

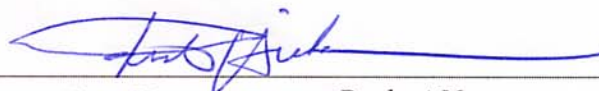
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Page: 1 (74)

Number: TL 1010749

Date of handing in: 10.01.2001

Measured by:



Risto Hietanen

Product Manager

Approved by:



Aarni Roth

Application Manager



T017 (EN 45001)

SORT OF EQUIPMENT: **Radio Modem**

MARKETING NAME:

SATELLINE-3ASd EPIC

TYPE:

SATELLINE-3ASd/125/10W/DIV

MANUFACTURER:

Satel Oy

SERIAL NUMBER:

0102078, 0102079, 0102080, 0102081

CUSTOMER:

Satel Oy

ADDRESS:

Meriniitynkatu 17, FIN-24100 Salo

TELEPHONE:

+358 2 777 7800 / Tapio Malmivaara

TESTSPESIFICATION:

ETSI EN 300 113-1 v1.3.1 (2001-01)

REMARKS:

This test report includes the appendix:

"Application form for testing to ETS 300 113" from the customer.

Three original identical test reports have been prepared.

All have been delivered to the client. This test report is No. 1 (of 3).

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

Type:	SATELLINE-3ASd/125/10W/DIV		
Alignment range:	75 MHz		
Switching range:	1 channel		
	Category: AR3		

Measurement Frequencies Tx/Rx:	Equipment 1 and 4	Equipment 2	Equipment 3
	Serial no. 0102078, 0102081 1) 400.000 MHz 4) 475.000 MHz	Serial no. 0102079 2) 425.000 MHz	Serial no. 0102080 3) 450.000 MHz

Voltages: Temperatures: Humidity:	Normal	Minimum	Maximum
	24.0 VDC	11.8 VDC	30.0 VDC
	21.3 to 22.5 °C	- 20 °C	+ 55 °C
	23.8 to 38.2 %		

Carrier power: 10 W /1 W	Antenna: Two TNC-connectors (*)
Class of emission: F1D	If frequencies: 77 550 khz, 455 kHz
Number of channels: 1	Production model: Yes
Channel separation: 12.5 kHz	Mode of DATA: Multilevel State FM, 9600 pbs

The following measurements according to ETS EN 300 113-1 standard have been performed:

Eq. 2 Ch. 2)	Eq. 1 and 4 Channels 1) 4)	Eq. 3 Ch. 3)	
x	x	x	5.1.1 Frequency error
x	x	x	5.1.2 Carrier power (conducted)
x	x	x	5.1.4 Adjacent channel power
na	x	na	5.1.5 Spurious emissions (conducted)
na	x	na	5.1.5 Spurious emissions (radiated)
na	na	na	5.1.6 Intermodulation attenuation
na	x	na	5.1.7 Transmitter attack time
na	x	na	5.1.8 Transmitter release time
na	x	na	5.1.9.1 Time domain analysis of power and frequency
na	x	na	5.1.9.2 Adjacent channel power transient
x	x	x	5.2.1 Maximum useable sensitivity
na	x	na	5.2.3 Error behaviour at high input levels
na	x	na	5.2.4 Co-channel rejection
x	x	x	5.2.5 Adjacent channel selectivity
na	x	na	5.2.6 Spurious response rejection
na	x	na	5.2.7 Intermodulation response rejection
na	x	na	5.2.8 Blocking or desensitisation
na	x	na	5.2.9 Spurious radiations (conducted)
na	x	na	5.2.9 Spurious radiations (radiated)
			Duplex operation
☐	☐	☐	5.3.1 Receiver desensitisation and maximum useable sensitivity
☐	☐	☐	5.3.2 Receiver spurious response rejection

na: no applicable

REMARKS: *) Two receivers (diversity receiver)

**The results of the transmitter
(Rated output power: 1W)**

Ambient temperature: 21.5 °C Relative humidity: 35.1 % Date: 17.01.2001 (normal test conditions) (1, 2 and 3)
Ambient temperature: 22.5 °C Relative humidity: 34.8 % Date: 06.02.2001 (normal test conditions) (4)
Date: 06.02.2001 (extreme test conditions – 20 °C)
Date: 08.02.2001 (extreme test conditions + 55 °C)

TRANSMITTER FREQUENCY ERROR CLAUSE 8.1

Rated output power: 1 W.

TEST CONDITIONS		FREQUENCY ERROR (Hz)			
		Channel			
		1	2	3	4
T _{nom}	V _{nom}	- 8 Hz	- 110 Hz	-156 Hz	+ 293 Hz
T _{min}	V _{min}	+ 395 Hz	-137 Hz	+ 447 Hz	+ 624 Hz
	V _{max}	+ 407 Hz	-138 Hz	+ 450 Hz	+ 600 Hz
T _{max}	V _{min}	- 381 Hz	- 460 Hz	- 654 Hz	- 357 Hz
	V _{max}	- 383 Hz	- 455 Hz	- 657 Hz	- 353 Hz
Maximum freq. error. (Hz)		+ 407 Hz	- 460 Hz	- 657 Hz	+ 624 Hz
Measurement uncertainty (U95)		6.1 x 10 ⁻⁸			

LIMITS CLAUSE 5.1.1

CHANNEL SPACING (kHz)	FREQUENCY RANGES				
	Below 47MHz	Above 47 to 137MHz	Above 137 to 300MHz	Above 300 to 500MHz	Above 500 to 1000MHz
	LIMITS kHz				
12.5	± 0.60	± 1.00	± 1.00 (B) ± 1.50 (M)	± 1.00 (B) ± 1.50 (M) (note)	No value specified
20.0 / 25.0	± 0.60	± 1.35	± 2.00	± 2.00 (note)	± 2.50 (note)

NOTE: For handportable stations having integral power supplies, these limits only apply to the reduced extreme temperature range 0 °C to + 30 °C.

However for the full extreme temperature conditions (subclause 6.4.1), 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.

B = BASE STATION

M = MOBILE STATION

TEST EQUIPMENT USED: 48, 120, 390, 146, 131, 77, 403, 157, 230

Ambient temperature: 21.5 °C Relative humidity: 35.1 % Date: 17.01.2001 (normal test conditions) (1, 2 and 3)
Ambient temperature: 22.5 °C Relative humidity: 34.8 % Date: 06.02.2001 (normal test conditions) (4)
Date: 06.02.2001 (extreme test conditions – 20 C)
Date: 08.02.2001 (extreme test conditions + 55 C)

TRANSMITTER CARRIER OUTPUT POWER (CONDUCTED) CLAUSE 8.2

Rated output power: 1 W.

TEST CONDITIONS		TRANSMITTER POWER (Watts)			
		Channel			
		1	2	3	4
Tnom	Vnom	1.33	1.20	1.19	1.21
Tmin	Vmin	1.32	1.24	1.25	1.32
	Vmax	1.32	1.24	1.25	1.32
Tmax	Vmin	1.20	1.14	1.14	1.16
	Vmax	1.22	1.14	1.13	1.16
Variation in output power under normal test conditions		+ 1.24 dB	+ 0.79 dB	+ 0.76 dB	+ 0.83 dB
Variation in output power under extreme test conditions		+ 0.79 to + 1.21 dB	+ 0.57 to + 0.93 dB	+ 0.53 to + 0.97 dB	+ 0.65 to + 1.21 dB
Measurement uncertainty		± 0.75 dB			

LIMITS CLAUSE 5.1.2

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

TEST EQUIPMENT USED: 59, 218, 120, 390, 146, 131, 77, 403, 157, 230

Ambient temperature: 21.5 °C Relative humidity: 35.1 % Date: 17.01.2001 (1)
 Ambient temperature: 21.7 °C Relative humidity: 35.1 % Date: 11.01.2001 (2, 3)
 Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (4)

TRANSMITTER ADJACENT CHANNEL POWER CLAUSE 8.5

Modulation bit rate: 9600 bps (direct 4-FSK)
 Channel separation 12.5 kHz
 Rated output power: 1 W.

ADJACENT CHANNEL	BELOW CARRIER POWER (dBc)			
	Channel			
	1	2	3	4
+ 12.5 kHz	- 64.9	- 62.6	- 61.3	- 65.7
- 12.5 kHz	- 60.8	- 60.3	- 60.2	- 61.9
Measurement uncertainty (U95)	± 1.6 dB			

LIMIT CLAUSE 5.1.4	20.0 kHz & 25.0 kHz channel spacing: 70dB below carrier power 12.5 kHz channel spacing: 60dB below carrier power
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TEST EQUIPMENT USED: 9, 33, 120, 390, 77, 403

Ambient temperature: 21.9 °C Relative humidity: 34.9 % Date: 19.01.2001 (1)
Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (4)

TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED) CLAUSE 8.6

Rated output power: 1 W.

FREQUENCY (MHz)	CHANNEL 1	FREQUENCY (MHz)	CHANNEL 4	Remarks
Tx operating		Tx operating		
387.75	- 47.9 dBm	449.15	- 43.0 dBm	
412,25	- 46.8 dBm	others to 12,75 GHz	< - 50.0 dBm	
477.55	- 48.0 dBm			
1600.00	- 39.4 dBm			
2000.00	- 39.4 dBm			
others to 4.0 GHz	< - 50.0 dBm			
Tx on standby		Tx on standby		
				See page 55
Measurement uncertainty	± 1.8 dB			

Limits CLAUSE 5.1.5 TABLE 2

Frequency range	9 kHz to 1 GHz	above 1 to 4 GHz or above 1 to 12.75 GHz, (clause 8.6.2)
Tx operating	0.25 µW (- 36.0 dBm)	1.00 µW (- 30.0 dBm)
Tx standby	2.0 nW (- 57.0 dBm)	20.0 nW (- 47.0 dBm)

TEST EQUIPMENT USED: 41, 145, 120, 390, 211, 212, 384, 375, 77, 403

Ambient temperature: 22.5 °C Relative humidity: 34.8 % Date: 06.02.2001 (1)
Ambient temperature: 21.3 °C Relative humidity: 34.8 % Date: 30.01.2001 (4)

TRANSMITTER SPURIOUS EMISSIONS (RADIATED) CLAUSE 8.6

Rated output power: 1 W.

FREQUENCY (MHz)	CHANNEL 1	FREQUENCY (MHz)	CHANNEL 4	REMARKS
Tx operating		Tx operating		
800.00	- 53.7 dBm	950.00	- 59.1 dBm	
others 30 MHz - 1 GHz	< - 60.0 dBm	others 30 MHz - 1 GHz	< - 60.0 dBm	
2000.00	- 38.9 dBm	all 1 GHz - 4 GHz	< - 45.0 dBm	
others 1 GHz - 4 GHz	< - 50.0 dBm			
Tx on standby		Tx on standby		
				See page 55
Measurement uncertainty	+ 3.4 dB - 4.4 dB			

Limits CLAUSE 5.1.5 TABLE 3

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

TEST EQUIPMENT USED: 42, 205, 89, 92, 176, 185, 65, 66, 77, 403

Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (1)
Ambient temperature: 22.4 °C Relative humidity: 23.8 % Date: 05.02.2001 (4)

TRANSMITTER ATTACK TIME CLAUSE 8.8

Power level at which the measurement has been performed: 1 W

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

TIME CHARACTERISTIC	Channel		
	1	4	
Time relative to the power rise	0.63 ms	0.68 ms	
Time relative to the frequency behaviour	< 0.2 ms	< 0.2 ms	
Maximum of these times, i.e. attack time	0.63 ms	0.68 ms	
Measurement uncertainty	± 3.0 ms		

See clause 8.8.1 (ETS 300 113) for the definition and clause 8.10 (ETS 300 113), figures 12 and 13 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 8.10.

See pages 13, 14, 19 and 20

LIMIT CLAUSE 5.1.7

The transmitter attack time shall not exceed: 25 ms

TEST EQUIPMENT USED: 9, 10, 31, 41, 120, 390, 395, 377, 136, 102, 134, 62, 77, 403

Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (1)
Ambient temperature: 22.4 °C Relative humidity: 23.8 % Date: 05.02.2001 (4)

TRANSMITTER RELEASE TIME CLAUSE 8.9

Power level at which the measurement has been performed: 1 W

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

TIME CHARACTERISTIC	Channel		
	1	4	
Transmitter release time	0.46 ms	0.55 ms	
Measurement uncertainty	± 3.0		

See clause 8.9.1 (ETS 300 113) for the definition and clause 8.10 (ETS 300 113), figure 14 for the graph of the transmitter release time.

The plots of frequency and power versus time can be found in the test report sheets corresponding to Clause 8.10.

See pages 15, 16, 21 and 22

LIMIT CLAUSE 5.1.8

The transmitter release time shall not exceed: 20 ms

TEST EQUIPMENT USED: 9, 10, 31, 41, 120, 390, 395, 377, 136, 102, 134, 62, 77, 403

Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (1)
Ambient temperature: 22.4 °C Relative humidity: 23.8 % Date: 05.02.2001 (4)

TRANSIENT BEHAVIOUR OF THE TRANSMITTER CLAUSE 8.10

(TIME DOMAIN ANALYSIS OF POWER AND FREQUENCY)

Power level at which the measurement has been performed: 1 W

MEASUREMENT	Channel		
	1	4	
tp	0.24 ms	0.25 ms	
td	0.23 ms	0.26 ms	
Measurement uncertainty	± 3.0		

See pages 17, 18, 23 and 24

LIMIT CLAUSE 5.1.9.1

The carrier frequency must remain within $F_c \pm 12.5$ kHz, when the carrier power > $P_c - 30$ dB.
tp: ≥ 0.20 ms, td: ≥ 0.20 ms

TEST EQUIPMENT USED: 9, 10, 31, 41, 120, 390, 395, 377, 136, 102, 134, 62, 77, 403

Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (1)
Ambient temperature: 22.4 °C Relative humidity: 23.8 % Date: 05.02.2001 (4)

TRANSIENT BEHAVIOUR OF THE TRANSMITTER CLAUSE 8.10

(ADJACENT CHANNEL POWER TRANSIENT)

Power level at which the measurement has been performed: 1 W

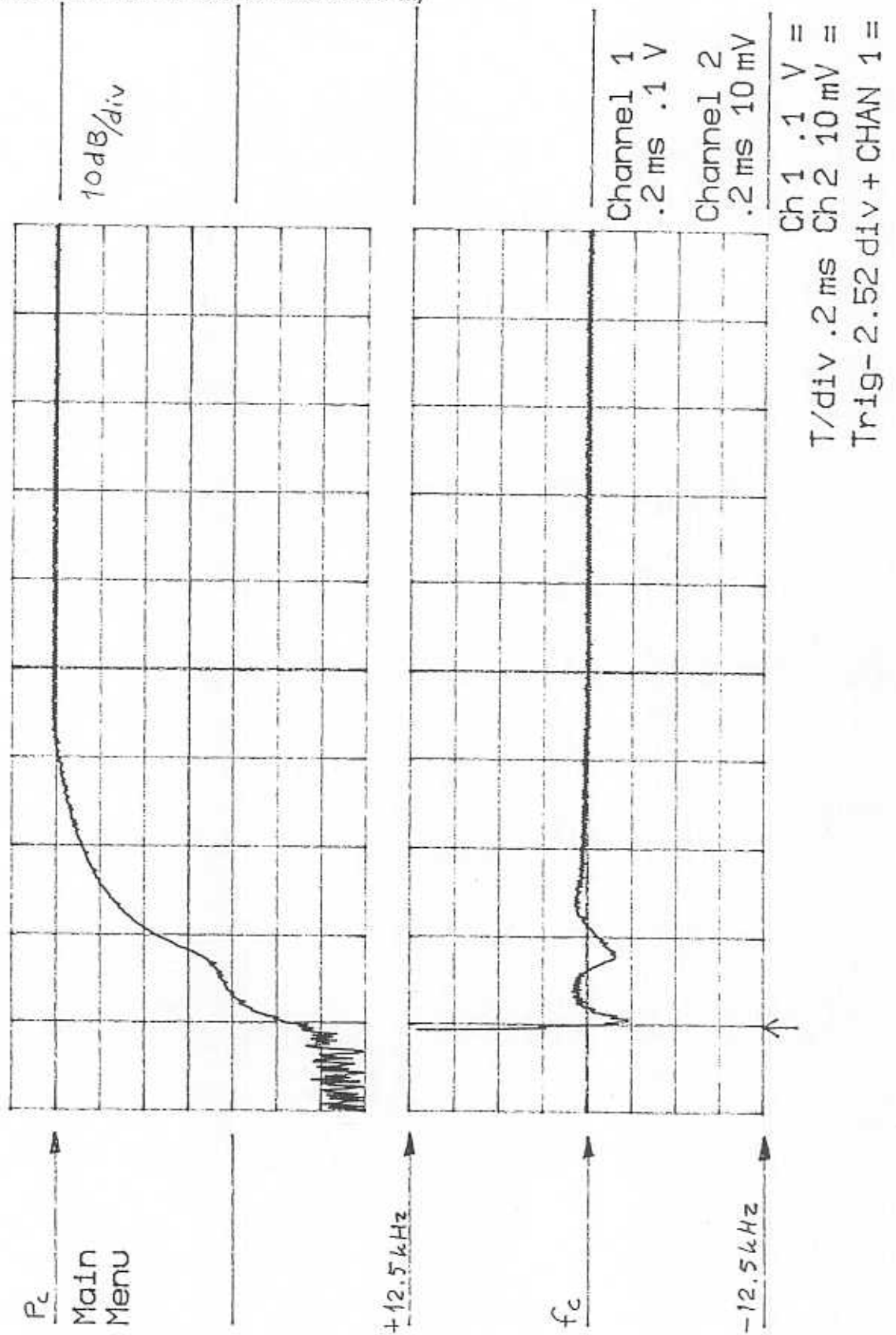
Channel separation: 12.5 kHz

ADJACENT CHANNEL	BELOW CARRIER POWER (dBc)					
	Channel					
	1		4			
	TX on	TX off	TX on	TX off	TX on	TX off
+ 12.5 kHz	- 57.0	- 57.0	- 56.0	- 56.0		
- 12.5 kHz	- 56.0	- 56.0	- 55.0	- 56.5		
Measurement uncertainty (U95)	+ 1.4 dB, -1.6 dB					

