

FCC Test Report

(PART 24)

Report No.: RF150901C09-3

FCC ID: HFS-FT7

Test Model: FT7

Received Date: Sep. 01, 2015

Test Date: Sep. 07, 2015 ~ Sep. 08, 2015

Issued Date: Sep. 21, 2015

Applicant: Quanta Computer Inc.

Address: No. 188, Wen Hwa 2nd Rd., Guishan Dist., Tao Yuan City 33377, Taiwan

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
(R.O.C)

Test Location (1): No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan
Hsien 333, Taiwan, R.O.C.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty	5
2.2 Test Site And Instruments	6
3 General Information	7
3.1 General Description of EUT	7
3.2 Configuration Of System Under Test	9
3.2.1 Description of Support Units	9
3.3 Test Mode Applicability and Tested Channel Detail	10
3.4 EUT Operating Conditions	12
3.5 General Description of Applied Standards	12
4 Test Types and Results	13
4.1 Output Power Measurement	13
4.1.1 Limits of Output Power Measurement	13
4.1.2 Test Procedures	13
4.1.3 Test Setup	14
4.1.4 Test Results	15
4.2 Frequency Stability Measurement	23
4.2.1 Limits of Frequency Stability Measurement	23
4.2.2 Test Procedure	23
4.2.3 Test Setup	23
4.2.4 Test Results	24
4.3 Occupied Bandwidth Measurement	25
4.3.1 Test Procedure	25
4.3.2 Test Setup	25
4.3.3 Test Result	26
4.4 Band Edge Measurement	29
4.4.1 Limits of Band Edge Measurement	29
4.4.2 Test Setup	29
4.4.3 Test Procedures	29
4.4.4 Test Results	30
4.5 Peak To Average Ratio	36
4.5.1 Limits of Peak to Average Ratio Measurement	36
4.5.2 Test Setup	36
4.5.3 Test Procedures	36
4.5.4 Test Results	37
4.6 Conducted Spurious Emissions	40
4.6.1 Limits of Conducted Spurious Emissions Measurement	40
4.6.2 Test Setup	40
4.6.3 Test Procedure	40
4.6.4 Test Results	41
4.7 Radiated Emission Measurement	42
4.7.1 Limits of Radiated Emission Measurement	42
4.7.2 Test Procedure	42
4.7.3 Deviation from Test Standard	42
4.7.4 Test Setup	42
4.7.5 Test Results	43
5 Pictures of Test Arrangements	45
Appendix – Information on the Testing Laboratories	46



A D T

Release Control Record

Issue No.	Description	Date Issued
RF150901C09-3	Original Release	Sep. 21, 2015

1 Certificate of Conformity

Product: Tablet

Brand: C-Spire

Test Model: FT7

Sample Status: Identical Prototype

Applicant: Quanta Computer Inc.

Test Date: Sep. 07, 2015 ~ Sep. 08, 2015

Standards: FCC Part 24, Subpart E

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 : Vera Huang , **Date:** Sep. 21, 2015
Vera Huang / Specialist

Approved by : Kay Wu , **Date:** Sep. 21, 2015
Kay Wu / Supervisor

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Effective Isotropic Radiated Power	PASS	Meet the requirement of limit.
2.1046 24.232(d)	Peak To Average Ratio	PASS	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 24.238(b)	Occupied Bandwidth	PASS	Meet the requirement of limit.
24.238(b)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -26.23dB at 3765.00MHz.

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) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

2.2 Test Site And Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Jan. 21, 2015	Jan. 21, 2016
Spectrum Analyzer Agilent	N9010A	MY52220314	Sep. 03, 2015	Sep. 02, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 10, 2014	Dec. 09, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Feb. 04, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Feb. 09, 2015	Feb. 09, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Feb. 04, 2015	Feb. 04, 2016
Preamplifier EMCI	EMC 012645	980115	Dec. 12, 2014	Dec. 11, 2015
Preamplifier EMCI	EMC 184045	980116	Jan. 09, 2015	Jan. 08, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 27, 2014	Dec. 26, 2015
Power Meter Anritsu	ML2495A	1448002	Jan. 05, 2015	Jan. 04, 2016
Power Sensor Anritsu	MA2411B	1339230	Jan. 05, 2015	Jan. 04, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 18, 2014	Oct. 17, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 18, 2014	Oct. 17, 2015
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Nov. 07, 2014	Nov. 06, 2015
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	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 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 690701.
5. The IC Site Registration No. is IC7450F-10.

3 General Information

3.1 General Description of EUT

Product	Tablet	
Brand	C-Spire	
Test Model	FT7	
Power Supply Rating	5.0Vdc (adapter or host equipment) 3.8Vdc (Li-ion battery)	
Modulation Type	LTE	QPSK, 16QAM
Frequency Range	LTE Band 25 (Channel Bandwidth: 1.4MHz)	1850.7 ~ 1914.3 MHz
	LTE Band 25 (Channel Bandwidth: 3MHz)	1851.5 ~ 1913.5 MHz
	LTE Band 25 (Channel Bandwidth: 5MHz)	1852.5 ~ 1912.5 MHz
	LTE Band 25 (Channel Bandwidth: 10MHz)	1855.0 ~ 1910.0 MHz
	LTE Band 25 (Channel Bandwidth: 15MHz)	1857.5 ~ 1907.5 MHz
	LTE Band 25 (Channel Bandwidth: 20MHz)	1860.0 ~ 1905.0 MHz
Max. EIRP Power	LTE Band 25 (Channel Bandwidth: 1.4MHz)	151.39mW
	LTE Band 25 (Channel Bandwidth: 3MHz)	153.50mW
	LTE Band 25 (Channel Bandwidth: 5MHz)	155.27mW
	LTE Band 25 (Channel Bandwidth: 10MHz)	157.07mW
	LTE Band 25 (Channel Bandwidth: 15MHz)	159.62mW
	LTE Band 25 (Channel Bandwidth: 20MHz)	166.38mW
Emission Designator	LTE Band 25 (Channel Bandwidth: 1.4MHz)	1M10G7D
	LTE Band 25 (Channel Bandwidth: 3MHz)	2M70G7D
	LTE Band 25 (Channel Bandwidth: 5MHz)	4M50G7D
	LTE Band 25 (Channel Bandwidth: 10MHz)	8M99W7D
	LTE Band 25 (Channel Bandwidth: 15MHz)	13M5G7D
	LTE Band 25 (Channel Bandwidth: 20MHz)	18M0W7D
Antenna Type	Fixed Internal Antenna	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

Note:

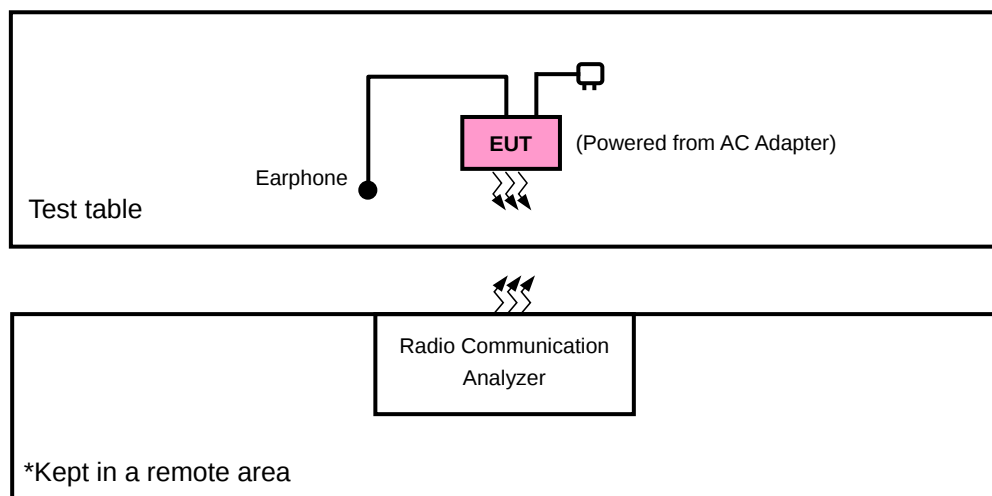
1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	Tamura	NSS050200B	I/P: 100-240Vac, 0.3A O/P: 5Vdc, 2A
Battery	Veken	141016	3.8Vdc, 3780mAh
USB Cable	Elinke	18-94U1DG1-004G	1.03m cable
LCD Panel	Shenzhen Laibao Hi-Technology Co.,Ltd	ST070SI000BKF	6.98"
Photo Camera	Kingcome	HM7P2-ALRFHQ	2M
Video Camera	Globaloptics	GEGR150012-2R	8M
CPU	Qualcomm	MSM8916	--
eMMC (ROM)	Kingston	EMMC16G-S100-R09	16GB
RAM	Samsung	K4E8E304EE-EGCE	8GB
BT/WLAN Module	Qualcomm	WCN3620	--
WWAN Module	Qualcomm	WCN3620	--

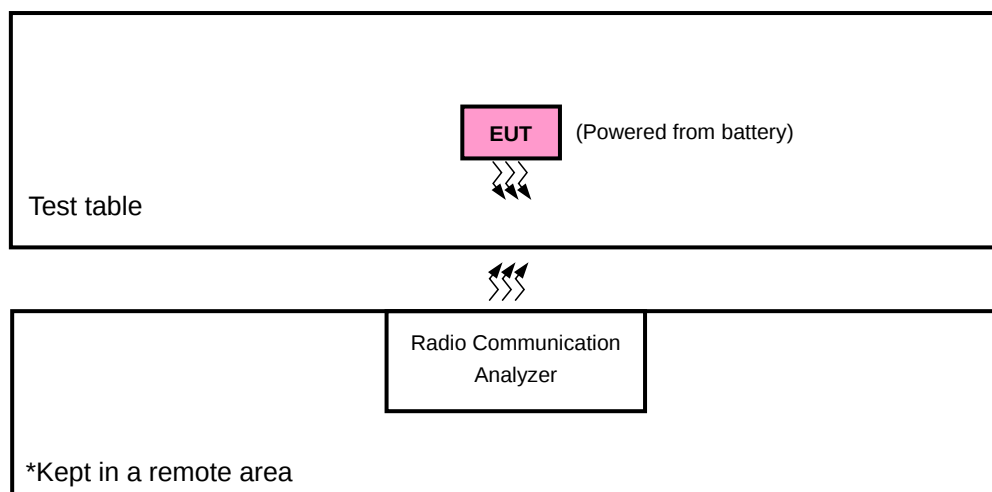
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Configuration Of System Under Test

<Radiated Emission Test>



<E.I.R.P. 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.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Radio Communication Analyzer	Anritsu	MT8820C	6201300640	N/A
2.	Earphone	N/A	N/A	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A
2.	N/A

Note:

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

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 as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	EIRP	Radiated Emission
LTE Band 25	Y-plane	Y-axis

