

TEST REPORT

Test Report Reference: R52367, 3rd Version

Equipment under Test: 70TX-D

Applicant: HM-Funktechnik GmbH

Manufacturer: HM-Funktechnik GmbH

**Test Laboratory
(CAB)
accredited by
DATech e.V.
in compliance with DIN EN ISO/IEC 17025
under the
DAT-P-105/94-32
OATS registration number 90877**

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1 IDENTIFICATION

1.1 APPLICANT

Name:	HM-Funktechnik GmbH
Address:	Zum Handenberg 3 66620 Primstal
Country:	Germany
Name for contact purposes:	Mr. Thomas Stöhr
Tel:	+49-(0)-6875-9105-32
Fax:	+49-(0)-6875-9105-10
e-mail address:	info@hmradio.de

1.2 MANUFACTURER

Name:	HM-Funktechnik GmbH
Address:	Zum Handenberg 3 66620 Primstal
Country:	Germany
Name for contact purposes:	Mr. Thomas Stöhr
Tel:	+49-(0)-6875-9105-32
Fax:	+49-(0)-6875-9105-10
e-mail address:	info@hmradio.de

1.3 DATES

Date of receipt of test sample:	22 Dec. 2005 22 June 2006 (modified sample for Occupied Bandwidth)
Start of test:	20 Jan. to 3 Feb. 2006 26 June 2006 (Occupied Bandwidth with modified EUT)
End of test:	26 June 2006

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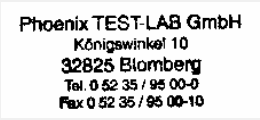
1.4 TEST LABORATORY

The tests were carried out at:

PHOENIX TEST-LAB GmbH
Königswinkel 10
D-32825 Blomberg
Germany

Phone: +49 (0) 52 35 / 95 00-0
Fax: +49 (0) 52 35 / 95 00-10

accredited by DATech e.V. in compliance with DIN EN ISO/IEC 17025 under Reg. No. DAT-P-105/99-21,
 FCC Test site registration number 90877 and Industry Canada Test site registration IC3469.

Test engineer:	Raimund BLASK		26 June 2006
	Name		Date
Test report checked by:	Bernd STEINER		27 June 2006
	Name		Date
			
	Stamp		

1.5 RESERVATION

This test report is only valid in its original form.

Any reproduction of its contents without written permission of the accredited test laboratory
 PHOENIX TEST-LAB GmbH is prohibited.

The test results herein refer only to the tested sample. PHOENIX TEST-LAB GmbH is not responsible for
 any generalisations or conclusions drawn from these test results concerning further samples. Any
 modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page
 necessarily contains the PHOENIX TEST-LAB Logo and the TEST REPORT REFERENCE.

1.6 NORMATIVE REFERENCES

[1] **FCC 47 CFR Part 90 (October 2005), Private Land Mobile Radio Service**

[2] **FCC 47 CFR Part 2 (October 2005)**

[3] **TIA/EIA-603-C (17 August 2004), Land Mobile FM or PM Communication Equipment,**
 Measurement and Performance Standards

1.7 TEST RESULTS

The requirements of this test document are fulfilled by the equipment under test. The complete test results
 are presented in the following.

TEST REPORT REFERENCE: R52367, 3rd Version

2 TECHNICAL DATA OF EQUIPMENT

2.1 DEVICE UNDER TEST

Type of equipment:	UHF-Data-Transmitter*
Type designation:	70TX-D
Operating frequency range:	460.000 MHz to 470.000 MHz*
Transmitter output power:	0.5 W / +27 dBm*
Channel spacing:	25 kHz*
Antenna type:	See additional information
Antenna connector:	MCX-Connector (male)
Power supply voltage:	5 V to 7 V DC (nominal 6 V DC)*
Temperature range:	-30°C to +60°C*

* declared by the applicant

The following external I/O cables were used:

Cable	Length	Shielding	Connector
DC-power-supply	1.5 m	no	Not specified

2.2 PERIPHERY DEVICES

The ancillary equipment mentioned below was in use:

The EUT (transmitter) was powered with an external DC-power supply.

2.3 MODIFICATIONS

No modifications were necessary to fulfil the requirements.

2.4 ADDITIONAL INFORMATION

All radiated tests (documented in this Test-Report) were done with the following antenna:

Type: Gainflex Antenna
440-470 MHz
K7153239 / 510081

Nominal Gain: +4 dB (Ref.: Quarter-Wave Whip, declared by the Applicant)

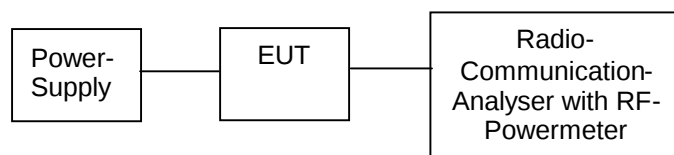
Manufacturer: KATHREIN-Werke KG
Anton-Kathrein-Straße 1-3
83004 Rosenheim
Germany

3 TEST PROCEDURES

The test procedures were performed as follows (according to TIA/EIA-603-C (17 August 2004)).

