



TEST REPORT NO: RU1228/6893
COPY NO: 2.....
ISSUE NO: 1
FCC ID: TVHRF516

**REPORT ON THE CERTIFICATION TESTING OF A
COMARK Ltd.
RF516
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.247 February 2006
INTENTIONAL RADIATOR SPECIFICATION**

TEST DATE: 27th February – 6th March 2006

TESTED BY: J Charters

APPROVED BY: P Green
Product Manager

DATE: 23rd June 2006

Distribution:

Copy Nos: 1. COMARK Ltd.
2. FCC EVALUATION LABORATORIES
3. TRL COMPLIANCE Ltd

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

TRL COMPLIANCE LTD

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



0728

CONTENTS

	PAGE
CERTIFICATE OF CONFORMITY & COMPLIANCE	3
APPLICANT'S SUMMARY	4
EQUIPMENT TEST CONDITIONS	5
TESTS REQUIRED	5
TEST RESULTS	6-15
 ANNEX	
PHOTOGRAPHS	A
PHOTOGRAPH No. 1: Test setup	
PHOTOGRAPH No. 2: Transmitter front view	
PHOTOGRAPH No. 3: Transmitter rear view	
PHOTOGRAPH No. 4: Control PCB Component Side	
PHOTOGRAPH No. 5: Control PCB Track Side	
PHOTOGRAPH No. 6: RF PCB Component Side	
PHOTOGRAPH No. 7: RF PCB Track Side	
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST	B
6dB BAND WIDTH PLOT	C
CONDUCTED BANDEDGE COMPLIANCE	D
CONDUCTED POWER SPECTRAL DENSITY	E
CONDUCTED SPURIOUS EMISSIONS - TX	F
RADIATED SPURIOUS EMISSIONS – TX	G
RADIATED SPURIOUS EMISSIONS – BANDEDGE	H
POWER LINE CONDUCTED EMISSIONS	I
RADIATED SPURIOUS EMISSIONS – RX	J
TEST EQUIPMENT CALIBRATION DETAILS	K
MEASUREMENT UNCERTAINTY	L
 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: TVHRF516

PURPOSE OF TEST: Certification

TEST SPECIFICATION: FCC RULES CFR 47, Part 15.247 February 2006

TEST RESULT: Compliant to Specification

EQUIPMENT UNDER TEST: RF516

EQUIPMENT SERIAL No: Engineering sample

EQUIPMENT TYPE: Temperature Monitor

CARRIER EMISSION: 0.001028 Watts

ANTENNA TYPE: Unique Antenna Connector

GAIN ANTENNA: 7dBi Maximum Gain antenna

FREQUENCY OF OPERATION: 2405MHz

CHANNEL SPACING: N/A Wideband channel

NUMBER OF CHANNELS: 1

FREQUENCY GENERATION: SAW Resonator Crystal Synthesiser

MODULATION METHOD: Amplitude Digital Angle

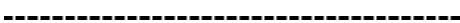
POWER SOURCE(s): +1.5Vdc or +110Vac

TEST DATE(s): 27th February – 6th March 2006

ORDER No(s): S05059

APPLICANT: Comark Ltd.

ADDRESS: Comark House
Gunnels Wood Park
Gunnelswood Road
Stevenage
Hertfordshire
SG1 2TS
United Kingdom

TESTED BY:  J Charters

APPROVED BY:  P Green
Product Manager

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): RF516

EQUIPMENT TYPE: Temperature Monitor

SERIAL NUMBER OF EUT: Engineering Sample

PURPOSE OF TEST: Certification

TEST SPECIFICATION(s): FCC RULES CFR 47, Part 15.247 February 2006

TEST RESULT: COMPLIANT Yes No

APPLICANT'S CATEGORY: MANUFACTURER
IMPORTER
DISTRIBUTOR
TEST HOUSE
AGENT

APPLICANT'S ORDER No(s): S05059

APPLICANT'S CONTACT PERSON(s): Mr P Morrison

E-mail address: paulmorrison@comarkltd.com

APPLICANT: Comark Ltd.

ADDRESS: Comark House
Gunnels Wood Park
Gunnelswood Road
Stevenage
Hertfordshire
SG1 2TS
United Kingdom

TEL: +44 1483 367367

FAX: +44 1483 367400

MANUFACTURER: Comark Ltd.

EUT(s) COUNTRY OF ORIGIN: United Kingdom

TEST LABORATORY: TRL Compliance Ltd

UKAS ACCREDITATION No: 0728

TEST DATE(s) 16th February – 6th March 2006

TEST REPORT No: RU1228/6893

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
	Intentional Emission Frequency:	15.247(b)	Peak	Yes
	Intentional Emission Field Strength:	-	-	No
	Intentional Emission Band Occupancy 6dB:	15.247 (a)	Peak	Yes
	Intentional Emission ERP (mW):	15.247 (b)	Peak	Yes
	Spurious Emissions – Conducted:	15.247 (c)	Peak	Yes
	Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak	Yes (note 1)
	Spurious Emissions – Radiated >1000MHz:	15.209	Average	Yes (note 1)
	Spectral Power Density	15.247 (e)	Peak	Yes
	Spurious Emissions – Power Line TX	15.207	Quasi Peak Average	Yes
	Spurious Emissions – Power Line RX	15.107	Quasi Peak Average	Yes
	Maximum Frequency of Search:	15.33	-	Yes
	Antenna Arrangements Integral:	15.203	-	Yes
	Antenna Arrangements External Connector:	15.204	-	Yes
	Restricted Bands	15.205	-	Yes
	Extrapolation Factor	15.31(f)	-	Yes

Note 1: The manufacturer has stated that this unit is not intended to be operated within 20cm of the body.

2. Emission Designator: 1M63F1D

3. Duty Cycle: <100%

4. Transmitter bit or pulse rate and level: 250kBps

5. Temperatures: Ambient (T_{nom}) 20°C

6. Supply Voltages: V_{nom} +1.5Vdc
+110Vac

Note: V_{nom} voltages are as stated above unless otherwise shown on the test report page

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

8. Channel Allocation: Narrowband []
Wideband [X]

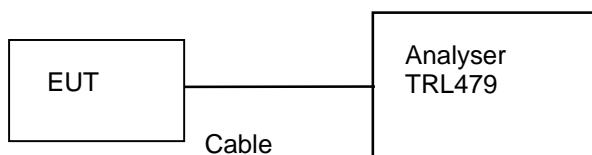
This report covers two models of temperature sensor the RF516 and RF513. The difference between the two units is the RF516 has an analogue input whereas the RF513 does not. The components required for the analogue input are not mounted on the RF513. The RF circuits are identical. As the RF516 has extra components and an external probe lead can be connected this was considered to be the worst case model. Therefore testing was performed on the RF516.

TRANSMITTER TESTS

TRANSMITTER 6dB BANDWIDTH – CONDUCTED - PART 15.247(A)(2)

Ambient temperature = 19°C(<1GHz)
Relative humidity = 47% (<1GHz)
Conditions = Radio Lab
Supply voltage = +110Vac

Diagram



Frequency	Channel	Measured Bandwidth	Limit
2.405MHz	1	1.630MHz	>500kHz

Notes: 1 For analyser plots see annex C.

Test Method: 1 The EUT was connected to the analyser via the unique antenna connector & a cable.
2 The 6dB bandwidth was recorded with the EUT activity transmitting data.

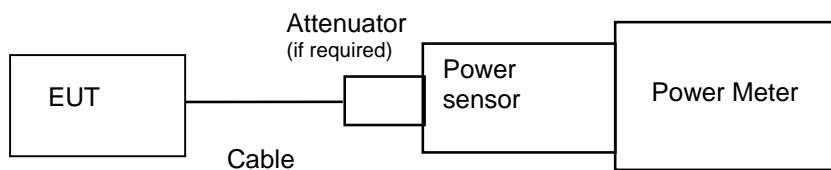
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

TRANSMITTER - MAXIMUM PEAK POWER - CONDUCTED - PART 15.247(B)(3)

Ambient temperature = 20°C(<1GHz)
 Relative humidity = 50% (<1GHz)
 Conditions = Radio Lab
 Supply voltage = +110Vac

Diagram



Frequency MHz	Channel	Peak Power on Meter dBm	Attenuator & Cable loss dB	Peak Power Watts	EUT Antenna Gain dBi	Average Power Watts	Limit Watts
2.405	1	-38.08	31.2	0.000205	7	0.001028	1

Notes: 1 Gain of antenna 7dB maximum gain antenna supplied by manufacturer.

