

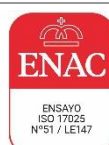
Test Report No:
85372RRF.004

Test Report

USA FCC Part 90

(*) Identification of item tested	LTE Cat1-bis module
(*) Trademark	Sequans Communications
(*) Model and /or type reference	GC02S1-WW
Other identification of the product	FCC ID: 2AAGMGC02SW IC: 12732A-GC02SW
(*) Features	LTE Category CAT1_BIS HW version: Rev1 SW version: LR9.0.5.1-63892
Applicant	Sequans Communications 55 Boulevard Charles de Gaulle, 92700 Colombes. FRANCE
Test method requested, standard	USA FCC Part 90 (10-1-22 Edition). ANSI C63.26-2015. KDB 971168 D01 Power Meas License Digital Systems v03r01, April. 2018.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager 
Date of issue	2026-03-10
Report template No	FDT08_27 (*) "Data provided by the client"

Firmado
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por 53680346W
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(C:A29507456)



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Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC - Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147. Tests conditions marked with “#” are out of the scope of ENAC accreditation.

DEKRA Testing and Certification is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and it is based on the knowledge and technical facilities available at DEKRA Testing and Certification at the time of performance of the test.

DEKRA Testing and Certification is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of: The Calliope 2 GC02S1 modules are based on Sequans's second-generation Calliope 2 silicon and delivers optimized 4G LTE Cat 1 connectivity for IoT, M2M and consumer devices such as wearables and hearables that require speeds higher than LTE-M.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results. The laboratory is not responsible for such information and it is not covered by accreditation.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/01	85370/002	LTE Cat1-bis module	GC02S1-WW	-	2025-12-11	Element Under Test
S/01	85370/011	LTE Cat1-bis module	GC02S1-WW	-	2026-01-09	Element Under Test
S/02	85370/002	LTE Cat1-bis module	GC02S1-WW	-	2025-12-11	Element Under Test
S/02	85370/005	SMA Cable	-	-	2025-12-11	Auxiliary Element
S/02	85370/010	LTE Cat1-bis module	GC02S1-WW	-	2026-01-09	Element Under Test
S/02	85370/012	SMA Cable	-	-	2026-01-09	Auxiliary Element

Notes referenced to samples during the project:

Id	Type
S/01	Radiated tests
S/02	Conducted tests

Test sample description

Ports..... :	Port name and description	Cable				
		Specified max length [m]	Attached during test	Shielded		
	USB	-	X	-		
	UART	-	X	-		
Supplementary information to the ports..... :	-					
Rated power supply :	Voltage and Frequency		Reference poles			
			L1	L2	L3	N
	AC:					
	DC: 3.3 to 4.5 V					
Rated Power..... :	-					
Clock frequencies..... :	-					
Other parameters :	-					
Software version..... :						
Hardware version :						
Dimensions in cm (W x H x D) ... :	21 x 19.5 x 1.8 mm					
Mounting position :	X	Table top equipment				
		Wall/Ceiling mounted equipment				
		Floor standing equipment				
		Hand-held equipment				
		Other:				
Modules/parts..... :	Module/parts of test item		Type		Manufacturer	
	-		-		-	
Accessories (not part of the test item) :	Description		Type		Manufacturer	
	USB Cables		USB		-	
	Antennas		Antenna		-	
Documents as provided by the applicant :	Description		File name		Issue date	
	-		-		-	

Identification of the client

Sequans Communications
55 Boulevard Charles de Gaulle, 92700 Colombes. FRANCE

Testing period and place

Test Location	DEKRA TESTING AND CERTIFICATION S.A.U. C/ Severo Ochoa, 6 - Parque Tecnológico de Andalucía; 29590 Campanillas (Málaga) (Location B)
Date (start)	2025-12-17
Date (finish)	2026-01-29

Document history

Report number	Date	Description
85372RRF.004	2026-03-10	First release.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the semi-anechoic chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Carmen Vázquez.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
06791	SEMIANECHOIC ABSORBER LINED CHAMBER IV	FACT 3 200 STP	ETS LINDGREN	N/A
06792	SHIELDED ROOM	S101	ETS LINDGREN	N/A
06609	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-21
06615	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-24
06158	SIGNAL AND SPECTRUM ANALYZER 10 Hz - 40 GHz	FSV40	ROHDE AND SCHWARZ	2026-02-05
08849	WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE AND SCHWARZ	2026-03-31
06043	POWER DIVIDER, DC-26 GHz	5333	TEKTRONIX	N/A
06165	EMI TEST RECEIVER 9 kHz-7 GHz	ESR	ROHDE AND SCHWARZ	2025-12-27
04578	HYBRID BILOG ANTENNA 30 MHz - 6 GHz	3142E	ETS LINDGREN	2026-06-01
07692	ATTENUATOR 3 dB, 2 W, DC, 18 GHz	TWTS2G	TECHNIWAVE	2026-02-03
08835	SIGNAL AND SPECTRUM ANALYZER 2 Hz - 50 GHz	FSW50	ROHDE AND SCHWARZ	2027-04-15
05705	PRE-AMPLIFIER G>40dB, 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2026-07-23
04611	HORN ANTENNA 1-18 GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2026-01-16
04716	SIGNAL AND SPECTRUM ANALYZER 2 Hz - 50 GHz	FSW50	ROHDE AND SCHWARZ	2026-08-02
10573	PRE-AMPLIFIER G>46dB 18-40 GHz	BLMA 1840-5G	BONN ELEKTRONIK	2026-03-07
04657	HORN ANTENNA 18-40 GHz	BBHA 9170	SCHWARZBECK MESS-ELEKTRONIK	2026-06-12
04848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

LTE Cat 1bis Band 26 (Sub-band 814-824 MHz):

FCC PART 90			
Requirement – Test case	Verdict	Remark	Location
FCC 90.635 (b): RF output power	P	-	DEKRA TESTING AND CERTIFICATION S.A.U. C/ Severo Ochoa, 6 - Parque Tecnológico de Andalucía; 29590, Málaga, Spain
FCC 2.1047: Modulation characteristics	P	-	
FCC 90.213: Frequency stability	P	-	
FCC 2.1049: Occupied Bandwidth	P	-	
FCC 90.691: Spurious emissions at antenna terminals	P	-	
FCC 90.691: Spurious emissions at antenna terminals (Emission mask requirements for EA-based systems)	P	-	
FCC 90.691: Radiated emissions	P	-	
<u>Supplementary information and remarks:</u>			
None.			

Appendix A: Test results for FCC 90

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TEST CONDITIONS

(*): Declared by the Applicant.

POWER SUPPLY (*):

Vnormal: 3.8 Vdc.
 Vminimum: 3.3 Vdc
 Vmaximum: 5.5 Vdc

Type of Power Supply: Internal DC.

ANTENNA (*):

BAND	GAIN (dBi)	ANTENNA TYPE
LTE 26	+2.4	TRIO mXTEND™ (NN03-310)

TEST FREQUENCIES:

LTE Cat 1bis 26 (Sub-band 814-824 MHz). QPSK and 16QAM:

	Channel (Frequency, MHz)				
	BW=1.4 MHz	BW=3 MHz	BW=5 MHz	BW=10 MHz	BW=15 MHz
Low	26697 (814.7)	26705 (815.5)	26715 (816.5)	N/A	N/A
Middle	26740 (819)	26740 (819)	26740 (819)	26740 (819)	N/A
High	26783 (823.3)	26775 (822.5)	26765 (821.5)	N/A	N/A

LTE Cat 1bis Band 26 (Sub-band 814-824 MHz). Cross-rule Channel (824 MHz). QPSK and 16QAM:

Channel (Frequency, MHz)				
BW=1.4 MHz	BW=3 MHz	BW=5 MHz	BW=10 MHz	BW=15 MHz
26790 (824)	26790 (824)	26790 (824)	26790 (824)	26790 (824)

RF Output Power

Limits

FCC §90.635 (b): The maximum output power of the transmitter for mobile stations is 100 Watts (20 dBW).

Method

The conducted RF output power measurements were made at the RF output terminals of the EUT using the power meter of the Universal Radio Communication tester R&S CMW500, selecting maximum transmission power of the EUT and different modes of modulation.

The maximum equivalent isotropically radiated power (e.i.r.p.) is calculated by adding the declared maximum antenna gain (dBi).

The maximum effective radiated power e.r.p. is calculated from the maximum equivalent isotropically radiated power (e.i.r.p.) by subtracting 2.15 dB:

$$\text{E.R.P.} = \text{E.I.R.P.} - 2.15 \text{ dB}$$

Test Setup



Results

CONDUCTED AVERAGE POWER:

Measurements required on one frequency near top channel and one frequency near bottom channel, according to ANSI C63.26.

LTE Cat 1bis 26 (Sub-band 814-824 MHz):

Worst-case of RF Power is BW=5 MHz, High Channel, QPSK, RB Size=1, RB Offset=24.

BANDWIDTH (MHz)	CHANNEL	FREQUENCY (MHz)	MODULATION	RB SIZE	RB OFFSET	AVERAGE POWER (dBm)
5	Low 26715	816.5	QPSK	1	0	23.28
				1	12	23.16
				1	24	23.23
				12	0	22.39
				12	6	22.27
				12	11	22.32
				25	0	22.33
			16-QAM	1	0	22.55
				1	12	22.49
				1	24	22.6
				12	0	21.44
				12	6	21.29
				12	11	21.35
				25	0	21.33
	Middle 26740	819	QPSK	1	0	
				1	7	
				1	14	
				8	0	
				8	4	
				8	7	
				15	0	
			16-QAM	1	0	
				1	7	
				1	14	
				8	0	
				8	4	
				8	7	
				15	0	
	High 26765	821.5	QPSK	1	0	23.36
				1	12	23.36
				1	24	23.37
				12	0	22.41
				12	6	22.33
				12	11	22.47
				25	0	22.37
			16-QAM	1	0	22.62
				1	12	22.6
				1	24	22.59
				12	0	21.41

				12	6	21.34
				12	11	21.44
				25	0	21.4

BW=5 MHz. QPSK:

MAX POWER	QPSK COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
LOW	23.28	2.4	25.68	23.53
HIGH	23.37	2.4	25.77	23.62
MAX:	23.37		25.77	23.62

BW=5 MHz. 16QAM:

MAX POWER	16QAM COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
LOW	22.6	2.4	25	22.85
HIGH	22.62	2.4	25.02	22.87
MAX:	22.62		25.02	22.87

LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz:

Worst-case of RF Power is BW=15 MHz, Single Channel, QPSK, RB Size=1, RB Offset=74.

BANDWIDTH (MHz)	CHANNEL	FREQUENCY (MHz)	MODULATION	RB SIZE	RB OFFSET	AVERAGE POWER (dBm)
15	Middle 26790	824	QPSK	1	0	23.22
				1	37	23.41
				1	74	23.54
				36	0	22.26
				36	18	22.52
				36	37	22.62
				75	0	22.65
			16-QAM	1	0	21.95
				1	37	22.71
				1	74	22.37
				25	0	21.31
				25	25	21.55
				25	50	21.55
				75	0	

BW=15 MHz. QPSK:

MAX POWER	QPSK COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
MIDDLE	23.54	2.4	25.94	23.79
MAX:	23.54		25.94	23.79

BW=15 MHz. 16QAM:

MAX POWER	16QAM COND. POWER AVG (dBm)	ANTENNA GAIN (dBi)	RAD. POWER AVG EIRP(dBm)	RAD. POWER AVG ERP(dBm)
MIDDLE	22.71	2.4	25.11	22.96
MAX:	22.71		25.11	22.96

Measurement uncertainty (dB) <±1.11

Verdict

Pass

Frequency Stability

Limits

FCC § 90.213: Frequency stability.

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

Table 1 to § 90.213(a)—Minimum Frequency Stability

Frequency range (MHz)	Fixed and base stations (Parts per million (ppm))	Mobile stations	
		Over 2 watts output power (Parts per million (ppm))	2 watts or less output power (Parts per million (ppm))
809–824	1.5	2.5	2.5

(b) For the purpose of determining the frequency stability limits, the power of a transmitter is considered to be the maximum rated output power as specified by the manufacturer.

Method

The frequency tolerance measurements over temperature variations were made over the temperature range of -30°C to +50°C. The EUT was placed inside a climatic chamber and the temperature was raised hourly in 10°C steps from -30°C up to +50°C.

The supply voltage was varied between 85% and 115% of nominal voltage.

Temperature and voltage range of testing has been extended to the maximum and minimum values declared by customer.

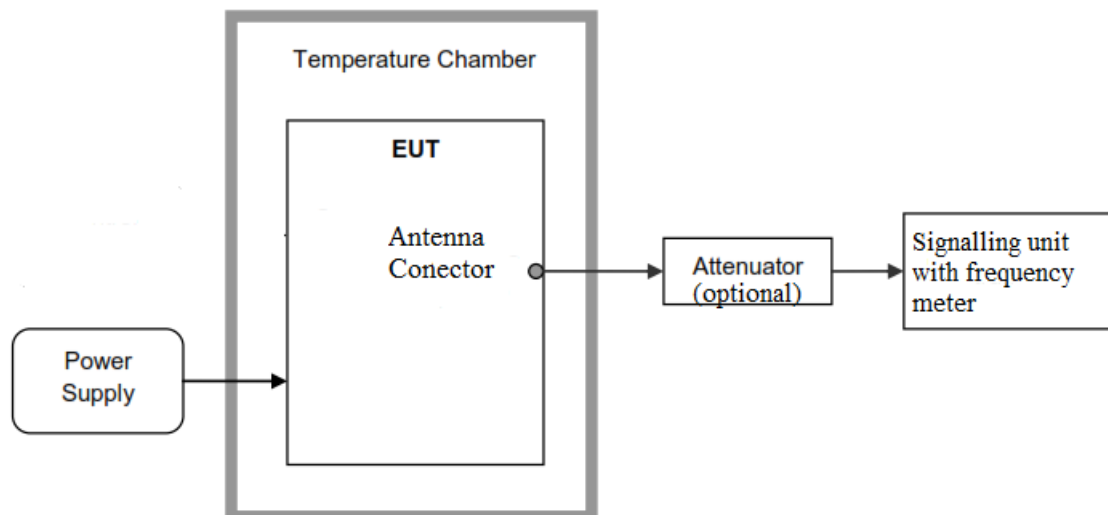
The EUT was set in “Radio Resource Control (RRC) mode” in the middle channel using the Universal Radio Communication tester R&S CMW500 and the maximum frequency error was measured using the built-in calibrated frequency meter.

The worst case LTE mode for conducted power was used for the test.

