

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

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CERTIFICATION

Manufacture;
HANTEL CO., LTD.

#513-15, Suntec City, Sangdaewon-Dong, Jungwon-Gu,
Seongnam-Si, Kyunggi-Do 462-806, Korea

KONINE FRN : 0007460181

Date of Issue : August 12, 2005

Test Report No.: HCT-F05-0804

Test Site: HYUNDAI CALIBRATION & CERTIFICATION
TECHNOLOGIES CO., LTD.

HCT FRN : 0005-8664-21

FCC ID :

ODGQOOLQEEI

MODEL:

Qoolqee i

Rule Part(s):	Part 15
Equipment Class:	FCC Class B Peripheral Device (JBP)
Standard(s):	FCC Class B: (CISPR 22)
EUT Type:	MP3 Player
Memory:	256, 512MB, 1GB
Model(s):	Qoolqee i
Port/Connector(s):	AUDIO OUT, USB

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



Report prepared by : Ki-Soo Kim

Manager of EMC Tech. Part

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MEASUREMENT REPORT

1. Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

Applicant Name:	HANTEL CO., LTD.
Address:	#513-15,Suntecity,Sangdaewon-Dong,Jungwon-Gu, Seongnam-Si,Kyunggi-Do 462-806,Korea

- **FCC ID : ODGQOOLQEEIII**
- Equipment Class: FCC Class B Peripheral Device (JBP)
- EUT Type: MP3 Player
- Model(s):Qoolqee i
- Memory : 256, 512MB,1GB
- Rule Part(s): FCC Part 15 Subpart B
- Test Procedure(s): ANSI C63.4 (2003)
- Dates of Tests: August 10 ~ August 12, 2005
- Place of Tests: 254-1,MAEKOK-RI,HOBUP-MYUN,ICHON-SI,KYOUNGKI-DO,467-701,KOREA

2. INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2001) was used in determining radiated and conducted emissions emanating from **HANTEL CO., LTD. MP3 Player FCC ID: ODGQOOLQEEI**

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1, MAEKOK-RI, HOBUP-MYUN, ICHON-SI, KYOUNGKI-DO, 467-701, KOREA. The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 23, 2003 (Confirmation Number: EA90661)

3. PRODUCT INFORMATION

3.1 Equipment Description

Equipment Under Test (EUT) is the **HANTEL CO., LTD. (Model : Qoolqee i) ODGQOOLQEEI**

FCC ID: **ODGQOOLQEEI**

Frequency Range :	20Hz ~ 20kHz
Earphone Output :	Left 20mW, Right 20mW (16Ω, Volume Max)
Signal to Noise Ratio :	Over 90dB
Decoding :	MP3 : MPEG 1/2/2.5 layer 3, 8kbps ~ 320kbps, 8kHz ~ 48kHz, VBR WMA : WMA7 WMA, 20kbps~ 192kbps, 8kHz ~ 48kHz WMA9 CBR, 5Kbps mono ~ 320kbps stereo VBR Average 48kbps ~ Average 256kbps (WMA9 Professional, lossless compression Codec- not support Audio Codec) Ogg: q0 ~ q10
Encoding :	MP3 : 32 ~ 128 kbps
Tag Info :	ID3 V1/V2 Tag (Song Title, Artist, Album)
LCD :	128 x 48 Mono STN
Languages :	Korean, English, French, German, Spanish, Danish, Swedish, Italian, Hungarian , Portuguese, Czech, Chinese Simple, Chinese Traditional, Japanese, Russian, Turkish, Dutch.
Play Time :	15hours, approx (128kbps MP3 file Play, Volume: 15, EQ: NOR, Backlight & LED Off)
Dimension :	60x25x25.3mm
Weight :	21.9g (not including AAA battery)
Battery :	1)5V AAA
Operational Temperature Range :	-5°C ~50°C

EMI Suppression Devices:

None

4. Description of Tests(Conducted)

4.1 Powerline Conducted RFI (150kHz- 30MHz)

The power line conducted RFI measurements were performed according to CISPR 22.

