

TEST REPORT NO:	RU1193/6631
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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 I	BY:		P GREEN PRODUCT MANAGER EMC
DATE:		11 th November 2005	
Distribution:			
Copy Nos:	1.	Aerial Facilities Limited	
	2.	TCB: TRL Compliance Limited	

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



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3. TRL EMC



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Notes: 1.	Component failure during test] X]
2.	If Yes, details of failure:		



MANAGER EMC

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

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APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): OFF AIR AMPLIFIER SYSTEM (900M			
EQUIPMENT TYPE:	Private Land Mobile Repeater		
PURPOSE OF TEST:	Certification		
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 90 Subpart I		
TEST RESULT:	COMPLIANT Yes [X] No []		
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [] DISTRIBUTOR [] TEST HOUSE [] AGENT []		
APPLICANT'S ORDER No(s):	32001		
APPLICANT'S CONTACT PERSON(s):	Mr Peter Bradfield		
E-mail address:	Peterb@aerial.co.uk		
APPLICANT:	Aerial Facilities Limited		
ADDRESS:	Aerial House Asheridge Road Chesham Buckinghamshire HP5 1TU United Kingdom		
TEL:	+44 (0)1494 777000		
FAX:	+44 (0)1494 778456		
MANUFACTURER:	Aerial Facilities Limited		
EUT(s) COUNTRY OF ORIGIN:	United Kingdom		
TEST LABORATORY:	TRL EMC		
UKAS ACCREDITATION No:	0728		
TEST DATE(s)	17 th August 2005 – 25 th August 2005		
TEST REPORT No:	RU1193/6631		

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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:

2.	Product Use:		Private Land Mobile R	tepeater	
3.	Emission Designator:		F3E		
4.	Temperatures:		Ambient (Tnom)	21°C	
5.	Supply Voltages:		Vnom	+110 Vac	
	Note: Vnom voltages are as stated above	e unless other	wise shown on the test	report page	
6.	Equipment Category:		Single channel Two channel Multi-channel	[] [] [X]	
7.	Channel spacing:		Narrowband Wideband	[X] []	15kHz
8.	Test Location	TRL Complia	nce Limited Up Holland Long Green	[X] []	
9.	Modifications made during test program		N	o modifications	s were performed.

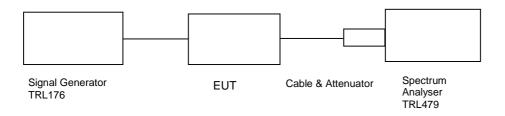
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¹ The EUT does not contain modulation circuitry, therefore the test was not performed. 2 The EUT is not a keyed carrier system, therefore the test was not performed.

AMPLIFIER GAIN - CONDUCTED - PART 2.1046 - DOWNLINK

Ambient temperature = 25°C Radio Laboratory

Relative humidity = 54% Supply voltage = +110 Vac Channel number = See test results



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:

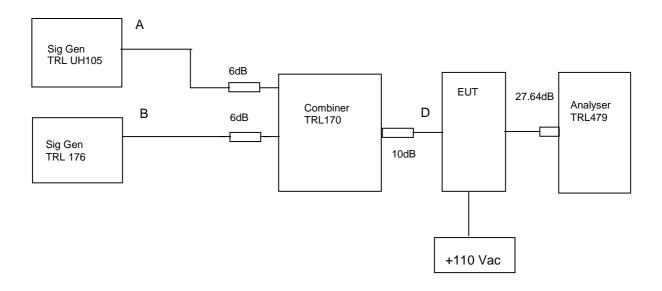
- 1. The signal generator input was increased by 10dBs and the level of the output signal remeasured.
- 2. Downlink consists of 2 channels only