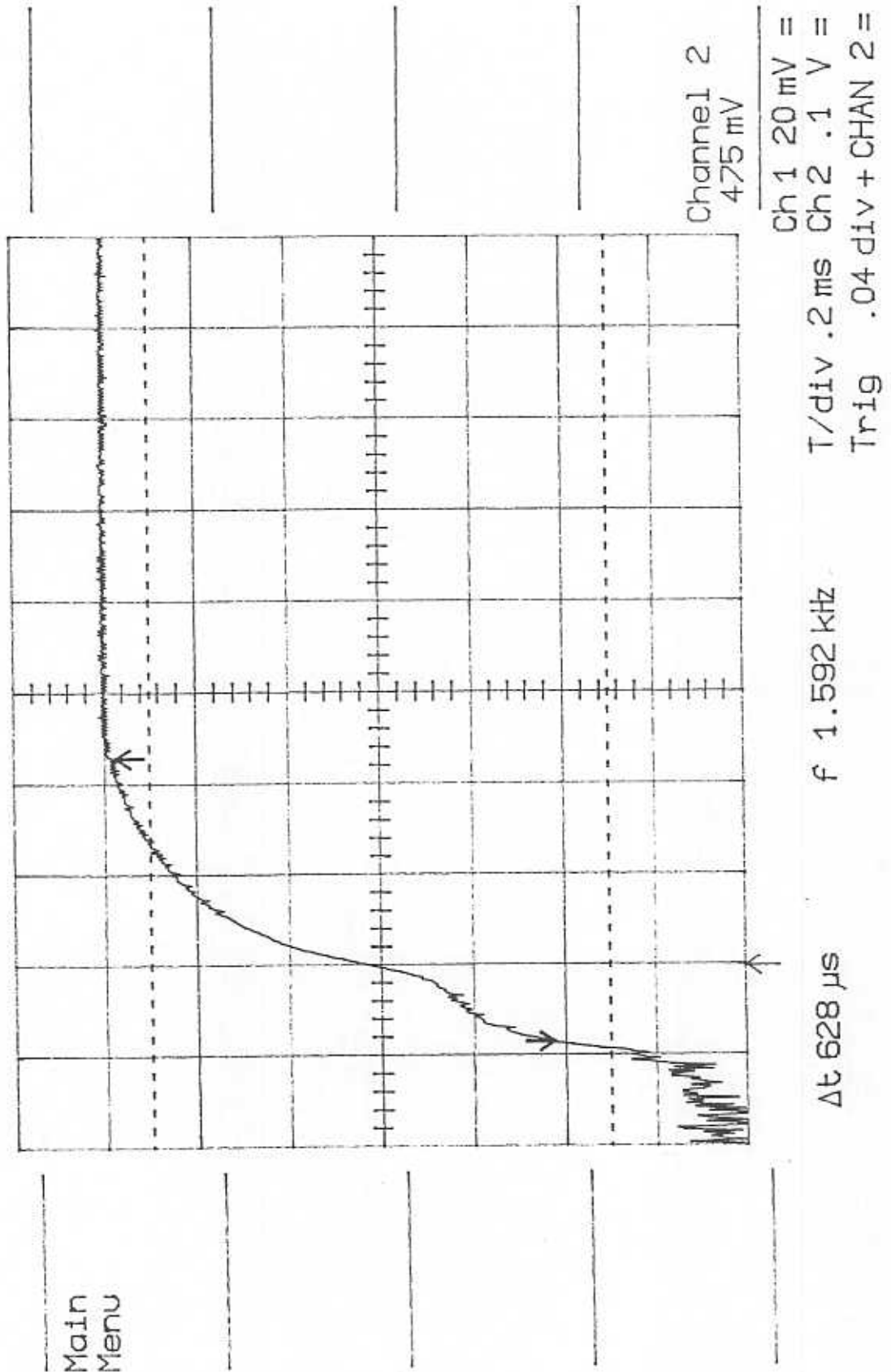
LIMIT CLAUSE 5.1.9.2	Ch. spacing 12.5 kHz: - 50 dBc (without the need to be below 2 µW) Ch. spacings 20.0/25.0 kHz: - 60 dBc (without the need to be below 2 µW)
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TEST EQUIPMENT USED: 41, 42, 33, 10, 62, 146, 134, 136, 120, 390, 375, 334, 335, 77, 403

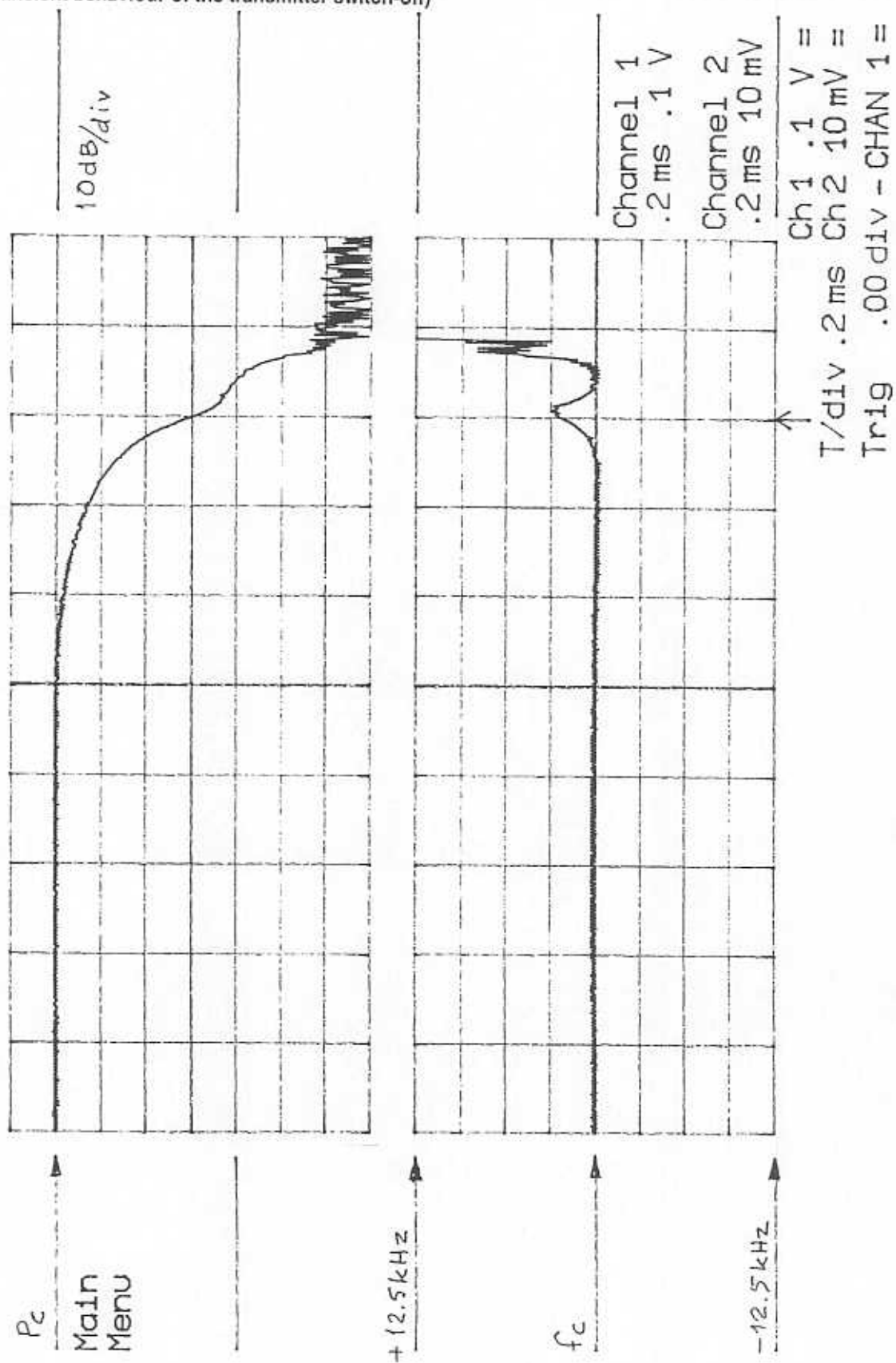
5.1.7 Transmitter attack time (400 MHz)
(Transient behaviour of the transmitter switch-on)



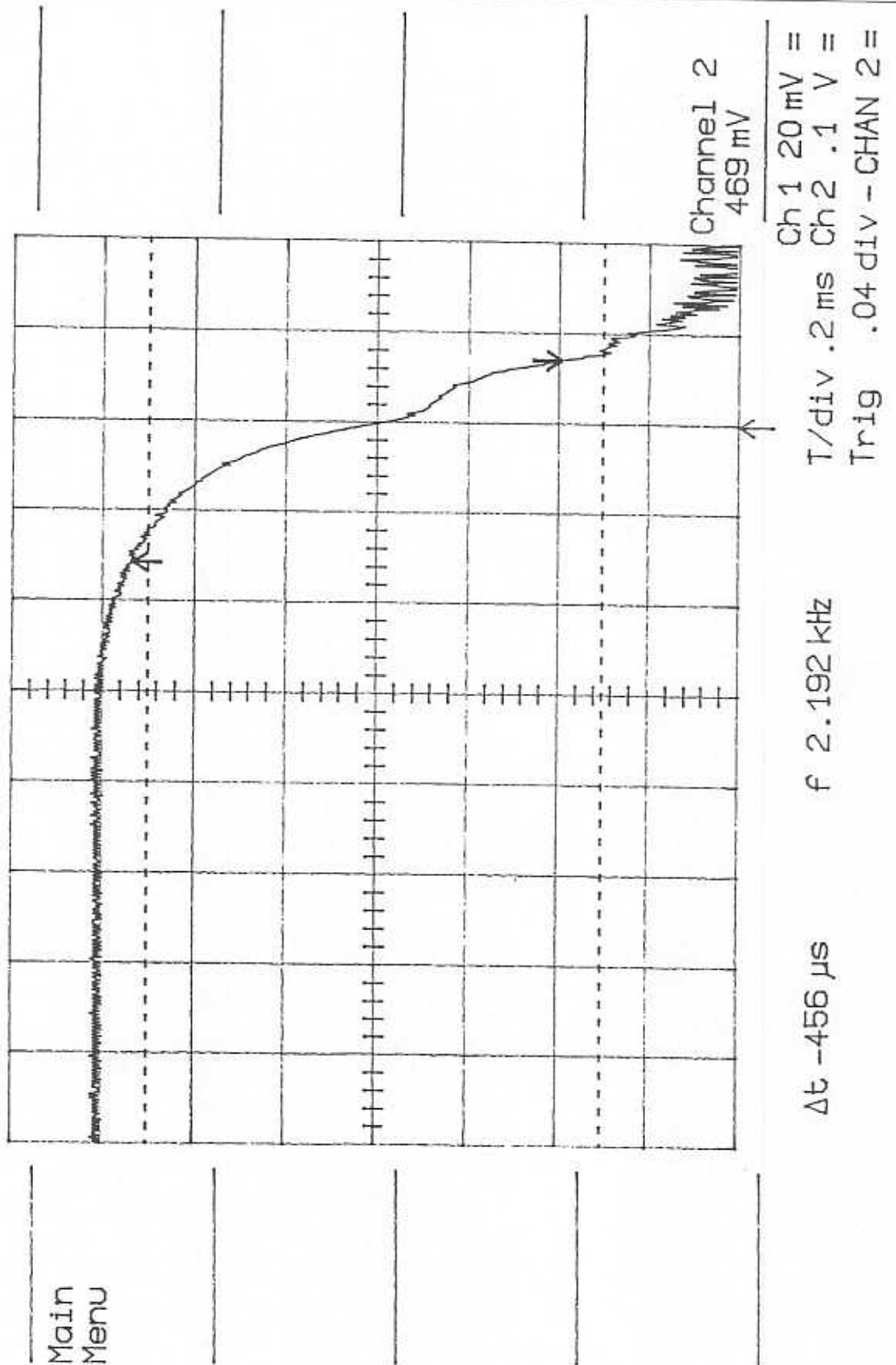
5.1.7 Transmitter attack time (400 MHz)



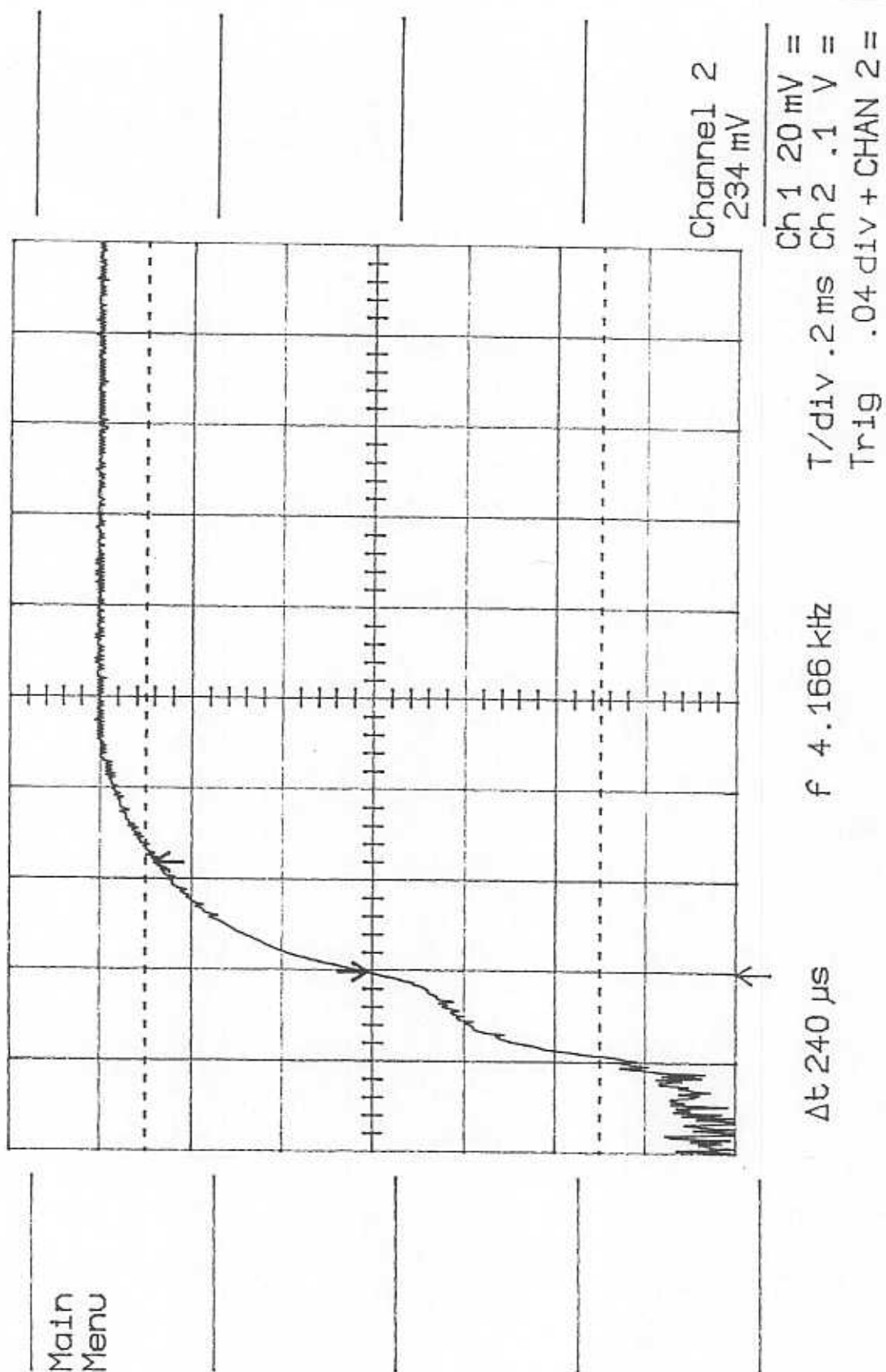
5.1.8 Transmitter release time (400 MHz)
(Transient behaviour of the transmitter switch-off)



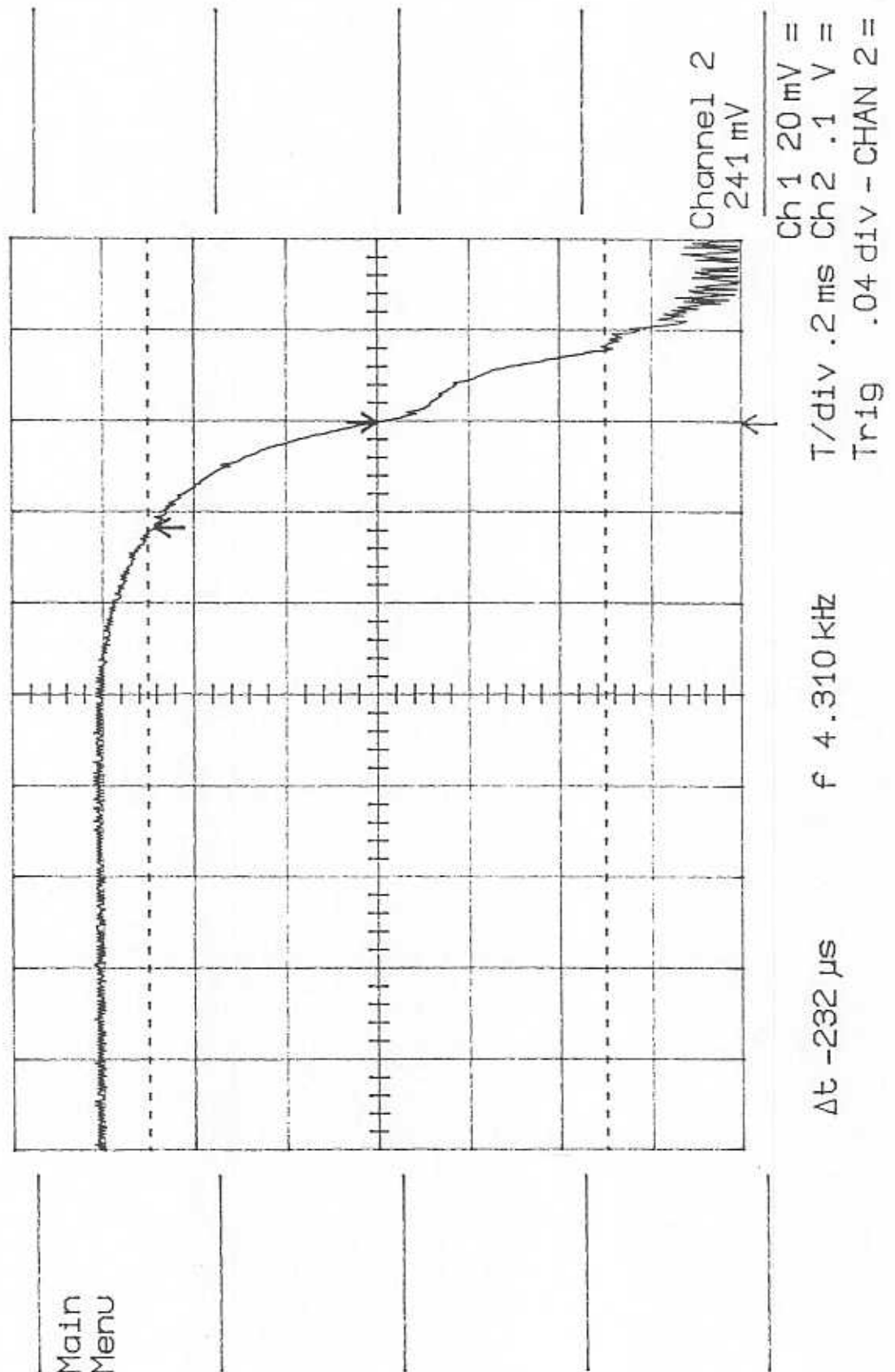
5.1.8 Transmitter release time (400 MHz)



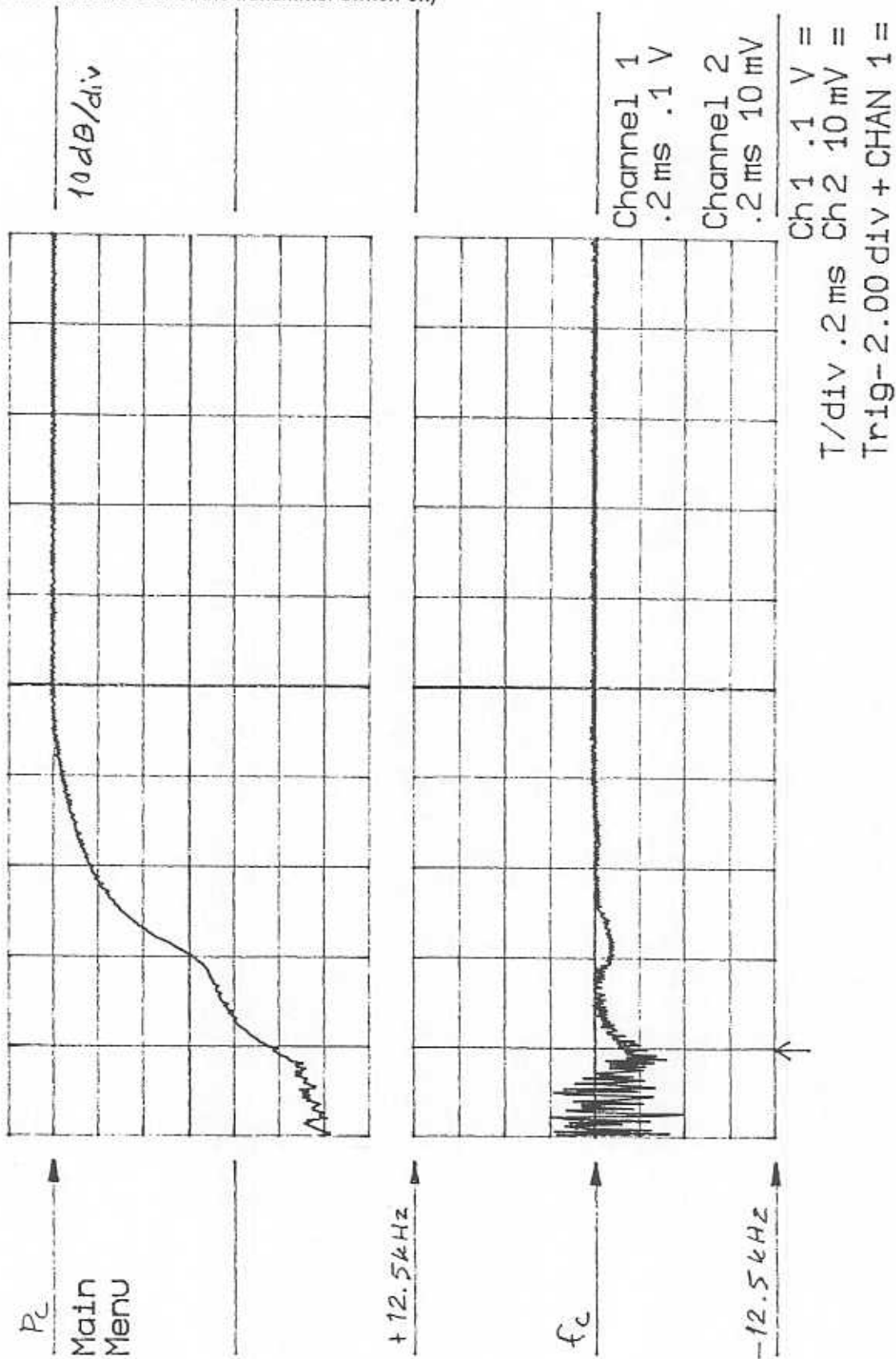
5.1.9.1 Time domain analysis of power and frequency (400 MHz)