Test Method:

- 1 The EUT was connected to the power sensor via the unique antenna connector a cable and attenuator - if applicable.
- 2 The EUT was operated in transmit mode with modulation.
- 3 The level on the power meter was recorded.
- 4 The power meter was adjusted to take the EUTs duty cycle into account.

Test equipment used for Peak Power measurement:

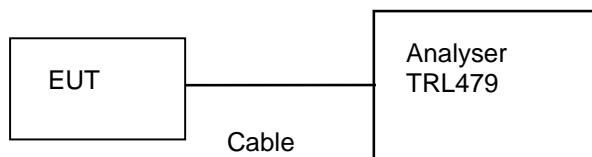
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
POWER METER	MARCONI	6960B	237034/019	UH132	X
POWER SENSOR	MARCONI	6920	1564	UH228	X
ATTENUATOR	JFW	50PF-030	N/A	N/A	X

TRANSMITTER TESTS

TRANSMITTER BAND EDGE EMISSIONS – CONDUCTED – Part 15.247(D)

Ambient temperature = 20°C
Relative humidity = 55%
Conditions = Conducted – Radio Lab
Supply voltage = +110Vac

Diagram



Test Result

Measured as compliant, see analyser plots

Notes:

- 1 The EUT was set into a transmit mode with modulation.
- 2 The EUT was connected to the analyser via the unique antenna connector & a cable.
- 3 See Annex D for analysers plots.

Test Method:

- 1 A plot covering transmission and lower band edge was taken. A marker was set on the peak emission of the lowest channel. The delta marker function was then used to measure the highest out of band emissions. (If no peaks exist outside the band the level is taken at the band edge).
- 2 A plot covering transmission and upper band edge was taken. A marker was set on the peak emission of the highest channel. The delta marker function was then used to measure the highest out of band emissions. (If no peaks exist outside the band the level is taken at the band edge).

The test equipment used for the tests is shown below:

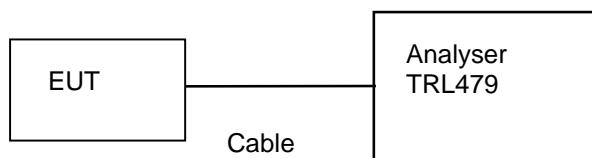
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

TRANSMITTER POWER SPECTRAL DENSITY – CONDUCTED - PART 15.247(E)

Ambient temperature = 15°C(<1GHz)
Relative humidity = 40% (<1GHz)
Conditions = Radio Lab
Supply voltage = +110Vac

Diagram



Frequency	Channel	Measured Power Spectral Density	Limit
2.405MHz	1	-10.49dBm	8dBm

Notes: 1 For analyser plots see annex E.

Test Method: 1 The EUT was connected to the analyser via the unique antenna connector & a cable with a sweep time of 1000 seconds
2 The resolution bandwidth on the analyser was set to 3kHz and trace set to max hold.

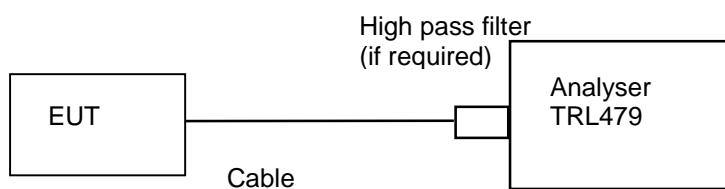
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – CONDUCTED – Part 15.247(D)

Ambient temperature = 22°C
 Relative humidity = 34%
 Conditions = Conducted –Radio Lab
 Supply voltage = +110Vac

Diagram



Range Frequency (MHz)	Emission Frequency (GHz)	Emission Level (dBm)	Cable loss (dB)	Level (dBm)	Limit (dBm)
30 – 26000	4.8120 7.2040	-53.21 -45.39	1.0 1.5	-52.21 -43.89	-23.54 -23.54

See spectrum analyser scan plots – Annex F

Notes:

- Section 15.247(c) states that all spurious emissions measured within a 100kHz bandwidth shall be attenuated by at least 20dB below the level of the highest fundamental level measured within a 100kHz bandwidth.
- Emissions with levels 20dB less than the limit are not necessarily recorded.

Test Method:

- The EUT was connected to the analyzer using a cable and high pass filter (if required).
- Frequency sweeps were performed to check for spurious emissions.
- Any emissions discovered were checked for compliance against the limit.

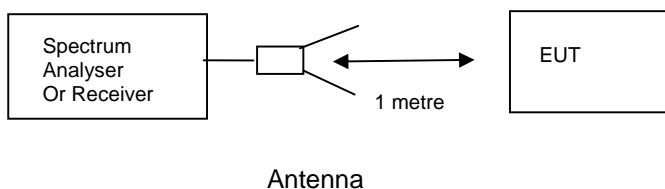
The test equipment used for the tests is shown below:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	
RANGE 1	TRL	3 METRE	N/A	UH06	
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – Part 15.247(c) and 15.209

Ambient temperature	=	7.5°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	30% (<1GHz)	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	=	+110Vac		



	Emission Frequency (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dB μ V/m)	Extrap. Factor (dB)	Result (μV/m)	Limit (μV/m)
30MHz – 88MHz Restricted band	Note 7							100
88MHz – 216MHz Restricted band	Note 7							150
216MHz – 960MHz Restricted band	Note 7							200
960MHz – 1GHz Restricted band	Note 7							500
1GHz – 26GHz Restricted band	Note 7							500
30MHz -26GHz	Note 7							-20dBc
See annex G for initial pre scan results.								

Notes:

- 1 R indicates frequency with a restricted band.
- 2 Initial pre scans were performed see Annex G for plots <1GHz.
- 3 See annex H for radiated bandedge compliance plots.
- 4 Emissions above 1GHz were measured with both a peak and average detectors.
- 5 Measurements <1GHz were performed at 3 meters.
- 6 Measurements >1GHz were initial performed at 0.3metres. This distance was increased if sensitivity of analyser allowed.
- 7 Only emissions with in 20dB of limit are recorded.

Test Method:

- 1 As per section 15.247.
- 2 Measuring distances as Notes 5 to 6 above.
- 3 EUT 0.8 metre above ground plane.
- 4 Emissions maximised by rotation of EUT, on an automatic turntable. Raising and lowering the receiver antenna between 1m & 4m >30MHz. Horizontal and vertical polarisations, of the receive antenna. EUT orientation in three orthogonal planes. Maximum results recorded.

The test equipment used for the tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
HORN ANTENNA	EMCO	3115	9010-3580	138	
HORN ANTENNA	EMCO	3115	9010-3581	139	X
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	X
RANGE 1	TRL	3 METRE	N/A	UH06	X
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	X
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X

TRANSMITTER and RECEIVER TESTS

TRANSMITTER CONDUCTED EMISSIONS – AC POWER LINE Part 15.207

Ambient temperature = 20°C(<1GHz)
 Relative humidity = 47%(<1GHz)
 Conditions = Power Line Laboratory
 Supply voltage = +110V AC
 Supply Frequency = 60Hz

SIGNIFICANT EMISSIONS

Transmitting

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dB μ V)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dB μ V)
No significant emissions within 10dB of limit.				

SIGNIFICANT EMISSIONS

Receiving

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dB μ V)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dB μ V)
No significant emissions within 10dB of limit.				

Notes: 1 See attached plots annex I (Worst Case Scan for TX and RX).

Test Method: 1 As per Radio – Noise Emissions, ANSI C63.4: 2003.

