HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

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SAN 136-1, AMI-RI , BUBAL-EUP, ICHEON-SI, KYOUNKI-DO, 467-701, KOREA
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CERTIFICATION

Manufacture;
TELITECH CO., LTD.

70-58 SONGJEONG-DONG HUNGDUK-KU,
CHEONGJU, CHUNGBUK KOREA

TELITECH FRN : 0012-3443-62

Date of Issue: December 23, 2004

Test Report No.: HCT-F04-1213

Test Site: HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD.
HCT FRN : 0005-8664-21

FCC ID : STNTDVD-3200CP

MODEL : TDVD-3200CP

Rule Part(s):	**FCC PART 15 Subpart C(2001)**
Equipment Class:	**FM Stereo Transmitter**
Port/Connector(s):	**Composite Input, Power input**

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 C63.4-2001.
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.

Ki Soo Kim

Report prepared by : Ki-Soo Kim
Manager of EMC Tech. Part

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MEASUREMENT REPORT

1.1 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:	**TELITECH CO., LTD.**
Address:	**70-58 SONGJEONG-DONG HUNGDUK-KU, CHEONGJU, CHUNGBUK KOREA**

- **Equipment Class**: Digital Device
- **EUT Type**: FM STEREO TRANSMITTER
- **Model(s):** TDVD-3200CP
- **Output Frequencies :** 88.1 ~ 91.2 MHz (User selectable)
- **Input audio Frequencies :** 1 KHz Audio signal
- **Method of modulation :** FM
- **Type of radiowave :** one way communication
- **Number of channels :** 32
- **Operation humidity :** 0% ~ 40%
- **Input Power :** DC 12V
- **Rule part(s) :** FCC PART 15 Subpart C

Place of Tests : 254-1,MAEKOK-RI,HOBUP-MYUN,ICHON-SI KYOUNGKI-DO,467-701,KOREA

2.1 INTRODUCTION(Site Information)

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 **TELITECH CO., LTD. FM STEREO TRANSMITTER. FCC ID : STNTDVD-3200CP**

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 (Registration Number: EA90661)

3.1 PRODUCT INFORMATION

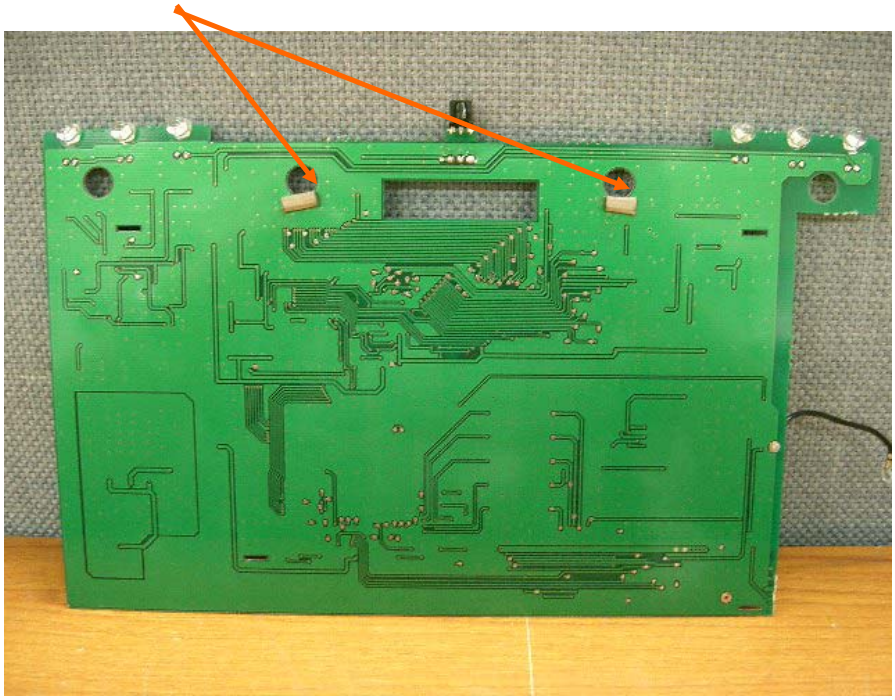
3.1.1 Equipment Description

Equipment Under Test (EUT) is **TELITECH CO., LTD. FM STEREO TRANSMITTER. (FCC ID : STNTDVD-3200CP)**

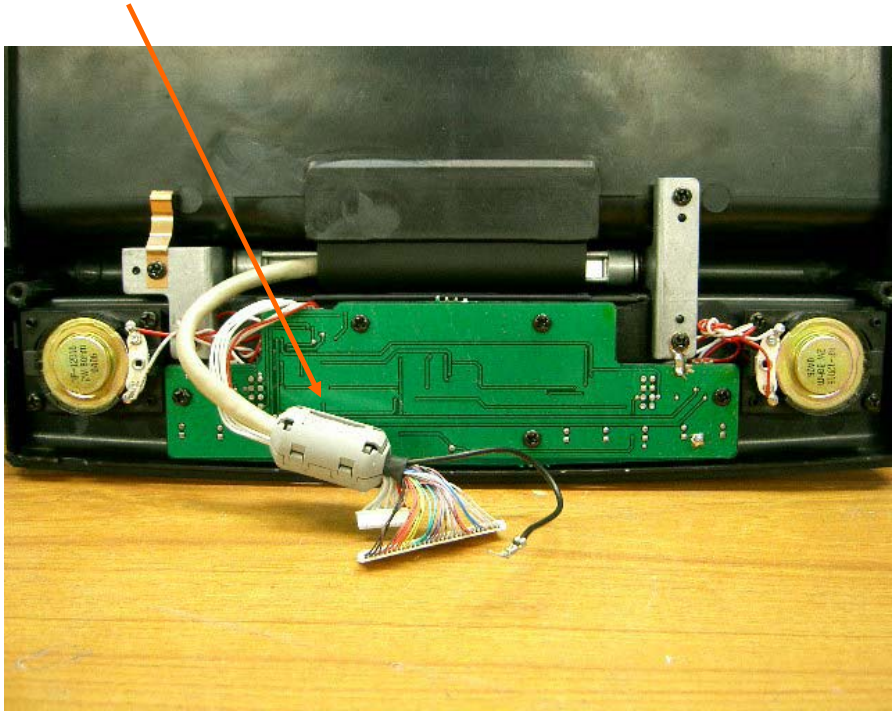
- **Equipment Class**: Digital Device
- **EUT Type**: FM STEREO TRANSMITTER
- **Model(s):** TDVD-3200CP
- **Output Frequencies :** 88.1 ~ 91.2 MHz (User selectable)
- **Input audio Frequencies :** 1 KHz Audio signal
- **Method of modulation :** FM
- **Type of radiowave :** one way communication
- **Number of channels :** 32
- **Operation humidity** 0% ~ 40%
- **Input Power** DC 12V