3.1 Power Output at Terminals 47 CFR 2.1046 and 47 CFR 90.205

The conducted RF output power is the available power at the output terminals of the transmitter when the output terminals are connected to the standard transmitter load. The test sample is connected to a radio communication analyser. The power output at the transmitter antenna port is determined by adding the value of the cable loss to the power reading. The test are performed at the frequencies as shown in chapter 4 of this Test Report with full rated power level of the transmitter.

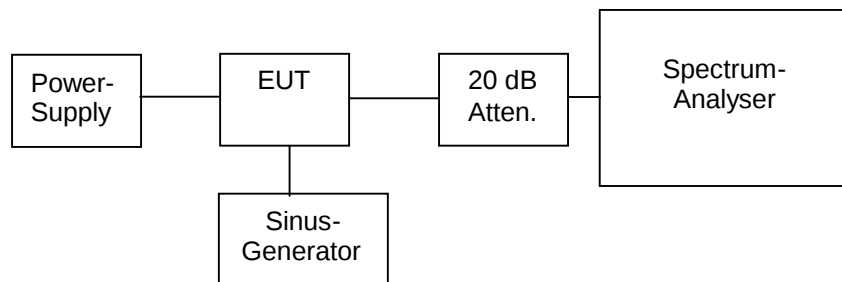


3.2 Occupied Bandwidth 47 CFR 2.1049 and 47 CFR 90.210

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. The transmitter is modulated by a 4 kHz sinusoidal signal.

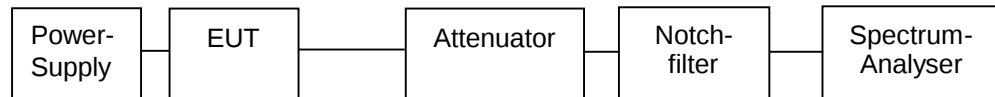
The input level shall be established at the frequency of maximum response of the audio modulating circuit. Different emission masks are required.

Emission Mask C is used for transmitters designed to operate with a 25 kHz bandwidth.



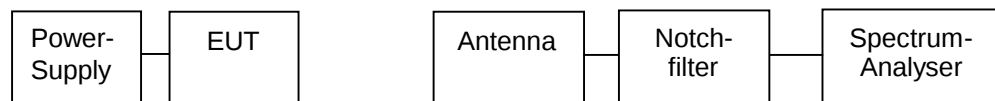
3.3 Spurious Emissions at Antenna Terminals 47 CFR 2.1051

Conducted spurious emissions are emissions at the antenna terminal on frequencies outside the operating band. In order to suppress inter-modulation products in the spectrum analyser a notch filter is used (if necessary). The tests were done in the frequency range 9 kHz to 6 GHz. The test is performed according the principle below:



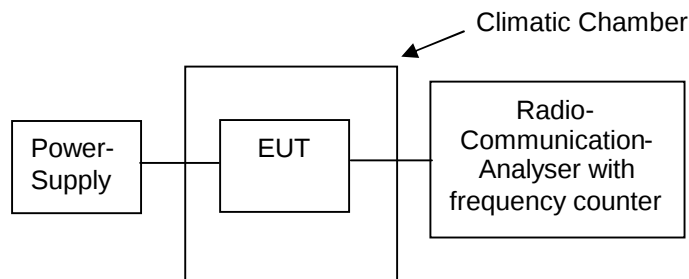
3.4 Radiated Spurious Emissions 47 CFR 2.1053 and 47 CFR 90.210

Radiated spurious emissions are emissions from the EUT when transmitting in non-radiating load on frequencies outside the operating band. ERP-Measurement of spurious emission were done to the general substitution method. The tests were done in the frequency range 25 MHz to 6 GHz. In order to suppress inter-modulation products in the spectrum analyser a notch filter is used (if necessary).



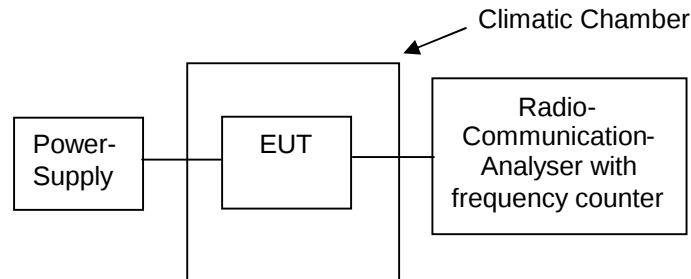
3.5 Frequency Stability with Temperature Variation 47 CFR 2.1055 and 47 CFR 90.213

The carrier frequency is the stability of the transmitter to maintain an assigned carrier frequency. The frequency stability was measured with variation of ambient temperature from -30°C to + 60°C and variation of the primary voltage.