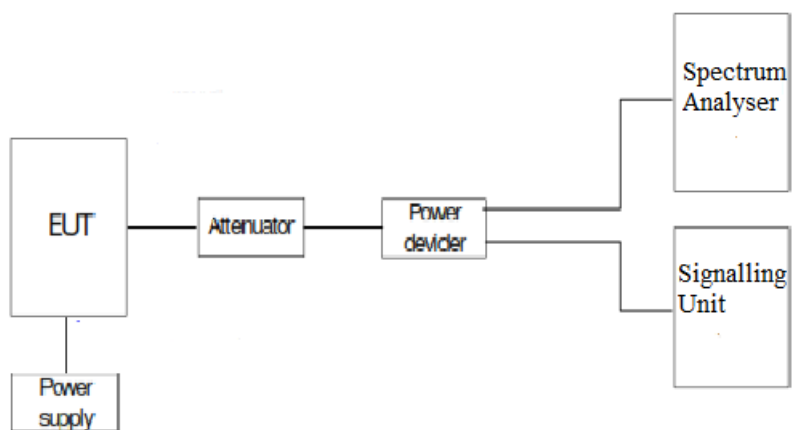
The reference point measurements were made at the RF output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation.

Test Setup

1. Frequency Tolerance:



2. Reference Frequency Points f_L and f_H:



Results

LTE Cat 1bis 26 (Sub-band 814-824 MHz):

The worst case modulation in terms of Frequency Stability is QPSK, BW=10 MHz, RB Size=1, RB Offset=0.

1. Frequency Tolerance:

- Frequency Stability over Temperature Variations:

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
+85 [#]	-6.42	-0.007838828
+80 [#]	5.18	0.006324786
+70 [#]	-2.97	-0.003626374
+60 [#]	3.64	0.004444444
+50	-4.85	-0.005921856
+40	2.31	0.002820513
+30	-5.06	-0.006178266
+20	4.92	0.006007326
+10	-3.58	-0.004371184
0	6	0.007326007
-10	-2.44	-0.002979243
-20	3.27	0.003992674
-30	-6.11	-0.007460317
-40 [#]	4.08	0.004981685

Tests conditions marked with “#” are out of the scope of ENAC accreditation

- Frequency Stability over Voltage Variations.

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4.5	3.57	0.004358974
Vmin	3.3	-4.89	-0.005970696

Measurement uncertainty (Hz) $< \pm 249.55$

Results

PASS

Modulation Characteristics

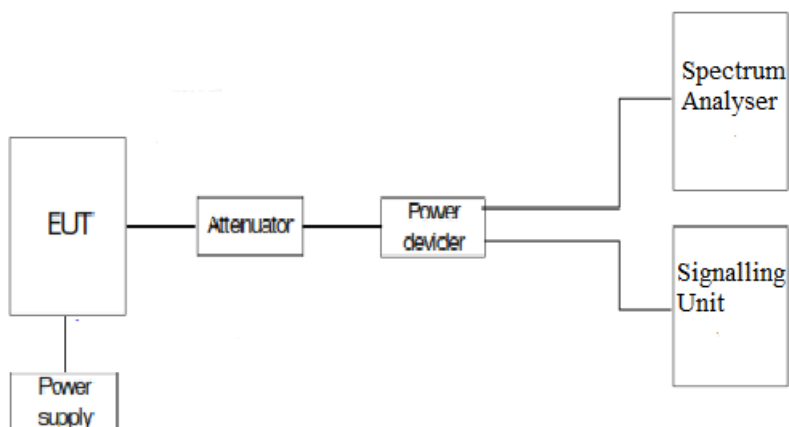
Limits

FCC §2.1047 Measurements required: Modulation characteristics.

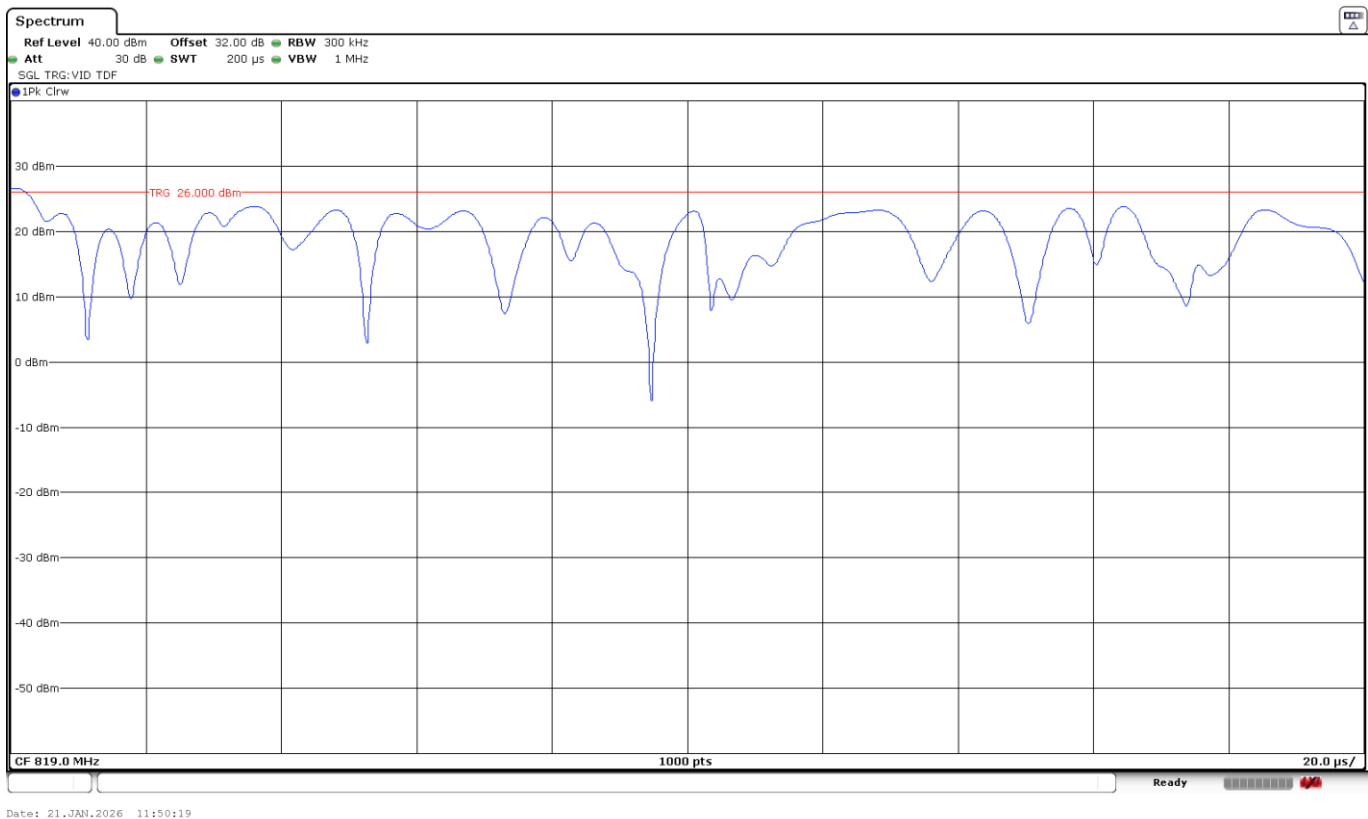
Method

For LTE the EUT operates with QPSK and 16QAM modes in which the information is digitised and coded into a bit stream. The RF transmission is multiplexed using Orthogonal Frequency Division Multiplexing (OFDM) using different possible arrangement of subcarriers (Resource Blocks RB).

Test Setup



LTE Cat 1bis 26 (Sub-band 814-824 MHz): 16QAM. BW=10 MHz. RB Size=1. RB Offset=25.



Occupied Bandwidth

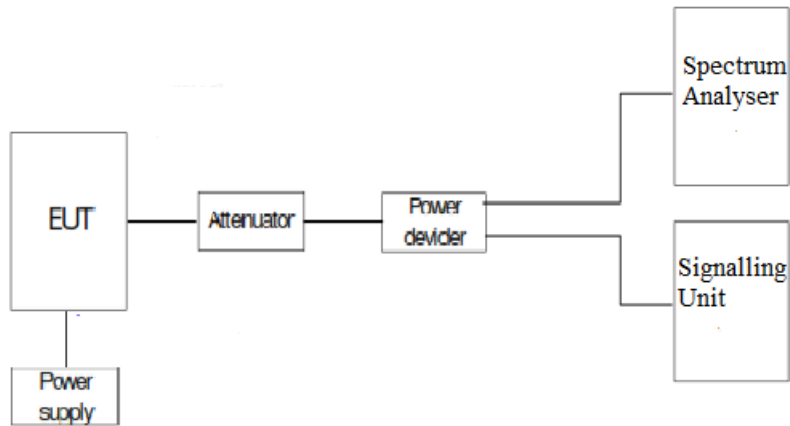
Limits

FCC §2.1049. Measurements required: Occupied bandwidth.

Method

The occupied bandwidth measurement was performed at the output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation. The 99% occupied bandwidth and the -26 dBc bandwidth were measured directly using the built-in bandwidth measuring option of spectrum analyser.

Test Setup



Results

LTE Cat 1bis Bands: The worst case of Occupied Bandwidth corresponds to all Resource Blocks (RB) with Offset 0, regardless the nominal bandwidth selected.

LTE Cat 1bis 26 (Sub-band 814-824 MHz):

LTE Cat 1bis 26 (Sub-band 814-824 MHz). BW=5 MHz. QPSK. RB Size = All.

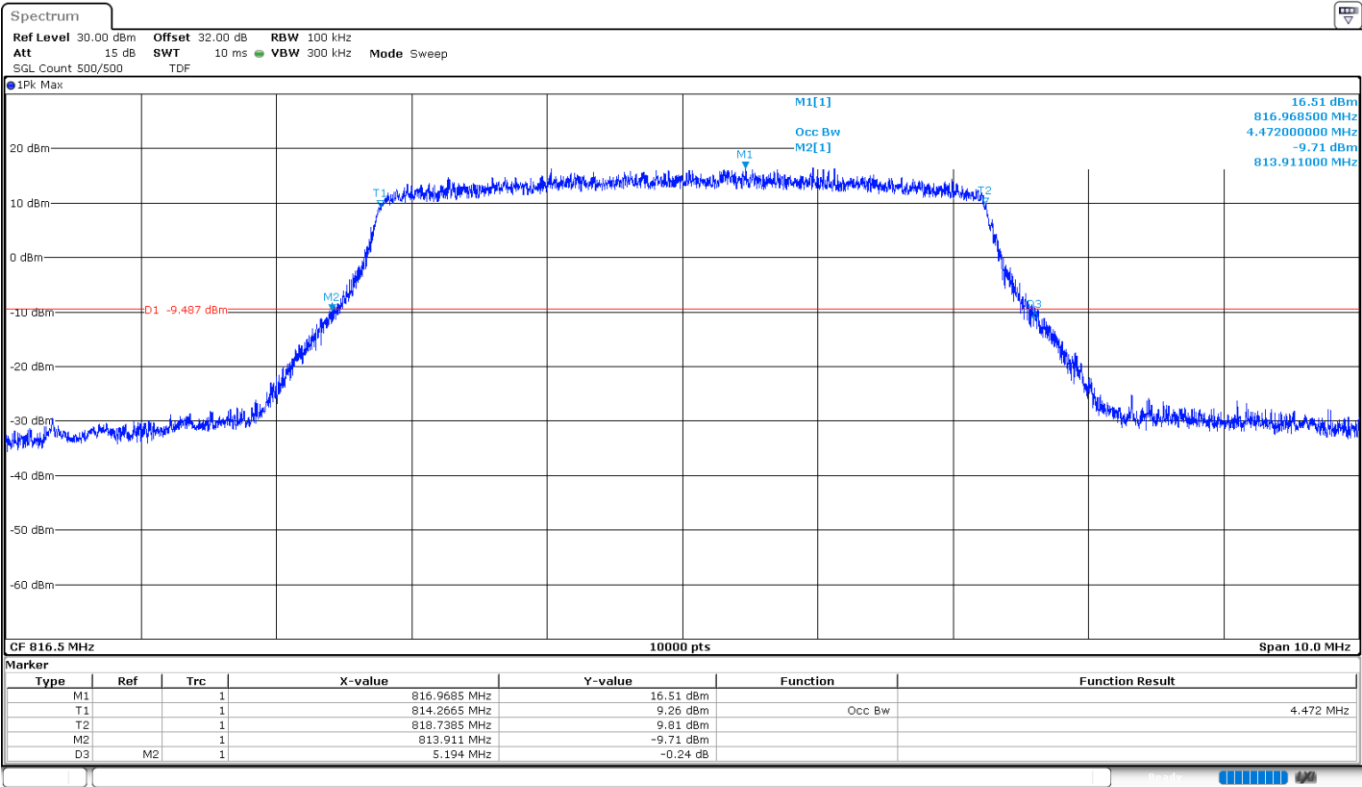
	Low Channel	High Channel
99% Occupied Bandwidth (MHz)	4.472	4.471
-26 dBc Bandwidth (MHz)	5.194	5.263
Measurement uncertainty (kHz)	<±4.67	

LTE Cat 1bis 26 (Sub-band 814-824 MHz). BW=5 MHz. 16QAM. RB Size = All.

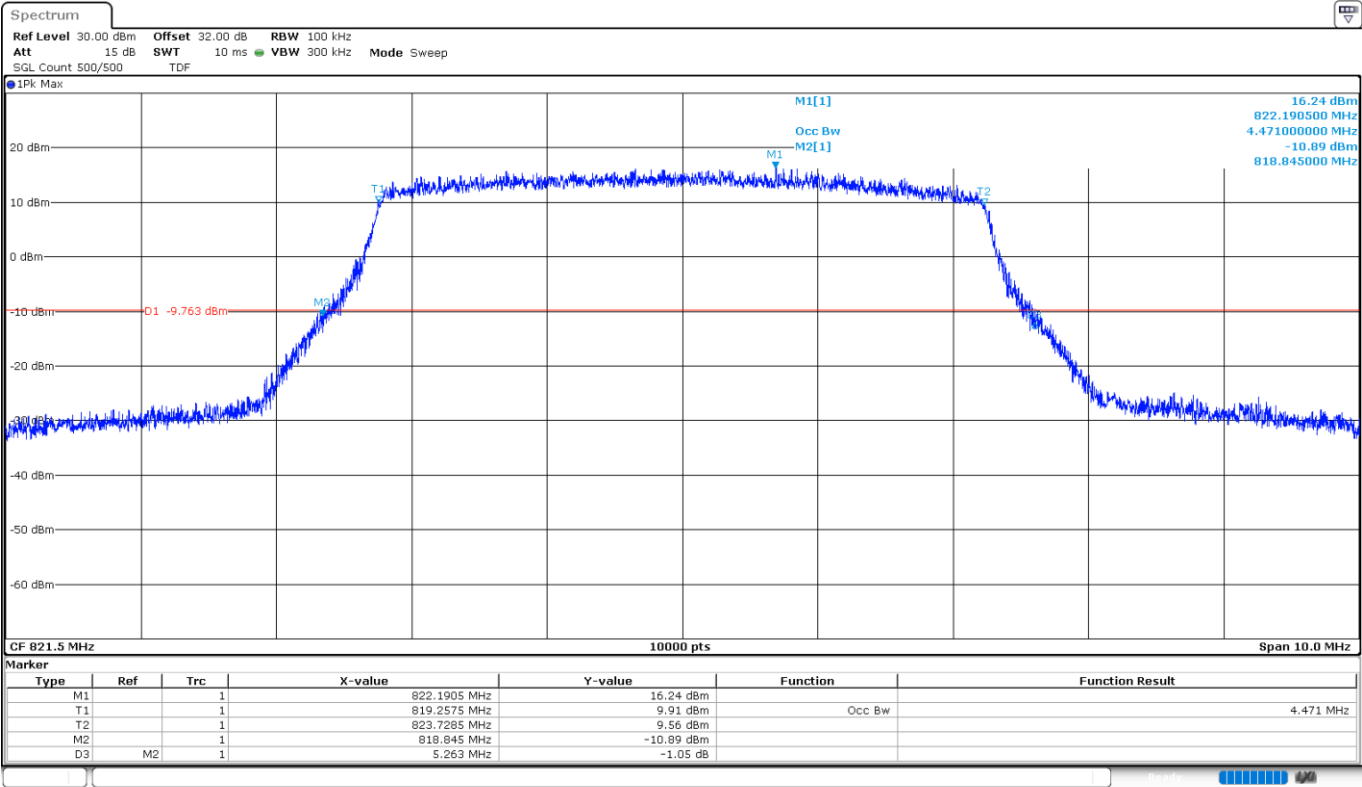
	Low Channel	High Channel
99% Occupied Bandwidth (MHz)	4.461	4.471
-26 dBc Bandwidth (MHz)	5.083	5.114
Measurement uncertainty (kHz)	<±4.67	

LTE Cat 1bis 26 (Sub-band 814-824 MHz). BW=5 MHz. QPSK.

