

TESTING CERTIFICATE



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Certificate No.:
CTK-2015-00237
Page (1) / (30) Pages

1. Client

- Name : Cresyn Co., Ltd.
- Address : 5 Gangnam-daero 107-gil, Seocho-gu, Seoul, Korea
- Date of Receipt : 2015-02-02

2. Manufacturer

- Name : Cresyn Co., Ltd.
- Address : 5 Gangnam-daero 107-gil, Seocho-gu, Seoul, Korea

3. Use of Report : For FCC certification

4. Test Sample / Model: Neck Band Bluetooth Noise cancelling Earphones / BT 100 NC

5. Date of Test : 2015-02-05 to 2015-02-06

6. Test Standard(method) used : FCC Part 15 Subpart B

7. Testing Environment: refer to 10 pages to 15 pages

8. Test Results : refer to 10 pages to 15 pages



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by	Approved by
	Jang Bongjun: (Signature) EMC Test Engineer	Park Young-joon: (Signature) Technical Manager

2015-02-26

Republic of KOREA **CTK Co., Ltd.**



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Certificate No.:
CTK-2015-00237
Page (2) / (30) Pages

REPORT REVISION HISTORY

Date	Revision	Page No
2015-02-26	Issued (CTK-2015-00237)	All

This report shall not be reproduced except in full, without the written approval of CTK Co., Ltd. This document may be altered or revised by CTK Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by CTK Co., Ltd. will constitute fraud and shall nullify the document.

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
1.0 General Product Description	4
1.1 Model Differences	4
1.2 Device Modifications	4
1.3 EUT Configuration(s)	5
1.4 Test Software	5
1.5 EUT Operating Mode(s)	5
1.6 Configuration	6
1.7 Calibration Details of Equipment Used for Measurement	7
1.8 Test Facility	7
1.9 Measurement Procedure	7
1.10 Laboratory Accreditations and Listings	8
1.11 Measurement Uncertainty	8
2.0 EMC Test Regulations/Standards	9
3.0 Results of Individual Test	10
3.1 Conducted Voltage Emissions of Mains ports	10
3.2 Radiated Electric Field Emissions (Below 1 GHz)	15
3.3 Radiated Electric Field Emissions (Above 1 GHz)	18
APPENDIX A - Test Setup Photos and Configuration	19
Conducted Voltage Emissions of Mains Ports	20
Radiated Electric Field Emissions (Below 1 GHz)	21
Radiated Electric Field Emissions (Above 1 GHz)	23
APPENDIX B - EUT Photographs	24
EUT External Photographs	25
EUT Internal Photographs	26
PCB	27

 CTK Co., Ltd. The Prime Leader of Global Regulatory Certification	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Certificate No.: CTK-2015-00237 Page (4) / (30) Pages	
---	---	---	--

1.0 General Product Description

No.	ITEM	APPLICATION
1	Test Sample	Neck Band Bluetooth Noise cancelling Earphones
2	Model	BT 100 NC
3	Variant Model	-
4	Dimensions (W x D)	143.0 mm × 173.1 mm
5	Mobility	☐ Table-top ☐ Floor-standing ☐ Built-in ☒ Portable
6	Maximum Clock Frequency	26 MHz
7	Electrical Ratings	EUT
		Input: DC 5 V (USB port of Notebook Computer)
		Output: -
		Battery
8	Test Voltage / Frequency	Voltage: AC 120 V (Mains of Notebook Computer)
		Frequency: 60 Hz

1.1 Model Differences

Not applicable

1.2 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.3 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

☒ Peripheral Devices

[Charging mode through Notebook Computer]

Device	Model No.	Serial No.	Manufacturer
Notebook Computer	Satellite A100	-	INVENTEC CORPORATION
AC/DC ADAPTOR	SADP-75PB B	0639 BF 0182584	DELTA ELECTRONICS (JIANG SU), LTD

[MP3 Play mode]

Device	Model No.	Serial No.	Manufacturer
Digital Audio Player	N11MT	-	iriver

☒ Cable Description

[Charging mode through Notebook Computer]

No.	From		To		Type of Cable		
	Device	I/O Port	Device	I/O Port	Length (m)	Shielded or Unshielded	Ferrite Core [Y/N]
1	EUT	Micro USB	Notebook Computer	USB	0.5	S	N
2	Notebook Computer	DC IN	AC/DC ADAPTOR	DC OUT	1.5	U	Y
3	AC/DC ADAPTOR	AC Power	AC Mains	-	1.8	U	N

[MP3 Play mode]

No.	From		To		Type of Cable		
	Device	I/O Port	Device	I/O Port	Length (m)	Shielded or Unshielded	Ferrite Core [Y/N]
1	EUT	Micro USB	Digital Audio Player	3.5 Pi	1.0	S	N

