





# **EMC Test Report**

Product Name: cdma2000 Digital Mobile Phone

Model Number: HUAWEI C8600/HUAWEI M860

Report No: SYBHZ (R) E012062010EB-1

FCC ID:QISM860

# Reliability Laboratory of Huawei Technologies Co., Ltd.

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- 4. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-1.
- 5. The laboratory also has been listed by the VCCI to perform EMC measurements. The accreditation number is R2364, C2583, and T256.
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# Notice 2

## Modification Information:

#### **Modification Information**

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REPORT ON	EMC Test of cdma 2000 Digital Mobile Phone
	M/N: HUAWEI C8600/HUAWEI M860
REGULATION	FCC CFR47 Part 15: Subpart B;
	FCC CFR47 Part 22: Subpart H;
	FCC CFR47 Part 24: Subpart E;
	FCC CFR47 Part 27: Subpart C;
START OF TEST	Jun. 07, 2010
END OF TEST	Jun. 11, 2010
Final Judgement:	Pass

Approver <u>2010-06-23</u> 张兴海 Date Name

Signature

Operator <u>2010-06-23</u> <u>温剑锋</u> <u>Date</u> Name Signature



# **REPORT BODY CONTENT**

1	Status	6
1.1 1.2	Product Information	
1.3	Test Site	
1.4	Test environment condition	7
2	Summary of Results	8
3	Equipment Specification	9
3.1	General Description	
3.2	Sub-Assembly Identity	9
4	System Configuration during EMC Test	10
4.1	Cables Used during Test	
4.2	Associated Equipment Used during Test	
4.3	Test Configurations and Test Mode	
4.4	Test conditions and test connections	11
5	Electromagnetic Interference (EMI)	12
5.1	Radiated Disturbance 30MHz to 18GHz	
5.2	Conducted Disturbance 0.15 MHz to 30MHz	13
5.3	Radiated Spurious Emissions	14
6	Main Test Instruments	17
7	System Measurement Uncertainty	18
8	Graph and Data of Emission Test	19
8.1	Radiated Disturbance	
8.2	Conducted Disturbance	21
03	Padiated Spurious Emission	22

## 1 Status

#### 1.1 Product Information

CLIENT: Huawei Technologies Co., Ltd.

ADDRESS: Bantian Longgang District Shenzhen, P.R. China

MANUFACTURING DESCRIPTION cdma2000 Digital Mobile Phone MANUFACTURERS MODEL NUMBER HUAWEI C8600/HUAWEI M860

## 1.2 Applied Standard

FCC	FCC Limits	Description	Result
Measurement	Part(s)		
Specification			
-	15.107	Conducted Emission at Power Port	PASS
-	15.109	Radiated Emission of Enclosure in Idle Mode	PASS
2.1051	22.917/24.238/27.53	Spurious Emission at Antenna Terminals	PASS

#### 1.3 Test Site

Site 1:

EMC LABORATORY OF RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD

#### 1.4 Test environment condition

Ambient temperature 20~25°C Relative humidity 40%~52% Atmospheric pressure 101kPa

## 2 Summary of Results

Table 2 below shows a brief summary of the results obtained.

Summary of results

EUT Classification: Wireless Terminal				
Test Items	Test Configuration &Test Mode	Required Performance Criteria	Result	Site
Radiated Emissions Enclosure Port	TC1/TC2 (TM12-TM20)	N/A	Pass	Site1
Conducted Emissions	TC1 (TM1- TM9,TM12- TM20)	N/A	Pass	Site1
Radiated Spurious Emissions Enclosure Port	TC1 (TM1- TM9,TM12- TM20)	N/A	Pass	Site1

#### Note:

- 1, Measurement taken is within the measurement uncertainty of measurement system.
- 2, TC = Test configuration



## 3 **Equipment Specification**

#### 3.1 General Description

cdma2000 Digital Mobile Phone-HUAWEI C8600/HUAWEI M860 is subscriber equipment in the CDMA/EVDO system. The frequency band is US Cellular and N.American PCS and AWS, Their band test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, cdma2000 1x and 1XEV-DO protocol processing, voice, MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port(to provide voice service) .

3.1.1 Main Equipment Technical Data

Description:	cdma2000 Digital Mobile Phone
Models:	HUAWEI C8600/HUAWEI M860
Input Rated Voltage	3.7V
Extreme Voltage	3.6V and 4.2V
Rated Power	Normal 3W ,Max 8 W
Dimensions	116mm (L) $\times$ 62.5mm (W) $\times$ 13.6mm (H)
Weight	<110g (with battery)

Mode		Work Frequency		
		Transmitt Frequency	Receive Frequency	
		(MHz)	(MHz)	
CDMA2000 1x	CDMA/EVDO800	824-849	869-894	
and 1XEV-DO	CDMA/EVDO 1900	1850-1910	1930-1990	
	AWS 1700	1710-1755	2110-2155	
Bluetooth		2400-2483.5		
WIFI		2	400-2483.5	

#### 3.2 Sub-Assembly Identity

Sub-Assembly Identity

eas recently recently					
Board					
Model Name	Qty.		Serial	Description	
HC1M860M	1		2X2AA11051900071	Main board of Mobile Phone	
			Accessory		
Name	Qt y.	Manufactur e	Serials number	Description	
Adapter	1	Huawei Technologie s Co., Ltd.	HKAA50924503	Adapter Model: HW-050100U1W voltage nominal: ~120V Input voltage: ~100-240V;50/60Hz Output voltage: +5.0V, 1A Rate power: 5W	
Rechargeable Li-ion	1	Huawei Technologie s Co., Ltd.	SCC9621HI2571560	Battery Model: HB4F1 Rated capacity: 1500mAh Nominal Voltage: === +3.7V Charging Voltage: === +4.2V	

## 4 System Configuration during EMC Test

The Equipment under Test (EUT) was functioning correctly during all tests. The EUT was installed within the test site and was configured to simulate a typical user installation.

