CMC Centro Misure Compatibilità S.r.l. - Via dell'Elettronica, 12/C - 36016 Thiene (VI) - ITALY - tel./fax +39 0445 367702
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TEST REPORT nr. R06148201_rev30

This test report cancel and replace document nr. R06148201_rev20 date 06.03.07

Test item

Description..... : A828US OEM UHF Compact reader
Trademark..... : CAEN RFID
Model and/or type reference..... : A828US
Manufacturer..... : Same as client
Serial Number..... : --

Client

Name ..... : CAEN RFID
Address ..... : Via Vetraia, 11
..... : 55049 VIAREGGIO (LU) – ITALY

Test specification

Standard ..... : FCC Rules & Regulations, Title 47 (2005) - Part 15 paragraph(s) : 247(a), 247(b), 247(c), 209 and 207

Report

Tested by (+ signature)..... : A. Bertezzolo - *Supervisor*

Approved by (+ signature) ..... : R. Beghetto - *Laboratory Manager*

Date of issue..... : 08.03.07
Contents ..... : 66 pages

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1. Summary

Emission: FCC Rules & Regulations, Title 47

Test specifications	Environmental Phenomena	Tests sequence	Result
Part 15.247(a)	Bandwidth	4	Complies
Part 15.247(a)	Channel Separation	1	Complies
Part 15.247(a)	Time of Occupancy	3	Complies
Part 15.247(a)	Number of Hopping Frequency	2	Complies
Part 15.247(b)	Peak Output Power conducted	5	Complies
Part 15.247(c)	Band Edge	6	Complies
Part 15.247(c) Part 15.209	Radiated Spurious	7	Complies
Part 15.247(c) Part 15.209	Conducted Spurious	8	Complies
Part 15.207	Conducted Emission		N.A. (+)

(+) Apparatus with 5Vdc

The Test Report was given to the Client representatives for necessary documentation of ratification of the tested equipment and it is valid for the FCC certification.

2. Description of Equipment under test (EUT)

Power supply	:	5 Vdc from external battery
Type of equipment	:	☒ Transmitter Unit ☒ Receiver Unit
		☒ Fixed station ☐ Portable station ☐ Mobile station
Receiver class	:	--
Alignment range	:	912,5 – 917,4 MHz
Switching frequency	:	912,5 – 917,4 MHz
Number of channels	:	--
Channel separation	:	--
Modulation	:	Type 1: EPC C1 G2
		Type 2: ISO 18000-6B
Extreme conditions	:	--
Maximum transmitter output power	:	--
Information on antenna	:	☐ Integrated
		❑ Extern
		☑ Other: See user's manual
Duty cycle	:	--
Remark	:	The A828US Module, which is rated at 50mW output, cannot use an antenna with more than 16dBi of gain. Use of any other antenna with a gain greater than 16dBi may void the user's authority to operate the equipment.

2.1 Test Site

Company	:	CMC Centro Misure Compatibilità S.r.l.
Address	:	Via dell'Elettronica, 12/C – 36016 Thiene (VI) – ITALY

3. Testing and sampling

Date of receipt of test item	:	09.11.06
Testing start date	:	09.11.06
Testing end date	:	11.12.06
Samples tested nr.	:	1
Sampling procedure	:	Equipment used for testing was picked up by the manufacturer, at the end of the production process with random criterion
Internal identification	:	adhesive label with the product number P061021

4. Operative conditions

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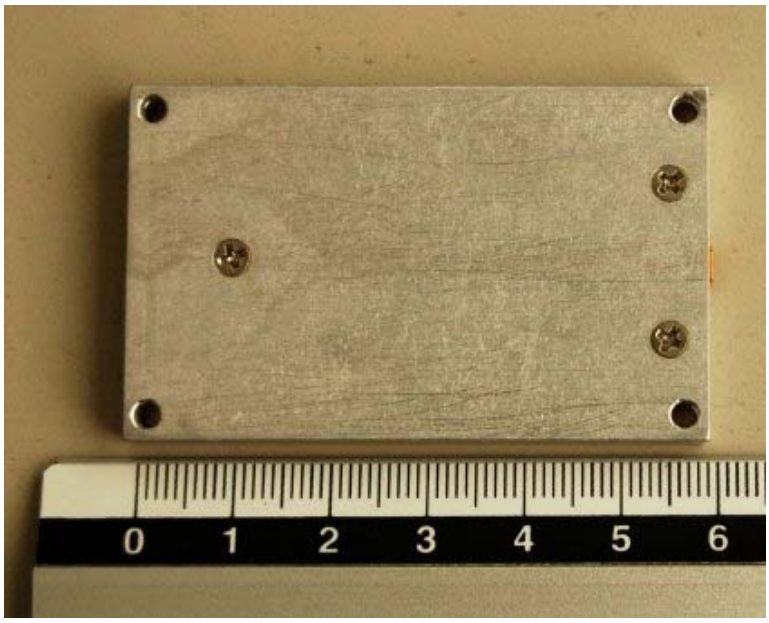
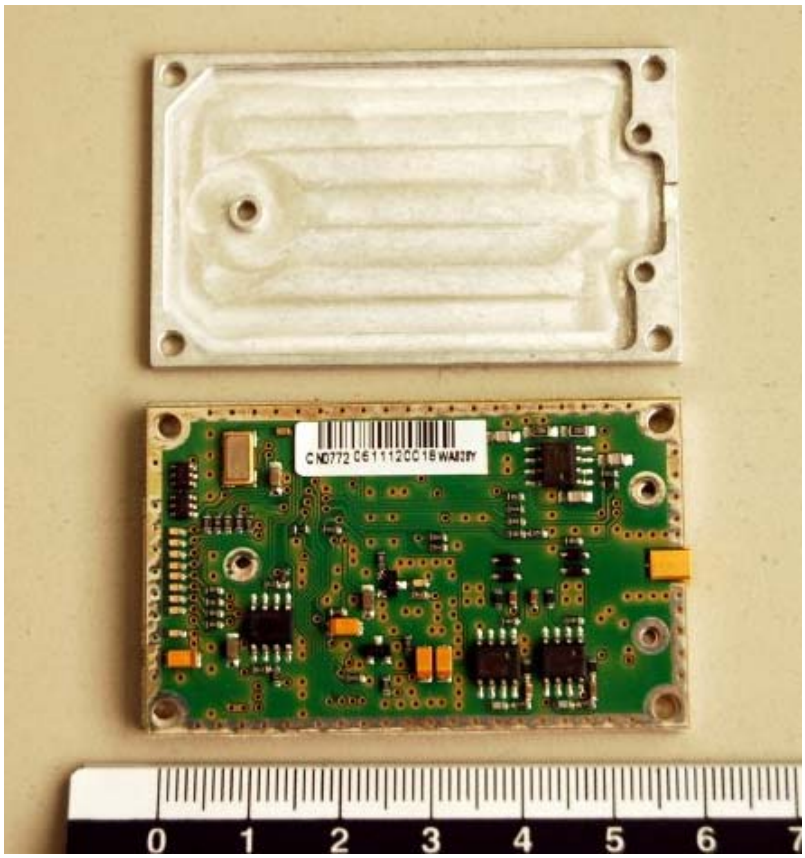
5. Photograph(s) of EUT




0 1 2 3 4 5 6 7

6. Equipment list

Id. number	*Manufacturer*	*Model*	*Description*	*Serial number*
CMC S001	Rohde & Schwarz	ESHS30	EMC interference receiver	862024/003
CMC S002	Rohde & Schwarz	ESVS30	EMC interference receiver	826638/011
CMC S003	SCHAFFNER	NSG 2025-4	Burst source with CDN	1010
CMC S004	SCHAFFNER	NSG 435-01	ESD simulator	1166
CMC S005	XITRON	2503	Harmonic & Flicker analyser	2503592013
CMC S006	Chauvin Arnoux	CA43	Field meter	218541RLV
CMC S007	Rohde & Schwarz	SMY01	RF signal generators	841403/038
CMC S009	Rohde & Schwarz	ESH2-Z5	Artificial network	839497/007
CMC S010	Rohde & Schwarz	ESH3-Z2	Impulses limiting device	- - -
CMC S012	Rohde & Schwarz	MDS21	Absorbing clamp	838506/015
CMC S013	Rohde & Schwarz	EZ-17	Current probe	840411/009
CMC S014	Rohde & Schwarz	ESH2-Z3	Passive probe	- - -
CMC S015	RKB	LOG801000	Log-periodic Antenna	- - -
CMC S016	Rohde & Schwarz	HK116	Biconical antenna	839472/001
CMC S017	Rohde & Schwarz	HL223	Log-periodic Antenna	825584/009
CMC S018	SCHAFFNER	CDN 126	Coupling clamp	128
CMC S019	FCC	FCC 801-M5-25	CDN Power Line	06
CMC S020	Ofel	ROS 100	Impedance	9511503
CMC S021	CMC	TRBS 01	Balance-to-unbalance transformer	- - -
CMC S022	Teseo	LAS 1	Loop antenna	3971
CMC S024	CMC	CTL-01	Voltage change for LISN	- - -
CMC S025	Salmoiraghi	1750-1	Hygro - Thermograph	323.601
CMC S026	Chroma	C6530	Power supply source	653000095
CMC S027	Amplifier Research	75A250	RF Amplifier	19349
CMC S028	FCC	FCC-203I	Injection clamp	209
CMC S029	Keytek	Cemaster	Surge, dips, burst source	9609258
CMC S030	Rohde & Schwarz	ESPC	EMC interference receiver	844006/013
CMC S031	Tektronix	TDS 210	Digital oscilloscope	B010552
CMC S032	SCHAFFNER	NSG 2050	Surge source with CDN	200111-253AR
CMC S033	Tektronix	P6015	High voltage probe	R0238/1
CMC S034	Schwarzbeck	UHA 9105	Dipole	UHA 91052234
CMC S037	Rohde & Schwarz	NRVS	Power meter	845127/023
CMC S039	CMC	BI 01	Induction coil	- - -
CMC S040	Walker Scientific	ELF 50-D	Magnetic field meter	K71484-290
CMC S042	Fluke	Fluke 73	Multimeter	67771510
CMC S(51-75)	CMC	LFXXX	Dummy lamp	- - -
CMC S076	Altitude	25438	Barometer	- - -
CMC S077	Fluke	Fluke-87	Multimeter	69050353
CMC S078	Amplifier Research	100W1000M1	RF Amplifier	21849
CMC S079	AH System, Inc	SAS-200/542	Biconical antenna	504
CMC S080	AH System; Inc	SAS-200/510	Log periodic antenna	807
CMC S081	AH System; Inc	SAS 200/550-1	Active Monopole Antenna	660
CMC S082	AH System; Inc	SAS-200/560	Loop Antenna	635
CMC S083	AH System; Inc	BCP-200/510	LF Current Probe	564
CMC S084	AH System; Inc	BCP-200/511	HF/VHF Current Probe	579
CMC S085	AH System; Inc	SAS-200/530	Broadband dipole	504
CMC S086	CMC	RHCP01	Resistance 470Kohm	- - -
CMC S087	CMC	RHCP01	Resistance 470Kohm	- - -
CMC S088	CMC	LFAS20	Dummy lamp	- - -
CMC S089	CMC	CSTARTER	Capacitor 5000pF	- - -
CMC S090	CMC	CSTARTER	Capacitor 5000pF	- - -
CMC S091	CMC	DIPLP	Dipole for Loop Antenna control	- - -
CMC S094	Schwarzbeck	NNBM 8126-A	Artificial network	8126A161

CMC S095	FCC	FCC 801-M3-16	CDN power line	9821
CMC S096	B & K	2260	Phonometer	1847463
CMC S105	Decca	PA-50	Log-periodic antenna	34/17977 - b
CMC S106	Gigatronix	900	RF signal generator	323001
CMC S107	Hewlett Packard	HP8563E	Spectrum analyser	3846A09658
CMC S108	Emco	3115	Horn antenna	9811-5622
CMC S109	Farnell	LFM4	LF signal generator	531
CMC S110	CMC	OPS800	Open strip line 800mm	- - -
CMC S111	LEM HEME	PR 1001	Current probes	- - -
CMC S112	Amplifier Research	DC3010	Directional coupler	15238
CMC S114	Schwarzbeck	VHA 9103	Dipole	VHA 91031801
CMC S116	CMC	BCIP01	Bulk current injection probe	--
CMC S117	MARCONI	2019A	RF signal generator	118453/014
CMC S118	Hewlett Packard	E3632A	Programmable power supply	KR75301881
CMC S119	Hewlett Packard	HP8903B	Audio Analyzer	3011A09055
CMC S120	FCC	FC130-A	Bulk Current Injection Probe	118
CMC S121	Wavetek	LCR55	Bridge LCR	20104738
CMC S122	Fluke	336	Amperometric clamp meter	81754972
CMC S123	Rohde & Schwarz	SML03	RF signal generator	100625
CMC S124	Spin	AMTP42-20	Horn Antenna	103
CMC S125	SCHAFFNER	PNW 2003	Dips source	200234-014SC
CMC S126	LDS + Dactron	V730-335+LASER	Vibration testing system	132+133+4512698
CMC S127	SCHAFFNER	HLA6120	Loop Antenna	1191
CMC S128	SCHAFFNER	CBA9428	RF Amplifier	1006
CMC S129	Rohde & Schwarz	ESPI7	Receiver	836.914/004
CMC S130	SCHAFFNER	NSG 5000	Automotive Impulse Generator	02032579-1
CMC S131	SCHAFFNER	CDN 500	Capacitive clamp	400-151/0128
CMC S132	CMC	OPS150	Open strip line 150mm	- - -
CMC S133	RKB	LOG8002500	Log-periodic Antenna	- - -
CMC S135	LEM HEME	PR 30	Current Probe	P04217832830
CMC S136	Schwarzbeck	VULB 9136	Broadband Antenna	9136-205
CMC S138	Agilent	33220A	Function / Arbitrary Waveform Gen.	MY44003979
CMC S139	Wilcoxon	736	Accelerometer 101 mV/g	12245
CMC S140	Wilcoxon	732A	Accelerometer 9.8 mV/g	1424
CMC S141	Dytran	3023A1	Accelerometer Triaxial	383
CMC S142	Narda	ELT-400+B-sensor	Exposure level tester	D-0034+D-0032
CMC S143	EM TEST	DPA 500	Harmonic & Flicker analyser	0903 - 04
CMC S144	Rohde & Schwarz	URV5	Power meter	881375/004
CMC S145	Hewlett Packard	778D	Directional coupler	17237
CMC S146	Amplifier Research	10W1000B	RF Amplifier	18451
CMC S150	RKB	LOG3080	Log-periodic Antenna	- - -
CMC S155	Chroma	61705	Power supply source	000000088
CMC S156	Yokogawa	DL9040	Digital oscilloscope	91F643771
CMC A001	Sispe	F5123	Shield chamber	- - -
CMC A002	SIDT	951130	Anechoic chamber	- - -
CMC A005	Fenner		Television	008203
CMC A006	Rohde & Schwarz	HZ-1	Wood support for antennas	893227/002
CMC A007	CMC	10707	Semi-anechoic chamber	- - -
CMC A008	CMC	BPA	Track for absorbing clamp	- - -
CMC A009	C&P	TI02	Isolating transformer	- - -
CMC A012	AH System; Inc	ATU 200/510	Support for antennas	- - -
CMC A013	CMC	TR01	Rotary motorized table	- - -
CMC A014	CMC	PM01	Antenna positionning Mast	- - -
CMC A015	Samsung	VP-D101	Camera	W4706VKX

7. Measurement uncertainty

Test	*Value*
Conducted disturbance test – continuous and discontinuous - (9 kHz – 30 MHz)	**1.8 dB**
Insertion loss test	**1.8 dB**
Radiated electromagnetic disturbance test (loop antenna)	**2.0 dB**
Radiated disturbance test	**5.1 dB**
Disturbance power test	**2.2 dB**
Harmonic current emissions test	**0.4 %**
Voltage fluctuation and flicker test	**1.5 %**
Electrostatic discharge immunity test	**8.1 %**
Electrical fast transients / burst immunity test	**7.1 %**
Radiated electromagnetic field immunity test	**0.6 V/m at 3V/m**
Pulse modulated radio-frequency electromagnetic field immunity test	**0.6 V/m at 3V/m**
Surge immunity test	**2.7 %**
Injected currents immunity test (150 kHz – 230 MHz)	**0.4 V at 3V**
Power frequency magnetic field immunity test	**0.2 A/m at 3 A/m**
Short interruption immunity test	**0.8 %**

8. Reference documents

Reference no.	*Description*
FCC Rules and Regulation Title 47 part 15 (2005)	--
ANSI C63.4	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz – 40GHz
Internal Procedure PM001 rev. 1.0 (Quality Manual)	Measure Procedure
Internal procedure INC_M rev. 5.3 (Quality Manual)	Measurement uncertainty calculation

9. Deviation from test specification

In agreement with the client, emission tests were performed with peak detector .
At the frequencies where the measures exceed the limit or within 6dB from it, the test was repeated with quasi-peak detector and/or average detector.

10. Test case verdicts

Test case does not apply to the test object ..... : N / N.A.

Test item does meet the requirement..... : P / Pass / Complies

Test item does not meet the requirement ..... : F / Fail / Does not comply

Test not performed ..... : NE / Not Executed

11. Results

In this clause tests results are reported.

All measurements are done in accordance with the Filling and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA-705

Measurement uncertainty is in accordance with document CMC INC_M rev. 5.3.

11.1 Bandwidth

Test configuration and test method

Test site: Laboratory
Auxiliary equipment: See clause 4 of this test report

Environmental conditions

Temperature 19 ºC Atmospheric pressure 100 kPa Relative humidity 46 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247(a)
- DA 00-705, march 30, 2000
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Result

Channel	*Modulation*	*Frequency*	Graph(s)	Bandwidth	Remark
0	Type 1	912,5 MHz	G06148201	88 kHz	--
25	Type 1	915 MHz	G06148202	88 kHz	--
49	Type 1	917,4 MHz	G06148203	89 kHz	--
0	Type 2	912,5 MHz	G06148204	95 kHz	--
25	Type 2	915 MHz	G06148205	97 kHz	--
49	Type 2	917,4 MHz	G06148206	96 kHz	--
Measurement uncertainty: ±1 kHz					

Remarks

//////////////

Reference documents

See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report)

CMC S129

Result

The requirements are met

11.2 Channel Separation

Test configuration and test method

Test site: Laboratory
Auxiliary equipment: See clause 4 of this test report

Environmental conditions

Temperature 21 ºC Atmospheric pressure 100 kPa Relative humidity 46 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247(a)
- DA 00-705, march 30, 2000
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Acceptance limits

Limit: Minimum 25kHz or the 20dB Bandwidth of the hopping system

Result

Port	*Modulation*	Graph(s)	Channel Separation	Remark
Enclosure	Type 1	G06148207	100 kHz	--
Enclosure	Type 2	G06148208	100 kHz	--
Measurement uncertainty: ±1kHz				

Remarks

//////////////

Reference documents

See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report)

CMC S129

Result

The requirements are met

11.3 Average Time of Occupancy

Test configuration and test method

Test site: Laboratory
Auxiliary equipment: See clause 4 of this test report

Environmental conditions

Temperature 21 ºC Atmospheric pressure 99 kPa Relative humidity 42 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247(a)
- DA 00-705, march 30, 2000
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Acceptance limits

0.4 s within 20 s period

Result

Channel	*Modulation*	*Graph(s)*	*Dwell time*	*Remark*
25	Type 1	G06148266	21,4ms	--
25	Type 2	G06148265	34,4ms	--

Channel	*Modulation*	Time between two transmission	Nr. of hopping frequency	Nr. of transmission for channel	Time of Occupancy	Remarks
25	Type 1	47,2ms	50	20s/0,0472/50 = 8,47	8,47x21,4= 181,3ms	--
25	Type 2	47,2ms	50	20s/0,0472/50 = 8,47	8,47x34,4= 291,4ms	--
Measurement uncertainty: ±1µs x nr. of channels						

Remarks //////////////
Reference documents See clause 8 of this test report
Test equipment used (Id number – see clause 6 of this test report) CMC S129
Result The requirements are met

11.4 Number of Hopping Channels

Test configuration and test method

Test site: Laboratory
Auxiliary equipment: See clause 4 of this test report

Environmental conditions

Temperature	22	ºC	Atmospheric pressure	99	kPa	Relative humidity	46	%

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247(a)
- DA 00-705, march 30, 2000
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Result

Port	Modulation	Graph(s)	Number of Hopping Frequency	Remark
Enclosure	Type 1	G06148209	50	--
Enclosure	Type 2	G06148210	50	--

Remarks

//////////////

Reference documents

See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report)

CMC S129

Result

The requirements are met

11.5 Peak Output Power

Test configuration and test method

Test site: Laboratory
Auxiliary equipment: See clause 4 of this test report

Environmental conditions

Temperature 21 ºC Atmospheric pressure 100 kPa Relative humidity 48 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247(b)
- DA 00-705, march 30, 2000
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Acceptance limits

Frequency range	RF power output
902 – 928 MHz	1,0 W / 30dBm

Result

Channel	*Modulation*	*Graphs*	*Results*	*Remark*
0	Type 1	G06148237 *	15,3 dBm	--
25	Type 1	G06148238 *	15,3 dBm	--
49	Type 1	G06148239 *	15,3 dBm	--
0	Type 2	G06148240 *	15,4 dBm	
25	Type 2	G06148241 *	15,4 dBm	
49	Type 2	G06148242 *	15,3 dBm	

Remarks

* Used +26dBm of attenuation during the test.

Reference documents See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report) CMC S129

Result The requirements are met

11.6 Band Edge

Test configuration and test method

Test site: Laboratory
Auxiliary equipment: See clause 4 of this test report

Environmental conditions

Temperature	22	ºC	Atmospheric pressure	99	kPa	Relative humidity	46	%

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247(c)
- DA 00-705, march 30, 2000
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Acceptance limits

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in section 15.209(a) is not required. In addition, radiated emission which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (see section 15.205(c)).

Result

Channel	*Modulation*	Graph(s)	Attenuation Band Edge	Remark
0 – 49	Type 1	G06148215	> 20dBc	Hopping enable
0 – 49	Type 1	G06148216	> 20dBc	Hopping enable
0 – 49	Type 2	G06148217	> 20dBc	Hopping enable
0 – 49	Type 2	G06148218	> 20dBc	Hopping enable
0 – 49	Type 1	G06148260	> 20dBc	Hopping disable
0 – 49	Type 1	G06148261	> 20dBc	Hopping disable
0 – 49	Type 2	G06148262	> 20dBc	Hopping disable
0 – 49	Type 2	G06148263	> 20dBc	Hopping disable
Measurement uncertainty: ±1dB				

Remarks ////////////////
Reference documents See clause 8 of this test report
Test equipment used (Id number – see clause 6 of this test report) CMC S129
Result The requirements are met

11.7 Conducted Spurious

Test configuration and test method

Test site	Semi-anechoic chamber
Auxiliary equipment	See clause 4 of this test report

Environmental conditions

Temperature	22	ºC	Atmospheric pressure	99	kPa	Relative humidity	46	%

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247(c) and Part 15.209
- DA 00-705, march 30, 2000
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Acceptance limits

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or radiated measurement. Attenuation below the general limits specified in cl. 15.209(a) is not required. In addition, radiated which fall in the restricted bands, as defined in cl. 15.205(a), must also comply with the radiated emission limits specified in cl. 15.209(a).

Result

Channel	*Modulation*	Graph(s)	Remarks	Result
Ch 0	Type 1	G06148219	--	Complies
Ch 25	Type 1	G06148220	--	Complies
Ch 49	Type 1	G06148221	--	Complies
Ch 0	Type 2	G06148222	--	Complies
Ch 25	Type 2	G06148223	--	Complies
Ch 49	Type 2	G06148224	--	Complies

Remarks

Up to 7GHz, the measured level is more than 20dB below the limit.