LTE BAND 25 MODE

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	26047 to 26683	26047, 26365, 26683	1.4MHz	QPSK / 16QAM	1 RB / 5 RB Offset
		26055 to 26675	26055, 26365, 26675	3MHz	QPSK / 16QAM	1 RB / 14 RB Offset
		26065 to 26665	26065, 26365, 26665	5MHz	QPSK / 16QAM	1 RB / 24 RB Offset
		26090 to 26640	26090, 26365, 26640	10MHz	QPSK / 16QAM	1 RB / 49 RB Offset
		26115 to 26615	26115, 26365, 26615	15MHz	QPSK / 16QAM	1 RB / 74 RB Offset
		26140 to 26590	26140, 26365, 26590	20MHz	QPSK / 16QAM	1 RB / 99 RB Offset
-	Frequency Stability	26047 to 26683	26365	1.4MHz	QPSK	1 RB / 5 RB Offset
		26055 to 26675	26365	3MHz	QPSK	1 RB / 14 RB Offset
		26065 to 26665	26365	5MHz	QPSK	1 RB / 24 RB Offset
		26090 to 26640	26365	10MHz	QPSK	1 RB / 49 RB Offset
		26115 to 26615	26365	15MHz	QPSK	1 RB / 74 RB Offset
		26140 to 26590	26365	20MHz	QPSK	1 RB / 99 RB Offset
-	Occupied Bandwidth	26047 to 26683	26047, 26365, 26683	1.4MHz	QPSK / 16QAM	6 RB / 0 RB Offset
		26055 to 26675	26055, 26365, 26675	3MHz	QPSK / 16QAM	15 RB / 0 RB Offset
		26065 to 26665	26065, 26365, 26665	5MHz	QPSK / 16QAM	25 RB / 0 RB Offset
		26090 to 26640	26090, 26365, 26640	10MHz	QPSK / 16QAM	50 RB / 0 RB Offset
		26115 to 26615	26115, 26365, 26615	15MHz	QPSK / 16QAM	75 RB / 0 RB Offset
		26140 to 26590	26140, 26365, 26590	20MHz	QPSK / 16QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	26047 to 26683	26047, 26365, 26683	1.4MHz	QPSK / 16QAM	1 RB / 5 RB Offset
		26055 to 26675	26055, 26365, 26675	3MHz	QPSK / 16QAM	1 RB / 14 RB Offset
		26065 to 26665	26065, 26365, 26665	5MHz	QPSK / 16QAM	1 RB / 24 RB Offset
		26090 to 26640	26090, 26365, 26640	10MHz	QPSK / 16QAM	1 RB / 49 RB Offset
		26115 to 26615	26115, 26365, 26615	15MHz	QPSK / 16QAM	1 RB / 74 RB Offset
		26140 to 26590	26140, 26365, 26590	20MHz	QPSK / 16QAM	1 RB / 99 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Band Edge	26047 to 26683	26047	1.4MHz	QPSK	1 RB / 0 RB Offset
			26683	1.4MHz	QPSK	6 RB / 0 RB Offset
		26055 to 26675	26055	3MHz	QPSK	1 RB / 5 RB Offset
			26675	3MHz	QPSK	6 RB / 0 RB Offset
		26065 to 26665	26065	5MHz	QPSK	1 RB / 0 RB Offset
			26665	5MHz	QPSK	15 RB / 0 RB Offset
		26090 to 26640	26090	10MHz	QPSK	1 RB / 14 RB Offset
			26640	10MHz	QPSK	15 RB / 0 RB Offset
		26115 to 26615	26065	5MHz	QPSK	1 RB / 0 RB Offset
			26665	5MHz	QPSK	25 RB / 0 RB Offset
		26140 to 26590	26090	10MHz	QPSK	1 RB / 24 RB Offset
			26640	10MHz	QPSK	25 RB / 0 RB Offset
		26115 to 26615	26090	10MHz	QPSK	1 RB / 0 RB Offset
			26640	10MHz	QPSK	50 RB / 0 RB Offset
		26140 to 26590	26115	15MHz	QPSK	1 RB / 49 RB Offset
			26615	15MHz	QPSK	50 RB / 0 RB Offset
-	Conducted Emission	26047 to 26683	26115	15MHz	QPSK	1 RB / 0 RB Offset
		26055 to 26675	26615	15MHz	QPSK	75 RB / 0 RB Offset
		26065 to 26665	26615	15MHz	QPSK	1 RB / 74 RB Offset
		26090 to 26640	26615	15MHz	QPSK	75 RB / 0 RB Offset
		26115 to 26615	26140	20MHz	QPSK	1 RB / 0 RB Offset
		26140 to 26590	26590	20MHz	QPSK	100 RB / 0 RB Offset
-	Radiated Emission	26140 to 26590	26365	20MHz	QPSK	1 RB / 99 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26deg. C, 58%RH	3.8Vdc	Howard Kao
Frequency Stability	26deg. C, 58%RH	3.8Vdc	Howard Kao
Occupied Bandwidth	26deg. C, 58%RH	3.8Vdc	Howard Kao
Band Edge	26deg. C, 58%RH	3.8Vdc	Howard Kao
Peak To Average Ratio	26deg. C, 58%RH	3.8Vdc	Howard Kao
Condcudeted Emission	26deg. C, 58%RH	3.8Vdc	Howard Kao
Radiated Emission	25deg. C, 65%RH	120Vac, 60Hz	Gavin Wu

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. 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 24

ANSI/TIA/EIA-603-C 2004

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

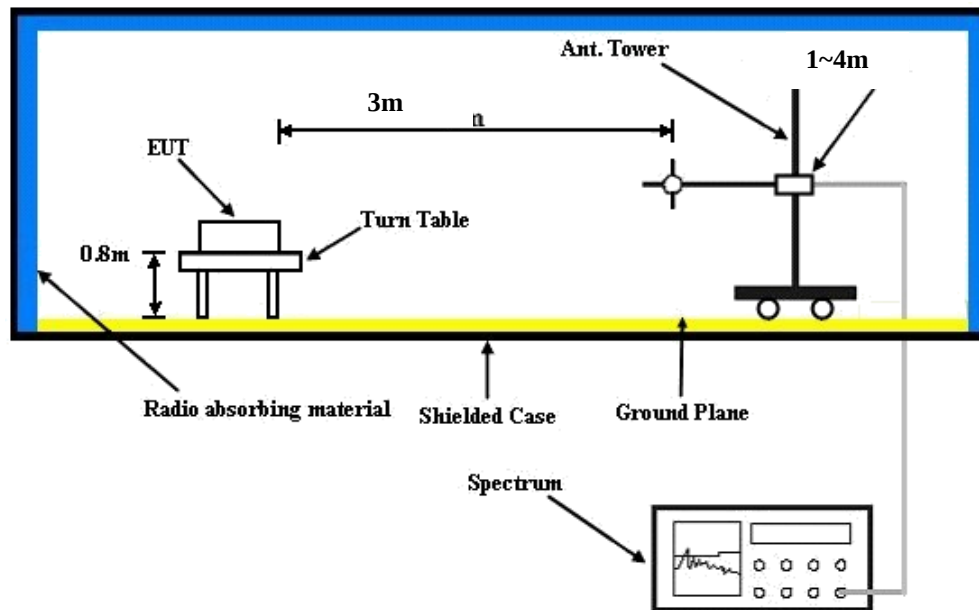
- All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1MHz for GSM, GPRS & EDGE, 5MHz for WCDMA and CDMA, and 10MHz for LTE mode.
- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, 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.
- 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
- $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated from E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15\text{dBi}$.

Conducted Power Measurement:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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:



4.1.4 Test Results

CONDUCTED OUTPUT POWER (dBm)

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26047	Mid Ch 26365	High Ch 26683		Low Ch 26047	Mid Ch 26365	High Ch 26683	
			1850.7 MHz	1882.5 MHz	1914.3 MHz		1850.7 MHz	1882.5 MHz	1914.3 MHz	
25 / 1.4M	1	0	22.04	22.14	22.18	0	21.05	21.12	21.16	1
	1	2	22.01	22.11	22.15	0	21.02	21.09	21.13	1
	1	5	22.07	22.17	22.21	0	21.08	21.15	21.19	1
	3	0	22.02	22.07	22.11	0	21.02	20.06	21.09	1
	3	1	22.05	22.10	22.14	0	21.05	21.07	21.12	1
	3	3	22.06	22.11	22.15	0	21.06	21.09	21.13	1
	6	0	21.02	21.08	21.12	1	20.01	20.07	20.11	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26055	Mid Ch 26365	High Ch 26675		Low Ch 26055	Mid Ch 26365	High Ch 26675	
			1851.5 MHz	1882.5 MHz	1913.5 MHz		1851.5 MHz	1882.5 MHz	1913.5 MHz	
25 / 3M	1	0	22.12	22.28	22.32	0	21.09	21.25	21.29	1
	1	7	22.09	22.25	22.29	0	21.06	21.22	21.26	1
	1	14	22.15	22.31	22.35	0	21.12	21.28	21.32	1
	8	0	20.02	21.14	21.18	1	20.06	20.11	20.15	2
	8	3	21.05	21.17	21.21	1	20.09	20.14	20.18	2
	8	7	21.06	21.18	21.22	1	20.10	20.15	20.19	2
	15	0	20.01	21.04	21.08	1	20.03	20.05	20.09	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26065	Mid Ch 26365	High Ch 26665		Low Ch 26065	Mid Ch 26365	High Ch 26665	
			1852.5 MHz	1882.5 MHz	1912.5 MHz		1852.5 MHz	1882.5 MHz	1912.5 MHz	
25 / 5M	1	0	22.27	22.43	22.47	0	21.24	21.40	21.44	1
	1	12	22.24	22.40	22.44	0	21.21	21.37	21.41	1
	1	24	22.30	22.46	22.50	0	21.27	21.43	21.47	1
	12	0	21.13	21.29	21.33	1	20.10	20.26	20.30	2
	12	6	21.16	21.32	21.36	1	20.13	20.29	20.33	2
	12	13	21.17	21.33	21.37	1	20.14	20.30	20.34	2
	25	0	21.03	21.19	21.23	1	20.00	20.16	20.20	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26090	Mid Ch 26365	High Ch 26640		Low Ch 26090	Mid Ch 26365	High Ch 26640	
			1855.0 MHz	1882.5 MHz	1910.0 MHz		1855.0 MHz	1882.5 MHz	1910.0 MHz	
25 / 10M	1	0	22.40	22.56	22.60	0	21.38	21.54	21.58	1
	1	24	22.37	22.53	22.57	0	21.35	21.51	21.55	1
	1	49	22.43	22.59	22.63	0	21.41	21.57	21.61	1
	25	0	21.26	21.42	21.46	1	20.24	20.40	20.44	2
	25	12	21.29	21.45	21.49	1	20.27	20.43	20.47	2
	25	25	21.30	21.46	21.50	1	20.28	20.44	20.48	2
	50	0	21.16	21.32	21.36	1	20.14	20.30	20.34	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26115	Mid Ch 26365	High Ch 26615		Low Ch 26115	Mid Ch 26365	High Ch 26615	
			1857.5 MHz	1882.5 MHz	1907.5 MHz		1857.5 MHz	1882.5 MHz	1907.5 MHz	
25 / 15M	1	0	22.56	22.72	22.76	0	21.52	21.68	21.72	1
	1	37	22.53	22.69	22.73	0	21.49	21.65	21.69	1
	1	74	22.59	22.75	22.79	0	21.55	21.71	21.75	1
	36	0	21.42	21.58	21.62	1	20.38	20.54	20.58	2
	36	19	21.45	21.61	21.65	1	20.41	20.57	20.61	2
	36	39	21.46	21.62	21.66	1	20.42	20.58	20.62	2
	75	0	21.32	21.48	21.52	1	20.28	20.44	20.48	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26140	Mid Ch 26365	High Ch 26590		Low Ch 26140	Mid Ch 26365	High Ch 26590	
			1860.0 MHz	1882.5 MHz	1905.0 MHz		1860.0 MHz	1882.5 MHz	1905.0 MHz	
25 / 20M	1	0	22.71	22.87	22.91	0	21.68	21.84	21.88	1
	1	50	22.68	22.84	22.88	0	21.65	21.81	21.85	1
	1	99	22.74	22.90	22.94	0	21.71	21.87	21.91	1
	50	0	21.57	21.73	21.77	1	20.54	20.70	20.74	2
	50	25	21.60	21.76	21.80	1	20.57	20.73	20.77	2
	50	50	21.61	21.77	21.81	1	20.58	20.74	20.78	2
	100	0	21.47	21.63	21.67	1	20.44	20.60	20.64	2

EIRP Power (dBm)

