Prüfbericht-Nr.: *Test Report No.*:	**50289118 002**	**Auftrags-Nr.:** *Order No.*:	168126584	Seite 1 von 26 *Page 1 of 26*
Kunden-Referenz-Nr.: *Client Reference No.*:	N/A	**Auftragsdatum:** *Order date*:	07.08.2019	
Auftraggeber: *Client*:	Telit Communications S.p.A., Viale Stazione di Prosecco 5/b, 34010, Trieste, Italy			
Prüfgegenstand: *Test item*:	Data Terminal Module			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	ME910G1-W1			
Auftrags-Inhalt: *Order content*:	Test Report			
Prüfgrundlage: *Test specification*:	47 CFR FCC Part 22 47 CFR FCC Part 24 47 CFR FCC Part 27 47 CFR FCC Part 90 47 CFR FCC Part 2	RSS-132 Issue 3 RSS-133 Issue 6 RSS-130 Issue 2 RSS-139 Issue 3 RSS-Gen Issue 5		
Wareneingangsdatum: *Date of receipt*:	10.09.2019	Refer to Photo Documentation		
Prüfmuster-Nr.: *Test sample No.*:	A000971166-005, A000971166-006			
Prüfzeitraum: *Testing period*:	20.09.2019 - 17.12.2019			
Ort der Prüfung: *Place of testing*:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: *Testing laboratory*:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: *Test result**:	Pass			

geprüft von / *tested by*:			**kontrolliert von / *reviewed by*:**		
10.01.2020	Lin Lin / Senior Project Manager		15.01.2020	Sam Lin / Technical Certifier	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*: FCC ID: RI7ME910G1W1; IC: 5131A-ME910G1W1
This report is for eMTC operation.

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery*:	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T = nicht getestet
Legend:	*1 = very good* *P(ass) = passed a.m. test specification(s)*	*2 = good*	*3 = satisfactory* *F(ail) = failed a.m. test specification(s)*	*4 = sufficient* *N/A = not applicable*	*5 = poor* *N/T = not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

TEST SUMMARY

5.1.1 RF POWER OUTPUT
RESULT: Pass

5.1.2 MODULATION CHARACTERISTICS
RESULT: Pass

5.1.3 OCCUPIED BANDWIDTH AND 26DB BANDWIDTH
RESULT: Pass

5.1.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS
RESULT: Pass

5.1.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS – BAND EDGE
RESULT: Pass

5.1.6 FIELD STRENGTH OF SPURIOUS RADIATION
RESULT: Pass

5.1.7 FREQUENCY STABILITY
RESULT: Pass

5.1.8 PEAK TO AVERAGE RATIO
RESULT: Pass

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1. GENERAL REMARKS

1.1 COMPLEMENTARY MATERIALS

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Test Results of Band 2 for eMTC operation

Appendix B: Test Results of Band 4 for eMTC operation

Appendix C: Test Results of Band 5 for eMTC operation

Appendix D: Test Results of Band 12 for eMTC operation

Appendix E: Test Results of Band 13 for eMTC operation

Appendix F: Test Results of Band 25 for eMTC operation

Appendix G: Test Results of Band 26 Lower Band for eMTC operation

Appendix H: Test Results of Band 26 Upper Band for eMTC operation

Appendix I: Test Results of Band 66 for eMTC operation

Appendix J: Test Results of Band 85 for eMTC operation

Appendix K: Test Results of Field Strength of Spurious Radiation for eMTC operation

1.2 TEST STANDARD(S)

Applied Rules:	47 CFR FCC Part 22	RSS-130 Issue 2
	47 CFR FCC Part 24	RSS-132 Issue 3
	47 CFR FCC Part 27	RSS-133 Issue 6
	47 CFR FCC Part 90	RSS-139 Issue 3
	47 CFR FCC Part 2	RSS-Gen Issue 5
Test Method:	KDB 971168 D01	
	ANSI C63.26	

2. TEST SITES

2.1 TEST FACILITIES

TÜV Rheinland (Shenzhen) Co., Ltd.
(FCC Registration No.: 694916 & IC Registration Number: 25069)

Address: 1F East & 2-4F, Cybio Technology Building No.1, No.16 Kejibei 2nd Road, High-Tech Industrial Park North Nanshan District, 518057, Shenzhen, China

2.2 TEST DATE

Date of test: 20.09.2019 - 17.12.2019

2.3 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Table 1: List of Test and Measurement Equipment

Description	**Manufacturer**	**Model**	**Serial No.**	**Calibrated until** (DD.MM.YYYY)
Raido Spectrum Testing				
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	166305	20.09.2020
Signal Analyzer	Rohde & Schwarz	FSV 40	101475	20.09.2020
Vector Signal Generator	Rohde & Schwarz	SMBV100A	263466	20.09.2020
Signal Generator	Rohde & Schwarz	SMB100A	181041	17.12.2020
High Speed Power Supply	KEITHLEY	2303	4080052	17.12.2020
RF Control Unit	Tonscend	JS0806-1	19H8060192	N/A
Field Strength of Spurious Radiation				
Signal Generator	Rohde & Schwarz	SMB100A	180840	20.08.2020
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	165339	20.08.2020
Signal Analyzer	Rohde & Schwarz	FSV 40	101440	21.08.2020
System Controller Interface	Rohde & Schwarz	SCI-100	S10010036	N/A
Filterbank	Rohde & Schwarz	GSM	100811	21.08.2020
OSP	Rohde & Schwarz	OSP 120	102041	N/A
OSP	Rohde & Schwarz	OSP 150	101385	17.12.2020
Pre-amplifier	Rohde & Schwarz	SCU08F1	08320030	20.08.2020

Amplifier	Rohde & Schwarz	SCU-18F	180079	20.08.2020
Amplifier	Rohde & Schwarz	SCU40A	100450	20.09.2020
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	192	02.09.2020
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218719	02.09.2020
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18312	02.09.2020
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19066	02.09.2020
Biconical Broadband Antenna (30 MHz - 1 GHz)	Schwarzbeck	VUBA 9117	357	02.09.2020
Double Ridged Broadband Horn Antenna (1 – 18 GHz)	Schwarzbeck	BBHA 9120 D	01760	02.09.2020
Broadband Horn Antenna (15 – 40 GHz)	Schwarzbeck	BBHA 9170	00862	02.09.2020
Test software	Rohde & Schwarz	EMC32 (V10.40.00)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NW9P2	N/A
3m Fully Anechoic Chamber	Albatross	FAC-3m	APC17151-FAC	06.07.2020

2.4 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.5 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. facility located at 1F East & 2-4F, Cybio Technology Building No.1, No.16 Kejibei 2nd Road, High-Tech Industrial Park North Nanshan District, 518057, Shenzhen, China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3. GENERAL PRODUCT INFORMATION

3.1 GENERAL DESCRIPTION

The EUT is wireless module which supports NB-IoT and eMTC wireless technology.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 RATING AND SYSTEM DETAILS

Table 2: Rating of EUT

General Information of EUT	Description
Kind of Equipment:	Data Terminal Module
Type Designation:	ME910G1-W1
FCC ID:	RI7ME910G1W1
IC:	5131A-ME910G1W1
Hardware Version:	0.0
Software Version:	M0C.300001
IMEI:	356813109993754
Type of Equipment:	Single Module
Antenna:	External Antenna
Operating Voltage:	DC 3.8V
Operating Temperature Range:	-40°C ~ +85°C

Table 3: Technical Specification of EUT

Characteristic	Description
Operated Modes:	eMTC
Operational Frequency Band(s):	Band 2, Band 4, Band 5, Band 12, Band 13, Band 25, Band 26, Band 66, Band 85
Nominal RF Output Power:	20 dBm ± 2dB
Power Class:	Class 5
Modulation Type:	QPSK, 16QAM
Antenna Type:	External Antenna The EUT doesn't have antenna, The adapter and antenna used for testing in this report is the after-market accessory
Antenna Gain:	2.14 dBi
Device Category:	CAT-M1
Extreme Voltage:	DC 3.2 ~ 4.5V
Extreme Temperature:	-40 ~ +85 °C

Table 4: Operating Frequency Range and Channel Bandwidth of EUT

Frequency Band(s)	Frequency Range						Channel Bandwidth (MHz)
	Transmitting f_{UL} (MHz)			Receiving f_{DL} (MHz)			
Band 2	1850	~	1910	1930	~	1990	1.4, 3, 5, 10, 15, 20
Band 4	1710	~	1755	2110	~	2155	1.4, 3, 5, 10, 15, 20
Band 5	824	~	849	869	~	894	1.4, 3, 5, 10
Band 12	699	~	716	729	~	746	1.4, 3, 5, 10
Band 13	777	~	787	746	~	756	5, 10
Band 25	1850	~	1915	1930	~	1995	1.4, 3, 5, 10, 15, 20
Band 26	814	~	849	859	~	894	1.4, 3, 5, 10, 15
Band 66	1710	~	1780	2110	~	2200	1.4, 3, 5, 10, 15, 20
Band 85	698	~	716	728	~	746	5, 10

3.3 INDEPENDENT OPERATION MODES

The basic operation modes are:

A. On, communication link established, Transmitting
   1) eMTC operating
      i. Low channel
      ii. Middle channel
      iii. High channel
B. On, communication link established, Receiving
   1) eMTC operating
C. Idle
D. Off

3.4 NOISE GENERATING AND NOISE SUPPRESSING PARTS

Refer to the Circuit Diagram.

3.5 SUBMITTED DOCUMENTS

☒ User Manual
☐ Circuit Diagram
☒ Block Diagram
☒ Schematics
☐ Model Difference Letter
☒ Rating Label
☒ PCB Layout
☒ Photo Document
☒ Parts List

4. TEST SET-UP AND OPERATION MODES

4.1 PRINCIPLE OF CONFIGURATION SELECTION

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 TEST OPERATION AND TEST SOFTWARE

Test operation refers to test setup in chapter 5. All testing were performed according to the procedure in KDB 971168 D01 and ANSI C63.26.

