TEST REPORT NO: RU1088/5135

COPY NO: 2

ISSUE NO: 1

FCC ID: F3S6KLTX

REPORT ON THE CERTIFICATION TESTING OF A
BBM ELECTRONIC GROUP Ltd.
S6000LTX
WITH RESPECT TO
THE FCC RULES CFR 47, PART 74 H
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 17th November – 8th December 2003

TESTED BY: JOHN CHARTERS (Signature Not Verified; Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2004.01.15 15:45:18 Z) J CHARTERS

APPROVED BY: Peter Green (Signature Not Verified; Digitally signed by Peter Green DN: cn=Peter Green, o=TRL Compliance Services Ltd., c=US Date: 2004.01.15 16:40:25 Z) P GREEN
PRODUCT MANAGER

DATE: 7th January 2004

Distribution:

Copy Nos:
1. BBM ELECTRONIC GROUP Ltd.
2. FCC EVALUATION LABORATORIES
3. TRL EMC

TRL COMPLIANCE SERVICES LTD EMC DIVISION
MOSS VIEW NIPE LANE UP HOLLAND WEST LANCASHIRE WN8 9PY UNITED KINGDOM
TELEPHONE +44 (0)1695 556666 FAX +44 (0)1695 557077
E-MAIL test@trl-emc.co.uk www.trlcompliance.com

FS 21805

CONTENTS

Notes:

1. Component failure during test — YES [ ] NO [X]
2. If Yes, details of failure:
3. The facilities used for the testing of the product contain in this report are FCC Listed.
4. The contents of the attached applicants declarations and other supplied information are not covered by the scope of this laboratory's UKAS or FCC accreditations' and is provided in good faith.

CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	F3S6KLTX
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 74 H
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	S6000LTX
EQUIPMENT SERIAL No:	Engineering samples
ITU: EMISSION CODE:	200KF3A
EQUIPMENT TYPE:	Wireless microphone
PRODUCT USE:	Sound Broadcast
CARRIER EMISSION:	Unit 1: 805.9MHz - 36.3mW Unit 2: 698.1MHz - 21.3mW Unit 3: 590.1MHz - 14.1mW
ANTENNA TYPE:	Whip antenna
BAND OF OPERATION:	Unit 1: 734MHz – 806MHz Unit 2: 662MHz – 734MHz Unit 3: 590MHz – 662MHz (excluding 608-614MHz)
CHANNEL SPACING:	25kHz
FREQUENCY GENERATION:	SAW Resonator [ ] Crystal [ ] Synthesiser [X]
MODULATION METHOD:	Amplitude [ ] Digital [ ] Angle [X]
POWER SOURCE(s):	+1.5Vdc (AA Battery)
TEST DATE(s):	17th November – 8th December 2003
ORDER No(s):	10208
APPLICANT:	BBM ELECTRONIC GROUP Ltd.
ADDRESS:	Kestral House Garth Road Morden Surrey SM4 4LP United Kingdom

TESTED BY: JOHN CHARTERS — Signature Not Verified — Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2004.01.15 15:45:35 Z

J Charters

APPROVED BY: Peter Green — Signature Not Verified — Digitally signed by Peter Green DN: cn=Peter Green, o=TRL Compliance Services Ltd., c=US Date: 2004.01.15 16:40:43 Z

P Green
Product Manager

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	S6000LTX
EQUIPMENT TYPE:	Wireless Microphone
SERIAL NUMBER OF EUT:	Engineering Sample
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 74 H
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	10208
APPLICANT'S CONTACT PERSON(s):	Mr Richard Ganley
E-mail address:	rik@trantec.co.uk
APPLICANT:	BBM ELECTRONIC GROUP Ltd.
ADDRESS:	Kestral House Garth Road Morden Surrey SM4 4LP United Kingdom
TEL:	+44 20 8330 3111
FAX:	+44 20 8330 3222
MANUFACTURER:	BBM ELECTRONIC GROUP Ltd.
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	17th November –8th December 2003
TEST REPORT No:	RU1088/5135

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	Part 74 LIMIT	APPLICABILITY
Application for Certification	2.1033		Yes
RF Power Output at terminals	2.1046	74.861(e)(1)(ii)	Yes
Modulation Characteristics	2.1047(a)	N/A	Yes
Modulation Limiting Characteristics	2.1047(b)	74.861(e)(3)	Yes
Occupied Bandwidth	2.1049(1)	74.861(e)(5)	Yes
Spurious Emissions at Antenna Terminals	2.1053	74.861(e)(6)(iii)	Yes
Frequency Stability	2.1055(a)(1)(d)(2)	74.861(e)(4)	Yes
Spurious emissions radiated		74.861(d)(3)	Yes
Frequency Spectrum to be Investigated	2.1057		Yes

2. Product Use: Sound Broadcast

3. Emission Designator: 200KF3A

4. Duty Cycle: <100%

5. Temperatures: Ambient (Tnom) 20^{o}C

6. Supply Voltages: Vnom +1.5V

Note: Vnom voltages are as stated above unless otherwise shown on the test report page

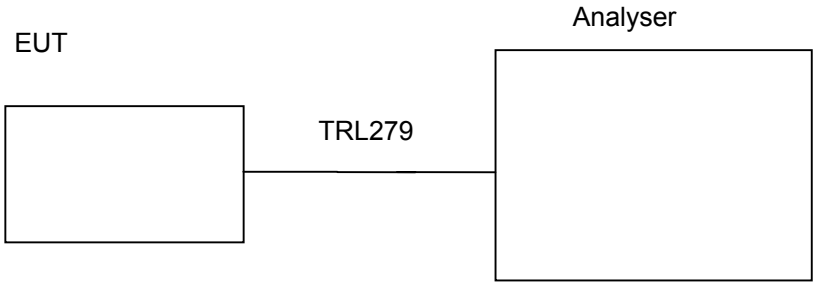
7. Equipment Category:
   Single channel [ ]
   Two channel [ ]
   Multi-channel [X]

8. Channel spacing:
   Narrowband [X]
   Wideband [ ]
   25kHz

TRANSMITTER TESTS

TRANSMITTER RF POWER OUTPUT AT TERMINALS – Part 2.1046

Ambient temperature = 22°C(<1GHz)
Relative humidity = 50% (<1GHz),
Conditions = Radio Lab
Supply voltage = +1.5Vdc



The transmitter powered from a single AA internal battery. The antenna port is connected to the Communications Analyser. The transmitter is tuned by the manufacturer in accordance with the stated procedure. The transmitter is turned on and keyed with an unmodulated condition. The RF power is recorded in the table below. The test was repeated on all three samples. The levels recorded are in the top middle and bottom of the tuneable range of the transmitter.

	FREQ. (MHz)	MEAS. Rx. (dBm)	CABLE LOSS (dB)	CARRIER POWER (mW)	LIMIT (mW)
Unit 1	805.9	12.6	3.0	36.3	250
Unit 2	662.1	11.1	2.2	21.3	250
Unit 3	590.1	11.85	2.2	25.4	250
Limits	74.861(e)(1)(ii)				

Notes:
1 Receiver detector >1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
2 New batteries used for battery powered products.
3 EUT unit was tested at top middle and bottom frequency of it tuneable range to ensure the RF power is with in 3dB across tuneable range.

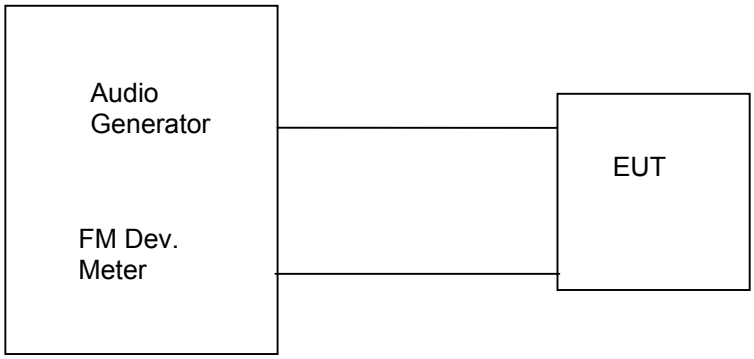
The test equipment used for the RF power output at terminals is shown overleaf:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
COMMUNICATIONS ANALYSER	ROHDE AND SCHARZ	CMTA 52	894715/003	05	**X**
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

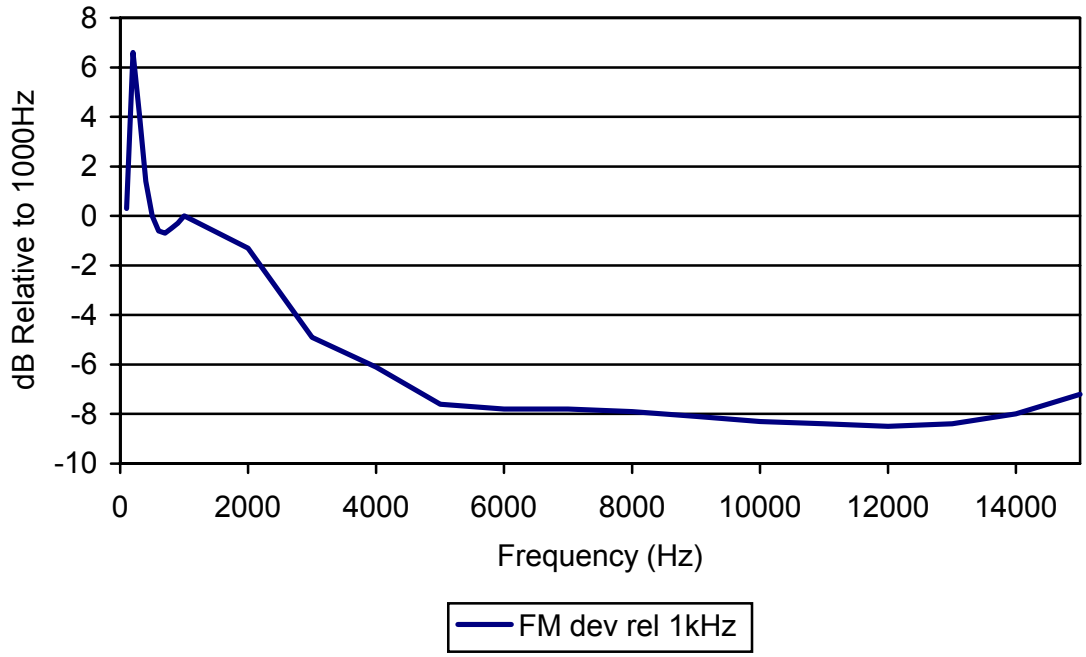
TRANSMITTER MODULATION CHARACTERISTICS – Part 2.1047(a)

Ambient temperature	=	22°C(<1GHz),
Relative humidity	=	50%(<1GHz),
Conditions	=	Open Area Test Site (OATS)
Supply voltage	=	1.5Vdc

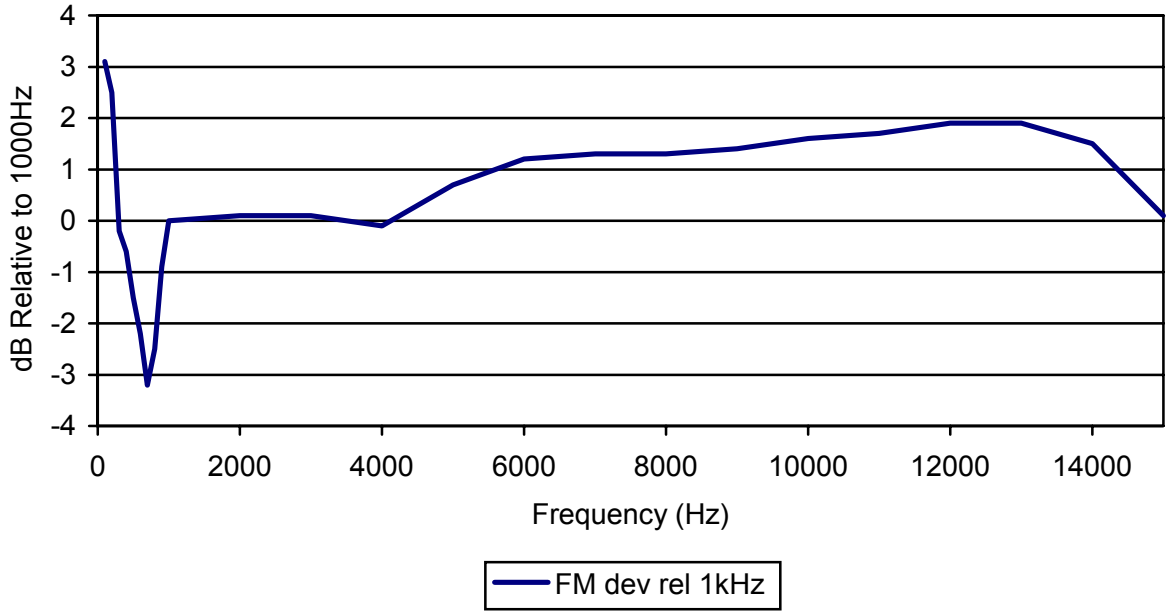


The EUT was connected to the audio generator and RF input of the communications analyser as in the diagram above. A 1000Hz test signal was applied to the audio input of the unit. The level of the audio signal was increased until the FM deviation became ±20kHz. The level of the audio input was then kept constant and the frequency varied from 50Hz-15kHz. The variation in FM deviation was recorded.

