

TEST REPORT

Test Report Reference: R40893VHF 3rd Version

Equipment under Test: SmartRadio SR-150 VHF-Synthesizer Transceiver

Applicant: Funk-Electronic Piciorgros GmbH

Manufacturer: Funk-Electronic Piciorgros GmbH

**Test Laboratory
(CAB)
accredited by
DATech GmbH
in compliance with DIN EN ISO/IEC 17025
under the
Reg. No. DAT-P-105/99-21
and
FCC Test site registration number 90877**

Contents:	Page
1 IDENTIFICATION	3
1.1 APPLICANT	3
1.2 MANUFACTURER	3
1.3 DATES	3
1.4 TEST LABORATORY	4
1.5 RESERVATION	4
1.6 NORMATIVE REFERENCES	4
1.7 TEST RESULTS	4
2 TECHNICAL DATA OF EQUIPMENT	5
2.1 DEVICE UNDER TEST	5
2.2 PERIPHERY DEVICES	5
2.3 MODIFICATIONS	5
3 TEST PROCEDURES	6
4 OPERATIONAL STATES AND PHYSICAL BOUNDARIES	9
5 LIST OF MEASUREMENTS	10
5.1 RF POWER OUTPUT AT TERMINALS 47CFR2.1046	11
5.2 OCCUPIED BANDWIDTH 47CFR2.1049	12
5.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS 47CFR2.1051 AND 90.210	15
5.4 FREQUENCY STABILITY WITH TEMPERATURE VARIATION 47CFR2.1055 AND 90.213	24
5.5 FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION 47CFR2.1055 / 90.213	25
5.6 TRANSMITTER TRANSIENT FREQUENCY BEHAVIOR 47CFR90.214	26
5.7 RADIATED SPURIOUS EMISSIONS 47CFR2.1053 / 90.210	30
6 MEASUREMENT EQUIPMENT	36
7 LIST OF ANNEXES	44

TEST REPORT REFERENCE: R40893VHF 3^d Version

1 IDENTIFICATION

1.1 APPLICANT

Name:	Funk-Electronic PICIORGROS
Address:	Claudiastraße 5 D-51149 Köln-Porz
Country:	Germany
Name for contact purposes:	Mr. Michael D. Piciorgros
Tel:	+49-(0)-2203-911770
Fax:	+49-(0)-2203-913006
e-mail address:	info@piciorgros.com

1.2 MANUFACTURER

Name:	Funk-Electronic PICIORGROS
Address:	Claudiastraße 5 D-51149 Köln-Porz
Country:	Germany
Name for contact purposes:	Mr. Michael D. Piciorgros
Tel:	+49-(0)-2203-911770
Fax:	+49-(0)-2203-913006
e-mail address:	info@piciorgros.com

1.3 DATES

Date of receipt of test sample:	24 June 2005
Start of test:	24 June 2005
End of test:	26 September 2005

and

Date of receipt of test sample:	6 May 2007
Start of test:	7 May 2007
End of test:	7 May 2007

TEST REPORT REFERENCE: R40893VHF 3rd Version

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.

Test engineer:	Raimund BLASK		14 June 2007
	Name		Date
Test report checked by:	Bernd STEINER		14 June 2007
	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 2004), Private Land Mobile Radio Service

[2] FCC 47 CFR Part 2 (October 2004)

[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.

2 TECHNICAL DATA OF EQUIPMENT

2.1 DEVICE UNDER TEST

Type of equipment:	VHF-Synthesizer Transceiver
Type designation:	SR-150 Smart-Radio
Operating frequency range:	146 MHz to 174 MHz
Transmitter output power:	6 W / +37.8 dBm
Channel spacing:	12.5 kHz / 25 kHz

* 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
Bit Pattern Generator	1.5 m	yes	BNC

2.2 PERIPHERY DEVICES

The ancillary equipment mentioned below was in use:

The EUT (transmitter) was powered with an external DC-power supply.
A Bit Pattern Generator "HP DATA ERROR ANALYSER 1645A" was used to generate a modulation signal.
A test board (delivered by the applicant) was used to fix the radio module and contact the periphery devices.

2.3 MODIFICATIONS

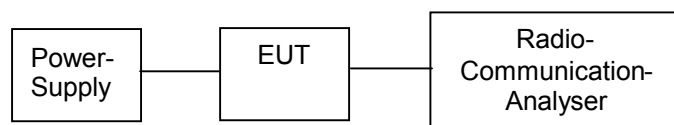
No modifications were necessary to fulfil the requirements.

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 FCC 2.1046, FCC 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 FCC 2.1049, 90.210

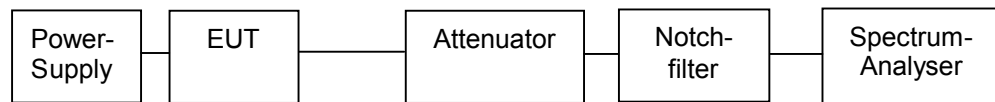
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. The transmitter is modulated by a 2400 bits/s signal.

The modulation amplitude was 775 mV.

Emission Mask C was used for the transmitter designed to operate with a 25 kHz bandwidth and Emission Mask D for transmitter designed to operate with a 12.5 kHz bandwidth.

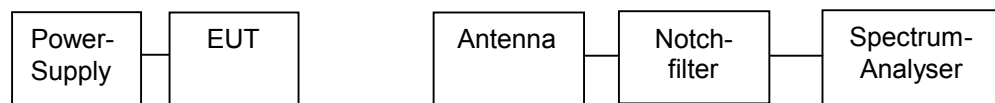
3.3 Spurious Emissions at Antenna Terminals FCC 2.1051

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 applicable). The test is performed according the principle below:



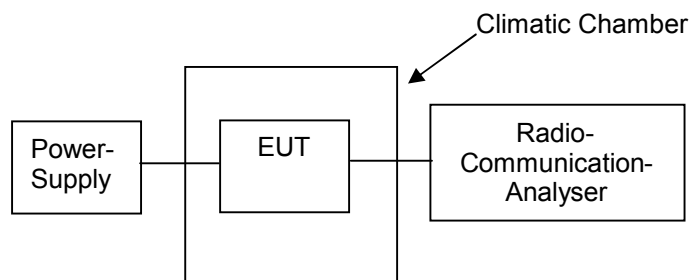
3.4 Radiated Spurious Emissions FCC 2.1053, FCC 90.210

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. In order to suppress inter-modulation products in the spectrum analyser a notch filter is used (if applicable).



3.5 Frequency Stability with Temperature Variation FCC 2.1055, FCC 90.213

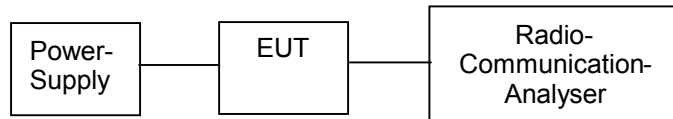
The carrier frequency is the stability of the transmitter to maintain an assigned carrier frequency. The frequency stability was measured with variation of ambient temperature from -30°C to+ 50°C and variation of the primary voltage.



3.6 Frequency Stability with Primary Voltage Variation FCC 2.1055, FCC 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 5 V DC (RF-module) and 9 V DC (RF-amplifier) by 2 external power supplies.

The test signals to modulate the EUT and/or to measure the bit error rate (BER) were generated and measured with an "HP DATA ERROR ANALYSER 1645A". All tests were done with 2400 bits/s.

The modulation amplitude was 775 mV.

All test "under extreme conditions" were done with variation of the 5 V DC (RF-module) and 9 V DC (RF-amplifier) supply voltage.

The "frequency stability", "carrier power conducted" and "transient behaviour" were measured without modulation. All other tests were done with modulation.

The Occupied Bandwidth was measured in 12.5 kHz and 25 kHz-Mode.

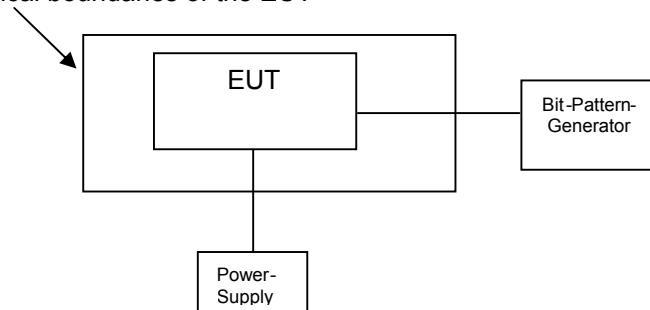
The spurious emission measurement was done in 25 kHz-Mode only, because pretests have shown that this mode is the worst case.

The tests were performed at the lowest, middle and highest frequency of the equipment under test as defined below:

Channel:	Transmit frequency:
1	146.020 MHz
2	160.040 MHz
3	173.980 MHz

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

Physical boundaries of the EUT



TEST REPORT REFERENCE: R40893VHF 3rd Version

5 LIST OF MEASUREMENTS

Test Type:	Application:	Reference clauses in 47 CFR	Appendix No. in Test Report	Result:
RF Power Output at Terminals	RF Terminals	2.1046	5.1	No Limit specified
Occupied Bandwidth 25 kHz-mode	RF Terminals	2.1049 and 90.210 c	5.2	Passed
Occupied Bandwidth 12.5 kHz-mode	RF Terminals	2.1049 and 90.210 d	5.2	Passed
Spurious Emissions at Antenna Terminal	RF Terminals	2.1051 and 90.210	5.3	Passed
Field Strength of Spurious Radiation	Antenna	2.1053 and 90.210	5.4	Passed
Frequency stability with temperature variation	RF Terminals	2.1055 a / i and 90.213	5.5	Passed
Frequency stability with primary voltage variation	RF Terminals	2.1055 d / i and 90.213	5.6	Passed
Transmitter Transient Frequency Behaviour	RF Terminals	90.214	5.7	Passed

TEST REPORT REFERENCE: R40893VHF 3rd Version

5.1 RF POWER OUTPUT AT TERMINALS

47CFR2.1046

Ambient temperature	20 °C	Relative humidity	55 %
---------------------	-------	-------------------	------

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	146.020 MHz	+37.7 dBm
2	160.040 MHz	+37.6 dBm
3	173.980 MHz	+35.8 dBm
Measurement uncertainty		+0.66 dB / - 0.72 dB

LIMITS:

No Limits are specified in the standard.

TEST EQUIPMENT USED FOR THE TEST:

32, 54, 125

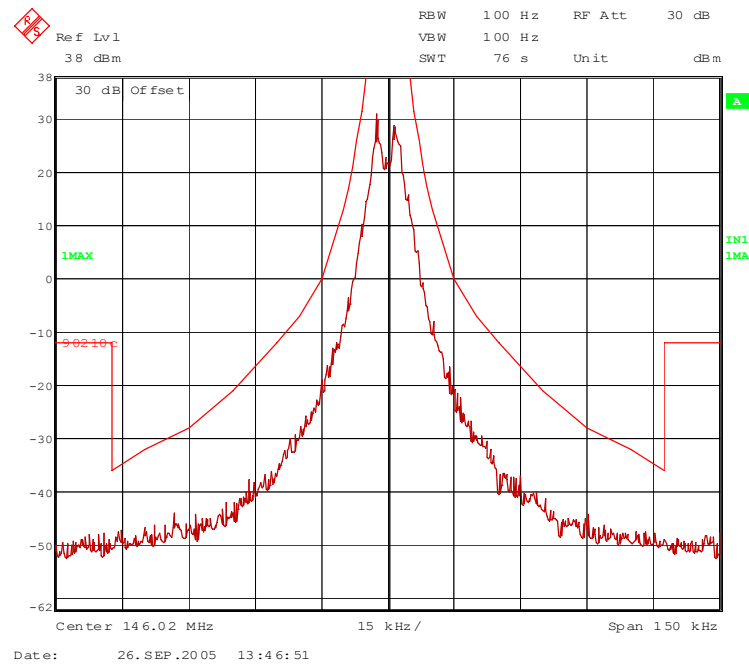
TEST REPORT REFERENCE: R40893VHF 3rd Version

5.2 OCCUPIED BANDWIDTH

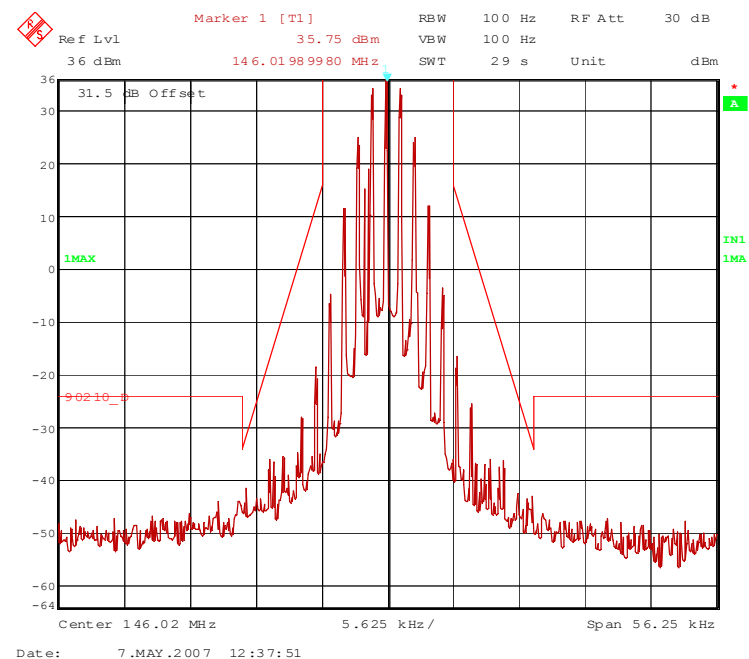
47CFR2.1049

Ambient temperature	20 °C	Relative humidity	50 %
---------------------	-------	-------------------	------

Test methods: The test was carried out in transmit mode according to TIA-603-C.
All results are shown in the following.
Operation mode: Modulated with 2400 bit/s.