* Shielded or Unshielded : Unshielded=U, Shielded=S

1.4 Test Software

- ☐ EMC Test V 1.0
☐ Display Test Patterns – V1.5
☐ Ping.exe
☒ Not applicable

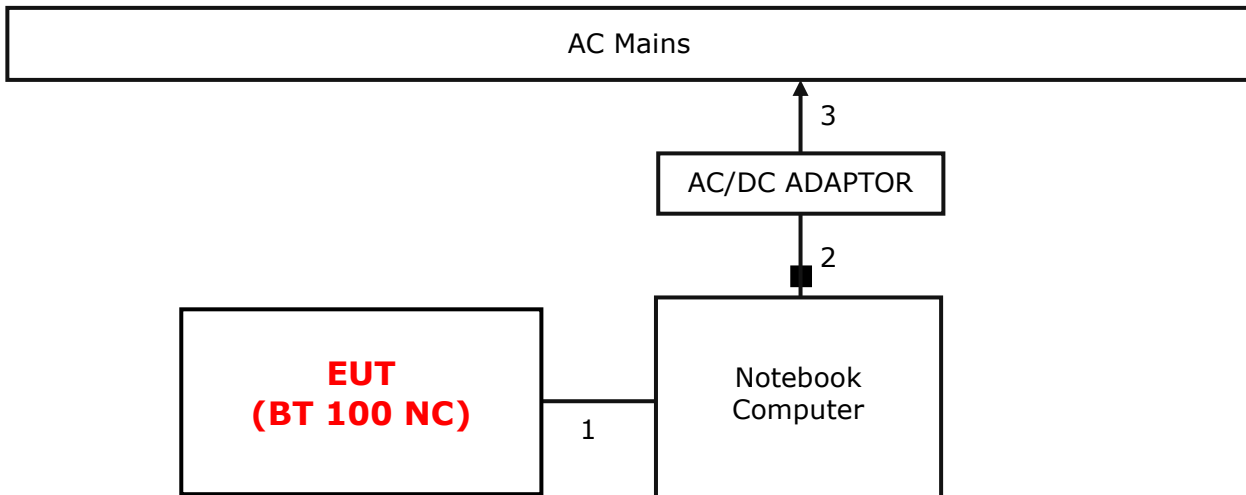
1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

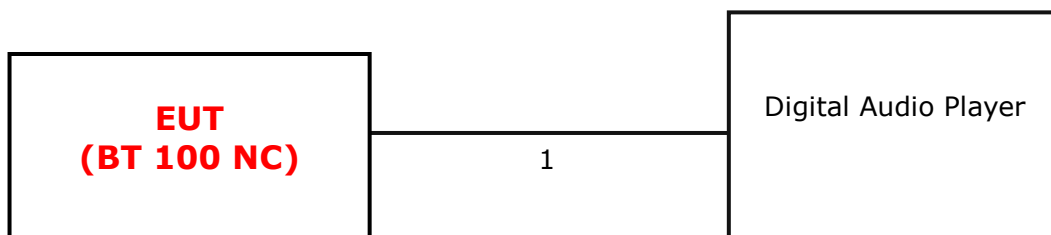
- ☒ MP3 Play mode
☒ Charging mode through Notebook Computer

1.6 Configuration

[Charging mode through Notebook Computer]



[MP3 Play mode]



 CTK Co., Ltd. The Prime Leader of Global Regulatory Certification	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Certificate No.: CTK-2015-00237 Page (7) / (30) Pages	
---	---	---	--

1.7 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.8 Test Facility

The measurement facility is located at (Ho-dong) 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.9 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested.

Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)

Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed Semi-Anechoic Chamber or anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed Semi-Anechoic Chamber.

Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

* Measurement procedures was In accordance with ANSI C63.4-2009 7.3.3, 7.3.4, 8.3.1.1, 8.3.1.2, 8.3.2.1, 8.3.2.2

 CTK Co., Ltd. The Prime Leader of Global Regulatory Certification	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Certificate No.: CTK-2015-00237 Page (8) / (30) Pages	
---	---	---	--

1.10 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Registration Number	Logo
USA	FCC	FCC Part 15 & 18 EMI (Electromagnetic Interference / Emission)	805871	
JAPAN	VCCI	VCCI V-3 EMI (Electromagnetic Interference / Emission)	C-986 T-1843 R-3627 G-387	
KOREA	MSIP	EMI (Electromagnetic Interference / Emission) EMS (Electromagnetic Susceptibility / Immunity)	KR0025	

1.11 Measurement Uncertainty

Compliance of the product is based on the measured value.

However, the measurement uncertainty is included for information purposes.

