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Tested by:



Risto Hietanen, Test Engineer



Reviewed by:



Jyrki Leino, Compliance Manager

SORT OF EQUIPMENT:

Radio modem

MODEL:

SATELLAR RU

TYPE:

SATEL-TA12

MANUFACTURER:

Satel Oy, Finland

SERIAL NUMBER:

-, -, -

CLIENT:

Satel Oy

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TEST SPECIFICATION

EN 300 113-2 V1.4.1 (2007-07)

REMARKS:

The test results are valid for the tested unit only. Without a written permission of Nemko Oy it is allowed to copy this report as a whole, but not partially.

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1. General

Type:	SATEL-TA12		
Alignment range:	360 – 485 MHz		
Switching range:	One channel		
	Category: AR3		

Measurement Frequencies:	Equipment 1 Serial no. -	Equipment 2 Serial no. -	Equipment 3 Serial no. -
	1) 360,000 MHz 2) 385,000 MHz	3) 410,000 MHz 4) 435,000 MHz	5) 460,000 MHz 6) 485,000 MHz

Voltages: Temperatures: Humidity:	Normal 12,0 VDC	Minimum 9,0 VDC	Maximum 30,0 VDC
	23,0° ± 1,5°C	-20,0°C	+55,0°C
	30 % ± 8 %		

Effective radiated power:	1 W / 100 mW	Antenna:	50 ohm (TNC-connector)
Channel separation:	12,5 and 25,0 kHz	Production model:	Yes
		Modulation:	Multilevel State FM (12,5 kHz: 9600 bps and 25 kHz: 19200 bps)

The following measurements been performed according to ETS EN 300 113-1 V1.6.1 (2007-07) standard:

Eq 1 Freq.: 1) 2)	Eq 2 Freq.: 3) 4)	Eq 3 Freq.: 5) 6)	
☒	☒	☒	7.1 Frequency error
☒	☒	☒	7.2 Transmitter power (conducted)
☒	☒	☒	7.3 Maximum Effective radiated power
☒	☒	☒	7.4 Adjacent channel power
☒	☒	☒	7.5.1 a Spurious emissions (conducted)
☒	☒	☒	7.5.1 b Spurious emissions (radiated)
☒	☒	☒	7.5 Intermodulation attenuation
☒	☒	☒	7.7 Transmitter attack time
☒	☒	☒	7.8 Transmitter release time
☒	☒	☒	7.9.3.1 Time domain analysis of power and frequency
☒	☒	☒	7.9.3.3 Adjacent and alternate channel transient power
☐	☐	☐	8.1 Maximum useable sensitivity (digital, conducted)
☐	☐	☐	8.2 Average usable sensitivity (digital, field strength)
☐	☐	☐	8.3 Level of the wanted signal for the degradation measurements
☐	☐	☐	8.4 Error behaviour at high input levels
☐	☐	☐	8.5 Co-channel rejection
☐	☐	☐	8.6 Adjacent channel selectivity
☐	☐	☐	8.7 Spurious response rejection
☐	☐	☐	8.8 Intermodulation response rejection
☐	☐	☐	8.9 Blocking or desensitization
☒	☐	☒	8.10.1 a Spurious radiations (conducted)
☒	☐	☒	8.10.1 b Spurious radiations (radiated)
☐	☐	☐	Duplex operation
☐	☐	☐	9.1 Receiver desensitization
☐	☐	☐	9.2 Receiver spurious response rejection

REMARKS:

2. Summary of performed tests and test results

(This interpretation of the test report's results does not belong to the scope of our accreditation.)

<i>ETSI EN 300 113-1 V1.6.1 (2007-07)</i>		<i>Result</i>
<i>7.1</i>	<i>Frequency error</i>	PASS
<i>7.2</i>	<i>Transmitter power (conducted)</i>	PASS
<i>7.4</i>	<i>Adjacent channel power</i>	PASS
<i>7.5.1 a</i>	<i>Spurious emissions (conducted)</i>	PASS
<i>7.5.1 b</i>	<i>Spurious emissions (radiated)</i>	PASS
<i>7.7</i>	<i>Transmitter attack time</i>	PASS
<i>7.8</i>	<i>Transmitter release time</i>	PASS
<i>7.9.3.1</i>	<i>Time domain analysis of power and frequency</i>	PASS
<i>7.9.3.3</i>	<i>Adjacent channel transient power</i>	PASS
<i>8.10.1 a</i>	<i>Spurious radiations (conducted)</i>	PASS
<i>8.10.1 b</i>	<i>Spurious radiations (radiated)</i>	PASS

According to the standard the measurement results have been compared directly with the limits without considering measurement uncertainties.

Explanations:

PASS The EUT passed that particular test.

FAIL The EUT failed that particular test.

3. Test results

3.1 Frequency error Clause 7.1

Date: 29.04.2010, except

date: 02.06.2010 (channel 1 and 2, +55°C)

Method of measurement: Clause 7.1.2

Test conditions		Frequency error (kHz)					
		Freq.1	Freq.2	Freq.3	Freq.4	Freq.5	Freq.6
Tnom	Vnom	+ 39	+ 11	+ 106	+ 124	- 12	+ 15
Tmin	Vmin	+ 32	- 10	+ 348	+ 483	- 151	- 50
	Vmax	+ 32	- 15	+ 336	+ 463	- 138	- 84
Tmax	Vmin	- 225	- 47	+ 216	+ 399	+ 24	+ 55
	Vmax	- 225	- 50	+ 253	+ 408	+ 24	+ 60
Maximum freq. error. (Hz)		- 225	- 50	+ 348	+ 483	- 151	- 84
Measurement uncertainty (U95)		$6,1 \times 10^{-8}$					

LIMITS Clause 7.1.3

Table 2: Frequency error

Channel separation (kHz)	Frequency error limit (kHz)				
	Below 47MHz	Above 47 to 137MHz	Above 137 to 300MHz	Above 300 to 500MHz	Above 500 to 1000MHz
12,5	± 0,60	± 1,00	± 1,00 (B) ± 1,50 (M)	± 1,00 (B) ± 1,50 (M) (note 2)	No value specified
20,0 / 25,0	± 0,60	± 1,35	± 2,00	± 2,00 (note)	± 2,50 (note 2)

NOTE 1: For handportable stations having integral power supplies, these limits only apply to the reduced extreme temperature range 0 °C to + 40 °C.

NOTE 2: However for the full extreme temperature conditions (subclause 5.4.1), exceeding the reduced extreme temperature range above, the following frequency error limits apply:

± 2,50 kHz between 300 MHz and 500 MHz;

± 3,50 kHz between 500 MHz and 1000 MHz.

NOTE 3: (B) = BASE STATION

NOTE 4: (M) = MOBILE STATION

TEST EQUIPMENT USED: 2046, 328, 390, 394, 146, 316, 404, 157, 599

3.2 Transmitter power (conducted) Clause 7.2

Date: 29.04.2010, except
date: 02.06.2010 (channel 1 and 2, +55°C)

Method of measurement: Clause 7.2.2

Rated output power: Low: 100 mW and high: 1 W

Test conditions		Transmitter power											
		Freq.1		Freq.2		Freq.3		Freq.4		Freq.5		Freq.6	
		P: low (mW)	P: high (W)	P: low (mW)	P: high (W)	P: low (mW)	P: high (W)	P: low (mW)	P: high (W)	P: low (mW)	P: high (W)	P: low (mW)	P: high (W)
Tnom	Vnom	78	0,86	93	0,92	95	1,00	104	0,90	90	0,93	72	0,77
Tmin	Vmin	88	1,05	117	1,06	104	1,15	153	1,09	115	1,06	100	0,94
	Vmax	88	1,05	117	1,06	104	1,15	153	1,09	115	1,06	100	0,94
Tmax	Vmin	76	0,78	80	0,85	85	0,92	81	0,80	71	0,83	55	0,66
	Vmax	76	0,78	80	0,85	85	0,92	81	0,80	71	0,83	55	0,66
Variation in output power under normal test conditions		-1,08 dB	-0,66 dB	-0,32 dB	-0,36 dB	-0,22 dB	±0,0 dB	+0,17 dB	-0,46 dB	-0,46 dB	-0,36 dB	-1,43 dB	-1,14 dB
Variation in output power under extreme test conditions		-1,19 to -0,56 dB	-1,08 to +0,21 dB	-0,97 to +0,68 dB	-0,71 to +0,25 dB	-0,71 to +0,17 dB	-0,36 to +0,61 dB	-0,92 to +1,85 dB	-0,97 to +0,37 dB	-1,49 to +0,61 dB	-0,81 to +0,25 dB	-2,60 to ±0,0 dB	-1,81 to -0,27 dB
Measurement uncertainty (U95)		± 0.75 dB											

LIMITS Clause 7.2.3

Under normal test conditions	± 1.5 (dB)
Under extreme test conditions	+ 2.0 (dB), - 3.0 (dB)

TEST EQUIPMENT USED: 59, 218, 328, 390, 394, 146, 316, 404, 157, 599

3.3 Adjacent channel power Clause 7.4

Date: 27.04.2010 (channel separation 25 kHz)

Date: 04.05.2010 (channel separation 12,5 kHz, freq. 3,4,5 and 6)

Date: 03.06.2010 (channel separation 12,5 kHz, freq. 1 and 2)

Method of measurement: Clause 7.4.2

Rated output power: Low: 100 mW and high: 1 W

Channel separation $\pm 12,5$ kHz

Adjacent channel	Below carrier power (dBc)											
	Freq.1		Freq.2		Freq.3		Freq.4		Freq.5		Freq.6	
	P: low	P: high	P: low	P: high	P: low	P: high	P: low	P: high	P: low	P: high	P: low	P: high
- 12,5 kHz	68,6	66,4	68,9	64,9	64,0	67,4	65,4	66,9	68,2	69,7	68,5	70,7
+ 12,5 kHz	69,1	68,0	69,9	67,7	68,0	71,2	68,7	71,2	70,1	72,8	70,2	73,5
Measurement uncertainty	± 1.6 dB											

Channel separation $\pm 25,0$ kHz

Adjacent channel	Below carrier power (dBc)											
	Freq. 1		Freq. 2		Freq. 3		Freq. 4		Freq. 5		Freq. 6	
	P: low	P: high	P: low	P: high	P: low	P: low	P: low	P: low	P: low	P: low	P: low	P: high
- 25,0 kHz	68,1	67,9	68,3	65,6	63,9	65,8	64,1	64,8	66,9	66,6	67,2	68,3
+ 25,0 kHz	68,1	67,9	68,3	65,8	64,0	66,7	64,1	65,4	67,0	66,8	67,4	68,3
Measurement uncertainty	± 1.6 dB											

