



TEST REPORT NO: RU1193/6631
COPY NO: 1
ISSUE NO: 1
FCC ID: NEO50-1185900

**REPORT ON THE CERTIFICATION TESTING OF A
AERIAL FACILITIES LIMITED
OFF AIR AMPLIFIER SYSTEM (900MHz)
DOWNLINK ONLY
WITH RESPECT TO
THE FCC RULES CFR 47, PART 90 Subpart P
PRIVATE LAND MOBILE REPEATER.**

TEST DATE: 17th August 2005 – 25th August 2005

TESTED BY: _____ J CHARTERS
APPROVED BY: _____ P GREEN
PRODUCT MANAGER
EMC
DATE: 11th November 2005

Distribution:

- Copy Nos:
1. Aerial Facilities Limited
 2. TCB: TRL Compliance Limited
 3. TRL EMC

THIS DOCUMENT MAY BE REPRODUCED ONLY IN ITS ENTIRETY AND WITHOUT CHANGE



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Notes:			
1. Component failure during test	YES		<input type="checkbox"/>
	NO		<input checked="" type="checkbox"/>
2. If Yes, details of failure:			
3. The facilities used for the testing of the product contain in this report are FCC Listed.			



CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	NEO50-1185900
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 90 Subpart I
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	OFF AIR AMPLIFIER SYSTEM (900MHz)
EQUIPMENT TYPE:	Private Land Mobile Repeater
MAXIMUM GAIN	+95.75 dB
MAXIMUM INPUT	-65dBm
MAXIMUM OUTPUT	+30.75 dBm
ANTENNA TYPE:	Not applicable
CHANNEL SPACING:	15 kHz
NUMBER OF CHANNELS:	Downlink 2
FREQUENCY GENERATION:	N/A
MODULATION TYPE:	F3E
POWER SOURCE(s):	+110 Vac
TEST DATE(s):	17 th August 2005 – 25 th August 2005
ORDER No(s):	32001
APPLICANT:	Aerial Facilities Limited
ADDRESS:	Aerial House Asheridge Road Chesham Buckinghamshire HP5 1TU United Kingdom
TESTED BY:	----- J CHARTERS
APPROVED BY:	----- P GREEN PRODUCT MANAGER EMC

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	RULE PART	APPLICABILITY	RESULT
	RF Power Output	90.205	Yes	Complies
	Audio Frequency Response	TIA EIA-603.3.2.6	N/A	N/A
	Audio Low-Pass Filter Response	TIA EIA-603.3.2.6	N/A	N/A
	Modulation Limiting	TIA EIA-603.3.2.6	N/A	N/A
	Occupied Bandwidth	90.210	Yes	Complies
	Spurious Emissions at Antenna Terminals	90.210	Yes	Complies
	Field Strength of Spurious Emissions	90.210	Yes	Complies
	Frequency Stability	90.213	N/A(note 1)	N/A
	Transient behaviour	90.214	N/A(note 2)	N/A

Notes:

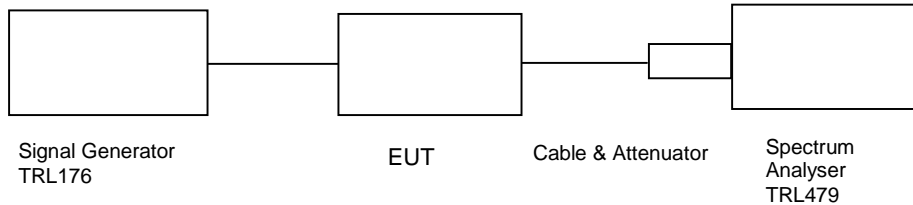
- 1 The EUT does not contain modulation circuitry, therefore the test was not performed.
- 2 The EUT is not a keyed carrier system, therefore the test was not performed.

- 2. Product Use: Private Land Mobile Repeater
- 3. Emission Designator: F3E
- 4. Temperatures: Ambient (Tnom) 21°C
- 5. Supply Voltages: Vnom +110 Vac
 Note: Vnom voltages are as stated above unless otherwise shown on the test report page
- 6. Equipment Category:
 - Single channel
 - Two channel
 - Multi-channel
- 7. Channel spacing:
 - Narrowband 15kHz
 - Wideband
- 8. Test Location
 - TRL Compliance Limited
 - Up Holland
 - Long Green
- 9. Modifications made during test program No modifications were performed.

AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – DOWNLINK

Ambient temperature = 25°C
 Relative humidity = 54%
 Supply voltage = +110 Vac
 Channel number = See test results

Radio Laboratory



Frequency MHz	Signal Generator input level dBm	Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Gain after 10dB input level increase dBm
929.5875 MHz	-64	28.12	2.31	94.43	84.78
929.6125 MHz	-65	28.12	2.63	95.75	85.96

Notes:

