Spectrum Report (WCDMA)

Applicant:	Connected Holdings LLC
Address of Applicant:	4740 Von Karman Avenue, Suite 120, Newport Beach, California 92660, United States
Manufacturer:	EE-Link
Address of Manufacturer:	Floor 3, Yuyang Mansion, Gaoxin North 4th Rd, Keji North 2nd Street, High Tech Park, Nanshan District, ShenZhen, China
Equipment Under Test (EUT)	
Product Name:	Battery operated LTE cellular GPS tracker
Model No.:	S4N-4LH
Trade Mark:	Dagger-L
FCC ID:	2AEB4DLT01
IC:	20080-DLT01
Applicable standards:	FCC CFR Title 47 Part 2
	FCC CFR Title 47 Part22 Subpart H
	FCC CFR Title 47 Part24 Subpart E
	RSS-132 Issue 3, January 2013
	RSS-133 Issue 6, January 2013
	RSS-Gen Issue 5, April 2018
Date of sample receipt:	November 13, 2018
Date of Test:	November 14-28, 2018
Date of report issued:	November 29, 2018
Test Result :	PASS *

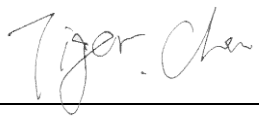
* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo
Laboratory Manager

1 Version

Version No.	Date	Description
00	*November 29, 2018*	*Original*

Prepared By:  ***Date:*** *November 29, 2018*

Project Engineer

Check By:  ***Date:*** *November 29, 2018*

Reviewer

2 Contents

Page

3 Test Summary

Test Item	Section in CFR 47	Result
RF Exposure (SAR)	Part 1.1307 Part 2.1093	Pass* (Please refer to MPE Report)
RF Output Power	Part 2.1046 Part 22.913 (a)(2) Part 24.232 (c)	Pass
Peak-to-Average Ratio	FCC part24.232(d)	Pass
Modulation Characteristics	Part 2.1047	Pass
99% & -26 dB Occupied Bandwidth	Part 2.1049 Part 22.917 Part 24.238	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 22.917 (a) Part 24.238 (a)	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 22.917 (a) Part 24.238 (a)	Pass
Out of band emission, Band Edge	Part 22.917 (a) Part 24.238 (a)	Pass
Frequency stability vs. temperature	Part 2.1055(a)(1)(b)	Pass
Frequency stability vs. voltage	Part 2.1055(d)(1)(2)	Pass

Pass: The EUT complies with the essential requirements in the standard.

Test Item	Section in RSS	Result
RF Exposure (SAR)	RSS-102	Pass* (Please refer to MPE Report)
Frequency Plan	RSS-132 Clause 5.1 RSS-133 Clause 6.1	Pass
Types of Modulation	RSS-132 Clause 5.2 RSS-133 Clause 6.2	Pass
Occupied Bandwidth	RSS-Gen Clause 6.6	Pass
Frequency Stability	RSS-132 Clause 5.3 RSS-133 Clause 6.3	Pass
Transmitter Output Power and Equivalent Isotropically Radiated Power	RSS-132 Clause 5.4 RSS-133 Clause 6.4	Pass
Peak-to-Average Power Ratio	RSS-132 Clause 5.4 RSS-133 Clause 6.4	Pass
Transmitter Unwanted Emissions	RSS-132 Clause 5.5 RSS-133 Clause 6.5	Pass
Field strength of spurious radiation measurement	RSS-Gen Clause 6.13	Pass

Pass: The EUT complies with the essential requirements in the standard.

3.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.68dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

4 General Information

4.1 General Description of EUT

Product Name:	Battery operated LTE cellular GPS tracker
Model No.:	S4N-4LH
S/N:	AGDNDA-500925569
Tested Sample(s) ID:	GTS201811000074-01
Hardware Version:	1.0
Software Version:	2.5.2
Support Networks:	WCDMA
Support Bands:	WCDMA Band II, Band V
TX Frequency:	WCDMA Band II: 1852.40MHz -1907.60MHz WCDMA Band V: 826.40MHz -846.60MHz
HSDPA:	Release 24
HSUPA:	Release 6
Modulation type:	WCDMA Band II/V: QPSK
Antenna type:	Integral antenna
Antenna gain:	B2:3.37dBi B5: 0.98.0dBi(declared by manufacturer)
Power supply:	DC 12V or Battery: DC 3.6V, 30.24WH

Operation Frequency List:

WCDMA Band V		WCDMA Band II	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
4132	826.40	9262	1852.40
4133	826.60	9263	1852.60
· ⋮	· ⋮	· ⋮	· ⋮
4181	836.20	9399	1879.80
4182	836.40	9400	1880.00
4183	836.60	9401	1880.20
· ⋮	· ⋮	· ⋮	· ⋮
4232	846.40	9537	1907.40
4233	846.60	9538	1907.60

Regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Final test channel:

WCDMA Band V		WCDMA Band II	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
4132	826.40	9262	1852.40
4183	836.60	9400	1880.00
4233	846.60	9538	1907.60

4.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is filing to comply with Section Part 22 subpart H and Part 24 subpart E of the FCC CFR 47 Rules.
This submittal(s) (test report) is filing to comply with RSS-132, RSS-133,, RSS-Gen of the IC Rules.

4.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures document on TIA/EIA 603 and ANSI C63.4, FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057

4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383, January 08, 2018.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.

4.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China

Tel: 0755-27798480

Fax: 0755-27798960

5 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 27 2018	June. 26 2019
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 27 2018	June. 26 2019
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 27 2018	June. 26 2019
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 27 2018	June. 26 2019
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 27 2018	June. 26 2019
9	Coaxial Cable	GTS	N/A	GTS211	June. 27 2018	June. 26 2019
10	Coaxial cable	GTS	N/A	GTS210	June. 27 2018	June. 26 2019
11	Coaxial Cable	GTS	N/A	GTS212	June. 27 2018	June. 26 2019
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 27 2018	June. 26 2019
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 27 2018	June. 26 2019
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 27 2018	June. 26 2019
15	Band filter	Amindeon	82346	GTS219	June. 27 2018	June. 26 2019
16	Power Meter	Anritsu	ML2495A	GTS540	June. 27 2018	June. 26 2019
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 27 2018	June. 26 2019
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 27 2018	June. 26 2019
19	Splitter	Agilent	11636B	GTS237	June. 27 2018	June. 26 2019
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 27 2018	June. 26 2019

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 27 2018	June. 26 2019
2	Barometer	ChangChun	DYM3	GTS255	June. 27 2018	June. 26 2019

6 System test configuration

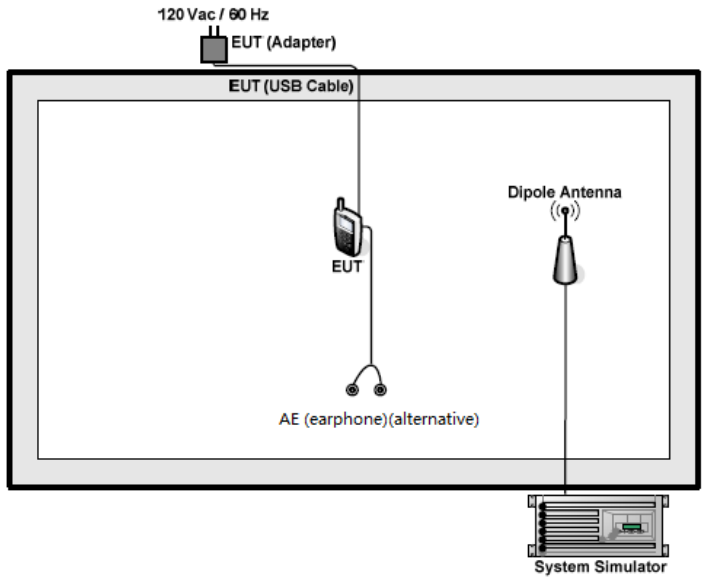
6.1 Test mode

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Test modes		
Band	Radiated	Conducted
WCDMA II	■ RMC 12.2Kbps link	■ RMC 12.2Kbps link
WCDMA Band V	■ RMC 12.2Kbps link	■ RMC 12.2Kbps link

Note: The maximum power levels is RMC12.2Kbps mode for WCDMA Band V, Band IV and Band II. only these modes were used for all tests.

