



**ELECTRONIC TECHNOLOGY SYSTEMS
DR. GENZ GMBH**

TEST - REPORT

FCC PART 15 for Isochronous UPCS devices

FCC ID: ELIRTX3055

Test report no.:

G0M20503-9313-C-1



Certificate 1983-01

TABLE OF CONTENTS

1 General information

- 1.1 Notes
- 1.2 Testing laboratory
- 1.3 Details of approval holder
- 1.4 Application details
- 1.5 Test item
- 1.6 Test standards

2 TECHNICAL TEST

- 2.1 Summary of test results
- 2.2 Test environment
- 2.3 Test equipment utilized
- 2.4 Examinations and Test Procedures
 - 2.4.1 Coordination with fixed microwave service, FCC 15.307 (b)
 - 2.4.2 Reference to Subpart B, FCC 15.309 (b)
 - 2.4.3 Labeling requirements, FCC 15.311,15.19(a)(3)
 - 2.4.4 Conducted limits AC Power line, FCC 15.315 , 15.207
 - 2.4.5 Antenna requirement, FCC 15.317, 15.203
 - 2.4.6 Modulation techniques, FCC 15.319 (b)
 - 2.4.7 Emission band width, FCC 15.323 (a)
 - 2.4.8 Peak Transmit Power, FCC 15.319 (c)
 - 2.4.9 Power spectral density, FCC 15.319 (d)
 - 2.4.10 Directional gain of the antenna, FCC 15.319 (e)
 - 2.4.11 Automatic discontinuation of transmission, FCC 15.319 (f)
 - 2.4.12 Radio frequency radiation exposure, FCC 15.319 (i)
 - 2.4.13 Monitoring threshold , FCC 15.323 (c)(2); (c)(9)
 - 2.4.14 Monitoring of intended transmit window and maximum reaction time, FCC 15.323 (c)(1)
 - 2.4.15 Monitoring band width, FCC 15.323 (c)(7)
 - 2.4.16 Random waiting interval, FCC 15.323 (c)(6)
 - 2.4.17 Duration of transmission, FCC 15.323 (c)(3)
 - 2.4.18 Connection acknowledgement, FCC 15.323 (c)(4)
 - 2.4.19 Upper threshold selected channel, power accuracy, segment occupancy; FCC 15.323 (c)(5)
 - 2.4.20 Monitoring antenna, FCC 15.323 (c)(8)
 - 2.4.21 Duplex connections, FCC 15.323 (c)(10)
 - 2.4.22 Alternative monitoring interval for co-located devices, FCC 15.323 (c)(11)
 - 2.4.23 Fair access to spectrum related to (c)(10) and (c)(11), FCC 15.323 (c)(12)
 - 2.4.24 Emissions inside and outside the sub-band, FCC 15.323 (d)
 - 2.4.25 Frame period, FCC 323 (e)
 - 2.4.26 Frequency stability, FCC 323 (f)

3 RESULTS OF EXAMINATIONS AND TESTS

- 3.1 Coordination with fixed microwave service, FCC 15.307 (b)
- 3.2 Reference to Subpart B, FCC 15.309 (b)
- 3.3 Labeling requirements, FCC 15.311, 15.19(a)(3)
- 3.4 Conducted limits AC Power line, FCC 15.315 , 15.207
- 3.5 Antenna requirement, FCC 15.317, 15.203
- 3.6 Modulation techniques, FCC 15.319 (b)
- 3.7 Emission band width, FCC 15.323 (a)
- 3.8 Peak Transmit Power, FCC 15.319 (c)
- 3.9 Power spectral density, FCC 15.319 (d)
- 3.10 Directional gain of the antenna, FCC 15.319 (e)
- 3.11 Automatic discontinuation of transmission, FCC 15.319 (f)
- 3.12 Radio frequency radiation exposure, FCC 15.319 (i)
- 3.13 Monitoring threshold , FCC 15.323 (c)(2); (c)(9)
- 3.14 Monitoring of intended transmit window and maximum reaction time, FCC 15.323 (c)(1)
- 3.15 Monitoring band width, FCC 15.323 (c)(7)
- 3.16 Random waiting interval, FCC 15.323 (c)(6)
- 3.17 Duration of transmission, FCC 15.323 (c)(3)
- 3.18 Connection acknowledgement, FCC 15.323 (c)(4)
- 3.19 Upper threshold selected channel, power accuracy, segment occupancy; FCC 15.323 (c)(5)
- 3.20 Monitoring antenna, FCC 15.323 (c)(8)
- 3.21 Duplex connections, FCC 15.323 (c)(10)
- 3.22 Alternative monitoring interval for co-located devices, FCC 15.323 (c)(11)
- 3.23 Fair access to spectrum related to (c)(10) and (c)(11), FCC 15.323 (c)(12)
- 3.24 Emissions inside and outside the sub-band, FCC 15.323 (d)
- 3.25 Frame period, FCC 323 (e)
- 3.26 Frequency stability, FCC 323 (f)

1 General Information

1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has Passed all the relevant tests conforms to a specification.

Neither is there any guarantee that such a test sample will interoperate with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.

The test report may only be reproduced or published in full.

Reproduction or publication of extracts from the report requires the prior written approval of the ELECTRONIC TECHNOLOGY SYSTEMS DR. GENZ GMBH.

Specific Conditions:

Usage of the hereunder tested device in combination with other integrated or external antennas requires at least additional output power measurements, spurious emission measurements, conducted emission measurements (AC supply lines) and radio frequency exposure evaluations for each individual configuration are performed, for certification by FCC.

This report is related to FCC Part 15 D applied to UPCS devices of which technology is derived from DECT standard.

Tester:

16.03.2005

D. Hoppe

i.s. 

Date

ETS-Lab.

Name

Signature

Technical responsibility for area of testing:

16.03.2005

N. Kaspar



Date

ETS

Name

Signature

1.2 Testing laboratory

1.2.1 Location

ELECTRONIC TECHNOLOGY SYSTEM DR. GENZ GMBH (ETS)
Storkower Straße 38c
D-15526 Reichenwalde b. Berlin
Germany
Telefon : +49 33631 888 00
Telefax : +49 33631 888 66

1.2.2 Details of accreditation status

ACCREDITED TESTING LABORATORY
DAR-REGISTRATION NUMBER: TTI-P-G 126/96

ACCREDITED COMPETENT BODY
DAR-REGISTRATION NUMBER: BPT-ZE-026/96

FCC FILED TEST LABORATORY REG. No. 96970

Bluetooth Qualification Test Facility (BQTF)
Accredited by Bluetooth Qualification Review Board (BQRF)

INDUSTRY CANADA FILED TEST LABORATORY REG. No. IC 3470

A2LA ACCREDITED Certificate Number: 1983-01

1.3 Details of approval holder

Name	: RTX Products A/S
Street	: Stroemmen 6
Town	: 9400 Noerresundby
Country	: Denmark
Telephone	: 0045 9632 2300
Fax	: 0045 9632 2310
Contact	: Mr. Niels Harsberg
Telephone	: 0045 9632 2300
E-mail	: nh@rtx.dk

1.4 Application details

Date of receipt of application : 08.03.2005
 Date of receipt of test item : 08.03.2005
 Date of test : 08.03.2005-16.03.2005

1.5 Test item

Description of test item : Isochronous UPCS device, cordless phone
 based on DECT modified technology.

Function	
Portable part	
Base station	☒
Repeater	

Type identification : 3055.1 (Base), 3055.2 (Handset), 3055.3 (Cradle)
 Fixed part

Serial number : Test model without serial number.

Photos : See annex

Technical data

Frequency bands : 1920 – 1930 MHz

Operating Channel numbers	Test Frequencies	Channel center frequency (MHz)
-14	F_L	1921.54
-15		1923.26
-16	F_M	1924.99
-17		1926.72
-18	F_U	1928.45

Number of channels : 20 (in time and spectrum window, declared by manufacturer)

Operating modes : MC / TDMA / TDD

Type of modulation : GFSK

Max. slot type:

single slot	☐
double slot	☒

Fixed point-to-point operation: Yes/No

Antenna	Type	Gain [dBi]	internal	external
1	F-antenna	3	☒	☐
2	F-antenna	3	☒	☐

Antenna connector : n.a.

Antenna diversity :

Antenna	Diversity supported	
	Tx	Rx
1	☒	☒
2	☒	☒

Host device : none

Classification : related to radio frequency radiation exposure

Fixed Device	☐
Mobile Device (Human Body distance > 20cm)	☒
Portable Device (Human Body distance < 20cm)	☐

Power supply : 10 V DC 120 V AC/DC Adapter

Type of power supply : AC Adaptor MC162-100050

Data connection :

Connection	used
None	☐
PSTN	☒
Data Networks	☐
others	☐

Remark: Devices intended to be connected to PSTN have to be applied for FCC PART 68 registration.

Manufacturer:
(if applicable)

Name :
Street :
Town :
Country :

1.6 Test standards

Technical standard : FCC PART 15, Subpart D

Test method and procedure: Following requirements of FCC Part 15 D and ANSI C63.17-1998

Additional information : The row scheme for frequency generation, radio channels, receiver parameters, synchronization procedure, and other parameters are determined by the DECT standard. Details are content of operational description provided by manufacturer.

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.



or

The deviations as specified in 2.5 were ascertained in the course of the tests performed.



2.2 Test environment

Temperature : 25°C

Relative humidity content : 20 ... 75 %

Air pressure : 86 ... 103 kPa

Details of power supply : 10 V DC 120 V AC/DC Adapter

Extreme conditions parameters: : test voltage - extreme min : 102 V, AC
(manufacturer declaration) max: 138 V, AC

temperatures – extreme min: -10°C ¹⁾
max: +55°C ¹⁾

Remarks: ¹⁾ declared by manufacturer

2.3 Test equipment utilized

No.	Test equipment	Type	Manufacturer
ETS 0001	ESD Gun	SESD 30000	Schlöder
ETS 0002	Test receiver	ESVP	Rohde & Schwarz
ETS 0003	Diode power sensor	NRV-Z2	Rohde & Schwarz
ETS 0004	Spectrum and network analyzer	FSMS 26	Rohde & Schwarz
ETS 0005	Test receiver	SMV 11	MEB
ETS 0006	Test receiver system	SME 12	MEB
ETS 0007	Horn antenna	AT 4004	ar
ETS 0008	Antenna	Loop antenna	Siemens
ETS 0009	Antenna	ARA 2	MEB
ETS 0010	Antenna	Loop antenna	MEB
ETS 0011	Antenna	van Veen/ Frame	Rohde & Schwarz
ETS 0012	Antenna	HK 116	Rohde & Schwarz
ETS 0013	Antenna	HL 223	Rohde & Schwarz
ETS 0014	Antenna	HL 025	Rohde & Schwarz
ETS 0015	Antenna	HL 025	Rohde & Schwarz
ETS 0016	Precision antenna kit	VHAP	Schwarzbeck
ETS 0017	Precision antenna kit	UHAP	Schwarzbeck
ETS 0018	Horn antenna	BBHA 9120 D	Schwarzbeck
ETS 0019	Horn antenna	BBHA 9120 D	Schwarzbeck
ETS 0020	Antenna	DP 21	MEB
ETS 0021	Antenna	DP 3	MEB
ETS 0022	Antenna	SAS-200/ 521	A.H. Systeme+D65
ETS 0023	Antenna	DP 1	MEB
ETS 0024	Antenna mast	AF 2	MEB
ETS 0025	Antenna mast	AF 2	MEB
ETS 0026	Tripod		Heinrich Deisel
ETS 0027	Tripod		Heinrich Deisel
ETS 0028	Tripod	STA 2	C. Lorenz AG
ETS 0029	Tripod		Berlebach
ETS 0030	Antenna	HK 116	Rohde & Schwarz
ETS 0031	Turn table	DS 412	Heinrich Deisel
ETS 0032	Controller	HD 050	Heinrich Deisel
ETS 0033	Calibr.Set CDN	3xAdapter 50-150 Ohm	ETS
ETS 0034	RF generator/ Amplifier	SMLR	Rohde & Schwarz
ETS 0035	RF generator/ Amplifier	SMLM	Rohde & Schwarz