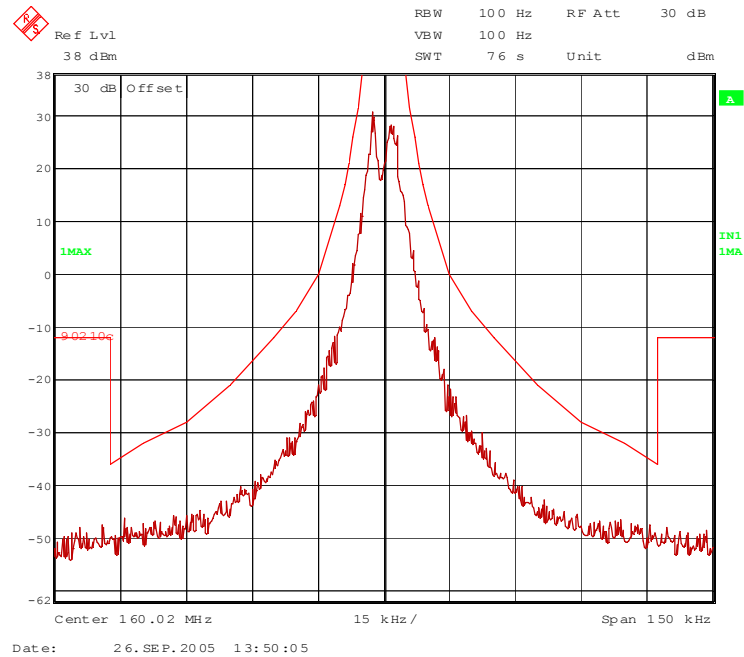


VHF25k1: Transmit 146.020 MHz, 25 kHz channel separation

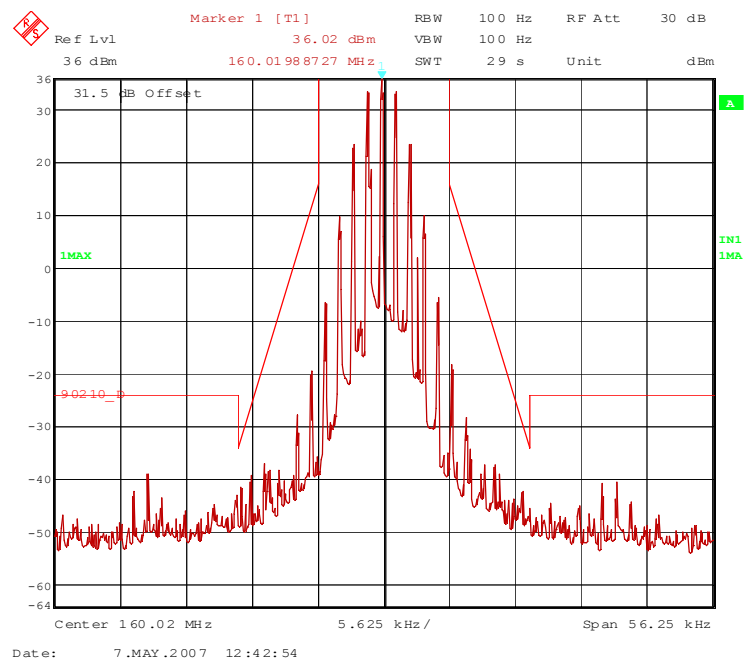


VHF12k1: Transmit 146.020 MHz, 12.5 kHz channel separation

TEST REPORT REFERENCE: R40893VHF 3rd Version

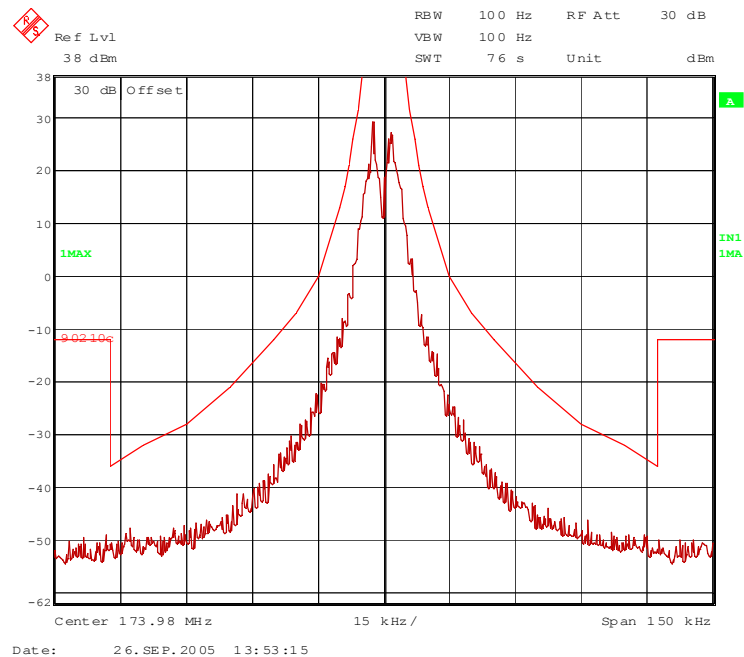


VHF25k2: Transmit 160.020 MHz, 25 kHz channel separation

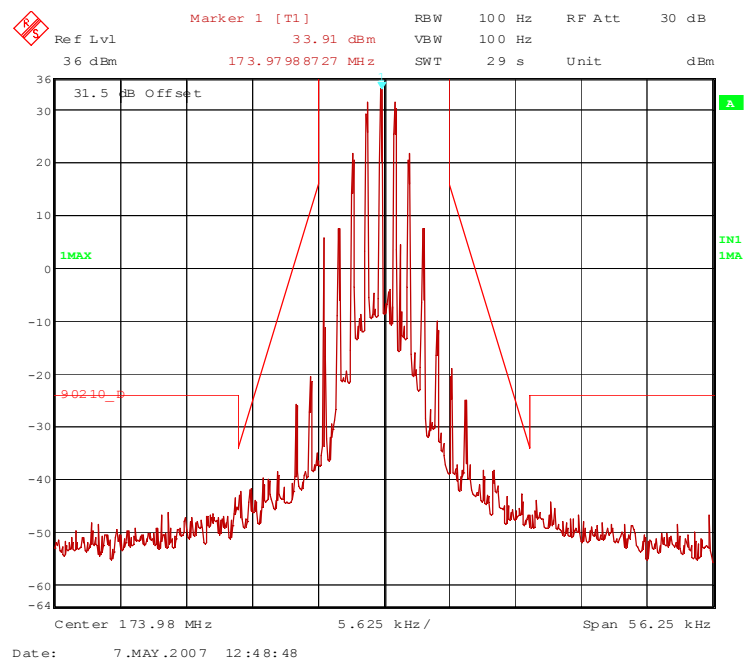


VHF12k2: Transmit 160.020 MHz, 12.5 kHz channel separation

TEST REPORT REFERENCE: R40893VHF 3rd Version



VHF25k3: Transmit 173.980 MHz, 25 kHz channel separation



VHF12k3: Transmit 173.980 MHz, 12.5 kHz channel separation

LIMITS: §90.210

“Emission Mask” type “C” for 25 kHz and type “D” for 12.5 kHz.

TEST EQUIPMENT USED FOR THE TEST:

07, 54, 101-103, 125-126

TEST REPORT REFERENCE: R40893VHF 3rd Version

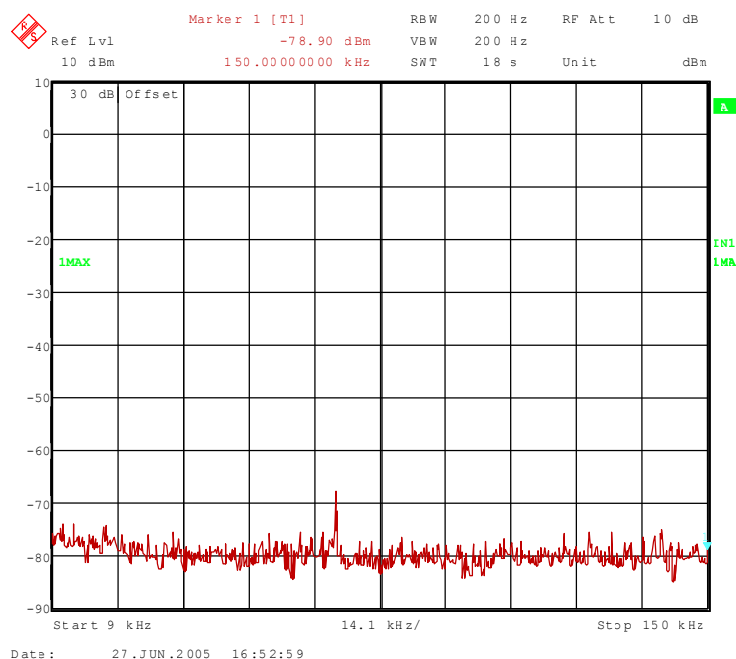
5.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS 47CFR2.1051 AND 90.210

Ambient temperature	20 °C	Relative humidity	55 %
---------------------	-------	-------------------	------

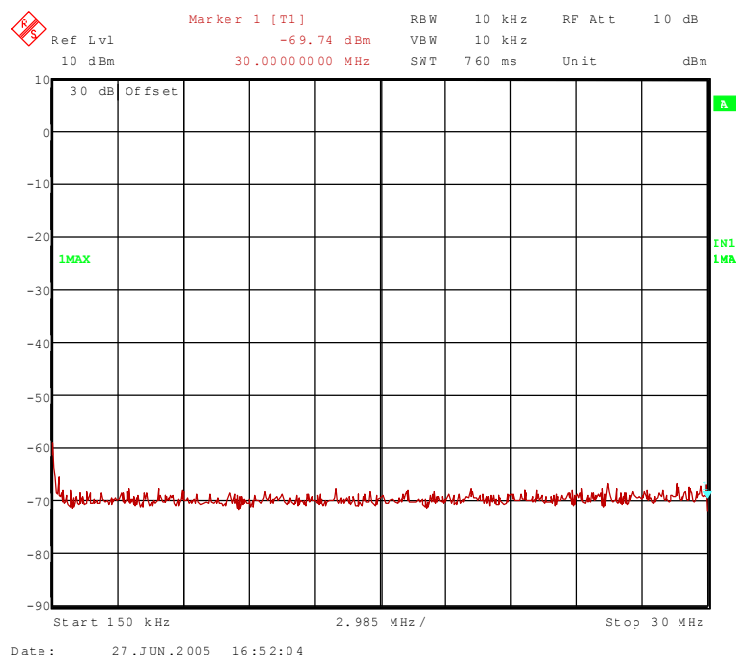
Test methods: The test was carried out in transmit mode according to TIA-603-C.

Operation mode: All results are shown in the following.
Modulated with 2400 bit/s.