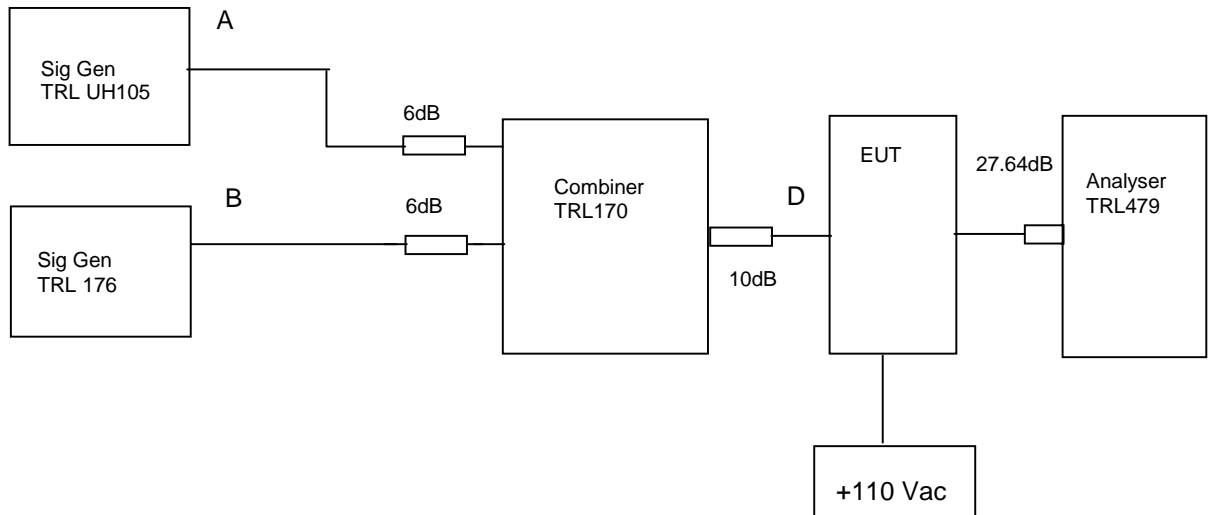
1. The signal generator input was increased by 10dBs and the level of the output signal remeasured.
2. Downlink consists of 2 channels only

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
ATTENUATOR	BIRD	8304-200	N/A	103	X
ATTENUATOR	BIRD	8304-300-N	N/A	220	X
CABLE	ROSENBERGER	MICRO COAX	N/A	280	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X

AMPLIFIER INTERMODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053– DOWNLINK

Ambient temperature = 26°C
 Relative humidity = 52%
 Supply voltage = +110 Vac

Radio Laboratory



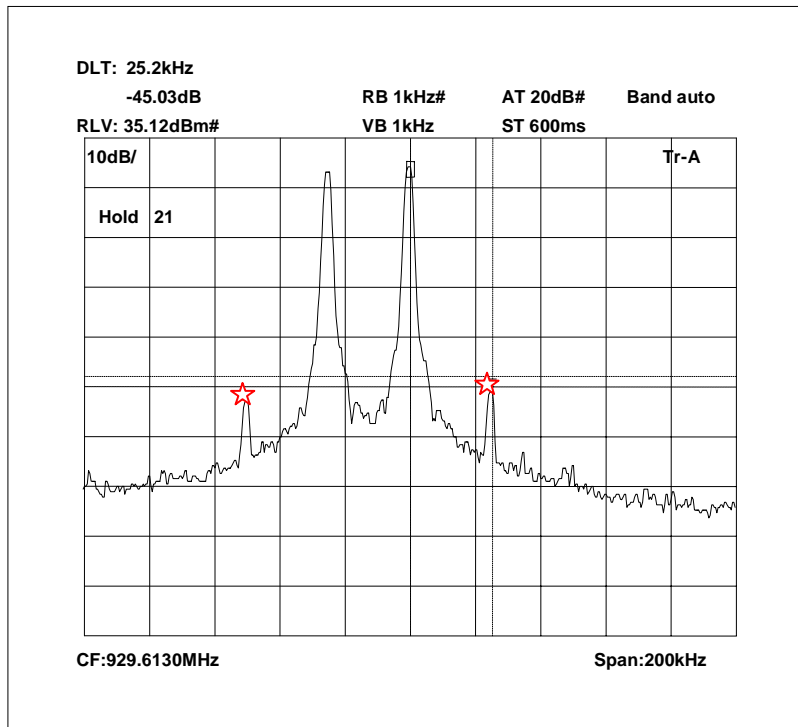
The Intermodulation and spurious products were measured with the amplifier operating at maximum gain. A two tone test was conducted using the equipment as above. The input power level was adjusted so the level at point D was 10dB above the maximum input of -64dBm. The cable and attenuators loss between the EUT and the spectrum analyser was 27.64 dB. This test was performed on the frequencies listed in the table below. Sweep data is shown on the next page for scan with the highest intermodulation product:

RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
929.5875	959.6125	N/A	-14.28dBm @ 929.6377MHz	-13

Test equipment used for intermodulation test

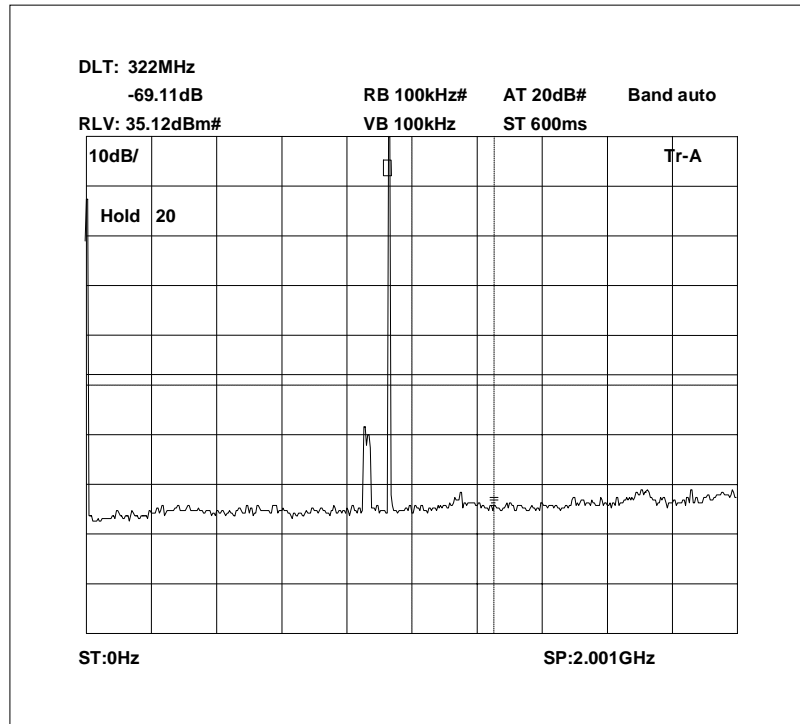
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
SIGNAL GENERATOR	MARCONI	2042	119224/035	UH89	
SIGNAL GENERATOR	MARCONI	2023	112224/040	UH105	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
COMBINER	ELCOM	RC-4-50	N/A	170	X