No.	Test equipment	Type	Manufacturer
ETS 0036	Zirc. Antenna	3102	EMCO
ETS 0037	Zirc. Antenna	3102L	EMCO
ETS 0038	RF amplifier	150L	Amplifier Research
ETS 0039	Absorbing clamp	MDS 21	Rohde & Schwarz
ETS 0040	Artificial mains	ESH3-Z5	Rohde & Schwarz
ETS 0041	Artificial mains	ESH3-Z4	Rohde & Schwarz
ETS 0042	Artificial mains	ESH3-Z6	Rohde & Schwarz
ETS 0043	Directional coupler	1850	KRYTAR
ETS 0044	Artificial mains	NNB 111	MEB
ETS 0045	Stripe line	IEC 801-3	ETS
ETS 0046	Power supply	LTS 006	RFT
ETS 0047	Power supply	TG 20/ 1	Statron
ETS 0048	Power supply	TG 20/ 1	Statron
ETS 0049	Power supply	T 102	TPW
ETS 0050	Power supply	T 101b	TPW
ETS 0051	Oscilloscope	TDS 640A	Tektronix
ETS 0053	ECAT Control center	CE 40	Keytek/ EMV
ETS 0054	EFT simulator	E 412	Keytek/ EMV
ETS 0055	Module network coupler	E 4551	Keytek/ EMV
ETS 0056	Blank plug-in		Keytek/ EMV
ETS 0057	Module SURGE with DC coupler	E 501	Keytek/ EMV
ETS 0058	Capacitive coupling clamp	E 502 B	Keytek/ EMV
ETS 0059	Kikusui amplifier	PCR 2000L	Keytek/ EMV
ETS 0060	Xitron power analyzer		Keytek/ EMV
ETS 0061	Power/ Arb (Harm., Ramp)		Keytek/ EMV
ETS 0062	Reference impedance		Keytek/ EMV
ETS 0063	Blank plug-in		Keytek/ EMV
ETS 0064	CDN IEC 1000-4-6		Keytek/ EMV
ETS 0065	ESD-generator minizap		Keytek/ EMV
ETS 0066	EM Injection Clamp		FCC/ EMV
ETS 0067	Calibration Fixture	IEC 801-2031 CF	FCC/ EMV
ETS 0068	CDN IEC 1000-4-6	CDN	FCC/ EMV
ETS 0069	EM Radiation Monitor	EMR-20	Wandel & Goltermann
ETS 0070	PC Transfer set EMR-20	EMR-20	Wandel & Goltermann
ETS 0071	Video camera system	KMB012	Kocom
ETS 0072	Interphone system	JS-1400	Jiuh Sheng
ETS 0073	Audio noise meter	GSM 2	MKD/ RFT
ETS 0074	RF millivoltmeter	QRV 2	MKD/ RFT

No.	Test equipment	Type	Manufacturer
ETS 0075	NF generator	GF 22	Präcitronic
ETS 0076	Feeding bridge A	SBA 1000	ESP
ETS 0078	LCR meter	SR 720	SRS
ETS 0079	Functional generator	MX-2020	Maxcom
ETS 0080	EMI Software	ES-K1	Rohde & Schwarz
ETS 0081	EMI Software	ES-K10	Rohde & Schwarz
ETS 0082	PC system	Novell	Esotronic
ETS 0083	Apple computer system	Performa 630	Macintosh
ETS 0084	Process controller	PSA 15	Rohde & Schwarz
ETS 0085	Shielded room	SR 1	Frankonia
ETS 0086	Anechoic chamber	AC 1	Frankonia
ETS 0087	Climatic cell	HC 4033	Heraeus
ETS 0088	Color TV pattern generator	PM 5518-TX VPS	Philips
ETS 0089	Radio communication tester	CMS 54	Rohde & Schwarz
ETS 0090	DECT type approval CTR06	TS 8930	Rohde & Schwarz
ETS 0091	RF signal generator	SME 03	Rohde & Schwarz
ETS 0092	Power amplifier	150W1000	AR Amplifier Research
ETS 0093	Attenuator	57-20-33	Weinschel
ETS 0094	Power sensor	NRV-Z55	Rohde & Schwarz
ETS 0095	DECT system controller	PSMD	Rohde & Schwarz
ETS 0096	DECT Signaling unit	PSMD-B11	Rohde & Schwarz
ETS 0097	Rack, 19", 36 HU	TS 89RA	Rohde & Schwarz
ETS 0098	System engineering and software	CS 893BE	Rohde & Schwarz
ETS 0099	Extension unit for basic version	TS 8930B	Rohde & Schwarz
ETS 0100	RF signal generator	SME-06	Rohde & Schwarz
ETS 0101	Power amplifier	50W1000B	AR Amplifier Research
ETS 0102	CDN	M3-801/6	MEB
ETS 0103	Magnetic field test set	MF1000	EMC Partner
ETS 0105	High power synthesizer/ sweeper	SMP 22 / 02	Rohde & Schwarz
ETS 0106	Antenna	VAMP 9443	Schwarzbeck Meßelektronik
ETS 0108	DECT protocol tester TBR 22	TS 1220	Rohde & Schwarz
ETS 0109	Process controller	PSM 2	Rohde & Schwarz
ETS 0110	Real time signaling unit	PSMD-B2	Rohde & Schwarz
ETS 0111	PCM Real-time audio interface for PSM	PSMD-B3	Rohde & Schwarz
ETS 0112	Synthesizer Module	PSMD-B4	Rohde & Schwarz
ETS 0113	Keyboard	PSA-Z2	Rohde & Schwarz
ETS 0114	RF step attenuator	RSG	Rohde & Schwarz
ETS 0115	Glide path		Rohde & Schwarz

No.	Test equipment	Type	Manufacturer
ETS 0117	Insertion unit	URV-Z2	Rohde & Schwarz
ETS 0118	Mixer	MFC 1000	Avcom
ETS 0119	Mixer	MFC 2000	Avcom
ETS 0120	RF step attenuator	TRI-50-20	INCO
ETS 0121	Oscilloscope	EO 147A	Serute
ETS 0122	Oscilloscope	5201	Dagatron
ETS 0123	RF step attenuator	RBU	Rohde & Schwarz
ETS 0124	Tripod	STA 2	Rohde & Schwarz
ETS 0125	Small components		
ETS 0126	Uninterruptible power supply	UPS - 1500	Sendon
ETS 0127	Uninterruptible power supply	UPS - 1000 LC	Sendon
ETS 0128	Uninterruptible power supply	UPS - 1000	Sendon
ETS 0129	Uninterruptible power supply	UPS - 500	Sendon
ETS 0130	Uninterruptible power supply	Power saver	Sendon
ETS 0131	Telephone connection box		Systel
ETS 0132	Frequency doubler	TR-0616	EMG
ETS 0133	Probe body	P6015	Tektronix
ETS 0135	Measuring switching point	AK 11	RFT
ETS 0136	Attenuator	33-6-34	Weinschel
ETS 0137	Multimeter	YX-360TRA	Mastech
ETS 0138	Multimeter	DT-9410	Diditec
ETS 0139	Multimeter	ST-9202	Standard
ETS 0140	High voltage generator	IP 6Wa	TPW
ETS 0141	Sliding bridge	J 573	RFT
ETS 0142	Impedance converter	TK 11	RFT
ETS 0143	Impedance converter	TK 12	RFT
ETS 0146	Active RF probe	ESH2-Z2	Rohde & Schwarz
ETS 0147	Probe	TK 103	MEB
ETS 0149	Power divider	ZAPD-21	MCL
ETS 0150	Switcher	HR07-720	Wisi
ETS 0151	Interference pulse generator	NSG 500C	Schaffner
ETS 0155	Signal generator	SMG	Rohde & Schwarz
ETS 0157	TV and Sat-Signalgenerator	VTG 700	Grundig
ETS 0158	TV and Sat Signalgenerator	VTG 700	Grundig
ETS 0156	Adjacent channel power meter	NKS	Rohde & Schwarz
ETS 0159	Programmable power supply	TOE 8815	Toellner
ETS 0160	Protective wire and isolation tester	PI 6001 D	SPS electronic
ETS 0161	Harmonic / Flicker Analyser	HFA 3000	Schlöder

No.	Test equipment	Type	Manufacturer
ETS 0162	Acoustic chamber	403-A	IAC
ETS 0163	Test head	BK 4602	Brüel & Kjær
ETS 0164	Simulator ear	BK 4185	Brüel & Kjær
ETS 0165	Simulator mouth	BK 4227	Brüel & Kjær
ETS 0166	Acoustic calibrator	BK 4231	Brüel & Kjær
ETS 0167	Communication Analysis System	CAS TE I	HEAD acoustics
ETS 0168	Acoustical test for DECT	CTR 10	HEAD acoustics
ETS 0169	Measurement - Front-end (analogue)	MFE III	HEAD acoustics
ETS 0170	Measurement - Front-end (digital)	MFE IV	HEAD acoustics
ETS 0171	Electronic test cradle	TEH	HEAD acoustics
ETS 0172	Noise generator	HNG III.1	HEAD acoustics
ETS 0173	Speaker	Canton S Pluss	HEAD acoustics
ETS 0174	Measurement - Front-end line interface	MFE V	HEAD acoustics
ETS 0175	Software line interface (analogue)	COPTZV5	HEAD acoustics
ETS 0176	Acoustic volt meter	COP 4	HEAD acoustics
ETS 0177	Feeding bridge B	SBB 1000	ESP
ETS 0178	Open area test side	10m	ETS
ETS 0180	Artificial mains	NNB01/RFZ	RFZ
ETS 0181	Test pin for protective wire	PE 156-i	SPS electronic
ETS 0182	Power supply	MX-9300	Maxcom
ETS 0183	Frequency counter	MX-9300	Maxcom
ETS 0184	Function generator	MX-9300	Maxcom
ETS 0185	Digital multimeter	MX-9300	Maxcom
ETS 0186	Power supply	DF 1730	WJG
ETS 0187	Power supply		TPW/RFT
ETS 0188	High voltage generator		
ETS 0189	Spectrum analyzer	FSEB	Rohde & Schwarz
ETS 0190	Function generator	MX 2020	Maxcom
ETS 0191	Sweep function generator	7202	Dagatron
ETS 0192	Audio generator	7101	Dagatron
ETS 0193	Vibration table	N1-201-M	Sandbox
ETS 0194	Digital multimeter	PMM 208	Dagatron
ETS 0195	Thermo hygro recorder		Amarell
ETS 0196	Digital thermometer	AK-688	KD
ETS 0197	Digital thermometer		Prima
ETS 0198	Digital thermometer	ad 170th	ama-digit
ETS 0199	Digital thermometer	ad 31th	ama-digit