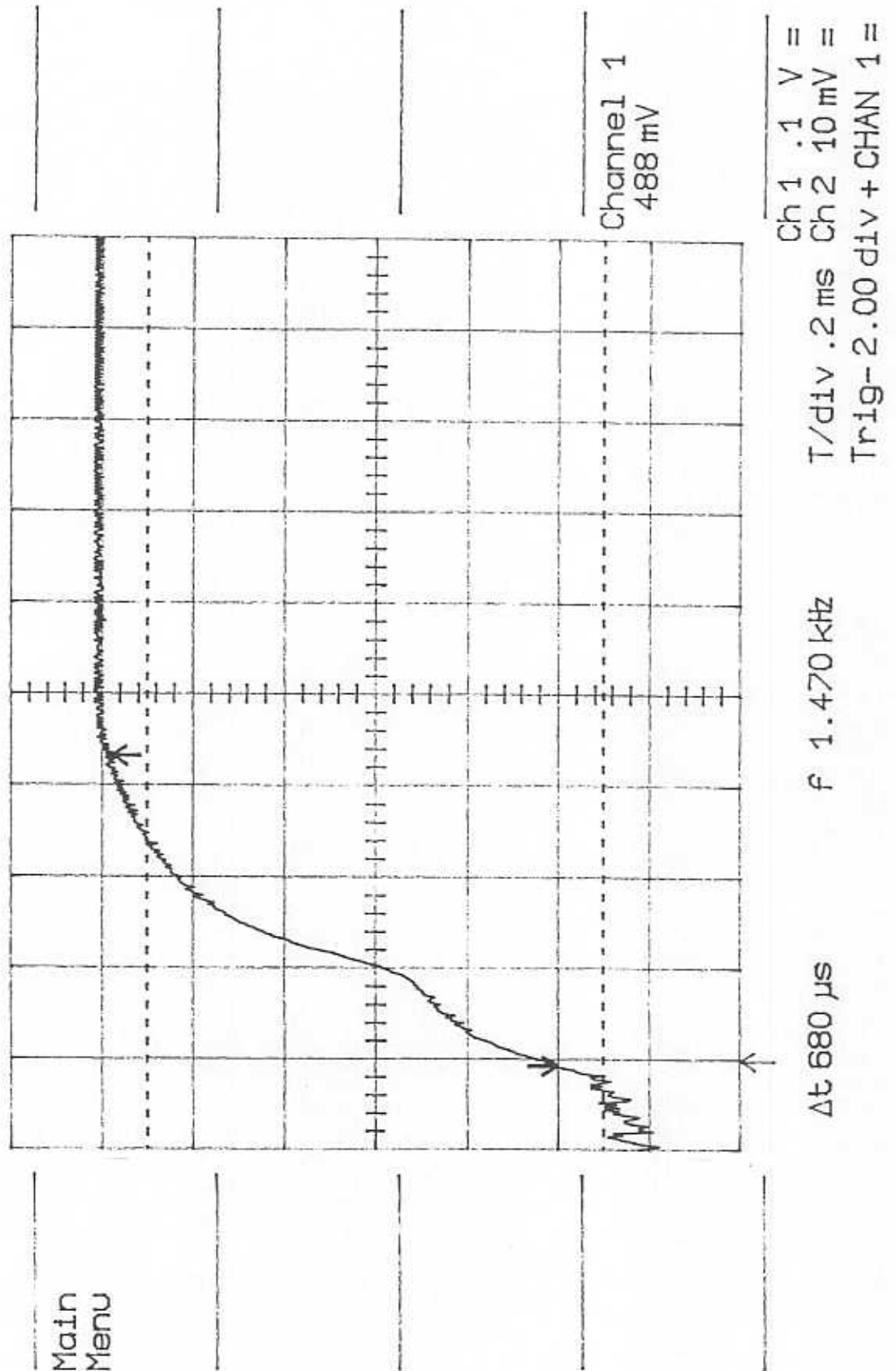
5.1.9.1 Time domain analysis of power and frequency (400 MHz)



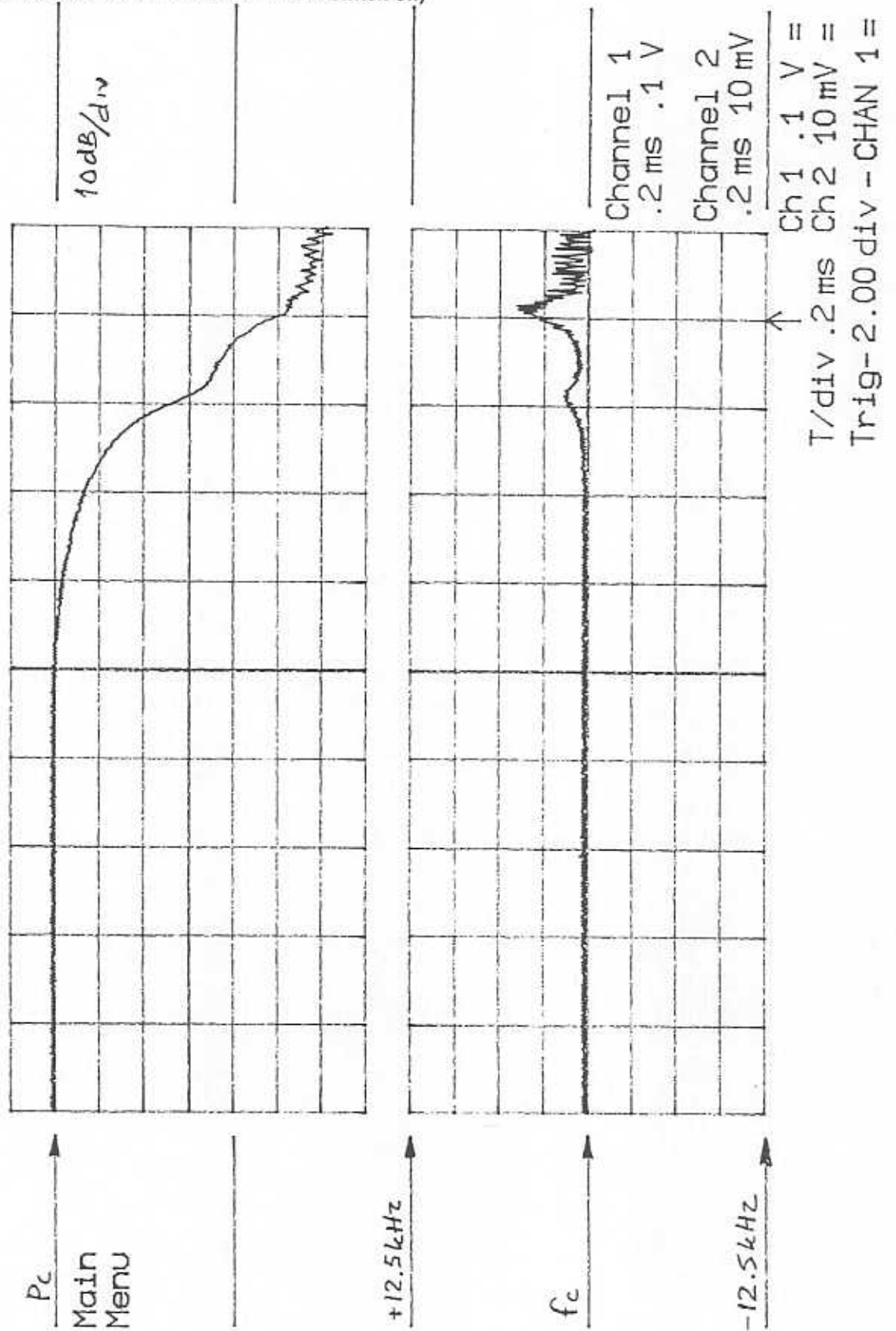
5.1.7 Transmitter attack time (475 MHz)
(Transient behaviour of the transmitter switch-on)



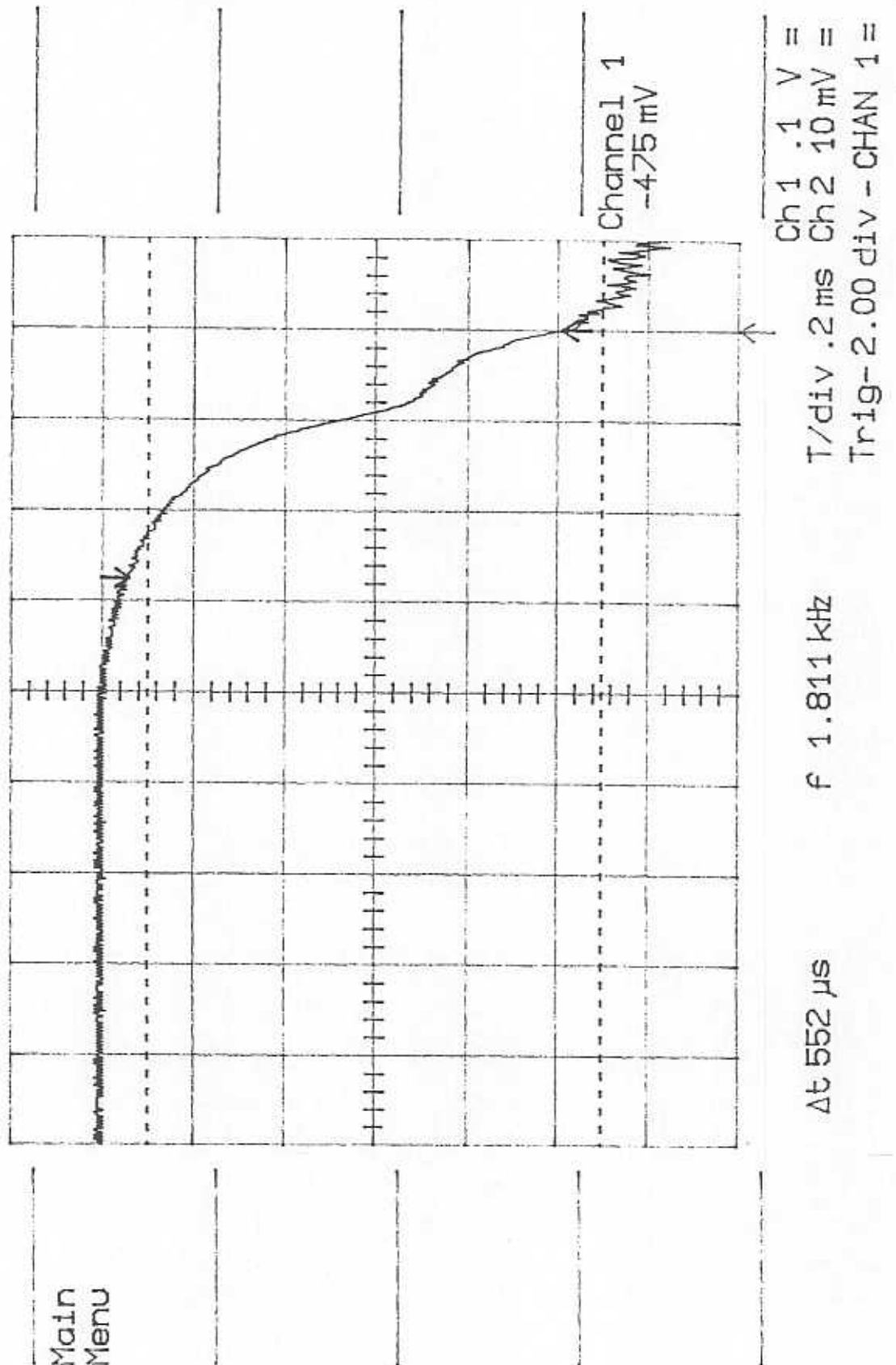
5.1.7 Transmitter attack time (475 MHz)



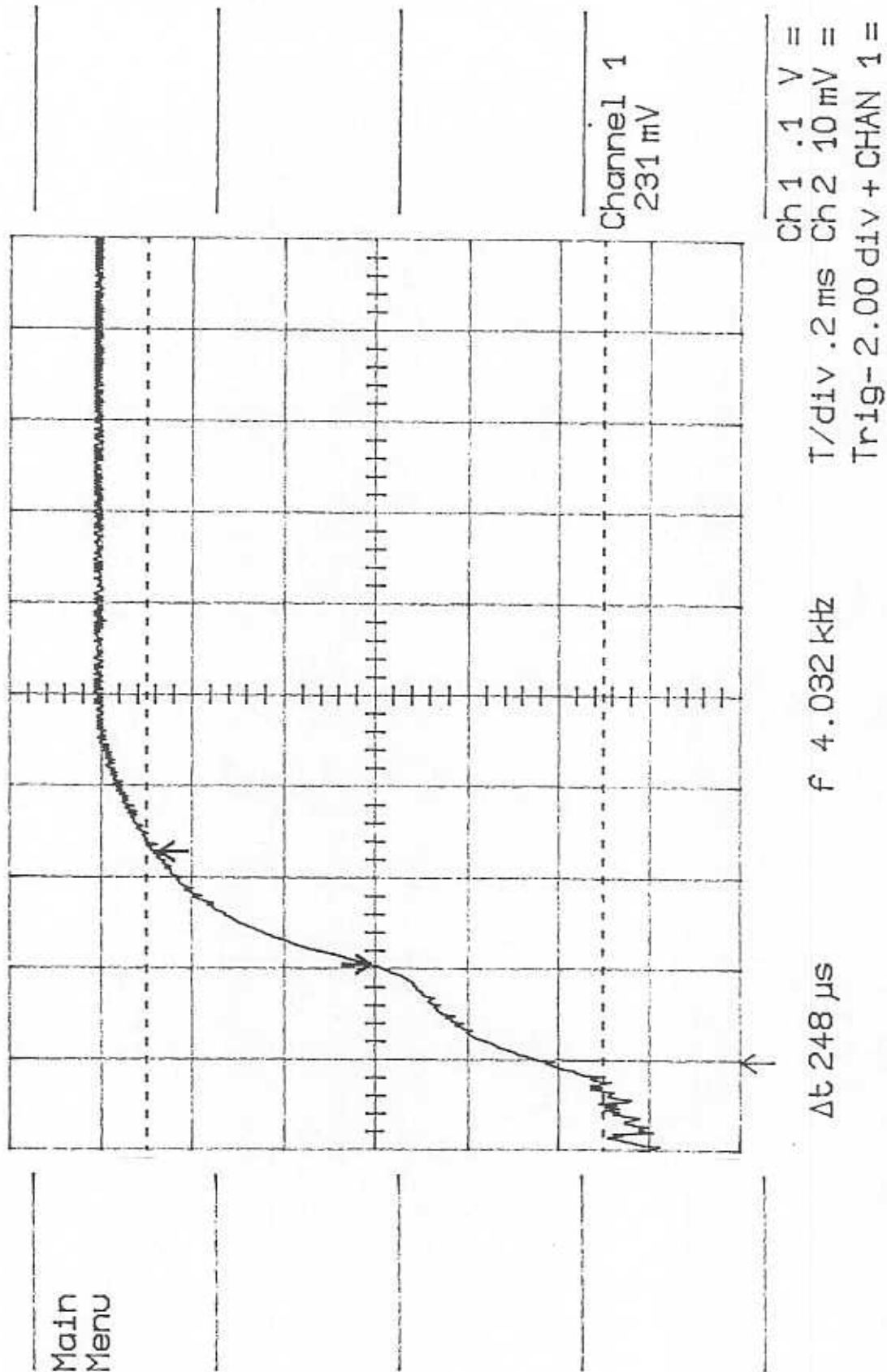
5.1.8 Transmitter release time (475 MHz)
(Transient behaviour of the transmitter switch-off)



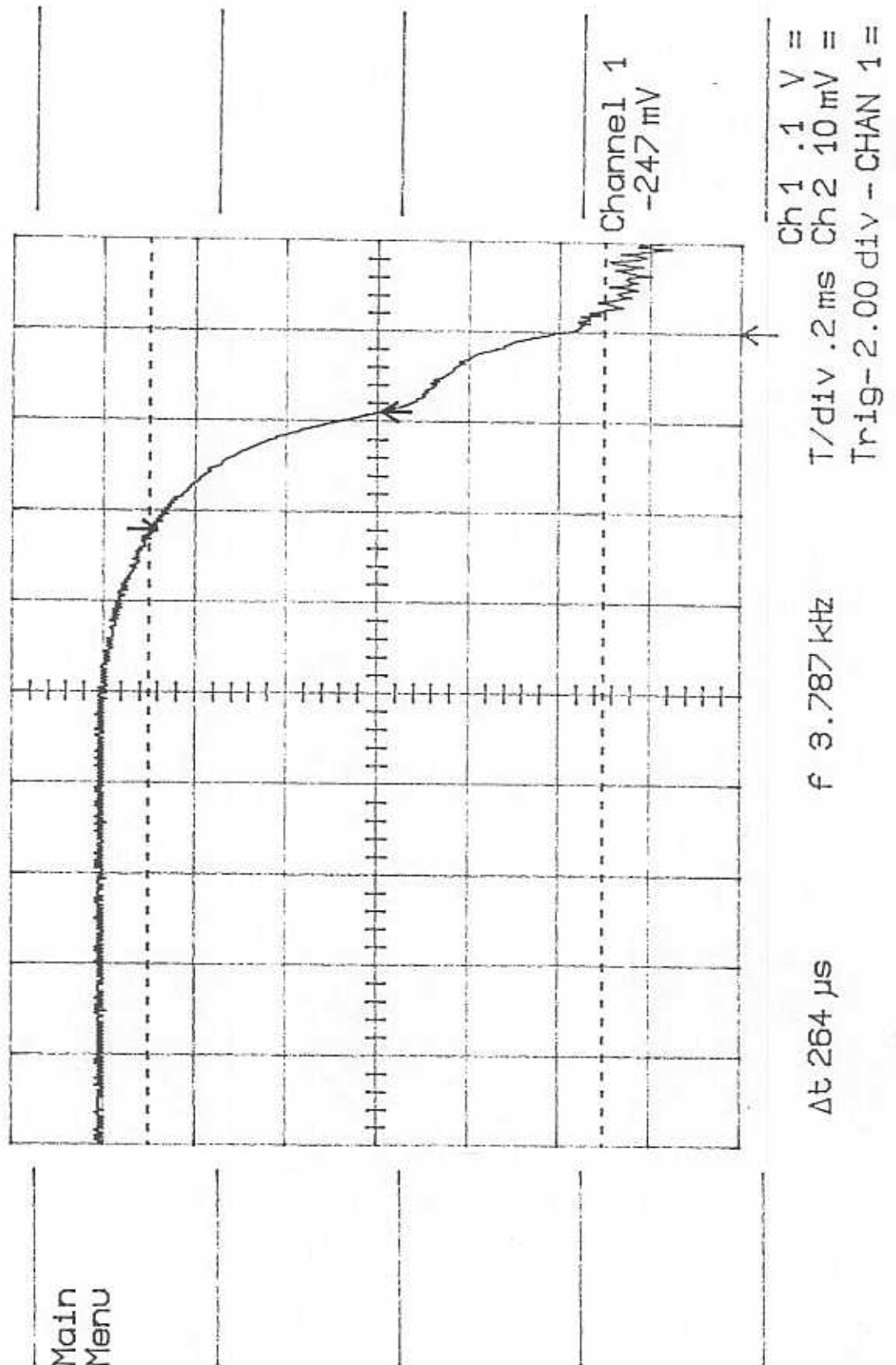
5.1.8 Transmitter release time (475 MHz)



5.1.9.1 Time domain analysis of power and frequency (475 MHz)



5.1.9.1 Time domain analysis of power and frequency (475 MHz)



The results of the transmitter
(Rated output power: 10 W)

Ambient temperature: 21.5 °C Relative humidity: 35.1 % Date: 17.01.2001 (normal test conditions) (1, 2 and 3)
Ambient temperature: 22.5 °C Relative humidity: 34.8 % Date: 06.02.2001 (normal test conditions) (4)
Date: 06.02.2001 (extreme test conditions – 20 °C)
Date: 08.02.2001 (extreme test conditions + 55 °C)

TRANSMITTER FREQUENCY ERROR CLAUSE 8.1

Rated output power: 10 W.

