

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT****INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 22 SUBPART H REQUIREMENT**

OF

Product Name: AL9S
Marketing Name Klic K4 Smartphone
Brand Name: Kalley
Model No.: K4-02 4G
Model Difference: N/A
FCC ID: HFS-K4-024G
Report No.: E2/2015/90056A-01
Issue Date: Oct. 07,2015
FCC Rule Part: 2 , 22H
Prepared for: Quanta Computer Inc.
188, Wen Hwa 2nd Rd., Guishan Dist., Tao Yuan City
33377, Taiwan
Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
No.2, Keji 1st Rd., Guishan Township, Taoyuan
County, Taiwan 333

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t (886-2) 2299-3279

f (886-2) 2298-0488

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VERIFICATION OF COMPLIANCE

Applicant: Quanta Computer Inc.
188, Wen Hwa 2nd Rd., Guishan Dist., Tao Yuan City 33377,
Taiwan

Product Name: AL9S

Marketing Name Klic K4 Smartphone

Brand Name: Kalley

Model No.: K4-02 4G

Model Difference: N/A

FCC ID: HFS-K4-024G

File Number: E2/2015/90056A-01

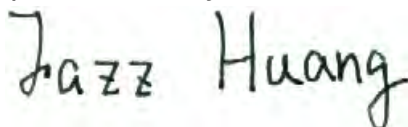
Date of test: Sep. 18, 2015 ~ Sep. 21, 2015

Date of EUT Received: Sep. 18, 2015

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-C-2004 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

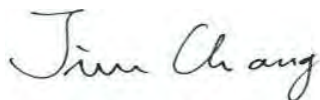
The test results of this report relate only to the tested sample identified in this report.

Test By:**Date:**

Oct.07,2015

Jazz Huang / Asst. Supervisor**Prepared By:****Date:**

Oct.07,2015

Allen Tsai / Engineer**Approved By:****Date:**

Oct.07,2015

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
E2/2015/90056A-01	Rev.00	Initial creation of document	Oct.07,2015

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1. GENERAL PRODUCT INFORMATION

1.1. Product Description

General:

Product Name:	AL9S	
Marketing Name:	Klic K4 Smartphone	
Brand Name:	Kalley	
Model No.:	K4-02 4G	
Model Difference:	N/A	
Software version:	SA52A.W1527	
Hardware version:	R1.0	
USB Cable	Model No.: K074-0028 Supplier: WELL SHIN ELECTRONIC PRODUCTS CO.,	
Headset	Model No.: KJAG4028AEPCB Supplier: Kingstate Electronics Corp.	
Power Supply:	3.8Vdc from Li-ion rechargeable battery	
	Battery:	Partl No.: E1GU111K2003, Supplier: KALLEY
	Adapter:	Model No.: DSA-5PJM-05 FUS 050100 Supplier: DVE
IMEI:	357264049401046	

GSM / WCDMA / LTE:

Cellular Phone Standards Frequency Range and Power	Operating Frequency		Rated Power
	WCDMA/HSUPA/HSDPA /HSPA+ Band V	826.4MHz - 846.6MHz	24dBm

Type of Emission:	WCDMA Band V	4M16F9W
	HSDPA Band V	4M16F9W
	HSUPA Band V	4M17F9W

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Max ERP Power Measurement Result:

	dBm		W
WCDMA Band V	20.92	ERP	0.12
HSDPA Band V	19.78	ERP	0.10
HSUPA Band V	20.78	ERP	0.12

1.2. Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is mobile phone supporting, WCDMA / LTE features, and below is details of information.

Product Feature	
Product Name:	AL9S
Marketing Name:	Klic K4 Smartphone
Brand Name:	Kalley
Model No.:	K4-02 4G
Model Difference:	N/A
FCC ID:	HFS-K4-024G
WCDMA Operating Band(s)	FDD Band V
WCDMA Rel. Version	Release 8
LTE Operating Band(s)	FCC Band 4 / 7
LTE Rel. Version	Release 9 / Category 4

Note: The above EUT information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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1.3. Test Methodology of Applied Standards

FCC 47 CFR Part 2, 22

ANSI / TIA / EIA 603C-C-2004

KDB971168 D01 Power Meas license Digital System v02r02

KDB941225 of the Output power Procedure of (SAR Measurement Procedures for 3G Devices, WCDMA / HSPA) was used for EUT and Base station setting.

TS 151 010-1 is used to set, and measure the output power.

Note:

1. All test items have been performed and record as per the above standards.
2. The composite system is compliance with FCC Subpart B is authorized under the certification procedure.

1.4. Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan. (TAF code 0513)

FCC Registration Numbers are: 628985

Canada Registration Number: 4620A-5.

1.5. Special Accessories

No special accessories were used during testing.

1.6. Equipment Modifications

There were no modifications incorporated into the EUT.

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2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

2.3. Test Procedure

2.3.1 Conducted Measurement at Antenna Port

According to measurement procured TIA/EIA 603C, the EUT is placed on a turn table which is 0.8 m above ground plan. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

2.3.2 Radiated Emissions (ERP)

According to measurement procured TIA/EIA 603C, The EUT is a placed on as turn table which is 0.8 m above ground plan. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna according to the requirements in Section 8 and 13.

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2.4. Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Following shows an offset computation example with cable loss 0.5 dB for low band and 0.5 for high band with 10 dB attenuator and splitter attenuation of 3.8 for low band and 3.5 for high band..

Offset = RF cable loss (dB)+ attenuation factor(dB) =1+10+3.8=14.8(dB)

2.5. Final Amplifier Voltage and Current Information:

Test Mode	DC voltage (V)	DC current (mA)
WCDMA B5	3.8	690
HSUPA B5	3.8	690
HSDPA B5	3.8	680

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2.6. Configuration of Tested System

Fig. 2-1 Configuration of Tested System (Fixed Channel-Conducted)

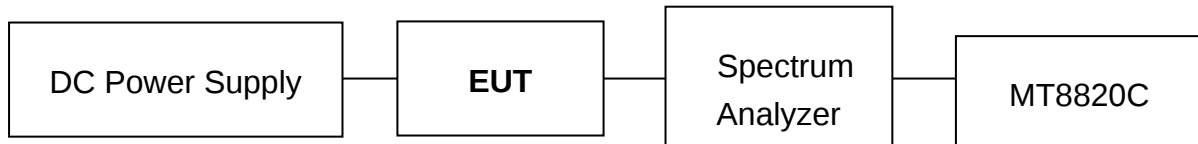
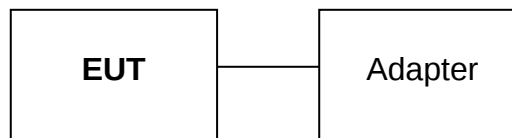


Fig. 2-2 Configuration of Tested System (Fixed Channel-Radiated)



Remote Side

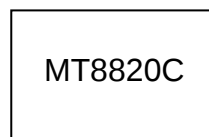


Table 2-1 Equipment Used in

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Universal Radio Communication Tester	Anritsu	MT8820C	6200307563	shielded	Un-shielded
2.	DC Power Supply	Agilent	E3634A	MY53180030	N/A	Un-shielded

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3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§2.1046(a)	RF Power Output	Compliant
§2.1046(a) §22.913(a)(2)	ERP measurement	Compliant
§2.1049(h)	99% & 26dB Occupied Bandwidth	Compliant
§2.1051 §22.917(a)	Out of Band Emissions at Antenna Terminals and Band Edge	Compliant
§2.1053 §22.917(a)	Field Strength of Spurious Radiation	Compliant
§2.1055(a)(1) §22.355	Frequency Stability	Compliant

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4. DESCRIPTION OF TEST MODES

4.1. The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X(E1)Y(E2)Z(H) axis and antenna ports. The worst case was found as listed below. Following channel(s) was (were) selected for the final test as listed below:

BAND	ERP	RADIATED EMISSION
WCDMA/HSPA Band IV	E1-plan	E1-plan

WCDMA/HSPA MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
ERP	9262 to 9538	4132, 4183, 4233	WCDMA/HSPA Band V
FREQUENCY STABILITY	9262 to 9538	4183	WCDMA Band V
OCCUPIED BANDWIDTH	9262 to 9538	4183	WCDMA/HSPA Band V
BAND EDGE	9262 to 9538	4132, 4183, 4233	WCDMA Band V
CONDCUDED EMISSION	9262 to 9538	4132, 4183, 4233	WCDMA Band V
RADIATED EMISSION	9262 to 9538	4132, 4183, 4233	WCDMA Band V

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5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
RF Power Output	+/- 1.10 dB
ERP measurement	Vertical Polarization = +/- 4.74dB Horizontal Polarization = +/- 4.62dB
99% Occupied Bandwidth	+/- 5.19 Hz
Out of Band Emissions at Antenna	+/- 0.70 dB
Terminals and Band Edge	
Peak to Average Ratio	+/- 0.70 dB
Frequency Stability vs. Temperature	+/- 5.19 Hz
Frequency Stability vs. Voltage	+/- 5.19 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : Vertical)	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : Horizontal)	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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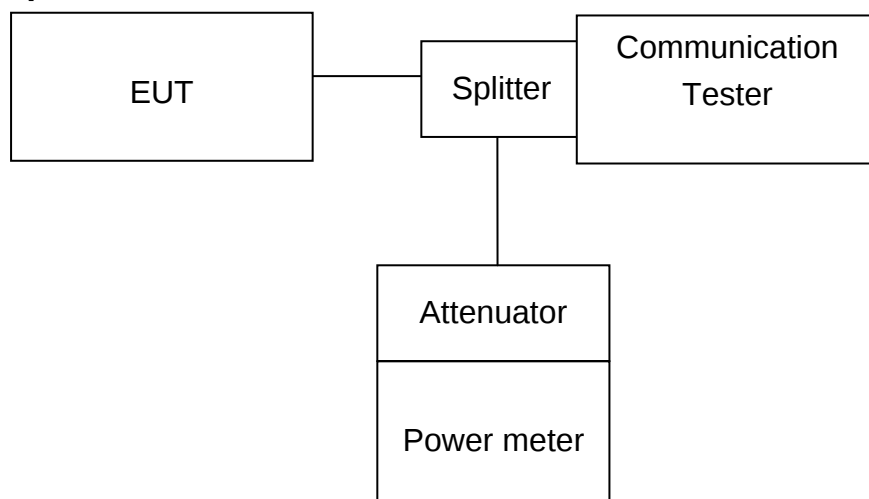
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6. RF CONDUCTED OUTPUT POWER MEASUREMENT

6.1. Standard Applicable

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals.

6.2. Test Set-up



Note: Measurement setup for testing on Antenna connector

6.3. Measurement Procedure

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading. TS 151 010-1 is reference to conduct the test measurement of output power.

The Procedure of KDB941225 (SAR Measurement Procedures for 3G devices, (WCDMA/HSPA) was used for EUT and Base station setting. RMC 12.2kps is used for this testing, and KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results

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6.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
Communication Tester	Anritsu	MT8820C	6201107337	05/27/2015	05/26/2016
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/19/2014	12/18/2015
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/18/2015	06/17/2016
DC Block	PASTERNAK	PE8210	RF29	12/19/2014	12/18/2015
Splitter	RF-LAMBDA	RFLT2W1G18G	RF35	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2015	05/03/2016

6.5. Measurement Result

RF Conducted Output Power

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WCDMA MODE:

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 V8.4.0 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7). RMC 12.2kps is used for this testing.

