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TEST REPORT

Racom_11102_TR_FCC version: A

Test of RipEX-400 Radiomodem

The tests have been carried out with reference to 47CFR Parts 2 and 90

Measured by: Radek Holý

Approved by: Karel Daněš

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1. Technical Summary And Test Results

1.1 Technical Summary

Applicant: **Racom s r.o.**
Mírová 1283
592 31 Nové Město na Moravě

Manufacturer: **Racom s.r.o.**
Mírová 1283
592 31 Nové Město na Moravě
Czech Republic

Produced By: **Racom s.r.o., Czech Republic**

Kind Of Equipment: **Radiomodem**

Type Designation(s): **RipEX-400**

Code: **RipEX-432**

RF Power: **0.1 W to 10 W**

Alignment Range: **432 MHz to 470 MHz**

Switching Range: **38 MHz**

Number Of Units: **1**

Finish Of Test: **6.3.2012**

Test made in **Racom s r.o.**
Mírová 1283
592 31 Nové Město na Moravě

1.2 Test Results of Unit No. 1 (432.0125 MHz)

Type Designation: **RipEX-400**
Code: **RipEX-432**
Serial No.: **10854108**
Channel Separation: **6.25 kHz, 12.5 kHz**
FW version **1.0.10.0**

Transmitter Part:
CH 1 **432.0125 MHz**

Receiver Part:
CH 1 **432.0125 MHz**

Power Supply Range: **Vnom = 20.0 V DC**
Vmin = 10.0 V DC
Vmax = 30.0 V DC

Temperature Range: **Tnom = Ambient temperature**
Tmin = -25 °C
Tmax = +60 °C

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10.0 W (unmodulated carrier - constant envelope modulation)

1.2.1. RF POWER OUTPUT AT TERMINALS

RULE PART NUMBER: 2.1046
TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	8.20	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W (unmodulated carrier - constant envelope modulation)

1.2.2. RF POWER OUTPUT AT TERMINALS

RULE PART NUMBER: 2.1046
TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	2.75	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

The measurement was carried out at maximum power level (unmodulated carrier - constant envelope modulation)

1.2.3. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS Temperature (°C)	FREQUENCY ERROR [ppm]		
	CH 1	CH 2	CH 3
-30	-0.50	--	--
-20	-0.10	--	--
-10	-0.20	--	--
0	-0.45	--	--
10	-0.25	--	--
20	-0.10	--	--
30	0.00	--	--
40	0.00	--	--
50	0.00	--	--
60	-0.05	--	--
Maximum frequency error	0.5 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	^{1,2,3} 100	100	200
25-50	20	20	50
72-76	5		50
150-174	^{5,11} 5	⁶ 5	^{4,6} 50

216-220	1.0		50
220-222	0.1	1.5	1.0
421-512	^{7,11,14} 2.5	⁸ 5	⁸ 5
806-809	¹⁴ 1.0	1.5	1.5
809-824	¹⁴ 1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	¹⁴ 0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	⁸ 300	300	300
Above 2450			
Note: ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14} FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

The measurement was carried out at maximum power level (unmodulated carrier - constant envelope modulation)

1.2.4. FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS Temperature (°C)	FREQUENCY ERROR [ppm]		
	CH 1	CH 2	CH 3
10.0V	0.0	--	--
15.0V	0.0	--	--
20.0V	0.0	--	--
25.0V	0.0	--	--
30.0V	0.0	--	--
Maximum frequency error	0.2 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	^{1,2,3} 100	100	200
25-50	20	20	50
72-76	5		50
150-174	^{5,11} 5	⁶ 5	^{4,6} 50
216-220	1.0		50
220-222	0.1	1.5	1.0
421-512	^{7,11,14} 2.5	⁸ 5	⁸ 5
806-809	¹⁴ 1.0	1.5	1.5
809-824	¹⁴ 1.5	2.5	2.5

851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	¹⁴ 0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	⁸ 300	300	300
Above 2450			
Note: ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14} FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 0.1 W

Test signal: 4-CPFSK, 10.42kbps; Random bit sequence

1.2.5. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6$ kHz	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$\text{Limit}_{(dBc)} = 55+10\log_{10}(P) = 55+10\log_{10}(0.1) = 45$ dBc

where P = RF output power in watts

$\text{Limit}_{(dBc)} = 50+10\log_{10}(P) = 50+10\log_{10}(0.1) = 40$ dBc

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609;

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK, 10.42kbps; Random bit sequence

1.2.6. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6 \text{ kHz}$	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$\text{Limit}_{(\text{dBc})} = 55+10\log_{10}(P) = 55+10\log_{10}(10) = 65 \text{ dBc}$

where P = RF output power in watts

$\text{Limit}_{(\text{dBc})} = 50+10\log_{10}(P) = 50+10\log_{10}(10) = 60 \text{ dBc}$

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM, 41.67kbps; Random bit sequence

1.2.7. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6$ kHz	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$\text{Limit}_{(dBc)} = 55+10\log_{10}(P) = 55+10\log_{10}(2.0) = 58$ dBc

where P = RF output power in watts

$\text{Limit}_{(dBc)} = 50+10\log_{10}(P) = 50+10\log_{10}(2.0) = 53$ dBc

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 0.5 W

Test signal: 16-DEQAM, 41.67kbps; Random bit sequence

1.2.8. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6$ kHz	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$$\text{Limit}_{(dBc)} = 55+10\log_{10}(P) = 55+10\log_{10}(0.5) = 52 \text{ dBc}$$

where P = RF output power in watts

$$\text{Limit}_{(dBc)} = 50+10\log_{10}(P) = 50+10\log_{10}(0.5) = 47 \text{ dBc}$$

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at minimum power level

1.2.9. TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+4.4 dB/-4.5 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6 \text{ kHz}$	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at maximum power level

1.2.10. TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
864.030	100	-42.2	-.-	-.-	-.-	-.-	-.-	-.-
For all other frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty								

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_0 > 4.6 \text{ kHz}$	$f_0 > 12.5$	$f_0 > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.2.13. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 1, GRAPH 2)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.2.14. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 3,GRAPH 4)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.2.15. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 5, GRAPH 6)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.2.16. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 7, GRAPH 8)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

The measurement at maximum power level

1.2.17. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.201, 2.202, 2.1033 (C) (14), 2.1049 (H), 2.1041; 90.203(J) (3)

TEST METHOD: TIA-603-D

TEST RESULTS:

Channel Spacing	6.25 kHz	12.5 kHz	6.25 kHz	6.25 kHz	6.25 kHz	12.5 kHz
Emission Type	4K35F1DDN	8K90F1DDN	5K00D1DEN	5K00G1DEN	5K00G1DDN	11K9D1DEN
Modulation	4-CPFSK	4-CPFSK	16-DEQAM	D8PSK	pi/4-DQPSK	16-DEQAM
Data Rate	5.21 kbit/s	10.42 kbit/s	17.36 kbit/s	13.02 kbit/s	8.68 kbit/s	41.67 kbit/s
Measured Peak Deviation	1.98 kHz	4.17 kHz	---	---	---	---
Measured 99% Occupied BW	4.15 kHz	8.85 kHz	5.04 kHz	5.02 kHz	4.93 kHz	11.99 kHz

Channel Spacing	12.5 kHz	12.5 kHz	12.5 kHz			
Emission Type	11K9G1DEN	11K9G1DDN	11K9G1DBN			
Modulation	D8PSK	pi/4-DQPSK	DPSK			
Data Rate	31.25 kbit/s	20.83 kbit/s	10.42 kbit/s			
Measured Peak Deviation	---	---	---			
Measured 99% Occupied BW	11.99 kHz	11.89 kHz	11.99 kHz			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK 5.21kbps; Random bit sequence

1.2.18. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 9)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 17.36kbps; Random bit sequence

1.2.19. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 10)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 13.02kbps; Random bit sequence

1.2.20. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 11)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 8.68kbps; Random bit sequence

1.2.21. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 12)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.2.22. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 13)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.2.23. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 14)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 31.25kbps; Random bit sequence

1.2.24. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 15)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 20.83kbps; Random bit sequence

1.2.25. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 16)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: DPSK 10.42kbps; Random bit sequence

1.2.26. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 17)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

1.3 Test Results of Unit No. 1 (451.0250 MHz)

Type Designation: **RipEX-400**
Code: **RipEX-432**
Serial No.: **10854108**
Channel Separation: **6.25 kHz, 12.5 kHz**
FW version **1.0.10.0**

Transmitter Part:
CH 1 **451.025 MHz**

Receiver Part:
CH 1 **451.025 MHz**

Power Supply Range: **Vnom = 20.0 V DC**
Vmin = 10.0 V DC
Vmax = 30.0 V DC

Temperature Range: **Tnom = Ambient temperature**
Tmin = -25 °C
Tmax = +60 °C

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10.0 W (unmodulated carrier - constant envelope modulation)

1.3.1. RF POWER OUTPUT AT TERMINALS

RULE PART NUMBER: 2.1046
TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	7.45	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W (unmodulated carrier - non-constant envelope modulation)

1.3.2. RF POWER OUTPUT AT TERMINALS

RULE PART NUMBER: 2.1046
TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	2.75	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

The measurement was carried out at maximum power level (unmodulated carrier - constant envelope modulation)

1.3.3. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS Temperature (°C)	FREQUENCY ERROR [ppm]		
	CH 1	CH 2	CH 3
-30	-0.45	--	--
-20	-0.10	--	--
-10	-0.15	--	--
0	-0.45	--	--
10	-0.26	--	--
20	-0.10	--	--
30	0.00	--	--
40	0.00	--	--
50	0.00	--	--
60	-0.05	--	--
Maximum frequency error	0.5 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	^{1,2,3} 100	100	200
25-50	20	20	50
72-76	5		50
150-174	^{5,11} 5	⁶ 5	^{4,6} 50

216-220	1.0		50
220-222	0.1	1.5	1.0
421-512	^{7,11,14} 2.5	⁸ 5	⁸ 5
806-809	¹⁴ 1.0	1.5	1.5
809-824	¹⁴ 1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	¹⁴ 0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	⁸ 300	300	300
Above 2450			
Note: ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14} FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

The measurement was carried out at maximum power level (unmodulated carrier - constant envelope modulation)

1.3.4. FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS Temperature (°C)	FREQUENCY ERROR [ppm]		
	CH 1	CH 2	CH 3
10.0V	0.0	--	--
15.0V	0.0	--	--
20.0V	0.0	--	--
25.0V	0.0	--	--
30.0V	0.0	--	--
Maximum frequency error	0.2 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	^{1,2,3} 100	100	200
25-50	20	20	50
72-76	5		50
150-174	^{5,11} 5	⁶ 5	^{4,6} 50
216-220	1.0		50
220-222	0.1	1.5	1.0
421-512	^{7,11,14} 2.5	⁸ 5	⁸ 5
806-809	¹⁴ 1.0	1.5	1.5
809-824	¹⁴ 1.5	2.5	2.5

851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	¹⁴ 0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	⁸ 300	300	300
Above 2450			
Note: ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14} FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 0.1 W

Test signal: 4-CPFSK, 10.42kbps; Random bit sequence

1.3.5. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6 \text{ kHz}$	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$$\text{Limit}_{(dBc)} = 55+10\log_{10}(P) = 55+10\log_{10}(0.1) = 45 \text{ dBc}$$

where P = RF output power in watts

$$\text{Limit}_{(dBc)} = 50+10\log_{10}(P) = 50+10\log_{10}(0.1) = 40 \text{ dBc}$$

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609;

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK, 10.42kbps; Random bit sequence

1.3.6. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6 \text{ kHz}$	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$\text{Limit}_{(\text{dBc})} = 55+10\log_{10}(P) = 55+10\log_{10}(10) = 65 \text{ dBc}$

where P = RF output power in watts

$\text{Limit}_{(\text{dBc})} = 50+10\log_{10}(P) = 50+10\log_{10}(10) = 60 \text{ dBc}$

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM, 41.67kbps; Random bit sequence

1.3.7. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6 \text{ kHz}$	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$\text{Limit}_{(dBc)} = 55+10\log_{10}(P) = 55+10\log_{10}(2.0) = 65 \text{ dBc}$

where P = RF output power in watts

$\text{Limit}_{(dBc)} = 50+10\log_{10}(P) = 50+10\log_{10}(2.0) = 60 \text{ dBc}$

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 0.5 W

Test signal: 16-DEQAM, 41.67kbps; Random bit sequence

1.3.8. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6$ kHz	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$$\text{Limit}_{(dBc)} = 55+10\log_{10}(P) = 55+10\log_{10}(0.5) = 52 \text{ dBc}$$

where P = RF output power in watts

$$\text{Limit}_{(dBc)} = 50+10\log_{10}(P) = 50+10\log_{10}(0.5) = 47 \text{ dBc}$$

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at minimum power level

1.3.9. TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+4.4 dB/-4.5 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_0 > 4.6$ kHz	$f_0 > 12.5$	$f_0 > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at maximum power level

1.3.10. TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
902.057	100	-38.1	--	--	--	--	--	--
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+4.4 dB/-4.5 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6 \text{ kHz}$	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.3.13. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 18,GRAPH 19)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.3.14. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 20, GRAPH 21)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.3.15. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 22, GRAPH 23)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.3.16. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 24, GRAPH 25)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

The measurement at maximum power level

1.3.17. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.201, 2.202, 2.1033 (C) (14), 2.1049 (H), 2.1041; 90.203(J) (3)

TEST METHOD: TIA-603-D

TEST RESULTS:

Channel Spacing	6.25 kHz	12.5 kHz	6.25 kHz	6.25 kHz	6.25 kHz	12.5 kHz
Emission Type	4K35F1DDN	8K90F1DDN	5K00D1DEN	5K00G1DEN	5K00G1DDN	11K9D1DEN
Modulation	4-CPFSK	4-CPFSK	16-DEQAM	D8PSK	pi/4-DQPSK	16-DEQAM
Data Rate	5.21 kbit/s	10.42 kbit/s	17.36 kbit/s	13.02 kbit/s	8.68 kbit/s	41.67 kbit/s
Measured Peak Deviation	2.00 kHz	4.09 kHz	---	---	---	---
Measured 99% Occupied BW	4.40 kHz	8.89 kHz	5.07 kHz	5.02 kHz	4.92 kHz	11.99 kHz

Channel Spacing	12.5 kHz	12.5 kHz	12.5 kHz			
Emission Type	11K9G1DEN	11K9G1DDN	11K9G1DBN			
Modulation	D8PSK	pi/4-DQPSK	DPSK			
Data Rate	31.25 kbit/s	20.83 kbit/s	10.42 kbit/s			
Measured Peak Deviation	---	---	---			
Measured 99% Occupied BW	12.01 kHz	11.91 kHz	11.91 kHz			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK 5.21kbps; Random bit sequence

1.3.18. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 26)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 17.36kbps; Random bit sequence

1.3.19. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 27)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3\text{kHz})$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 13.02kbps; Random bit sequence

1.3.20. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 28)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 8.68kbps; Random bit sequence

1.3.21. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 29)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.3.22. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 30)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3\text{kHz})$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.3.23. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 31)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 31.25kbps; Random bit sequence

1.3.24. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 32)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 20.83kbps; Random bit sequence

1.3.25. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 33)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: DPSK 10.42kbps; Random bit sequence

1.3.26. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 34)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

1.4 Test Results of Unit No. 1 (469.9875 MHz)

Type Designation: **RipEX-400**
Code: **RipEX-432**
Serial No.: **10854108**
Channel Separation: **6.25 kHz, 12.5 kHz**
FW version **1.0.10.0**

Transmitter Part:
CH 1 **469.9875 MHz**

Receiver Part:
CH 1 **469.9875 MHz**

Power Supply Range: **Vnom = 20.0 V DC**
Vmin = 10.0 V DC
Vmax = 30.0 V DC

Temperature Range: **Tnom = Ambient temperature**
Tmin = -25 °C
Tmax = +60 °C

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10.0 W (unmodulated carrier - constant envelope modulation)

1.4.1. RF POWER OUTPUT AT TERMINALS

RULE PART NUMBER: 2.1046
TEST METHOD: TIA-603-D; 2.2.1
TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	7.73	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W (unmodulated carrier - non-constant envelope modulation)

1.4.2. RF POWER OUTPUT AT TERMINALS

RULE PART NUMBER: 2.1046
TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	2.78	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

The measurement was carried out at maximum power level (unmodulated carrier - constant envelope modulation)

1.4.3. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS Temperature (°C)	FREQUENCY ERROR [ppm]		
	CH 1	CH 2	CH 3
-30	-0.35	--	--
-20	-0.15	--	--
-10	-0.10	--	--
0	-0.45	--	--
10	-0.20	--	--
20	-0.10	--	--
30	0.00	--	--
40	0.00	--	--
50	0.00	--	--
60	-0.05	--	--
Maximum frequency error	0.5 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	^{1,2,3} 100	100	200
25-50	20	20	50
72-76	5		50
150-174	^{5,11} 5	⁶ 5	^{4,6} 50

216-220	1.0		50
220-222	0.1	1.5	1.0
421-512	^{7,11,14} 2.5	⁸ 5	⁸ 5
806-809	¹⁴ 1.0	1.5	1.5
809-824	¹⁴ 1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	¹⁴ 0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	⁸ 300	300	300
Above 2450			
Note: ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14} FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

The measurement was carried out at maximum power level (unmodulated carrier - constant envelope modulation)

1.4.4. FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS Temperature (°C)	FREQUENCY ERROR [ppm]		
	CH 1	CH 2	CH 3
10.0V	0.2	--	--
15.0V	0.2	--	--
20.0V	0.2	--	--
25.0V	0.2	--	--
30.0V	0.2	--	--
Maximum frequency error	0.2 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	^{1,2,3} 100	100	200
25-50	20	20	50
72-76	5		50
150-174	^{5,11} 5	⁶ 5	^{4,6} 50
216-220	1.0		50
220-222	0.1	1.5	1.0
421-512	^{7,11,14} 2.5	⁸ 5	⁸ 5
806-809	¹⁴ 1.0	1.5	1.5
809-824	¹⁴ 1.5	2.5	2.5

851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	¹⁴ 0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	⁸ 300	300	300
Above 2450			
Note: ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14} FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 0.1 W

Test signal: 4-CPFSK, 10.42kbps; Random bit sequence

1.4.5. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6 \text{ kHz}$	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$\text{Limit}_{(\text{dBc})} = 55+10\log_{10}(P) = 55+10\log_{10}(0.1) = 45 \text{ dBc}$

where P = RF output power in watts

$\text{Limit}_{(\text{dBc})} = 50+10\log_{10}(P) = 50+10\log_{10}(0.1) = 40 \text{ dBc}$

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609;

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK, 10.42kbps; Random bit sequence

1.4.6. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6$ kHz	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$\text{Limit}_{(\text{dBc})} = 55+10\log_{10}(P) = 55+10\log_{10}(10) = 65$ dBc

where P = RF output power in watts

$\text{Limit}_{(\text{dBc})} = 50+10\log_{10}(P) = 50+10\log_{10}(10) = 60$ dBc

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM, 41.67kbps; Random bit sequence

1.4.7. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6$ kHz	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$\text{Limit}_{(dBc)} = 55+10\log_{10}(P) = 55+10\log_{10}(2.0) = 58$ dBc

where P = RF output power in watts

$\text{Limit}_{(dBc)} = 50+10\log_{10}(P) = 50+10\log_{10}(2.0) = 53$ dBc

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 0.5 W

Test signal: 16-DEQAM, 41.67kbps; Random bit sequence

1.4.8. TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6 \text{ kHz}$	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

$$\text{Limit}_{(\text{dBc})} = 55+10\log_{10}(P) = 55+10\log_{10}(0.5) = 52 \text{ dBc}$$

where P = RF output power in watts

$$\text{Limit}_{(\text{dBc})} = 50+10\log_{10}(P) = 50+10\log_{10}(0.5) = 47 \text{ dBc}$$

where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at maximum power level

1.4.9. TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+4.4 dB/-4.5 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_0 > 4.6$ kHz	$f_0 > 12.5$	$f_0 > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at maximum power level

1.4.10. TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
939.982	100	-42.3	--	10	--	--	--	--
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+4.4 dB/-4.5 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	$f_o > 4.6 \text{ kHz}$	$f_o > 12.5$	$f_o > 250\%Bw$
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.4.13. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 35,GRAPH 36)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.4.14. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 37, GRAPH 38)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.4.15. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 39, GRAPH 40)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.4.16. TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 41, GRAPH 42)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	5.0	10
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	5.0	10
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	20	25
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10173; 10293; 900000609; 900000611

REMARKS: See chapter 4 for plots of frequency and power versus time,

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

The measurement at maximum power level

1.4.17. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.201, 2.202, 2.1033 (C) (14), 2.1049 (H), 2.1041; 90.203(J) (3)

TEST METHOD: TIA-603-D

TEST RESULTS:

Channel Spacing	6.25 kHz	12.5 kHz	6.25 kHz	6.25 kHz	6.25 kHz	12.5 kHz
Emission Type	4K35F1DDN	8K90F1DDN	5K00D1DEN	5K00G1DEN	5K00G1DDN	11K9D1DEN
Modulation	4-CPFSK	4-CPFSK	16-DEQAM	D8PSK	pi/4-DQPSK	16-DEQAM
Data Rate	5.21 kbit/s	10.42 kbit/s	17.36 kbit/s	13.02 kbit/s	8.68 kbit/s	41.67 kbit/s
Measured Peak Deviation	1.98 kHz	4.10 kHz	---	---	---	---
Measured 99% Occupied BW	4.42 kHz	8.89 kHz	5.04 kHz	5.04 kHz	4.95 kHz	11.99 kHz

Channel Spacing	12.5 kHz	12.5 kHz	12.5 kHz			
Emission Type	11K9G1DEN	11K9G1DDN	11K9G1DBN			
Modulation	D8PSK	pi/4-DQPSK	DPSK			
Data Rate	31.25 kbit/s	20.83 kbit/s	10.42 kbit/s			
Measured Peak Deviation	---	---	---			
Measured 99% Occupied BW	11.99 kHz	11.78 kHz	11.94 kHz			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK 5.21kbps; Random bit sequence