Table 5: List of Frequencies under Test

Operation bands	Mode	Channel Bandwidth (MHz)	Frequencies under Test					
			EARFCN	CH_{Low} (MHz)	EARFCN	CH_{Mid} (MHz)	EARFCN	CH_{High} (MHz)
2	TX	1.4	18607	1850.7	18900	1880	19193	1909.3
		3	18615	1851.5	18900	1880	19185	1908.5
		5	18625	1852.5	18900	1880	19175	1907.5
		10	18650	1855	18900	1880	19150	1905
		15	18675	1857.5	18900	1880	19125	1902.5
		20	18700	1860	18900	1880	19100	1900
	RX	1.4	607	1930.7	900	1960	1193	1989.3
		3	615	1931.5	900	1960	1185	1988.5
		5	625	1932.5	900	1960	1175	1987.5
		10	650	1935	900	1960	1150	1985
		15	675	1937.5	900	1960	1125	1982.5
		20	700	1940	900	1960	1100	1980
4	TX	1.4	19957	1710.7	20175	1732.5	20393	1754.3
		3	19965	1711.5	20175	1732.5	20385	1753.5
		5	19975	1712.5	20175	1732.5	20375	1752.5
		10	20000	1715	20175	1732.5	20350	1750
		15	20025	1717.5	20175	1732.5	20325	1747.5
		20	20050	1720	20175	1732.5	20300	1745
	RX	1.4	1957	2110.7	2175	2132.5	2393	2154.3
		3	1965	2111.5	2175	2132.5	2385	2153.5
		5	1975	2112.5	2175	2132.5	2375	2152.5
		10	2000	2115	2175	2132.5	2350	2150
		15	2025	2117.5	2175	2132.5	2325	2147.5

		20	2050	2120	2175	2132.5	2300	2145
5	TX	1.4	20407	824.7	20525	836.5	20643	848.3
		3	20415	825.5	20525	836.5	20635	847.5
		5	20425	826.5	20525	836.5	20625	846.5
		10	20450	829	20525	836.5	20600	844
	RX	1.4	2407	869.7	2525	881.5	2643	893.3
		3	2415	870.5	2525	881.5	2635	892.5
		5	2425	871.5	2525	881.5	2625	891.5
		10	2450	874	2525	881.5	2600	889
12	TX	1.4	23017	699.7	23095	707.5	23173	715.3
		3	23025	700.5	23095	707.5	23165	714.5
		5	23035	701.5	23095	707.5	23155	713.5
		10	23060	704	23095	707.5	23130	711
	RX	1.4	5017	729.7	5095	737.5	5173	745.3
		3	5025	730.5	5095	737.5	5165	744.5
		5	5035	731.5	5095	737.5	5155	743.5
		10	5060	734	5095	737.5	5130	741
13	TX	5	23205	779.5	23230	782	23255	784.5
		10	23230	782	23230	782	23230	782
	RX	5	5205	748.5	5230	751	5255	753.5
		10	5230	751	5230	751	5230	751
25	TX	1.4	26047	1850.7	26365	1882.5	26683	1914.3
		3	26055	1851.5	26365	1882.5	26675	1913.5
		5	26065	1852.5	26365	1882.5	26665	1912.5
		10	26090	1855	26365	1882.5	26640	1910
		15	26115	1857.5	26365	1882.5	26615	1907.5
		20	26140	1860	26365	1882.5	26590	1905
	RX	1.4	8047	1930.7	8365	1962.5	8683	1994.3
		3	8055	1931.5	8365	1962.5	8675	1993.5
		5	8065	1932.5	8365	1962.5	8665	1992.5
		10	8090	1935	8365	1962.5	8640	1990
		15	8115	1937.5	8365	1962.5	8615	1987.5
		20	8140	1940	8365	1962.5	8590	1985
26_Lower Band (814-824 MHz)	TX	1.4	26697	814.7	26740	819	26783	823.3
		3	26705	815.5	26740	819	26775	822.5
		5	26715	816.5	26740	819	26765	821.5
		10	26740	819	26740	819	26740	819
	RX	1.4	8697	859.7	8740	864	8783	868.3
		3	8705	860.5	8740	864	8775	867.5
		5	8715	861.5	8740	864	8765	866.5
		10	8740	864	8740	864	8740	864
26_Upper Band (824-849 MHz)	TX	1.4	26797	824.7	26915	836.5	27033	848.3
		3	26805	825.5	26915	836.5	27025	847.5
		5	26815	826.5	26915	836.5	27015	846.5
		10	26840	829	26915	836.5	26990	844
		15	26865	831.5	26915	836.5	26965	841.5
	RX	1.4	8797	869.7	8915	881.5	9033	893.3
		3	8805	870.5	8915	881.5	9025	892.5

		5	8815	871.5	8915	881.5	9015	891.5
		10	8840	874	8915	881.5	8990	889
		15	8865	876.5	8915	881.5	8965	886.5
66	TX	1.4	131979	1710.7	1745	-11312.7	132665	1779.3
		3	131987	1711.5	1745	-11312.7	132657	1778.5
		5	131997	1712.5	1745	-11312.7	132647	1777.5
		10	132022	1715	1745	-11312.7	132622	1775
		15	132047	1717.5	1745	-11312.7	132597	1772.5
		20	132047	1717.5	1745	-11312.7	132572	1770
	RX	1.4	66443	2110.7	66786	2145	67129	2179.3
		3	66451	2111.5	66786	2145	67121	2178.5
		5	66461	2112.5	66786	2145	67111	2177.5
		10	66486	2115	66786	2145	67086	2175
		15	66511	2117.5	66786	2145	67061	2172.5
		20	66536	2120	66786	2145	67036	2170
85	TX	5	134027	700.5	134092	707	134157	713.5
		10	134052	703	134092	707	134132	711
	RX	5	70391	730.5	70456	737	70521	743.5
		10	70416	733	70456	737	70496	741

Table 6: Test Environments

Environment Parameter	Selected Values During Tests		
	Temperature (°C)	**Voltage (V)** DC	**Relative Humidity (%)**
Normal (NTNV)	24	3.8	51%
HTHV	85 °C	4.5	---
LTHV	-40 °C	4.5	---
HTLV	85 °C	3.2	---
LTLV	-40 °C	3.2	---

Table 7: Test Configurations

Frequency Bands	Bandwidths (MHz)						Modulation	
	1.4	3	5	10	15	20	QPSK	16QAM
2	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
4	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
5	Δ	Δ	Δ	Δ	-	-	Δ	Δ
12	Δ	Δ	Δ	Δ	-	-	Δ	Δ
13	-	-	Δ	Δ	-	-	Δ	Δ
25	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
26	Δ	Δ	Δ	Δ	Δ	-	Δ	Δ
66	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
85	-	-	Δ	Δ	-	-	Δ	Δ

4.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT

Table 8: Cables used during test

Port	Quantity	Length (m)	Connector	Type of Cable
USB	1	1.2	USB	USB cable, shielding

Table 9: Auxiliary Equipment used during test

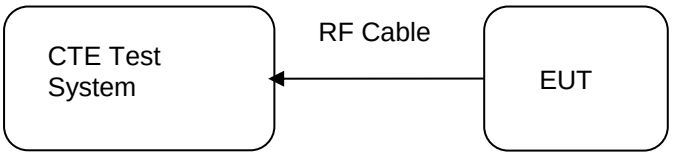
Name	Model	Manufacturer	S/N
Evaluation Kit	EVK2	Telit	N/A
LTE Magnetic Antenna	T-AT305 Frequency Range: 700-960 MHz / 1710-2700 MHz Omnidirectional antenna Gain: 2.14 dBi (Max.) Cable: RG 174mm 2500	ATEL-CAB	N/A

4.4 COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE

The test sample, which has been tested, contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Equipment Configuration for Transmitter Conducted Measurement



5. TEST RESULTS

5.1 ESSENTIAL REQUIREMENTS

5.1.1 RF POWER OUTPUT

RESULT: **Pass**

Test standard	:	47 CFR FCC Part 22	RSS-130 Issue 2	
		47 CFR FCC Part 24	RSS-132 Issue 3	
		47 CFR FCC Part 27	RSS-133 Issue 6	
		47 CFR FCC Part 90	RSS-139 Issue 3	
		47 CFR FCC Part 2	RSS-Gen Issue 5	
Limits	:	Operating band	FCC Limit	ISED Limit
		Band 2	EIRP 2 watts	EIRP 2 watts
		Band 4	EIRP 1 watts	EIRP 1 watts
		Band 5	ERP 7 watts	ERP 11.5 watts
		Band 12	ERP 3 watts	ERP 3 watts
		Band 13	ERP 3 watts	ERP 3 watts
		Band 25	EIRP 2 watts	EIRP 2 watts
		Band 26 Lower Band	< 100 watts	N/A
		Band 26 Upper Band	ERP 7 watts	ERP 11.5 watts
		Band 66	EIRP 1 watts	EIRP 1 watts
		Band 85	ERP 3 watts	ERP 3 watts
Test procedure	:	Clause 5.2.4.2 of ANSI C63.26		
Kind of test site	:	Shielding Room		

TEST SETUP

Date of testing	:	20.09.2019 - 17.12.2019
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions
		☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	23 ºC
Relative humidity	:	50%
Atmospheric pressure	:	101.0 kPa

ERP or EIRP = $P_{Meas} + G_T$

where

ERP or EIRP: effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g. dBm)

P_{Meas}: measured transmitter output power, in dBm

G_T: gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

Refer to attached Appendix A to Appendix J for details of test results.

5.1.2 MODULATION CHARACTERISTICS

RESULT: **Pass**

Test standard	:	47 CFR FCC Part 22	RSS-130 Issue 2
		47 CFR FCC Part 24	RSS-132 Issue 3
		47 CFR FCC Part 27	RSS-133 Issue 6
		47 CFR FCC Part 90	RSS-139 Issue 3
		47 CFR FCC Part 2	RSS-Gen Issue 5
Limits	:	“Other types of equipment”, the use of higher order modulations such as OFDM or LTE or other modulation are acceptable for use	
Test procedure	:	Clause 5.2.3 of ANSI C63.26	
Kind of test site	:	Shielding Room	

Note:
The device implement digital modulation such as QPSK and 16QAM, hence the EUT is deemed to comply with this requirement without additional testing.