Reference documents

See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report)

CMC S129
Measurement uncertainty: See clause 7 of this test report

Result

The requirements are met

11.8 Radiated Spurious

Test configuration and test method

Test site: Semi-anechoic chamber
Auxiliary equipment: See clause 4 of this test report

Environmental conditions

Temperature 22 ºC Atmospheric pressure 99 kPa Relative humidity 46 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247(c) and Part 15.209
- DA 00-705, march 30, 2000
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;
For measurements below 1GHz the resolution bandwidth is set to 100kHz.
For measurements above 1GHz the resolution bandwidth is set to 1MHz.

EUT exercising

See clause 4 of this test report

Acceptance limits

In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in cl. 15.205(a), must also comply with the radiated emission limits specified in cl. 15.209(a) (see cl.15.205(c)).

Result

Channel	*Modulation*	*Polarization*	Frequency Range (MHz)	Graph(s) (peak measurements)	Remarks	Result
Ch 0	Type 1	Horizontal	30 – 1000	G06148225	--	Complies
Ch 25	Type 1	Horizontal	30 – 1000	G06148226	--	Complies
Ch 49	Type 1	Horizontal	30 – 1000	G06148227	--	Complies
Ch 0	Type 2	Horizontal	30 – 1000	G06148228	--	Complies
Ch 25	Type 2	Horizontal	30 – 1000	G06148229	--	Complies
Ch 49	Type 2	Horizontal	30 – 1000	G06148230	--	Complies
Ch 0	Type 1	Vertical	30 – 1000	G06148231	--	Complies
Ch 25	Type 1	Vertical	30 – 1000	G06148232	--	Complies
Ch 49	Type 1	Vertical	30 – 1000	G06148233	--	Complies
Ch 0	Type 2	Vertical	30 – 1000	G06148234	--	Complies
Ch 25	Type 2	Vertical	30 – 1000	G06148235	--	Complies
Ch 49	Type 2	Vertical	30 – 1000	G06148236	--	Complies

Nr. Harmonics	*AV level (dBµV/m)*						*AV Limits (dBµV/m)*	*Remark*
	Channel 0		*Channel 25*		*Channle. 49*			
	Frequency	*(dBµV/m)*	*Frequency*	*(dBµV/m)*	*Frequency*	*(dBµV/m)*		
II Harmonic	1825	44,9	1830	44,7	1834,8	44,9	54,00	--
III Harmonic	2737,5	47,4	2745	48,7	2752,2	48,6	54,00	--
IV Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	54,00	--
V Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	54,00	--
VI Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	54,00	--
VII Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	54,00	--
VIII Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	54,00	--
IX Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	54,00	--
X Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	54,00	--
Measuremt Uncertainty: ±4dB								

Nr. Harmonics	*PK level (dBµV/m)*						*PK Limits (dBµV/m)*	*Remark*
	Channel 0		*Channel 25*		*Channle. 49*			
	Frequency	*(dBµV/m)*	*Frequency*	*(dBµV/m)*	*Frequency*	*(dBµV/m)*		
II Harmonic	1825	45,6	1830	45,4	1834,8	50,5	74,00	--
III Harmonic	2737,5	47,9	2745	49,2	2752,2	49,3	74,00	--
IV Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	74,00	--
V Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	74,00	--
VI Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	74,00	--
VII Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	74,00	--
VIII Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	74,00	--
IX Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	74,00	--
X Harmonic	--	More than 20dB below limit	--	More than 20dB below limit	--	More than 20dB below limit	74,00	--
Measuremt Uncertainty: ±4dB								

Remarks
EUT was tested in 3 orthogonal planes. In results table are reported the worst case.

Reference documents
See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report)
CMC S107
Measurement uncertainty: See clause 7 of this test report

Result
The requirements are met

11.9 Maximum permissible Exposure

Test configuration and test method

Test site: Laboratory
Auxiliary equipment: See clause 4 of this test report

Environmental conditions

Temperature	22	ºC	Atmospheric pressure	99	kPa	Relative humidity	46	%

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 1.1310
- DA 00-705, march 30, 2000
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Acceptance limits

915/1500 mW/cm^2 = 0,61 mW/cm^2 max at 20cm of distance

Result

Power Density Limit (mW/cm^2)	*Output Power (mW)*	Antenna Gain (G)	Power Density at 20cm *(mW/cm^2)*	Remarks
0,61	34,7	39,8	0,27	Measured
0,61	50	39,8	0,39	Declared

Remarks

//////////////////

Reference documents

See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report)

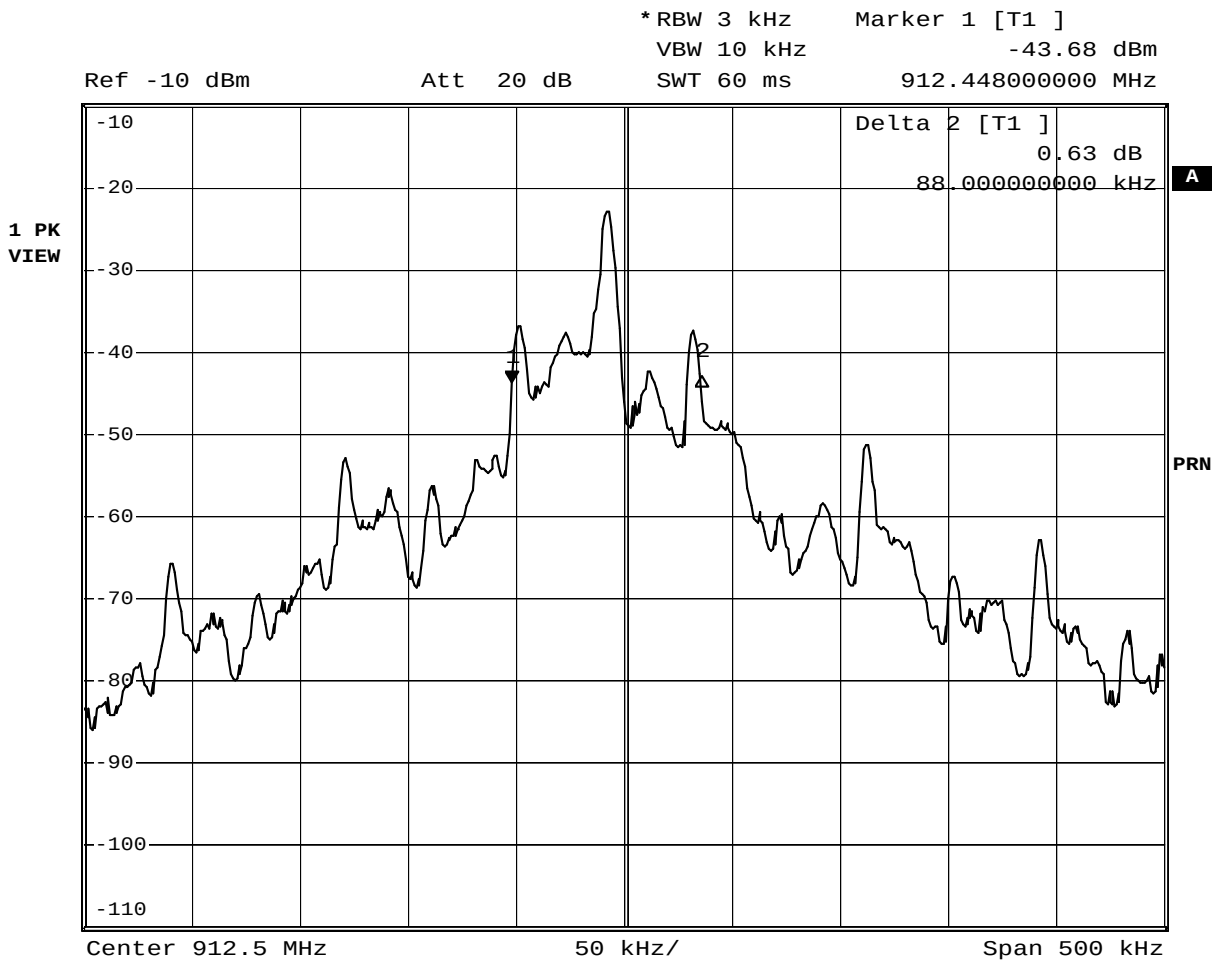
CMC S129
Measurement uncertainty: See clause 7 of this test report

Result

The requirements are met

12. Graphs and Tables

G06148201



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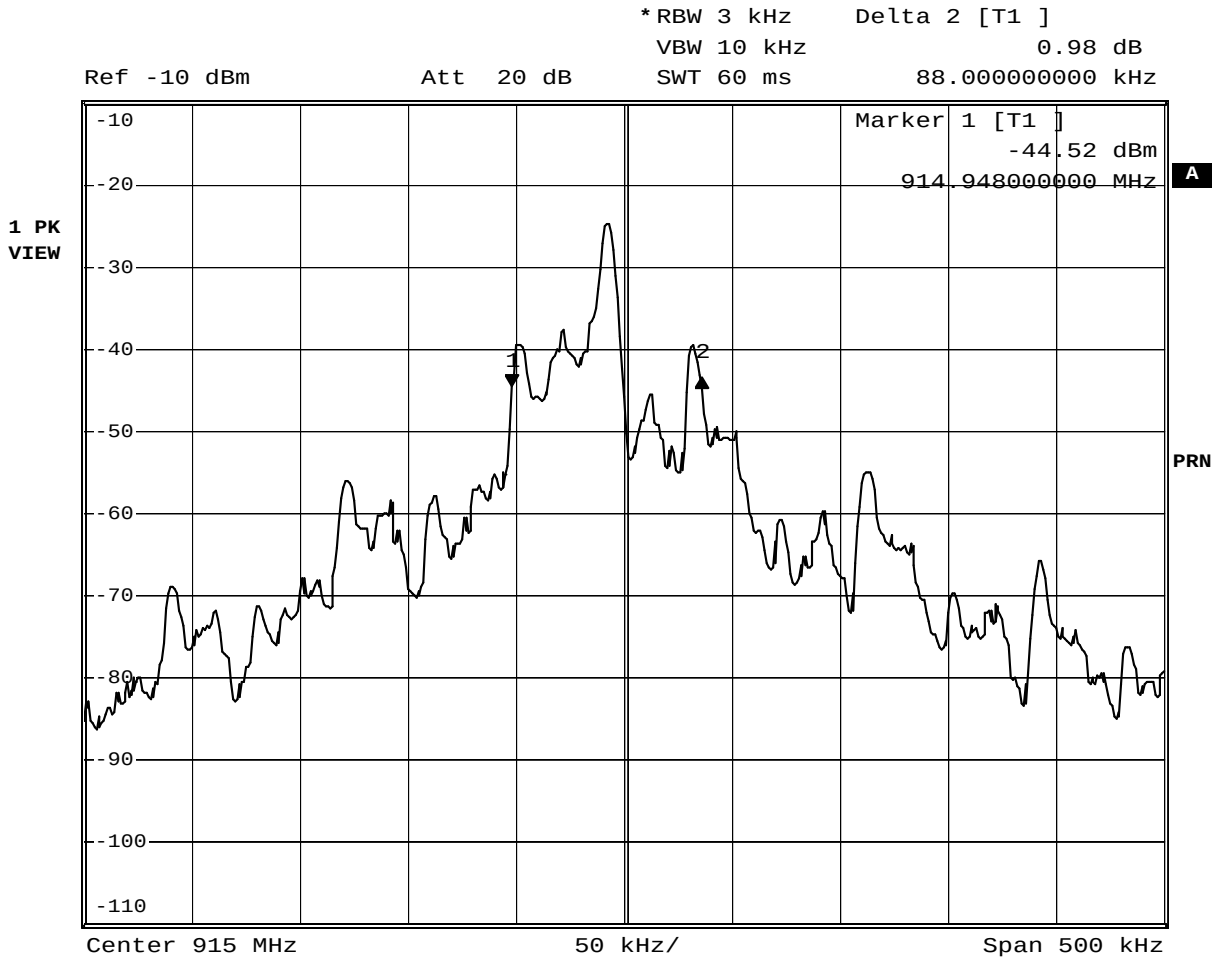

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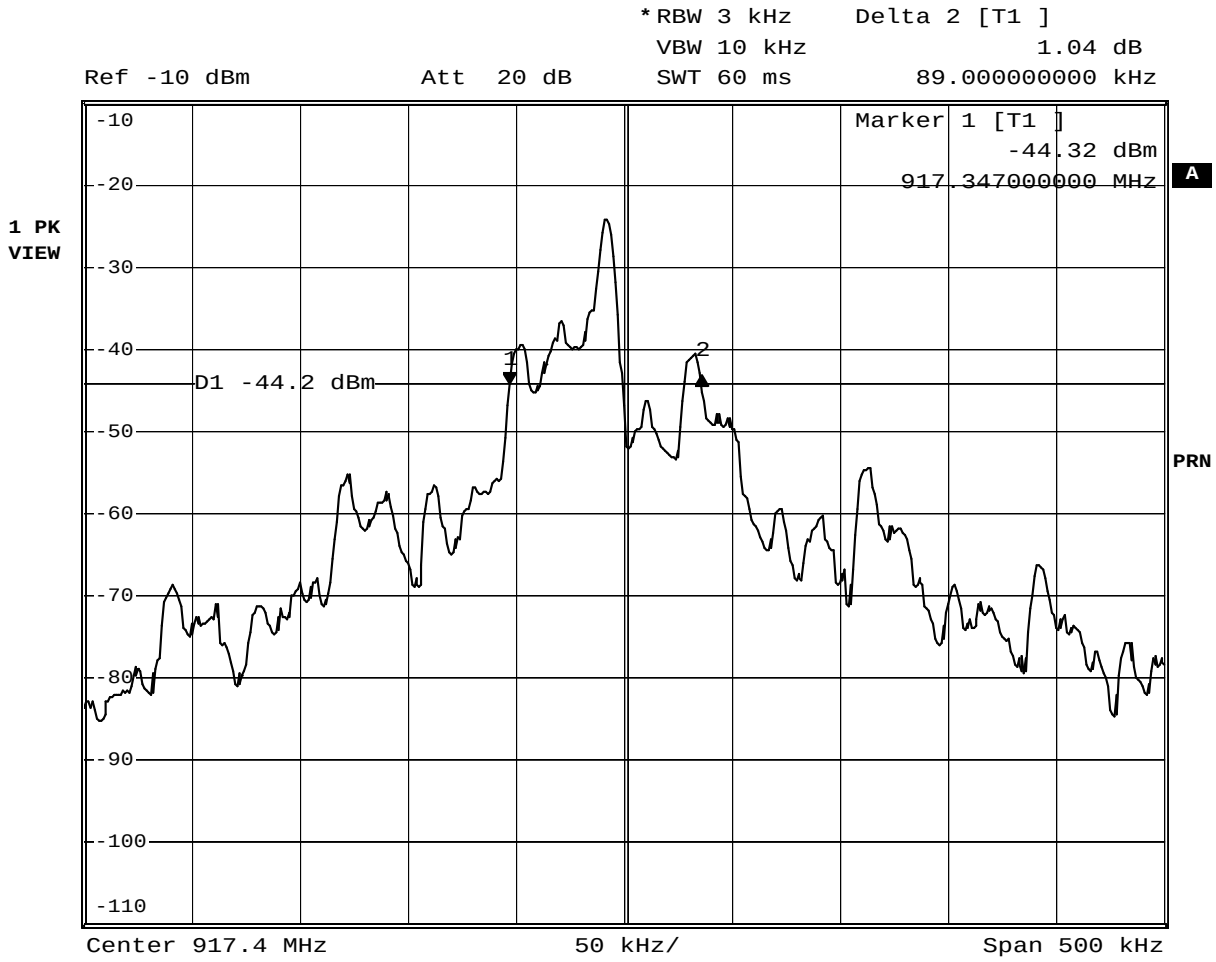

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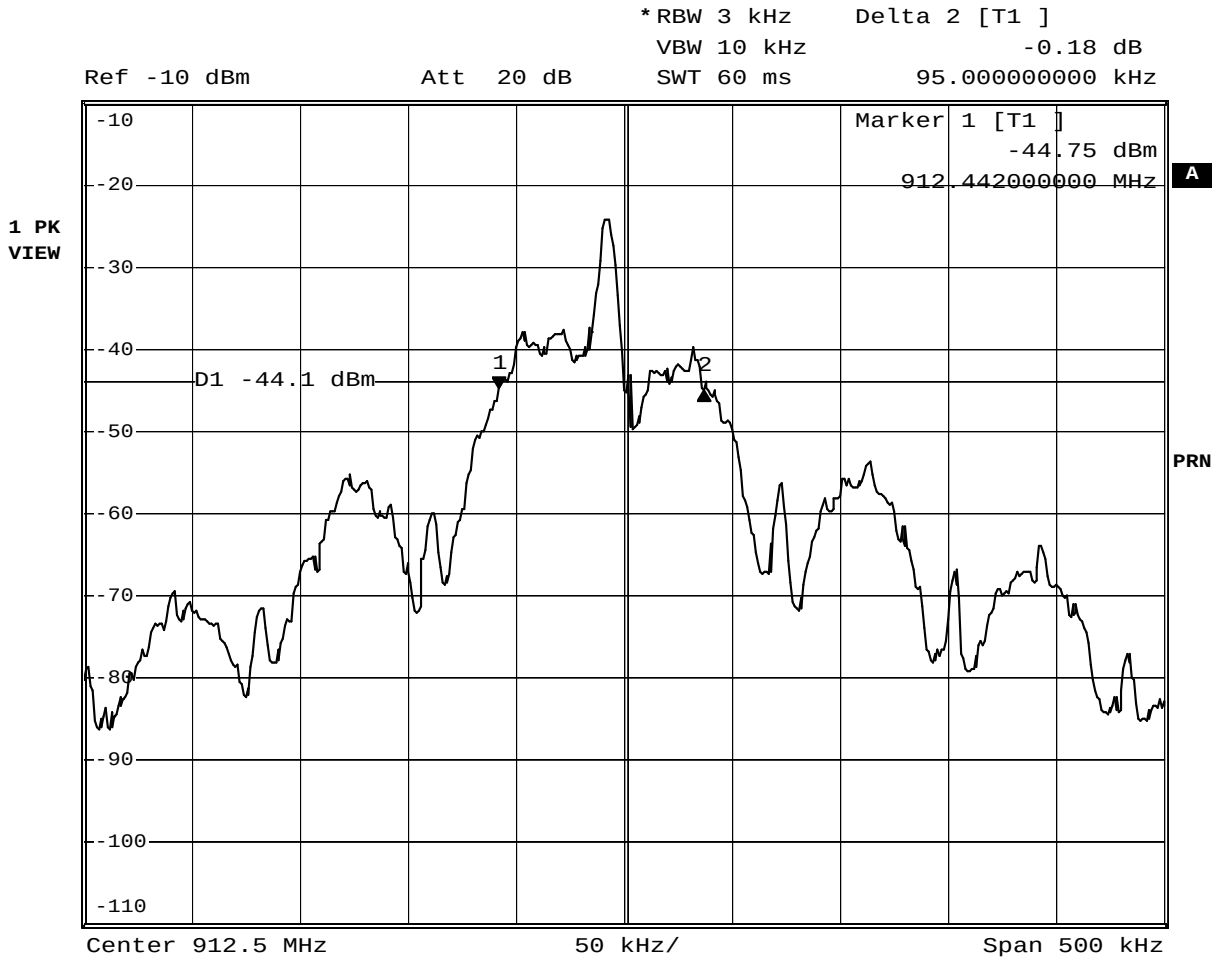

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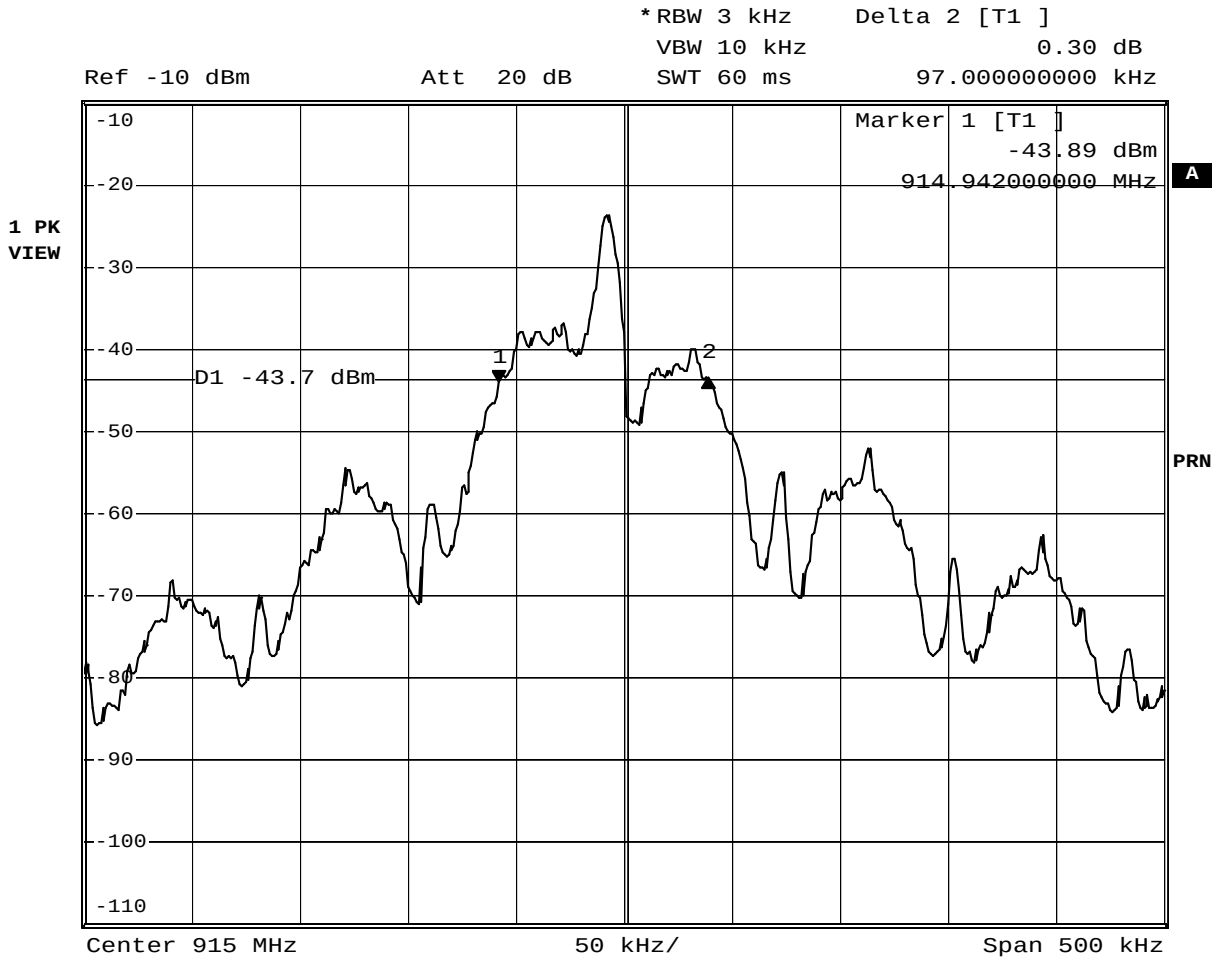

