

FCC Report (GSM&WCDMA)

Applicant: Shenzhen Orchid Electronic Technology Co.,Ltd
Address of Applicant: 7/F,Bldg 4,XinYongFeng Industrial Zone, Shilong Rd., Shiyan St.,Bao'an Dist.,Shenzhen,China 518109
Manufacturer: Shenzhen HLXT Technology Co.,Ltd.

Address of Manufacturer: 7/F,Bldg 4,XinYongFeng Industrial Zone, Shilong Rd., Shiyan St.,Bao'an Dist.,Shenzhen,China 518109

Equipment Under Test (EUT)
Product Name: gps tracker
Model No.: GT021, GT028, GT029

FCC ID: 2APBR-GT021

Applicable standards: FCC CFR Title 47 Part 2: 2017
FCC CFR Title 47 Part22 Subpart H: 2017
FCC CFR Title 47 Part24 Subpart E: 2017

Date of sample receipt: March 08, 2018

Date of Test: March 09-27, 2018

Date of report issued: March 28, 2018

Test Result : PASS *

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

Authorized Signature:



Robinson Lo

Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

1 Version

Version No.	Date	Description
00	March 28, 2018	Original

Prepared By:

Bill. Yuan

Date:

March 28, 2018

Project Engineer

Check By:

Andy. Wu

Date:

March 28, 2018

Reviewer

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3 Test Summary

Test Item	Section in CFR 47	Result
RF Exposure (SAR)	Part 1.1307 Part 2.1093	(Please refer to SAR Report)
RF Output Power	Part 2.1046 Part 22.913 (a)(2) Part 24.232 (c)	Pass
Peak-to-Average Ratio	Part 2.1046 Part 24.232 (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.

4 General Information

4.1 General Description of EUT

Product Name:	gps tracker
Model No.:	GT021, GT028, GT029
Test Model No:	GT021
<i>Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The only differences model name for commercial purpose.</i>	
Serial No.:	8888030044248
Hardware:	HL312-VO1-170417
Software:	MD302_V02_GM_171124_NEW
Test sample(s) ID:	GTS201803000191-2
Sample(s) Status	Engineer sample
Support Networks:	GSM, GPRS
Support Bands:	GSM850, PCS1900
TX Frequency:	GSM850: 824.20MHz-848.80MHz PCS1900: 1850.20MHz-1909.80MHz
GPRS Class:	12
Modulation type:	GMSK
Antenna type:	Integral antenna
Antenna gain:	1.0dBi
Power supply:	DC 3.7V 12000mAh Li-ion Battery DC 5V by USB Charger

Operation Frequency List:

GSM 850		PCS1900	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20
129	824.40	513	1850.40
· ∴	· ∴	· ∴	· ∴
189	836.40	660	1879.80
190	836.60	661	1880.00
191	836.80	662	1880.20
· ∴	· ∴	· ∴	· ∴
250	848.60	809	1909.60
251	848.80	810	1909.80

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:

GSM 850		PCS1900	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20
190	836.60	661	1880.00
251	848.80	810	1909.80

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.

4.3 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC Approval
APPLE	USB Charger	A1399	N/A	Doc

4.4 Test Methodology

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

4.5 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.

4.6 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 518102

Tel: 0755-27798480

Fax: 0755-27798960

5 Test Instruments list

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 28 2017	June 27 2018
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June 28 2017	June 27 2018
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 28 2017	June 27 2018
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 28 2017	June 27 2018
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June 28 2017	June 27 2018
9	Coaxial Cable	GTS	N/A	GTS211	June 28 2017	June 27 2018
10	Coaxial cable	GTS	N/A	GTS210	June 28 2017	June 27 2018
11	Coaxial Cable	GTS	N/A	GTS212	June 28 2017	June 27 2018
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June 28 2017	June 27 2018
13	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June 28 2017	June 27 2018
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 28 2017	June 27 2018
15	Band filter	Amindeon	82346	GTS219	June 28 2017	June 27 2018
16	Universal radio communication tester	Rohde & Schwarz	CMU200	GTS235	June 28 2017	June 27 2018
17	Signal Generator	Rohde & Schwarz	SML03	GTS236	June 28 2017	June 27 2018
18	Temp. Humidity/ Barometer	Oregon Scientific	BA-888	GTS248	June 28 2017	June 27 2018
19	D.C. Power Supply	Instek	PS-3030	GTS232	NA	NA
20	Splitter	Agilent	11636B	GTS237	June 28 2017	June 27 2018
21	Power meter	Rohde & Schwarz	NRVS	GTS238	June 28 2017	June 27 2018
22	Spectrum Analyzer	Agilent	E4440A	GTS533	June 28 2017	June 27 2018
23	Temp.&Humidity chamber	Chuang wei	GDS-225	GTS005-1	June 28 2017	June 27 2018
24	Highpass filter	Micro-Tronics	HPM50108	GTS549	June 28 2017	June 27 2018
25	Highpass filter	Micro-Tronics	HPM50111	GTS550	June 28 2017	June 27 2018
26	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS588	May 07 2017	May 06 2018

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.

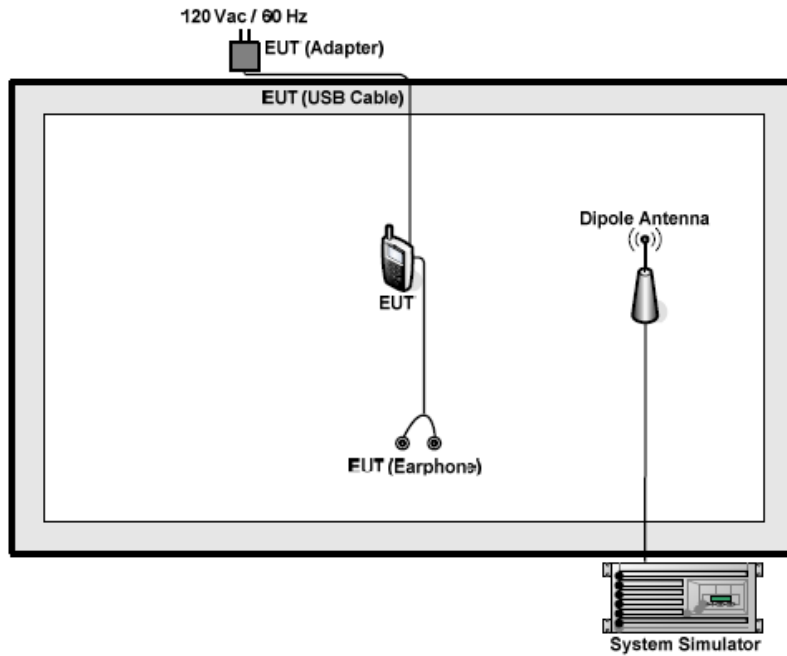
Test modes		
Band	Radiated	Conducted
GSM 850	■ GSM link	■ GSM link
	■ GPRS 1 link	■ GPRS 1 link
PCS 1900	■ GSM link	■ GSM link
	■ GPRS 1 link	■ GPRS 1 link

Note: The maximum power levels are GSM mode for GMSK link, GPRS multi-slot class 8 mode for GMSK link. only these modes were used for all tests.

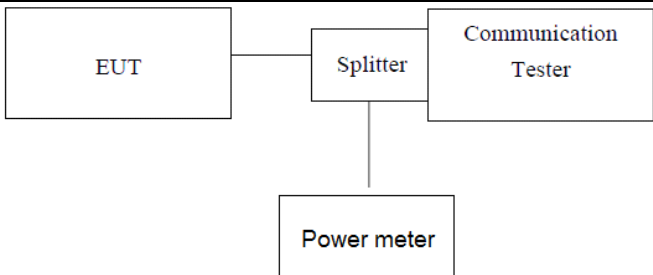
The conducted power tables are as follows:

Conducted Power (dBm)						
Band	GSM850			PCS1900		
Channel	128	190	251	512	661	810
Frequency	824.20	836.60	848.80	1850.20	1880.00	1909.80
GSM (GMSK, 1 TX slot)	31.75	31.77	31.79	28.25	28.20	28.24
GPRS (GMSK, 1 TX slot)	31.63	31.57	31.71	28.23	28.19	28.17
GPRS (GMSK, 2 TX slot)	30.23	30.26	30.18	27.51	27.74	27.36
GPRS (GMSK, 3 TX slot)	29.15	29.27	29.40	26.63	26.85	26.27
GPRS (GMSK, 4 TX slot)	28.16	28.29	28.23	25.57	25.66	25.33

6.2 Configuration of Tested System



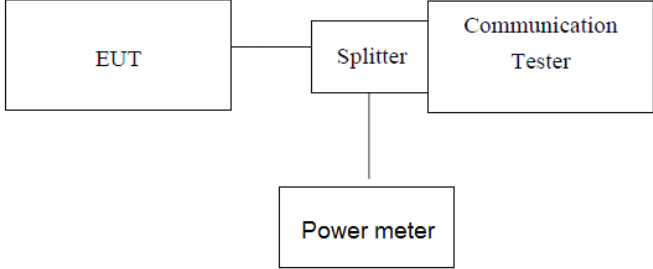
6.3 Conducted Peak Output Power

Test Requirement:	FCC part22.913(a) and FCC part24.232(b)
Test Method:	FCC part2.1046
Limit:	GSM850: 7W PCS1900, WCDMA Band II: 2W
Test setup:	 <p><i>Note: Measurement setup for testing on Antenna connector</i></p>
Test Procedure:	<ol style="list-style-type: none"> 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)	PK power (dBm)	Limit (dBm)	Result
GSM 850 (GSM link)	128	824.20	31.75	38.45	Pass
	190	836.60	31.77		
	251	848.80	31.79		
GSM 850 (GPRS 1 link)	128	824.20	31.63	38.45	Pass
	190	836.60	31.57		
	251	848.80	31.71		
PCS 1900 (GSM link)	512	1850.20	28.25	33.01	Pass
	661	1880.00	28.20		
	810	1909.80	28.24		
PCS 1900 (GPRS 1 link)	512	1850.20	28.23	33.01	Pass
	661	1880.00	28.19		
	810	1909.80	28.17		

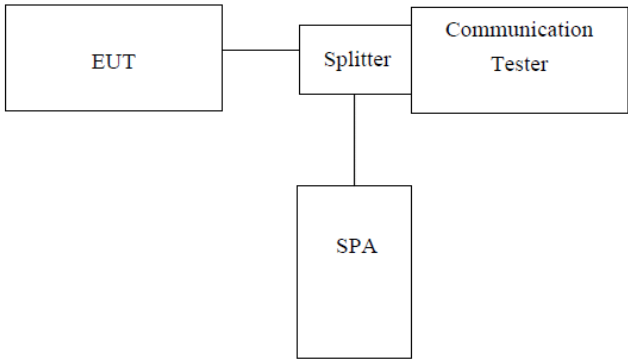
6.4 Peak-to-Average Ratio

Test Requirement:	FCC part24.232(d)
Test Method:	FCC part2.1046
Limit:	13db
Test setup:	 <p><i>Note: Measurement setup for testing on Antenna connector</i></p>
Test Procedure:	<ol style="list-style-type: none"> 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