5.1.3 Occupied Bandwidth and 26dB Bandwidth

RESULT: **Pass**

Test standard	:	47 CFR FCC Part 22	RSS-130 Issue 2
		47 CFR FCC Part 24	RSS-132 Issue 3
		47 CFR FCC Part 27	RSS-133 Issue 6
		47 CFR FCC Part 90	RSS-139 Issue 3
		47 CFR FCC Part 2	RSS-Gen Issue 5
Test requirement	:	Section 2.1049 of 47 CFR FCC Part 2 Clause 6.7 of RSS-Gen Issue 5	
Limits	:	No limit	
Test procedure	:	Section 5.4.3 of ANSI C63.26 ☒ Conducted measurements ☐ Radiated measurements	
Kind of test site	:	Shielding Room	

Test Setup

Date of testing	:	20.09.2019 - 17.12.2019
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 ºC
Relative humidity	:	50%
Atmospheric pressure	:	101.0 kPa

Refer to attached Appendix A to Appendix J for details of test results.

5.1.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

RESULT: **Pass**

Test standard	:	47 CFR FCC Part 22	RSS-130 Issue 2	
		47 CFR FCC Part 24	RSS-132 Issue 3	
		47 CFR FCC Part 27	RSS-133 Issue 6	
		47 CFR FCC Part 90	RSS-139 Issue 3	
		47 CFR FCC Part 2	RSS-Gen Issue 5	
Limits	:	Operating band	FCC Limit	ISED Limit
		Band 2	< - 13 dBm /1MHz	< - 13 dBm /1MHz
		Band 4	< - 13 dBm /1MHz	< - 13 dBm /1MHz
		Band 5	< - 13 dBm /100kHz @ < 1GHz < - 13 dBm /1MHz @ > 1GHz	< - 13 dBm / 100 kHz
		Band 12	< - 13 dBm /100kHz	< - 13 dBm /100kHz
		Band 13	< - 13 dBm /100kHz	< - 13 dBm /100kHz
		Band 25	< - 13 dBm /1MHz	< - 13 dBm /1MHz
		Band 26 Lower Band	< - 13 dBm /100kHz	N/A
		Band 26 Upper Band	< - 13 dBm /100kHz @ < 1GHz < - 13 dBm /1MHz @ > 1GHz	< - 13 dBm / 100 kHz
		Band 66	< - 13 dBm /1MHz	< - 13 dBm /1MHz
		Band 85	< - 13 dBm /100kHz	< - 13 dBm /100kHz
Test procedure	:	Clause 5.7.4 of ANSI C63.26		
Kind of test site	:	Shielding Room		

TEST SETUP

Date of testing	:	20.09.2019 - 17.12.2019
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 ºC
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

The limit calculation:
Limit = P_{Meas} (dBm) – [43+10log(P_{Meas})] = −13 dBm

Refer to attached Appendix A to Appendix J for details of test results.

5.1.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS – BAND EDGE

RESULT: **Pass**

Test standard	:	47 CFR FCC Part 22	RSS-130 Issue 2	
		47 CFR FCC Part 24	RSS-132 Issue 3	
		47 CFR FCC Part 27	RSS-133 Issue 6	
		47 CFR FCC Part 90	RSS-139 Issue 3	
		47 CFR FCC Part 2	RSS-Gen Issue 5	
Limits	:	Operating band	FCC Limit	ISED Limit
		Band 2	< - 13 dBm /1%EBW	< - 13 dBm / 1%OBW
		Band 4	< - 13 dBm /1%EBW	< - 13 dBm / 1%OBW
		Band 5	< - 13 dBm /1%EBW	< - 13 dBm / 1%OBW
		Band 12	< - 13 dBm /30kHz	< - 13 dBm /30kHz
		Band 13	< - 13 dBm /30kHz	< - 13 dBm /30kHz
		Band 25	< - 13 dBm /1%EBW	< - 13 dBm / 1%OBW
		Band 26 Lower Band	< - 20 dBm /1%EBW	N/A
		Band 26 Upper Band	< - 13 dBm /1%EBW	< - 13 dBm / 1%OBW
		Band 66	< - 13 dBm /1%EBW	< - 13 dBm / 1%OBW
		Band 85	< - 13 dBm /30kHz	< - 13 dBm /30kHz
Test procedure	:	Clause 5.7.3 of ANSI C63.26		
Kind of test site	:	Shielding Room		

TEST SETUP

Date of testing	:	20.09.2019 - 17.12.2019
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions
		☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 ºC
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

The limit calculation:
Limit = P_{Meas} (dBm) – [43+10log(P_{Meas})] = -13 dBm
Limit = P_{Meas} (dBm) – [50+10log(P_{Meas})] = -20 dBm

Refer to attached Appendix A to Appendix J for details of test results.

5.1.6 FIELD STRENGTH OF SPURIOUS RADIATION

RESULT: **Pass**

Test standard	:	47 CFR FCC Part 22	RSS-130 Issue 2	
		47 CFR FCC Part 24	RSS-132 Issue 3	
		47 CFR FCC Part 27	RSS-133 Issue 6	
		47 CFR FCC Part 90	RSS-139 Issue 3	
		47 CFR FCC Part 2	RSS-Gen Issue 5	
Limits	:	Operating band	FCC Limit	ISED Limit
		Band 2	< - 13 dBm /1MHz	< - 13 dBm /1MHz
		Band 4	< - 13 dBm /1MHz	< - 13 dBm /1MHz
		Band 5	< - 13 dBm /100kHz @ < 1GHz < - 13 dBm /1MHz @ > 1GHz	< - 13 dBm / 100 kHz
		Band 12	< - 13 dBm /100kHz	< - 13 dBm /100kHz
		Band 13	< - 13 dBm /100kHz	< - 13 dBm /100kHz
		Band 25	< - 13 dBm /1MHz	< - 13 dBm /1MHz
		Band 26 Lower Band	< - 13 dBm /100kHz	N/A
		Band 26 Upper Band	< - 13 dBm /100kHz @ < 1GHz < - 13 dBm /1MHz @ > 1GHz	< - 13 dBm / 100 kHz
		Band 66	< - 13 dBm /1MHz	< - 13 dBm /1MHz
		Band 85	< - 13 dBm /100kHz	< - 13 dBm /100kHz
Test procedure	:	Clause 5.5 of ANSI C63.26		
Kind of test site	:	3m Semi Anechoic Room		

TEST SETUP

Date of testing	:	20.09.2019 - 17.12.2019
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 ºC
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

The limit calculation:
Limit = P_{Meas} (dBm) – [43+10log(P_{Meas})] = -13 dBm

Refer to attached Appendix K for details of test results.

5.1.7 FREQUENCY STABILITY

RESULT: **Pass**

Test standard	:	47 CFR FCC Part 22	RSS-130 Issue 2
		47 CFR FCC Part 24	RSS-132 Issue 3
		47 CFR FCC Part 27	RSS-133 Issue 6
		47 CFR FCC Part 90	RSS-139 Issue 3
		47 CFR FCC Part 2	RSS-Gen Issue 5

		Operating band	FCC Limit	ISED Limit
Limits	:	Band 2	Within authorized bands	2.5 ppm
		Band 4	Within authorized bands	Within authorized bands
		Band 5	2.5 ppm	2.5 ppm
		Band 12	Within authorized bands	Within authorized bands
		Band 13	Within authorized bands	Within authorized bands
		Band 25	Within authorized bands	2.5 ppm
		Band 26 Lower Band	2.5 ppm	N/A
		Band 26 Upper Band	2.5 ppm	2.5 ppm
		Band 66	Within authorized bands	Within authorized bands
		Band 85	Within authorized bands	Within authorized bands

Test procedure	:	Clause 5.6.3 of ANSI C63.26
Kind of test site	:	Shielding Room

TEST SETUP

Date of testing	:	20.09.2019 - 17.12.2019
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions
		☒ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 ºC
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

Refer to attached Appendix A to Appendix J for details of test results.

5.1.8 PEAK TO AVERAGE RATIO

RESULT: **Pass**

Test standard	:	47 CFR FCC Part 22	RSS-130 Issue 2	
		47 CFR FCC Part 24	RSS-132 Issue 3	
		47 CFR FCC Part 27	RSS-133 Issue 6	
		47 CFR FCC Part 90	RSS-139 Issue 3	
		47 CFR FCC Part 2	RSS-Gen Issue 5	
Limits	:	Operating band	FCC Limit	ISED Limit
		Band 2	PAR ≤ 13 dB	PAR ≤ 13 dB
		Band 4	PAR ≤ 13 dB	PAR ≤ 13 dB
		Band 5	PAR ≤ 13 dB	PAR ≤ 13 dB
		Band 12	PAR ≤ 13 dB	PAR ≤ 13 dB
		Band 13	PAR ≤ 13 dB	PAR ≤ 13 dB
		Band 25	PAR ≤ 13 dB	PAR ≤ 13 dB
		Band 26 Lower Band	N/A	N/A
		Band 26 Upper Band	PAR ≤ 13 dB	PAR ≤ 13 dB
		Band 66	PAR ≤ 13 dB	PAR ≤ 13 dB
		Band 85	PAR ≤ 13 dB	PAR ≤ 13 dB
Test procedure	:	Clause 5.2.6 of ANSI C63.26		
Kind of test site	:	Shielding Room		

TEST SETUP

Date of testing	:	20.09.2019 - 17.12.2019
Input voltage	:	DC 3.8V
Test environment	:	☒ Normal test conditions
		☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 ºC
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

Refer to attached Appendix A to Appendix J for details of test results.

