



Electromagnetic Emission

FCC / INDUSTRY CANADA MEASUREMENT REPORT

CERTIFICATION OF COMPLIANCE

FCC PART90 & INDUSTRY CANADA RSS-119 CERTIFICATION

PRODUCT : Two Way Radio
MODEL/TYPE NO : SP 6402
FCC ID : RXUSP6402
TRADE NAME : 
APPLICANT : MAXON CIC CO LTD
CHONGHO BLDG #7-61 YANGJAE-DONG SEOCHO-GU SEOUL 137-130 korea
Attn. : MR. YU-SIK SUH
FCC CLASSIFICATION : TNF Licensed Non-Broadcast Station Transmitter Held to Face
FCC RULE PART(S) : FCC Part 90 Private land mobile radio services
RSS-119 Land Mobile and Fixed Radio Transmitters and Receivers, 27.4 MHz to 960 MHz
FCC PROCEDURE : Certification
DATES OF TEST : OCTOBER 11, 2005
DATES OF ISSUE : November 2, 2005
TEST REPORT No. : BWS-05-RF-0027
TEST LAB. : BWS TECH Inc.(FCC Registration Number : 553281)

This Two Way Radio SP 6402 has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 and ANSI/TIA-603-B-2002 at the BWS TECH/EMC Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part 90 and Industry Canada RSS-119.

I attest to the accuracy of data. All measurement herein was performed by me or were made under my supervision. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. The results of testing in this report apply to the product/system, which was tested only. Other similar equipment may not necessarily produce the same results due to production tolerance and measurement uncertainties.



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#611-1 Maesan-Ri, Mohyeon-Myeon, Yongin-Si, Gyeonggi-Do, 449-853 Korea

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FCC / INDUSTRY CANADA TEST REPORT

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

1. General Information

Applicant

Company Name :	MAXON CIC CO LTD
Company Address :	CHONGHO BLDG #7-61 YANGJAE-DONG SEOCHO-GU SEOUL 137-130 korea
Phone/Fax :	Phone : +82-2-3498-3051 Fax : 02-3498-3113

Manufacturer

Company Name :	MAXON CIC CO LTD
Company Address :	CHONGHO BLDG #7-61 YANGJAE-DONG SEOCHO-GU SEOUL 137-130 Korea
Phone/Fax :	Phone : +82-2-3498-3051 Fax : 02-3498-3113
● EUT Type :	Two Way Radio
● Model Number :	SP 6402
● FCC Identifier :	RXUSP6402
● S/N :	Prototype
● FCC Rule Part(s) :	FCC Part 90 Private land mobile radio services RSS-119 Land Mobile and Fixed Radio Transmitters and Receivers, 27.4 MHz to 960 MHz
● FCC Classification :	TNF : Licensed Non-Broadcast Station Transmitter
● Freq. Range :	440 MHz ~ 470 MHz
● Channel :	208 Channels
● Modulation Method :	FM
● Emission Designator :	16K0F3E, 16K0F3E
● RF Power Output :	1/5 Watt
● Test Procedure :	ANSI C63.4-2003 and ANSI/TIA-603-B-2002
● Dates of Tests :	October 10 ~ November 11, 2005
● Place of Tests :	BWS TECH Inc.(FCC Registration Number : 553281) #611-1 Maesan-Ri, Mohyeon-Myeon, Yongin-Si, Gyeonggi-Do, 449-853 Korea TEL: +82 31 333 5997 FAX: +82 31 333 0017
● Test Report No. :	BWS-05-RF-0027

2. Description of Test Facility

The measurement for radiated and conducted emission test were conducted at the open area test site of BWS TECH Inc. facility located at #611-1 Maesan-Ri, Mohyeon-Myeon, Yongin-Si, Gyeonggi-Do, 449-853 Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-2000 and CISPR Publication 16. The BWS TECH measurement facility has been filed to the Commission with the FCC for 3 and 10-meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-2000 and registered to the Federal Communications Commission (Registration Number : 553281).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-2000) was used in determining radiated and conducted emissions from the MAXON CIC CO LTD Two Way Radio Model : SP 6402.

3. Product Information

The Equipment Under Test (EUT) is the MAXON CIC CO LTD Two Way Radio model: SP 6402(FCC ID: RXUSP6402).

Maxon's SP-6402 radio feature up to 13 groups and up to 16 channel operation per group for a total channel capacity of 208 channels of superior performance and reliability. Operation and functions for Maxon's SP-6402 radios are described in this manual.

Application of some of the functions described in this manual is determined by the system you use. Your Maxon Dealer will program your radio so that you have the greatest number of functions possible relative to your needs.

3.1 DC Voltage abd Currents

The DC voltages applied to and DC currents into the several elements of the final radio frequency amplifying stage for normal operation over power range were;

Standby: 7.5 Volts, 0.08 Ampare

Low Power: 7.5 Volts, 1.11 Ampare

High Power: 7.5 volts, 2.23 Ampare

3.2 Emission Designator

Type of Emission : F3E

Necessary Bandwidth and Emission Bandwidth:

12.5 kHz (Narrow Band) : Bn = 11K0F3E

25 kHz (Wide Band) : Bn = 16K0F3E

Calculation:

Maximum Modulation(M) in kHz : 3

Maximum Deviation(D) in kHz : 2.5(NB) and 5(WB)

Constant Factor(k) : 1

$B_n = 2M + 2DK$

3.3 General Specification

EQUIPMENT TYPE	Hand Held / Portable
PERFORMANCE SPECIFICATIONS	TIA/EIA-603
BAND	UHF2(440~470 Mhz)
CHANNEL SPACINGS	12.5 KHz, 25 KHz PROGRAMMBLE
RF OUTPUT POWER	5 Watts High and 1 Watt Low
MODULATION TYPE	F3E
AUDIO POWER	500mW (EXT WITH 16 OHM) 1W (INT WITH 4 OHM)
INTERMEDIATE FREQUENCY	45.1 MHz, 455 KHz
CHANNELS	208 Channel
FREQUENCY SOURCE	SYNTHESIZER
BATTERY	LI-ION 7.5 VDC NOMINAL EXTREME, +/- 10% VDC EXTREME
Antenna	Radiation : Omni-Direction Impedance : 50 Ohms Norminal V.S.W.R : 1.5 or less (center frequency) Polarization : Vertical Gain : Unity Connector : SMA with Ni-finished Pin and Body
TRANSMITTER	
FREQUENCY ERROR	< 0.75KHz NOMINAL CONDITION, ±3PPM EXTREME CONDITION
ADJACENT CHANNEL POWER	25 KHz < 70 dBc @nominal conditions < 65 dBc @extreme conditions 12.5 KHz < 60 dBc @nominal condition < 55 dBc @extreme codition
TX SPURIOUS EMISSION(CONDUCTED)	BELOW 1 GHz < -36 dBm @nominal BELOW 4 GHz < -30 dBm @nominal
TRANSMITTER AUDIO DISTORTION (WITHOUT CTCSS)	@1KHz < 5%, < 10% @extreme condition
HUM & NOISE	12.5 kHz C.S. >40dB (with PSOPH) 25 kHz C.S. >40dB (with no PSOPH)
Peak Deviation Range Adjustment (@Nominal/Extreme Conditions)	Channel Spacing: (@ 1KHz, Nom. Dev + 20dB) Min. Max. 25KHz >3.5 <6.0 12.5KHz >1.5 <4.0

3.4 EUT operating conditions & test configuration

3.4.1 Client Condition

Temperature : -30 °C ~ +50 °C
Humidity : 95 %

3.4.2 EUT Operating Condition

Operating Mode : Transmitter was operated in a continues transmission mode with the carrier modulated as specified in the test data.

Special test Software : Not Used.

Special test Hardware : Not Used.

TX Frequency Band : 440 MHz ~ 470 MHz

Test Frequencies : Low 440.075 MHz

Middle 455.075 MHz

High 469.975 MHz

Modulation : FM Modulation

Modulation Signal Source : External Source

4. Summary of Test Results

TEST REQUIREMENTS	FCC Paragraph	IC Paragraph	Result
RF Power Output (Conducted)	§2.1046	RSS-119 §6.2	Pass
Audio Frequency Response	§2.1047(A)	RSS-119 §6.6	Pass
Audio Low pass Filter Response	§2.1047(A)	RSS-119 §6.6	Pass
Modulation Limiting	§2.1047(B)	RSS-119 §6.6	Pass
Occupied Bandwidth	§2.1049	RSS-119 §6.4	Pass
Spurious Emissions at Antenna Terminals	§2.1051	RSS-119 §6.3	Pass
Field Strength of Spurious Radiation	§2.1053	RSS-119 §6.3	Pass
Frequency Stability/Temperature Variation	§2.1055	RSS-119 §7.0	Pass
Transient Frequency Behavior	§90.214	RSS-119 §7.0	Pass

5. TEST DATA

5.1 RF Power Output (Conducted)

5.1.1 Specification

FCC Rules Part 2, Section 2.1046

FCC Rules Part 90, Section 90.205

Industry Canada, RSS-119 Section 6.2

5.1.2 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.1

5.1.3 Measurement Set-Up

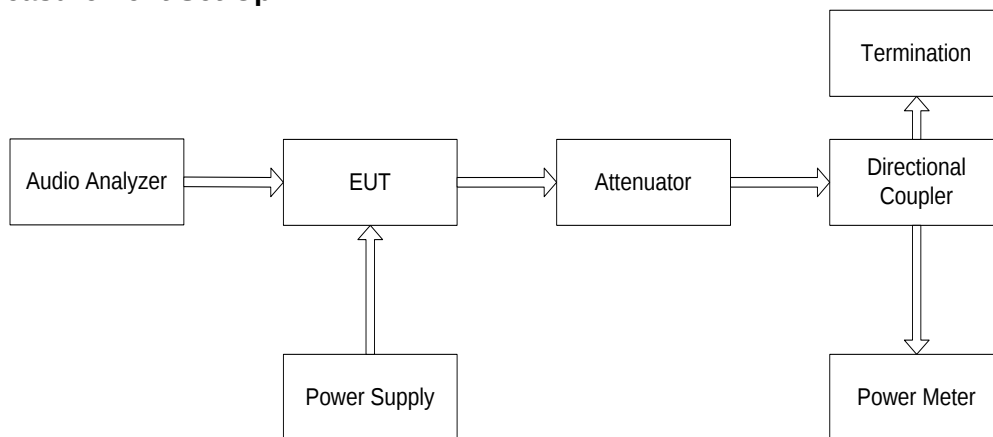


Fig.1

5.1.4 Test Equipment List

Equipment	Model Name	Manufacturer
EUT	SP 6402	MAXON CIC CO LTD
Power Supply	IPS-30B03DD	INTERACT
Audio Analyzer	8903B	Agilent
Attenuator	33-30-33	WEINSCHEL
Directional Coupler	778D	Agilent
Termination	8173	Bird
Power Sensor	8481A	Agilent
Power Meter	E4418A	Agilent

5.1.5 Test Procedure

- The unit was turn-up in accordance with the alignment procedure stated in the FIG. 1 , and was loaded into a 50 ohm resistive termination.
- The unit was powered though its normally accompanied power cord by a DC power supply.
- Power supply voltage was set to nominal voltage at the power supply terminals with transmitter off.
- The unit was operated for three consecutive test cycles of 15 minutes standby and 5 minutes in transmitting.
- The EUT was aligned for transmitter operation on three frequencies(F_o) at full rated power per the tune-up procedure outlined in the Product Specification. This represents frequencies at the low, mid and high end of the EUT operating frequency band.