Test mode	Channel	Peak power (dBm)	Average power(dBm)	PAR(dB)	Limit (dB)	Verdict
GSM 850	824.2	31.75	31.50	0.51	13	Compliant
	836.6	31.77	31.46	0.53		
	848.8	31.79	31.13	0.56		
PCS 1900	1850.2	28.25	27.52	0.21		
	1880.0	28.20	27.37	0.25		
	1909.8	28.24	27.44	0.28		

6.5 Occupy Bandwidth

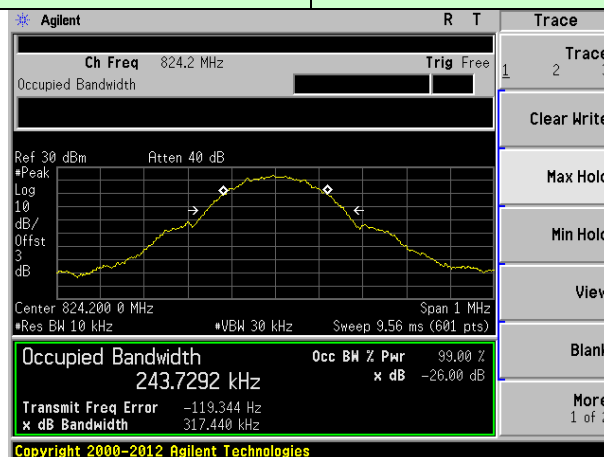
Test Requirement:	FCC part22.913(a) and FCC part24.232(b)
Test Method:	FCC part2.1049
Test setup:	 <p><i>Note: Measurement setup for testing on Antenna connector</i></p>
Test Procedure:	<ol style="list-style-type: none"> 1. The EUT's output RF connector was connected with a short cable to the spectrum 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

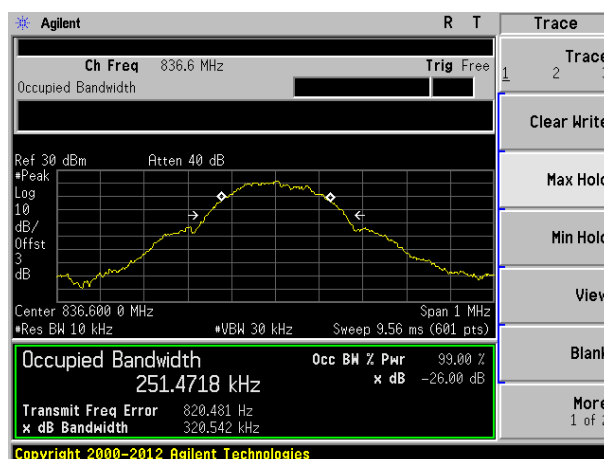
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
GSM 850 (GSM link)	128	824.20	243.7292	317.440
	190	836.60	251.4718	320.542
	251	848.80	242.8918	318.435
GSM 850 (GPRS 1 link)	128	824.20	253.7258	323.081
	190	836.60	255.8955	327.541
	251	848.80	250.9672	322.755
PCS 1900 (GSM link)	512	1850.20	236.9830	317.149
	661	1880.00	245.2865	318.581
	810	1909.80	243.1315	323.785
PCS 1900 (GPRS 1 link)	512	1850.20	242.9705	322.056
	661	1880.00	243.2544	319.474
	810	1909.80	248.0281	317.057

Test plot as follows:

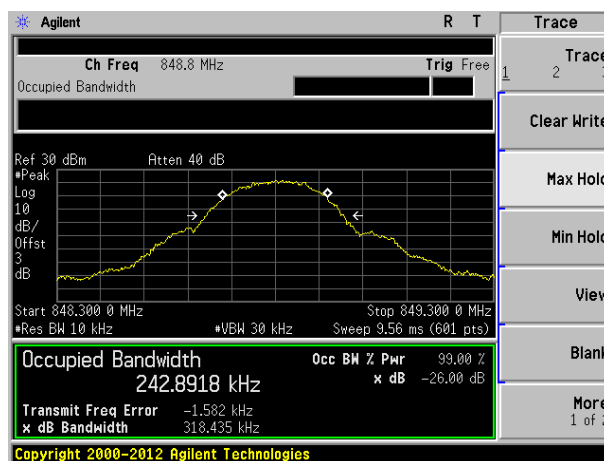
Test band:	GSM 850 (GSM link)
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Lowest channel

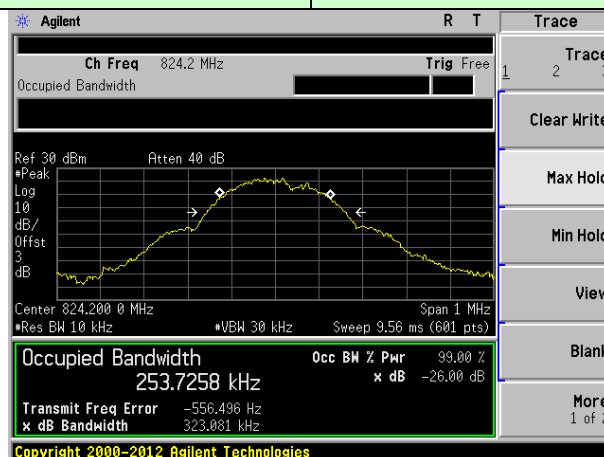


Middle channel

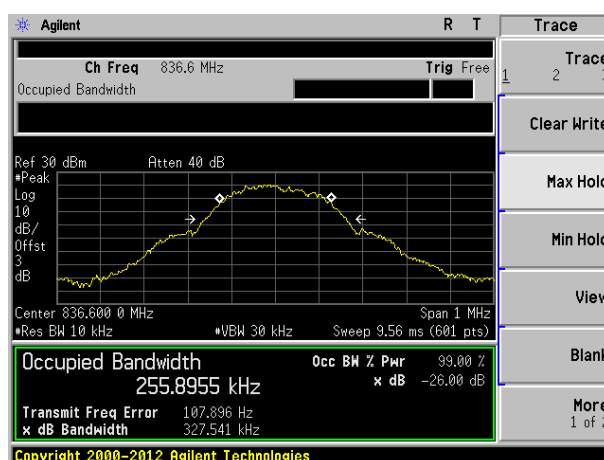


Highest channel

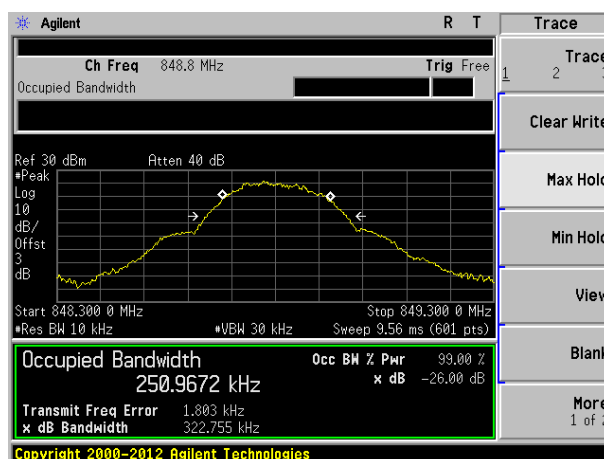
Test band:	GSM 850 (GPRS 1 link)
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Lowest channel

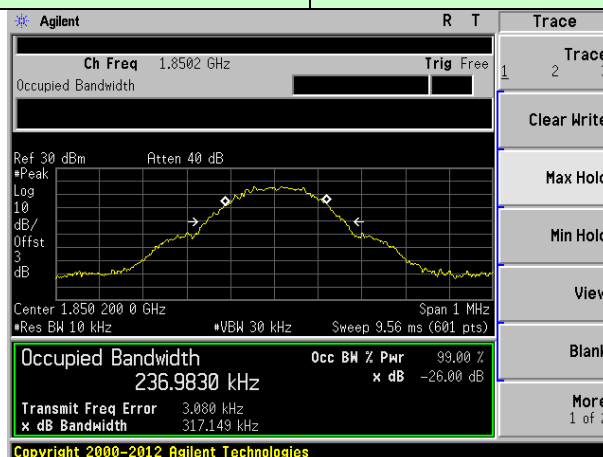


Middle channel

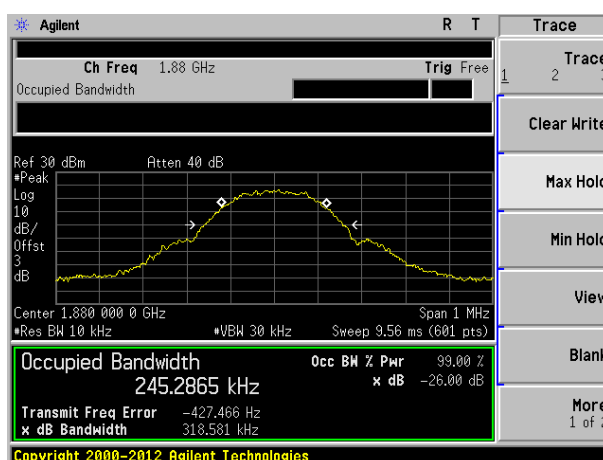


Highest channel

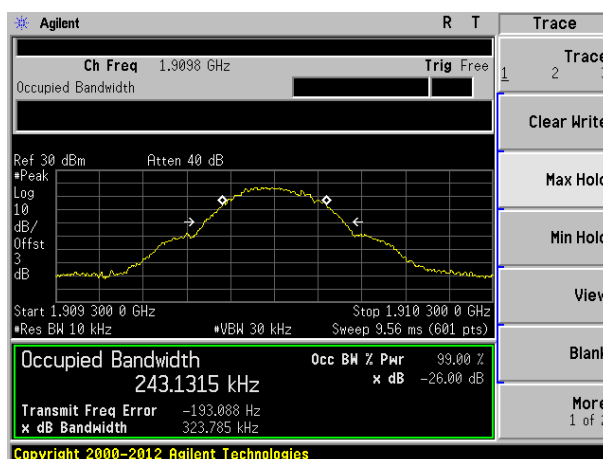
Test band:	PCS 1900 (GSM link)
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Lowest channel