Low Channel:

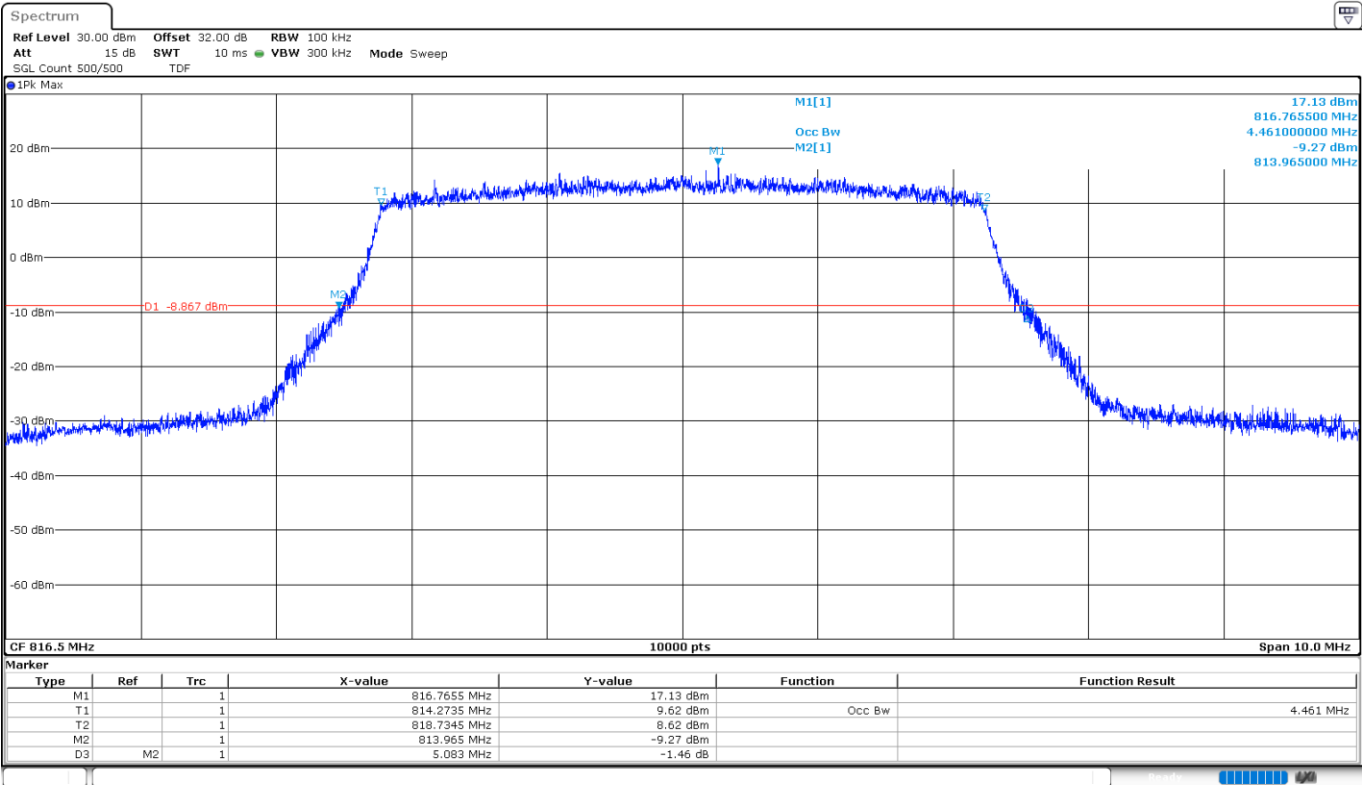


High Channel:

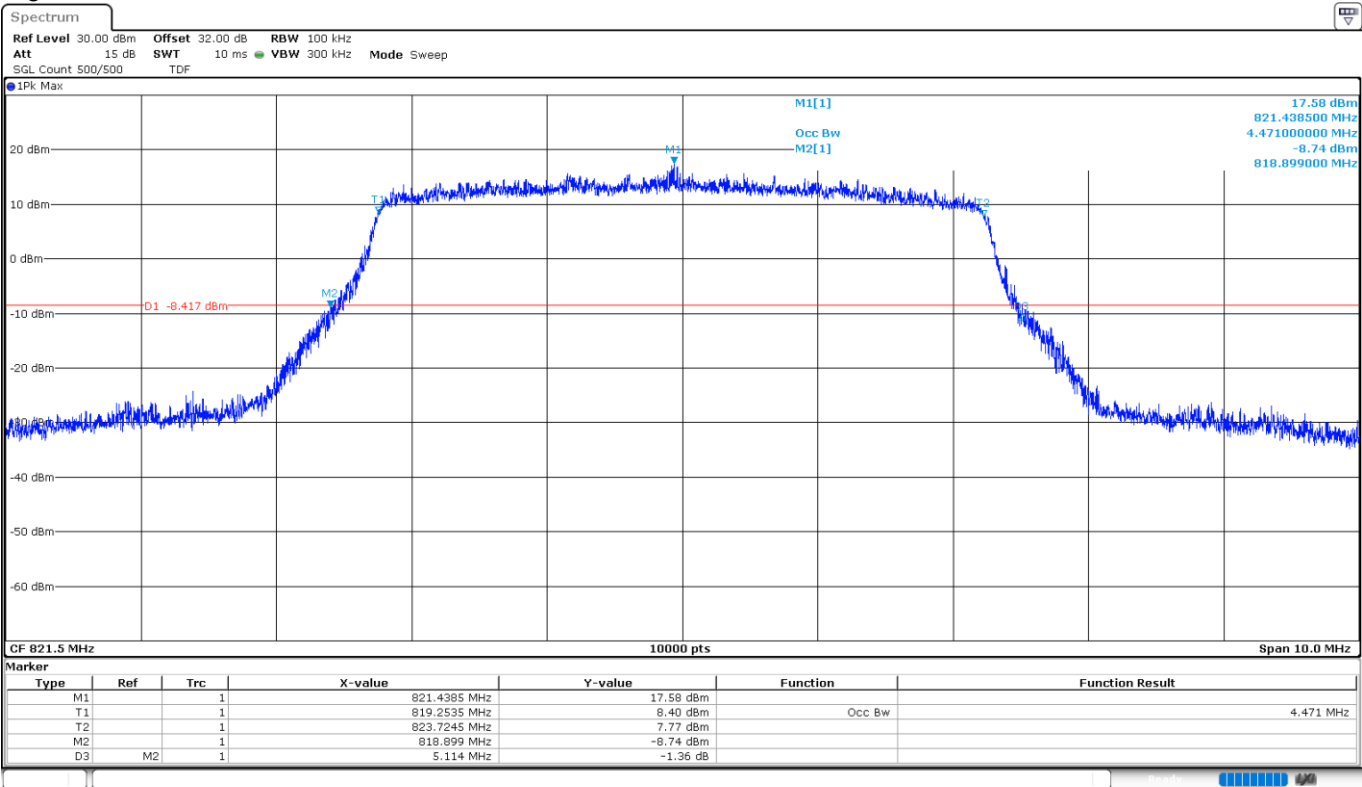


LTE Cat 1bis 26 (Sub-band 814-824 MHz). BW=5 MHz. 16QAM.

Low Channel:



High Channel:



LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz:

LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz. BW=5 MHz. QPSK. RB Size = All.

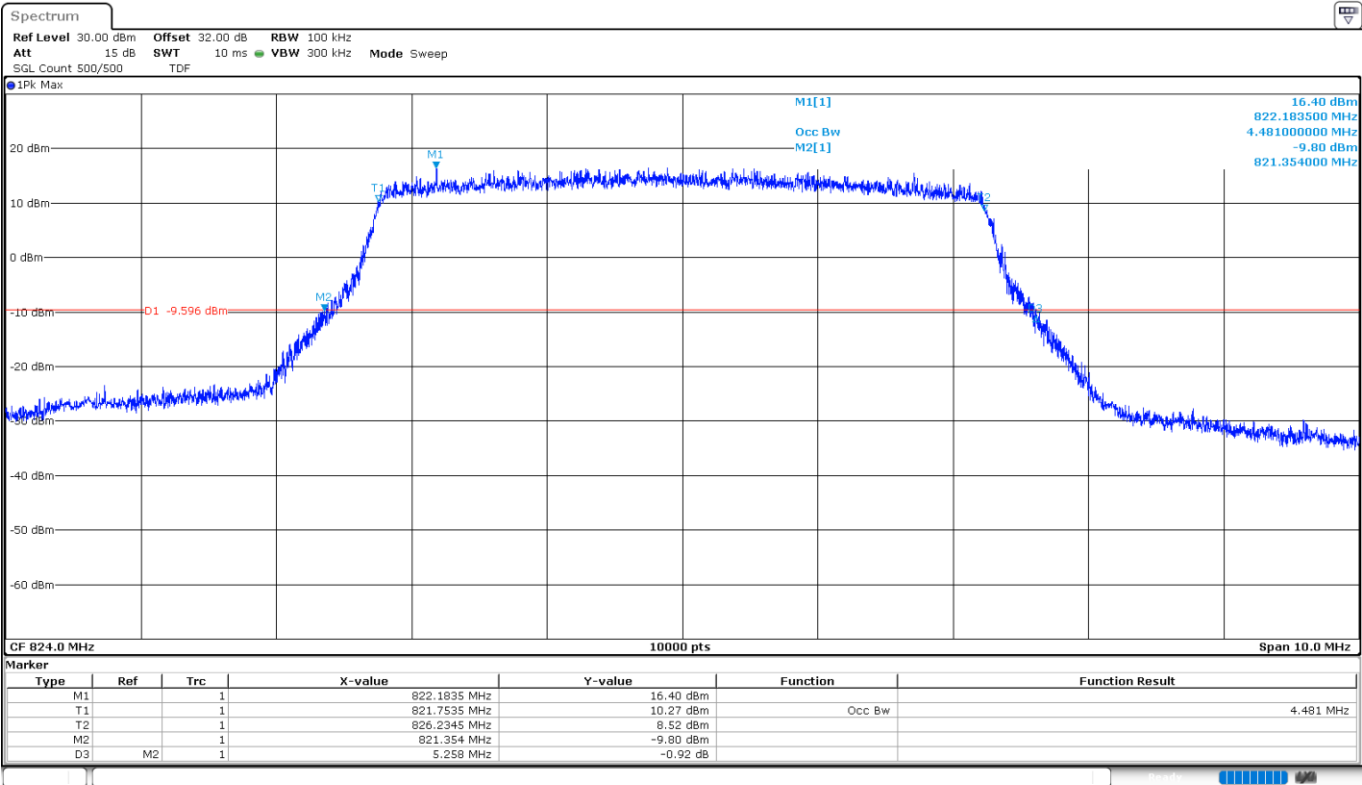
	Single Channel
99% Occupied Bandwidth (MHz)	4.48100
-26 dBc Bandwidth (MHz)	5.25800
Measurement uncertainty (kHz)	<±4.67

LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz. BW=5 MHz. 16QAM. RB Size = All.

	Single Channel
99% Occupied Bandwidth (MHz)	4.46900
-26 dBc Bandwidth (MHz)	5.34800
Measurement uncertainty (kHz)	<±4.67

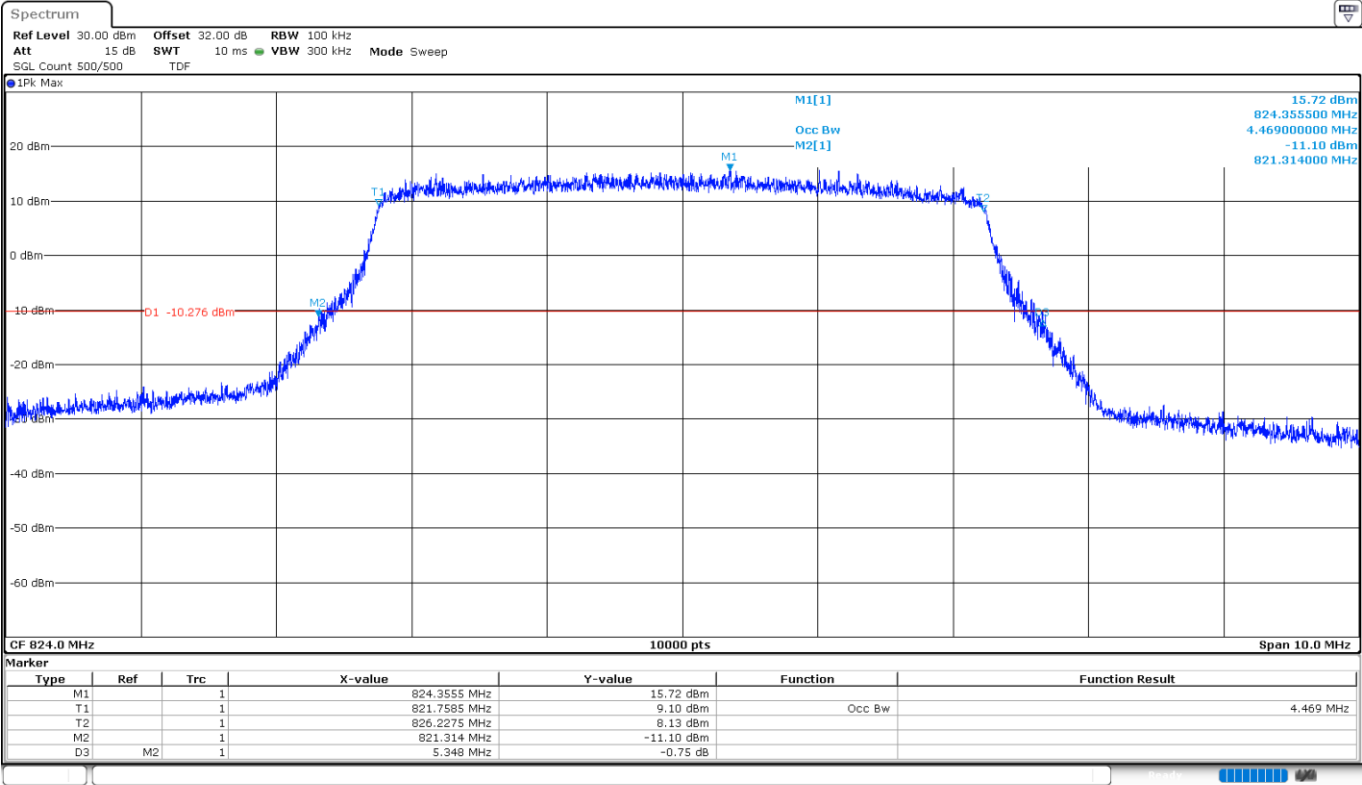
LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz. BW=5 MHz. QPSK.