6. SYSTEM MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Table 10: System Measurement Uncertainty

Items		Extended Uncertainty
RE	Radiated emission 9 kHz - 30 MHz	±3.97 dB
	Radiated emission 30 MHz - 1 GHz	±4.30 dB
Remark: 95% Confidence Levels, K=2.		

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Appendix A: Test Results of Band 2 for eMTC operation

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Appendix A.1: RF Power Output and Effective (Isotropic) Radiated Power Output Data for M1

Test Result

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NBIndex	Result (dBm)	EIRP dBm	EIRP Watts	Limit (watts)	Verdict
Band2	1.4MHz	QPSK	18607	6	0	Low	18.61	20.75	0.119	2	PASS
Band2	1.4MHz	QPSK	18607	1	0	Low	20.67	22.81	0.191	2	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	21.4	23.54	0.226	2	PASS
Band2	1.4MHz	QPSK	18900	6	0	Low	18.97	21.11	0.129	2	PASS
Band2	1.4MHz	QPSK	19193	1	5	Low	21	23.14	0.206	2	PASS
Band2	1.4MHz	QPSK	19193	6	0	Low	18.82	20.96	0.125	2	PASS
Band2	1.4MHz	16QAM	18607	1	0	Low	19.73	21.87	0.154	2	PASS
Band2	1.4MHz	16QAM	18607	6	0	Low	18.61	20.75	0.119	2	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	19.98	22.12	0.163	2	PASS
Band2	1.4MHz	16QAM	18900	6	0	Low	18.97	21.11	0.129	2	PASS
Band2	1.4MHz	16QAM	19193	1	5	Low	19.79	21.93	0.156	2	PASS
Band2	1.4MHz	16QAM	19193	6	0	Low	18.82	20.96	0.125	2	PASS
Band2	3MHz	QPSK	18615	6	0	Low	18.44	20.58	0.114	2	PASS
Band2	3MHz	QPSK	18615	1	0	Low	20.66	22.80	0.191	2	PASS
Band2	3MHz	QPSK	18900	6	0	Low	18.76	20.90	0.123	2	PASS
Band2	3MHz	QPSK	18900	1	0	Low	21.03	23.17	0.207	2	PASS
Band2	3MHz	QPSK	19185	1	5	High	20.88	23.02	0.200	2	PASS
Band2	3MHz	QPSK	19185	6	0	High	18.67	20.81	0.121	2	PASS
Band2	3MHz	16QAM	18615	1	0	Low	19.77	21.91	0.155	2	PASS
Band2	3MHz	16QAM	18615	6	0	Low	18.45	20.59	0.115	2	PASS
Band2	3MHz	16QAM	18900	1	0	Low	20.37	22.51	0.178	2	PASS
Band2	3MHz	16QAM	18900	6	0	Low	18.77	20.91	0.123	2	PASS
Band2	3MHz	16QAM	19185	1	5	High	20.17	22.31	0.170	2	PASS
Band2	3MHz	16QAM	19185	6	0	High	18.67	20.81	0.121	2	PASS
Band2	5MHz	QPSK	18625	1	0	Low	20.54	22.68	0.185	2	PASS
Band2	5MHz	QPSK	18625	6	0	Low	19.5	21.64	0.146	2	PASS
Band2	5MHz	QPSK	18900	6	0	Low	19.94	22.08	0.161	2	PASS
Band2	5MHz	QPSK	18900	1	0	Low	21.08	23.22	0.210	2	PASS
Band2	5MHz	QPSK	19175	1	5	High	20.73	22.87	0.194	2	PASS
Band2	5MHz	QPSK	19175	3	3	High	20.88	23.02	0.200	2	PASS
Band2	5MHz	16QAM	18625	1	0	Low	20.35	22.49	0.177	2	PASS
Band2	5MHz	16QAM	18625	6	0	Low	19.5	21.64	0.146	2	PASS
Band2	5MHz	16QAM	18900	6	0	Low	19.94	22.08	0.161	2	PASS
Band2	5MHz	16QAM	18900	1	0	Low	20.79	22.93	0.196	2	PASS
Band2	5MHz	16QAM	19175	3	3	High	20.75	22.89	0.195	2	PASS
Band2	5MHz	16QAM	19175	1	5	High	20.57	22.71	0.187	2	PASS
Band2	10MHz	QPSK	18650	5	0	Low	20.39	22.53	0.179	2	PASS
Band2	10MHz	QPSK	18650	1	0	Low	20.5	22.64	0.184	2	PASS
Band2	10MHz	QPSK	18900	5	0	Low	20.99	23.13	0.206	2	PASS
Band2	10MHz	QPSK	18900	1	0	Low	21.21	23.35	0.216	2	PASS
Band2	10MHz	QPSK	19150	1	5	High	20.75	22.89	0.195	2	PASS
Band2	10MHz	QPSK	19150	5	1	High	20.77	22.91	0.195	2	PASS
Band2	10MHz	16QAM	18650	1	0	Low	20.3	22.44	0.175	2	PASS
Band2	10MHz	16QAM	18650	5	0	Low	20.41	22.55	0.180	2	PASS
Band2	10MHz	16QAM	18900	1	0	Low	20.91	23.05	0.202	2	PASS
Band2	10MHz	16QAM	18900	5	0	Low	20.9	23.04	0.201	2	PASS
Band2	10MHz	16QAM	19150	5	1	High	20.79	22.93	0.196	2	PASS
Band2	10MHz	16QAM	19150	1	5	High	20.57	22.71	0.187	2	PASS
Band2	15MHz	QPSK	18675	6	0	Low	20.49	22.63	0.183	2	PASS
Band2	15MHz	QPSK	18675	1	0	Low	20.5	22.64	0.184	2	PASS

Band2	15MHz	QPSK	18900	1	0	Low	21.15	23.29	0.213	2	PASS
Band2	15MHz	QPSK	18900	6	0	Low	20.96	23.10	0.204	2	PASS
Band2	15MHz	QPSK	19125	1	5	High	20.75	22.89	0.195	2	PASS
Band2	15MHz	QPSK	19125	6	0	High	20.73	22.87	0.194	2	PASS
Band2	15MHz	16QAM	18675	6	0	Low	20.49	22.63	0.183	2	PASS
Band2	15MHz	16QAM	18675	1	0	Low	20.3	22.44	0.175	2	PASS
Band2	15MHz	16QAM	18900	1	0	Low	20.88	23.02	0.200	2	PASS
Band2	15MHz	16QAM	18900	6	0	Low	20.97	23.11	0.205	2	PASS
Band2	15MHz	16QAM	19125	6	0	High	20.8	22.94	0.197	2	PASS
Band2	15MHz	16QAM	19125	1	5	High	20.58	22.72	0.187	2	PASS
Band2	20MHz	QPSK	18700	1	0	Low	20.5	22.64	0.184	2	PASS
Band2	20MHz	QPSK	18700	6	0	Low	20.44	22.58	0.181	2	PASS
Band2	20MHz	QPSK	18900	6	0	Low	20.92	23.06	0.202	2	PASS
Band2	20MHz	QPSK	18900	1	0	Low	21.08	23.22	0.210	2	PASS
Band2	20MHz	QPSK	19100	1	5	High	20.78	22.92	0.196	2	PASS
Band2	20MHz	QPSK	19100	6	0	High	20.87	23.01	0.200	2	PASS
Band2	20MHz	16QAM	18700	1	0	Low	20.3	22.44	0.175	2	PASS
Band2	20MHz	16QAM	18700	6	0	Low	20.45	22.59	0.182	2	PASS
Band2	20MHz	16QAM	18900	1	0	Low	20.8	22.94	0.197	2	PASS
Band2	20MHz	16QAM	18900	6	0	Low	20.92	23.06	0.202	2	PASS
Band2	20MHz	16QAM	19100	1	5	High	20.61	22.75	0.188	2	PASS
Band2	20MHz	16QAM	19100	6	0	High	20.87	23.01	0.200	2	PASS

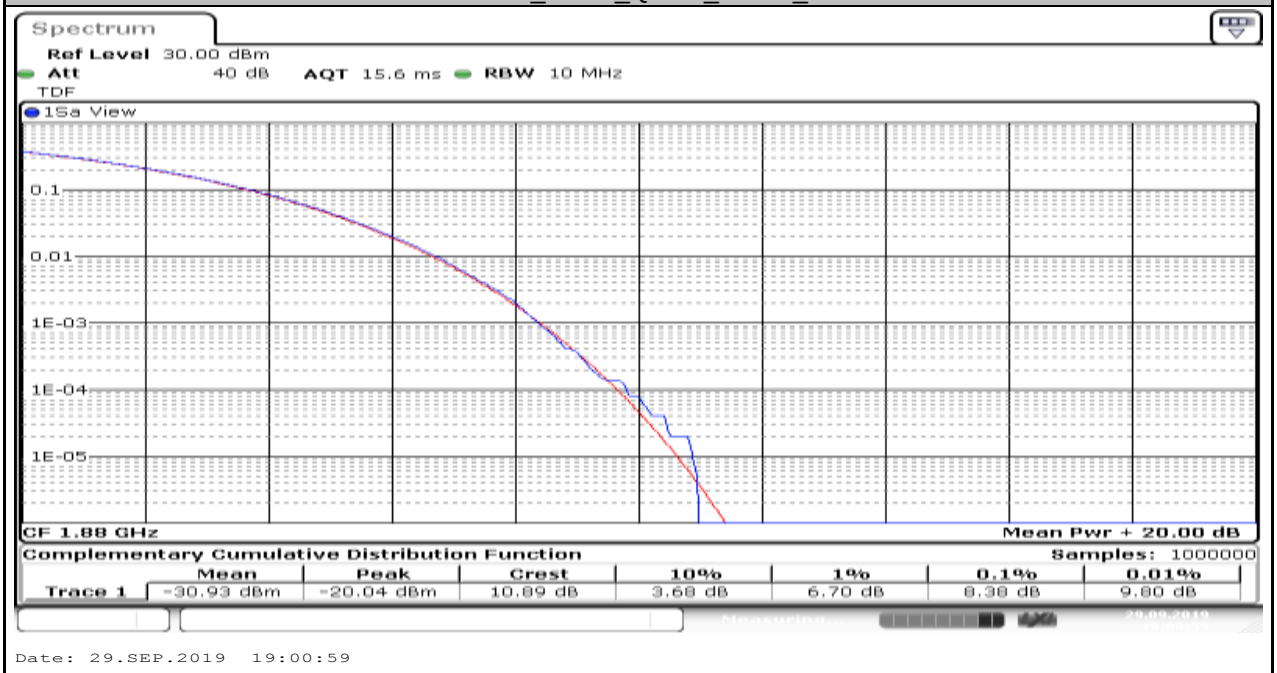
Appendix A.2: Peak-to-Average Ratio (CCDF) for M1