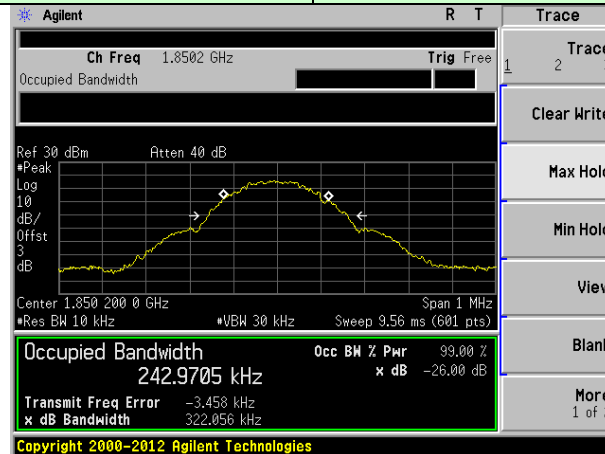


Middle channel

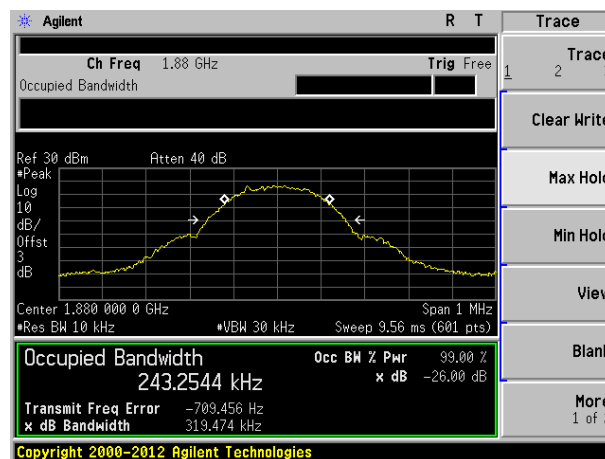


Highest channel

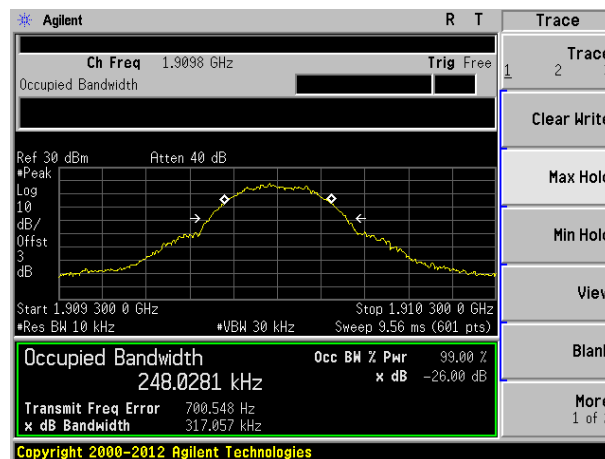
Test band:	PCS 1900 (GPRS 1 link)
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Lowest channel



Middle channel

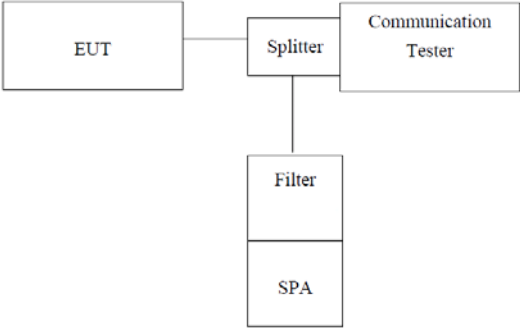


Highest channel

6.6 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.

6.7 Out of band emission at antenna terminals

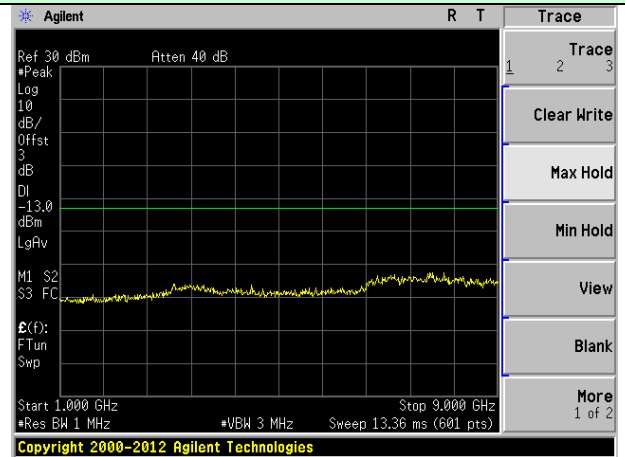
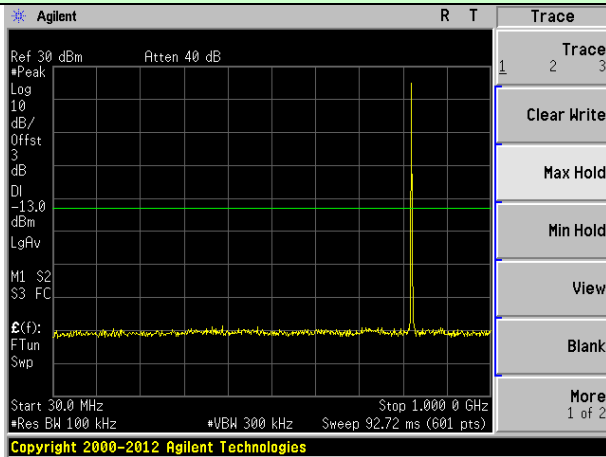
Test Requirement:	FCC part22.917(a) and FCC part24.238(a)
Test Method:	FCC part2.1051
Limit:	-13dBm
Test setup:	 <p><i>Note: Measurement setup for testing on Antenna connector</i></p>
Test Procedure:	<ol style="list-style-type: none"> 1 The RF output of the transceiver was connected to a spectrum analyzer 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:

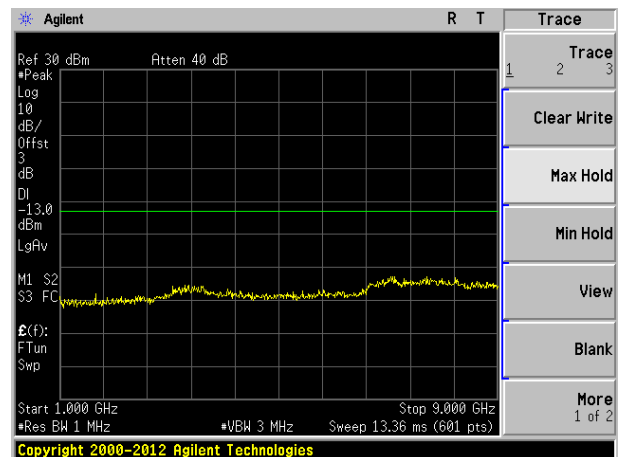
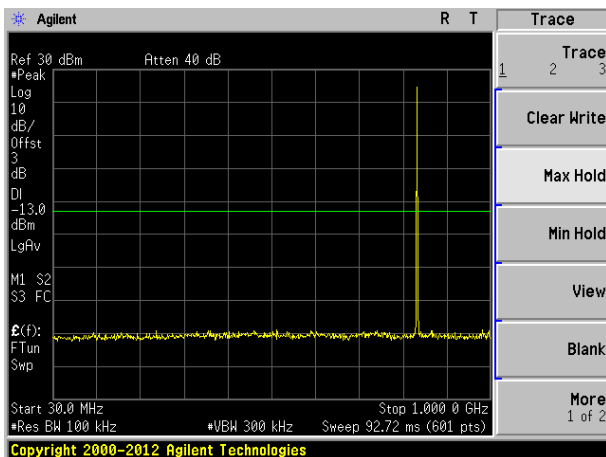
Note: During the conducted spurious emission test, a band filter was used. The information of the filter is reported at section 6.0 (refer to item 24, 25).

Test Mode: Traffic mode

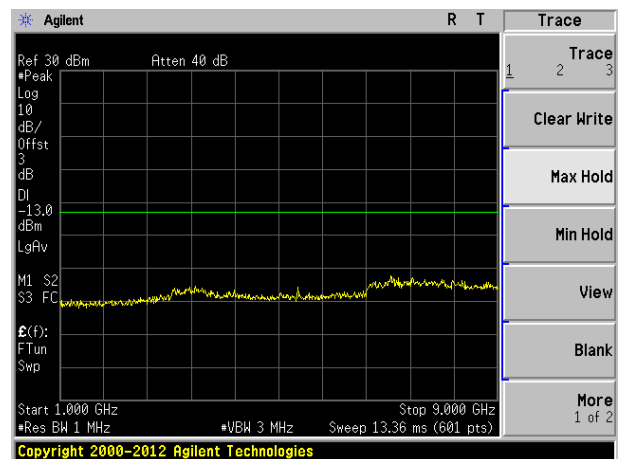
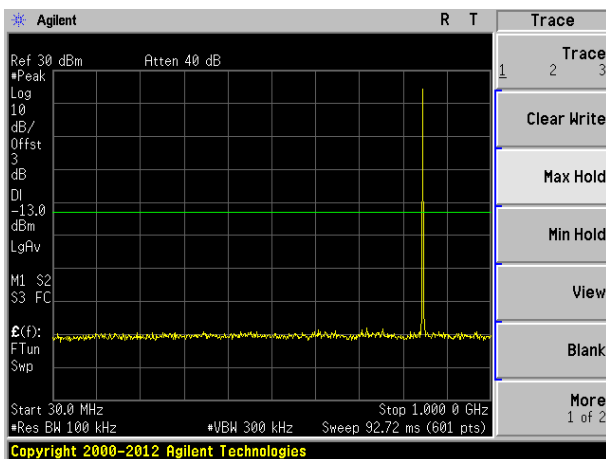
GSM 850 (GSM link)



Lowest channel

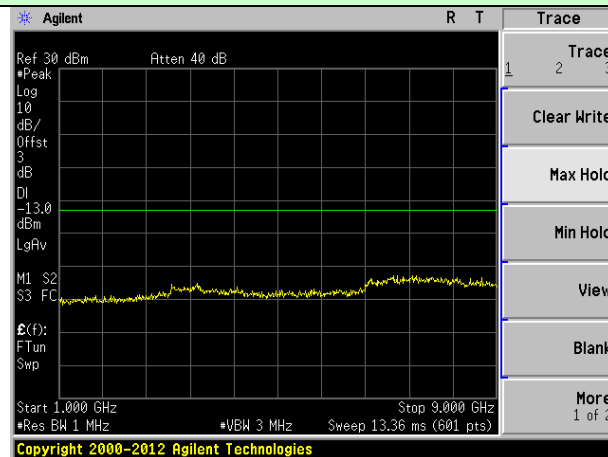
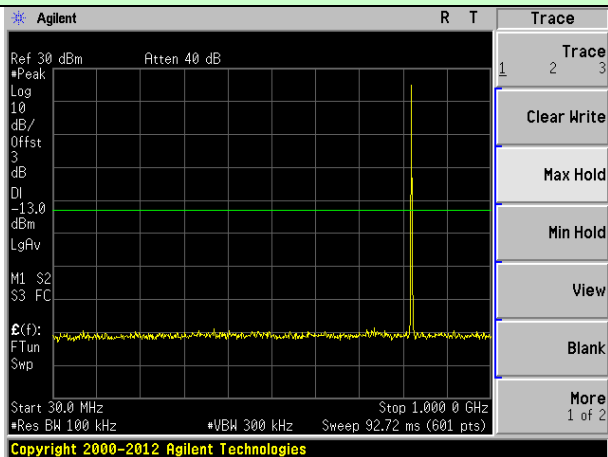


