Nemko Korea CO., Ltd.

300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA

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FCC EVALUATION REPORT FOR CERTIFICATION

Applicant : Samsung Electronics Co., Ltd.
Visual Display Division,R&D Dept, 416,Maetan3-dong,
YeongTong-gu Suwon-City,Kyungki-Do, Korea,
(Post code : 442-742)
Attn. : Mr.ChangSeub Eum

Dates of Issue : April 12, 2004
Test Report No. : NK2ER059
Test Site : Nemko Korea Co., Ltd.
EMC site, Korea

FCC ID	*A3LDV50P3W*
Brand Name	*SAMSUNG*
Contact Person	Samsung Electronics Co., Ltd. Visual Display Division,R&D Dept,#416 Maetan3-dong, YeongTong-gu,Suwon-City,Kyunggi-do, Korea , 442-742. Mr. ChangSeub Eum Telephone No. : +82 31 200 7611

Applied Standard: FCC 47 CFR Part 15, Subpart E : 2000
Classification : FCC Class B Device
EUT Type: Wireless PDP Monitor

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-1992.

I attest to the accuracy of data and 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.

Tested By : C.S.Choi
Senior Engineer

Reviewed By : H.H.Kim
Manager & Chief Engineer

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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 under FCC part 15.

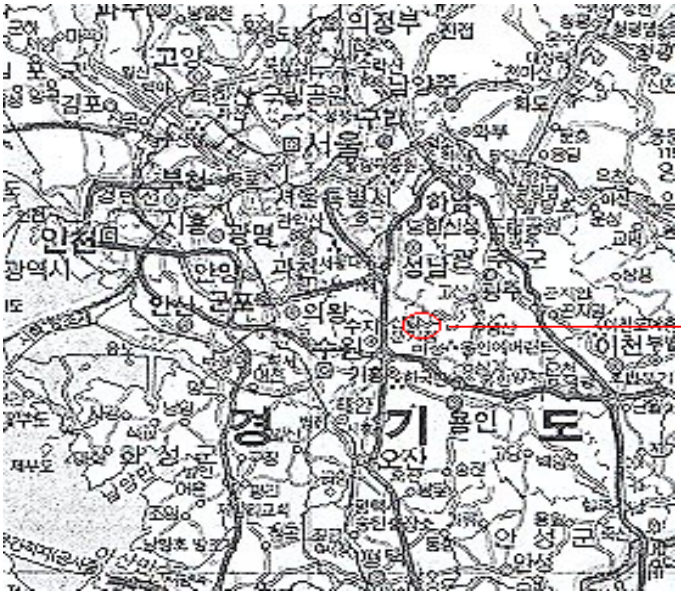
Responsible Party* :	Samsung Electronics Co., Ltd.
Contact Person :	Mr. ChangSeub Eum
Manufacturer :	Samsung Electronics Co., Ltd. Visual Display Division,R&D Dept, #416 Maetan3-dong, YeongTong-gu, Suwon-City,Kyunggi-do, Korea , 442-742

- FCC ID: A3LDV50P3W
- Model: DV50P3W
- Brand Name: SAMSUNG
- EUT Type: Wireless PDP Monitor
- Classification: FCC Class B
- Applied Standard: FCC 47 CFR Part 15 , Subpart E
- Test Procedure(s): ANSI C63.4 (2001), DA 02-2138(2002)
- Dates of Test: March 31, 2004 to April 10, 2004
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: NK2ER059

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 C63.4-1992) was used in determining radiated and conducted emissions emanating from **Samsung Electronics Co., Ltd.**
FCC ID : **A3LDV50P3W**

These measurement tests were conducted at ***Nemko Korea Co., Ltd. EMC Laboratory*** .
The site address is 300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA
The area of Nemko Korea Corporation LTD. EMC Test Site is located in a mountain area at 80 kilometers (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 kilometers (18miles) south-southeast from central Seoul.
It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.
The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 on October 19, 1992.



Nemko Korea Co., Ltd.
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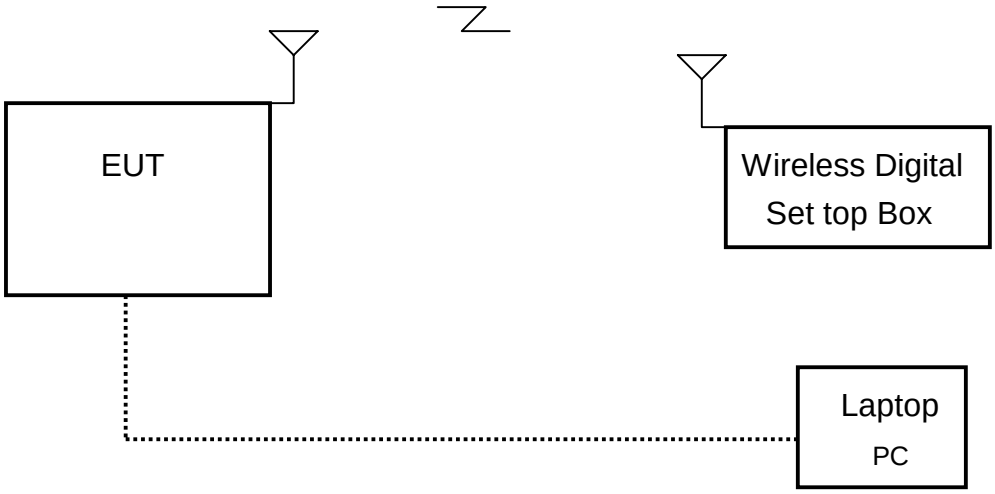
Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows Nemko Korea Corporation Ltd. EMC Lab. and Incheon Airport.

TEST CONDITIONS & EUT INFORMATION

Operating During Test



For Part 15 subpart E testing of this EUT, Tx power and channels are changed through RS-232 cable of laptop pc. Laptop and RS-232 cable are removed,
FCC part 15.207,15.209 testing has been performed while EUT is communicating with "Wireless Digital Set top Box".
The test results related to PDP Monitor.(i.e. Part 15 subpart B) were not included in this report. Therefore, Is refered in other report

Support Equipment

No.	PRODUCT	BRAND	MODEL	SERIAL No.
1	Laptop PC	SAMSUNG Electronics Co.,Ltd	S830	571191AR100141
2	Wireless Digital Set top Box	SAMSUNG Electronics Co.,Ltd	FC20	-

TEST CONDITIONS & EUT INFORMATION

EUT Information

Clock:	See Appendix C
Chipset:	MGS6218/MGS6228
RF frequency (Center Frequency)	5.18 ~ 5.32GHz for 802.11a
RF output power (EIRP)	5.15 - 5.25GHz: 16.86dBm(48.53mW) Conducted Peak Power 5.25 - 5.35GHz: 14.36dBm(27.28mW) Conducted Peak Power
Transmission Method	OFDM (Orthogonal Frequency Division Multiplexing)
Number of channels	8
Antenna	The Antenna is integral (PCB Vertical Antenna) Gain: -3.35dBi
Size	PDP :1260mm X 740mm X 90mm Wireless : 200mm X 215mm X 100mm
Weight	44Kg
Power Source	AC120V/60Hz

SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	Paragraph No.	Result	Remark
Power line Conducted Emission	15.207	Complies	
Radiated Emission (Spurious)	15.209	Complies	
Emission Bandwidth (26dB Bandwidth)	15.407(a)(1)(2)	Complies	
Peak Conducted Transmit Output Power	15.407(a)(1)(2)	Complies	
Peak Excursion Measurement	15.407(a)(6)	Complies	
Peak Power Spectral Density	15.407(a)(1)(2)	Complies	
Band Edge	15.407(b)	Complies	
Conducted & Radiated Spurious Emission	15.407(b)	Complies	
Frequency Stability	15.407(g)	Complies	
Maximum Permissible Exposure	1.1307(b)	Complies	

RECOMMENDATION/CONCLUSION

The data collected shows that the **Samsung Electronics Co., Ltd.**
FCC ID : **A3LDV50P3W**
The highest emission observed was at **216 MHz** for radiated emissions with a margin of **4.8 dB.**

SAMPLE CALCULATION

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

$$\mu V = 10^{(\text{dB}\,\mu V/20)}$$

<u>EX. 1.</u>

@57.7 MHz Class B limit = 100 μV/m = 40.0 dB μV/m

Reading = 19.1 dB μV(calibrated level)

Antenna factor + Cable Loss = 10.12 dB

Total = 29.22 dB μV/m

Margin = 40.0 - 29.22 = 10.78

10.78 dB below the limit

DESCRIPTION OF TEST

Conducted Emissions

The Line conducted emission test facility is located inside a 4 X 7 X 2.5 meter shielded enclosure.
It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in Accordance with MIL-STD-285 or NSA 65-6.
A 1mX 1.5M wooden table 0.8m height is placed 0.4m away from the vertical wall and 1.5m away from the side of wall of the shielded room
Rohde & Schwarz LISN and Kyoritsu KNW-407 50ohm/50uH line impedance stabilization Network are bonded to the shielded room.
The EUT is powered from the Rohde & Schwarz LISN and the support equipment is powered from the Kyoritsu LISN. Power to the LISN s are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1/2”.
If DC power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISNs,
All interconnecting cables more than 1 meter were shortened by non inductive bundling (Serpentine fashion) to a 1 meter length.
Sufficient time for EUT, support equipment, and test equipment was 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 from the EUT.
The spectrum was scanned from 150KHz to 30MHz with 200msec sweep time.
The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz, ESCS30).
The detector function was set to CISPR quasi-peak mode and average mode.
The bandwidth of receiver was set to 9KHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.
Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.

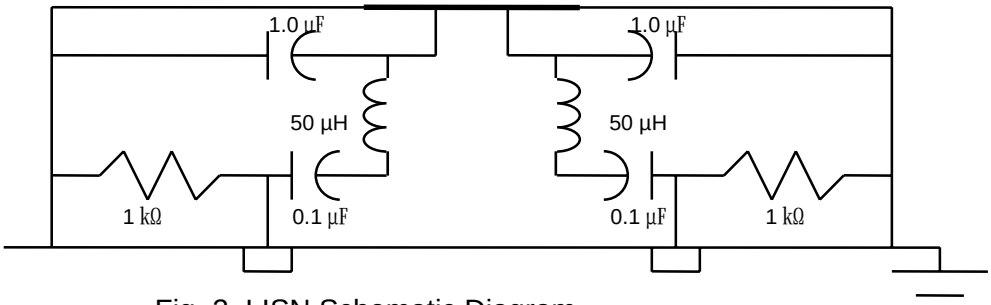


Fig. 2. LISN Schematic Diagram

DESCRIPTION OF TEST

Radiated Emissions

Preliminary measurement were made indoors at 3 meter using broad band 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 Technology configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was note for each frequency found.

The spectrum was scanned from 30 to 1000MHz using Biconical log Antenna (ARA, LPB-2520/A). Above 1GHz, Horn antenna (Scwarzbeck BBHA 9120D: upto 18GHz)was used.

Final Measurements were made outdoors at 3 or 10m test range using Logbicon Super Antenna(Schwarzbeck,VULB9166)or Horn antenna.(Schwarzbeck BBHA9120D:upto18GHz , BBHA9170:Upto40GHz)The test equipment was placed on a wooden table.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during pre-scan measurements was reexamined and investigated using EMI test receiver.(ESCS30)

The detector function was set to CISPR quasi-peak mode or Average mode and the bandwidth of the receiver was set to 120KHz or 1MHz depending on the frequency or type of signal.

The half wave dipole antenna was tuned to the frequency found during preliminary radiated measurements.

The EUT support equipment and interconnecting cables were re configured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8m high non- metallic 1.0X 1.5 meter table.

The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission.

The turn table containing the Technology was rotated; the antenna height was varied 1 to 4meter and stopped at the azimuth or height producing the maximum emission Each emission was maximized by : switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.

Each EME reported was calibrated using the R/S signal generator.

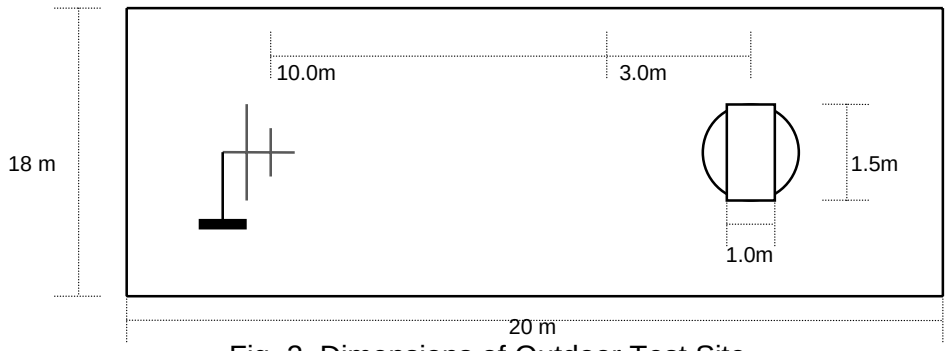
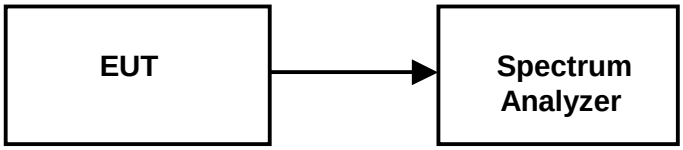


Fig. 2. Dimensions of Outdoor Test Site

DESCRIPTION OF TEST

Emission Bandwidth (26dB Bandwidth)

Test Setup

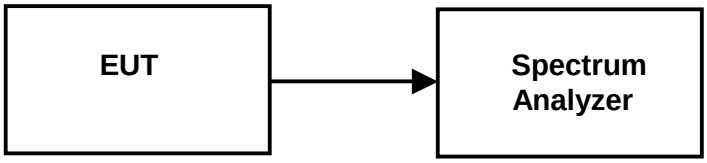


Test Procedure

The transmitter output is connected to the spectrum analyzer.
The RBW of spectrum analyzer is set to approximately 1% of the emission bandwidth and peak detection is used. The emission bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 26dB.

Peak Conducted Transmit Output Power

Test Setup



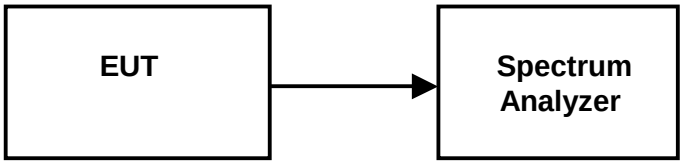
Test Procedure

The transmitter output is connected to the spectrum analyzer.
The RBW of spectrum analyzer is set to 1MHz, and VBW is greater than RBW or equal.
Peak detection is used, and the peak power is determined by channel integration over the previously measured emission bandwidth.

DESCRIPTION OF TEST

Peak Excursion measurement

Test Setup

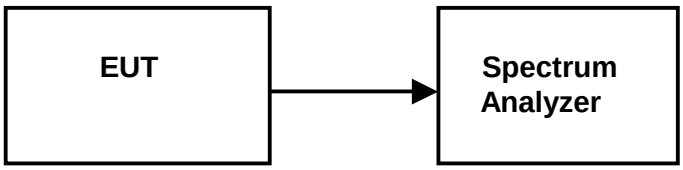


Test Procedure

The transmitter output is connected to the spectrum analyzer.
The RBW of spectrum analyzer is set to 1MHz and maintained at 1MHz.
First the VBW is set to the 3MHz, Trace A is set to Max Hold, then to View.
Then VBW is readjusted to 1MHz, and the under this Peak Transmit power measurement condition is captured in Trace B.
The difference between the traces is investigated. The marker is placed at the frequency that shows the largest difference. The amplitude between the traces at this frequency is peak excursion.

Peak Power Spectral Density

Test Setup



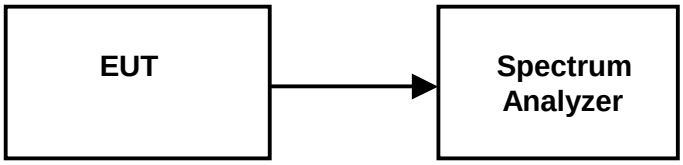
Test Procedure

The transmitter output is connected to the spectrum analyzer.
The maximum level in a 1MHz bandwidth is measured with the spectrum analyzer.
The RBW of spectrum analyzer is set to 1MHz, VBW is set to 3MHz, and 100 sweeps of power averaging.
The PPSD is the highest level found across the emission in any 1MHz band.

DESCRIPTION OF TEST

Conducted Spurious Emission

Test Setup

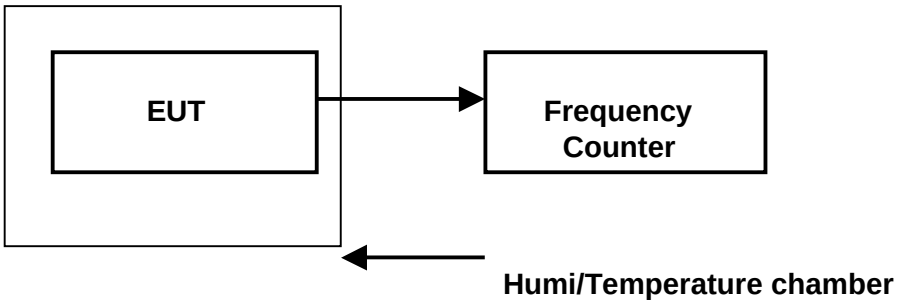


Test Procedure

The transmitter output is connected to the spectrum analyzer.
The RBW of spectrum analyzer is set to 1MHz and VBW is set to the 1MHz.
Measurements are made over the 30MHz to 40GHz range with the transmitter set to the lowest, middle, and highest channels within the 5GHz band.

Frequency Stability

Test Setup



Test Procedure

The frequency tolerance of the carrier signal shall be maintained within +/-0.02% of the operating frequency over variation of –20 degree to 50 degrees C at normal supply voltage, and for a variation in primary supply voltage from 85% to 115%.
The transmitter output (Carrier signal) is connected to the Frequency counter.

TEST DATA

Conducted Emissions-15.207

FCC ID : A3LDV50P3W
Test Mode : RF Transmit .

