Independent Testing Laboratory
CMC Centro Misure Compatibilità S.r.l.
Via dell'Elettronica, 12/C
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Accredited by Ministry of Communications – Notified Body EMC Directive 2004/108/EC n° NB 2044

TEST REPORT nr. R10150601

Federal Communication Commission (FCC)

Test item

Description..... : Transmitter Unit

Trademark..... : Teleco Automation

Model/Type..... : TCSP240C04

Test Specification

Standard..... : FCC Rules & Regulations, Title 47 (2009) - Part 15 paragraph(s) : 209, 215 and 249

Client's name..... : Teleco Automation S.r.l.

Address..... : Piazza Ex Convento Cappuccine, 8 - 31100 TREVISO (TV) - ITALY

Manufacturer's name : Same ad client

Address..... :

Report

Tested by..... : A. Bertezzolo - *Technician*

Approved by..... : R. Beghetto - *Laboratory Manager*

Date of issue..... : 12.01.11

Contents..... : 32 pages

Index

1. Summary

Emission: FCC Rules & Regulations, Title 47

Test specifications	Environmental Phenomena	Tests sequence	Result
Part 15.209 + 15.249	Radiated Emission 30-1000 MHz	1	Complies
Part 15.209	Spurious Emission 1-25 GHz	2	Complies
Part 15.205	Band Edge	3	Complies
Part 15.215	Bandwidth	4	Complied

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	:	3,6Vdc from battery
Type of equipment	:	☒ Transmitter Unit ☐ Receiver Unit ☐ Fixed station ☒ Portable station ☐ Mobile station
Receiver class	:	--
Alignment range	:	2,4000 ÷ 2,4835GHz
Switching frequency	:	2,4000 ÷ 2,4835GHz
Number of channels	:	--
Channel separation	:	--
Modulation	:	GFSK
Extreme conditions	:	--
Maximum transmitter output power	:	--
Information on antenna	:	☑ Integrated ☐ Extern ☐ Other: Dedicated
Duty cycle	:	--

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	:	16.07.10
Testing start date	:	18.11.10
Testing end date	:	07.12.10
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 P100981

4. Operative conditions

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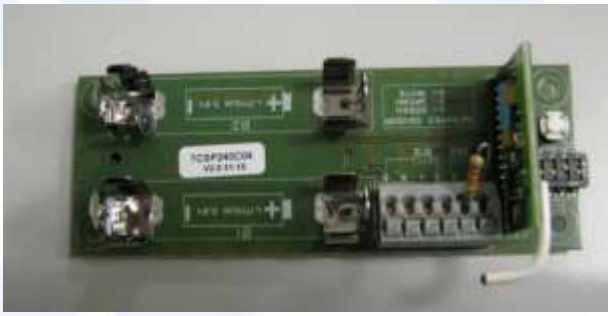
5. Photograph(s) of EUT



6. Equipment list

Id. number	*Manufacturer*	*Model*	*Description*	*Serial number*	*Last calibration*	*Due date calibration*
CMC S001	Rohde & Schwarz	ESHS30	EMC interference receiver	862024/003	January '10	January '11
CMC S108	Emco	3115	Horn antenna	9811-5622	April '10	April '13
CMC S124	Spin	AMTP42-20	Horn Antenna 18-26GHz	103	May '10	May '13
CMC S127	SCHAFFNER	HLA6120	Loop Antenna	1191	January '10	January '13
CMC S129	Rohde & Schwarz	ESPI7	Receiver	836.914/004	January '10	January '11
CMC S136	Schwarzbeck	VULB 9163	Broadband Antenna	9136-205	May '10	May '13
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January '10	January '11

7. Measurement uncertainty

Test	Expanded Uncertainty	note
Conducted Emission		
(50Ω/50µH AMN) - (9 kHz – 150 kHz)	±3.8 dB	1
(50Ω/50µH AMN) - (150 kHz – 30 MHz)	±3.4 dB	1
(Voltage probe) - (150 kHz – 30 MHz)	±3.0 dB	1
(50Ω/5µH AMN) - (150 kHz – 108 MHz)	±3.2 dB	1
DiscontinuousConducted Emission		
Conducted Emission (50Ω/50µH AMN) - (9 kHz – 150 kHz)	±3.8 dB	1
Conducted Emission (50Ω/50µH AMN) - (150 kHz – 30 MHz)	±3.4 dB	1
Disturbance Power (30 MHz – 300 MHz)	±3.2 dB	1
Radiated Emission		
(0,150 MHz – 30 MHz)	±4.5 dB	1
(30 MHz – 1000 MHz)	±4.8 dB	1
(1 GHz – 6 GHz)	±4.4 dB	1
Electromagnetic field EMF	±18.8 dB	1
Harmonic current emissions test	±2.4 %	1
Voltage fluctuation and flicker test	±6.0 %	1
Insertion loss test	±2.6 %	1
Radiated electromagnetic disturbance test (loop antenna)	±2.5 %	1
Radiated electromagnetic field immunity test	0.9 V/m at 3V/m	1
Pulse modulated radiated electromagnetic field immunity test	0.9 V/m at 3V/m	1
Injected currents immunity test	0.6 V at 3V	1
Bulk current	9 mA at 60 mA	1
Power frequency magnetic field immunity test	0.3 A/m at 3 A/m	1
Electrostatic discharge immunity test		2
Electrical fast transients / burst immunity test		2
Surge immunity test		2
Short interruption immunity test		2
Voltage transient emission test	±5 %	1
Transient immunity test		2

Notes

Note 1:
The expanded uncertainty reported according to EN55016-4-2(2004-10) is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of p = 95%

Note 2:

It has been demostrated that the used test equipment meets the specified requirements in the standard with at least a 95% confidence, covering factor k = 2.

8. Reference documents

Reference no.	*Description*
FCC Rules and Regulation Title 47 part 15 (2009)	--
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. 2.0 (Quality Manual)	Measure Procedure
Internal procedure INC_M rev. 8.0 (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.

Measurement uncertainty is in accordance with document CMC INC_M rev. 8.0.

11.1 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 ºC Atmospheric pressure 99 kPa Relative humidity 48 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.249 and Part 15.209
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Enclosure.

