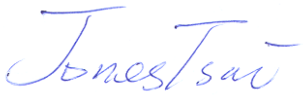
Variant FCC RF Test Report

APPLICANT	:	TECOM CO., LTD.
EQUIPMENT	:	Residential Fire and Burglar Control Unit
BRAND NAME	:	technicolor
MODEL NAME	:	DLC-200C US
FCC ID	:	D6XDLC200
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Mar. 04, 2016 and testing was completed on Mar. 23, 2016. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR630407	Rev. 01	This is a variant report which can be referred to Product Equality Declaration. All the test cases were performed on original report which can be referred to Sporton Report Number FR4N1471-02 as appendix D. Based on the original report, conducted output power, AC conducted emission and radiated emission were tested.	Jun. 30, 2016
FR630407	Rev. 02	Revising description of history. This is a variant report. Since the test result is not affected by the changes, all the test cases were performed on original report which can be referred to Sporton Report Number FR4N1471-02 as appendixD. Detail changes list as below : 1. LED controller. 2. 3G unit hot-swap. (3G unit FCC ID: D6XDLC200C) 3. Add conductive foam on RF main board. 4. Add vents on the bottom of enclosure. 5. Change brand name, update label accordingly. 6. Change RTC battery (B2) position. 7. Remove redundant connectors of JTAG (j4000) & boot configuration (p7000) & wifi ipex (j9305 & j9304). 8. 2nd source of resistor (R11027).	Aug. 01, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 2.03 dB at 2390.000 MHz
3.3	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 8.30 dB at 0.454 MHz
3.4	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

TECOM CO., LTD.
No. 23 R&D Road 2, Science-Based Industrial Park, Hsin-Chu Taiwan

1.2 Manufacturer

Global Brands Manufacture (DongGuan) Ltd.
Yue Yuan Industrial Estate, Huang Jiang Zhen, DongGuan City, GuangDong Province, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Residential Fire and Burglar Control Unit
Brand Name	technicolor
Model Name	DLC-200C US
FCC ID	D6XDLC200
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA WLAN 11b/g/n HT20/HT40
HW Version	614-901005R V1.9
SW Version	V1.02.73
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

<table>
<tr><th colspan="2">Standards-related Product Specification</th></tr>
<tr><td>Tx/Rx Channel Frequency Range</td><td>802.11b/g/n : 2412 MHz ~ 2462 MHz</td></tr>
<tr><td>Maximum (Average) Output Power to antenna</td><td><Ant. 1>
802.11b : 23.89 dBm (0.2449 W)
802.11g : 21.20 dBm (0.1318 W)
<Ant. 2>
802.11g : 21.56 dBm (0.1432 W)
<SISO Ant. 1>
802.11n HT20 : 21.49 dBm (0.1409 W)
802.11n HT40 : 17.75 dBm (0.0596 W)
<SISO Ant. 2>
802.11n HT20 : 21.41 dBm (0.1384 W)
802.11n HT40 : 16.82 dBm (0.0481 W)
<MIMO Ant. 1+2>
802.11n HT20 : 24.55 dBm (0.2851 W)
802.11n HT40 : 20.83 dBm (0.1211 W)</td></tr>
<tr><td>Antenna Type</td><td><Ant 1>
802.11b/g/n : PCB Antenna type with gain 5.50 dBi
<Ant 2>
802.11b/g/n : PCB Antenna type with gain 5.50 dBi</td></tr>
<tr><td>Type of Modulation</td><td>802.11b : DSSS (DBPSK / DQPSK / CCK)
802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)</td></tr>
<tr><td>Antenna Function for Transmitter</td><td>
<table>
<tr><th></th><th>Ant. 1</th><th>Ant. 2</th></tr>
<tr><td>802.11 b</td><td>V</td><td>-</td></tr>
<tr><td>802.11 g</td><td>V</td><td>V</td></tr>
<tr><td>802.11 n SISO</td><td>V</td><td>V</td></tr>
<tr><td>802.11 n MIMO</td><td>V</td><td>V</td></tr>
</table>
</td></tr>
</table>

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH02-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Alley. 75, Lane 564, Wenhua 3rd Rd. Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0838
Test Site No.	**Sporton Site No.**
	03CH10-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r04
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test shown in the following tables.