Frequency	Level(dBμV)		Line	Limit(dBμV)		Margin(dB)	
(MHz)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.26	44.1	44.1	L	61.4	51.4	17.3	7.3
0.33	42.9	42.4	L	59.5	49.5	16.6	7.1
0.60	38.1	35.6	L	56.0	46.0	17.9	10.4
1.20	32.8	30.0	N	56.0	46.0	23.2	16.0
1.67	33.6	27.3	L	56.0	46.0	22.4	18.7
12.90	39.5	17.2	L	60.0	50.0	20.5	32.8

Table 1. Line Conducted Emissions Tabulated Data

NOTES:
1. Measurements using CISPR quasi-peak mode & average mode.
2. All modes of operation were investigated and the worst -case emission are reported. See attached Plots.
3.The limit for Class B device is on the FCC Part section 15.107(a).
4.Line L = Line Line N = Neutral

Tested by C.S.Choi

PLOT OF TEST DATA

NEMKO KOREA

06 Apr 2004 17:22

Conducted Emissions

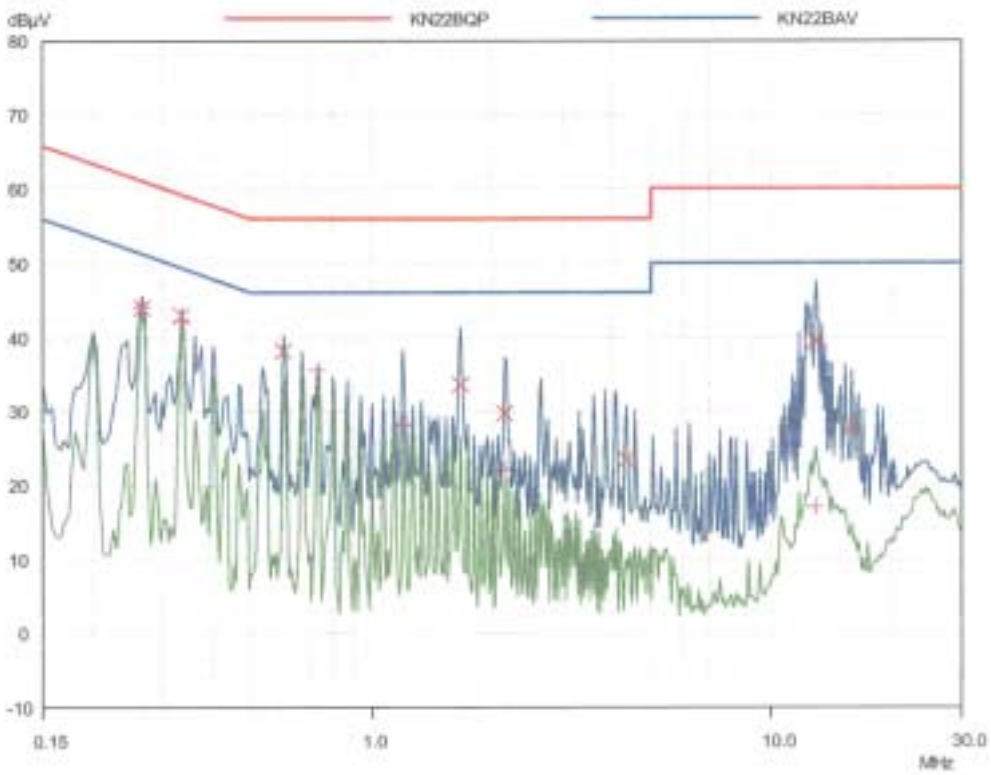
EUT:	Wireless PDP Monitor
Manuf:	SAMSUNG Electronics Co., Ltd.
Op Cond:	
Operator:	
Test Spec:	FCC Part 15 Subpart E
Comment:	MODEL : DV50P4W
	LINE : LINE-PE
Result File:	5gpdp-l.dat : ESCS prescan

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	2sec
	Subranges:	8
	Acc Margin:	30 dB



PLOT OF TEST DATA

NEMKO KOREA

06 Apr 2004 17:09

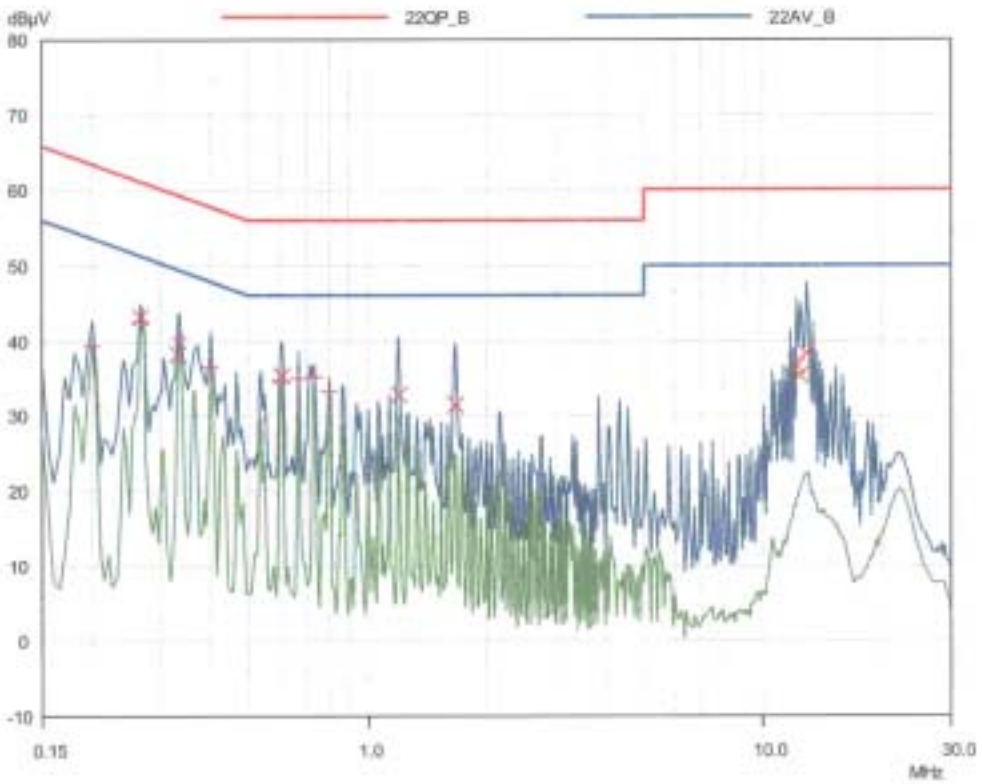
EUT:	Wireless PDP Monitor
Manuf:	SAMSUNG Electronics Co., Ltd.
Op Cond:	
Operator:	
Test Spec:	FCC Part 15 Subpart E
Comment:	MODEL : DV50P4W
	LINE : NEUTRAL-PE
Result File:	5gpdp-n.dat : ESCS prescan

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	5kHz	9kHz	PK+AV	20msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Peaks:	8
	Acc Margin:	40 dB



TEST DATA

Radiated Emissions below 1GHz-15.209

FCC ID : A3LDV50P3W
Test Mode : RF Transmit.

● **30MHz ~ 1GHz**

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
159.98	45.3	H	-12.8	32.5	43.5	11.0
216.00	52.0	V	-13.3	38.7	43.5	4.8
561.03	44.3	H	-4.7	39.6	46.0	6.4
674.88	42.1	H	-1.6	40.5	46.0	5.5
809.84	37.0	H	1.8	38.8	46.0	7.2
944.83	35.7	V	4.7	40.4	46.0	5.6

Notes:The lowest,middle,highest of channel were measured and the worst data(highest Channel) Was recorded

Table 1. Radiated Measurements at 3meters

Radiated Emissions above 1GHz (Part 15.209)

● **1GHz ~ 40GHz (Lowest Channel)**

Frequency	Reading		Pol*	AF+CL+Amp	Limit (dBμV/m)		Results (dB)	
(MHz)	Peak	Average	(H/V)	(dB)**	Peak	Average	Peak	Average
1113.00	53.4	45.9	H	-8.3	74.0	54.0	45.1	37.6
1199.00	52.0	33.0	H	-7.9	74.0	54.0	44.1	25.1
1262.00	48.7	45.9	H	-7.8	74.0	54.0	40.9	38.2
1360.00	47.6	32.6	H	-7.5	74.0	54.0	40.1	25.1
1410.00	49.4	45.0	H	-7.3	74.0	54.0	42.1	37.7
1559.00	46.9	42.0	H	-5.9	74.0	54.0	41.0	36.1

Table 5. Radiated Measurements at 3meters

● **1GHz ~ 40GHz (Middle Channel)**

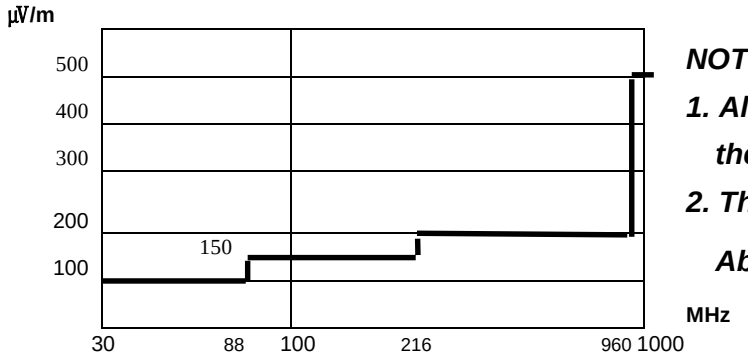
Frequency	Reading		Pol*	AF+CL+Amp	Limit (dBμV/m)		Results (dB)	
(MHz)	Peak	Average	(H/V)	(dB)**	Peak	Average	Peak	Average
1113.00	56.8	51.4	V	-8.3	74.0	54.0	48.5	43.1
1199.00	47.9	38.7	V	-7.9	74.0	54.0	40.0	30.8
1410.00	47.5	42.5	V	-7.3	74.0	54.0	40.2	35.2
1559.00	46.5	40.6	H	-5.9	74.0	54.0	40.6	34.7
1856.00	53.7	49.4	V	-4.7	74.0	54.0	49.0	44.7
4319.00	49.8	40.6	H	3.9	74.0	54.0	53.7	44.5

Table 6. Radiated Measurements at 3meters

● **1GHz ~ 40GHz (Highest Channel)**

Frequency (MHz)	Reading		Pol* (H/V)	AF+CL+Amp (dB)**	Limit (dBμV/m)		Results (dB)	
	Peak	Average			Peak	Average	Peak	Average
1113.00	55.0	51.5	V	-8.3	74.0	54.0	46.7	43.2
1199.00	51.8	39.2	H	-7.9	74.0	54.0	43.9	31.3
1262.00	49.2	43.8	H	-7.8	74.0	54.0	41.4	36.1
1360.00	47.7	34.0	H	-7.5	74.0	54.0	40.2	26.5
1410.00	48.8	42.7	H	-7.3	74.0	54.0	41.5	35.4
1559.00	47.9	40.2	V	-5.9	74.0	54.0	42.0	34.3
4936.00	52.1	44.0	V	4.1	74.0	54.0	56.2	48.1

Table 7. Radiated Measurements at 3meters



NOTES:

1. All modes of operation were investigated the worst-case emission are reported.

2. The radiated limits are shown on Figure 3. Above 1GHz the limit is 500 μV/m.

Fig. 3. Limits at 3 meters

NOTES:

*1. *Pol. H =Horizontal V=Vertical*

*2. **AF+CL+Amp. = Antenna Factor + Cable Loss + Amplifier.*

3. The limit for Class B device is on the FCC Part section 15.209(a)

4.Measurements using CISPR quasi-peak mode.Above 1GHz,peak detector function mode is used using a resoluation 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..

Tested by C.S.Choi

TEST DATA

Emission Bandwidth (26dB Bandwidth)

FCC ID : A3LDV50P3W

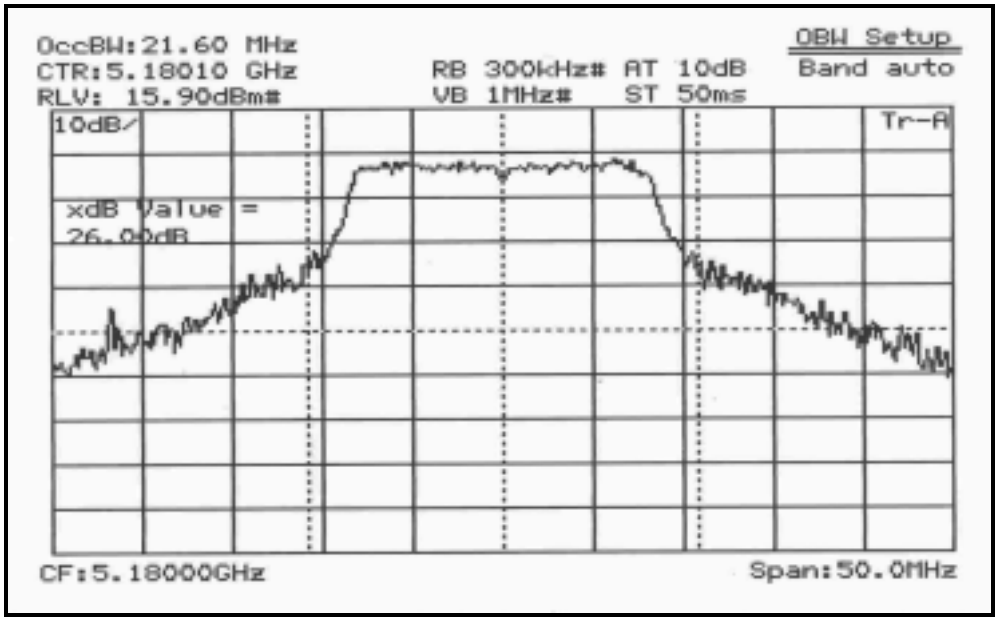
Test Mode : Set to Lowest channel and Middle channel and Highest channel

Channel	Frequency (MHz)	Result (MHz)	Limit (MHz)	Margin (MHz)
1	5180	21.60	N/A	N/A
4	5240	21.20	N/A	N/A
5	5260	21.30	N/A	N/A
8	5320	21.10	N/A	N/A

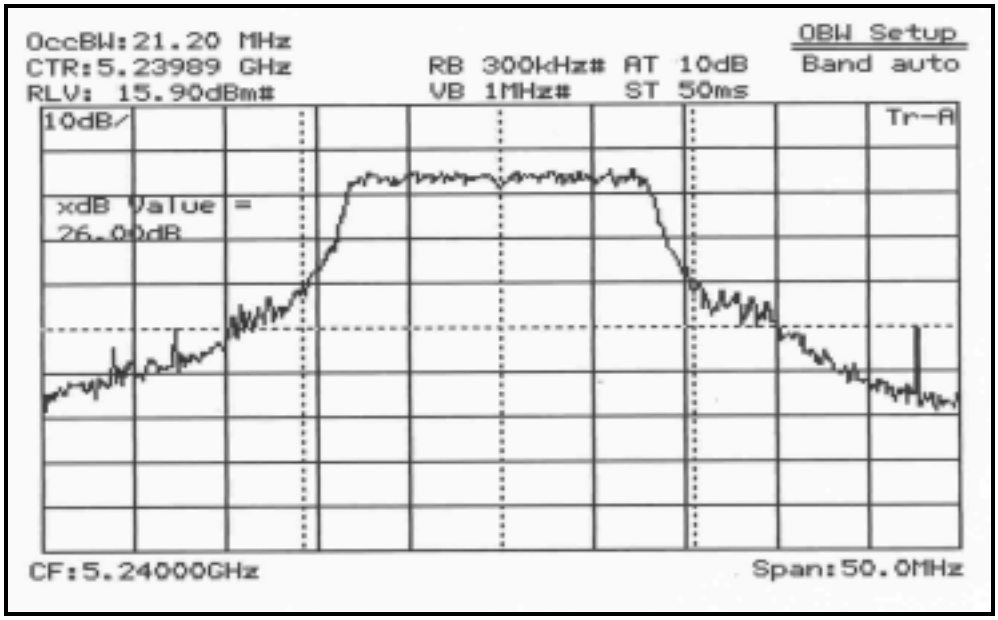
Tested by C.S.Choi

PLOT OF TEST DATA

26dB Bandwidth, Low Channel (5180MHz)

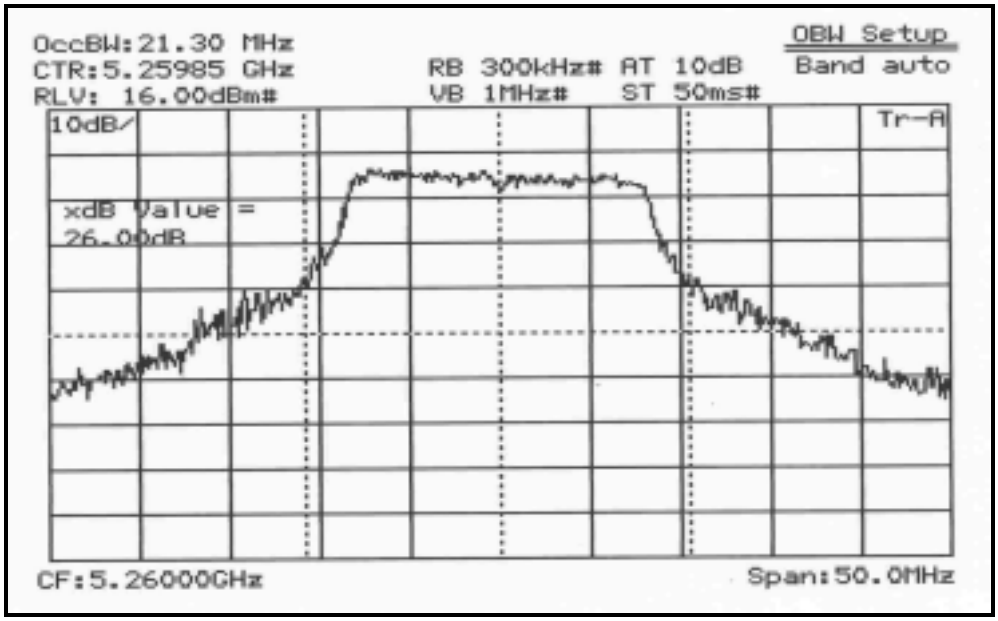


26dB Bandwidth, Middle Channel (5240MHz)

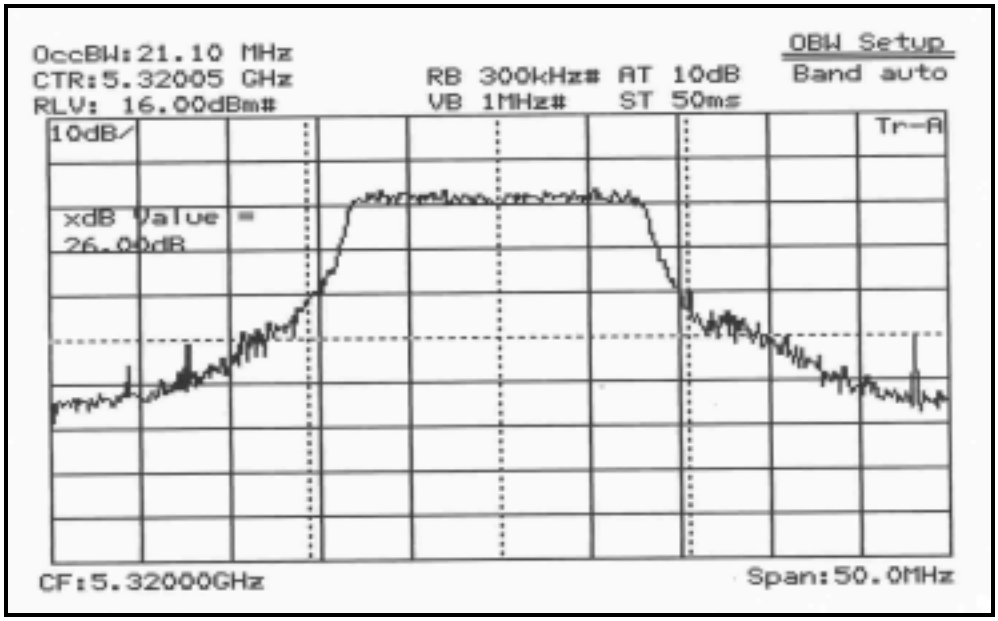


PLOT OF TEST DATA

26dB Bandwidth, Middle Channel (5260MHz)



