



TEST REPORT NO: RU1178/6435
COPY NO: 2
ISSUE NO: 1
FCC ID: TFT-RM100

**REPORT ON THE CERTIFICATION TESTING OF A
MAXID LIMITED
RM100
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.209 and 15.247
INTENTIONAL RADIATOR SPECIFICATION**

TEST DATE: 21st June 2005 – 25th June 2005

TESTED BY: _____ D WINSTANLEY
APPROVED BY: _____ P GREEN
PRODUCT MANAGER
DATE: 20 September 2005

Distribution:

- Copy Nos:
1. MAXID LIMITED
 2. FCC EVALUATION LABORATORIES
 3. TRL EMC

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

TRL COMPLIANCE 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



0728

CONTENTS

	PAGE
CERTIFICATE OF CONFORMITY & COMPLIANCE	3
APPLICANT'S SUMMARY	4
EQUIPMENT TEST CONDITIONS	5
TESTS REQUIRED	6
SAMPLE CALCULATIONS	6
TEST RESULTS	

	ANNEX
PHOTOGRAPHS	A
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST	B
CARRIER FREQUENCY SEPARATION	C
NUMBER OF HOPPING CHANNELS PLOT	D
20dB BANDWIDTH PLOT	E
TIME OF OCCUPANCY	F
PEAK POWER CONDUCTED	G
CONDUCTED SPURIOUS EMISSIONS - TRANSMIT	H
RADIATED SPURIOUS EMISSIONS - TRANSMIT	I
BAND-EDGE EMISSIONS CONDUCTED	J
POWERLINE CONDUCTED EMISSIONS - TRANSMIT	K
CONDUCTED SPURIOUS EMISSIONS - RECEIVE	L
RADIATED SPURIOUS EMISSIONS - RECEIVE	M
POWERLINE CONDUCTED EMISSIONS - RECEIVE	N

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: TFT-RM100

PURPOSE OF TEST: CERTIFICATION

TEST SPECIFICATION: FCC RULES CFR 47, Part 15.247, April 2005

TEST RESULT: Compliant to Specification

EQUIPMENT UNDER TEST: RM100

EQUIPMENT SERIAL No: Engineering sample

EQUIPMENT TYPE: UHF RFID Tag Reader

PRODUCT USE: Wireless tag reader

CONDUCTED CARRIER EMISSION: 769.59mW

ANTENNA TYPE: Plate Antenna

ALTERNATIVE ANTENNA: Handheld Antenna

CHANNEL SPACING: Not Applicable. Wideband

FREQUENCY GENERATION. SAW Resonator ☐ Crystal ☐ Synthesiser ☒

MODULATION METHOD: Amplitude ☐ Digital ☒ Angle ☐

POWER SOURCE(s): 6Volts dc

TEST DATE(s): 21st June 2005 – 25th June 2005

ORDER No(s): PO00009204

APPLICANT: MaxID Limited

ADDRESS: Hillswood Business Park
3000 Hillswood Drive
Chertsy
KT16 0RS

TESTED BY: _____ D Winstanley

APPROVED BY: _____ P Green
Product manager

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	RM100
EQUIPMENT TYPE:	UHF RFID Tag Reader
SERIAL NUMBER OF EUT:	Engineering sample
PURPOSE OF TEST:	CERTIFICATION
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.247, April 2005
TEST RESULT:	COMPLIANT Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
APPLICANT'S CATEGORY:	MANUFACTURER <input checked="" type="checkbox"/> IMPORTER <input type="checkbox"/> DISTRIBUTOR <input type="checkbox"/> TEST HOUSE <input type="checkbox"/> AGENT <input type="checkbox"/>
APPLICANT'S ORDER No(s):	PO00009204
APPLICANT'S CONTACT PERSON(s):	Mr R Biggs
E-mail address:	roger.biggs@maxidgroup.com
APPLICANT:	MaxID Limited
ADDRESS:	Hillswood Business Park 3000 Hillswood Drive Chertsy KT16 0RS
TEL:	+44 (0)1932 895396
FAX:	+44 (0)1932 895397
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	21 st June 2005 – 25 th June 2005
TEST REPORT No:	RU1178/6435

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
	Intentional Emission Frequency:	15.247	Peak	Yes
	Intentional Emission Field Strength:	-	-	No
	Intentional Emission Band Occupancy:	15.247(a)(1)(i)	Peak	Yes
	Intentional Emission EIRP (mW):	-	-	No
	Intentional Emission Conducted (mW)	15.247(b)(3)	Peak	Yes
	Spurious Emissions – Conducted:	15.207	Quasi peak Average	Yes
	Spurious Emissions – Conducted:	15.247	Peak	Yes
	Spurious Emissions – Radiated <1000MHz:	15.247	Quasi Peak	Yes
	Spurious Emissions – Radiated >1000MHz:	15.247 15.209	Peak average	Yes
	Transmitter Carrier Frequency Separation	15.247(a)(1)(i)	Peak	Yes
	Transmitter Maximum Peak Power Output Power	15.247(b)(3)	Peak	Yes
	Transmitter Band Edge Conducted Emissions	15.247(c)	Peak	Yes
	Transmitter Band Edge Radiated Emission	15.247(c)	Peak	No
	Extrapolation Factor	15.31(f)	-	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
2.	Product Description :	The RM100 is a wireless radio frequency identification (RFID) device.		
3.	Temperatures:	Ambient (Tnom)	24°C	
4.	Supply Voltages:	Vnom	+6Vdc	
	Note: Vnom voltages are as stated above unless otherwise shown on the test report page			
5.	Equipment Category:	Single channel Two channel Multi-channel	[] [] [X]	
6.	Channel spacing:	Narrowband Wideband	[] [X]	

TRANSMITTER TESTS

TRANSMITTER CARRIER FREQUENCY SEPARATION – CONDUCTED – Part 15.247

Ambient temperature = 24°C
Relative humidity = 45%
Conditions = Conducted –Radio Lab
Supply voltage = +6Vdc

Transmitter Carrier Frequency Separation (MHz)
506 kHz
LIMIT SPECIFIED IN 15.247 (A)(1): The channels should be separated by at least 25kHz or the 20dB bandwidth which ever is greater. See spectrum analyser plot – Annex C See note 1

- Notes:**
- 1 20dB Bandwidth of one carrier is 145.4kHz therefore carrier frequency separation must be greater than 145.4kHz. See Annex E
 - 2 Conducted measurements were performed with a reverse SMA antenna connector provided by the client.
 - 3 For analyser setting see scan data annex C.

- Test Method:**
- 1 Test method as per 15.247 and public notice DA 00-705.
 - 2 With the unit operating in hopping mode with maximum data rate a graphical plot of two adjacent channels was taken.
 - 3 Delta marker function was used to measure the difference between the peak emission of each channel.