LIMIT Clause 7.4.3	12,5 kHz, 20,0 kHz & 25,0 kHz channel spacing: 60dB below carrier power (without the need to be below 0,2 μ W (-37dBm))
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TEST EQUIPMENT USED: 337, 33, 328, 390, 394, 316, 404

3.4 Unwanted emissions in the spurious domain Clause 7.5

Transmitter Spurious Emissions (Conducted) 7.5.1 a

Date: 28.04.2010

Method of measurement: Clause 7.5.2

Rated output power: Low: 100 mW and high: 1 W

Frequency 1			Frequency 4		
Frequency (MHz)	Results / dBm (P: low)	Results / dBm (P: high)	Frequency (MHz)	Results / dBm (P: low)	Results / dBm (P: high)
Tx operating			Tx operating		
341,68	-51,9	-42,7	970,00	-74,4	-57,7
366,11	-56,0	-48,7	2910,00	< -80,0	-66,0
720,00	< -80,0	-68,0			
Others	< -70,0	< -70,0	Others	< -70,0	< -70,0
Tx on standby			Tx on standby		
all 9 kHz to 4.0 GHz	< -75,0		all 9 kHz to 12,75 GHz	< -75,0	
Measurement uncertainty	± 1.8 dB				

LIMITS Clause 7.5.4

Table 4: Conducted emissions

Frequency range	Tx operating	Tx standby
9 kHz to 1 GHz	0.25 μ W (- 36.0 dBm)	2.0 nW (- 57.0 dBm)
above 1 to 4 GHz or above 1 to 12.75 GHz,	1.00 μ W (- 30.0 dBm)	20.0 nW (- 47.0 dBm)

TEST EQUIPMENT USED: 42, 33, 328, 390, 394, 571, 145, 316, 404

3.5 Unwanted emissions in the spurious domain Clause 7.5

Transmitter Spurious Emissions (Radiated) 7.5.1 b

Date: 27.04.2010

Method of measurement: Clause 7.5.3

Rated output power: Low: 100 mW and high: 1 W

Frequency 1			Frequency 4		
Frequency (MHz)	Results / dBm (P: low)	Results / dBm (P: high)	Frequency (MHz)	Results / dBm (P: low)	Results / dBm (P: high)
Tx operating			Tx operating		
All	< -60,0	< -60,0	All	< -60,0	< -60,0
Tx on standby			Tx on standby		
all 30 MHz to 1.0 GHz	< - 70,0		all 30 MHz to 1.0 GHz	< - 70,0	
all 1 GHz to 4.0 GHz	< - 60,0		all 1 GHz to 4.0 GHz	< - 60,0	
			all 14 GHz to 12,75 GHz	< - 50,0	
Measurement uncertainty	- 4.4 dB / +3.4 dB				

LIMITS Clause 7.5.4

Table 4: Radiated emissions

Frequency range	Tx operating	Tx standby
30 MHz to 1 GHz	0.25 μ W (- 36.0 dBm)	2.0 nW (- 57.0 dBm)
above 1 to 4 GHz or above 1 to 12.75 GHz,	1.00 μ W (- 30.0 dBm)	20.0 nW (- 47.0 dBm)

TEST EQUIPMENT USED: 566, 317, 564, 176, 89, 185, 417, 328, 133, 571, 316, 404

3.6 Transmitter attack time Clause 7.7

Date: 26.04.2010 (Frequency 360 MHz)

Date: 23.04.2010 (Frequency 485 MHz)

Method of measurement: Clause 7.7.2

Rated output power: Low: 100 mW and high: 1 W

Measured the time after the carrier power exceeds – 50 dBc to the power – 1 dBc

Time characteristic	Attack time			
	Frequency 1		Frequency 2	
	P: low	P: high	P: low	P: high
Time relative to the power rise	1,04	0,99	0,82	0,81
Time relative to the frequency behaviour	-	-	-	-
Maximum of these times, i.e. attack time	1,04	0,99	0,82	0,81
Measurement uncertainty	± 3.0 ms			

See clause 7.7.1 (ETS 300 113) for the definition and clause 7.9.1 (ETS 300 113), figures 11 and 12 for the graphs of transmitter attack time.

The plots of frequency and power versus time can be found in the test report sheets corresponding to clause 7.9.1.
See pages 14, 16, 18 and 20

LIMIT Clause 7.7.3

The transmitter attack time shall not exceed: 25 ms

TEST EQUIPMENT USED: 337, 33, 30, 10, 133, 102, 328, 390, 394, 62, 316, 404

3.7 Transmitter release time Clause 7.8

Date: 26.04.2010 (Frequency 360 MHz)

Date: 23.04.2010 (Frequency 485 MHz)

Method of measurement: Clause 7.8.2

Rated output power: Low: 100 mW and high: 1 W

The release time was measured between the power levels from - 3 dBc to - 50 dBc.

Time characteristic	Release time			
	Frequency 1		Frequency 2	
	P: low	P: high	P: low	P: high
Transmitter release time	0,69	0,64	0,72	0,61
Measurement uncertainty	± 3.0 ms			

See clause 7.8.1 (ETS 300 113) for the definition and clause 7.9.1 (ETS 300 113), figure 13 for the graphs of transmitter release time.

The plots of frequency and power versus time can be found in the test report sheets corresponding to clause 7.9.1. See pages 15, 17, 19 and 21

LIMIT Clause 7.8.3

The transmitter release time shall not exceed: 20 ms

TEST EQUIPMENT USED: 337, 33, 30, 10, 133, 102, 328, 390, 394, 62, 316, 404

3.8 Transient behaviour of the transmitter Clause 7.9 (Time domain analysis of power and frequency 7.9.3.1)

Date: 26.04.2010 (Frequency 360 MHz)

Date: 23.04.2010 (Frequency 485 MHz)

Method of measurement: Clause 7.9.3.1

Power level at which the measurement has been performed: Low: 100 mW and high: 1 W

Measurement	Time (tp and td)			
	Frequency 1		Frequency 2	
	P: low	P: high	P: low	P: high
tp	0,36	0,30	0,34	0,25
td	-0,42	-0,40	-0,37	-0,36
Measurement uncertainty	± 3.0 ms			

See pages from 14 to 21

LIMIT Clause 7.9.4.1

In case of equipment operating with channel separation of 12,5 kHz, the slopes of the plots "power as a function of time" corresponding to both attack and release times, shall be such that:

- tp: $\geq 0,10$ ms, td: $\geq 0,10$ ms, for attack and release time;
- between the Pc - 30 dB point and the Pc - 6 dB point, both in the case of attack and release time, the sign of the slope shall not change.

In case of equipment operating with channel separation of 20 kHz or 25 kHz, the slopes of the plots "power as a function of time" corresponding to both attack and release times, shall be such that:

- tp: $\geq 0,05$ ms, td: $\geq 0,05$ ms, for attack and release time;
- between the Pc - 30 dB point and the Pc - 6 dB point, both in the case of attack and release time, the sign of the slope shall not change.

TEST EQUIPMENT USED: 337, 33, 30, 10, 133, 102, 328, 390, 394, 62, 316, 404

3.9 Transient behaviour of the transmitter Clause 7.9 (Adjacent channel transient power 7.9.3.3.2)

Date: 23.04.2010

Date: 05.05.2010

Date: 03.06.2010

Method of measurement: Clause 7.9.3.3.2 (constant envelope angle modulation equipment)

Rated output power: Low: 100 mW and high: 1 W

Adjacent channel	Below carrier power (dBc)							
	Frequency 1				Frequency 2			
	P: low		P: high		P: low		P: high	
	TX: on	TX: off	TX: on	TX: off	TX: on	TX: off	TX: on	TX: off
- 12,5 kHz	<-57,0	<-57,5	<-57,5	<-58,5	<-54,5	<-56,0	<-57,0	<-56,5
+ 12,5 kHz	<-56,5	<-58,0	<-57,5	<-58,0	<-57,5	<-55,5	<-58,5	<-58,0
- 25,0 kHz	<-60,0	<-57,0 (*)	<-61,0	<-61,5	<-59,0 (*)	<-55,5 (*)	<-60,5	<-61,0
+ 25,0kHz	<-59,5 (*)	<-59,5 (*)	<-61,0	<-60,0	<-58,5 (*)	<-56,5 (*)	<-59,0 (*)	<-61,0
Measurement uncertainty	+ 1.4 dB, -1.6 dB							

(*) < 2 μ W. Limits: -47 dBc (100 mW) and -57 dBc (1 W)

LIMITS:

7.9.4.2.1 Equipment measured as constant envelope angle modulation equipment

The transient power, in the adjacent channels shall not exceed a value of:

- 60,0 dB below the transmitter power (conducted) of the transmitter in decibels relative to the carrier power (dBc) without the need to be below 2 μ W (-27,0 dBm), for channel separations of 20 kHz and 25 kHz;
- 50,0 dB below the transmitter power (conducted) of the transmitter (in dBc) without the need to be below 2 μ W (-27,0 dBm), for a channel separation of 12,5 kHz.

7.9.4.2.2 Equipment measured as non-constant envelope modulation equipment

The transient power, in the adjacent channels shall not exceed a value of:

- 60,0 dB below the transmitter power (conducted) of the transmitter in decibels relative to the carrier power (dBc) without the need to be below 2 μ W (-27,0 dBm), for channel separations of 20 kHz and 25 kHz;
- 50,0 dB below the transmitter power (conducted) of the transmitter (in dBc) without the need to be below 2 μ W (-27,0 dBm), for a channel separation of 12,5 kHz.

The transient power, in the alternate channels shall not exceed a value of:

- 65,0 dB below the transmitter power (conducted) of the transmitter in decibels relative to the carrier power (dBc) without the need to be below 2 μ W (-27,0 dBm), for channel separations of 20 kHz and 25 kHz;
- 60,0 dB below the transmitter power (conducted) of the transmitter (in dBc) without the need to be below 2 μ W (-27,0 dBm), for a channel separation of 12,5 kHz.