3.1.2 Modification

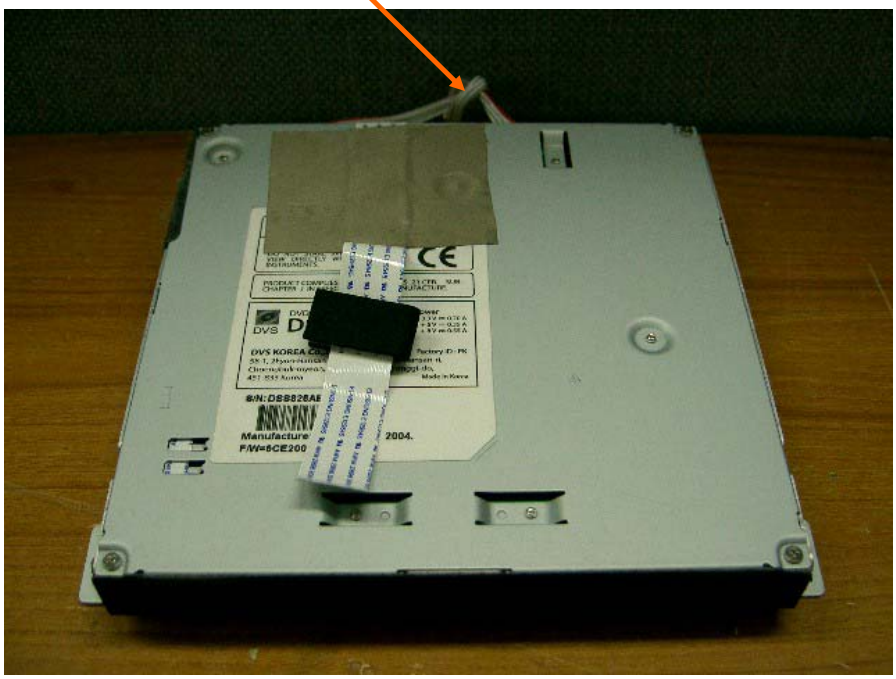
1. **Attach a gasket on Main Board**



2. **Apply a ferrite Core to the Interface Cable**



3. Attach a Gasket Tape on DVD module Rear Cover



4.1 Limitation

4.1.1 Conducted Emission Limits:

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 centre 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 CISPR 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

Table 1. RFI Conducted Limits

4.1.2 Radiated Emission Limits:

According to 15.239 the field strength of emissions from internal radiators operated under these frequency band shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental □/meter	□□/meter
88-108	250	48

Field strength limits are at the distance of 3 meter, emissions radiated outside of the specified band, shall be according to the general radiated limits in 15.209, as following table:

Other Frequencies (MHz)	Field Strength of Fundamental □/meter	□□/meter
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.3 Emissions Band Limits:

According to 15.239(a), emissions from the intentional radiator shall be confined within a band 200kHz wide centered on the operating frequency. The 200kHz band shall lie wholly within the frequency range of 88-108 MHz

5.1 List of Support Equipment

5.1.1 Support Equipment used

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
FM STEREO TRANSMITTER (EUT)	TELITECH CO., LTD.	TDVD-3200CP	STNTDVD-3200CP	Composite port Termination Video in: 75Ω Audio in: 10□

5.1.2 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
FM STEREO TRANSMITTER	Power	N	N/A	1.8(P)
	Composite In	N/A	Y	1.8(D)

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

5.1.3 Noise Suppression Parts on Cable (I/O CABLE)

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
FM STEREO TRANSMITTER	POWER	N	N/A	N	N/A
	Composite In	N	N/A	Y	EUT END