### 4.1 Cables Used during Test

Cable Used during Test

Cable	Quantity	Type of Cable
AC Power Port	1	Unshielded
USB	1	shielded
Earphone	1	Unshielded

#### 4.2 Associated Equipment Used during Test

Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date	Cal Interval (month)
Radio Communication Tester	CMU200	R&S	3607033573	2010-03-12	12
Notebook	D810	DELL	3105083303	NA	NA

#### 4.3 Test Configurations and Test Mode

#### 4.3.1 Test Configuration.

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

TC1:EUT powered with an adapter and connected to the test system (Base Station Simulator). TC2:EUT connected to the notebook by USB port.

Configuration table

TC1/TC2 TM1	~TM22
-------------	-------

#### 4.3.2 Test Mode

There were 22 test Modes. TM1 and TM22 were shown in the diagrams below:

TM1: operate in traffic mode CDMA 800;

TM2: operate in traffic mode PCS 1900;

TM3: operate in traffic mode AWS 1700;

TM4: operate in traffic mode EVDO.0 800;

TM5: operate in traffic mode EVDO.0 1900:

TM6: operate in traffic mode EVDO.0 1700;

TM7: operate in traffic mode EVDO.A 800;

TM8: operate in traffic mode EVDO.A 1900;

TM9: operate in traffic mode EVDO.A 1700;

TM10: operate in traffic mode Bluetooth;

TM11: operate in traffic mode WIFI;

TM12: operate in idle mode CDMA 800;

TM13: operate in idle mode PCS 1900;

TM14: operate in idle mode AWS 1700;

TM15: operate in idle mode EVDO.0 800;

TM16: operate in idle mode EVDO.0 1900;

TM17: operate in idle mode EVDO.0 1700;

ID: QISM860 Security Level: secret

TM18: operate in idle mode EVDO.A 800; TM19: operate in idle mode EVDO.A 1900; TM20: operate in idle mode EVDO.A 1700; TM21: operate in idle mode Bluetooth; TM22: operate in idle mode WIFI;

#### 4.4 Test conditions and test connections

#### 4.4.1 Test Conditions

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

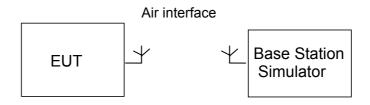
#### 4.4.2 Test connections

Traffic Mode:

The EUT is required to be in the traffic mode, a call is set up according to the generic call set up procedure and enter the EUT into loop back test mode.

For CDMA, the following conditions shall also be met:

- The EUT shall be commanded to operate at maximum transmit power;



#### : Test Configuration

#### Idle Mode:

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

The EUT is required to be in the idle mode.

For CDMA, the following conditions shall be met:

- UE shall be camped on a cell;
- UE shall perform Location Registration (LR) before the test, but not during the test;
- UE's neighbour cell list shall be empty;

For Cellular, PCS and AWS, the following conditions shall be met:

When the EUT is required to be in the idle mode, the test system shall simulate a Base Station (BS) with Broadcast Control Channel/Common Control Channel (BCCH/CCCH) on one carrier. The EUT shall be synchronized to the BCCH, listening to the CCCH and able to respond to paging messages. Periodic Location Updating shall be disabled.

## 5 <u>Electromagnetic Interference (EMI)</u>

#### 5.1 Radiated Disturbance 30MHz to 18GHz

#### 5.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4. The test distance was 3m.The set-up and test methods were according to ANSI 63.4 and CAN/CSA-CEI/IEC CISPR 22

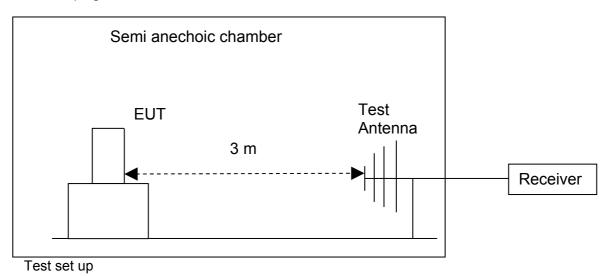
A preliminary scan and a final scan of the emissions were made from 30 MHz to18 GHz by using test script of software; the emissions were measured using Quasi-Peak Detector (30MHz~1GHz) and AV detector (above 1GHz). The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0°to 360°, The receive antenna has two polarizations V and H.

EUT was configured in idle mode and the test performed at worst emission state.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 k Hz

Measurement bandwidth: 1GHz – 18GHz: 1MHz

Test set up figure:



### 5.1.2 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.

The test data is shown in section 8.1 of the report.

Test Limits

Frequency of Emission (MHz)	Radiated Limit		
Frequency of Emission (MHZ)	Unit(μv/m)	Unit(dBµV/m)	
30-88	100	40	
88-216	150	43.5	
216-960	200	46	
Above 960	500	54	



#### 5.2 Conducted Disturbance 0.15 MHz to 30MHz

#### 5.2.1 Test Procedure

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4: 2003.

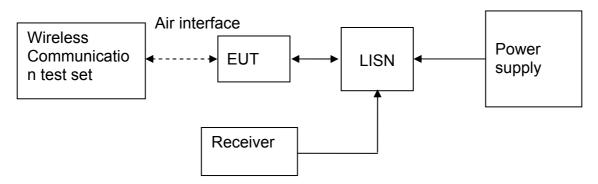
Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector.

Huawei Mobile Station was communicated with the BTS simulator through Air interface, the BTS simulator controls the Mobile Station to transmitter the maximum power which defined in specification of product. The Mobile Station operated on the typical channel.

Measurement bandwidth (RBW) for 150kz to 30 MHz: 9 kHz;

Test Set-up figure:

The Mobile Station was setup in the screened chamber and operated under nominal conditions.