Results:

EUT Mode	Frequency (MHz)	CH	Peak Power (dBm)	Avg. Power (dBm)
WCDMA Band V	826.4	4132	27.12	23.38
	836.6	4183	27.05	23.35
	846.6	4233	27.00	23.37
HSDPA Band V	826.4	4132	26.27	22.25
	836.6	4183	26.28	22.29
	846.6	4233	26.18	22.23
HSUPA Band V	826.4	4132	25.61	21.66
	836.6	4183	25.55	21.64
	846.6	4233	25.47	21.58

Note: The results above reflect max power with all up bits.

Cable loss offset Low Band: 1dB

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HSDPA Release 6 MODE:

The following 4 Sub-Tests were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121-1 V8.4.0 specification. All TX RMS power requirements for Power Class 3 were met according to table 5.2AA.5 and 5.2B.5 All UE channels and power ratio's are set according to table C10.1.4 & C11.1.3 in the 3GPP TS34.121-1 V8.4.0. RMC 12.2kps is used for this testing.

HSDPA SUB-TEST Setting

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH(FOR HSDPA)

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)	RMC (Kbps)
1	2/15	15/15	64	2/15	4/15	0.0	0.0	12.2
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0	12.2
3	15/15	8/15	64	15/8	30/15	1.5	0.5	12.2
4	15/15	4/15	64	15/4	30/15	1.5	0.5	12.2

Note: The recommended HSDPA MPRs are implemented as per following sub-tests.

Results:

Mode	Sub-test	Avg. Power (dBm) Channel			Power Class 3 Lim- itation (dBm)	Comments
		4132	4183	4233		
HSDPA (B5)	1	23.17	23.21	23.25	20.3dBm – 25.7dBm	Pass
	2	23.31	23.24	23.24	20.3dBm – 25.7dBm	Pass
	3	22.71	22.73	22.76	19.8dBm – 25.7dBm	Pass
	4	22.76	22.77	22.82	19.8dBm – 25.7dBm	Pass

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HSPA (HSDPA & HSUPA) Release 6 MODE

The following 5 Sub-Tests were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121-1 V8.4.0 specification. All TX RMS power requirements for Power Class 3 were met according to table 5.2AA.5 and 5.2B.5 All UE channels and power ratio's are set according to table C11.1.3 in the 3GPP TS34.121-1 V8.4.0. RMC 12.2kps is used for this testing

HSPA SUB-TEST Setting

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH(FOR HSUPA)

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (Code s)	CM (dB)	MPR (dB)	AG Index	E-TFCI	RMC (Kbps)
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75	12.2
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67	12.2
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1} : 47/15 β_{ed2} : 47/15	4 4	2	2.0	1.0	15	92	12.2
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71	12.2
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81	12.2

Note: The recommended HSUPA MPRs are implemented as per following sub-tests.

Results:

Mode	Sub-test	Avg. Power (dBm)			Power Class 3 Limitation (dBm)	Comments
		4132	4183	4233		
HSUPA(B5)	1	23.34	23.28	23.29	18.8dBm – 25.7dBm	Pass
	2	21.40	21.36	21.33	16.8dBm – 25.7dBm	Pass
	3	22.38	22.34	22.37	17.8dBm – 25.7dBm	Pass
	4	21.45	21.42	21.41	16.8dBm – 25.7dBm	Pass
	5	23.20	23.11	23.18	18.8dBm – 25.7dBm	Pass

WCDMA/HSDPA/HSUPA band V

The EUT output power was controlled by simulator. Set Communication Tester CMU200 function key "UE Power Control" and enter max rated power 24dBm. The EUT is going to be set to max output power to 24dBm. Then record the read (see page 7 for measurement data). The min. power was measures by a function key "minimum power" then record the read. It is -52.3dBm. The power variation can be 0.1dB step by setting.

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7. EFFECTIVE RADIATED POWER AND EQUIVALENT ISOTROPIC RADIATED POWER MEASUREMENT

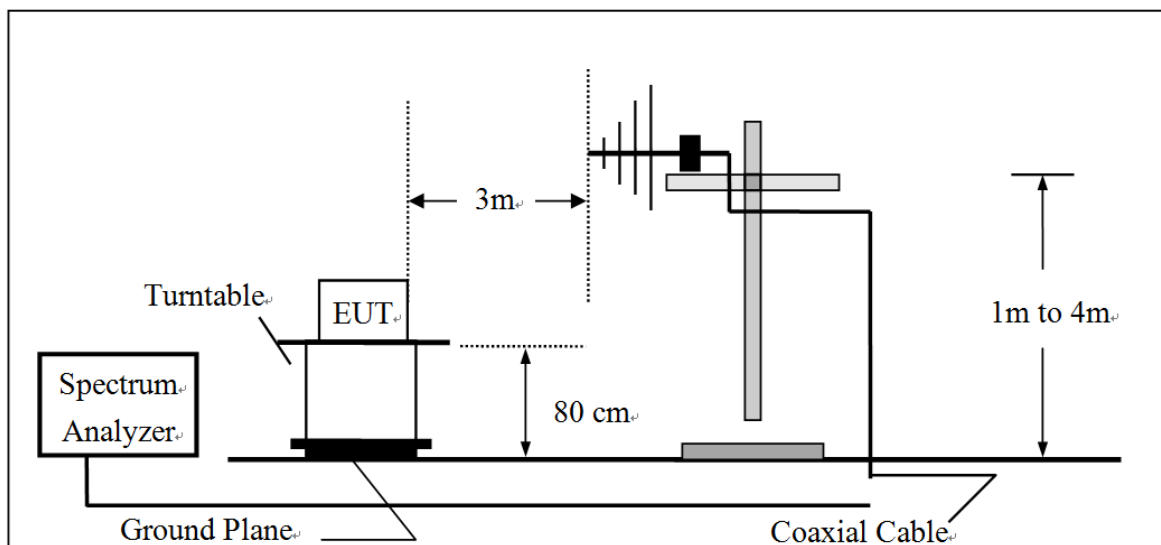
7.1. Standard Applicable

According to FCC §2.1046

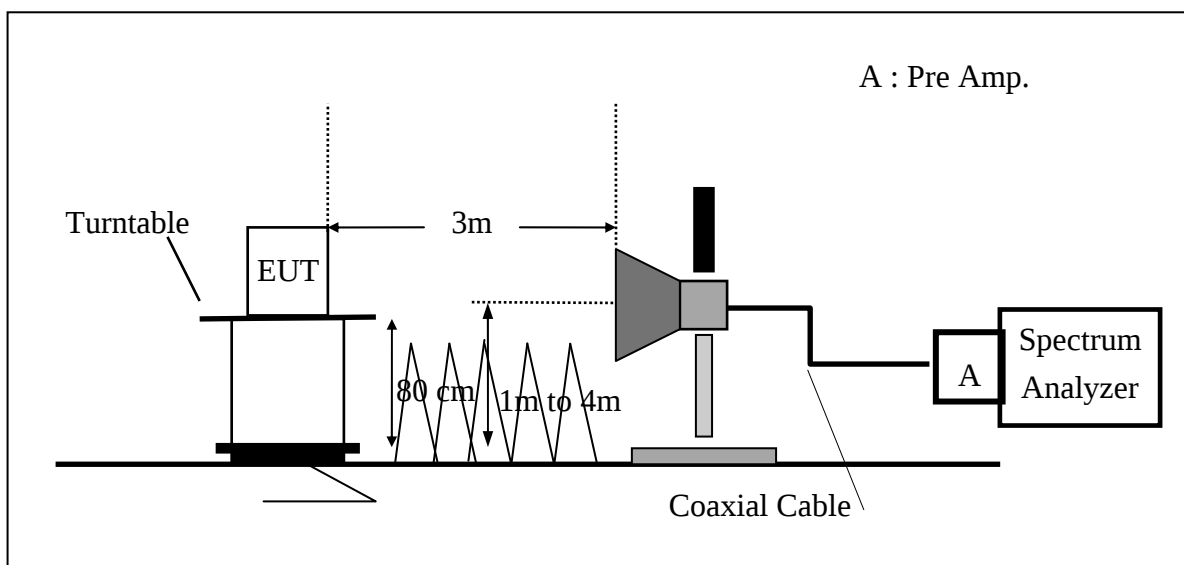
FCC 22.913(a) Mobile station is limited to 7W ERP.

7.2. Test SET-UP

(A) Radiated Power Test Set-Up, Frequency Below 1000MHz



(B) Radiated Power Test Set-Up Frequency Over 1 GHz



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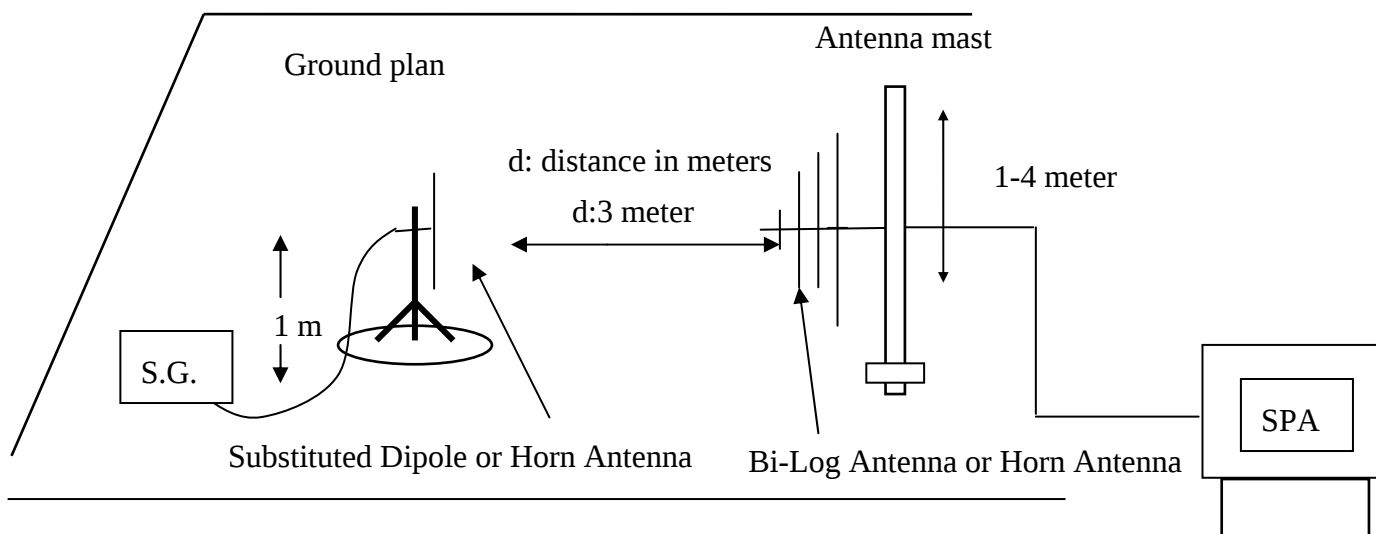
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(C) Substituted Method Test Set-UP



7.3. Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB 971168 D01
 2. The EUT was placed on a non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.
 3. During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated
 4. The testing follows the Measurement Procedure of FCC KDB 971168 D01
 5. 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.
 6. $ERP = S.G. \text{ output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable Loss (dB)}$
 7. Spectrum setting:
 - (1) Detector = Peak, marker the highest value of the detector by maximum hold, set RBW wide enough to capture the entire signal of emission, and $VBW > 3 \times RBW$.
 - (2) KDB 971168 D01 is adopted, and the procedure as lists under item 4, Measurement of the Average Power over the Fundamental Signal Bandwidth, is followed to set correspondingly for the acquisition of proper measurement data.
- Set frequency = nominal signal center frequency;

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Set span = 2 X occupied BW;
Set RBW $\approx$ 1~5% of the span, not to exceed 1 MHz
Set VBW = 3 x RBW;
Select average power (RMS) detector
Set sweep time and number of measurement points to achieve a minimum of 1 millisecond/pt
integration time (ex. Point = 601points, then sweep time = $601 \times 10^{-3} = 6\text{s}$).