5.1.6 Test Result

5.1.6.1. High Power

Transmitter Channel Setting	Frequency Tuned (MHz)	Measured Power (dBm)	Rated Power (Watts)
12.5 kHz Channel Spacing : Narrow Band			
Low	440.075	36.90	4.90
Mid	455.075	36.95	4.95
High	469.975	36.58	4.55
25 kHz Channel Spacing : Wide Band			
Low	440.075	36.87	4.86
Mid	455.075	36.69	4.67
High	469.975	36.51	4.48

5.1.6.2. Low Power

Transmitter Channel Setting	Frequency Tuned (MHz)	Measured Power (dBm)	Rated Power (Watts)
12.5 kHz Channel Spacing : Narrow Band			
Low	440.075	30.43	1.10
Mid	455.075	30.11	1.03
High	469.975	29.80	0.95
25 kHz Channel Spacing : Wide Band			
Low	440.075	30.16	1.04
Mid	455.075	30.02	1.00
High	469.975	29.88	0.97



Tested by **Choi, Chang Young**

5.2 Modulation Characteristics – Audio Frequency Response

5.2.1 Specification

FCC Rules Part 2, Section 2.1047(a)
FCC Rules Part 90, Section 90.207 & 90.242(b)(8)
Industry Canada, RSS-119 Section 6.6

5.2.2 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.6

5.2.3 Measurement Set-Up

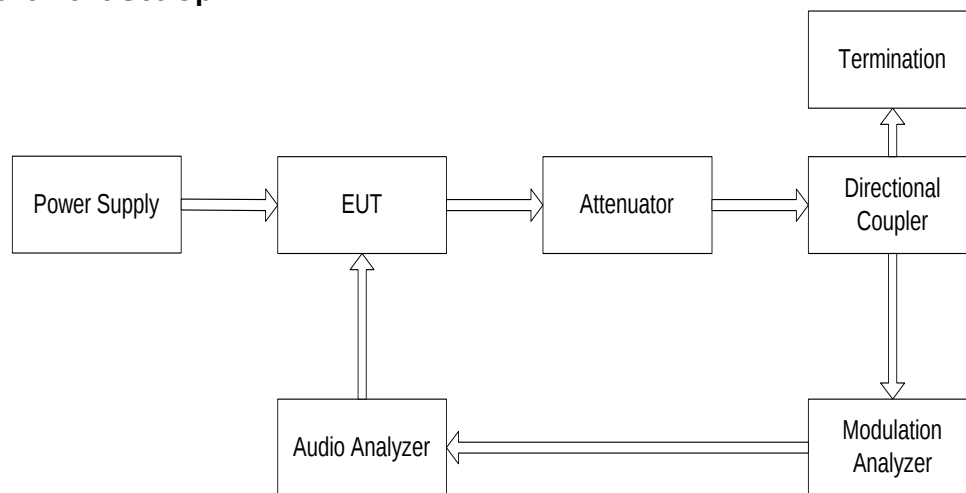


Fig.2

5.2.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	SP 6402	MAXON CIC CO LTD
Power Supply	IPS-30B03DD	INTERACT
Audio Analyzer	8903B	Agilent
Modulation Analyzer	8901B	Agilent
Attenuator	33-30-33	WEINSCHEL
Directional Coupler	778D	Agilent
Termination	8173	Bird

5.2.5 Test Procedure

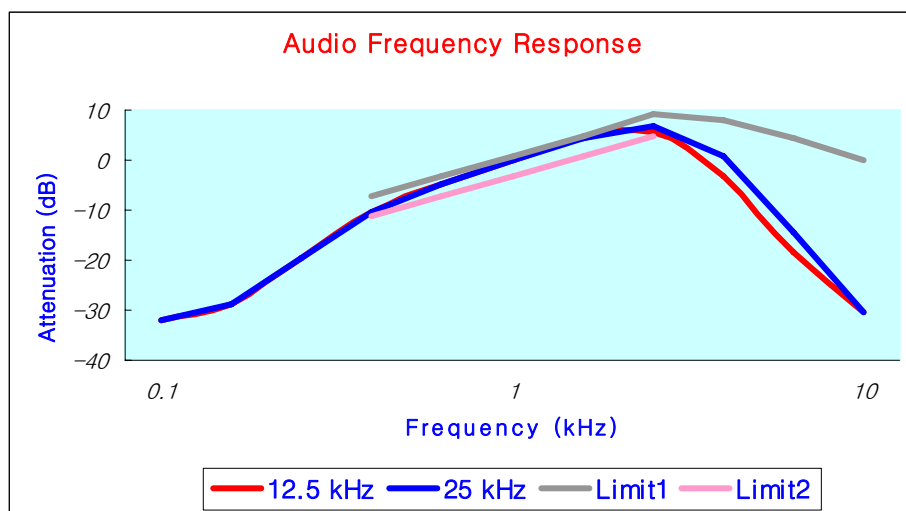
- The unit was turn-up in accordance with the alignment procedure stated in the FIG. 2 , and was loaded into a 50 ohm resistive termination.
- The audio analyzer was connected to the audio input circuit/microphone of the EUT.
- The audio signal input was adjusted to obtain 20% modulation at 1 kHz, and this point was taken as the 0 dB reference level.
- With input levels held constant and below limiting at all frequencies, the audio signal generator was varied from 100 Hz to 10 kHz.
- The response in dB relative to 1 kHz was then measured, using the HP 8901A Modulation Analyzer.
- No limit is required by the FCC for audio frequency response. The measured audio response data shows the roll-off curve at 3 kHz.

5.2.5 Test Data

FCC Rules : Part 2 §2.1047(a) & §90.242(b)(8)
Operating Frequency : 455.075 MHz
Channel : Mid
Referency Voltage : 7.2 VDC
Power Output : 5 Watts

Audio Input Frequency (Hz)	Attenuation (dB)	
	Channel Spacing : 12.5 kHz	Channel Spacing : 25 kHz
100	-32.0	-32.0
200	-24.4	-24.7
300	-15.3	-15.5
400	-10.3	-10.5
500	-7.4	-7.5
600	-5.3	-5.4
700	-3.7	-3.8
800	-2.3	-2.4
900	-1.1	-1.2
1000	0	0
1500	3.8	3.9
2000	6.2	6.0
2500	6.9	5.7
3000	5.9	3.6
4000	0.5	-3.2
5000	-6.2	-10.5
6000	-12.6	-16.7
7000	-18.3	-22.0
8000	-23.2	-26.0
9000	-27.3	-28.8
10000	-30.1	-30.4

5.2.5.2 Graph



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5.3 Modulation Characteristics – Audio Low pass Filter Response

5.3.1 Specification

FCC Rules Part 2, Section 2.1047(a)
FCC Rules Part 90, Section 90.207 & 90.242(b)(8)
Industry Canada, RSS-119 Section 6.6

5.3.2 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.15

5.3.3 Measurement Set-Up

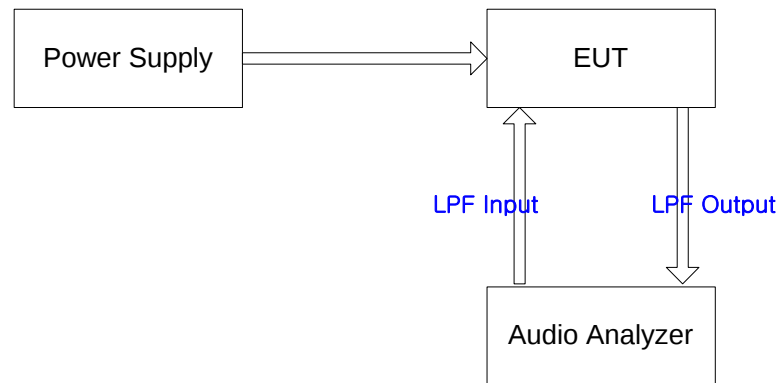


Fig.3

5.3.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	SP 6402	MAXON CIC CO LTD
Power Supply	IPS-30B03DD	INTERACT
Audio Analyzer	8903B	Agilent

5.3.5 Test Procedure

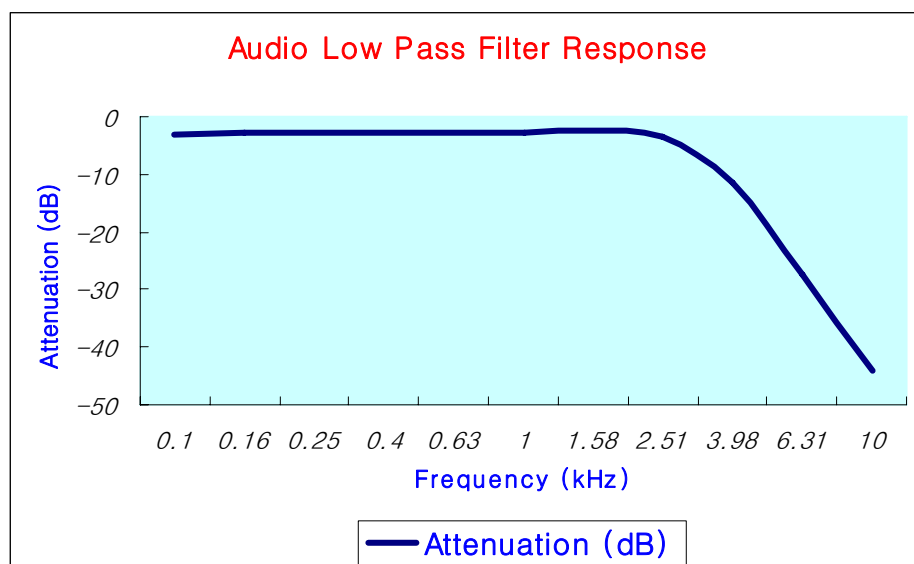
- The unit was turn-up in accordance with the alignment procedure stated in the FIG. 3 , and was loaded into a 50 ohm resistive termination.
- To measure the audio low pass filter response, an audio analyzer were connected to the actual Printed Circuit Board of the transmitter.
- Audio analyzer monitored the output of the audio filter.
- An AF input level was maintained constant at least 10 dB below the saturation level at 1 kHz tone.
- Record the dB level of the 1 kHz tone of the audio analyzer.
- Set the audio input frequency to desired test frequency between 3 kHz and upper low pass filter limit.
- Record dB level on the audio analyzer.
- Calculate the audio frequency response as $LPF\ response = LEV_{FREQ} - LEV_{REF}$
- Audio frequencies in 3 kHz to 20 kHz : Minimum Attenuation to reference point shell be greater than $60\log(f/3)$ dB, above 20 kHz, at least 50dB attenuation. ("f" in kHz)

5.3.5 Test Result

5.3.5.1 Data

Audio Input Frequency (Hz)	Attenuation (dB)	Input Audio Frequency (Hz)	Attenuation (dB)	Input Audio Frequency (Hz)	Attenuation (dB)
50	-3.2	900	-2.9	2600	-3.6
60	-3.1	1000	-2.9	2700	-4.0
70	-3.1	1100	-2.8	2800	-4.2
80	-3.1	1200	-2.7	2900	-4.5
90	-3.1	1300	-2.6	3000	-4.8
100	-3.0	1400	-2.5	3100	-5.4
150	-3.0	1500	-2.4	3200	-6.4
200	-2.8	1600	-2.4	3300	-7.2
250	-2.8	1700	-2.3	3400	-8.2
300	-2.9	1800	-2.3	3500	-8.6
350	-2.9	1900	-2.2	4000	-11.7
400	-2.8	2000	-2.0	5000	-19.2
450	-2.9	2100	-2.1	6000	-25.7
500	-2.9	2200	-2.3	7000	-31.5
600	-2.9	2300	-3.1	8000	-36.5
700	-2.9	2400	-3.1	9000	-40.2
800	-2.9	2500	-3.2	10000	-44.2

5.3.5.2 Graph




Tested by **Choi, Chang Young**

5.4 Modulation Characteristics – Modulation Limiting

5.4.1 Specification

FCC Rules Part 2, Section 2.1047(b)
FCC Rules Part 90, Section 90.207
Industry Canada, RSS-119 Section 6.6

5.4.2 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.3

5.4.3 Measurement Set-Up

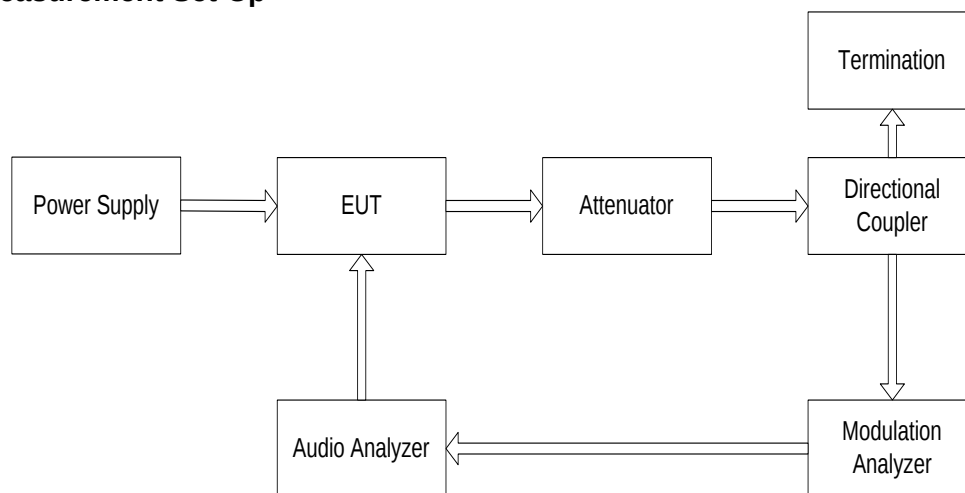


Fig.4

5.4.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	SP 6402	MAXON CIC CO LTD
Power Supply	IPS-30B03DD	INTERACT
Audio Analyzer	8903B	Agilent
Modulation Analyzer	8901B	Agilent
Attenuator	33-30-33	WEINSCHEL
Directional Coupler	778D	Agilent
Termination	8173	Bird

5.4.5 Test Procedure

- The unit was turn-up in accordance with the alignment procedure stated in the FIG. 4, and was loaded into a 50 ohm resistive termination.
- Apply an 1kHz modulating signal to EUT from the audio frequency analyzer, and adjust the level to obtain 60% of full rated system deviation.
- Increase the level from the AF generator by ± 20 dB in one step.
- Measure the steady-state deviation.
- With the AF generator level hold constant, vary the audio frequency from 300 Hz to 3000 Hz. Record the maximum deviation.
- Set the modulation analyzer to measure the peak negative deviation and repeat the test above.