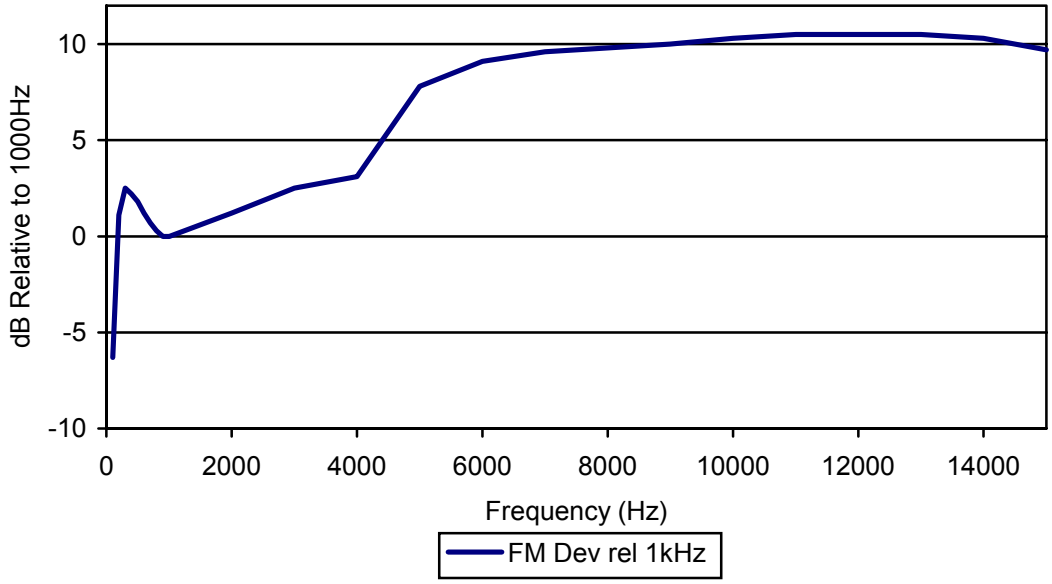
MOULATION CHARACTERISTIC UNIT 1



MODULATION CHARACTERISTIC UNIT 2



MODULATION CHARACTERISTIC UNIT 3

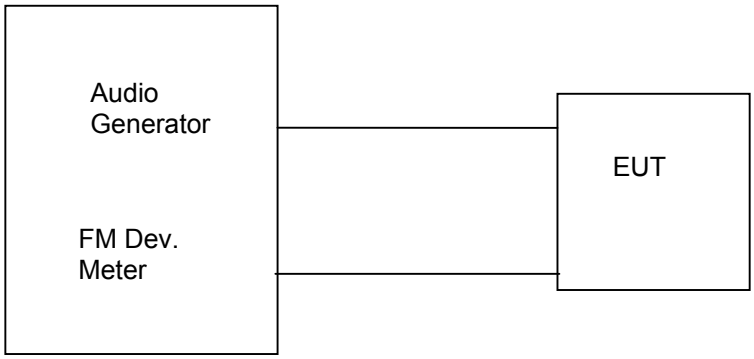


TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
COMMUNICATIONS ANALYSER	ROHDE AND SCHARZ	CMTA 52	894715/003	05	**X**

TRANSMITTER TESTS

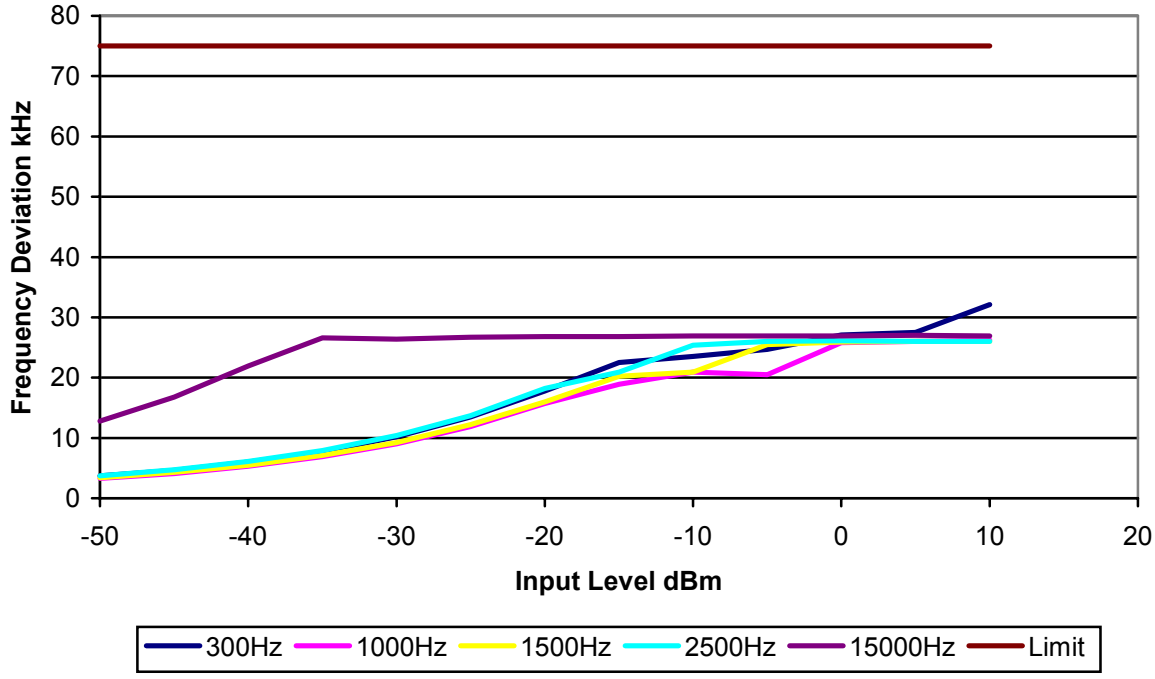
TRANSMITTER MODULATION LIMITING CHARACTERISTICS – Part 2.1047(b)

Ambient temperature	=	22°C(<1GHz),
Relative humidity	=	50%(<1GHz),
Conditions	=	Open Area Test Site (OATS)
Supply voltage	=	1.5Vdc

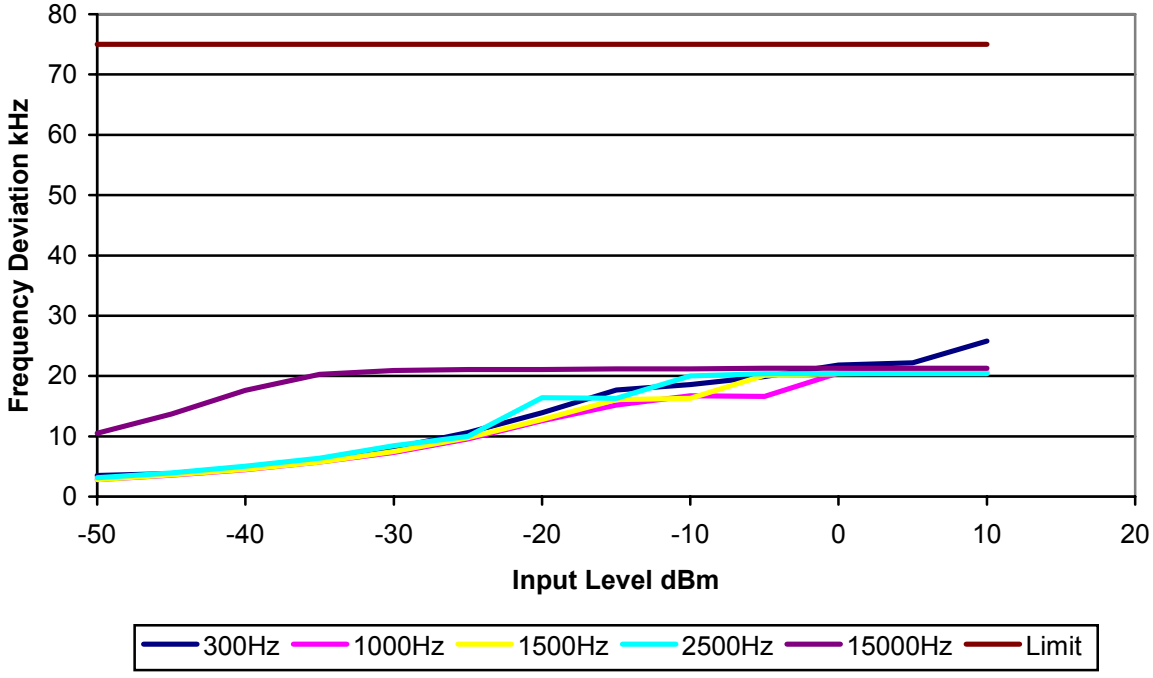


The EUT was connected to the audio generator and RF input of the communications analyser as in the diagram above. A 1000Hz test signal was applied to the audio input of the unit. The level of the input audio signal was varied between –50dBm and +10dBm. At each level the FM deviation was recorded. The test was repeated with the following audio frequencies : 300Hz,1500Hz, 2500Hz and 15000Hz.

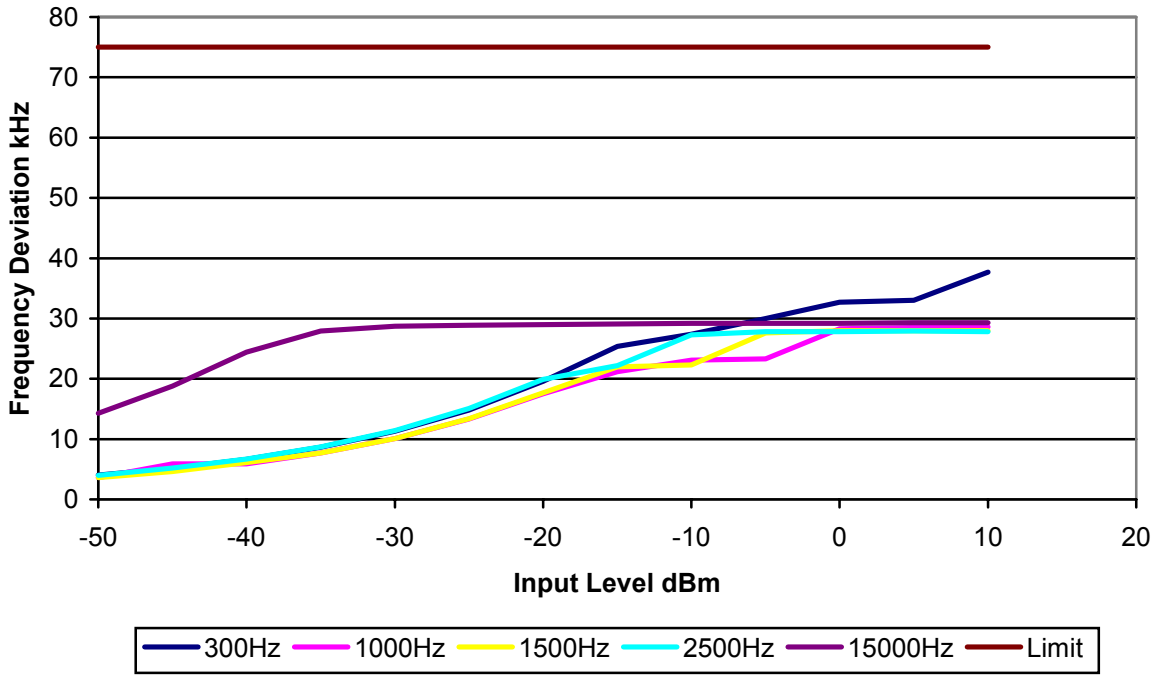
MODULATION LIMITING CHARACTERISTICS Unit 1



MODULATION LIMITING CHARACTERISTICS Unit 2



MODULATION LIMITING CHARACTERISTICS Unit 3

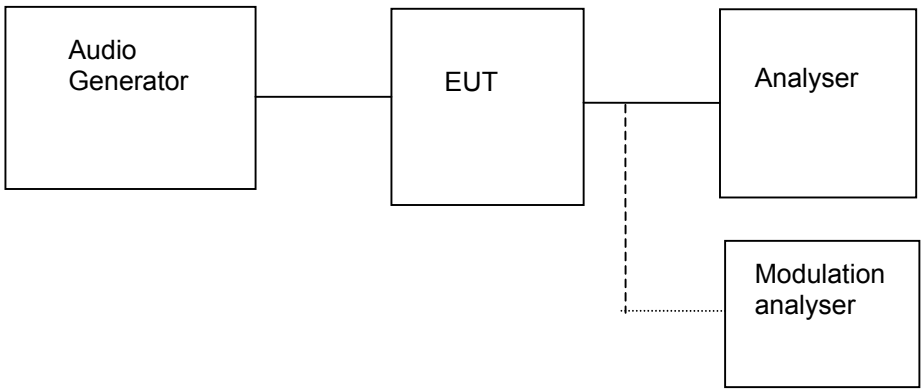


TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
COMMUNICATIONS ANALYSER	ROHDE AND SCHARZ	CMTA 52	894715/003	05	**X**
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

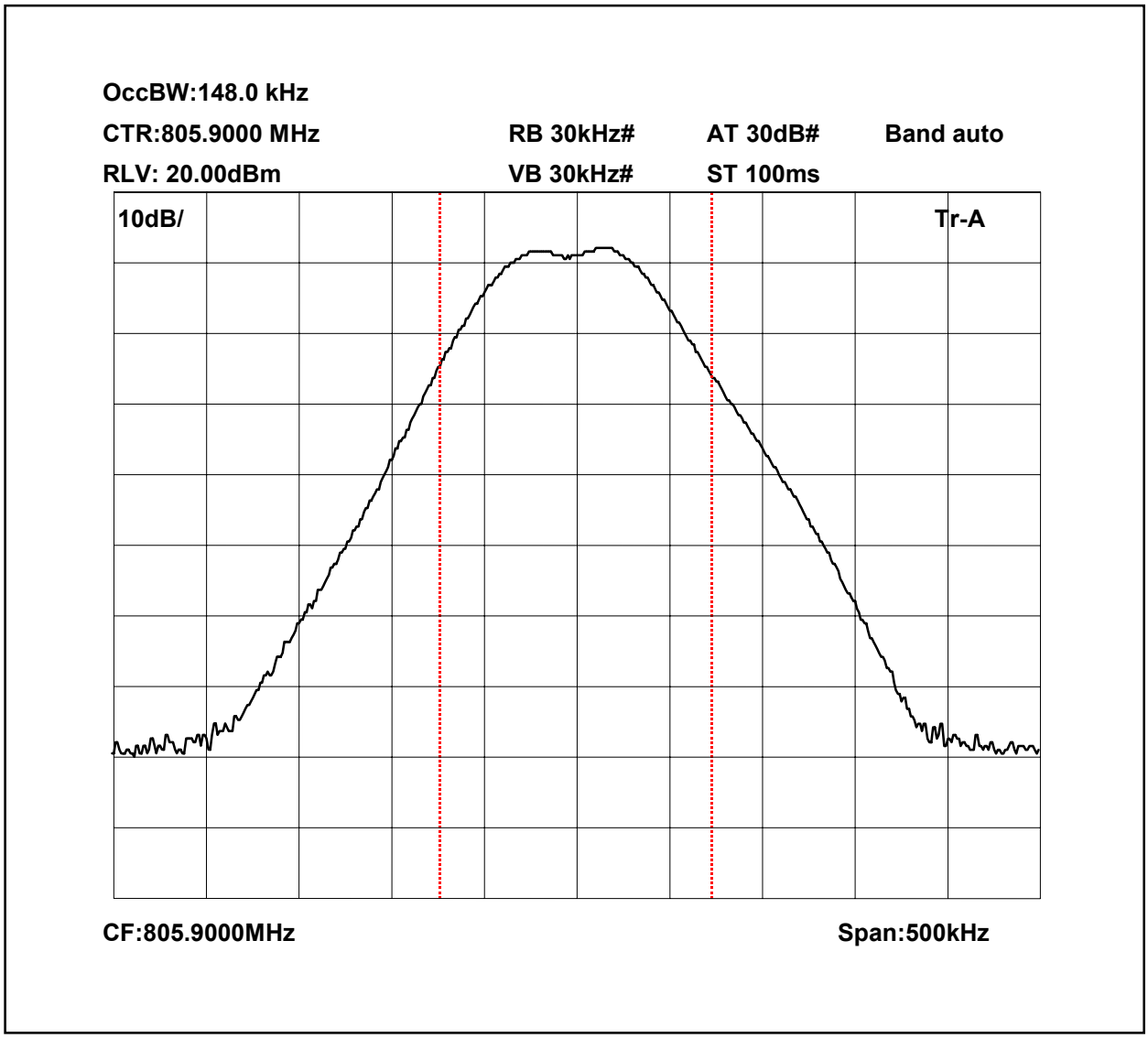
TRANSMITTEROCCUPIED BANDWIDTH– Part 2.1049(1)

