

FCC Test Report

(Part 27: LTE Band 4)

Report No.: RF170208C16-1

FCC ID: H8NSS2FII

Test Model: SS2FII Femtocell Multi-band SOHO

Received Date: Feb. 08, 2017

Test Date: Feb. 22 ~ Apr. 17, 2017

Issued Date: Apr. 24, 2017

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Release Control Record

Issue No.	Description	Date Issued
RF170208C16-1	Original release	Apr. 24, 2017

1 Certificate of Conformity

Product: Femtocell

Brand: Nokia

Test Model: SS2FII Femtocell Multi-band SOHO

Sample Status: Engineering sample


Applicant: ASKEY COMPUTER CORP.

Test Date: Feb. 22 ~ Apr. 17, 2017

Standards: FCC Part 27, Subpart C
FCC Part 2

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :  _____, **Date:** _____ Apr. 24, 2017
Pettle Chen / Senior Specialist

Approved by :  _____, **Date:** _____ Apr. 24, 2017
Dylan Chiou / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
LTE Band 4			
2.1046 27.50(d)(4)	Equivalent Isotropically Radiated Power	Pass	Meet the requirement of limit.
----	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1055 27.54	Frequency Stability Stay with the authorized bands of operation	Pass	Meet the requirement of limit.
2.1049 27.53(h)	Occupied Bandwidth	Pass	Meet the requirement of limit.
2.1051 27.53(h)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(h)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -13.6dB at 6457.50MHz.

2.1 Measurement 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	Expanded Uncertainty (k=2) (\pm)
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.59 dB
	200MHz ~ 1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 18, 2016	Apr. 17, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Nov. 16, 2016	Nov. 15, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Dec. 28, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Dec. 27, 2016	Dec. 26, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 14, 2016	Dec. 13, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2016	Aug. 10, 2017
Preamplifier Agilent	8449B	3008A01638	Feb. 22, 2017	Feb. 21, 2018
Preamplifier Agilent	8447D	2944A10638	Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-02 (248780+MY13377)	Feb. 02, 2017	Feb. 01, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-03 (274092)	Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	8D-FB	Cable-CH9-01	Aug. 09, 2016	Aug. 08, 2017
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
High Speed Peak Power Meter	ML2495A	0824012	Aug. 11, 2016	Aug. 10, 2017
Power Sensor	MA2411B	0738171	Aug. 11, 2016	Aug. 10, 2017
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 08, 2016	Jun. 07, 2017
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jun. 13, 2016	Jun. 12, 2017
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 9.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 215374.
5. The IC Site Registration No. is IC 7450F-9.

3 General Information

3.1 General Description of EUT

Product	Femtocell		
Brand	Nokia		
Test Model	SS2FII Femtocell Multi-band SOHO		
Status of EUT	Engineering sample		
Power Supply Rating	12Vdc (Adapter)		
Modulation Type	QPSK, 16QAM, 64QAM		
Operating Frequency	LTE Band 4	Channel Bandwidth 5MHz	2112.5MHz ~ 2152.5MHz
		Channel Bandwidth 10MHz	2115.0MHz ~ 2150.0MHz
		Channel Bandwidth 15MHz	2117.5MHz ~ 2147.5MHz
		Channel Bandwidth 20MHz	2120.0MHz ~ 2145.0MHz
Max. EIRP Power	LTE Band 4	Channel Bandwidth 5MHz	562.341mW (27.5dBm)
		Channel Bandwidth 10MHz	575.440mW (27.6dBm)
		Channel Bandwidth 15MHz	501.187mW (27.0dBm)
		Channel Bandwidth 20MHz	575.440mW (27.6dBm)
Antenna Type	LTE Band 4: Antenna 1: PIFA antenna with 3.1dBi gain Antenna 3: PIFA antenna with 2.6dBi gain		
Antenna Connector	NA		
Accessory Device	Adapter, GPS antenna (Brand: INPAQ, model: GPSGLONASS15D-S6-0341-A, cable: 4.55m non-shielded cable w/o core)		
Data Cable Supplied	2.95m non-shielded RJ45 cable w/o core		

Note:

1. The EUT uses following adapter.

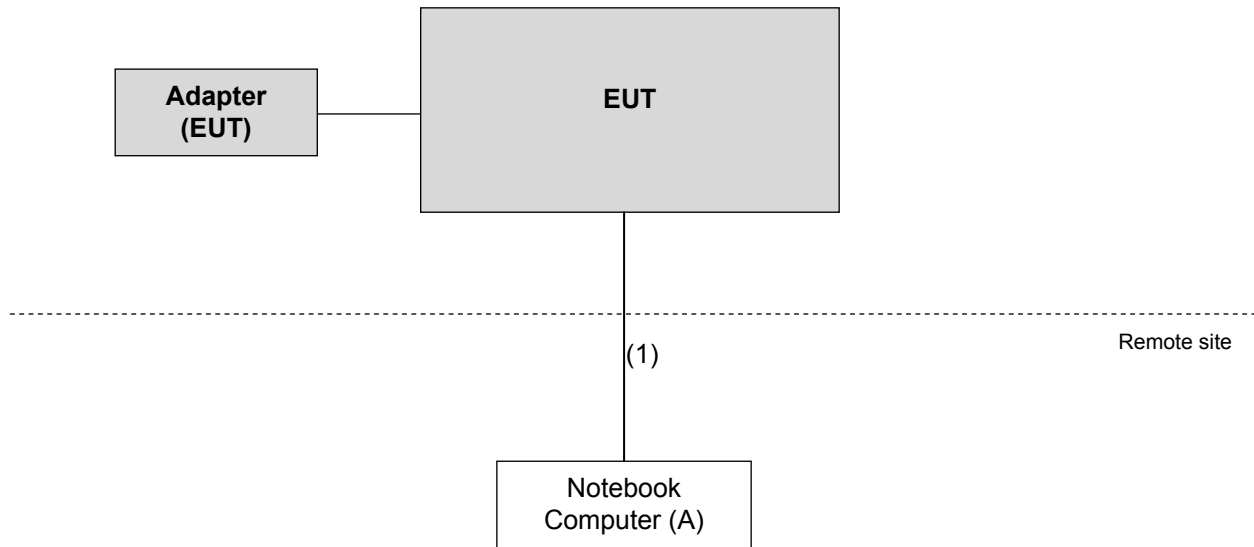
Brand	SHENZHEN FRECOM ELECTRONICS CO., LTD
Model	F24W5-120200SPAU
Input Power	100-240Vac, 50/60Hz, 0.6A
Output Power	12Vdc, 2A
Power Line	1.5m DC cable without core attached on adapter

2. The EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	TX FUNCTION	RX FUNCTION
LTE	2TX	2RX

3. Carrier Aggregation technology supported for this device, the operation behavior is LTE Band 2 + LTE Band 4, for more details information please refer to "CA Mode" of test report.

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook Computer	DELL	E5410	1HC2XM1	FCC DoC Approved	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45 Cable	1	10	N	0	Cat5e

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on Z-plane. Following channel(s) was (were) selected for the final test as listed below:

LTE Band 4

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation
Output Power	1975 to 2375	1975, 2175, 2375	5MHz	QPSK / 16QAM / 64QAM
	2000 to 2350	2000, 2175, 2350	10MHz	QPSK / 16QAM / 64QAM
	2025 to 2325	2025, 2175, 2325	15MHz	QPSK / 16QAM / 64QAM
	2050 to 2300	2050, 2175, 2300	20MHz	QPSK / 16QAM / 64QAM
Frequency Stability	1975 to 2375	1975	5MHz	QPSK
Emission Bandwidth	1975 to 2375	1975, 2175, 2375	5MHz	QPSK / 16QAM / 64QAM
	2000 to 2350	2000, 2175, 2350	10MHz	QPSK / 16QAM / 64QAM
	2025 to 2325	2025, 2175, 2325	15MHz	QPSK / 16QAM / 64QAM
	2050 to 2300	2050, 2175, 2300	20MHz	QPSK / 16QAM / 64QAM
Channel Edge	1975 to 2375	1975, 2375	5MHz	QPSK
	2000 to 2350	2000, 2350	10MHz	QPSK
	2025 to 2325	2025, 2325	15MHz	QPSK
	2050 to 2300	2050, 2300	20MHz	QPSK
Peak To Average Ratio	1975 to 2375	1975, 2175, 2375	5MHz	QPSK / 16QAM / 64QAM
	2000 to 2350	2000, 2175, 2350	10MHz	QPSK / 16QAM / 64QAM
	2025 to 2325	2025, 2175, 2325	15MHz	QPSK / 16QAM / 64QAM
	2050 to 2300	2050, 2175, 2300	20MHz	QPSK / 16QAM / 64QAM
Conducted Emission	1975 to 2375	1975, 2175, 2375	5MHz	QPSK
	2000 to 2350	2000, 2175, 2350	10MHz	QPSK
	2025 to 2325	2025, 2175, 2325	15MHz	QPSK
	2050 to 2300	2050, 2175, 2300	20MHz	QPSK
Radiated Emission Below 1GHz	1975 to 2375	1975	5MHz	QPSK
	2000 to 2350	2000	10MHz	QPSK
	2025 to 2325	2025	15MHz	QPSK
	2050 to 2300	2050	20MHz	QPSK
Radiated Emission Above 1GHz	1975 to 2375	1975, 2175, 2375	5MHz	QPSK
	2000 to 2350	2000, 2175, 2350	10MHz	QPSK
	2025 to 2325	2025, 2175, 2325	15MHz	QPSK
	2050 to 2300	2050, 2175, 2300	20MHz	QPSK

Note:

1. For radiated emission below 1 GHz, the low, mid and high channels were pre-tested in chamber. The low channel was the worst case and chosen for final test.
2. The conducted output power for QPSK, 16QAM and 64QAM, measured value of QPSK is higher than 16QAM and 64QAM mode. Therefore, Frequency Stability, Channel edge, Conducted Emission, Radiated Emission were presented under QPSK mode only.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
Output Power	25deg. C, 69%RH	120Vac, 60Hz	Tank Wu
Frequency Stability	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui
Emission Bandwidth	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui
Channel Edge	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui
Peak To Average Ratio	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui
Conducted Emission	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui
Radiated Emission	20deg. C, 69%RH	120Vac, 60Hz	Tank Wu, Bayu Chen

3.4 EUT Operating Conditions

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

KDB 971168 D01 Power Meas License Digital Systems v02r02

KDB 412172 D01 Determining ERP and EIRP v01r01

KDB 662911 D01 multiple transmitter output v02r01

ANSI/TIA/EIA-603-C 2004

All test items have been performed and recorded as per the above standards.

Note: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC).
The test report has been issued separately.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

The radiated peak output power shall be according to the specific rule Part 27.50(d)(2) that are limited to EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

4.1.2 Test Procedures

EIRP / ERP Measurement:

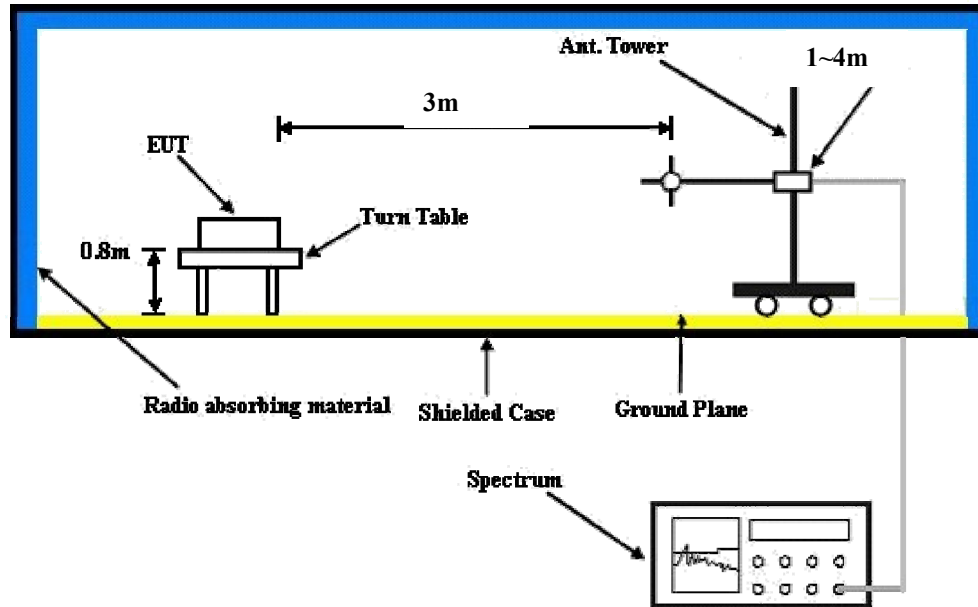
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10MHz for LTE Mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15\text{dBi}$.

Conducted Power Measurement:

A power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

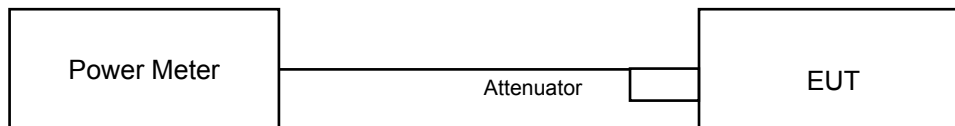
4.1.3 Test Setup

EIRP / ERP MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

CONDUCTED POWER MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.4 Test Results

CONDUCTED OUTPUT POWER (dBm)

Band / BW	RB Size	RB Offset	QPSK						16QAM						64QAM					
			Low CH 1975		Mid CH 2175		High CH 2375		Low CH 1975		Mid CH 2175		High CH 2375		Low CH 1975		Mid CH 2175		High CH 2375	
			2112.5 MHz		2132.5 MHz		2152.5 MHz		2112.5 MHz		2132.5 MHz		2152.5 MHz		2112.5 MHz		2132.5 MHz		2152.5 MHz	
			Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1
4/5M	25	0	19.92	20.43	20.39	20.76	20.46	20.36	19.46	20.03	19.86	20.25	19.94	19.79	18.93	19.56	19.33	19.71	19.51	19.28
			Total		Total		Total		Total		Total		Total		Total		Total		Total	
			23.19		23.59		23.42		22.76		23.07		22.88		22.27		22.53		22.41	
Band / BW	RB Size	RB Offset	QPSK						16QAM						64QAM					
			Low CH 2000		Mid CH 2175		High CH 2350		Low CH 2000		Mid CH 2175		High CH 2350		Low CH 2000		Mid CH 2175		High CH 2350	
			2115 MHz		2132.5 MHz		2150 MHz		2115 MHz		2132.5 MHz		2150 MHz		2115 MHz		2132.5 MHz		2150 MHz	
			Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1
4/10M	50	0	20.53	20.59	20.56	20.90	20.26	20.62	20.08	20.13	19.96	20.47	19.77	20.10	19.53	19.72	19.43	20.00	19.24	19.64
			Total		Total		Total		Total		Total		Total		Total		Total		Total	
			23.57		23.74		23.45		23.12		23.23		22.95		22.64		22.73		22.45	
Band / BW	RB Size	RB Offset	QPSK						16QAM						64QAM					
			Low CH 2025		Mid CH 2175		High CH 2325		Low CH 2025		Mid CH 2175		High CH 2325		Low CH 2025		Mid CH 2175		High CH 2325	
			2117.5 MHz		2132.5 MHz		2147.5 MHz		2117.5 MHz		2132.5 MHz		2147.5 MHz		2117.5 MHz		2132.5 MHz		2147.5 MHz	
			Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1
4/15M	75	0	20.73	20.68	20.48	20.82	20.46	20.62	20.24	20.15	19.87	20.31	19.92	20.27	19.76	19.78	19.38	19.85	19.51	19.76
			Total		Total		Total		Total		Total		Total		Total		Total		Total	
			23.72		23.66		23.55		23.21		23.11		23.11		22.78		22.63		22.65	
Band / BW	RB Size	RB Offset	QPSK						16QAM						64QAM					
			Low CH 2025		Mid CH 2175		High CH 2325		Low CH 2025		Mid CH 2175		High CH 2325		Low CH 2025		Mid CH 2175		High CH 2325	
			2117.5 MHz		2132.5 MHz		2147.5 MHz		2117.5 MHz		2132.5 MHz		2147.5 MHz		2117.5 MHz		2132.5 MHz		2147.5 MHz	
			Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1	Chain0	Chain1
4/20M	100	0	20.48	20.80	20.42	20.63	20.26	20.46	20.04	20.25	19.82	20.10	19.69	19.99	19.50	19.64	19.14	19.63	19.23	19.52
			Total		Total		Total		Total		Total		Total		Total		Total		Total	
			23.65		23.54		23.37		23.16		22.97		22.85		22.58		22.40		22.39	

EIRP Power (dBm)

LTE Band 4

Channel Bandwidth: 5MHz

MODE		TX channel 1975					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2112.50	-20.8	20.9	-0.3	20.6	30.0	-9.4
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2112.50	-15.8	26.7	-0.3	26.4	30.0	-3.6

MODE		TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-19.7	22.2	-0.4	21.8	30.0	-8.2
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-15.4	27.2	-0.4	26.8	30.0	-3.2

MODE		TX channel 2375					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2152.50	-20.5	21.5	-0.3	21.2	30.0	-8.8
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2152.50	-14.6	27.8	-0.3	27.5	30.0	-2.5

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Channel Bandwidth: 10MHz

MODE		TX channel 2000					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2115.00	-19.5	22.2	-0.3	21.9	30.0	-8.1
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2115.00	-15.0	27.5	-0.3	27.2	30.0	-2.8

MODE		TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-22.8	19.1	-0.4	18.7	30.0	-11.3
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-15.7	26.9	-0.4	26.5	30.0	-3.5

MODE		TX channel 2350					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2150.00	-21.7	20.2	-0.3	19.9	30.0	-10.1
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2150.00	-14.5	27.9	-0.3	27.6	30.0	-2.4

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Channel Bandwidth: 15MHz

MODE		TX channel 2025					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2117.50	-21.1	20.6	-0.3	20.3	30.0	-9.7
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2117.50	-15.5	27.0	-0.3	26.7	30.0	-3.3

MODE		TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-20.1	21.8	-0.4	21.4	30.0	-8.6
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-15.2	27.4	-0.4	27.0	30.0	-3.0

MODE		TX channel 2325					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2147.50	-20.6	21.3	-0.3	21.0	30.0	-9.0
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2147.50	-15.2	27.2	-0.3	26.9	30.0	-3.1

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Channel Bandwidth: 20MHz

MODE		TX channel 2050					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2120.00	-17.9	23.9	-0.3	23.6	30.0	-6.4
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2120.00	-14.6	27.9	-0.3	27.6	30.0	-2.4

MODE		TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-17.6	24.3	-0.4	23.9	30.0	-6.1
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-15.7	26.9	-0.4	26.5	30.0	-3.5

MODE		TX channel 2300					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2145.00	-19.8	22.1	-0.3	21.8	30.0	-8.2
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2145.00	-15.5	27.0	-0.3	26.7	30.0	-3.3

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

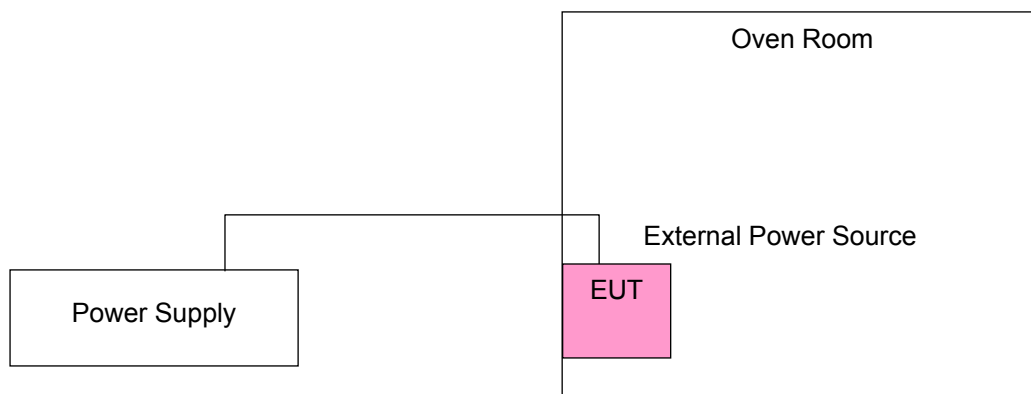
According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that "The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT $-20^{\circ}\text{C} \sim 50^{\circ}\text{C}$.