6.2 Configuration of Tested System

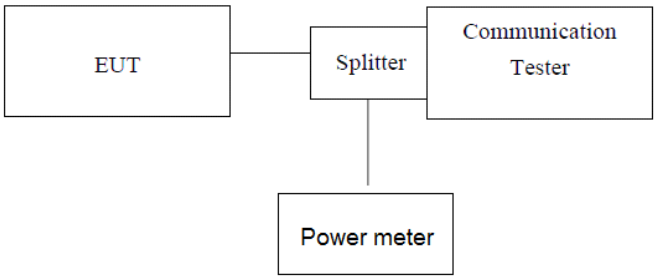


6.3 Frequency Plan

Frequency Plan for band 824MHz ~ 849MHz				
Frequency Plan (MHz)	**824-835**	**835-845**	**845-846.5**	**846.5-849**
Product Supported plan (Yes or No)	Y	Y	Y	Y

Frequency Plan for band 1850MHz ~ 1915MHz			
Block	**Total Spectrum**	**Lower Sub-band**	**Product Supported plan (Yes or No)**
Block A	30 MHz	1850-1865 MHz	Y
Block D*	10 MHz	1865-1870 MHz	Y
Block B1	10 MHz	1870-1875 MHz	Y
Block B2*	10 MHz	1875-1880 MHz	Y
Block B3*	10 MHz	1880-1885 MHz	Y
Block E*	10 MHz	1885-1890 MHz	Y
Block F	10 MHz	1890-1895 MHz	Y
Block C1*	10 MHz	1895-1900 MHz	Y
Block C2*	10 MHz	1900-1905 MHz	Y
Block C3*	10 MHz	1905-1910 MHz	Y
Block G	10 MHz	1910-1915 MHz	N
Note: * The usage of these blocks in certain geographic areas is under policies listed in SRSP-510 sections 3.1.3, 3.1.4, 3.1.5 and 3.1.15.			

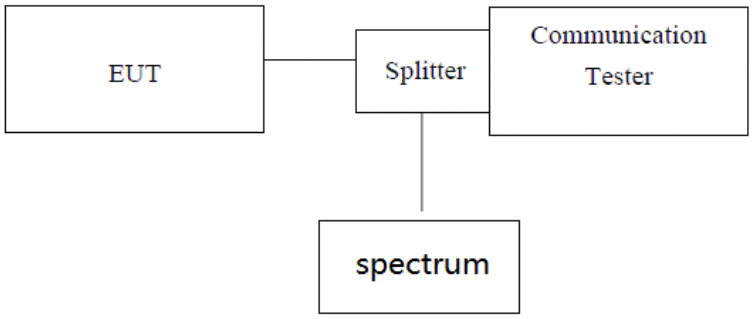
6.4 Conducted Average Output Power

Test Requirement for FCC:	FCC part22.913(a) and FCC part24.232(b)
Test Requirement for IC	RSS-132 Clause 5.4, RSS-133 Clause 6.4,
Limit for FCC:	WCDMA Band V: 7W WCDMA Band II: 2W
Limit for IC:	WCDMA Band V: 11.5W WCDMA Band II: 2W
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1. The transmitter output port was connected to base station. 2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement. 3. Set EUT at maximum power through base station. 4. Select lowest, middle, and highest channels for each band and different modulation. 5. Measure the maximum burst average power.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

EUT Mode	Channel	Frequency (MHz)	power (dBm)
WCDMA Band V (RMC 12.2Kbps link)	4132	826.40	23.11
	4183	836.60	22.52
	4233	846.60	22.69
WCDMA Band II (RMC 12.2Kbps link)	9262	1852.40	22.68
	9400	1880.00	22.89
	9538	1907.60	22.78

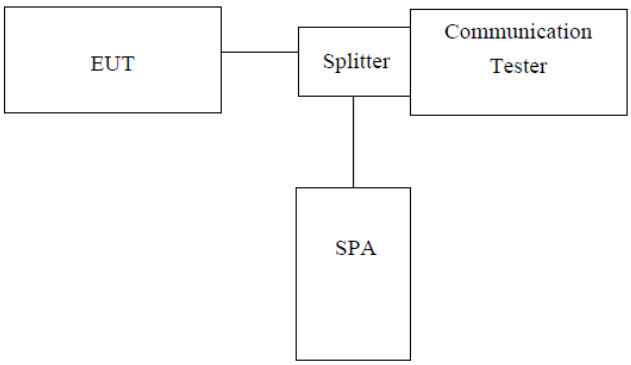
6.5 Peak-to-Average Ratio

Test Requirement for FCC:	FCC part 22.913(d), FCC part24.232(d)
Test Requirement for IC:	RSS-132 Clause 5.4, RSS-133 Clause 6.4,
Limit:	13db
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1. The transmitter output port was connected to base station. 2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement. 3. Set EUT at maximum power through base station. 4. Select lowest, middle, and highest channels for each band and different modulation. 5. Measure the maximum burst average power. 6. Record the maximum peak-to-average ratio value.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement data:

band	Frequency(MHz)	PAPR(dB)	Limit	Verdict
WCMDA BAND V	826.4	4.23	13	Compliant
	836.6	4.25	13	Compliant
	846.6	4.69	13	Compliant
WCDMA BAND II	1852.4	4.76	13	Compliant
	1880.0	4.83	13	Compliant
	1907.6	4.96	13	Compliant

6.6 Occupy Bandwidth

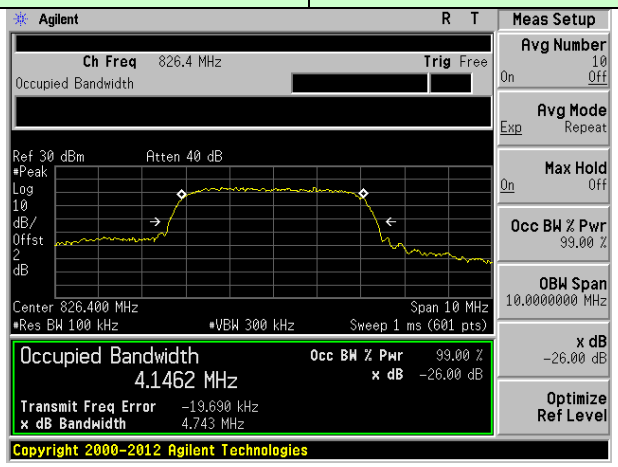
Test Requirement for FCC:	FCC part22.913(a) and FCC part24.232(b)
Test Requirement for IC:	RSS-Gen Clause 6.6
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer 2. RBW was set to about 1% of emission BW, VBW= 3 times RBW. 3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

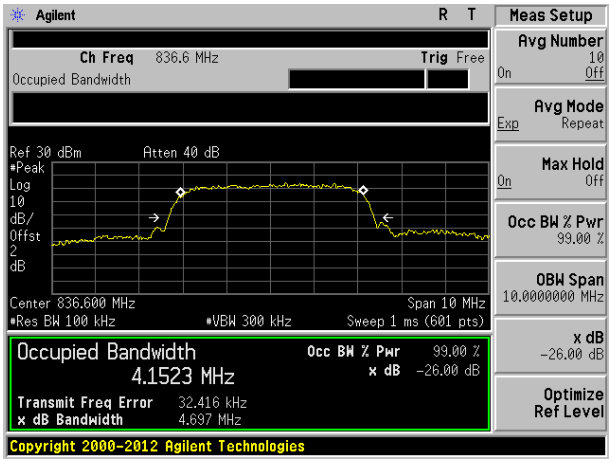
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (MHz)	-26dB bandwidth (MHz)
WCDMA Band V (RMC 12.2Kbps link)	4132	826.40	4.1462	4.743
	4183	836.60	4.1523	4.697
	4233	846.60	4.1606	4.728
WCDMA Band II (RMC 12.2Kbps link)	9262	1852.40	4.1561	4.731
	9400	1880.00	4.1329	4.728
	9538	1907.60	4.1128	4.706