Ambient temperature	=	22°C(<1GHz),
Relative humidity	=	50%(<1GHz),
Conditions	=	Radio Lab
Supply voltage	=	1.5Vdc



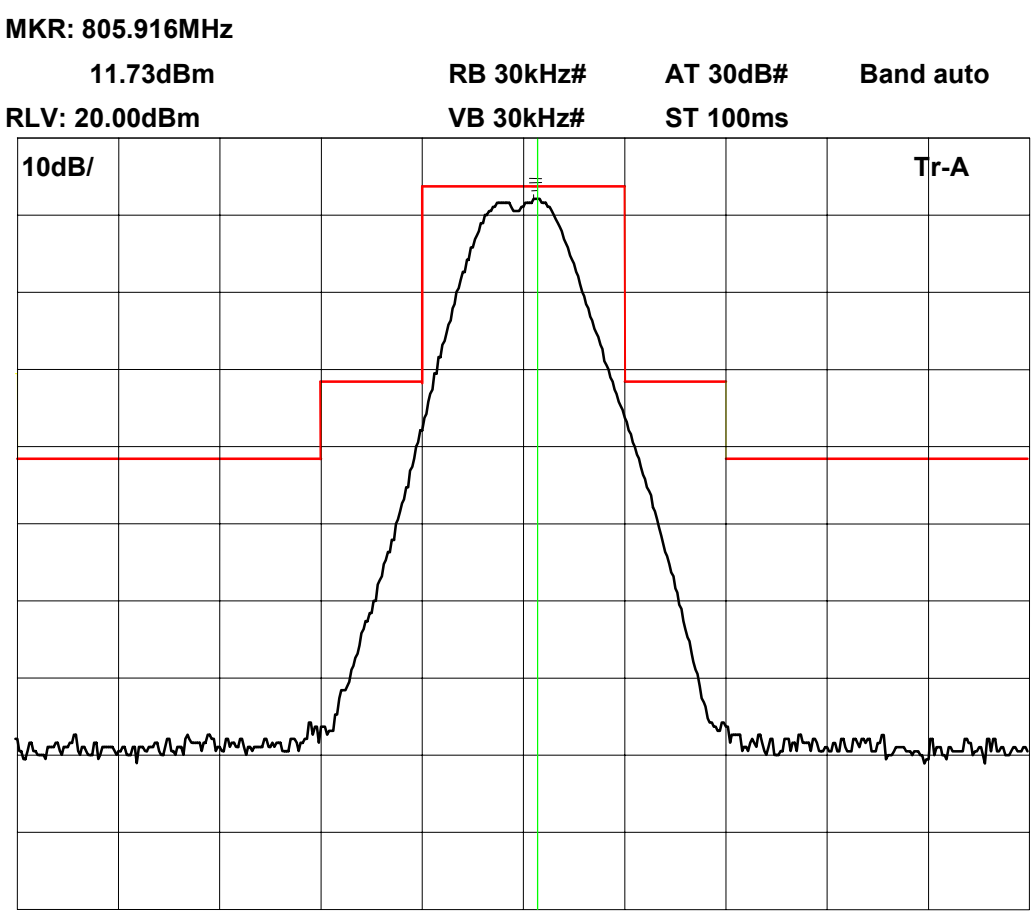
The EUT was connected to the audio generator and RF input of the analyser as in the diagram above.
An audio signal of 15kHz, +10dBm(max audio input) was applied to the input of the EUT. The occupied bandwidth was then recorded.

Unit 1 Band Occupancy

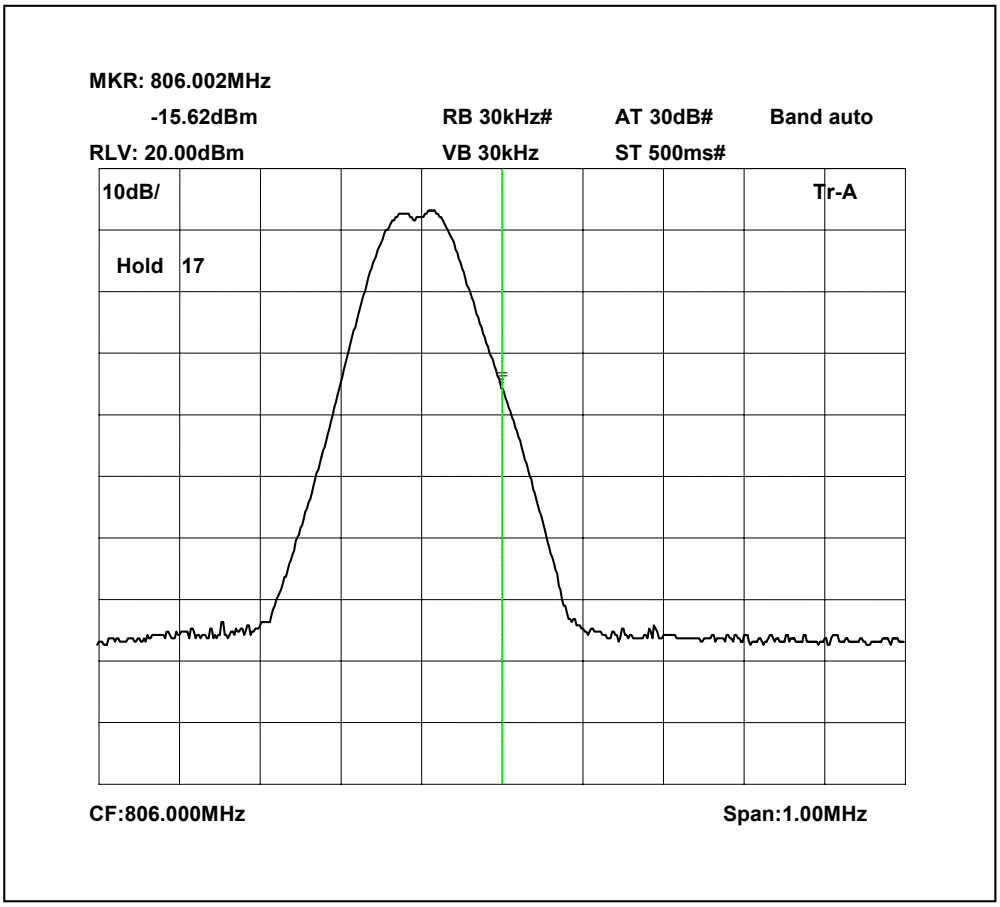


Frequency Fl	805.827MHz
Frequency Fh	805.975MHz
Measured Occupied Bandwidth	148.0kHz
Occupied Bandwidth Limit	200kHz

Unit 1 Band occupancy Limit 74.861(e) (6)

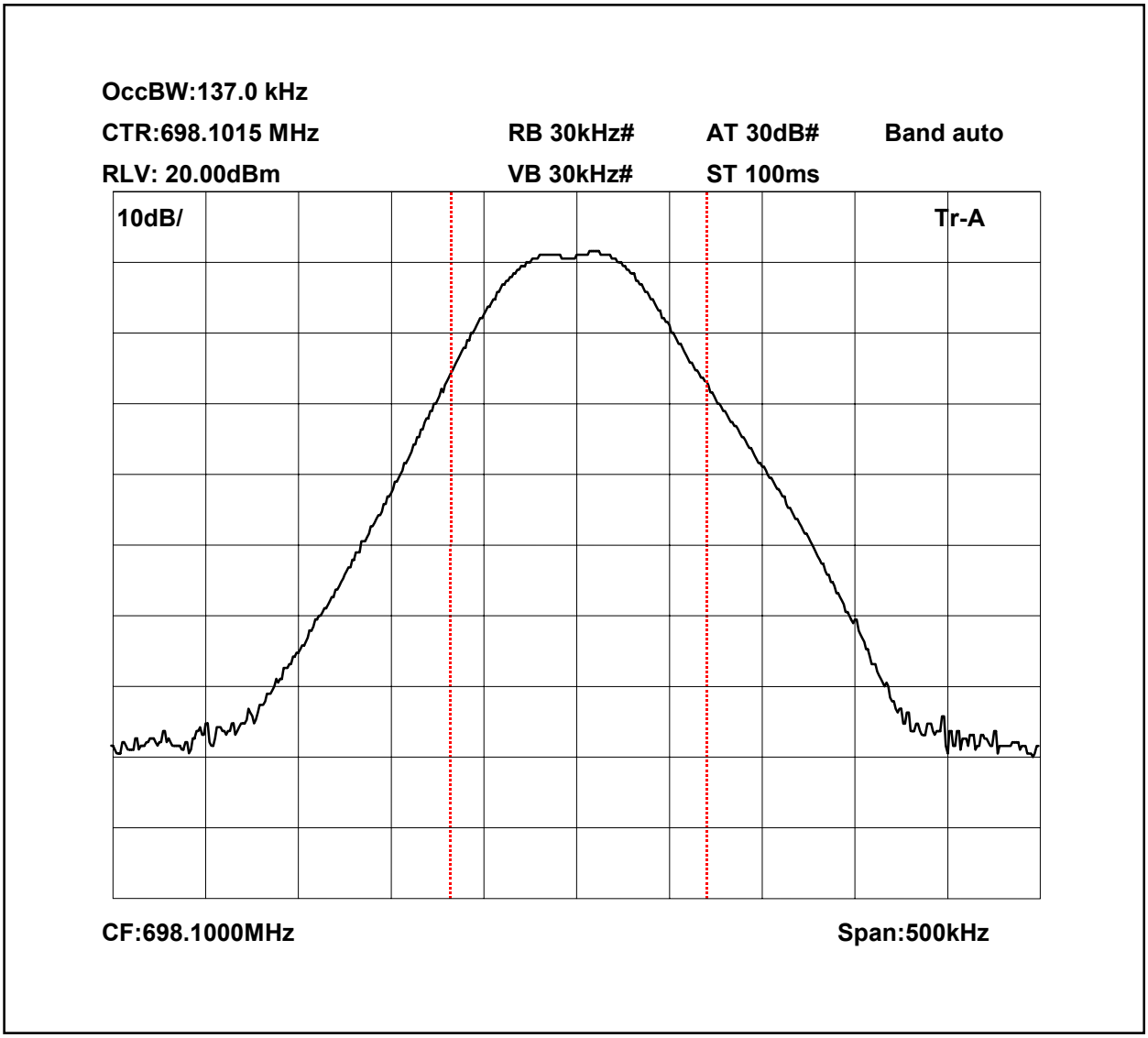


Unit 1 Band Edge Compliance



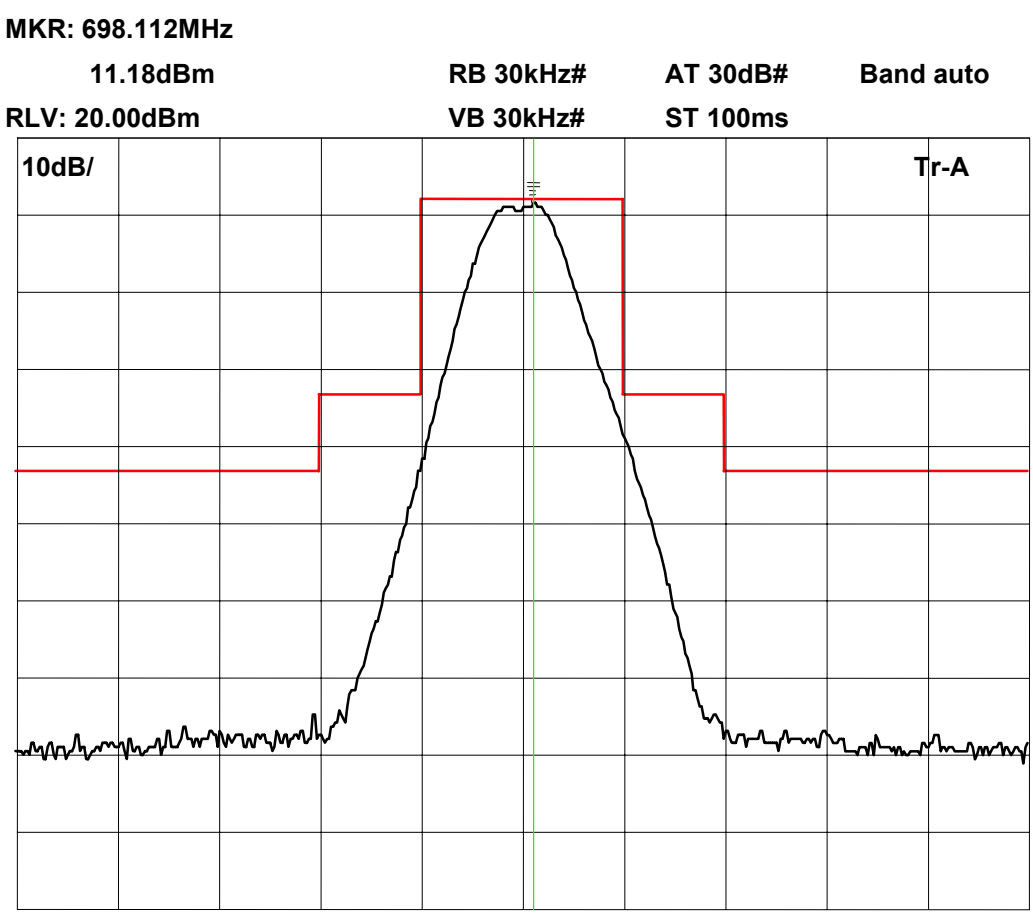
Note: An audio signal of 15kHz at a level of 10dBm was applied to the input of the unit.