Test Set-up

#### 5.2.2 Test Results

The EUT has met requirements for Conducted disturbance of signal lines.

The test data is shown in section 8.2 of the report.

Test Limit of DC&AC Power Port

Frequency range	150kHz~ 30MHz				
Classification	Class B				
Limit(Class B)	Voltage limits				
	QP	AV			
0.15MHz~0.5MHz	66~56 dBµV	56~46 dBµV			
0.5MHz~5MHz	56 dBµV	46 dBμV			
5MHz~30MHz	60 dBμV	50 dBμV			

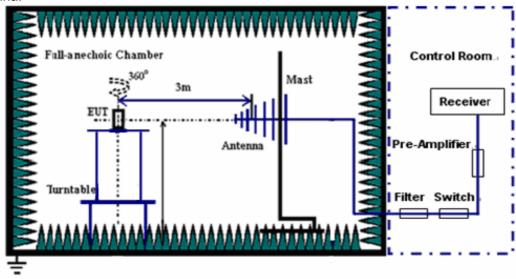
#### 5.3 Radiated Spurious Emissions

#### 5.3.1 Test Procedure

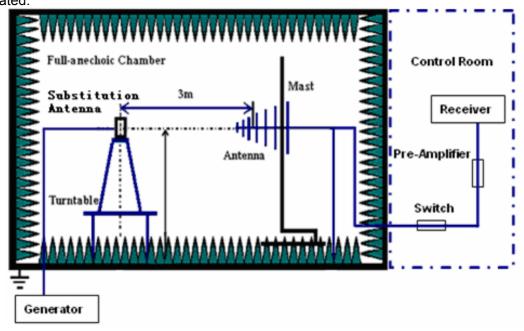
A test site fulfilling the requirements of ITU-R Recommendation SM329-10 was used. The EUT was placed on a non-conducting support in the anechoic chamber and was operated from a power source via an RF filter to avoid radiation from the power leads. Step 1:

For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, ERP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the EUT to the BTS simulator via the air interface.

Test the Radiated maximum output power by the Rohde and Schwarz ESIB26 Test Receiver from test antenna.



Step 2: Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step1 on ESIB26 Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.



Test should be performed in normal voltage condition.

According to part 22.917,the received power shall be measured for frequencies within 30MHz~18GHz for CDMA,, shown below, are applicable for frequencies in the spurious domain.

According to part 22.917, the defined measurement bandwidth as following:

22.917(b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz; Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz; Measurement bandwidth (RBW) for 30MHz up to 1 GHz: 100 kHz; Measurement bandwidth (RBW) for 1GHz up to 18GHz: 1MHz;

Radiated Spurious Emissions Limits

Frequency band	Minimum				
	requirement (E.R.P)				
	traffic mode				
9KHz~18GHz	-13dBm				

According to part 24.238, the received power shall be measured for frequencies within 30MHz~26.5GHz for CDMA,, shown below, are applicable for frequencies in the spurious domain.

According to part 24.238, the defined measurement bandwidth as following:

24.238(b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz; Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz; Measurement bandwidth (RBW) for 30MHz up to 26.5GHz: 1MHz;

Radiated Spurious Emissions Limits

Frequency band	Minimum						
	requirement (E.R.P)						
	traffic mode						
9KHz~26.5GHz	-13dBm						

According to part 27.53, the received power shall be measured for frequencies within 30MHz~18GHz for CDMA.. shown below, are applicable for frequencies in the spurious domain.

According to part 27.53, the defined measurement bandwidth as following:

27.53(g) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz; Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz; Measurement bandwidth (RBW) for 30MHz up to 18GHz: 1MHz;

Radiated Spurious Emissions Limits

Frequency band	Minimum
	requirement (F.P.P)

Frequency band	requirement (E.R.P)  traffic mode
9KHz~18GHz	-13dBm

No peak found in pre- test. All frequency points' margin is bigger than 20dB, so the substitution method isn't used.

Calculation Sample:

#### Substitution Results

Freq. [MHz]	Measure ment Value [dBm]	Substitution Antenna Type	Gain [dBd]	Cable Loss [dB]	Signal Generator Level [dBm]	Substitution Level [dBm]	FCC limit [dBm]	Result

Note: For get the E.R.P. (Efficient Radiated Power) in substitution method, the following formula should take to calculate it,

E.R.P. [dBm] = SGP [dBm] - Cable Loss [dB] + Gain [dBd] NOTE: SGP- Signal Generator Level

#### 5.3.2 Test Results

The EUT has met the requirements of FCC Part22/Part 24/Part 27 requirement.

Security Level: secret

## 6 Main Test Instruments

Main Test Equipments

Test item	Test	Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
	EMI T	est receiver	ESU26	R&S	Jul.07, 2009	12
RE&CE -	Broadb	and Antenna	VULB 9163	SCHWARZBEC	K Jun.24, 2009	12
	Hori	n Antenna	HF906	R&S	Jun.19.2009	12
		LISN	ENV216	R&S	Aug.12.2009	12
	EMI Test receiver		ESIB26	R&S	April.22, 2010	12
Bro RSE	Broadb	and Antenna	CBL6112B	SCHAFFNER	Sep.21.2009	12
KSE	Hori	n Antenna	3117	ETS-Lindgren	Sep.11.2009	12
	Hori	n Antenna	3160	ETS-Lindgren	Sep.21.2009	12
			Software	Information		
Test Item Software Nam		ne Man	Manufacturer		n	
RE/0	CE	ES-K1		R&S		
RS	E	EMC32		R&S	V5.10.9	99

