



EMC TEST REPORT

No. I14Z49111-EMC02

for

TCL Communication Ltd.

UMTS Triband / GSM Quadband mobile phone

Model Name: 2067X

FCC ID: 2ACCJA003

with

Hardware Version: 01

Software Version: C97

Issued Date: 2015-01-15

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 CTTL.

Test Laboratory:

FCC 2.948 Listed: No. 525429

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I14Z49111-EMC02	Rev.0	1st edition	2015-01-15

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1. Test Laboratory

1.1. Testing Location

Location 1: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China 100191

1.2. Testing Environment

Normal Temperature: 15-35 °C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2014-12-20

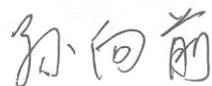
Testing End Date: 2014-12-25

1.4. Signature



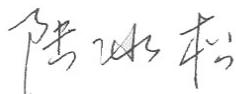
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(Prepared this test report)



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(Reviewed this test report)



Lu Bingsong

Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd
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2.2. Manufacturer Information

Company Name: TCL Communication Ltd
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Pudong Area Shanghai, P.R. China.
City: Shanghai
Postal Code: 201203
Country: China
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Fax: 0086-21-61460602

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

3.1. About EUT

Description	UMTS Triband / GSM Quadband mobile phone
Model Name	2067X
FCC ID	RAD528
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.8VDC)

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Telecommunication Metrology Center of MIIT of People's Republic of China.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	356789060009923	01	C97

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN	Remarks
AE1	Battery	/	14TCT-BA-0264
AE2	Battery	/	14TCT-BA-1516
AE3	Battery	/	14TCT-BA-1635
AE4	Battery	/	/
AE5	Battery	/	14TCT-BA-1522
AE6	Battery	/	14TCT-BA-0267
AE7	Battery	/	14TCT-BA-1532
AE8	Battery	/	14TCT-BA-2137
AE9	Battery	/	14TCT-BA-0315
AE10	Travel charger	/	14TCT-CH-1906
AE11	USB cable	/	14TCT-DC-0502
AE12	USB cable	/	14TCT-DC-0674

AE1, AE2, AE3, AE4, AE5, AE6, AE7, AE8, AE9

Model	CAB3120000C1
Manufacturer	BYD
Capacitance	850mAh
Nominal voltage	3.8V

AE10

Model	CBA3002AG0C1
Manufacturer	BYD
Length of cable	122cm

AE11, AE12

Model CDA3122005C1

Manufacturer JUWEI

Length of cable 98cm

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

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT1+ AE1 + AE10	Charger
Set.2	EUT1+ AE1 + AE11	USB

4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
FCC Part 15, Subpart B	Radio frequency devices - Unintentional Radiators	10-1-13
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	Edition 2009

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ±4 dB, 10 m distance
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 6GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

Shielded room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω

6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	P	Pass
	NA	Not applicable
	F	Fail
Location Column	1/2/3/4	The test is performed in test location 1, 2, 3 or 4 which are described in section 1.1 of this report

Clause	List	Clause in FCC rules	Verdict	Location
1	Radiated Emission	15.109(a)	P	1
2	Conducted Emission	15.107(a)	P	1

7. Test Equipments Utilized

NO.	DESCRIPTION	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCI	100344	R&S	2015-03-03	1 year
2	Test Receiver	ESCI 7	100948	R&S	2015-07-16	1 year
3	Universal Radio Communication Tester	CMU200	109914	R&S	2015-04-13	1 year
4	Test Receiver	FSV	101047	R&S	2015-06-27	1 year
5	LISN	ESH2-Z5	829991/012	R&S	2015-04-14	1 year
6	EMI Antenna	VULB 9163	9163-234	Schwarzbeck	2016-09-16	3 years
7	EMI Antenna	3115	9906-5827	ETS-Lindgren	2016-11-19	3 years
8	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
9	Monitor	E178FPc	CN-OWR979-64180 -7AJ-D2MS	DELL	N/A	N/A
10	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
11	Keyboard	L100	CN0RH659658907 ATOI40	DELL	N/A	N/A
12	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission (§15.109(a))

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (USB mode of MS and charging mode of MS) at distances of 10 meters(for 30MHz-1GHz) and 3 meters (for above 1GHz) is tested. Tested in accordance with the procedures of ANSI C63.4 - 2009, section 8.3.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3/10 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

A.1.2 EUT Operating Mode:

The MS is operating in the USB mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

A.1.3 Measurement Limit

Frequency range (MHz)	Field strength limit (μ V/m)		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

Note: the above limit is for 3 meters test distance. 10 meters' limit is got by converting.