EUT exercising

See clause 4 of this test report

Result

Frequency (MHz)	*Graph(s)*	*Measured PK level (dBµV/m)*	*Limits (dBµV/m)*	*Remark*
2404,21	G10150617	90,8	93,9	--
2440,24	G10150618	92,3	93,9	--
2476,24	G10150614	92,9	93,9	--

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 S164
Measurement uncertainty: See clause 7 of this test report

Result

The requirements are met

11.2 Spurious Emission 1-25 GHz

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 48 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Result

Frequency (MHz)	*Polarization*	Frequency Range (MHz)	Graph(s)	Remarks	Result
2476,24	Vertical	30 – 1000	G10150601	--	Complies
2476,24	Horizontal	30 – 1000	G10150602	--	Complies
2440,24	Horizontal	30 – 1000	G10150603	--	Complies
2440,24	Vertical	30 – 1000	G10150604	--	Complies
2404,21	Vertical	30 – 1000	G10150605	--	Complies
2404,21	Horizontal	30 – 1000	G10150606	--	Complies

Antenna	Frequency Range (MHz)	Graph(s)	Remarks	Result
Loop Antenna	9kHz – 30MHz	G10150607	--	Complies

Nr. Harmonics	*AV level (dBµV/m)*						*AV Limits (dBµV/m)*	*Remark*
	2404,21MHz		*2440,24MHz*		*2476,24MHz*			
	Frequency	*(dBµV/m)*	*Frequency*	*(dBµV/m)*	*Frequency*	*(dBµV/m)*		
II Harmonic	4808,53MHz	49,3	4880,47MHz	48,2	4950,49MHz	41,3	54,00	--
III Harmonic	7212,79MHz	45,9	7320,71MHz	51,8	7428,73MHz	46,3	54,00	--
IV Harmonic	9617,05MHz	47,5	9760,96MHz	49,6	9904,98MHz	46,5	54,00	--
V Harmonic	1202,13MHz	47,2	1220,12MHz	47,6	1238,12MHz	50,4	54,00	--
VI Harmonic	--	More than 10dB below limit	--	More than 10dB below limit	--	More than 10dB below limit	54,00	--
VII Harmonic	--	More than 10dB below limit	--	More than 10dB below limit	--	More than 10dB below limit	54,00	--
VIII Harmonic	--	More than 10dB below limit	--	More than 10dB below limit	--	More than 10dB below limit	54,00	--
IX Harmonic	--	More than 10dB below limit	--	More than 10dB below limit	--	More than 10dB below limit	54,00	--
X Harmonic	--	More than 10dB below limit	--	More than 10dB below limit	--	More than 10dB below limit	54,00	--
Measurement Uncertainty: ±4dB								

Nr. Harmonics	*PK level (dBµV/m)*						*PK Limits (dBµV/m)*	*Remark*
	2404,21MHz		*2440,24MHz*		*2476,24MHz*			
	Frequency	*(dBµV/m)*	*Frequency*	*(dBµV/m)*	*Frequency*	*(dBµV/m)*		
II Harmonic	4808,53MHz	53,7	4880,47MHz	51,9	4950,49MHz	49,5	74,00	--
III Harmonic	7212,79MHz	53,3	7320,71MHz	56,9	7428,73MHz	53,7	74,00	--
IV Harmonic	9617,05MHz	55,5	9760,96MHz	56,1	9904,98MHz	56,6	74,00	--
V Harmonic	1202,13MHz	56,2	1220,12MHz	57,9	1238,12MHz	59,5	74,00	--
VI Harmonic	--	More than 10dB below limit	--	More than 10dB below limit	--	More than 10dB below limit	74,00	--
VII Harmonic	--	More than 10dB below limit	--	More than 10dB below limit	--	More than 10dB below limit	74,00	--
VIII Harmonic	--	More than 10dB below limit	--	More than 10dB below limit	--	More than 10dB below limit	74,00	--
IX Harmonic	--	More than 10dB below limit	--	More than 10dB below limit	--	More than 10dB below limit	74,00	--
X Harmonic	--	More than 10dB below limit	--	More than 10dB below limit	--	More than 10dB below limit	74,00	--
Measurement 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 S108, CMC S124, CMC S127, CMC S136, CMC S164
Measurement uncertainty: See clause 7 of this test report

Result
The requirements are met

11.3 Band edge

Test configuration and test method

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

Environmental conditions

Temperature	20	ºC	Atmospheric pressure	99	kPa	Relative humidity	48	%

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.205
- 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

LIMITS
Permitted operating frequency range
2,4000 ÷ 2,4835GHz

Result

Graph(s)	*Attenuation Band Edge at 2483,5MHz*	*Remark*
G10150683 and G10150616	48,13 dBµV/m	Peak value
	42,89 dBµV/m	Average value
Measurement Uncertainty: ±4dB		

Graphs for bottom frequency	G10150610 and G10150611

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

Reference documents

See clause 8 of this test report

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

CMC S164

Result The requirements are met

11.4 Bandwidth

Test configuration and test method

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

Environmental conditions

Temperature 20 ºC Atmospheric pressure 99 kPa Relative humidity 48 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.215
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Result

Frequency	Graph(s)	Bandwidth	Remark
2404,21	G10150681	101,4 kHz	--
2440,24	G10150680	97,2 kHz	--
2476,24	G10150682	116,6 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

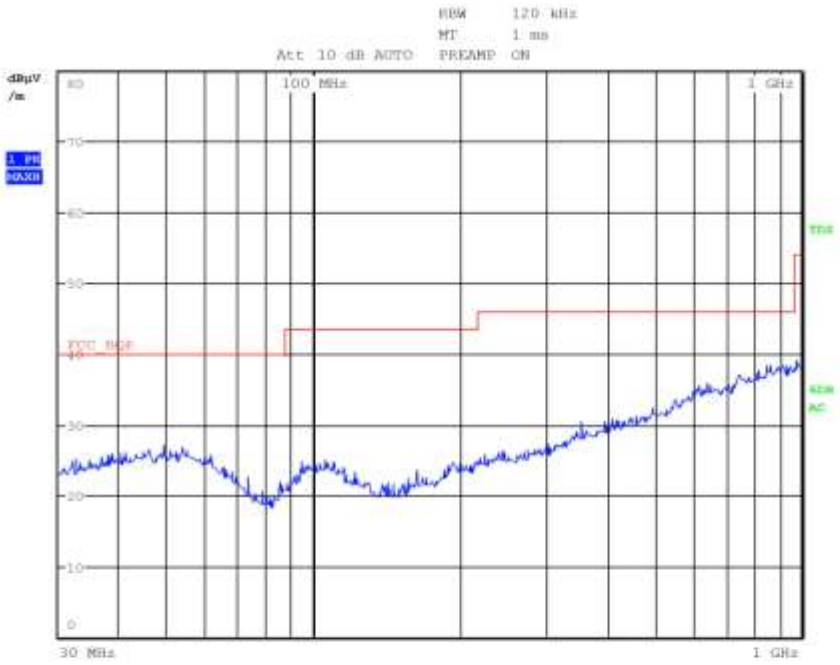
Result

The requirements are met

12. Graphs and Tables

G10150601

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition F MAX
Operator Gandini 10150601
Test Spec
Vert