Activate trace averaging routine over a minimum of 10 sweeps;
Activate marker/span pair and set span = signal or channel bandwidth;
Activate the band/interval power marker function;
Record the band power level;

Record adjusted value as the average signal power level. Then activate the occupied bandwidth measurement function.

The proper adjustment due to limitation of spectrum capability is given compensated to spectrum with conversion factor of $10 \times \log(\text{TBW}/\text{RBW})$, where TBW is the transmission BW of UE exceeding the maximum BW UE can extend, and RBW is the resolution BW in spectrum.

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7.4. Measurement Equipment Used

ERP MEASUREMENT EQUIPMENT List 966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESU 40	100363	04/09/2015	04/08/2016
Broadband Antenna	TESEQ	CBL 6112D	35240	12/05/2014	12/04/2015
Broadband Antenna	TESEQ	CBL 6112D	35243	11/14/2014	11/13/2015
Horn Antenna	ETS-Lindgren	3117	00143272	12/08/2014	12/07/2015
Horn Antenna	ETS-Lindgren	3117	00143280	09/23/2014	09/22/2015
Horn Antenna	ETS-Lindgren	3160-09	00117911	11/13/2014	11/12/2015
Horn Antenna	ETS-Lindgren	3160-09	00117910	11/13/2014	11/12/2015
Pre Amplifier	EMC Instruments	EMC330	980096	12/19/2014	12/18/2015
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-18	10204	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-26	100780	12/19/2014	12/18/2015
Pre Amplifier	EMC Instruments	EMC184045B	980135	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF27	12/19/2014	12/18/2015
Communication Tester	Anritsu	MT8820C	6201107337	05/27/2015	05/26/2016
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2015	05/03/2016
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

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7.5. Measurement Result: (Peak) –using option of peak measurement

EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	ERP	Limit
	MHz		V/H	dBm	dBd	dB	dBm	dBm
WCDMA B5	826.4	4132	V	16.14	5.13	-3.34	17.93	38.45
			H	18.38	5.13	-3.34	20.17	38.45
	836.6	4183	V	16.88	5.09	-3.38	18.59	38.45
			H	19.21	5.09	-3.38	20.92	38.45
	846.6	4233	V	17.34	5.06	-3.41	18.99	38.45
			H	18.17	5.06	-3.41	19.82	38.45

EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	ERP	Limit
	MHz		V/H	dBm	dBd	dB	dBm	dBm
HSDPA B5	826.4	4132	V	15.19	5.13	-3.33	16.99	38.45
			H	17.98	5.13	-3.33	19.78	38.45
	836.6	4183	V	16.41	5.09	-3.41	18.09	38.45
			H	17.83	5.09	-3.41	19.51	38.45
	846.6	4233	V	16.65	5.06	-3.40	18.31	38.45
			H	17.58	5.06	-3.40	19.24	38.45

EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	ERP	Limit
	MHz		V/H	dBm	dBd	dB	dBm	dBm
HSUPA B5	826.4	4132	V	14.66	5.13	-3.34	16.45	38.45
			H	18.99	5.13	-3.34	20.78	38.45
	836.6	4183	V	16.61	5.09	-3.42	18.28	38.45
			H	18.55	5.09	-3.42	20.22	38.45
	846.6	4233	V	17.70	5.06	-3.41	19.35	38.45
			H	18.95	5.06	-3.41	20.60	38.45

Remark :

- (1) The RBW,VBW of SPA for frequency RBW= 300kHz , VBW= 1MHz

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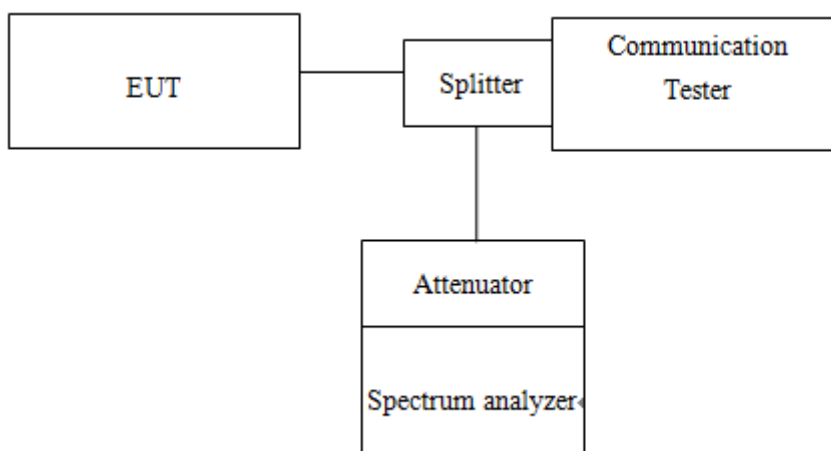
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8. OCCUPIED BANDWIDTH MEASUREMENT

8.1. Standard Applicable

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power.

8.2. Test Set-up



8.3. Measurement Procedure

99% & 26dB Bandwidth

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW= 3 times RBW, -26dBc display line was placed on the screen (or 26dB bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace. Then set RBW to 99% bandwidth, RBW= 1%, VBW= 3 RBW, with span > 2 * Signal BW, set % Power = 99%.

NOTE: For the plot of bandwidth measurement, the marker of the 99% bandwidth is diamond-shape while the marker of the 20dB BW is arrow-mark

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8.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
Communication Tester	Anritsu	MT8820C	6201107337	05/27/2015	05/26/2016
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/19/2014	12/18/2015
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/18/2015	06/17/2016
DC Block	PASTERNAK	PE8210	RF29	12/19/2014	12/18/2015
Splitter	RF-LAMBDA	RFLT2W1G18G	RF35	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2015	05/03/2016

8.5. Measurement Result 99% Bandwidth

Frequency (MHz)	CH	99% Bandwidth (MHz)	99% Bandwidth (MHz)	99% Bandwidth (MHz)
		WCDMA V	HSDPA V	HSUPA V
826.40	4132	4.1593	4.1325	4.1345
836.60	4183	4.1475	4.1381	4.1644
846.60	4233	4.1515	4.1553	4.1653

26dB Bandwidth

Frequency (MHz)	CH	26dB Bandwidth (MHz)	26dB Bandwidth (MHz)	26dB Bandwidth (MHz)
		WCDMA V	HSDPA V	HSUPA V
826.40	4132	4.617	4.596	4.600
836.60	4183	4.595	4.615	4.636
846.60	4233	4.610	4.609	4.637

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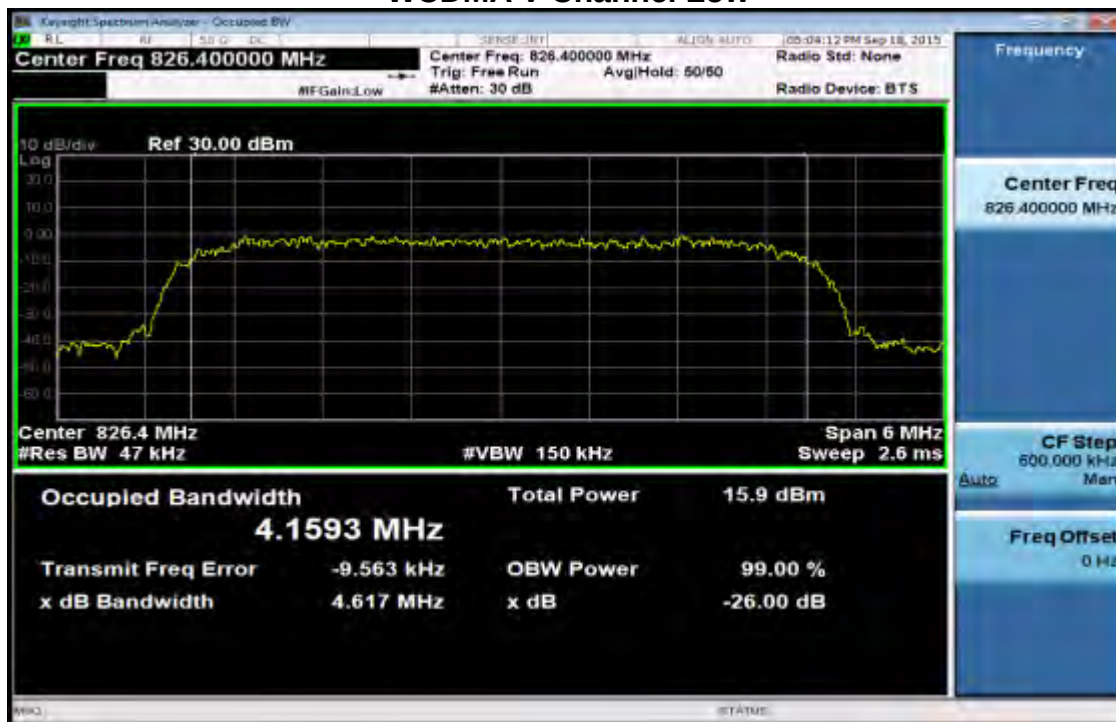
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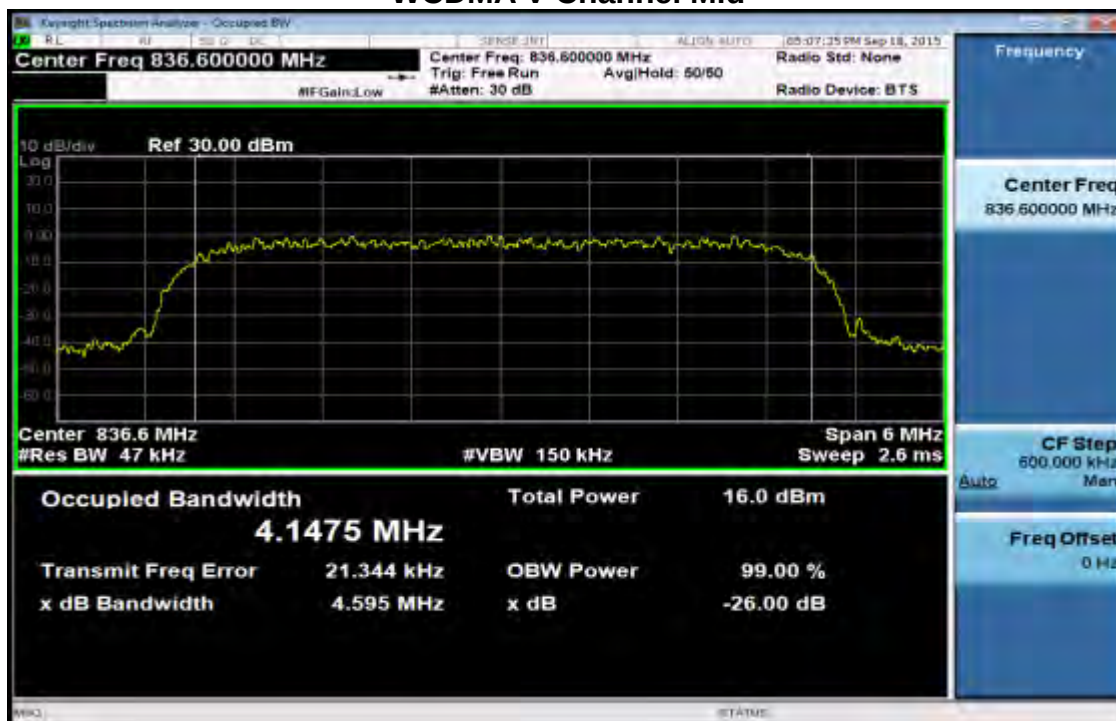
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99% & 26dB Bandwidth Test Data