No.	Test equipment	Type	Manufacturer
ETS 0200	Digital thermometer / hygrometer	ad 90h	ama-digit
ETS 0201	Digital thermometer / hygrometer	37950-10	Cole Parmer
ETS 0202	Digital thermometer	ad 15th	ama-digit
ETS 0204	Digital thermometer	ad 20th	ama-digit
ETS 0205	High voltage test generator	HA 3300 D	SPS electronic
ETS 0206	High voltage test accessories	HVGZ 312	SPS electronic
ETS 0207	Socket outlet torque balance	F 37.13	PTL
ETS 0208	Unjointed Finger probe	P 10.05	PTL
ETS 0209	Flexible Finger probe	P 10.01	PTL
ETS 0210	Spring operated impact hammer	P 22.50	PTL
ETS 0211	Metallic ball	F 53.32	PTL
ETS 0212	Hazardous live probe	P 10.06	PTL
ETS 0213	Hazardous live probe	P 10.11	PTL
ETS 0214	Ball pressure test apparatus	T 10.02	PTL
ETS 0215	Glow Wire tester	T 03.14	PTL
ETS 0216	Force indicator 50N	P 10.31	PTL
ETS 0218	RF probe	URV5-Z7	Rohde & Schwarz
ETS 0219	Power sensor	NRV-Z2	Rohde & Schwarz
ETS 0221	ISDN-S0-Analyzer	K1403	Siemens
ETS 0222	ISDN Protocol Analyzer	TE965	Tekelec Teleco.
ETS 0223	GSM/ PCN/ PCS-Simul.	TS8915B	Rohde & Schwarz
ETS0224A	Millivolt meter	URV5	Rohde & Schwarz
ETS0224B	Diode Power Sensor	NRV-Z1	Rohde & Schwarz
ETS0224C	Programmable high resolution time counter	PM6654G	Philips
ETS0224D	RF Stepp Attenuator	RSP	Rohde & Schwarz
ETS 0225	SIM Simulator		Orga
ETS 0226	SIM Editor		Orga
ETS 0227	Vibration table	TIRA vib	GenRad
ETS 0228	Climatic chamber	VT 4010	Vötsch
ETS 0229	Radio commun. tester	CMT 54	Rohde & Schwarz
ETS 0230	Radio commun. tester	CMD 65	Rohde & Schwarz
ETS 0232	Radiation test source	VSQ 1	MEB
ETS 0233	Direction coupler	RK 100	MEB
ETS 0234	Power meter	NRVD	Rohde & Schwarz
ETS 0235	RF network-analyzer	8752 C	Hewlett Packard
ETS 0236	RF amplifier	100A100	Amplifier Research
ETS 0237	RF amplifier	100W1000M1	Amplifier Research
ETS 0238	Field strength meter	FM 2000	Amplifier Research

No.	Test equipment	Type	Manufacturer
ETS 0239	Isotr. field probe 40 GHz	FP 2080 Kit	Amplifier Research
ETS 0240	Isotr. field probe 1 GHz	FP 2000 Kit	Amplifier Research
ETS 0241	Pulse Generator	4050	PicoSecond PL
ETS 0242	Harmonics analyzer	F 41B	Fluke
ETS 0243	AC-clamp 1000 A	80i 1000s	Fluke
ETS 0244	Burst generator	EFT 200	EM-Test
ETS 0245	Load dump generator	LD 200	EM-Test
ETS 0246	Voltage drop simulator	VDS 200	EM-Test
ETS 0247	Microsecond generator	MPG 200	EM-Test
ETS 0248	Switch unit	AN 200	EM-Test
ETS 0249	Coupling network	CNA 200	EM-Test
ETS 0250	Coupling clamp	ACC	EM-Test
ETS 0251	Climatic chamber	VT 4004	Vötsch
ETS 0252	System controller	PSM 12	Rohde & Schwarz
ETS 0253	Spectrum analyzer	FSIQ	Rohde & Schwarz
ETS 0254	RF generator	SMIQ 03	Rohde & Schwarz
ETS 0255	RF generator	SMIQ 03	Rohde & Schwarz
ETS 0256	RF generator	SMP 03	Rohde & Schwarz
ETS 0257	Step attenuator	RSP	Rohde & Schwarz
ETS 0258	Rubidium standard	RSTU	DATUM GmbH
ETS 0259	Power meter	NRVD	Rohde & Schwarz
ETS 0260	Power sensor	NRVD-Z1	Rohde & Schwarz
ETS 0261	Power sensor	NRVD-Z1	Rohde & Schwarz
ETS 0262	Switching unit	SSCU	Rohde & Schwarz
ETS 0263	Signaling unit	PTW60	Rohde & Schwarz
ETS 0264	Spectrum analyzer	F 1048	HAMEG
ETS 0265	Loop antenna	HFRA 9150	Schwarzbeck
ETS 0266	Measurement adapter 1:100	50 Ohm	
ETS 0267	RF signal generator	SMT 03	Rohde & Schwarz
ETS 0268	RF signal generator	SMP 02	Rohde & Schwarz
ETS 0269	RF bridge 50 Ohm	86205 A	Aglient
ETS 0270	RF signal generator	SMP 04	Rohde & Schwarz
ETS 0271	Spectrum analyser	FSEK30	Rohde & Schwarz
ETS 0272	RF signal generator	SME 03	Rohde & Schwarz
ETS 0273	RF signal generator	SME 03	Rohde & Schwarz
ETS 0274	RF signal generator	SMY 01	Rohde & Schwarz
ETS 0275	Power sensor	NRV-Z51	Rohde & Schwarz
ETS 0276	Audio analyzer	UPL	Rohde & Schwarz

No.	Test equipment	Type	Manufacturer
ETS 0277	Power sensor	NRV-Z1	Rohde & Schwarz
ETS 0278	Power sensor	NRV-Z31	Rohde & Schwarz
ETS 0279	Step attenuator	RSP	Rohde & Schwarz
ETS 0280	Power meter	NRVD	Rohde & Schwarz
ETS 0281	Spectrum analyzer	FSM	Rohde & Schwarz
ETS 0282	RF bridge 75 Ohm	86207 A	Hewlett Packard
ETS 0283	RF bridge 50 Ohm	86205 A	Hewlett Packard
ETS 0284	Field probe	11940 A	Hewlett Packard
ETS 0285	Field probe	11941 A	Hewlett Packard
ETS 0286	Limiter	11867 A	Hewlett Packard
ETS 0287	Test receiver	ESHS 10	Rohde & Schwarz
ETS 0288	Artificial mains	ESH2-Z5	Rohde & Schwarz
ETS 0289	Audio generator	TAG 101	Troneer
ETS 0290	Audio generator	TAG 101	Troneer
ETS 0291	Loop antenna	HFH2-Z2	Rohde & Schwarz
ETS 0292	RF generator	SMHU	Rohde & Schwarz
ETS 0293	Artificial mains	NNBM 8125	Schwarzbeck
ETS 0294	Biconical antenna	HK 116	Rohde & Schwarz
ETS 0295	LPD antenna	HL 223	Rohde & Schwarz
ETS 0297	Power pulse generator	IGUF 2910	Schwarzbeck
ETS 0298	ICO tester	TS 1232	Rohde & Schwarz
ETS 0299	DECT protocol tester	TS 1220	Rohde & Schwarz
ETS 0300	RF amplifier	75 A 250	Amplifier Research
ETS 0301	Relay switch unit	RSU	Rohde & Schwarz
ETS 0302	Data line CDN	CM-I/O CD	Keytek
ETS 0303	Telecom line CDN	CM-TEL CD	Keytek
ETS 0304	Test receiver	ESHS 10	Rohde & Schwarz
ETS 0305	Test receiver	ESVS 10	Rohde & Schwarz
ETS 0306	Function generator	HP 33120A	Hewlett Packard
ETS 0307	Commu. Sign. Analyzer	CSA 803 A	Tektronix
ETS 0308	Spectrum analyzer	R 3361A	Advantest
ETS 0309	Anechoic chamber	AC 2	Frankonia
ETS 0310	Anechoic chamber	AC 3	Frankonia
ETS 0311	Anechoic chamber	AC 4	Frankonia
ETS 0312	Climatic chamber	VC 0033	Vötsch
ETS 0313	Power sensor	NRV-Z51	Rohde & Schwarz
ETS 0314	LPD antenna	HL 223	Rohde & Schwarz
ETS 0315	Biconical antenna	HK 116	Rohde & Schwarz

No.	Test equipment	Type	Manufacturer
ETS 0316	Switcher	Hr 07-720	WISI
ETS 0318	Dial pulse/ DTMF tester	210	HE
ETS 0319	Opto link	GPIO 140	NI
ETS 0320	Opto link	GPIO 140	NI
ETS 0322	Insertion unit	URV5-Z4	Rohde & Schwarz
ETS 0323	DECT portable part	Gigaset 1000	SIEMENS
ETS 0324	DECT fix part	Gigaset 1000	SIEMENS
ETS 0325	DECT portable part		Philipps
ETS 0326	DECT fix part		Philipps
ETS 0327	Blue Unit	V 2.0	Nokia
ETS 0328	ELF Field Strenght System	HI-3604	Holaday Industries, INC.
ETS 0329	VDT/VLF Radiation System	HI-3603	Holaday Industries, INC.
ETS 0330	Fiber Optic Remote Control	HI.3616	Holaday Industries, INC.
ETS 0331	TS 1220		
ETS 0332	PSM		
ETS 0333	turn table	DE 350	Heinrich Deisel
ETS 0334	Controller	HD 100	Heinrich Deisel
ETS 0335	BT development kit	CASIRA	CSR
ETS 0336	LPD Antenna	HL 223	Rohde & Schwarz
ETS 0337	Professional Power Amplifier	SE-1200	Wharfedale Pro
ETS 0338	Coupling network	KN002	ETS
ETS 0339	Isolating transformer	KN003	ETS
ETS 0340	Thermometer		Proficell
ETS 0341	Thermometer		Proficell
ETS 0342	Thermometer		Proficell
ETS 0343	Thermometer		Proficell
ETS 0344	Thermometer		Proficell
ETS 0345	Thermometer		Proficell
ETS 0346	Thermometer		Proficell
ETS 0347	Current Probe	EZ-17	Rohde & Schwarz
ETS 0348	RF millivoltmeter	URV 55	Rohde & Schwarz
ETS 0349	Insertion unit	URV5-Z4	Rohde & Schwarz
ETS 0350	Horn Antenna	BBHA 9120-C	Schwarzbeck
ETS 0351	RF amplifier	DWT-1857	Microwave
ETS 0354	RF amplifier	DBS-0408N423	Microwave
ETS 0355	high pass	H03G12G3	Microwave
ETS 0356	high pass	H03G12G3	Microwave
ETS 0357	high pass	H08G18G3	Microwave
ETS 0358	RF amplifier	AFD3-010040-15-ln	MITEQ
ETS 0359	RF amplifier	M/N AM-1331	MITEQ
ETS 0360	RF amplifier	DBS-0408N423	Microwave
ETS 0361	RF amplifier	DBS 1826N515	Microwave

