

**ELECTRONIC TECHNOLOGY SYSTEMS
DR. GENZ GMBH**

TEST - REPORT

FCC PART 15 for U-NII devices

FCC ID: RPD-SA5250MPCI-01

Test report no.:

G0M20311-8358-C-1

FCC

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3 Test Results

- 3.1 Emission Bandwidth, FCC 15.407 (a)
- 3.2 Peak Transmit Power, FCC 15.407 (a)(1,2,3,4)
- 3.3 Peak Power Spectral Density, FCC 15.407 (a)(1,2,4,5)
- 3.4 Ratio of the Peak Excursion of the modulation envelope, FCC 15.407 (a)(6)
- 3.5 Peak Emissions outside the frequency bands of operation, FCC 15.205, 15.209, 15.407 (b)
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- 3.8 Indoor Operation Restriction, FCC 15.407 (e)
- 3.9 Radio Frequency Radiation Exposure, FCC 15.407 (f)
- 3.10 Frequency Stability, FCC 15.407 (g)
- 3.11 Spurious emissions related to AC power line, FCC 15.207

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.

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Specific Conditions:

Usage of the hereunder tested device in combination with other types/models of LapTop computers and/or other installed 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.


The test sample is able to work according IEEE 802.11 a,b,g.

This report is related to FCC Part 15 E (UNII device, IEEE 802.11a) only and do not cover requirements for other parts like FCC Part 15 C (e.g. for IEEE 802.11b,g).

Tester:

16.12.2003		N. Kaspar	
Date	ETS-Lab.	Name	Signature

Technical responsibility for area of testing:

16.12.2003		Dr. Genz	
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 : Philips Semiconductors Dresden AG

Street : Am Waldschloesschen 1

Town : 01099 Dresden

Country : Germany

Telephone : +49 351 80800 710

Fax : +49 351 80800 39

Contact : Herr Thomas Oberthür

Telephone : +49 351 80800 710

E-mail : Thomas.Oberthuer@philips.com

1.4 Application details

Date of receipt of application : 25.11.2003
 Date of receipt of test item : 25.11.2003
 Date of test : 25.11.2003

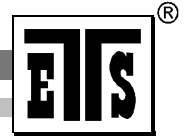
1.5 Test item

Description of test item : Philips SA5250/1 802.11a/b/g Mini PCI Reference Design
 Type identification : SA5250/1 mPCI
 Serial number : Test model without serial number.
 Photos : See annex

Technical data

Frequency bands :

Band (GHz)	Operating Channel numbers	Channel center frequency (MHz)	Supported by Test item
U-NII lower band (5.15 – 5.25)	36	5180	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
	40	5200	
	44	5220	
	48	5240	
U-NII middle band (5.25 – 5.35)	52	5260	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
	56	5280	
	60	5300	
	64	5320	
U-NII (new) band (5.470 – 5.725)	100	5500	<input type="checkbox"/> Yes / <input checked="" type="checkbox"/> No
	104	5520	
	108	5540	
	112	5560	
	116	5580	
	120	5600	
	124	5620	
	128	5640	
	132	5660	
	136	5680	
140	5700		
U-NII upper band (5.725 – 5.825)	149	5745	<input type="checkbox"/> Yes / <input checked="" type="checkbox"/> No
	153	5765	
	157	5785	
	161	5805	



Operating modes : duplex

Type of modulation : OFDM

Data rate (Mbits/s)	Modulation	Supported by Test item
6	BPSK	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
9	BPSK	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
12	QPSK	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
18	QPSK	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
24	16-QAM	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
36	16-QAM	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
48	64-QAM	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
54	64-QAM	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
(64)	(256-QAM)	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
(72)	(256-QAM)	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No

Fixed point-to-point operation: Yes/No

Antenna : MPCl Module antenna integral

Antenna gain : 5 dBi (peak gain)

Power supply : Supply by host device

Emission designator : 21M0W7D

Host device : For the purpose of testing the sample is hosted in the following device.
DELL notebook type Latitude D 600 , using provisional installed antenna MPCl Module antenna and AC Adapter DELL AA22850 PA-12 Family.