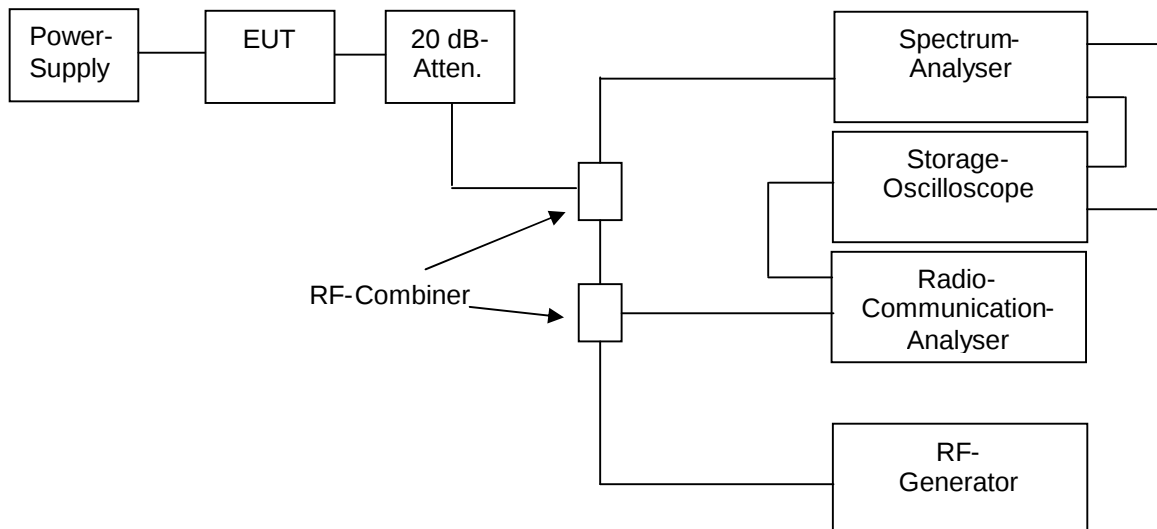
3.6 Frequency Stability with Primary Voltage Variation 47 CFR 2.1055 and 47 CFR 90.213

The carrier frequency is the stability of the transmitter to maintain an assigned carrier frequency. The frequency stability was measured with variation of the primary voltage.



3.7 Transmitter transient frequency behaviour FCC 90.214

Transient frequency behaviour is a measure of the difference, as a function in time, of the actual transmitter frequency to the assigned transmitter frequency behaviour during the switch on and switch off time.



4 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

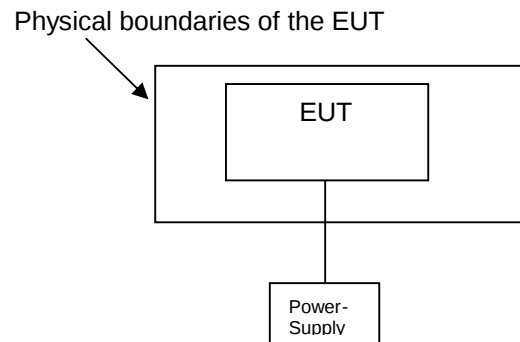
The EUT was powered with 6 V DC by an external power supply.

The "frequency error" and "carrier power conducted" were measured without modulation.

To modulate the EUT a 5 kHz TTL-Signal was used (as worst case) because the EUT will be used for digital data transmission with 9600 Bit/s (4800 Hz rectangular signal) as declared by the applicant.

Channel:	Transmit frequency:
1	460.000 MHz
2	470.000 MHz

The physical boundaries of the Equipment Under Test are shown below.



5 LIST OF MEASUREMENTS

Test Type:	Application:	Reference clauses in 47 CFR	Appendix No. Test Report	Result:
RF Power Output at Terminals	RF Terminals	2.1046	4.1	No Limit specified
Occupied Bandwidth	RF Terminals	2.1049 and 90.210 c/d	4.2	Passed
Modulation limiting	RF Terminals	90.210	-	Not Applicable*
Spurious Emissions at Antenna Terminal	RF Terminals	2.1051 and 90.210	4.3	Passed
Field Strength of Spurious Radiation	Antenna	2.1053 and 90.210	4.4	Passed
Frequency stability with temperature variation	RF Terminals	2.1055 a / i and 90.213	4.5	Passed
Frequency stability with primary voltage variation	RF Terminals	2.1055 d / i and 90.213	4.6	Passed
Transmitter Transient Frequency Behaviour	RF Terminals	90.214	4.7	Passed

* Transmitter is designed for digital data transmission, no analogue speech available.

TEST REPORT REFERENCE: R52367, 3rd Version

5.1 RF POWER OUTPUT AT TERMINALS

47 CFR 2.1046

Ambient temperature	20 °C	Relative humidity	55 %
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Test methods: The test was carried out in transmit mode according to TIA-603-C.
All results are shown in the following.

Test modulation: Unmodulated

Power measurement (conducted):

Channel:	Transmit frequency:	Carrier Power:
1	460.000 MHz	+26.5 dBm
2	470.000 MHz	+26.8 dBm
Measurement uncertainty		+0.66 dB / - 0.72 dB

LIMITS:

No Limits are specified in the Standard.