## 7 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

**System Measurement Uncertainty** 

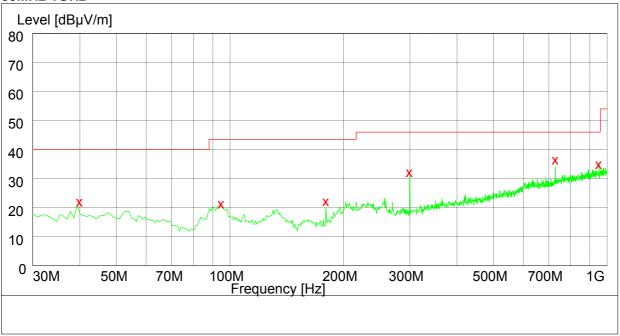
	Items	Extended Uncertainty
RE	Field strength (dBµV/m)	U=4.1dB; k=2(30MHz-1GHz)
RE	Fleid Strength (dbµV/III)	U=4.1dB; k=2(1GHz-18GHz)
RSE	ERP (dBm)	U=2.2dB; k=2
CE	Disturbance Voltage (dBµV)	U=3.4dB; k=2

## 8 Graph and Data of Emission Test

#### 8.1 Radiated Disturbance

This test was carried out in all the test modes, Here only the worst test result was shown.

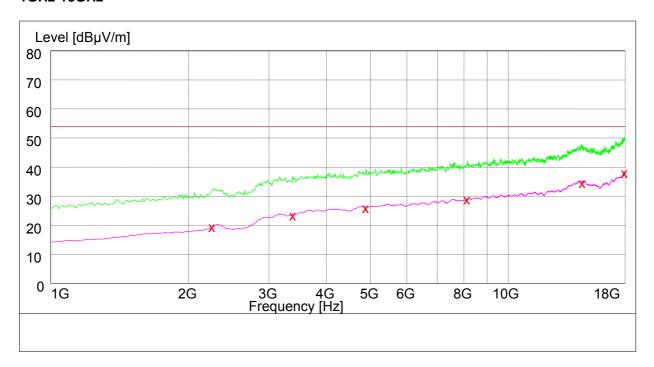




#### MEASUREMENT RESULT: QP Detector

Frequency	Level	Transd	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dB	dBµV/m	dB	cm	deg	
40.020000	21.80	13.1	40.0	18.2	141.0	2.00	HORIZONTAL
94.980000	21.20	12.8	43.5	22.3	225.0	191.00	HORIZONTAL
180.000000	21.90	10.9	43.5	21.6	150.0	48.00	HORIZONTAL
300.000000	31.90	15.5	46.0	14.1	100.0	103.00	HORIZONTAL
729.600000	36.30	24.1	46.0	9.7	122.0	127.00	HORIZONTAL
952.260000	34.80	26.5	46.0	11.2	218.0	257.00	HORIZONTAL

#### 1GHz-18GHz



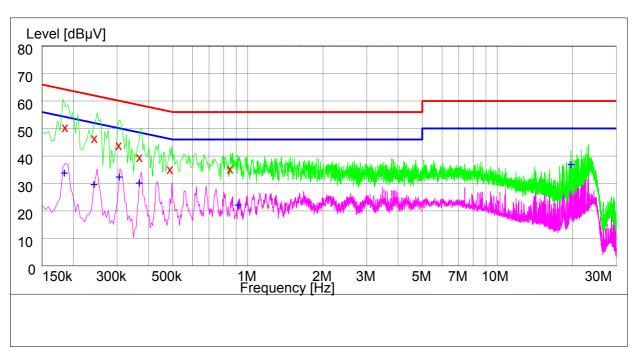
#### MEASUREMENT RESULT: AV Detector

Frequency	Level	Transd	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dB	dBµV/m	dB	cm	deg	
2253.500000	19.10	-11.8	54.0	34.9	135.0	170.00	VERTICAL
3385.000000	23.10	-7.8	54.0	30.9	141.0	86.00	VERTICAL
4891.500000	25.70	-3.9	54.0	28.3	174.0	360.00	VERTICAL
8139.000000	28.50	2.4	54.0	25.5	184.0	67.00	VERTICAL
14521.000000	34.30	12.3	54.0	19.7	145.0	115.00	HORIZONTAL
17978.000000	37.60	17.2	54.0	16.4	149.0	92.00	HORIZONTAL

#### 8.2 Conducted Disturbance

## 8.2.1 AC Port Test Data

This test was carried out in all the test modes, Here only the worst test result was shown.



#### MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.186000	50.40	10.1	64	13.6	N	FLO
0.244000	46.80	10.0	62	15.2	N	FLO
0.306000	44.10	10.0	60	15.9	N	FLO
0.370000	39.70	10.0	59	19.3	N	FLO
0.490000	35.50	10.1	56	20.5	N	FLO
0.854000	35.70	10.1	56	20.3	N	FLO

#### MEASUREMENT RESULT: AV Detector

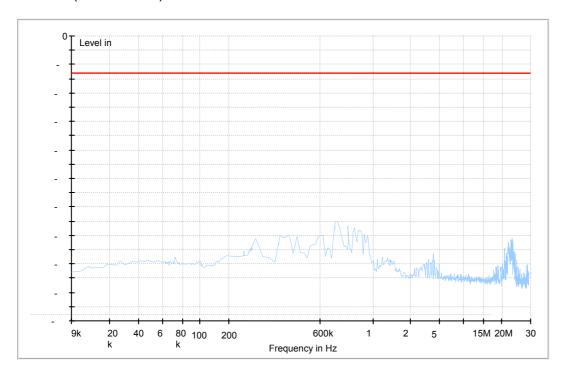
Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dΒμV	dB	dΒμV	dB		
0.184000	34.00	10.1	54	20.0	N	FLO
0.242000	29.80	10.0	52	22.2	N	FLO
0.306000	32.50	10.0	50	17.5	N	FLO
0.368000	30.30	10.0	49	18.7	N	FLO
0.914000	22.40	10.1	46	23.6	N	FLO
19.720000	37.10	10.3	50	12.9	L1	FLO

## 8.3 Radiated Spurious Emission

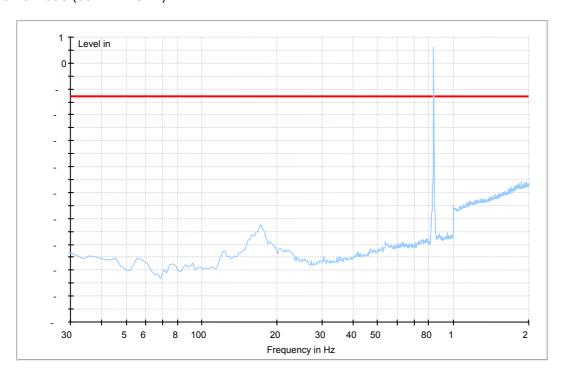
This test results are the maximum level of radiated spurious emissions in vertical and horizontal polarity.