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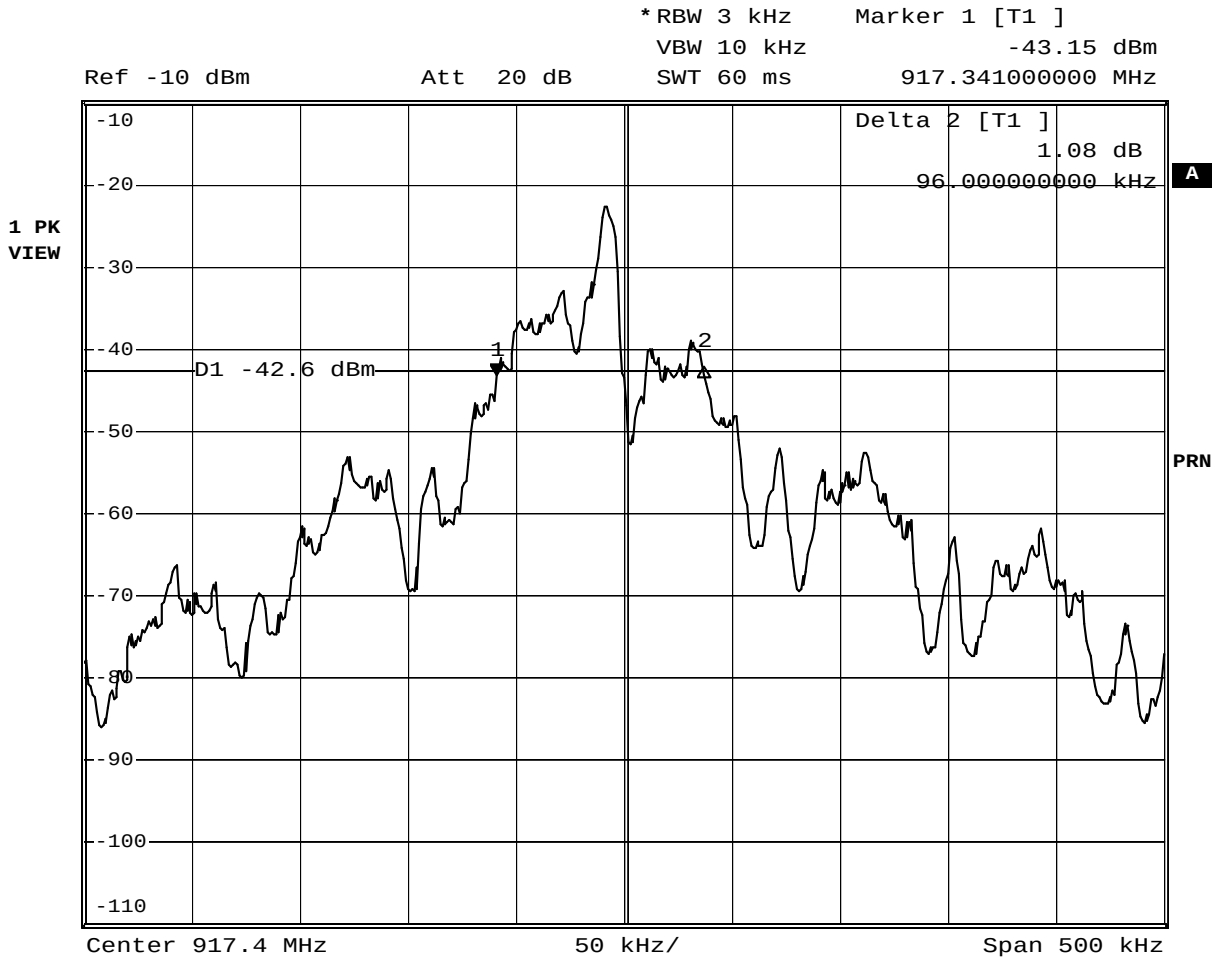

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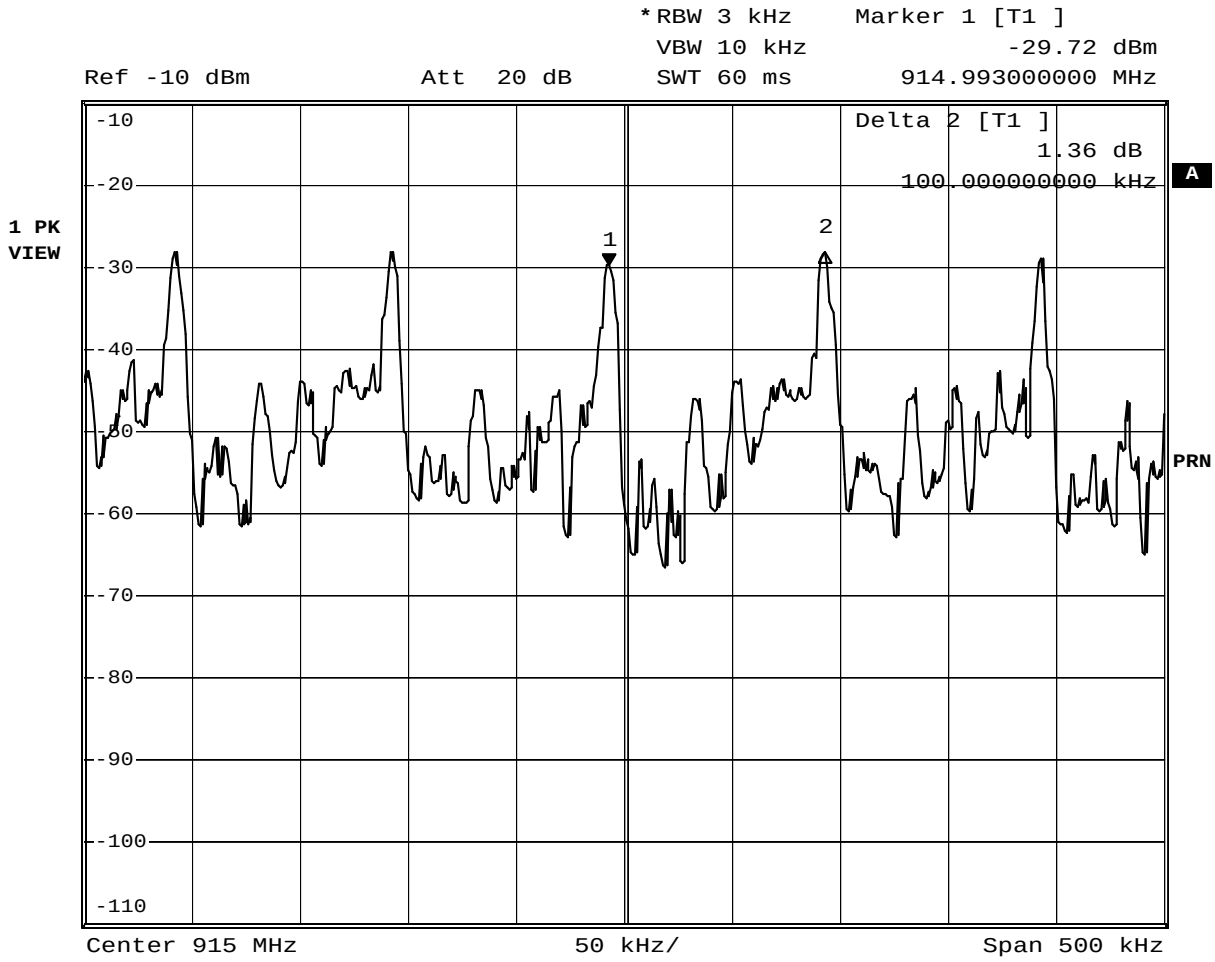

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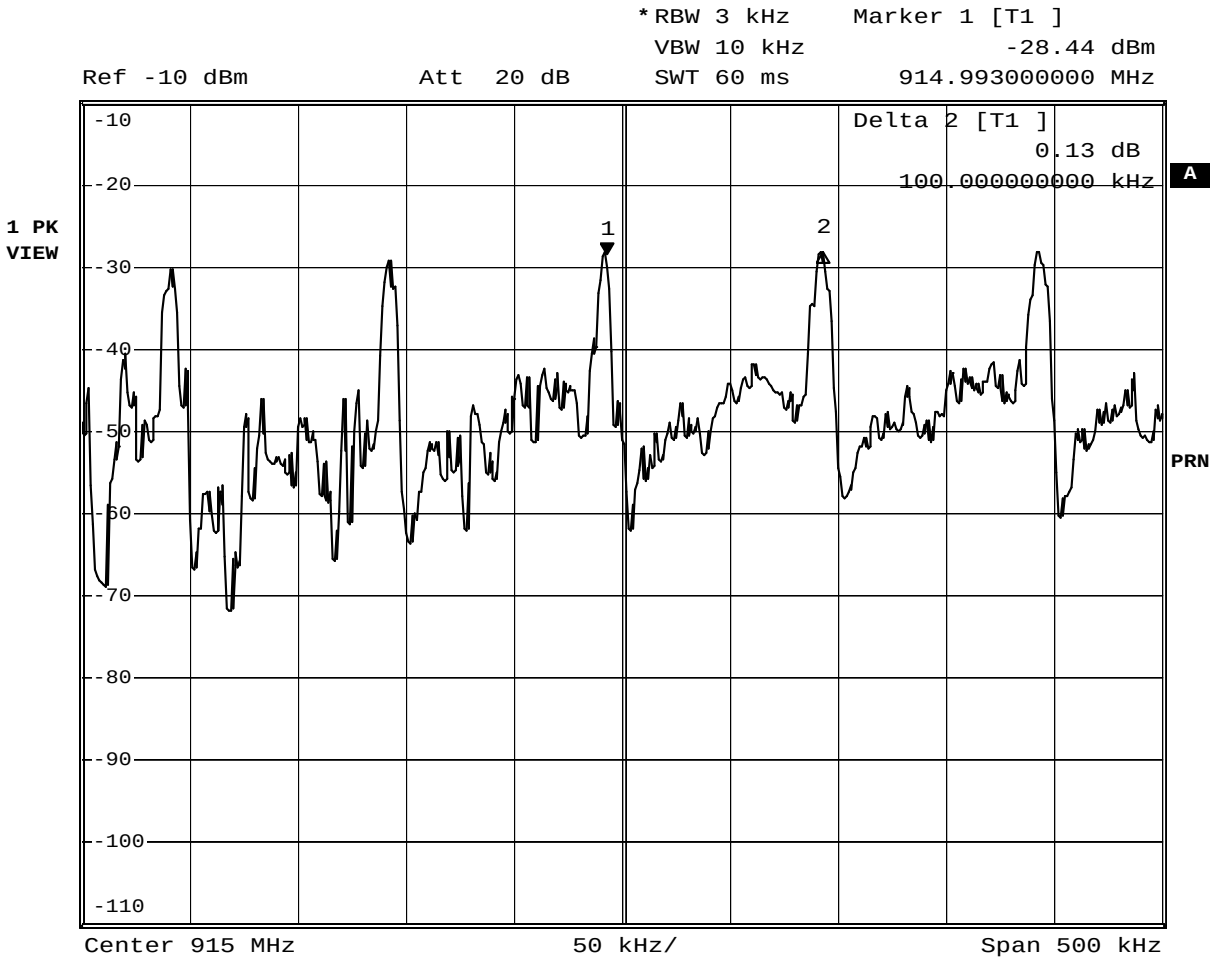

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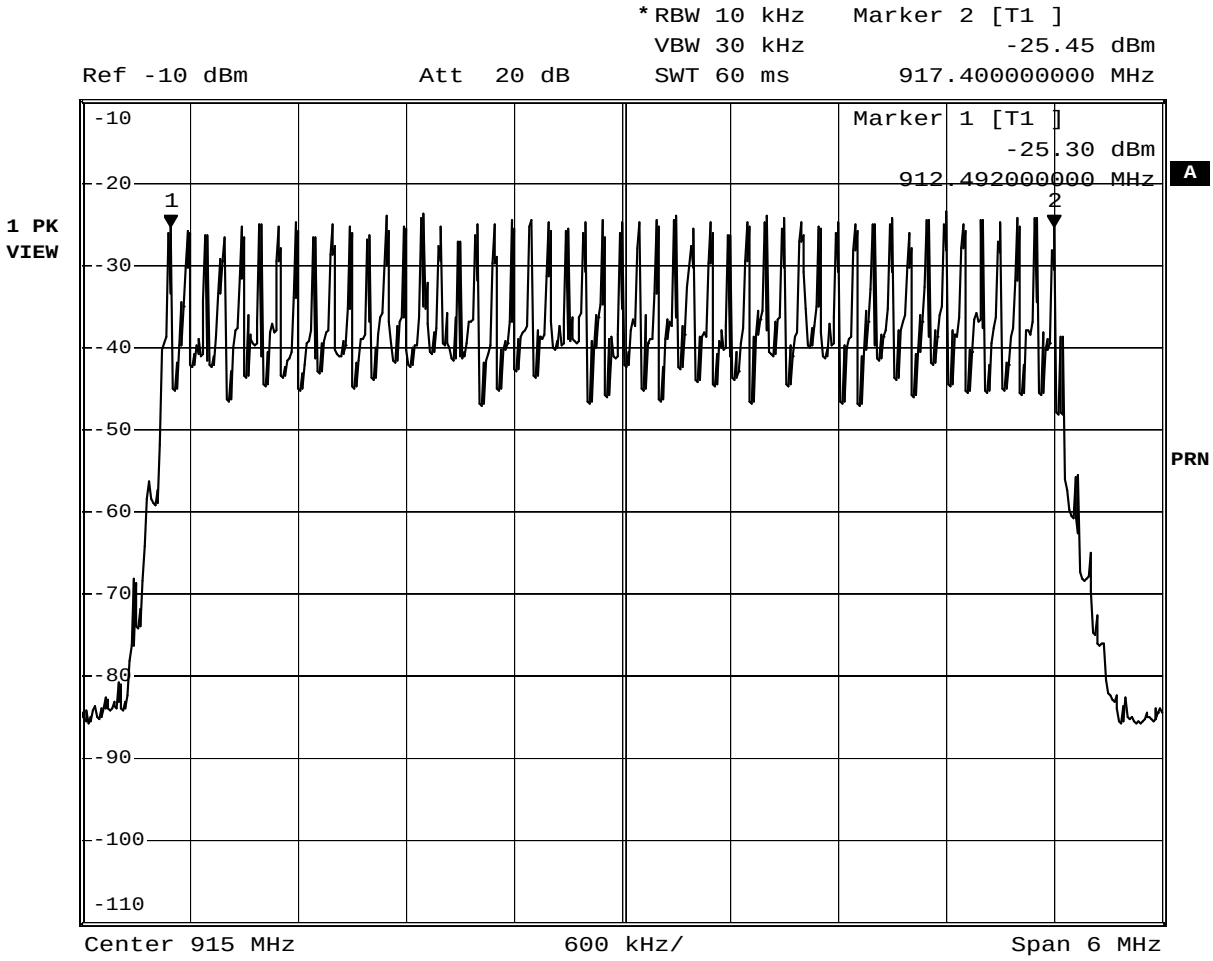

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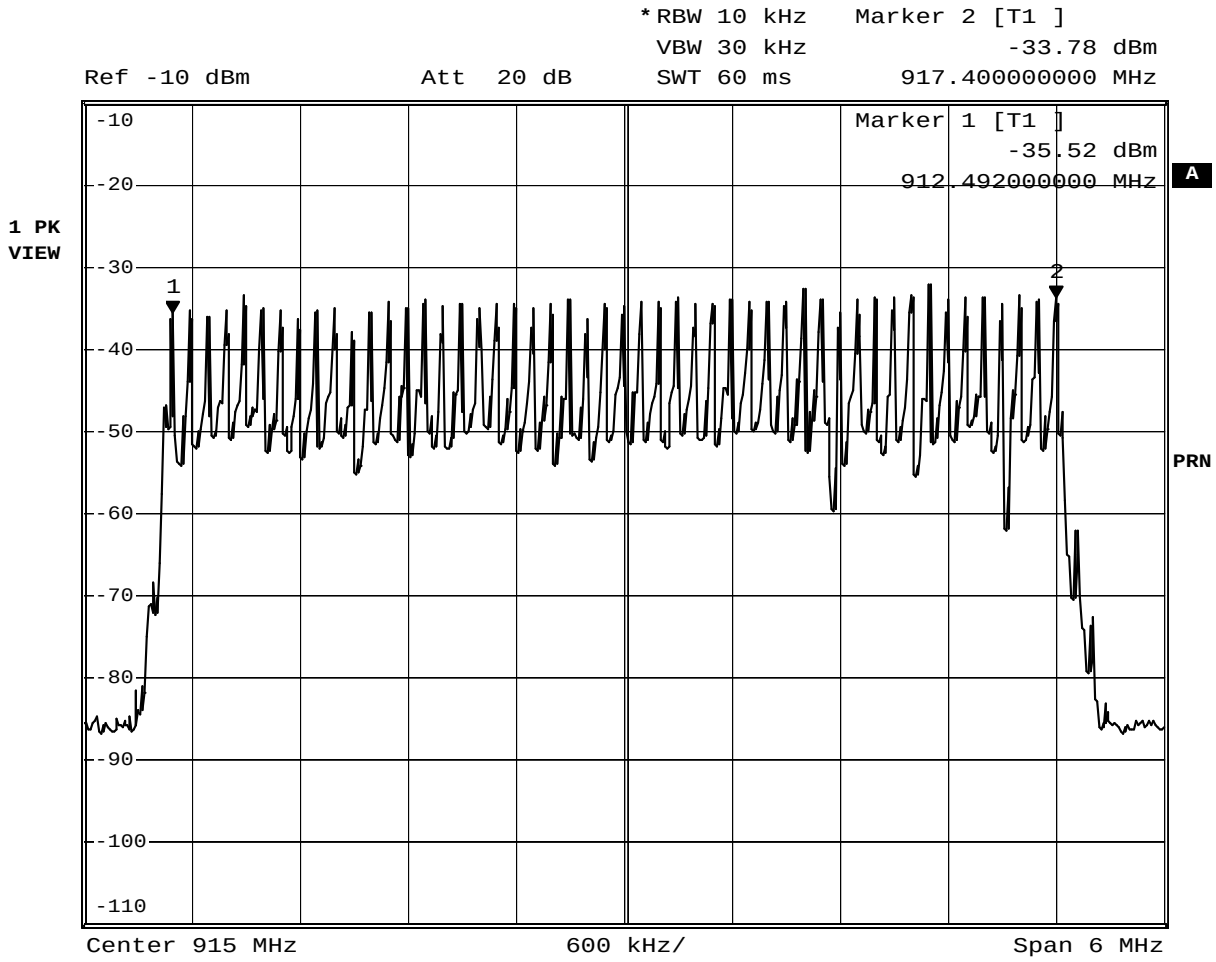

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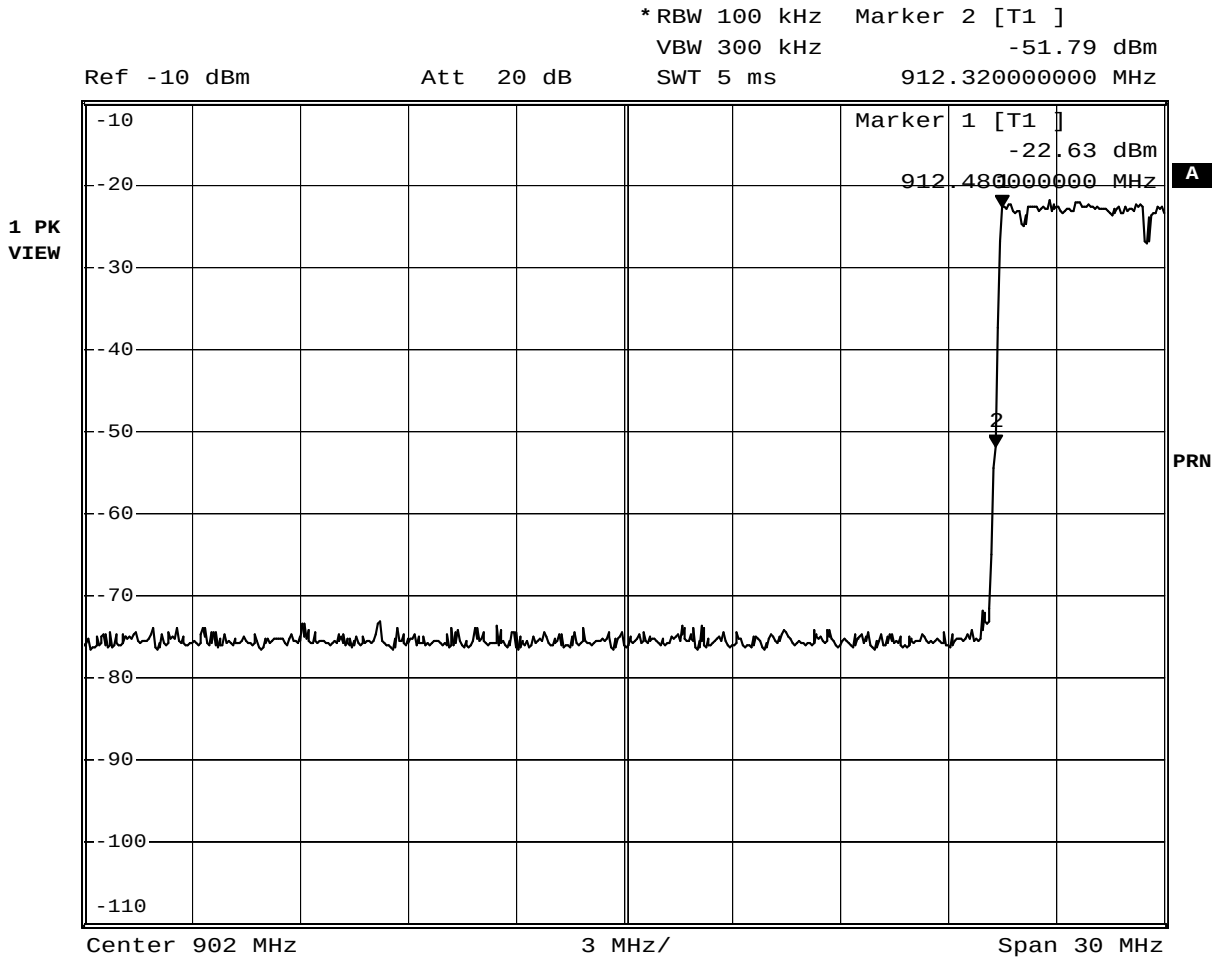

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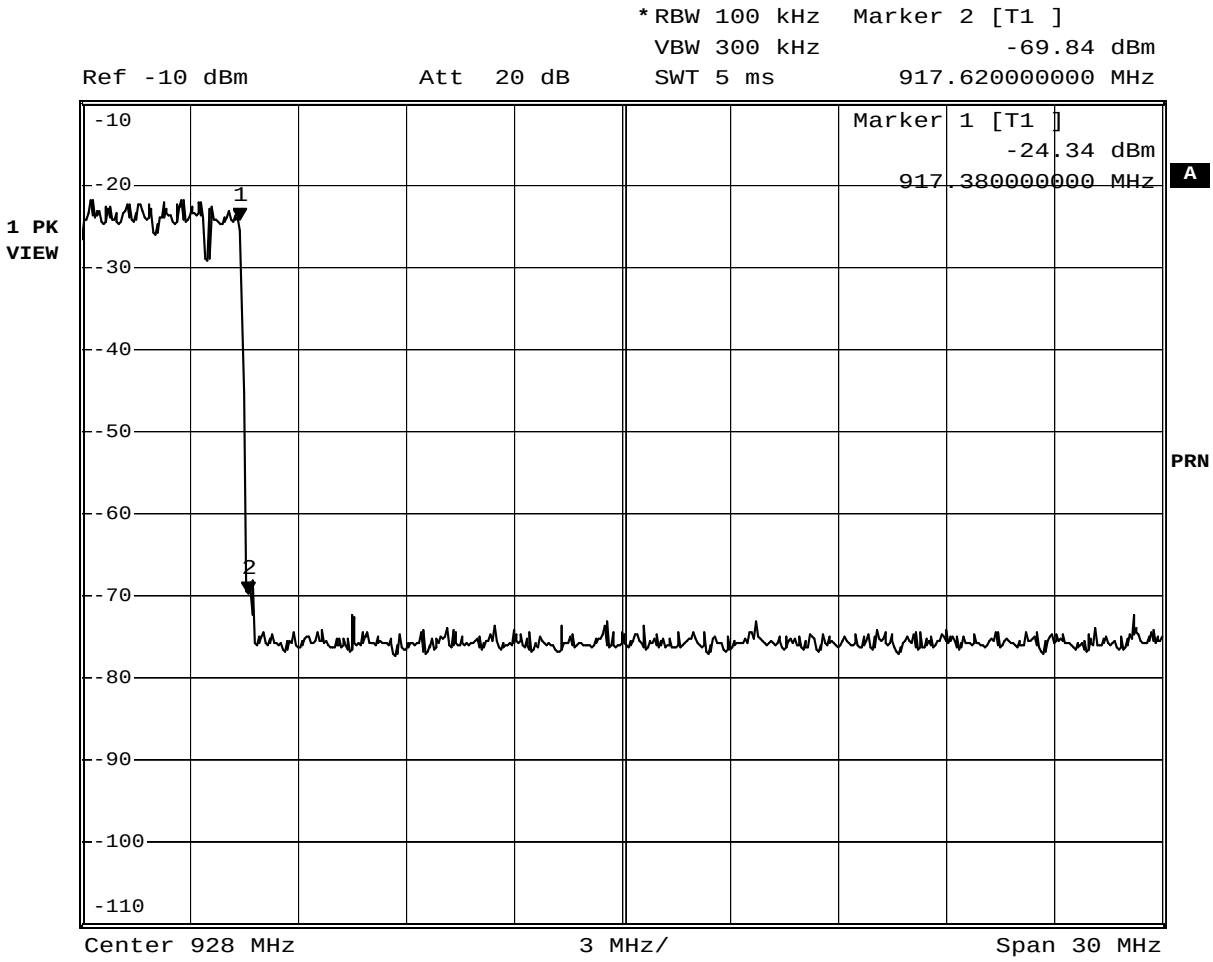