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
ATTENUATOR	BIRD	8304-300-N	N/A	220	X
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	
RANGE 1	TRL	3 METRE	N/A	UH06	
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

TRANSMITTER 20dB BANDWIDTH – CONDUCTED – Part 15.247

Ambient temperature	=	24°C
Relative humidity	=	45%
Conditions	=	Conducted –Radio Lab
Supply voltage	=	+6Vdc

20dB Bandwidth (kHz)
145.4kHz
Limit 500kHz

See spectrum analyser plot – Annex E

- Notes:**
- 1 The EUT has 50 hopping channels see annex D.
 - 2 Conducted measurements were performed with a reverse SMA antenna connector provided by the client.
 - 3 For analyser setting see scan data annex E.

- Test Method:**
- 1 Test method as per 15.247 and public notice DA 00-705.
 - 2 With the unit operating in hopping mode with maximum data rate.
 - 3 The analyser was centre frequency was tuned to the centre of a hopping channel.
 - 4 The peak hold function was used to establish a 20dB band width level.

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
ATTENUATOR	BIRD	8304-300-N	N/A	220	X
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	
RANGE 1	TRL	3 METRE	N/A	UH06	
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

TRANSMITTER AVERAGE TIME OF OCCUPANCY – CONDUCTED – Part 15.247

Ambient temperature = 24°C
Relative humidity = 45%
Conditions = Conducted –Radio Lab
Supply voltage = +6Vdc

Packet Width (ms)	Number of Transmissions in 20 Seconds	Average time of Occupancy (s)
10	33	0.33
Limit 0.4 seconds		

See spectrum analyser plot – Annex F

- Notes:**
- 1 Conducted measurements were performed with a temporary antenna connector provided by the client.
 - 2 For analyser setting see scan data annex F.
 - 3 The EUT has 50 hopping channels see annex D.

Test Method:

- 1 As per 15.247 and Public Notice DA 00-705.
- 2 The analyser was tuned to the centre frequency of the hopping channel
- 3 With the analyser set to zero span a sweep of 20 seconds was performed. The number of transmission was recorded.
- 4 The sweep time was reduced to show the length of one transmission.
The time occupancy of the system was tested on a single carrier. The maximum packet length was measured and multiplied by the number of transmissions within a 30 second period. The result was noted as being the average time of occupancy.

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
ATTENUATOR	BIRD	8304-300-N	N/A	220	X
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	
RANGE 1	TRL	3 METRE	N/A	UH06	
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

TRANSMITTER PEAK OUTPUT POWER – CONDUCTED – Part 15.247

Ambient temperature = 24°C(<1GHz),
Relative humidity = 45%(<1GHz),
Conditions = Radio Lab
Supply voltage = +6Vdc

Channel Frequency (MHz)	Reading From Analyser (dBm)	Attenuator Losses (dB)	Transmitter Peak Power Output (dBm)	Transmitter Peak Power Output (mW)	Limit (Watts)
902.750	3.14	25.7	28.84	765.59	1.0
914.750	2.93	25.7	28.63	729.45	1.0
927.250	2.72	25.7	28.42	695.02	1.0

Notes: 1 Number of hopping channels employed is 50 see annex D.

Test Method:

- 1 As per Public Notice DA 00-705
- 2 The analyser was centered on a hopping channel with peak hold enabled .
- 3 Marker to peak function was used to find the peak emission.

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
ATTENUATOR	BIRD	8304-300-N	N/A	220	X
ANTENNA	EMCO	3115	9010-35810	138	X
RANGE 1	TRL	3 METRE	N/A	UH06	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
ANTENNA	EMCO	3115	9010-3581	139	X

TRANSMITTER TESTS

TRANSMITTER CONDUCTED SPURIOUS EMISSIONS – CONDUCTED – Part 15.247(c)

Ambient temperature = 24°C
Relative humidity = 45%
Conditions = Conducted –Radio Lab
Supply voltage = +6Vdc

Top Channel

Range Frequency (MHz)	Emission Frequency (MHz)	Emission Level	Atten loss	Level (dBm)	Limit (dBm)
30 – 10000	Note 3		-	<-11.16	8.84

See spectrum analyser scan plots – Annex H

Middle Channel

Range Frequency (MHz)	Emission Frequency (MHz)	Emission Level	Atten loss	Level (dBm)	Limit (dBm)
30 – 10000	Note3		-	<-11.16	8.84

See spectrum analyser scan plots – Annex H

Bottom Channel

Range Frequency (MHz)	Emission Frequency (MHz)	Emission Level	Atten loss	Level (dBm)	Limit (dBm)
30 – 10000	Note 3		-	<-11.16	8.84

See spectrum analyser scan plots – Annex H

Hopping at maximum data rate

Range Frequency (MHz)	Emission Frequency (MHz)	Emission Level	Atten loss	Level (dBm)	Limit (dBm)
30 – 10000	Note 3		-	<-11.16	8.84

See spectrum analyser scan plots – Annex H

Notes:

- 1 During the scans the unit was operated in the following modes:
Hopping stopped unit operating on lowest channel
Hopping stopped unit operating on mid channel
Hopping stopped unit operating on highest channel
Hopping over all frequencies.
- 2 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.
- 3 Only emissions within 20dB of limit are recorded.

Test Method:

- 1 As per section 15.247 and Public Notice DA 00-705.
- 2 Frequency sweeps were performed to check for spurious emissions.
- 3 Any emissions discovered were checked for compliance with 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
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
ATTENUATOR	BIRD	8304-300-N	N/A	220	X
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	
RANGE 1	TRL	3 METRE	N/A	UH06	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS – PLATE ANTENNAS

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

Ambient temperature = 26°C
 Relative humidity = 44%
 Conditions = Radiated OATS
 Supply voltage = +6Vdc

Bottom Channel 30MHz -10000MHz

	Emission Freq (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dBµV/m)	Extrap. Factor (dB)	Duty Cycle Corr. (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 – 10GHz Restricted band	1001.05(p)	34.68	1.23	24.3	60.21	-	-	1024.27	5000
	1001.05(a)	30.22	1.23	24.3	57.53	-	20	75.25	500
	2708.25(p)	36.77	1.81	29.8	68.38	-	-	2624.23	5000
	2708.25(a)	31.98	1.81	29.8	63.59	-	20	151.18	500
30MHz -10GHz	Note 7								-20dBc
See annex I for initial pre scan results.									

Middle Channel 30MHz -10000MHz

	Emission Freq (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dBµV/m)	Extrap. Factor (dB)	Duty Cycle Corr. (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 – 10GHz Restricted band	1013.06(p)	34.45	1.23	24.1	59.98	-	-	997.70	5000
	1013.06(a)	25.83	1.23	24.1	56.12	-	20	63.97	500
	2744.25(p)	35.45	1.84	29.8	67.09	-	-	2262.04	5000
	2744.25(a)	29.99	1.84	29.8	61.63	-	20	120.64	500
30MHz -10GHz	Note 7								-20dBc
See annex I for initial pre scan results.									