LTE Band 25							
Channel Bandwidth: 1.4MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26047	1850.7	-18.62	36.57	17.95	62.40	H
	26365	1882.5	-19.45	37.22	17.77	59.90	
	26683	1914.3	-21.24	39.09	17.85	60.95	
	26047	1850.7	-15.85	37.65	21.80	151.39	V
	26365	1882.5	-15.96	37.58	21.62	145.31	
	26683	1914.3	-16.13	37.92	21.79	151.01	

LTE Band 25							
Channel Bandwidth: 1.4MHz / 16QAM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26047	1850.7	-20.14	36.57	16.43	43.97	H
	26365	1882.5	-20.81	37.22	16.41	43.79	
	26683	1914.3	-22.67	39.09	16.42	43.85	
	26047	1850.7	-17.38	37.65	20.27	106.44	V
	26365	1882.5	-17.43	37.58	20.15	103.59	
	26683	1914.3	-17.67	37.92	20.25	105.93	

LTE Band 25							
Channel Bandwidth: 3MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26055	1851.5	-18.66	36.57	17.91	61.83	H
	26365	1882.5	-19.34	37.22	17.88	61.43	
	26675	1913.5	-21.18	39.11	17.93	62.09	
	26055	1851.5	-15.79	37.65	21.86	153.50	V
	26365	1882.5	-15.95	37.58	21.63	145.65	
	26675	1913.5	-16.14	37.93	21.79	151.01	

LTE Band 25							
Channel Bandwidth: 3MHz / 16QAM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26055	1851.5	-20.07	36.57	16.50	44.69	H
	26365	1882.5	-20.77	37.22	16.45	44.20	
	26675	1913.5	-22.60	39.11	16.51	44.77	
	26055	1851.5	-17.28	37.65	20.37	108.92	V
	26365	1882.5	-17.38	37.58	20.20	104.79	
	26675	1913.5	-17.44	37.93	20.49	111.94	

LTE Band 25							
Channel Bandwidth: 5MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26065	1852.5	-18.55	36.57	18.02	63.42	H
	26365	1882.5	-19.29	37.22	17.93	62.14	
	26665	1912.5	-21.11	39.11	18.00	63.10	
	26065	1852.5	-15.74	37.65	21.91	155.27	V
	26365	1882.5	-15.91	37.58	21.67	146.99	
	26665	1912.5	-16.16	37.96	21.80	151.36	

LTE Band 25							
Channel Bandwidth: 5MHz / 16QAM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26065	1852.5	-19.90	36.57	16.67	46.47	H
	26365	1882.5	-20.64	37.22	16.58	45.54	
	26665	1912.5	-22.52	39.11	16.59	45.60	
	26065	1852.5	-17.19	37.65	20.46	111.20	V
	26365	1882.5	-17.37	37.58	20.21	105.03	
	26665	1912.5	-17.61	37.96	20.35	108.39	

LTE Band 25							
Channel Bandwidth: 10MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26090	1855.0	-18.51	36.57	18.06	64.00	H
	26365	1882.5	-19.22	37.22	18.00	63.15	
	26640	1910.0	-21.18	39.19	18.01	63.24	
	26090	1855.0	-15.69	37.65	21.96	157.07	V
	26365	1882.5	-15.85	37.58	21.73	149.04	
	26640	1910.0	-16.29	38.15	21.86	153.46	

LTE Band 25							
Channel Bandwidth: 10MHz / 16QAM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26090	1855.0	-19.75	36.57	16.82	48.08	H
	26365	1882.5	-20.60	37.22	16.62	45.96	
	26640	1910.0	-22.42	39.19	16.77	47.53	
	26090	1855.0	-17.01	37.65	20.64	115.90	V
	26365	1882.5	-17.31	37.58	20.27	106.49	
	26640	1910.0	-17.71	38.15	20.44	110.66	

LTE Band 25							
Channel Bandwidth: 15MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26115	1857.5	-18.19	36.57	18.38	68.90	H
	26365	1882.5	-19.08	37.22	18.14	65.22	
	26615	1907.5	-20.96	39.23	18.27	67.14	
	26115	1857.5	-15.62	37.65	22.03	159.62	V
	26365	1882.5	-15.76	37.58	21.82	152.16	
	26615	1907.5	-16.29	38.22	21.93	155.96	

LTE Band 25							
Channel Bandwidth: 15MHz / 16QAM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26115	1857.5	-19.77	36.57	16.80	47.89	H
	26365	1882.5	-20.58	37.22	16.64	46.17	
	26615	1907.5	-22.54	39.23	16.69	46.67	
	26115	1857.5	-16.84	37.65	20.81	120.53	V
	26365	1882.5	-17.22	37.58	20.36	108.72	
	26615	1907.5	-17.52	38.22	20.70	117.49	

LTE Band 25							
Channel Bandwidth: 20MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26140	1860.0	-18.07	36.57	18.50	70.83	H
	26365	1882.5	-19.02	37.22	18.20	66.13	
	26590	1905.0	-20.34	38.72	18.38	68.87	
	26140	1860.0	-15.44	37.65	22.21	166.38	V
	26365	1882.5	-15.74	37.58	21.84	152.86	
	26590	1905.0	-15.50	37.56	22.06	160.69	

LTE Band 25							
Channel Bandwidth: 20MHz / 16QAM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Y	26140	1860.0	-19.76	36.57	16.81	48.00	H
	26365	1882.5	-20.54	37.22	16.68	46.60	
	26590	1905.0	-21.99	38.72	16.73	47.10	
	26140	1860.0	-16.69	37.65	20.96	124.77	V
	26365	1882.5	-17.18	37.58	20.40	109.72	
	26590	1905.0	-16.71	37.56	20.85	121.62	

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

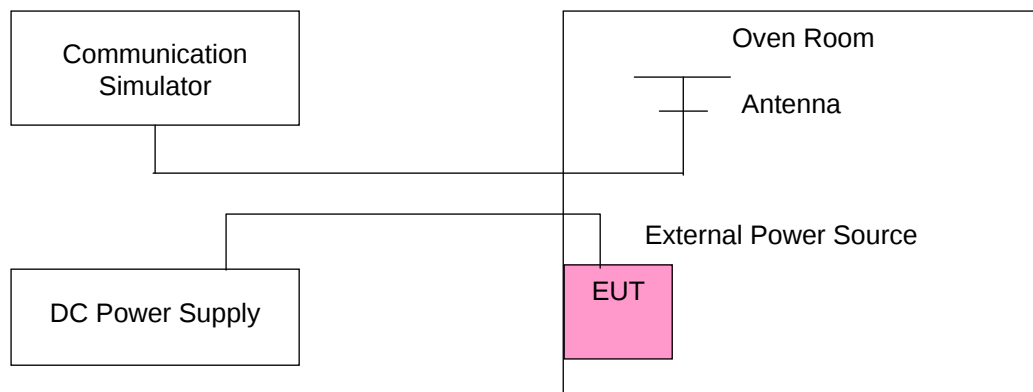
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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 DC 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 ± 0.5 °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 (ppm)
	LTE Band 25						
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
3.8	0.000175299	0.000488712	0.001572377	0.0004834	0.001513944	0.000579017	2.5
3.4	0.000467463	0.000584329	0.002029216	0.001205843	0.001285525	0.00188579	2.5
4.2	0.000589641	0.001742364	0.000669323	0.001848606	0.001264276	0.001800797	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.4Vdc to 4.2Vdc.

Frequency Error vs. Temperature

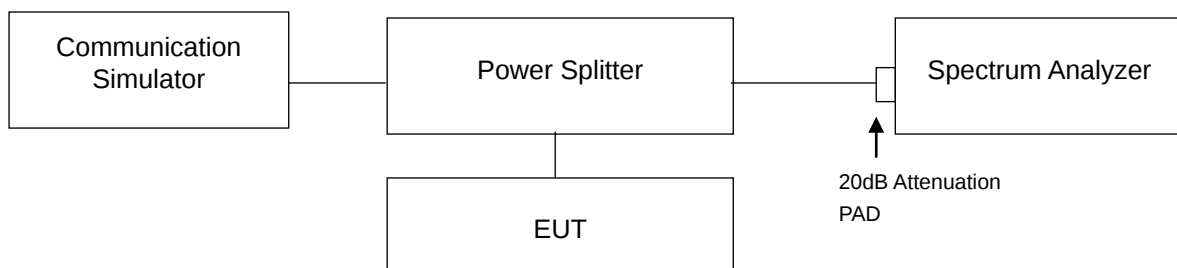
Temp. (°C)	Frequency Error (ppm)						Limit (ppm)
	LTE Band 25						
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
-30	0.001556441	0.000196547	0.001306773	0.001992032	0.000462151	0.001136786	2.5
-20	0.001211155	0.000446215	0.000956175	0.000679947	0.000701195	0.000478088	2.5
-10	0.001450199	0.000339973	0.000786189	0.001864542	0.000403718	0.000579017	2.5
0	0.001572377	0.002108898	0.000706507	0.001290837	0.000998672	0.001232404	2.5
10	0.000679947	0.00201328	0.001827357	9.03054E-05	0.001088977	0.000701195	2.5
20	-0.001131474	-0.001577689	-0.001237716	-0.001768924	-0.000467463	-0.001752988	2.5
30	-0.001540505	-0.000116866	-0.001232404	-0.001795485	-0.001938911	-0.001981408	2.5
40	-0.001513944	-0.001567065	-0.000791501	-0.001444887	-0.000387782	-0.000552457	2.5
50	-0.000520584	-0.001540505	-0.000664011	-0.000876494	-0.000648074	-0.000924303	2.5

4.3 Occupied Bandwidth Measurement

4.3.1 Test Procedure

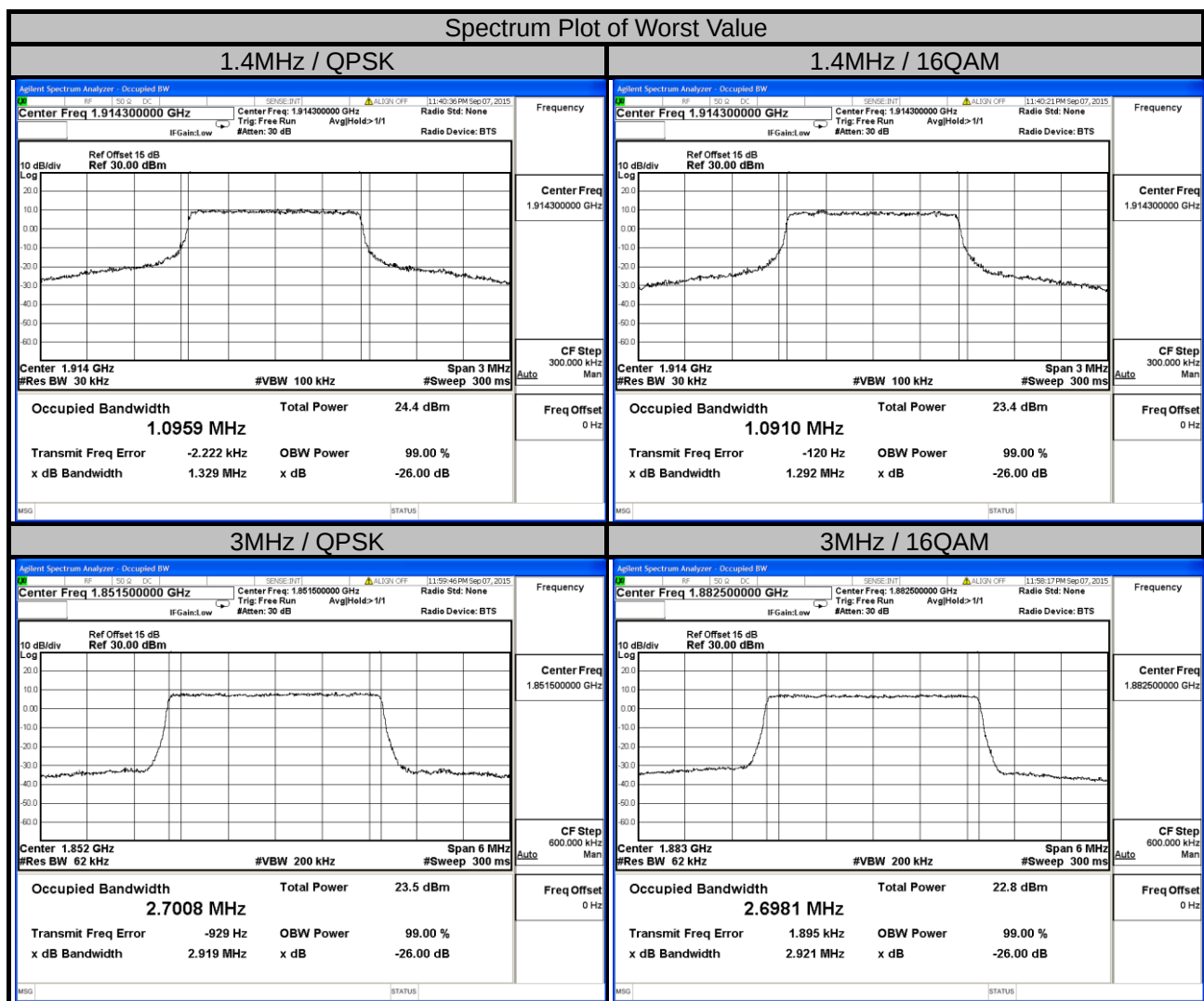
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function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

