FCC Measurement/Technical Report on CAP L 7/80-85/17E/19 F-DC Cellular Repeater

FCC ID: XS5-CAPH7E817E19
IC: 2237E-EH7E817E19

Test Report Reference: MDE_BVNBG_1807_FCCa

Test Laboratory:
7layers GmbH
Borsigstrasse 11
40880 Ratingen
Germany

Deutsche Akkreditierungsstelle D-PL-12140-01-00

Note:
The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

Table of Contents

Applied Standards and Test Summary

1.1 APPLIED STANDARDS

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 and 20, 90, (10/1/18 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 90; Private Land Mobile Radio Services

Subpart S – Regulations Governing Licensing and Use of Frequencies in the 806-824, 851-869, 896-901 and 935-940 MHz Bands

§ 90.635 – Limitations on power and antenna height
§ 90.691 – Emission mask requirements for EA-based systems

Subpart I – General Technical Standards

§ 90.213 – Frequency Stability
§ 90.219 – Use of signal boosters

The tests were selected and performed with reference to:

- FCC Public Notice 935210 applying "Signal Boosters Basic Certification Requirements" 935210 D02 v04r02, 2019-04-15.
- FCC Public Notice 935210 applying "Measurement guidance for industrial and non-consumer signal booster, repeater and amplifier devices" 935210 D05 v01r03, 2019-04-15.
- FCC Public Notice 971168 applying "Measurement guidance for certification of licensed digital transmitters" 971168 D01 v03r01,2018-04-09
- ANSI C63.26: 2015

Summary Test Results:
The EUT complied with all performed tests as listed in chapter 1.3 Measurement Summary / Signatures.

1.2 FCC-ISED CORRELATION TABLE

Correlation of measurement requirements for Industrial Signal Booster from FCC and ISED Canada

Band 851 MHz – 861 MHz

Measurement	FCC reference	ISED reference
Effective radiated power, mean output power and zone enhancer gain	§2.1046 §90.219 (d)(3)(i) §90.635 (a) KDB 935210 D05 v01r03: 4.5	RSS-GEN Issue 5, 6.12 RSS-119 Issue 12, 5.4 SRSP-502, Issue 7, 6.3 RSS-131, Issue 3, 6.2
Peak to Average Ratio	-	-
Occupied bandwidth Input-versus-output spectrum	§2.1049 §90.219 (e)(4)(ii) KDB 935210 D05 v01r03: 4.4	RSS-GEN Issue 5, 6.7 -
Conducted spurious Emission at Antenna Terminal	§2.1051 §90.219 (e)(3)	RSS-GEN Issue 5, 6.13 RSS-119 Issue 12, 5.8 RSS-131, Issue 3, 6.5
Out-of-band emissions limits/Intermodulation	§2.1051 §90.219 (d)(6)(i) KDB 935210 D05 v01r03: 4.7	RSS-GEN Issue 5, 6.13 RSS-119 Issue 12, 5.8 RSS-131, Issue 3, 6.3
Frequency stability	§2.1055	RSS-GEN Issue 5, 6.11 RSS-119 Issue 12, 5.3
Field strength of spurious radiation	§2.1053 §90.219 (e)(3) KDB 935210 D05 v01r03: 4.9	RSS-GEN Issue 5, 6.13 RSS-119 Issue 12, 5.8 RSS-131, Issue 3, 6.5
Out-of-band rejection	KDB 935210 D05 v01r03: 4.3	-
Noise	§90.219	RSS-131, Issue 3, 6.4

1.3 MEASUREMENT SUMMARY / SIGNATURES

Band 14 (758 MHz – 768 MHz)

47 CFR CHAPTER I FCC PART 90 Subpart R/I [Base Stations/Repeater]	**§2.1046, §90.219 (d)(3)(i), §90.635 (a), KDB 935210 D02 II (p)(4)**

Effective Radiated Power, mean output power and zone enhancer gain
The measurement was performed according to ANSI C63.26, KDB 935210 D05 v01r03: 4.5 — **Final Result**

OP-Mode	**Setup**	**FCC**	**IC**
Frequency Band, Direction, Input Power, Signal Type			
Band 851 MHz – 861 MHz, RF downlink, 0.3 dB < AGC, CW	S01_AA01	Passed	Passed
Band 851 MHz – 861 MHz, RF downlink, 3 dB > AGC, CW	S01_AA01	Passed	Passed

47 CFR CHAPTER I FCC PART 90 Subpart S/I [Base Stations/Repeater]

Peak to Average Ratio
The measurement was performed according to ANSI C63.26 — **Final Result**

OP-Mode	**Setup**	**FCC**	**IC**
Frequency Band, Direction, Input Power, Signal Type			
Band 851 MHz – 861 MHz, RF downlink, 0.3 dB < AGC, 11K3F3E	S01_AA01	Performed	Performed
Band 851 MHz – 861 MHz, RF downlink, 0.3 dB < AGC, 8K10F1D	S01_AA01	Performed	Performed
Band 851 MHz – 861 MHz, RF downlink, 0.3 dB < AGC, 9K80D7W	S01_AA01	Performed	Performed
Band 851 MHz – 861 MHz, RF downlink, 3 dB > AGC, 11K3F3E	S01_AA01	Performed	Performed
Band 851 MHz – 861 MHz, RF downlink, 3 dB > AGC, 8K10F1D	S01_AA01	Performed	Performed
Band 851 MHz – 861 MHz, RF downlink, 3 dB > AGC, 9K80D7W	S01_AA01	Performed	Performed

47 CFR CHAPTER I FCC PART 90 Subpart S/I [Base Stations/Repeater]	**§2.1049, §90.219(e)(4)(ii), KDB 935210 D02 II (p)(3)**

Occupied Bandwidth / Input-versus-output Spectrum
The measurement was performed according to ANSI C63.26, KDB 935210 D05 v01r03: 4.4 — **Final Result**

OP-Mode	**Setup**	**FCC**	**IC**
Frequency Band, Direction, Input Power, Signal Type			
Band 851 MHz – 861 MHz, RF downlink, 0.3 dB < AGC, 11K3F3E	S01_AA01	Performed	Passed
Band 851 MHz – 861 MHz, RF downlink, 0.3 dB < AGC, 8K10F1D	S01_AA01	Performed	Passed
Band 851 MHz – 861 MHz, RF downlink, 0.3 dB < AGC, 9K80D7W	S01_AA01	Performed	Passed
Band 851 MHz – 861 MHz, RF downlink, 3 dB > AGC, 11K3F3E	S01_AA01	Performed	Passed
Band 851 MHz – 861 MHz, RF downlink, 3 dB > AGC, 8K10F1D	S01_AA01	Performed	Passed
Band 851 MHz – 861 MHz, RF downlink, 3 dB > AGC, 9K80D7W	S01_AA01	Performed	Passed

47 CFR CHAPTER I FCC PART 90 Subpart S/I [Base Stations/Repeater]	**§2.1051, §90.543(e)(1)(3), §90.543 (f)**

Conducted spurious emissions at antenna terminals
The measurement was performed according to ANSI C63.26 **Final Result**

OP-Mode	**Setup**	**FCC**	**IC**
Frequency Band, Test Frequency, Direction, Signal Type			
Band 851 MHz – 861 MHz, high, RF downlink, CW	S01_AA01	Passed	Passed
Band 851 MHz – 861 MHz, low, RF downlink, CW	S01_AA01	Passed	Passed
Band 851 MHz – 861 MHz, mid, RF downlink, CW	S01_AA01	Passed	Passed

47 CFR CHAPTER I FCC PART 90 Subpart S/I [Base Stations/Repeater]	**§2.1053, §90.213(e)(3), KDB 935210 D02 II (p)(3)**

Out-of-band emission limits/Intermodulation
The measurement was performed according to ANSI C63.26, KDB 935210 D05 v01r02: 3.6 **Final Result**

OP-Mode	**Setup**	**FCC**	**IC**
Frequency Band, Number of signals, Direction, Input Power, Signal Type			
Band 851 MHz – 861 MHz, 1, RF downlink, 0.3 dB < AGC, CW	S01_AA01	Passed	Passed
Band 851 MHz – 861 MHz, 2, RF downlink, 0.3 dB < AGC, CW 12.5 kHz	S01_AA01	Passed	Passed
Band 851 MHz – 861 MHz, 2, RF downlink, 0.3 dB < AGC, CW 25 kHz	S01_AA01	Passed	Passed
Band 851 MHz – 861 MHz, 2, RF downlink, 3 dB > AGC, CW 12.5 kHz	S01_AA01	Passed	Passed
Band 851 MHz – 861 MHz, 2, RF downlink, 3 dB > AGC, CW 25 kHz	S01_AA01	Passed	Passed

47 CFR CHAPTER I FCC PART 90 Subpart S/I [Base Stations/Repeater]	**KDB 935210 D02 II (p)(2)**

Out-of-band rejection
The measurement was performed according to ANSI C63.26 **Final Result**

OP-Mode	**Setup**	**FCC**	**IC**
Frequency Band, Direction			
Band 851 MHz – 861 MHz, RF downlink	S01_AA01	Passed	Passed

47 CFR CHAPTER I FCC PART 90 Subpart S/I [Base Stations/Repeater] **§90.213(d)(6)(ii)/(iii), (e)(3)**

Noise

The measurement was performed according to ANSI C63.26 **Final Result**

OP-Mode	**Setup**	**FCC**	**IC**
Frequency Band, Direction, Test Step			
Band 14, RF downlink, passband	S01_AA01	Passed	Passed
Band 14, RF downlink, out of passband	S01_AA01	Passed	Passed
Band 14, RF downlink, noise figure	S01_AA01	declared	declared

47 CFR CHAPTER I FCC PART 90 Subpart S/I [Base Stations/Repeater] **§2.1053, §90.543(e)(1)(3)**

Field strength of spurious radiation

The measurement was performed according to ANSI C63.26 **Final Result**

OP-Mode	**Setup**	**FCC**	**IC**
Frequency Band, Test Frequency, Direction			
Band 851 MHz – 861 MHz, low+mid+high, RF downlink	S01_AA01	Passed	Passed

N/A: Not applicable
N/P: Not performed

The test case frequency stability was not performed, since the EUT is not equipped with signal processing capabilities.

Report version control			
Version	**Release date**	**Change Description**	**Version validity**
initial	2019-07-16	--	valid
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(responsible for accreditation scope)
Dipl.-Ing. Marco Kullik

(responsible for testing and report)
Dipl.-Ing. Daniel Gall

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2 ADMINISTRATIVE DATA

2.1 TESTING LABORATORY

Company Name:	7layers GmbH
Address:	Borsigstr. 11 40880 Ratingen Germany

The test facility is accredited by the following accreditation organisation:

Laboratory accreditation no:	DAkkS D-PL-12140-01-00
FCC Designation Number:	DE0015
FCC Test Firm Registration:	929146
ISED CAB Identifier	DE0007; ISED#:3699A
Responsible for accreditation scope:	Dipl.-Ing. Marco Kullik
Report Template Version:	2019-03-11

2.2 PROJECT DATA

Responsible for testing and report:	Dipl.-Ing. Daniel Gall
Employees who performed the tests:	documented internally at 7Layers
Date of Report:	2019-07-16
Testing Period:	2019-06-04 to 2019-07-04

2.3 APPLICANT DATA

Company Name:	Commscope Andrew Wireless Systems GmbH
Address:	Industriering 10 86675 Buchdorf Germany
Contact Person:	Mr. Frank Futter

2.4 MANUFACTURER DATA

Company Name:	please see applicant data
Address:	
Contact Person:	

3 TEST OBJECT DATA

3.1 GENERAL EUT DESCRIPTION

Kind of Device product description	Cellular Repeater
Product name	Cellular Repeater
Type	CAP L 7/80-85/17E/19 F-DC
Declared EUT data by the supplier	
General Product Description	The EUT is an industrial signal booster supporting the following band: PSRS 800 (851 MHz – 861 MHz) A RF operation is only supported for the downlink.
Booster Type	Industrial Signal Booster
Voltage Type	AC
Voltage Level	100 – 240 V, 50 – 60 Hz
Maximum Output Donor Port [Uplink]	-
Maximum Output Server Port [Downlink]	Band 851 MHz – 861 MHz: 18.6 dBm
Maximum Gain [Uplink]	-
Maximum Gain [Downlink]	Band 851 MHz – 861 MHz: 17.3 dB

The main components of the EUT are listed and described in chapter 3.2 EUT Main components.

3.2 EUT MAIN COMPONENTS

Sample Name	**Sample Code**	**Description**
EUT A	DE1277011aa01	FCC sample
Sample Parameter	**Value**	
Serial Number	SZCBF18460068	
HW Version	CAP L 7/80-85/17E/19 (Id.7776596-0007)	
SW Version	2.6.0.112 (Id.7694174-12)	
Comment	-	

NOTE:The short description is used to simplify the identification of the EUT in this test report.

3.3 ANCILLARY EQUIPMENT

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Device	**Details (Manufacturer, Type Model, OUT Code)**	**Description**
-	-	-

3.4 AUXILIARY EQUIPMENT

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it.
But nevertheless Auxiliary Equipment can influence the test results.

Device	**Details (Manufacturer, HW, SW, S/N)**	**Description**
-	-	-

3.5 EUT SETUPS

This chapter describes the combination of EUTs and equipment used for testing. The rationale for selecting the EUTs, ancillary and auxiliary equipment and interconnecting cables, is to test a representative configuration meeting the requirements of the referenced standards.

Setup	**Combination of EUTs**	**Description and Rationale**
S01_AA01	EUT A	Setup for all tests

3.6 OPERATING MODES

This chapter describes the operating modes of the EUTs used for testing.

3.6.1 TEST CHANNELS

Band	Direction	Lower Frequency Band Edge [MHz]	Upper Frequency Band Edge [MHz]	Center Frequency [MHz]	Port
851 MHz to 861 MHz	downlink	851.0000	861.0000	856.0000	Donor

3.6.2 AUTOMATIC GAIN CONTROL LEVELS

AGC Levels							
Band	Direction	Emission Designator	AGC Start Pin [dBm]	AGC Start Pin -0.3 dB [dBm]	AGC Start Pin +3 dB [dBm]	Frequency [MHz]	Frequency
851 MHz to 861 MHz	downlink	CW	2.2	1.9	5.2	856.0000	f_m
851 MHz to 861 MHz	downlink	CW	2.0	1.7	5.0	851.0125	f_{low}
851 MHz to 861 MHz	downlink	CW	2.2	1.9	5.2	860.9875	f_{high}
851 MHz to 861 MHz	downlink	CW	1.6	1.3	4.6	860.8500	f_0
851 MHz to 861 MHz	downlink	CW	2.0	1.7	5.0	860.0000	$f_{customer}$

3.7 PRODUCT LABELLING

3.7.1 FCC ID LABEL

Please refer to the documentation of the applicant.

3.7.2 LOCATION OF THE LABEL ON THE EUT

Please refer to the documentation of the applicant.

4 TEST RESULTS

4.1 EFFECTIVE RADIATED POWER, MEAN OUTPUT POWER AND ZONE ENHANCER GAIN

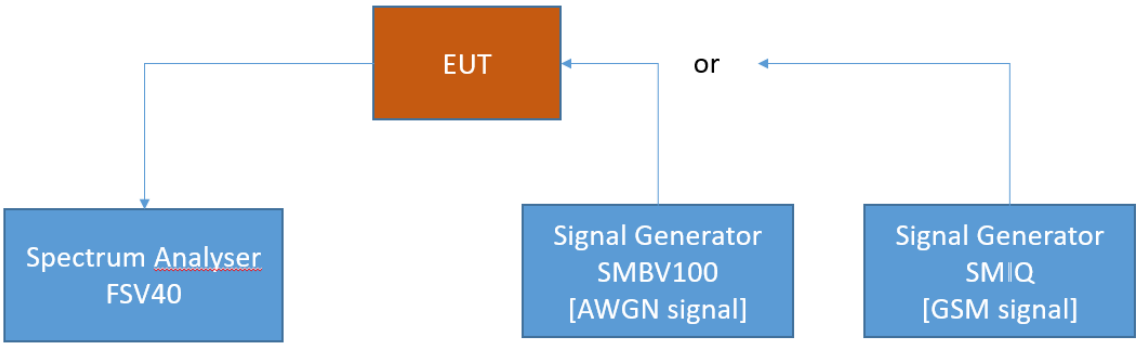
Standard FCC Part 90, §90.635, §90.219

The test was performed according to:
ANSI C63.26, KDB 935210 D05 v01r03: 4.5

4.1.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the signal booster power and gain limits and requirements for industrial signal boosters.

The EUT was connected to the test setup according to the following diagram:



FCC Part 22/24/27/90 Industrial signal booster – Test Setup; RF Output Power / Gain

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

4.1.2 TEST REQUIREMENTS / LIMITS

FCC Part 90

§90.219 (d)(3)(i)

The output power capability of a signal booster must be designed for deployments providing a radiated power not exceeding 5 Watts ERP for each retransmitted channel.