The EUT was placed on a non-conducting 1.0 by 1.5 meter table which is 0.8 meters in height and 0.40 meters away from the vertical wall of the shielded enclosure. Power to the EUT is provided through a Rohde & Schwarz 50 Ω / 50 uH Line Impedance Stabilization Network (LISN) and the support equipment through a separate Solar 50 Ω / 50 uH Line- Conducted Test Facility LISN. Sufficient time for the EUT, support equipment, and test equipment were allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME. The spectrum was scanned from 150kHz to 30 MHz. Each maximum EME was remeasured using an EMI receiver. The detector function of the receiver was set to CISPR quasi- peak and average mode with the bandwidth set to 9 kHz. Each emission was maximized consistent with the typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum Diagram emission. Excess cable lengths were bundled at the center with 30- 40cm. in length. The worst-case configuration is noted in the test report and the photographs are attached. Each EME reported was calibrated using the Rohde & Schwarz SMX signal generator and are listed on Table 1. RFI Conducted FCC Class B

RFI CONDUCTED	CISPR 22 CLASS B	
	Limits dB(uV/m)	
Freq. Range	CISPR 22 Quasi-Peak	CISPR 22 Average
150kHz - 0.5MHz	66-56**	56-46**
0.5MHz - 5MHz	56	46
5MHz - 30MHz	60	50
*FCC Class B limits starts from 450kHz		
**Limits decreases linearly with the logarithm of frequency		

Table 1. RFI Conducted Limits

4.2 Description of Tests(Radiated)

Radiated Emissions

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The spectrum was scanned from 30 to 300 MHz using biconical antenna, 300 to 1000 MHz using log- periodic antenna, and above 1 GHz using linearly polarized horn antennas. Final measurements were made outdoors at 10-meter test range using Dipole antennas and EMI receiver. For frequencies above 1 GHz, horn antennas were used. Sufficient time for the EUT, support equipment, and test equipment were allowed in order for them to warm up to their normal operating condition. The EMI receiver detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120 kHz. The EUT, support equipment, and interconnecting cables were arranged to the configuration that produces the maximum EME emission found during preliminary scan. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Horizontal and vertical antenna polarizations were checked. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/ or support equipment, and powering the monitor the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission.

ITE Radiated Limits			
Frequency (MHz)	FCC Limit @ 3m. Quasi-Peak dB[μV/m]	FCC Limit @ 10m.* Quasi – Peak dB [μV/m]	CISPR Limit @ 10m. Quasi-Peak dB [μV/m]
30-88	40.0	29.5	30.0
88-216	43.5	33.0	30.0
216-230	46.0	35.6	30.0
230-960	46.0	35.6	37.0
960-1000	54.0	43.5	37.0
> 1000	54.0	43.5	No Specified Limit
* Limit extrapolated 20 dB/decade			

Table 2. Radiated Class B limits @ 10-meters

5. Support Equipment Used

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
MP3 Player(EUT)	HANTEL CO.,LTD.	QoolqeeI	ODGQOOLQEEI	NOTE BOOK
MOUSE	Microsoft	Intellimouse optical USB And PS/2 compatible	DoC	NOTEBOOK
PRINTER	H/P	C4569A	DoC	NOTEBOOK
NOTEBOOK PC	TOSHIBA	PAS50K-04W007	DoC	EUT
NOTEBOOK PC ADAPTOR	DELTA ELECTRONICS (JIANG SU).LTD	ADP-60RH A	DoC	NOTEBOOK
EARPHONE	-	-	-	EUT

5.1 Cable Description

- DATA UP/DOWN Load Mode

		Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
MP3 Player (EUT)	USB	N	Y	1.0(D)
	Audio out	N	N	0.5(D)
NOTE BOOK	USB (Mouse)	N	Y	1.8(P,D)
	Parallel	N/A	Y	1.8(D)
	DC in	N	N/A	1.8(P)
PRINTER	AC in	N	N/A	1.8(P)

The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

5.2 Noise Suppression Parts on Cable. (I/O CABLE)

- DATA UP/DOWN Load Mode

		Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
MP3 Player (EUT)	USB	N	N/A	N	N/A
	Audio out	N	N/A	Y	N/A
NOTE BOOK	USB (Mouse)	Y	NOTE BOOK END	Y	NOTE BOOK END
	Parallel	N	N/A	Y	BOTH END
	DC in	Y	NOTE BOOK END	N	N/A
PRINTER	AC in	N	N/A	N	N/A