Band Occupancy Unit 2

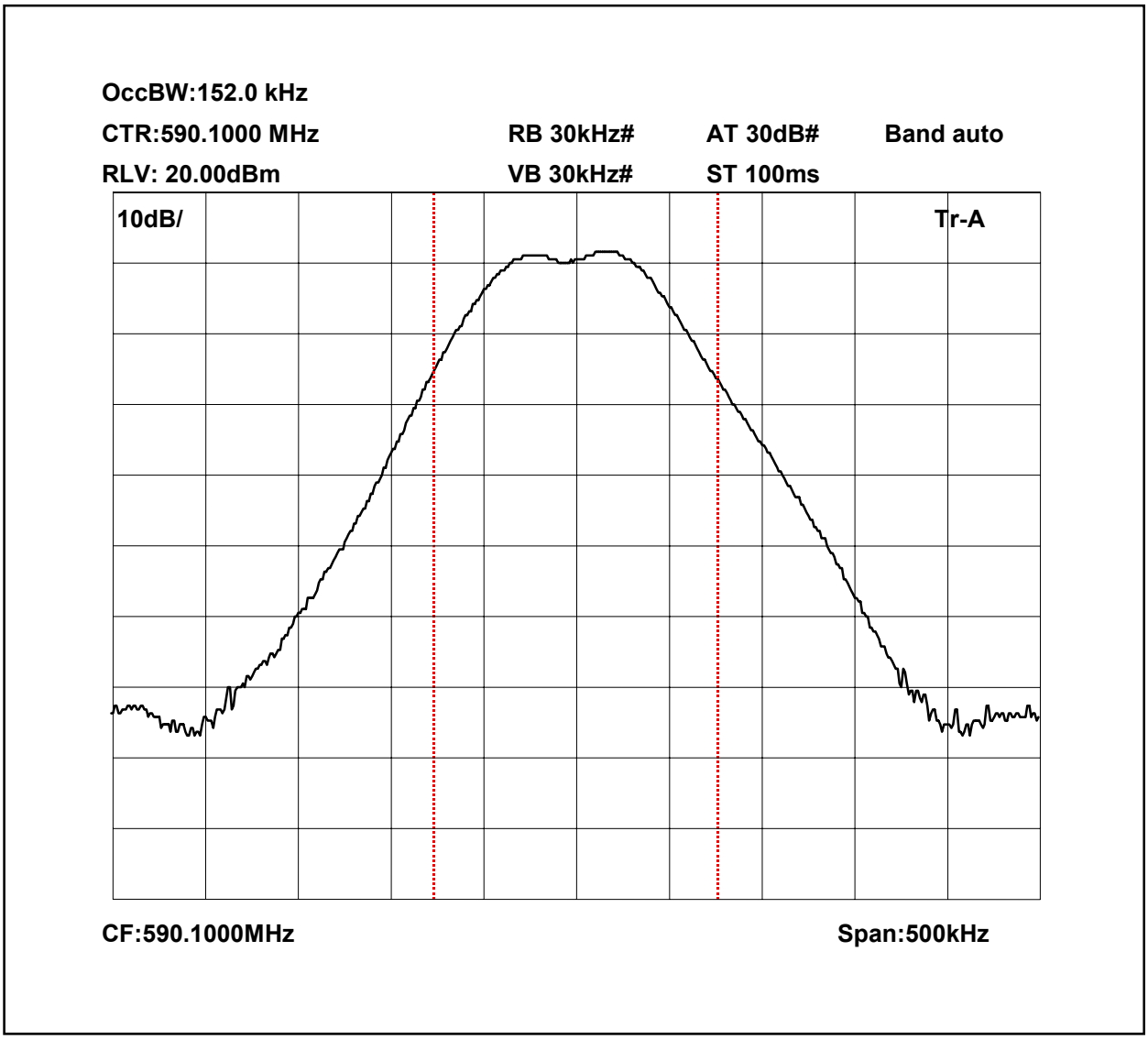


Frequency Fl	698.101MHz
Frequency Fh	698.238MHz
Measured Occupied Bandwidth	137.0kHz
Occupied Bandwidth Limit	200kHz

Band Occupancy Unit 2 Limit 74.861(e) (6)

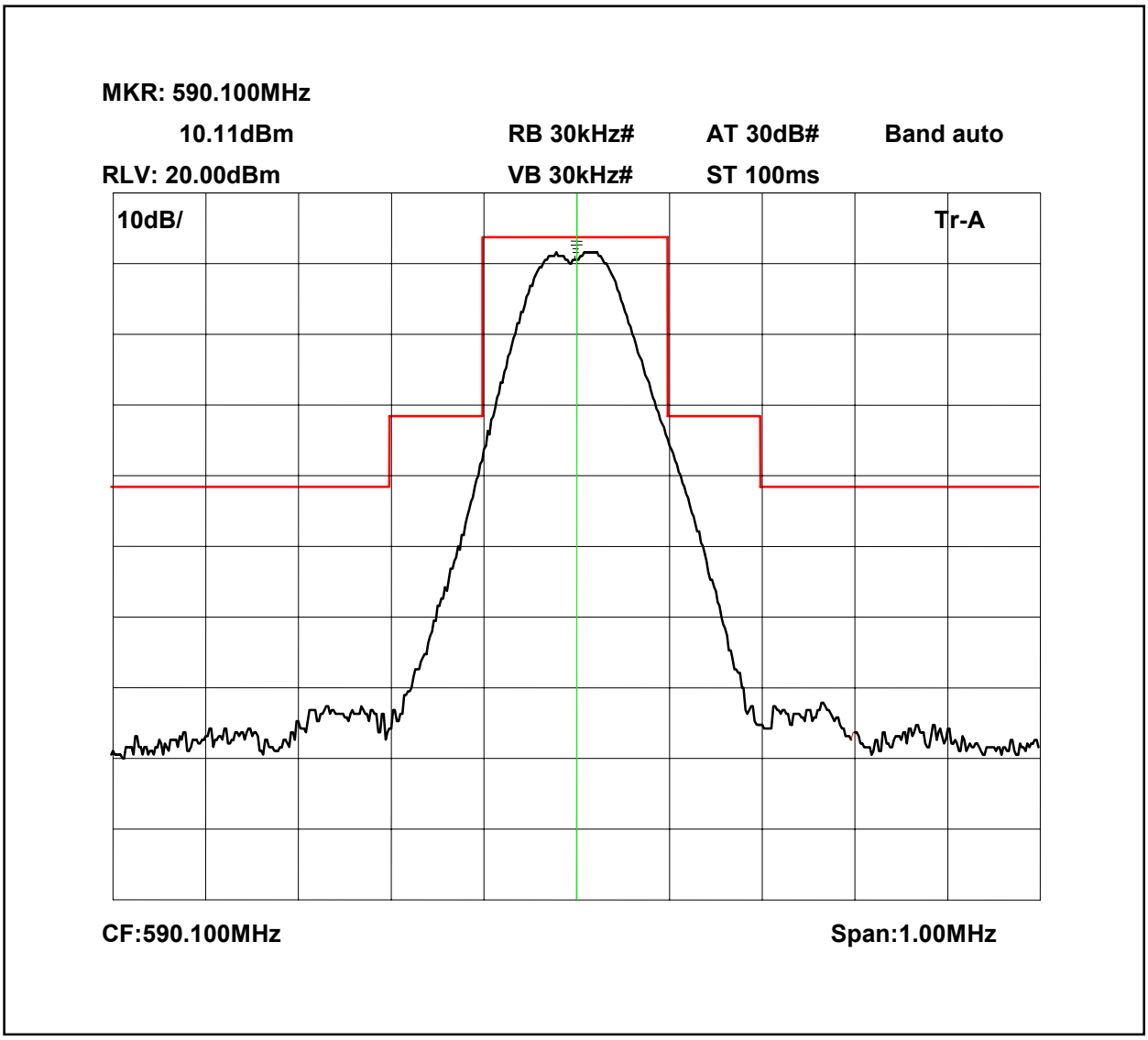


Band Occupancy Unit 3

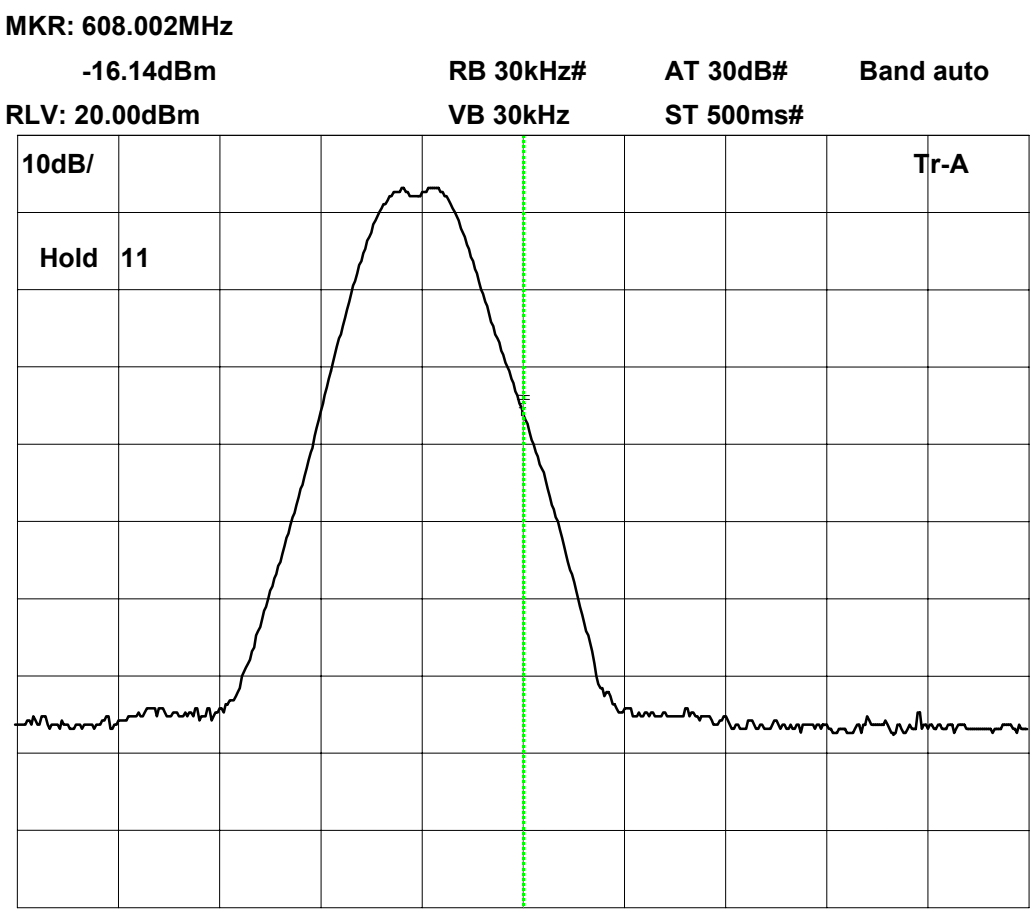


Frequency Fl	590.027MHz
Frequency Fh	590.179MHz
Measured Occupied Bandwidth	152.0kHz
Occupied Bandwidth Limit	200kHz

Band Occupancy Unit 3 Limit 74.861 (e)(6)

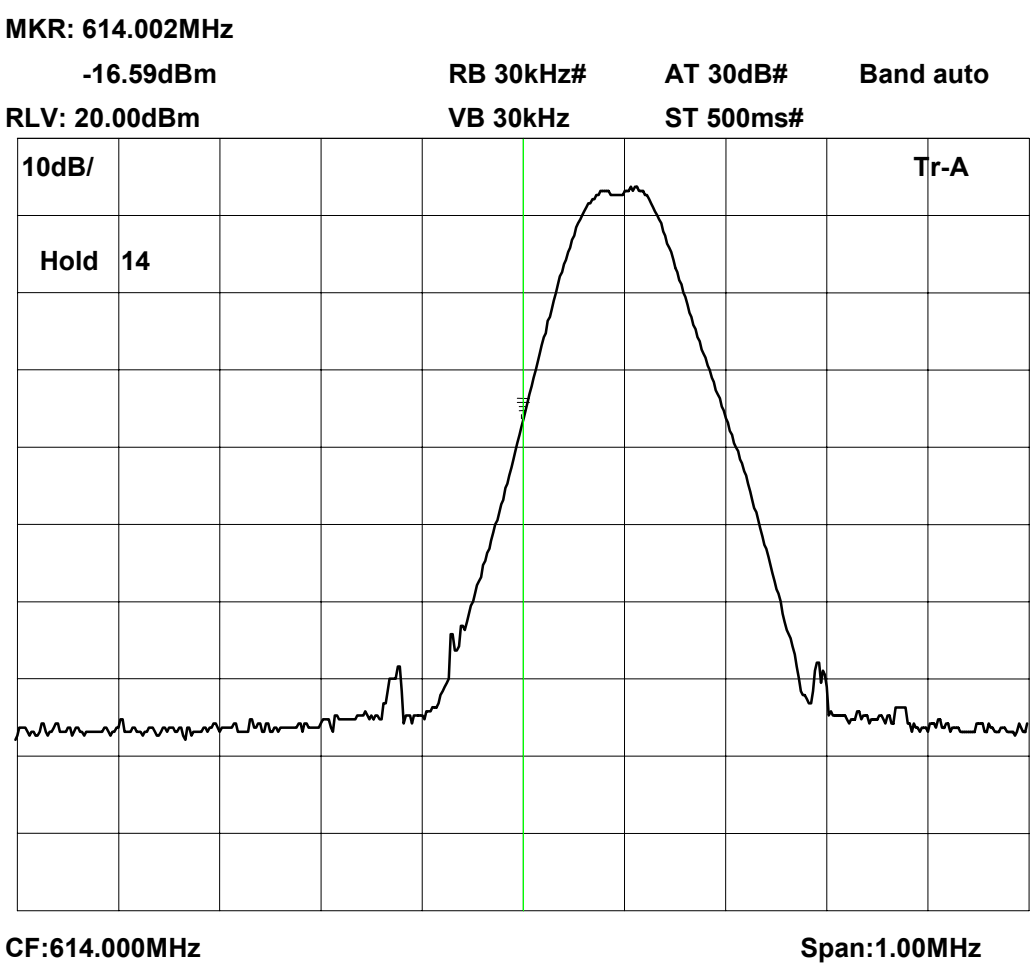


Unit 3 Exclusion Band Edge Compliance



Note: An audio signal of 15kHz at a level of 10dBm was applied to the input of the unit.

