

**REPORT ON THE CERTIFICATION TESTING OF A
3M ROCHFORD THOMPSON
RTE5000
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.225 July 2008
INTENTIONAL RADIATOR SPECIFICATION**

TEST REPORT NO: 8F2065Q1WRP2

COPY NO: 1

ISSUE NO: PDF

FCC ID: TULRTEIDPAD

**REPORT ON THE CERTIFICATION TESTING OF A
3M ROCHFORD THOMPSON
RTE5000
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.225 July 2008
INTENTIONAL RADIATOR SPECIFICATION**

TRaC
testing regulatory and compliance

TEST DATE: 11th – 17th March 2009

TESTED BY: D WINSTANLEY

APPROVED BY: J CHARTERS
RADIO PRODUCT
MANAGER

DATE: 11th January 2009

Distribution:

- Copy Nos:
1. 3M Rochford Thompson
 2. TCB: TRaC EMC and Safety
 3. TRaC Telecoms & Radio

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

The results herein relate only to the sample tested. Full results are contained in the relevant works order file.

UP HOLLAND

Moss View, Nipe Lane, Up Holland, West Lancashire, WN8 9PY, UK.
T +44 (0)1695 556666 F +44 (0)1695 557077 E test@tracglobal.com
www.tracglobal.com



0728

CONTENTS

	PAGE
CERTIFICATE OF CONFORMITY & COMPLIANCE	4
APPLICANT'S SUMMARY	5
EQUIPMENT TEST CONDITIONS	6
TESTS REQUIRED	6
TEST RESULTS	7 - 11
	ANNEX
PHOTOGRAPHS	A
PHOTOGRAPH No. 1: Test setup	
PHOTOGRAPH No. 2: Top Overview	
PHOTOGRAPH No. 3: Connector Overview	
PHOTOGRAPH No. 4: Control PCB Top	
PHOTOGRAPH No. 5: Control PCB Bottom	
PHOTOGRAPH No. 6: RF Module Track Side	
PHOTOGRAPH No. 7: RF Module Component Side	
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST	B
MEASUREMENT UNCERTAINTY	C
TEST EQUIPMENT CALIBRATION	D
BAND OCCUPANCY PLOT	E
EMISSIONS GRAPH(S)	F
AC POWERLINE CONDUCTION GRAPH(S)	G
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.	
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:	TULRTEIDPAD
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.225 July 2008
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	RTE5000
ITU: EMISSION CODE:	2k98A1D
EQUIPMENT TYPE:	Inductive Reader
PRODUCT USE:	E-Passport Reader
CARRIER EMISSION:	53.18 μ V/m @ 30m
ANTENNA TYPE:	Integral
ALTERNATIVE ANTENNA:	Not Applicable
FREQUENCY OF OPERATION:	13.56 MHz
CHANNEL SPACING:	Not Applicable, Wideband
NUMBER OF CHANNELS:	1
FREQUENCY GENERATION:	SAW Resonator <input type="checkbox"/> Crystal <input checked="" type="checkbox"/> Synthesiser <input type="checkbox"/>
MODULATION METHOD:	Amplitude <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Angle <input type="checkbox"/>
POWER SOURCE(s):	+110Vac
TEST DATE(s):	11 th – 17 th March 2009
MANUFACTURER:	3M Rochford Thompson
ADDRESS:	The Votec Centre Hambridge Lane Newbury Berkshire RG14 5TN United Kingdom

TESTED BY: _____ D Winstanley

APPROVED BY: _____ J Charters
Radio Product
Manager

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	RTE5000		
EQUIPMENT TYPE:	Inductive Reader		
PURPOSE OF TEST:	Certification		
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.225 July 2008		
TEST RESULT:	COMPLIANT	Yes No	[X] []
APPLICANT'S CATEGORY:	MANUFACTURER IMPORTER DISTRIBUTOR TEST HOUSE AGENT	[] [] [] [X] []	
MANUFACTURER'S CONTACT PERSON(s):	Mr Parfes Mohammed		
E-mail address:	pmohammed@mmm.com		
MANUFACTURER:	3M Rochford Thompson		
ADDRESS:	The Votec Centre Hambridge Lane Newbury Berkshire RG14 5TN United Kingdom		
TEL:	+44 (0) 1635 580666		
FAX:	+44 (0) 1635 36940		
EUT(s) COUNTRY OF ORIGIN:	United Kingdom		
TEST LABORATORY:	TRaC Telecoms & Radio, Up Holland		
UKAS ACCREDITATION No:	0728		
TEST DATE(s)	11 th – 17 th March 2009		
TEST REPORT No:	8F2065Q1WRP2		