KDB 935210 D02

V. PART 90 SIGNAL BOOSTER SPECIFIC REQUIREMENTS

(j) Other provisions for part 90 boosters in specific bands and/or for specific conditions.

(1) Equipment authorizations to support both Section 90.219 and higher power operations. For devices that support output power higher than the 5 W ERP limit of Section 90.219, and are intended for marketing and subsequent US non-federal (FCC) station operations both within and outside the scope of the Section 90.219 authorization and deployment framework,8 for equipment authorization purposes the following provisions apply.

(i) For equipment to be certified as acceptable for Section 90.219(b) operations, B9A and B9B Form 731 applications must contain test data, install/operating instructions, etc., specifically for the Section 90.219(e) requirements, along with the usual Sections 2.911(c), 2.1033(c), 90.203, and associated contents requirements. In addition, the B9A or B9B application must contain test data, install/operating instructions, etc., for other intended and supported maximum output powers and maximum emissions end-use configurations.

(ii) Per the usual OET practice, the highest output powers for each emission mode are listed on Form 731 line entries. It is preferred, however not required, that the Section 90.219 associated emission modes (reflecting maximum 5 W ERP) are also separately listed on the Form 731 line entries. A grant comment should be applied that specific station authorizations are required for equipment operations exceeding Section 90.219 conditions.

§ 90.635

(a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested.

4.1.3 TEST PROTOCOL

Band 851 MHz – 861 MHz, downlink							
Emission Designator	**Input Power**	**Frequency [MHz]**	**Input Power [dBm]**	**Maximum Average Output Power [dBm]**	**Limit Average Output Power [dBm]**	**Margin to Limit [dB]**	**Gain [dB]**
CW at f_m	0.3 dB < AGC	856.0000	1.9	11.8	37	25.2	9.9
CW at f_m	3 dB > AGC	856.0000	5.2	11.7	37	25.3	6.5
CW at f_{low}	0.3 dB < AGC	851.0125	1.7	-20.7	37	56.3	-22.4
CW at f_{low}	3 dB > AGC	851.0125	5.0	-20.0	37	57.0	-25.0
CW at f_{high}	0.3 dB < AGC	860.9875	1.9	14.3	37	22.7	12.4
CW at f_{high}	3 dB > AGC	860.9875	5.2	14.0	37	23.0	8.8
CW at f_0	0.3 dB < AGC	860.8500	1.3	18.6	37	18.4	17.3
CW atf_0	3 dB > AGC	860.8500	4.6	18.5	37	18.5	13.9
CW at $f_{customer}$	0.3 dB < AGC	860.0000	1.7	18.2	37	18.8	16.5
CW at $f_{customer}$	3 dB > AGC	860.0000	5.0	17.3	37	19.7	12.3

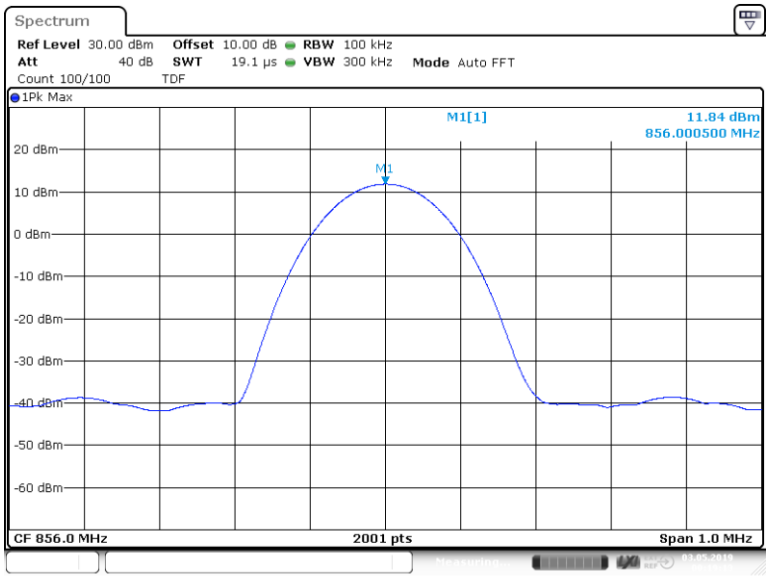
Glossary:

f_{low}: lowest usable frequency in the whole band
f_{high}: highest usable frequency in the band
f_m: frequency in the middle of the band
f_0: frequency with the EUT's highest gain
$f_{customer}$: specified frequency given by the customer

Remark: Please see next sub-clause for the measurement plot.

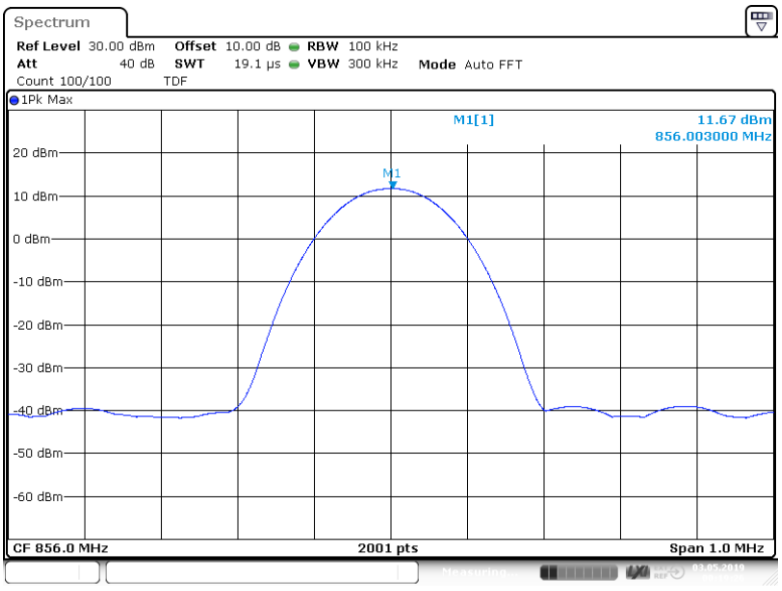
4.1.4 MEASUREMENT PLOT

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = CW at f_m



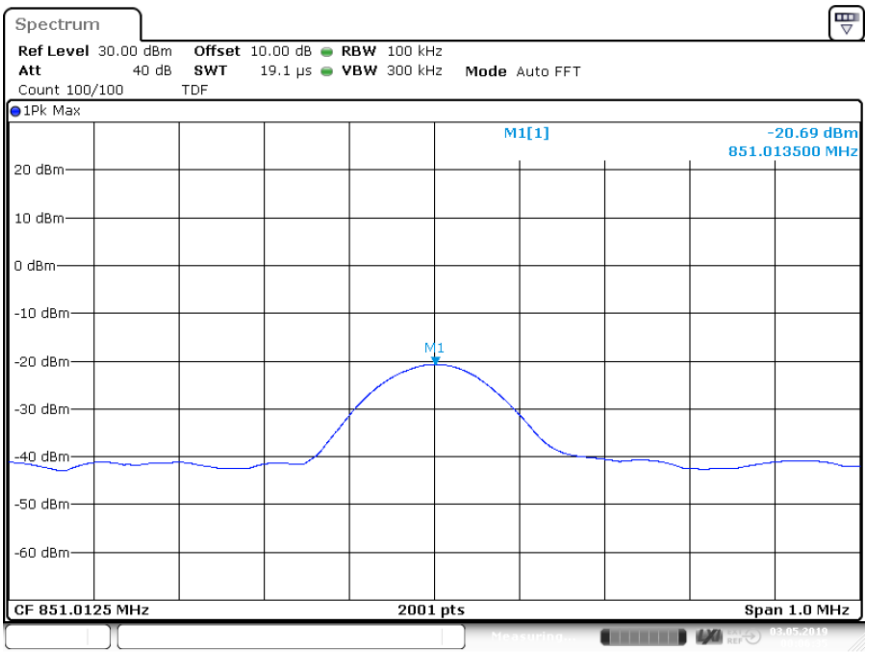
PowerCW-0.3; 856.0000000M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 3 dB > AGC, Emission Designator = CW at f_m



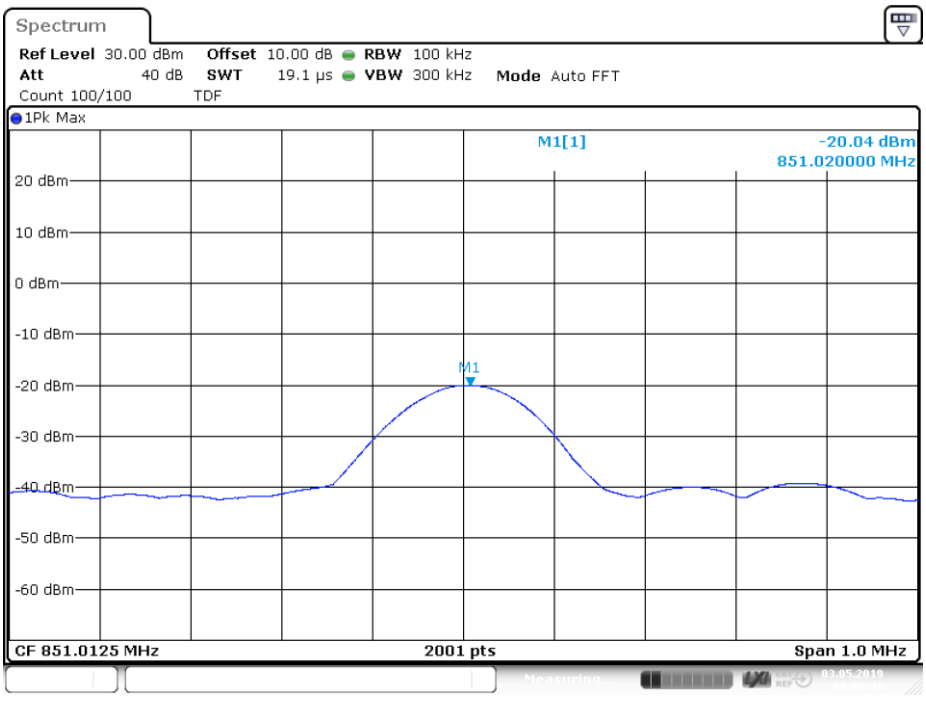
PowerCW+3; 856.0000000M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = CW at f_{low}



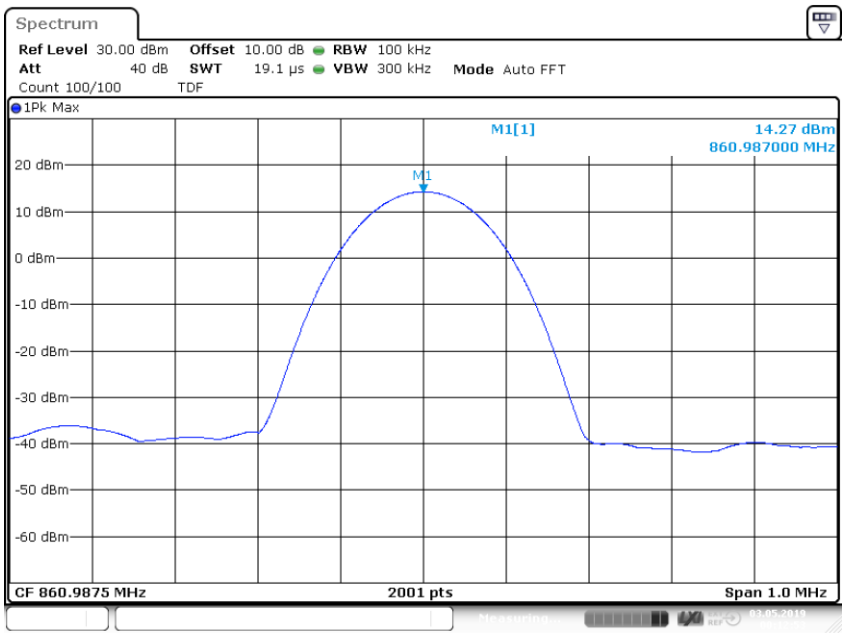
PowerCW-0.3; 851.0125000M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 3 dB > AGC, Emission Designator = CW at f_{low}



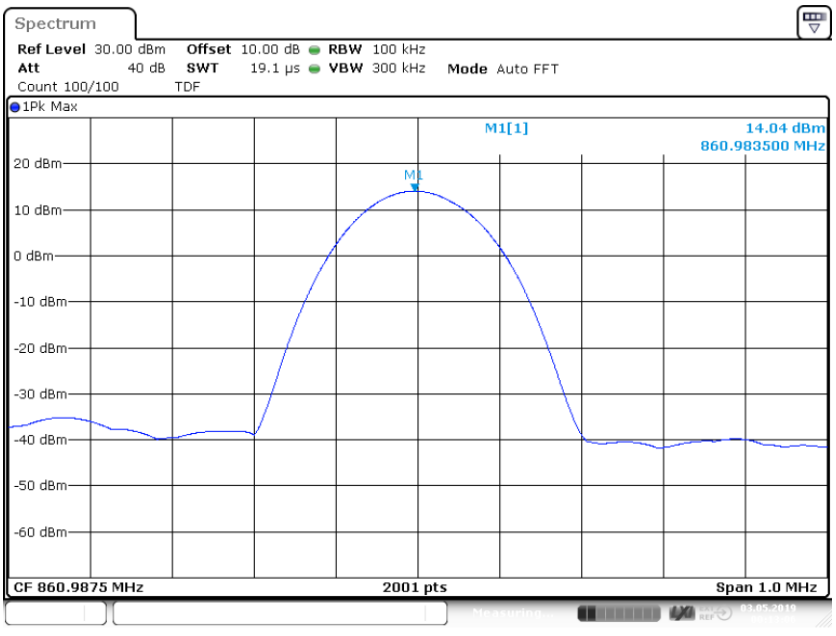
PowerCW+3; 851.0125000M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = CW at f_{high}



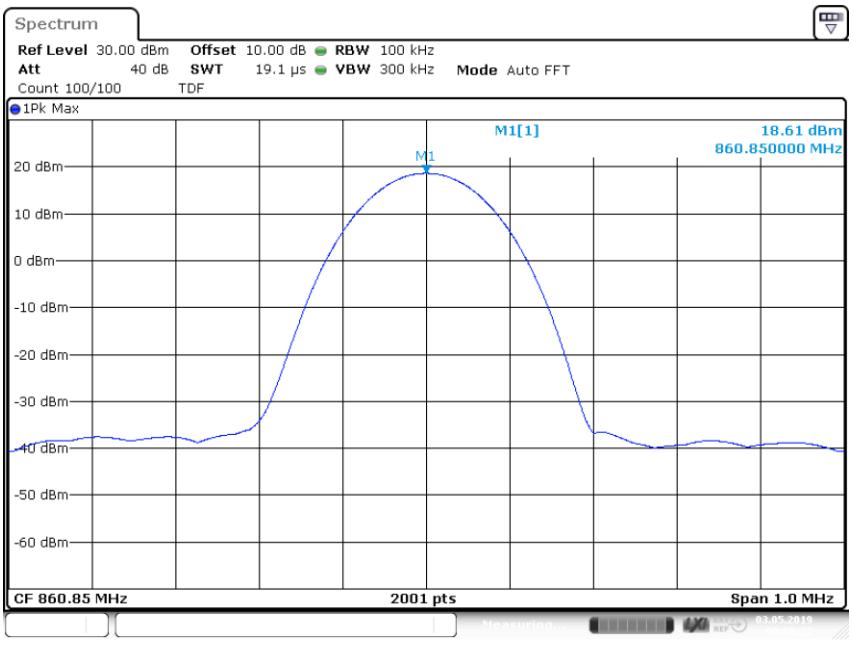
PowerCW-0.3; 860.9875000M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 3 dB > AGC, Emission Designator = CW at f_{high}



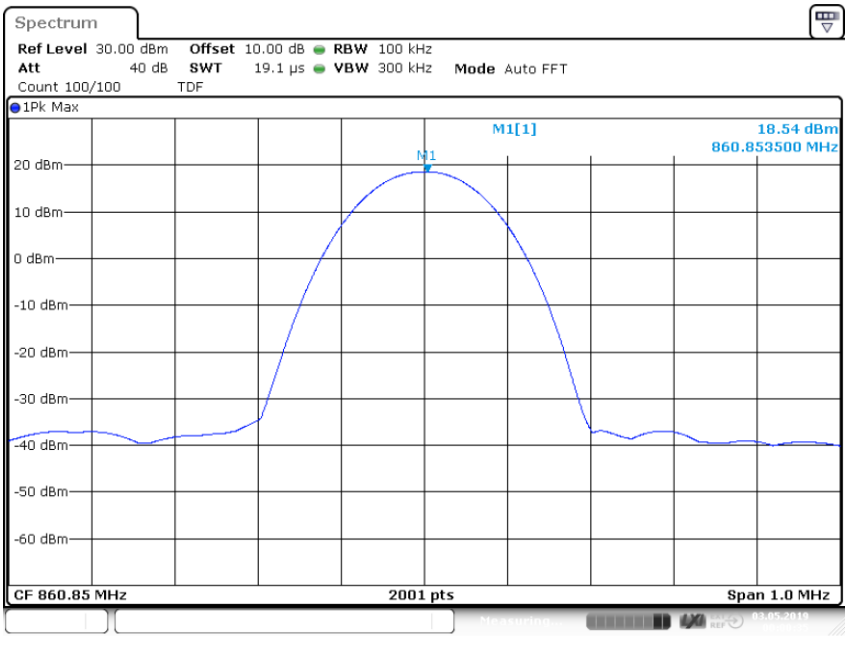
PowerCW+3; 860.9875000M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = CW at f_0



