



**FCC PART 15C  
TEST REPORT  
No. I14N00915-NFC**

**For**

**Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd  
mobile phone**

**Model Name: vodafone 890N**

**Marketing Name: vodafone 890N**

**With**

**Hardware Version: T3**

**Software Version: 4.4.150.00.T3.140821.KTU84P.VF.DE**

**FCC ID: R38YL890N**

**Issued Date: Sep 29<sup>th</sup>, 2014**

**Test Laboratory:**

***FCC 2.948 Listed: No.310359***

***IC O.A.T.S listed: No.6629C-1***

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology  
No. 52, Huayuan Bei Road, Haidian District, Beijing, P. R. China 100191

Tel:+86(0)10-62304633-2678 , Fax:+86(0)10-62304633-2504 Email:welcome@emcite.com. www.emcite.com

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## 1. Test Laboratory

### 1.1. Testing Location

Company Name: TMC Shenzhen, Telecommunication Metrology Center of MIIT  
Address: No. 12 Building, Shangsha Innovation and Technology Park, Futian District, Shenzhen, P. R. China  
Postal Code: 518048  
Telephone: +86(0)755-33322000  
Fax: +86(0)755-33322001

### 1.2. Testing Environment

Normal Temperature: 15°C-30°C  
Extreme Temperature: -20°C/+55°C  
Relative Humidity: 30%-60%

### 1.3. Project data

Project Leader: Zhang Bojun  
Test Engineer: Tang Weisheng  
Testing Start Date: 2014-08-01  
Testing End Date: 2014-09-29

### 1.4. Signature



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**Tang Weisheng**  
**(Prepared this test report)**



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**Zhang Bojun**  
**(Reviewed this test report)**



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**Lu Minniu**  
**Director of the laboratory**  
**(Approved this test report)**

## **2. Client Information**

### **2.1. Applicant Information**

Company Name: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd  
Address /Post: Coolpad Information Harbor, 2nd Mengxi Road, Hi-Tech Industrial Park(North), Nanshan district, Shenzhen, P.R.C  
Country: China  
City: Shenzhen  
E-mail: liamei@yulong.com  
Telephone: +86 13410415799  
Fax: /

### **2.2. Manufacturer Information**

Company Name: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd  
Address /Post: Coolpad Information Harbor, 2nd Mengxi Road, Hi-Tech Industrial Park(North), Nanshan district, Shenzhen, P.R.C  
Country: China  
City: Shenzhen  
E-mail: liamei@yulong.com  
Telephone: +86 13410415799  
Fax: /

### **3. Equipment Under Test (EUT) and Ancillary Equipment (AE)**

#### **3.1. About EUT**

Description	mobile phone
Type	vodafone 890N
Marketing Name	vodafone 890N
Frequency	13.56MHz
Extreme Temperature	-20/+50°C
Normal Voltage	3.9 V
Extreme Low Voltage	3.6 V
Extreme High Voltage	4.2 V
FCC ID	R38YL890N

Note: Photographs of EUT are shown in ANNEX A of this test report.

Note: high and low voltage values in extreme condition test are given by manufacturer

#### **3.2. Internal Identification of EUT used during the test**

<b>EUT ID*</b>	<b>SN or IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
EUT1	/	T3	4.4.150.00.T3.140821.KTU84P.VF.DE

\*EUT ID: is used to identify the test sample in the lab internally.

#### **3.3. Internal Identification of AE used during the test**

<b>AE ID*</b>	<b>Description</b>	<b>Type</b>	<b>SN</b>
AE1	Charger	CYSK05-050100A-UK	/
AE2	Charger	CYSK05-050100A-CE	/
AE3	Li-ion Battery	CPLD-315	

\*AE ID: is used to identify the test accessory in the lab internally.