5.4.6 Test Result

5.4.6.1 Data (Wide Band)

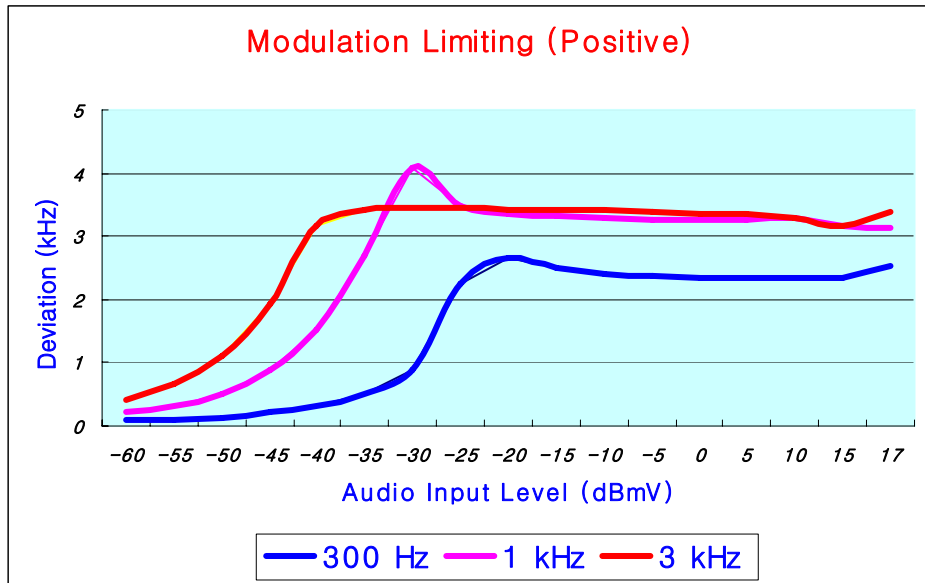
Audio Input Level (dBmV)	Positive Peak Deviation (kHz)			Negative Peak Deviation (kHz)		
	300 Hz	1 kHz	3 kHz	300 Hz	1 kHz	3 kHz
-60	0.10	0.21	0.40	0.10	0.21	0.40
-55	0.11	0.32	0.65	0.11	0.34	0.66
-50	0.14	0.52	1.10	0.14	0.54	1.11
-45	0.21	0.88	1.92	0.20	0.90	1.90
-40	0.31	1.53	3.16	0.32	1.54	3.19
-35	0.52	2.70	3.43	0.52	2.73	3.47
-30	0.88	4.07	3.44	0.88	4.13	3.49
-25	2.24	3.47	3.44	2.26	3.57	3.49
-20	2.65	3.36	3.43	2.58	3.45	3.48
-15	2.49	3.32	3.42	2.58	3.39	3.48
-10	2.42	3.28	3.42	2.58	3.38	3.47
-5	2.38	3.26	3.39	2.59	3.37	3.46
0	2.35	3.25	3.37	2.58	3.36	3.45
5	2.33	3.26	3.34	2.58	3.32	3.44
10	2.33	3.30	3.29	2.58	3.29	3.40
15	2.34	3.16	3.16	2.73	3.53	3.34
17	2.52	3.14	3.38	2.82	3.72	3.55

5.4.6.2 Data (Narrow Band)

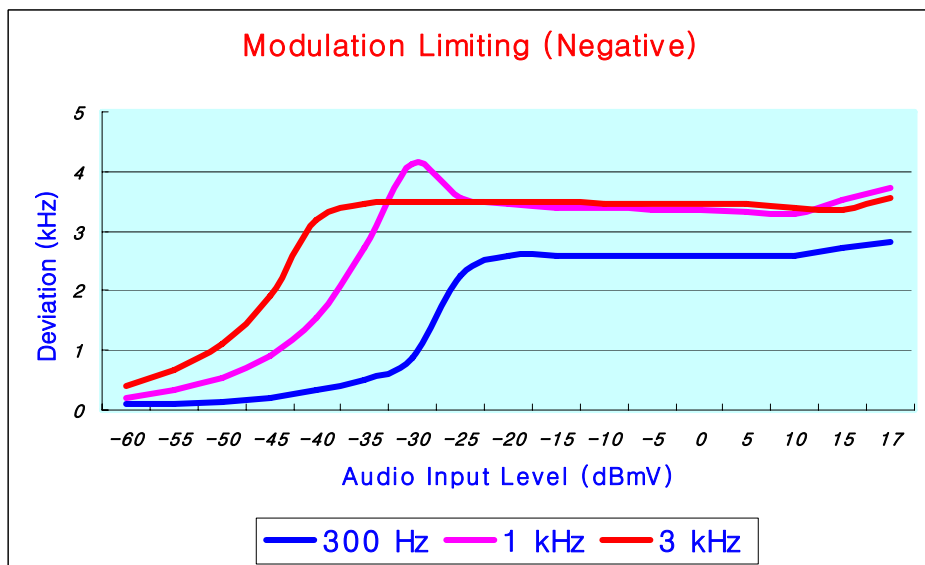
Audio Input Level (dBmV)	Positive Peak Deviation (kHz)			Negative Peak Deviation (kHz)		
	300 Hz	1 kHz	3 kHz	300 Hz	1 kHz	3 kHz
-60	0.08	0.13	0.22	0.08	0.13	0.21
-55	0.09	0.19	0.33	0.09	0.19	0.33
-50	0.11	0.30	0.54	0.10	0.30	0.54
-45	0.13	0.48	0.90	0.13	0.48	0.90
-40	0.19	0.82	1.54	0.18	0.82	1.54
-35	0.28	1.43	1.75	0.29	1.42	1.76
-30	0.46	2.20	1.77	0.46	2.08	1.78
-25	1.11	1.84	1.77	1.13	1.80	1.78
-20	1.39	1.78	1.76	1.36	1.75	1.77
-15	1.30	1.75	1.76	1.37	1.71	1.78
-10	1.27	1.74	1.76	1.38	1.71	1.77
-5	1.24	1.72	1.74	1.38	1.71	1.77
0	1.21	1.73	1.73	1.39	1.70	1.76
5	1.20	1.73	1.73	1.38	1.69	1.76
10	1.20	1.75	1.71	1.39	1.68	1.75
15	1.20	1.84	1.68	1.39	1.70	1.73
17	1.20	1.80	1.64	1.40	1.82	1.69

5.4.7 Graph (Wide Band)

5.4.7.1. Wide Band (Positive)

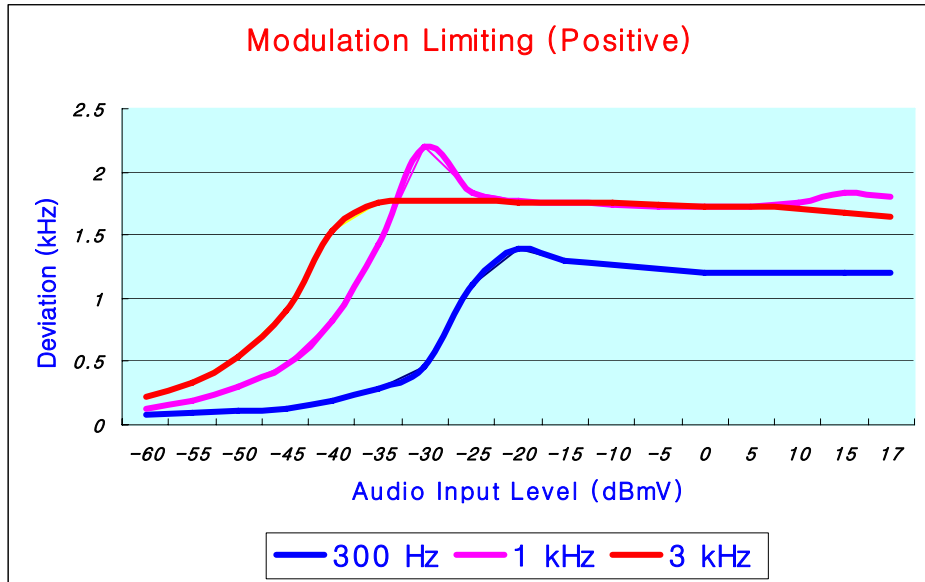


5.4.7.2 Wide Band (Negative)

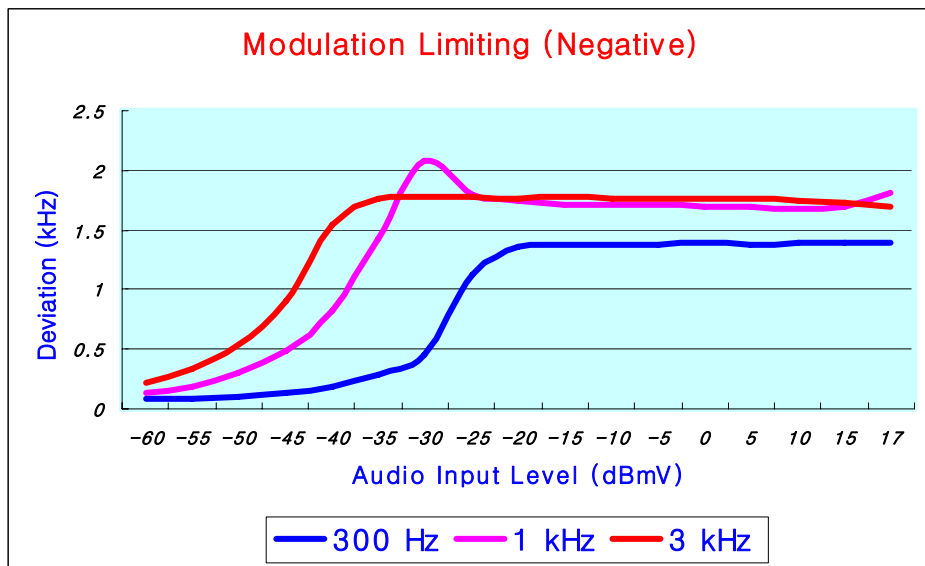


5.4.8. Graph (Narrow Band)

5.4.8.1. Wide Band (Positive)



5.4.8.2 Wide Band (Negative)




Tested by **Choi, Chang Young**

5.5 Occupied Bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. Specified limits according to the emission mask per section 90.210 is as below.

Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be below the unmodulated carrier power (P) as follows:

- (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
- (2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 per-cent of the authorized bandwidth: At least 35 dB.
- (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized band-width: At least $43 + 10 \log (P)$ dB.

Emission Mask D. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least $7.27(f_d - 2.88 \text{ kHz})$ dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation.

