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Dates of Tests: May 21~ June 4, 2012
Test Report S/N: LR500111206F
Test Site : LTA CO., LTD.

FCC ID

T7MLMR250R01C1

APPLICANT

Kisan Telecom Co., Ltd.

TEST REPORT

FCC Part 27 Certification

Classification	:	Licensed Non-Broadcast Station Transmitter
Manufacturing Description	:	Optical DAS Repeater (LTE)
Manufacturer	:	Kisan Telecom Co., Ltd.
Model name	:	LMR250R01C
Test Device Serial No.:	:	Identification
FCC Rule Part(s)	:	§27, §2
Type Of Modulation and Designators:	:	LTE (F9W)
Data of issue	:	June 13, 2012

This test report is issued under the authority of:

Kyu-Hyun LEE, Technical Manager

The test was supervised by:

Jung-Moo Her, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.



NVLAP LAB Code.: 200723-0

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1. General information's

1-1 Test Performed

Company name : LTA Co., Ltd.
 Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822
 Web site : <http://www.ltalab.com>
 E-mail : chahn@ltalab.com
 Telephone : +82-31-323-6008
 Facsimile : +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2012-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2013-04-24	EMC accredited Lab.
FCC	U.S.A	610755	2014-04-27	FCC filing
FCC	U.S.A	649054	2013-04-13	FCC CAB
VCCI	JAPAN	R2133(10m), C2307	2014-06-21	VCCI registration
VCCI	JAPAN	T-2009	2013-12-23	VCCI registration
IC	CANADA	IC5799	UPDATING	IC filing

2. Information's about test item

2-1 Client

Company name : Kisan Telecom Co., Ltd.
Address : 2F, Segi Bldg., 66-2 Bangyi-Dong Songpa-Gu, Seoul, 138-828, Korea
Telephone : +82-2-3433-8341

2-2 Equipment Under Test (EUT)

Classification : Licensed Non-Broadcast Station Transmitter
Trade name : Optical DAS Repeater (LTE)
Model name : LMR250R01C
Serial number : Identification
Date of receipt : May 21, 2012
EUT condition : Pre-production, not damaged
Downlink : LTE Block C : 746~757MHz
Uplink : LTE Block C : 776~787MHz
Gain range : 20~30dB (Uplink) / 30~50dB (Downlink)
Emission Designators : F9W
Power Input : 120Vac

2.5 Mode of Operation

The EUT was powered by 120VAC. The EUT was configured for maximum gain, 50dB. Repeater simulators were used to provide the input signals to the EUT. Tests were performed with LTE modulations. The input power was the maximum declared by the manufacturer.

3. Test Report

3.1 Summary of tests

Parameter	Status
Transmitter Requirements	
RF Power Output	C
Occupied Bandwidth, Input/Output Comparison	C
Intermodulation	C
Spurious Emissions at antenna terminal	C
Field Strength of Spurious Radiation	C
Frequency Stability	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are to be tested to the ANSI/TIA-603-C-2004 standard

3.2 Results Of Tests

3.2.1 RF Power Output

1. Test Procedure

The EUT RF output was connected to Powermeter. The EUT was setup to transmit continuously with maximum power. Powermeter was setup to measure power. Measurements were performed at one frequency (LTE Block C_MAIN/MIMO) with all modulations.

2. Test Results

Direction	Block	Power output (dBm)	Power Output (W)
DL_MAIN	C	40.05	10.116
DL_MIMO	C	40.01	10.023
UL_MAIN	C	-10.16	0.000096
UL_MIMO	C	-10.15	0.000097

※ Input Signal Power: -10dBm (Downlink) / -40dBm (Uplink)

3.2.2 Occupied Bandwidth, Input/Output Comparison

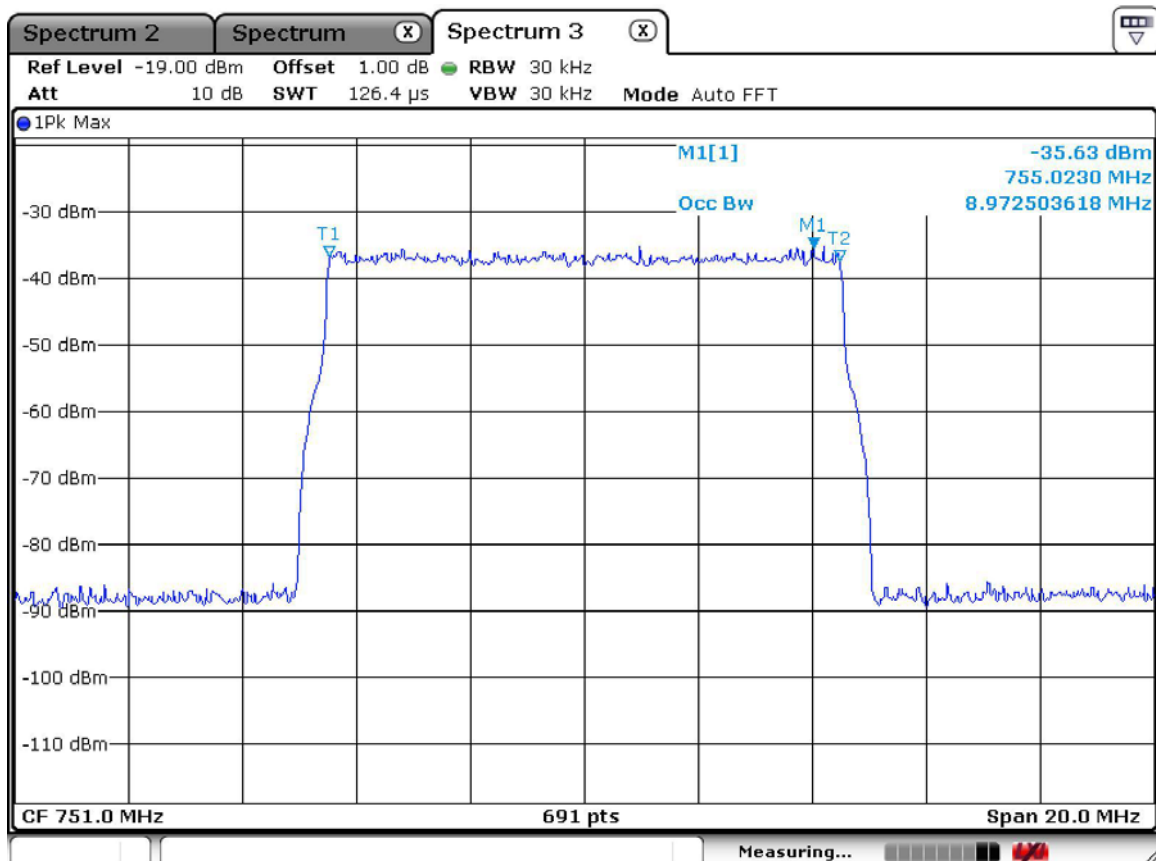
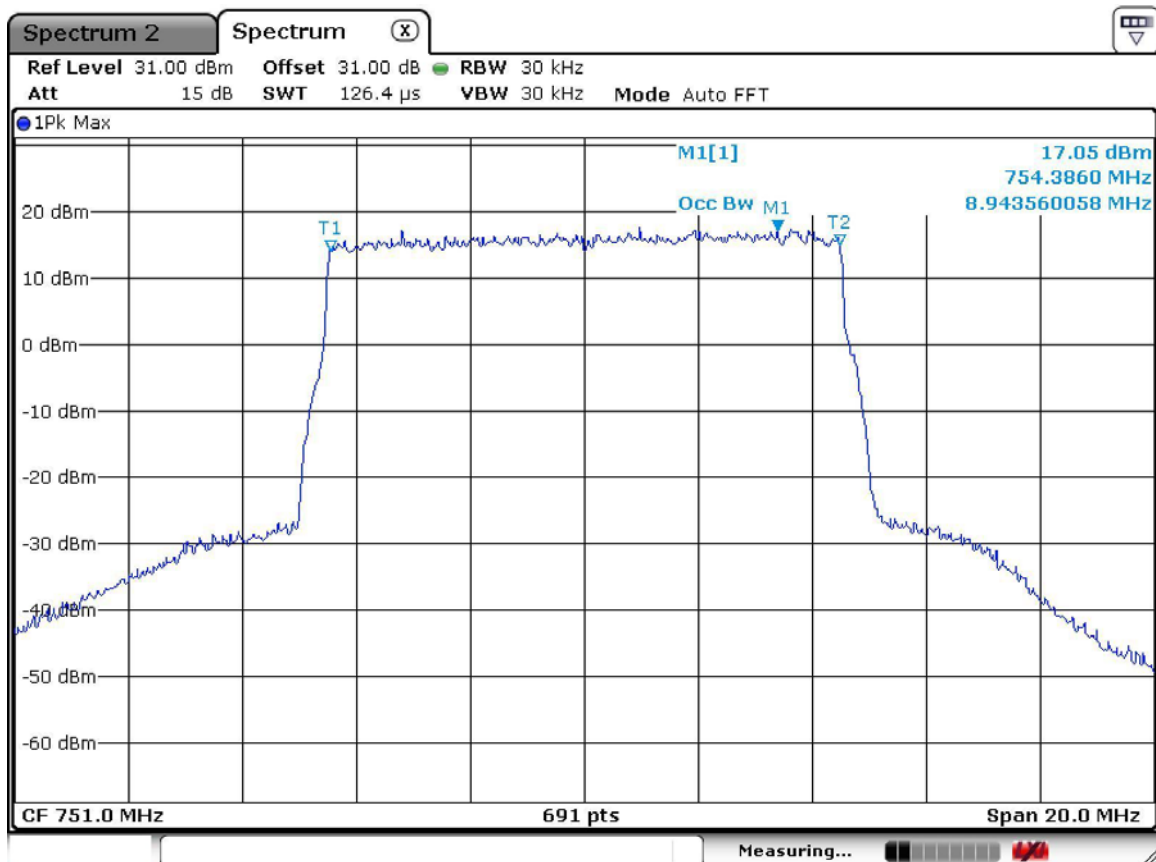
1. Test Procedure

The EUT RF ports were connected to Spectrum analyzer. The EUT was setup to transmit maximum power. The spectrum analyzer was setup to measure the Occupied Bandwidth (defined as the 99% Power Bandwidth). The Occupied Bandwidth was measured at the input and output ports of the EUT at the middle channels for each type of modulation

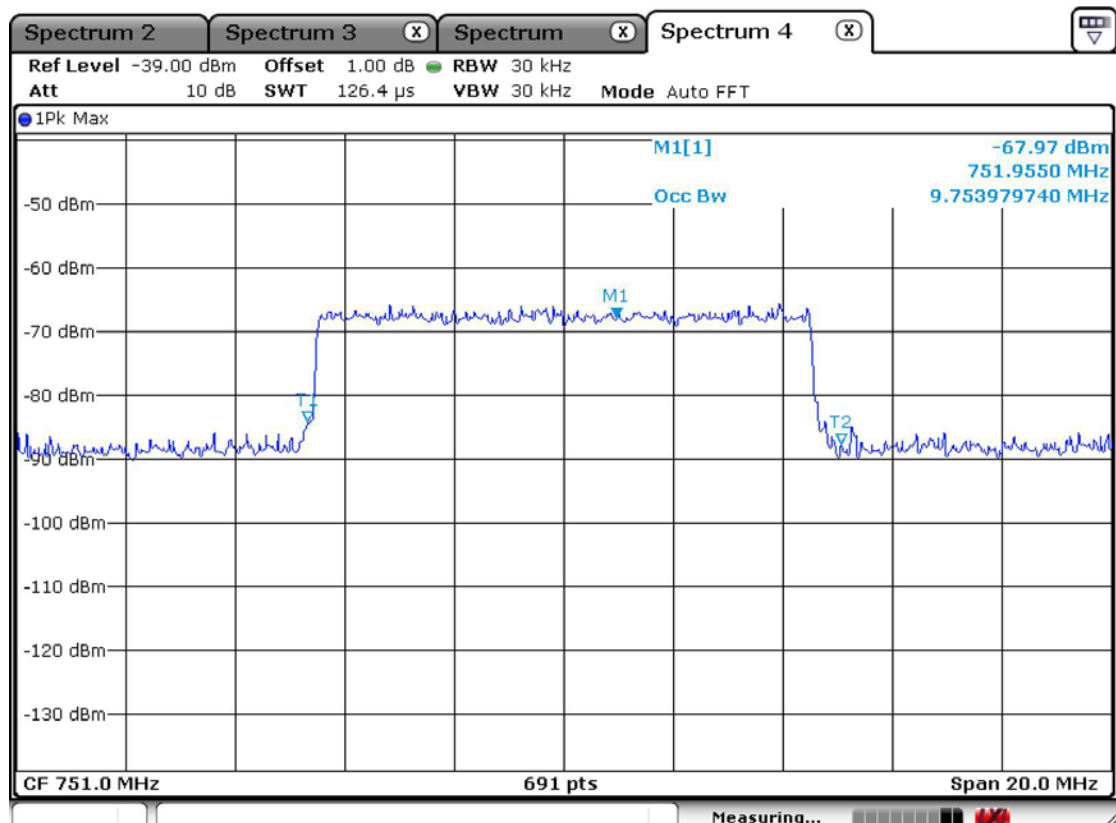
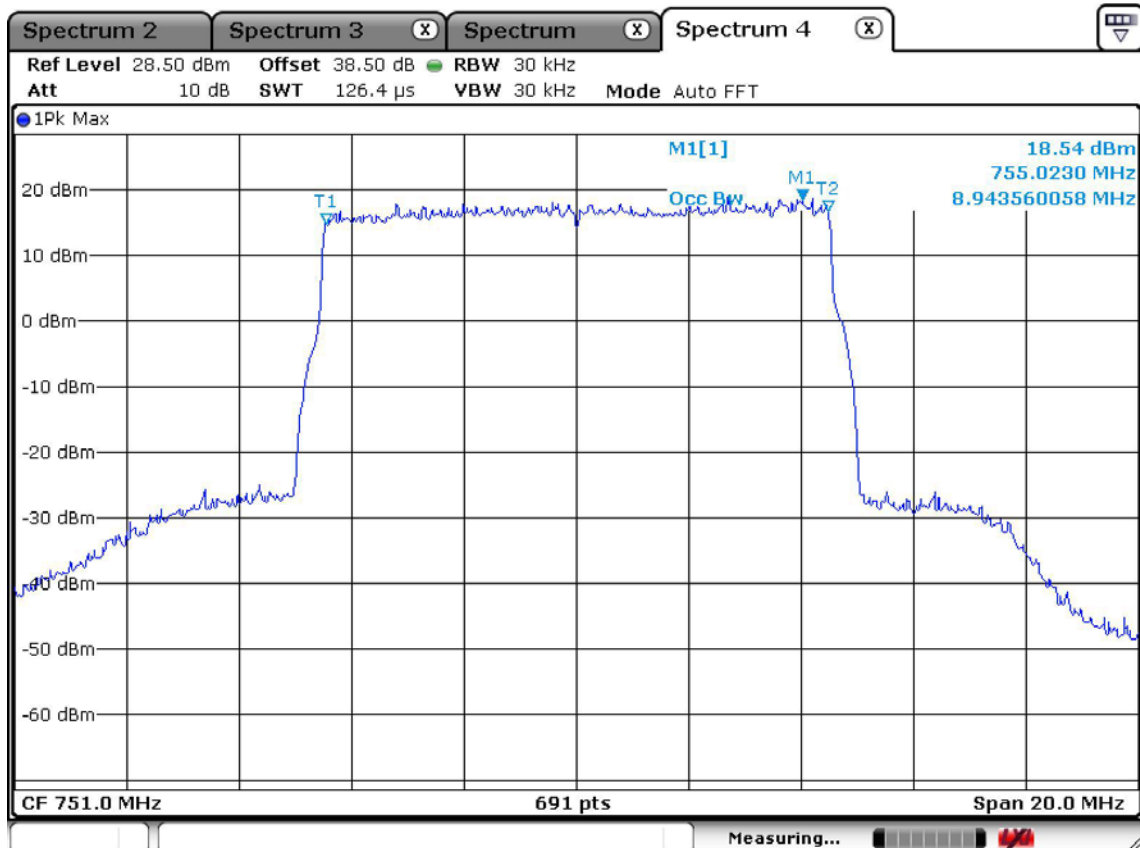
2. Test Results : Complies

Refer to the following Graphs.