Classification :

Fixed Device	<input type="checkbox"/>
Mobile Device (Human Body distance > 20cm)	<input type="checkbox"/>
Portable Device (Human Body distance < 20cm)	<input checked="" type="checkbox"/>

Manufacturer:
(if applicable)

Name :
 Street :
 Town :
 Country :

1.6 Test standards

Technical standard : FCC RULES PART 15 E

Additional information : The test sample is a reference design for a WLAN-PCI Card. Therefore it can not considered as a final product and some requirements of the standard are not applicable.
The test sample is designed for Mini PCI Card using WLAN technology according IEEE 802.11 a/ b/ g.
For this report the function according IEEE 802.11a is considered only. The scheme for frequency generation, spectrum spreading, receiver parameters, synchronization procedure, and other parameters are determined by the mentioned standard above.

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 : 23°C

Relative humidity content : 20 ... 75 %

Air pressure : 86 ... 103 kPa

Details of power supply : 120 V AC/DC Adapter

Extrem conditions parameters: : test voltage - extreme min : -- V, AC
max: -- V, AC

2.3 Test equipment utilized

No.	Measurement device:	Type:	Manufacturer:
ETS 0001	Test receiver	ESHS 10	Rohde&Schwarz
ETS 0002	Test receiver	ESVP	Rohde&Schwarz
ETS 0003	Test receiver	ESVS 10	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	Spectrum analyzer	PSA-65A	Avcom
ETS 0008	Antenna	Loop antenna	Siemens
ETS 0009	Antenna	Loop antenna	MEB
ETS 0010	Antenna	Loop antenna	MEB
ETS 0011	Antenna	van Veen/ Frame	ETS
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	Antenna	VHAP	Schwarzbeck
ETS 0017	Antenna	VHAP	Schwarzbeck
ETS 0018	Antenna	UHAP	Schwarzbeck
ETS 0019	Antenna	UHAP	Schwarzbeck
ETS 0020	Antenna	DP 21	MEB
ETS 0021	Antenna	DP 3	MEB
ETS 0022	Antenna	SAS-200/ 521	A.H. Systeme / USA
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	Turn table	TT 1	ETS
ETS 0031	Turn table	DS 412	Heinrich Deisel
ETS 0032	Controller	HD 050	Heinrich Deisel
ETS 0033	RF generator	SMG	Rohde&Schwarz
ETS 0034	RF generator/ Amplifier	SMLR	Rohde&Schwarz
ETS 0035	RF generator/ Amplifier	SMLM	Rohde&Schwarz
ETS 0036	RF amplifier	10W 1000AM2	Amplifier Research
ETS 0037	RF amplifier	50W 1000	Amplifier Research
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	Artificial mains	NNB 11	MEB
ETS 0044	Artificial mains	NNB 111	MEB
ETS 0045	Stripe line	IEC 801-3	ETS

No.	Measurement device:	Type:	Manufacturer:
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	Tektronic
ETS 0052	Audio analyzer	UPA 4	Rohde&Schwarz
ETS 0053	ECAT Control center		Keytek/ EMV
ETS 0054	EFT simulator		Keytek/ EMV
ETS 0055	Module network coupler		Keytek/ EMV
ETS 0056	Blank plug-in		Keytek/ EMV
ETS 0057	Module SURGE with DC coupler		Keytek/ EMV
ETS 0058	Capacitive coupling clamp		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	Filter system 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	Filter system 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 milivoltmeter	QRV 2	MKD/ RFT
ETS 0075	NF generator	GF 22	Präcitronic
ETS 0076	Feeding bridge A	SBA 1000	ESP
ETS 0077	Audio/ Video Filter	AV 55020	ETS
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 Novell network 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	DM-Coder	SME-B11	Rohde&Schwarz
ETS 0093	Pulse Modulator	SM-B8	Rohde&Schwarz
ETS 0094	Rear-panel connectors	SME-B19	Rohde&Schwarz

No.	Measurement device:	Type:	Manufacturer:
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	DM-Coder	SME-B11	Rohde&Schwarz
ETS 0102	Pulse modulator	SM-B8	Rohde&Schwarz
ETS 0103	Pulse generator	SM-B4	Rohde&Schwarz
ETS 0104	Rear-panel connectors	SME-B19	Rohde&Schwarz
ETS 0105	High power synthesizer/ sweeper	SMP 22	Rohde&Schwarz
ETS 0106	Frequency extension	SMP-B11	Rohde&Schwarz
ETS 0107	RF attenuator for SMP 22	SMP-B15	Rohde&Schwarz
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 Realtime audio interface for	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		ETS
ETS 0116	RF Millivoltmeter	URV 55	Rohde&Schwarz
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 0134	Mains filter	MSF	Erika Fiedler
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

