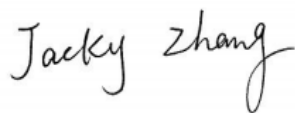






TEST REPORT

Report No.:	E201704241213-1	Application No.:	E201704241213
Applicant:	Comba Telecom Ltd.		
Applicant Address:	611 East Wing, No. 8 Science Park West Avenue, Hong Kong Science Park, Tai Po, Hong Kong		
Sample Description:	700/800MHz Public Safety Bi-directional Amplifier		
Model:	RX-7W22-B		
Adding Model:	RX-7W22A48-B		
Test Location:	EMC Laboratory of Guangzhou GRG Metrology and Test Co., Ltd.		
Test Specification:	FCC PART 2--- FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS. FCC PART 90-- PRIVATE LAND MOBILE RADIO SERVICES.		
Test Date:	2017-05-16 to 2017-07-11		
Issue Date:	2017-07-12		
Test Result:	<i>Pass.</i>		
Prepared By:	Reviewed By:	Approved By:	
Jacky zhang/ Test Engineer	Lyn xiao/ Technical Assistance	Yong Dai / Manager	
			
Date: 2017-07-12	Date: 2017-07-12	Date: 2017-07-12	
Other Aspects:			
Abbreviations: <i>ok / P = passed; fail / F = failed; n.a. / N = not applicable</i>			
The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT.			

DIRECTIONS OF TEST

1. This station carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.
2. 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.
3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.

Table of Contents

1	General description of EUT	4
1.1	Client information	4
1.2	Manufacturer and Factory	4
1.3	Basic description of EUT	4
1.4	Standards applicable for testing	5
1.5	Signal control process	5
1.6	Abbreviations and acronyms	6
2	Test result summary	6
3	Laboratory and accreditations	7
3.1	Test location	7
3.2	Accreditations	7
4	Measurements uncertainty	7
5	Devices used during test	8
6	Radio technical requirement specification	9
6.1	Radiated output power	9
6.1.1	Limit	9
6.1.2	Test configuration	9
6.1.3	Test procedures	10
6.1.4	Test Results	11
6.1.5	Test screenshot	18
6.2	Occupied bandwidth	31
6.2.1	Limit	31
6.2.2	Test configuration	32
6.2.3	Test procedures	32
6.2.4	Test Results	34
6.2.5	Test screenshot	39
6.3	Emission mask	57
6.3.1	Limit	57
6.3.2	Test configuration	59
6.3.3	Test procedures	60
6.3.4	Test Results	61
6.3.5	Test screenshot	65
6.4	Conducted spurious emissions	77
6.4.1	Limit	77
6.4.2	Test configuration	77
6.4.3	Test procedures	78
6.4.4	Test Results	79
6.5	Frequency stability	83

6.5.1	Limit.....	83
6.5.2	Test configuration	83
6.5.3	Test procedures	84
6.5.4	Test Results.....	85
6.5.5	Test screenshot.....	86
6.6	Noise figure.....	87
6.6.1	Limit.....	87
6.6.2	Test configuration	87
6.6.3	Test procedures	88
6.6.4	Test Results.....	89
6.6.5	Test screenshot.....	89
6.7	Intermodulation product.....	91
6.7.1	Limit.....	91
6.7.2	Test configuration	91
6.7.3	Test procedures	92
6.7.4	Test Results.....	93
6.7.5	Test screenshot.....	98
6.8	Radiated spurious emissions	108
6.8.1	Limit.....	108
6.8.2	Test configuration	108
6.8.3	Test procedures	109
6.8.4	Test Results.....	111
APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM		116
APPENDIX B. PHOTOGRAPHS OF EUT		119
1	External photos	119
2	Internal photos	122
3	Photo caption	132

1 General description of EUT

1.1 Client information

Name: Comba Telecom Ltd.
Address: 611 East Wing, No. 8 Science Park West Avenue, Hong Kong Science Park, Tai Po, Hong Kong

1.2 Manufacturer and Factory

Manufacture Name: Comba Telecom systems (China) Ltd.
Address: No.10 Shenzhou Road, Guangzhou Science City, Guangzhou 510663, Guangdong, P.R. China
Factory: Comba Telecom Technology (Guangzhou) Ltd.
Address: No.6 Jinbi Road, Economics and Technology Development District, Guangzhou Guangdong China

1.3 Basic description of EUT

Product Name: 700/800MHz Public Safety Bi-directional Amplifier
Product Model: RX-7W22-B
Adding Model: RX-7W22A48-B
Trade Name: Comba
Power Supply^①: AC 100~240V, 50/60Hz
DC -48V
Power cord: AC power cord (4m)
DC power cord (4m)
Frequency Band^②: 700MHz Band:
Downlink: 758MHz ~ 775MHz, Uplink: 788MHz ~805MHz
800MHz Band:
Downlink: 851MHz ~862MHz, Uplink: 806MHz ~ 817MHz
Type of Modulation^③: C4FM, Tetra ,Analog FM and LTE
Normal Power Output: Downlink: 33dBm
Uplink: 27dBm
Normal System Gain: Downlink: 90dB
Uplink: 90dB
Operating Temperature: -33°C to +60°C
Operating Humidity: 5% to 95%
Antenna Type: N/A

Note: ^① Power Supply of The device is AC 100~240V, 50/60Hz or DC -48V, It uses different power modules and Surge protector module.

^② PS Guardband: Downlink:768MHz~769MHz and Uplink: 798MHz ~ 799MHz.

Ⓢ LTE Modulation : Downlink: 758MHz ~768MHz, Uplink: 788MHz ~ 798MHz, LTE channel Bandwidth is 10MHz.

1.4 Standards applicable for testing

The standard used FCC part 2, part 90, KDB 935210 D05 and EIA/TIA 603- D-2010.

1.5 Signal control process

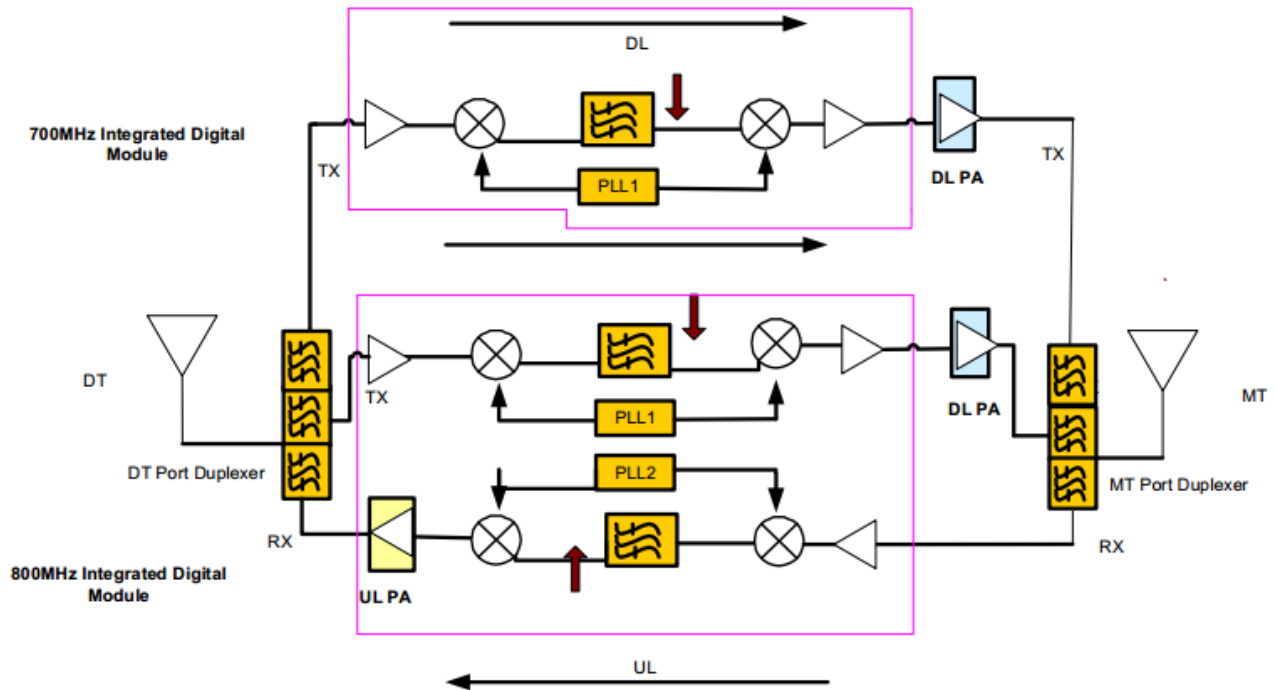


Figure 1: PS BDA Functional Block Diagram

In the downlink, the BTS signals are received by donor antenna of the device. After the duplexer, the signals are sent to the LNA module for pre-amplification and digital RF integrated module for digital filtering and frequency conversion. Then the DL signals will be sent to downlink PA to amplify power and filter via duplexer. After amplification, the signals are transmitted at the MT port to the service antenna.

In the uplink, the mobile signals are received by the service antenna. After the MT port integrated duplexer, the signals are sent to the LNA module, integrated module for digital filtering, then to PA for power amplification and to duplexer. After that, the uplink signals are sent to the donor antenna for transmission back to the BTS.

1.6 Abbreviations and acronyms

For the purposes of the reporter, the following symbols can be applied:

AC	Alternating current
DC	Direct current
AVR	Average(detector)
dB	decibel
dBm	Decibel referred to one milliwatt
EIRP	Equivalent isotropically radiated power
ERP	Effective radiated power
F	Frequency
GHz	Gigahertz
RF	Radio Frequency
PS	Public safety
DL	Downlink
UL	Uplink
LNA	Low Noise Amplifier
SDR	Software Defined Radio

2 Test result summary

Test Item	Test Requirement	Test Method	Result
Radiated output power	Part 90.219(e)(1)	FCC part 2.1046& KDB 935210 D05 Indus Booster Basic Meas v01r01	PASS
Occupied bandwidth	Part 90.219(a)	FCC part 2. 1049& KDB 935210 D05 Indus Booster Basic Meas v01r01	PASS
Emission mask	Part 90.210(b), Part 90.210(c), Part 90.210(g). Part 90.210(h)	FCC part 2. 1047& FCC part 2. 1051 & KDB 935210 D05 Indus Booster Basic Meas v01r01	PASS
Intermodulation product	Part 90.219(e)(3)	KDB 935210 D05 Indus Booster Basic Meas v01r01	PASS
Frequency stability	part 90.213 & part 90.539	KDB 935210 D05 Indus Booster Basic Meas v01r01	PASS
Noise figure	Part 90.219(e)(2)	KDB 935210 D05 Indus Booster Basic Meas v01r01	PASS
Radiated spurious emissions	Part 90.219(e)(3)	KDB 935210 D05 Indus Booster Basic Meas v01r01 EIA/TIA 603- D/2.2.12	PASS
Conducted spurious emissions	Part 90.219(e)(3)	KDB 935210 D05 Indus Booster Basic Meas v01r01	PASS

Notes:

- (1). This is a Class B broadband Industrial signal booster device and it is a Non-SDR.
- (2). The device has audio low pass filters.
- (3). The modulation methods used in this test are C4FM, Tetra, Analog FM and LTE.

3 Laboratory and accreditations

3.1 Test location

The tests and measurements refer to this report were performed by Guangzhou GRG Metrology and Test Co., Ltd.

Add.: 163 Pingyun Rd, West of Huangpu Ave, Guangzhou, 510656, P. R. China

Telephone: +86-20-38699959, 38699960, 38699961

Fax : +86-20-38695185

3.2 Accreditations

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC Listed Lab No. 688188
Canada	Registration No.:8355A-1

4 Measurements uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Radiated Emission	Horizontal	30MHz~1000MHz	4.2dB
	Horizontal	1GHz~6GHz	4.2dB
	Vertical	30MHz~1000MHz	4.4dB
	Vertical	1GHz~6GHz	4.4dB
Conducted Emission		9kHz~150kHz	2.6dB
		150kHz~30MHz	2.4dB

This uncertainty represents an expanded uncertainty factor of $k=2$.