5.5.1 Specification

FCC Rules Part 2, Section 2.1049
FCC Rules Part 90, Section 90.210
Industry Canada, RSS-119 Section 6.4

5.5.2 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.11

5.5.3 Measurement Set-Up

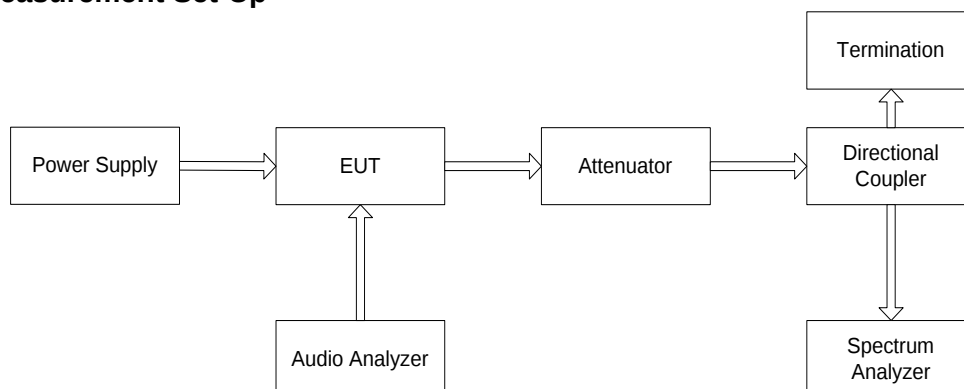


Fig.5

5.5.4 Test Equipment List

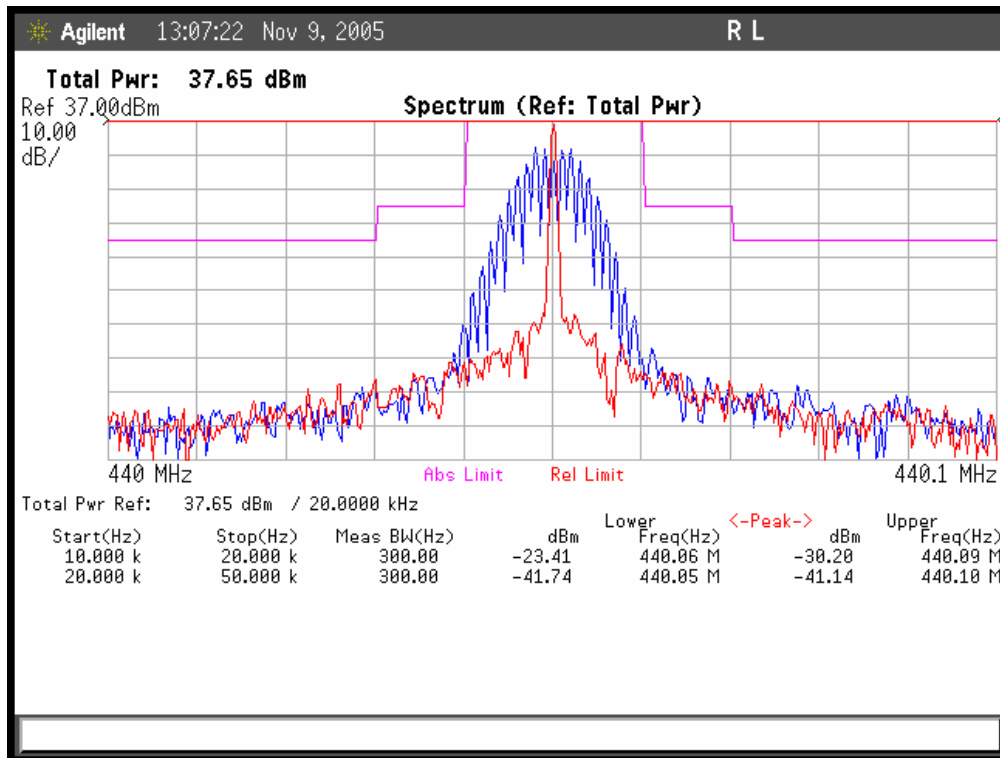
Equipment	Model Name	Manufacture
EUT	SP 6402	MAXON CIC CO LTD
Power Supply	IPS-30B03DD	INTERACT
Audio Analyzer	8903B	Agilent
Spectrum Analyzer	E4404B	Agilent
Attenuator	33-30-33	WEINSCHEL
Directional Coupler	778D	Agilent
Termination	8173	Bird

5.5.5 Measurement Procedure

- The unit was turn-up in accordance with the alignment procedure stated in the FIG. 5 , and was loaded into a 50 ohm resistive termination.
- The radio transmitter was modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.
- The occupied bandwidth data is obtained for 25kHz and 12.5 kHz channel bandwidth.

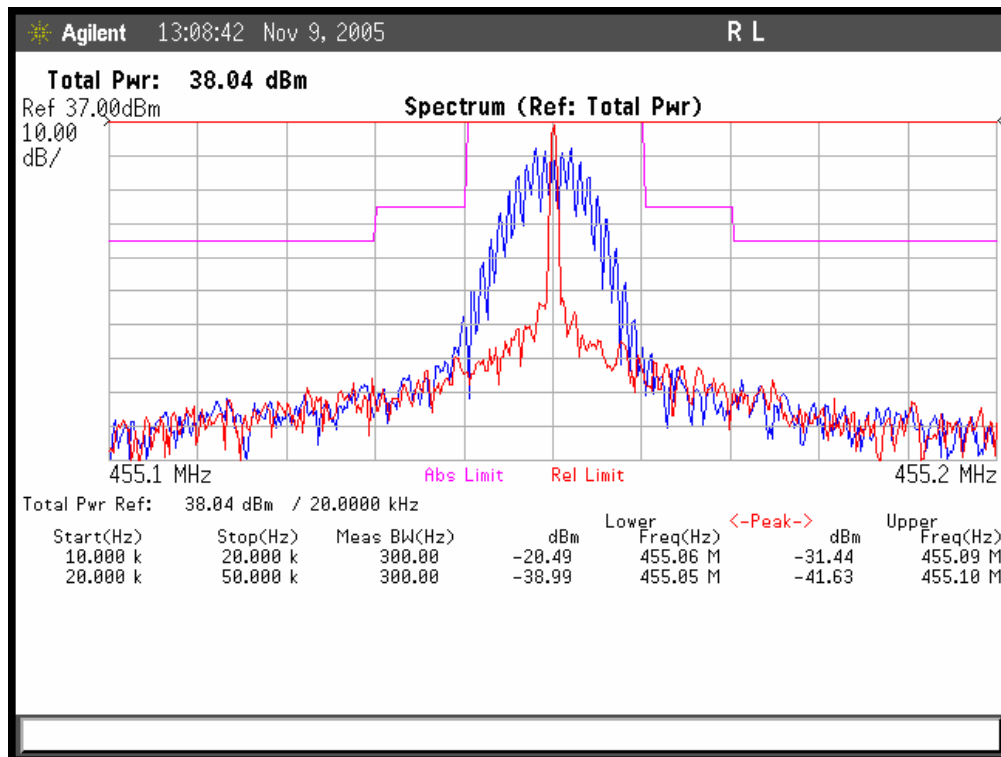
5.5.6 Occupied Bandwidth Plot

FCC Rules : Part 2 §2.1053(a) , §90.210
Operating Frequency : 440.075 MHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 2.5kHz sine wave signal
Emission Mask : Mask B



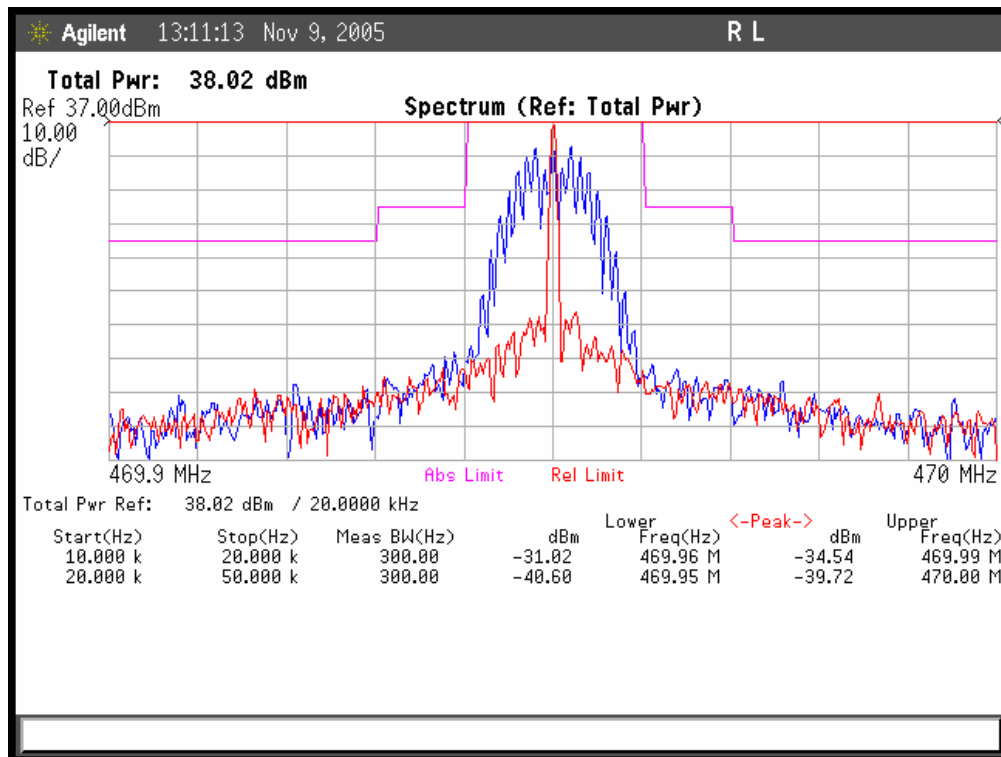
Occupied Bandwidth Plot (continued)

FCC Rules : Part 2 §2.1053(a) , §90.210
Operating Frequency : 455.075 MHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 2.5kHz sine wave signal
Emission Mask : Mask B



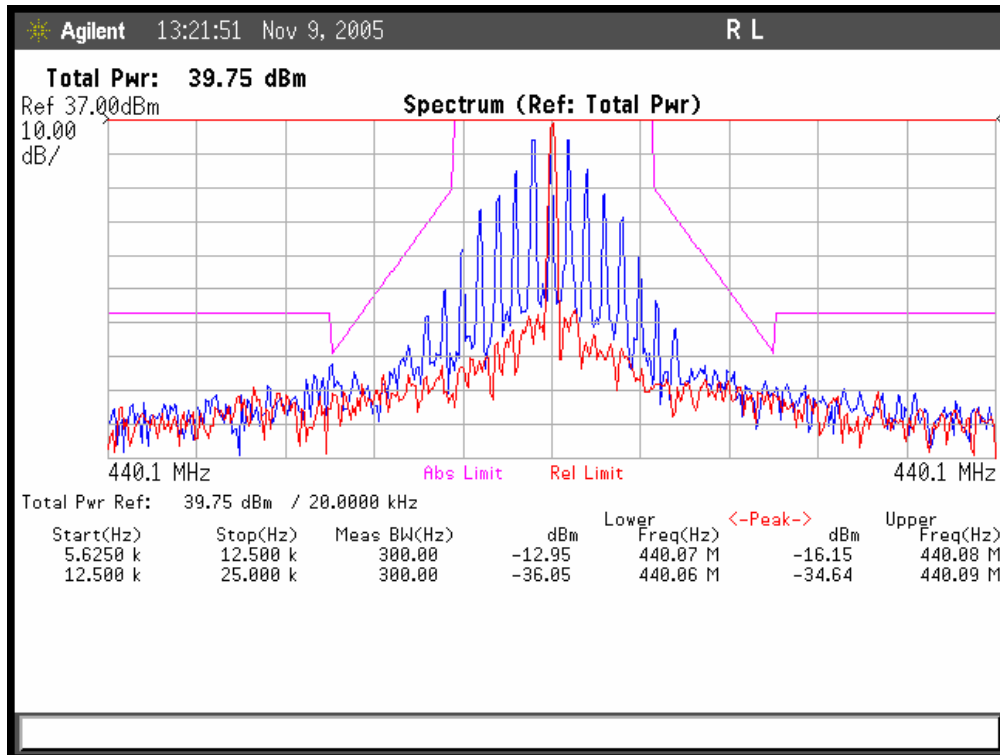
Occupied Bandwidth Plot (continued)

FCC Rules : Part 2 §2.1053(a) , §90.210
Operating Frequency : 469.975 MHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 2.5kHz sine wave signal
Emission Mask : Mask B



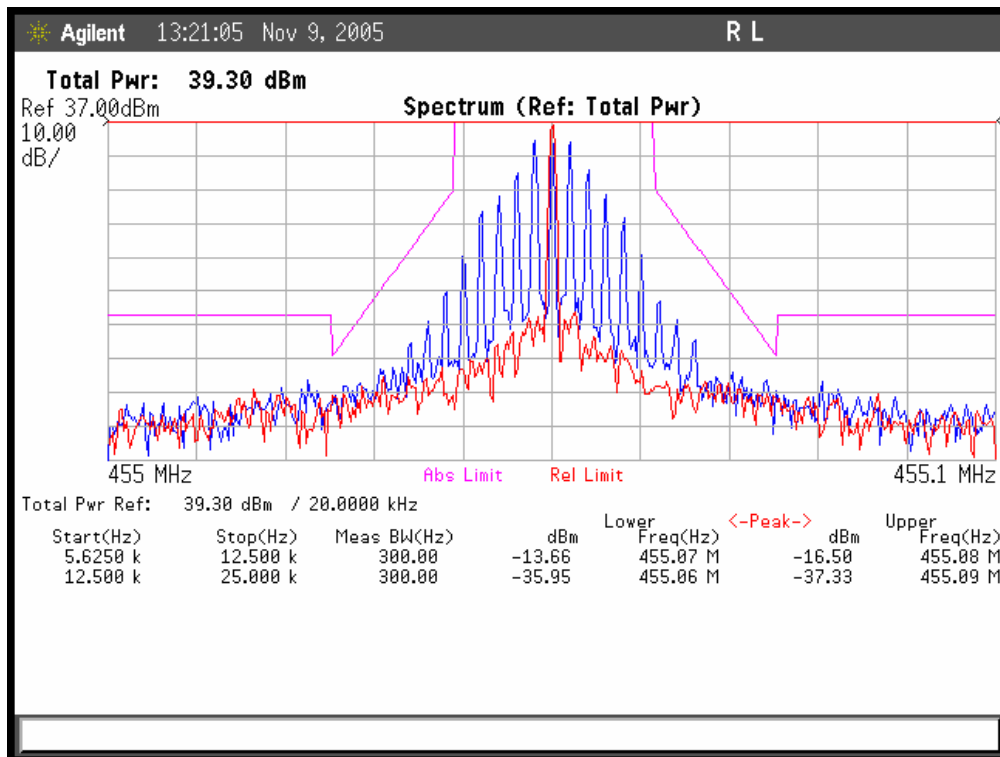
Occupied Bandwidth Plot (continued)