Frequency: Channel 1 / 146.020 MHz

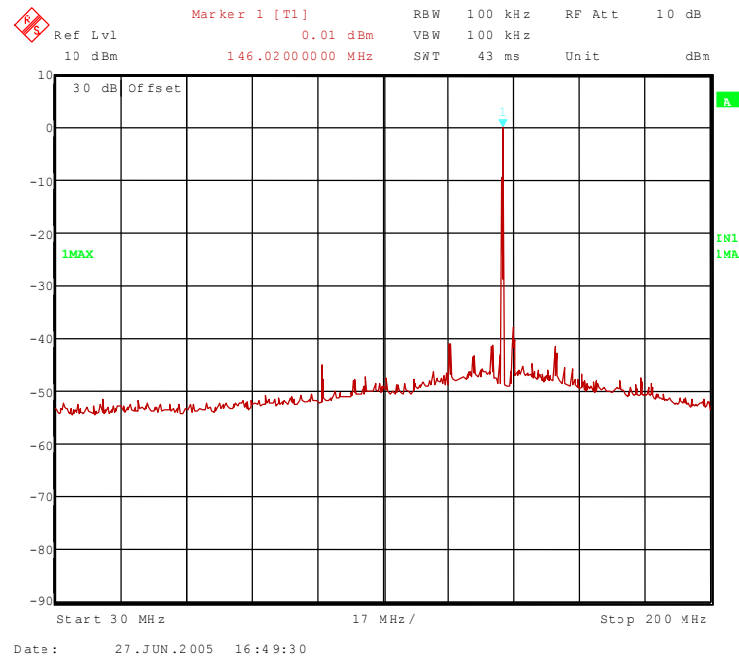


40893VHF1_1.wmf: 9 kHz to 150 kHz

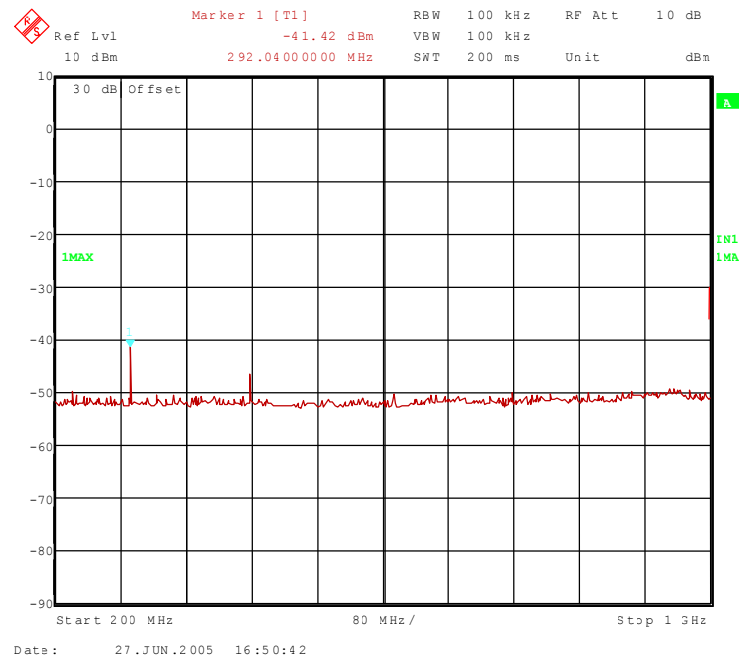


40893VHF1_2.wmf: 150 kHz to 30 MHz

TEST REPORT REFERENCE: R40893VHF 3rd Version

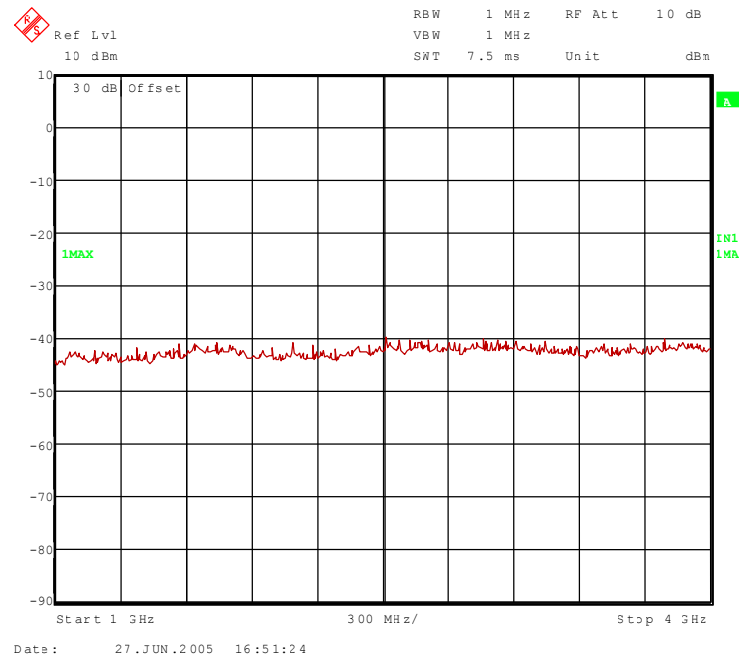


40893VHF1_3.wmf: 30 MHz to 200 MHz



40893VHF1_4.wmf: 200 MHz to 1000 MHz

TEST REPORT REFERENCE: R40893VHF 3rd Version



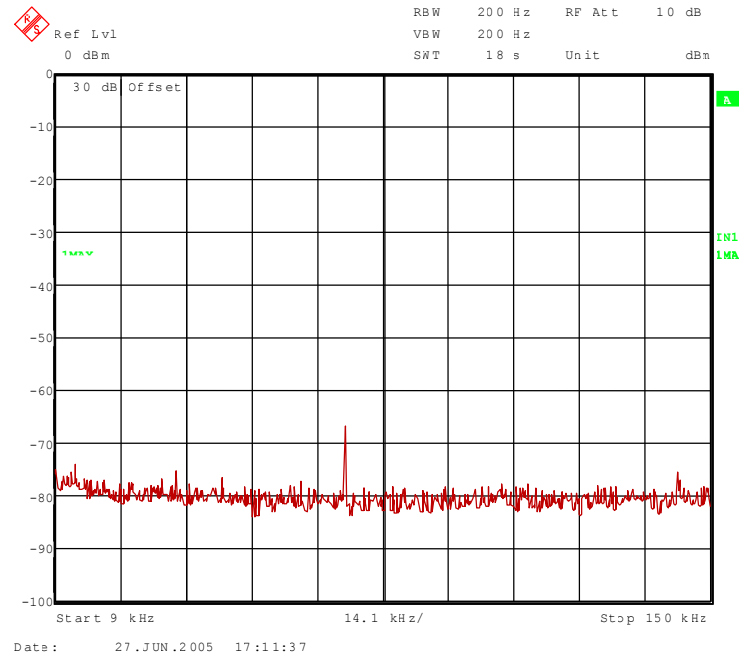
40893VHF1_5.wmf: 1 GHz to 4 GHz

Measurement results:

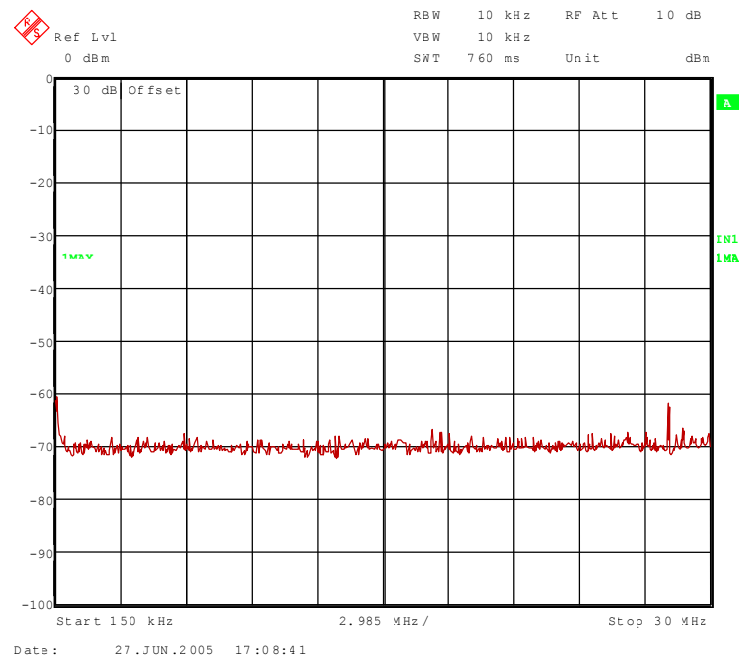
SPURIOUS EMISSIONS LEVEL (CONDUCTED)					
f	Level	Bandwidth	f	Level	Bandwidth
292.040 MHz	-41.5 dBm	100 kHz	-	-	-
-	All other spurious emission more than 20 dB below the limit.				-
-					-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

TEST REPORT REFERENCE: R40893VHF 3rd Version

Frequency: Channel 2 / 160.020 MHz

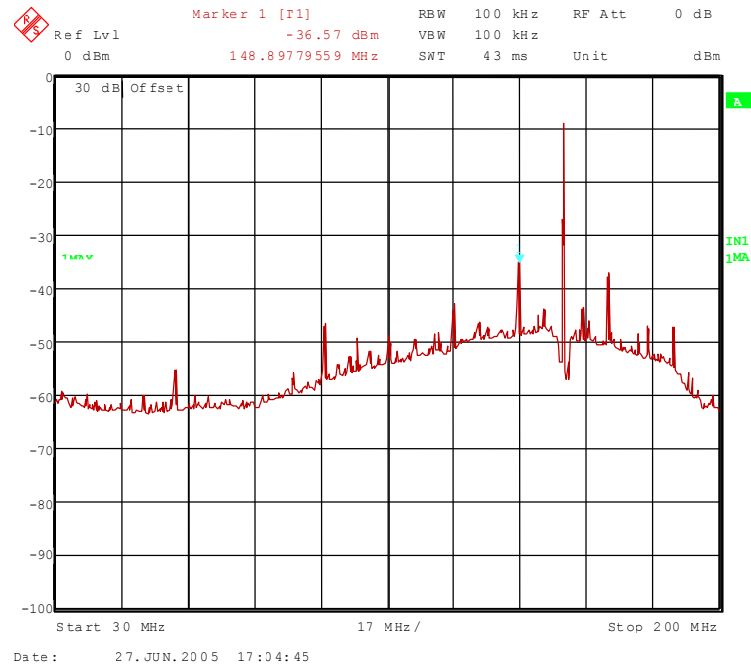


40893VHF2_1.wmf: 9 kHz to 150 kHz

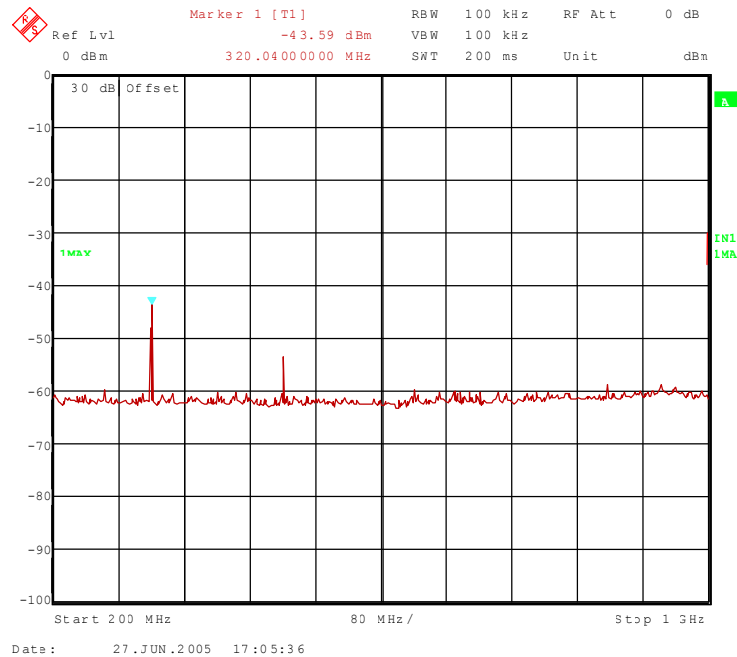


40893VHF2_2.wmf: 150 kHz to 30 MHz

TEST REPORT REFERENCE: R40893VHF 3rd Version

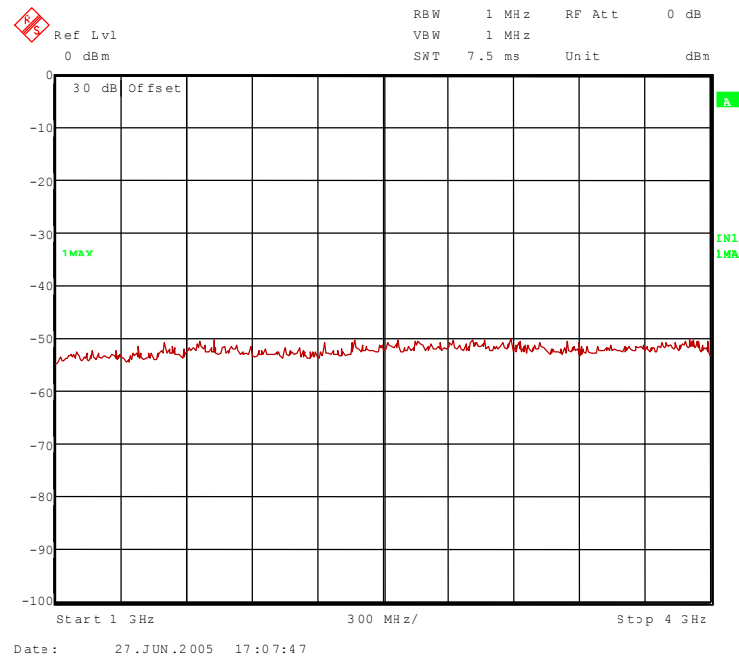


40893VHF2_3.wmf: 30 MHz to 200 MHz



40893VHF2_4.wmf: 200 MHz to 1000 MHz

TEST REPORT REFERENCE: R40893VHF 3rd Version



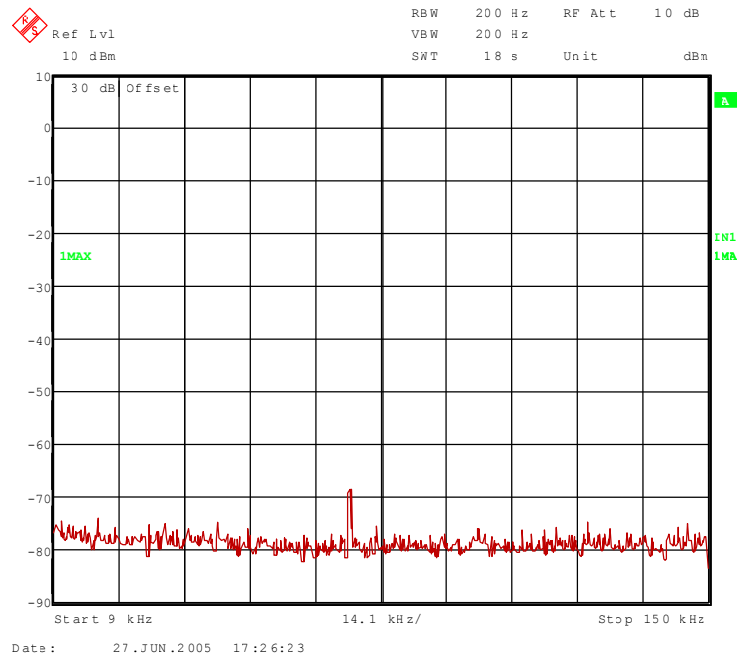
40893VHF2_5.wmf: 1 GHz to 4 GHz

Measurement results:

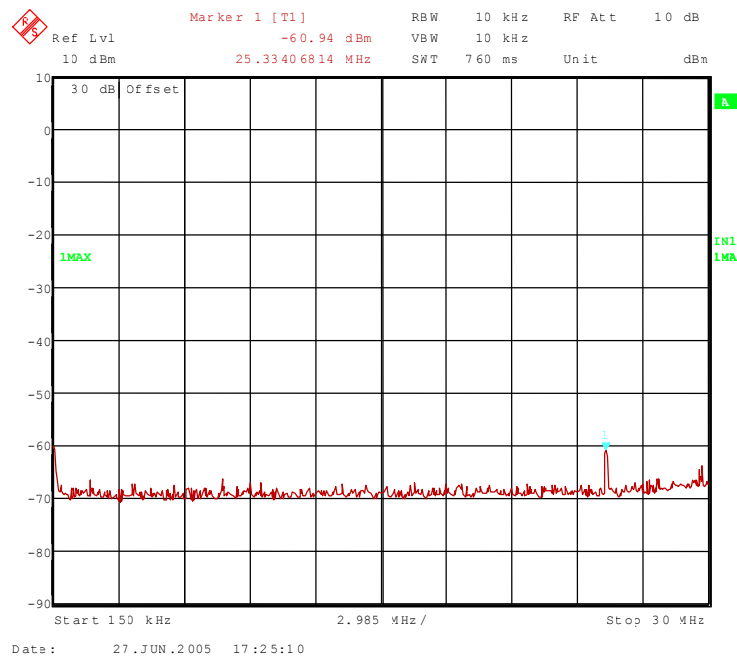
SPURIOUS EMISSIONS LEVEL (CONDUCTED)					
f	Level	Bandwidth	f	Level	Bandwidth
148.898 MHz	-36.5 dBm	100 kHz	320.080 MHz	-43.5 dBm	100 kHz
-	All other spurious emission more than 20 dB below the limit.				-
-					-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

TEST REPORT REFERENCE: R40893VHF 3rd Version

Frequency: Channel 3 / 173.980 MHz

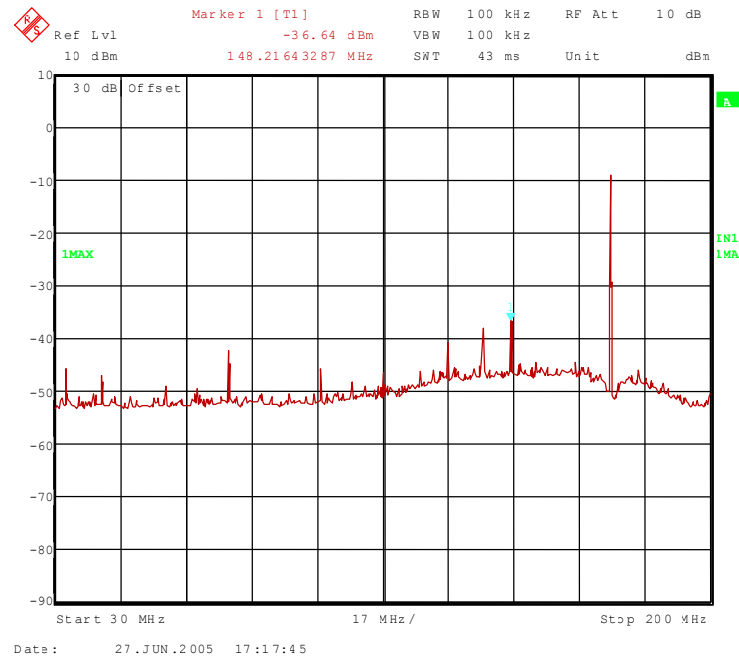


40893VHF3_1.wmf: 9 kHz to 150 kHz

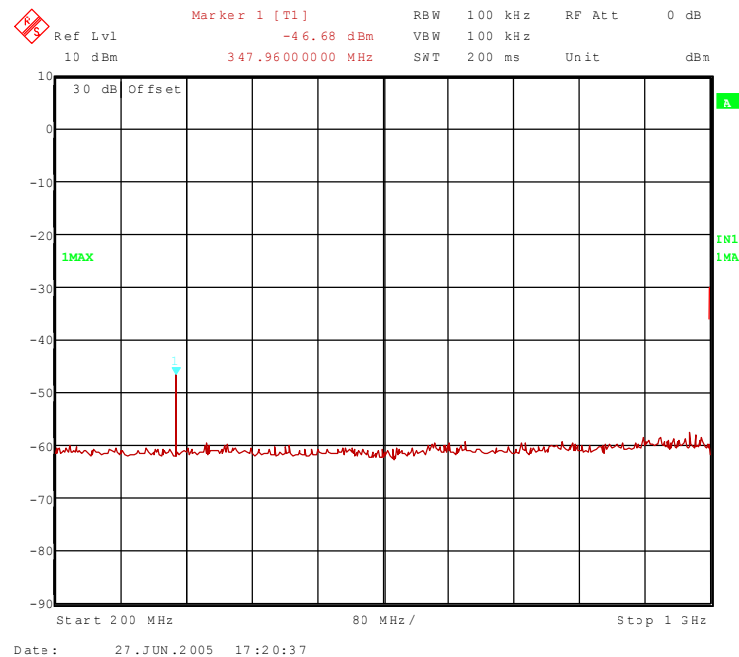


40893VHF3_2.wmf: 150 kHz to 30 MHz

TEST REPORT REFERENCE: R40893VHF 3rd Version

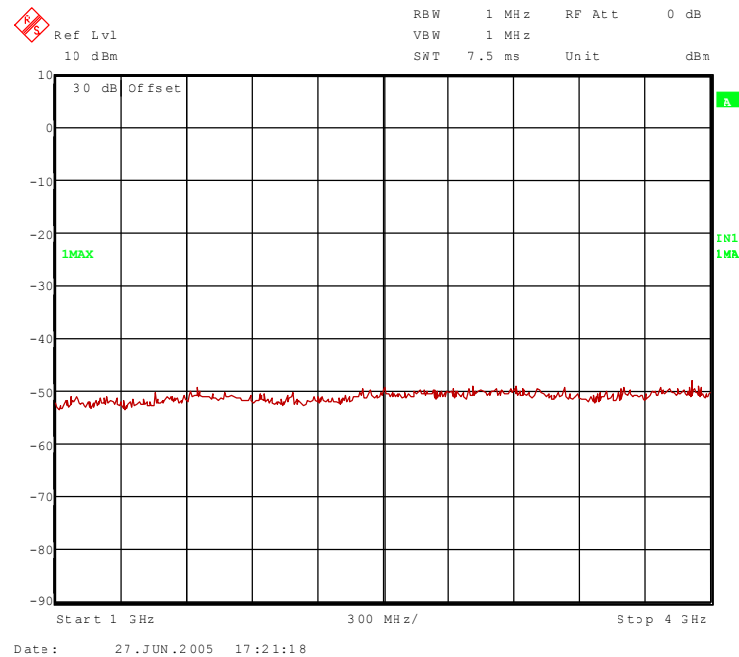


40893VHF3_3.wmf: 30 MHz to 200 MHz



40893VHF3_4.wmf: 200 MHz to 1000 MHz

TEST REPORT REFERENCE: R40893VHF 3rd Version



40893VHF3_5.wmf: 1 GHz to 4 GHz

Measurement results:

SPURIOUS EMISSIONS LEVEL (CONDUCTED)					
f	Level	Bandwidth	f	Level	Bandwidth
148.216 MHz	-36.5 dBm	100 kHz	347.960	-46.5 dBm	100 kHz
-	All other spurious emission more than 20 dB below the limit.				-
-					-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

LIMITS:

P (dBm) – (43+10 log (P)) P = Carrier Power in Watts
P = -13 dBm

TEST EQUIPMENT USED:

07, 54, 79, 101-103, 125-127

TEST REPORT REFERENCE: R40893VHF 3rd Version

5.4 FREQUENCY STABILITY WITH TEMPERATURE VARIATION 47CFR2.1055 AND 90.213

Ambient temperature	20 °C	Relative humidity	50 %
---------------------	-------	-------------------	------

Test methods: The test was carried out according to TIA-603-C.
All results are shown in the following.

Operation mode: Unmodulated.

Measuring results: Channel 1

Temperature:	Voltage:	Measured frequency:	Relative error:
+20° C	5 V DC (RF-module) 9 V DC (RF-amplifier)	146.019930 MHz	Reference
-30° C		146.019690 MHz	-1.6 ppm
-20° C		146.019650 MHz	-1.9 ppm
-10° C		146.019620 MHz	-2.1 ppm
0° C		146.019940 MHz	+0.1 ppm
+10° C		146.019950 MHz	-0.1 ppm
+20° C		146.019930 MHz	-0.0 ppm
+30° C		146.019880 MHz	-0.3 ppm
+40° C		146.019850 MHz	-0.5 ppm
+50° C		146.019780 MHz	-1.0 ppm

Measuring results: Channel 2

Temperature:	Voltage:	Measured frequency:	Relative error:
+20° C	5 V DC (RF-module) 9 V DC (RF-amplifier)	160.019900 MHz	Reference
-30° C		160.019690 MHz	-1.3 ppm
-20° C		160.019730 MHz	-1.1 ppm
-10° C		160.019910 MHz	-0.1 ppm
0° C		160.019920 MHz	+0.1 ppm
+10° C		160.019940 MHz	-0.3 ppm
+20° C		160.019900 MHz	-0.0 ppm
+30° C		160.019860 MHz	-0.3 ppm
+40° C		160.019810 MHz	-0.6 ppm
+50° C		160.019750 MHz	-1.0 ppm

Measuring results: Channel 3

Temperature:	Voltage:	Measured frequency:	Relative error:
+20° C	5 V DC (RF-module) 9 V DC (RF-amplifier)	173.979880 MHz	Reference
-30° C		173.979710 MHz	-1.0 ppm
-20° C		173.979810 MHz	-0.4 ppm
-10° C		173.979910 MHz	-0.2 ppm
0° C		173.979920 MHz	+0.2 ppm
+10° C		173.979930 MHz	-0.3 ppm
+20° C		173.979880 MHz	-0.0 ppm
+30° C		173.979850 MHz	-0.2 ppm
+40° C		173.979820 MHz	-0.3 ppm
+50° C		173.979730 MHz	-0.9 ppm

Limits: §90.213

± 2.5 ppm

TEST EQUIPMENT USED FOR THE TEST:

32, 54, 61, 125

TEST REPORT REFERENCE: R40893VHF 3rd Version

5.5 FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION 47CFR2.1055 / 90.213

Ambient temperature	20 °C	Relative humidity	50 %
---------------------	-------	-------------------	------

Test methods: The test was carried out according to TIA-603-C.
All results are shown in the following.

Operation mode: Unmodulated.

Measuring results: Channel 1

Temp:	Voltage:		Measured frequency:	Relative Error:
	RF-Part	PA-Part		
+20° C	4.25 V	7.65 V	146.019932 MHz	+0.014 ppm
	5.00 V	9.00 V	146.019930 MHz	Reference
	5.75 V	10.35 V	146.019931 MHz	+0.007 ppm

Measuring results: Channel 2

Temp:	Voltage:		Measured frequency:	Relative Error:
	RF-Part	PA-Part		
+20° C	4.25 V	7.65 V	160.019901 MHz	+0.006 ppm
	5.00 V	9.00 V	160.019900 MHz	Reference
	5.75 V	10.35 V	160.019902 MHz	+0.012 ppm

Measuring results: Channel 3

Temp:	Voltage:		Measured frequency:	Relative Error:
	RF-Part	PA-Part		
+20° C	4.25 V	7.65 V	173.979879 MHz	-0.006 ppm
	5.00 V	9.00 V	173.979880 MHz	Reference
	5.75 V	10.35 V	173.979881 MHz	+0.006 ppm

LIMITS: §90.213

± 2.5 ppm

TEST EQUIPMENT USED FOR THE TEST:

32, 54, 125

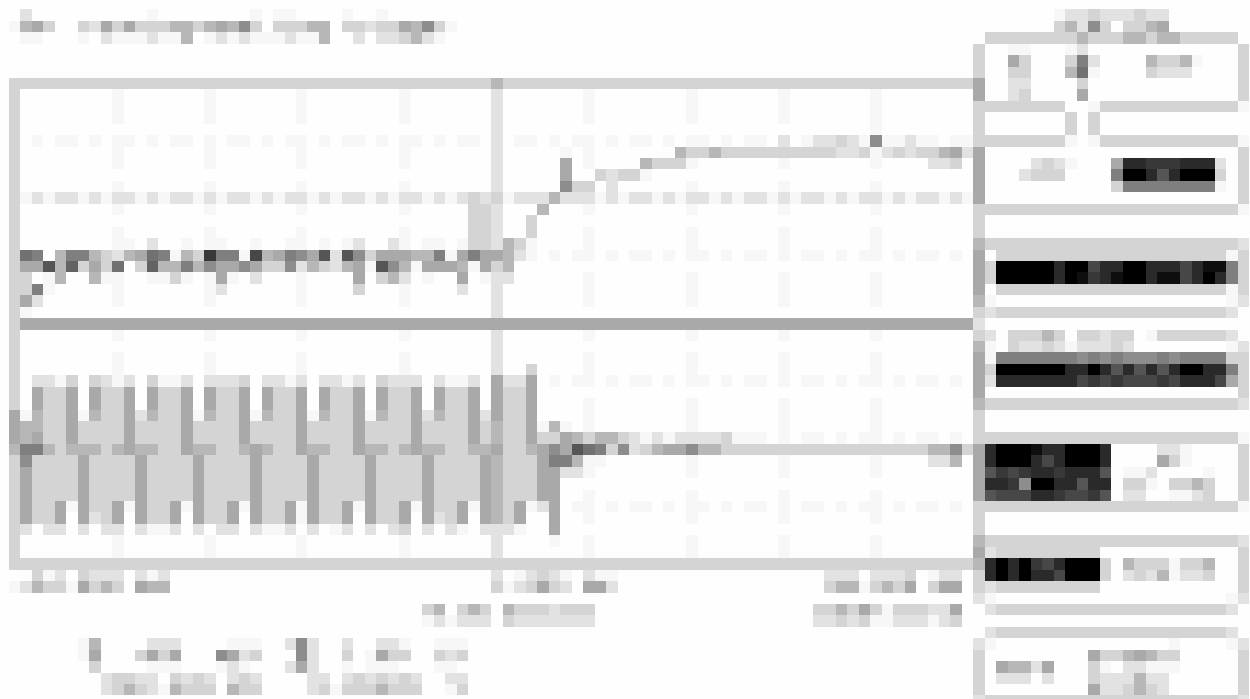
TEST REPORT REFERENCE: R40893VHF 3rd Version

5.6 TRANSMITTER TRANSIENT FREQUENCY BEHAVIOR

47CFR90.214

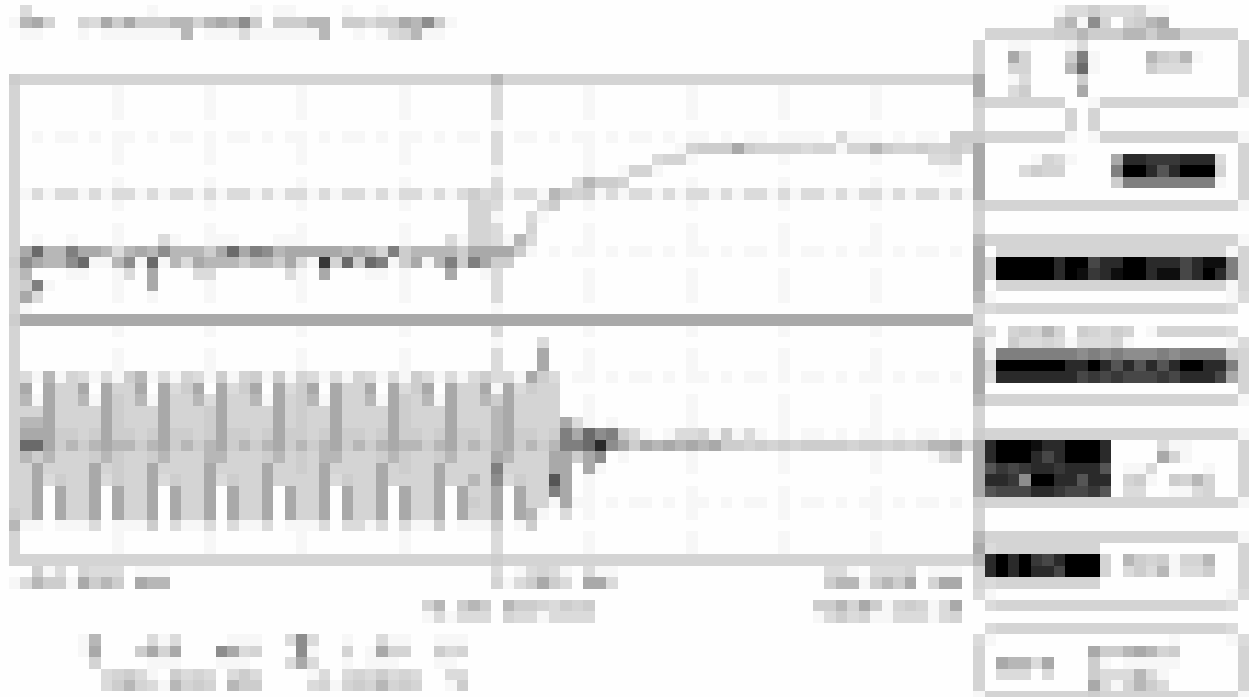
Ambient temperature	20 °C	Relative humidity	55 %
---------------------	-------	-------------------	------

Test methods: The test was carried out according to TIA-603-C Section 2.2.19
 All results are shown in the following.
 Operation mode: unmodulated
 Frequency: Channel 1 / 146.020 MHz