Test Result

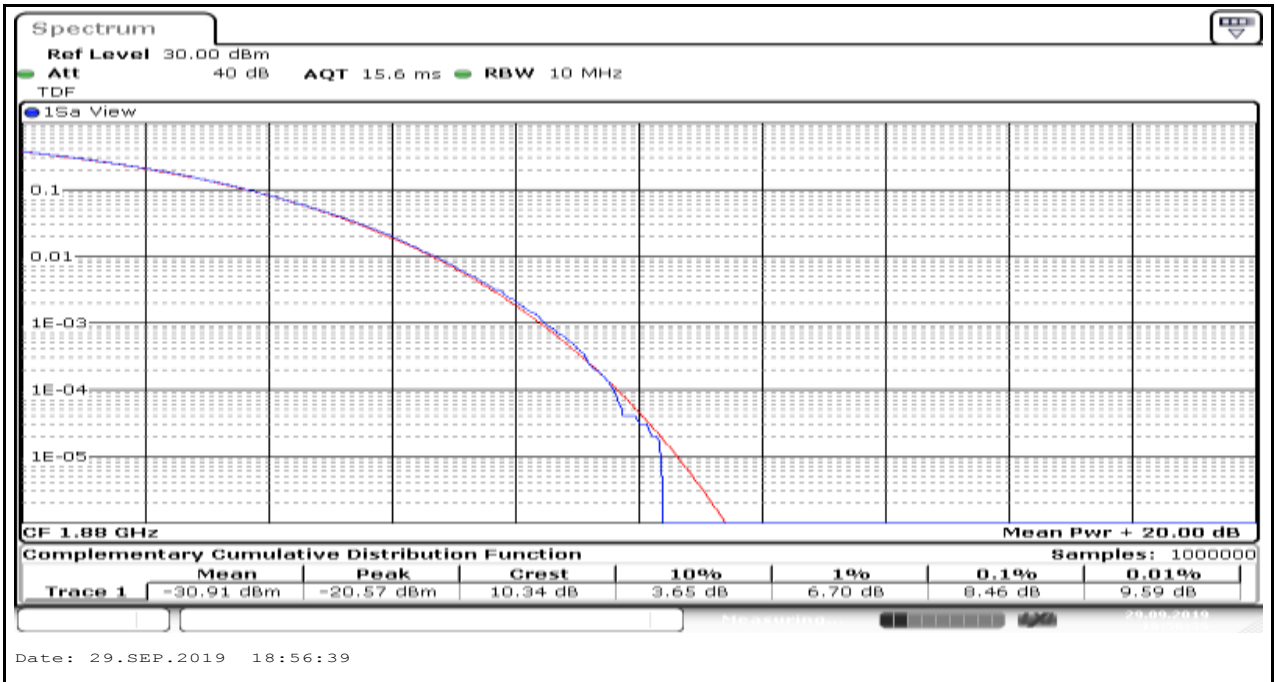
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NBIndex	Result(dB)	Limit(dB)	Verdict
Band2	3MHz	QPSK	18900	6	0	Low	8.38	<=13	PASS
Band2	10MHz	QPSK	18900	6	0	Low	8.46	<=13	PASS
Band2	15MHz	QPSK	18900	6	0	Low	8.52	<=13	PASS
Band2	5MHz	QPSK	18900	6	0	Low	4.75	<=13	PASS
Band2	20MHz	QPSK	18900	6	0	Low	8.43	<=13	PASS
Band2	1.4MHz	QPSK	18900	6	0	Low	8.17	<=13	PASS
Band2	15MHz	16QAM	18900	6	0	Low	10.61	<=13	PASS
Band2	10MHz	16QAM	18900	6	0	Low	10.32	<=13	PASS
Band2	5MHz	16QAM	18900	6	0	Low	10.03	<=13	PASS
Band2	1.4MHz	16QAM	18900	6	0	Low	11.77	<=13	PASS
Band2	3MHz	16QAM	18900	6	0	Low	11.68	<=13	PASS
Band2	20MHz	16QAM	18900	6	0	Low	8.14	<=13	PASS