## 4. Reference Documents

### 4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

### 4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.225 Operation within the band 13.110-14.010 MHz	Oct,2013 Edition
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2003

## 5. Laboratory Environment

**Half-anechoic chamber** (11.20 metersx6.10 metersx5.60 meters) did not exceed following limits:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2M Ω
Ground system resistance	< 0.5 Ω
Normalized Site Attenuation (NSA)	< ±3.5dB, with 3m of Measuring distance, 30MHz – 1000MHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

**Fully-anechoic chamber** (11.20 metersx6.10 metersx6.60 meters) did not exceed following limits:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2M Ω
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 30MHz to 18 000 MHz

**Conduction Lab** did not exceed following limits:

Temperature	Min.=15 °C, Max.=30 °C
Relative humidity	Min.=30 %, Max.= 60 %
Shielding effectiveness	> 80 dB
Electrical insulation	> 2M Ω
Ground system resistance	< 0.5 Ω



## 6. Summary of Test Results

### 6.1. Summary of Test Results

No	Test cases	Sub-clause of Part15C	Verdict
0	Antenna Requirement	15.203	<b>P</b>
1	In band and out of band electric field strength test (MASK)	15.225(a)(b)(c)	<b>P</b>
2	Radiated Emission below 30 MHz	15.225(d)	<b>P</b>
3	Radiated Emission $\geq$ 30 MHz	15.225(d)	<b>P</b>
4	Frequency Stability	15.225(e)	<b>P</b>
5	Occupied 20dB Bandwidth	15.215(c)	<b>P</b>
6	AC Power line Conducted Emission	15.207,107	<b>P</b>

### 6.2. Statements

TMC has evaluated the test cases requested by the applicant/manufacturer as listed in section 6.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2

### 6.3. Terms used in the result table

Terms used in Verdict column

P	Pass
NA	Not Available
F	Fail

Abbreviations

AC	Alternating Current
BW	Band Width
ISM	Industrial, Scientific and Medical
RF	Radio Frequency

## 7. Test Equipments Utilized

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2015-04-22	1 year

### Climate chamber

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Climate chamber	SH-641	92008082	ESPEC	2015-03-07	1 year

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Chamber	FACT5-2.0	4166	ETS-Lindgren	2016-05-29	3 years
2	Test Receiver	ESCI	100701	Rohde & Schwarz	2015-07-30	1 year
3	BiLog Antenna	VULB9163	9163-329	Schwarzbeck	2017-01-20	3 years
4	Loop Antenna	HLA6120	35779	TESEQ	2016-02-25	3 years

### Anechoic chamber

Fully anechoic chamber by ETS-Lindgren.

**ANNEX A: EUT photograph**



**Pic A-1 Mobile Phone**



**Pic A-2 Mobile Phone**



**Pic A-3 Adapter(AE1)**



**Pic A-4 Adapter(AE2)**

## ANNEX B: MEASUREMENT RESULTS

### B.0 Antenna requirement

#### Measurement Limit:

Standard	Requirement
FCC CRF Part 15.203	<p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, § 15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.</p>

## B.1 In Band and Out of Band Electric Field Strength Test (MASK)

### Measurement Limit:

#### Standard

FCC 47 CFR Part 15.225(a)(b)(c) RSS-210 Issue8 A2.6

Frequency range (MHz)	E-field strength limit (μV/m) at 30m	E-field strength limit (dBμV/m) at 3m
13,56 to ± 7 kHz	+15,848	124
13,410 to 13,553 13,567 to 13,710	+334	90
13,110 to 13,410 13,710 to 14,010	+106	81

根据 CFR 47 § 15 中，不同测试距离之间的限值的转换公式如下：  

$$\text{Extrapolation(dB)}=40\log_{10}(\text{Measurement Distance/Specification Distance})$$

### Measurement Result:

Frequency(MHz)	Test Results	Conclusion
13.56	Fig.1	P

See ANNEX C for test graphs.