6.1 Conducted Emissions according to § 15.207

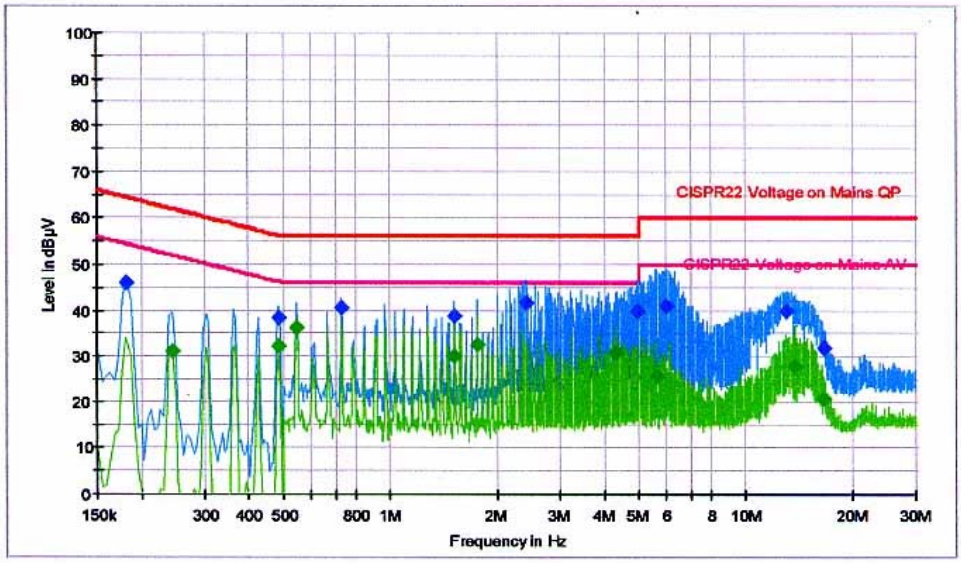
EMI Auto Test(5) 1

Conducted Emission Report

Test Information

EUT Name:	TDVD-3200CP
Serial Number:	-
Test Description:	CISPR 22 CLASS B
Operating Conditions:	NORMAL
Operator Name:	BK, HAM
Comment:	NEUTRAL(110V)

CISPR22 CLASS B Neutral Line



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EMI Auto Test(5) 2

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line
0.181500	45.9	100.000	9.000	GND	N
0.483000	38.4	100.000	9.000	GND	N
0.729500	40.6	100.000	9.000	GND	N
1.521500	38.7	100.000	9.000	GND	N
2.421500	41.5	100.000	9.000	GND	N
4.955000	40.0	100.000	9.000	GND	N
5.954000	41.1	100.000	9.000	GND	N
12.965000	40.0	100.000	9.000	GND	N
16.664000	32.0	100.000	9.000	GND	N

(continuation of the "Final Measurement Detector 1" table from column 6 ...)

Frequency (MHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.181500	10.2	18.5	64.4	
0.483000	9.7	17.9	56.3	
0.729500	9.7	15.4	56.0	
1.521500	9.7	17.3	56.0	
2.421500	9.8	14.5	56.0	
4.955000	10.0	16.0	56.0	
5.954000	10.0	18.9	60.0	
12.965000	10.5	20.0	60.0	
16.664000	10.6	28.0	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line
0.244500	31.2	100.000	9.000	GND	N
0.483000	32.4	100.000	9.000	GND	N
0.545000	36.3	100.000	9.000	GND	N
1.521500	30.2	100.000	9.000	GND	N
1.760000	32.8	100.000	9.000	GND	N
4.302500	30.7	100.000	9.000	GND	N
5.648000	25.9	100.000	9.000	GND	N
13.716500	27.9	100.000	9.000	GND	N
16.682000	20.5	100.000	9.000	GND	N

(continuation of the "Final Measurement Detector 2" table from column 6 ...)

Frequency (MHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.244500	9.9	20.7	51.9	
0.483000	9.7	13.9	46.3	
0.545000	9.7	9.7	46.0	
1.521500	9.7	15.8	46.0	
1.760000	9.7	13.2	46.0	
4.302500	9.9	15.3	46.0	
5.648000	10.0	24.1	50.0	
13.716500	10.5	22.1	50.0	
16.682000	10.6	29.5	50.0	

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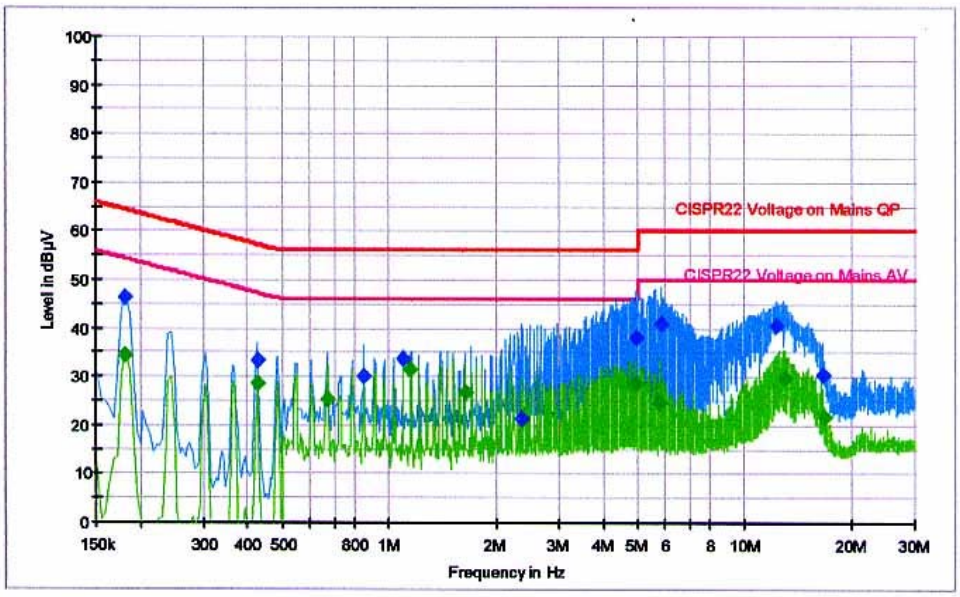
EMI Auto Test(5) 1

Conducted Emission Report

Test Information

EUT Name:	TDVD-3200CP
Serial Number:	-
Test Description:	CISPR 22 CLASS B
Operating Conditions:	NORMAL
Operator Name:	BK, HAM
Comment:	HOT(110V)

CISPR22 CLASS B Hot Line



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EMI Auto Test(5) 2

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line
0.181500	46.2	100.000	9.000	GND	L1
0.424500	33.4	100.000	9.000	GND	L1
0.851000	30.1	100.000	9.000	GND	L1
1.094000	33.7	100.000	9.000	GND	L1
2.367500	21.2	100.000	9.000	GND	L1
4.982000	38.1	100.000	9.000	GND	L1
5.832500	41.0	100.000	9.000	GND	L1
12.308000	40.7	100.000	9.000	GND	L1
16.668500	30.3	100.000	9.000	GND	L1

(continuation of the "Final Measurement Detector 1" table from column 6 ...)