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
1GB	X
512MB	
256MB	

6.2 Radiated Emission Test

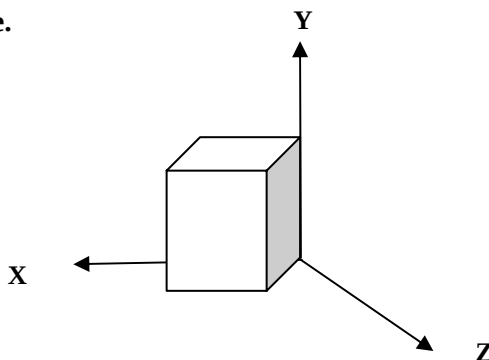
During Preliminary Test, the Following operation mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
1GB	X
512MB	
256MB	

During Preliminary Tests, the following operating conditions were investigated

Axes	The worst operating condition
X	X
Y	
Z	

Note : This transmitter has been investigated with three axes and the reported readings are the worse case.



7. LINE-CONDUCTED TEST DATA

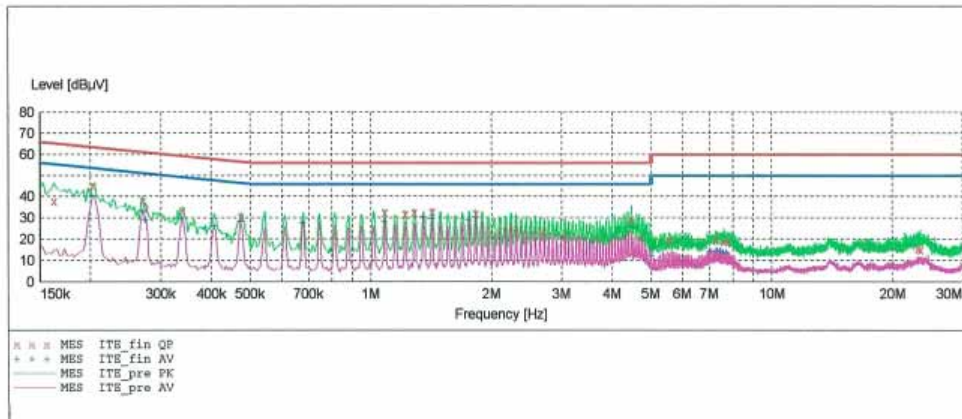
HCT

EMC TEST LAB

EUT: Qoolqee I
Manufacturer: HANTEL
Operating Condition: NORMAL
Test Site: SHIELD ROOM
Operator: KH-SEO
Test Specification: KN 22 CLASS B
Comment: N

SCAN TABLE: "KN 22 CLASS B"

Short Description:			KN22 CLASS B			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "ITE_fin QP"

8/10/2005 11:37AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.162500	38.10	9.9	65	27.2	---	---
0.202500	45.40	9.9	64	18.1	---	---
0.270000	38.00	9.9	61	23.1	---	---
0.275000	34.00	9.9	61	27.0	---	---
0.340000	33.50	9.9	59	25.7	---	---
0.475000	30.60	9.9	56	25.8	---	---
1.085000	32.70	9.9	56	23.3	---	---
1.220000	32.00	10.0	56	24.0	---	---
1.285000	32.60	10.0	56	23.4	---	---
1.425000	33.20	10.0	56	22.8	---	---
1.830000	32.20	10.0	56	23.8	---	---
4.475000	29.50	10.3	56	26.5	---	---
5.560000	19.80	10.5	60	40.2	---	---
7.255000	19.70	10.7	60	40.3	---	---
7.600000	19.20	10.7	60	40.8	---	---
7.800000	18.90	10.8	60	41.1	---	---
23.215000	15.60	10.7	60	44.4	---	---
23.540000	15.30	10.7	60	44.7	---	---

MEASUREMENT RESULT: "ITE_fin AV"