TEST EQUIPMENT USED FOR THE TEST:

32, 55, 121

TEST REPORT REFERENCE: R52367, 3rd Version

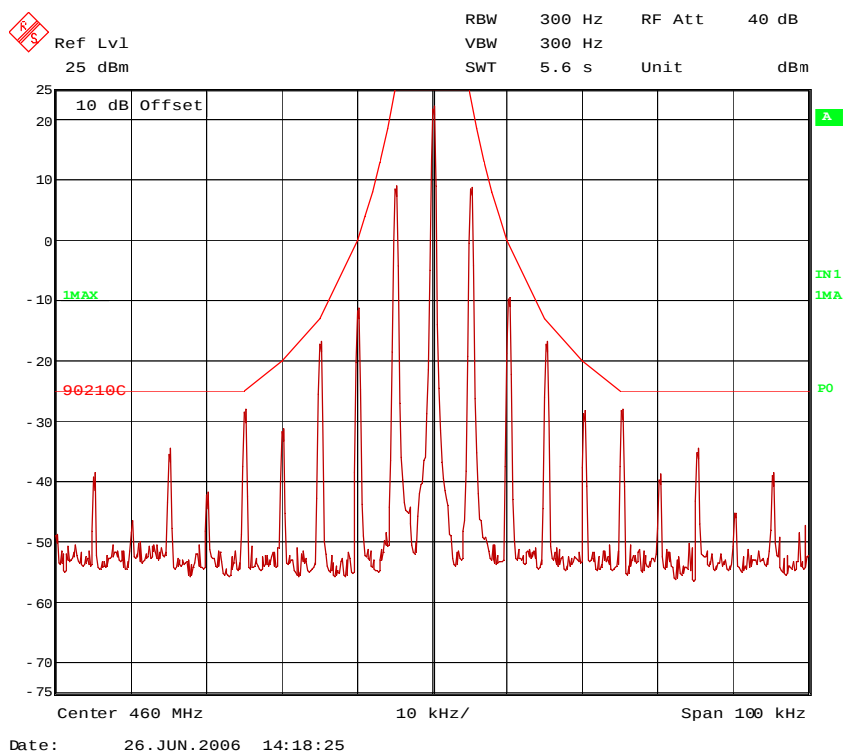
5.2 OCCUPIED BANDWIDTH

47 CFR 2.1049

Ambient temperature	20 °C	Relative humidity	50 %
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Test methods: The test was carried out in transmit mode according to TIA-603-C.
All results are shown in the following.

Modulation signal: 5 kHz-TTL-Signal (rectangular signal as worst case)

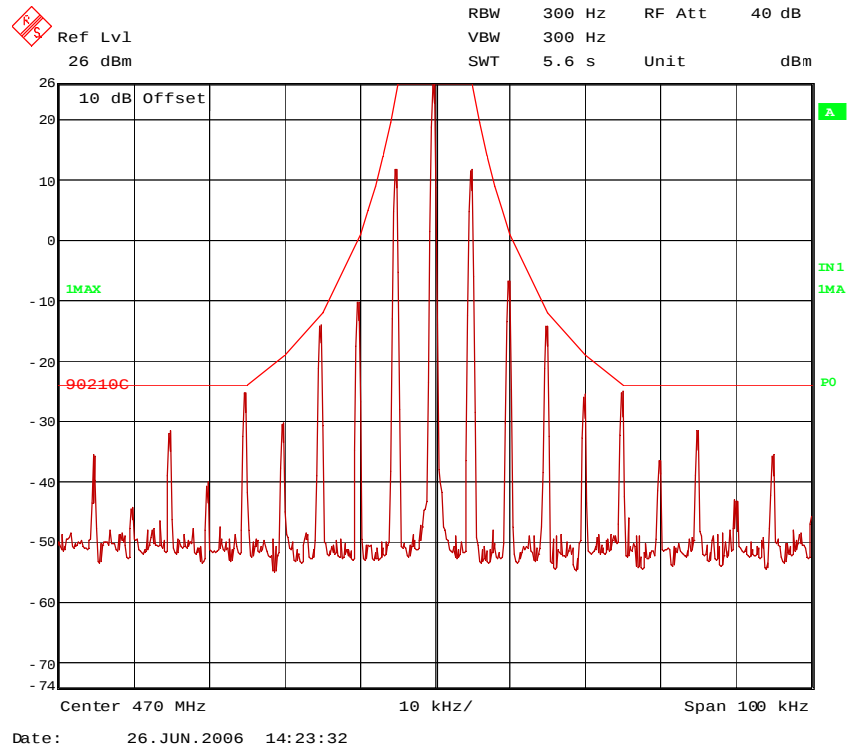


52367obw460mod.wmf: Transmit 460.000 MHz, 25 kHz channel separation

Continued next page:

TEST REPORT REFERENCE: R52367, 3rd Version

Continued:



52367obw470mod.wmf: Transmit 470.000 MHz, 25 kHz channel separation

LIMITS: 47 CFR 90.210

"Emission Mask" type "C"

TEST EQUIPMENT USED FOR THE TEST:

07, 55, 106, 121

TEST REPORT REFERENCE: R52367, 3rd Version

5.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS 47 CFR 2.1051 AND 90.210

Ambient temperature	20 °C	Relative humidity	55 %
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Test methods: The test was carried out in transmit mode according to TIA-603-C.
All results are shown in the following.