Frequency (MHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.181500	10.2	18.2	64.4	
0.424500	9.7	24.0	57.4	
0.851000	9.7	25.9	56.0	
1.094000	9.7	22.3	56.0	
2.367500	9.8	34.8	56.0	
4.982000	10.0	17.9	56.0	
5.832500	10.0	19.0	60.0	
12.308000	10.4	19.3	60.0	
16.668500	10.6	29.7	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line
0.181500	34.4	100.000	9.000	GND	L1
0.424500	28.5	100.000	9.000	GND	L1
0.671000	25.5	100.000	9.000	GND	L1
1.152500	31.5	100.000	9.000	GND	L1
1.634000	26.6	100.000	9.000	GND	L1
4.968500	28.5	100.000	9.000	GND	L1
5.756000	24.5	100.000	9.000	GND	L1
12.992000	29.7	100.000	9.000	GND	L1
16.691000	21.8	100.000	9.000	GND	L1

(continuation of the "Final Measurement Detector 2" table from column 6 ...)

Frequency (MHz)	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.181500	10.2	20.0	54.4	
0.424500	9.7	18.9	47.4	
0.671000	9.7	20.5	46.0	
1.152500	9.7	14.5	46.0	
1.634000	9.7	19.4	46.0	
4.968500	10.0	17.5	46.0	
5.756000	10.0	25.5	50.0	
12.992000	10.5	20.3	50.0	
16.691000	10.6	28.2	50.0	

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NOTES:

1. **All modes of operation were investigated, and the worst-case emissions are reported.**
2. **The conducted limits are listed on Table 1 (Page 6).**
3. **Line H = Hot Line N = Neutral**

** Measurements using CISPR quasi-peak mode.

7.1 Radiated Emissions according to § 15.239(b)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
88.1	21.6	8.5	2.1	V	**32.2**	48 Av	15.8
88.1	31.4	8.5	2.1	V	**42.0**	68 Pk	26.0
88.5	21.3	8.5	2.1	V	**31.9**	48 Av	16.1
88.5	31.6	8.5	2.1	V	**42.2**	68 Pk	25.8
89.1	18.4	8.7	2.1	V	**29.2**	48 Av	18.8
89.1	24.6	8.7	2.1	V	**35.4**	68 Pk	32.6
89.6	13.3	8.7	2.1	V	**24.1**	48 Av	24.0
89.6	26.0	8.7	2.1	V	**36.8**	68 Pk	31.2
90.1	15.7	8.9	2.1	V	**26.7**	48 Av	21.3
90.1	24.5	8.9	2.1	V	**35.5**	68 Pk	32.5
90.6	14.9	8.9	2.1	V	**25.9**	48 Av	22.1
90.6	24.7	8.9	2.1	V	**35.7**	68 Pk	32.3
90.9	17.2	8.9	2.1	V	**28.2**	48 Av	19.8
90.9	26.5	8.9	2.1	V	**37.5**	68 Pk	30.5
91.2	17.2	9.0	2.1	V	**28.3**	48 Av	19.7
91.2	25.2	9.0	2.1	V	**36.3**	68 Pk	31.7

Radiated Measurements at 3-meters.

NOTES:

1. **The radiated limits are listed on Table 2 (Page 7).**
2. **Av = Average detection mode, Pk = Peak detection mode.**

8.1 Radiated Emissions according to § 15.239(C)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
99.0	21.6	9.9	2.3	V	**33.8**	43.5	9.7
202.8	15.7	16.3	3.2	V	**35.2**	43.5	8.3
231.1	17.9	17.1	3.4	H	**38.4**	46.0	7.6
280.1	14.7	18.4	3.8	V	**36.9**	46.0	9.1
400.1	16.5	17.0	4.6	V	**38.1**	46.0	7.9
571.5	13.0	20.6	5.5	H	**39.1**	46.0	6.9
580.1	10.6	20.8	5.5	V	**36.9**	46.0	9.1
608.3	10.8	21.4	5.6	H	**37.8**	46.0	8.2
645.1	11.8	22.6	5.8	V	**40.2**	46.0	5.8
682.1	10.8	22.6	6.0	V	**39.4**	46.0	6.6

Radiated Measurements at 3-meters.