WCDMA V Channel Low



WCDMA V Channel Mid



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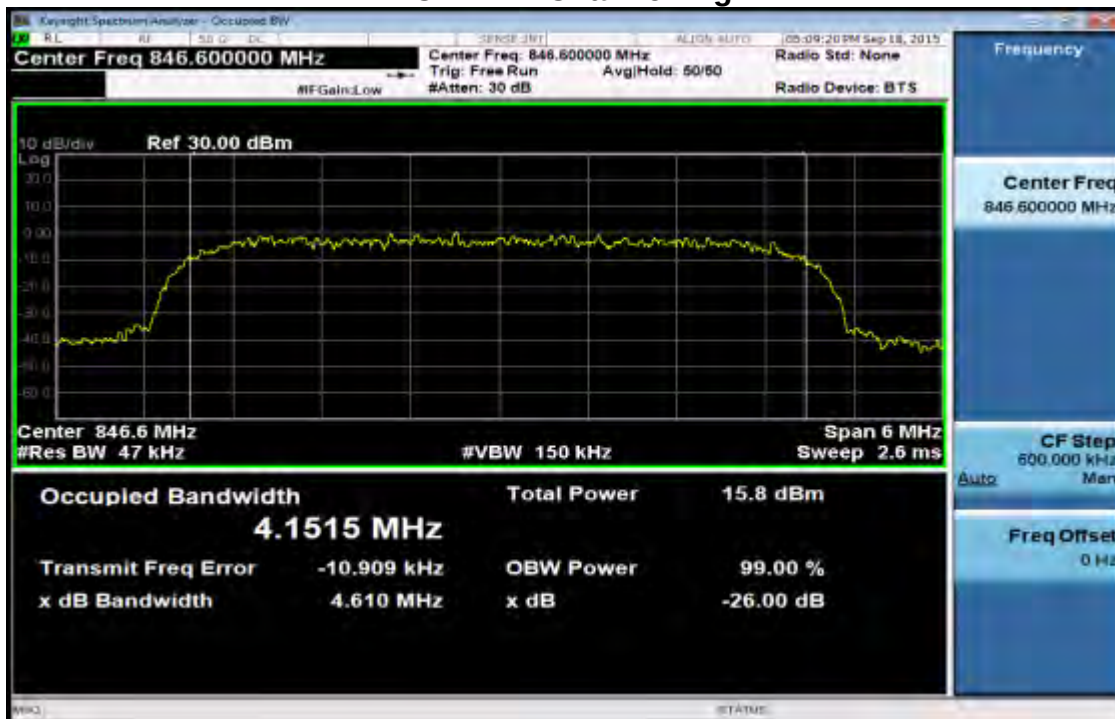
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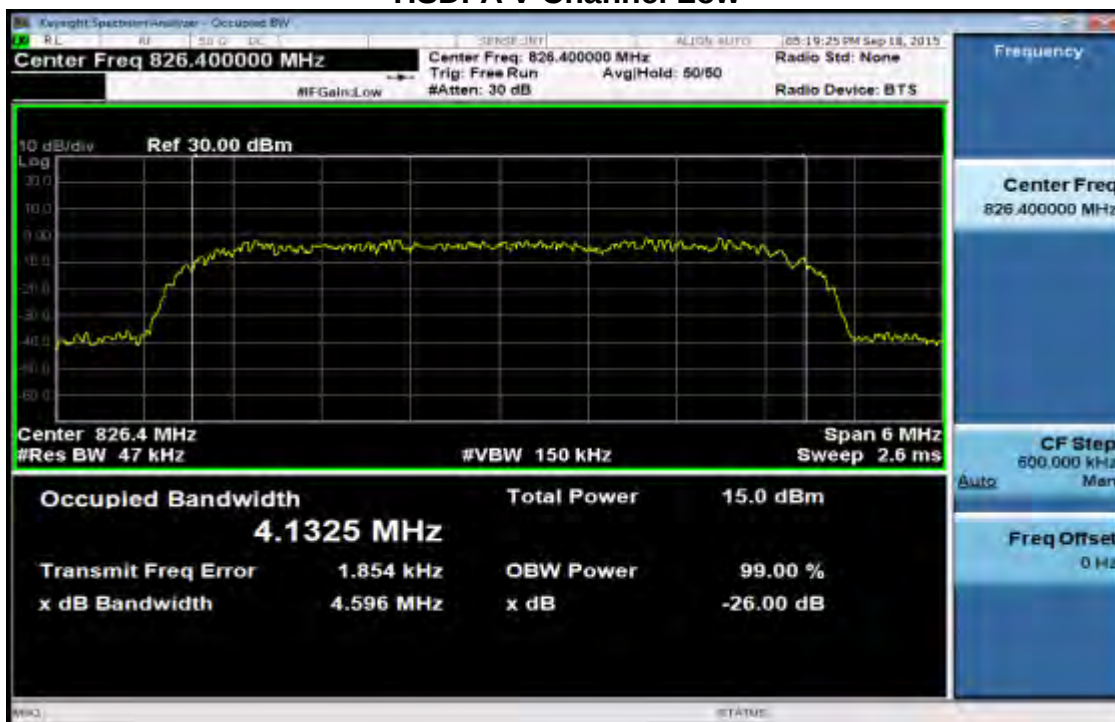
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WCDMA V Channel High



HSDPA V Channel Low



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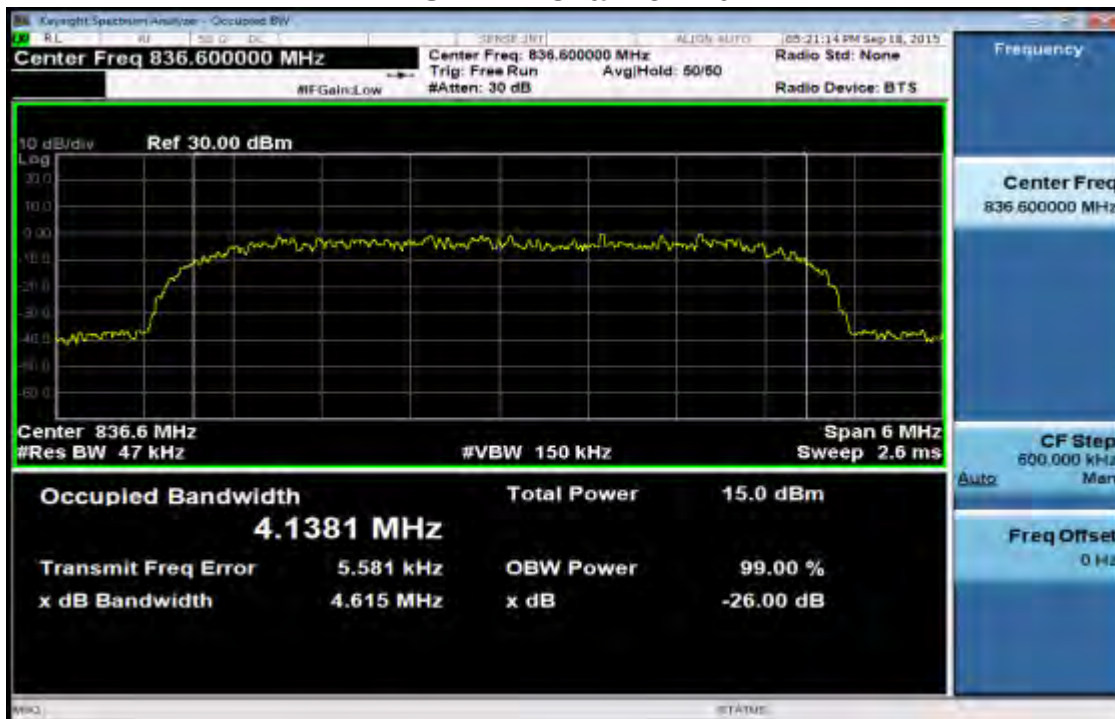
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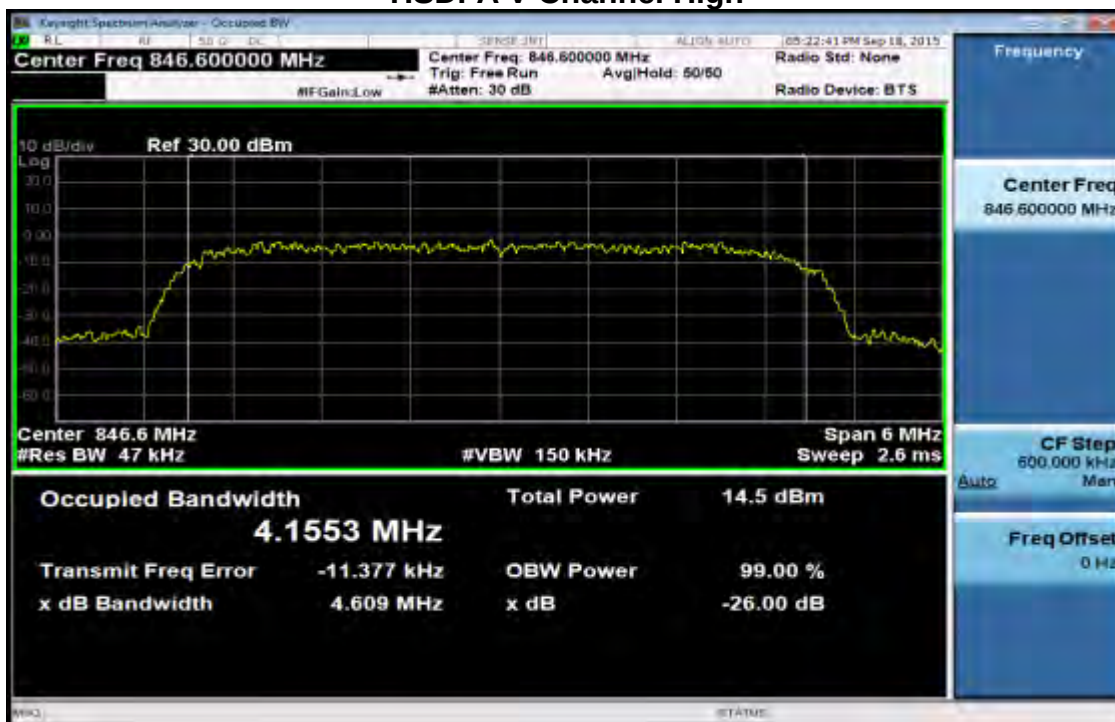
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HSDPA V Channel Mid