Test plot as follows:

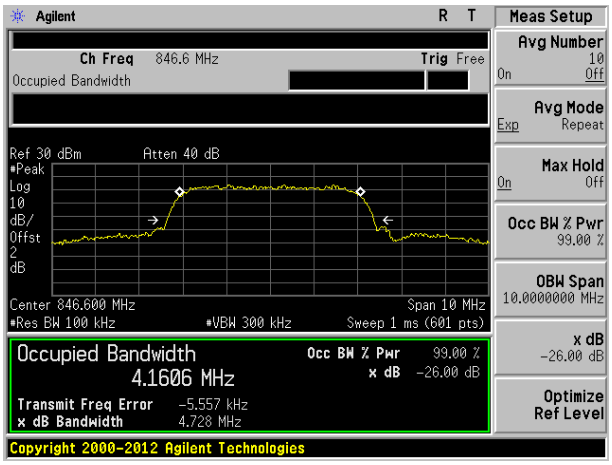
Test band:	WCDMA Band V (RMC 12.2Kbps link)



Lowest channel

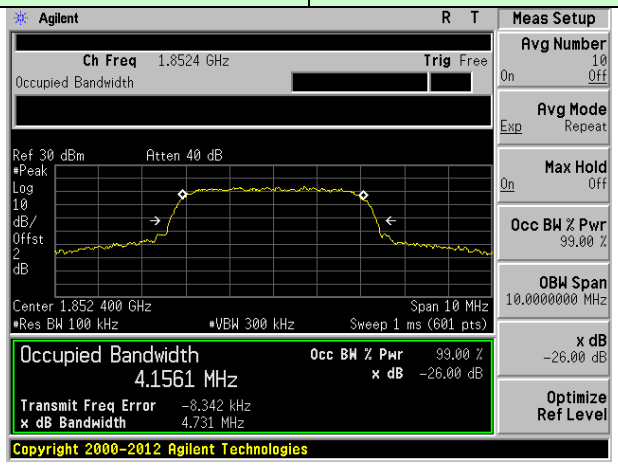


Middle channel

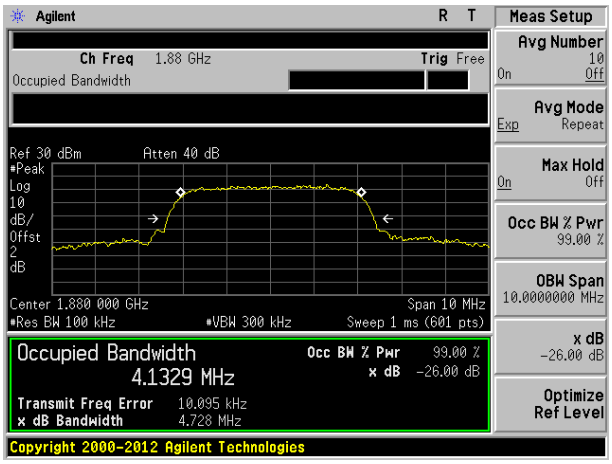


Highest channel

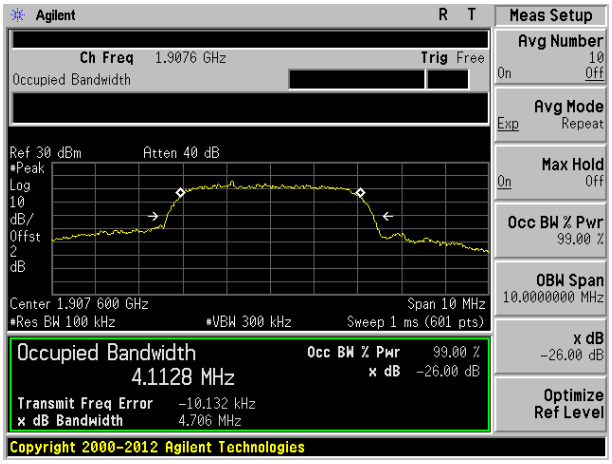
Test band:	WCDMA Band II (RMC 12.2Kbps link)



Lowest channel



Middle channel

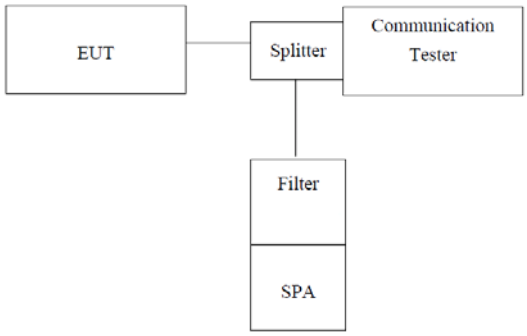


Highest channel

6.7 MODULATION CHARACTERISTIC

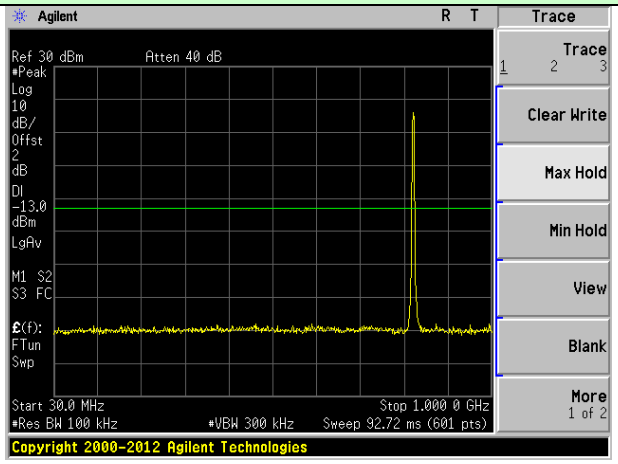
According to FCC § 2.1047(d), Part 22H & 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

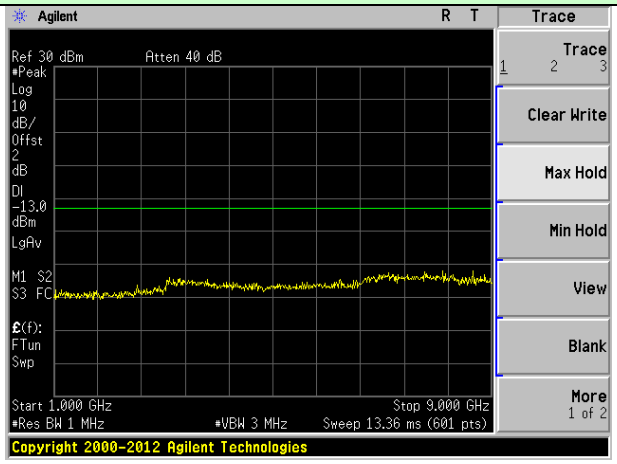
6.8 Out of band emission at antenna terminals

Test Requirement for FCC:	FCC part22.917(a) and FCC part24.238(a)
Test Requirement for IC:	RSS-132 Clause 5.5, RSS-133 Clause 6.5
Limit:	-13dBm
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 2 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. 3 For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10th harmonic. 4 Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

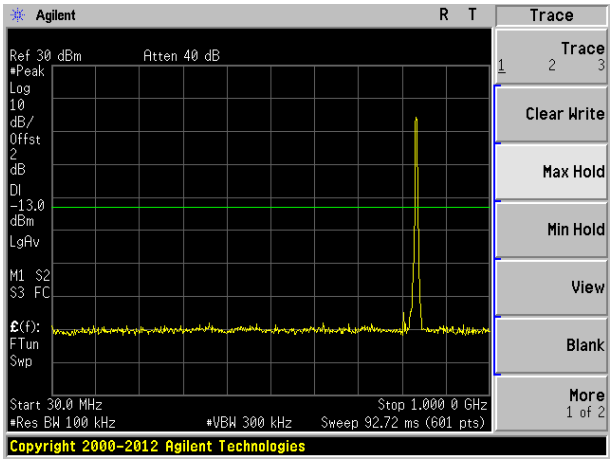
Test plot as follows:

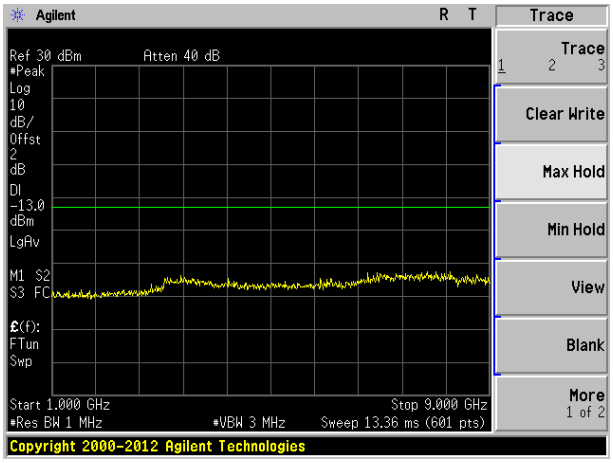
Test Mode: Traffic mode	WCDMA Band V (RMC 12.2Kbps link)



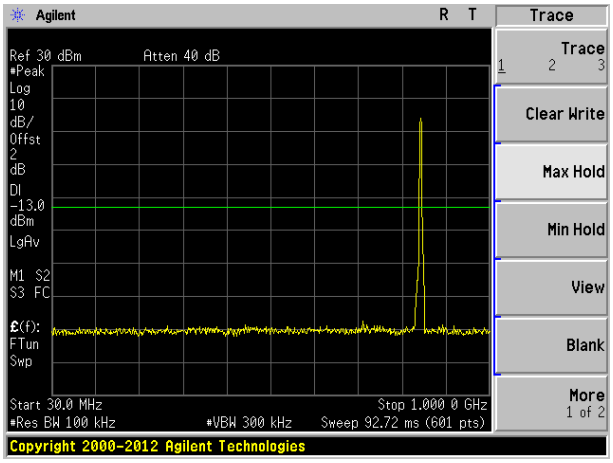


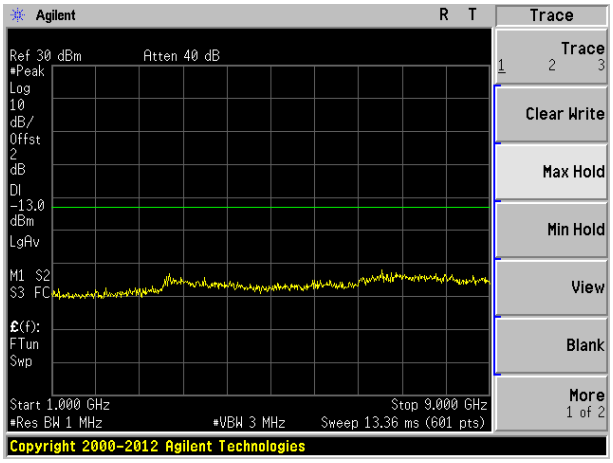
Lowest channel





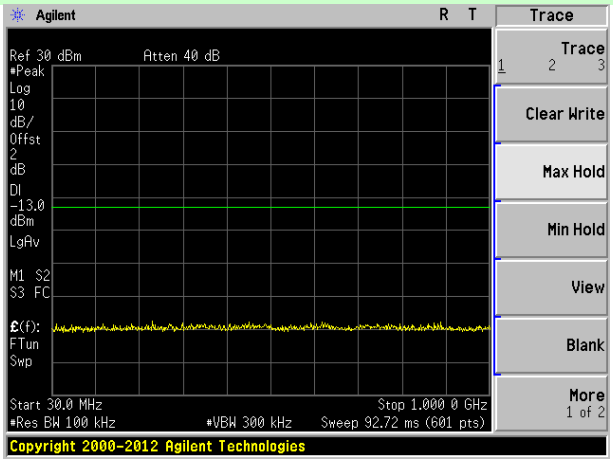
Middle channel

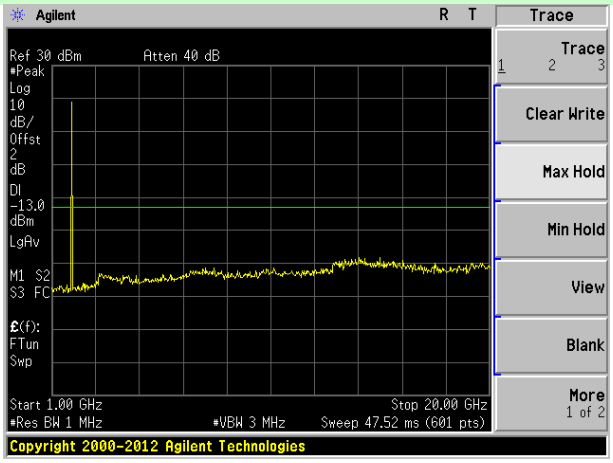




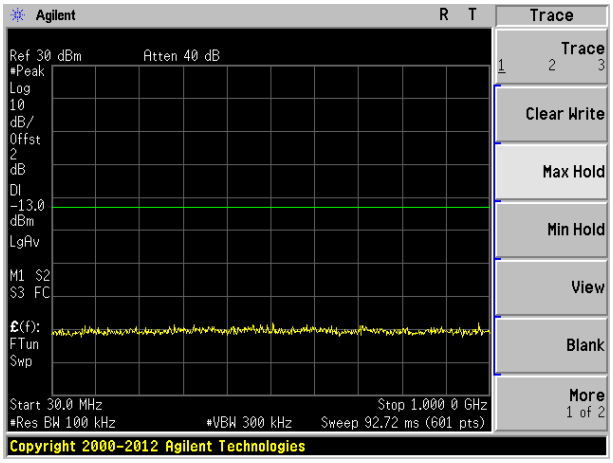
Highest channel

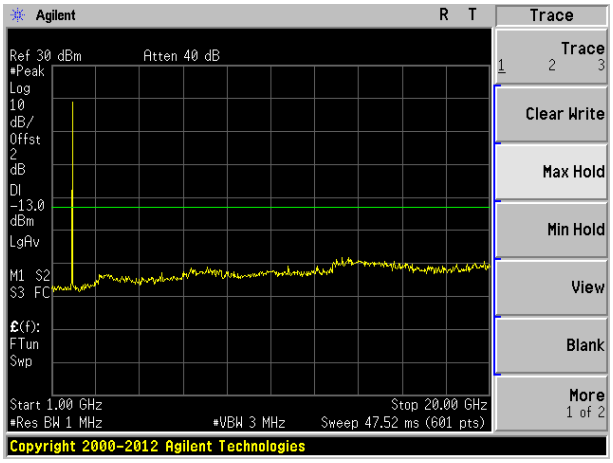
Test Mode: Traffic mode	WCDMA Band II (RMC 12.2Kbps link)