NOTES:

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

*** 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 3MHz. The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

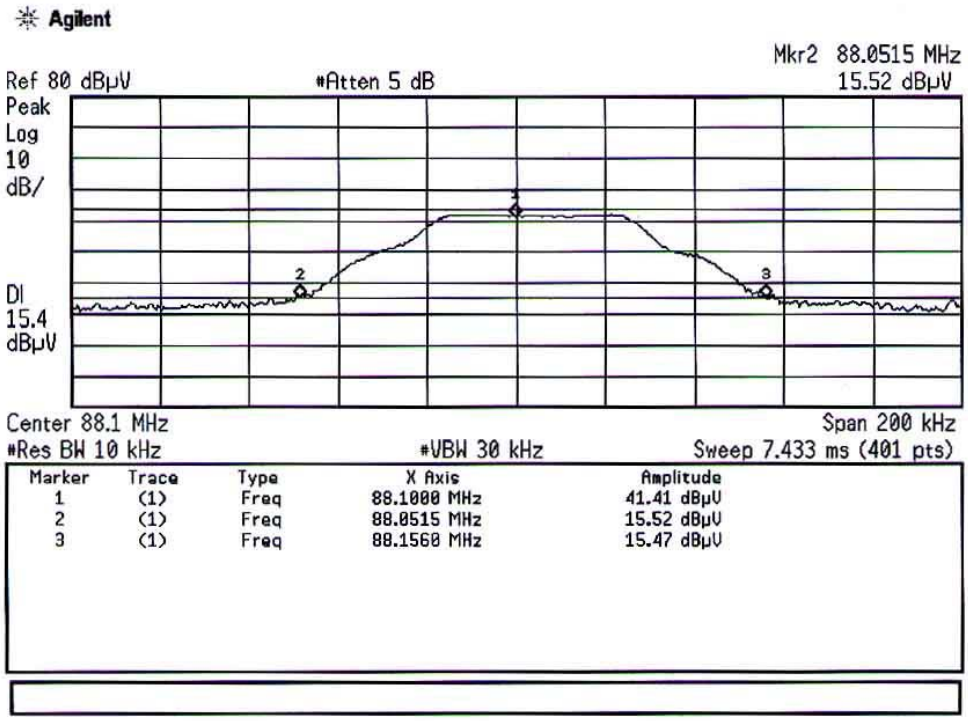
9.1 Emissions Band Measurement according to § 15.239(a)

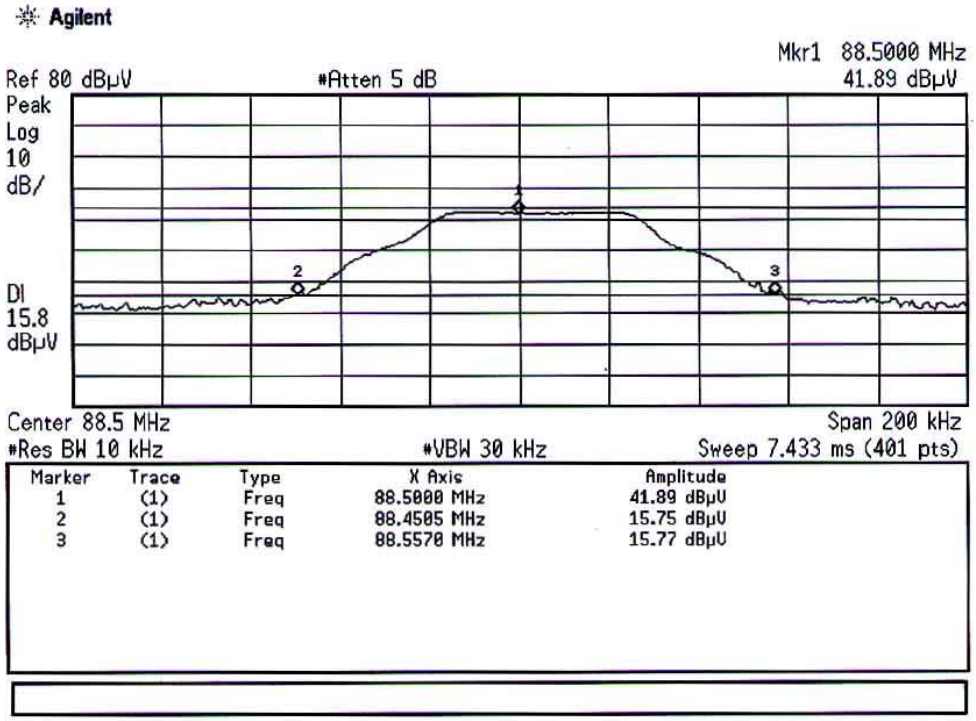
Center Frequency (MHz)	Measured occupied bandwidth (KHz)	Pass/Fail
88.1	104.5	Pass
88.5	106.5	Pass
89.1	107.5	Pass
89.6	109.0	Pass
90.1	112.5	Pass
90.6	106.5	Pass
90.9	107.0	Pass
91.2	110.5	Pass