Conclusion: PASS

## B.2 Radiated Emission Below 30MHz

### Measurement Limit:

Standard	Limit
15.225(d) RSS-210 Issue8 A2.6	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209

### Limit in restricted band:

Frequency of emission (MHz)	Field strength(μV/m)	Measurement distance (meters)	E-field strength limit (dBμV/m) at 3m
0.009-0.490	2400/F(kHz)	300	129-94
0.490-1.705	24000/F(kHz)	30	74-63
1.705-30.0	30	30	70

根据 CFR 47 § 15 中，不同测试距离之间的限值的转换公式如下：  

$$\text{Extrapolation(dB)}=40\log_{10}(\text{Measurement Distance/Specification Distance})$$

### Measurement Results:

Frequency(MHz)	Frequency Range	Test Results	Conclusion
13.56	9 kHz ~30 MHz	Fig.2	P

See ANNEX C for test graphs.

Conclusion: Pass

### B.3 Radiated Emission ≥ 30 MHz

**Measurement Limit:**

Standard	Limit
15.225(d) RSS-210 Issue8 A2.6	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209

**Limit in restricted band:**

Frequency of emission (MHz)	Field strength(μV/m)	Measurement distance (meters)	E-field strength limit (dBμV/m) at 3m
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

**Measurement Results:**

Frequency(MHz)	Frequency Range	Test Results	Conclusion
13.56	30 MHz ~1 GHz	Fig.3	P

See ANNEX C for test graphs.

**Conclusion: Pass**

### B.4 Frequency Stability

**Measurement Limit:**

**Standard**

FCC 47 CFR Part 15.225(e) RSS-210 Issue8 A2.6

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipments, the equipment test shall be performed using a new battery.

Nominal Frequency	Test Condition		Limits(13.56MHz ± 1.356kHz)	Conclusion
			Test Results (MHz)	
13.56MHz	Tnom,	Vnom	13.5600	P
	Tmax	Vmax	13.5595	P
	Tmax	Vmin	13.5595	P
	Tmin	Vmax	13.5603	P
	Tmin	Vmin	13.5600	P

**Conclusion: Pass**

### B.5 Occupied 20dB Bandwidth

**Measurement Limit:**

Standard	Limit
15.215(c)	If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

**Measurement Result:**

Frequency(MHz)	Limit(kHz)	Test Result(kHz)		conclusion
13.56	11.2	Fig.4	0.365	P

See ANNEX C for test graphs.

**Conclusion: Pass**

### B.6 AC Power line Conducted Emission

**Test Condition:**

Voltage (V)	Frequency (Hz)
120	60

**Measurement Result and limit:**

NFC (Quasi-peak Limit)-AE1

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.5	Fig.6	P
0.5 to 5	56			
5 to 30	60			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

NFC (Average Limit)-AE1

Frequency range (MHz)	Average-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.5	Fig.6	P
0.5 to 5	46			
5 to 30	50			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.



NFC (Quasi-peak Limit)-AE2

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.7	Fig.8	P
0.5 to 5	56			
5 to 30	60			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

NFC (Average Limit)-AE2

Frequency range (MHz)	Average-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.7	Fig.8	P
0.5 to 5	46			
5 to 30	50			

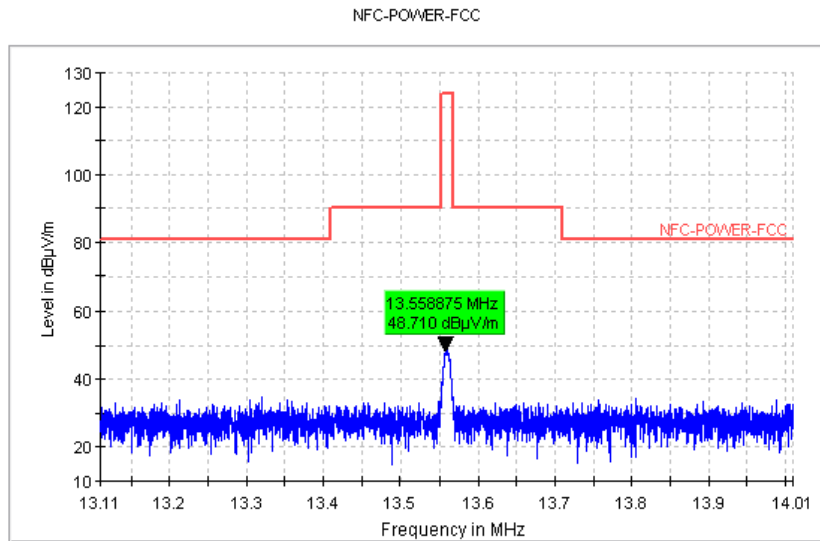
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