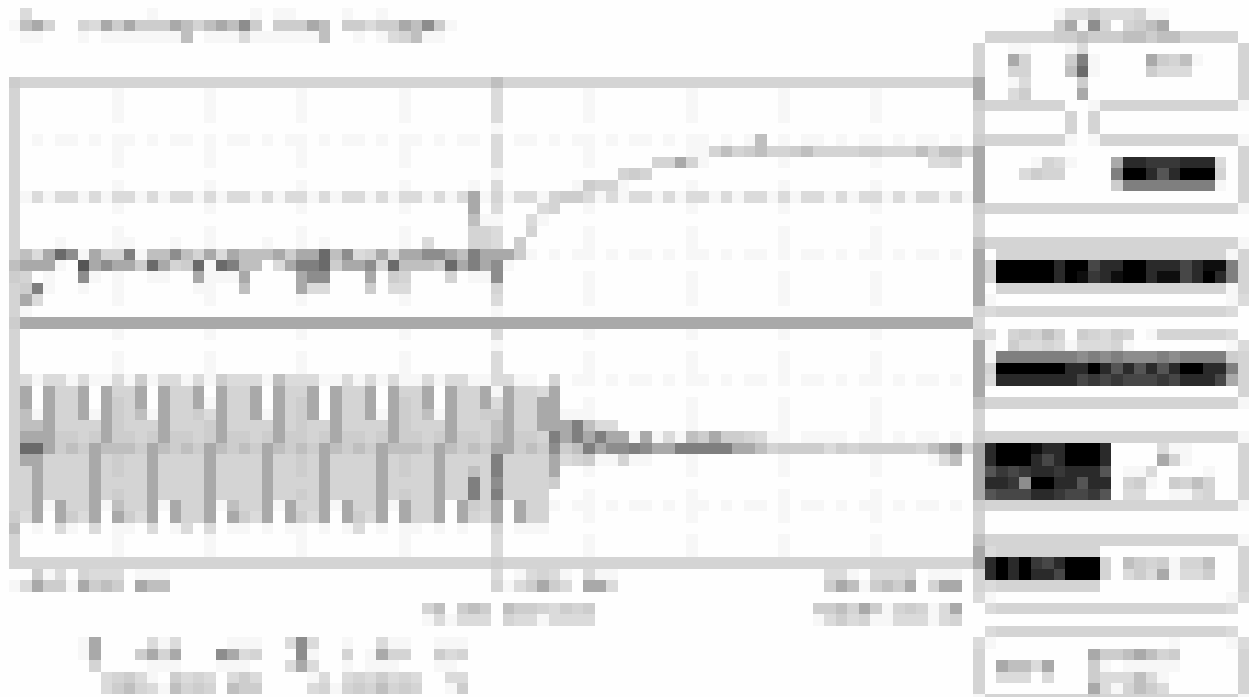


TEST REPORT REFERENCE: R40893VHF 3rd Version

Frequency: Channel 2 / 160.040 MHz

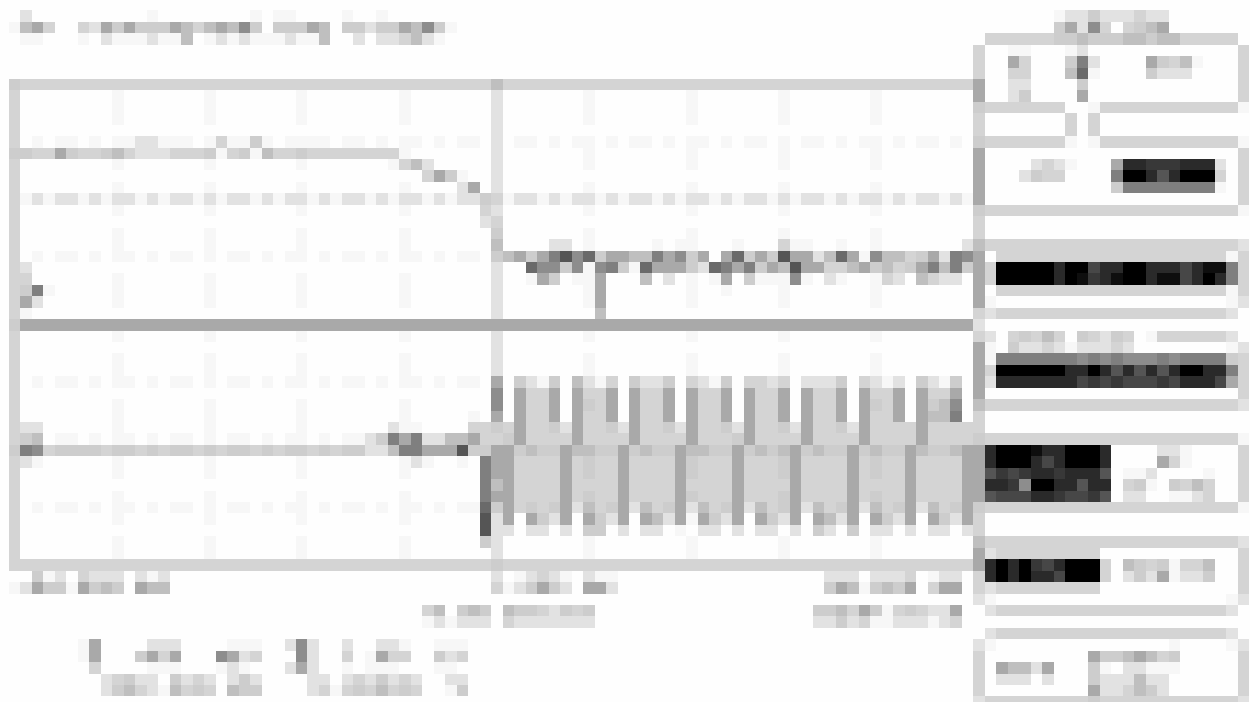


Frequency: Channel 3 / 173.980 MHz

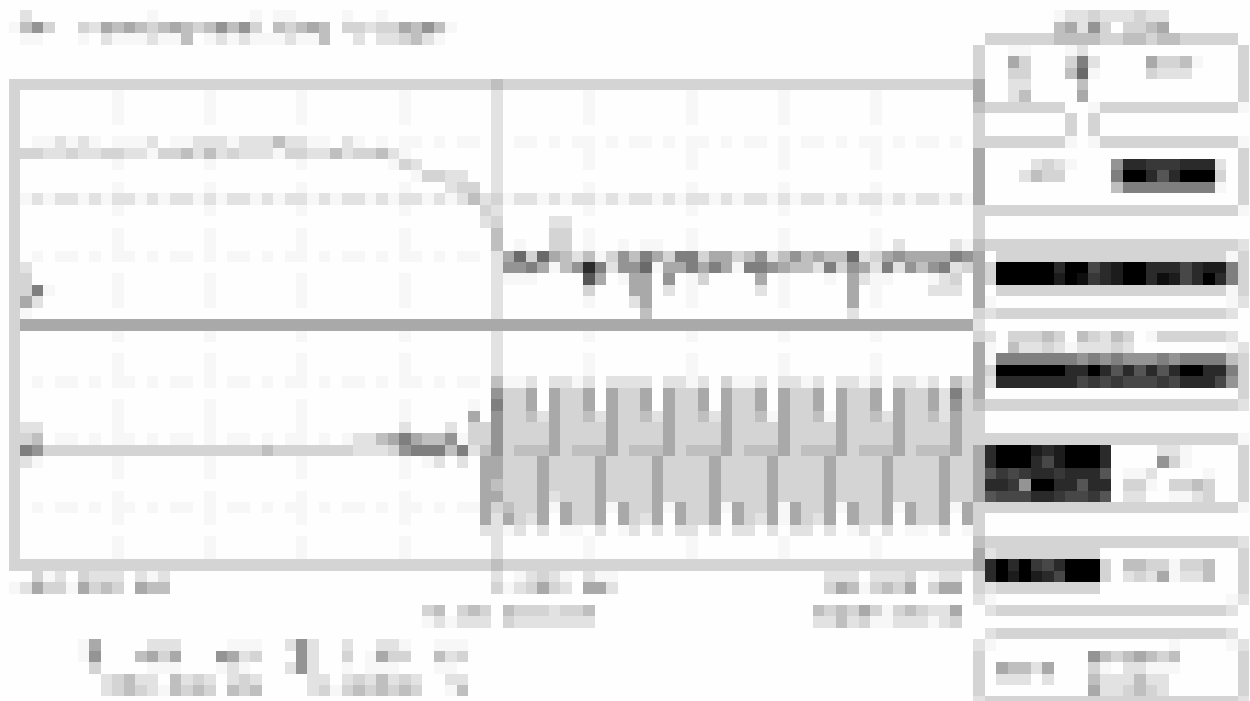


TEST REPORT REFERENCE: R40893VHF 3^d Version

Frequency: Channel 1 / 146.020 MHz

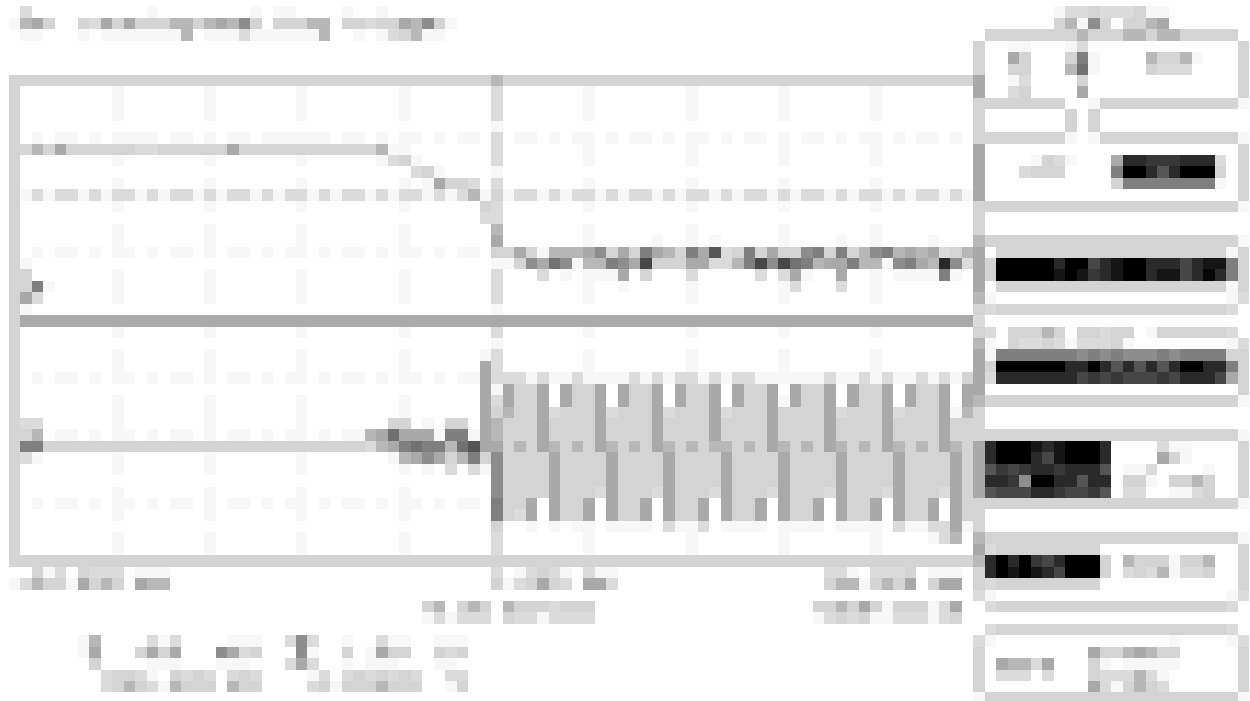


Frequency: Channel 2 / 160.040 MHz



TEST REPORT REFERENCE: R40893VHF 3^d Version

Frequency: Channel 3 / 173.980 MHz



Channel:	"Turn on"		"Turn off"
	t 1	t 2	t 3
1: f = 146.020 MHz	< ±10 kHz	< ±500 Hz	< ±10 kHz
2: f = 160.020 MHz	< ±10 kHz	< ±500 Hz	< ±10 kHz
3: f = 173.980 MHz	< ±10 kHz	< ±500 Hz	< ±10 kHz

LIMITS: §90.214

Maximum frequency difference during time interval:
t 1 = 5 ms ± 25 kHz
t 2 = 20 ms ± 12.5 kHz
t 3 = 5 ms ± 25 kHz

TEST EQUIPMENT USED:

6, 28, 32, 34, 37-39, 54, 110, 125-130

TEST REPORT REFERENCE: R40893VHF 3rd Version

5.7 RADIATED SPURIOUS EMISSIONS

47CFR2.1053 / 90.210

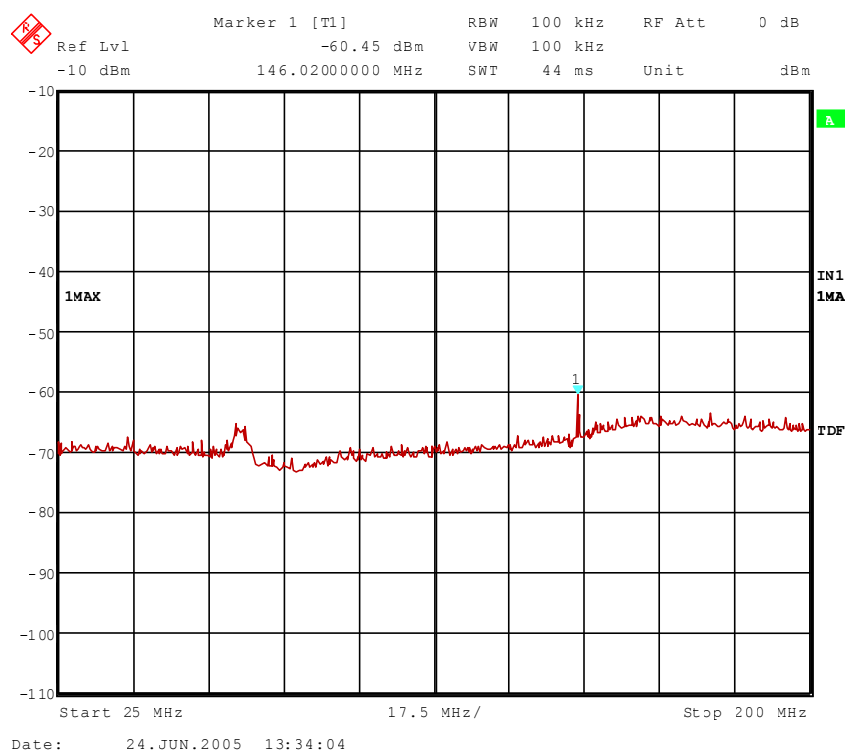
Ambient temperature	20 °C	Relative humidity	55 %
---------------------	-------	-------------------	------

Test methods: The test was carried out according to TIA-603-C Section 2.2.12.
All results are shown in the following.

Remark: The preliminary measurements (shown in the following plots) were done with a resolution bandwidth of 100 kHz below 1 GHz (instead of 10 kHz according to Section 2.2.12).
The final measurements were done with the normative resolution bandwidth (10 kHz below 1 GHz and 1 MHz over 1 GHz).

Preliminary measurement results (radiated):

Channel 1:

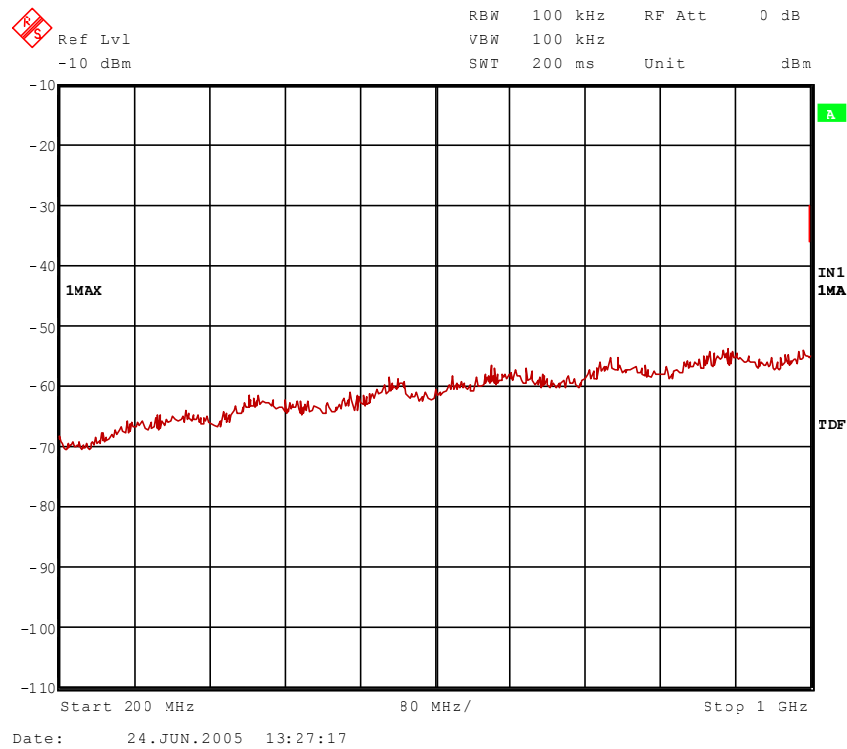


40893VHF1TX1.wmf: 25 MHz to 200 MHz, transmit mode, channel 1

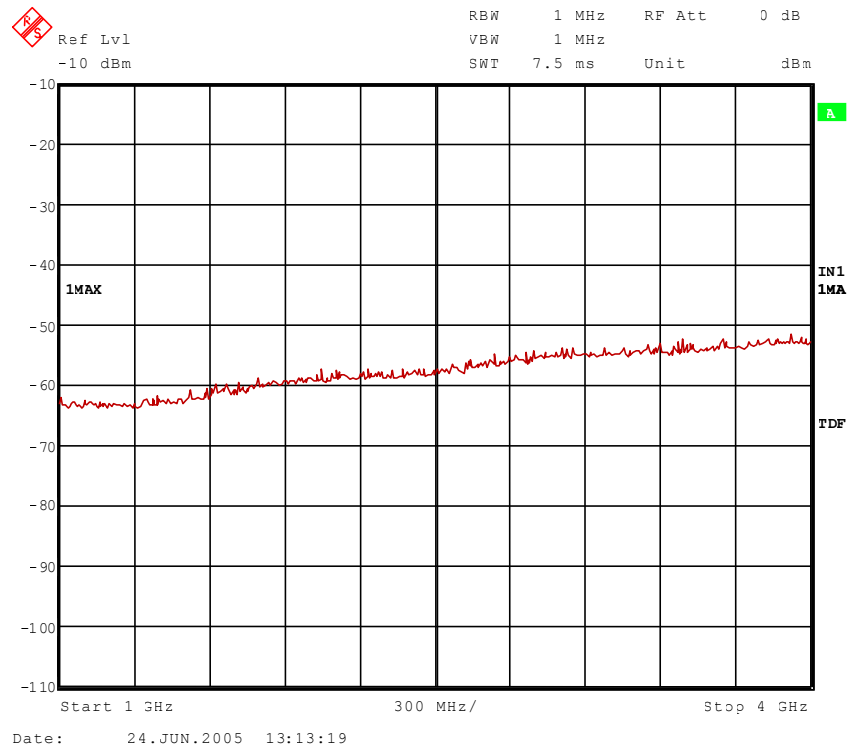
Continued next page:

TEST REPORT REFERENCE: R40893VHF 3rd Version

Continued:



40893VHF1TX2.wmf: 200 MHz to 1000 MHz, transmit mode, channel 1



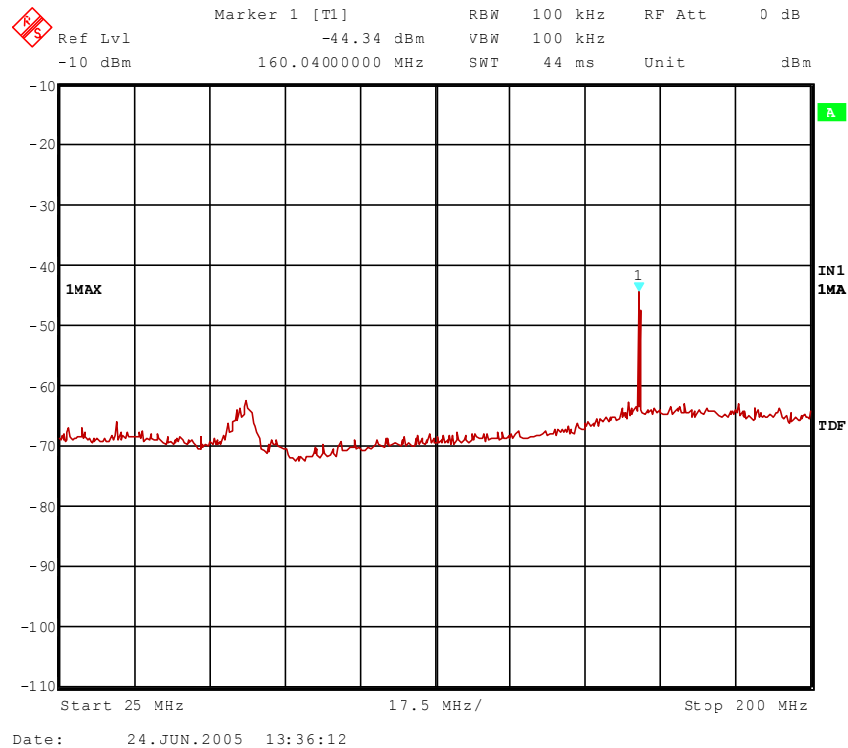
40893VHF1TX3.wmf: 1 GHz to 4 GHz, transmit mode, channel 1