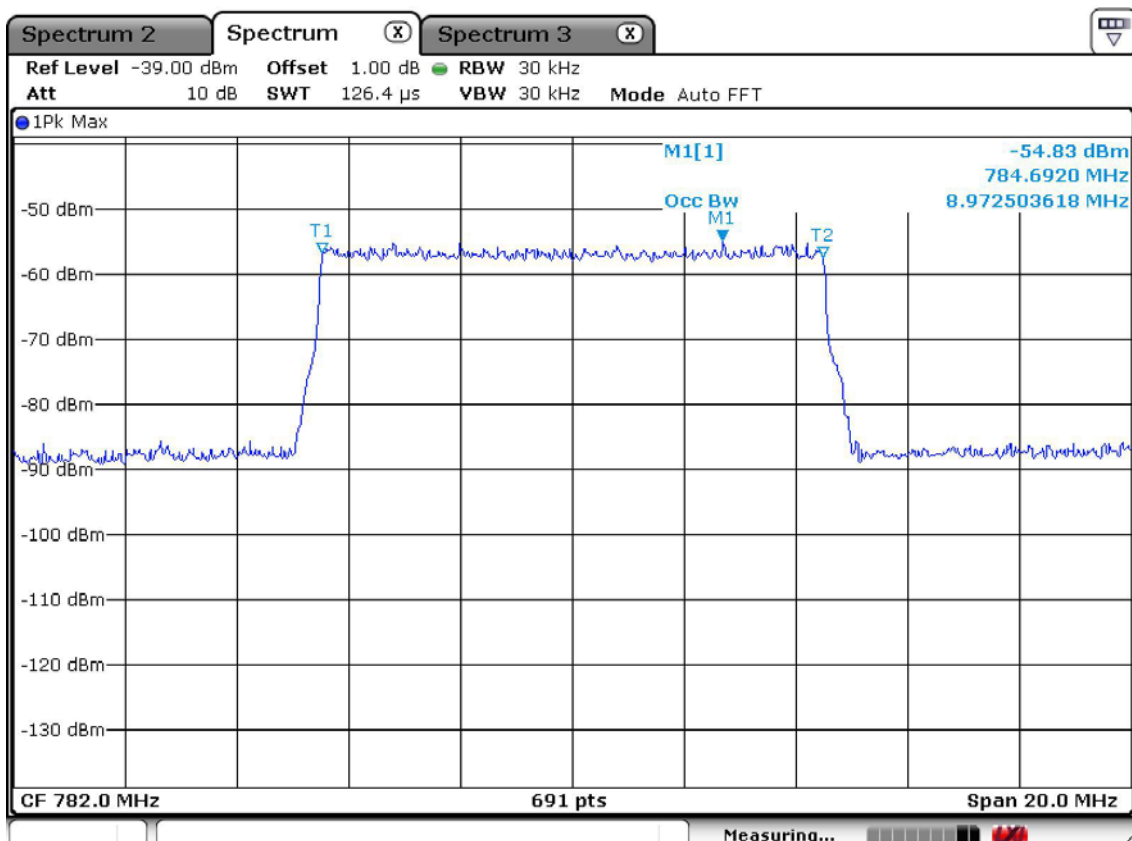
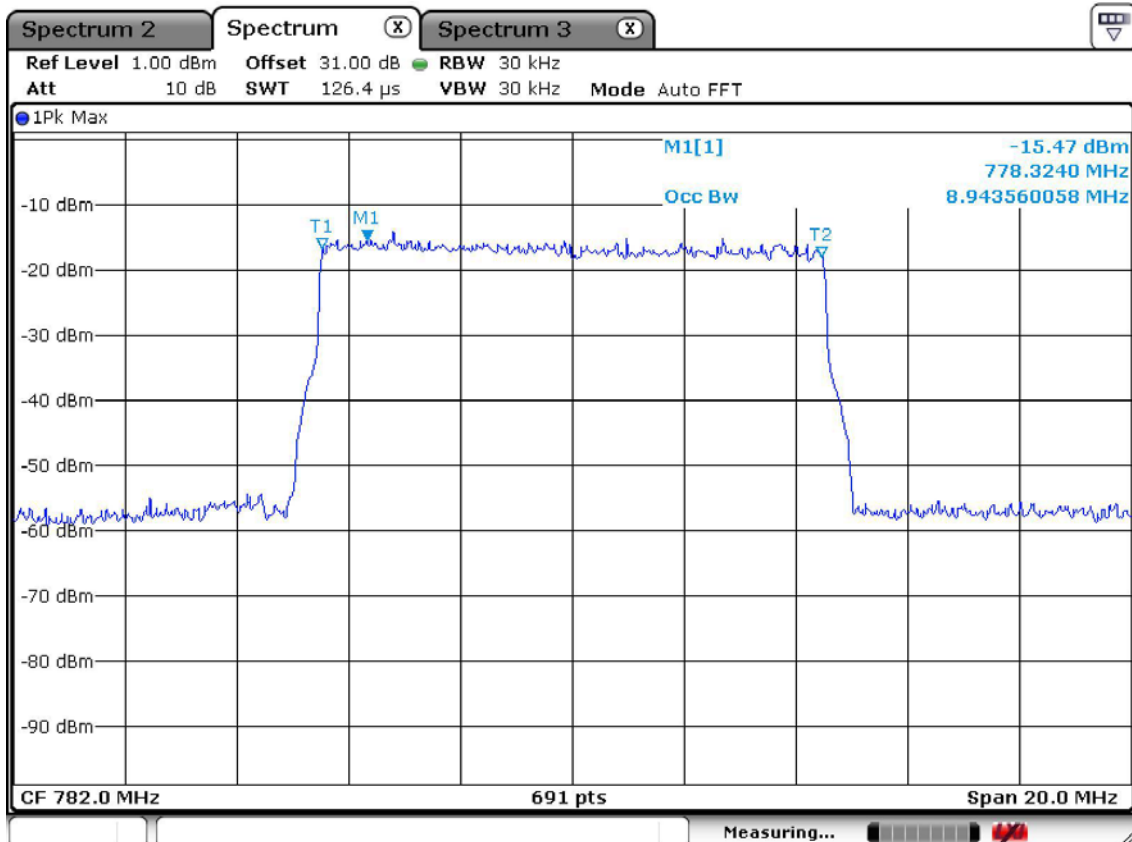
Input/Output Bandwidth Comparison – LTE Block C_DL-MAIN



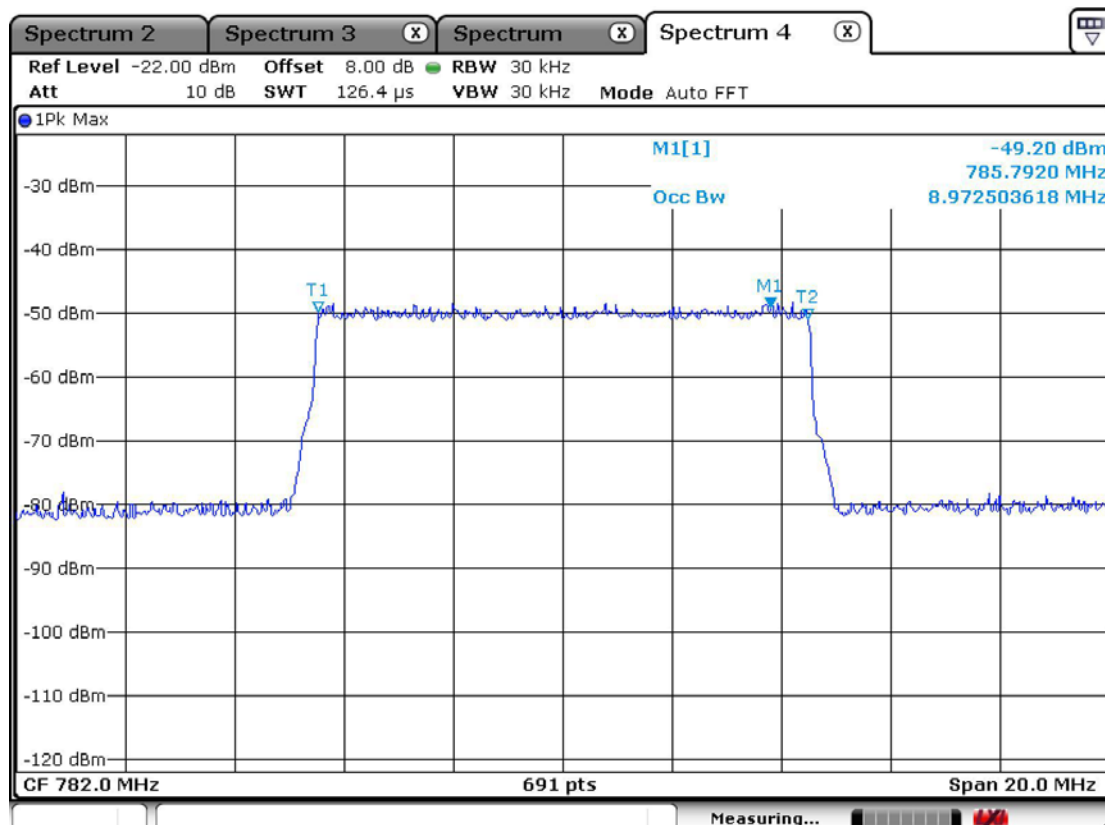
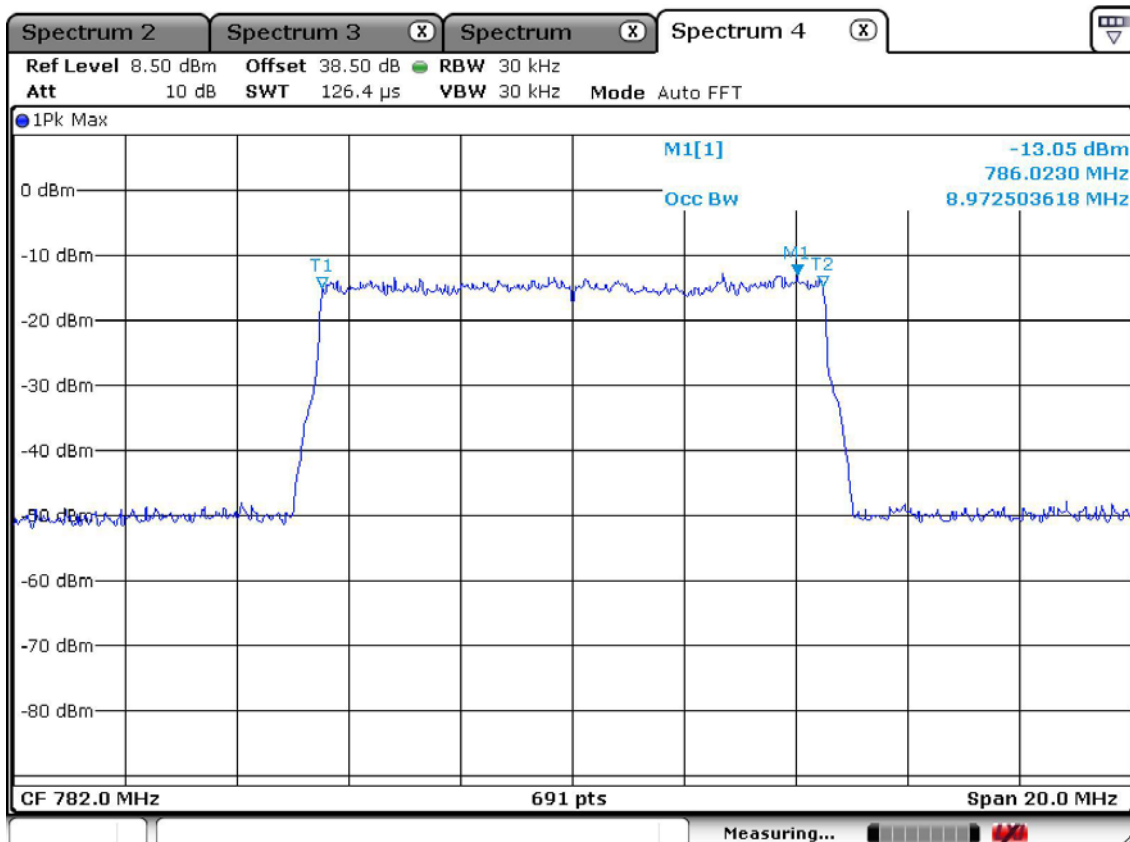
Input/Output Bandwidth Comparison – LTE Block C_DL-MIMO



Input/Output Bandwidth Comparison – LTE Block C_UL-MAIN



Input/Output Bandwidth Comparison – LTE Block C_UL-MIMO



3.2.3 Intermodulation

1. Requirement

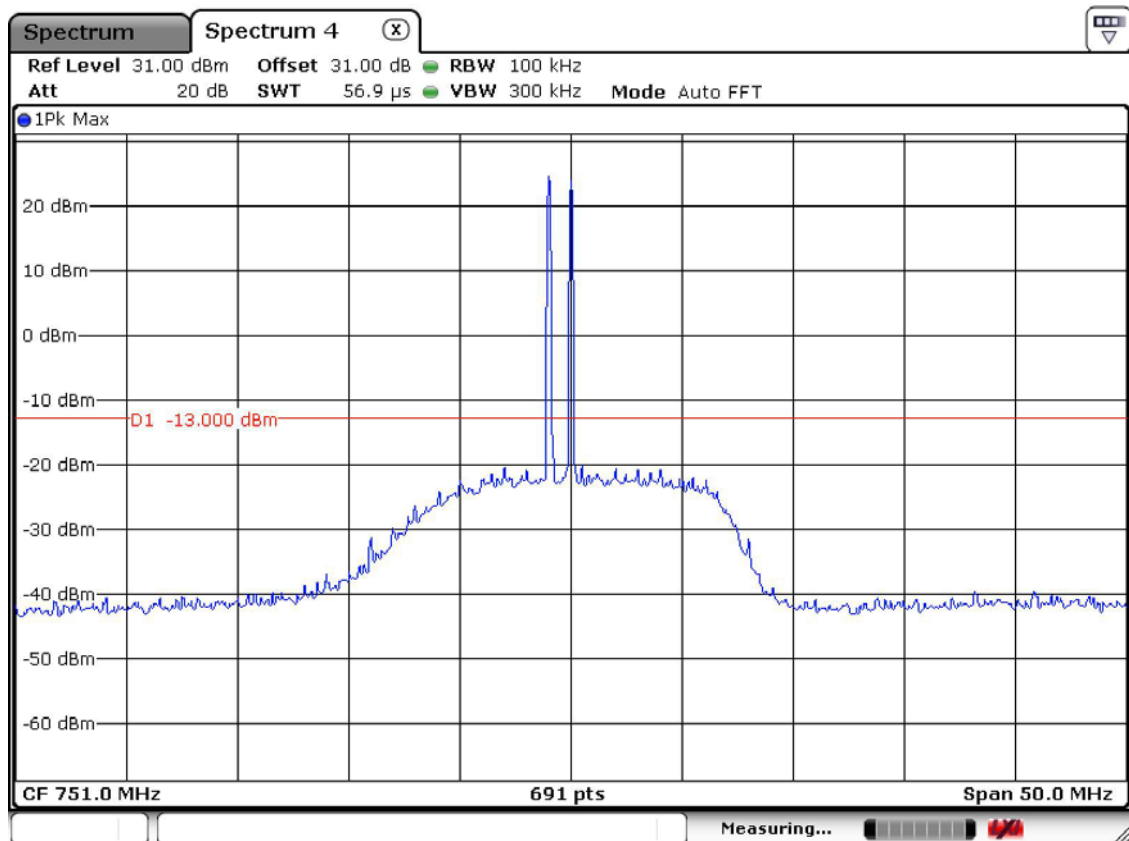
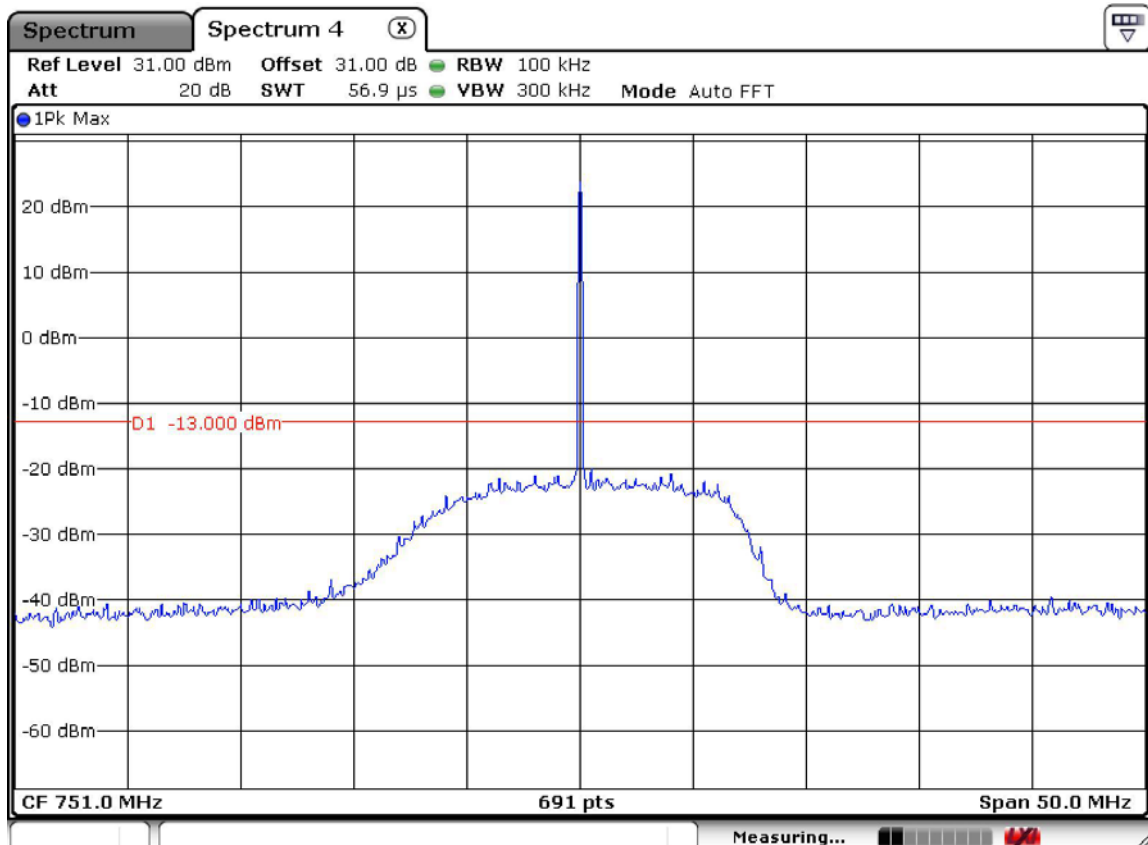
the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB. The limit of emission equal to -13dBm .