26dB Bandwidth, High Channel (5320MHz)



TEST DATA

Peak Conducted Transmit Output Power

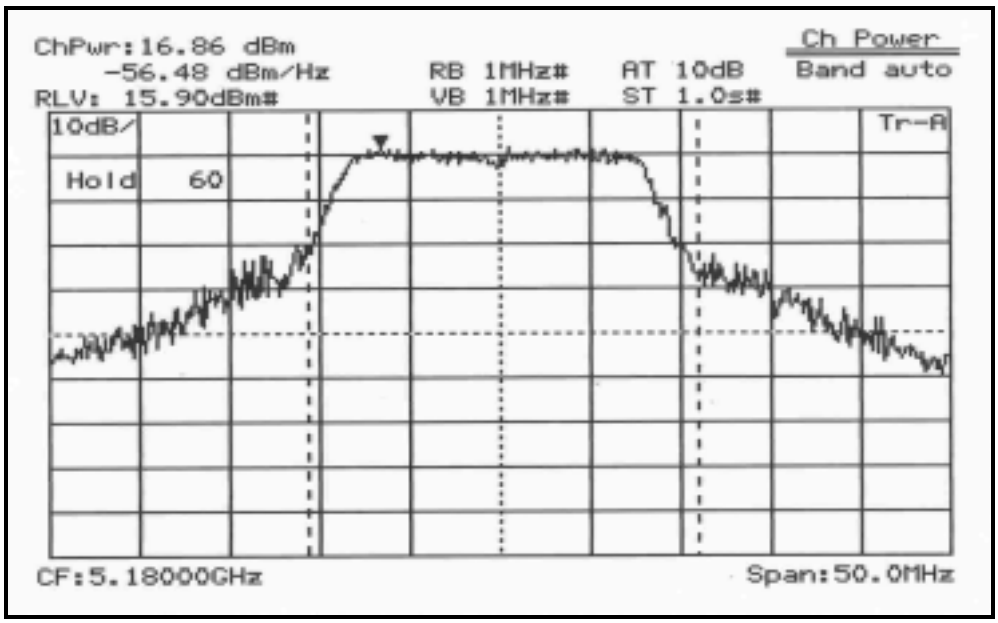
FCC ID : A3LDV50P3W
Test Mode : set to Lowest channel and Middle channel and Highest channel

Channel	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)
1	5180	16.86 (48.53mW)	17.00 (50mW)	0.48 (1.47mW)
4	5240	14.32 (27.04mW)	17.00 (50mW)	4.87 (22.96mW)
5	5260	14.36 (27.29mW)	23.98 (250mW)	10.10 (222.71mW)
8	5320	12.24 (16.75mW)	23.98 (250mW)	12.61 (233.25mW)

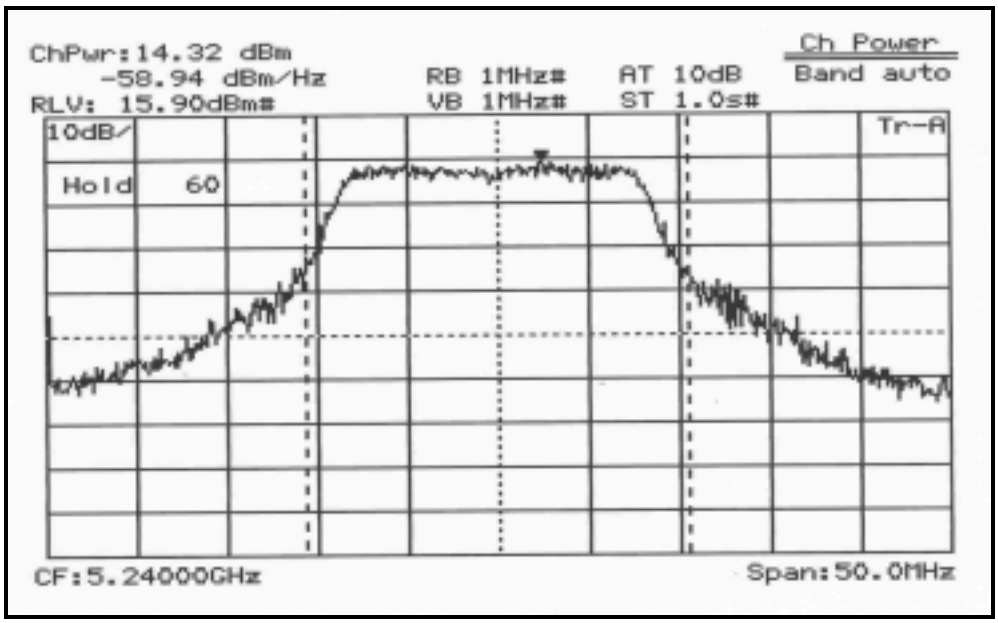
Tested by C.S.Choi

PLOT OF TEST DATA

Peak Conducted Transmit Output Power, Low Channel (5180MHz)

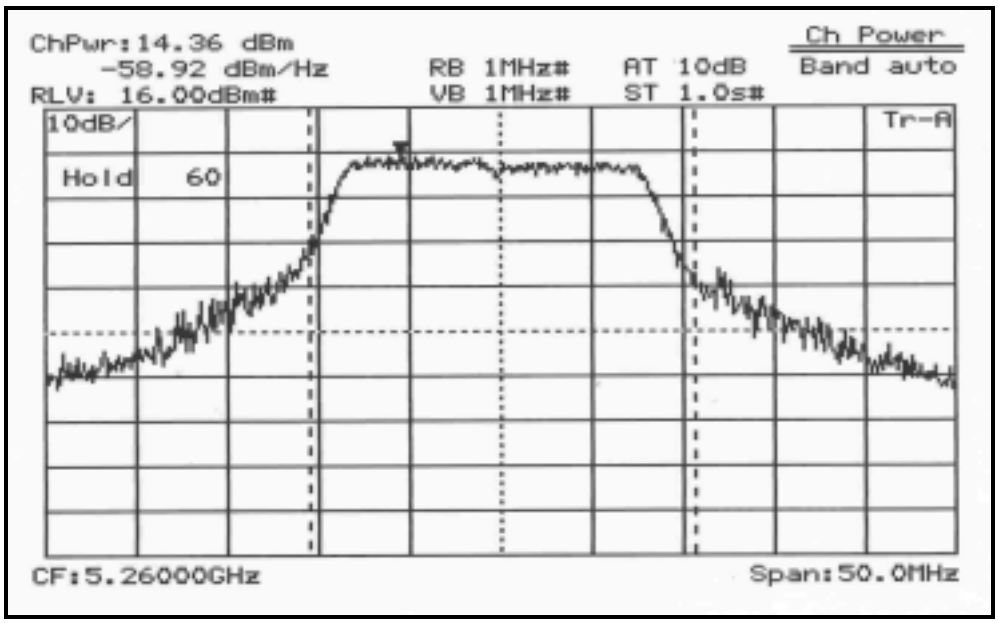


Peak Conducted Transmit Output Power, Middle Channel (5240MHz)

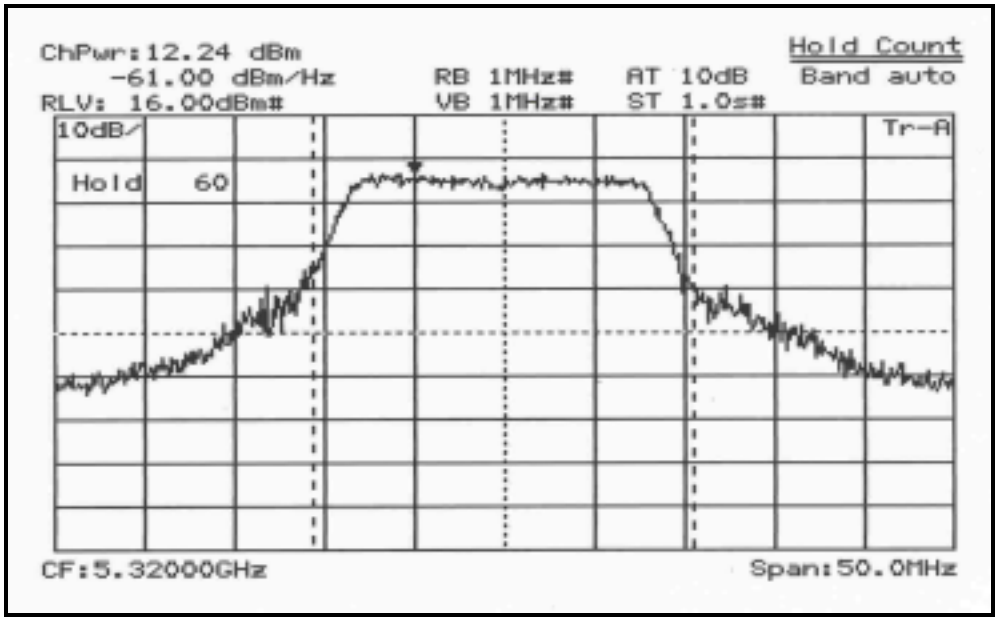


PLOT OF TEST DATA

Peak Conducted Transmit Output Power, Middle Channel (5260MHz)



Peak Conducted Transmit Output Power, High Channel (5320MHz)



TEST DATA

Peak Excursion measurement

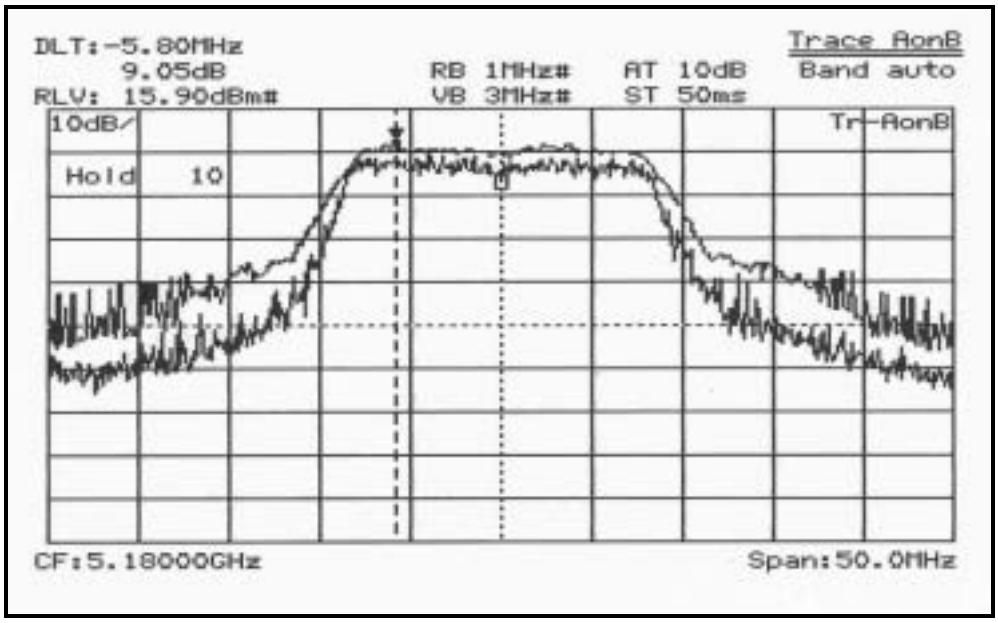
FCC ID : A3LDV50P3W
Test Mode : set to Lowest channel and Middle channel and Highest channel

Channel	Frequency (MHz)	Result (dB)	Limit (dB)	Margin (dB)
1	5180	9.05	13	3.95
4	5240	6.69	13	6.31
5	5260	5.31	13	7.69
8	5320	5.55	13	7.45

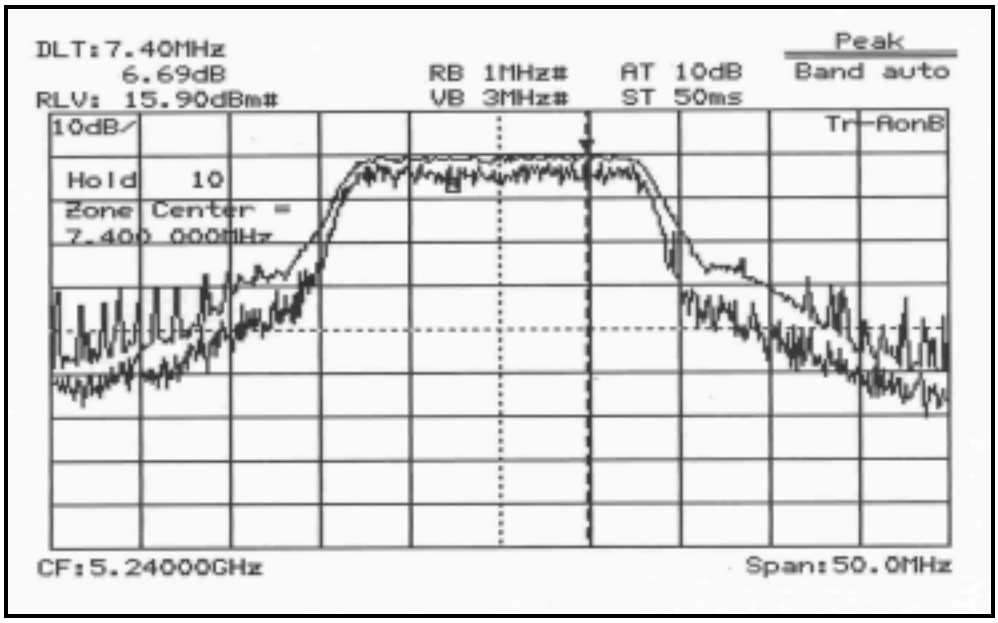
Tested by C.S.Choi

PLOT OF TEST DATA

Peak Excursion measurement, Low Channel (5180MHz)

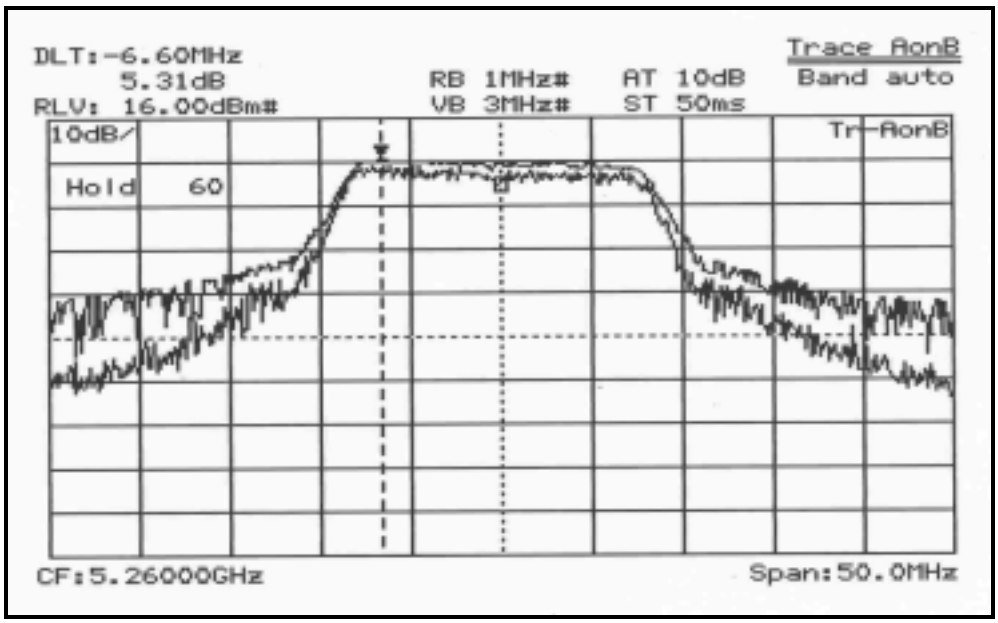


Peak Excursion measurement, Middle Channel (5240MHz)

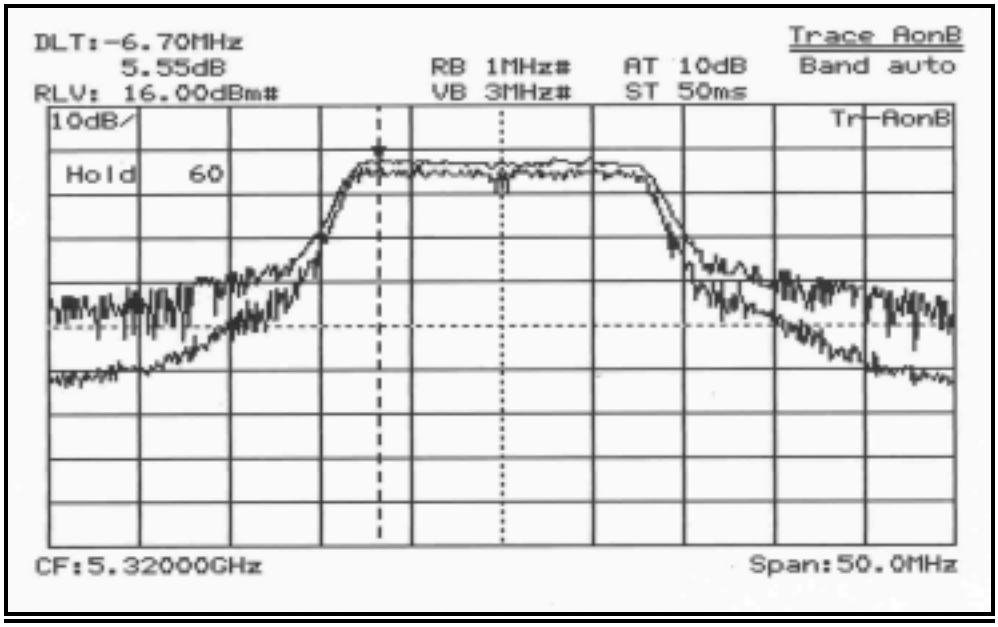


PLOT OF TEST DATA

Peak Excursion measurement, Middle Channel (5260MHz)



Peak Excursion measurement, High Channel (5320MHz)



TEST DATA

Peak Power Spectral Density

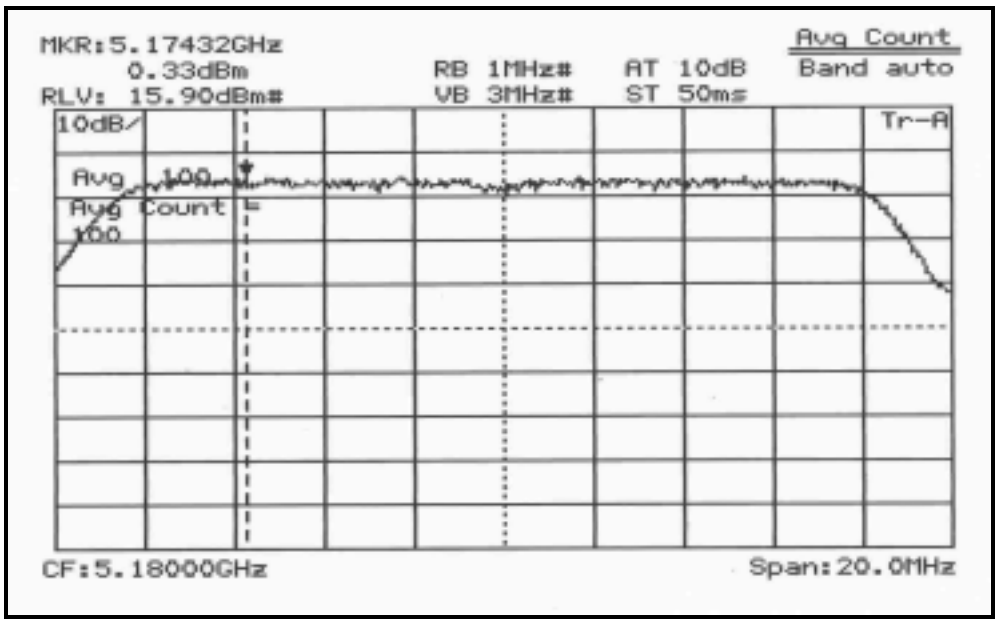
FCC ID : A3LDV50P3W
Test Mode : set to lowest channel and middle channel and highest channel.

