



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Applicant : Shenzhen Zokon Industry Development Co., Ltd.

Address : 5F, Administration Building, Jinxing Industry District
Dongbin Road, Nanshan, Shenzhen, China

Product Name : Industry Data Collector

Model Name : T650, Z660, T350, T550, T750, T800, T820, T860, T880,
T890, T900, T920, T960, T980, T990

Brand Name : ZOKO

FCC ID : XUK-T650

Report No. : MST/STS091002F2

Date of Issue : October 26, 2009

Issued by : Most Technology Service Co., Ltd.

Address : No.5, 2nd Langshan Road, North District, Hi-tech Industrial
Park, Nanshan, Shenzhen, Guangdong, China

Tel : 86-755-8617 0306

Fax : 86-755-8617 0310

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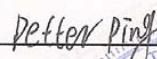
1. VERIFICATION OF CONFORMITY

Equipment Under Test: Industry Data Collector
Brand Name: ZOKO
Model Number: T650, Z660, T350, T550, T750, T800, T820, T860, T880, T890, T900, T920, T960, T980, T990
FCC ID: XUK-T650
Applicant: Shenzhen Zokon Industry Development Co., Ltd.
5F, Administration Building, Jinxing Industry District Dongbin Road, Nanshan, Shenzhen, China
Manufacturer: Shenzhen Zokon Industry Development Co., Ltd.
5F, Administration Building, Jinxing Industry District Dongbin Road, Nanshan, Shenzhen, China
Technical Standards: 47 CFR Part 15 Subpart C
File Number: MST/STS091002F2
Date of test: October 16, 2009 –October 26, 2009
Deviation: None
Condition of Test Sample: Normal
Test Result: PASS

The above equipment was tested by MOST. for compliance with the requirements set forth in FCC rules and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

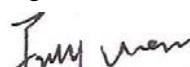
The test results of this report relate only to the tested sample identified in this report.

Tested by (+ signature):



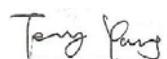
Petter Ping October 26, 2009

Review by (+ signature):



July Wen October 26, 2009

Approved by (+ signature):



Terry Yang October 26, 2009

2. GENERAL INFORMATION

2.1 Product Information

EUT1- Industry Data Collector	
Description:	Industry Data Collector
Model Name:	T650
Frequency Range	IEEE 802.11b/ g: 2412 ~ 2462 MHz
Transmit Power	IEEE 802.11b: 10.36 dBm IEEE 802.11g: 13.50 dBm
Modulation Technique	IEEE 802.11b: DSSS (CCK; DQPSK; DBPSK) IEEE 802.11g: OFDM
Antenna Gain	3.0 dBi (Max)
Antenna Designation	Internal

NOTE:

- Please refer to Appendix I for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.*

2.2 Objective

The objective of the report is to perform tests according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-05 Edition)	Radio Frequency Devices

2.3 Test Standards and Results

Test items and the results are as bellow:

No.	Section	Description	Result	Date of Test
1	§15.247(a)	6 dB Bandwidth	PASS	2009-10-24
2	§15.247(b)	Maximum Peak Output Power	PASS	2009-10-24
3	§15.247(c)	Power Spectrum Density	PASS	2009-10-24
4	§15.247(c)	Conducted Spurious Emission	PASS	2009-10-24
5	§15.247(d)	Band Edge	PASS	2009-10-24

Note: 1. The test result judgment is decided by the limit of measurement standard
 2. The information of measurement uncertainty is available upon the customer's request.

2.4 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

3. TEST FACILITY

Test Site: Most Technology Service Co.,ltd

Location: Add: No.5, Nangshan 2nd Rd., North Hi-Tech Industrial park , Nanshan Shenzhen, Guangdong ,China

Description: There is one 3m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4 and CISPR 16 requirements. The FCC Registration Number is **490827**.

Site Filing: The site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.

Instrument Tolerance: All measuring equipment is in accord with ANSI C63.4 and CISPR 16 requirements that meet industry regulatory agency and accreditation agency requirement.

Ground Plane: Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz.

4. TEST EQUIPMENT LIST

Instrumentation: The following list contains equipment used at Most for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10 kHz to 1.0 GHz or above.

No.	Equipment	Manufacturer	Model No.	S/N	Calculator due date
1	Test Receiver	Rohde & Schwarz	ESCI	100492	2010/03/14
2	L.I.S.N.	Rohde & Schwarz	ENV216	100093	2010/03/14
3	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2010/03/14
4	Terminator	Hubersuhner	50Ω	No.1	2010/03/14
5	RF Cable	SchwarzBeck	N/A	No.1	2010/03/14
6	Test Receiver	Rohde & Schwarz	ESPI	101202	2010/03/14
7	Bilog Antenna	Sunol	JB3	A121206	2010/03/14
8	Cable	Resenberger	N/A	NO.1	2010/03/14
9	Cable	SchwarzBeck	N/A	NO.2	2010/03/14
10	Cable	SchwarzBeck	N/A	NO.3	2010/03/14
11	DC Power Filter	DuoJi	DL2×30B	N/A	2010/03/14
12	Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	2010/03/14
13	3 Phase Power Line Filter	DuoJi	FNF 402B30	N/A	2010/03/14
14	Test Receiver	Rohde & Schwarz	ESCI	100492	2010/03/14
15	Absorbing Clamp	Luthi	MDS21	3635	2010/03/14
16	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2010/03/14
17	AC Power Source	Kikusui	AC40MA	LM003232	2010/03/14
18	Test Analyzer	Kikusui	KHA1000	LM003720	2010/03/14
19	Line Impedance Network	Kikusui	LIN40MA-PCR-L	LM002352	2010/03/14
20	ESD Tester	Kikusui	KES4021	LM003537	2010/03/14
21	EMCPRO System	EM Test	UCS-500-M4	V0648102026	2010/03/14
22	Signal Generator	IFR	2032	203002/100	2010/03/14
23	Amplifier	A&R	150W1000	301584	2010/03/14
24	CDN	FCC	FCC-801-M2-25	47	2010/03/14
25	CDN	FCC	FCC-801-M3-25	107	2010/03/14
26	EM Injection Clamp	FCC	F-203I-23mm	403	2010/03/14
27	RF Cable	MIYAZAKI	N/A	No.1/No.2	2010/03/14
28	Universal Radio Communication Tester	ROHDE&SCHWARZ	CMU200	0304789	2010/03/14
29	Telecommunication Antenna	European Antennas	PSA 75301R/170	0304213	2010/03/14
30	Analyzer Spectrum	Agilent	4408A	GB43132689	2010/03/14

NOTE: Equipments listed above have been calibrated and are in the period of validation.

5. 47 CFR Part 15C Requirements

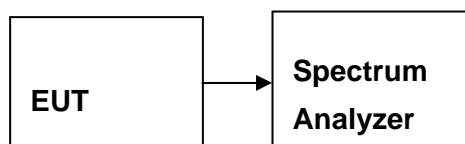
5.1 6dB Bandwidth Measurement

5.1.1 Definition

According to FCC section 15.247(a) (2), System using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz and 5725-5850MHz bands, the minimum 6dB bandwidth shall be at least 500 KHz.

5.1.2 Test Description

Test Setup:



5.1.3 Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100 kHz, VBW = RBW, Span = 20MHz, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

5.1.4 EUT Setup and Operating Conditions

Controlled by an embedded test program provided by applicant, the EUT was set to continuous transmitting at maximum peak output power and different data rate(802.11b 11Mbps,802.11g 54Mbps),Lowest ,middle and highest channel were measured respectively.

5.1.5 Test Result

802.11b

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	10930	>500	PASS
Mid	2437	10930		PASS
High	2462	10945		PASS

802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	11750	>500	PASS
Mid	2437	11750		PASS
High	2462	11730		PASS

5.2 Maximum Peak Output Power

5.2.1 Requirement

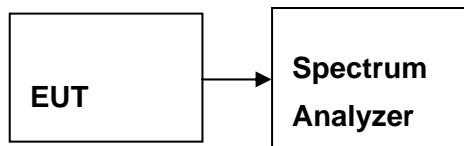
The maximum peak output power of the intentional radiator shall not exceed the following:

1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt.
2. Except as shown in paragraphs (b) (3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.2.2 Test Procedure

The EUT was connected to the Power Meter. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables and the test system is calibrated to correct the reading.