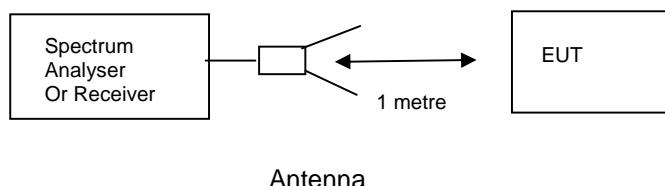
The test equipment used for the Transmitter Conducted Emissions – AC Power Line Part 15.207 test was:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
LISN / AMN	ROHDE & SCHWARZ	ESH3-Z5	83746/010	289	
RECEIVER	ROHDE & SCHWARZ	ESHS10	844077/019	353	
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	X
LISN/AMN	ROHDE & SCHWARZ	ESH3-Z5	863906/018	UH05	X
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

RECEIVER TESTS

RECEIVER SPURIOUS EMISSIONS – RADIATED – PART 15.109

Ambient temperature	= 7.5°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	= 30% (<1GHz)	0.3m measurements >1GHz	[X]
Conditions	= Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	= +110Vac		



	FREQ. (MHz)	MEAS. Rx. (dB μ V)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dB μ /m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (μ V/m)
30MHz - 88MHz	Note 6						
88MHz - 216MHz	Note 6						
216MHz - 960MHz	Note 6						
960MHz - 1GHz	Note 6						
1GHz - 5GHz	Note 6						
Limits	1.705MHz to 30MHz				30 μ V/m @ 30m		
	30MHz to 88MHz				100 μ V/m @ 3m		
	88MHz to 216MHz				150 μ V/m @ 3m		
	216MHz to 960MHz				200 μ V/m @ 3m		
	960MHz to 1GHz				500 μ V/m @ 3m		
	1GHz to 5GHz				500 μ V/m @ 3m		

Notes:

- 1 R indicates frequency with a restricted band.
- 2 Initial pre scans were performed see Annex J for plots <1GHz.
- 3 Emissions above 1GHz were measured with both a peak and average detectors.
- 4 Measurements <1GHz were performed at 3 meters.
- 5 Measurements >1GHz were initial performed at 0.3metres. This distance was increased if sensitivity of analyser allowed.
- 6 Only emissions with in 20dB of limit are recorded.

Test Method:

- 1 As per Radio – Noise Emissions, ANSI C63.4: 2003.
- 2 Measuring distances as Notes 1 to 4 above.
- 3 EUT 0.8 metre above ground plane.
- 4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthogonal planes.
Maximum results recorded.

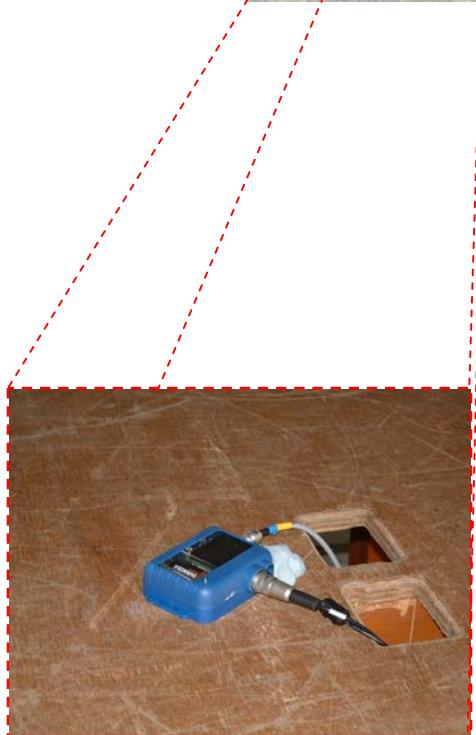
The test equipment used for the Transmitter Spurious Emissions – Radiated – Part 15.209 tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
HORN ANTENNA	EMCO	3115	9010-3580	138	
HORN ANTENNA	EMCO	3115	9010-3581	139	X
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	X
RANGE 1	TRL	3 METRE	N/A	UH06	X
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	X
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X