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
	Intentional Emission Frequency:	15.225(a)	Quasi Peak	Yes
	Intentional Emission Field Strength:	15.225(a)	Quasi Peak	Yes
	Intentional Emission Band Occupancy:	15.225(e)	Peak	Yes
	Intentional Emission ERP (mW):	-	-	No
	Spurious Emissions – Conducted:	15.207	Quasi Peak Average	Yes
	Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak	Yes
	Spurious Emissions – Radiated >1000MHz:	15.209	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

2. Product Use: E-Passport Reader
3. Emission Designator: 2k98A1D
4. Duty Cycle: <100%
5. Temperatures: Ambient (Tnom) 12°C
6. Supply Voltages: Vnom 110Vac
- Note: Vnom voltages are as stated above unless otherwise shown on the test report page
7. Equipment Category: Single channel ☒
Two channel ☐
Multi-channel ☐
8. Channel spacing: Narrowband ☐
Wideband ☒

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209

Ambient temperature	=	12°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	82% (<1GHz),	10m measurements <30MHz	[X]
Conditions	=	Open Area Test Site (OATS)	30m extrapolated from 10m	[X]
Supply voltage	=	110Vac		

Bottom Channel	FREQ. (MHz)	MEAS Rx (dBμV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	FIELD ST'GH (dBμV/m)	EXTRAP FACT (dB)	FIELD ST'GH (μV/m)	LIMIT (μV/m)
0.009MHz - 0.49MHz								
0.49MHz - 1.705MHz								
1.705MHz - 30MHz								
30MHz - 88MHz	40.68	22.8	1.1	12.2	36.1	-	63.82	100
88MHz - 216MHz	149.20	21.5	1.7	10.0	33.2	-	45.71	150
	166.00	20.5	1.8	9.2	31.5	-	37.58	150
	176.30	28.7	1.8	8.6	39.1	-	90.15	150
	203.45	29.5	1.9	8.7	40.1	-	101.58	150
216MHz - 960MHz	217.00	33.0	2.0	8.3	43.3	-	146.22	200
	298.65	23.8	2.3	12.9	39.0	-	89.12	200
	311.90	28.4	2.4	13.4	44.2	-	162.18	200
	318.90	29.7	2.4	13.6	45.7	-	192.75	200
	329.50	26.1	2.3	13.8	42.2	-	128.82	200
	355.60	19.7	2.5	14.5	36.7	-	68.39	200
	357.50	21.1	2.5	14.6	38.2	-	81.28	200
	407.90	25.3	2.7	16.3	44.3	-	164.06	200
	409.05	26.5	2.7	16.4	45.6	-	190.54	200
	495.10	18.3	3.1	17.1	38.5	-	84.14	200
	498.40	18.4	3.0	17.2	38.6	-	85.11	200
960MHz - 1GHz								
Limits	0.009 MHz to 0.49 MHz		2400/f(kHz) μV/m @ 300m					
	0.49 MHz to 1.705 MHz		24000/f(kHz) μV/m @ 30m					
	1.705MHz to 30MHz		30μV/m @ 30m					
	30MHz to 88MHz		100μV/m @ 3m					
	88MHz to 216MHz		150μV/m @ 3m					
	216MHz to 960MHz		200μV/m @ 3m					
	960MHz to 1GHz		500μV/m @ 3m					

See next page for noted, test method and test equipment.