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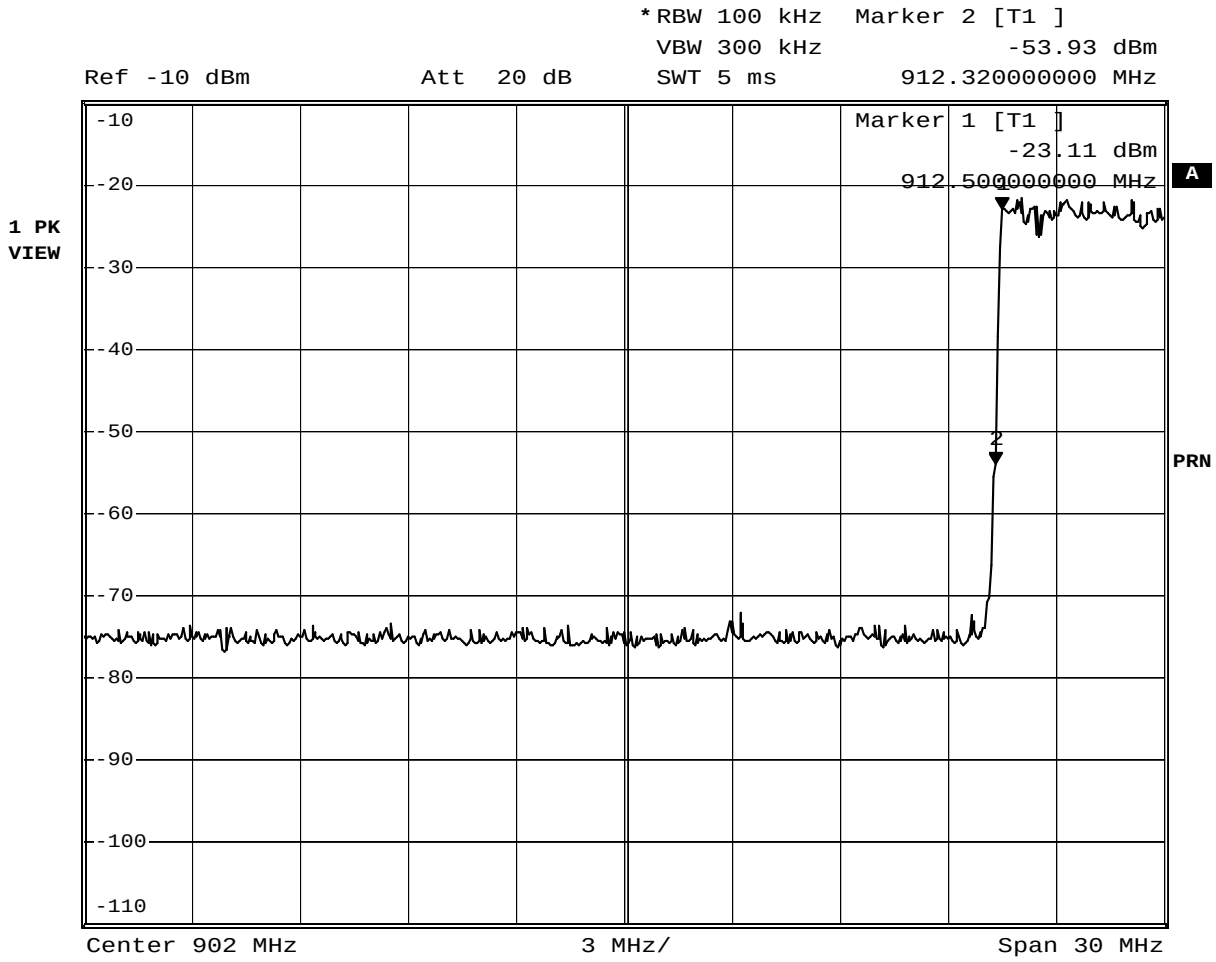

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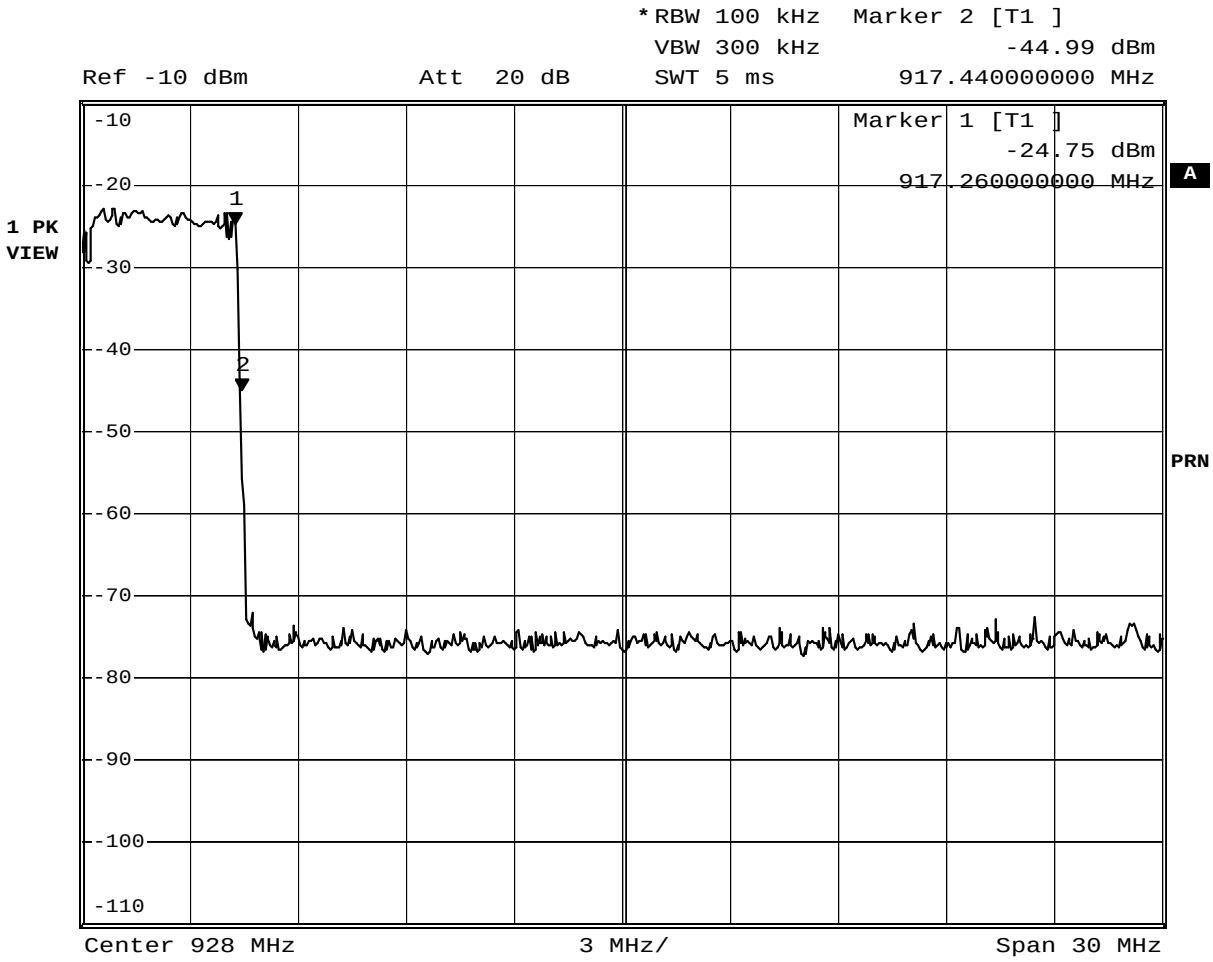

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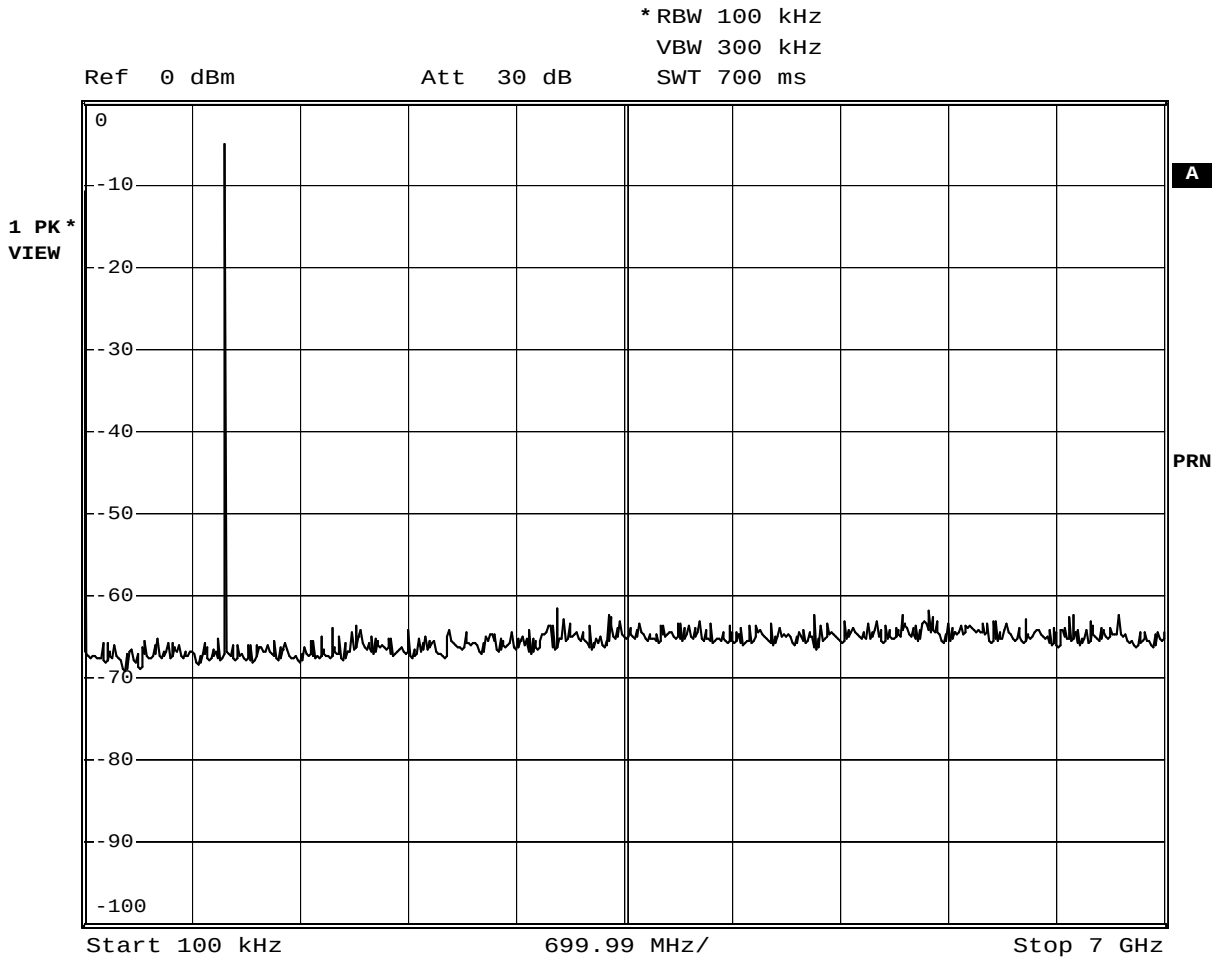

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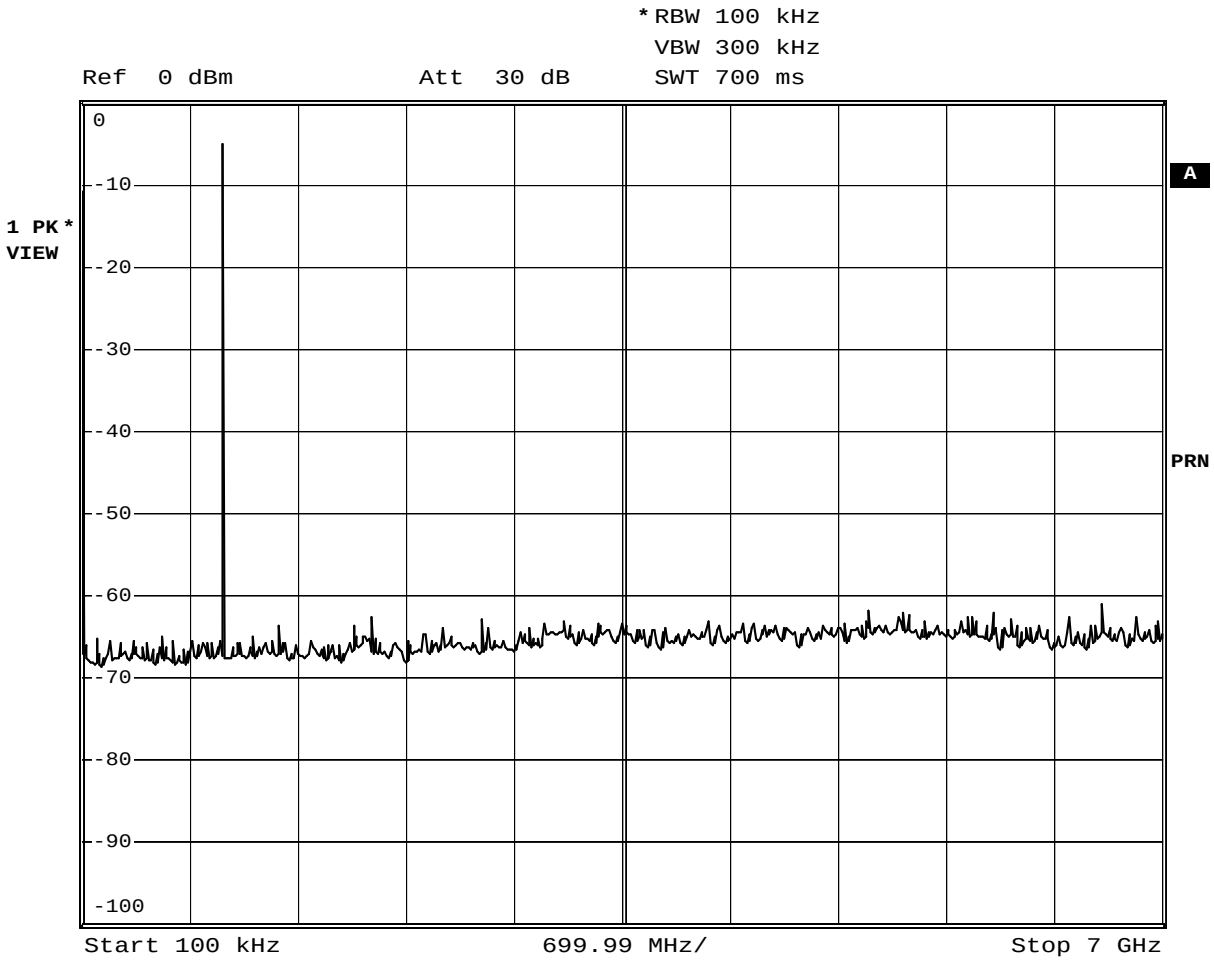

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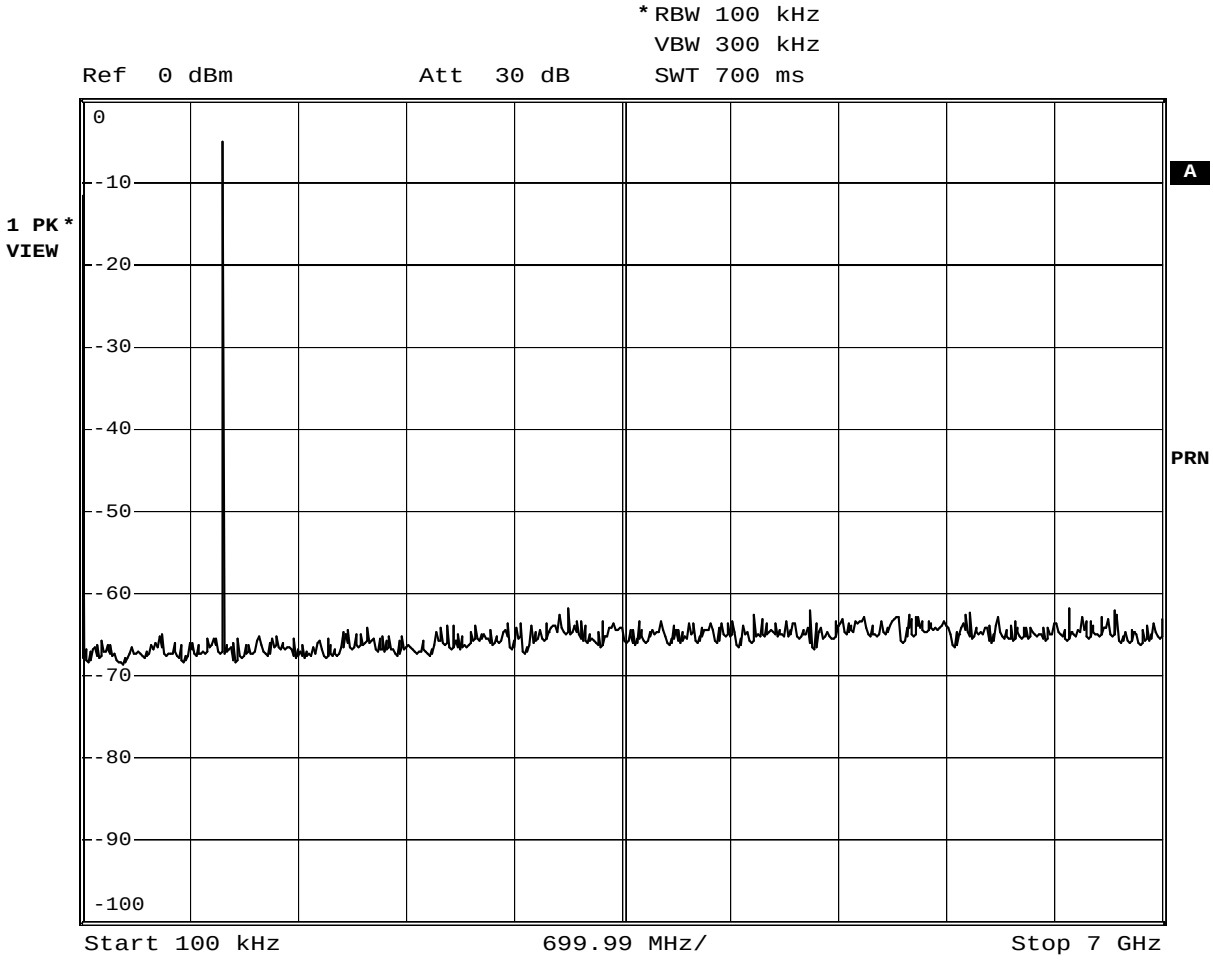

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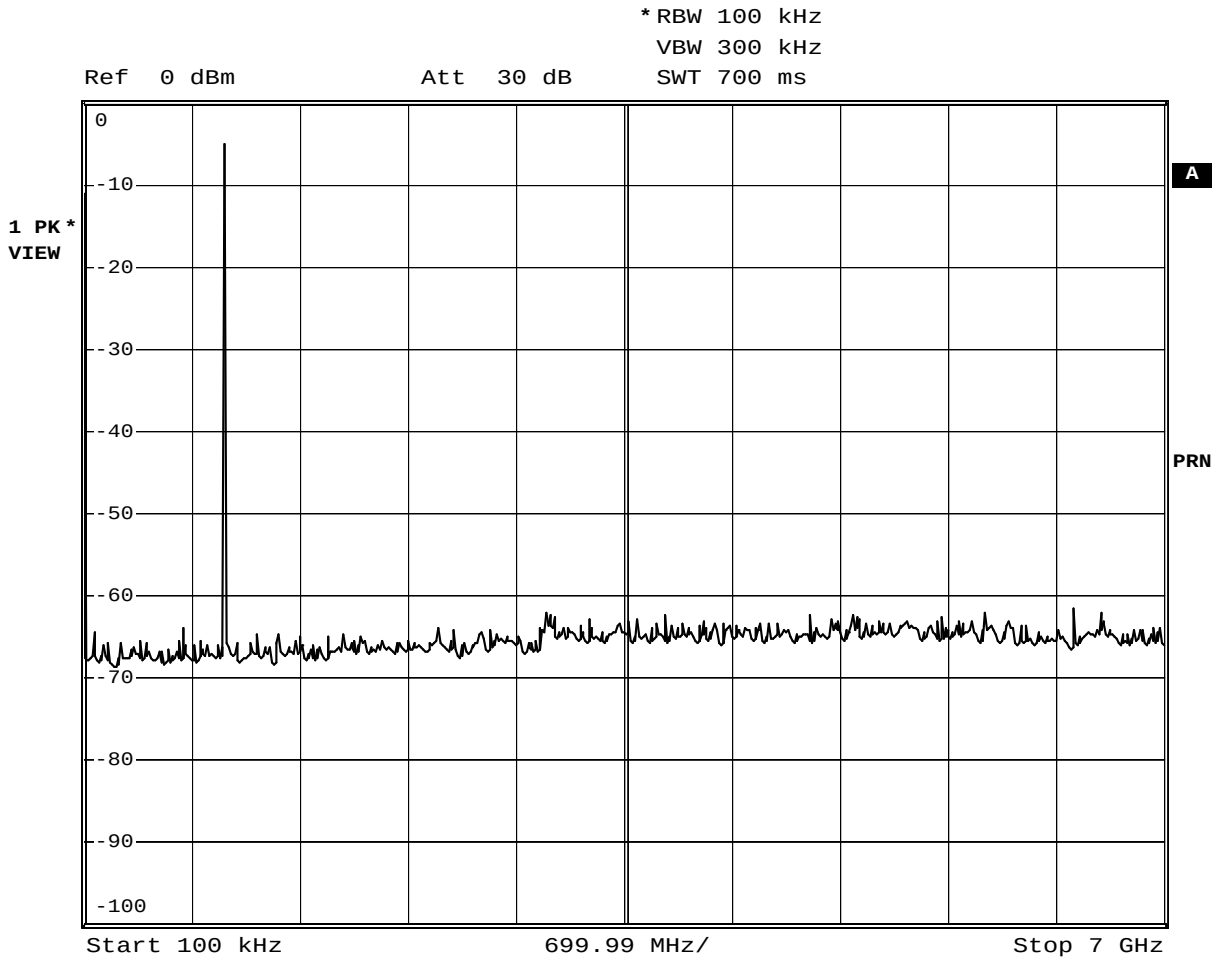