For measurements at 100 kHz and 1 MHz (from the wanted channel), the transient power shall not exceed a value:

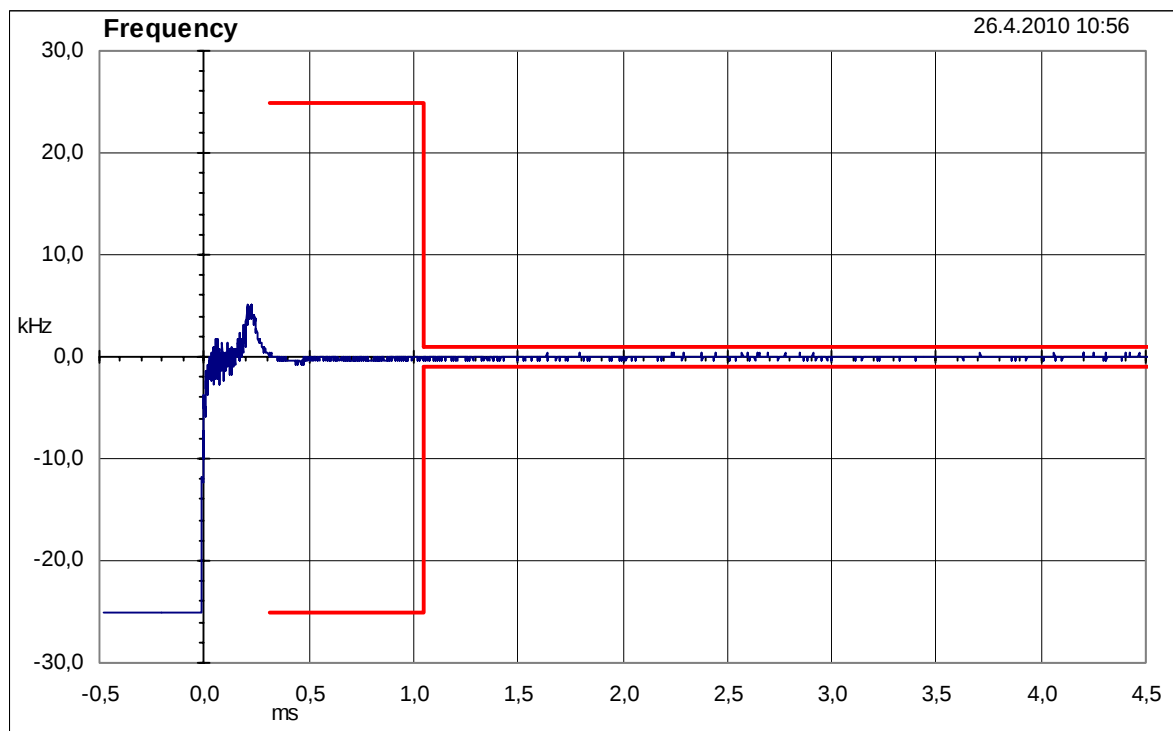
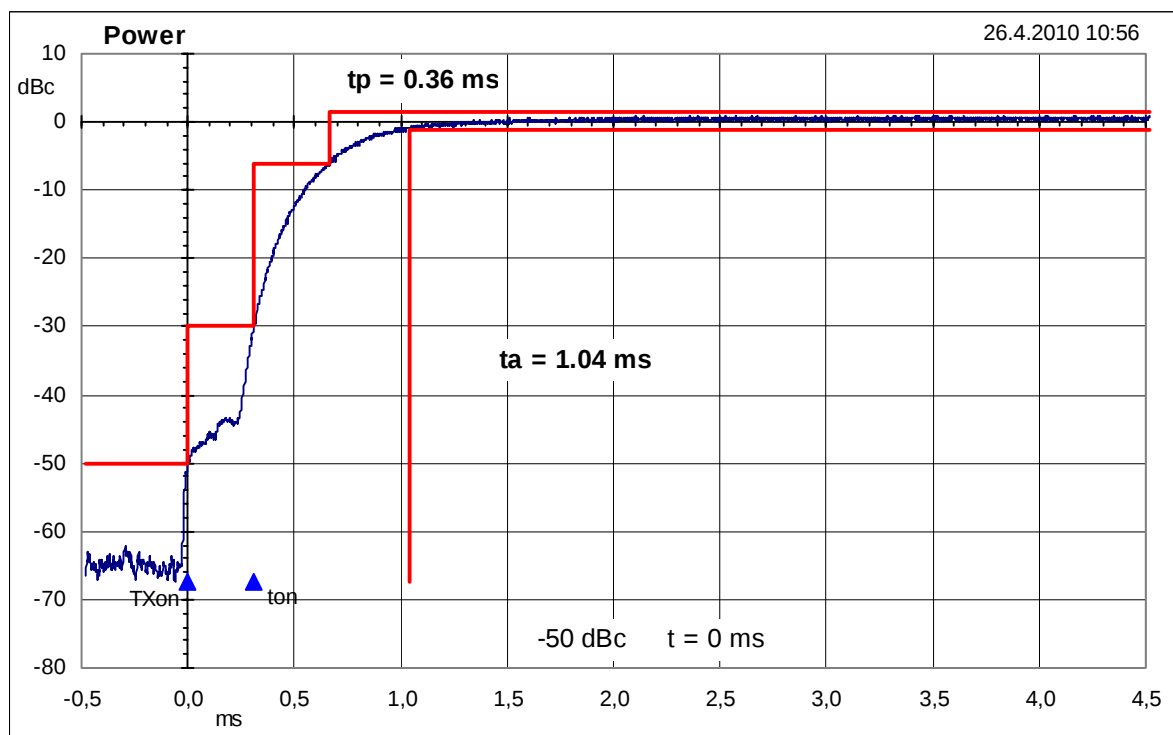
- 65,0 dB below the transmitter power (conducted) of the transmitter in decibels relative to the carrier power (dBc) without the need to be below 2 μ W (-27,0 dBm), for channel separations of 20 kHz and 25 kHz;
- 60,0 dB below the transmitter power (conducted) of the transmitter (in dBc) without the need to be below 2 μ W (-27,0 dBm), for a channel separation of 12,5 kHz.

TEST EQUIPMENT USED: 335, 33, 30, 332, 334, 10, 43, 42, 146, 133, 328, 390, 394, 316, 404

3.10 Graphs of the attack time and release measurements Rated output power 100 mW

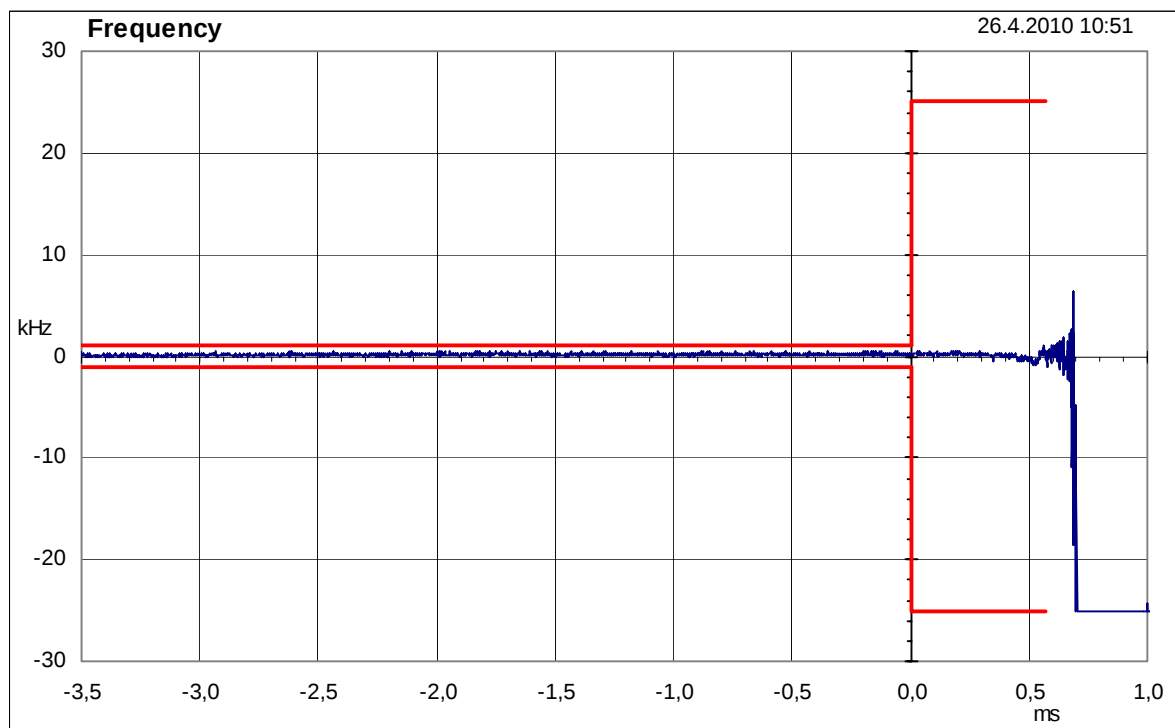
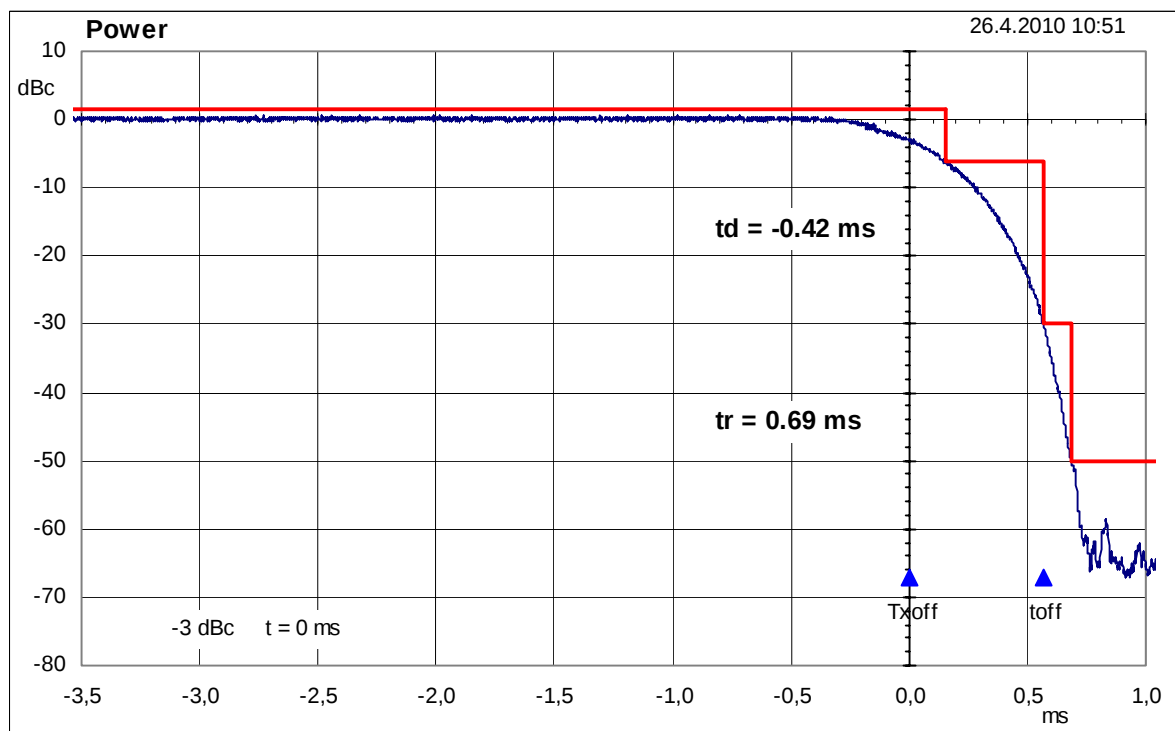
Transmitter attack time (360 MHz)
(Transient behaviour of the transmitter switch-on)

Output power: 100 mW.