A.1.4 Test Condition

Frequency range (MHz)	RBW/VBW	Sweep Time (s)	Detector
30-1000	120kHz (IF Bandwidth)	5	Peak/Quasi-peak
Above 1000	1MHz/1MHz	15	Peak, Average

A.1.5 Measurement Results

A "reference path loss" is established and the A_{RPL} is the attenuation of "reference path loss". It includes the antenna factor of receive antenna and the path loss.

The measurement results are obtained as described below:

$$\text{Result} = P_{\text{Mea}} + A_{RPL} = P_{\text{Mea}} + G_A + G_{PL}$$

Where

G_A : Antenna factor of receive antenna

G_{PL} : Path Loss

P_{Mea} : Measurement result on receiver.

Measurement uncertainty (worst case): $U = 4.3 \text{ dB}$, $k=2$.

Measurement results for Set.1:

Charging Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
5261.563	30.7	-34.5	34.6	30.600	V
5263.125	30.4	-34.5	34.6	30.300	H
5267.813	30.4	-34.5	34.6	30.300	V
5259.375	30.4	-34.5	34.6	30.300	V
5260.000	30.3	-34.5	34.6	30.200	H
5262.500	30.3	-34.5	34.6	30.200	H

Charging Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
5011.875	43.0	-34.6	34.6	43.000	H
5021.875	42.6	-34.6	34.6	42.600	H
5646.250	42.4	-34.4	35.1	41.700	V
5265.000	42.3	-34.5	34.6	42.200	H
5527.813	42.3	-34.0	35.1	41.200	V
5649.063	42.3	-34.2	35.1	41.400	H

Measurement results for Set.2:**USB Mode/Average detector**

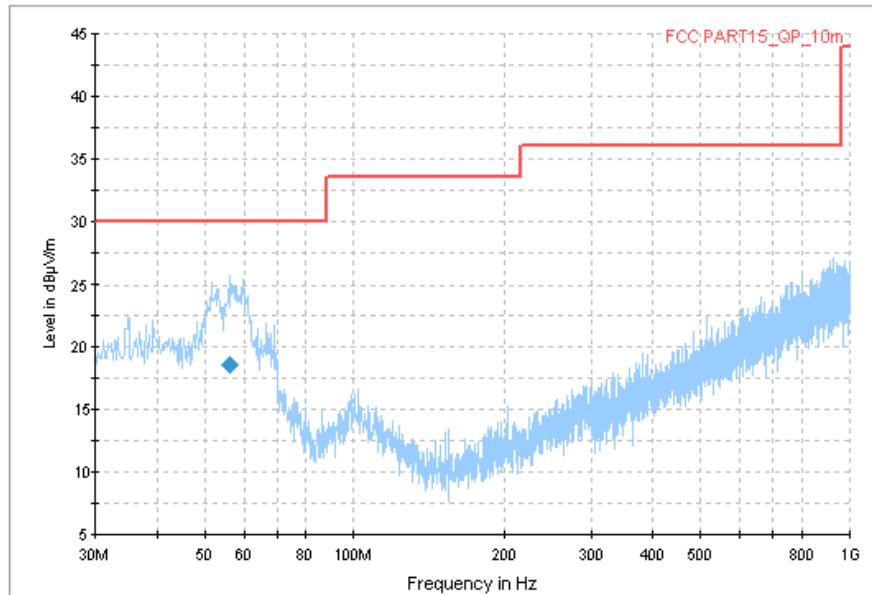
Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
1499.063	34.9	-40.3	24.1	51.100	H
1498.750	34.8	-40.3	24.1	51.000	V
1498.438	34.4	-40.3	24.1	50.600	H
1498.125	34.1	-40.3	24.1	50.300	H
1497.813	34.1	-40.3	24.1	50.300	V
1497.500	33.7	-40.3	24.1	49.900	V