1.4.18. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 43)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 17.36kbps; Random bit sequence

1.4.19. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 44)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 13.02kbps; Random bit sequence

1.4.20. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 45)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 8.68kbps; Random bit sequence

1.4.21. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 46)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.4.22. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 47)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.4.23. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 48)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 31.25kbps; Random bit sequence

1.4.24. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 49)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 20.83kbps; Random bit sequence

1.4.25. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 50)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) °C

Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: DPSK 10.42kbps; Random bit sequence

1.4.26. TRANSMITTER OCCUPIED BANDWIDTH

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 51)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30 + 16.67 \cdot (f_d - 3\text{kHz})$ or $55 + 10 \cdot \log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55 + 10 \cdot \log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27 \cdot (f_d - 2.88\text{kHz})$	$5.625 < f_o < 12.5$
	$50 + 10 \cdot \log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83 \cdot \log_{10}(f_d/5)$	$5 < f_o < 10$
	$29 \cdot \log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43 + 10 \cdot \log_{10}(P)$	$250\%Bw < f_o$
	<i>Note: P is output power in W; f_d displacement frequency in kHz</i>	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

1.5 Summary of Test Results

P = Complied with the requirements of the specification for this test
U = The results were within measurement uncertainties
F = Not complied with the requirements of the specification for this test
N/A = Not applicable

Unit No. 1 (432.0125 MHz)

RF POWER OUTPUT AT TERMINALS	P
FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION.....	P
TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS	P
TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS	P
TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (25 kHz).....	P
TRANSMITTER OCCUPIED BANDWIDTH	P
TRANSMITTER OCCUPIED BANDWIDTH FOR EMISSION DESIGNATORS.....	P

Unit No. 1 (451.0250 MHz)

RF POWER OUTPUT AT TERMINALS	P
FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION.....	P
TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS	P
TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS	P
TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (25 kHz).....	P
TRANSMITTER OCCUPIED BANDWIDTH	P
TRANSMITTER OCCUPIED BANDWIDTH FOR EMISSION DESIGNATORS.....	P

Unit No. 1 (469.9875 MHz)

RF POWER OUTPUT AT TERMINALS P

FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION..... P

TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS P

TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS P

TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (25 kHz)..... P

TRANSMITTER OCCUPIED BANDWIDTH P

TRANSMITTER OCCUPIED BANDWIDTH FOR EMISSION DESIGNATORS..... P

2. Test Equipment

[illegible]

3. Additional Information

4. Graphs

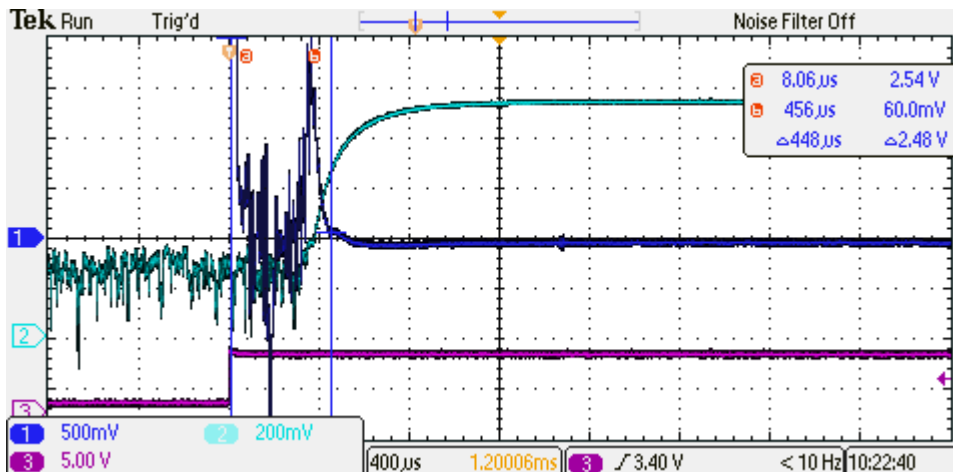
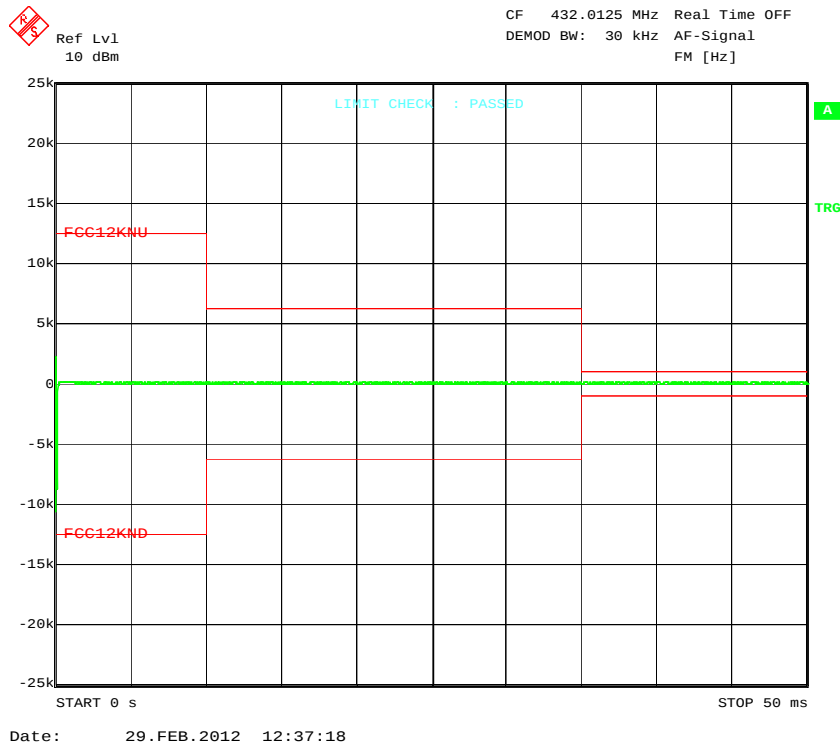
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4.1 Graphs - Unit No.1

GRAPH 1: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

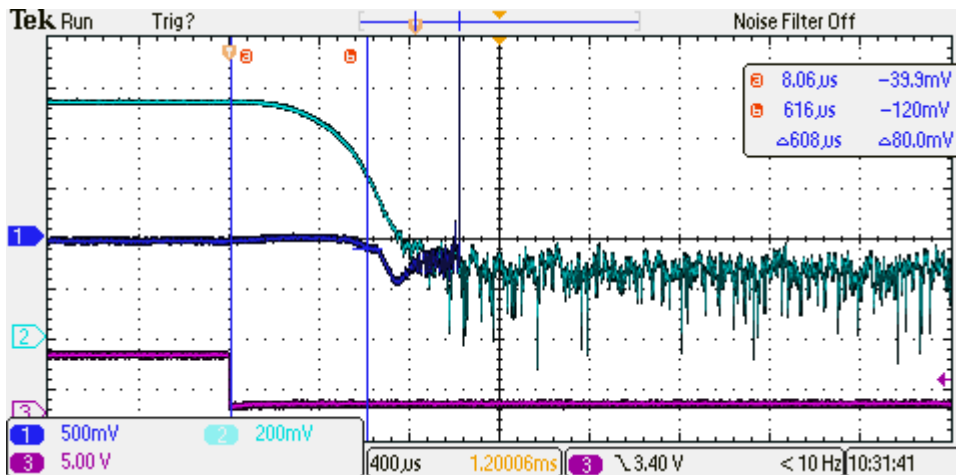
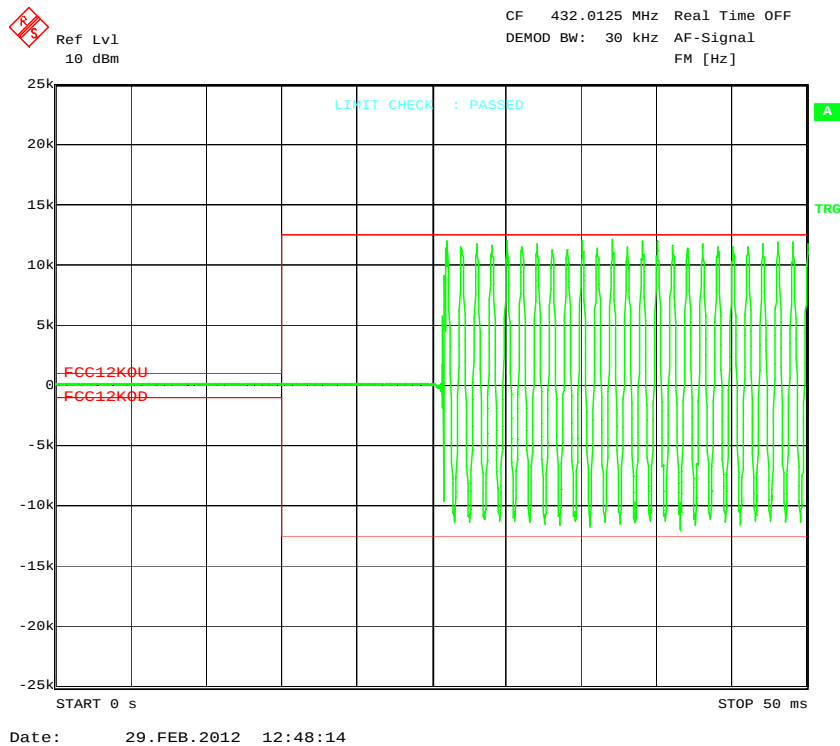


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 2: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF

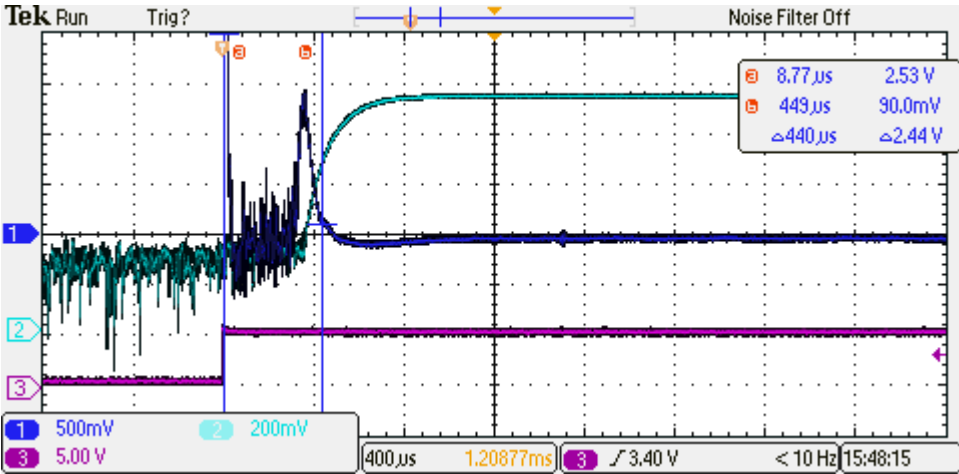
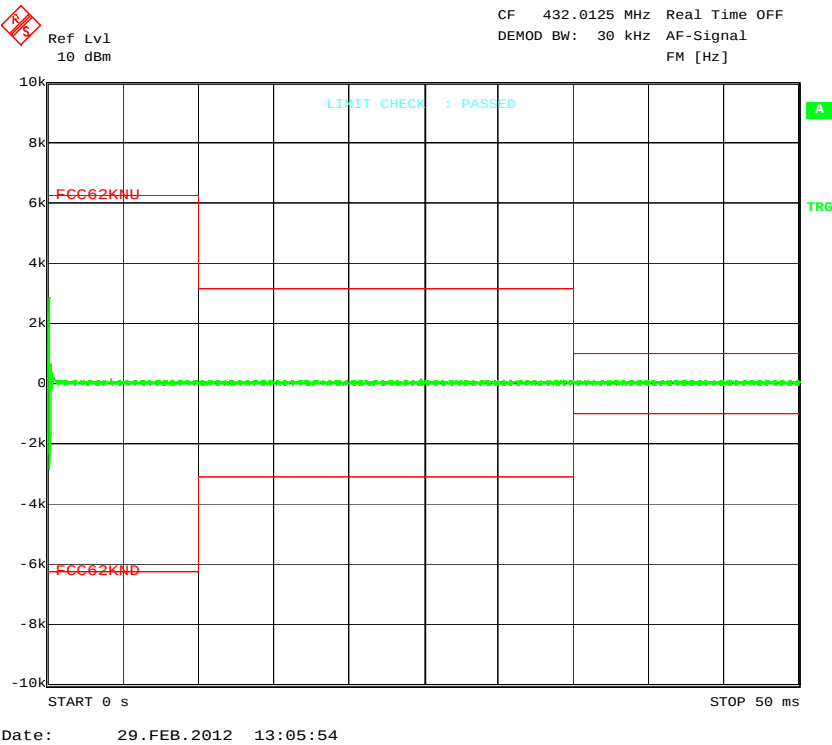


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 3: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

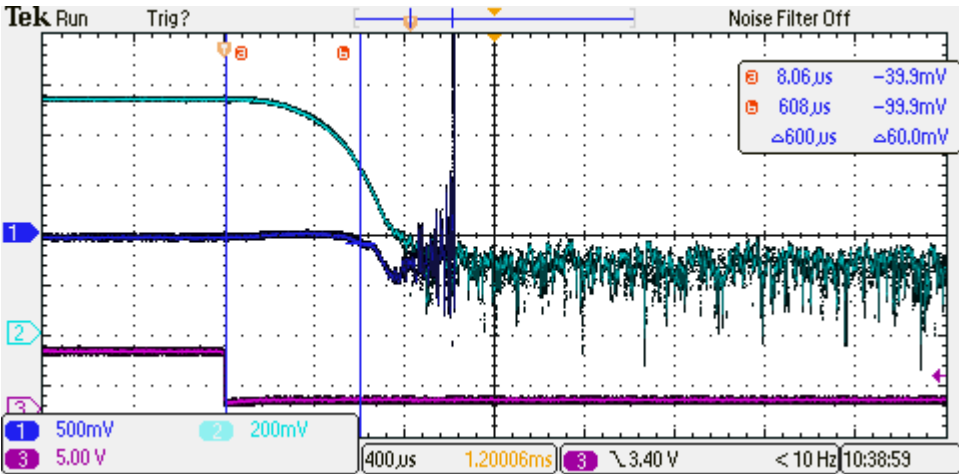
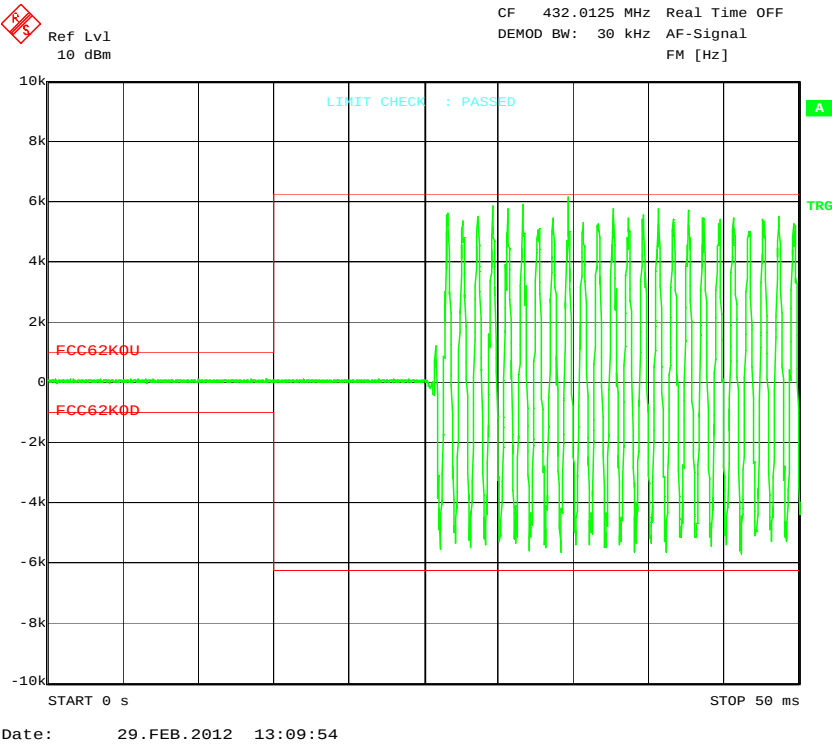


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

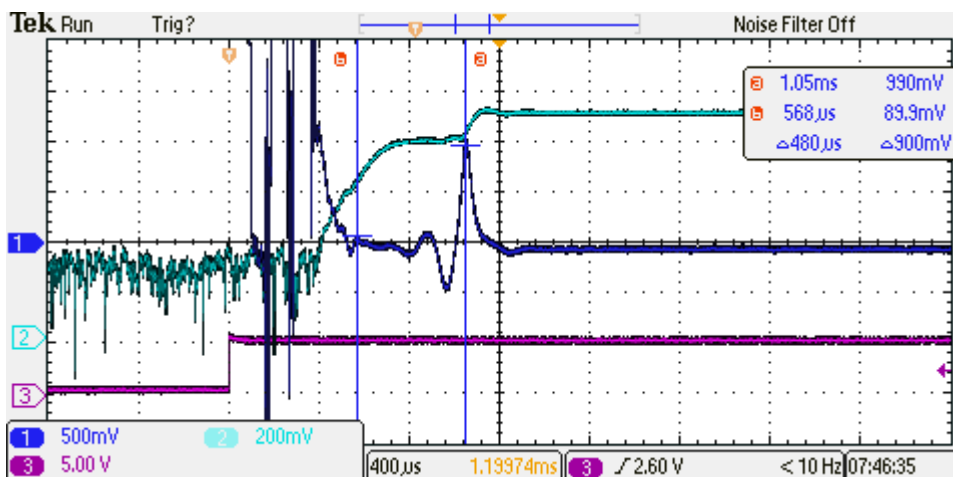
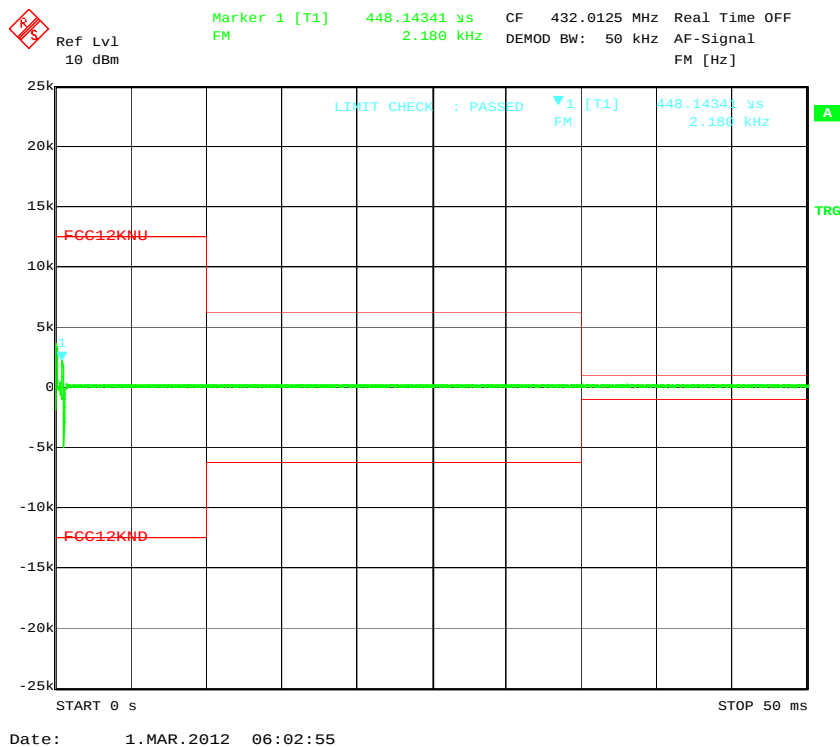
violet – PTT

GRAPH 4: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



blue – power as a function of time (90 mV/10dB)
dark blue – frequency as a function of time (200mV/1kHz)
violet – PTT

GRAPH 5: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

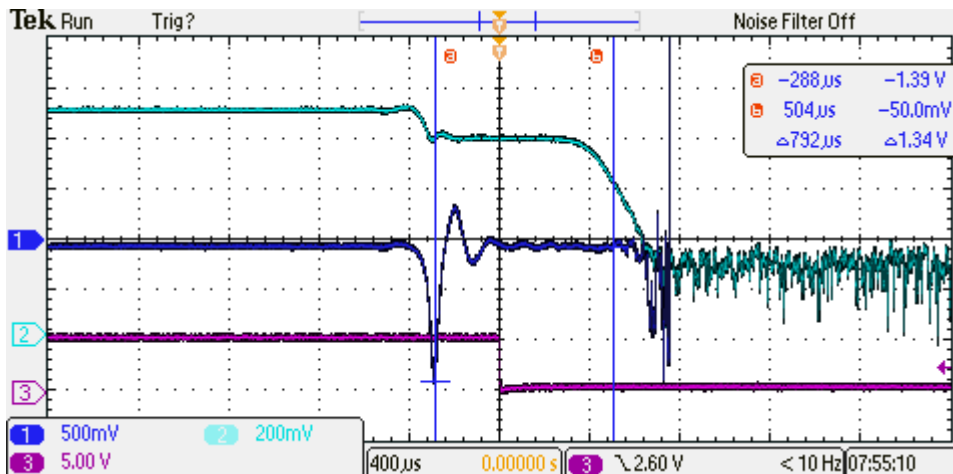
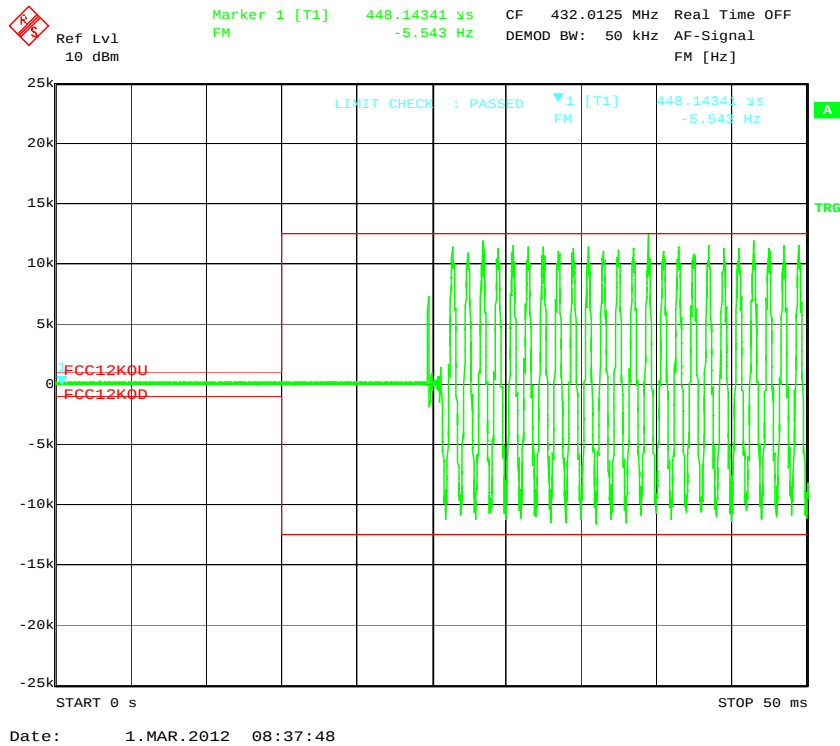