No.	Measurement device:	Type:	Manufacturer:
ETS 0144			
ETS 0145			
ETS 0146	Probe	TK 103	MEB
ETS 0147	Active probe	ESH2-Z2	Rohde&Schwarz
ETS 0148	Test TV	21PT4301/00	Philips
ETS 0149	Power divider	ZAPD-21	MCL
ETS 0150	Switcher	HR07-720	Wisi
ETS 0151	Interference pulse generator	NSG 500C	Schaffner
ETS 0152	Simulator for Load-Dump-Impulse	NSG 506C (I)	Schaffner
ETS 0153	Simulator for Load-Dump-Impulse	NSG 506C (II)	Schaffner
ETS 0154	Signal generator	SMG	Rohde&Schwarz
ETS 0155	Signal generator	SMG	Rohde&Schwarz
ETS 0156	Adjacent channel power meter	NKS	Rohde&Schwarz
ETS 0157	TV and Sat-Signal generator	VTG 700	Grundig
ETS 0158	TV and Sat Signal generator	VTG 700	Grundig
ETS 0159	Programmable power supply	TOE 8815	Toellner
ETS 0160	Protective wire and isolation tester	PI 6001 D	SPS electronic
ETS 0161	Filter system / consumer electronic		Fiedler
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 - Frontend (analog)	MFE III	HEAD acoustics
ETS 0170	Measurement - Frontend (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 - Frontend line interface	MFE V	HEAD acoustics
ETS 0175	Software Line interface (analog)	COPTZV5	HEAD acoustics
ETS 0176	Acoustic volt meter	COP 4	HEAD acoustics
ETS 0177	Feeding bridge B	SBA 1000	ESP
ETS 0178	Open area test side	30m	ETS
ETS 0179	Open area test side	30m	ETS
ETS 0180	Artificial mains	NNB01/RFZ	ETS
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

No.	Measurement device:	Type:	Manufacturer:
ETS 0193	Vibration table	N1-201-M	Sandox
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
ETS 0200	Digital thermometer / hygro meter	ad 90h	ama-digit
ETS 0201	Digital thermometer / hygro meter	37950-10	Cole Parmer
ETS 0202	Digital thermometer	ad 15th	ama-digit
ETS 0203	Digital thermometer	Type K	Amarell
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 0217	Millivolt meter	URV 55	Rohde&Schwarz
ETS 0218	RF probe	URV5-Z7	Rohde&Schwarz
ETS 0219	Power sensor	NRV-Z2	Rohde&Schwarz
ETS 0220	Insertion unit	URV5-Z4	Rohde&Schwarz
ETS 0221	ISDN-S0-Analyzer	K1403	Siemens
ETS 0222	ISDN Protocol Analyser	TE965	Tekelec Teleco.
ETS 0223	GSM/ PCN/ PCS-Simul.	TS8915B	Rohde & Schwarz
ETS 0224	GSM System Simulator	FTA	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 0231	Testreceiver	ESVS 30	Rohde & Schwarz
ETS 0232	Radiation test source	VSO 1	MEB
ETS 0233	Direction coupler	RK 100	MEB
ETS 0234	Power meter	NRVD	Rohde & Schwarz
ETS 0235	RF-network-analyser	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
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

No.	Measurement device:	Type:	Manufacturer:
ETS 0242	Harmonics analyser	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 0252	System controller	PSM 12	Rohde & Schwarz
ETS 0253	Spectrum analyser	FSIO	Rohde & Schwarz
ETS 0254	RF generator	SMIO 03	Rohde & Schwarz
ETS 0255	RF generator	SMIO 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		Wird
ETS 0264	Spectrum analyser	F 1048	HAMEG
ETS 0265	Loop antenna	HFRA 9150	Schwarzbeck
ETS 0267	RF signal generator	SMT 03	Rohde & Schwarz
ETS 0268	RF signal generator	SMP 02	Rohde & Schwarz
ETS 0270	RF signal generator	SMP 04	Rohde & Schwarz
ETS 0271	Test receiver	ESI 40	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 analyser	UPL	Rohde & Schwarz
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 analyser	FSM	Rohde & Schwarz
ETS 0282	RF bridge	86207 A	Hewlett Packard
ETS 0283	RF bridge	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