4.2.2 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the AC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

Note: The frequency error was recorded frequency error from the communication simulator.

4.2.3 Test Setup



4.2.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	Frequency Error (ppm)	Limit (Pass/Fail)
	LTE Band 4	
138	-0.006	Pass
120	-0.006	Pass
102	-0.006	Pass

Note: The applicant defined the normal working voltage is from 102Vac to 138Vac.

Frequency Error vs. Temperature.

TEMP. (°C)	Frequency Error (ppm)	Limit (Pass/Fail)
	LTE Band 4	
50	-0.006	Pass
40	-0.005	Pass
30	-0.005	Pass
20	-0.006	Pass
10	-0.006	Pass
0	-0.006	Pass
-10	-0.006	Pass
-20	-0.007	Pass

4.3 Emission Bandwidth Measurement

4.3.1 Limits of Emission Bandwidth Measurement

-26dBc Bandwidth

According to FCC 27.53(m)(6) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

Occupied Bandwidth

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.2 Test Procedure

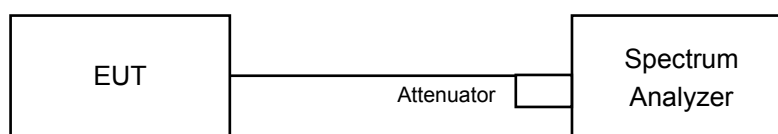
-26dBc Bandwidth

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW = 100kHz and VBW = 300kHz (Channel Bandwidth: 5MHz), RBW = 200kHz and VBW = 620kHz (Channel Bandwidth: 10MHz), RBW = 200kHz and VBW = 620kHz (Channel Bandwidth: 15MHz) and RBW = 430kHz and VBW = 1.2MHz (Channel Bandwidth: 20MHz). The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

Occupied Channel Bandwidth

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW = 51kHz and VBW = 150kHz (Channel Bandwidth: 5MHz), RBW = 100kHz and VBW = 300kHz (Channel Bandwidth: 10MHz), RBW = 200kHz and VBW = 620kHz (Channel Bandwidth: 15MHz) and RBW = 430kHz and VBW = 1.2MHz (Channel Bandwidth: 20MHz).

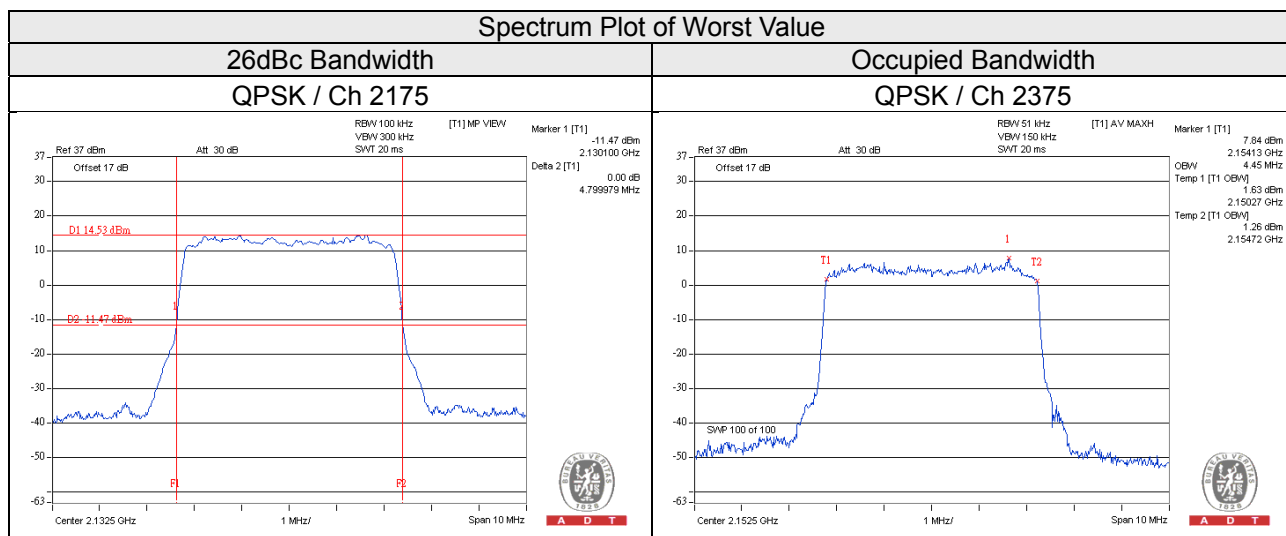
4.3.3 Test Setup



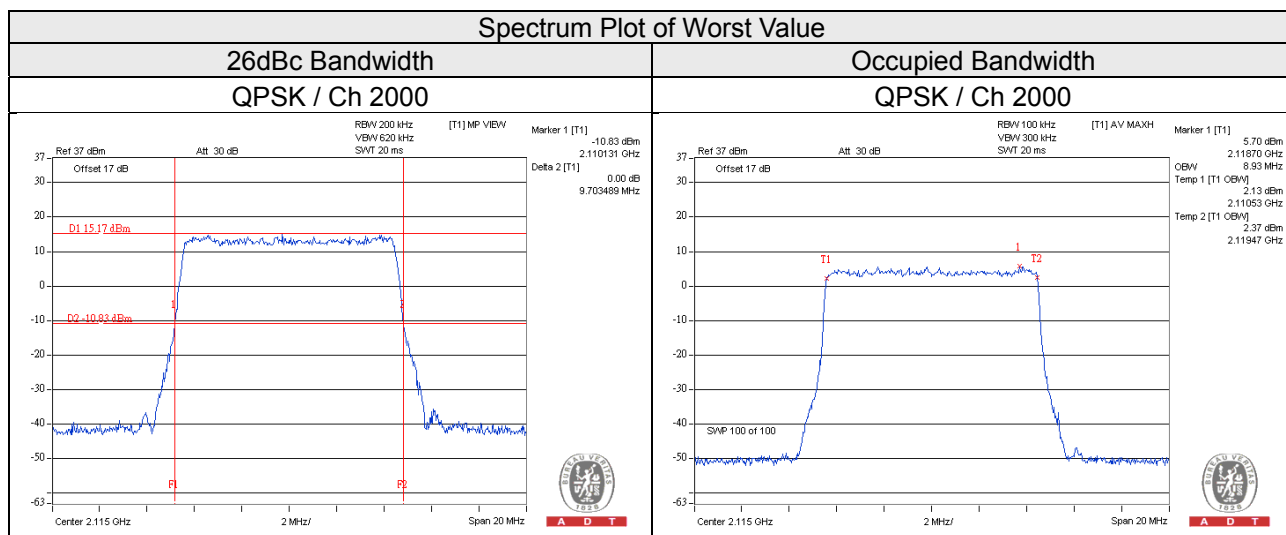
4.3.4 Test Result

LTE Band 4 / Chain 0

Channel Bandwidth: 5MHz							
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1975	2112.5	4.78	4.77	4.78	4.43	4.43	4.42
2175	2132.5	4.80	4.78	4.78	4.43	4.42	4.43
2375	2152.5	4.79	4.78	4.77	4.45	4.43	4.43



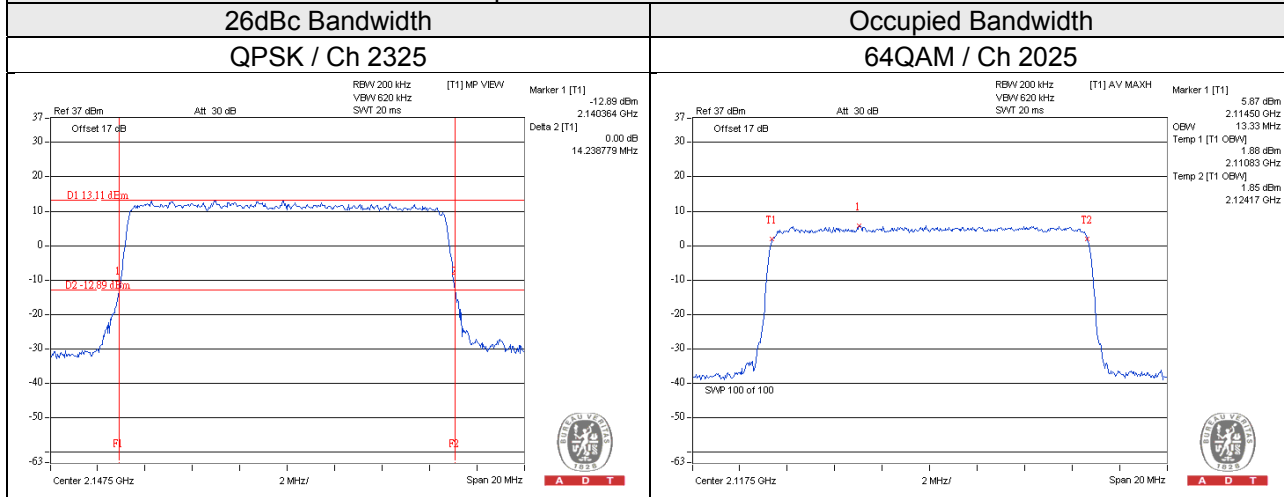
Channel Bandwidth: 10MHz							
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
2000	2115.0	9.70	9.65	9.69	8.93	8.93	8.93
2175	2132.5	9.64	9.65	9.64	8.90	8.93	8.90
2350	2150.0	9.67	9.64	9.65	8.93	8.93	8.93



Channel Bandwidth: 15MHz

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
2025	2117.5	14.18	14.17	14.14	13.30	13.30	13.33
2175	2132.5	14.20	14.18	14.16	13.30	13.30	13.30
2325	2147.5	14.24	14.16	14.16	13.30	13.30	13.30

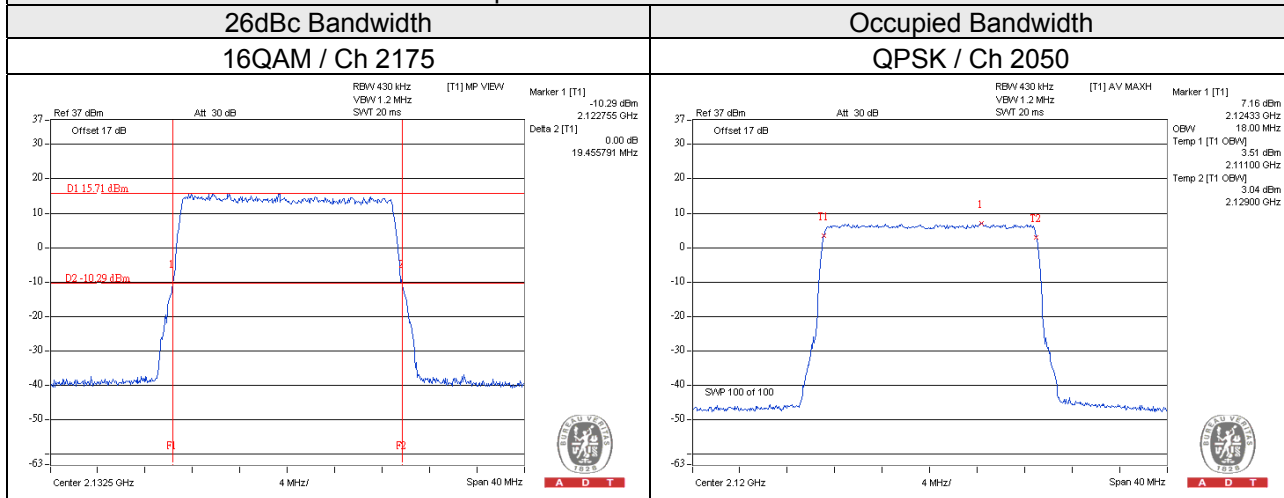
Spectrum Plot of Worst Value



Channel Bandwidth: 20MHz

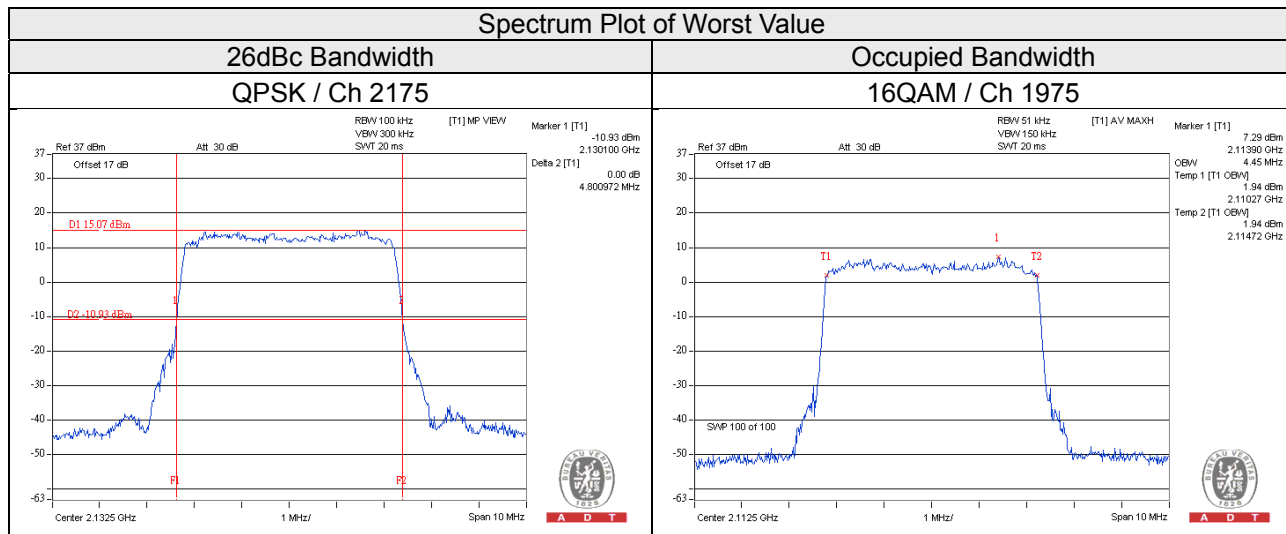
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
2050	2120.0	19.32	19.31	19.38	18.00	18.00	18.00
2175	2132.5	19.34	19.46	19.17	17.93	18.00	18.00
2300	2145.0	19.29	19.27	19.35	18.00	18.00	18.00

Spectrum Plot of Worst Value

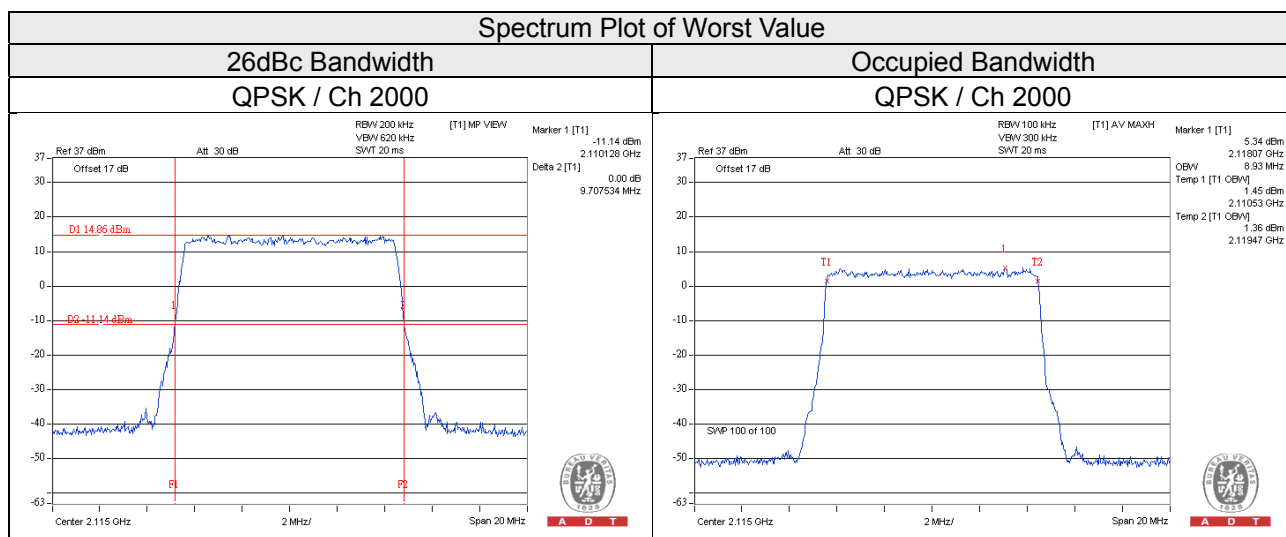


LTE Band 4 / Chain 1

Channel Bandwidth: 5MHz							
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1975	2112.5	4.78	4.79	4.76	4.43	4.45	4.45
2175	2132.5	4.80	4.77	4.78	4.42	4.43	4.43
2375	2152.5	4.77	4.79	4.75	4.43	4.43	4.43