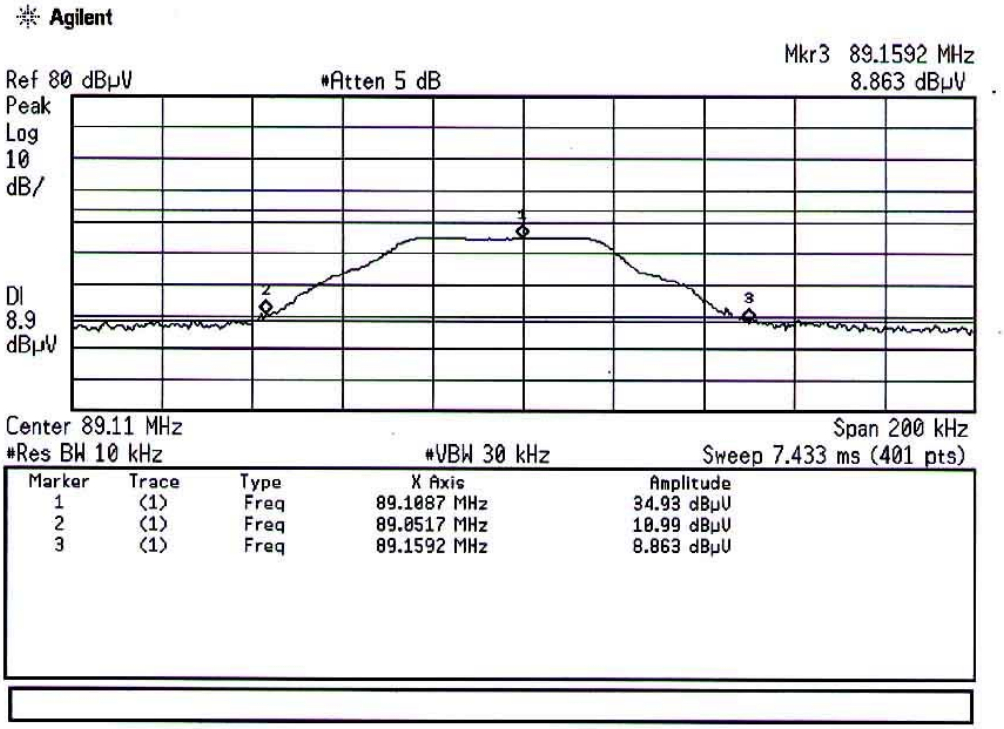
NOTES:

1. **The radiated limits are listed on Table 2 (Page 7).**
2. **Please refer to the below measurement result(figure 1).**

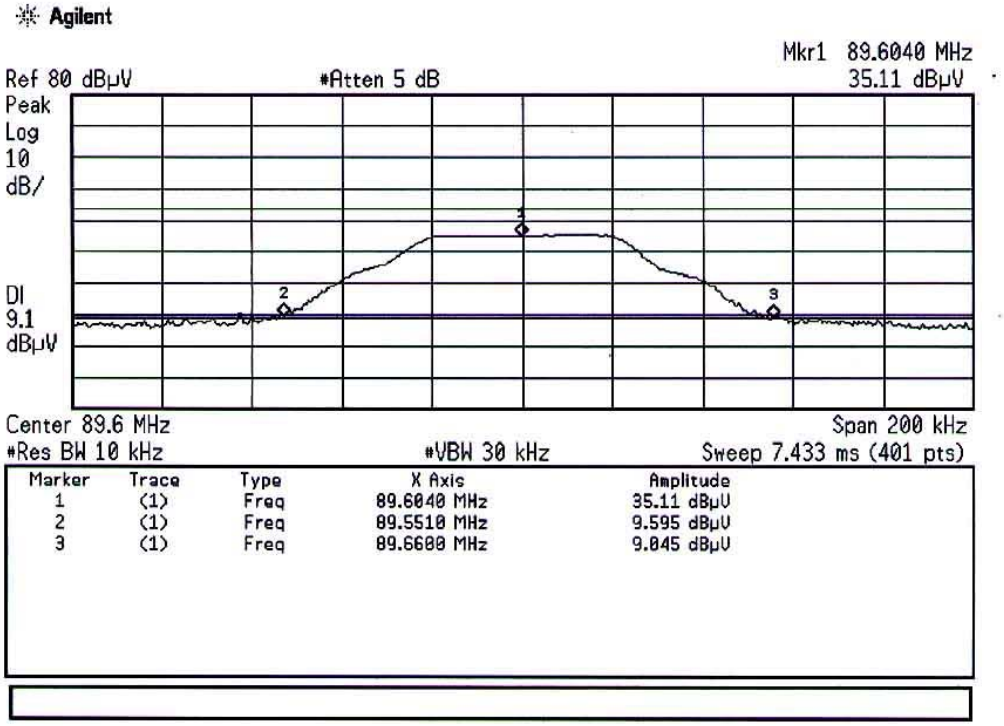
Figure 1 : Occupied bandwidth measurement results