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 6: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF

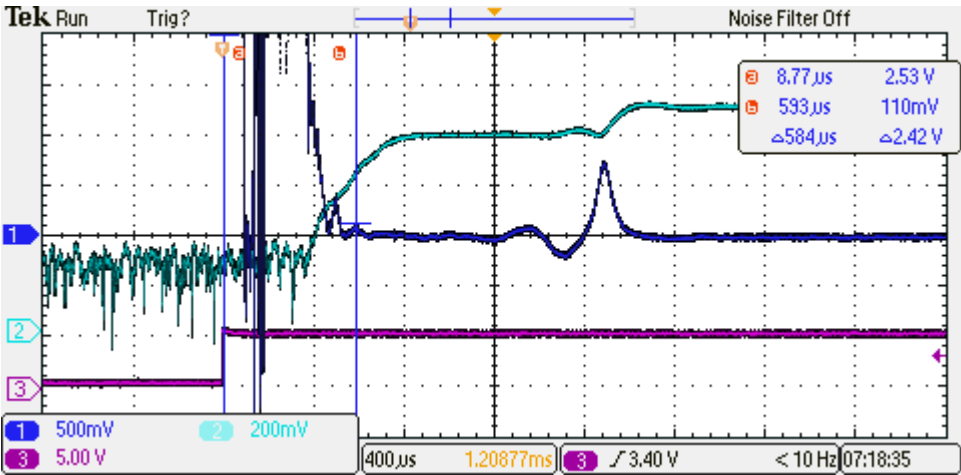
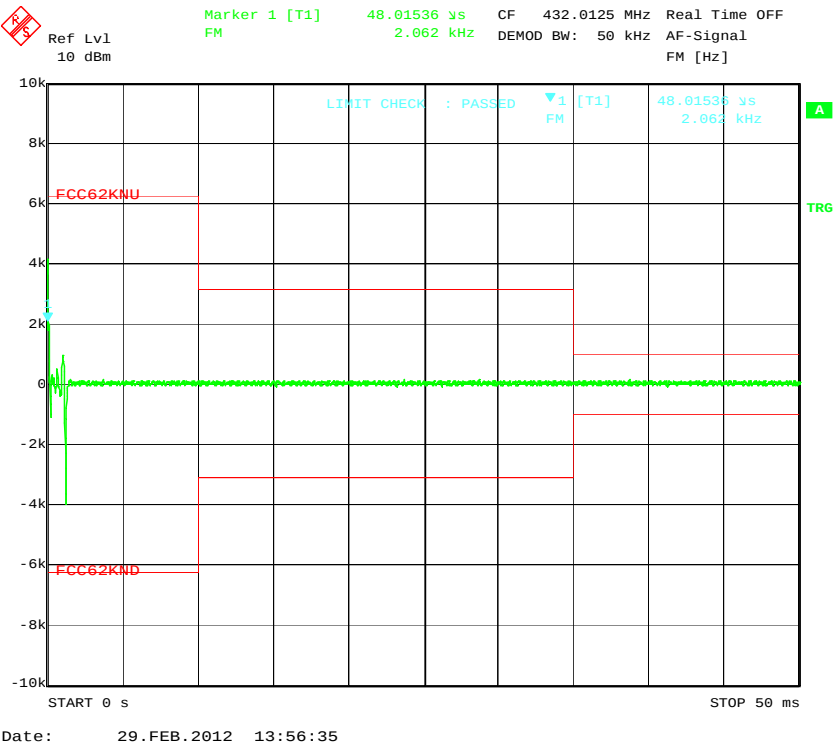


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 7: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

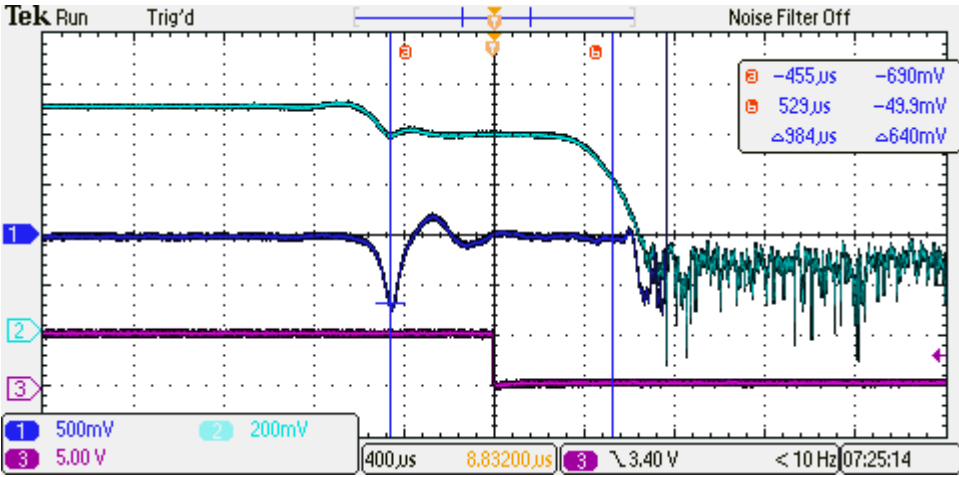
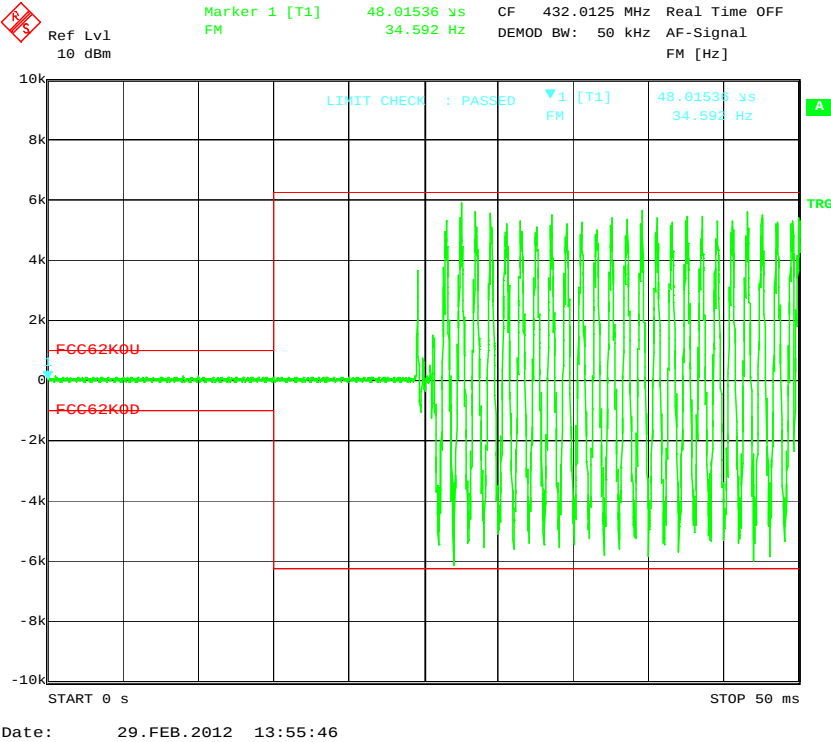


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 8: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF

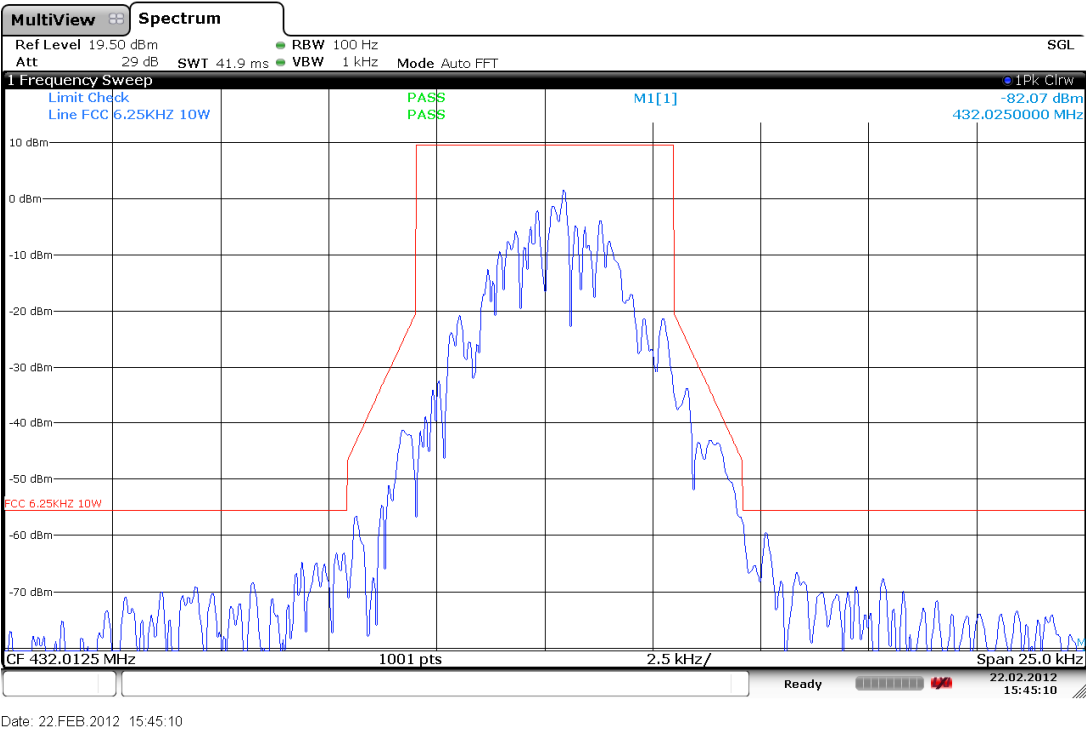


blue – power as a function of time (90 mV/10dB)

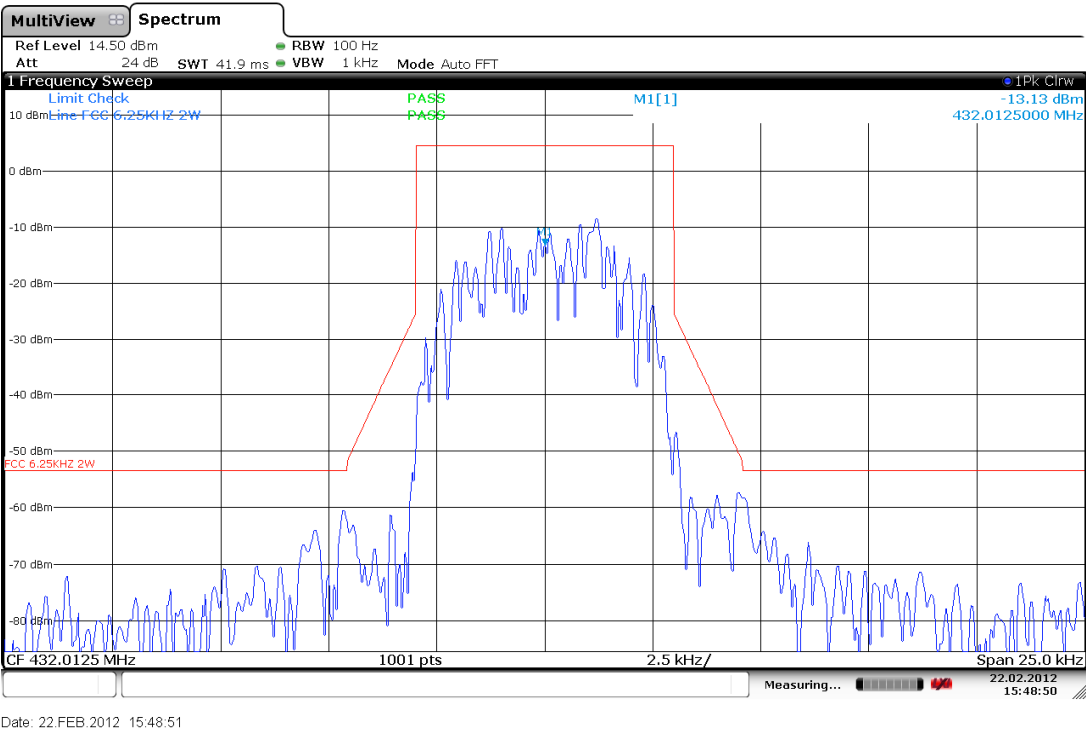
dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

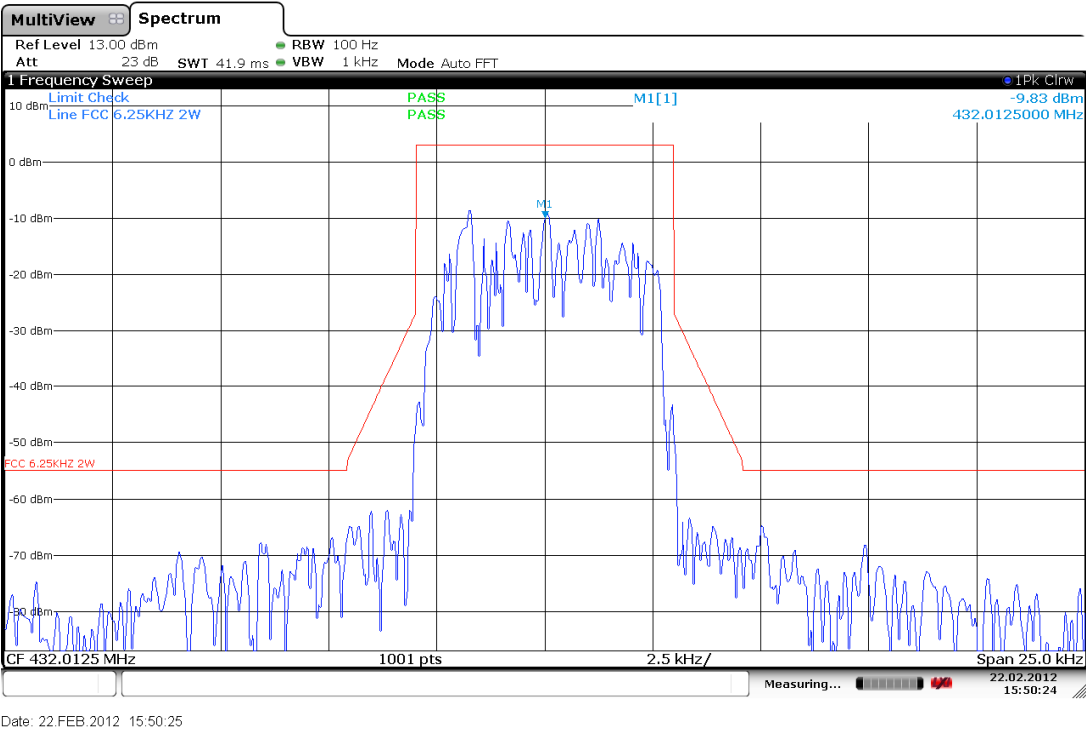
GRAPH 9: Spectrum for Emission 6.25 kHz 4-CPFSK



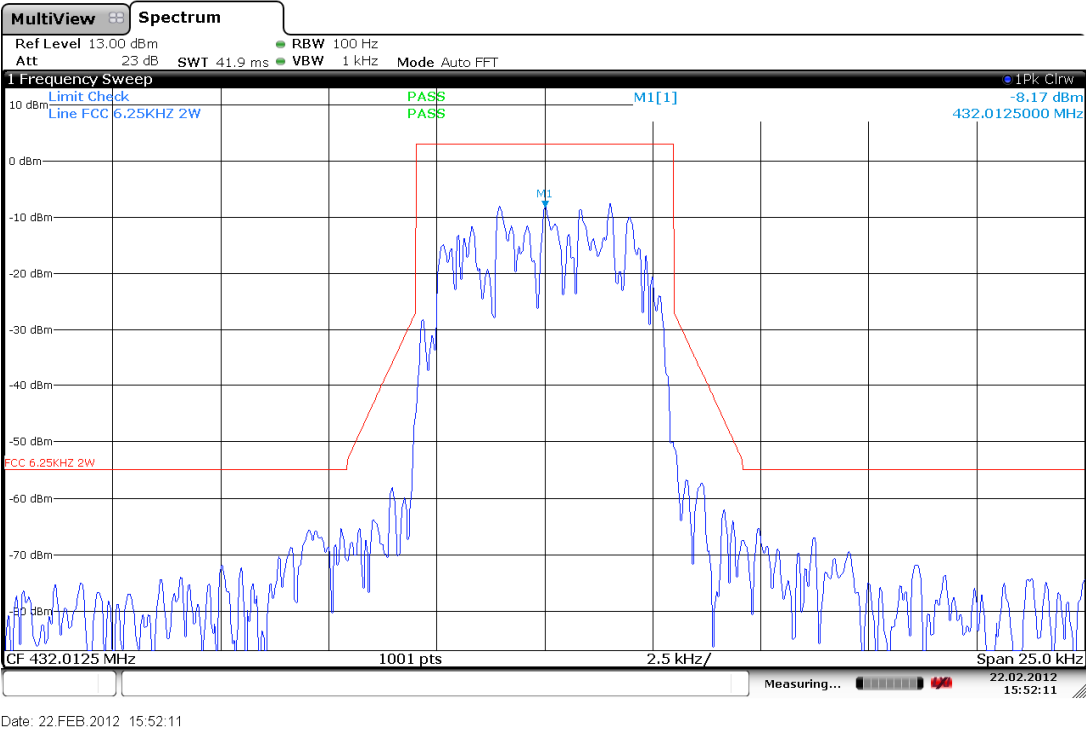
GRAPH 10: Spectrum for Emission 6.25 kHz 16-DEQAM



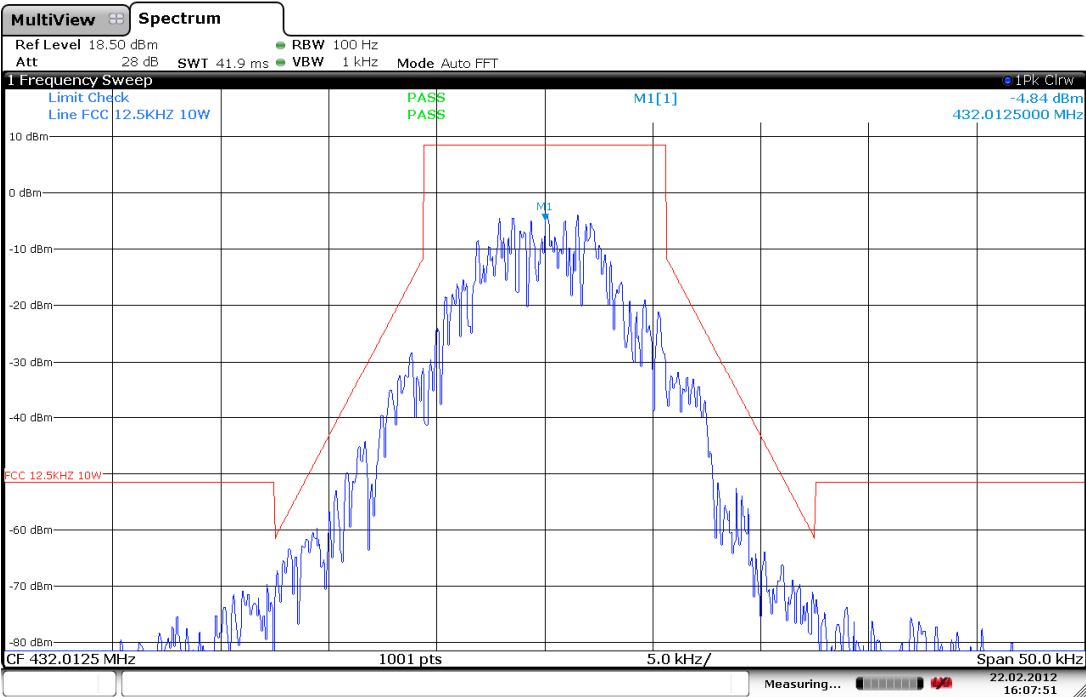
GRAPH 11: Spectrum for Emission 6.25 kHz D8PSK