5 Devices used during test

Name of Device	Manufacturer	Model	Serial Number	Calibration Due(yy-mm-dd)	Calibration Interval
Signal Generator	R&S	SMJ100A	101647	2017-05-10	2018-05-09
Signal Generator	Agilent	E4438C	MY42082584	2017-01-15	2018-01-14
Spectrum analyzer	R&S	FSV3	102004	2017-05-09	2018-05-08
Spectrum analyzer	Agilent	N9010A	MY49061079	2017-03-26	2018-03-25
SNS Series Noise Source	Agilent	N4000A	MY44421910	2017-04-15	2018-04-14
NFA Series Noise Figure Analyzer	Agilent	N8973A	MY45271261	2017-04-15	2018-04-14
Frequency meter	FLUKE	PM6685R	SM826664	2017-05-13	2018-05-12
Voltage parameters tester	China weibo	PF1211	0112104	2016-08-12	2017-08-11
DC power supply	Puxin Henan	P6030A	200823	2016-09-09	2017-09-08
Voltage regulator	China tianzheng	TDGC2J-3	1027	2016-10-19	2017-10-18
Radiated Spurious Emission					
Bi-Log Antenna	ETS-LINDGR EN	3142C	00075971	2017-03-02	2018-03-01
Horn antenna	ETS.LINDGR EN	3117	00075824	2016-07-14	2017-07-13
EMI Receiver	Rohde & Schwarz	ESU 40	100526	2016-12-27	2017-12-26
Semi anechoic chamber	ETS	966(RFD-F/A-100)	3730	2016-12-06	2017-12-05

6 Radio technical requirement specification

6.1 Radiated output power

Test Date (yy-mm-dd): 2017-05-16 to 2017-07-11

Test environment: Normal

Ambient Temp 24.1°C~26.1°C, Humid 46%~51%, Atmospheric Pressure 101kpa

Power supply: AC 120V 50/60Hz
DC -48V

Test Method: FCC part 2. 1046& KDB 935210 D05 Indus Booster Basic Meas v01r01

Test Requirement: FCC part 90.219(e)(1)

6.1.1 Limit

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 according to tables 1.

Table 1 Maximum output power limits

Assigned frequency range(MHz)	Maximum output power(ERP)	
	W	dBm
Above 150	5	37.00

NOTE:

1. RF channels to be tested for single-carrier: Low frequency, Mid frequency and High frequency.
2. Modulation types are C4FM, Tetra and Analog FM and LTE.
3. The nominal output power by Manufacturer declaration: Downlink 33dBm ± 1dB and Uplink 27dBm ± 1dB.

6.1.2 Test configuration

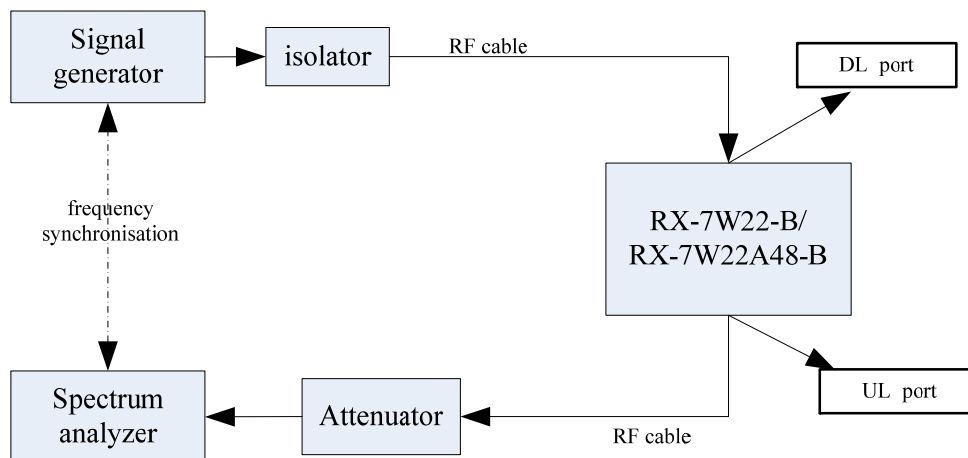


Figure 1: Maximum output power arrangement for Downlink

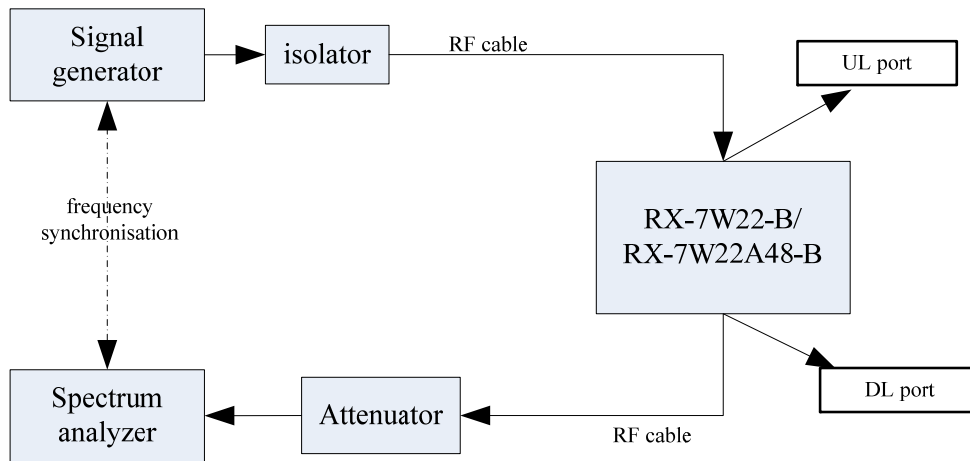


Figure 2: Maximum output power arrangement for Uplink

6.1.3 Test procedures

- (1) Connect the device as illustrated Figure 1 and Figure 2, when the output power is over the maximum value of the Spectrum Analyzer, add the attenuator to avoid destroying.
- (2) The signal generator should initially be configured to produce either of the required test signals (i.e., broadband).
- (3) Set the signal generator frequency to the center frequency of the EUT operating band.
- (4) While monitoring the output power of the EUT, measured using the methods of in KDB Publication 971168 [R8], increase the input level until a 1 dB increase in the input signal power no longer causes a 1 dB increase in the output signal power.
- (5) Record this level as the ALC threshold level.
- (6) Repeat the procedure with the remaining test signal.
- (7) Repeat RF channels to be tested for single-carrier: Low frequency and High frequency.

Note: The device has ALC function.

6.1.4 Test Results

6.1.4.1 700MHz Band

6.1.4.1.1 Modulation signal: LTE

Resolution Bandwidth:	100kHz
Video Bandwidth:	1MHz
Configuration:	Single Band
Carrier band:	10MHz
Operating frequency range:	Downlink: 758MHz~768MHz Uplink: 788MHz~798MHz

Carrier frequency (MHz)	Input power (dBm)	Output power ^{1*} (dBm)	Limit(dBm)	Margin ^{2*} (dB)	Result
1. Input Power: AC 120V, 50/60Hz					
(1). Downlink transmit mode					
763.0	-57.20	33.74	37.00	-3.26	pass
(2). Uplink transmit mode					
793.0	-63.30	26.60	37.00	-10.40	pass
2. Input Power: DC -48V					
(3). Downlink transmit mode					
763.0	-57.20	33.03	37.00	-3.34	pass
(4). Uplink transmit mode					
793.0	-62.80	26.60	37.00	-10.50	pass
Note:					
1*--Output power means to Maximum value from output port (with ALC).					
2*--Margin= Maximum ERP- specification limit.					

6.1.4.1.2 Modulation signal: C4FM

Resolution Bandwidth:	100 Hz
Video Bandwidth:	300 Hz
Detector mode:	Peak
Trace mode:	RMS
Symbol Rate:	4.8ksps
Configuration:	Single Band
Operating frequency range:	Downlink: 769MHz~775MHz Uplink:799MHz~805MHz

Carrier frequency (MHz)	Input power (dBm)	Output power ^{1*} (dBm)	Limit(dBm)	Margin ^{2*} (dB)	Result
1. Input Power: AC 120V,50/60Hz					
(1). Downlink transmit mode					
769.00625	-56.50	32.73	37.00	-4.27	pass
772.00625	-57.10	32.70	37.00	-4.30	pass
774.99375	-57.00	32.32	37.00	-4.68	pass
(2). Uplink transmit mode					
799.00625	-62.80	27.15	37.00	-9.85	pass
802.00625	-63.00	27.27	37.00	-9.73	pass
804.99375	-63.20	27.28	37.00	-9.72	pass
2. Input Power: DC -48V					
(3). Downlink transmit mode					
769.00625	-56.40	33.15	37.00	-3.85	pass
772.00625	-57.20	33.09	37.00	-3.91	pass
774.99375	-56.60	32.82	37.00	-4.18	pass
(4). Uplink transmit mode					
799.00625	-63.00	26.80	37.00	-10.20	pass
802.00625	-63.00	27.01	37.00	-9.99	pass
804.99375	-63.00	27.01	37.00	-9.99	pass
Note: 1*--Output power means to Maximum value from output port (with ALC). 2*--Margin= Maximum ERP- specification limit.					

6.1.4.1.3 Modulation signal: Tetra

Resolution Bandwidth:	300 Hz
Video Bandwidth:	1 kHz
Detector mode:	Peak
Trace mode:	RMS
Symbol Rate:	18ksps
Configuration:	Single Band
Operating frequency range:	Downlink: 769MHz~775MHz Uplink:799MHz~805MHz

Carrier frequency (MHz)	Input power (dBm)	Output power ^{1*} (dBm)	Limit(dBm)	Margin ^{2*} (dB)	Result
1. Input Power: AC 120V,50/60Hz					
(1). Downlink transmit mode					
769.0125	-56.90	32.69	37.00	-4.31	pass
772.0125	-57.20	32.61	37.00	-4.39	pass
774.9875	-57.10	32.34	37.00	-4.64	pass
(2). Uplink transmit mode					
799.0125	-62.60	27.40	37.00	-9.60	pass
802.0125	-62.70	27.52	37.00	-9.48	pass
804.9875	-62.90	27.53	37.00	-9.47	pass
2. Input Power: DC -48V					
(3). Downlink transmit mode					
769.0125	-56.50	33.14	37.00	-3.86	pass
772.0125	-57.20	33.08	37.00	-3.92	pass
774.9875	-56.70	32.81	37.00	-4.19	pass
(4). Uplink transmit mode					
799.0125	-62.70	27.20	37.00	-9.80	pass
802.0125	-62.90	27.33	37.00	-9.67	pass
804.9875	-62.90	27.32	37.00	-9.68	pass
Note:					
1*--Output power means to Maximum value from output port (with ALC).					
2*--Margin= Maximum ERP- specification limit.					

6.1.4.1.4 Modulation signal: Analog FM

Resolution Bandwidth:	300 Hz
Video Bandwidth:	1 kHz
Detector mode:	Peak
Trace mode:	RMS
Symbol Rate:	1ksps
Frequency Dev:	10kHz
Configuration:	Single Band
Operating frequency range:	Downlink: 769MHz~775MHz Uplink:799MHz~805MHz

Carrier frequency (MHz)	Input power (dBm)	Output power ^{1*} (dBm)	Limit(dBm)	Margin ^{2*} (dB)	Result
1. Input Power: AC 120V,50/60Hz					
(1). Downlink transmit mode					
769.0125	-56.80	33.61	37.00	-3.39	pass
772.0125	-57.20	33.54	37.00	-3.46	pass
774.9875	-57.10	33.24	37.00	-3.76	pass
(2). Uplink transmit mode					
799.0125	-62.90	27.11	37.00	-9.89	pass
802.0125	-62.90	27.26	37.00	-9.74	pass
804.9875	-63.20	27.26	37.00	-9.74	pass
2. Input Power: DC -48V					
(3). Downlink transmit mode					
769.0125	-56.40	33.20	37.00	-3.80	pass
772.0125	-57.20	33.12	37.00	-3.88	pass
774.9875	-56.60	32.84	37.00	-4.16	pass
(4). Uplink transmit mode					
799.0125	-63.00	26.90	37.00	10.10	pass
802.0125	-63.10	27.03	37.00	-9.97	pass
804.9875	-63.10	27.04	37.00	-9.96	pass
Note:					
1*--Output power means to Maximum value from output port (with ALC).					
2*--Margin= Maximum ERP- specification limit.					

