

## 6.4 Conducted spurious emissions

Test Date (yy-mm-dd): 2016-05-06 to 2016-05-15

Test environment: Normal

Ambient Temp 24.5°C~26.3°C, Humid 49%~65%, Atmospheric Pressure 101kpa

Power supply: AC 120V 50/60Hz

Test Method: KDB 935210 D05 Indus Booster Basic Meas v01r01

Test Requirement: FCC part 90.219(e)(3)

### 6.4.1 Limit

Specification test limits of spurious emissions from a signal booster are given in table 8

Table 8 Spurious emissions limits

frequency range	Maximum level	Measurement bandwidth
9kHz~150kHz	-13dBm	1kHz
150kHz~30MHz	-13dBm	10kHz
30MHz~1000MHz	-13dBm	100kHz
1000MHz~8600MHz	-13dBm	1MHz

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(10kHz/1kHz);

### 6.4.2 Test configuration

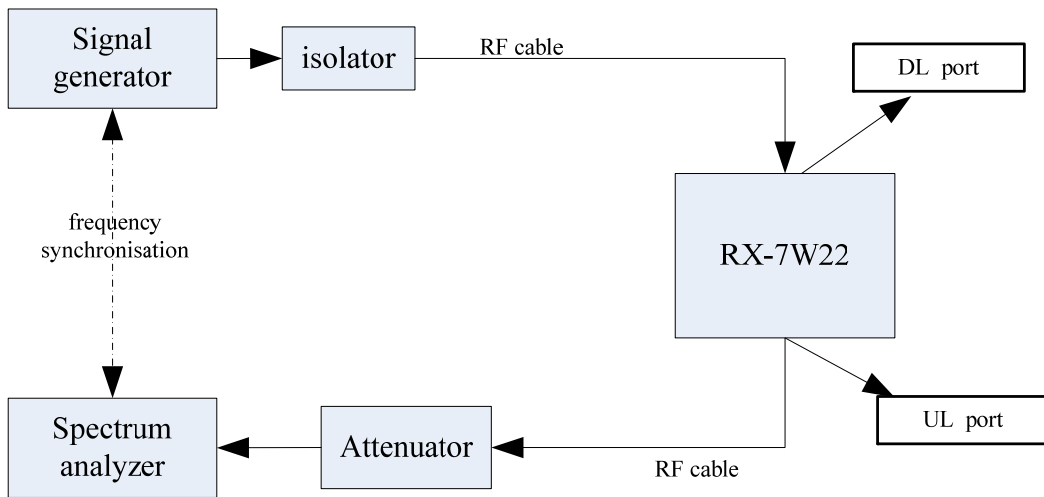


Figure 7: Conducted spurious emissions arrangement for Downlink

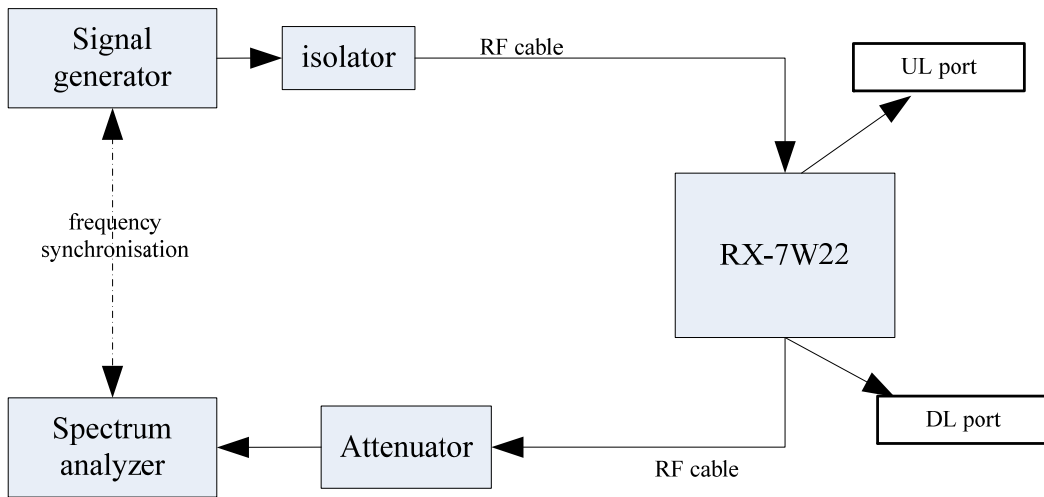


Figure 8: Conducted spurious emissions arrangement for Uplink

### 6.4.3 Test procedures

- (1) Connect the equipment as illustrated Figure 7 and Figure 8, 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 C4FM(Tetra or Analog FM) test signals;
- (3) Set the signal generator frequency to the center frequency of the EUT operating band;
- (4) Set the output power level so that the resultant signal is just below the AGC threshold and maximum gain;
- (5) Connect a spectrum analyzer to the output of the EUT, using appropriate attenuation as necessary;
- (6) Set the RBW = 100 kHz. (i.e., for 30 MHz to 1 GHz PLMRS and/or PSRS booster devices);
- (7) Set the VBW =  $3 \times$  RBW;
- (8) Set the Sweep time = auto-couple;
- (9) Set the detector to PEAK;
- (10) 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;
- (11) 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.);
- (12) Capture a plot for inclusion in the test report;
- (13) Repeat steps (3) to (12) for each authorized frequency band/block of operation

## 6.4.4 Test Results

### 6.4.4.1 700MHz Band

#### 6.4.4.1.1 Modulation signal: C4FM

Frequency range		Max. Spurious Limit	RBW	Max. Spurious mark frequency	Max. Spurious mark Level(dBm)	Result
Downlink transmit mode						
Low frequency 769.00625MHz	9kHz~150kHz	-13dBm	1kHz	9.31kHz	-65.73	pass
	150kHz~30MHz	-13dBm	10kHz	172.0kHz	-72.75	pass
	30MHz~1000MHz	-13dBm	100kHz	759.0MHz	-43.24	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.5399GHz	-37.30	pass
Mid frequency 772.00625MHz	9kHz~150kHz	-13dBm	1kHz	9.10kHz	-65.97	pass
	150kHz~30MHz	-13dBm	10kHz	172.0kHz	-72.82	pass
	30MHz~1000MHz	-13dBm	100kHz	759.0MHz	-45.81	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.5437GHz	-37.23	pass
High frequency 774.99375MHz	9kHz~150kHz	-13dBm	1kHz	11.55kHz	-66.42	pass
	150kHz~30MHz	-13dBm	10kHz	172.0kHz	-73.44	pass
	30MHz~1000MHz	-13dBm	100kHz	759.0MHz	-42.66	pass
	1000MHz~8600MHz	-13dBm	1MHz	3.5906GHz	-37.38	pass
Uplink transmit mode						
Low frequency 799.00625MHz	9kHz~150kHz	-13dBm	1kHz	9.31kHz	-54.68	pass
	150kHz~30MHz	-13dBm	10kHz	29.892MHz	-63.55	pass
	30MHz~1000MHz	-13dBm	100kHz	790.40MHz	-36.46	pass
	1000MHz~8600MHz	-13dBm	1MHz	3.5567GHz	-30.45	pass
Mid frequency 802.00625MHz	9kHz~150kHz	-13dBm	1kHz	9.92kHz	-55.38	pass
	150kHz~30MHz	-13dBm	10kHz	25.745MHz	-63.49	pass
	30MHz~1000MHz	-13dBm	100kHz	790.40MHz	-36.26	pass
	1000MHz~8600MHz	-13dBm	1MHz	3.3761GHz	-30.52	pass

High frequency 804.99375MHz	9kHz~150kHz	-13dBm	1kHz	9.92kHz	-56.29	pass
	150kHz~30MHz	-13dBm	10kHz	24.449MHz	-62.70	pass
	30MHz~1000MHz	-13dBm	100kHz	797.40MHz	-26.04	pass
	1000MHz~8600MHz	-13dBm	1MHz	3.5831GHz	-30.05	pass

Note:

1\*--Margin= Maximum mark level- specification limit.

## 6.4.4.1.2 Modulation signal: Tetra

Frequency range	Max. Spurious Limit	RBW	Max. Spurious mark frequency	Max. Spurious mark Level(dBm)	Result	
Downlink transmit mode						
Low frequency 769.0125MHz	9kHz~150kHz	-13dBm	1kHz	17.88kHz	-27.17	pass
	150kHz~30MHz	-13dBm	10kHz	29.676MHz	-69.20	pass
	30MHz~1000MHz	-13dBm	100kHz	759.0MHz	-43.22	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.5399GHz	-35.56	pass
Mid frequency 772.0125MHz	9kHz~150kHz	-13dBm	1kHz	9.10kHz	-27.82	pass
	150kHz~30MHz	-13dBm	10kHz	28.596MHz	-69.23	pass
	30MHz~1000MHz	-13dBm	100kHz	759.0MHz	-45.52	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.5437GHz	-34.11	pass
High frequency 774.9875MHz	9kHz~150kHz	-13dBm	1kHz	17.88kHz	-30.96	pass
	150kHz~30MHz	-13dBm	10kHz	21.641MHz	-63.02	pass
	30MHz~1000MHz	-13dBm	100kHz	759.0MHz	-44.07	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.5512GHz	-35.05	pass
Uplink transmit mode						
Low frequency 799.0125MHz	9kHz~150kHz	-13dBm	1kHz	9.10kHz	-55.29	pass
	150kHz~30MHz	-13dBm	10kHz	24.881MHz	-62.85	pass
	30MHz~1000MHz	-13dBm	100kHz	789.0MHz	-38.74	pass

	1000MHz~8600MHz	-13dBm	1MHz	3.5793GHz	-30.16	pass
Mid frequency 802.0125MHz	9kHz~150kHz	-13dBm	1kHz	9.31kHz	-55.42	pass
	150kHz~30MHz	-13dBm	10kHz	21.641MHz	-62.84	pass
	30MHz~1000MHz	-13dBm	100kHz	824.10MHz	-36.08	pass
	1000MHz~8600MHz	-13dBm	1MHz	3.5529GHz	-30.16	pass
High frequency 804.9875MHz	9kHz~150kHz	-13dBm	1kHz	10.53kHz	-55.52	pass
	150kHz~30MHz	-13dBm	10kHz	27.30MHz	-62.74	pass
	30MHz~1000MHz	-13dBm	100kHz	797.40MHz	-26.09	pass
	1000MHz~8600MHz	-13dBm	1MHz	3.0074GHz	-29.60	pass
Note: 1*--Margin= Maximum mark level- specification limit.						