No.	Measurement device:	Type:	Manufacturer:
ETS 0294	Biconical antenna	HK 116	Rohde & Schwarz
ETS 0295	LPD antenna	HL 223	Rohde & Schwarz
ETS 0296	Oscilloscope	TDS 520 A	Tektronix
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	Keitek
ETS 0303	Telecom line CDN	CM-TEL CD	Keitek
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. Analyzser	CSA 803 A	Tektronix
ETS 0308	Spectrum analyzser	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
ETS 0316	Switcher	Hr 07-720	WISI
ETS 0317	Switcher	Hr 07-720	WISI
ETS 0318	Dial pulse/ DTMF tester	210	HE
ETS 0319	Opto link	GPIB 140	NI
ETS 0320	Opto link	GPIB 140	NI
ETS 0321	RF Millivoltmeter	URV 55	Rohde & Schwarz
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		Philips
ETS 0326	DECT fix part		Philips
ETS 0327	Blue Unit	V 2.0	Nokia
ETS 0328	BT Protocol tester	PTW 60	Rohde & Schwarz
ETS 0330	Spectrum analyser	FSM	Rohde & Schwarz
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	Bluetooth test set	TS8960	Rohde & Schwarz
ETS 0431	AC Mains Adaptor	BS5733	Travel Emporium
ETS 0432	RF Verstärkermatrix	RSU-ETS-BT	ETS
ETS 0433	RF Verstärkermatrix	RSU-ETS-CTR6	ETS
ETS 0434	Reserviert Tre	RSU-ETS-GSM	
ETS 0435	HP-Filter	H1G04G01	Microwave

No.	Measurement device:	Type:	Manufacturer:
ETS 0436	HP-Filter	H1G04G01	Microwave
ETS 0437	HP-Filter	H0G408G1	Microwave
ETS 0438	HP-Filter	H0G408G1	Microwave
ETS 0439	Reserviert Tre		
ETS 0440	Reserviert Tre		
ETS 0441	Bluetooth Protcol Tester	PTW 60	R & S
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-Attenuattor 6dB	50FH-006-300	JFK
ETS 0446	RF-Attenuattor 30dB	50FH-030-300	JFK
ETS 0447	KFZ-Bordnetznachbildung	LN-KFZ/200	R. Heine
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 Electronis	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 0467	Universal Radio Communication T	CMU 200	R & S
ETS 0468			
ETS 0469	Dielectric Probe Kit	85070C	Agilent
ETS 0470	Amplifier	AM-1300-1103	MITEQ
ETS 0471			
ETS 0472	Antenna	BTA-H	Frankonia
ETS 0473	GSM / UMTS System Simulator	TS 8950	R&S
ETS 0474	Antenna	BTA-H	Frankonia
ETS 0475	Verstärker	AFS4-00101800-U	MITEQ
ETS 0476	Test receiver	ESCS 30	R&S
ETS 0477	GPS-System(aktive GPS-antenne)	4490	HOPF
ETS 0478	Crystal filter	MQF 127.50-2400/F	Vectron International
ETS 0479			
ETS 0480	Validation Dipole	DB 3	EMCO
ETS 0481	40GHz Standard Gain Horn mit	22240-25	Flann Microwave
ETS 0482	40GHz High Gain Antenna	AT4560	Amplifier research
ETS 0483	Verstärker	AFD3010040-15-LN	Miteq

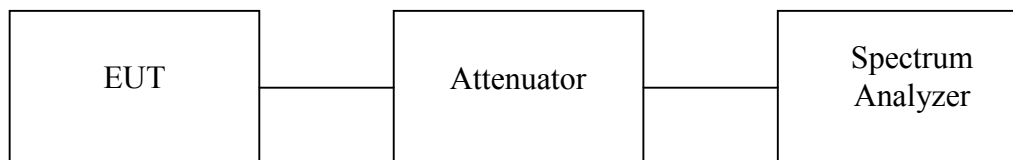
2.4 Test Procedure

The test procedures are performed following the test stands ANSI STANDARD C63.4 and Public Notice DA 02-2138 “Measurement Procedure for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands”.