The measurement uncertainties given below are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Measurement Type	Frequency Range	Expanded Uncertainty
Conducted Emission	9 kHz to 150 kHz	2.78 dB (C.L.: Approx. 95 %, $k=2$)
Conducted Emission	150 kHz to 30 MHz	2.70 dB (C.L.: Approx. 95 %, $k=2$)
Disturbance Power	30 MHz to 300 MHz	3.74 dB (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	30 MHz to 1000 MHz	3.66 dB (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	1 GHz Above	4.16 dB (C.L.: Approx. 95 %, $k=2$)

 CTK Co., Ltd. The Prime Leader of Global Regulatory Certification	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Certificate No.: CTK-2015-00237 Page (9) / (30) Pages	
---	---	---	--

2.0 EMC Test Regulations/Standards

The tests were performed according to following regulations:

Applied standard	Title	Applied	Test Result
FCC Part 15 Subpart B ☐ Class A ☒ Class B	Conducted Voltage Emissions	☒	☒ MET ☐ NOT MET
	Radiated Electric Field Emissions	☒	☒ MET ☐ NOT MET

3.0 Results of Individual Test

3.1 Conducted Voltage Emissions of Mains ports

Test Date

2015-02-05

Test Location

Shielded Room

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESCI3	Rohde & Schwarz	100032	2016-02-02	☐
LISN	ENV216	Rohde & Schwarz	101235	2015-07-30	☐
LISN	ENV216	Rohde & Schwarz	101236	2015-07-30	☐
EMI Test Receiver	ESR7	Rohde & Schwarz	101088	2015-07-29	☐
LISN	ENV216	Rohde & Schwarz	101151	2015-11-07	☐
LISN	ESH3-Z5	Rohde & Schwarz	100207	2015-11-07	☐
EMI Test Receiver	ESCI7	Rohde & Schwarz	100816	2015-12-05	☒
LISN	ENV216	Rohde & Schwarz	101760	2016-02-02	☒
LISN	NNLK 8121	SCHWARZBECK	8121-644	2015-08-21	☐
LISN	ENV216	Rohde & Schwarz	101150	2016-02-02	☐

Test Software

ESCI7, ESCI3 : EMC32 Ver. 8.50.0
ESR7 : EMC32 Ver. 8.53.0

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Setting

IF Band Width: 9 kHz

Climate Condition

Temperature: (23 ± 1) °C
Relative Humidity: (39 ± 1) %
Atmospheric Pressure: 99 kPa

Test Result

The requirements are: ☒ MET ☐ NOT MET

[Charging mode through Notebook Computer]

Frequency (MHz)	Measured Data (dBμV)	Margin (dB)	Remark
1.545 000	29.9	16.1	CAverage

The Result is calculated by using the following formula;

* Result = Limit – Margin (Result included the correction factor)

* Correction factor = Cable Loss + Insertion loss of LISN

Test Data

[Charging mode through Notebook Computer] [Line: L1]

Test

1 / 2

Test Report

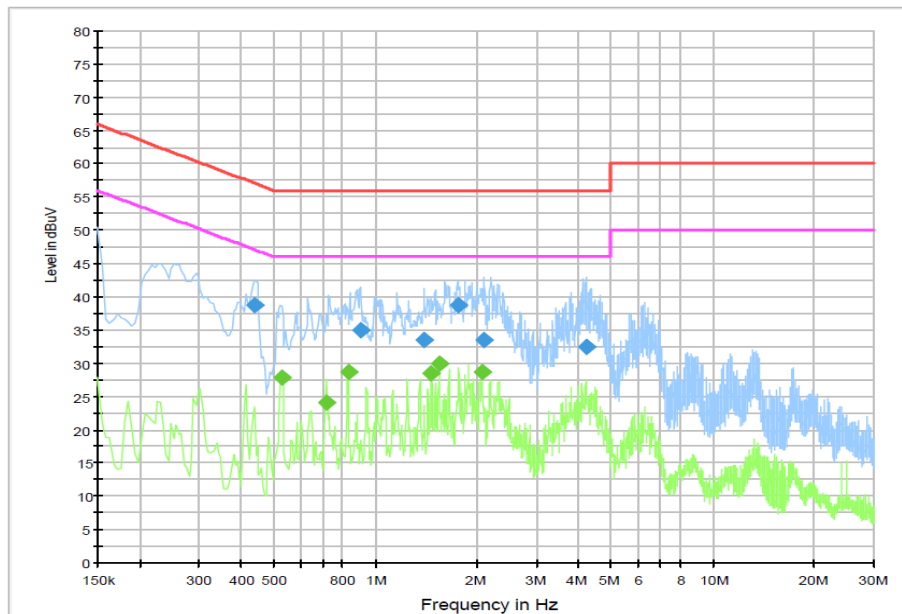
Common Information

Test Model Name: BT 100 NC
Test Mode: Notebook Charging Mode
Manufacturer: Cresyn Co., Ltd.
Tester: JANG, BONG JUN

Hardware Setup: EMI conducted\Voltage with ENV216_FO(101760) - [EMI conducted]

Subrange 1
Frequency Range: 150 kHz - 30 MHz
Receiver: ESCI 7 [ESCI 7]
@ GPIB0 (ADR 23), SN 100816/007, FW 4.42
Signal Path: ESCI 7-ENV216 FO(101760)
Correction Table: 3-2 CE Cable Loss
LISN: ENV216 FO(101760)
Correction Table (Line 0): ENV216_FO_N(101760)
Correction Table (Line 1): ENV216_FO_L1(101760)