2. Test Procedure

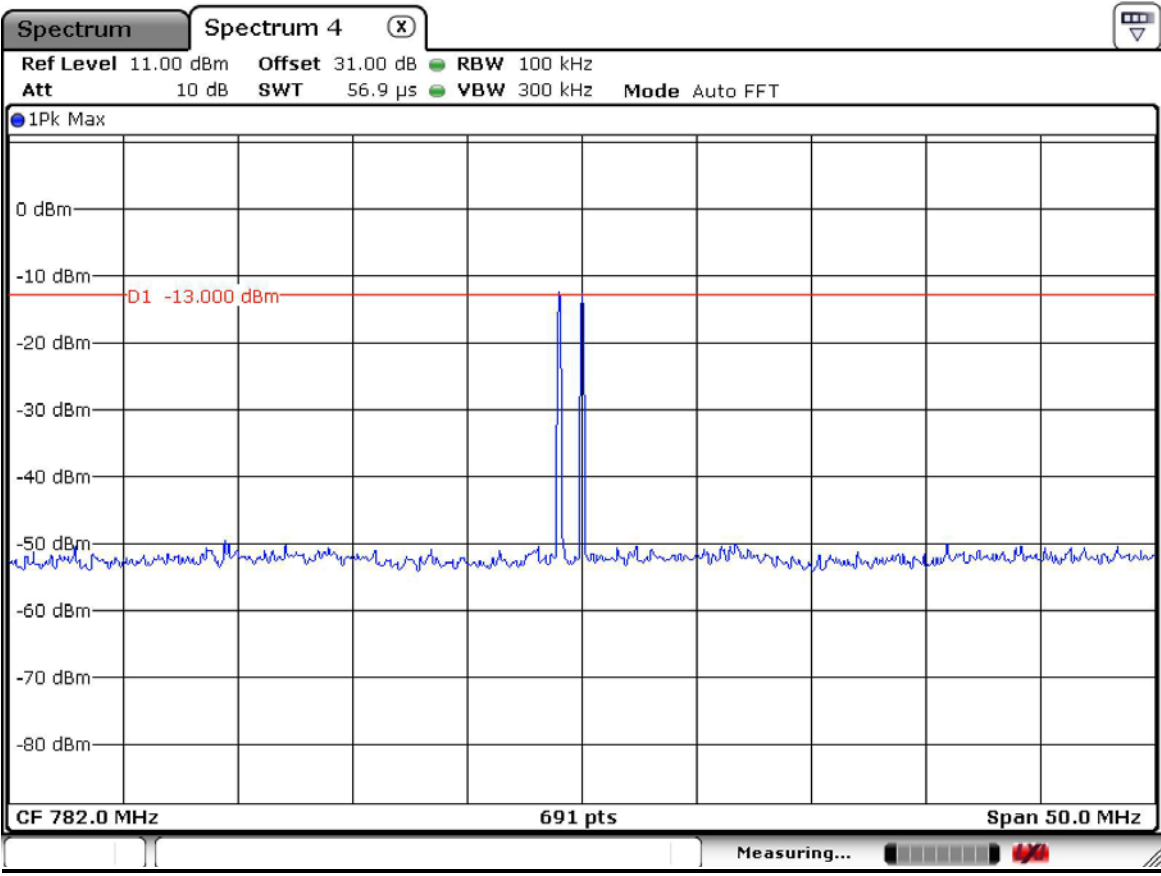
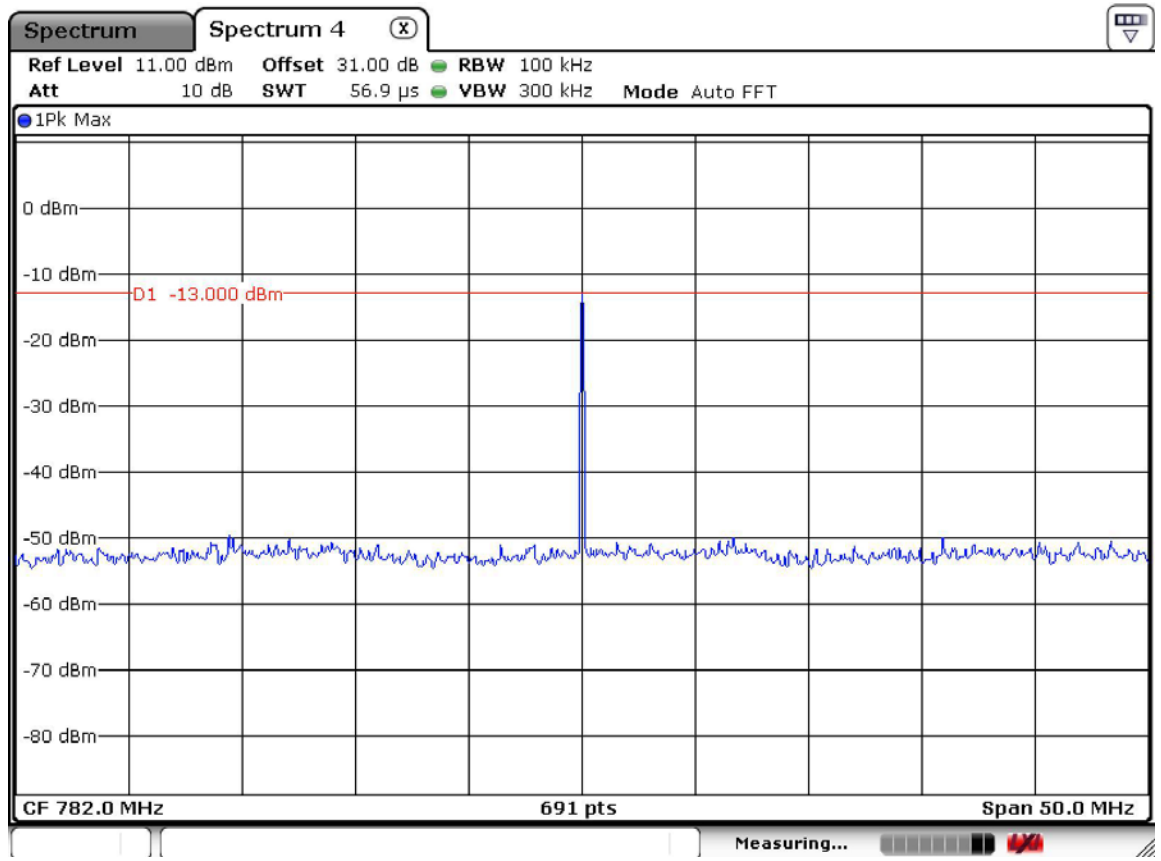
Two RF signals set as inputs. The frequencies of both RF signals shall be within the repeater's operating band. The spacing between both RF signals shall be the minimum possible spacing applied in a network. The level of both RF input signals shall be increased, until the maximum rated output power per channel, as declared by the manufacturer, is reached.

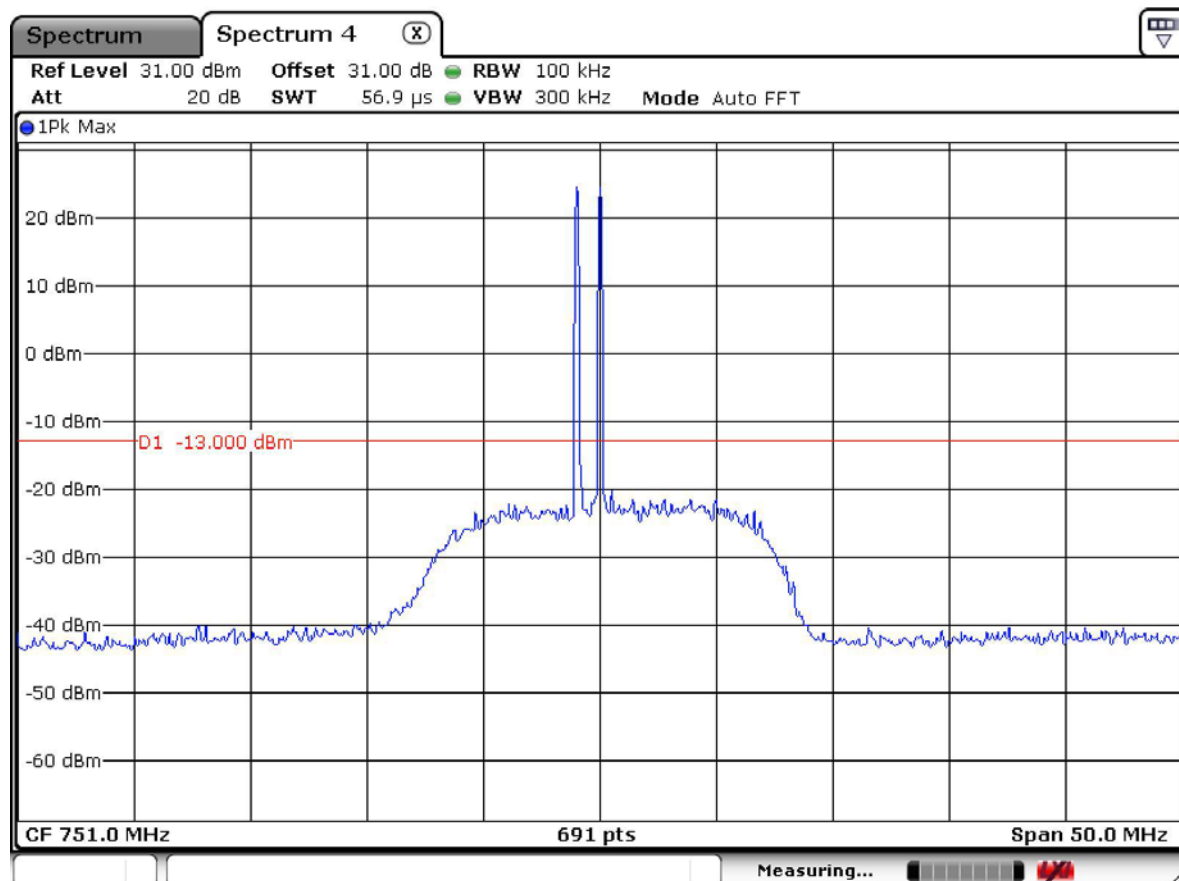
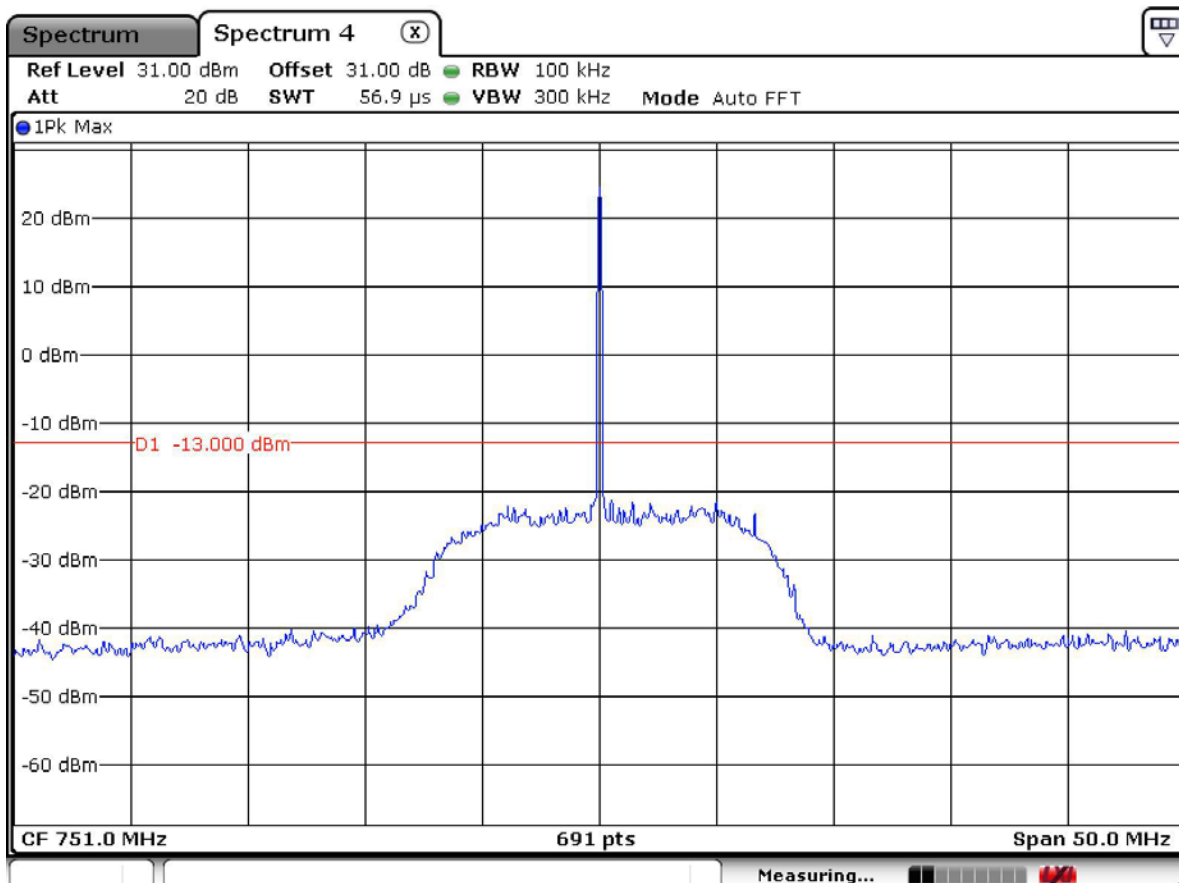
3. Test Results : Complies

Refer to the following Graphs.

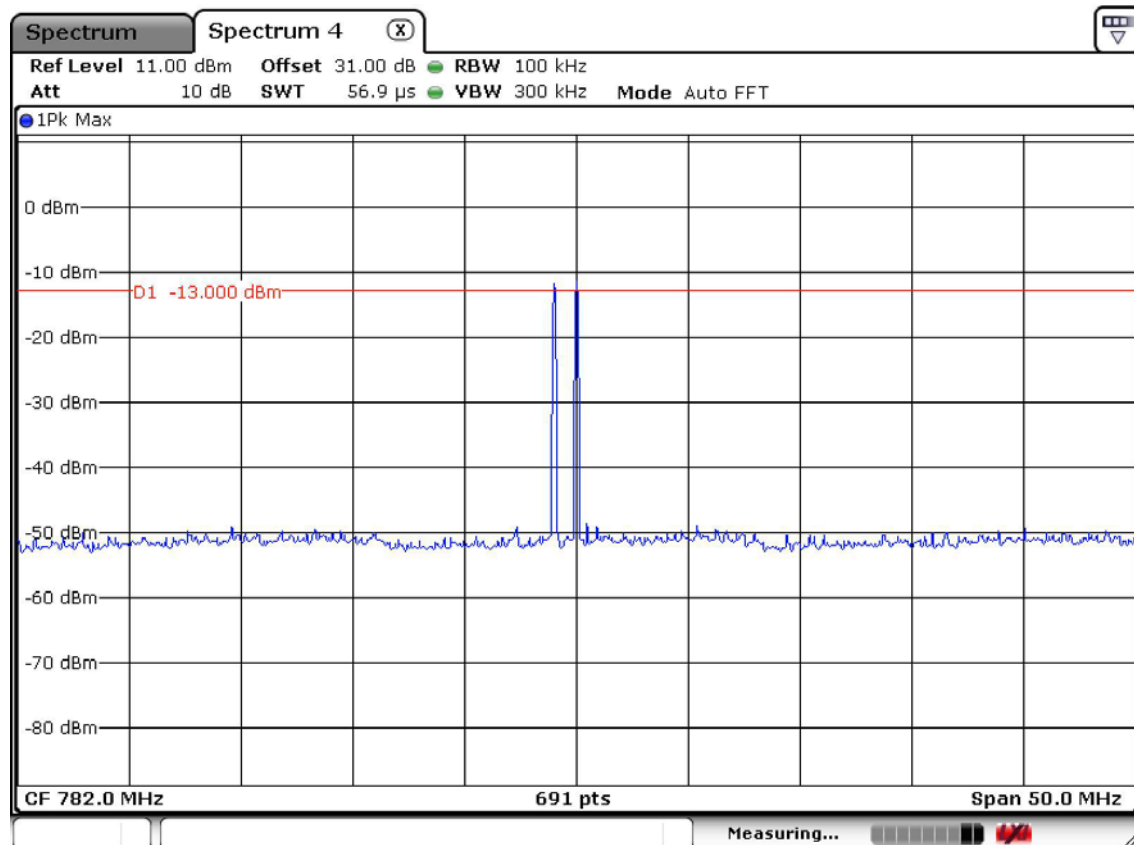
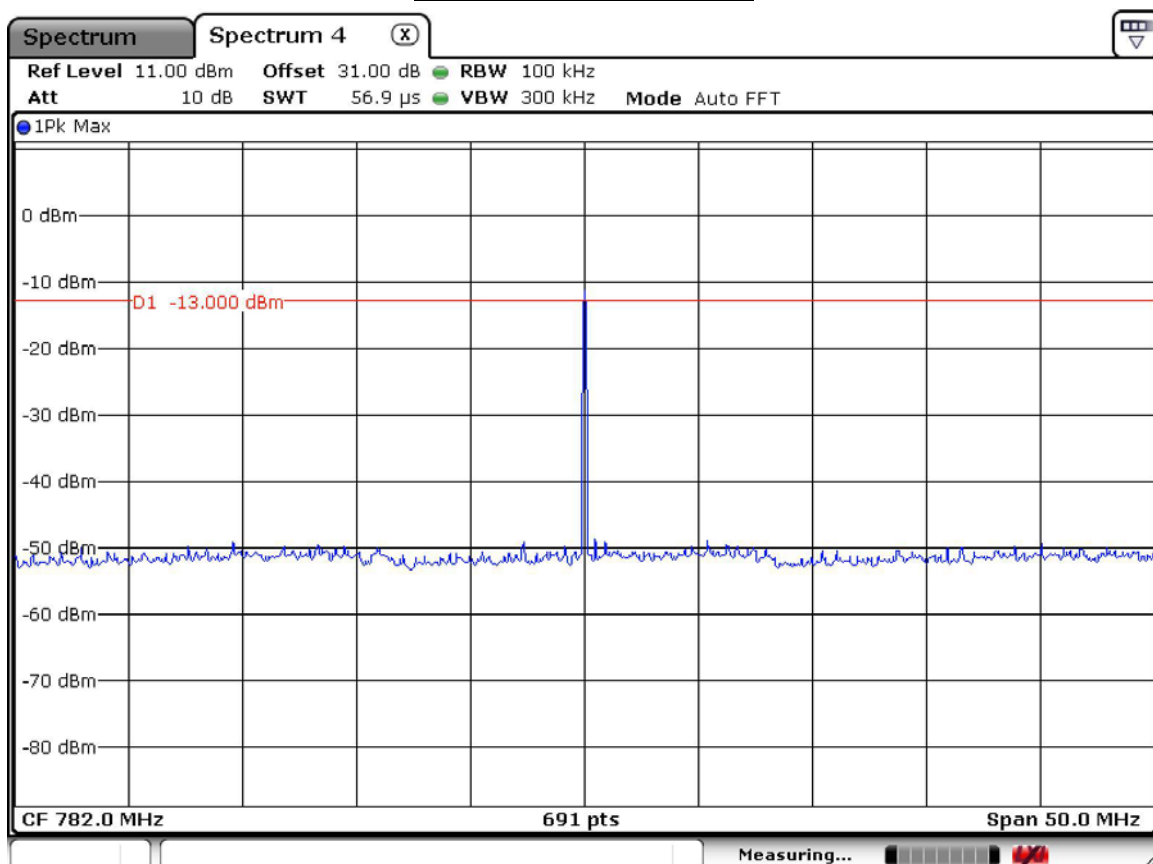
LTE Block C DL-MAIN