4.3.2 Test Setup



4.3.3 Test Result

LTE Band 25							
Channel Bandwidth: 1.4MHz				Channel Bandwidth: 3MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
26047	1850.7	1.0908	1.0897	26055	1851.5	2.7008	2.6975
26365	1882.5	1.0923	1.0883	26365	1882.5	2.6972	2.6981
26683	1914.3	1.0959	1.0910	26675	1913.5	2.6994	2.6980





A D T

LTE Band 25

Channel Bandwidth: 5MHz

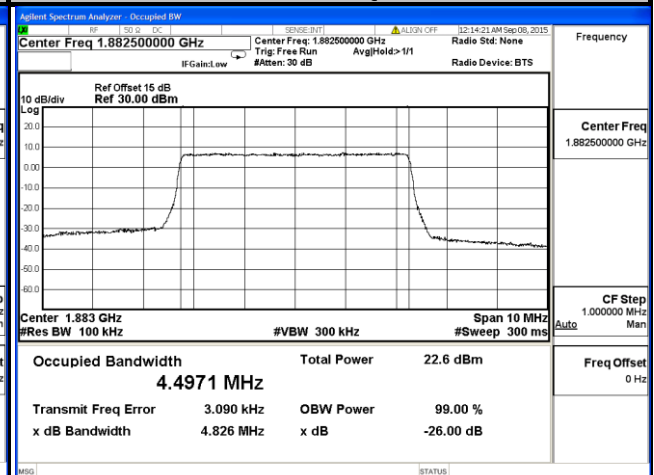
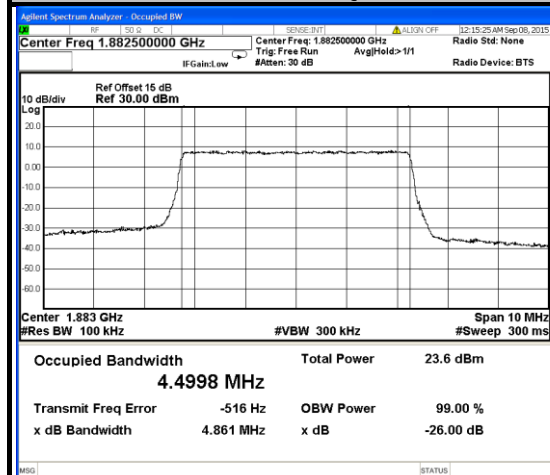
Channel Bandwidth: 10MHz

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
26065	1852.5	4.4977	4.4936	26090	1855.0	8.9830	8.9888
26365	1882.5	4.4998	4.4971	26365	1882.5	8.9781	8.9780
26665	1912.5	4.4949	4.4912	26640	1910.0	8.9741	8.9716

Spectrum Plot of Worst Value

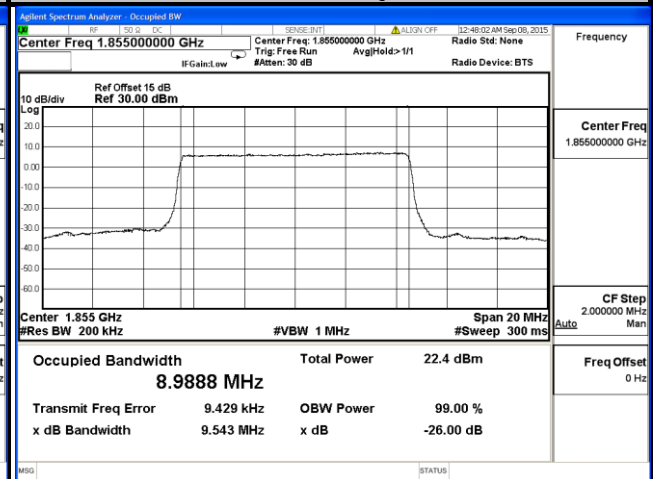
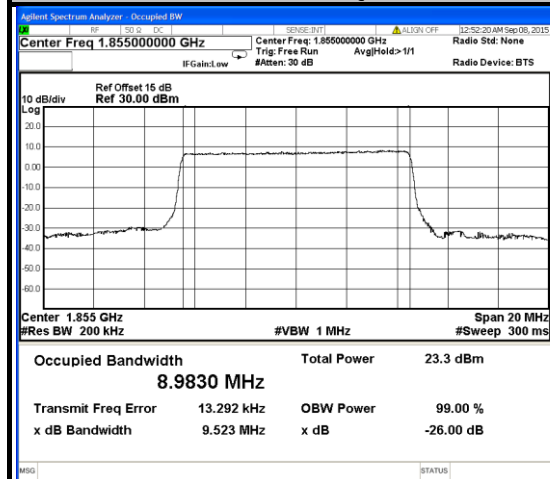
5MHz / QPSK

5MHz / 16QAM



10MHz / QPSK

10MHz / 16QAM



LTE BAND 25

Channel Bandwidth: 15MHz

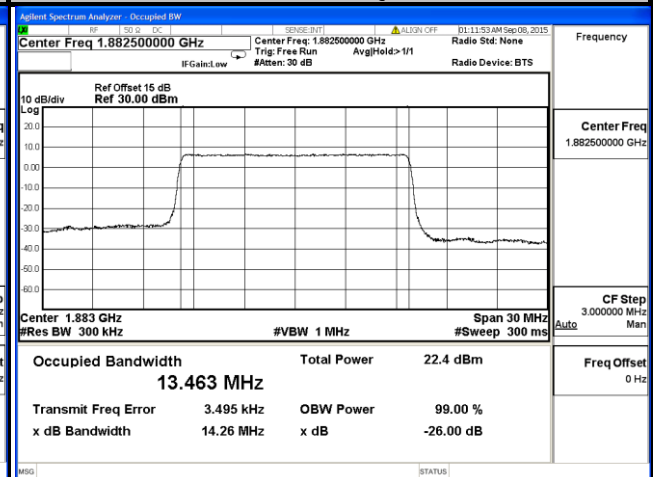
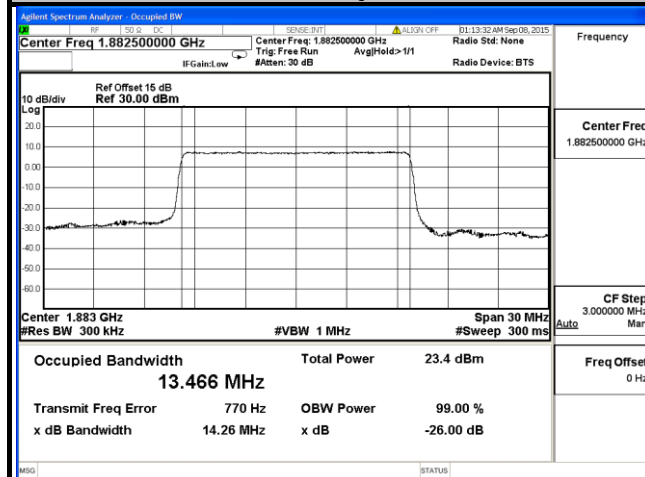
Channel Bandwidth: 20MHz

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
26115	1857.5	13.451	13.452	26140	1860	17.909	17.915
26365	1882.5	13.466	13.463	26365	1882.5	17.952	17.965
26615	1907.5	13.459	13.455	26590	1905	17.943	17.946

Spectrum Plot of Worst Value

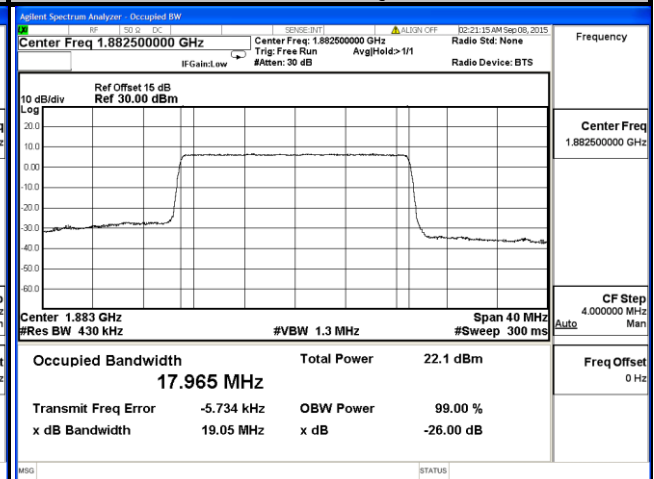
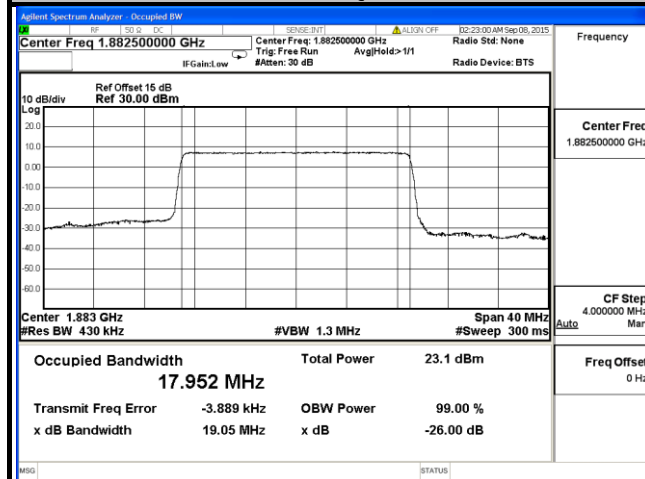
15MHz / QPSK

15MHz / 16QAM



20MHz / QPSK

20MHz / 16QAM

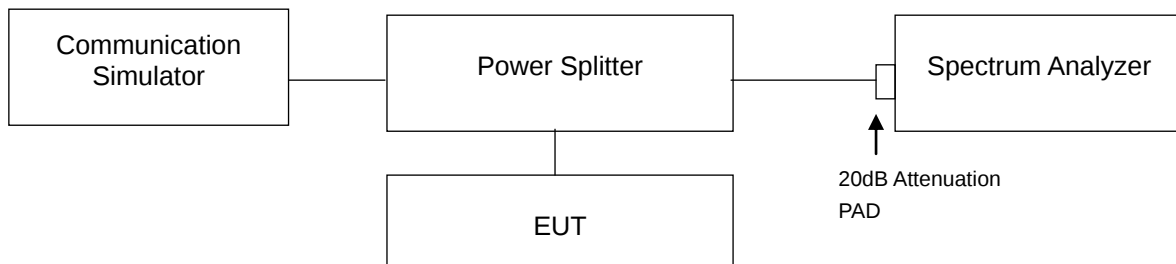


4.4 Band Edge Measurement

4.4.1 Limits of Band Edge Measurement

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. 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.