No.	Test equipment	Type	Manufacturer
ETS 0362	high pass	H03G12G3	Microwave
ETS 0363	high pass	H08G18G3	Microwave
ETS 0364	high pass	H08G18G3	Microwave
ETS 0365	Notch filter 2.4 GHz	WRCT2.40/248	Wain Wright
ETS 0366	high pass	H08G18G3	Microwave
ETS 0367	high pass	H03G12G3	Microwave
ETS 0368	Notch filter 0.5-1 GHz	BN86883	Schomandl
ETS 0369	Notch filter 210-500 MHz	BN86882	Schomandl
ETS 0370	Notch filter 15-90 MHz	BN86880	Schomandl
ETS 0371	Notch filter 85-250 MHz	BN86881	Schomandl
ETS 0372	Direction coupler	RK 100	MEB
ETS 0373	Direction coupler	DC3001	emv
ETS 0374	Power Supply	NGSM32	Rohde & Schwarz
ETS 0375	Vector Signal Generator	SMIQ03B	Rohde & Schwarz
ETS 0376	Signal Generator	SMP22	Rohde & Schwarz
ETS 0377	Advanced Signal Condi. Unit	ASCU850	Rohde & Schwarz
ETS 0378	Advanced Signal Condi. Unit	ASCU190	Rohde & Schwarz
ETS 0379	Advanced Signal Condi. Unit	ASCU180	Rohde & Schwarz
ETS 0380	Advanced Signal Condi. Unit	ASCU900	Rohde & Schwarz
ETS 0381	Ethernet HUB	CS-HUB	Rohde & Schwarz
ETS 0382	Vector Signal Generator	SMIQ03B	Rohde & Schwarz
ETS 0383	Spectrum Analyzer	FSU26	Rohde & Schwarz
ETS 0384	Main Frame Signal and Con. Unit	SSCU-GW	Rohde & Schwarz
ETS 0385	Universal Protocol Tester	CRTU-RU	Rohde & Schwarz
ETS 0386	Power meter	NRVD	Rohde & Schwarz
ETS 0387	Power sensor	NRV-Z1	Rohde & Schwarz
ETS 0388	Power sensor	NRV-Z1	Rohde & Schwarz
ETS 0389	Fading Simulator	ABFS	Rohde & Schwarz
ETS 0390	System PC PC3600	TS-PC36	Rohde & Schwarz
ETS 0391	Rubidium Frequency Standard	DATUM 8040	DATUM GmbH
ETS 0392	RF Distribution	DATUM 6502	DATUM GmbH
ETS 0393	Insertion unit	URV5-Z4	Rohde & Schwarz
ETS 0394	Advanced Signal Cond. Unit	ASCUFDD-WCDMA	Rohde & Schwarz
ETS 0395	Universal Protocol Tester	CRTU-RU	Rohde & Schwarz
ETS 0396	Universal Protocol Tester	CRTU-RU	Rohde & Schwarz
ETS 0397	Universal Protocol Tester	CRTU-RU	Rohde & Schwarz
ETS 0398	Fading Simulator	ABFS	Rohde & Schwarz
ETS 0399	Universal Protocol Tester	CRTU-PU	Rohde & Schwarz
ETS 0400	Universal Protocol Tester	CRTU-W	Rohde & Schwarz
ETS 0418	High pass filter 4-8GHz		Microwave
ETS 0419	High pass filter 8-18 GHz		Microwave
ETS 0420	Amplifier 0.1-1 GHz	M/N AM-1331	MITEC
ETS 0421	Amplifier 1-4 GHz	AFD3-010040-15-LN	MITEC
ETS 0422	Amplifier 4-8 GHz	DBS-0408N423	Narda
ETS 0423	Amplifier 8-18 GHz	DWT-18057	Narda
ETS 0424	Amplifier 18-26.5 GHz	DBS-1826N515	Narda

No.	Test equipment	Type	Manufacturer
ETS 0425	T-network	ESH 3-Z4	R&S
ETS 0426	CDN	T4 HF	MEB
ETS 0427	Power sensor	NRV-Z6	Rohde & Schwarz
ETS 0428	4-WIRE ISN with B1	ENY41	Rohde & Schwarz
ETS 0429	Current probe test jig	SW14 7LY	Chase
ETS 0430	RF signal generator	SML02	R&S
ETS 0431	AC mains adapter	BS5733	Travel Emporium
ETS 0432	RF amplifier matrix	RSU-ETS-BT	ETS
ETS 0433	RF amplifier matrix	RSU-ETS-CTR6	ETS
ETS 0434	Reserved Tre	RSU-ETS-GSM	
ETS 0435	HP-Filter	H1G04G01	Microwave
ETS 0436	HP-Filter	H1G04G01	Microwave
ETS 0437	HP-Filter	H0G408G1	Microwave
ETS 0438	HP-Filter	H0G408G1	Microwave
ETS 0439	Amplifier	DBS-1826N515	Narda-DBS-Microwave
ETS 0440	Amplifier	AM-1331	MITEQ
ETS 0441	Bluetooth Protocol Tester	PTW 60	Rohde & Schwarz
ETS 0442	Nokia Tester for Bluetooth 1.1	DTL - 1	Nokia
ETS 0443	IBM BT PC Card	BTPCN101	IBM / Motorola
ETS 0444	Sony BT DUN Modem	BTA- NW 1	Sony
ETS 0445	RF attenuator 6dB	50FH-006-300	JFK
ETS 0446	RF attenuator 30dB	50FH-030-300	JFK
ETS 0447	Motor vehicle artificial network	LN-KFZ/200	R. Heine Hochfrequenztechn.
ETS 0448	RF power amplifier	AR 60S1G3	AR Amplifier Resarch
ETS 0449	Stäubli robot	RX90B L	Stäubli
ETS 0450	Stäubli robot controller	CS/MBs&p	Stäubli
ETS 0451	DASY 4 measurement server		Schmidt & Partner
ETS 0452	Control pendant		Stäubli
ETS 0453	Compaq computer	Pentium IV 2 GHz	Schmidt & Partner
ETS 0454	Dabu acquisition electronics	DAE3V1	Schmidt & Partner
ETS 0455	Dummy probe		Schmidt & Partner
ETS 0456	Dosimetric E-field probe	ET3DV6	Schmidt & Partner
ETS 0457	Dosimetric E-field probe	ET3DV6	Schmidt & Partner
ETS 0458	Dosimetric H-field probe	H3DV6	Schmidt & Partner
ETS 0459	System validation kit	D900V2	Schmidt & Partner
ETS 0460	System validation kit	D1800V2	Schmidt & Partner
ETS 0461	System validation kit	D1900V2	Schmidt & Partner
ETS 0462	System validation kit	D2450V2	Schmidt & Partner
ETS 0463	Probe alignment unit	LBV2	Schmidt & Partner
ETS 0464	SAM twin phantom	V4.0	
ETS 0465	Mounting device	V 3.1	
ETS 0466	Directional coupler	HP 87300B	
ETS 0468	Isotropic E-Field Probe	ER3DV6	Schmid&Partner
ETS 0469	Dielectric probe kit	85070D	Agilent
ETS 0470	Amplifier	AM-1300-1103	MITEQ
ETS 0472	Antenna	BTA-H	Frankonia

No.	Test equipment	Type	Manufacturer
ETS 0473	GSM / UMTS system simulator	TS 8950	Rohde & Schwarz
ETS 0474	EMI test receiver	ESCS30	Rohde & Schwarz
ETS 0475	Amplifier	AFS4-00101800-U	MITEQ
ETS 0476	Test receiver	ESCS 30	Rohde & Schwarz
ETS 0477	GPS system (active GPS antenna)	4490	HOPF
ETS 0478	Crystal filter	MQF 127.50-2400/F	Vectron International
ETS 0480	Validation dipole	DB 3	EMCO
ETS 0481	40GHz standard gain horn with amplifier	22240-25 CBL26402075	Flann Microwave
ETS 0482	40GHz high gain antenna	AT4560	Amplifier research
ETS 0483	Amplifier	AFD3010040-15-LN	MITEQ
ETS 0485	Radio Communication Tester	CMU 200	Rohde & Schwarz
ETS 0490	Rubidium Frequency Standard	8040	DATUM
ETS 0491	RF Distribution	6502	DATUM
ETS 0492	Industrial Controller	PSM12	R & S
ETS 0493	Protokoll Tester	PTW60	R & S
ETS 0494	Switching unit	SSCU	R & S
ETS 0495	RF Step Attenuator	RSP	R & S
ETS 0496	Spectrum Analyzer	FSP	R & S
ETS 0497	Power Meter	NRVD	R & S
ETS 0498	Diode Power Sensor	NRV-Z1	R & S
ETS 0499	Diode Power Sensor	NRV-Z1	R & S
ETS 0500	Signal Generator	SMIQ03	R & S
ETS 0501	Signal Generator	SMIQ03	R & S
ETS 0502	Power Splitter	DS-808-4	Macom

2.4 Examinations and Test Procedures

The test procedures are performed following the requirements of FCC Part 15 and test standard ANSI C63.17-1998 [American National Standard for Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices].

2.4.1 Coordination with fixed microwave service, FCC 15.307 (b)

UTAM, Inc., is designated to coordinate and manage the transition of the 1910 – 1930 MHz band from Private Operational-Fixed Microwave Service (OFS) operating under Part 94 of this Chapter to unlicensed PCS operations.

Therefore each applicant for certification operating under the provisions of this Subpart must be accompanied by an affidavit from UTAM, Inc. certifying that the applicant is a participating member of UTAM, Inc.

2.4.2 Reference to Subpart B, FCC 15.309 (b)

The requirements of Subpart D apply only to the radio transmitter contained in the PCS device. Other aspects of the operation of a PCS device may be subject to requirements contained elsewhere in this Chapter. In particular, a PCS device that includes digital circuitry not direct associated with the radio transmitter also is subject to the requirements for unintentional radiators in Subpart B,

Test procedure: FCC Part 15B

2.4.3 Labeling requirements, FCC 15.311, 15.19; DA05-1005

This requirement is provisional suspended by FCC Public Notice DA 05-1005 dated April 04, 2005.

2.4.4 Conducted limits AC Power line, FCC 15.315, 15.207

An unlicensed PCS device that is designated to be connected to the public utility (AC) power line must meet the limits specified in Section 15.207.

Test procedure: FCC Part 15.207

2.4.5 Antenna requirement, FCC 15.317, 15.203

An unlicensed PCS device must meet the antenna requirement of Section 15.203

Test procedure: Visual inspection

2.4.6 Modulation techniques, FCC 15.319 (b)

All transmissions must use only digital modulation techniques.

Procedure: Consideration of declaration provided by applicant.

2.4.7 Emission band width, FCC 15.323 (a)

Operation will be contained within the 1920 – 1930 MHz band. The emission band width shall be less than 2.5 MHz , but in no event the emission band width shall be less than 50 kHz.

Test procedure: ANSI 63.17 Sub-clause 6.1.3

2.4.8 Peak transmit power, FCC 15.319 (c)

Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission band width in hertz. Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution band width capability when compared to the emission band width, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full band width of the channel.