## 6.4.4.1.3 Modulation signal: Analog FM(10kHz/1kHz)

Frequency range	Max. Spurious Limit	RBW	Max. Spurious mark frequency	Max. Spurious mark Level(dBm)	Result	
Downlink transmit mode						
Low frequency 769.0125MHz	9kHz~150kHz	-13dBm	1kHz	9.31kHz	-66.62	pass
	150kHz~30MHz	-13dBm	10kHz	21.641MHz	-70.32	pass
	30MHz~1000MHz	-13dBm	100kHz	759.0MHz	-42.96	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.5399GHz	-36.53	pass
Mid frequency 772.0125MHz	9kHz~150kHz	-13dBm	1kHz	10.94kHz	-67.96	pass
	150kHz~30MHz	-13dBm	10kHz	172.0kHz	-68.62	pass
	30MHz~1000MHz	-13dBm	100kHz	759.0MHz	-46.35	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.5437GHz	-37.17	pass
High frequency 774.9875MHz	9kHz~150kHz	-13dBm	1kHz	9.31kHz	-66.87	pass
	150kHz~30MHz	-13dBm	10kHz	21.641MHz	-62.87	pass
	30MHz~1000MHz	-13dBm	100kHz	759.0MHz	-44.60	pass

	1000MHz~8600MHz	-13dBm	1MHz	3.5417GHz	-37.74	pass
Uplink transmit mode						
Low frequency 799.0125MHz	9kHz~150kHz	-13dBm	1kHz	11.55kHz	-54.31	pass
	150kHz~30MHz	-13dBm	10kHz	24.751MHz	-53.54	pass
	30MHz~1000MHz	-13dBm	100kHz	793.20MHz	-35.78	pass
	1000MHz~8600MHz	-13dBm	1MHz	3.4438GHz	-29.76	pass
Mid frequency 802.0125MHz	9kHz~150kHz	-13dBm	1kHz	9.10kHz	-54.45	pass
	150kHz~30MHz	-13dBm	10kHz	24.233MHz	-52.61	pass
	30MHz~1000MHz	-13dBm	100kHz	791.80MHz	-32.46	pass
	1000MHz~8600MHz	-13dBm	1MHz	3.5755GHz	-30.34	pass
High frequency 804.9875MHz	9kHz~150kHz	-13dBm	1kHz	10.94kHz	-53.75	pass
	150kHz~30MHz	-13dBm	10kHz	172kHz	-52.80	pass
	30MHz~1000MHz	-13dBm	100kHz	797.40MHz	-26.08	pass
	1000MHz~8600MHz	-13dBm	1MHz	3.4627GHz	-30.33	pass
Note: 1*--Margin= Maximum mark level- specification limit.						

## 6.4.4.2 800MHz Band

## 6.4.4.2.1 Modulation signal: C4FM

Frequency range		Max. Spurious Limit	RBW	Max. Spurious mark frequency	Max. Spurious mark Level(dBm)	Result
Downlink transmit mode						
Low frequency 851.00625MHz	9kHz~150kHz	-13dBm	1kHz	9.71kHz	-49.52	pass
	150kHz~30MHz	-13dBm	10kHz	23.239MHz	-67.90	pass
	30MHz~1000MHz	-13dBm	100kHz	534.7MHz	-40.71	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.7017GHz	-31.35	pass
Mid frequency 860.00625MHz	9kHz~150kHz	-13dBm	1kHz	10.94kHz	-50.97	pass
	150kHz~30MHz	-13dBm	10kHz	21.814MHz	-68.29	pass
	30MHz~1000MHz	-13dBm	100kHz	787.3MHz	-36.61	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.7205GHz	-31.52	pass
High frequency 868.99375MHz	9kHz~150kHz	-13dBm	1kHz	9.10kHz	-50.32	pass
	150kHz~30MHz	-13dBm	10kHz	24.795MHz	-67.97	pass
	30MHz~1000MHz	-13dBm	100kHz	631.5MHz	-38.19	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.7394GHz	-31.84	pass
Uplink transmit mode						
Low frequency 806.00625MHz	9kHz~150kHz	-13dBm	1kHz	10.94kHz	-64.65	pass
	150kHz~30MHz	-13dBm	10kHz	28.034MHz	-68.81	pass
	30MHz~1000MHz	-13dBm	100kHz	788.70MHz	-39.25	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.6114GHz	-39.99	pass
Mid frequency 816.00625MHz	9kHz~150kHz	-13dBm	1kHz	11.96kHz	-64.20	pass
	150kHz~30MHz	-13dBm	10kHz	24.147MHz	-69.04	pass
	30MHz~1000MHz	-13dBm	100kHz	797.20MHz	-36.99	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.6302GHz	-38.83	pass
High frequency 823.99375MHz	9kHz~150kHz	-13dBm	1kHz	18.28kHz	-66.05	pass



	150kHz~30MHz	-13dBm	10kHz	22.419MHz	-68.49	pass
	30MHz~1000MHz	-13dBm	100kHz	788.70MHz	-37.08	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.6491GHz	-38.42	pass
Note: 1*--Margin= Maximum mark level- specification limit.						

## 6.4.4.2.2 Modulation signal: Tetra

Frequency range		Max. Spurious Limit	RBW	Max. Spurious mark frequency	Max. Spurious mark Level(dBm)	Result
Downlink transmit mode						
Low frequency 851.0125MHz	9kHz~150kHz	-13dBm	1kHz	9.10kHz	-52.67	pass
	150kHz~30MHz	-13dBm	10kHz	26.134MHz	-58.30	pass
	30MHz~1000MHz	-13dBm	100kHz	656.80MHz	-39.93	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.7017GHz	-28.06	pass
Mid frequency 860.0125MHz	9kHz~150kHz	-13dBm	1kHz	9.51kHz	-54.70	pass
	150kHz~30MHz	-13dBm	10kHz	24.579MHz	-57.73	pass
	30MHz~1000MHz	-13dBm	100kHz	655.40MHz	-38.27	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.7205GHz	-28.31	pass
High frequency 868.9875MHz	9kHz~150kHz	-13dBm	1kHz	10.73kHz	-56.78	pass
	150kHz~30MHz	-13dBm	10kHz	25.097MHz	-57.86	pass
	30MHz~1000MHz	-13dBm	100kHz	655.40MHz	-37.60	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.7394GHz	-28.20	pass
Uplink transmit mode						
Low frequency 806.0125MHz	9kHz~150kHz	-13dBm	1kHz	9.10kHz	-59.13	pass
	150kHz~30MHz	-13dBm	10kHz	27.646MHz	-63.36	pass
	30MHz~1000MHz	-13dBm	100kHz	796.0MHz	-39.91	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.6114GHz	-36.88	pass

Mid frequency 815.0125MHz	9kHz~150kHz	-13dBm	1kHz	9.31kHz	-56.51	pass
	150kHz~30MHz	-13dBm	10kHz	22.332MHz	-62.42	pass
	30MHz~1000MHz	-13dBm	100kHz	797.40MHz	-35.42	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.6302GHz	-35.77	pass
High frequency 823.9875MHz	9kHz~150kHz	-13dBm	1kHz	9.10kHz	-56.64	pass
	150kHz~30MHz	-13dBm	10kHz	25.183MHz	-61.88	pass
	30MHz~1000MHz	-13dBm	100kHz	790.40MHz	-26.92	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.6491GHz	-36.26	pass
Note: 1*--Margin= Maximum mark level- specification limit.						

## 6.4.4.2.3 Modulation signal: Analog FM(10kHz/1kHz)

Frequency range	Max. Spurious Limit	RBW	Max. Spurious mark frequency	Max. Spurious mark Level(dBm)	Result	
Downlink transmit mode						
Low frequency 851.0125MHz	9kHz~150kHz	-13dBm	1kHz	9.10kHz	-59.28	pass
	150kHz~30MHz	-13dBm	10kHz	27.646MHz	-58.57	pass
	30MHz~1000MHz	-13dBm	100kHz	721.4MHz	-47.79	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.7017GHz	-31.97	pass
Mid frequency 860.0125MHz	9kHz~150kHz	-13dBm	1kHz	9.92kHz	-60.14	pass
	150kHz~30MHz	-13dBm	10kHz	21.512MHz	-58.72	pass
	30MHz~1000MHz	-13dBm	100kHz	711.5MHz	-47.93	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.7205GHz	-31.31	pass
High frequency 868.9875MHz	9kHz~150kHz	-13dBm	1kHz	9.71kHz	-59.82	pass
	150kHz~30MHz	-13dBm	10kHz	24.276MHz	-58.02	pass
	30MHz~1000MHz	-13dBm	100kHz	711.5MHz	-48.93	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.7394GHz	-31.89	pass

Uplink transmit mode						
Low frequency 806.0125MHz	9kHz~150kHz	-13dBm	1kHz	13.18kHz	-60.95	pass
	150kHz~30MHz	-13dBm	10kHz	26.955MHz	-67.81	pass
	30MHz~1000MHz	-13dBm	100kHz	796.0MHz	-40.90	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.6114GHz	-38.50	pass
Mid frequency 815.0125MHz	9kHz~150kHz	-13dBm	1kHz	11.35kHz	-60.71	pass
	150kHz~30MHz	-13dBm	10kHz	27.602MHz	-69.03	pass
	30MHz~1000MHz	-13dBm	100kHz	796.0MHz	-41.25	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.6302GHz	-36.40	pass
High frequency 823.9875MHz	9kHz~150kHz	-13dBm	1kHz	10.53kHz	-59.67	pass
	150kHz~30MHz	-13dBm	10kHz	29.503MHz	-68.07	pass
	30MHz~1000MHz	-13dBm	100kHz	790.40MHz	-33.84	pass
	1000MHz~8600MHz	-13dBm	1MHz	1.6491GHz	-36.71	pass
Note: 1*--Margin= Maximum mark level- specification limit.						

