FCC PART 90

TEST REPORT

For

Comba Telecom Ltd.

611 East Wing, No. 8 Science Park West Avenue, Hk

FCC ID: PX8RH-7W22-R

Report Type:	Product Type:
Original Report	700/800MHz Public Safety Distributed Antenna System

Report Number:	RSZ171031010-00B
Report Date:	2018-03-13
Reviewed By:	Rocky Kang RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third 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 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 are marked with an asterisk "*".

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Comba Telecom Ltd.'s* product, model number: *RH-7W22-R (FCC ID: PX8RH-7W22-R) in* this report is a *700/800MHz Public Safety Distributed Antenna System*, which was measured approximately: 570 mm (L)*390 mm (W)*215 mm (H), rated with input voltage: DC -48 V.

Note: *This series products model: RH-7W22-R-AC and RH-7W22-R are identical; they have the same or similar appearance, structure, PCB, Material and function to the testing products, Model RH-7W22-R was selected for fully testing, the detailed information can be referred to the attached declaration which was stated and guaranteed by the applicant*.

Operating Frequency Range for RU:

Modulation Type	700 Downlink (RU)	800 Downlink (RU)	Equipment Class
FM 12.5K	769-775 MHz	851-862 MHz	B9A
FM 25K	769-775 MHz	851-862 MHz	B9A
C4FM	769-775 MHz	851-862 MHz	B9A

** All measurement and test data in this report was gathered from production sample serial number: 17023761. (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2017-10-31.*

Objective

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

Related Submittal(s)/Grant(s)

FCC Part 90 B9A, Part of system submissions with FCC ID: PX8RH-7W22-D.

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 Part 90.219 – Use of signal boosters, and KDB 935210 D05 Indus Booster Basic Meas v01r02 Measurement Guidance for Industrial and Non-consumer Signal Booster, Repeater, and Amplifier Devices.

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

Measurement Uncertainty

Parameter	uncertainty
Occupied Channel Bandwidth	±5%
Input/output power and amplifier gain	±1.5dB
Unwanted Emission, conducted	±1.5dB
Radiated Emissions Below 1GHz	±4.70dB
Radiated Emissions Above 1GHz	±4.80dB
Internodulation	±1.5dB
Noise Figure Measurements	±1.5dB
Temperature	±1℃
Supply voltages	±0.4%

Test Facility

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

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 382179,the FCC Designation No. : CN5001.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

EUT Exercise Software

No exercise software was used.

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

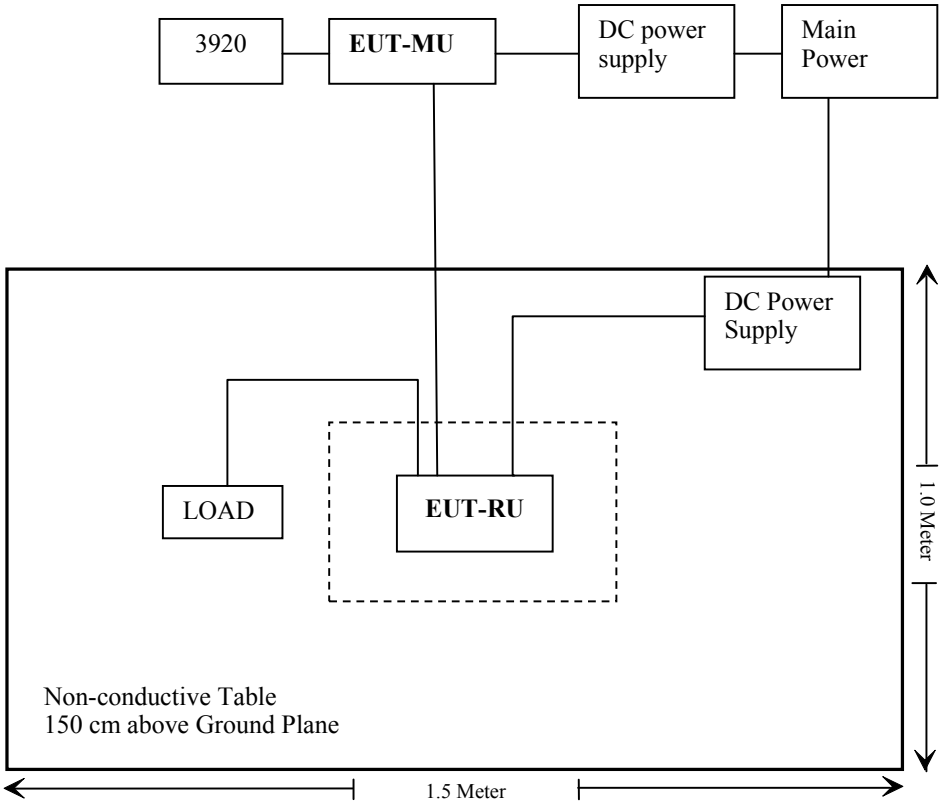
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
GW instek	DC power supply	GPS-3030DD	EM832096
Agilent	Digital Radio Tester	3920	100636779
Comba	700/800MHz Public Safety Distributed Antenna System-MU	RH-7W22-D	N/A
N/A	Load	N/A	N/A

External I/O Cable

Cable Description	Length (m)	From Port	To
Unshielded Un-Detachable DC Cable	1.5	DC Power Supply	EUT
Fiber Optic Cable	2.0	MU	RU
Shielded Detachable RF Cable	1.2	RU	load

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§1.1307 (b)(1), §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§90.219 (e)(1)	Input/Output Power And Amplifier Gain	Compliance
§90.219 (e)(4)(ii)	Input-Versus-Output Signal Comparison: Occupied Bandwidth	Compliance
§90.219 (e)(4)(iii), §90.210	Emission Mask	Compliance
§90.219 (d)(6)	Intermodulation	Compliance
§90.219 (e)(3)	Spurious Emissions At Antenna Terminals	Compliance
§90.219 (e)(3)	Radiated Spurious Emission	Compliance
§90.219 (e)(2)	Noise Figure Measurements	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2014-12-29	2017-12-28
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2017-04-24	2018-04-24
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-17	2017-12-16
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2017-05-21	2018-05-21
HP	Amplifier	HP8447E	1937A01046	2017-11-19	2018-05-21
Agilent	3920 Digifal Radio Tester	3920	100636779	2017/07/21	2018-07-21
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2016-12-07	2017-12-07
COM POWER	Dipole Antenna	AD-100	041000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	104PEA	218124002	Each time	
Ducommun technologies	RF Cable	RG-214	1	Each time	
Ducommun technologies	RF Cable	RG-214	2	Each time	
RF Conducted Test					
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200120	2016-12-05	2017-12-05
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200120	2017-12-05	2018-12-05
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
Agilent	3920 DIgifal Radio Tester	3920	100636779	2017/07/21	2018-07-21
R&S	Wideband Radio Communication tester	CMW500	1201.002K50-146520-wh	2017-04-24	2018-04-24
Ducommun technologies	RF Cable	RG-214	3	Each time	
Ducommun technologies	RF Cable	104PEA	218124002	Each time	
WEINSCHEL	10dB Attenuator	5324	AU0709	2017-06-15	2018-06-15

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

FCC§1.1307 (b)(1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	$*180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For Occupational/controlled exposure:

Frequency (MHz)	Antenna Gain		Max Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
769-775	4	2.51	33	2000	20	1.0	2.56
851-862	4	2.51	33	2000	20	1.0	2.84

Radiation Exposure Statement:

To comply with FCC RF exposure requirements, a minimum separation distance of 20cm is required between the antenna and all public persons， and the available max antenna gain must not exceed 4 dBi

FCC §90.219 (e)(1) - INPUT/OUTPUT POWER AND AMPLIFIER GAIN

Applicable Standard

FCC §2.1046 and §90.219 (e)(1)
The output power capability of a signal booster must be designed for deployments providing a radiated power not exceeding 5 Watts ERP for each retransmitted channel

Test Procedure

Conducted RF Output Power:

The signal generator was connected to EUT-MU, and RF output of the EUT-RU was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

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

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Vincent Zheng on 2017-11-10.

Test Mode: Transmitting

Test Result: Compliance. Please refer to following table.

Band (MHz)	Frequency (MHz)	AGC threshold (dBm)	Input Power (dBm)	Conducted Output Power (dBm)	Max Gain (dBi)	Max Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Results
769-775	769.00625	-62.5	-62.5	32.63	95.13	4.00	34.48	37	pass
		AGC+3	-59.5	32.54	92.04	4.00	34.39	37	pass
	772.00625	-62.5	-62.5	32.10	94.60	4.00	33.95	37	pass
		AGC+3	-59.5	32.43	91.93	4.00	34.28	37	pass
	774.99375	-62.5	-62.5	32.21	94.71	4.00	34.06	37	pass
		AGC+3	-59.5	32.19	91.69	4.00	34.04	37	pass
851-862	851.00625	-63	-63	32.58	95.58	4	34.43	37	pass
		AGC+3	-60	32.68	92.68	4	34.53	37	pass
	856.50000	-63	-63	32.81	95.81	4	34.66	37	pass
		AGC+3	-60	32.90	92.90	4	34.75	37	pass
	861.99375	-63	-63	32.82	95.82	4	34.67	37	pass
		AGC+3	-60	32.85	92.85	4	34.70	37	pass

Note: ERP= Measured Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 (dB)
Limit=5 W=37 dBm

FCC §90.219 (e)(4)(ii) –INPUT-VERSUS-OUTPUT SIGNAL COMPARISON: OCCUPIED BANDWIDTH

Applicable Standard

According to FCC §90.219 (e)(4)(ii), There is no change in the occupied bandwidth of the retransmitted signals.

Test Procedure

Test Method: KDB 935210 D05 Indus Booster Basic Meas v01r02 section 4.4

Test Data

Environmental Conditions

Temperature:	25~26 ℃
Relative Humidity:	55~56 %
ATM Pressure:	101.0~101.5 kPa

The testing was performed by Vincent Zheng on 2017-11-08 to 2017-11-28.

Test Mode: Transmitting

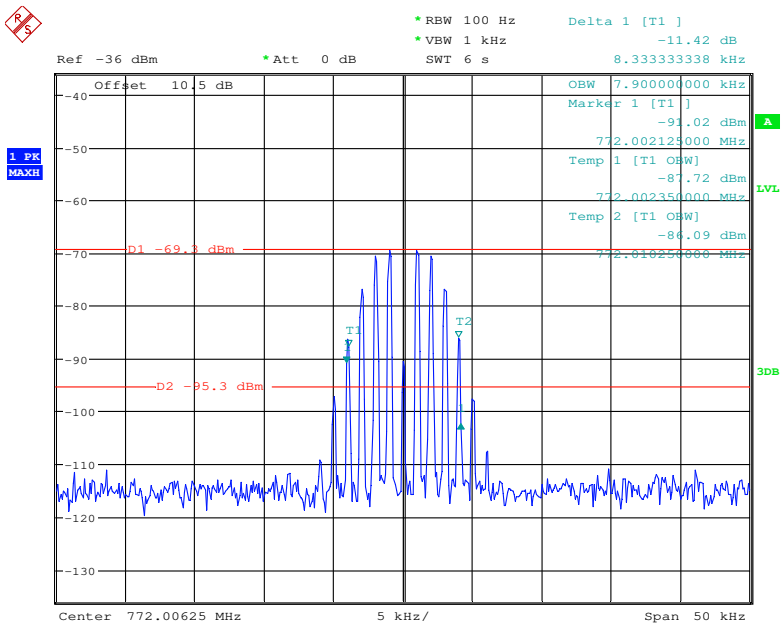
Please refer to the following tables and plots.

Signal Type	Frequency (MHz)	Input Signal Level	Input		Output	
			99% OBW (kHz)	26db Band width (kHz)	99% OBW (kHz)	26db Band width (kHz)
FM 12.5k	772.00625	AGC	7.90	8.33	7.90	8.32
		AGC+3 dB	7.90	8.25	7.90	8.24
	860.00625	AGC	7.90	8.32	7.90	8.29
		AGC+3 dB	7.90	8.24	7.90	8.29
FM 25k	772.00625	AGC	12.48	14.58	12.36	14.57
		AGC+3 dB	12.48	14.58	12.36	14.57
	860.00625	AGC	12.48	14.84	12.36	14.73
		AGC+3 dB	12.48	14.65	12.12	14.73
C4FM	772.00625	AGC	7.61	9.62	7.37	9.81
		AGC+3 dB	7.53	9.70	7.45	9.89
	860.00625	AGC	7.61	9.86	7.69	9.70
		AGC+3 dB	7.61	9.86	7.69	9.86

Note: Input signal level refer to the result of item: Input/output power and amplifier gain

FM 12.5K:

Frequency: 772.00625 MHz, 99% Occupied & 26 dB Bandwidth AGC Input



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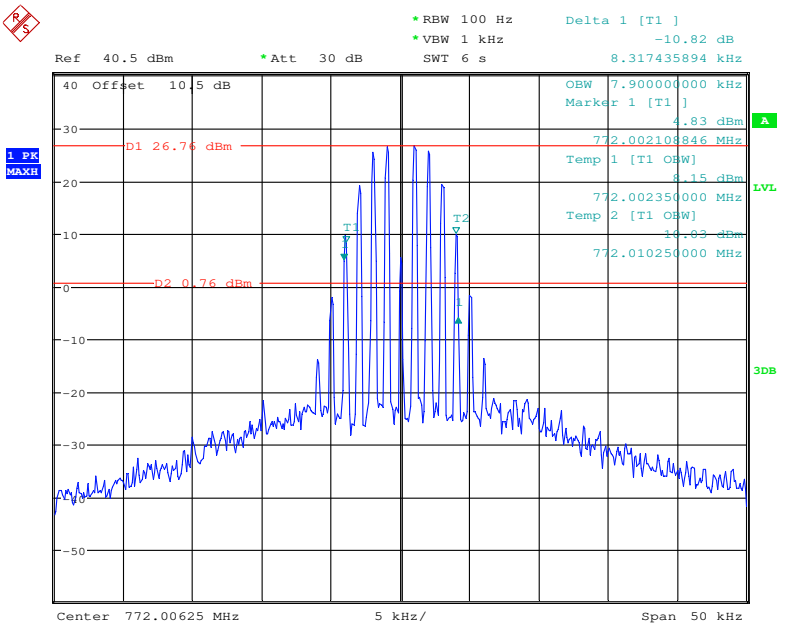

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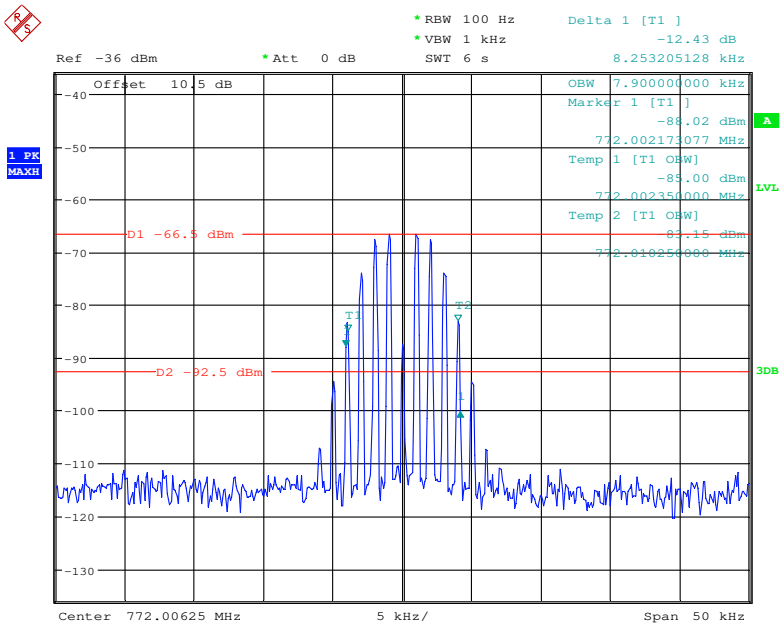
Frequency: 772.00625 MHz, 99% Occupied & 26 dB Bandwidth AGC+3 Input