Test procedure: ANSI 63.17 Sub-clause 6.1.2

2.4.9 Power spectral density, FCC 15.319 (d)

Power spectral density shall not exceed 3 mW in any 3 kHz band width as measured with a spectrum analyzer having a resolution band width of 3 kHz.

Test procedure: ANSI 63.17 Sub-clause 6.1.5

2.4.10 Directional gain of antenna, FCC 15.319 (e)

The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

Procedure: Consideration of antenna gain value provided by manufacturer or additional radiated test of Peak transmit power.

2.4.11 Automatic discontinuation of transmission, FCC 15.319 (f)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

Procedure: Consideration of declaration provided by applicant.

2.4.12 Radio frequency radiation exposure, FCC 15.319 (i)

UPCS devices are subject to the radio frequency radiation exposure requirements specified in FCC parts 1.1307 (b), 2.1091 and 2.1093 , as appropriate. All equipment shall be considered to operate in a “general population / uncontrolled environment. For portable devices tests according to IEEE 1528 are requested, if applicable.

Procedure: MPE or SAR evaluation depending on
power value – distance to human body criteria.

2.4.13 Monitoring threshold, FCC 15.323 (c)(2); (c)(9)

The monitoring threshold must not be more than 30 dB above the thermal noise power for a band width equivalent to the emission band width of the device.

Test procedure: ANSI 63.17 Sub-clause 7.3.2.1

Devices that have a power output lower than the maximum permitted under the rules can increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

Test procedure: ANSI 63.17 Sub-clause 4.4 or 4.7, if applicable

2.4.14 Monitoring of intended transmit window and maximum reaction time, FCC 15.323 (c)(1)

Immediately prior to initiating transmission, devices must monitor the combined time and spectrum window in which they intend to transmit. For a period of at least 10 milliseconds for systems designed to use a 10 millisecond or shorter frame period or at least 20 milliseconds for systems designed to use a 20 millisecond frame period.

Test procedure: ANSI 63.17 Sub-clause 7.5

2.4.15 Monitoring band width, Monitoring reaction time, FCC 15.323 (c)(7)

The monitoring system band width must be equal to or greater than the emission band width of the intended transmission and have a maximum reaction time less than $50 \times \text{SQRT}(1.25/\text{emission band width in MHz})$ microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microsecond. If a signal is detected that is 6 dB or more above the applicable threshold level, the maximum reaction time shall be $35 \times \text{SQRT}(1.25/\text{emission band width in MHz})$ microseconds but shall not be required to be less than 35 microseconds.

Test procedure: ANSI 63.17 Sub-clause 7.4 and 7.5

2.4.16 Random waiting interval, FCC 15.323 (c)(6)

If the selected combined time and spectrum windows are unavailable, the device may either monitor and select different windows or seek to use the same window after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.

Test procedure: ANSI 63.17 Sub-clause 8.1.3

2.4.17 Duration of Transmission, FCC 15.323 (c)(3)

If no signal above the threshold level is detected, transmission may commence and continue with the same emission band width in the monitored time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum window by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.

Procedure: Consideration of declaration provided by applicant or test according to ANSI 63.17 Sub-clause 8.2.2

2.4.18 Connection acknowledgements, FCC 15.323 (c)(4)

Once access to specific combined time and spectrum windows is obtained an acknowledgement from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgements must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgement, at which time the access criteria must be repeated.

Test procedure: ANSI 63.17 Sub-clause 8.2.1

2.4.19 Upper threshold selected channel, power accuracy, segment occupancy, FCC 15.323 (c)(5)

If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission band width may be assessed. A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 milliseconds frame period) immediately preceding actual channel access that the detected power of the selected time and spectrum windows is no higher than the previously detected value. The power measurement resolution for this comparison must be accurate within 6 dB.

No device or group of co-operating devices located within 1 meter of each other shall during any frame period occupy more than 6 MHz of aggregate band width, or alternatively, more than one third of the time and spectrum windows defined by the system.

Test procedure: ANSI 63.17 Sub-clause 7.3.2.1

Best channel selection, Best channel confirmation, Power measurement resolution, Segment occupancy (here declaration sufficient)

2.4.20 Monitoring antenna, FCC 15.323 (c)(8)

The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

Procedure: Consideration of declaration provided by applicant or test according to ANSI 63.17 Sub-clause 4

2.4.21 Duplex connections, FCC 15.323 (c)(10)

An initiating device may attempt to establish a duplex connection by monitoring both its intended transmit and receive time spectrum windows. If both the intended transmit and receive time and spectrum window meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.

Test procedure: ANSI 63.17 Sub-clause 8.2.3, if applicable

2.4.22 Alternative monitoring interval for co-located devices, FCC 15.323 (c)(11)

An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within 1.25 MHz of the center frequency of channel(s) already occupied by that device or co-located co-operating device. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.

Test procedure: ANSI 63.17 Sub-clause 8.2.4, if applicable

2.4.23 Fair access to spectrum related to (c)(10) and (c)(11), FCC 15.323 (c)(12)

The provisions of (c)(10) or (c)(11) shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum for other devices.

2.4.24 Emissions inside and outside the sub-bands, FCC 15.323 (d)

Emissions outside the sub-bands shall be attenuated below a reference power of 112 milliwatts as follows: 30 dB between the sub-band and 1.25 MHz above or below the sub-band; 50 dB between 1.25 and 2.5 MHz above or below the sub-band; and 60 dB at 2.5 MHz or greater above or below the sub-band.

Emissions inside the sub-band must comply with the following emission mask: In the bands between 1B and 2B ("B" is defined as the emission band width of the device in hertz) measured from the center of the emission band width the total power emitted by the device shall be at least 50 dB below the transmit power permitted for that radiator; in the bands between 3B and the sub-band edge the total power emitted by an intentional radiator in the measurement band width shall be at least 60 dB below the transmit power permitted for that radiator.

Compliance with the emission limits is based on the use of measurement instrumentation employing peak detector function with an instrument resolution band width approximately equal to 1.0 percent of the emission band width of the device under measurement.

Test procedure: ANSI 63.17 Sub-clause 6.1.6.2; 6.1.6.3

2.4.25 Frame period, FCC 15.323 (e)

The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in these subbands shall be 20 milliseconds/X where x is a positive whole number. Each device that implements time division for the purposes of maintaining a duplex connection on a given frequency carrier shall maintain a frame repletion rate with a frequency stability of at least 50 parts per millions (ppm). Each devices which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame repletion rate with a frequency stability of at least 10 ppm. The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 microseconds for any two consecutive transmissions.

Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.

2.4.26 Frequency stability, FCC 15.323 (f)

The frequency stability of the carrier frequency of the intentional radiator shall be maintained within ± 10 ppm over 1 hour or the interval between channel access monitoring, whichever is shorter. The frequency stability shall be maintained over a temperature variation of -20° to $+50^{\circ}$ degrees C at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20°C . For equipment that is capable only of operating from a battery, the frequency stability tsts shall be performed using a new battery without any further requirements to vary supply voltage.

3 RESULTS OF EXAMINATIONS AND TESTS (enclosure)

TEST CASE	FCC Rules	Required	Customer Declaration	Test passed	Test failed
Coordination with fixed microwave service	FCC 15.307 (b)	☒	☐	☒	☐
Reference to Subpart B	FCC 15.309 (b)	☐	☐	☐	☐
Labeling requirements	FCC 15.311, 15.19(a)(3)	☒	☒	☐	☐
Conducted limits AC Power line	FCC 15.315 , 15.207	☒	☐	☒	☐
Antenna requirement	FCC 15.317, 15.203	☒	☐	☒	☐
Modulation techniques	FCC 15.319 (b)	☒	☒	☐	☐
Emission band width	FCC 15.323 (a)	☒	☐	☒	☐
Peak Transmit Power	FCC 15.319 (c)	☒	☐	☒	☐
Power spectral density	FCC 15.319 (d)	☒	☐	☒	☐
Directional gain of the antenna	FCC 15.319 (e)	☒	☒	☐	☐
Automatic discontinuation of transmission	FCC 15.319 (f)	☒	☐	☒	☐
Radio frequency radiation exposure	FCC 15.319 (i)	☒	☐	☒	☐
Monitoring threshold	FCC 15.323(c)(2); (c)(9)	☒	☐	☒	☐
Monitoring of intended transmit window and maximum reaction time	FCC 15.323(c)(1)	☒	☐	☒	☐
Monitoring band width	FCC 15.323 (c)(7)	☒	☐	☒	☐
Random waiting interval,	FCC 15.323 (c)(6)	☒	☐	☒	☐
Duration of transmission,	FCC 15.323 (c)(3)	☒	☐	☒	☐
Connection acknowledgement,	FCC 15.323 (c)(4)	☒	☐	☒	☐
Upper threshold selected channel, power accuracy, segment occupancy	FCC 15.323 (c)(5)	☒	☐	☒	☐
Monitoring antenna,	FCC 15.323 (c)(8)	☒	☒	☐	☐
Duplex connections	FCC 15,323 (c)(10)	☒	☐	☒	☐
Alternative monitoring interval for co-located devices	FCC 15.323 (c)(11)	☒	☒	☐	☐
Fair access to spectrum related to (c)(10) and (c)(11)	FCC 15.323 (c)(12)	☒	☒	☐	☐
Emissions inside and outside the sub-band	FCC 15.323 (d)	☒	☐	☒	☐
Frame period	FCC 323 (e)	☒	☐	☒	☐
Frequency stability	FCC 323 (f)	☒	☐	☒	☐

3.1 Coordination with fixed microwave service, FCC 15.307 (b)

The affidavit from UTAM Inc. is attached in Appendix B	☒
The applicant will provide the affidavit from UTAM Inc. later in the course of certification by TCB or FCC	☐

3.2 Reference to Subpart B, FCC 15.309 (b)

This requirement is not applicable because the test sample do not include digital circuitry which is not direct associated with the radio transmitter	☒
For test results according to FCC 15B see Appendix C	☐
This requirement is covered by results of radiated emission test according to FCC 15.323(d)	☐

3.3 Labeling requirements, FCC 15.311; 15.19 (a)(3)

This requirement is provisional suspended by FCC Public Notice DA 05-1005 dated April 04, 2005.

The applicant will provide labeling documentation later in the course of certification by TCB or FCC	☒
Labeling of the test sample confirms to the requirements of DA05-1005 for documentation see Appendix D	☐

3.4 Conducted limits AC Power line, FCC 15.315 , 15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the table below. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

This measurement was transact first with instrumentation using an average and peak detector and a 10 kHz band width. If the peak detector achieves a calculated level, the measurement is repeated by an instrumentation using a quasi-peak detector.

Frequency	Level	
	quasi-peak	average
150 kHz	Lower limit line	Lower limit line

Limits:

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi Peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Test equipment used: ETS 0125; ETS 0288; ETS 0474

Comment: See attached diagrams in Appendix E.

3.5 Antenna requirement, FCC 15.317, 15.203

In this arrangement the EUT fulfils the requirements of FCC 15.203.