Channel	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)
1	5180	0.33	4	3.67
4	5240	-2.69	4	6.69
5	5260	-1.95	11	12.95
8	5320	-4.33	11	15.33

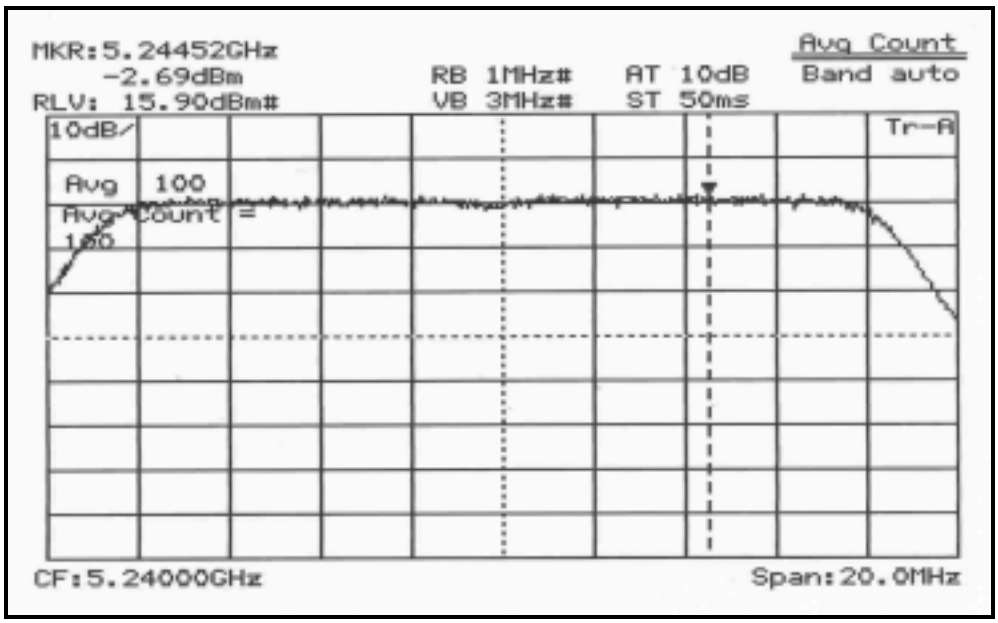
Tested by C.S.Choi

PLOT OF TEST DATA

Peak Power Spectral Density, Low Channel (5180MHz)

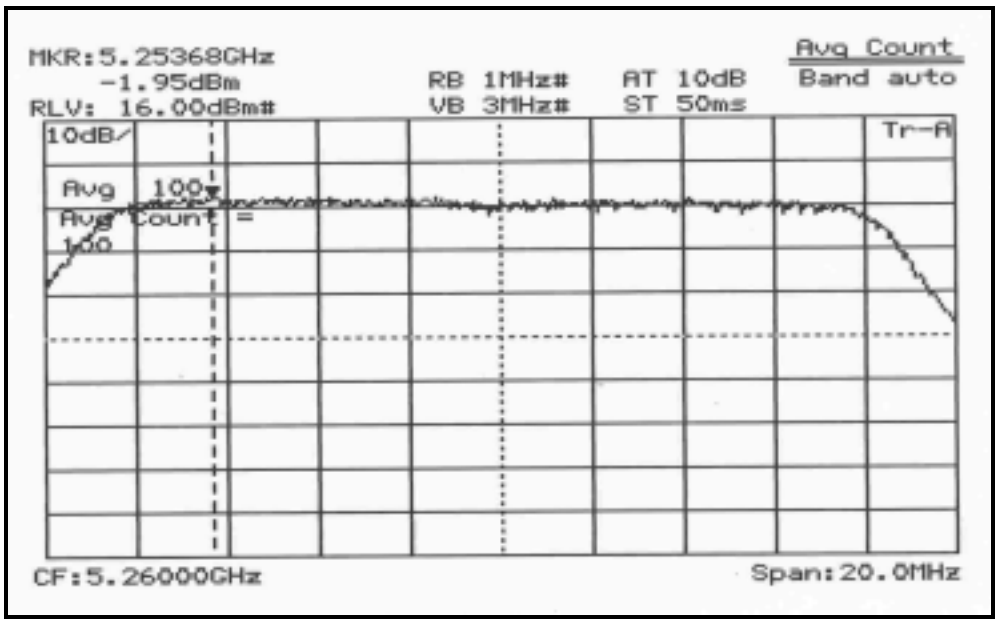


Peak Power Spectral Density, Middle Channel (5240MHz)

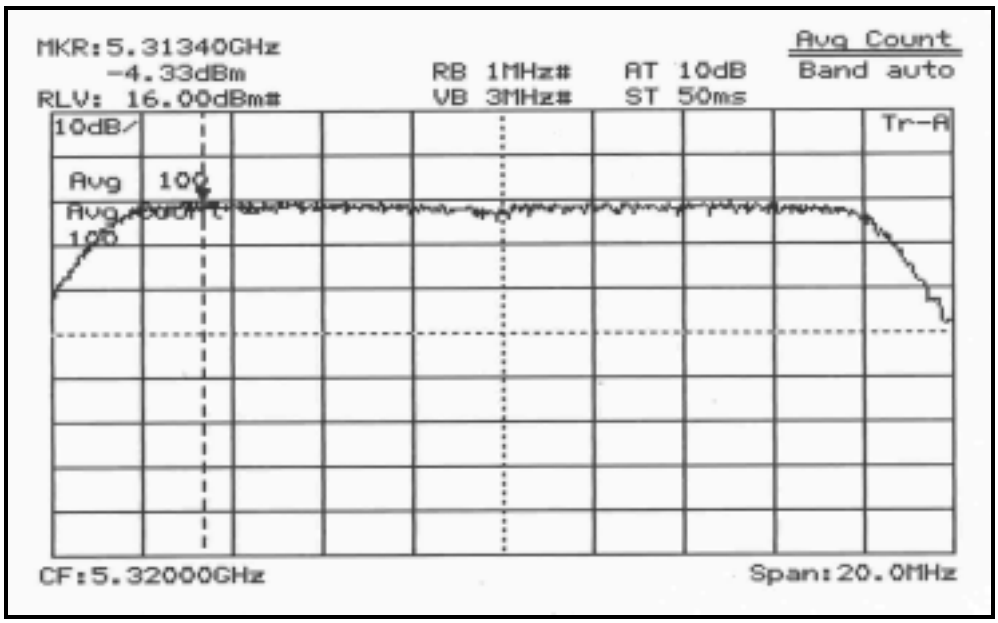


PLOT OF TEST DATA

Peak Power Spectral Density, Middle Channel (5260MHz)



Peak Power Spectral Density, High Channel (5320MHz)



TEST DATA

Band Edge

FCC ID : A3LDV50P3W
Test Mode : set to Lowest channel and Highest channel

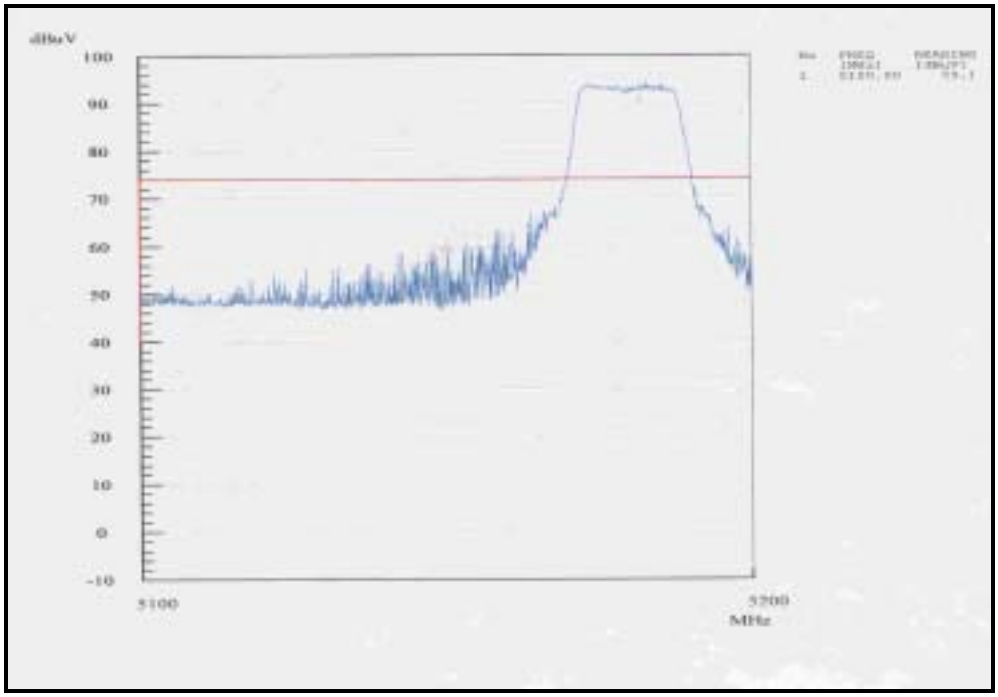
Channel Frequency (MHz)	Frequency (MHz)	Pol *	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
			Peak	AVG	Peak	AVG	Peak	AVG
1 (5180MHz)	5150	H	59.1	37.6	74	54	14.9	16.4
		V	64.9	40.5	74	54	9.1	13.5
8 (5320MHz)	5350	H	54.0	36.4	74	54	20.0	17.6
		V	60.2	39.1	74	54	13.8	14.9

NOTES:
**Pol. H =Horizontal V=Vertical*

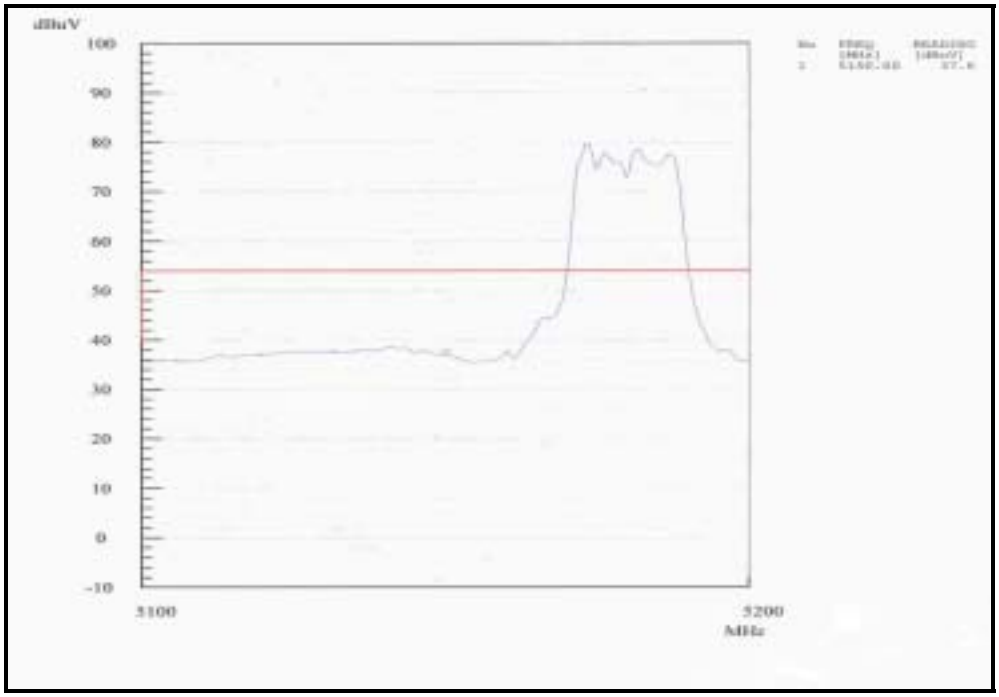
Tested by C.S.Choi

PLOT OF TEST DATA

Band edge at 5.15GHz, Horizontal, Low Channel(Peak)

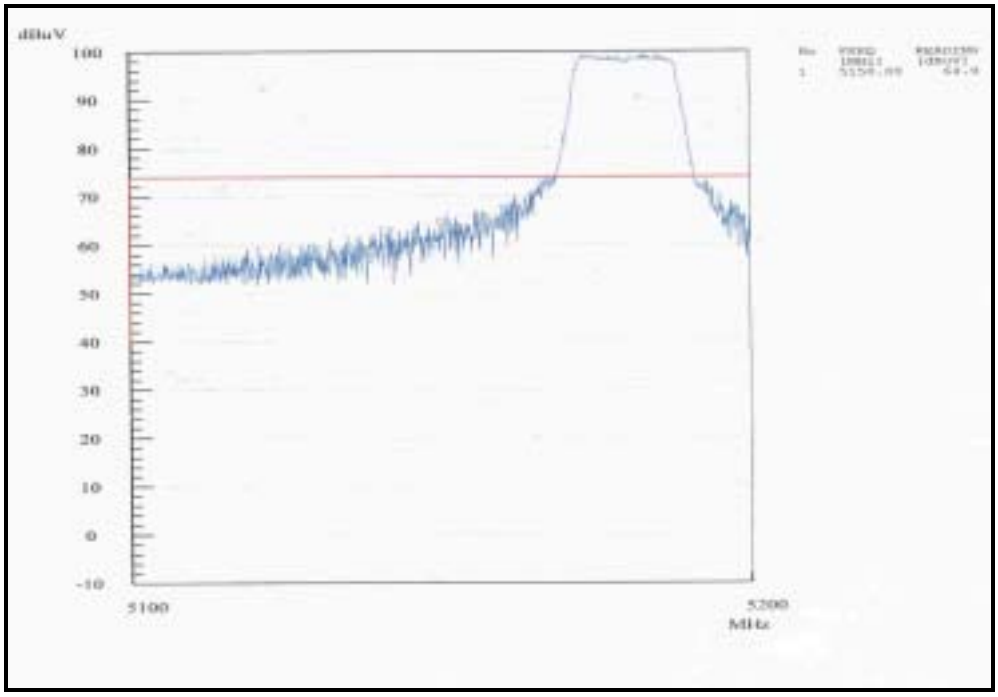


Band edge at 5.15GHz, Horizontal, Low Channel(Avg)

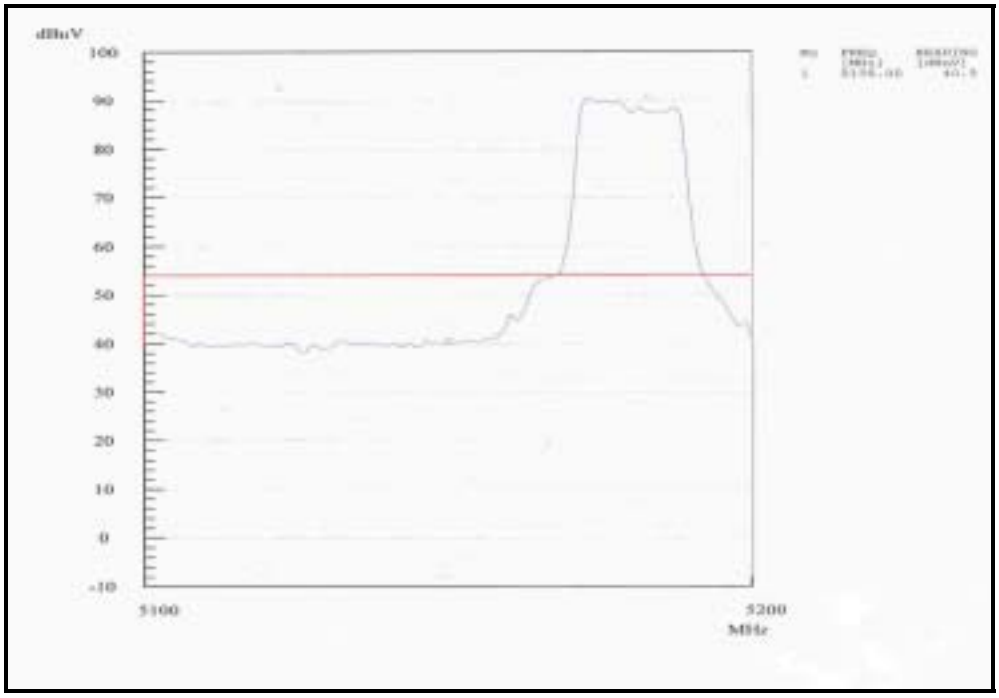


PLOT OF TEST DATA

Band edge at 5.15GHz, Vertical, Low Channel(Peak)

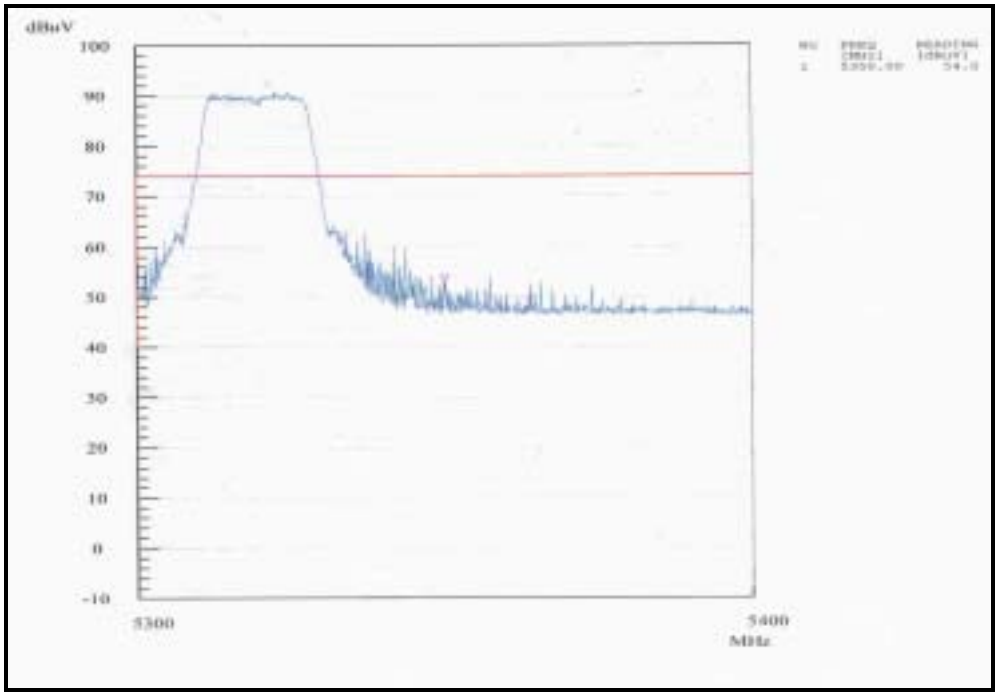


Band edge at 5.15GHz, Vertical, Low Channel(Avg)