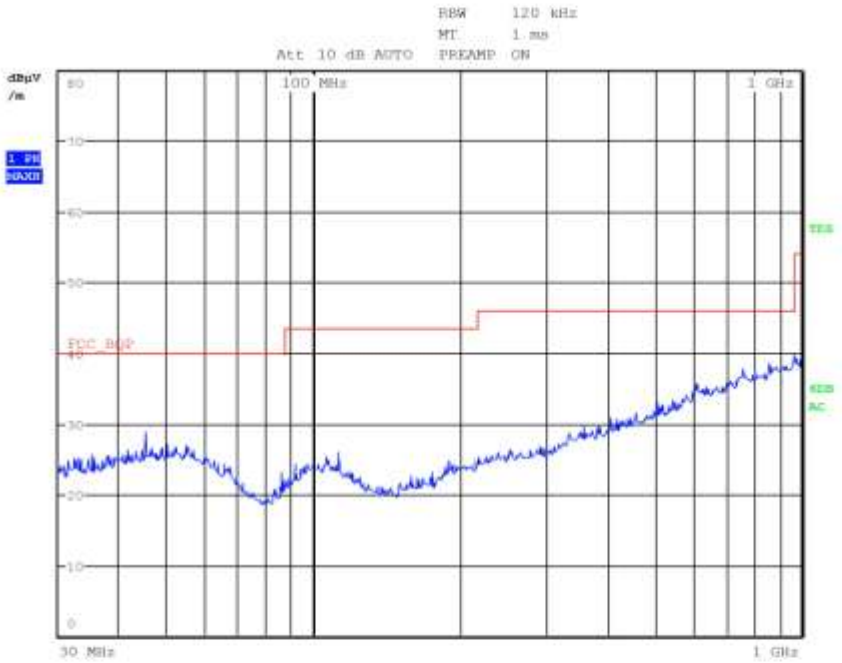
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 0

G10150602

Meas Type	Emission 30-1000MHz
Equipment under Test	
Manufacturer	
OP Condition	F MAX
Operator	Gandini 10150602
Test Spec	

Horiz



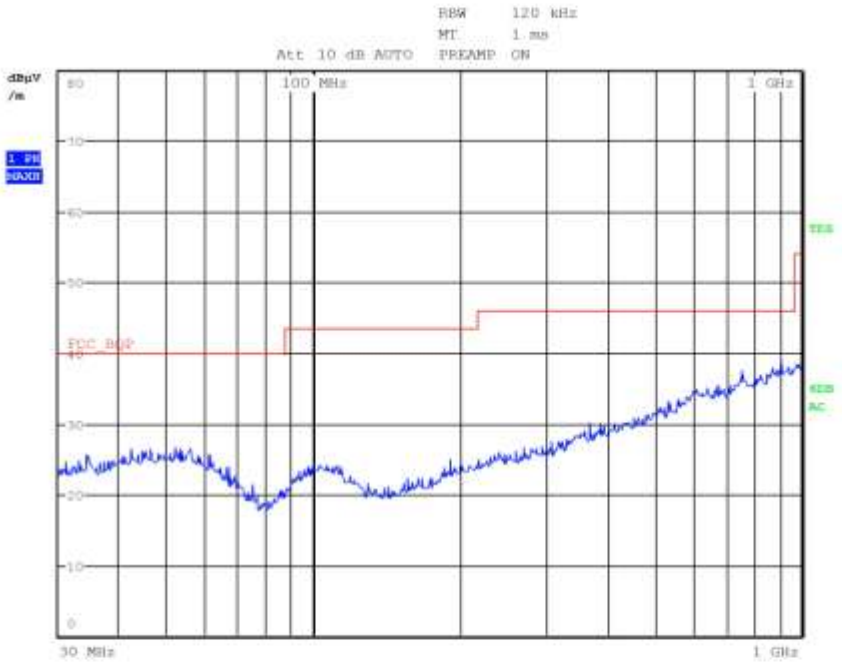
Final Measurement

Meas Time:	1 s
Margin:	6 dB
Subranges:	0

G10150603

Meas Type	Emission 30-1000MHz
Equipment under Test	
Manufacturer	
OP Condition	F MED
Operator	Gandini 10150603
Test Spec	

Horiz



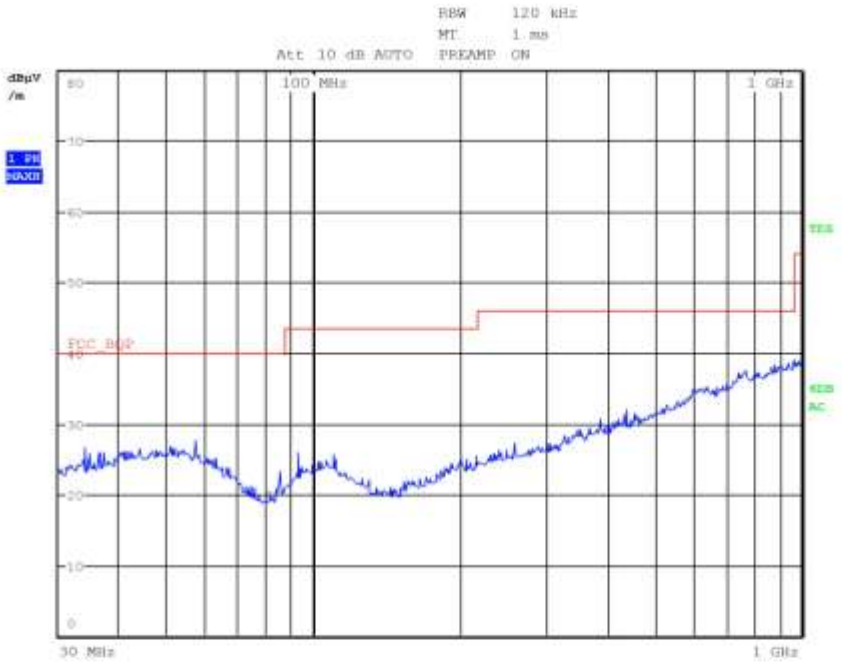
Final Measurement

Meas Time:	1 s
Margin:	6 dB
Subranges:	0

G10150604

Meas Type	Emission 30-1000MHz
Equipment under Test	
Manufacturer	
OP Condition	F MED
Operator	Gandini 10150604
Test Spec	