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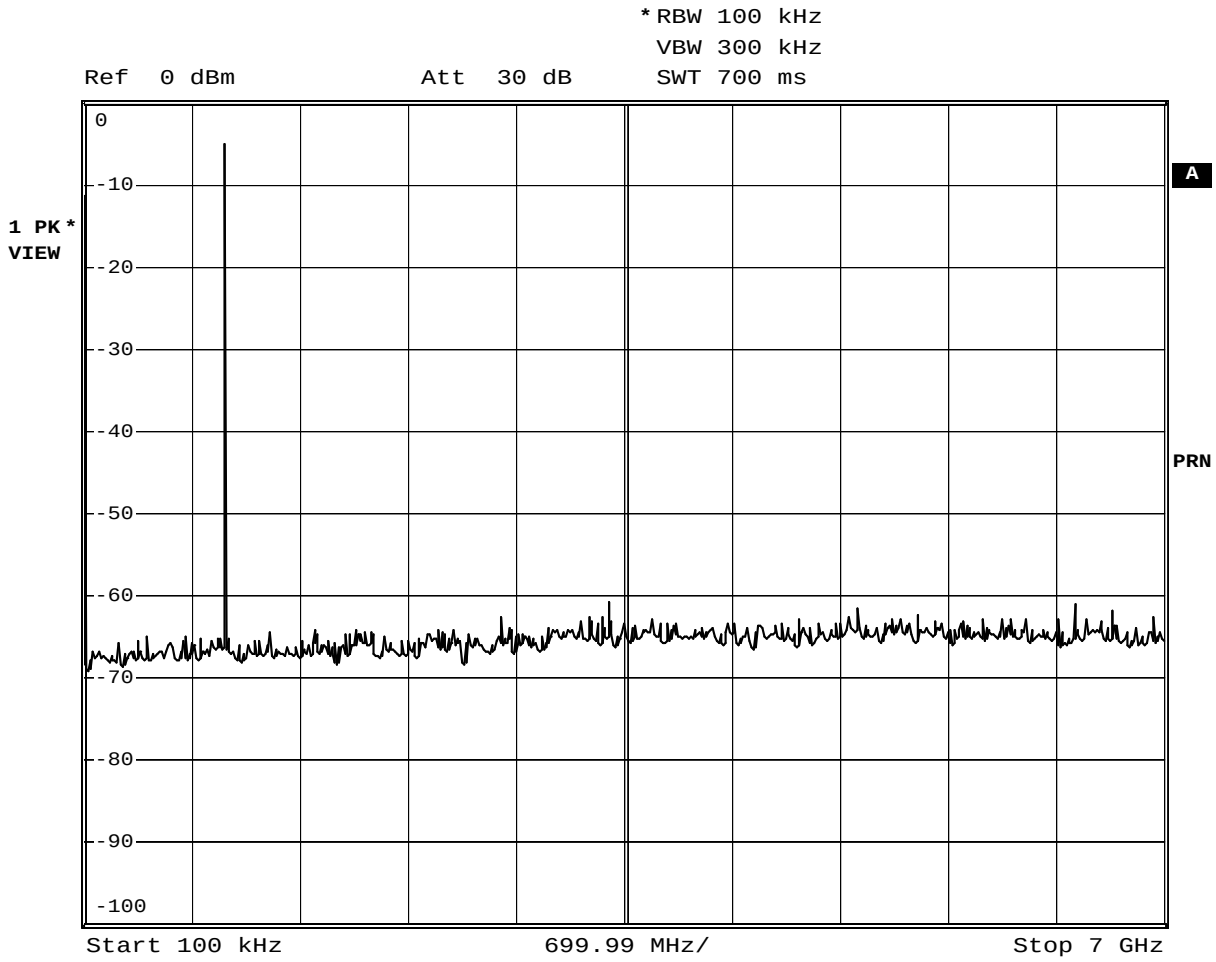

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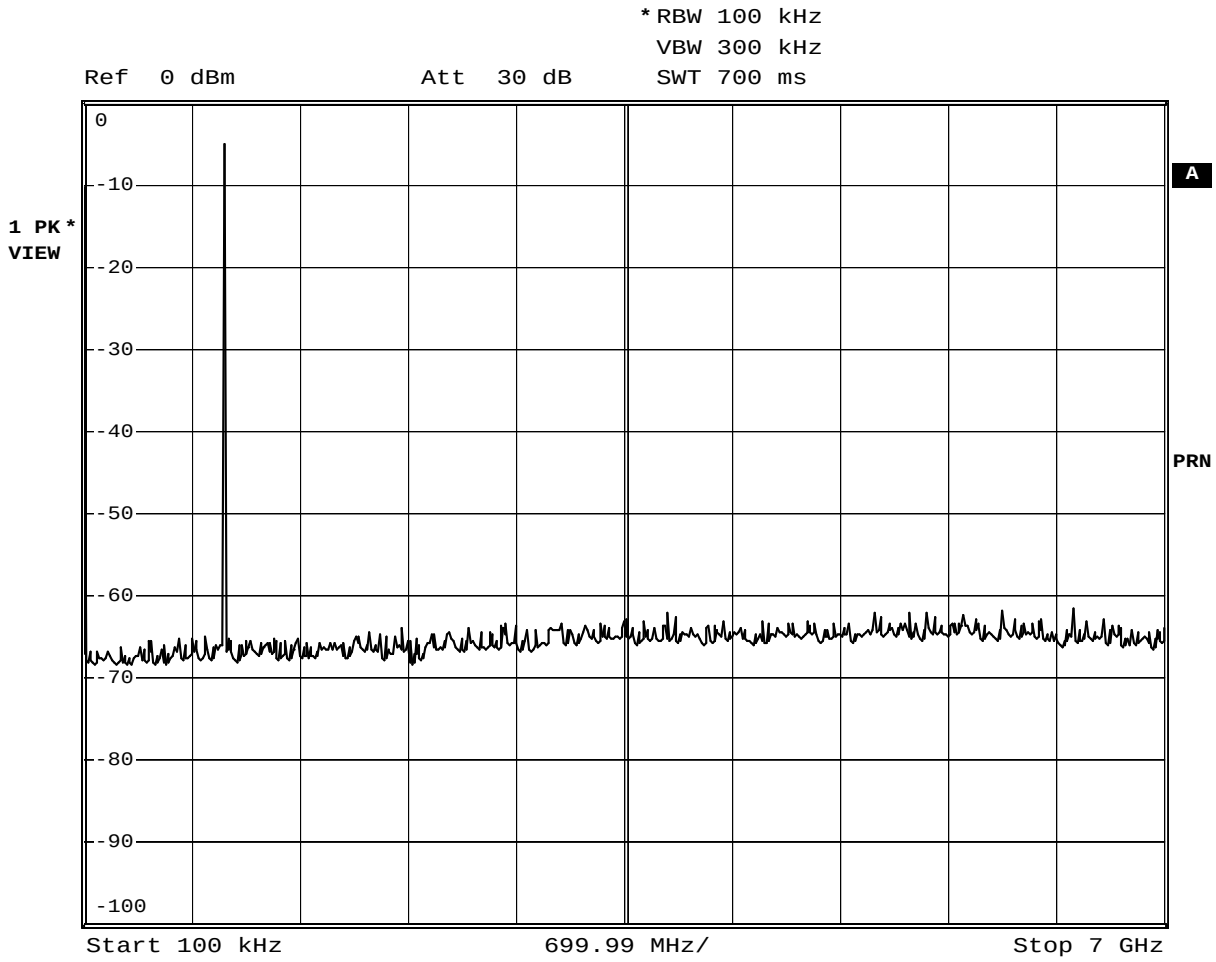

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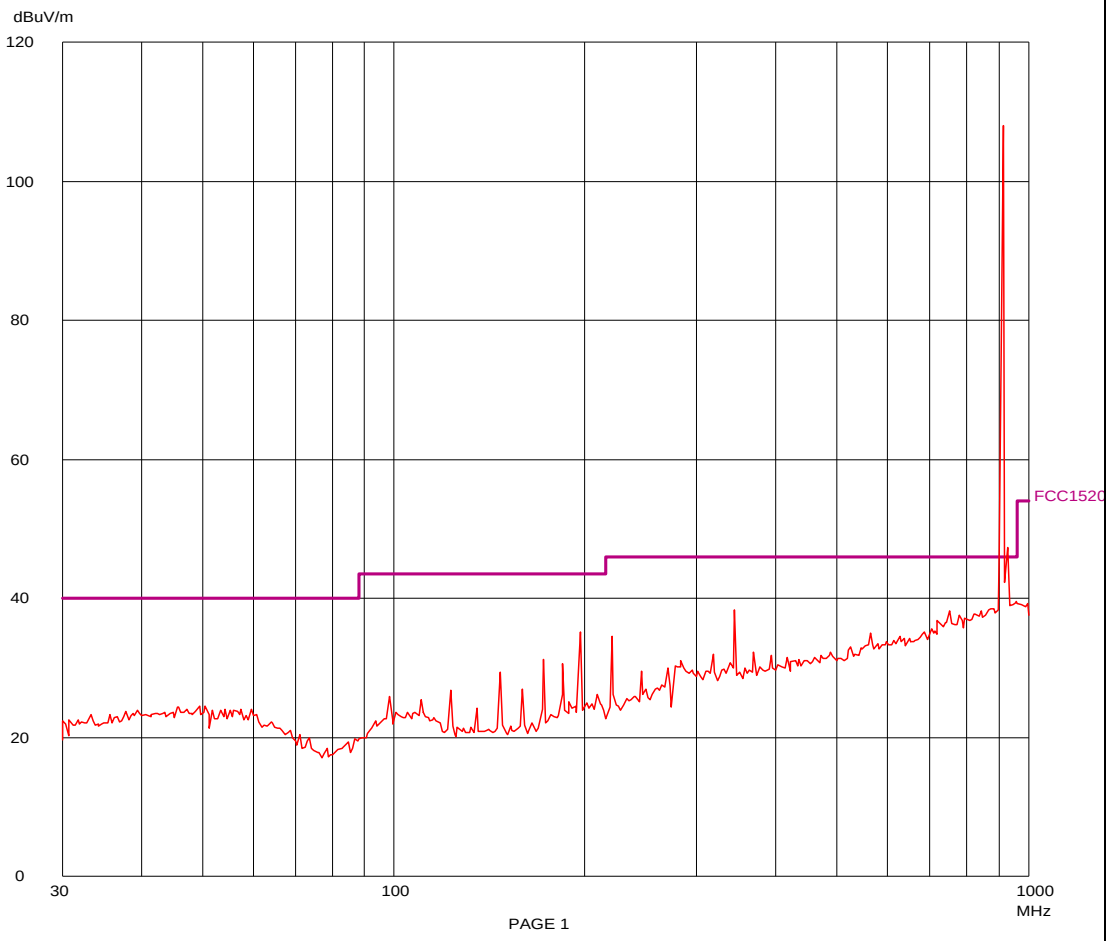
G06148225

CMC Centro Misure Compatibilita'
Emissioni 30 - 1000MHz

Op Cond: Mod. Gen 2 CH0
Operator: Gandini 06148225
Test Spec: FO



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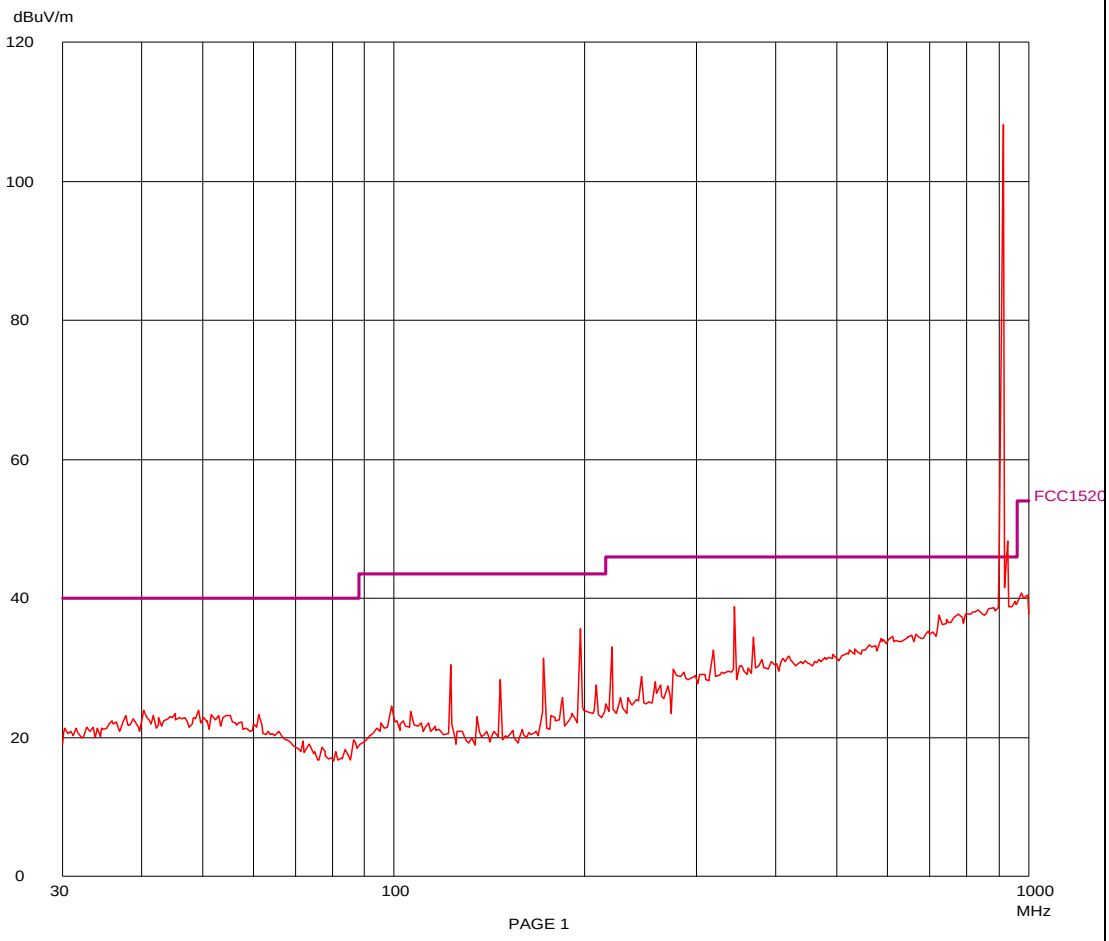
CMC Centro Misure Compatibilita'
Emissioni 30 - 1000MHz

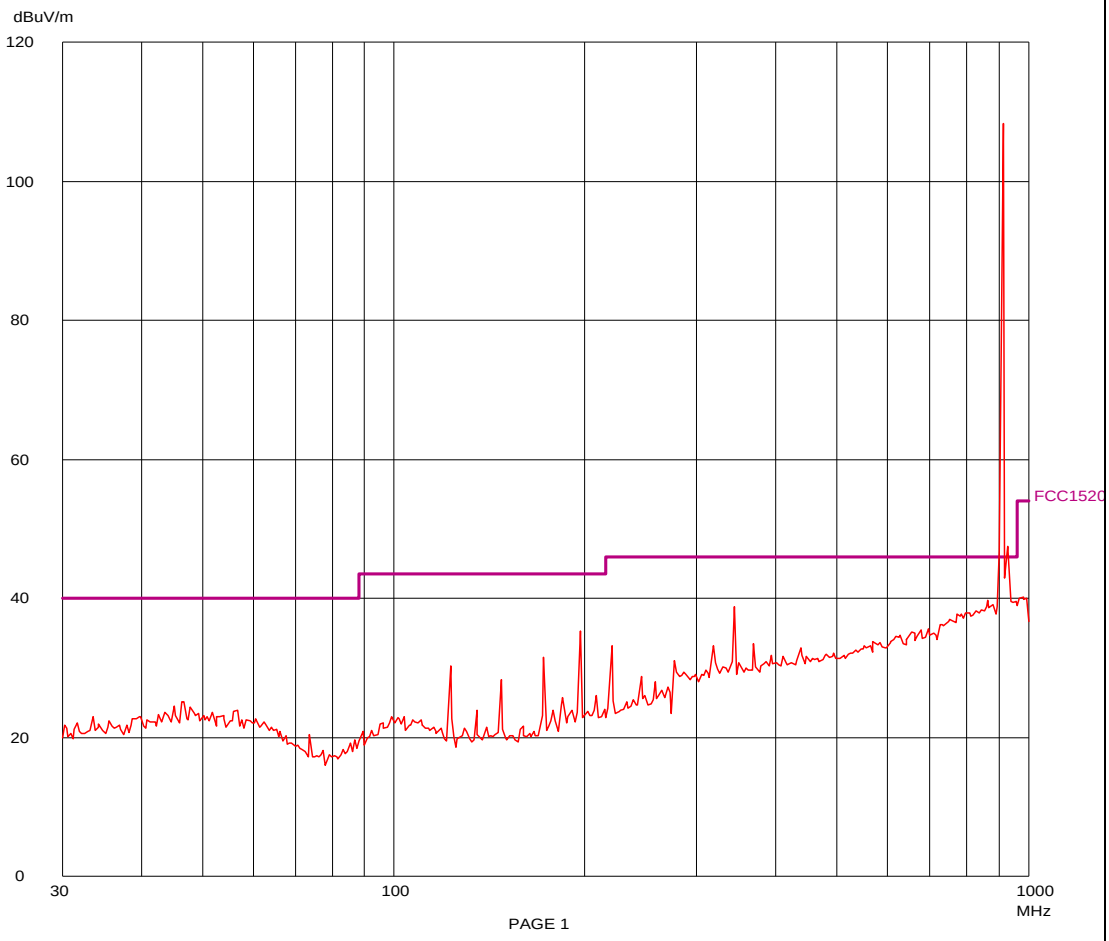
Op Cond: Mod. Gen 2 CH25
Operator: Gandini 06148226
Test Spec: FO



G06148227

CMC Centro Misure Compatibilita'
Emissioni 30 - 1000MHz

Op Cond: Mod. Gen 2 CH49
Operator: Gandini 06148227
Test Spec: FO



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CMC Centro Misure Compatibilita'
Emissioni 30 - 1000MHz

Op Cond: Mod. Iso Ch0
Operator: Gandini 06148228
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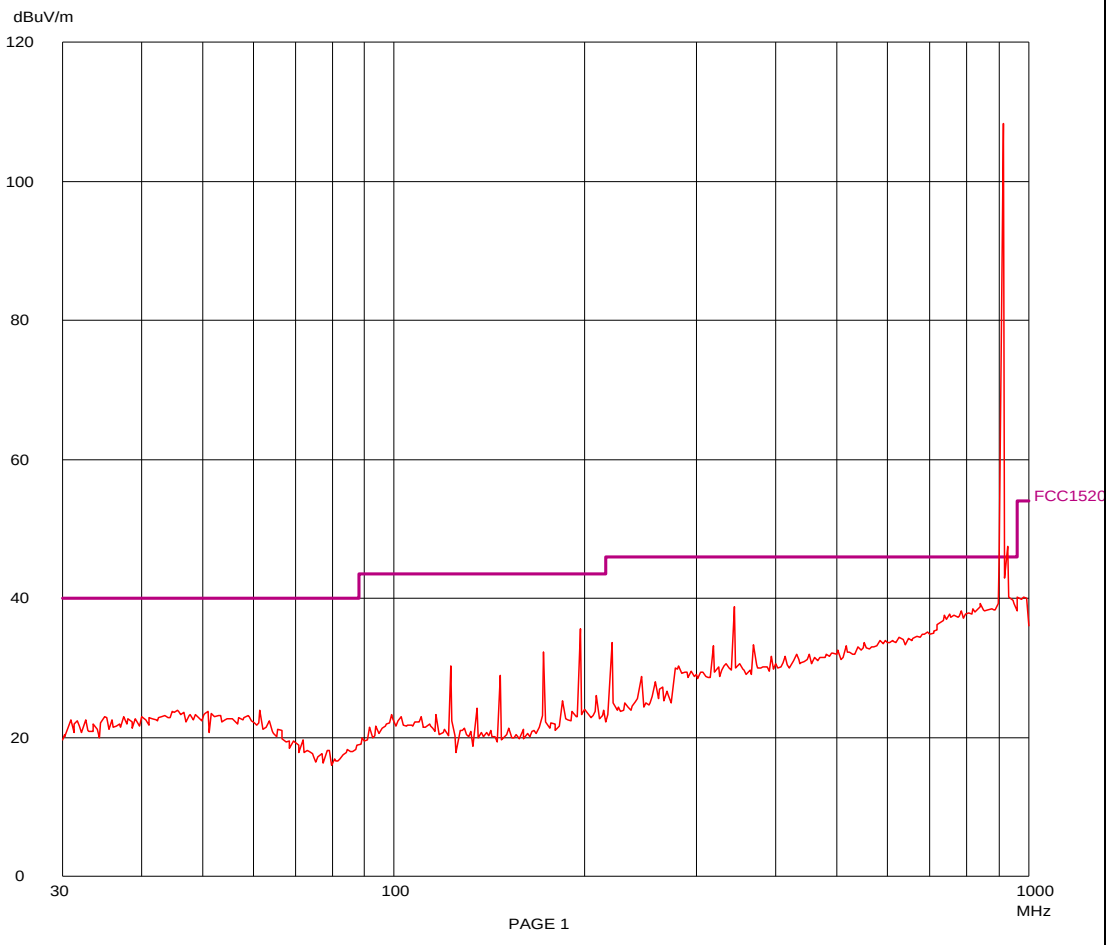

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CMC Centro Misure Compatibilita'
Emissioni 30 - 1000MHz