#### For CDMA 800

Traffic Mode (9kHz-30MHz)

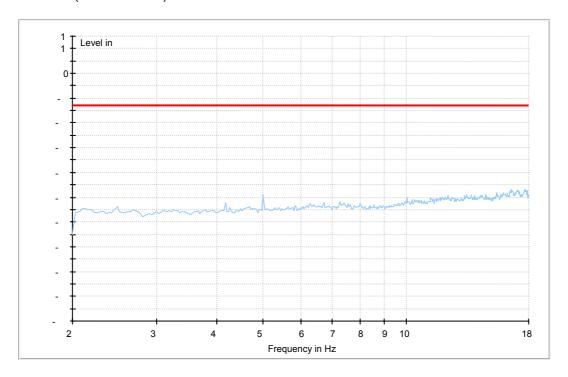


## Traffic Mode (30MHz-2GHz)



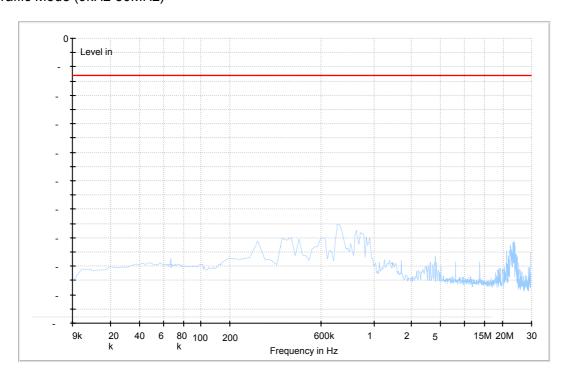


## Traffic Mode (2GHz-18GHz)

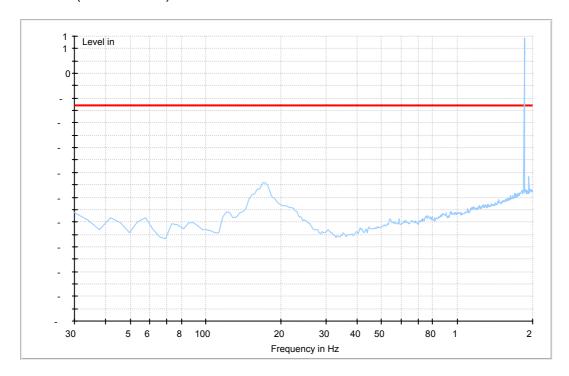


#### **For PCS 1900**

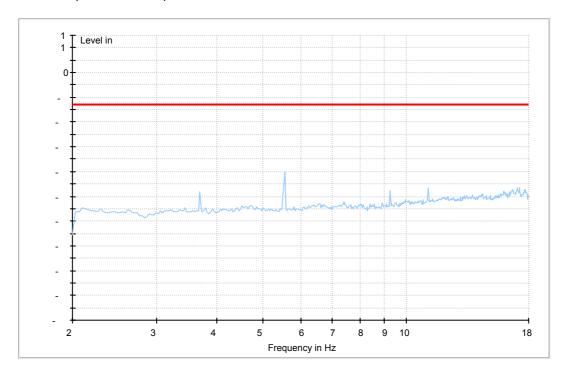
## Traffic Mode (9kHz-30MHz)



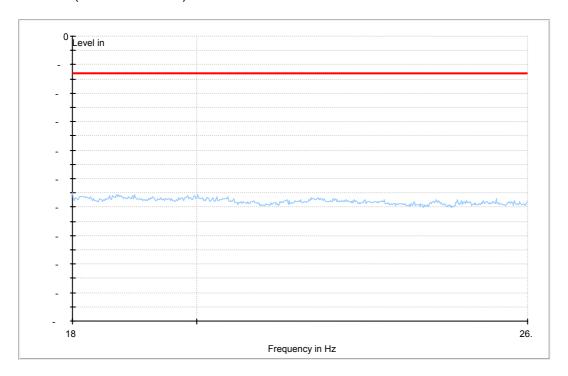
## Traffic Mode (30MHz-2GHz)



