



TEST REPORT nr. R06042601_rev20

This test report cancel and replace document nr. R06042601 date 18.05.06

Test item

Description.....: RECEIVER UNIT
 Trademark.....: AUTEK
 Model and/or type reference.....: Type R402 Model 156D Configuration C01/C02/C11/C12
 Manufacturer.....: Same as client
 Serial Number.....: --

Client

Name.....: AUTEK S.r.l.
 Address.....: Via Pomaroli, 65
: 36030 Caldogno (VI) – ITALY

Test specification

Standard.....: FCC Rules & Regulations, Title 47 (2005) - Part 15 paragraph(s) : 109, 107 and 111

Report

Tested by (+ signature).....: G.. Chiumento - *Supervisor*

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

Date of issue.....: 31.05.06

Contents.....: 32 pages

This test report shall not be reproduced except in full without the written approval of CMC.
 The test results presented in this report relate only to the item tested.



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1. Summary			
Emission: FCC Rules & Regulations, Title 47			
Test specifications	Environmental Phenomena	Tests sequence	Result
Part 15.109	Radiated Emission	1	Complies
Part 15.107	RF Disturbance voltage: - continuous	2	Complies
Part 15.111	Antenna power conduction limits for receivers	3	Complies

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 : 120Vac 50Hz single-phase + earth

Type of equipment : Transmitter Unit Receiver Unit
 Fixed station Portable station Mobile station

Receiver class : --

Alignment range : 902 – 928 MHz

Switching frequency : 902 – 928 MHz

Number of channels : --

Channel separation : --

Modulation : --

Extreme conditions : --

Maximum transmitter output power : --

Information on antenna : Integrated
 Extern
 Other:

Duty cycle : --

Mode of operation : Simplex mode
 Duplex mode
 Other :



3. Testing and sampling

Date of receipt of test item : 28.03.06
 Testing start date : 29.03.06
 Testing end date : 29.03.06
 Samples tested nr. : 2

Test executed at configuration C02 and C12 because the test results are pejorative respect to the 4 models.

Difference between 4 models:

Configuration C01:

- Embedded antenna

Configuration C02:

- Antenna with stylus and with a cable 1-5 metres

Configuration C11:

- Embedded antenna
- Converter d/a extension interface (card) E16RIR4A

Configuration C12:

- Antenna with stylus and with a cable 1-5 metres
- Converter d/a extension interface (card) E16RIR4A

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 P060300

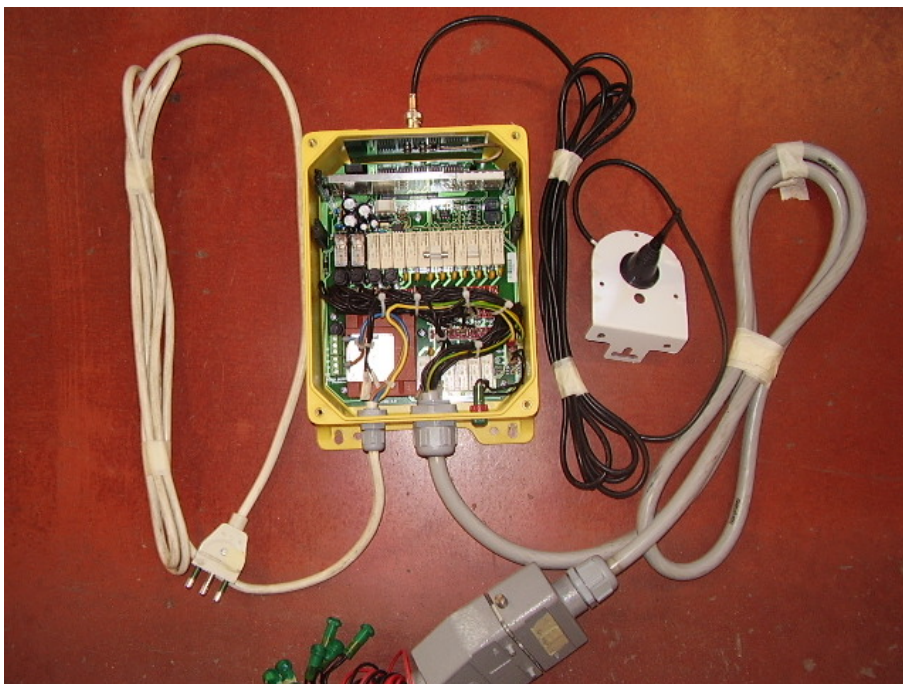
4. Operative conditions

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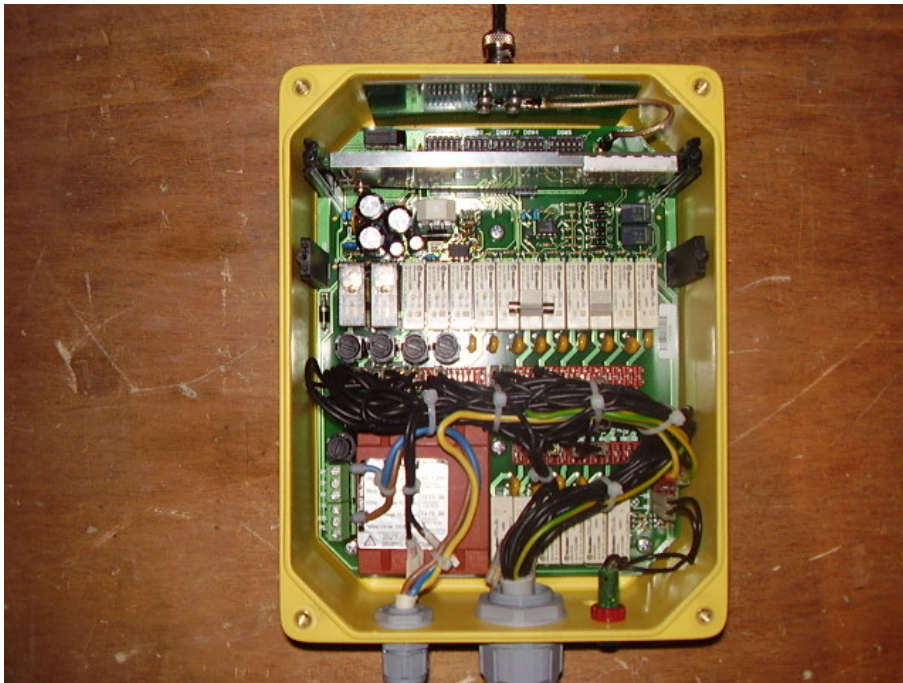
5. Photograph(s) of EUT

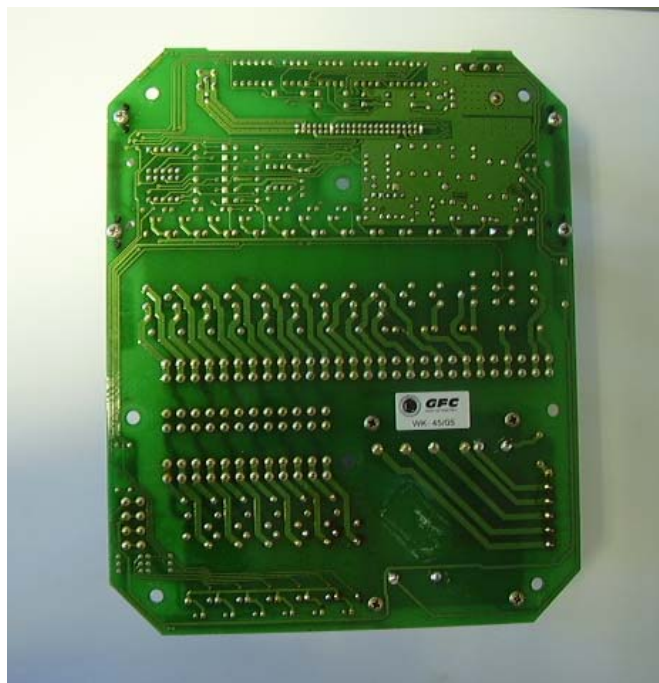
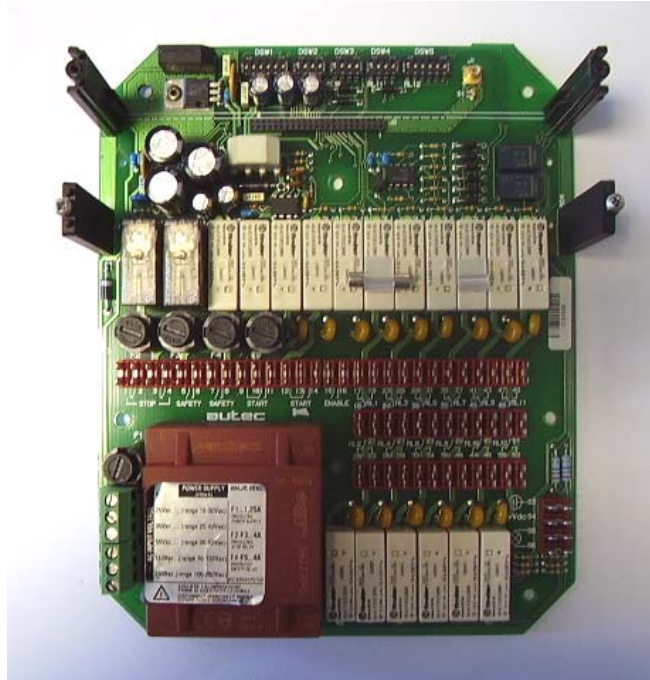
Configuration C02