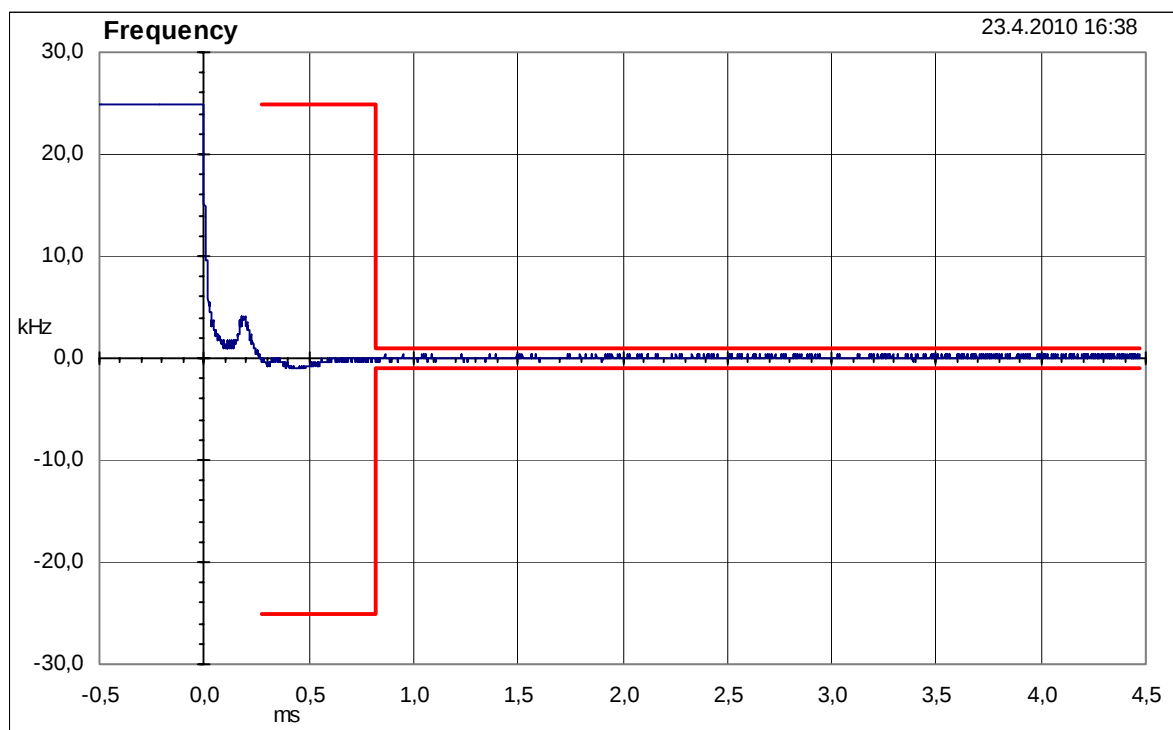
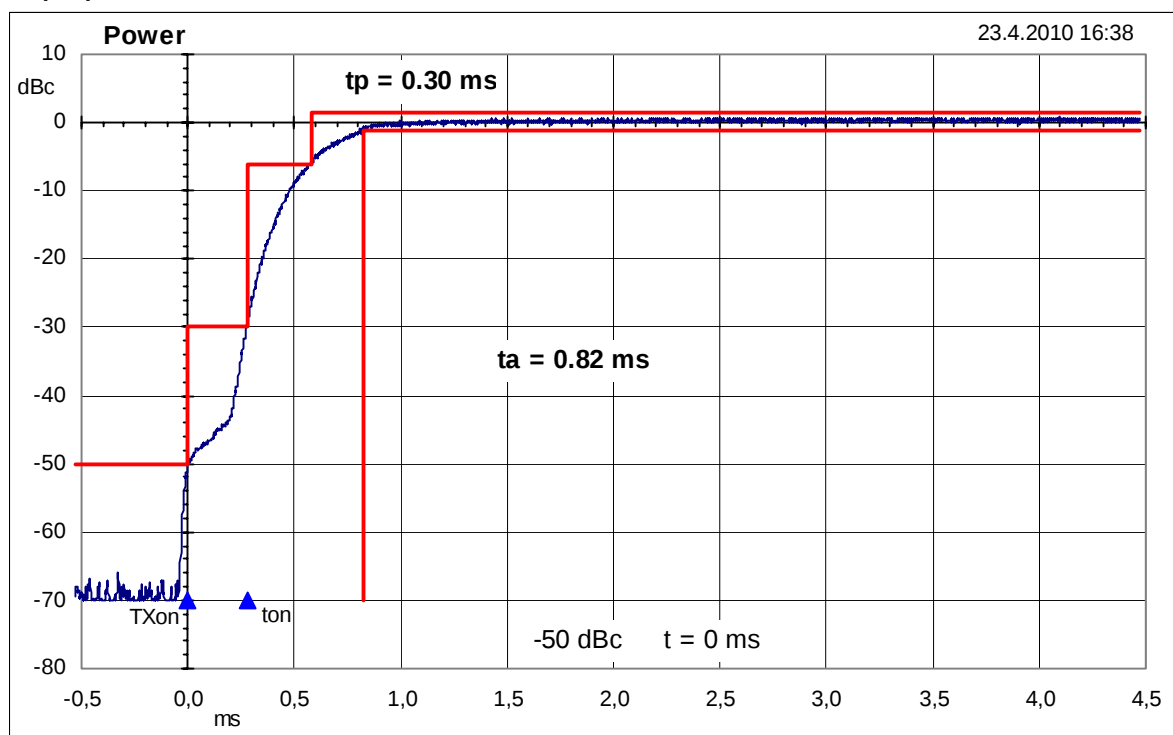
Transmitter release time (360 MHz)
(Transient behaviour of the transmitter switch-off)

Output power: 100 mW.



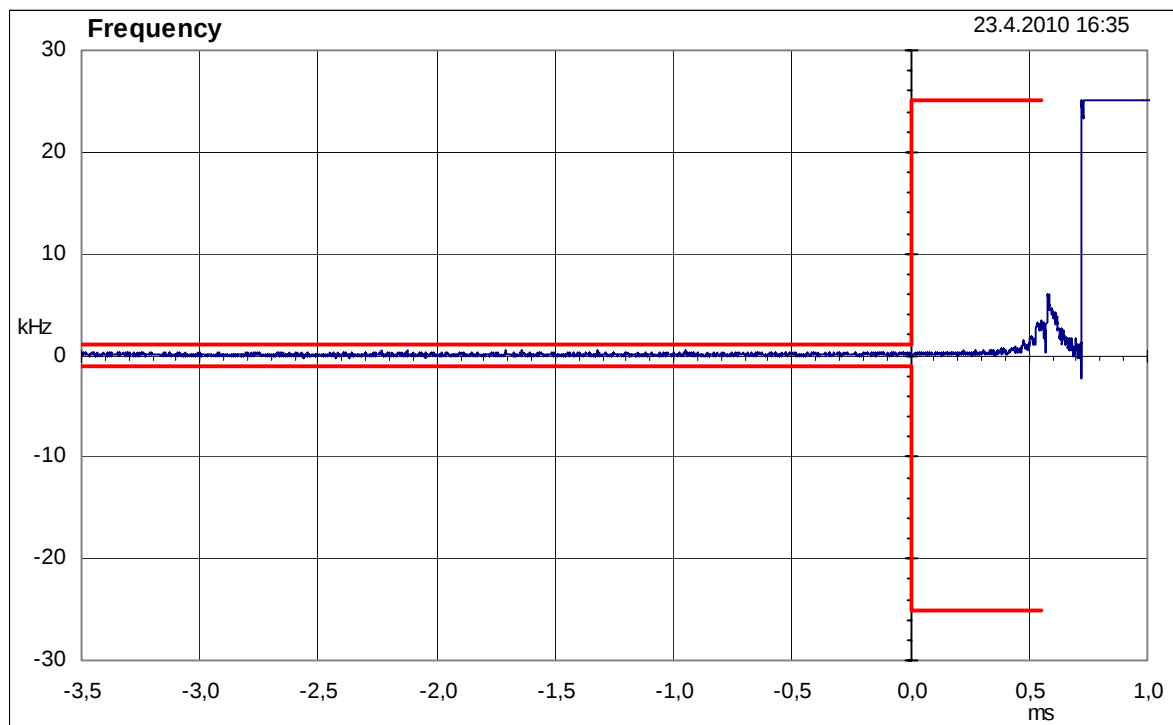
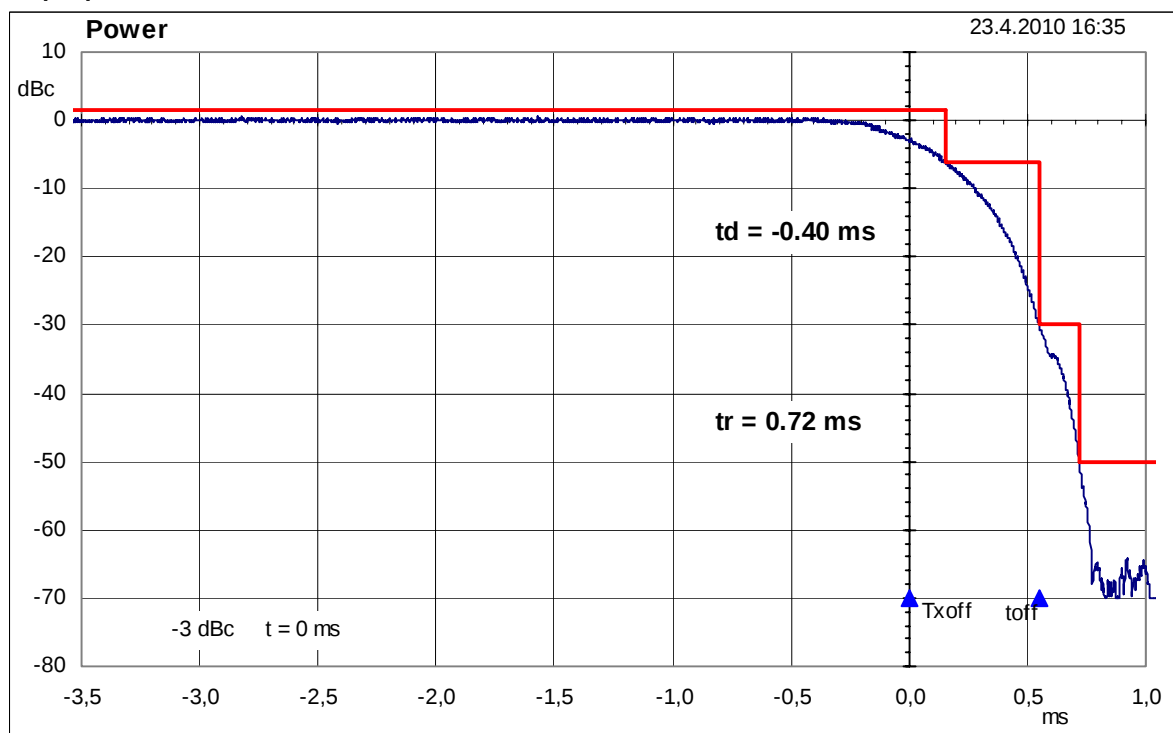
Transmitter attack time (485 MHz)
(Transient behaviour of the transmitter switch-on)