FCC Rules : Part 2 §2.1053(a) , §90.210
Operating Frequency : 469.975 MHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 2.5kHz sine wave signal
Emission Mask : Mask D



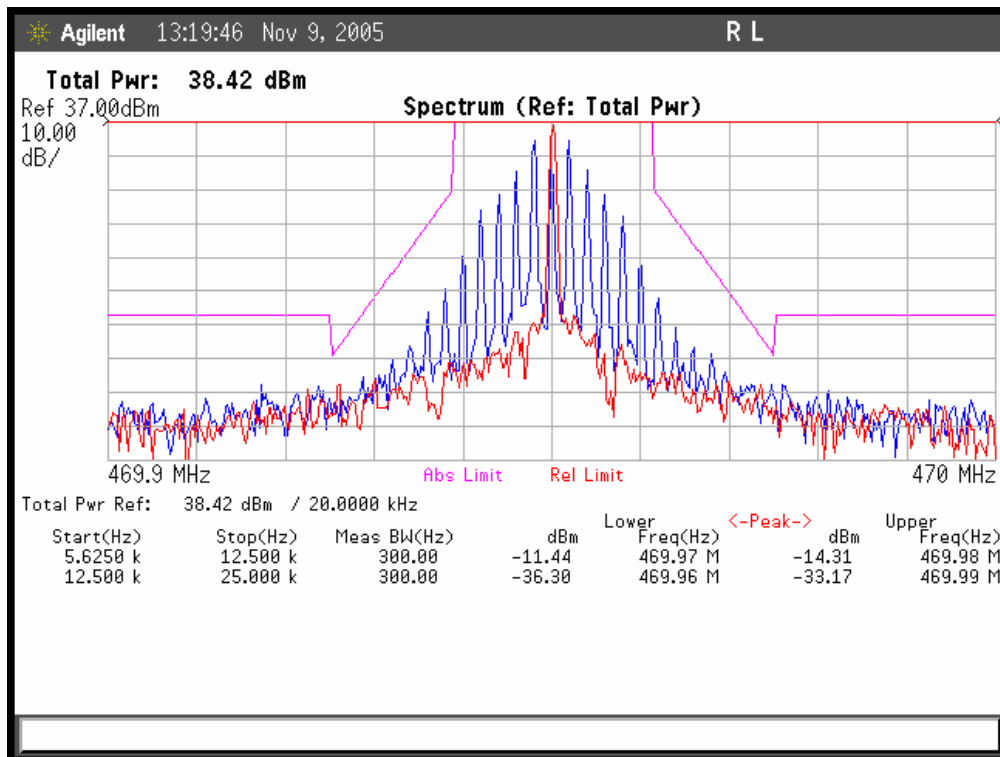
Occupied Bandwidth Plot (continued)

FCC Rules : Part 2 §2.1053(a) , §90.210
Operating Frequency : 455.075 MHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 2.5kHz sine wave signal
Emission Mask : Mask D



Occupied Bandwidth Plot (continued)

FCC Rules : Part 2 §2.1053(a) , §90.210
Operating Frequency : 469.975 MHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 2.5kHz sine wave signal
Emission Mask : Mask D




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5.6 Spurious Emissions at Antenna Terminals

Conducted spurious emissions are emissions at the antenna terminals on a frequency or frequencies which are outside of band sufficient to ensure transmission or information of required quality for the class of communication desired.

5.6.1 Specification

FCC Rules Part 2, Section 2.1051
FCC Rules Part 90, Section 90.210
Industry Canada, RSS-119 Section 6.3

5.6.2 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.13

5.6.3 Measurement Set-Up

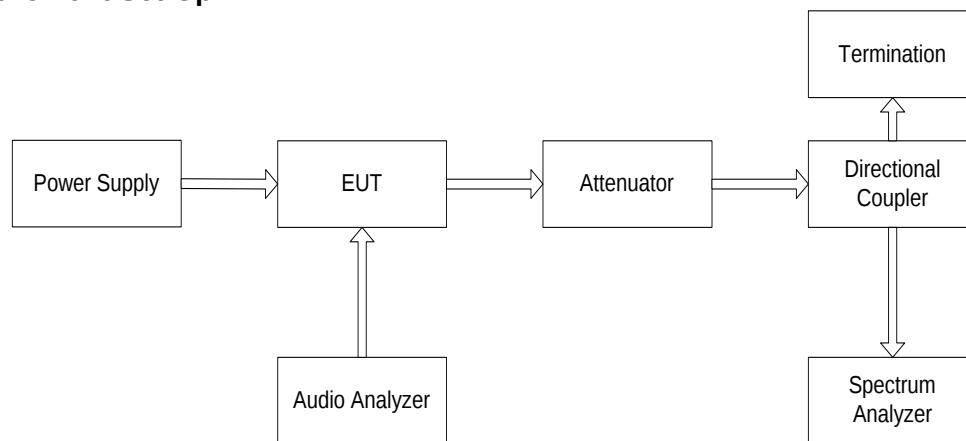


Fig.6

5.6.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	SP 6402	MAXON CIC CO LTD
Power Supply	IPS-30B03DD	INTERACT
Audio Analyzer	8903B	Agilent
Spectrum Analyzer	E4404B	Agilent
Attenuator	33-30-33	WEINSCHEL
Directional Coupler	778D	Agilent
Termination	8173	Bird

5.6.5 Measurement Procedure

- The unit was turned-up in accordance with the alignment procedure stated in the FIG. 6, and was loaded into a 50 ohm resistive termination.
- The antenna output terminal of the EUT was connected to the input of a 50 ohm spectrum analyzer through a matched 10 dB attenuator and notch filter.
- Transmitter was set to the maximum power output condition.
- The unit was modulated with a 2.5 kHz audio tone at an input level 16dB greater than that required 50% modulation. The spectrum was scanned from the lowest frequency generated in the equipment to the 10th harmonic of the carrier.

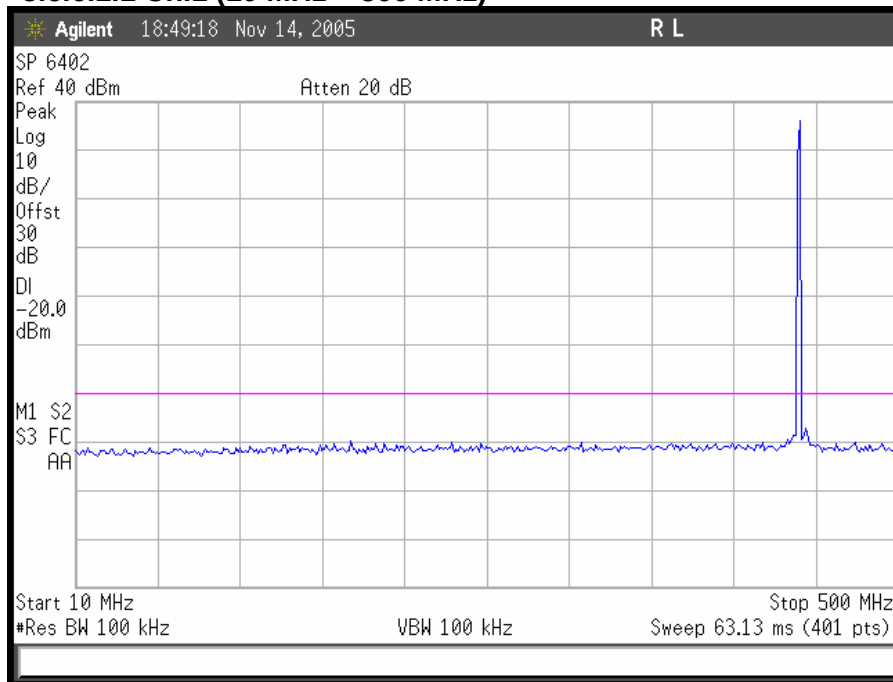
- The limit was applied according the $50 + 10\log_{10}(P)$ (P: mean power in Watts) dB.

5.5.6 Plots

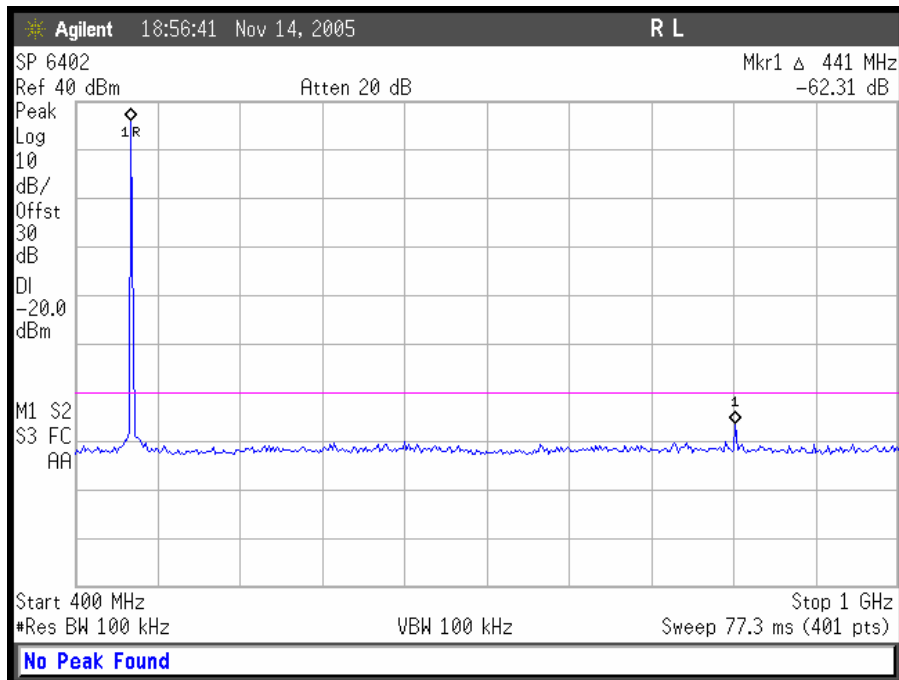
5.6.6.1 Ch.1 (440.075 MHz)

FCC Rules : Part 2 §2.1051 , §90.210
Operating Frequency : 440.075 MHz
Channel Bandwidth : 12.5 kHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 2.5kHz sine wave signal
Limit : $50 + 10\log_{10}P$

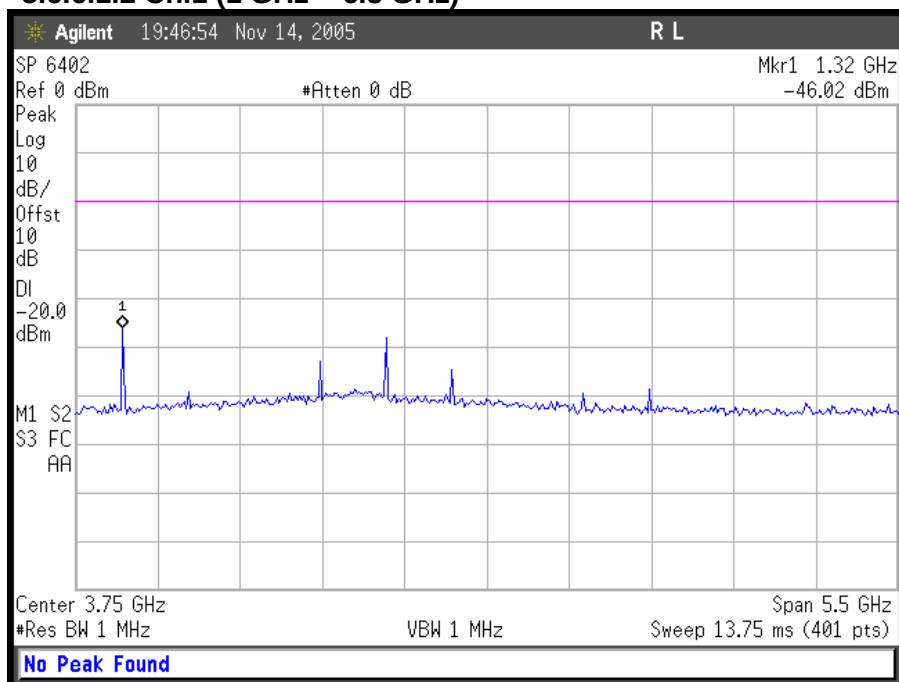
5.6.6.1.1 Ch.1 (10 MHz ~ 500 MHz)