## Traffic Mode (2GHz-18GHz)

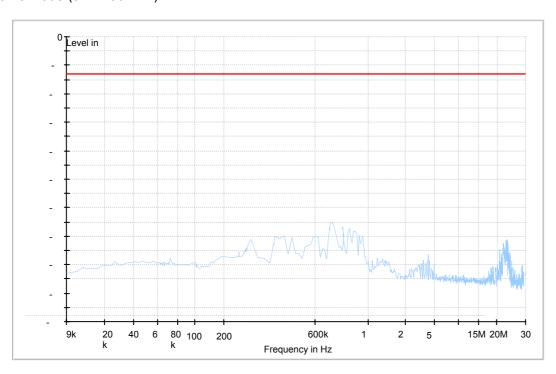


## Traffic Mode (18GHz-26.5GHz)

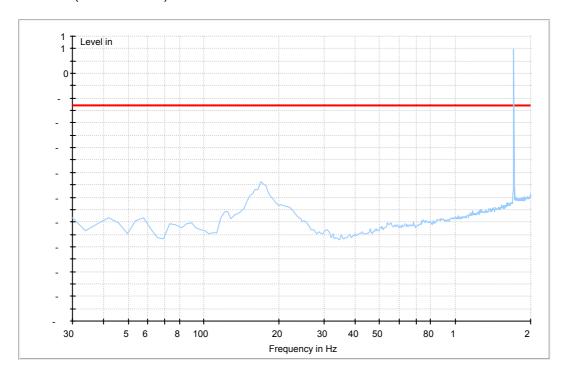


#### For AWS 1700

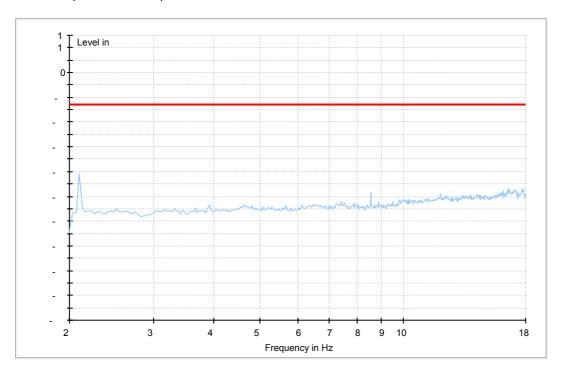
## Traffic Mode (9kHz-30MHz)



## Traffic Mode (30MHz-2GHz)

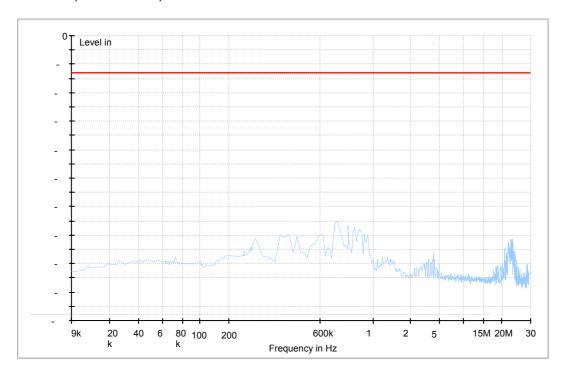


## Traffic Mode (2GHz-18GHz)

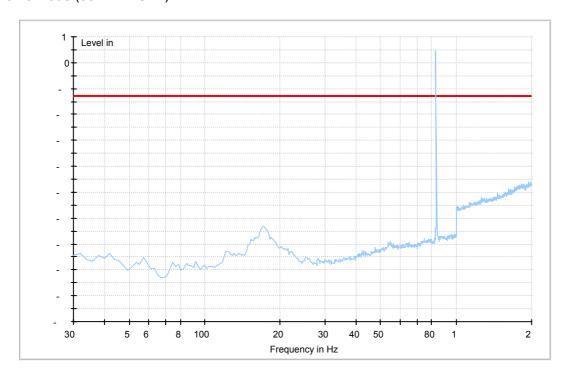


#### For EVDO.0 800

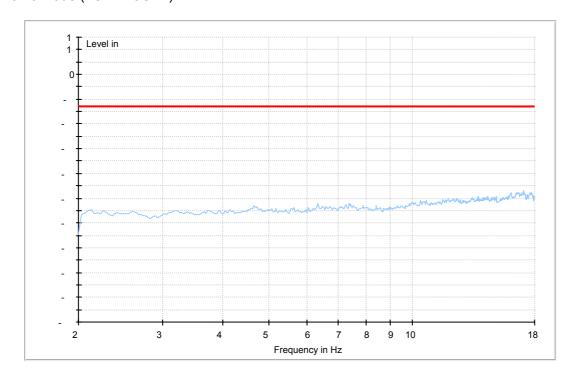
## Traffic Mode (9kHz-30MHz)