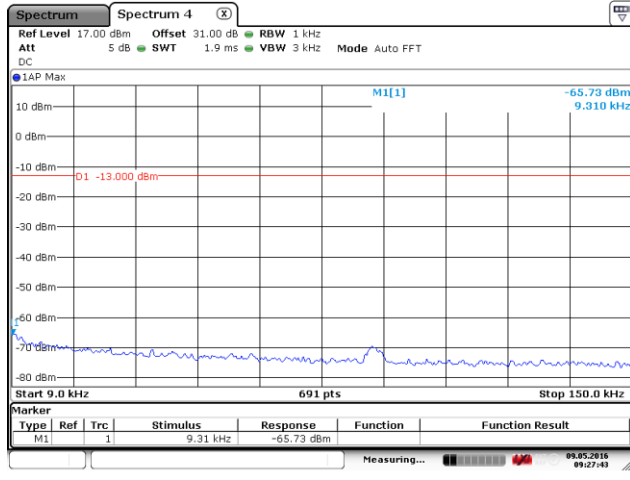
### 6.4.5 Test screenshot

#### 6.4.5.1 700MHz Band

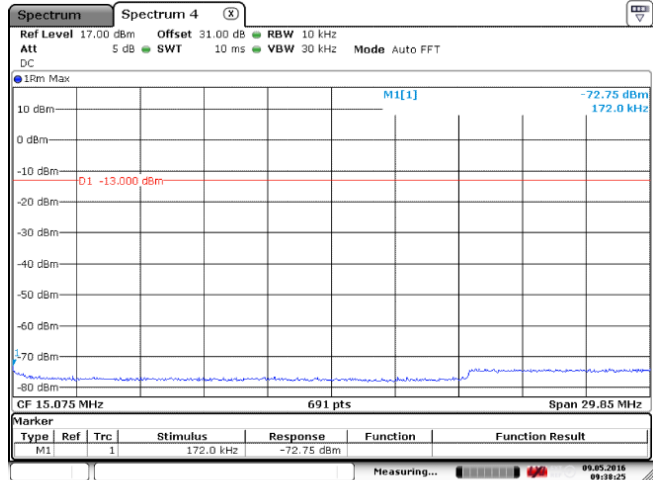
##### 6.4.5.1.1 Modulation signal: C4FM

##### (1) Downlink

##### (1.1) Low frequency 769.00625MHz

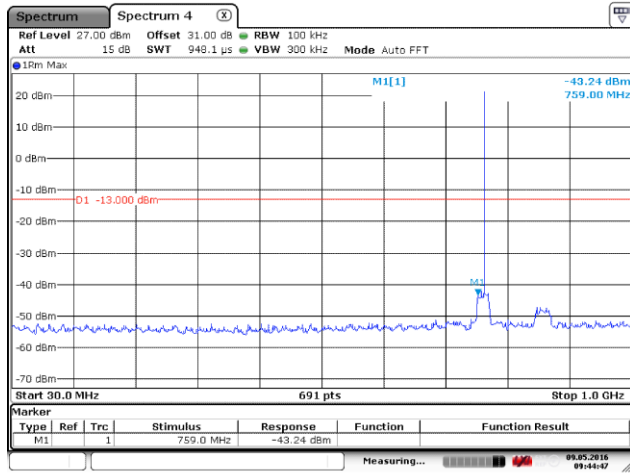


Date: 9.MAY.2016 09:27:43



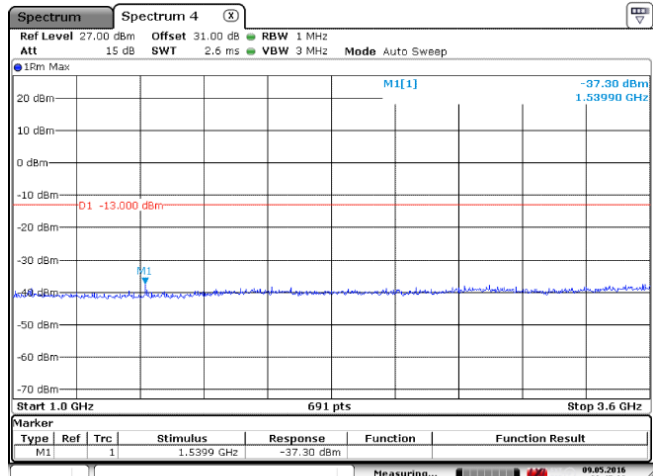
Date: 9.MAY.2016 09:38:25

##### 9kHz ~ 150 kHz



Date: 9.MAY.2016 09:44:47

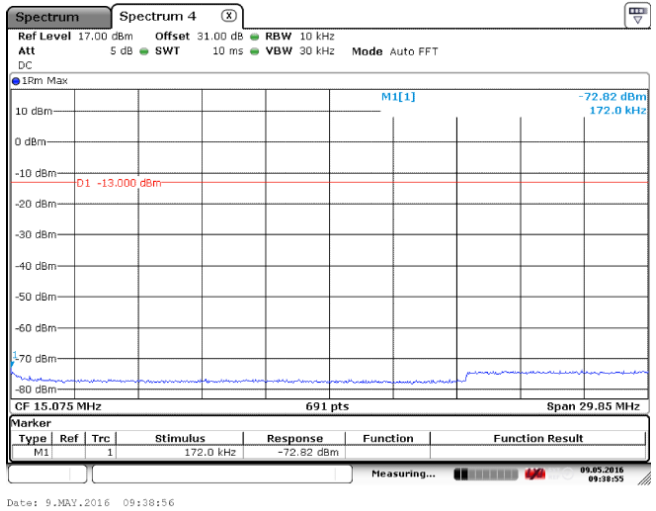
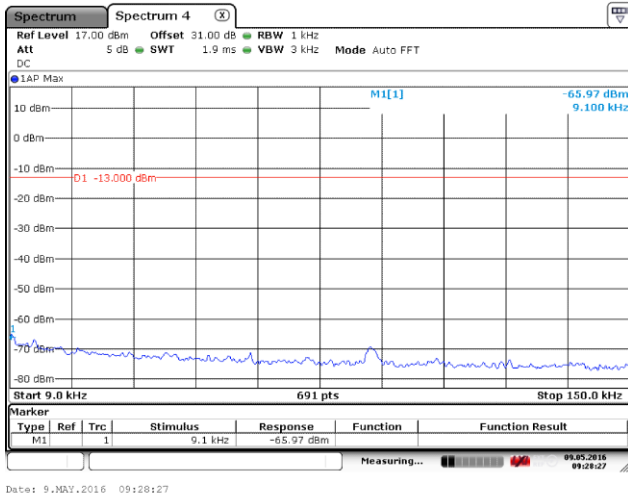
##### 30 MHz ~1.0 GHz



Date: 9.MAY.2016 09:45:33

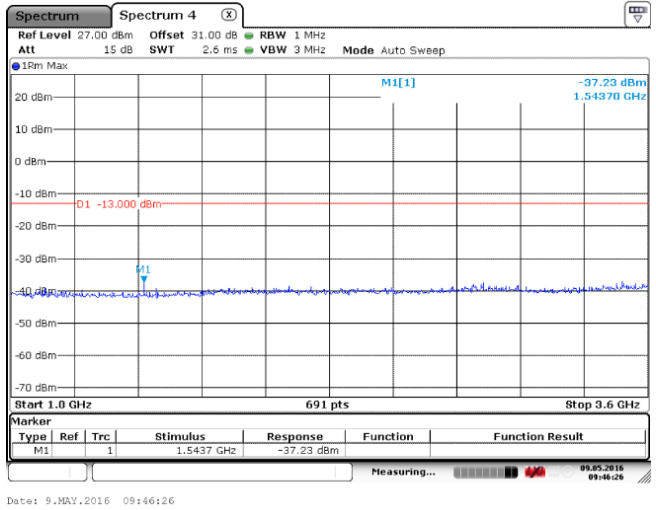
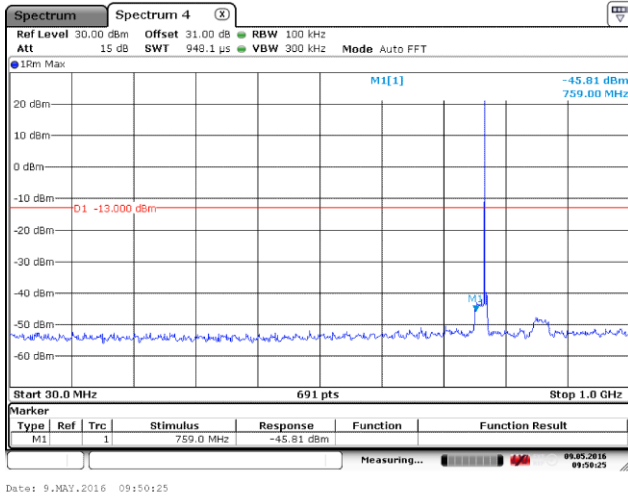
##### 1.0 GHz ~3.6 GHz