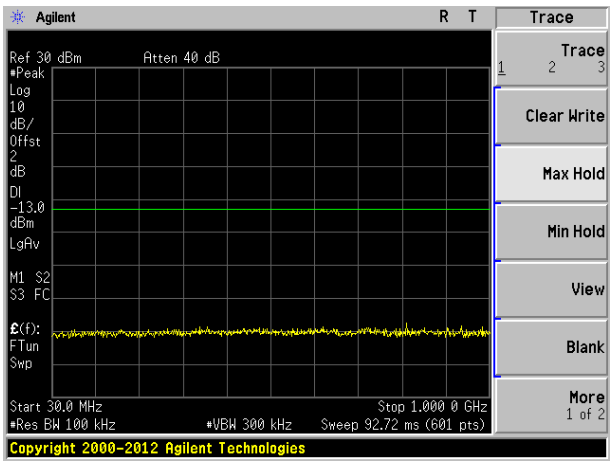


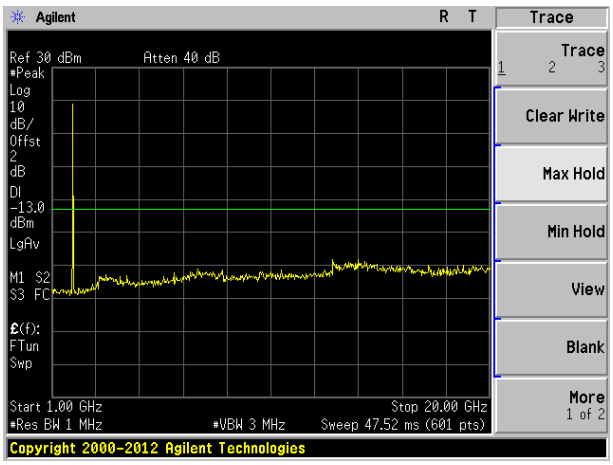
Lowest channel





Middle channel

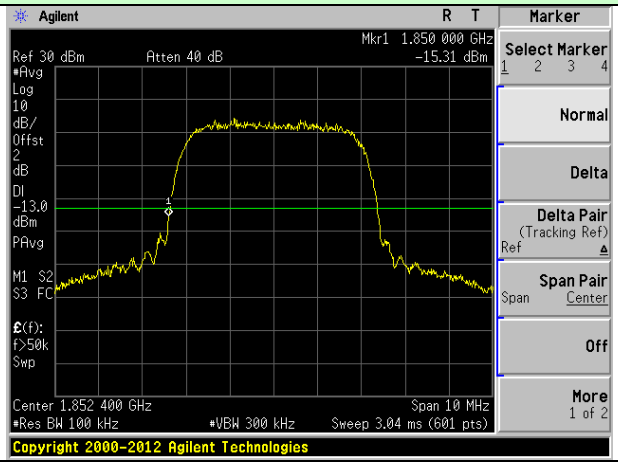




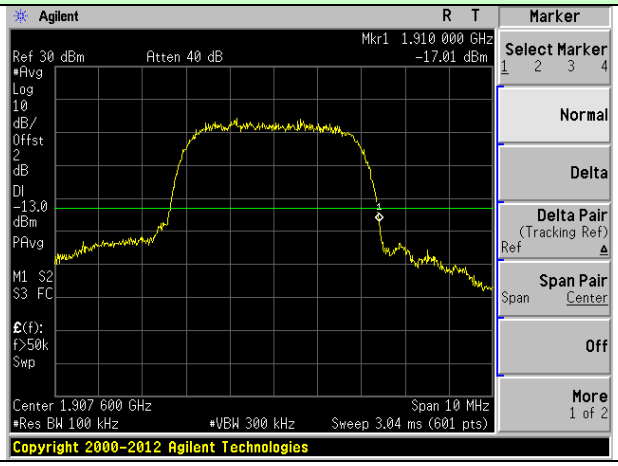
Highest channel

Band Edge:

Test Mode: Traffic mode	WCDMA Band V (RMC 12.2Kbps link)

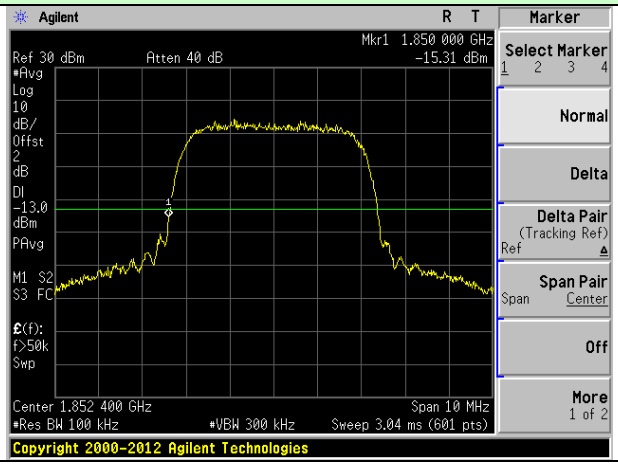


Lowest channel

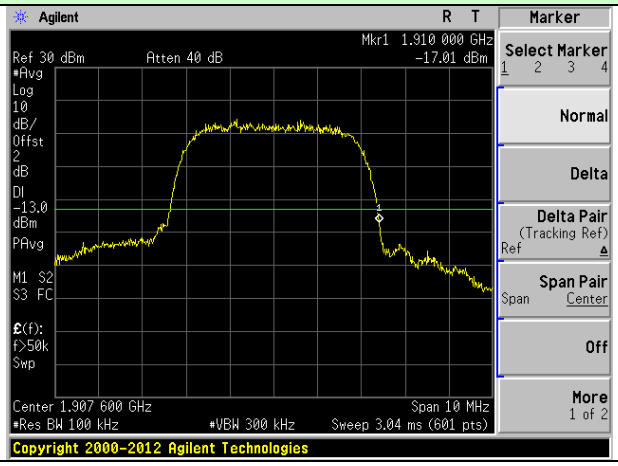


Highest channel

Test Mode: Traffic mode	WCDMA Band II (RMC 12.2Kbps link)

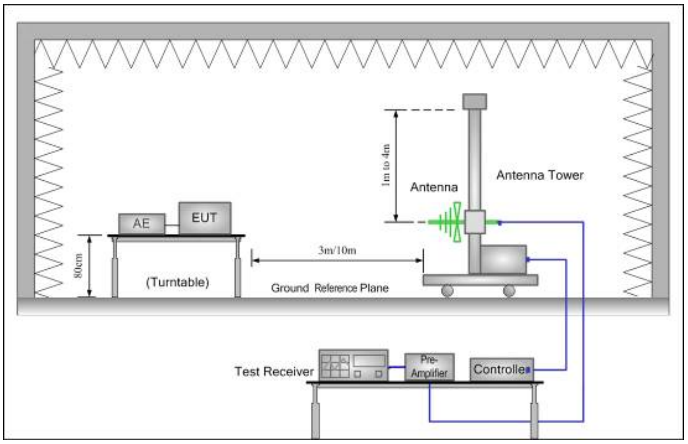
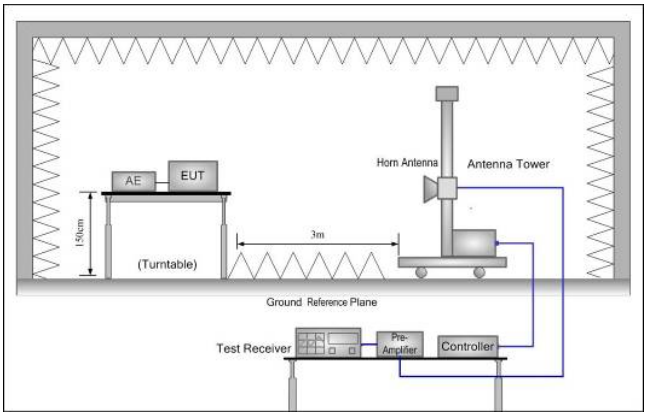


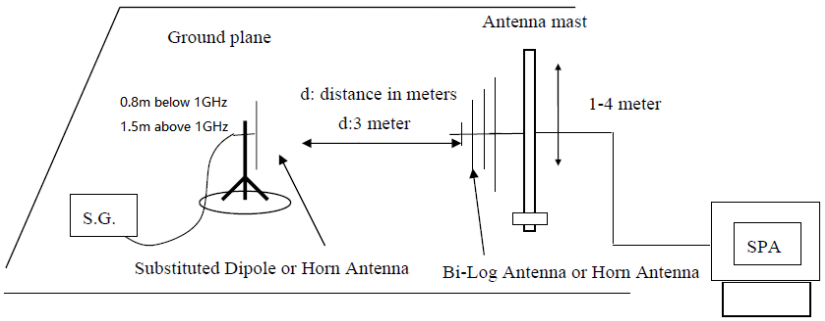
Lowest channel



Highest channel

6.9 ERP, EIRP Measurement

Test Requirement for FCC:	FCC part22.913(a) and FCC part24.232(b)
Test Requirement for IC:	RSS-132 Clause 5.4, RSS-133 Clause 6.4,
Limit for FCC:	WCDMA Band V: 7W WCDMA Band II: 2W
Limit for IC	WCDMA Band V: 11.5W WCDMA Band II: 2W
Test setup:	Below 1GHz  Above 1GHz  Substituted method:

<table>
<tr><td></td><td colspan="6"> 
</td></tr>
<tr><td>Test Procedure:</td><td colspan="6">1. The EUT was placed on an 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.
2. 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.
3. ERP in frequency band 824.2 –848.80.8MHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated asfollows:
ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB)
4. EIRP in frequency band 1850.2 –1909.8MHz were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:
EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable Loss (dB)</td></tr>
<tr><td>Test environment:</td><td>Temp.:</td><td>25 °C</td><td>Humid.:</td><td>52%</td><td>Press.:</td><td>1 012mbar</td></tr>
<tr><td>Test Instruments:</td><td colspan="6">Refer to section 5.0 for details</td></tr>
<tr><td>Test mode:</td><td colspan="6">Refer to section 6.1 for details</td></tr>
<tr><td>Test results:</td><td colspan="6">Pass</td></tr>
</table>

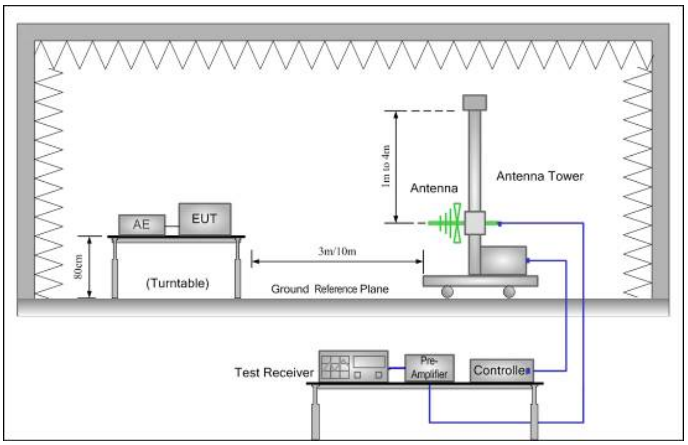
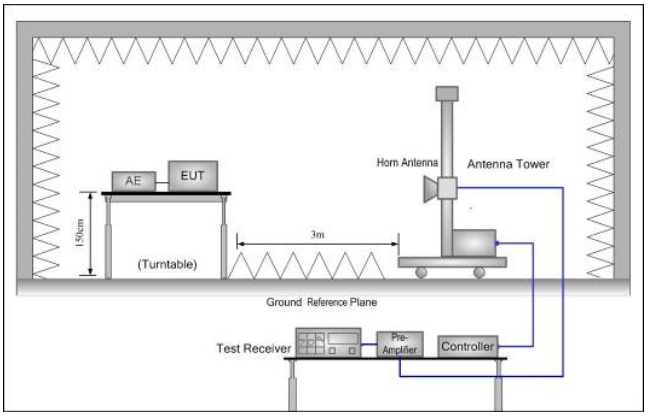
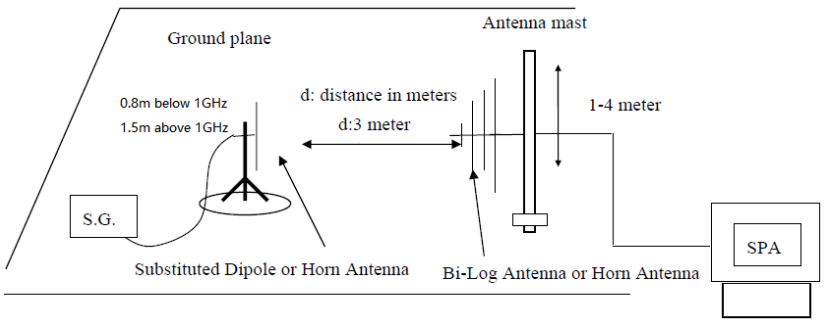
Measurement Data

The maximum value has been record and the tighter limits apply:

EUT mode	Channel	Modulation	Polarization	SGP [dBm]	Substitution Gain[dBi]	Cable loss[dB]	EIRP (dBm)	Limit (dBm)	Result
WCDMA Band 2	Lowest	QPSK	V	22.76	-1.93	1.13	21.96	33.00	Pass
	Middle	QPSK	V	22.46	-1.93	1.22	21.75	33.00	Pass
	Highest	QPSK	V	22.51	-1.93	1.34	21.92	33.00	Pass

EUT mode	Channel	Modulation	Polarization	SGP [dBm]	Substitution Gain[dBi]	Cable loss[dB]	ERP (dBm)	Limit (dBm)	Result
WCDMA Band 5	Lowest	QPSK	V	23.01	-2.08	1.55	22.48	38.45	Pass
	Middle	QPSK	V	22.73	-2.08	1.6	22.25	38.45	Pass
	Highest	QPSK	V	22.69	-2.08	1.65	22.26	38.45	Pass

6.10 Field strength of spurious radiation measurement

Test Requirement for FCC:	FCC part22.917(a) and FCC part24.238(a)
Test Requirement for IC:	RSS-GEN Clause 6.13
Limit:	-13dBm
Test setup:	Below 1GHz  Above 1GHz  Substituted method: 

Test Procedure:	1. The EUT was placed on an 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. 2. 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. 3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method. 4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) – Cable Loss (dB)					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1 012mbar
Test Instruments:	Refer to section 5.0 for details					
Test mode:	Refer to section 6.1 for details					
Test results:	Pass					

Measurement Data

Test mode:	WCDMA Band V		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1652.80	Vertical	-42.66	-13.00	Pass
2479.20	V	-43.42		
3305.60	V	-41.91		
4132.00	V	-43.16		
4958.40	V	-44.16		
1652.80	Horizontal	-41.96	-13.00	Pass
2479.20	H	-43.70		
3305.60	H	-44.69		
4132.00	H	-47.69		
4958.40	H	-45.34		
Test mode:	**WCDMA Band V**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1672.80	Vertical	-43.63	-13.00	Pass
2509.20	V	-41.79		
3345.60	V	-43.42		
4182.00	V	-47.54		
5018.40	V	-43.79		
1672.80	Horizontal	-42.90	-13.00	Pass
2509.20	H	-43.83		
3345.60	H	-46.11		
4182.00	H	-49.25		
5018.40	H	-42.85		
Test mode:	**WCDMA Band V**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1693.20	Vertical	-42.62	-13.00	Pass
2539.80	V	-42.08		
3386.40	V	-41.19		
4233.00	V	-42.27		
5079.60	V	-43.13		
1693.20	Horizontal	-43.49	-13.00	Pass
2539.80	H	-47.38		
3386.40	H	-41.51		
4233.00	H	-42.56		
5079.60	H	-41.40		