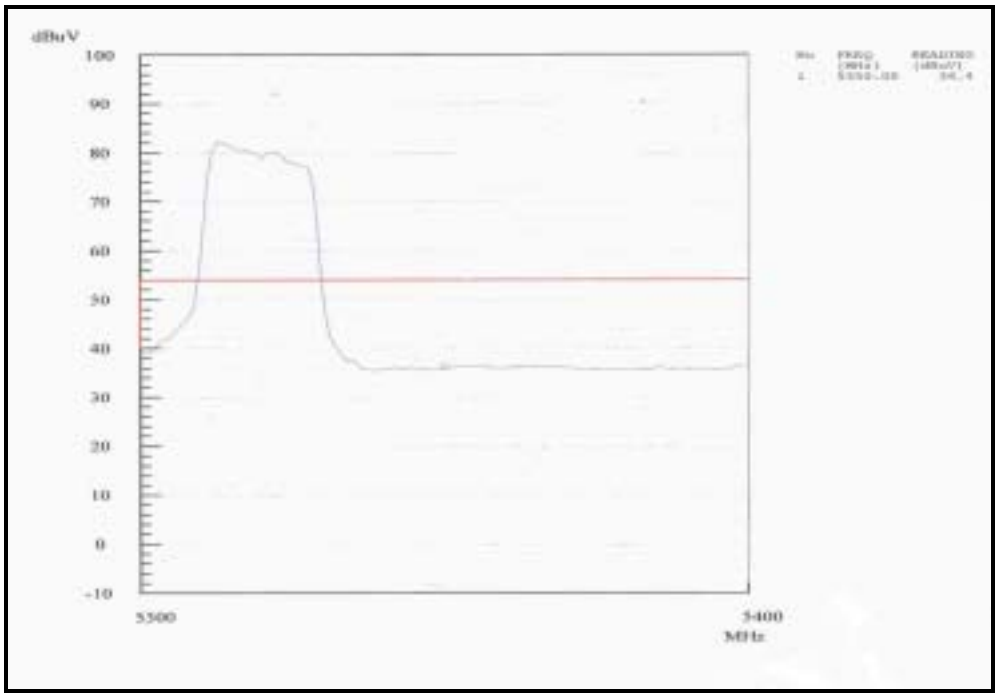


PLOT OF TEST DATA

Band edge at 5.35GHz, Horizontal, high Channel(Peak)

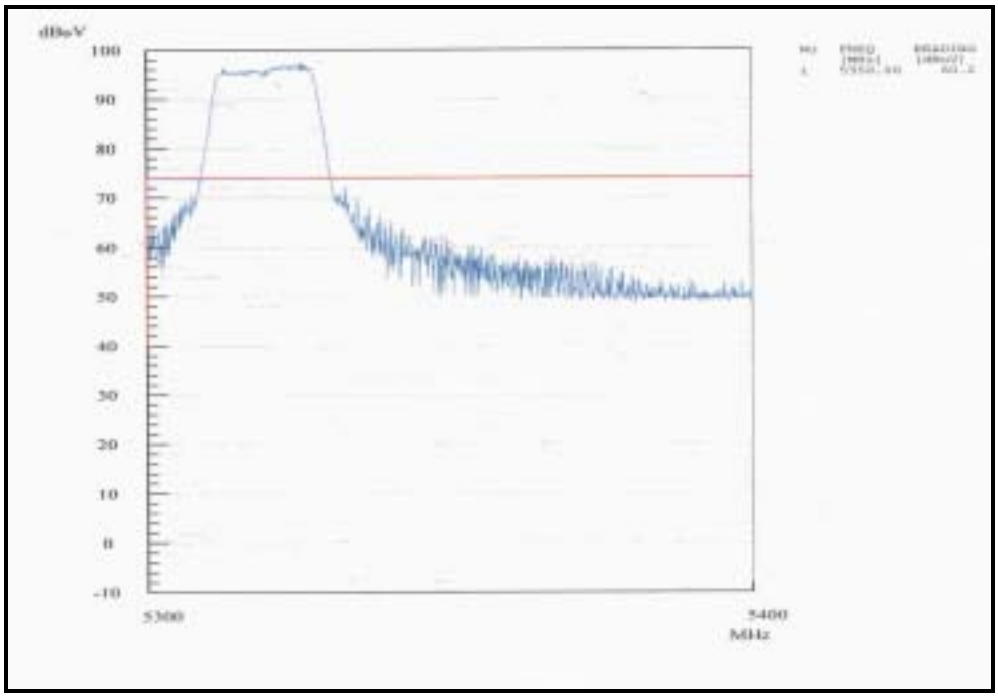


Band edge at 5.35GHz, Horizontal, High Channel(Avg)

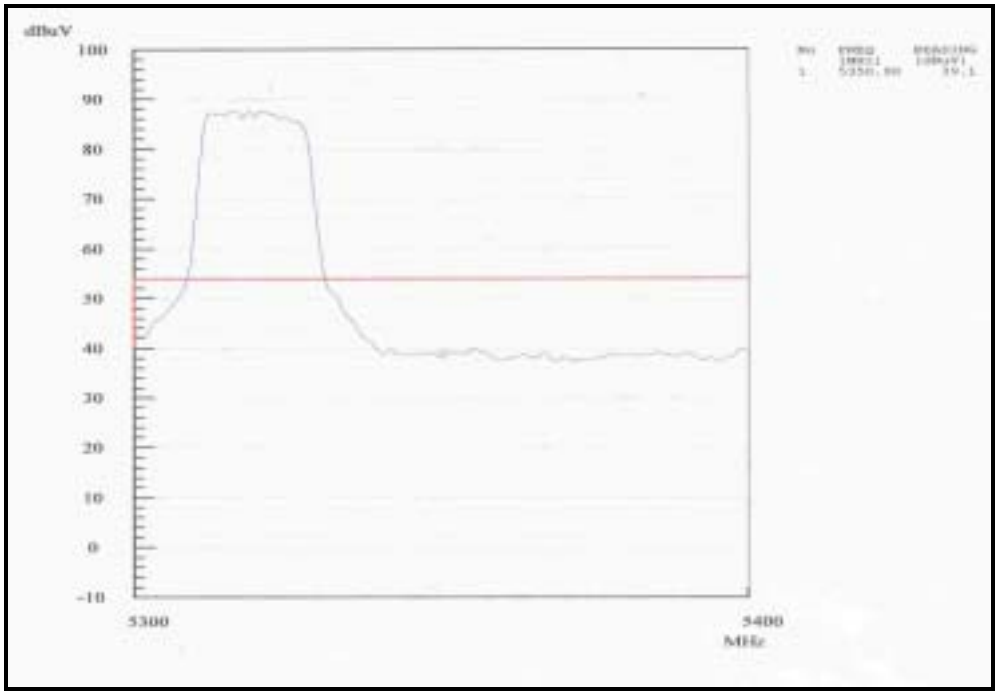


PLOT OF TEST DATA

Band edge at 5.35GHz, Vertical, high Channel(Peak)



Band edge at 5.35GHz, Vertical, High Channel(Avg)



PLOT OF TEST DATA

Conducted Spurious Emission

FCC ID : A3LDV50P3W

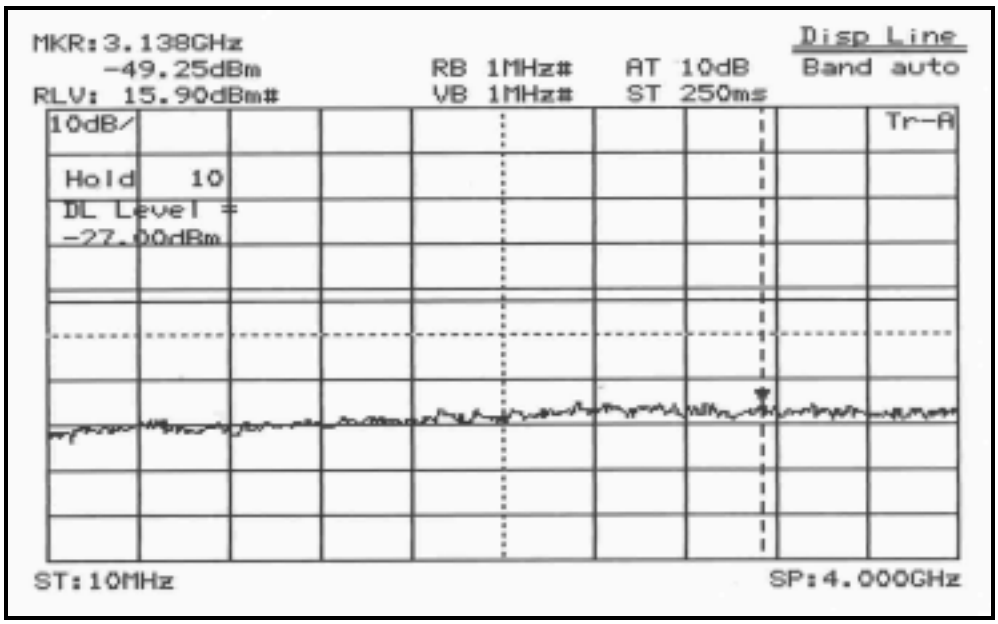
Test Mode : set to Lowest channel and Middle channel and Highest channel

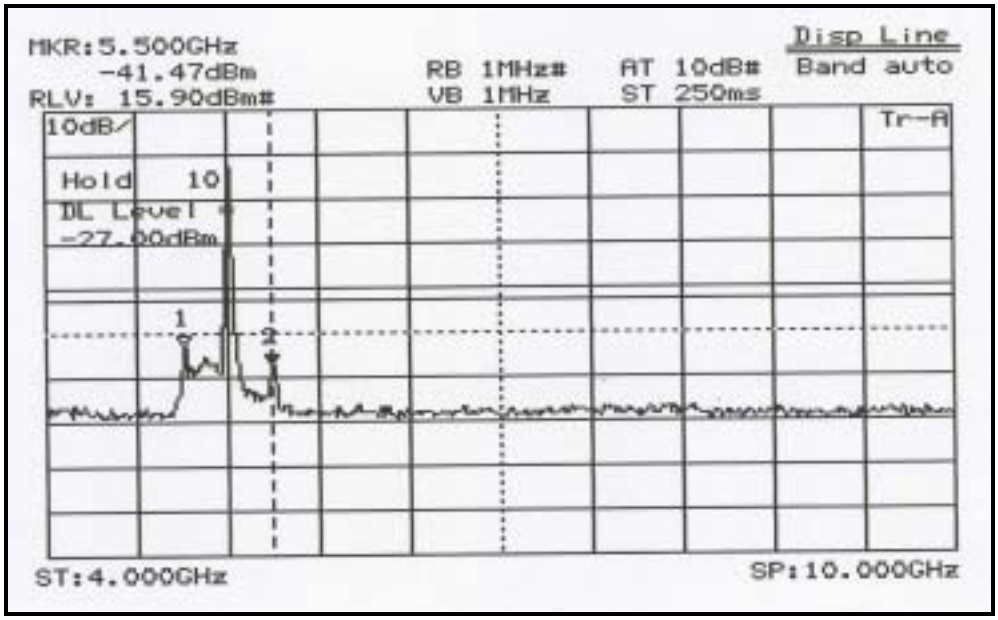
Channel Frequency (MHz)	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)
1 (5180MHz)	4924	-37.20	-27	10.20
	5500	-41.47	-27	14.47
4 (5240MHz)	4936	-38.15	-27	11.15
	5524	-42.98	-27	15.98
5 (5260MHz)	4936	-32.70	-27	5.70
	5536	-39.78	-27	12.78
8 (5320MHz)	4924	-31.64	-27	4.64
	5680	-46.48	-27	19.48

Tested by C.S.Choi

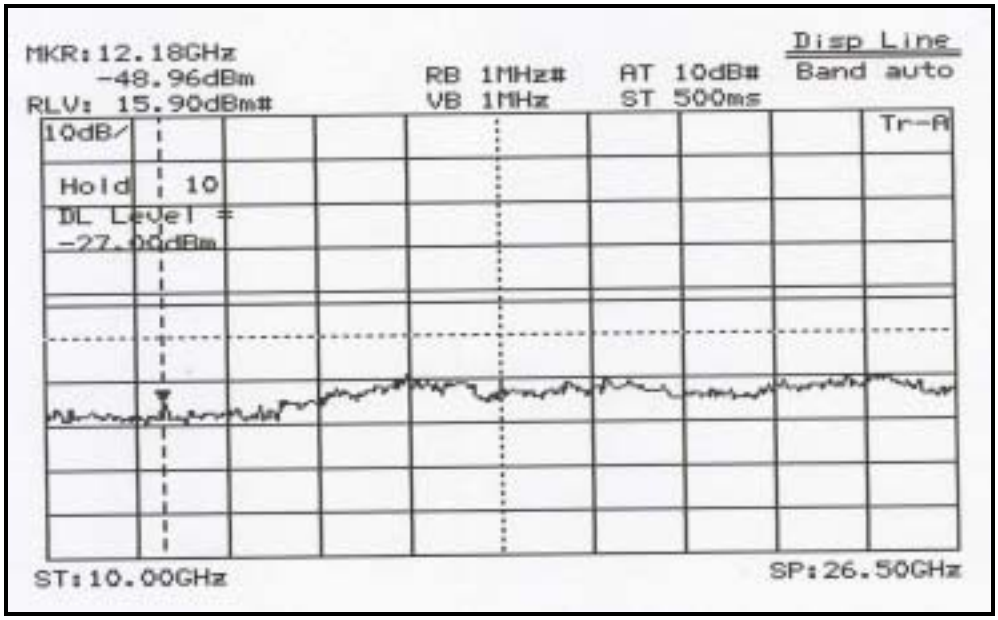
PLOT OF TEST DATA

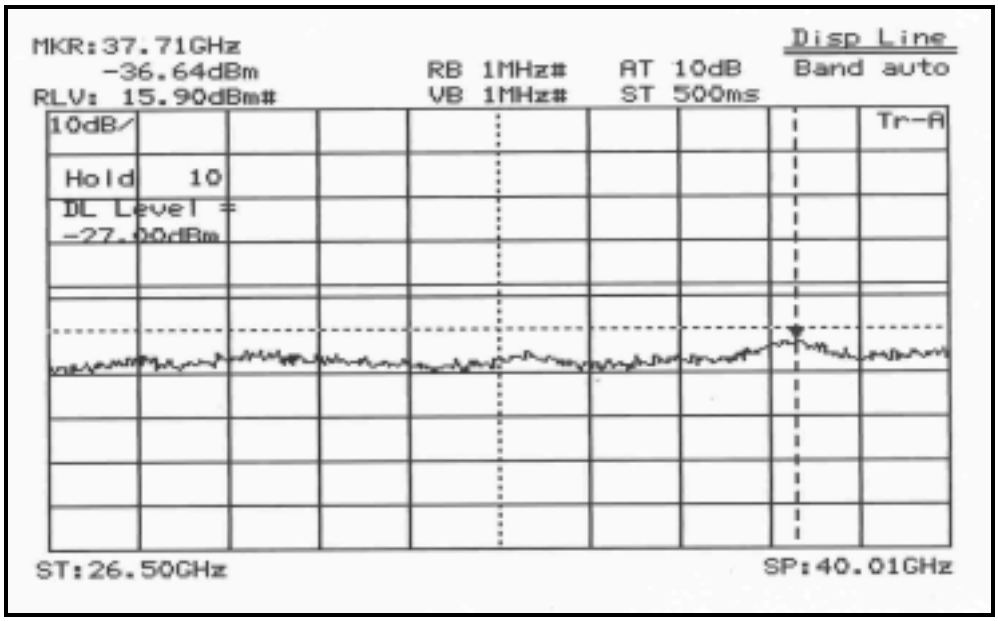
Conducted Spurious Emission, Low Channel (5180MHz)



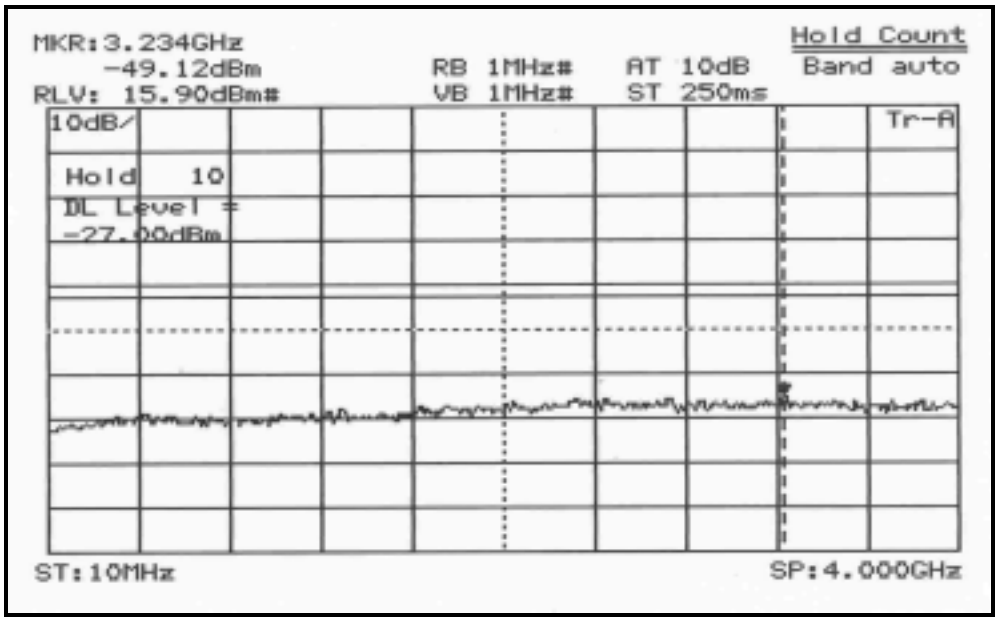


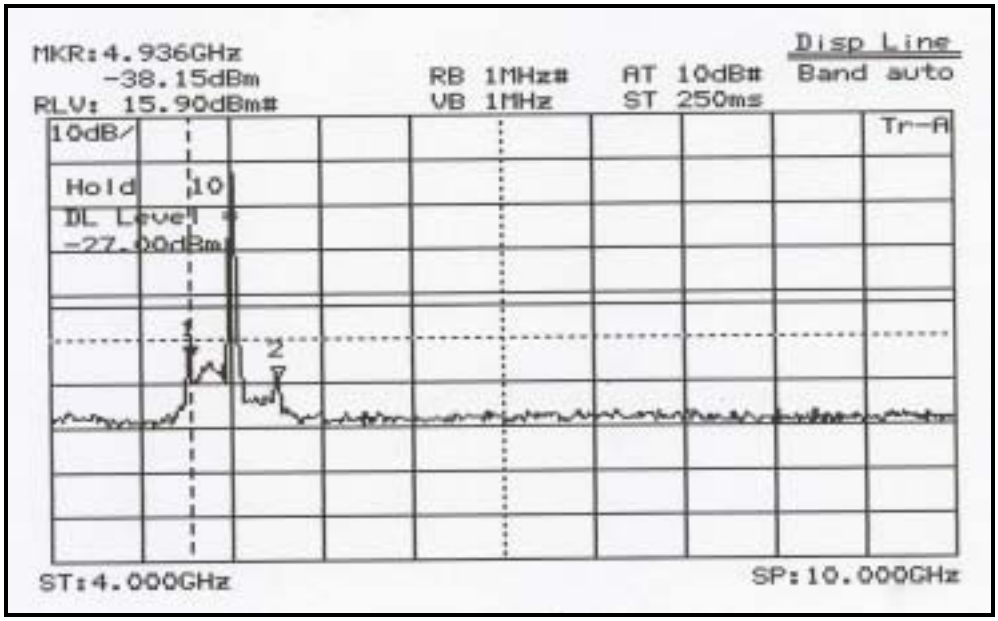
Conducted Spurious Emission, Low Channel (5180MHz)-Continued