Middle channel

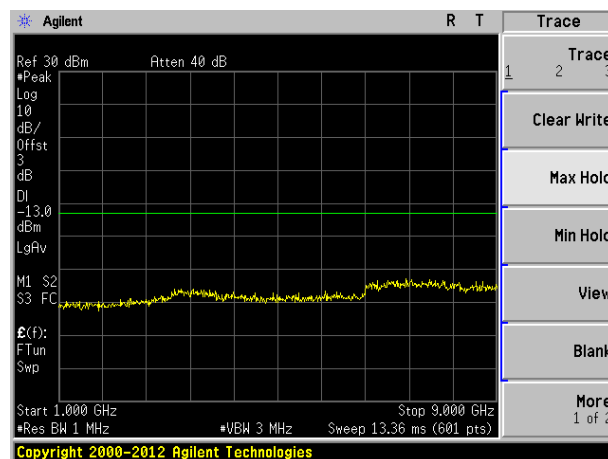
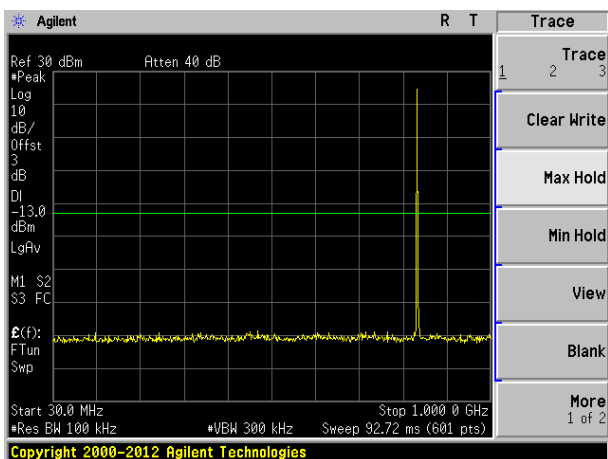


Highest channel

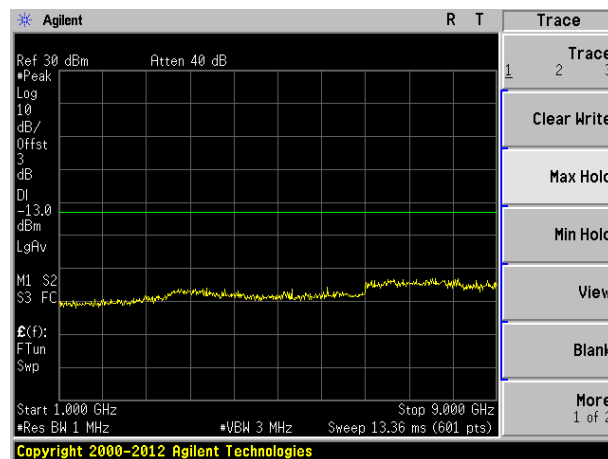
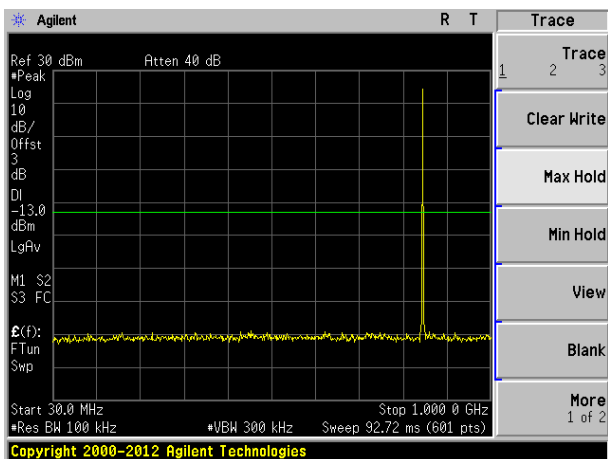
Test Mode: Traffic mode	GSM 850 (GPRS 1 link)
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Lowest channel

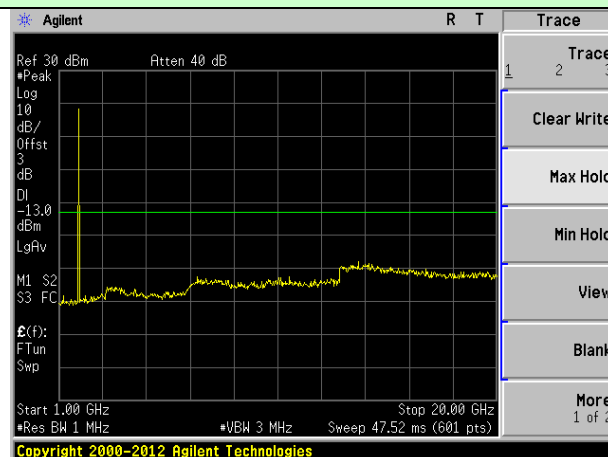
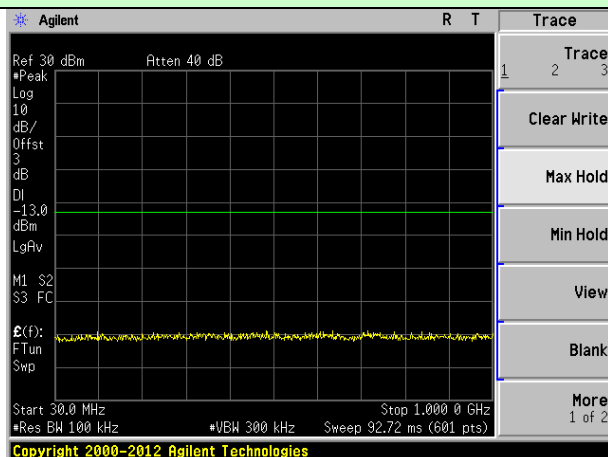


Middle channel

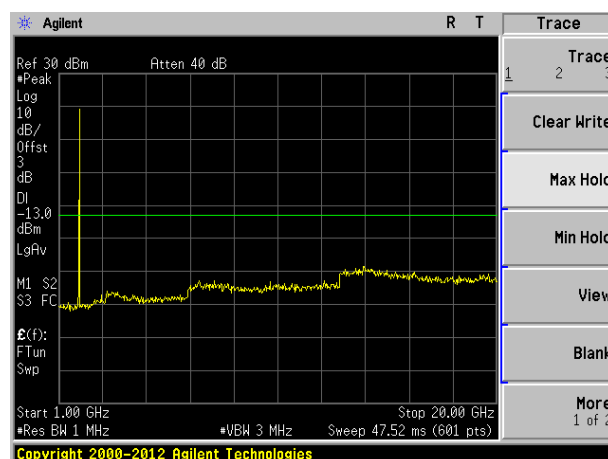
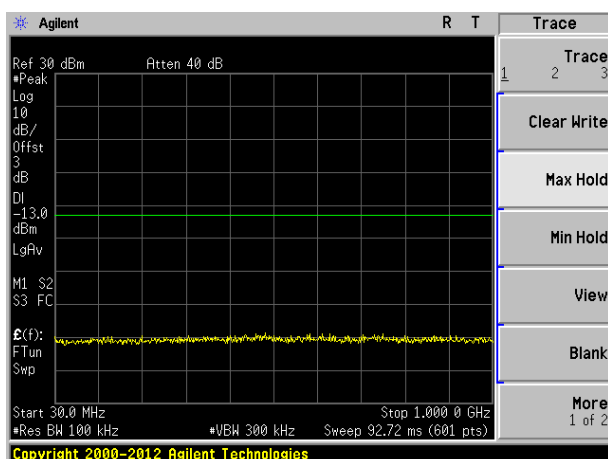


Highest channel

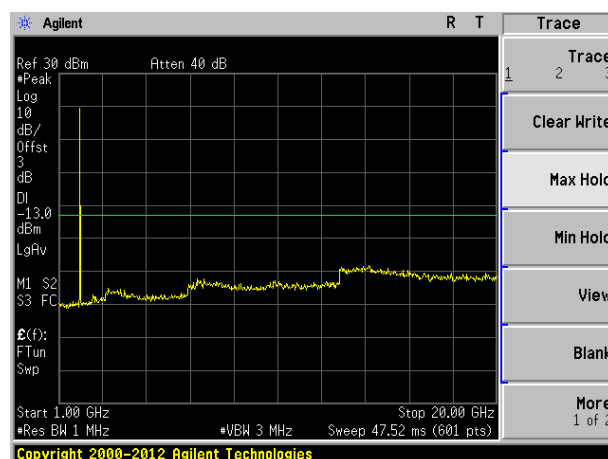
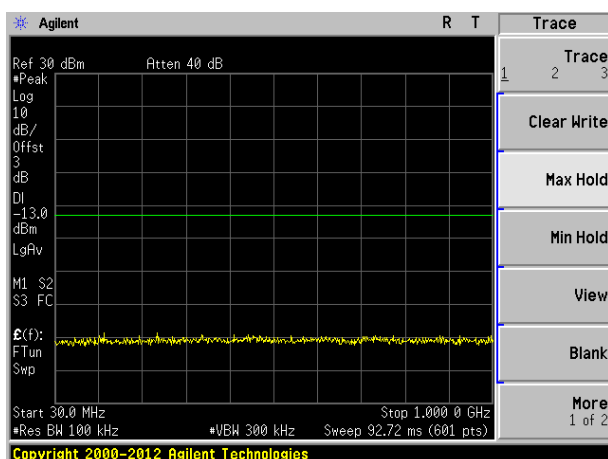
Test Mode: Traffic mode	PCS1900 (GSM link)
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Lowest channel