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

AMPLIFIER INTERMODULATION SPURIOUS EMISSIONS - CONDUCTED - PART 2.1053- DOWNLINK

Ambient temperature = 26°C Radio Laboratory

Relative humidity = 52% Supply voltage = +110 Vac



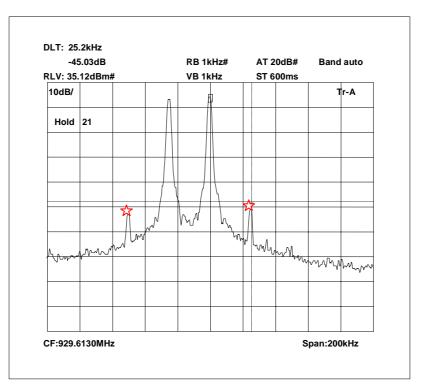
The Intermodulation and spurious products were measured with the amplifier operating at maximum gain. A two tone test was conducted using the equipment as above. The input power level was adjusted so the level at point D was 10dB above the maximum input of -64dBm. The cable and attenuators loss between 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	RF Input Frequency (MHz)		Highest Intermodulation Product Level (dBm)	
929.5875	959.6125	N/A	-14.28dBm @ 929.6377MHz	-13

Test equipment used for intermodulation test

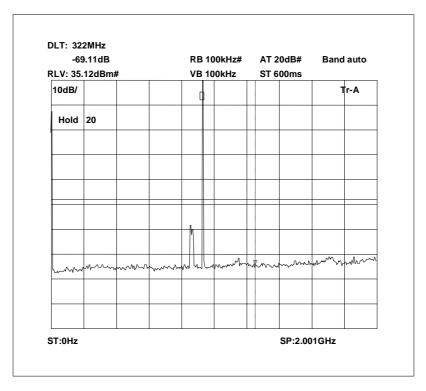
Tool equipment doed for intermediation test					
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	x
SIGNAL GENERATOR	MARCONI	2042	119224/035	UH89	
SIGNAL GENERATOR	MARCONI	2023	112224/040	UH105	х
SIGNAL GENERATOR	MARCONI	2042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

Intermodulation Inband



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

Intermodulation Wideband



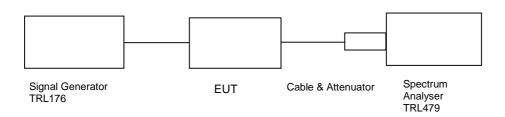
The above plot shows that there are no products outside the bands.

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



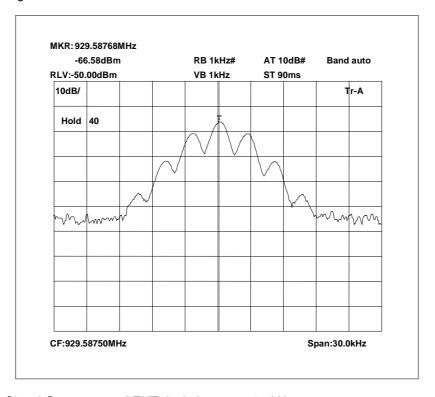
This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input level (-64dBm) and modulated with a 2500Hz tone. The plots show the signal measured at the signal generator and the signal measured at the output of the EUT.

Note: The cables and attenuators had the following losses.

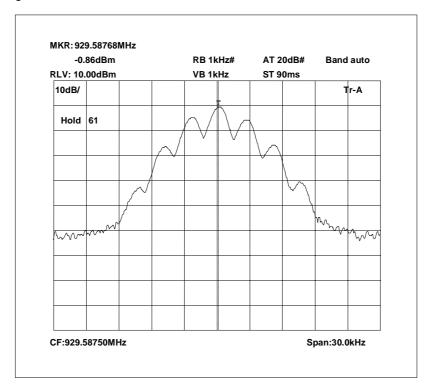
- 1. Cable and attenuator losses between EUT and spectrum analyser 27.64dB
- 2. Cable between signal generator and EUT = 0.64dB