4.4.2 Test Setup



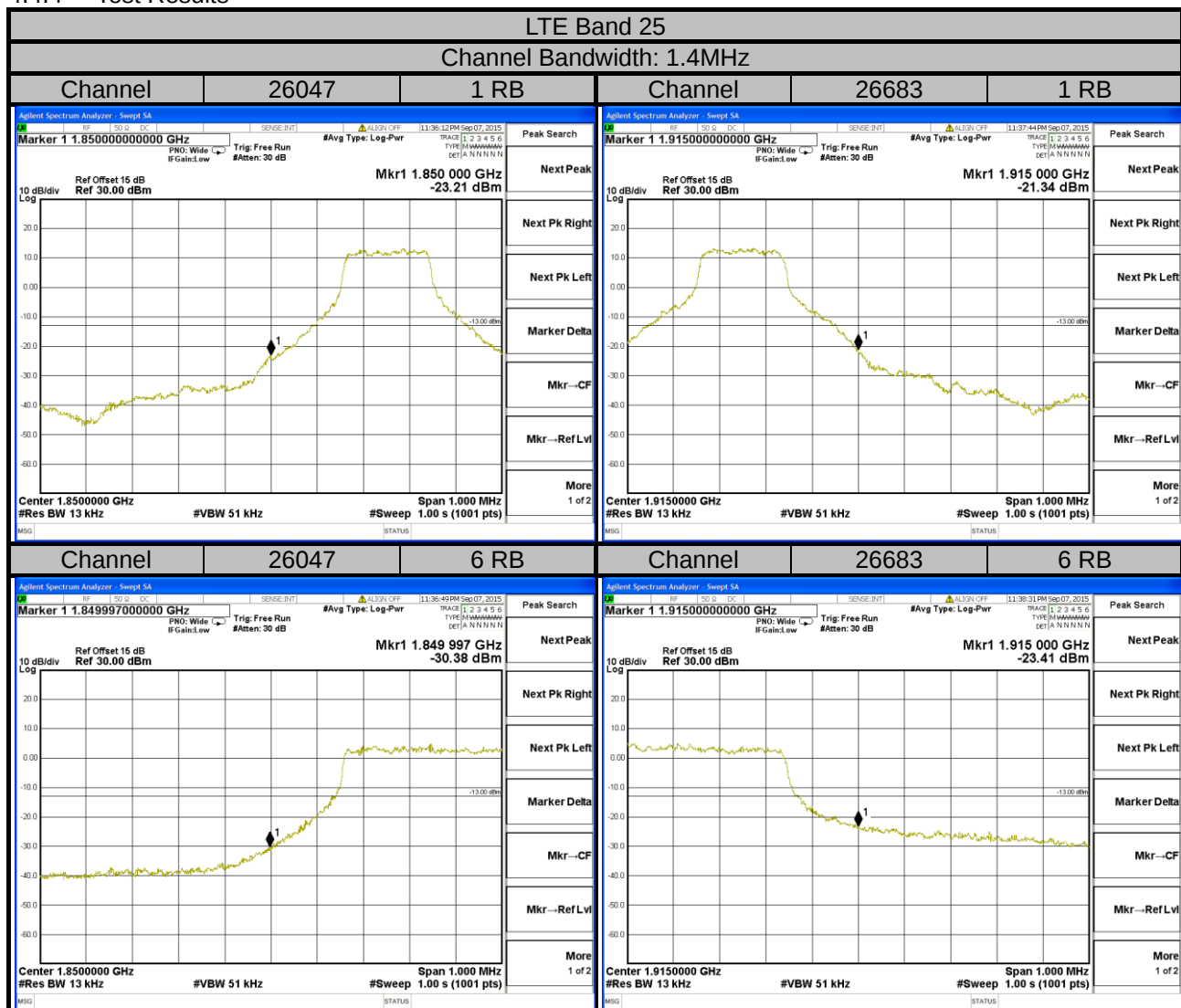
4.4.3 Test Procedures

- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 13kHz and VB of the spectrum is 51kHz (LTE Bandwidth 1.4MHz).
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 30kHz and VB of the spectrum is 100kHz (LTE Bandwidth 3MHz).
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (LTE Bandwidth 5MHz/10MHz).
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 150kHz and VB of the spectrum is 470kHz (LTE Bandwidth 15MHz).
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 180kHz and VB of the spectrum is 560kHz (LTE Bandwidth 20MHz).
- Record the max trace plot into the test report.