Cross-rule Channel 824 MHz:



LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz. BW=5 MHz. 16QAM.

Cross-rule Channel 824 MHz:



LTE Cat 1bis 26 (Sub-band 814-824 MHz):

LTE Cat 1bis 26 (Sub-band 814-824 MHz). BW=10 MHz. QPSK. RB Size = All.

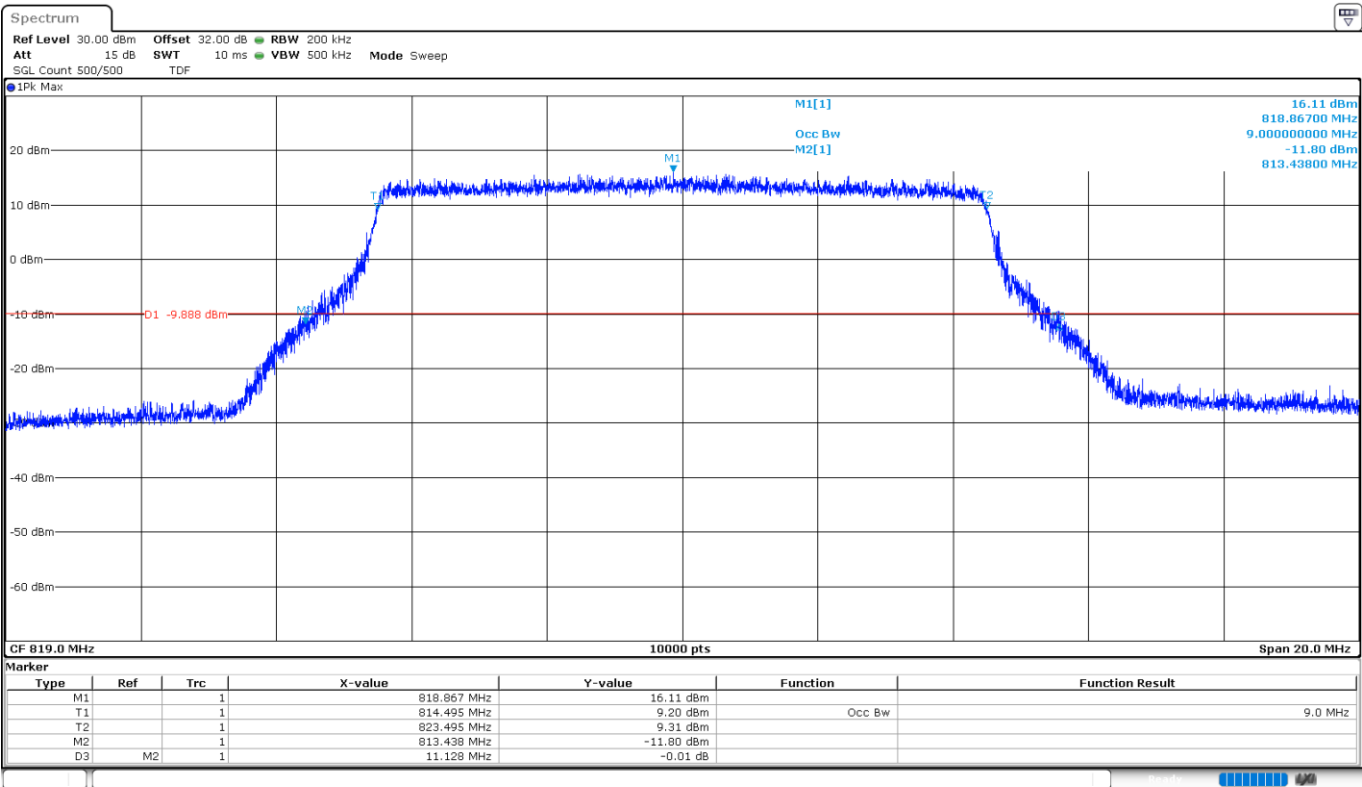
	Middle Channel
99% Occupied Bandwidth (MHz)	9.000
-26 dBc Bandwidth (MHz)	11.128
Measurement uncertainty (kHz)	<±4.67

LTE Cat 1bis 26 (Sub-band 814-824 MHz). BW=10 MHz. 16QAM. RB Size = All.

	Middle Channel
99% Occupied Bandwidth (MHz)	4.606
-26 dBc Bandwidth (MHz)	6.444
Measurement uncertainty (kHz)	<±4.67

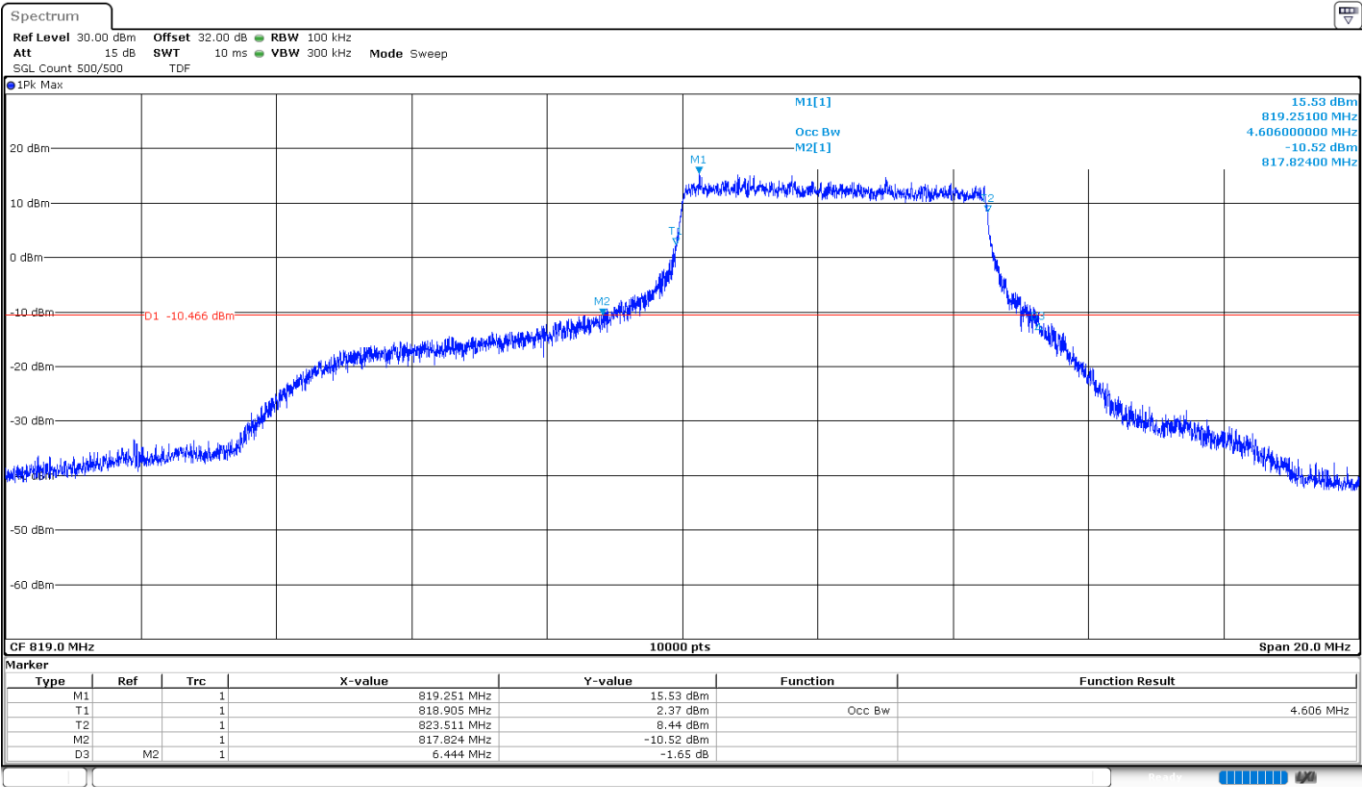
LTE Cat 1bis 26 (Sub-band 814-824 MHz). BW=10 MHz. QPSK.

Middle Channel:



LTE Cat 1bis 26 (Sub-band 814-824 MHz). BW=10 MHz. 16QAM.

Middle Channel:



LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz:

LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz. BW=10 MHz. QPSK. RB Size = All.

	Single Channel
99% Occupied Bandwidth (MHz)	9.05200
-26 dBc Bandwidth (MHz)	11.22800
Measurement uncertainty (kHz)	<±4.67

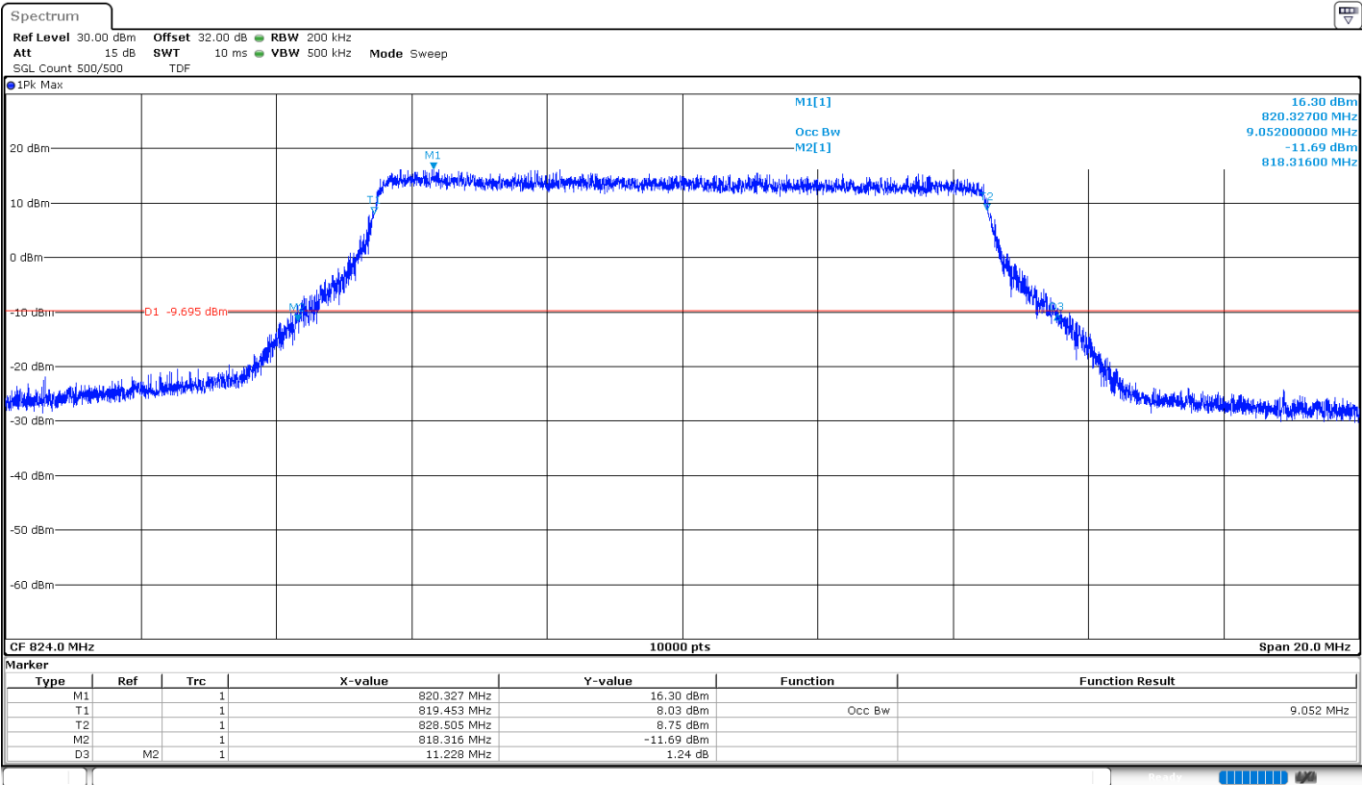
LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz. BW=10 MHz. 16QAM. RB Size = All.

	Single Channel
99% Occupied Bandwidth (MHz)	4.65400
-26 dBc Bandwidth (MHz)	7.12800
Measurement uncertainty (kHz)	<±4.67

LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz.

BW=10 MHz. QPSK.