Notes:

- 1 Results quoted are extrapolated as indicated
- 2 Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a
- 3 Extrapolation factor 9.5dB from 1m to 3m, as per Part 15.31f
- 4 Extrapolation factor 10m to 30m, as per Part 15.31f
- 5 Measurements >1GHz @ 1m as per Part 15.31f(1)
- 6 Receiver detector <1GHz CISPR, Quasi-Peak, 120kHz bandwidth
- 7 Receiver detector < 30MHz = CISPR, Quasi-Peak, 10kHz bandwidth except in the bands 9-90 kHz, 110-490 kHz where an average detector is employed.
- 8 New batteries used for battery-powered products.
- 10 See Annex F for Emissions Graph(s).
- 11 Emissions 20 dB below the limit are not necessarily recorded.
- 12 For Emissions below 30 MHz the measuring receiver automatically compensates for the losses due to the antenna factor of the loop antenna. This loss is 20 dB across the measurement range 9kHz – 30MHz.
- 13 For emissions below 30 MHz cable losses are assumed to be negligible.

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 below:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	EQUIPMENT USED
LOOP ANTENNA	R & S	HFH2	881058-53	07	X
RECEIVER	R & S	ESVS 10	844594/003	352	X
RECEIVER	R & S	ESHS 10	830051/001	UH03	X
RANGE 1	TRaC	3 METRE	N/A	UH06	X
RANGE 1	TRaC	10 METRE	N/A	UH07	X
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	X

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.225 July 2008

Ambient temperature	=	12°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	48%(<1GHz),	10m measurements @ fc	[X]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[]
Supply voltage	=	110Vac	30m extrapolated from 3m	[X]
Channel number	=	1	30m extrapolated from 10m	[X]

FREQ. (MHz)	MEASUREMENT DISTANCE Meters	MEASUREMENT Rx. READING (dBµV/m)	EXTRAPOLATION FACTOR (dB)	FIELD STRENGTH (µV/m)
13.56	3	73.00	38.48	53.18
13.56	10	53.60	19.08	53.18
Limit value @ fc		15,848 (µV/m)		
Band occupancy @ -20 dBc		f lower	f higher	
		13.560128205 MHz	13.563108974 MHz	

See spectrum analyser plot – Annex E

Notes:

- 1 Results quoted are extrapolated as indicated
- 2 Receiver detector @ fc = Quasi Peak 10kHz
- 3 When battery powered the EUT was powered with new batteries
- 4 The 3 –10 meter extrapolation factor of 19.4 dB Calculated from the above results
- 5 Extrapolation factor 10 – 30 meters is 19.08dB using the extrapolation factor of 40dB/decade as per 15.31(f)
- 6 For Emissions below 30 MHz the measuring receiver automatically compensates for the losses due to the antenna factor of the loop antenna. This loss is 20 dB across the measurement range 9kHz – 30MHz.
- 7 For emissions below 30 MHz cable losses are assumed to be negligible.
- 8 The results quoted are the highest seen after the supply voltage is varied between 85% to 115%

Test Method:

- 1 As per Radio – Noise Emissions, ANSI C63.4: 2003
- 2 Measuring distances 3m
- 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 Intentional Emission – Radiated – Part 15.225 July 2008 tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	EQUIPMENT USED
LOOP ANTENNA	R & S	HFH2	881058-53	07	X
RECEIVER	R & S	ESHS 10	830051/001	UH03	X
RANGE 1	TRaC	3 METRE	N/A	UH06	X
RANGE 1	TRaC	10 METRE	N/A	UH07	X

TRANSMITTER TESTS

TRANSMITTER CONDUCTED EMISSIONS – AC POWER LINE Part 15.207

Ambient temperature = 12°C(<1GHz),
Relative humidity = 48%(<1GHz),
Conditions = Power Line Laboratory
Supply voltage = 110V AC
Supply Frequency = 60Hz