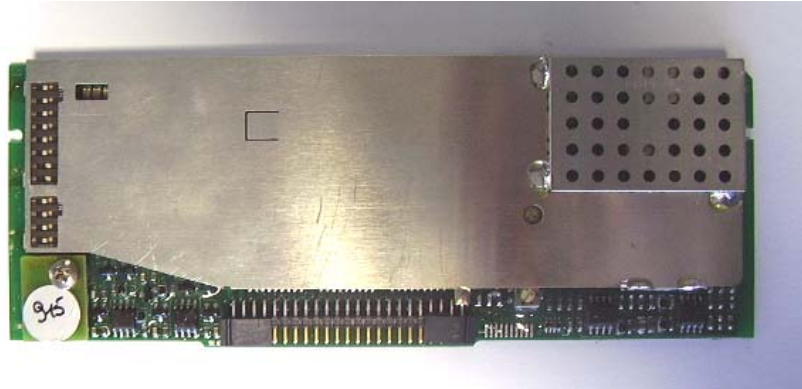
CMC
Centro Misure Compatibilità S.r.l.
Via dell' Elettronica, 12/C
36016 Thiene (VI)



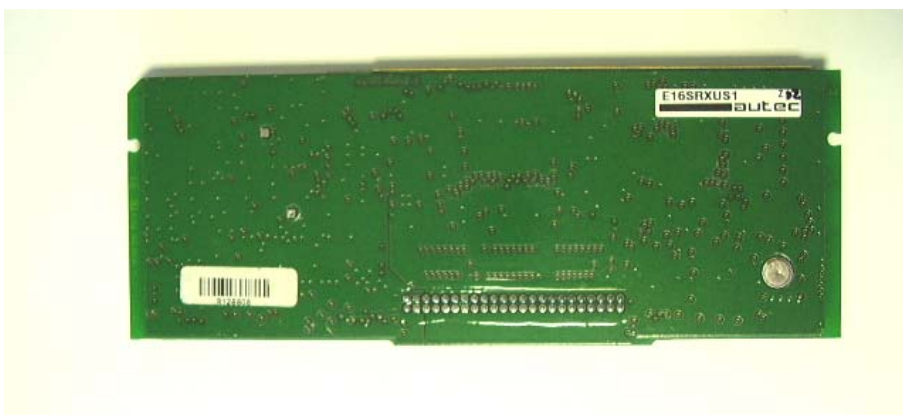
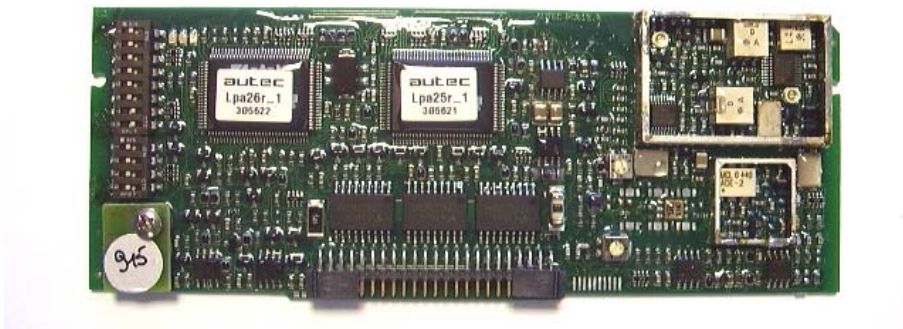




Radio Module



Radio Module without shield



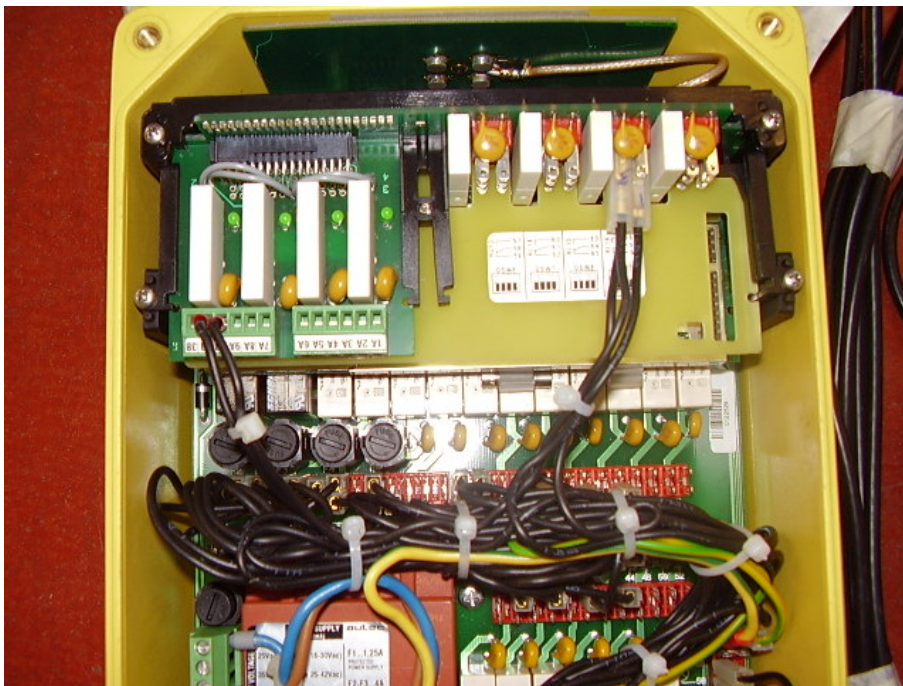


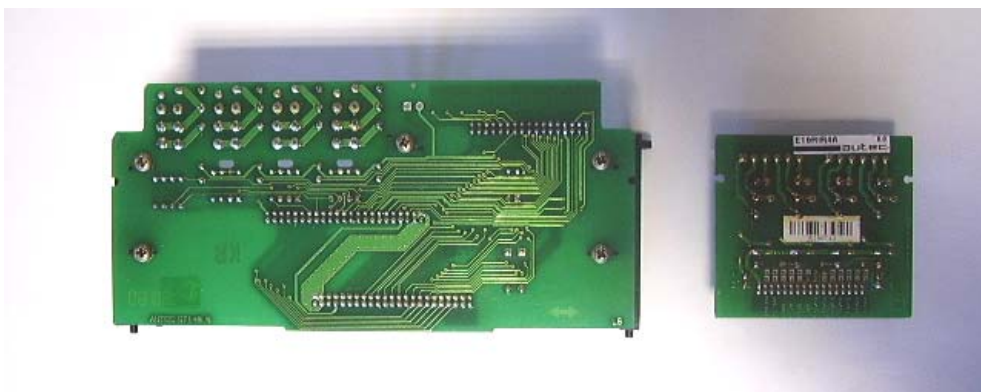
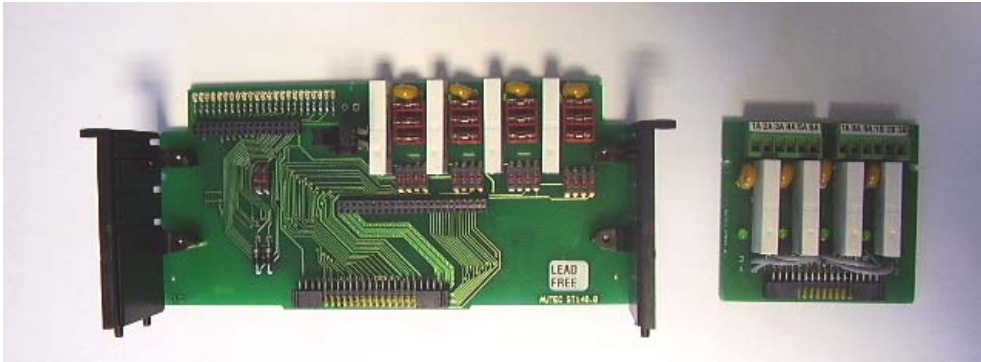
Configuration C12





