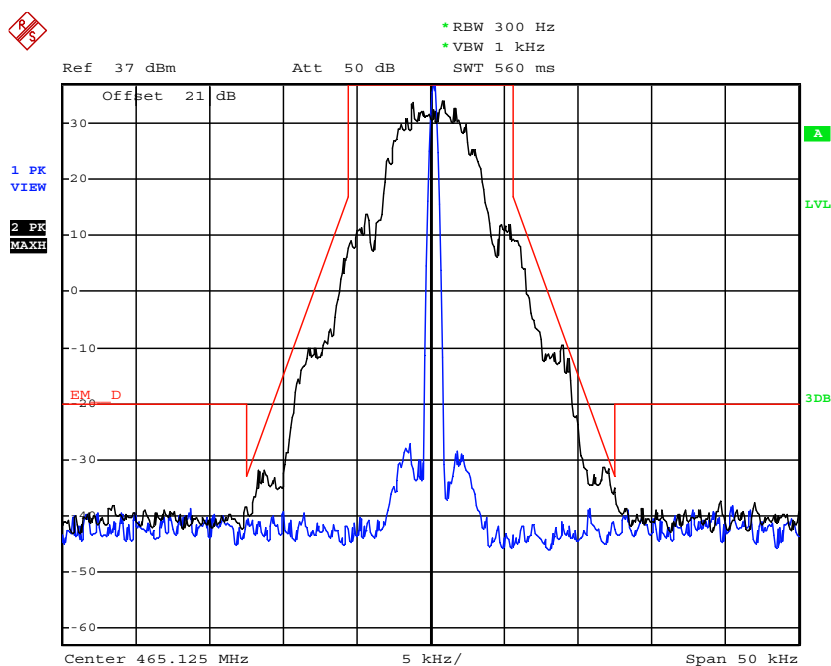
The Blue curve represents modulated signal.

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Applicable Mask	RBW (Hz)	Audio Freq. (KHz)	Results
GMSK	12.5KHz	Op 1	Ch1	460.125	D	300	/	PASS



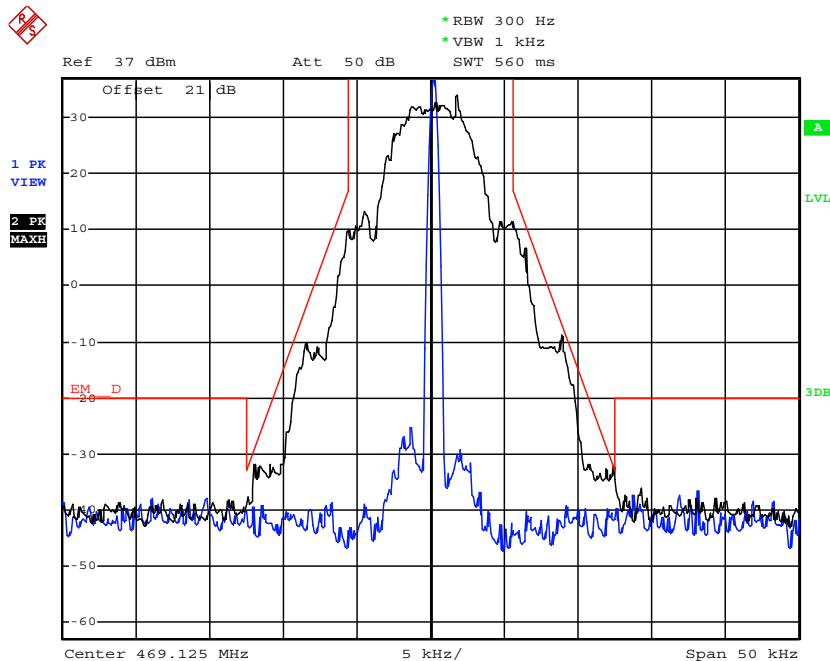
Date: 16.MAY.2016 13:13:01

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Applicable Mask	RBW (Hz)	Audio Freq. (KHz)	Results
GMSK	12.5KHz	Op 1	Ch2	465.125	D	300	/	PASS



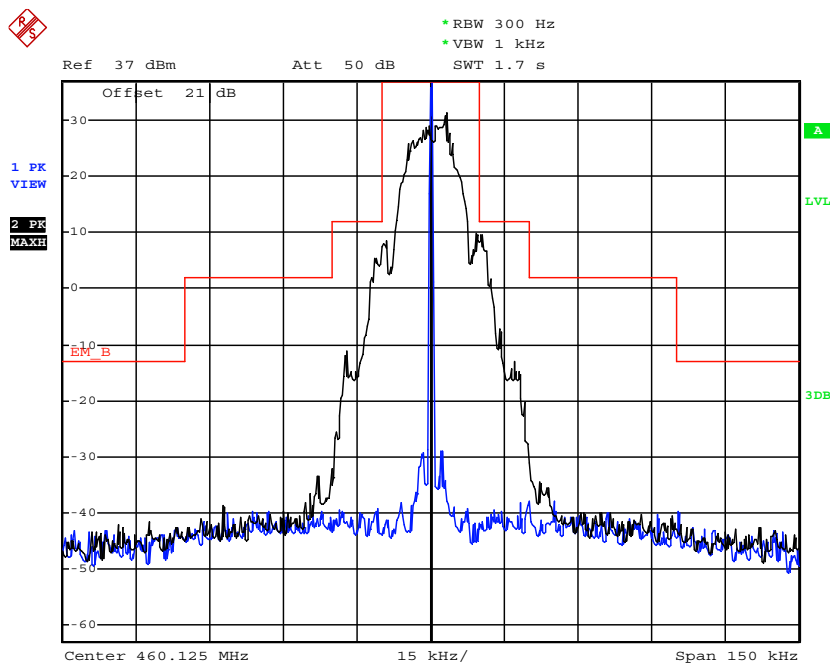
Date: 16.MAY.2016 13:14:43

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Applicable Mask	RBW (Hz)	Audio Freq. (KHz)	Results
GMSK	12.5KHz	Op 1	Ch3	469.125	D	300	/	PASS



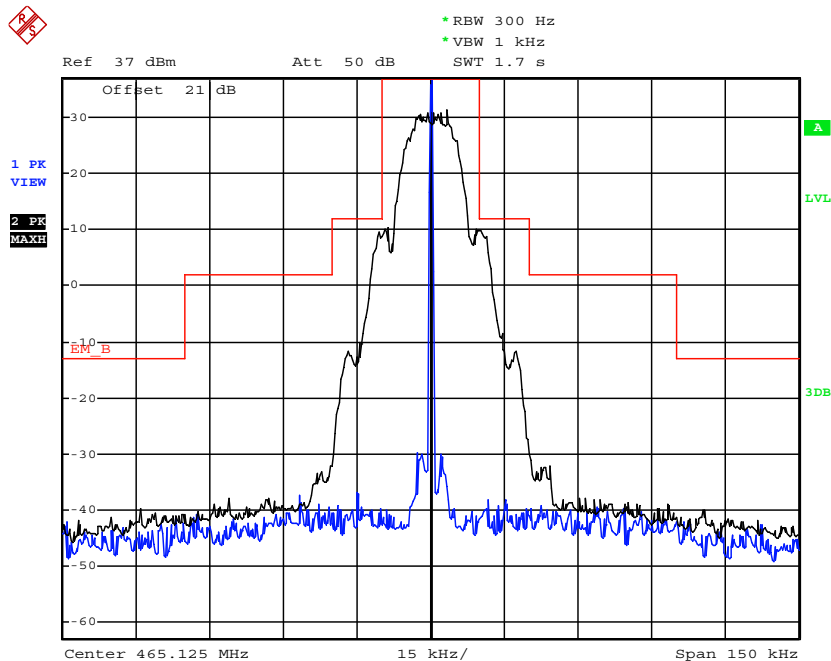
Date: 16.MAY.2016 13:18:47

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Applicable Mask	RBW (Hz)	Audio Freq. (KHz)	Results
GMSK	25KHz	Op 3	Ch4	460.125	B	300	/	PASS



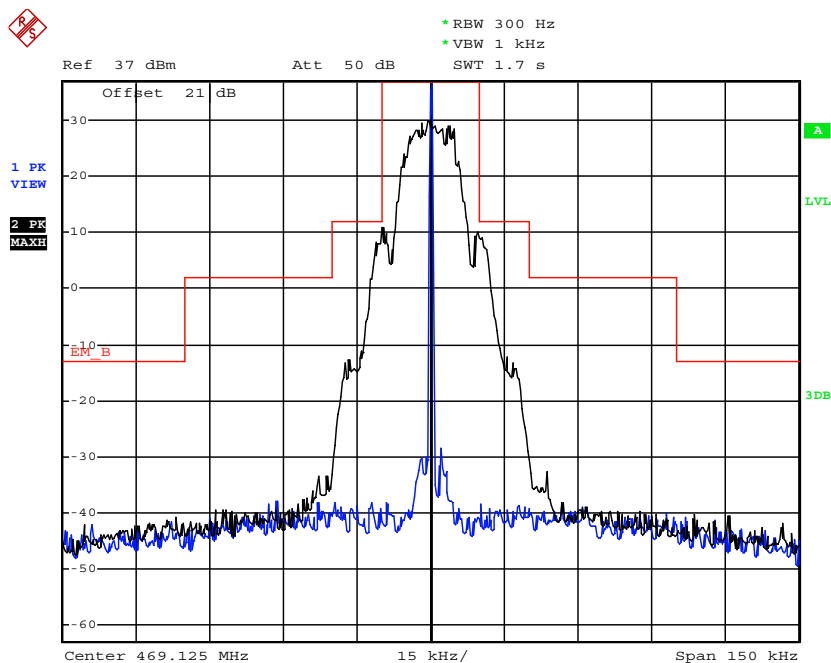
Date: 16.MAY.2016 13:46:12

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Applicable Mask	RBW (Hz)	Audio Freq. (KHz)	Results
GMSK	25KHz	Op 3	Ch5	465.125	B	300	/	PASS



Date: 16.MAY.2016 13:43:26

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Applicable Mask	RBW (Hz)	Audio Freq. (KHz)	Results
GMSK	25KHz	Op 3	Ch6	469.125	B	300	/	PASS



Date: 16.MAY.2016 13:39:47

4.3. Transmitter Radiated Spurious Emission

TEST APPLICABLE

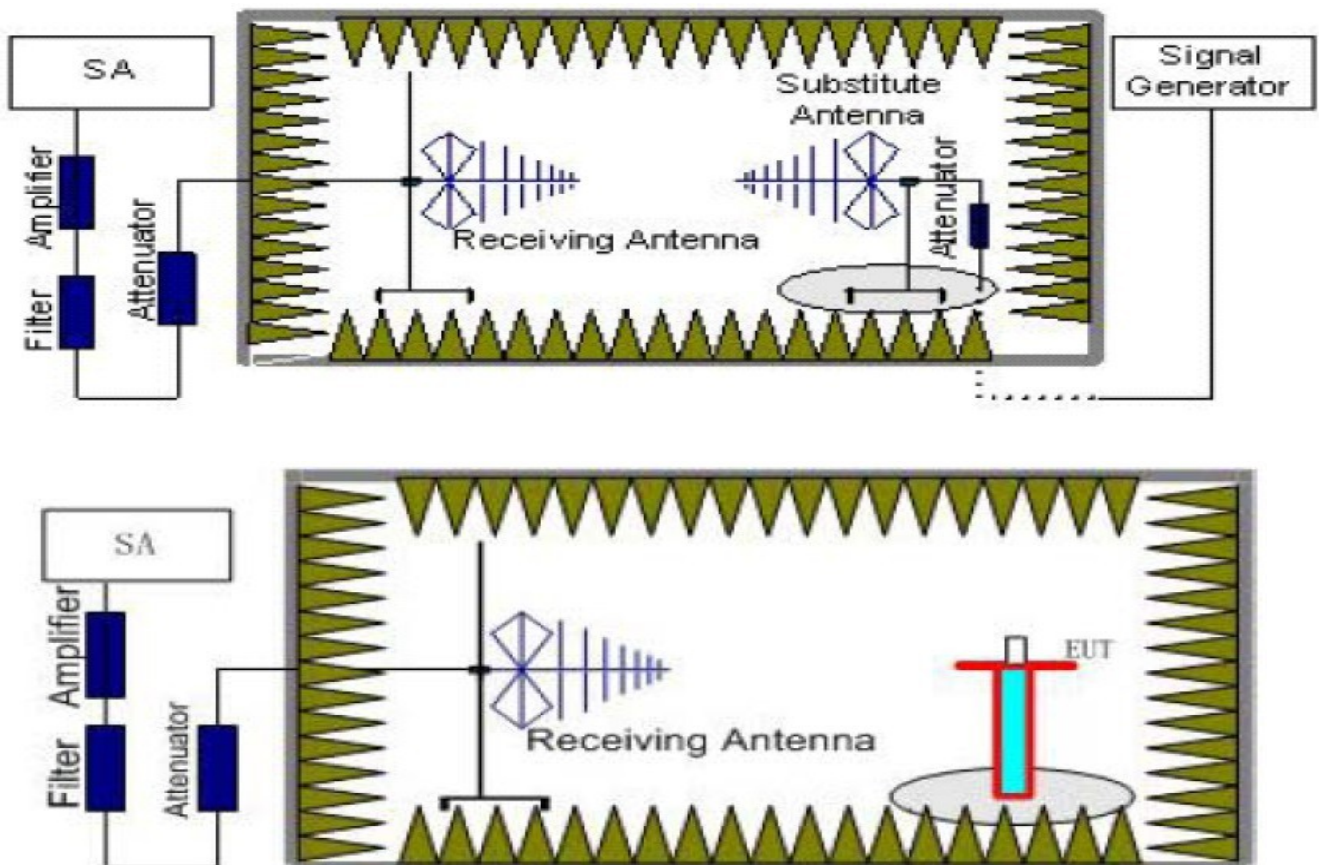
According to the TIA/EIA 603 test method, and according to Section 90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 12.5 KHz channel bandwidth:

- 1 On any frequency removed from the centre of the authorized bandwidth f_0 to 5.625 KHz removed from f_0 : Zero dB
- 2 On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (f_d in KHz) f_0 of more than 5.625 KHz but no more than 12.5 KHz: At least 7.27dB
- 3 On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (f_d in KHz) f_0 of more than 12.5 KHz: At least $50+10 \log (P)$ dB or 70 dB, which ever is lesser attenuation.

For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

- 1 On any frequency removed from the assigned frequency by more than 50 percent, but no more than 100 percent of the authorized bandwidth: At least 25 dB.
- 2 On any frequency removed from the assigned frequency by more than 100 percent, but no more than 250 percent of the authorized bandwidth: At least 35 dB.
- 3 On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43+10 \log (P)$ dB.

TEST CONFIGURATION



TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in six channels were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz for above 1GHz and RBW=100 KHz, VBW=300 KHz for 30MHz to 1GHz, and the maximum value of the receiver should be recorded as (P_r).
4. The EUT shall be replaced by a substitution antenna. In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}), the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.
The measurement results are obtained as described below:
Power (EIRP) = $P_{Mea} - P_{Ag} - P_{cl} - G_a$
The measurement results are amending as described below:
Power (EIRP) = $P_{Mea} - P_{cl} - G_a$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15dBi$.

LIMIT

Modulation Type: GMSK

FCC Part 22.359, 74.462, 80.211 and 90.210 and RSS Gen, RSS 119 Issue 12:

For 12.5 kHz bandwidth:

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:

High: $50 + 10 \log (P_{watts}) = 50 + 10 \log (3.0) = 54.77 \text{ dB}$

Low: $50 + 10 \log (P_{watts}) = 50 + 10 \log (1.0) = 50.00 \text{ dB}$

Note: In general, the worst case attenuation requirement shown above was applied.

Calculation: Limit (dBm) = $EL - 50 - 10 \log_{10} (TP)$

Notes: EL is the emission level of the Output Power expressed in dBm,

In this application, the EL is 34.77 dBm for High rated power and 30.00 for lower rated power.

High: Limit (dBm) = $34.77 - 50 - 10\log(3.0) = -20$ dBm

Low: Limit (dBm) = $30.00 - 50 - 10\log(1.0) = -20$ dBm

For 25 kHz bandwidth:

On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 62.5 kHz at least:

High: $43 + 10 \log(P_{\text{watts}}) = 43 + 10 \log(3.0) = 47.77$ dB

Low: $43 + 10 \log(P_{\text{watts}}) = 43 + 10 \log(1.0) = 43.00$ dB

Note: In general, the worst case attenuation requirement shown above was applied.

Calculation: Limit (dBm) = $EL - 43 - 10\log_{10}(TP)$

In this application, the EL is 34.77 dBm for High rated power and 30.00 for lower rated power.

High: Limit (dBm) = $34.77 - 43 - 10\log(3.0) = -13$ dBm

Low: Limit (dBm) = $30.00 - 43 - 10\log(1.0) = -13$ dBm

Note: 1. In general, the worse case attenuation requirement shown above was applied.

2. The measurement frequency range from 9KHz to 5 GHz.

3. *** means that the emission level is too low to be measured or at least 20 dB down than the limit.