LTE Block C UL-MAIN



LTE Block C DL-MIMO

LTE Block C UL-MIMO



3.2.4 Spurious Emissions at antenna terminal

1. Requirement

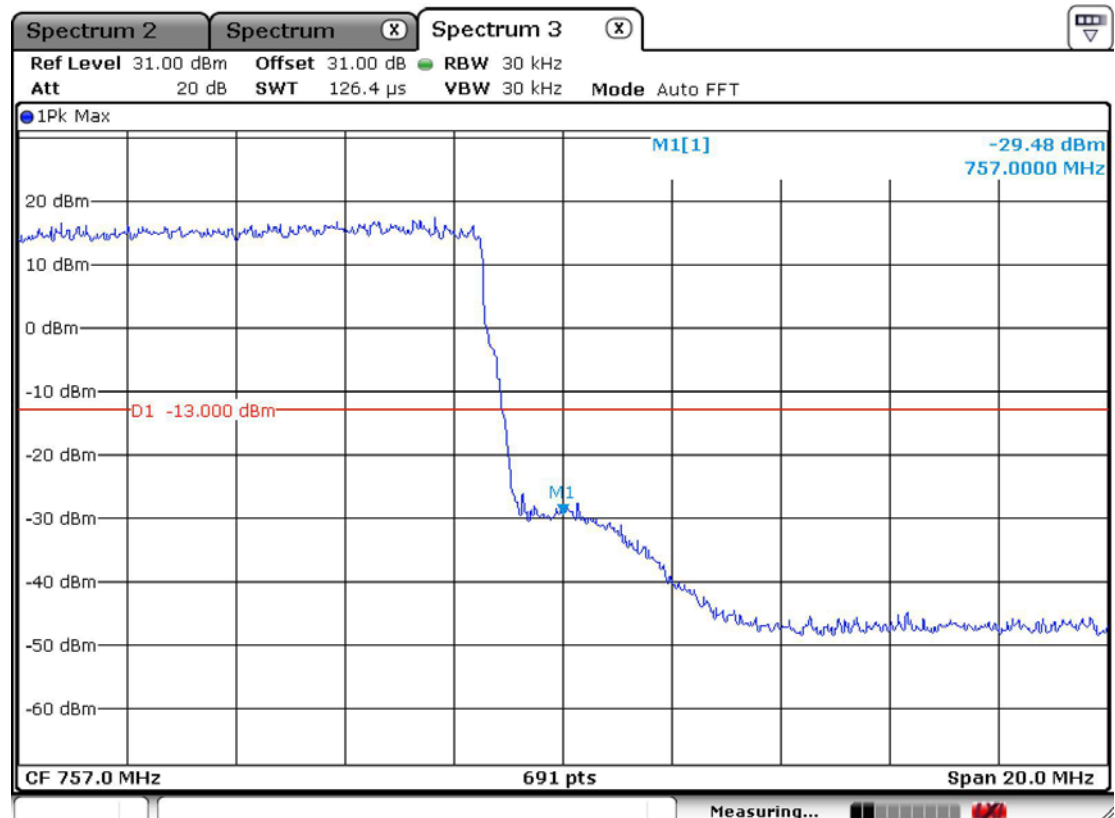
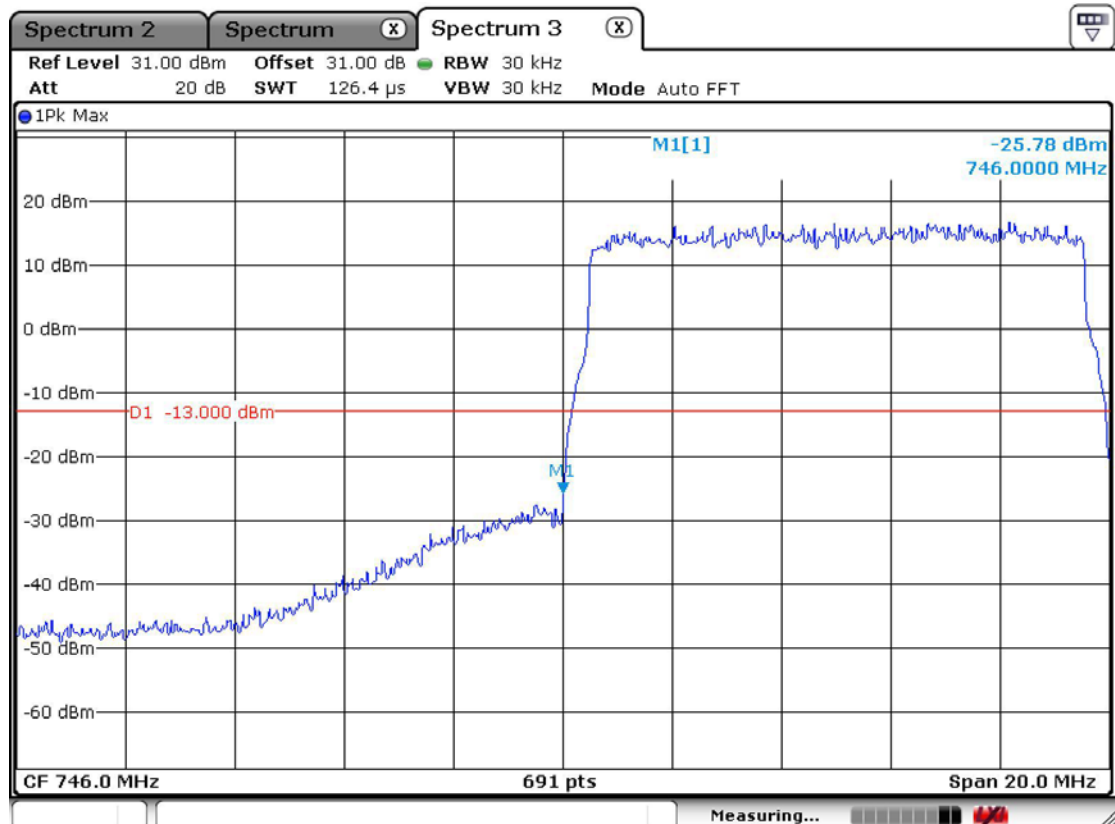
For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside of the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside of the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (2) On any frequency outside of the 776-787 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log (P)$ in a 6.25 KHz band segment for base and fixed stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based upon the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of 30 kHz may be employed.

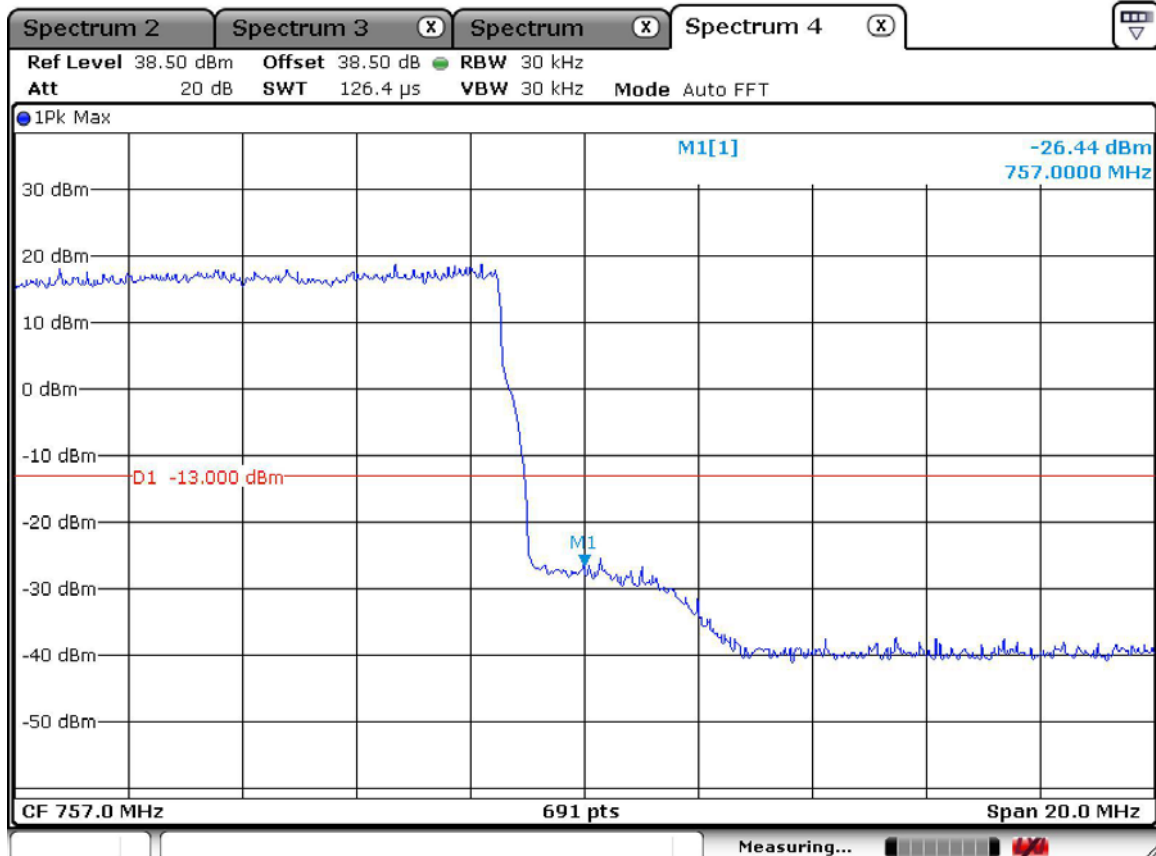
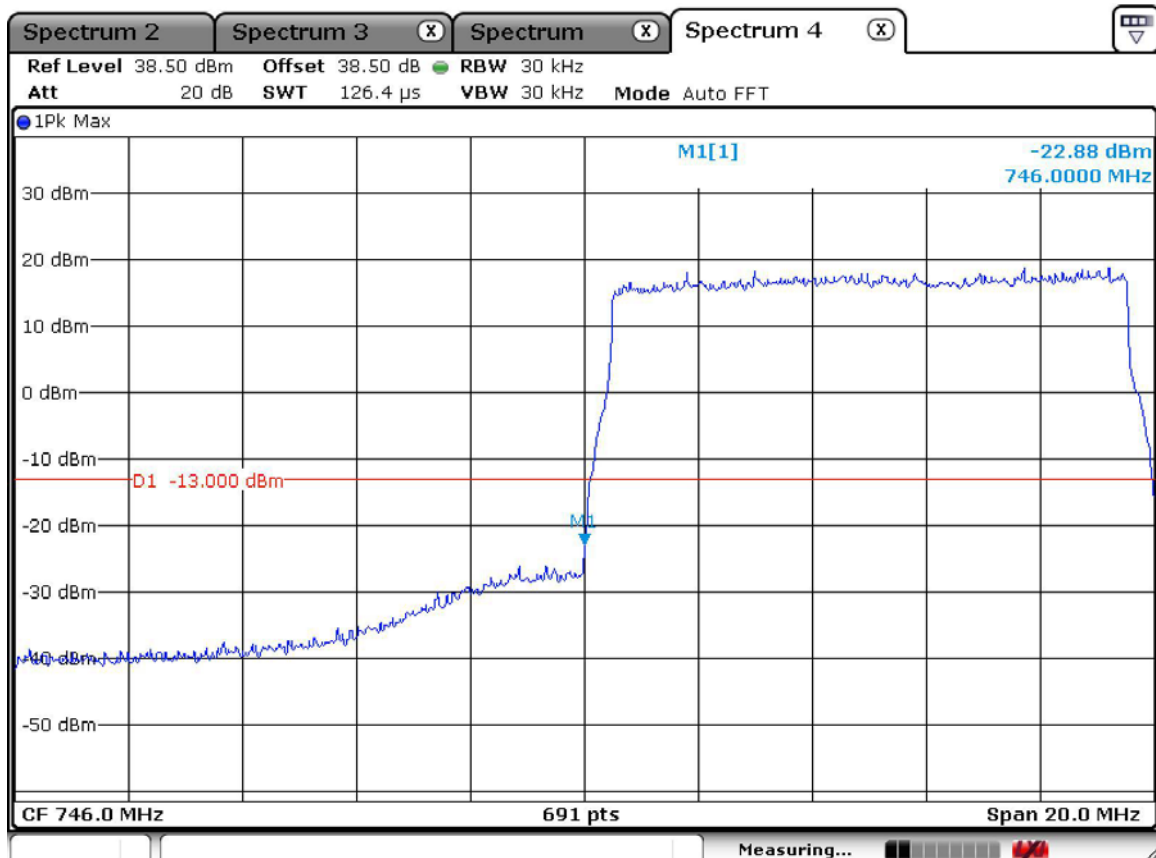
2. Test Results : Complies

Refer to the following Graphs.

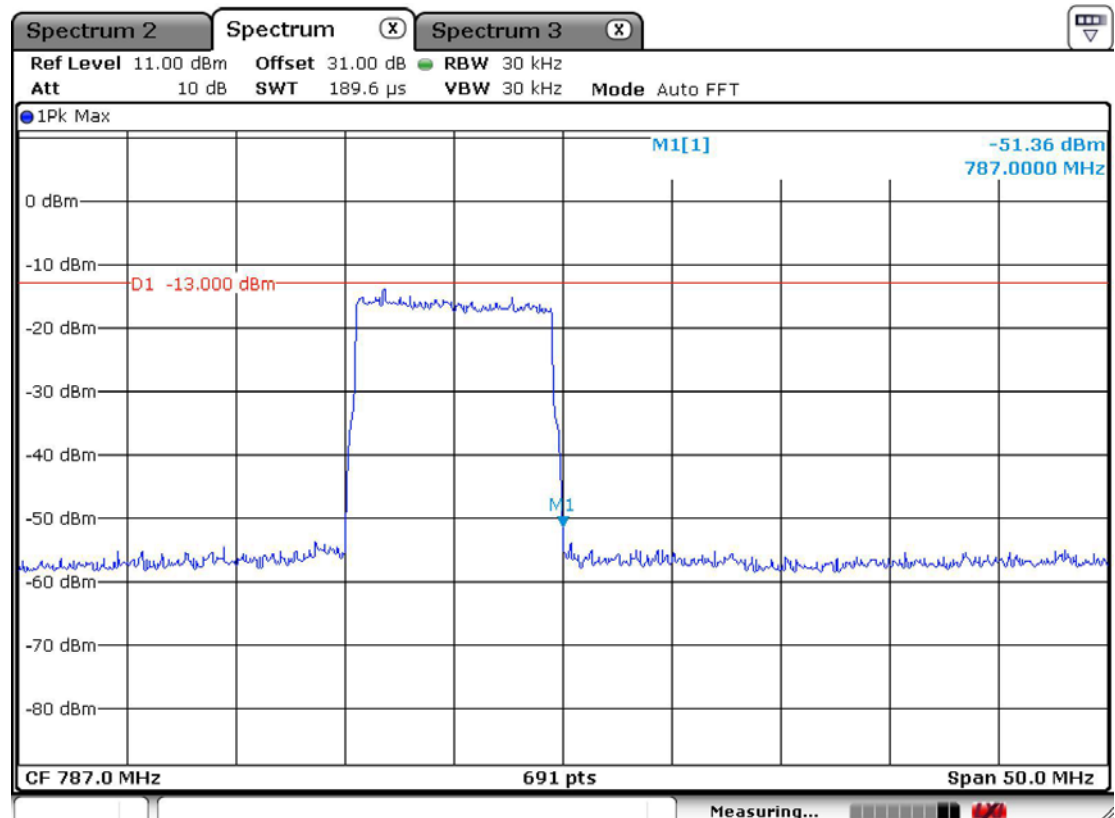
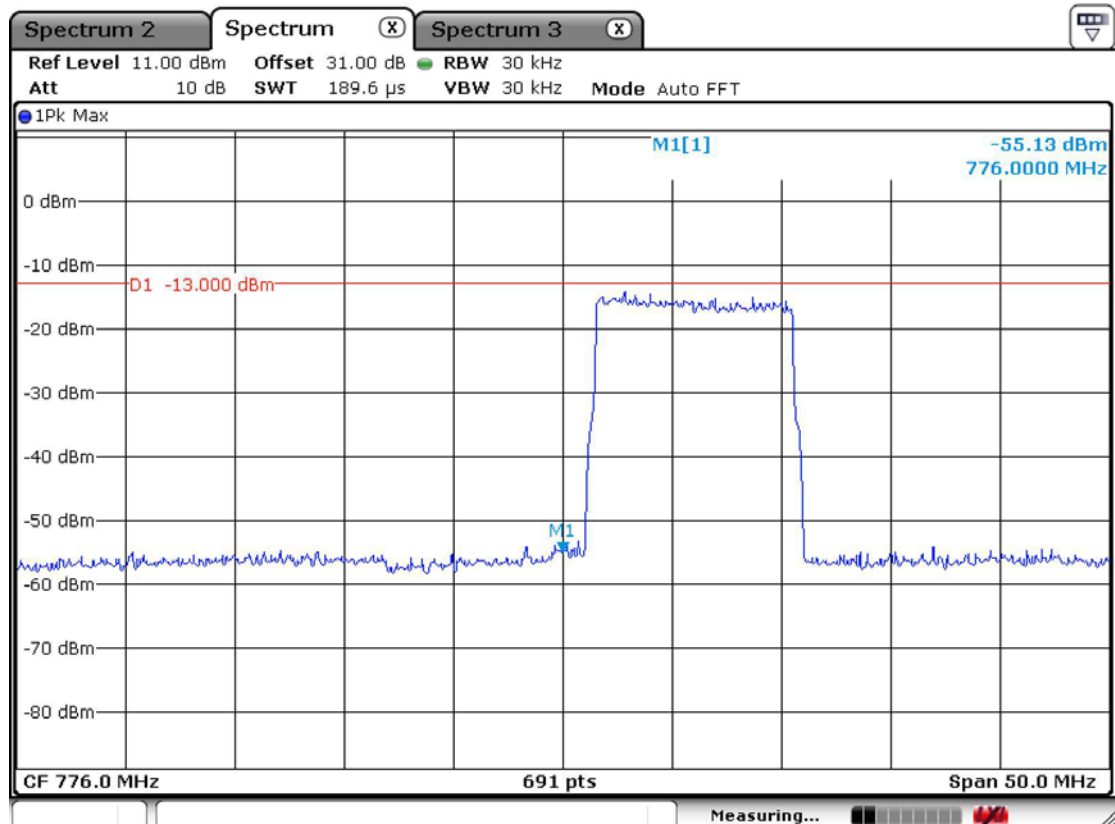
Antenna Terminal Spurious Emissions, Band edge, LTE Block C_DL-MAIN