Test Graphs

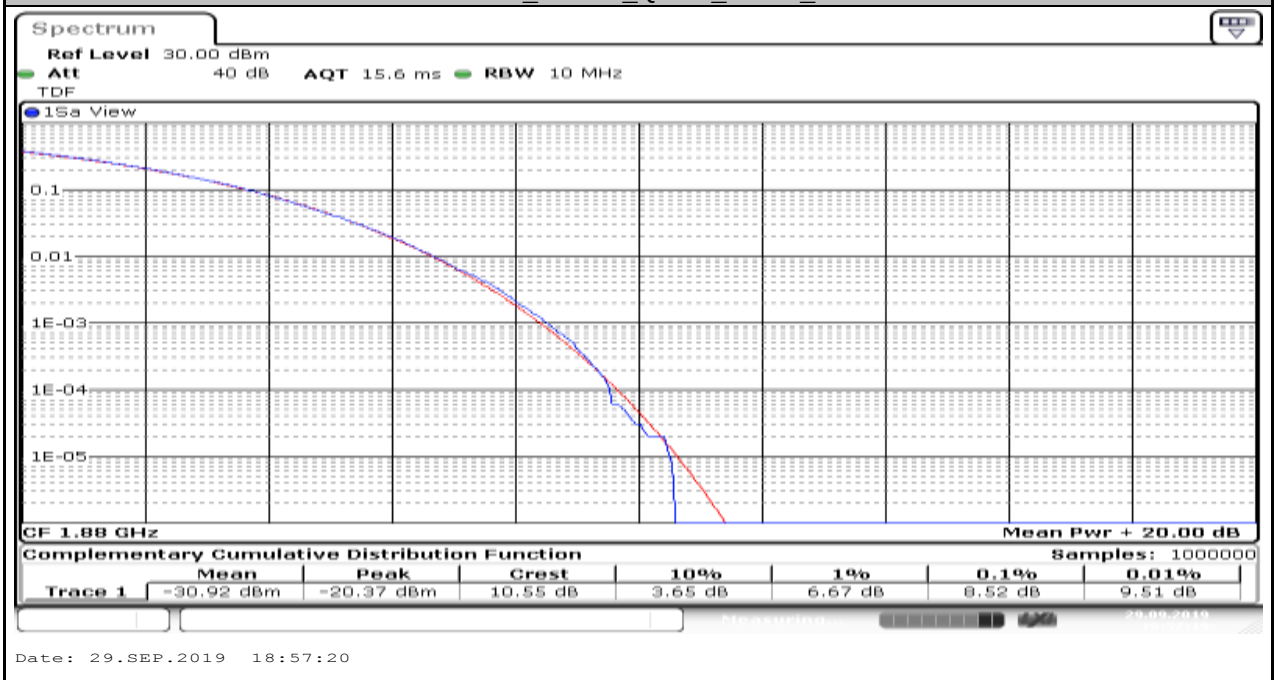
Band2_3MHz_QPSK_18900_6



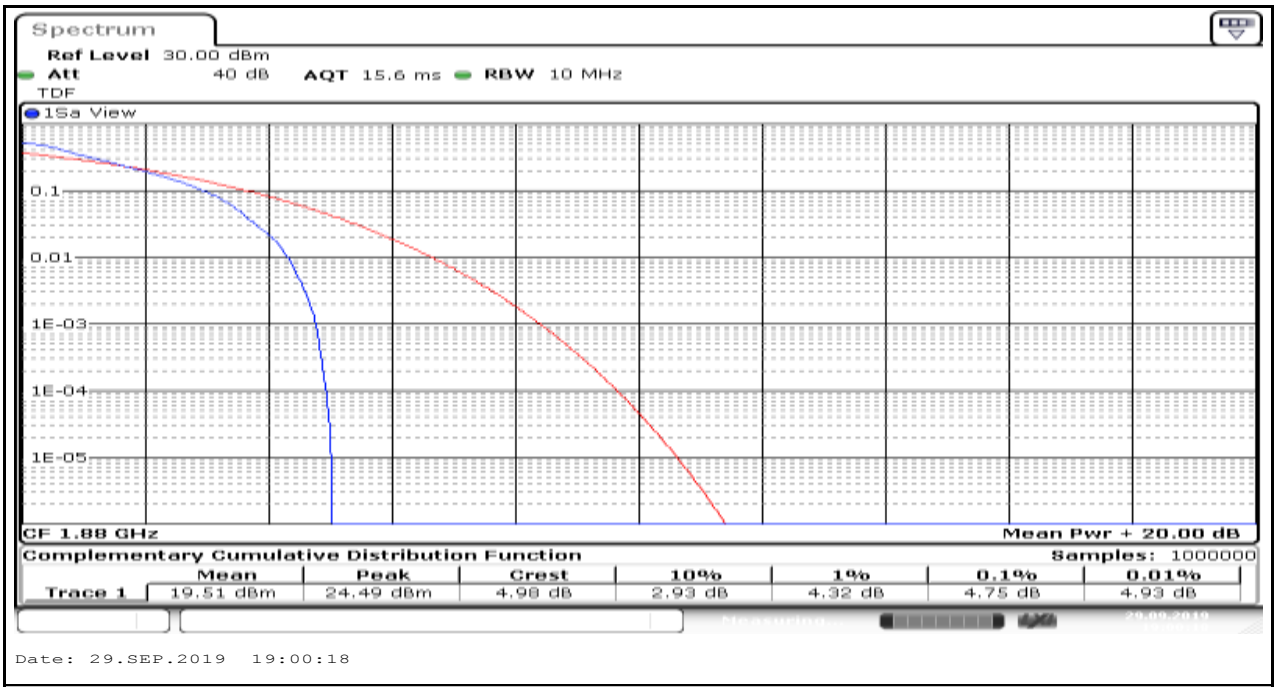
Band2_10MHz_QPSK_18900_6



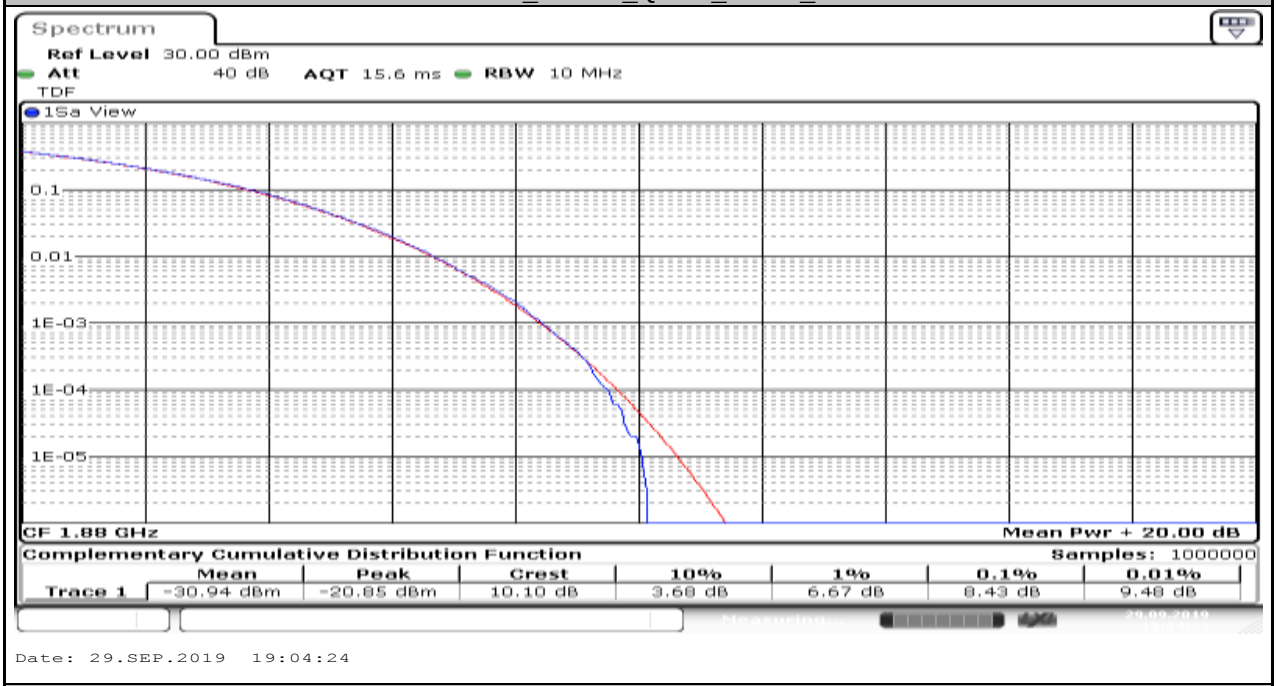
Band2_15MHz_QPSK_18900_6



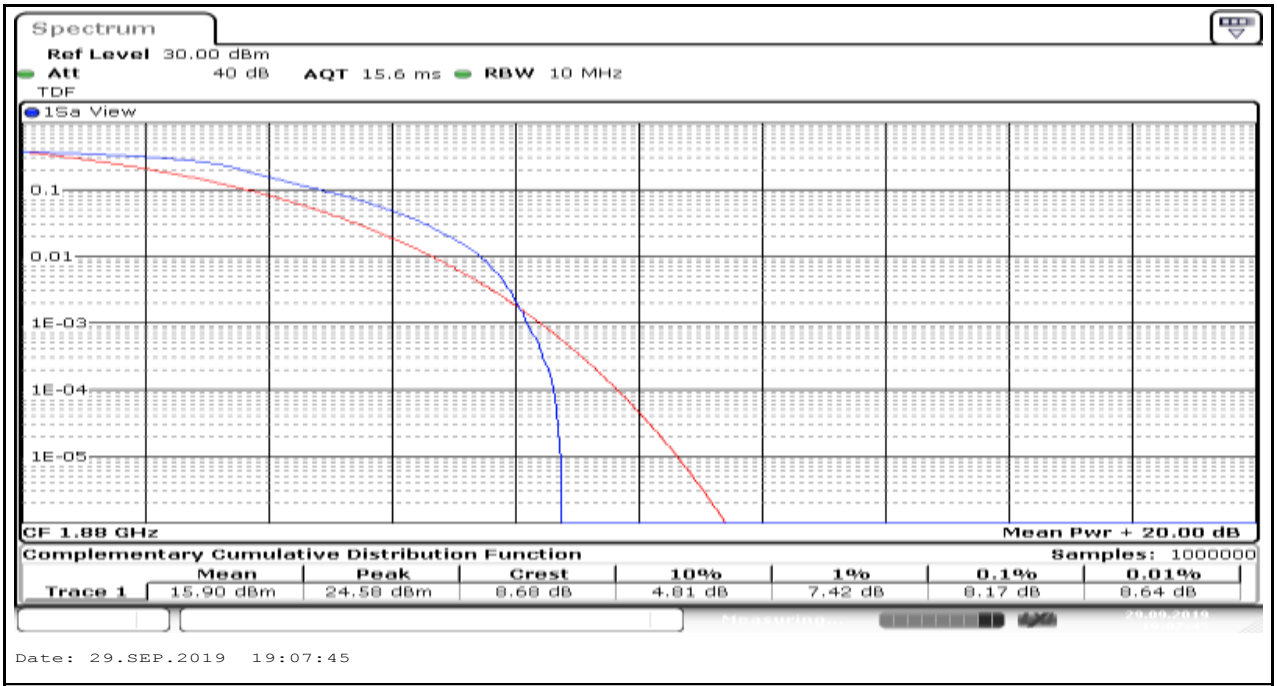
Band2_5MHz_QPSK_18900_6



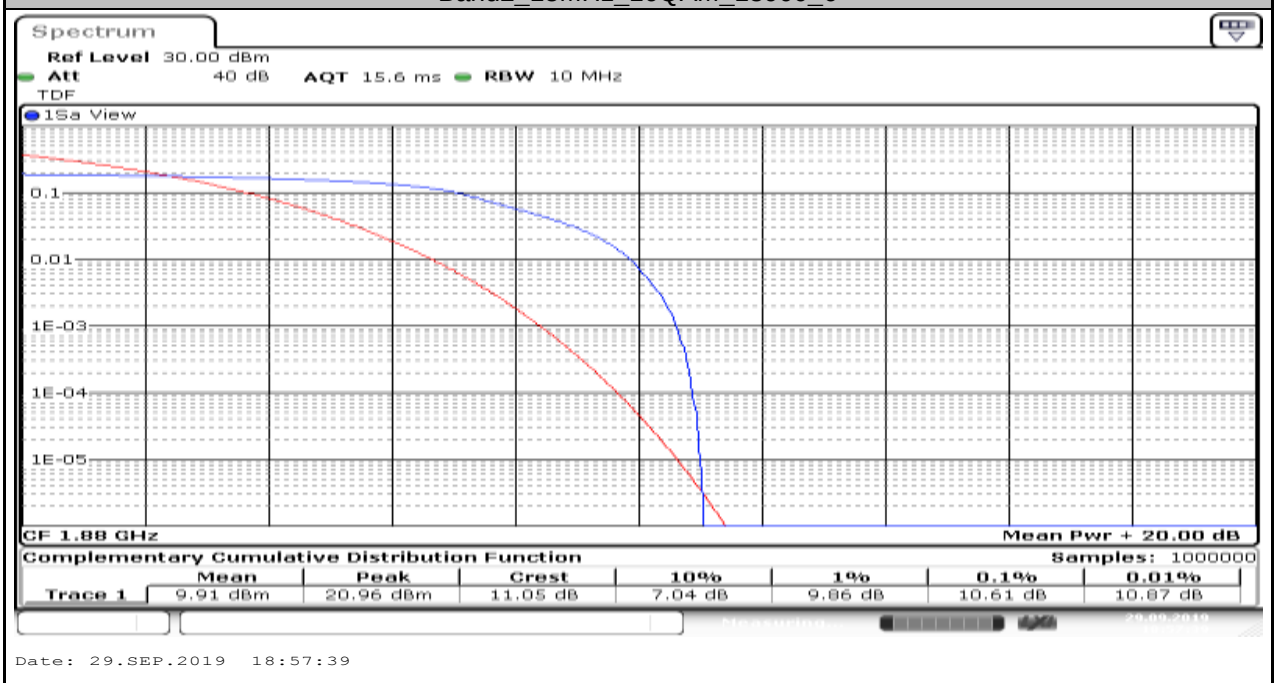
Band2_20MHz_QPSK_18900_6



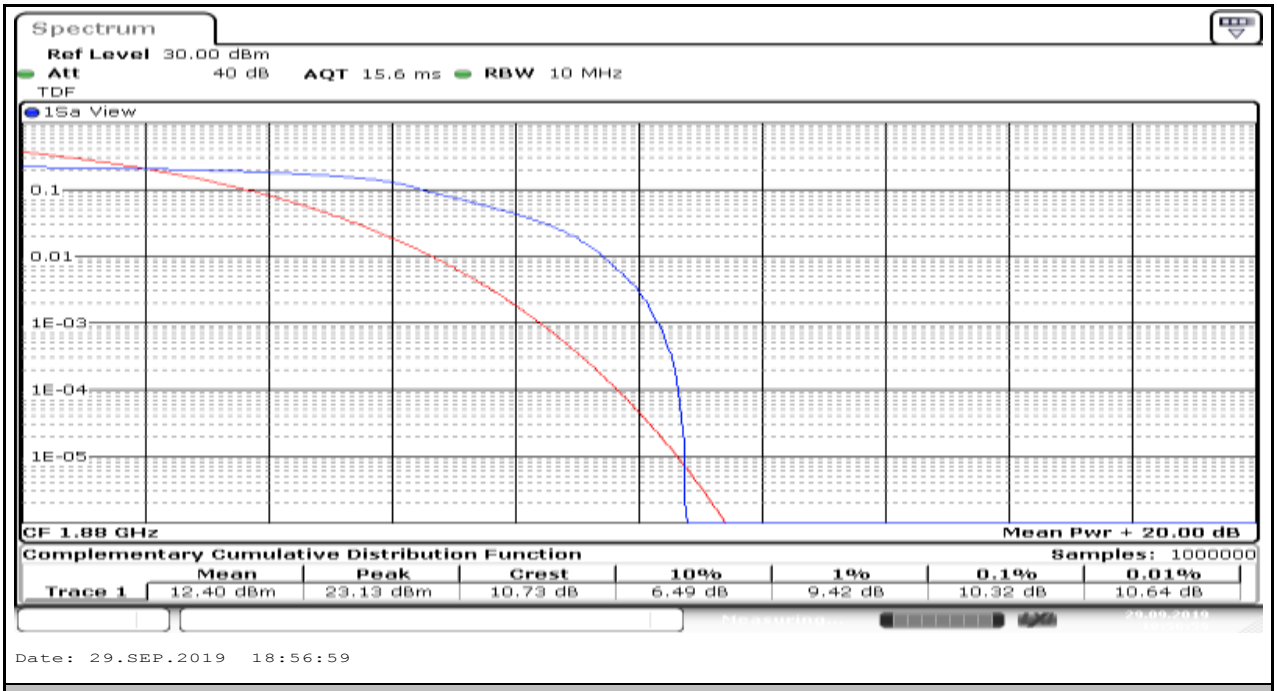
Band2_1.4MHz_QPSK_18900_6



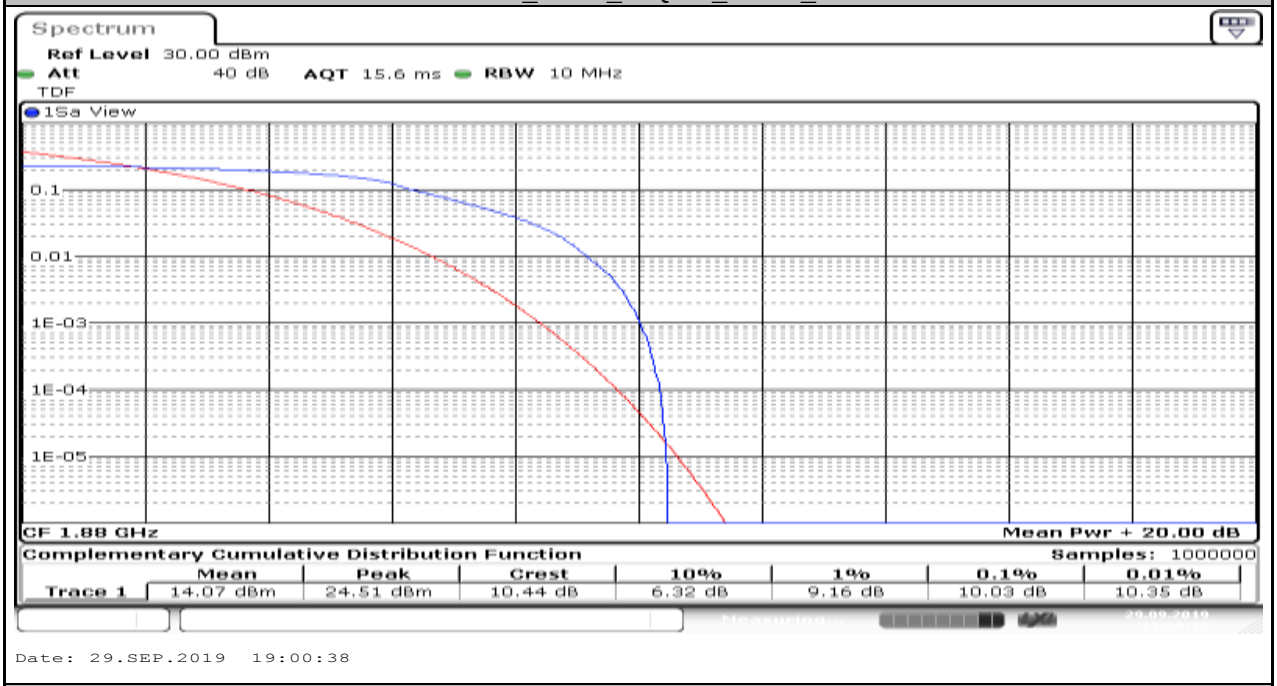
Band2_15MHz_16QAM_18900_6



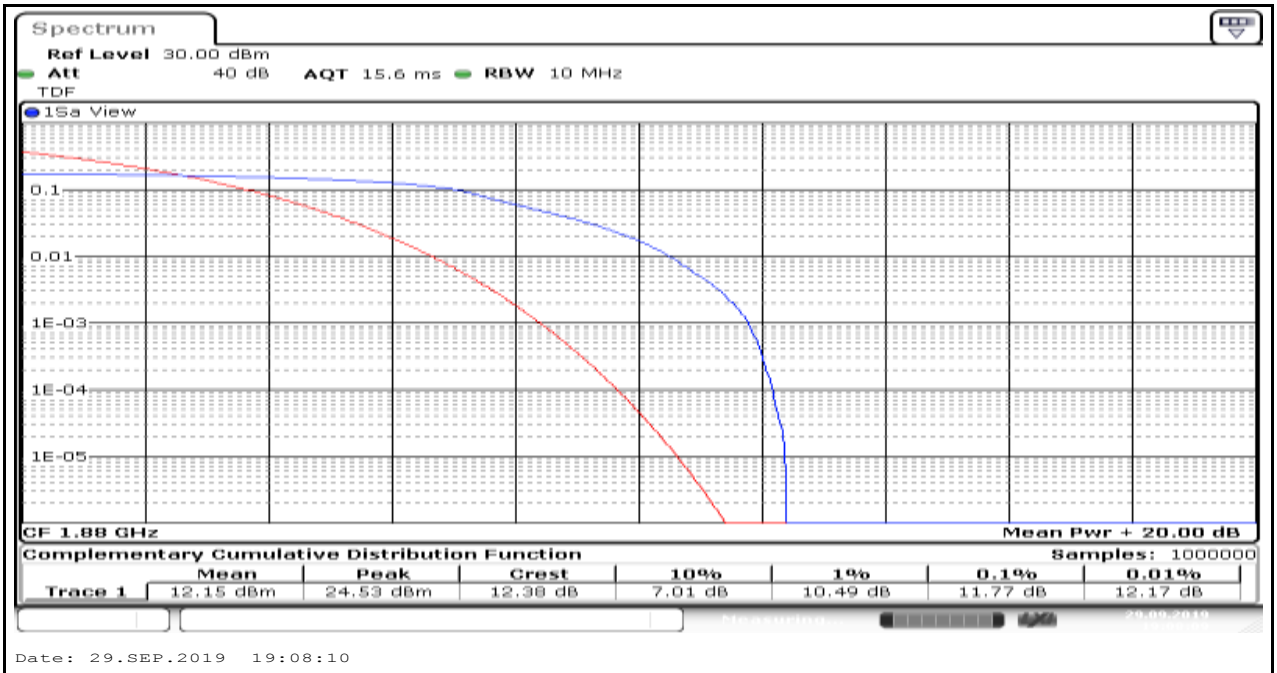