4. ERP for below 1GHz and EIRP above 1GHz.

TEST RESULTS

Remark:

1. We tested Op 1 to Op 8, recorded worst case at Op 1 and Op 3.

Modulation Type: GMSK							
Operation Mode: Op 1				Channel Separation:12.5KHz			
Test Channel: Ch1				Test Frequency:460.125MHz			
Frequency (MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak EIRP (dBm)	Limit (dBm)	Polarization
920.250	-50.88	0.87	6.42	2.15	-47.48	-20.00	H
1380.375	-48.42	1.02	7.35	2.15	-44.24	-20.00	H
2300.625	-58.84	1.10	8.26	2.15	-53.83	-20.00	H
...	...	...	...	...	...	...	H
920.250	-53.42	0.87	6.42	2.15	-50.02	-20.00	V
1380.375	-47.32	1.02	7.35	2.15	-43.14	-20.00	V
2300.625	-58.55	1.10	8.26	2.15	-53.54	-20.00	V
...	...	...	...	...	...	...	V

Modulation Type: GMSK							
Operation Mode: Op 1				Channel Separation:12.5KHz			
Test Channel: Ch2				Test Frequency: 465.125MHz			
Frequency (MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak EIRP (dBm)	Limit (dBm)	Polarization
930.250	-52.86	0.92	6.80	2.15	-49.13	-20.00	H
1395.375	-46.08	1.06	7.89	2.15	-41.40	-20.00	H
2325.625	-55.48	1.12	8.12	2.15	-50.63	-20.00	H
...	...	...	...	...	...	...	H
930.250	-50.56	0.92	6.80	2.15	-46.83	-20.00	V
1395.375	-47.03	1.06	7.89	2.15	-42.35	-20.00	V
2325.625	-56.86	1.12	8.12	2.15	-52.01	-20.00	V
...	...	...	...	...	...	...	V

Modulation Type: GMSK							
Operation Mode: Op 1				Channel Separation:12.5KHz			
Test Channel: Ch3				Test Frequency: 469.125MHz			
Frequency (MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak EIRP (dBm)	Limit (dBm)	Polarization
928.250	-52.95	0.95	6.80	2.15	-49.25	-20.00	H
1407.375	-45.33	1.10	7.91	2.15	-40.67	-20.00	H
2345.625	-58.25	1.21	8.25	2.15	-53.36	-20.00	H
...	...	...	...	...	...	...	H
928.250	-53.20	0.95	6.80	2.15	-49.50	-20.00	V
1407.375	-43.75	1.10	7.91	2.15	-39.09	-20.00	V
2345.625	-58.27	1.21	8.25	2.15	-53.38	-20.00	V
...	...	...	...	...	...	...	V

Modulation Type: GMSK							
Operation Mode: Op 3				Channel Separation:25KHz			
Test Channel: Ch4				Test Frequency:460.125MHz			
Frequency (MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak EIRP (dBm)	Limit (dBm)	Polarization
920.250	-50.32	0.87	6.42	2.15	-46.92	-13.00	H
1380.375	-45.42	1.02	7.35	2.15	-41.24	-13.00	H
2300.625	-55.30	1.10	8.26	2.15	-50.29	-13.00	H
...	...	...	...	...	...	...	H
920.250	-51.95	0.87	6.42	2.15	-48.55	-13.00	V
1380.375	-45.36	1.02	7.35	2.15	-41.18	-13.00	V
2300.625	-59.91	1.10	8.26	2.15	-54.90	-13.00	V
...	...	...	...	...	...	...	V

Modulation Type: GMSK							
Operation Mode: Op 3				Channel Separation:25KHz			
Test Channel: Ch5				Test Frequency: 465.125MHz			
Frequency (MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak EIRP (dBm)	Limit (dBm)	Polarization
930.250	-51.30	0.92	6.80	2.15	-47.57	-13.00	H
1395.375	-45.29	1.06	7.89	2.15	-40.61	-13.00	H
2325.625	-56.85	1.12	8.12	2.15	-52.00	-13.00	H
...	...	...	...	...	...	...	H
930.250	-50.95	0.92	6.80	2.15	-47.22	-13.00	V
1395.375	-45.57	1.06	7.89	2.15	-40.89	-13.00	V
2325.625	-57.37	1.12	8.12	2.15	-52.52	-13.00	V
...	...	...	...	...	...	...	V

Modulation Type: GMSK							
Operation Mode: Op 3				Channel Separation:25KHz			
Test Channel: Ch6				Test Frequency: 469.125MHz			
Frequency (MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak EIRP (dBm)	Limit (dBm)	Polarization
928.250	-51.14	0.95	6.80	2.15	-47.44	-13.00	H
1407.375	-44.06	1.10	7.91	2.15	-39.40	-13.00	H
2345.625	-60.21	1.21	8.25	2.15	-55.32	-13.00	H
...	...	...	...	...	...	...	H
928.250	-53.48	0.95	6.80	2.15	-49.78	-13.00	V
1407.375	-43.81	1.10	7.91	2.15	-39.15	-13.00	V
2345.625	-56.84	1.21	8.25	2.15	-51.95	-13.00	V
...	...	...	...	...	...	...	V

4.4. Spurious Emission on Antenna Port

TEST APPLICABLE

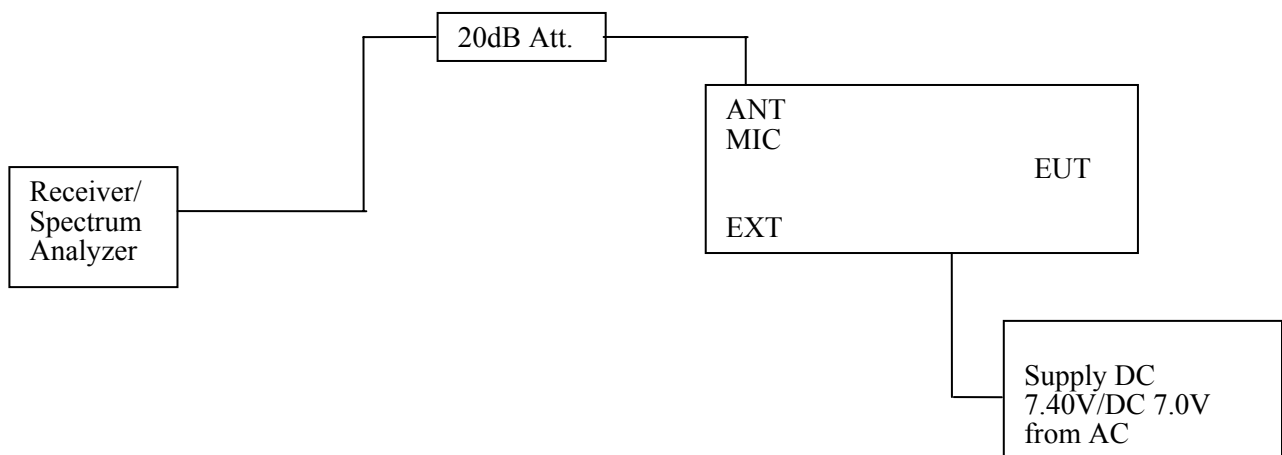
The same as Section 4.3

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 to 100 kHz. Sufficient scans were taken to show any out of band emission up to 10th. Harmonic for the lower and the highest frequency range. Set RBW 1KHz, VBW 3KHz in the frequency band 9KHz to 150KHz, set RBW 10KHz, VBW 30 KHz in the frequency band 150KHz to 30 MHz, set RBW 100 kHz, VBW 300 kHz in the frequency band 30MHz to 1GHz, while set RBW=1MHz. VBW=3MHz from the 1GHz to 10th Harmonic.

The audio input was set to 0 to get the unmodulated carrier, the resulting picture is print out for each channel separation.

TEST CONFIGURATION



LIMIT

Modulation Type: GMSK

FCC Part 22.359, 74.462, 80.211 and 90.210 and RSS Gen, RSS 119 Issue 12:

For 12.5 kHz bandwidth:

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:

High: $50 + 10 \log (P_{\text{watts}}) = 50 + 10 \log (3.0) = 54.77 \text{ dB}$

Low: $50 + 10 \log (P_{\text{watts}}) = 50 + 10 \log (1.0) = 50.00 \text{ dB}$

Note: In general, the worse case attenuation requirement shown above was applied.

Calculation: Limit (dBm) = EL - 50 - 10log10 (TP)

Notes: EL is the emission level of the Output Power expressed in dBm,

In this application, the EL is 34.77 dBm for High rated power and 30.00 for lower rated power.

High: Limit (dBm) = $34.77 - 50 - 10 \log (3.0) = -20 \text{ dBm}$

Low: Limit (dBm) = $30.00 - 50 - 10\log(1.0) = -20$ dBm

For 25 kHz bandwidth:

On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 62.5 kHz at least:

High: $43 + 10\log(\text{Pwatts}) = 43 + 10\log(3.0) = 47.77$ dB

Low: $43 + 10\log(\text{Pwatts}) = 43 + 10\log(1.0) = 43.00$ dB

Note: In general, the worst case attenuation requirement shown above was applied.

Calculation: Limit (dBm) = EL-43-10log10 (TP)

In this application, the EL is 34.77 dBm for High rated power and 30.00 for lower rated power.

High: Limit (dBm) = $34.77 - 43 - 10\log(3.0) = -13$ dBm

Low: Limit (dBm) = $30.00 - 43 - 10\log(1.0) = -13$ dBm

Note: 1. In general, the worse case attenuation requirement shown above was applied.

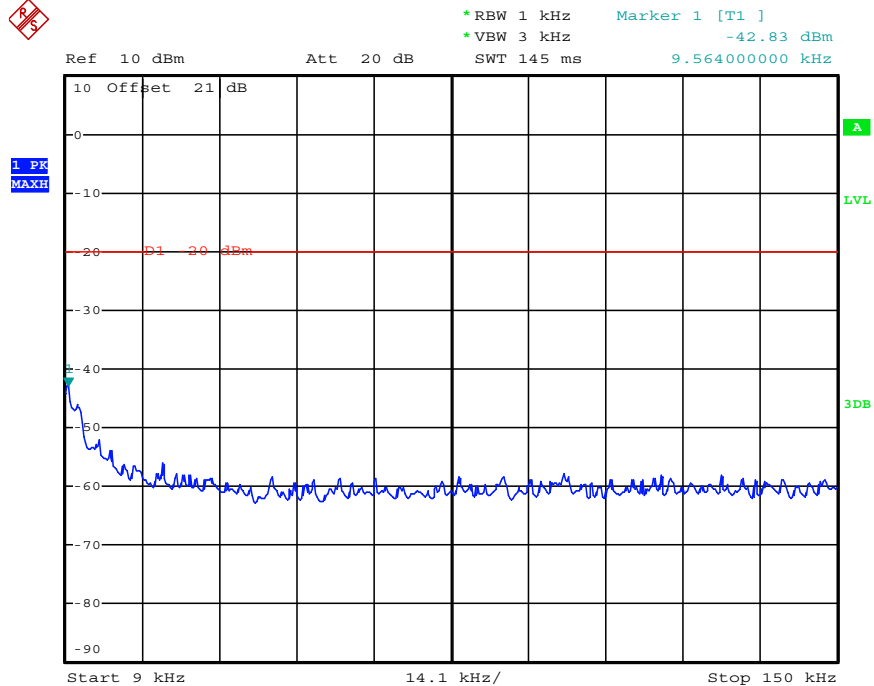
2. The measurement frequency range from 9 KHz to 5GHz.

TEST RESULTS

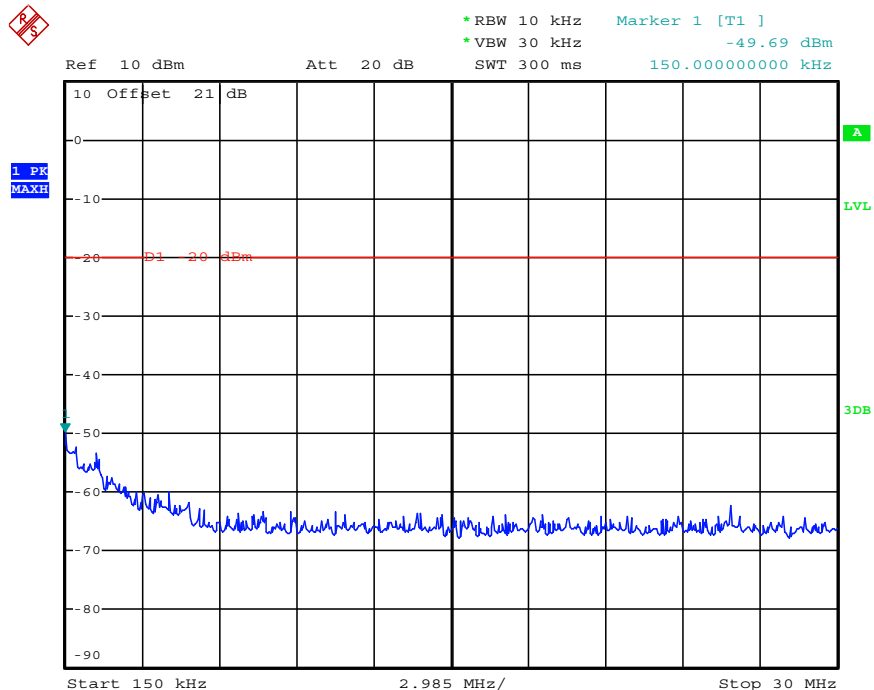
Operation Mode	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz	
			Frequency (MHz)	Data (dBm)	Frequency (MHz)	Data (dBm)
Op 1	Ch1	460.125	301.60	-28.08	1260.00	-33.87
	Ch2	465.125	317.12	-30.20	1210.00	-33.06
	Ch3	469.125	346.22	-29.84	1168.00	-33.92
Op 3	Ch4	460.125	301.60	-27.35	1682.00	-32.78
	Ch5	465.125	317.12	-29.64	1440.00	-32.47
	Ch6	469.125	346.22	-27.43	1264.00	-32.8
Limit			-20dBm for 12.5KHz Channel Separation			
			-13dBm for 25KHz Channel Separation			
Test Results			PASS			

Plots of Spurious Emission on Antenna Port Measurement

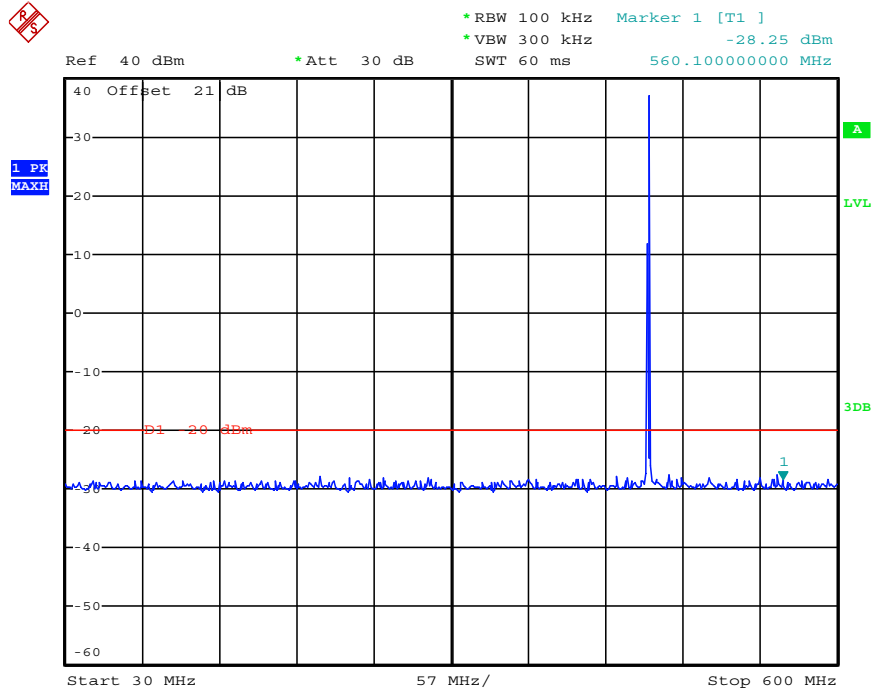
Operation Mode	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		Limit (dBm)
			Frequency (MHz)	Data (dBm)	Frequency (MHz)	Data (dBm)	
Op 1	Ch1	460.125	301.60	-28.08	1260.00	-33.87	-20.00