5.2.3 Test Setup



5.2.4 EUT Setup and Operating Conditions

Controlled by an embedded test program provided by applicant, the EUT was set to continuous transmitting at maximum peak output power and different data rate(802.11b 11Mbps,802.11g 54Mbps), Lowest ,middle and highest channel were measured respectively.

5.2.5 Test Result

802.11b

Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Limit (W)	Result
Low	2412	10.10	0.0102	1	PASS
Mid	2437	10.15	0.0104		PASS
High	2462	10.36	0.0109		PASS

802.11g

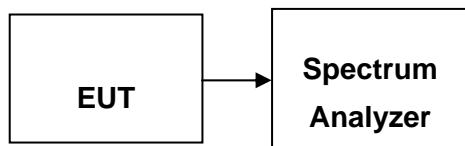
Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Limit (W)	Result
Low	2412	13.45	0.0221	1	PASS
Mid	2437	13.18	0.0208		PASS
High	2462	13.50	0.0224		PASS

5.3 Peak Power Spectral Density

5.3.1 Limits

1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.
2. The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

5.3.2 Test Configuration



5.3.3 Test procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s
4. Record the max reading.
5. Repeat the above procedure until the measurements for all frequencies are completed.

5.3.4 EUT Setup and Operating Conditions

Controlled by an embedded test program provided by applicant, the EUT was set to continuous transmitting at maximum peak output power and different data rate(802.11b 11Mbps,802.11g 54Mbps), Lowest ,middle and highest channel were measured respectively.

5.3.4 Test results

802.11b

Channel	Frequency	Peak Power Spectral Density (dBm)	Limit (dBm)	Result
Low	2412	-16.25	8.00	PASS
Mid	2437	-19.59		PASS
High	2462	-17.62		PASS

802.11g

Channel	Frequency	Peak Power Spectral Density (dBm)	Limit (dBm)	Result
Low	2412	-25.28	8.00	PASS
Mid	2437	-20.46		PASS
High	2462	-23.16		PASS

5.4 Conducted Spurious Emissions

5.4.1 Requirement

According to FCC section 15.247(c), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c))..

5.4.2 Test Procedure

1. Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.
2. The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 KHz. The video bandwidth is set to 100 KHz.
3. Measurements are made over the 30MHz to 26.5GHz range with the transmitter set to the lowest, middle, and highest channels.

5.4.3 Test Result

The EUT operates at hopping-off test mode. The measurement frequency range is from 9 KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

802.11b, highest channel

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	2412	-39.15	3.400	-16.60	PASS
6	2437	-40.54	3.822	-16.18	PASS
11	2462	-41.38	3.802	-16.20	PASS

802.11b, middle channel

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	2412	-39.15	3.400	-16.60	PASS
6	2437	-40.54	3.822	-16.18	PASS
11	2462	-41.38	3.802	-16.20	PASS

802.11b, lowest channel

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	2412	-39.15	3.400	-16.60	PASS
6	2437	-40.54	3.822	-16.18	PASS
11	2462	-41.38	3.802	-16.20	PASS

802.11g, highest channel

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	2412	-39.15	3.400	-16.60	PASS
6	2437	-40.54	3.822	-16.18	PASS
11	2462	-41.38	3.802	-16.20	PASS

802.11g, middle channel

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	2412	-39.15	3.400	-16.60	PASS
6	2437	-40.54	3.822	-16.18	PASS
11	2462	-41.38	3.802	-16.20	PASS

802.11g, lowest channel

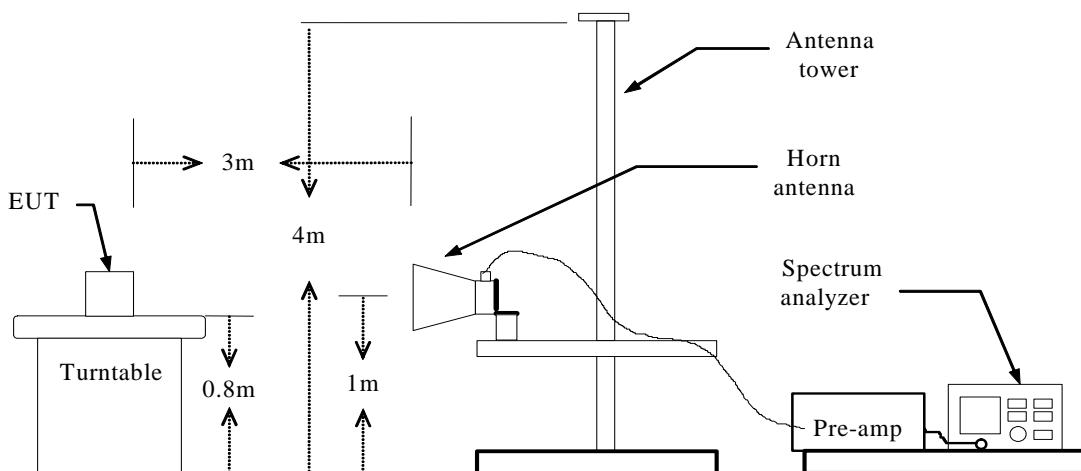
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
0	2412	-39.15	3.400	-16.60	PASS
6	2437	-40.54	3.822	-16.18	PASS
11	2462	-41.38	3.802	-16.20	PASS

5.5 Band Edge

5.5.1 Requirement

According to FCC section 15.247(c), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a)..

5.5.2 Test Setup



5.5.3 Test Procedure

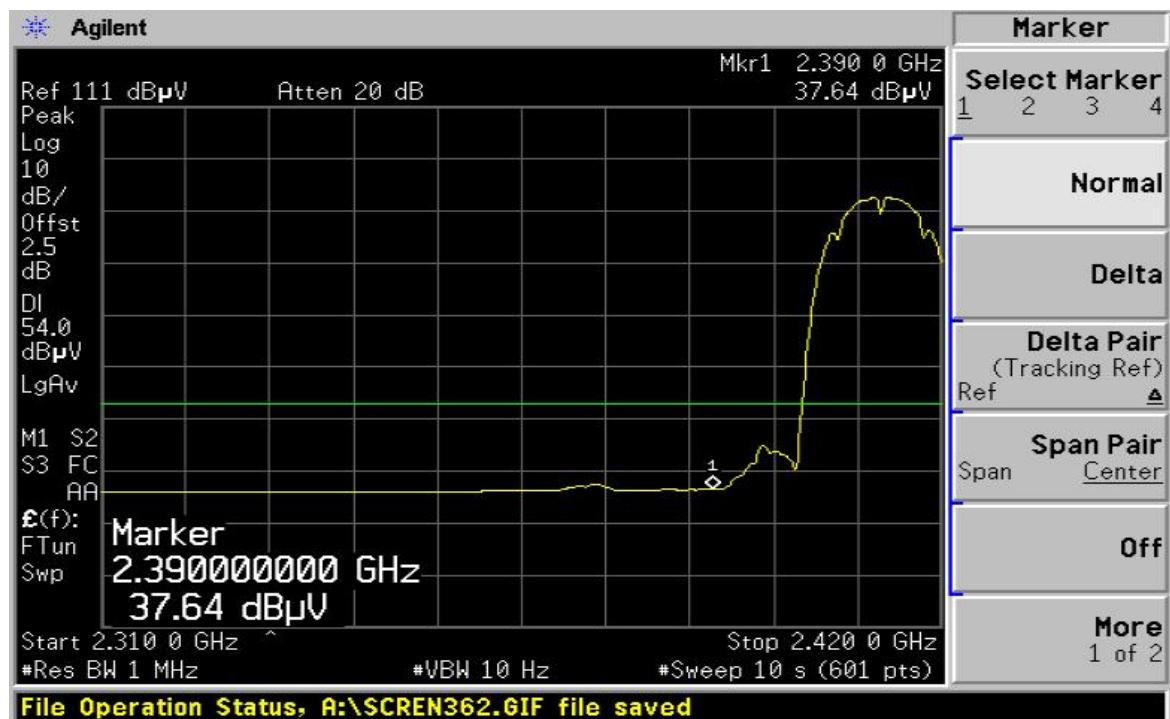
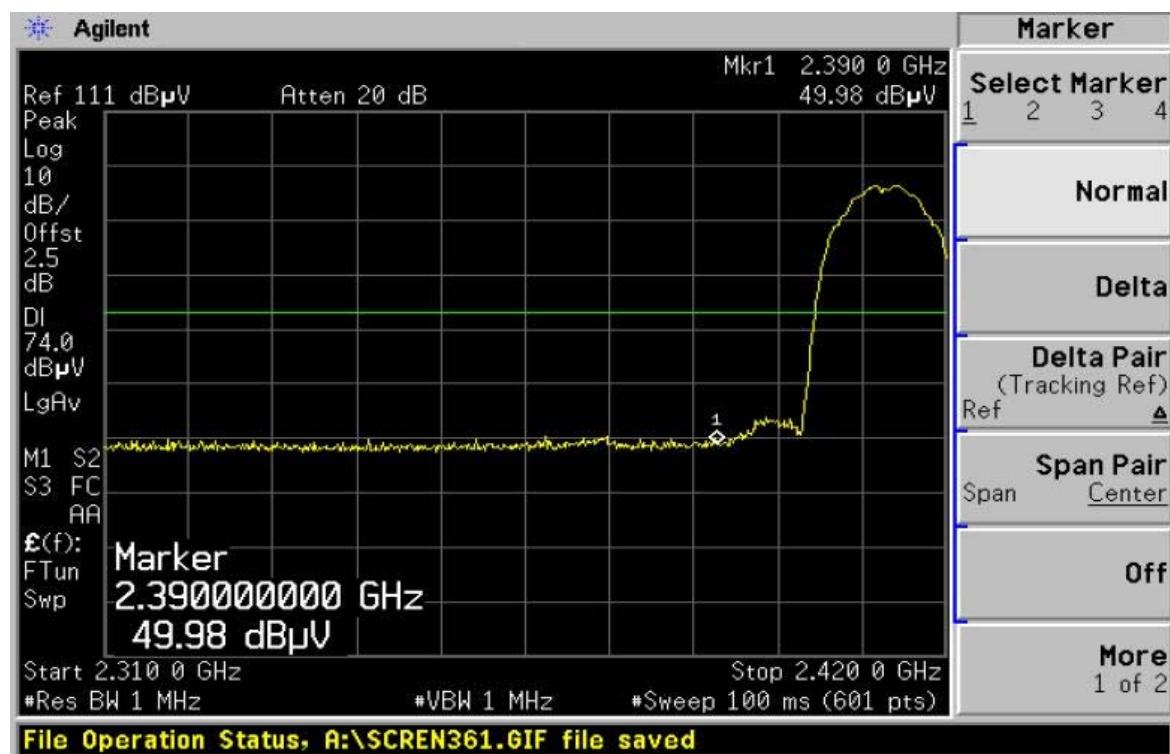
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