Continued next page:

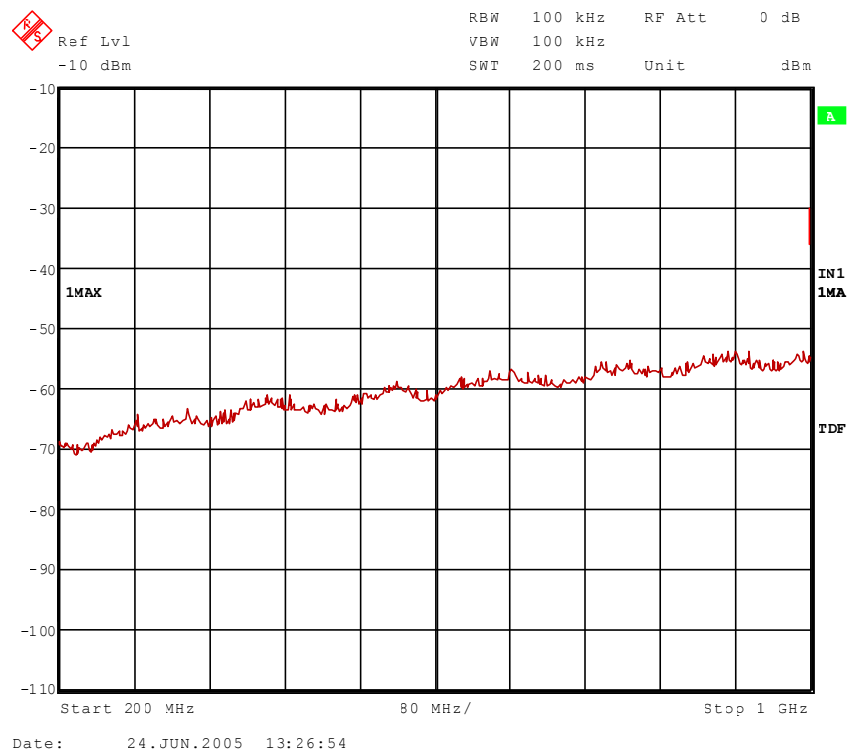
TEST REPORT REFERENCE: R40893VHF 3rd Version

Continued:

Channel 2:



40893VHF2TX1.wmf: 25 MHz to 200 MHz, transmit mode

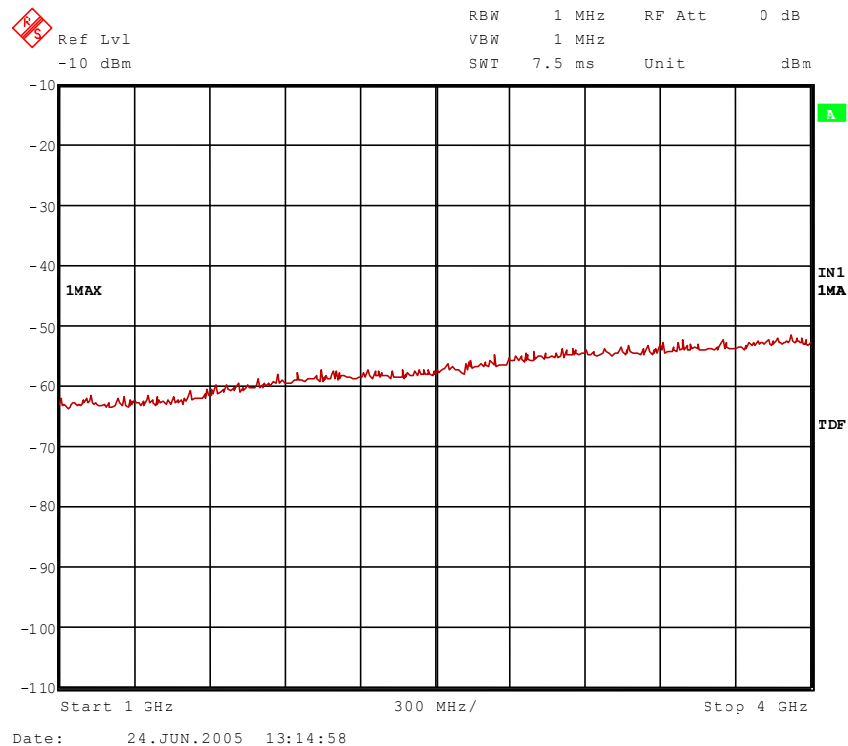


40893VHF2TX2.wmf: 200 MHz to 1000 MHz, transmit mode

Continued next page:

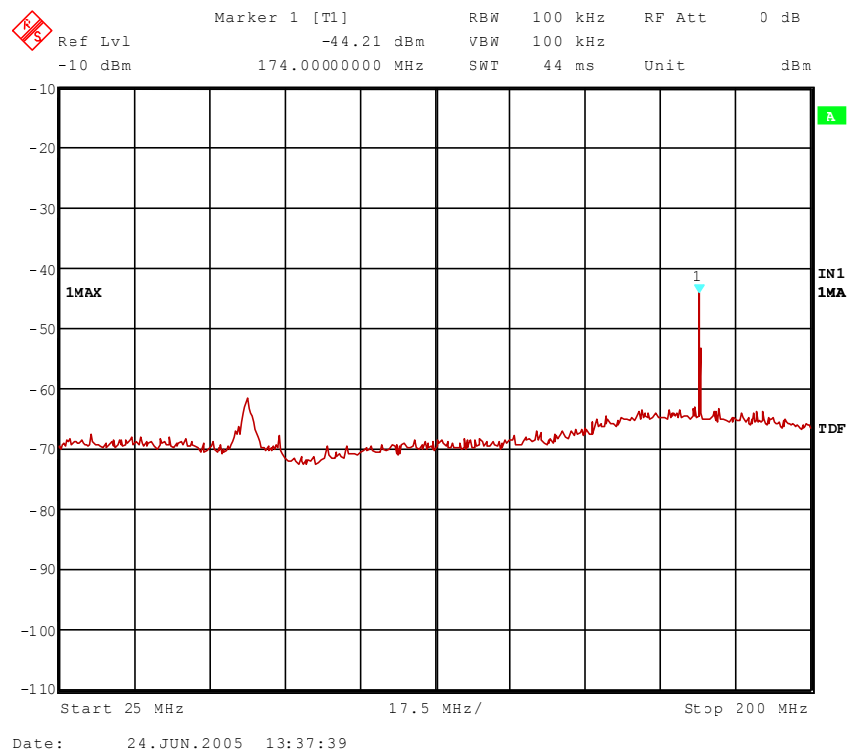
TEST REPORT REFERENCE: R40893VHF 3rd Version

Continued:



40893VHF2TX3.wmf: 1 GHz to 4 GHz, transmit mode

Channel 3:

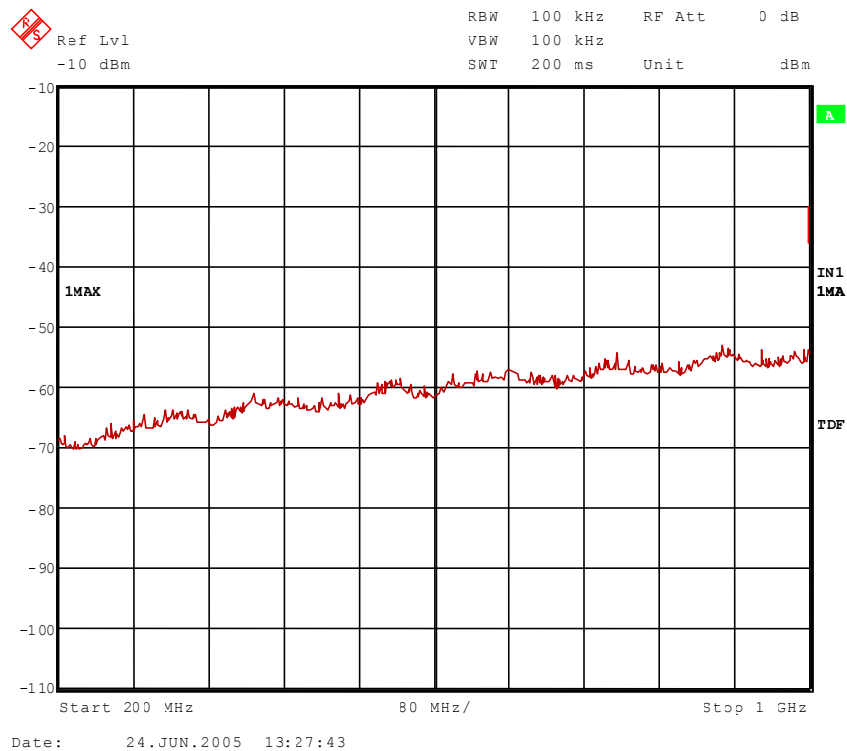


40893VHF3TX1.wmf: 25 MHz to 200 MHz, transmit mode

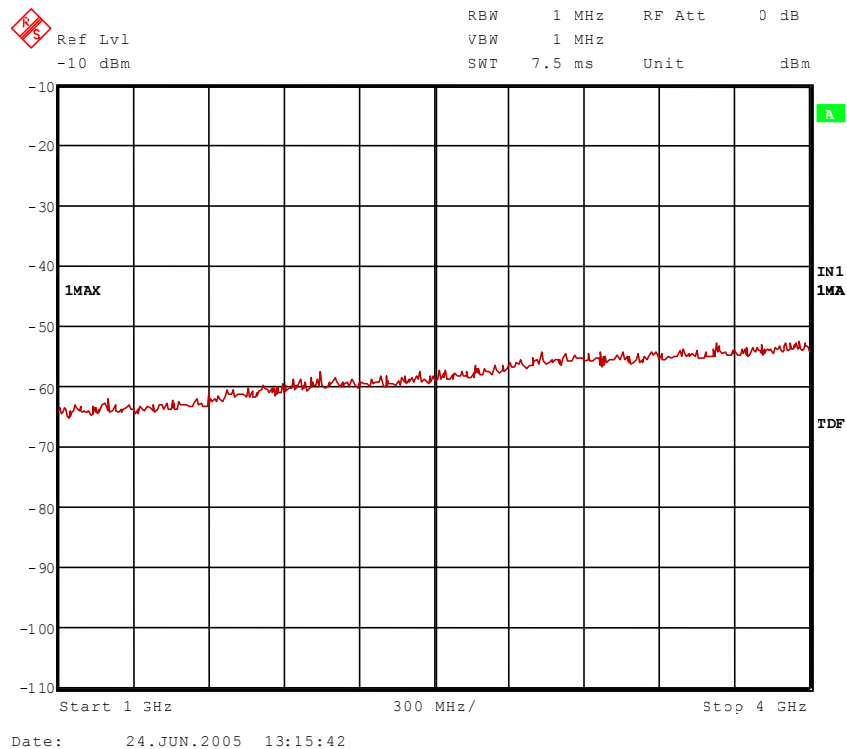
Continued next page:

TEST REPORT REFERENCE: R40893VHF 3rd Version

Continued:



40893VHF3TX2.wmf: 200 MHz to 1000 MHz, transmit mode



40893VHF3TX3.wmf: 1 GHz to 4 GHz, transmit mode

Continued next page:

TEST REPORT REFERENCE: R40893VHF 3rd Version

Final measurement results (radiated):

EMISSIONS LEVEL					
Operation Channel:	Frequency:	Bandwidth:	Level:	Limit:	Result:
1	292.040 MHz	10 kHz	< -60 dBm*	-13 dBm	Passed
	438.060 MHz	10 kHz	< -55 dBm*	-13 dBm	Passed
	584.080 MHz	10 kHz	< -55 dBm*	-13 dBm	Passed
	-	No other emissions found.		-	-
	-			-	-
Measurement uncertainty		+2.2 dB / -3.6 dB			

EMISSIONS LEVEL					
Operation Channel:	Frequency:	Bandwidth:	Level:	Limit:	Result:
2	320.080 MHz	10 kHz	< -60 dBm*	-13 dBm	Passed
	480.120 MHz	10 kHz	< -55 dBm*	-13 dBm	Passed
	640.160 MHz	10 kHz	< -55 dBm*	-13 dBm	Passed
	-	No other emissions found.		-	-
	-			-	-
Measurement uncertainty		+2.2 dB / -3.6 dB			

EMISSIONS LEVEL					
Operation Channel:	Frequency:	Bandwidth:	Level:	Limit:	Result:
3	347.960 MHz	10 kHz	< -55 dBm*	-13 dBm	Passed
	521.940 MHz	10 kHz	< -55 dBm*	-13 dBm	Passed
	695.920 MHz	10 kHz	< -50 dBm*	-13 dBm	Passed
	-	No other emissions found.		-	-
	-			-	-
Measurement uncertainty		+2.2 dB / -3.6 dB			

* Remark: Noise floor of the measuring system.