Intermodulation Inband



The above plot shows that all products (designated by ☆) are below the spurious limit.

Intermodulation Wideband

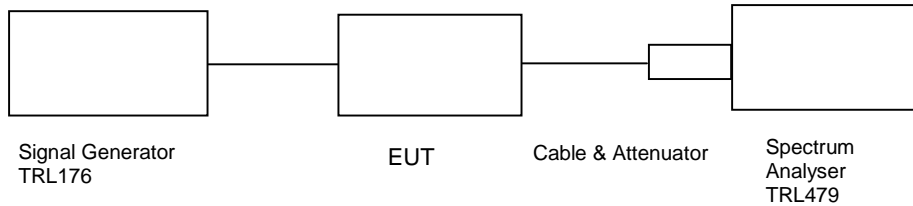


The above plot shows that there are no products outside the bands.

TRANSMITTER TESTS

AMPLIFIER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049– DOWNLINK

Ambient temperature = 24°C Radio Laboratory
 Relative humidity = 52%
 Supply voltage = +110 Vac
 Channel number = See test results



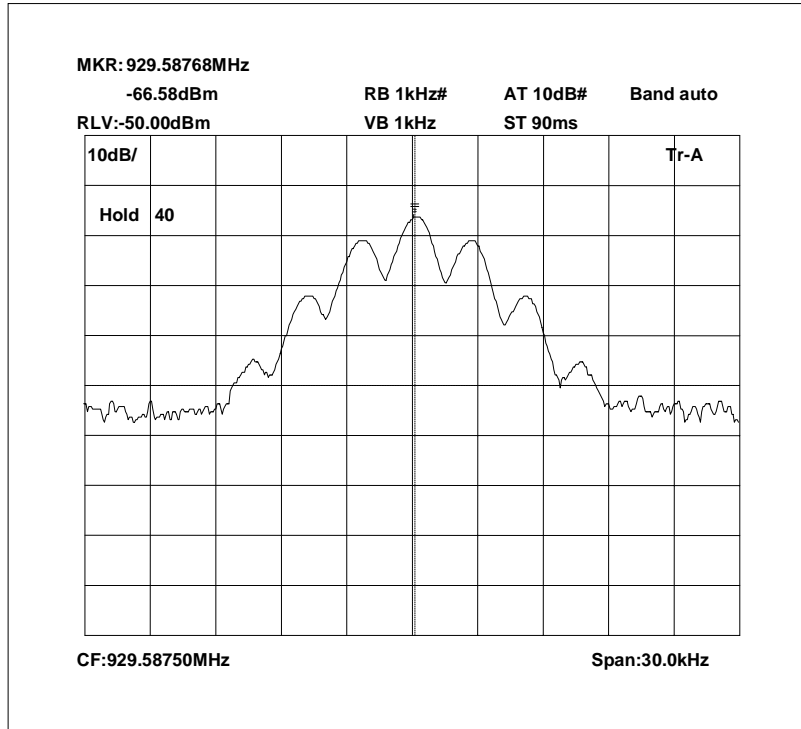
This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input level (-64dBm) and modulated with a 2500Hz tone. The plots show the signal measured at the signal generator and the signal measured at the output of the EUT.

Note: The cables and attenuators had the following losses.

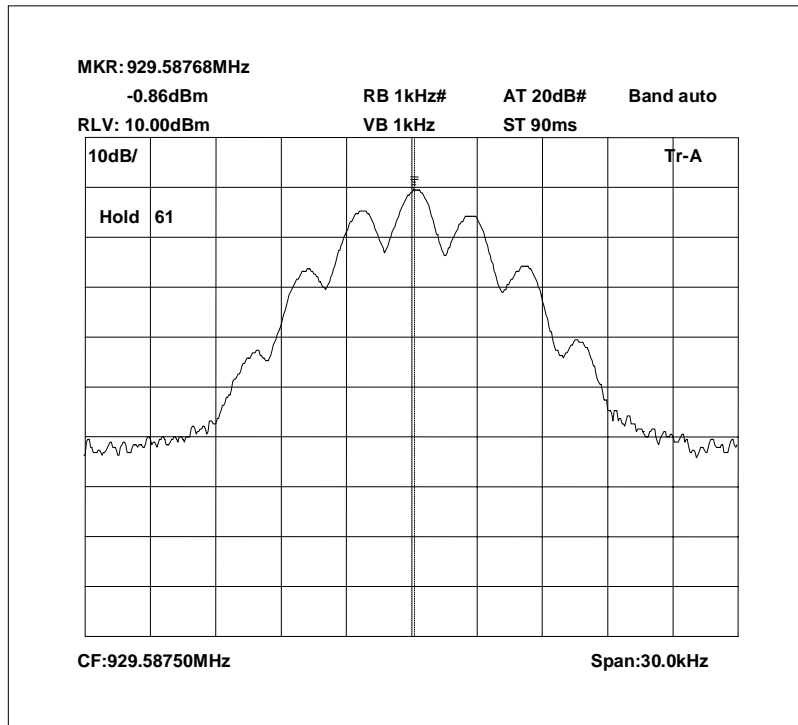
1. Cable and attenuator losses between EUT and spectrum analyser 27.64dB
2. Cable between signal generator and EUT = 0.64dB