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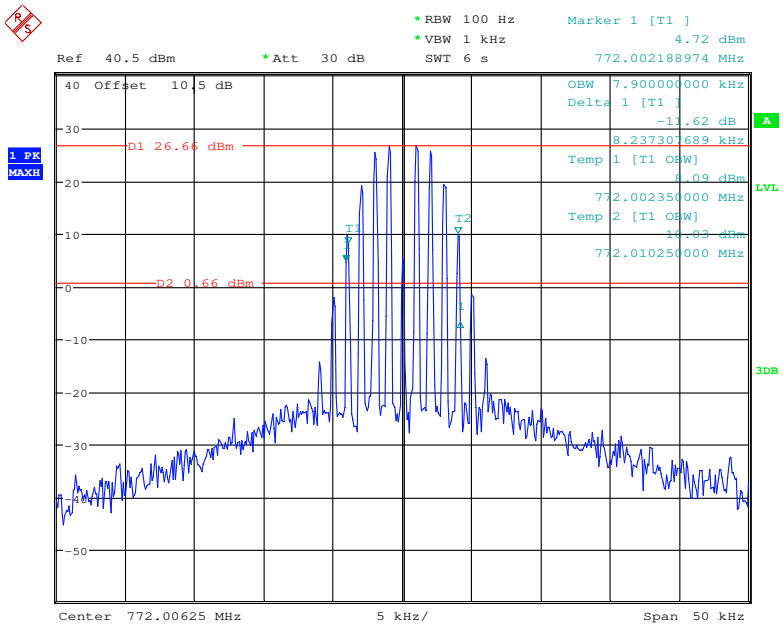

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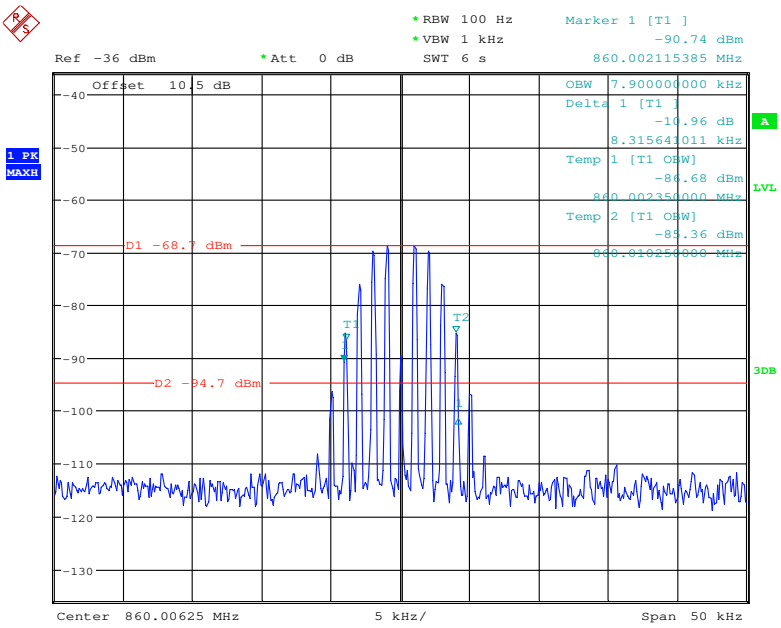
Frequency: 860.00625 MHz, 99% Occupied & 26 dB Bandwidth AGC Input



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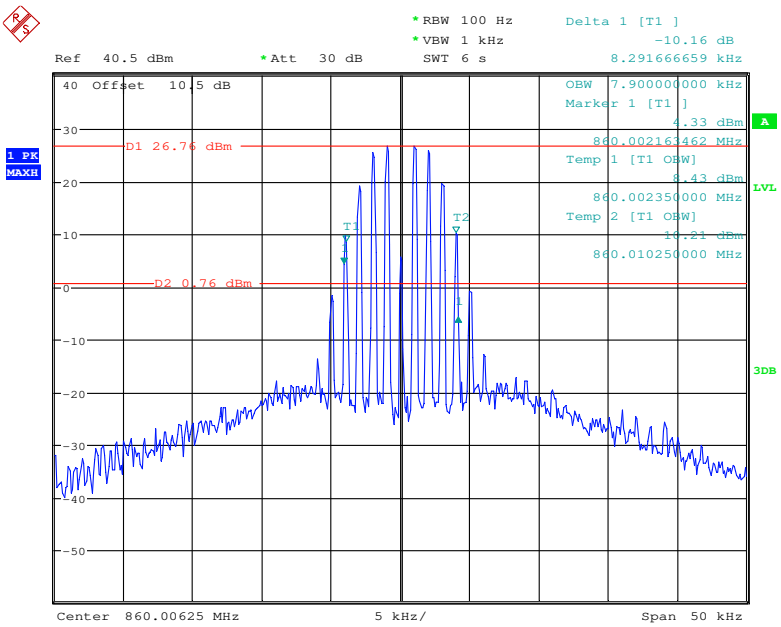

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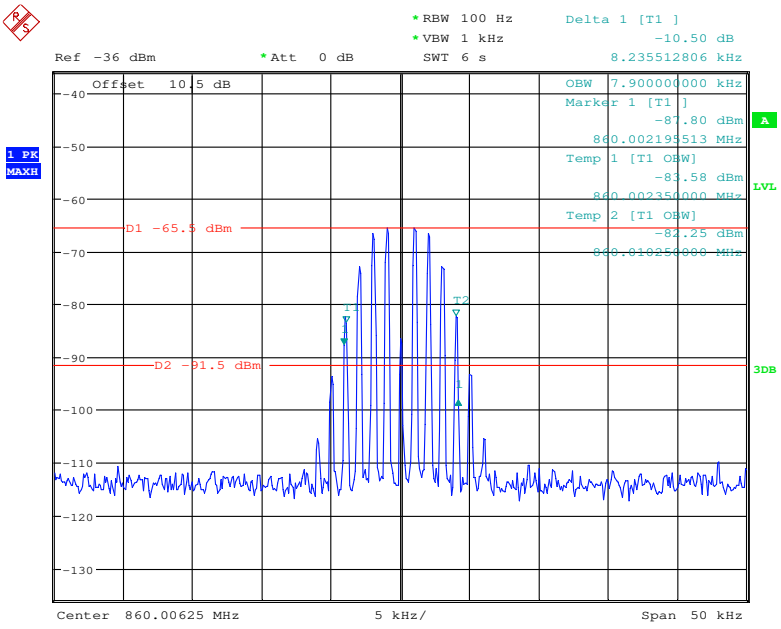

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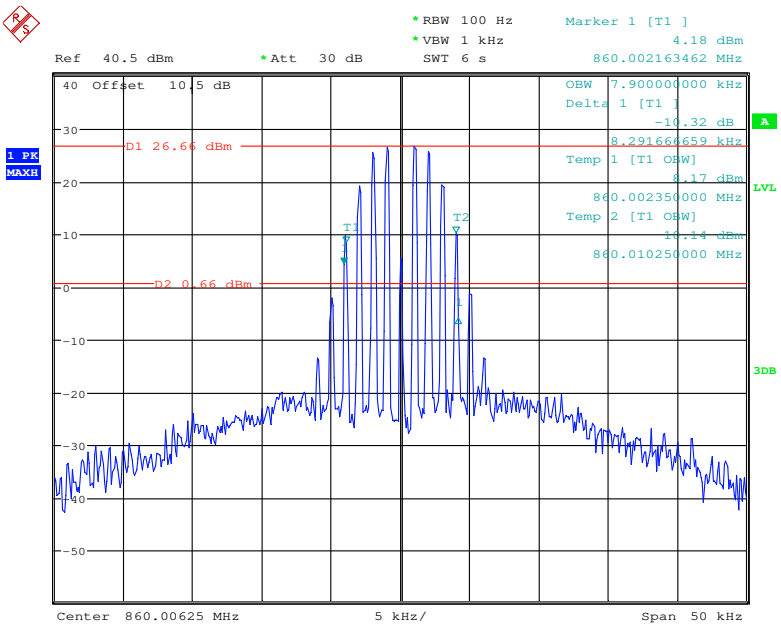

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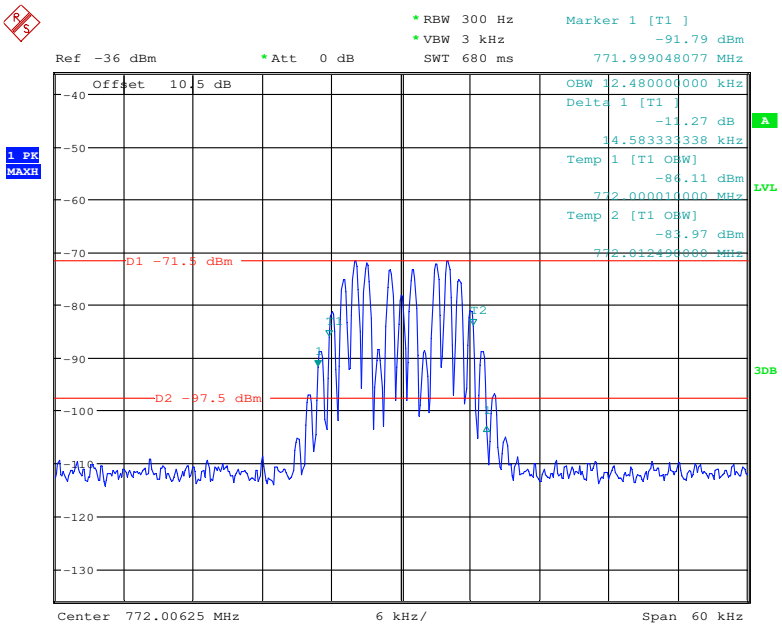
FM 25K:

Frequency: 772.00625 MHz, 99% Occupied & 26 dB Bandwidth AGC Input



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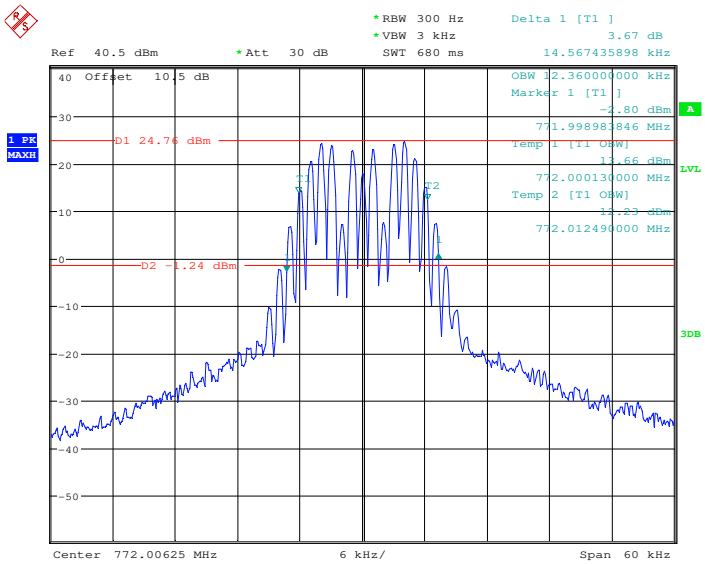

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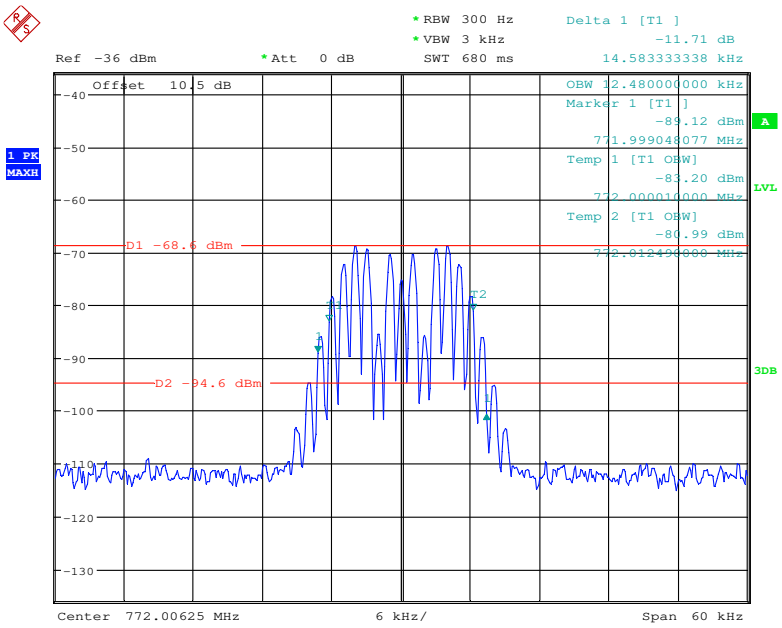

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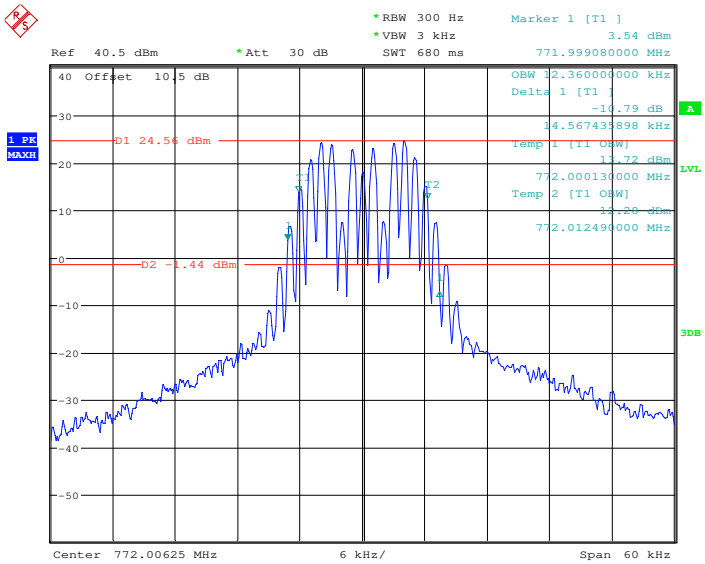

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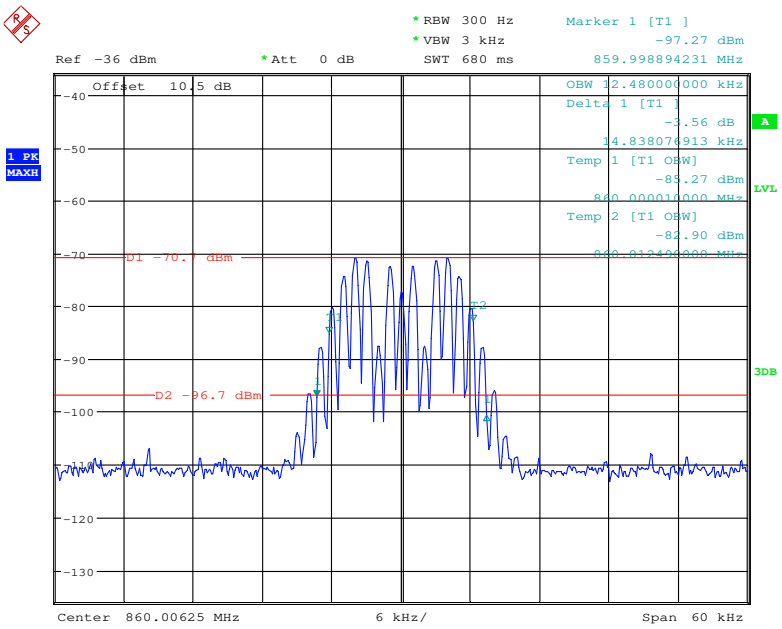