CISPR 22 Class B_L1



2/5/2015

1:39:35



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Certificate No.:
CTK-2015-00237
Page (12) / (30) Pages

Test

2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.438000	38.8	1000.0	9.000	On	L1	9.9	18.3	57.1
0.901500	34.9	1000.0	9.000	On	L1	9.8	21.1	56.0
1.392000	33.5	1000.0	9.000	On	L1	9.7	22.5	56.0
1.756500	38.8	1000.0	9.000	On	L1	9.7	17.2	56.0
2.094000	33.6	1000.0	9.000	On	L1	9.8	22.4	56.0
4.200000	32.4	1000.0	9.000	On	L1	9.8	23.6	56.0

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.528000	27.9	1000.0	9.000	On	L1	9.9	18.1	46.0
0.712500	24.2	1000.0	9.000	On	L1	9.8	21.8	46.0
0.829500	28.6	1000.0	9.000	On	L1	9.8	17.4	46.0
1.468500	28.5	1000.0	9.000	On	L1	9.7	17.5	46.0
1.545000	29.9	1000.0	9.000	On	L1	9.7	16.1	46.0
2.071500	28.7	1000.0	9.000	On	L1	9.8	17.3	46.0

2/5/2015

1:39:35

[Charging mode through Notebook Computer] [Line : Neutral]

Test

1 / 2

Test Report

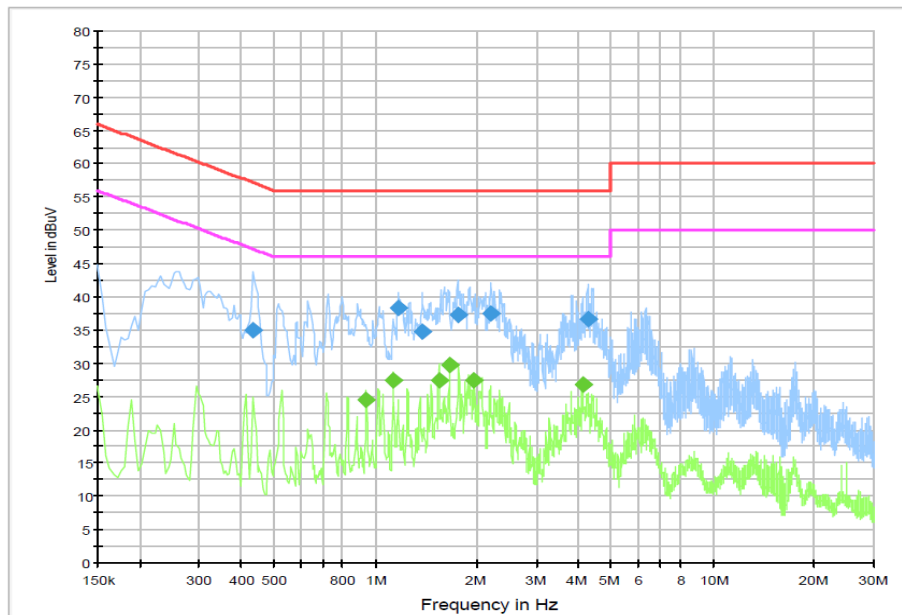
Common Information

Test Model Name: BT 100 NC
Test Mode: Notebook Charging Mode
Manufacturer: Cresyn Co., Ltd.
Tester: JANG, BONG JUN

Hardware Setup: EMI conducted\Voltage with ENV216_FO(101760) - [EMI conducted]

Subrange 1
Frequency Range: 150 kHz - 30 MHz
Receiver: ESCI 7 [ESCI 7]
@ GPIB0 (ADR 23), SN 100816/007, FW 4.42
Signal Path: ESCI 7-ENV216 FO(101760)
Correction Table: 3-2 CE Cable Loss
ENV216 FO(101760)
LISN: Correction Table (Line 0): ENV216_FO_N(101760)
Correction Table (Line 1): ENV216_FO_L1(101760)

CISPR 22 Class B_N



2/5/2015

1:49:06



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Certificate No.:
CTK-2015-00237
Page (14) / (30) Pages

Test

2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.433500	35.1	1000.0	9.000	On	N	9.9	22.1	57.2
1.171500	38.2	1000.0	9.000	On	N	9.7	17.8	56.0
1.378500	34.7	1000.0	9.000	On	N	9.7	21.3	56.0
1.752000	37.4	1000.0	9.000	On	N	9.7	18.6	56.0
2.193000	37.5	1000.0	9.000	On	N	9.8	18.5	56.0
4.254000	36.6	1000.0	9.000	On	N	9.7	19.4	56.0

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.942000	24.6	1000.0	9.000	On	N	9.7	21.4	46.0
1.131000	27.5	1000.0	9.000	On	N	9.7	18.5	46.0
1.540500	27.3	1000.0	9.000	On	N	9.7	18.7	46.0
1.657500	29.7	1000.0	9.000	On	N	9.7	16.3	46.0
1.954500	27.5	1000.0	9.000	On	N	9.7	18.5	46.0
4.105500	26.7	1000.0	9.000	On	N	9.7	19.3	46.0