TEST CONDITIONS		FREQUENCY ERROR (Hz)			
		Channel			
		1	2	3	4
Tnom	Vnom	- 193 Hz	- 178 Hz	- 147 Hz	+ 29 Hz
Tmin	Vmin	+ 312 Hz	-147 Hz	+ 448 Hz	+ 511 Hz
	Vmax	+ 331 Hz	-147 Hz	+ 448 Hz	+ 501 Hz
Tmax	Vmin	- 388 Hz	- 492 Hz	- 751 Hz	- 313 Hz
	Vmax	- 386 Hz	- 490 Hz	- 730 Hz	- 310 Hz
Maximum freq. error. (Hz)		+ 327 Hz	+ 452 Hz	+ 804 Hz	- 648 Hz
Measurement uncertainty (U95)		6.1 x 10 ⁻⁸			

LIMITS CLAUSE 5.1.1

CHANNEL SPACING (kHz)	FREQUENCY RANGES				
	Below 47MHz	Above 47 to 137MHz	Above 137 to 300MHz	Above 300 to 500MHz	Above 500 to 1000MHz
	LIMITS kHz				
12.5	± 0.60	± 1.00	± 1.00 (B) ± 1.50 (M)	± 1.00 (B) ± 1.50 (M) (note)	No value specified
20.0 / 25.0	± 0.60	± 1.35	± 2.00	± 2.00 (note)	± 2.50 (note)

NOTE: For handportable stations having integral power supplies, these limits only apply to the reduced extreme temperature range 0 °C to + 30 °C.

However for the full extreme temperature conditions (subclause 6.4.1), 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.

B = BASE STATION

M = MOBILE STATION

TEST EQUIPMENT USED: 48, 120, 390, 146, 131, 77, 403, 157, 230

Ambient temperature: 21.5 °C Relative humidity: 35.1 % Date: 17.01.2001 (normal test conditions) (1, 2 and 3)
Ambient temperature: 22.5 °C Relative humidity: 34.8 % Date: 06.02.2001 (normal test conditions) (4)
Date: 06.02.2001 (extreme test conditions – 20 C)
Date: 08.02.2001 (extreme test conditions + 55 C)

TRANSMITTER CARRIER OUTPUT POWER (CONDUCTED) CLAUSE 8.2

Rated output power: 10 W.

TEST CONDITIONS		TRANSMITTER POWER (Watts)			
		Channel			
		1	2	3	4
Tnom	Vnom	9.4	11.8	10.1	9.5
Tmin	Vmin	9.2	11.5	9.4	9.1
	Vmax	9.2	12.8	10.7	10.4
Tmax	Vmin	7.6	9.3	7.8	7.3
	Vmax	7.6	10.2	9.0	8.2
Variation in output power under normal test conditions		- 0.27 dB	+ 0.72 dB	+ 0.043 dB	- 0.22 dB
Variation in output power under extreme test conditions		- 1.19 to - 0.36 dB	- 0.32 to + 1.07 dB	- 1.08 to + 0.29 dB	- 1.37 to + 0.17 dB
Measurement uncertainty		± 0.75 dB			

LIMITS CLAUSE 5.1.2

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

TEST EQUIPMENT USED: 59, 218, 120, 390, 146, 131, 77, 403, 157, 230

Ambient temperature: 21.5 °C Relative humidity: 35.1 % Date: 17.01.2001 (1)
 Ambient temperature: 21.7 °C Relative humidity: 35.1 % Date: 11.01.2001 (2, 3)
 Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (4)

TRANSMITTER ADJACENT CHANNEL POWER CLAUSE 8.5

Rated output power: 10 W.

Modulation bit rate: 9600 bps (direct 4-FSK)
 Channel separation 12.5 kHz

Channel separation: 12.5 kHz

ADJACENT CHANNEL	BELOW CARRIER POWER (dBc)			
	Channel			
	1	2	3	4
+ 12.5 kHz	- 69.2	- 69.6	- 69.6	- 70.1
- 12.5 kHz	- 62.6	- 62.6	- 64.5	- 64.4
Measurement uncertainty (U95)	± 1.6 dB			

LIMIT CLAUSE 5.1.4	20.0 kHz & 25.0 kHz channel spacing: 70dB below carrier power 12.5 kHz channel spacing: 60dB below carrier power
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TEST EQUIPMENT USED: 9, 33, 120, 390, 77, 403

Ambient temperature: 21.9 °C Relative humidity: 34.9 % Date: 19.01.2001 (1)
Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (4)

TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED) CLAUSE 8.6

Rated output power: 10 W.

FREQUENCY (MHz)	CHANNEL 1	FREQUENCY (MHz)	CHANNEL 4	Remarks
Tx operating		Tx operating		
374.15	- 44.0 dBm	319.90	- 47.6 dBm	
387.75	- 39.3 dBm	449.15	- 39.7 dBm	
396.20	- 46.5 dBm	465.30	- 44.2 dBm	
412.25	- 39.2 dBm	484.70	- 46.5 dBm	
425.85	- 40.2 dBm	500.85	- 40.4 dBm	
800.00	- 43.7 dBm	630.10	- 47.0 dBm	
1200.00	- 46.7 dBm	950.00	- 34.4 dBm	
1600.00	- 32.6 dBm	1425.00	- 33.1 dBm	
others to 4.0 GHz	< - 50.0 dBm	1900.00	- 34.8 dBm	
		2375.00	- 32.8 dBm	
		3325.00	- 31.5 dBm	
		others to 12.75 GHz	< - 50.0 dBm	
Tx on standby		Tx on standby		
				See page 55
Measurement uncertainty	± 1.8 dB			

Limits CLAUSE 5.1.5 TABLE 2

Frequency range	9 kHz to 1 GHz	above 1 to 4GHz or above 1 to 12.75 GHz, (clause 8.6.2)
Tx operating	0.25 µW (-36.0 dBm)	1.00 µW (-30.0 dBm)
Tx standby	2.0 nW (-57.0 dBm)	20.0 nW (-47.0 dBm)

TEST EQUIPMENT USED: 41, 145, 120, 390, 211, 212, 384, 375, 77, 403

Ambient temperature: 22.5 °C Relative humidity: 34.8 % Date: 06.02.2001 (1)
Ambient temperature: 21.3 °C Relative humidity: 34.8 % Date: 30.01.2001 (4)

TRANSMITTER SPURIOUS EMISSIONS (RADIATED) CLAUSE 8.6

Rated output power: 10 W.

FREQUENCY (MHz)	CHANNEL 1	FREQUENCY (MHz)	CHANNEL 4	REMARKS
Tx operating		Tx operating		
800.00	- 43.6 dBm	all 30 MHz to 1.0 GHz	< - 50.0 dBm	
others 30 MHz to 1.0 GHz	< - 50.0 dBm	2375.00	- 38.9 dBm	
all 1.0 GHz to 4.0 GHz	< - 40.0 dBm	others 1 GHz to 4.0 GHz	< - 40.0 dBm	
Tx on standby		Tx on standby		
				See page 55
Measurement uncertainty	+ 3.4 dB - 4.4 dB			

See clause 9.10, page 27

Limits CLAUSE 5.1.5 TABLE 3

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

TEST EQUIPMENT USED: 42, 205, 89, 92, 176, 185, 65, 66, 77, 403

Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (1)
Ambient temperature: 22.4 °C Relative humidity: 23.8 % Date: 05.02.2001 (4)

TRANSMITTER ATTACK TIME CLAUSE 8.8

Power level at which the measurement has been performed: 10 W

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

TIME CHARACTERISTIC	Channel		
	1	4	
Time relative to the power rise	0.90 ms	1.06 ms	
Time relative to the frequency behaviour	< 0.2 ms	< 0.2 ms	
Maximum of these times, i.e. attack time	0.90 ms	1.06 ms	
Measurement uncertainty	± 3.0		

See clause 8.8.1 (ETS 300 113) for the definition and clause 8.10 (ETS 300 113), figures 12 and 13 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 8.10.

See pages 35, 36, 41 and 42

LIMIT CLAUSE 5.1.7

The transmitter attack time shall not exceed: 25 ms

TEST EQUIPMENT USED: 9, 10, 31, 41, 120, 390, 395, 377, 136, 102, 134, 62, 77, 403

Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (1)
Ambient temperature: 22.4 °C Relative humidity: 23.8 % Date: 05.02.2001 (4)

TRANSMITTER RELEASE TIME CLAUSE 8.9

Power level at which the measurement has been performed: 10 W

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

TIME CHARACTERISTIC	Channel		
	1	4	
Transmitter release time	0.60 ms	0.8 ms	
Measurement uncertainty	± 3.0		

See clause 8.9.1 (ETS 300 113) for the definition and clause 8.10 (ETS 300 113), figure 14 for the graph of the transmitter release time.

The plots of frequency and power versus time can be found in the test report sheets corresponding to Clause 8.10.

See pages 37, 38, 43 and 44

LIMIT CLAUSE 5.1.8

The transmitter release time shall not exceed: 20 ms

TEST EQUIPMENT USED: 9, 10, 31, 41, 120, 390, 395, 377, 136, 102, 134, 62, 77, 403

Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (1)
Ambient temperature: 22.4 °C Relative humidity: 23.8 % Date: 05.02.2001 (4)

TRANSIENT BEHAVIOUR OF THE TRANSMITTER CLAUSE 8.10

(TIME DOMAIN ANALYSIS OF POWER AND FREQUENCY)

Power level at which the measurement has been performed: 10 W

MEASUREMENT	Channel		
	1	4	
tp	0.36 ms	0.41 ms	
td	0.36 ms	0,46 ms	
Measurement uncertainty	± 3.0		

See pages 39, 40, 45 and 46

LIMIT CLAUSE 5.1.9.1

The carrier frequency must remain within $F_c \pm 12.5$ kHz, when the carrier power > $P_c - 30$ dB.
tp: ≥ 0.20 ms, td: ≥ 0.20 ms

TEST EQUIPMENT USED: 9, 10, 31, 41, 120, 390, 395, 377, 136, 102, 134, 62, 77, 403

Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (1)
Ambient temperature: 22.4 °C Relative humidity: 23.8 % Date: 05.02.2001 (4)

TRANSIENT BEHAVIOUR OF THE TRANSMITTER CLAUSE 8.10

(ADJACENT CHANNEL POWER TRANSIENT)

Power level at which the measurement has been performed: 10 W

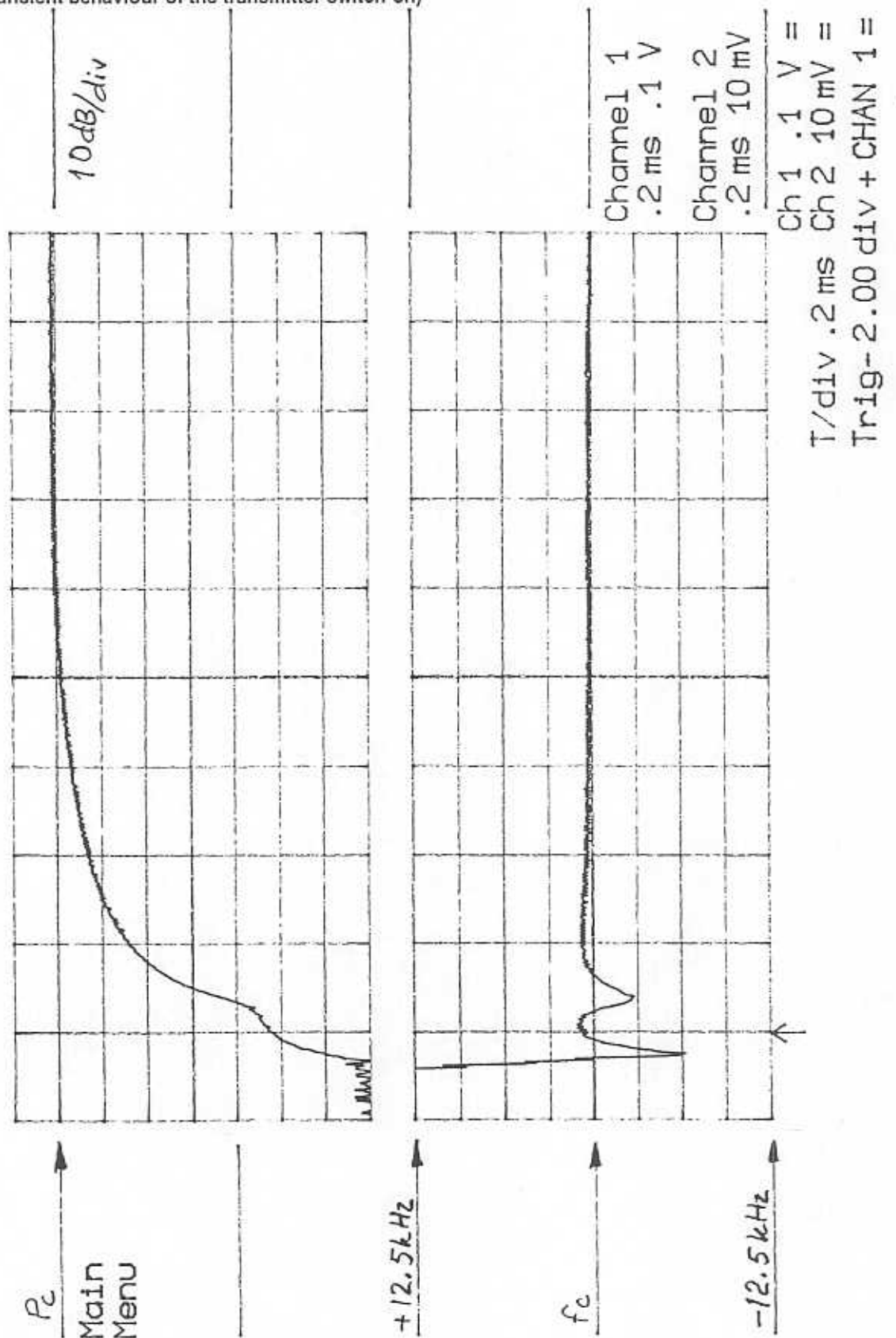
Channel separation: 12.5 kHz

ADJACENT CHANNEL	BELOW CARRIER POWER (dBc)					
	Channel					
	1		4			
	TX on	TX off	TX on	TX off	TX on	TX off
+ 12.5 kHz	- 61.0	- 62.0	- 59.5	- 59.5		
- 12.5 kHz	- 62.0	- 58.0	- 60.0	- 59.9		
Measurement uncertainty (U95)	+ 1.4 dB, -1.6 dB					

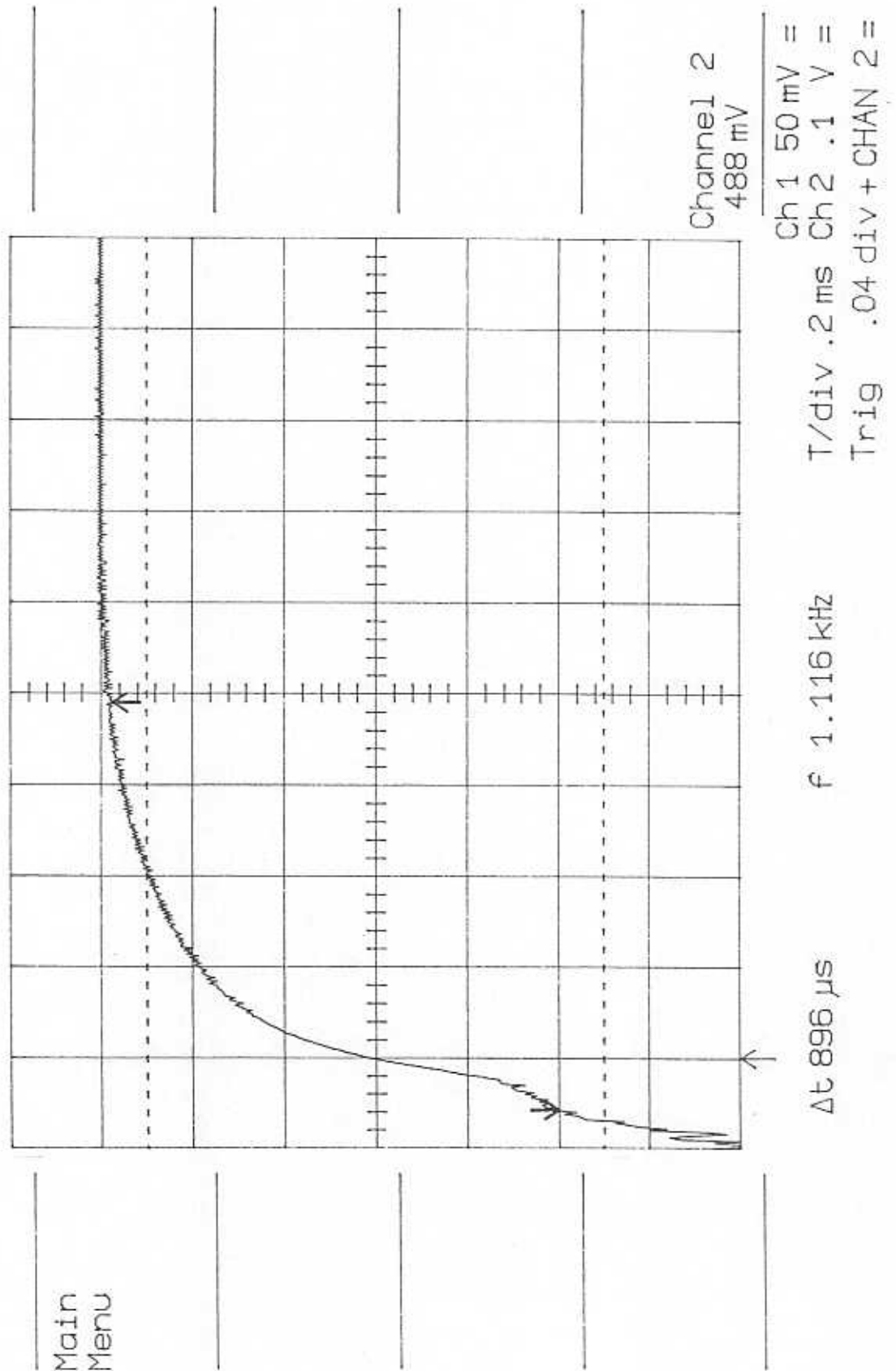
LIMIT CLAUSE 5.1.9.2	Ch. spacing 12.5 kHz: - 50 dBc (without the need to be below 2 µW) Ch. spacings 20.0/25.0 kHz: - 60 dBc (without the need to be below 2 µW)
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TEST EQUIPMENT USED: 41, 42, 33, 10, 62, 146, 134, 136, 120, 390, 375, 334, 335, 77, 403