Unit 3 Exclusion Band Edge Compliance



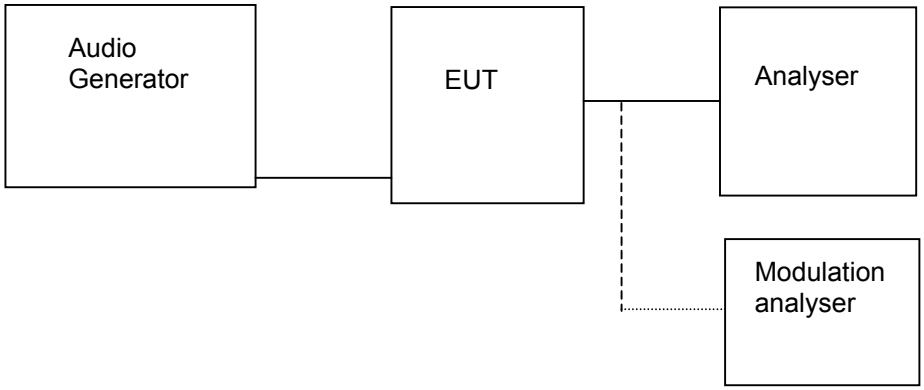
Note: An audio signal of 15kHz at a level of 10dBm was applied to the input of the unit.

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
COMMUNICATIONS ANALYSER	ROHDE AND SCHARZ	CMTA 52	894715/003	05	**X**
SPECRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS AT ANTENNA TERMINALS - 2.1051

Ambient temperature = 22°C(<1GHz),
Relative humidity = 50%(<1GHz),
Conditions = Radio Lab
Supply voltage = 1.5Vdc



The equipment was setup as in the diagram above. The transmitter was modulated with a sine wave of 15000Hz. The output of the transmitter was connected to the spectrum analyser. The spurious emissions and fundamental carrier power were observed.

Due to the low level of carrier power it was not necessary to use a notch filter. The attenuator of the spectrum analyser was adjusted to ensure the spectrum analyser was not over loaded.

Any emissions found in the wideband scans (see over) where analysed in detail to determine the correct power level. Only emissions with 20dB of limit need to be recorded:

Spurious emission limit -(43+10log P) = - 26.9dBc or –13dBm actual

Unit 1 Spurious emissions

Frequency (MHz)	Level dBm	Level dBc	Limit dBc
1611.1796	-22.47	-36.47	-26.9
2417.694	-18.17	-32.17	-26.9
3223.592	-17.8	-31.8	-26.9

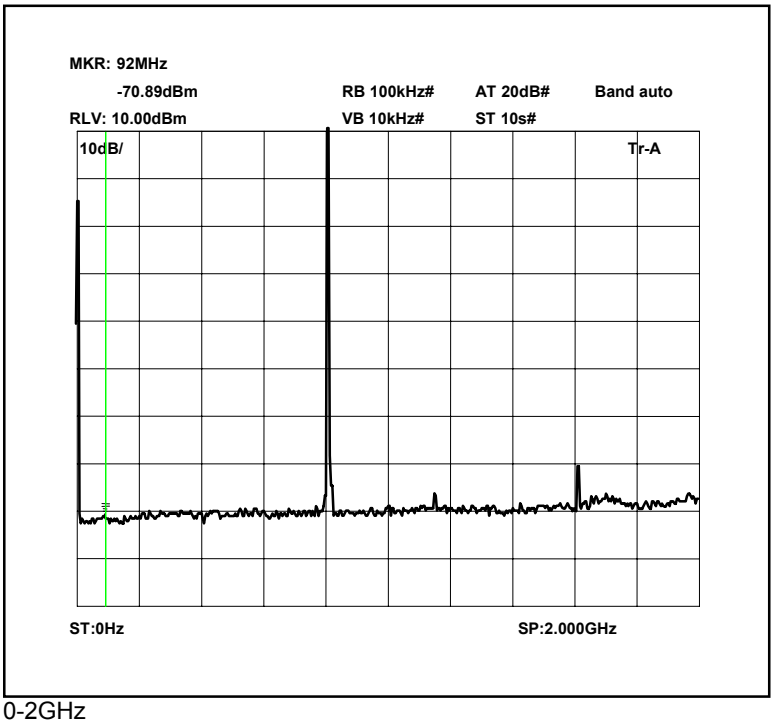
Unit 2 Spurious emissions

Frequency (MHz)	Level dBm	Level dBc	Limit dBc
1396.214	-33.09	-47.79	-26.9
2417.694	-30.75	-45.45	-26.9

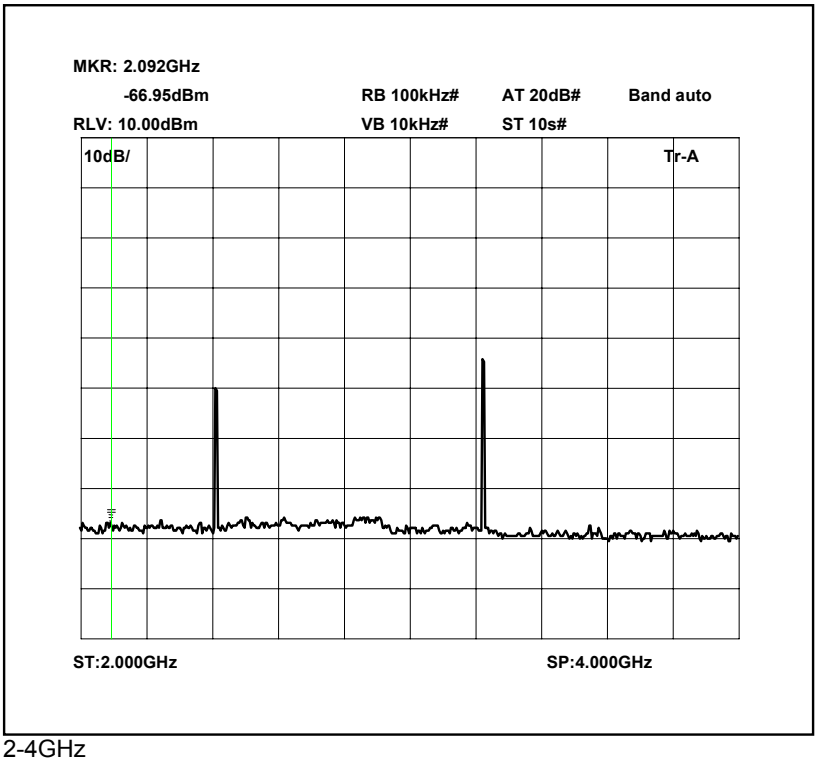
Unit 1 Spurious emissions

Frequency (MHz)	Level dBm	Level dBc	Limit dBc
1770.251	-27.4	-41.45	-26.9

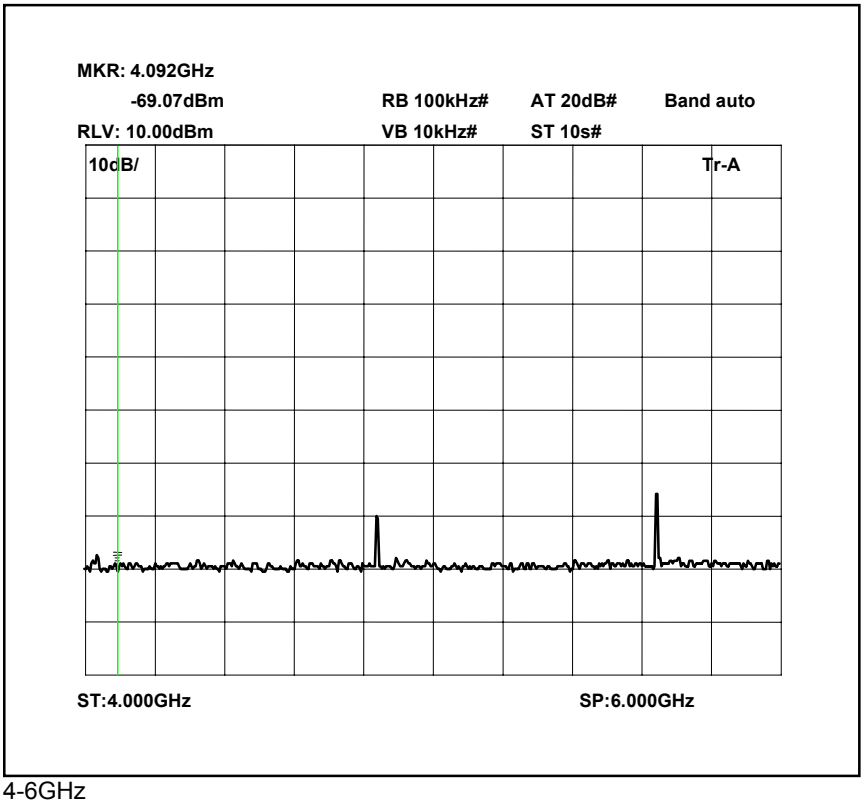
Unit 1 Scan Data



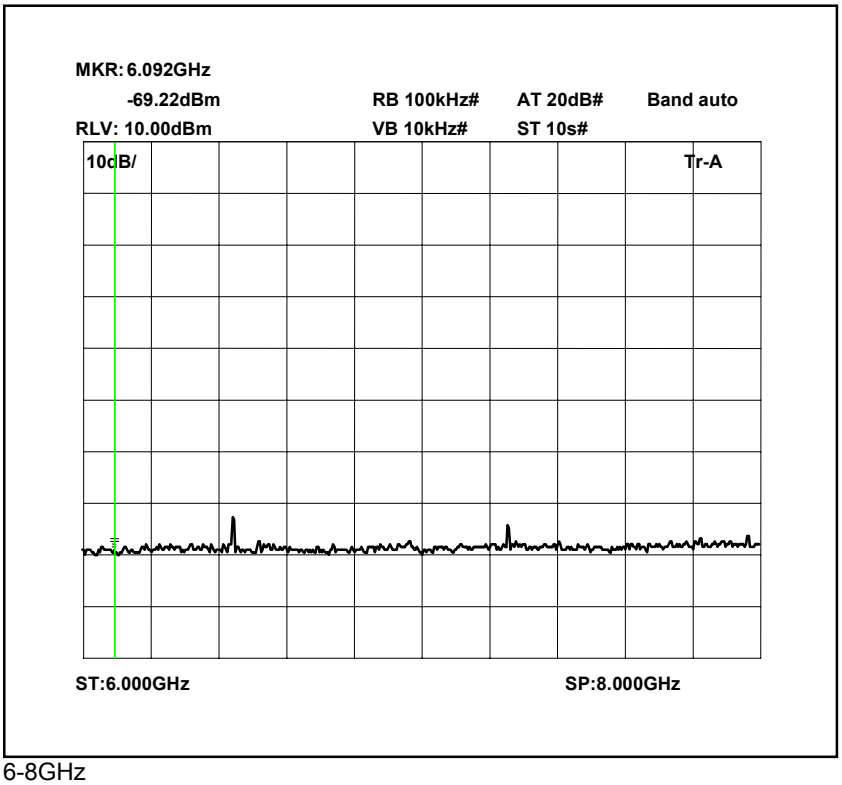
0-2GHz



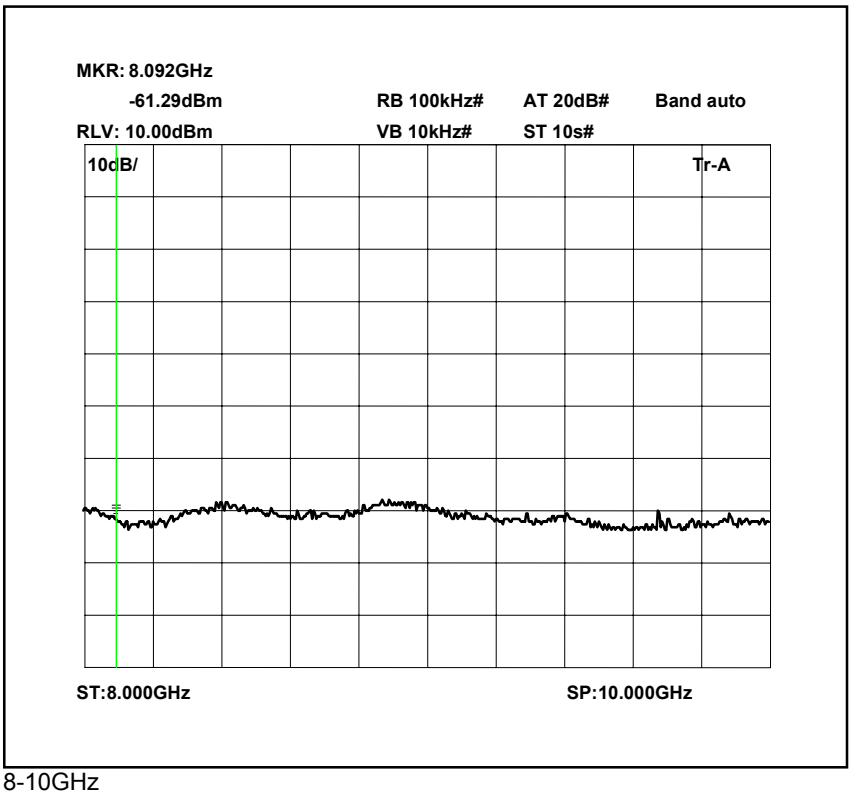
2-4GHz


MKR: 4.092GHz
-69.07dBm
RB 100kHz#
AT 20dB#
Band auto
RLV: 10.00dBm
VB 10kHz#
ST 10s#
10dB/
Tr-A
ST:4.000GHz
SP:6.000GHz