Test modulation: Unmodulated

Frequency: Channel 1 / 460.000 MHz

SPURIOUS EMISSIONS LEVEL (CONDUCTED)					
f	Level	Bandwidth	f	Level	Bandwidth
920.000 MHz	-32.1 dBm	MHz	-	-	-
-	No other significant spurious emission found.				-
-					-
-					-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

Frequency: Channel 2 / 470.000 MHz

SPURIOUS EMISSIONS LEVEL (CONDUCTED)					
f	Level	Bandwidth	f	Level	Bandwidth
-	No significant spurious emission found.				-
-					-
-					-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

LIMITS: 47 CFR 90.210

P (dBm) – (43+10 log (P)) P = Carrier Power in Watts
with P = +27 dBm / 500 mW
Limit: -13 dBm

TEST EQUIPMENT USED:

07, 55, 75, 106, 115

TEST REPORT REFERENCE: R52367, 3rd Version

5.4 FREQUENCY STABILITY WITH TEMPERATURE VARIATION 47 CFR 2.1055 AND 90.213

Ambient temperature	20 °C	Relative humidity	50 %
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Test methods: The test was carried out according to TIA-603-C.
All results are shown in the following.

Test modulation: Unmodulated

Measuring results: Channel 1

Temperature:	Voltage:	Measured frequency:	Relative error:
+20° C	6 V DC	460.00029 MHz	Reference
-30° C		459.99816 MHz	-4.6 ppm
-20° C		459.99960 MHz	-1.5 ppm
-10° C		460.00091 MHz	+1.3 ppm
0° C		460.00038 MHz	+2.0 ppm
+10° C		460.00014 MHz	-0.3 ppm
+20° C		459.99988 MHz	-0.9 ppm
+30° C		459.99870 MHz	-3.5 ppm
+40° C		459.99899 MHz	-2.8 ppm
+50° C		459.99864 MHz	-3.6 ppm
+60° C		459.99873 MHz	-3.4 ppm

Measuring results: Channel 2

Temperature:	Voltage:	Measured frequency:	Relative error:
+20° C	6 V DC	469.99834 MHz	Reference
-30° C		469.99635 MHz	-4.3 ppm
-20° C		469.99664 MHz	-3.6 ppm
-10° C		469.99805 MHz	-0.6 ppm
0° C		469.99874 MHz	+0.9 ppm
+10° C		469.99914 MHz	+1.7 ppm
+20° C		469.99897 MHz	+1.3 ppm
+30° C		469.99852 MHz	+0.4 ppm
+40° C		469.99817 MHz	-0.4 ppm
+50° C		469.99838 MHz	+0.1 ppm
+60° C		470.00063 MHz	+4.9 ppm

Limits: 47 CFR 90.213

± 5 ppm

TEST EQUIPMENT USED FOR THE TEST:

32, 55, 61, 121

TEST REPORT REFERENCE: R52367, 3rd Version

5.5 FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION 47 CFR 2.1055 / 90.213

Ambient temperature	20 °C	Relative humidity	50 %
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Test methods: The test was carried out according to TIA-603-C.
All results are shown in the following.

Test modulation: Unmodulated

Measuring results: Channel 1

Temp:	Voltage:	Measured frequency:	Relative Error:
+20° C	5.00 V	459.99973 MHz	-0.3 ppm
	6.00 V	459.99986 MHz	Reference
	7.00 V	459.99963 MHz	-0.5 ppm

Measuring results: Channel 2

Temp:	Voltage:	Measured frequency:	Relative Error:
+20° C	5.00 V	469.99818 MHz	+0.02 ppm
	6.00 V	469.99817 MHz	Reference
	7.00 V	469.99813 MHz	-0.09 ppm

LIMITS: 47 CFR 90.213

± 5 ppm

TEST EQUIPMENT USED FOR THE TEST:

32, 55, 61, 114

TEST REPORT REFERENCE: R52367, 3rd Version

5.6 TRANSMITTER TRANSIENT FREQUENCY BEHAVIOR

47 CFR 90.214

Ambient temperature	20 °C	Relative humidity	55 %
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Test methods: The test was carried out according to TIA-603-C Section 2.2.19
All results are shown in the following.

Test modulation: Unmodulated

Operation mode: 25 kHz channel mode

Channel:	"Turn on"		"Turn off"
	t 1	t 2	t 3
1: f = 460.000 MHz	< 10 kHz	< 1 kHz	< 10 kHz
2: f = 470.000 MHz	< 10 kHz	< 1 kHz	< 10 kHz

LIMITS: 47 CFR 90.214

Maximum frequency difference during time interval (25 kHz-Channel-Mode):

t 1 = 10 ms ± 25 kHz
t 2 = 25 ms ± 12.5 kHz
t 3 = 10 ms ± 25 kHz

TEST EQUIPMENT USED:

06, 07, 28, 32, 34, 37-40, 52, 106, 121-125

TEST REPORT REFERENCE: R52367, 3rd Version

5.7 RADIATED SPURIOUS EMISSIONS

47 CFR 2.1053 / 90.210

Ambient temperature	20 °C	Relative humidity	55 %
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Test methods: The test was carried out according to TIA-603-C Section 2.2.12.
All results are shown in the following.