GRAPH 12: Spectrum for Emission 6.25 kHz pi/4-DQPSK

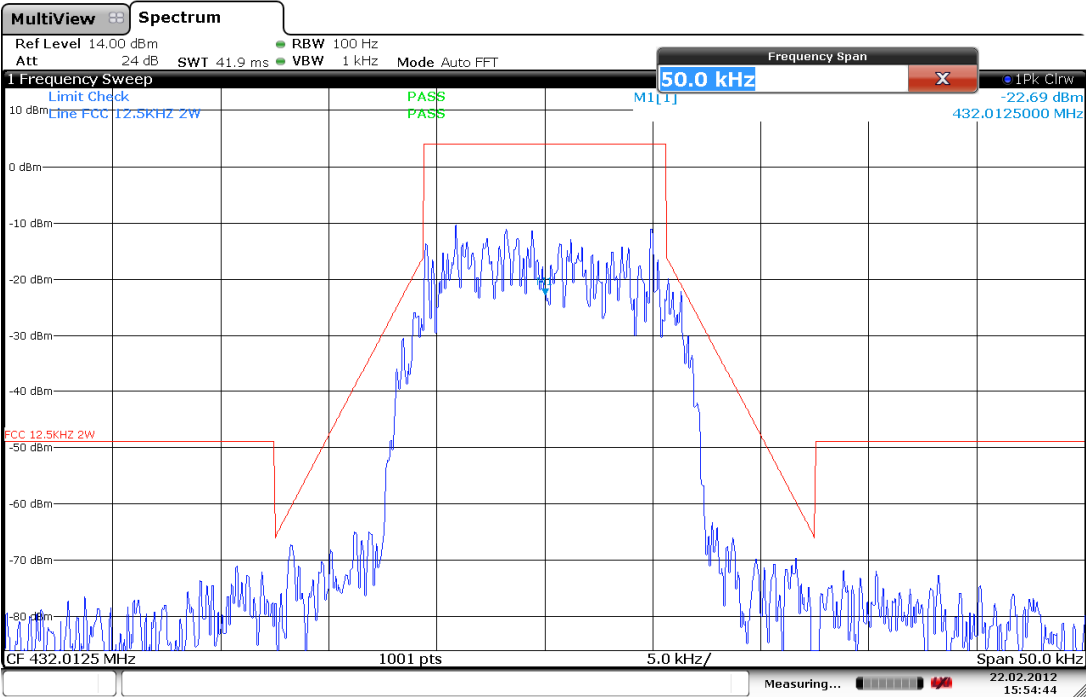


GRAPH 13: Spectrum for Emission 12.5 kHz 4-CPFSK



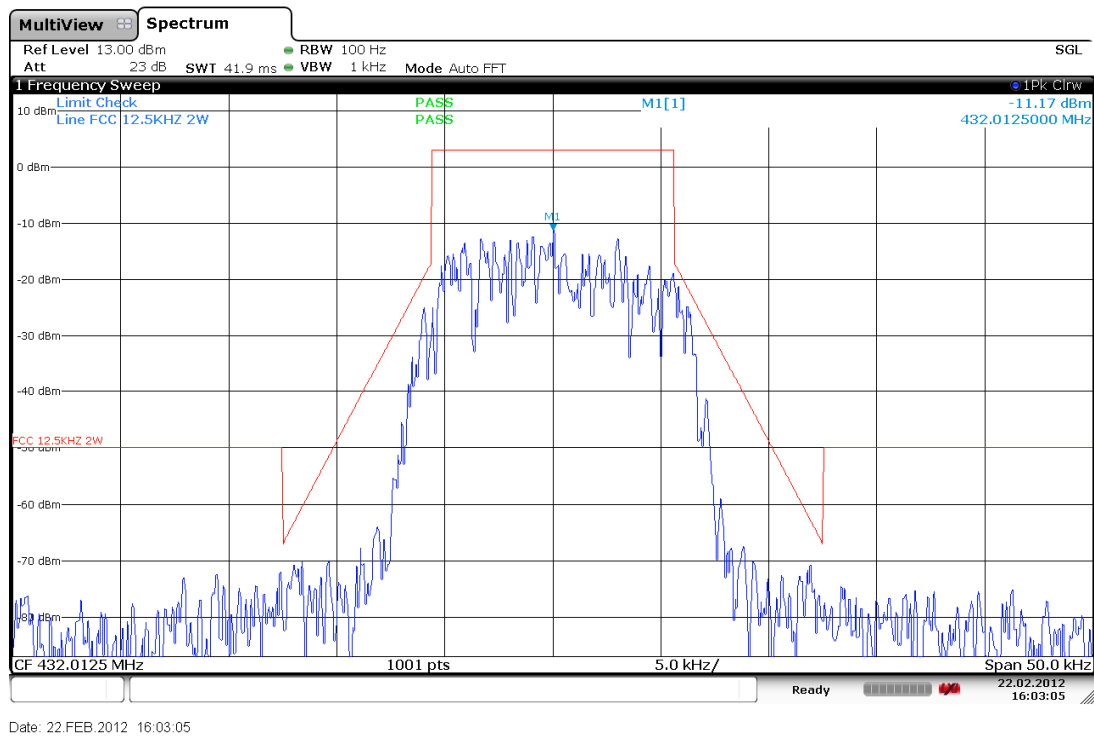
Date: 22.FEB.2012 16:07:51

GRAPH 14: Spectrum for Emission 12.5 kHz 16-DEQAM

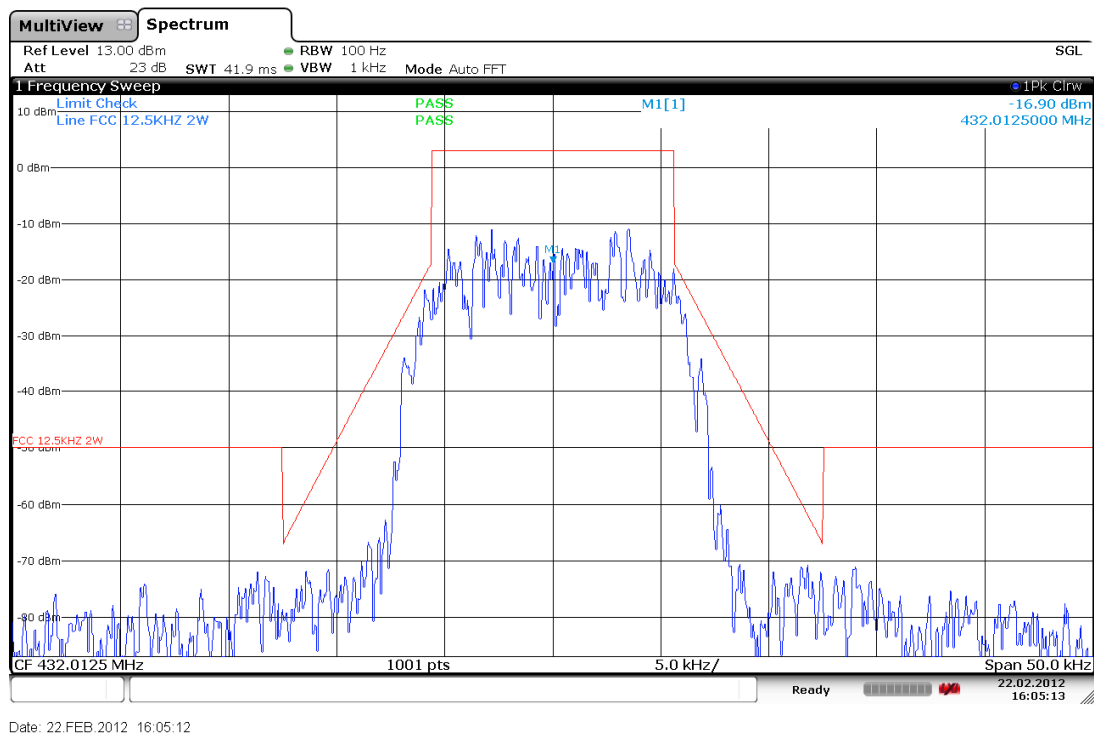


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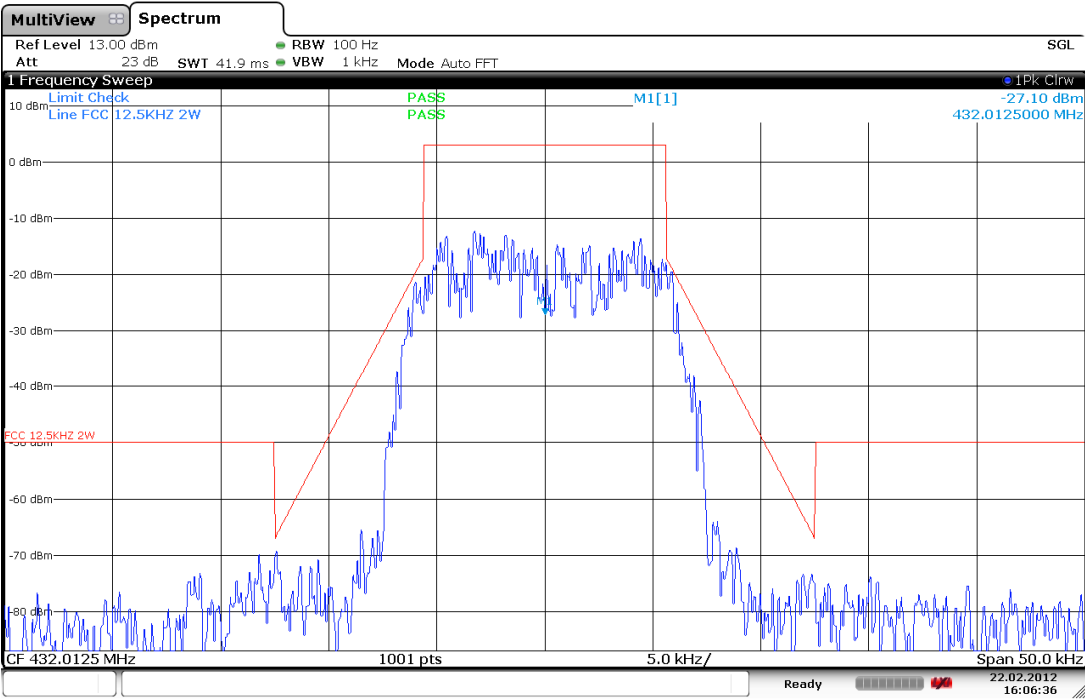
GRAPH 15: Spectrum for Emission 12.5 kHz D8PSK



GRAPH 16: Spectrum for Emission 12.5 kHz pi/4-DQPSK



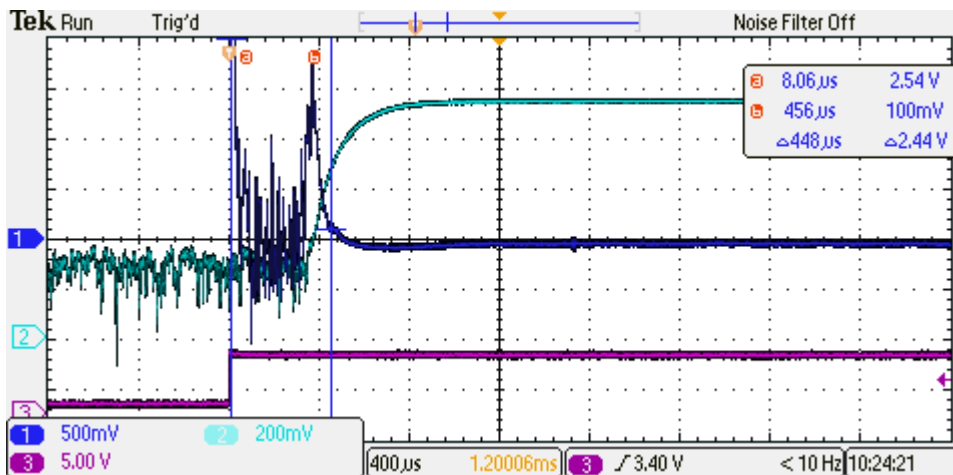
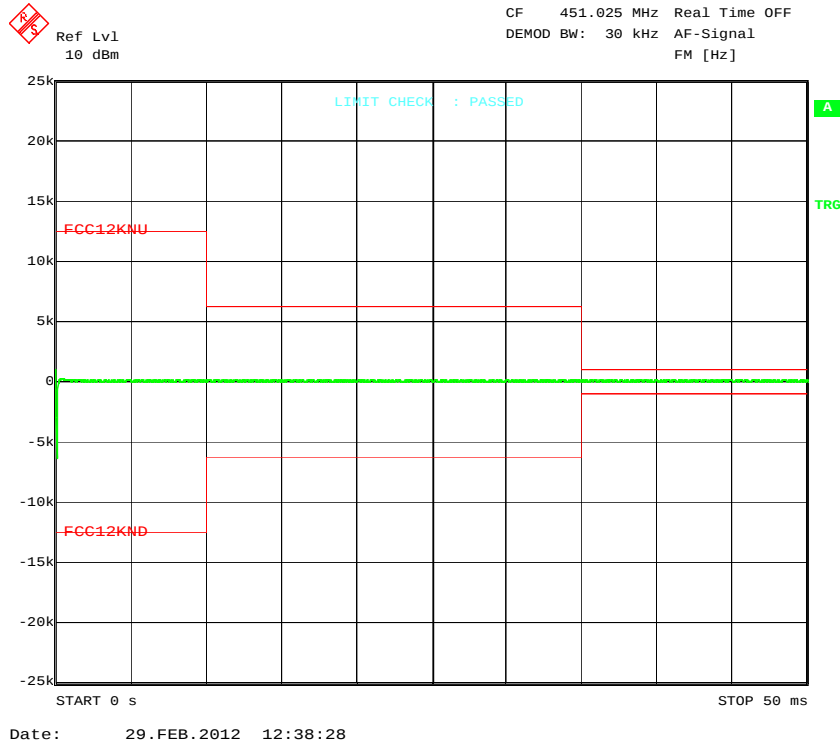
GRAPH 17: Spectrum for Emission 12.5 kHz DPSK



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4.2 Graphs - Unit No.2

GRAPH 18: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

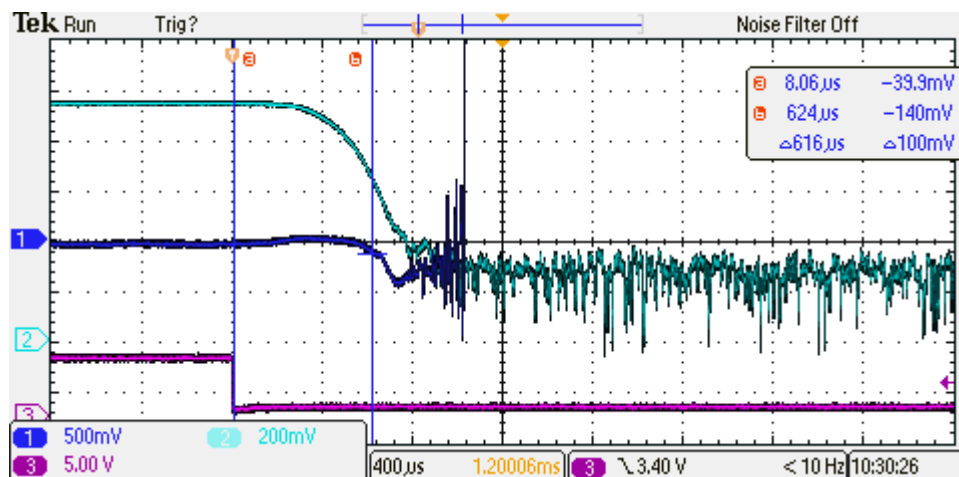
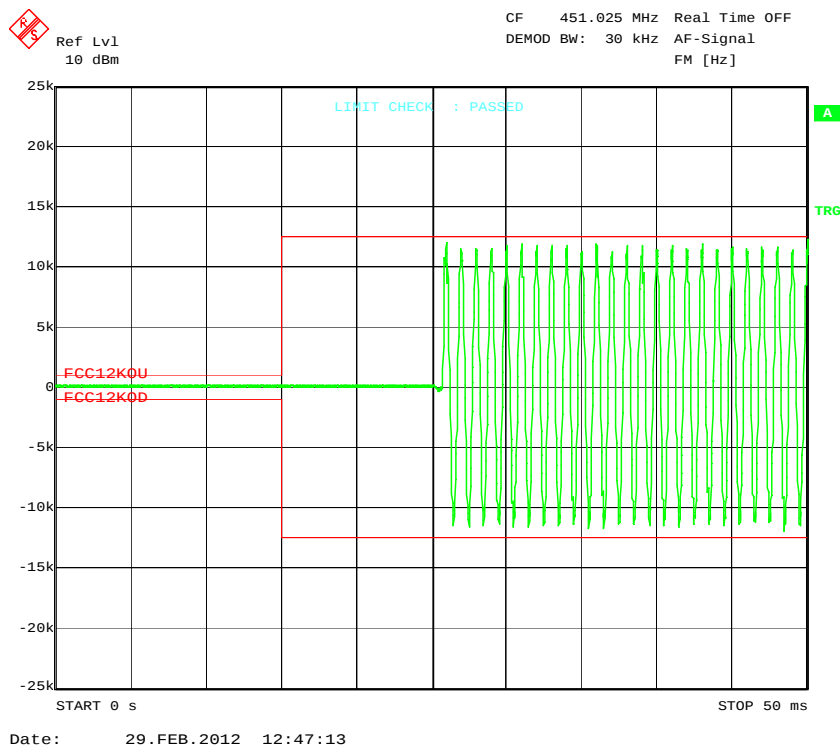


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 19: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF

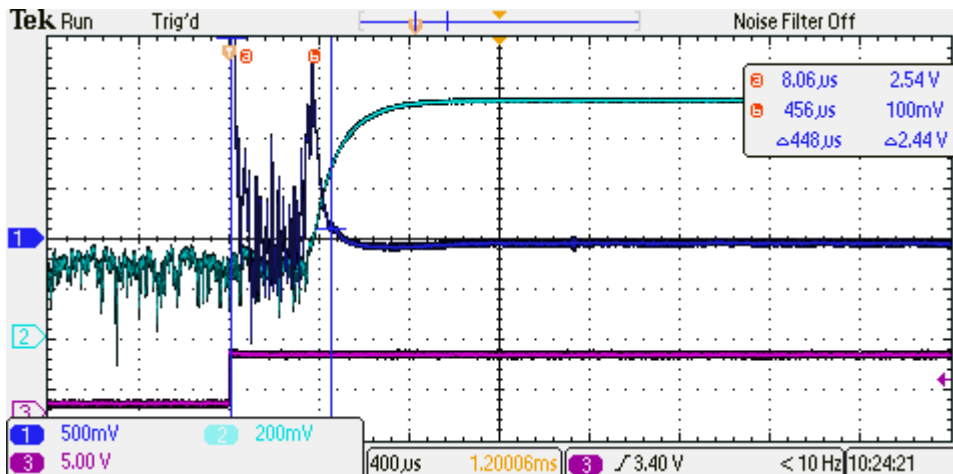
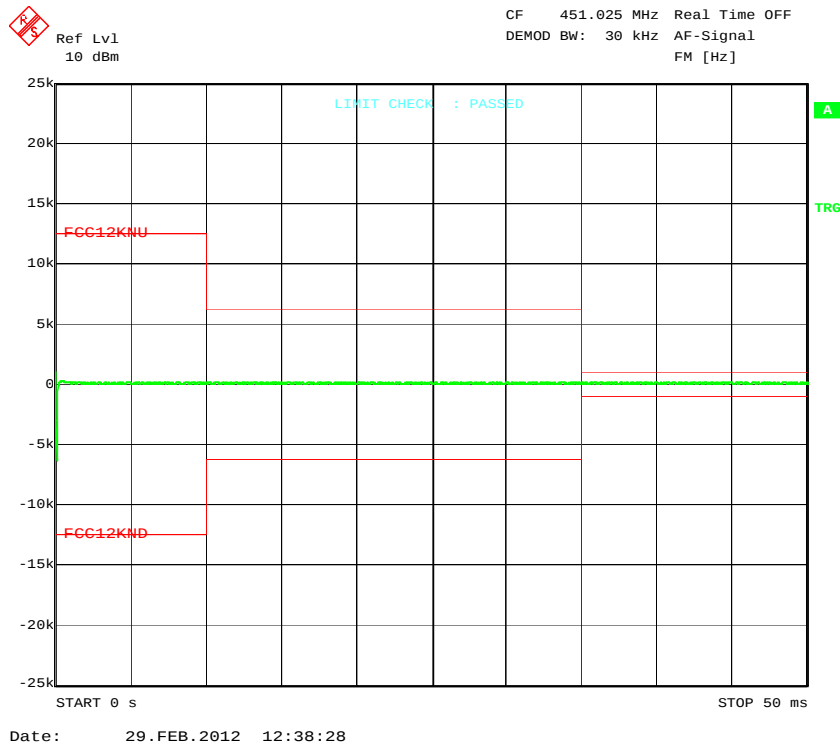


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 20: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