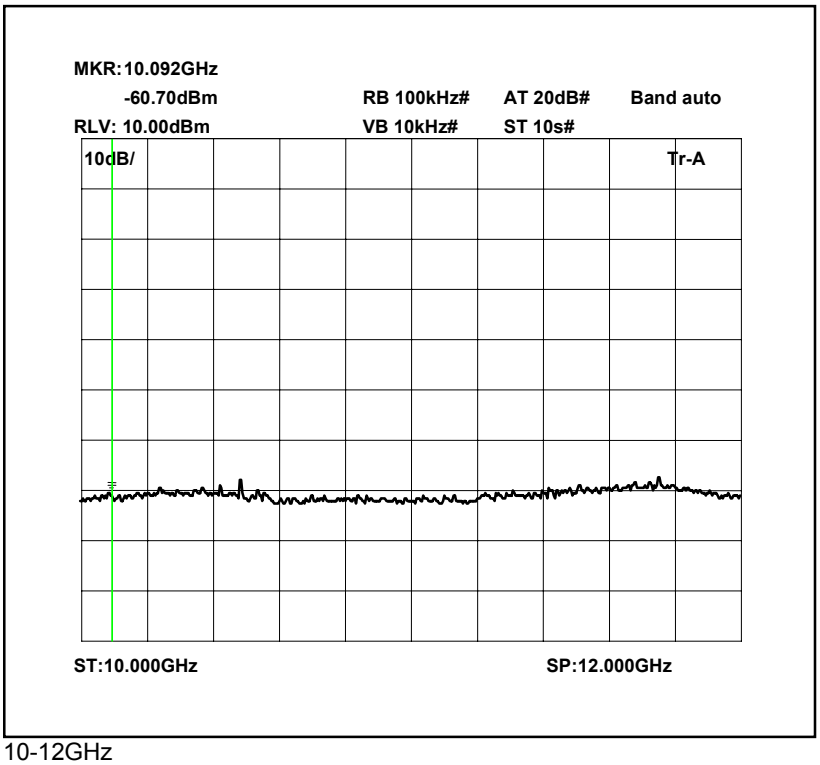
4-6GHz


MKR: 6.092GHz
-69.22dBm
RB 100kHz#
AT 20dB#
Band auto
RLV: 10.00dBm
VB 10kHz#
ST 10s#
10dB/
Tr-A
ST:6.000GHz
SP:8.000GHz

6-8GHz

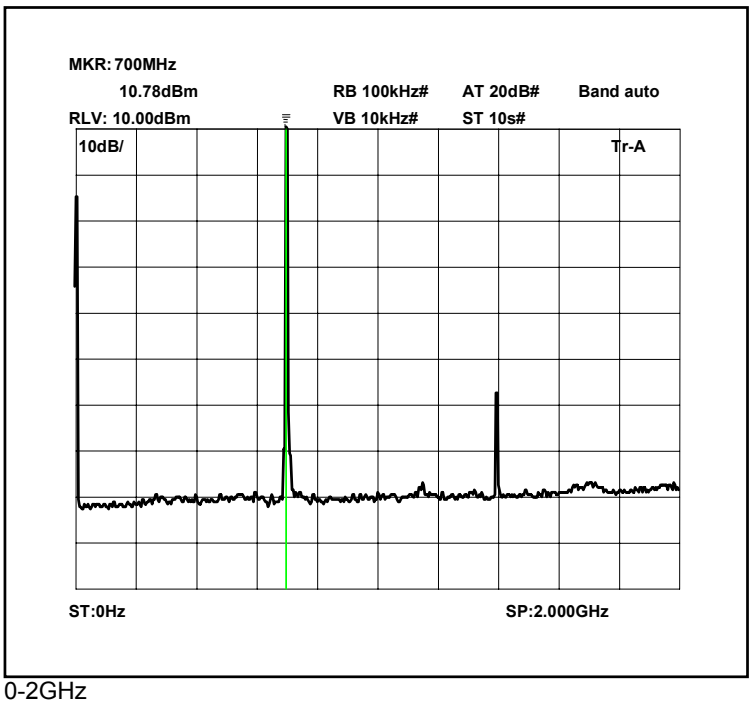


8-10GHz

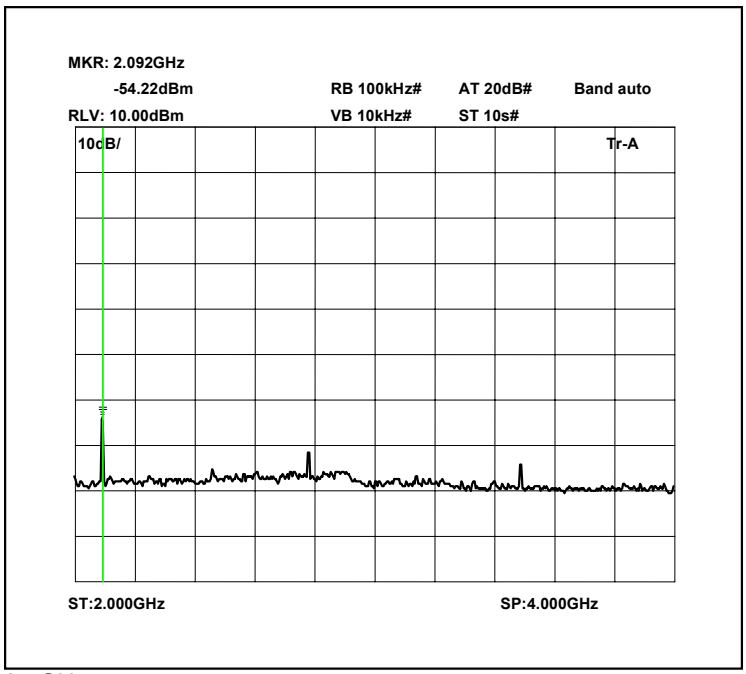


10-12GHz

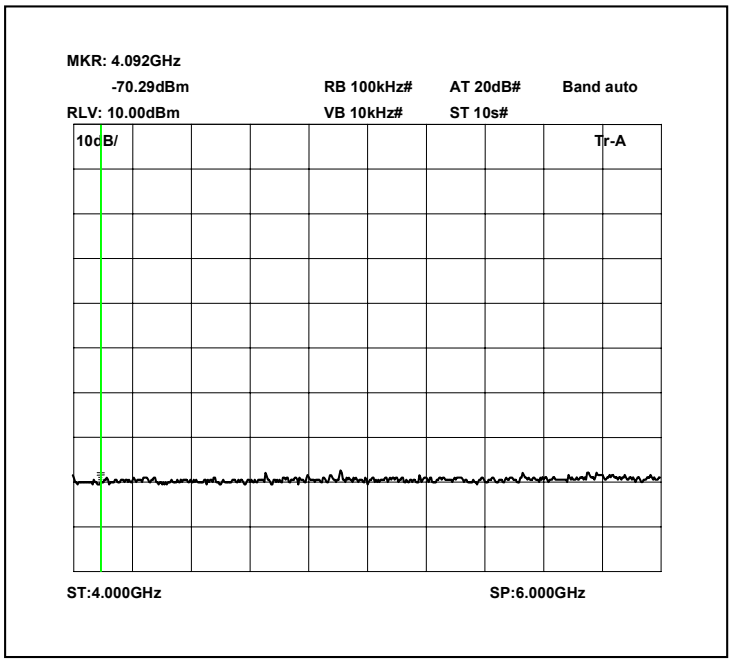
Unit 2



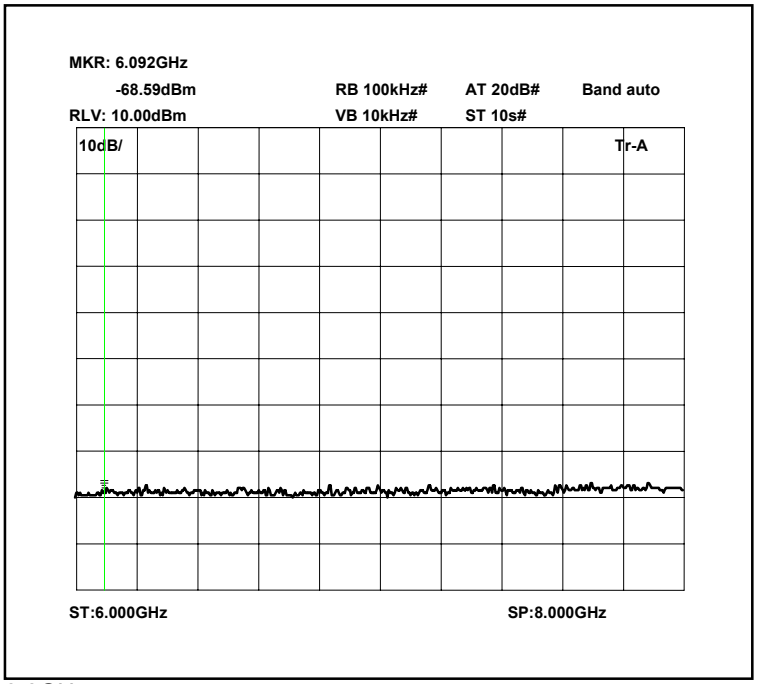
0-2GHz



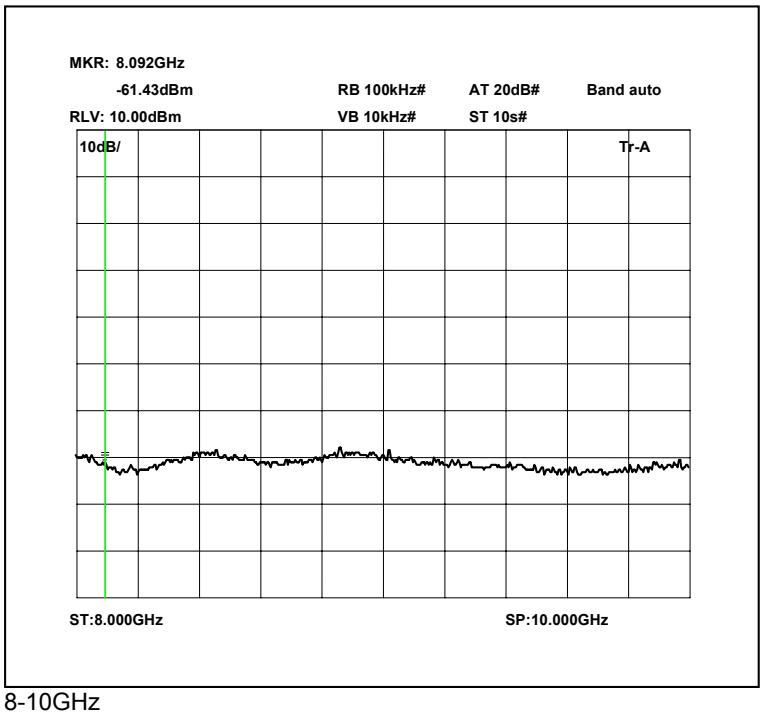
2-4GHz


MKR: 4.092GHz
-70.29dBm
RB 100kHz#
AT 20dB#
Band auto
RLV: 10.00dBm
VB 10kHz#
ST 10s#
10dB/
Tr-A
ST:4.000GHz
SP:6.000GHz

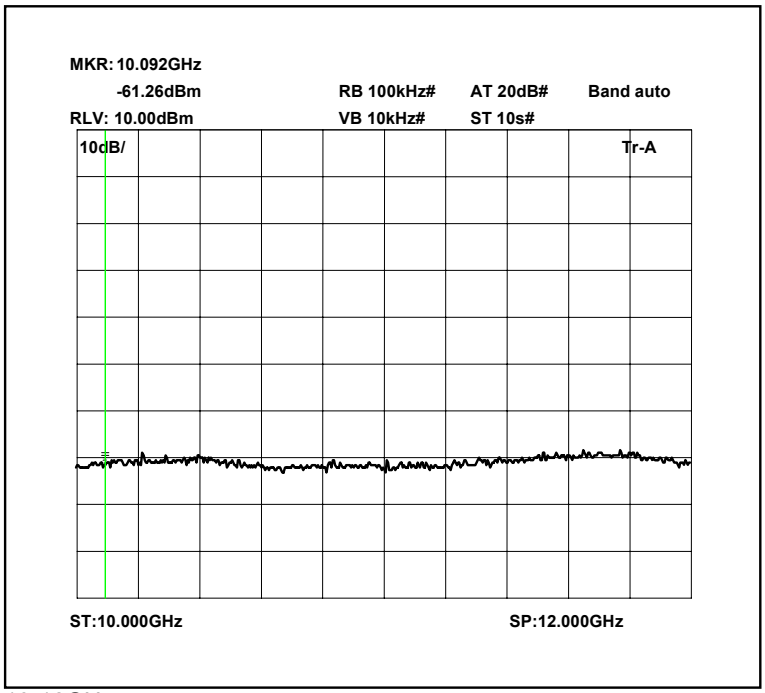
4-6GHz


MKR: 6.092GHz
-68.59dBm
RB 100kHz#
AT 20dB#
Band auto
RLV: 10.00dBm
VB 10kHz#
ST 10s#
10dB/
Tr-A
ST:6.000GHz
SP:8.000GHz