5.5.4 Test Result

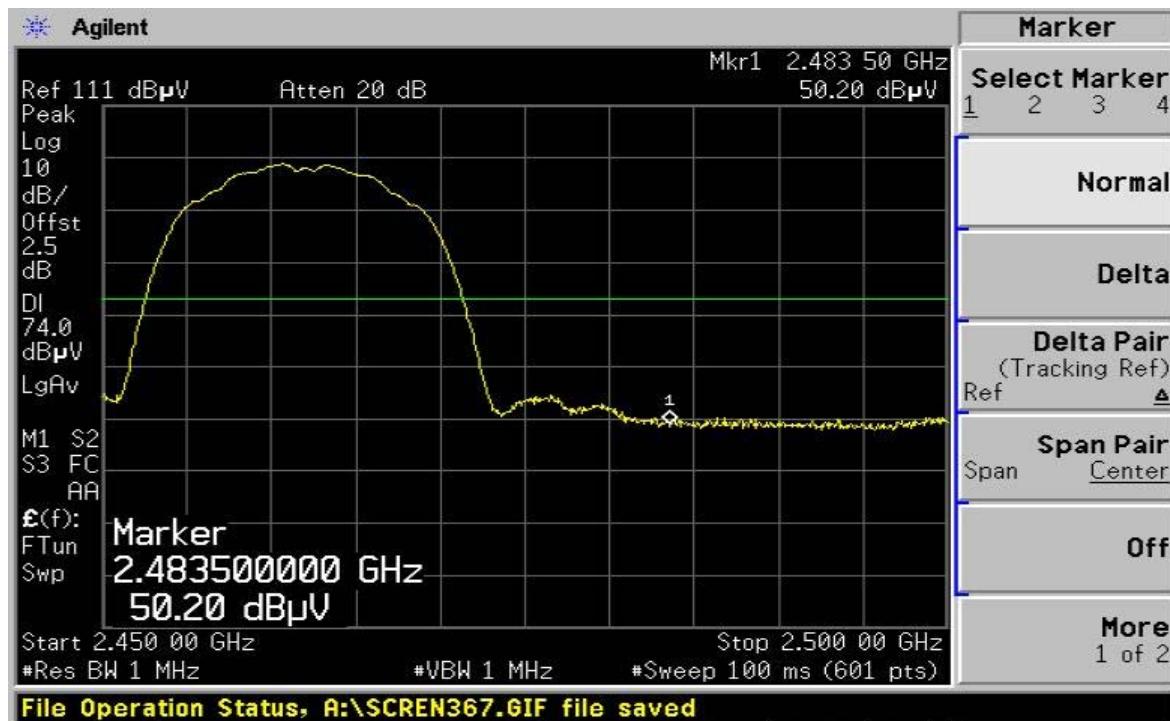
The radio frequency power beyond the band edge was 20dB below the peak output power, measured with 100 KHz resolution bandwidth.

Refer to attach spectrum analyzer data chart.