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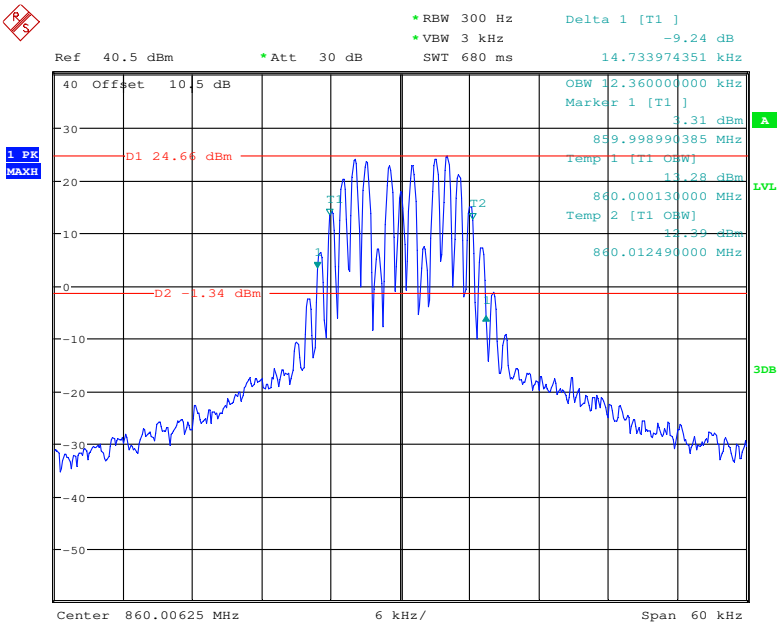

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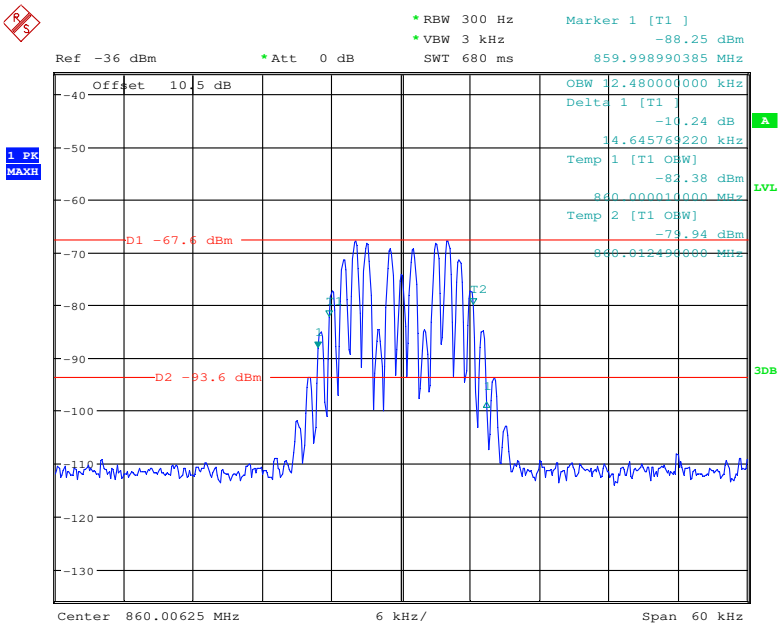

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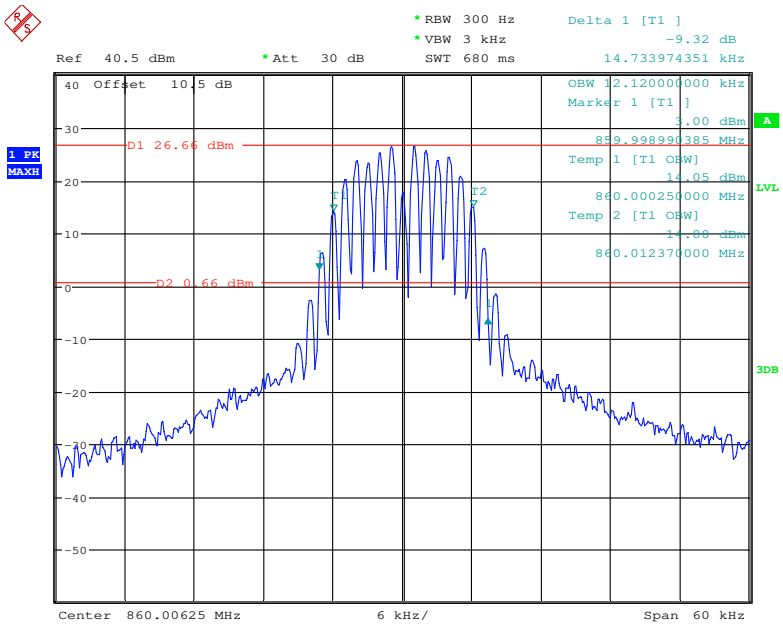

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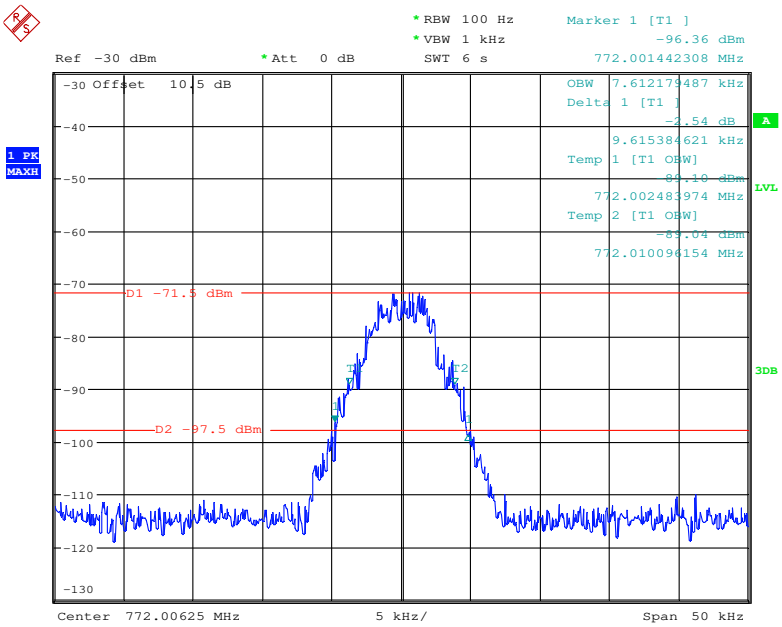
C4FM:

Frequency: 772.00625 MHz, 99% Occupied & 26 dB Bandwidth AGC Input



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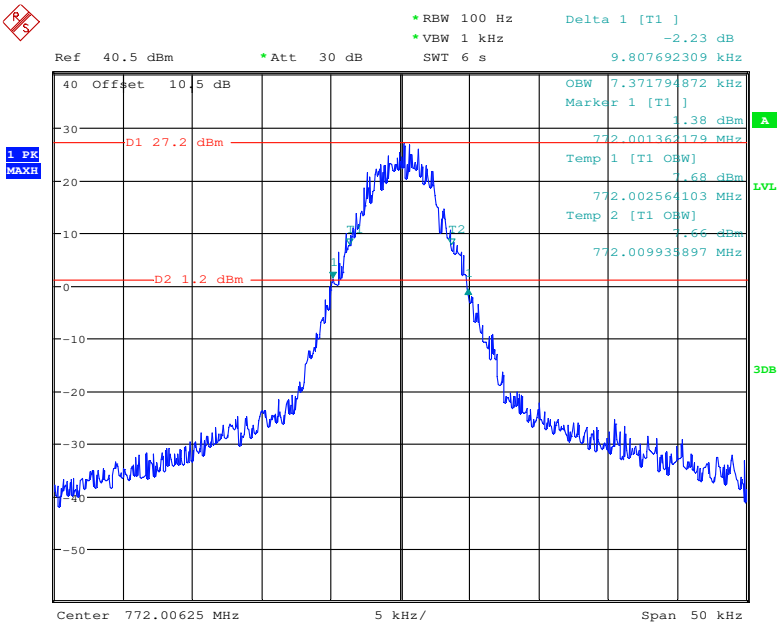

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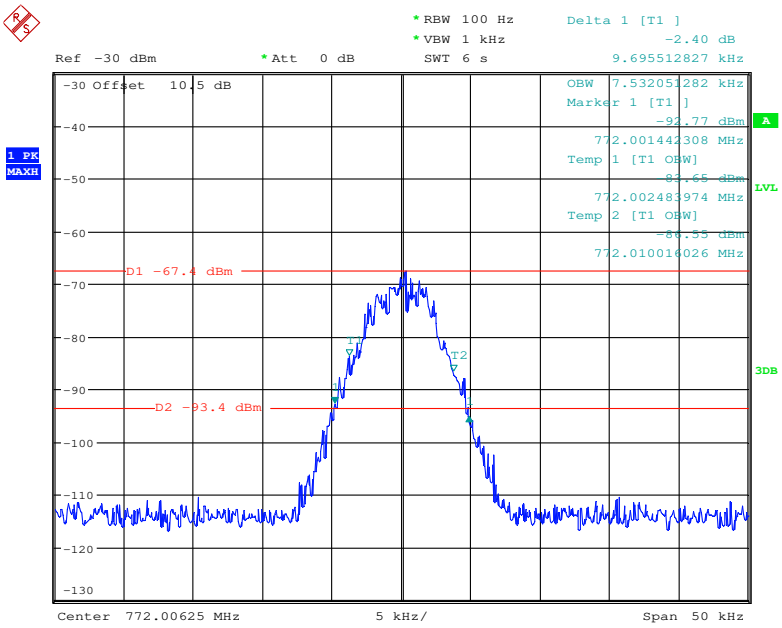

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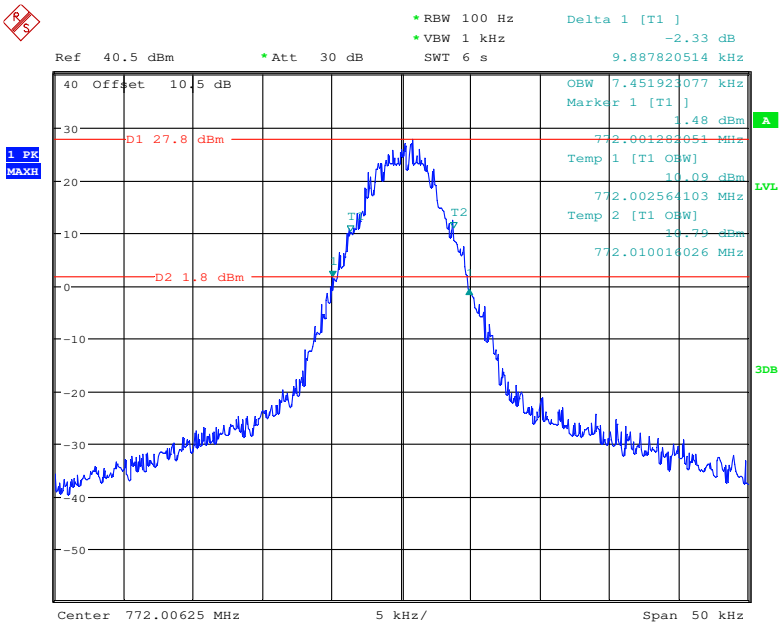

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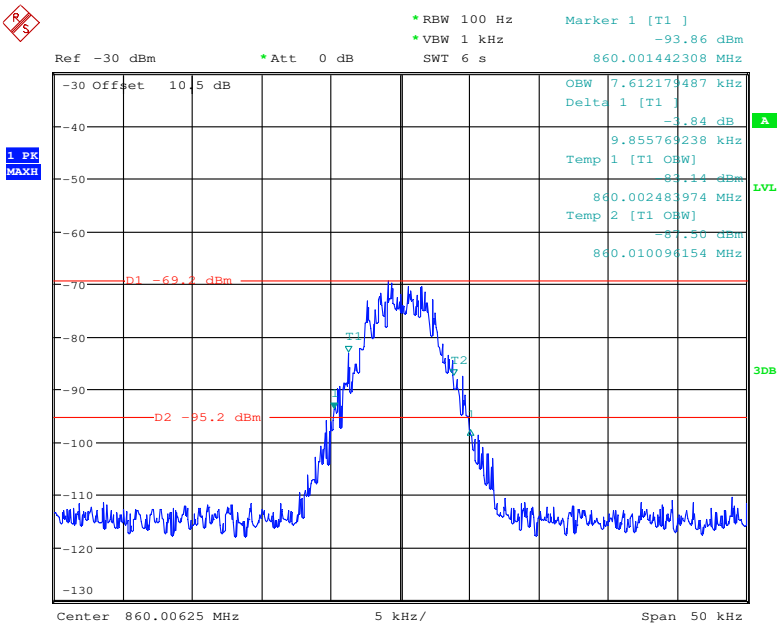

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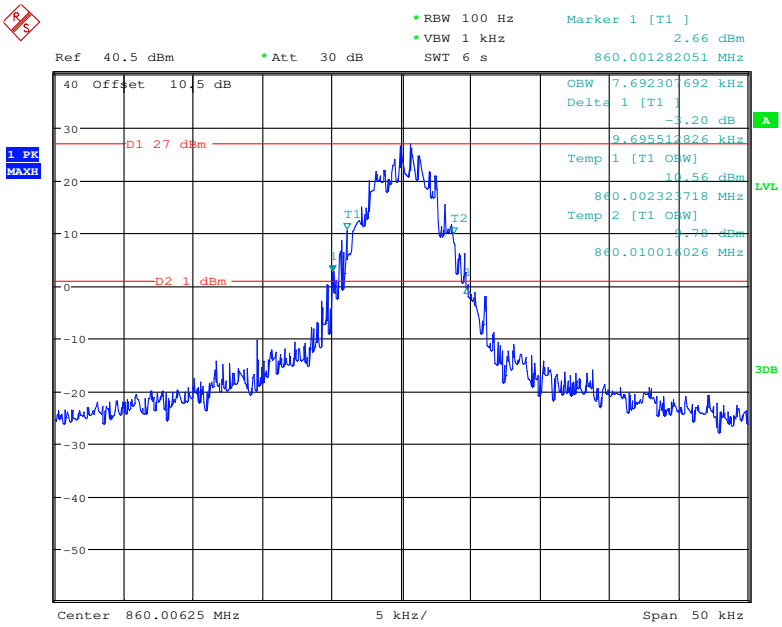
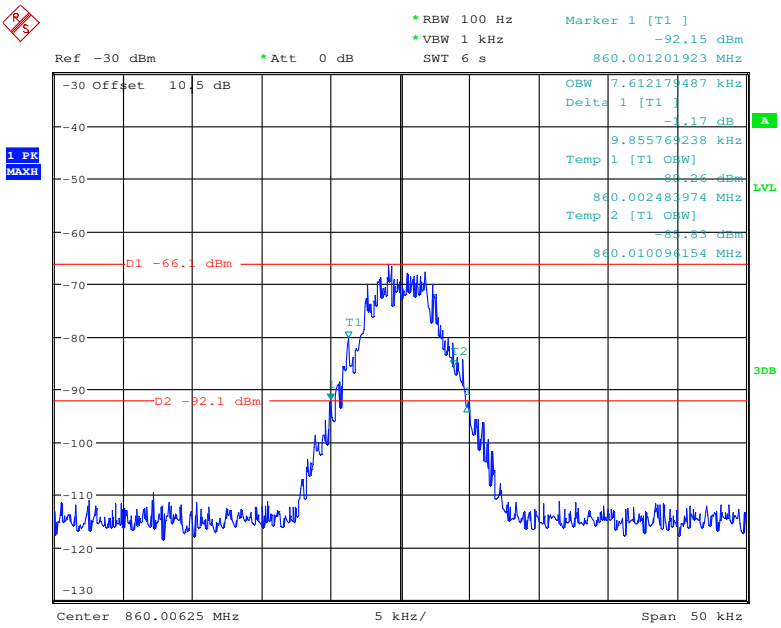