8/10/2005 11:37AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.202500	40.30	9.9	54	13.2	---	---
0.270000	33.00	9.9	51	18.1	---	---
0.275000	28.90	9.9	51	22.1	---	---
0.340000	30.10	9.9	49	19.1	---	---
0.407500	26.00	9.9	48	21.7	---	---
0.475000	28.10	9.9	46	18.3	---	---
0.680000	27.80	9.9	46	18.2	---	---
1.085000	28.40	9.9	46	17.6	---	---
1.355000	30.40	10.0	46	15.6	---	---
1.425000	29.90	10.0	46	16.1	---	---
1.760000	29.10	10.0	46	16.9	---	---
1.830000	30.60	10.0	46	15.4	---	---
5.015000	12.10	10.4	50	37.9	---	---
7.050000	14.30	10.7	50	35.7	---	---
7.320000	14.80	10.7	50	35.2	---	---
7.455000	14.50	10.7	50	35.5	---	---
7.590000	13.80	10.7	50	36.2	---	---
7.725000	13.70	10.8	50	36.3	---	---

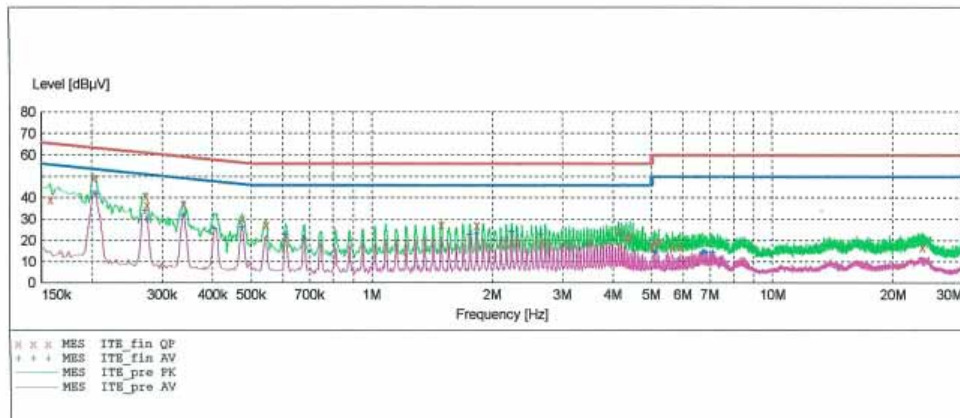
HCT

EMC TEST LAB

EUT: Qoolqee I
Manufacturer: HANTEL
Operating Condition: NORMAL
Test Site: SHIELD ROOM
Operator: KH-SEO
Test Specification: KN 22 CLASS B
Comment: H

SCAN TABLE: "KN 22 CLASS B"

Short Description:			KN22 CLASS B			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "ITE_fin QP"

8/10/2005 11:32AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.157500	39.50	9.9	66	26.1	---	---
0.202500	49.40	9.9	64	14.1	---	---
0.272500	40.90	9.9	61	20.1	---	---
0.275000	37.00	9.9	61	24.0	---	---
0.340000	37.20	9.9	59	22.0	---	---
0.475000	30.40	9.9	56	26.1	---	---
0.545000	27.50	9.9	56	28.5	---	---
1.490000	27.50	10.0	56	28.5	---	---
1.830000	27.20	10.0	56	28.8	---	---
4.130000	24.80	10.3	56	31.2	---	---
4.330000	21.80	10.3	56	34.2	---	---
4.410000	22.20	10.3	56	33.8	---	---
5.015000	17.70	10.4	60	42.3	---	---
5.085000	19.30	10.4	60	40.7	---	---
5.210000	19.80	10.4	60	40.2	---	---
5.630000	17.10	10.5	60	42.9	---	---
5.885000	17.30	10.6	60	42.7	---	---
23.735000	17.00	10.7	60	43.0	---	---

MEASUREMENT RESULT: "ITE_fin AV"

8/10/2005 11:32AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.205000	41.70	9.9	53	11.7	---	---
0.272500	34.30	9.9	51	16.8	---	---
0.275000	30.00	9.9	51	21.0	---	---
0.340000	31.90	9.9	49	17.3	---	---
0.405000	25.80	9.9	48	21.9	---	---
0.475000	26.50	9.9	46	19.9	---	---
0.610000	23.20	9.9	46	22.8	---	---
0.680000	21.10	9.9	46	24.9	---	---
1.760000	23.10	10.0	46	22.9	---	---
1.830000	23.30	10.0	46	22.7	---	---
2.235000	24.20	10.1	46	21.8	---	---
2.640000	23.00	10.1	46	23.0	---	---
5.080000	14.40	10.4	50	35.6	---	---
5.145000	14.80	10.4	50	35.2	---	---
6.700000	14.50	10.6	50	35.5	---	---
6.770000	15.00	10.6	50	35.0	---	---
6.840000	14.30	10.6	50	35.7	---	---
7.110000	14.50	10.7	50	35.5	---	---