2.4.1 Emission Bandwidth, FCC 15.407 (a)

The Emission Bandwidth “B” is the bandwidth at 26 dB down relative to the maximum level of the modulated carrier. The result “B” is used for determining of Peak Power Transmit limits. The measurement is performed according FCC Public Notice DA 02-2138.

The test are performed at the frequencies (low and high channels of the EUT operating band), full rated power levels and all applicable data rates of the transmitter.



2.4.2 Peak Transmit Power, FCC 15.407 (a)(1,2,3,4)

Peak Transmit Power is the maximum transmit power as measured over an interval of time of at most 30/B or the transmission pulse duration of the device, whichever is less, under all conditions of modulation.

The applied FCC Public Notice DA 02-2138 describes three different methods to measure Peak Transmit Power.

If transmitting antennas of directional gain AG greater than 6 dBi are used, the Peak Transmit Power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Fixed point-to-point U-NII devices operating in the band 5.725 – 5.825 GHz may employ transmitting antennas with directional gain AG up to 23 dBi without any corresponding reduction. For antenna gains greater than 23 dBi, a 1 dB reduction in Peak Transmit Power for each 1 dB of antenna gain in excess of 23 dBi would be required.

2.4.3 Peak Power Spectral Density, FCC 15.407 (a)(1,2,4,5)

The Peak Power Spectral Density is the maximum power spectral density, measured with a specified bandwidth, within the U-NII device operating band.

FCC Public Notice DA 02-2138 specifies two different methods for this conducted measuring at the antenna port. If the device can not connected directly, alternative techniques can be used.

If transmitting antennas of directional gain greater than 6 dBi are used, the Peak Power Spectral Density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Fixed point-to-point U-NII devices operating in the band 5.725 – 5.825 GHz may employ transmitting antennas with directional gain up to 23 dBi without any corresponding reduction. For antenna gains greater than 23 dBi, a 1 dB reduction in Peak Power Spectral Density for each 1 dB of antenna gain in excess of 23 dBi would be required.

2.4.4 Ratio of the Peak Excursion of the modulation envelope, FCC 15.407 (a)(6)

The Ratio of the Peak Excursion of the modulation envelope to the Peak Transmit Power shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less. The used measurement method is described in FCC Public Notice DA 02-2138.

2.4.5 Peak Emissions outside the frequency bands of operation, FCC 15.205, 15.209, 15.407 (b)

Peak Emissions outside the frequency band of operation are called Spurious Emissions in this test report. Here the spurious emissions are measured as field strength values. The given power value limits of –27 dBm and –17 dBm are calculated to field strength values of 68.23 dB μ V/m and 78.23 dB μ V/m for a 3 m measuring distance. This procedure can simplify the necessary comparison with field strength based limits for the restricted band according 15.205; 15.209.

For frequencies above 26 GHz a measuring distance of 1 m is used with values corrected accordingly.

The test procedure used is ANSI STANDARD C63.4-2000 using a spectrum analyzer. The bandwidth of the spectrum analyzer is 100 kHz for the frequency range of 30 MHz to 1 GHz and 1 MHz for frequencies above 1 GHz with an appropriate sweep speed. The analyzer is calibrated in dB above a microvolt at the output of the antenna.

The Field Strength is established by adding the meter reading of the spectrum analyzer (which is set to read in units of dB μ V) to the antenna correction factors supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

Freq (MHz)	METER READING + ACF + CABLE LOSS (to the receiver) = FS
33	20 dB μ V + 10.36 dB + 6 dB = 36.36 dB μ V/m @3m

ANSI STANDARD C63.4-2000 10.1.7 MEASUREMENT PROCEDURES: The test sample is placed on a table 80 cm high and with dimensions of 1m by 1.5m (non metallic table). The test sample is placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum is scanned from 30 MHz to 10th harmonic of the fundamental or 40 GHz, whichever is lower.

Peak readings is taken in three (3) orthogonal planes and the highest readings.

When an emission is found, the table is rotated to produce the maximum signal strength. At this point, the antenna is raised and lowered from 1m to 4m. The antenna is placed in both the horizontal and vertical planes.

2.4.6 Automatic Discontinuation of transmission, FCC 15.407 (c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

2.4.7 Transmitting Antenna, FCC 15.407 (d)

Any U-NII device that operates in the band 5.15 – 5.25 GHz shall use a transmitting antenna that is integral part of the device.