Vert



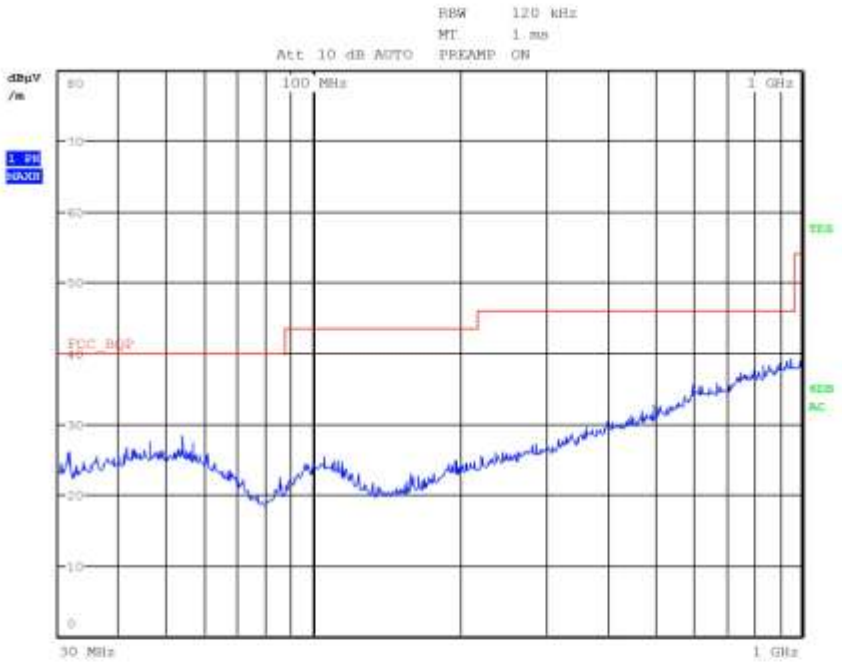
Final Measurement

Meas Time:	1 s
Margin:	6 dB
Subranges:	0

G10150605

Meas Type	Emission 30-1000MHz
Equipment under Test	
Manufacturer	
OP Condition	F MIN
Operator	Gandini 10150605
Test Spec	

Vert



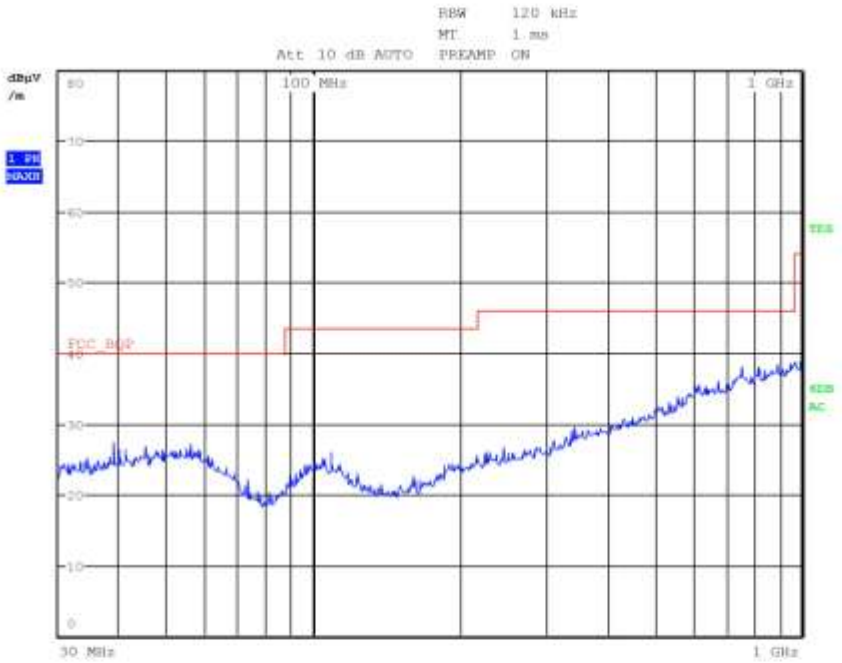
Final Measurement

Meas Time:	1 s
Margin:	6 dB
Subranges:	0

G10150606

Meas Type	Emission 30-1000MHz
Equipment under Test	
Manufacturer	
OP Condition	F MIN
Operator	Gandini 10150606
Test Spec	