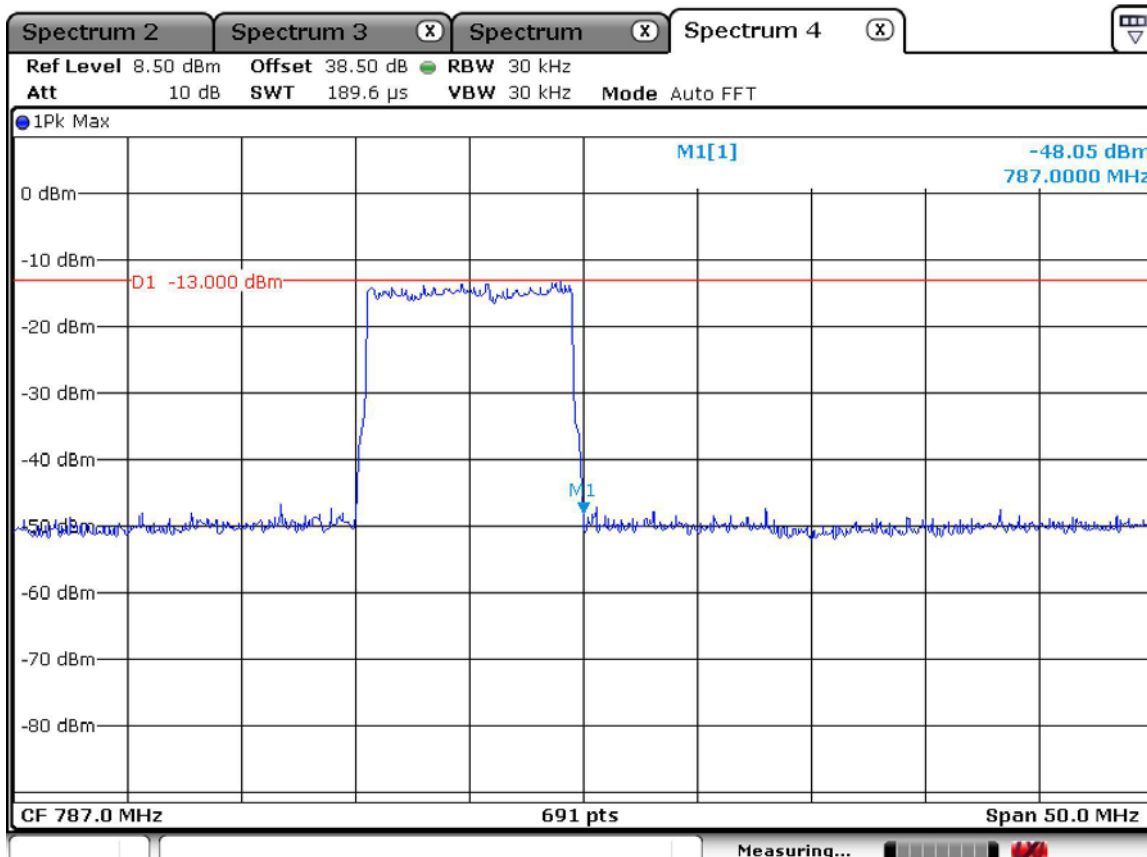
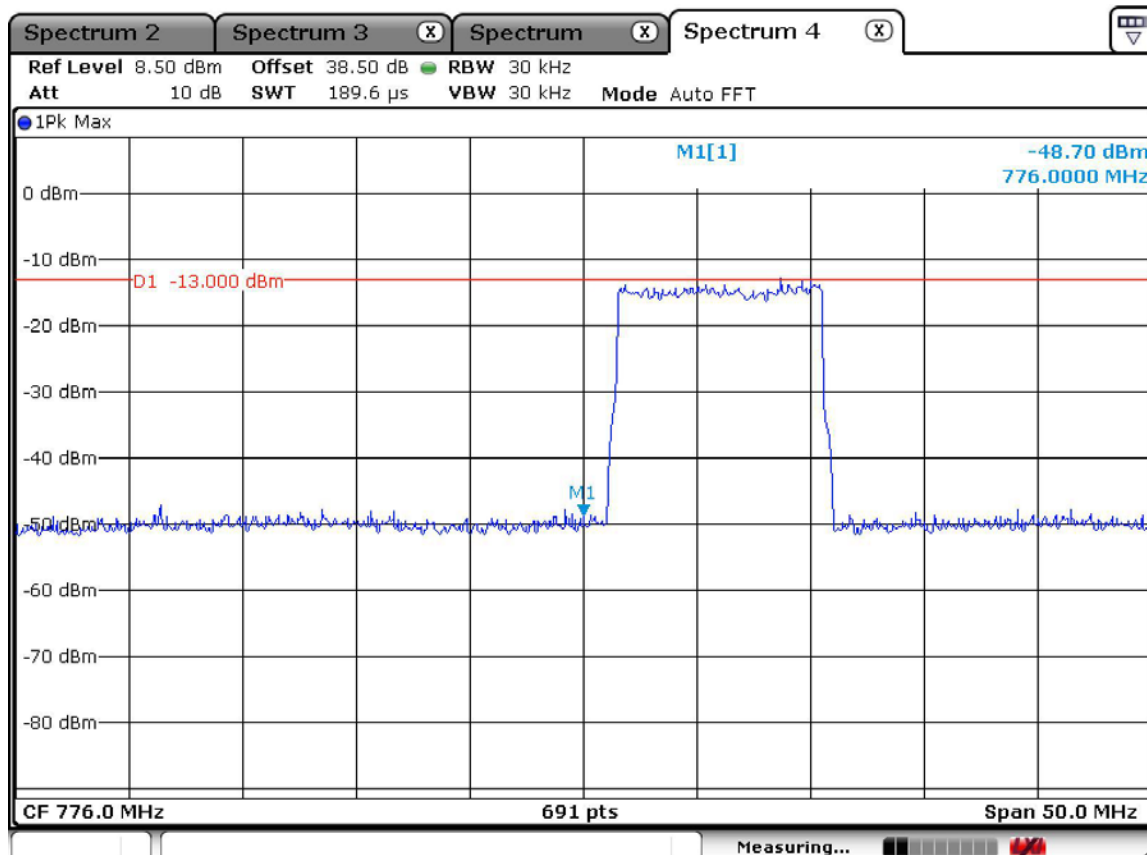
Antenna Terminal Spurious Emissions, Band edge, LTE Block C_DL-MIMO



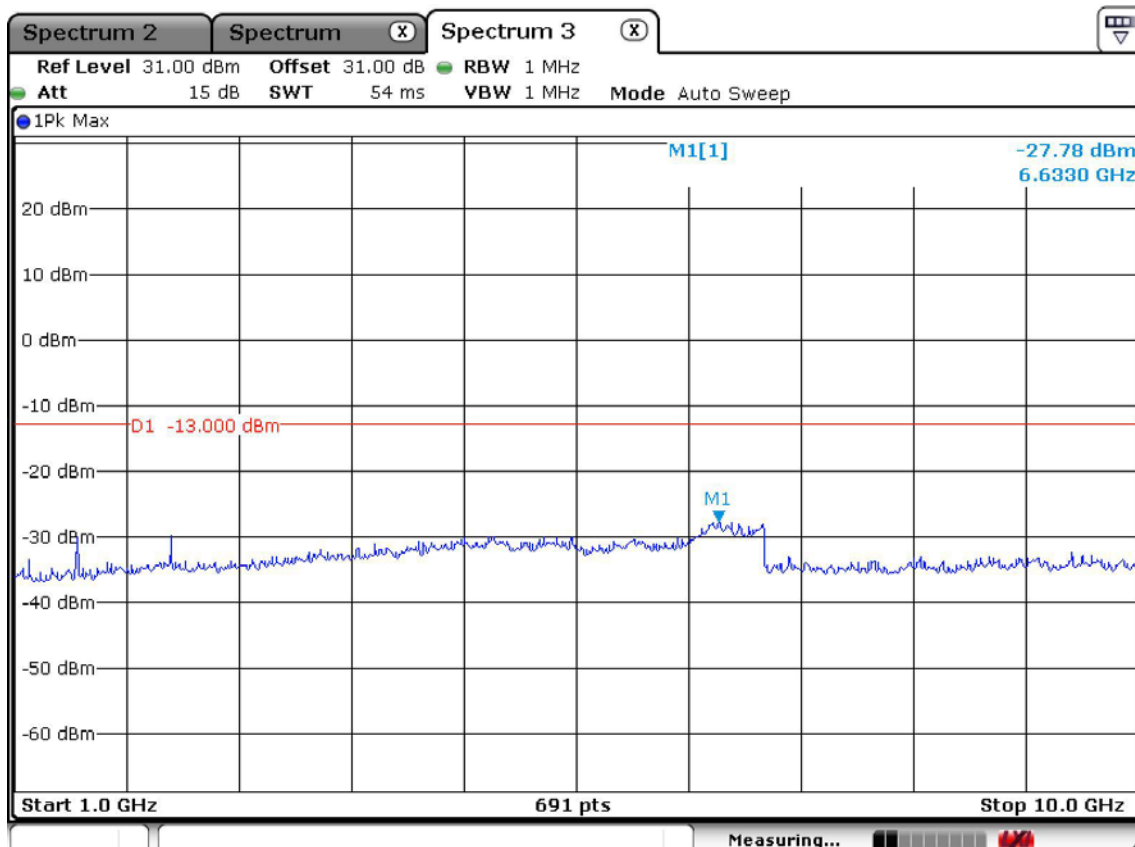
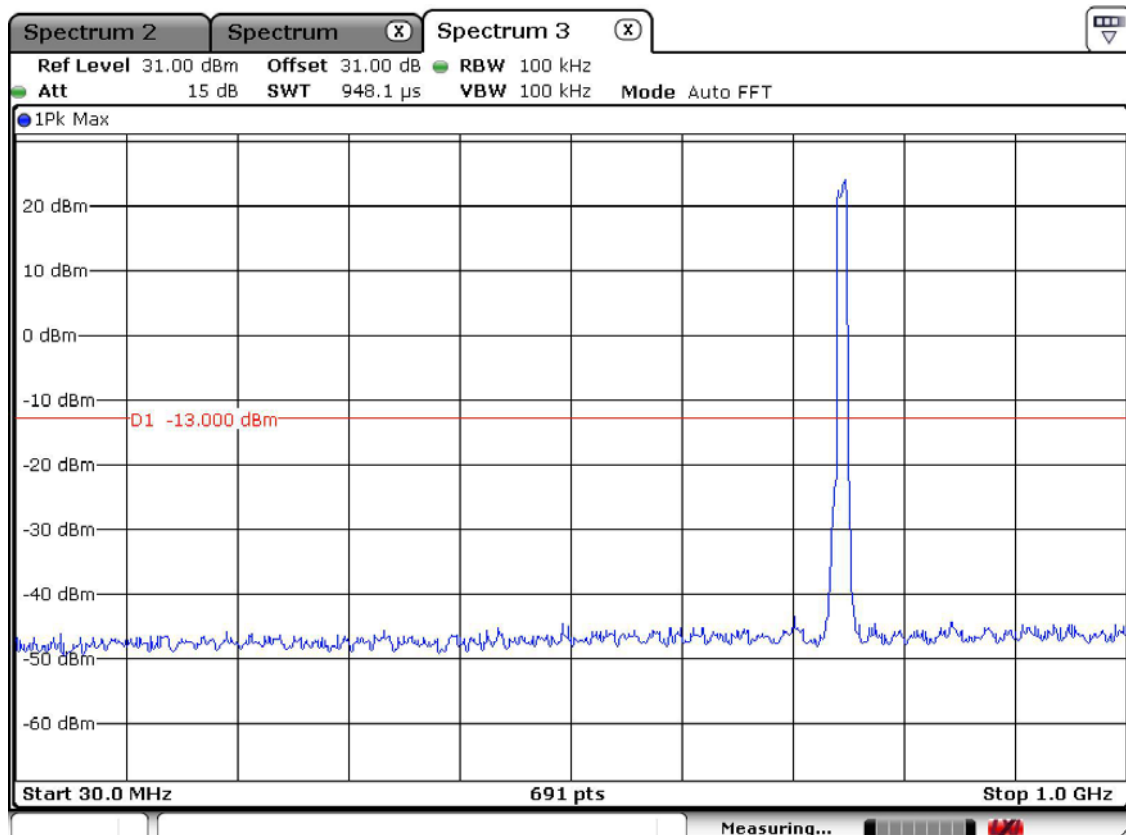
Antenna Terminal Spurious Emissions, Band edge, LTE Block C_UL-MAIN



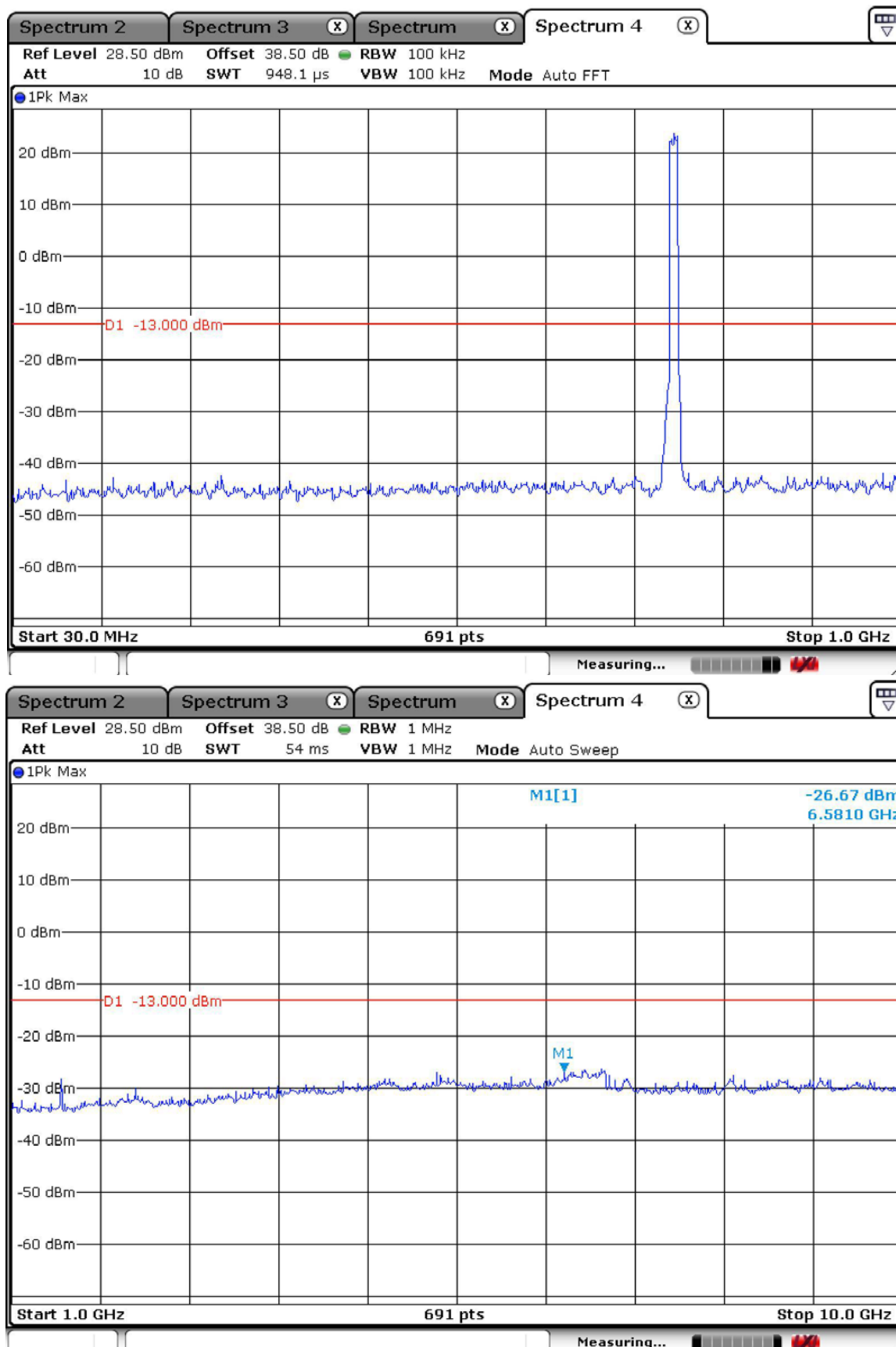
Antenna Terminal Spurious Emissions, Band edge, LTE Block C_UL-MIMO



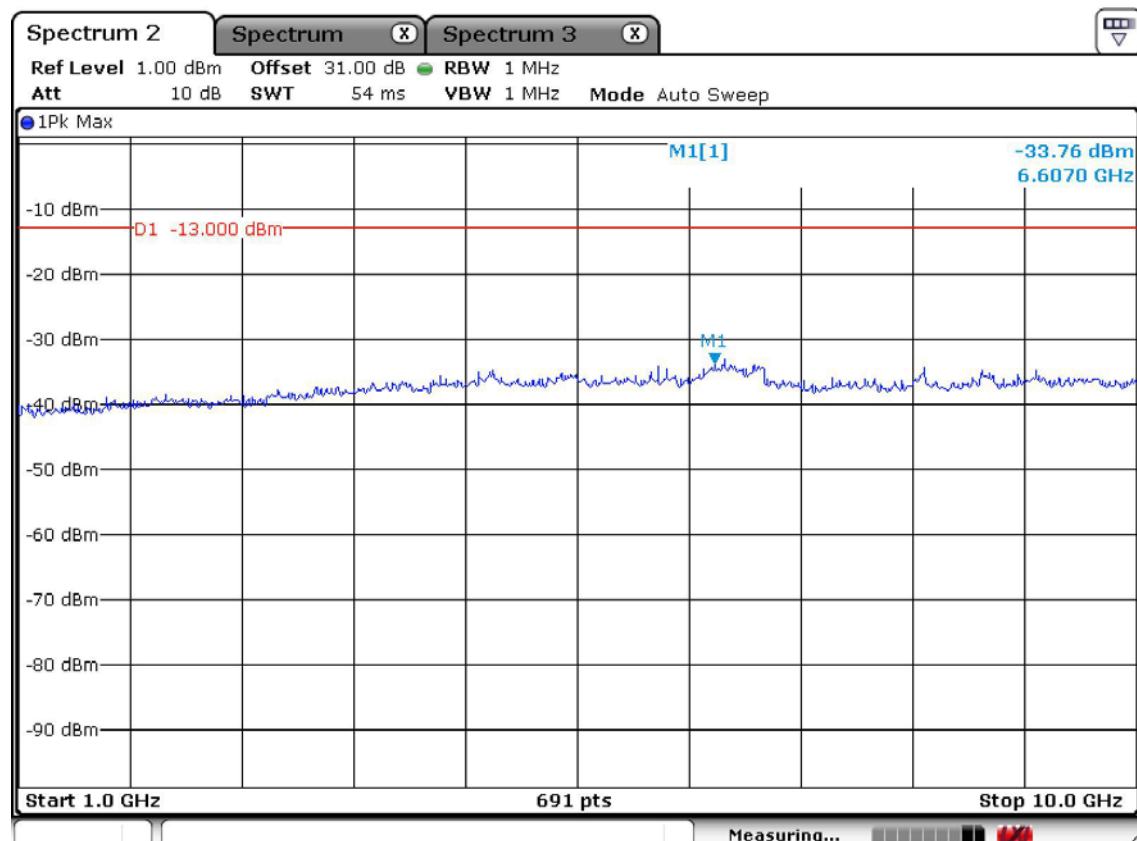
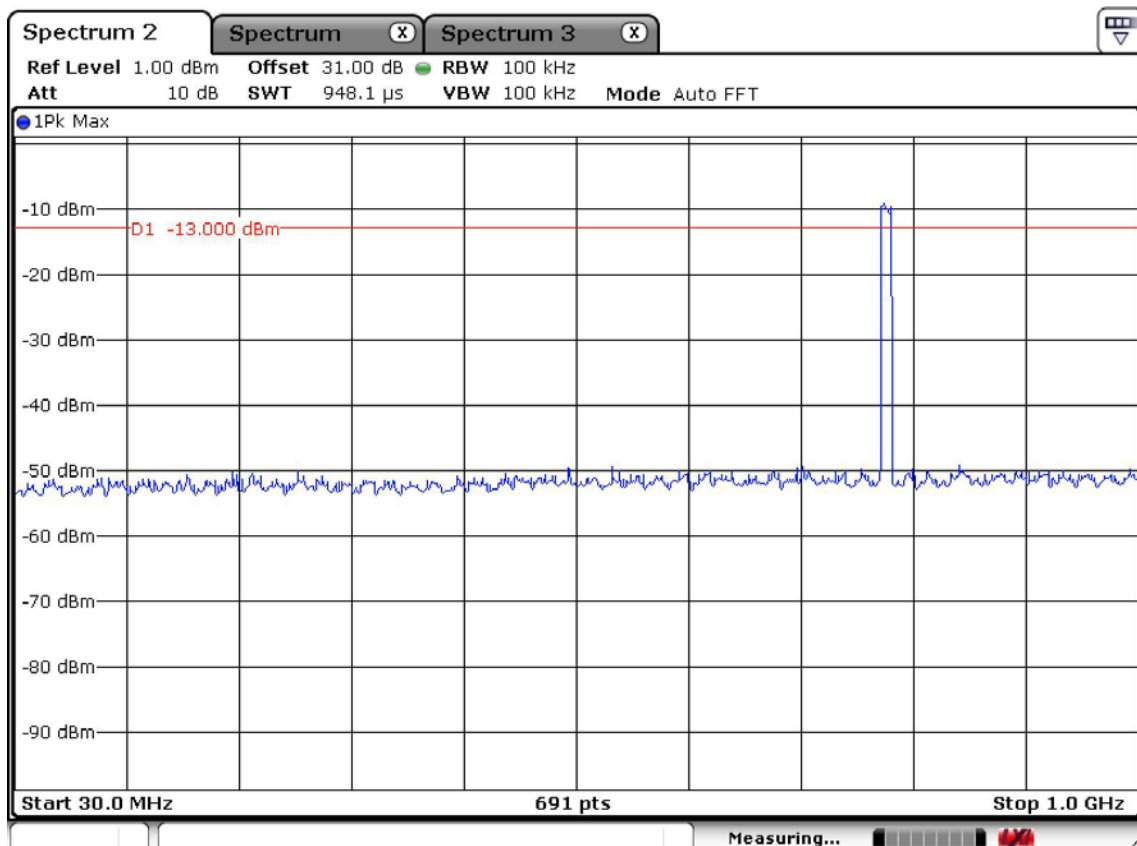
Antenna Terminal Spurious Emissions, Spurious, LTE Block C_DL-MAIN