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

929.5875 MHz Signal Generator deviation set to 2.5kHz

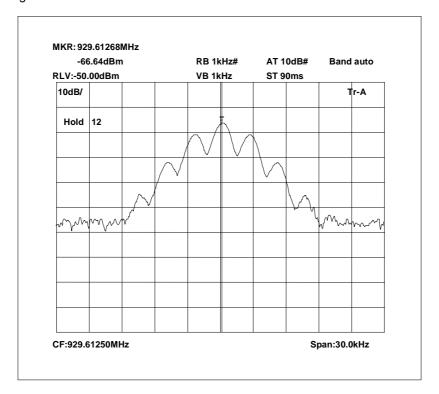


929.5875 MHz Signal Generator and EUT deviation set to 2.5kHz

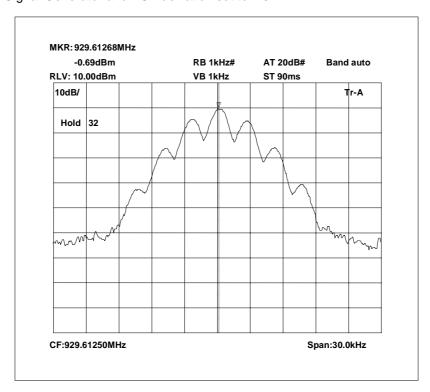


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

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 waveshape show no measurable distortion visible when compared to the input signal.

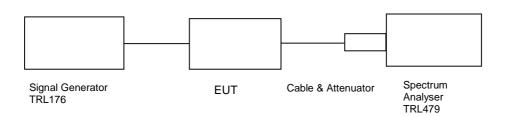
TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS - CONDUCTED - Part 2.10 - DOWNLINK

Ambient temperature = 25°C Radio Laboratory

Relative humidity = 34% Test Signal = F3E

Supply voltage = +110 Vac



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

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

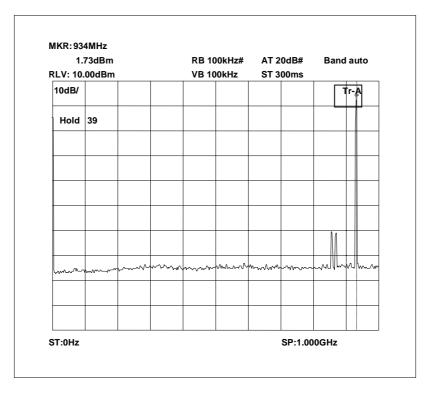
RESULTS

FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTENUATOR & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
0 Hz - 9.4GHz		No Significant emissio	-13		

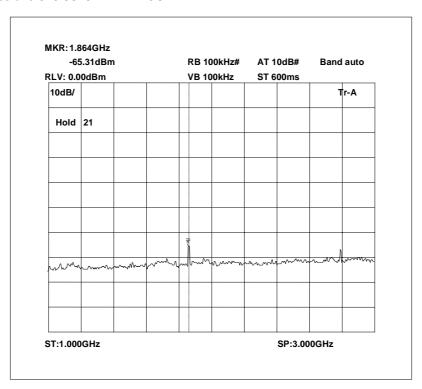
The test equipment used for the Transmitter Conducted Emissions:

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

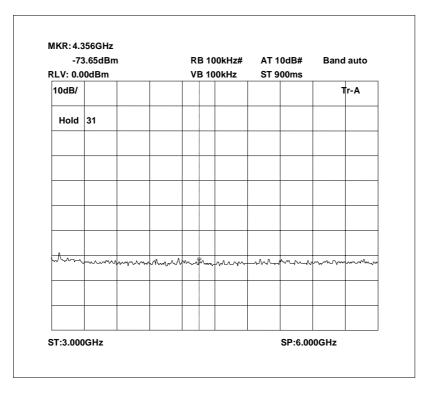
Conducted emissions 929.5875 MHz 0 - 1GHz



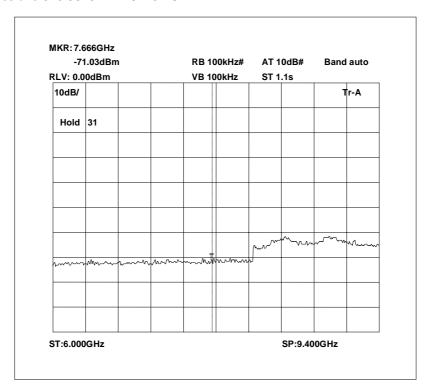
Conducted emissions 929.5875 MHz 1 - 3GHz