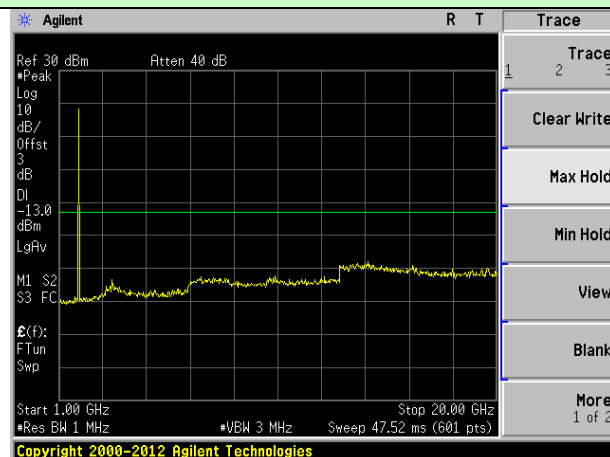
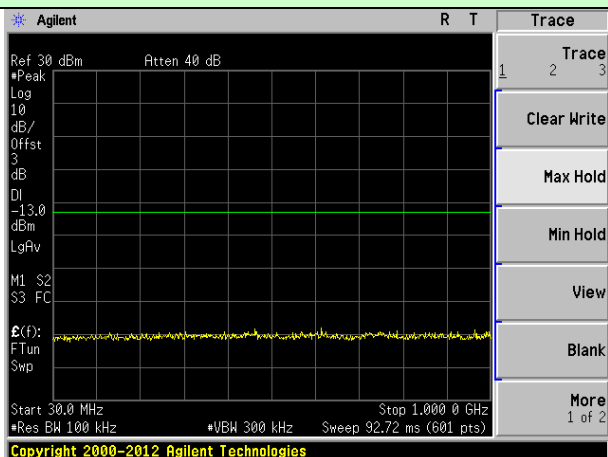


Middle channel

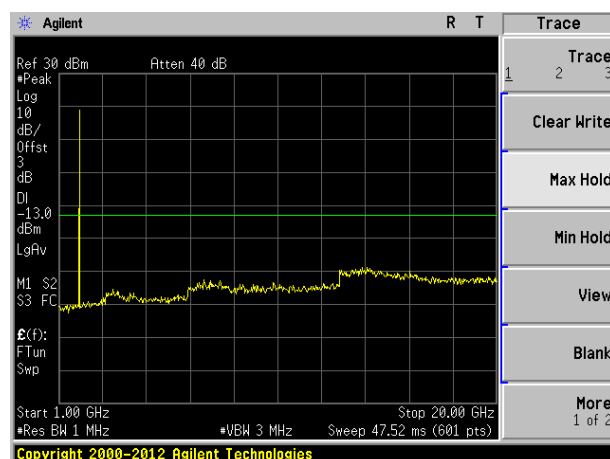
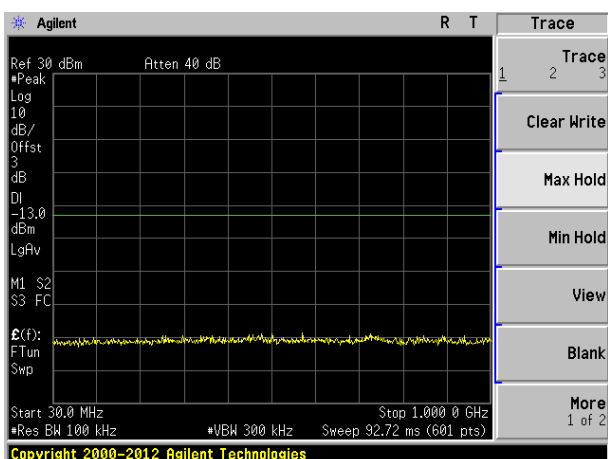


Highest channel

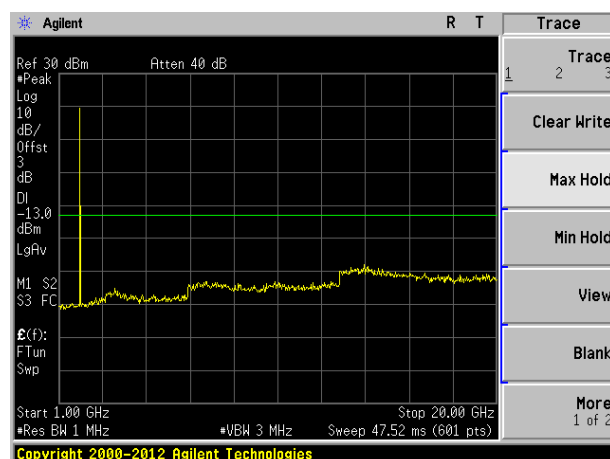
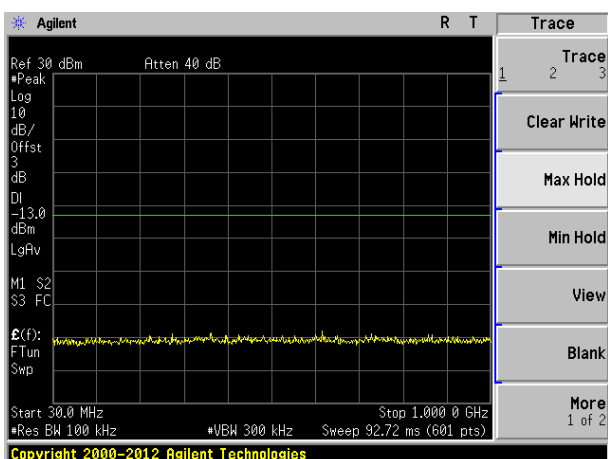
Test Mode: Traffic mode	PCS1900 (GPRS 1 link)
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Lowest channel



Middle channel

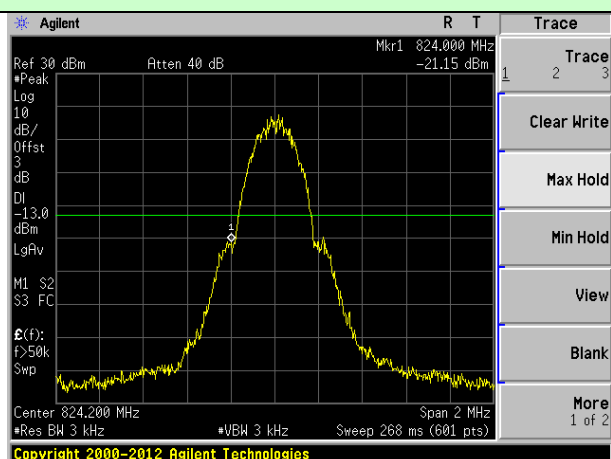


Highest channel

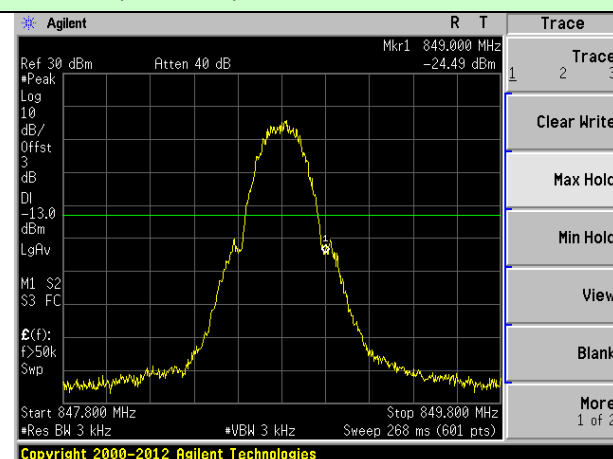
Band Edge:

Test Mode: Traffic mode

GSM850 (GSM link)



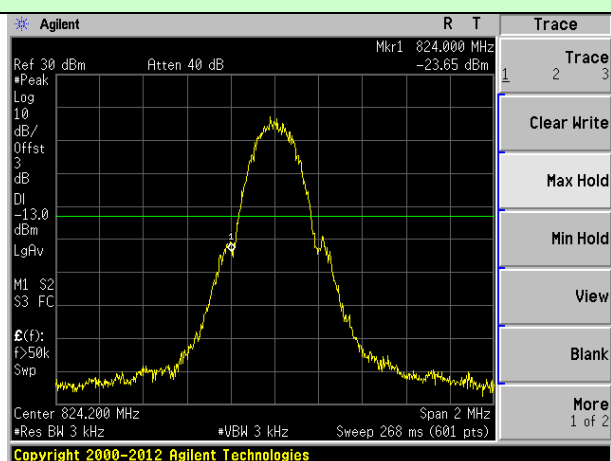
Lowest channel



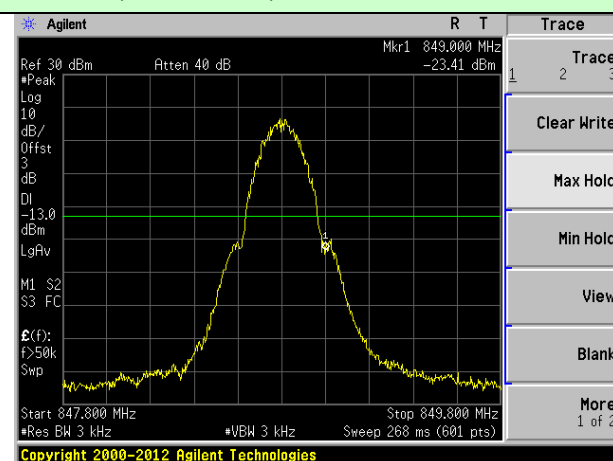
Highest channel

Test Mode: Traffic mode

GSM850 (GPRS 1 link)

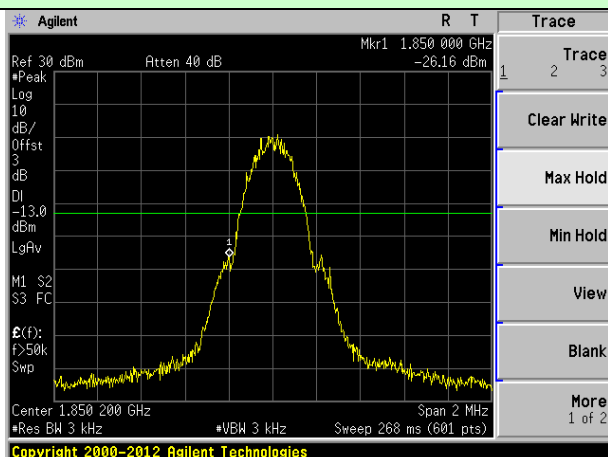


Lowest channel

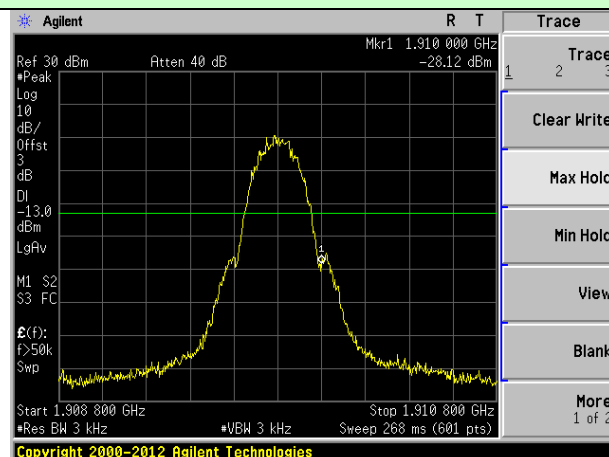


Highest channel

Test Mode: Traffic mode	PCS1900 (GSM link)
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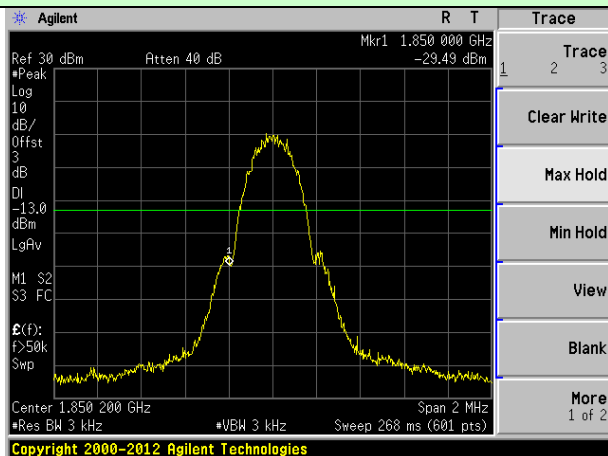