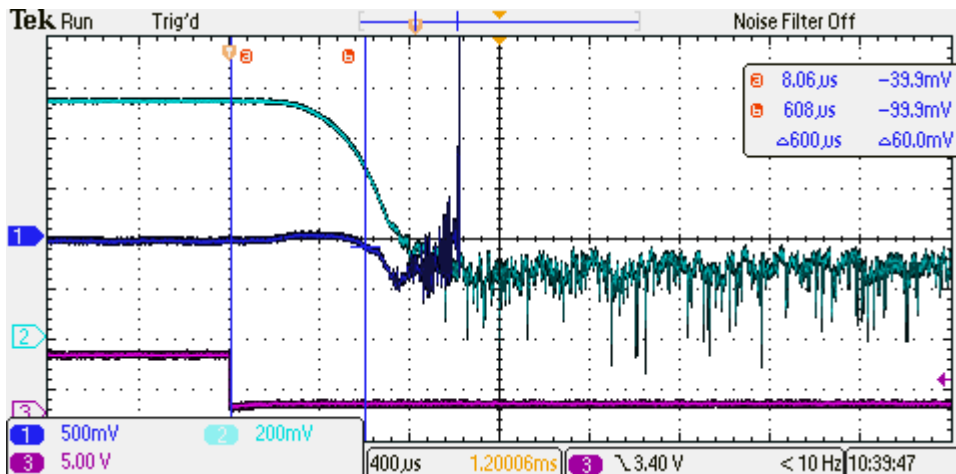
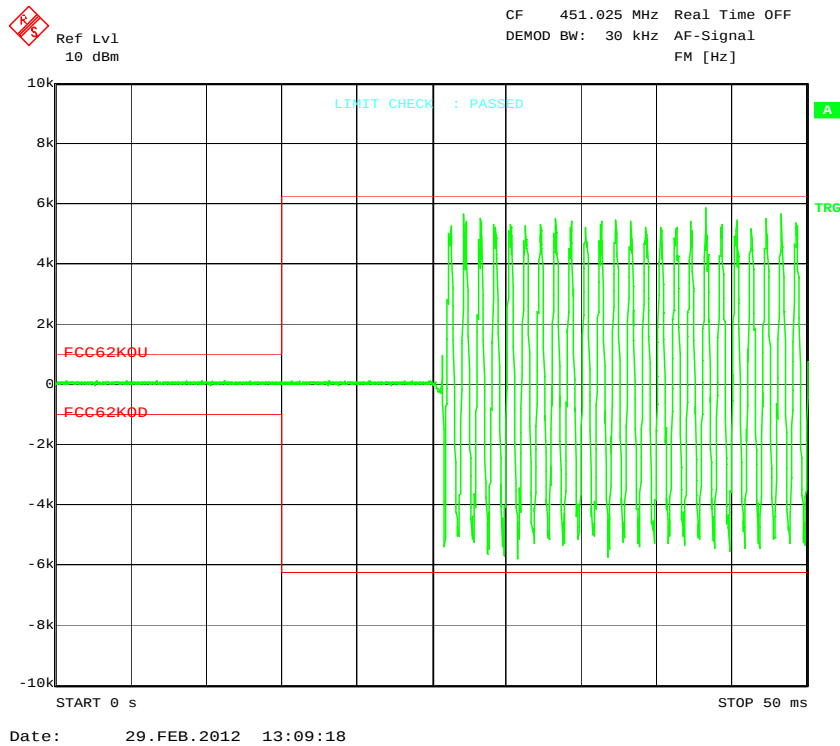


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 21: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF

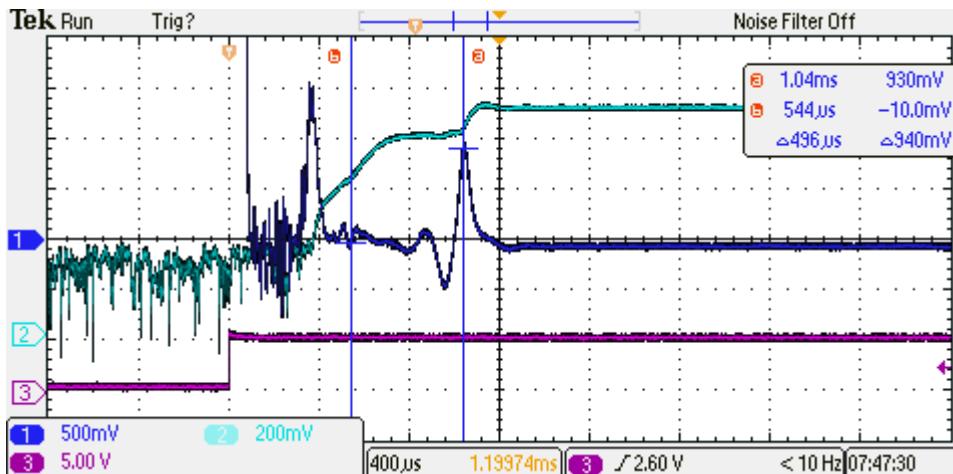
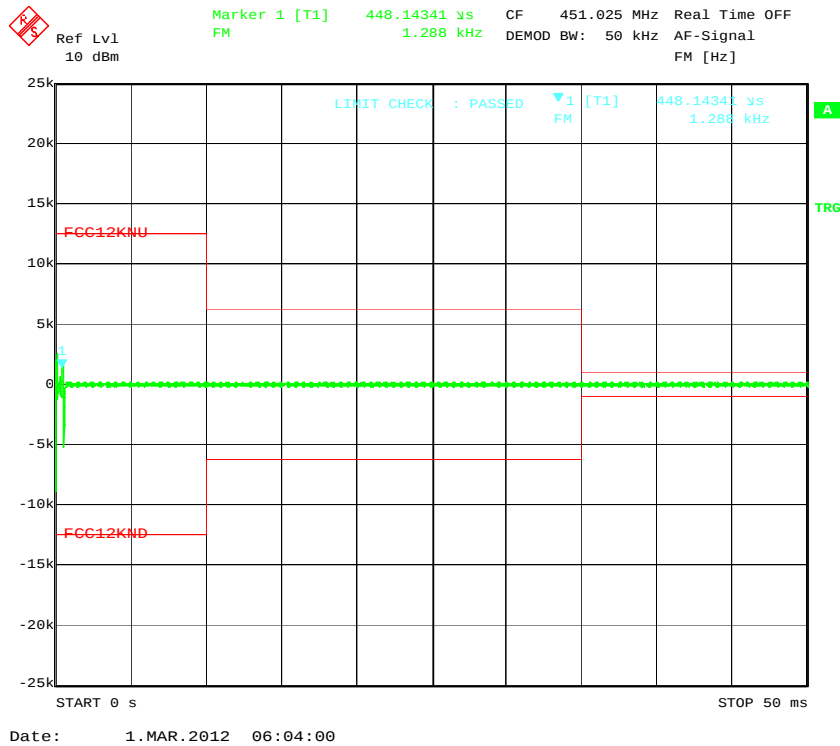


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 22: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

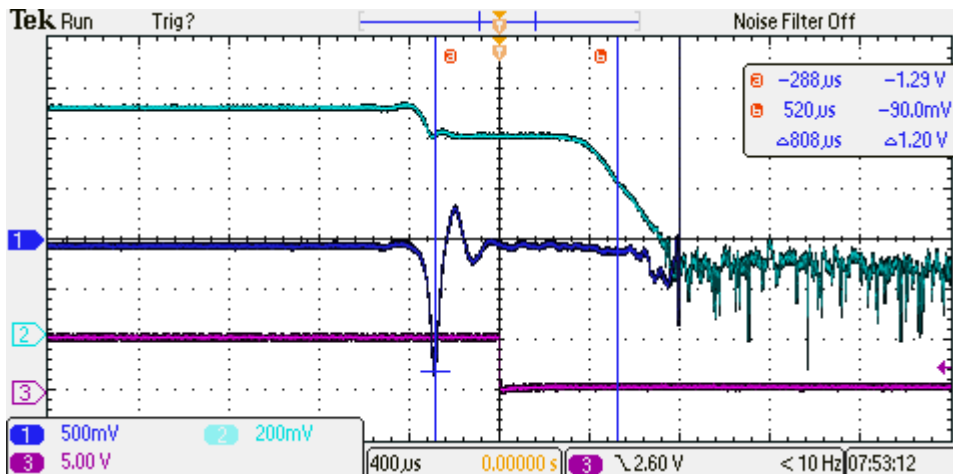
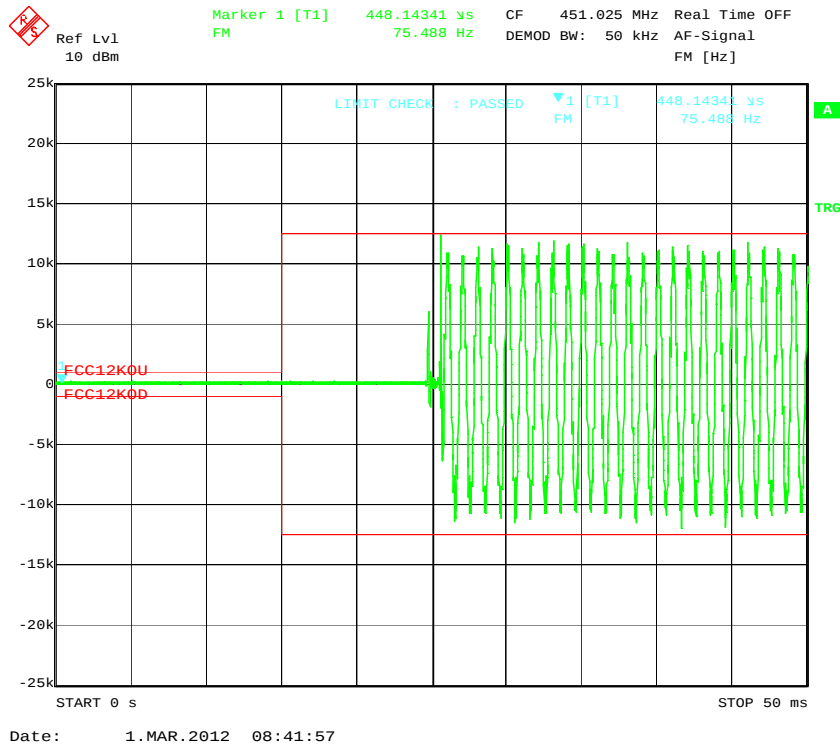


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 23: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF

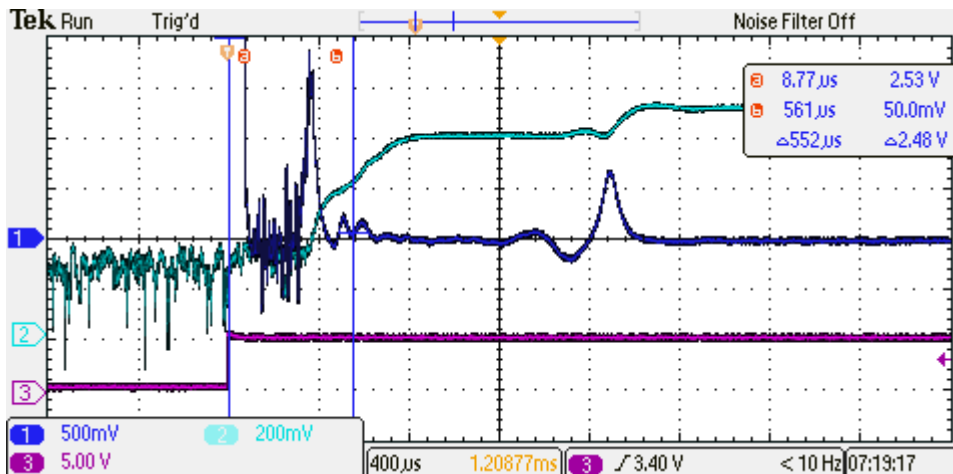
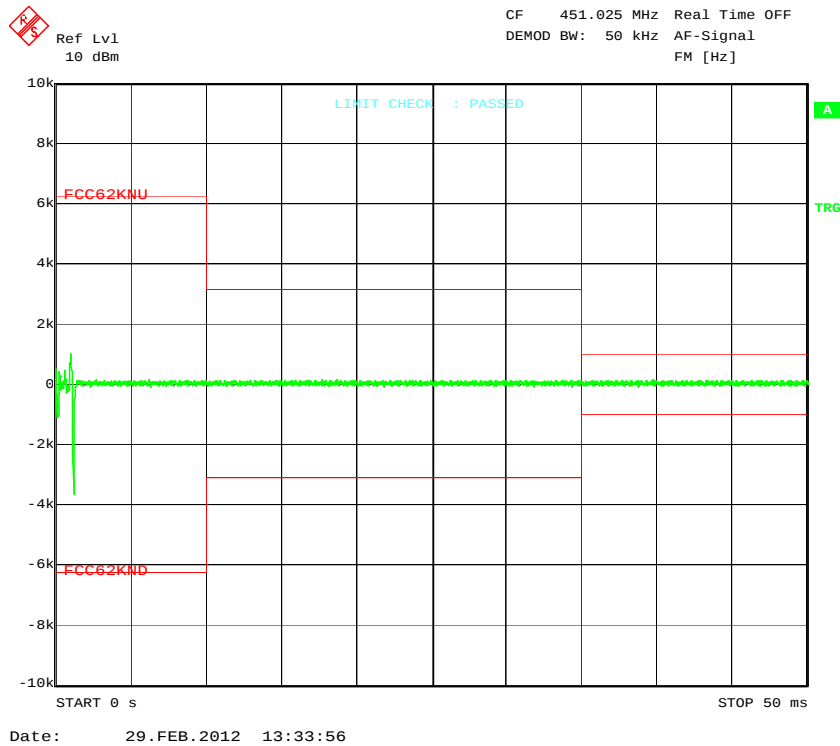


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 24: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

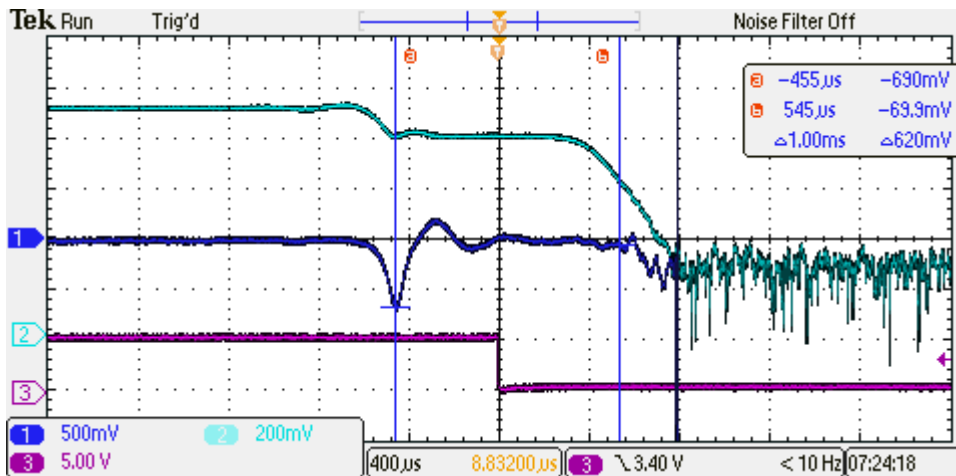
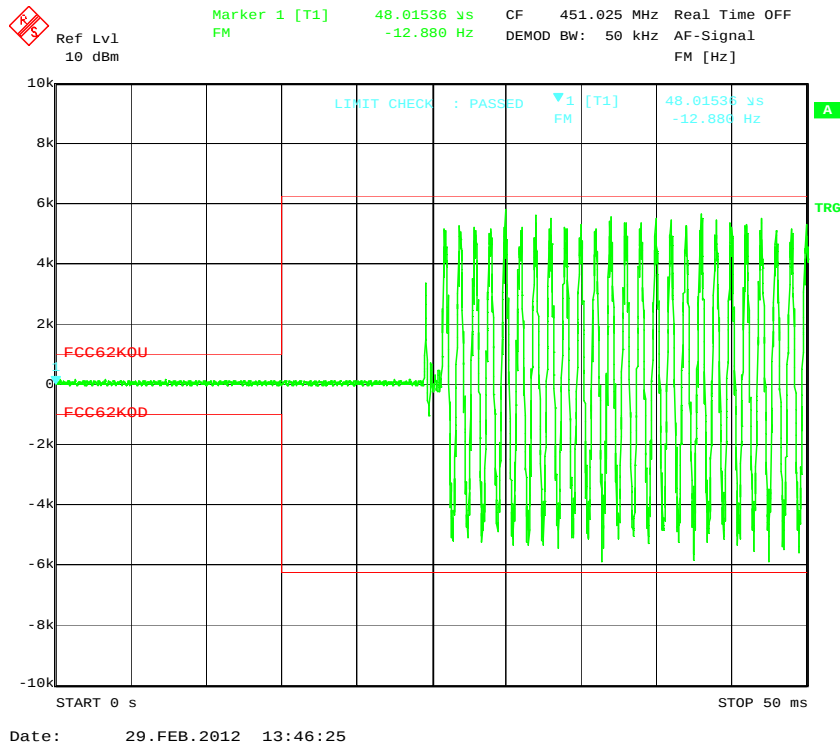


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 25: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF

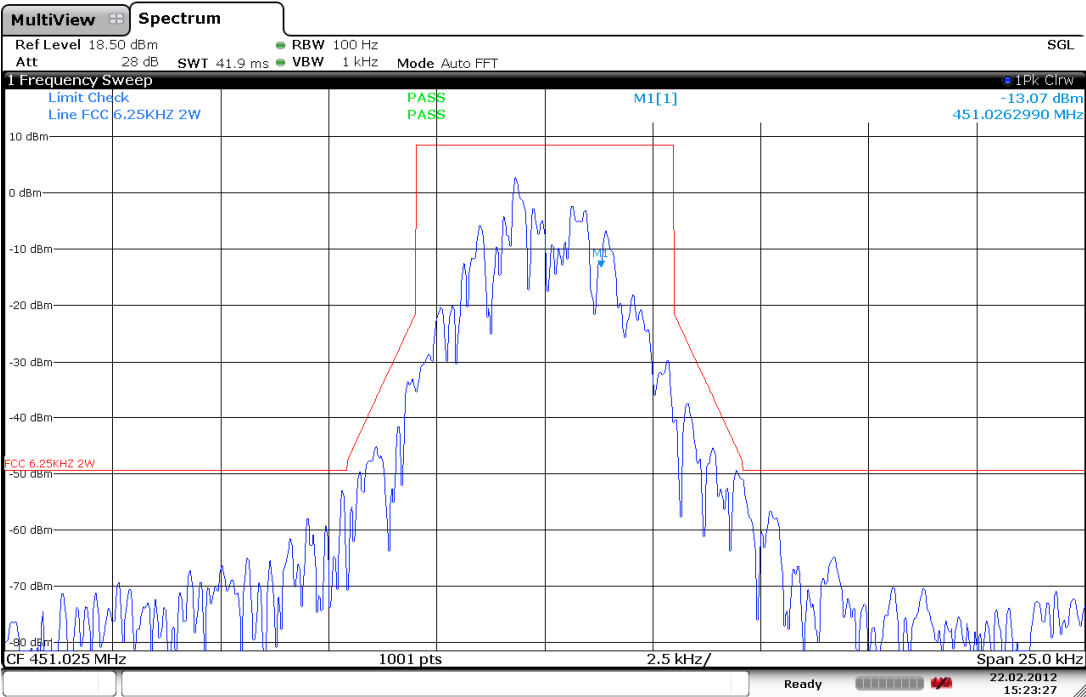


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

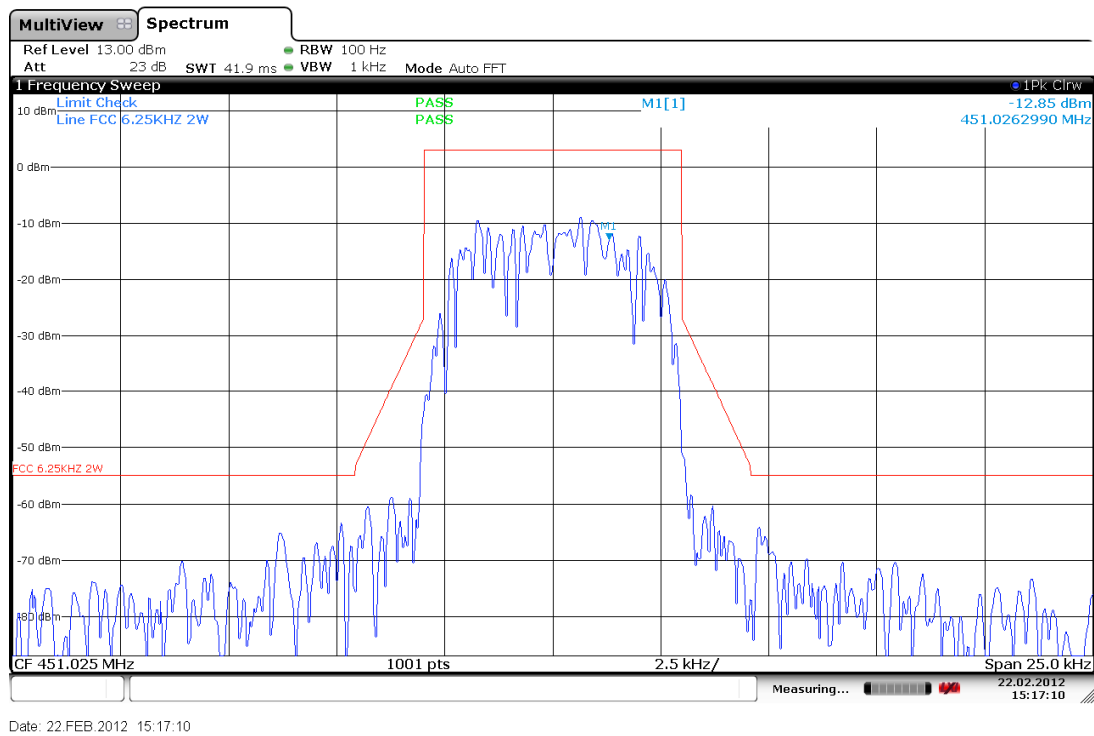
GRAPH 26: Spectrum for Emission 6.25 kHz 4-CPFSK