TRANSMITTER TESTS – PLATE ANTENNAS

TRANSMITTER EMISSIONS cont. – RADIATED – Part 15.247(c) and 15.209

Top Channel 30MHz -10000MHz

	Emission Freq (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dBµV/m)	Extrap. Factor (dB)	Duty Cycle Corr. (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 – 10GHz Restricted band	1025.55(p)	32.96	1.23	24.3	58.49	-	-	840.43	5000
	1025.55(a)	28.81	1.23	24.3	54.34	-	20	52.12	500
	2781.75(p)	39.06	1.86	30.0	70.92	-	-	3515.60	5000
	2781.75(a)	36.77	1.86	30.0	68.63	20	20	270.08	500
30MHz -10GHz	Note 7								-20dBc
See annex I for initial pre scan results.									

Hopping at maximum data rate 30MHz -10000MHz

	Emission Freq (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dBµV/m)	Extrap. Factor (dB)	Duty Cycle Corr. (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 – 10GHz Restricted band	1006.2(p)	42.23	1.23	24.3	67.76	-	-	2443.43	5000
	1006.2(a)	23.90	1.23	24.3	49.43	-	20	29.61	500
	2720.7(p)	38.58	1.82	29.8	70.2	-	-	3235.98	5000
	2720.7(a)	26.89	1.82	29.8	78.51	20	20	84.23	500
	5468.0(p)	37.83	4.66	34.9	77.39	20	-	740.46	5000
	5468.0(a)	25.42	4.66	34.9	64.98	20	20	17.74	500
30MHz -10GHz	Note 7								-20dBc
See annex I for initial pre scan results.									

TRANSMITTER TESTS – HANDHELD ANTENNA

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

Ambient temperature = 26°C
 Relative humidity = 44%
 Conditions = Radiated OATS
 Supply voltage = +6Vdc

Bottom Channel 30MHz -10000MHz

	Emission Freq (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dBµV/m)	Extrap. Factor (dB)	Duty Cycle Corr. (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 – 10GHz Restricted band	1001.05(p)	32.70	1.23	24.3	58.23	-	-	815.64	5000
	1001.05(a)	28.22	1.23	24.3	53.75	-	20	48.69	500
	2708.25(p)	36.24	1.81	29.8	67.85	-	-	2468.88	5000
	2708.25(a)	32.88	1.81	29.8	64.46	-	20	167.11	500
30MHz -10GHz	Note 7								-20dBc
See annex I for initial pre scan results.									

Middle Channel 30MHz -10000MHz

	Emission Freq (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dBµV/m)	Extrap. Factor (dB)	Duty Cycle Corr. (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 – 10GHz Restricted band	2744.25(p)	33.39	1.84	29.8	65.03	-	-	1784.43	5000
	2477.25(a)	28.24	1.84	29.8	59.88	-	20	98.63	500
30MHz -10GHz	Note 7								-20dBc
See annex I for initial pre scan results.									

TRANSMITTER TESTS – HANDHELD ANTENNA

TRANSMITTER EMISSIONS cont. – RADIATED – Part 15.247(c) and 15.209

Top Channel 30MHz -10000MHz

	Emission Freq (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dBµV/m)	Extrap. Factor (dB)	Duty Cycle Corr. (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 – 10GHz Restricted band	2781.75(p) 2781.75(a)	34.77 29.02	1.86 1.86	30.0 30.0	66.63 60.88	- -	- 20	2145.36 110.66	5000 500
30MHz -10GHz	Note 7								-20dBc

See annex I for initial pre scan results.

Hopping at maximum data rate 30MHz -10000MHz

	Emission Freq (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dBµV/m)	Extrap. Factor (dB)	Duty Cycle Corr. (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 – 10GHz Restricted band	1002.7(p)	36.33	1.23	24.3	61.86	-	-	1238.79	5000
	1002.7(a)	22.03	1.23	24.3	47.56	-	20	23.87	500
	2745.0(p)	35.79	1.81	29.8	67.40	-	-	2344.23	5000
	2745.0(a)	25.66	1.81	29.8	57.27	-	20	73.03	500
	3680.0(p)	38.25	4.85	32.1	75.20	20	-	575.44	5000
	3680.0(a)	29.05	4.85	32.1	66.00	20	20	19.95	500
30MHz -10GHz	Note 7								-20dBc

See annex I for initial pre scan results.

Duty Cycle Correction calculated as per Public Notice DA 00-705.

Duty Cycle Correction = 20 Log (dwell time/100ms) dB

Dwell time = 10ms

Duty Cycle Correction = 20 Log (10ms/100ms) dB

Duty Cycle Correction = -20 dB

Notes:

- 1 During the scans the unit was operated in the following modes:
Hopping stopped unit operating on lowest channel
Hopping stopped unit operating on mid channel
Hopping stopped unit operating on highest channel
Hopping over all frequencies,
- 2 Initial pre scans were performed see Annex I for plots.
- 3 Emissions above 1GHz were measured as per Public Notice DA 00-705.
- 4 High pass filter used for measurements above 3 GHz
- 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.
- 8 (p) indicated peak emission compared against peak limit (20dB above average limit)
- 9 (a) indicates peak emission with 10Hz VBW corrected for duty cycle and compared against average limit
- 10 See Annex F for dwell time during 100ms
- 11 Unit tested with both types of antenna to be used.

Test Method:

- 1 As per section 15.247 and Public Notice DA 00-705.
- 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 below:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
ANTENNA	EMCO	3115	9010-3580	138	X
ANTENNA	CHASE	CBL6112B	2803	UH93	X
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	X
RANGE 1	TRL	3 METRE	N/A	UH06	X
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

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

Ambient temperature = 25°C
Relative humidity = 55%
Conditions = Conducted –Radio Lab
Supply voltage = +6Vdc

Test Result

Measured as compliant see analyser plots

- Notes:**
- 1 The EUT was set in a hopping mode using all hopping channels.
 - 2 The EUT was set to the top and bottom channels
 - 3 A reverse SMA antenna connector was used to take the measurement.
 - 4 See Annex J for analysers plots.

Test Method:

- 1 As per section 15.247 and Public Notice DA 00-705.
- 2 A plot covering the lowest channel and 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).
- 3 A plot covering the highest channel and 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
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	X
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	
RANGE 1	TRL	3 METRE	N/A	UH06	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS – PLATE ANTENNAS

TRANSMITTER CONDUCTED EMISSIONS – AC POWER LINE Part 15.207

Ambient temperature = 25°C(<1GHz),
Relative humidity = 55%(<1GHz),
Conditions = Power Line Laboratory
Supply voltage = 110V AC
Supply Frequency = 60Hz

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	DETECTOR	CONDUCTOR (L or N)	EMISSION (dBµV)	LIMIT (dBµV)
0.350	Quasi Peak	Neutral	49.24	58.96
0.375	Quasi Peak	Neutral	52.84	58.39
0.530	Quasi Peak	Neutral	46.58	56.00
0.565	Quasi Peak	Neutral	50.69	56.00
0.575	Quasi Peak	Live	49.17	56.00
0.945	Quasi Peak	Live	48.50	56.00
0.960	Quasi Peak	Neutral	49.26	56.00
1.020	Quasi Peak	Live	47.26	56.00
1.100	Quasi Peak	Neutral	46.20	56.00
1.320	Quasi Peak	Live	46.99	56.00
1.340	Quasi Peak	Neutral	49.22	56.00
2.565	Quasi Peak	Neutral	46.21	56.00

Notes:

- 1 See annex K for plot
- 2 Emissions not within 10dB of the limit not necessarily recorded.