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
ATTENUATOR	BIRD	8304-200	N/A	103	
ATTENUATOR	BIRD	8304-300-N	N/A	220	X
CABLE	ROSENBERGER	MICRO COAX	N/A	280	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X

929.5875 MHz Signal Generator deviation set to 2.5kHz

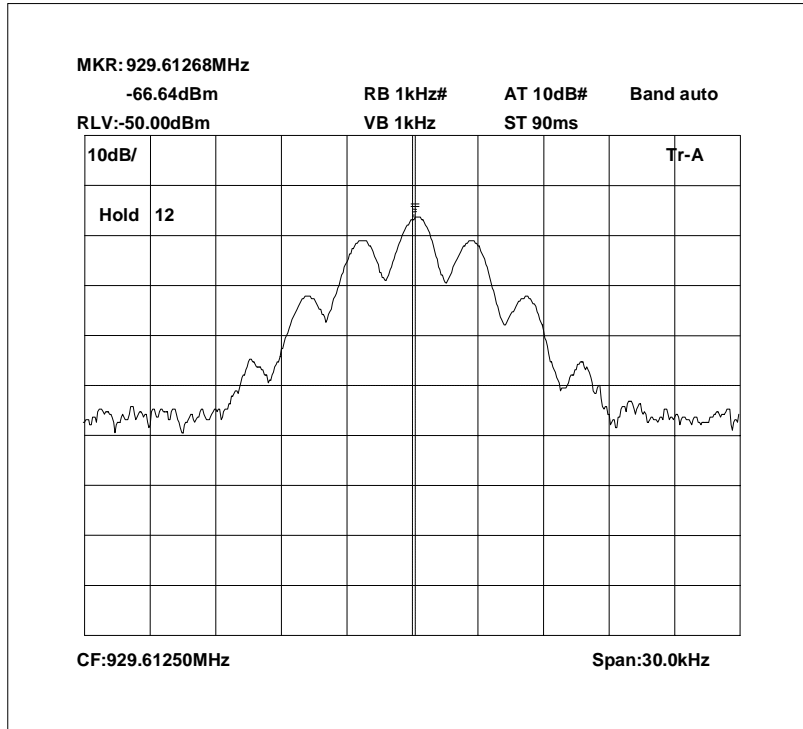


929.5875 MHz Signal Generator and EUT deviation set to 2.5kHz

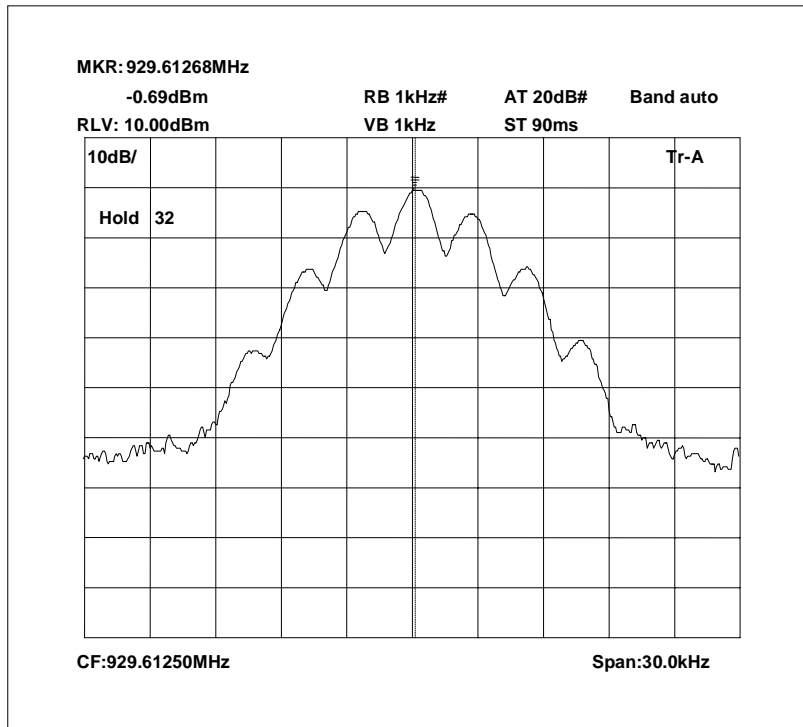


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

929.6125 MHz Signal Generator deviation set to 2.5kHz



929.6125 MHz Signal Generator and EUT deviation set to 2.5kHz



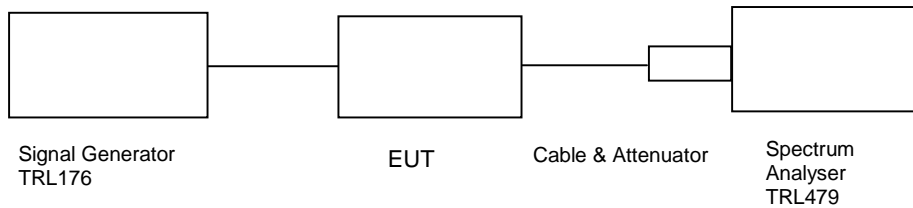
The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.10 – DOWNLINK

Ambient temperature = 25°C
 Relative humidity = 34%
 Supply voltage = +110 Vac

Radio Laboratory
 Test Signal = F3E



The test was set up as per the diagram. The level at the input was adjusted to compensate for the loss of the interconnecting cable. The unit was tested operating at maximum power and on three test frequencies.