5.6.6.1.2 Ch.1 (400 MHz ~ 1 GHz)



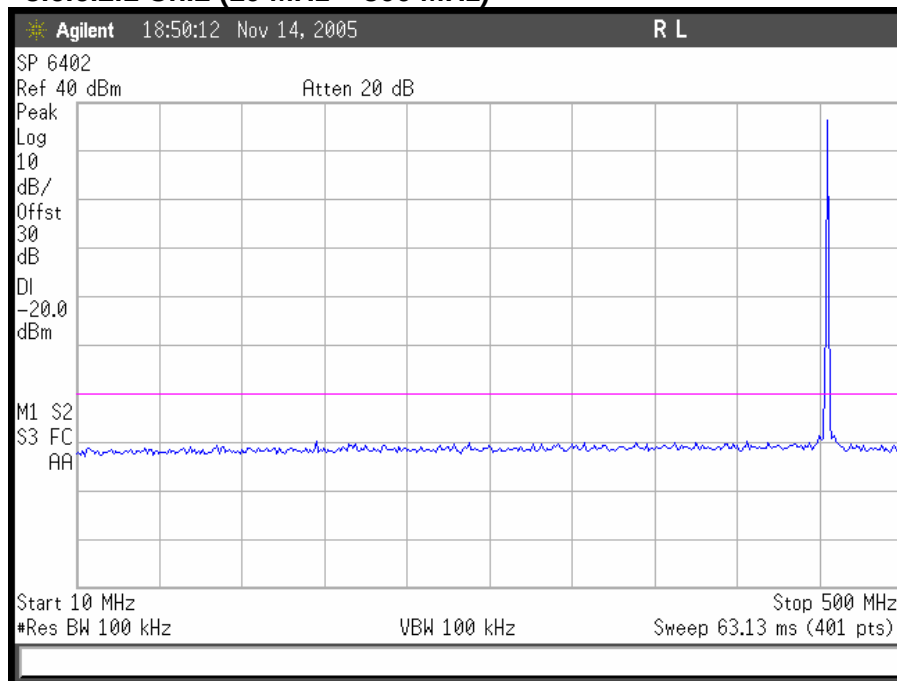
5.6.6.1.2 Ch.1 (1 GHz ~ 6.5 GHz)



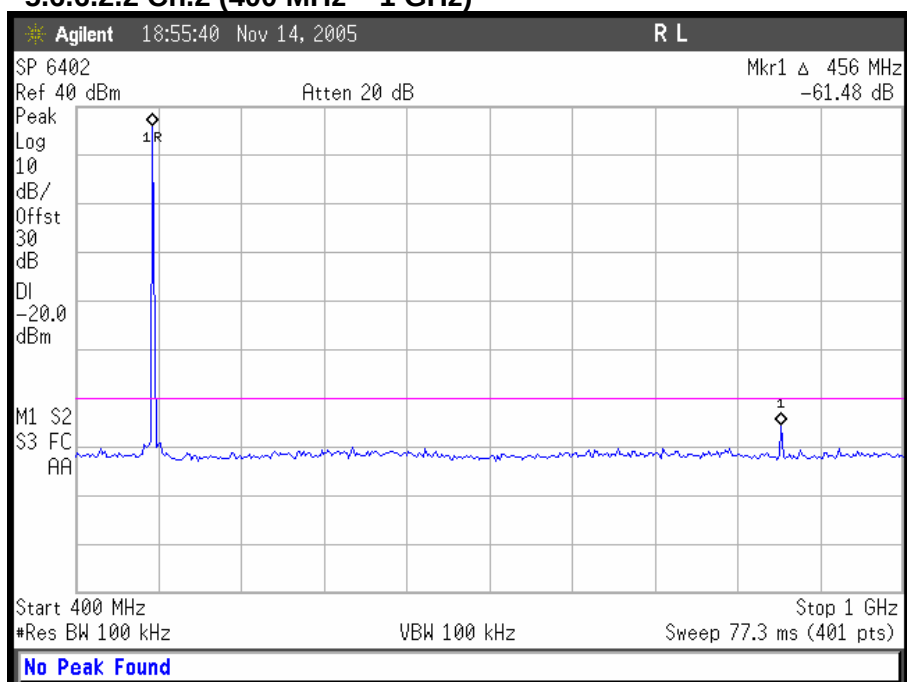
5.6.6.2 Ch.2 (455.075 MHz)

FCC Rules : Part 2 §2.1051 , §90.210
Operating Frequency : 455.075 MHz
Channel Bandwidth : 12.5 kHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 5kHz sine wave signal
Limit : $50 + 10\log_{10}P$

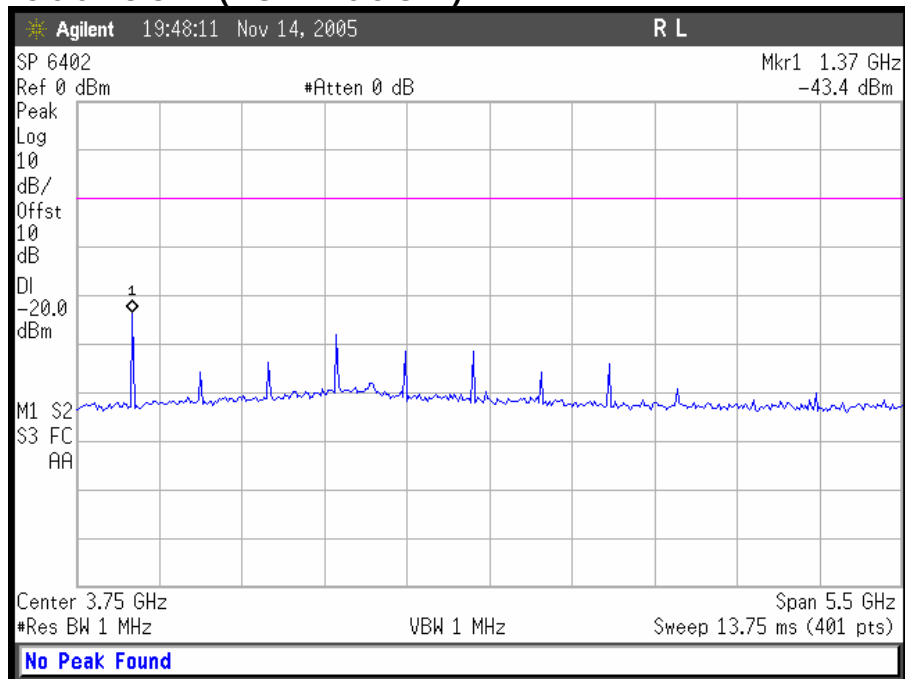
5.6.6.2.1 Ch.2 (10 MHz ~ 500 MHz)



5.6.6.2.2 Ch.2 (400 MHz ~ 1 GHz)



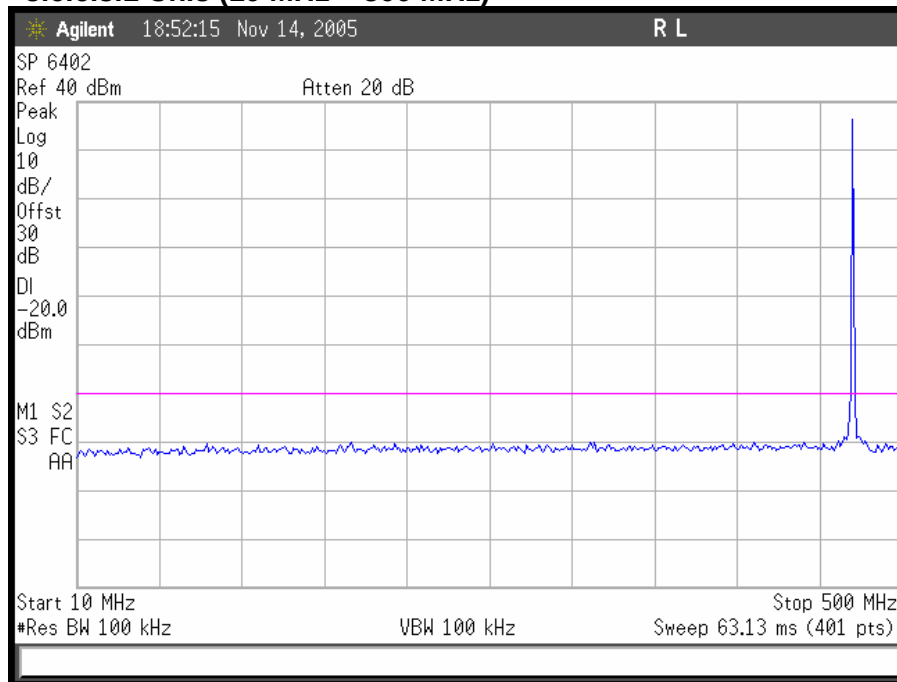
5.6.6.2.3 Ch.2 (1 GHz ~ 6.5 GHz)



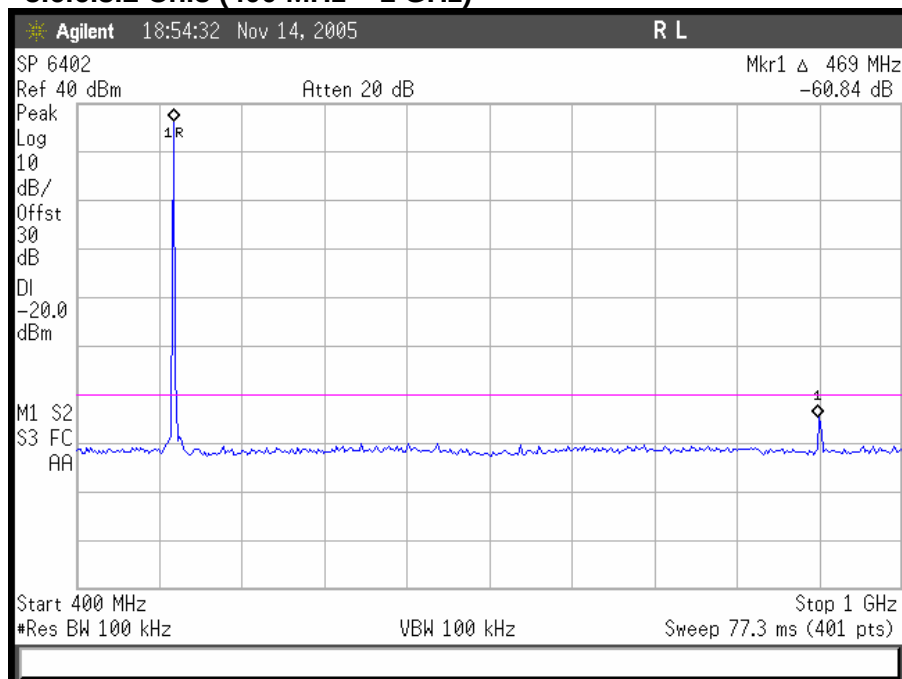
5.6.6.3 Ch.3 (469.975 MHz)

FCC Rules : Part 2 §2.1051 , §90.210
Operating Frequency : 469.975 MHz
Channel Bandwidth : 12.5 kHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 2.5kHz sine wave signal
Limit : $50 + 10\log_{10}P$

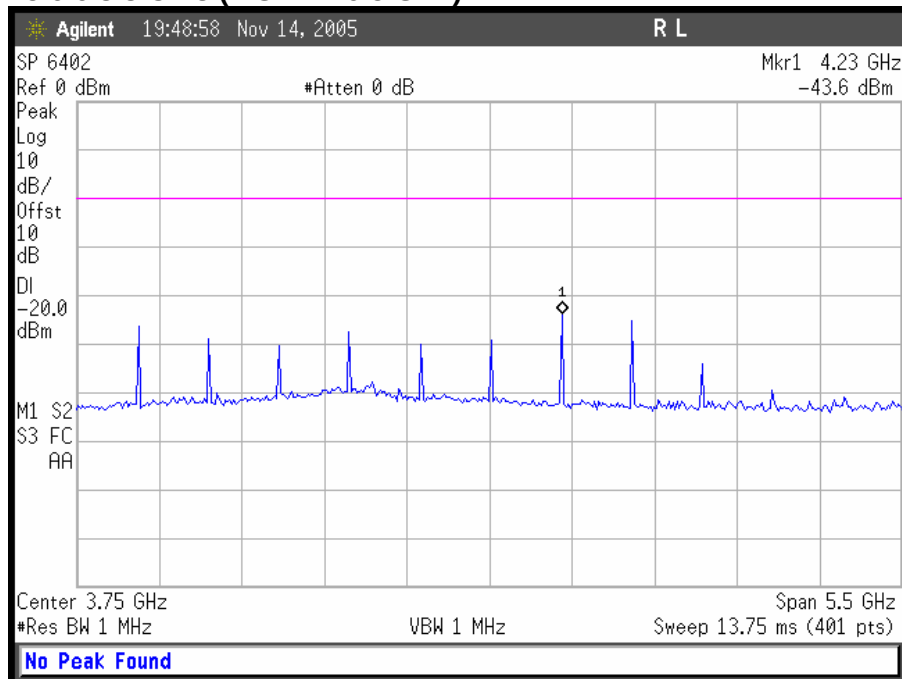
5.6.6.3.1 Ch.3 (10 MHz ~ 500 MHz)



5.6.6.3.2 Ch.3 (400 MHz ~ 1 GHz)



5.6.6.3.3 Ch.3 (1 GHz ~ 6.5 GHz)



Note :

1. The spectrum was checked from 10 MHz up to the 10th harmonic(5GHz) of the carrier frequency.
2. All emission not reported were found to be more than 20dB below the limit.
3. The spectrum bandwidth was set to RBW 100 kHz (freq. up to 1GHz) and RBW 1 MHz(freq above 1GHz).
4. Transmitter was set to the high power output(5 watts) condition because the high power setting is the worst case emission condition.
5. The measurement has been made both narrow and wide band but the attached plots are for narrowband. There is no difference in the test result for the bandwidth setting.
6. The limit was applied according to the section 90.210(d) 50 +10log(P) or -20dBm whichever is less.
7. Please refer to the plots for details.