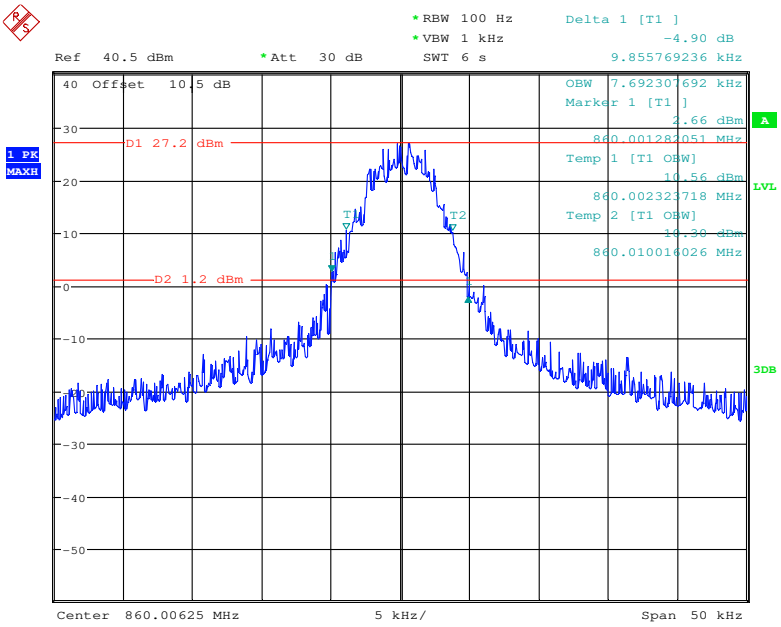
Date: 28.NOV.2017 14:40:24

Frequency: 860.00625 MHz, 99% Occupied & 26 dB Bandwidth AGC+3 Input



Date: 28.NOV.2017 13:51:32

Frequency: 860.00625 MHz, 99% Occupied & 26 dB Bandwidth AGC+3 Output



Date: 28.NOV.2017 14:41:35

FCC §90.219 (e)(4)(iii) & §90.210 –EMISSION MASK

Applicable Standard

FCC §90.219 (e)(4)(iii) and §90.210

The retransmitted signals continue to meet the unwanted emissions limits of §90.210 applicable to the corresponding received signals (assuming that these received signals meet the applicable unwanted emissions limits by a reasonable margin)

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
Below 25[1]	A or B	A or C
25-50	B	C
72-76	B	C
150-174[2]	B, D, or E	C, D or E
150 paging only	B	C
220-222	F	F
421-512[2 5]	B, D, or E	C, D, or E
450 paging only	B	G
806-809/851-854[6]	B	H
809-824/854-869[3 5]	B	G
896-901/935-940	I	J
902-928	K	K
929-930	B	G
4940-4990 MHz	L or M	L or M
5850-5925[4]		
All other bands	B	C

Emission Mask C. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least 83 log (f_d/5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (f_d^2/11) dB or 50 dB, whichever is the lesser attenuation;

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

Emission Mask G. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least 116 log (f_d/6.1) dB, or 50 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation;

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

Emission Mask H. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4 kHz or less: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least 107 log (f_d/4) dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least 40.5 log (f_d/1.16) dB;

(4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least 116 log (f_d/6.1) dB;

(5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least 43 + 10 log (P) dB.

Test Procedure

Test Method: KDB 935210 D05 Indus Booster Basic Meas v01r02 section 4.4

The nominal RBW shall be 300 Hz for 16K0F3E, and 100 Hz for all other emissions types

Test Data

Environmental Conditions

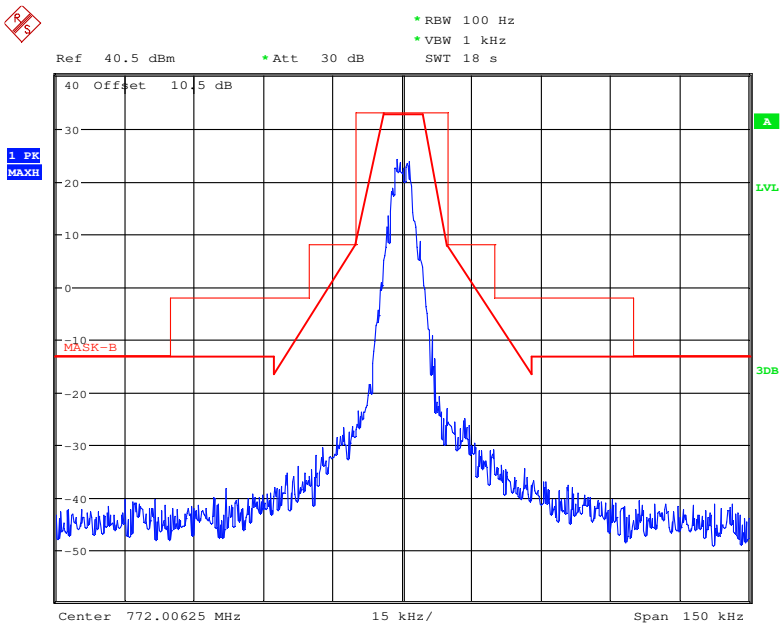
Temperature:	25~26 ℃
Relative Humidity:	54~55 %
ATM Pressure:	101.0~101.5 kPa

The testing was performed by Vincent Zheng from 2017-11-11 to 2018-01-26.

Note: the input signal level “AGC” refer to the testing item Output power&Maximum gain.

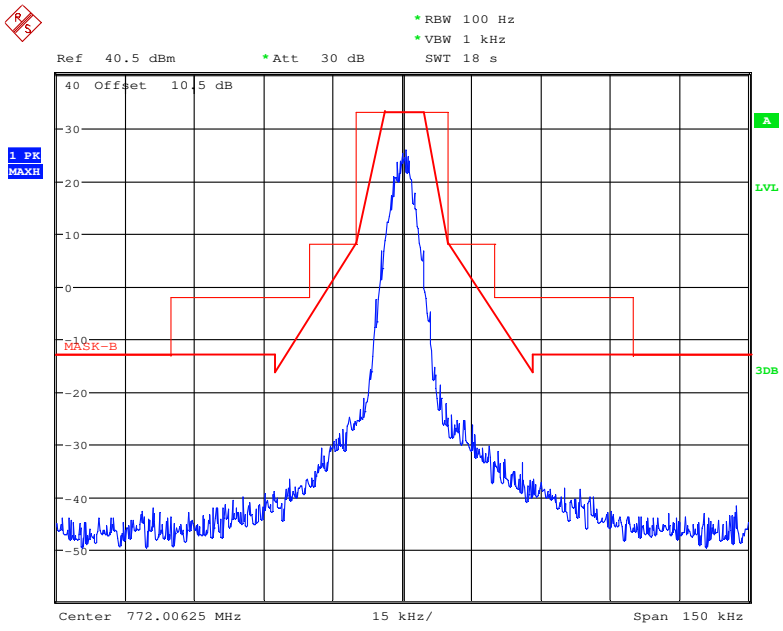
C4FM:

Frequency 772.00625 MHz: Emission Mask C, AGC



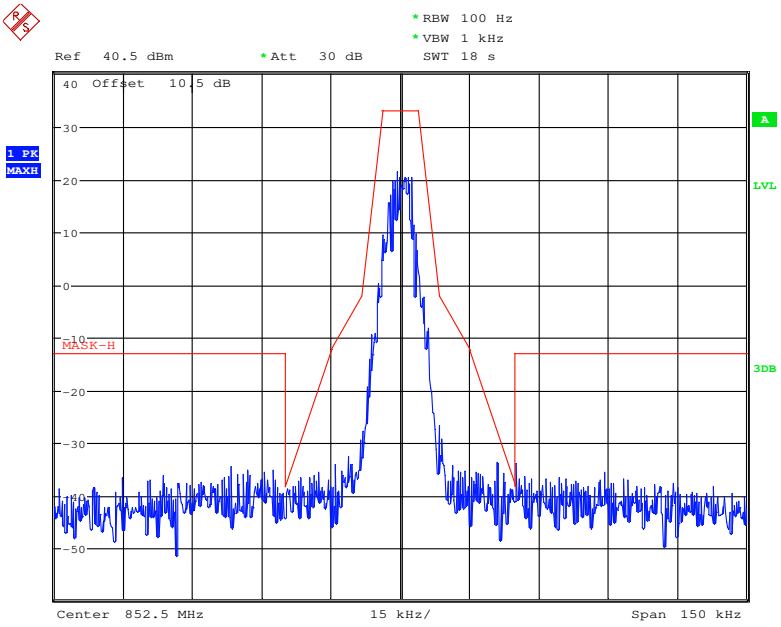
Date: 28.NOV.2017 16:02:55

Frequency 772.00625 MHz: Emission Mask C, AGC+3 dB



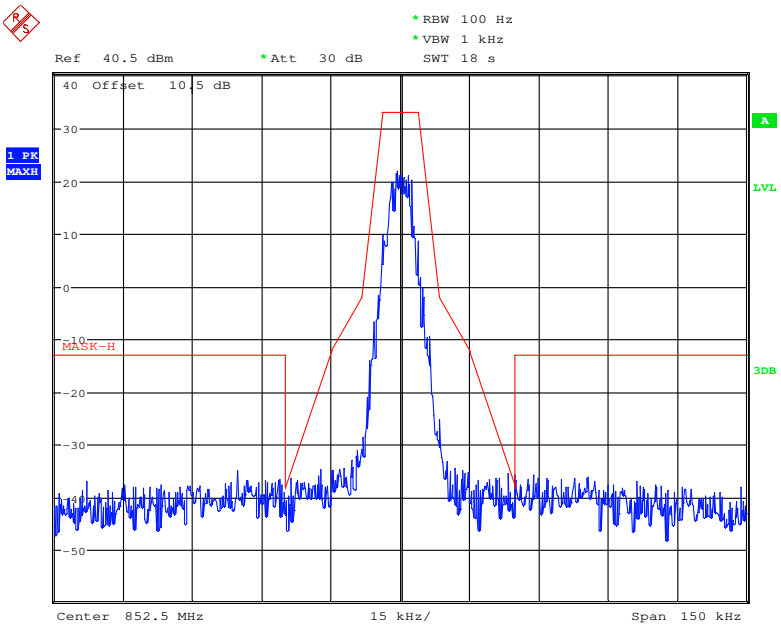
Date: 28.NOV.2017 16:01:04

Frequency 852.5 MHz: Emission Mask H, AGC



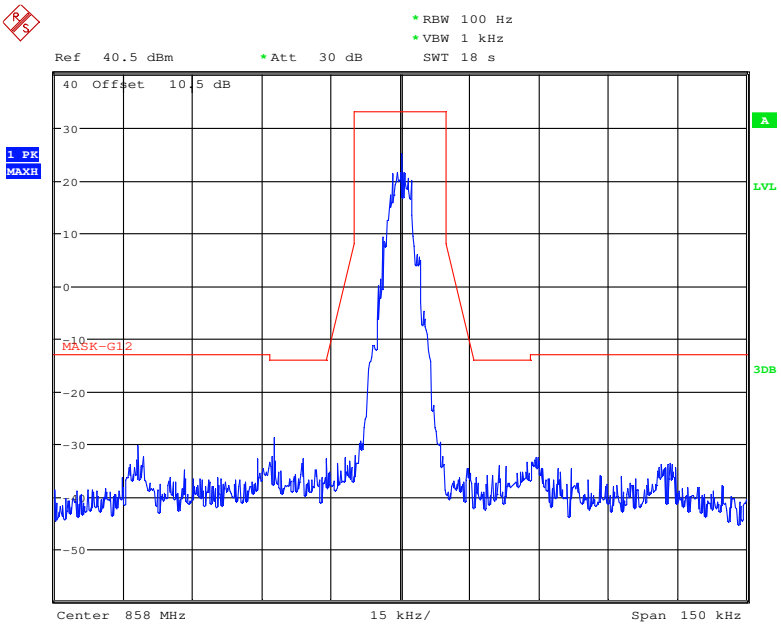
Date: 26.JAN.2018 16:10:20

Frequency 852.5 MHz: Emission Mask H, AGC+3 dB



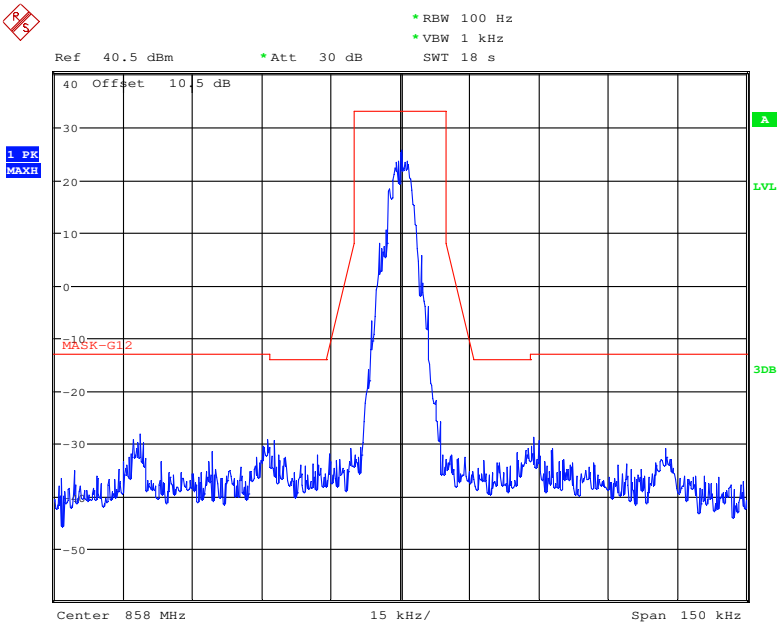
Date: 26.JAN.2018 16:12:18

Frequency 858 MHz: Emission Mask G, AGC



Date: 26.JAN.2018 16:15:35

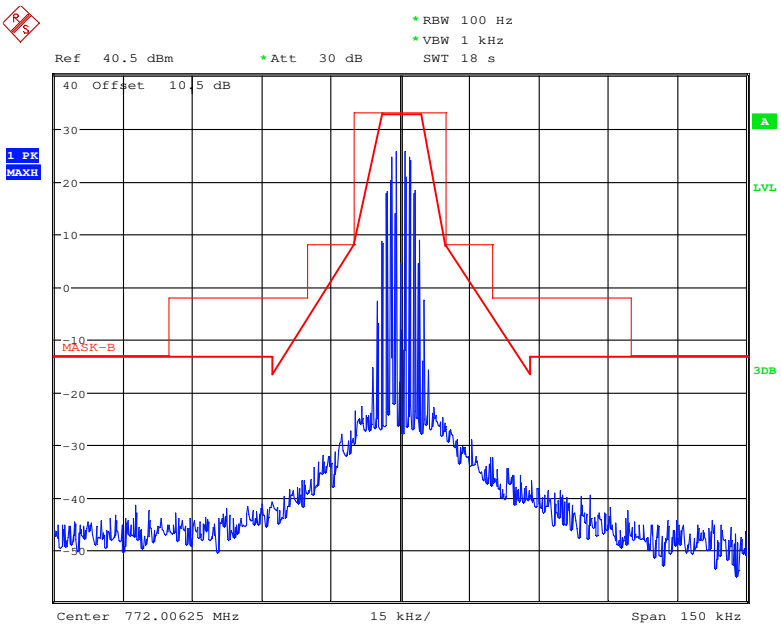
Frequency 858 MHz: Emission Mask G, AGC+3