2/5/2015

1:49:06

 CTK Co., Ltd. The Prime Leader of Global Regulatory Certification	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Certificate No.: CTK-2015-00237 Page (15) / (30) Pages	
---	--	---	--

3.2 Radiated Electric Field Emissions (Below 1 GHz)

Test Date

2015-02-06

Test Location

10 m SAC (test distance : ☐ 10 m, ☒ 3 m)

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100814	2015-12-05	☒
Bilog Antenna	CBL6111C	Schaffner	2551	2016-05-08	☒
6dB Attenuator	DNF	Rohde & Schwarz	272.4110.50-2	2015-11-07	☒
Amplifier	310	Sonoma Instrument Co.	291721	2016-02-02	☒

Test Software

TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Setting

IF Band Width: 120 kHz

Climate Condition

Temperature: (22 ± 1) °C

Relative Humidity: (40 ± 1) %

Atmospheric Pressure: 99 kPa

Test Result

The requirements are: ☒ MET ☐ NOT MET

[Charging mode through Notebook Computer]

Frequency (MHz)	Measured Data (dBμV/m)	Margin (dB)	Remark
826.370	39.6	6.4	Quasi-peak

[MP3 Play mode]

Frequency (MHz)	Measured Data (dBμV/m)	Margin (dB)	Remark
825.521	34.0	12.0	Quasi-peak

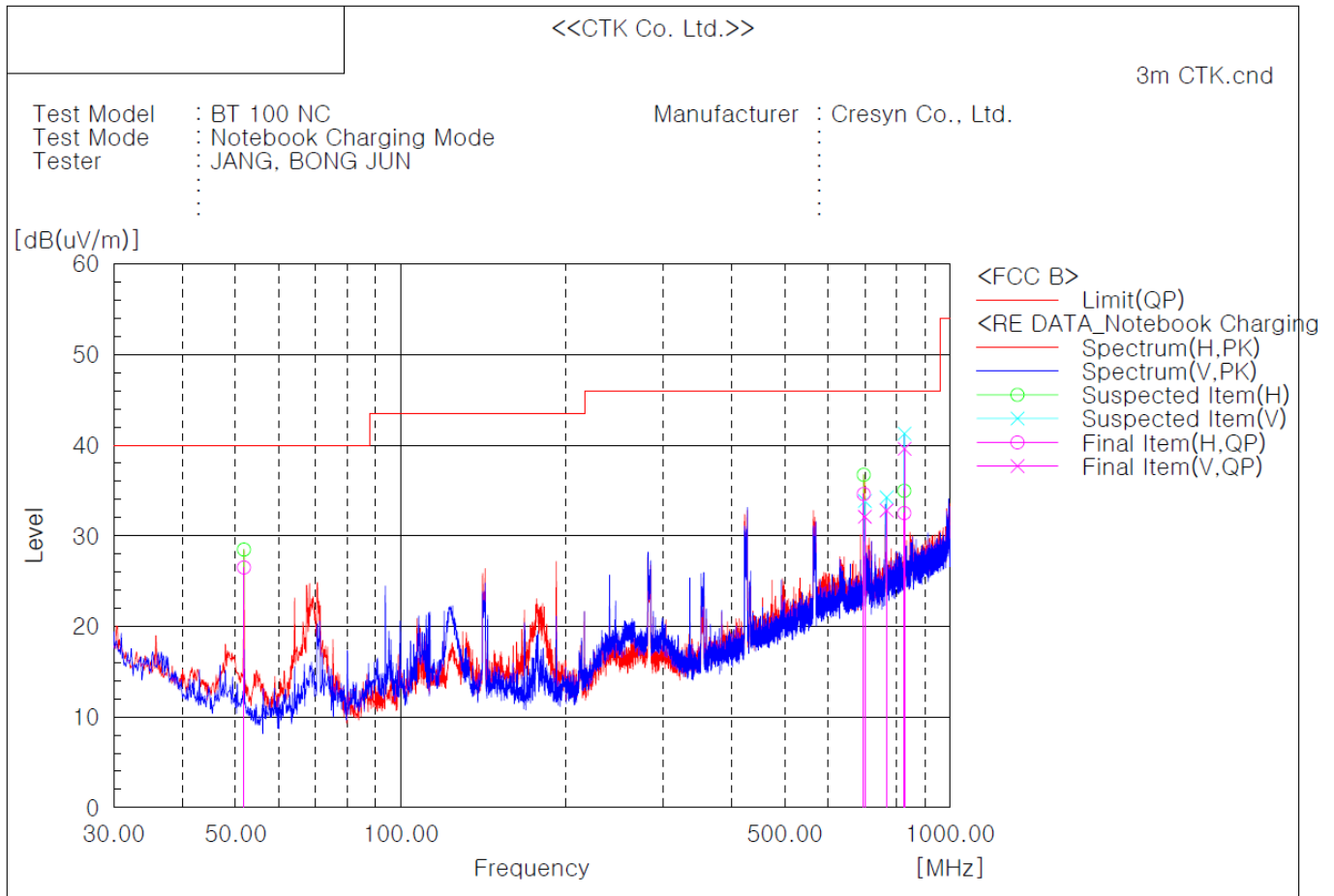
The Result is calculated by using the following formula;