**Note:** The measurement results include the L1 and N measurements.

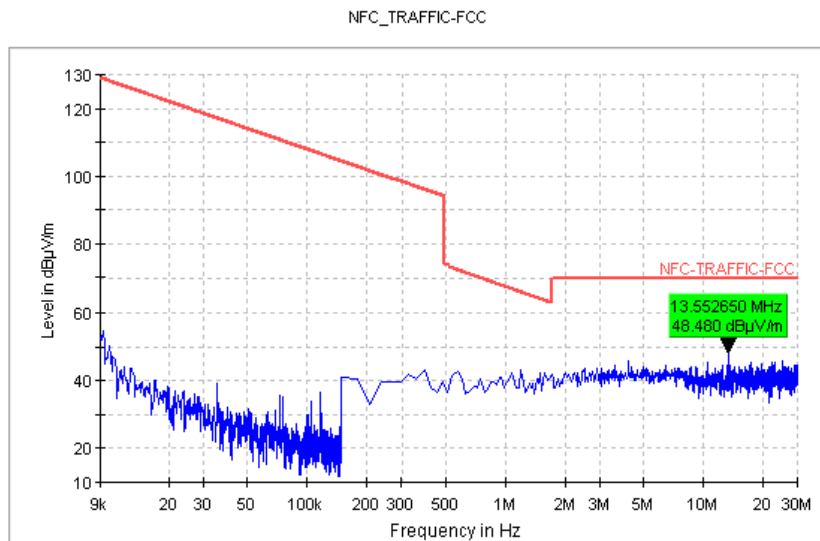
**See ANNEX C for test graphs.**

**Conclusion: Pass**

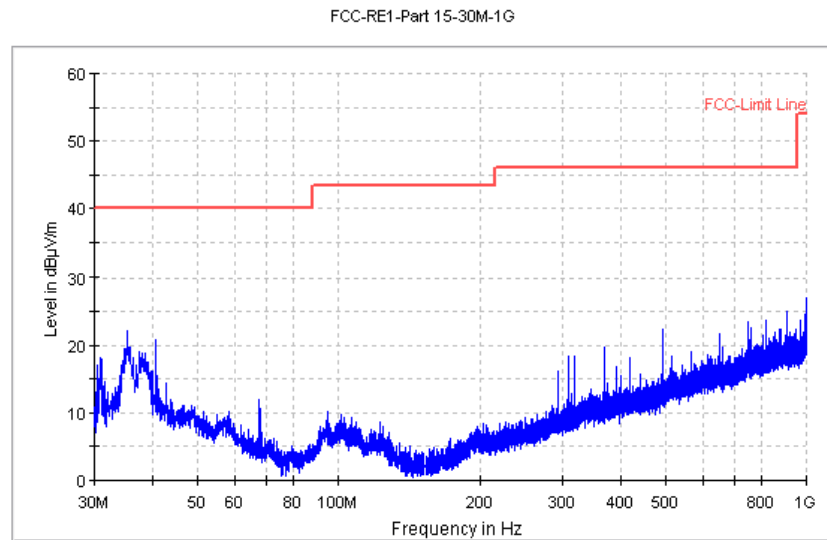
### ANNEX C: TEST FIGURE LIST



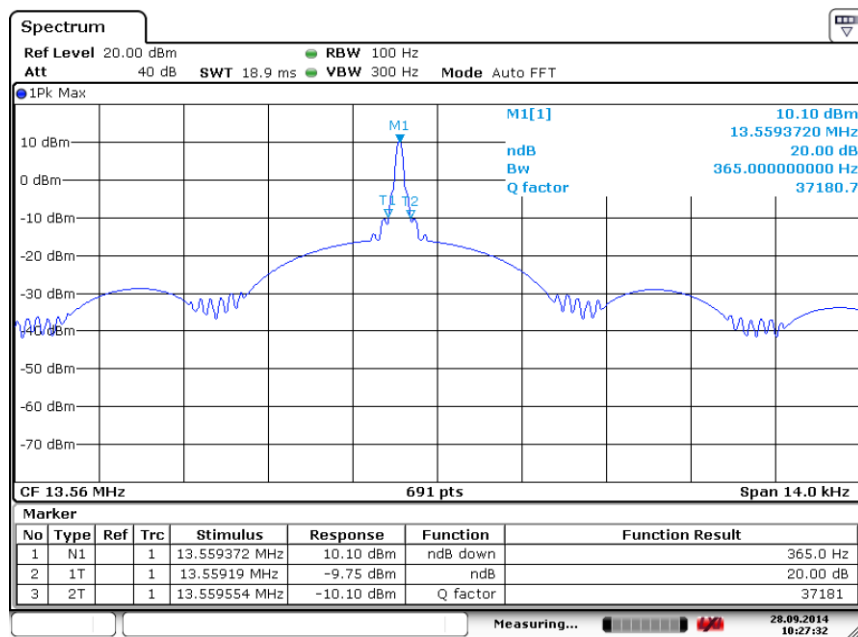