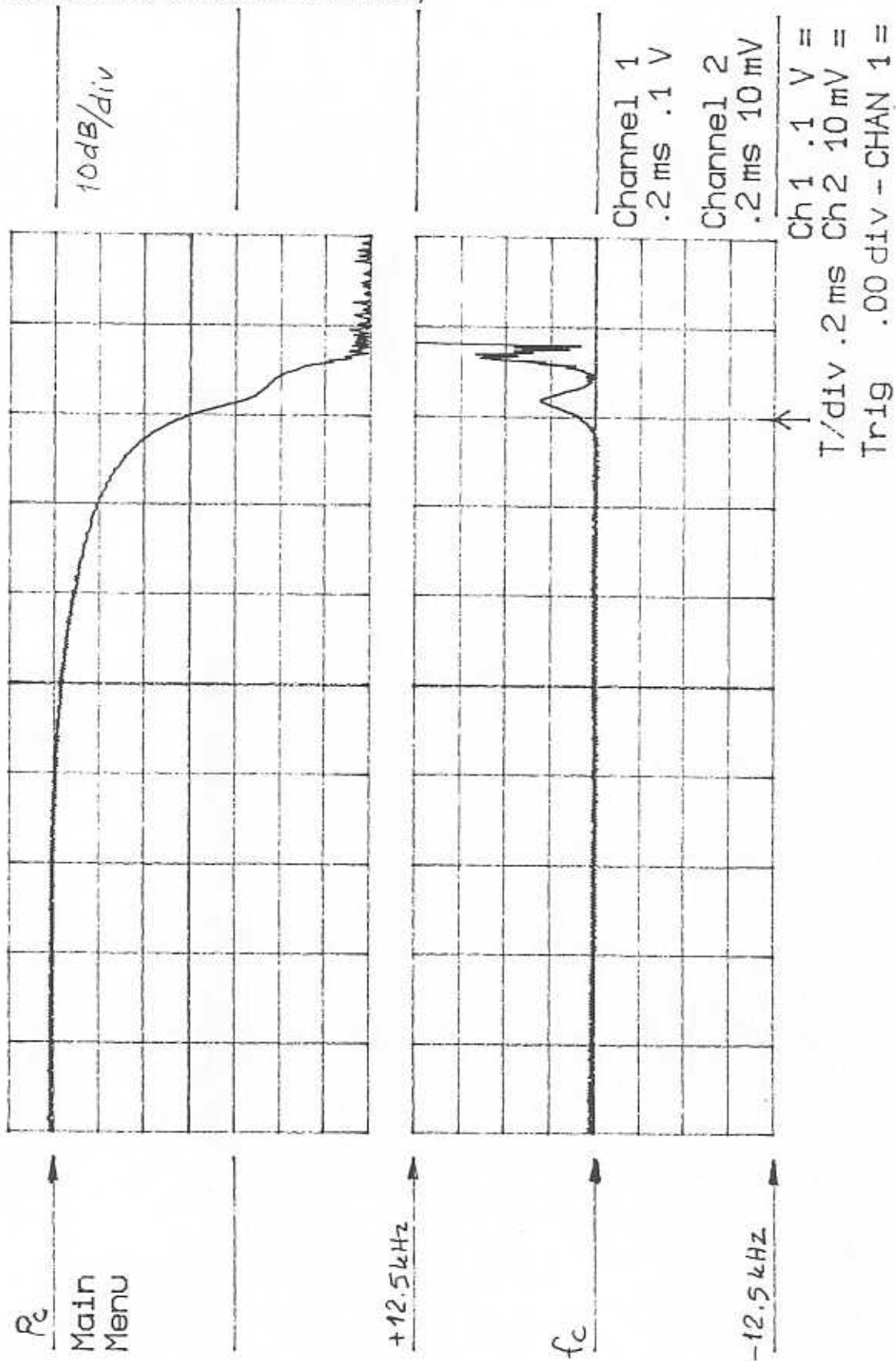
5.1.7 Transmitter attack time (400 MHz)
(Transient behaviour of the transmitter switch-on)



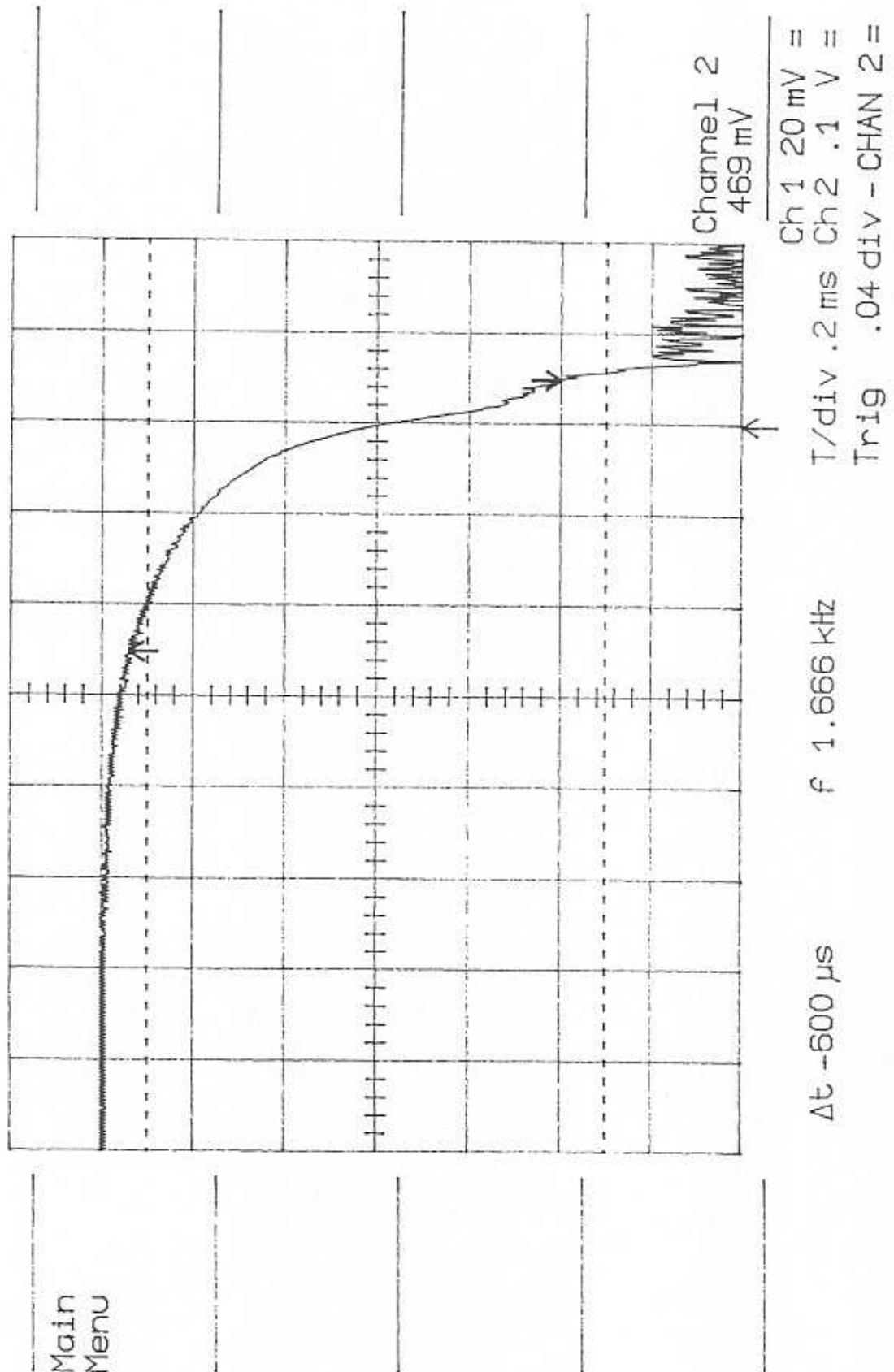
5.1.7 Transmitter attack time (400 MHz)



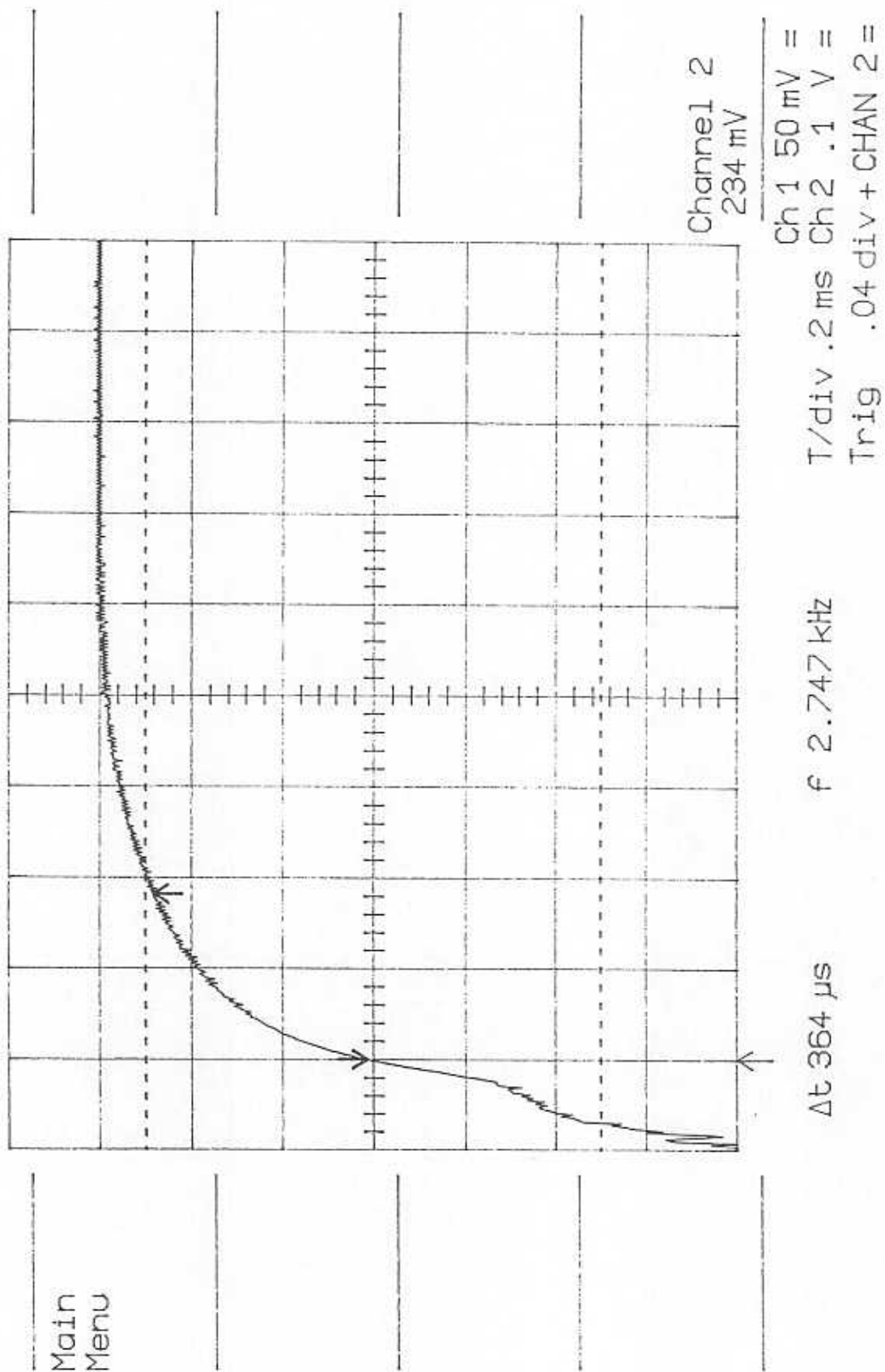
5.1.8 Transmitter release time (400 MHz)
(Transient behaviour of the transmitter switch-off)



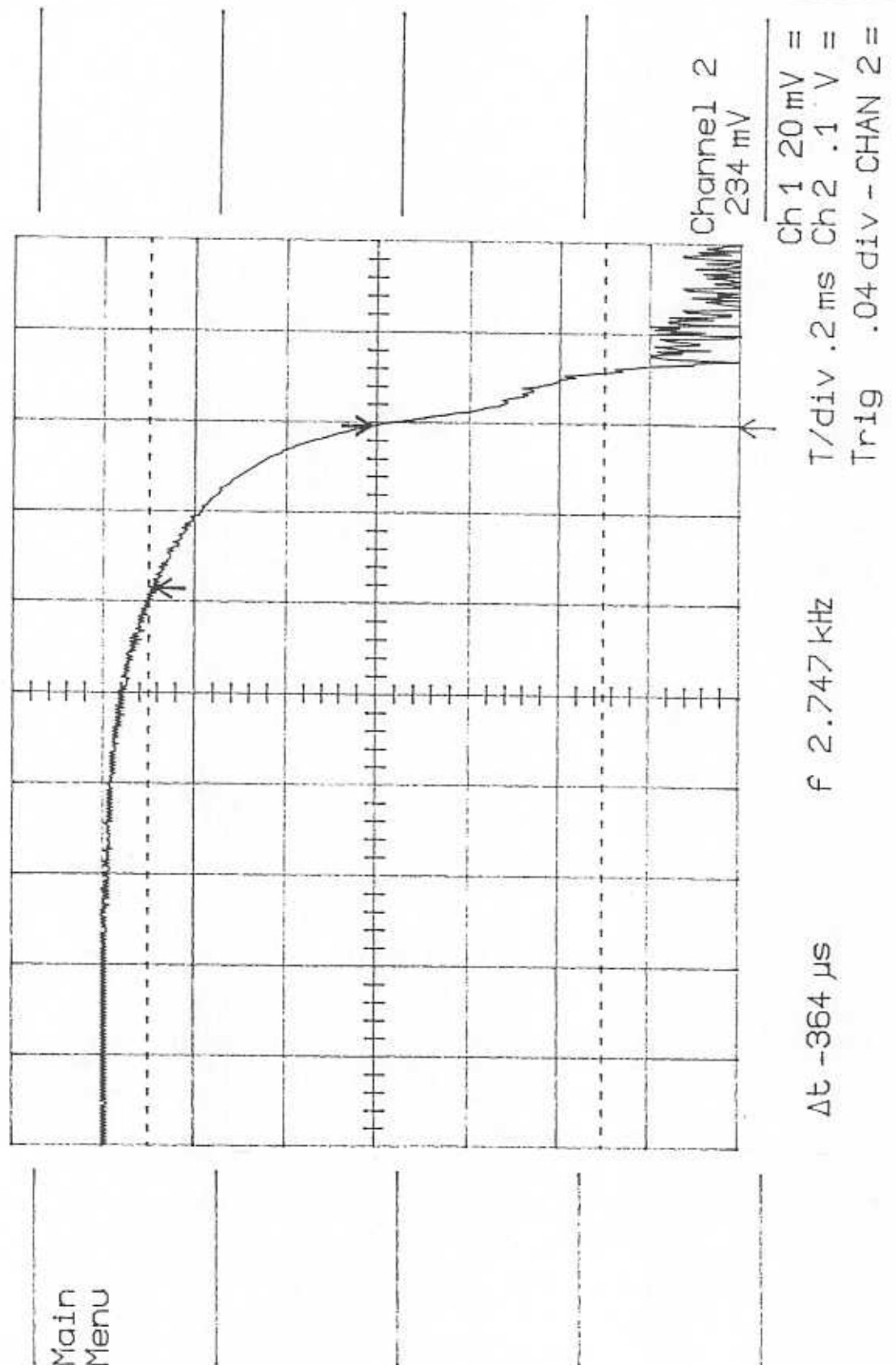
5.1.8 Transmitter release time (400 MHz)



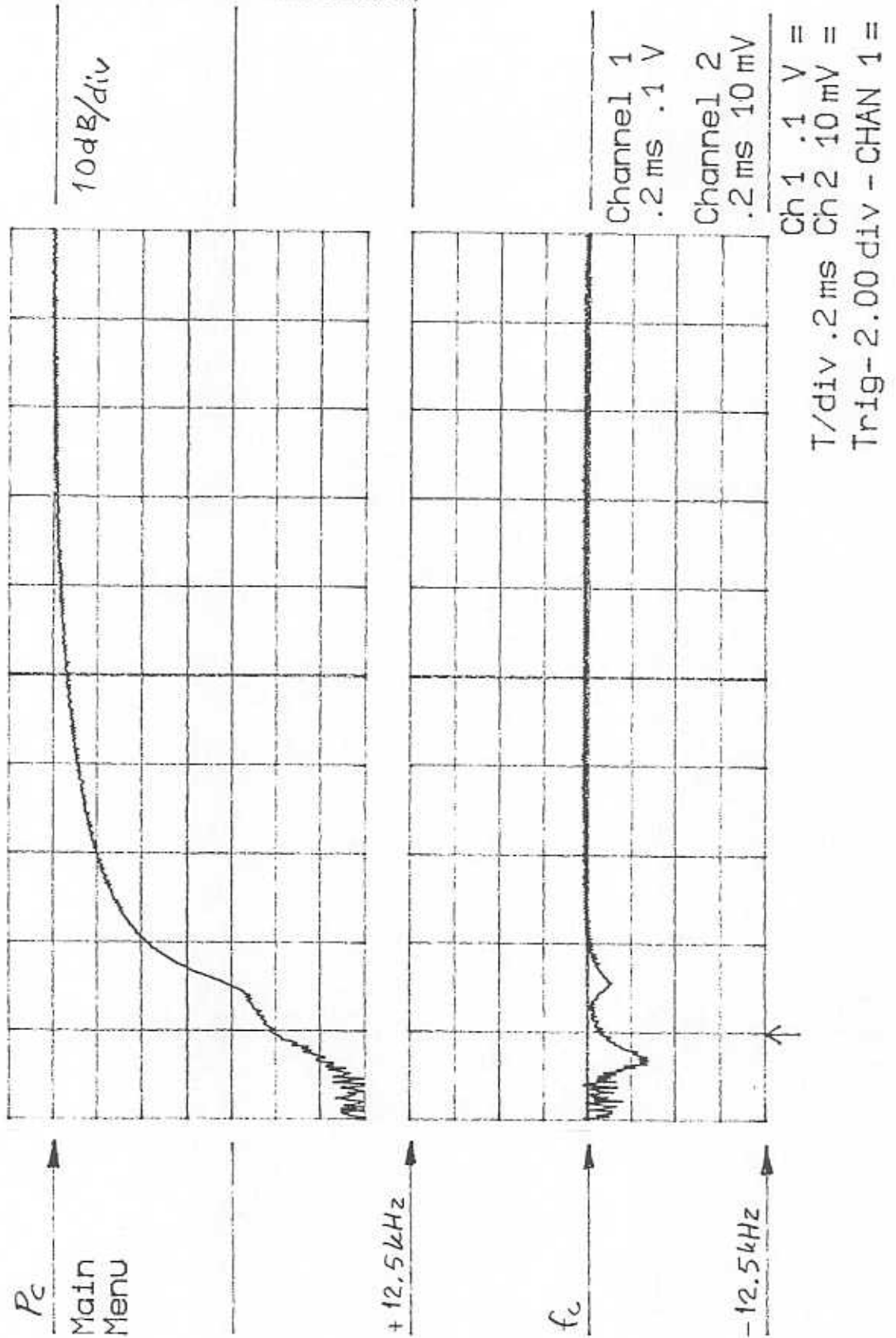
5.1.9.1 Time domain analysis of power and frequency (400 MHz)