<Ant. 1>

802.11b				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Average Power (dBm)	23.89	23.87	23.47	23.46

802.11g								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Average Power (dBm)	21.20	21.10	21.11	21.17	21.14	21.18	21.16	21.15

<Ant. 2>

802.11g								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Average Power (dBm)	21.56	21.47	21.52	21.49	21.51	21.49	21.52	21.54

SISO <Ant. 1>

2.4GHz 802.11n HT20								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	21.49	21.41	21.48	21.45	21.43	21.25	21.22	21.19

2.4GHz 802.11n HT40								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	17.75	17.72	17.70	17.71	17.69	17.74	17.70	17.72

SISO <Ant. 2>

2.4GHz 802.11n HT20								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	21.41	21.22	21.31	21.36	21.39	21.35	21.37	21.39

2.4GHz 802.11n HT40								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	16.82	16.81	16.76	16.77	16.81	16.77	16.48	16.45

MIMO <Ant. 1+2>

2.4GHz 802.11n HT20								
Data Rate (MHz)	**MCS0**	**MCS1**	**MCS2**	**MCS3**	**MCS4**	**MCS5**	**MCS6**	**MCS7**
Average Power (dBm)	**24.55**	24.53	24.51	24.53	24.54	24.52	24.31	24.36

2.4GHz 802.11n HT40								
Data Rate (MHz)	**MCS0**	**MCS1**	**MCS2**	**MCS3**	**MCS4**	**MCS5**	**MCS6**	**MCS7**
Average Power (dBm)	**20.83**	20.80	20.81	20.82	20.60	20.69	20.70	20.59

Note: MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.

2.3 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

Single Antenna

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

MIMO Antenna

Modulation	Data Rate
802.11n HT20	MCS8
802.11n HT40	MCS8

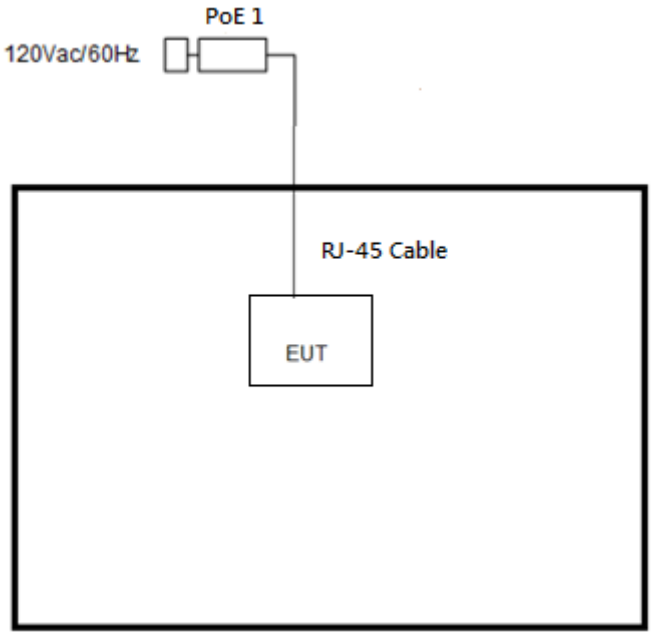
Test Cases	
AC Conducted Emission	Mode 1 : GSM850 (GPRS Class 8) Idle + WLAN Link + LAN Link + PoE1 Link + Battery

Remark:

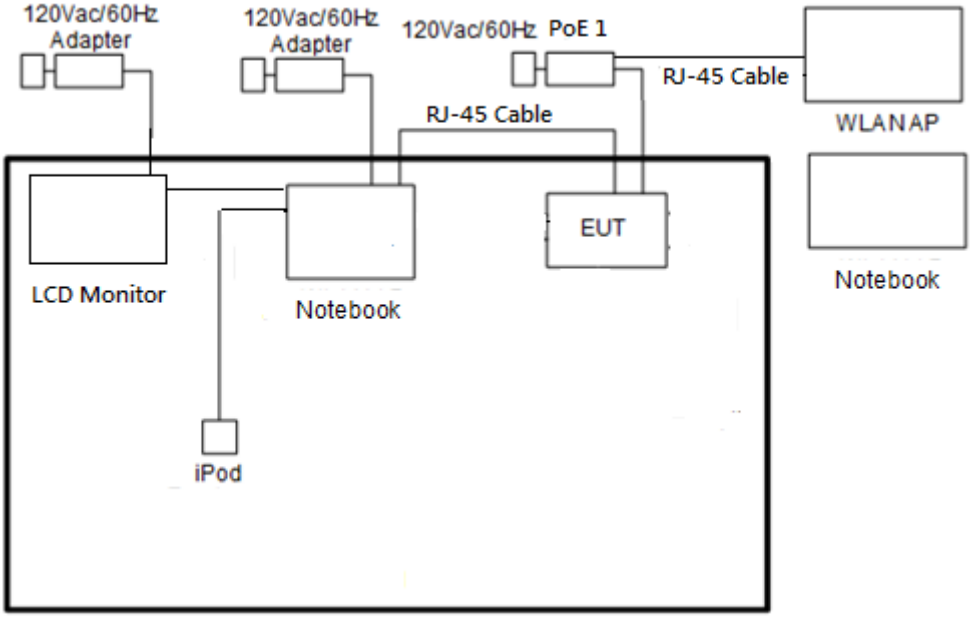
1. PoE Link includes data Link with Notebook which means data application transferred mode between EUT and Notebook.
2. This is a variant product of FCC ID: D6XDLC200 (model name: DLC-200C US; Sporton report Number FR4N1471-02 Rev. 01), after spot-checking the tests, the parent test results were worse than variant test results, thus this test report was reuse parent test data.

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Notebook	DELL	P20G	FCC DoC/ Contains FCC ID:QDS-BRCM1051	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	LCD TV	DELL	P2715Qt	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
6.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
7.	PoE 1	PowerDsine	PD-9001GR/AC	FCC DoC	N/A	N/A
8.	PoE 2	PHIHONG	POE31U-1AT	FCC DoC	N/A	N/A

2.6 EUT Operation Test Setup

The programmed RF utility “Tera Term” is installed in EUT to provide channel selection, power level, data rate and the application type. RF Utility can send transmitting signal for all testing. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

2.7 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 Peak Output Power Measurement

3.1.1 Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

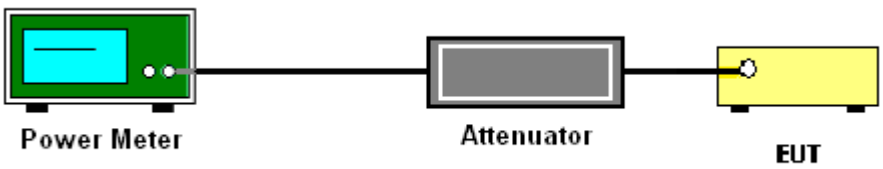
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r04 section 9.1.2 PKPM1 Peak power meter method.
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 to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.1.4 Test Setup



3.2 Radiated Band Edges and Spurious Emission Measurement

3.2.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

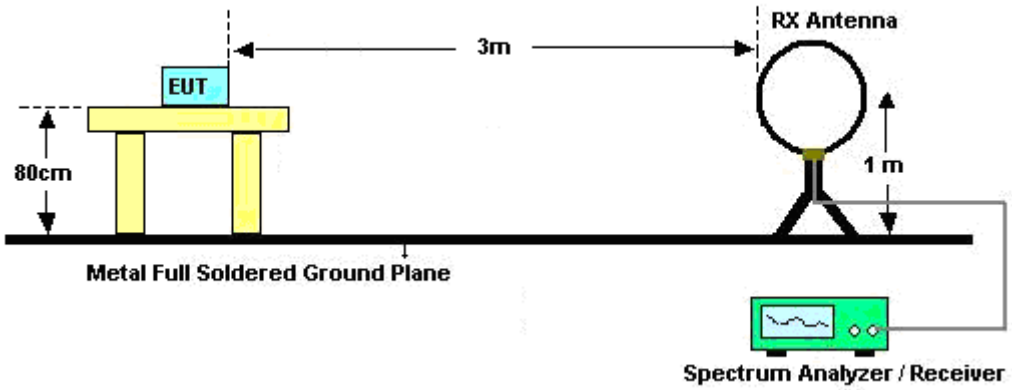
3.2.3 Test Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