Remark：

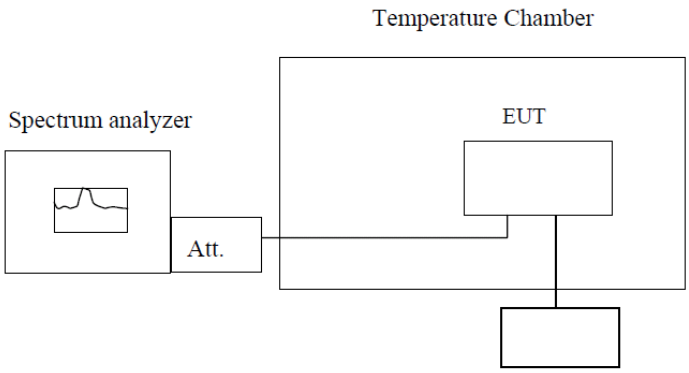
1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	WCDMA Band II		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3704.46	Vertical	-42.31	-13.00	Pass
5556.86	V	-40.10		
7409.26	V	-42.89		
9261.66	V	-40.43		
11114.40	V	-42.21		
3704.46	Horizontal	-42.19	-13.00	Pass
5556.86	H	-41.95		
7409.26	H	-47.41		
9261.66	H	-45.11		
11114.40	H	-42.94		
Test mode:	**WCDMA Band II**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3759.83	Vertical	-42.54	-13.00	Pass
5639.83	V	-40.89		
7519.83	V	-43.55		
9399.83	V	-46.03		
11280.00	V	-48.46		
3759.83	Horizontal	-41.06	-13.00	Pass
5639.83	H	-43.02		
7519.83	H	-47.75		
9399.83	H	-44.19		
11280.00	H	-41.79		
Test mode:	**WCDMA Band II**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3815.03	Vertical	-41.20	-13.00	Pass
5722.63	V	-43.67		
7630.23	V	-42.33		
9537.83	V	-45.24		
11445.60	V	-42.20		
3815.03	Horizontal	-40.60	-13.00	Pass
5722.63	H	-43.07		
7630.23	H	-44.48		
9537.83	H	-42.71		
11445.60	H	-43.48		

Remark：

1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

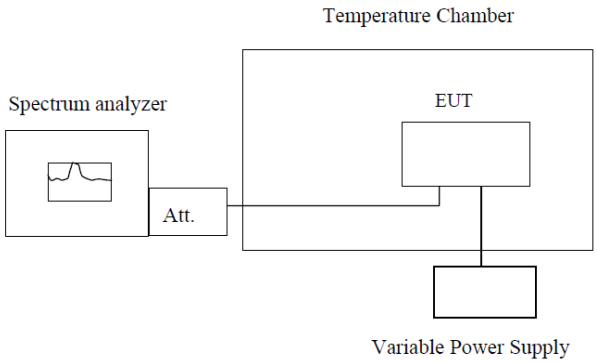
6.11 Frequency stability V.S. Temperature measurement

Test Requirement for FCC:	FCC Part2.1055(a)(1)(b)
Test Requirement for IC:	RSS-132 Clause 5.3, RSS-133 Clause 6.3
Limit:	2.5ppm
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test procedure:	1. The equipment under test was connected to an external DC power supply and input rated voltage. 2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. 3. The EUT was placed inside the temperature chamber. 4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. 5. Turn EUT off and set the chamber temperature to –20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. 6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.0	-30	77	0.0925	2.5	Pass
	-20	87	0.1045		
	-10	74	0.0885		
	0	61	0.0726		
	10	71	0.0846		
	20	61	0.0726		
	30	101	0.1204		
	40	91	0.1084		
	50	87	0.1045		
Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880.0MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.0	-30	22	0.0258	2.5	Pass
	-20	24	0.0290		
	-10	20	0.0242		
	0	18	0.0211		
	10	19	0.0227		
	20	16	0.0195		
	30	31	0.0370		
	40	26	0.0306		
	50	24	0.0290		

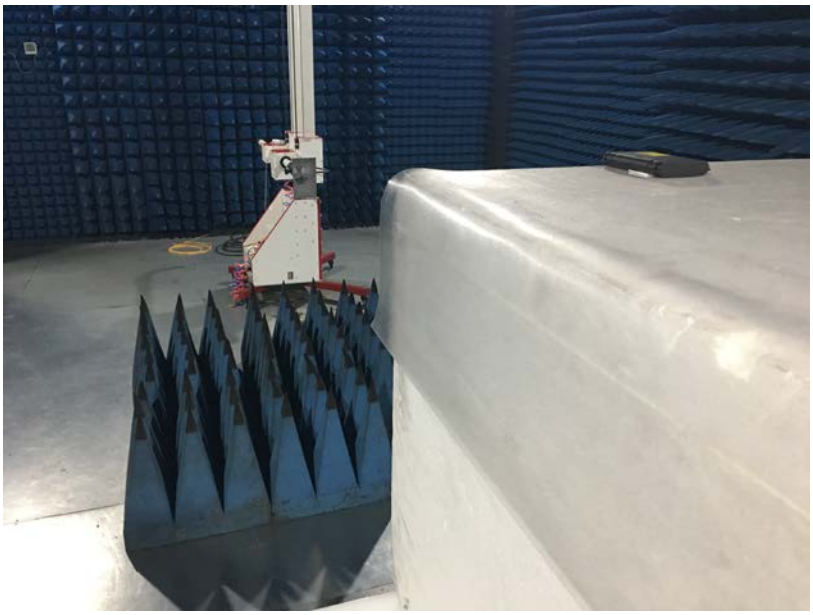
6.12 Frequency stability V.S. Voltage measurement

Test Requirement for FCC:	FCC Part2.1055(d)(1)(2)
Test Requirement for IC:	RSS-132 Clause 5.3, RSS-133 Clause 6.3
Limit:	2.5ppm
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test procedure:	1. Set chamber temperature to 25°C. Use a variable DC power source to power the EUT and set the voltage to rated voltage. 2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. 3. Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

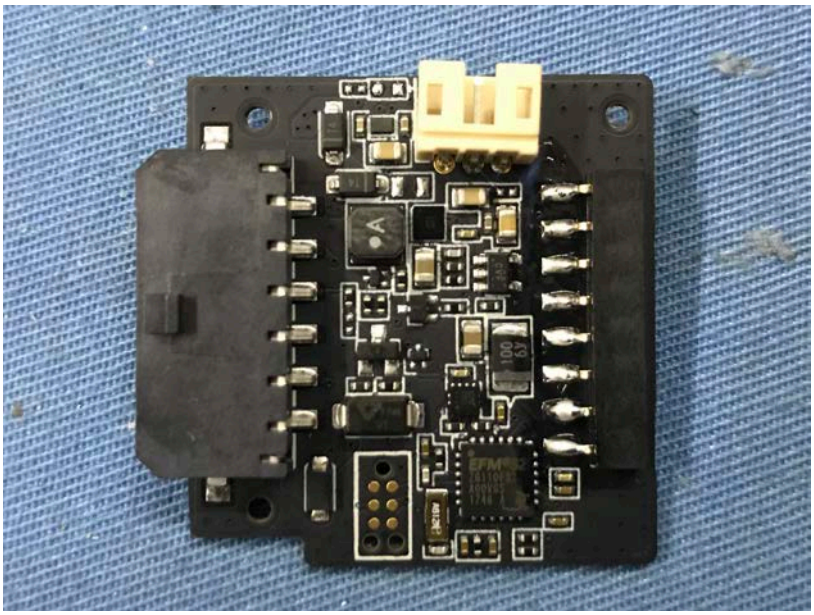
Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	6.0	115	0.1375	2.5	Pass
	12.0	131	0.1566		
	16.0	147	0.1751		
Reference Frequency: WCDMA Band II Middle channel=940 channel=1880.0MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	6.0	118	0.1406	2.5	Pass
	12.0	85	0.1017		
	16.0	96	0.1147		