6.1.4.2 800MHz Band

6.1.4.2.1 Modulation signal: C4FM

Resolution Bandwidth:	100 Hz
Video Bandwidth:	300 Hz
Detector used:	RMS
Configuration:	Single Band
Symbol Rate:	4.8ksps
Operating frequency range:	Downlink: 851MHz~862MHz Uplink:806MHz~817MHz

Carrier frequency (MHz)	Input power (dBm)	Output power ^{1*} (dBm)	Limit(dBm)	Margin ^{2*} (dB)	Result
1. Input Power: AC 120V, 50/60Hz					
(1). Downlink transmit mode					
851.00625	-55.80	33.35	37.00	-3.65	pass
856.50625	-56.20	33.41	37.00	-3.59	pass
861.99375	-57.00	33.41	37.00	-3.59	pass
(2). Uplink transmit mode					
806.00625	-62.10	27.39	37.00	-9.61	pass
811.50625	-61.90	27.43	37.00	-9.57	pass
816.99375	-62.10	27.45	37.00	-9.55	pass
2. Input Power: DC -48V					
(3). Downlink transmit mode					
851.00625	-55.50	33.39	37.00	-3.61	pass
856.50625	-56.20	33.61	37.00	-3.39	pass
861.99375	-56.90	33.31	37.00	-3.69	pass
(4). Uplink transmit mode					
806.00625	-62.10	27.14	37.00	-9.86	pass
811.50625	-62.00	27.30	37.00	-9.70	pass
816.99375	-60.70	27.16	37.00	-9.84	pass
Note:					
1*--Output power means to Maximum value from output port (with ALC).					
2*--Margin= Maximum ERP- specification limit.					

6.1.4.2.2 Modulation signal: Tetra

Resolution Bandwidth:	300 Hz
Video Bandwidth:	1 kHz
Detector used:	RMS
Configuration:	Single Band
Symbol Rate:	18ksps
Operating frequency range:	Downlink: 851MHz~862MHz Uplink:806MHz~817MHz

Carrier frequency (MHz)	Input power (dBm)	Output power ^{1*} (dBm)	Limit(dBm)	Margin ^{2*} (dB)	Result
1. Input Power: AC 120V,50/60Hz					
(1). Downlink transmit mode					
851.0125	-55.70	33.05	37.00	-3.95	pass
856.5125	-56.70	33.42	37.00	-3.58	pass
861.9875	-57.40	33.41	37.00	-3.69	pass
(2). Uplink transmit mode					
806.0125	-61.90	27.55	37.00	-9.45	pass
811.5125	-62.00	27.55	37.00	-9.45	pass
816.9875	-61.90	27.65	37.00	-9.35	pass
2. Input Power: DC -48V					
(3). Downlink transmit mode					
851.0125	-55.50	33.34	37.00	-3.66	pass
856.5125	-56.20	33.62	37.00	-3.38	pass
861.9875	-57.00	33.24	37.00	-3.76	pass
(4). Uplink transmit mode					
806.0125	-62.00	27.44	37.00	-9.56	pass
811.5125	-61.80	27.60	37.00	-9.40	pass
816.9875	-61.60	27.43	37.00	-9.57	pass
Note: 1*--Output power means to Maximum value from output port (with ALC). 2*--Margin= Maximum ERP- specification limit.					

6.1.4.2.3 Modulation signal: Analog FM

Resolution Bandwidth:	300 Hz
Video Bandwidth:	1 kHz
Detector used:	RMS
Configuration:	Single Band
Symbol Rate:	1ksps
Frequency Dev:	10kHz
Operating frequency range:	Downlink: 851MHz~862MHz Uplink:806MHz~817MHz

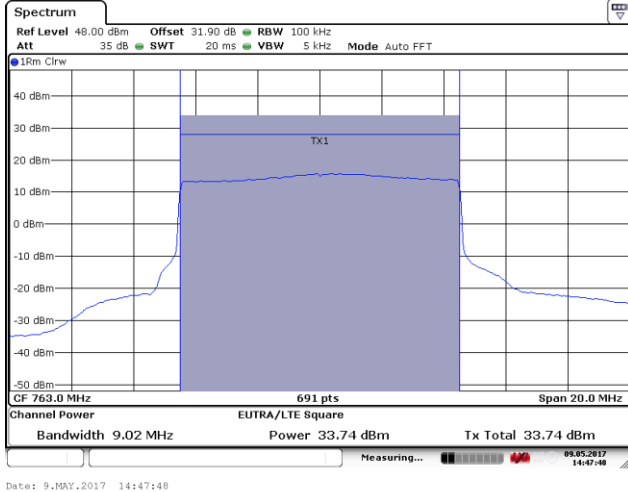
Carrier frequency (MHz)	Input power (dBm)	Output power ^{1*} (dBm)	Limit(dBm)	Margin ^{2*} (dB)	Result
1. Input Power: AC 120V,50/60Hz					
(1). Downlink transmit mode					
851.0125	-55.90	33.33	37.00	-3.67	pass
856.5125	-56.60	33.38	37.00	-3.62	pass
861.9875	-57.00	33.38	37.00	-3.62	pass
(2). Uplink transmit mode					
806.0125	-62.10	27.40	37.00	-9.60	pass
811.5125	-62.00	27.27	37.00	-9.73	pass
816.9875	-61.50	27.45	37.00	-9.55	pass
2. Input Power: DC -48V					
(3). Downlink transmit mode					
851.0125	-55.70	33.40	37.00	-3.60	pass
856.5125	-56.20	33.59	37.00	-3.41	pass
861.9875	-56.90	33.29	37.00	-3.71	pass
(4). Uplink transmit mode					
806.0125	-62.20	27.15	37.00	-9.85	pass
811.5125	-62.10	27.31	37.00	-9.69	pass
816.9875	-61.70	27.20	37.00	-9.80	pass
Note:					
1*--Output power means to Maximum value from output port (with ALC).					
2*--Margin= Maximum ERP- specification limit.					