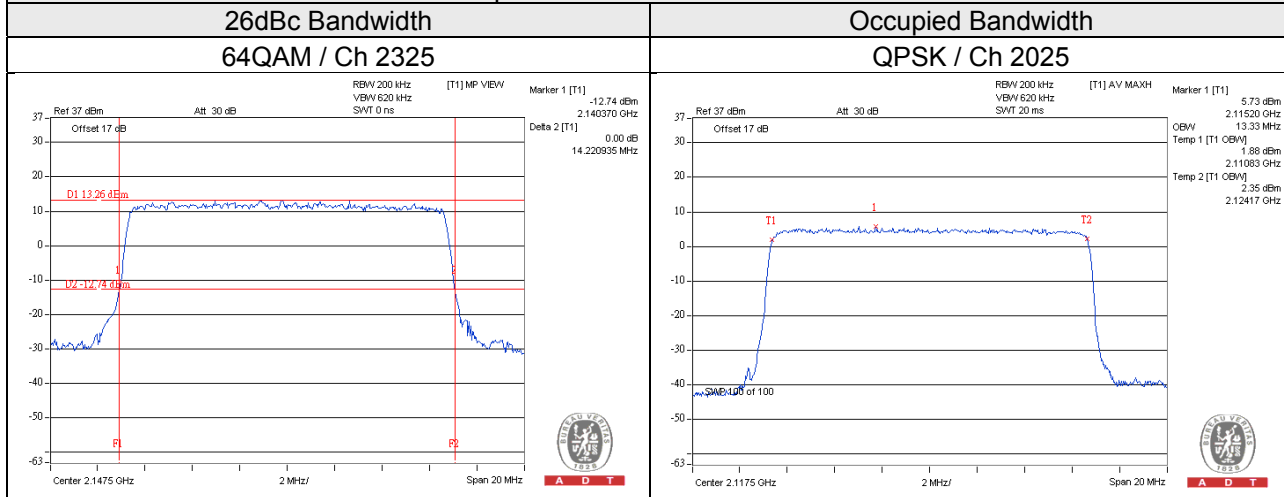
Channel Bandwidth: 10MHz							
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
2000	2115.0	9.71	9.69	9.65	8.93	8.90	8.90
2175	2132.5	9.71	9.66	9.64	8.90	8.90	8.93
2350	2150.0	9.65	9.66	9.68	8.90	8.90	8.90



Channel Bandwidth: 15MHz

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
2025	2117.5	14.21	14.19	14.20	13.33	13.30	13.30
2175	2132.5	14.19	14.14	14.11	13.33	13.33	13.30
2325	2147.5	14.19	14.20	14.22	13.33	13.30	13.30

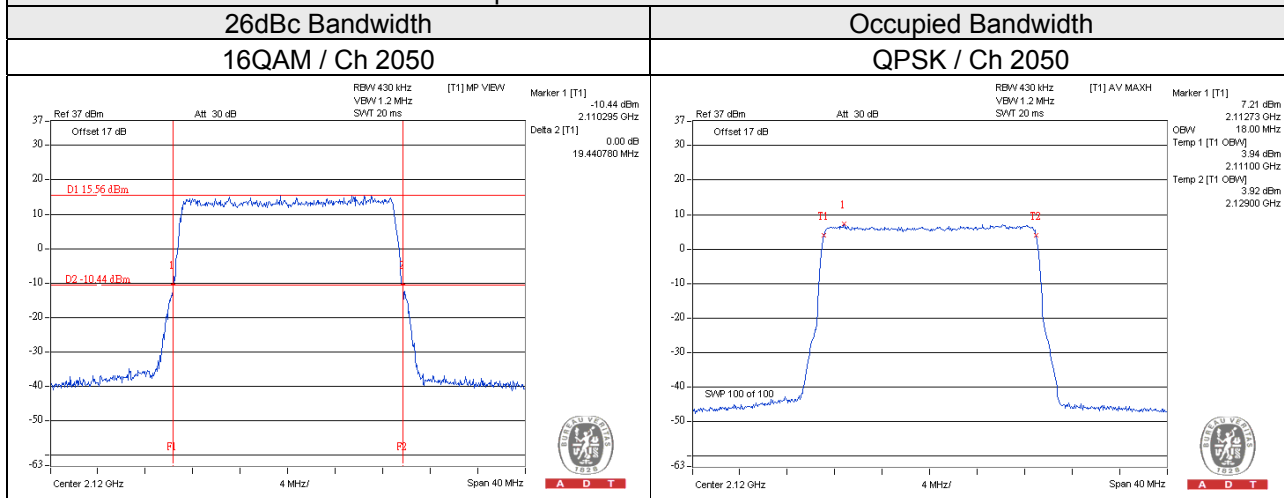
Spectrum Plot of Worst Value



Channel Bandwidth: 20MHz

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
2050	2120.0	19.41	19.44	19.44	18.00	18.00	18.00
2175	2132.5	19.36	19.24	19.34	18.00	18.00	18.00
2300	2145.0	19.36	19.32	19.21	17.93	17.93	17.93

Spectrum Plot of Worst Value



4.4 Channel Edge Measurement

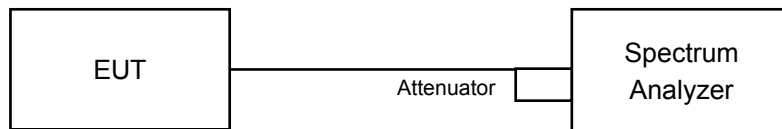
4.4.1 Limits of Band Edge Measurement

According to FCC 27.53(h) specified the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB. 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.

Note:

This device can be implemented MIMO function, so the limit of spurious emissions needs to be reduced by $10 \log(\text{Numbers}_{\text{Ant}})$ according to FCC KDB 662911 D01 guidance.

4.4.2 Test Setup



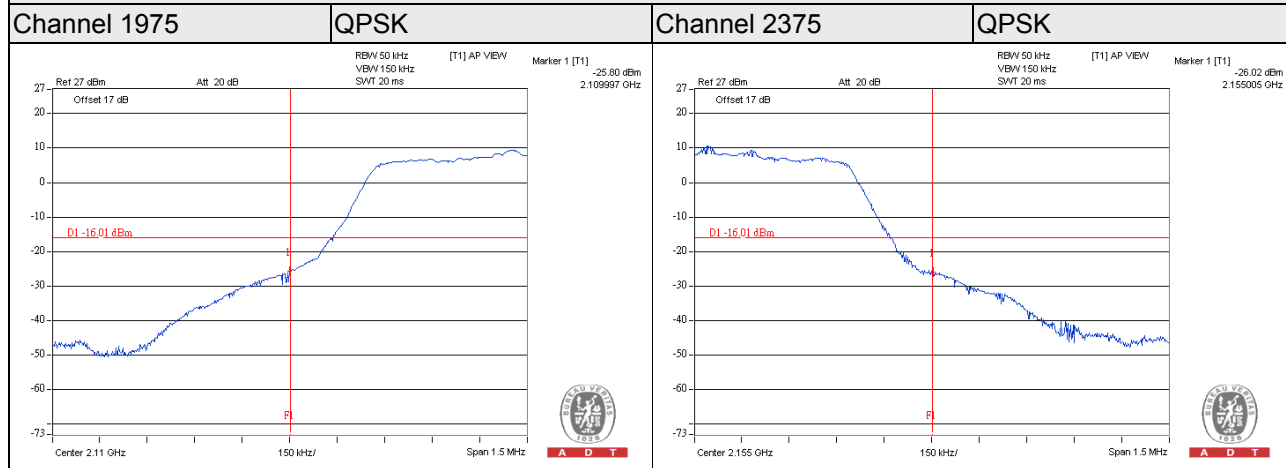
4.4.3 Test Procedures

- The EUT was set up for the rated peak power. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels: low, middle and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1.5MHz. RBW of the spectrum is 50kHz.
- Record the max trace plot into the test report.

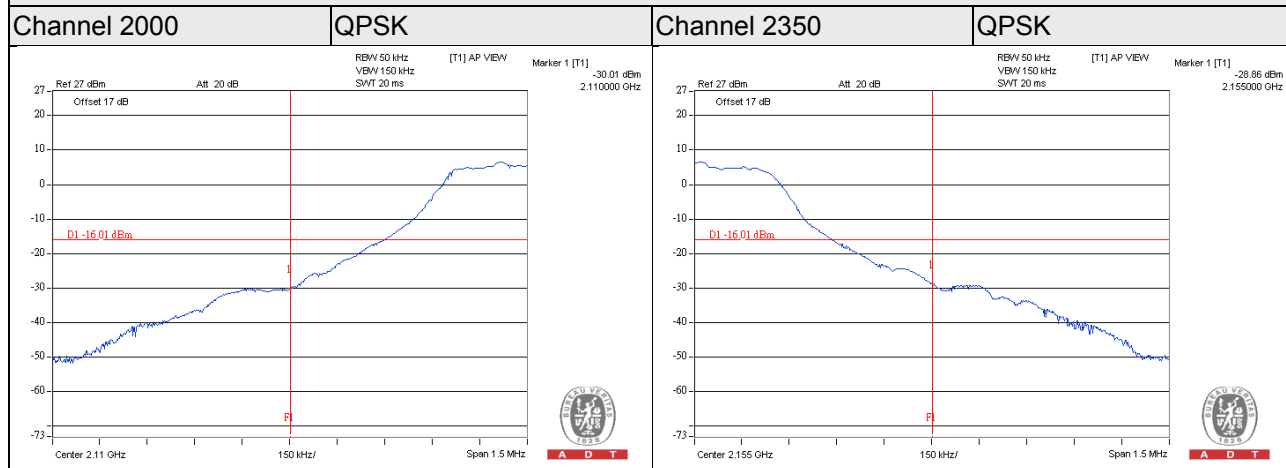
4.4.4 Test Results

LTE Band 4 / Chain 0

Channel Bandwidth: 5MHz



Channel Bandwidth: 10MHz



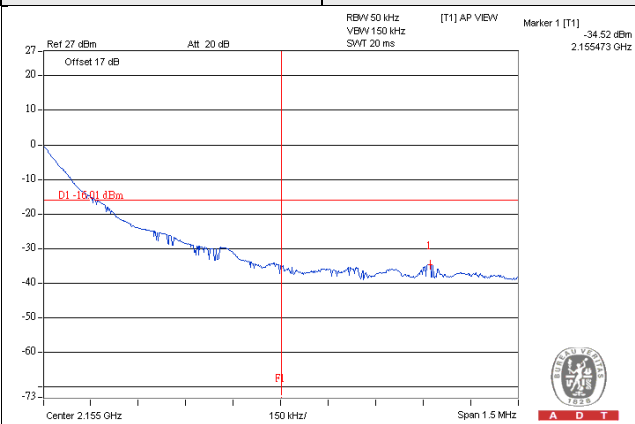
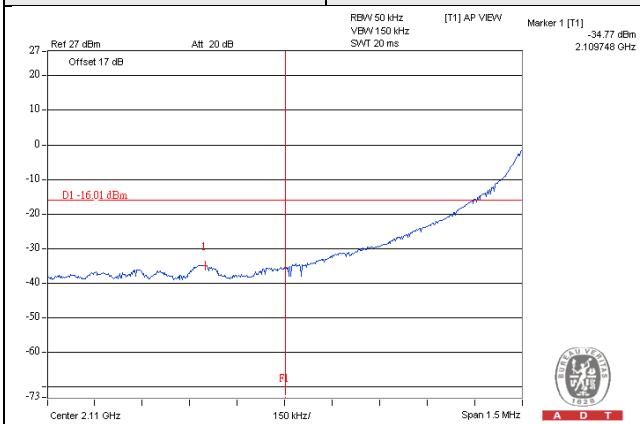
Channel Bandwidth: 15MHz

Channel 2025

QPSK

Channel 2325

QPSK



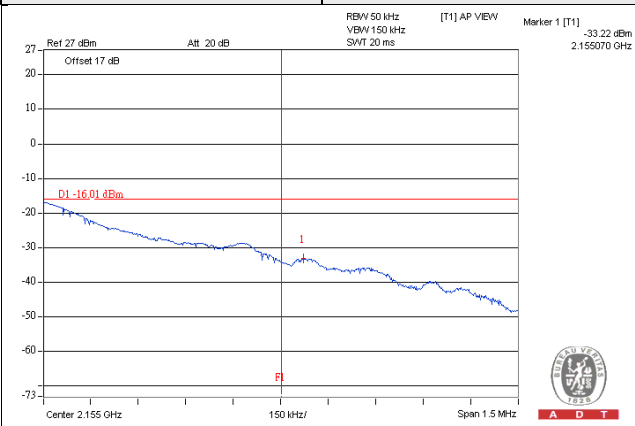
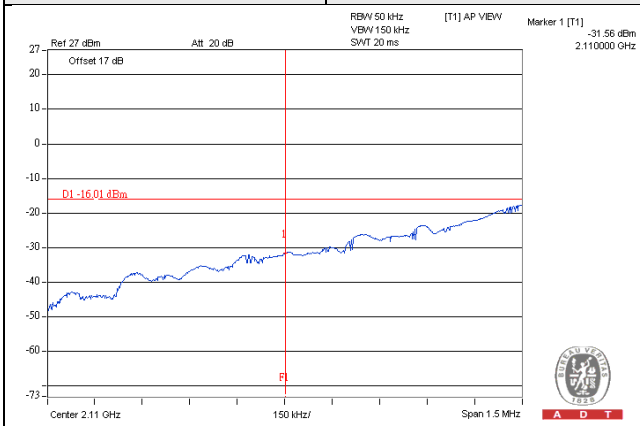
Channel Bandwidth: 20MHz

Channel 2050

QPSK

Channel 2300

QPSK

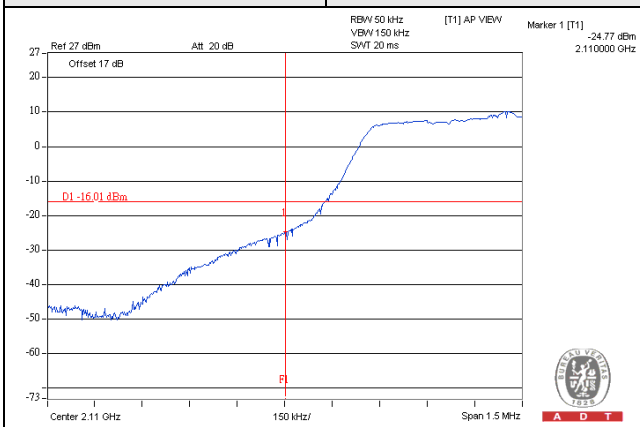


LTE Band 4 / Chain 1

Channel Bandwidth: 5MHz

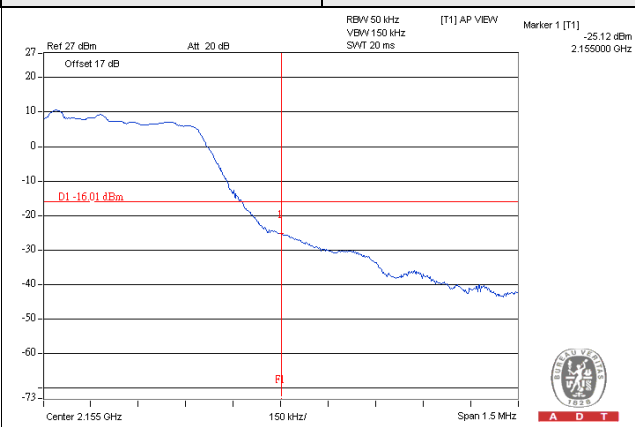
Channel 1975

QPSK



Channel 2375

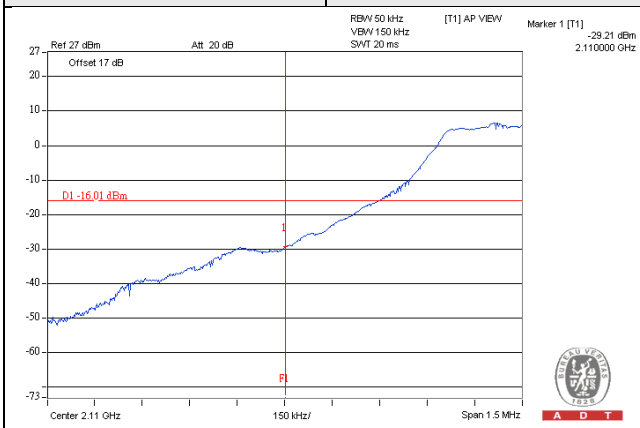
QPSK



Channel Bandwidth: 10MHz

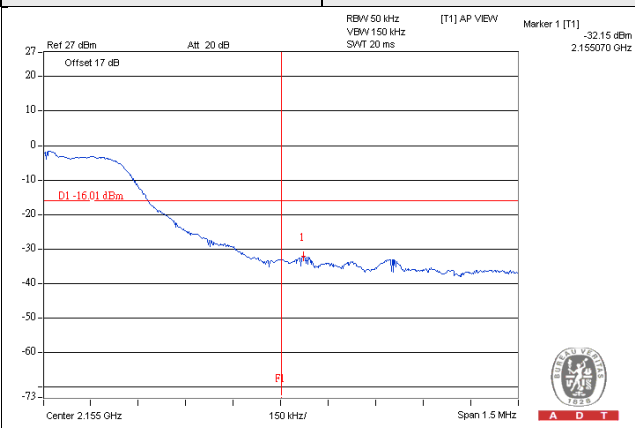
Channel 2000

QPSK



Channel 2350

QPSK



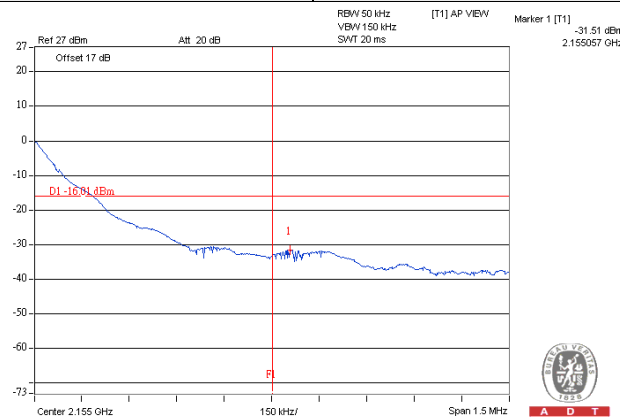
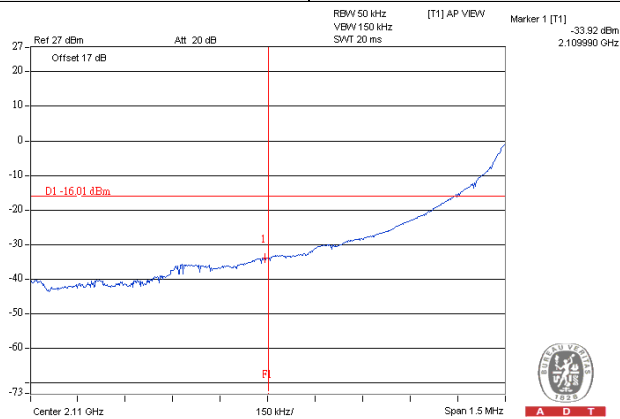
Channel Bandwidth: 15MHz