Test modulation: Unmodulated

Measurement results (radiated):

EMISSIONS LEVEL					
Operation Channel:	Frequency:	Bandwidth:	Level:	Limit:	Result:
1	416.875 MHz	100 kHz	-38.5 dBm	-13 dBm	Passed
	431.250 MHz	100 kHz	-36.0 dBm	-13 dBm	Passed
	445.625 MHz	100 kHz	-33.5 dBm	-13 dBm	Passed
	474.375 MHz	100 kHz	-32.0 dBm	-13 dBm	Passed
	488.750 MHz	100 kHz	-40.5 dBm	-13 dBm	Passed
	503.125 MHz	100 kHz	-43.0 dBm	-13 dBm	Passed
	1380.000 MHz	1 MHz	-53.1 dBm	-13 dBm	Passed
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

EMISSIONS LEVEL					
Operation Channel:	Frequency:	Bandwidth:	Level:	Limit:	Result:
2	455.625 MHz	100 kHz	-40.5 dBm	-13 dBm	Passed
	484.375 MHz	100 kHz	-42.5 dBm	-13 dBm	Passed
	1410.000 MHz	1 MHz	-40.5 dBm	-13 dBm	Passed
	-	No other emissions found.*		-	-
	-			-	-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

* Remark: Noise floor of the measuring system.

LIMITS: 47 CFR 90.210

P (dBm) – (43+10 log (P)) P = Carrier Power in Watts
with P = +27 dBm / 500 mW
Limit: -13 dBm

TEST EQUIPMENT USED FOR THE TEST:

02, 07, 15-22, 28, 55, 75, 106, 132, 133

TEST REPORT REFERENCE: R52367, 3rd Version

6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

TEST REPORT REFERENCE: R52367, 3rd Version

No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
1	Fully anechoic chamber M8	-	Siemens Matsushita	B83117-E7019-T231	480190
2	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303
3	Open area test site	-	Phoenix Test-Lab	-	480085
4	Outdoor test site	-	Phoenix Test-Lab	-	480293
5	Measuring receiver	ESAI	Rohde & Schwarz	831953/001 833181/018	480025 480026
6	Measuring receiver	ESMI	Rohde & Schwarz	843977/001 843530/018	480179 480180
7	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355
8	Measuring receiver	ESCS 30	Rohde & Schwarz	828985/014	480270
9	Measuring receiver	ESVS30	Rohde & Schwarz	829673/012	480024
10	Spectrum analyser	R3261C	Advantest	51720469	480144
11	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059
12	BILOG Antenna	CBL6112 A	Chase	2034	480185
13	BILOG Antenna	CBL6112 B	Chase	2688	480328
14	BILOG Antenna	CBL6111 A	Chase	1643	480147
15	Bikon Antenna	HK 116	Rohde & Schwarz	833599/008	480071
16	Bikon Antenna	HK 116	Rohde & Schwarz	836891/012	480122
17	Log-Per Antenna	HL 223	Rohde & Schwarz	835556/014	480123
18	Log-Per Antenna	HL 223	Rohde & Schwarz	833335/005	480072
19	Horn Antenna	3115 A	EMCO	9609-4918	480183
20	Horn Antenna	3115 B	EMCO	9609-4922	480184
21	Precision Dipole	HZ 12	Rohde & Schwarz	831781/02	480061
22	Precision Dipole	HZ 13	Rohde & Schwarz	831782/02	480062
23	Shorted Dipole	VHAA 9110	Schwarzbeck	143	480166
24	Loop Antenna $\varnothing = 225$ mm	-	Phoenix Test-Lab	-	410085
25	Loop Antenna $\varnothing = 110$ mm	-	Phoenix Test-Lab	-	410084
26	Test fixture	-	Phoenix Test-Lab	-	410160
27	Signal generator	SMP 03	Rohde & Schwarz	848986/004	480245
28	Signal generator	SMHU	Rohde & Schwarz	844170/017	480266
29	Signal generator	SME 06	Rohde & Schwarz	844530/008	480174
30	Signal generator	SMG	Rohde & Schwarz	8334497/030	480013
31	Signal generator	83650L	Agilent	3844A00554	480333
32	Radio communication analyser	CMTA 54	Rohde & Schwarz	841904/011	480169