6.1.5 Test screenshot

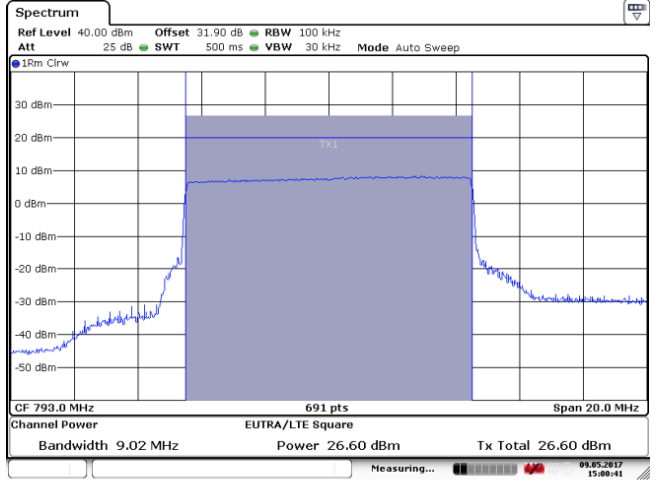
6.1.5.1 700MHz Band

6.1.5.1.1 Modulation signal: LTE

1). AC 120V, 50/60Hz

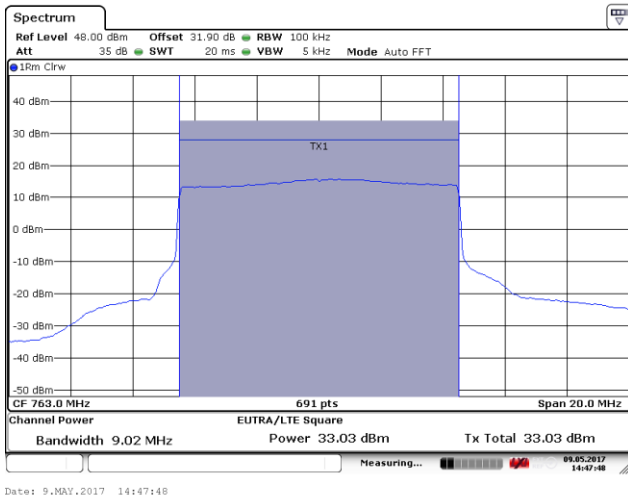


Downlink Frequency: 763MHz

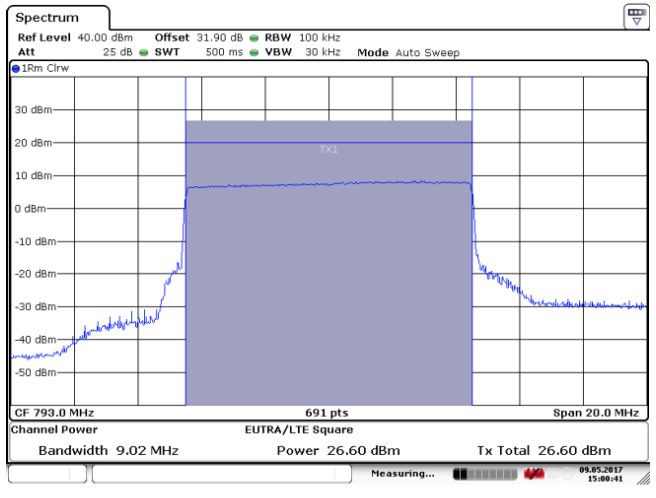


Uplink Frequency: 793MHz

2). DC -48V



Downlink Frequency: 763MHz

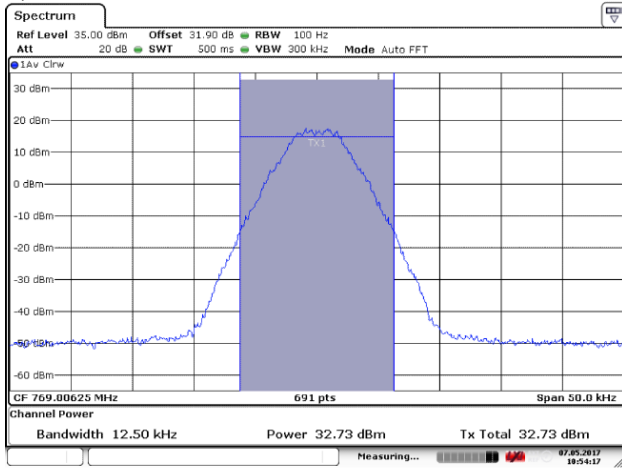


Uplink Frequency: 793MHz

6.1.5.1.2 Modulation signal: C4FM

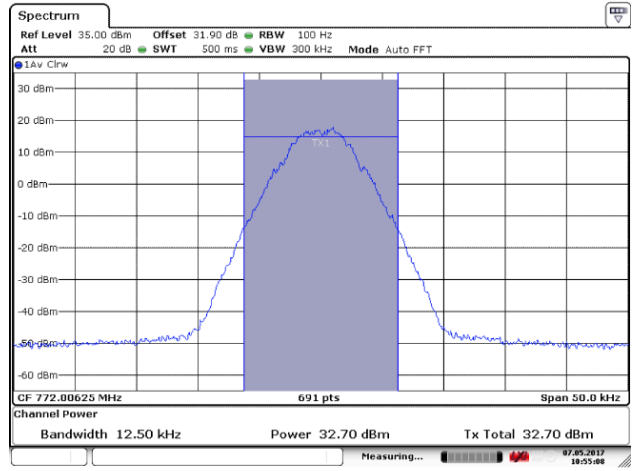
(1) Downlink

1). AC 120V, 50/60Hz



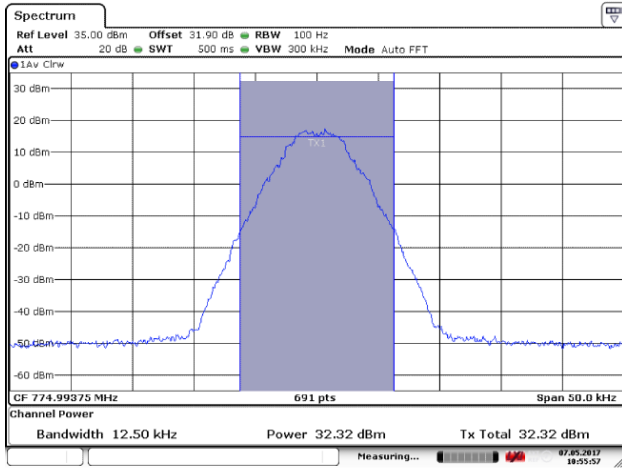
Date: 7.MAY.2017 10:54:17

Low Frequency: 769.00625MHz



Date: 7.MAY.2017 10:55:08

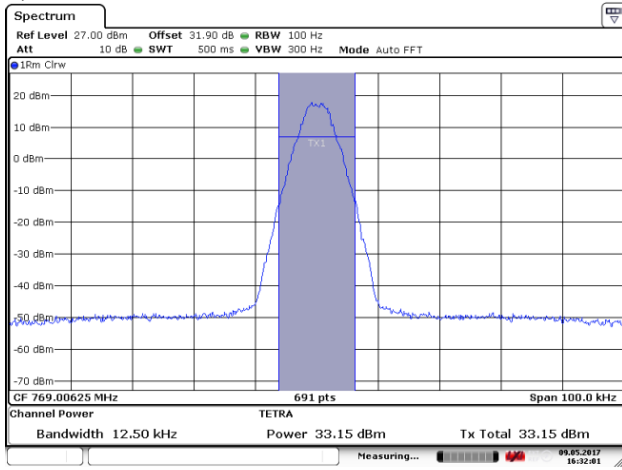
Mid Frequency: 772.00625MHz



Date: 7.MAY.2017 10:55:57

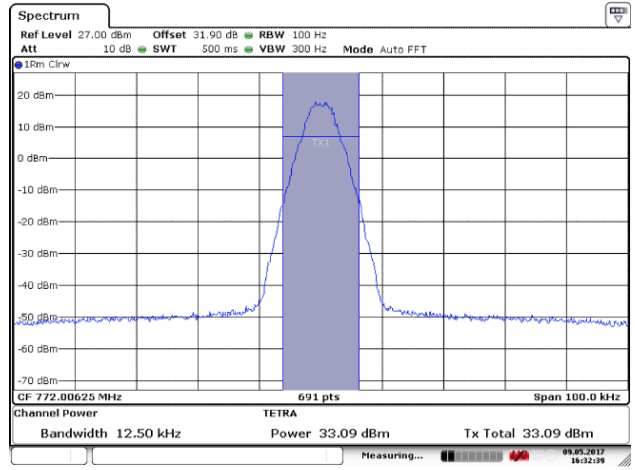
High Frequency: 774.99375MHz

2). DC -48V



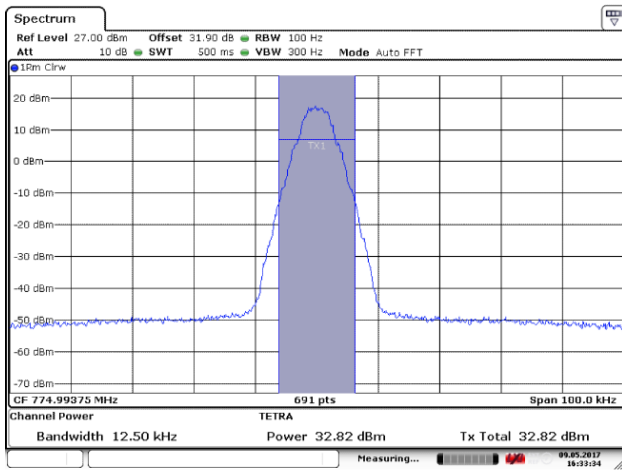
Date: 9.MAY.2017 16:32:01

Low Frequency: 769.00625MHz



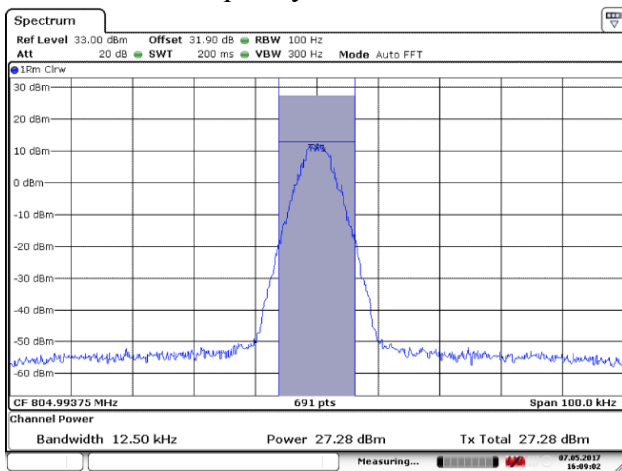
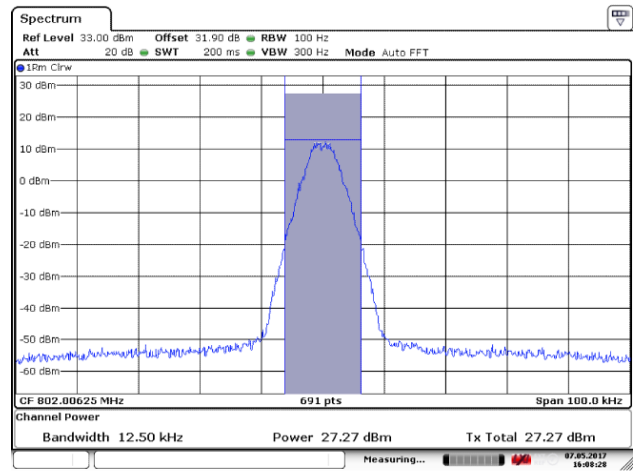
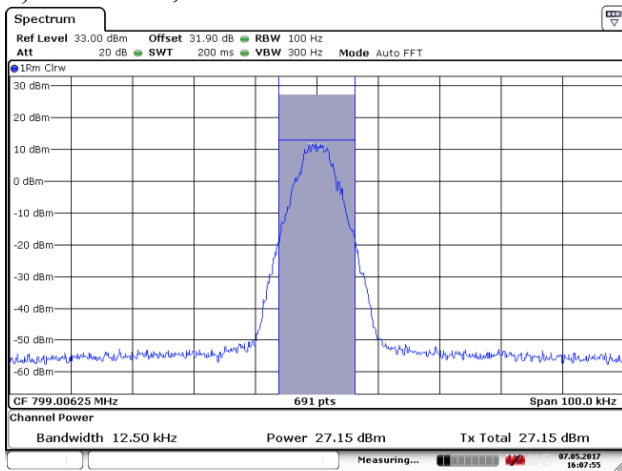
Date: 9.MAY.2017 16:32:39

Mid Frequency: 772.00625MHz

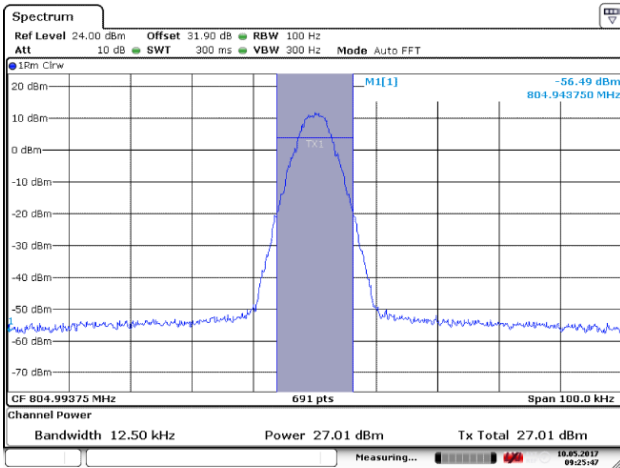
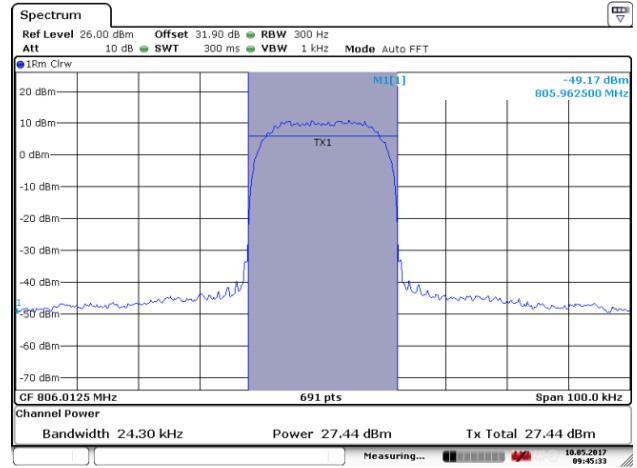
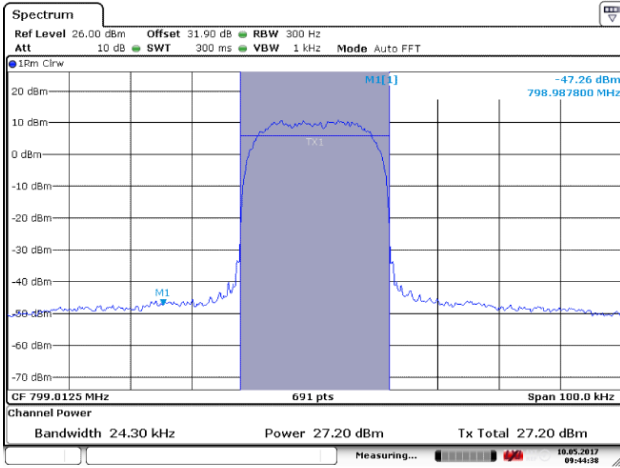


(2) Uplink

1). AC 120V, 50/60Hz



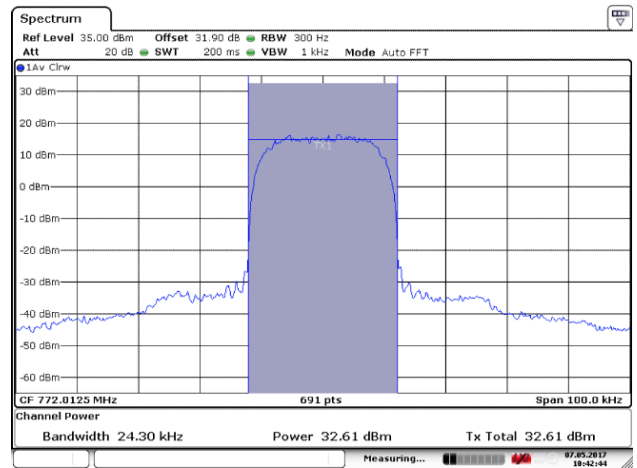
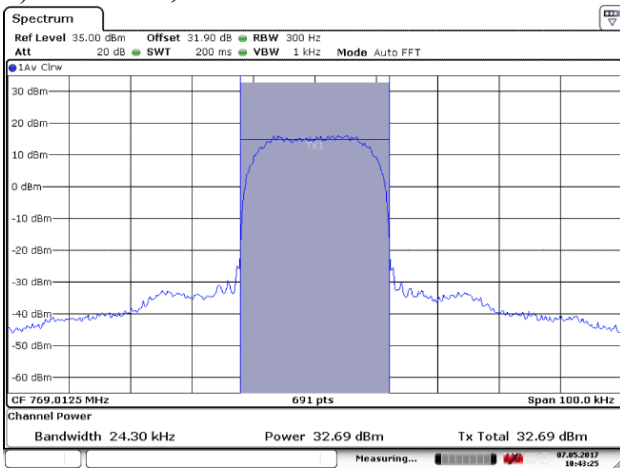
2). DC -48V