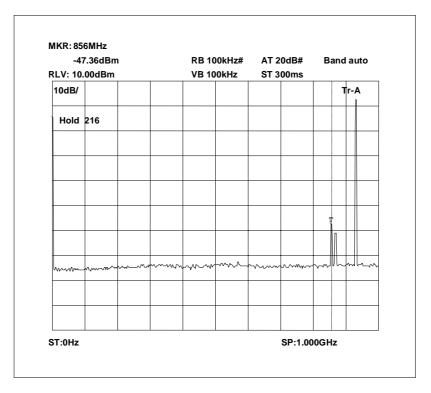
Conducted emissions 929.5875 MHz 3 - 6GHz



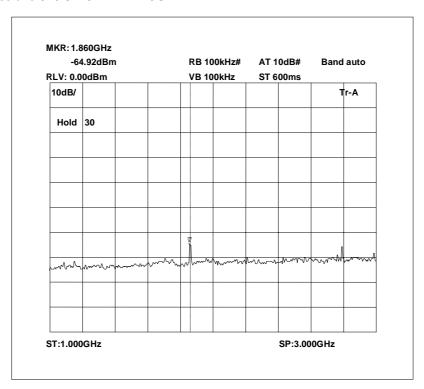
Conducted emissions 929.5875 MHz 6 - 9.4GHz



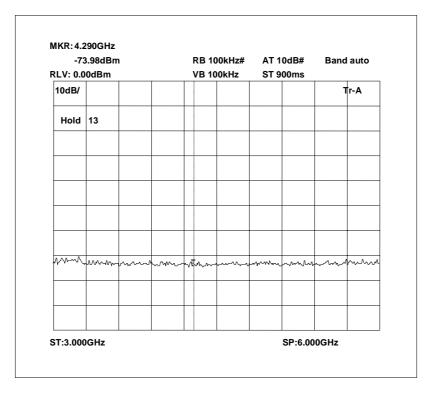
Conducted emissions 929.6125 MHz 0 - 1GHz



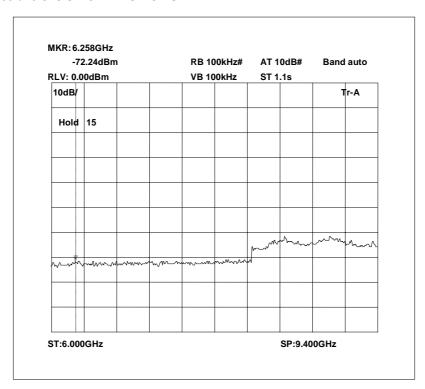
Conducted emissions 929.6125 MHz 1 - 3GHz



Conducted emissions 929.6125 MHz 3 - 6GHz

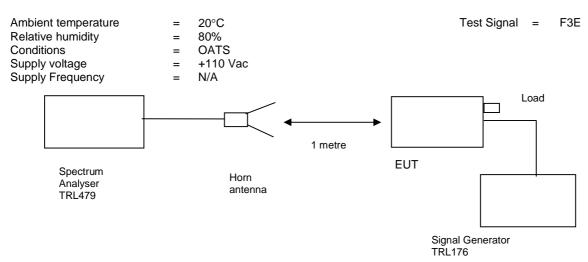


Conducted emissions 929.6125 MHz 6 - 9.4GHz



TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS - RADIATED - Part 2.1053- DOWNLINK



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 that 250% of the authorised bandwidth

At least 43 + 10 log PdB

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

RESULTS

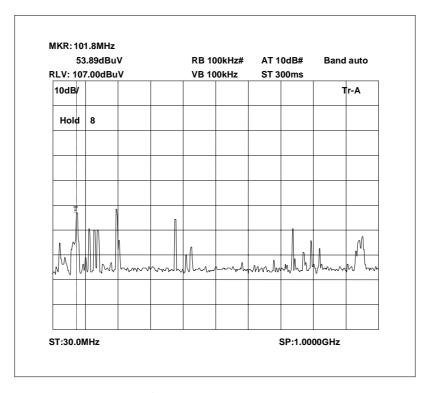
FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBμV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
0 Hz - 9.4GHz		No Significant emissions within 20 dB's of the limit					

