ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW POWER AUXILIARY STATIONS

Test Report No.	**: E108R-036**
AGR No.	**: A09NA-005**
Applicant	**: TJ Media Co., Ltd.**
Address	**: 640-8, Deungchon-dong, Gangseo-gu, Seoul, 157-030, Korea**
Manufacturer	**: TJ Media Co., Ltd.**
Address	**: 640-8, Deungchon-dong, Gangseo-gu, Seoul, 157-030, Korea**
Type of Equipment	**: Wireless MIC (TX)**
FCC ID.	**: TO8-TKR-320**
Model Name	**: TKR-320**
Serial number	**: None**
Total page of Report	**: 54 pages (including this page)**
Date of Incoming	**: July 26, 2010**
Date of issue	**: August 23, 2010**

SUMMARY

The equipment complies with the regulation; **FCC Part 74 Subpart H.**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by: Young-Min, Choi / Asst. Chief Engineer
EMC/RF Center
ONETECH Corp.

Reviewed by: Y. K. Kwon / Managing Director
EMC/RF Center
ONETECH Corp.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

CONTENTS

PAGE

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
E108R-036	August 23, 2010	Initial Issue	All

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

1. VERIFICATION OF COMPLIANCE

APPLICANT	: TJ Media Co., Ltd.
ADDRESS	: 640-8, Deungchon-dong, Gangseo-gu, Seoul, 157-030, Korea
CONTACT PERSON	: Mr. Ki-Tae, Kim / Asst. Manager
TELEPHONE NO	: +82-2-3663-4700
FCC ID	: TO8-TKR-320
MODEL NO/NAME	: TKR-320
SERIAL NUMBER	: N/A
DATE	: August 23, 2010

EQUIPMENT CLASS	***TBT – Licensed Broadcast Transmitter Worn on Body***
KIND OF EQUIPMENT	Low Power Auxiliary Station - Wireless MIC (TX)
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4: 2009, EIA/TIA 603-C
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 74 SUBPART H, Low Power Auxiliary Stations
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 m open area test site

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
74.861 (e)(1), 2.1046(a)	Output Power	Met the Limit / Pass
74.861 (e)(2)	Frequency Control	Met the Limit (See Note 1)
74.861 (e)(3), 2.1047	Modulation Characteristics	Met the Limit / Pass
74.861 (e)(4) 2.1055 (a)(1) and (d)(2)	Frequency Tolerance Versus Temperature and Voltage	Met the Limit / Pass
74.861 (e)(5), 2.1049 (c)(1)	Operating Bandwidth	Met the Limit / Pass
74.861 (e)(6)	Emission Mask	Met the Limit / Pass
74.861 (e)(6)(iii)	Radiated Emission	Met the Limit / Pass
74.861 (f)	Antenna Requirement	Met the Limit / Pass
2.1093	RF Exposure	Met the Limit / Pass

Note: 1. The operating frequency of the Equipment under test shall be changed by Frequency Synthesizer (PLL IC: U10, LMX1600SLB).

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 2.1.

2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4: 2009. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51 Daessangryung-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. Description details of test facilities were submitted to the Commission on August 21, 2008. (Registration Number: 340658)

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

3. GENERAL INFORMATION

3.1 Product Description

The TJ Media Co., Ltd., Model: TKR-320 (referred to as the EUT in this report) is a Wireless MIC (TX) shall be used with the receiver, wireless MIC (RX) that was manufactured by TJ Media Co., Ltd. The receiver shall be subject to DoC procedure and issued by another test report. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Portable Device
OPERATING FREQUENCY	494.000 MHz ~ 501.000 MHz (400 kHz Step) 498.200 MHz ~ 505.200 MHz (400 kHz Step)
MAX.OUTPUT POWER	10.21 dBm (10.5 mW)
EMISSION DESIGNATOR	172KF3E
ANTENNA	Inserted into the main board
ANTENNA TYPE AND GAIN	PCB Pattern, 1.53 dBi
CHANNEL	8 Channels
TYPE OF MODULATION	FM
LIST OF EACH OSC. OR CRY. FREQ.(FREQ. >= 1 MHz)	8 MHz
NUMBER OF LAYER	KEY Board: 2 Layers, TX Board: 2 Layers
POWER REQUIREMENT	DC 3 V from a two AA type battery
EXTERNAL CONNECTOR	None

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

4. EUT MODIFICATIONS

-. None

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	N/A	TKR-320S_TX	N/A
KEY BOARD	N/A	TKR-320 KEY-02	N/A
MIC	N/A	TDMC-1SPU686-1	N/A

5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested: None

5.3 Mode of operation during the test

The EUT was set to low channel (494.000 MHz and 498.200 MHz) and high channel (501.000 MHz and 505.200 MHz) and then transmitted maximum power during the testing. For getting maximum emission from the EUT, the EUT was moved through XY, XZ, and YZ planes.

6. Antenna Requirement

According to §74.861(f), unusual transmitting antennas or antenna elevations shall not be used to deliberately extend the range of low power auxiliary stations beyond the limited areas defined in §74.831.

Antenna Construction:

The transmitting antenna of the EUT is internal type, so no consideration of replacement or elevation by the user.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

7. OUTPUT POWER

7.1 Operating environment

Temperature : 27 °C

Relative humidity : 43 % R.H.

7.2 Test set-up

The radiated emissions measurements were on the 3 m, open-field test site. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to up to 10th harmonic of the fundamental frequency was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. The test was performed by placing the EUT on 3-orthogonal axis. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

The maximum radiated emission was recorded and used as reference for the effective radiated power measurement. The EUT was then replaced by a tuned dipole antenna or Horn antenna and was oriented for vertical polarization and then the length was adjusted to correspond to the frequency of the transmitter. The substitution antenna was connected to a signal generator with a coaxial cable. The receiving antenna height was raised and lowered again through the specified range of height until maximum signal level is detected by the measuring receiver. The signal to the substitution antenna was adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the EUT radiated power measured, corrected for the change of input attenuation setting of the measuring receiver. The signal generator level was recorded and corrected by the power loss in the cable between the signal generator and substitution antenna and further corrected for the gain of the dipole antenna or horn antenna used relative to an ideal tuned dipole antenna. The measurement was repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESiB26	Rohde & Schwarz	EMI Test Receiver	100296	Apr. 14, 2010
■ -	8566B	HP	Spectrum Analyzer	3407A08547	June 11, 2010
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	8447D	Hewlett Packard	Amplifier	2727A04987	June 11, 2010
■ -	8347A	Hewlett Packard	RF Amplifier	3307A01354	Dec. 01, 2009
■ -	83650L	Hewlett-Packard	Signal Generator	3844A00415	June 10, 2010
■ -	VHA9103	Schwarzbeck	Biconical Antenna	91031852	Mar. 30, 2010(2Y)
■ -	9108-A(494)	Schwarzbeck	Log Periodic Antenna	62281001	Mar. 30, 2010(2Y)
■-	3121C	EMCO	Dipole Antenna	9002-530	Dec. 04, 2009(2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	June 17, 2009(2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	June 17, 2009(2Y)
■ -	MA240	HD GmbH	Antenna Master	N/A	N/A
■ -	HD100	HD GmbH	Position Controller	N/A	N/A
■ -	DS420S	HD GmbH	Turn Table	N/A	N/A

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

7.4. Test data for RF output power

7.4.1 Operating Frequency: 494.000 MHz ~ 501.000 MHz

-. Test Date : August 10, 2010

-. Operating Condition : Un-modulated signal with Max Power Transmitting

-. Measurement Distance : 3 m

-. Result : Passed by -13.77 dB at low Channel

Frequency (GHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
494.000	78.60	11.20	1.62	H	2.61	10.21	23.98	-13.77
	68.80	3.10		V		2.11	23.98	-21.87
Test Data for High Channel								
501.000	77.80	10.50	1.61	H	2.66	9.45	23.98	-14.53
	66.90	1.50		V		0.45	23.98	-23.53

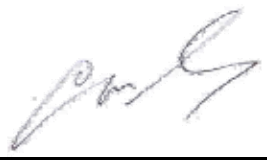
Tabulated test data for Restricted Band

Remark: This test was performed through XY, XZ, and YZ planes, but the worst case data was recorded in above table.

The Limit for this device is 250 mW = 23.98 dBm

Result calculation is as following:

Total = Generator Reading – Cable Loss + Antenna Gain Corrected



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

7.4.2 Operating Frequency: 498.200 MHz ~ 505.200 MHz

-. Test Date : August 10, 2010

-. Operating Condition : Un-modulated signal with Max Power Transmitting

-. Measurement Distance : 3 m

-. Result : Passed by -14.21 dB at low Channel

Frequency (GHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
498.200	78.20	10.80	1.62	H	2.65	9.77	23.98	-14.21
	67.10	1.80		V		0.77	23.98	-23.21
Test Data for High Channel								
505.200	77.90	10.60	1.58	H	2.67	9.51	23.98	-14.47
	67.20	1.80		V		0.71	23.98	-23.27

Tabulated test data for Restricted Band

Remark: This test was performed through XY, XZ, and YZ planes, but the worst case data was recorded in above table.

The Limit for this device is 250 mW = 23.98 dBm

Result calculation is as following:

Total = Generator Reading – Cable Loss + Antenna Gain Corrected

Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

7.5. Test data for spurious radiated emission

7.5.1 Operating Frequency: 494.000 MHz ~ 501.000 MHz

-. Test Date : August 10, 2010
-. Resolution bandwidth : 100 kHz / 1 MHz
-. Video bandwidth : 300 kHz / 1 MHz
-. Operating Condition : Un-modulated signal with Max Power Transmitting
-. Measurement Distance : 3 m
-. Result : Passed by -12.24 dB at High Channel

Frequency (GHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
988.00	36.80	-28.90	-0.35	H	3.62	-32.87	-13.00	-19.87
	33.50	-31.20		V		-35.17	-13.00	-22.17
1 482.00	27.30	-35.60	7.58	H	4.44	-32.46	-13.00	-19.46
	25.60	-38.10		V		-34.96	-13.00	-21.96
1 976.00	25.00	-36.90	10.12	H	4.54	-31.32	-13.00	-18.32
	23.90	-37.80		V		-32.22	-13.00	-19.22
Test Data for High Channel								
1 002.00	39.30	-26.70	5.12	H	3.66	-25.24	-13.00	-12.24
	35.90	-29.40		V		-27.94	-13.00	-14.94
1 503.00	26.60	-36.40	7.69	H	4.49	-33.20	-13.00	-20.20
	23.90	-38.90		V		-35.70	-13.00	-22.70
2 004.10	26.10	-36.10	10.24	H	4.51	-30.37	-13.00	-17.37
	25.00	-37.00		V		-31.27	-13.00	-18.27

Tabulated test data for Restricted Band

Remark: This test was performed through XY, XZ, and YZ planes, but the worst case data was recorded in above table.
Result calculation is as following
Total = Generator Reading – Cable Loss + Antenna Gain Corrected

Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

7.5.2 Operating Frequency: 498.200 MHz ~ 505.200 MHz

-. Test Date : August 10, 2010

-. Resolution bandwidth : 100 kHz / 1 MHz

-. Video bandwidth : 300 kHz / 1 MHz

-. Operating Condition : Un-modulated signal with Max Power Transmitting

-. Measurement Distance : 3 m

-. Result : Passed by -11.71 dB at High Channel

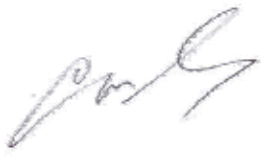
Frequency (GHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
996.40	37.00	-28.30	-0.32	H	3.65	-32.27	-13.00	-19.27
	35.80	-29.30		V		-33.27	-13.00	-20.27
1 494.50	27.00	-35.20	7.65	H	4.48	-32.03	-13.00	-19.03
	24.60	-37.00		V		-33.83	-13.00	-20.83
1 992.80	26.80	-35.70	10.20	H	4.51	-30.01	-13.00	-17.01
	24.30	-38.00		V		-32.31	-13.00	-19.31
Test Data for High Channel								
1 011.60	39.90	-26.20	5.17	H	3.68	-24.71	-13.00	-11.71
	36.80	-29.70		V		-28.21	-13.00	-15.21
1 517.50	26.50	-35.80	7.77	H	4.44	-32.47	-13.00	-19.47
	25.10	-37.10		V		-33.77	-13.00	-20.77
2 023.20	26.40	-36.00	10.26	H	4.54	-30.28	-13.00	-17.28
	23.90	-38.30		V		-32.58	-13.00	-19.58

Tabulated test data for Restricted Band

Remark: This test was performed through XY, XZ, and YZ planes, but the worst case data was recorded in above table.

Result calculation is as following

Total = Generator Reading – Cable Loss + Antenna Gain Corrected



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

8. MODULATION CHARACTERISTICS

8.1 Operating environment

Temperature : 23 °C

Relative humidity : 40 % R.H.

8.2 Test set-up

The EUT was connected to the audio generator and RF input of the modulation analyzer. A 1 kHz test signal was applied to the audio input of the EUT. Adjust the audio input for 60 % of rated system deviation at 1 kHz using this level as a reference (0 dB) and vary the input level from -30 dB to +20 dB. Record the frequency deviation obtained as a function of the input level. Repeat input level variation as mentioned above with input frequency changing to 500 Hz, 800 Hz, 1 kHz, 2.5 kHz, 5 kHz, 10 kHz and 15 kHz in sequence.

8.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	2350A	HP	30 dB Attenuator	2350A03133	June 10, 2010
■ -	8903B	HP	Audio Analyzer	2836A05161	June 10, 2010
■ -	8901B	HP	Modulation Analyzer	3028A02930	June 10, 2010
■ -	DRP-305DN	DIGITAL Elec.	DC Power Supply	4030191	Sep. 05, 2009

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

8.4 Test data

8.4.1 Operating Frequency: 494.000 MHz

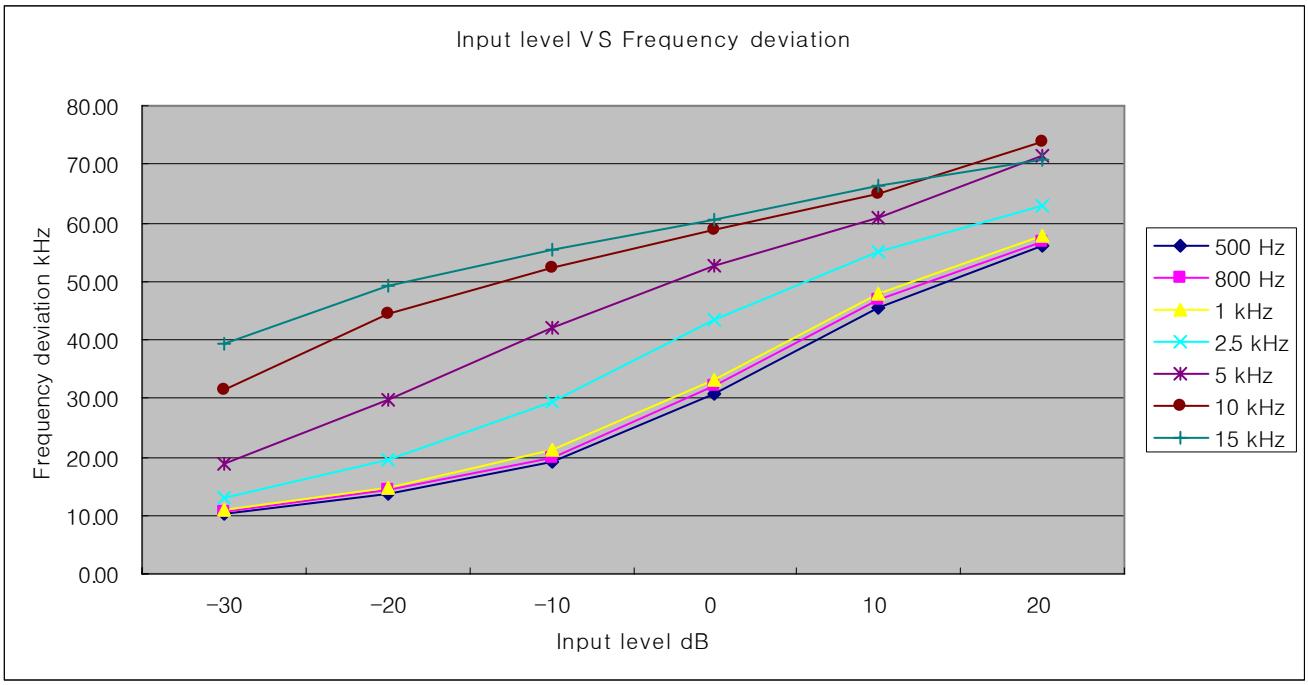
-. Test Date : August 11, 2010

-. Rated Supply Voltage : 3 Vdc

-. Result : Passed

-. Reference Level : 0 dB @ 1 kHz.