2.4.8 Indoor Operation Restriction, FCC 15.407 (e)

U-NII devices operating in the 5.15 – 5.25 GHz band will be restricted to indoor operations to reduce any potential for harmful interference to co-channel MSS operations.

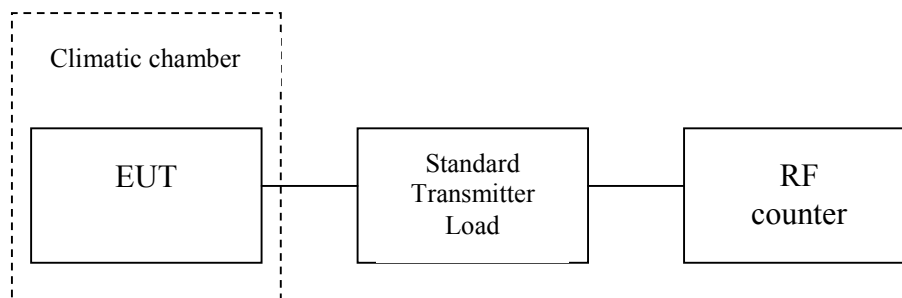
2.4.9 Radio Frequency Radiation Exposure, FCC 15.407 (f)

U-NII devices are subject to the radio frequency exposure requirements specified in FCC Part 1.1307(b), Part 2.1091 and Part 2.1093, as appropriate. All equipment shall be considered to operate in a “general population/uncontrolled” environment.

Applicants shall include in their application of how this requirement is met.

2.4.10 Frequency Stability, FCC 15.407 (g)

Frequency Stability of a U-NII device means that an intended emission is maintained within the band of operation under all conditions of operation as specified in the user manual.



A plot of the emission at the band edge, with the transmitting frequency tuned to band edge channel, may be required for devices which do not utilize a standard carrier that may be measured.

2.4.11 Spurious Emissions related to AC power line, FCC 15.107, 15.207

The power line conducted interference measurement follows ANSI STANDARD C63.4- using a 50 μ H LISN. The bandwidth of the measurement receiver is 10 kHz. Both lines are observed in the frequency range 150 kHz to 30 MHz.

3 Test results (enclosure)

TEST CASE	Required	Customer Declaration	Test passed	Test failed
Emission Bandwidth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Peak Transmit Power	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Peak Power Spectral Density	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ratio of Peak Excursion of the modulation envelope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Peak Emissions outside the frequency band of operation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Automatic Discontinuation of transmission	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transmitting Antenna	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Indoor Operation Restriction	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radio Frequency Exposure	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Frequency Stability	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Spurious Emissions related to AC power line	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

3.1 Emission Bandwidth, FCC 15.407 (a)

Data rate Mbit/s	Emission Bandwidth (MHz)			
	Channel			
	36	48	52	64
6	20.74	20.74	20.84	20.74
9	20.84	20.84	20.74	20.74
12	20.84	20.84	20.84	20.94
18	20.94	21.04	21.04	20.94
24	20.74	20.84	20.84	20.64
36	20.84	20.94	20.64	20.74
48	20.74	20.64	20.84	20.74
54	20.94	20.84	20.94	20.84
64	20.74	20.94	20.74	20.84
72	20.44	20.44	20.44	20.44

Test equipment used: ETS 0125, ETS 0271

Comments: See attached diagrams for examples.

3.2 Peak Transmit Power, FCC 15.407 (a)(1,2,3,4)

This measurement is performed according Method 3 of Public Notice DA 02-2138 for Peak Transmit Power measurement.

Data rate Mbit/s	Peak Transmit Power (mW)			
	Channel			
	36	48	52	64
6	18.2	17.5	19.0	19.6
9	15.2	16.0	17.5	18.3
12	17.1	17.8	19.2	20.7
18	16.6	17.5	18.8	19.6
24	17.2	18.3	19.2	20.2
36	16.5	17.2	18.8	19.2
48	16.8	17.6	18.1	19.1
54	16.2	17.8	18.5	19.3
64	16.8	17.1	18.9	19.9
72	16.8	17.2	19.1	18.4