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
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	

TRANSMITTER TESTS – HANDHELD ANTENNA

TRANSMITTER CONDUCTED EMISSIONS – AC POWER LINE Part 15.207

Ambient temperature	=	25°C(<1GHz),
Relative humidity	=	55%(<1GHz),
Conditions	=	Power Line Laboratory
Supply voltage	=	110V AC
Supply Frequency	=	60Hz

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	DETECTOR	CONDUCTOR (L or N)	EMISSION (dBµV)	LIMIT (dBµV)
0.380	Quasi Peak	Neutral	51.27	58.28
0.565	Quasi Peak	Live	47.76	56.00
0.570	Quasi Peak	Neutral	49.01	56.00
0.990	Quasi Peak	Live	46.23	56.00
1.0005	Quasi Peak	Neutral	47.42	56.00
1.13	Quasi Peak	Neutral	46.62	56.00

- Notes:**
- 1 See annex K for plot
 - 2 Emissions not within 10dB of the limit not necessarily recorded.

- 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
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 CONDUCTED SPURIOUS EMISSIONS – CONDUCTED – Part 15.247(c)

Ambient temperature = 24°C
Relative humidity = 45%
Conditions = Conducted –Radio Lab
Supply voltage = +6Vdc

Top Channel

Range Frequency (MHz)	Emission Frequency (MHz)	Emission Level	Atten loss	Level (dBm)	Limit (dBm)
30 – 10000	Note 2		-		

See spectrum analyser scan plots – Annex L

Middle Channel

Range Frequency (MHz)	Emission Frequency (MHz)	Emission Level	Atten loss	Level (dBm)	Limit (dBm)
30 – 10000	Note 2		-		

See spectrum analyser scan plots – Annex L

Bottom Channel

Range Frequency (MHz)	Emission Frequency (MHz)	Emission Level	Atten loss	Level (dBm)	Limit (dBm)
30 – 10000	Note 2		-		

See spectrum analyser scan plots – Annex L

Notes:

- 1 During the scans the unit was operated in the following modes:
Transmitter stopped unit operating on lowest channel and switched into receive mode
Transmitter stopped unit operating on mid channel switched into receive mode
Transmitter stopped unit operating on highest channel switched into receive mode
- 2 Only emissions within 20dB of limit are recorded.

Test Method:

- 1 As per section 15.247 and Public Notice DA 00-705.
- 2 Frequency sweeps were performed to check for spurious emissions.
- 3 Any emissions discovered were checked for compliance with the limit.

RECEIVER TESTS – PLATE ANTENNAS

RECEIVER EMISSIONS – RADIATED – Part 15.247(c) and 15.209

Ambient temperature = 26°C
 Relative humidity = 44%
 Conditions = Radiated OATS
 Supply voltage = +6Vdc

Bottom Channel 30MHz -10000MHz

	Emission Freq (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dBμV/m)	Extrap. Factor (dB)	Duty Cycle Corr. (dB)	Result (μV/m)	Limit (μV/m)
30MHz – 88MHz	Note 6								100
88MHz – 216MHz	Note 6								150
216MHz – 960MHz	Note 6								200
960MHz – 1GHz	Note 6								500
1GHz – 10GHz	Note 6								500
See annex M for initial pre scan results.									

Middle Channel 30MHz -10000MHz

	Emission Freq (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dBμV/m)	Extrap. Factor (dB)	Duty Cycle Corr. (dB)	Result (μV/m)	Limit (μV/m)
30MHz – 88MHz	Note 6								100
88MHz – 216MHz	Note 6								150
216MHz – 960MHz	Note 6								200
960MHz – 1GHz	Note 6								500
1GHz – 10GHz	Note 6								500
See annex M for initial pre scan results.									

RECEIVER TESTS – PLATE ANTENNAS

RECEIVER EMISSIONS cont. – RADIATED – Part 15.247(c) and 15.209

Top Channel 30MHz -10000MHz

	Emission Freq (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor	Field Strength (dBuV/m)	Extrap. Factor (dB)	Duty Cycle Corr. (dB)	Result (uV/m)	Limit (uV/m)
30MHz – 88MHz	Note 6								100
88MHz – 216MHz	Note 6								150
216MHz – 960MHz	Note 6								200
960MHz – 1GHz	Note 6								500
1GHz – 10GHz	Note 6								500
See annex M for initial pre scan results.									

Notes:

- 1 During the scans the unit was operated in the following modes:
Hopping stopped unit operating on lowest channel in receive mode
Hopping stopped unit operating on mid channel in receive mode
Hopping stopped unit operating on highest channel in receive mode
- 2 Initial pre scans were performed see annex M for plots.
- 3 Emissions above 1GHz were measured as per Public Notice DA 00-705.
- 4 Measurements <1GHz were performed at 3 meters.
- 5 Measurements >1GHz were performed at 0.3metres.
- 6 Only emissions with in 20dB of limit are recorded.

Test Method:

- 1 As per section 15.247 and Public Notice DA 00-705.
- 2 Measuring distances as Notes 4 to 5 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 below:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
ANTENNA	EMCO	3115	9010-3580	138	X
ANTENNA	CHASE	CBL6112B	2803	UH93	X
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	X
RANGE 1	TRL	3 METRE	N/A	UH06	X

RECEIVER TESTS – PLATE ANTENNAS

RECEIVER CONDUCTED EMISSIONS – AC POWER LINE Part 15.207

Ambient temperature = 25°C(<1GHz),
Relative humidity = 55%(<1GHz),
Conditions = Power Line Laboratory
Supply voltage = 110V AC
Supply Frequency = 60Hz

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	DETECTOR	CONDUCTOR (L or N)	EMISSION (dBµV)	LIMIT (dBµV)
0.500	Quasi Peak	Live	37.18	56.00
0.545	Quasi Peak	Live	36.30	56.00

Notes:

- 1 See annex N for plot
- 2 Emissions not within 10dB of the limit not necessarily recorded.

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
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 – HANDHELD ANTENNA

RECEIVER CONDUCTED EMISSIONS – AC POWER LINE Part 15.207

Ambient temperature = 25°C(<1GHz),
Relative humidity = 55%(<1GHz),
Conditions = Power Line Laboratory
Supply voltage = 110V AC
Supply Frequency = 60Hz

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	DETECTOR	CONDUCTOR (L or N)	EMISSION (dBµV)	LIMIT (dBµV)
0.500	Quasi Peak	Live	37.06	56.00
0.545	Quasi Peak	Live	36.34	56.00

Notes:

- 1 See annex N for plot
- 2 Emissions not within 10dB of the limit not necessarily recorded.