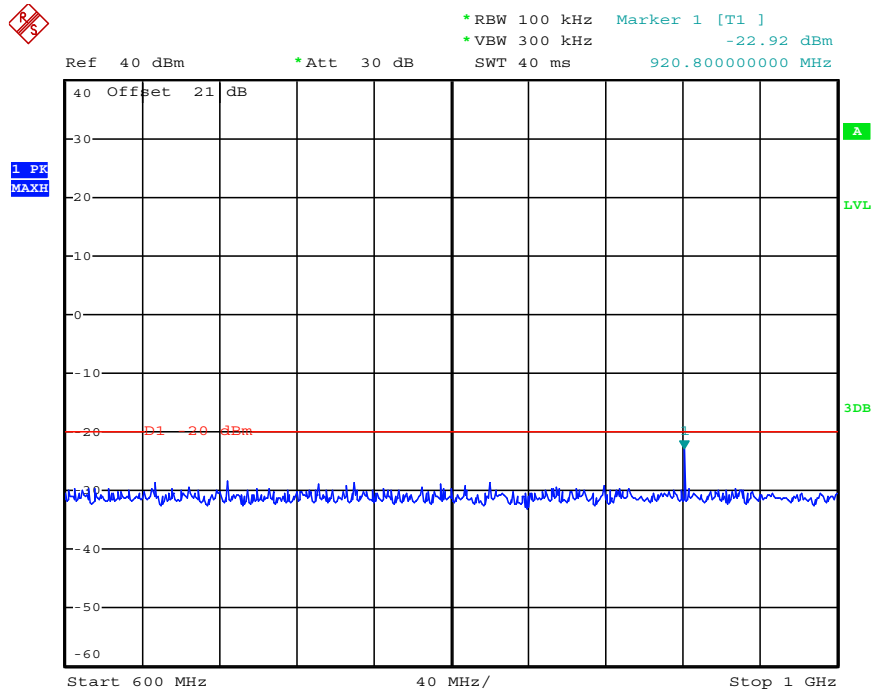
Date: 16.MAY.2016 13:49:20



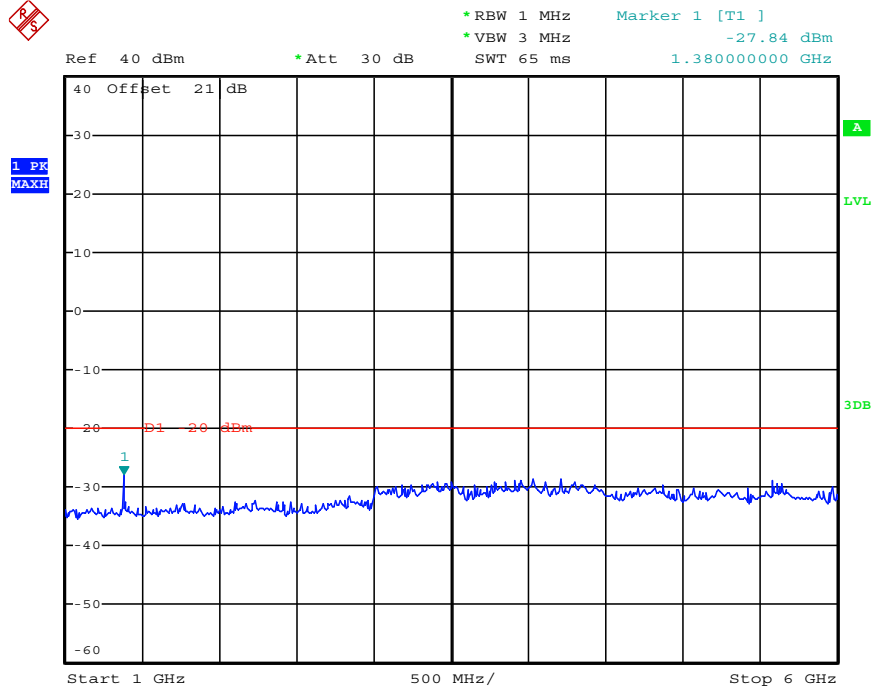
Date: 16.MAY.2016 13:50:25



Date: 16.MAY.2016 13:59:45

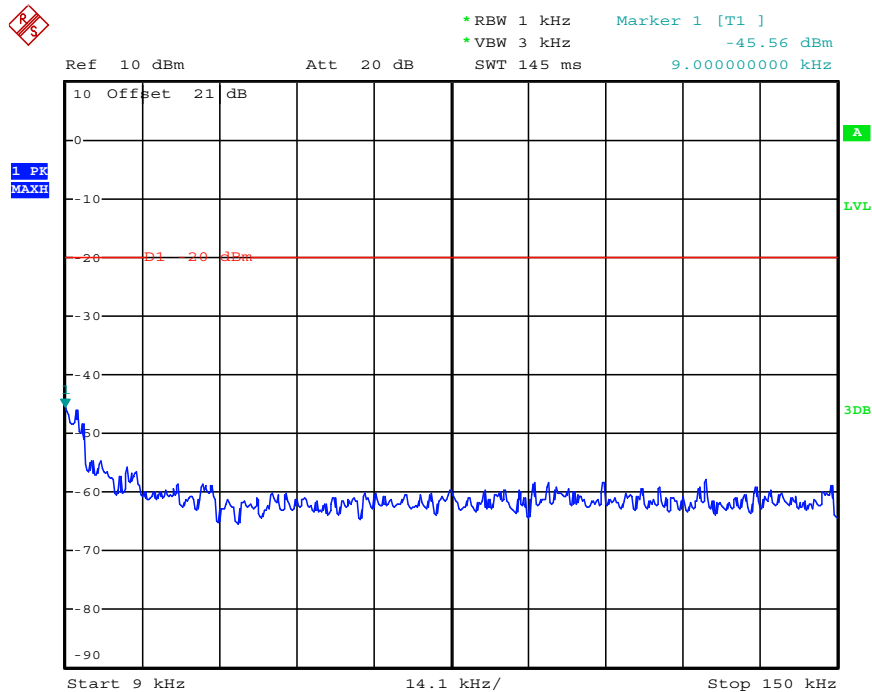


Date: 16.MAY.2016 14:02:19

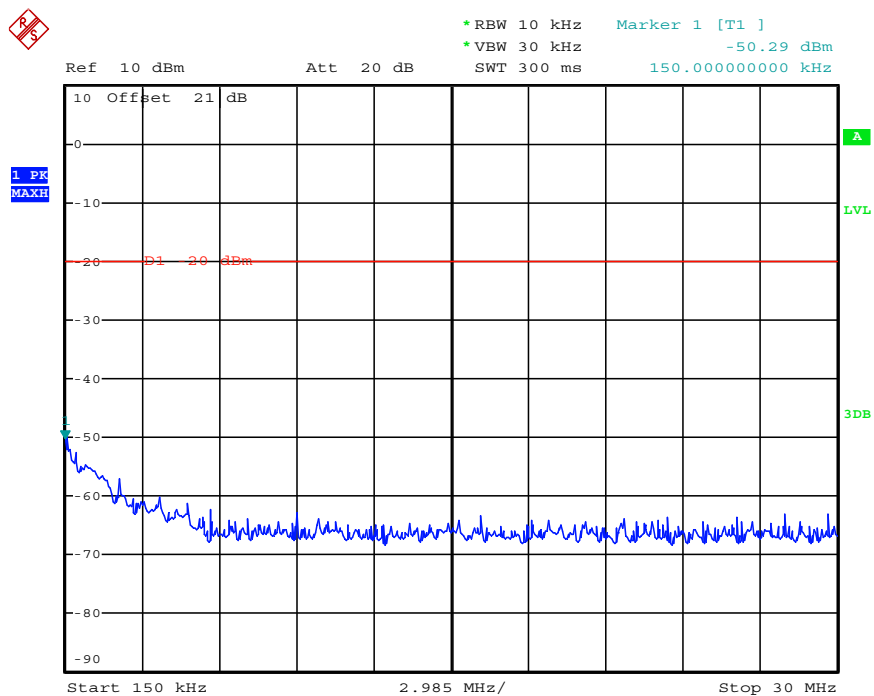


Date: 16.MAY.2016 14:03:29

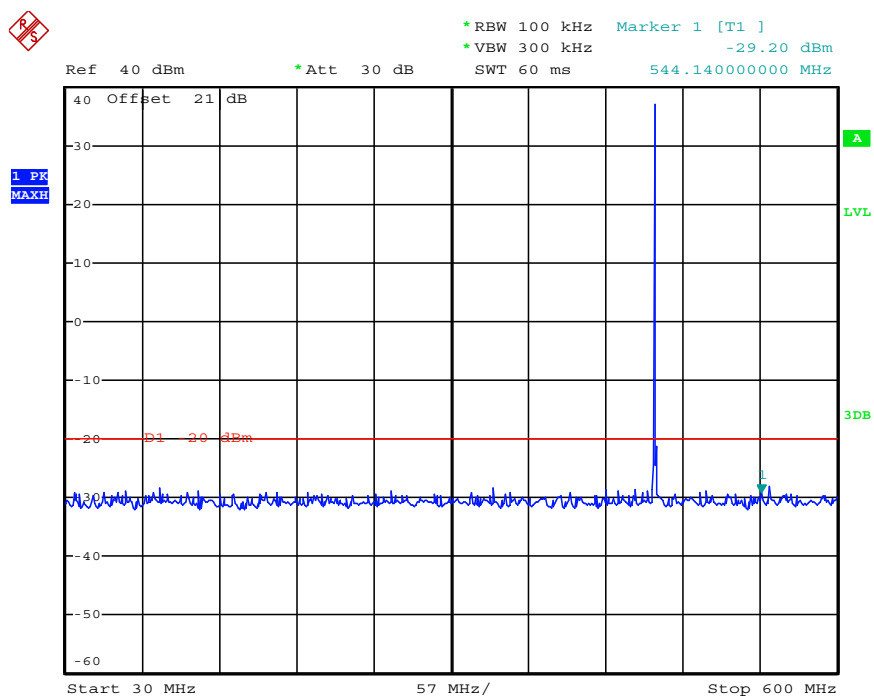
Operation Mode	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		Limit (dBm)
			Frequency (MHz)	Data (dBm)	Frequency (MHz)	Data (dBm)	
Op 1	Ch2	465.125	317.12	-30.20	1210.00	-33.06	-20.00