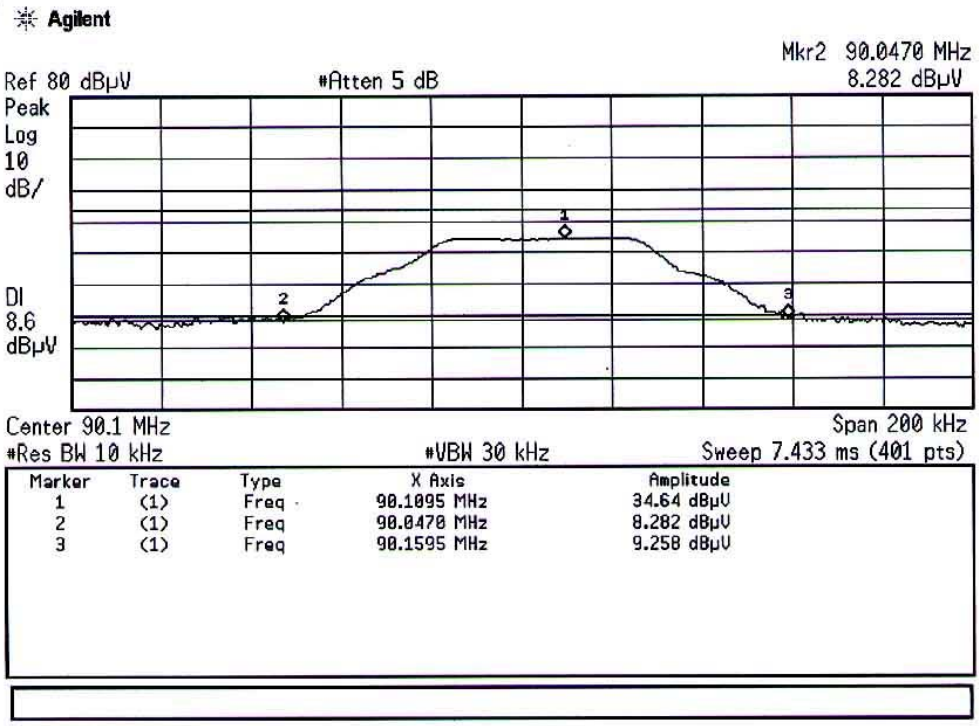


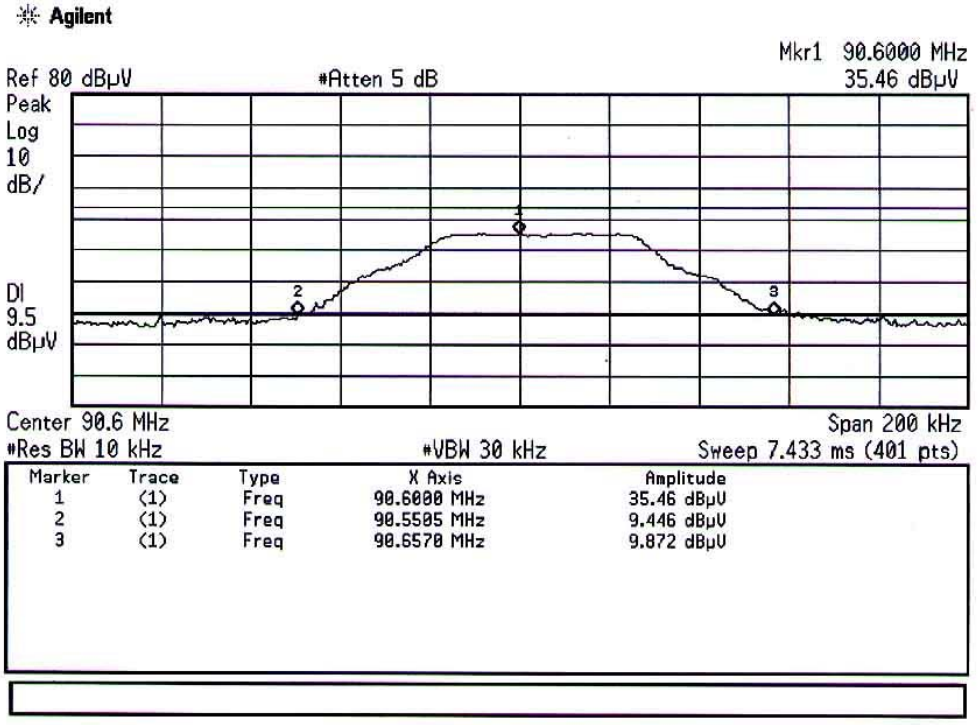


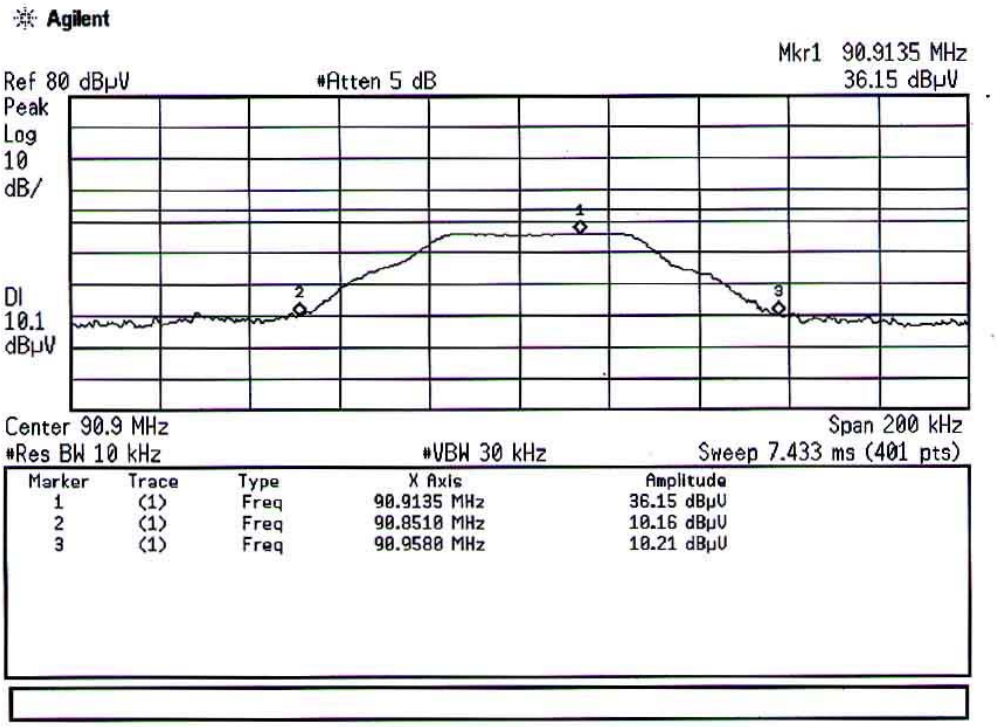
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	89.1087 MHz	34.93 dBµV
2	(1)	Freq	89.0517 MHz	10.99 dBµV
3	(1)	Freq	89.1592 MHz	8.863 dBµV