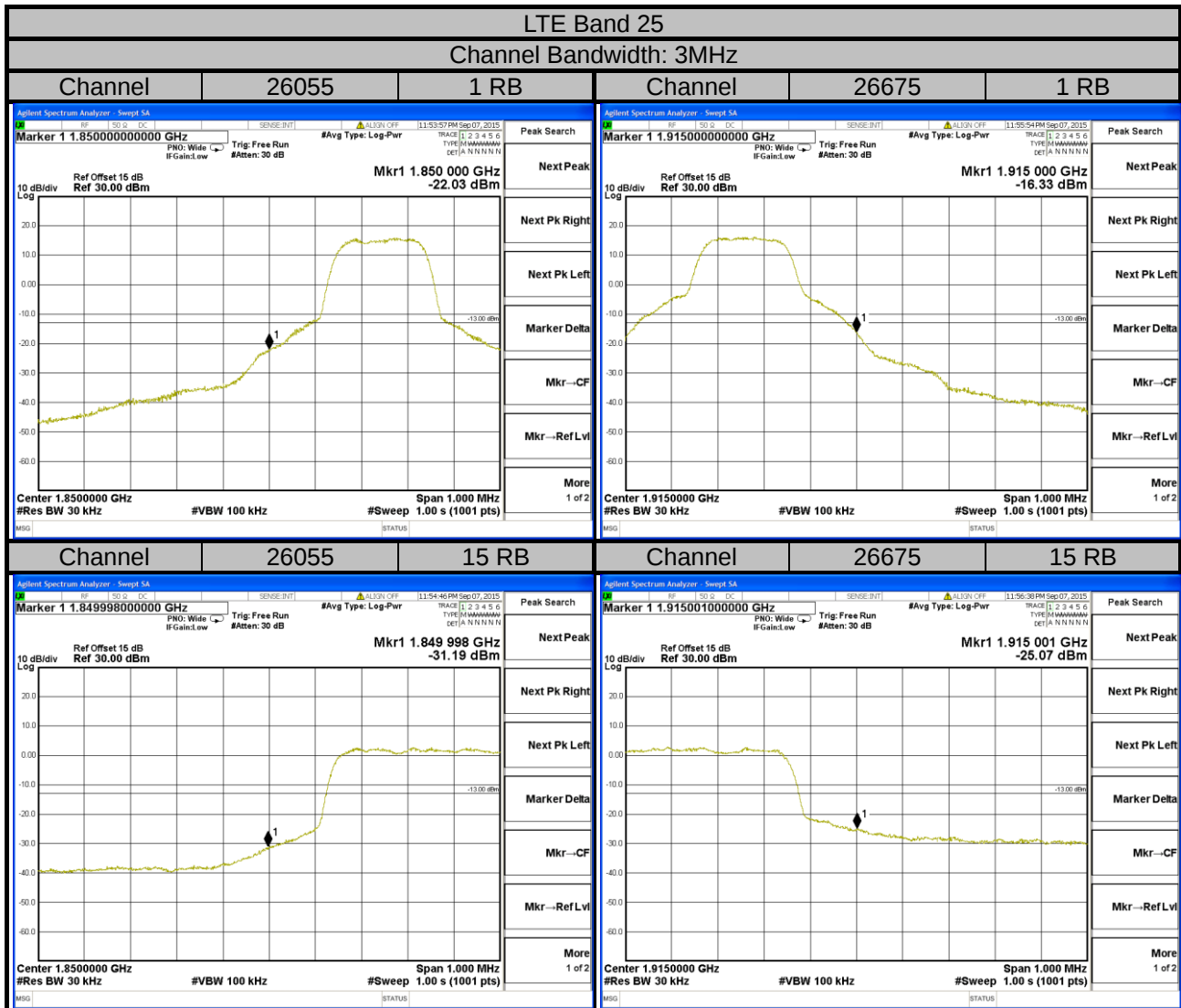
A D T

4.4.4 Test Results



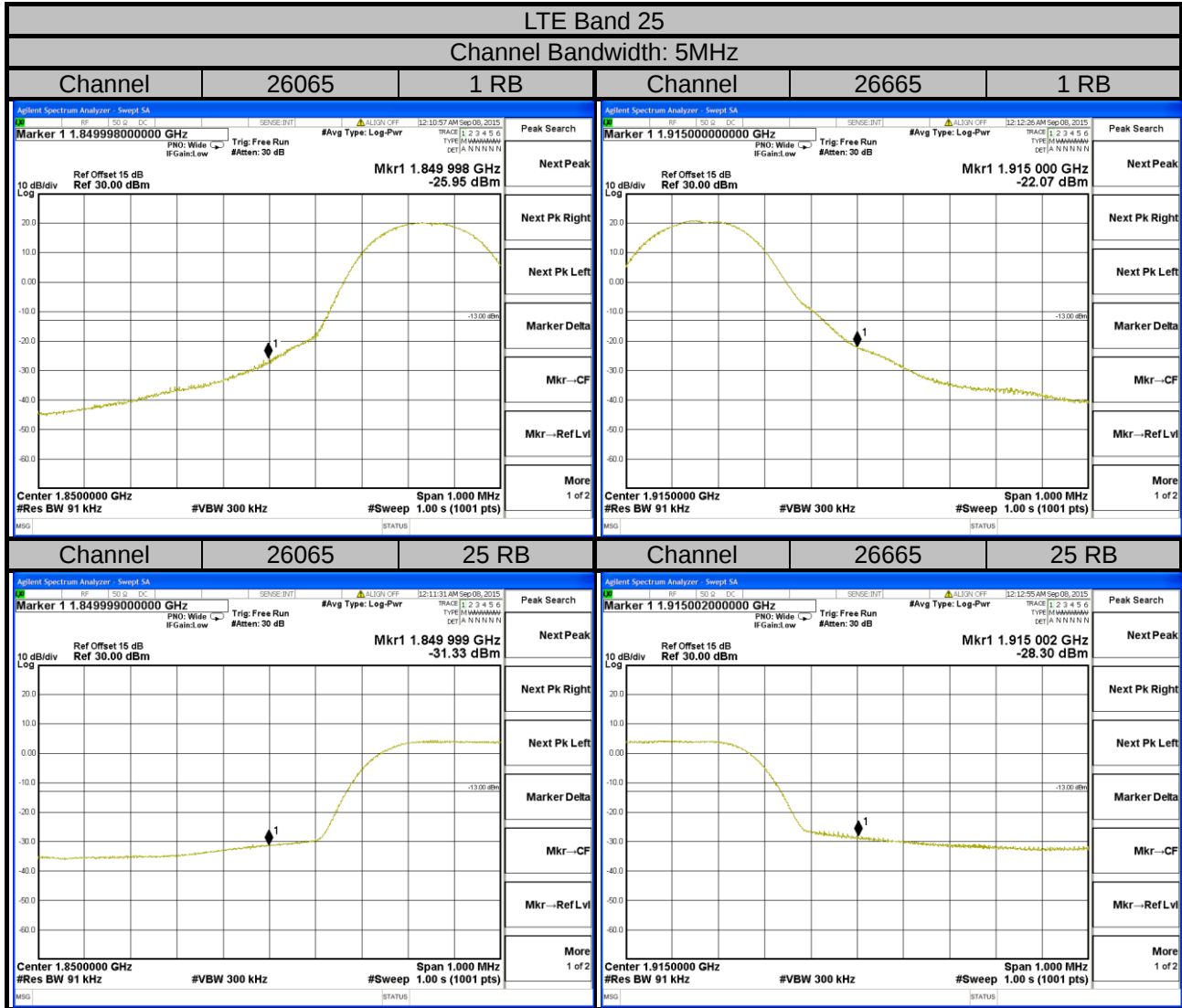


A D T





A D T

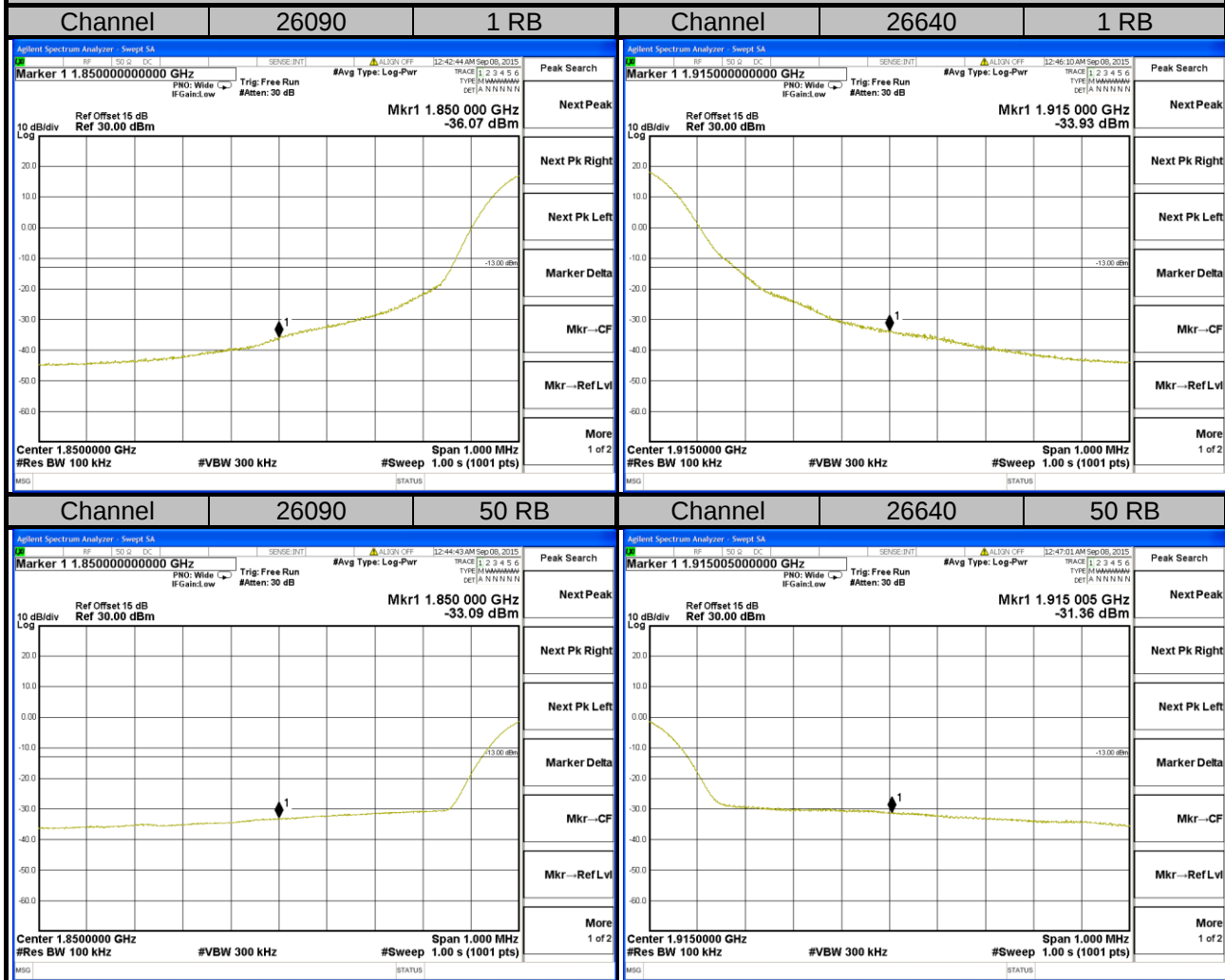




A D T

LTE Band 25

Channel Bandwidth: 10MHz

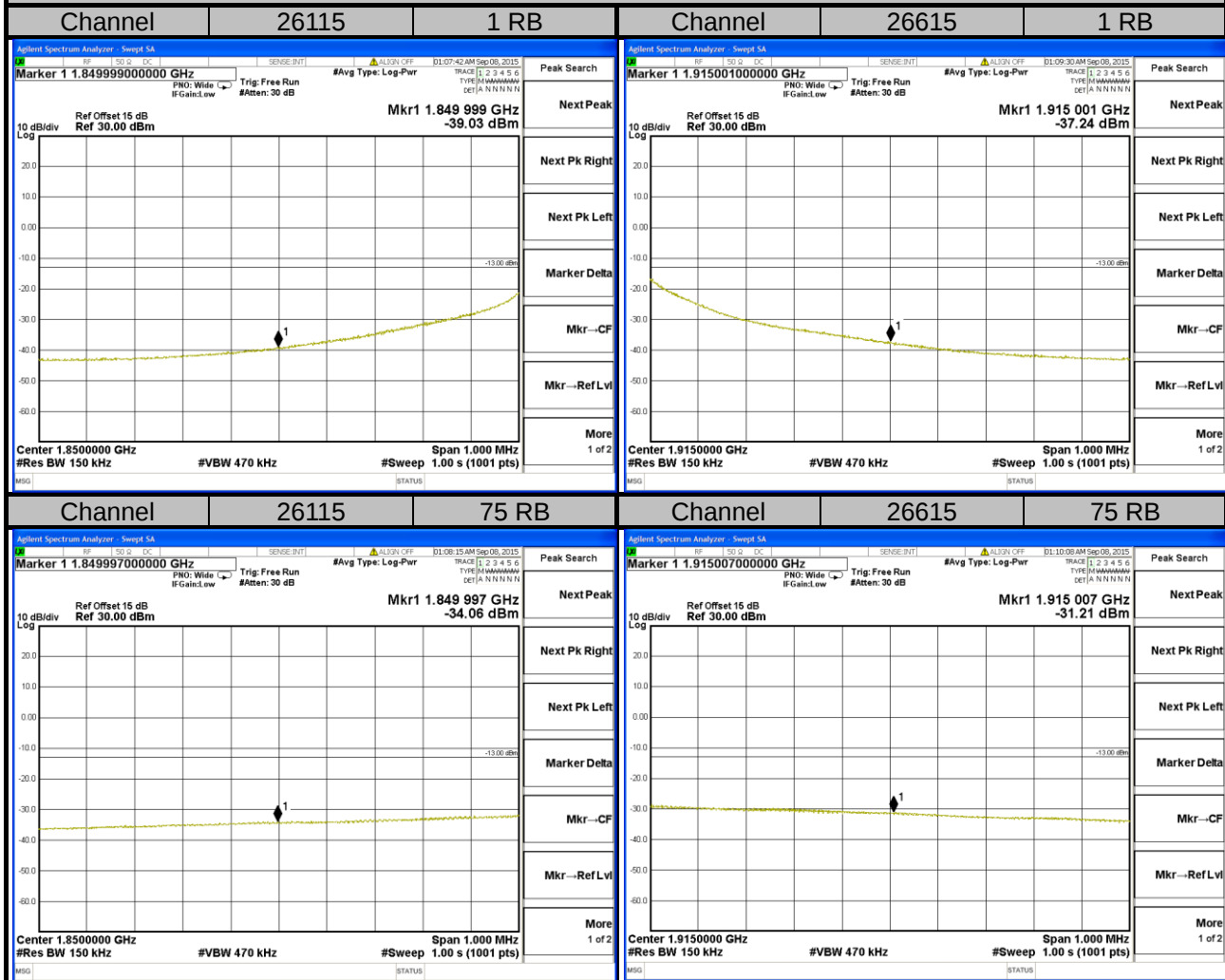




A D T

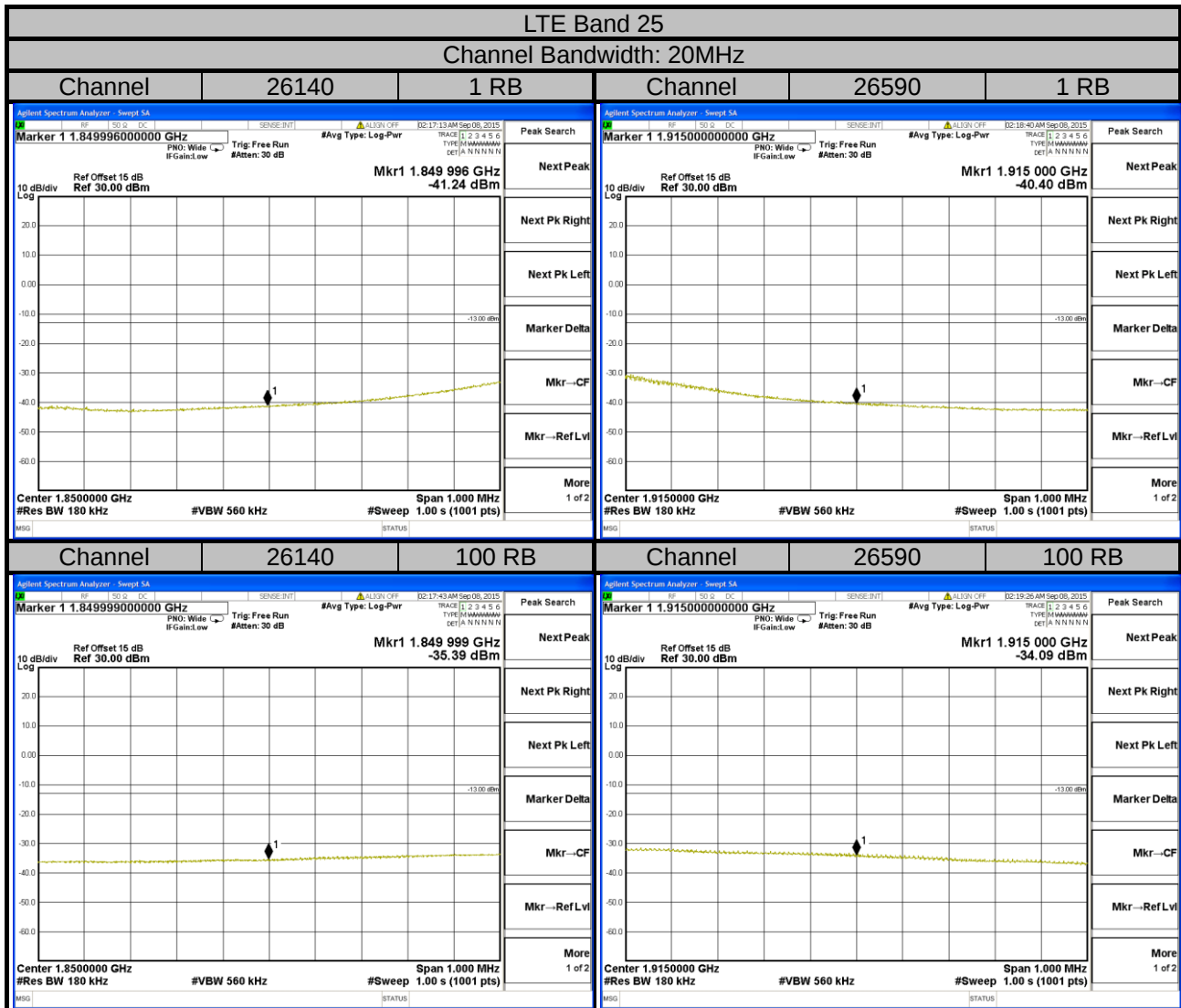
LTE Band 25

Channel Bandwidth: 15MHz





A D T

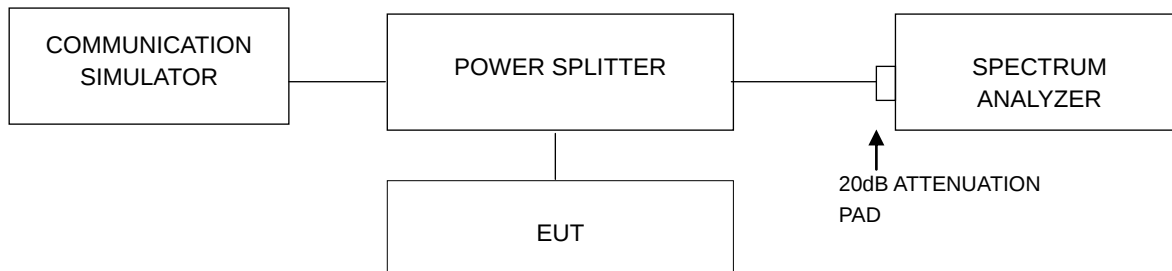


4.5 Peak To Average Ratio

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

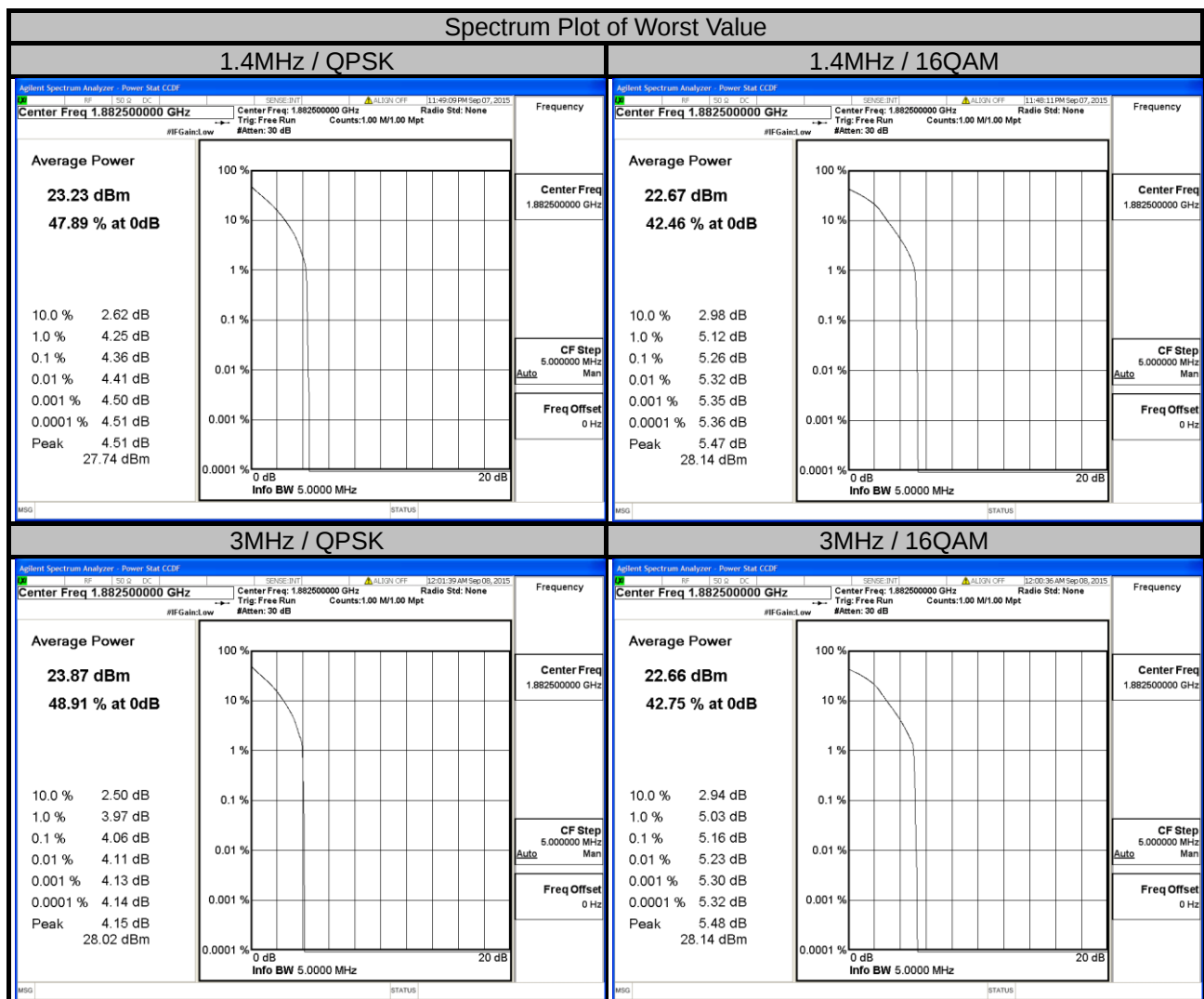


4.5.3 Test Procedures

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

4.5.4 Test Results

LTE Band 25							
Channel Bandwidth: 1.4MHz				Channel Bandwidth: 3MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
26047	1850.7	3.90	4.90	26055	1851.5	3.95	4.93