Output power: 100 mW.



Transmitter release time (485 MHz)
(Transient behaviour of the transmitter switch-off)

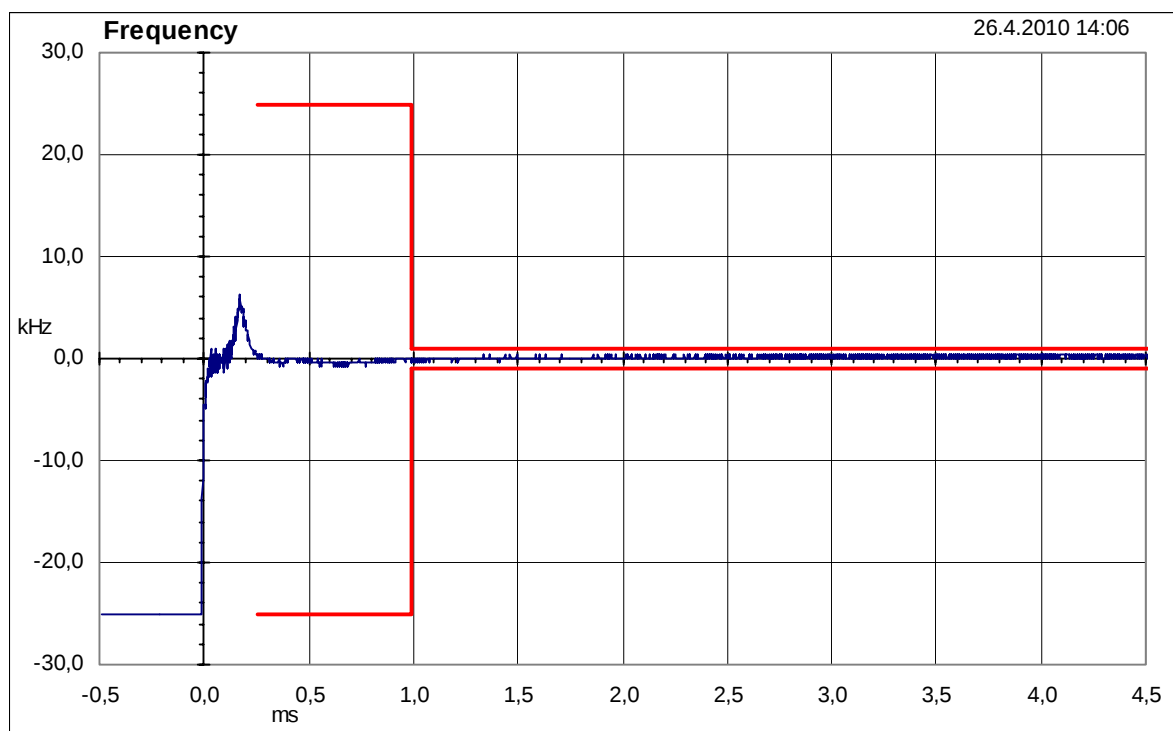
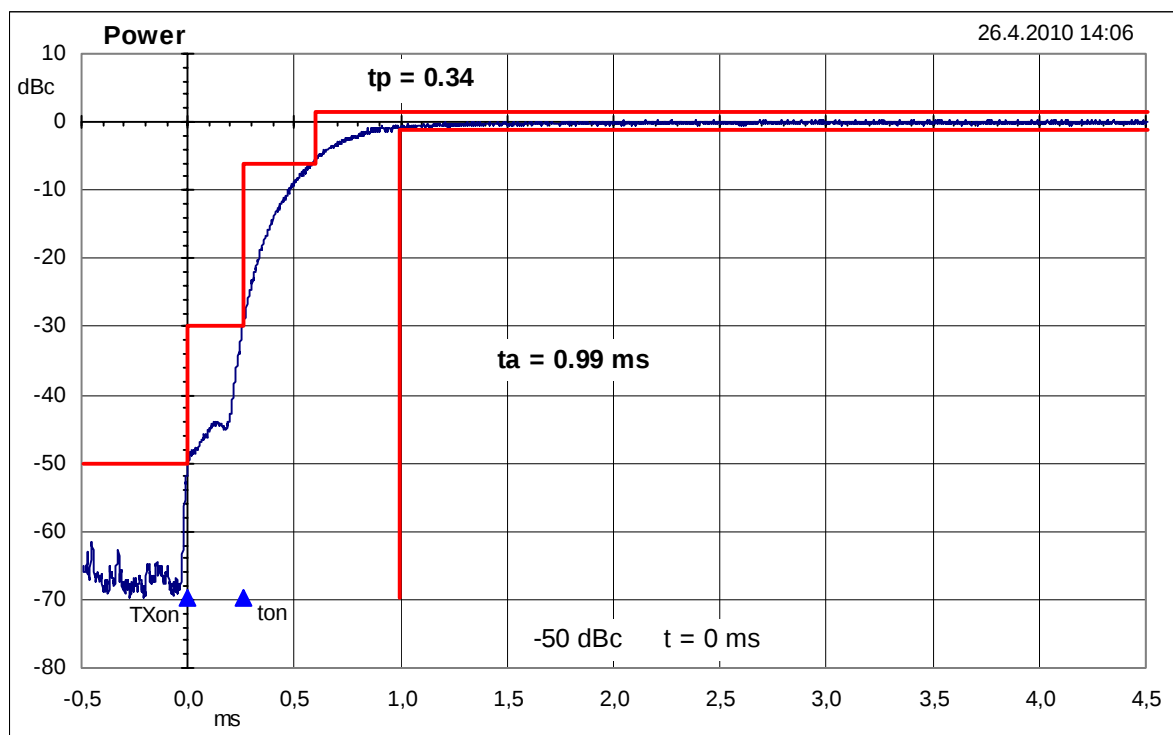
Output power: 100 mW.