USB Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
1195.625	52.7	-41.2	24.1	69.800	H
1464.688	52.4	-40.0	24.1	68.300	V
1464.063	52.1	-40.0	24.1	68.000	V
1464.375	51.7	-40.0	24.1	67.600	H
1465.000	51.3	-40.0	24.1	67.200	H
1463.750	51.2	-40.0	24.1	67.100	V

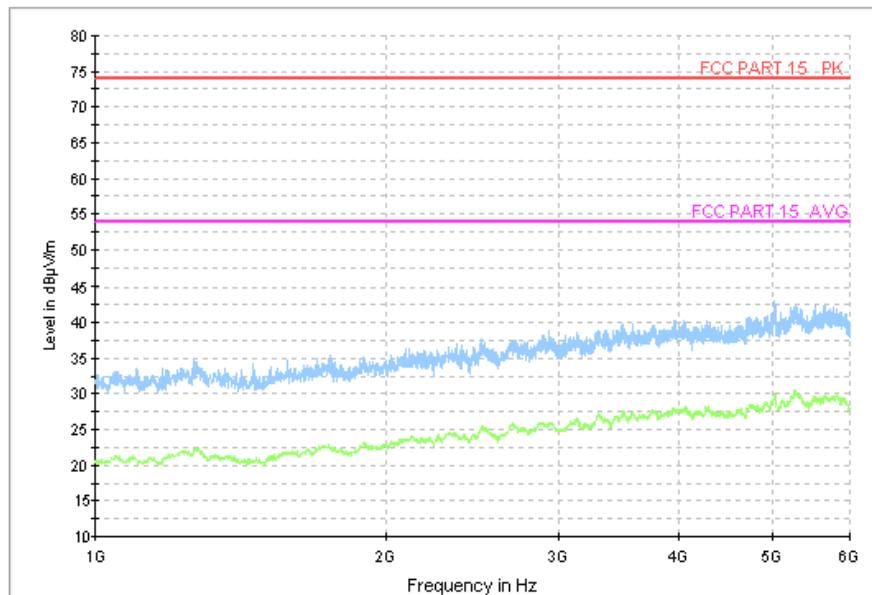
Charging Mode, Set.1

Normal RE_30M-1GHz_10m


Fig.1 Radiated Emission from 30MHz to 1GHz
Final Result

Frequency MHz	QuasiPeak dB μ V/m	Limit dB μ V/m	Margin dB	Azimuth Deg	Polarization H/V
56.068750	18.5	30.0	11.5	210.0	V