Date: 26.JAN.2018 16:17:08

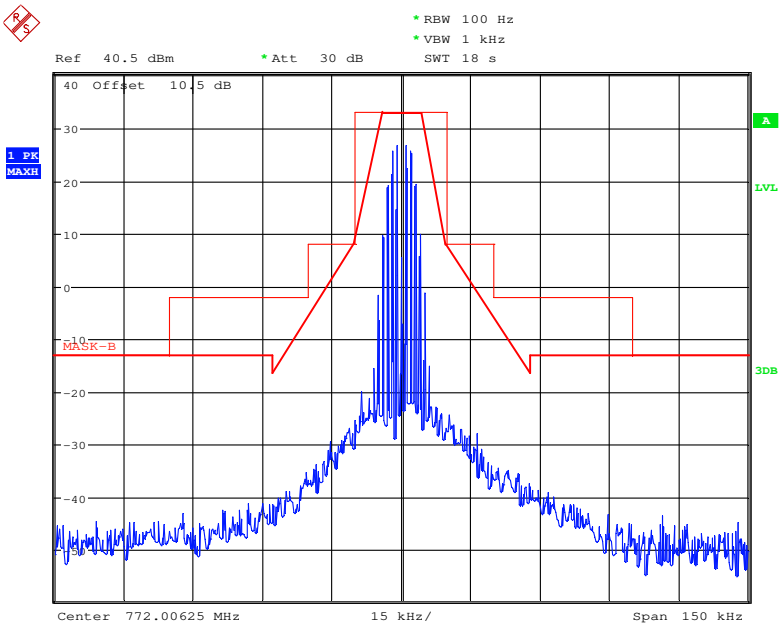
FM 12.5K:

Frequency 772.00625 MHz: Emission Mask C, AGC



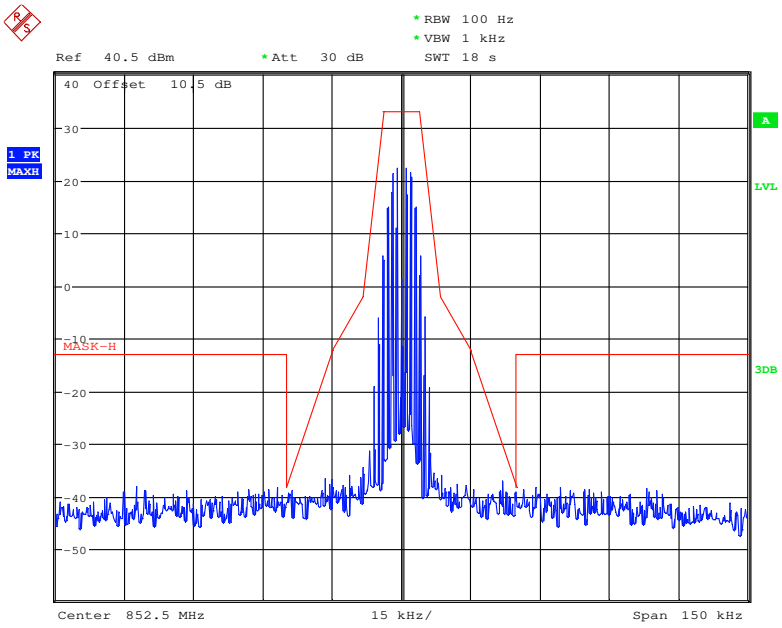
Date: 11.NOV.2017 14:35:19

Frequency 772.00625 MHz: Emission Mask C, AGC+3 dB



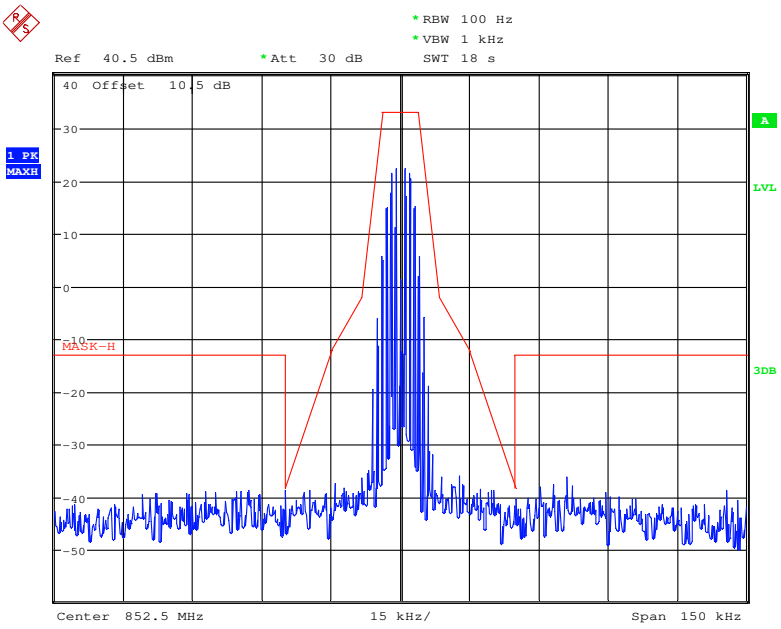
Date: 11.NOV.2017 14:34:01

Frequency 852.5 MHz: Emission Mask H, AGC



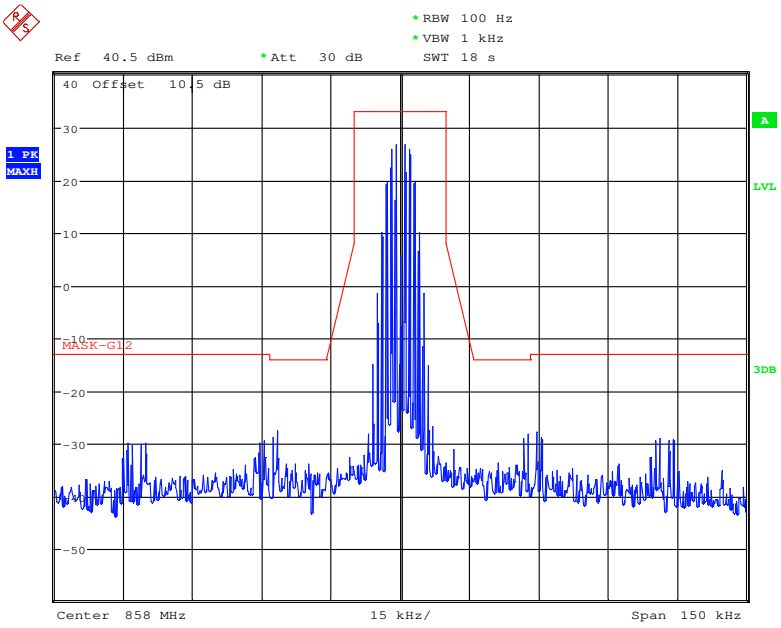
Date: 26.JAN.2018 14:56:57

Frequency 852.5 MHz: Emission Mask H, AGC+3 dB



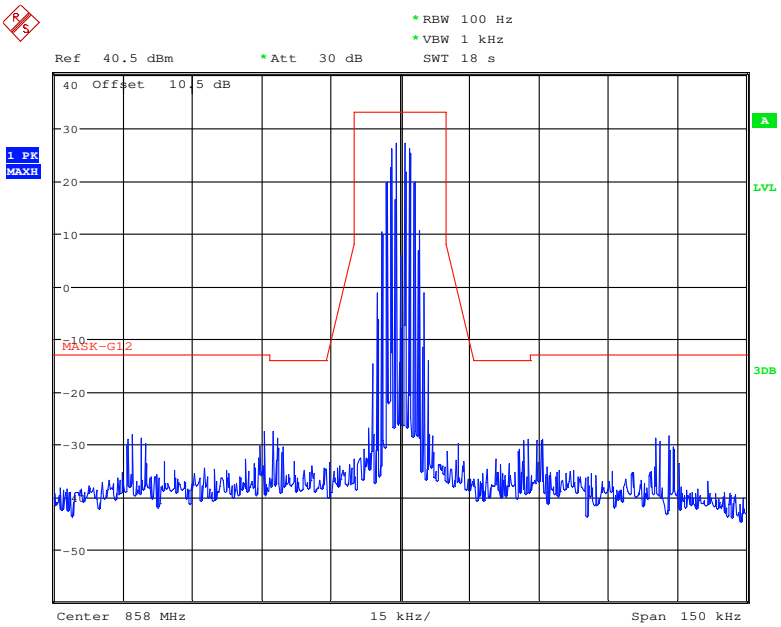
Date: 26.JAN.2018 14:55:58

Frequency 858 MHz: Emission Mask G, AGC



Date: 26.JAN.2018 14:43:04

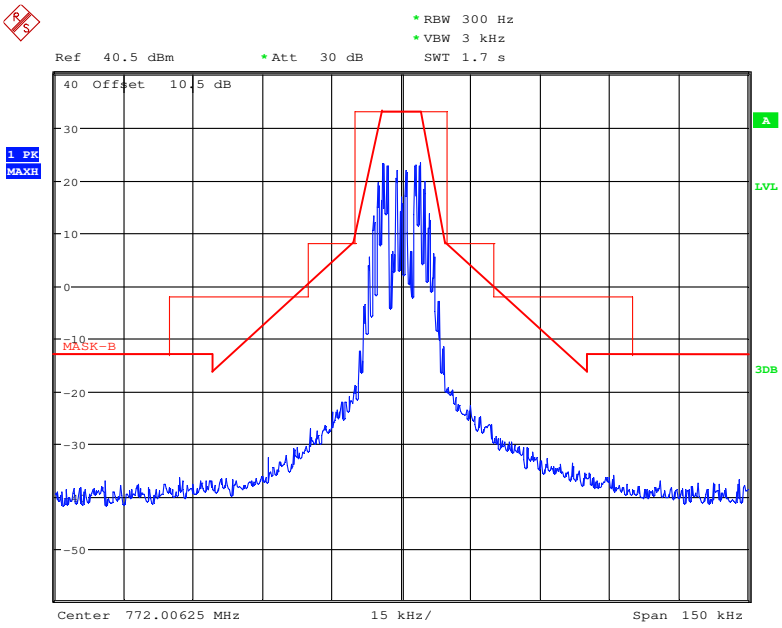
Frequency 858 MHz: Emission Mask G, AGC+3



Date: 26.JAN.2018 14:44:27

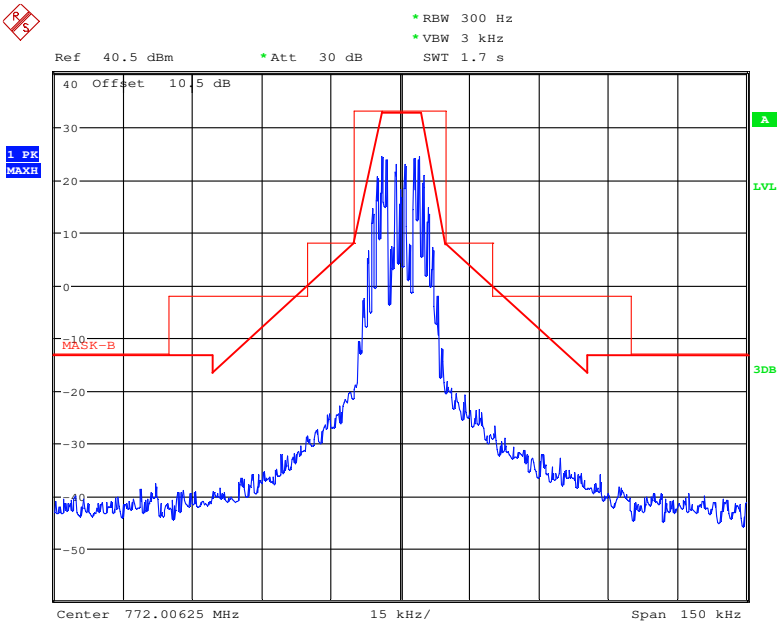
FM 25K:

Frequency 772.00625 MHz: Emission Mask C, AGC



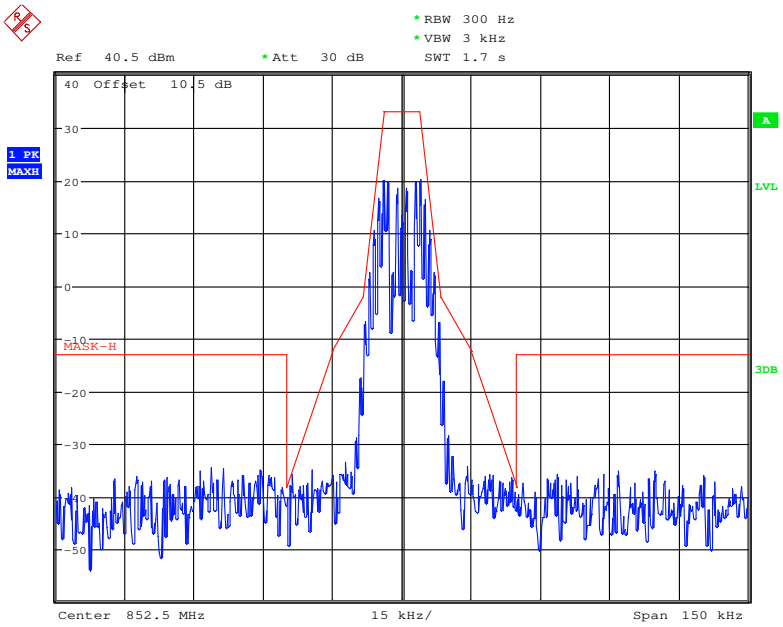
Date: 11.NOV.2017 14:29:27

Frequency 772.00625 MHz: Emission Mask C, AGC+3 dB



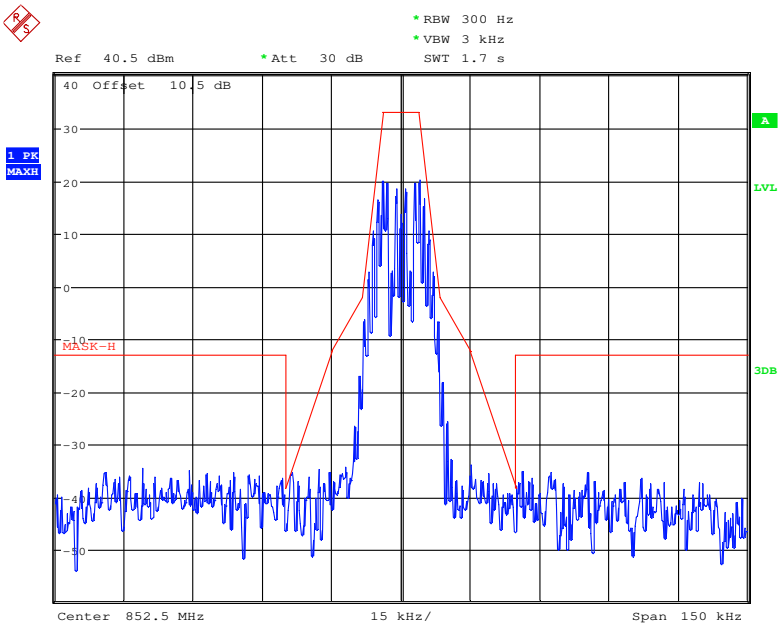
Date: 11.NOV.2017 14:32:47

Frequency 852.5 MHz: Emission Mask H, AGC



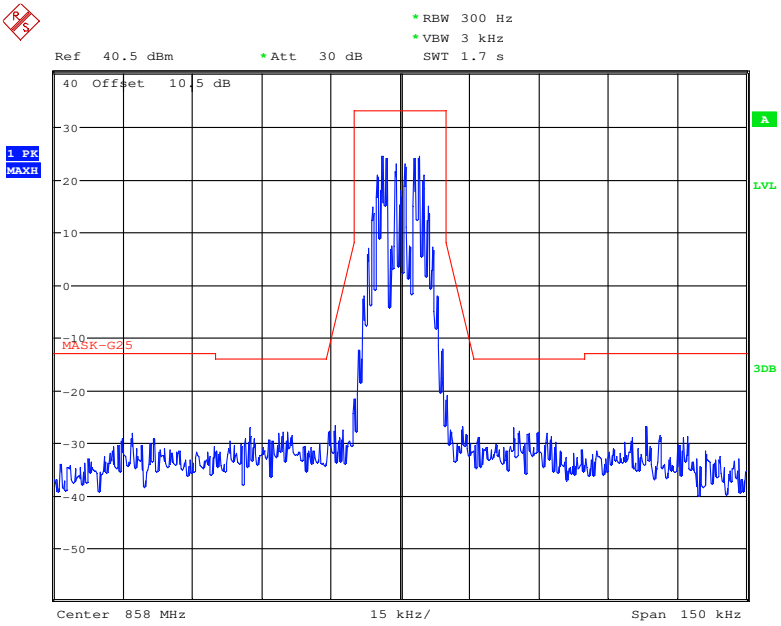
Date: 26.JAN.2018 14:53:59

Frequency 852.5 MHz: Emission Mask H, AGC+3 dB



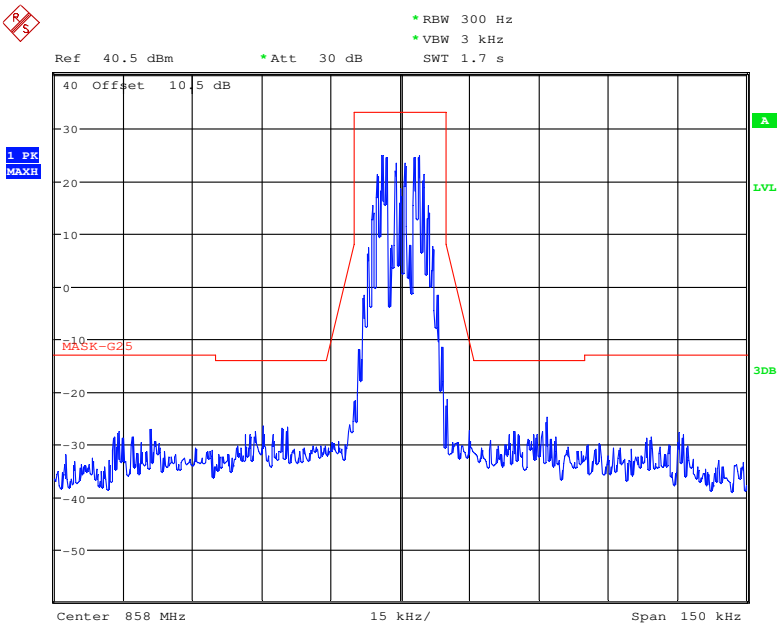
Date: 26.JAN.2018 14:54:28

Frequency 858 MHz: Emission Mask G, AGC



Date: 26.JAN.2018 14:46:15

Frequency 858 MHz: Emission Mask G, AGC+3



Date: 26.JAN.2018 14:45:50

FCC §90.219 (e)(3) - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §90.219 (e)(3) Spurious emissions from a signal booster must not exceed −13 dBm within any 100 kHz measurement bandwidth

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 1g (TXpwr in Watts/0.001)-the absolute level

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Vincent Zheng on 2017-11-23.

Test Mode: Transmitting(pre-scan the low, middle and high channel, the worst case was middle channel)

Model: RH-7W22-R

30MHz - 10GHz:

Frequency (MHz)	Receiver Reading (dBμV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
772.00625 MHz										
218.25	35.42	277	2.0	H	-61.6	0.30	0	-61.90	-13	48.90
218.25	35.98	62	1.8	V	-61.0	0.30	0	-61.30	-13	48.30
1544.01	47.98	329	2.2	H	-60.8	1.60	8.50	-53.90	-13	40.90
1544.01	47.88	215	1.7	V	-61.2	1.60	8.50	-54.30	-13	41.30
860.00625 MHz										
218.25	36.21	351	1.7	H	-60.8	0.30	0	-61.10	-13	48.10
218.25	36.51	295	1.3	V	-60.5	0.30	0	-60.80	-13	47.80
1720.00	48.51	246	1.4	H	-59.0	1.30	9.10	-51.20	-13	38.20
1720.00	48.46	71	1.2	V	-58.4	1.30	9.10	-50.60	-13	37.60

Model: RH-7W22-R-AC

30MHz - 10GHz:

Frequency (MHz)	Receiver Reading (dBμV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
772.00625 MHz										
187.54	35.70	28	1.3	H	-61.3	0.29	0	-61.59	-13	48.59
187.54	36.99	254	1.9	V	-60.0	0.29	0	-60.29	-13	47.29
1544.01	46.35	336	1.7	H	-62.4	1.60	8.50	-55.50	-13	42.50
1544.01	45.74	352	1.8	V	-63.3	1.60	8.50	-56.40	-13	43.40
860.00625 MHz										
187.54	36.30	149	2.0	H	-60.7	0.29	0	-60.99	-13	47.99
187.54	36.74	324	2.2	V	-60.3	0.29	0	-60.59	-13	47.59
1720.01	47.51	229	1.4	H	-59.6	1.30	8.90	-52.00	-13	39.00
1720.01	46.62	100	2.2	V	-59.9	1.30	8.90	-52.30	-13	39.30

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

FCC §90.219 (e)(3) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

FCC §90.219 (e)(3) Spurious emissions from a signal booster must not exceed −13 dBm within any 100 kHz measurement bandwidth

Test Procedure

Test Method: KDB 935210 D05 Indus Booster Basic Meas v01r02 section 4.7.3

a) Connect a signal generator to the input of the EUT.
b) Configure the signal generator to produce a CW signal.
c) Set the frequency of the CW signal to the center channel of the EUT passband.
d) Set the output power level so that the resultant signal is just below the AGC threshold (see 4.2).
e) Connect a spectrum analyzer to the output of the EUT, using appropriate attenuation as necessary.
f) Set the RBW = 100 kHz. (i.e., for 30 MHz to 1 GHz PLMRS and/or PSRS booster devices)
g) Set the VBW = 3 × RBW.
h) Set the Sweep time = auto-couple.
i) Set the detector to PEAK.
j) Set the spectrum analyzer start frequency to 30 MHz (or the lowest radio frequency signal generated in the EUT, without going below 9 kHz if the EUT has additional internal clock frequencies), and the stop frequency to 10 times the highest allowable frequency of the EUT passband.
k) Select MAX HOLD, and use the marker peak function to find the highest emission(s) outside the passband. (This could be either at a frequency lesser or greater than the passband frequencies.)
l) Capture a plot for inclusion in the test report.
m) Repeat steps c) to l) for each authorized frequency band/block of operation.

Test Data

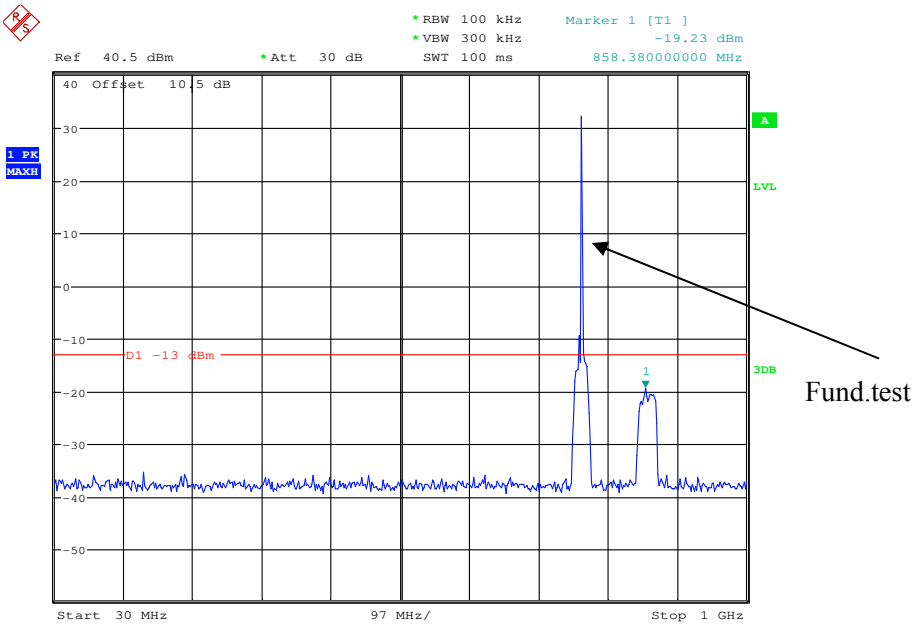
Environmental Conditions

Temperature:	25~26 ℃
Relative Humidity:	53~54 %
ATM Pressure:	101.0~101.5 kPa

The testing was performed by Vincent Zheng from 2018-01-26 to 2018-01-29.

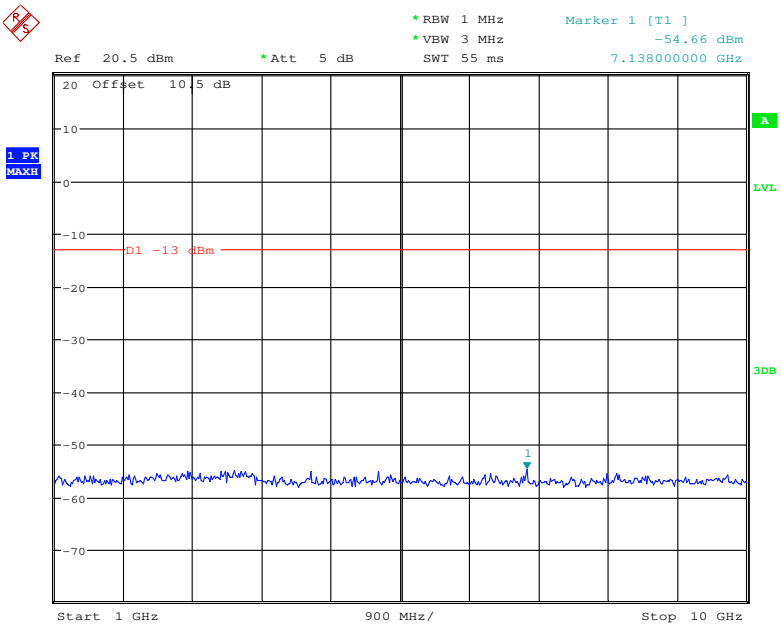
Test Mode: Transmitting, please refer to the following plots.