3.11 Graphs of the attack time and release measurements Rated output power 1 W

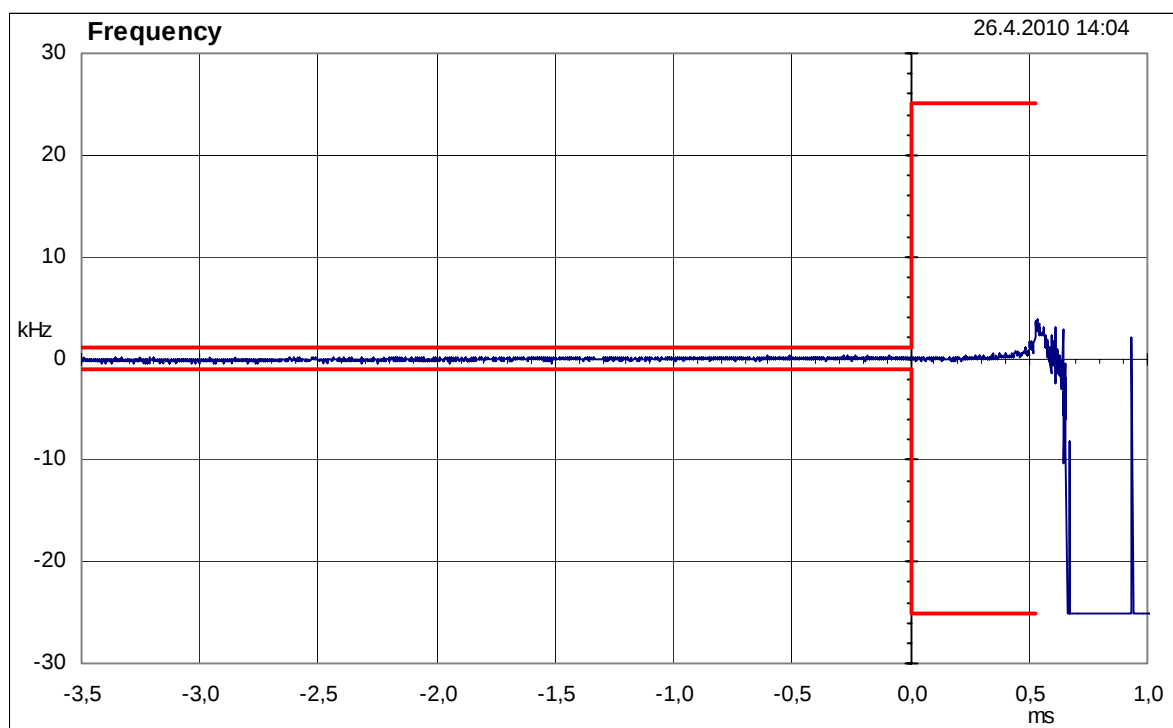
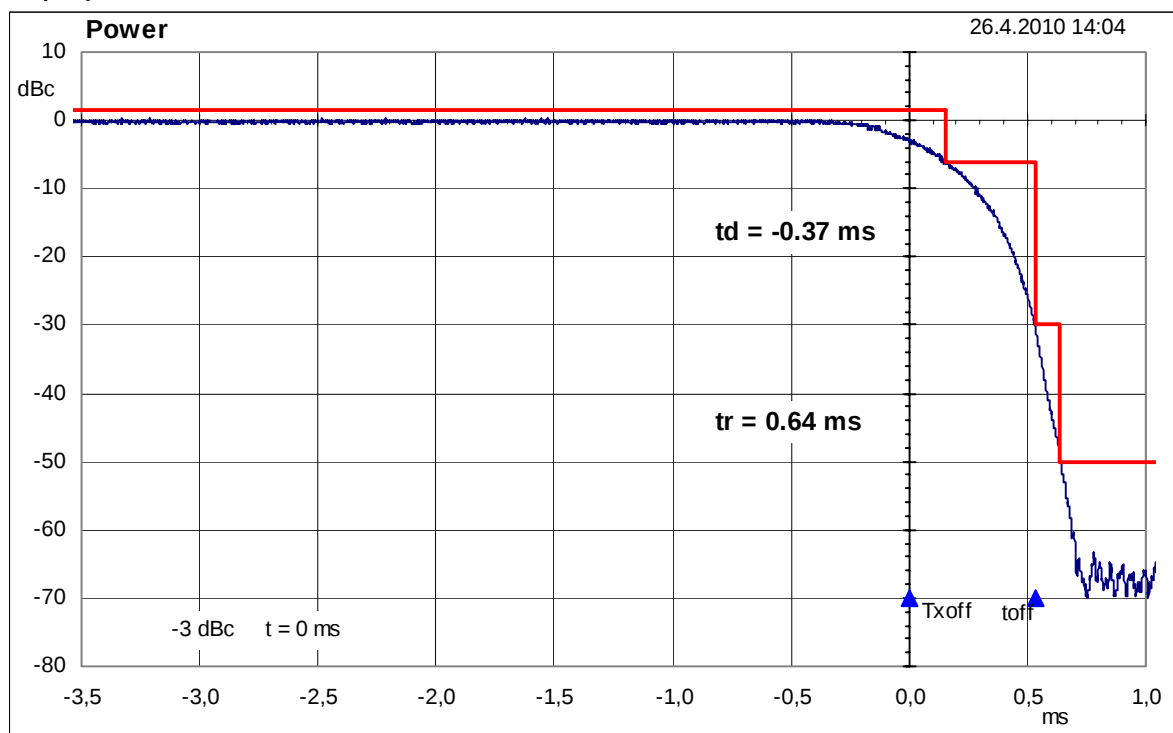
Transmitter attack time (360 MHz)
(Transient behaviour of the transmitter switch-on)

Output power: 1 W.



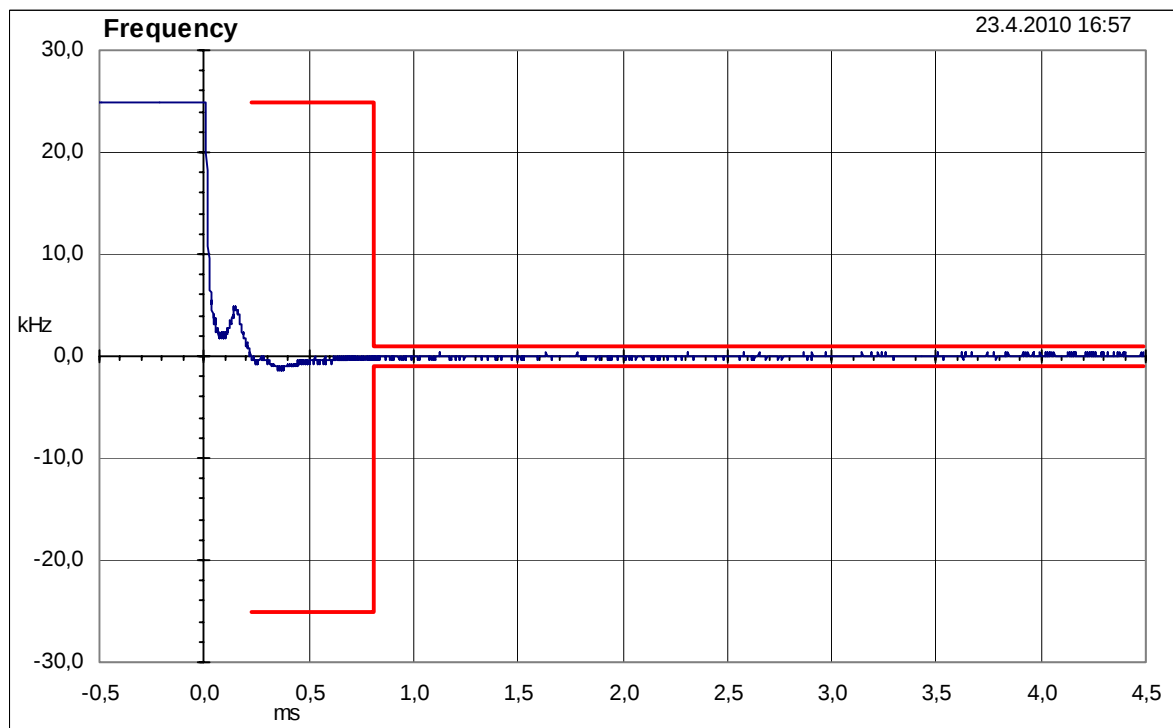
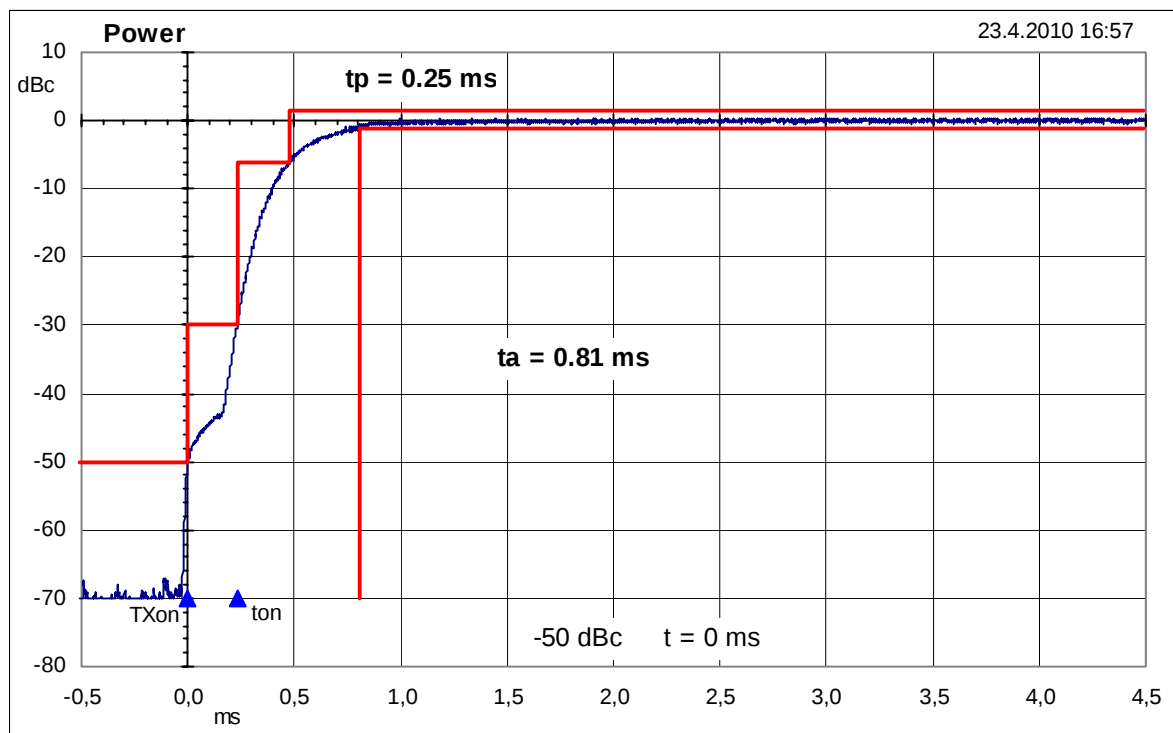
Transmitter release time (360 MHz)
(Transient behaviour of the transmitter switch-off)

Output power: 1 W.