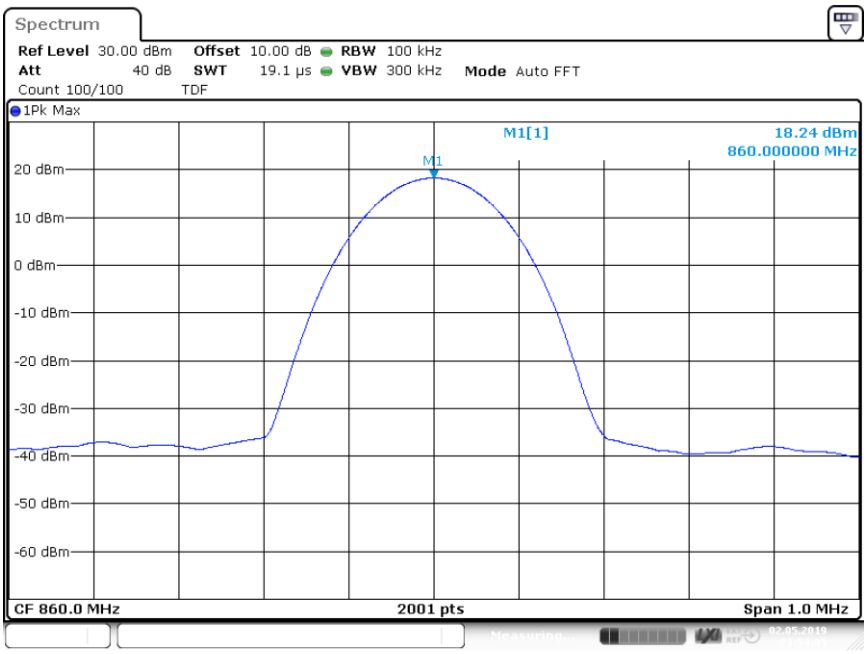
PowerCW-0.3; 860.8500000M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 3 dB > AGC, Emission Designator = CW at f_0



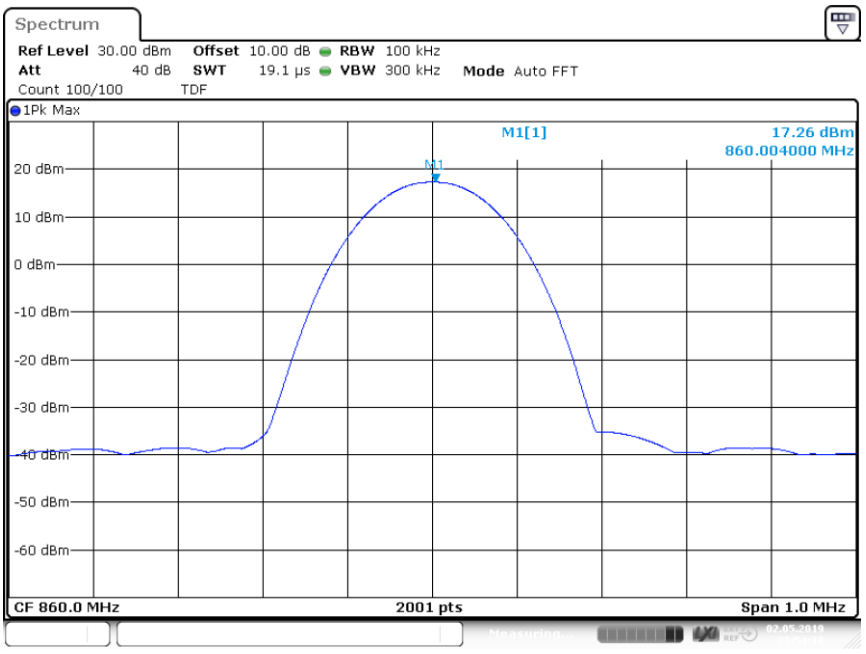
PowerCW+3; 860.8500000M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = CW at $f_{customer}$



PowerCW-0.3; 860.0000000M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 3 dB > AGC, Emission Designator = CW at $f_{customer}$



PowerCW+3; 860.0000000M

4.2 PEAK TO AVERAGE RATIO

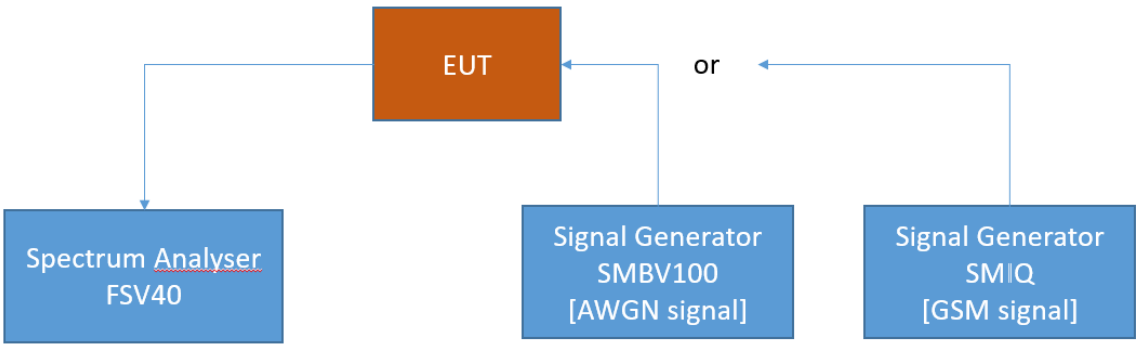
Standard -

The test was performed according to:
ANSI C63.26

4.2.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the signal booster power and gain limits and requirements for industrial signal boosters.

The EUT was connected to the test setup according to the following diagram:



FCC Part 22/24/27/90 Industrial signal booster – Test Setup; RF Output Power / Gain

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

4.2.2 TEST REQUIREMENTS / LIMITS

There is no requirement for the Peak-to-Average value in the applicable rule parts.

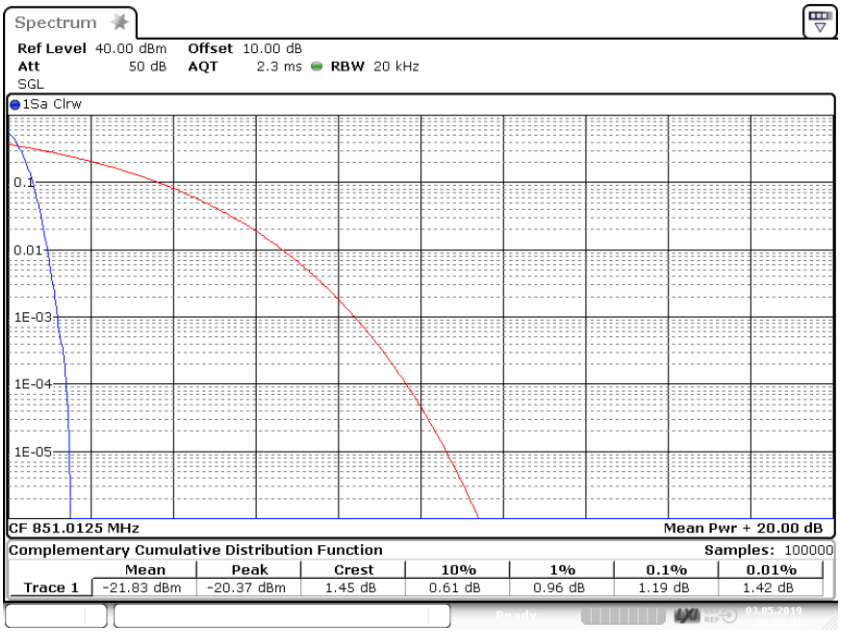
4.2.3 TEST PROTOCOL

Band 851 MHz – 861 MHz, downlink						
Emission Designator	**Input Power**	**Frequency [MHz]**	**Input Power [dBm]**	**PAPR [dB]**	**Limit PAPR [dB] *)**	**Margin to Limit [dB]**
11K3F3E at f_{low}	0.3 dB < AGC	851.0125	1.7	1.2	13.0	11.8
11K3F3E at f_{low}	3 dB > AGC	851.0125	5.0	1.2	13.0	11.8
11K3F3E at f_{high}	0.3 dB < AGC	860.9875	1.9	0.4	13.0	12.6
11K3F3E at f_{high}	3 dB > AGC	860.9875	5.2	0.4	13.0	12.6
8K10F1D at f_{low}	0.3 dB < AGC	851.0125	1.7	1.0	13.0	12.0
8K10F1D at f_{low}	3 dB > AGC	851.0125	5.0	1.0	13.0	12.0
8K10F1D at f_{high}	0.3 dB < AGC	860.9875	1.9	0.3	13.0	12.7
8K10F1D at f_{high}	3 dB > AGC	860.9875	5.2	0.3	13.0	12.7
9K80D7W at f_{low}	0.3 dB < AGC	851.0125	1.7	2.8	13.0	10.2
9K80D7W at f_{low}	3 dB > AGC	851.0125	5.0	2.7	13.0	10.3
9K80D7W at f_{high}	0.3 dB < AGC	860.9875	1.9	2.4	13.0	10.6
9K80D7W at f_{high}	3 dB > AGC	860.9875	5.2	2.4	13.0	10.6

Remark: *) Limit only for comparison purposes, no Part 90 requirement
Please see next sub-clause for the measurement plot.

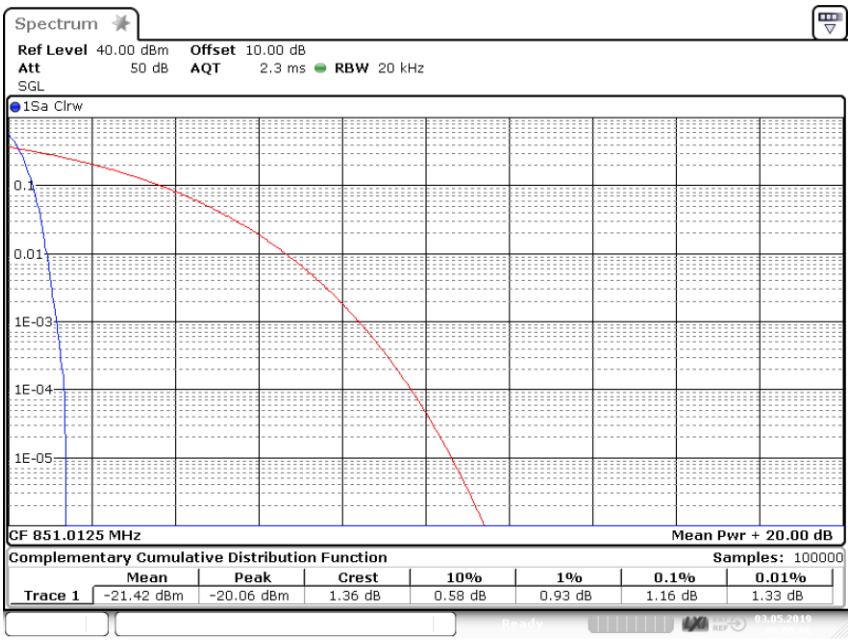
4.2.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 0.3 dB < AGC, Emission Designator = 11K3F3E at f_{low}



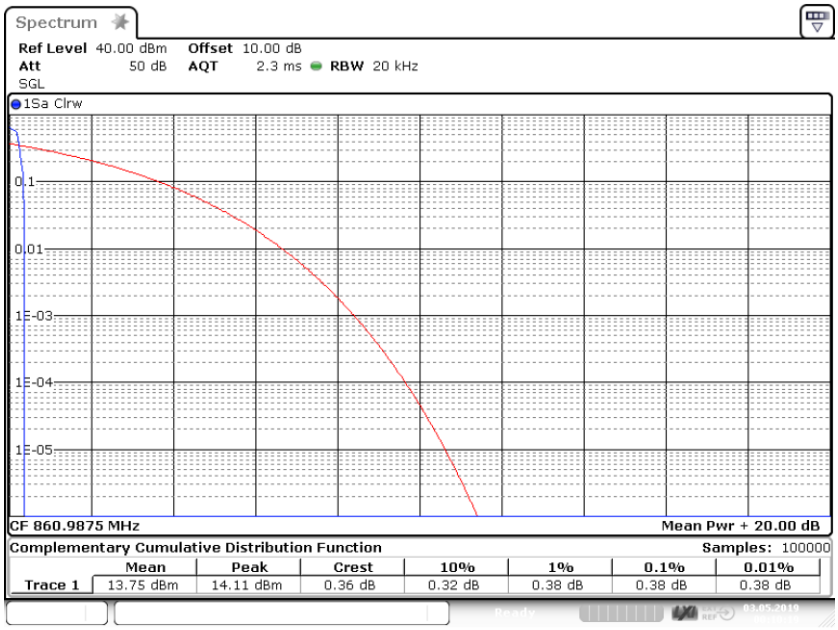
PAPR 11K3F3E-0.3;851.012500M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 11K3F3E at f_{low}



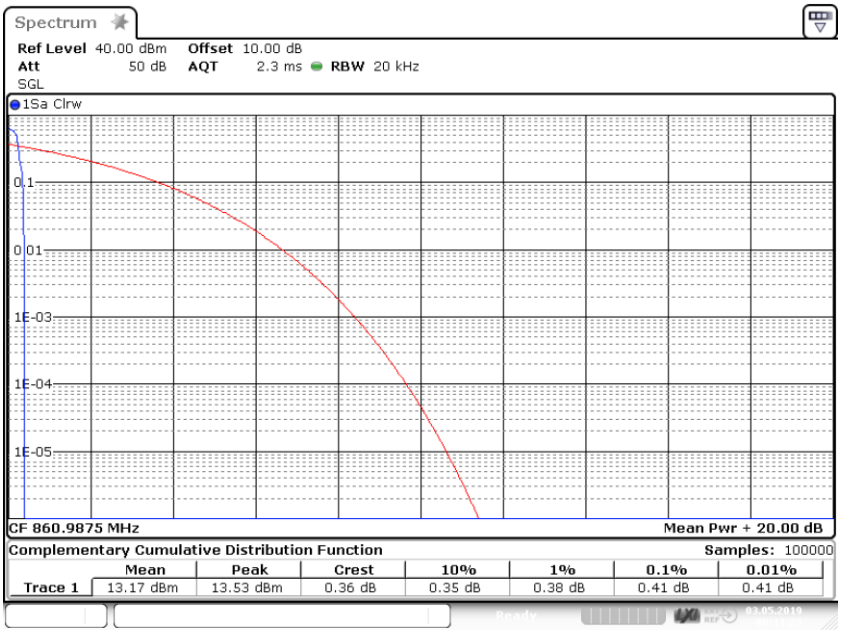
PAPR 11K3F3E+3;851.012500M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 0.3 dB < AGC, Emission Designator = 11K3F3E at f_{high}



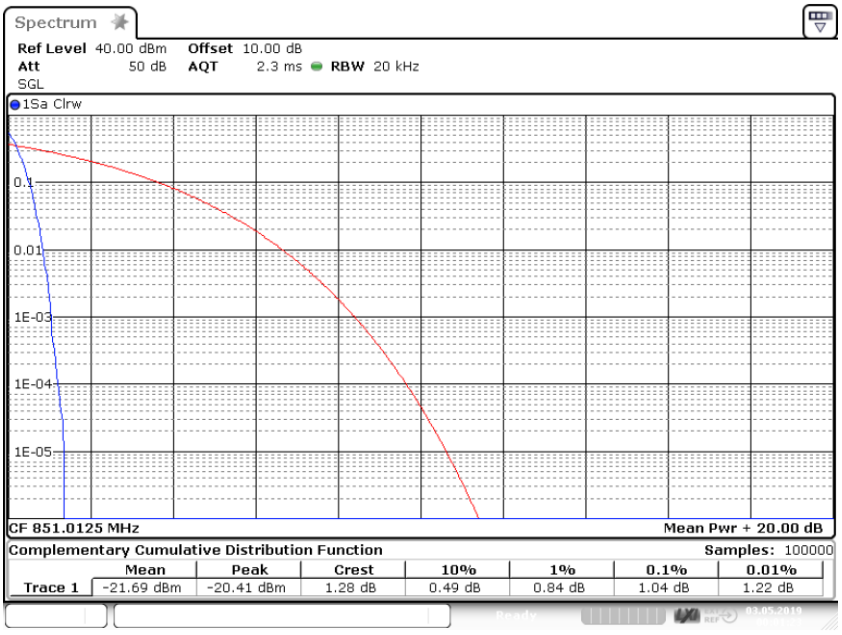
PAPR 11K3F3E-0.3;860.987500M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 11K3F3E at f_{high}