* Result = Reading + Correction factor

* Correction factor = Antenna Factor + Cable Loss + 6 dB attenuator – Amp Gain

Test Data

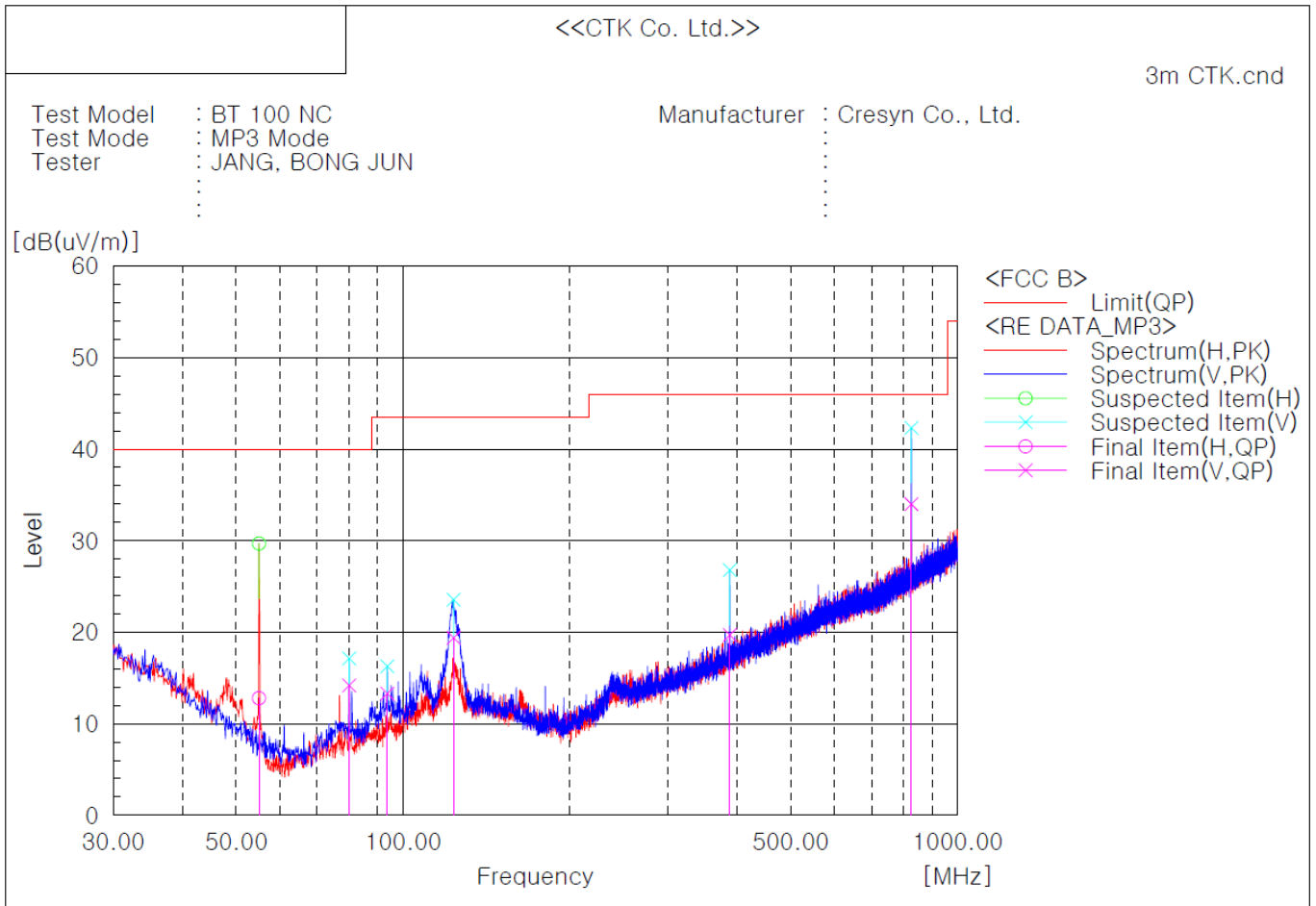
[Charging mode through Notebook Computer]



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	51.825	H	42.5	-16.0	26.5	40.0	13.5	308.0	238.0
2	696.633	H	34.2	0.4	34.6	46.0	11.4	308.0	89.0
3	699.906	V	31.7	0.4	32.1	46.0	13.9	191.0	238.0
4	766.594	V	31.0	1.8	32.8	46.0	13.2	191.0	238.0
5	825.400	H	29.4	3.1	32.5	46.0	13.5	400.0	0.0
6	826.370	V	36.5	3.1	39.6	46.0	6.4	191.0	52.0