The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

At least 43 + 10 log PdB

$$(10\log P_{\text{watts}}) - (43+10\log (P_{\text{watts}} * 1000)) = \text{LIMIT} = -13 \text{ dBm}$$

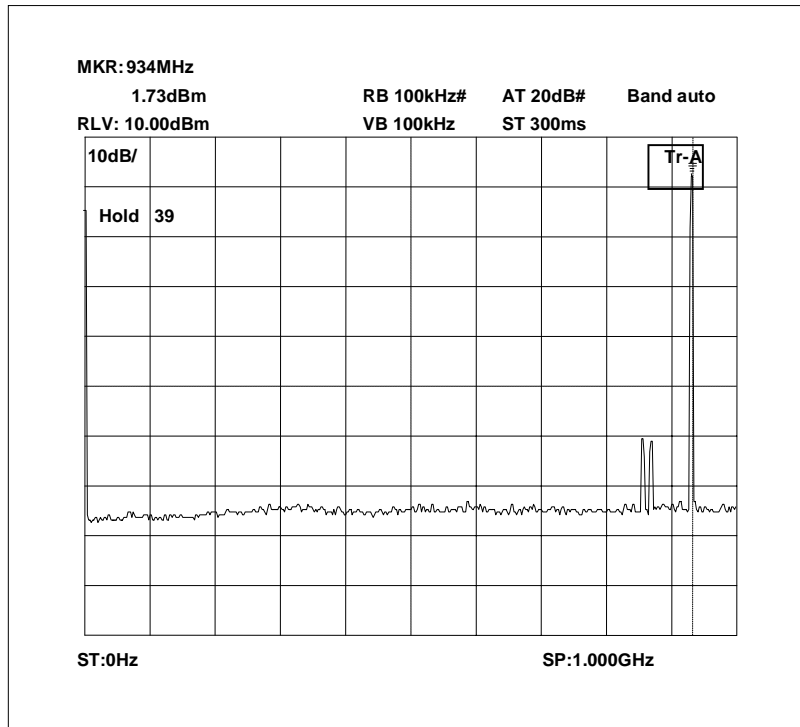
RESULTS

FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTENUATOR & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
0 Hz - 9.4GHz	No Significant emissions within 20 dB's of the limit				-13

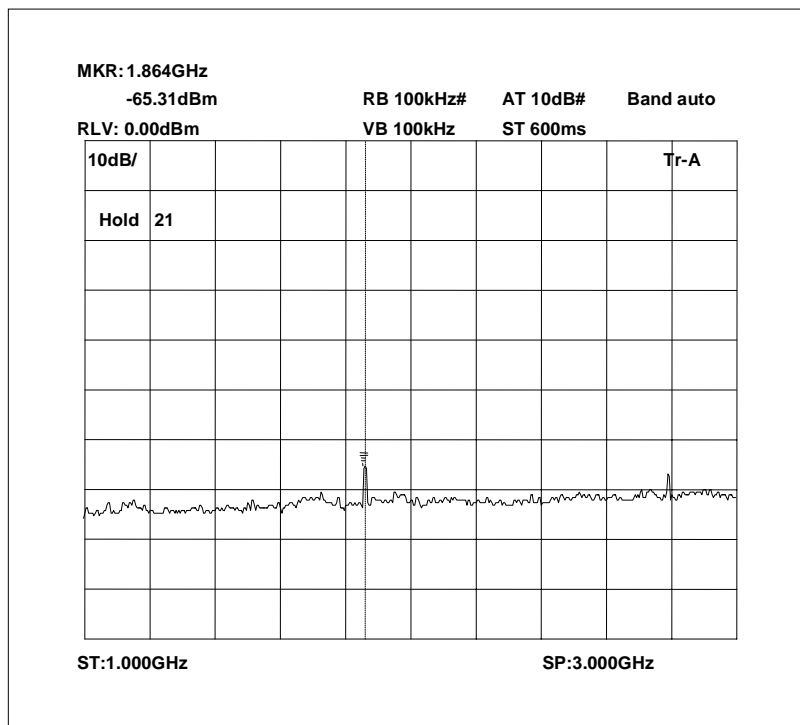
The test equipment used for the Transmitter Conducted Emissions:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
ATTENUATOR	BIRD	8304-200	N/A	103	
ATTENUATOR	BIRD	8304-300-N	N/A	220	X
CABLE	ROSENBERGER	MICRO COAX	N/A	280	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X