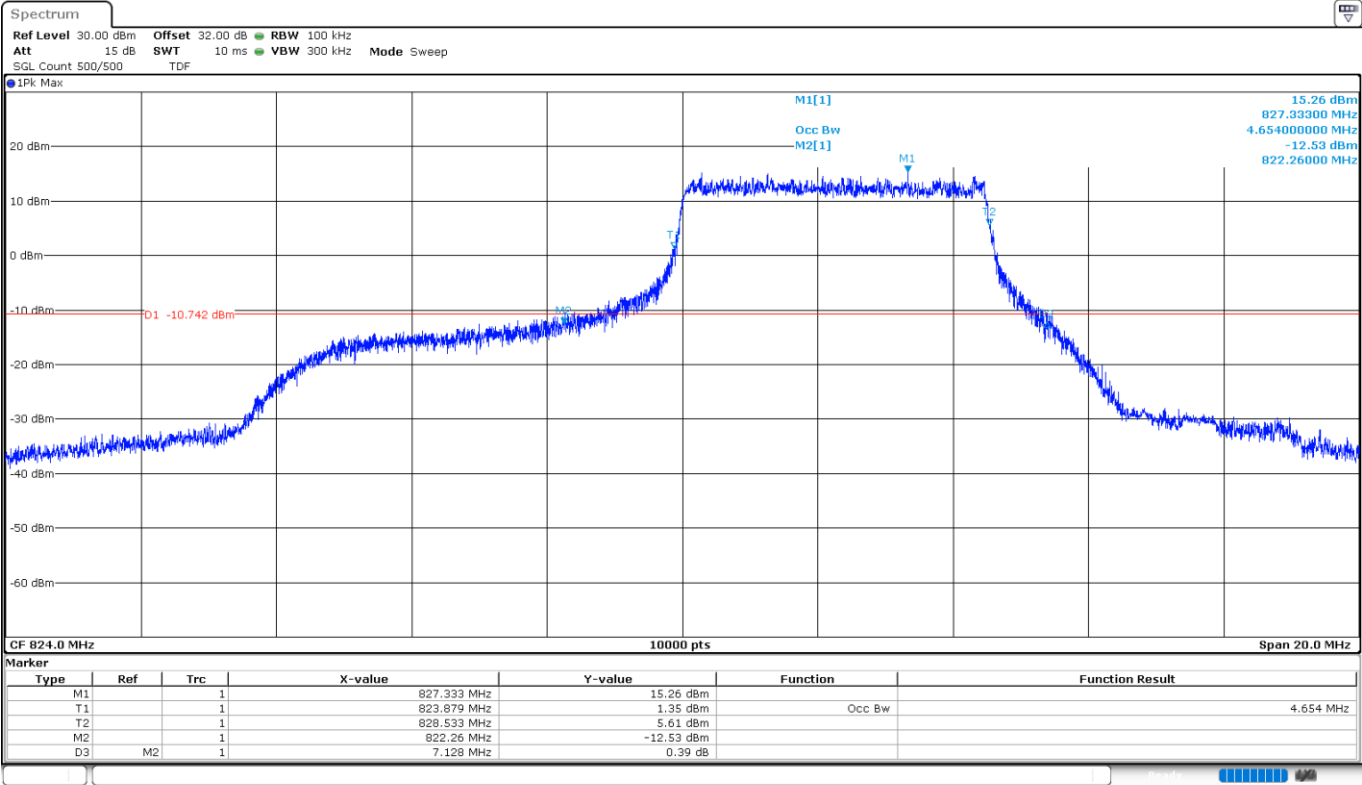
Cross-rule Channel 824 MHz:



LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz.

BW=10 MHz. 16QAM.

Cross-rule Channel 824 MHz:



LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz:

LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz. BW=15 MHz. QPSK. RB Size = All.

	Single Channel
99% Occupied Bandwidth (MHz)	13.45800
-26 dBc Bandwidth (MHz)	15.25200
Measurement uncertainty (kHz)	<±4.67

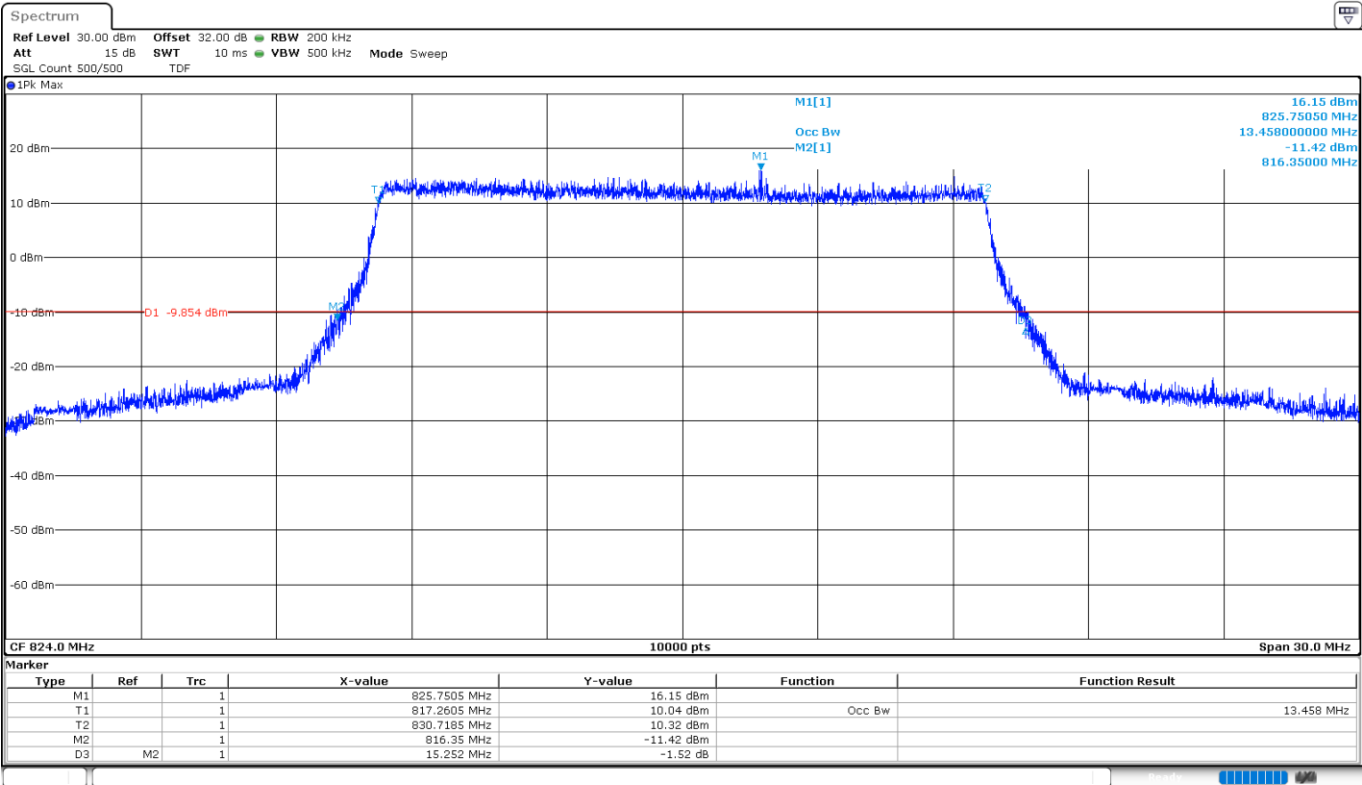
LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz. BW=15 MHz. 16QAM. RB Size = All.

	Single Channel
99% Occupied Bandwidth (MHz)	4.64400
-26 dBc Bandwidth (MHz)	6.69300
Measurement uncertainty (kHz)	<±4.67

LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz.

BW=15 MHz. QPSK.

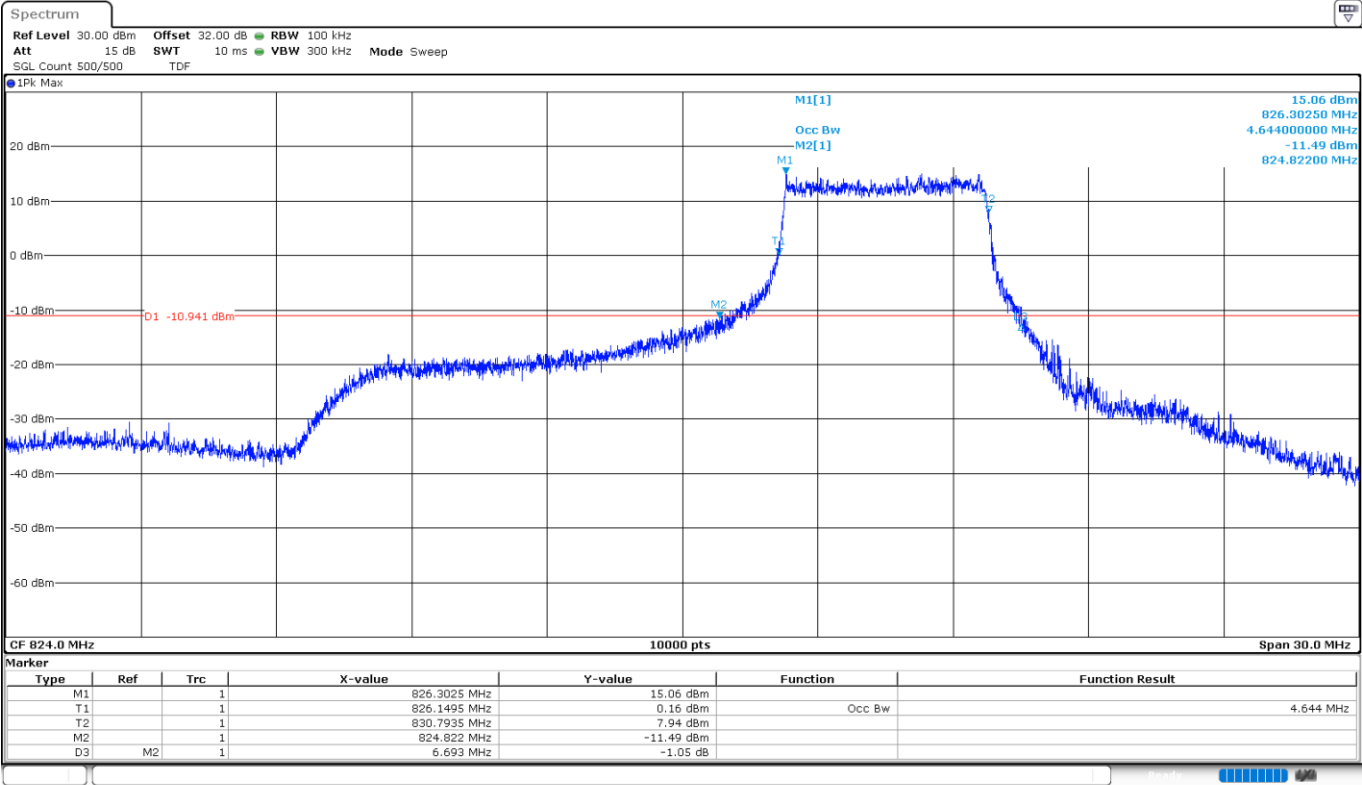
Cross-rule Channel 824 MHz:



LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz.

BW=15 MHz. 16QAM.

Cross-rule Channel 824 MHz:



Spurious emissions at antenna terminals

Limits

FCC §2.1051. Measurements required: Spurious emissions at antenna terminals.

FCC §90.691:

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

Method

The EUT RF output connector was connected to a spectrum analyser and to the Universal Radio Communication tester R&S CMW500 (selecting maximum transmission power of the EUT and different modes of modulation) using a 50 Ohm attenuator and a power divider.

The reading of the spectrum analyser is corrected with the attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

The configuration of Resource Blocks and modulation which is the worst case for conducted power was used.

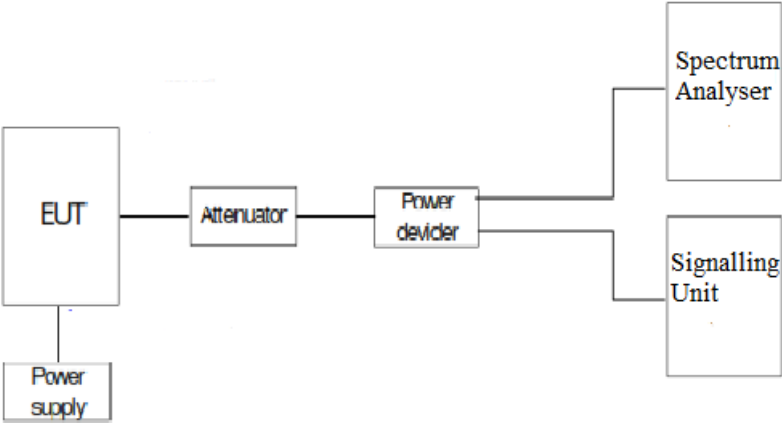
Measurement Limit:

According to specification. the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. P in watts.

At P_o transmitting power. the specified minimum attenuation becomes $43 + 10 \log (P_o)$. and the level in dBm relative P_o becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = - 13 \text{ dBm}$$

Test Setup



Results

Test performed on the worst-case modulation, RB Size and RB Offset.

LTE Cat 1bis 26 (Sub-band 814-824 MHz):

BW=5 MHz. QPSK. RB Size=1. RB Offset=24.

Frequency range 9 KHz - 10 GHz:

- Low Channel: No spurious frequencies detected at less than 20 dB below the limit.
- High Channel: No spurious frequencies detected at less than 20 dB below the limit.

LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz:

BW=15 MHz. QPSK. RB Size=1. RB Offset=74.

Frequency range 9 KHz - 10 GHz:

- Single Channel: No spurious frequencies detected at less than 20 dB below the limit.

Measurement uncertainty (dB): $<\pm 2.76$

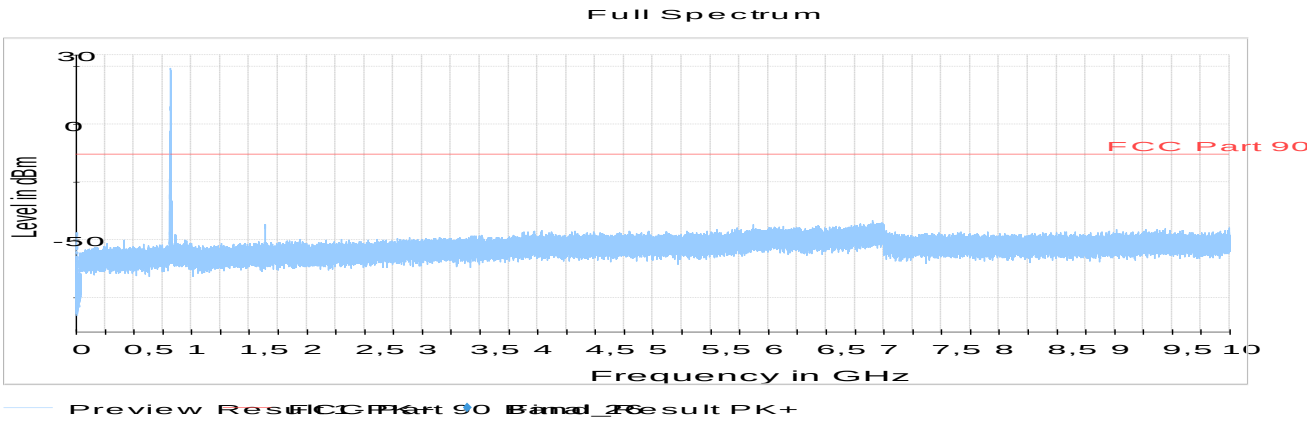
Verdict

PASS

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
9 kHz - 150 kHz	14.1 Hz	PK+	300 Hz	Coupled	0 dB
150 kHz - 30 MHz	932.812 Hz	PK+	10 kHz	Coupled	0 dB
30 MHz - 1 GHz	30.312 kHz	PK+	100 kHz	Coupled	0 dB
1 GHz - 2 GHz	31.25 kHz	PK+	100 kHz	Coupled	0 dB
2 GHz - 3 GHz	31.25 kHz	PK+	100 kHz	Coupled	0 dB
3 GHz - 4 GHz	31.25 kHz	PK+	100 kHz	Coupled	0 dB
4 GHz - 5 GHz	31.25 kHz	PK+	100 kHz	Coupled	0 dB
5 GHz - 6 GHz	31.25 kHz	PK+	100 kHz	Coupled	0 dB
6 GHz - 7 GHz	31.25 kHz	PK+	100 kHz	Coupled	0 dB
7 GHz - 8 GHz	31.25 kHz	PK+	100 kHz	Coupled	0 dB
8 GHz - 9 GHz	31.25 kHz	PK+	100 kHz	Coupled	0 dB
9 GHz - 10 GHz	31.25 kHz	PK+	100 kHz	Coupled	0 dB