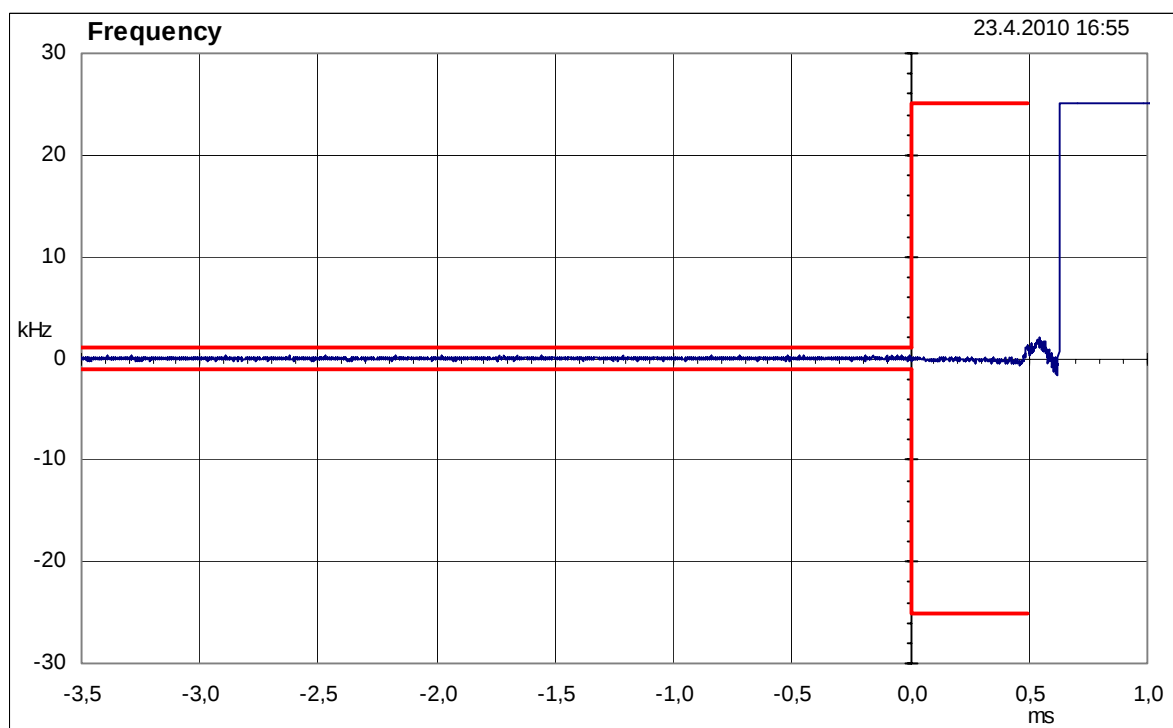
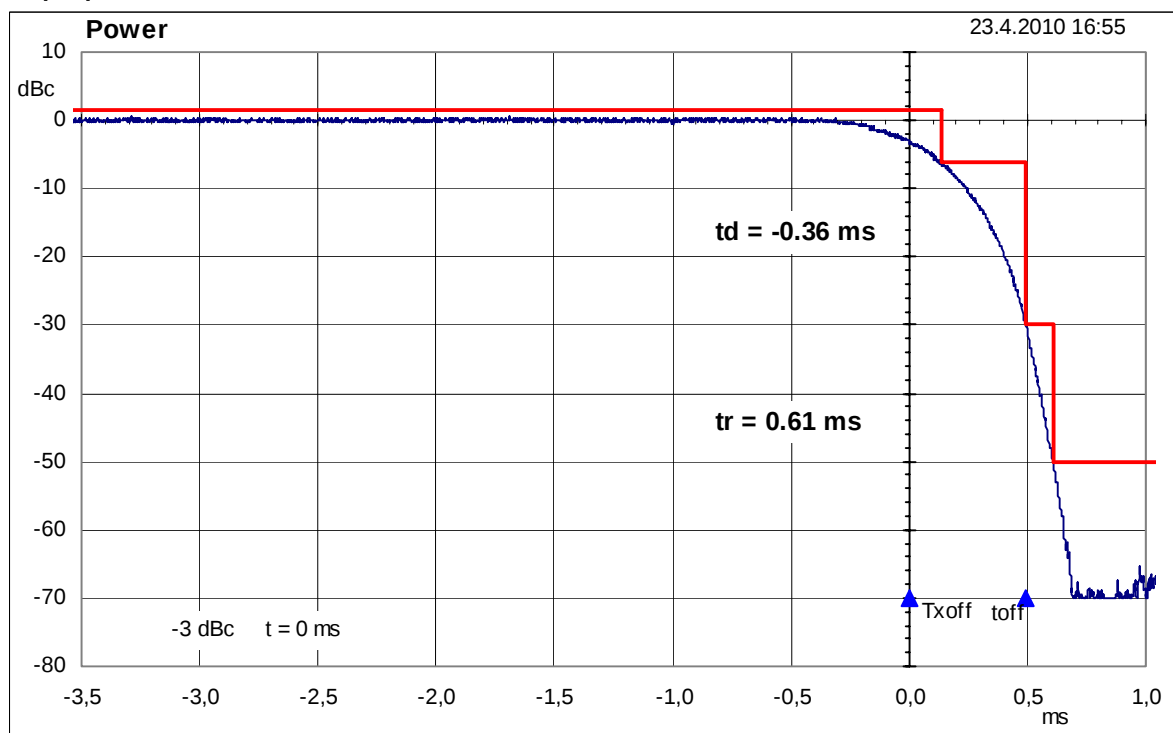
Transmitter attack time (485 MHz)
(Transient behaviour of the transmitter switch-on)

Output power: 1 W.



Transmitter release time (485 MHz)
(Transient behaviour of the transmitter switch-off)

Output power: 1 W.



3.12 Receiver spurious radiation Clause 8.10

Conducted Clause 8.10.1 a)

Date: 28.04.2010

Measurement method: Clause 8.10.2

Frequency 1		Frequency 4		Remarks
Frequency (MHz)	Level (dBm)	Frequency (MHz)	Level (dBm)	
all 9 kHz to 4.0 GHz	< -75,0	all 9 kHz to 12,75 GHz	< -75,0	
others 9 kHz to 4.0 GHz	< -80,0	others 9 kHz to 12,750 GHz	< -80,0	
Measurement uncertainty	- 4.4 dB / +3.4 dB			

LIMITS: Clause 8.10.4

Table 9: Conducted components

Frequency range	Limit
9 kHz to 1 GHz	2,0 nW (-57 dBm)
Above 1 GHz to 4 GHz, or above 1 GHz to 12,75 GHz	20,0 nW (-47 dBm)

TEST EQUIPMENT USED: 42, 33, 316, 404

3.13 Receiver spurious radiation Clause 9.7

Radiated Clause 7.5.1 b)

Date: 27.04.2010

Measurement method: Clause 8.10.3

Frequency 1		Frequency 4		Remarks
Frequency (MHz)	Level (dBm)	Frequency (MHz)	Level (dBm)	
all 30 MHz to 1.0 GHz	< - 70,0	all 30 MHz to 1.0 GHz	< - 70,0	
all 1 GHz to 4.0 GHz	< - 60,0	all 1 GHz to 4 GHz	< - 60,0	
		all 14 GHz to 12,75 GHz	< - 50,0	
Measurement uncertainty	- 4.4 dB / +3.4 dB			

LIMITS: Clause 8.10.4

Table 10a: Radiated components

Frequency range	Limit
30 MHz to 1 GHz	2,0 nW (-57 dBm)
Above 1 GHz to 4 GHz	20,0 nW (-47 dBm)

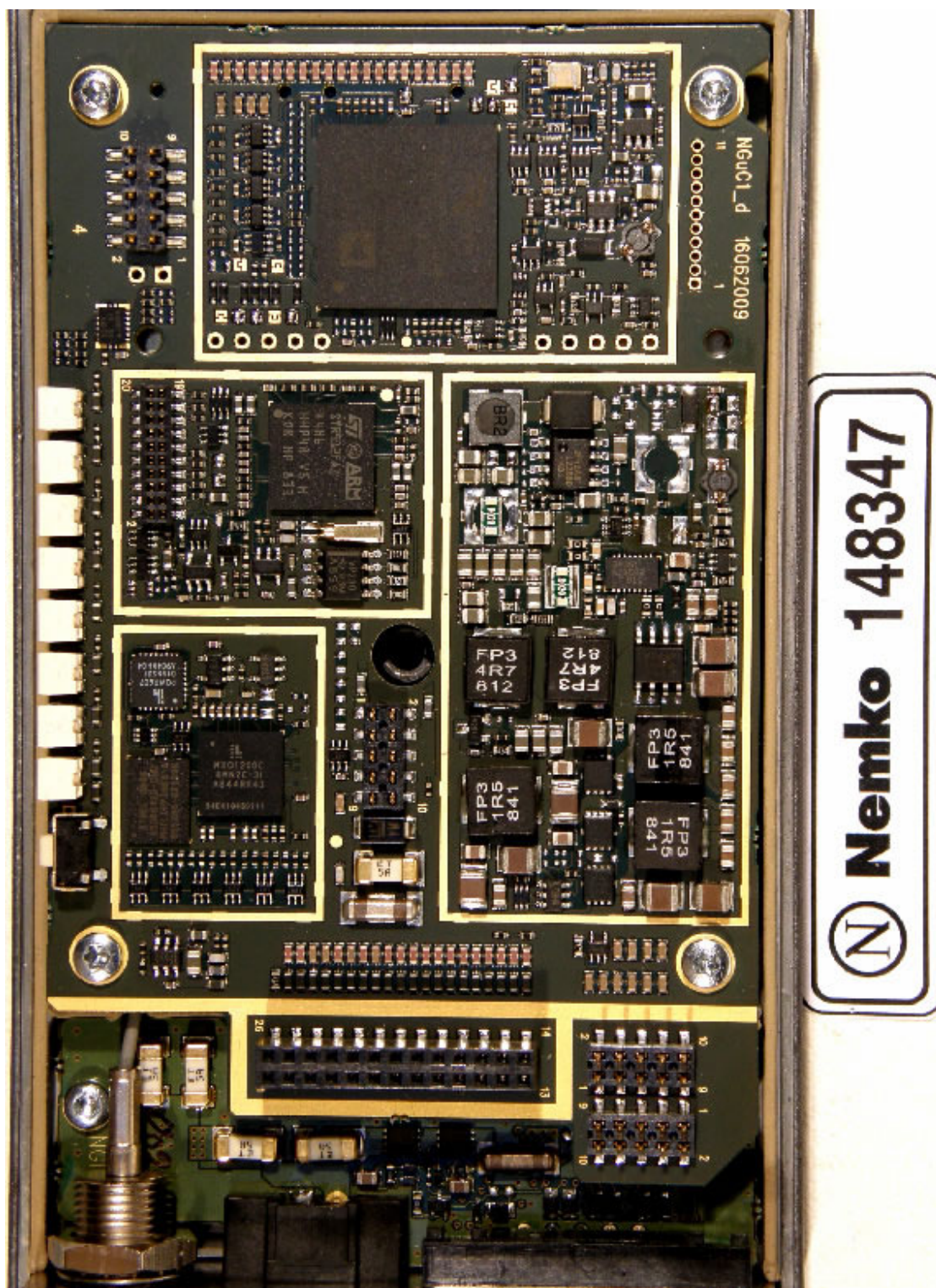
TEST EQUIPMENT USED: 566, 201, 205, 133, 89, 176, 185, 417, 316, 404