ANNEX A
PHOTOGRAPHS

PHOTOGRAPH No. 1

TEST SETUP



PHOTOGRAPH No. 2

TRANSMITTER FRONT VIEW



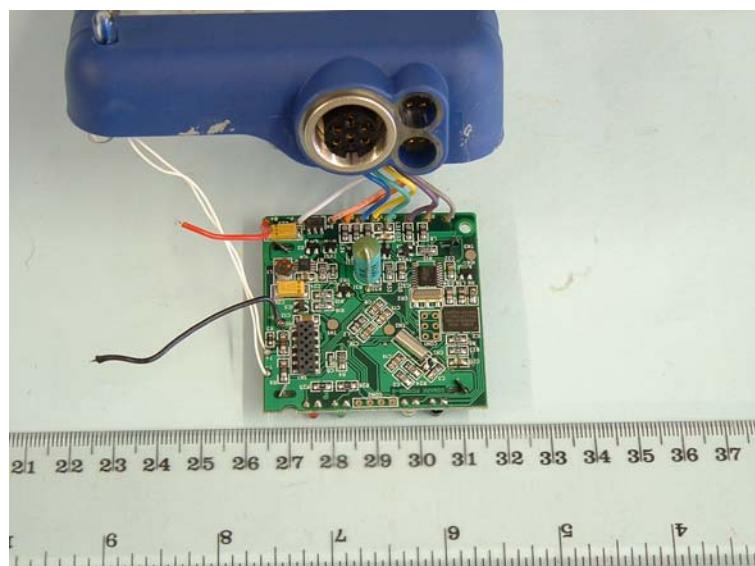
PHOTOGRAPH No. 3

TRANSMITTER REAR VIEW



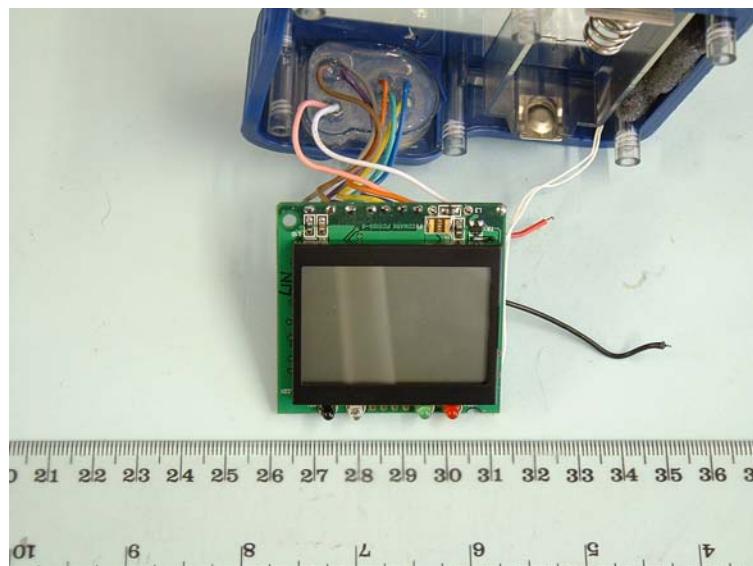
PHOTOGRAPH No. 4

CONTROL PCB COMPONENT SIDE



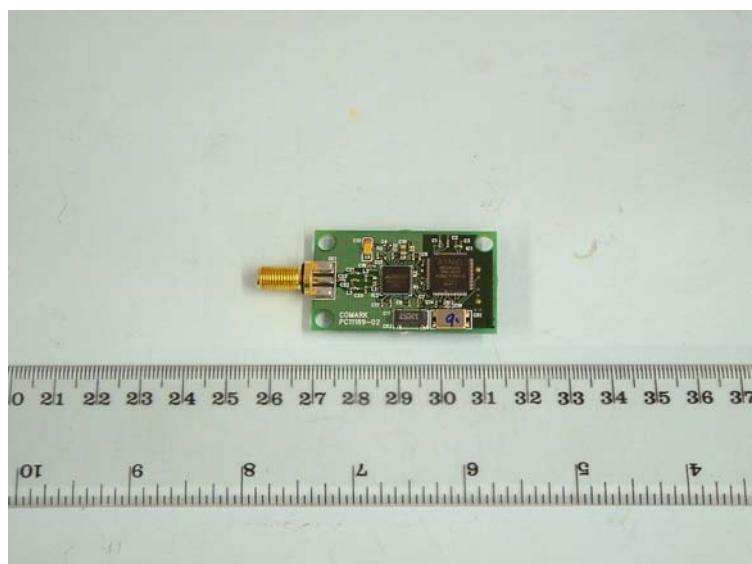
PHOTOGRAPH No. 5

CONTROL PCB TRACK SIDE



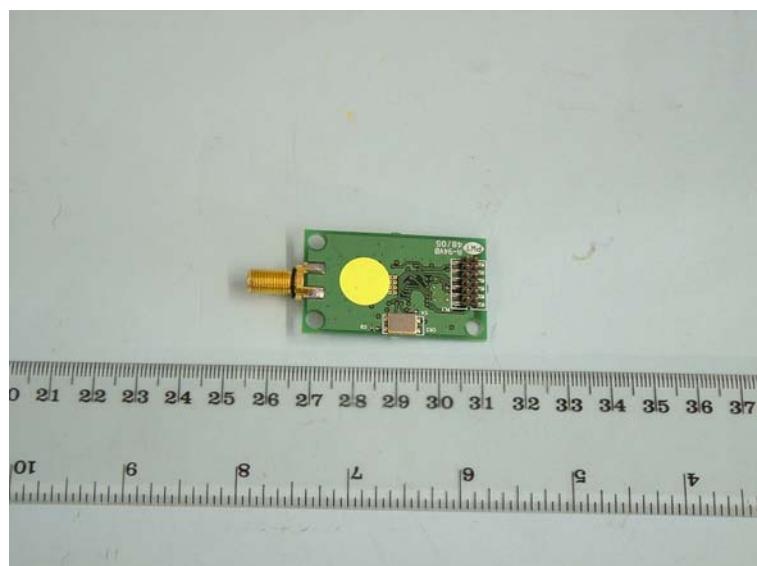
PHOTOGRAPH No. 6

RF PCB COMPONENT SIDE



PHOTOGRAPH No. 7

RF PCB TRACK SIDE



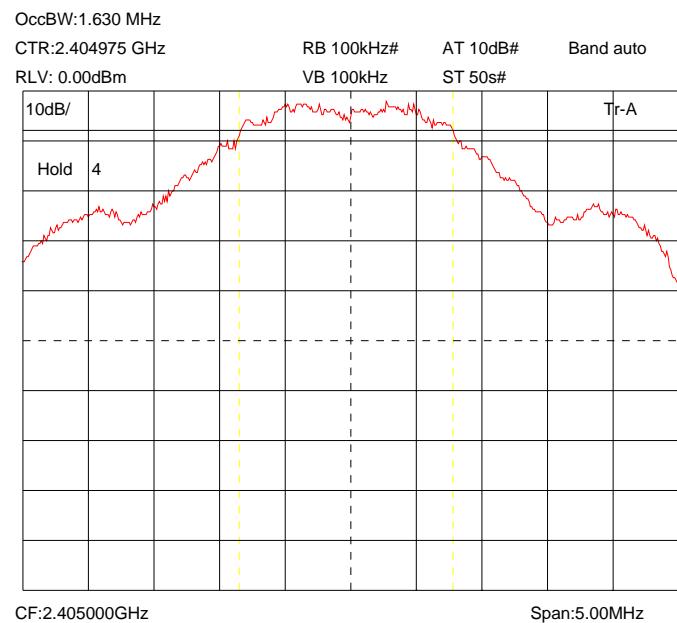
ANNEX B
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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