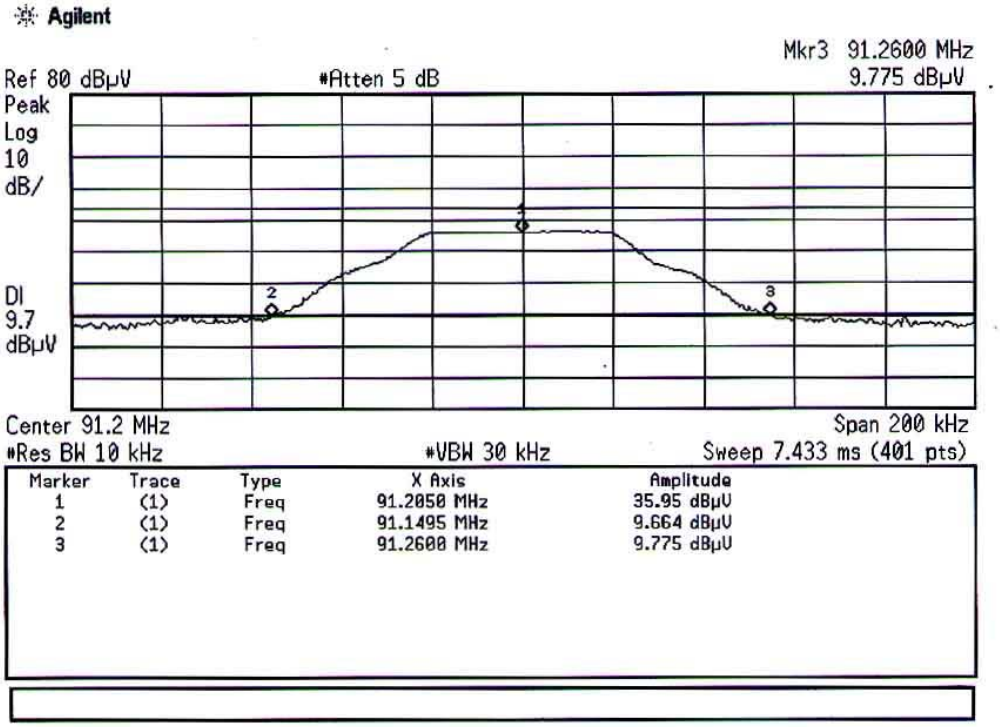
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	89.6040 MHz	35.11 dBµV
2	(1)	Freq	89.5510 MHz	9.595 dBµV
3	(1)	Freq	89.6600 MHz	9.045 dBµV


Agilent
Mkr2 90.0470 MHz
8.282 dBµV
Ref 80 dBµV
#Atten 5 dB
Peak
Log
10
dB/
DI
8.6
dBµV
Center 90.1 MHz
Span 200 kHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 7.433 ms (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 90.1095 MHz 34.64 dBµV
2 (1) Freq 90.0470 MHz 8.282 dBµV
3 (1) Freq 90.1595 MHz 9.258 dBµV


Agilent
Mkr1 90.6000 MHz
35.46 dBµV
Ref 80 dBµV
#Atten 5 dB
Peak
Log
10
dB/
DI
9.5
dBµV
Center 90.6 MHz
Span 200 kHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 7.433 ms (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 90.6000 MHz 35.46 dBµV
2 (1) Freq 90.5505 MHz 9.446 dBµV
3 (1) Freq 90.6570 MHz 9.872 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	90.9135 MHz	36.15 dBµV
2	(1)	Freq	90.8510 MHz	10.16 dBµV
3	(1)	Freq	90.9580 MHz	10.21 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	91.2050 MHz	35.95 dBµV
2	(1)	Freq	91.1495 MHz	9.664 dBµV
3	(1)	Freq	91.2600 MHz	9.775 dBµV

10.1 Sample Calculations

dB □ = 20 log $_{10}$ □

dB □ = dBm + 107

9.1.2 Example 1:

@ 2.4215 MHz

Class B limit = 56 dBuV
Reading = 41.5 dBuV(calibrated level)

Margin = 41.5 – 56.0 = - 14.5

= 14.5 dB below limit

9.1.3 Example 2:

@ 682.1 MHz

Class B limit = 200 uV/m = 46.0 dBuV/m
Reading = 10.8 dBuV/m (calibrated level)
Antenna Factor + Cable Loss = 28.6 dB
Total = 39.4 dBuV/m

Margin = 39.4 - 46.0 = - 6.6

= 6.6 dB below limit

11.1 Test Equipment

Type	Manufacture	Model Number	CAL Due Date
EMI Test Receiver	Rohde & Schwarz	ESI40	2005.11.16
EMI Test Receiver	Rohde & Schwarz	ESVS30	2006.07.15
EMI Test Receiver	Rohde & Schwarz	ESCI	2005.09.13
EMC Analyzer	Agilent	E7403A	2005.05.16
LISN	Rohde & Schwarz	ESH2-Z5	2005.07.28
LISN	EMCO	3825/2SH	2005.11.29
Tri-Log Antennas	Schwarzbeck	VULB9160	2005.04.06
Antenna Position Tower	HD	MA240	N/A
Turn Table	EMCO	1050	N/A
Reference Network Impedance	Voltech	IEC 555	N/A
AC Power Source	PACIFIC	Magnetic Module	N/A
AC Power Source	PACIFIC	360AMX	2005.11.25
Controller	HD GmbH	HD 100	N/A
SlideBar	HD GmbH	KMS 560	N/A

12.1 Test Software Used

The EUT was acted standby mode during radiated and conducted testing.

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.

The device under test was operated during the measurement under following conditions:

- 1KHz Audio signal was saved in the DVD CD and used as source for signal transmission during EUT test.

13.1 Conclusion

The data collected shows that **TELITECH CO., LTD. FM STEREO TRANSMITTER. FCC ID : STNTDVD-3200CP**

complies with §15.239(b), §15.209 and §15.207(c) of the FCC Rules.