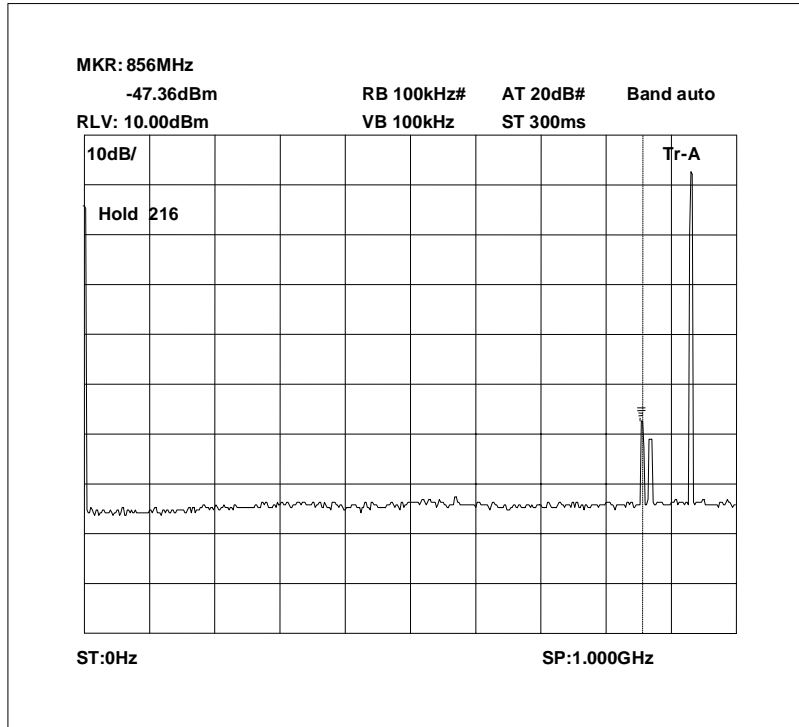
Conducted emissions 929.5875 MHz 0 – 1GHz



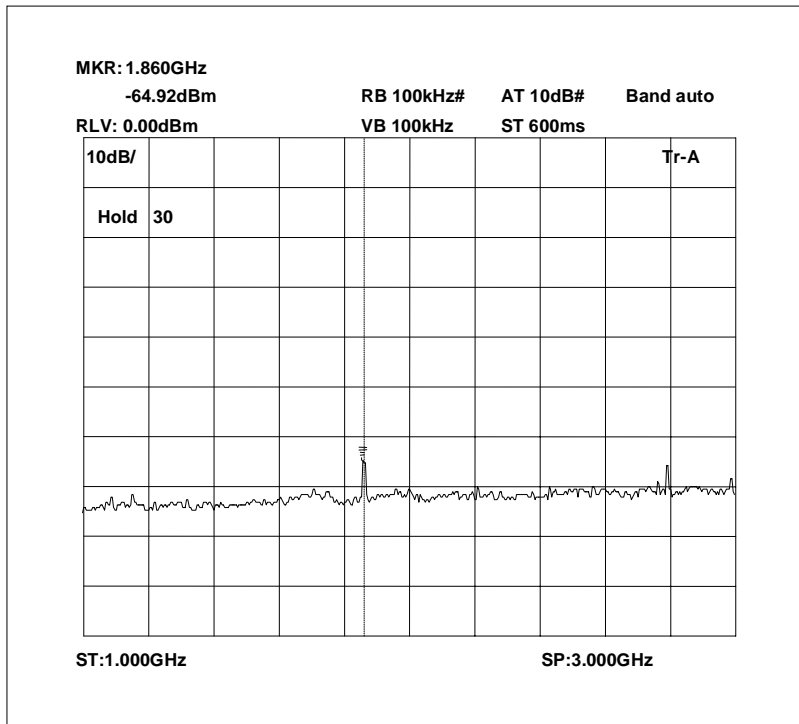
Conducted emissions 929.5875 MHz 1 – 3GHz



Conducted emissions 929.6125 MHz 0 – 1GHz



Conducted emissions 929.6125 MHz 1 – 3GHz

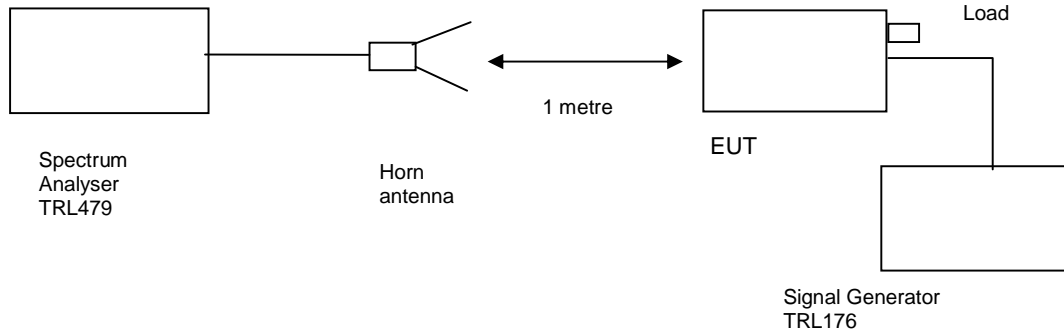


TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– DOWNLINK

Ambient temperature = 20°C
 Relative humidity = 80%
 Conditions = OATS
 Supply voltage = +110 Vac
 Supply Frequency = N/A

Test Signal = F3E



The test was set up as per the diagram. The level at the input was adjusted to compensate for the loss of the interconnecting cable. The unit was tested operating maximum power on three test frequencies with a 50 ohm load on the output.