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dBμV)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dBμV)
0.200	60.62	Quasi Peak	Live Line	63.82
0.265	52.57	Quasi Peak	Live Line	61.27
0.330	45.01	Quasi Peak	Live Line	59.45
0.395	35.78	Quasi Peak	Live Line	47.96
0.530	35.33	Average	Live Line	46.00
0.660	33.80	Average	Live Line	46.00
0.795	34.01	Average	Neutral Line	46.00
0.855	29.44	Average	Neutral Line	46.00
0.990	30.74	Average	Live Line	46.00
1.055	29.86	Average	Neutral Line	46.00
1.385	30.47	Average	Neutral Line	46.00
13.56*	22.90	Average	Neutral Line	60.00

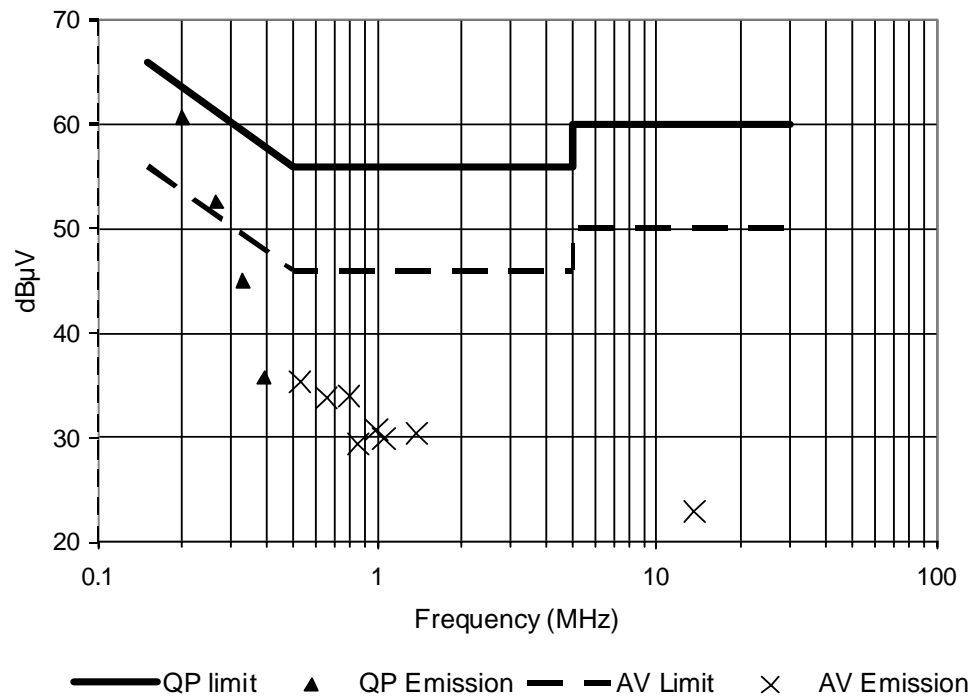
Notes:
1 See attached plot annex G
2 * Measured the antenna replace by dummy load.

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	
LISN/AMN	ROHDE & SCHWARZ	ESH3-Z5	863906/018	UH05	
RECEIVER	ROHDE & SCHWARZ	ESHS 10	841429/012	UH187	X
LISN/AMN	ROHDE & SCHWARZ	ESH3-Z5	8407 31/015	UH195	X