Op Cond: Mod. Iso Ch25
Operator: Gandini 06148229
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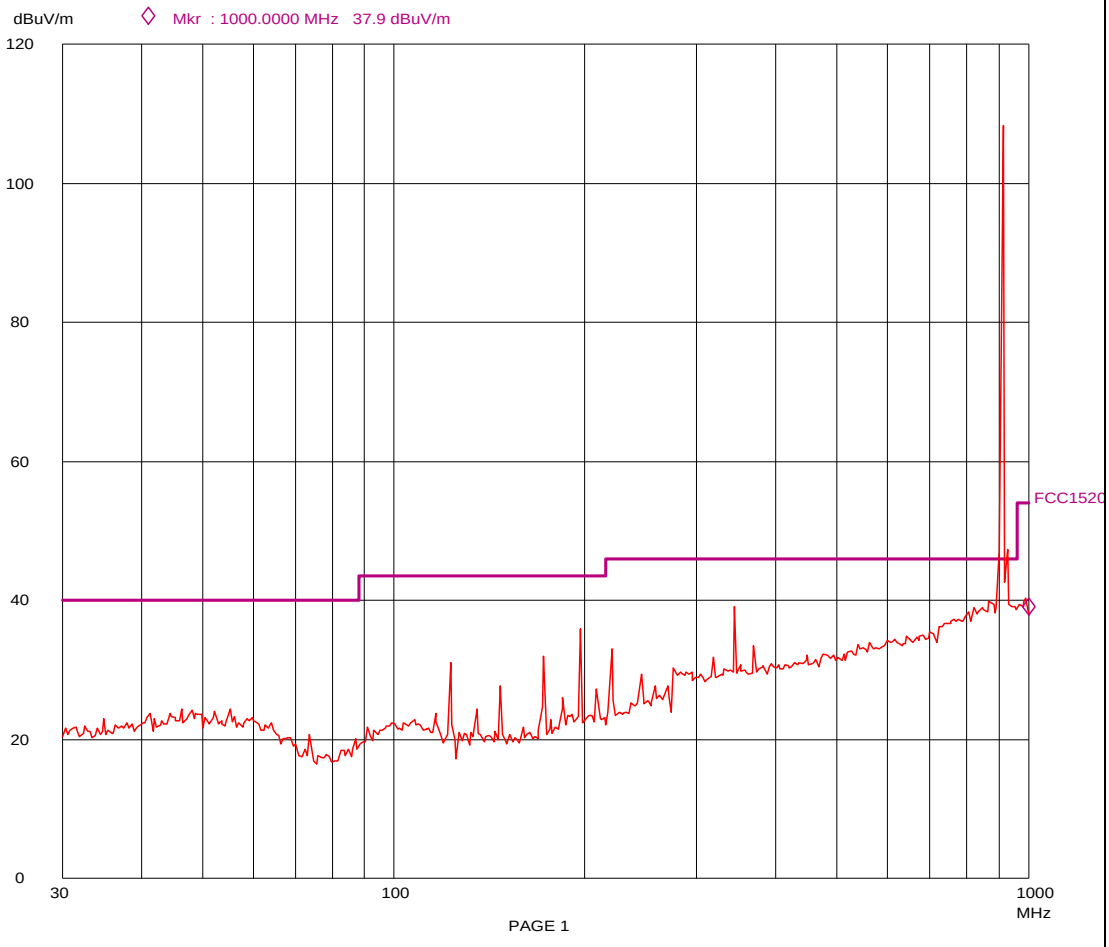
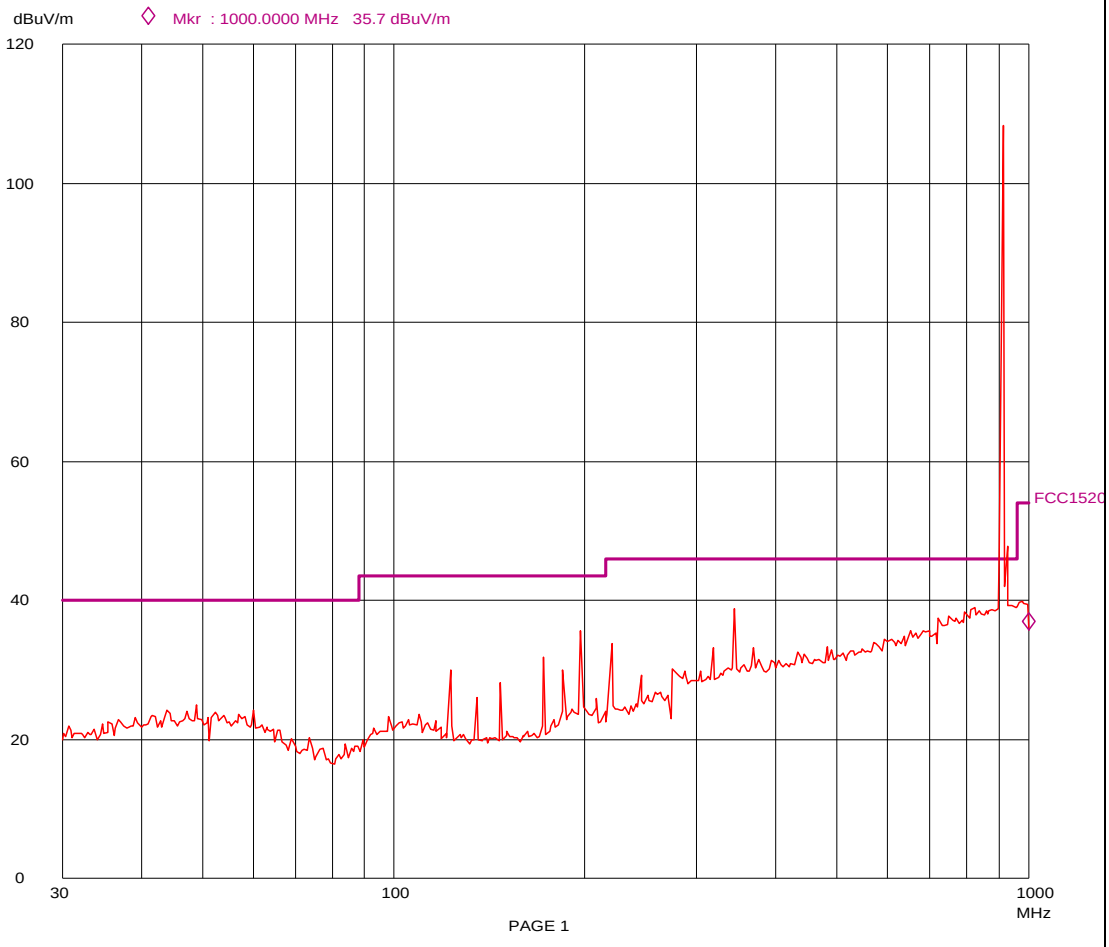


G06148230

CMC Centro Misure Compatibilita'
Emissioni 30 - 1000MHz

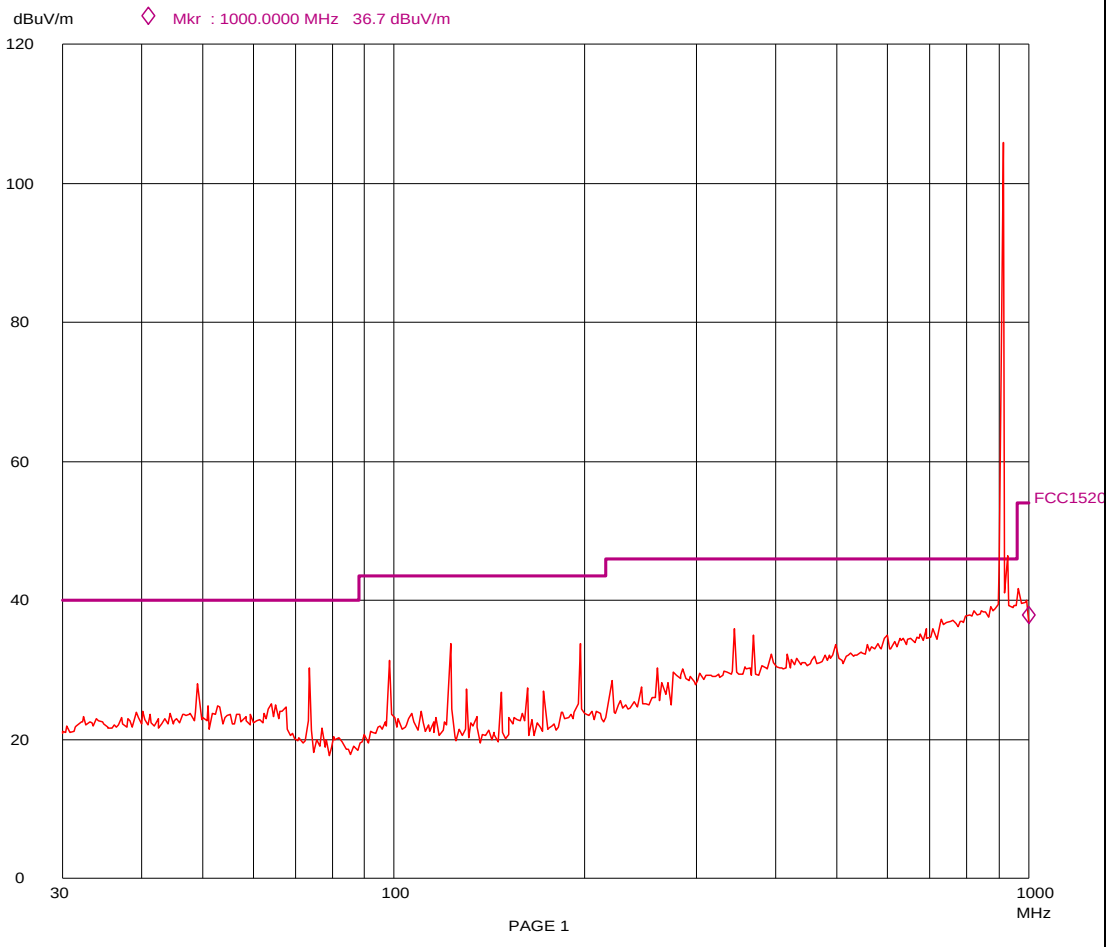
Op Cond: Mod. Iso Ch49
Operator: Gandini 06148230
Test Spec: FO



G06148231

CMC Centro Misure Compatibilita'
Emissioni 30 - 1000MHz

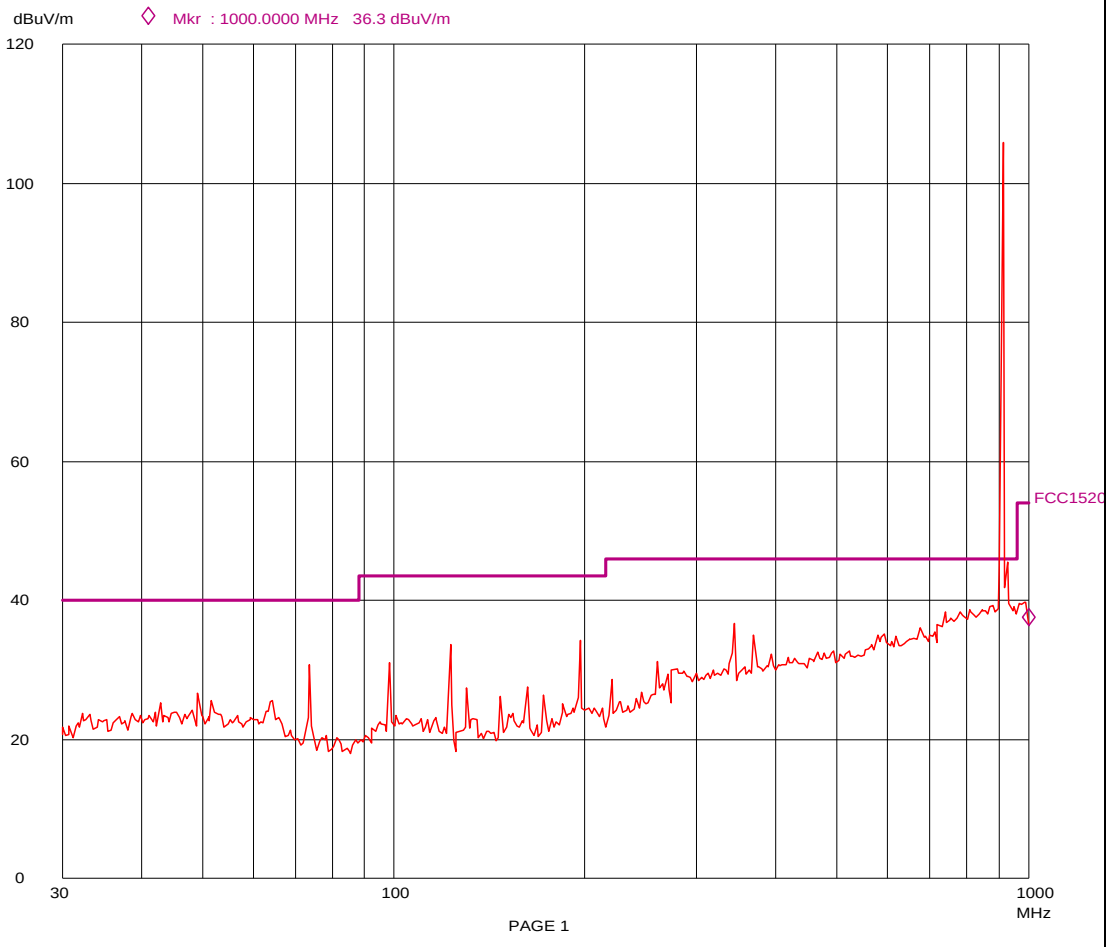
Op Cond: Mod. Gen2 Ch0
Operator: Gandini 06148231
Test Spec: FV



G06148232

CMC Centro Misure Compatibilita'
Emissioni 30 - 1000MHz

Op Cond: Mod. Gen2 Ch25
Operator: Gandini 06148232
Test Spec: FV



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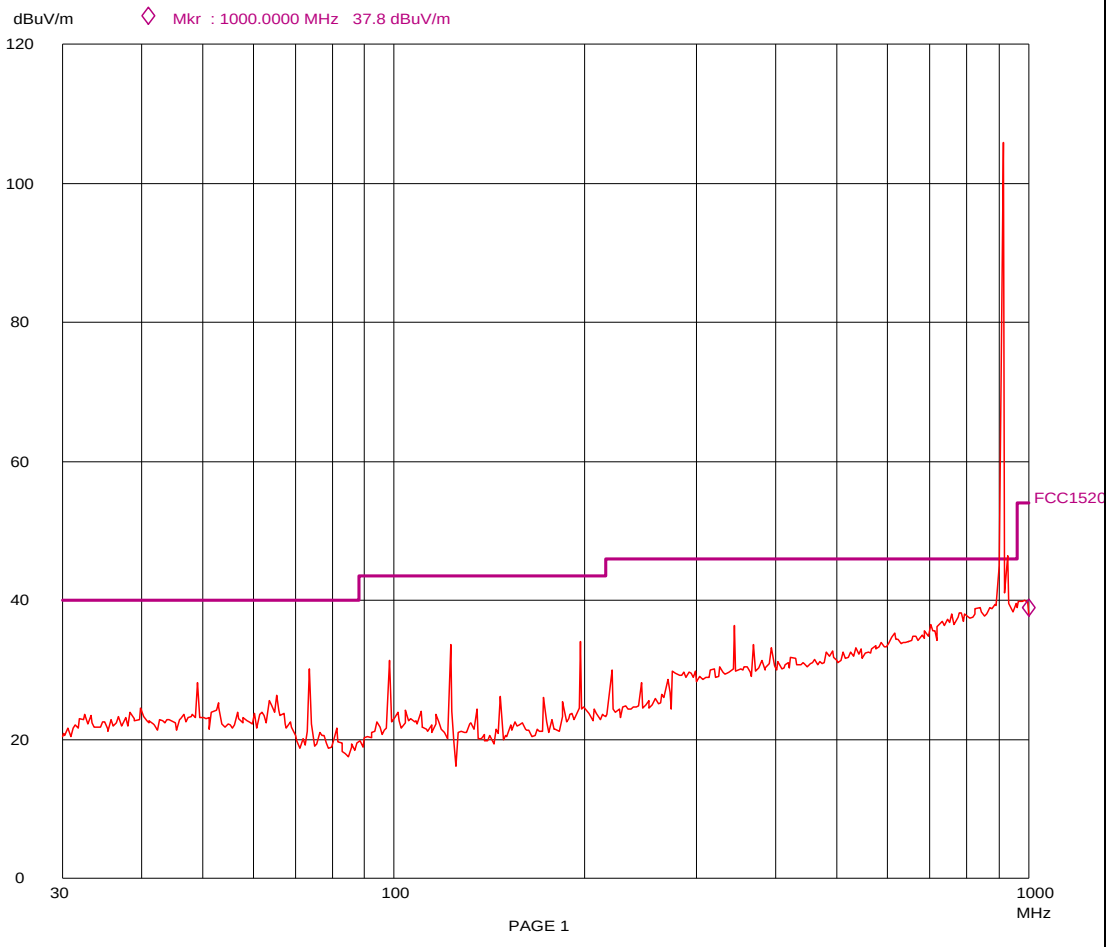
CMC Centro Misure Compatibilita'
Emissioni 30 - 1000MHz

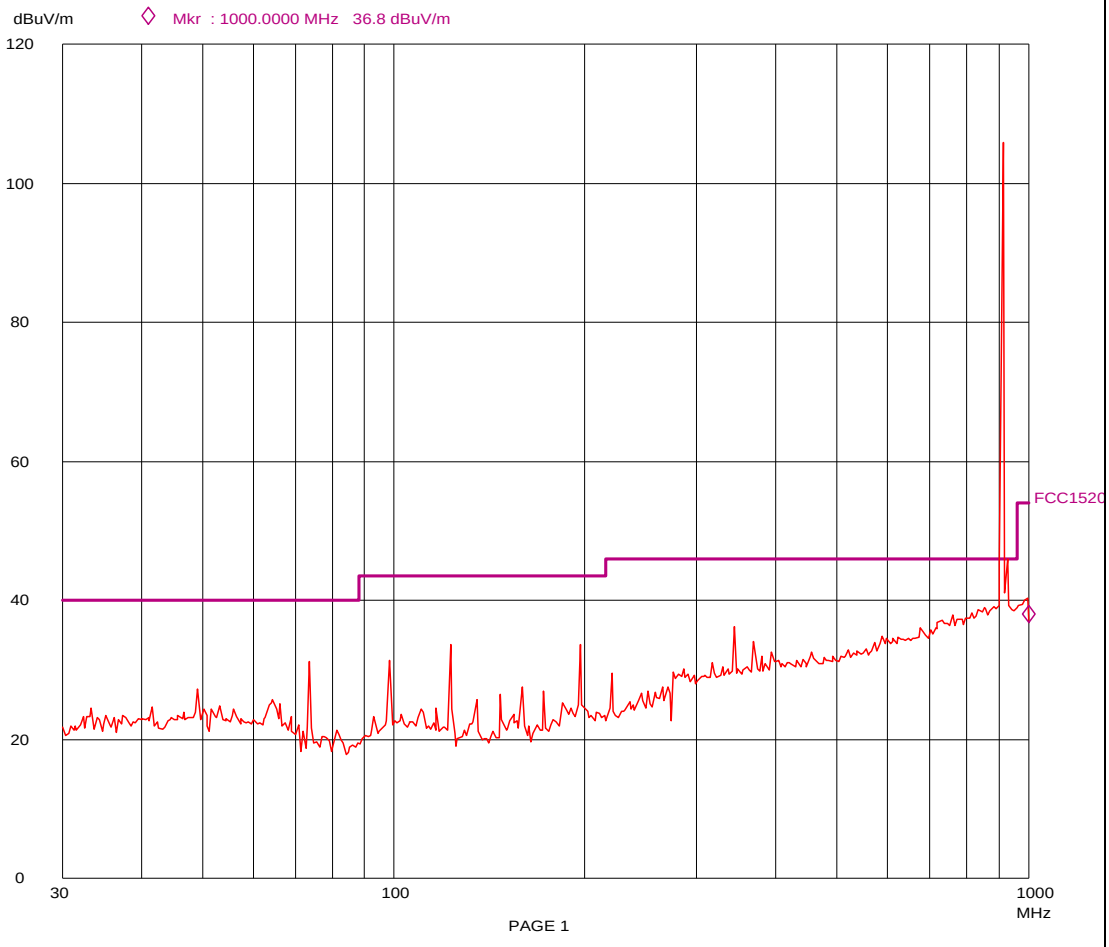
Op Cond: Mod. Gen2 Ch49
Operator: Gandini 06148233
Test Spec: FV



G06148234

CMC Centro Misure Compatibilita'
Emissioni 30 - 1000MHz

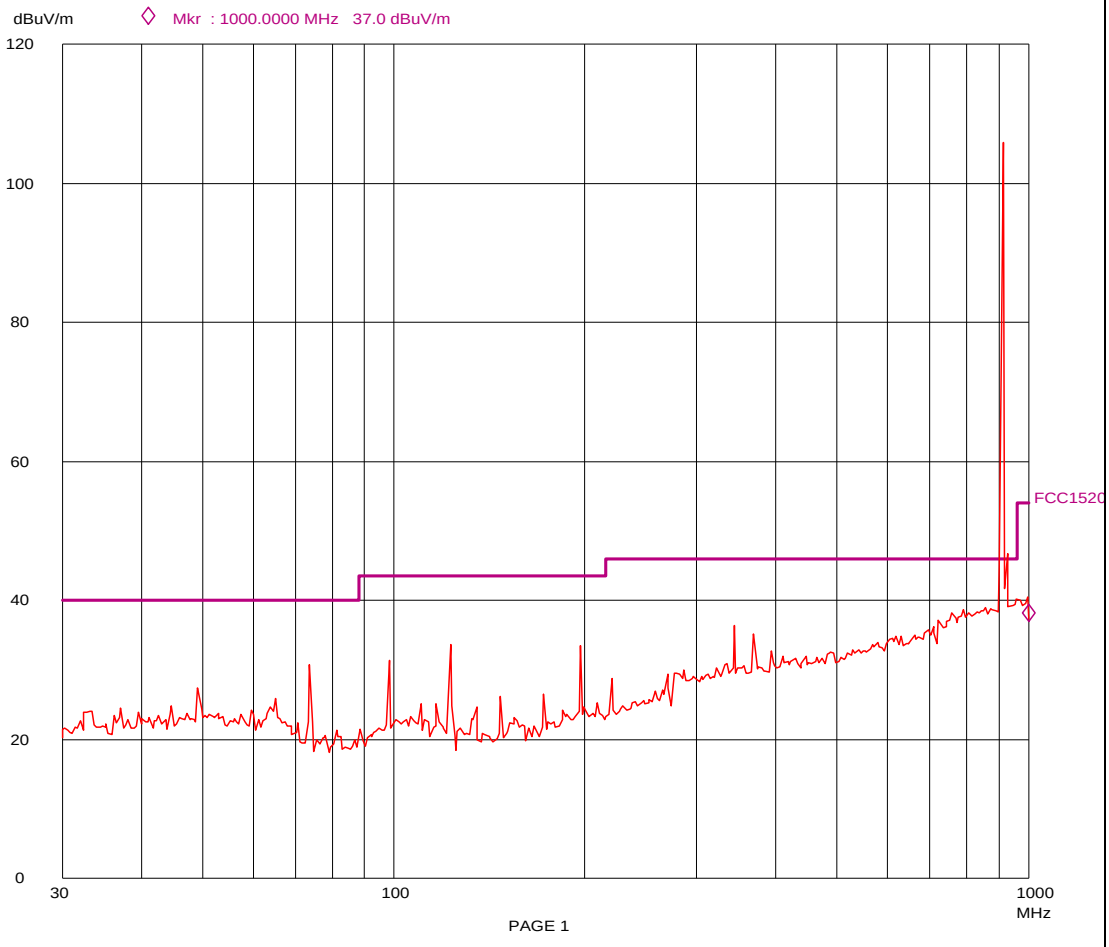
Op Cond: Mod. Iso Ch0
Operator: Gandini 06148234
Test Spec: FV



G06148235

CMC Centro Misure Compatibilita'
Emissioni 30 - 1000MHz

Op Cond: Mod. Iso Ch25
Operator: Gandini 06148235
Test Spec: FV



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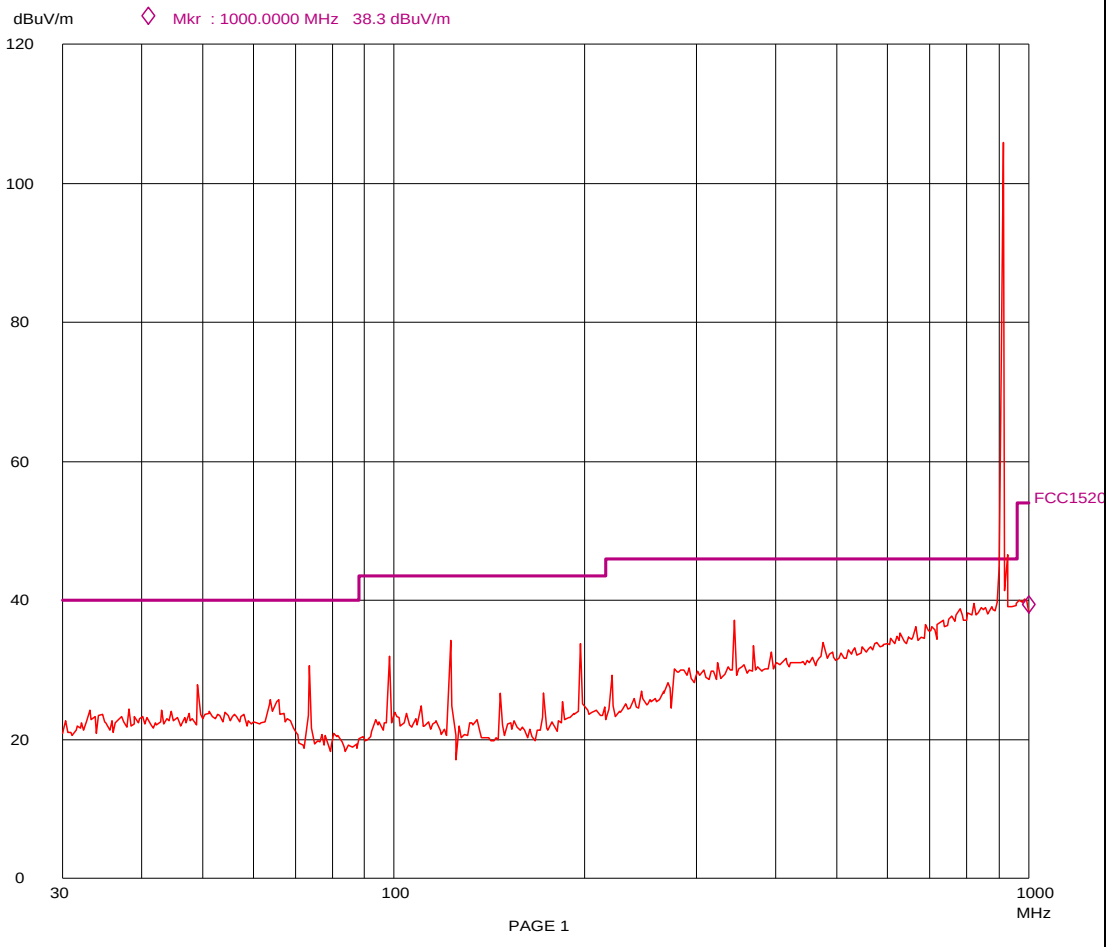