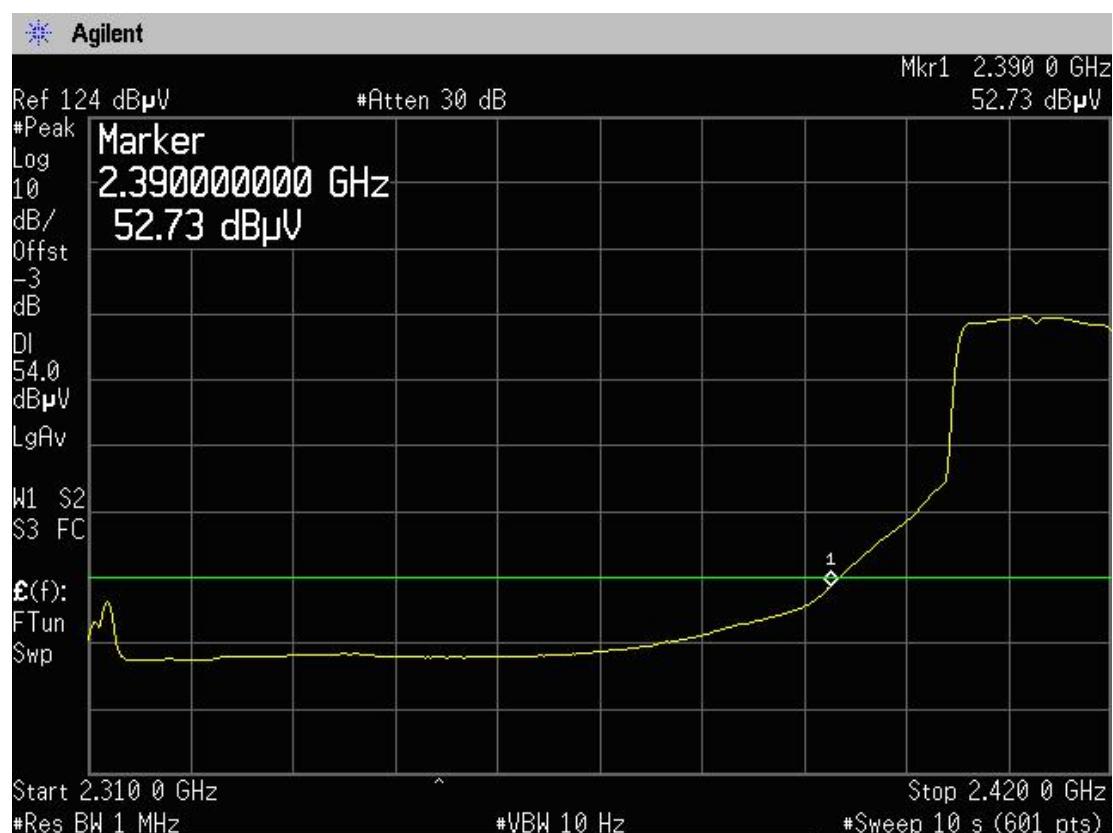
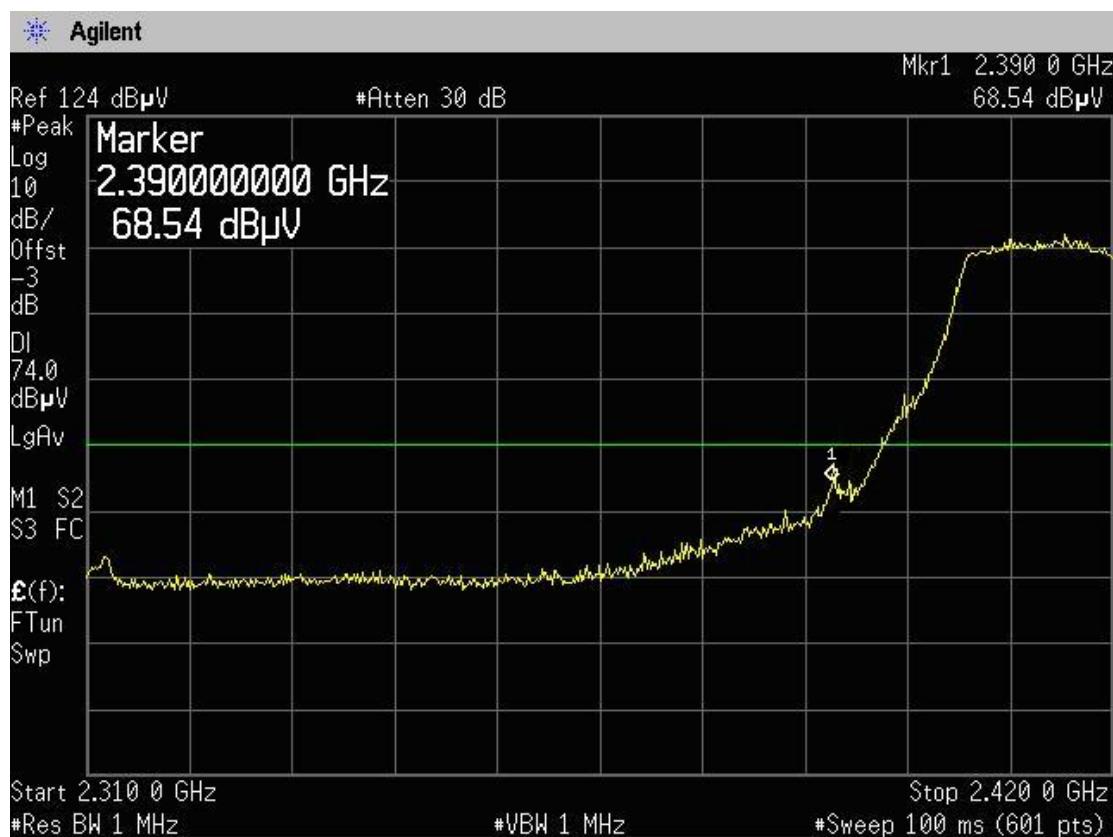
802.11b, lowest channel



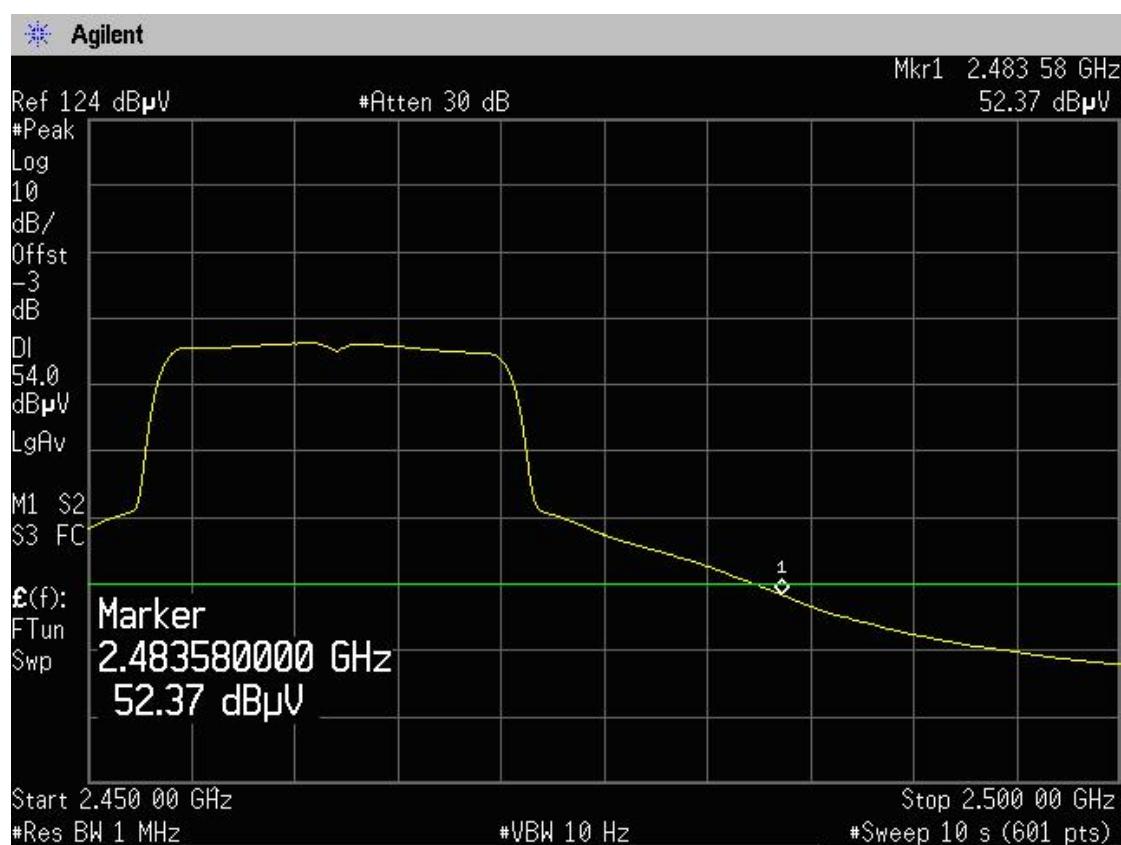
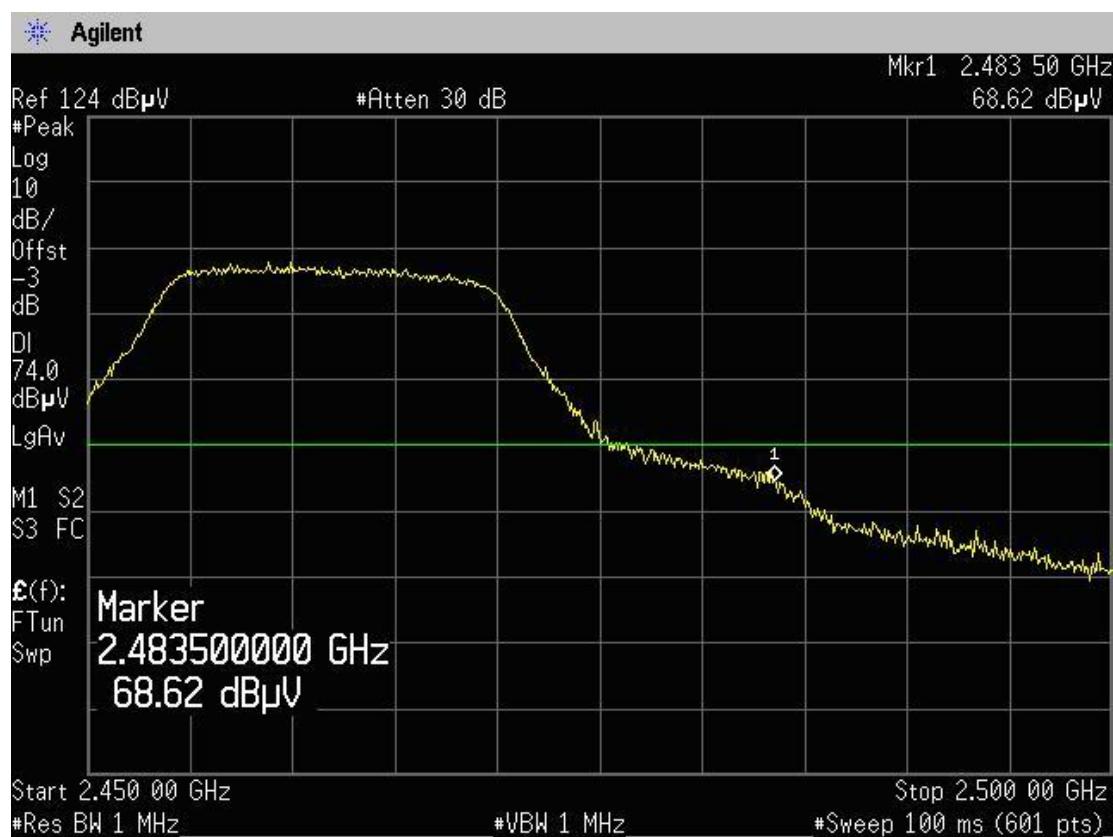
802.11b, highest channel



802.11g, lowest channel



802.11g, highest channel



5.6 Radio Frequency Exposure

5.6.1 Limit

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §15.247(b)(4) and §1.1307(b)(1) of this chapter.