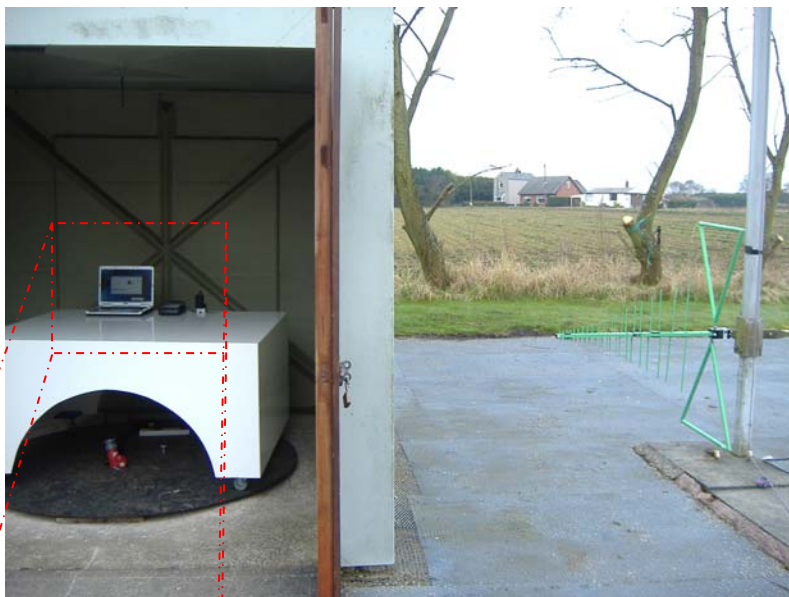
POWER LINE CONDUCTION EMISSIONS



ANNEX A
PHOTOGRAPHS

PHOTOGRAPH No. 1

TEST SETUP

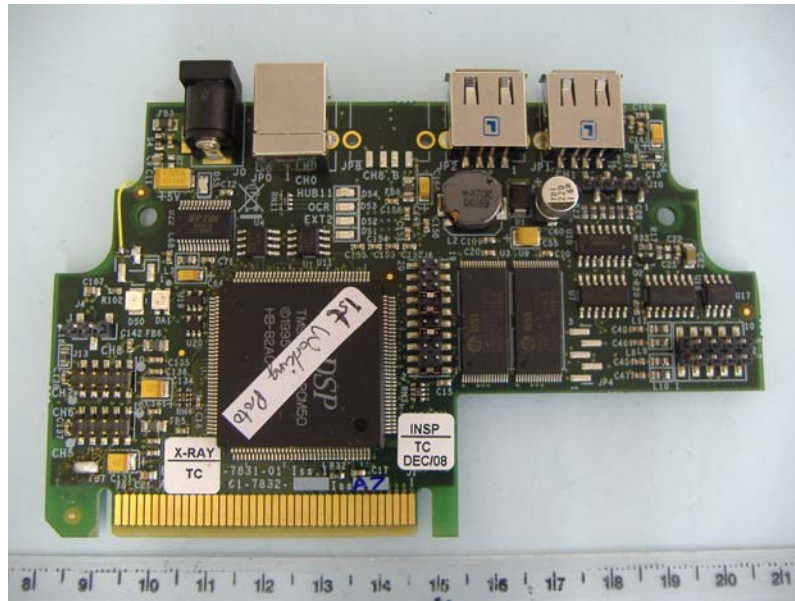


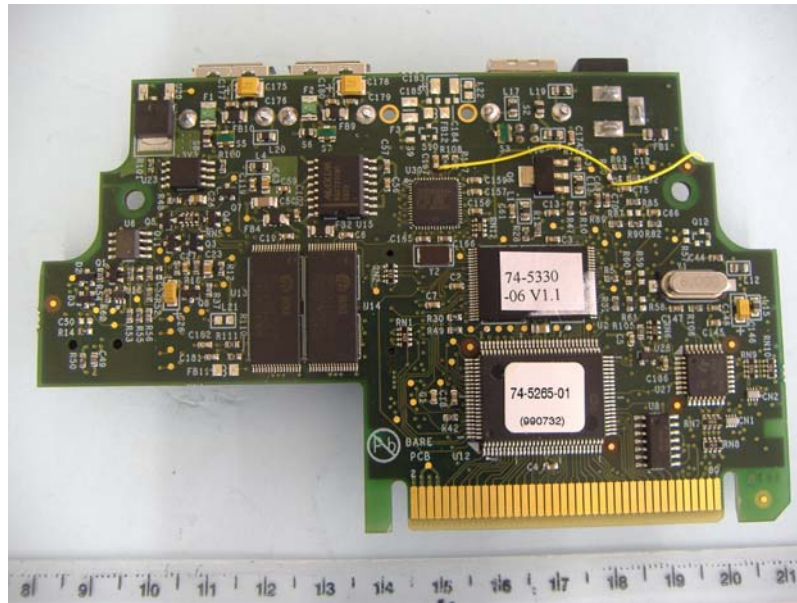




PHOTOGRAPH No. 4

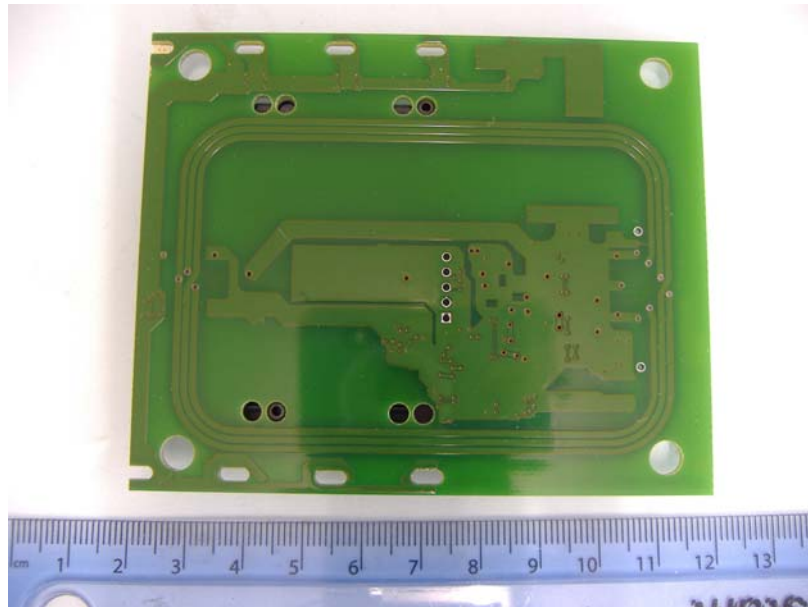
CONTROL PCB TOP SIDE





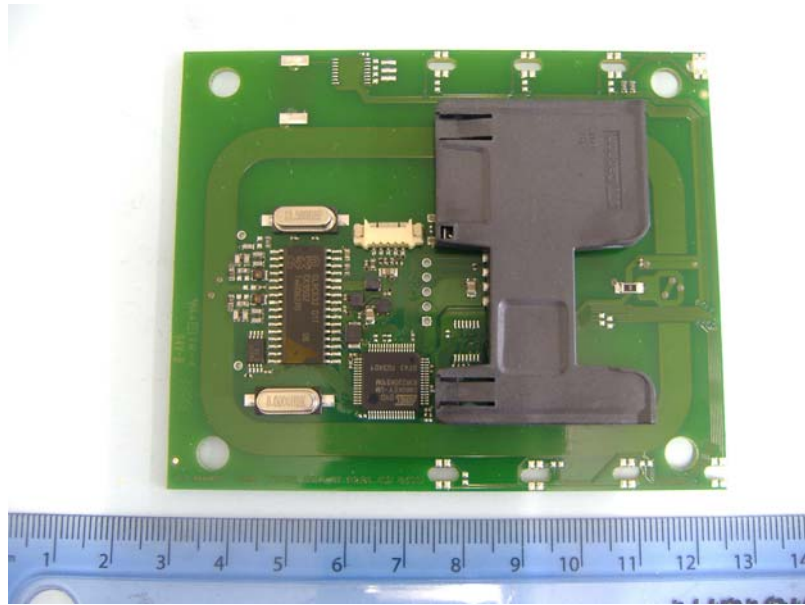
PHOTOGRAPH No. 6

RF MODULE TRACK SIDE



PHOTOGRAPH No. 7

RF MODULE COMPONENT 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	-		[X]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[]
		-	DRAWINGS	[]
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
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**

[12] Spectrum Mask Measurements

Uncertainty in test result = **2.59% (frequency)**
Uncertainty in test result = **1.32dB (amplitude)**