Channel 2025

QPSK

Channel 2325

QPSK



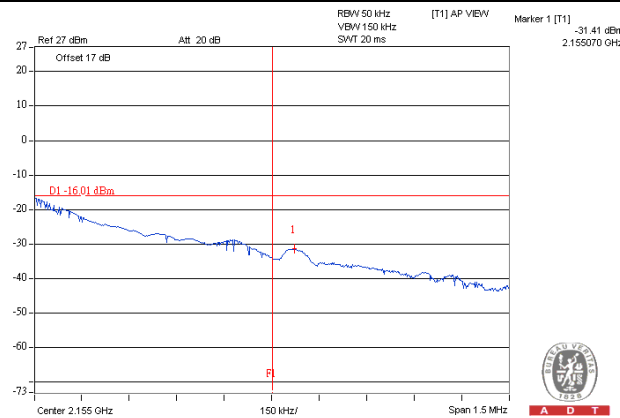
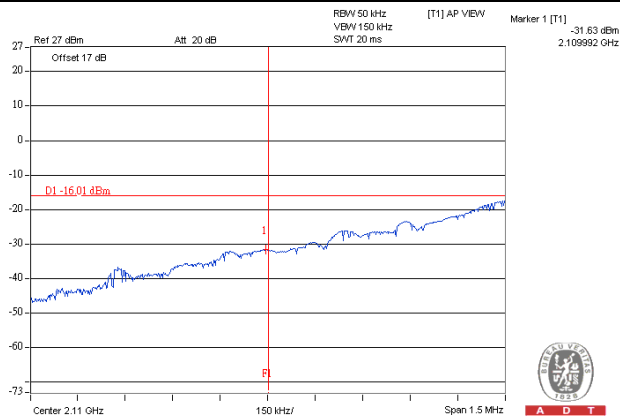
Channel Bandwidth: 20MHz

Channel 2050

QPSK

Channel 2300

QPSK

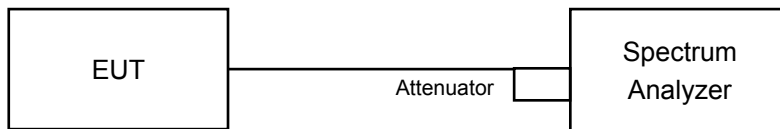


4.5 Peak to Average Ratio

4.5.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

4.5.2 Test Setup



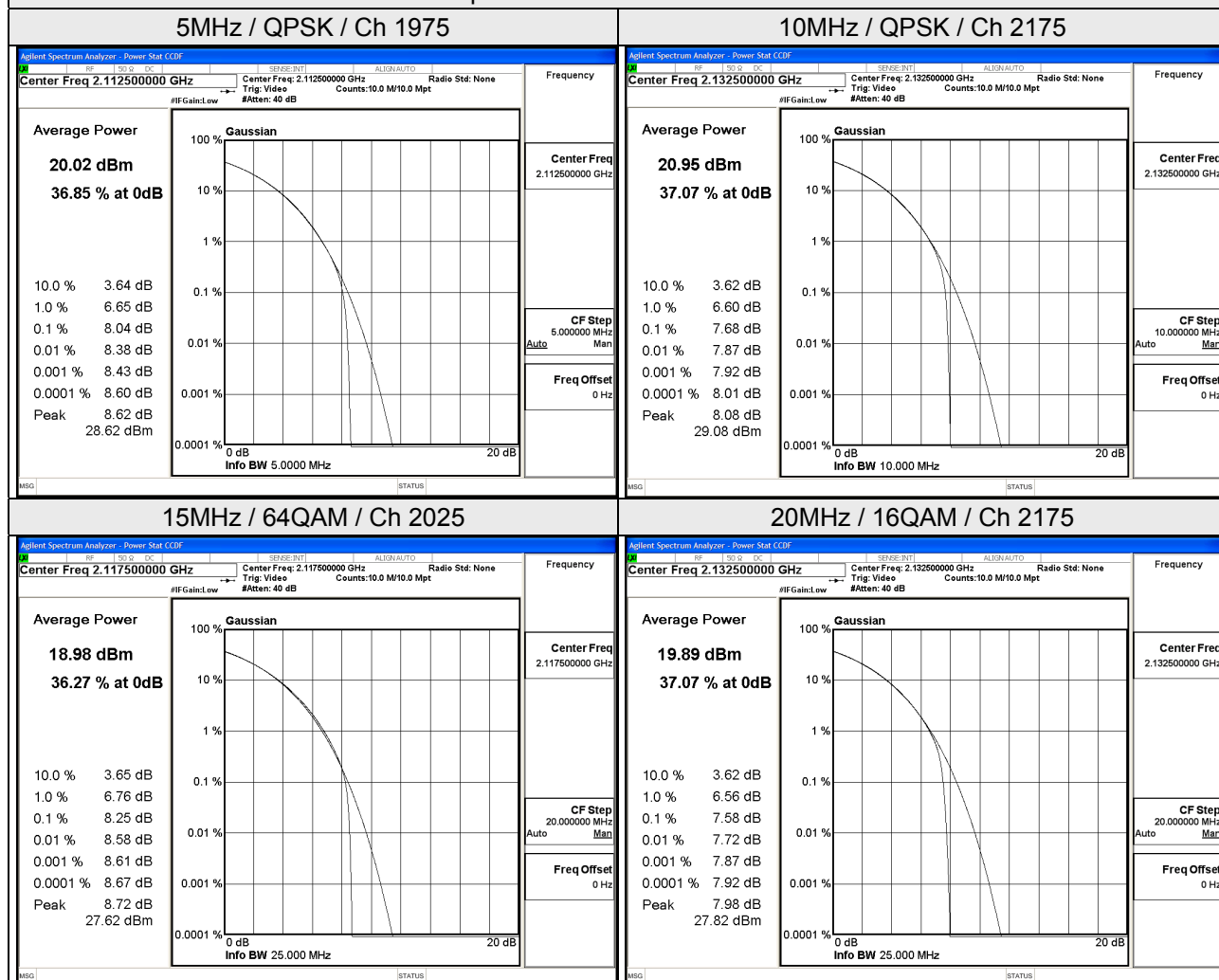
4.5.3 Test Procedures

- Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
- Set the number of counts to a value that stabilizes the measured CCDF curve;
- Record the maximum PAPR level associated with a probability of 0.1%.

4.5.4 Test Results

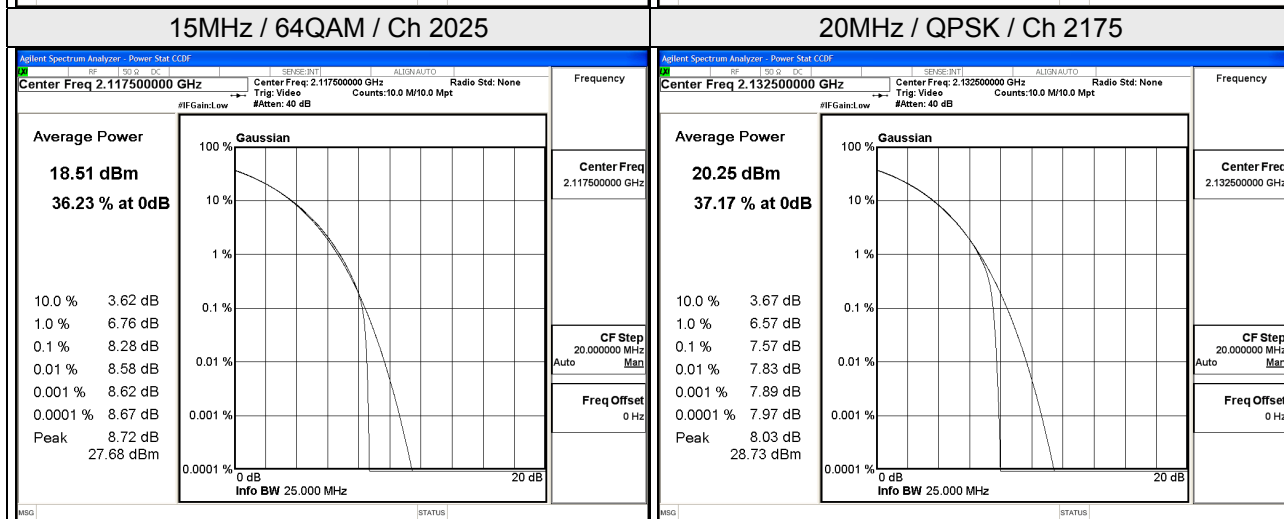
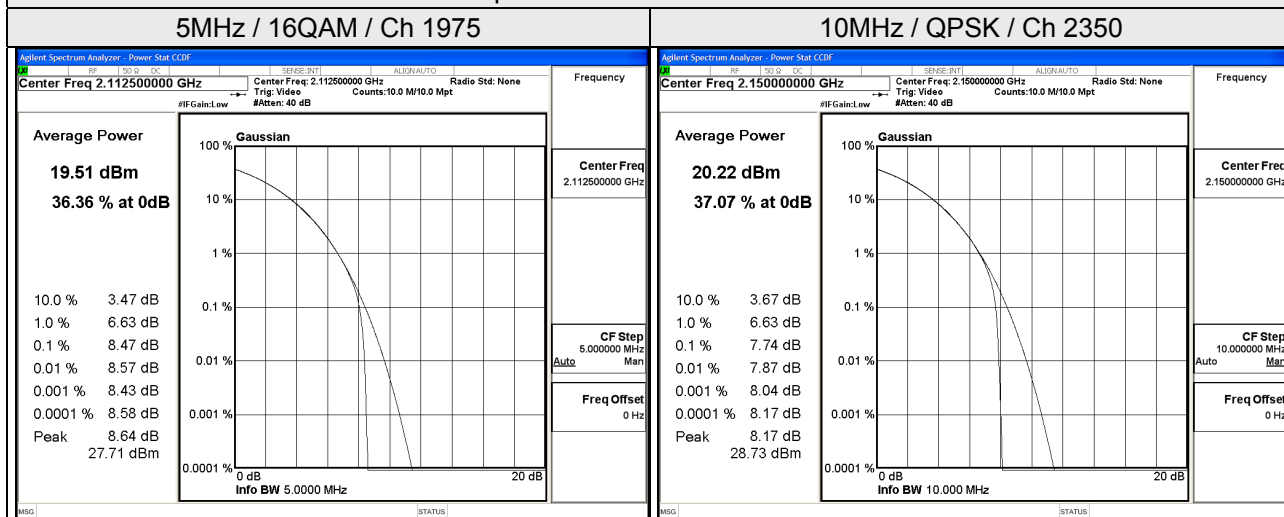
LTE Band 4 / Chain 0									
Channel Bandwidth 5MHz					Channel Bandwidth 10MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
1975	2112.5	8.04	8.03	8.04	2000	2115.0	7.67	7.67	7.62
2175	2132.5	8.02	8.01	8.02	2175	2132.5	7.68	7.64	7.63
2375	2152.5	8.01	8.01	8.01	2350	2150.0	7.66	7.63	7.62
Channel Bandwidth 15MHz					Channel Bandwidth 20MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
2025	2117.5	8.23	8.23	8.25	2050	2120.0	7.46	7.48	7.45
2175	2175.0	8.12	8.11	8.12	2175	2132.5	7.53	7.58	7.57
2325	2325.0	8.06	8.03	8.04	2300	2145.0	7.49	7.57	7.43

Spectrum Plot of Worst Value



LTE Band 4 / Chain 1									
Channel Bandwidth 5MHz					Channel Bandwidth 10MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
1975	2112.5	8.26	8.47	8.14	2000	2115.0	7.61	7.37	7.61
2175	2132.5	8.23	8.13	8.13	2175	2132.5	7.66	7.63	7.73
2375	2152.5	8.11	8.16	8.06	2350	2150.0	7.74	7.66	7.61
Channel Bandwidth 15MHz					Channel Bandwidth 20MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
2025	2117.5	8.22	8.23	8.28	2050	2120.0	7.47	7.42	7.41
2175	2175.0	8.14	8.12	8.14	2175	2132.5	7.57	7.52	7.52
2325	2325.0	8.16	8.06	8.14	2300	2145.0	7.46	7.53	7.48

Spectrum Plot of Worst Value



4.6 Conducted Spurious Emissions

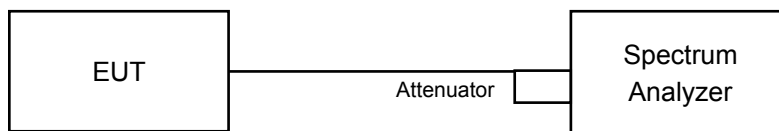
4.6.1 Limits of Conducted Spurious Emissions Measurement

In the FCC 27.53(h), On any frequency outside a licensee's frequency block, The power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB, the emission limit equal to -13dBm .

Note:

This device can be implement MIMO function, so the limit of spurious emissions needs to be reduced by $10\log(\text{Numbers}_{\text{Ant}})$ according to FCC KDB 662911 D01 guidance.

4.6.2 Test Setup



4.6.3 Test Procedure

- All measurements were done at 3 channels: low, middle and high operational frequency range.
- When the spectrum scanned from 9kHz to 20GHz for LTE Band 4, it shall be connected to the attenuator with the carried frequency.

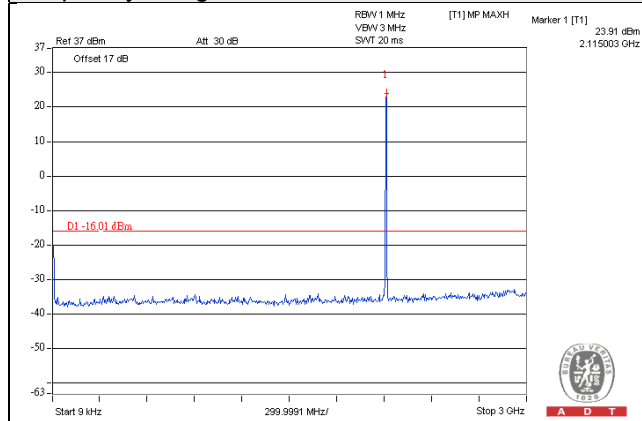
4.6.4 Test Results

LTE Band 4 / Chain 0

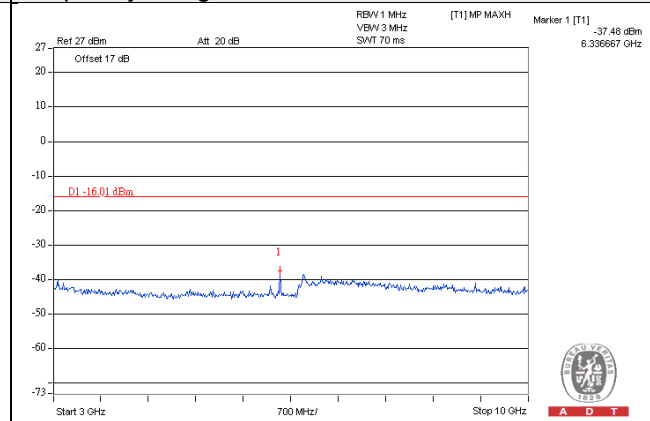
Channel Bandwidth: 5MHz

Channel 1975

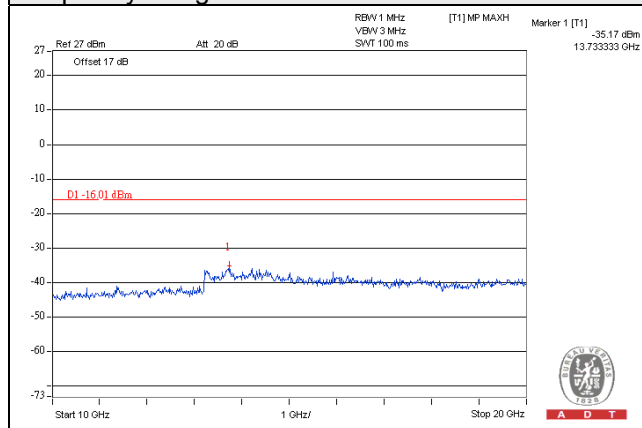
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



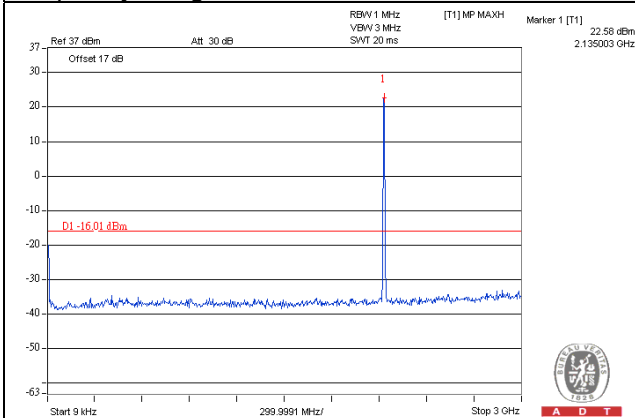
Frequency Range : 10GHz~20GHz



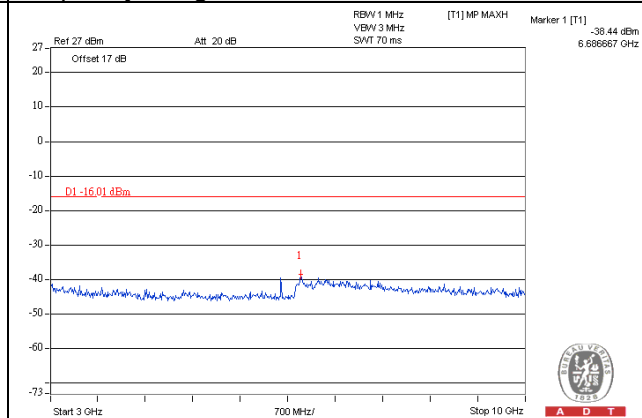
Channel Bandwidth: 5MHz

Channel 2175

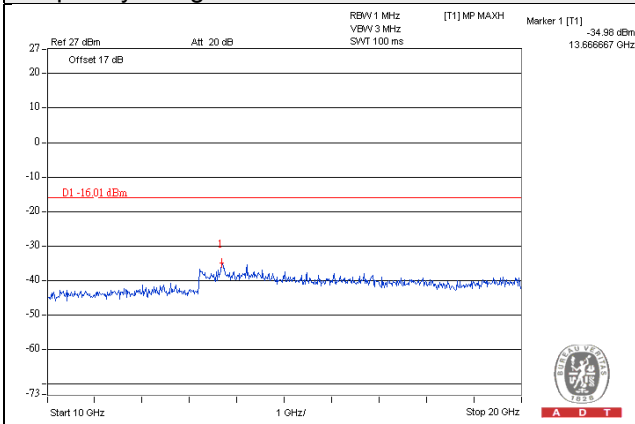
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