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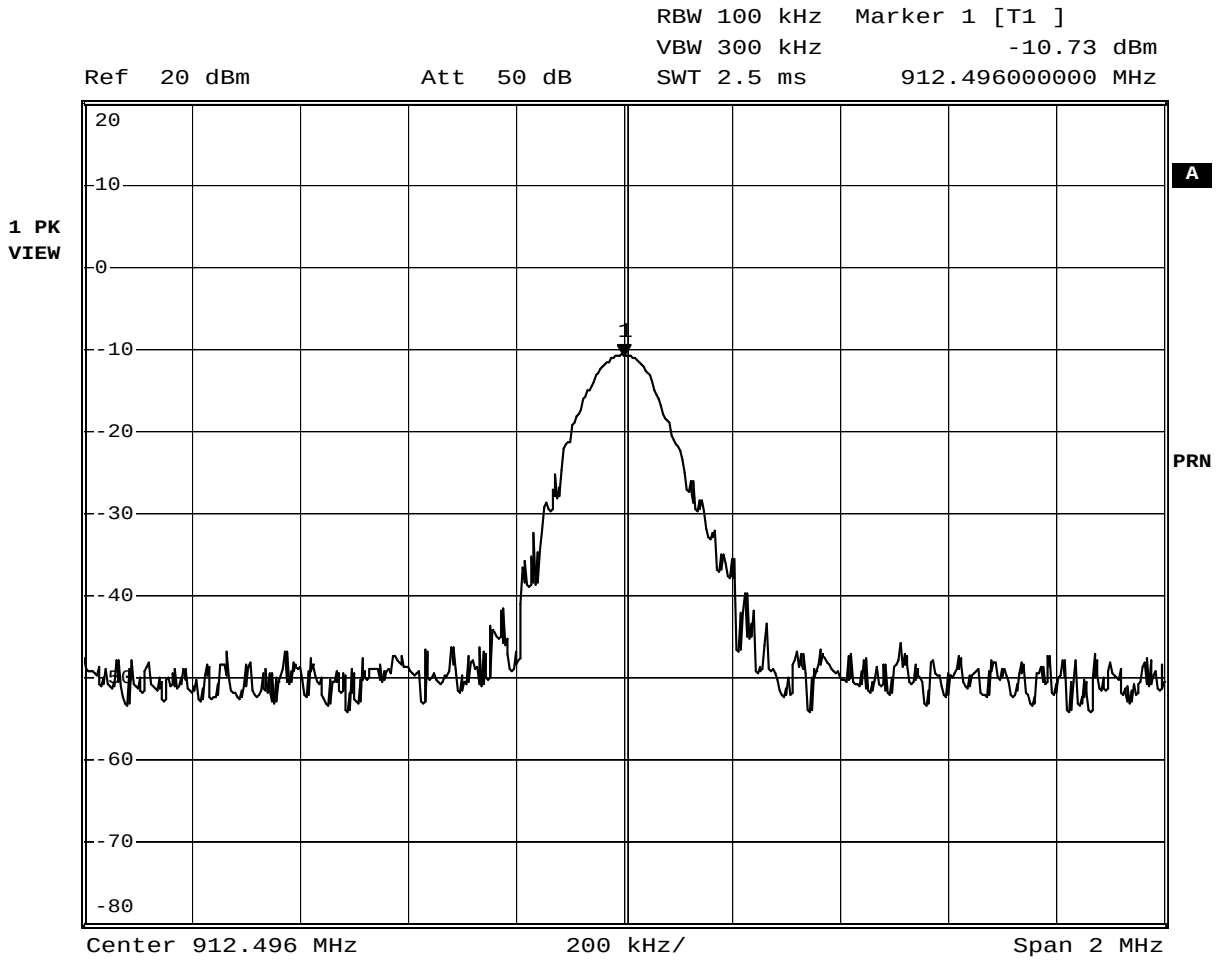

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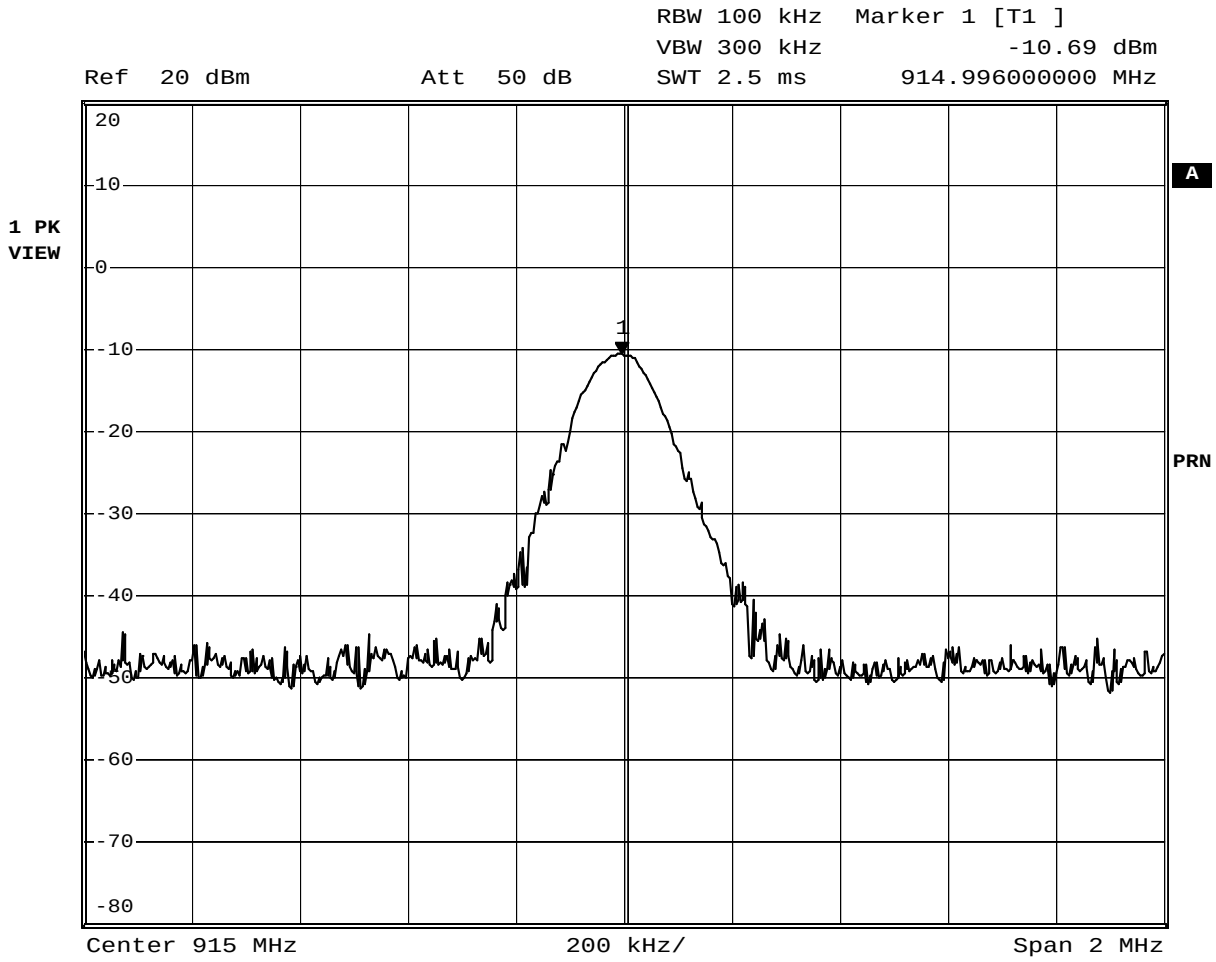

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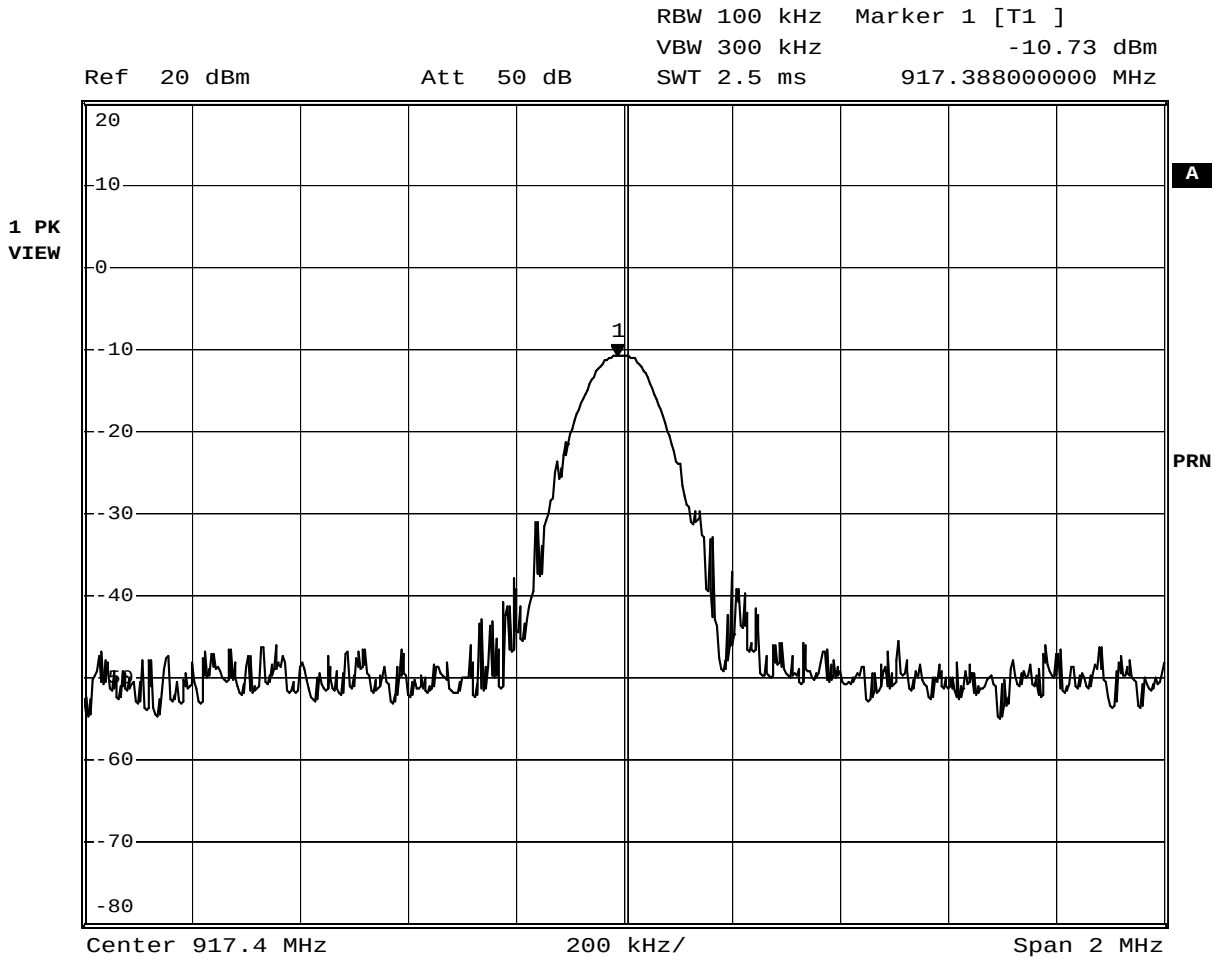

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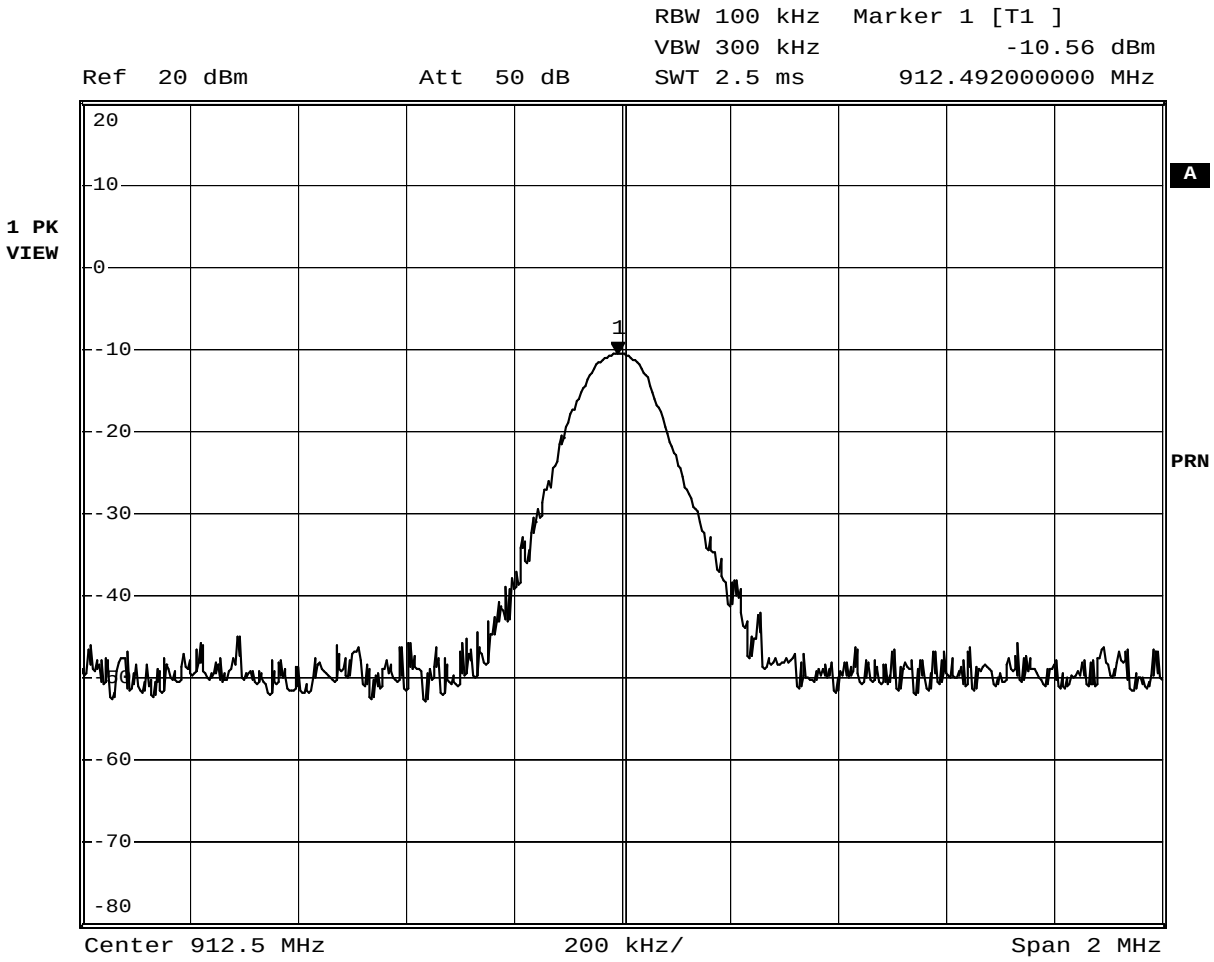

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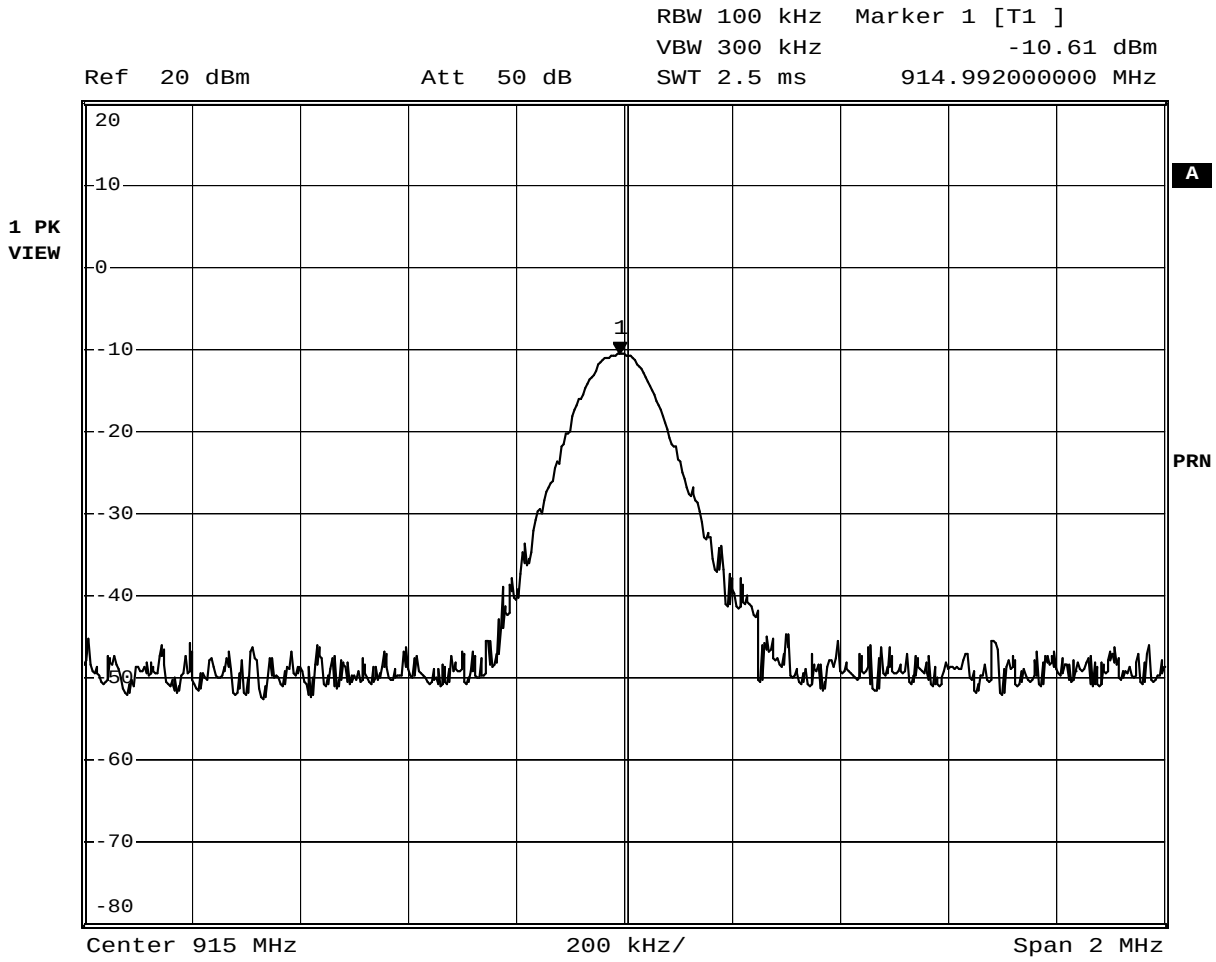

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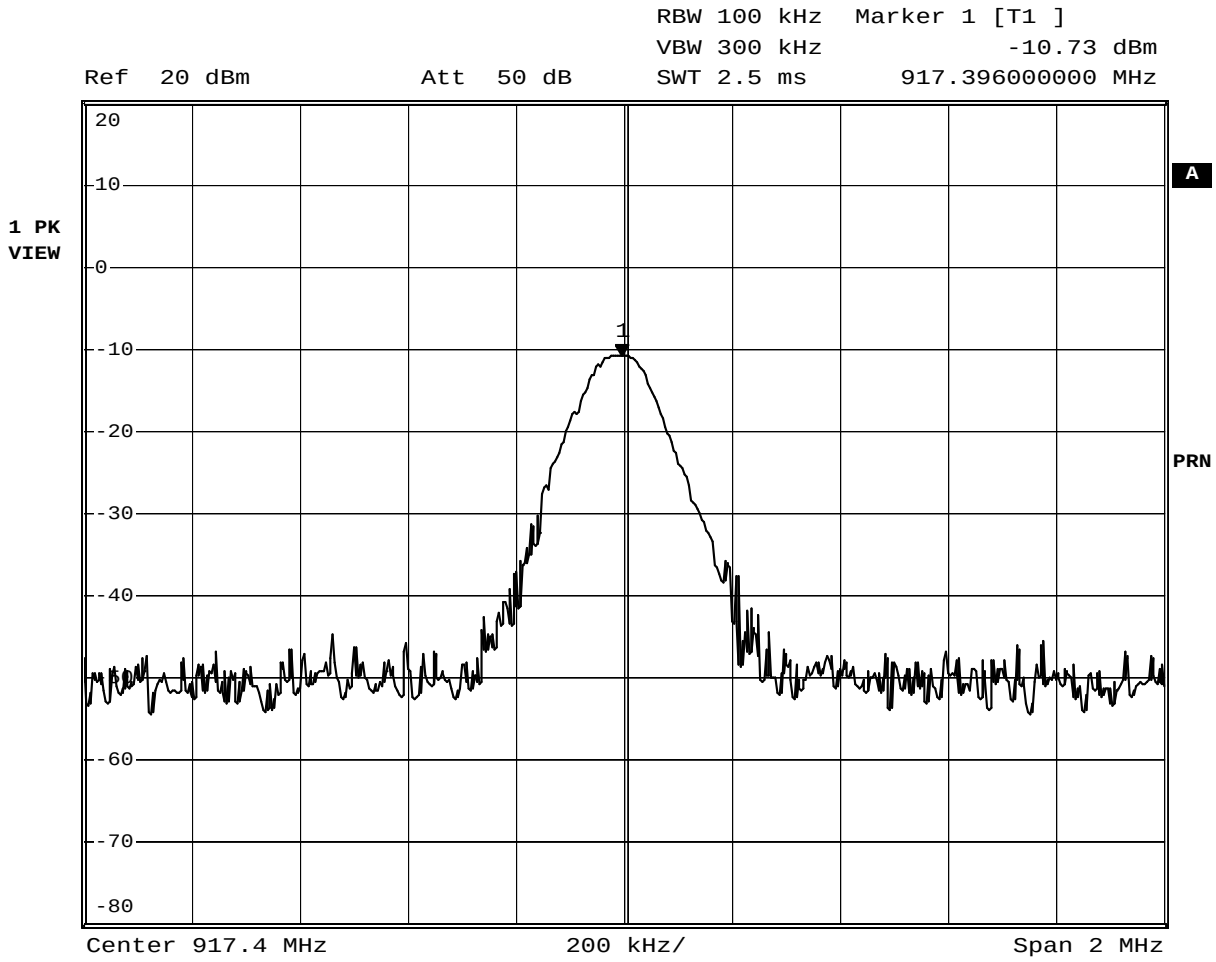