Input Level (dBm)	Frequency Deviation Response						
	0.5 kHz	0.8 kHz	1 kHz	2.5 kHz	5 kHz	10 kHz	15 kHz
-30.00	10.21	10.49	10.98	13.12	18.72	31.59	39.38
-20.00	13.71	14.26	14.65	19.53	29.60	44.40	49.40
-10.00	19.14	19.66	21.19	29.48	42.20	52.40	55.30
0	30.80	32.11	33.20	43.40	52.70	58.80	60.60
10.00	45.60	46.70	47.70	55.20	61.00	64.90	66.30
20.00	55.90	56.80	57.70	63.00	71.50	74.00	70.60
Limit	± 75.0 kHz						



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

8.4.2 Operating Frequency: 501.000 MHz

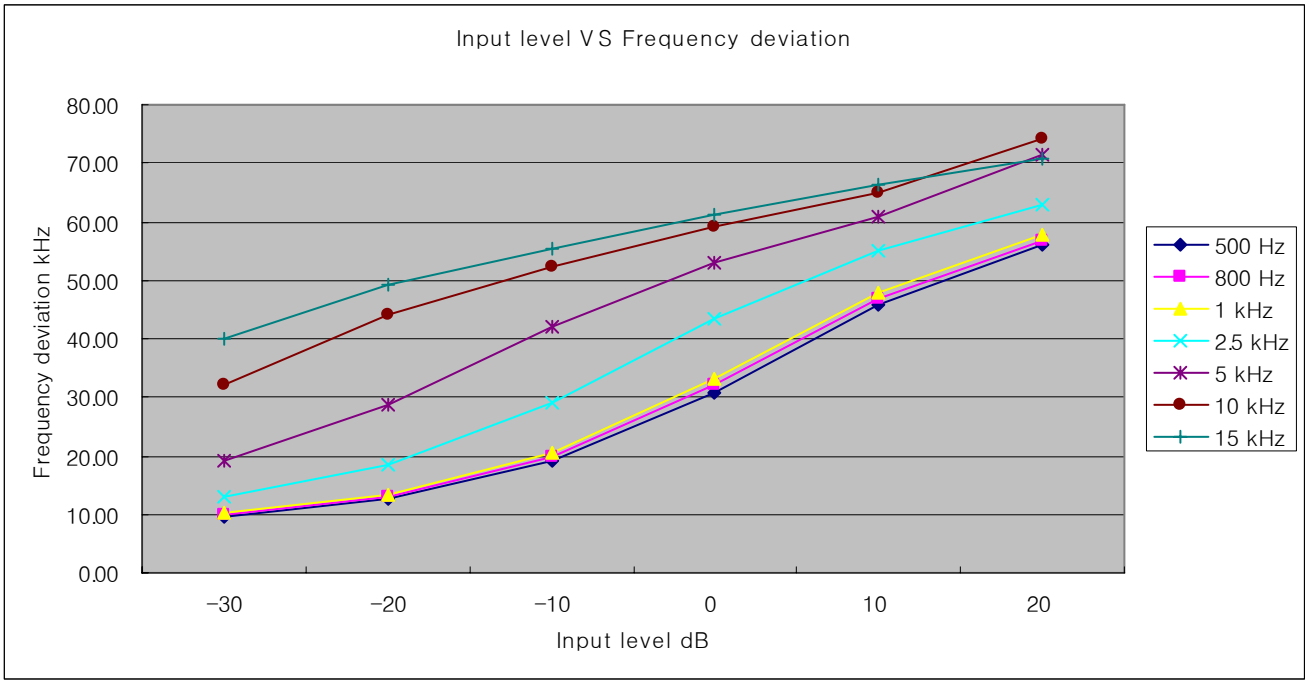
-. Test Date : August 11, 2010

-. Rated Supply Voltage : 3 Vdc

-. Result : Passed

-. Reference Level : 0 dB @ 1 kHz.

Input Level (dBm)	Frequency Deviation Response						
	0.5 kHz	0.8 kHz	1 kHz	2.5 kHz	5 kHz	10 kHz	15 kHz
-30.00	9.73	9.98	10.30	13.03	19.22	32.22	39.89
-20.00	12.50	12.93	13.35	18.42	28.74	44.20	49.20
-10.00	19.06	19.88	20.63	29.07	42.10	52.40	55.50
0	30.92	32.18	33.29	43.40	52.90	59.10	61.10
10.00	45.70	46.70	47.80	55.10	61.00	65.00	66.40
20.00	56.10	56.90	57.80	63.00	71.60	74.10	70.70
Limit	±75.0 kHz						



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

8.4.3 Operating Frequency: 498.200 MHz

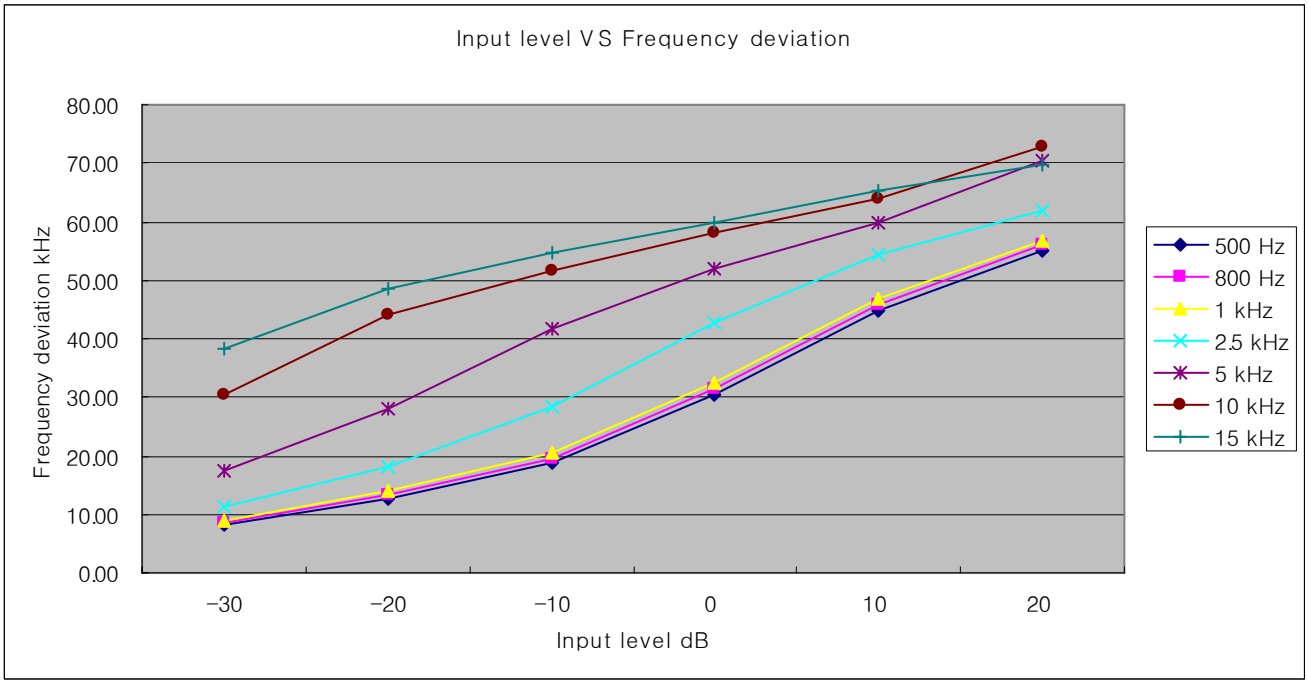
-. Test Date : August 11, 2010

-. Rated Supply Voltage : 3 Vdc

-. Result : Passed

-. Reference Level : 0 dB @ 1 kHz.

Input Level (dBm)	Frequency Deviation Response						
	0.5 kHz	0.8 kHz	1 kHz	2.5 kHz	5 kHz	10 kHz	15 kHz
-30.00	8.34	8.49	8.92	11.38	17.29	30.41	38.15
-20.00	12.68	13.20	13.89	17.95	27.92	44.10	48.70
-10.00	18.82	19.64	20.38	28.42	41.60	51.70	54.70
0	30.34	31.58	32.64	42.70	52.10	58.10	60.00
10.00	44.90	45.90	46.80	54.30	60.00	63.90	65.20
20.00	55.20	55.90	56.90	62.00	70.40	72.90	69.60
Limit	±75.0 kHz						



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

8.4.4 Operating Frequency: 505.200 MHz

-. Test Date : August 11, 2010

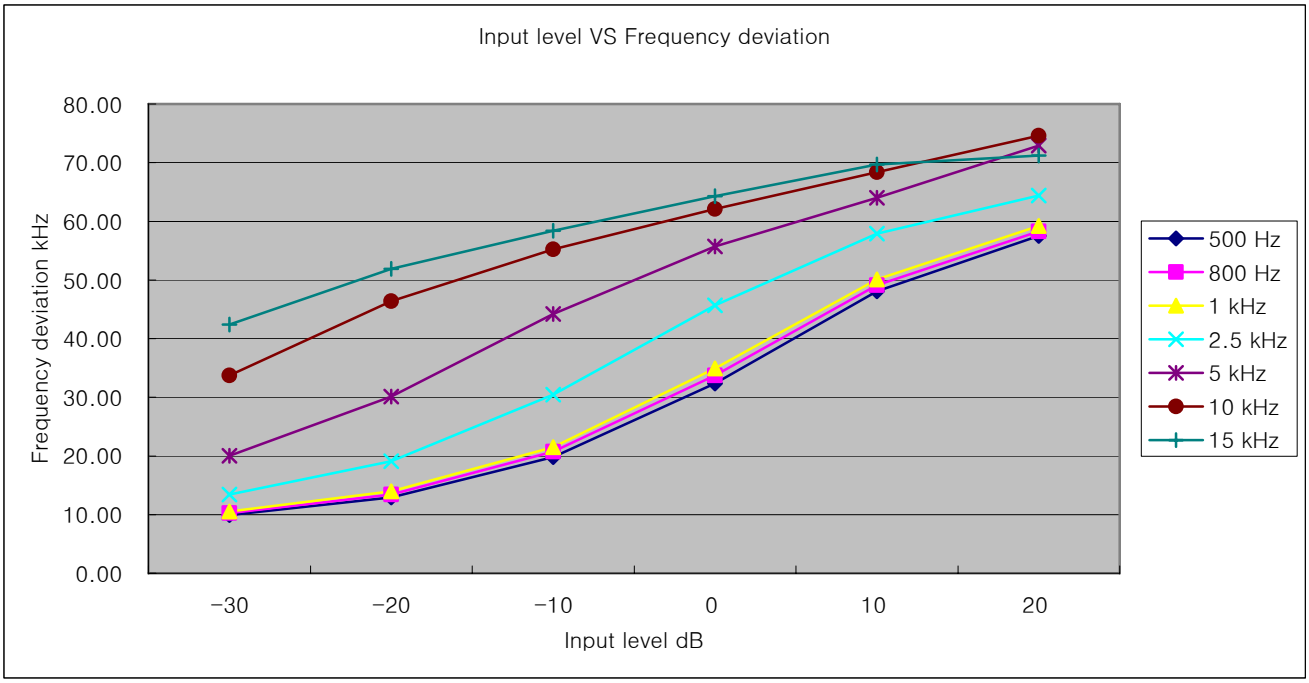
-. Rated Supply Voltage : 3 Vdc

-. Limit : ±75 kHz

-. Result : Passed

-. Reference Level : 0 dB @ 1 kHz.

Input Level (dBm)	Frequency Deviation Response						
	0.5 kHz	0.8 kHz	1 kHz	2.5 kHz	5 kHz	10 kHz	15 kHz
-30.00	9.95	10.24	10.55	13.45	20.03	33.73	42.40
-20.00	12.96	13.43	13.95	19.10	30.11	46.40	51.90
-10.00	19.81	20.72	21.49	30.44	44.20	55.20	58.40
0	32.38	33.70	34.95	45.70	55.70	62.10	64.30
10.00	48.10	49.10	50.10	57.90	64.00	68.40	69.70
20.00	57.50	58.30	59.20	64.40	72.90	74.60	71.20



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

9. AUDIO FREQUENCY RESPONSE

9.1 Operating environment

Temperature : 23 °C

Relative humidity : 40 % R.H.

9.2 Test set-up

The EUT was connected to the audio generator and RF input of the modulation analyzer. A 1 kHz test signal was applied to the audio input of the EUT. Adjust the audio input for 20 % of rated system deviation at 1 kHz using this level as a reference (0 dB). Vary the audio frequency from 200 Hz to 20 kHz and record the frequency deviation.

9.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	2350A	HP	30 dB Attenuator	2350A03133	June 10, 2010
■ -	8903B	HP	Audio Analyzer	2836A05161	June 10, 2010
■ -	8901B	HP	Modulation Analyzer	3028A02930	June 10, 2010
■ -	DRP-305DN	DIGITAL Elec.	DC Power Supply	4030191	Sep. 05, 2009

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

9.4 Test data

9.4.1 Operating Frequency: 494.000 MHz

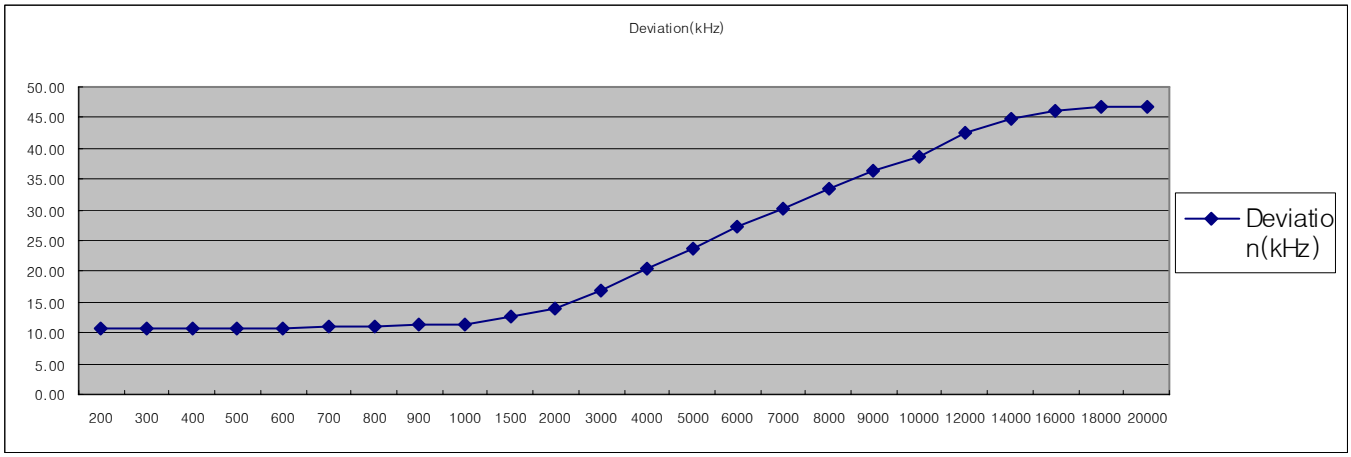
-. Test Date : August 11, 2010

-. Rated Supply Voltage : 3 Vdc

-. Result : Passed

-. Reference Level : 0 dB @ 1 kHz.