26365	1882.5	4.36	5.26	26365	1882.5	4.06	5.16
26683	1914.3	2.99	3.26	26675	1913.5	2.43	3.37



LTE Band 25

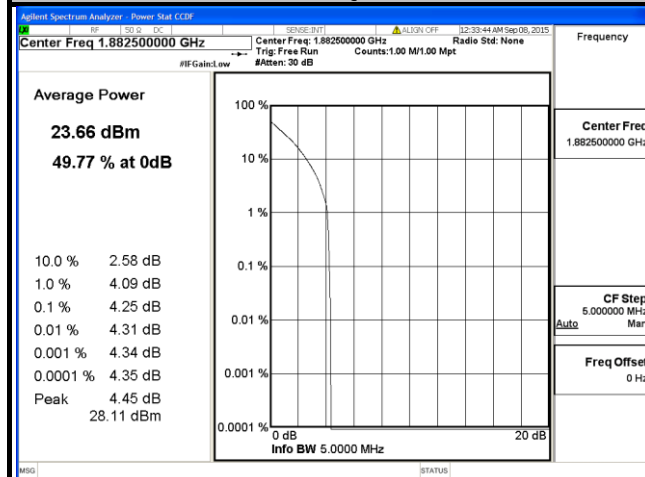
Channel Bandwidth: 5MHz

Channel Bandwidth: 10MHz

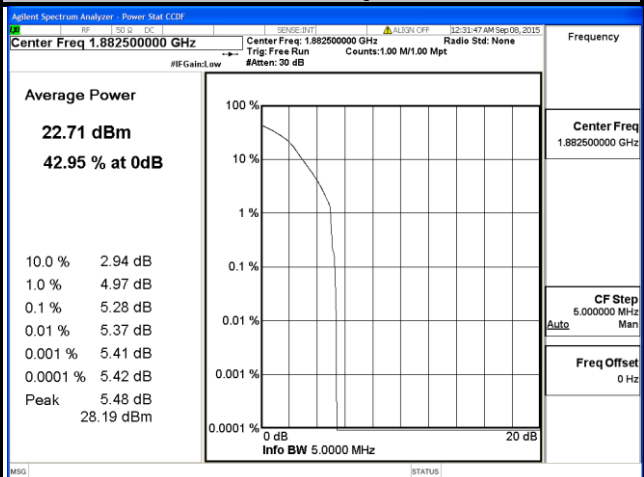
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
26065	1852.5	4.19	5.08	26090	1855.0	4.36	5.13
26365	1882.5	4.25	5.28	26365	1882.5	4.20	4.99
26665	1912.5	3.26	3.83	26640	1910.0	3.64	4.49

Spectrum Plot of Worst Value

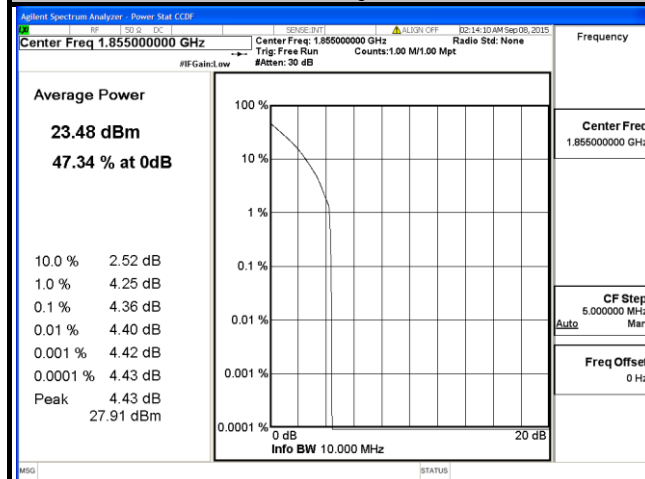
5MHz / QPSK



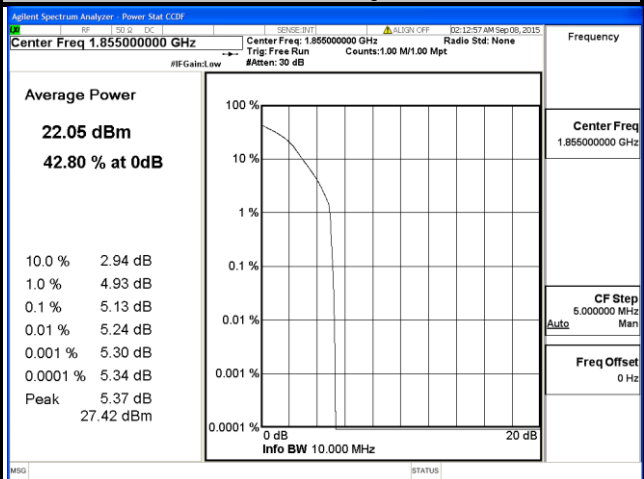
5MHz / 16QAM



10MHz / QPSK



10MHz / 16QAM

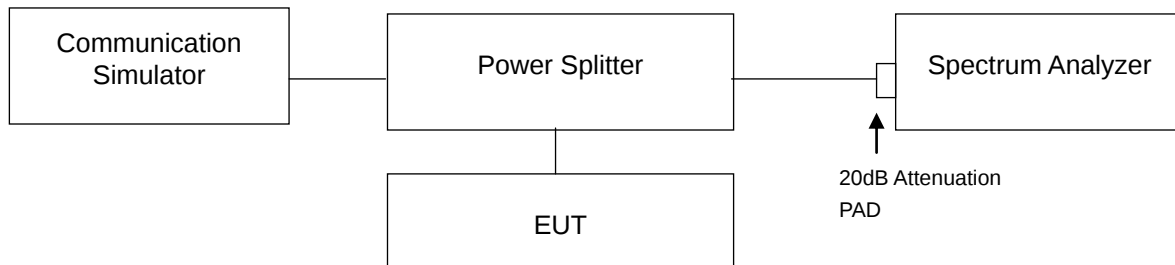


4.6 Conducted Spurious Emissions

4.6.1 Limits of Conducted Spurious Emissions Measurement

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. The emission limit equal to -13dBm .