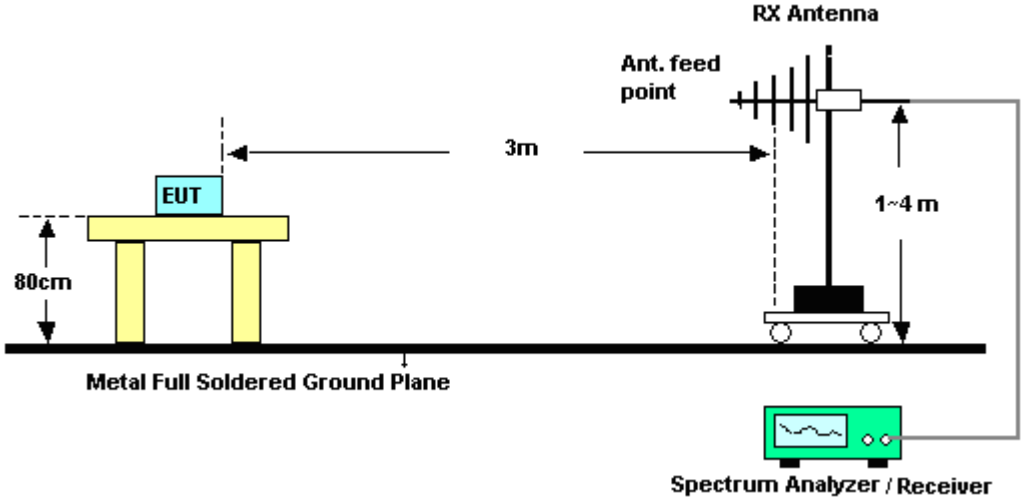
Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1	802.11g Ant 1	94.5	2060	0.49	1kHz
2	2.4GHz 802.11n HT20 for Ant 2	93.6	1900	0.53	1kHz
1+2	2.4GHz 802.11n HT20 for Ant 1	90.65	970	1.03	3kHz
1+2	2.4GHz 802.11n HT20 for Ant 2	89.82	970	1.03	3kHz

3.2.4 Test Setup

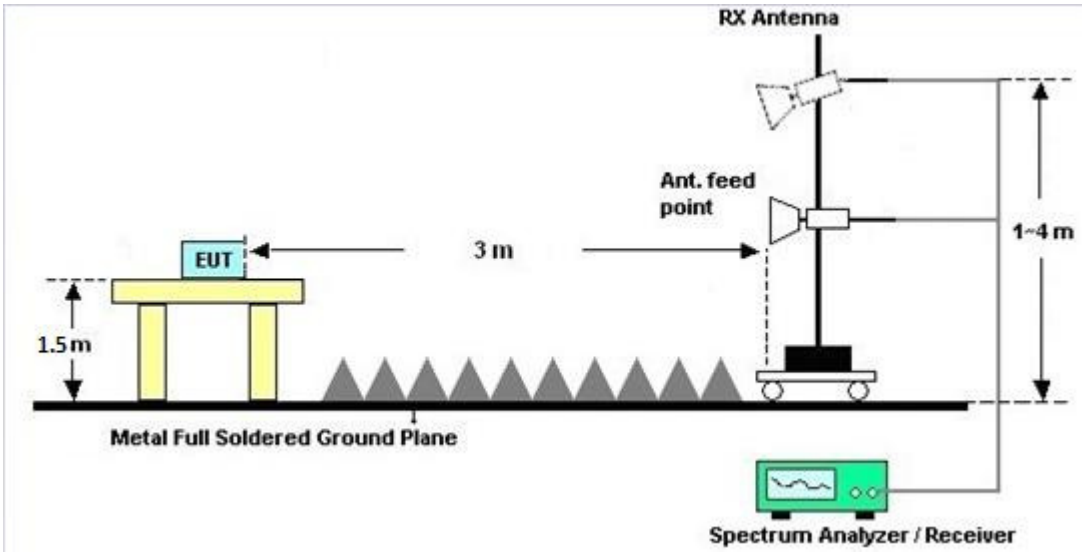
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 Test Results of Radiated Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A and B of this test report.

3.2.7 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix A and B of this test report.

3.3 AC Conducted Emission Measurement

3.3.1 Limit of AC Conducted Emission

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 in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	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.