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5.7 Field Strength of Spurious Radiation

Radiated spurious emissions are emissions from the equipment when transmitting load on frequency or frequencies which are outside of band sufficient to ensure transmission or information of required quality for the class of communication desired.

5.7.1 Specification

FCC Rules Part 2, Section 2.1053(a)
FCC Rules Part 90, Section 90.210
Industry Canada, RSS-119 Section 6.3

5.7.2 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.12

5.7.3 Measurement Set-Up

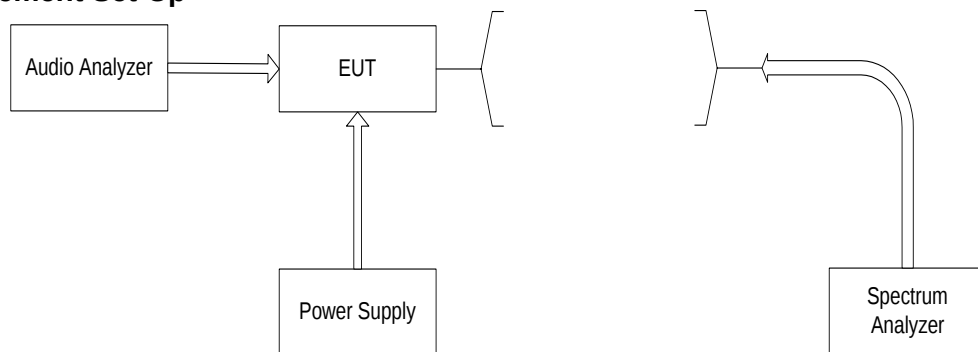


Fig.7

5.7.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	SP 6402	MAXON CIC CO LTD
Power Supply	IPS-30B03DD	INTERACT
Audio Analyzer	8903B	Agilent
Spectrum Analyzer	E7403A	Agilent
Biconical Antenna	VHA9103(BBA9106)	SWALZBECK
Log Periodic Antenna	UPA6109	Schaffner
Horn Antenna	BBHA 9120 D	SWALZBECK

5.7.5 Test Procedure

- The unit was turn-up in accordance with the alignment procedure stated in the FIG. 7, and was loaded into a 50 ohm resistive termination.
- The spectrum bandwidth was set to RBW 100 kHz (freq. up to 1GHz) and RBW 1 MHz(freq above 1GHz).
- Transmitter was set to the high power output condition.
- The spectrum was checked from 30 MHz up to the 10th harmonic of the carrier frequency.
- The other emissions measured were not found to be more than 20dB below the limit.
- The EUT was positioned through 3 orthogonal axis and worst-case are reported.
- ERP measurements were performed using the standard battery with full charged condition.
- The limit was applied according the $50+10\log_{10}(P)$ (P: mean power in Watts) dB.

5.7.6 Test Data

FCC Rules : Part 2 §2.1053(a) , §90.210
Operating Frequency : 440.075 MHz, 455.075 MHz, 469.975 MHz
Channel Bandwidth : 12.5 kHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 2.5kHz sine wave signal
Limit : $50 + 10\log_{10}P$

Frequency MHz	Spectrum Reading dBuV/m	Ant. Pol. H/V	S.G Level dBm	Ant. Gain dB	Loss dB	Emission Level dBm	Limit dBm	Margin dB
880.15	72.2	V	-23.5	0	1.17	-24.67	-20	-4.67
1320.225	73.3	H	-26.67	4.93	1.5	-23.24	-20	-3.24
2640.45	60.5	H	-39.9	8.73	2.33	-33.5	-20	-13.5
3080.525	64.2	H	-31.7	9.35	2.67	-25.02	-20	-5.02
910.15	76.6	V	-20.1	0	1.5	-21.6	-20	-1.6
1365.225	76.8	H	-29.87	5.04	1.5	-26.33	-20	-6.33
2730.45	65.4	H	-29	8.87	2.33	-22.46	-20	-2.46
3185.525	65.9	H	-36.5	9.6	2.5	-29.4	-20	-9.4
939.95	73.6	V	-24	0	1.33	-25.33	-20	-5.33
1409.925	73.7	H	-29	5.17	1.67	-25.5	-20	-5.5
2819.85	68.4	H	-30	9.09	2.5	-23.41	-20	-3.41
3289.825	65.6	H	-37.1	10.49	2.5	-29.11	-20	-9.11

Note :

1. The spectrum bandwidth was set to RBW 100 kHz (freq. up to 1GHz) and RBW 1 MHz(freq above 1GHz).
2. Transmitter was set to the high power output(5 watts) condition.
3. The spectrum was checked from 30 MHz up to the 10th harmonic of the carrier frequency.
4. All emission not reported were found to be more than 20dB below the limit.
5. The EUT was positioned through 3 orthogonal axis and worst-case are reported.
6. Transmitter was set to the high power output(5 watts) condition because the high power setting is the worst case emission condition.
7. The measurement has been made both narrow and wide band but the attached plots are for narrowband. There is no difference in the test result for the bandwidth setting.
8. ERP measurements were performed using the standard battery with full charged condition.
9. The limit was applied according to the section 90.210(d) $50 + 10\log(P)$ or -20dBm or 70dBc whichever is less.



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5.8 Frequency Stability/Temperature Variation

5.8.1 Specification

FCC Rules Part 2, Section 2.1055

FCC Rules Part 90, Section 90.231

Industry Canada, RSS-119 Section 7.0

5.8.2 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.2

5.8.3 Measurement Set-Up

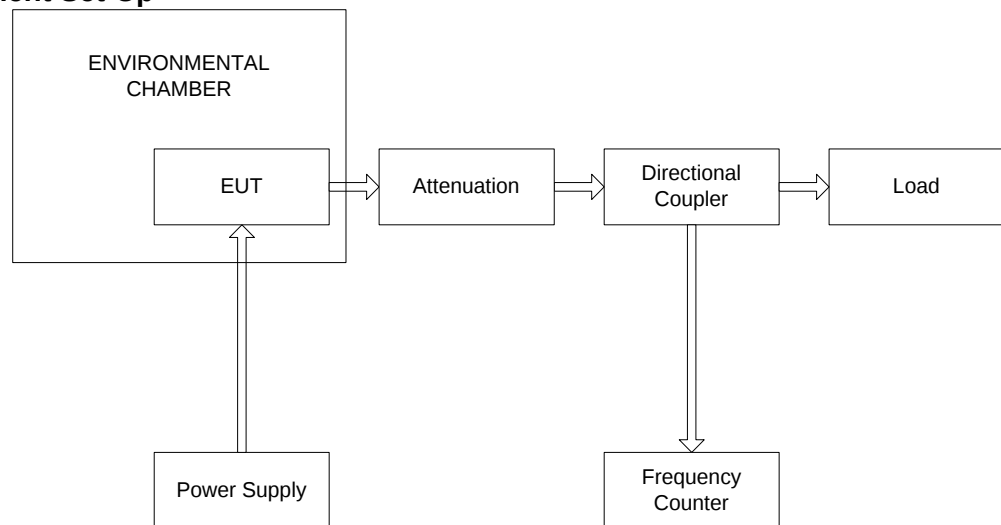


Fig.8

5.8.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	SP 6402	MAXON CIC CO LTD
Power Supply	IPS-30B03DD	INTERACT
Directional Coupler	778D	Agilent
Termination	8173	Bird
Attenuator	33-30-33	WEINSCHEL
Frequency Counter	R5372	Advantest
Environmental Chamber	EN-GLMP-54	ENEX

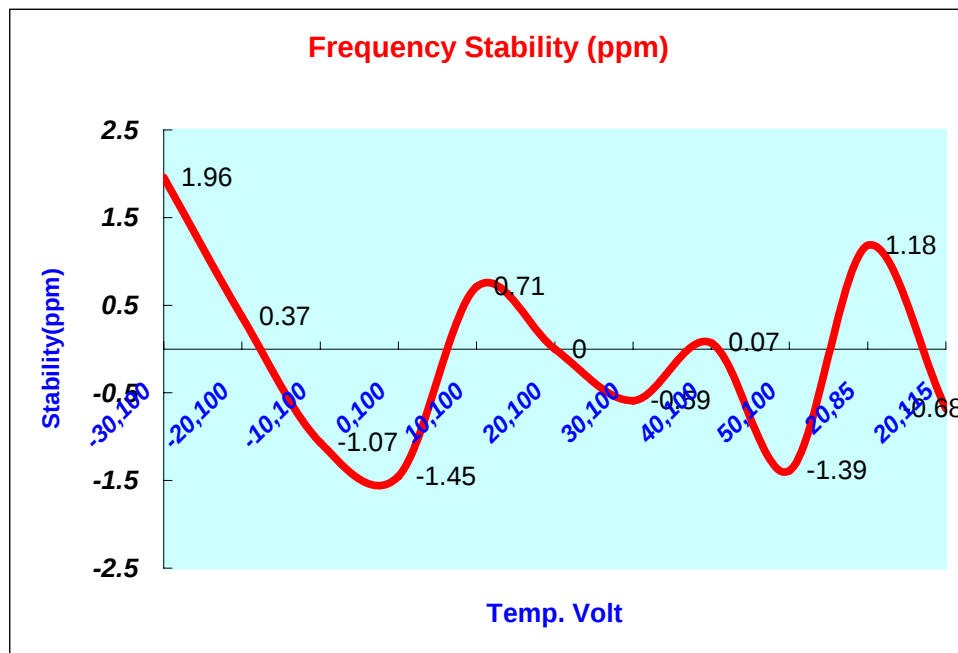
5.8.5 Test Procedure

- The unit was turn-up in accordance with the alignment procedure stated in the FIG. 8 , and was loaded into a 50 ohm resistive termination.
- With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.
- With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.
- The temperature tests were performed for the worst case.
- FCC Limits (according to part 90.213) : $2.5 \times 10^{-6} \times \text{Frequency}$

5.8.6 Test Result

Voltage (%)	Power Supply (Vdc)	Temperature (°C)	Frequency (Hz)	Deviation (ppm)	Limit (ppm)
100 %	7.5	+20(Ref)	455025000	0	2.5
100 %	7.5	-30	455025892	+1.96	2.5
100 %	7.5	-20	455025169	+0.37	2.5
100 %	7.5	-10	455024512	-1.07	2.5
100 %	7.5	0	455024339	-1.45	2.5
100 %	7.5	+10	455025321	+0.71	2.5
100 %	7.5	+20	455025000	0	2.5
100 %	7.5	+30	455024732	-0.59	2.5
100 %	7.5	+40	455025032	+0.07	2.5
100 %	7.5	+50	455024369	-1.39	2.5
85 %	6.4	+20	455025538	+1.18	2.5
115 %	8.6	+20	455024692	-0.68	2.5

5.8.7 Graph




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5.9 Transient Frequency Behavior