[MP3 Play mode]



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	54.978	H	30.2	-17.4	12.8	40.0	27.2	308.0	238.0
2	79.955	V	30.8	-16.6	14.2	40.0	25.8	100.0	235.0
3	93.656	V	28.1	-14.8	13.3	43.5	30.2	100.0	273.0
4	123.363	V	31.5	-12.1	19.4	43.5	24.1	100.0	0.0
5	388.536	V	25.8	-6.1	19.7	46.0	26.3	100.0	347.0
6	825.521	V	30.9	3.1	34.0	46.0	12.0	100.0	49.0

 CTK Co., Ltd. The Prime Leader of Global Regulatory Certification	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Certificate No.: CTK-2015-00237 Page (18) / (30) Pages	
---	---	--	--

3.3 Radiated Electric Field Emissions (Above 1 GHz)

Test Date

Not Applicable

Test Location

3 m SAC

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100816	2015-12-05	☐
Double Ridged Guide Antenna	3117	ETS-Lindgren	154525	2015-07-03	☐
Preamplifier	8449B	Agilent Technologies	3008A02307	2015-12-26	☐

Test Software

TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Setting

IF Band Width: 1 MHz

Climate Condition

Temperature:

Relative Humidity:

Atmospheric Pressure:

Test Result

The requirements are: ☐ MET ☐ NOT MET

Frequency (MHz)	Measured Data (dBμV/m)	Margin (dB)	Remark

The Result is calculated by using the following formula;

* Result = Reading + Correction factor

* Correction factor = Antenna Factor + Cable Loss- Amp Gain

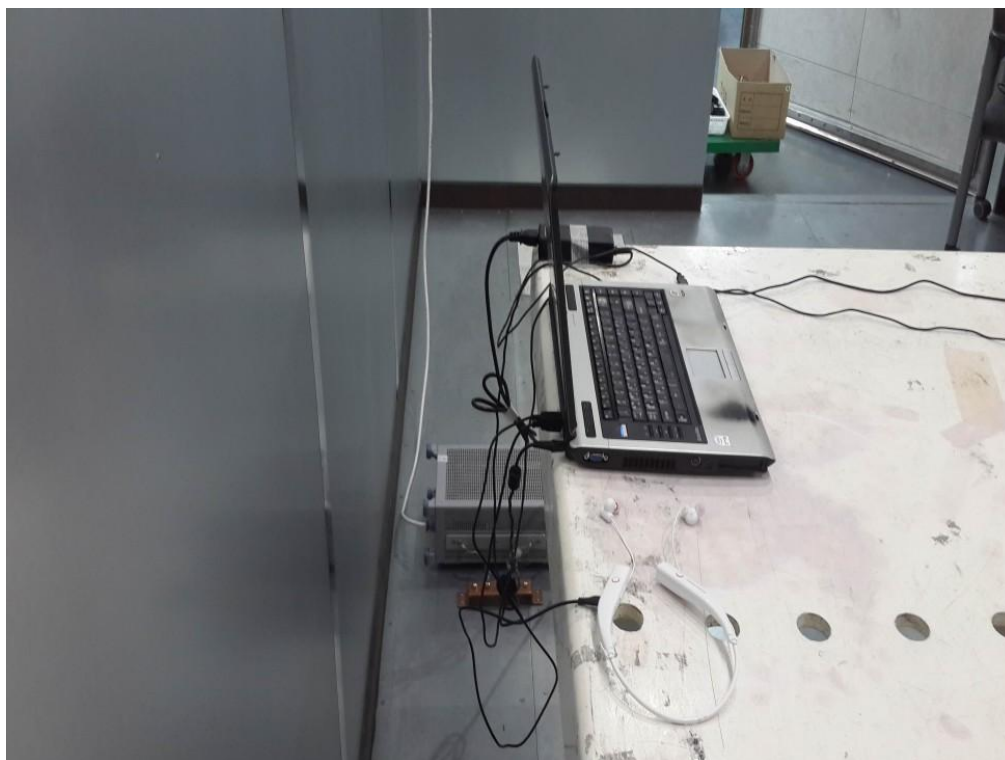
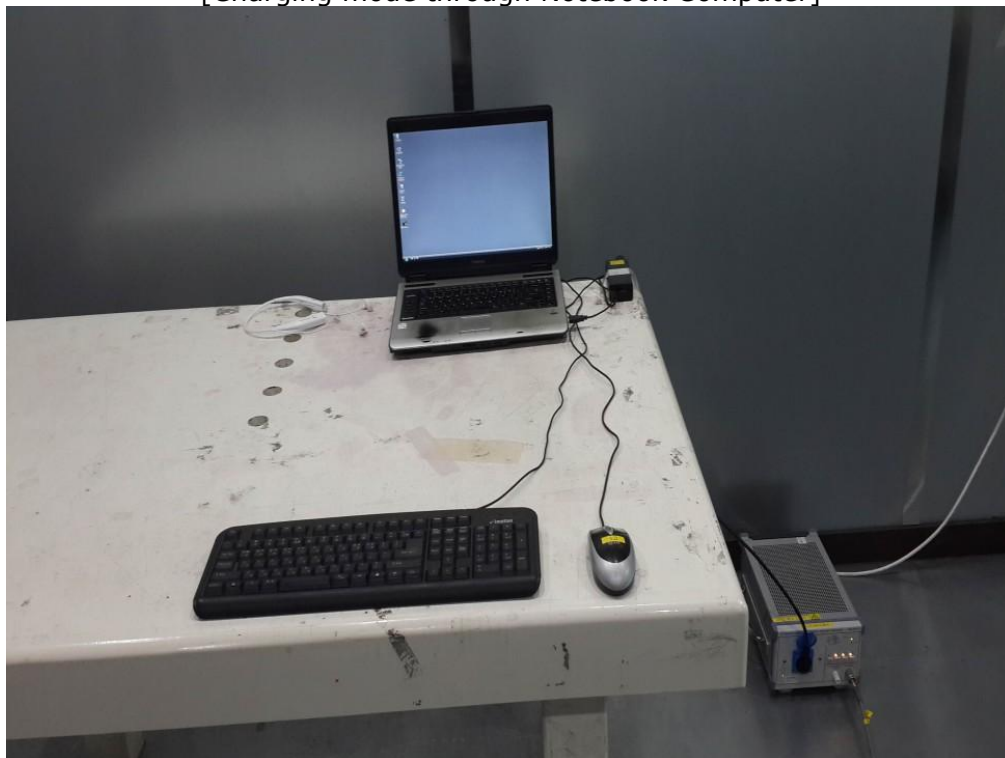
Test Data