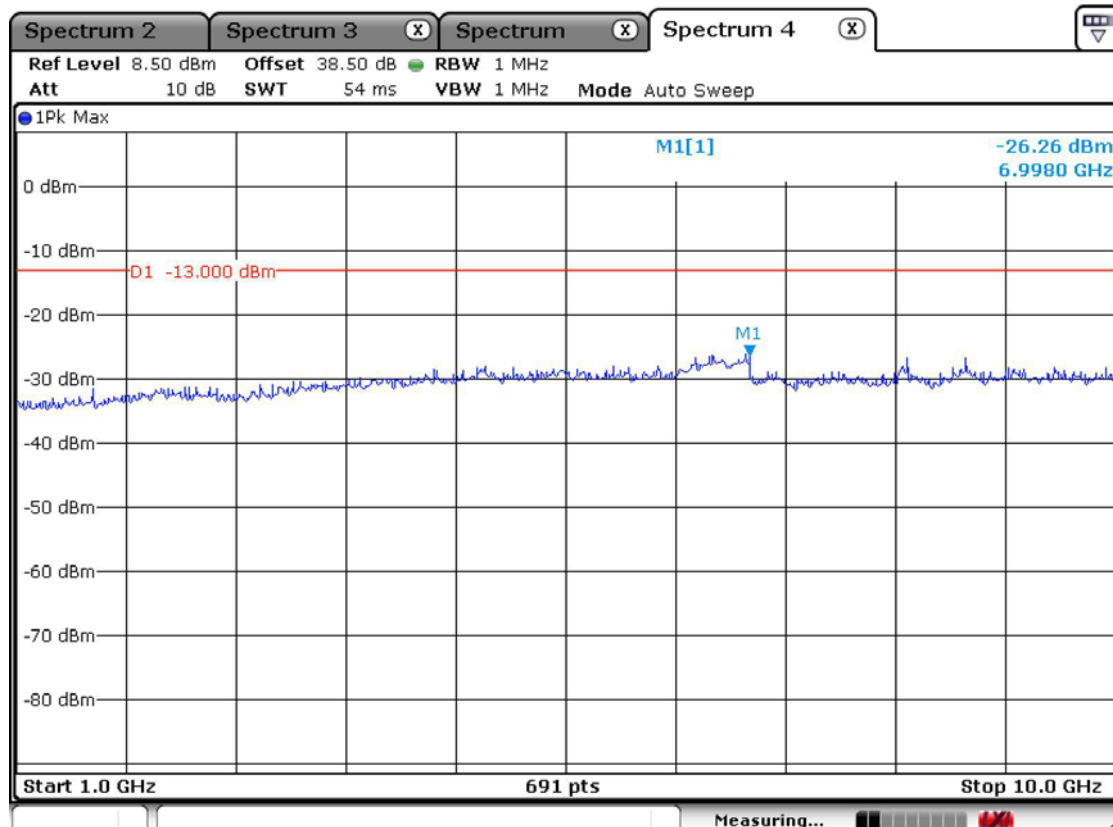
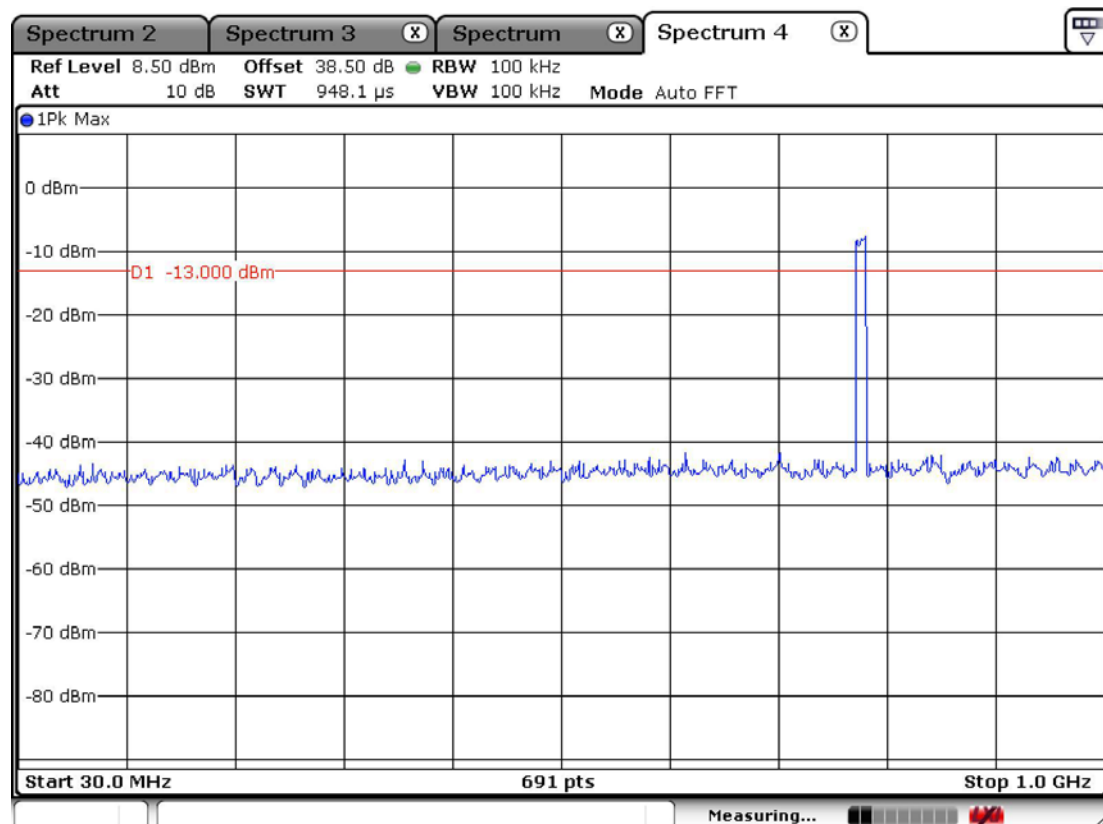
Antenna Terminal Spurious Emissions, Spurious, LTE Block C_DL-MIMO



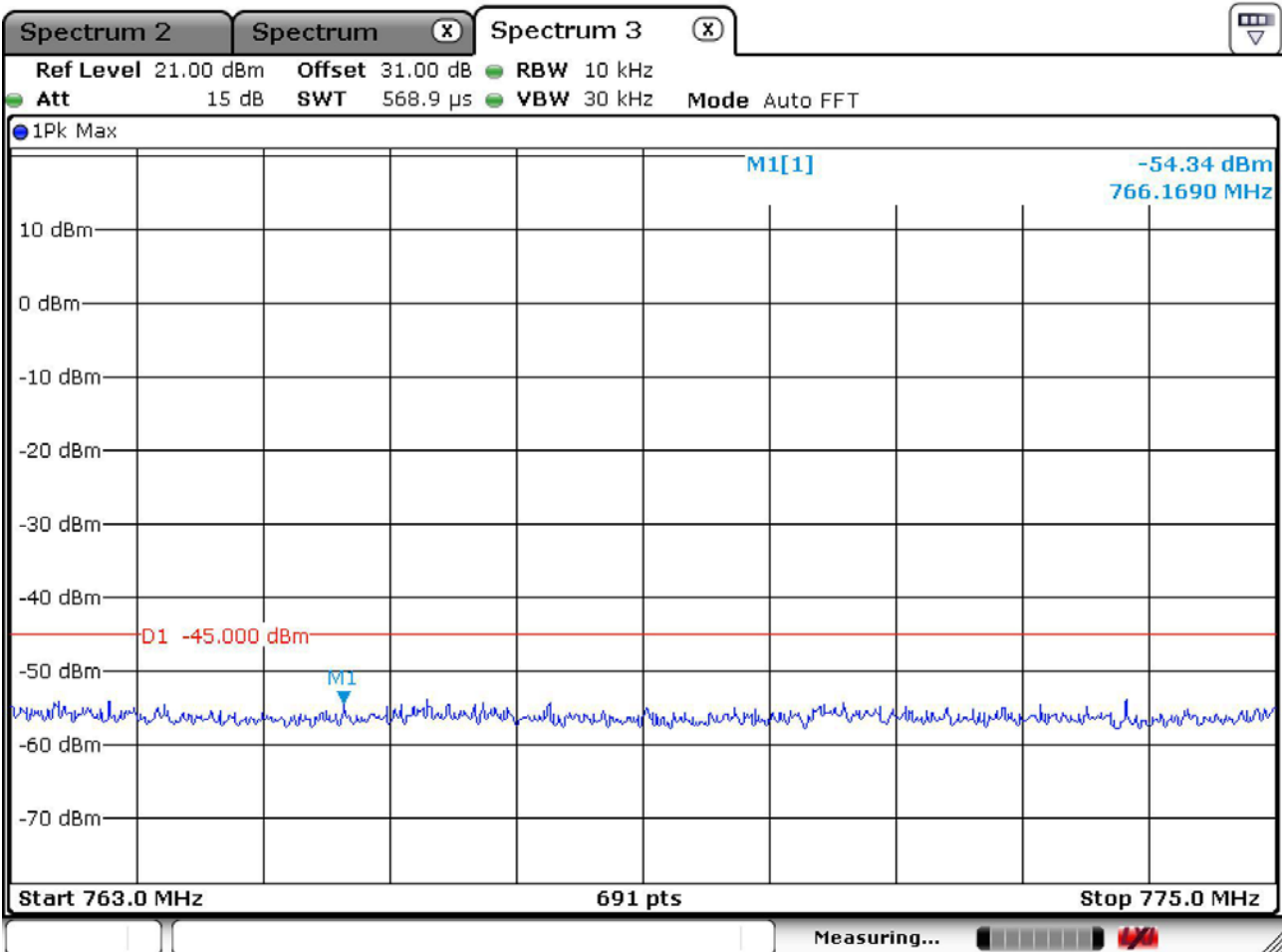
Antenna Terminal Spurious Emissions, Spurious, LTE Block C_UL-MAIN



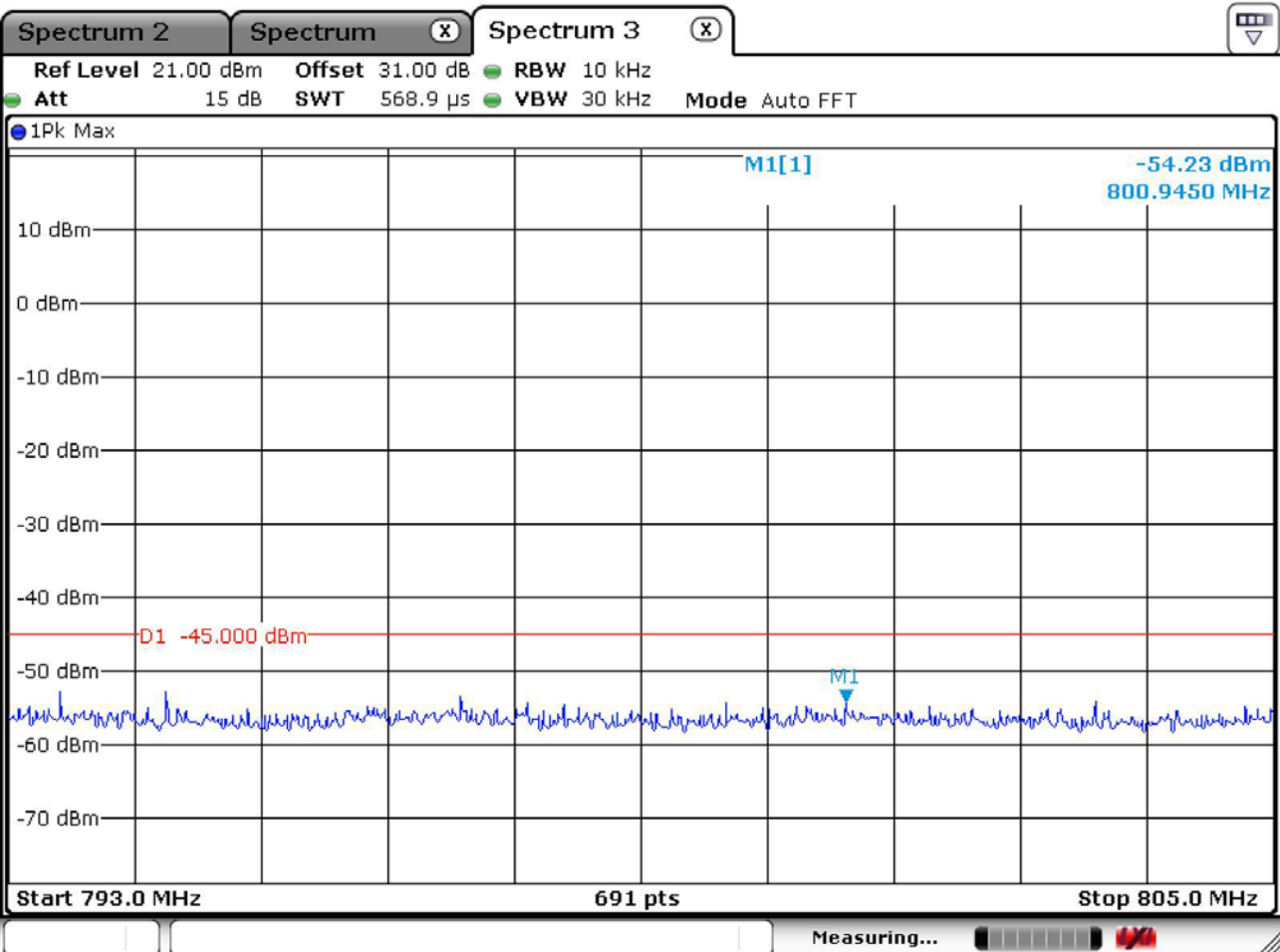
Antenna Terminal Spurious Emissions, Spurious, LTE Block C_UL-MIMO