[13] Adjacent Sub Band Selectivity

Uncertainty in test result = **1.24dB**

[14] Receiver Blocking – Listen Mode, Radiated

Uncertainty in test result = **3.42dB**

[15] Receiver Blocking – Talk Mode, Radiated

Uncertainty in test result = **3.36dB**

[16] Receiver Blocking – Talk Mode, Conducted

Uncertainty in test result = **1.24dB**

[17] Receiver Threshold

Uncertainty in test result = **3.23dB**

[18] Transmission Time Measurement

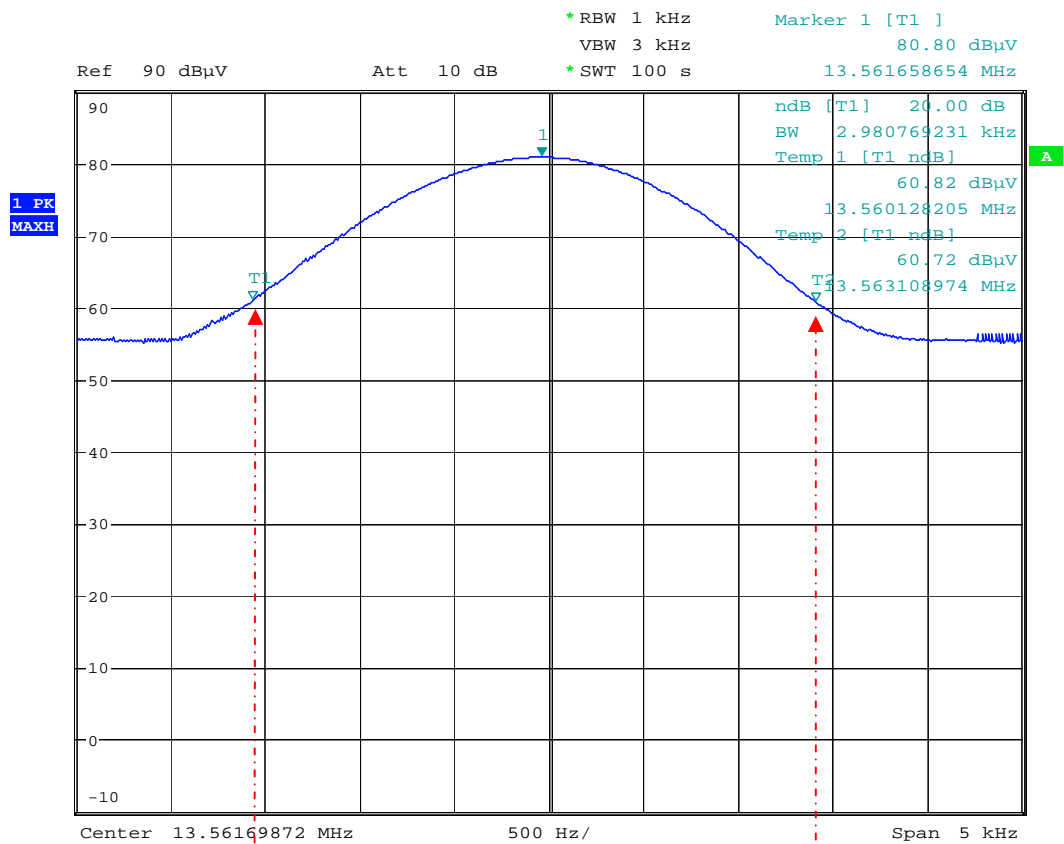
Uncertainty in test result = **7.98%**

ANNEX D
TEST EQUIPMENT CALIBRATION

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH003	Receiver	R&S	09/12/2008	12	09/12/2009
UH093	Bilog Antenna	Chase	21/05/2007	24	21/05/2009
UH187	Receiver	R&S	09/12/2008	12	09/12/2009
UH195	LISN	R&S	19/01/2009	12	19/01/2010
UH281	Spectrum Analyser	R&S	28/10/2008	12	28/10/2009
L007	Loop Antenna	R&S	22/05/2007	24	22/05/2009
L352	Receiver	R&S	09/12/2008	12	09/12/2009

ANNEX E
BANDWIDTH PLOT

BANDWIDTH PLOT



Date: 20.MAR.2009 09:16:32

f_{Lower}

f_{Higher}

f_{Lower} = 13.560128205 MHz
 f_{Higher} = 13.563108974 MHz
Occupied Bandwidth = 2.98 kHz

ANNEX F
EMISSIONS GRAPH(s)

TRaC Global

11 Mar 2009 10:32

E-Field Radiation (30MHz-1GHz)

EUT: RTE5000
 Manuf: 3M
 Op Cond: Prescan 30MHz - 1000MHz
 Operator: J Charters
 Test Spec: CFR47 Part15
 Comment:

Rx antenna Vertical.