(1.2) Mid Frequency: 772.00625MHz



9kHz ~ 150 kHz

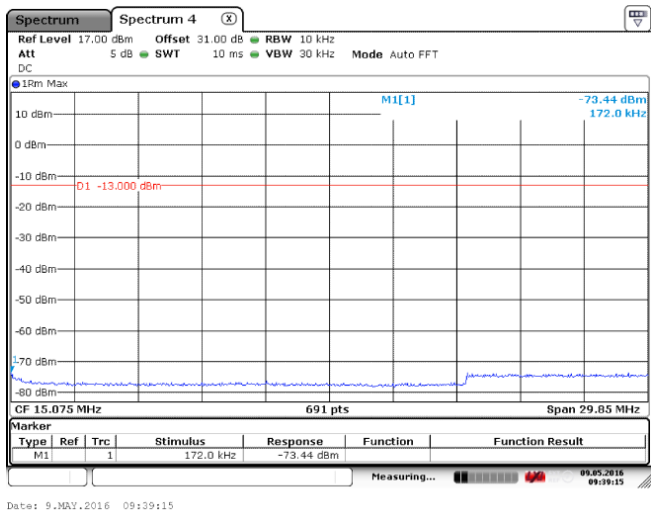
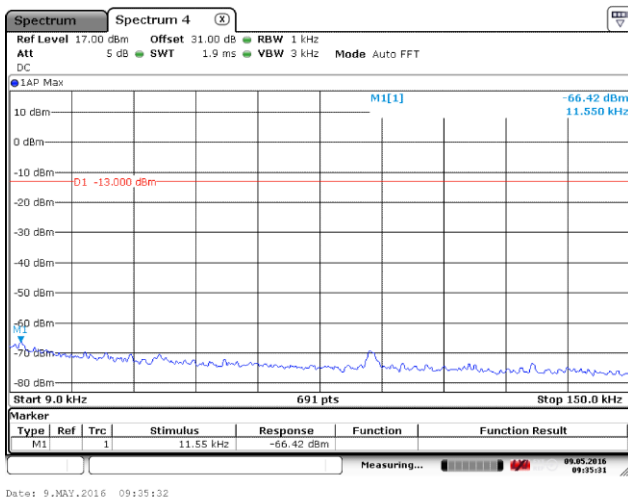
150 kHz ~ 30 MHz



30 MHz ~ 1.0 GHz

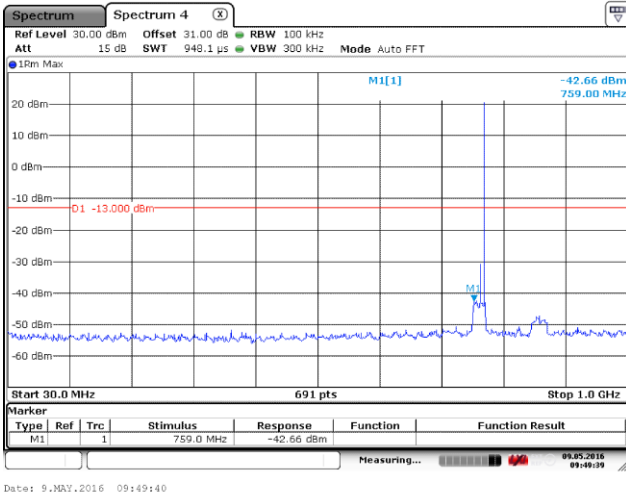
1.0 GHz ~ 3.6 GHz

(1.3) High Frequency: Frequency: 774.99375MHz

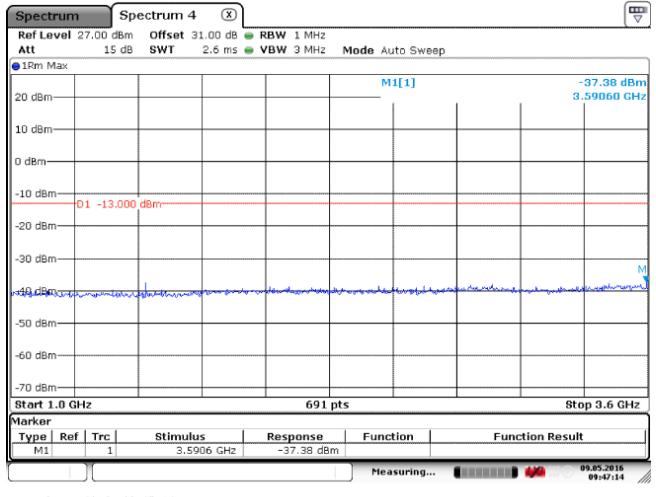


9kHz ~ 150 kHz

150 kHz ~ 30 MHz



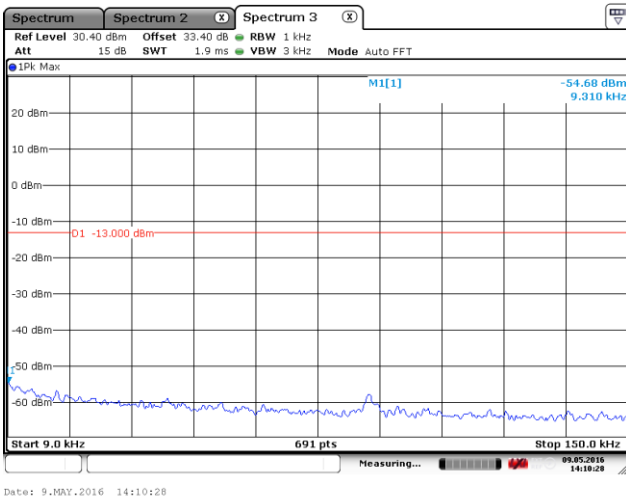
30 MHz ~1.0 GHz



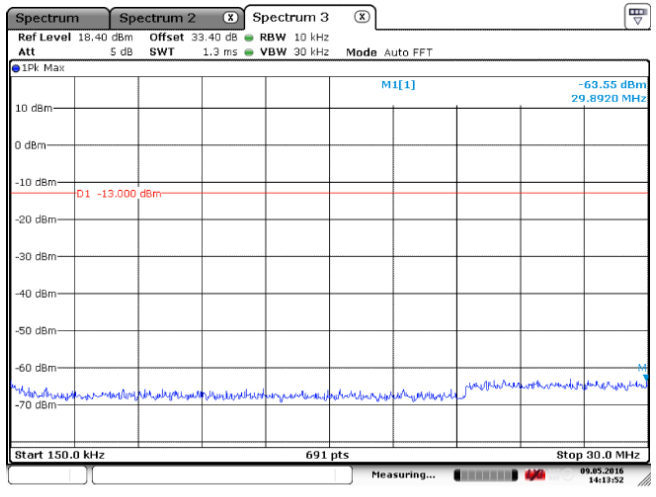
1.0 GHz ~3.6 GHz

(2) Uplink

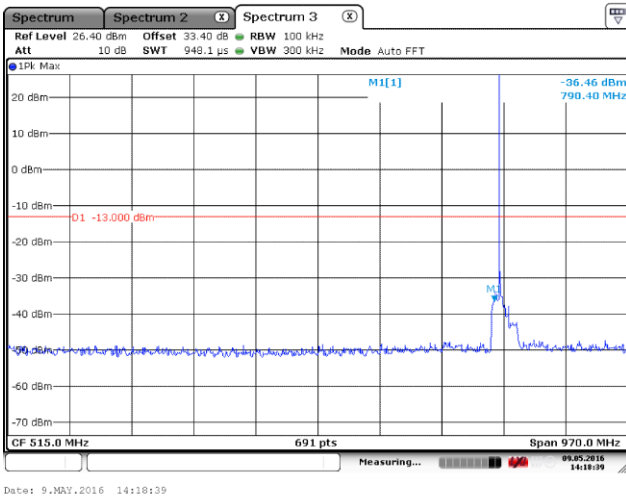
(2.1) Low frequency 799.00625MHz



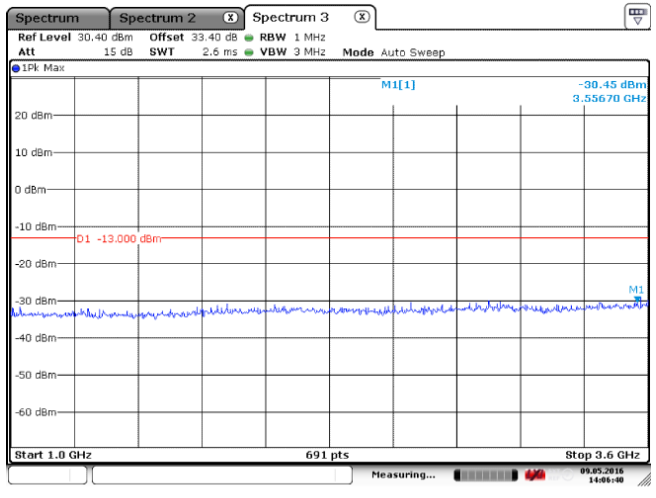
9kHz ~ 150 kHz



150 kHz ~ 30 MHz

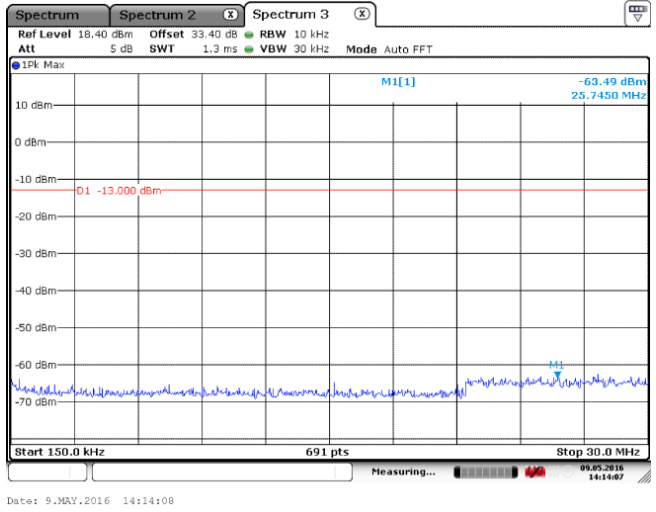
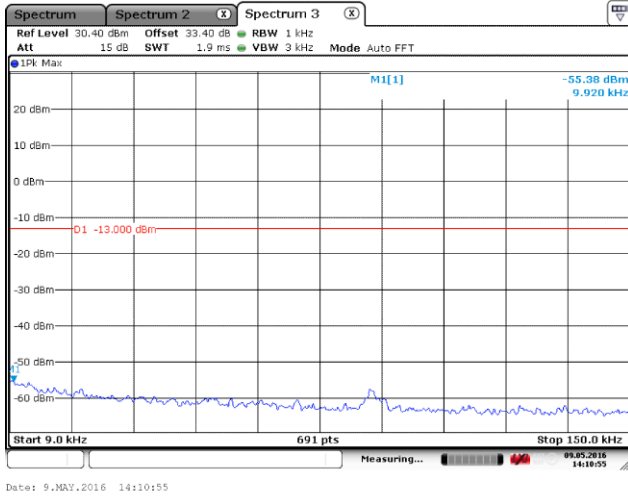