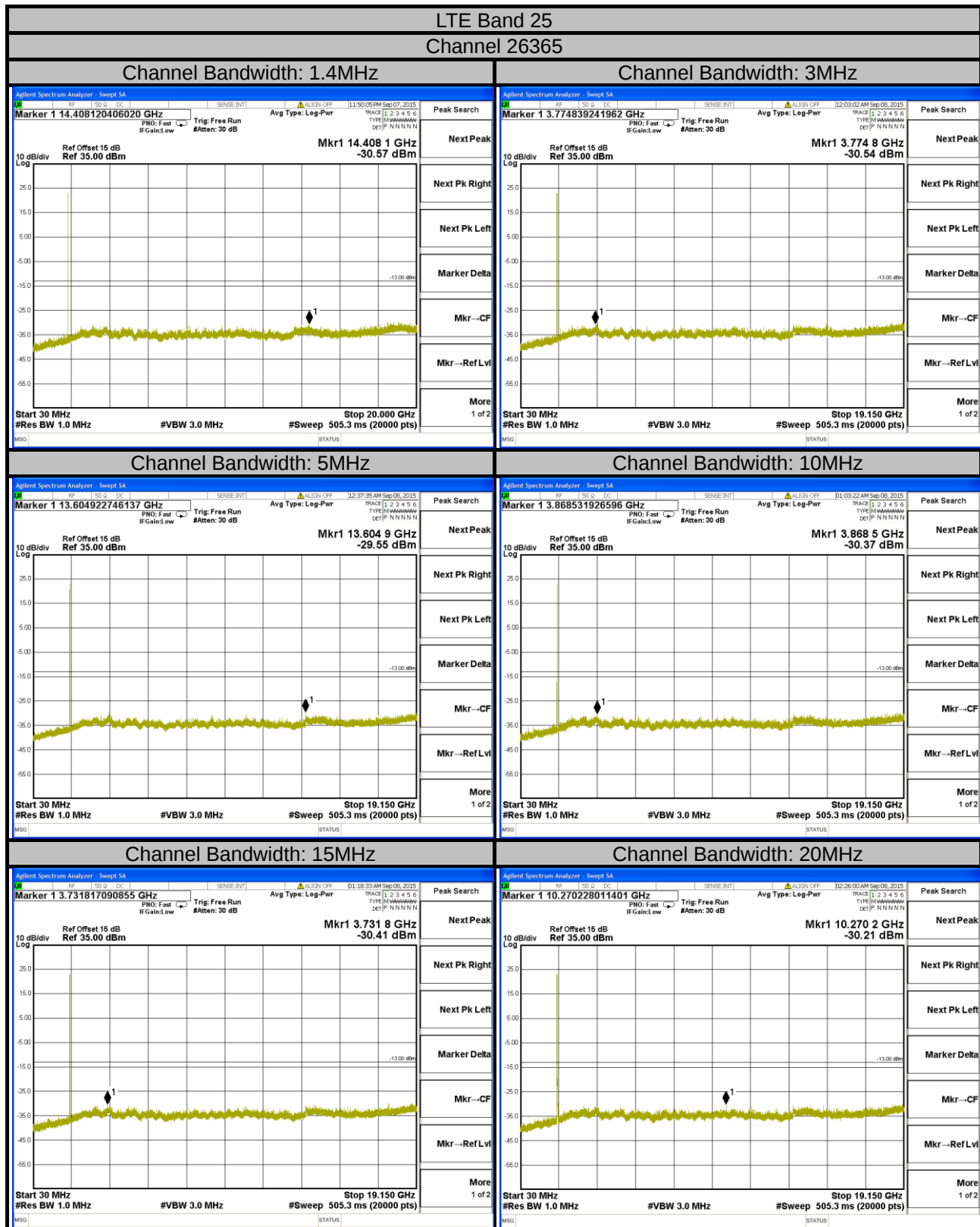
4.6.2 Test Setup



4.6.3 Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to 9GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

4.6.4 Test Results



4.7 Radiated Emission Measurement

4.7.1 Limits of Radiated Emission Measurement

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. The emission limit equal to -13dBm .

4.7.2 Test Procedure

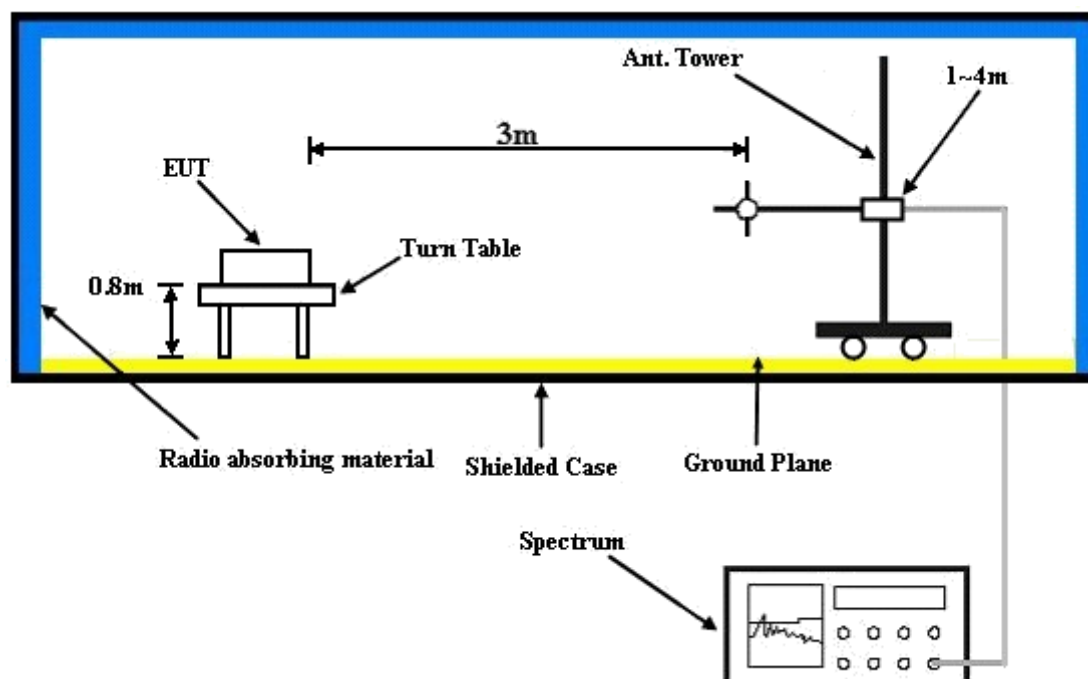
- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- 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 a. Record the power level of S.G
- EIRP = Output power level of S.G – TX cable loss + 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 power = E.I.P.R power - 2.15dBi.

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

LTE Band 25

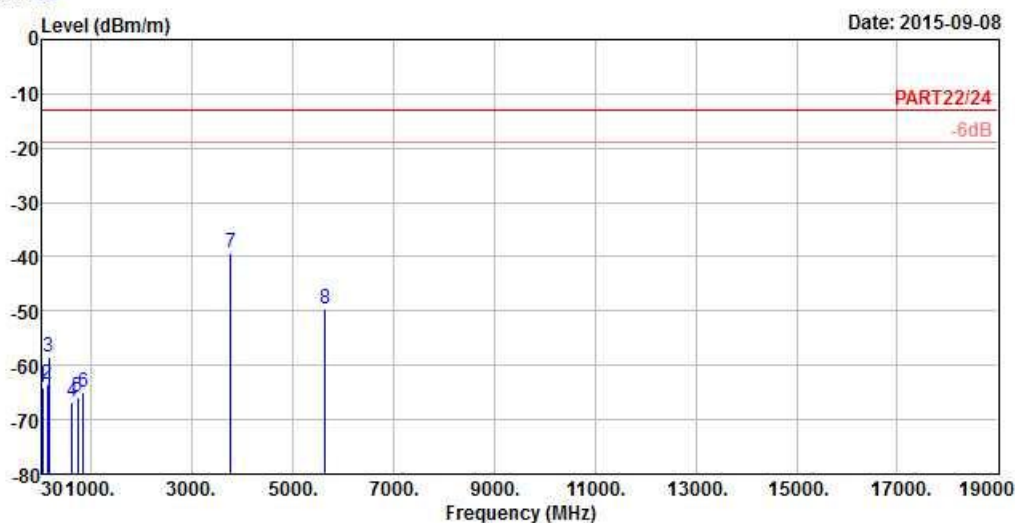
Channel Bandwidth: 20MHz / QPSK



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 13



Site : 966 Chamber 5
Condition: PART22/24 3m HORIZONTAL
Remak : LTE Band 25_QPSK_20M(1.99)
Tested by: Gavin Wu
Plane : Y

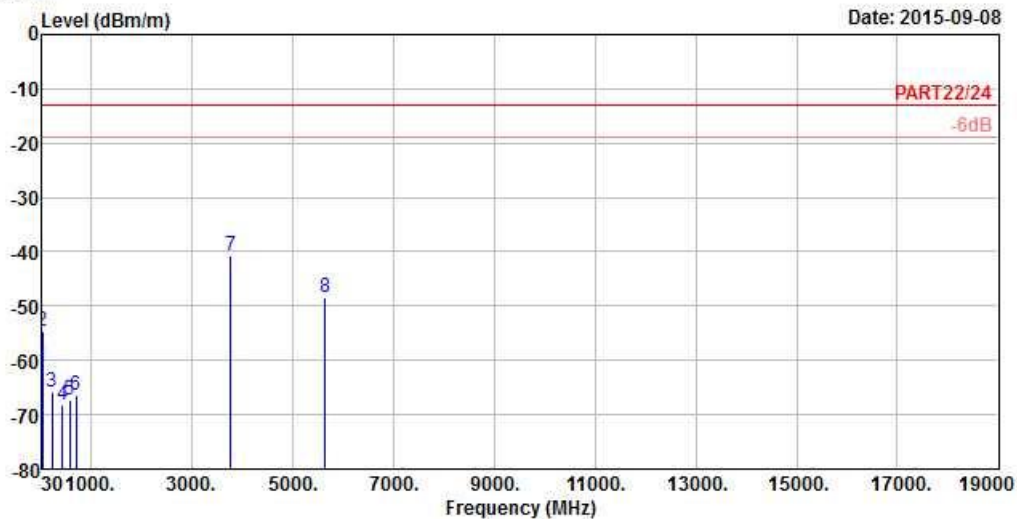
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	41.61	-64.05	-63.64	-13.00	-51.05	-0.41	Peak
2	127.47	-63.61	-54.57	-13.00	-50.61	-9.04	Peak
3	160.41	-58.39	-53.55	-13.00	-45.39	-4.84	Peak
4	629.00	-66.64	-65.81	-13.00	-53.64	-0.83	Peak
5	741.00	-65.80	-66.51	-13.00	-52.80	0.71	Peak
6	845.30	-64.89	-65.22	-13.00	-51.89	0.33	Peak
7 pp	3765.00	-39.23	-31.26	-13.00	-26.23	-7.97	Peak
8	5647.50	-49.66	-47.72	-13.00	-36.66	-1.94	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 14



Site : 966 Chamber 5
Condition: PART22/24 3m VERTICAL
Remak : LTE Band 25_QPSK_20M(1.99)
Tested by: Gavin Wu
Plane : Y

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	31.35	-61.02	-60.91	-13.00	-48.02	-0.11	Peak
2	42.42	-54.51	-53.57	-13.00	-41.51	-0.94	Peak
3	222.51	-65.80	-58.68	-13.00	-52.80	-7.12	Peak
4	424.60	-68.29	-62.54	-13.00	-55.29	-5.75	Peak
5	570.20	-67.37	-65.37	-13.00	-54.37	-2.00	Peak
6	699.70	-66.42	-66.31	-13.00	-53.42	-0.11	Peak
7 pp	3764.00	-40.73	-32.76	-13.00	-27.73	-7.97	Peak
8	5648.00	-48.51	-46.57	-13.00	-35.51	-1.94	Peak

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.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab/Telecom Lab

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

--- END ---