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
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	

ANNEX A
PHOTOGRAPHS

PHOTOGRAPH No. 1

TEST SETUP PLATE ANTENNAS



Plate Antennas

PHOTOGRAPH No. 2

TEST SETUP HANDHELD ANTENNA



PHOTOGRAPH No. 3 TEST SETUP PLATE ANTENNAS, POWERLINE CONDUCTION



PHOTOGRAPH No. 4 TEST SETUP HANDHELD ANTENNA, POWERLINE CONDUCTION



PHOTOGRAPH No. 5

PLATE ANTENNA FRONT VIEW



PHOTOGRAPH No. 6

HANDHELD ANTENNA FRONT VIEW



PHOTOGRAPH No. 7

HANDHELD ANTENNA REAR VIEW



PHOTOGRAPH No. 8

TOP OF UNIT, LID REMOVED



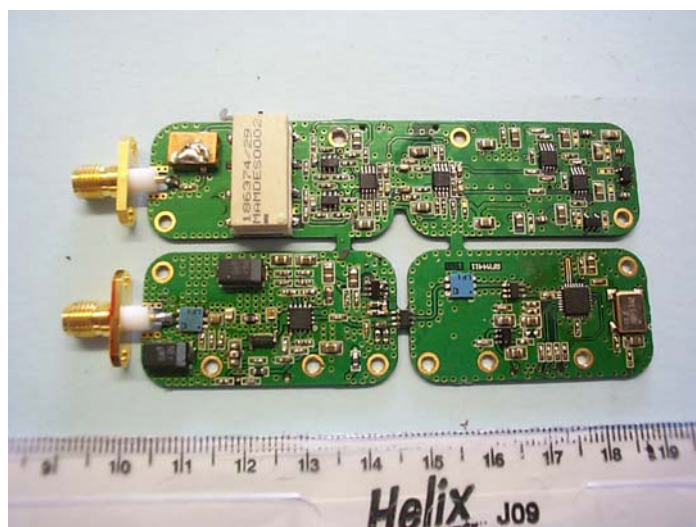
PHOTOGRAPH No. 9

BOTTOM OF UNIT, LID REMOVED



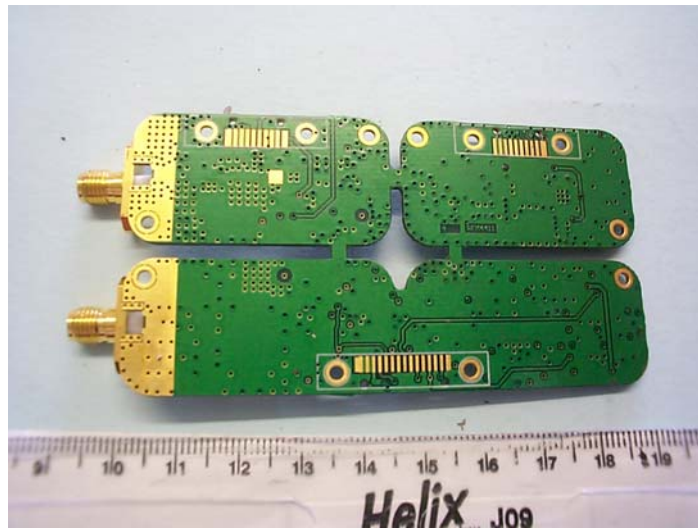
PHOTOGRAPH No. 10

TOP PCB COMPONENT SIDE



PHOTOGRAPH No. 11

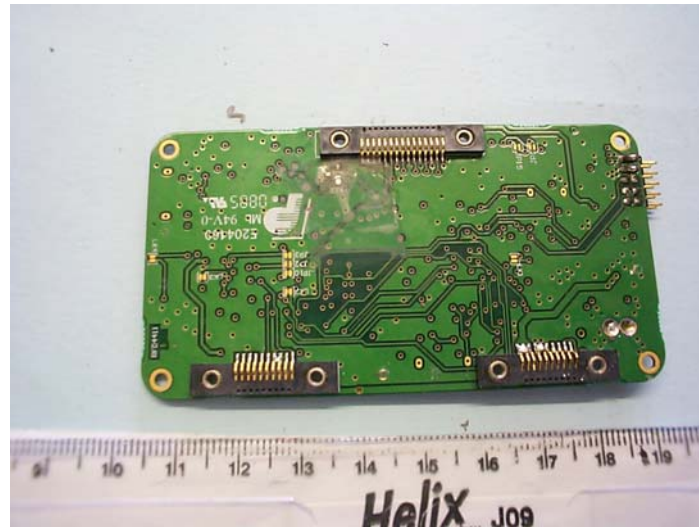
TOP PCB TRACK SIDE





PHOTOGRAPH No. 13

BOTTOM 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)	-		[X]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[]
		-	DRAWINGS	[X]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	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]