TEST EQUIPMENT USED FOR THE TEST:

2, 7, 15, 17, 19, 21-23, 28, 54, 79, 136-137

TEST REPORT REFERENCE: R40893VHF 3rd Version

6 MEASUREMENT EQUIPMENT

TEST REPORT REFERENCE: R40893VHF 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 225 mm	-	Phoenix Test-Lab	-	410085
25	Loop Antenna 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

TEST REPORT REFERENCE: R40893VHF 3rd Version

No.	Test equipment:	Type:	Manufacturer:	Serial No.	PM-No.
32	Radio communication analyser	CMTA 54	Rohde & Schwarz	841904/011	480169
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	ZFSC-2-10G	Mini Circuits	-	480564
43	Power splitter	ZFSC-2-10G	Mini Circuits	-	480565
44	Power splitter	11850C	Hewlett Packard	01052	410069
46	Power splitter	-	Suhner	-	410070
47	Power divider	PWD-2533-02-SMA-79	Midwest Microwave	-	480443
48	Symmetrical transformer	-	Phoenix Test Lab	-	410086
49	Feeding bridge A	-	Phoenix Test Lab	-	410087
50	Feeding bridge A	-	Phoenix Test Lab	-	410088
51	Regulating transformer	BR802	Block	-	480094
52	Regulating transformer	BR802	Block	-	480095
53	Regulating transformer	B9701089	Block	105713	480341
54	Power supply	TOE 8752	Toellner	31566	480010
55	Power supply	TOE 8852	Toellner	51712	480233
56	Power supply	TOE 8752	Toellner	31569	480009
57	Power supply	TOE 8852	Toellner	51786	490001
58	Climatic chamber	KS600/75L	RS-Simulatoren	19002901	490065
59	Climatic chamber	KS600/75	RS-Simulatoren	19004201	490070
60	Climatic chamber	ST2K220/75	RS-Simulatoren	9803901	490020
61	Climatic chamber	MK 240	BINDER	05-79022	480462
62	Climatic chamber	GTS500.40	GTS	1660	490073
63	Climatic Chamber	KS600/75	RS Simulatoren	20000401	490081

TEST REPORT REFERENCE: R40893VHF 3rd Version

No.	Test equipment:	Type:	Manufacturer:	Serial No.	PM-No.
64	Double circulator	-	Motorola	-	-
65	Directional coupler	ZFDC-20-5	Mini Circuits	-	410092
66	Directional coupler	4001B-20	Narda Microwave	02010	410150
67	Directional coupler	774D	Hewlett Packard	06375	410149
68	Impedance matching unit	-	Phoenix-Test-Lab	-	410091
69	High Pass Filter	HP-350	Dirk Fischer Elektronik	-	410151
70	High Pass Filter	HP-450	Dirk Fischer Elektronik	-	410152
71	High Pass Filter	HP-1000	Dirk Fischer Elektronik	-	410147
72	High Pass Filter	HP 4000	Dirk Fischer Elektronik	-	480445
73	High Pass Filter	WHJS1000C 11/60EF	Wainwright Instruments GmbH	1	480413
74	IF-Filter 20 kHz/25 kHz	MQF 10.7- 1400/11	Telefilter	0043	480323
75	IF-Filter 12.5 kHz	MQF 10.7- 0850/11	Telefilter	0043	480324
76	BIAS TEE	ZNBT-60-1W	Mini Circuits	-	410185
77	DC block	BLK-18	Mini Circuits	15542	480575
78	Tuneable Notch Filter	TTR 375- 3EE	TELONIC Berkeley	-	480330
79	Tuneable Notch Filter	TTR 190- 3EE	TELONIC Berkeley	97284-6	480331
80	Tuneable Notch Filter	TTR 95-3EE	TELONIC Berkeley	00104-2	480332
81	Tuneable Notch Filter	WRCA800/9 00-0.2/40- 6EEK	Wainwright Instruments GmbH	15	480414
82	Tuneable Notch Filter	WRCD1700/ 2000-0.2/40- 10EEK	Wainwright Instruments GmbH	14	480415
83	Tuneable Band reject Filter	WRCT2300/2 650-5/40- 10EEK	Wainwright Instruments GmbH	1	480446
84	Mixer	ZP-1	Mini Circuits	00040	410148
85	Mixer	ZP-5	Mini Circuits	00126	410159
86	Variable Attenuator 0 -11 dB	8494B	Hewlett Packard	3308A38264	480264
87	Variable Attenuator 0 - 110 dB	8496B	Hewlett Packard	3308A71365	480265
88	Attenuator / 3 dB / 5 W	WA2-3	Weinschel	8250	410115
89	Attenuator / 3 dB / 5 W	WA2-3	Weinschel	8251	410116

TEST REPORT REFERENCE: R40893VHF 3rd Version

No.	Test equipment:	Type:	Manufacturer:	Serial No.	PM-No.
90	Attenuator / 3 dB / 5 W	WA2-3	Weinschel	8252	410117
91	Attenuator / 3 dB / 50 W	33-3-34	Weinschel	BH 5062	410131
92	Attenuator / 6 dB / 5 W	WA2-6	Weinschel	8253	410118
93	Attenuator / 6 dB / 5 W	WA2-6	Weinschel	8254	410119
94	Attenuator / 6 dB / 5 W	WA2-6	Weinschel	8255	410120
95	Attenuator / 6 dB / 25 W	33-6-34	Weinschel	BH 5536	410128
96	Attenuator / 6 dB / 150 W	150-A-FFN-06	Bird	0029	480370
97	Attenuator / 10 dB / 1 W	6810.17A	Huber + Suhner	-	410067
98	Attenuator / 10 dB / 5 W	WA2-10	Weinschel	8259	410121
99	Attenuator / 10 dB / 5 W	WA2-10	Weinschel	8260	410122
100	Attenuator / 10 dB / 5 W	WA2-10	Weinschel	8261	410123
101	Attenuator / 10 dB / 10 W	WA8-10	Weinschel	7538	410112
102	Attenuator / 10 dB / 25 W	33-10-34	Weinschel	BH 4878	410129
103	Attenuator / 10 dB / 25 W	33-10-34	Weinschel	BH 4856	410130
104	Attenuator / 10 dB / 100 W	BN 745353	Spinner	20262	480274
105	Attenuator / 10 dB / 100 W	BN 745353	Spinner	20262	480274
106	Attenuator / 20 dB / 1 W	6820.17A	Huber + Suhner	-	410068
107	Attenuator / 20 dB / 5 W	WA2-20	Weinschel	8256	410124
108	Attenuator / 20 dB / 5 W	WA2-20	Weinschel	8257	410125
109	Attenuator / 20 dB / 5 W	WA2-20	Weinschel	8258	410126
110	Attenuator / 20 dB / 10 W	WA8-20	Weinschel	7539	410113
111	Attenuator / 30 dB / 200 W	BN 745395	Spinner	29971	480232
112	Attenuator / 30 dB / 100 W	BN 745358	Spinner	20900	480369
113	Termination / 50 Ω / 15 W	6515.17.A	Huber + Suhner	-	410078
114	Termination / 50 Ω / 0.5 W	6500.17.A	Huber + Suhner	-	410074
115	Termination / 50 Ω / 0.5 W	6500.17.A	Huber + Suhner	-	410075
116	Termination / 50 Ω / 200 W	BN 531212	Spinner	20593	480371
117	Termination / 50 Ω / 600 W	BN 534242	Spinner	29440	480372
118	RF-cable No. 1	RTK 081	Rosenberger	-	410093
119	RF-cable No. 2	RTK 081	Rosenberger	-	410094
120	RF-cable No. 3	RTK 081	Rosenberger	-	410095
121	RF-cable No. 4	RTK 081	Rosenberger	-	410096

TEST REPORT REFERENCE: R40893VHF 3rd Version

No.	Test equipment:	Type:	Manufacturer:	Serial No.	PM-No.
122	RF-cable No. 5	RTK 081	Rosenberger	-	410097
123	RF-cable No. 6	RTK 081	Rosenberger	-	410098
124	RF-cable No. 7	Sucoflex 104	Huber + Suhner	-	410099
125	RF-cable No. 8	RG223	Phoenix-Test-Lab	-	410100
126	RF-cable No. 9	RG223	Phoenix-Test-Lab	-	410101
127	RF-cable No. 10	RG223	Phoenix-Test-Lab	-	410102
128	RF-cable No. 11	RG223	Phoenix-Test-Lab	-	410103
129	RF-cable No. 12	RG223	Phoenix-Test-Lab	-	410104
130	RF-cable No. 13	RG223	Phoenix-Test-Lab	-	410105
131	RF-cable No. 14	RG223	Phoenix-Test-Lab	-	410106
132	RF-cable No. 15	RG223	Phoenix-Test-Lab	-	410107
133	RF-cable No. 16	RG223	Phoenix-Test-Lab	-	410108
134	RF-cable No. 17	RG223	Phoenix-Test-Lab	-	410109
135	RF-cable No. 18	RG58	Phoenix-Test-Lab	-	410110
136	RF-cable No. 30	RTK 081	Rosenberger	-	410141
137	RF-cable No. 31	RTK 081	Rosenberger	-	410142
138	RF-cable No. 36	Sucoflex 106B	Suhner	0522/6B	480571

TEST REPORT REFERENCE: R40893VHF 3rd Version

Microwave Test Equipment:

No.	Test equipment:	Type:	Manufacturer:	Serial No.	PM-No.
139	Standard Gain Horn 8.2 - 12.5 GHz	16240-20	Flann Microwave	135671	480513
141	Standard Gain Horn 11.9 GHz – 18 GHz	18240-20	Flann Microwave	483	480294
142	Standard Gain Horn 11.9 GHz – 18 GHz	18240-20	Flann Microwave	482	480295
143	Standard Gain Horn 17.9 GHz – 26.7 GHz	20240-20	Flann Microwave	411	480297
144	Standard Gain Horn 17.9 GHz – 26.7 GHz	20240-20	Flann Microwave	410	480296
145	Standard Gain Horn 26.4 GHz – 40.1 GHz	22240-20	Flann Microwave	469	480299
146	Standard Gain Horn 26.4 GHz – 40.1 GHz	22240-20	Flann Microwave	468	480298
147	Standard Gain Horn 33 GHz - 55 GHz	23240-20	Flann Microwave	122391	480483
148	Standard Gain Horn 40 GHz – 60 GHz	24240-20	Flann Microwave	133313	480481
149	Standard Gain Horn 50 GHz – 75 GHz	25240-20	Flann Microwave	135181	480480
150	Standard Gain Horn 75 GHz – 110 GHz	27240-20	Flann Microwave	132148	480482
151	50 to 75 GHz mm Wave Source Module	83557A	Agilent	MY39420013	480485
	Standard Gain Horn 50 GHz – 75 GHz	25240-20	Flann Microwave	135180	
	Coupler/Detector	83557-60001	Agilent	-	
152	75 to 110 GHz mm Wave Source Module	83558A	Agilent	MY39420016	480484
	Standard Gain Horn 75 GHz – 110 GHz	27240-20	Flann Microwave	138294	
	Coupler/Detector	83558-60003	Agilent	-	
153	Preamplifier	JS3- 00101200- 23-5A	Miteq	681851	480337
154	Preamplifier	JS3- 12001800- 16-5A	Miteq	571667	480343
155	Preamplifier	JS3- 18002600- 20-5A	Miteq	658697	480342

TEST REPORT REFERENCE: R40893VHF 3rd Version

No.	Test equipment:	Type:	Manufacturer:	Serial No.	PM-No.
156	Preamplifier	JS3-26004000-25-5A	Miteq	563593	480344
157	Microwave System Amplifier 0.5 to 26.5 GHz	83017A	Agilent	MY39500630	480488
158	Harmonic Mixer 40 to 60 GHz	FS-Z60	Rohde&Schwarz	100071	480481
159	Harmonic Mixer 50 to 75 GHz	FS-Z75	Rohde&Schwarz	100045	480480
160	Harmonic Mixer 75 to 110 GHz	FS-Z110	Rohde&Schwarz	100049	480482
161	RF-cable 1m	KPS-1533-400-KPS	Insulated Wire	-	480300
162	RF-cable 1m	KPS-1533-400-KPS	Insulated Wire	-	480301
163	RF-cable 2m	KPS-1533-400-KPS	Insulated Wire	-	480302
164	RF-cable 1m	2JS-1401-400-2PS	Insulated Wire	-	480486
165	Microwave-Cable	-	Rohde&Schwarz	-	480487
166	Detector	8473D	Hewlett Packard	3614A01788	480320
167	Power Meter	NRVD	Rohde & Schwarz	828110/026	480267
168	Thermal Power Sensor	NRV-Z51	Rohde & Schwarz	825489/004	480247
169	Peak Power Sensor	NRV-Z32	Rohde & Schwarz	849745/016	480551
170	Power Supply	87421A	Agilent	MY44350236	-

7 LIST OF ANNEXES

ANNEX A	PHOTOS OF THE TEST SET-UP:	4 pages
	Test set-up radiated spurious emissions	40893emi3.jpg
	Test set-up radiated spurious emissions	40893emi8.jpg
	Test set-up radiated spurious emissions	40893emi2.jpg
	Test set-up climatic chamber	40893clima2.jpg
ANNEX B	EXTERNAL PHOTOS OF THE EUT:	2 pages
	EUT, front view	40893eut20.jpg
	EUT, rear view	40893eut22.jpg
ANNEX C	INTERNAL PHOTOS OF THE EUT:	4 pages
	Main-PCB, front view	40893eut23.jpg
	Main-PCB, rear view	40893eut21.jpg
	VCO-PCB, front view	40893VCO3.jpg
	VCO-PCB, rear view	40893VCO1.jpg
	Test board 1	40893TB1.jpg
	Test board 2	40893TB2.jpg
ANNEX D	MEASUREMENT EQUIPMENT:	16 pages