TEST EQUIPMENT USED: 566, 317, 564, 176, 89, 185, 417, 328, 133, 316, 404

4. Photographs



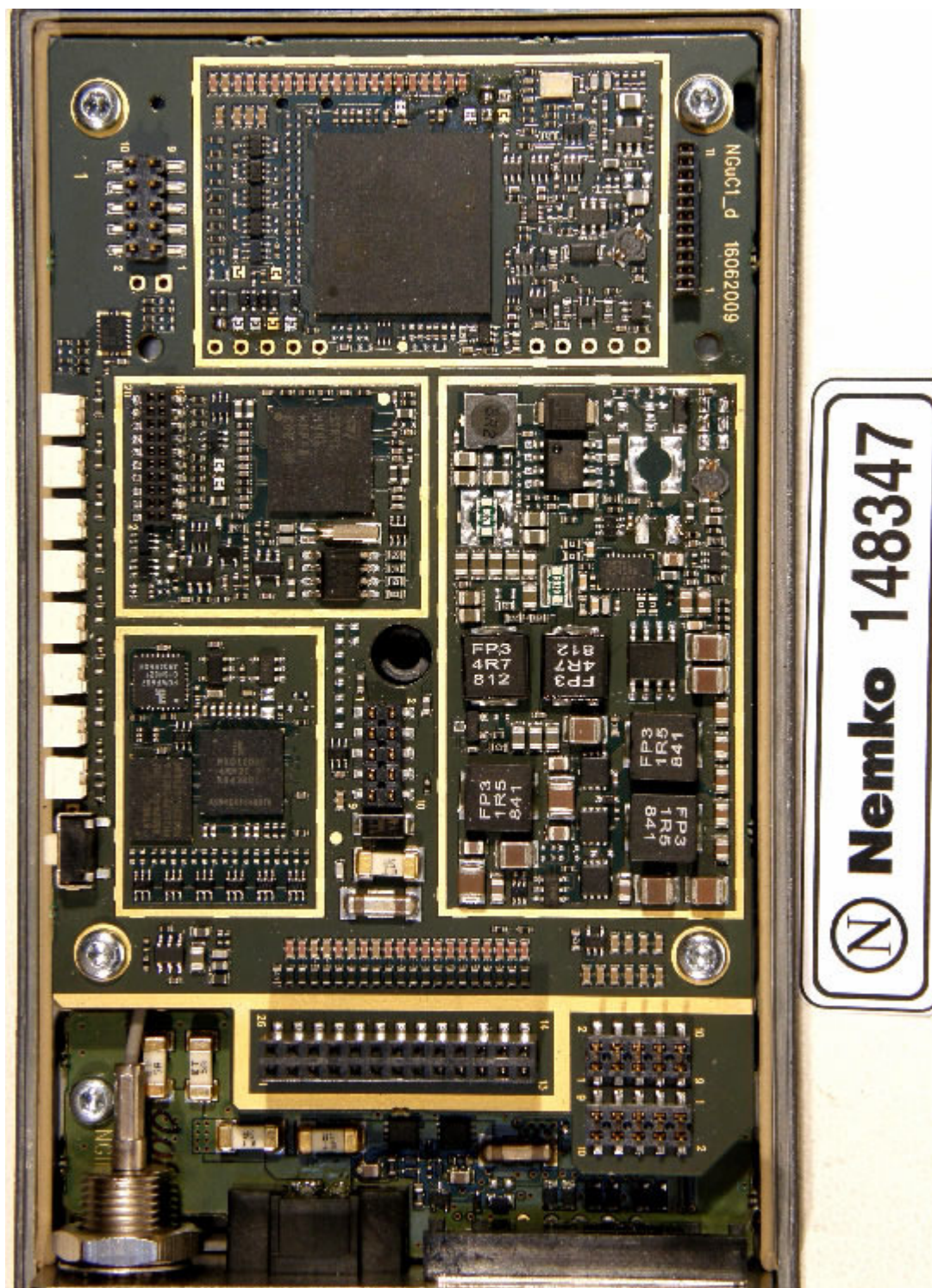
Photograph 1. (Equipment 1)



Photograph 2. (Equipment 1)



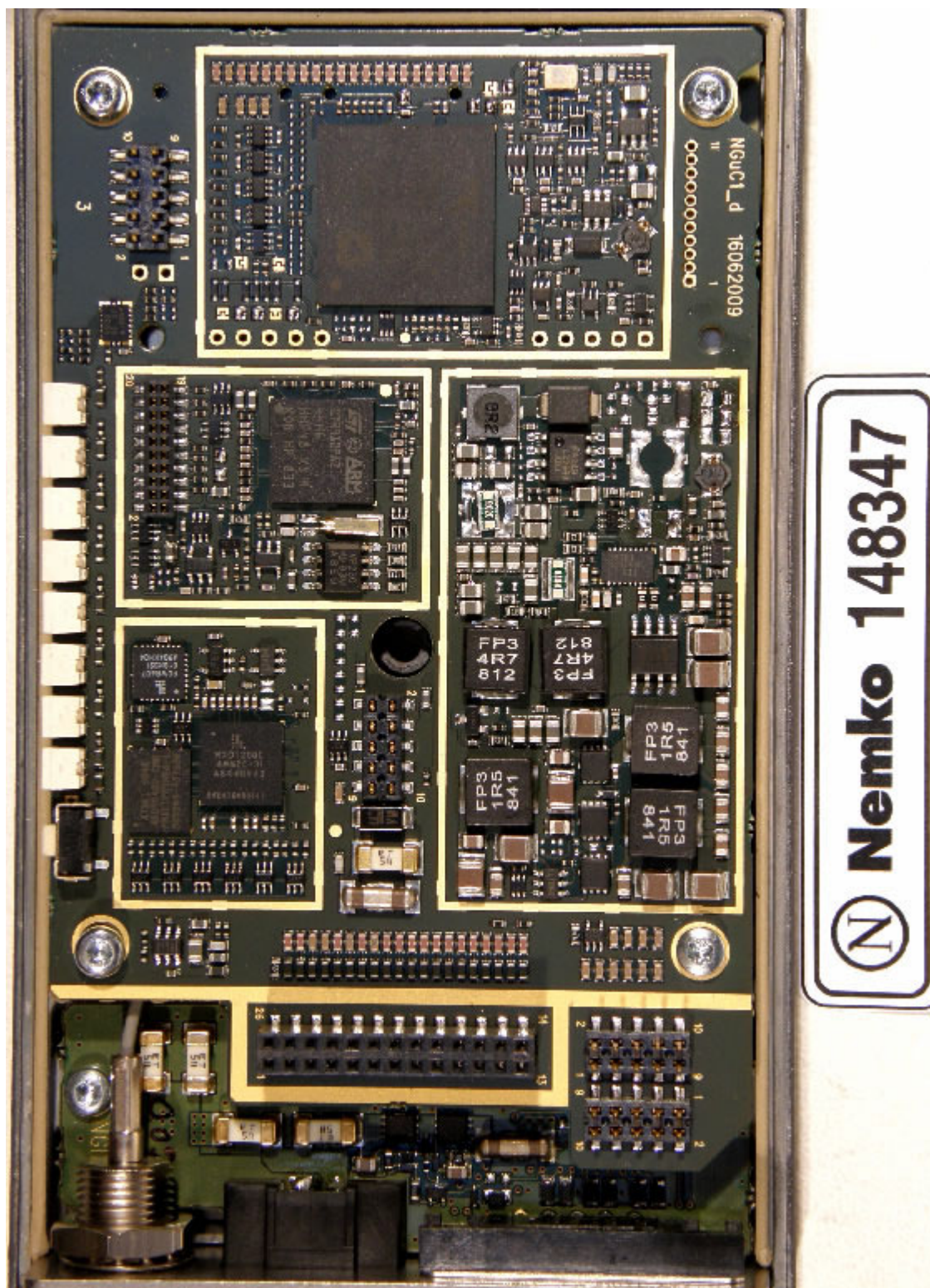
Photograph 3. (Equipment 2)



Photograph 4. (Equipment 2)



Photograph 5. (Equipment 3)



Photograph 6. (Equipment 3)

5. List of measuring equipment:

No.	Equipment	Type	Manufacturer	Serial Number
10	Oscilloscope	9400A	LeCroy	8878
30	RF generator	8642A	Hewlett Packard	2644A00601
33	RF generator	8642B	Hewlett Packard	2521A00232
42	Spectrum analyzer	8566B	Hewlett Packard	2637A04102
43	Spectrum analyzer	8568B	Hewlett Packard	2039A01256
62	Audio amplifier	PRL ?	Self made	
89	Antenna	3147	EMCO	9202-1078
102	Hybrid	H 9	Anzac	
133	Termination 50Ω	370 BNM	Narda	
145	Notch Filter	TTR - 375 - 3EE	Telonic	3062 - 1
146	Dual directional coupler	778D	Hewlett Packard	1144A02333
157	Temp. test chamber	VMT 04/240	Vötsch	31884
176	Anechoic chamber	888 cm x 585 cm x 416 cm	length of absorber 66 cm	
185	Antenna	PRL LogPer	Self made	1A93
201	RF-Generator	2042	Marconi	119571/062
316	Power supply	HP 6032A	Hewlett Packard	2517A-00654
317	RF generator	2052	Marconi	119754/058
328	Power attenuator	765-20	Narda	-
332	IF-filter	10.7MHz/25kHz	Ultracom Oy	-
334	IF-filter	10.7MHz/12.5kHz	Ultracom Oy	-
335	Mixer	ZFM-150	Mini-Circuits	-
337	Modulation analyzer	HP 8901B	Hewlett Packard	3538A05622
386	RF attenuator PAD	WA2-3	Weinschel	3780
390	RF attenuator PAD	WA2-10	Weinschel	3784
392	RF attenuator PAD	1A (6dB)	Weinschel	
394	RF attenuator PAD	1A (20dB)	Weinschel	
404	Processmeter	787	Fluke	7005196
417	Antenna, bilog	CBL 6141	Chase	4028
566	Spectrum analyzer	E4448A	Agilent	US42510236
567	RF generator	E8257C	Agilent	MY43320736
571	High Pass Filter	WHK0.6/13G-10SS	Wainwright Instruments	1
599	Thermometer	THERMA 1	E.T.I. Ltd	D05510005
2046	Counter	5351B	Hewlett Packard	2844U00220