The test equipment used for the Transmitter Spurious Emissions:

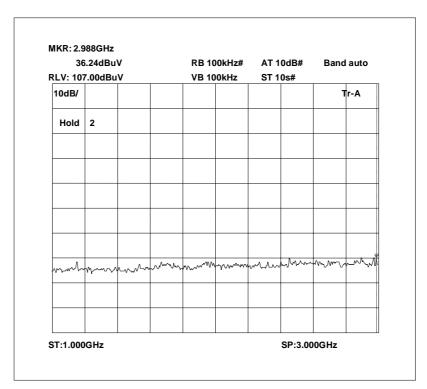
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	х
HORN	EMCO	3115	9010-3581	139	х
ATTENUATOR	BIRD	8304-300-N	N/A	220	х
ATTENUATOR	BIRD	8308-100	N/A	112	х
CABLE	ROSENBERGER	MICRO COAX	N/A	280	x
SIGNAL GENERATOR	MARCONI	2042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

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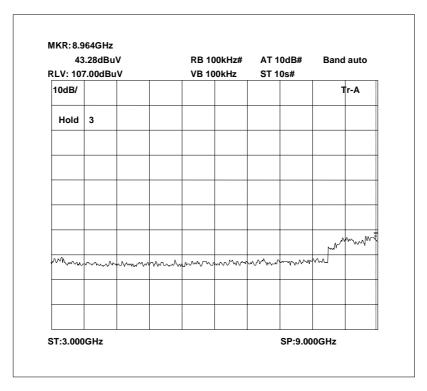
Radiated emissions 929.5875 MHz 0 - 1GHz



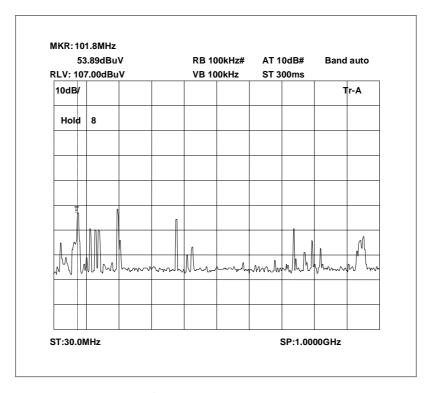
Radiated emissions 929.5875 MHz 1 - 3GHz



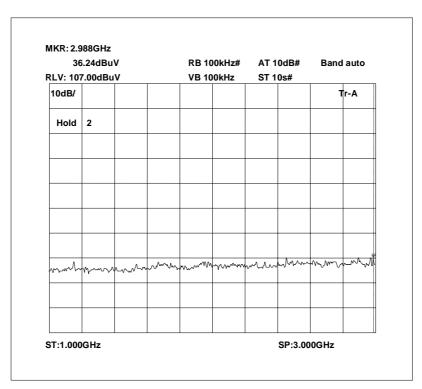
Radiated emissions 929.5875 MHz 3 - 9.4GHz



Radiated emissions 929.6125 MHz 0 - 1GHz



Radiated emissions 929.6125 MHz 1 - 3GHz



43	.28dBı	ıV		RB 10	00kHz#	AT 1	0dB#	Band	lauto	
RLV: 10	7.00dB	uV		VB 10	VB 100kHz		ST 10s#			
10dB/								1	r-A	
Hold	3									
		-								
									mmm	
mm	~~~~		·~~~		·····	~~~~	~~~~	mJ		
							SP:9.00			

ANNEX A PHOTOGRAPHS

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PHOTOGRAPH No. 1

TEST SETUP



PHOTOGRAPH No. 2

TEST SETUP



ANNEX B APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

a.	TCB	-	APPLICATION FEE	[X] [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 Rx PSU AUX	[X] [] []
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