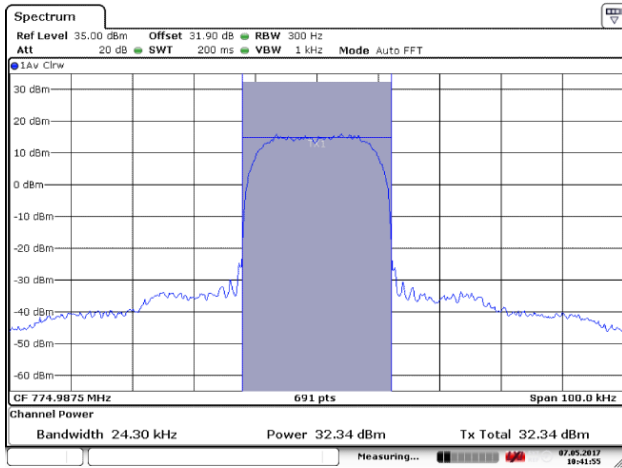


6.1.5.1.3 Modulation signal: Tetra

(1) Downlink

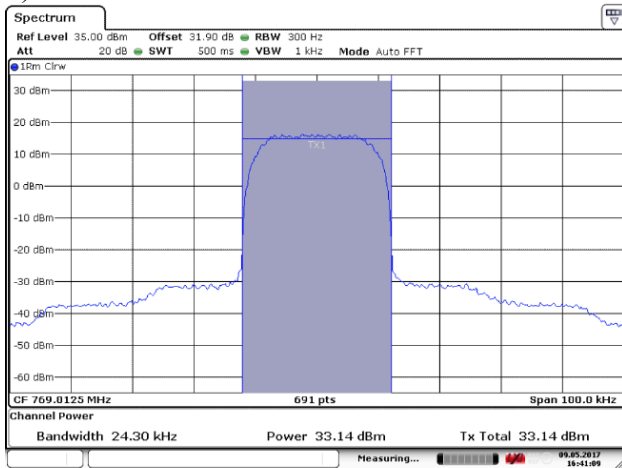
1). AC 120V, 50/60Hz



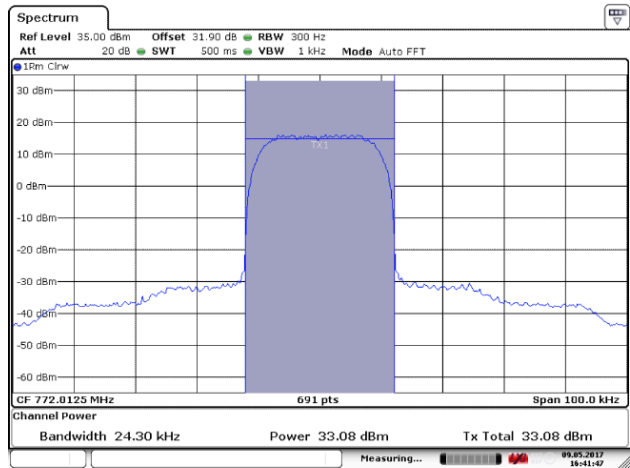


High Frequency: 774.9875MHz

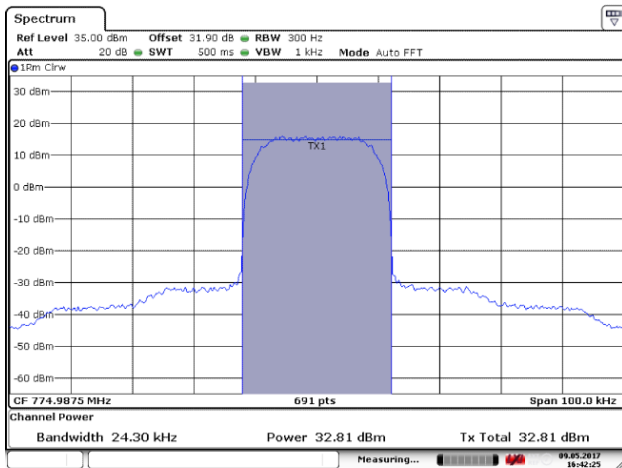
2). DC -48V



Low Frequency: 769.0125MHz



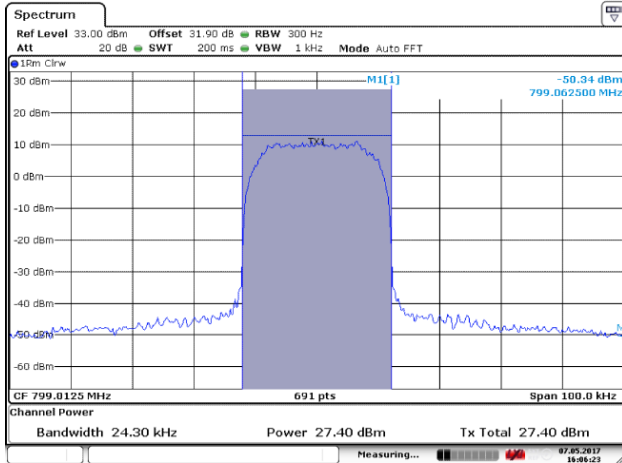
Mid Frequency: 772.0125MHz



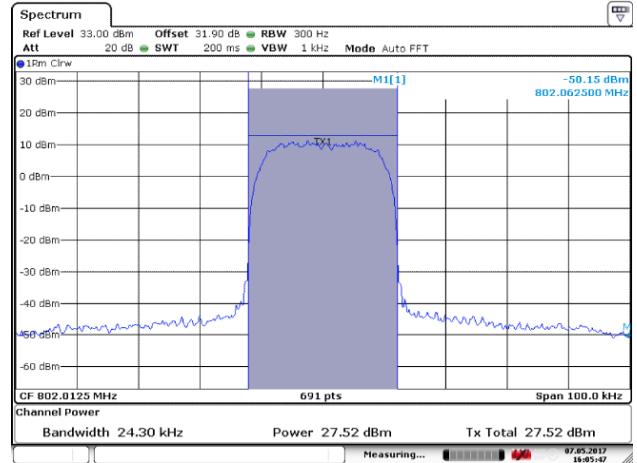
High Frequency: 774.9875MHz

(2) Uplink

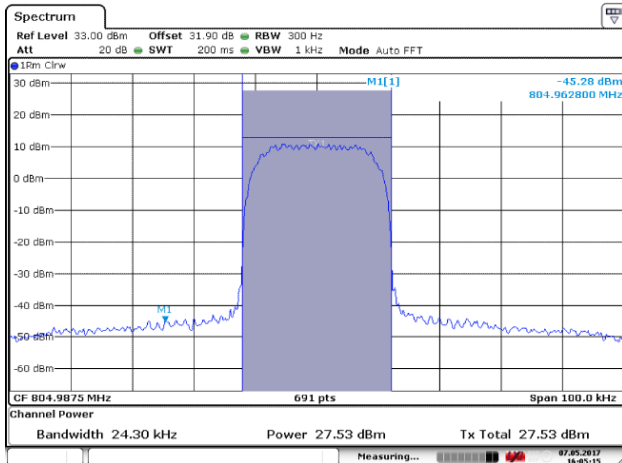
1). AC 120V, 50/60Hz



Low Frequency: 799.0125MHz

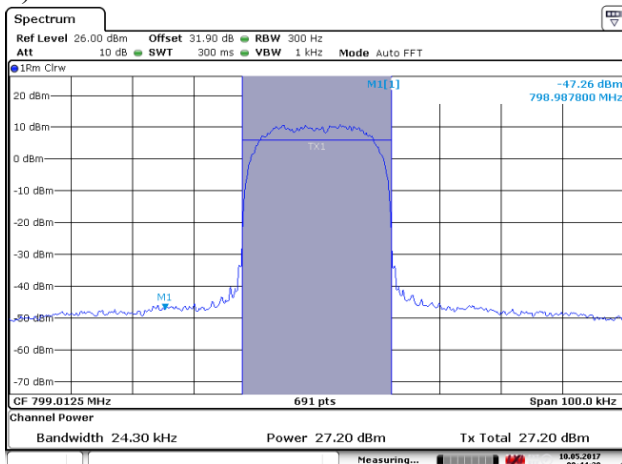


Mid Frequency: 802.0125MHz

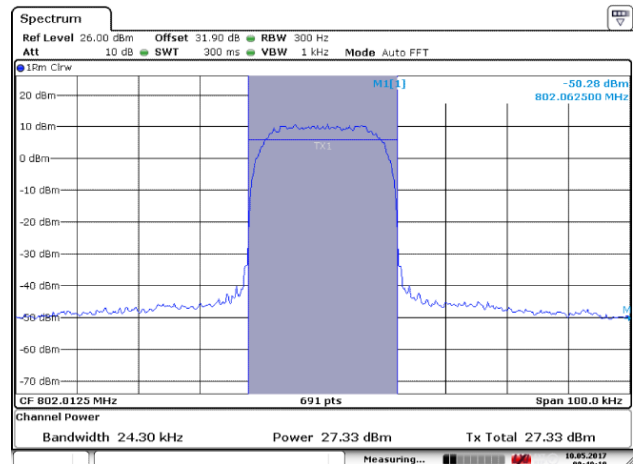


High Frequency: 804.9875MHz

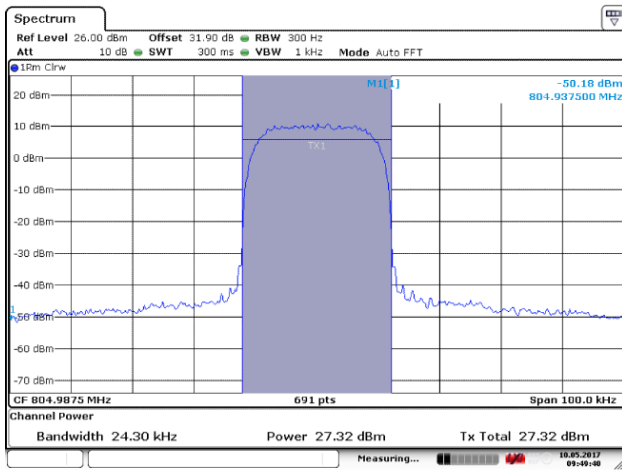
2). DC -48V



Low Frequency: 799.0125MHz



Mid Frequency: 802.0125MHz

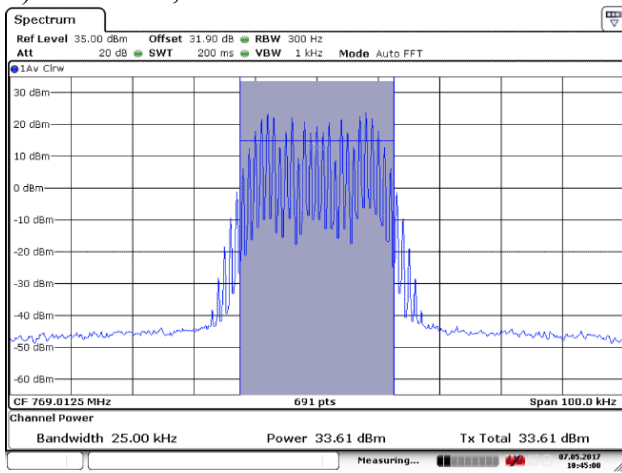


High Frequency: 804.9875MHz

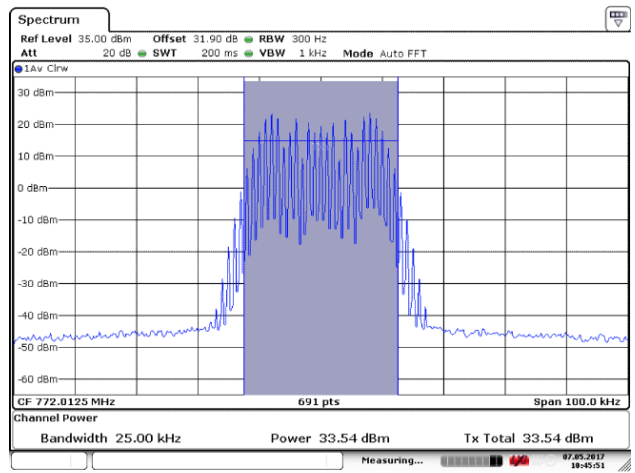
6.1.5.1.4 Modulation signal: Analog FM(10kHz/1kHz)