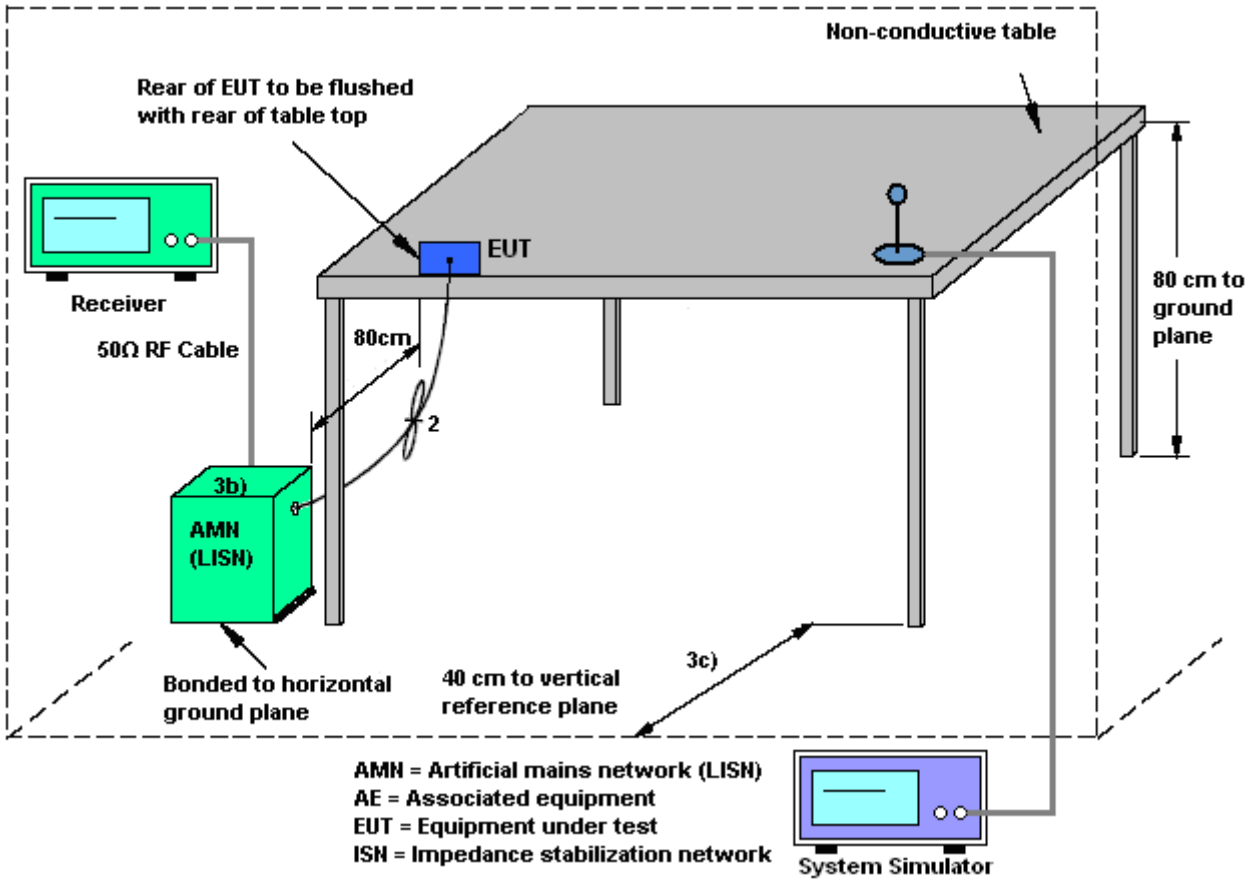
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