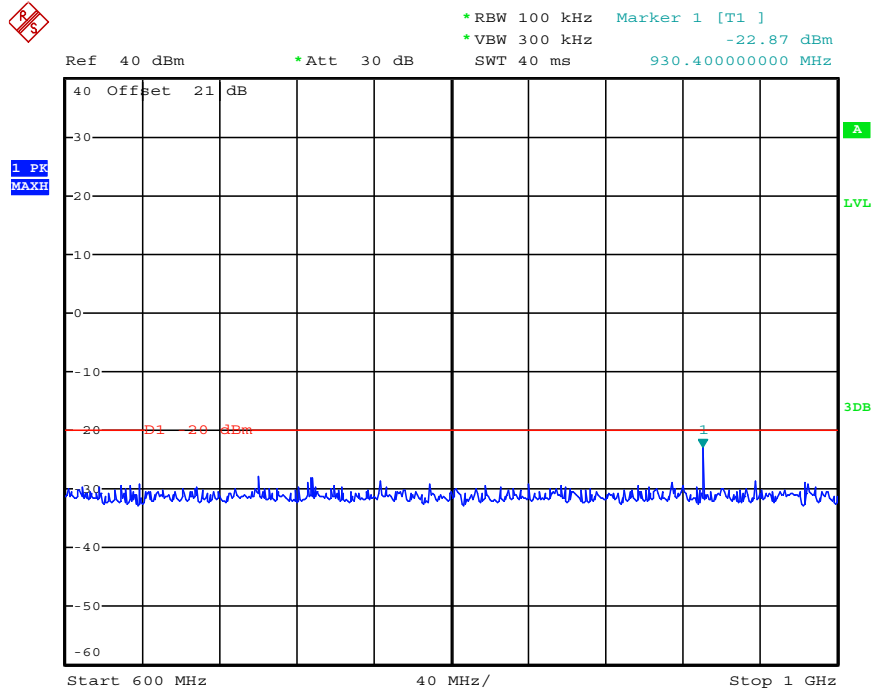
Date: 16.MAY.2016 13:49:41



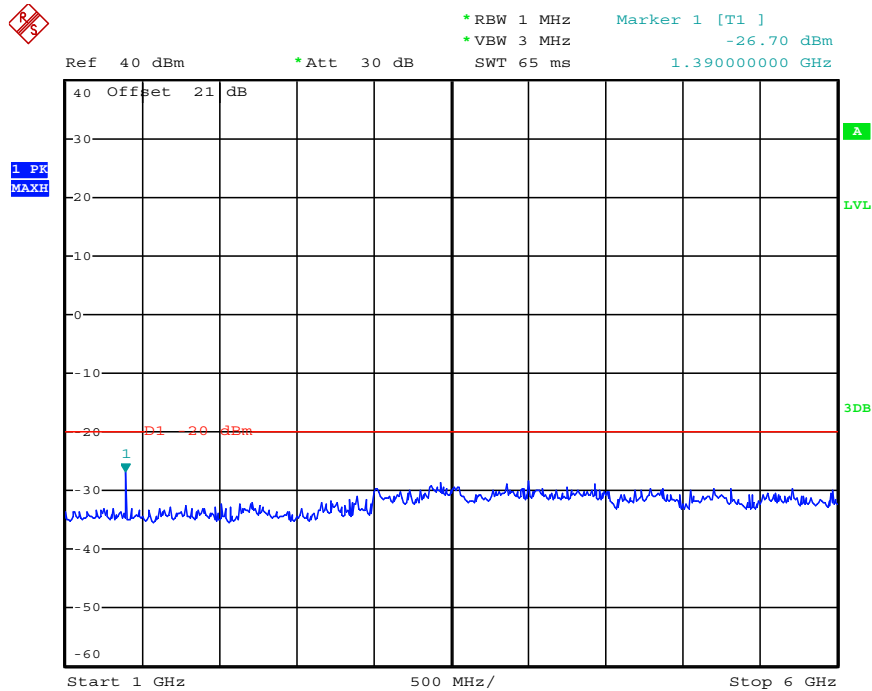
Date: 16.MAY.2016 13:50:36



Date: 16.MAY.2016 14:00:11

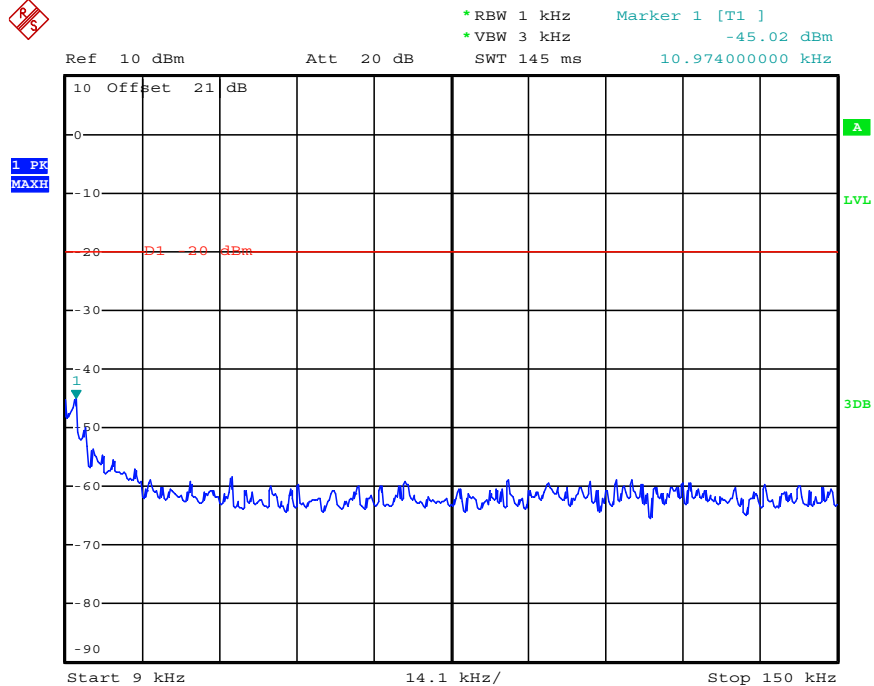


Date: 16.MAY.2016 14:02:00

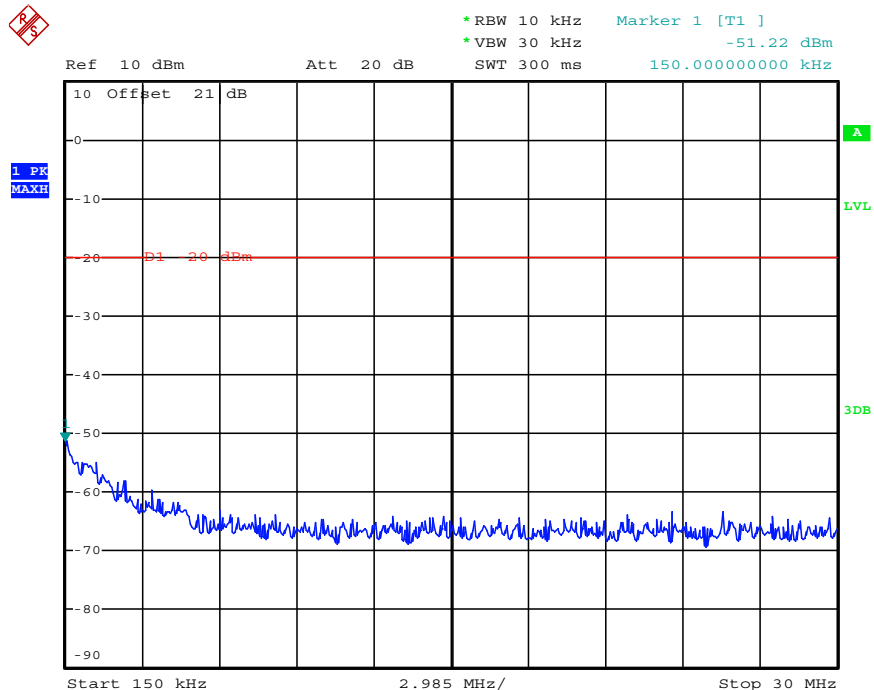


Date: 16.MAY.2016 14:03:54

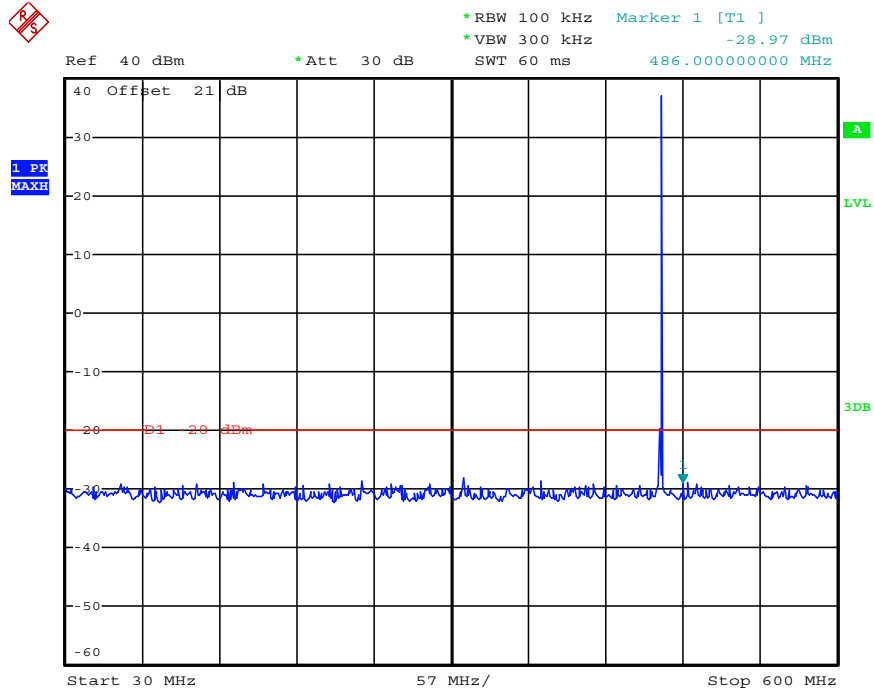
Operation Mode	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		Limit (dBm)
			Frequency (MHz)	Data (dBm)	Frequency (MHz)	Data (dBm)	
Op 1	Ch3	469.125	346.22	-29.84	1168.00	-33.92	-20.00



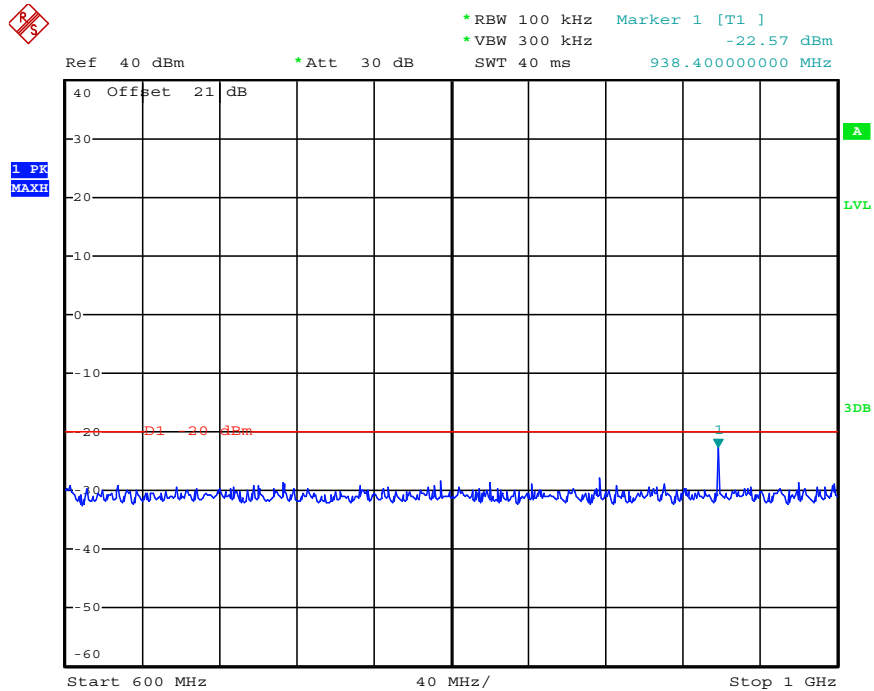
Date: 16.MAY.2016 13:49:55



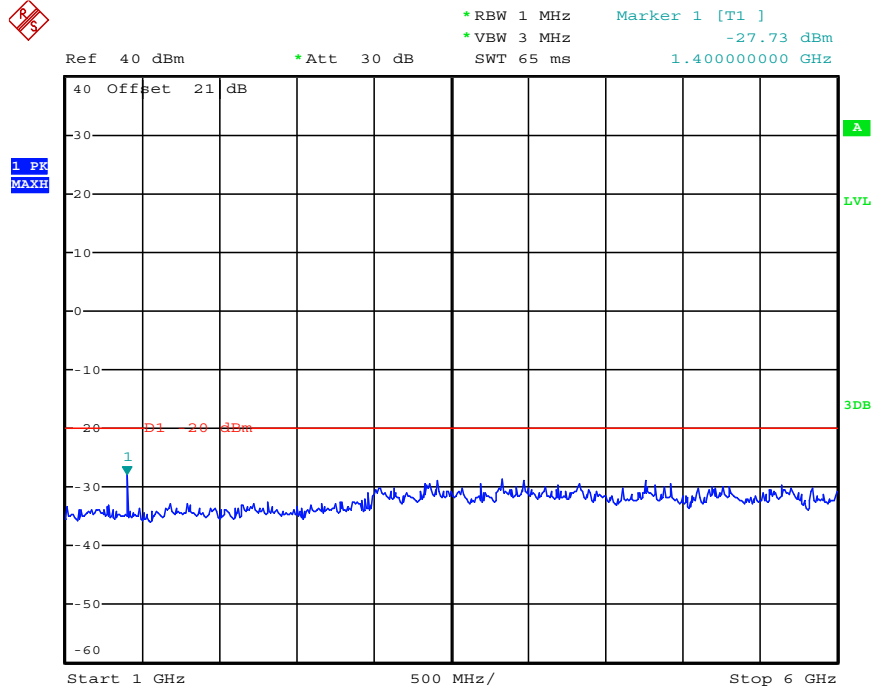
Date: 16.MAY.2016 13:50:53



Date: 16.MAY.2016 14:00:40

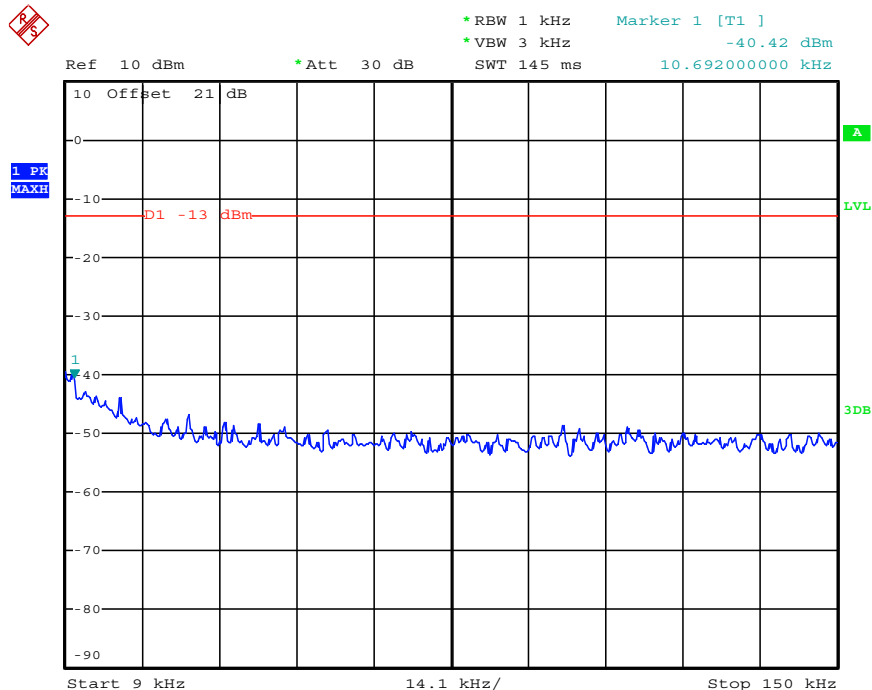


Date: 16.MAY.2016 14:01:32

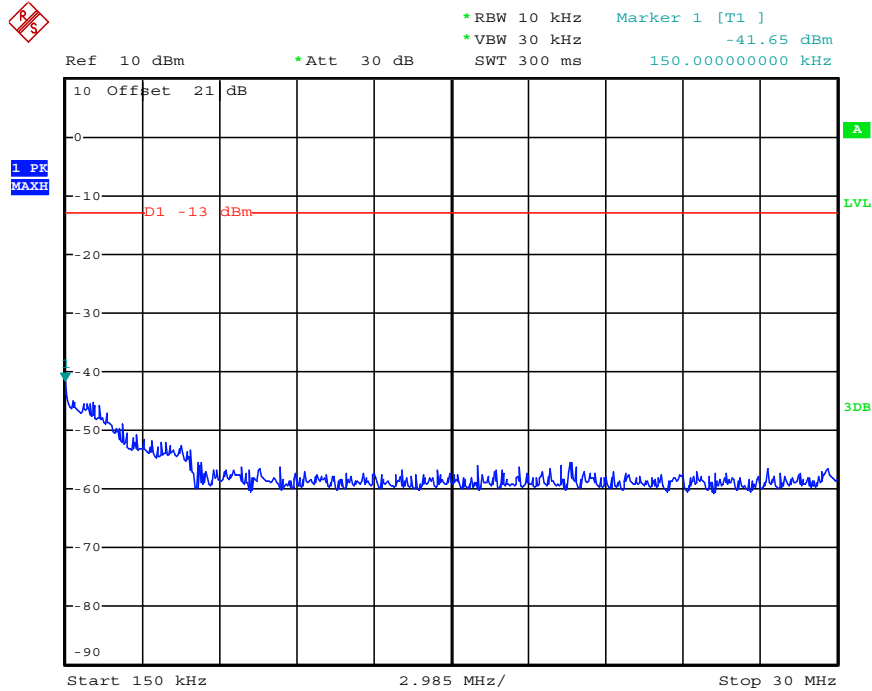


Date: 16.MAY.2016 14:04:16

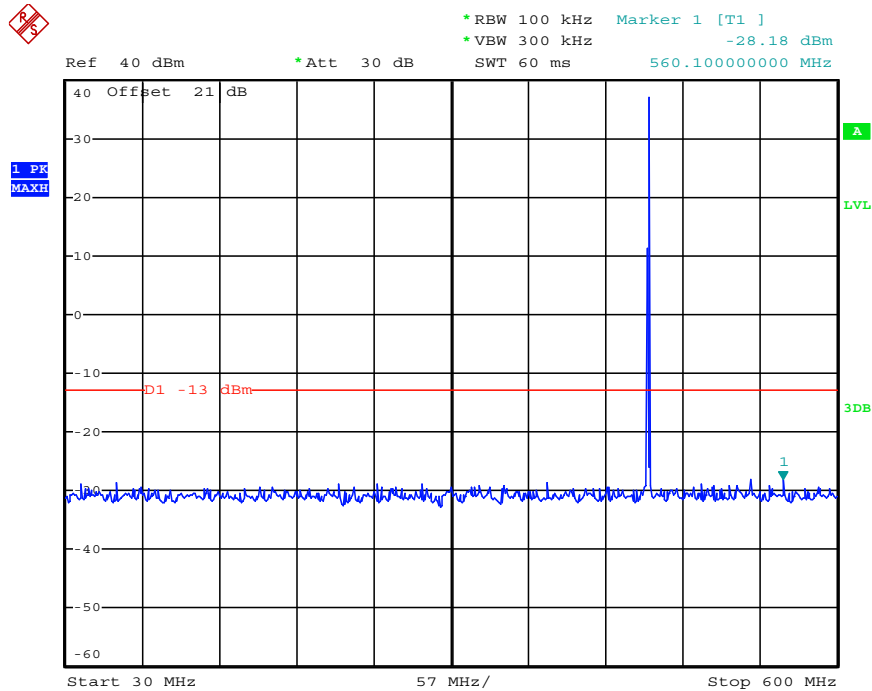
Operation Mode	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		Limit (dBm)
			Frequency (MHz)	Data (dBm)	Frequency (MHz)	Data (dBm)	
Op 3	Ch4	460.125	301.60	-27.35	1682.00	-32.78	-13.00



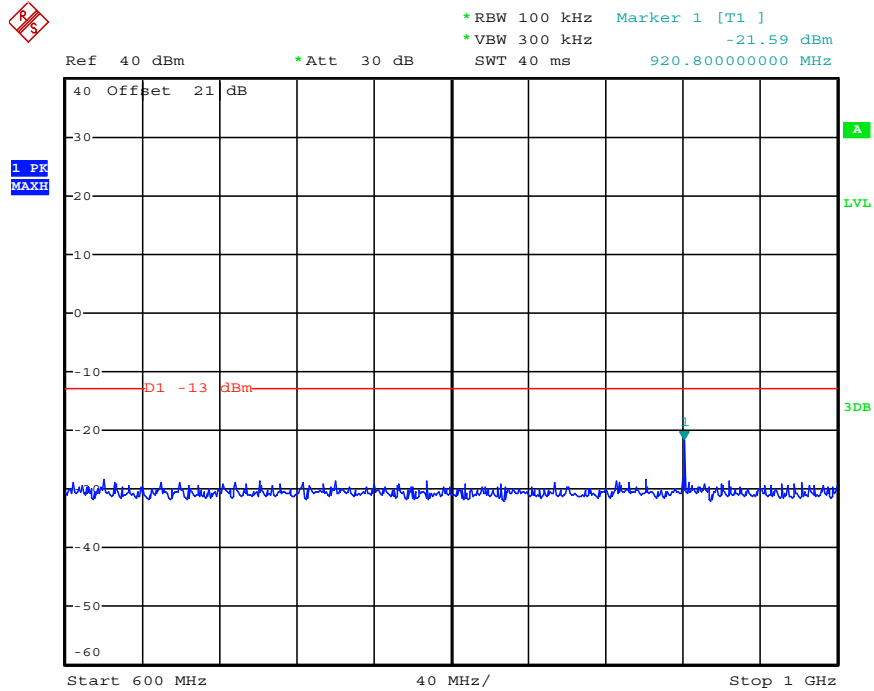
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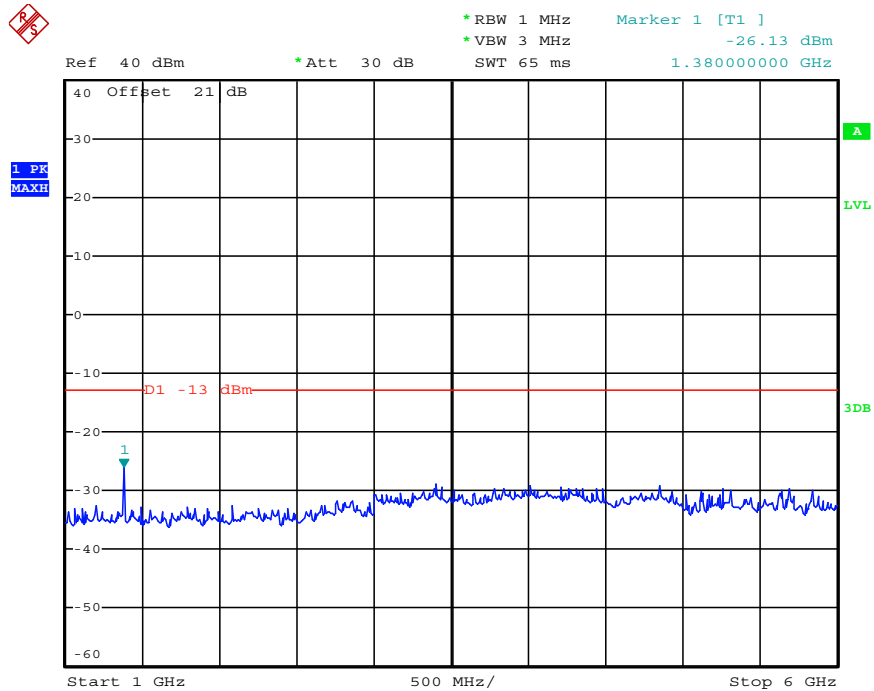
Date: 16.MAY.2016 14:07:19