## Traffic Mode (30MHz-2GHz)

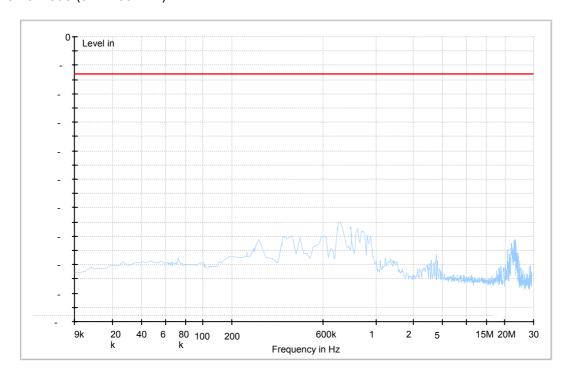


# Traffic Mode (2GHz-18GHz)



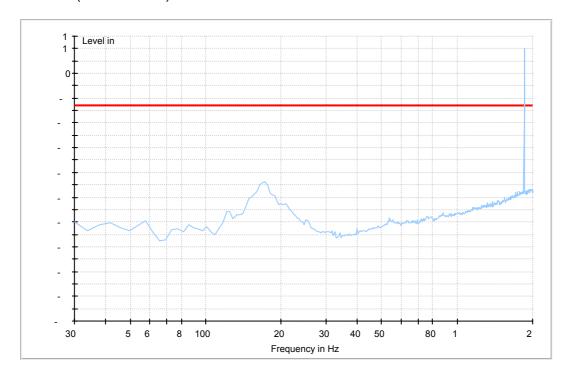
#### For EVDO.0 1900

## Traffic Mode (9kHz-30MHz)

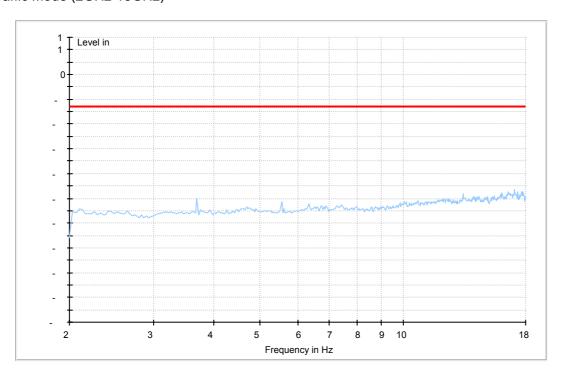




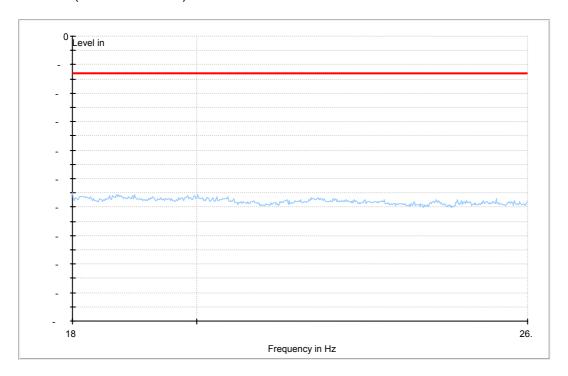
## Traffic Mode (30MHz-2GHz)



## Traffic Mode (2GHz-18GHz)

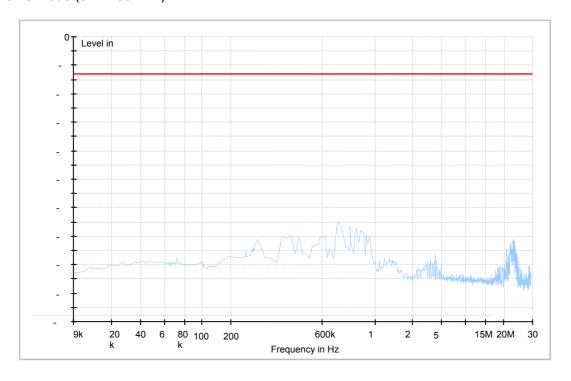


## Traffic Mode (18GHz-26.5GHz)

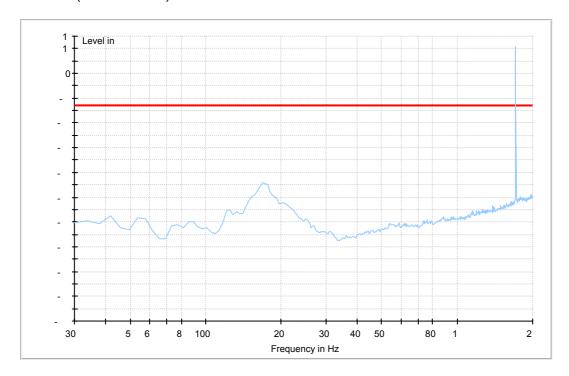


#### For EVDO.0 1700

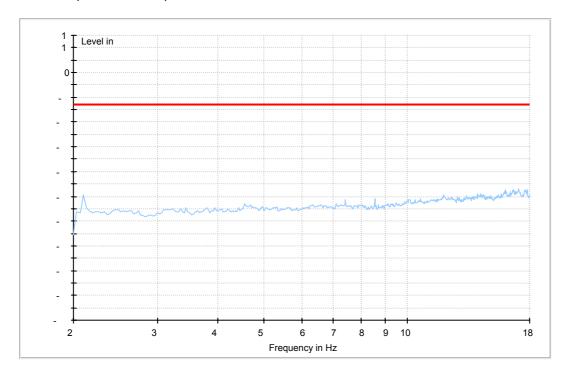
## Traffic Mode (9kHz-30MHz)



## Traffic Mode (30MHz-2GHz)

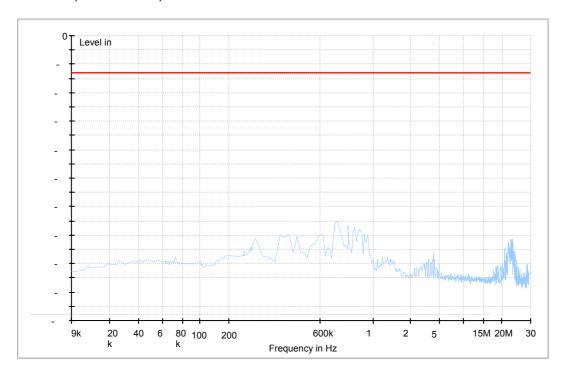


## Traffic Mode (2GHz-18GHz)

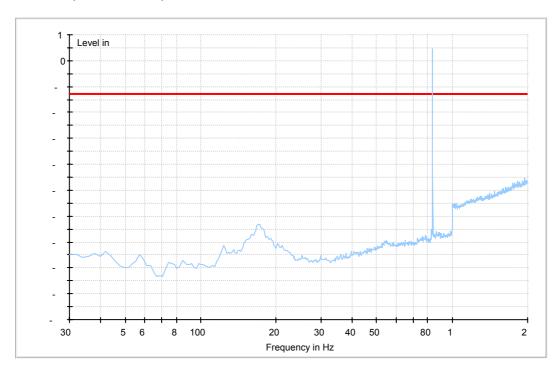


#### For EVDO.A 800

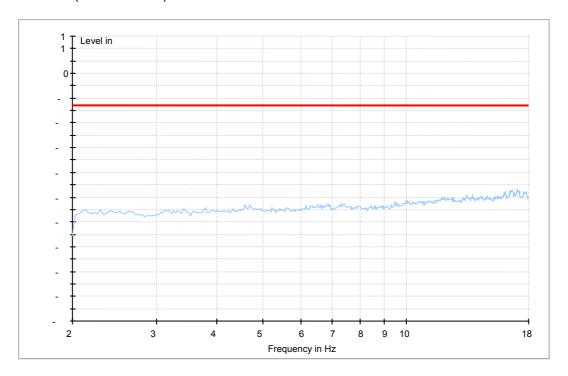
## Traffic Mode (9kHz-30MHz)