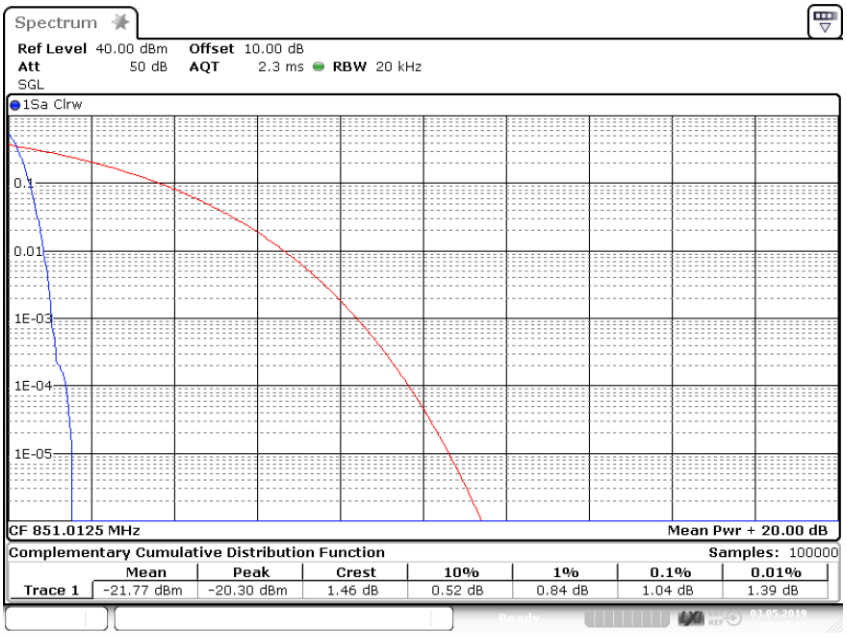
PAPR 11K3F3E+3;860.987500M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 0.3 dB < AGC, Emission Designator = 8K10F1D at f_{low}



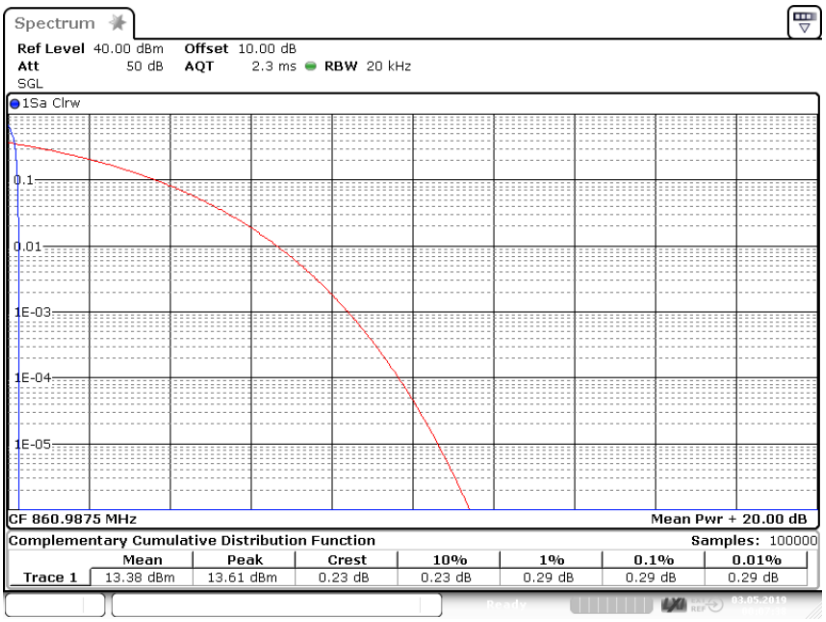
PAPR 8K10F1D-0.3;851.012500M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 8K10F1D at f_{low}



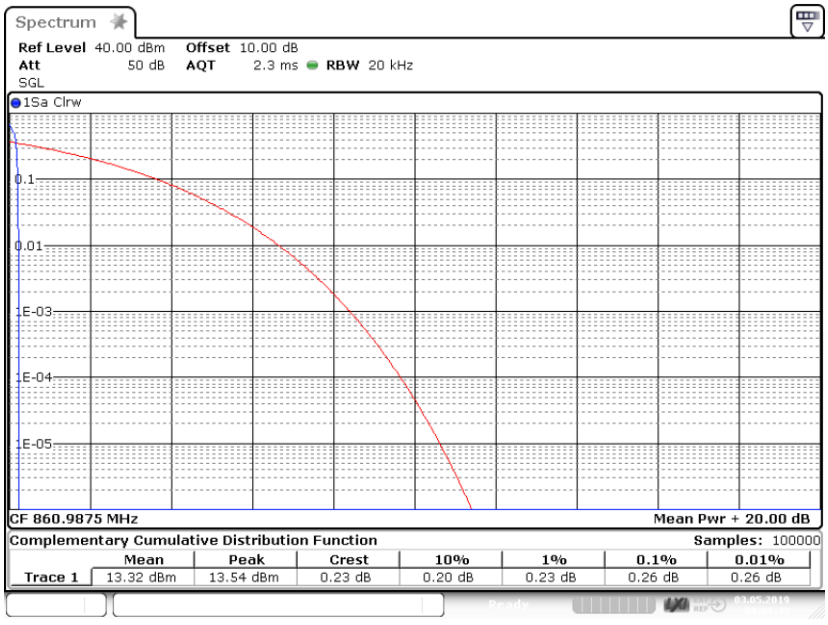
PAPR 8K10F1D+3;851.012500M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 0.3 dB < AGC, Emission Designator = 8K10F1D at f_{high}



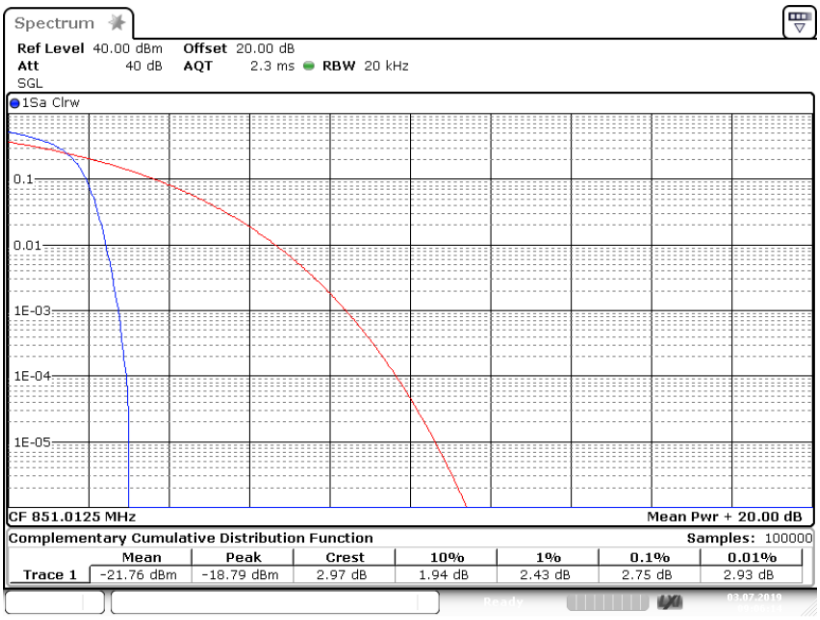
PAPR 8K10F1D-0.3;860.987500M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 8K10F1D at f_{high}



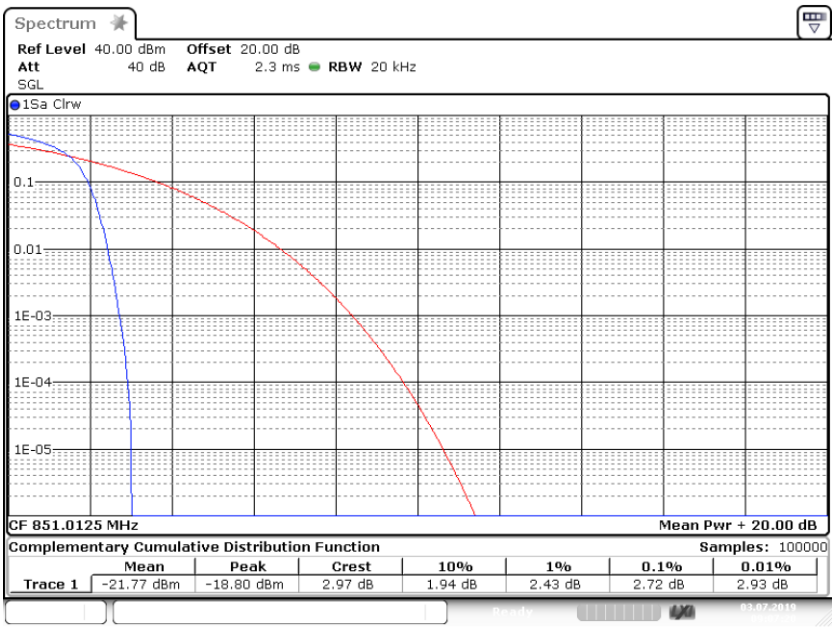
PAPR 8K10F1D+3;860.987500M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 0.3 dB < AGC, Emission Designator = 9K80D7W at f_{low}



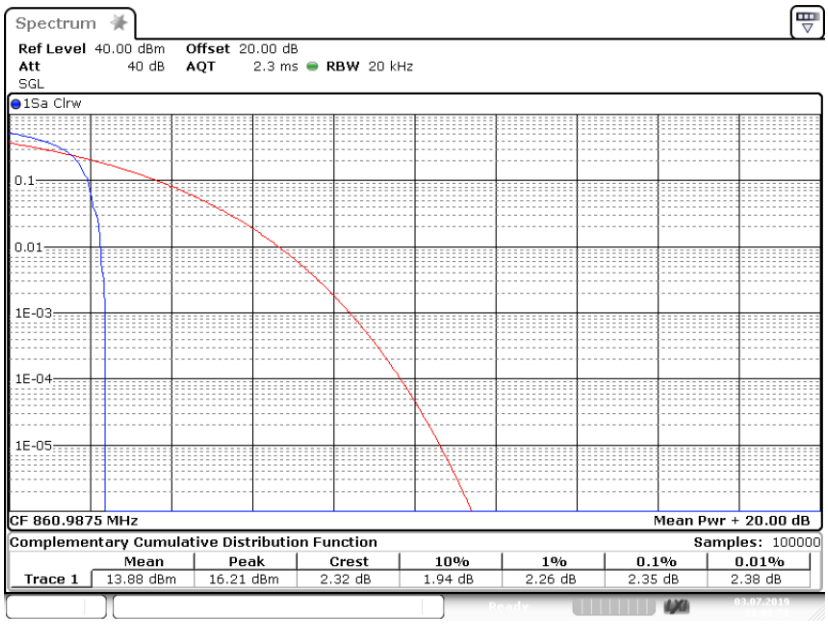
PAPR 9K80D7W-0.3;851.012500M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 9K80D7W at f_{low}



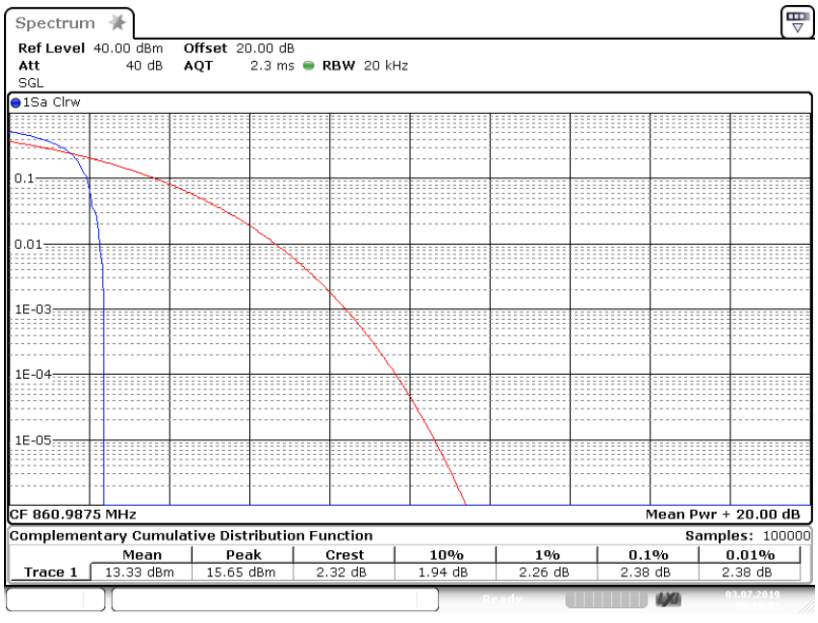
PAPR 9K80D7W+3;851.012500M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 0.3 dB < AGC, Emission Designator = 9K80D7W at f_{high}



PAPR 9K80D7W-0.3;860.987500M

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 9K80D7W at f_{high}



PAPR 9K80D7W+3;860.987500M

4.2.5 TEST EQUIPMENT USED

- FCC Conducted Base Station / Repeater

4.3 OCCUPIED BANDWIDTH / INPUT-VERSUS-OUTPUT SPECTRUM

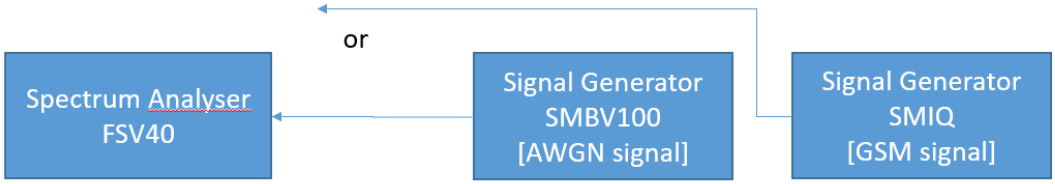
Standard FCC Part 2.1049; FCC Part 90; §90.219

The test was performed according to:
ANSI C63.26, KDB 935210 D05 v01r03: 4.4

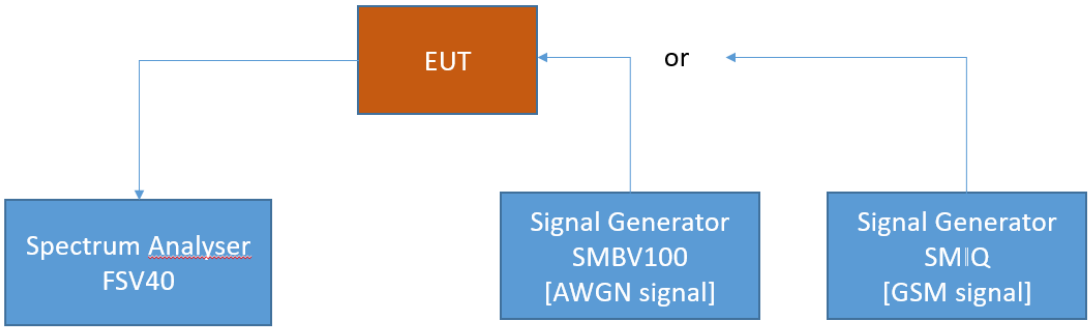
4.3.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission limits per FCC §2.1049, RSS-GEN 6.4 and RSS-131-5.2.2

The EUT was connected to the test setups according to the following diagram:



FCC Part 22/24/27/90; Industrial Signal Booster
Test Setup step 1: Measuring characteristics of test signals



FCC Part 22/24/27/90; Industrial Signal Booster
Test Setup step 2; Occupied Bandwidth/Input-versus-output spectrum

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

4.3.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1049; Occupied Bandwidth:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

(h) Transmitters employing digital modulation techniques—when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

(i) Transmitters designed for other types of modulation—when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used. A description of the input signal should be supplied.

Band 851 MHz – 861 MHz

FCC Part 90; §90.219(e)(4)(ii)

There is no change in the occupied bandwidth of the signal.