Date: 16.MAY.2016 14:10:14

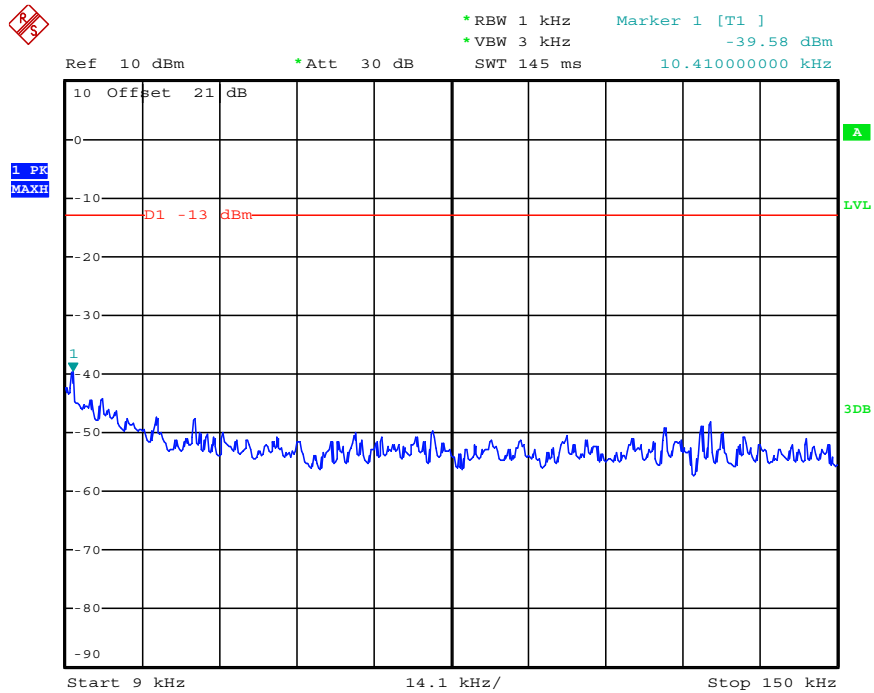


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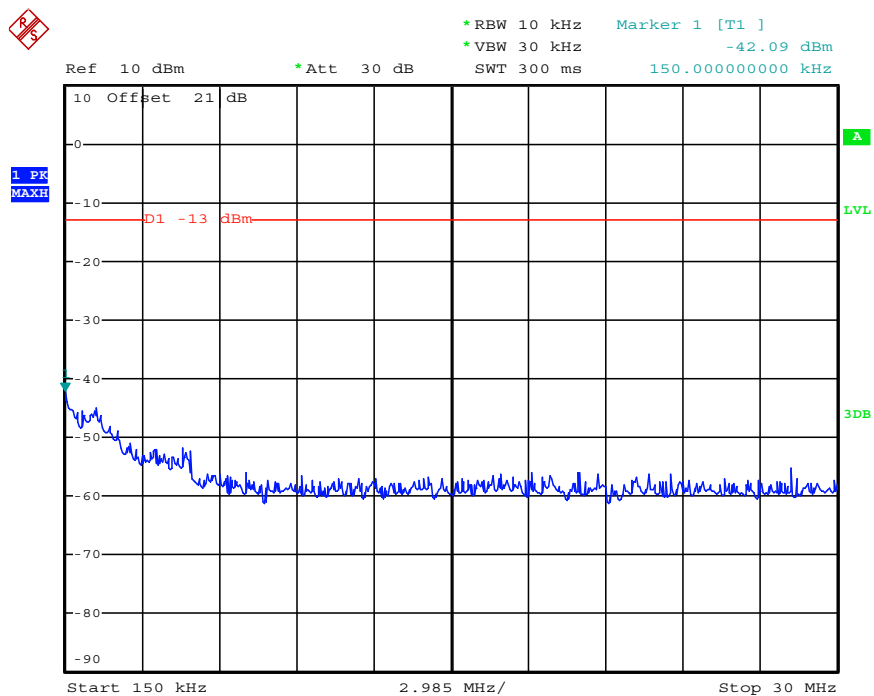


Date: 16.MAY.2016 14:15:53

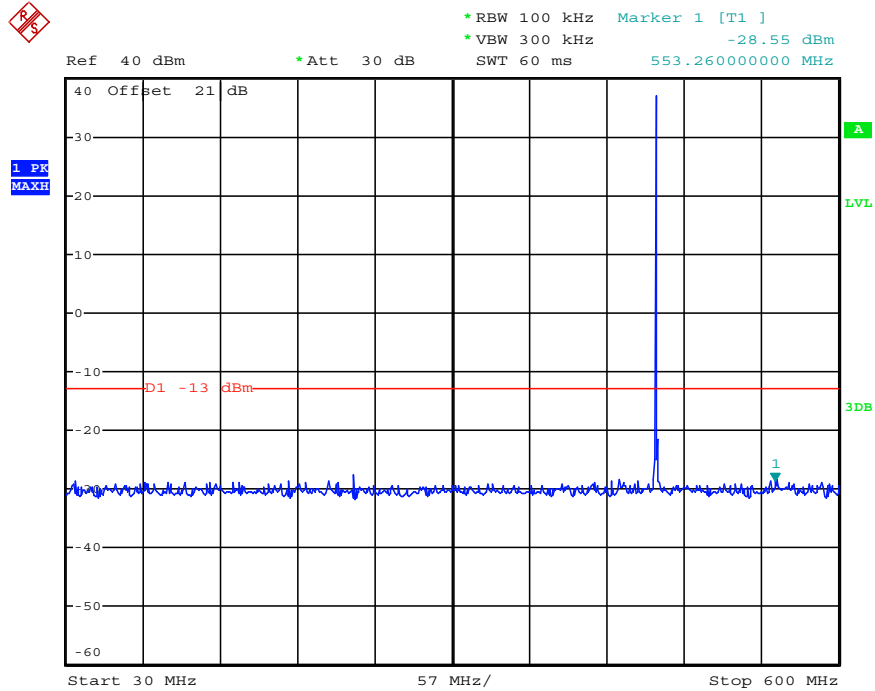
Operation Mode	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		Limit (dBm)
			Frequency (MHz)	Data (dBm)	Frequency (MHz)	Data (dBm)	
Op 3	Ch5	465.125	317.12	-29.64	1440.00	-32.47	-13.00



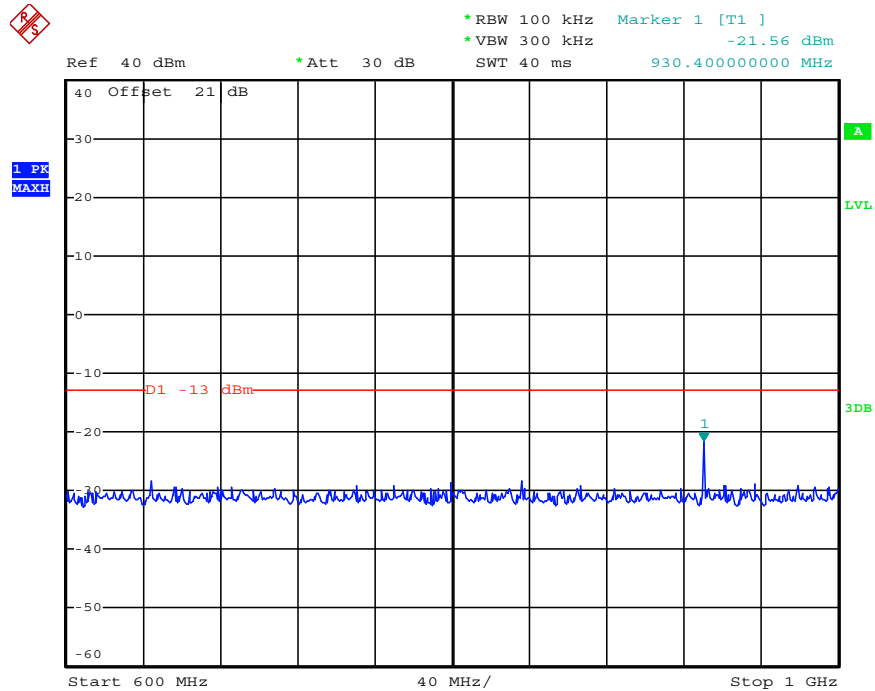
Date: 16.MAY.2016 14:05:41



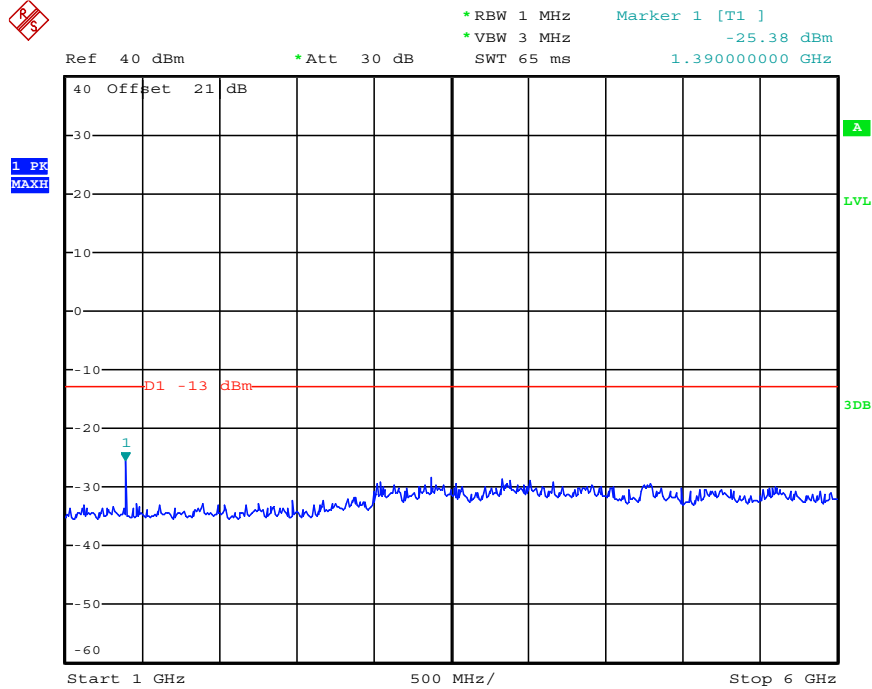
Date: 16.MAY.2016 14:07:32



Date: 16.MAY.2016 14:09:50

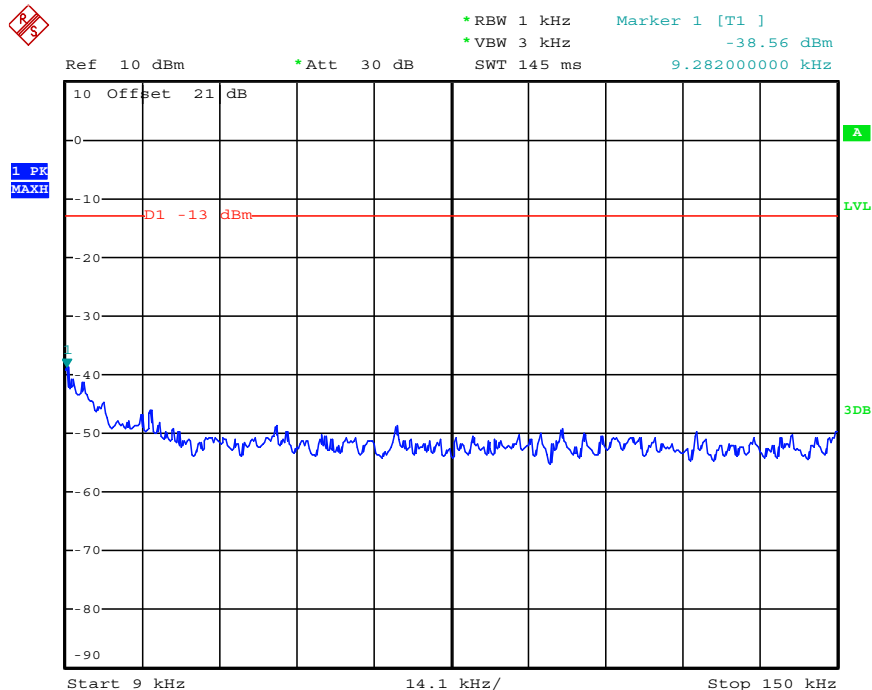


Date: 16.MAY.2016 14:14:11

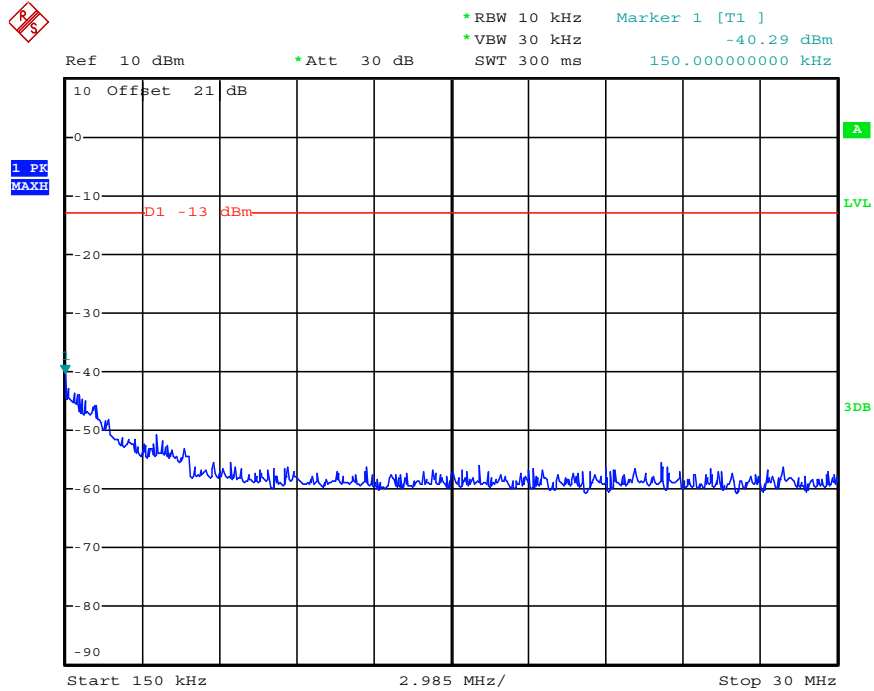


Date: 16.MAY.2016 14:15:32

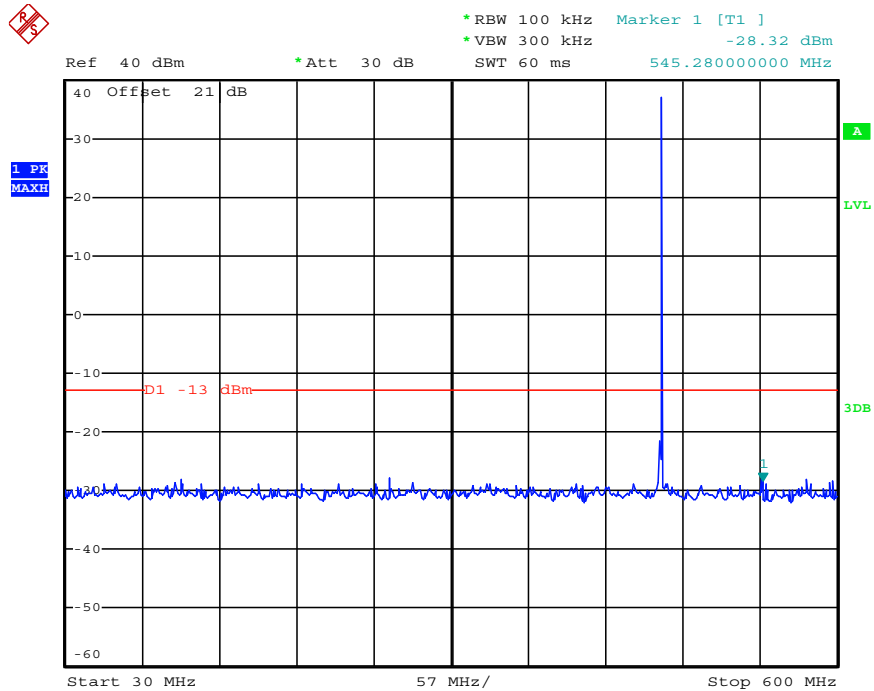
Operation Mode	Test Channel	Test Frequency (MHz)	Maximum Conducted Spurious Emissions Below 1GHz		Maximum Conducted Spurious Emissions Above 1GHz		Limit (dBm)
			Frequency (MHz)	Data (dBm)	Frequency (MHz)	Data (dBm)	
Op 3	Ch6	469.125	346.22	-27.43	1264.00	-32.80	-13.00