**Fig. 1 In band and out of band electric field strength test (MASK)**



**Fig. 2 Radiated Emission Below 30 MHz**

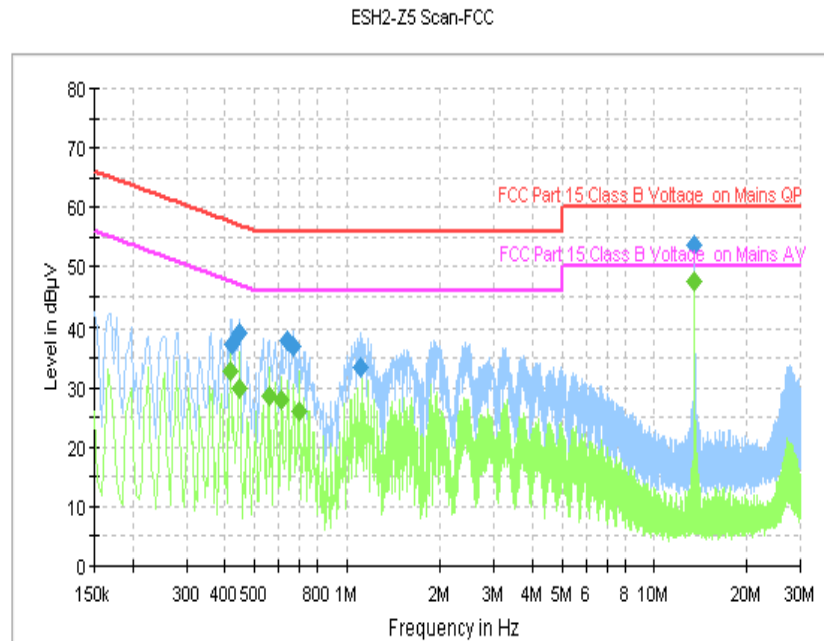


**Fig. 3 Radiated Emission  $\geq$  30 MHz**



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**Fig. 4 Occupied 20dB Bandwidth**