Frequency (Hz)	Deviation (kHz)	Frequency (Hz)	Deviation (kHz)	Frequency (Hz)	Deviation (kHz)
200	10.63	1 000	11.48	8 000	33.45
300	10.68	1 500	12.72	9 000	36.23
400	10.68	2 000	13.99	10 000	38.66
500	10.71	3 000	17.03	12 000	42.60
600	10.74	4 000	20.33	14 000	44.80
700	10.94	5 000	23.72	16 000	46.00
800	11.08	6 000	27.18	18 000	46.70
900	11.32	7 000	30.34	20 000	46.80



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

9.4.2 Operating Frequency: 501.000 MHz

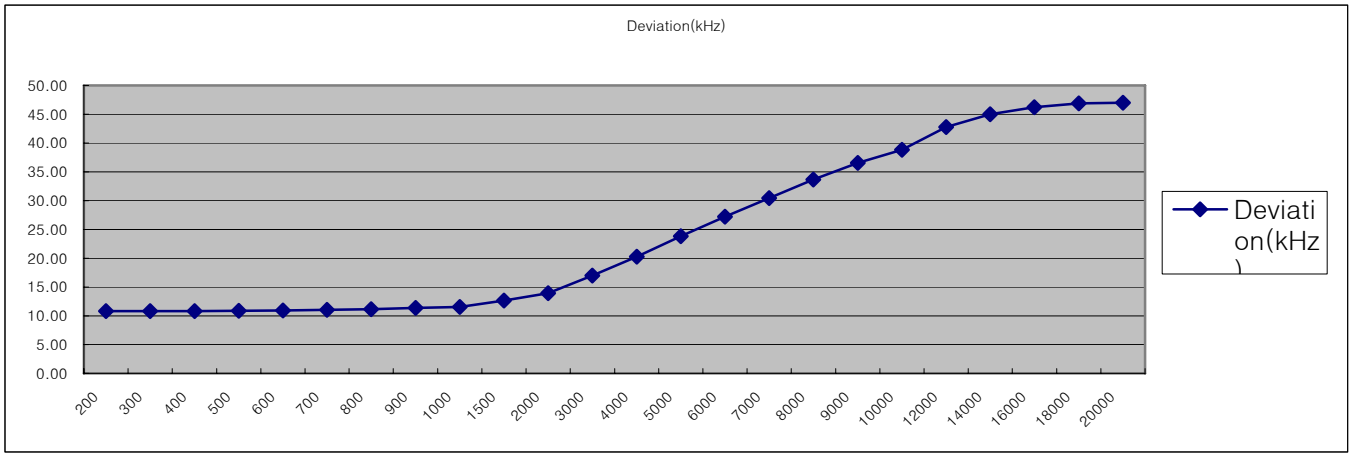
-. Test Date : August 11, 2010

-. Rated Supply Voltage : 3 Vdc

-. Result : Passed

-. Reference Level : 0 dB @ 1 kHz.

Frequency (Hz)	Deviation (kHz)	Frequency (Hz)	Deviation (kHz)	Frequency (Hz)	Deviation (kHz)
200	10.83	1 000	11.58	8 000	33.68
300	10.85	1 500	12.68	9 000	36.54
400	10.86	2 000	13.95	10 000	38.83
500	10.91	3 000	16.99	12 000	42.80
600	10.96	4 000	20.30	14 000	45.00
700	11.07	5 000	23.82	16 000	46.20
800	11.19	6 000	27.24	18 000	46.90
900	11.40	7 000	30.46	20 000	47.00



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

9.4.3 Operating Frequency: 498.200 MHz

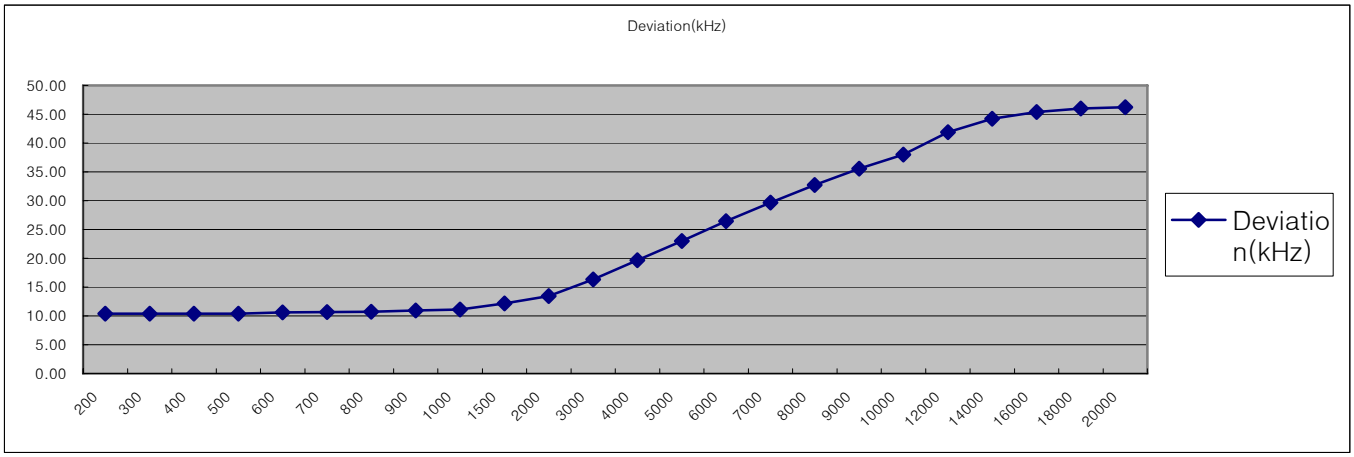
-. Test Date : August 11, 2010

-. Rated Supply Voltage : 3 Vdc

-. Result : Passed

-. Reference Level : 0 dB @ 1 kHz.

Frequency (Hz)	Deviation (kHz)	Frequency (Hz)	Deviation (kHz)	Frequency (Hz)	Deviation (kHz)
200	10.37	1 000	11.13	8 000	32.73
300	10.37	1 500	12.15	9 000	35.58
400	10.40	2 000	13.42	10 000	38.00
500	10.41	3 000	16.35	12 000	41.90
600	10.61	4 000	19.68	14 000	44.20
700	10.64	5 000	23.02	16 000	45.40
800	10.73	6 000	26.44	18 000	46.00
900	10.92	7 000	29.67	20 000	46.20



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

9.4.4 Operating Frequency: 505.200 MHz

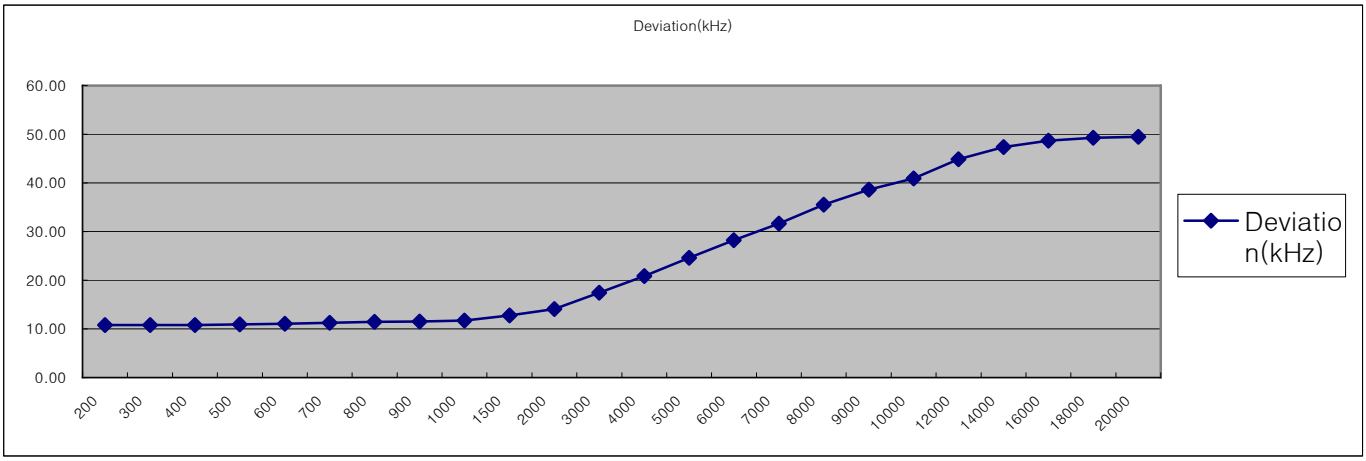
-. Test Date : August 11, 2010

-. Rated Supply Voltage : 3 Vdc

-. Result : Passed

-. Reference Level : 0 dB @ 1 kHz.

Frequency (Hz)	Deviation (kHz)	Frequency (Hz)	Deviation (kHz)	Frequency (Hz)	Deviation (kHz)
200	10.78	1 000	11.68	8 000	35.50
300	10.80	1 500	12.77	9 000	38.60
400	10.80	2 000	14.11	10 000	40.90
500	10.94	3 000	17.43	12 000	44.90
600	11.06	4 000	20.85	14 000	47.40
700	11.26	5 000	24.59	16 000	48.70
800	11.43	6 000	28.23	18 000	49.30
900	11.54	7 000	31.66	20 000	49.50



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10. OCCUPIED BANDWIDTH, EMISSION MASKS

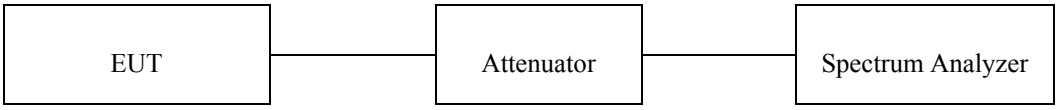
10.1 Operating environment

Temperature : 25 °C

Relative humidity : 40 % R.H.

10.2 Test set-up

The RF output port of the EUT was connected to the input of the spectrum analyzer through sufficient attenuation. The resolution bandwidth and video bandwidth of the spectrum analyzer was set at 1 kHz and 3 kHz for this test, plot the un-modulated chart shows on spectrum. According to the result of Modulation Characteristics, set the output of the signal generator to 100 Hz, 500 Hz, 1 kHz, 10 kHz and 15 kHz, increase the amplitude of the signal, until maximum modulation is shown on the spectrum analyzer.



10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	FSP	Rohde & Schwarz	Spectrum Analyzer	100017	Mar 16, 2010
■ -	8903B	HP	Audio Analyzer	2836A05161	June 10, 2010
■ -	2350A	HP	30 dB Attenuator Assembly	2350A03133	June 10, 2010
■ -	DRP-305DN	DIGITAL Elec.	DC Power Supply	4030191	Sep. 05, 2009

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

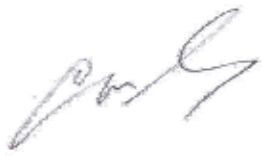
10.4 Test data for Operating Bandwidth

10.4.1 Operating Frequency: 494.000 MHz ~ 501.000 MHz

-. Test Date : August 12, 2010

-. Test Result : Pass

Channel	Frequency (MHz)	Input Signal (kHz)	Measured Value (kHz)	Limit (kHz)	Margin (kHz)
Low	494.000	0.5	82.80	200	-117.20
		0.8	84.60		-115.40
		1	88.20		-111.80
		2.5	108.00		-92.00
		5	122.40		-77.60
		10	142.20		-57.80
		15	153.00		-47.00
High	501.000	0.5	82.80	200	-117.20
		0.8	86.40		-113.60
		1	90.00		-110.00
		2.5	108.00		-92.00
		5	129.60		-70.40
		10	144.00		-56.00
		15	153.00		-47.00



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.4.2 Operating Frequency: 498.200 MHz ~ 505.200 MHz

-. Test Date : August 12, 2010

-. Test Result : Pass

Channel	Frequency (MHz)	Input Signal (kHz)	Measured Value (kHz)	Limit (kHz)	Margin (kHz)
Low	498.200	0.5	81.00	200	-119.00
		0.8	84.60		-115.40
		1	86.40		-113.60
		2.5	108.00		-92.00
		5	122.40		-77.60
		10	142.20		-57.80
		15	153.00		-47.00
High	505.200	0.5	90.00	200	-110.00
		0.8	93.60		-106.40
		1	95.40		-104.60
		2.5	117.00		-83.00
		5	136.80		-63.20
		10	162.00		-38.00
		15	180.00		-20.00

Tested by: In-Sub, Youn / Project Engineer

10.5 Calculation of necessary bandwidth

The formula for necessary bandwidth (Bn) is as following.

Bn = 2 * M + 2 * D * K

Where, M means Max. Modulation Frequency, 15 kHz

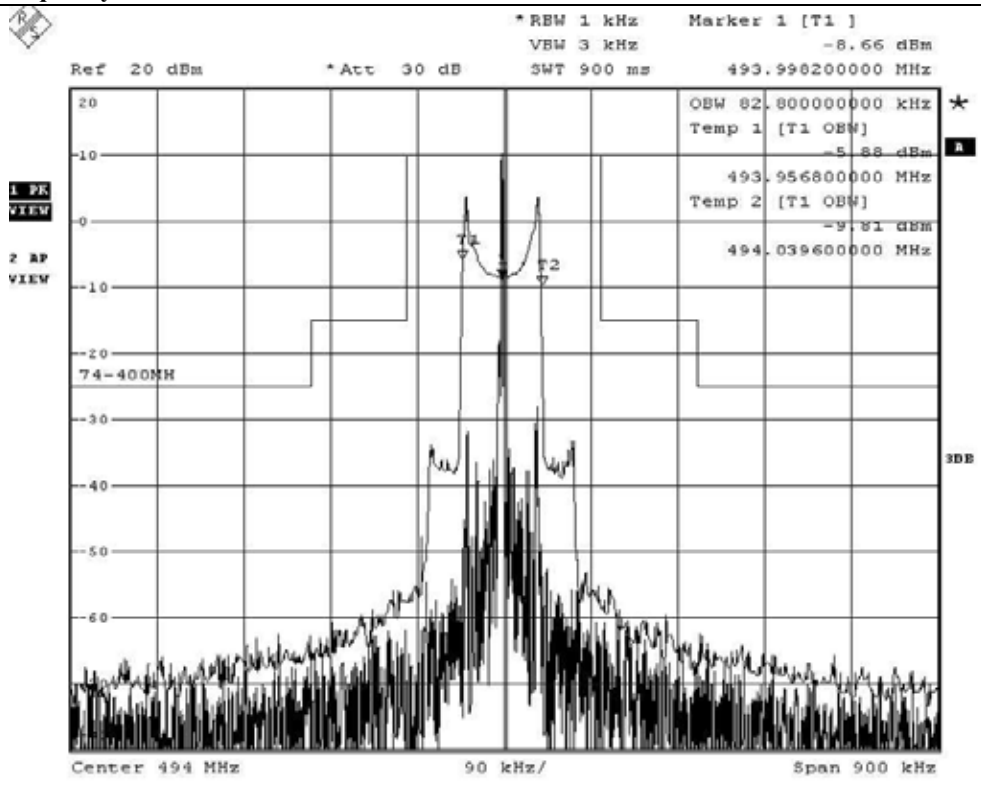
D means Max. Frequency Deviation, 71.20 kHz (Please refer to test result, clause 11.4.4)