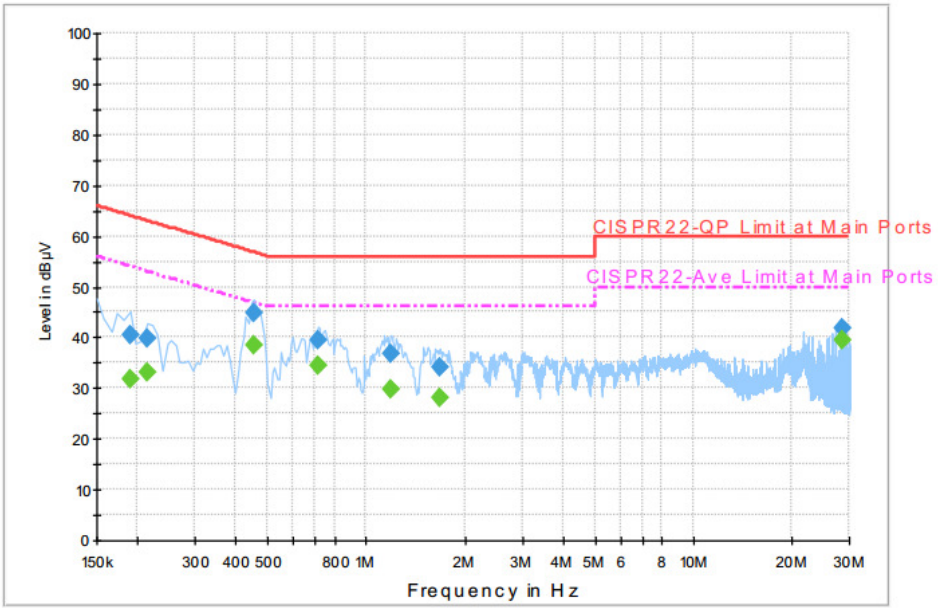
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.3.4 Test Setup



3.3.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	25~26℃
Test Engineer :	Derreck Chen	Relative Humidity :	58~60%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 (GPRS Class 8) Idle + WLAN Link + LAN Link + PoE1 Link + Battery		



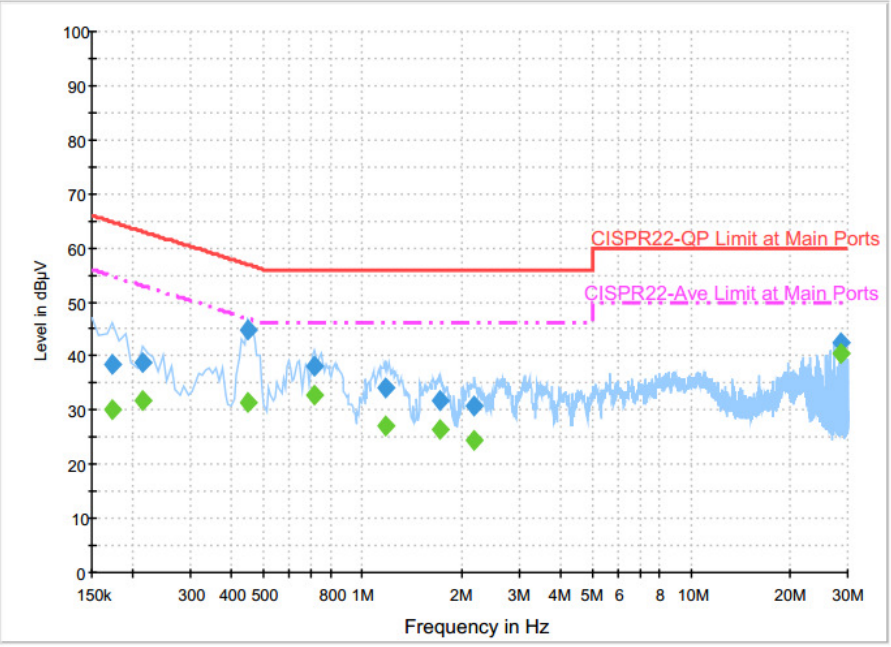
Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	40.4	Off	L1	19.6	23.6	64.0
0.214000	39.9	Off	L1	19.6	23.1	63.0
0.454000	44.8	Off	L1	19.6	12.0	56.8
0.710000	39.4	Off	L1	19.6	16.6	56.0
1.190000	36.8	Off	L1	19.6	19.2	56.0
1.686000	34.2	Off	L1	19.6	21.8	56.0
28.686000	41.8	Off	L1	19.9	18.2	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	31.7	Off	L1	19.6	22.3	54.0
0.214000	33.1	Off	L1	19.6	19.9	53.0
0.454000	38.5	Off	L1	19.6	8.3	46.8
0.710000	34.6	Off	L1	19.6	11.4	46.0
1.190000	29.6	Off	L1	19.6	16.4	46.0
1.686000	28.1	Off	L1	19.6	17.9	46.0
28.686000	39.6	Off	L1	19.9	10.4	50.0