Normal RE_1G-18GHz_directly


Fig.2 Radiated Emission from 1GHz to 6GHz

USB Mode, Set.2

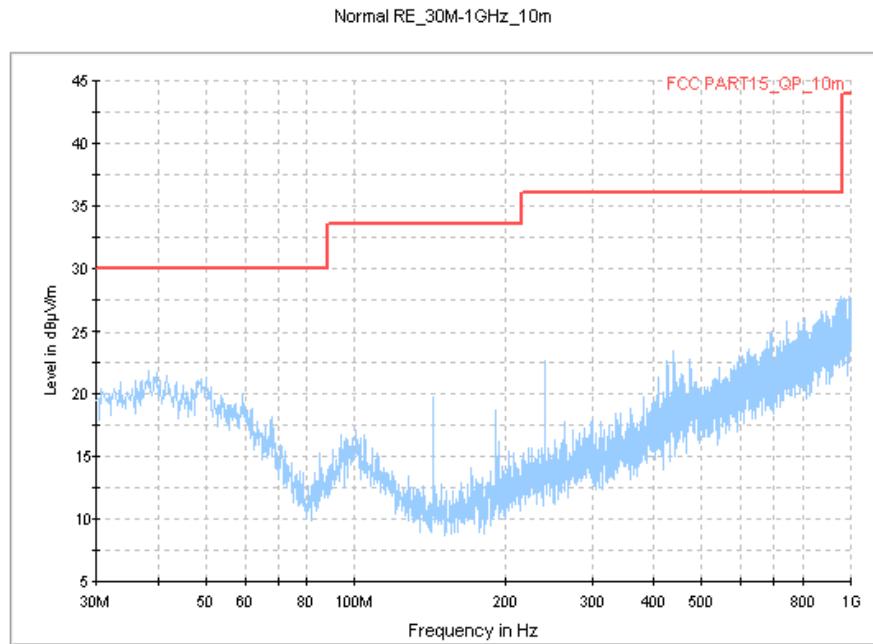


Fig.3 Radiated Emission from 30MHz to 1GHz

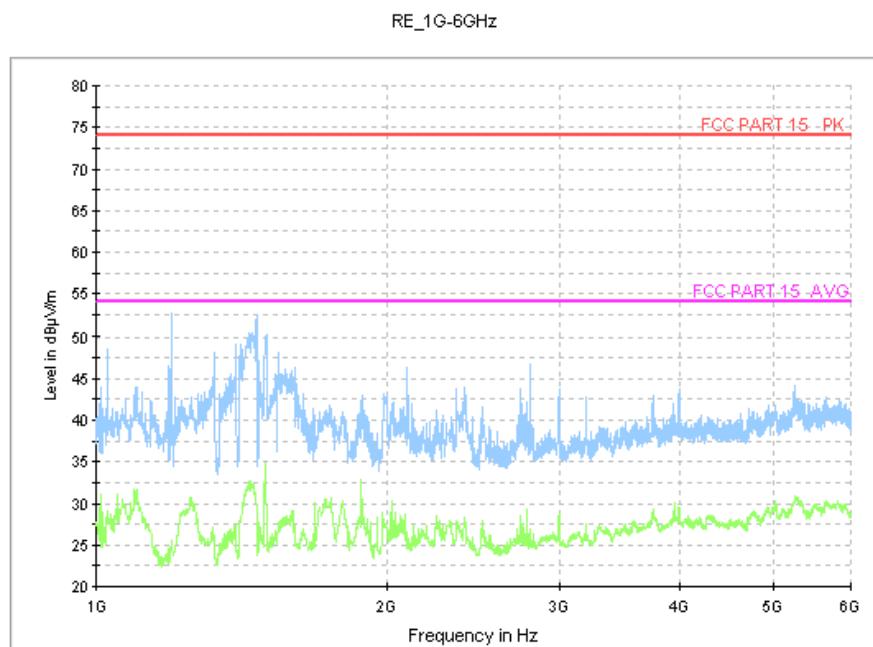


Fig.4 Radiated Emission from 1GHz to 6GHz

A.2 Conducted Emission (§15.107(a))

A.2.1 Method of measurement

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 - 2009, section 7.2.

A.2.2 EUT Operating Mode

The MS is operating in the USB mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

A.2.3 Measurement Limit

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency

A.2.4 Test Condition in charging mode

Voltage (V)	Frequency (Hz)
120	60

RBW/IF bandwidth	Sweep Time(s)
9kHz	1

A.2.5 Measurement Results

Measurement uncertainty: $U = 2.9 \text{ dB}$, $k=2$.