6-8GHz

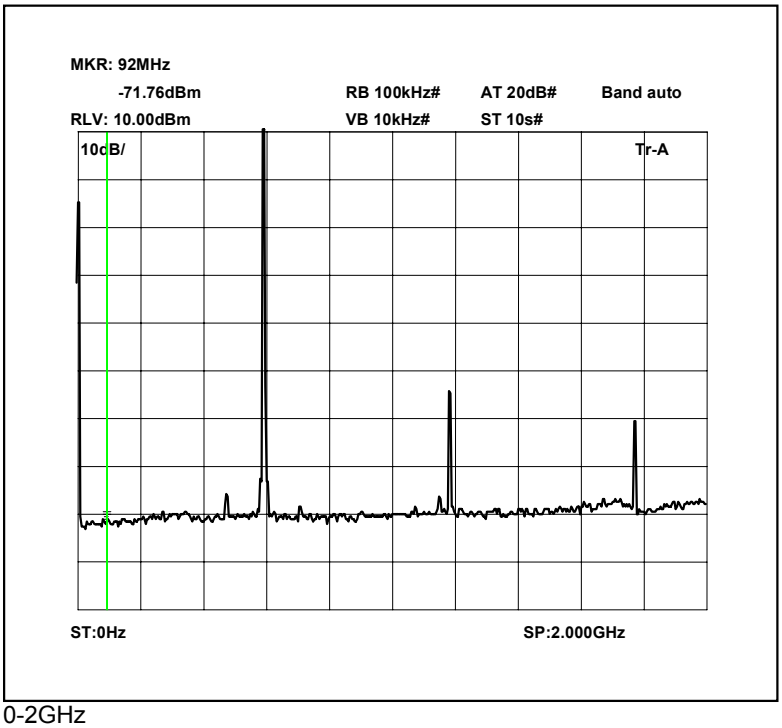


8-10GHz

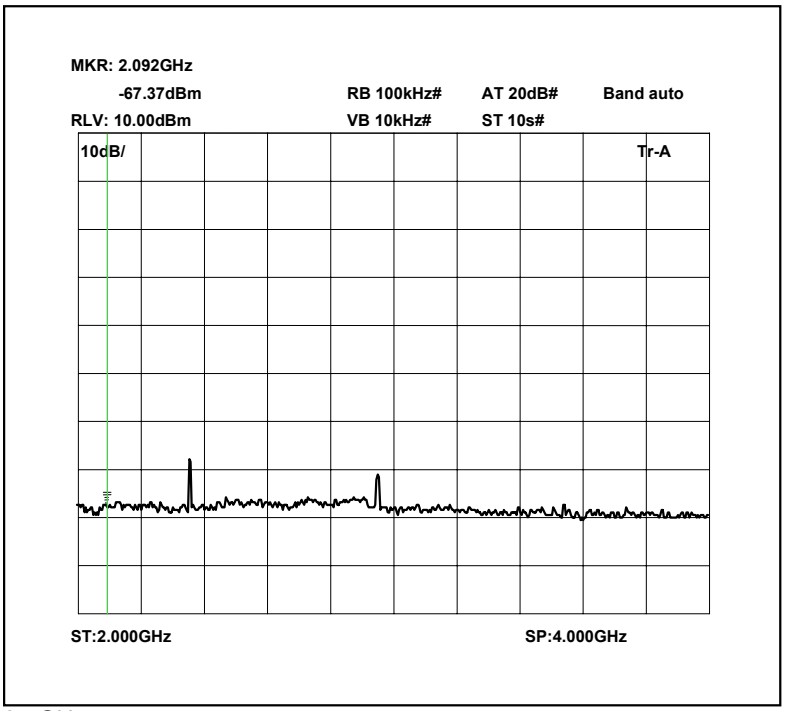


10-12GHz

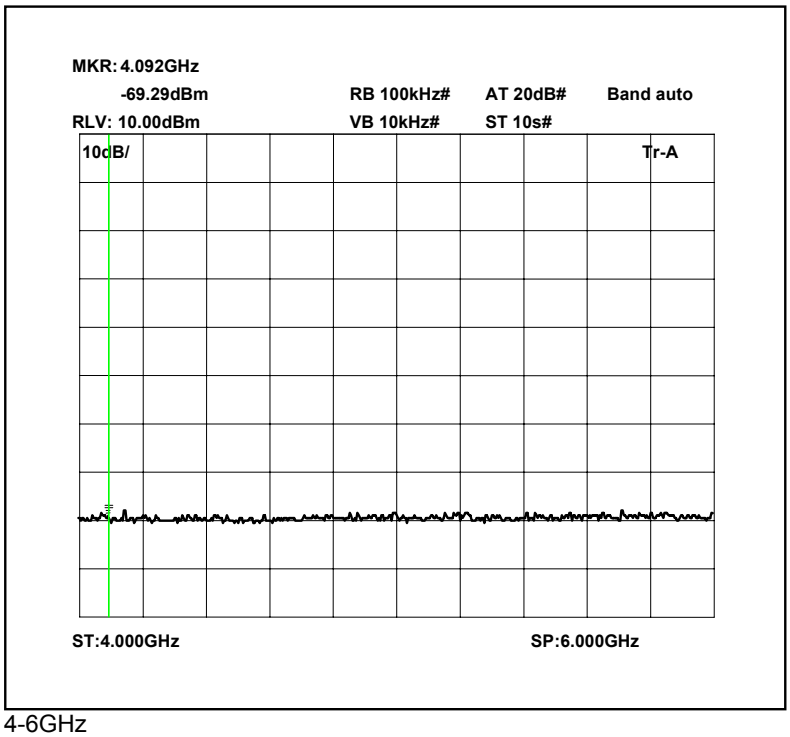
Unit 3



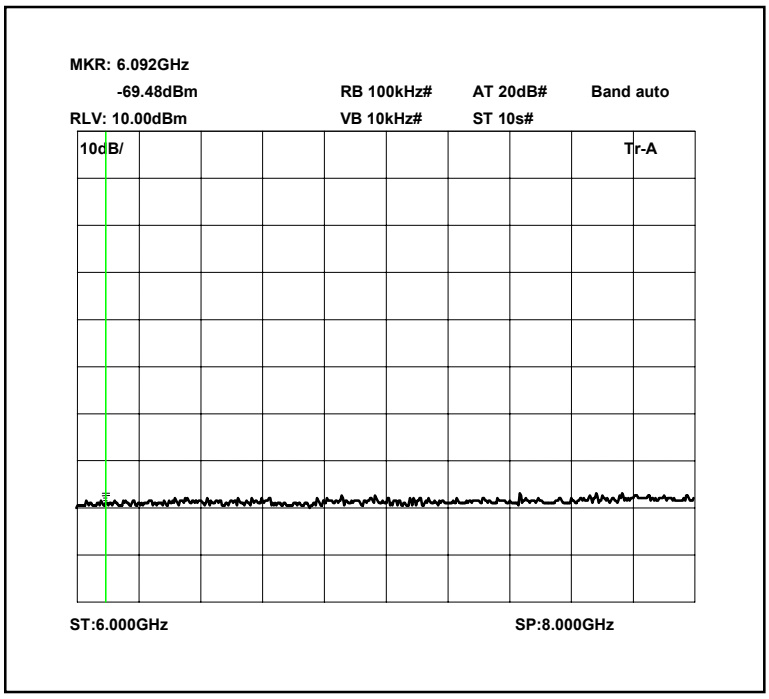
0-2GHz



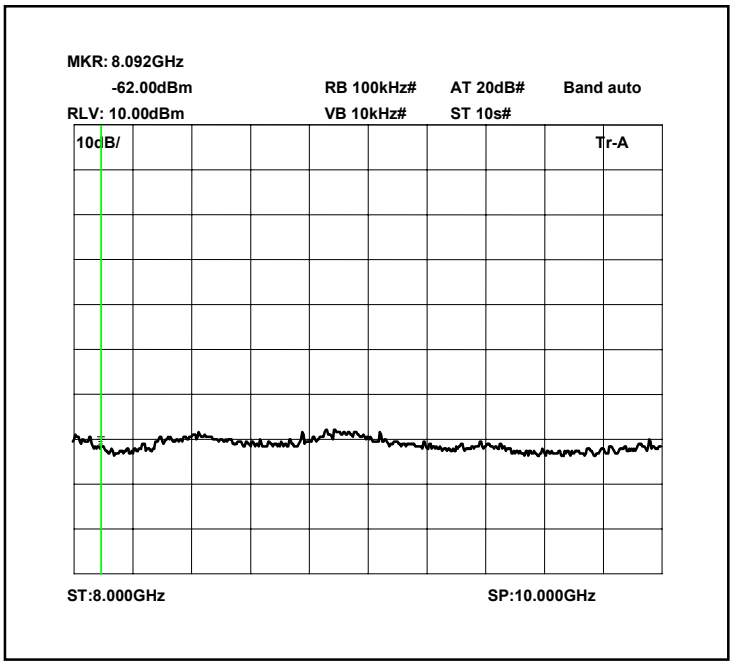
2-4GHz


MKR: 4.092GHz
-69.29dBm
RB 100kHz#
AT 20dB#
Band auto
RLV: 10.00dBm
VB 10kHz#
ST 10s#
10dB/
Tr-A
ST:4.000GHz
SP:6.000GHz

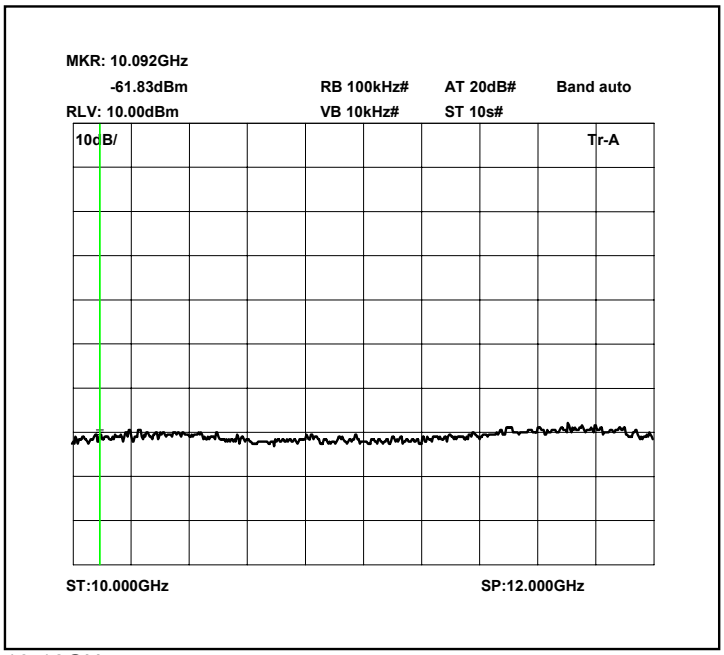
4-6GHz


MKR: 6.092GHz
-69.48dBm
RB 100kHz#
AT 20dB#
Band auto
RLV: 10.00dBm
VB 10kHz#
ST 10s#
10dB/
Tr-A
ST:6.000GHz
SP:8.000GHz

6-8GHz



8-10GHz



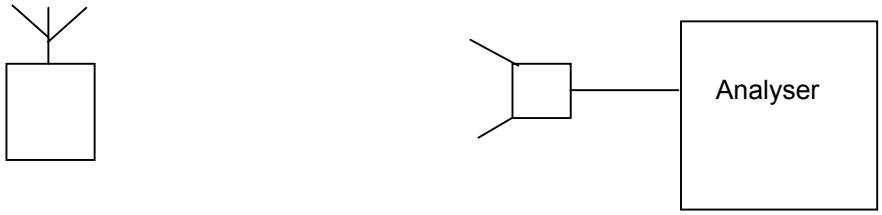
10-12GHz

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

TRANSMITTER FIELD STRENGTH OF SPURIOUS EMISSIONS RADIATED - 2.1051

Ambient temperature = 22°C(<1GHz),
Relative humidity = 50%(<1GHz),
Conditions = Radio Lab
Supply voltage = 1.5Vdc



The equipment was setup as in the diagram above. The transmitter was modulated with a sine wave of 15000Hz. The output of the transmitter was connected to the antenna. The spurious emissions and fundamental carrier were observed. The levels were noted and the EUT turned off and removed form the open area test site. The unit was replaced with a second antenna which was connected to a signal generator . The generator was tuned to the frequency noted and the level increased until the level seen on the analyser was the same as the level noted when the EUT was in place. The low level of carrier power meant that it was not necessary to use a notch filter.

The frequency spectrum was searched to the 10th harmonic.

Spurious emission limit -(43=10log P) = - 26.9dBc or –13dBm actual

Unit 1 Spurious emissions

Frequency (MHz)	Level dBm	Level dBc	Limit dBc
1611.1796	-44.2	-59.87	-26.9
2417.694	-34.32	-49.9	-26.9
3223.592	-30.8	-46.7	-26.9

Unit 2 Spurious emissions

Frequency (MHz)	Level dBm	Level dBc	Limit dBc
1396.214	-47.6	-60.9	-26.9

Unit 3 Spurious emissions

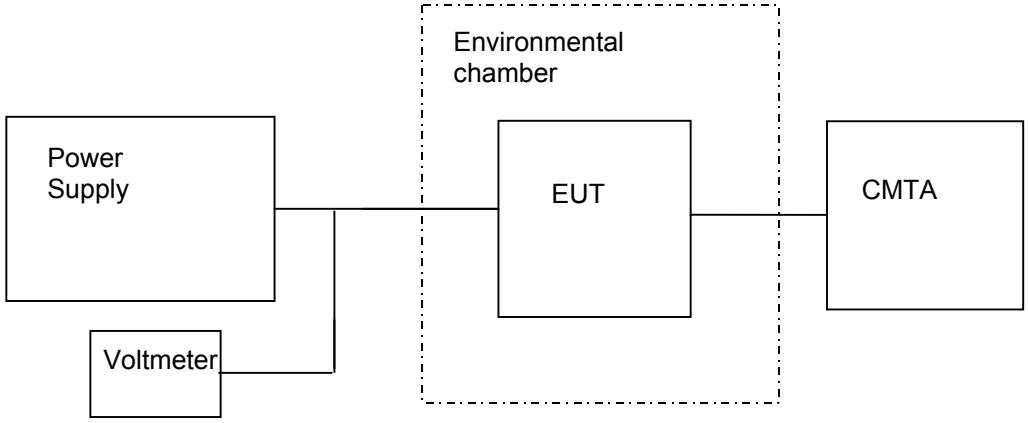
Frequency (MHz)	Level dBm	Level dBc	Limit dBc
1180.12	-33.9	-47.95	-26.9

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
HORN ANTENNA	EMCO	3115	9010-3580	138	**X**
HORN ANTENNA	EMCO	3115	9010-3581	139	**X**
COMMUNICATIONS ANALYSER	ROHDE AND SCHARZ	CMTA 52	894715/003	05	**X**
SPECRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	**X**
RANGE 1	TRL	3 METRE	N/A	UH06	**X**
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	**X**
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	**x**

TRANSMITTER TESTS

TRANSMITTER FREQUENCY STABILTIY – Part 2.1055 (a) (1) (d) (2)

Ambient temperature	=	22°C(<1GHz),
Relative humidity	=	50%(<1GHz),
Conditions	=	Radio Lab
Supply voltage	=	1.5Vdc



The transmitter was placed inside the environmental chamber . The AA battery cell was replaced by a power supply placed outside the chamber. The RF output port was connected to the communication analyser frequency counter. The temperature was varied between -30°C and +50°C in 10° steps.