This unit uses internal antennas . There is no provision for an external antenna.	☒
This unit uses an unique antenna jack for connection to dedicated external antenna	☐
This unit has an external antenna which is fix attached.	☐
This unit with its antenna will be professionally installed as described in manufacturers description.	☐

Comment: See Appendix A for pictures.

3.6 Modulation techniques, FCC 15.319 (b)

The test sample is an isochronous digital modulated device that operates in 1920-1930 MHz band.

This device bases on DECT technology described in European Standards EN 300 175-2 and EN 300 175-3, now operating in frequency channels mentioned before on sub-clause 1.5.

The operating modes are MC/TDMA/TDD (Multi carrier / Time Division Mutiple Access / Time Division Duplex) using Digital GFSK modulation.

For further details see operational description provided by manufacturer.

3.7 Emission band width, FCC 15.323 (a)

Emission band width is measured according to ANSI 63.17 sub-clause 6.1.3 using test set-up no. 1. See Appendix F for measurement diagrams.

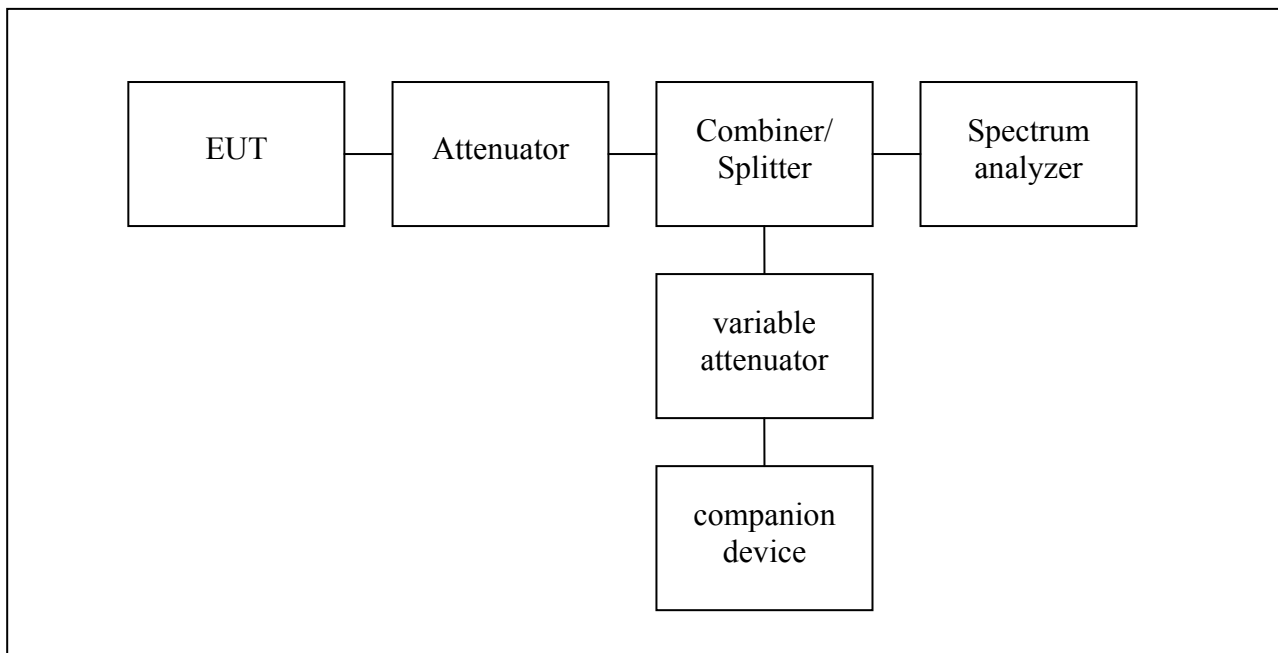
$f_x = 1921.54 \text{ MHz}$			
ΔP	$f_{(\text{low})}$	$f_{(\text{high})}$	$\Delta f = f_{(\text{high})} - f_{(\text{low})}$
-26	1920.89	1922.32	1.44
-24	1920.90	1922.32	1.42
-12	1921.02	1922.19	1.17
-6	1921.18	1921.95	0.77

$f_x = 1924.99 \text{ MHz}$			
ΔP	$f_{(\text{low})}$	$f_{(\text{high})}$	$\Delta f = f_{(\text{high})} - f_{(\text{low})}$
-26	1924.34	1925.78	1.44
-24	1924.36	1925.76	1.40
-12	1924.48	1925.64	1.16
-6	1924.69	1925.43	0.74

$f_x = 1928.45 \text{ MHz}$			
ΔP	$f_{(\text{low})}$	$f_{(\text{high})}$	$\Delta f = f_{(\text{high})} - f_{(\text{low})}$
-26	1927.81	1929.23	1.42
-24	1927.81	1929.21	1.40
-12	1927.93	1929.09	1.16
-6	1928.15	1928.87	0.72

Limit:

$\Delta f_{\min} (-26\text{dB}) >$	50 KHz
$\Delta f_{\max} (-26\text{dB}) <$	2.5 MHz



Test set-up 1 – Equipment configuration for conducted RF tests

3.8 Peak Transmit Power, FCC 15.319 (c)

The Peak transmit Power is measured according to ANSI 63.17 sub-clause 6.1.2. using test set-up No. 1.

The limit for Peak Transmit Power has to be calculated according to following formula using the emission band width measured before.

$$PTP = 100\mu W \times \sqrt{EBW}$$

EBW = emission band width [Hz]

Additional the directional gain of used antenna [FCC 15.319(e)] has to be considered.

Results:

On the attached diagrams PEAK AVG re presents the related measurement value determined by values in time between T1 and T2.

Frequency [MHz]	Power [dBm]
F_L	20.40
F_M	20.38
F_H	20.74

Limit:

EBW [Hz]	Max. power [dBm]	Corrected by antenna gain > 3 dB
1.442.000	20.8	n.a.

Comment: See Appendix G for measurement diagrams.

3.9 Power spectral density, FCC 15.319 (d)

Power spectral density is measured according to ANSI 63.17 sub-clause 6.1.5 using test set-up No. 1.

Results:

Frequency [MHz]	Power density [mW/3kHz]
F_L	0.117
F_M	0.100
F_H	0.136

Limit:

Power spectral Density	Test condition
3 mW = 4.77 dBm	3 kHz band width

Comment: See Appendix H for measurement diagrams.

3.10 Directional gain of the antenna, FCC 15.319 (e)

Directional gain of antennas influences the limit of peak transmit power if the maximum directional gain exceeds 3 dBi.

Max antenna gain [dBi]	Exceeds 3 dBi by amount [dB]
3	--

The antenna gain value is derived from:

Manufacturer declaration	☒
Antenna diagram	☐
Measured gain of complete system	☐

Comment: Manufacturer declaration documents or Antenna diagrams will be considered in course of certification by responsibility authority.

3.11 Automatic discontinuation of transmission; FCC 15.319(f)

FP repetitive codes are allowed	☒
PP	☐

Automatic break off the transmission means break off of connection and break of transmissions which are not control and signaling information or repetitive codes of complete frame or burst intervals. In case of devices using basics of DECT technology at least fixed parts and repeaters are using control and signaling information without direct connection to their counter part.

The test are done after establishment of a connection to counter part.

	Test	Reaction of EUT	Verdict
1	Switch – off counterpart	B	pass
2	Hook-off by counterpart	B	pass
3	Switch- off by EUT		n.a.
4	Hook -off on EUT side	B	pass
5	Remove power from EUT	A	pass
6	Remove power from counterpart	B	Pass

A – Connection break down, cease of transmit

B – Connection break down, EUT transmits signaling information

C – Connection break down, counter part transmits signaling information

3.12 Radio frequency radiation exposure; FCC 15.319(i)

Consideration of radio frequency radiation exposure for EUT is done as

SAR test acc. IEEE 1528	☐
MPE calculation as below	☒

SAR test results: not applicable

MPE calculation:

Please find radiated power test results in Appendix J.

The EUT is considered as a mobile device according to OET Bulletin 65, Edition – 97 – 01. Therefore distance to human body of min. 20 cm is determined.

The limit of Power density for General Population / Uncontrolled Exposure is 1.0 mW/cm².

Formula:

$$S = \text{EIRP} / 4\pi R^2$$

Calculation:

EIRP	Radiated Power [dBm]	23.57
EIRP	Radiated Power [mW]	251
R	Distance [cm]	20
S	Power Density [mW/cm ²]	0.05

Result:

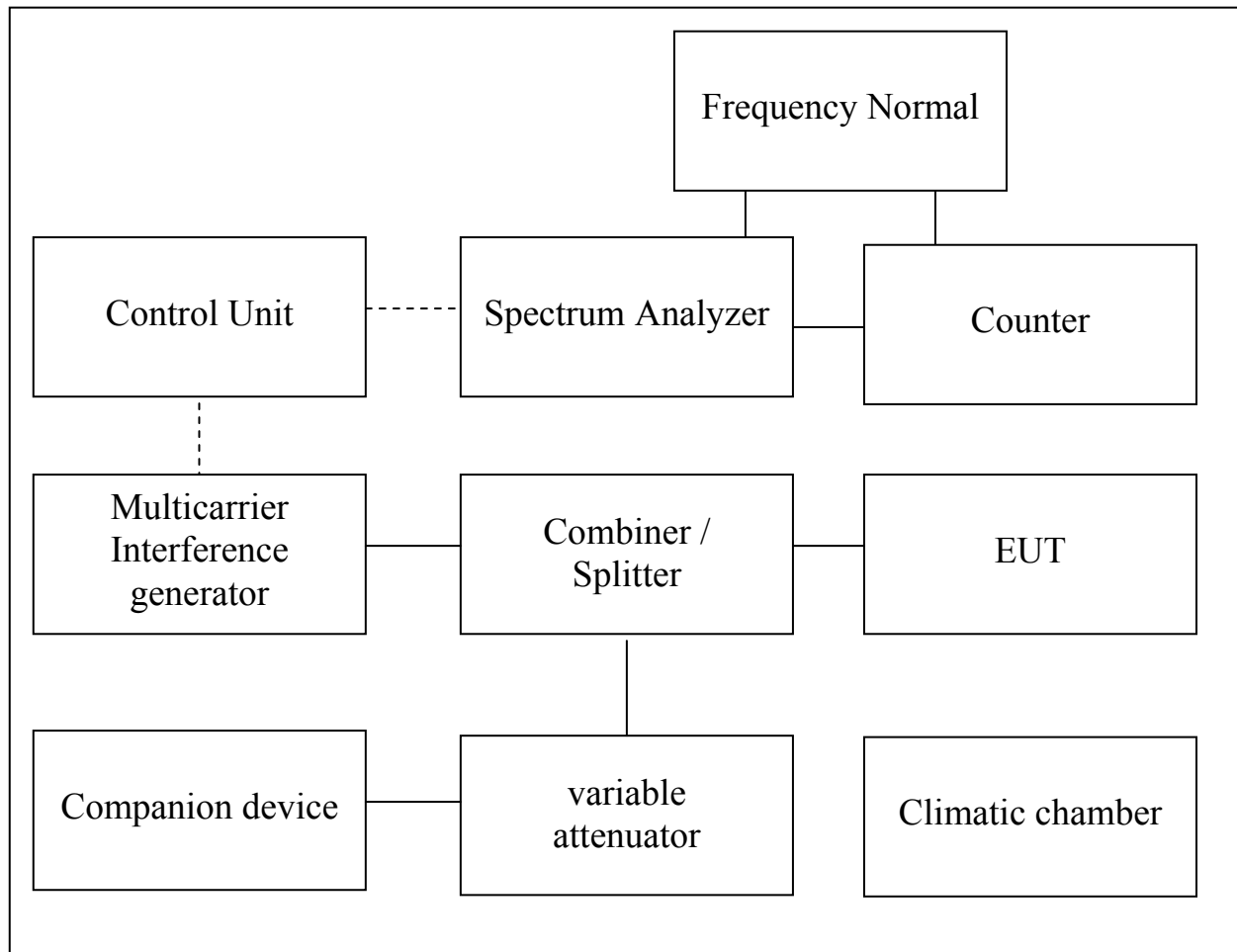
The EUT complies with the radio frequency radiation exposure requirement.