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No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
33	Oscilloscope 4channel	54540A	Hewlett Packard	3339A00192	480001
34	Oscilloscope 2 channel	54520A	Hewlett Packard	3344A00390	480007
35	Radio Code Analyser	SI4923	Schlumberger	1231064	480432
36	Signal generator	TOE 7704	TOELLNER	39385	480008
37	Combiner	ZFSC-2-11	Mini Circuits	-	410089
38	Combiner	ZFSC-2-11	Mini Circuits	-	410090
39	Combiner	ZFSC-2-11	Mini Circuits	-	410169
40	Combiner	ZFSC-2-11	Mini Circuits	-	410170
41	Combiner	ZFSC-4-1	Mini Circuits	-	410171
42	Power splitter	11850C	Hewlett Packard	01052	410069
43	Power splitter	-	Suhner	-	410070
44	Power divider	PWD-2533-02-SMA-79	Midwest Microwave	-	480443
46	Symmetrical transformer	-	Phoenix Test Lab	-	410086
47	Feeding bridge A	-	Phoenix Test Lab	-	410087
48	Feeding bridge A	-	Phoenix Test Lab	-	410088
49	Regulating transformer	BR802	Block	-	480094
50	Regulating transformer	BR802	Block	-	480095
51	Regulating transformer	B9701089	Block	105713	480341
52	Power supply	TOE 8752	Toellner	31566	480010
53	Power supply	TOE 8852	Toellner	51712	480233
54	Power supply	TOE 8752	Toellner	31569	480009
55	Power supply	TOE 8852	Toellner	51786	490001
56	Climatic chamber	KS600/75L	RS-Simulatoren	19002901	490065
57	Climatic chamber	KS600/75	RS-Simulatoren	19004201	490070
58	Climatic chamber	ST2K220/75	RS-Simulatoren	9803901	490020
59	Climatic chamber	ST2K220/75	RS-Simulatoren	2002701	490072
60	Climatic chamber	GTS500.40	GTS	1660	490073
61	Climatic Chamber	MK240	Binder	05-79022	480462
62	Double circulator	-	Motorola	-	-
63	Directional coupler	ZFDC-20-5	Mini Circuits	-	410092
64	Directional coupler	4001B-20	Narda Microwave	02010	410150
65	Directional coupler	774D	Hewlett Packard	06375	410149
66	Impedance matching unit	-	Phoenix-Test-Lab	-	410091
67	High Pass Filter	HP-350	Dirk Fischer Elektronik	-	410151
68	High Pass Filter	HP-450	Dirk Fischer Elektronik	-	410152

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No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
69	High Pass Filter	HP-1000	Dirk Fischer Elektronik	-	410147
70	High Pass Filter	HP 4000	Dirk Fischer Elektronik	-	480445
71	High Pass Filter	WHJS1000C 11/60EF	Wainwright Instruments GmbH	1	480413
72	IF-Filter 20 kHz/25 kHz	MQF 10.7- 1400/11	Telefilter	0043	480323
73	IF-Filter 12.5 kHz	MQF 10.7- 0850/11	Telefilter	0043	480324
74	BIAS TEE	ZNBT-60-1W	Mini Circuits	-	410185
75	Tuneable Notch Filter	TTR 375- 3EE	TELONIC Berkeley	-	480330
76	Tuneable Notch Filter	TTR 190- 3EE	TELONIC Berkeley	97284-6	480331
77	Tuneable Notch Filter	TTR 95-3EE	TELONIC Berkeley	00104-2	480332
78	Tuneable Notch Filter	WRCD1700/ 2000-0.2/40- 10EEK	Wainwright Instruments GmbH	14	480415
79	Tuneable Notch Filter	WRCA800/ 960-0.2/40- 6EEK	Wainwright Instruments GmbH	15	480414
80	Mixer	ZP-1	Mini Circuits	00040	410148
81	Mixer	ZP-5	Mini Circuits	00126	410159
82	Variable Attenuator 0 -11 dB	8494B	Hewlett Packard	3308A38264	480264
83	Variable Attenuator 0 - 110 dB	8496B	Hewlett Packard	3308A71365	480265
84	Attenuator / 3 dB / 5 W	WA2-3	Weinschel	8250	410115
85	Attenuator / 3 dB / 5 W	WA2-3	Weinschel	8251	410116
86	Attenuator / 3 dB / 5 W	WA2-3	Weinschel	8252	410117
87	Attenuator / 3 dB / 50 W	33-3-34	Weinschel	BH 5062	410131
88	Attenuator / 6 dB / 5 W	WA2-6	Weinschel	8253	410118
89	Attenuator / 6 dB / 5 W	WA2-6	Weinschel	8254	410119
90	Attenuator / 6 dB / 5 W	WA2-6	Weinschel	8255	410120
91	Attenuator / 6 dB / 25 W	33-6-34	Weinschel	BH 5536	410128
92	Attenuator / 6 dB / 150 W	150-A-FFN- 06	Bird	0029	480370
93	Attenuator / 10 dB / 1 W	6810.17A	Huber + Suhner	-	410067
94	Attenuator / 10 dB / 5 W	WA2-10	Weinschel	8259	410121
95	Attenuator / 10 dB / 5 W	WA2-10	Weinschel	8260	410122
96	Attenuator / 10 dB / 5 W	WA2-10	Weinschel	8261	410123
97	Attenuator / 10 dB / 10 W	WA8-10	Weinschel	7538	410112