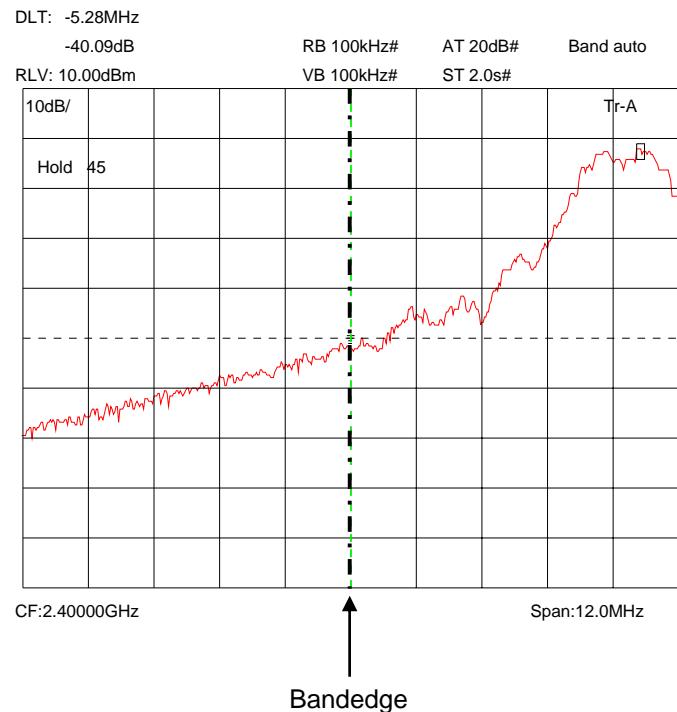
ANNEX C
6 dB BANDWIDTH

6dB Bandwidth

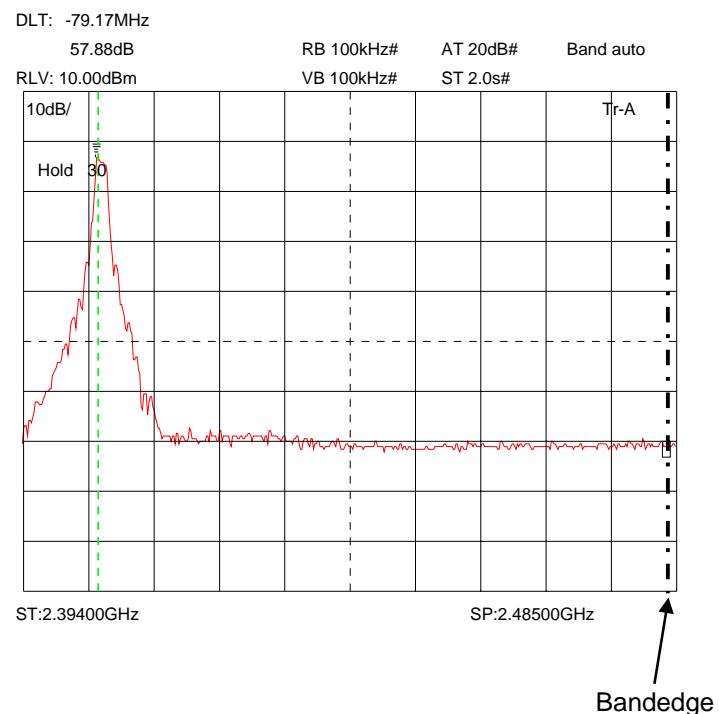


ANNEX D
BAND EDGE COMPLIANCE

Lower Band Edge

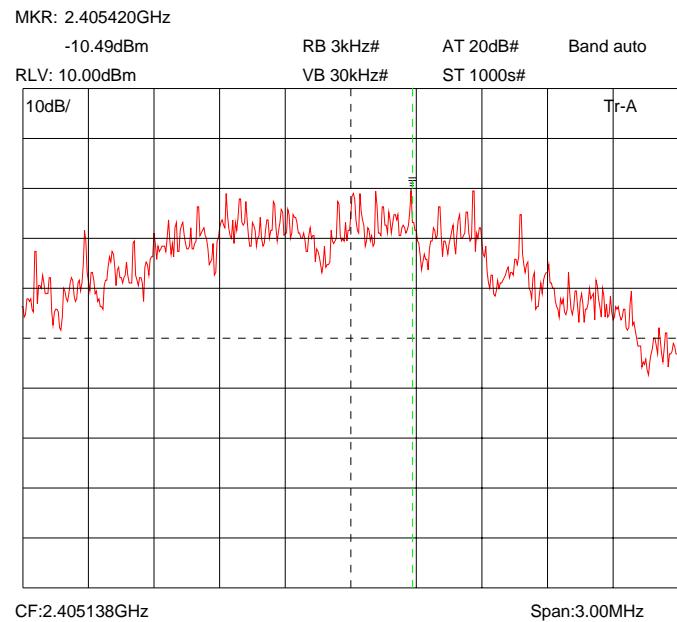


Upper Band Edge



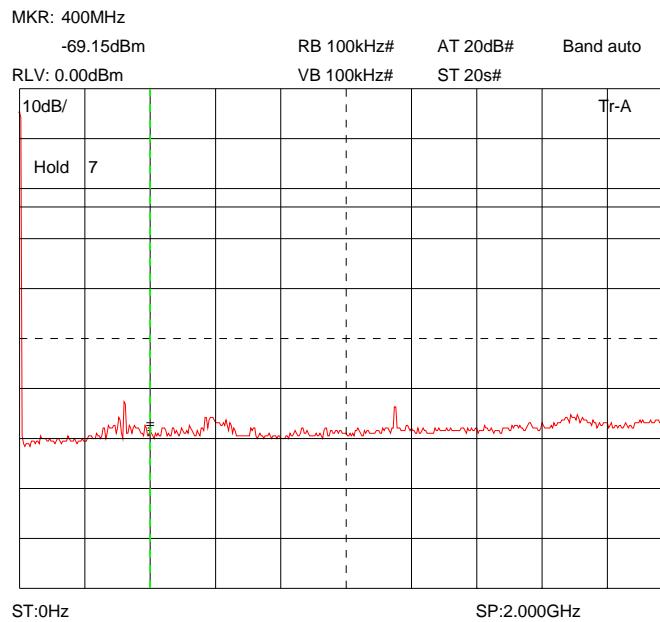
ANNEX E
POWER SPECTRAL DENSITY

Power Spectral Density

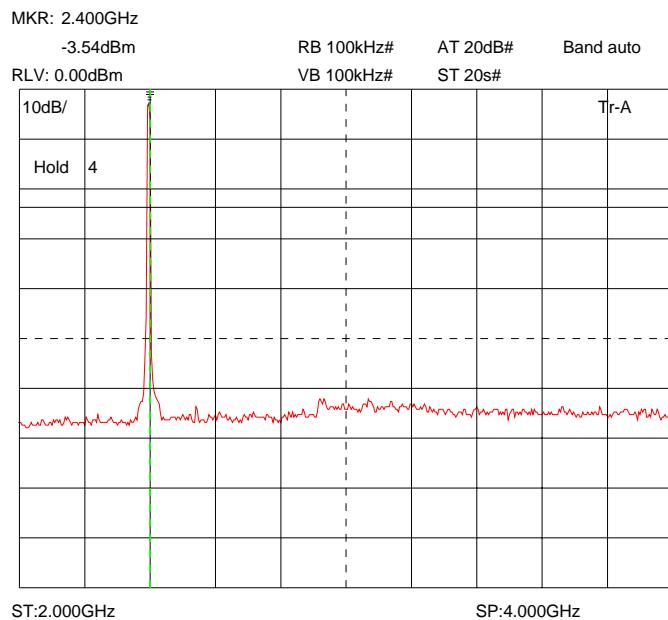


ANNEX F
TRANSMITTER SPURIOUS EMISSIONS CONDUCTED

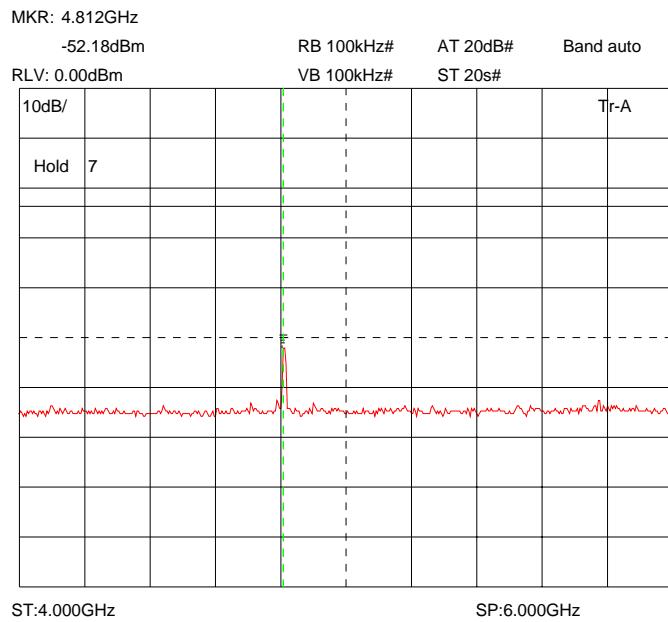
0 – 2GHz



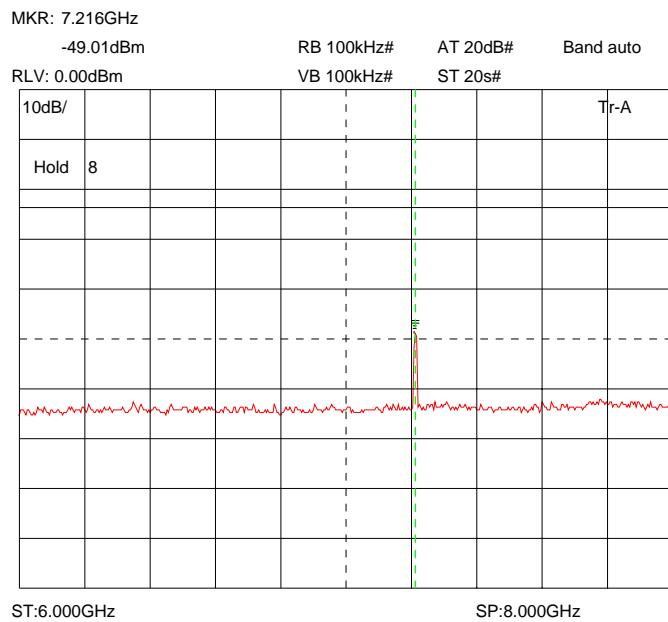