K means Constant Factor, 1

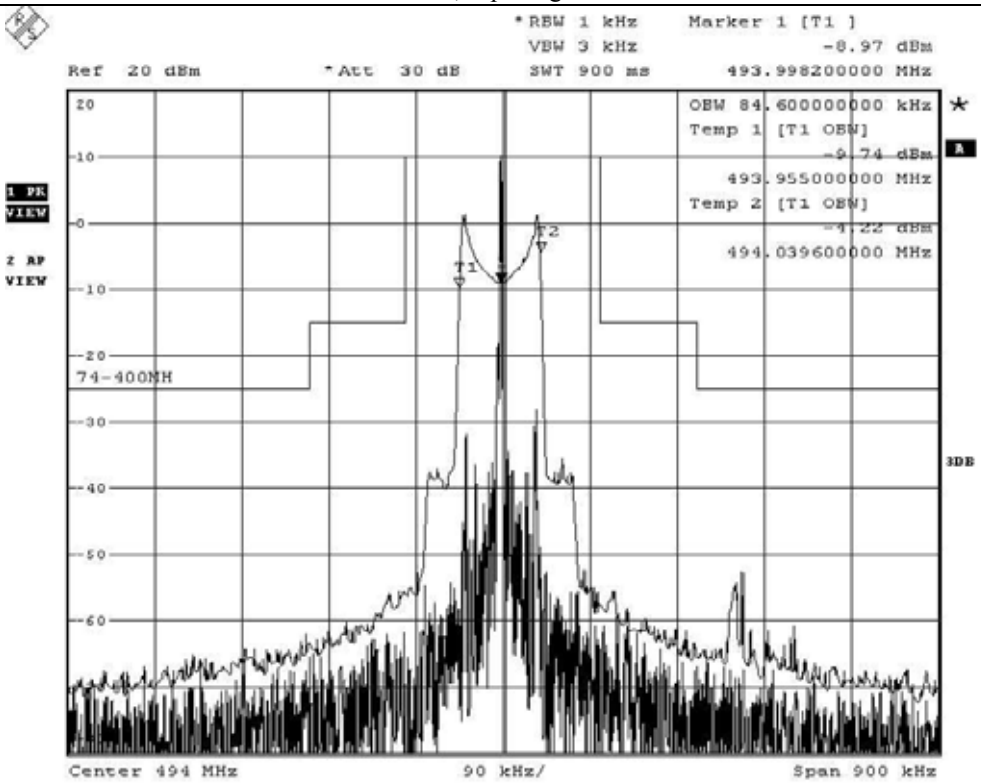
So, the calculated necessary bandwidth is 172.40 kHz.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

*** Operating Frequency: 494.000 MHz**



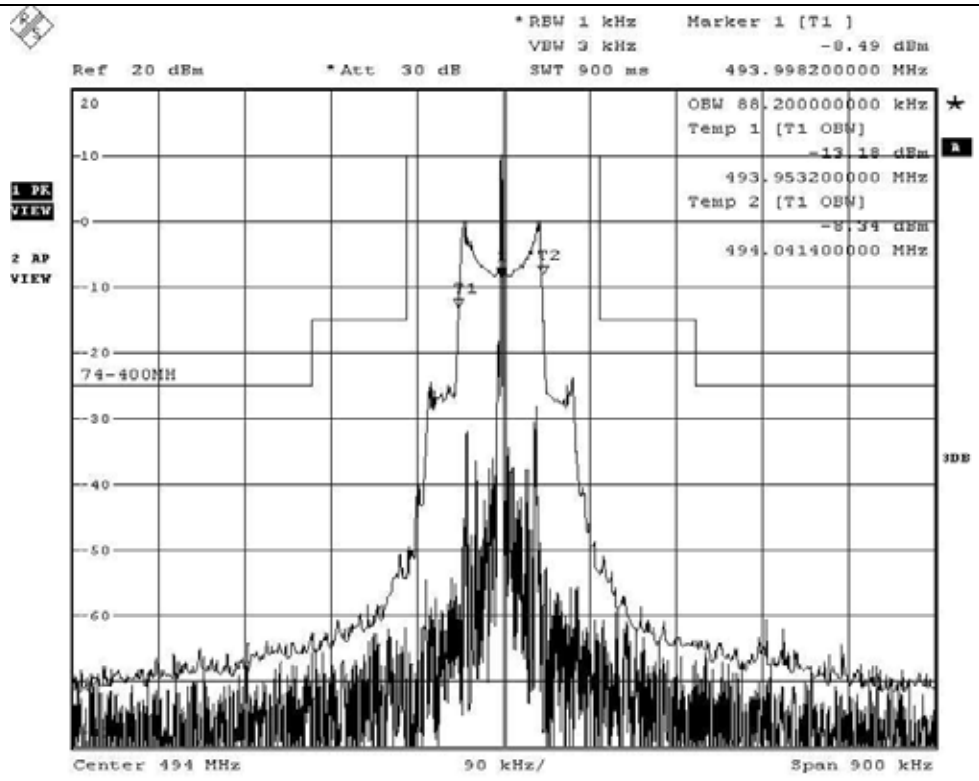
Low Channel, Input signal 0.5 kHz



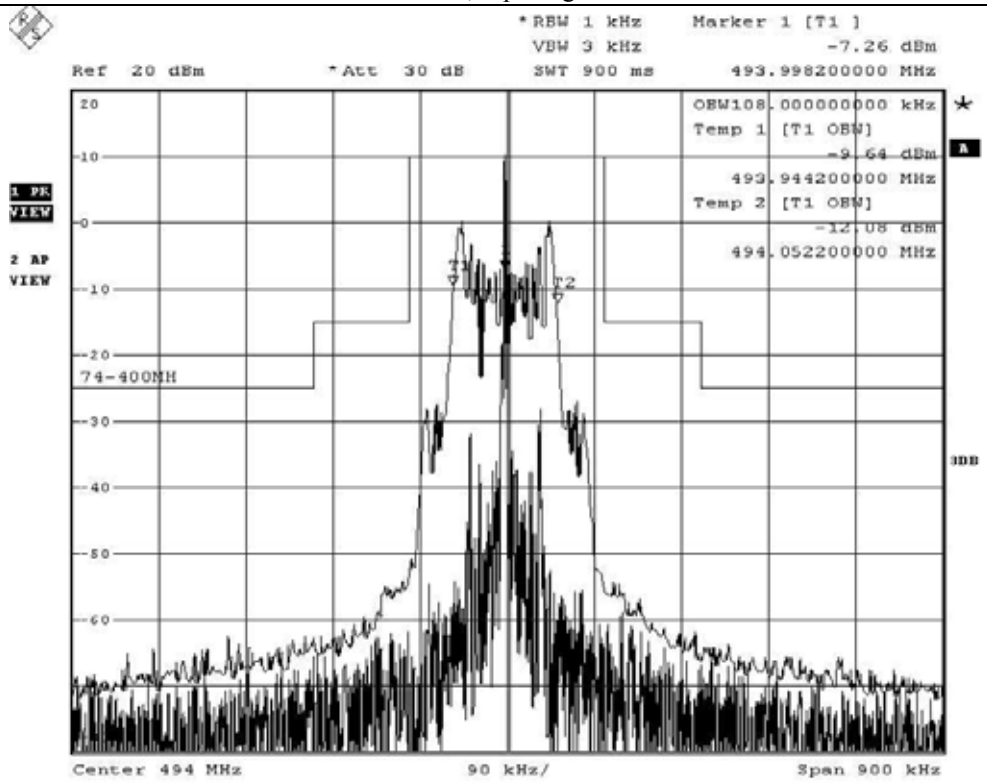
Low Channel, Input signal 0.8 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

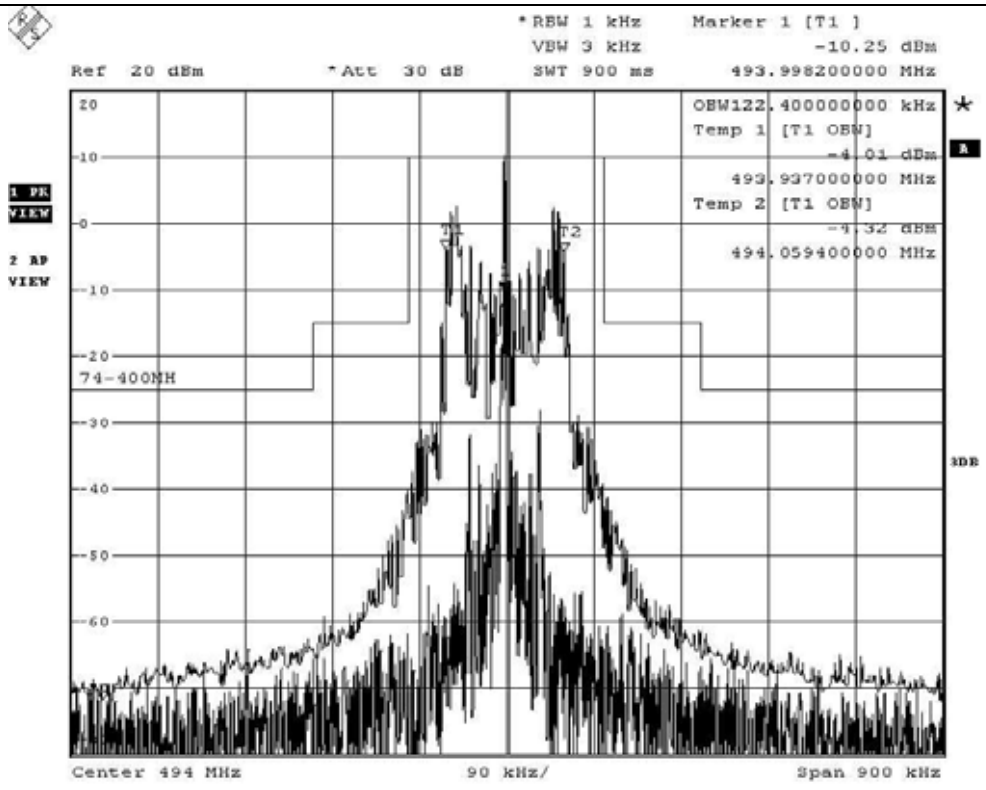


Low Channel, Input signal 1 kHz

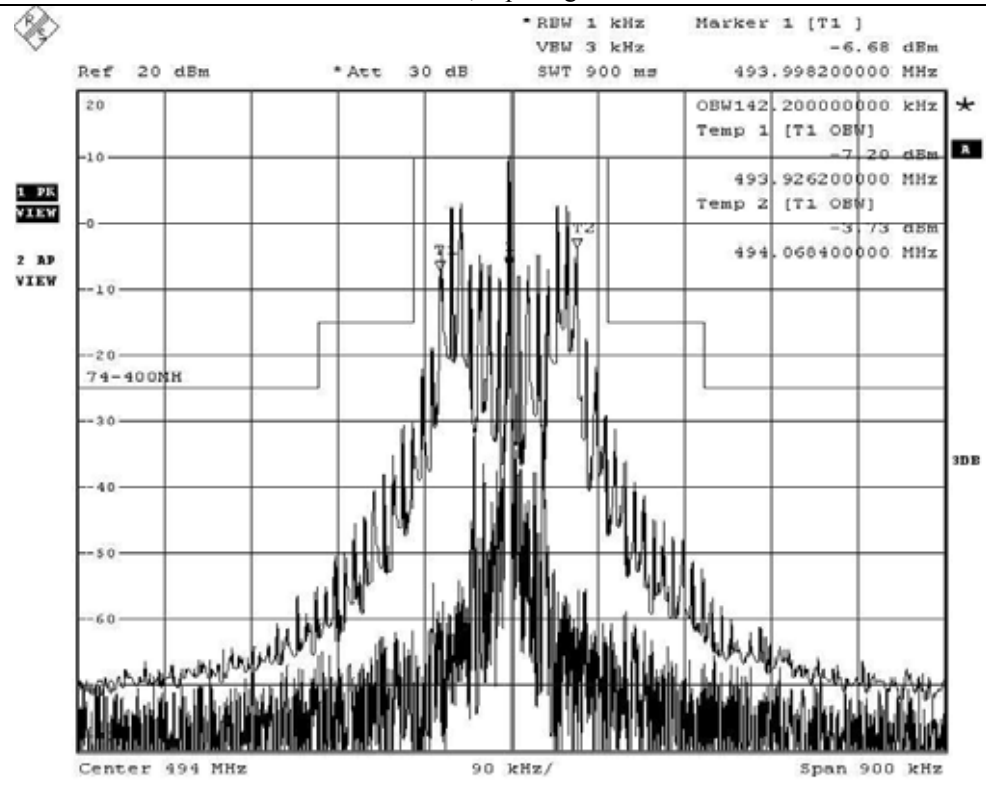


Low Channel, Input signal 2.5 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



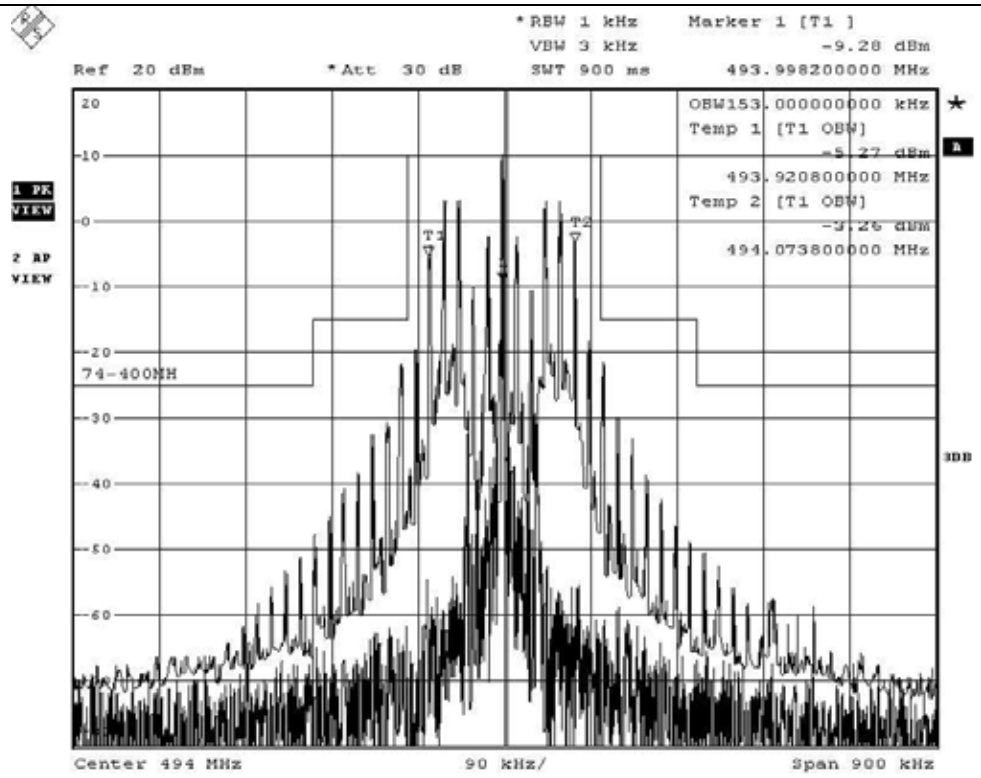
Low Channel, Input signal 5 kHz



Low Channel, Input signal 10 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