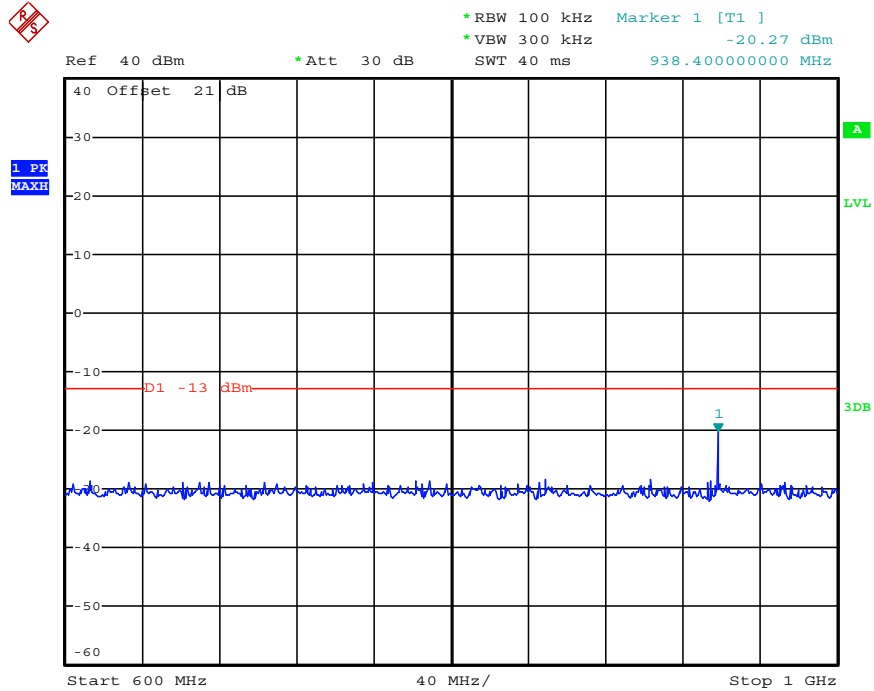
Date: 16.MAY.2016 14:05:59



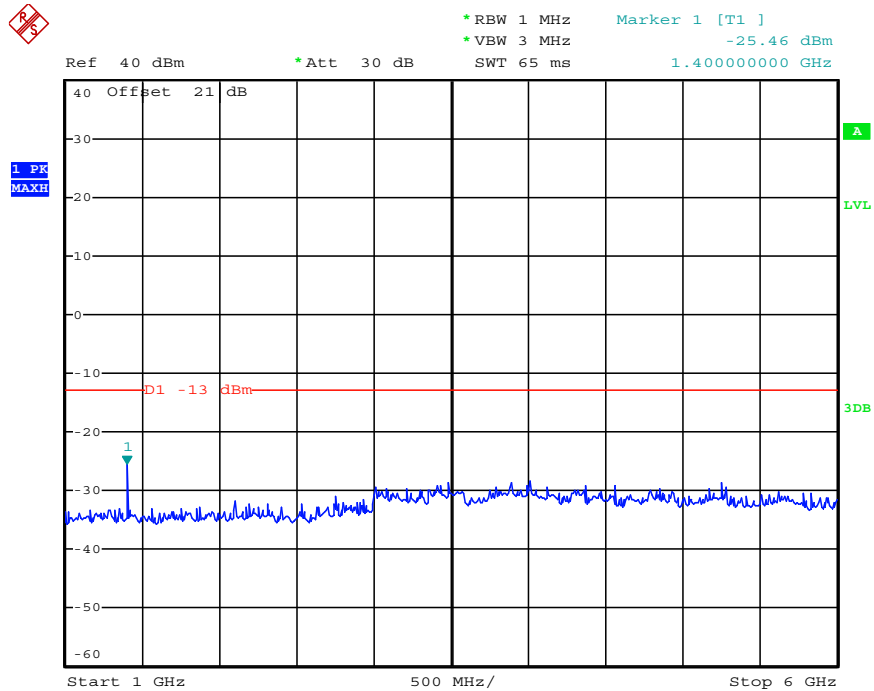
Date: 16.MAY.2016 14:07:47



Date: 16.MAY.2016 14:08:49



Date: 16.MAY.2016 14:13:50



Date: 16.MAY.2016 14:16:18

4.5. Modulation Characteristics

TEST APPLICABLE

According to CFR47 section 2.1047(a), for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

TEST PROCEDURE

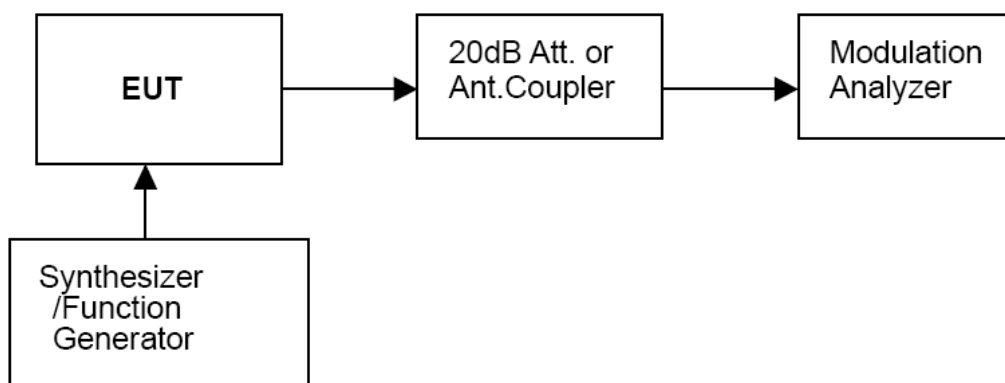
Modulation Limit

- 1 Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system deviation at 1 KHz using this level as a reference (0dB) and vary the input level from -20 to +20dB. Record the frequency deviation obtained as a function of the input level.
- 2 Repeat step 1 with input frequency changing to 300, 1004, 1500 and 2500Hz in sequence.

Audio Frequency Response

- 1 Configure the EUT as shown in figure 1.
- 2 Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0dB).
- 3 Vary the Audio frequency from 100 Hz to 3 KHz and record the frequency deviation.
- 4 Audio Frequency Response = $20\log_{10}$ (Deviation of test frequency/Deviation of 1 KHz reference).

TEST CONFIGURATION



TEST RESULTS

It is not applicable for devices which operate with the digitized data modulation type.

4.6. Frequency Stability Test

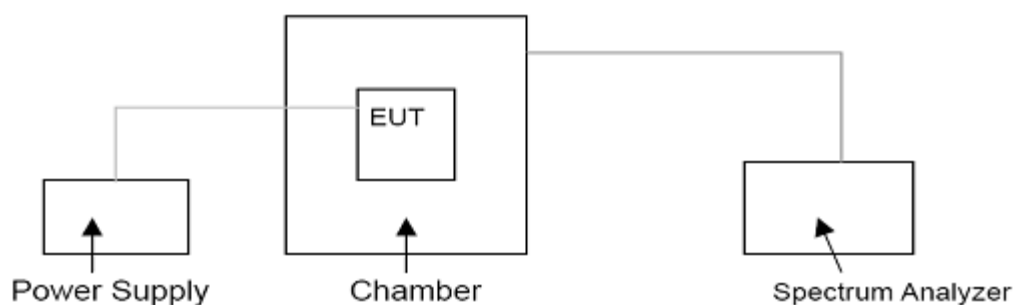
TEST APPLICABLE

- 1 According to FCC Part 2 Section 2.1055 (a) (1), the frequency stability shall be measured with variation of ambient temperature from -30°C to +60°C centigrade.
- 2 According to FCC Part 2 Section 2.1055 (e) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
- 3 Vary primary supply voltage from 85 to 115 percent of the nominal value.
- 4 According to §90.213, the frequency stability limit is 2.5 ppm for 12.5KHz and 5.0ppm for 25KHz channel separation

TEST PROCEDURE

The EUT was set in the climate chamber and connected to an external DC power supply and AC power supply. The RF output was directly connected to Spectrum Analyzer ESCI3. The coupling loss of the additional cables was recorded and taken in account for all the measurements. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded. For Frequency stability Vs. Voltage the EUT was connected to a DC power supply or AC power supply and the voltage was adjusted in the required ranges. The result was recorded.

TEST CONFIGURATION



TEST LIMITS

According to 90.213, Transmitters used must have minimum frequency stability as specified in the following table.

Frequency Range (MHz)	Channel Bandwidth (KHz)	Frequency Tolerance (ppm)		
		Fixed and Base Stations	Mobile Stations	
			> 2 W	≤ 2 W
150-174 MHz	6.25	1.0	2.0	2.0
	12.5	2.5	5.0	5.0
	25	5.0	5.0	50.0*
421-512 MHz	6.25	0.5	1.0	1.0
	12.5	1.5	2.5	2.5
	25	2.5	5.0	5.0

- Stations operating in the 154.45 to 154.49 MHz or the 173.2 to 173.4 MHz bands must have a frequency stability of 5 ppm.
- Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150-174 MHz band and 2.5 ppm in the 421-512 MHz band.

TEST RESULTS

Remark:

1. We tested Op 1 to Op 8, recorded worst case at Op 1, Op 3, Op5 and Op 7.

Operation Mode	Channel Separation	Test conditions		Frequency error (ppm)		
		Voltage(V)	Temp(°C)	460.125	465.125	469.125
Op1	12.5KHz	7.4 V	-30	0.57	0.64	0.60
			-20	0.55	0.64	0.59
			-10	0.52	0.71	0.61
			0	0.60	0.74	0.62
			10	0.50	0.75	0.58
			20	0.62	0.85	0.48
			30	0.55	0.74	0.61
			40	0.57	0.70	0.59
			50	0.53	0.72	0.58
		6.29 (85% Rated)	20	0.73	0.77	0.76
		8.51(115% Rated)	20	0.61	0.74	0.81
Limit		2.5 ppm				
Test Results		PASS				

Operation Mode	Channel Separation	Test conditions		Frequency error (ppm)		
		Voltage(V)	Temp(°C)	460.125	465.125	469.125
Op3	25KHz	7.4 V	-30	0.45	0.55	0.66
			-20	0.67	0.65	0.73
			-10	0.63	0.54	0.71
			0	0.65	0.61	0.71
			10	0.78	0.72	0.72
			20	0.69	0.67	0.66
			30	0.56	0.69	0.75
			40	0.43	0.78	0.76
			50	0.56	0.65	0.65
		6.29 (85% Rated)	20	0.89	0.71	0.73
		8.51(115% Rated)	20	0.87	0.83	0.62
Limit		5.0 ppm				
Test Results		PASS				

Operation Mode	Channel Separation	Test conditions		Frequency error (ppm)		
		Voltage(V)	Temp(°C)	460.125	465.125	469.125
Op5	12.5KHz	120 V	-30	0.56	0.69	0.62
			-20	0.55	0.65	0.58
			-10	0.55	0.65	0.55
			0	0.60	0.61	0.65
			10	0.50	0.72	0.51
			20	0.59	0.78	0.49
			30	0.56	0.76	0.66
			40	0.56	0.76	0.62
			50	0.51	0.75	0.52
		102V (85% Rated)	20	0.56	0.72	0.49
		138V (115% Rated)	20	0.55	0.72	0.49
Limit		2.5 ppm				
Test Results		PASS				

Operation Mode	Channel Separation	Test conditions		Frequency error (ppm)		
		Voltage(V)	Temp(°C)	460.125	465.125	469.125
Op7	25KHz	120 V	-30	0.55	0.55	0.60
			-20	0.52	0.61	0.66
			-10	0.51	0.50	0.54
			0	0.49	0.47	0.54
			10	0.44	0.44	0.56
			20	0.62	0.64	0.66
			30	0.59	0.59	0.65
			40	0.55	0.51	0.65
			50	0.51	0.47	0.61
		102V (85% Rated)	20	0.62	0.64	0.66
		138V (115% Rated)	20	0.61	0.64	0.66
Limit		5.0 ppm				
Test Results		PASS				

4.7. Maximum Transmitter Power

TEST APPLICABLE

Per FCC Part 2.1046 and Part 90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

Per RSS-119 Section 5.4 and 5.4.1: The output power shall be within ± 1.0 dB of the manufacturer's rated power. Typical transmitter output powers are 110 watts for base and/or fixed stations (paging transmitters excepted), and 30 watts for mobile stations. Higher powers may be certified, but it should be noted that mobile stations are normally only licensed up to 30 watts. See the SRSP relevant to the operating frequency for equipment power limits.

TEST PROCEDURE

Measurements shall be made to establish the radio frequency power delivered by the transmitter the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted below:

If the power output is adjustable, measurements shall be made for the highest and lowest power levels.

The EUT connect to the Receiver through 20 dB attenuator.

Measurement with Spectrum Analyzer conducted external power supply with 7.4 V stabilized supply voltage.

TEST CONFIGURATION

EUT		Attenuator		Spectrum Analyzer/Receiver

The EUT was directly connected to a RF Communication
Test set by a 20 dB attenuator

TEST RESULTS

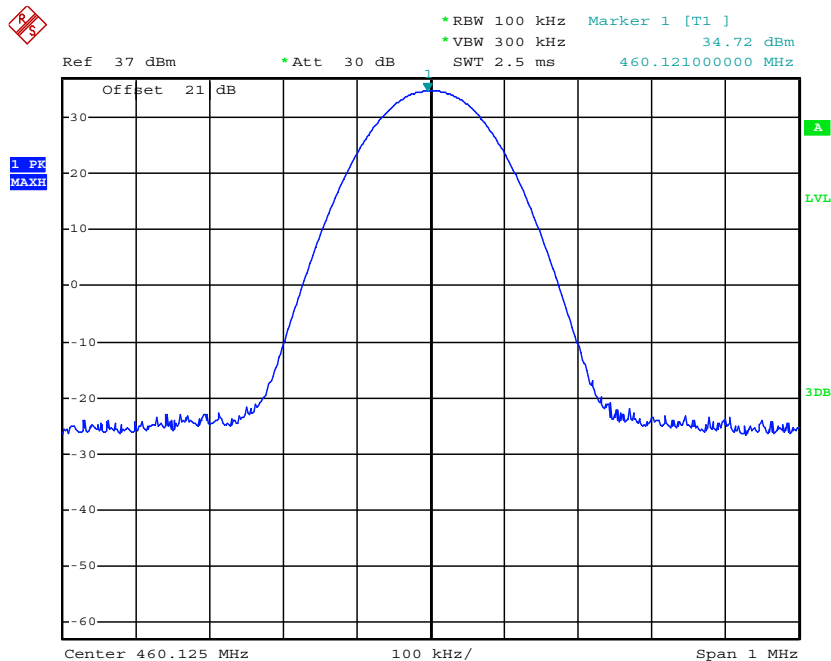
Remark:

1. We tested Op 1 to Op 8, recorded worst case at Op 1 to Op4 .

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Test Results (dBm)
Digital/GMSK	12.5KHz	Op 1	Ch1	460.125	34.72
			Ch2	465.125	34.74
			Ch3	469.125	34.78
		Op 2	Ch1	460.125	30.37
			Ch2	465.125	30.39
			Ch3	469.125	30.43
Digital/GMSK	25KHz	Op 3	Ch4	460.125	34.74
			Ch5	465.125	34.73
			Ch6	469.125	34.72
		Op 4	Ch4	460.125	30.34
			Ch5	465.125	30.33
			Ch6	469.125	30.10
Limit	The limit is dependent upon the station's antenna HAAT and required service area.				
Test Results		PASS			

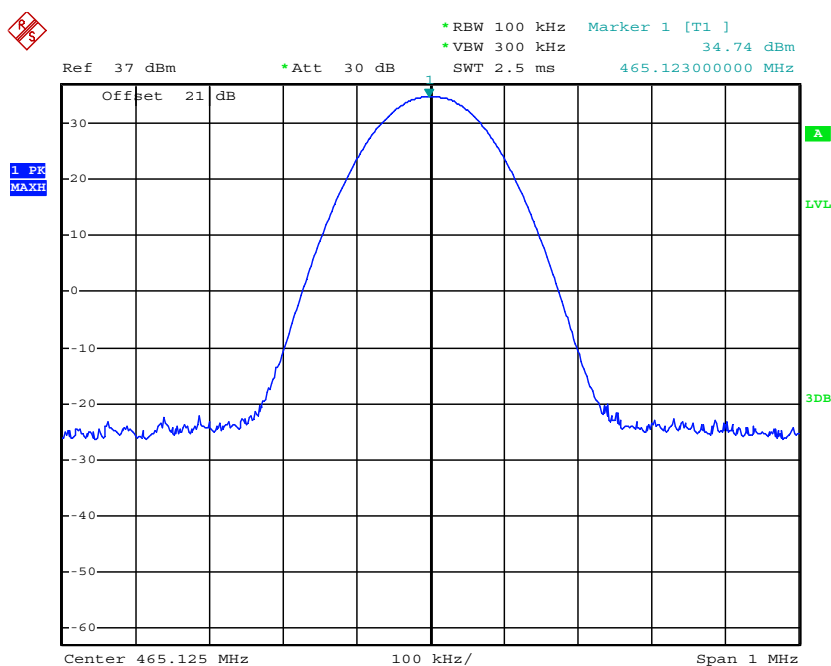
Plots of Transmitter Power Measurement

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	12.5KHz	Op 1	Ch1	460.125	3.0	34.72	Varies	PASS