Unit 1

Temperature °C	Tx Frequency MHz Voltage 1.5 Volts	Tx Frequency MHz Voltage 1.0 Volts
-30	805.88528	805.88495
-20	805.89055	805.88981
-10	805.89362	805.88981
0	805.89518	805.89478
10	805.89588	805.89569
20	805.89523	805.89488
30	805.89455	805.89440
40	805.89393	805.89370
50	805.89400	805.89388

Frequency Error	kHz
Minimum	4.12
Maximum	15.05
Limit 74.861 e(4)	40.29

Unit 2

Temperature °C	Tx Frequency MHz Voltage 1.5 Volts	Tx Frequency MHz Voltage 1.0 Volts
-30	698.09271	698.09211
-20	698.09717	698.09675
-10	698.09932	698.09780
0	698.09994	698.09980
10	698.09949	698.09938
20	698.09821	698.09815
30	698.09677	698.09675
40	698.05350	698.09542
50	698.09424	698.09444

Frequency Error	kHz
Minimum	0.06
Maximum	7.89
Limit 74.861 e(4)	34.9

Unit 3

Temperature °C	Tx Frequency MHz Voltage 1.5 Volts	Tx Frequency MHz Voltage 1.0 Volts
-30	590.08306	590.08327
-20	590.09282	590.09213
-10	590.09667	590.09604
0	590.09768	590.09697
10	590.09798	590.09688
20	590.09779	590.09692
30	590.09774	590.09692
40	590.09788	590.09722
50	590.09850	590.09796

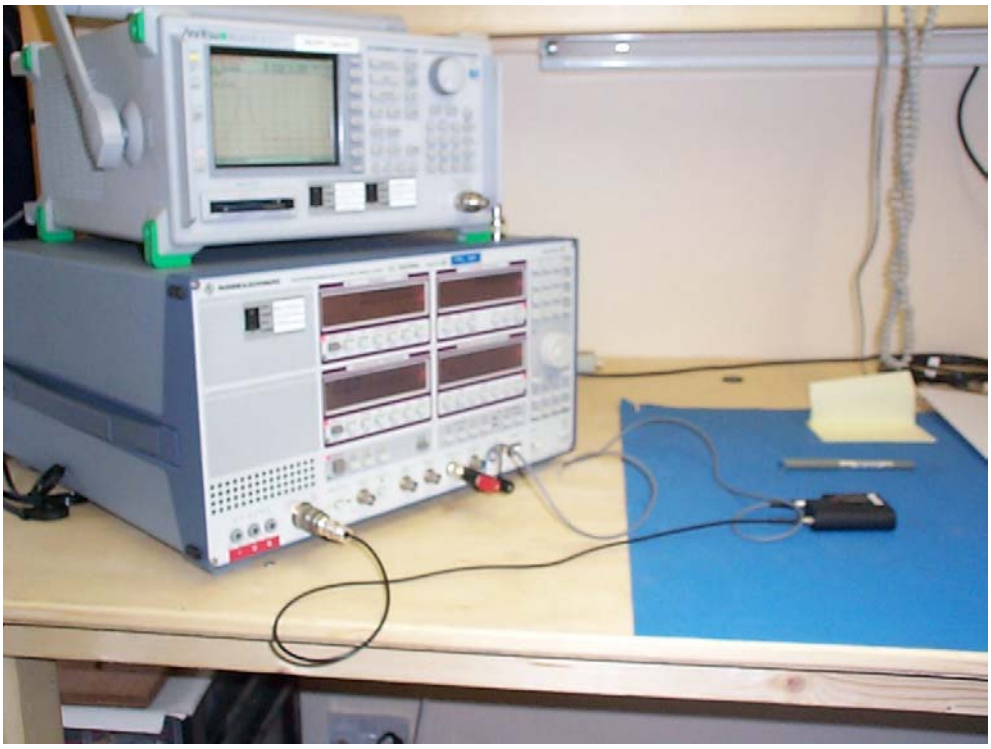
Frequency Error	kHz
Minimum	1.5
Maximum	16.94
Limit 74.861 e(4)	29.5

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
COMMUNICATIONS ANALYSER	ROHDE AND SCHARZ	CMTA 52	894715/003	05	**X**
MULTIMETER	AVO	M3004	M3270006	UH41	**X**
ENVIRONMENTAL CHAMBER	SHARETREE	TCC 125-15PP	CS 203	11	**X**
THERMOMETER	FLUKE	52 SERIES II	74700044	426	**X**

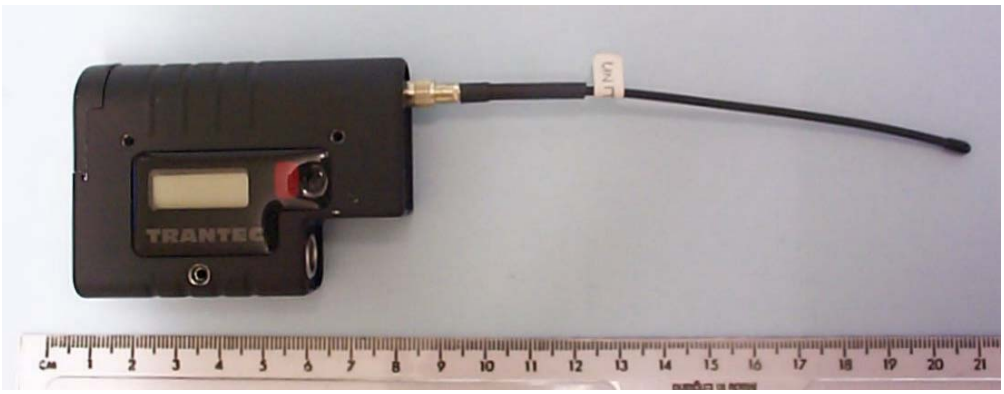
ANNEX A

PHOTOGRAPHS

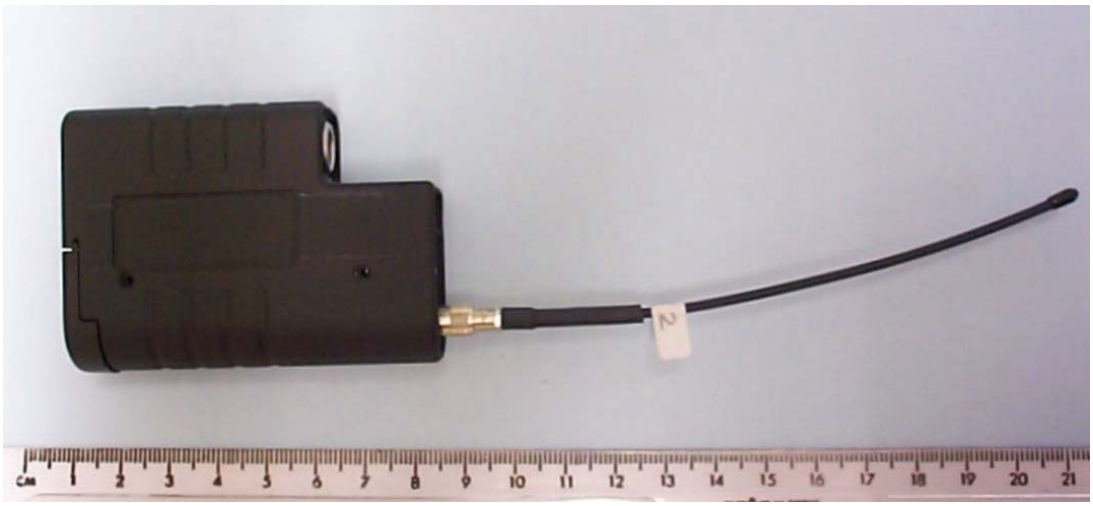
PHOTOGRAPH No. 1 **TEST SETUP**



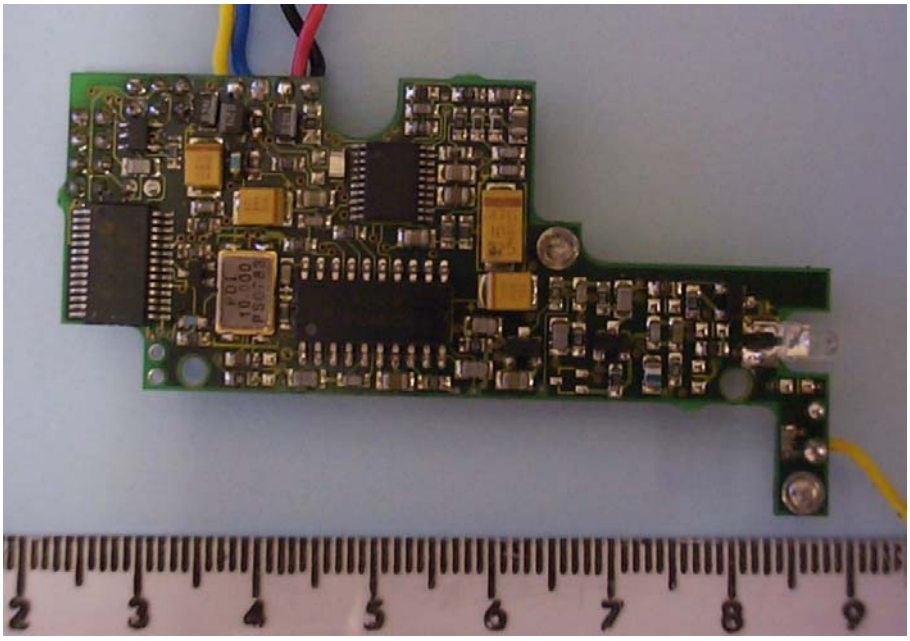
PHOTOGRAPH No. 2 **TRANSMITTER FRONT VIEW**



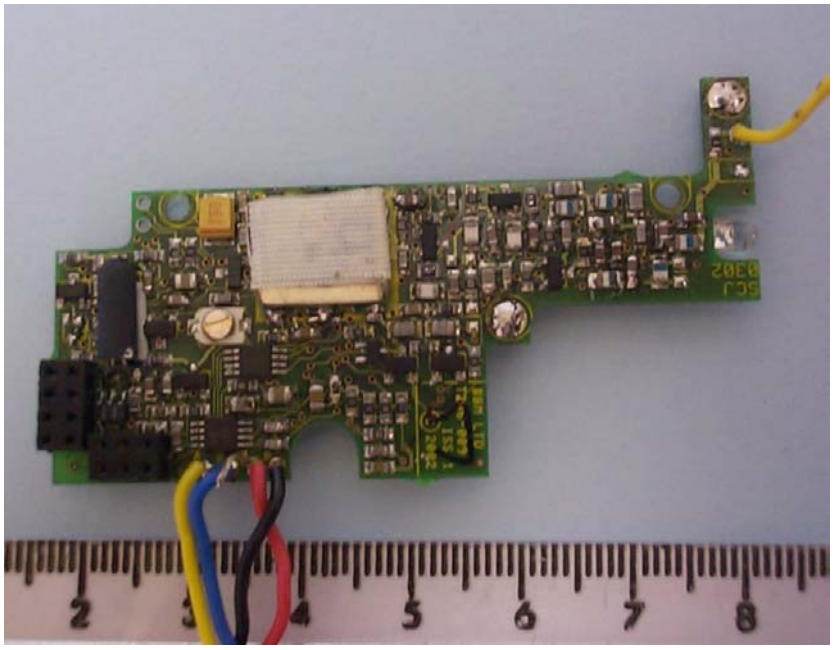
PHOTOGRAPH No. 3 **TRANSMITTER REAR VIEW**



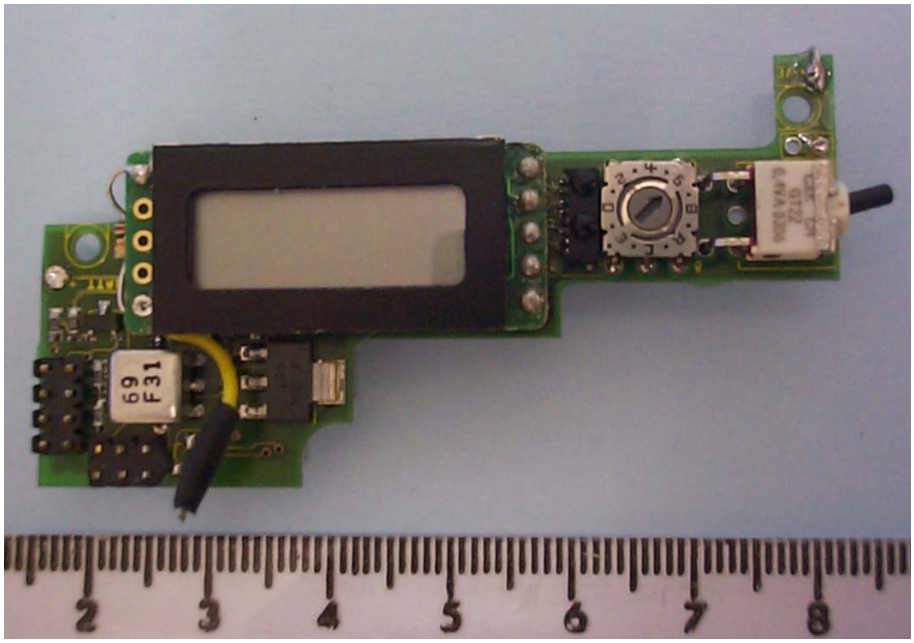
PHOTOGRAPH No. 4 **PCB 1 TRACK SIDE**



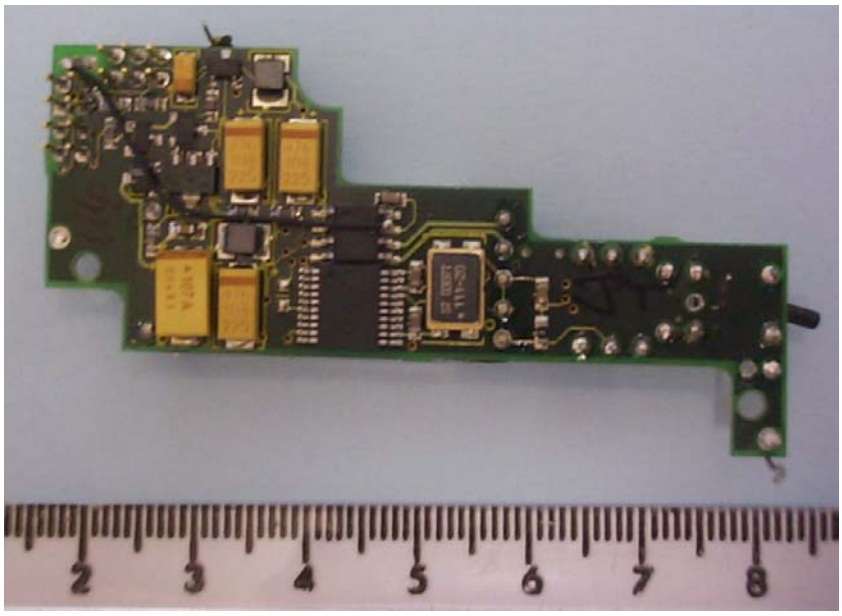
PHOTOGRAPH No. 5 **PCB 1 COMPONENT SIDE**



PHOTOGRAPH No. 6 **PCB 2 COMPONENT SIDE**



PHOTOGRAPH No. 7 **PCB 2 TRACK SIDE**



ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

a.	TCB	-	APPLICATION	[X]
		-	FEE	[X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
c.	MODEL(s) vs IDENTITY	-		[ ]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[ ]
e.	LABELLING	-	PHOTOGRAPHS	[ ]
		-	DECLARATION	[X]
		-	DRAWINGS	[X]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[ ]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
h.	CIRCUIT DIAGRAMS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
i.	COMPONENT LOCATION	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
j.	PCB TRACK LAYOUT	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
k.	BILL OF MATERIALS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
l.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]