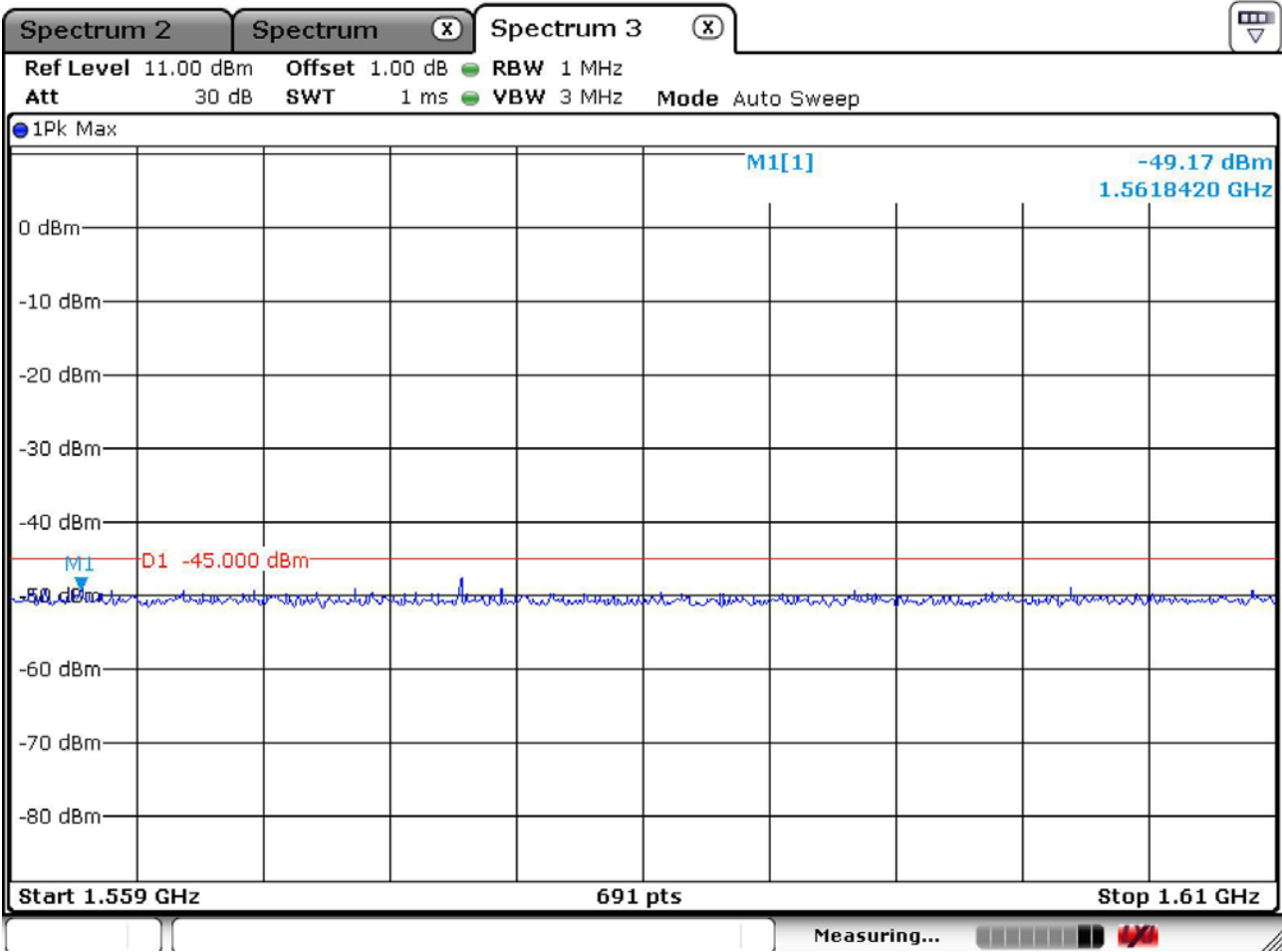
Antenna Terminal Spurious Emissions, 763-775MHz (MAIN)



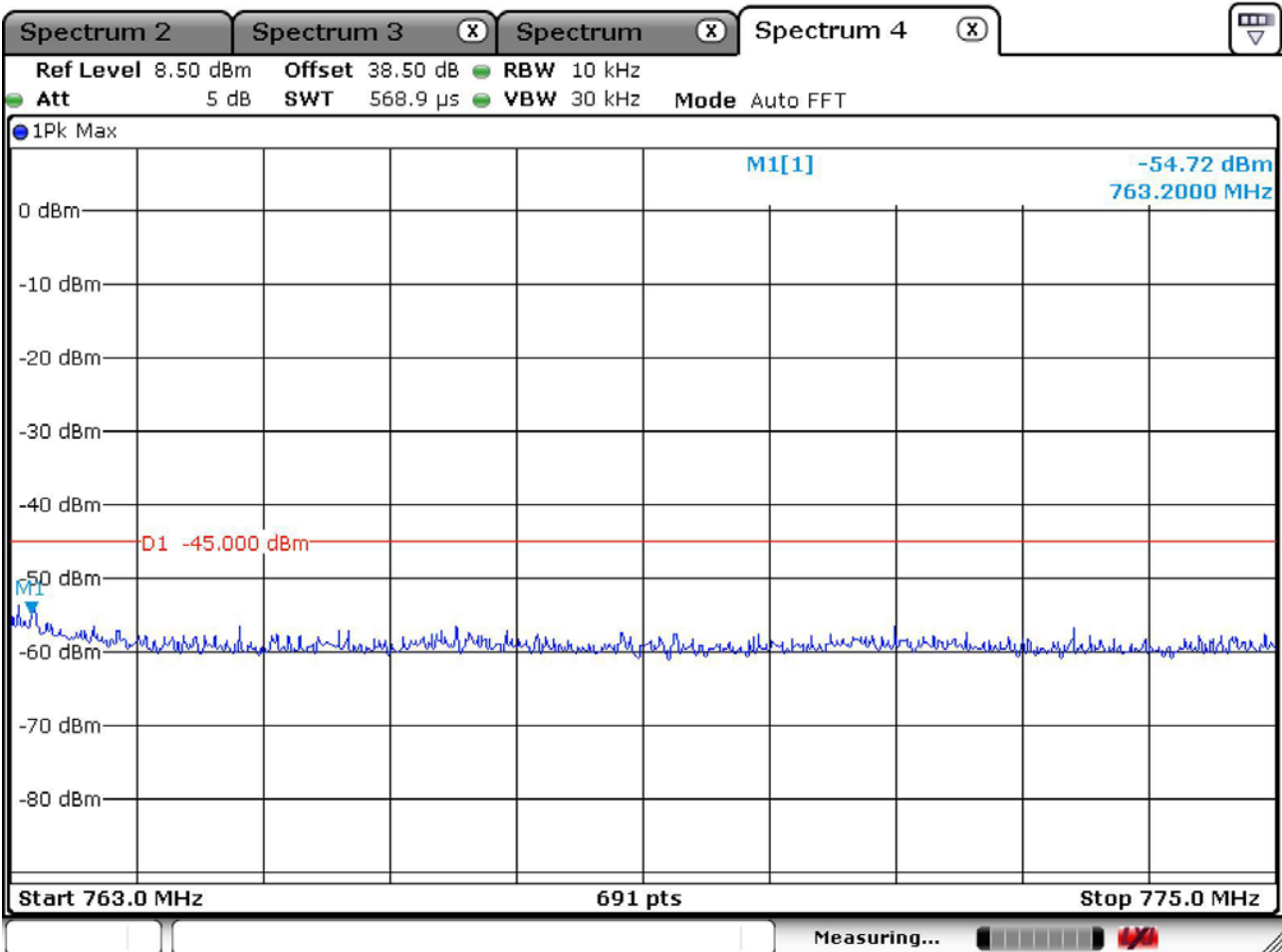
Antenna Terminal Spurious Emissions, 793-805MHz (MAIN)



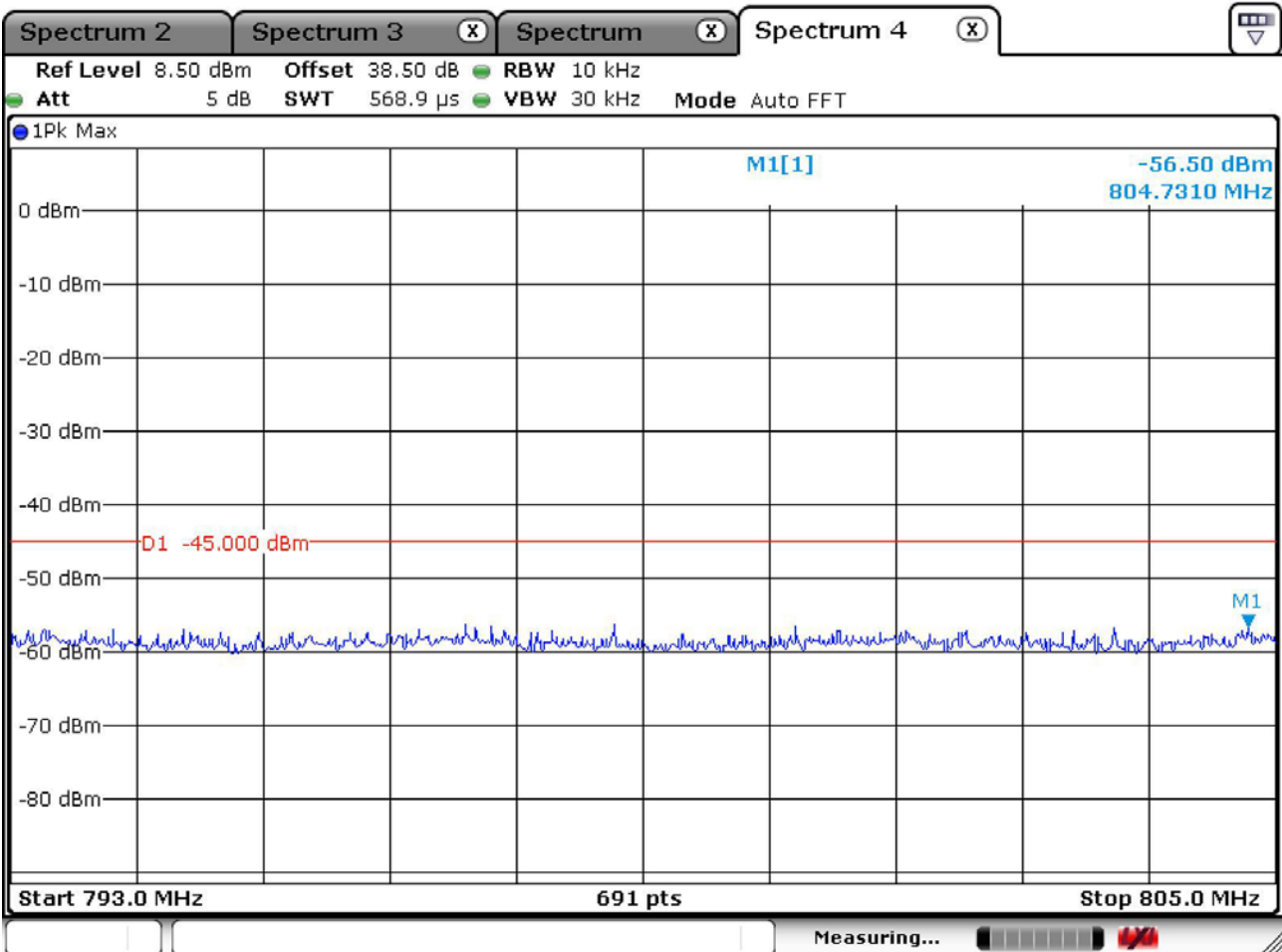
Antenna Terminal Spurious Emissions, additional requirement 27.53(f)
1559-1610MHz (MAIN)



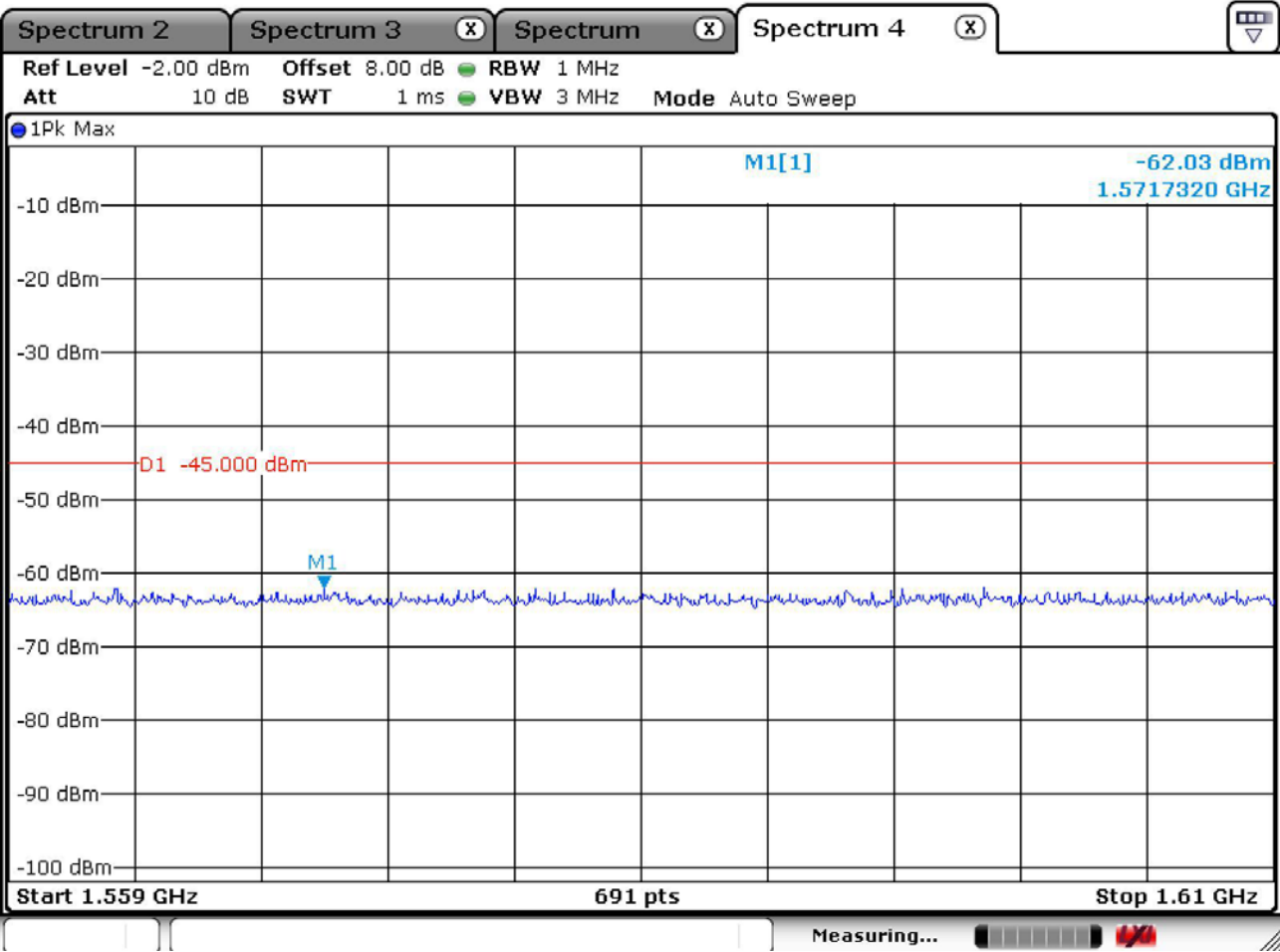
Antenna Terminal Spurious Emissions, 763-775MHz (MIMO)



Antenna Terminal Spurious Emissions, 793-805MHz (MIMO)



Antenna Terminal Spurious Emissions, additional requirement 27.53(f)
1559-1610MHz (MIMO)



3.2.5 Field Strength of Spurious Emissions 27.53 (c)

4. Requirement

For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside of the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside of the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (2) On any frequency outside of the 776-787 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;

5. Test Procedure

Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

6. Test Results : Complies

Refer to the following Graphs.

Note: The Plots are worst case in LTE Block C (MIMO)

Radiated Emission < 1GHz

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EUT/Model No.: LMR250R01C

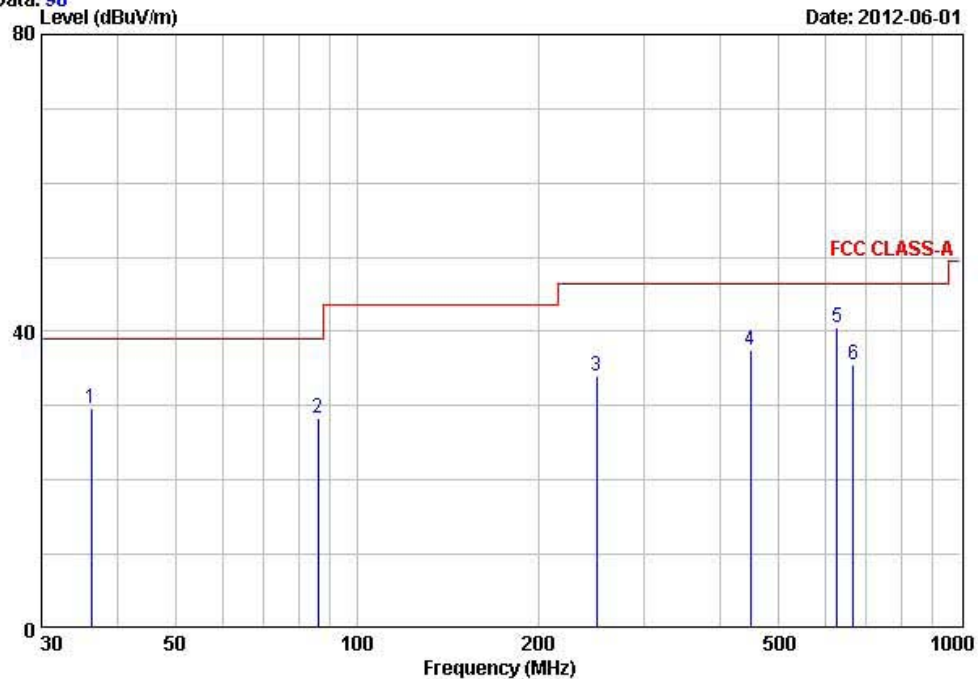
TEST MODE: LTE Downlink mode

Temp Humi : 24 / 47

Tested by: PARK H W

Data: 98

Date: 2012-06-01



	Freq	Reading	C.F	Result	Limit QP	Margin	Height	Angle	Polarity
	MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	36.30	46.20	-16.61	29.59	39.00	9.41	100	123	VERTICAL
2	86.33	47.90	-19.58	28.32	39.00	10.68	400	189	HORIZONTAL
3	250.02	46.80	-12.74	34.06	46.40	12.34	381	345	HORIZONTAL
4	450.03	44.90	-7.47	37.43	46.40	8.97	214	116	HORIZONTAL
5	625.01	43.20	-2.63	40.57	46.40	5.83	142	333	VERTICAL
6	665.33	37.20	-1.58	35.62	46.40	10.78	146	298	VERTICAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



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EUT/Model No.: LMR250R01C

TEST MODE: LTE Uplink mode

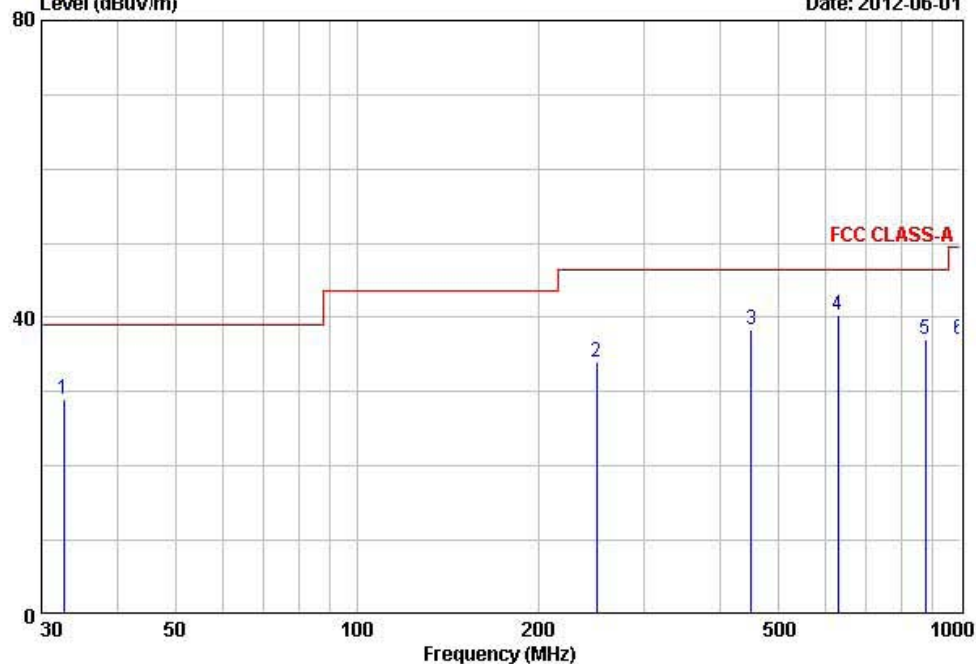
Temp Humi : 24 / 47

Tested by: PARK H W

Data: 97

Level (dBuV/m)