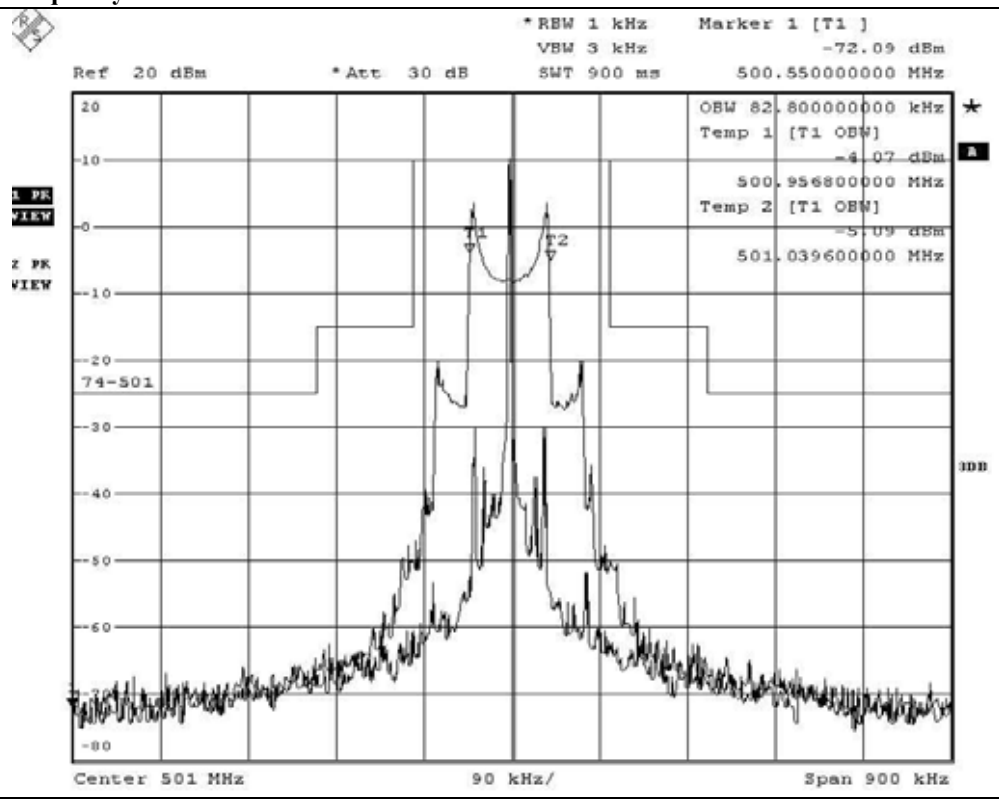
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



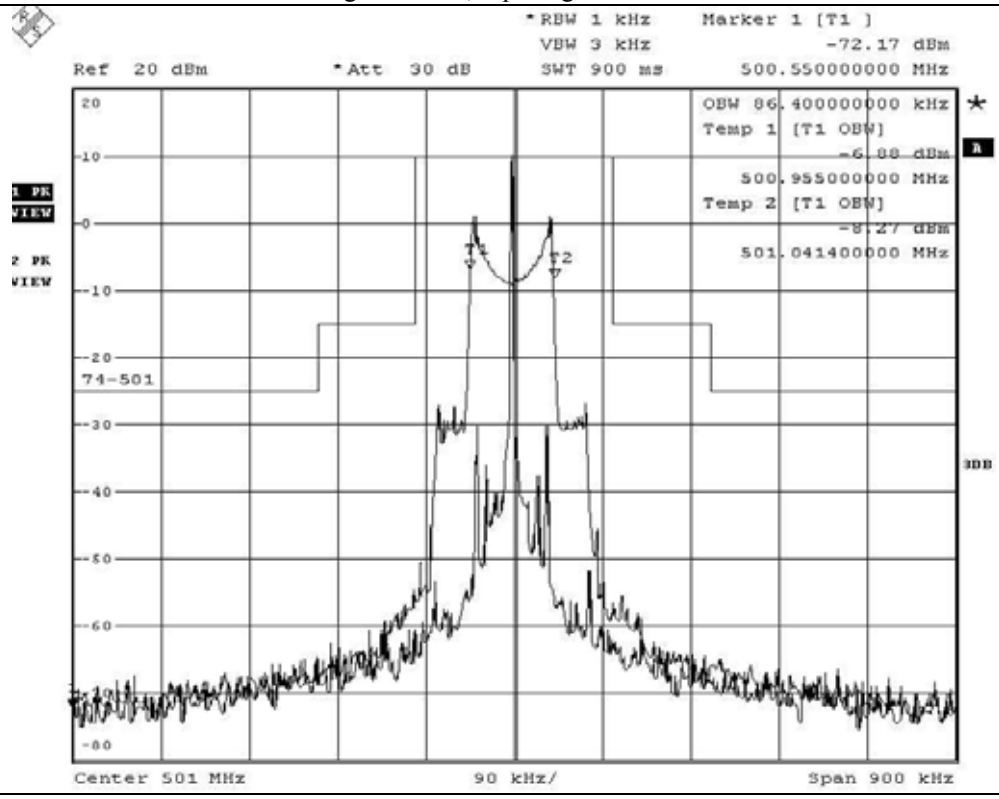
Low Channel, Input signal 15 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

*** Operating Frequency: 501.000 MHz**



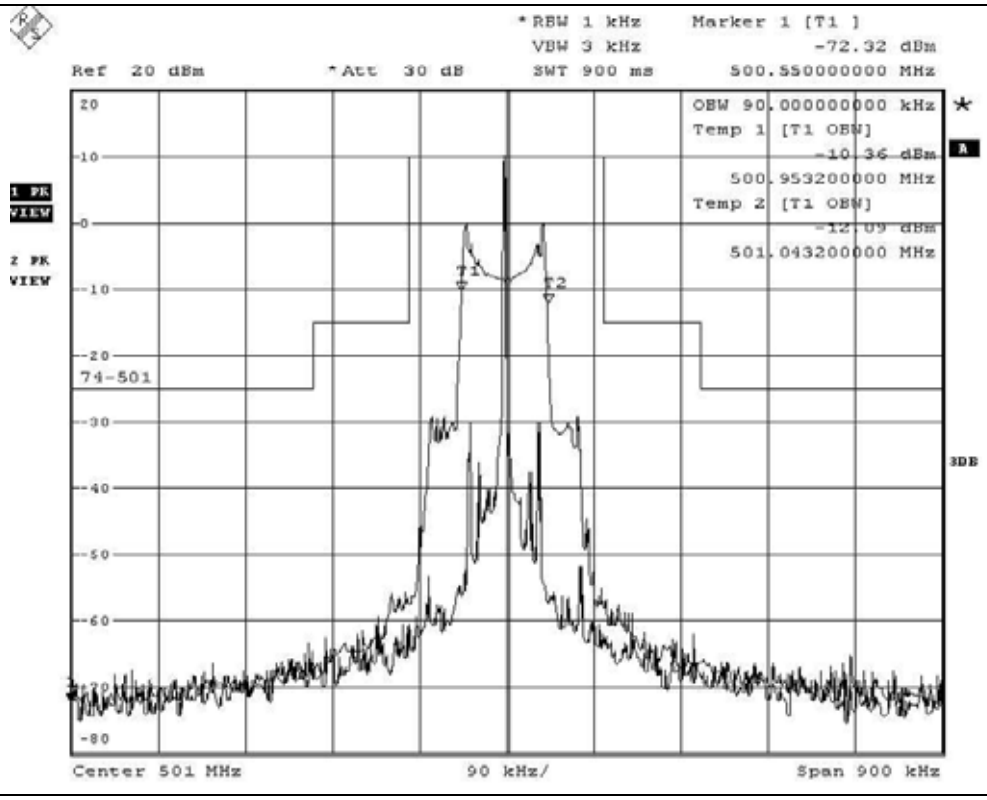
High Channel, Input signal 0.5 kHz



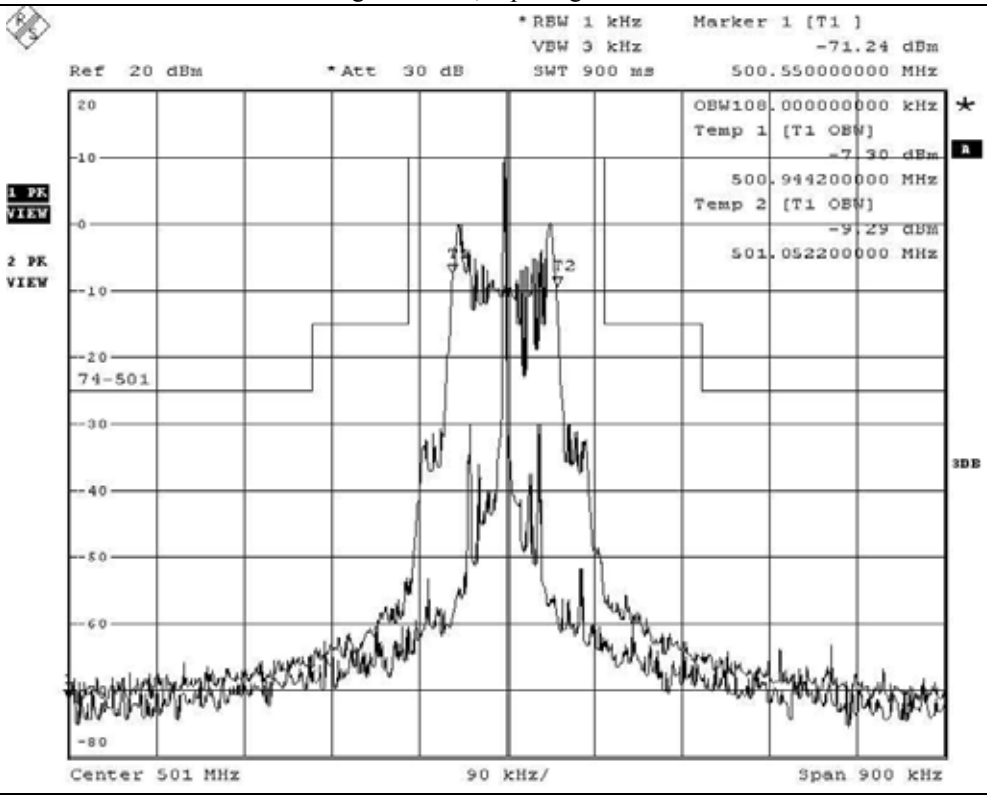
High Channel, Input signal 0.8 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

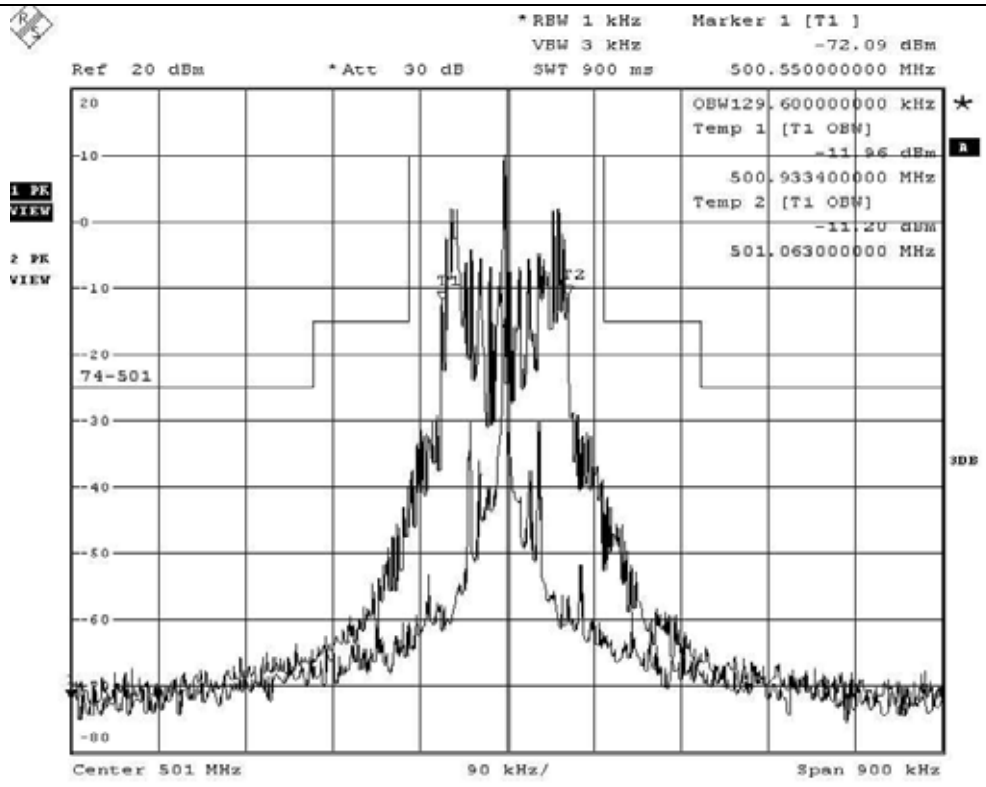


High Channel, Input signal 1 kHz

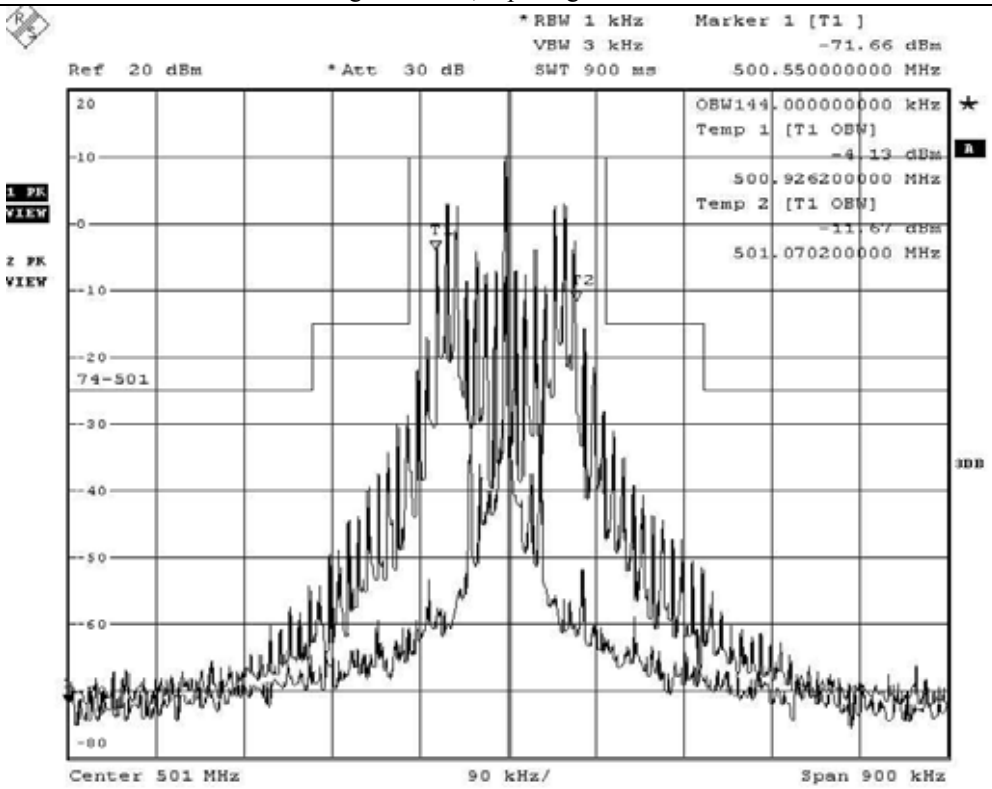


High Channel, Input signal 2.5 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