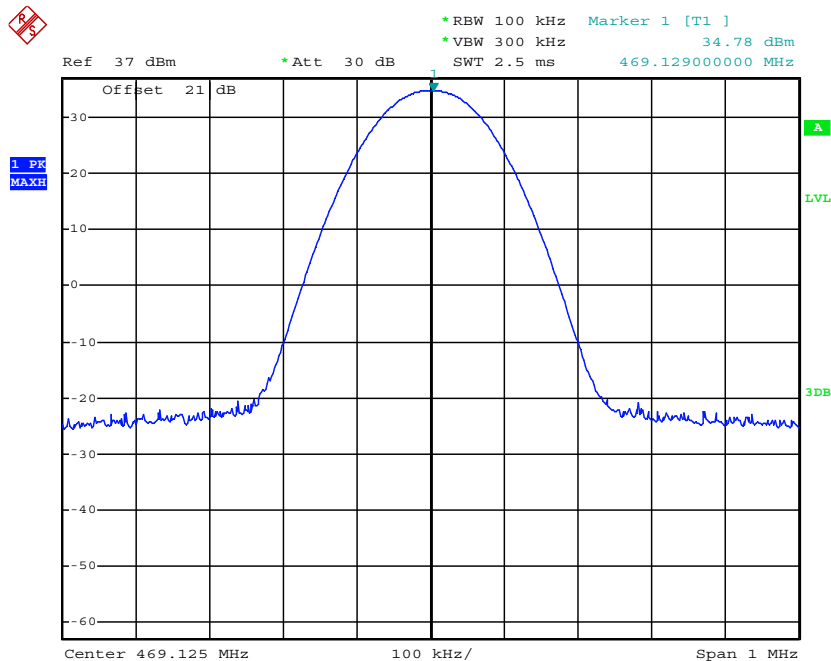
Date: 16.MAY.2016 14:32:16

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	12.5KHz	Op 1	Ch2	465.125	3.0	34.74	Varies	PASS



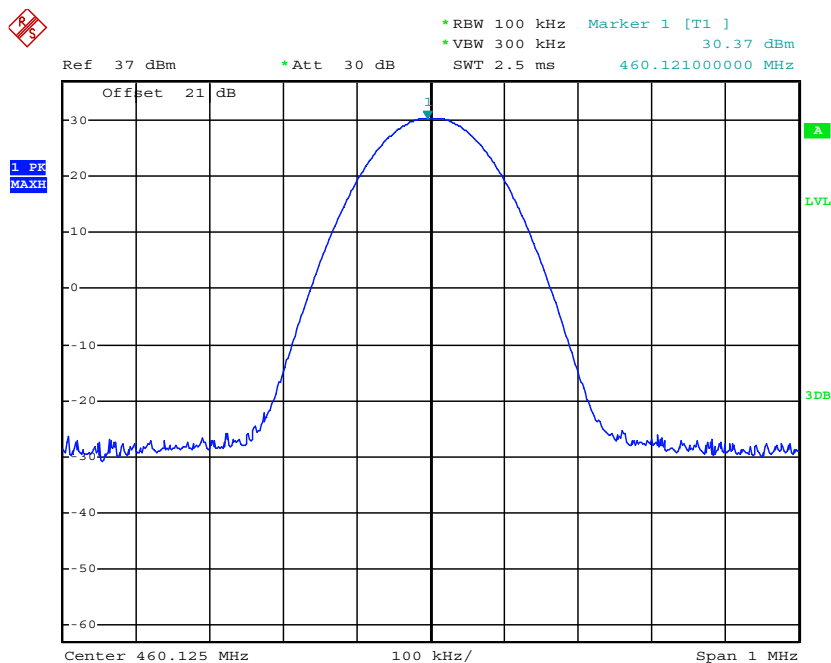
Date: 16.MAY.2016 14:31:45

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	12.5KHz	Op 1	Ch3	469.125	3.0	34.78	Varies	PASS



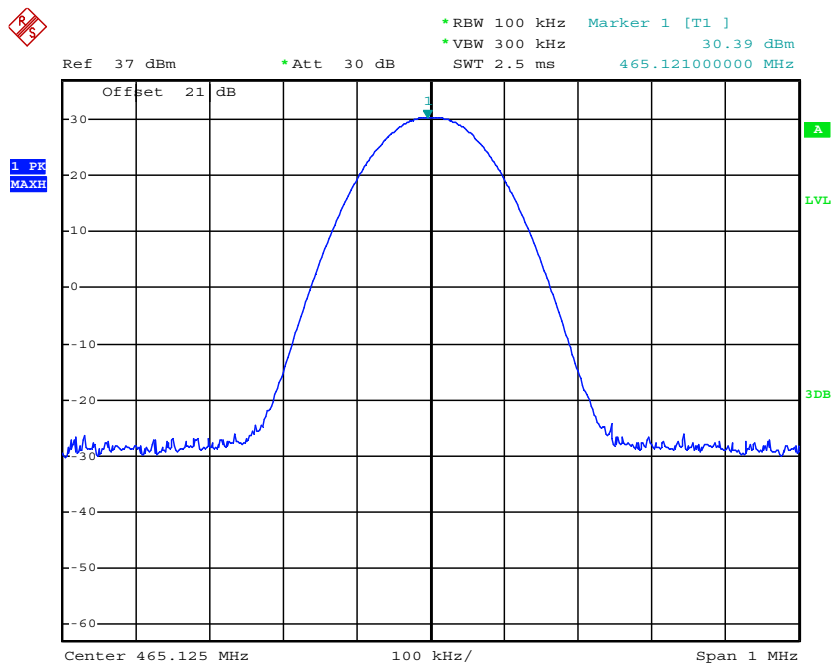
Date: 16.MAY.2016 14:31:15

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	12.5KHz	Op 2	Ch1	460.125	1	30.37	Varies	PASS



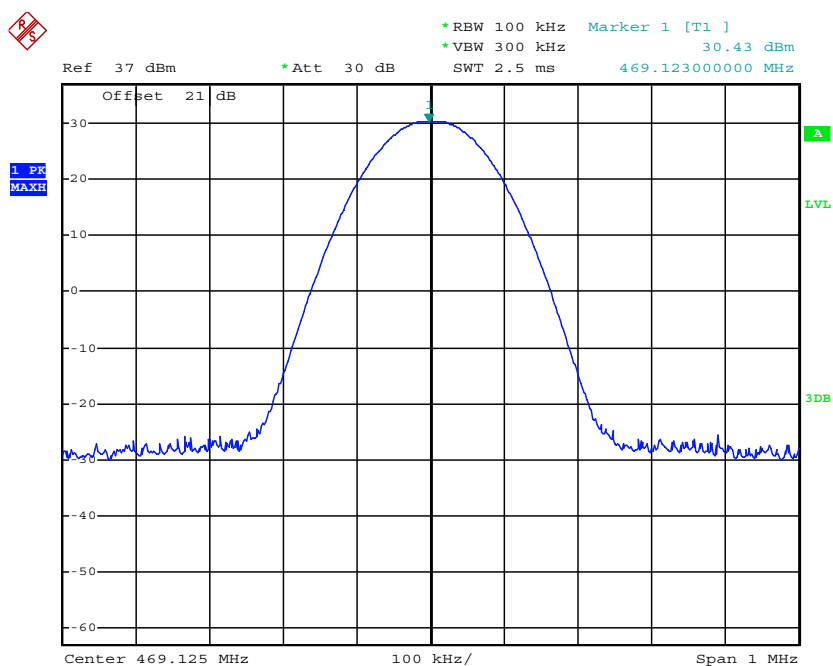
Date: 16.MAY.2016 14:33:11

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	12.5KHz	Op 2	Ch2	465.125	1	30.39	Varies	PASS



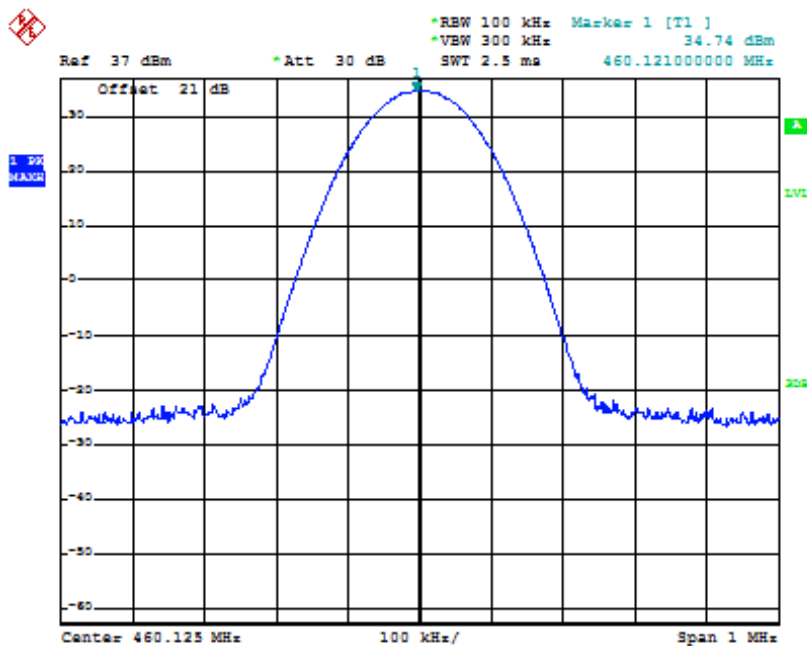
Date: 16.MAY.2016 14:33:35

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	12.5KHz	Op 2	Ch3	469.125	1	30.43	Varies	PASS



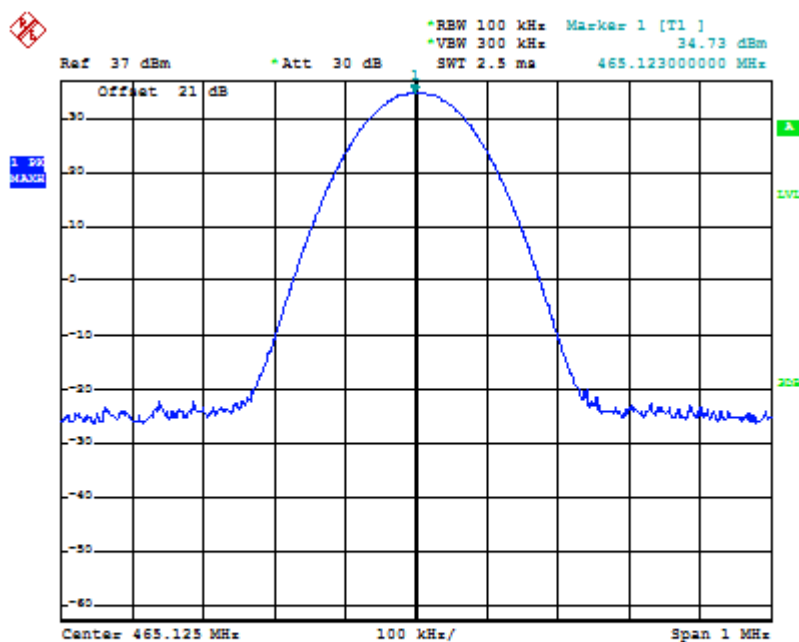
Date: 16.MAY.2016 14:33:54

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	25KHz	Op 3	Ch4	460.125	3.0	34.74	Varies	PASS



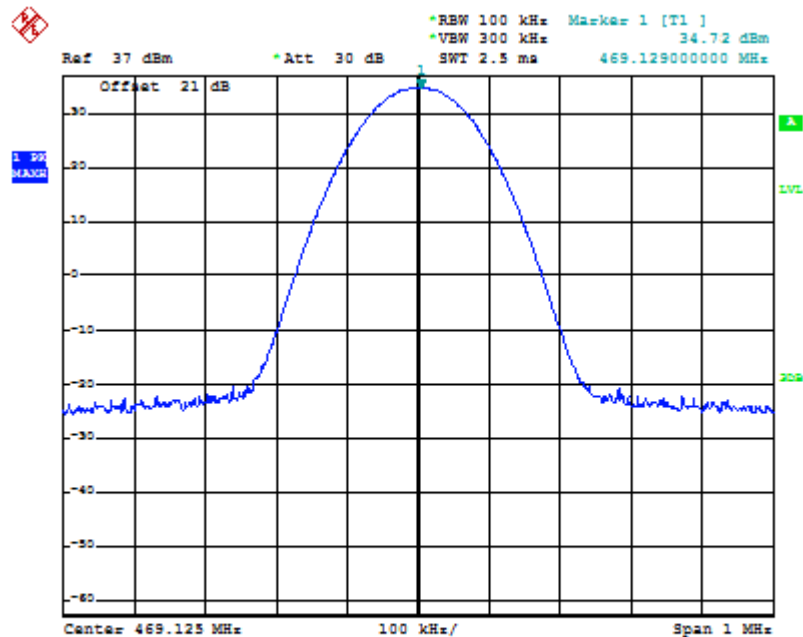
Date: 16.MAY.2016 14:36:16

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	25KHz	Op 3	Ch5	465.125	3.0	34.73	Varies	PASS



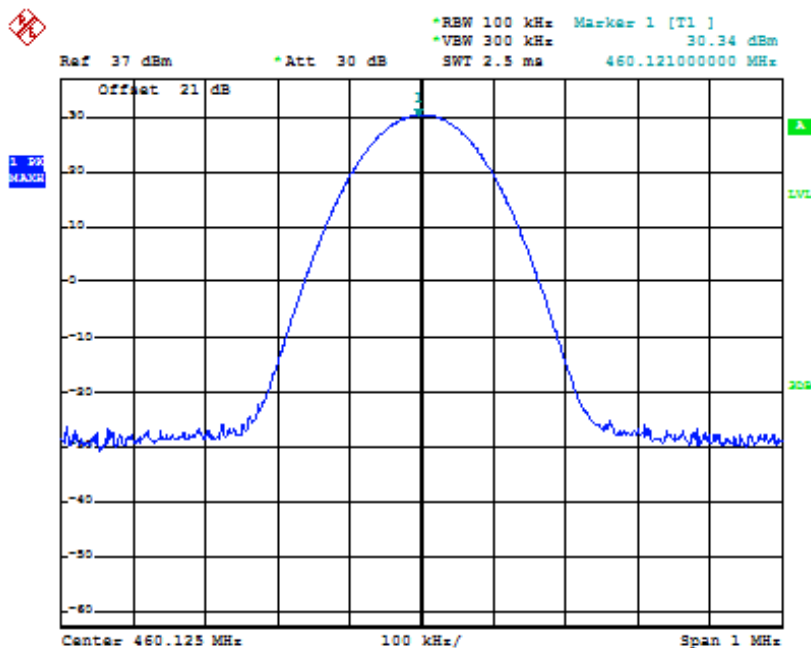
Date: 16.MAY.2016 14:41:45

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	25KHz	Op 3	Ch6	469.125	3.0	34.72	Varies	PASS



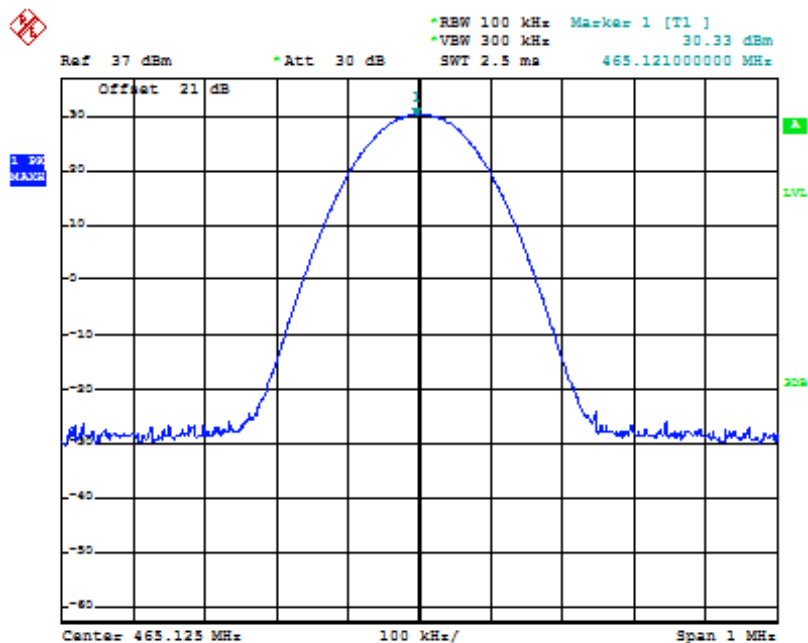
Date: 16.MAY.2016 14:21:15

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	25KHz	Op 4	Ch4	460.125	1	30.34	Varies	PASS



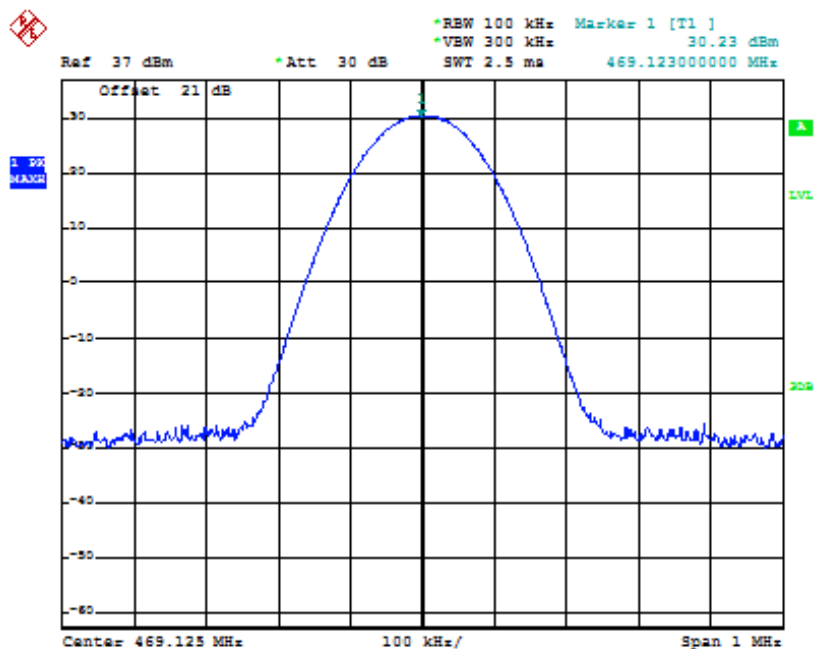
Date: 16.MAY.2016 14:36:11

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	25KHz	Op 4	Ch5	465.125	1	30.33	Varies	PASS