Date: 2012-06-01



	Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
	MHz	dBuV/m	dB/m	dBuV/m	QP	dB	cm	deg	
1	32.64	45.80	-16.80	29.00	39.00	10.00	100	43	VERTICAL
2	250.03	46.70	-12.74	33.96	46.40	12.44	376	350	HORIZONTAL
3	451.24	45.70	-7.44	38.26	46.40	8.14	100	233	VERTICAL
4	627.26	42.90	-2.57	40.33	46.40	6.07	138	296	VERTICAL
5	875.64	34.50	2.54	37.04	46.40	9.36	142	135	HORIZONTAL
6	1000.00	30.90	6.17	37.07	49.50	12.43	103	247	VERTICAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

Radiated Emission > 1GHz

There were no emissions detected above the noise floor, which was at least 20 dB below the specification limit

Frequency [MHz]	Reading [dBuV / m]	Pol.	Correction Factor		EIRP [dBm]		Limit [dBm]	Margin [dB]
			Antenna	Cable	S / G Reading	Result		
No other emissions were detected at a level greater than 20dB below limit								

3.2.6 Frequency Stability

1. Requirement

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

2. Test Procedure

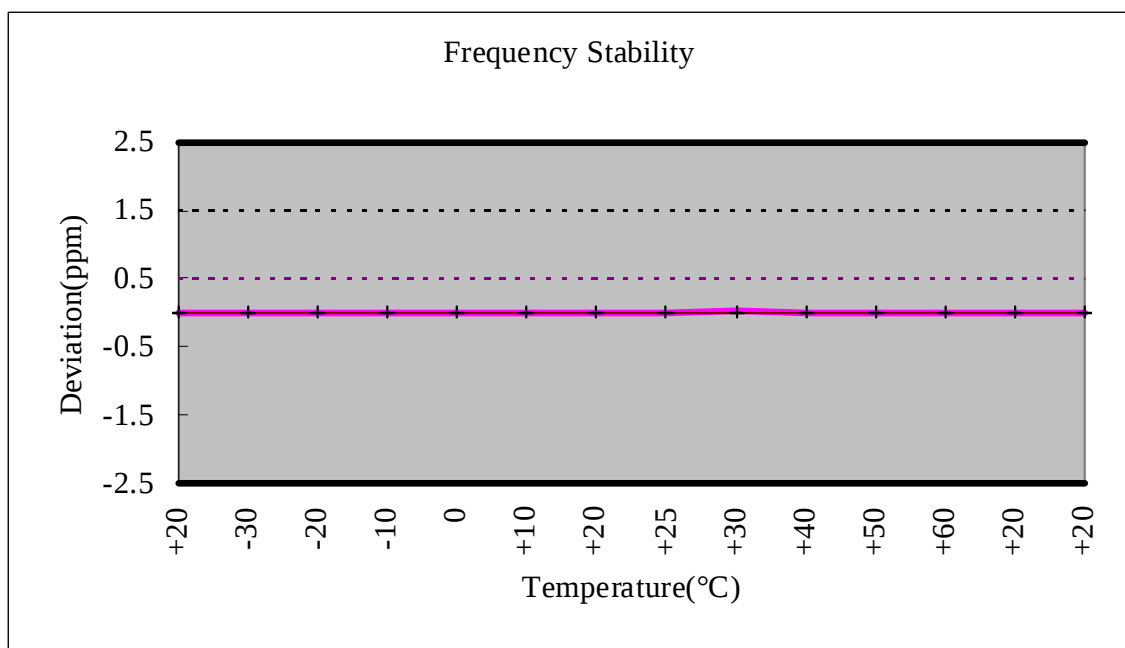
The EUT was placed inside the temperature chamber. The RF output port was connected to a spectrum analyzer. The EUT was setup to transmit the maximum power. After the temperature stabilized for approximately 20 minutes, the transmitting frequency was measured by the spectrum analyzer and recorded. At room temperature, the frequency was measured when the EUT was powered with the nominal voltage and with 85% and 115% of the nominal voltage.

3. Test Results : Complies

-refer to the next page

LTE Block C mode DL-MAINOPERATING FREQUENCY : 751,000,000 HzREFERENCE VOLTAGE : 120 VACDEVIATION LIMIT : ± 0.00010 % or 1 ppm

VOLTAGE (%)	POWER (VAC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100%	120	+20(Ref)	751,000,000	0.000000
100%		-30	751,000,006	0.000001
100%		-20	751,000,004	0.000001
100%		-10	751,000,002	0.000000
100%		0	751,000,003	0.000000
100%		+10	751,000,002	0.000000
100%		+20	751,000,003	0.000000
100%		+25	751,000,005	0.000001
100%		+30	751,000,008	0.000001
100%		+40	751,000,007	0.000001
100%		+50	751,000,005	0.000001
100%		+60	751,000,006	0.000001
85%	102	+20	751,000,005	0.000001
115%	138	+20	751,000,002	0.000000



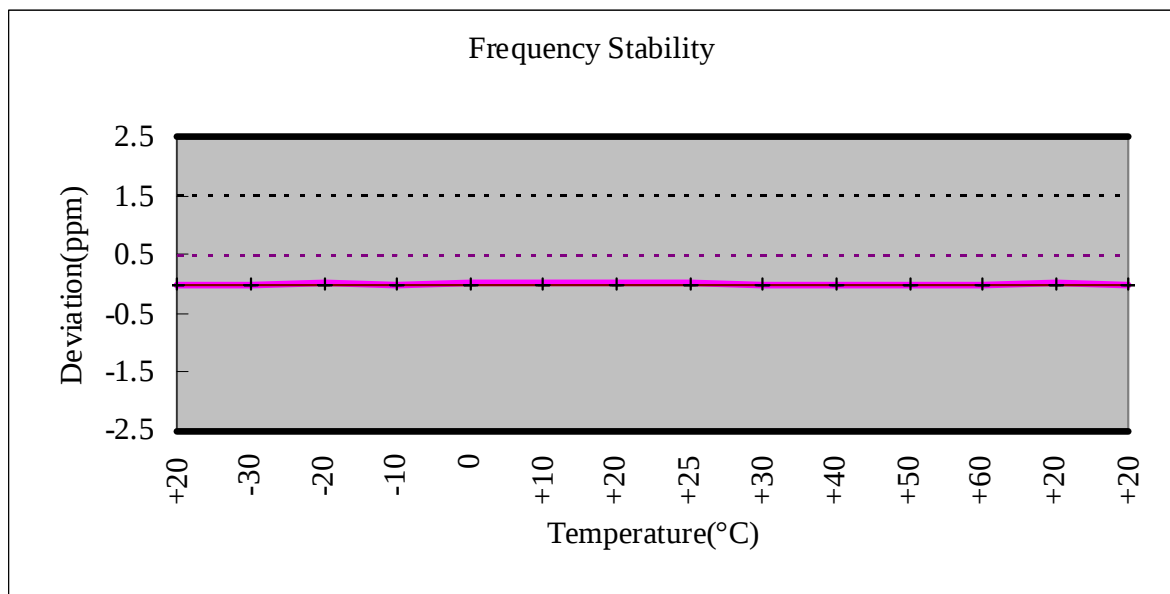
LTE Block C mode DL-MIMO

OPERATING FREQUENCY : 751,000,000 Hz

REFERENCE VOLTAGE : 120 VAC

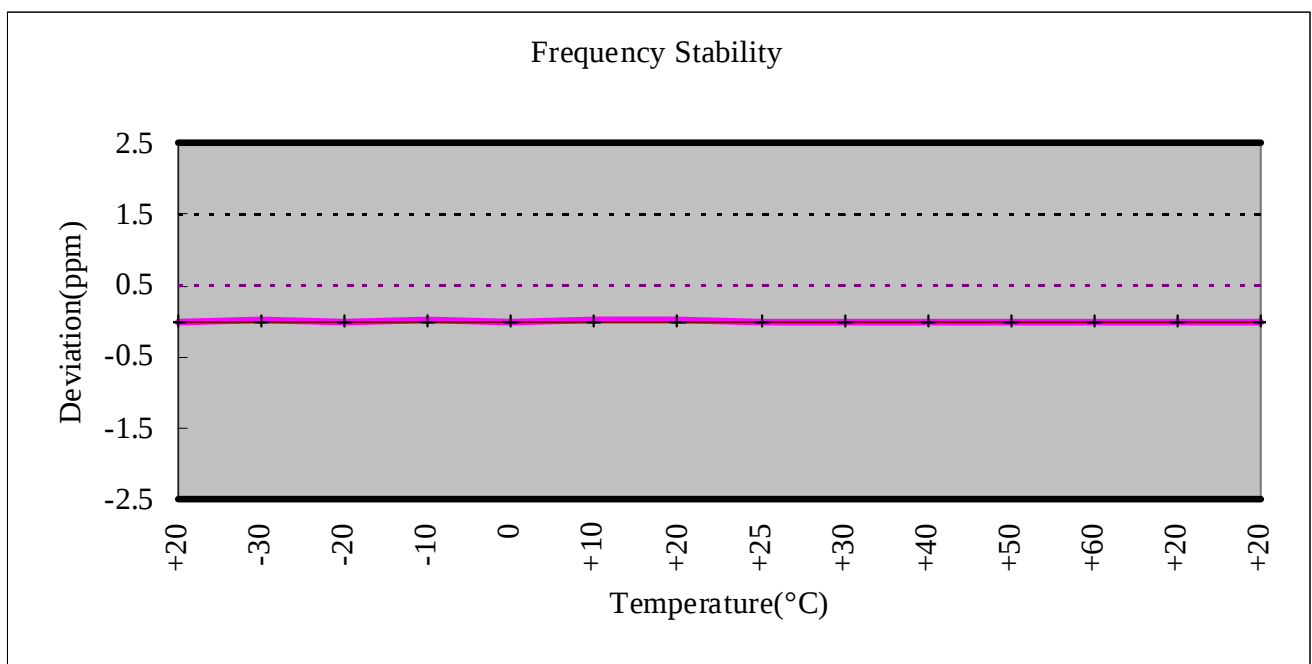
DEVIATION LIMIT : ± 0.00010 % or 1 ppm

VOLTAGE (%)	POWER (VAC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100%	120	+20(Ref)	751,000,000	0.000000
100%		-30	751,000,002	0.000008
100%		-20	751,000,005	0.000005
100%		-10	751,000,002	0.000004
100%		0	751,000,006	0.000003
100%		+10	751,000,008	0.000001
100%		+20	751,000,009	0.000000
100%		+25	751,000,004	-0.000002
100%		+30	751,000,001	-0.000005
100%		+40	751,000,002	-0.000006
100%		+50	751,000,002	-0.000006
100%		+60	751,000,001	-0.000008
85%	102	+20	751,000,003	-0.000001
115%	138	+20	751,000,001	-0.000001



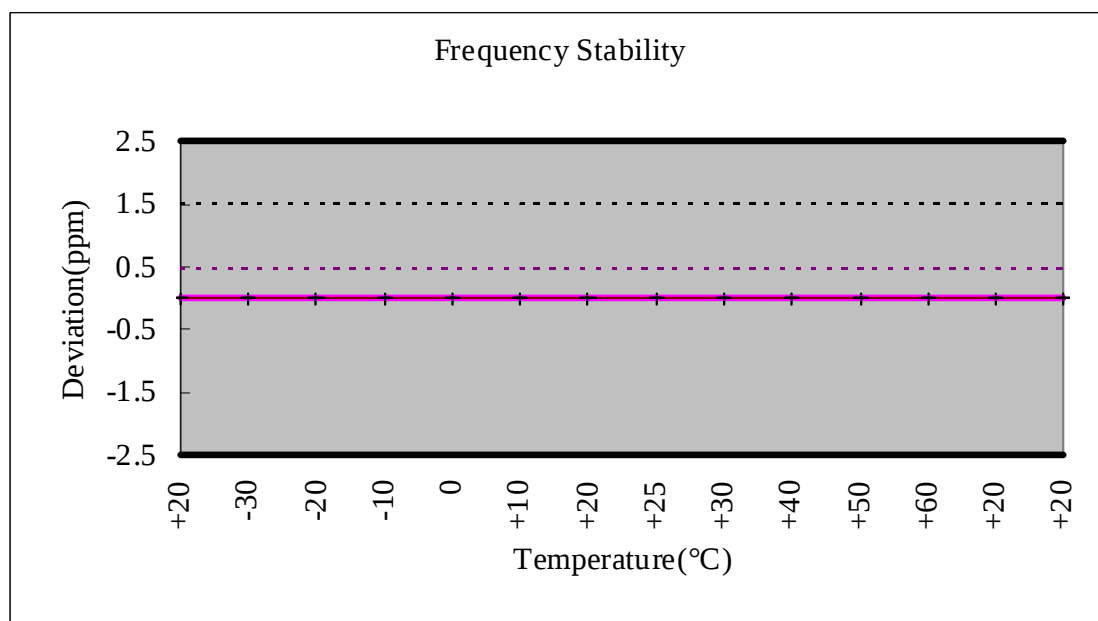
LTE Block C mode UL-MAINOPERATING FREQUENCY : 782,000,000 HzREFERENCE VOLTAGE : 120 VACDEVIATION LIMIT : ± 0.00010 % or 1 ppm

VOLTAGE (%)	POWER (VAC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100%	120	+20(Ref)	782,000,000	0.000000
100%		-30	782,000,006	0.000001
100%		-20	782,000,004	0.000001
100%		-10	782,000,006	0.000001
100%		0	782,000,002	0.000000
100%		+10	782,000,007	0.000001
100%		+20	782,000,005	0.000001
100%		+25	782,000,002	0.000000
100%		+30	782,000,004	0.000001
100%		+40	782,000,003	0.000000
100%		+50	782,000,003	0.000000
100%		+60	782,000,001	0.000000
85%	102	+20	782,000,003	0.000000
115%	138	+20	782,000,002	0.000000



LTE Block C mode UL-MIMOOPERATING FREQUENCY : 782,000,000 HzREFERENCE VOLTAGE : 120 VACDEVIATION LIMIT : ± 0.00010 % or 1 ppm

VOLTAGE (%)	POWER (VAC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100%	120	+20(Ref)	782,000,000	0.000000
100%		-30	782,000,006	0.000008
100%		-20	782,000,002	0.000005
100%		-10	782,000,005	0.000004
100%		0	782,000,003	0.000003
100%		+10	782,000,001	0.000001
100%		+20	782,000,004	0.000000
100%		+25	782,000,004	-0.000002
100%		+30	782,000,005	-0.000005
100%		+40	782,000,002	-0.000006
100%		+50	782,000,001	-0.000006
100%		+60	782,000,003	-0.000008
85%	102	+20	782,000,005	-0.000001
115%	138	+20	782,000,003	-0.000001



3.3 CONCLUSION

The data collected shows that the **Kisan Telecom Co., Ltd. Optical DAS Repeater (LTE)**
FCC ID: T7MLMR250R01C complies with all the requirements of Parts 27 of the FCC Rules.

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APPENDIX

TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Interval	Last Cal. Date
1	Spectrum Analyzer (~30GHz)	FSV-30	100757	R&S	1 year	2012-01-10
2	Signal Generator (~3.2GHz)	8648C	3623A02597	HP	1 year	2012-03-26
3	Signal Generator (1~20GHz)	83711B	US34490456	HP	1 year	2012-03-26
4	Attenuator (3dB)	8491A	37822	HP	2 year	2010-10-08
5	Attenuator (10dB)	8491A	63196	HP	2 year	2010-10-08
6	Attenuator (30dB)	8498A	3318A10929	HP	2 year	2011-01-05
7	Test Receiver (~30MHz)	ESHS10	828404/009	R&S	1 year	2012-03-26
8	EMI Test Receiver (~1GHz)	ESCI7	100722	R&S	1 year	2011-10-07
9	RF Amplifier (~1.3GHz)	8447D	2439A09058	HP	2 year	2010-10-08
10	RF Amplifier (1~18GHz)	8449B	3008A02126	HP	2 year	2012-03-26
11	Horn Antenna (1~18GHz)	BBHA 9120D	9120D122	SCHWARZBECK	2 year	2010-12-24
12	Horn Antenna (18 ~ 40GHz)	SAS-574	154	Schwarzbeck	2 year	2010-11-25
13	Horn Antenna (18 ~ 40GHz)	SAS-574	155	Schwarzbeck	2 year	2010-11-25
14	TRILOG Antenna	VULB 9160	9160-3172	SCHWARZBECK	2 year	2010-10-07
15	Dipole Antenna	VHA9103	2116	SCHWARZBECK	2 year	2010-11-25
16	Dipole Antenna	VHA9103	2117	SCHWARZBECK	2 year	2010-11-25
17	Dipole Antenna	VHA9105	2261	SCHWARZBECK	2 year	2010-11-25
18	Dipole Antenna	VHA9105	2262	SCHWARZBECK	2 year	2010-11-25
19	Hygro-Thermograph	THB-36	0041557-01	ISUZU	2 year	2013-04-26
20	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
21	Power Divider	11636A	6243	HP	2 year	2010-10-08
22	DC Power Supply	6622A	3448A03079	HP	-	-
23	Frequency Counter	5342A	2826A12411	HP	1 year	2012-03-26
24	Power Meter	EPM-441A	GB32481702	HP	1 year	2012-03-26
25	Power Sensor	8481A	US41030291	HP	1 year	2011-10-07
26	Audio Analyzer	8903B	3729A18901	HP	1 year	2011-10-07
27	Modulation Analyzer	8901B	3749A05878	HP	1 year	2011-10-07
28	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2011-10-07
29	Stop Watch	HS-3	601Q09R	CASIO	2 year	2012-03-26
30	LISN	ENV216	100408	R&S	1 year	2011-10-07
31	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	2 year	2012-05-11
32	Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	-	-
33	Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	-	-
34	Loop Antenna	FMZB 1516	151602/94	SCHWARZBECK	2 year	2011-04-05