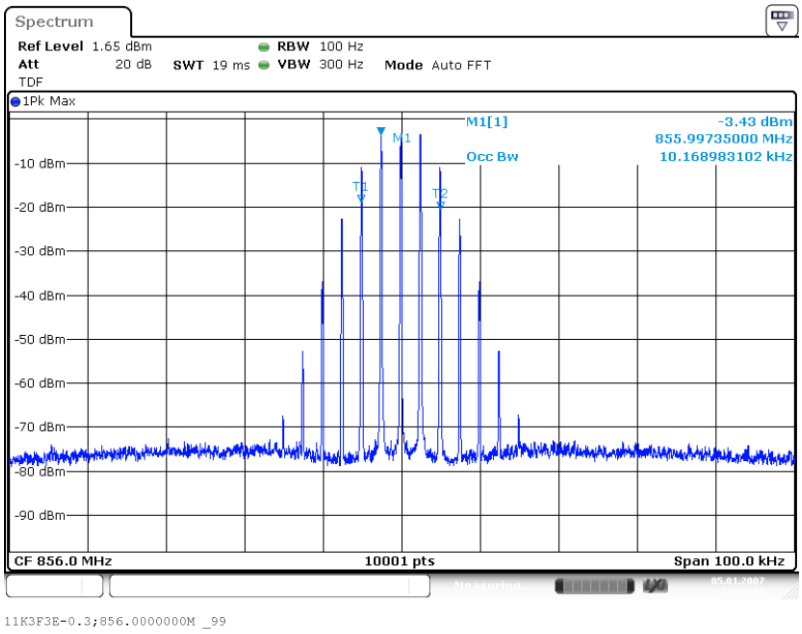
4.3.3 TEST PROTOCOL

Band 851 MHz – 861 MHz, downlink							
Signal Type	**Input Power**	**Signal Frequency [MHz]**	**Occupied Bandwidth SG [kHz]**	**Occupied Bandwidth Booster [kHz]**	**Delta Occupied Bandwidth [kHz]**	**Limit Delta Occupied Bandwidth [kHz]**	**Margin to Limit [kHz]**
11K3F3E at f_m	0.3 dB < AGC	856.0000	10.169	10.200	0.031	0.565	0.534
11K3F3E at f_m	3 dB > AGC	856.0000	10.169	10.200	0.031	0.565	0.534
11K3F3E at f_{low}	0.3 dB < AGC	851.0125	10.169	10.109	0.060	0.565	0.505
11K3F3E at f_{low}	3 dB > AGC	851.0125	10.169	10.109	0.060	0.565	0.505
11K3F3E at f_{high}	0.3 dB < AGC	860.9875	10.169	10.109	0.060	0.565	0.505
11K3F3E at f_{high}	3 dB > AGC	860.9875	10.169	10.109	0.060	0.565	0.505
11K3F3E at f_0	0.3 dB < AGC	860.8500	10.169	10.199	0.030	0.565	0.535
11K3F3E at f_0	3 dB > AGC	860.8500	10.169	10.199	0.030	0.565	0.535
11K3F3E at $f_{customer}$	0.3 dB < AGC	860.0000	10.169	10.199	0.030	0.565	0.535
11K3F3E at $f_{customer}$	3 dB > AGC	860.0000	10.169	10.199	0.030	0.565	0.535
8K10F1D at f_m	0.3 dB < AGC	856.0000	8.049	8.109	0.060	0.405	0.345
8K10F1D at f_m	3 dB > AGC	856.0000	8.049	8.109	0.060	0.405	0.345
8K10F1D at f_{low}	0.3 dB < AGC	851.0125	8.049	8.079	0.030	0.405	0.375
8K10F1D at f_{low}	3 dB > AGC	851.0125	8.049	8.079	0.030	0.405	0.375
8K10F1D at f_{high}	0.3 dB < AGC	860.9875	8.049	8.109	0.060	0.405	0.345
8K10F1D at f_{high}	3 dB > AGC	860.9875	8.049	8.099	0.050	0.405	0.355
8K10F1D at f_0	0.3 dB < AGC	860.8500	8.049	8.109	0.060	0.405	0.345
8K10F1D at f_0	3 dB > AGC	860.8500	8.049	8.119	0.070	0.405	0.335
8K10F1D at $f_{customer}$	0.3 dB < AGC	860.0000	8.049	8.109	0.060	0.405	0.345
8K10F1D at $f_{customer}$	3 dB > AGC	860.0000	8.049	8.109	0.060	0.405	0.345
9K80D7W at f_m	0.3 dB < AGC	856.0000	9.799	9.829	0.030	0.490	0.460
9K80D7W at f_m	3 dB > AGC	856.0000	9.809	9.829	0.020	0.490	0.470
9K80D7W at f_{low}	0.3 dB < AGC	851.0125	9.789	9.819	0.030	0.490	0.460
9K80D7W at f_{low}	3 dB > AGC	851.0125	9.809	9.809	0.000	0.490	0.490
9K80D7W at f_{high}	0.3 dB < AGC	860.9875	9.799	9.849	0.050	0.490	0.440
9K80D7W at f_{high}	3 dB > AGC	860.9875	9.809	9.849	0.040	0.490	0.450
9K80D7W at f_0	0.3 dB < AGC	860.8500	9.799	9.819	0.020	0.490	0.470
9K80D7W at f_0	3 dB > AGC	860.8500	9.789	9.839	0.050	0.490	0.440
9K80D7W at $f_{customer}$	0.3 dB < AGC	860.0000	9.809	9.829	0.020	0.490	0.470
9K80D7W at $f_{customer}$	3 dB > AGC	860.0000	9.789	9.839	0.050	0.490	0.440

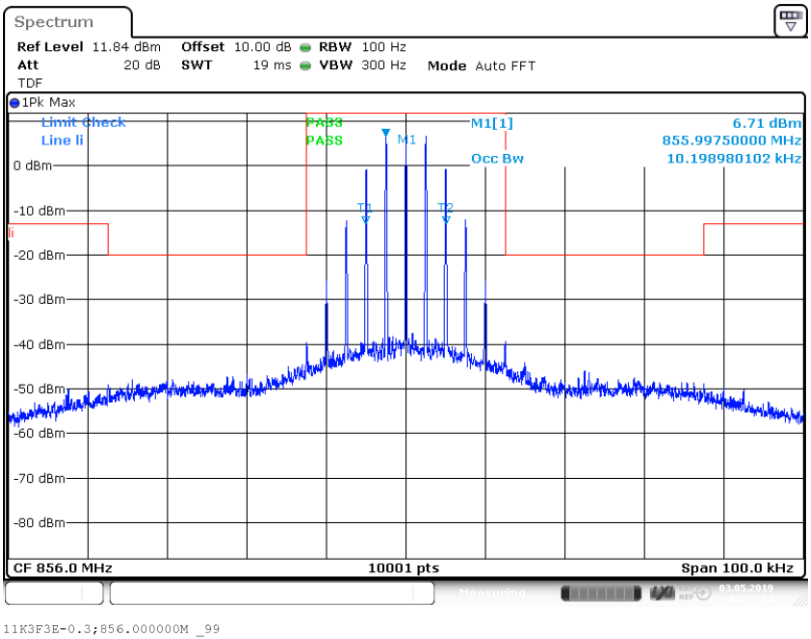
Remark: Please see next sub-clause for the measurement plot.