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No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
98	Attenuator / 10 dB / 25 W	33-10-34	Weinschel	BH 4878	410129
99	Attenuator / 10 dB / 25 W	33-10-34	Weinschel	BH 4856	410130
100	Attenuator / 10 dB / 100 W	BN 745353	Spinner	20262	480274
101	Attenuator / 10 dB / 100 W	BN 745353	Spinner	20262	480274
102	Attenuator / 20 dB / 1 W	6820.17A	Huber + Suhner	-	410068
103	Attenuator / 20 dB / 5 W	WA2-20	Weinschel	8256	410124
104	Attenuator / 20 dB / 5 W	WA2-20	Weinschel	8257	410125
105	Attenuator / 20 dB / 5 W	WA2-20	Weinschel	8258	410126
106	Attenuator / 20 dB / 10 W	WA8-20	Weinschel	7539	410113
107	Attenuator / 30 dB / 200 W	BN 745395	Spinner	29971	480232
108	Attenuator / 30 dB / 100 W	BN 745358	Spinner	20900	480369
109	Termination / 50 Ω / 15 W	6515.17.A	Huber + Suhner	-	410078
110	Termination / 50 Ω / 0.5 W	6500.17.A	Huber + Suhner	-	410074
111	Termination / 50 Ω / 0.5 W	6500.17.A	Huber + Suhner	-	410075
112	Termination / 50 Ω / 200 W	BN 531212	Spinner	20593	480371
113	Termination / 50 Ω / 600 W	BN 534242	Spinner	29440	480372
114	RF-cable No. 1	RTK 081	Rosenberger	-	410093
115	RF-cable No. 2	RTK 081	Rosenberger	-	410094
116	RF-cable No. 3	RTK 081	Rosenberger	-	410095
117	RF-cable No. 4	RTK 081	Rosenberger	-	410096
118	RF-cable No. 5	RTK 081	Rosenberger	-	410097
119	RF-cable No. 6	RTK 081	Rosenberger	-	410098
120	RF-cable No. 7	Sucoflex 104	Huber + Suhner	-	410099
121	RF-cable No. 8	RG223	Phoenix-Test-Lab	-	410100
122	RF-cable No. 9	RG223	Phoenix-Test-Lab	-	410101
123	RF-cable No. 10	RG223	Phoenix-Test-Lab	-	410102
124	RF-cable No. 11	RG223	Phoenix-Test-Lab	-	410103
125	RF-cable No. 12	RG223	Phoenix-Test-Lab	-	410104
126	RF-cable No. 13	RG223	Phoenix-Test-Lab	-	410105
127	RF-cable No. 14	RG223	Phoenix-Test-Lab	-	410106
128	RF-cable No. 15	RG223	Phoenix-Test-Lab	-	410107
129	RF-cable No. 16	RG223	Phoenix-Test-Lab	-	410108
130	RF-cable No. 17	RG223	Phoenix-Test-Lab	-	410109
131	RF-cable No. 18	RG58	Phoenix-Test-Lab	-	410110
132	RF-cable No. 30	RTK 081	Rosenberger	-	410141

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No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
133	RF-cable No. 31	RTK 081	Rosenberger	-	410142

Microwave Test equipment

No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
127	Standard Gain Horn 11.9 GHz – 18 GHz	18240-20	Flann Microwave	483	480294
128	Standard Gain Horn 11.9 GHz – 18 GHz	18240-20	Flann Microwave	482	480295
129	Standard Gain Horn 17.9 GHz – 26.7 GHz	20240-20	Flann Microwave	411	480297
130	Standard Gain Horn 17.9 GHz – 26.7 GHz	20240-20	Flann Microwave	410	480296
131	Standard Gain Horn 26.4 GHz – 40.1 GHz	22240-20	Flann Microwave	469	480299
132	Standard Gain Horn 26.4 GHz – 40.1 GHz	22240-20	Flann Microwave	468	480298
133	Preamplifier	JS3- 00101200- 23-5A	Miteq	681851	480337
134	Preamplifier	JS3- 12001800- 16-5A	Miteq	571667	480343
135	Preamplifier	JS3- 18002600- 20-5A	Miteq	658697	480342
136	Preamplifier	JS3- 26004000- 25-5A	Miteq	563593	480344
137	RF-cable 1m	KPS-1533- 400-KPS	Insulated Wire	-	480300
138	RF-cable 1m	KPS-1533- 400-KPS	Insulated Wire	-	480301
139	RF-cable 2m	KPS-1533- 400-KPS	Insulated Wire	-	480302
140	Detector	8473D	Hewlett Packard	3614A01788	480320
141	Power Meter	NRVD	Rohde & Schwarz	828110/026	480267
142	Thermal Power Sensor	NRV-Z51	Rohde & Schwarz	825489/004	480247

All used measurement equipment was calibrated (if necessary). The calibration intervals and the calibration history will be given out on request.

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