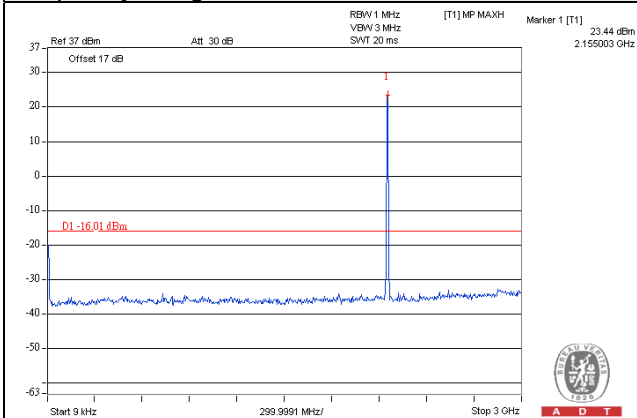
Frequency Range : 10GHz~20GHz



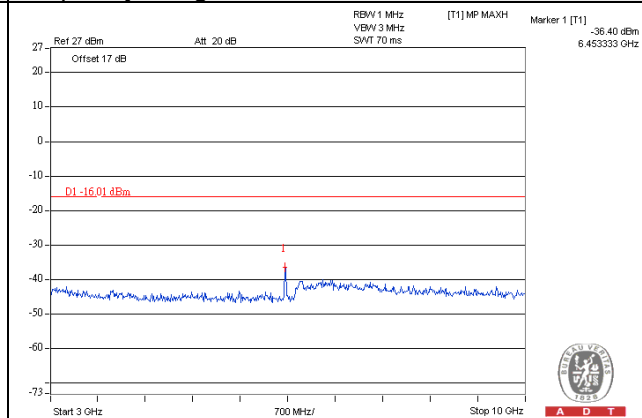
Channel Bandwidth: 5MHz

Channel 2375

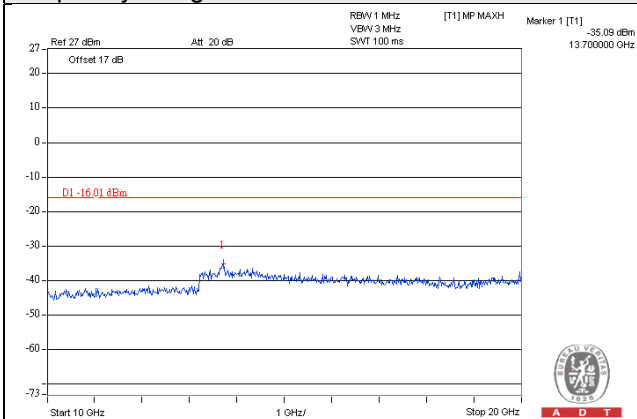
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



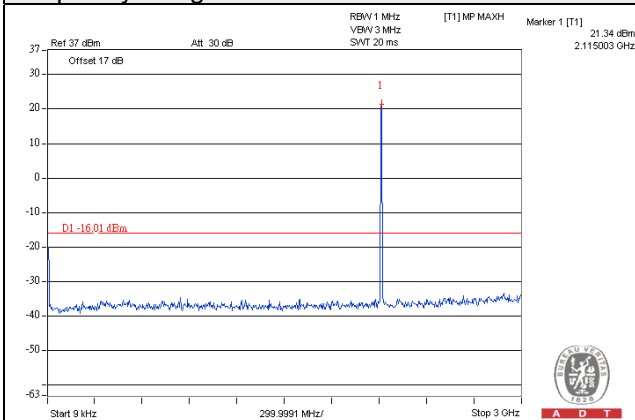
Frequency Range : 10GHz~20GHz



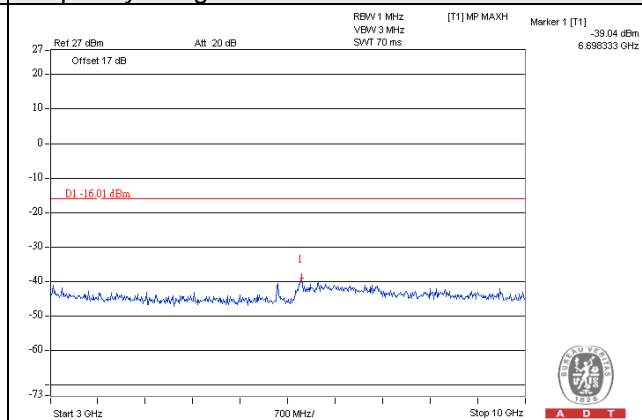
Channel Bandwidth: 10MHz

Channel 2000

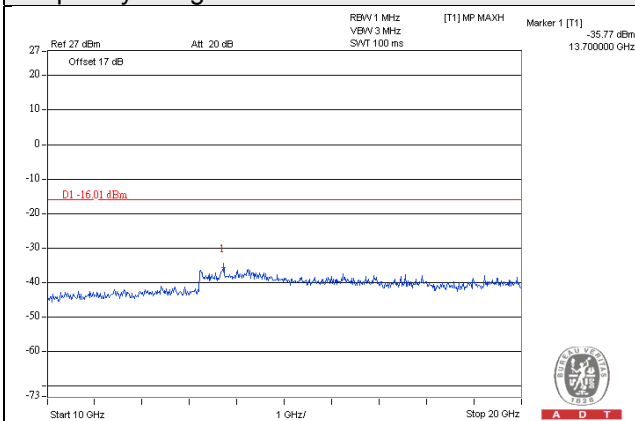
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



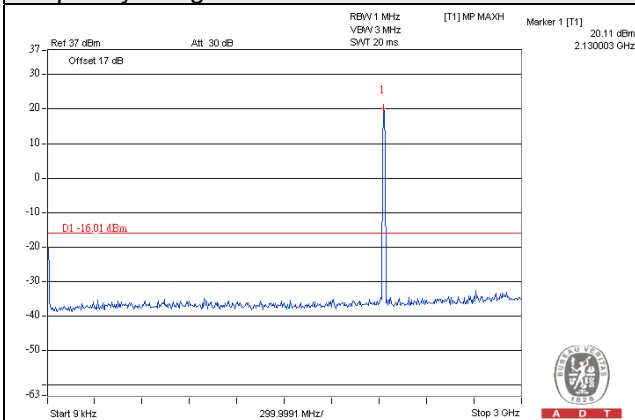
Frequency Range : 10GHz~20GHz



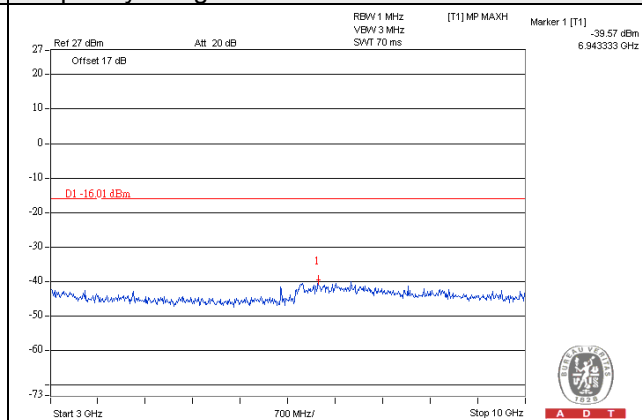
Channel Bandwidth: 10MHz

Channel 2175

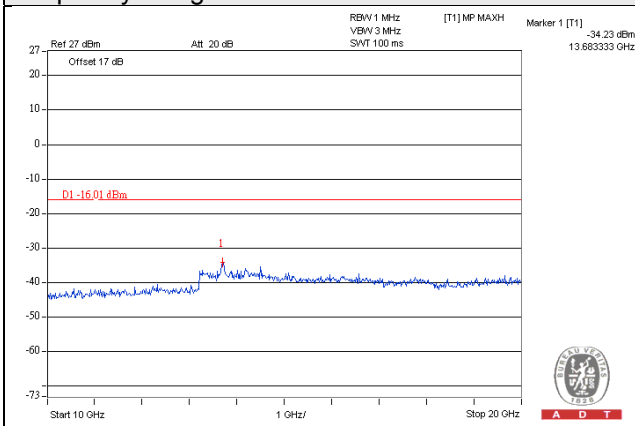
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



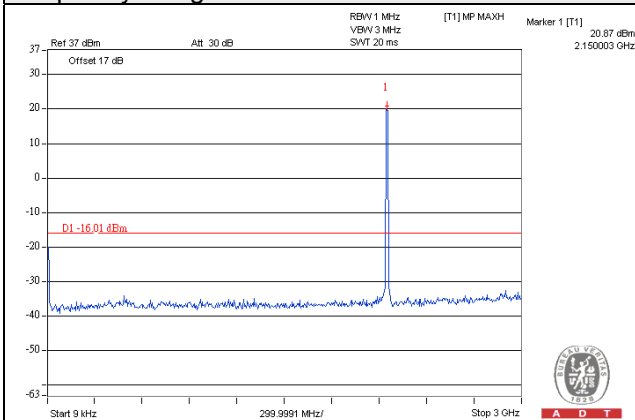
Frequency Range : 10GHz~20GHz



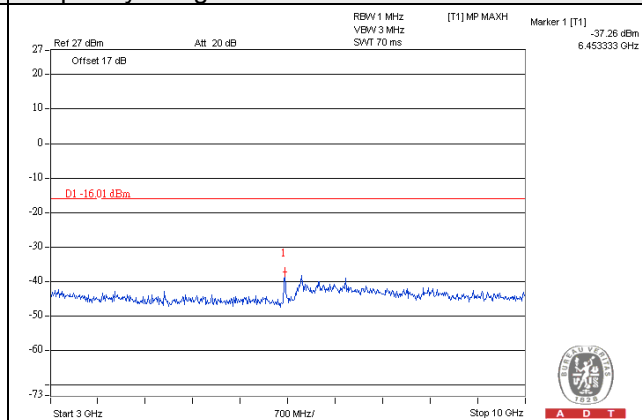
Channel Bandwidth: 10MHz

Channel 2350

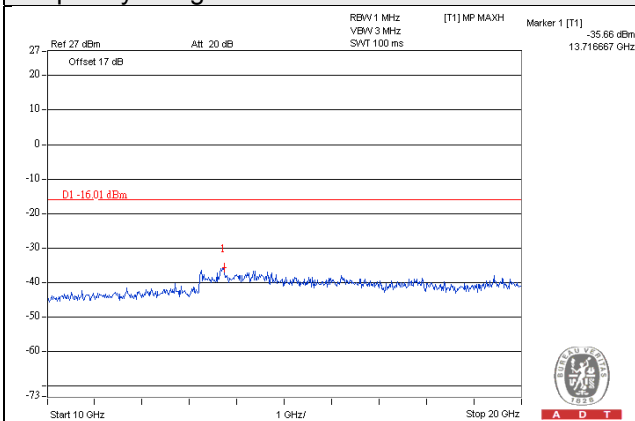
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



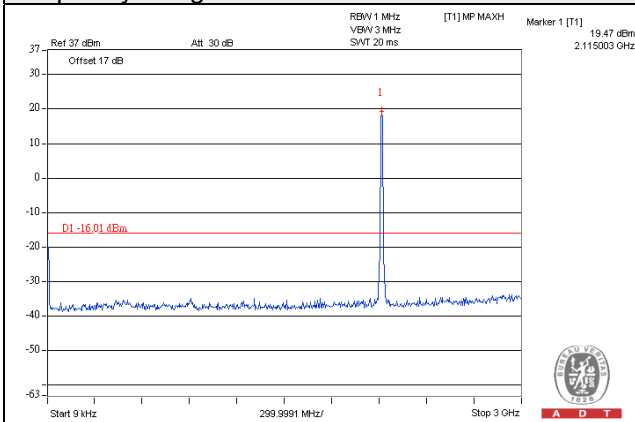
Frequency Range : 10GHz~20GHz



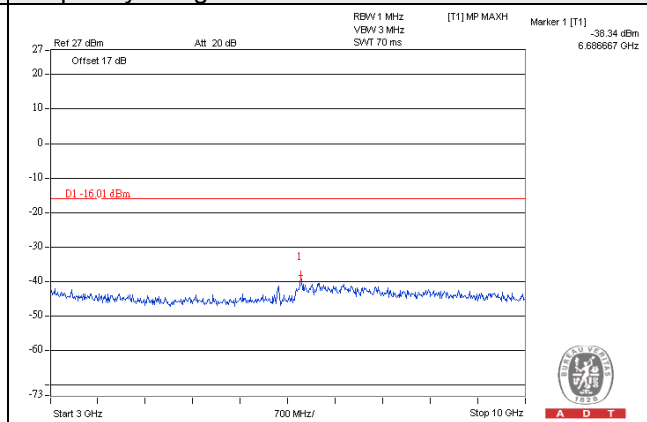
Channel Bandwidth: 15MHz

Channel 2025

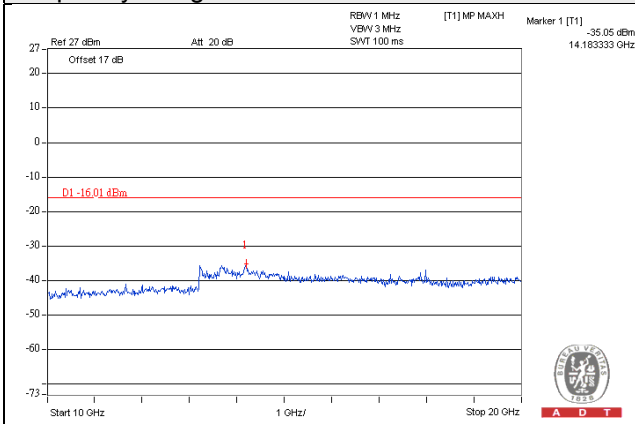
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



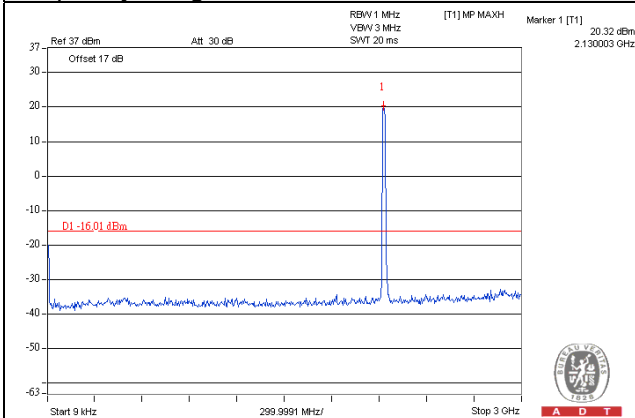
Frequency Range : 10GHz~20GHz



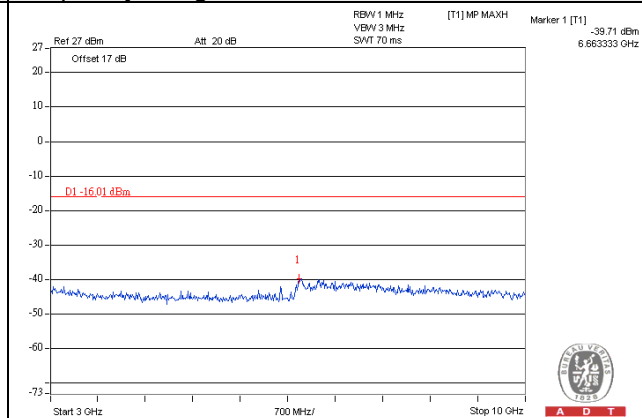
Channel Bandwidth: 15MHz

Channel 2175

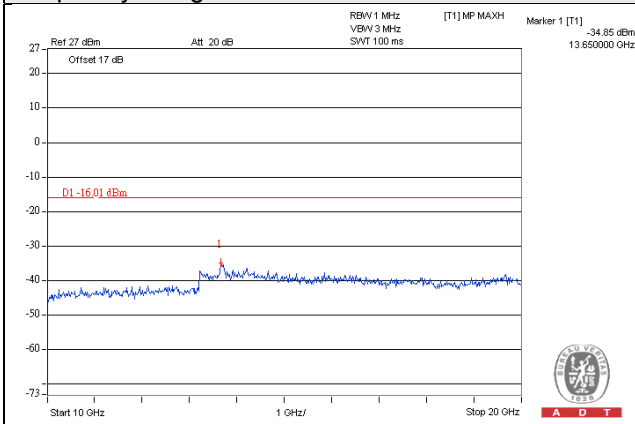
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



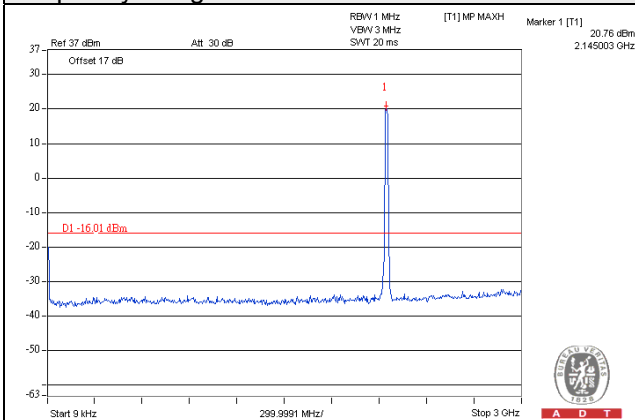
Frequency Range : 10GHz~20GHz



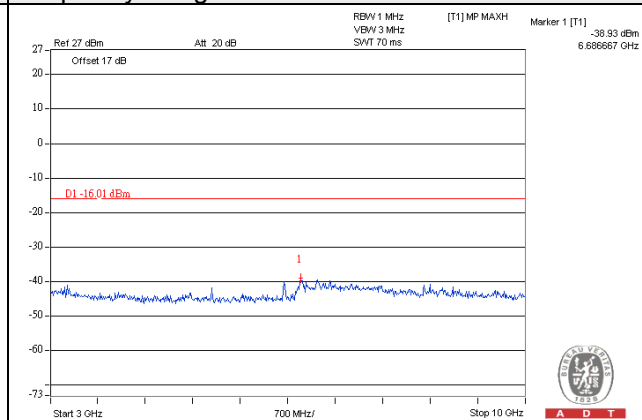
Channel Bandwidth: 15MHz

Channel 2325

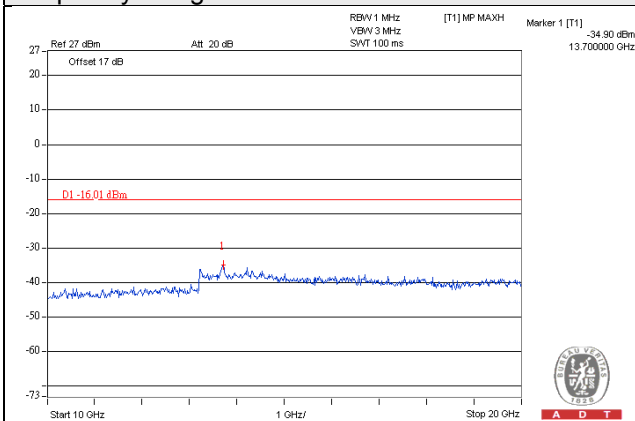
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