ANNEX C

CARRIER FREQUENCY SEPARATION

DLT: 506kHz

-0.03dB

RB 300kHz#

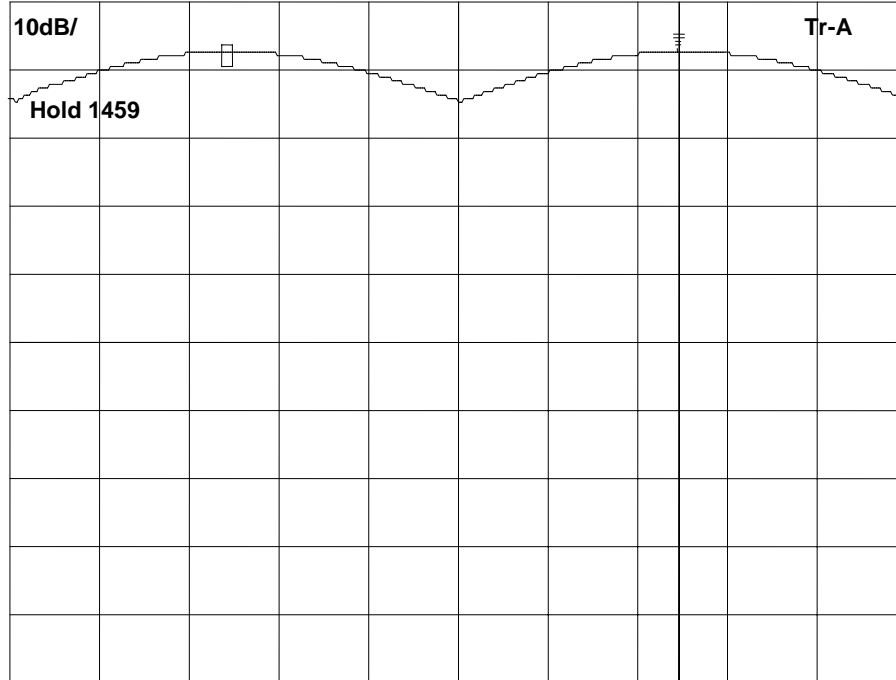
AT 20dB#

Band auto

RLV: 10.00dBm

VB 300kHz

ST 50ms

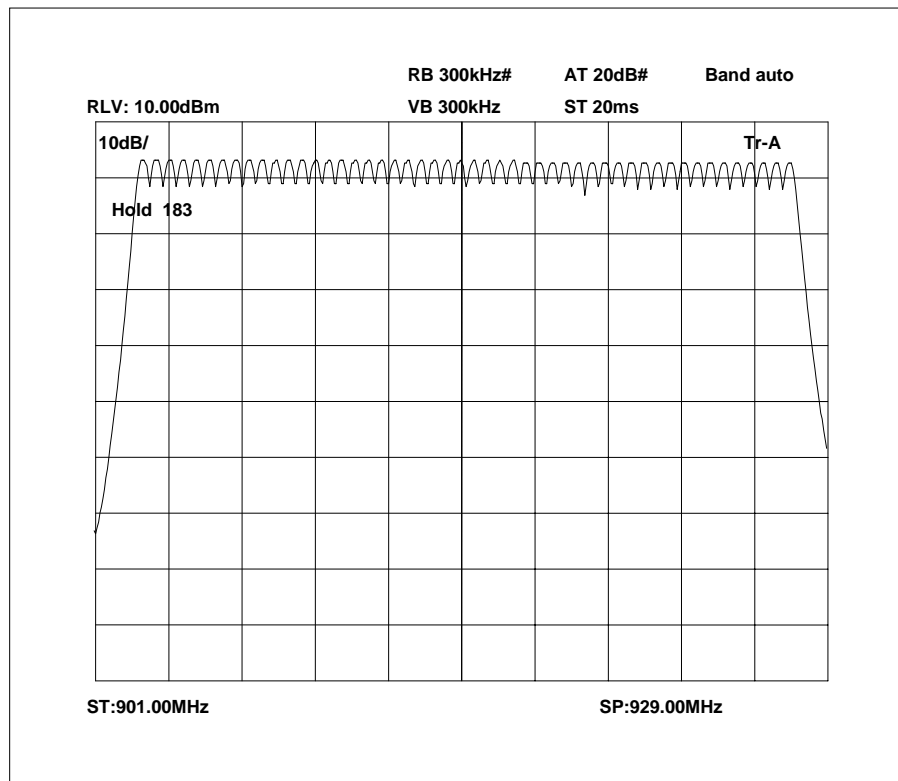


CF:926.985MHz

Span:1.00MHz

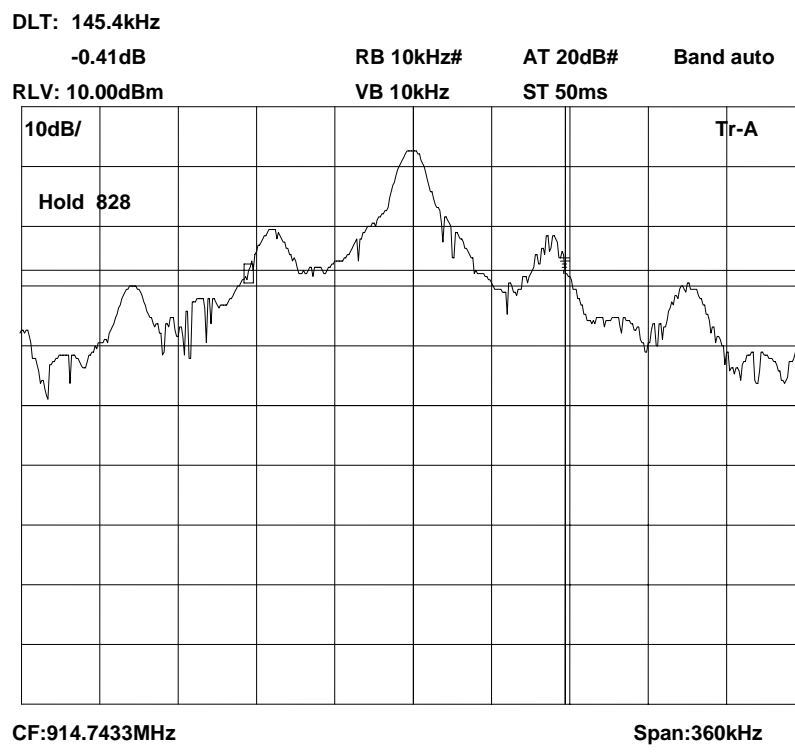
Carrier Frequency Separation = 506kHz

ANNEX D
NUMBER OF HOPPING CHANNELS



Number of Hopping Channels = 50

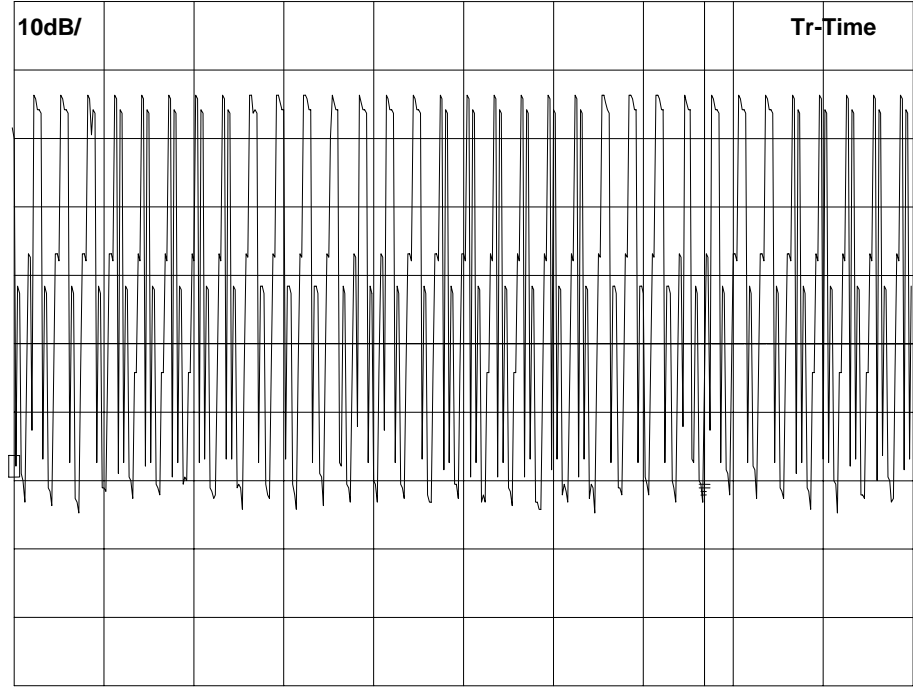
ANNEX E
20dB BANDWIDTH



20 dB Bandwidth = 145.4kHz

ANNEX F
AVERAGE TIME OF OCCUPANCY

DLT: 15.35s
-6.22dB