5.6.2 EUT Specification

EUT	GSM Mobile Phone
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz <input type="checkbox"/> Others
Device category	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure ($S = 5\text{mW/cm}^2$) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure $(S=1\text{mW/cm}^2)$
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <ul style="list-style-type: none"> <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Max. output power	13.50 dBm (22.40 mW)
Antenna gain (Max)	1.0 dBi
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation
Note:	
<ol style="list-style-type: none"> 1. The maximum output power is <u>13.50 dBm (22.40 mW)</u> at <u>2462MHz</u>. 2. The Bluetooth, WIFI and the RF ID module cannot be used at the same time. 3. DSS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance. 4. For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20 cm, even if the calculations indicate that the MPE distance would be lesser. 	

5.6.3 Test Results

No non-compliance noted.

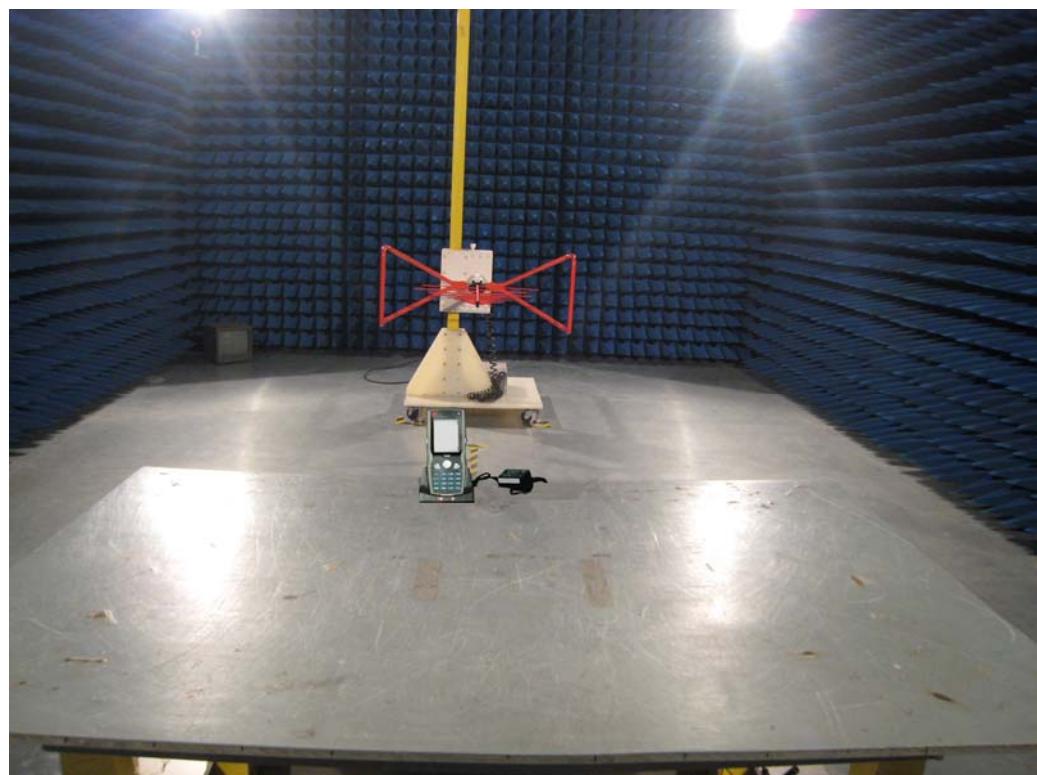
(SAR evaluation is not required for the PORTABLE device while its maximum output power is lower than the general population low threshold: $60/f\text{ (GHz)}=60/2.37=25.32\text{mW}$)