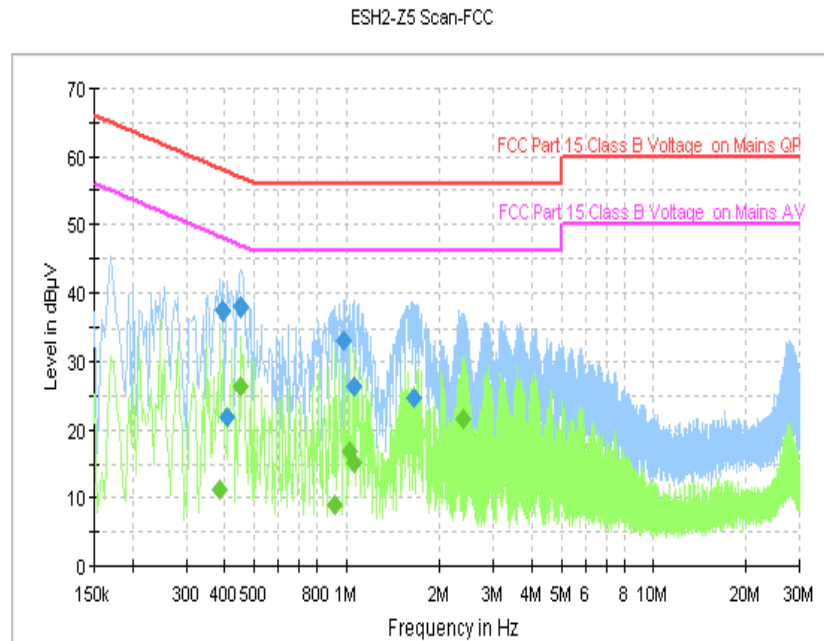
**Fig. 5 AC Power line Conducted Emission(Traffic,AE1)**

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.422000	37.2	FLO	L1	10.0	20.2	57.4
0.446000	39.1	FLO	L1	10.0	17.9	56.9
0.642000	37.8	FLO	L1	10.0	18.2	56.0
0.670000	37.1	FLO	L1	10.0	18.9	56.0
1.114000	33.4	FLO	N	10.1	22.6	56.0
13.558000	53.8	FLO	L1	10.4	6.2	60.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.418000	32.9	FLO	L1	10.0	14.6	47.5
0.446000	29.9	FLO	L1	10.0	17.1	46.9
0.558000	28.7	FLO	L1	10.1	17.3	46.0
0.610000	27.9	FLO	L1	10.0	18.1	46.0
0.698000	26.0	FLO	L1	10.0	20.0	46.0
13.562000	47.7	FLO	L1	10.4	2.3	50.0



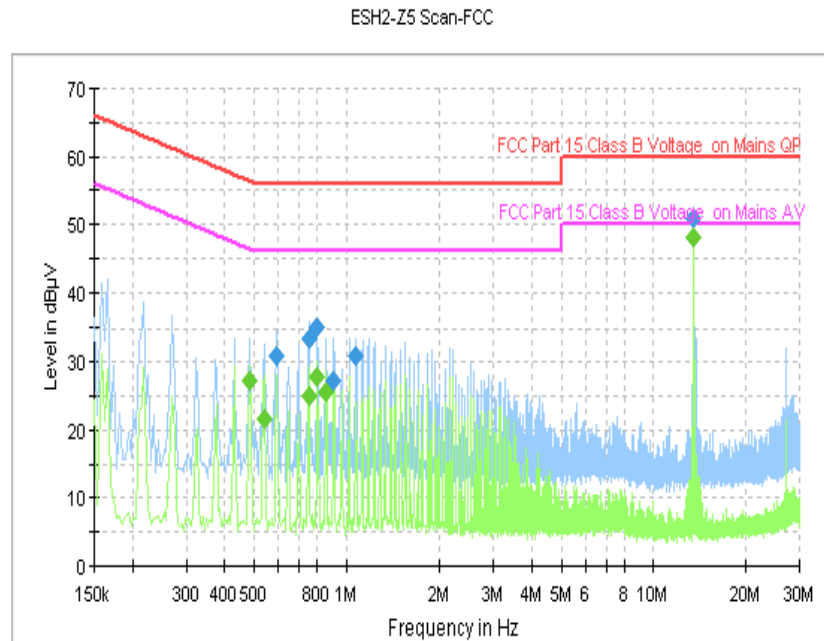
**Fig. 6 AC Power line Conducted Emission(Idle,AE1)**