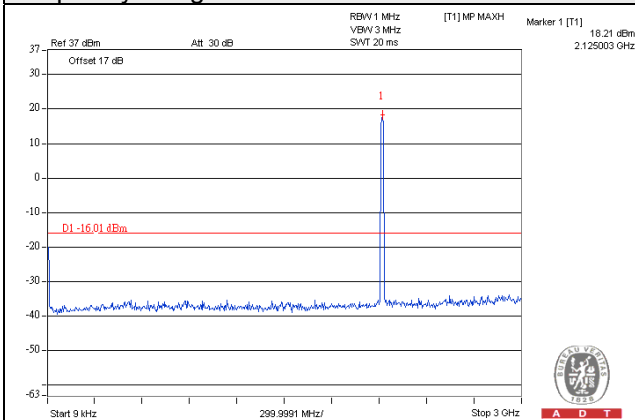
Frequency Range : 10GHz~20GHz



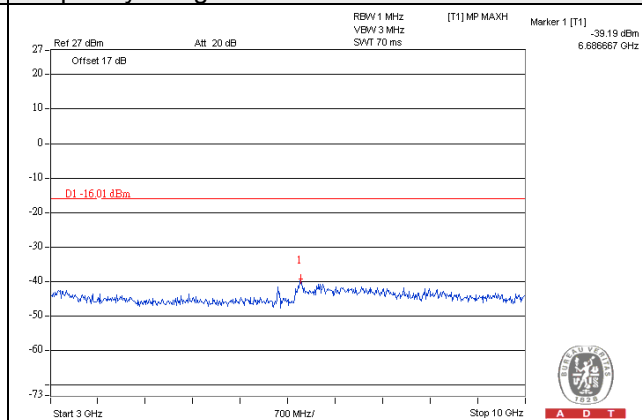
Channel Bandwidth: 20MHz

Channel 2050

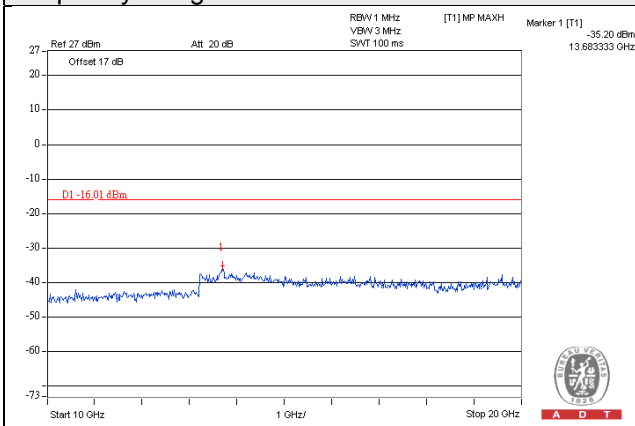
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



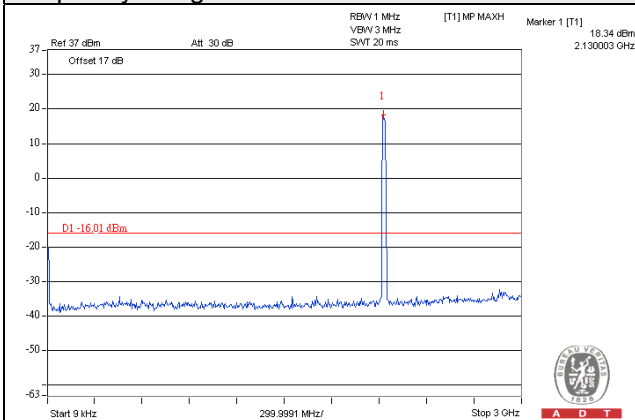
Frequency Range : 10GHz~20GHz



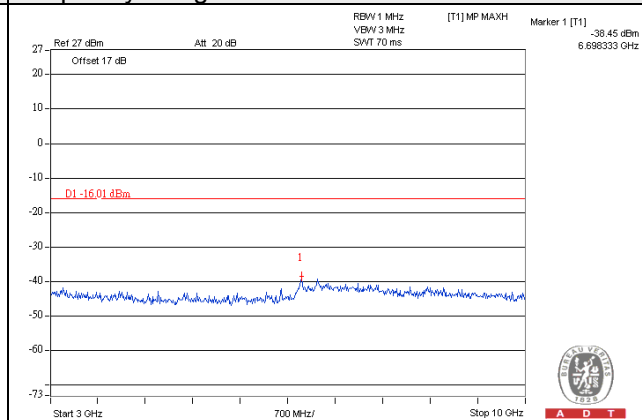
Channel Bandwidth: 20MHz

Channel 2175

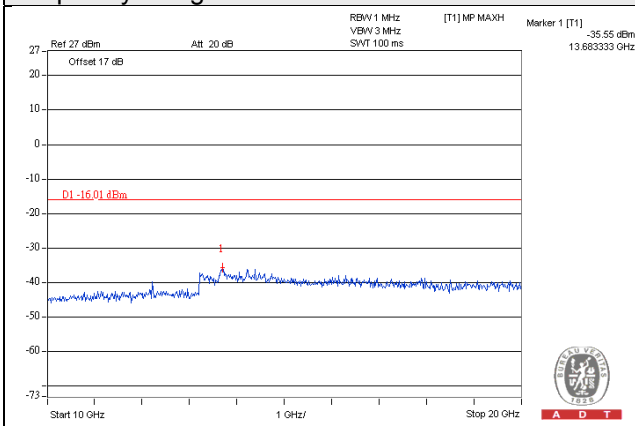
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



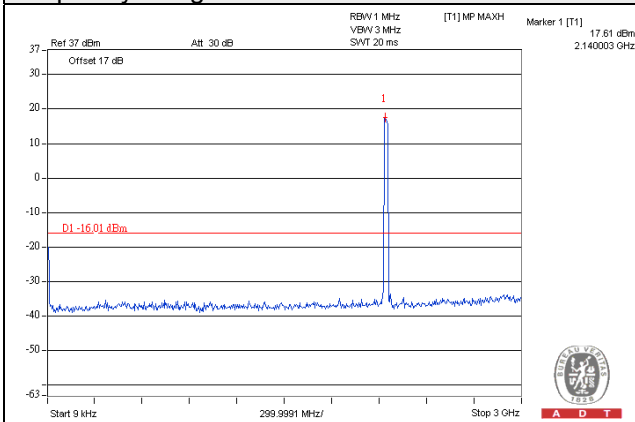
Frequency Range : 10GHz~20GHz



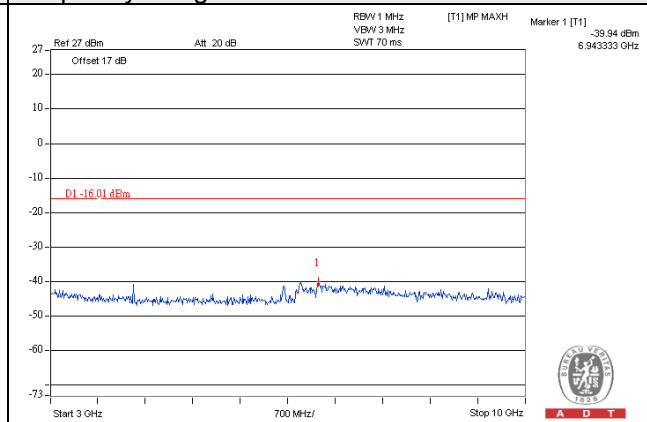
Channel Bandwidth: 20MHz

Channel 2300

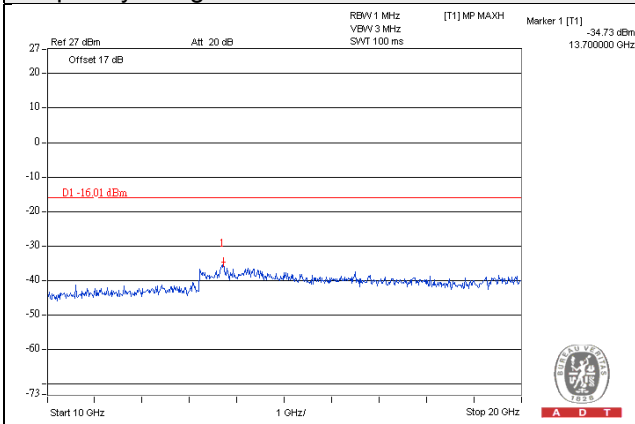
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



Frequency Range : 10GHz~20GHz

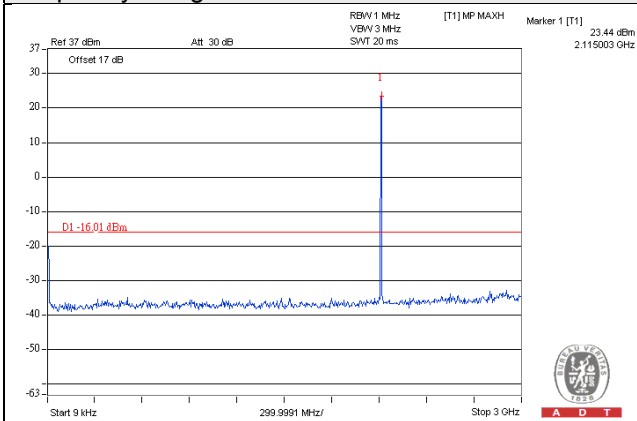


LTE Band 4 / Chain 1

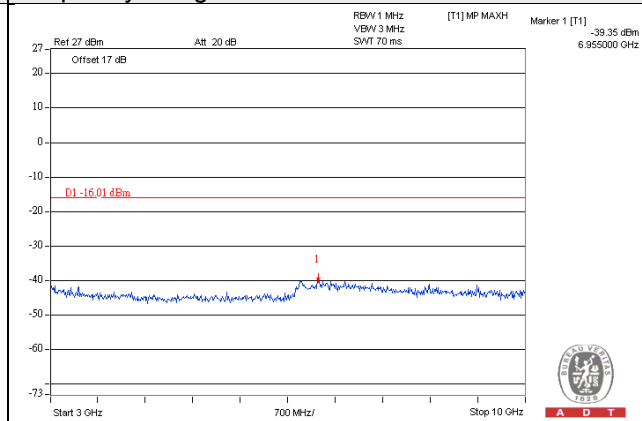
Channel Bandwidth: 5MHz

Channel 1975

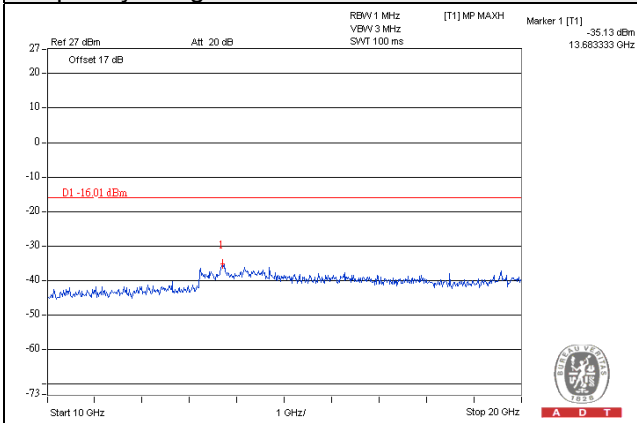
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



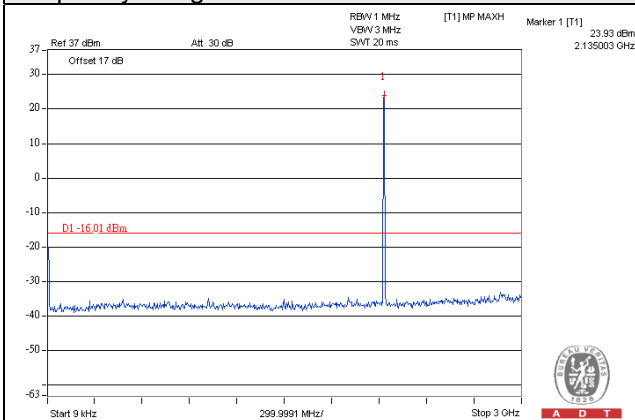
Frequency Range : 10GHz~20GHz



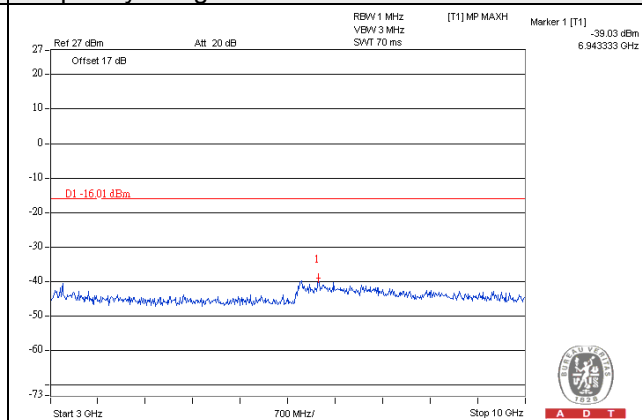
Channel Bandwidth: 5MHz

Channel 2175

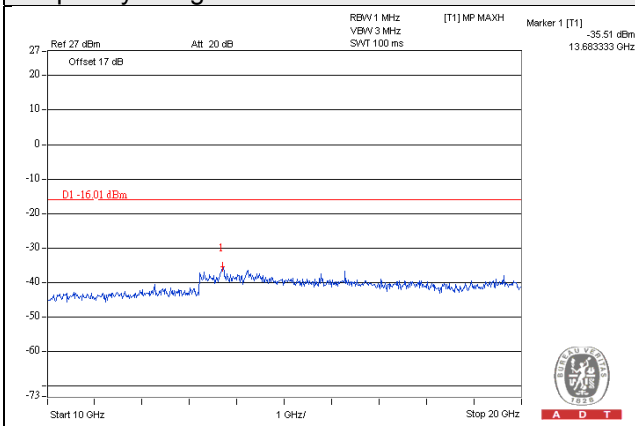
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



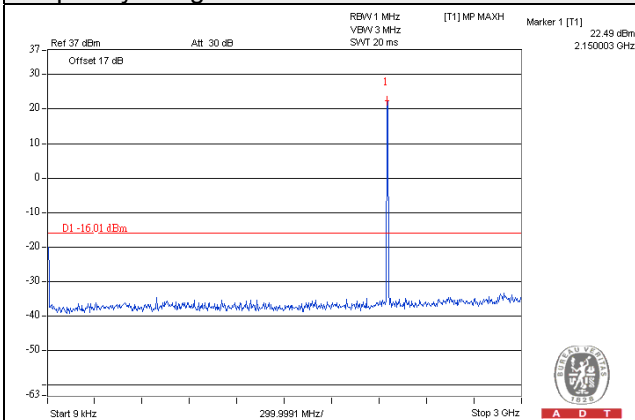
Frequency Range : 10GHz~20GHz



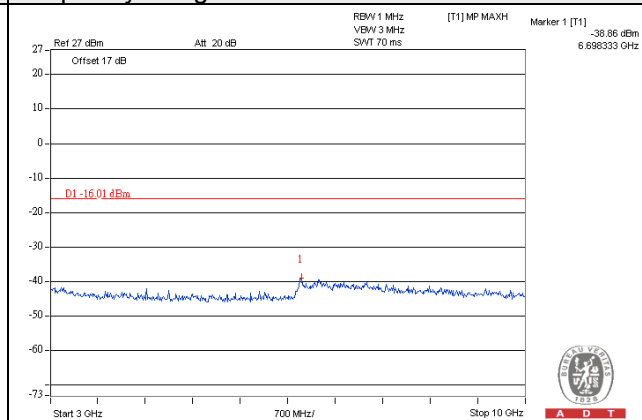
Channel Bandwidth: 5MHz

Channel 2375

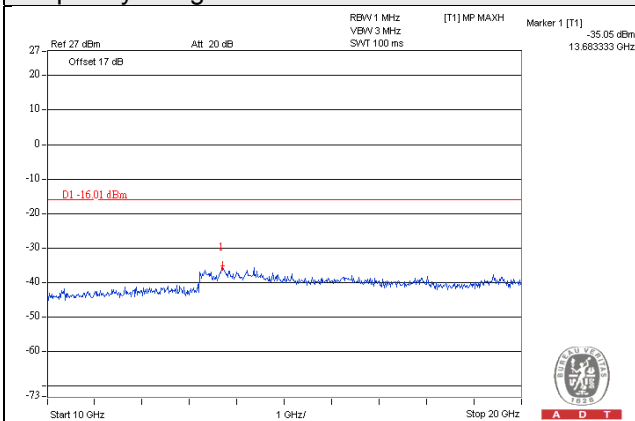
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



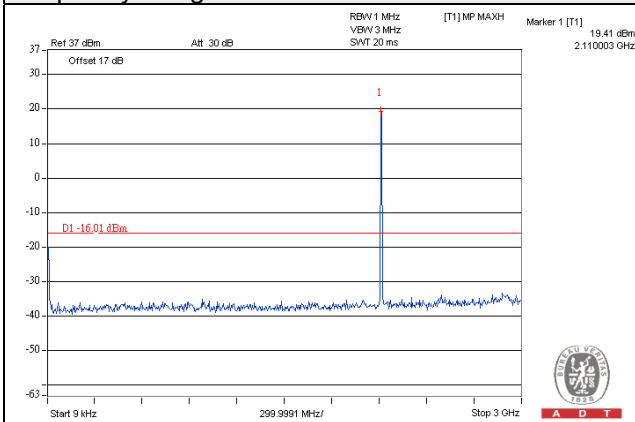
Frequency Range : 10GHz~20GHz



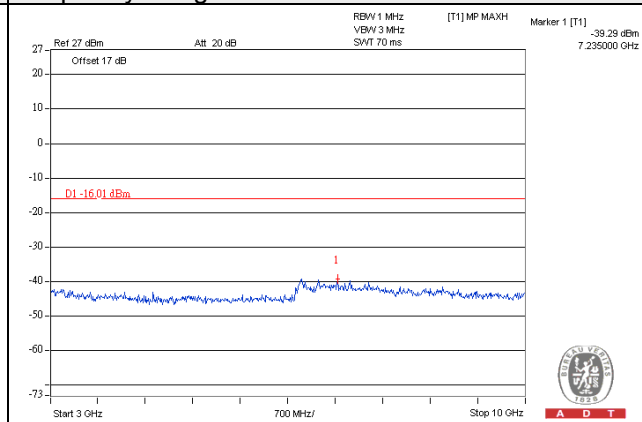
Channel Bandwidth: 10MHz

Channel 2000

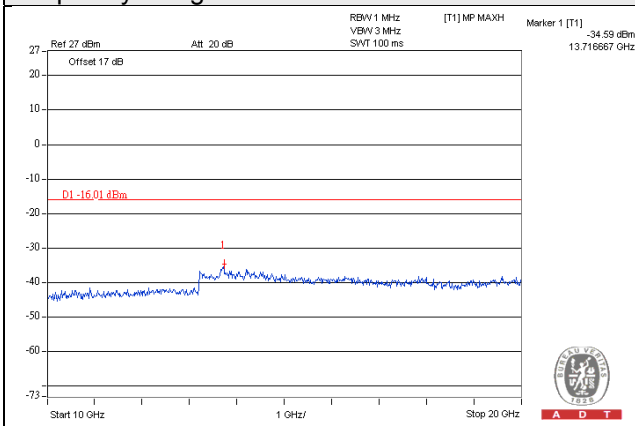
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