HSDPA V Channel High



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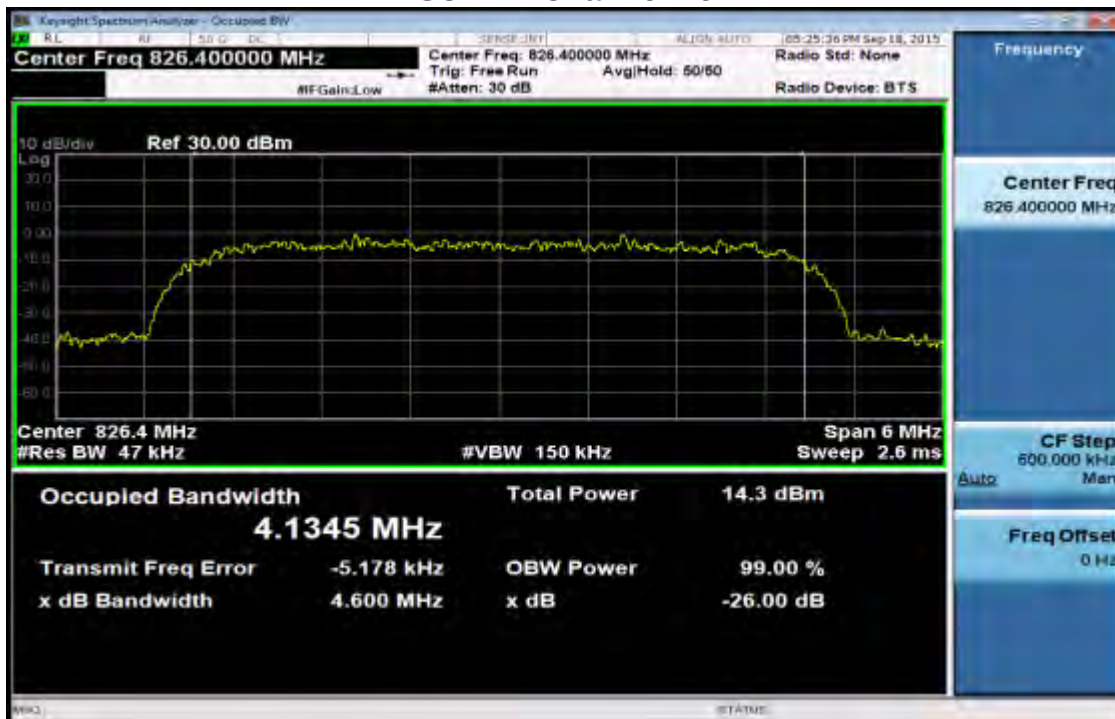
t (886-2) 2299-3279

f (886-2) 2298-0488

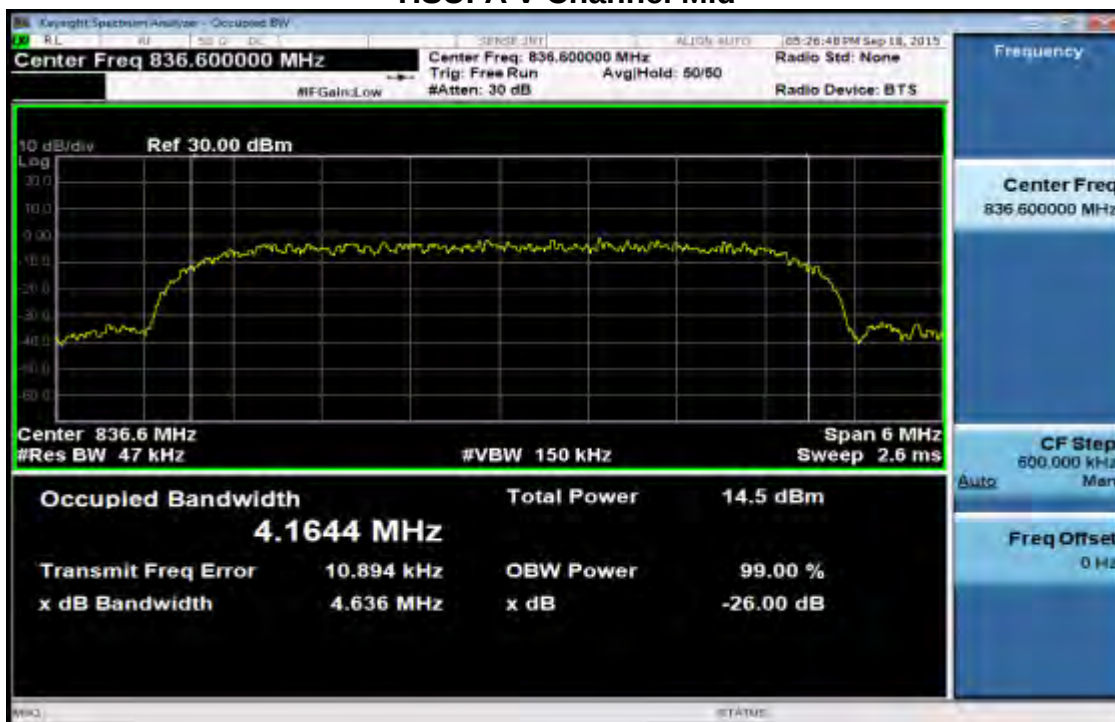
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HSUPA V Channel Low



HSUPA V Channel Mid



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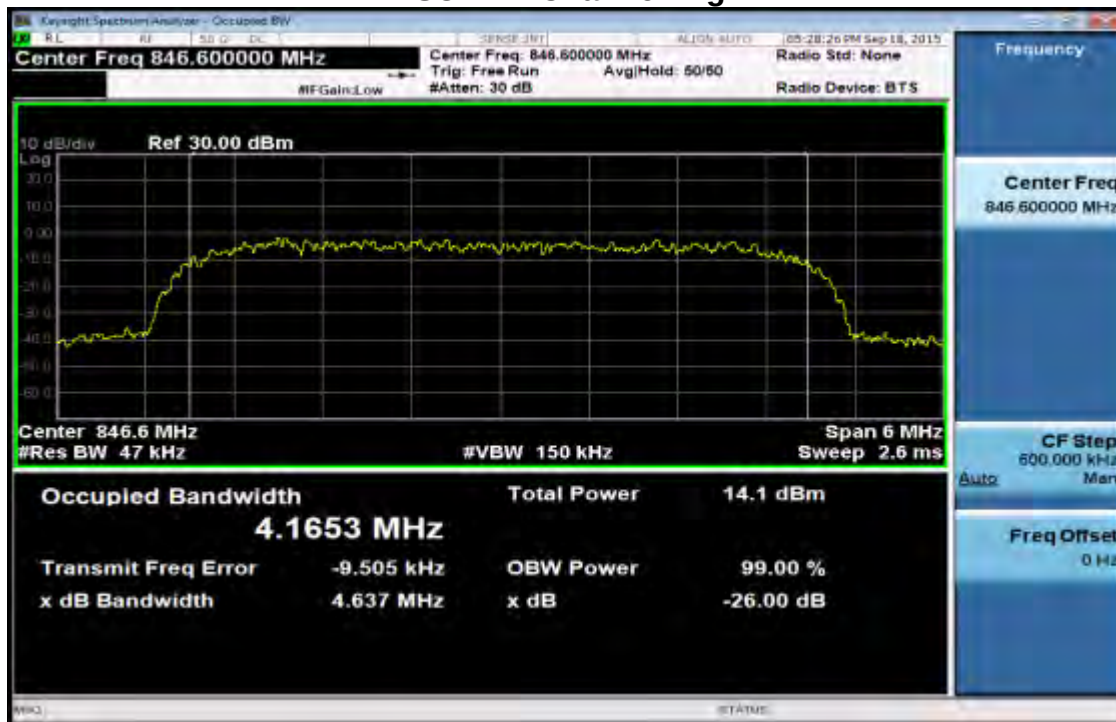
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HSUPA V Channel High



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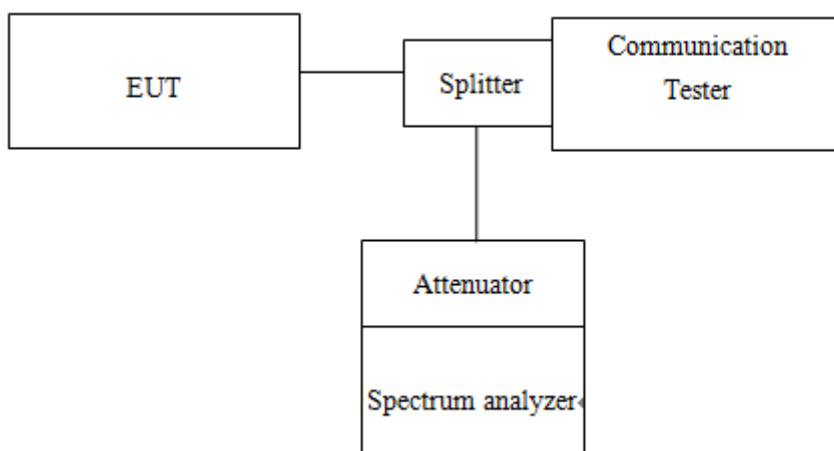
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9. OUT OF BAND EMISSION AT ANTENNA TERMINALS

9.1. Standard Applicable

FCC §22.917(a), the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/or alignment procedure, shall not be less than $43 + 10 \log$ (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm).

9.2. Test SET-UP



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9.3. Measurement Procedure

Conducted Emission

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 1MHz & VBW = 1MHz on Spectrum.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

Band Edge

1. To connect Antenna Port of EUT to Spectrum.
2. The band edge of low and high channels for the highest RF powers was measured. Setting RBW $\geq$ 1% EBW.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

9.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
Communication Tester	Anritsu	MT8820C	6201107337	05/27/2015	05/26/2016
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/19/2014	12/18/2015
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/18/2015	06/17/2016
DC Block	PASTERNAK	PE8210	RF29	12/19/2014	12/18/2015
Splitter	RF-LAMBDA	RFLT2W1G18G	RF35	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2015	05/03/2016

9.5. Measurement Result:

Refer to next pages.

NOTE: The occurrence of the spike on the conducted emission is the signal of the fundamental emission.

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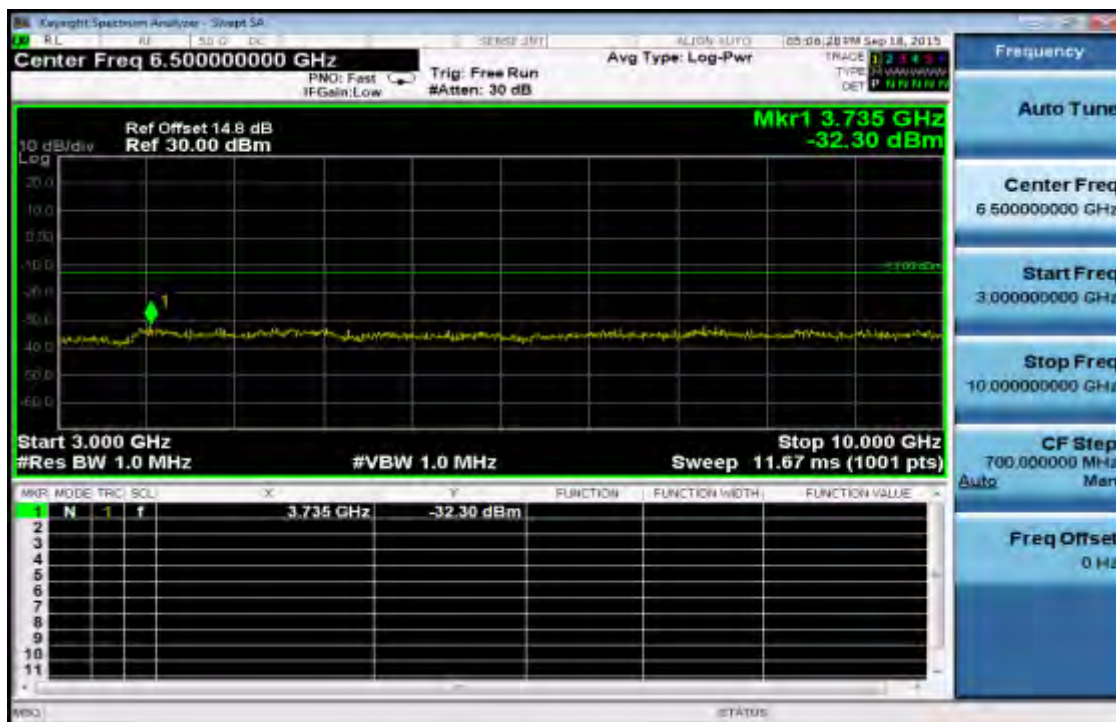
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Out of Band emission at antenna terminals – WCDMA V Channel Lowest