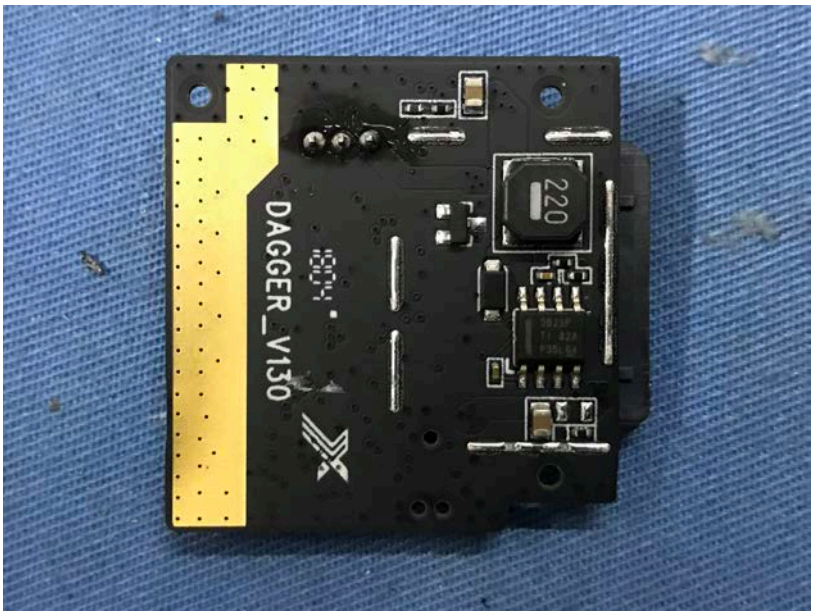
7 Test Setup Photo

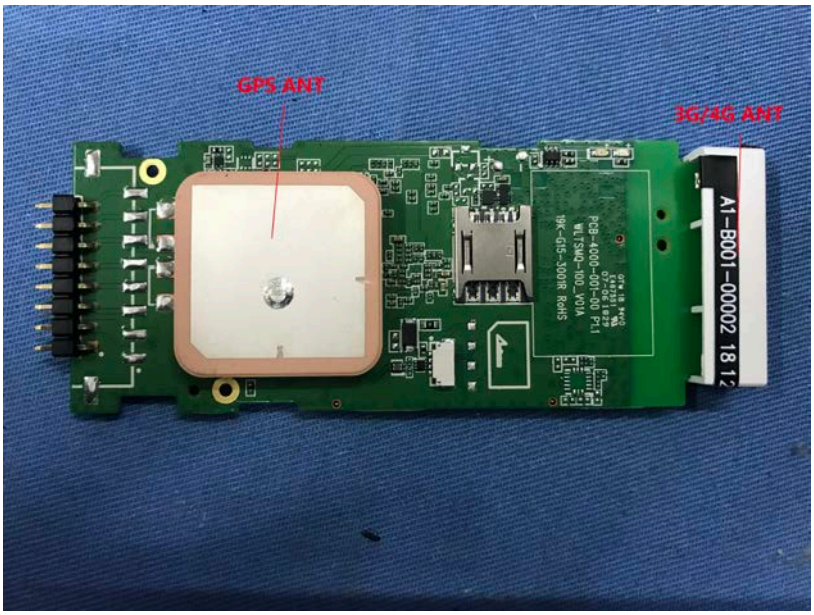


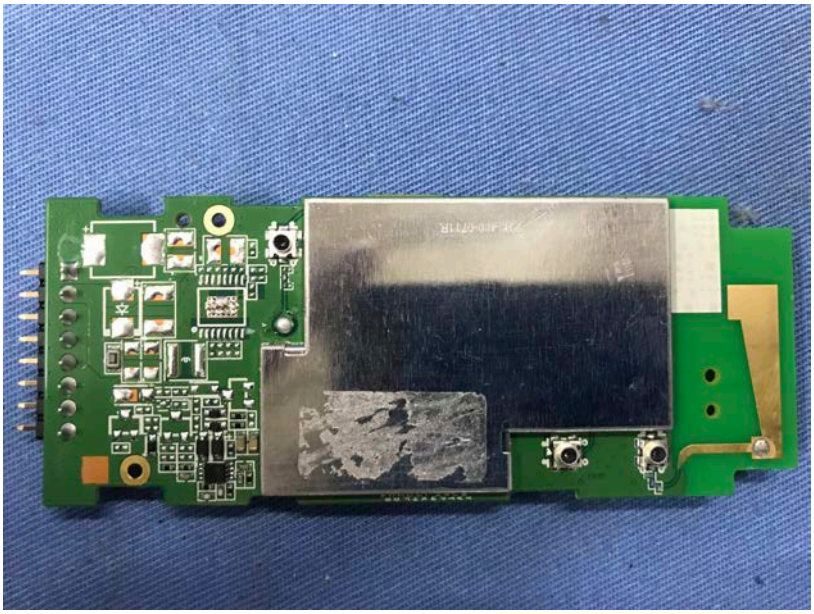
8 EUT Constructional Details

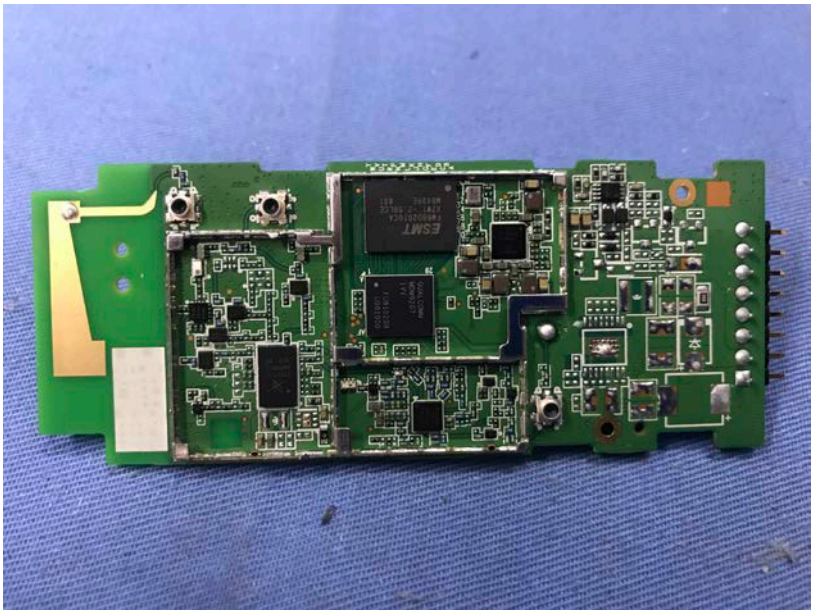

THIS
SIDE
DOWN



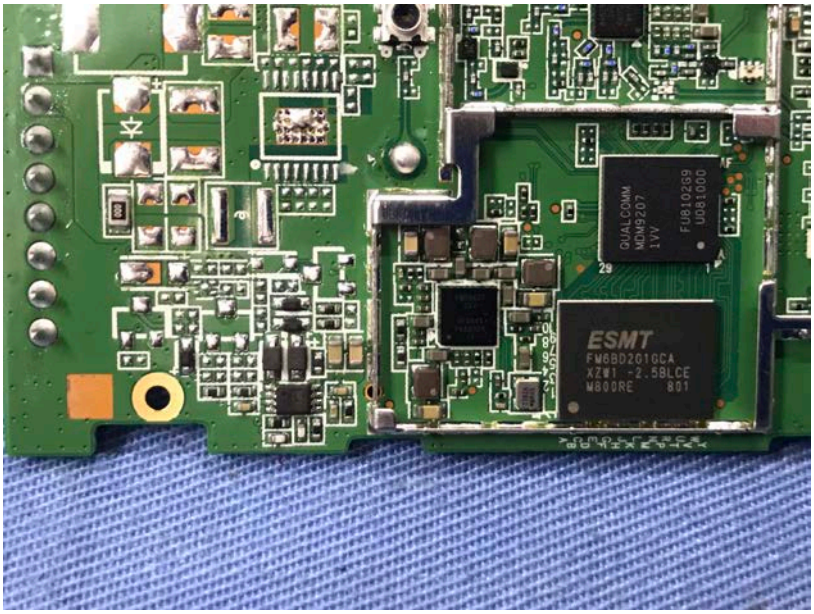

DAGGER_V130
220


GPS ANT
3G/4G ANT
A1-B001-00002 18 12






ER14505M-4
3.6V 30.24WH
FT1824


QUALCOMM
MDM9207
1YV
FU8102G9
U081000
ESMT
FW8BD201GCA
XZW1 -2.5BLCE
W800RE 801

-----End------