4.3.4 MEASUREMENT PLOT

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = 11K3F3E at f_m

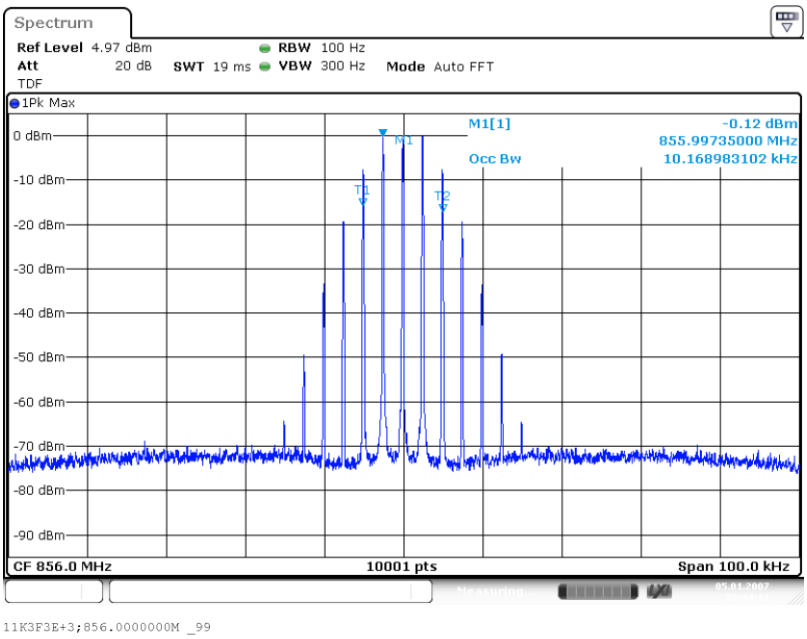


Input Signal

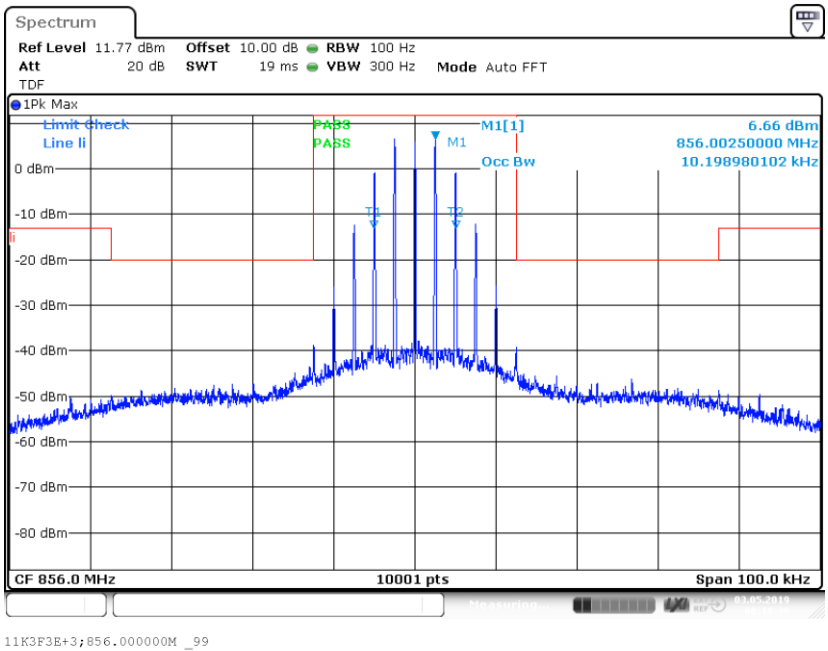


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 11K3F3E at f_m

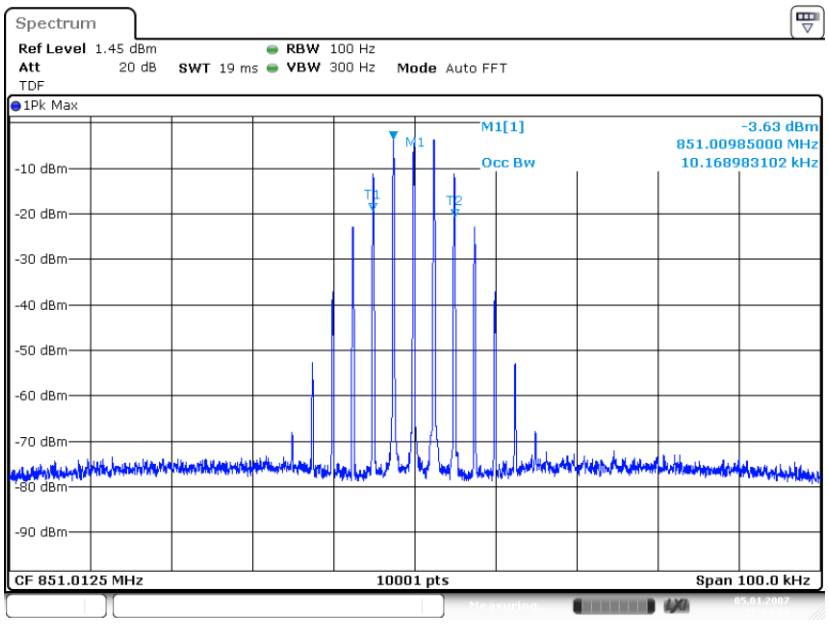


Input Signal

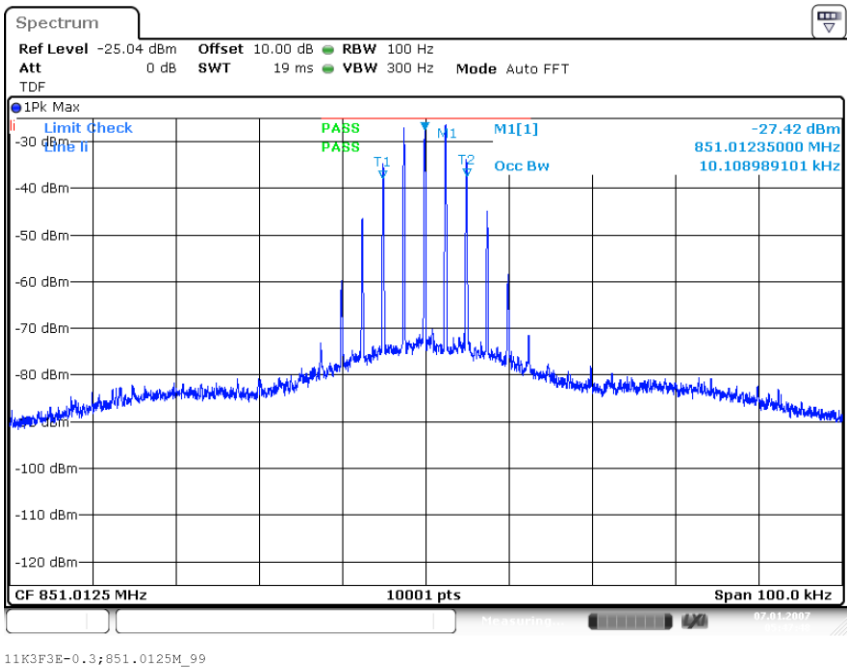


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = 11K3F3E at f_{low}

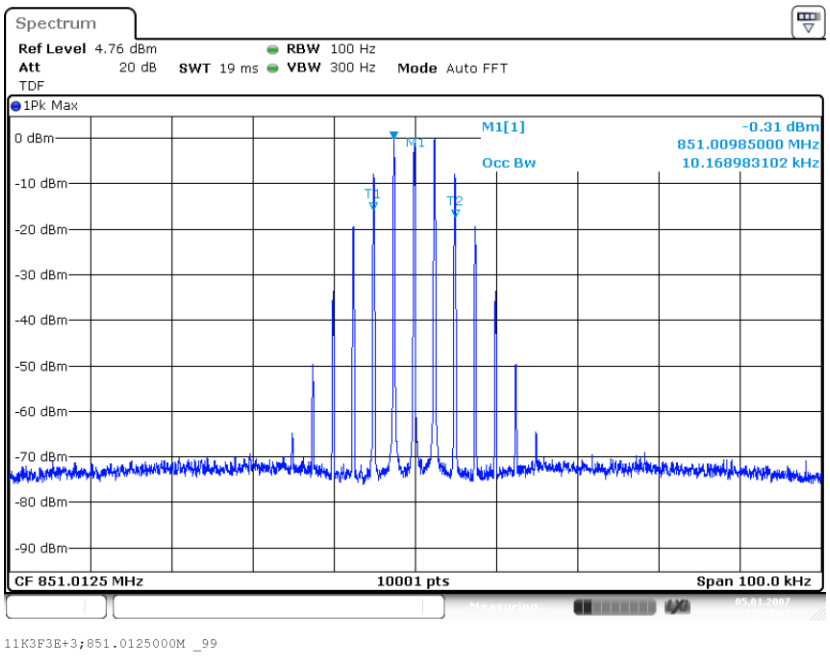


Input Signal

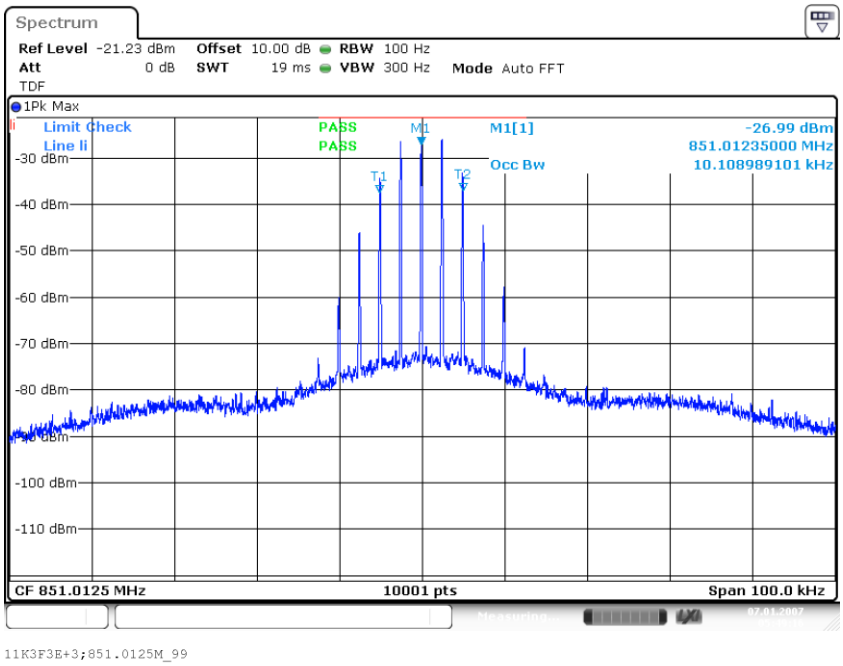


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 11K3F3E at f_{low}

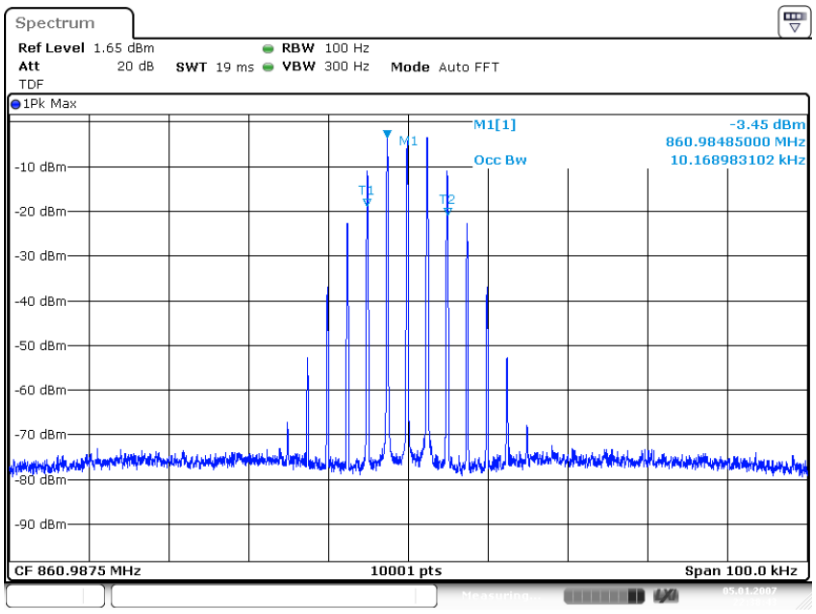


Input Signal

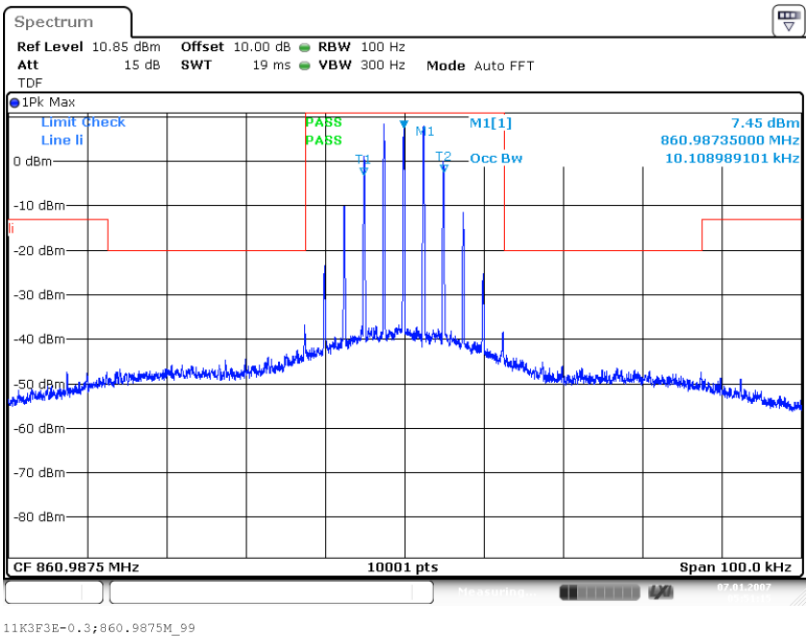


Output Signal

Output SignalFrequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = 11K3F3E at f_{high}

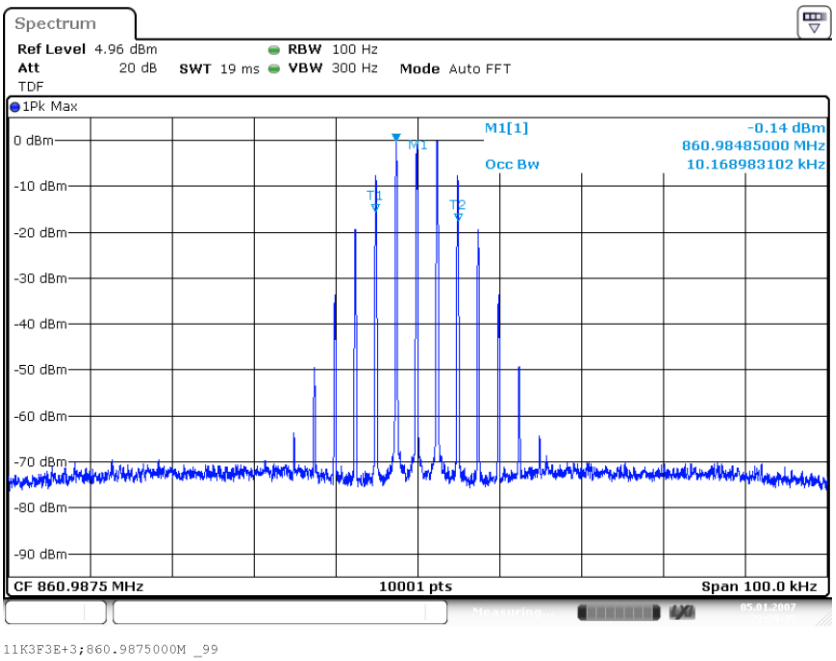


Input Signal

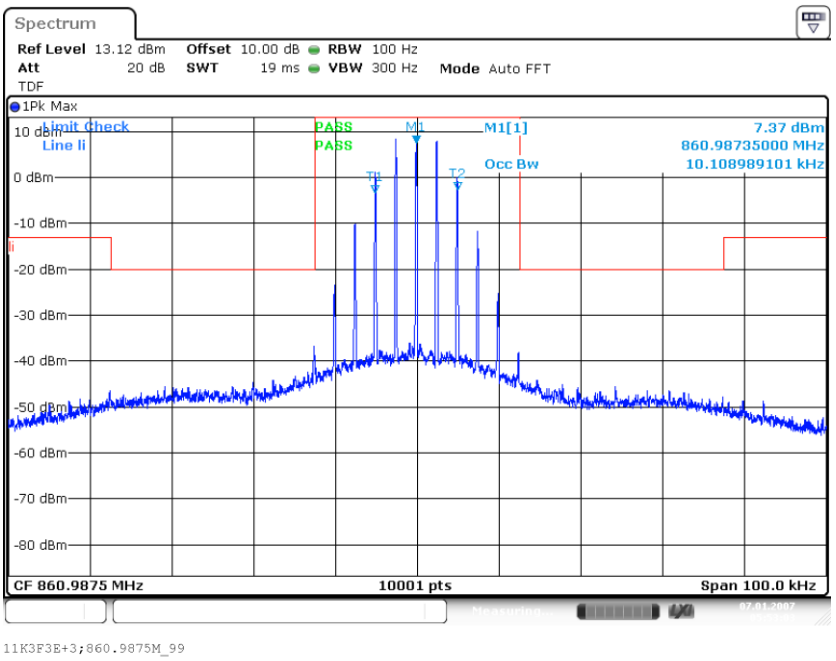


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 11K3F3E at f_{high}

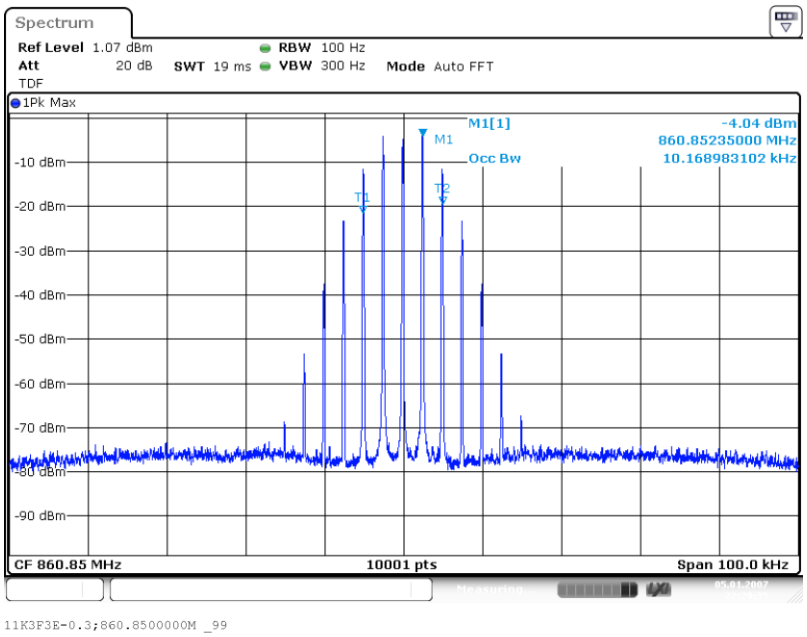


Input Signal

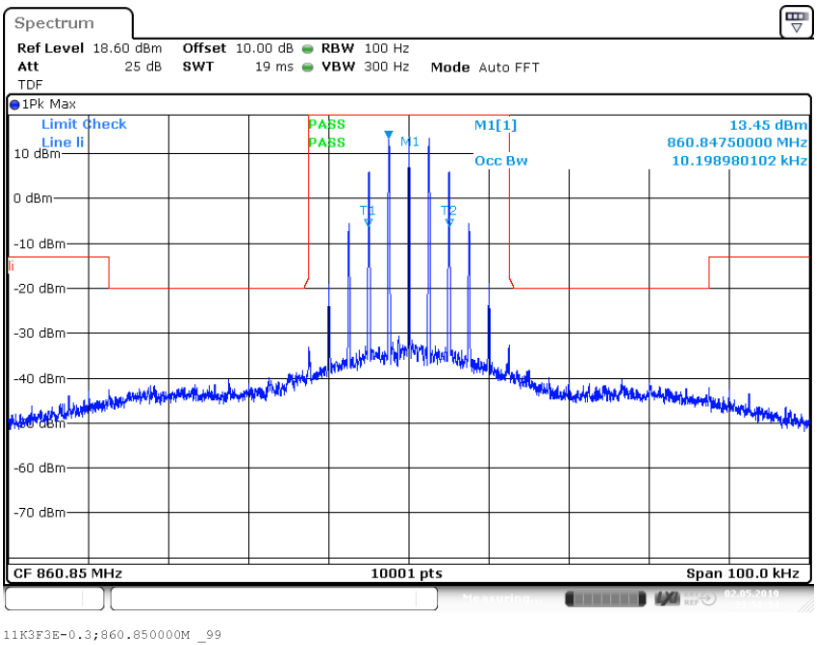


Output Signal

Output SignalFrequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = 11K3F3E at f_0

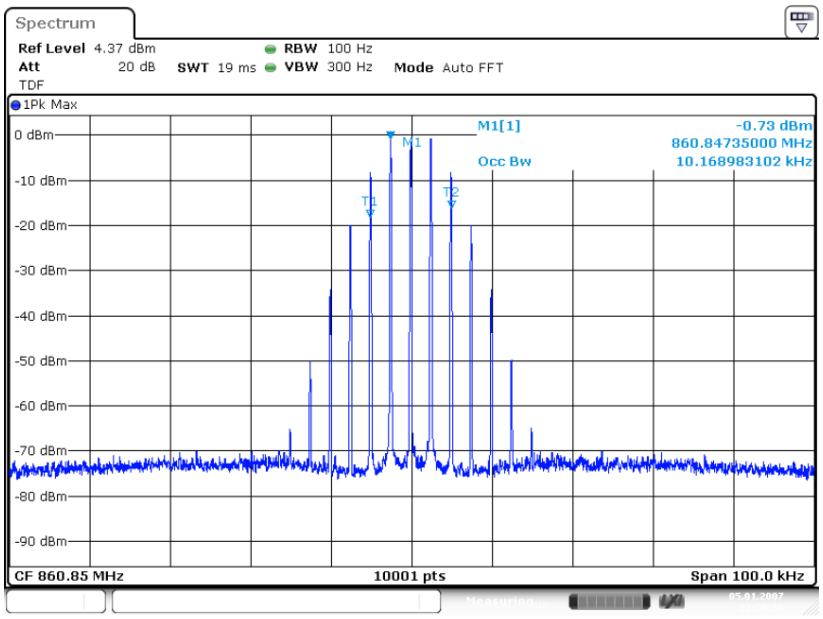


Input Signal

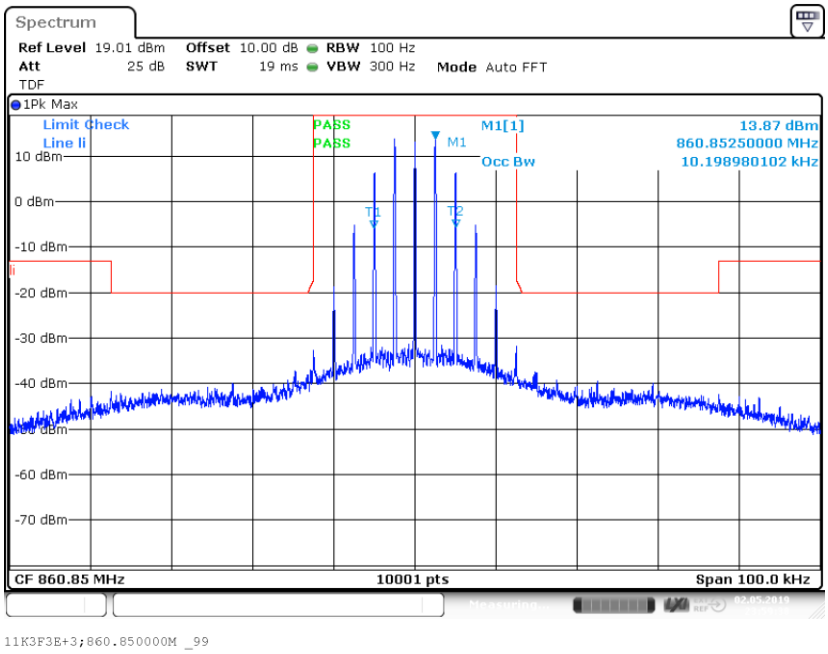


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 11K3F3E at f_0

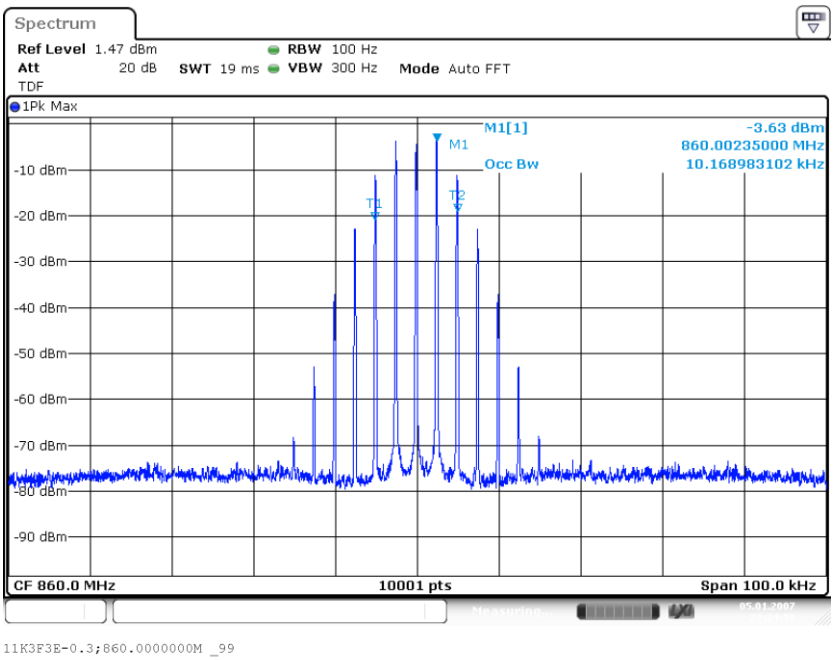


Input Signal



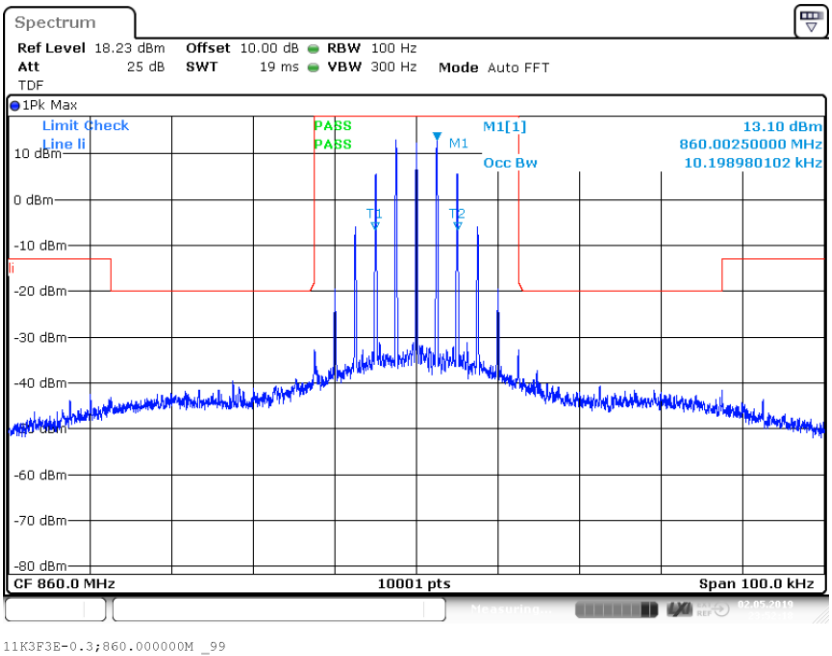
Output Signal

Output SignalFrequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = 11K3F3E at $f_{customer}$