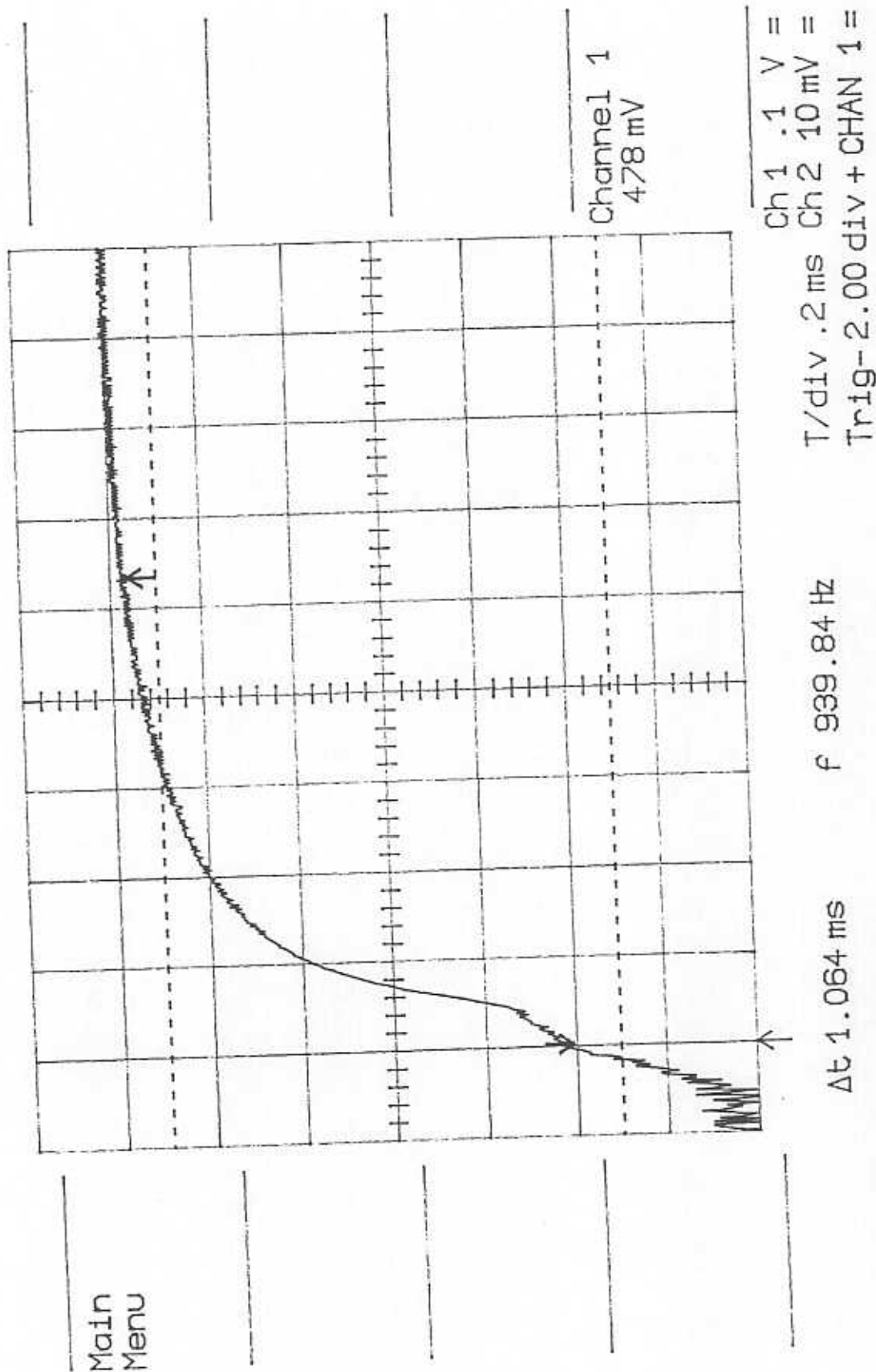
5.1.9.1 Time domain analysis of power and frequency (400 MHz)



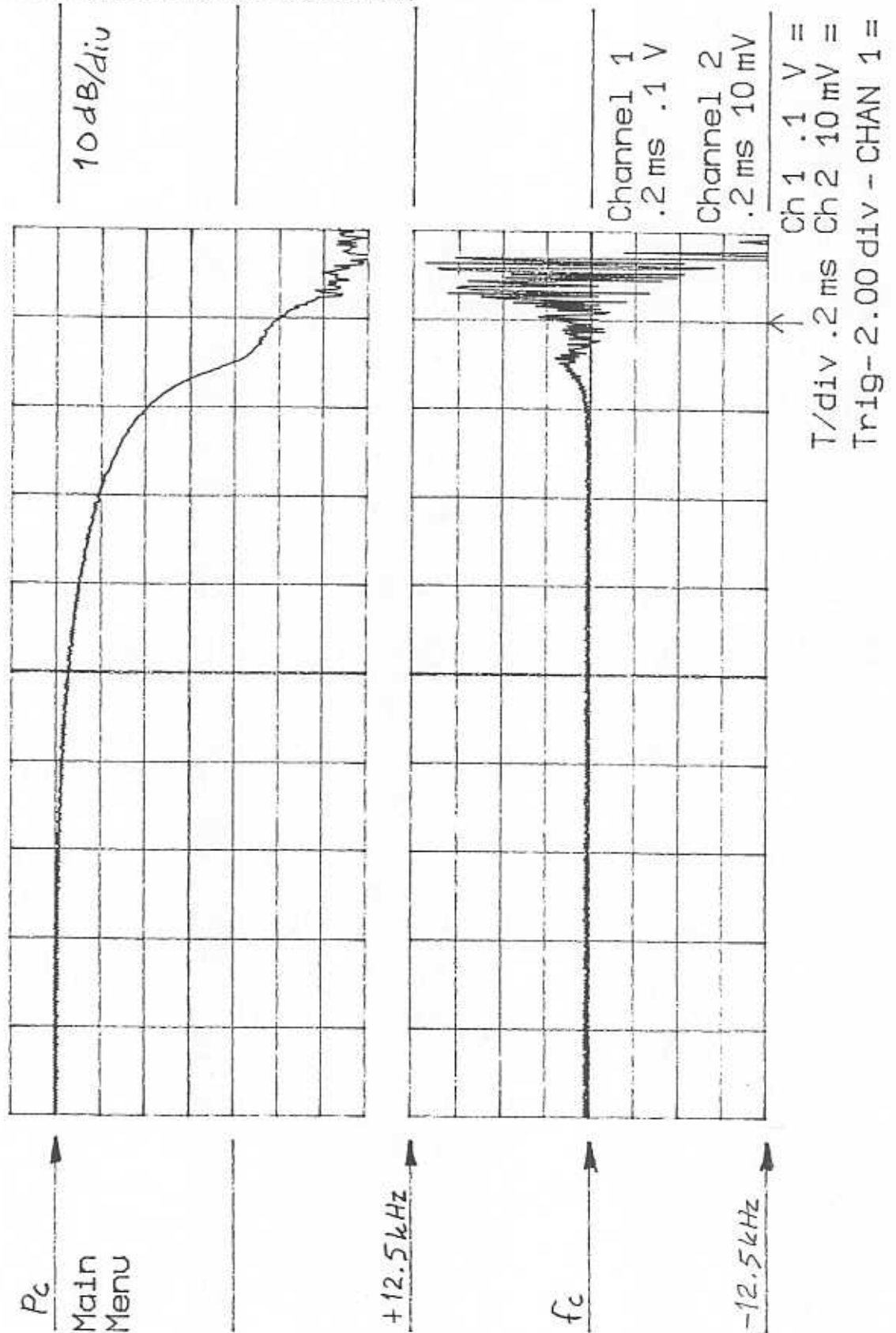
5.1.7 Transmitter attack time (475 MHz)
(Transient behaviour of the transmitter switch-on)



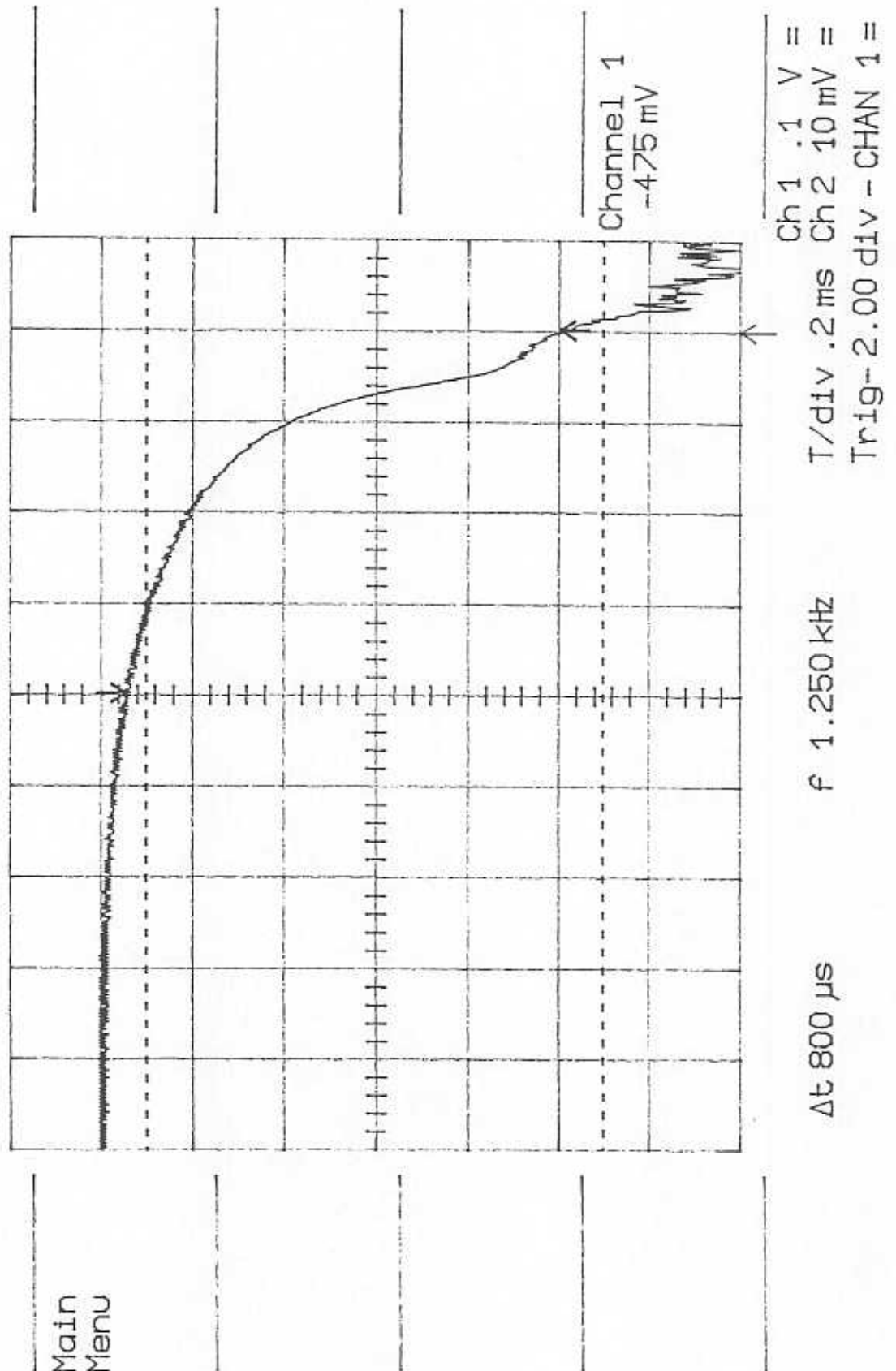
5.1.7 Transmitter attack time (475 MHz)



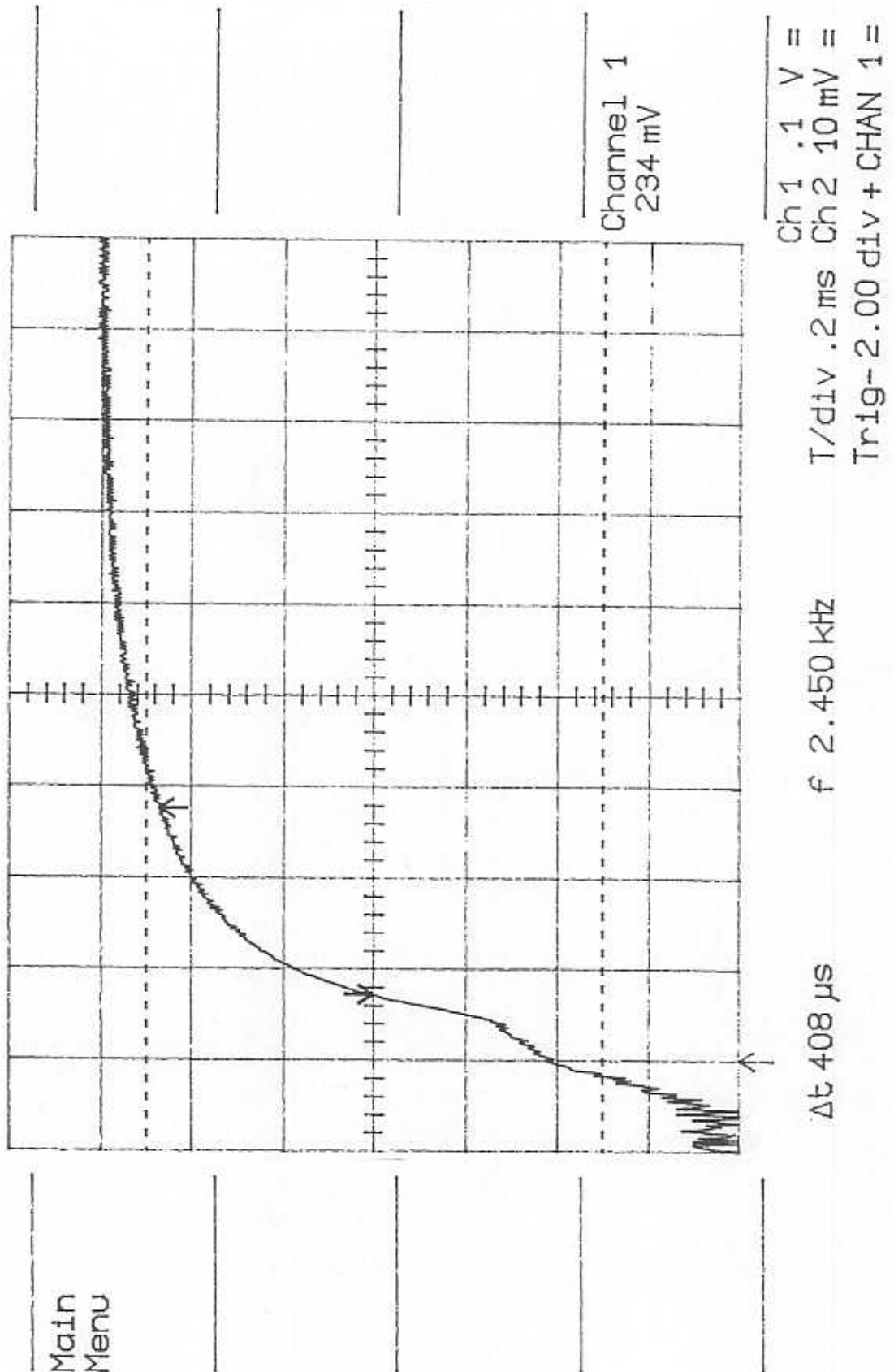
5.1.8 Transmitter release time (475 MHz)
(Transient behaviour of the transmitter switch-off)



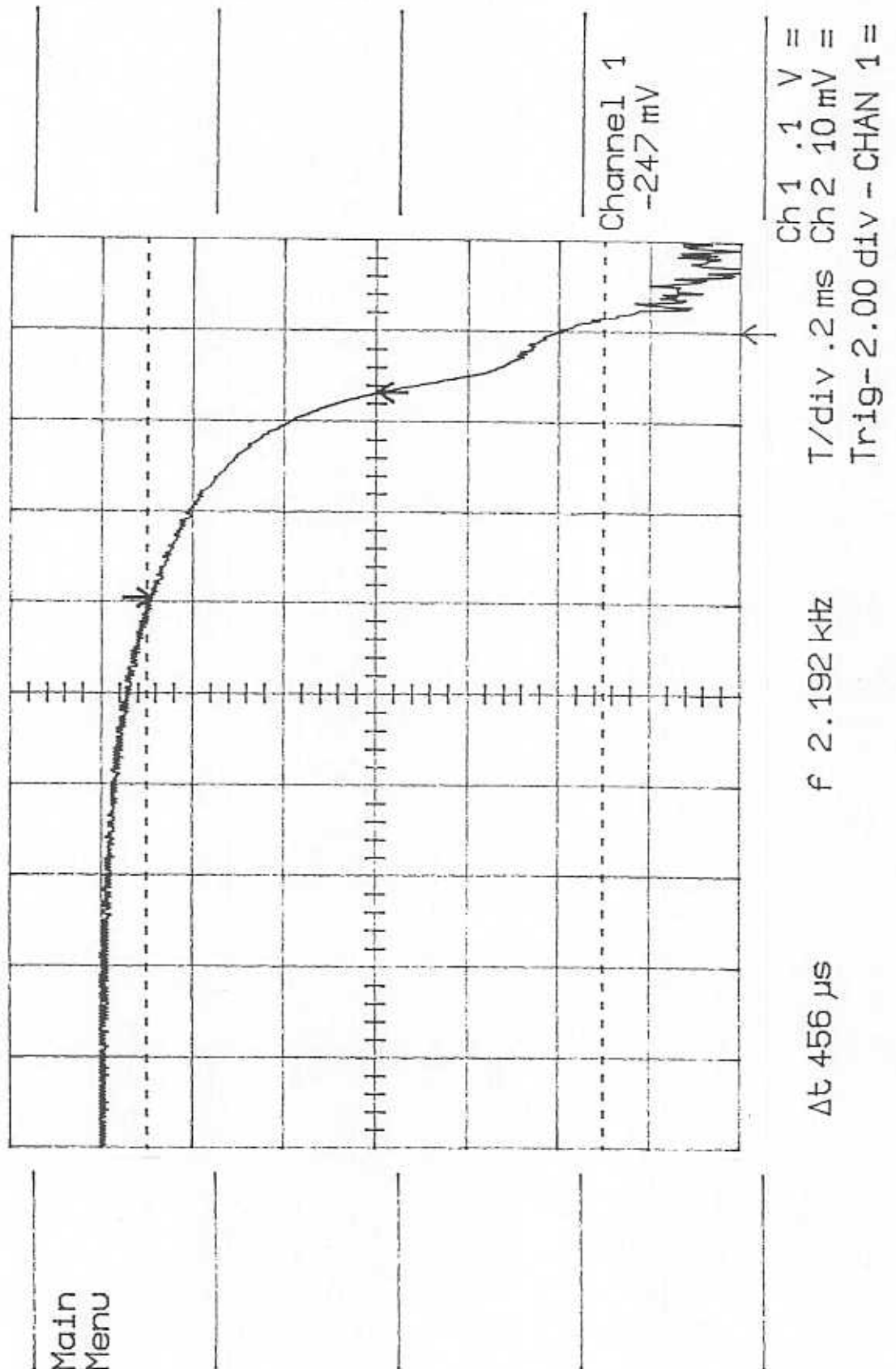
5.1.8 Transmitter release time (475 MHz)



5.1.9.1 Time domain analysis of power and frequency (475 MHz)



5.1.9.1 Time domain analysis of power and frequency (475 MHz)

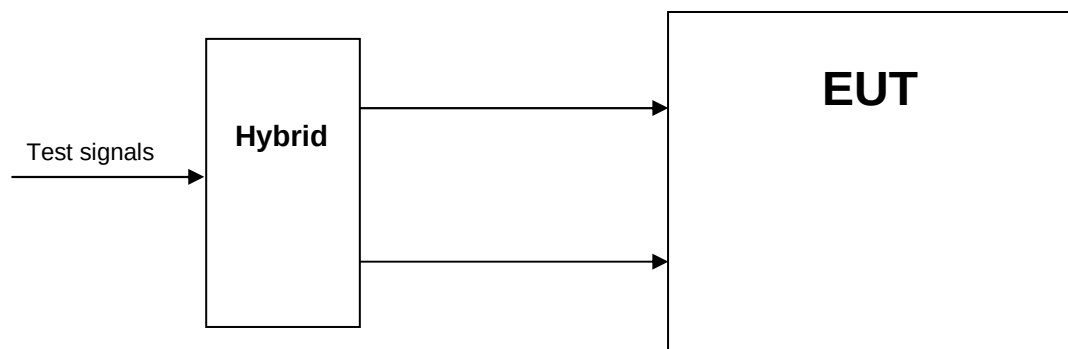


The results of the receivers

Note

EUT includes two receivers (diversity receiver).
The customer had ordered only a simultaneous measurement of receivers (diversity mode).