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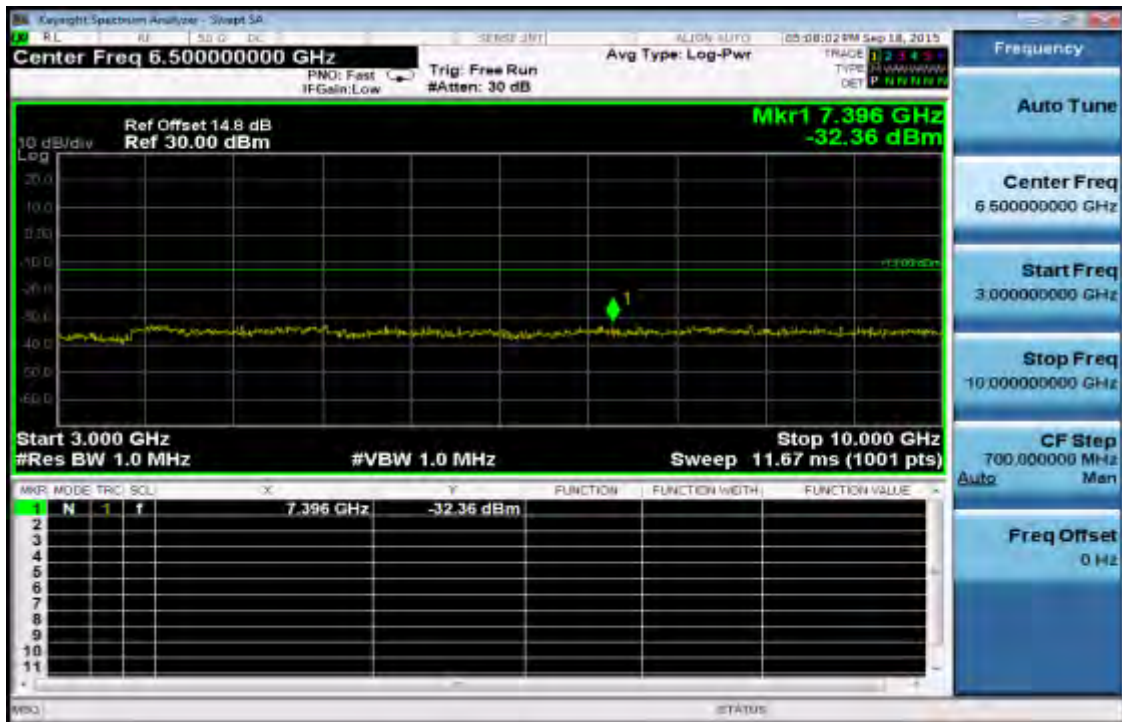
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Out of Band emission at antenna terminals – WCDMA V Channel Mid



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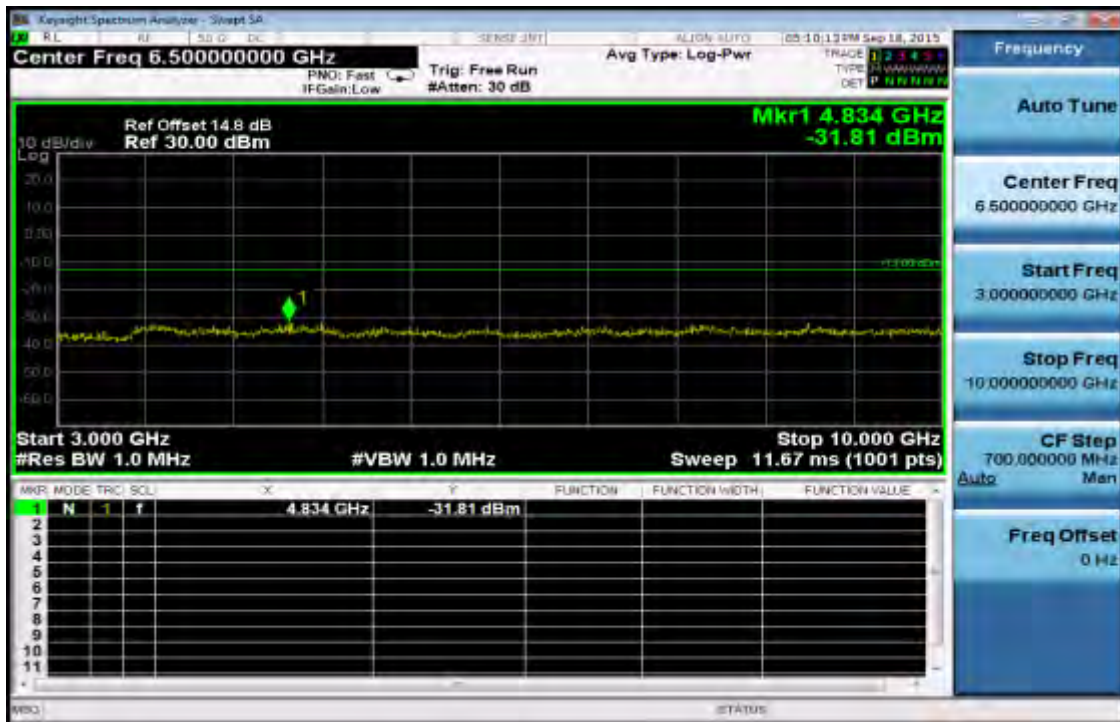
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Out of Band emission at antenna terminals – WCDMA V Channel Highest



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Band edge emission at antenna terminals – WCDMA V Channel Lowest



Band edge emission at antenna terminals – WCDMA V Channel Highest



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10. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

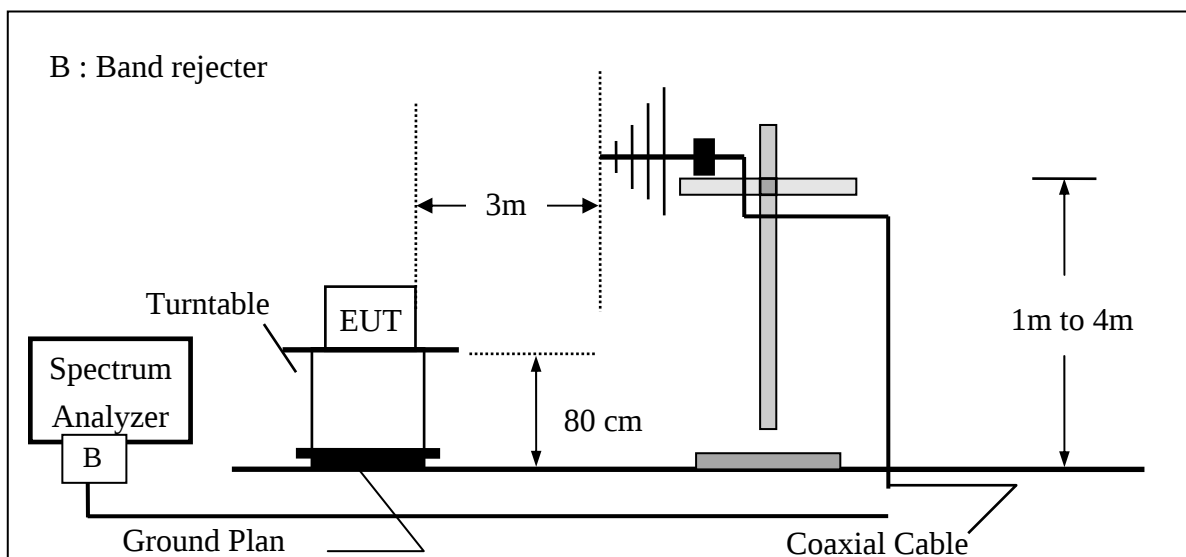
10.1. Standard Applicable

According to FCC §2.1053,

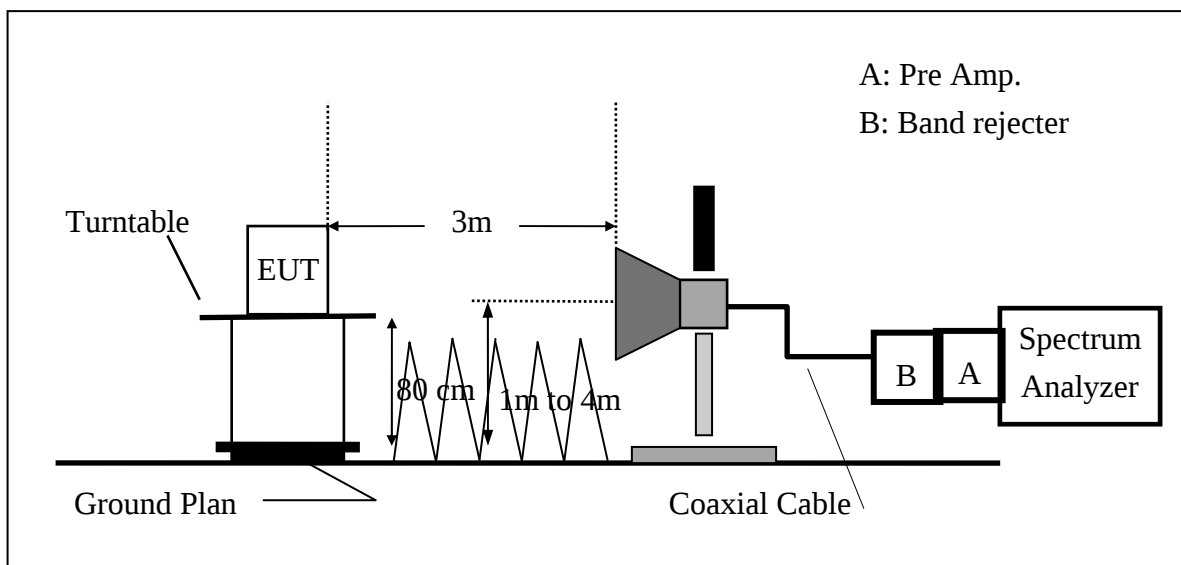
FCC §22.917(a), the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than $43 + 10 \log$ (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm).