2-4 GHz



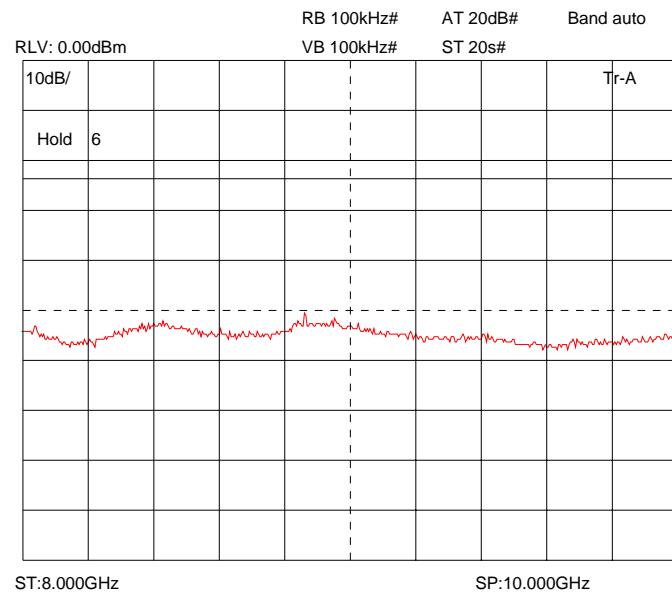
4-6GHz



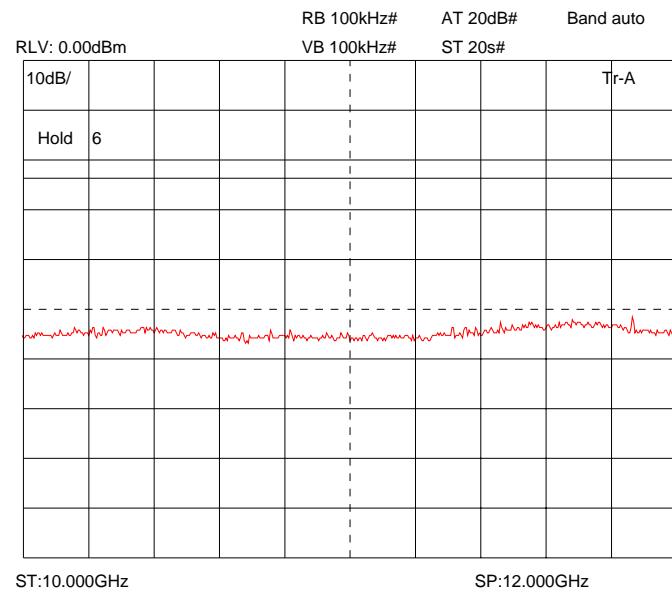
6-8GHz



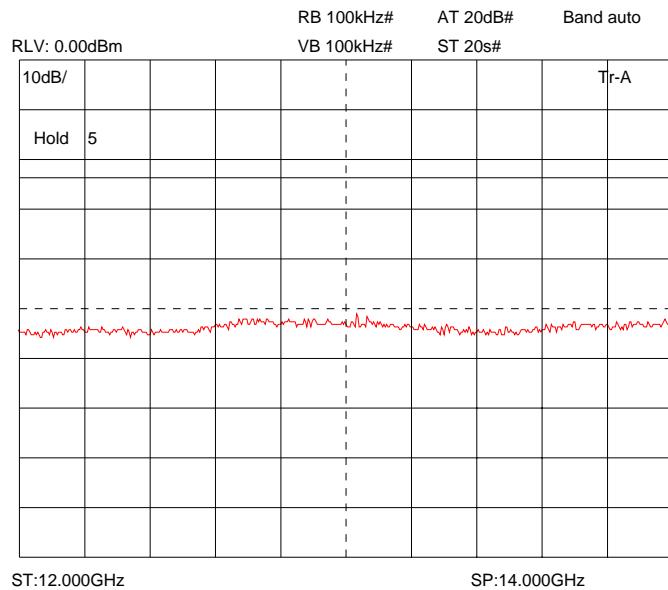
8-10 GHz



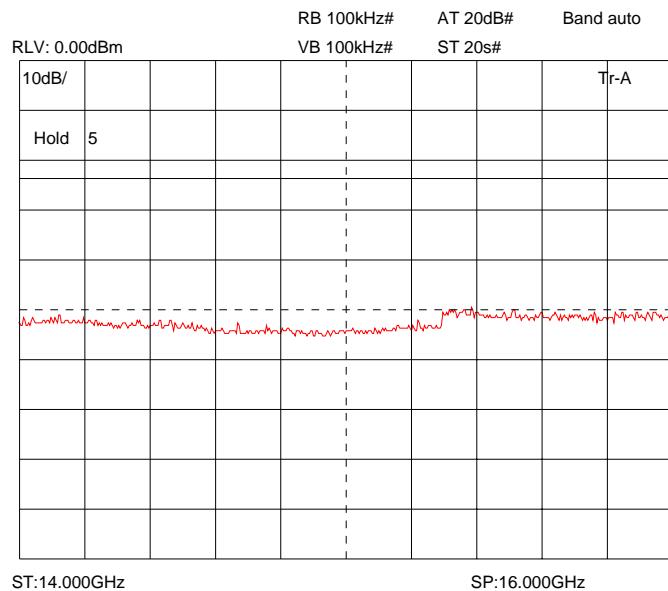
10-12 GHz



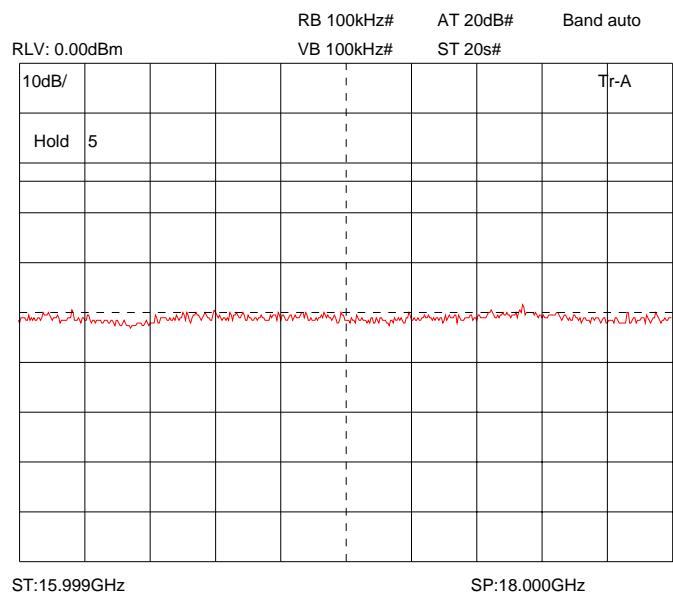
12-14GHz



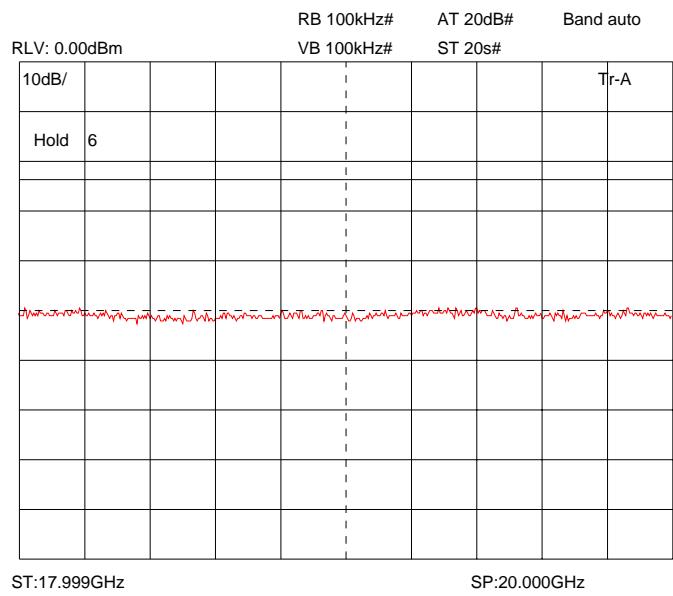
14-16GHz



16-18GHz



18-20GHz



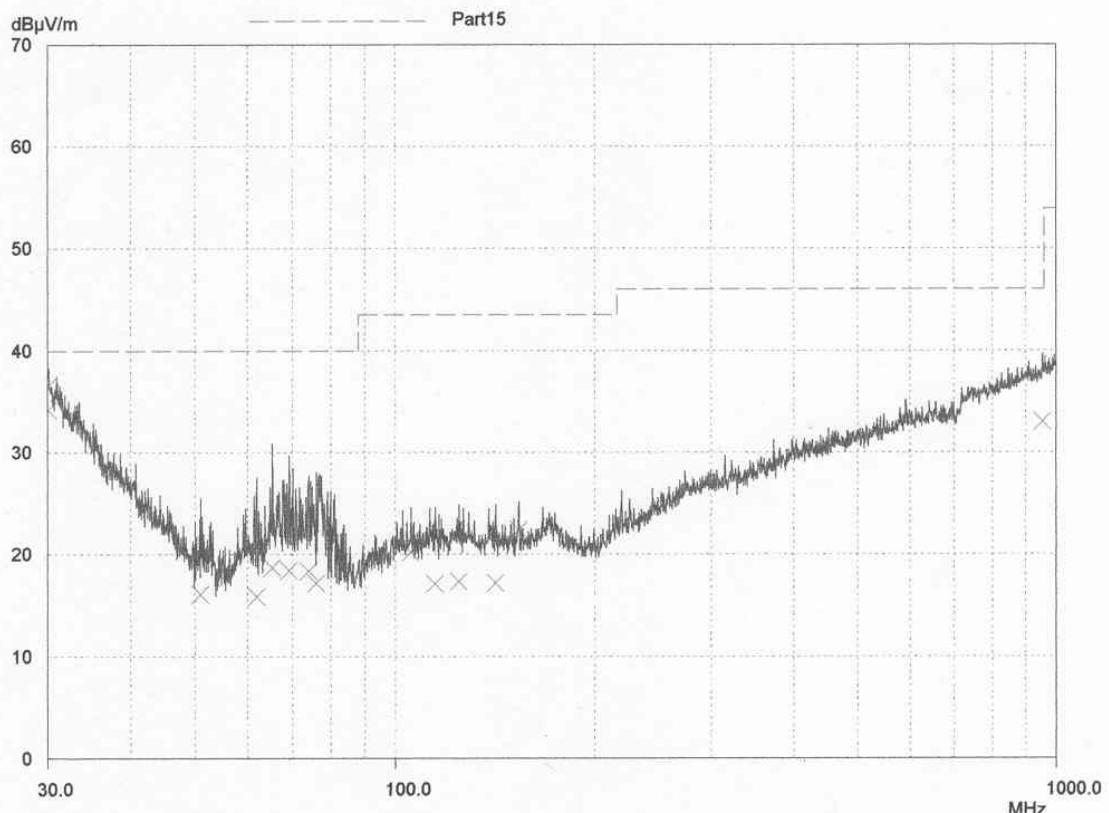
ANNEX G
TRANSMITTER SPURIOUS EMISSIONS RADIATED

TRL Compliance Ltd
E-Field Radiation (30MHz-1GHz)