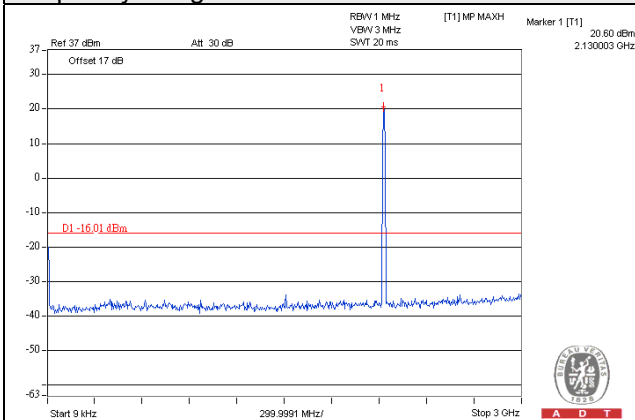
Frequency Range : 10GHz~20GHz



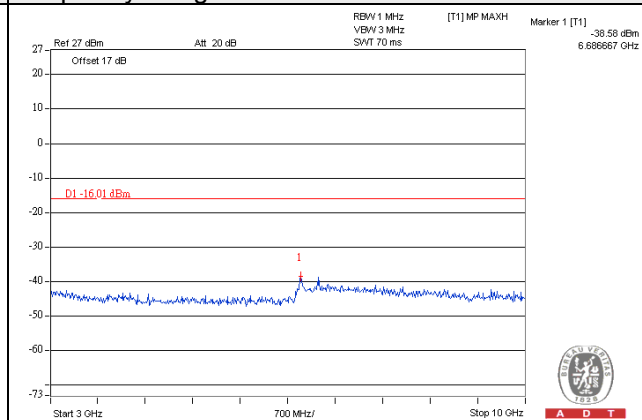
Channel Bandwidth: 10MHz

Channel 2175

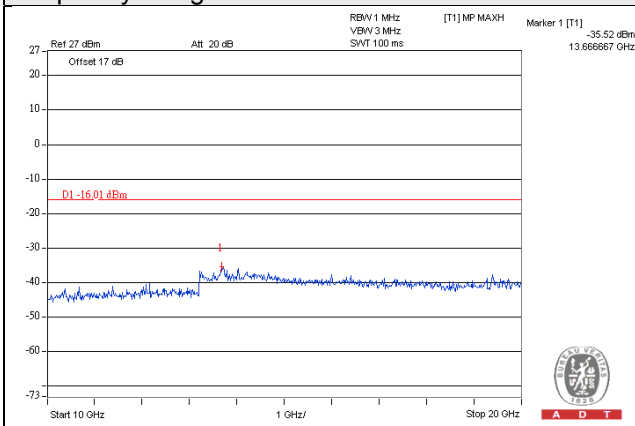
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



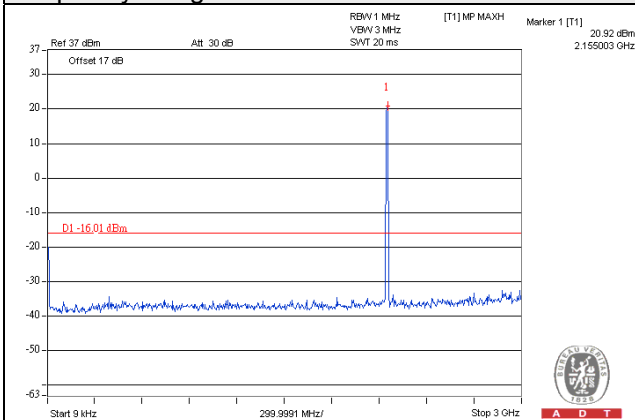
Frequency Range : 10GHz~20GHz



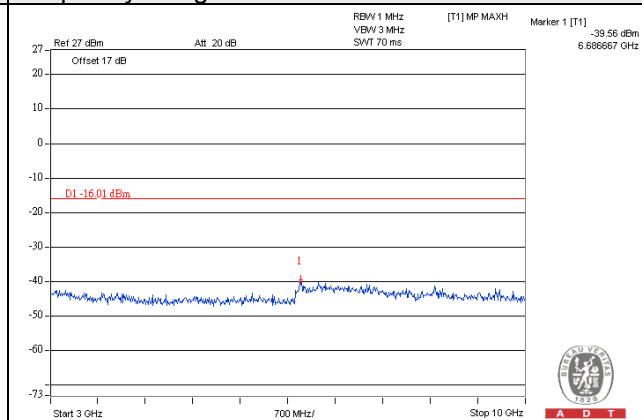
Channel Bandwidth: 10MHz

Channel 2350

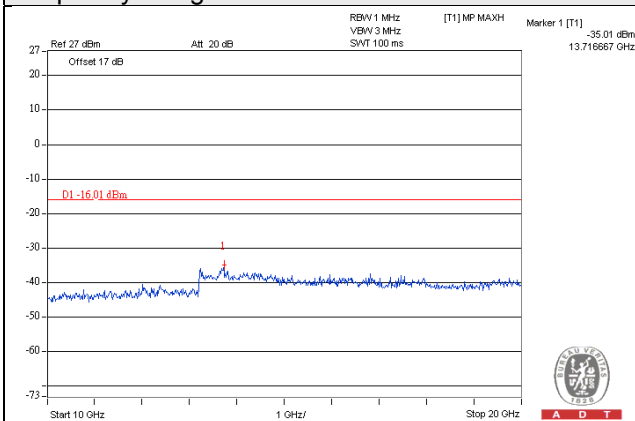
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



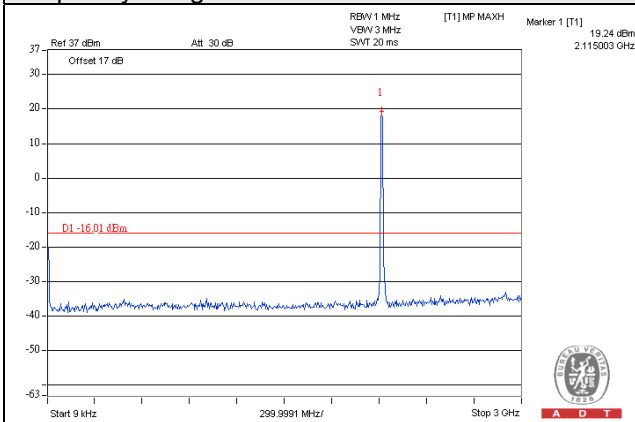
Frequency Range : 10GHz~20GHz



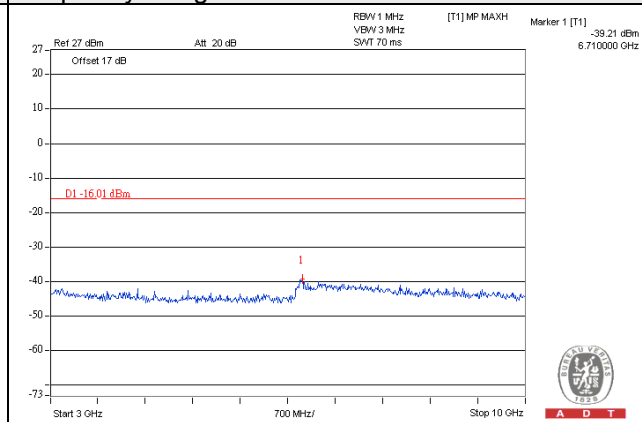
Channel Bandwidth: 15MHz

Channel 2025

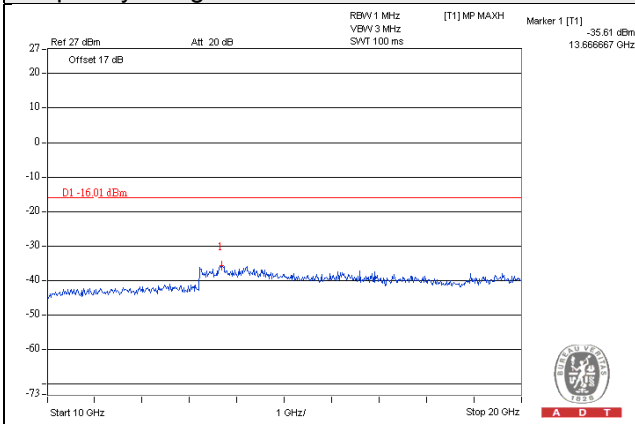
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



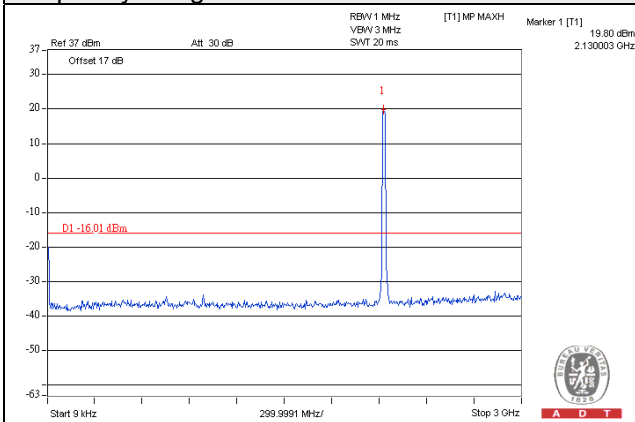
Frequency Range : 10GHz~20GHz



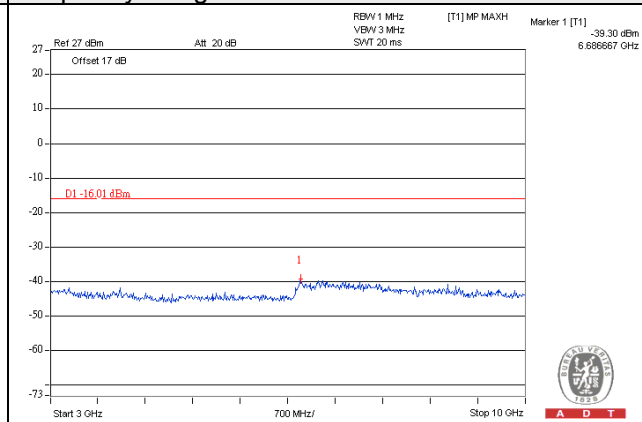
Channel Bandwidth: 15MHz

Channel 2175

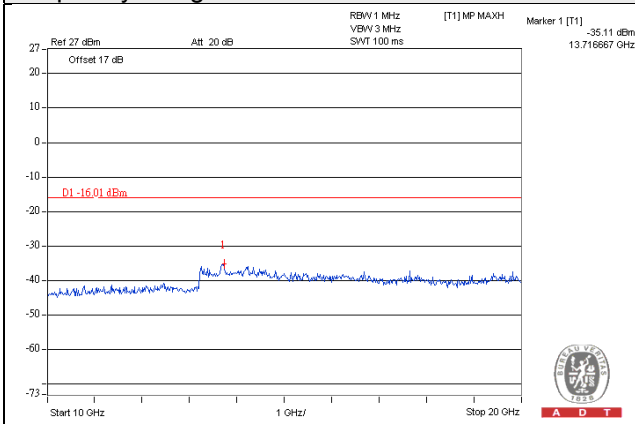
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



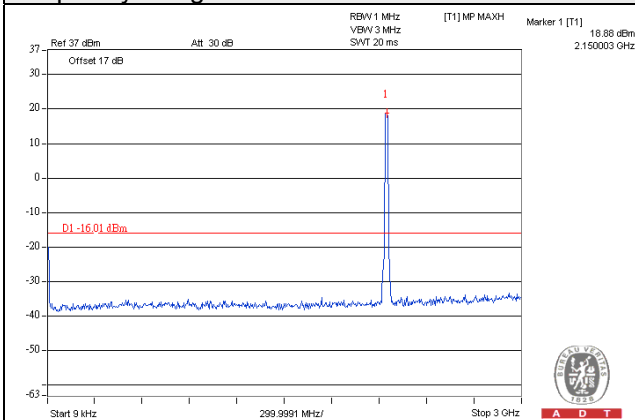
Frequency Range : 10GHz~20GHz



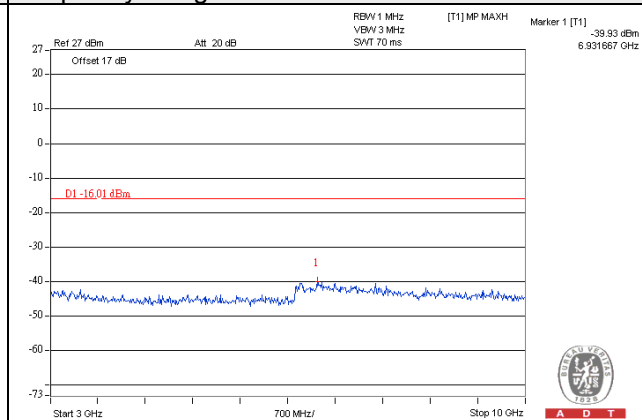
Channel Bandwidth: 15MHz

Channel 2325

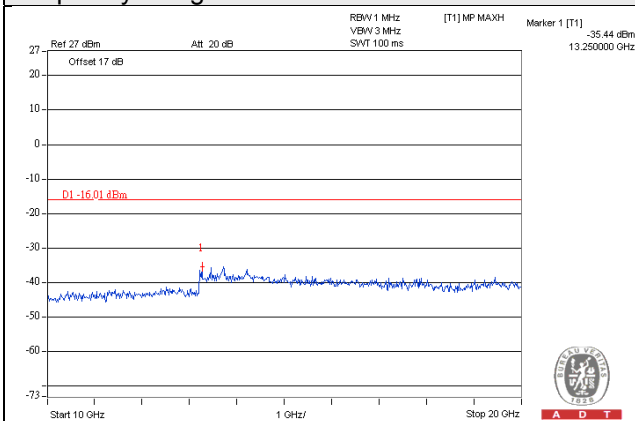
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



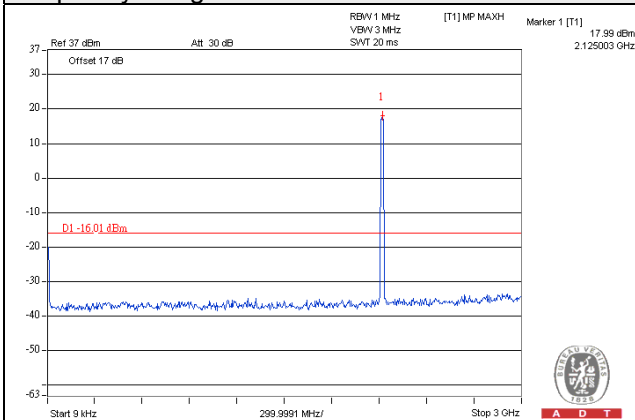
Frequency Range : 10GHz~20GHz



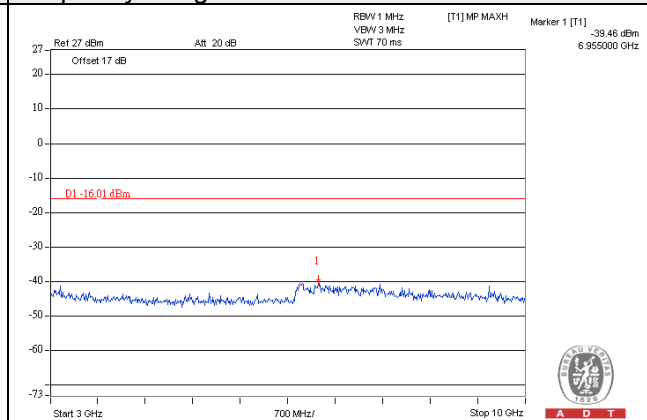
Channel Bandwidth: 20MHz

Channel 2050

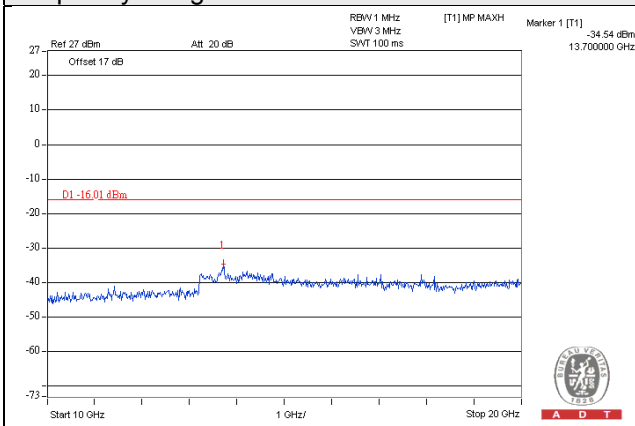
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