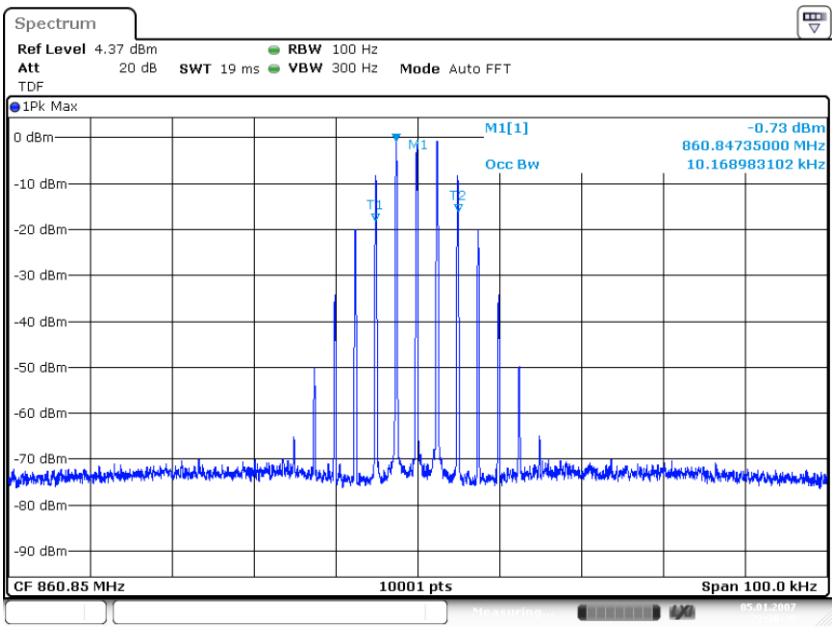
Input Signal

a

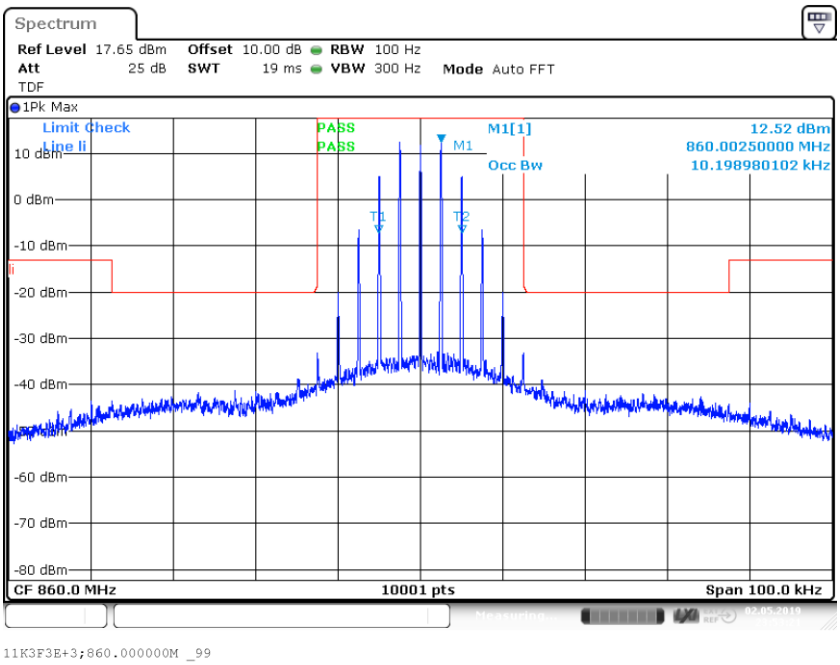


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 11K3F3E at $f_{customer}$

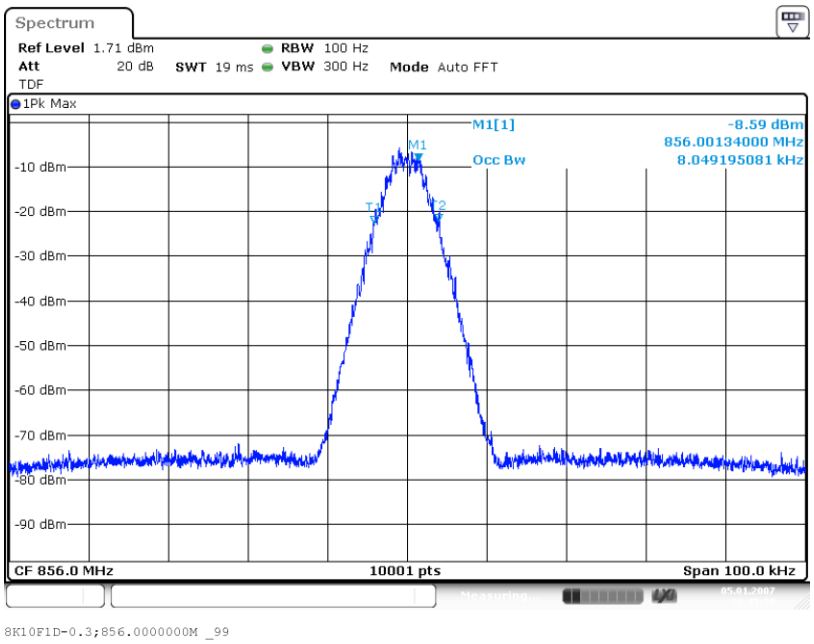


Input Signal

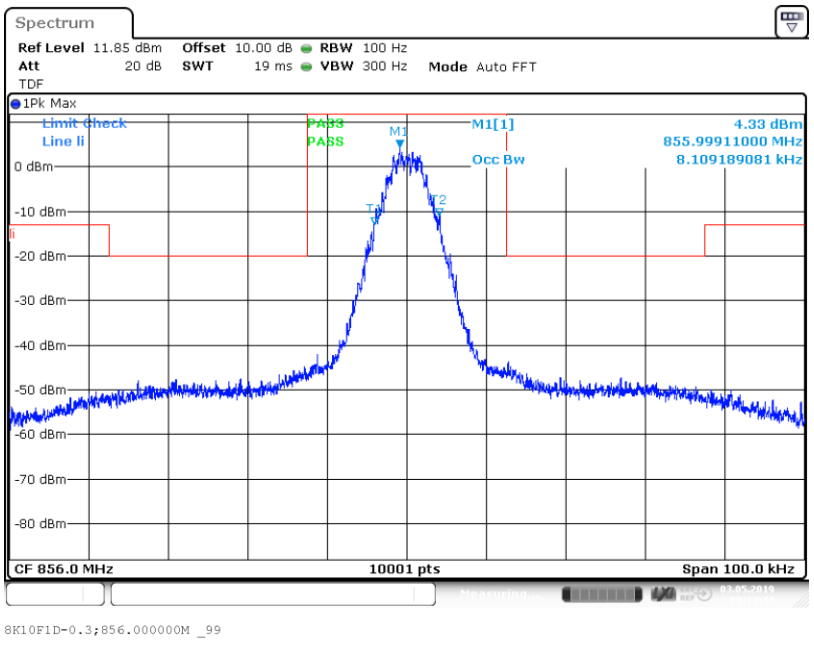


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = 8K10F1D at f_m

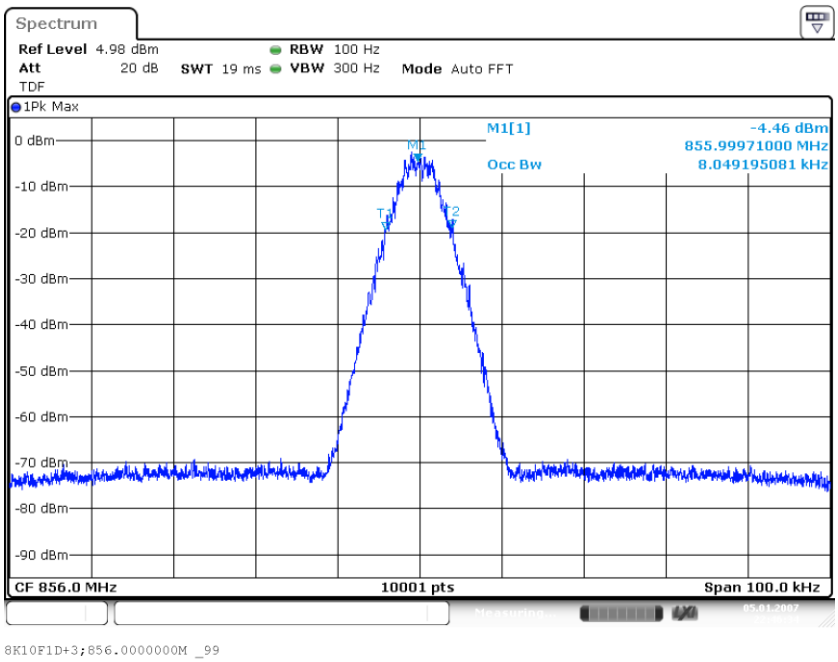


Input Signal

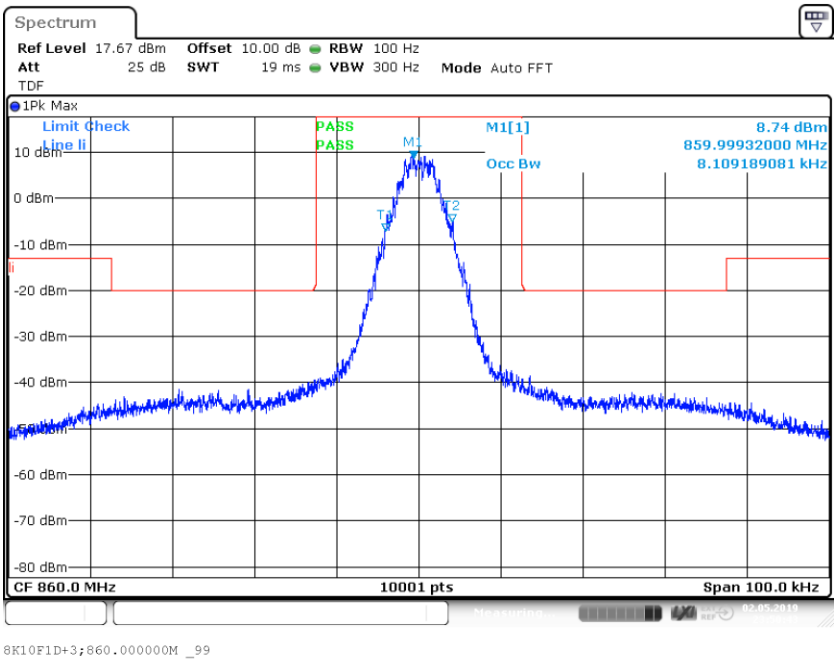


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 8K10F1D at f_m

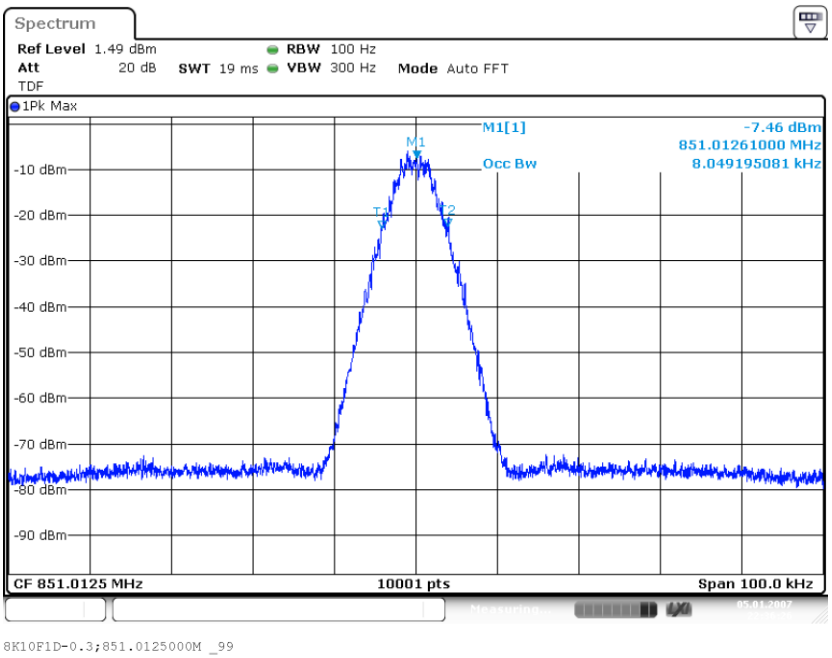


Input Signal

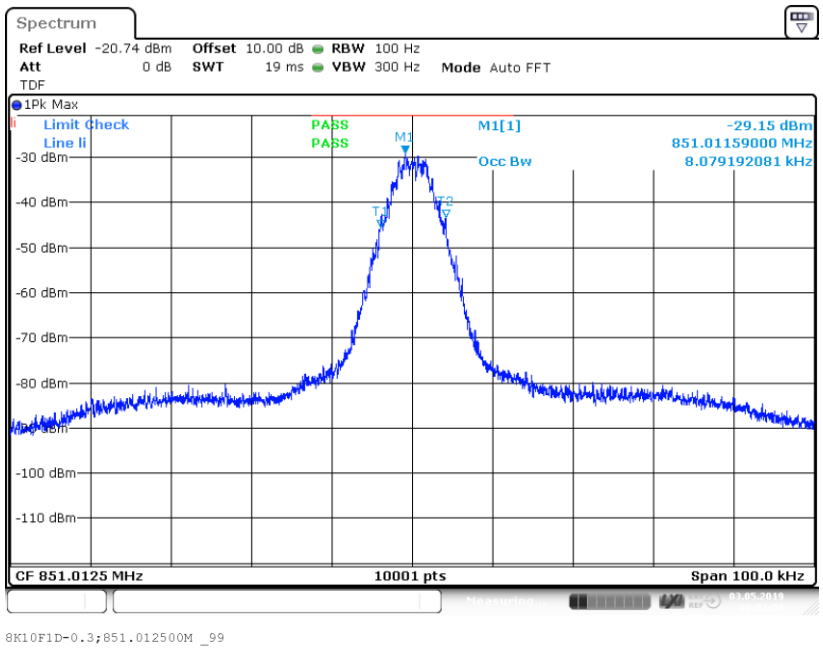


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = 8K10F1D at f_{low}

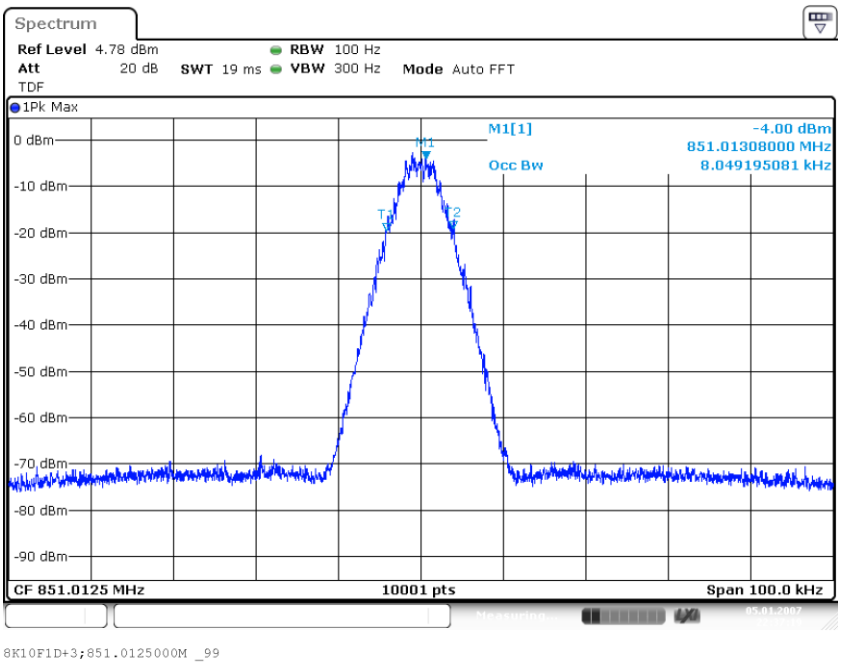


Input Signal

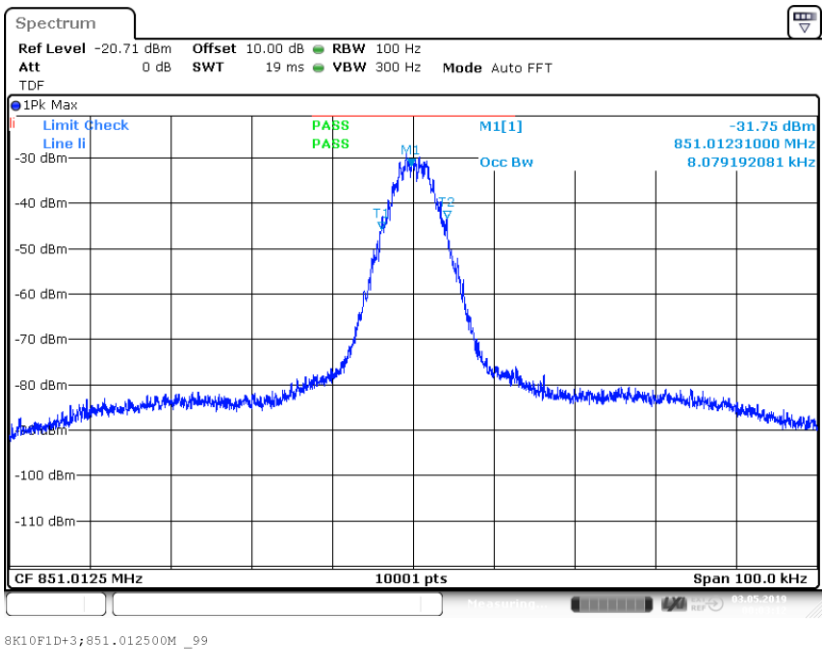


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 8K10F1D at f_{low}

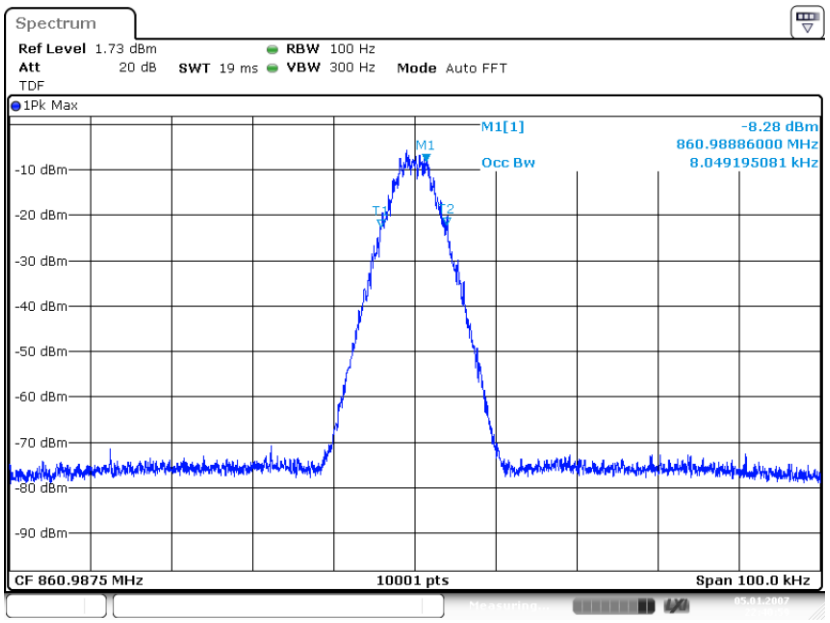