Limits for Peak Transmit Power			
Frequency f (GHz)	dBm	dBm	Remarks
	Fix value	B related value	For B = 20 MHz
5.15 – 5.25	17	17	4 dBm + 10log B
5.25 – 5.35	24	24	11 dBm + 10log B
5.725 – 5.825	30	30	17 dBm + 10log B
5.15 – 5.35	17 + (AG – 6 dB)	17 + (AG – 6 dB)	for AG > 6 dBi
5.25 – 5.35	24 + (AG – 6 dB)	24 + (AG – 6 dB)	for AG > 6 dBi
5.725 – 5.825	30 + (AG – 23 dB)	30 + (AG – 23 dB)	for AG > 23 dBi
			AG – antenna gain

Test equipment used: ETS 0125, ETS 0271

Comments: See attached diagrams for examples.

3.3 Peak Power Spectral Density, FCC 15.407 (a)(1,2,4,5)

This measurement is performed according Method 2 of Public Notice DA 02-2138 for Peak Power Spectral Density measurement.

Data rate Mbit/s	Peak Power Spectral Density (dBm)			
	Channel			
	36	48	52	64
6	0,49	0,45	0,67	0,93
9	0,20	0,50	0,77	1,06
12	0,22	0,68	0,56	0,99
18	0,15	0,48	0,60	0,90
24	0,83	1,09	1,23	1,59
36	1,08	1,45	1,53	1,74
48	1,07	1,31	1,50	0,99
54	0,87	1,15	1,20	1,60
64	0,87	0,94	1,10	1,45
72	1,29	1,55	1,58	2,00

Limits for Peak Power Spectral Density		
Frequency f (GHz)	dBm/MHz	Remarks
5.15 – 5.25	4	Conducted
5.25 – 5.35	11	Conducted
5.725 – 5.825	17	Conducted
5.15 – 5.35	4 + (AG – 6 dB)	for AG > 6 dBi
5.25 – 5.35	11 + (AG – 6 dB)	for AG > 6 dBi
5.725 – 5.825	17 + (AG – 23 dB)	for AG > 23 dBi
		AG – antenna gain

Test equipment used: ETS 0125, ETS 0271

Comments: See attached diagrams for examples.

3.4 Ratio of the Peak Excursion of the modulation envelope, FCC 15.407 (a)(6)

Data rate	Ratio of the Peak Excursion of the modulation envelope (dBm)			
	Channel			
Mbit/s	36	48	52	64
6	11,6	10,3	10,6	10,2
9	11,5	12,1	12,2	11,3
12	11,6	11,2	12,4	12,2
18	11,2	11,2	12,5	11,8
24	10,8	11,0	10,6	10,6
36	11,7	11,2	11,4	11,1
48	12,5	10,4	11,8	11,2
54	12,6	12,4	12,0	12,0
64	10,3	9,7	10,7	9,9
72	9,9	10,1	10,6	9,4

Limit		
	dB	Remarks
Ratio of Peak Excursion	13	across any 1 MHz BW or the emission bandwidth

Test equipment used: ETS 0125, ETS 0271

Comments: See attached diagrams for examples.

3.5 Peak Emissions outside the frequency bands of operation, FCC 15.205, 15.209, 15.407 (b)

Summary table with radiated data of the test plots

Freq.	Used Ch.	Frequency Marker [GHz]	Polarization	Δ corrections dB	Max. Field Strength [dB μ V/m]	Compliance Limit [dB μ V/m]	Detector	BW [MHz]	Margin [dB]
5	64	5.350	H		68.31	74	P	1	<u>-5,69</u>
5	64	5.350	H		51.58	54	AV	1	<u>-2,42</u>
5	52	5.245	H		79.21	88.23	P	1	<u>-9,02</u>
5	52	5.245	H		60.38	68.23	AV	1	<u>-7,85</u>

Freq. – Frequency Range:

1:	30	–	200 MHz
2:	200	–	1000 MHz
3:	1	–	4 GHz
4:	4	–	8 GHz
5:	4	–	8 GHz mid range
6:	4	–	8 GHz high range
7:	8	–	12 GHz
8:	12	–	17 GHz
9:	17	–	26,5 GHz

All not in the table noted test results are more than 20 dB below the relevant limits.
All other not noted test plots do not contain significant test results in relation to the limits.

TEST RESULT (Transmitter): The unit DOES meet the FCC requirements.