Lowest channel

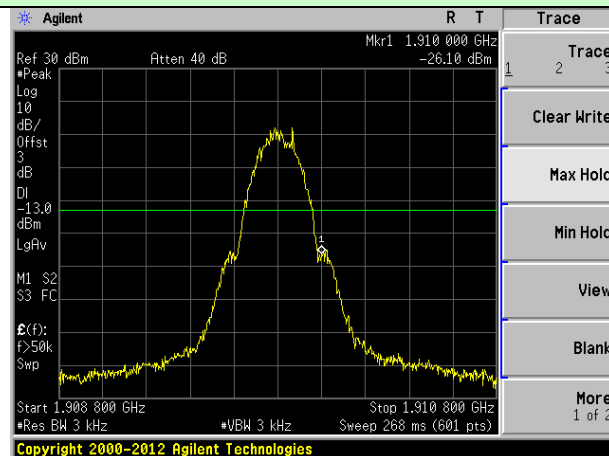


Highest channel

Test Mode: Traffic mode	PCS1900 (GPRS 1 link)
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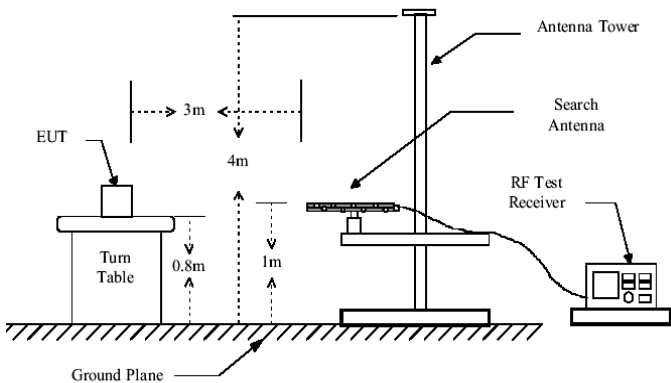
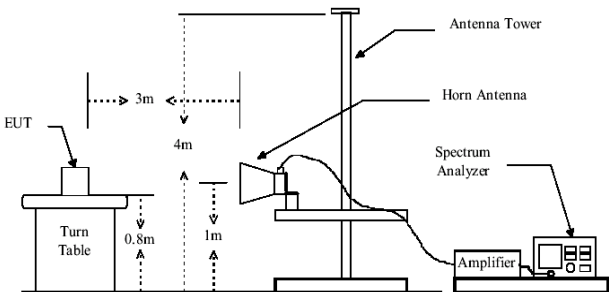
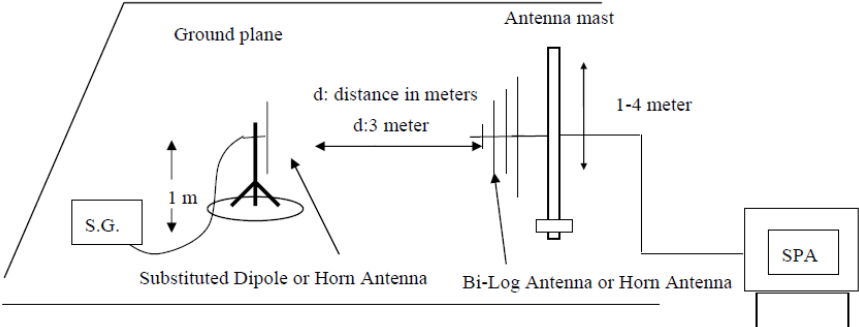


Lowest channel



Highest channel

6.8 ERP, EIRP Measurement

Test Requirement:	FCC part22.913(a) and FCC part24.232(b)
Test Method:	FCC part2.1046
Limit:	GSM850: 7W PCS1900: 2W
Test setup:	<p>Below 1GHz</p>  <p>Above 1GHz</p>  <p>Substituted method:</p> 

Test Procedure:	<ol style="list-style-type: none"> 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 as follows: $\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable Loss (dB)}$ 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: $\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

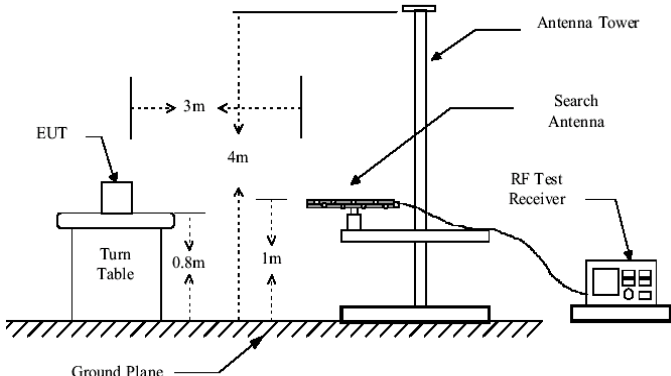
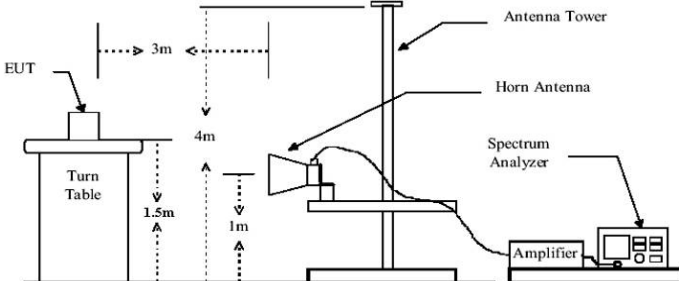
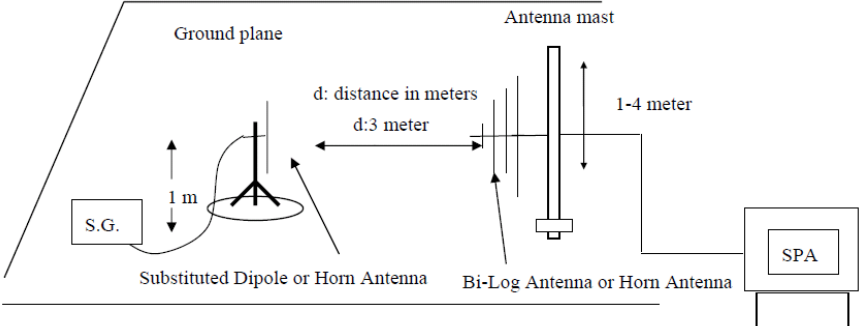
EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
GSM850 (GSM link)	Lowest	H	V	31.23	38.45	Pass
			H	28.01		
		E1	V	22.56		
			H	27.99		
		E2	V	21.43		
			H	25.43		
	Middle	H	V	30.77	38.45	Pass
			H	27.41		
		E1	V	22.01		
			H	27.49		
		E2	V	22.91		
			H	25.82		
	Highest	H	V	31.22	38.45	Pass
			H	27.37		
		E1	V	22.21		
			H	26.64		
		E2	V	21.54		
			H	26.83		

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
GSM850 (GPRS 1 link)	Lowest	H	V	30.60	38.45	Pass
			H	27.33		
		E1	V	21.81		
			H	27.19		
		E2	V	20.57		
			H	24.51		
	Middle	H	V	29.94	38.45	Pass
			H	26.44		
		E1	V	20.97		
			H	26.39		
		E2	V	21.96		
			H	24.81		
	Highest	H	V	30.40	38.45	Pass
			H	26.49		
		E1	V	21.28		
			H	25.64		
		E2	V	20.82		
			H	26.04		

EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP (dBm)	Limit (dBm)	Result
PCS1900 (GSM link)	Lowest	H	V	28.39	33.01	Pass
			H	25.62		
		E1	V	20.84		
			H	25.83		
		E2	V	20.05		
			H	23.73		
	Middle	H	V	28.42	33.01	Pass
			H	25.65		
		E1	V	20.95		
			H	25.97		
		E2	V	21.59		
			H	24.31		
	Highest	H	V	28.89	33.01	Pass
			H	25.54		
		E1	V	21.04		
			H	25.11		
		E2	V	20.06		
			H	24.91		

EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP (dBm)	Limit (dBm)	Result
PCS1900 (GPRS 1 link)	Lowest	H	V	27.92	33.01	Pass
			H	25.11		
		E1	V	20.29		
			H	25.24		
		E2	V	21.42		
			H	23.07		
	Middle	H	V	27.81	33.01	Pass
			H	24.95		
		E1	V	20.21		
			H	25.19		
		E2	V	20.90		
			H	23.58		
	Highest	H	V	28.30	33.01	Pass
			H	24.91		
		E1	V	20.37		
			H	24.39		
		E2	V	20.52		
			H	24.33		

6.9 Field strength of spurious radiation measurement

Test Requirement:	FCC part22.917(a) and FCC part24.238(a)
Test Method:	FCC part2.1053
Limit:	-13dBm
Test setup:	<p>Below 1GHz</p>  <p>Above 1GHz</p>  <p>Substituted method:</p> 

Test Procedure:	<ol style="list-style-type: none"> 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. $\text{ERP / EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain(dB/dBi)} - \text{Cable Loss (dB)}$
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:	GSM850		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1648.40	Vertical	-35.77	-13.00	Pass
2472.60	V	-38.51		
3296.80	V	-40.79		
4121.00	V	-42.95		
4945.20	V	---		
1648.40	Horizontal	-41.02	-13.00	Pass
2472.60	H	-44.90		
3296.80	H	-46.48		
4121.00	H	-49.22		
4945.20	H	---		
Test mode:	GSM850		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-37.17	-13.00	Pass
2509.80	V	-39.45		
3346.40	V	-41.35		
4183.00	V	-43.16		
5019.60	V	---		
1673.20	Horizontal	-41.55	-13.00	Pass
2509.80	H	-44.78		
3346.40	H	-46.10		
4183.00	H	-48.39		
5019.60	H	---		
Test mode:	GSM850		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1697.60	Vertical	-37.43	-13.00	Pass
2546.40	V	-39.46		
3395.20	V	-41.14		
4244.00	V	-42.76		
5092.80	V	---		
1697.60	Horizontal	-41.33	-13.00	Pass
2546.40	H	-44.21		
3395.20	H	-45.37		
4244.00	H	-47.40		
5092.80	H	---		