27 Feb 2006 12:53

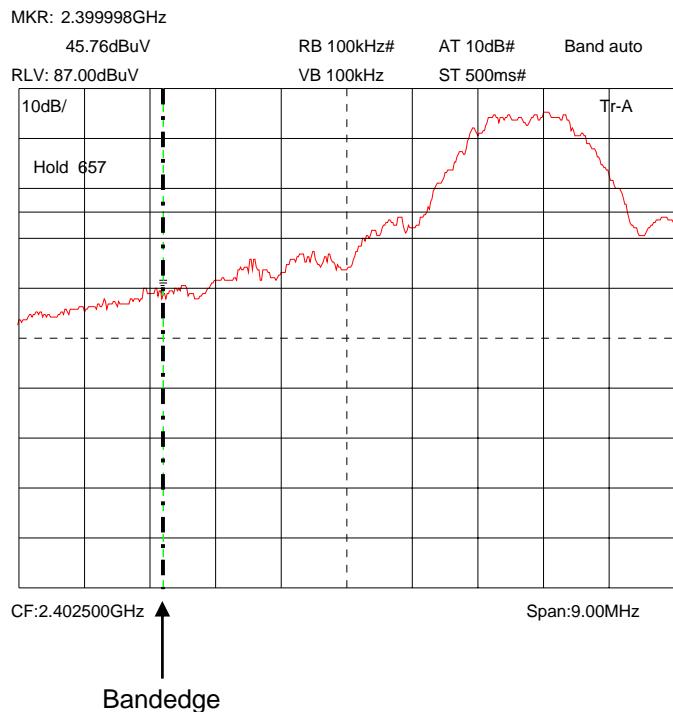
EUT: RF516
Manuf: Comark
Op Cond: Prescan 30MHz - 1000MHz
Operator: D Winstanley
Test Spec: Part15
Comment: Uni TX. Operates on one channel only. Antenna Port Terminated. Powered By Battery.
RX Antenna Vertical. Unit flat Cables to Rear.

Scan Settings		(1 Range)			Receiver Settings				
		Frequencies			Detector	M-Time	Atten	Preamp	OpRge
Start	Stop	Step	IF BW	Detector	1msec	Auto	ON	60dB	
30MHz	1000MHz	50kHz	120kHz	PK					
Transducer	No.	Start	Stop	Name					
1	21	30MHz	1000MHz	UH72					
	22	30MHz	1000MHz	UH93					
Final Measurement:		Detector:	X QP						
		Meas Time:	2sec						
		Subranges:	50						
		Acc Margin:	10 dB						

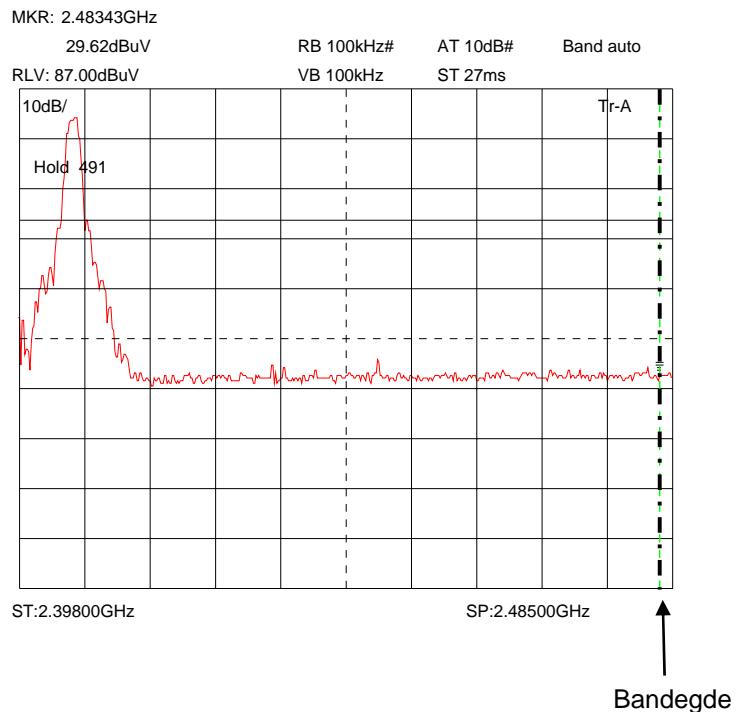


ANNEX H
SPURIOUS EMISSIONS RADIATED (BAND EDGE)

Lower Band Edge



Upper Band Edge



ANNEX I
AC POWER LINE CONDUCTION

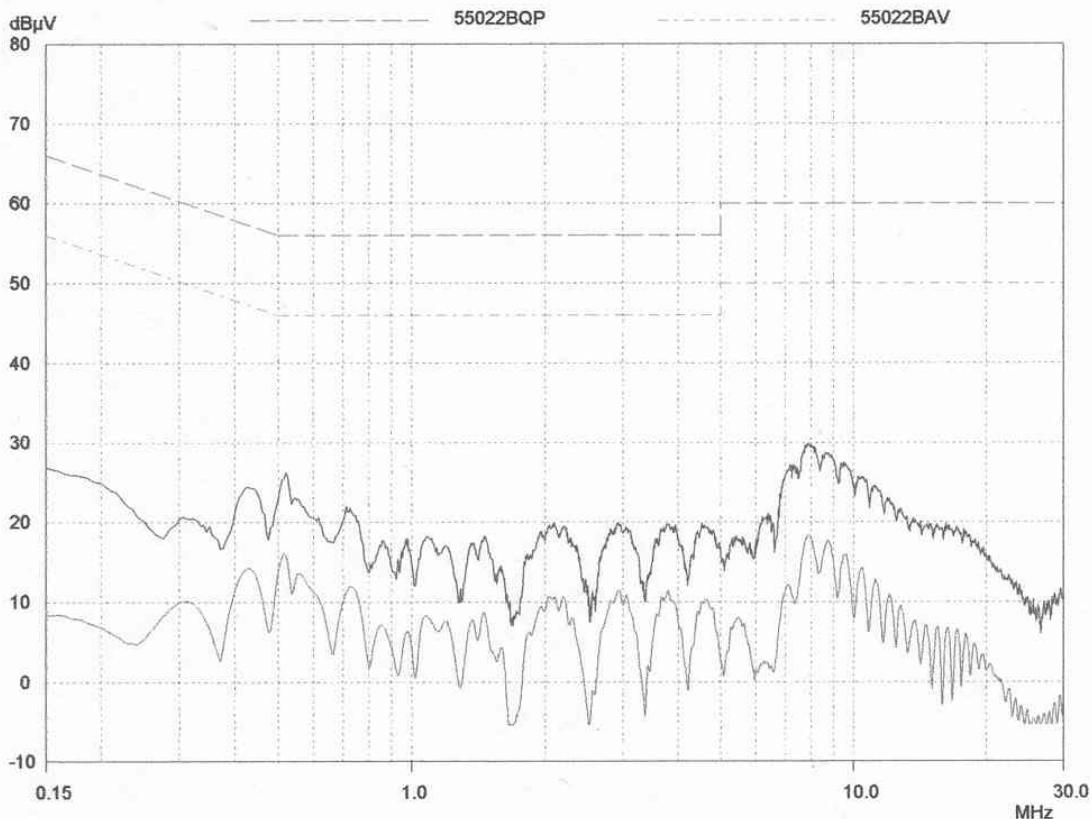
Powerline Conduction

06 Mar 2006 09:26

150kHz - 30MHz

EUT: RF516
 Manuf: Comark
 Op Cond: LISN UH05, cable UH21 & Receiver UH187
 Operator: D Winstanley
 Test Spec: EN55022 Class B (or Variant)
 Comment: Live Line 110Vac. unit in receive mode

Scan Settings		(1 Range) Frequencies			Receiver Settings									
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge						
150kHz	30MHz	5kHz	10kHz	PK+AV	50msec	Auto	OFF	60dB						
Transducer	No.	Start	Stop	Name										
	1	150kHz	30MHz	UH21										
Prescan Measurement:														
Detectors: X PK / + AV														
Meas Time: see scan settings														
Subranges: 25														
Acc Margin: 20 dB														