RLV: 10.00dBm
RB 300kHz#
AT 20dB#
Band auto
VB 300kHz



DT:0us
TS:20s
F:914.966000MHz

Number of transmissions made within 20 seconds

DLT: 10.00ms

53.86dB

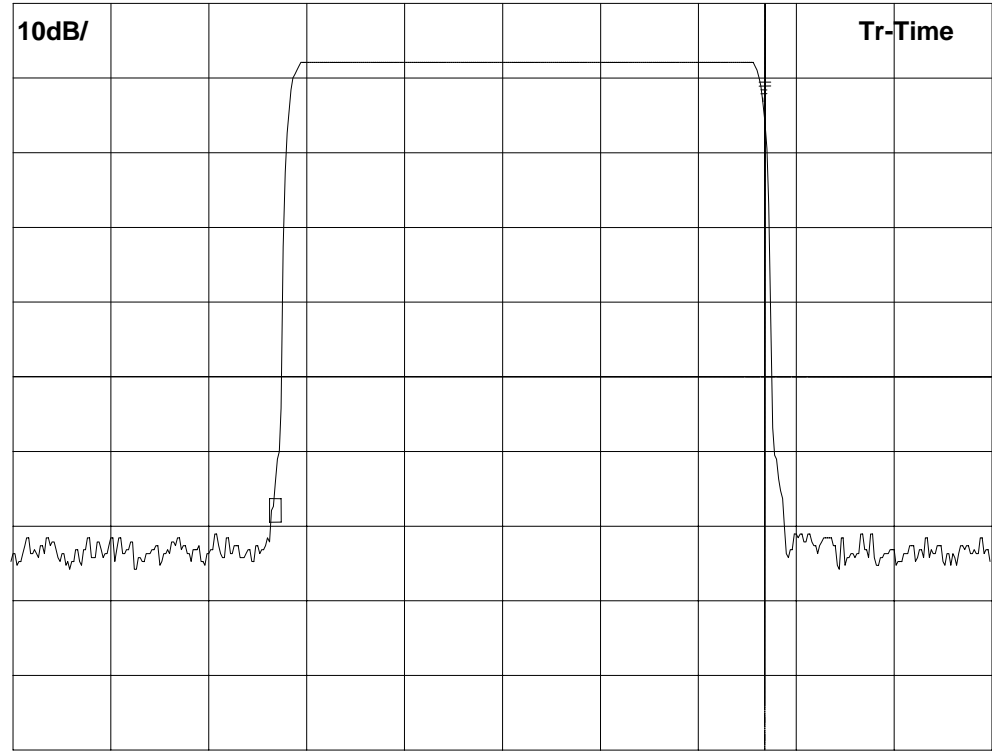
RB 1MHz#

AT 20dB#

Band auto

RLV: 10.00dBm

VB 1MHz



DT:0us

TS:20ms

F:914.966000MHz

Length of one packet

DLT: 10.0ms

58.53dB

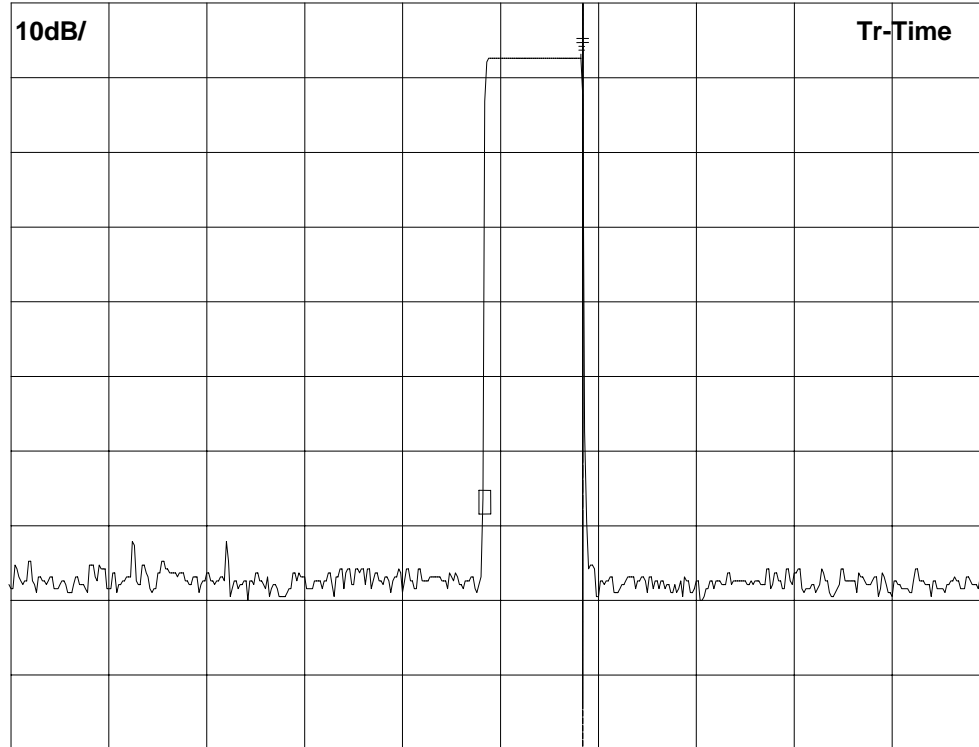
RB 100kHz#

AT 20dB#

Band auto

RLV: 10.00dBm

VB 100kHz



DT:0us

TS:100ms

F:914.736000MHz

Average Dwell time during 100ms

ANNEX G
PEAK POWER CONDUCTED