5.6.4 MPE evaluation

PASS

APPENDIX 1
PHOTOGRAPHS OF TEST SETUP

Radiated Emission Test Setup



Conducted Emission Test Setup



APPENDIX 2
PHOTOGRAPHS OF EUT

FRONT VIEW OF SAMPLE



BACK VIEW OF SAMPLE



LEFT VIEW OF SAMPLE



RIGHT VIEW OF SAMPLE



TOP VIEW OF SAMPLE



BOTTOM VIEW OF SAMPLE



PHOTO OF POWER SUPPLY



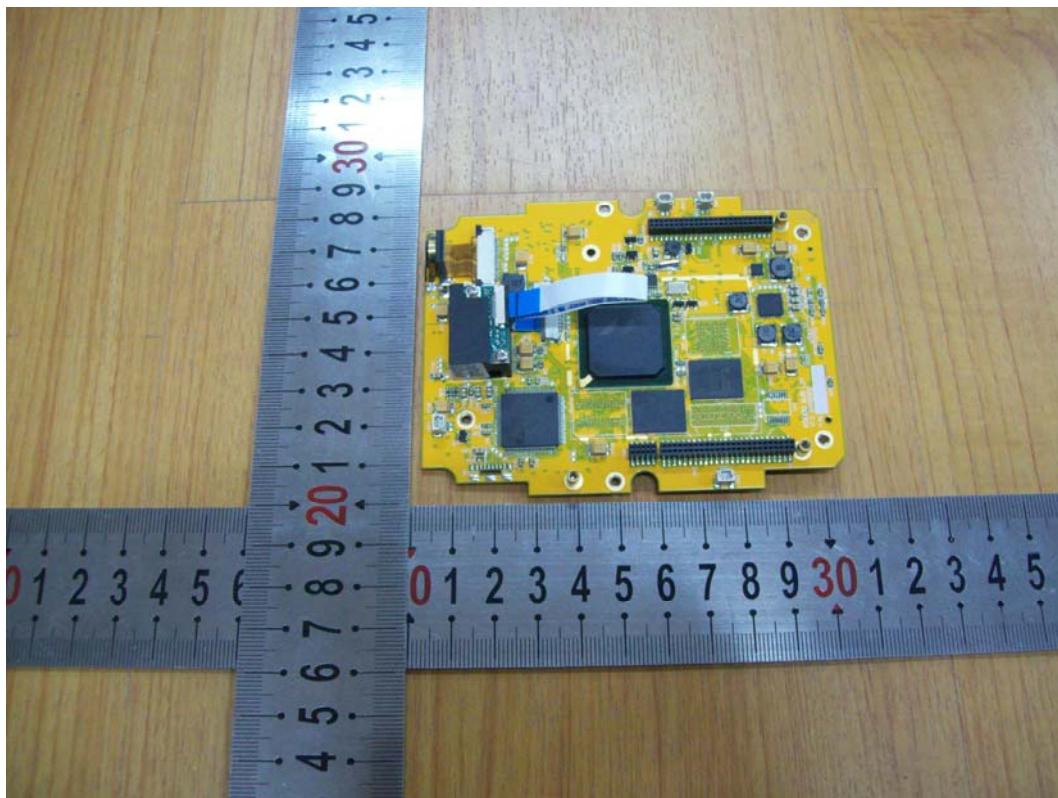
PHOTO OF USB CABLE