Horiz

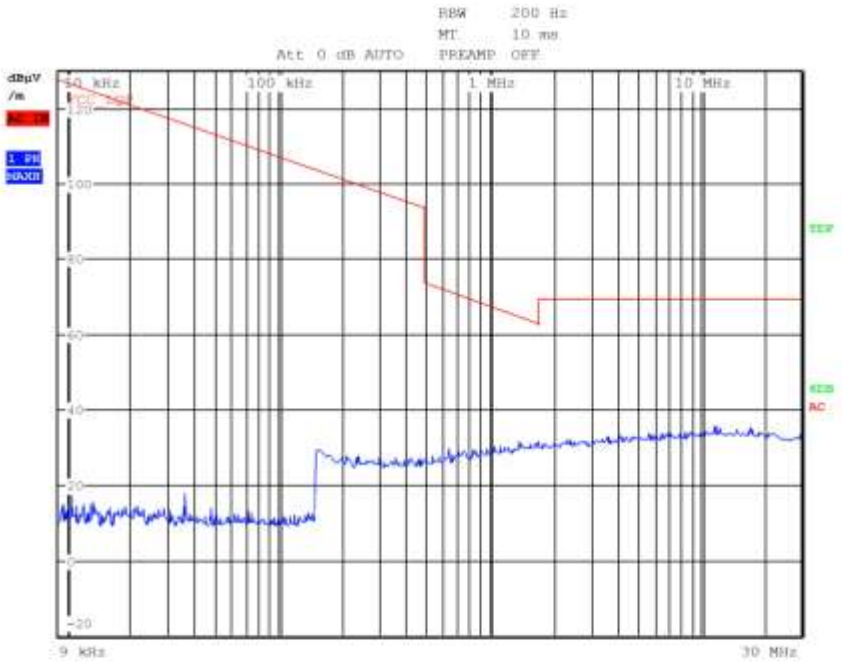


Final Measurement

Meas Time:	1 s
Margin:	6 dB
Subranges:	0

G10150607

Meas Type Emission 0.009-30MHz
Equipment under Test
Manufacturer
OP Condition
Operator Gandini 10150607
Test Spec
Loop

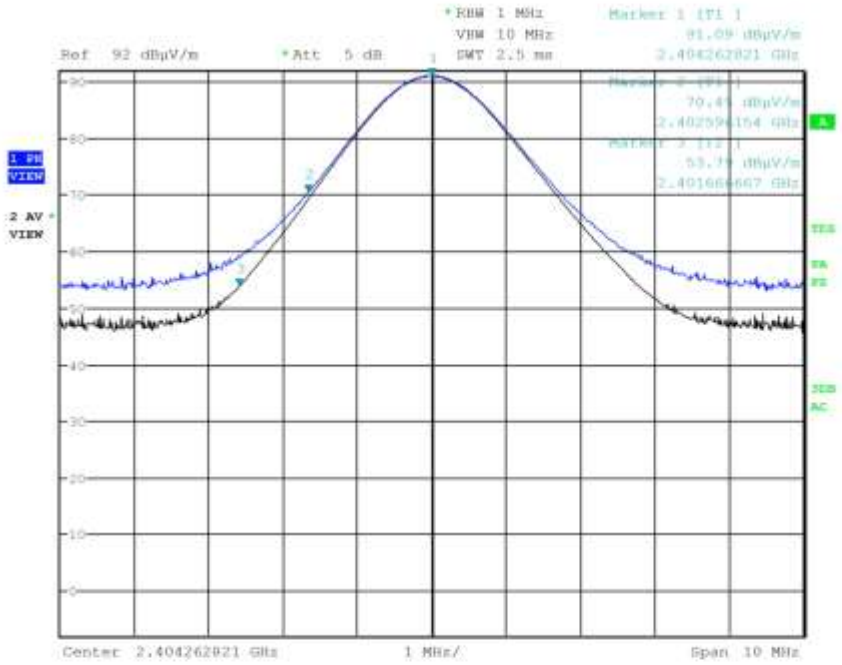


Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 0

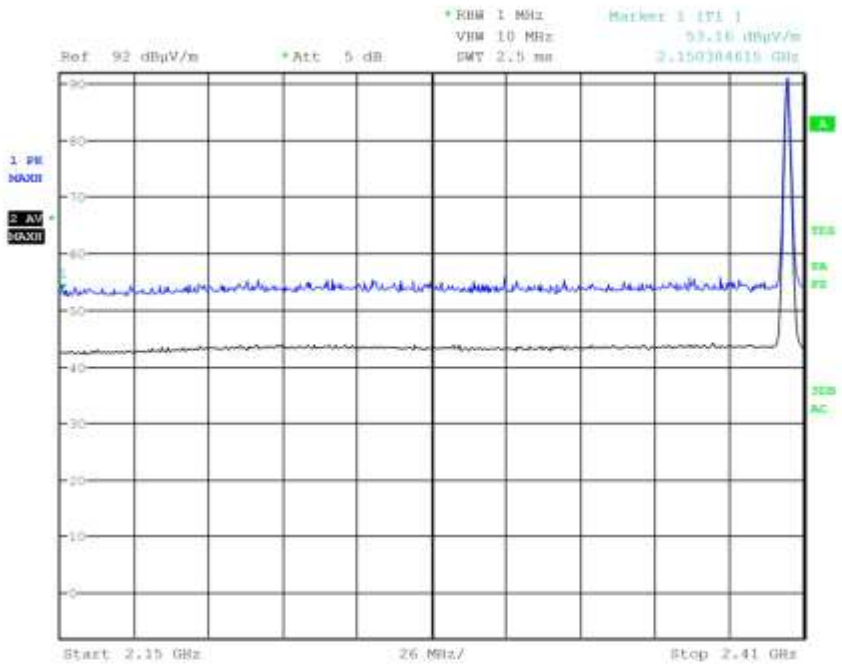
G10150610

Meas Type
Equipment under Test
Manufacturer
OP Condition Fmin
Operator Bertezzolo 10150610
Test Spec
Vert



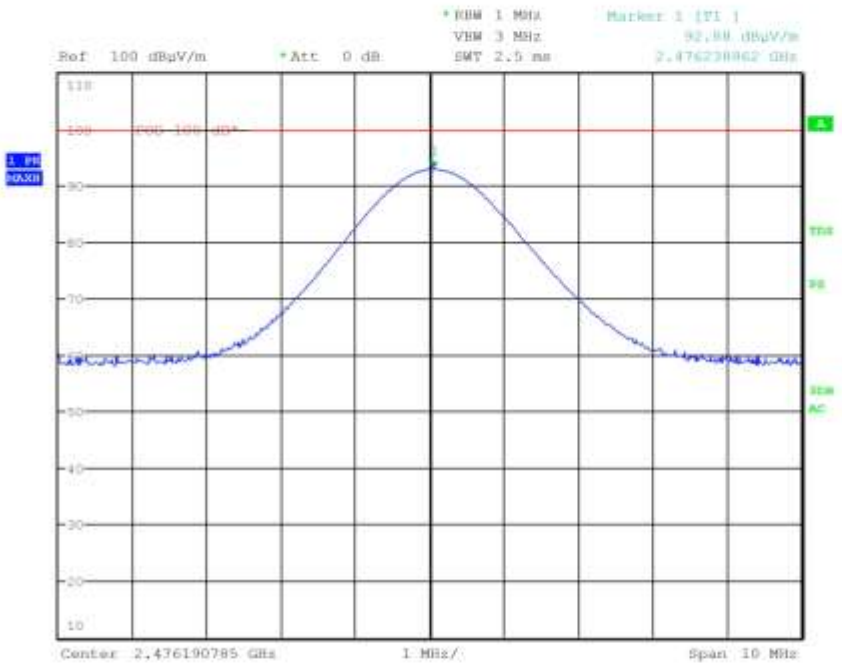
G10150611

Meas Type
Equipment under Test
Manufacturer
OP Condition Fmin
Operator Bertezzolo 10150611
Test Spec