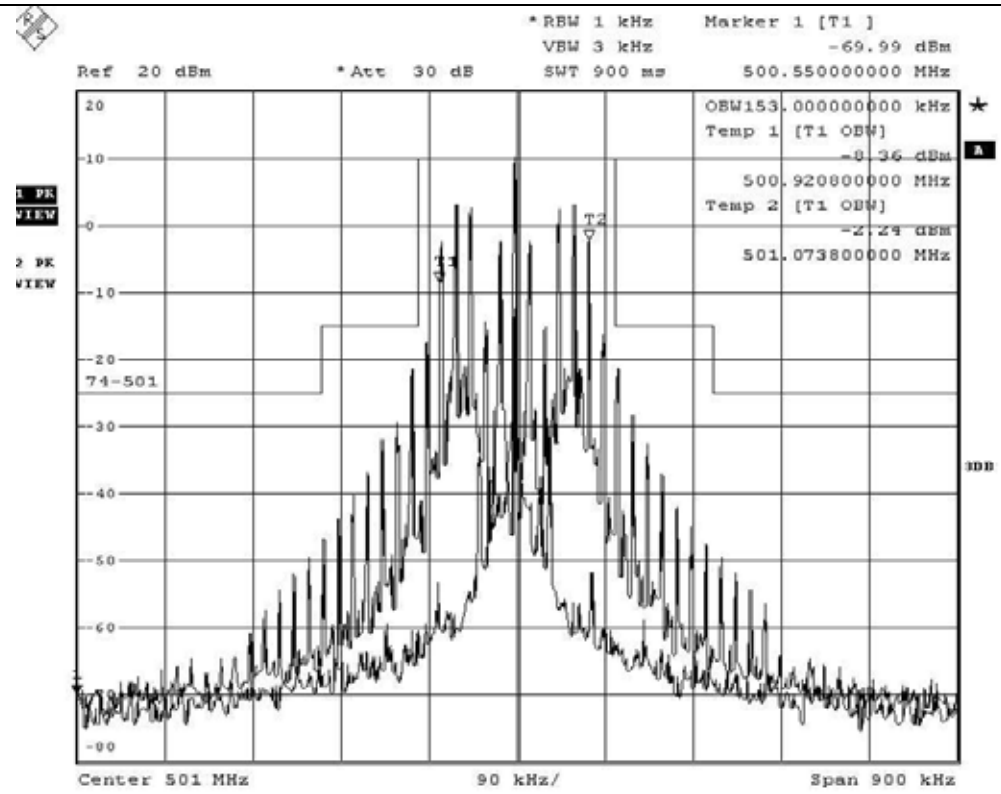


High Channel, Input signal 5 kHz



High Channel, Input signal 10 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

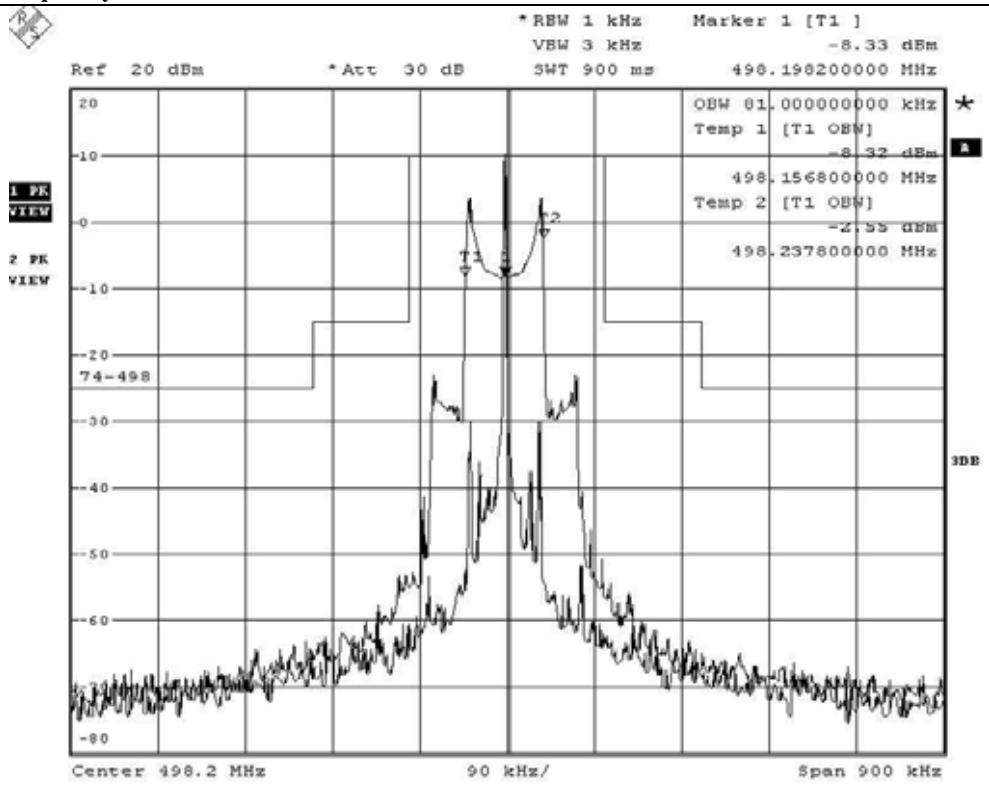


High Channel, Input signal 15 kHz

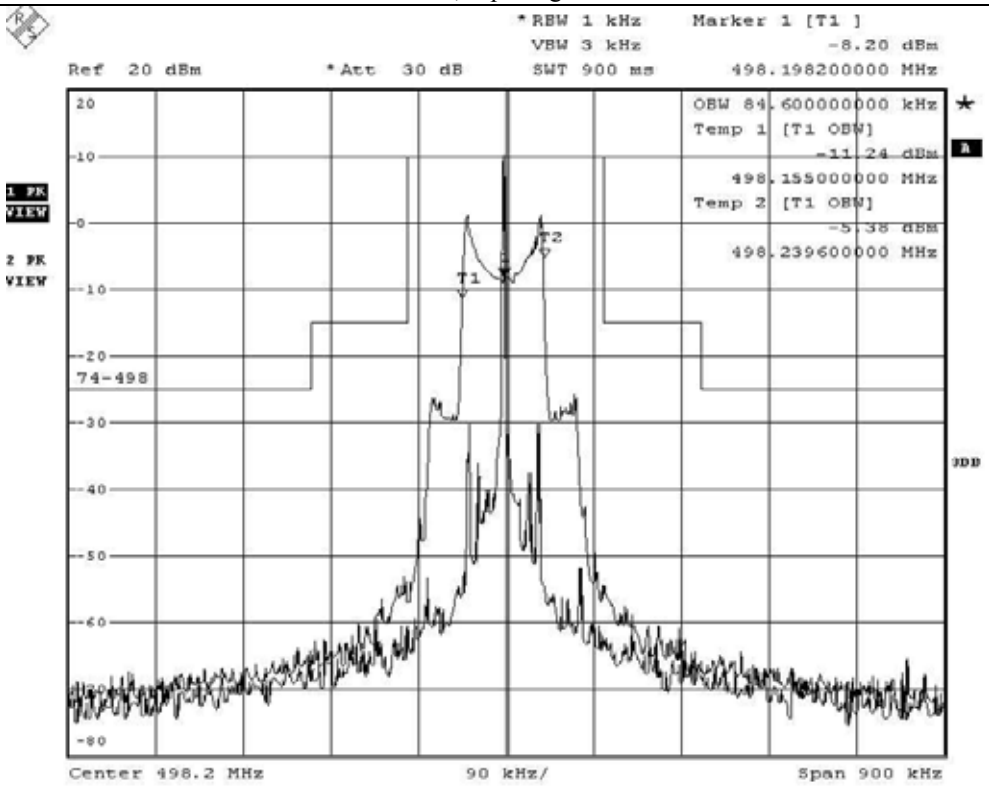
HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

*** Operating Frequency: 498.200 MHz**



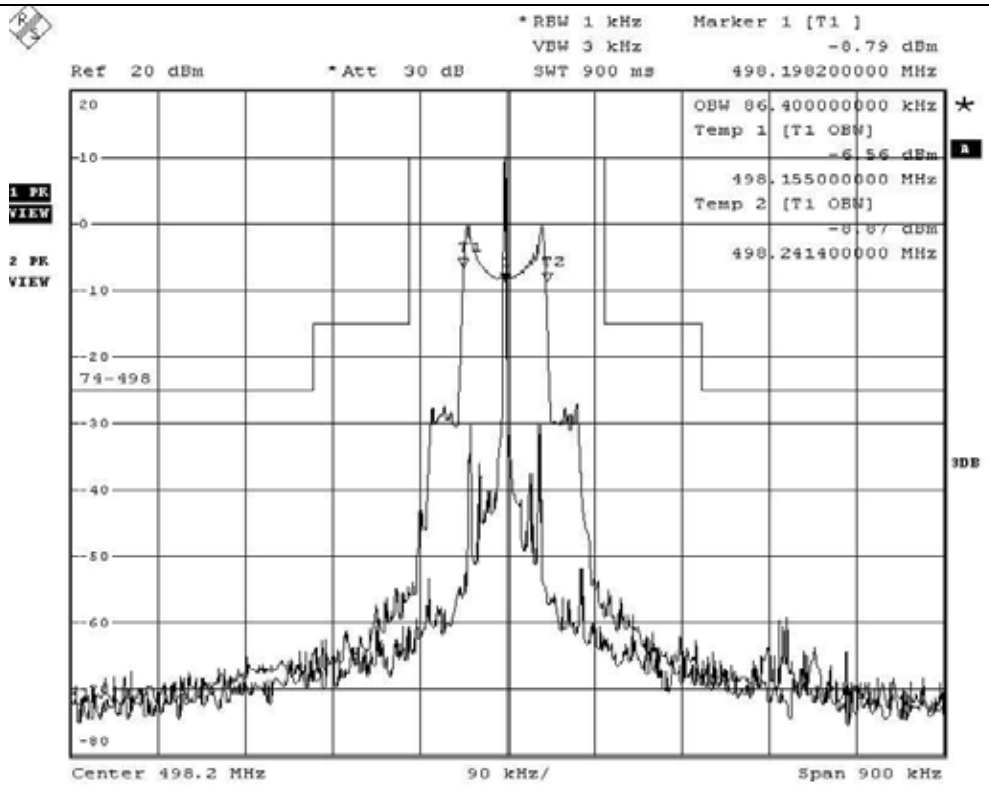
Low Channel, Input signal 0.5 kHz



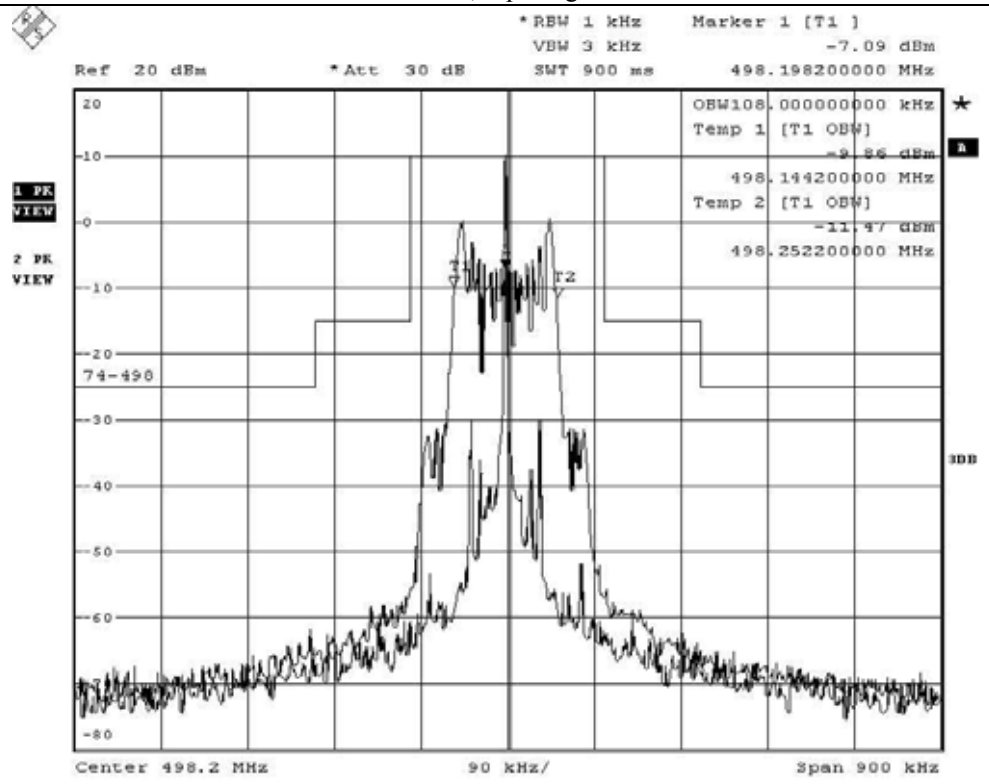
Low Channel, Input signal 0.8 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