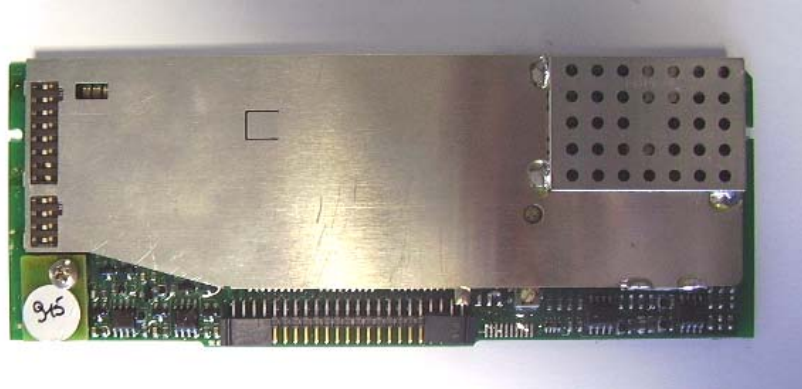
CMC
Centro Misure Compatibilità S.r.l.
Via dell' Elettronica, 12/C
36016 Thiene (VI)



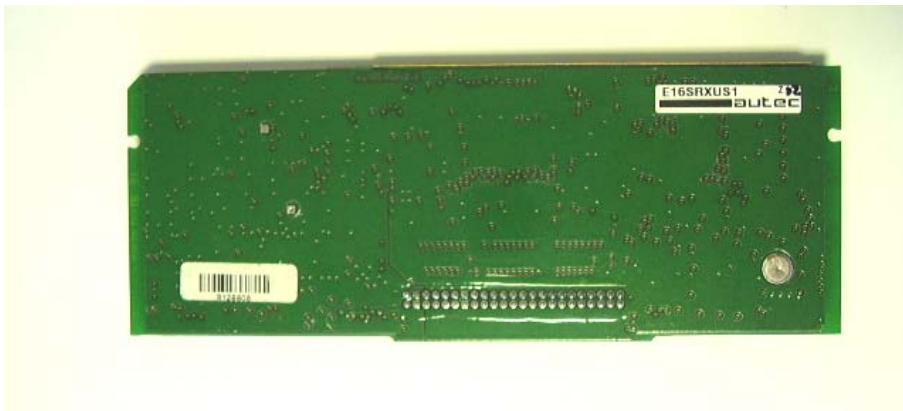
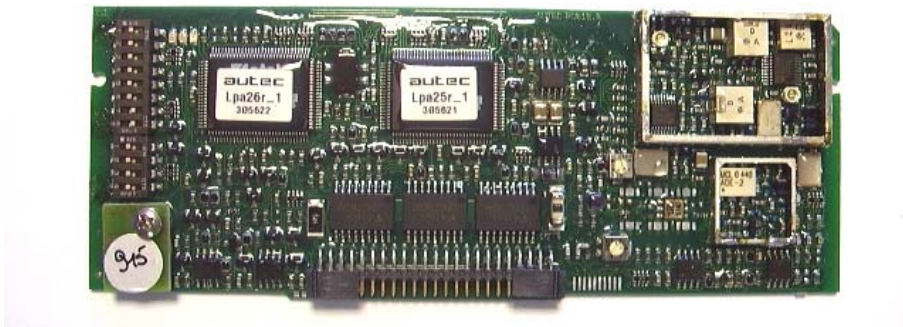




Radio Module



Radio Module without shield





6. Equipment list

<i>Id. number</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Description</i>	<i>Serial number</i>
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 A001	Sispe	F5123	Shield chamber	---
CMC A002	SIDT	951130	Anechoic chamber	---
CMC A003	Stab	AR 500	Power supply	---
CMC A004	Sony		Telecamera	128577
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 A010	Stab	AR 300	Power supply	---
CMC A012	AH System; Inc	ATU 200/510	Support for antennas	---
CMC A013	CMC	TR01	Rotary motorized table	---
CMC A014	CMC	PM01	Antenna positioning Mast	---
CMC A017	Siemens	(logo)!230RC	PLC	---



7. Measurement uncertainty

<i>Test</i>	<i>Value</i>
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

<i>Reference no.</i>	<i>Description</i>
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 Emission of mains terminal disturbance voltage (continuous disturbance)

Test configuration and test method

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

Environmental conditions

Temperature 20 °C Atmospheric pressure 99 kPa Relative humidity 45 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.107
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: AC mains

EUT exercising

See clause 4 of this test report

Acceptance limits

<i>Limits</i>		
<i>Frequency range (MHz)</i>	<i>dB(μV) Quasi-peak</i>	<i>dB(μV) Average</i>
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Result

<i>Line</i>	<i>Graphs</i>	<i>Remarks</i>	<i>Result</i>
N	G06042605	Configuration C12	Complies
L1	G06042606	Configuration C12	Complies
N	G06042607	Configuration C02	Complies
L1	G06042608	Configuration C02	Complies

Graphs Legend

PK: Peak; QP [1s] (quasi-peak at 1 second) values are marked with a X
 AV: Average; AV [1s] (average at 1 second) values are marked with a +

Remarks

//////////

Reference documents

See clause 8 of this test report

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

CMC S001

Measurement uncertainty: See clause 7 of this test report

Result

The requirements are met



11.2 Radiated Emission 30-1000 MHz

Test configuration and test method

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

Environmental conditions

Temperature 20 °C Atmospheric pressure 99 kPa Relative humidity 45 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.109
- 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 (MHz)	Limits [dB(μV/m)]
30 to 88	40,00
88 to 216	43,52
126 to 960	46,02
Above 960	53,97

Result

Side	Polarization	Frequency range	Graph(s)	Remarks	Result
Front	V	30MHz – 1GHz	G06042601	Configuration C12	Complies
Front	H	30MHz – 1GHz	G06042602	Configuration C12	Complies
Front	H	30MHz – 1GHz	G06042603	Configuration C02	Complies
Front	V	30MHz – 1GHz	G06042604	Configuration C02	Complies
Front	H	1GHz – 2GHz	G06042609	Configuration C12	Complies
Front	V	1GHz – 2GHz	G06042610	Configuration C12	Complies
Front	V	1GHz – 2GHz	G06042611	Configuration C02	Complies
Front	H	1GHz – 2GHz	G06042612	Configuration C02	Complies

Graphs Legend

PK: Peak; QP [1s] (quasi-peak at 1 second) values are marked with a X
 AV: Average; AV [1s] (average at 1 second) values are marked with a +

Remarks

//////////

Reference documents

See clause 8 of this test report

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

CMC S102

Measurement uncertainty: See clause 7 of this test report

Result

The requirements are met



11.3 Antenna power conduction limits for receivers

Test configuration and test method

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

Environmental conditions

Temperature 20 °C Atmospheric pressure 99 kPa Relative humidity 45 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.111
- 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

<i>LIMITS</i>
2nW (-57dBm)

Result

Frequency (MHz)	Bandwidth (kHz)	Level (dBm)
30 – 200	120	< -80
200 – 1000	120	< -80
Measurement Uncertainty: ±3dB		