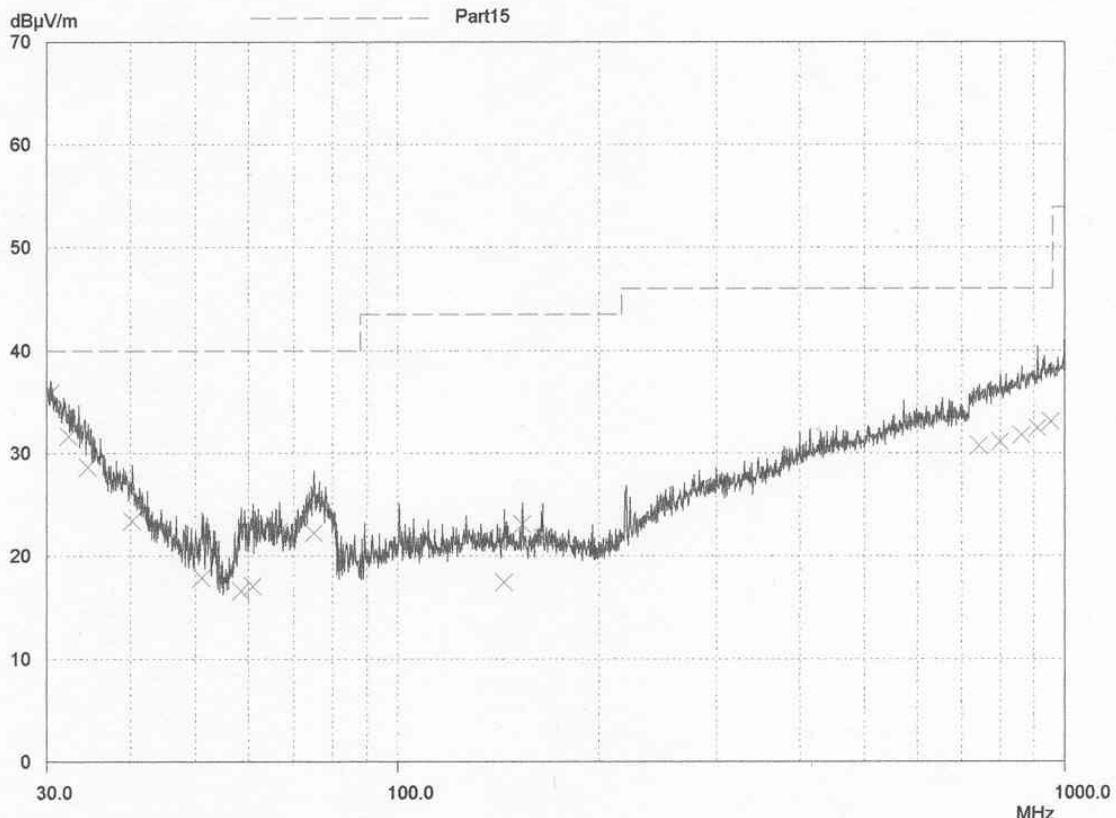


ANNEX J
RECEIVER SPURIOUS EMISSIONS RADIATED

E-Field Radiation (30MHz-1GHz)

EUT: RF516
 Manuf: Comark
 Op Cond: Prescan 30MHz - 1000MHz
 Operator: D Winstanley
 Test Spec: Part15
 Comment: Uni RX. Operates on one channel only. Antenna Port Terminated. Powered By Mains
 RX Antenna Vertical. Unit flat Cables to Rear.

Scan Settings		(1 Range)			Receiver Settings					
		Frequencies			IF BW	Detector	M-Time	Atten	Preamp	OpRge
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge		
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB		
Transducer	No.	Start	Stop	Name						
1	21	30MHz	1000MHz	UH72						
	22	30MHz	1000MHz	UH93						
Final Measurement:		Detector:	X QP							
		Meas Time:	2sec							
		Subranges:	50							
		Acc Margin:	10 dB							



ANNEX K
TEST EQUIPMENT CALIBRATION DETAILS

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH006	3m Range ERP CAL	TRL	06/01/2006	12	06/01/2007
UH028	Log Periodic Ant	Schwarbeck	28/04/2005	24	28/04/2007
UH029	Bicone Antenna	Schwarbeck	27/04/2005	24	27/04/2007
UH041	Multimeter	AVOMeter	20/12/2005	12	20/12/2006
UH120	Spectrum Analyser	Marconi	15/03/2005	12	15/03/2006
UH122	Oscilloscope	Tektronix	07/06/2005	24	07/06/2007
UH132	Power meter	Marconi	03/01/2006	12	03/01/2007
UH162	ERP Cable Cal	TRL	06/01/2006	12	06/01/2007
UH179	Power Sensor	Marconi	14/12/2004	12	14/12/2005
UH228	Power Sensor	Marconi	03/01/2006	12	03/01/2007
UH253	1m Cable N type	TRL	23/02/2006	12	23/02/2007
UH254	1m Cable N type	TRL	05/01/2006	12	05/01/2007
UH265	Notch filer	Telonic	24/06/2005	12	24/06/2006
UH271	1m Cable N type	TRL	23/02/2006	12	23/02/2007
UH273	1m Cable N type	TRL	23/02/2006	12	23/02/2007
L005	CMTA	R&S	05/12/2005	12	05/12/2006
L007	Loop Antenna	R&S	29/03/2005	24	29/03/2007
L138	1-18GHz Horn	EMCO	15/04/2005	24	15/04/2007
L139	1-18GHz Horn	EMCO	03/05/2005	24	03/05/2007
L176	Signal Generator	Marconi	31/01/2005	12	31/01/2006
L193	Bicone Antenna	Chase	12/10/2003	24	12/10/2005
L203	Log Periodic Ant	Chase	21/10/2003	24	21/10/2005
L280	18GHz Cable	Rosenberger	05/01/2006	12	05/01/2007
L343	CCIR Noise Filter	TRL	07/06/2005	12	07/06/2006
L426	Temperature Indicator	Fluke	04/01/2006	12	04/01/2007
L479	Analyser	Anritsu	18/11/2005	12	18/11/2006
L552	Signal Generator	Agilent	25/04/2005	12	25/04/2006
N/A	High Pass Filter	AFL	23/02/2006	12	23/02/2007

ANNEX L
MEASUREMENT UNCERTAINTY

Radio Testing – General Uncertainty Schedule

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95% confidence where no required test level exists.

[1] Adjacent Channel Power

Uncertainty in test result = **1.86dB**

[2] Carrier Power

Uncertainty in test result (Equipment - TRLUH120) = **2.18dB**

Uncertainty in test result (Equipment – TRL05) = **1.08dB**

Uncertainty in test result (Equipment – TRL479) = **2.48dB**

[3] Effective Radiated Power

Uncertainty in test result = **4.71dB**

[4] Spurious Emissions

Uncertainty in test result = **4.75dB**

[5] Maximum frequency error

Uncertainty in test result (Equipment - TRLUH120) = **119ppm**

Uncertainty in test result (Equipment – TRL05) = **0.113ppm**

Uncertainty in test result (Equipment – TRL479) = **0.265ppm**

[6] Radiated Emissions, field strength OATS 14kHz-18GHz Electric Field

Uncertainty in test result (14kHz – 30MHz) = **4.8dB**, Uncertainty in test result (30MHz – 1GHz) = **4.6dB**, Uncertainty in test result (1GHz-18GHz) = **4.7dB**

[7] Frequency deviation

Uncertainty in test result = **3.2%**

[8] Magnetic Field Emissions

Uncertainty in test result = **2.3dB**

[9] Conducted Spurious

Uncertainty in test result (Equipment TRL479) Up to 8.1GHz = **3.31dB**

Uncertainty in test result (Equipment TRL479) 8.1GHz – 15.3GHz = **4.43dB**

Uncertainty in test result (Equipment TRL479) 15.3GHz – 21GHz = **5.34dB**

Uncertainty in test result (Equipment TRLUH120) Up to 26GHz = **3.14dB**

[10] Channel Bandwidth

Uncertainty in test result = **15.5%**

[11] Amplitude and Time Measurement – Oscilloscope

Uncertainty in overall test level = **2.1dB**, Uncertainty in time measurement = **0.59%**, Uncertainty in Amplitude measurement = **0.82%**

[11] Power Line Conduction

Uncertainty in test result = **3.4dB**