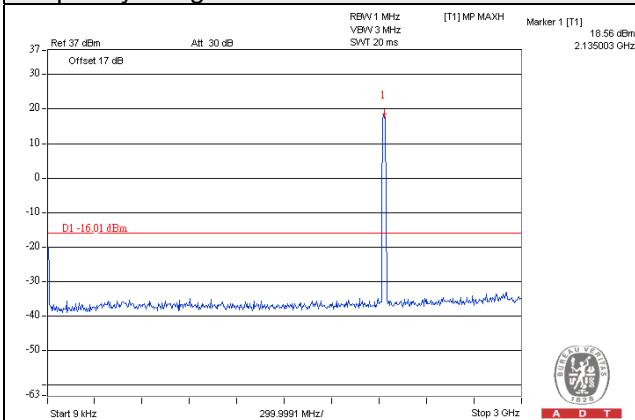
Frequency Range : 10GHz~20GHz



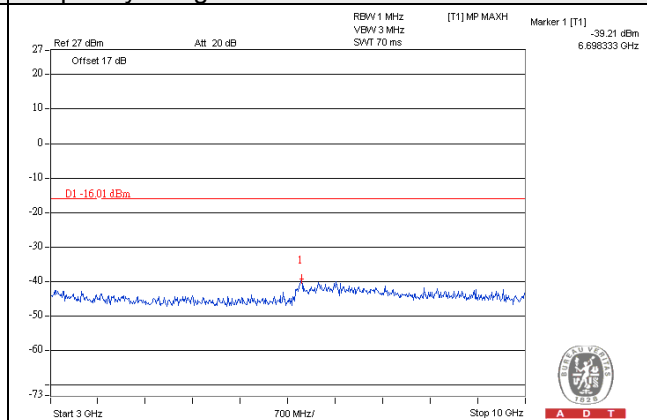
Channel Bandwidth: 20MHz

Channel 2175

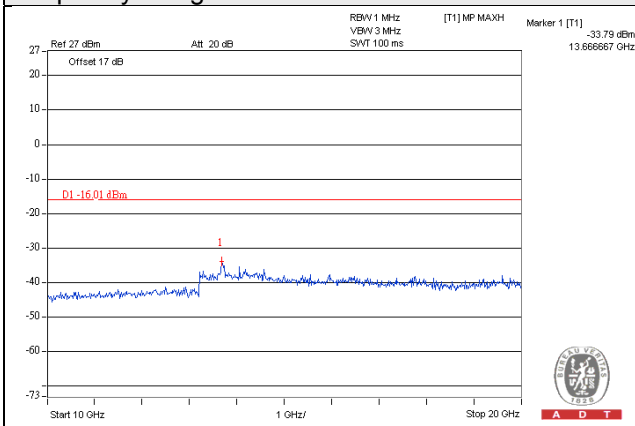
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



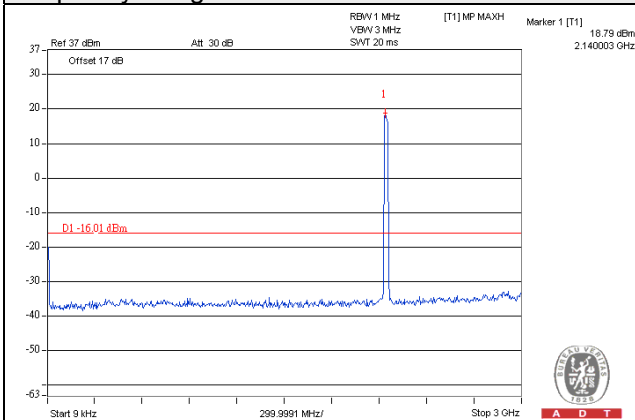
Frequency Range : 10GHz~20GHz



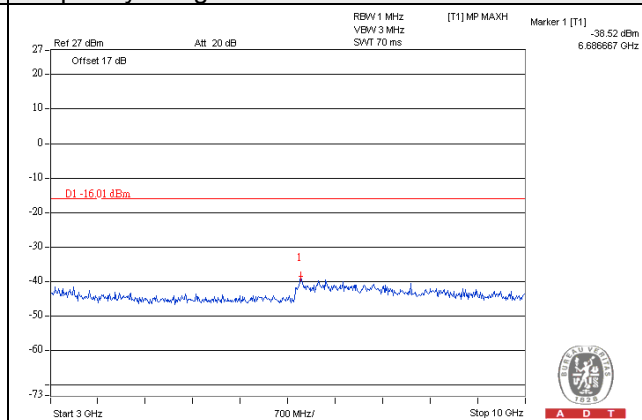
Channel Bandwidth: 20MHz

Channel 2300

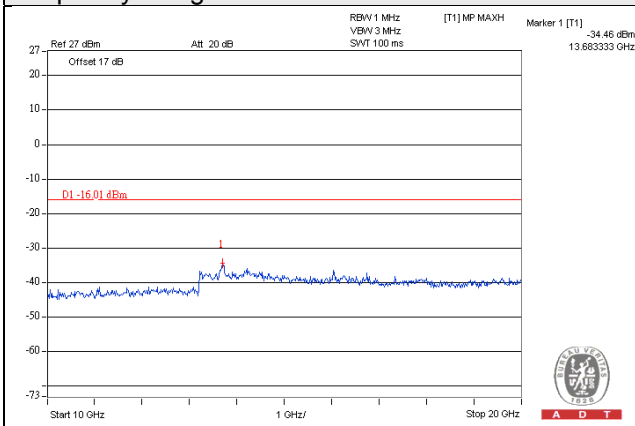
Frequency Range : 9kHz~3GHz



Frequency Range : 3GHz~10GHz



Frequency Range : 10GHz~20GHz



4.7 Radiated Emission Measurement

4.7.1 Limits of Radiated Emission Measurement

In the FCC 27.53(h), On any frequency outside a licensee's frequency block, The power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB, the emission limit equal to -13dBm .

4.7.2 Test Procedure

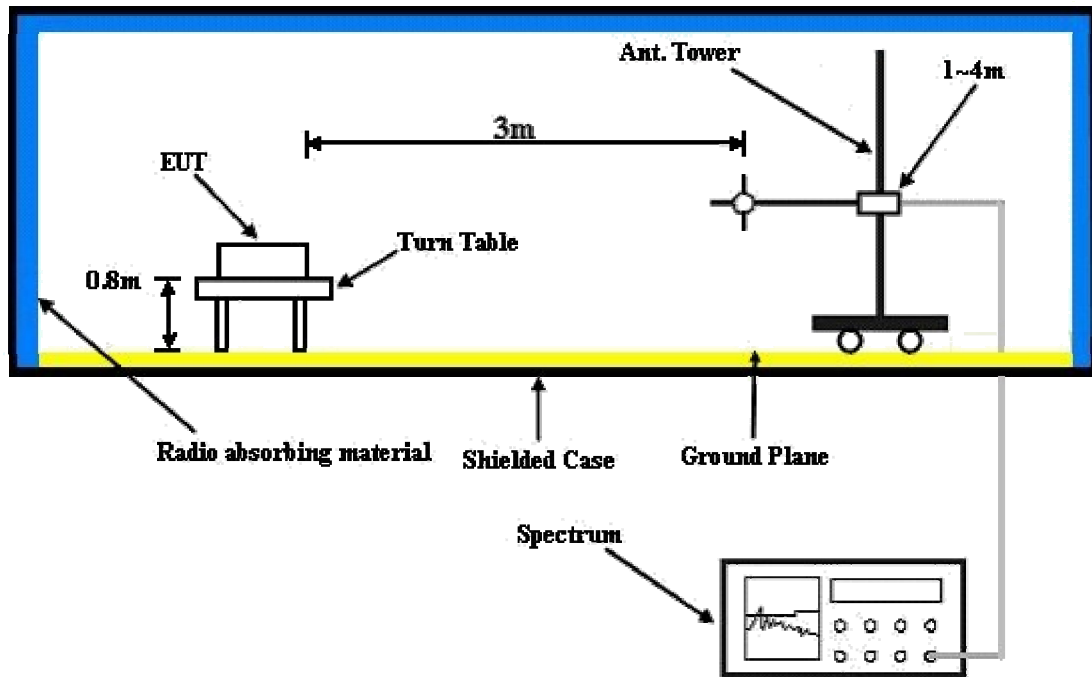
- a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high channel of operational frequency range.)
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G
- d. $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution antenna}$.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.7.3 Deviation from Test Standard

No deviation.

4.7.4 Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.7.5 Test Results

Below 1GHz

LTE Band 4

Channel Bandwidth: 5MHz

Mode	TX channel 1975	Frequency Range	Below 1000 MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-36.6	-13.2	-19.4	-32.6	-13.0	-19.6
2	92.08	-45.1	-53.1	-0.6	-53.7	-13.0	-40.7
3	154.16	-46.1	-47.5	-2.9	-50.4	-13.0	-37.4
4	202.66	-45.7	-51.6	-2.1	-53.7	-13.0	-40.7
5	272.50	-58.0	-60.8	-1.5	-62.3	-13.0	-49.3
6	802.12	-63.2	-61.5	4.0	-57.5	-13.0	-44.5
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-40.1	-30.6	-19.4	-50.0	-13.0	-37.0
2	59.10	-41.6	-44.6	-3.8	-48.4	-13.0	-35.4
3	154.16	-44.9	-44.3	-2.9	-47.2	-13.0	-34.2
4	198.78	-52.6	-51.2	-2.4	-53.6	-13.0	-40.6
5	272.50	-60.7	-56.8	-1.5	-58.3	-13.0	-45.3
6	815.70	-63.4	-60.3	3.9	-56.4	-13.0	-43.4

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Channel Bandwidth: 10MHz

Mode	TX channel 2000	Frequency Range	Below 1000 MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-42.4	-19.0	-19.4	-38.4	-13.0	-25.4
2	90.14	-46.6	-54.4	-0.2	-54.6	-13.0	-41.6
3	154.16	-46.2	-47.6	-2.9	-50.5	-13.0	-37.5
4	202.66	-45.5	-51.4	-2.1	-53.5	-13.0	-40.5
5	272.50	-58.8	-61.6	-1.5	-63.1	-13.0	-50.1
6	811.82	-63.6	-61.6	3.9	-57.7	-13.0	-44.7

Antenna Polarity & Test Distance: Vertical at 3 M

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-37.9	-30.1	-18.3	-48.4	-13.0	-35.4
2	59.10	-41.9	-44.9	-3.8	-48.7	-13.0	-35.7
3	154.16	-44.7	-44.1	-2.9	-47.0	-13.0	-34.0
4	196.84	-52.6	-51.0	-2.5	-53.5	-13.0	-40.5
5	272.50	-60.4	-56.5	-1.5	-58.0	-13.0	-45.0
6	817.64	-63.5	-60.3	3.9	-56.4	-13.0	-43.4

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Channel Bandwidth: 15MHz

Mode	TX channel 2025	Frequency Range	Below 1000 MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-42.0	-18.6	-19.4	-38.0	-13.0	-25.0
2	95.96	-45.4	-53.3	-1.2	-54.5	-13.0	-41.5
3	154.16	-46.4	-47.8	-2.9	-50.7	-13.0	-37.7
4	204.60	-45.4	-51.4	-2.0	-53.4	-13.0	-40.4
5	297.72	-59.5	-60.5	-1.7	-62.2	-13.0	-49.2
6	823.46	-64.8	-62.0	3.9	-58.1	-13.0	-45.1

Antenna Polarity & Test Distance: Vertical at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-40.5	-31.0	-19.4	-50.4	-13.0	-37.4
2	59.10	-41.9	-44.9	-3.8	-48.7	-13.0	-35.7
3	154.16	-45.7	-45.1	-2.9	-48.0	-13.0	-35.0
4	196.84	-52.5	-50.9	-2.5	-53.4	-13.0	-40.4
5	276.38	-61.7	-56.8	-1.6	-58.4	-13.0	-45.4
6	815.70	-63.0	-59.9	3.9	-56.0	-13.0	-43.0

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Channel Bandwidth: 20MHz

Mode	TX channel 2050	Frequency Range	Below 1000 MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	33.88	-46.0	-26.0	-17.1	-43.1	-13.0	-30.1
2	94.02	-46.3	-54.3	-0.7	-55.0	-13.0	-42.0
3	154.16	-45.3	-46.7	-2.9	-49.6	-13.0	-36.6
4	227.88	-42.3	-48.5	-1.7	-50.2	-13.0	-37.2
5	291.90	-59.4	-61.0	-2.1	-63.1	-13.0	-50.1
6	802.12	-63.7	-62.0	4.0	-58.0	-13.0	-45.0

Antenna Polarity & Test Distance: Vertical at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	33.88	-37.2	-30.7	-17.1	-47.8	-13.0	-34.8
2	59.10	-41.9	-44.9	-3.8	-48.7	-13.0	-35.7
3	154.16	-44.4	-43.8	-2.9	-46.7	-13.0	-33.7
4	196.84	-51.4	-49.8	-2.5	-52.3	-13.0	-39.3
5	272.50	-60.9	-57.0	-1.5	-58.5	-13.0	-45.5
6	819.58	-63.6	-60.3	3.9	-56.4	-13.0	-43.4

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Above 1GHz

Channel Bandwidth: 5MHz

Mode	TX channel 1975	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4225.00	-57.2	-48.6	1.0	-47.6	-13.0	-34.6
2	6337.50	-49.8	-33.9	0.6	-33.3	-13.0	-20.3
3	8450.00	-59.0	-39.8	1.1	-38.7	-13.0	-25.7
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4225.00	-56.4	-46.7	1.0	-45.7	-13.0	-32.7
2	6337.50	-44.6	-29.4	0.6	-28.8	-13.0	-15.8
3	8450.00	-59.1	-40.6	1.1	-39.5	-13.0	-26.5

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 2175	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4265.00	-60.6	-51.8	1.1	-50.7	-13.0	-37.7
2	6397.50	-49.6	-33.7	0.6	-33.1	-13.0	-20.1
3	8530.00	-63.7	-44.2	1.1	-43.1	-13.0	-30.1
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4265.00	-58.2	-48.7	1.1	-47.6	-13.0	-34.6
2	6397.50	-47.6	-32.0	0.6	-31.4	-13.0	-18.4
3	8530.00	-61.5	-42.7	1.1	-41.6	-13.0	-28.6

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 2375	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4305.00	-58.7	-49.5	1.0	-48.5	-13.0	-35.5
2	6457.50	-44.9	-28.9	0.5	-28.4	-13.0	-15.4
3	8610.00	-59.0	-39.2	1.2	-38.0	-13.0	-25.0

Antenna Polarity & Test Distance: Vertical at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4305.00	-56.0	-46.5	1.0	-45.5	-13.0	-32.5
2	6457.50	-42.7	-27.1	0.5	-26.6	-13.0	-13.6
3	8610.00	-56.8	-37.6	1.2	-36.4	-13.0	-23.4

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Channel Bandwidth: 10MHz

Mode	TX channel 2000	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4230.00	-49.6	-40.9	1.0	-39.9	-13.0	-26.9
2	6345.00	-47.9	-32.0	0.6	-31.4	-13.0	-18.4
3	8460.00	-61.8	-42.5	1.1	-41.4	-13.0	-28.4
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4230.00	-56.9	-47.2	1.0	-46.2	-13.0	-33.2
2	6345.00	-45.3	-30.1	0.6	-29.5	-13.0	-16.5
3	8460.00	-60.1	-41.6	1.1	-40.5	-13.0	-27.5

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 2175	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4265.00	-60.2	-51.4	1.1	-50.3	-13.0	-37.3
2	6397.50	-50.4	-34.5	0.6	-33.9	-13.0	-20.9
3	8530.00	-63.3	-43.8	1.1	-42.7	-13.0	-29.7
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4265.00	-58.4	-48.9	1.1	-47.8	-13.0	-34.8
2	6397.50	-48.8	-33.2	0.6	-32.6	-13.0	-19.6
3	8530.00	-61.1	-42.3	1.1	-41.2	-13.0	-28.2

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 2350	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4300.00	-60.7	-51.5	1.0	-50.5	-13.0	-37.5
2	6450.00	-50.8	-34.8	0.5	-34.3	-13.0	-21.3
3	8600.00	-62.7	-42.9	1.2	-41.7	-13.0	-28.7

Antenna Polarity & Test Distance: Vertical at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4300.00	-58.2	-48.7	1.0	-47.7	-13.0	-34.7
2	6450.00	-48.6	-33.0	0.5	-32.5	-13.0	-19.5
3	8600.00	-60.9	-41.7	1.2	-40.5	-13.0	-27.5

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Channel Bandwidth: 15MHz

Mode	TX channel 2025	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4235.00	-57.0	-48.3	1.0	-47.3	-13.0	-34.3
2	6352.50	-47.9	-32.0	0.6	-31.4	-13.0	-18.4
3	8470.00	-56.2	-36.9	1.1	-35.8	-13.0	-22.8
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4235.00	-57.2	-47.5	1.0	-46.5	-13.0	-33.5
2	6352.50	-45.0	-29.7	0.6	-29.1	-13.0	-16.1
3	8470.00	-56.4	-37.8	1.1	-36.7	-13.0	-23.7

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 2175	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4265.00	-56.6	-47.8	1.1	-46.7	-13.0	-33.7
2	6397.50	-48.4	-32.5	0.6	-31.9	-13.0	-18.9
3	8530.00	-56.8	-37.3	1.1	-36.2	-13.0	-23.2
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4265.00	-56.5	-47.0	1.1	-45.9	-13.0	-32.9
2	6397.50	-45.1	-29.5	0.6	-28.9	-13.0	-15.9
3	8530.00	-58.9	-40.1	1.1	-39.0	-13.0	-26.0

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 2325	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4295.00	-56.3	-47.3	1.1	-46.2	-13.0	-33.2
2	6442.50	-46.6	-30.6	0.5	-30.1	-13.0	-17.1
3	8590.00	-56.2	-36.4	1.2	-35.2	-13.0	-22.2

Antenna Polarity & Test Distance: Vertical at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4295.00	-56.9	-47.5	1.1	-46.4	-13.0	-33.4
2	6442.50	-43.3	-27.7	0.5	-27.2	-13.0	-14.2
3	8590.00	-56.8	-37.6	1.2	-36.4	-13.0	-23.4

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Channel Bandwidth: 20MHz

Mode	TX channel 2050	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4240.00	-56.9	-48.2	1.0	-47.2	-13.0	-34.2
2	6360.00	-48.3	-32.4	0.6	-31.8	-13.0	-18.8
3	8480.00	-58.3	-39.0	1.1	-37.9	-13.0	-24.9
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4240.00	-57.4	-47.8	1.0	-46.8	-13.0	-33.8
2	6360.00	-46.1	-30.8	0.6	-30.2	-13.0	-17.2
3	8480.00	-57.6	-39.0	1.1	-37.9	-13.0	-24.9

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 2175	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4265.00	-56.2	-47.4	1.1	-46.3	-13.0	-33.3
2	6397.50	-47.8	-31.9	0.6	-31.3	-13.0	-18.3
3	8530.00	-58.1	-38.6	1.1	-37.5	-13.0	-24.5
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4265.00	-57.0	-47.5	1.1	-46.4	-13.0	-33.4
2	6397.50	-45.0	-29.4	0.6	-28.8	-13.0	-15.8
3	8530.00	-57.2	-38.4	1.1	-37.3	-13.0	-24.3

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 2300	Frequency Range	Above 1000MHz
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Antenna Polarity & Test Distance: Horizontal at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4290.00	-59.6	-50.6	1.1	-49.5	-13.0	-36.5
2	6435.00	-46.1	-30.1	0.5	-29.6	-13.0	-16.6
3	8580.00	-56.3	-36.6	1.2	-35.4	-13.0	-22.4

Antenna Polarity & Test Distance: Vertical at 3 M							
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No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4290.00	-56.5	-47.1	1.1	-46.0	-13.0	-33.0
2	6435.00	-43.5	-27.9	0.5	-27.4	-13.0	-14.4
3	8580.00	-56.5	-37.4	1.2	-36.2	-13.0	-23.2

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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The address and road map of all our labs can be found in our web site also.

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