Remarks //////////////

Reference documents See clause 8 of this test report

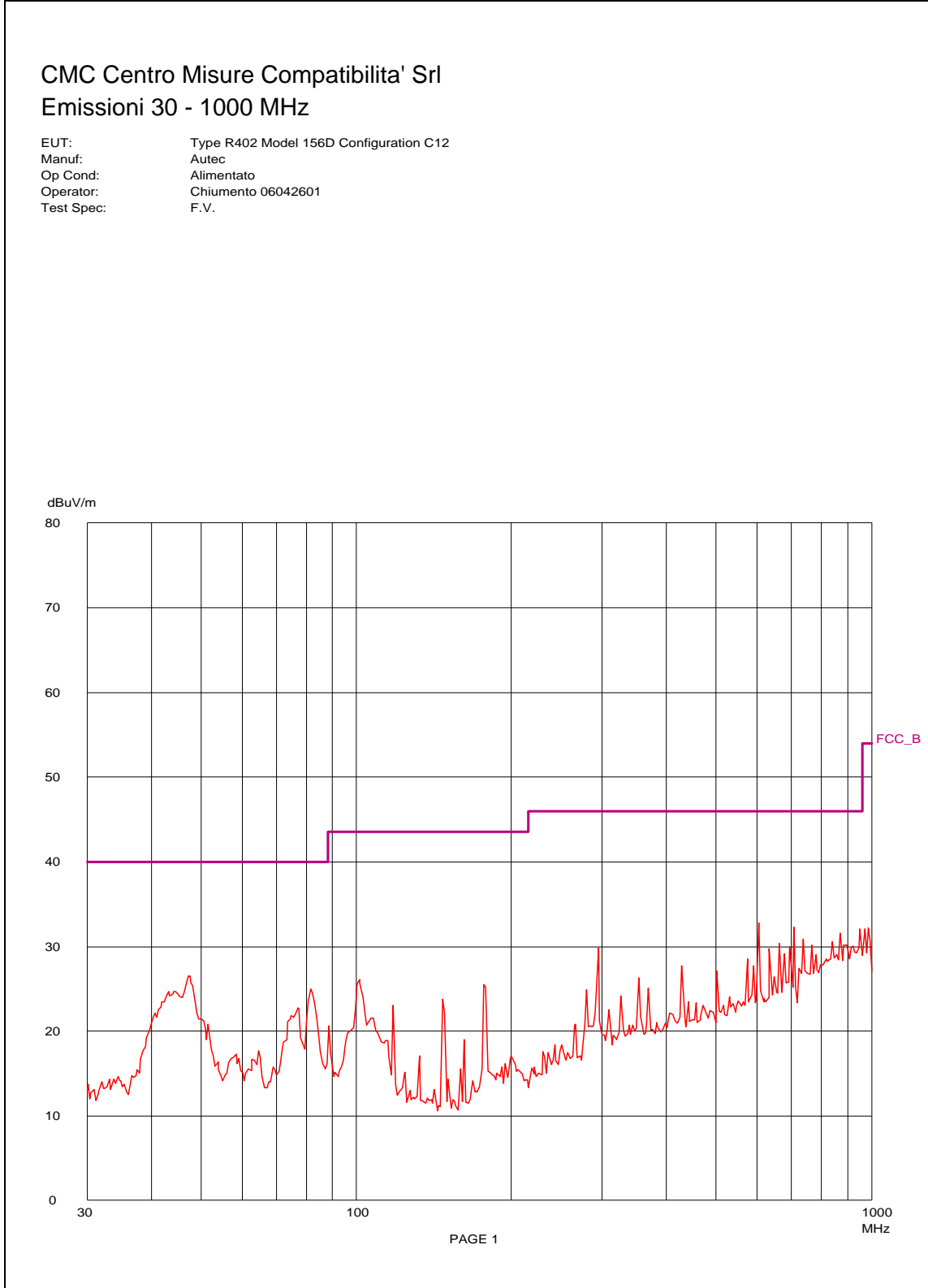
Test equipment used (Id number – see clause 6 of this test report)

CMC S129

Result The requirements are met



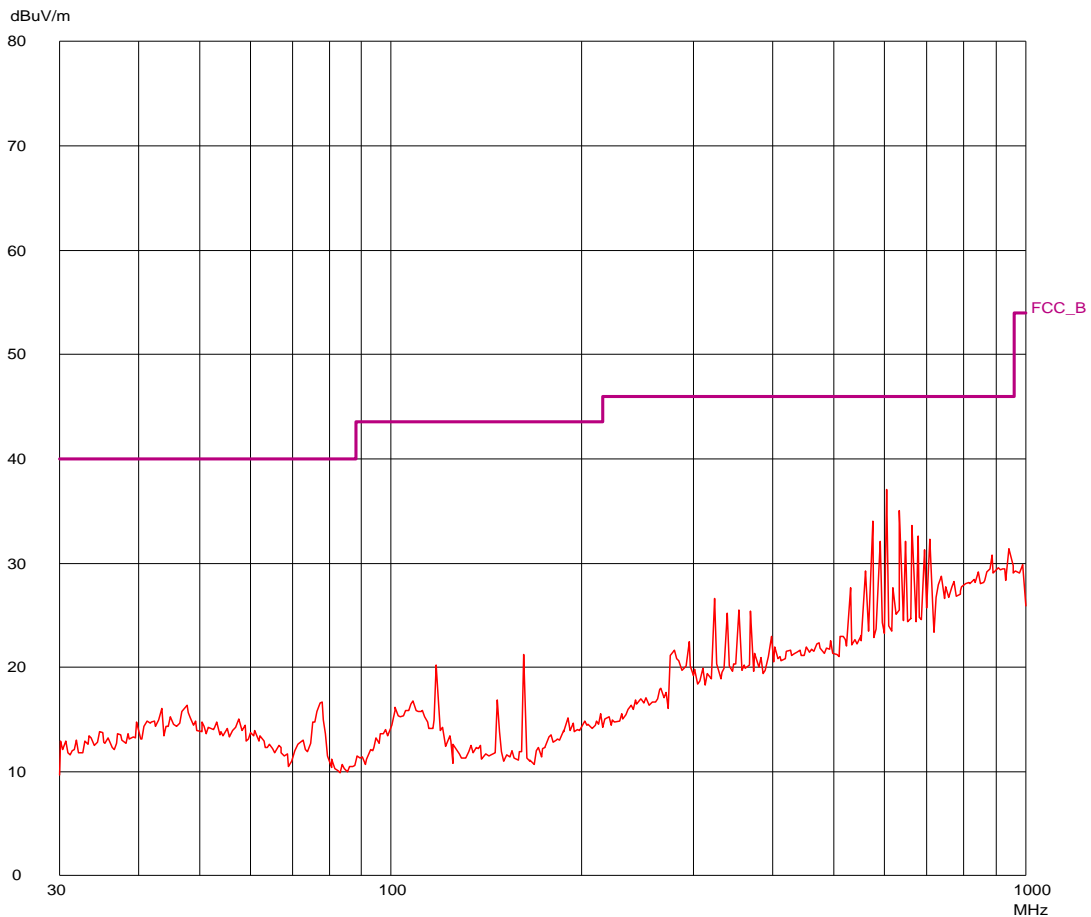
12. Graphs and Tables





CMC Centro Misure Compatibilita' Srl Emissioni 30 - 1000 MHz

EUT: Type R402 Model 156D Configuration C12
Manuf: Autec
Op Cond: Alimentato
Operator: Chiumento 06042602
Test Spec: F.O.