Arrangement for test signals applied to antenna inputs:



Ambient temperature: 21.5 °C Relative humidity: 35.1 % Date: 17.01.2001 (normal test conditions) (1, 2 and 3)
Ambient temperature: 22.3 °C Relative humidity: 28.2 % Date: 02.02.2001 (normal test conditions) (4)
Date: 06.02.2001 (extreme test conditions)

MAXIMUM USEABLE SENSITIVITY (CONDUCTED) CLAUSE 9.1

Method of measurement: Message
Channel separation: 12.5 kHz

TEST CONDITIONS		RECEIVER SENSIVITY (dB μ V)			
		Channel			
		1	2	3	4
Tnom	Vnom	- 5.0	- 4.7	- 5.5	- 4.2
Tmin	Vmin	- 6.4	- 5.6	- 4.6	- 4.8
	Vmax	- 6.2	- 4.7	- 5.2	- 4.4
Tmax	Vmin	- 2.6	- 3.6	- 4.4	- 2.8
	Vmax	- 2.3	- 2.5	- 4.4	- 2.5
Measurement uncertainty		+ 1.8 dB, - 2.1 dB			

LIMITS CLAUSE 5.2.1

Under normal test conditions	+ 3 dB μ V
Under extreme test conditions	+ 9 dB μ V

TEST EQUIPMENT USED: 33, 102, 134, 62, 157, 230, 77, 403

Ambient temperature: 21.9 °C Relative humidity: 34.9 % Date: 19.01.2001 (1)
Ambient temperature: 22.3 °C Relative humidity: 28.2 % Date: 02.02.2001 (4)

ERROR BEHAVIOUR AT HIGH INPUT LEVELS CLAUSE 9.4

Method of measurement: Message

RF INPUT TO RECEIVER	BER		
	Channel		
	1	4	
+ 6 dB μ V + 30 dB	No errors	No errors	
+ 6 dB μ V + 100 dB	No errors	No errors	
Measurement uncertainty	$\pm 0.1 \%$		

LIMIT CLAUSE 5.2.3

Errors ≤ 1

TEST EQUIPMENT USED: 33, 99, 62, 133, 134, 77, 403

Ambient temperature: 21.5 °C Relative humidity: 35.1 % Date: 17.01.2001 (1)
Ambient temperature: 22.3 °C Relative humidity: 28.2 % Date: 02.02.2001 (4)

CO-CHANNEL REJECTION CLAUSE 9.5

Method of measurement: Message
Channel separation: 12.5 kHz

FREQUENCY OF UNWANTED SIGNAL	REJECTION RATIO (dB)		
	Channel		
	1	4	
f+1500 Hz	- 8.7	- 8.7	
f	- 9.1	- 8.9	
f-1500 Hz	- 8.3	- 8.9	
Measurement uncertainty (U95)	+ 2.2 dB, - 2.6 dB		

The lowest value of the five measurement results noted shall be recorded as the co-channel rejection.

LIMIT CLAUSE 5.2.4

CHANNEL SPACING (kHz)	LIMIT (dB)
12.5	-12 and 0
20.0	-8 and 0
25.0	-8 and 0

TEST EQUIPMENT USED: 31, 33, 314, 102, 134, 99, 136, 131, 133, 77, 403

Ambient temperature: 21.5 °C Relative humidity: 35.1 % Date: 17.01.2001 (normal test conditions) (1, 2 and 3
Ambient temperature: 22.3 °C Relative humidity: 28.2 % Date: 02.02.2001 (normal test conditions) (4
Date: 06.02.2001 (extreme test conditions)

ADJACENT CHANNEL SELECTIVITY CLAUSE 9.6

Method of measurement: Message
Channel separation: 12.5 kHz

CONDITIONS		UNWANTED SIGNAL + AND - RELATIVE TO WANTED RATIO (dB)							
		Channel							
		1		2		3		4	
		+12.5kHz	-12.5kHz	+12.5kHz	-12.5kHz	+12.5kHz	-12.5kHz	+12.5kHz	-12.5kHz
Tnom	Vnom	63.7	64.8	63.4	64.9	63.1	65.5	69.1	66.5
Tmin	Vmin	61.5	63.6	60.1	62.1	53.7	62.6	60.2	59.3
	Vmax	61.5	63.4	60.7	61.2	57.3	64.7	61.7	61.1
Tmax	Vmin	63.7	64.1	63.4	63.1	62.7	64.6	67.4	64.4
	Vmax	64.3	64.5	63.9	63.9	62.9	65.4	67.4	64.4
Measurement uncertainty (U95):		+ 2.2 dB, - 2.6 dB							

LIMITS CLAUSE 5.2.5

CHANNEL SPACING (kHz)	Under normal conditions	Under extreme conditions
12.5	60 dB	50 dB
20.0	70 dB	60 dB
25.0	70 dB	60 dB

TEST EQUIPMENT USED: 31, 33, 102, 99, 134, 136, 62, 157, 230, 77, 403

Ambient temperature: 21.5 °C Relative humidity: 35.1 % Date: 17.01.2001 (1)
Ambient temperature: 22.3 °C Relative humidity: 28.2 % Date: 02.02.2001 (4)

RECEIVER SPURIOUS RESPONSE REJECTION CLAUSE 9.7

a) = List of spurious responses found in the limited frequency range
b) = List of spurious responses calculated outside the limited frequency range

SPURIOUS RESPONSES	RATIO (dB)		
	Channel		
	1	4	
a)	244.445 MHz – 400.455 MHz	319.445 MHz – 475.455 MHz	
399.089	72.1 dB		
361.225	73.9 dB		
436.225		71.5 dB	
474.089		70.9 dB	
others	> 80.0 dB	> 80.0 dB	
b)	100 kHz ... 2 GHz, but outside the range "a"	100 kHz ... 2 GHz, but outside the range "a"	
all	> 80.0 dB	> 80.0 dB	
Measurement uncertainty	+ 2.5 dB, - 3.2 dB		

LIMIT CLAUSE 5.2.6

Limit	70 dB
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TEST EQUIPMENT USED: 31, 33, 314, 102, 99, 131, 133, 136, 134, 77, 62, 403

Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (1)
Ambient temperature: 22.3 °C Relative humidity: 28.2 % Date: 02.02.2001 (4)

RECEIVER INTERMODULATION RESPONSE REJECTION **CLAUSE 9.8**

Channel separation: 12.5 kHz

FREQUENCY INCREMENTS OF UNWANTED SIGNALS	RATIO (dB)		
	Channel		
	1	4	
+50/100 kHz	70.3	72.2	
-50/100 kHz	70.6	70.3	
Measurement uncertainty	± 1.5 dB		

LIMITS **CLAUSE 5.2.7**

base stations	not less than 70 dB.
mobile and handportable stations	not less than 65 dB.

TEST EQUIPMENT USED: 31, 32, 33, 314, 99, 102, 131, 133, 134, 136, 175, 62, 77, 403

Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (1)
Ambient temperature: 22.3 °C Relative humidity: 28.2 % Date: 02.02.2001 (4)

RECEIVER BLOCKING OR DESENSITISATION CLAUSE 9.9

Channel separation: 12.5 kHz

FREQUENCY OF WANTED SIGNAL	RATIO (dB)		
	Channel		
	1	4	
f+10 MHz	97.1	93.2	
f+5 MHz	95.9	92.7	
f+2 MHz	94.9	93.1	
f+1 MHz	94.3	92.5	
f-1 MHz	93.7	92.4	
f-2 MHz	93.6	92.5	
f-5 MHz	93.7	92.3	
f-10 MHz	94.2	92.3	
Measurement uncertainty	+ 2.4 dB, - 3.0 dB		

LIMIT CLAUSE 5.2.8

(The blocking ratio, for any frequency within the specified ranges shall not be less than 84 dB, except at frequencies on which spurious responses are found, clause 9.7 refers.).

TEST EQUIPMENT USED: 31, 33, 314, 102, 99, 131, 133, 134, 136, 62, 77, 403

Ambient temperature: 21.9 °C Relative humidity: 34.9 % Date: 19.01.2001 (conducted) (1)
 Ambient temperature: 21.4 °C Relative humidity: 38.2 % Date: 26.01.2001 (conducted) (4)
 Ambient temperature: 22.5 °C Relative humidity: 34.8 % Date: 06.02.2001 (radiated) (1)
 Ambient temperature: 21.3 °C Relative humidity: 34.8 % Date: 30.01.2001 (radiated) (4)

RECEIVER SPURIOUS RADIATION CLAUSE 9.10

Diversity receiver

FREQUENCY OF SPURIOUS	Channel 1		FREQUENCY OF SPURIOUS	Channel 4	
	Antenna connector			Antenna connector	
	“RX/TX”	“RX”		“RX/TX”	“RX”
a) Conducted			a) Conducted		
322.45	- 62.6 dBm	- 67.3 dBm	397.45	- 62.5 dBm	- 60.7 dBm
3224.50		- 65.5 dBm	3577.05	- 69.4 dBm	
3546.95	- 72.1 dBm		5166.85		- 63.6 dBm
3869.40	- 72.6 dBm		others 9 kHz – 12.75 GHz	< - 75.0 dBm	< - 75.0 dBm
others 9 kHz - 4 GHz	< - 75.0 dBm	< - 75.0 dBm			
b) Radiated			b) Radiated		
all 30 MHz - 1 GHz	< - 70.0 dBm		all 30 MHz - 1 GHz	< - 70.0 dBm	
all 1 GHz - 4 GHz	< - 55.0 dBm		3577.05	- 48.8 dBm	
			others 1 GHz - 4 GHz	< - 55.0 dBm	
Measurement uncertainty	Conducted: ± 1.8 dB Radiated: + 3.4, - 4.4 dB				

LIMIT CLAUSE 5.2.9

	FREQUENCY RANGE	LIMITS
CONDUCTED	9 kHz to 1 GHz	2.0 nW (- 57 dBm)
	above 1 GHz to 4 GHz, or above 1 GHz to 12.75 GHz, (subclause 9.10.2)	20.0 nW (- 47 dBm)
RADIATED	30 MHz to 1 GHz	2.0 nW (- 57 dBm)
	above 1 GHz to 4 GHz	20.0 nW (- 47 dBm)

TEST EQUIPMENT USED: 41, 390, 77, 403 (conducted)
 42, 205, 89, 92, 176, 185, 65, 66, 77, 403 (radiated)