5.9.1 Specification

FCC Rules Part 90, Section 90.214

Industry Canada, RSS-119 Section 7.0

5.9.2 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.19

5.9.3 Measurement Set-Up

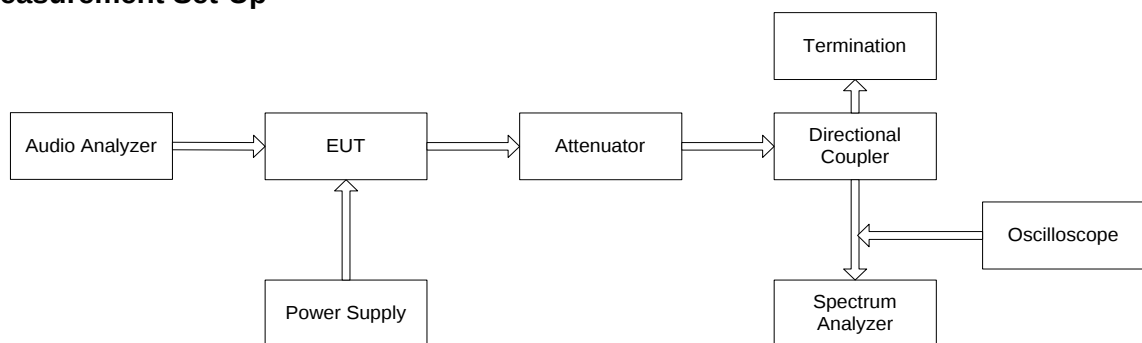


Fig.9

5.9.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	SP 6402	MAXON CIC CO LTD
Power Supply	IPS-30B03DD	INTERACT
Audio Analyzer	8903B	Agilent
Attenuator	33-30-33	WEINSCHEL
Directional Coupler	778D	Agilent
Termination	8173	Bird
Oscilloscope	TDS3032	Tektronix
Spectrum Analyzer	E4404B	Agilent

5.9.5 Test Procedure

- The unit was turn-up in accordance with the alignment procedure stated in the FIG. 9, and was loaded into a 50 ohm resistive termination.
- Using the variable attenuator the transmitter level was set to 40 dB below the test receivers maximum input level, then the transmitter was turned off.
- With the transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
- Reduce the attenuation between the transmitter and the RF detector by 30 dB.
- With the levels set as above the transient frequency behavior was observed & recorded.
- Requirements

Transient Frequency Difference Limits

Time Interval	Max. Permitted Frequency Difference for 25 and 30 kHz Channel Spacing (in kHz)	Max. Permitted Frequency Difference for 12.5 and 15 kHz Channel Spacing (in kHz)
t_1 or t_3	25	12.5
t_2	12.5	6.25

Transient Duration Limits

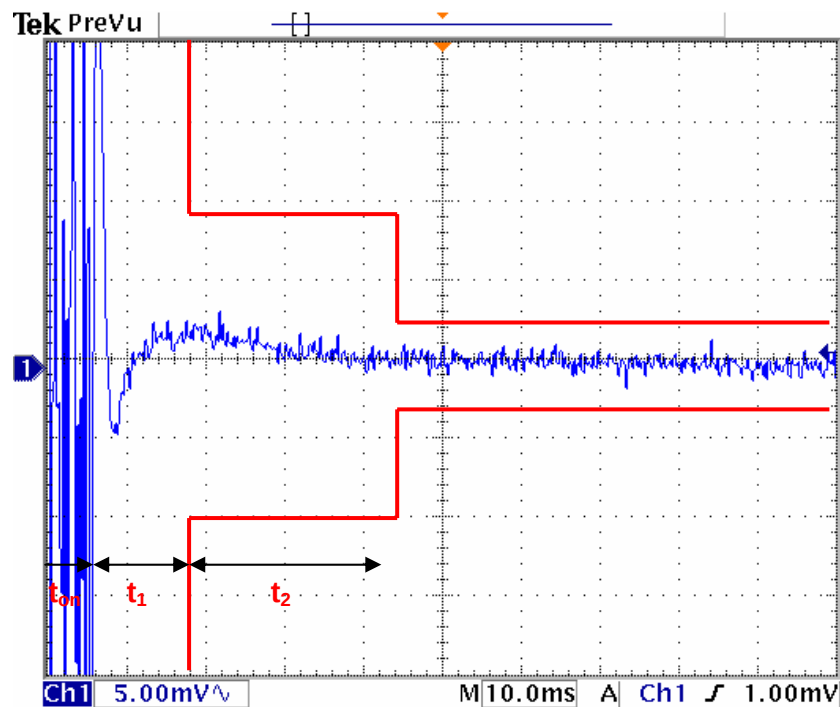
Time Intervals	Frequency Ranges (MHz)		
	30 to 174	406 to 512	806 to 940
t_1	5.0 ms	10.0 ms	20.0 ms
t_2	20.0 ms	25.0 ms	50.0 ms
t_3	5.0 ms	10.0 ms	10.0 ms

5.9.6 Test Plot

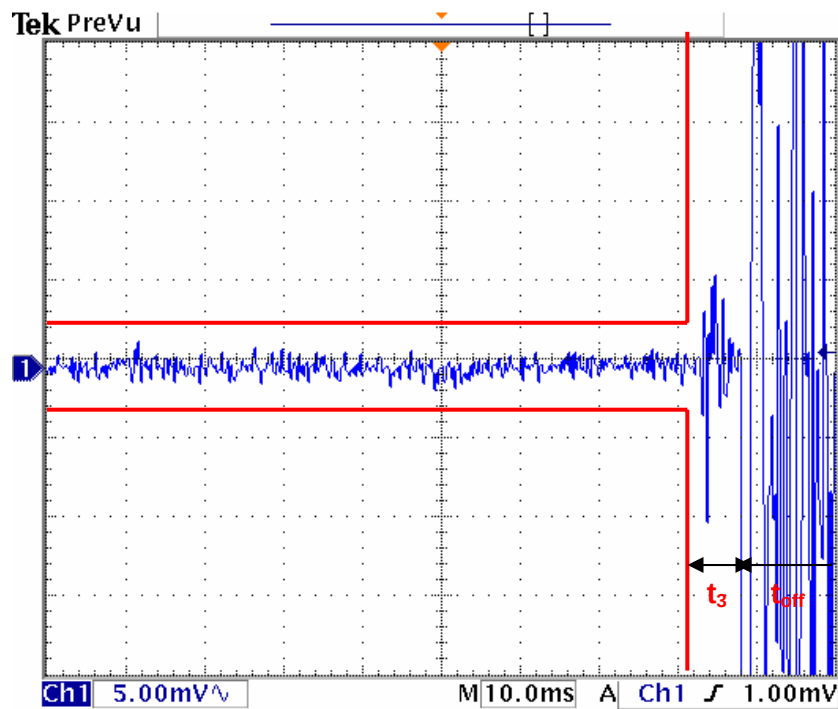
5.9.6.1 Channel 2 (455.075 MHz), Narrow Band (12.5 kHz)

FCC Rules : Part 90 §90.214
Operating Frequency : 455.075 MHz
Channel Bandwidth : 12.5 kHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 2.5kHz sine wave signal

5.9.6.1.1 Switch on condition t_{on} , t_1 and t_2



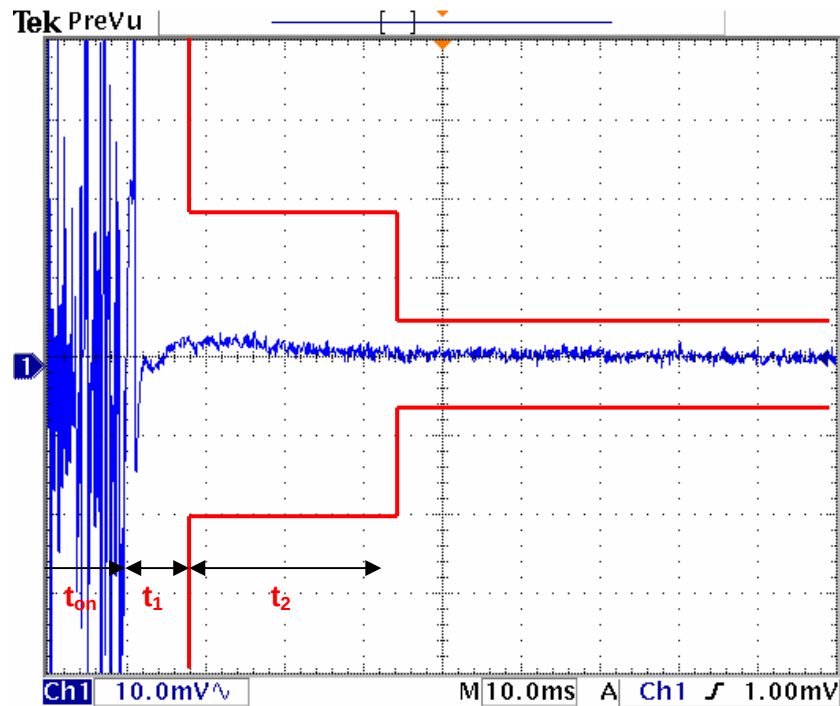
5.9.6.1.2 Switch off condition t_3 , t_{off}



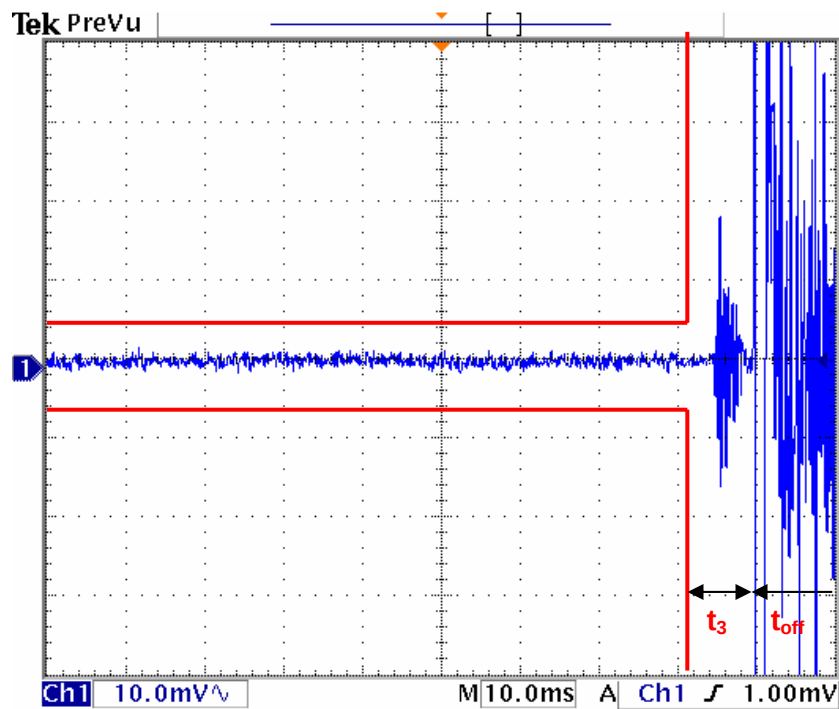
5.9.6.2 Channel 2 (455.075 MHz), Wideband Band (25 kHz)

FCC Rules : Part 90 §90.214
Operating Frequency : 455.075 MHz
Channel Bandwidth : 25 kHz
Measured Output Power : 37.0 dBm
Modulation Signal : FM modulation with 2.5kHz sine wave signal

5.9.6.2.1 Switch on condition t_{on} , t_1 and t_2



5.9.6.2.2 Switch off condition t_3 , t_{off}




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6. TEST EQUIPMENTS LIST

The listing below denotes the test equipments utilized for the test(s).

<u>Test Equipment</u>	<u>Manufacture</u>	<u>Serial Number</u>	<u>Calibrated</u>	
<u>Calibration</u>	<u>Model Number</u>		<u>Date</u>	<u>Due date</u>
Audio Analyzer	8903B	Agilent	2005-03-10	2006-03-10
Modulation Analyzer	8901B	Agilent	2005-03-10	2006-03-10
Attenuator	33-30-33	Weinschel	2005-03-10	2006-03-10
Directional Coupler	778D	Agilent	2005-10-15	2006-10-15
Oscilloscope	TDS3032	Tektronix	2005-10-28	2006-10-28
Spectrum Analyzer	E4404B	Agilent	2005-07-25	2006-07-25
Spectrum Analyzer	E7403A	Agilent	2005-05-18	2006-05-18
Power Sensor	8481A	Agilent	2005-03-10	2006-03-10
Power Meter	E4418A	Agilent	2005-03-10	2006-03-10
Biconical Antenna	VHA9103(BBA9106)	Swalzbeck	2005-01-17	2006-01-17
Log Periodic Antenna	UPA6109	Schaffner	2005-01-19	2006-01-19
Horn Antenna	BBHA 9120 D	Swalzbeck	2005-02-07	2007-02-07
Frequency Counter	R5372	Advantest	2005-03-11	2006-03-11
Power Supply	IPS-30B03DD	Interact	2005-03-10	2006-03-10
Environmental Chamber	EN-GLMP-54	Enex	2005-03-22	2006-03-22
Termination	8173	Bird	-	-