(1) Downlink

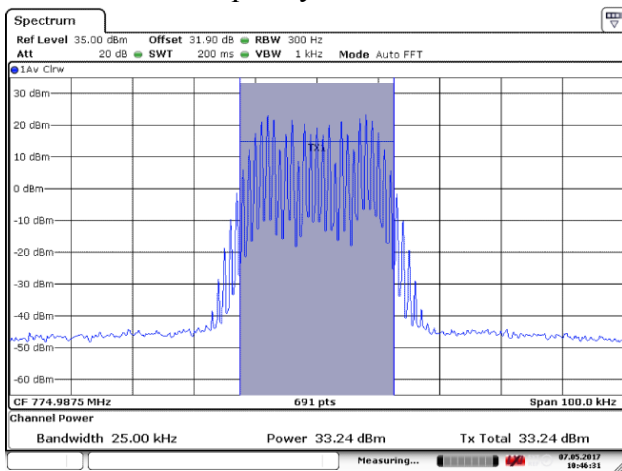
1). AC 120V, 50/60Hz



Low Frequency: 769.0125MHz

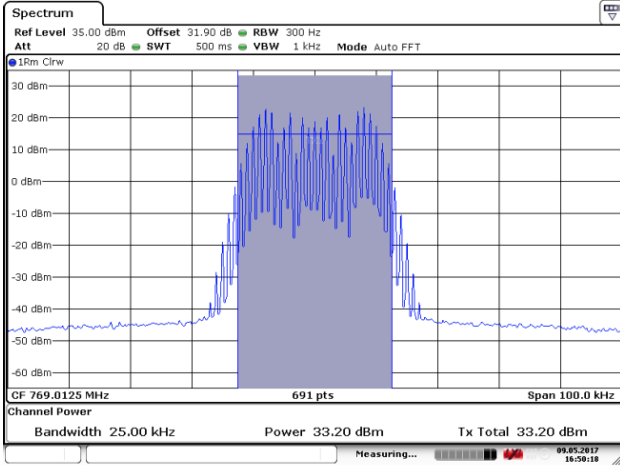


Mid Frequency: 772.0125MHz



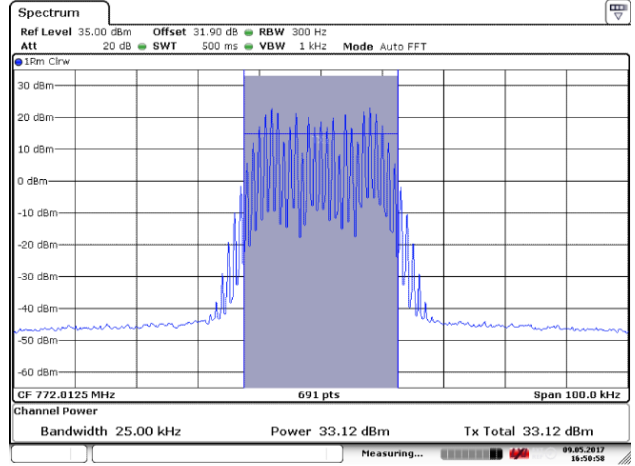
High Frequency: 774.9875MHz

2). DC -48V



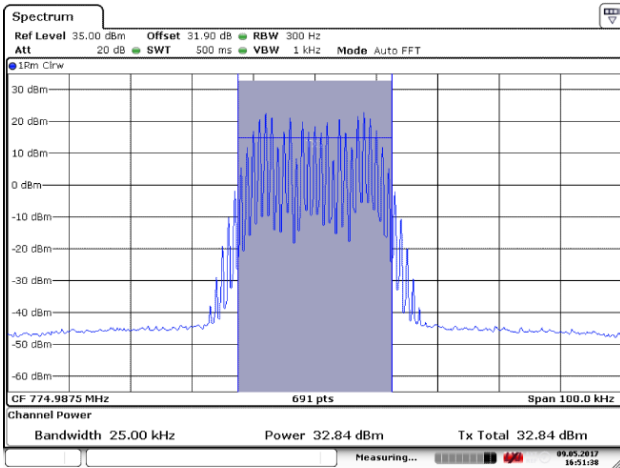
Date: 9.MAY.2017 16:50:18

Low Frequency: 769.0125MHz



Date: 9.MAY.2017 16:50:58

Mid Frequency: 772.0125MHz

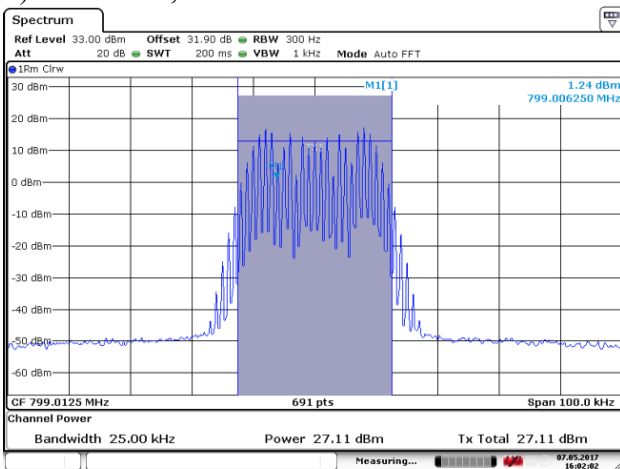


Date: 9.MAY.2017 16:51:38

High Frequency: 774.9875MHz

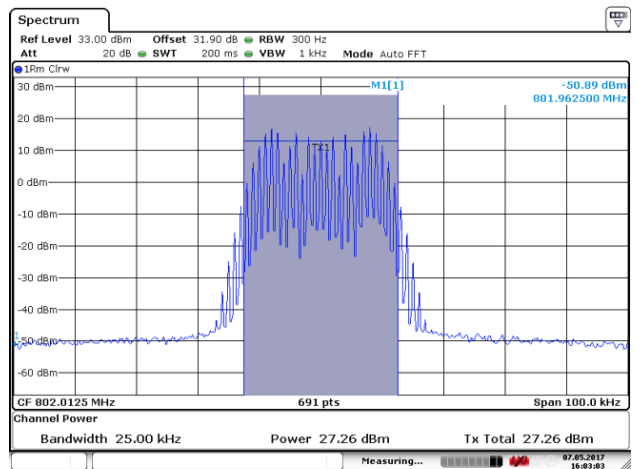
(2) Uplink

1). AC 120V, 50/60Hz



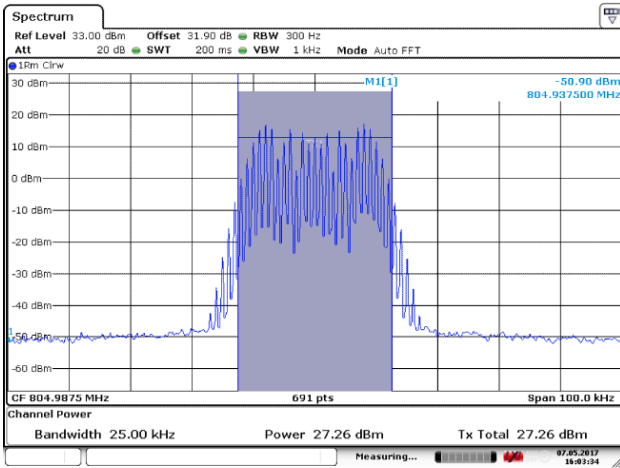
Date: 7.MAY.2017 16:02:03

Low Frequency: 799.0125MHz



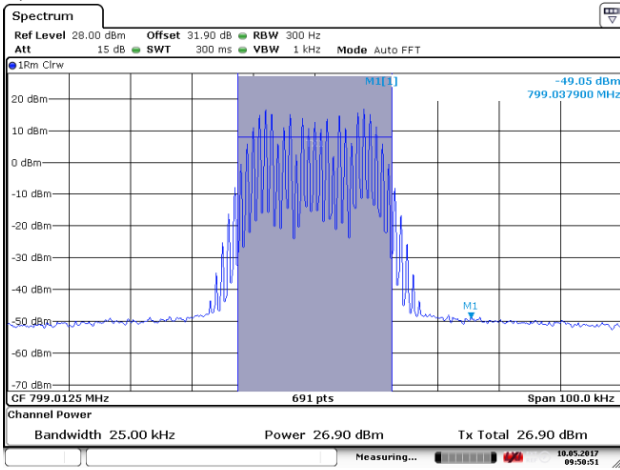
Date: 7.MAY.2017 16:03:03

Mid Frequency: 802.0125MHz

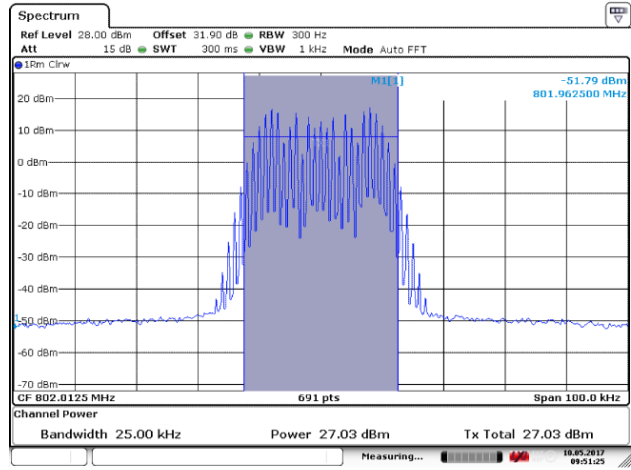


High Frequency: 804.9875MHz

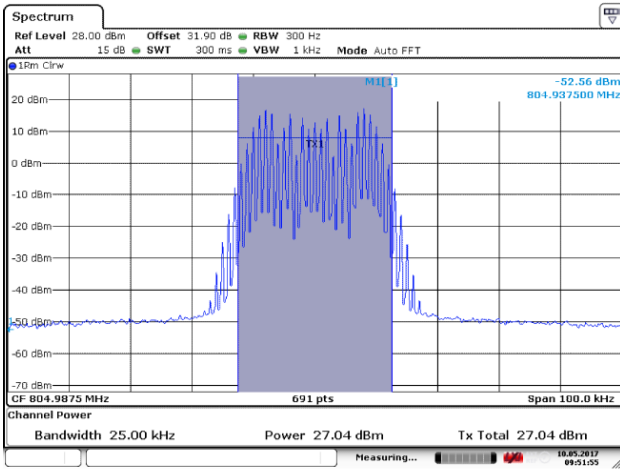
2). DC -48V



Low Frequency: 799.0125MHz



Mid Frequency: 802.0125MHz



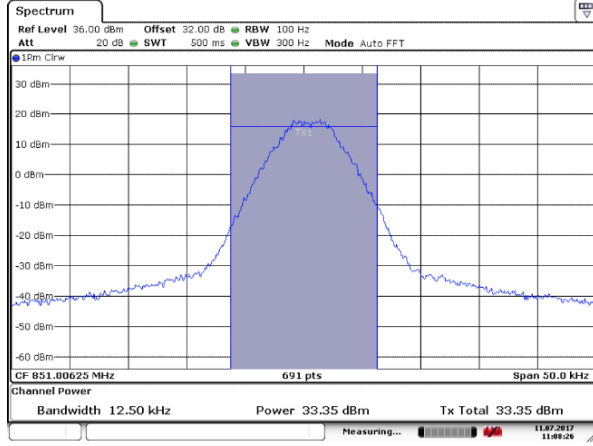
High Frequency: 804.9875MHz

6.1.5.2 800MHz Band

6.1.5.2.1 Modulation signal: C4FM

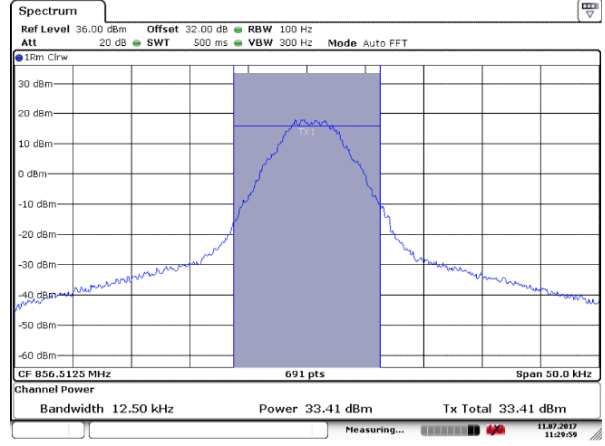
(1) Downlink

1). AC 120V, 50/60Hz