30MHz – 1 GHz, 700 BAND Low Channel



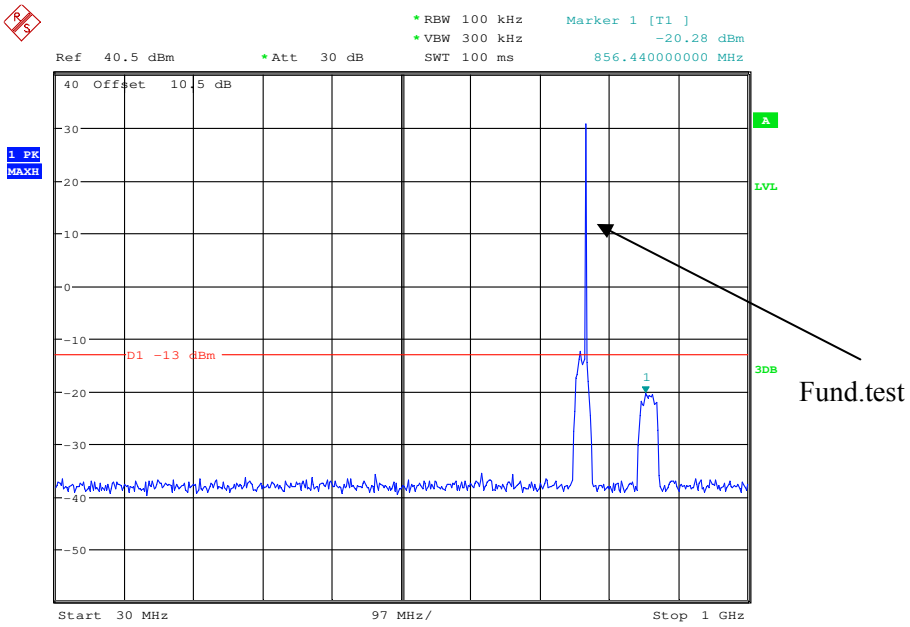
Date: 29.JAN.2018 18:34:00

1 GHz – 10 GHz, 700 BAND Low Channel



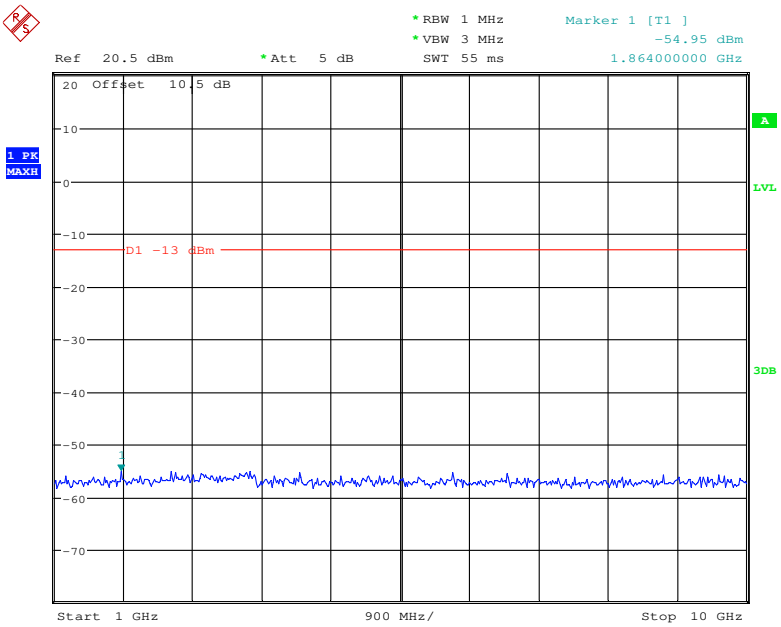
Date: 29.JAN.2018 18:28:16

30MHz – 1 GHz, 700 BAND Middle Channel



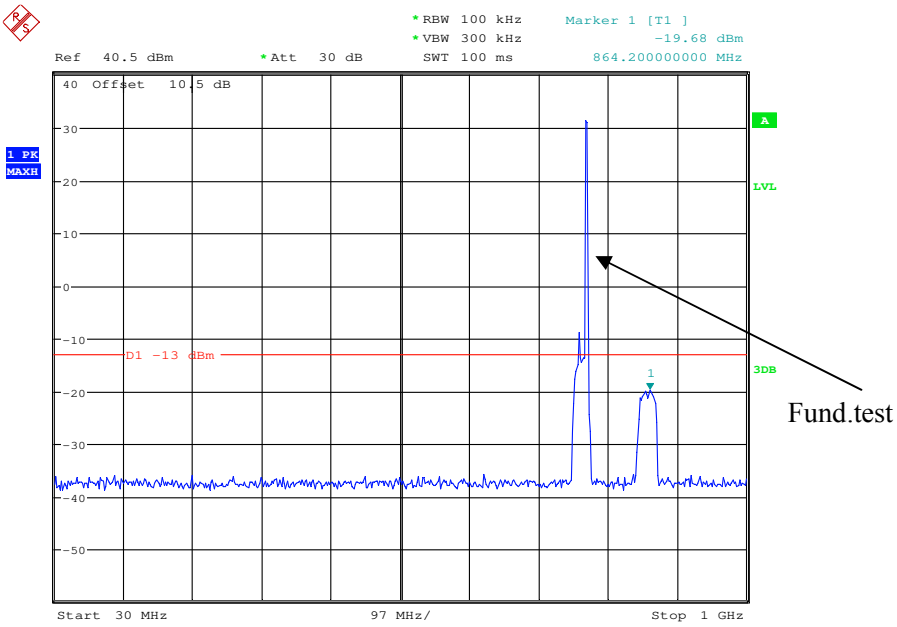
Date: 29.JAN.2018 18:33:22

1 GHz – 10 GHz, 700 BAND Middle Channel



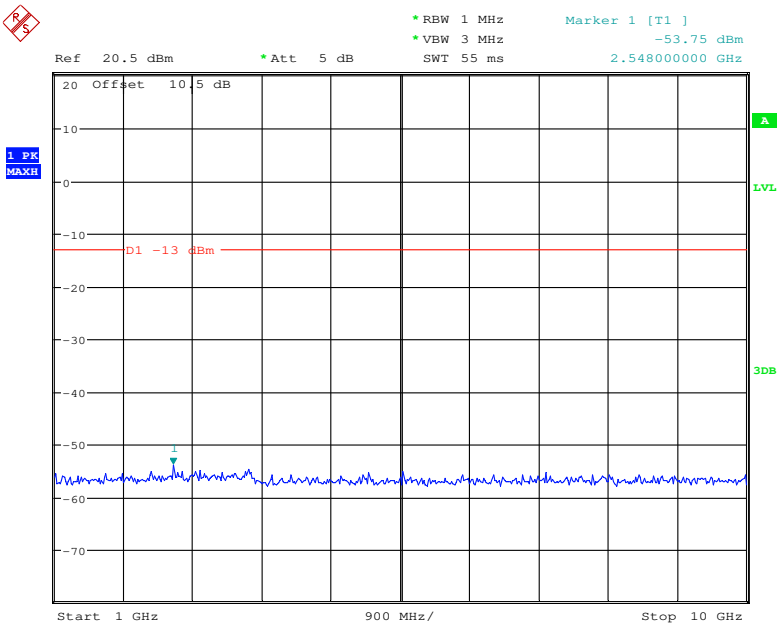
Date: 29.JAN.2018 18:27:41

30MHz – 1 GHz, 700 BAND, High Channel



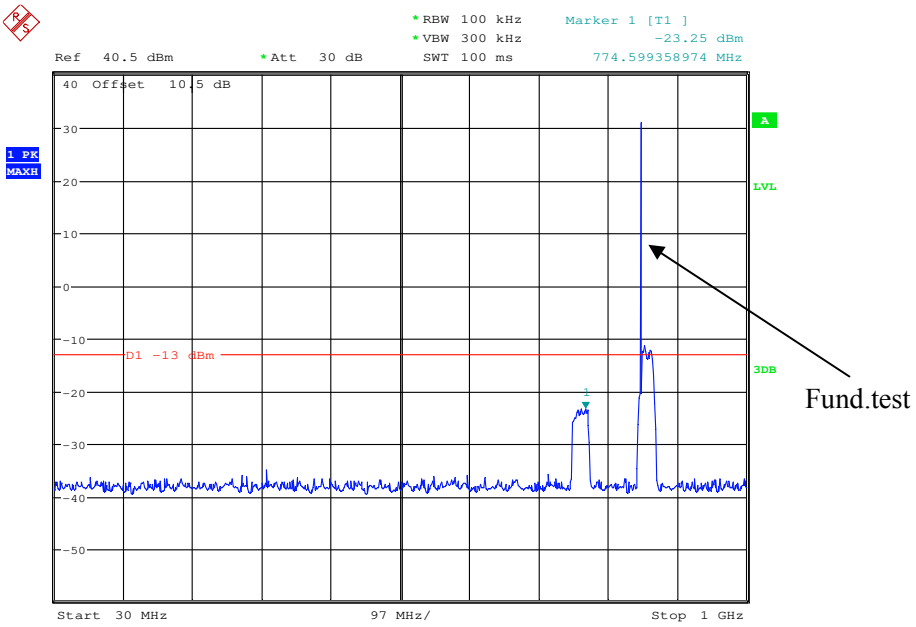
Date: 29.JAN.2018 18:32:31

1 GHz – 10 GHz, 700 BAND, High Channel



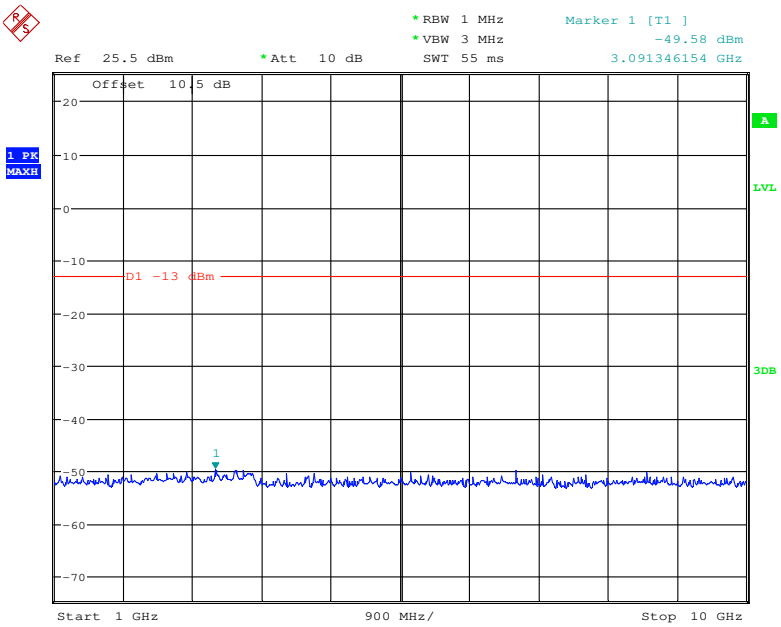
Date: 29.JAN.2018 18:27:09

30MHz – 1 GHz, 800 BAND Low Channel



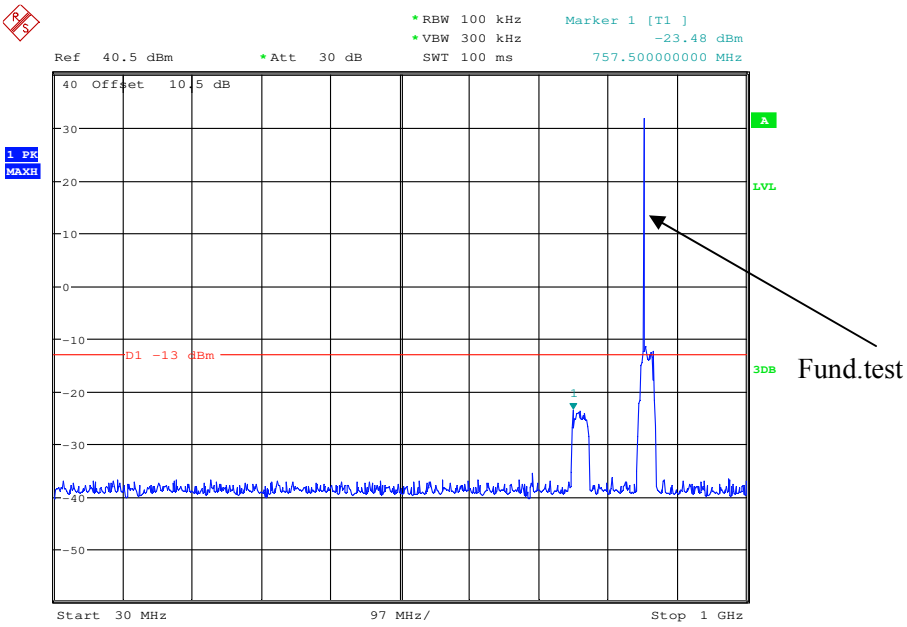
Date: 26.JAN.2018 10:05:20

1 GHz – 10 GHz, 800 BAND Low Channel



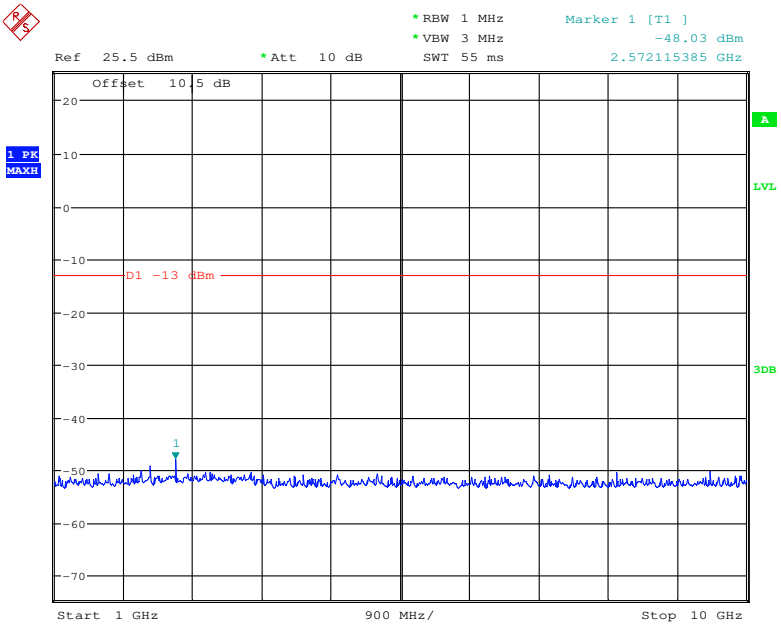
Date: 26.JAN.2018 10:15:21

30MHz – 1 GHz, 800 BAND Middle Channel



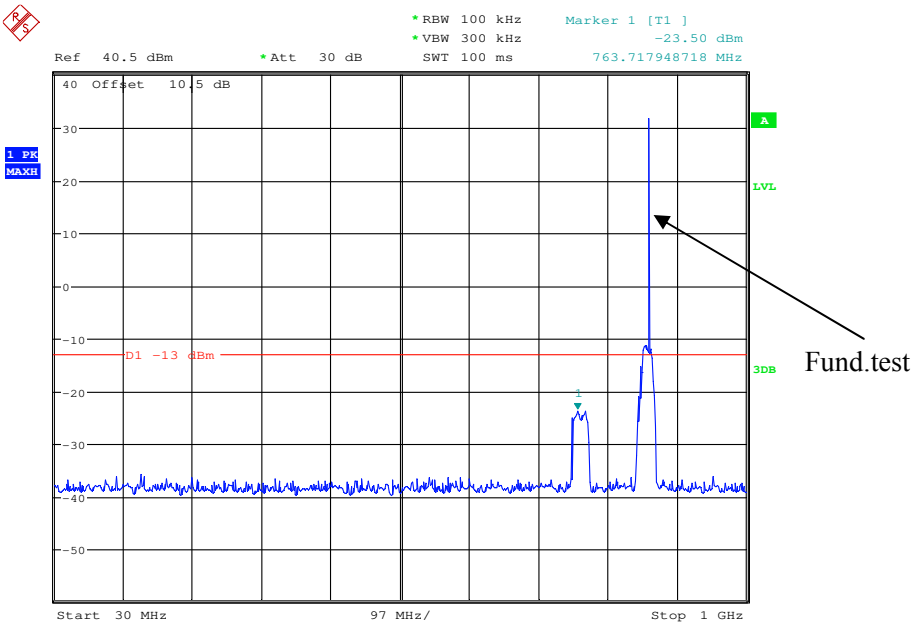
Date: 26.JAN.2018 10:02:27

1 GHz – 10 GHz, 800 BAND Middle Channel



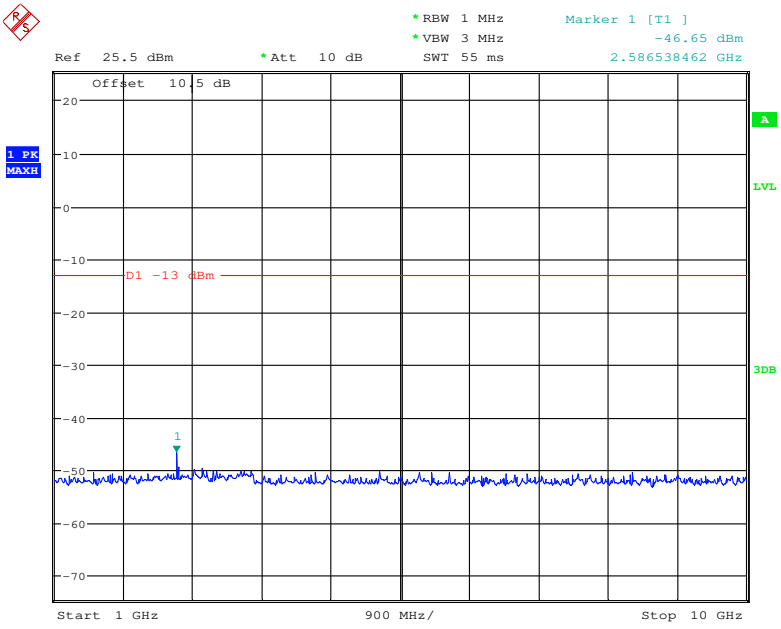
Date: 26.JAN.2018 10:14:47

30MHz – 1 GHz, 800 BAND High Channel



Date: 26.JAN.2018 10:05:53

1 GHz – 10 GHz, 800 BAND High Channel



Date: 26.JAN.2018 10:14:10

FCC §90.219 (e)(3) – INTERMODULATION

Applicable Standard

FCC §90.219 (e)(3) Spurious emissions from a signal booster must not exceed −13 dBm within any 100 kHz measurement bandwidth

Test Procedure

a) Connect a signal generator to the input of the MU
b) Configure the two signal generators to produce CW on frequencies spaced sonsistent with 4.7.1, with amplitude levels set to just below the AGC threshold
c) Connect a spectrum analyzer through appropriate attenuation to the MU output
d) Set the span to 150 kHz
e) Set RBW = 1 kHz with VBW ≥ 3*RBW
f) Set the detector to power averaging(RMS)
g) Place a marker on highest intermodulation product amplitude
h) Capture the plot for inclusion in the test report
i) Repeat steps c) to h) with the composite input power lecel set to 3 dB above the AGC threshold
j) Repeat steps b) to i) for all operational bands

Test Data

Environmental Conditions

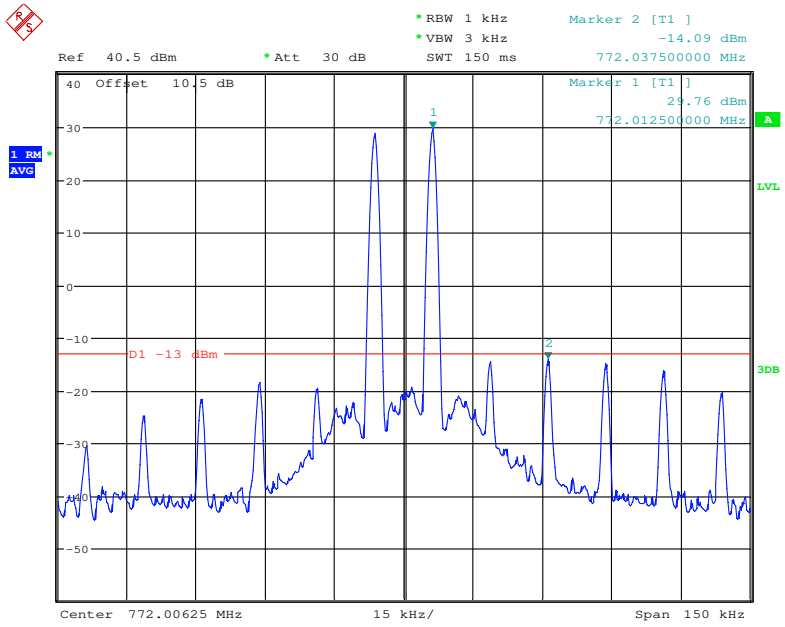
Temperature:	20~26 ℃
Relative Humidity:	50~55 %
ATM Pressure:	100~101.5 kPa

The testing was performed by Vincent Zheng from 2017-11-27 to 2018-01-09.

Test Mode: Transmitting

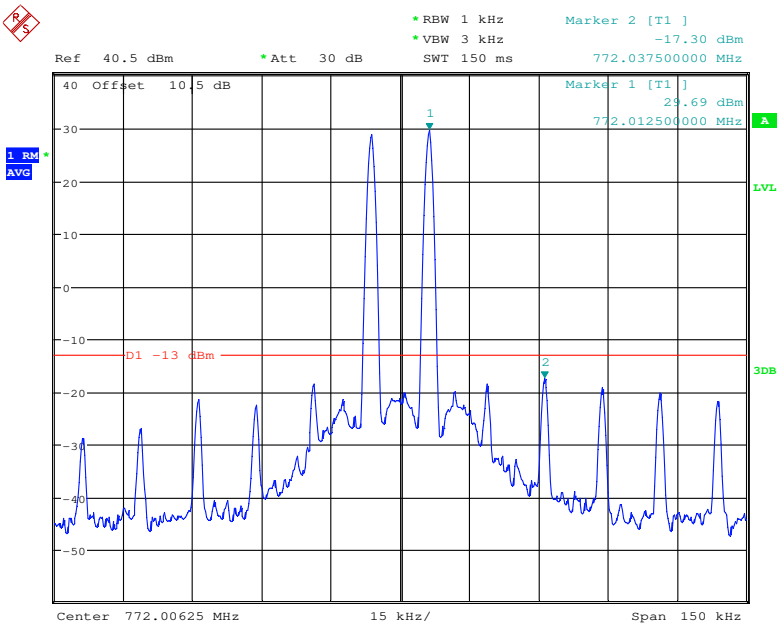
Test Result: Compliance. Please refer to following plots.