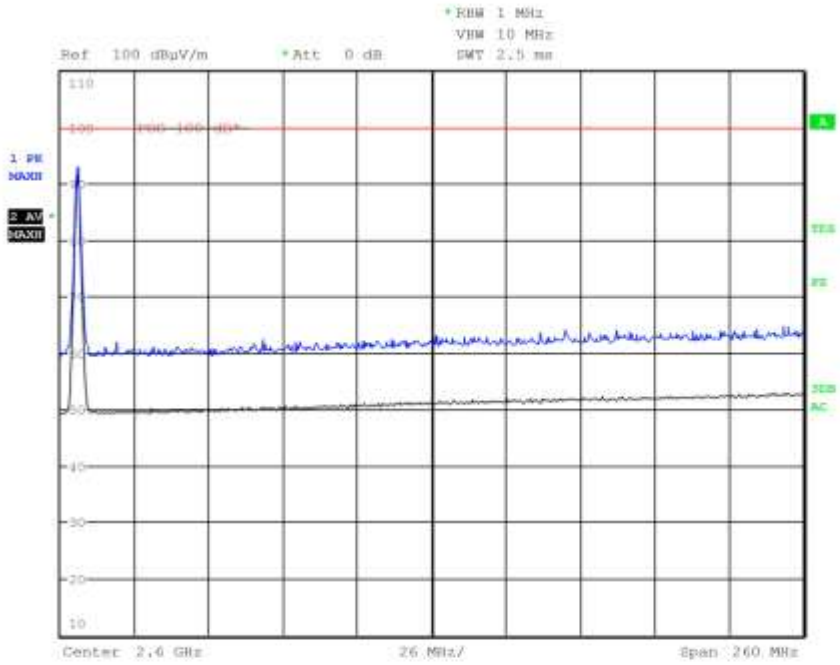
G10150614

Meas Type
Equipment under Test
Manufacturer
OP Condition Fmax
Operator Bertezzolo 10150614
Test Spec
Vert.



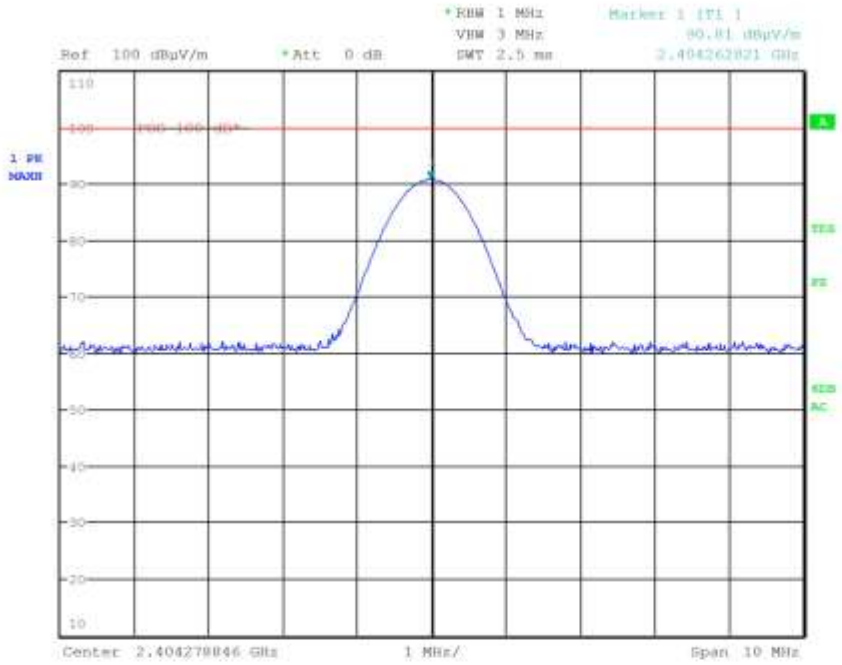
G10150616

Meas Type
Equipment under Test
Manufacturer
OP Condition Fmax
Operator Bertezzolo 10150616
Test Spec
Vert.



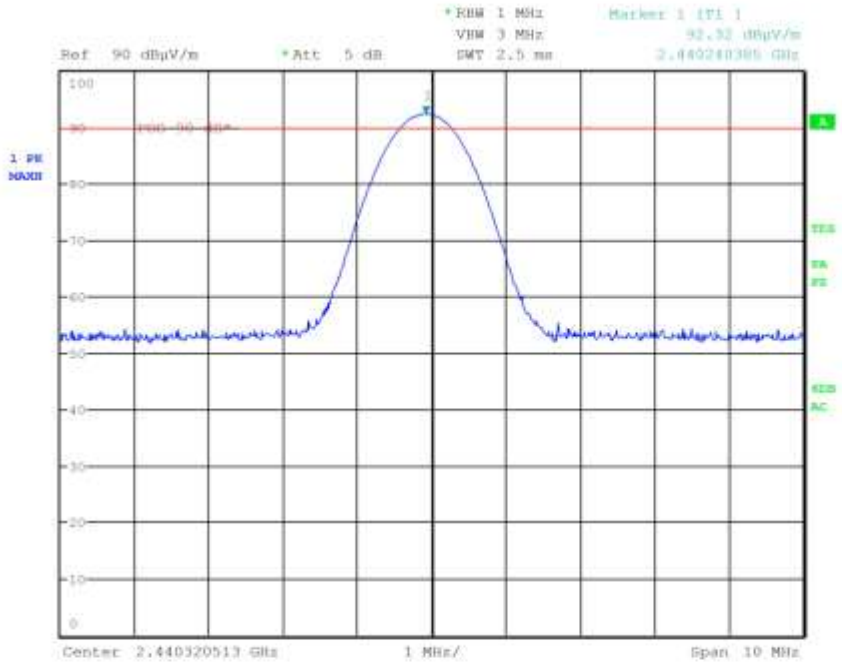
G10150617

Meas Type
Equipment under Test
Manufacturer
OP Condition Fmin
Operator Bertezzolo 10150617
Test Spec
Vert.