10.2. EUT Setup

Radiated Emission Test Set-Up, Frequency Below 1000MHz



Radiated Emission Test Set-UP Frequency Over 1 GHz



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10.3. Measurement Procedure:

The EUT was placed on a non-conductive; the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$$\text{ERP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBd)} + \text{Cable Loss(dB)}$$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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10.4. Measurement Equipment Used:

ERP MEASUREMENT EQUIPMENT List 966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESU 40	100363	04/09/2015	04/08/2016
Broadband Antenna	TESEQ	CBL 6112D	35240	12/05/2014	12/04/2015
Broadband Antenna	TESEQ	CBL 6112D	35243	11/14/2014	11/13/2015
Horn Antenna	ETS-Lindgren	3117	00143272	12/08/2014	12/07/2015
Horn Antenna	ETS-Lindgren	3117	00143280	09/23/2014	09/22/2015
Horn Antenna	ETS-Lindgren	3160-09	00117911	11/13/2014	11/12/2015
Horn Antenna	ETS-Lindgren	3160-09	00117910	11/13/2014	11/12/2015
Pre Amplifier	EMC Instruments	EMC330	980096	12/19/2014	12/18/2015
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-18	10204	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-26	100780	12/19/2014	12/18/2015
Pre Amplifier	EMC Instruments	EMC184045B	980135	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF27	12/19/2014	12/18/2015
Communication Tester	Anritsu	MT8820C	6201107337	05/27/2015	05/26/2016
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2015	05/03/2016
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

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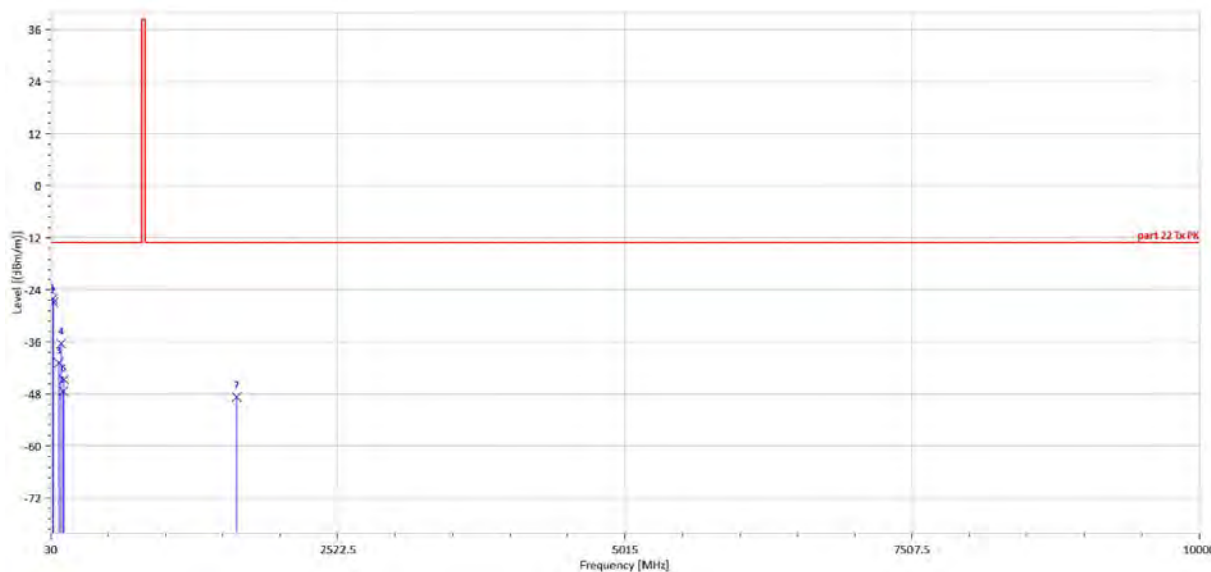
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10.5. Measurement Result:

Radiated Spurious Emission Measurement Result: HSDPA V Mode

ARFCN	:CH 4132	Test Date	:2015-09-19
Operation Band	:HSDPA B5	Temp./Humi.	:25.5deg_C/61RH
Fundamental Frequency	:826.4 MHz	Engineer	:Ashton
Operation Mode	:TX LOW		
EUT Pol.	:E1 Plan	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	ERP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBd	Loss dB	dBm	dB
49.43	S	-26.07	-17.69	-7.51	-0.86	-13.00	-13.07
54.29	S	-26.82	-20.50	-5.45	-0.87	-13.00	-13.82
102.87	S	-40.70	-36.06	-3.42	-1.22	-13.00	-27.70
123.92	S	-36.28	-31.99	-2.95	-1.34	-13.00	-23.28
143.36	S	-47.40	-45.17	-0.72	-1.51	-13.00	-34.40
146.59	S	-44.61	-42.97	-0.23	-1.40	-13.00	-31.61
1652.80	H	-48.70	-47.29	3.70	-5.10	-13.00	-35.70

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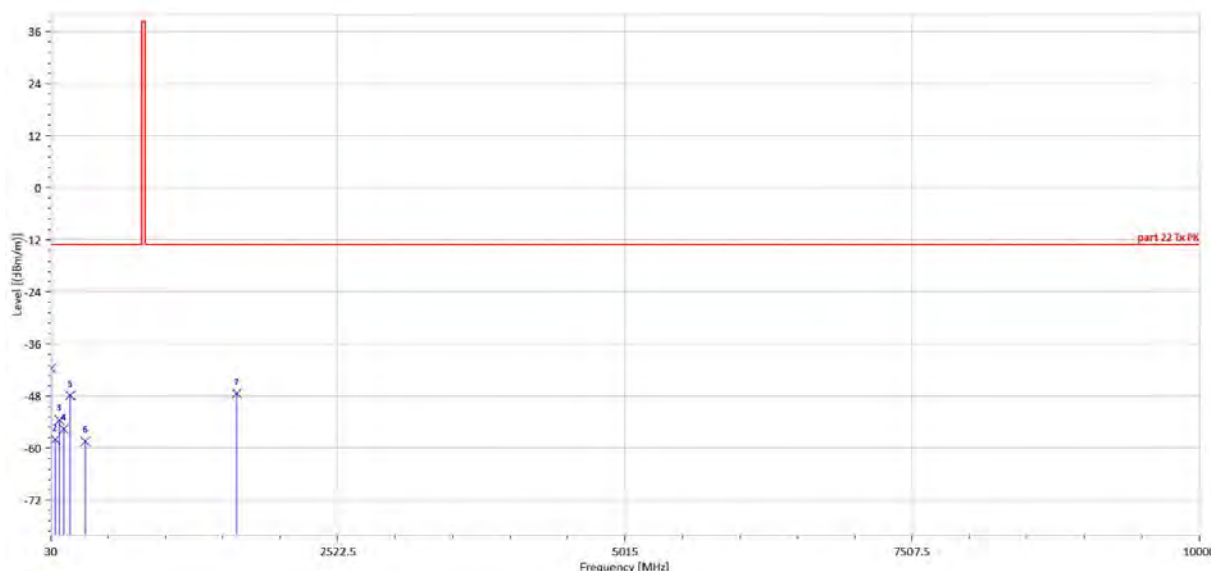
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ARFCN	:CH 4132	Test Date	:2015-09-19
Operation Band	:HSDPA B5	Temp./Humi.	:25.5deg_C/61RH
Fundamental Frequency	:826.4 MHz	Engineer	:Ashton
Operation Mode	:TX LOW		
EUT Pol.	:E1 Plan	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	ERP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBd	Loss dB	dBm	dB
34.86	S	-41.51	-22.50	-18.28	-0.72	-13.00	-28.51
70.48	S	-57.97	-55.05	-1.93	-0.99	-13.00	-44.97
107.73	S	-53.52	-48.72	-3.55	-1.25	-13.00	-40.52
146.59	S	-55.56	-53.92	-0.23	-1.40	-13.00	-42.56
203.27	S	-47.86	-49.98	3.85	-1.73	-13.00	-34.86
331.20	S	-58.39	-59.69	3.46	-2.16	-13.00	-45.39
1652.80	H	-47.43	-46.02	3.70	-5.10	-13.00	-34.43

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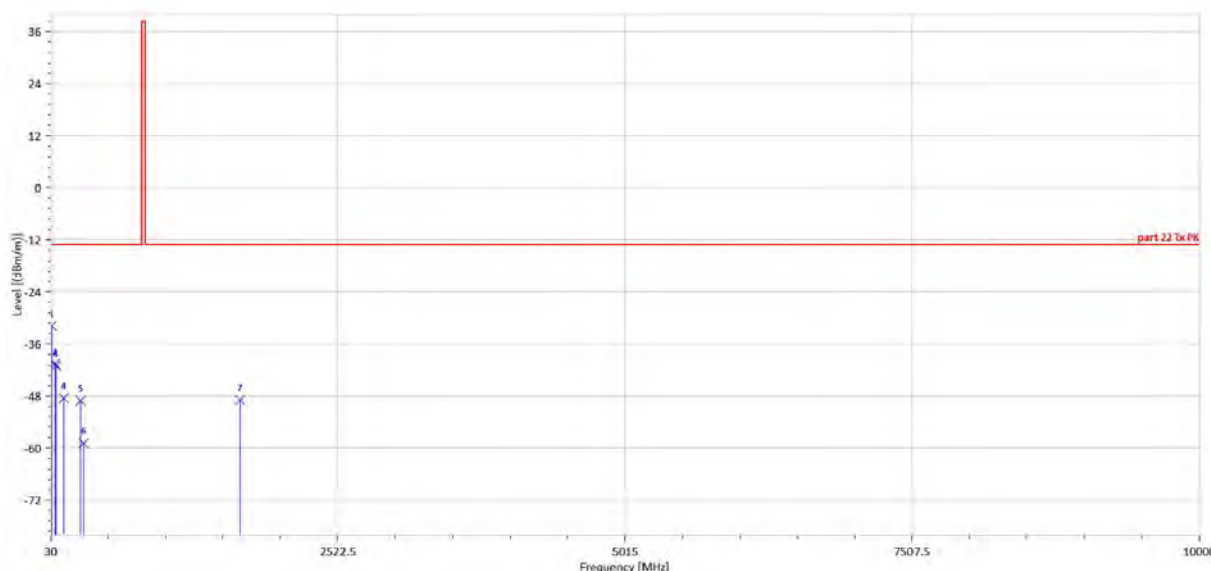
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ARFCN	:CH 4183	Test Date	:2015-09-19
Operation Band	:HSDPA B5	Temp./Humi.	:25.5deg_C/61RH
Fundamental Frequency	:836.6 MHz	Engineer	:Ashton
Operation Mode	:TX MID		
EUT Pol.	:E1 Plan	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	ERP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBd	Loss dB	dBm	dB
39.72	S	-31.81	-16.69	-14.33	-0.79	-13.00	-18.81
68.86	S	-40.43	-37.32	-2.08	-1.03	-13.00	-27.43
78.58	S	-40.94	-38.18	-1.72	-1.04	-13.00	-27.94
146.59	S	-48.49	-46.86	-0.23	-1.40	-13.00	-35.49
289.10	S	-49.10	-50.46	3.40	-2.04	-13.00	-36.10
316.63	S	-58.81	-60.11	3.48	-2.17	-13.00	-45.81
1673.20	H	-48.91	-47.41	3.63	-5.12	-13.00	-35.91