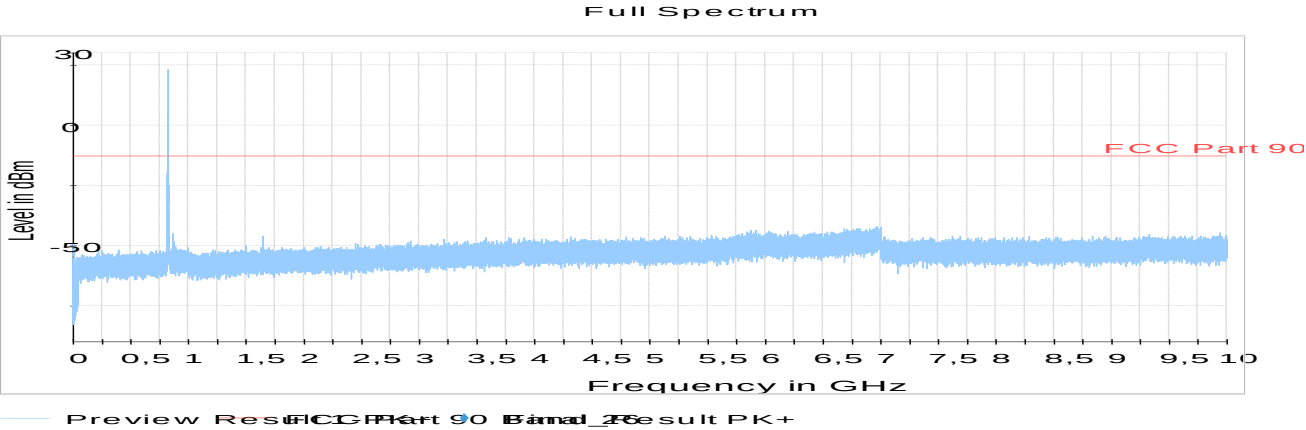
LTE Cat 1bis 26 (Sub-band 814-824 MHz):

Low Channel:



The peak above the limit is the carrier frequency.

High Channel:



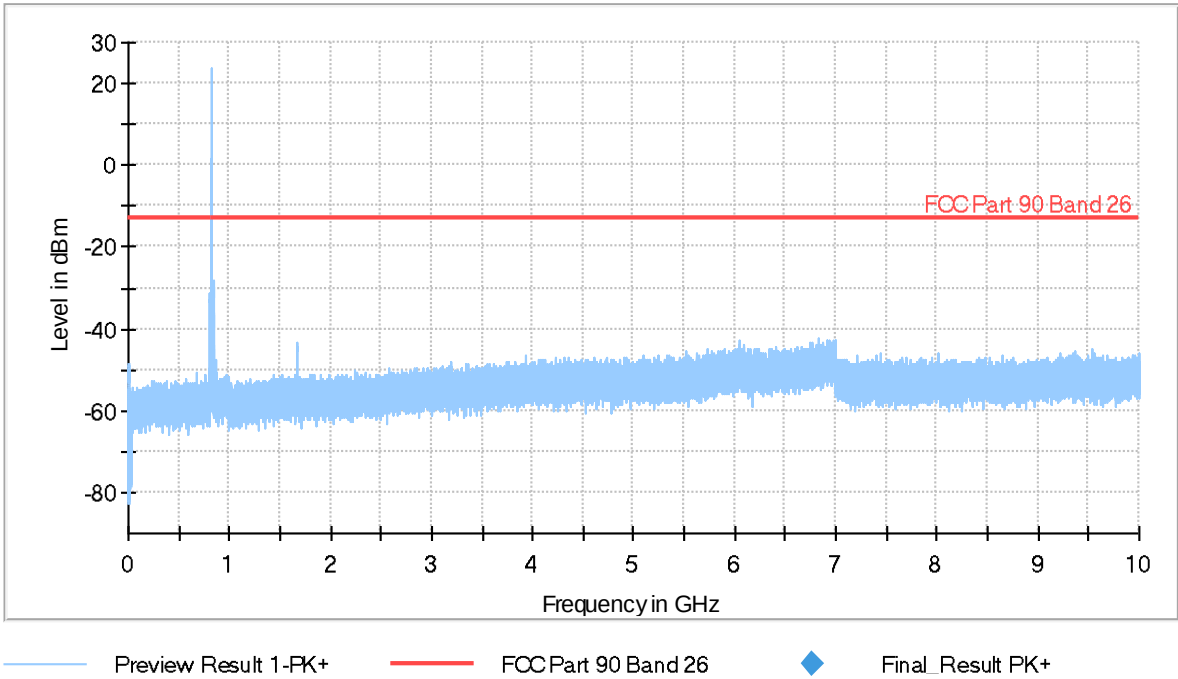
The peak above the limit is the carrier frequency.

LTE Cat 1bis 26 (Sub-band 814-824 MHz). Cross-rule Channel 824 MHz:

BW=1.4 MHz. QPSK. RB Size=1. RB Offset=2.

Single Channel:

Full Spectrum



The peak above the limit is the carrier frequency.

Spurious Emissions at Antenna Terminals at Block Edges

Limits

* FCC §2.1051:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

* FCC §90.691:

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

Method

The EUT RF output connector was connected to a spectrum analyzer and to the Universal Radio Communication tester R&S CMW500 (selecting maximum transmission power of the EUT and different modes of modulation) using a 50-Ohm attenuator and a power splitter.

The reading of the spectrum analyser is corrected with the path loss of the connection between the output terminal of the EUT and the input of the spectrum analyzer.

The configuration of modulation which is the worst case for conducted power was used.

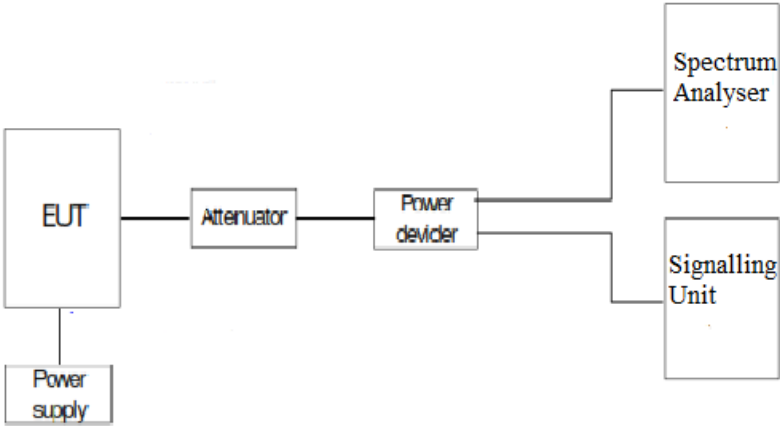
As stated in FCC §2.1051, in the 1 MHz bands immediately outside and adjacent to the frequency block or band a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

Measurement Limit:

At P_o transmitting power, the specified minimum attenuation $43 + 10 \log_{10} p$ (watts) for any frequency removed from the EA licensee's frequency block greater than 37.5 kHz becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

Test Setup



Results

Sub-band 814-824 MHz:

Preliminary measurements determined the BW=5 MHz, QPSK as the worst case. Results attached are for this worst-case configuration.

LTE Cat 1bis Band 26 (Sub-band 814-824 MHz). QPSK.	Narrowband=0. RB Size=1. RB Offset=0. BW=1.4 MHz	Narrowband=0. RB Size=1. RB Offset=0. BW=3 MHz	Narrowband=0. RB Size=1. RB Offset=0. BW=5 MHz	Narrowband=0. RB Size=1. RB Offset=0. BW=10 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)			-21.21	-24.48

LTE Cat 1bis Band 26 (Sub-band 814-824 MHz). QPSK.	Narrowband=0. RB Size=Max. RB Offset=0. BW=1.4 MHz	Narrowband=0. RB Size=Max. RB Offset=0. BW=3 MHz	Narrowband=0. RB Size=Max. RB Offset=0. BW=5 MHz	Narrowband=0. RB Size=Max. RB Offset=0. BW=10 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)			-31.16	-34.38

LTE Cat 1bis Band 26 (Sub-band 814-824 MHz). QPSK.	Narrowband=All. RB Size=1. RB Offset=Max. BW=1.4 MHz	Narrowband=All. RB Size=1. RB Offset=Max. BW=3 MHz	Narrowband=All. RB Size=1. RB Offset=Max. BW=5 MHz	Narrowband=All. RB Size=1. RB Offset=Max. BW=10 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)			-22.03	-24.51

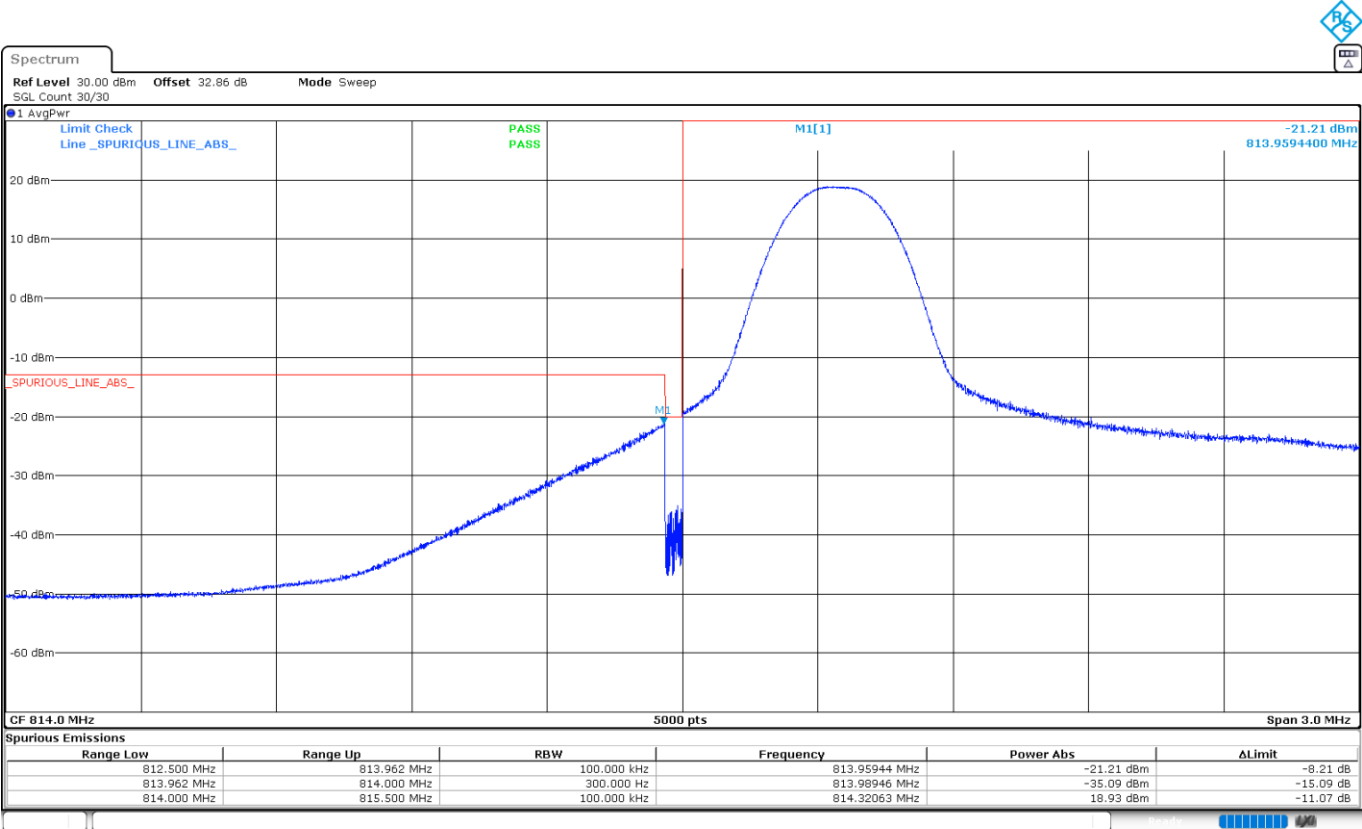
LTE Cat 1bis Band 26 (Sub-band 814-824 MHz). QPSK.	Narrowband=All. RB Size= Max. RB Offset=1. BW=1.4 MHz	Narrowband=All. RB Size= Max. RB Offset=1. BW=3 MHz	Narrowband=All. RB Size= Max. RB Offset=1. BW=5 MHz	Narrowband=All. RB Size= Max. RB Offset=1. BW=10 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)			-30.61	-33.04