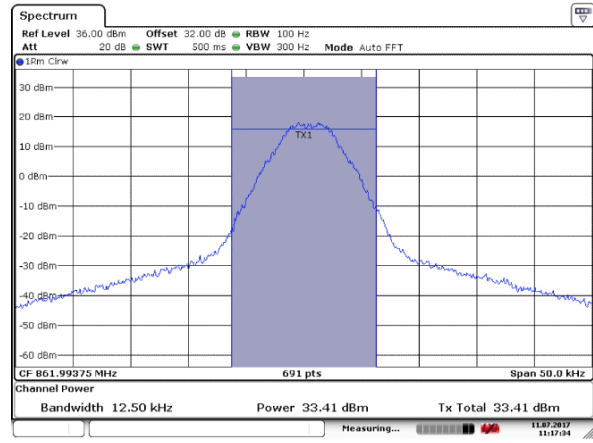
Date: 11.JUL.2017 11:08:26

Low Frequency: 851.00625MHz



Date: 11.JUL.2017 11:29:59

Mid Frequency: 856.50625MHz

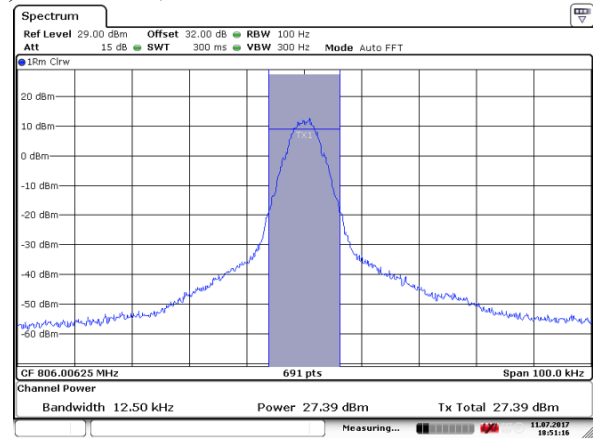


Date: 11.JUL.2017 11:17:34

High Frequency: 861.99375MHz

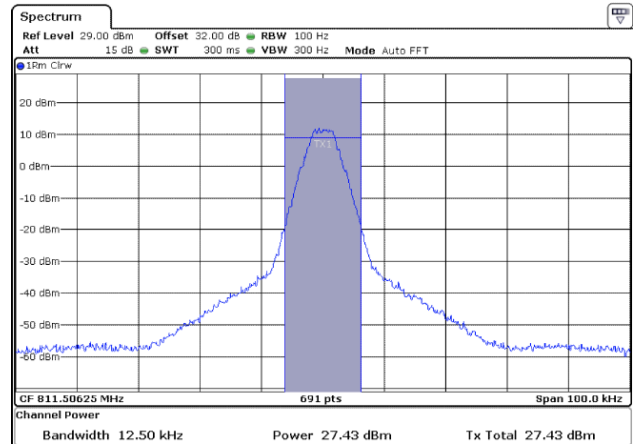
(2) Uplink

1). AC 120V, 50/60Hz



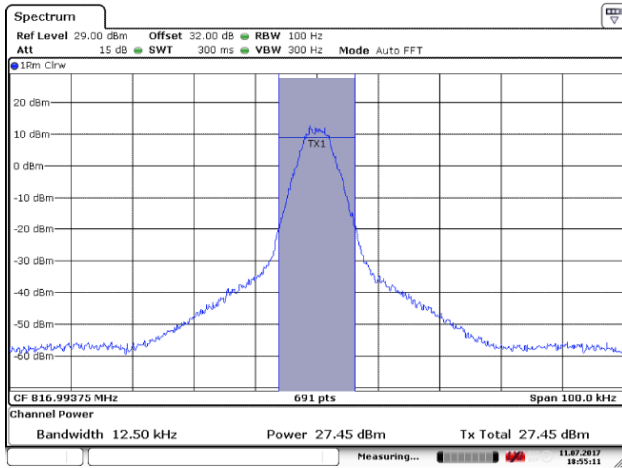
Date: 11.JUL.2017 18:51:16

Low Frequency: 806.00625MHz



Date: 11.JUL.2017 18:52:45

Mid Frequency: 811.50625MHz

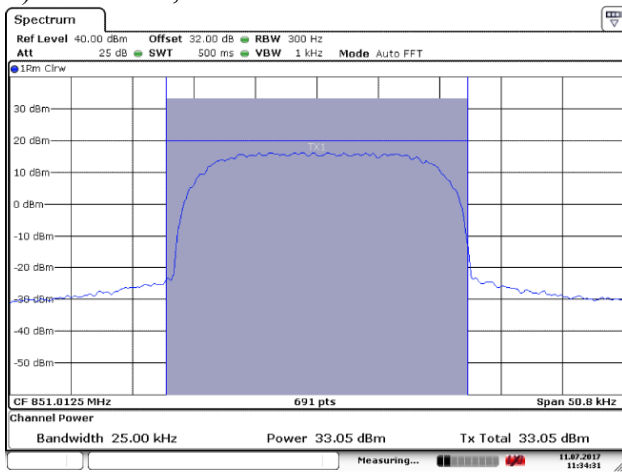


High Frequency: 816.99375MHz

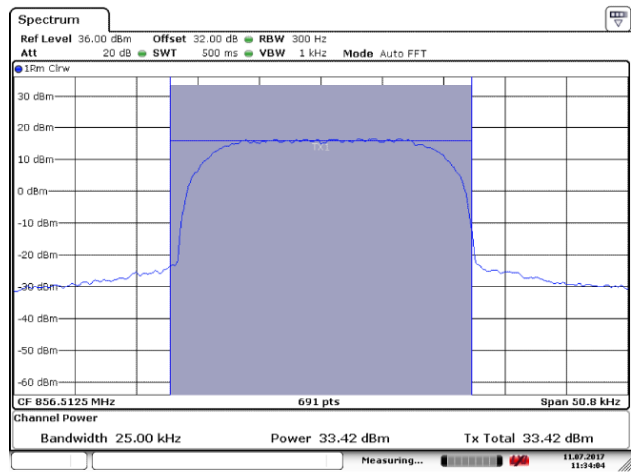
6.1.5.2.2 Modulation signal: Tetra

(1) Downlink

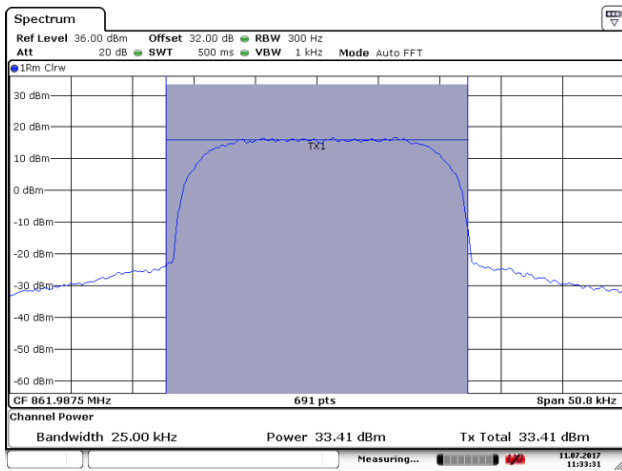
1). AC 120V, 50/60Hz



Low Frequency: 851.0125MHz



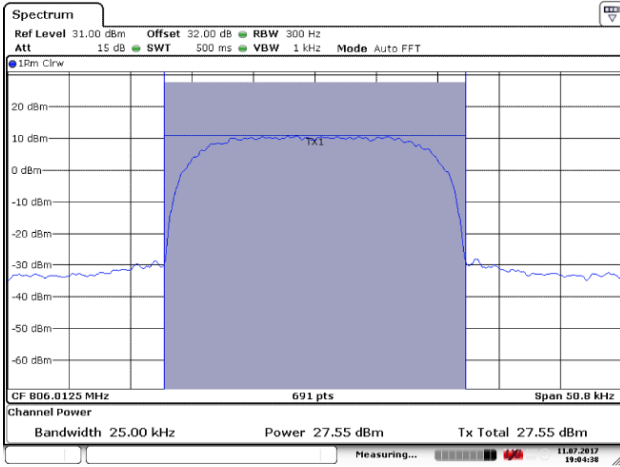
Mid Frequency: 856.5125MHz



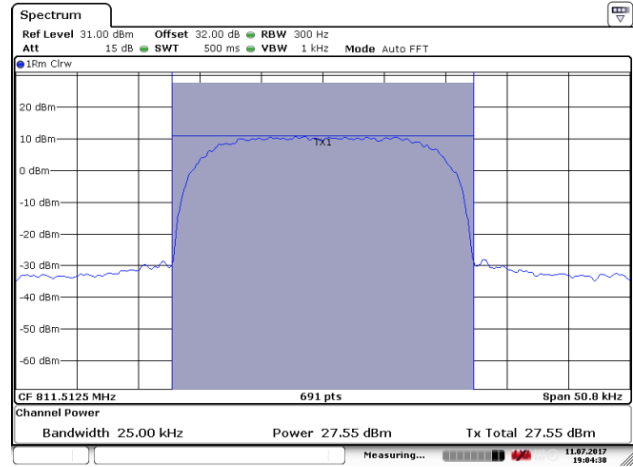
High Frequency: 861.9875MHz

(2) Uplink

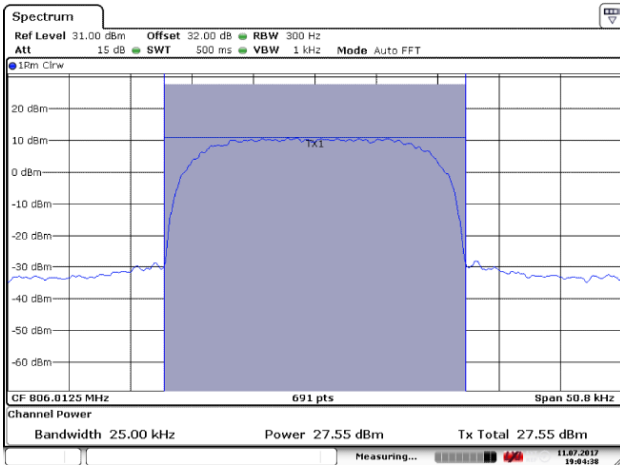
1). AC 120V, 50/60Hz



Low Frequency: 806.0125MHz



Mid Frequency: 811.5125MHz

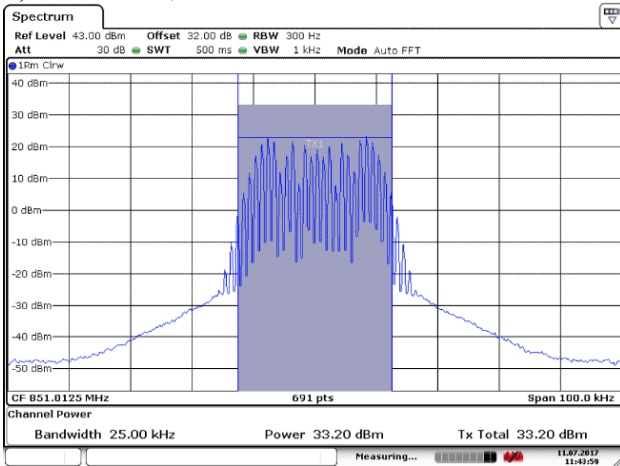


High Frequency: 816.9875MHz

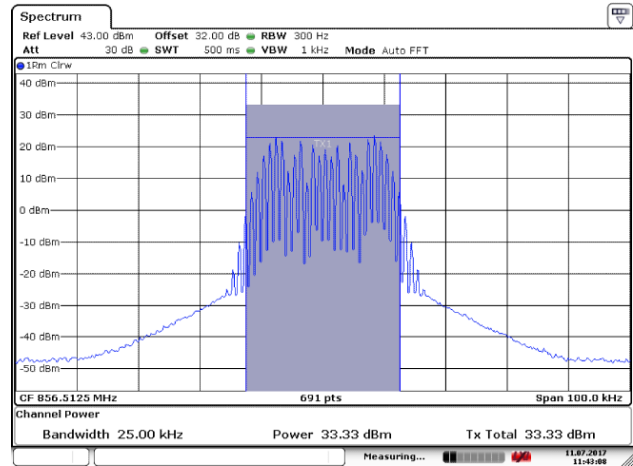
6.1.5.2.3 Modulation signal: Analog FM(10kHz/1kHz)