Remark :

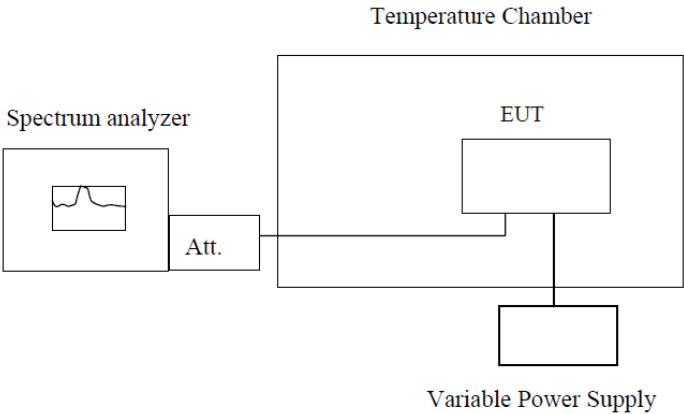
1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	PCS1900		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-37.01	-13.00	Pass
5550.60	V	-39.39		
7400.80	V	-41.36		
9251.00	V	-43.26		
11101.20	V	---		
3700.40	Horizontal	-41.59	-13.00	Pass
5550.60	H	-44.96		
7400.80	H	-46.32		
9251.00	H	-48.69		
11101.20	H	---		
Test mode:	PCS1900		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-34.72	-13.00	Pass
5640.00	V	-37.18		
7520.00	V	-39.21		
9400.00	V	-41.18		
11280.00	V	---		
3760.00	Horizontal	-39.45	-13.00	Pass
5640.00	H	-42.93		
7520.00	H	-44.35		
9400.00	H	-46.80		
11280.00	H	---		
Test mode:	PCS1900		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-35.90	-13.00	Pass
5729.40	V	-38.28		
7639.20	V	-40.26		
9549.00	V	-42.16		
11458.80	V	---		
3819.60	Horizontal	-40.48	-13.00	Pass
5729.40	H	-43.87		
7639.20	H	-45.23		
9549.00	H	-47.60		
11458.80	H	---		

Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

6.10 Frequency stability V.S. Temperature measurement

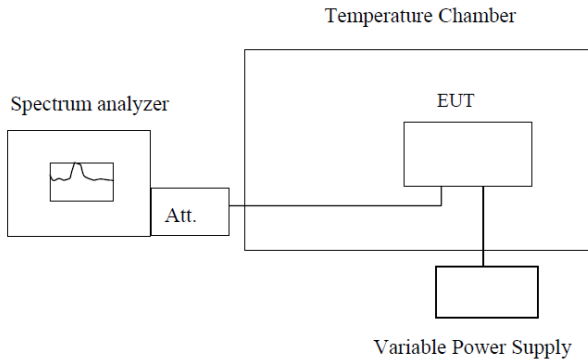
Test Requirement:	FCC Part2.1055(a)(1)(b)
Test Method:	FCC Part2.1055(a)(1)(b)
Limit:	2.5ppm
Test setup:	 <p>Note : Measurement setup for testing on Antenna connector</p>
Test procedure:	<ol style="list-style-type: none"> 1. The equipment under test was connected to an external DC power supply and input 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: GSM850 (GSM link) Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	35	0.0415	2.5	Pass
	-20	38	0.0459		
	-10	33	0.0400		
	0	28	0.0340		
	10	32	0.0385		
	20	28	0.0340		
	30	43	0.0518		
	40	40	0.0474		
	50	38	0.0459		
Reference Frequency: GSM850 (GPRS 1 link) Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	51	0.0611	2.5	Pass
	-20	60	0.0713		
	-10	49	0.0589		
	0	42	0.0507		
	10	48	0.0573		
	20	41	0.0493		
	30	72	0.0864		
	40	62	0.0746		
	50	59	0.0704		

Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error			Result
		Hz	ppm		
3.70	-30	25	0.0135	2.5	Pass
	-20	32	0.0172		
	-10	25	0.0135		
	0	20	0.0104		
	10	25	0.0135		
	20	21	0.0110		
	30	40	0.0215		
	40	33	0.0178		
	50	31	0.0166		
Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error			Result
		Hz	ppm		
3.70	-30	95	0.0505	2.5	Pass
	-20	113	0.0599		
	-10	91	0.0484		
	0	74	0.0395		
	10	92	0.0490		
	20	77	0.0408		
	30	127	0.0674		
	40	105	0.0561		
	50	111	0.0590		

6.11 Frequency stability V.S. Voltage measurement

Test Requirement:	FCC Part2.1055(d)(1)(2)
Test Method:	FCC Part2.1055(d)(1)(2)
Limit:	2.5ppm
Test setup:	 <p>Note : Measurement setup for testing on Antenna connector</p>
Test procedure:	<ol style="list-style-type: none"> 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

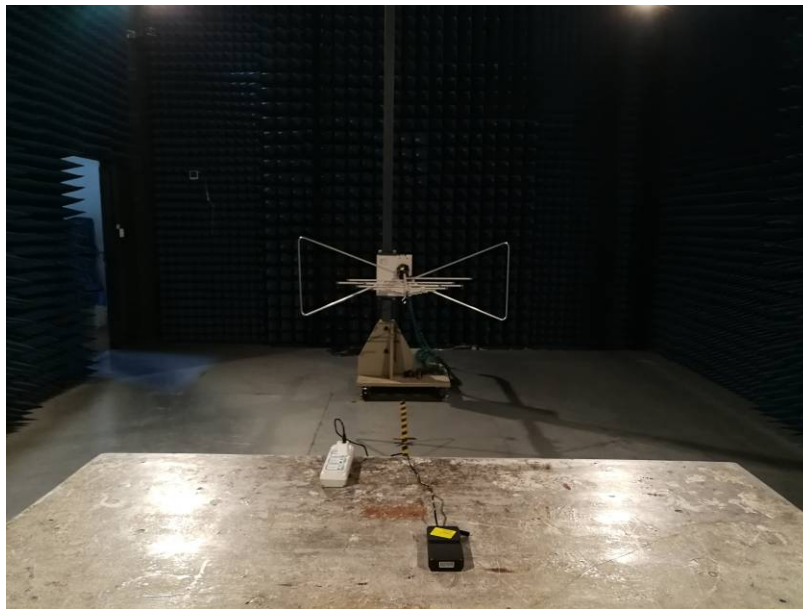
Measurement Data

Reference Frequency: GSM850 (GSM link) Middle channel=190 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.2	20	0.0240	2.5	Pass
	3.7	23	0.0270		
	3.6	25	0.0299		
Reference Frequency: GSM850 (GPRS 1 link) Middle channel=190 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.2	28	0.0331	2.5	Pass
	3.7	32	0.0384		
	3.6	36	0.0436		

Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.2	15	0.0080	2.5	Pass
	3.7	22	0.0116		
	3.6	22	0.0116		
Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.2	66	0.0349	2.5	Pass
	3.7	74	0.0396		
	3.6	75	0.0398		

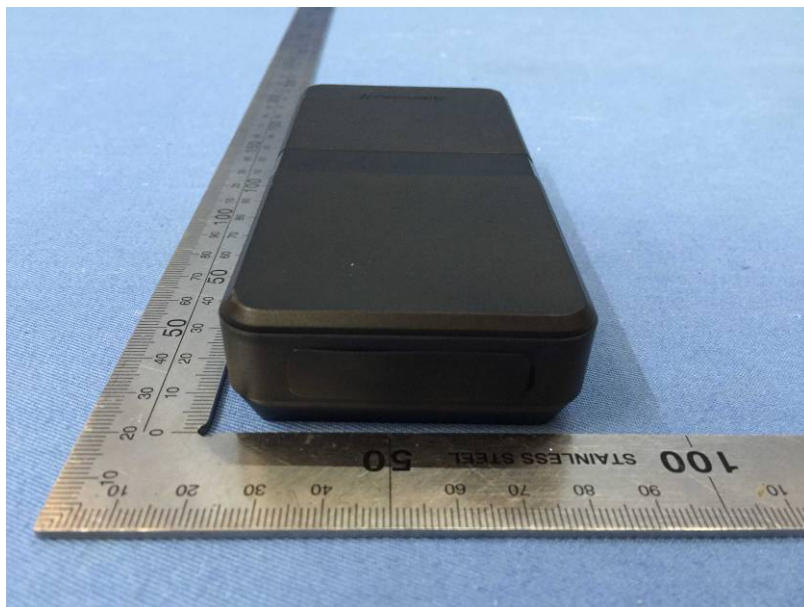
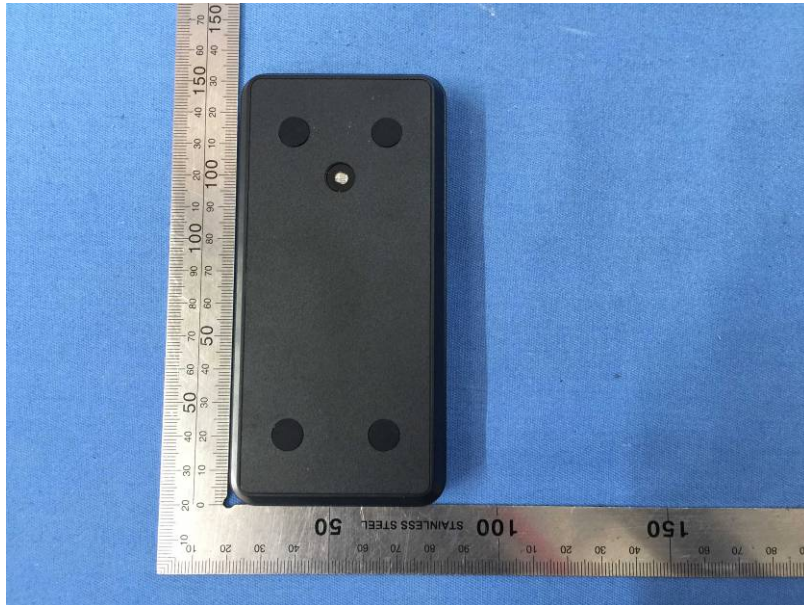
7 Test Setup Photo