Date: 16.MAY.2016 14:35:35

Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Rated Power (Watt)	Measurement (dBm)	Limit	Results
GMSK	25KHz	Op 4	Ch6	469.125	1	30.10	Varies	PASS



Date: 16.MAY.2016 14:43:54

4.8. Transmitter Frequency Behavior

TEST APPLICABLE

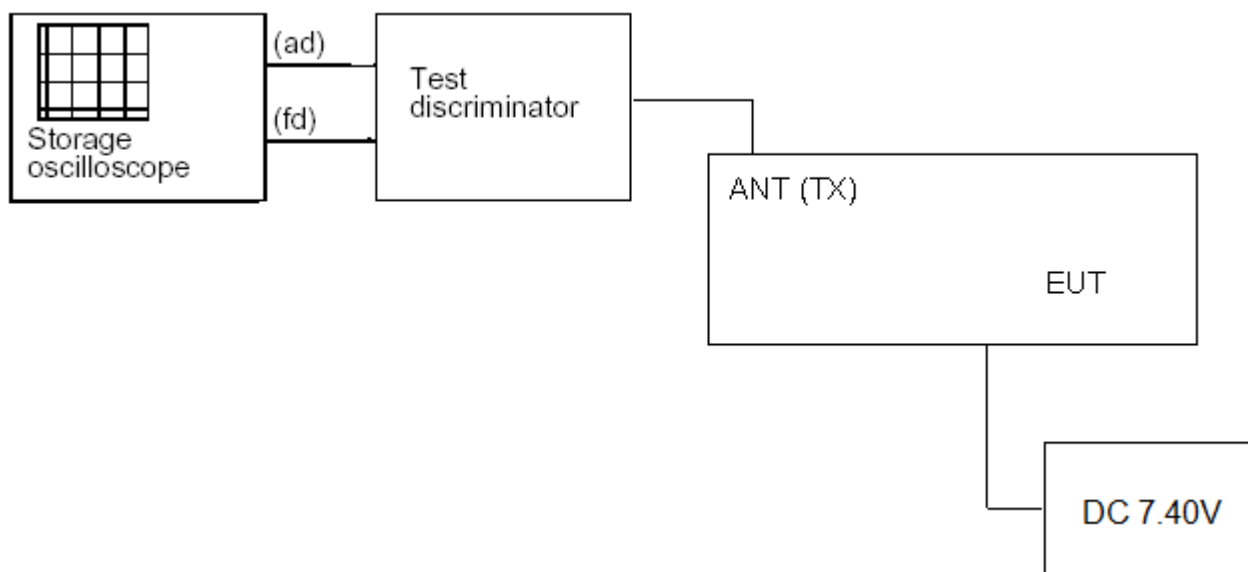
Section 90.214

Transient frequencies must be within the maximum frequency difference limits during the time intervals indicated:

Time intervals ^{1, 2}	Maximum frequency difference ³	All equipment	
		150 to 174 MHz	421 to 512MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 KHz Channels			
t ₁ ⁴	± 25.0 KHz	5.0 ms	10.0 ms
t ₂	± 12.5 KHz	20.0 ms	25.0 ms
t ₃ ⁴	± 25.0 KHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 KHz Channels			
t ₁ ⁴	± 12.5 KHz	5.0 ms	10.0 ms
t ₂	± 6.25 KHz	20.0 ms	25.0 ms
t ₃ ⁴	± 12.5 KHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 KHz Channels			
t ₁ ⁴	±6.25 KHz	5.0 ms	10.0 ms
t ₂	±3.125 KHz	20.0 ms	25.0 ms
t ₃ ⁴	±6.25 KHz	5.0 ms	10.0 ms

1. t_{on} is the instant when a 1 KHz test signal is completely suppressed, including any capture time due to phasing.
t₁ is the time period immediately following t_{on}.
t₂ is the time period immediately following t₁.
t₃ is the time period from the instant when the transmitter is turned off until t_{off}.
t_{off} is the instant when the 1 KHz test signal starts to rise.
2. During the time from the end of t₂ to the beginning of t₃, the frequency difference must not exceed the limits specified in § 90.213.
3. Difference between the actual transmitter frequency and the assigned transmitter frequency.
4. If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

TEST CONFIGURATION



TEST PROCEDURE

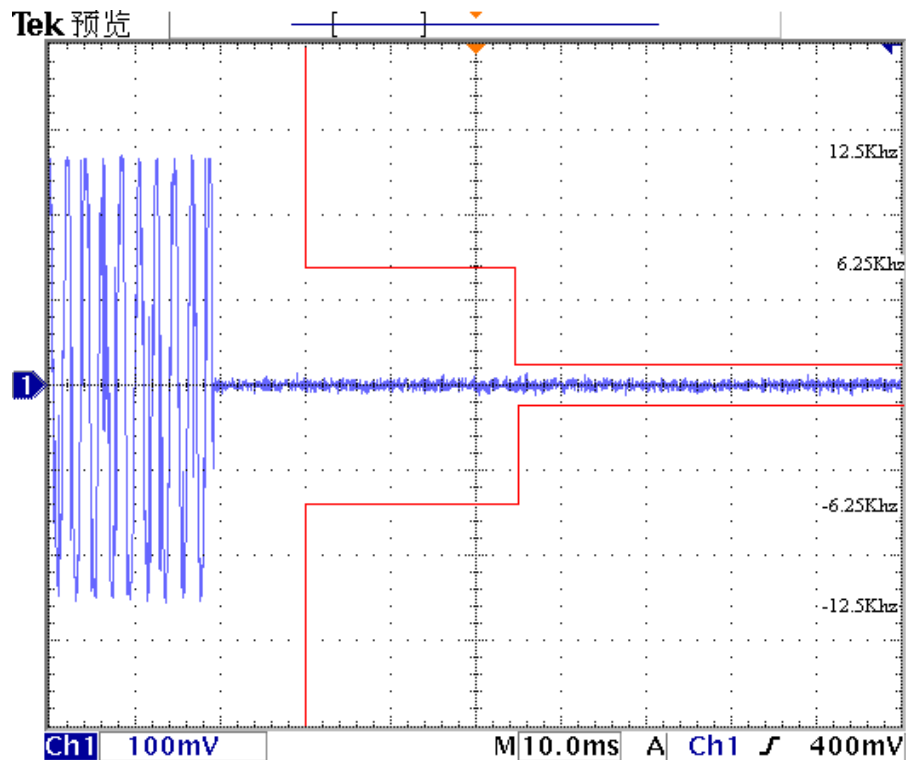
According to TIA/EIA-603 2.2.19 requirement.

TEST RESULTS

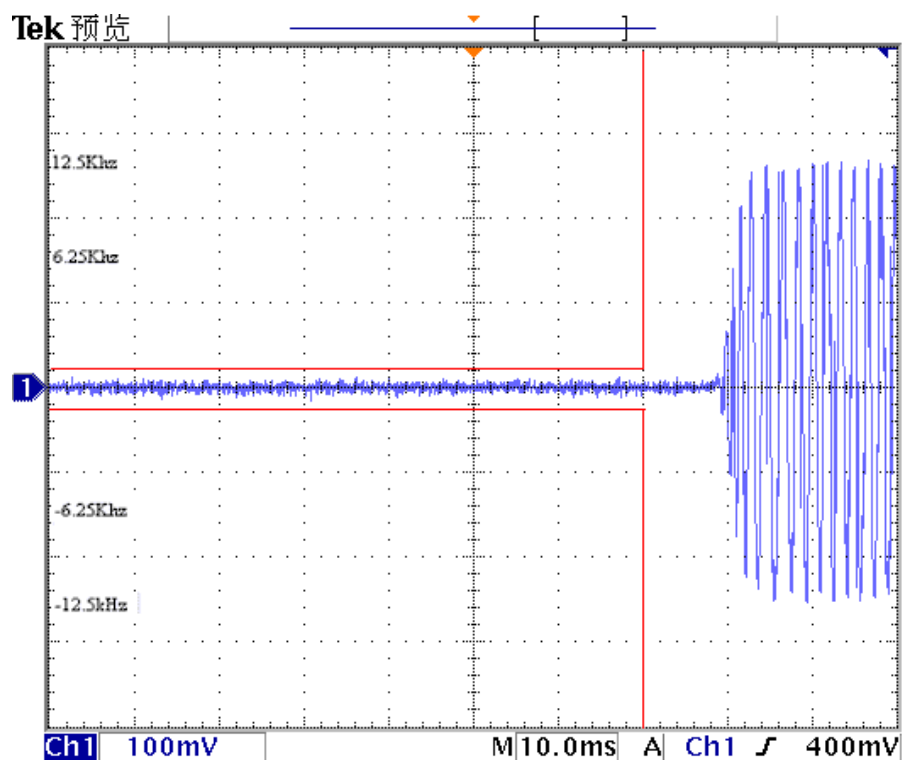
Please refer to the following plots.

Modulation Type: GMSK

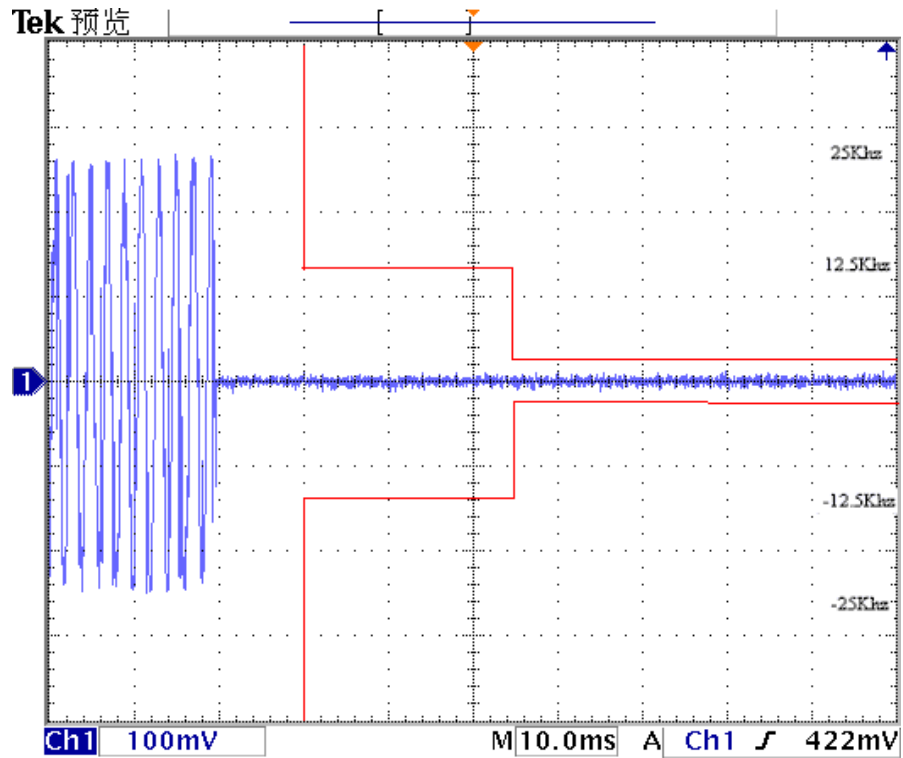
Transmitter Frequency Behavior @ 12.5 KHz Channel Separation-----Off – On



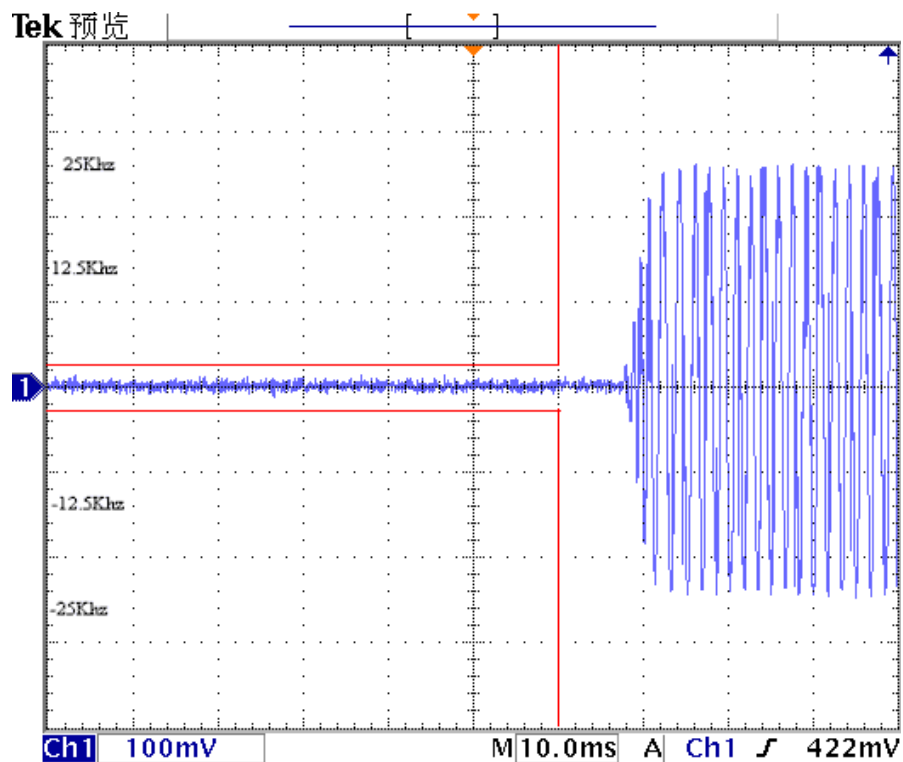
Transmitter Frequency Behavior @ 12.5 KHz Channel Separation-----On – Off



Transmitter Frequency Behavior @ 25 KHz Channel Separation-----Off – On



Transmitter Frequency Behavior @ 25 KHz Channel Separation-----On – Off



5. LIST OF MEASURING EQUIPMENT

AC Power Conducted Emission

Name of Equipment	Manufacturer	Model	Serial Number	Cal Date
Artificial Mains	MESS Tec	NNB-2/16Z	99079	June 18,2015
EMI Test Receiver	R&S	ESCS 30	100174	June 18,2015
EMI Test Software	Audix	E3	N/A	N/A
RF COMMUNICATION TEST SET	HP	8920A	3813A10245	June 19,2015

Modulation Characteristic

Name of Equipment	Manufacturer	Model	Serial Number	Cal Date
RF COMMUNICATION TEST SET	HP	8920A	3813A10245	June 19,2015

Frequency Stability

Name of Equipment	Manufacturer	Model	Serial Number	Cal Date
RF COMMUNICATION TEST SET	HP	8920A	3813A10245	June 19,2015
Signal Generator	Rohde&Schwarz	SMR40	10016	July 16, 2015
Climate Chamber	Giant Force	GTH-225-20-S	MAB0103-00	June 18,2015

Maximum Transmitter Power & Spurious Emission On Antenna Port & Occupied Bandwidth & Emission Mask

Name of Equipment	Manufacturer	Model	Serial Number	Cal Date
Receiver	Rohde&Schwarz	ESPI 7	125590	June 19,2015
RF COMMUNICATION TEST SET	HP	8920A	3813A10245	June 19,2015
High-Pass Filter	Anritsu	MP526B	6220875288	July 16, 2015
High-Pass Filter	Anritsu	MP526D	6220878442	July 16, 2015

Transient Frequency Behavior

Name of Equipment	Manufacturer	Model	Serial Number	Cal Date
Signal Generator	Rohde&Schwarz	SMR40	10016	July 16, 2015
Storage Oscilloscope	Tektronix	TDS3054B	B033154	July 17, 2015
RF COMMUNICATION TEST SET	HP	8920A	3813A10245	June 19,2015

Transmitter Radiated Spurious Emission

Name of Equipment	Manufacturer	Model	Serial Number	Cal Date
Receiver	Rohde&Schwarz	ESPI 7	125590	June 19,2015
EMI Test Software	Audix	E3	N/A	N/A
RF COMMUNICATION TEST SET	HP	8920A	3813A10245	June 19,2015
HORN ANTENNA	EMCO	3115	6741	June 10, 2015
HORN ANTENNA	EMCO	3115	6829	June 10, 2015
By-log Antenna	SCHWARZBECK	VULB9163	9163-470	June 10, 2015
By-log Antenna	SCHWARZBECK	VULB9163	9163-498	May 29, 2016
High-Pass Filter	Anritsu	MP526B	6220875288	July 16, 2015
High-Pass Filter	Anritsu	MP526D	6220878442	July 16, 2015

The calibration interval was one year.

.....The End of Report.....