Test Mode :	Mode 1	Temperature :	25~26℃
Test Engineer :	Derreck Chen	Relative Humidity :	58~60%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 (GPRS Class 8) Idle + WLAN Link + LAN Link + PoE1 Link + Battery		



Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	38.5	Off	N	19.6	26.3	64.8
0.214000	38.7	Off	N	19.6	24.3	63.0
0.446000	44.8	Off	N	19.6	12.1	56.9
0.710000	38.0	Off	N	19.6	18.0	56.0
1.182000	34.1	Off	N	19.6	21.9	56.0
1.718000	31.8	Off	N	19.6	24.2	56.0
2.182000	30.8	Off	N	19.5	25.2	56.0
28.686000	42.5	Off	N	20.1	17.5	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	30.1	Off	N	19.6	24.7	54.8
0.214000	31.7	Off	N	19.6	21.3	53.0
0.446000	31.3	Off	N	19.6	15.6	46.9
0.710000	32.9	Off	N	19.6	13.1	46.0
1.182000	26.9	Off	N	19.6	19.1	46.0
1.718000	26.3	Off	N	19.6	19.7	46.0
2.182000	24.6	Off	N	19.5	21.4	46.0
28.686000	40.4	Off	N	20.1	9.6	50.0

3.4 Antenna Requirements

3.4.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the Antenna exceeds 6 dBi. 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 FCC rule.

3.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.4.3 Antenna Gain

FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	5.50	5.50	5.50	8.51	0.00	2.51

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Jul. 29, 2015	Mar. 15, 2016 ~ Mar. 16, 2016	Jul. 28, 2016	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Jul. 29, 2015	Mar. 15, 2016 ~ Mar. 16, 2016	Jul. 28, 2016	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz-40GHz	Nov. 23, 2015	Mar. 15, 2016 ~ Mar. 16, 2016	Nov. 22, 2016	Conducted (TH02-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Mar. 19, 2016	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 26, 2015	Mar. 19, 2016	Aug. 25, 2016	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 02, 2015	Mar. 19, 2016	Dec. 01, 2016	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 08, 2016	Mar. 19, 2016	Jan. 07, 2017	Conduction (CO05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Sep. 02, 2015	Mar. 22, 2016 ~ Mar. 23, 2016	Sep. 01, 2016	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D	35413	30MHz~1GHz	Jan. 13, 2016	Mar. 22, 2016 ~ Mar. 23, 2016	Jan. 12, 2017	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1325	1GHz ~ 18GHz	Sep. 30, 2015	Mar. 22, 2016 ~ Mar. 23, 2016	Sep. 29, 2016	Radiation (03CH10-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 02, 2015	Mar. 22, 2016 ~ Mar. 23, 2016	Nov. 01, 2016	Radiation (03CH10-HY)
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Nov. 16, 2015	Mar. 22, 2016 ~ Mar. 23, 2016	Nov. 15, 2016	Radiation (03CH10-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1902246	1GHz~18GHz	Nov. 16, 2015	Mar. 22, 2016 ~ Mar. 23, 2016	Nov. 15, 2016	Radiation (03CH10-HY)
Preamplifier	Keysight	83017A	MY53270078	1GHz~26.5GHz	Nov. 13, 2015	Mar. 22, 2016 ~ Mar. 23, 2016	Nov. 12, 2016	Radiation (03CH10-HY)
Preamplifier	MITEQ	JS44-18004000-33-8P	1840917	18GHz ~ 40GHz	Jun. 02, 2015	Mar. 22, 2016 ~ Mar. 23, 2016	Jun. 01, 2016	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz ~ 44GHz	Oct. 15, 2015	Mar. 22, 2016 ~ Mar. 23, 2016	Oct. 14, 2016	Radiation (03CH10-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 21, 2015	Mar. 22, 2016 ~ Mar. 23, 2016	Dec. 20, 2016	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Mar. 22, 2016 ~ Mar. 23, 2016	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Mar. 22, 2016 ~ Mar. 23, 2016	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0~360 Degree	N/A	Mar. 22, 2016 ~ Mar. 23, 2016	N/A	Radiation (03CH10-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.90**

Appendix D. Original Report

Please refer to Sporton report number FR4N1471-02 as below.