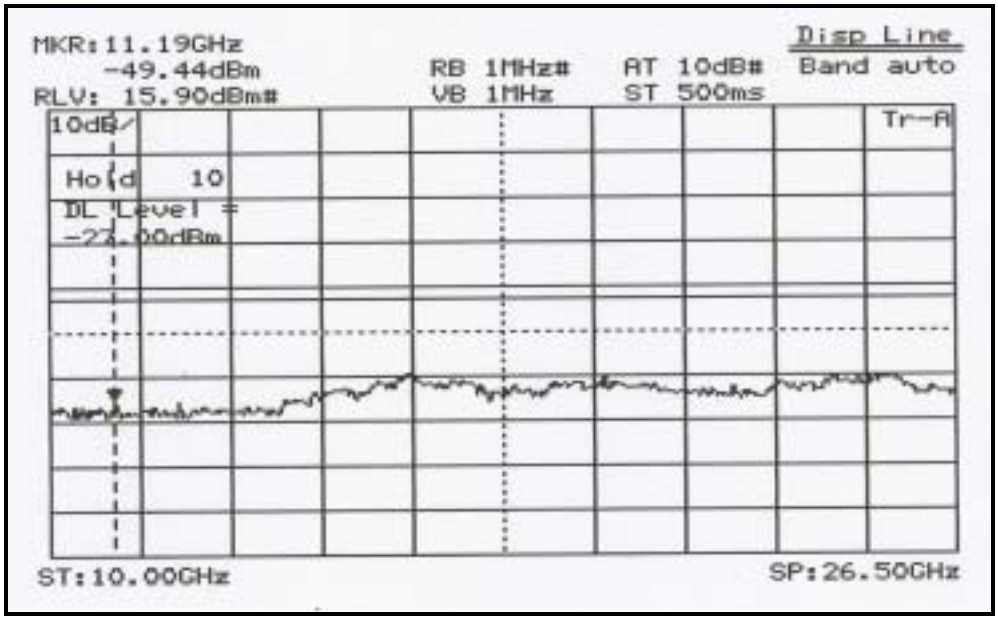


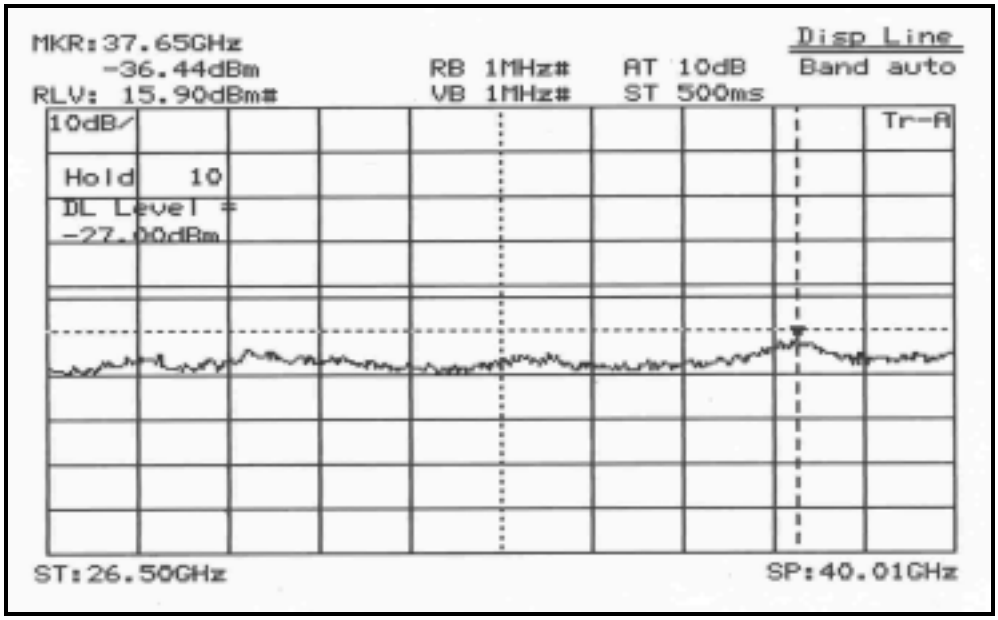
Conducted Spurious Emission, Middle Channel (5240MHz)





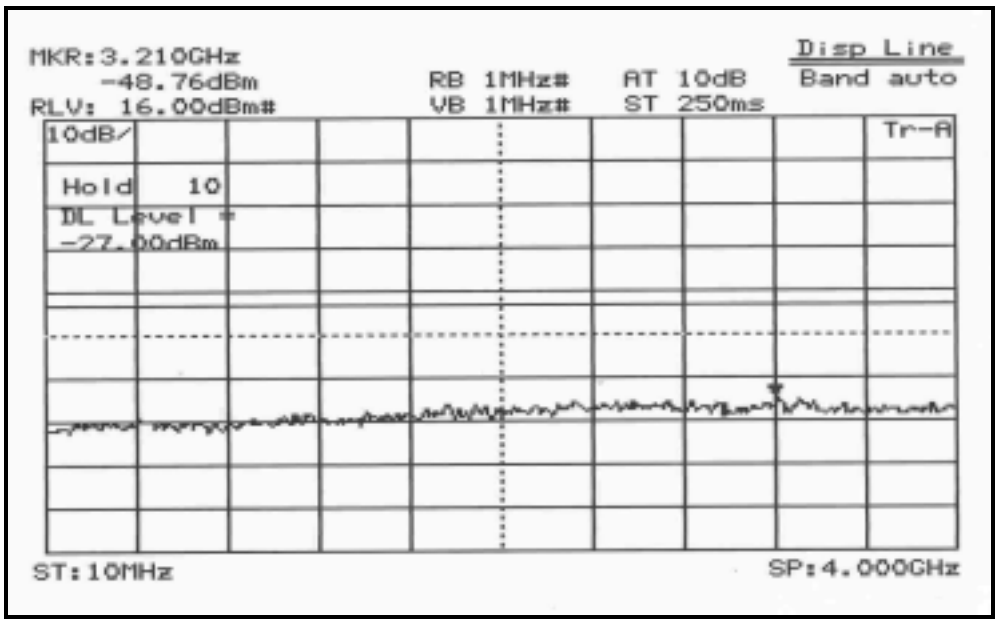
Conducted Spurious Emission, Middle Channel (5240MHz)-Continued

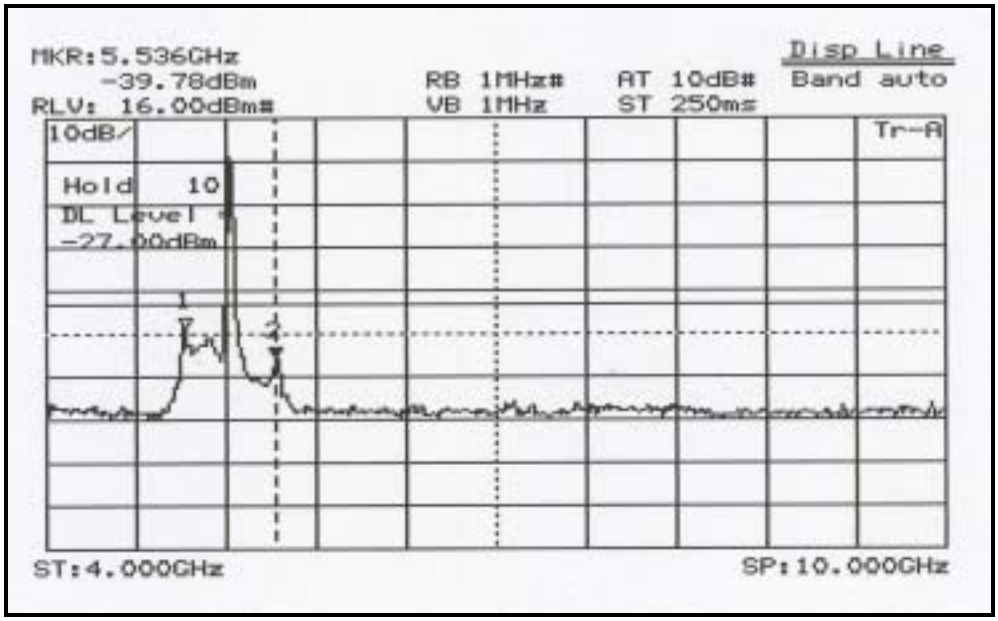




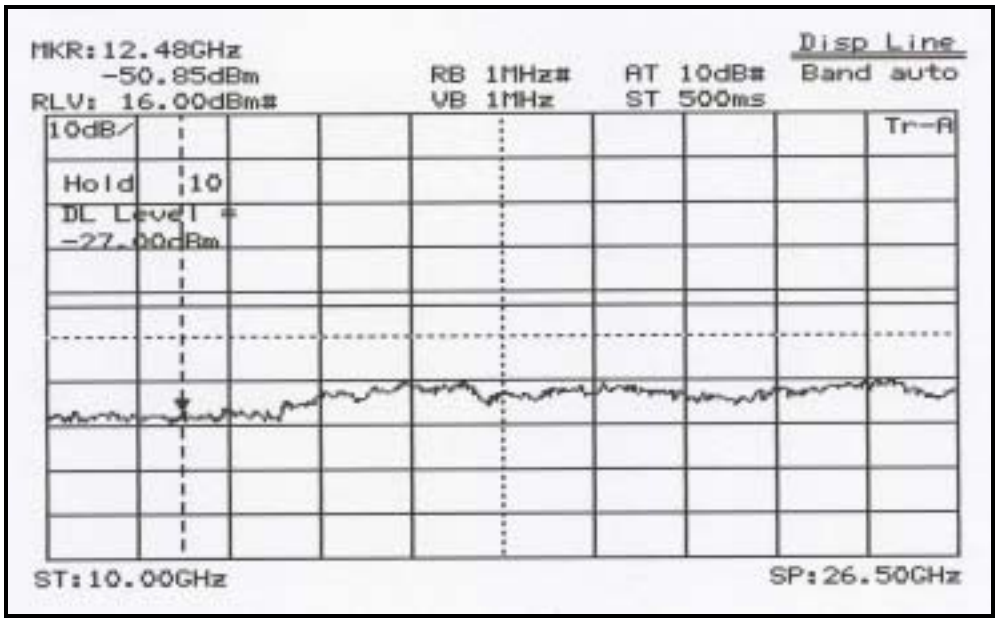
PLOT OF TEST DATA

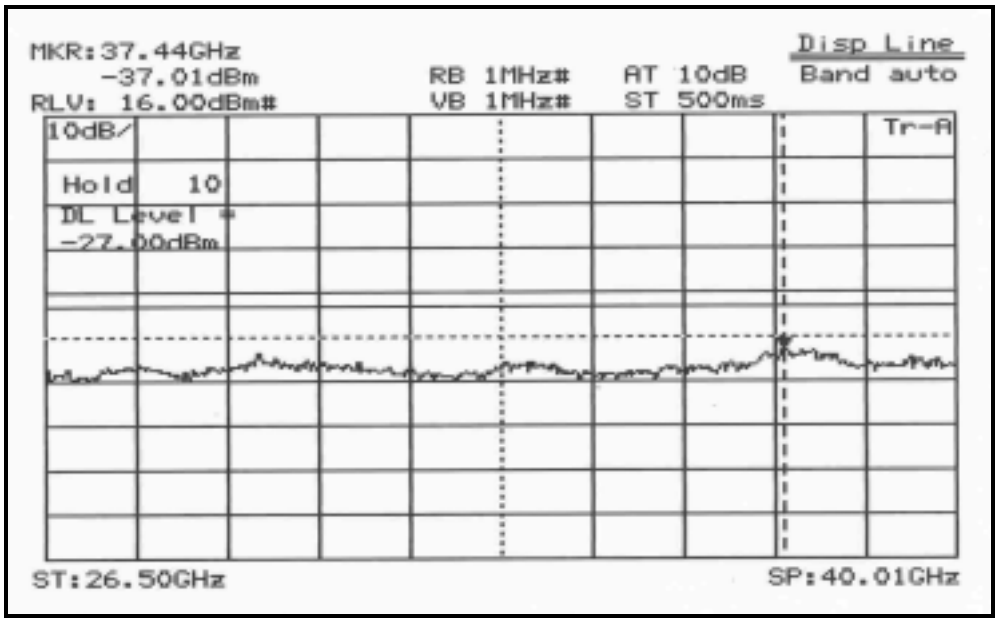
Conducted Spurious Emission, Middle Channel (5260MHz)



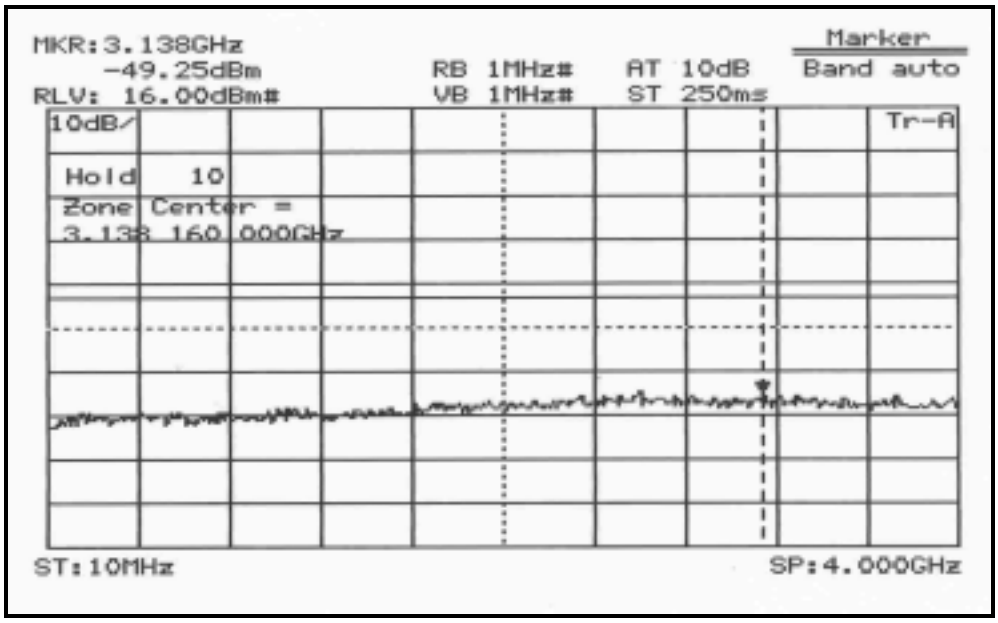


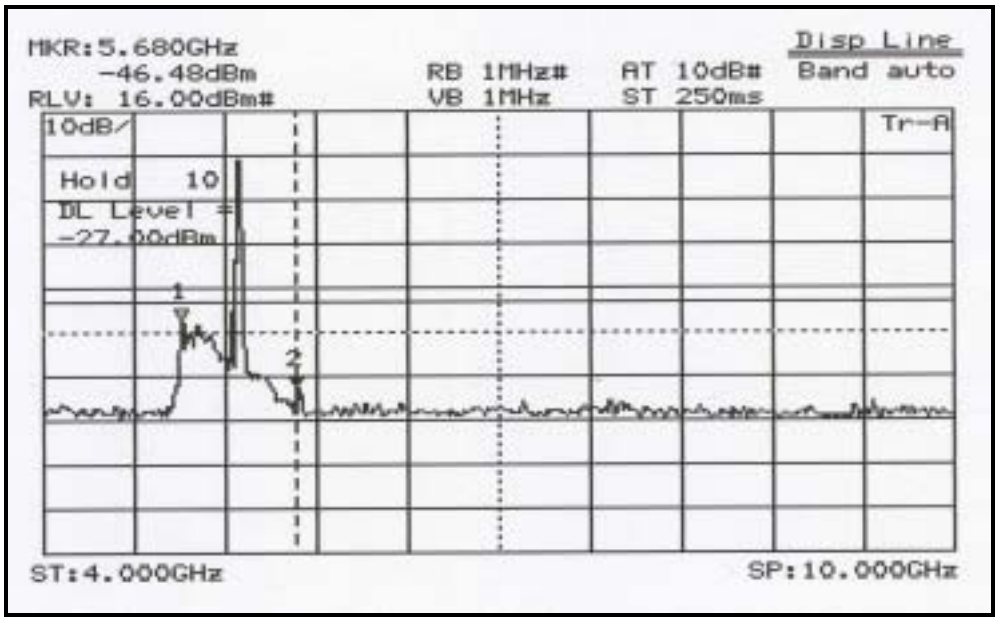
Conducted Spurious Emission, Middle Channel (5260MHz)-Continued