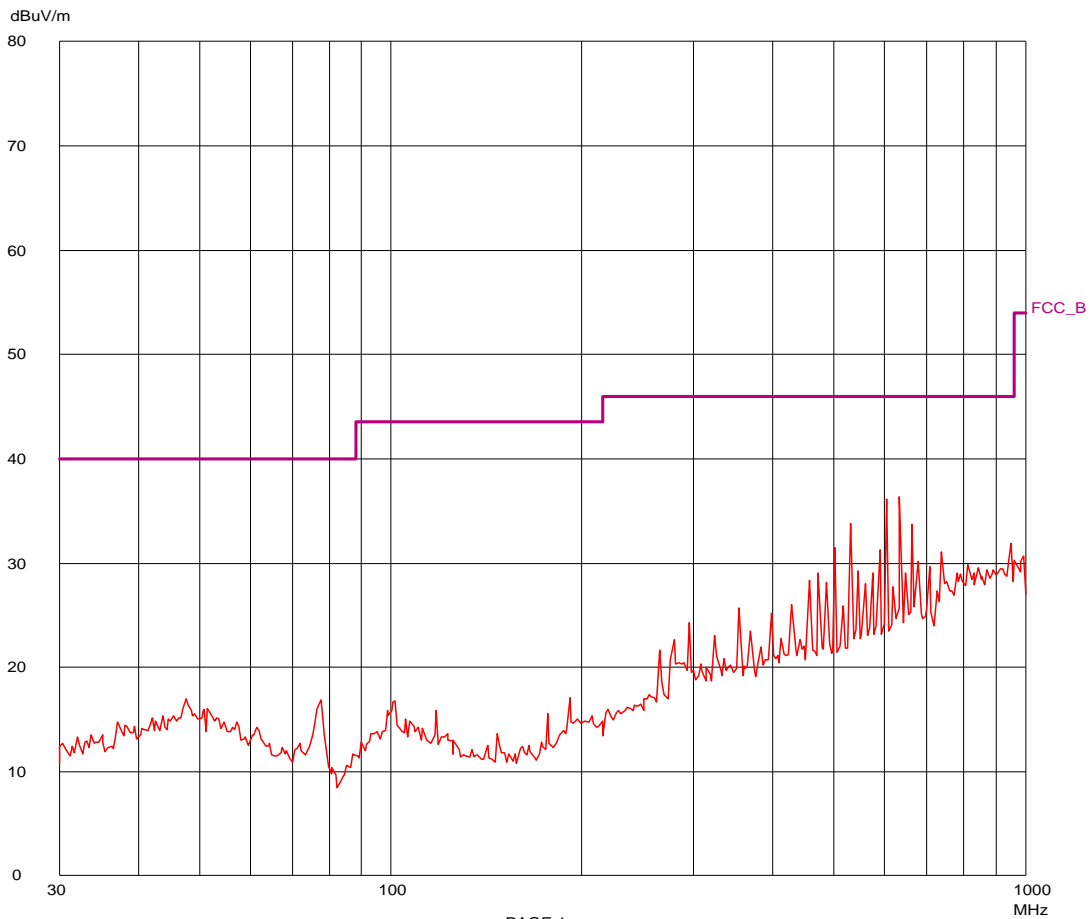


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CMC Centro Misure Compatibilit  Srl Emissioni 30 - 1000 MHz

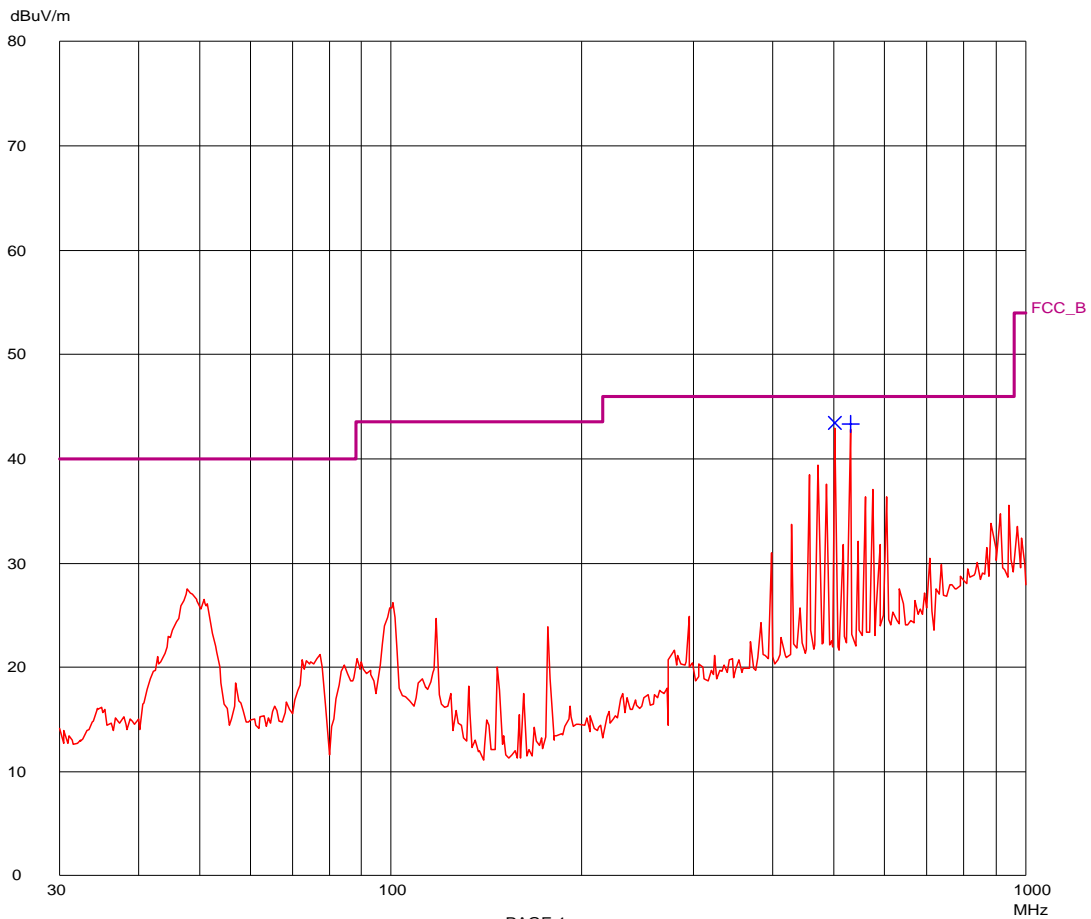
EUT: Type R402 Model 156D Configuration C02
Manuf: Autec
Op Cond: Alimentato
Operator: Chimento 06042603
Test Spec: F.O.





CMC Centro Misure Compatibilita' Srl Emissioni 30 - 1000 MHz

EUT: Type R402 Model 156D Configuration C02
Manuf: Autec
Op Cond: Alimentato
Operator: Chiumento 06042604
Test Spec: F.V.

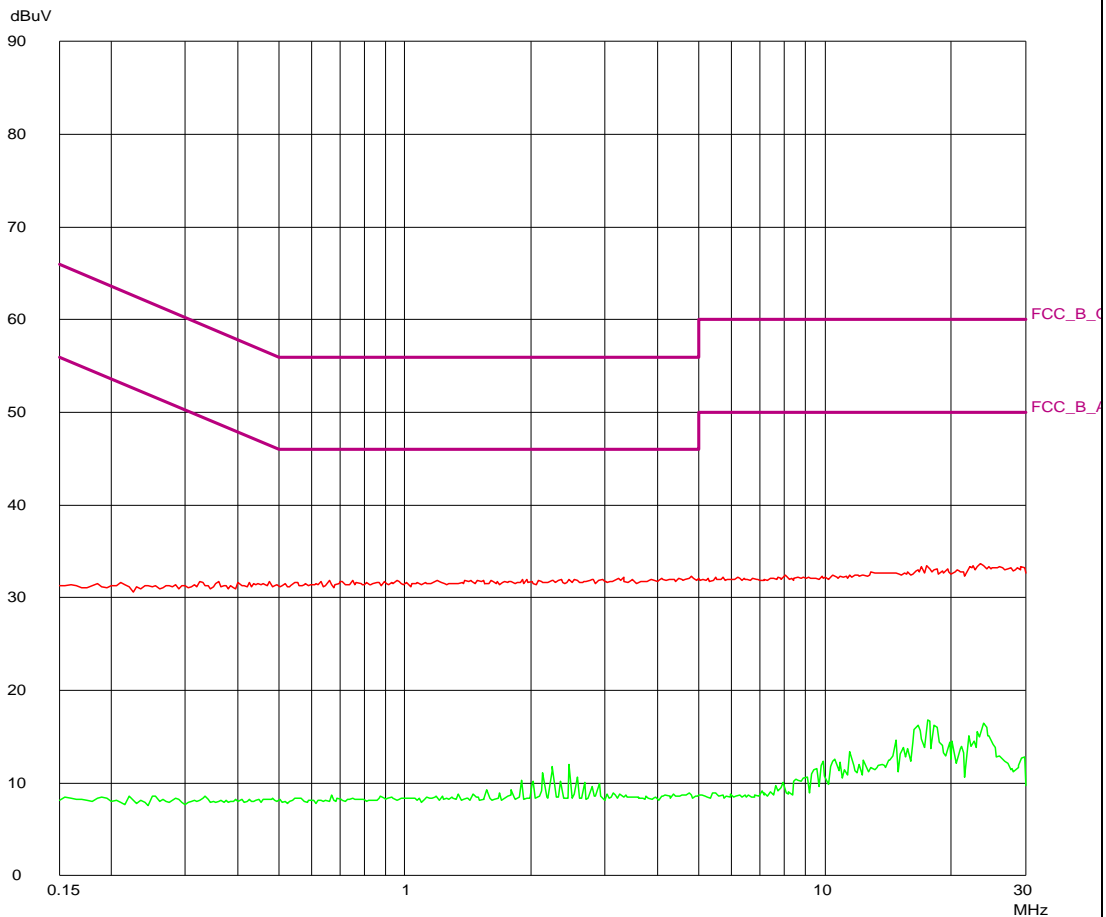


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CMC Centro Misure Compatibilita' Srl Emissioni 0.15 - 30 MHz

EUT: Type R402 Model 156D Configuration C12
Manuf: Autec
Op Cond: Link con TX
Operator: Chiumento 06042605
Test Spec: Line N (120Vac)
Comment:

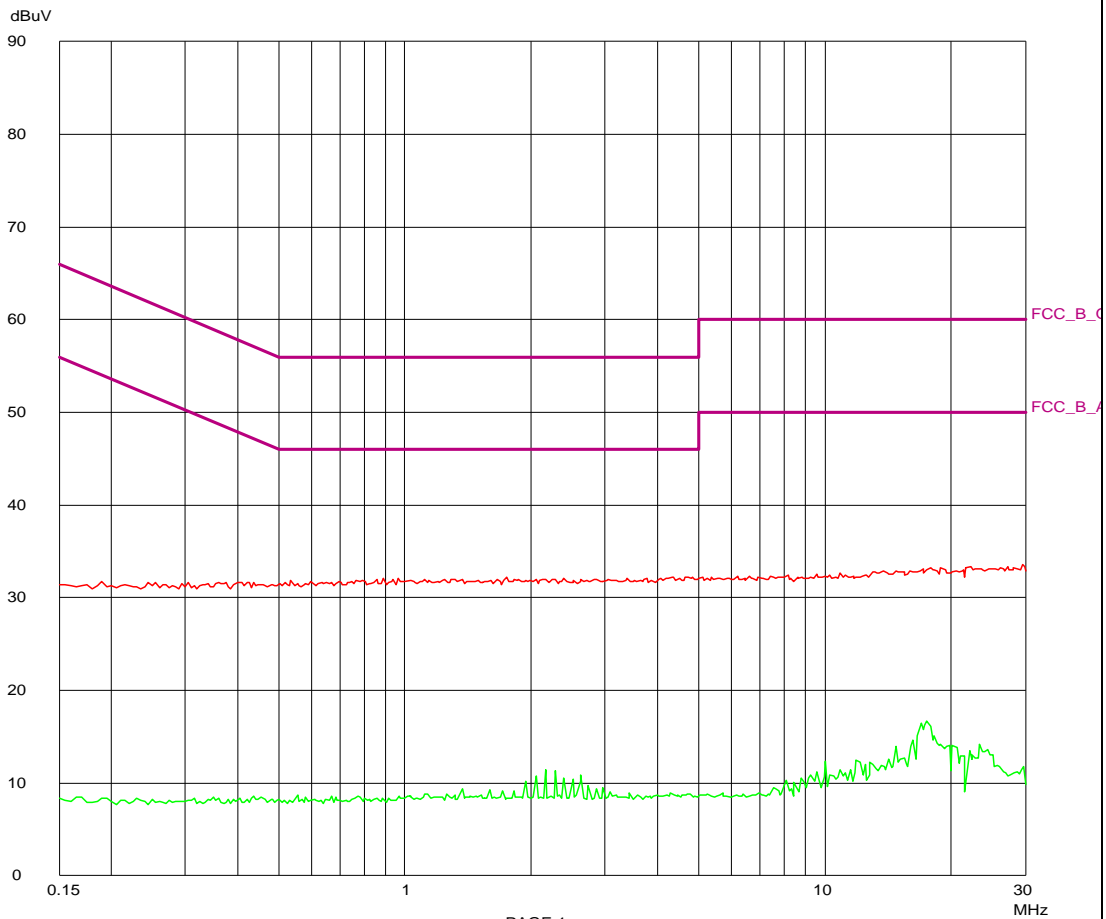


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CMC Centro Misure Compatibilita' Srl Emissioni 0.15 - 30 MHz

EUT: Type R402 Model 156D Configuration C12
Manuf: Autec
Op Cond: Link con TX
Operator: Chiumento 06042606
Test Spec: Line L (120Vac)
Comment:

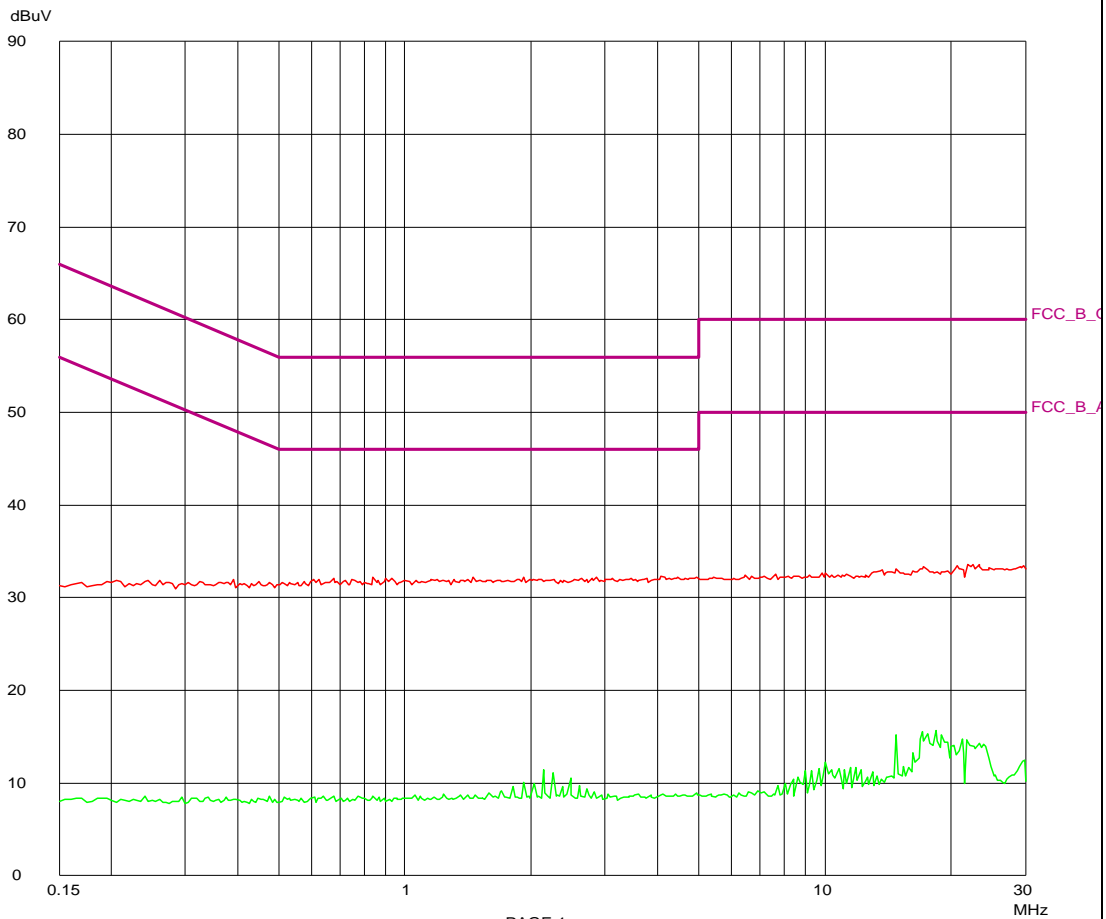


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CMC Centro Misure Compatibilita' Srl Emissioni 0.15 - 30 MHz

EUT: Type R402 Model 156D Configuration C02
Manuf: Autec
Op Cond: Link con TX
Operator: Chiumento 06042607
Test Spec: Line N (120Vac)
Comment:

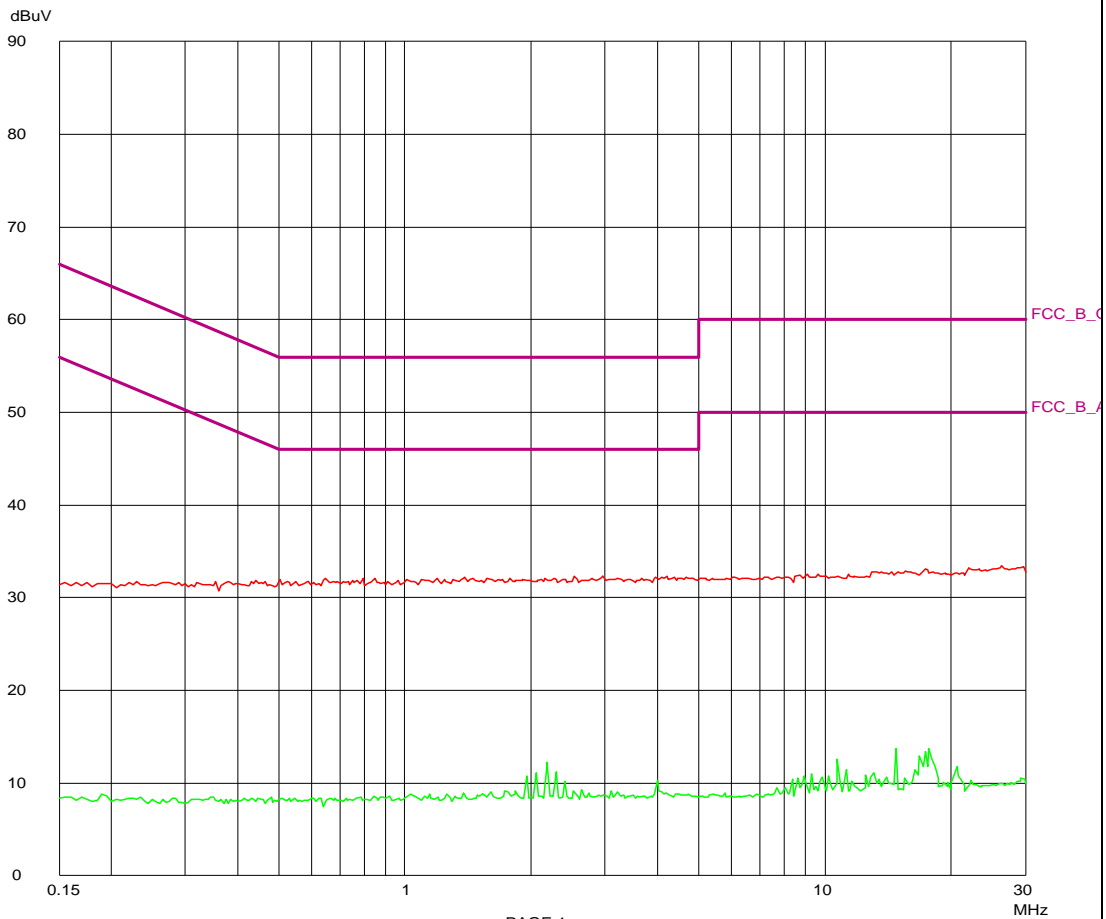


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CMC Centro Misure Compatibilita' Srl Emissioni 0.15 - 30 MHz

EUT: Type R402 Model 156D Configuration C02
Manuf: Autec
Op Cond: Link con TX
Operator: Chiumento 06042608
Test Spec: Line L (120Vac)
Comment:



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G06042609

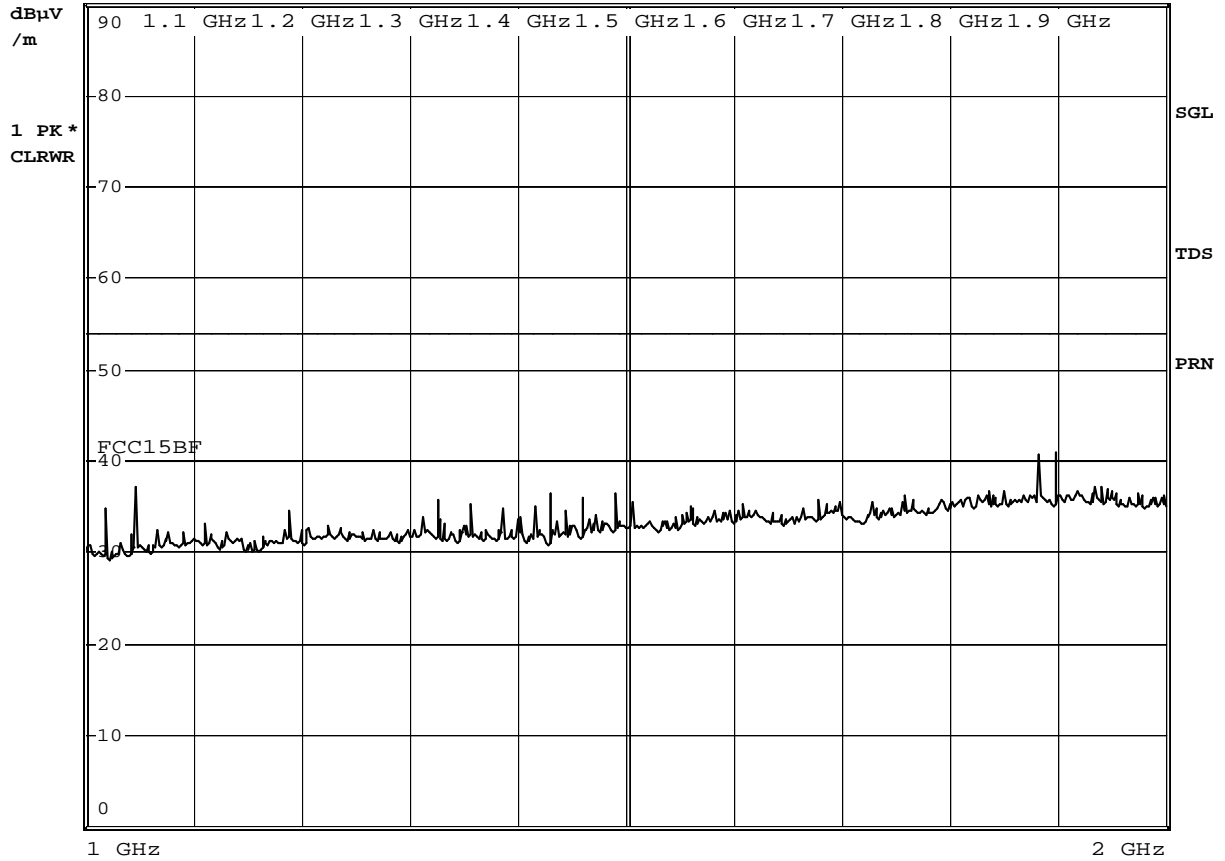
06042609

RBW 120 kHz

MT 1 ms

Att 0 dB AUTO

PREAMP ON



Comment B: Movimento gruppo catene e testa
 Date: 31.MAY.2006 15:32:21



G06042610

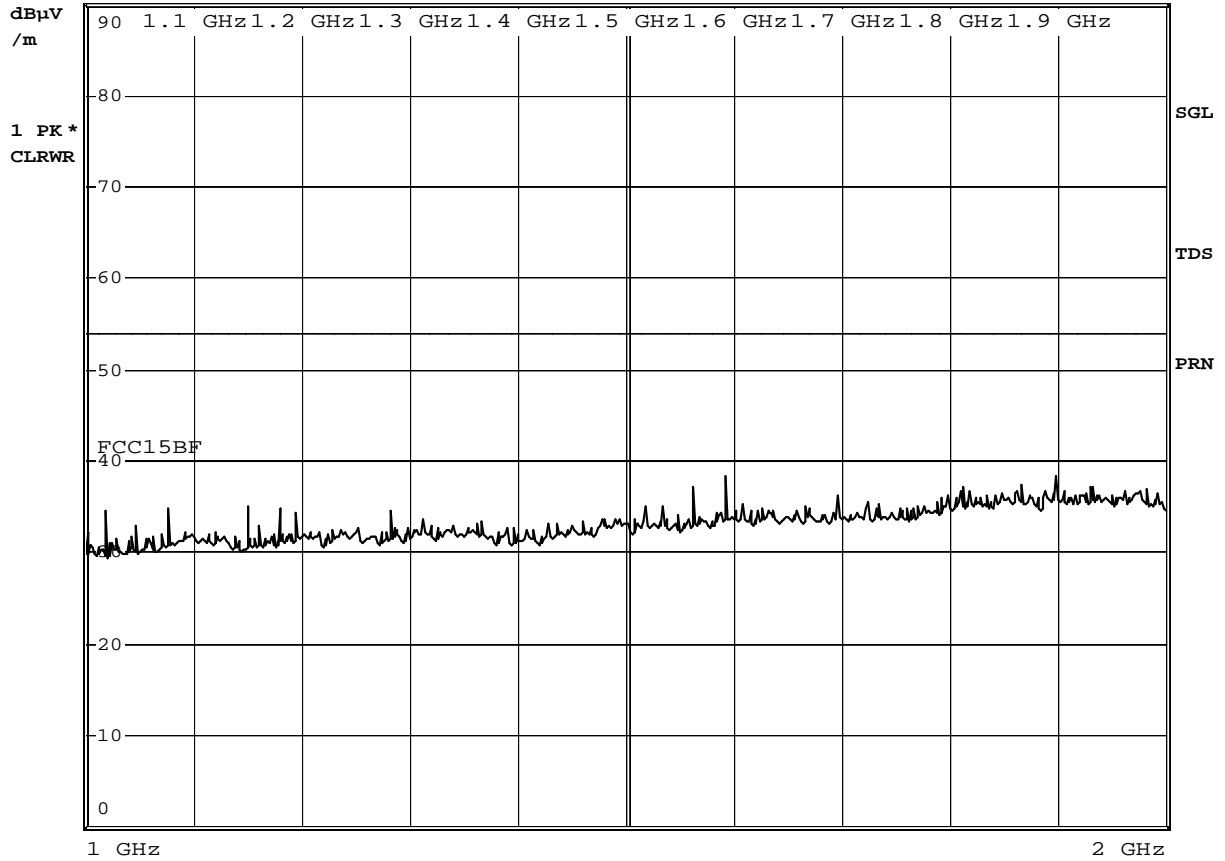
06042610

RBW 120 kHz

MT 1 ms

Att 0 dB AUTO

PREAMP ON



Comment B: Movimento gruppo catene e testa
 Date: 31.MAY.2006 15:40:24



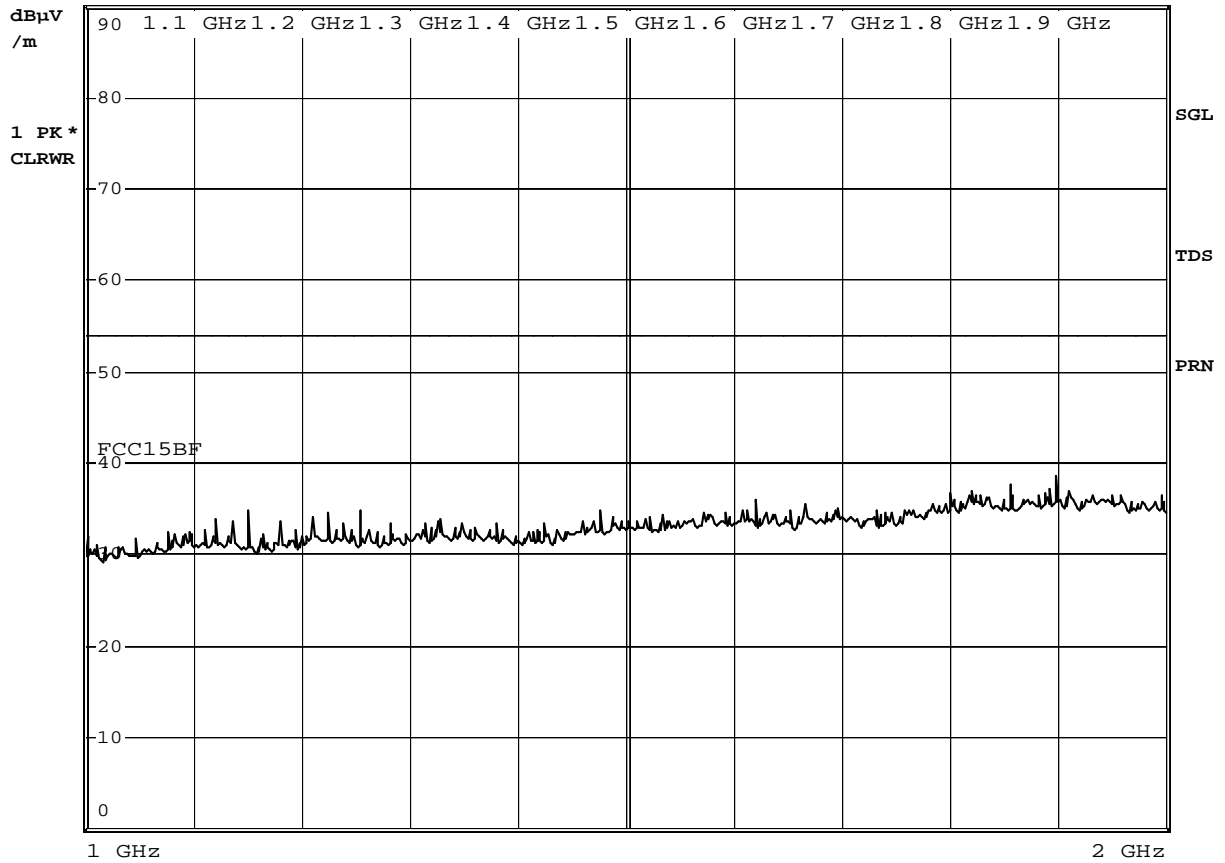
G06042611

06042611

RBW 120 kHz

MT 1 ms

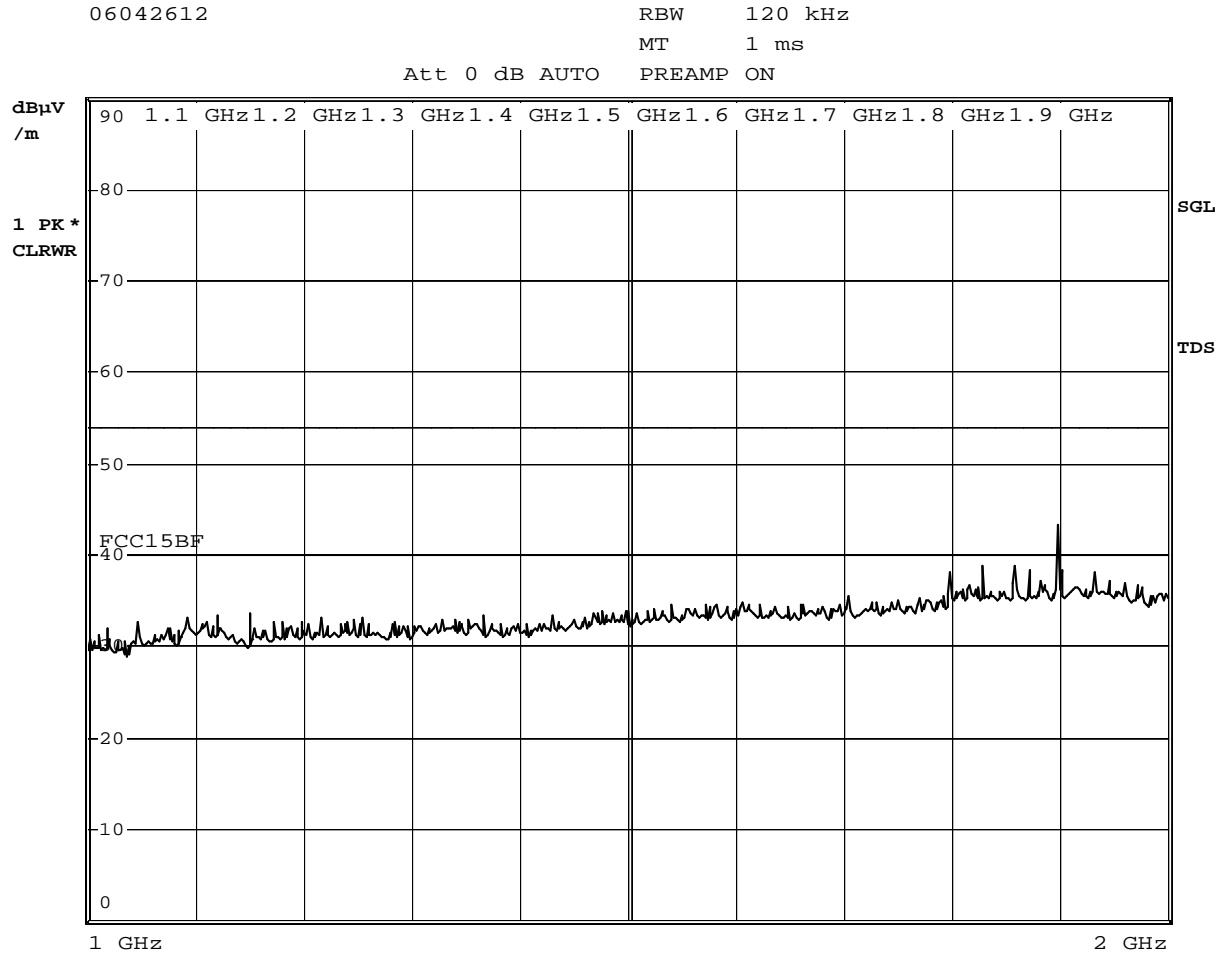
Att 0 dB AUTO PREAMP ON



Comment B: Movimento gruppo catene e testa
 Date: 31.MAY.2006 15:50:36



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Comment B: Movimento gruppo catene e testa
 Date: 31.MAY.2006 15:56:14