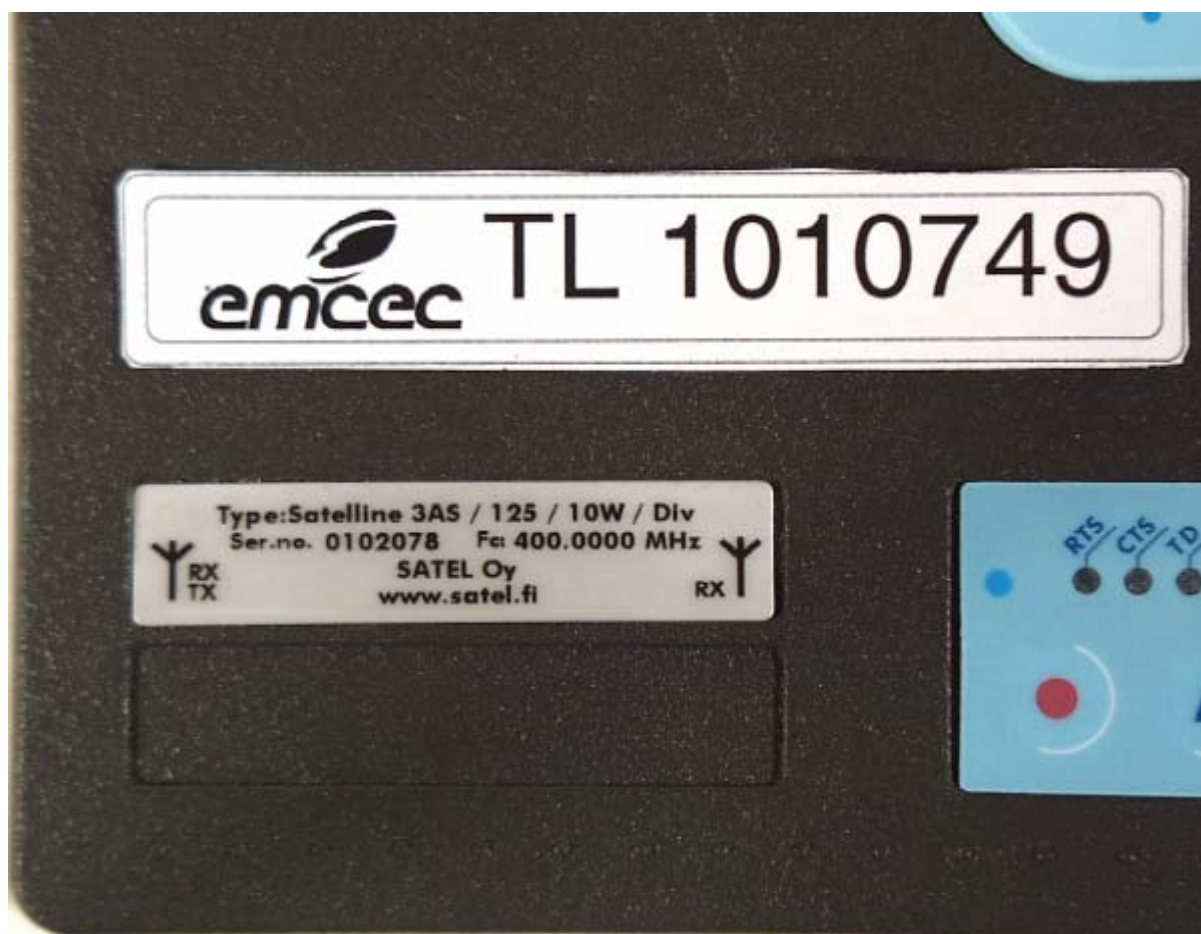


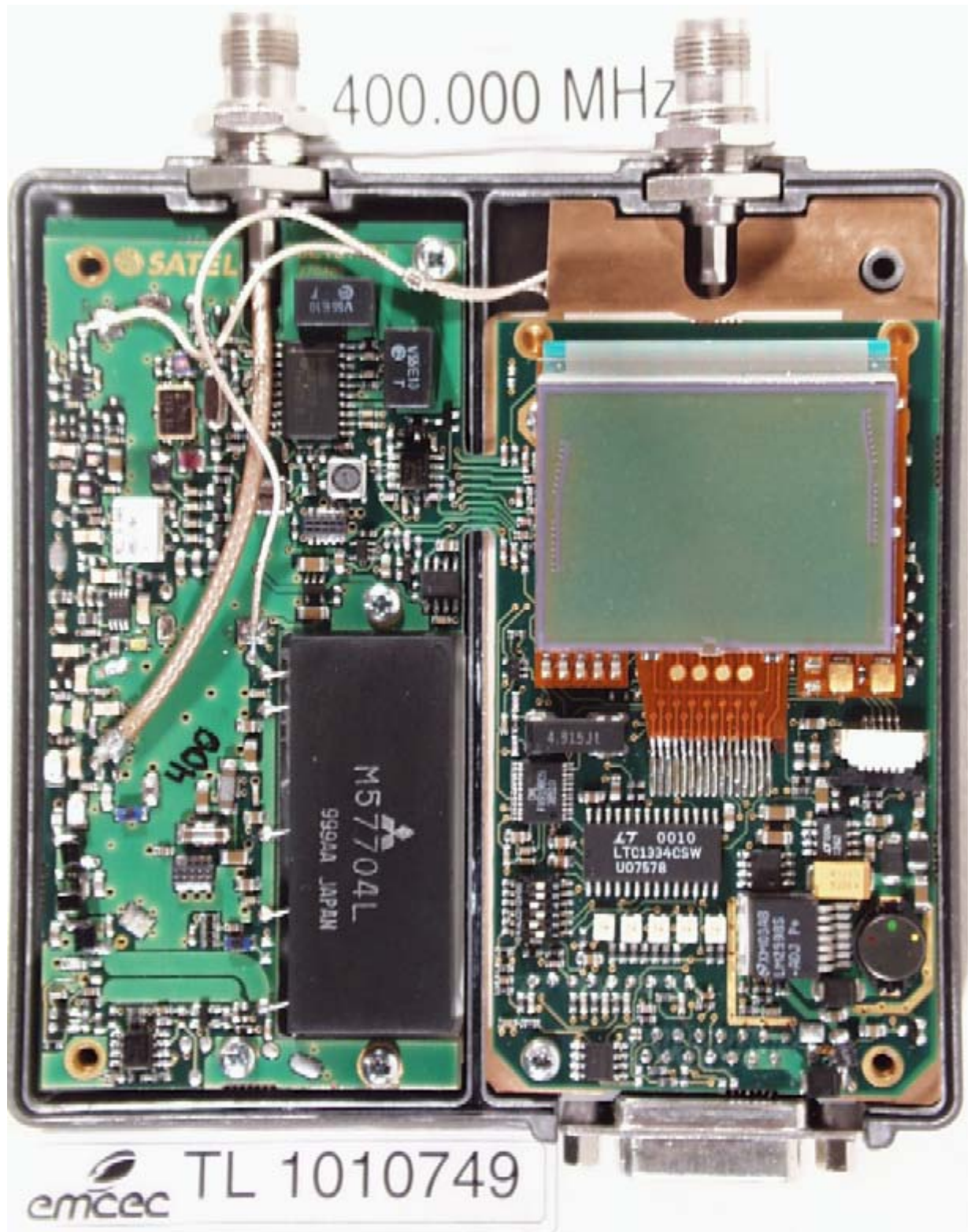


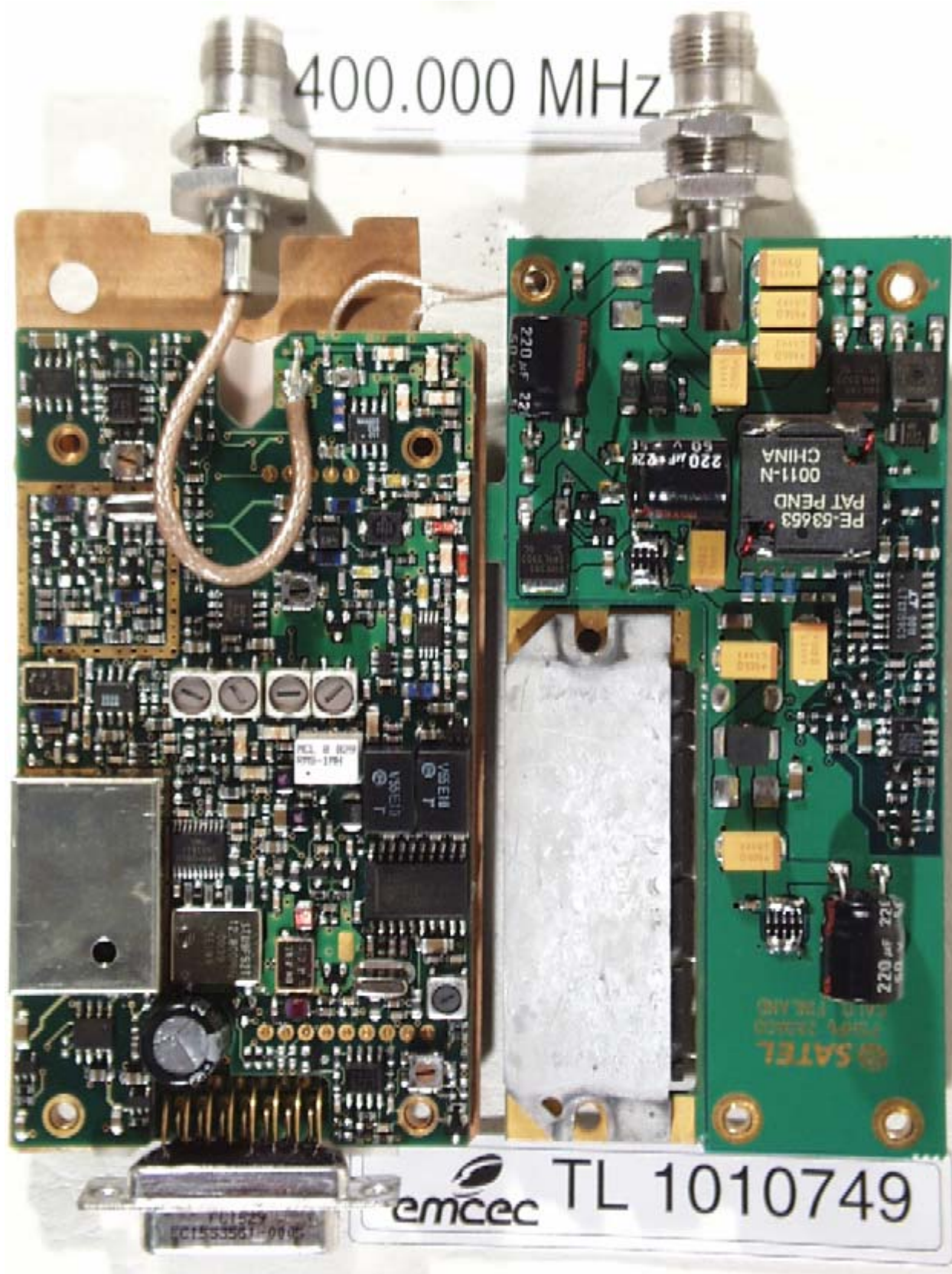




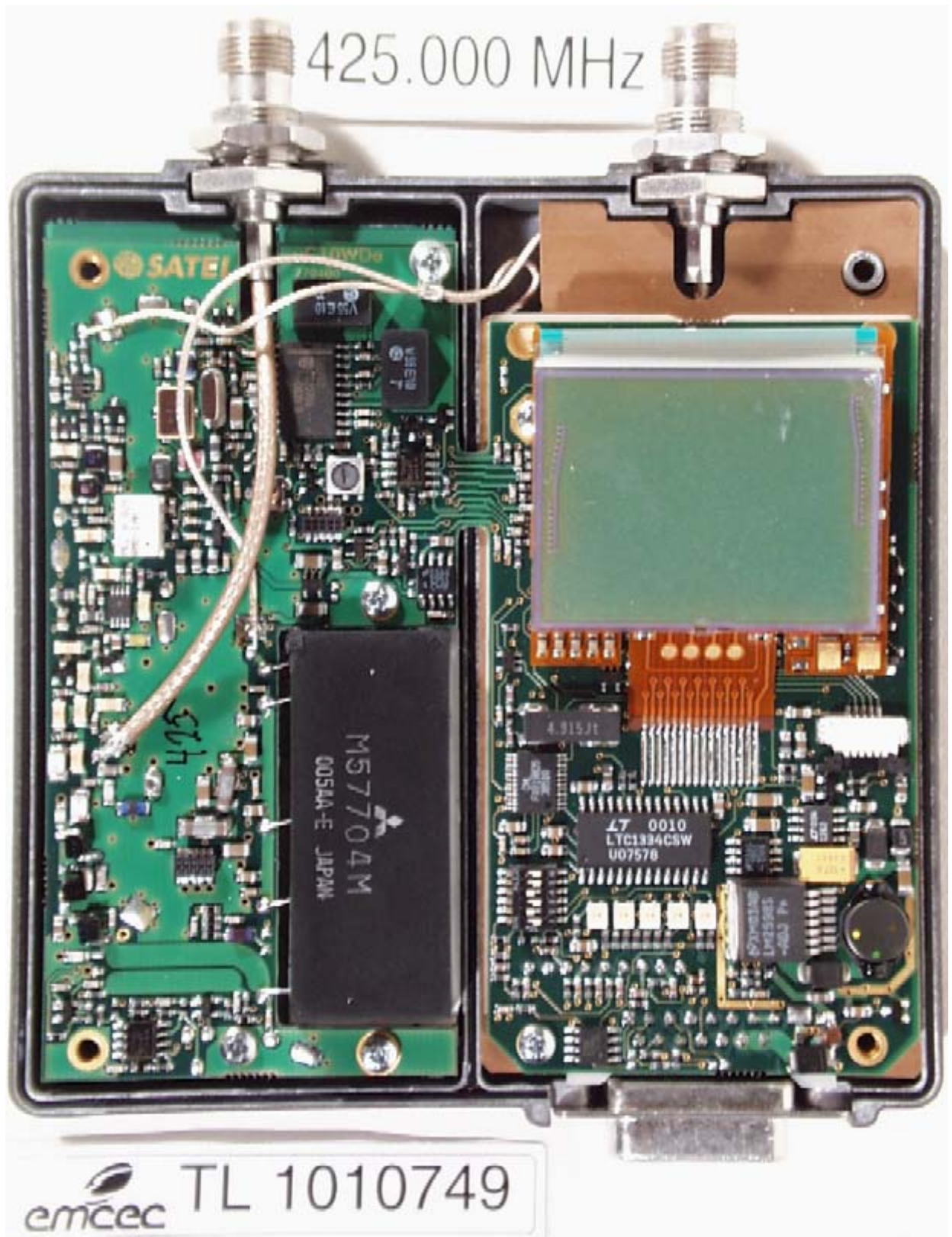






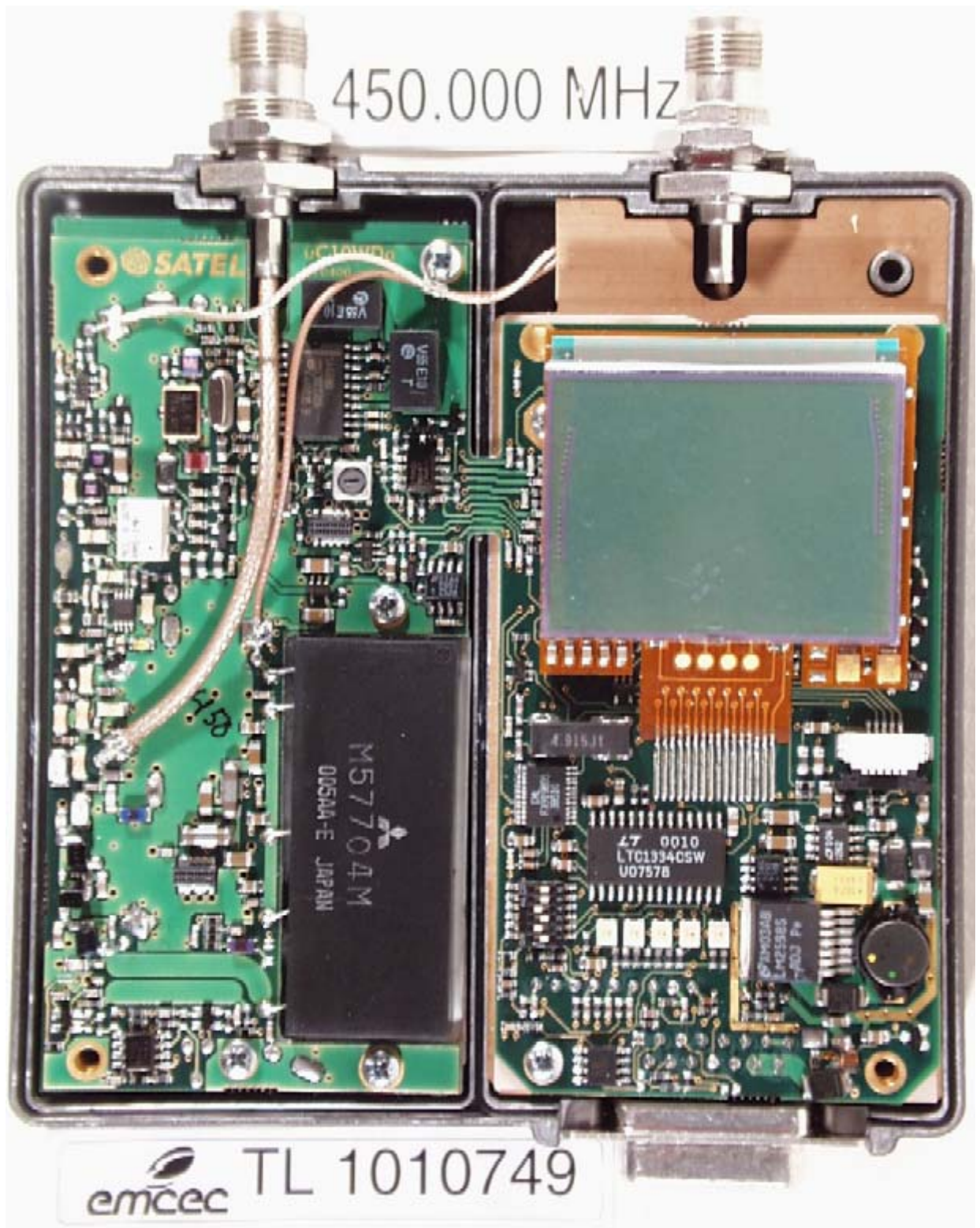


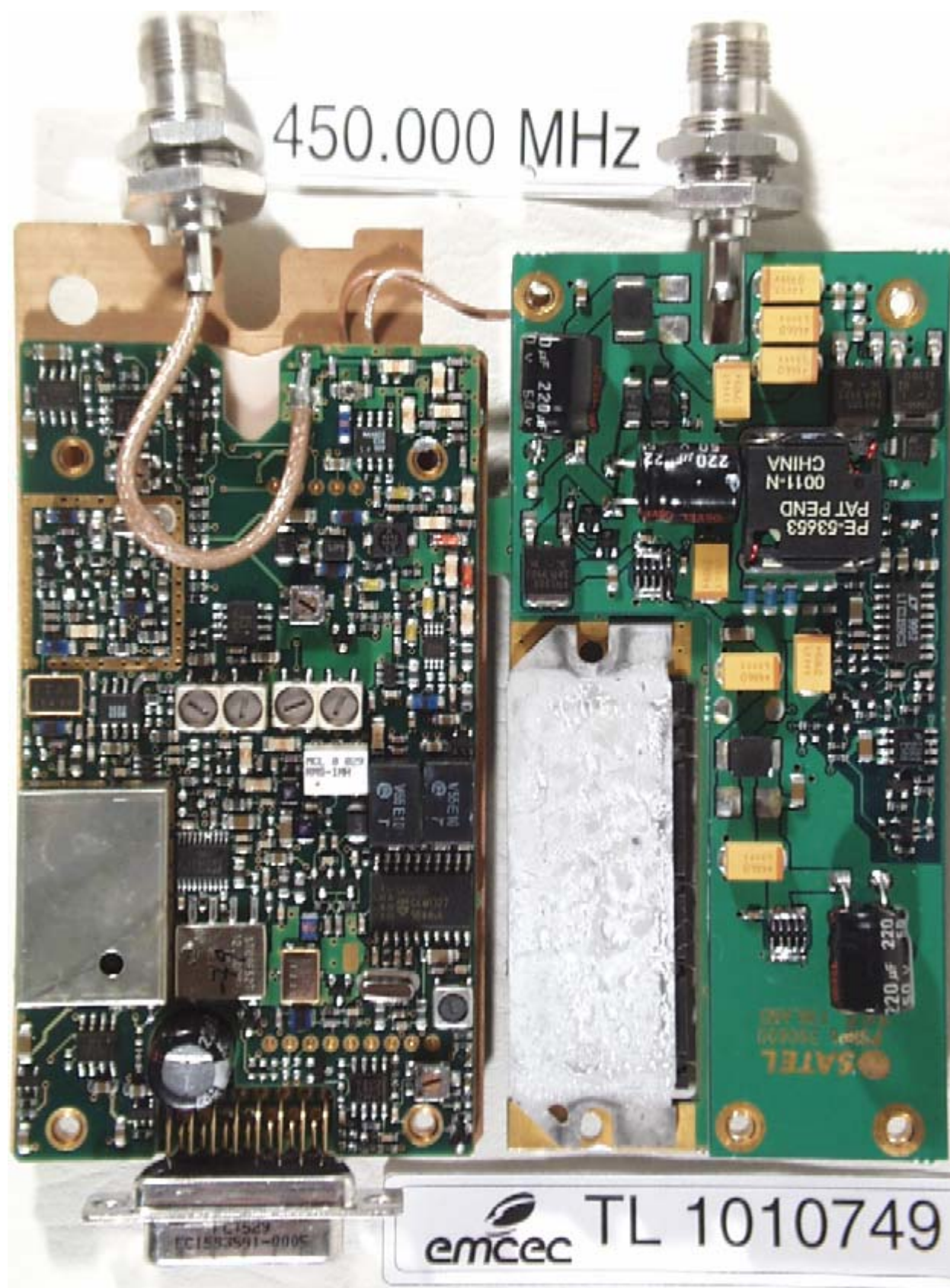






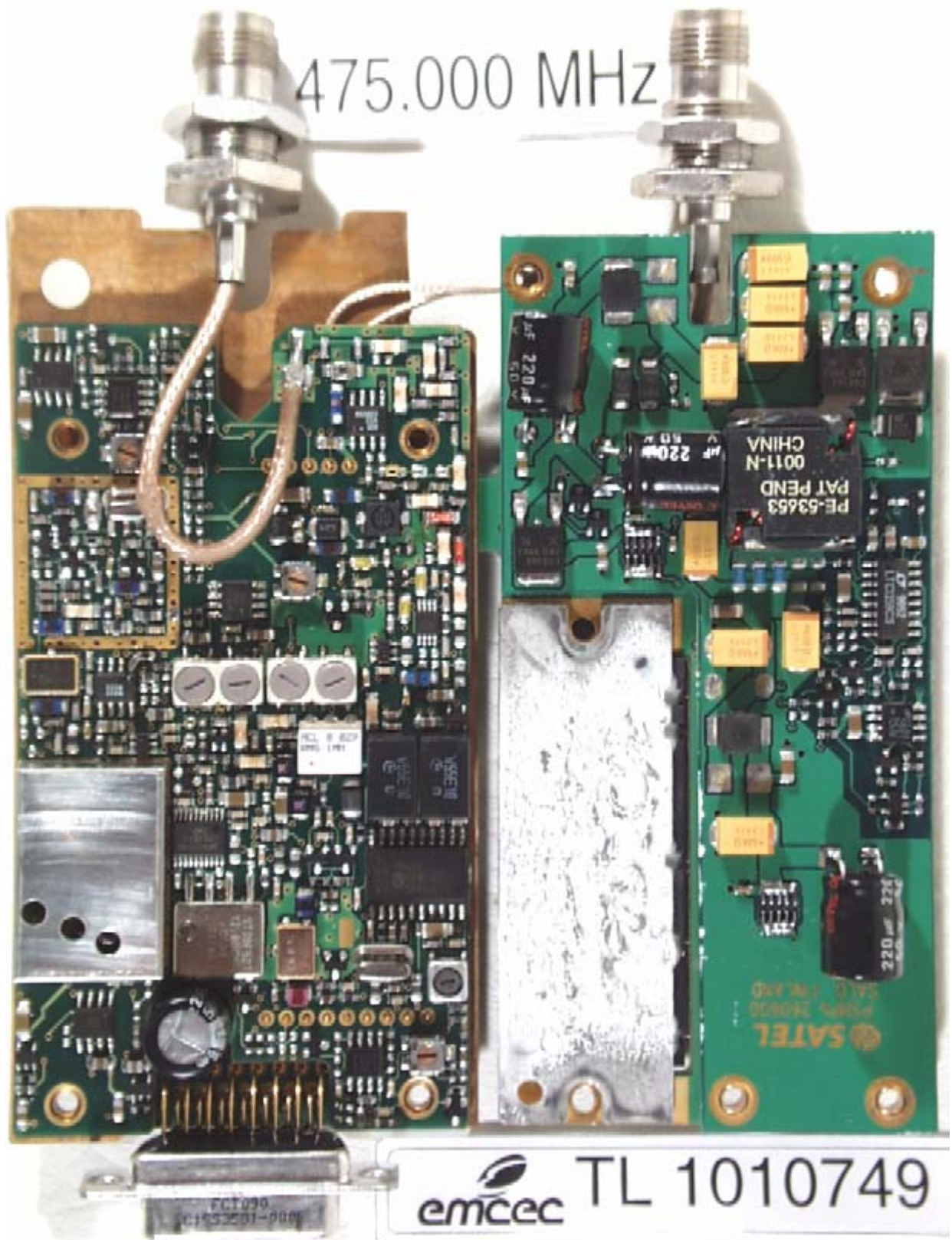












List of measuring equipment:

No.	Equipment	Type	Manufacturer	Serial Number
9	Modulation analyzer	8901B	Hewlett Packard	2718A01220
10	Oscilloscope	9400A	LeCroy	8878
31	RF generator	8642B	Hewlett Packard	2427A00131
32	RF generator	8642B	Hewlett Packard	2521A00226
33	RF generator	8642B	Hewlett Packard	2521A00232
41	Spectrum analyzer	8566B	Hewlett Packard	2005A01452
42	Spectrum analyzer	8568B	Hewlett Packard	2039a01256
48	Counter	351DCCN150	EiP Incorporated	00369
53	Counter	1999	Racal-Dana	1321
59	Power meter	435A	Hewlett Packard	1430000505
62	Audio amplifier	PRL ?	Self made	
65	RF amplifier	6616-605N	Watkins-Johnson	
66	RF amplifier	5325-507N	Watkins-Johnson	
77	Power supply	B32-20R	Oltronix	500
79	Power supply	B60-15R	Oltronix	512
89	Antenna	3147	EMCO	9202-1078
92	Antenna	VHA 9103 BBA 9106	Schwarzbeck	
99	Hybrid	H 9	Anzac	
102	Hybrid	H 9	Anzac	
120	RF High-Power Attenuator	765	Narda	
131	Termination 50□	908A	Hewlett Packard	
132	Termination 50□	908A	Hewlett Packard	
133	Termination 50□	370 BNM	Narda	
134	Termination 50□	370 BNM	Narda	
135	Termination 50□	370 BNM	Narda	
136	Termination 50□	370 BNM	Narda	
137	Termination 50□	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
175	Hybrid	T-1000	Anzac	
176	Anechoic chamber	888 cm x 585 cm x 416 cm	length of absorber	66 cm
185	Antenna	PRL LogPer	Self made	1A93
195	Calibrator	Fluke 515A	Fluke	18522
199	RF-Amplifier	ZHL-1042J	Mini-Circuits	
201	RF-Generator	2042	Marconi	119571/062
205	RF- Amplifier	ZHL-1042J	Mini-Circuits	012288-11
211	Bandpass Filter	TTF 1500-5-5EE	Telonic Berkeley Inc	93037-3
212	Bandpass Filter	TTF 3000-5-5EE	Telonic Berkeley Inc	93039-1
218	Power sensor	HP 8485A	Hewlett Packard	2942A08711
230	Thermometer	MT 120 KC	Eirelec Ltd.	0894/83
308	Internet advisor	J2300A	Hewlett Packard	3530A00685
314	RF generator	HP 8642B	Hewlett Packard	2535A00464
317	RF generator	2052	Marconi	119754/058
326	Power attenuator	765-6	Narda	-
327	Power attenuator	765-20	Narda	-
328	Power attenuator	765-20	Narda	-
329	Power attenuator	BN 745392	Spinner	12/93
330	Power attenuator	BN 745394	Spinner	36009
332	IF-filter	10.7MHz/25kHz	Ultracom Oy	-
333	IF-filter	10.7MHz/20kHz	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
341	Multimeter	Fluke 87	Fluke	593100386
350	Unechoic shielded room, 10 m test site, hybrid absorber			
362	Power supply	B32-20R	Oltronix	653
376	RF attenuator PAD	757 C - 20 dB	Narda	

375	RF attenuator PAD	757 C - 20 dB	Narda	
377	Attenuator	757 C - 20 dB	Narda	
380	RF attenuator PAD	771 C - 20 dB	Narda	
384	RF High-Power Attenuator	WA48-20	Weinschel	3698
385	RF attenuator PAD	WA2-3	Weinschel	3779
389	RF attenuator PAD	WA2-10	Weinschel	3783
390	RF attenuator PAD	WA2-10	Weinschel	3784
391	RF attenuator PAD	1A (3dB)	Weinschel	
392	RF attenuator PAD	1A (6dB)	Weinschel	
393	RF attenuator PAD	1A (10dB)	Weinschel	
394	RF attenuator PAD	1A (20dB)	Weinschel	
395	RF attenuator PAD	757 C - 10 dB	Narda	
403	Processmeter	787	Fluke	6975028