30 MHz ~1.0 GHz



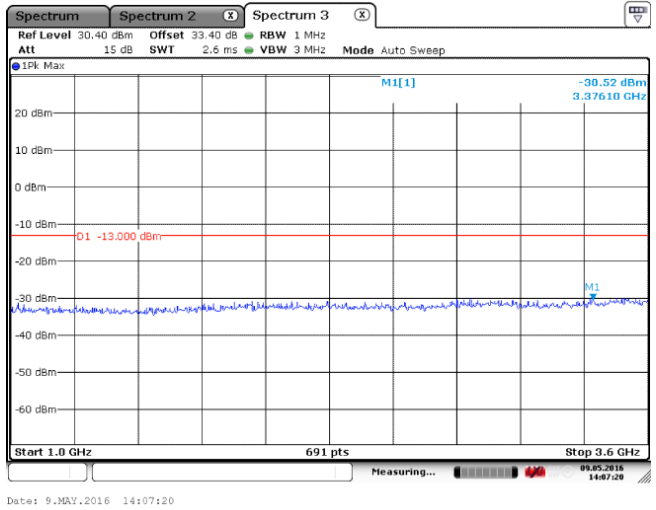
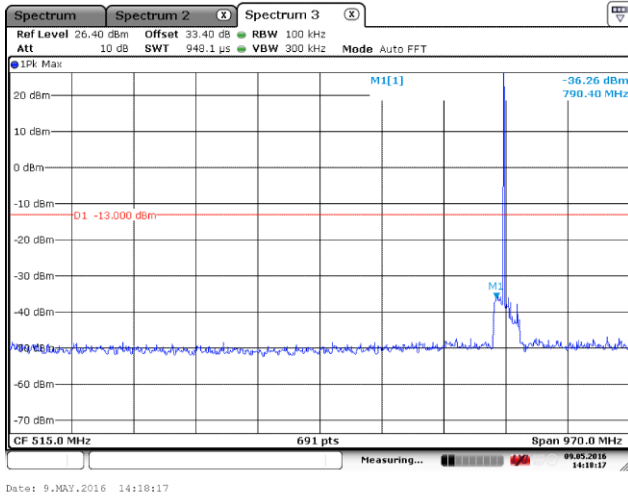
1.0 GHz ~3.6 GHz

(2.2) Mid Frequency: 802.00625MHz



9kHz ~ 150 kHz

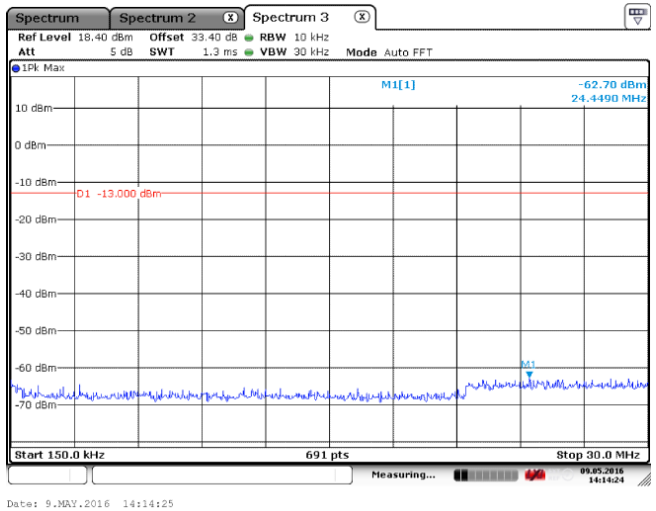
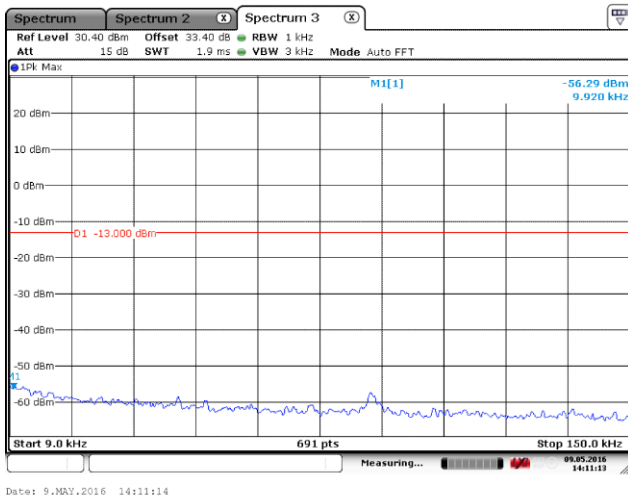
150 kHz ~ 30 MHz