MKR: 902.7262MHz

3.14dBm

RB 300kHz#

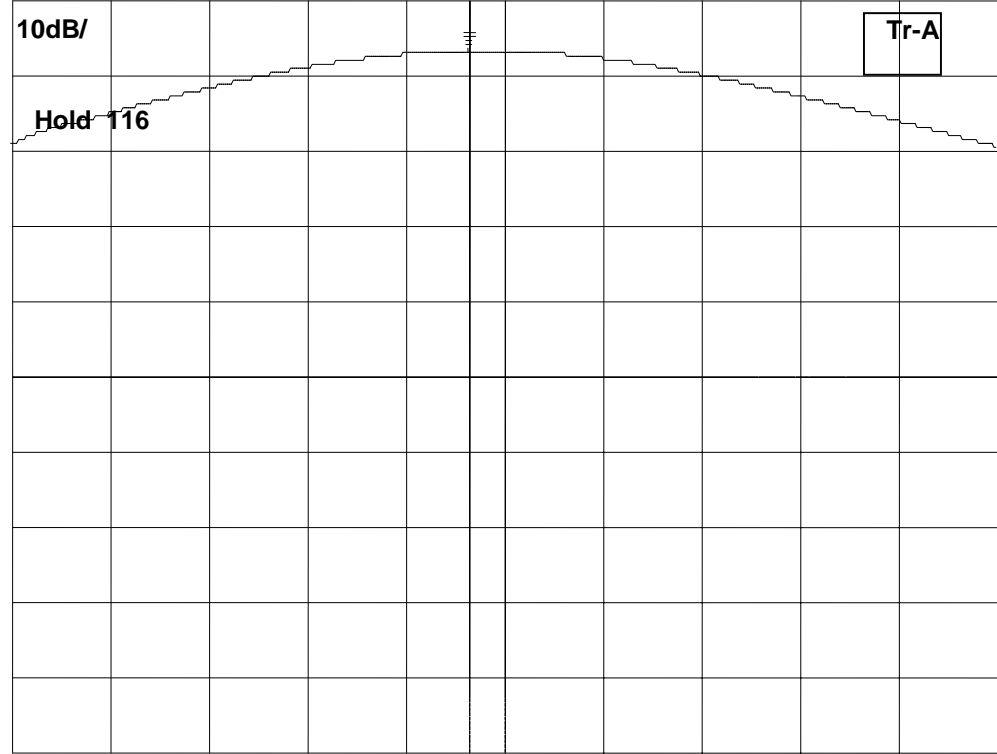
AT 20dB#

Band auto

RLV: 10.00dBm

VB 300kHz

ST 50ms



PEAK POWER LOW CHANNEL

MKR: 914.7282MHz

2.93dBm

RB 300kHz#

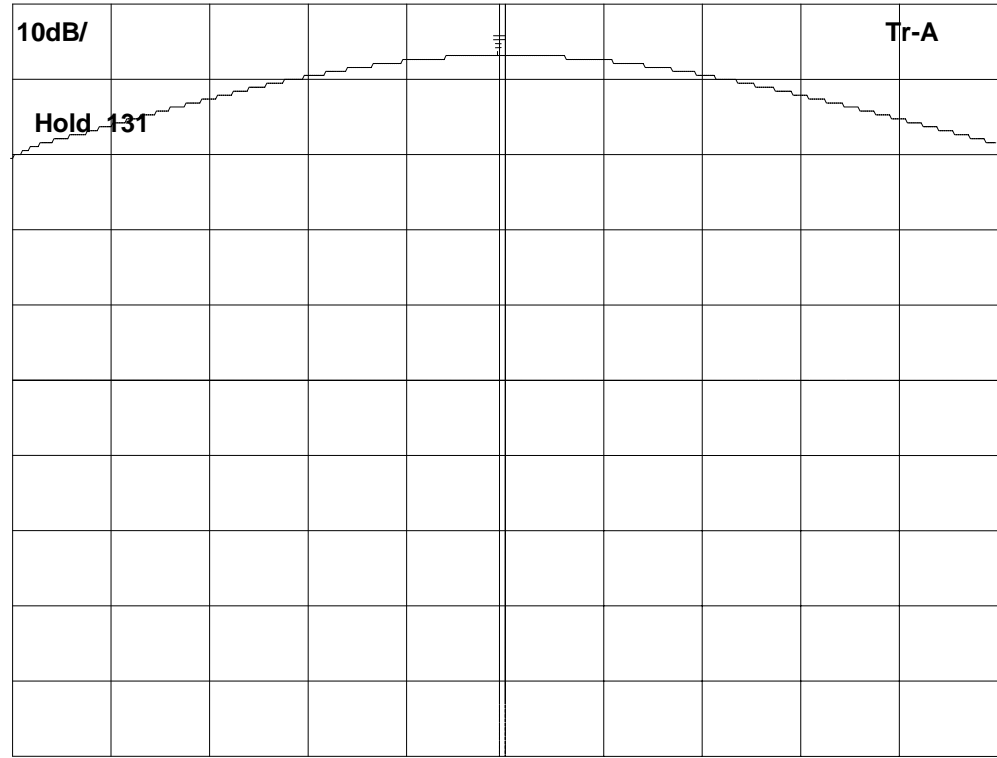
AT 20dB#

Band auto

RLV: 10.00dBm

VB 300kHz

ST 50ms



CF:914.7324MHz

Span:700kHz

PEAK POWER MID CHANNEL

MKR: 927.2360MHz

2.72dBm

RB 300kHz#

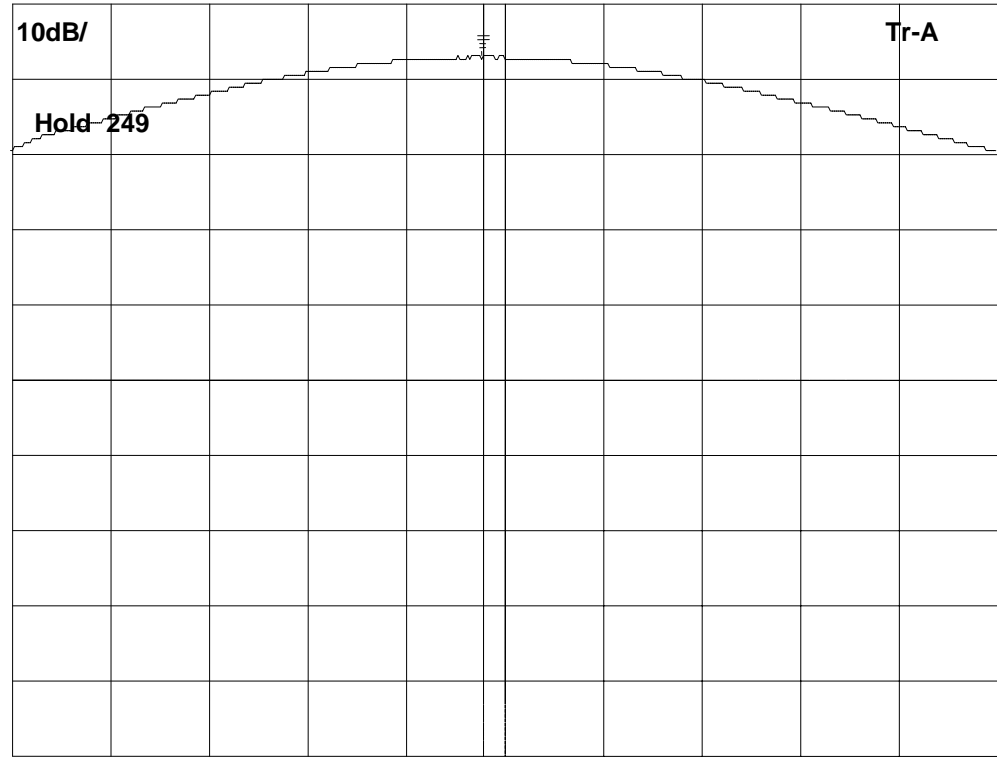
AT 20dB#

Band auto

RLV: 10.00dBm

VB 300kHz

ST 50ms



CF:927.2500MHz

Span:700kHz

PEAK POWER HIGH CHANNEL