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.394000	37.3	FLO	L1	10.0	20.7	58.0
0.406000	22.0	FLO	L1	10.0	35.8	57.7
0.450000	37.8	FLO	L1	10.0	19.0	56.9
0.986000	33.3	FLO	L1	10.1	22.7	56.0
1.058000	26.4	FLO	L1	10.1	29.6	56.0
1.650000	24.7	FLO	L1	10.1	31.3	56.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.386000	11.3	FLO	L1	10.0	36.9	48.1
0.454000	26.4	FLO	L1	10.0	20.4	46.8
0.918000	9.0	FLO	L1	10.1	37.0	46.0
1.022000	16.8	FLO	L1	10.0	29.2	46.0
1.058000	15.3	FLO	L1	10.1	30.7	46.0
2.378000	21.6	FLO	L1	10.1	24.4	46.0



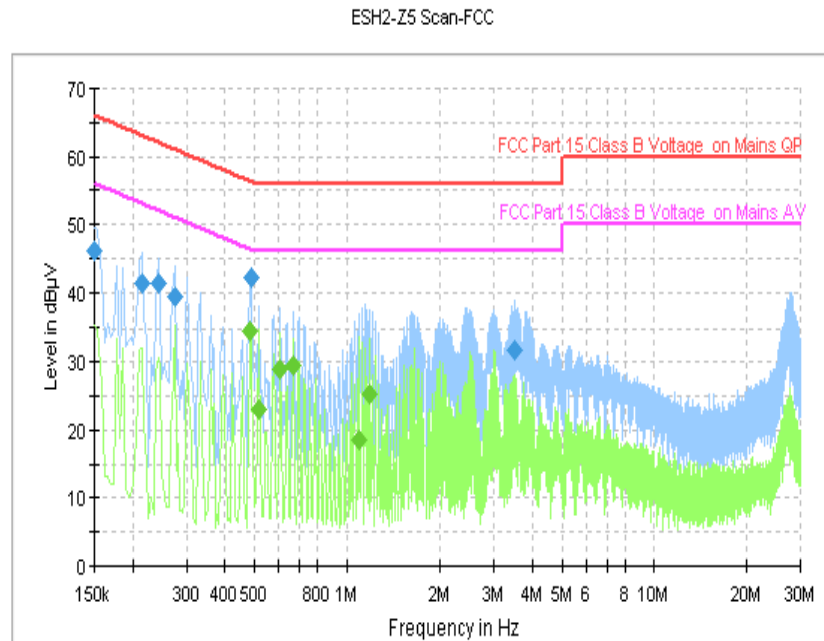
**Fig. 7 AC Power line Conducted Emission(Traffic,AE2)**

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.594000	30.8	FLO	L1	10.1	25.2	56.0
0.754000	33.5	FLO	L1	10.1	22.5	56.0
0.806000	35.2	FLO	L1	10.1	20.8	56.0
0.910000	27.3	FLO	N	10.1	28.7	56.0
1.078000	30.9	FLO	L1	10.1	25.1	56.0
13.562000	50.8	FLO	L1	10.4	9.2	60.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.482000	27.1	FLO	L1	10.0	19.2	46.3
0.542000	21.6	FLO	L1	10.1	24.4	46.0
0.754000	24.9	FLO	L1	10.1	21.1	46.0
0.806000	27.7	FLO	L1	10.1	18.3	46.0
0.858000	25.6	FLO	N	10.1	20.4	46.0
13.558000	48.1	FLO	L1	10.4	1.9	50.0



**Fig. 8 AC Power line Conducted Emission(Idle,AE2)**

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	46.1	FLO	N	10.1	19.9	66.0
0.214000	41.3	FLO	N	10.1	21.7	63.0
0.242000	41.4	FLO	N	10.0	20.6	62.0
0.274000	39.4	FLO	N	10.1	21.6	61.0
0.486000	42.2	FLO	L1	10.0	14.1	56.2
3.514000	31.7	FLO	N	10.2	24.3	56.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.482000	34.7	FLO	L1	10.0	11.7	46.3
0.518000	23.0	FLO	L1	10.0	23.0	46.0
0.606000	29.1	FLO	L1	10.0	16.9	46.0
0.666000	29.6	FLO	L1	10.0	16.4	46.0
1.094000	18.6	FLO	L1	10.1	27.4	46.0
1.182000	25.2	FLO	L1	10.0	20.8	46.0

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