30 MHz ~1.0 GHz

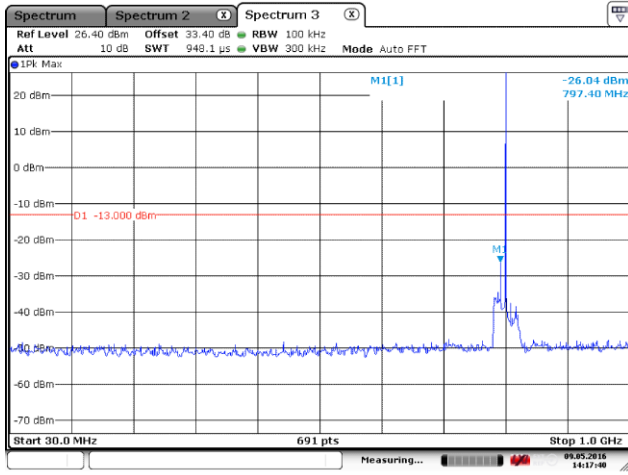
1.0 GHz ~3.6 GHz

(2.3) High Frequency: Frequency: 804.99375MHz



9kHz ~ 150 kHz

150 kHz ~ 30 MHz

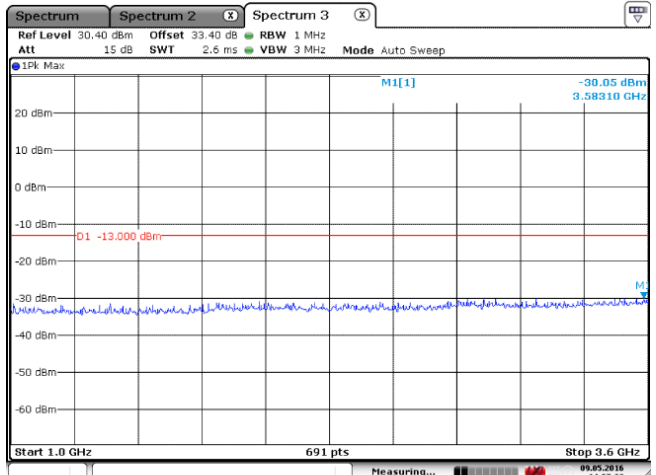


30 MHz ~1.0 GHz

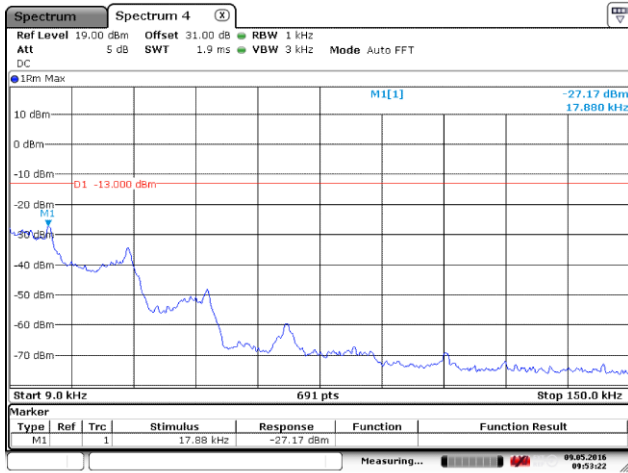
6.4.5.1.2 Modulation signal: Tetra

(1) Downlink

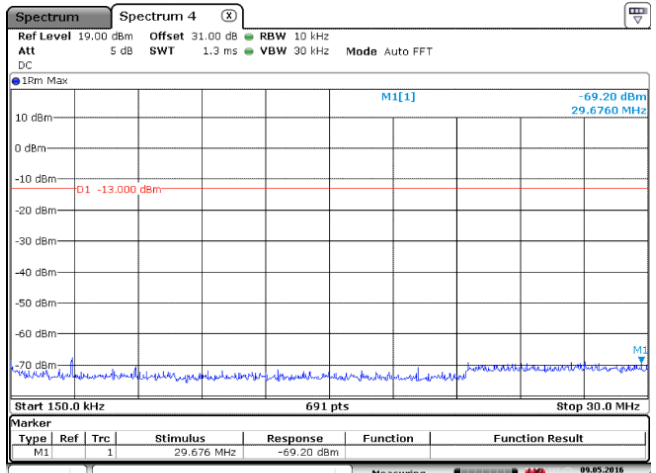
(1.1) Low frequency 769.0125MHz



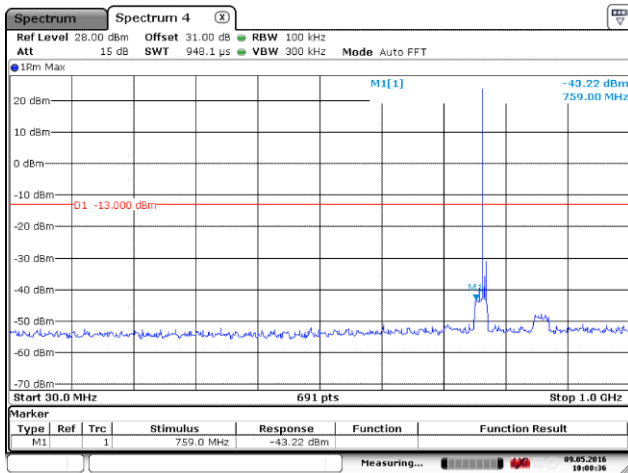
1.0 GHz ~3.6 GHz



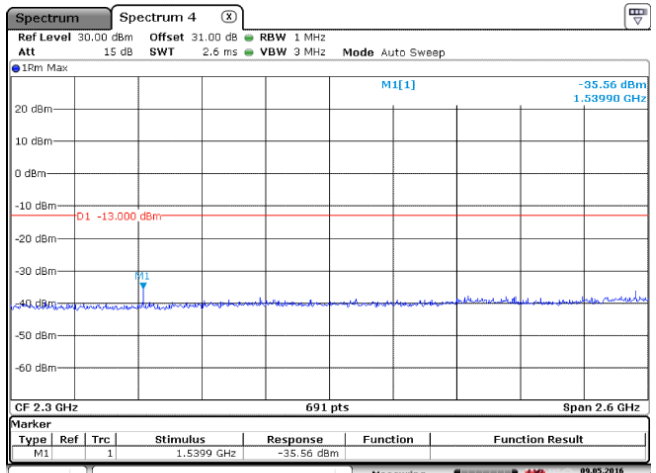
9kHz ~ 150 kHz



150 kHz ~ 30 MHz



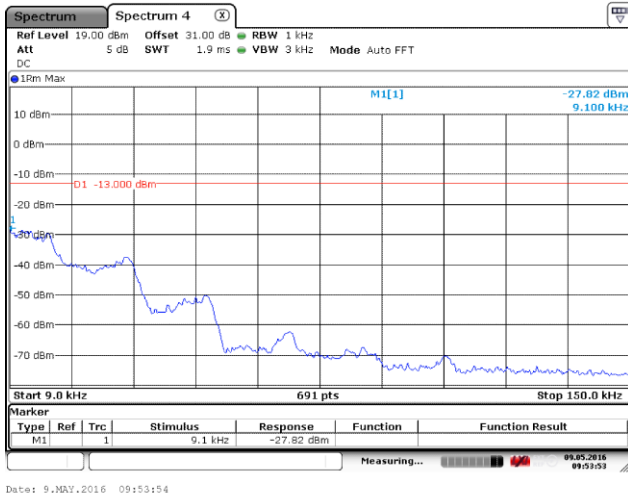
30 MHz ~1.0 GHz



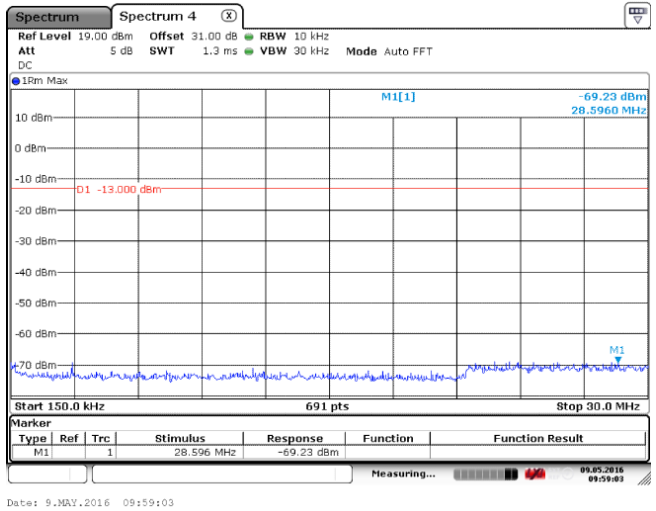
1.0 GHz ~3.6 GHz



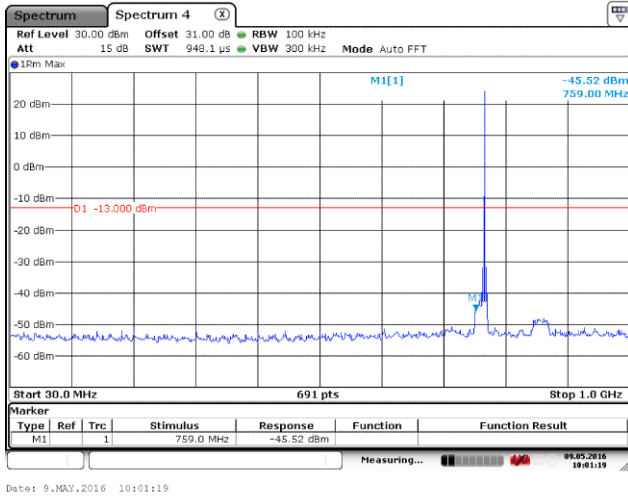
(1.2) Mid Frequency: 772.0125MHz



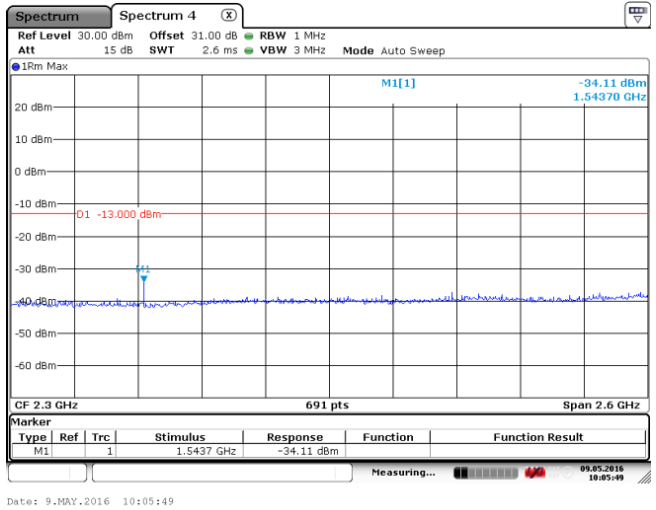
9kHz ~ 150 kHz



150 kHz ~ 30 MHz

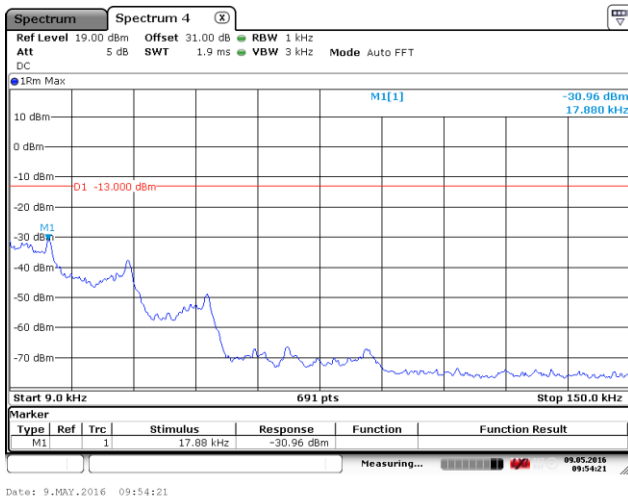


30 MHz ~ 1.0 GHz

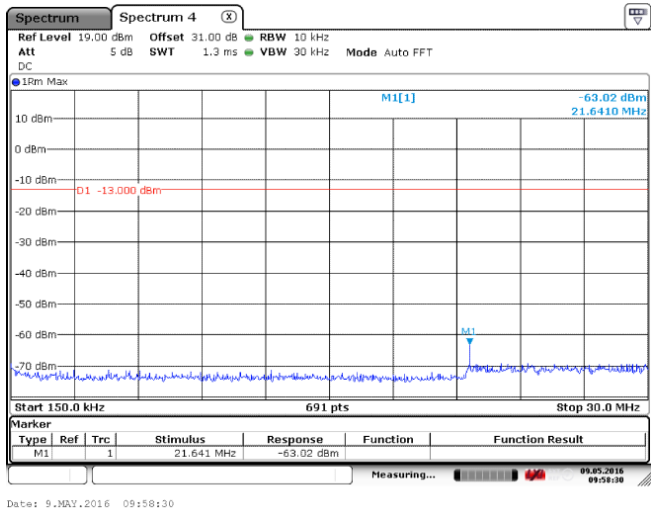


1.0 GHz ~ 3.6 GHz

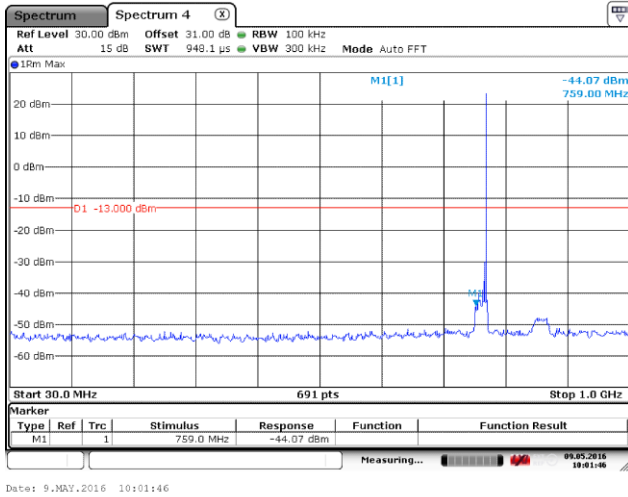
(1.3) High Frequency: Frequency: 774.9875MHz