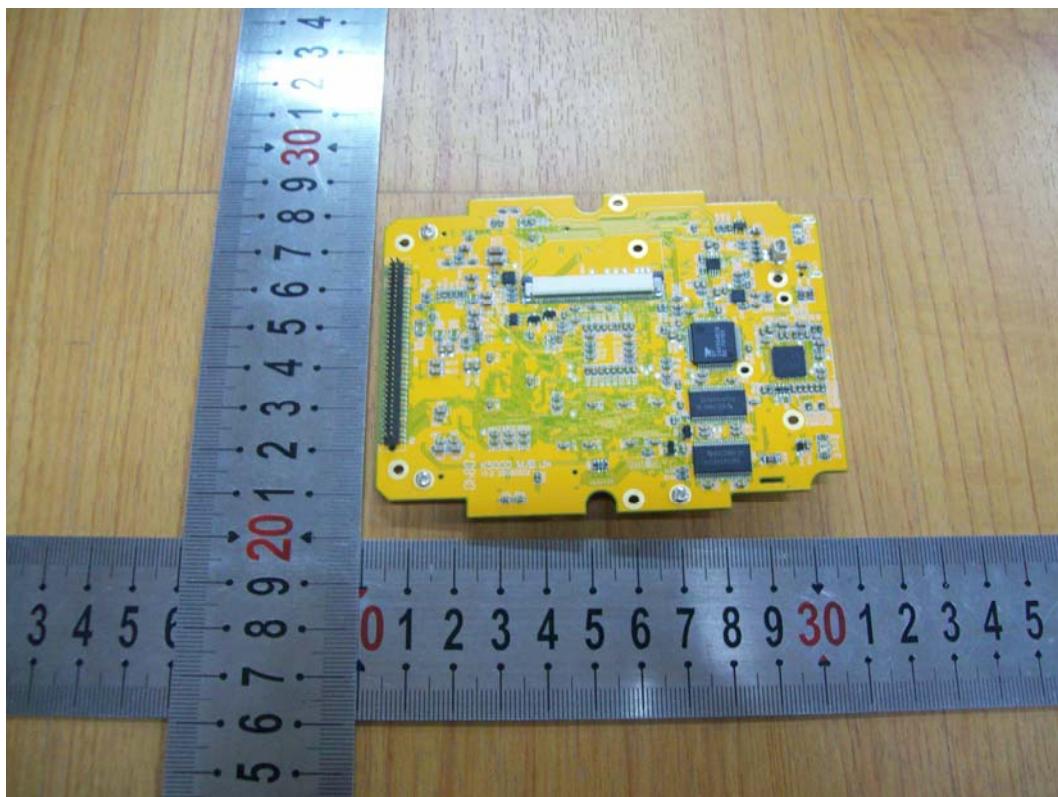
PHOTO OF BATTERY



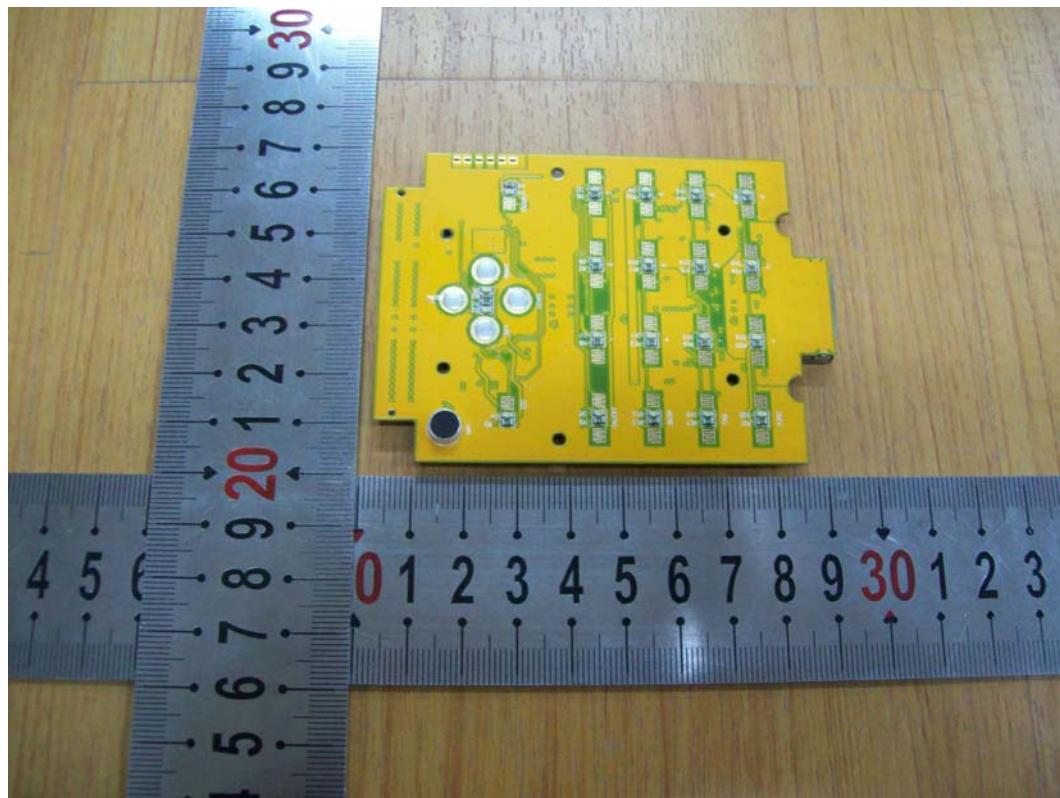
INTERNAL PHOTO OF SAMPLE – 1



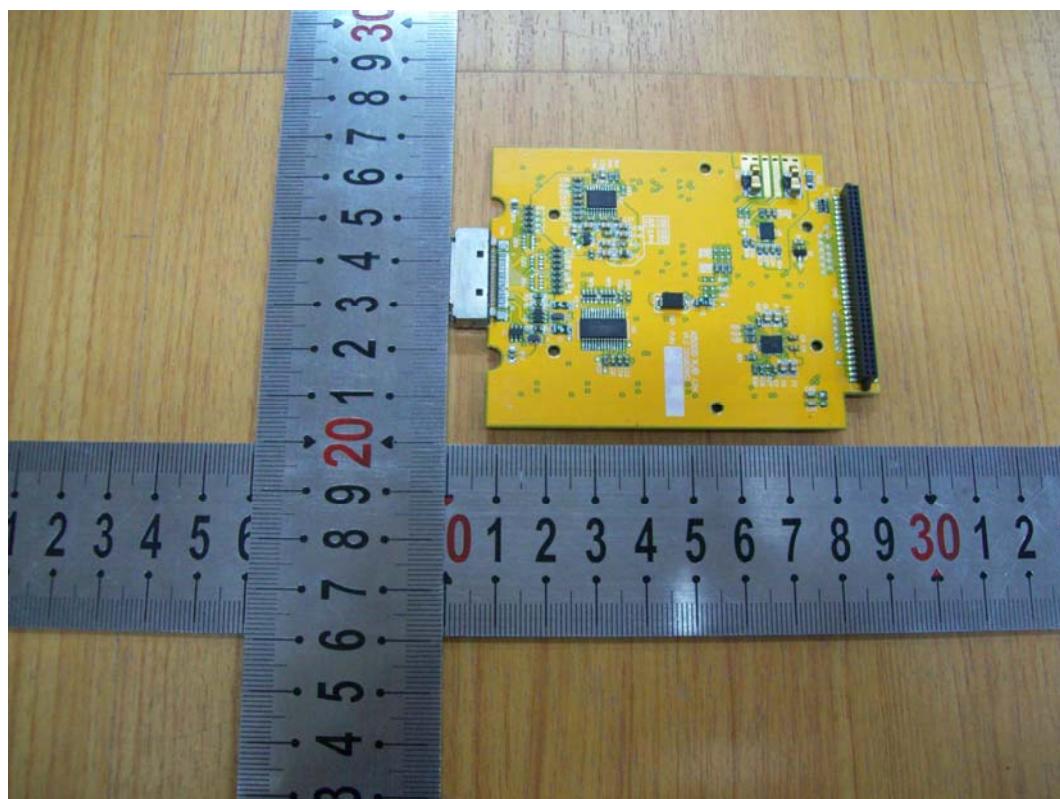
INTERNAL PHOTO OF SAMPLE – 2



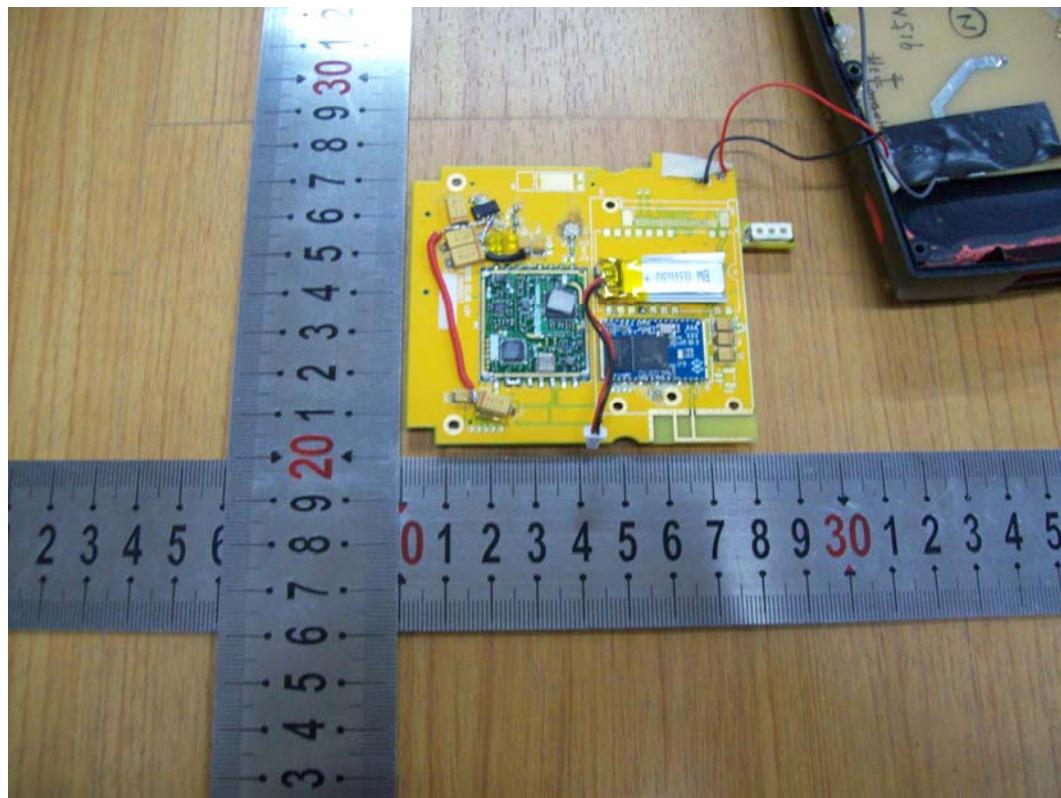
INTERNAL PHOTO OF SAMPLE – 3



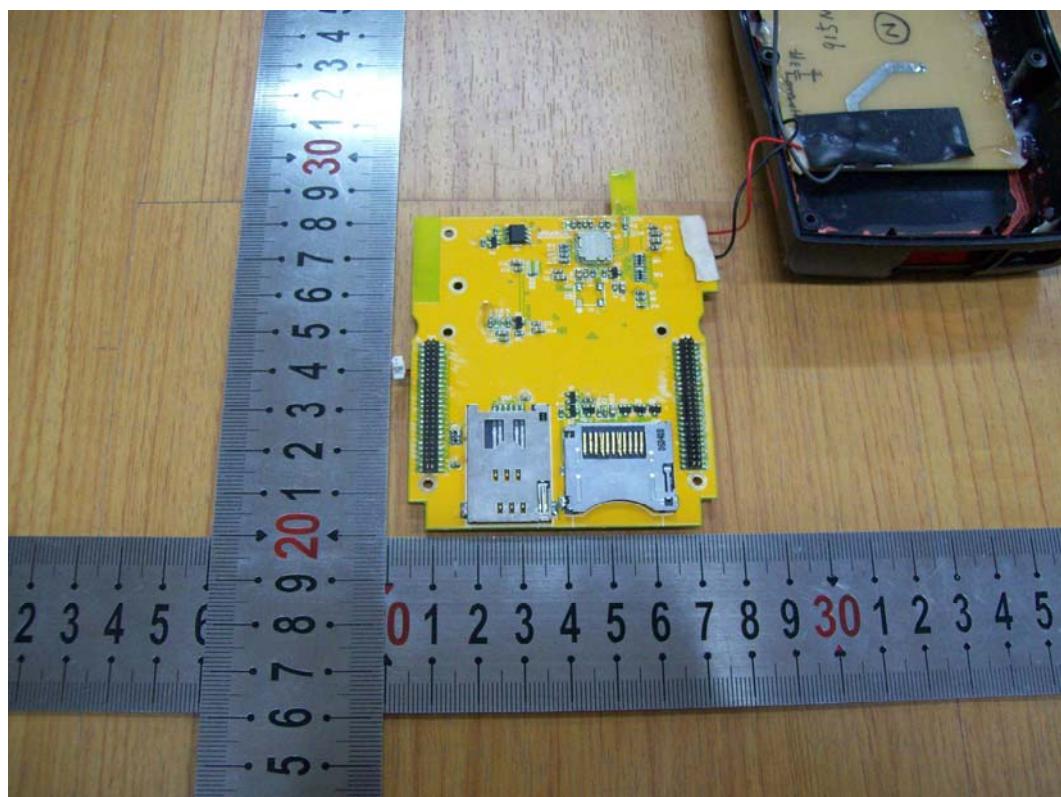
INTERNAL PHOTO OF SAMPLE – 4



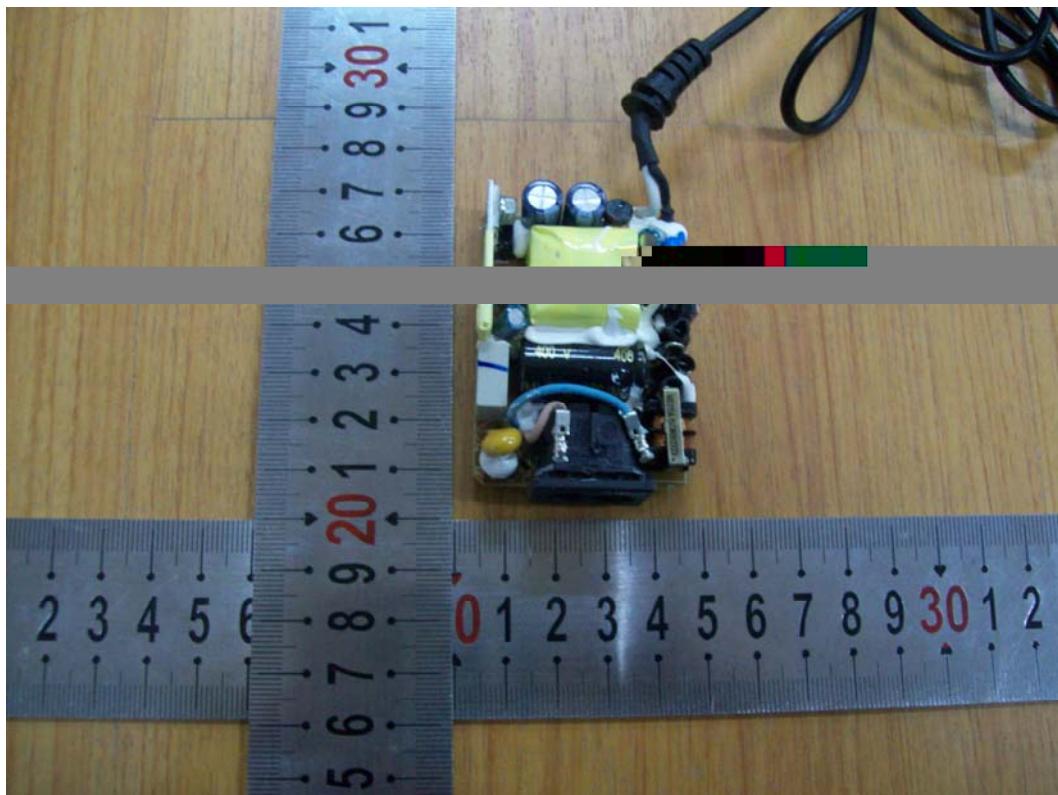