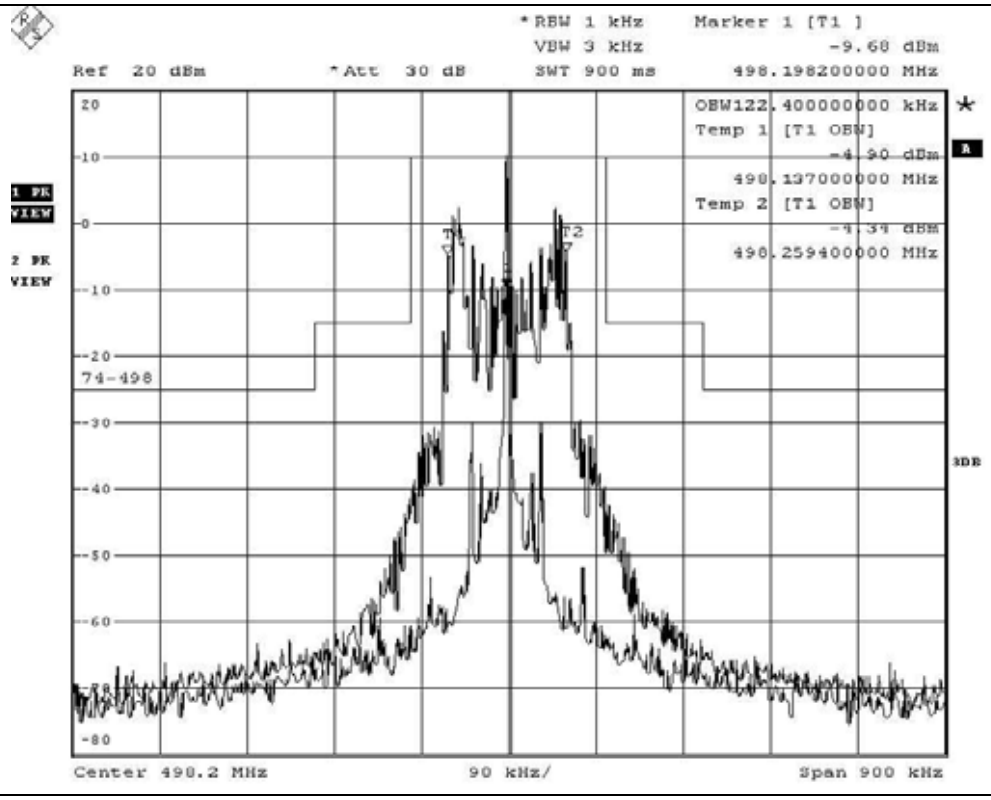


Low Channel, Input signal 1 kHz

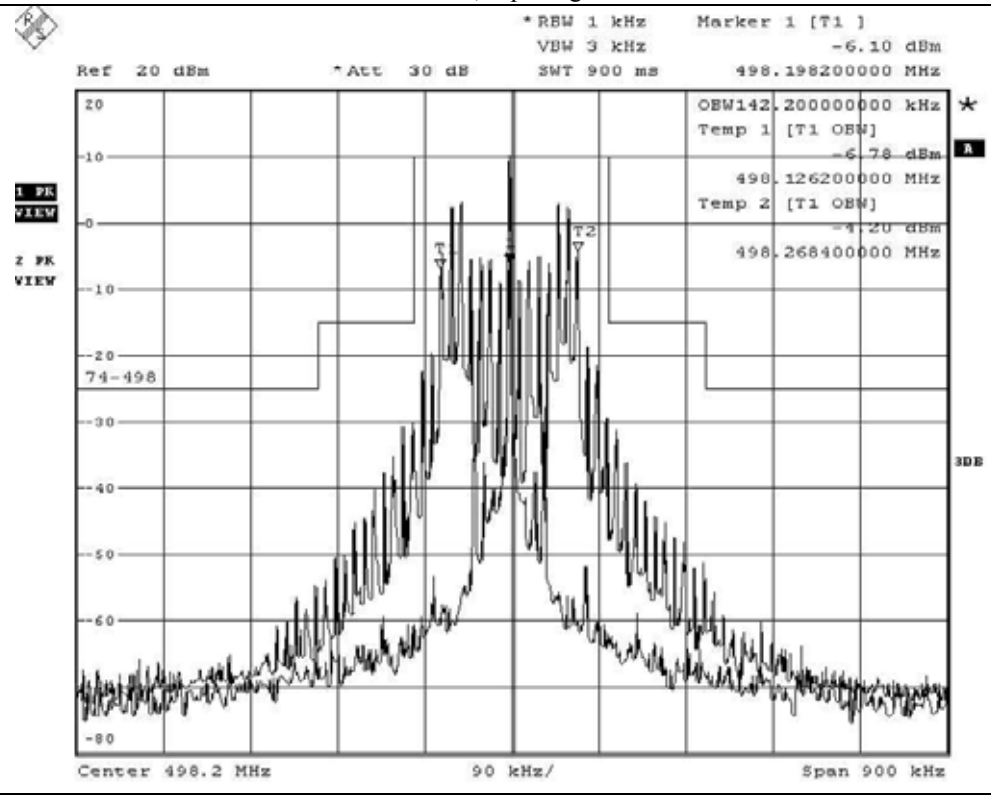


Low Channel, Input signal 2.5 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

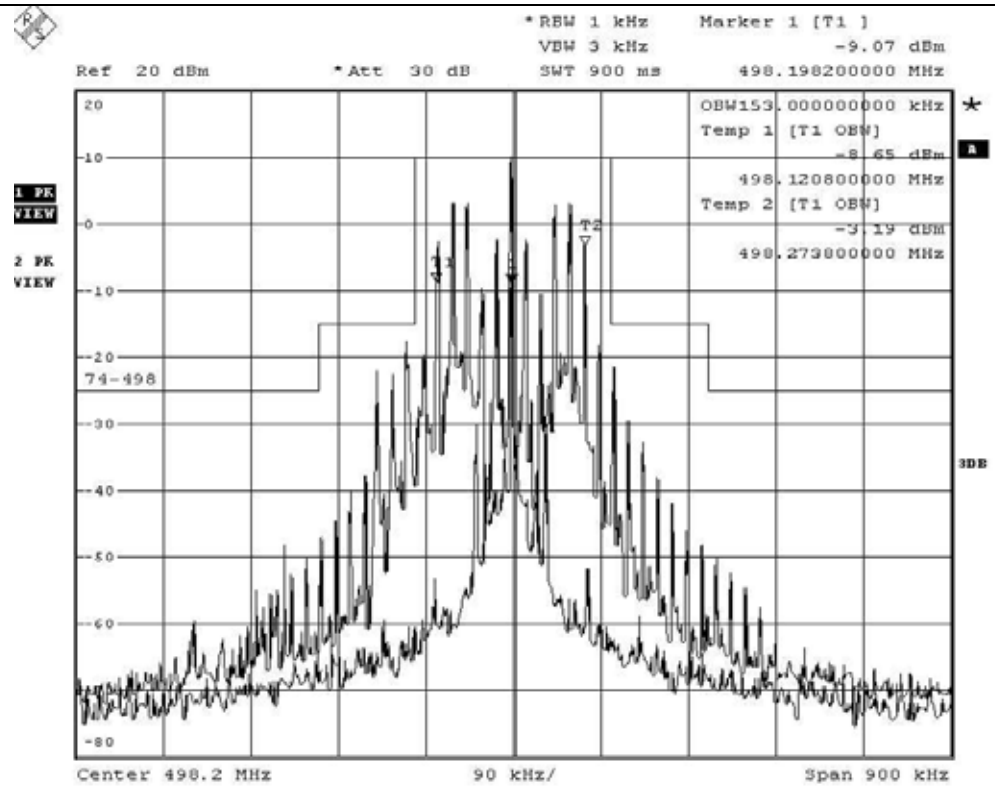


Low Channel, Input signal 5 kHz



Low Channel, Input signal 10 kHz

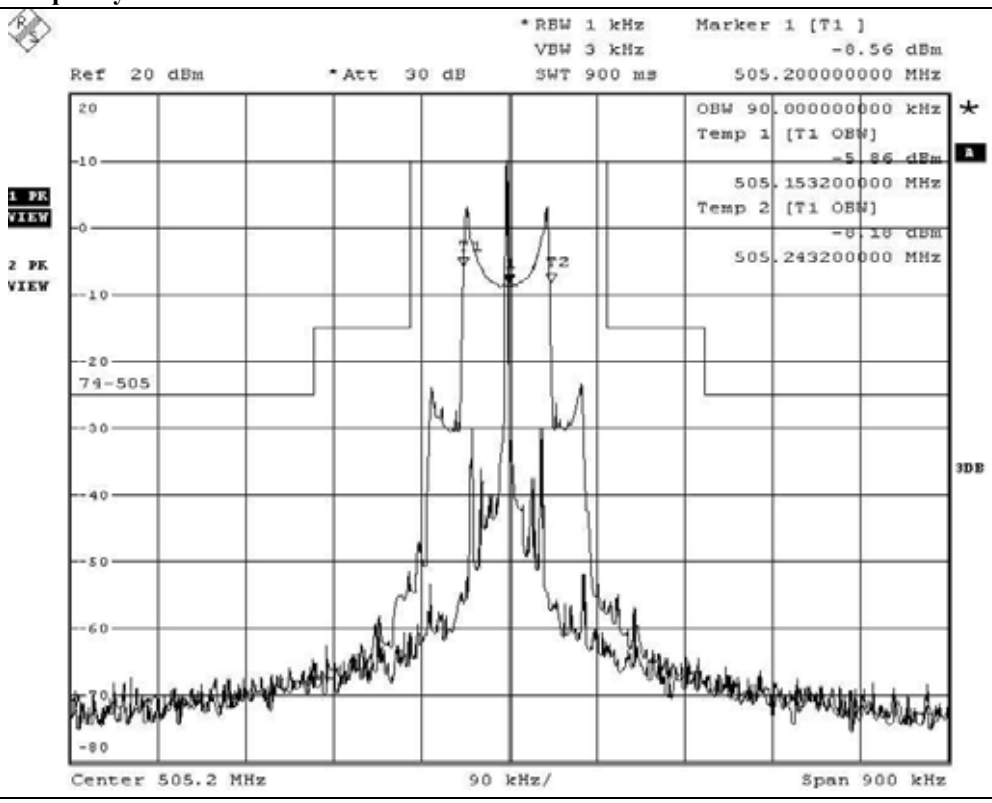
HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



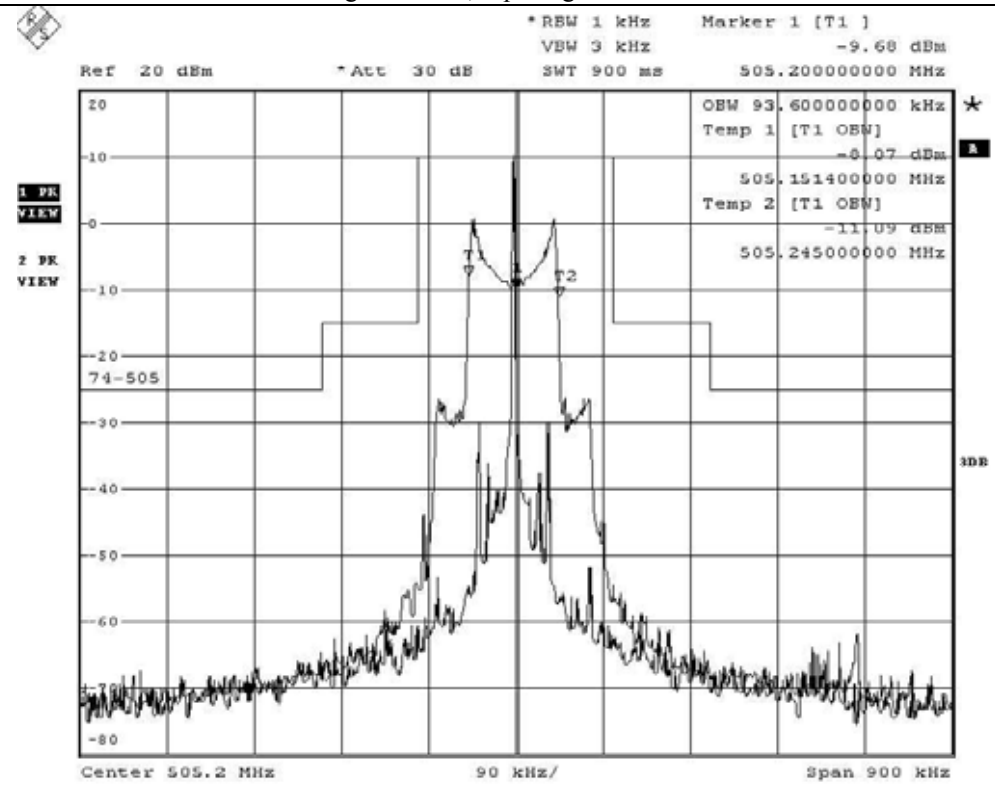
Low Channel, Input signal 15 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

*** Operating Frequency: 505.200 MHz**



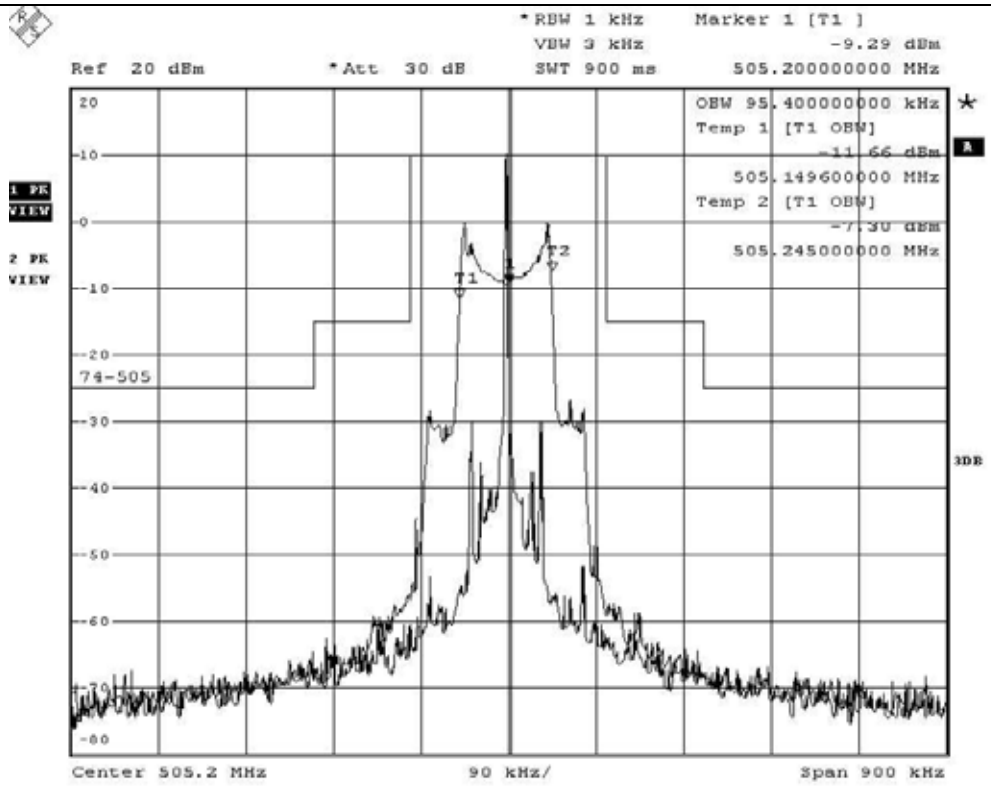
High Channel, Input signal 0.5 kHz



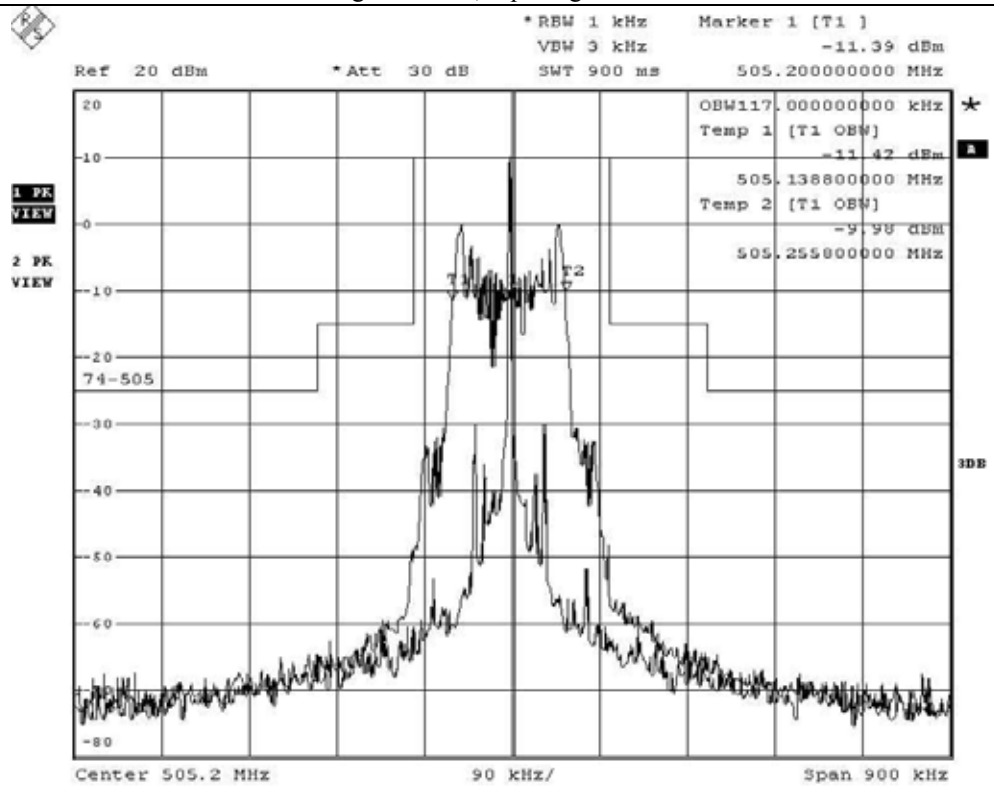
High Channel, Input signal 0.8 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