The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more than 250% of the authorised bandwidth

At least $43 + 10 \log P_{dB}$

$$(10 \log P_{\text{watts}}) - (43 + 10 \log (P_{\text{watts}} * 1000)) = \text{LIMIT} = -13 \text{ dBm}$$

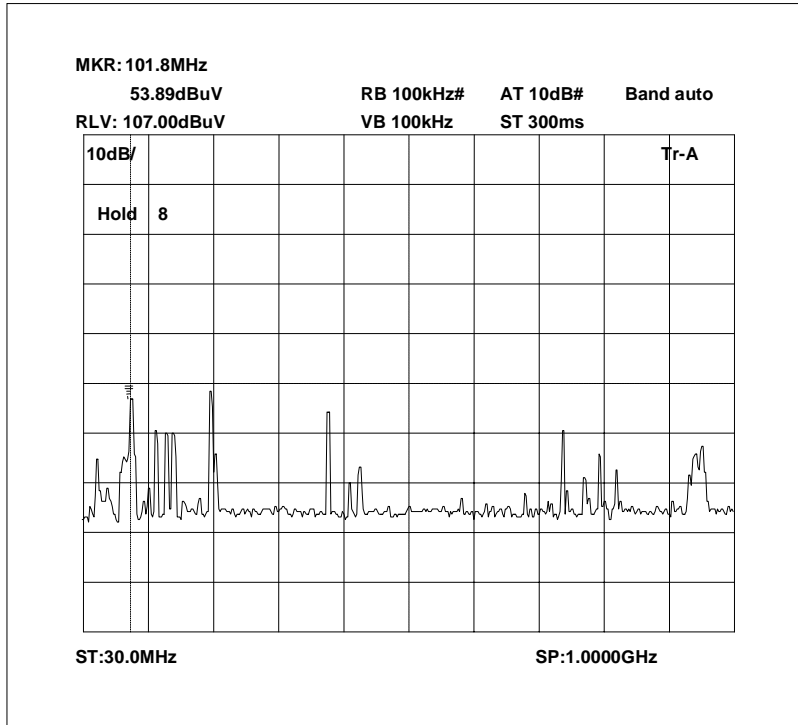
RESULTS

FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
0 Hz - 9.4GHz	No Significant emissions within 20 dB's of the limit						-13

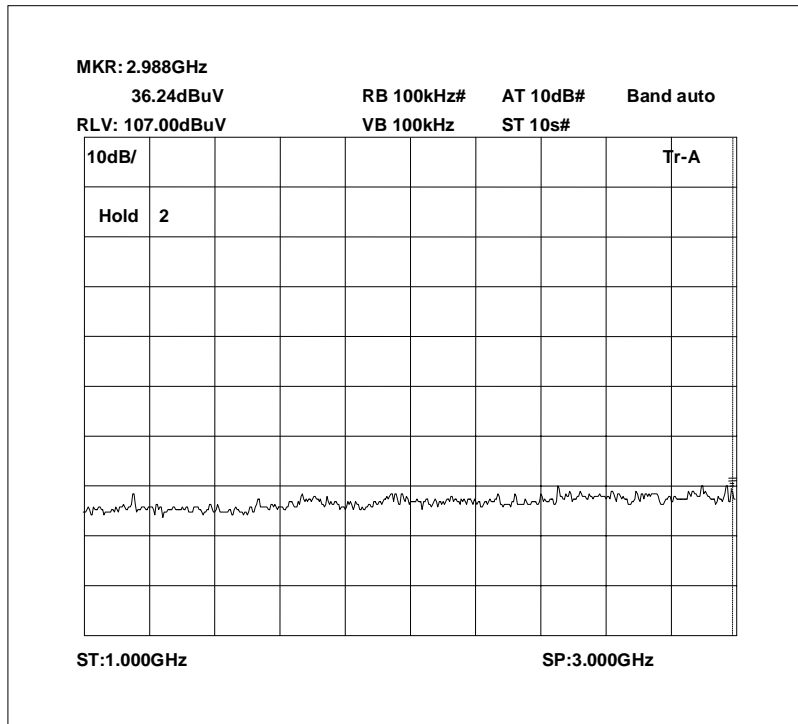
The test equipment used for the Transmitter Spurious Emissions:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
HORN	EMCO	3115	9010-3581	139	X
ATTENUATOR	BIRD	8304-300-N	N/A	220	X
ATTENUATOR	BIRD	8308-100	N/A	112	X
CABLE	ROSENBERGER	MICRO COAX	N/A	280	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X