Measurement uncertainty (dB): $<\pm 2.76$

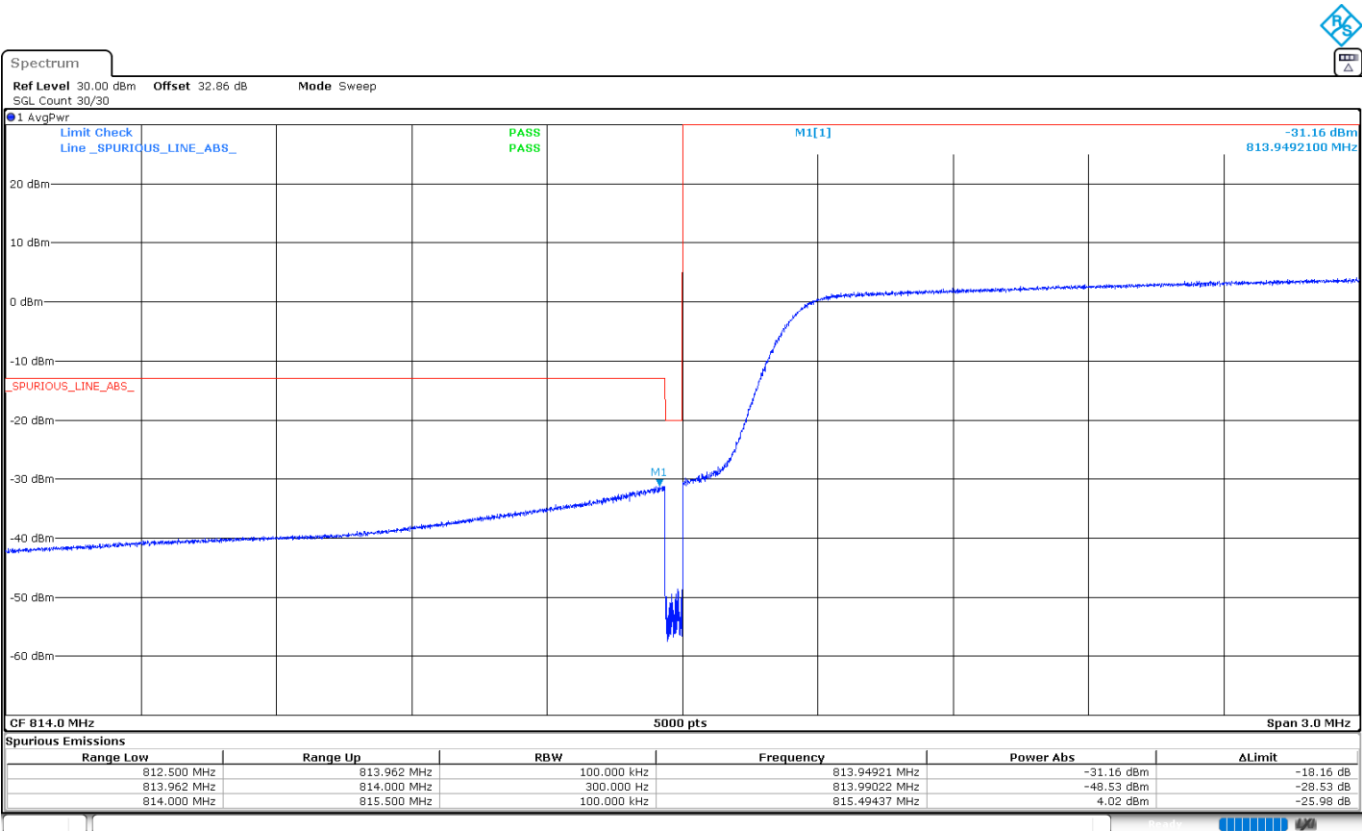
Verdict

Pass

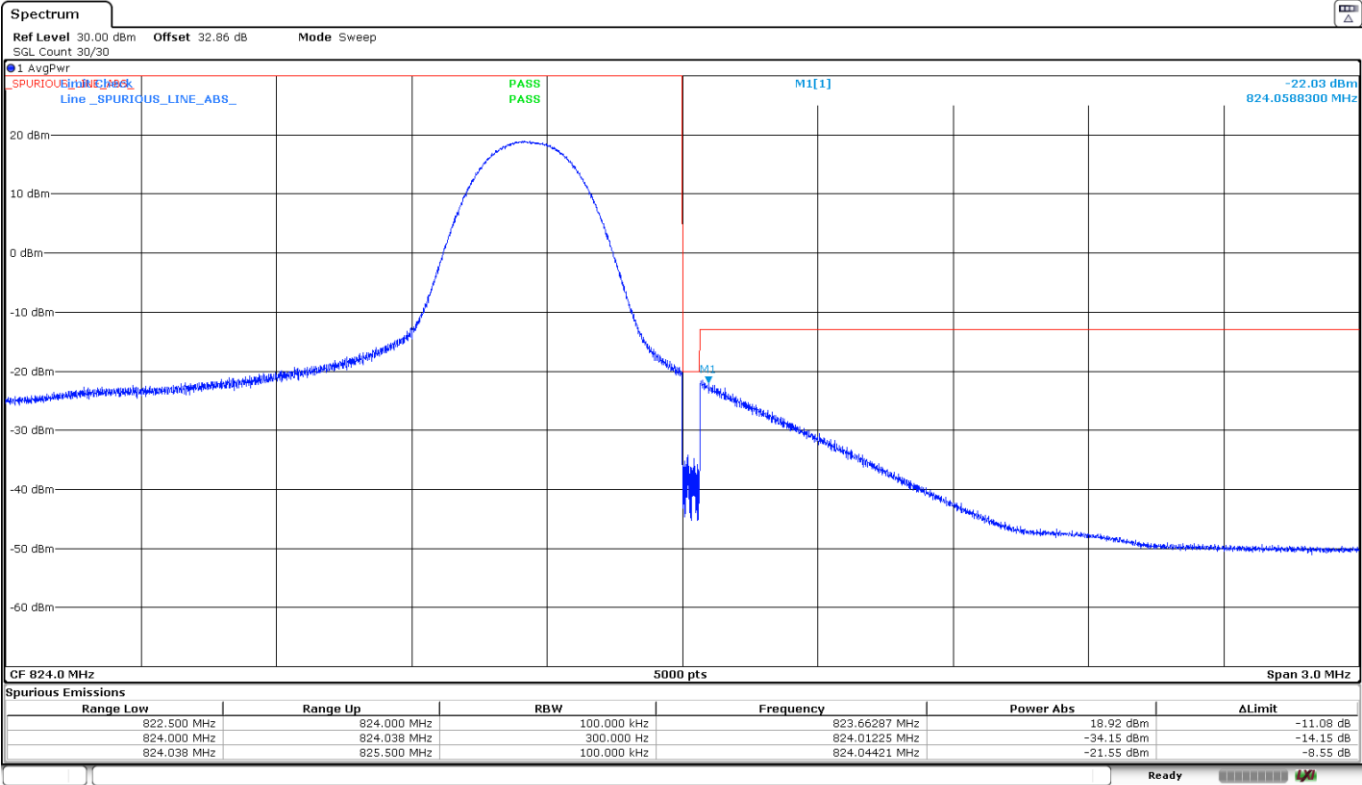
Sub-band 814-824 MHz. EA MASK: BW=5 MHz. QPSK. RB Size=1. RB Offset=0. Low Block Edge:



Sub-band 814-824 MHz. EA MASK: BW=5 MHz. QPSK. RB Size= Max. RB Offset=0. Low Block Edge:

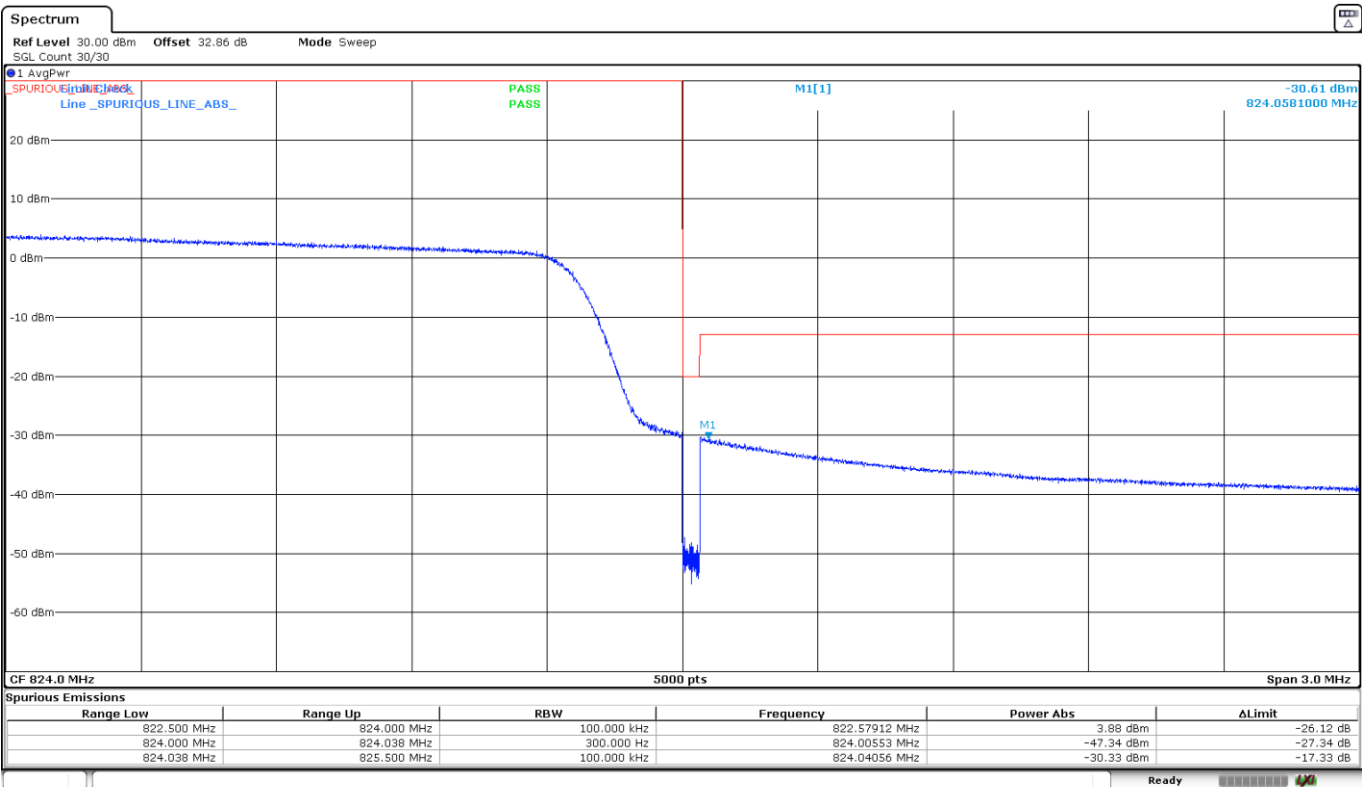


Sub-band 814-824 MHz. EA MASK: BW=5 MHz. QPSK. RB Size=1. RB Offset=Max. High Block Edge:



Date: 17.DEC.2025 13:22:15

Sub-band 814-824 MHz. EA MASK: BW=5 MHz. QPSK. RB Size= Max. RB Offset=1. High Block Edge:



Date: 17.DEC.2025 13:19:50

Radiated Emissions

Limits

FCC §90.691:

For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

Method

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to at least the 10th harmonic of the High frequency generated within the equipment.

The EUT was placed on a high non-conductive stand at a 3 meter distance from the measuring antenna. Detected emissions were maximized at each frequency by rotating the EUT and adjusting the height and polarization of the measuring antenna. The maximum meter reading was recorded.

MEASUREMENT LIMIT:

According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log(P)$ dB, P in watts.

At P_o transmitting power, the specified minimum attenuation becomes $43 + 10 \log(P_o)$, and the level in dBm relative P_o becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log(P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

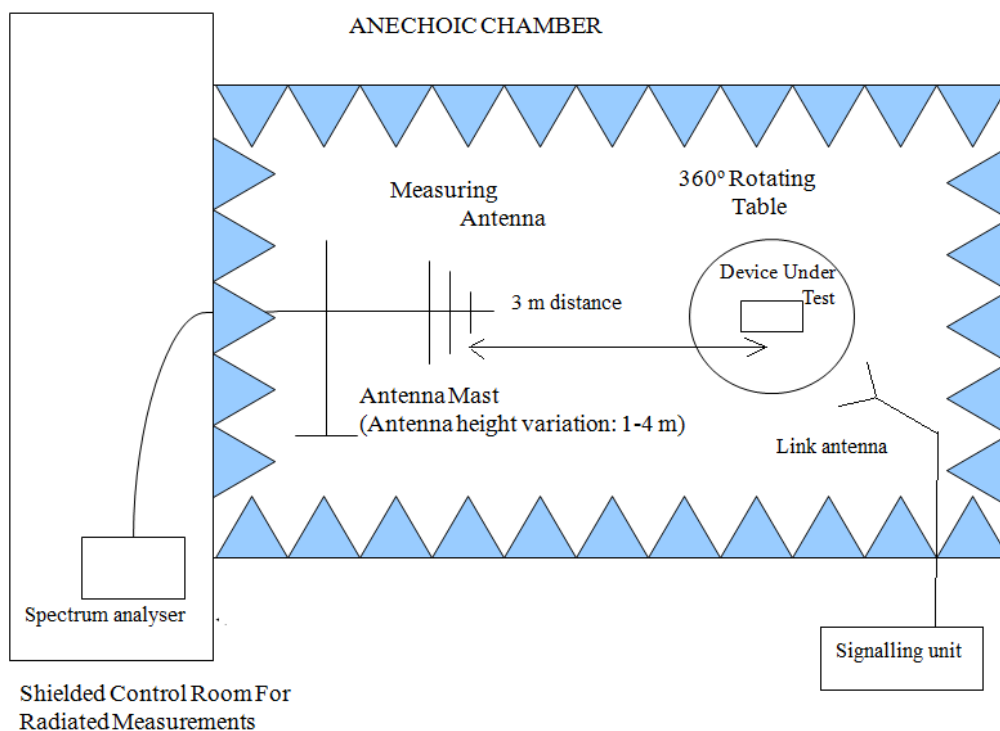
The maximum field strength (dB μ V/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

$$\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20 \log(D) - 104.8; \text{ where } D \text{ is the measurement distance (in the far field region) in m. } D = 3 \text{ m}$$

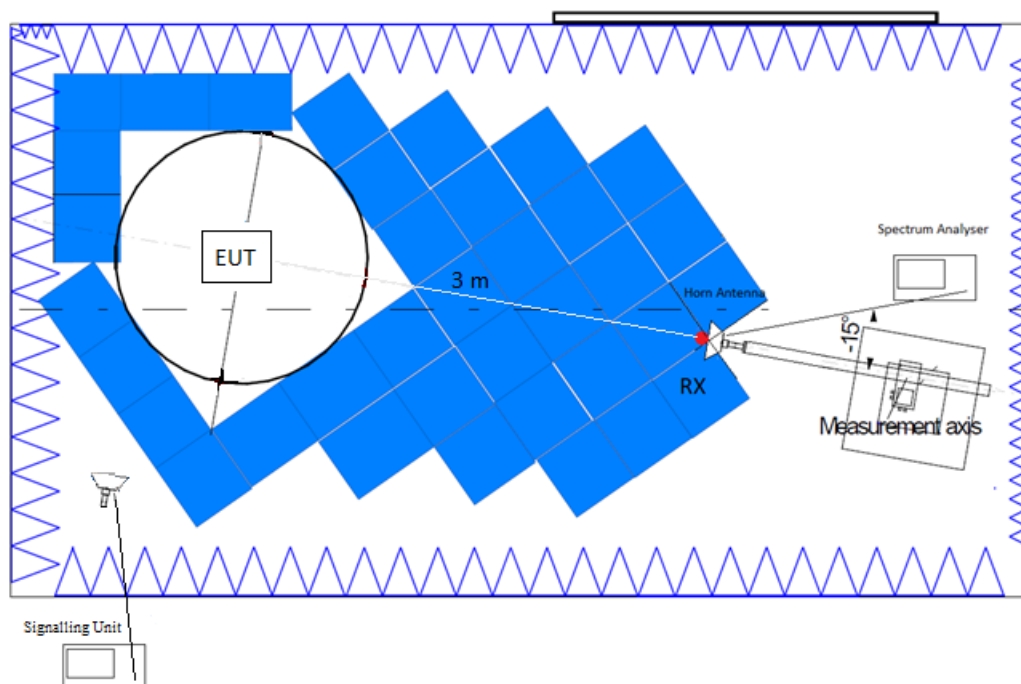
A resolution bandwidth / video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

Test Setup

Radiated measurements below 1 GHz:



Radiated measurements above 1 GHz:



Results

Measurements required on one frequency near top channel and one frequency near bottom channel, according to FCC § 15.31 (m).