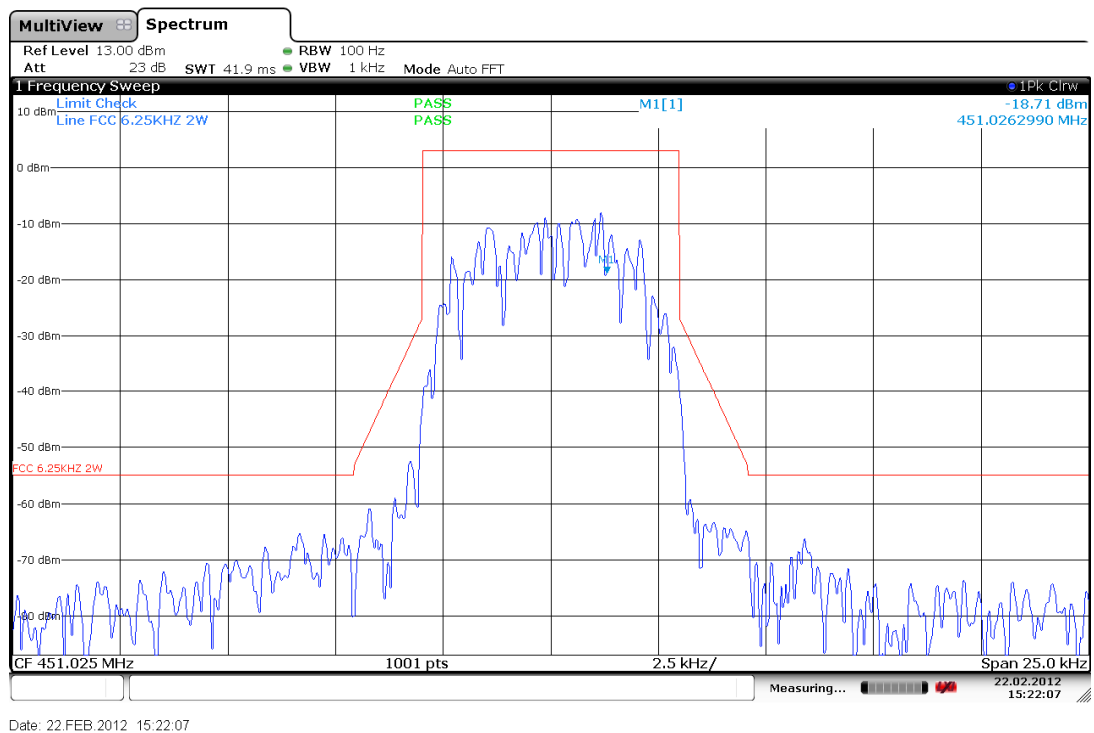
GRAPH 27: Spectrum for Emission 6.25 kHz 16-DEQAM



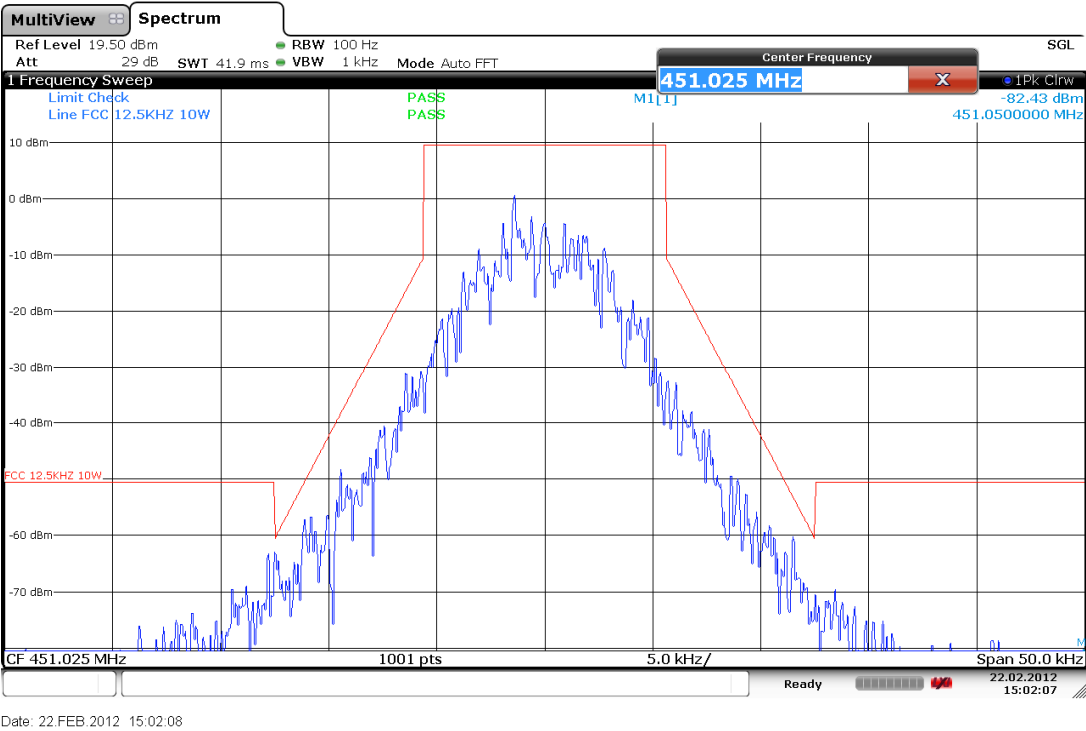
GRAPH 28: Spectrum for Emission 6.25 kHz D8PSK



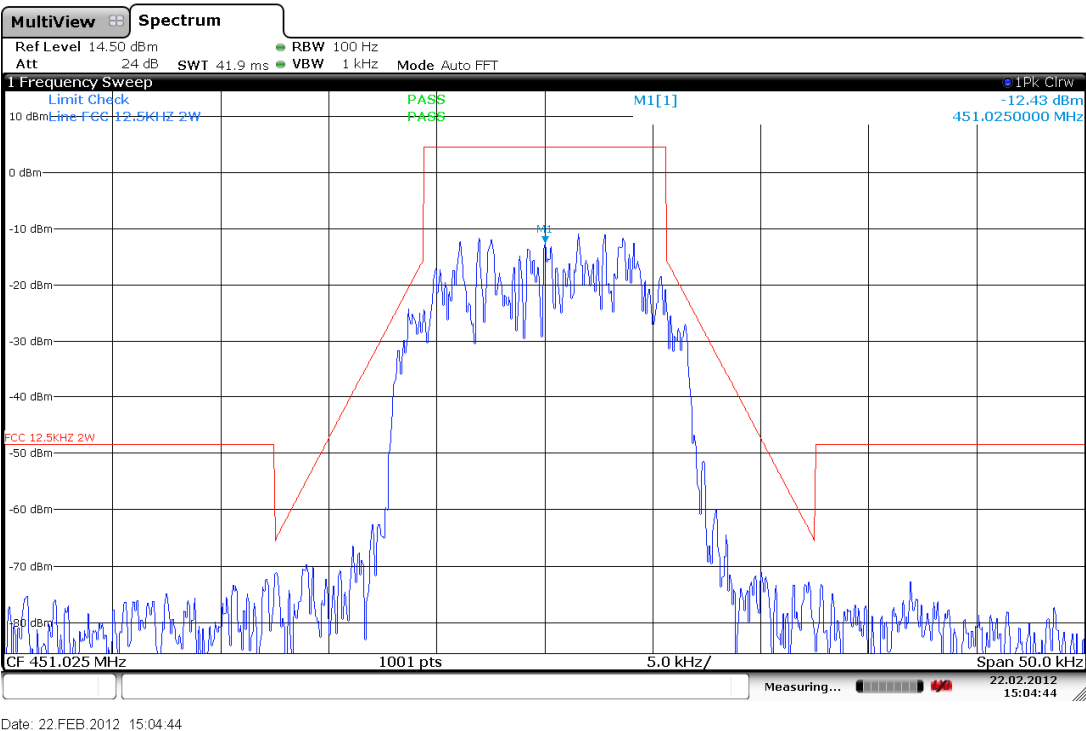
GRAPH 29: Spectrum for Emission 6.25 kHz pi/4-DQPSK



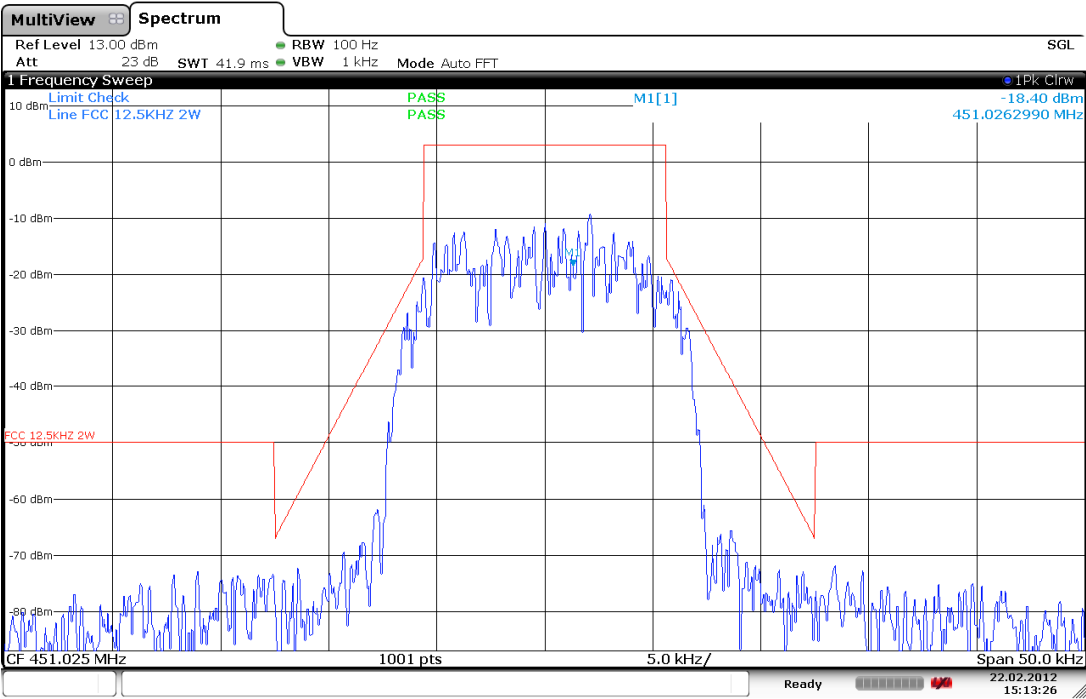
GRAPH 30: Spectrum for Emission 12.5 kHz 4-CPFSK



GRAPH 31: Spectrum for Emission 12.5 kHz 16-DEQAM

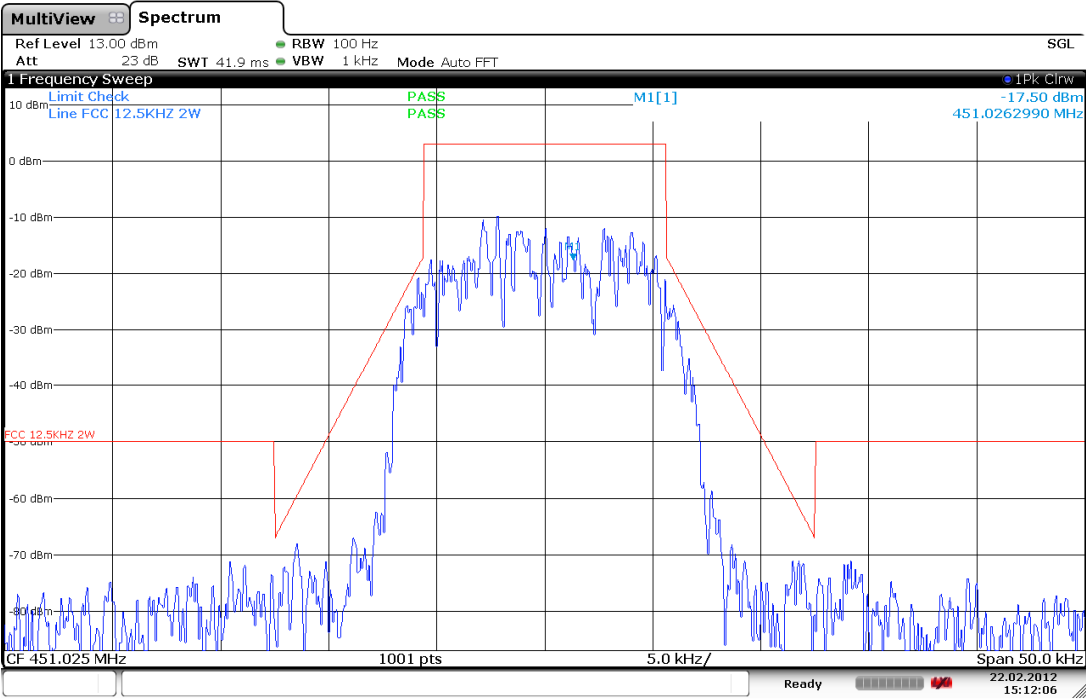


GRAPH 32: Spectrum for Emission 12.5 kHz D8PSK



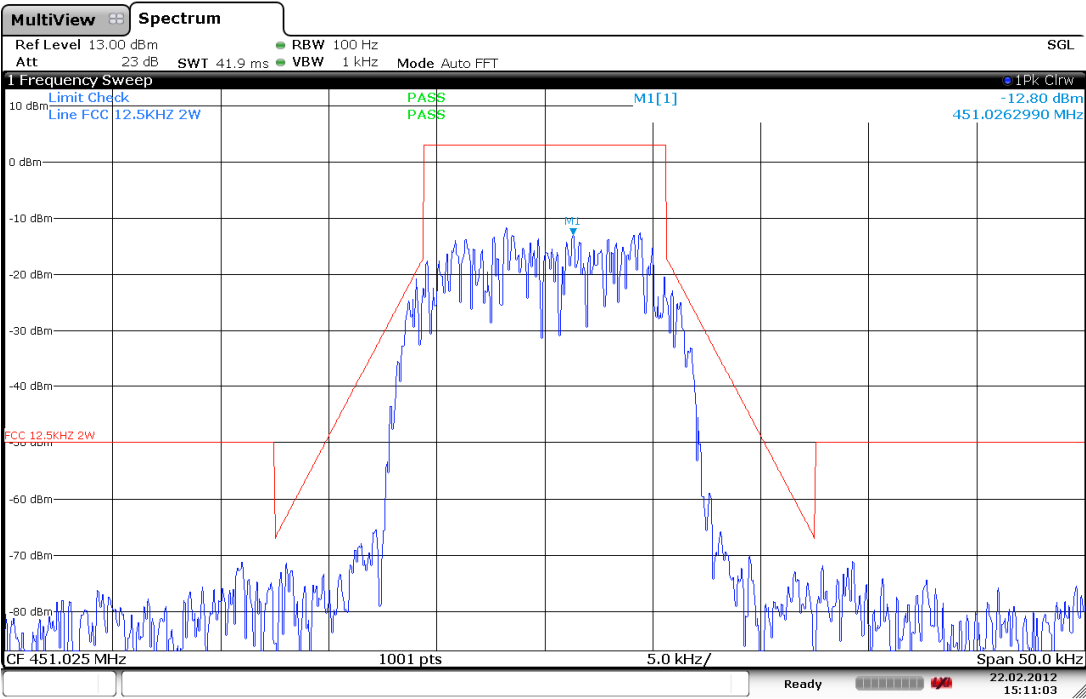
Date: 22.FEB.2012 15:13:26

GRAPH 33: Spectrum for Emission 12.5 kHz pi/4-DQPSK



Date: 22.FEB.2012 15:12:06

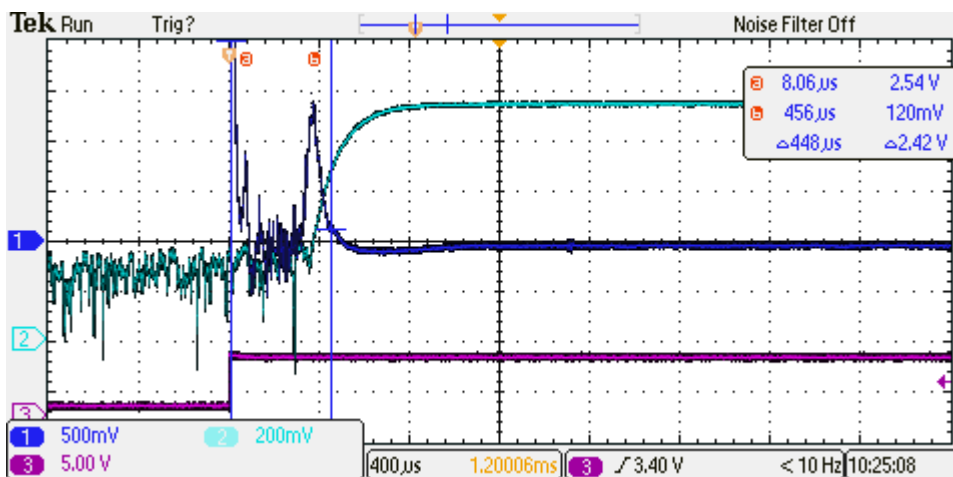
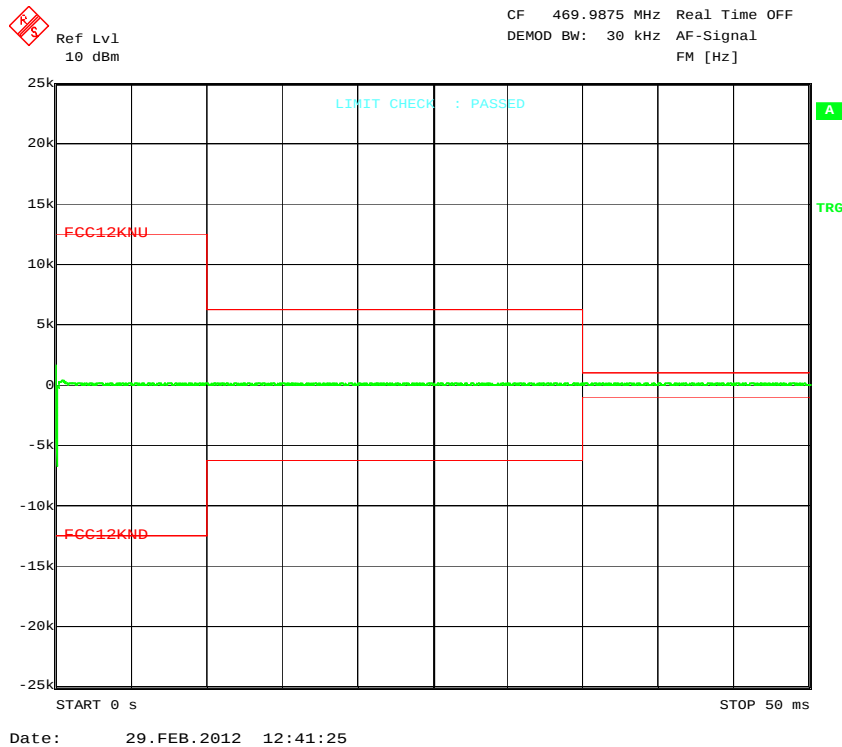
GRAPH 34: Spectrum for Emission 12.5 kHz DPSK



Date: 22.FEB.2012 15:11:03

4.3 Graphs - Unit No.3

GRAPH 35: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

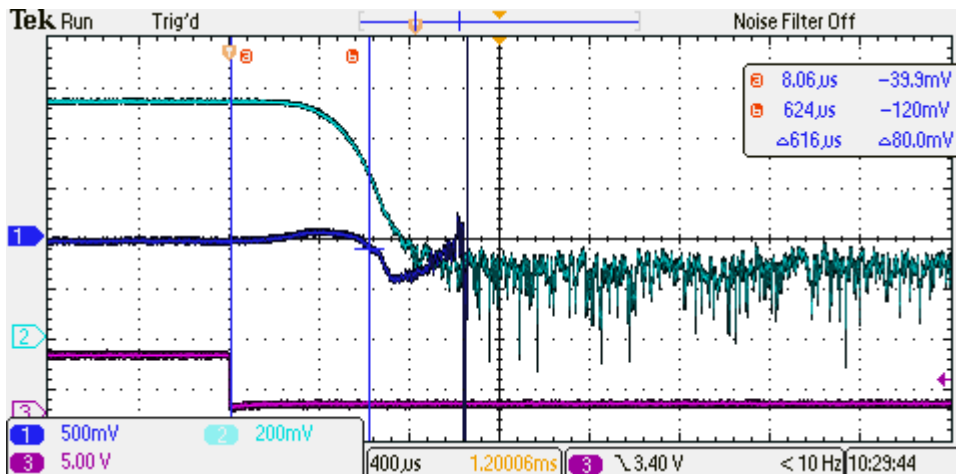
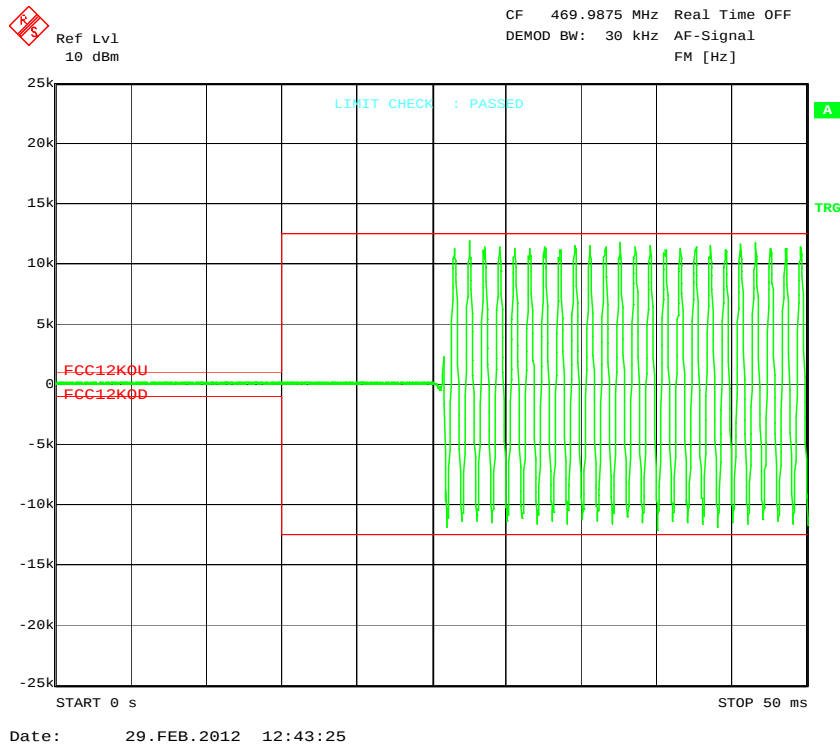


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 36: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF

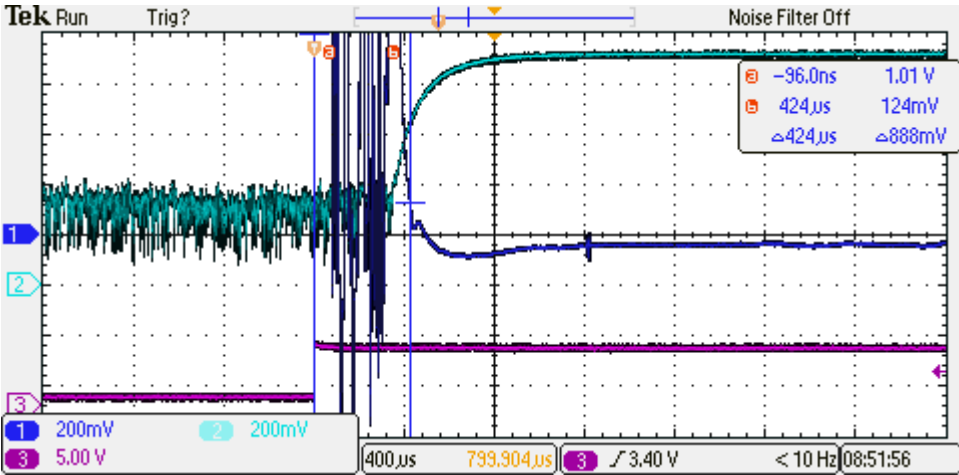
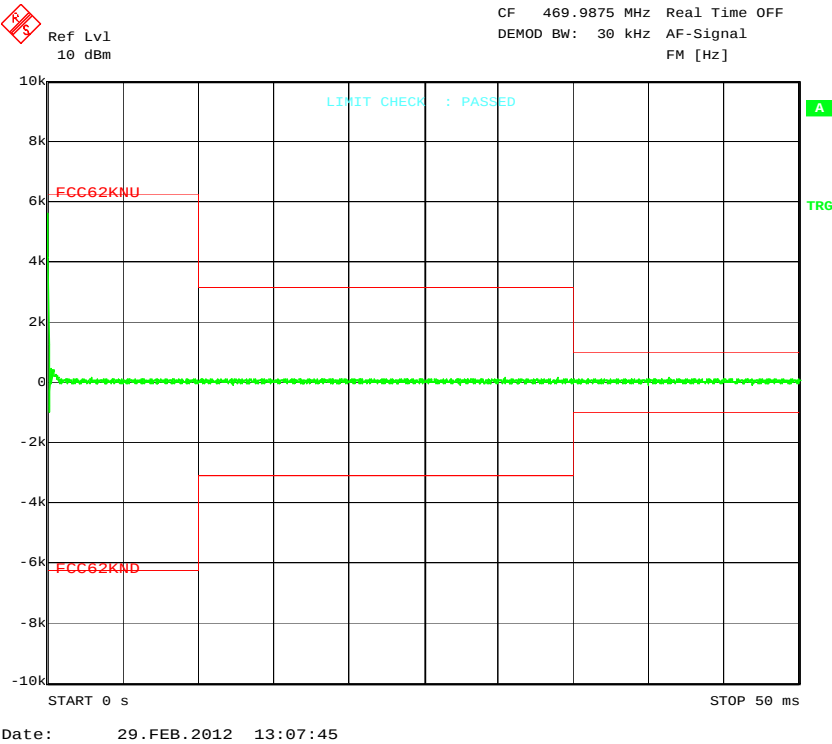


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 37: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

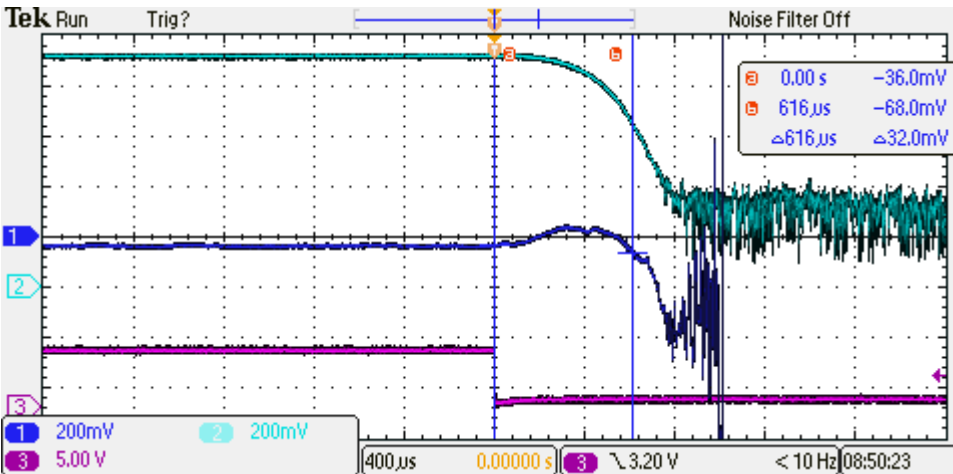
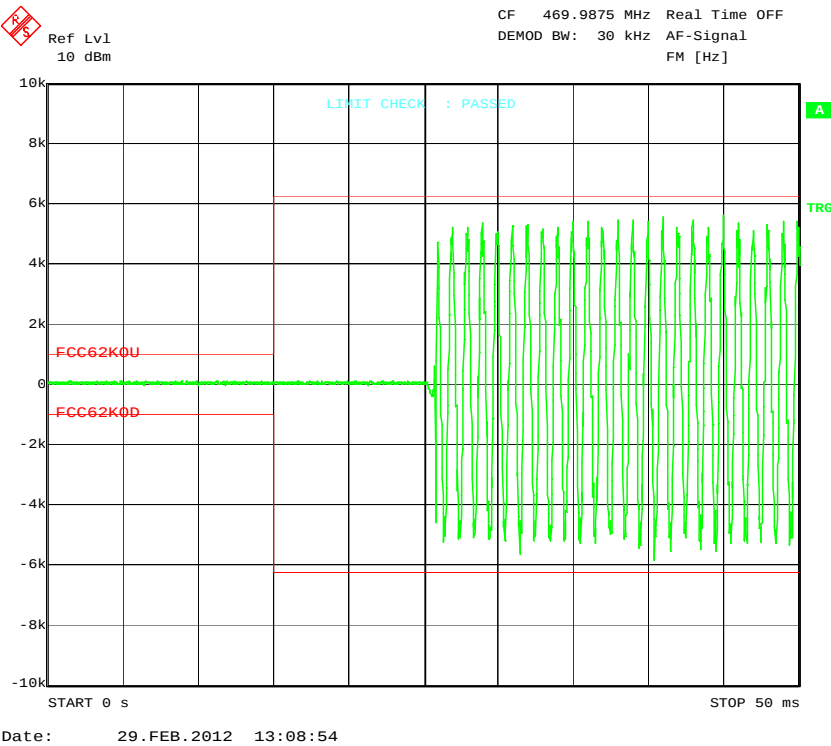


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

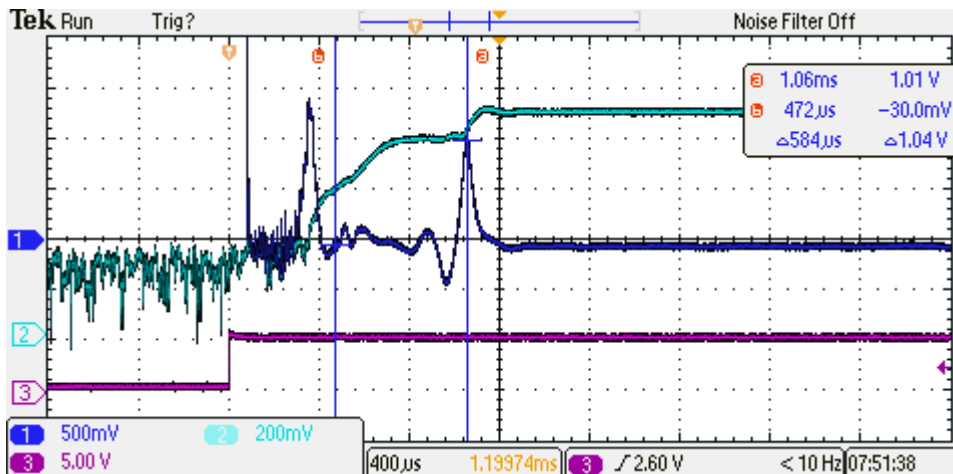
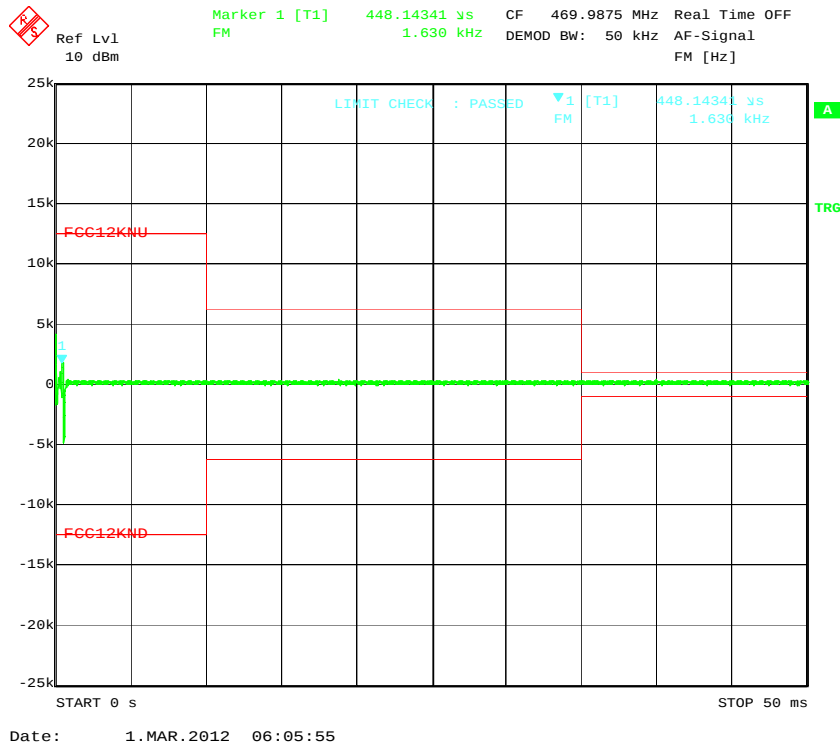
violet – PTT

GRAPH 38: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



blue – power as a function of time (90 mV/10dB)
dark blue – frequency as a function of time (200mV/1kHz)
violet – PTT

GRAPH 39: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

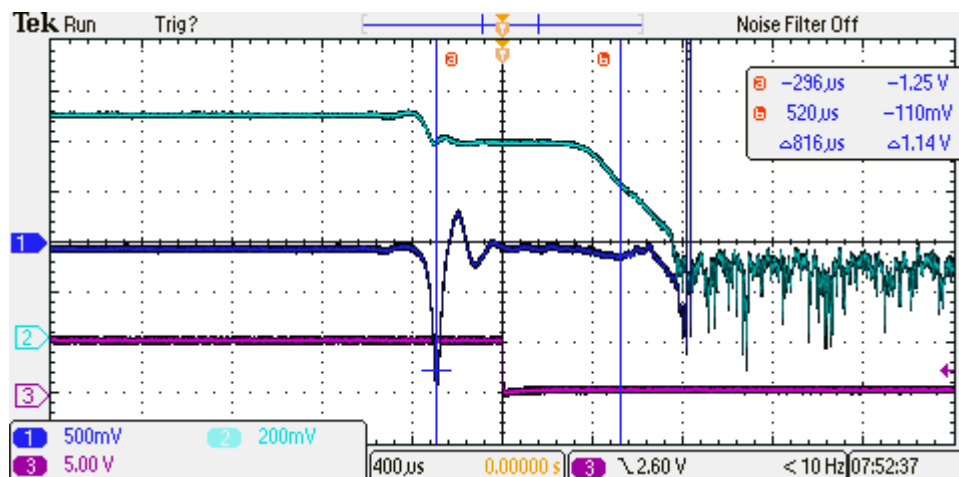
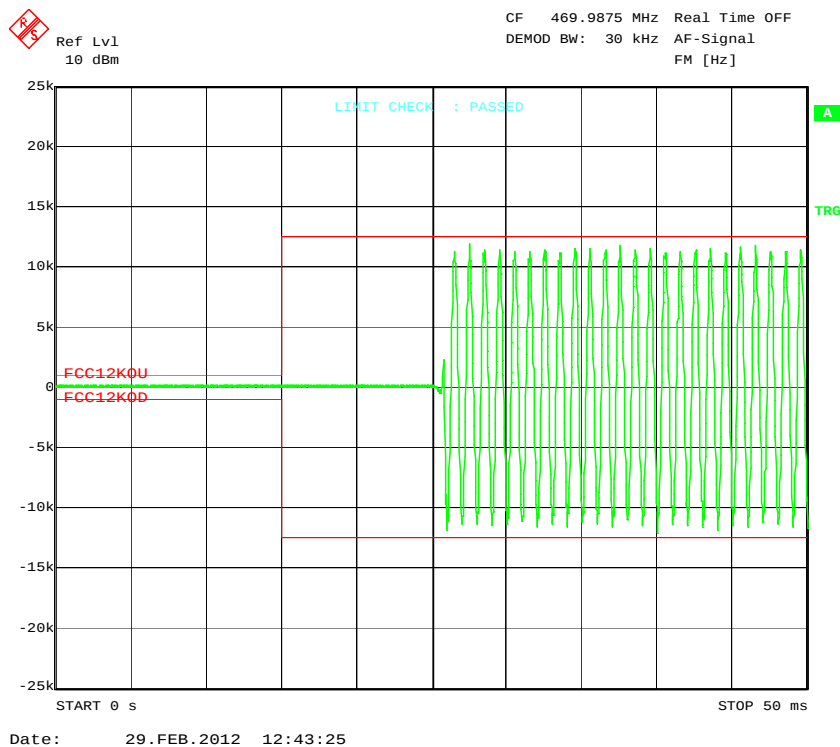


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 40: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF

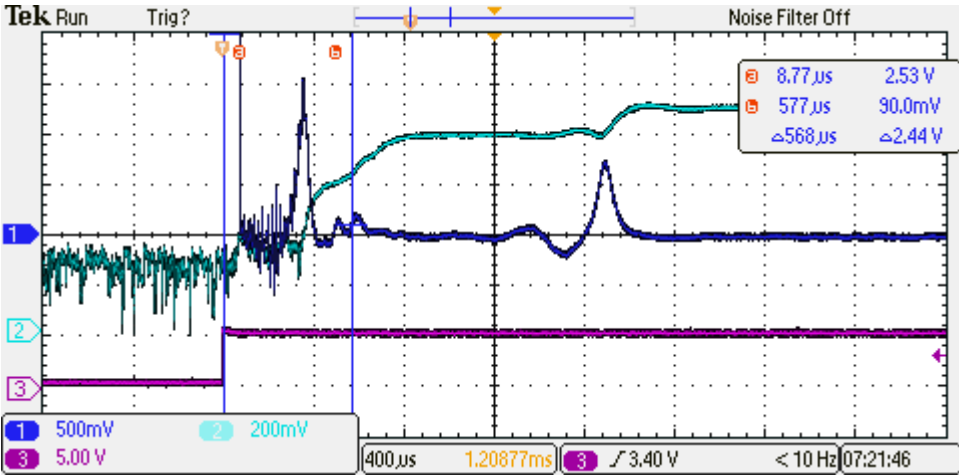
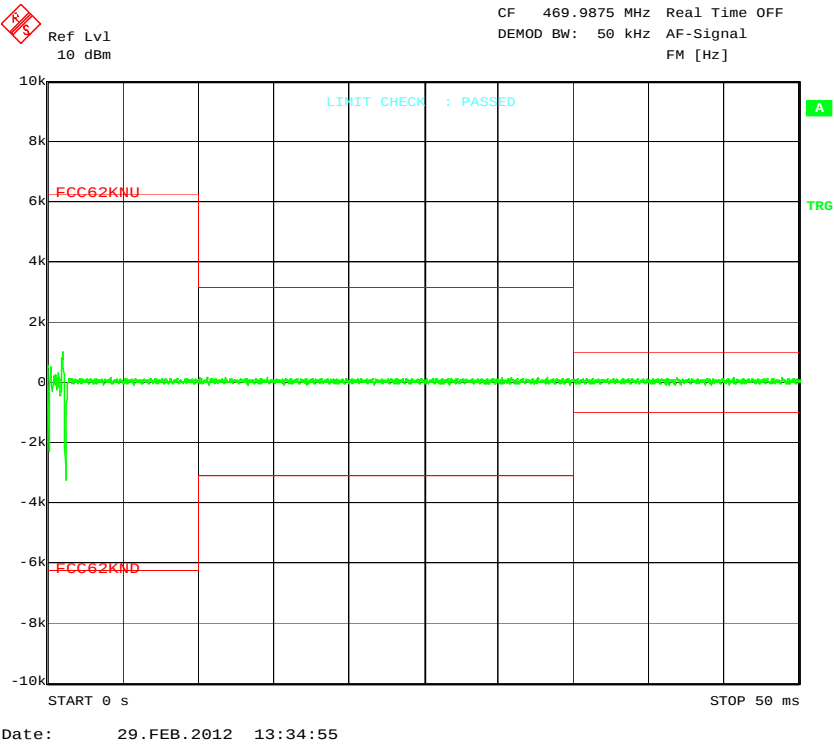


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 41: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON

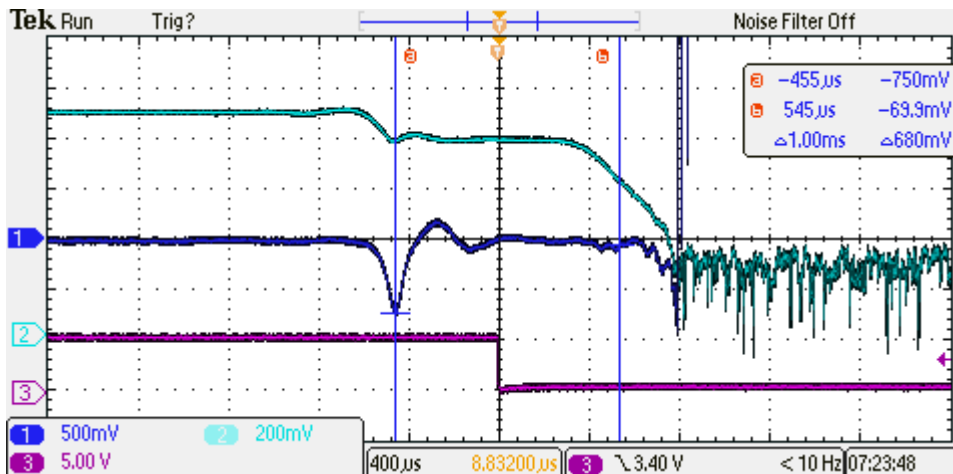
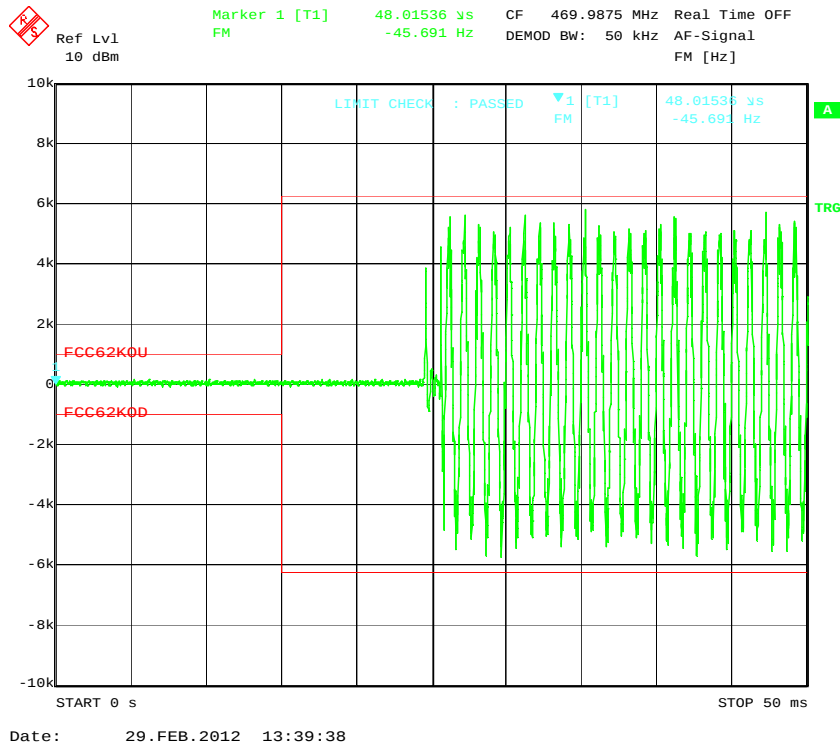


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 42: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF

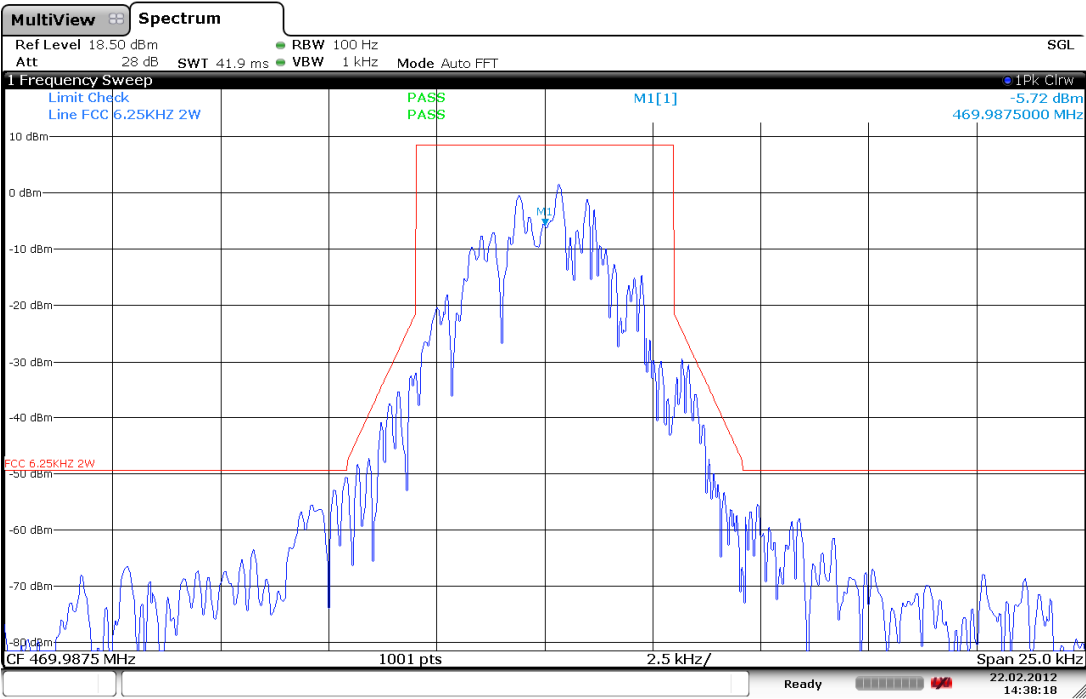


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

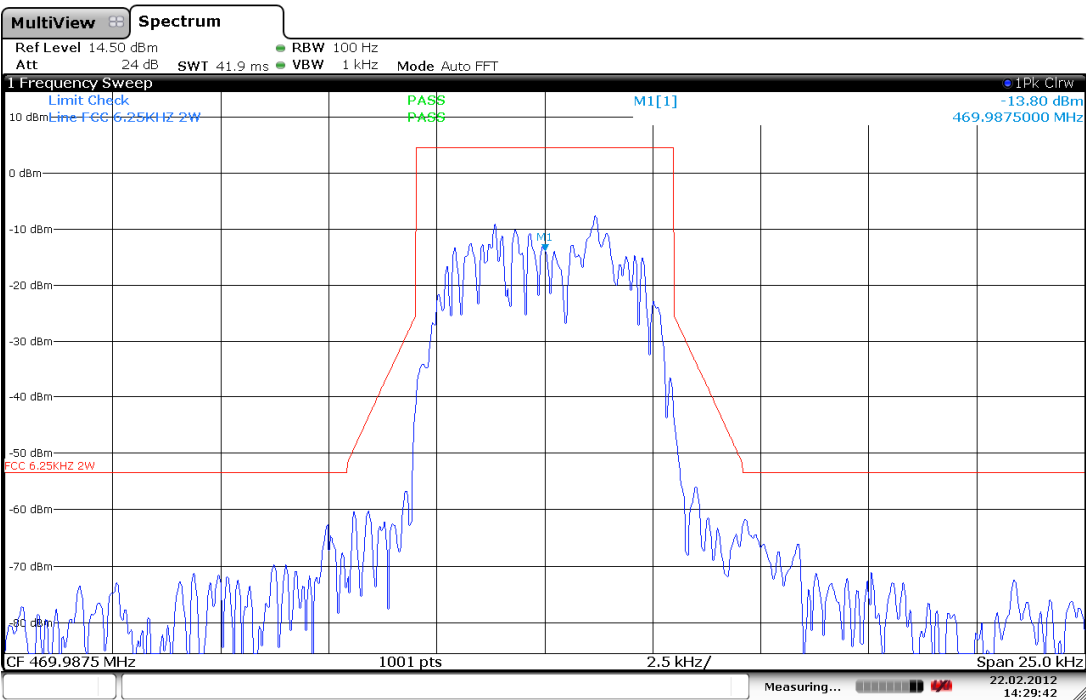
violet – PTT

GRAPH 43: Spectrum for Emission 6.25 kHz 4-CPFSK



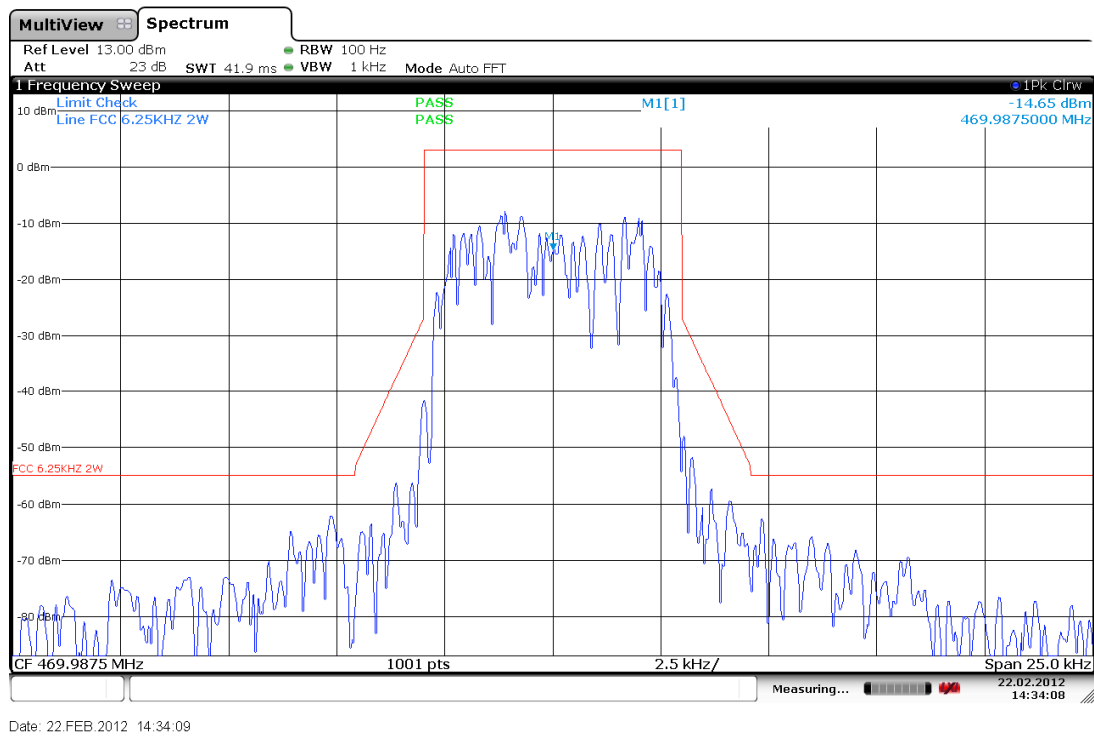
Date: 22.FEB.2012 14:38:18

GRAPH 44: Spectrum for Emission 6.25 kHz 16-DEQAM

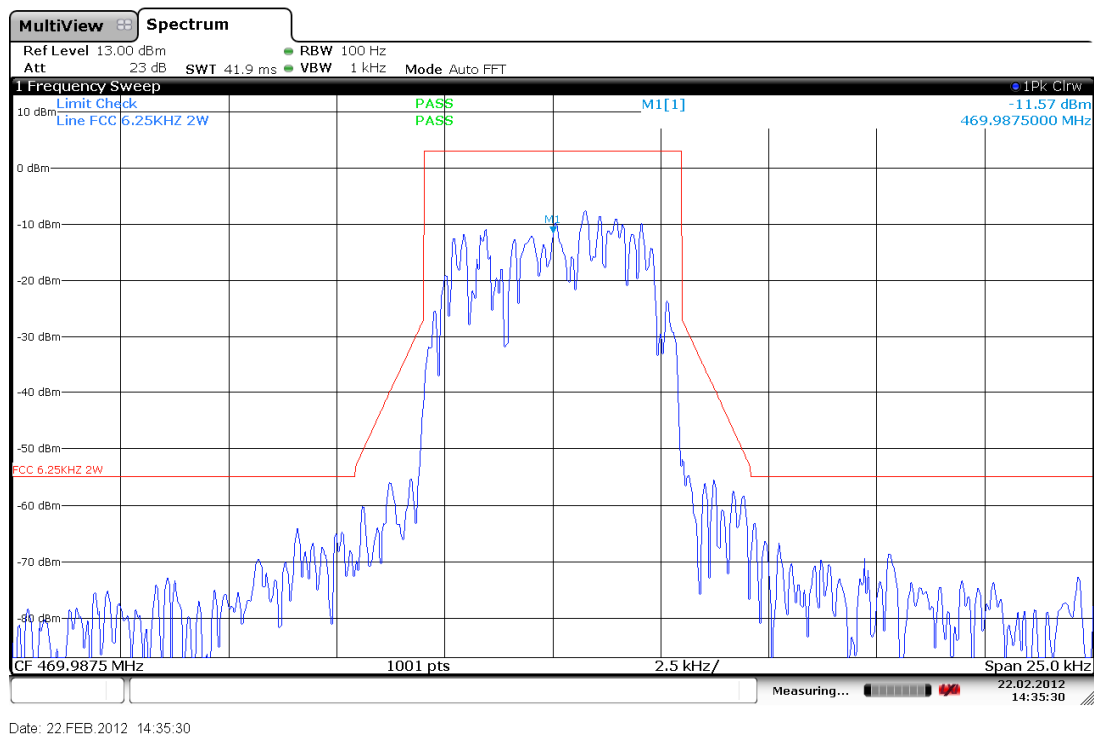


Date: 22.FEB.2012 14:29:42

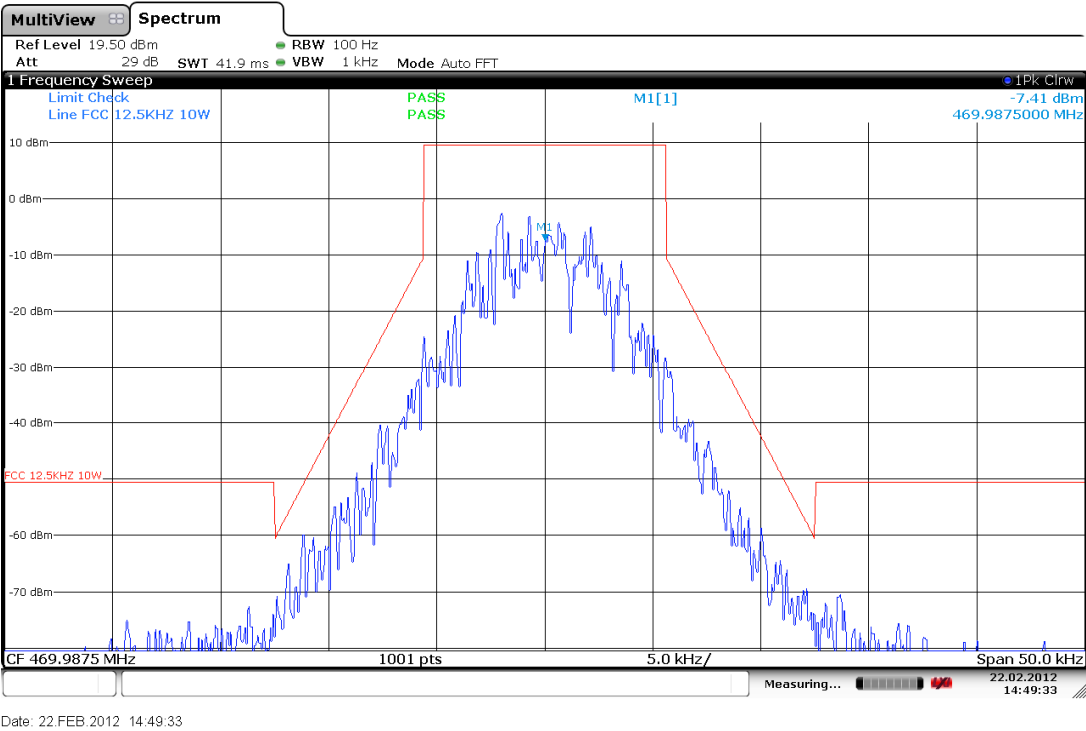
GRAPH 45: Spectrum for Emission 6.25 kHz D8PSK



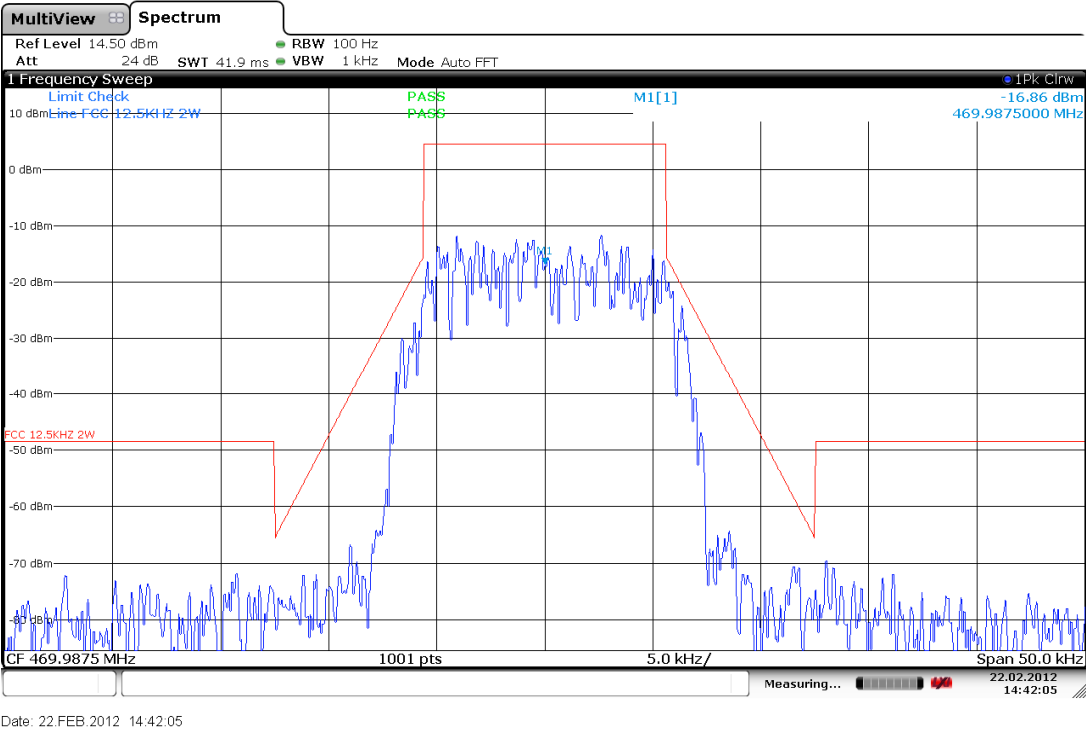
GRAPH 46: Spectrum for Emission 6.25 kHz pi/4-DQPSK



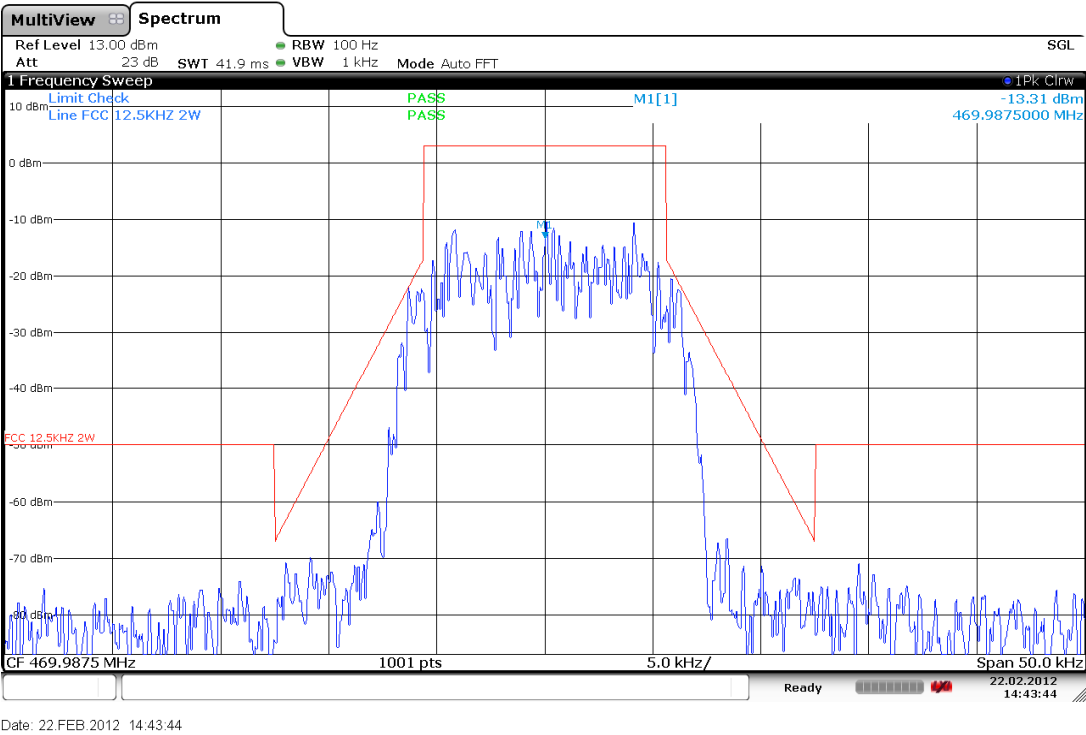
GRAPH 47: Spectrum for Emission 12.5 kHz 4-CPFSK



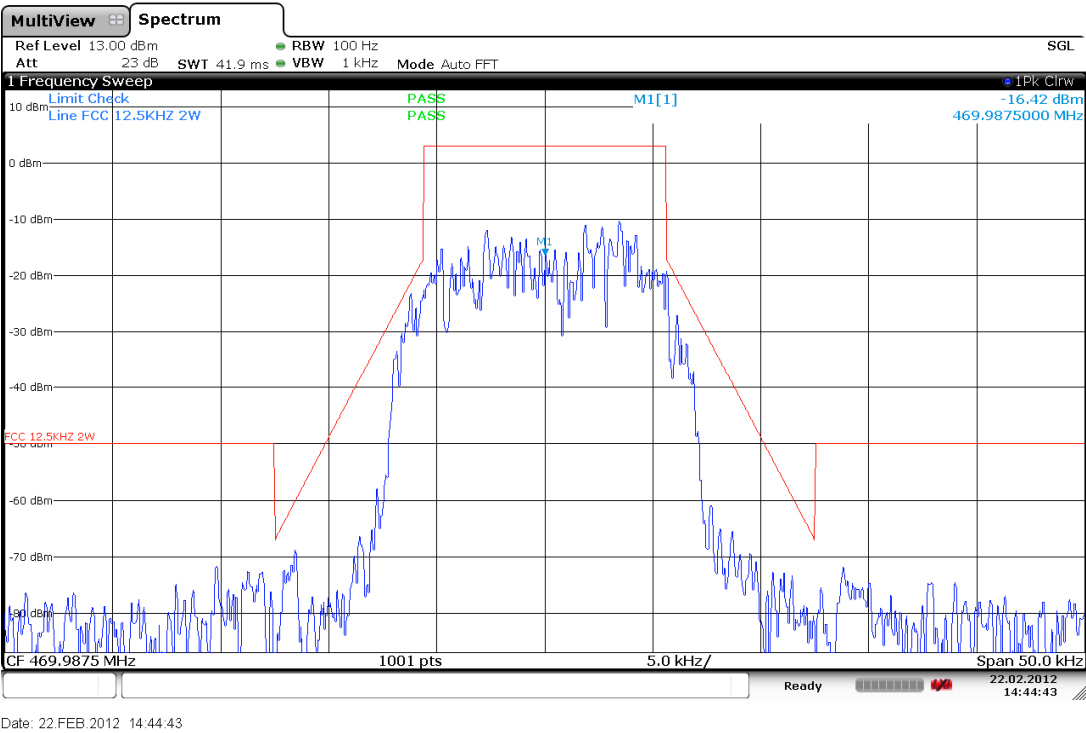
GRAPH 48: Spectrum for Emission 12.5 kHz 16-DEQAM



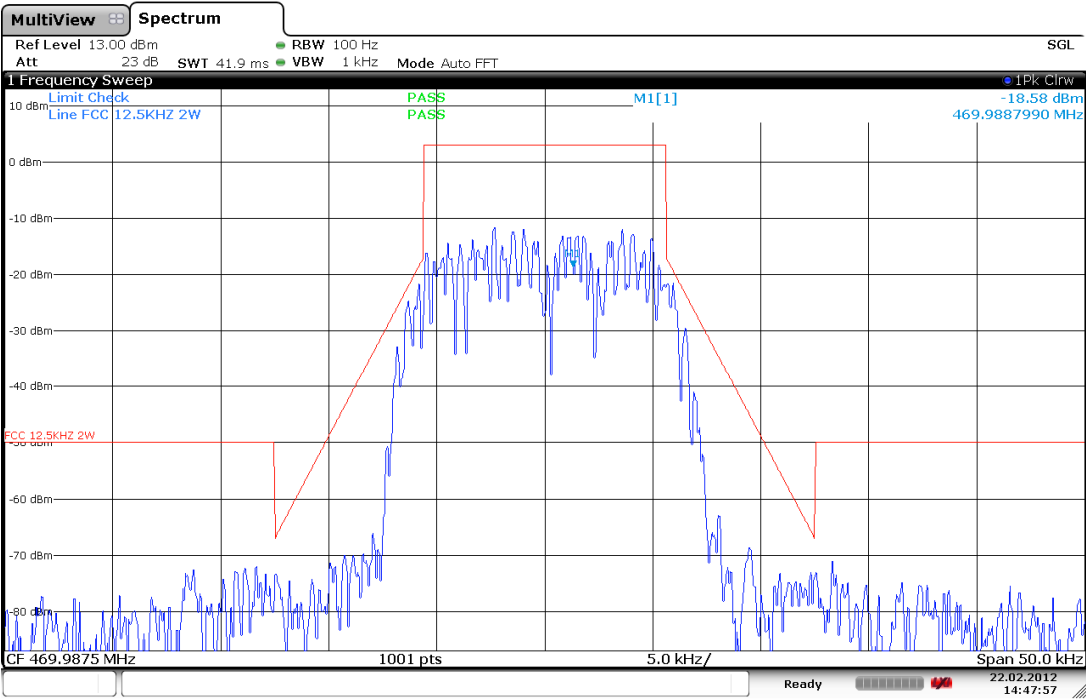
GRAPH 49: Spectrum for Emission 12.5 kHz D8PSK



GRAPH 50: Spectrum for Emission 12.5 kHz pi/4-DQPSK



GRAPH 51: Spectrum for Emission 12.5 kHz DPSK



Date: 22.FEB.2012 14:47:57