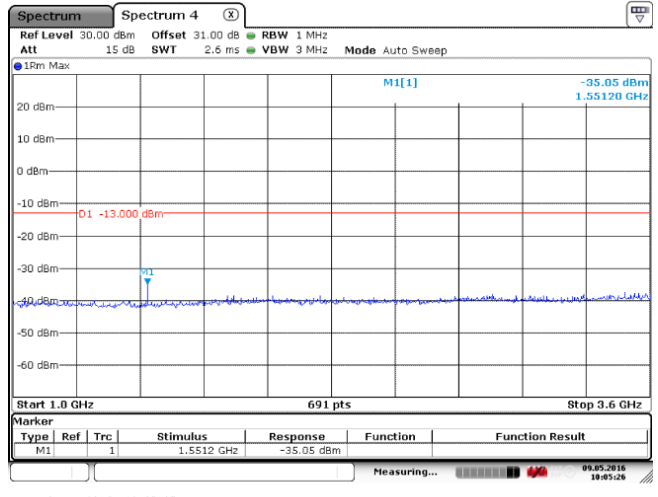
9kHz ~ 150 kHz



150 kHz ~ 30 MHz



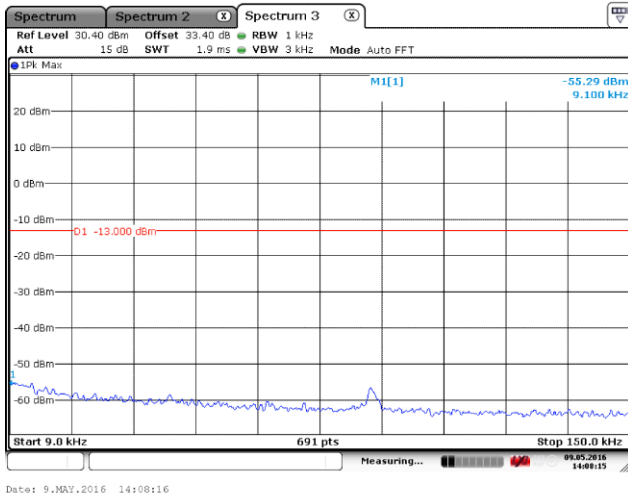
30 MHz ~ 1.0 GHz



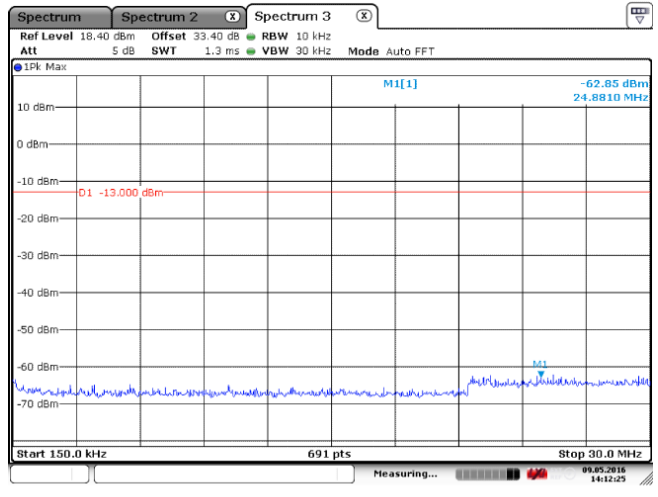
1.0 GHz ~ 3.6 GHz

(2) Uplink

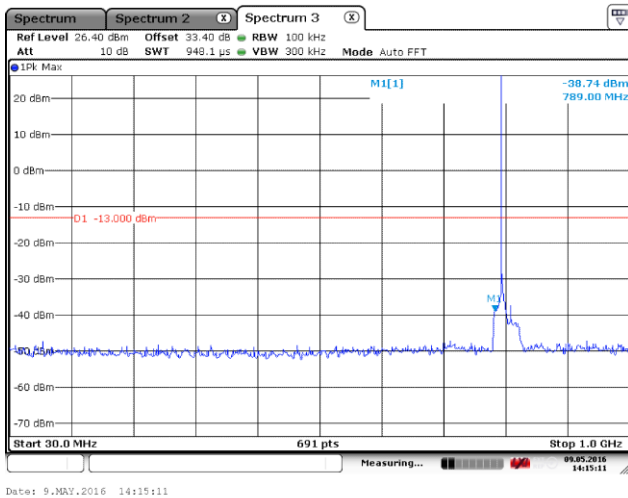
(2.1) Low frequency 799.0125MHz



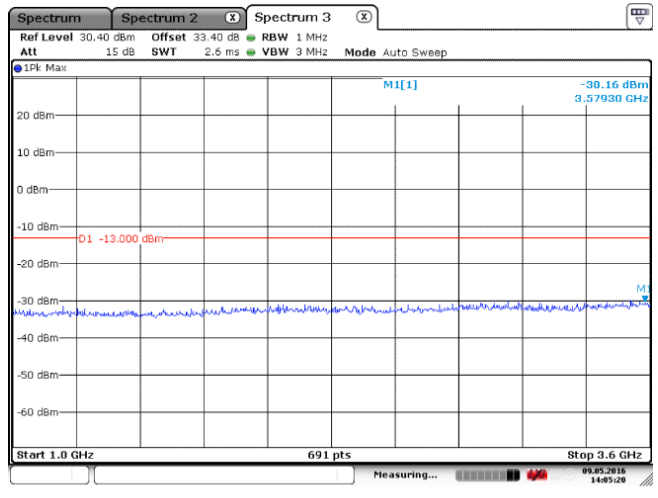
9kHz ~ 150 kHz



150 kHz ~ 30 MHz

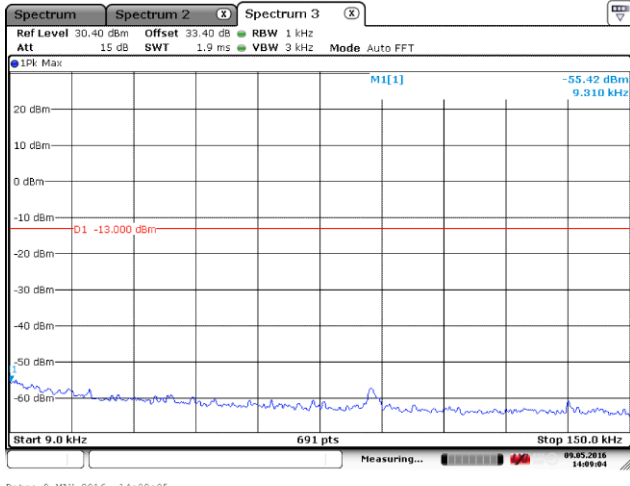


30 MHz ~ 1.0 GHz



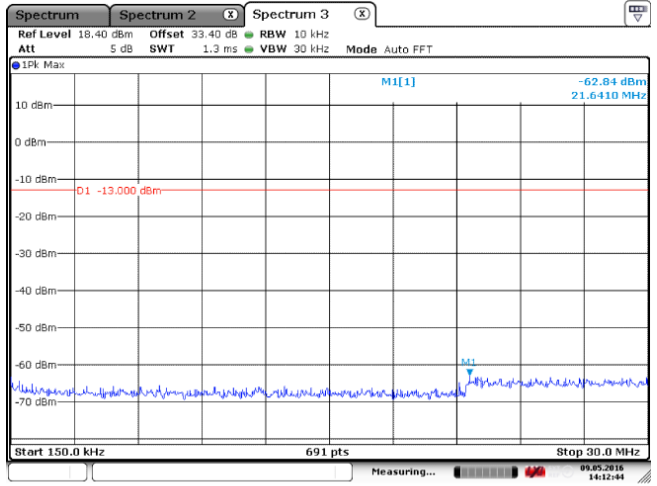
1.0 GHz ~ 3.6 GHz

(2.2) Mid Frequency: 802.0125MHz



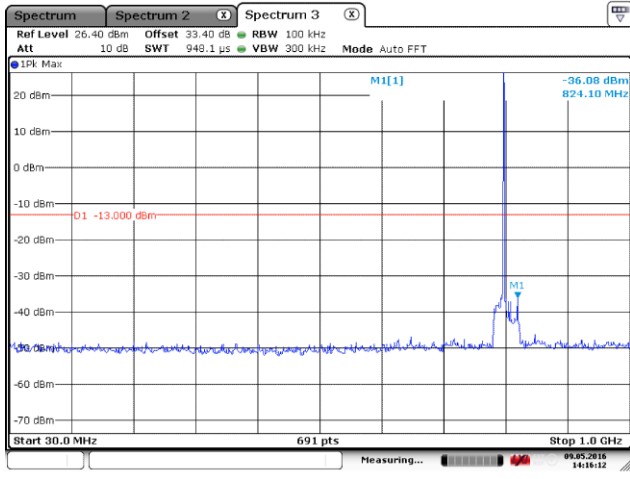
Date: 9.MAY.2016 14:09:05

9kHz ~ 150 kHz



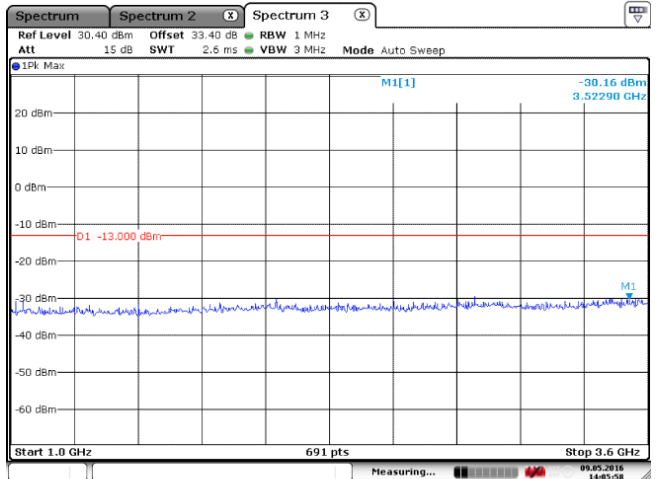
Date: 9.MAY.2016 14:12:44

150 kHz ~ 30 MHz



Date: 9.MAY.2016 14:16:12

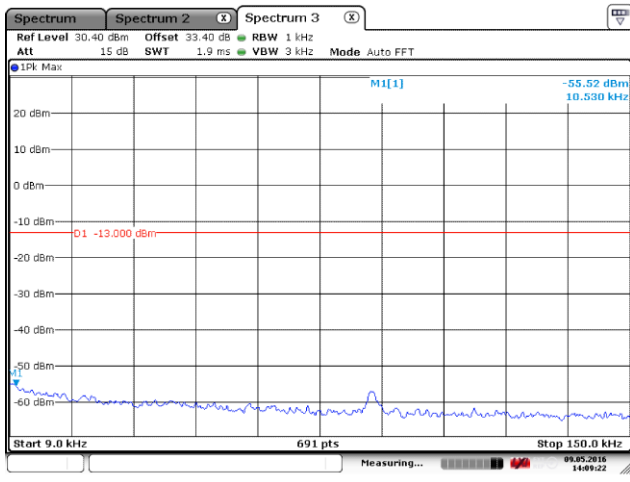
30 MHz ~ 1.0 GHz



Date: 9.MAY.2016 14:05:59