	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Certificate No.: CTK-2015-00237 Page (19) / (30) Pages	
---	---	--	--

APPENDIX A - Test Setup Photos and Configuration

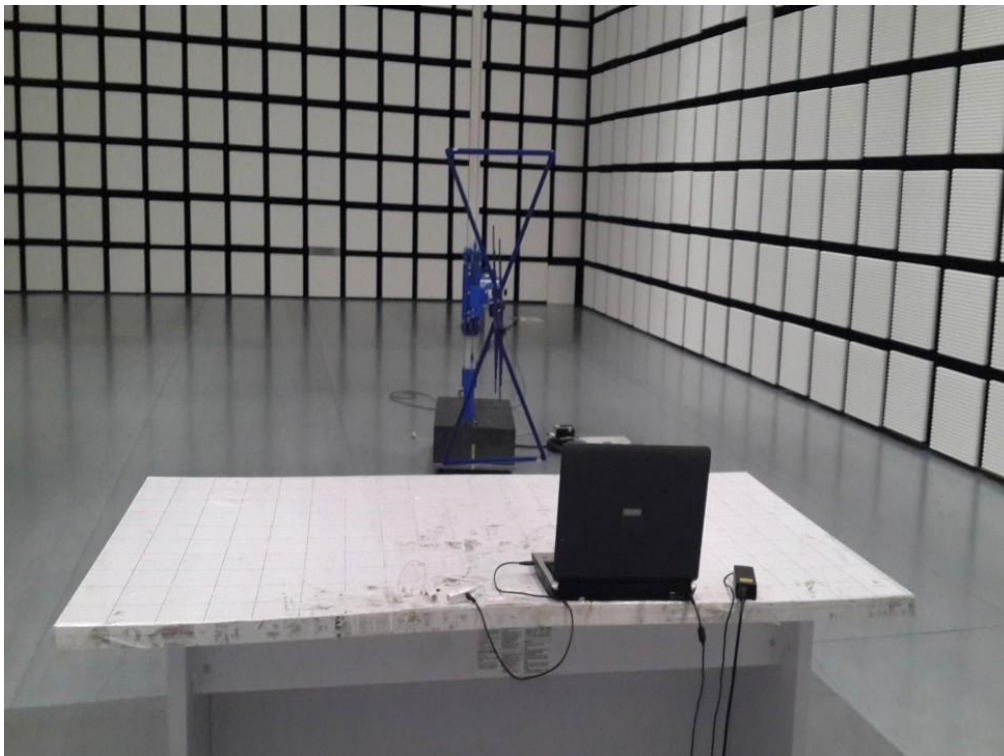
Conducted Voltage Emissions of Mains Ports

[Charging mode through Notebook Computer]



Radiated Electric Field Emissions (Below 1 GHz)

[Charging mode through Notebook Computer]



[MP3 Play mode]



 CTK Co., Ltd. The Prime Leader of Global Regulatory Certification	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Certificate No.: CTK-2015-00237 Page (23) / (30) Pages	
---	--	---	--

Radiated Electric Field Emissions (Above 1 GHz)

Not Applicable

	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Certificate No.: CTK-2015-00237 Page (24) / (30) Pages	
---	---	--	--

APPENDIX B – EUT Photographs

EUT External Photographs



EUT Internal Photographs



PCB