LTE Cat 1bis 26 (Sub-band 814-824 MHz):

A preliminary scan determined the BW=5 MHz, QPSK. RB Size=1, RB Offset=24 as the worst-case. The next results are for this worst-case configuration.

Frequency range 30 MHz - 1 GHz:

- LOW CHANNEL:

Spurious frequencies at less than 20 dB below the limit:

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Pol
810.001250	-21.69	-13.00	8.69	H
812.214063	-30.23	-13.00	17.23	H

- HIGH CHANNEL:

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 - 8.5 GHz:

- LOW CHANNEL:

Spurious frequencies at less than 20 dB below the limit:

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Pol
1637.266667	-22.83	-13.00	9.83	H

- HIGH CHANNEL:

Spurious frequencies at less than 20 dB below the limit:

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Pol
1647.400000	-28.34	-13.00	15.34	H

Measurement uncertainty (dB): < ±5.35 for f ≥ 30 MHz up to 1 GHz
< ±4.32 for f ≥ 1 GHz up to 8.5 GHz

Verdict

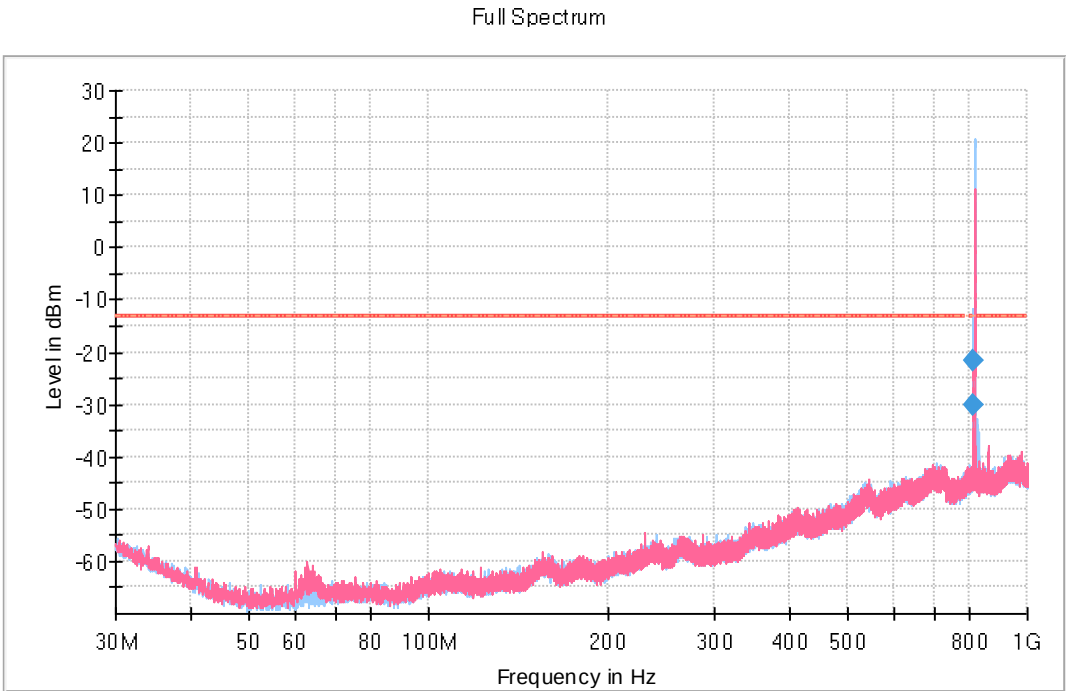
Pass

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	30.312 kHz	PK+	100 kHz	Coupled	0 dB
1 GHz - 8.5 GHz	234.375 kHz	PK+	1 MHz	1 s	0 dB

LTE Cat 1bis Band 26 (Sub-band 814-824 MHz):

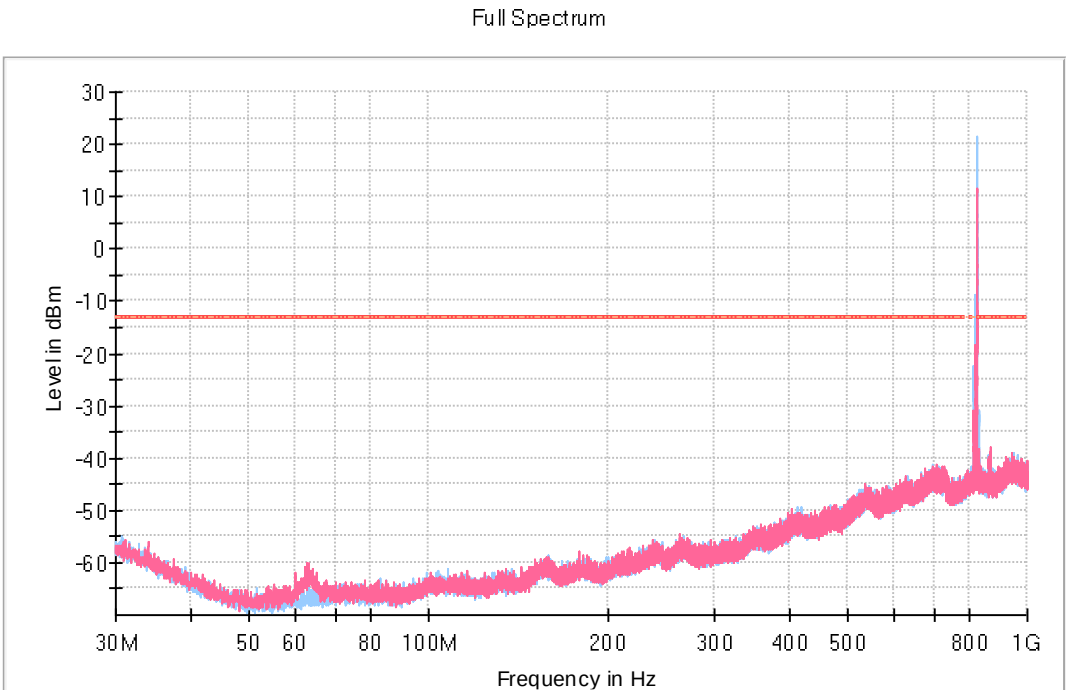
FREQUENCY RANGE 30 MHz - 1 GHz:

- LOW CHANNEL:



The peak above the limit is the carrier frequency:
LTE Cat 1bis Band 26 (Sub-band 814-824 MHz), 814.7 MHz

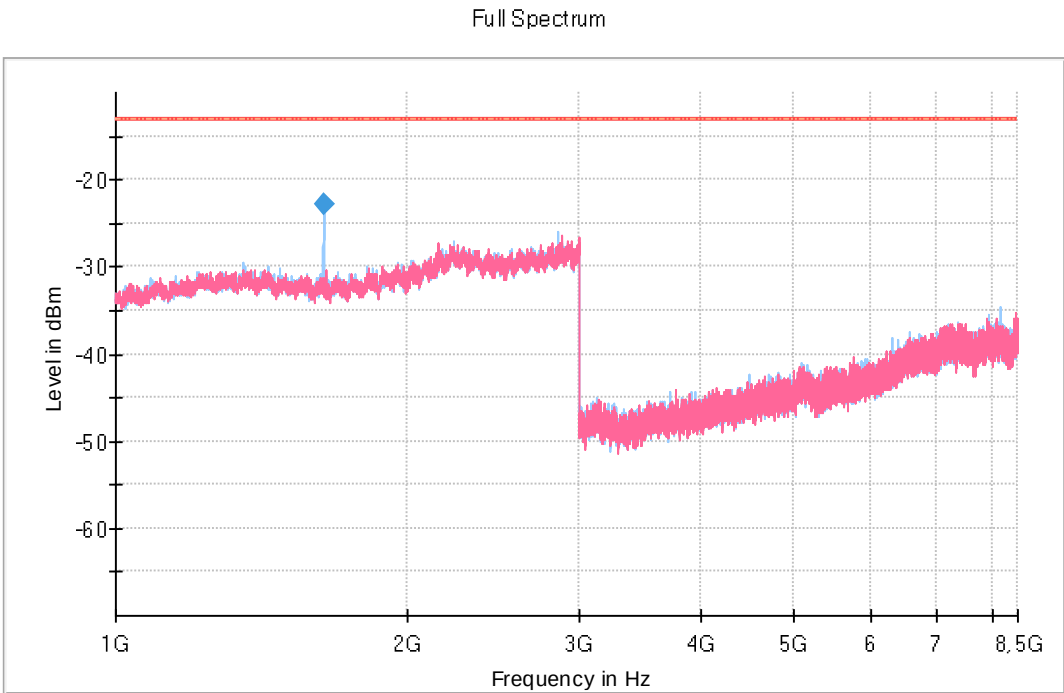
- HIGH CHANNEL:



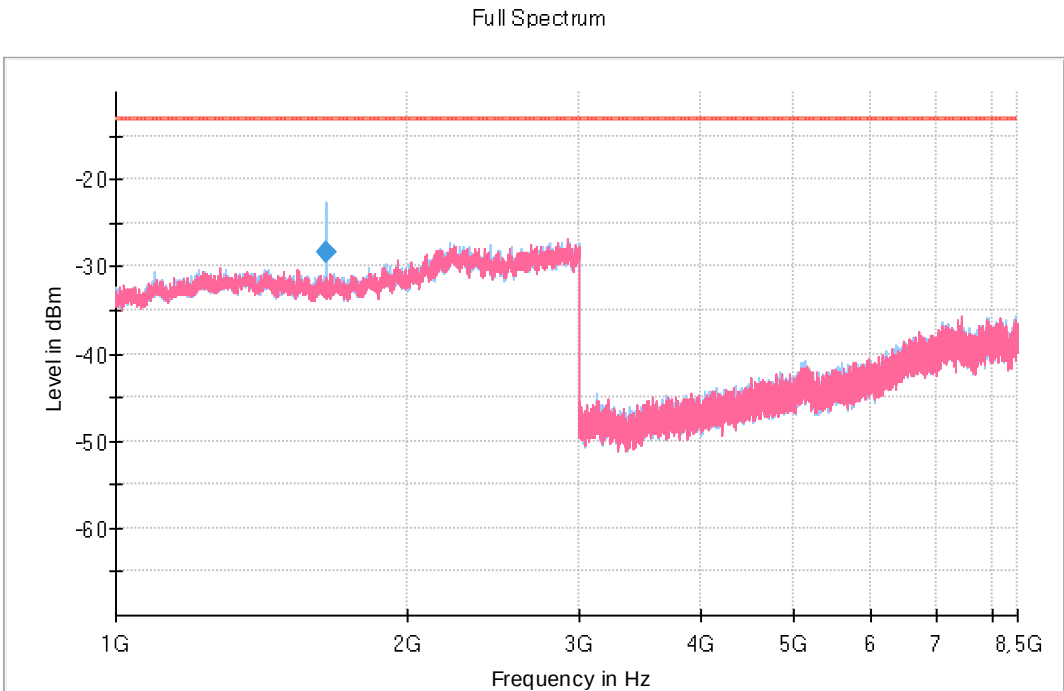
The peak above the limit is the carrier frequency:
LTE Cat 1bis Band 26 (Sub-band 814-824 MHz), 823.3 MHz

FREQUENCY RANGE 1 - 8.5 GHz:

- LOW CHANNEL:



- HIGH CHANNEL:



LTE Cat 1bis Band 26. Cross-rule Channel 824 MHz:

A preliminary scan determined the QPSK, BW=15 MHz, RB Size=1, RB Offset=74 as the worst case. The next results are for this worst-case configuration.

- SINGLE CHANNEL (Cross-rule Channel 824 MHz):

Frequency range 30 MHz - 1 GHz:

Spurious frequencies at less than 20 dB below the limit:

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Pol
810.668125	-30.49	-13.00	17.49	H

Frequency range 1 - 8.5 GHz:

Spurious frequencies at less than 20 dB below the limit:

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Pol
1661.400000	-29.85	-13.00	16.85	H

Measurement uncertainty (dB): < ±5.35 for f ≥ 30 MHz up to 1 GHz
< ±4.32 for f ≥ 1 GHz up to 8.5 GHz

Verdict

Pass

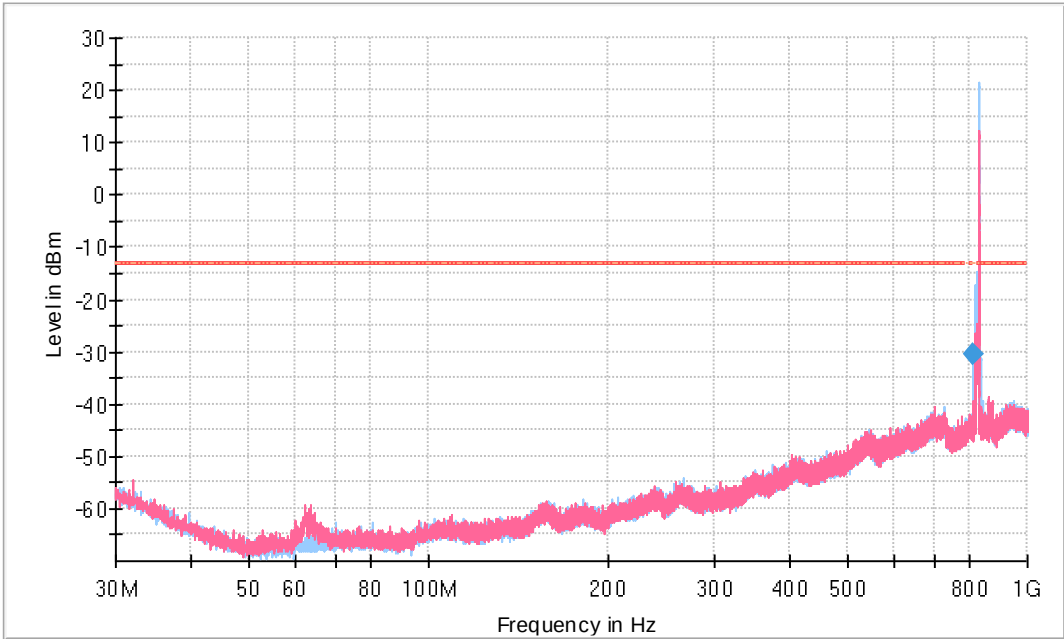
Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	30.312 kHz	PK+	100 kHz	Coupled	0 dB
1 GHz - 8.5 GHz	234.375 kHz	PK+	1 MHz	1 s	0 dB

LTE Cat 1bis Band 26. Cross-rule Channel 824 MHz:

FREQUENCY RANGE 30 MHz - 1 GHz:

- SINGLE CHANNEL (Cross-rule Channel 824 MHz):

Full Spectrum



The peak above the limit is the carrier frequency:
LTE Cat 1bis Band 26 (Sub-band 814-824 MHz), 824 MHz

FREQUENCY RANGE 1 - 8.5 GHz:

- SINGLE CHANNEL (Cross-rule Channel 824 MHz):

Full Spectrum