700 BAND, 12.5 kHz channel spacing, AGC



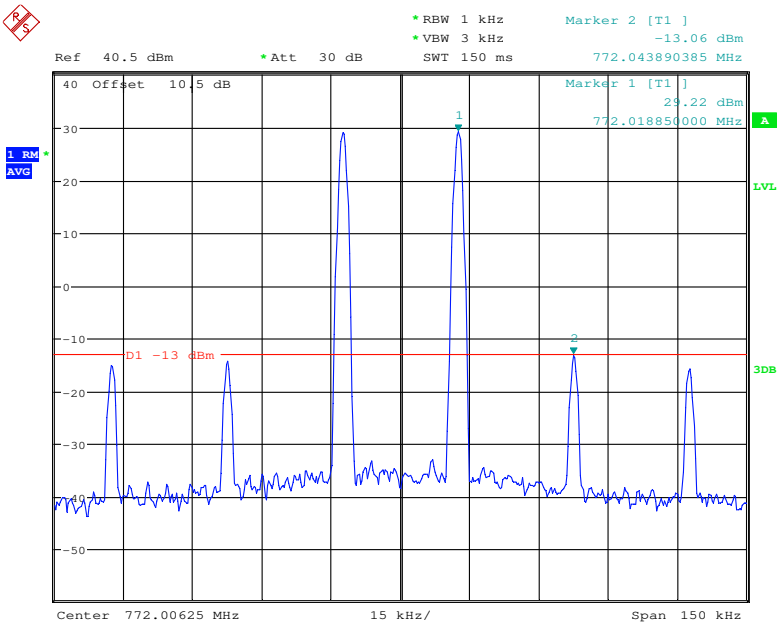
Date: 27.NOV.2017 17:21:38

700 BAND, 12.5 kHz channel spacing, AGC+3



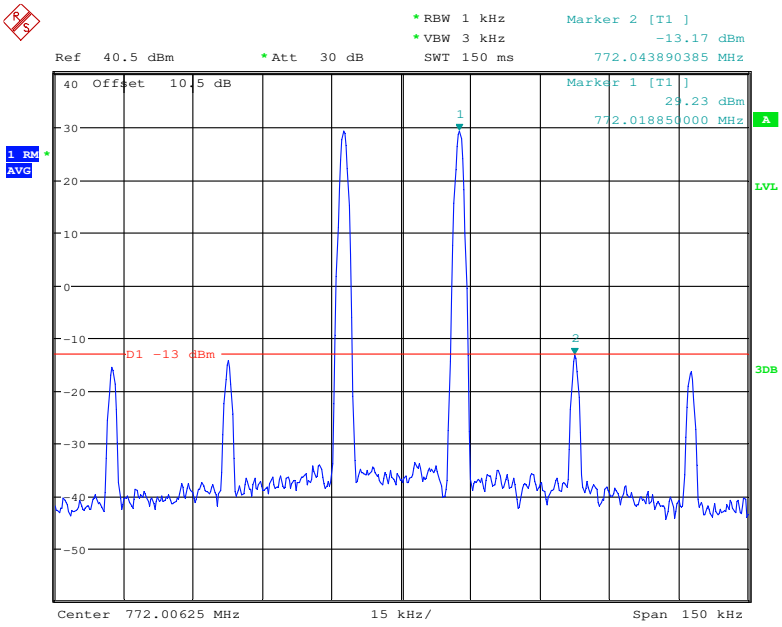
Date: 27.NOV.2017 17:21:59

700 BAND, 25 kHz channel spacing, AGC



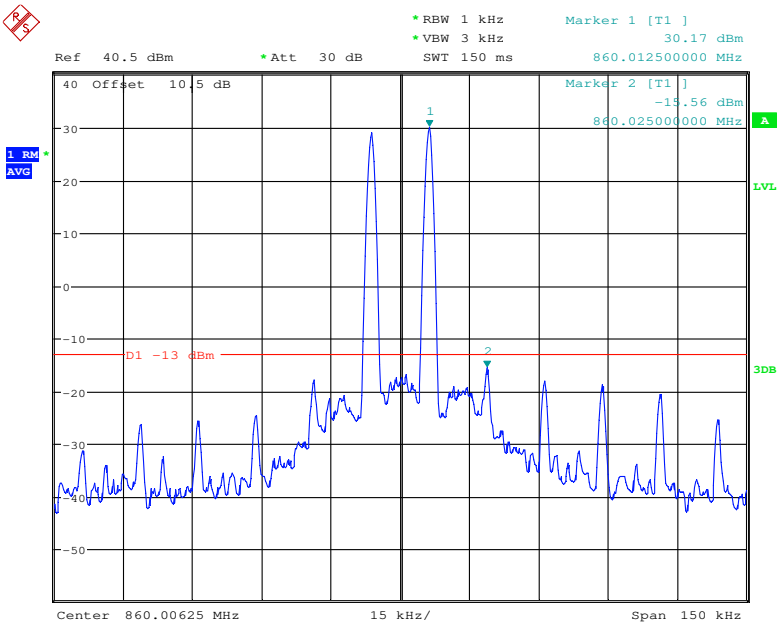
Date: 6.JAN.2018 14:08:28

700 BAND, 25 kHz channel spacing, AGC+3



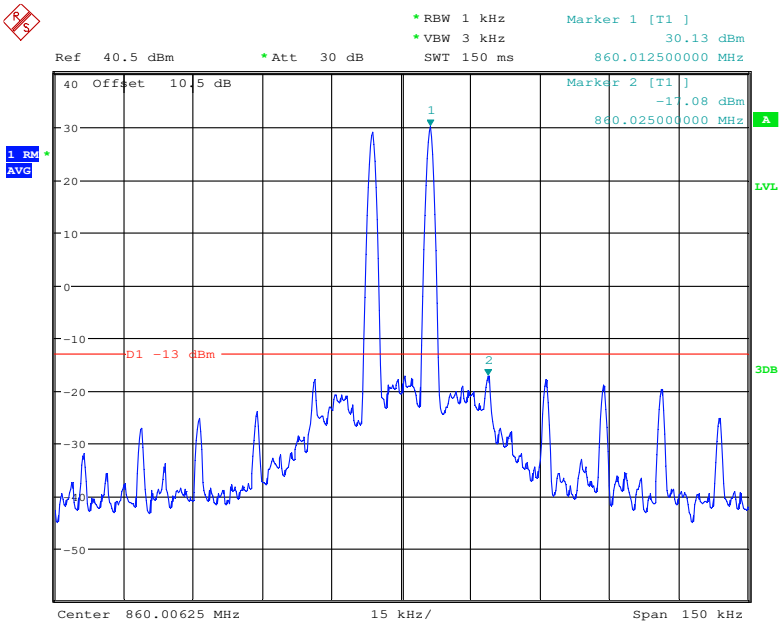
Date: 6.JAN.2018 14:09:23

800 BAND, 12.5 kHz channel spacing, AGC



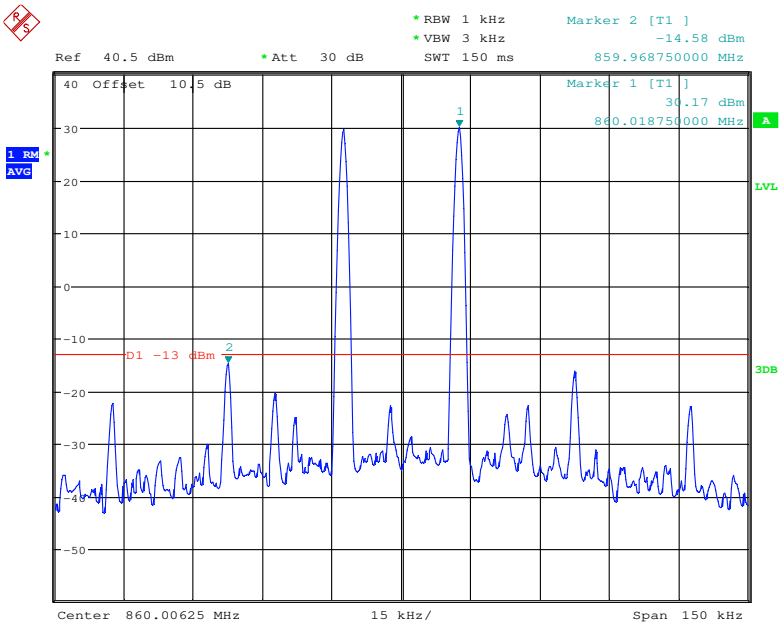
Date: 27.NOV.2017 17:33:49

800 BAND, 12.5 kHz channel spacing, AGC+3



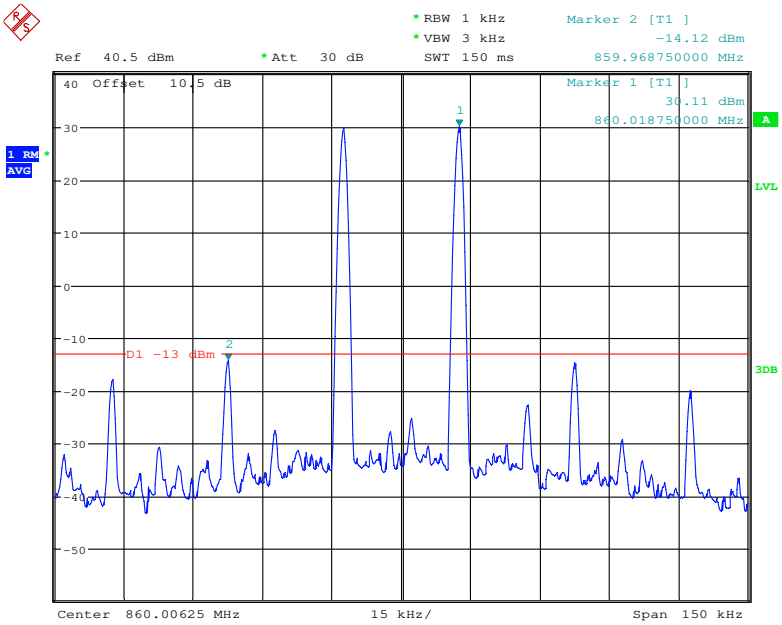
Date: 27.NOV.2017 17:34:49

800 BAND, 25 kHz channel spacing, AGC



Date: 9.JAN.2018 13:11:04

800 BAND, 25 kHz channel spacing, AGC+3



Date: 9.JAN.2018 13:12:01

FCC§90.219 (e)(2) – NOISE FIGURE MEASUREMENTS

Applicable Standard

FCC§90.219 (e)(2) The noise figure of a signal booster must not exceed 9 dB in either direction

Test Procedure

a) A spectrum analyzer was connected to RU output port
b) The RU input was terminated
c) The spectrum analyzer was set to 100 trace average in the RMS average mode
d) A peak reading was recorded
e) The noise figure was calculated using the following formula
NF= Max reading - (-174dBm/Hz +10*$\log_{10}$(RBW)+ Booster gain)
Note: 174= Thermal noise for 1Hz RBW at room temperature
RBW= Resolution Bandwidth of Spectrum Analyzer in Hz

Test Data

Environmental Conditions

Temperature:	25~26 ℃
Relative Humidity:	54~55 %
ATM Pressure:	101.0~101.5 kPa

The testing was performed by Vincent Zheng on 2018-01-26 and 2018-03-02.

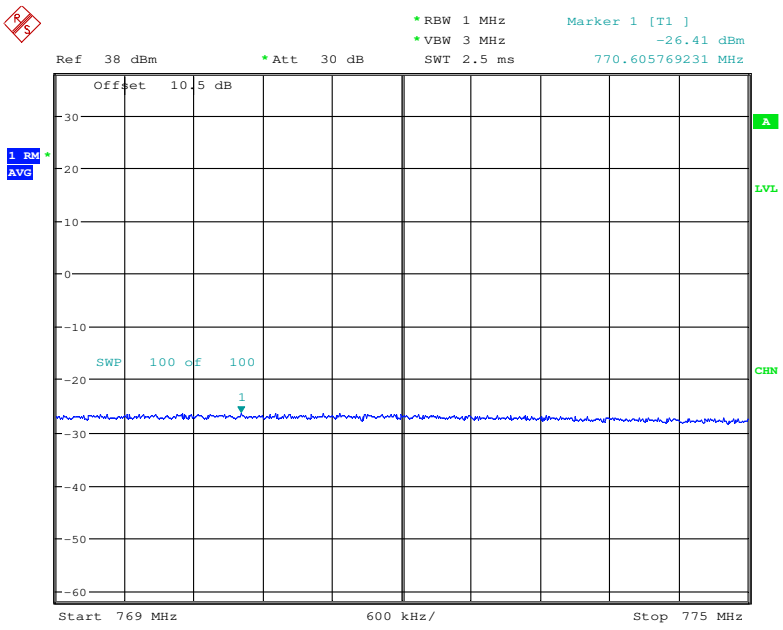
Test Mode: Transmitting

Test Result: Compliance. Please refer to following table and plots.

Analyzer Settings			Max Reading (dBm/MHz)	Booster Gain (dB)	Thermal Noise (dBm/MHz)	Noise Figure (dB)	Limit (dB)
Frequency (MHz)	RBW (MHz)	VBW (MHz)					
770.605769231	1	3	-26.41	95.19	-114	-7.60	9
856.5	1	3	-12.00	95.81	-114	6.19	9

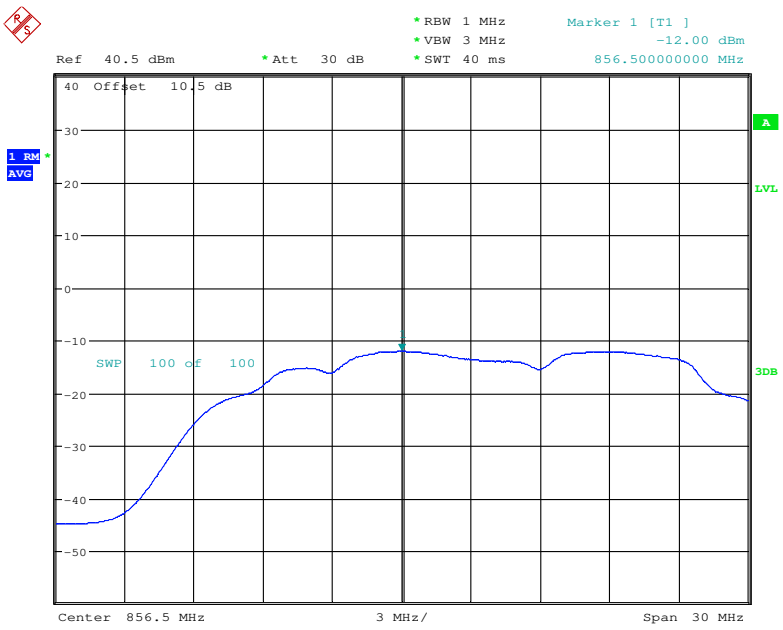
Note: Noise Figure=Max reading-(-174dBm/Hz+10*Log_{10}(RBW)+booster gain)

700 band



Date: 2.MAR.2018 16:29:25

800 band



Date: 26.JAN.2018 16:56:07

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