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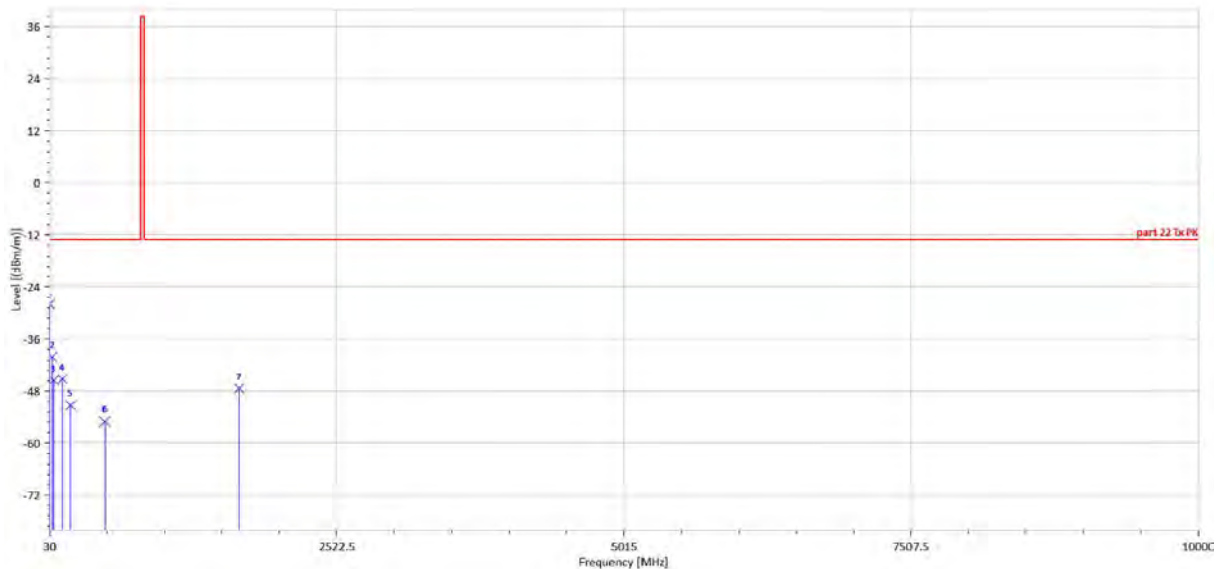
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ARFCN	:CH 4183	Test Date	:2015-09-19
Operation Band	:HSDPA B5	Temp./Humi.	:25.5deg_C/61RH
Fundamental Frequency	:836.6 MHz	Engineer	:Ashton
Operation Mode	:TX MID		
EUT Pol.	:E1 Plan	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	ERP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBd	Loss dB	dBm	dB
30.00	S	-27.95	-4.81	-22.50	-0.64	-13.00	-14.95
52.67	S	-40.07	-33.11	-6.10	-0.86	-13.00	-27.07
65.63	S	-45.52	-42.05	-2.48	-0.99	-13.00	-32.52
143.36	S	-45.22	-42.99	-0.72	-1.51	-13.00	-32.22
214.61	S	-51.30	-53.53	4.00	-1.77	-13.00	-38.30
510.95	S	-54.99	-56.42	4.02	-2.60	-13.00	-41.99
1673.20	H	-47.42	-45.93	3.63	-5.12	-13.00	-34.42

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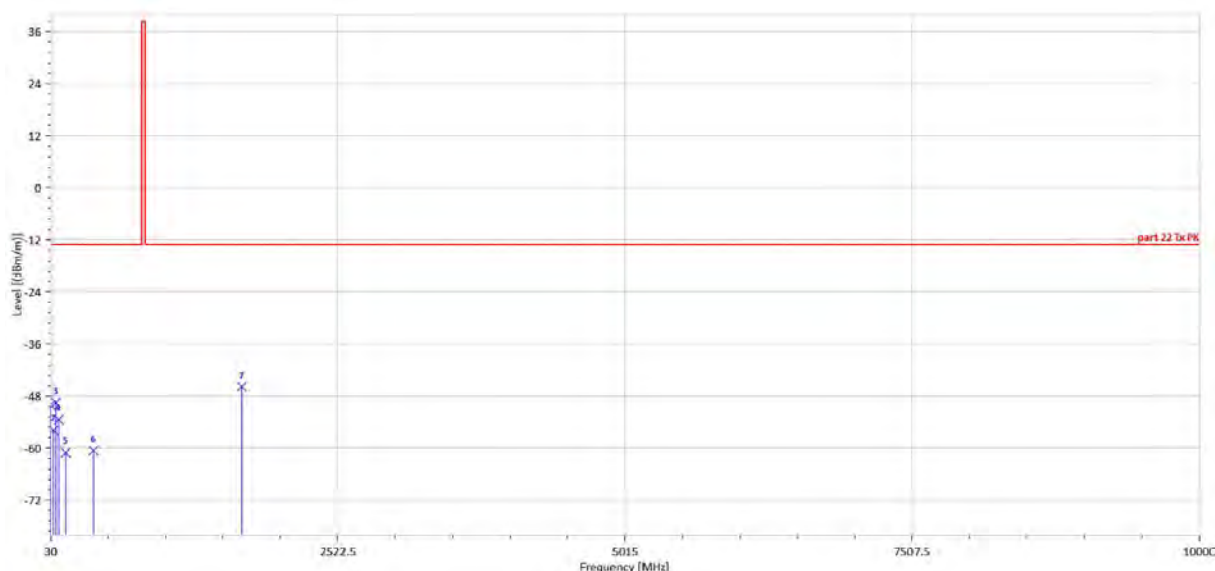
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ARFCN	:CH 4233	Test Date	:2015-09-19
Operation Band	:HSDPA B5	Temp./Humi.	:25.5deg_C/61RH
Fundamental Frequency	:846.6 MHz	Engineer	:Ashton
Operation Mode	:TX HIGH		
EUT Pol.	:E1 Plan	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	ERP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBd	Loss dB	dBm	dB
30.00	S	-50.11	-26.97	-22.50	-0.64	-13.00	-37.11
54.29	S	-55.87	-49.54	-5.45	-0.87	-13.00	-42.87
76.96	S	-49.53	-46.69	-1.76	-1.08	-13.00	-36.53
101.25	S	-53.39	-48.82	-3.37	-1.20	-13.00	-40.39
164.41	S	-60.98	-61.34	1.88	-1.53	-13.00	-47.98
404.07	S	-60.50	-61.25	3.23	-2.49	-13.00	-47.50
1693.20	H	-45.89	-44.33	3.59	-5.15	-13.00	-32.89

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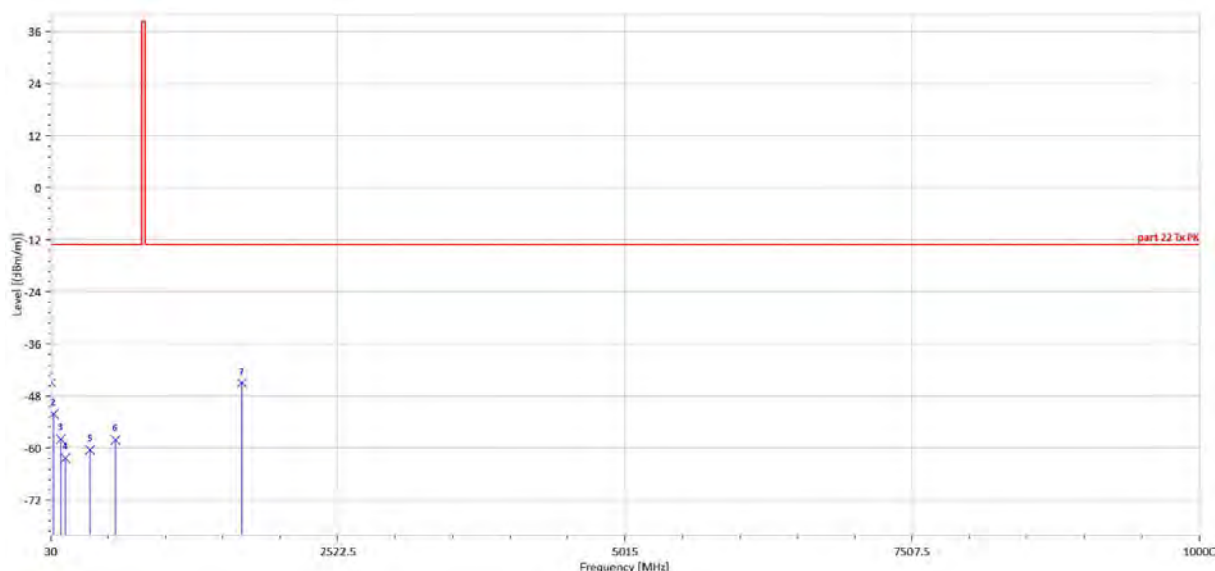
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ARFCN	:CH 4233	Test Date	:2015-09-19
Operation Band	:HSDPA B5	Temp./Humi.	:25.5deg_C/61RH
Fundamental Frequency	:846.6 MHz	Engineer	:Ashton
Operation Mode	:TX HIGH		
EUT Pol.	:E1 Plan	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Note	ERP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBd	Loss dB	dBm	dB
33.24	S	-44.86	-24.47	-19.69	-0.70	-13.00	-31.86
55.91	S	-52.09	-46.35	-4.81	-0.93	-13.00	-39.09
120.68	S	-57.89	-53.40	-3.21	-1.29	-13.00	-44.89
161.17	S	-62.25	-62.07	1.48	-1.67	-13.00	-49.25
373.31	S	-60.36	-61.35	3.33	-2.34	-13.00	-47.36
593.54	S	-58.07	-59.25	4.27	-3.10	-13.00	-45.07
1693.20	H	-44.94	-43.38	3.59	-5.15	-13.00	-31.94

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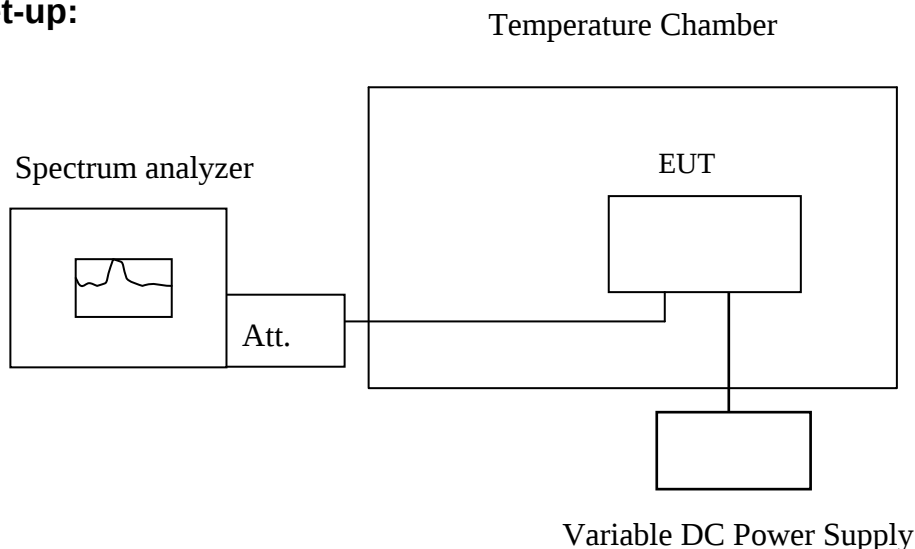
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11. FREQUENCY STABILITY MEASUREMENT

11.1. Standard Applicable:

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

11.2. Test Set-up:



Note: Measurement setup for testing on Antenna connector

11.3. Measurement Procedure:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Set chamber temperature to 25 °C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint as declared by the manufacturer, record the maximum frequency change.

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11.4. Measurement Equipment Used:

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
Communication Tester	Anritsu	MT8820C	6201107337	05/27/2015	05/26/2016
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/19/2014	12/18/2015
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/18/2015	06/17/2016
DC Block	PASTERNAK	PE8210	RF29	12/19/2014	12/18/2015
Splitter	RF-LAMBDA	RFLT2W1G18G	RF35	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2015	05/03/2016

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11.5. Measurement Result:

FREQUENCY ERROR vs. VOLTAGE

Reference Frequency: WCDMA V Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature ()	(MHz)		
4.4	20	836600004	1	2091
3.8	20	836600003	0	2091
3.2	20	836599994	-9	2091
2.9 (End Point)	20	836599993	-10	2091

FREQUENCY ERROR vs. TEMPERATURE

Reference Frequency: WCDMA V Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature ()	(MHz)		
3.8	50	836600003	0	2091
3.8	40	836600004	1	2091
3.8	30	836600002	-1	2091
3.8	20	836600003	0	2091
3.8	10	836600004	1	2091
3.8	0	836599995	-8	2091
3.8	-10	836599997	-6	2091
3.8	-20	836599996	-7	2091
3.8	-30	836600002	-1	2091

~ End of Report ~

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