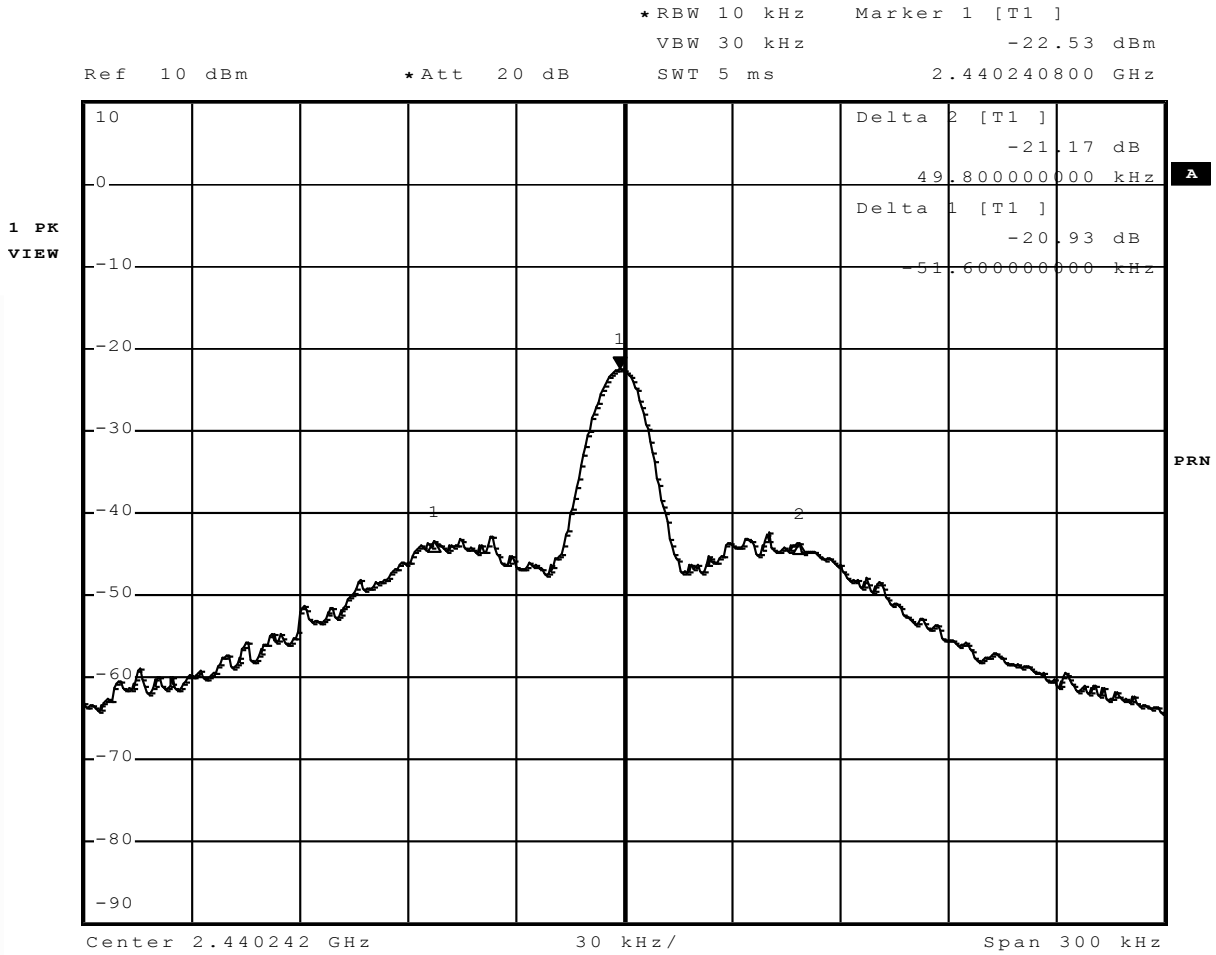


G10150618

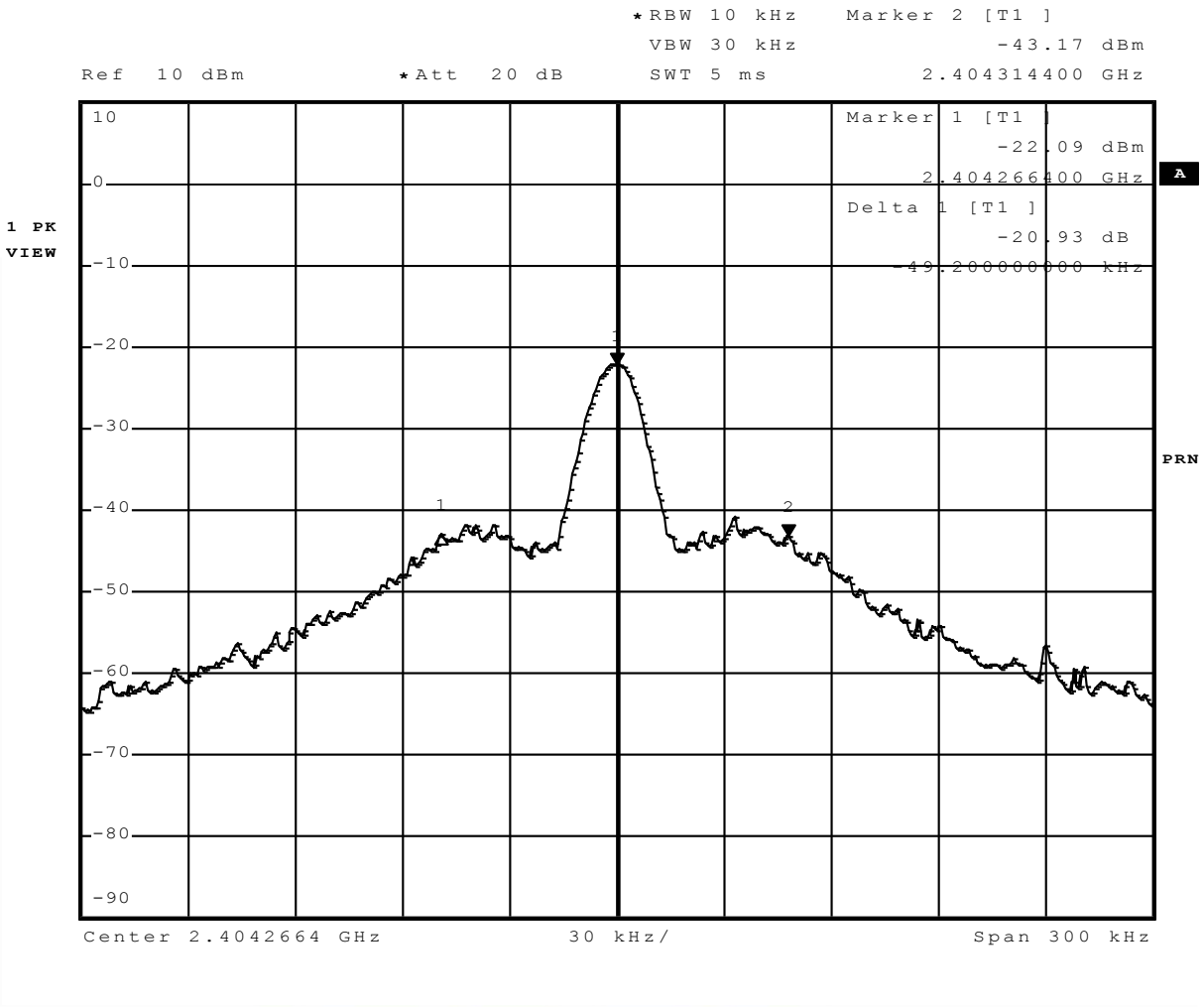
Meas Type
Equipment under Test
Manufacturer
OP Condition Fmed
Operator Bertezzolo 10150618
Test Spec
Vert