Radiated emissions 929.5875 MHz 0 – 1GHz

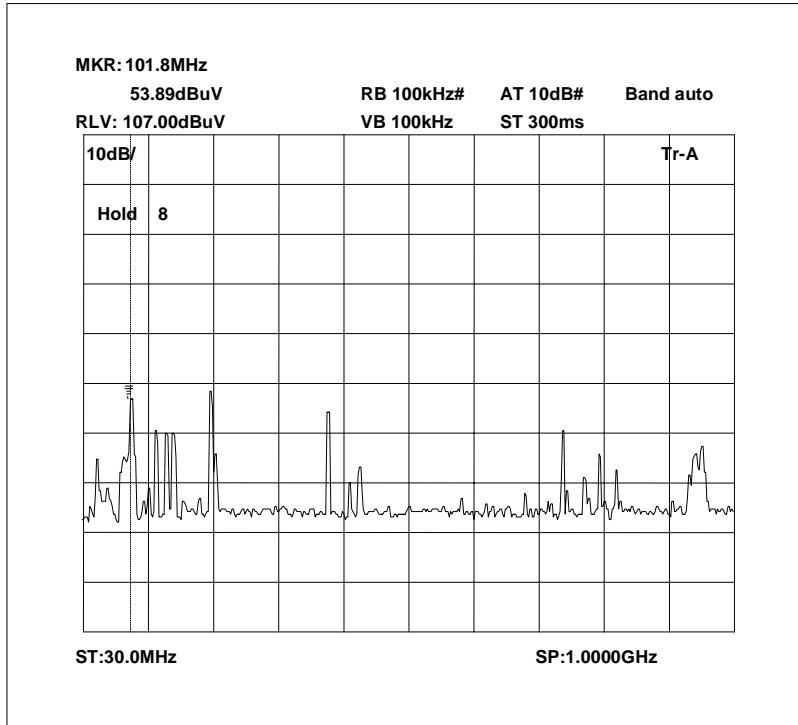


Radiated emissions 929.5875 MHz 1 – 3GHz

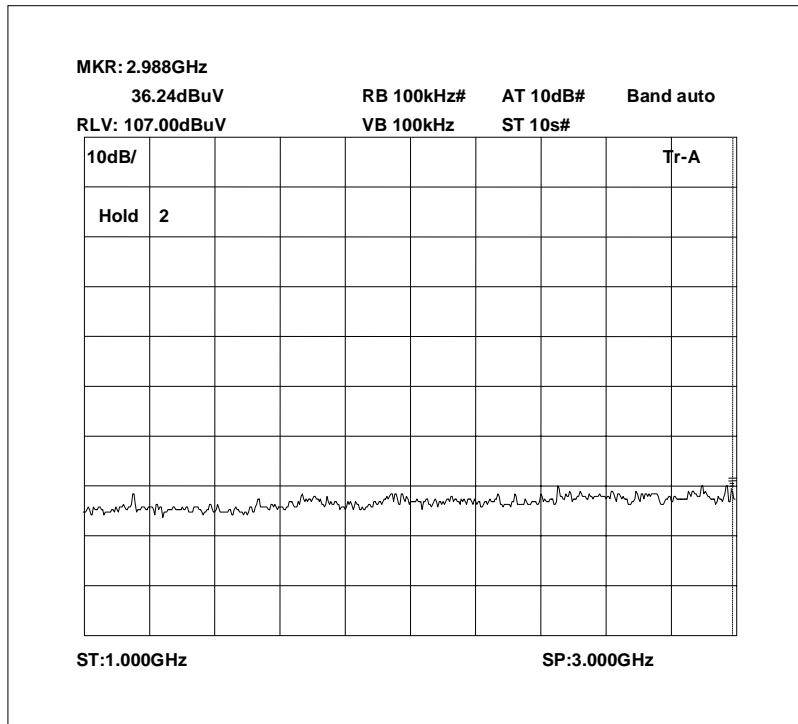


The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 929.6125 MHz 0 – 1GHz



Radiated emissions 929.6125 MHz 1 – 3GHz



The above test results show that there were no emissions within 20dBs of the -13dBm limit.

ANNEX A
PHOTOGRAPHS

PHOTOGRAPH No. 1

TEST SETUP



PHOTOGRAPH No. 2

TEST SETUP



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	[]
		-	DRAWINGS	[]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
h.	CIRCUIT DIAGRAMS	-	Tx	[]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
i.	COMPONENT LOCATION	-	Tx	[]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
j.	PCB TRACK LAYOUT	-	Tx	[]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
k.	BILL OF MATERIALS	-	Tx	[]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
l.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]

ANNEX C
EQUIPMENT CALIBRATION

EQUIPMENT CALIBRATION

UH006	3m Range ERP CAL	TRL	01/03/05	12	01/03/06
UH028	Log Periodic Ant	Schwarbeck	28/04/05	24	28/04/07
UH029	Bicone Antenna	Schwarbeck	27/04/05	24	27/04/07
UH041	Multimeter	AVOmeter	14/12/04	12	14/12/05
UH120	Spectrum Analyser	Marconi	15/03/05	12	15/03/06
UH122	Oscilloscope	Tektronix	07/06/05	24	07/06/07
UH162	ERP Cable Cal	TRL	23/05/05	12	23/05/06
UH179	Power Sensor	Marconi	14/12/04	12	14/12/05
UH228	Power Sensor	Marconi	17/01/05	12	17/01/06
UH253	1m Cable N type	TRL	10/01/05	12	10/01/06
UH254	1m Cable N type	TRL	10/01/05	12	10/01/06
UH265	Notch filer	Telonic	24/06/05	12	24/06/06
L005	CMTA	R&S	22/10/04	12	22/10/05
L007	Loop Antenna	R&S	29/03/05	24	29/03/07
L138	1-18GHz Horn	EMCO	15/04/05	24	15/04/07
L139	1-18GHz Horn	EMCO	03/05/05	24	03/05/07
L176	Signal Generator	Marconi	31/01/05	12	31/01/06
L193	Bicone Antenna	Chase	12/10/03	24	12/10/05
L203	Log Periodic Ant	Chase	21/10/03	24	21/10/05
L254	Signal Generator	Marconi	13/12/04	12	13/12/05
L280	18GHz Cable	Rosenberger	10/01/05	12	10/01/06
L343	CCIR Noise Filter	TRL	07/06/05	12	07/06/06
L426	Temperature Indicator	Fluke	14/12/04	12	14/12/05
L479	Analyser	Anritsu	05/10/04	12	05/10/05
L552	Signal Generator	Agilent	25/04/05	12	25/04/06