NOTES:

1. All modes(256, 512MB,1GB) of operation were investigated and the worst-case emissions are reported.
2. The CISPR RFI conducted limits are listed on Table 1 (Page 6).
3. Line H = Phase Line N = Neutral

** Measurements using CISPR quasi-peak mode.

8. RADIATED TEST DATA

Frequency MHz	Reading dBuV	Ant. Factor dB/m	Cable Loss Db	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
77.4	12.9	8.3	1.9	V	23.1	30.0	6.9
91.5	15.3	7.8	2.1	V	25.2	30.0	4.8
142.5	10.9	12.8	2.6	H	26.3	30.0	3.7
166.3	8.9	12.4	2.9	V	24.2	30.0	5.8
195.4	12.1	10.0	3.2	H	25.3	30.0	4.7
200.4	11.9	9.6	3.2	V	24.7	30.0	5.3
260.6	10.0	11.6	3.7	H	25.3	37.0	11.7
325.7	11.8	13.5	4.1	V	29.4	37.0	7.6
390.9	11.9	14.8	4.5	V	31.2	37.0	5.8
456.1	10.6	16.9	4.9	V	32.4	37.0	4.6
500.2	9.8	16.9	5.1	V	31.8	37.0	5.2
600.3	8.5	19.3	5.6	V	33.4	37.0	3.6

Radiated Measurements at 10-meters.

1GB

NOTES:

1. All modes(256, 512MB,1GB) of operation were investigated, and the worst-case emissions are reported.
2. The radiated limits are listed on Table 2 (Page 7).

** AFCL = Antenna Factor (Roberts dipole) and Cable Loss .

*** Measurements using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is used using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

9. Sample Calculations

$$\text{dB } \mu\text{V} = 20 \log_{10} (\text{mV/m})$$

9.1 Example 1:

@ 1.09 MHz

Class B limit	= 56.0 dB μV
Reading	= 38.9 dB μV (calibrated level)

Margin	= 38.9 – 56 = -17.1 dB μV
	= 17.1 dB below limit

9.2 Example 2:

@ 591.6 MHz

Class B limit	= 37 dB $\mu\text{V/m}$
Reading	= 11.9 dB $\mu\text{V/m}$ (calibrated level)
Antenna Factor + Cable Loss	= 19.3 dB
Total	= 31.2 dB $\mu\text{V/m}$

Margin	= 31.2 - 37.0 = - 5.8
	= 5.8 dB below limit

10. Test Equipment

<u>Type</u>	<u>Manufacture</u>	<u>Model Number</u>	<u>CAL Due Date</u>
EMI Test Receiver	Rohde & Schwarz	ESCI40	2005.11.16
EMI Test Receiver	Rohde & Schwarz	ESVS30	2006.07.01
EMI Test Receiver	Rohde & Schwarz	ESCI	2005.09.13
LISN	Rohde & Schwarz	ESH2-Z5	2006.04.26
LISN	Rohde & Schwarz	ESH3-Z2	2005.11.16
TRILOG Antenna	Schwarzbeck	9160	2006.03.31
Antenna Position Tower	HD	MA240	N/A
Turn Table	EMCO	1050	N/A
Power Analyzer	Voltech	PM 3300	2006.03.22
Reference Network Impedance	Voltech	IEC 555	N/A
AC Power Source	PACIFIC	Magnetic Module	N/A
AC Power Source	PACIFIC	360-AMX	2005.11.25
Controller	HD GmbH	HD 100	N/A
SlideBar	HD GmbH	KMS 560	N/A
PULSE LIMITER	Rohde & Schwarz	ESH3-Z2	2005.11.16

11. Test Software Used

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

NOTE: This is a sample of the basic program used during the test. However, during testing, a different software program may be used; whichever determines the worst-case condition. In addition, the program used also depends on the number and type of devices being tested.

12. Conclusion

The data collected shows that the **HANTEL CO., LTD. MP3 Player FCC ID:ODGQOOLQEEI** complies with §15.107 and §15.109 of the FCC Rules.