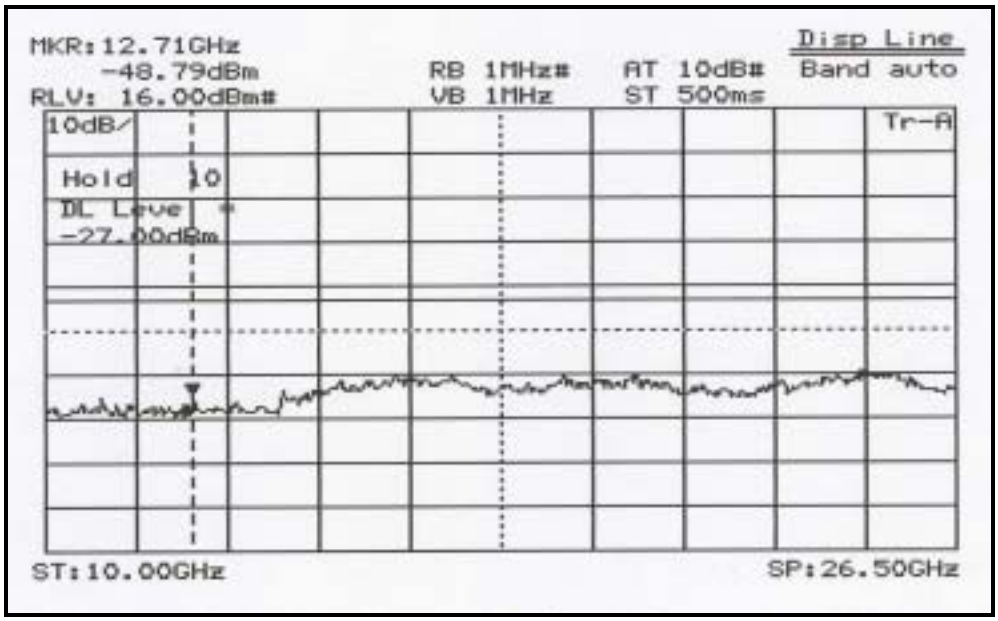


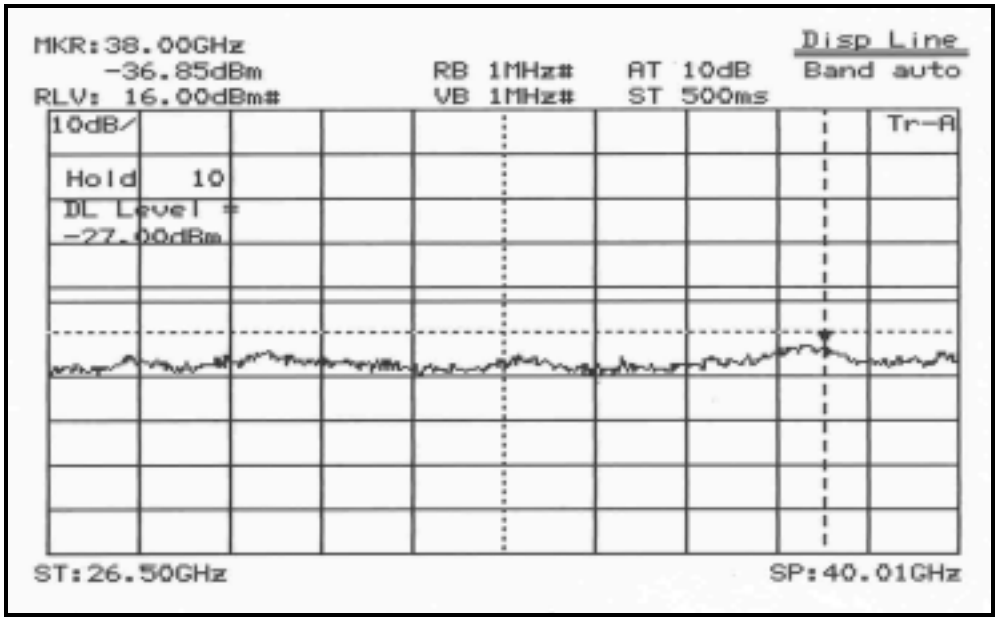
Conducted Spurious Emission, High Channel (5320MHz)





Conducted Spurious Emission, High Channel (5320MHz)-Continued





TEST DATA

Frequency Stability

Operating frequency (5.18GHz)

Temp.	Power Supply	2Min.(Hz)	5Min.(Hz)	10Min.(Hz)
+20℃	138Volt	-7,271	-7,586	-7,752
	120Volt	-7,237	-7,608	-7,819
	102Volt	-7,251	-7,625	-7,848
+50℃	138Volt	-7,354	-7,618	-7,851
	120Volt	-7,498	-7,627	-7,788
	102Volt	-7,512	-7,621	-7,775
-20℃	138Volt	-7,824	-7,946	-7,968
	120Volt	-7,934	-7,961	-7,983
	102Volt	-7,951	-7,983	-7,993

Operating frequency (5.32GHz)

Temp.	Power Supply	2Min.(Hz)	5Min.(Hz)	10Min.(Hz)
+20℃	138Volt	-7,331	-7,624	-7,832
	120Volt	-7,352	-7,631	-7,861
	102Volt	-7,382	-7,659	-7,899
+50℃	138Volt	-7,394	-7,575	-7,675
	120Volt	-7,412	-7,601	-7,688
	102Volt	-7,444	-7,621	-7,722
-20℃	138Volt	-8,022	-8,108	-8,311
	120Volt	-8,053	-8,131	-8,342
	102Volt	-8,067	-8,162	-8,364

TEST DATA

MAXIMUM PERMISSIBLE EXPOSURE

RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Average Time (Minutes)
(A) Limits for Occupational / Control Exposure				
30 - 300	6.14	0.163	1.0	6
300 - 1500	…	…	F/300	6
1500 - 100000	…	…	5	6
(B) Limits for General Population / Uncontrolled Exposure				
30 - 300	27.5	0.073	0.2	30
300 - 1500	…	…	F/1500	30
1500 - 100000	…	…	1	30

F = Frequency (MHz)

Fries Formula

Fries transmission formula : $Pd = (Pout * G) / (4 * \pi * r^2)$

$r = \sqrt{((Pout * G) / 4 * \pi * Pd)}$

Where

Pd = Power density in mW/cm²

Pout = Output power to antenna in mW

G = Gain of antenna in linear scale

$\pi = 3.1416$

r = Distance between observation point center of the radiator in cm

Pd is the limit of MPE, 1 mW/cm². If we know the Maximum Gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

TEST DATA

Test Result

The maximum antenna gain is –3.35dBi or 0.462(Numeric)

Output power into antenna and RF Exposure Distance

Channel	Frequency (MHz)	Output power to Antenna (mW)	RF Exposure Distance (cm)
1	5180	48.53mW	1.34
4	5240	27.04mW	1.00
5	5260	27.29mW	1.00
8	5320	16.75mW	0.78

MPE Safe Distance = 1.34cm

ACCURACY OF MEASUREMENT

The Measurement Uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with the confidence level of 95%

1. Radiation Uncertainty Calculation

Contribution	*Probability Distribution*	*Uncertainty(+/-dB)*
Antenna Factor	Normal (k=2)	± 0.5
Cable Loss	Normal (k=2)	± 0.04
Receiver Specification	Rectangular	± 2.0
Antenna directivity	Rectangular	± 1.0
Antenna Factor variation with Height		
Antenna Phase Center Variation		
Antenna Factor Frequency Interpolation		
Measurement Distance Variation		
Site Inperfections	Rectangular	± 2.0
Mismatch:Receiver VRC ri=0.3 Antenna VRC rR=0.1(Bi)0.4(Lp) Uncertainty Limits 20Log(1+/-ri rR)	U-Shaped	＋ 0.25 / - 0.26
System Repeatibilty	Std.deviation	± 0.05
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.77
Expended Uncertainty U	Normal (k=2)	± 3.5

2. Conducted Uncertainty Calculation

Contribution	*Probability Distribution*	*Uncertainty(+/-dB)*
Receiver Specification	Normal (k=2)	± 2.0
LISN coupling spec.	Normal (k=2)	± 0.4
Cable and input attenuator cal.	Rectangular	± 0.4
Mismatch:Receiver VRC ri=0.3 LISN vrc rg=0.1 Uncertainty Limits 20Log(1+/-ri rR)	U-Shaped	± 0.26
System Repeatibilty	Std.deviation	± 0.68
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.18
Expended Uncertainty U	Normal (k=2)	± 2.4

TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Calibration Date
1	*Test Receiver	Rohde&Schwarz	ESCS30	2003.09
2	*Spectrum Analyzer	Advantest	R3265A	2003.12
3	*Spectrum Analyzer	Anritsu Corp.	MS2668C	2003.12
4	*Spectrum Analyzer	H/P	8566B	2004.03
5	*Frequency Counter	Anritsu Corp.	MF2414B	2003.12
6	Attenuator	H/P	8489A	2003.12
7	*Attenuator	H/P	8491B	2003.12
8	*Amplifier	H/P	8447F	2003.11
9	*Amplifier	H/P	8449B	2004.03
10	*Logbicon Super Antenna	Schwarzbeck	VULB9166	2003.05
11	*Biconical Log Antenna	ARA	LPB-2520/A	2004.01
12	*Horn Antenna	Schwarzbeck	BBHA9120D	2003.05
13	*Horn Antenna	Schwarzbeck	BBHA9170	2003.11
14	Dipole Antenna	Rohde&Schwarz	VHA9103	2003.05
15	Dipole Antenna	Rohde&Schwarz	UHA9105	2003.05
16	*Signal Generator	Rohde&Schwarz	SMR40	2003.11
17	*LISN	Kyoritsu	KNW-408	2003.12
18	*LISN	Rohde&Schwarz	ESH3-Z5	2003.11
19	*Temp./Humi Chamber	KyunPoong	FX1077B	2003.12
20	*Position Controller	EM Eng.	N/A	N/A
21	*Turn Table	EM Eng.	N/A	N/A
22	*Anechoic Chamber	EM Eng.	N/A	N/A
23	*Shielded	EM Eng.	N/A	N/A
24	*Antenna Master	EM Eng.	N/A	N/A

*) Test equipment used during the test

APPENDIX A – LABELLING REQUIREMENTS

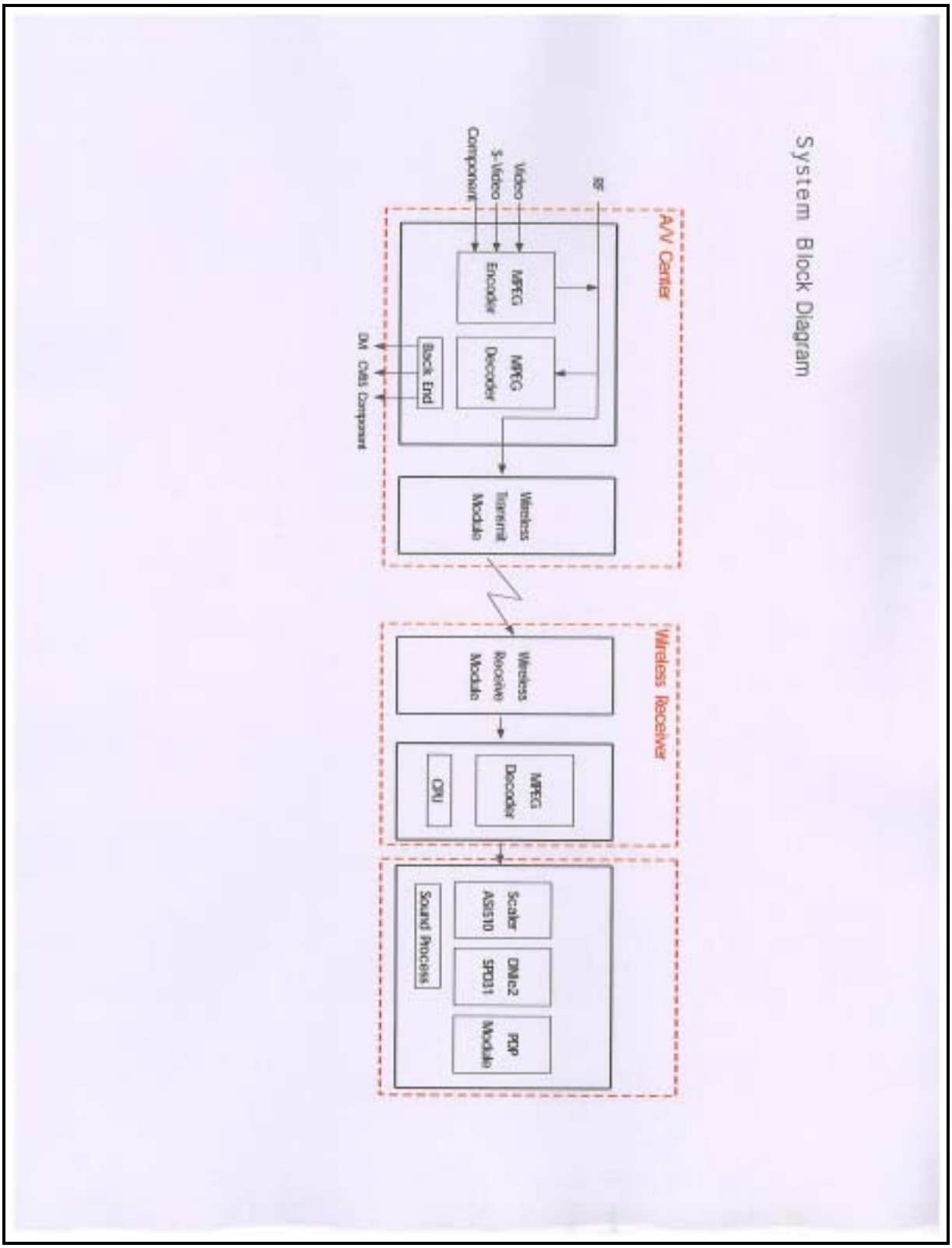
Labelling Requirements

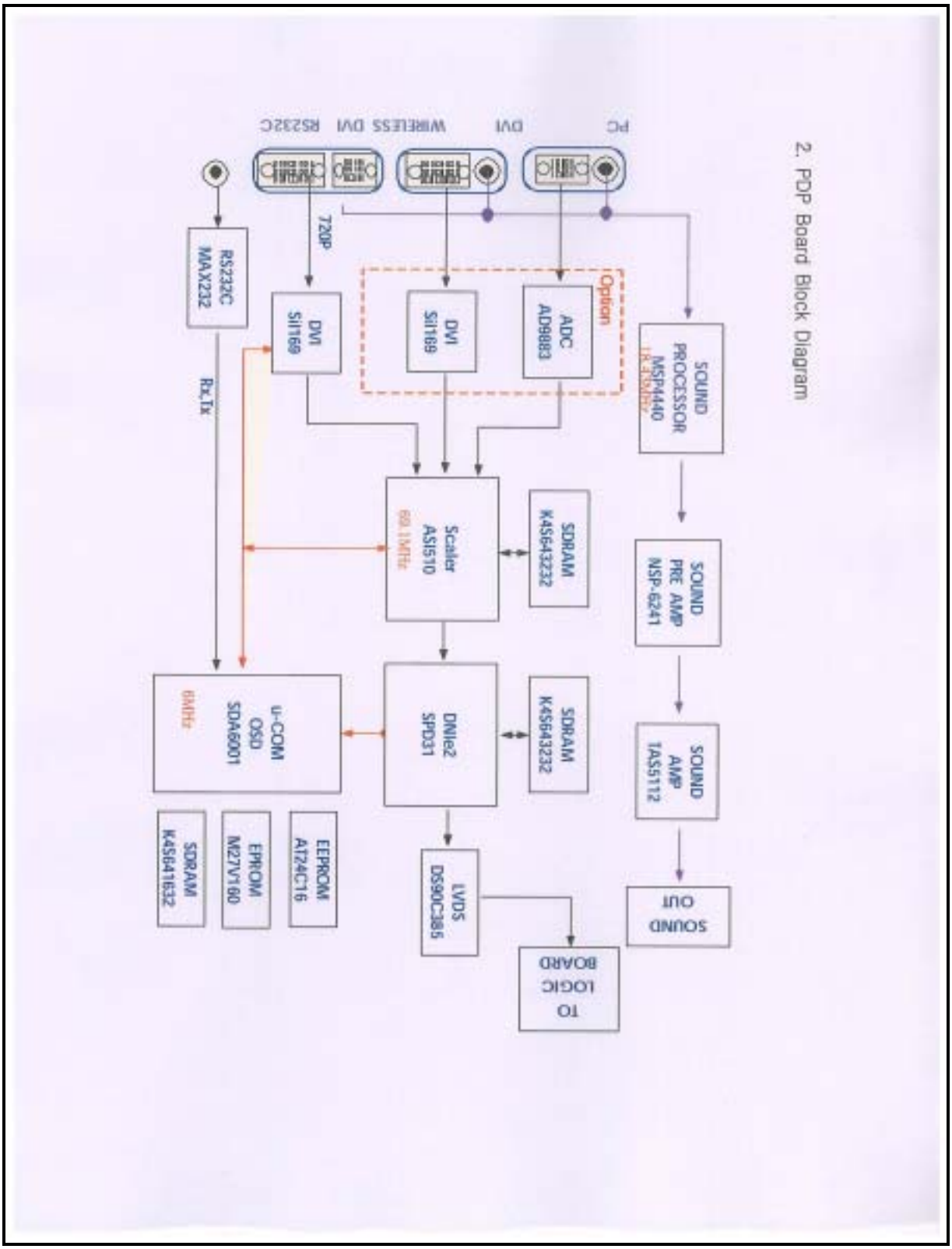
The sample label shown shall be *permanently affixed* at a conspicuous location on the device and be readily visible to the user at the time of purchase.