Radiated Emission

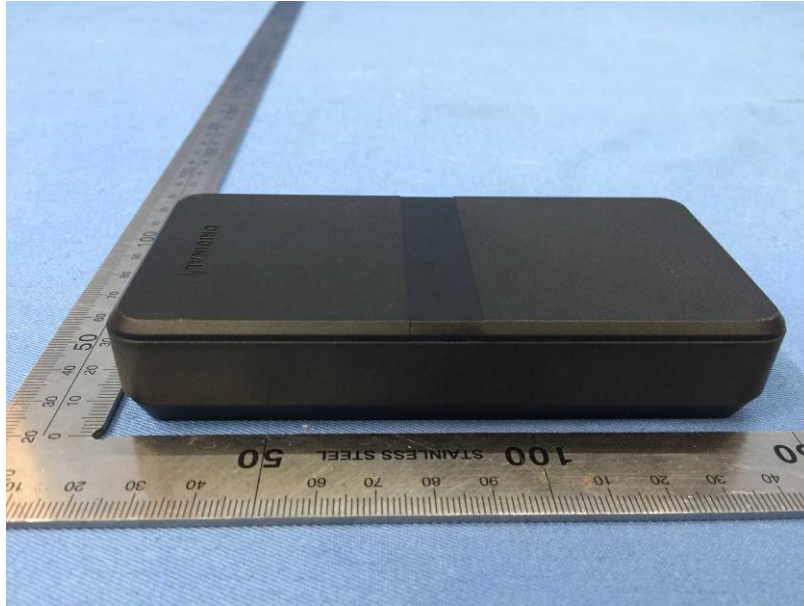


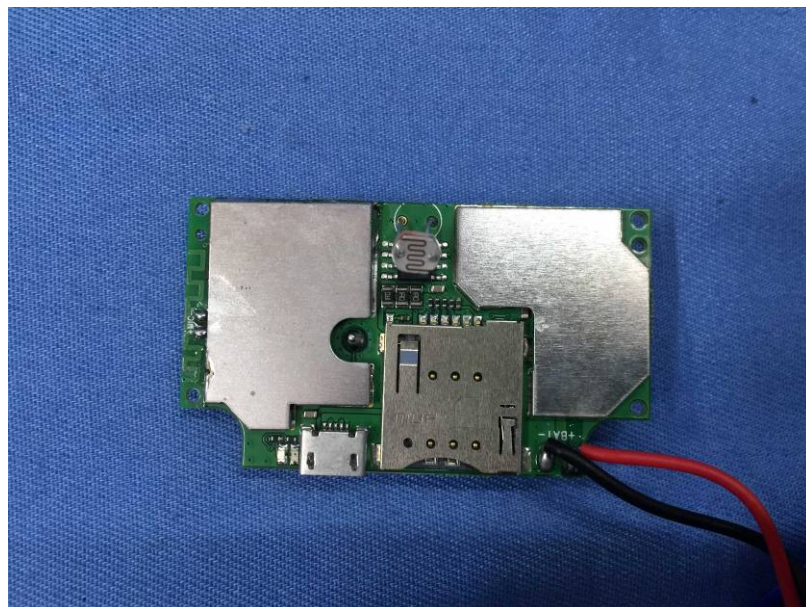
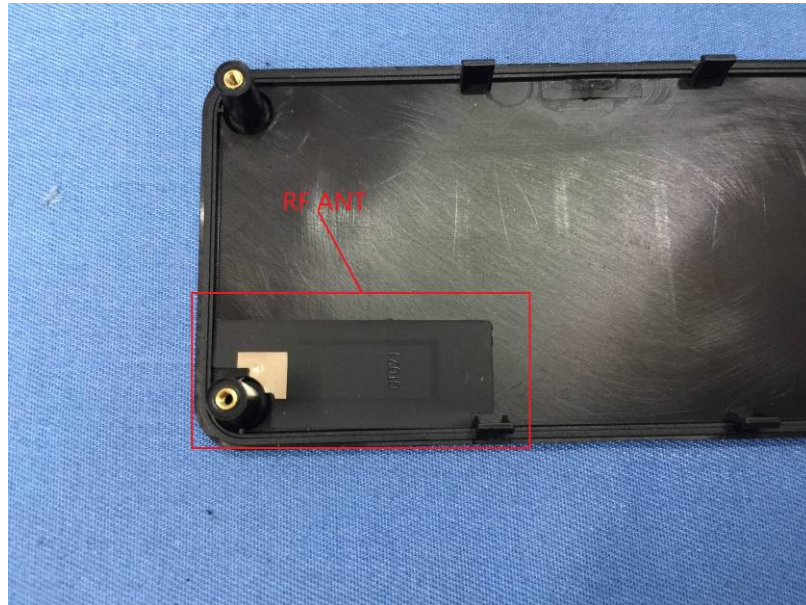
8 EUT Constructional Details

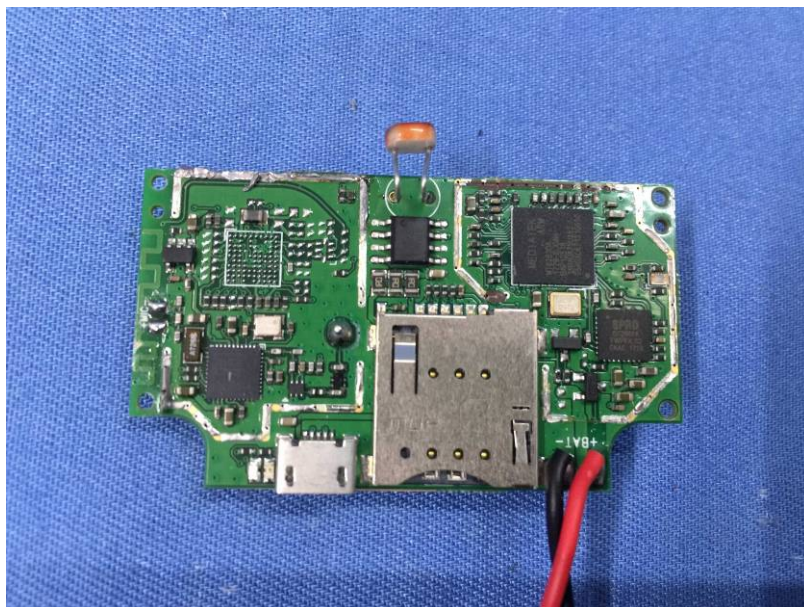
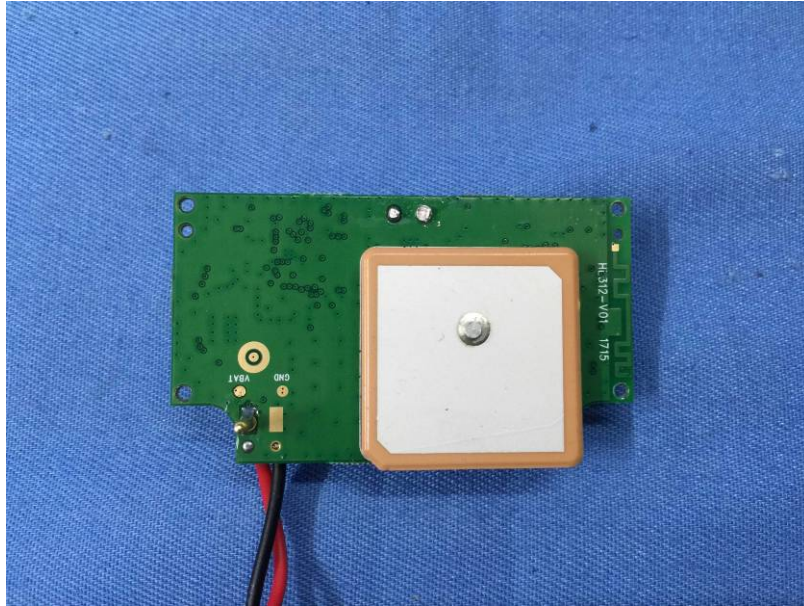


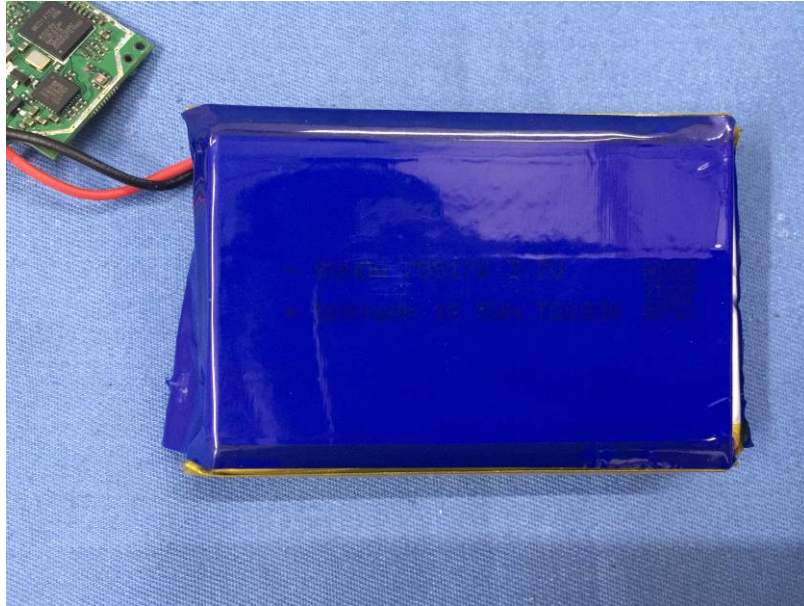


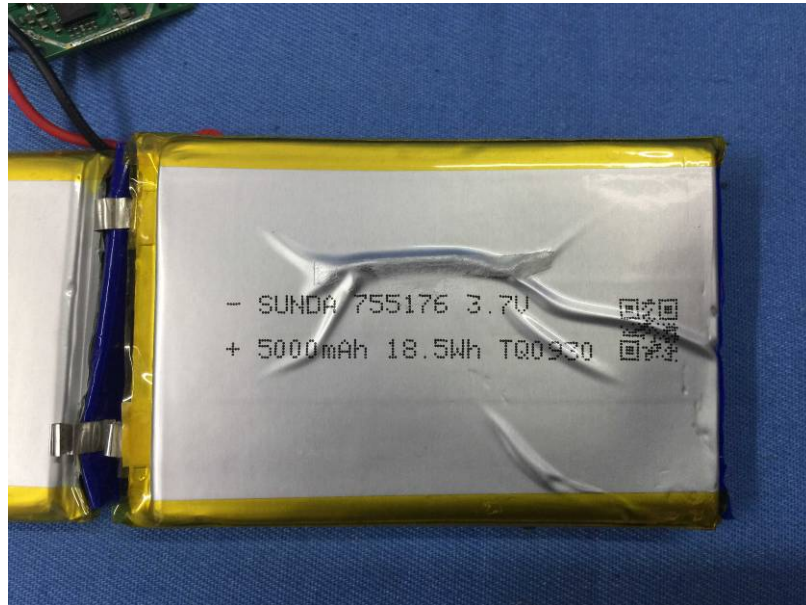












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