Charging Mode, Set.1

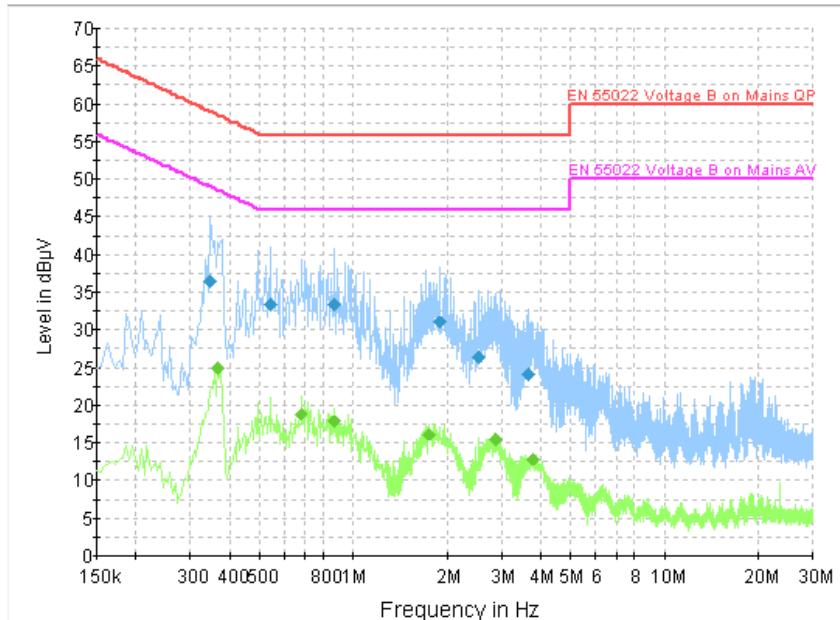


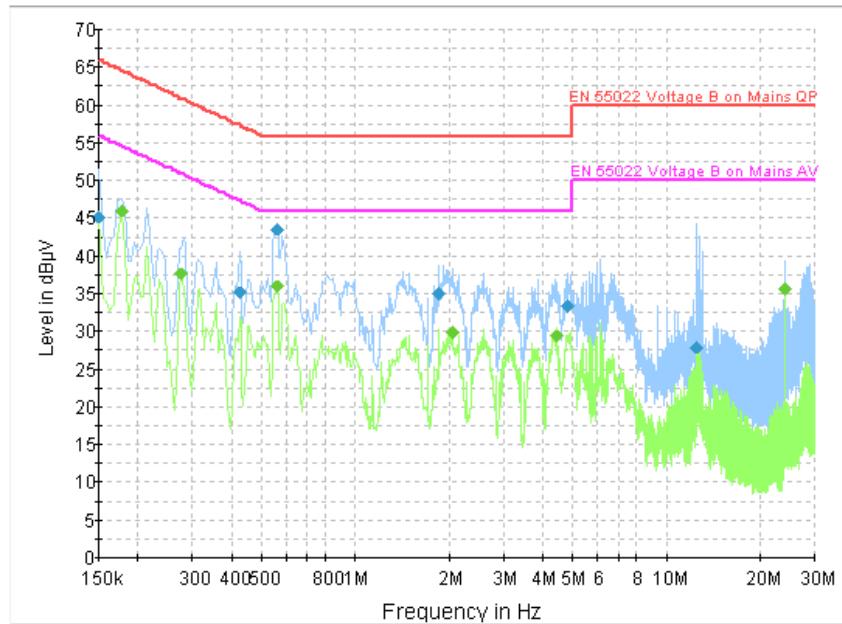
Fig.5 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.348000	36.5	GND	L1	19.9	22.5	59.0
0.541500	33.4	GND	L1	20.0	22.6	56.0
0.870000	33.4	GND	L1	19.8	22.6	56.0
1.900500	31.0	GND	L1	19.7	25.0	56.0
2.535000	26.4	GND	L1	19.7	29.6	56.0
3.660000	24.2	GND	L1	19.7	31.8	56.0

Final Result 2

Frequency (MHz)	CAverage (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.366000	24.9	GND	L1	19.9	23.7	48.6
0.681000	18.8	GND	L1	19.9	27.2	46.0
0.870000	17.8	GND	L1	19.8	28.2	46.0
1.743000	16.3	GND	L1	19.7	29.7	46.0
2.863500	15.5	GND	L1	19.7	30.5	46.0
3.804000	12.8	GND	L1	19.7	33.2	46.0

USB Mode, Set.2

Fig.6 Conducted Emission
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	45.3	GND	L1	19.7	20.7	66.0
0.424500	35.1	GND	L1	20.0	22.2	57.4
0.559500	43.5	GND	L1	20.0	12.5	56.0
1.851000	35.0	GND	N	19.7	21.0	56.0
4.821000	33.3	GND	L1	19.7	22.7	56.0
12.565500	27.9	GND	L1	19.8	32.1	60.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.177000	46.0	GND	N	19.9	8.6	54.6
0.276000	37.6	GND	N	19.9	13.3	50.9
0.559500	36.0	GND	L1	20.0	10.0	46.0
2.062500	29.8	GND	N	19.7	16.2	46.0
4.411500	29.5	GND	N	19.7	16.5	46.0
24.058500	35.7	GND	L1	19.8	14.3	50.0

*****END OF REPORT*****