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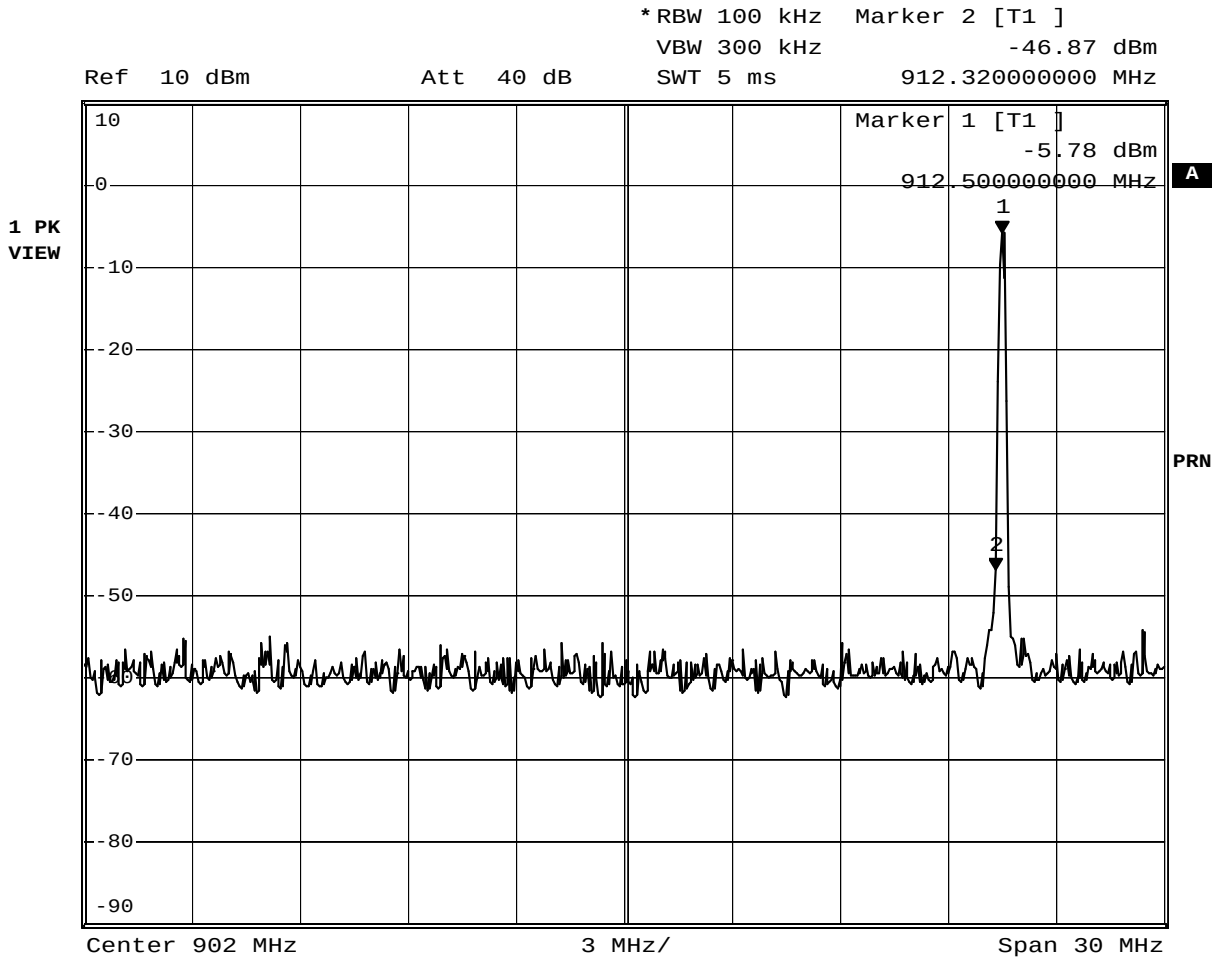

Date: 2.MAR.2007 16:00:48

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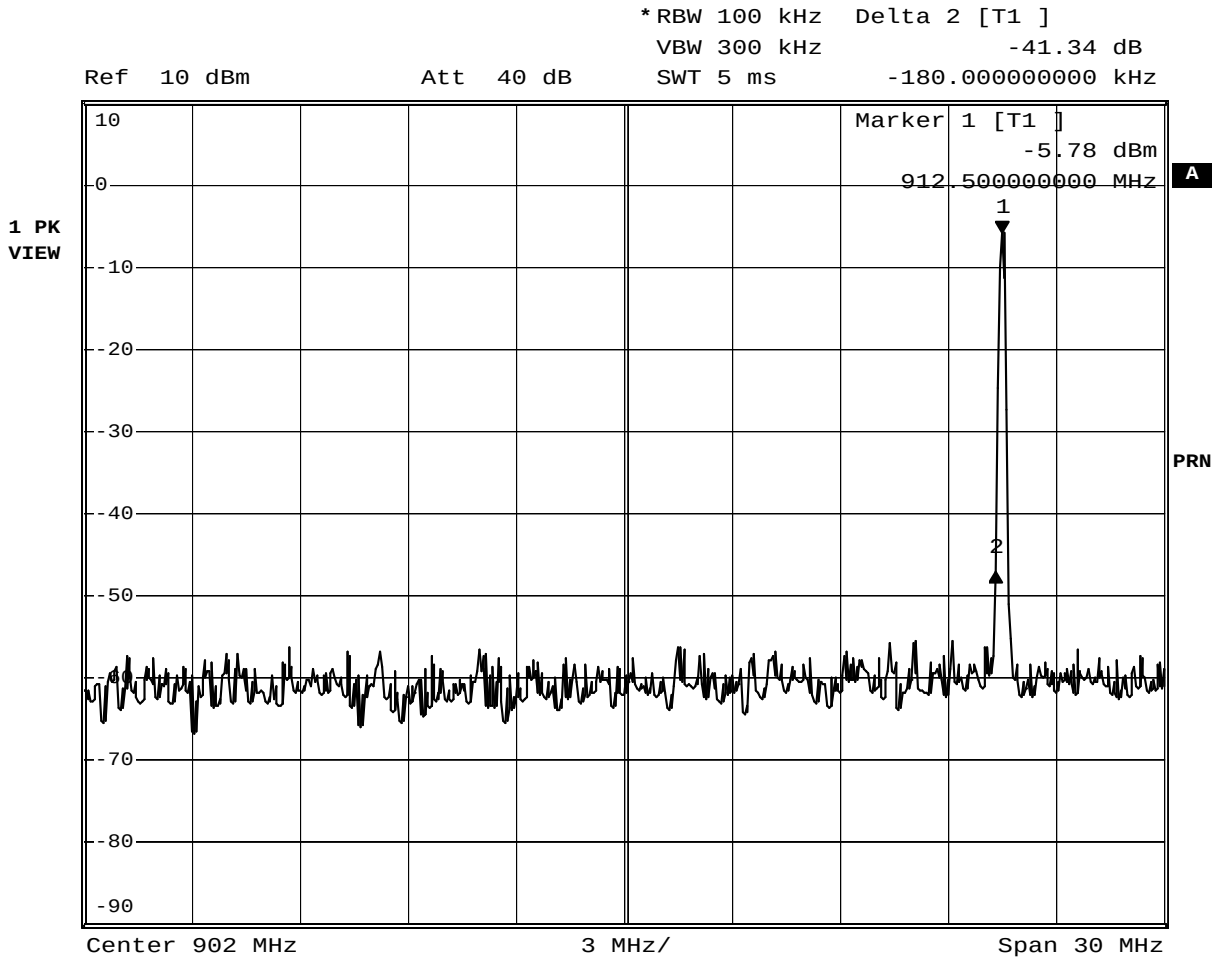

Date: 2.MAR.2007 16:02:13

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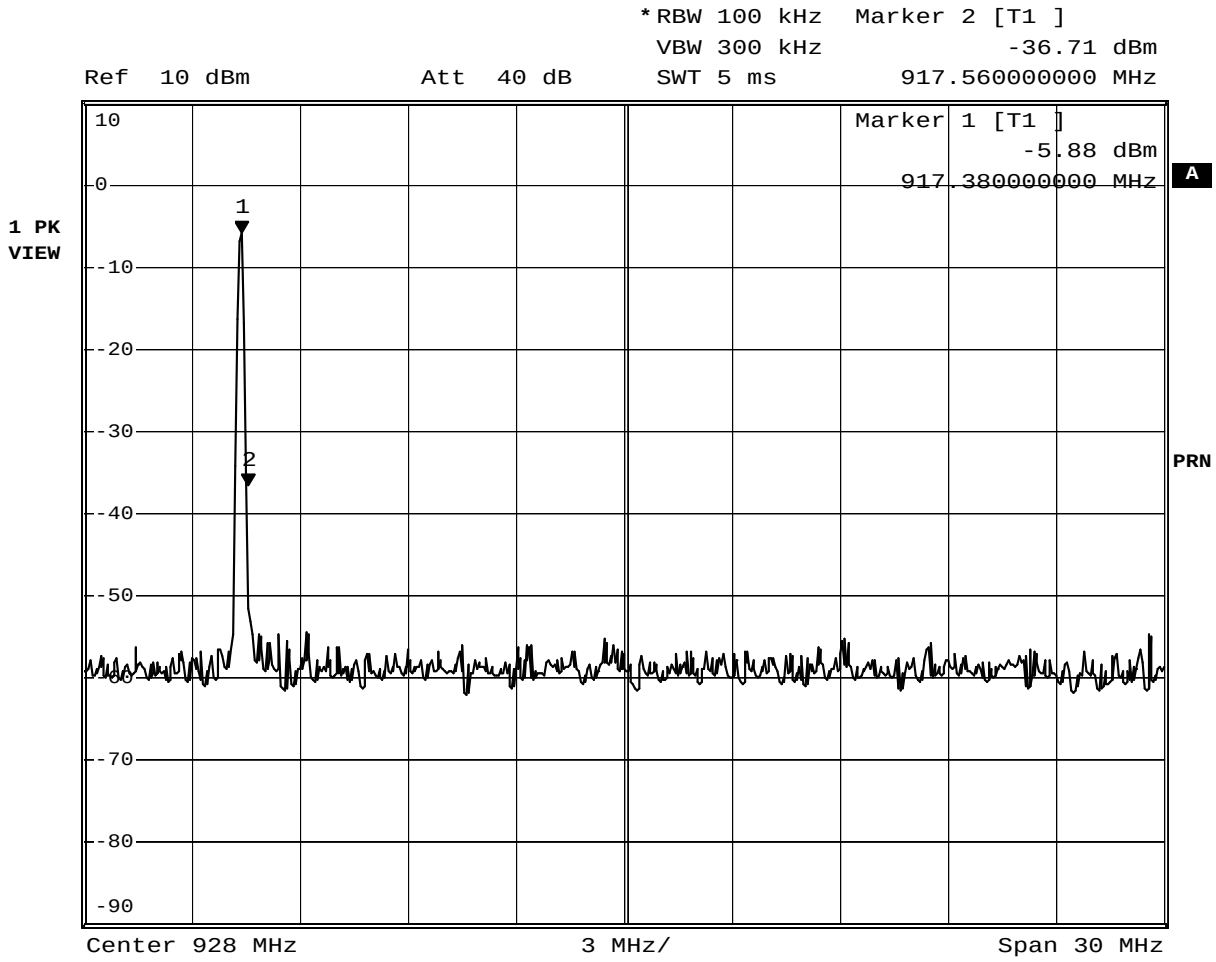

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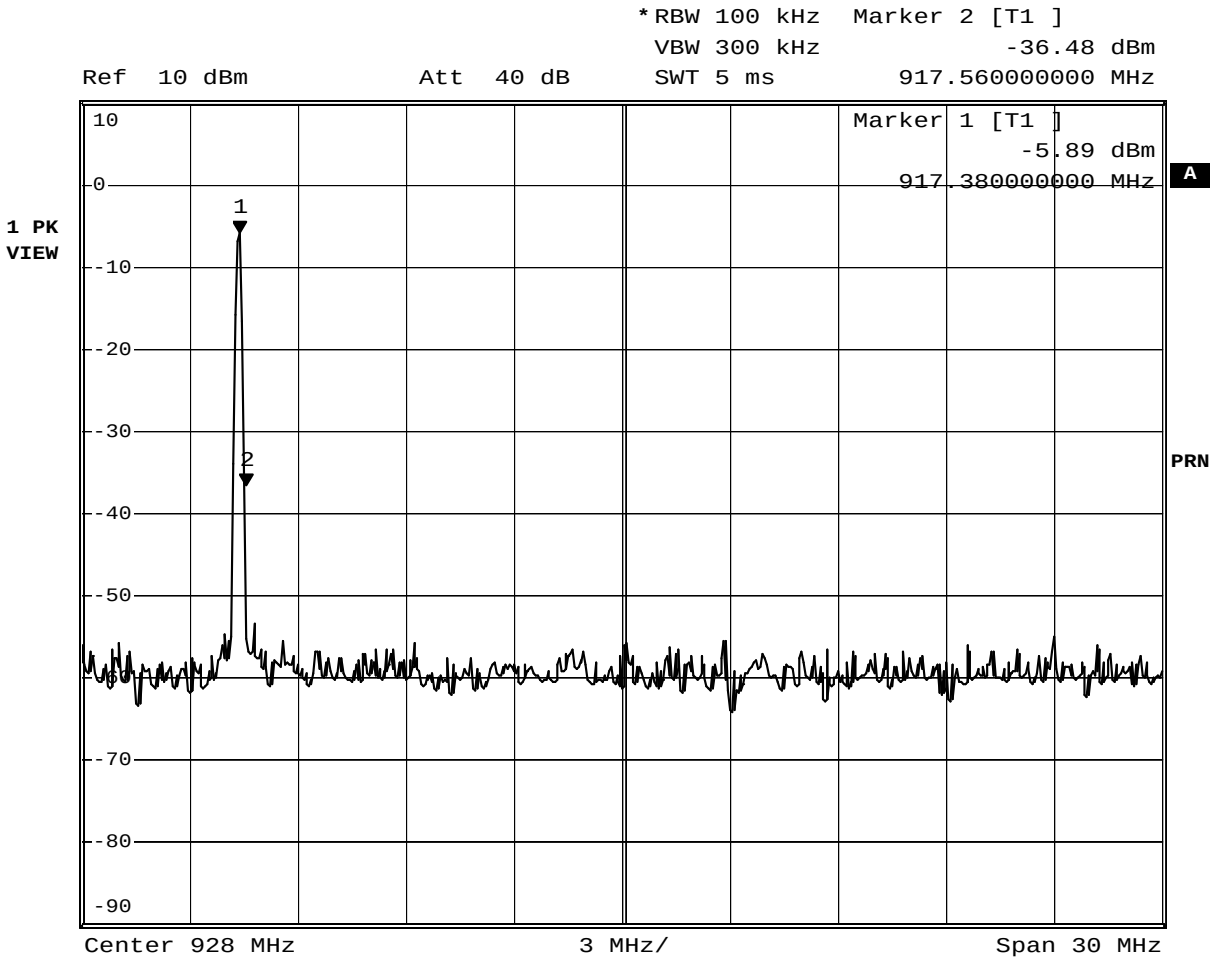

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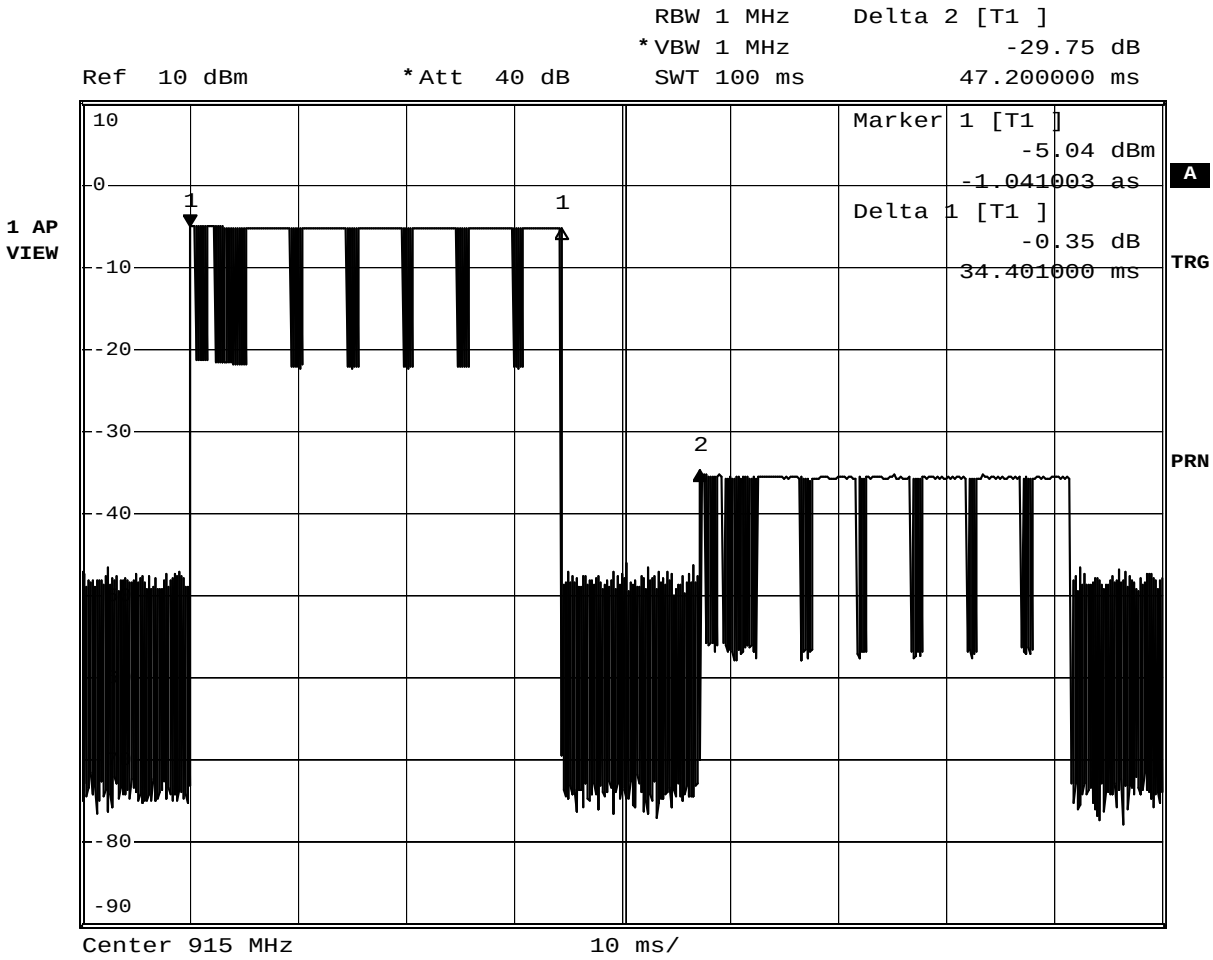

Date: 8.MAR.2007 10:15:32

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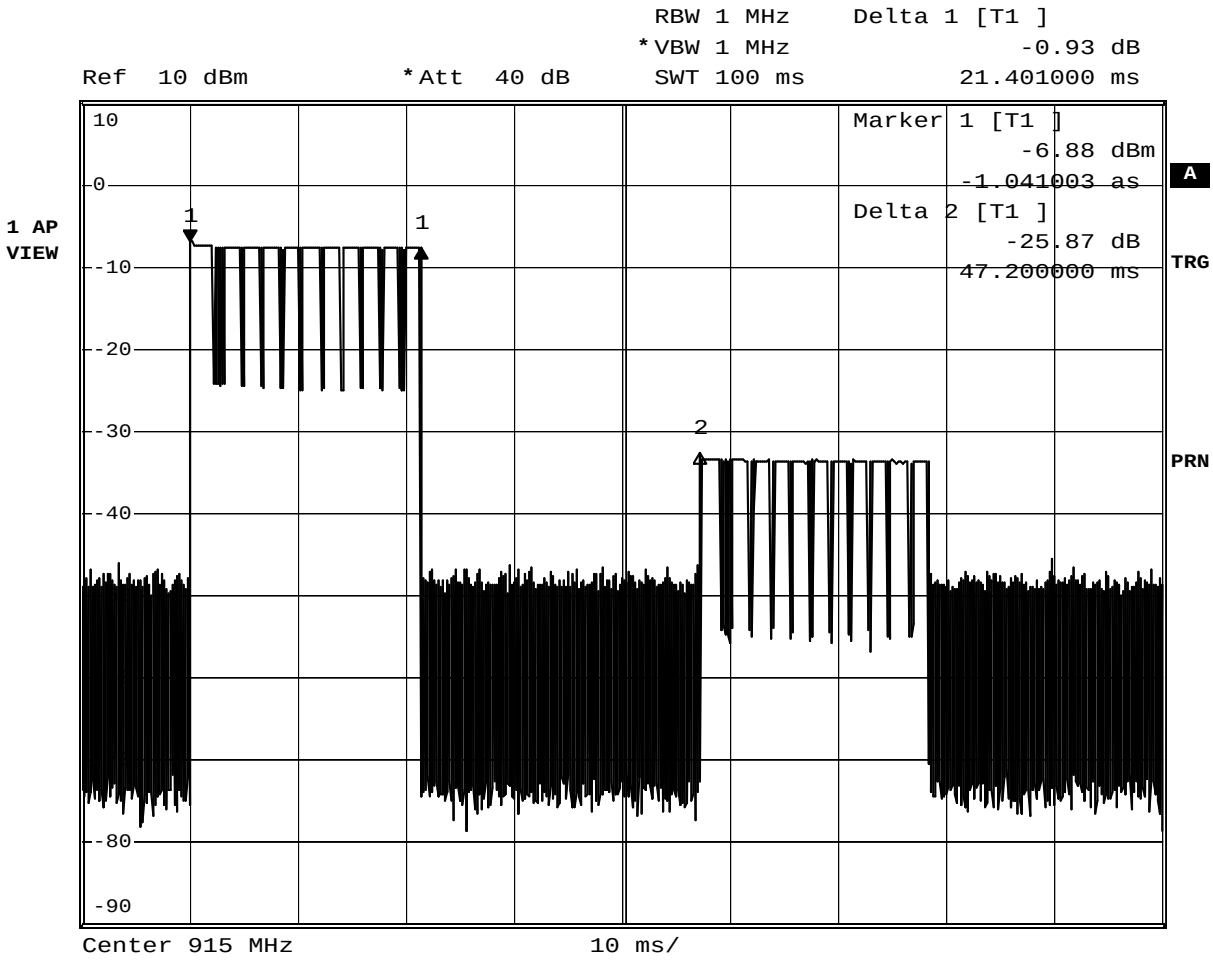

Date: 8.MAR.2007 10:17:56

13. Remarks

Pseudorandom Frequency Hopping Sequence

At boot time, a random sequence of numbers comprised between 0 and 49 is generated using the C rand() function with an initial seed derived from the reader Serial Number (SN).
An example of a random sequence generated by the reader is the following:

Sequence : 37,47,41,11,30,26,6,42,9,20,7,23,44,15,39,32,43,1,40,27,46,
13,12,3,36,25,0,33,4,14,21,2,16,24,18,22,31,35,34,10,29,19,
28,5,38,45,48,8,17,49

The random sequence is inserted into an array (named CHlist in the firmware code) of 50 elements : the first element of the array is the first random number of the sequence, the last element is the last random number of the sequence. Each element (named CH) represents a different RF channel; each channel is related to the carrier wave frequency by the following formula:

Fcw = 912.5 + 100KHz*CH (MHz)

Equal Hopping Frequency Use

Each time a continuos wave is switched on, an array index (called CHindex) is incremented by one and the element value of the CHlist array whose index is equal to CHindex is extracted from the array. This would be the channel selected for the next transmission phase. When the array index equals 49 the next selected index will be 0. In the firmware code a timeout is set to check if the currently selected channel has been in use for more than 400 msec in a 20 sec period starting from the first time the channel was selected. When the timeout is reached the next index channel When the timeout is reached the next index channel whose dwell time is less than 400 msec will be selected for continuing the transmission cycle.

System Receiver Hopping Capability

The receiver's architecture is based on a direct conversion scheme (zero IF) with local oscillator derived from the transmit chain, so the reception frequency is automatically synchronized to the transmission frequency during frequency hopping sequence.

System Receiver Input Bandwidth

The receiver input bandwidth is determined by the baseband filter at the output of zero IF mixer. As this filter has a 3dB bandwidth of 100 KHz it matches the channel spacing.