Comment: For radiated power test results see Appendix J.

3.13 Monitoring of threshold, FCC 15.323 (c)(2); (c)(9)

Monitoring threshold is measured according to ANSI 63.17 sub-clause 7.3.2.1 using test set-up No. 2.

This test set-up is used for most tests related to monitoring.



Test set-up 2 Equipment configuration for monitoring tests

Monitoring tests generally determine the lower and upper threshold of the EUT , and verify that if the EUT is operating in the “least-interfered channel” mode, it can properly select the channel with the lowest interference power, within a 6 dB resolution. The “preferred” end of the 1920-1930 MHz band denotes the end at which the search for channels with interference below the lower threshold shall begin. For devices with an emission band width of less than 625 kHz, the search shall begin within 3 MHz , of the lower end of the band (i.e., 1920 MHz). For device with an emission band width of greater than 625 kHz, the search shall begin within 3 MHz of the upper end of the band.

Calculation of monitoring threshold limits for isochronous devices:

Lower threshold:

$$T_L = 15 \log_{10} B - 184 + 30 - P \quad (\text{dBm})$$

Upper threshold:

$$T_H = 15 \log_{10} B - 184 + 50 - P \quad (\text{dBm})$$

B= emission bandwidth (Hz)

P = transmitted power (dBm)

The upper threshold is applicable for systems which have defined a minimum of 40 duplex system access channels.

Measurement procedure:

For a not or defined interfered band the system will initiate a connection on channel with the lowest level.

After that interferer level on this channel will be increased by 1dB steps, until a new connection on an other channel will established. The related interferer level represents the measured lower threshold.

Results:

Lower threshold [dBm]	-93
Upper threshold [dBm]	n.a.

Limits:

Used results	Emission band width [MHz]	1.47
	Peak transmit power [dBm]	20.7
Limits	Lower threshold [dBm]	≤ -82.2
	Upper threshold [dBm]	≤ -62.2
Manufacturer declaration	Lower threshold [dBm]	
	Upper threshold [dBm]	n.a.

For a device with less than 40 channel it has to be proved whether it omit the transmission if there are disturbances in all channels above the lower threshold. ANSI 63.17 sub-clause 7.3.2.1 h) is applied.

Result:

Interferer	Transmission
All interferer ON	No

Comment: For LOG tables and measurement diagrams see Appendix K.

3.14 Monitoring of intended transmit window and maximum reaction time, FCC 15.323 (c) (1)

Monitoring of intended transmit window is tested according to NASI 63.7 sub-clause 7.5 using test set-up No. 2.

These tests are related to isochronous reaction time and monitoring interval.

The reaction time is the duration of the RF power, during the monitoring interval, that shall be detected by the device to determine that the monitored time and spectrum window is occupied.

The objective of the test is to demonstrate that the device defers use of a region of spectrum when the interfering signals are of a time duration that exceeds the allowed limit.

If the sample fulfills the requirements of reaction time it shows that it has monitored the intended transmit window.

Test c:

With the channel interferer level at the calculated threshold limit, verify that the EUT does not establish a connection when the width of the interference pulse exceeds $50 \sqrt{1.25/B} \mu s$.

B-Emission band width of EUT in MHz

Test d:

With the channel interferer set to a level that is 6 dB above the calculated threshold limit, verify that no connection occurs with a interference pulse width more than $35 \sqrt{1.25/B} \mu s$.

Test e:

Increase the pulse duration to $75 \sqrt{1.25/B} \mu s$. Set the interference power to a level 10 dB above the calculated upper threshold limit and randomly vary the synchronization of the pulsed interference generator with respect to the EUT frame.

Verify that the EUT does not transmit.

Results:

Pulse width	Connection		
	F _L	F _M	F _U
$50 \sqrt{1.25/B} \mu s$	no	no	no
$35 \sqrt{1.25/B} \mu s$	no	no	no
$75 \sqrt{1.25/B} \mu s$	no	no	no

Calculation of applied pulse width and maximum reaction time:

Used results	Emission band width [MHz]	1.47
Max. reaction time and Pulse width	$50 \sqrt{1.25/B} \mu s$	46.1
	$35 \sqrt{1.25/B} \mu s$	32.3
Pulse width	$75 \sqrt{1.25/B} \mu s$	69.2
lower consideration limit	[μs]	50
lower consideration limit	[μs]	35

Comment: For examples of LOG tables and measurement diagrams see Appendix L.

3.15 Monitoring band width, FCC 15.323 (c)(7)

Monitoring band width is measured according to ANSI 63.17 sub-clause 7.4.1. using test set-up No. 2.

Test procedure:

Center the interfering signal at a frequency above the center of the emission of the EUT, separated by 40% of the emission band width of the EUT, at a level that is 4 dB above the calculated threshold limit. The band width of the interfering signal shall be equal to or greater than the minimum emission band width allowed for the sub-band. It shall be verified that the EUT does not establish a connection. The procedure is repeated with the interference centered at a frequency below the center of the emission of the EUT, separated by 40% of the emission band width of the EUT, at a level that is 4 dB above the calculated threshold limit. It shall be verified that the EUT does not establish a connection.

Results:

Interferer level [dBm]		-78.2
Test frequency	Interferer frequency	Connection
F_L	$F_L - 40 \% BW$	no
	$F_L + 40 \% BW$	no
F_M	$F_M - 40 \% BW$	no
	$F_M + 40 \% BW$	no
F_U	$F_U - 40 \% BW$	no
	$F_U + 40 \% BW$	no

Comment: For LOG tables see Appendix M.

3.16 Random waiting interval, FCC 15.323 (c)(6)

Random waiting interval is considered according ANSI 63.17 sub-clause 8.1.3.d.

This test applies to an EUT capable of transmitting control and signaling information on its own without companion device.

It is measured the time interval between the end of the EUT transmission and the beginning of transmission by the EUT.

Test set-up No. 1 is used.

Results:

Time interval	[ms]
1	> 150
2	> 150
3	> 150
4	> 150
5	> 150

Limit:

Time interval	> 150 ms
---------------	----------

or

Time interval Random distribution	> 10...150 ms
--------------------------------------	---------------

Comment: For sample LOG table or measurement diagram see Appendix N.

3.17 Duration of Transmission, FCC 15.323 (c)(3)

Duration of Transmission (Maximum transmit period) is measured according to ANSI 63.17 sub-clause 8.2.2 using test set-up No. 1.

The connection was watched over a time period of more than 4 hours.
During this test time the access criteria were repeated several times.

Result:

Maximum transmission time [min]	40
---------------------------------	----

Limit:

Maximum transmission time [h]	< 8
-------------------------------	-----

Comment: For LOG tables see Appendix O.

3.18 Connection acknowledgement, FCC 15.323 (c)(4)

Connection acknowledgements are tested according to ANSI 63.17 sub-clause 8.2.1 using test set-up No. 2 with not activated Multichannel-interferer. Repeating of access criteria is tested following ANSI 63.17 sub-clause 8.13.e.

Results:

Requirement	channel	Time [s]
Change of access criteria for control information	0	26
	1	26
	2	22
	3	24
	4	22
Connection acknowledgement	3	< 1
Connection break down	3	0.65
Repeating of access criteria	1	25
	2	23

Limits:

Requirement	Time [s]
Change of access criteria	30
Connection acknowledgement	1
Repeating of access criteria for control and signaling information	30

Comment: For LOG tables see Appendix P.

3.19 Upper threshold Selected channel, power accuracy, segment occupancy; FCC 15.323 (c)(5)

Best channel selection:

For systems with a least 40 logical channels the time and spectrum window with the lowest power level below the upper monitoring threshold shall be assessed.

For system with less than 40 logical channels the least interfered channel related to lower monitoring threshold shall be assessed.

These test are done according to ANSI 63.17 sub-clause 7.3.2.1.2 least-interfered channel using test set-up No. 2.

Results:

Test	Transmit on f_1	Transmit on f_2
a	no	no
b	yes	no
c	no	no

No connections at test c because the number of channels is less than 40.

Selected channel confirmation:

This test are done according to ANSI 63.17 sub-clause 7.3.2.2 using test set-up No. 2.

Results:

Test	Transmit on f_1	Transmit on f_2
c	no	no

No connections at test a and c because the number of channels is less than 40.

Power accuracy

The power measurement resolution for the previous comparisons must be accurate to within 6 dB. This requirement was proved automatically by testing of monitoring thresholds according to FCC 15.323 (c)(2); 3.13.

Segment occupancy

Document	available	sufficient
Manufacturers declaration	☒	☒
Technical description	☐	☐

Comment: See attached diagrams in Appendix Q.

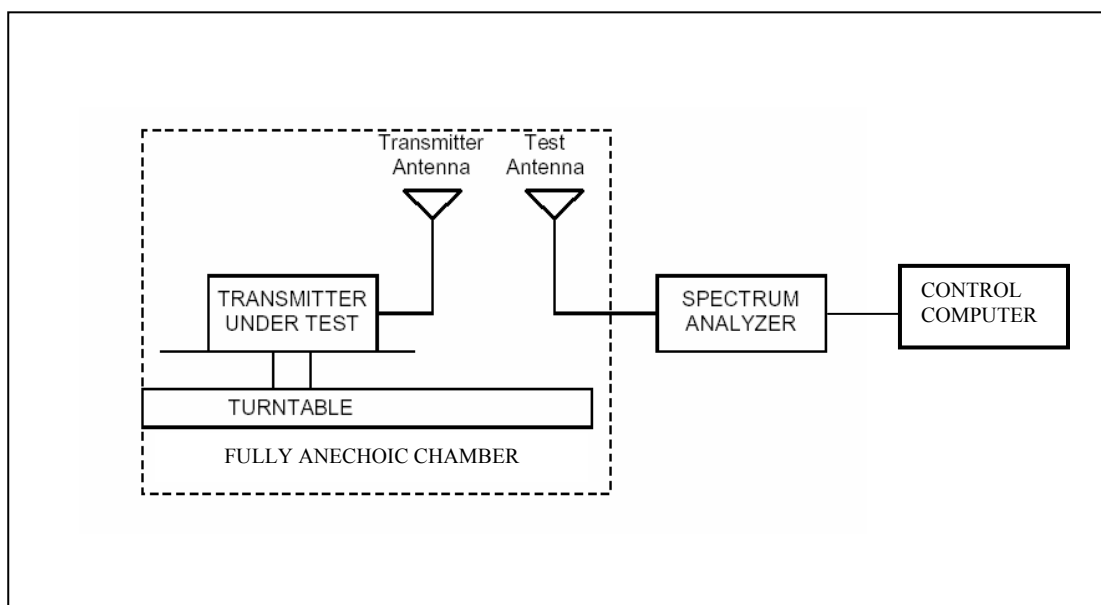
3.20 Monitoring antenna, FCC 15.323 (c)(8)

The monitoring system shall use the same antenna used for transmission or an antenna that yields equivalent reception.