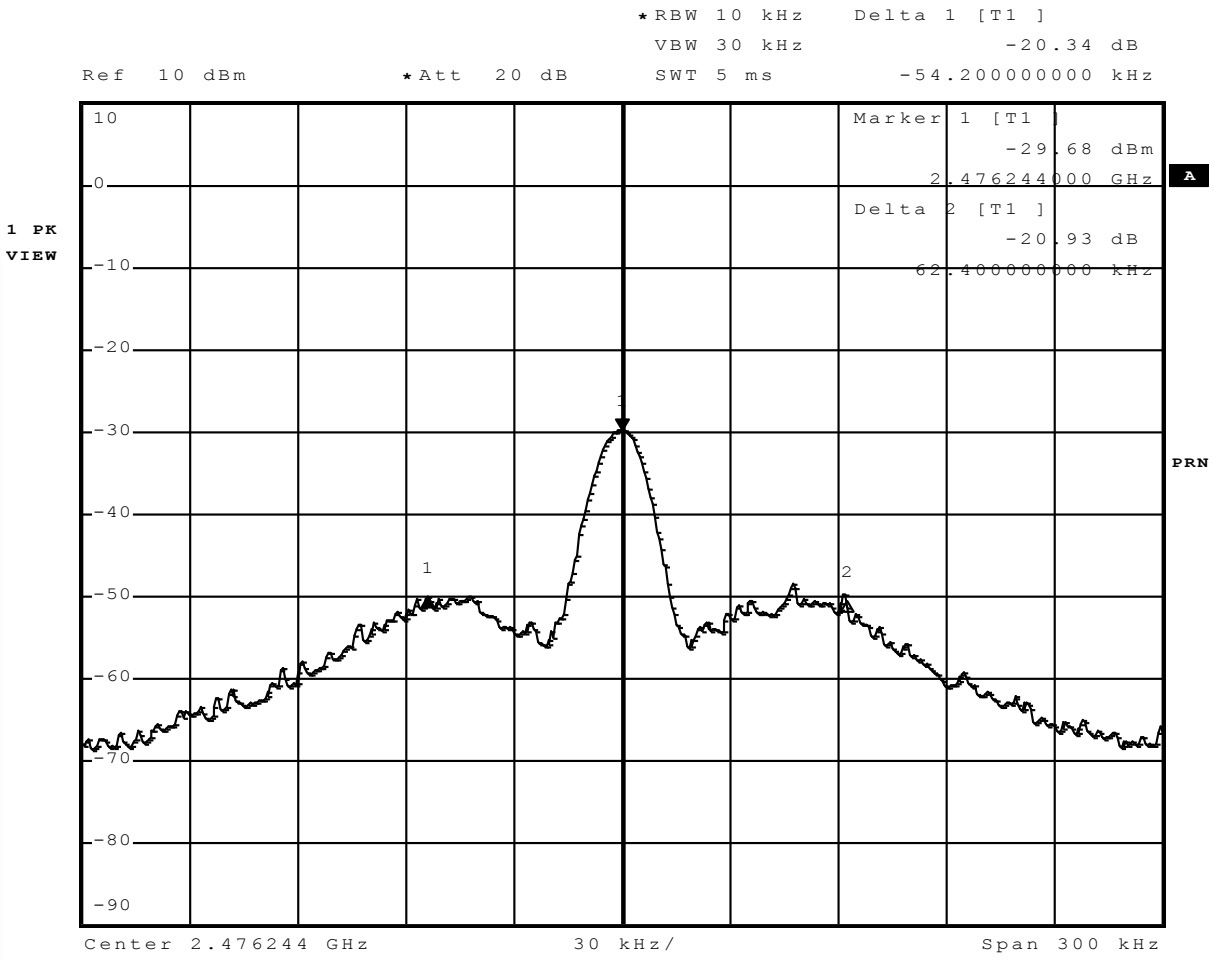
G10150680


*RBW 10 kHz
VBW 30 kHz
SWT 5 ms
Marker 1 [T1]
-22.53 dBm
2.440240800 GHz
Ref 10 dBm
*Att 20 dB
Delta 2 [T1]
-21.17 dB
49.800000000 kHz
Delta 1 [T1]
-20.93 dB
-51.600000000 kHz
1 PK
VIEW
A
PRN
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.440242 GHz
30 kHz/
Span 300 kHz

G10150681



G10150682



G10150683

Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	F MAX
Operator	Bertezzolo 10150683
Test Spec	

Vert