(1) Downlink

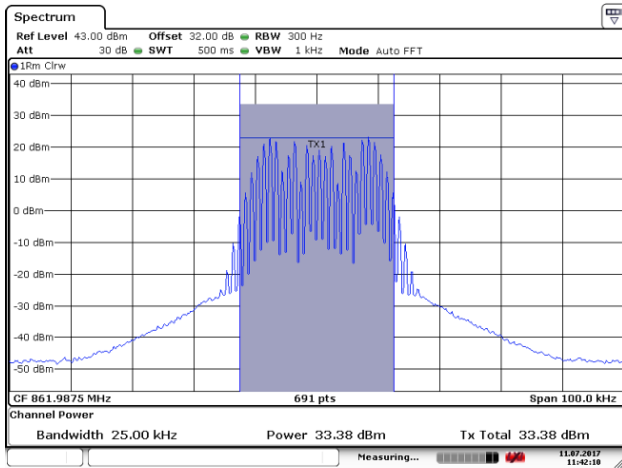
1). AC 120V, 50/60Hz



Low Frequency: 851.0125MHz

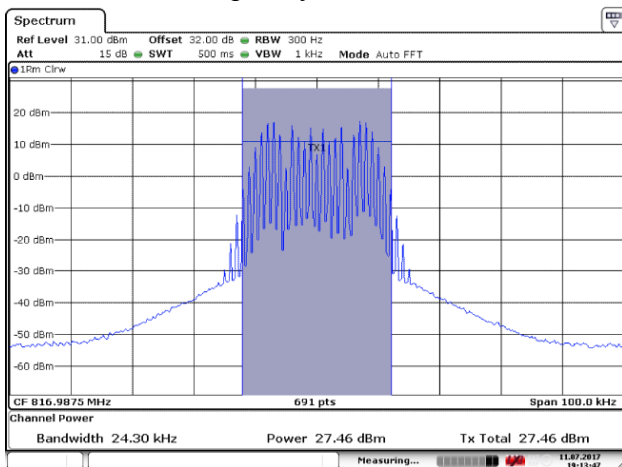
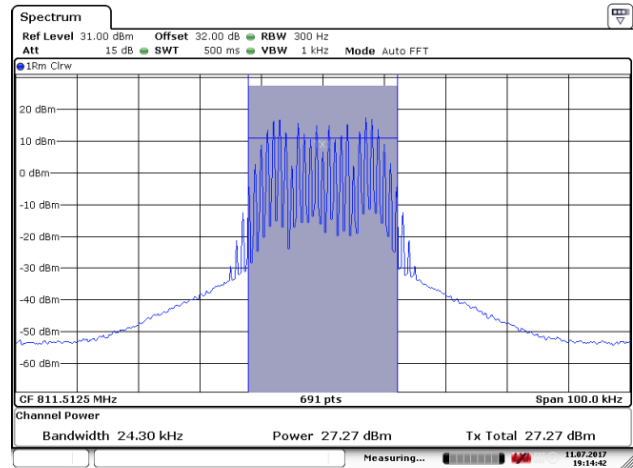
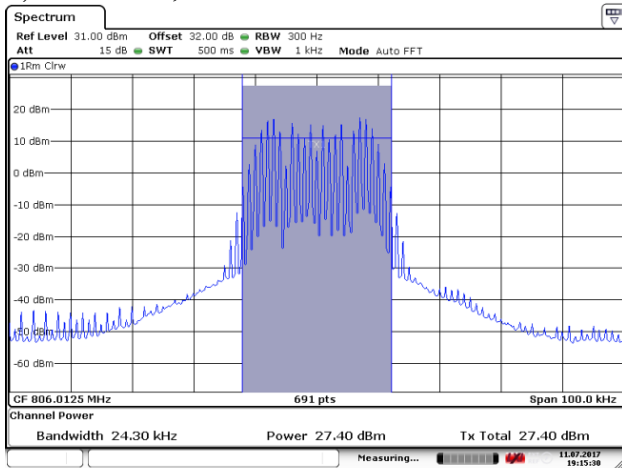


Mid Frequency: 856.5125MHz



(2) Uplink

1). AC 120V, 50/60Hz



6.2 Occupied bandwidth

Test Date (yy-mm-dd): 2017-05-16 to 2017-07-11

Test environment: Normal

Ambient Temp 24.1°C~26.1°C, Humid 46%~51%, Atmospheric Pressure 101kpa

Power supply: AC 120V 50/60Hz

Test Method: FCC part 2. 1049& KDB 935210 D05 Indus Booster Basic Meas v01r01

Test Requirement: FCC part 90.219(a)

6.2.1 Limit

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in table 2.

Table 2 Occupied bandwidth limits

Assigned frequency (MHz)	Modulation envelope reference points or X% power)	Maximum allowed bandwidth
700MHz Band(LTE) Downlink: 758~768 Uplink:788~798	26dBc or 99%	10MHz
700MHz Band Downlink: 769~775 Uplink:799~805	26dBc or 99%	75kHz
800MHz Band Downlink: 851~869 Uplink:806~824	26dBc or 99%	75kHz

NOTE:

1. RF channels to be tested for single-carrier: Low, Mid and High frequency.
2. Modulation types are C4FM, Tetra , Analog FM and LTE.
3. Modulation envelope reference points are provided in terms of attenuation below the modulated carrier.

6.2.2 Test configuration

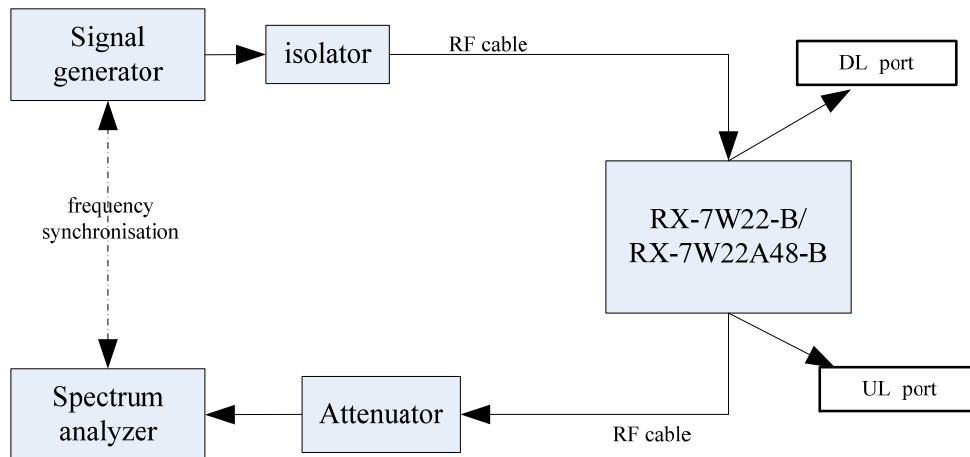


Figure 3: Occupied bandwidth arrangement for Downlink

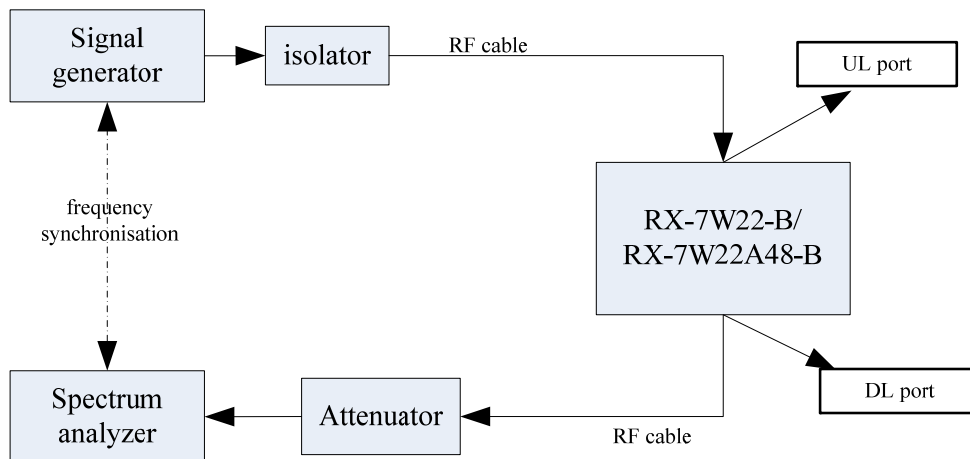


Figure 4: Occupied bandwidth arrangement for Uplink

6.2.3 Test procedures

- (1) Connect the device as illustrated Figure 3 and Figure 4, when the output power is over the maximum value of the Spectrum Analyzer, add the attenuator to avoid destroying.
- (2) Configure the signal generator to transmit the appropriate test signal associated with the public safety emission designation.
- (3) Configure the signal level to be just below the ALC threshold and maximum gain.
- (4) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation as necessary.
- (5) Set the spectrum analyzer center frequency to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between 2 times to 5 times the OBW.
- (6) The nominal RBW shall be 100 Hz for 12.5kHz channel and 300 Hz for 25kHz channel and 100kHz for LTE.

- (7) Set the reference level of the spectrum analyzer to accommodate the maximum input amplitude level.
- (8) Set spectrum analyzer detection mode to peak, and trace mode to max hold.
- (9) Allow the trace to fully stabilize.
- (10) Confirm that the signal is contained within the appropriate emissions mask.
- (11) Use the marker function to determine the maximum emission level and record the associated frequency as f_0 .
- (12) Capture the emissions mask plot for inclusion in the test report (output signal spectra).
- (13) Measure the EUT input signal power (signal generator output signal) directly from the signal generator using power measurement guidance provided in KDB Publication 971168 [R8] (input signal spectra).
- (14) Compare the spectral plot of the output signal (determined in step 11), to the input signal (determined in step 1) to affirm they are similar (in passband and roll off characteristic features and relative spectral locations).
- (15) Repeat steps (4) to (16) with the input signal amplitude set 3 dB above the AGC threshold;
- (16) Repeat steps (2) to (17) for all authorized operational bands and emissions types.
- (17) Include all accumulated spectral plots depicting EUT input signal and EUT output signal in the test report, and note any observed dissimilarities.
- (18) Repeat RF channels to be tested for single-carrier: Low and High frequency.

6.2.4 Test Results

6.2.4.1 700MHz Band

6.2.4.1.1 Modulation signal: LTE

Resolution Bandwidth:	100 kHz
Video Bandwidth:	1MHz
Detector mode:	Peak hold
Trace mode:	Maximum hold
Modulation envelope reference points	20dBc
Configuration:	Single Band
Operating frequency range:	Downlink: 758MHz~768MHz Uplink:788MHz~798MHz

Carrier frequency (MHz)	Input power (dBm)	Input Occupied BW(MHz)	Output Occupied BW (MHz)	Max.Limit (MHz)	Result
Downlink transmit mode					
763.00	-57.20	9.262	9.262	10.00	pass
	-54.20	9.262	9.233	10.00	pass
Uplink transmit mode					
793.00	-63.30	9.262	9.262	10.00	pass
	-60.30	9.262	9.262	10.00	pass

6.2.4.1.2 Modulation signal: C4FM

Resolution Bandwidth:	100 Hz
Video Bandwidth:	300 Hz
Detector mode:	Peak hold
Trace mode:	Maximum hold
Modulation envelope reference points	20dBc
Configuration:	Single Band
Symbol Rate:	4.8ksps
Operating frequency range:	Downlink: 769MHz~775MHz Uplink:799MHz~805MHz

Carrier frequency (MHz)	Input power (dBm)	Input Occupied BW(kHz)	Output Occupied BW (kHz)	Max.Limit (kHz)	Result
Downlink transmit mode					
769.00625	-56.50	9.55	9.55	75.00	pass