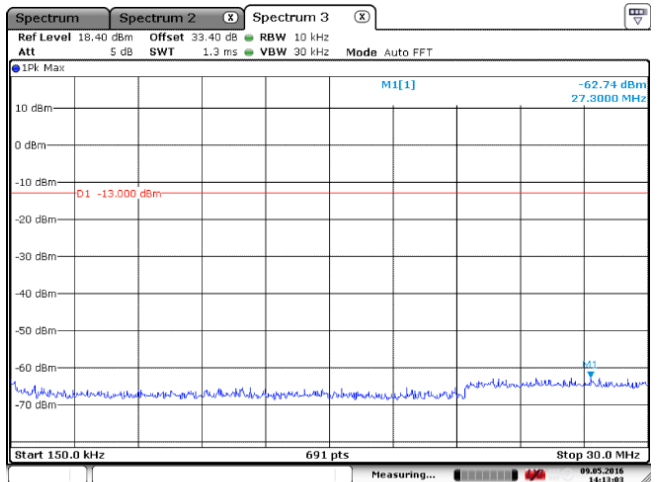
1.0 GHz ~ 3.6 GHz

(2.3) High Frequency: Frequency: 804.9875MHz



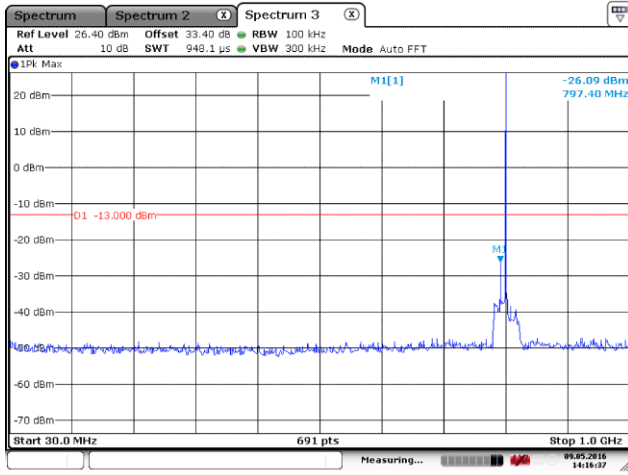
Date: 9.MAY.2016 14:09:22

9kHz ~ 150 kHz



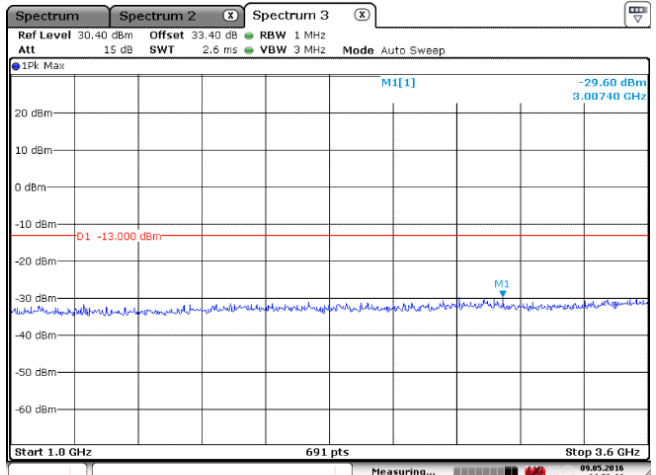
Date: 9.MAY.2016 14:13:03

150 kHz ~ 30 MHz



Date: 9.MAY.2016 14:16:37

30 MHz ~1.0 GHz



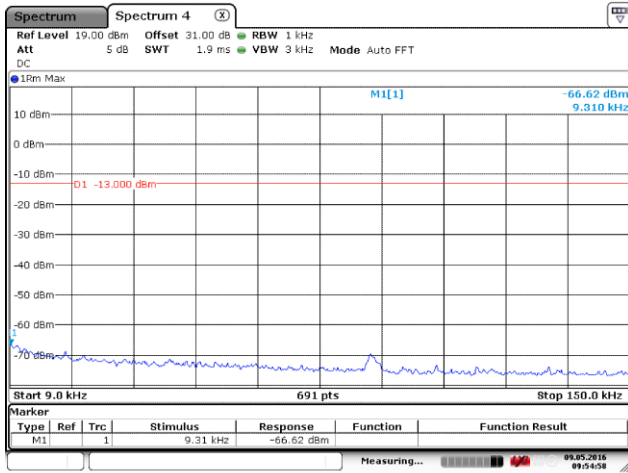
Date: 9.MAY.2016 14:06:11

1.0 GHz ~3.6 GHz

### 6.4.5.1.3 Modulation signal: Analog FM(10kHz/1kHz)

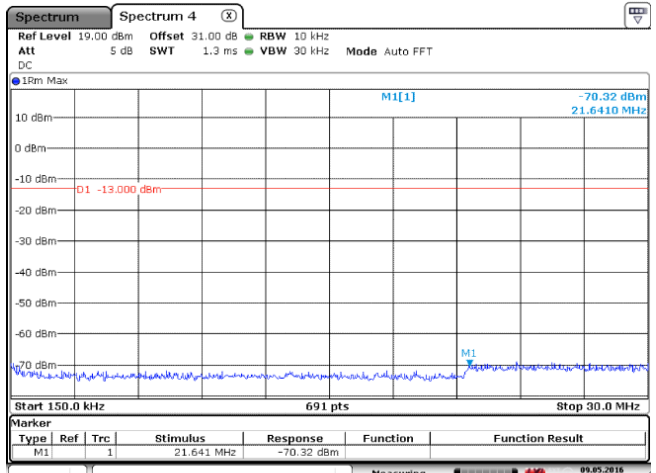
#### (1) Downlink

#### (1.1) Low frequency 769.0125MHz



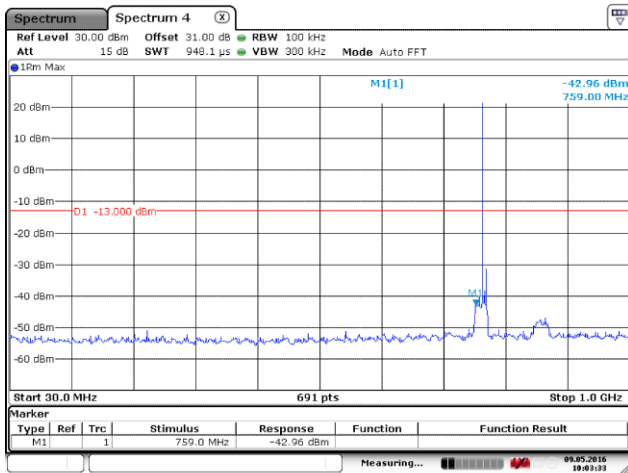
Date: 9.MAY.2016 09:54:58

9kHz ~ 150 kHz



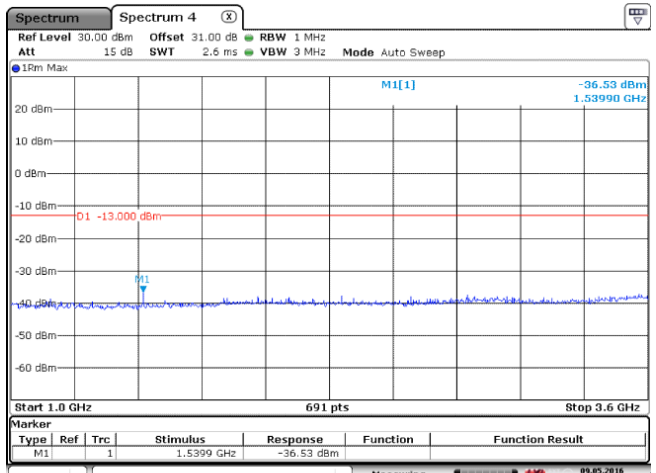
Date: 9.MAY.2016 09:57:05

150 kHz ~ 30 MHz



Date: 9.MAY.2016 10:03:34

30 MHz ~1.0 GHz



Date: 9.MAY.2016 10:04:17

1.0 GHz ~3.6 GHz