INTERNAL PHOTO OF SAMPLE -5



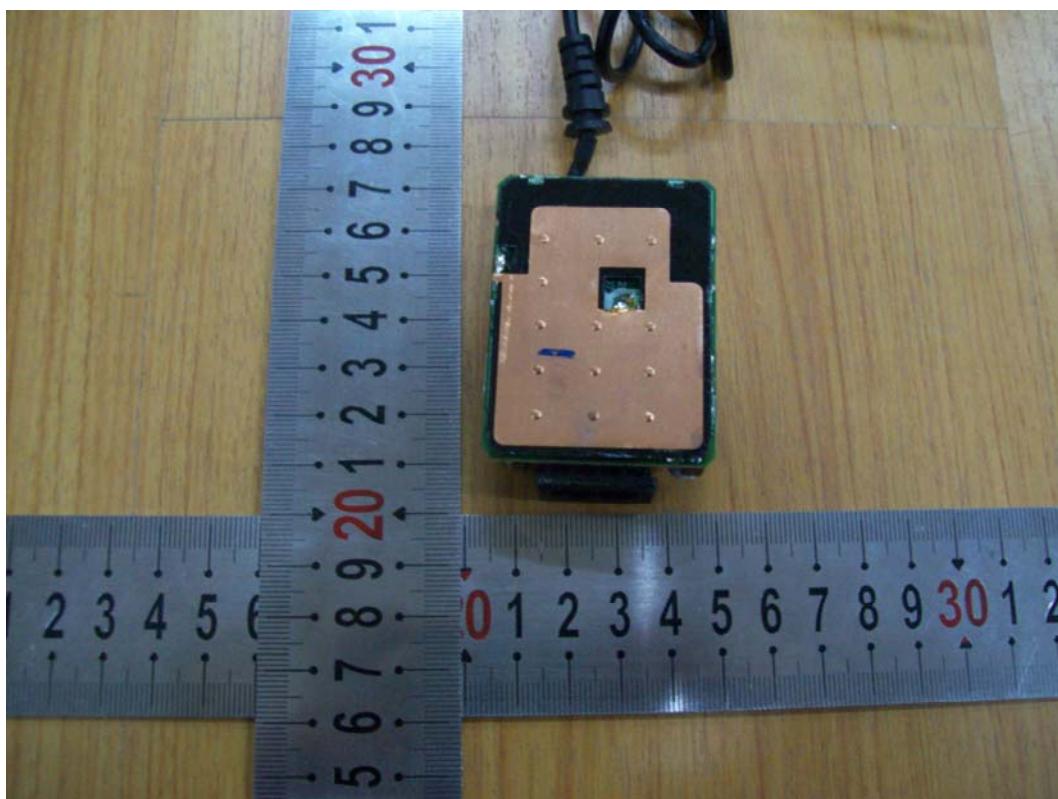
INTERNAL PHOTO OF SAMPLE -6



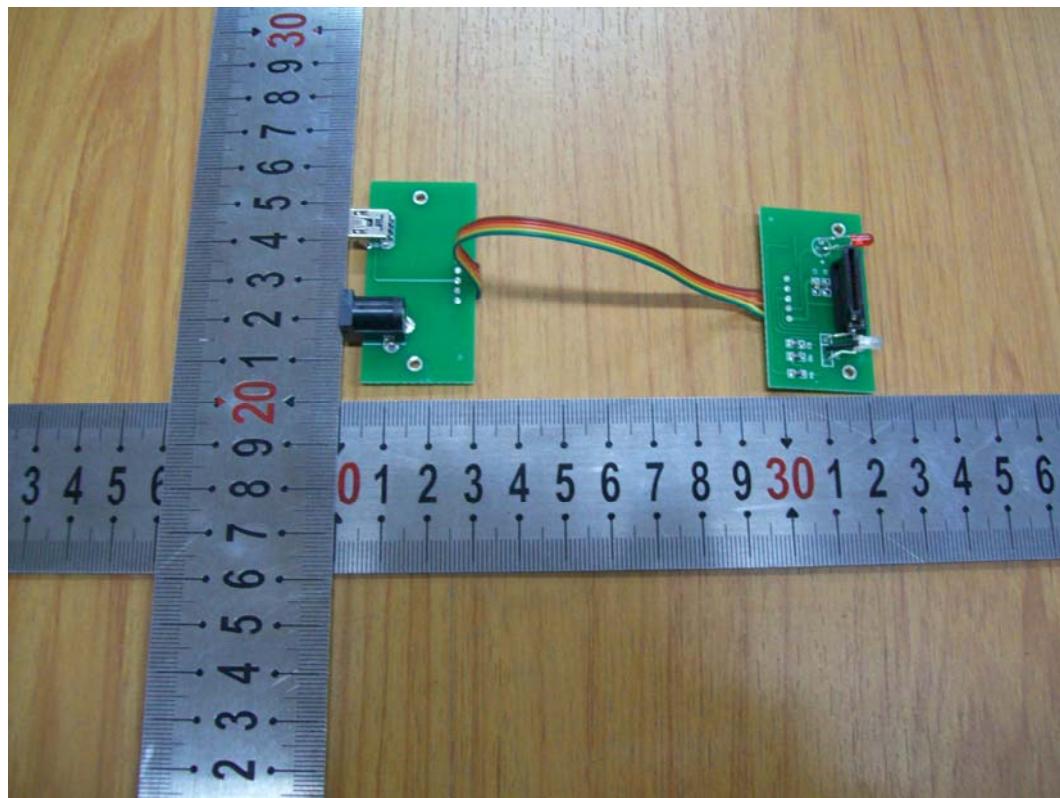
INTERNAL PHOTO OF POWER SUPPLY-1



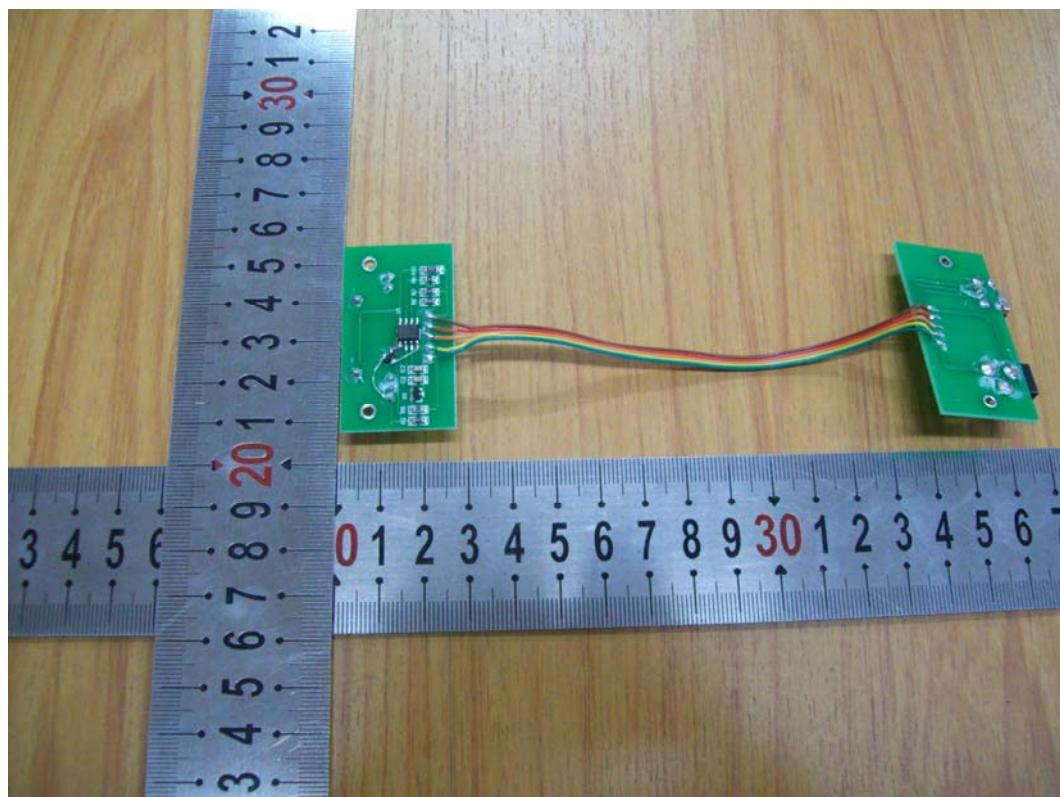
INTERNAL PHOTO OF POWER SUPPLY-2



INTERNAL PHOTO OF POWER SUPPLY SOCKET-1



INTERNAL PHOTO OF POWER SUPPLY SOCKET-2



-----END OF REPORT-----