Input Signal

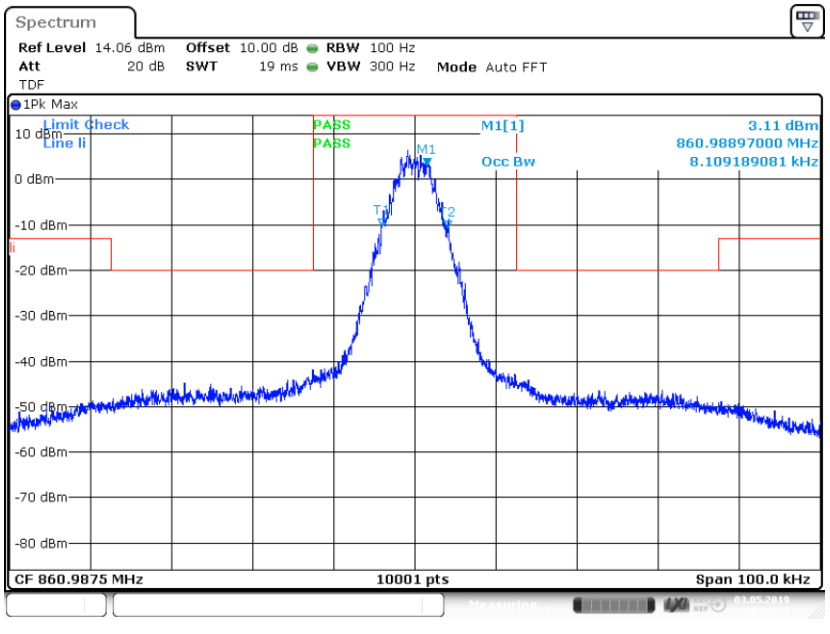


Output Signal

Output SignalFrequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = 8K10F1D at f_{high}

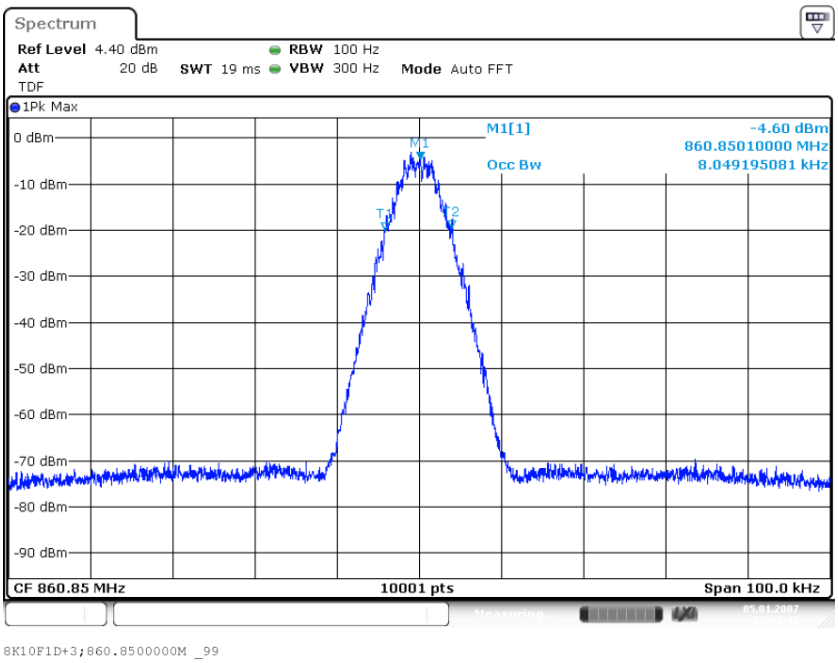


Input Signal

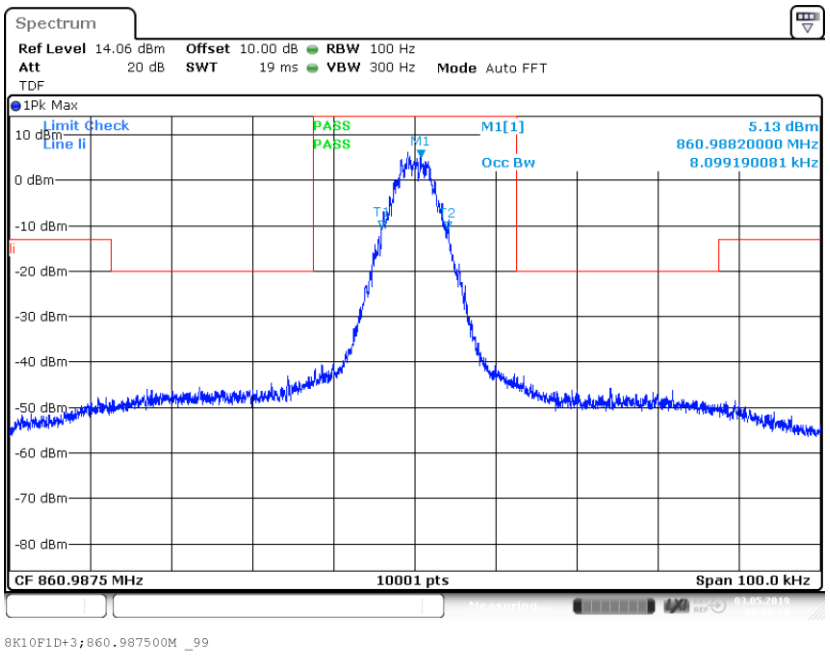


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 8K10F1D at f_{high}

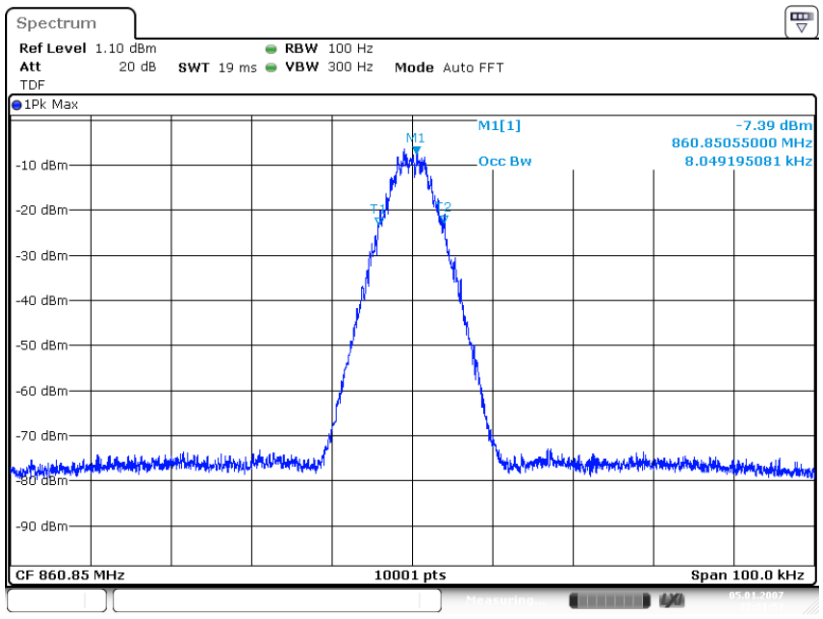


Input Signal

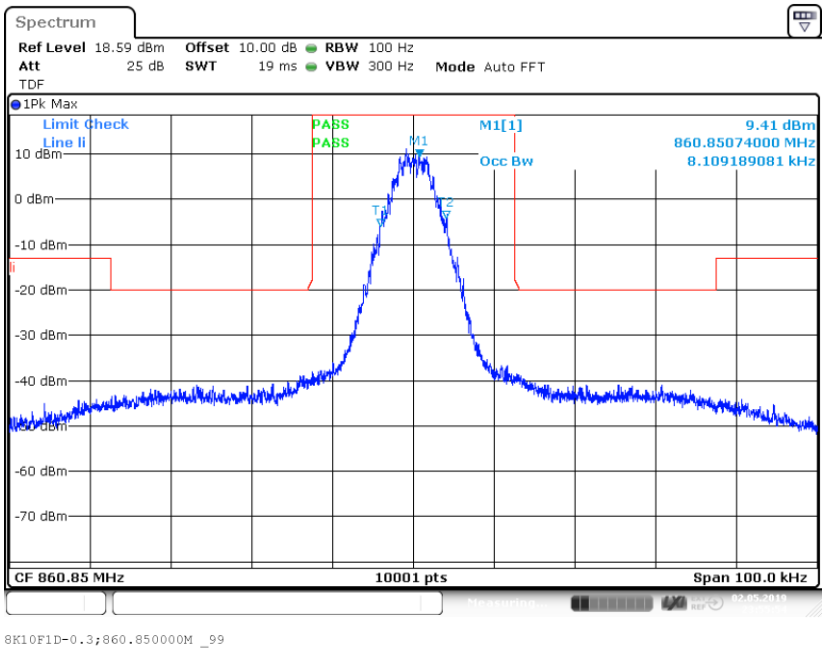


Output Signal

Output SignalFrequency Band = Band 851 MHz – 861 MHz, Direction = RF Downlink, Input Power = 0.3 dB < AGC, Emission Designator = 8K10F1D at f_0

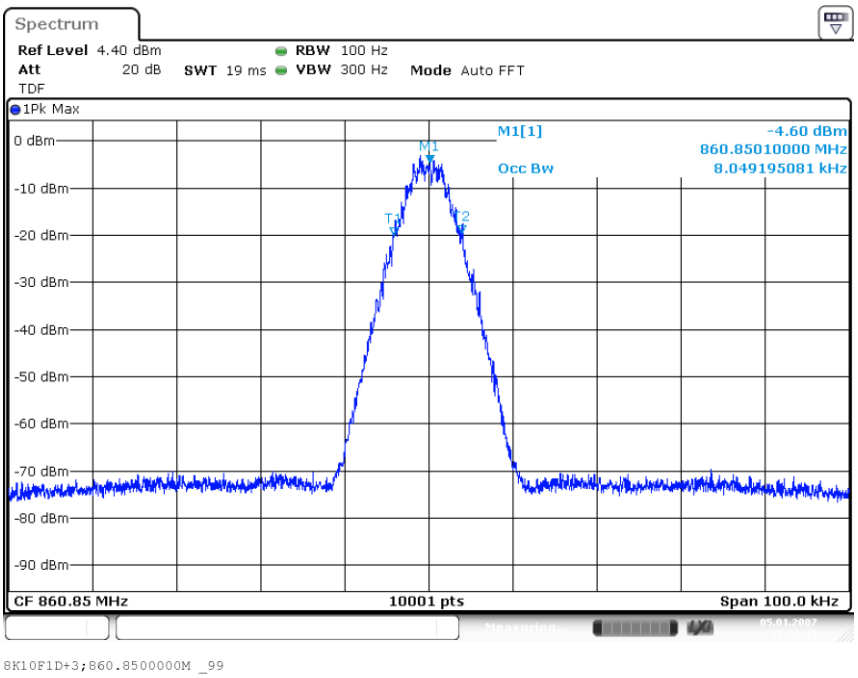


Input Signal

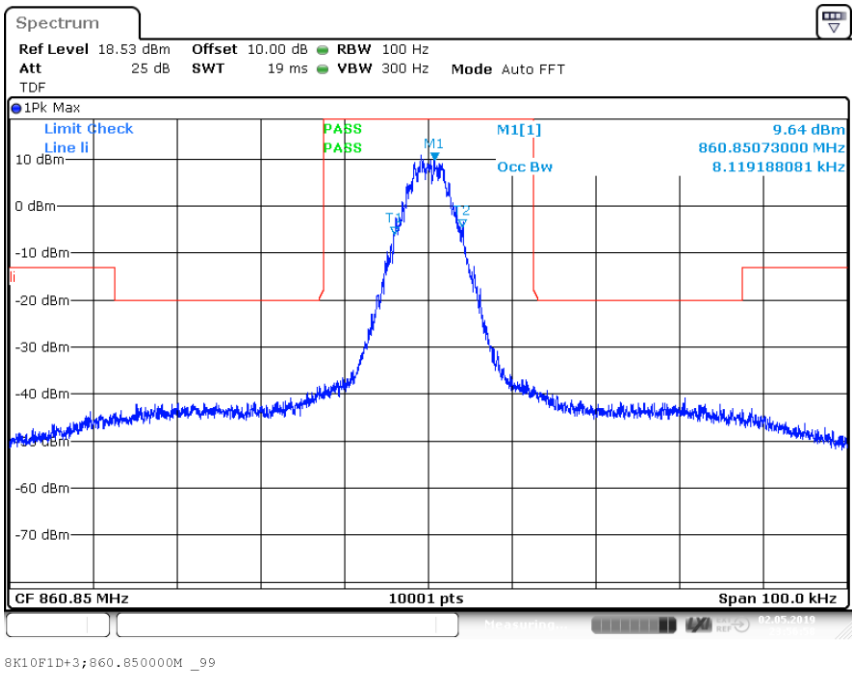


Output Signal

Frequency Band = Band 851 MHz – 861 MHz, Direction = RF downlink, Input Power = 3 dB > AGC, Emission Designator = 8K10F1D at f_0



Input Signal



Output Signal