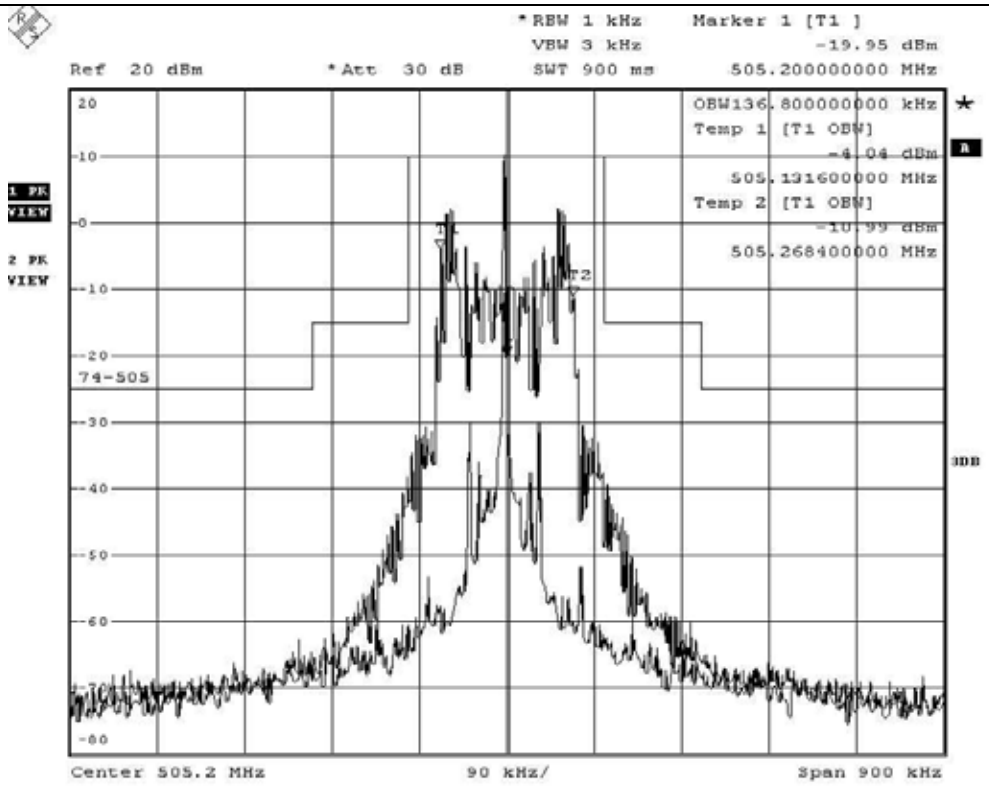
High Channel, Input signal 1 kHz



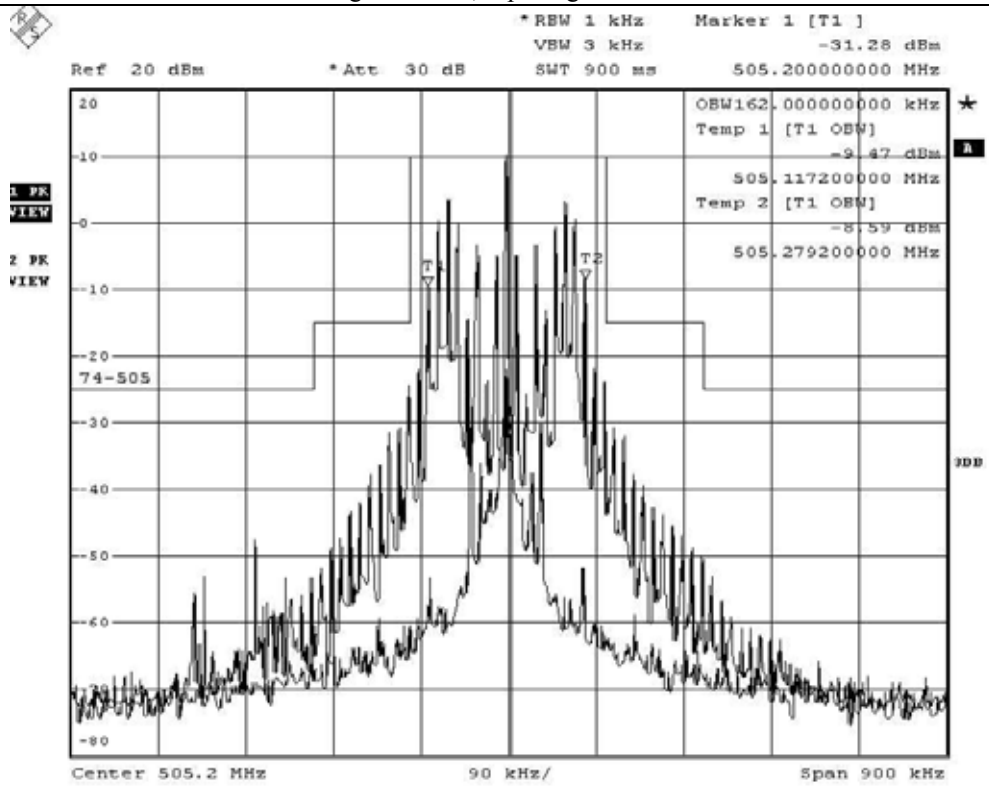
High Channel, Input signal 2.5 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

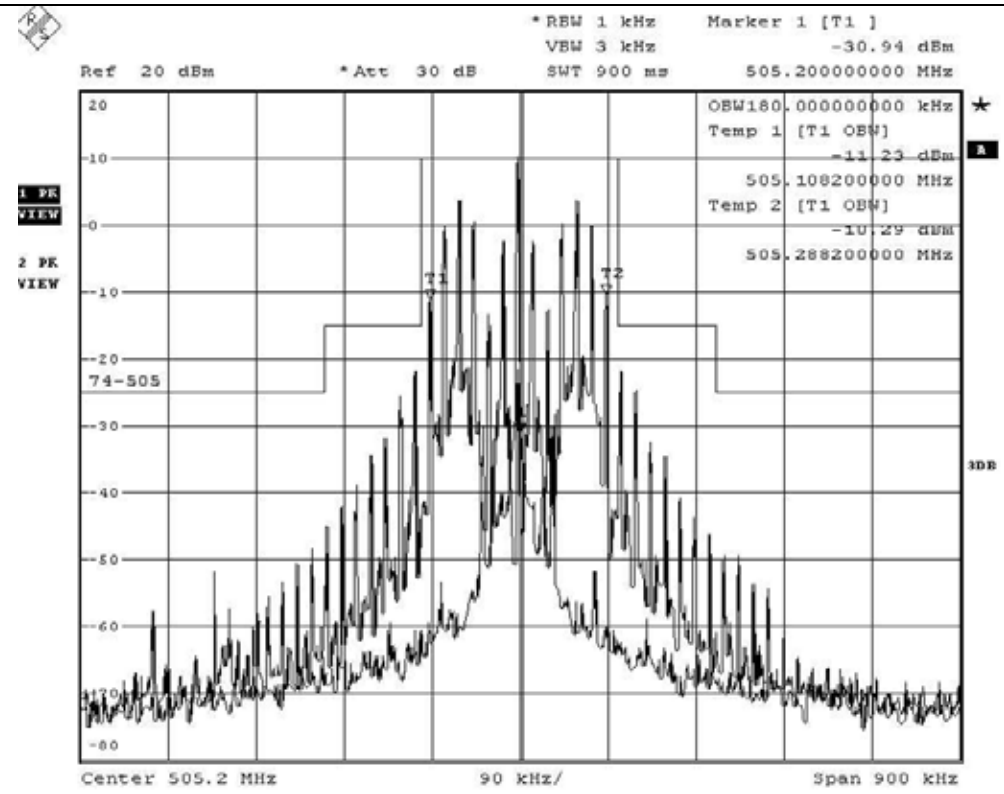


High Channel, Input signal 5 kHz



High Channel, Input signal 10 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



High Channel, Input signal 15 kHz

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

11. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

11.1 Operating environment

Temperature : 24 °C

Relative humidity : 41 % R.H.

11.2 Test set-up

The EUT was fixed in test fixture to a resistive coaxial attenuator of normal load impedance, and the un-modulated carrier was measured by the spectrum analyzer.

Turn EUT off and set chamber temperature to -30 °C and then allow sufficient time (approximately 20 min to 30 min after chamber reach the assigned temperature) for EUT to stabilize. Turn ON EUT and measure the EUT operating frequency and then turn off the EUT after the measurement. The temperature in the chamber was raised 10 °C step from -30 °C to +50 °C. Repeat above method for frequency measurements every 10 °C step and then record all measured frequencies on each temperature step.

11.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	53152A	HP	Frequency Counter	US39270295	Dec. 01, 2009
■ -	SSE-43CI-A	Samkun Tech	Chamber	060712	June 11, 2010
■ -	DRP-305DN	DIGITAL Elec.	DC Power Supply	4030191	Sep. 05, 2009

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

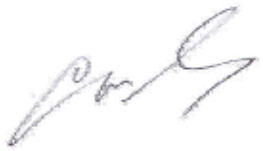
11.4 Test data

11.4.1 Operating Frequency: 494.000 MHz

-. Test Date : August 13, 2010

-. Result : Passed

Temperature (˚C)	Frequency (MHz)	Measured Freq. (MHz)	Frequency Tolerance (%)	Limit (%)
-30	494.000	494.002 629	0.000 532	0.005 %
-20		494.002 074	0.000 420	
-10		494.001 891	0.000 383	
0		494.001 158	0.000 234	
10		493.999 361	0.000 129	
20		493.998 172	0.000 370	
30		493.996 760	0.000 656	
40		493.995 261	0.000 959	
50		493.993 212	0.001 374	



Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

11.4.2 Operating Frequency: 501.000 MHz

-. Test Date : August 13, 2010

-. Result : Passed

Temperature (˚C)	Frequency (MHz)	Measured Freq. (MHz)	Frequency Tolerance (%)	Limit (%)
-30	501.000	501.002 744	0.000 548	0.005 %
-20		501.002 648	0.000 529	
-10		501.002 511	0.000 501	
0		501.002 060	0.000 411	
10		500.999 927	0.000 015	
20		500.998 613	0.000 277	
30		500.996 774	0.000 644	
40		500.994 772	0.001 044	
50		500.993 521	0.001 293	

Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

11.4.3 Operating Frequency: 498.200 MHz

-. Test Date : August 13, 2010

-. Result : Passed

Temperature (˚C)	Frequency (MHz)	Measured Freq. (MHz)	Frequency Tolerance (%)	Limit (%)
-30	498.200	498.202 520	0.000 506	0.005 %
-20		498.201 947	0.000 391	
-10		498.201 664	0.000 334	
0		498.201 321	0.000 265	
10		498.199 881	0.000 024	
20		498.198 262	0.000 349	
30		498.196 694	0.000 664	
40		498.195 089	0.000 986	
50		498.193 278	0.001 349	

Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

11.4.4 Operating Frequency: 505.200 MHz

-. Test Date : August 13, 2010

-. Result : Passed

Temperature (˚C)	Frequency (MHz)	Measured Freq. (MHz)	Frequency Tolerance (%)	Limit (%)
-30	505.200	505.202 773	0.000 549	0.005 %
-20		505.202 389	0.000 473	
-10		505.202 057	0.000 407	
0		505.201 843	0.000 365	
10		505.199 973	0.000 005	
20		505.198 343	0.000 328	
30		505.196 651	0.000 663	
40		505.194 802	0.001 029	
50		505.193 358	0.001 315	

Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

12. FREQUENCY STABILITY WITH VOLTAGE VARIATION

12.1 Operating environment

Temperature : 24 °C

Relative humidity : 41 % R.H.

12.2 Test set-up

The EUT was fixed in test fixture to a resistive coaxial attenuator of normal load impedance, and the un-modulated carrier was measured by the spectrum analyzer.

The voltage of EUT was varied in a range from 2.0 V to 3.0 V and the maximum change in frequency was recorded at each step. The temperature tests were performed on lowest and highest channel.

12.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	53152A	HP	Frequency Counter	US39270295	Dec. 01, 2009
■ -	2350A	HP	30 dB Attenuator	2350A03133	June 10, 2010
■ -	DRP-305DN	DIGITAL Elec.	DC Power Supply	4030191	Sep. 05, 2009

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

12.4 Test data

12.4.1 Operating Frequency: 494.000 MHz

-. Test Date : August 13, 2010

-. Rated Supply Voltage : 3 Vdc

-. Result : Passed

Voltage (V)	Frequency (MHz)	Measured Freq. (MHz)	Frequency Tolerance (%)	Limit (%)
3.0	494.000	493.997 881	0.000 429	0.005 %
2.5		493.997 874	0.000 430	
2.0		493.997 870	0.000 431	
1.5		-	-	
1.0		-	-	

Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

12.4.2 Operating Frequency: 501.000 MHz

-. Test Date : August 13, 2010

-. Rated Supply Voltage : 3 Vdc

-. Result : Passed

Voltage (V)	Frequency (MHz)	Measured Freq. (MHz)	Frequency Tolerance (%)	Limit (%)
3.0	501.000	500.997 835	0.000 432	0.005 %
2.5		500.997 832	0.000 433	
2.0		500.997 827	0.000 434	
1.5		-	-	
1.0		-	-	

Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

12.4.3 Operating Frequency: 498.200 MHz

-. Test Date : August 13, 2010

-. Rated Supply Voltage : 3 Vdc

-. Result : Passed

Voltage (V)	Frequency (MHz)	Measured Freq. (MHz)	Frequency Tolerance (%)	Limit (%)
3.0	498.200	498.197 876	0.000 426	0.005 %
2.5		498.197 872	0.000 427	
2.0		498.197 870	0.000 428	
1.5		-	-	
1.0		-	-	

Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

12.4.4 Operating Frequency: 505.200 MHz

-. Test Date : August 13, 2010

-. Rated Supply Voltage : 3 Vdc

-. Result : Passed

Voltage (V)	Frequency (MHz)	Measured Freq. (MHz)	Frequency Tolerance (%)	Limit (%)
3.0	505.200	505.197 829	0.000 430	0.005 %
2.5		505.197 827	0.000 430	
2.0		505.197 824	0.000 431	
1.5		-	-	
1.0		-	-	

Tested by: In-Sub, Youn / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

13. RADIO FREQUENCY EXPOSURE

13.1 RF Exposure Limit

According to the FCC rule §1.1310, the limit for General Population/Uncontrolled exposure is f (MHz)/1 500 = 0.33 mW/cm² for the device operating 300 MHz ~ 1 500 MHz.

13.2 EUT Description

Kind of EUT	Wireless Microphone
Operating Frequency Band	■ Wireless Microphone: 494.000 MHz ~ 501.000 MHz and 498.200 MHz ~ 505.200 MHz ☐ WLAN: 2 412 MHz ~ 2 462 MHz ☐ WLAN: 5 180 MHz ~ 5 320 MHz / 5 500 MHz ~ 5 700 MHz ☐ WLAN: 5 745 MHz ~ 5 825 MHz ☐ Bluetooth: 2 402 MHz ~ 2 480 MHz
Device Category	■ Portable (< 20 cm separation) ☐ Mobile (> 20 cm separation) ☐ Others
Max. Output Power	10.21 dBm (10.495 mW) @ 494.000 MHz
Used Antenna	Single Antenna (PCB Antenna.)
Used Antenna Gain	1.53 dBi
Exposure Evaluation Applied	☐ MPE ☐ SAR ■ N/A

13.3 Test Result

SAR evaluation is not required for the PORTABLE Device while its maximum output power is lower than threshold: 60/f (GHz) = 60/0.505 = 119.52 mW.

So, the device meets the RF exposure requirement.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)