Limits			
Frequency f (GHz)	dBm/MHz	dB μ V/m	Remarks
Restricted bands below 960 MHz		acc. § 15.209	
Restricted bands above 960 MHz		54	
$f < 5.15 - 5.25 < f$	- 27	(68,23)	for 5.15 – 5.25 GHz transmitters
$f < 5.25 - 5.35 < f$	- 27	(68,23)	for 5.25 – 5.35 GHz transmitters
$f < 5.715 - 5.8.35 < f$	- 27	(68,23)	for 5.725 – 5.825 GHz transmitters
$5.715 < f < 5.725$	- 17	(88,23)	for 5.725 – 5.825 GHz transmitters
$5.825 < f < 5.835$	- 17	(88,23)	for 5.725 – 5.825 GHz transmitters

Comment: See attached diagrams for examples.

Test equipment used: ETS 0012, ETS 0013, ETS 0014, ETS 0125, ETS 0271; ETS 0311, ETS 0481

3.6 Automatic Discontinuation of transmission, FCC 15.407 (c)

This function will be declared by manufacturer.

3.7 Transmitting Antenna, FCC 15.407 (d)

Any U-NII device that operate s in the band 5.15 – 5.25 GHz shall use a transmitting antenna that is integral part of the device.

This requirement has to be declared by manufacturer of a final product. For the here considered reference design for a module intended to use later in a final product this requirement should be content of the technical description.

3.8 Indoor Operation Restriction, FCC 15.407 (e)

This requirement has to be declared by manufacturer of a final product. For the here considered reference design for a module intended to use later in a final product this requirement should be content of the technical description.

3.9 Radio Frequency Radiation Exposure, FCC 15.407 (f)

The current test sample is a module reference design which is not assigned to a specific final product.

In this case an exposure evaluation is not mandatory.

Because the intended use of this reference design a theoretical MPE related evaluation as an example is done below, for information purposes.

FCC OET Bulletin 65 Edition 97.01 determines the equations for predicting RF fields and applicable limits.

The prediction for power density in the far-field of the antenna can be made by use of the general equation below.

This equation is generally accurate in the far-field but will over-predict power density in the near field, where it could be used for making a “worst case” or conservative prediction.

$$S = \frac{P G}{4 \pi R^2}$$

S – Power Density

P – Output power ERP

R – Distance

D – Cable Loss

AG – Antenna Gain G= AG-D

Item	Unit	Value	Remarks
P	mW	20,94	Average value
D	dB	4,5	Measured value
AG	dBi	+5	Peak gain
G		0,316	Calculated Value
R	cm	2,5	Assumed value
S	mW/cm ²	0,301	Calculated value

Limits:

Limit for General Population / Uncontrolled Exposure	
Frequency (MHz)	Power Density (mW/cm ²)
1500 – 100.000	1,0

3.10 Frequency Stability, FCC 15.407 (g)

Voltage (%)	Voltage (V)	Temperature (°C)	measured frequency (GHz)		
			Ch.: 36	Ch.: 52	Ch.: 64
100 %		+ 20 (Tnom)	5.179986354	5.259985845	5.319985646
115 % (1)		+35 (Tmax)	5.179985617	5.259985168	5.319984924
85 % (1)		+35 (Tmax)	5.179985632	5.259985196	5.319984851
115 % (1)		0 (Tmin)	5.179998134	5.259999983	5.320001756
85 % (1)		0 (Tmin)	5.179998484	5.259999785	5.320001878
Max. deviation kHz			+ 12.13	+14,14	+16,23
%			0,0002341	0,0002688	0,0003051
battery endpoint					

The displayed frequency stability will ensure that the emission is maintained within the band of operation.

Test equipment used: ETS 0271, ETS 273, ETS 0253, ETS 0481

Comments: Temperature range is determined by manufacturer

3.11 Spurious Emissions related to AC power line, FCC 15.107, 15.207

Conducted:

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

Limits:

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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 0003, ETS 0040, ETS 0109, ETS 0125

Comment: see attached diagram

Appendix

- A Pictures
- B Emission Bandwidth
- C Peak Transmit Power
- D Peak Power Spectral Density
- E Ratio of the Peak Excursion of the modulation envelope
- F Peak Emissions outside the frequency band of operation
- G Frequency stability
- H Spurious emissions related to AC power line