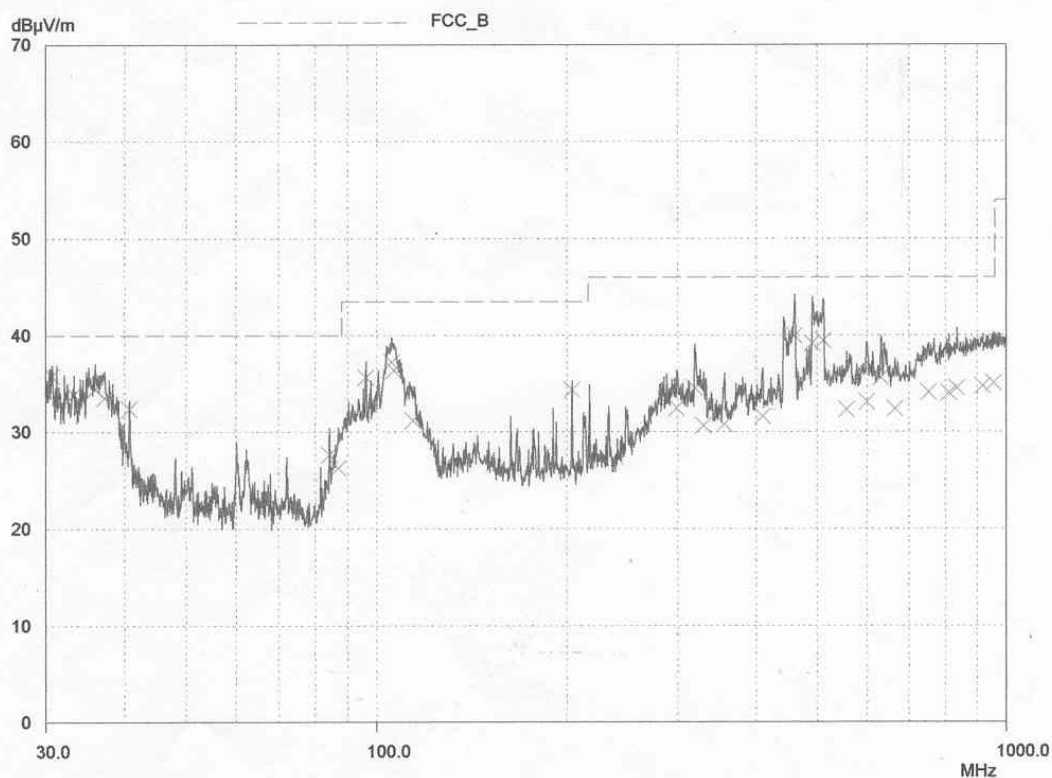
Scan Settings

(1 Range)

Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto

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



PAGE 1

ANNEX G
AC POWERLINE CONDUCTION GRAPH(s)

TRaC Telecoms & Radio

12 Mar 2009 14:47

Powerline Conduction 150kHz - 30MHz

EUT: RTE5000
 Manuf: 3M Rochford Thompson
 Op Cond: LISN UH195, cable UH21 & Receiver UH187
 Operator: D Winstanley
 Test Spec: Part 15
 Comment: Live Line, 110V, 60Hz, EUT on Passport Present,

Result File: Live_PP.dat : Live Line Passport Present

Scan Settings (1 Range)

Frequencies				Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150kHz	30MHz	5kHz	10kHz	PK+AV	50msec	Auto	OFF
				OpRge			
				60dB			

Transducer	No.	Start	Stop	Name
1	1	9kHz	30MHz	UH21
	2	150kHz	30MHz	UH195

Final Measurement: Detectors: X QP / + AV
 Meas Time: 2sec
 Subranges: 25
 Acc Margin: 20 dB