System uses same antenna(s)	☒
System uses different antenna(s)	☐

If the monitoring antenna is different from the transmitting antenna, it shall be verified that the monitoring antenna provides coverage equivalent to that of the transmitting antenna.

The related tests are to perform according to ANSI 63.17 sub-clause 4.5 using test set-up No. 3.



Test set-up 3 Equipment configuration for radiated tests

3.21 Duplex connections, FCC 15.323 (c)(10)

This test verifies that the two devices communicating over a duplex connection comply with the access criteria.

The test is done according to ANSI 63.17 sub-clause 8.2.3 using test set-up No. 2.

Test c)

The test proves the basic conditions for the following tests. The out-of-operating-region interference is used to confine the EUT to the band.

Test d)...k)

The interference levels at the companion device are at least 10 dB below the measured lower threshold.

Test d) and e)

This test proves whether a connection can be established with interferences at calculated lower threshold level in transmit window and receive window in which one slot is free of interferences.

For system with less than 40 channels a connection is not allowed.

Test f) and g)

This test proves whether a connection can be established with interferences at calculated lower threshold level in receive window and transmit window in which one slot is free of interferences.

For systems with less than 40 channels a connection is not allowed.

Test h) and i)

For this test the receive window is interfered with a level of +10 dB above the measured lower threshold except for one slot which is free.

The transmit window is interfered with a level of +3dB above the measured lower threshold only except for one slot which is free.

A connection shall be established on the free receive slot and its duplex mate.

Test j) and k)

The transmit window is interfered with a level of +10 dB above the measured lower threshold except for one slot which is free.

The receive window is interfered with a level of +3 dB above the measured lower threshold only except for one slot and its duplex mate.

Test l)

For this test both windows are interfered with a level of the calculated upper threshold except one slot in each window.

The received signal to the EUT from companion device is at least 30 dB above the upper threshold.

A connection shall not be established.

Test	Connection	No connection
c	☒	☐
d + e	☐	☒
f + g	☐	☒
h + i	☒	☐
j + k	☒	☐
l	☐	☒

Comment: See attached diagrams in Appendix R.

3.22 Alternative monitoring interval for co-located devices, FCC 15.323 (c)(11)

Alternative monitoring interval for co-located devices is tested according ANSI 63.17 sub-clause 8.2.4 using test set-up No. 2.

Results.

The manufacturer declares that this provision is not utilized by the EUT.

3.23 Fair access to spectrum related to (c)(10) and (c)(11), FCC 15.323 (c)(12)

The provisions of (c)(10) or (c)(11) shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

The manufacturer declares that is device does not work in a mode which denies fair access to spectrum for other participants.

3.24 Emissions inside and outside the sub-band, FCC 15.323 (d)

Emission inside and outside the sub-band are tested according to ANSI 63.17 sub-clauses 6.1.6.2 and 6.1.6.3.

Determination of measurement band width:

$$BT_T = \text{approx. } 1\% \text{ of } B$$

Used results	Emission band width [MHz]	1.47
Calculated value	Resolution band width [kHz]	14.7
Determined value	Resolution band width [kHz]	10

Emissions inside the sub-band

Testing of emissions inside the sub-band are performed using test set-up No.1.
The applied emission mask limit was created using the current emission band width.

Comment: For results see diagrams in Appendix S.

Emissions outside the sub-band

Out of sub band emissions are tested as radiated measurement band width of about 1% of emission band width near the band edges and at critical frequencies where the measurement values come near the limits. For practical reasons other frequencies the more stringent band width of 1 MHz is used.

As test environment serves a fully anechoic chamber providing a free space environment (test set-up No. 3)

All results will be updated by an automatic measuring system in accordance with point 2.3.

Calculation of test results:

Such factors like antenna correction, cable loss, external attenuation etc. are already included in the provided measurement results. This is done by using validated test software and calibrated test system according the accreditation requirements.

In the Table being listed the critical peak and average value an exhibit the compliance with the above calculated Limits.

Summary table with radiated data of the test plots Antenna 1

Freq.	Used Ch.	Frequency Marker [GHz]	Polarization	Δ corrections dB	Max. Power level [dBm]	Compliance Limit [dBm]	Detector	BW [MHz]	Margin [dB]
3	M	3.851	V		-40.34	-39.5	P	1	<u>-0.84</u>
4	M	7.703	V		-46.50	-39.5	P	1	<u>-7.00</u>
4	M	7.703	H		-46.17	-39.5	P	1	<u>-6.67</u>
3	M	3.851	H		-42.22	-39.5	P	1	<u>-2.72</u>
4	H	7.719	V		-48.58	-39.5	P	1	<u>-9.08</u>
4	H	7.719	H		-43.37	-39.5	P	1	<u>-3.87</u>
3	H	3.859	H		-41.27	-39.5	P	1	<u>-1.77</u>
3	H	3.859	V		-40.83	-39.5	P	1	<u>-1.33</u>
3	L	3.843	V		-40.73	-39.5	P	1	<u>-1.23</u>
3	L	3.843	H		-42.84	-39.5	P	1	<u>-3.34</u>
4	L	7.687	H		-43.93	-39.5	P	1	<u>-4.43</u>
4	L	7.687	V		-48.92	-39.5	P	1	<u>-9.42</u>
3	L	1.913	V		-48.32	-39.5	P	1	<u>-8.82</u>
3	L	1.913	H		-50.10	-39.5	P	1	<u>-10.60</u>

Summary table with radiated data of the test plots Antenna 2

Freq.	Used Ch.	Frequency Marker [GHz]	Polarization	Δ corrections dB	Max. Power level [dBm]	Compliance Limit [dBm]	Detector	BW [MHz]	Margin [dB]
4	M	7.703	H		-45.86	-39.5	P	1	<u>-6.36</u>
4	M	7.703	V		-47.07	-39.5	P	1	<u>-7.57</u>
3	M	3.851	V		-44.54	-39.5	P	1	<u>-5.04</u>
3	M	3.851	H		-42.01	-39.5	P	1	<u>-2.51</u>
3	L	1.915	V		-40.47	-39.5	P	1	<u>-0.97</u>
4	L	7.687	V		-47.96	-39.5	P	1	<u>-8.46</u>
4	L	7.687	H		-45.96	-39.5	P	1	<u>-6.46</u>
3	L	3.843	H		-40.39	-39.5	P	1	<u>-0.89</u>
3	L	3.843	V		-44.82	-39.5	P	1	<u>-5.32</u>
4	H	7.719	V		-45.41	-39.5	P	1	<u>-5.91</u>
6	H	13.493	H		-47.51	-39.5	P	1	<u>-8.01</u>
4	H	7.719	H		-43.63	-39.5	P	1	<u>-4.13</u>
3	H	3.859	H		-42.30	-39.5	P	1	<u>-2.80</u>
3	H	3.859	V		-39.95	-39.5	P	1	<u>-0.45</u>

Freq. – Frequency Range:

1:	30	–	200 MHz
2:	200	–	1000 MHz
3:	1	–	4 GHz
4:	4	–	8 GHz
5:	8	–	12 GHz
6:	12	–	17 GHz
7:	17	–	26.5 GHz

Comment: For diagrams see Appendix S.

3.25 Frame period, FCC 323 (e)

Frame repetition stability is tested according to ANSI 63.17 sub-clause 6.2.3. Frame period and jitter are tested following ANSI 63.17 sub-clause 6.2.4. For all measurement test set-up No.1 is used.

Frame repetition stability:

The spectrum analyzer is used as an envelope detector and provides gating signals to a frequency counter.

The obtained frequency values are computed to get mean value, deviation and frame repetition stability. Frame repetition stability is three times of the standard deviation SD.

Results:

Frequency (MHz)	Standard Deviation (Hz)	Mean(Hz)	Frame Repetition Stability (ppm)
1924,992	0,000000628129	100,0000295	0,019

Limits:

Time division mode	Frame repetition stability	applicable
TDA	50 ppm	☐
TDMA	10ppm	☒

Frame period and jitter:

Frame period and jitter test the spectrum and modulation is used to obtain the time duration between rising edges. These measurement value are used to compute the difference between any two consecutive frame periods (jitter).

The measured mean time is the frame period.

Results:

Frequency (MHz)	Max. jitter [μ s]	3xSD jitter [μ s]	Frame period [μ s]
1924,992	0.0952	0.286 ¹⁾	9.999997045

¹⁾ This value is not calculated because the low Maximum jitter value.

Limits:

Frame period [ms]	20 or 10/x
Max. jitter [μ s]	25
3 times the standard deviation SD [μ s] value of jitter ²⁾	12.5

²⁾ This item is not required by FCC 15.323(e).

Comment: For example measurement sheet of frame period see Appendix T.

3.26 Frequency stability, FCC 323 (f)

Frequency stability is measured by spectrum analyzer in modulation mode.
The procedure is carried out with conditions shown in result table.

Results:

Temp °C	Supply Voltage	Frequency of carrier (MHz)	delta f(min) (KHz)	delta f(max) (KHz)	maximum delta f (ppm)	Mean (MHz)	Deviation ppm
20	V _{nom}	1924,992	-7,6	-4,5	-3,95	1924,986093	Reference
20	V _{nom} -15%	1924,992	-7,7	-4,7	-4,00	1924,986003	0,05
20	V _{nom} +15%	1924,992	-7,5	-4,5	-3,90	1924,986194	-0,05
-10 ¹⁾	V _{nom}	1924,992	-9,2	7,3	-4,78	1924,984553	0,80
55 ¹⁾	V _{nom}	1924,992	-1,9	1,4	-0,99	1924,991786	-2,96

Limit : 10 ppm

$$Deviation\ ppm = \frac{FR - FM}{FR} * 10^6$$

FR = Reference frequency of carrier at 20°C and V_{nom}

FM = Measured frequency of carrier

Limit:

Temperature [°C]	Supply voltage	Frequency deviation [ppm]
20	Normal or new batteries	Reference
-20	Normal	10
+50	Normal	10
Others ¹⁾	Normal	10
Others ¹⁾	Normal	10

¹⁾ declared by manufacturer

Comment: For histograms see Appendix U.

Appendix

A	Pictures
B	Coordination with fixed microwave service
C	Reference to Subpart B
D	Labeling requirements
E	Conducted limits AC Power line
F	Emission band width
G	Peak Transmit Power
H	Power spectral density
I	Directional gain of the antenna
J	Radio frequency radiation exposure
K	Monitoring threshold
L	Monitoring of intended transmit window and maximum reaction time
M	Monitoring band width
N	Random waiting interval
O	Duration of Transmission
P	Connection acknowledgement
Q	Upper threshold selected channel, power accuracy, segment occupancy
R	Duplex connections
S	Emissions inside and outside the sub-band
T	Frame period
U	Frequency stability