## Traffic Mode (30MHz-2GHz)

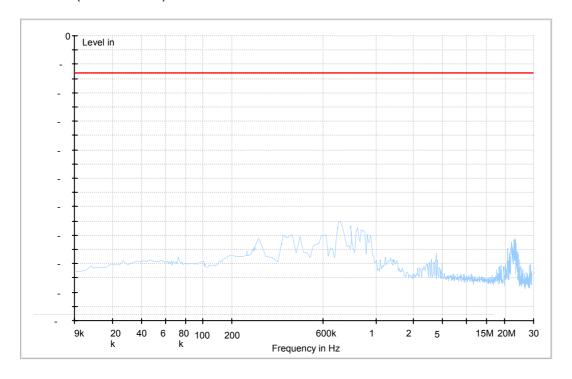


## Traffic Mode (2GHz-18GHz)



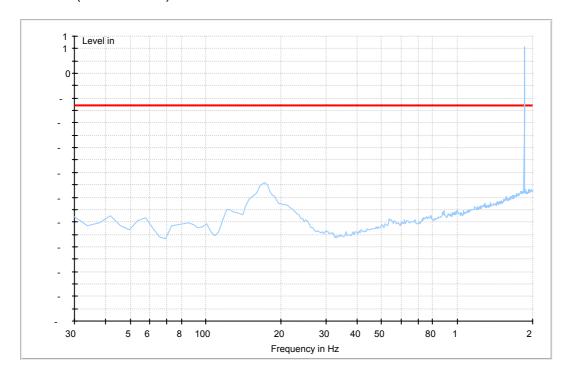
#### **For EVDO.A 1900**

## Traffic Mode (9kHz-30MHz)

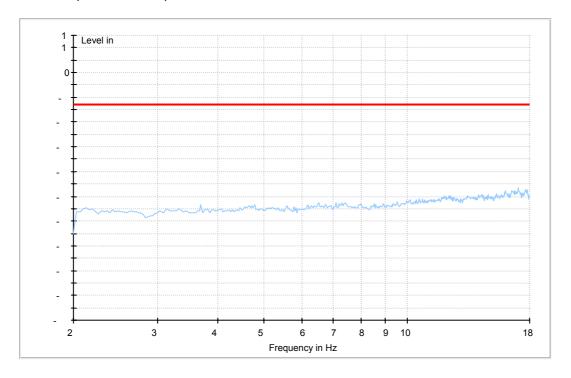




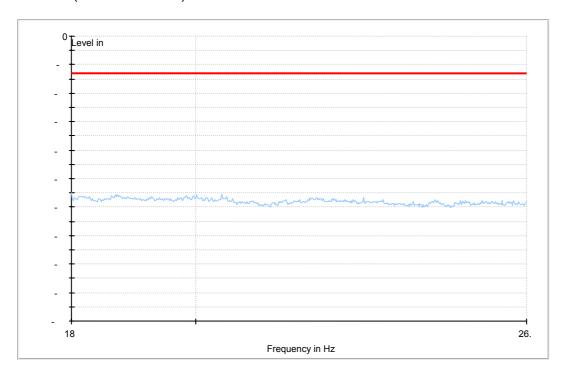
## Traffic Mode (30MHz-2GHz)



## Traffic Mode (2GHz-18GHz)

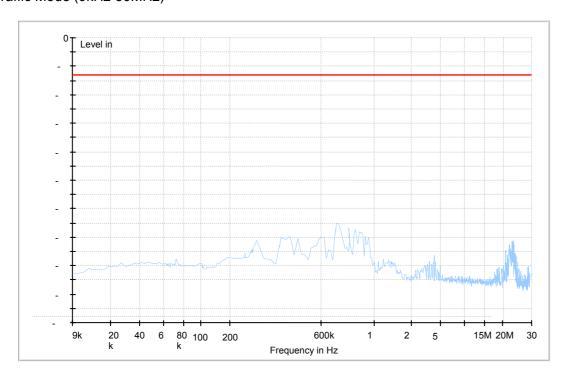


## Traffic Mode (18GHz-26.5GHz)

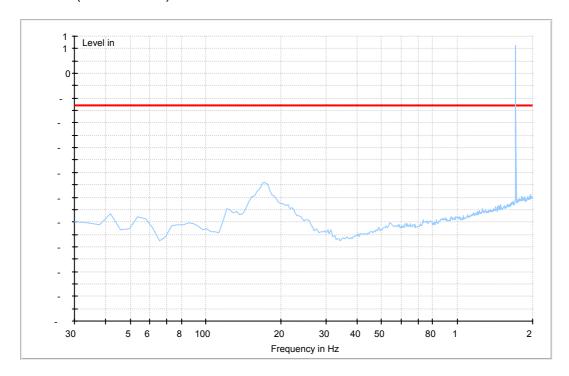


#### **For EVDO.A 1700**

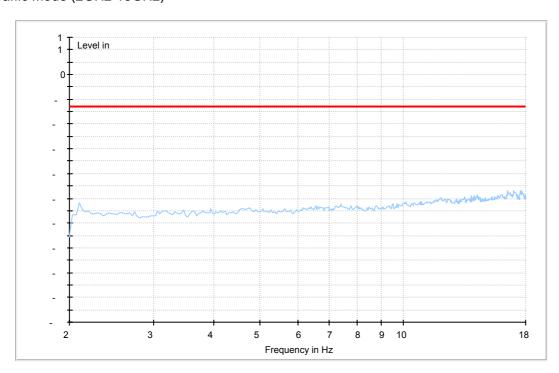
## Traffic Mode (9kHz-30MHz)



## Traffic Mode (30MHz-2GHz)



## Traffic Mode (2GHz-18GHz)



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## **END**