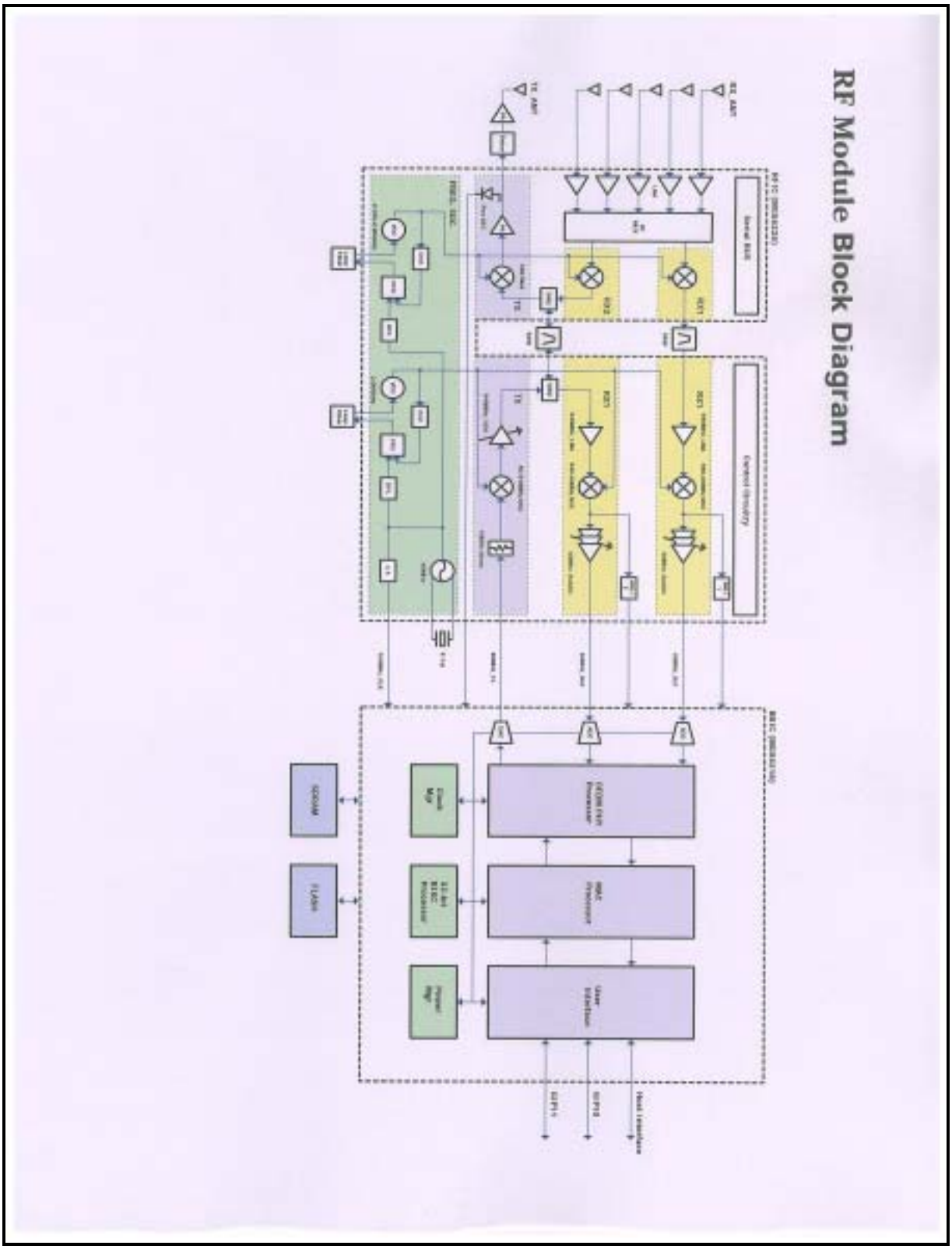
FCC ID: A3LDV50P3W
Brand Name: SAMSUNG
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

- **FCC ID Location of EUT**

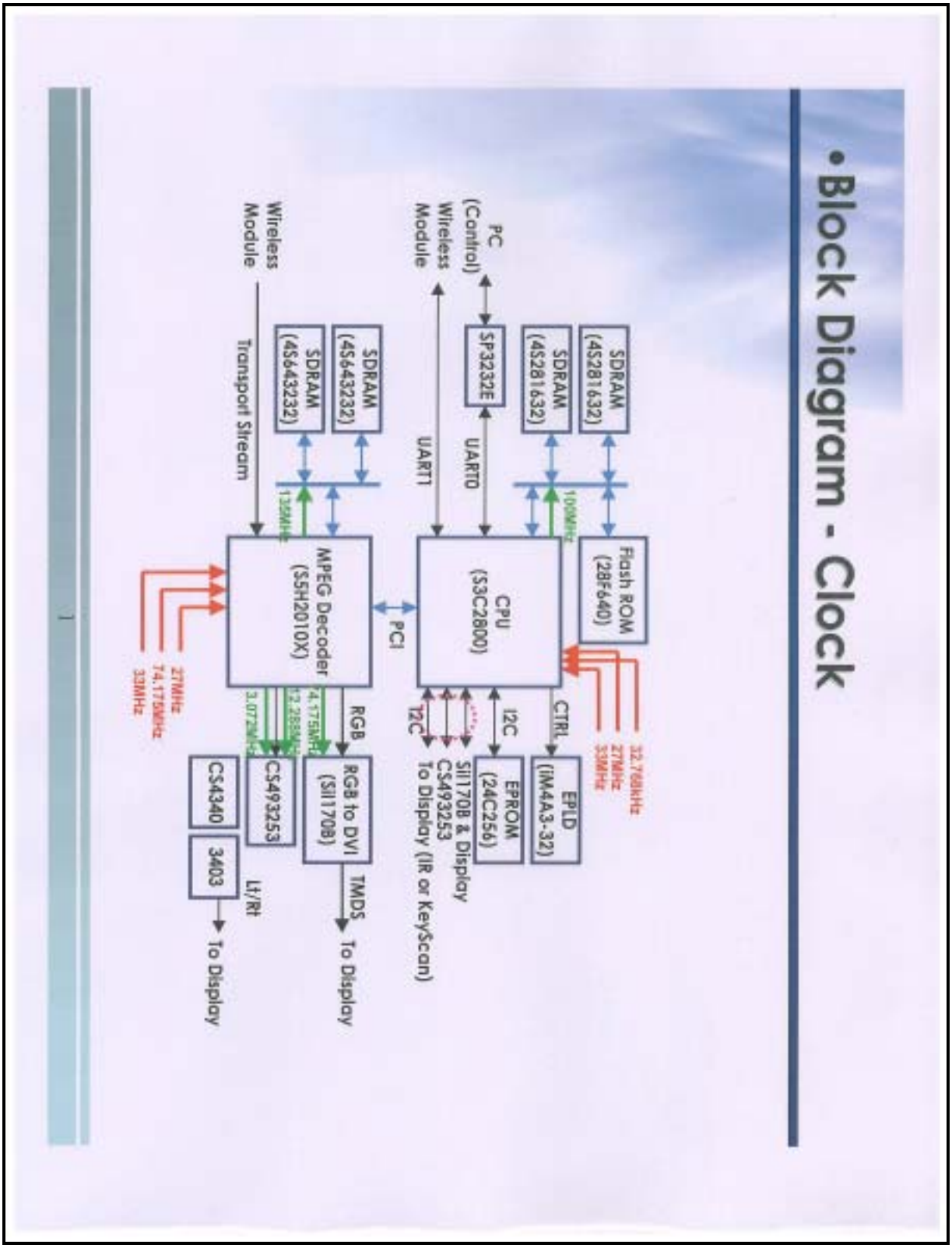
APPENDIX B – BLOCK DIAGRAM




2. PDP Board Block Diagram
PC
DVI
WIRELESS DVI
RS232C
SOUND PROCESSOR MSP4440
SOUND PRE AMP NSP-6241
SOUND AMP TAS5112
SOUND OUT
Option
ADC AD9883
DVI Sil169
DVI Sil169
720P
RS232C MAX232
Rx,Tx
Scaler AS1510
SDRAM K4S643232
SDRAM K4S643232
DNIe2 SPD31
LVDS DS90C386
TO LOGIC BOARD
u-COM OSD SDA6001
EEPROM AT24C16
EPROM M27V160
SDRAM K4S641632


RF Module Block Diagram

APPENDIX C – CLOCK DIAGRAM



APPENDIX D – PHOTOGRAPHS OF TEST SET-UP

The **Conducted Test Picture** and **Radiated Test Picture** and show the worst-case configuration and cable placement.

- **Conducted Test Picture(Front)**

- **Conducted Test Picture(Rear)**

The **Radiated Test Picture** show the worst-case configuration from the X-azimuth.

- **Radiated Test Picture(Front)**

- **Radiated Test Picture(Rear)**

APPENDIX E – EUT PHOTOGRAPHS

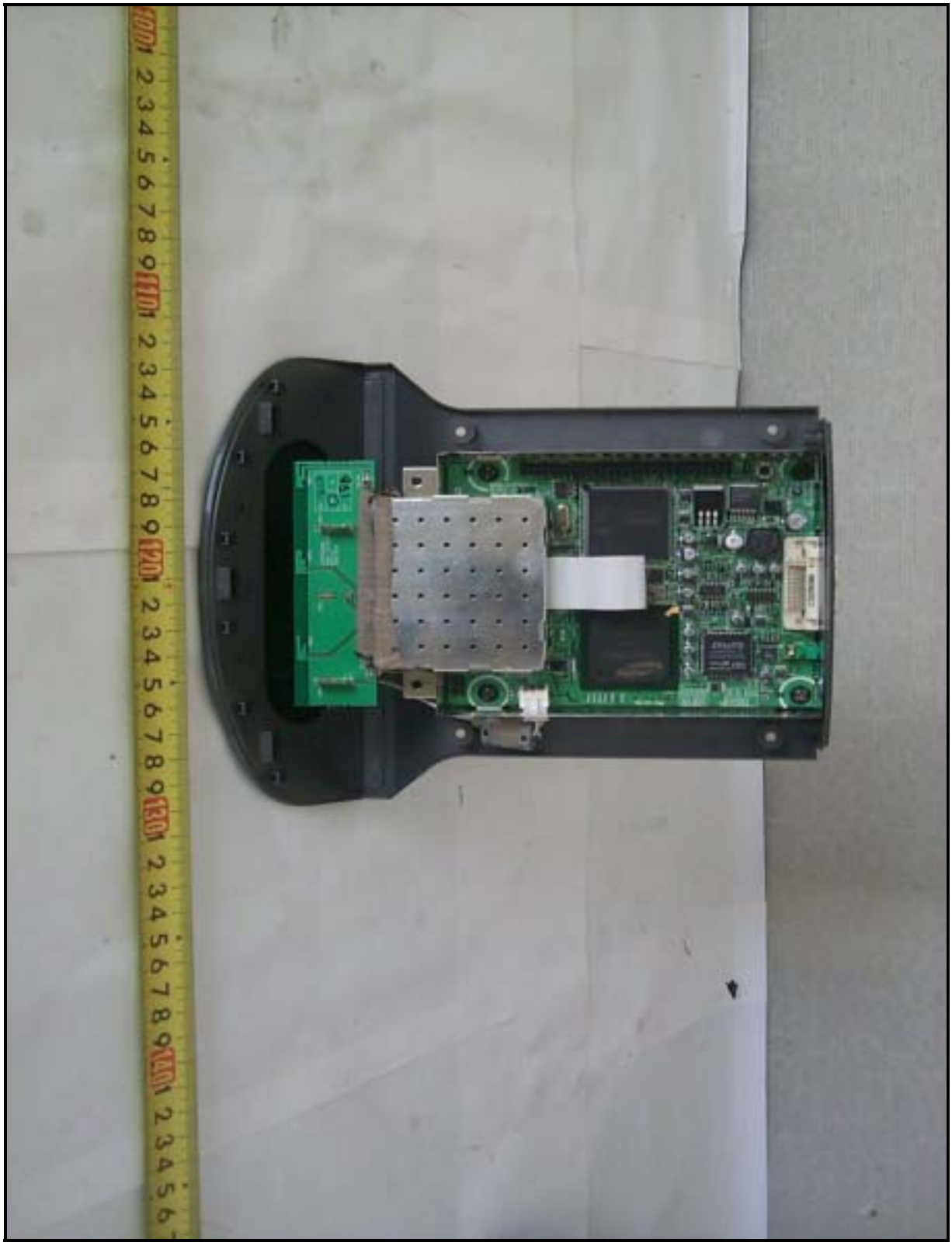
- **Front View of EUT**

- **Rear View of EUT**

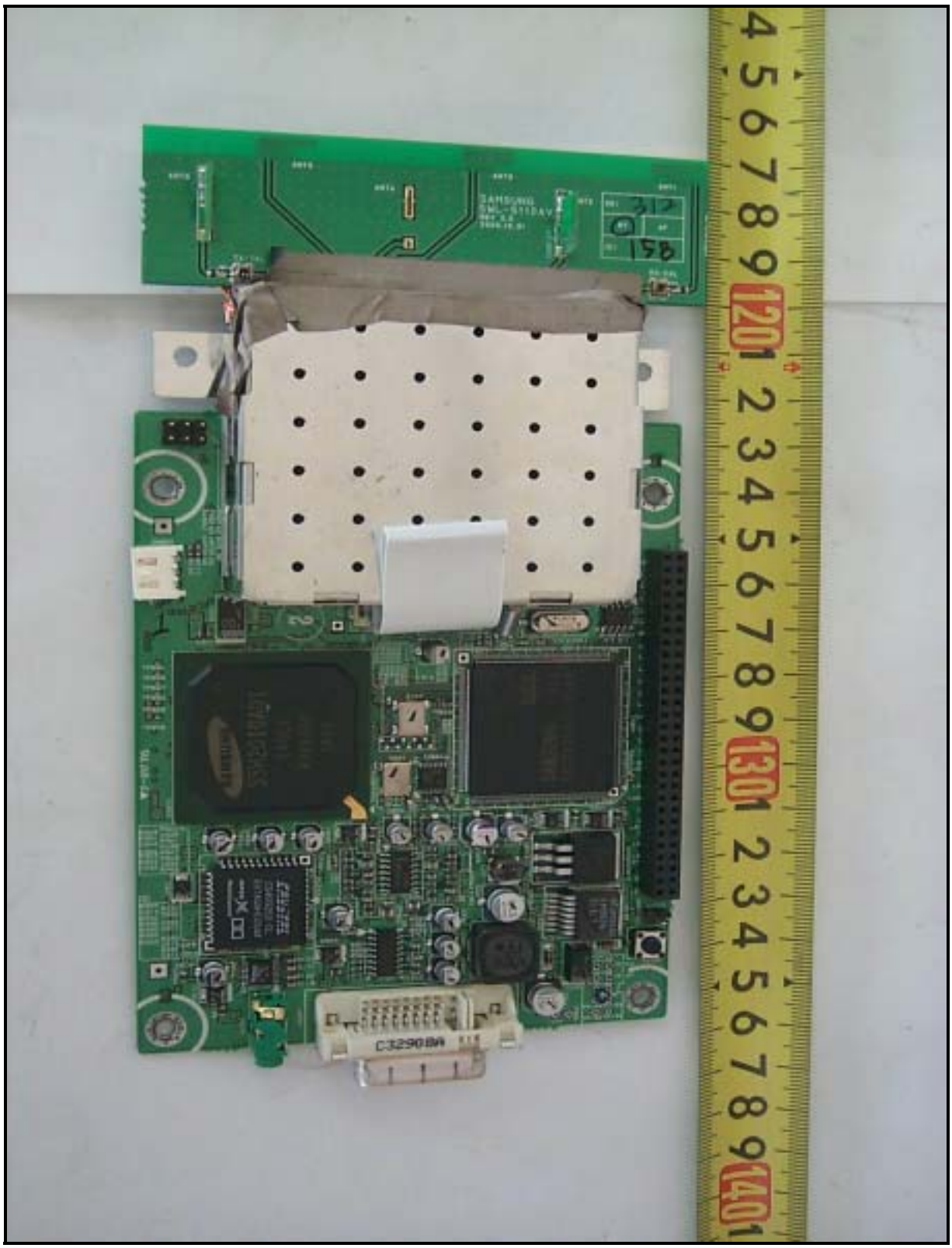
- **Front View of EUT(Wireless)**

- **Rear View of EUT(Wireless)**

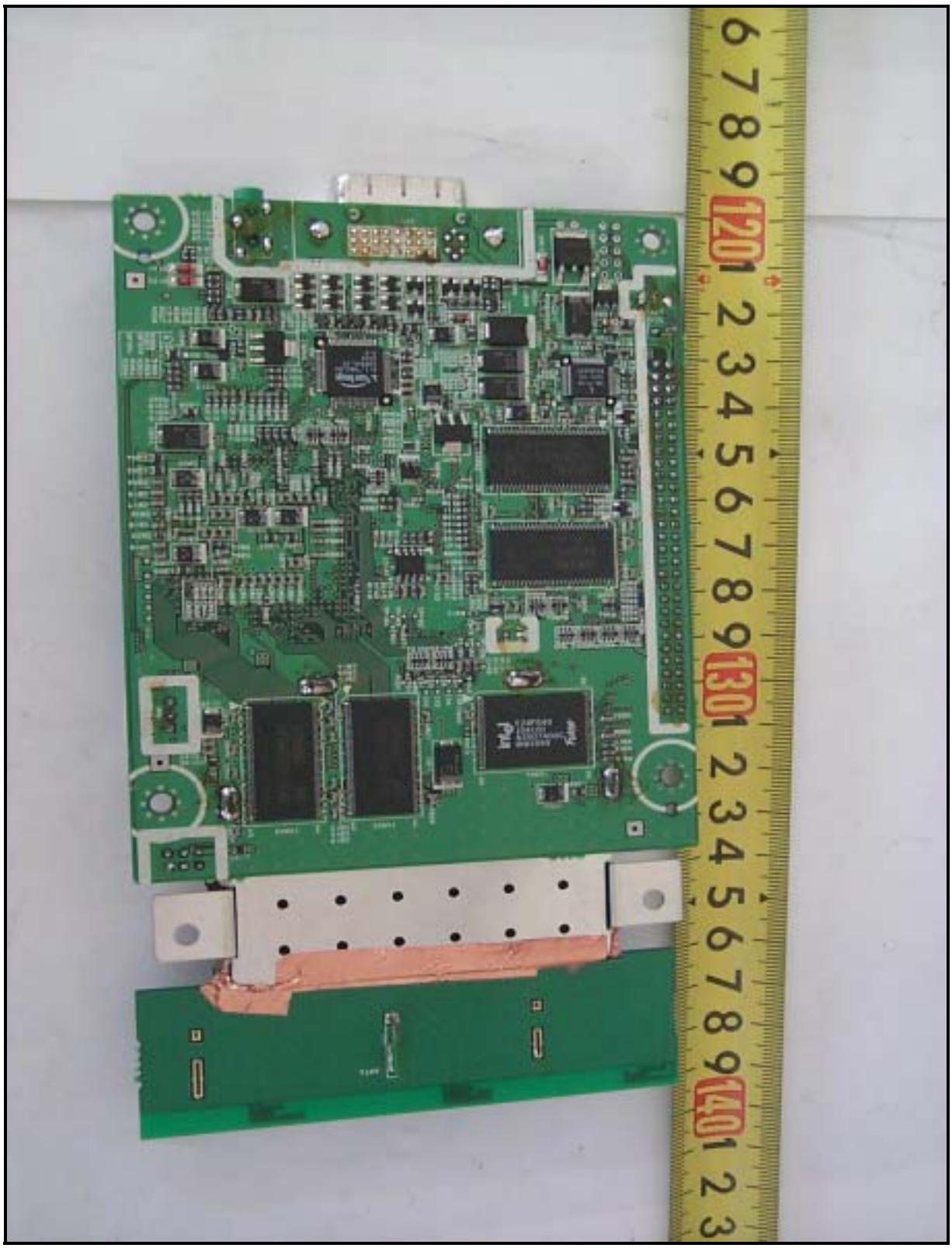
- **Inside View of EUT(Wireless)**



- **Front View of Mainboard**



- **Rear View of Mainboard(Wireless)**



- **Front View of Module**

- **Rear View of Module**

APPENDIX F – USER'S MANUAL

APPENDIX G – SCHEMATIC DIAGRAM

APPENDIX H - OPERATING DESCRIPTION

The EUT is part of transmitter that it is powered by AC120V/60Hz.
The EUT is with 8 channels in 5GHz band. This device has MPEG-TS port to transact with MPEG-Decoder and Encoder.

The mechanism to meet FCC part 15.407 (c) requirement;

If power is turn off or failure is occurred on the RT side, the AP will send the control message to re-establish the link. If power is turn off or failure is occurred on the AP side, no data will be transmitted from the RT. In normal operation mode, both AP and RT send data to each other.