Band2_10MHz_16QAM_18900_6



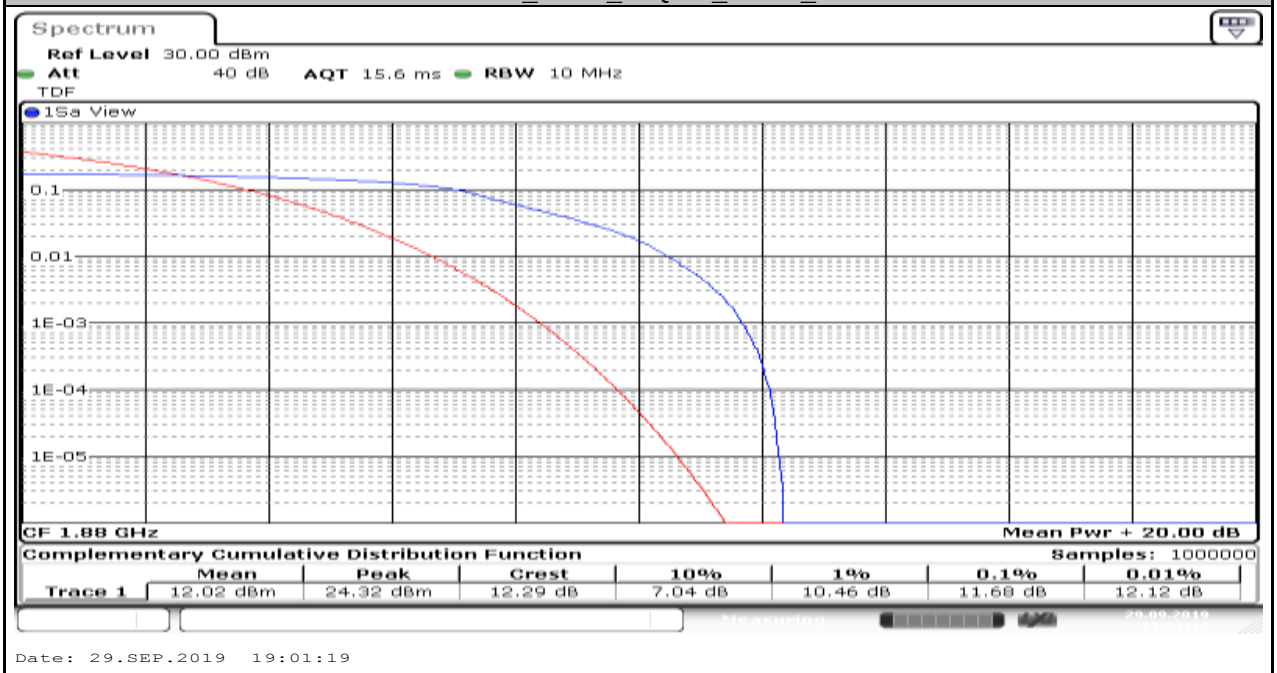
Band2_5MHz_16QAM_18900_6



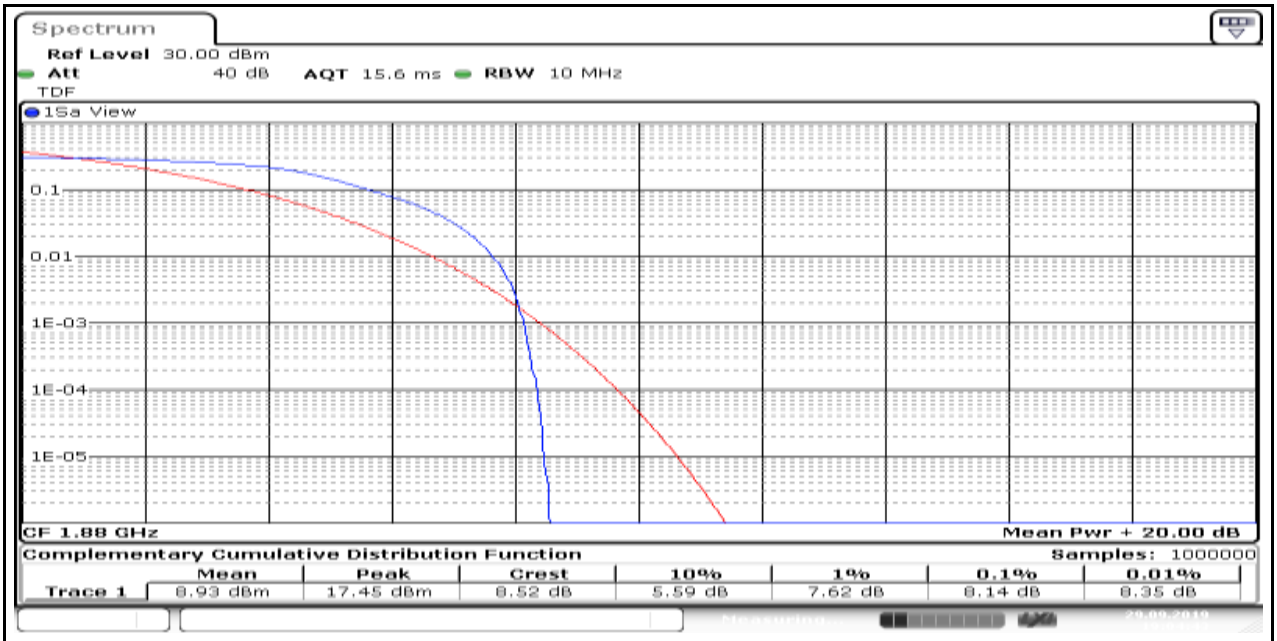
Band2_1.4MHz_16QAM_18900_6



Band2_3MHz_16QAM_18900_6



Band2_20MHz_16QAM_18900_6



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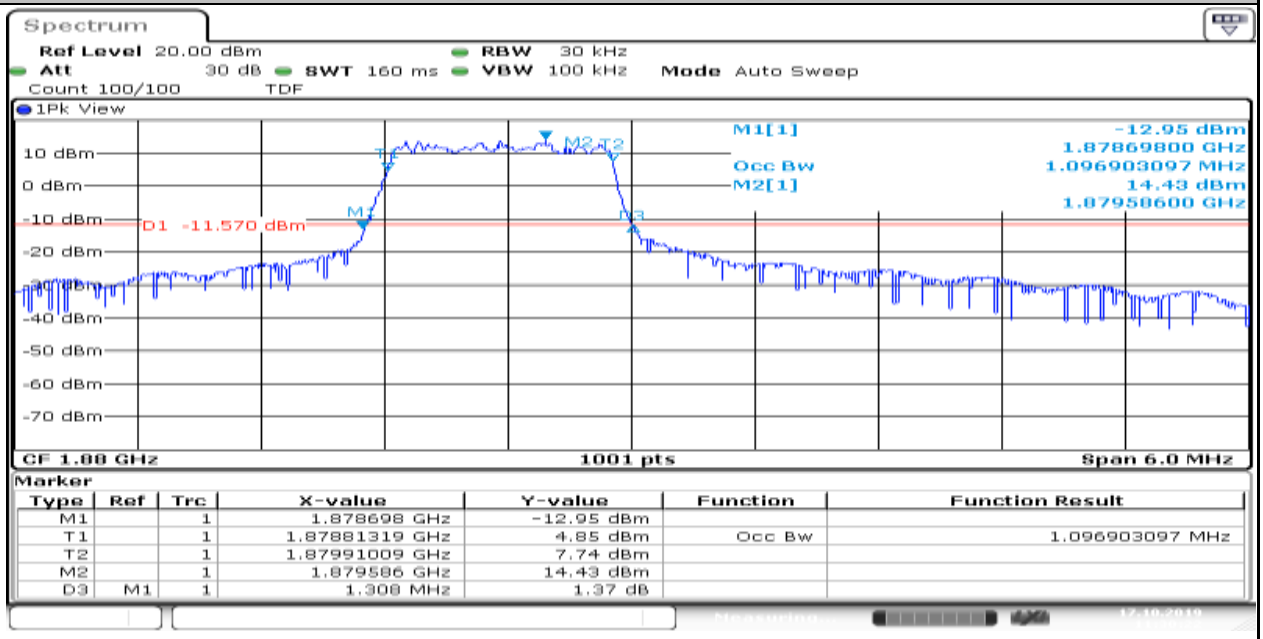
Appendix A.3: 26dB Bandwidth and Occupied Bandwidth for M1

Test Result

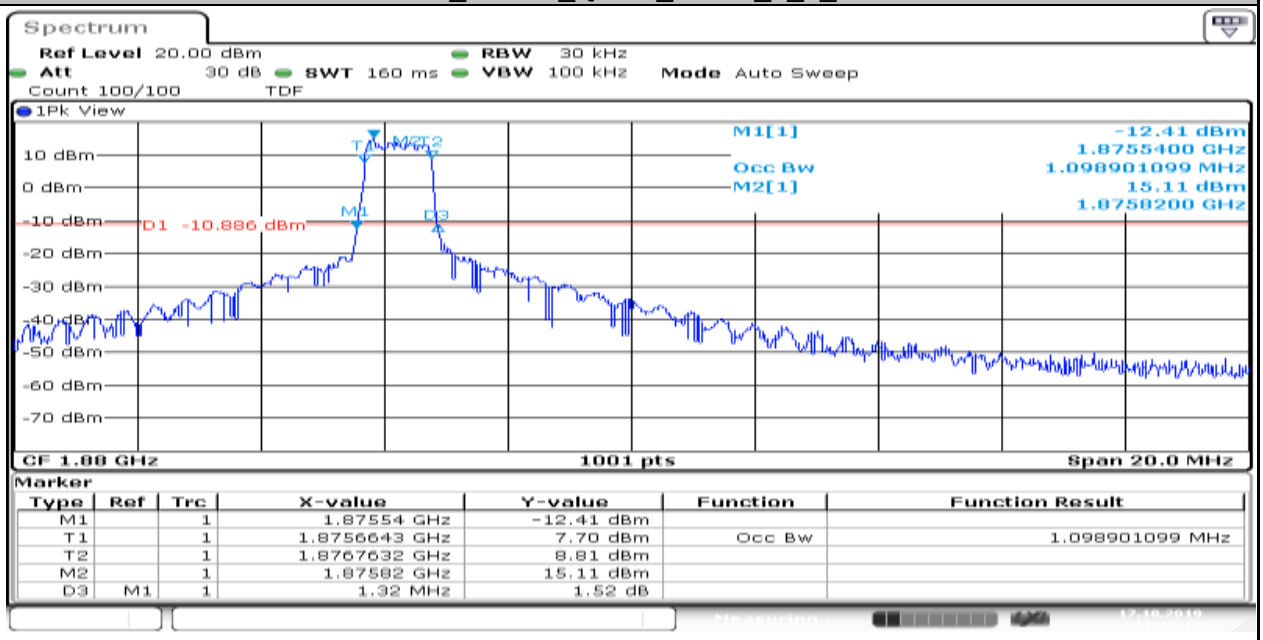
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)	Verdict
Band2	3MHz	QPSK	18900	6	0	Low	1.097	1.308	PASS
Band2	10MHz	QPSK	18900	6	0	Low	1.099	1.320	PASS
Band2	1.4MHz	QPSK	18900	6	0	Low	1.103	1.311	PASS
Band2	15MHz	QPSK	18900	6	0	Low	1.109	1.380	PASS
Band2	5MHz	QPSK	18900	6	0	Low	1.099	1.330	PASS
Band2	20MHz	QPSK	18900	6	0	Low	1.119	1.400	PASS
Band2	3MHz	16QAM	18900	6	0	Low	1.097	1.308	PASS
Band2	10MHz	16QAM	18900	6	0	Low	1.119	1.340	PASS
Band2	1.4MHz	16QAM	18900	6	0	Low	1.091	1.272	PASS
Band2	15MHz	16QAM	18900	6	0	Low	1.109	1.380	PASS
Band2	5MHz	16QAM	18900	6	0	Low	1.099	1.330	PASS
Band2	20MHz	16QAM	18900	6	0	Low	1.119	1.400	PASS

Test Graphs

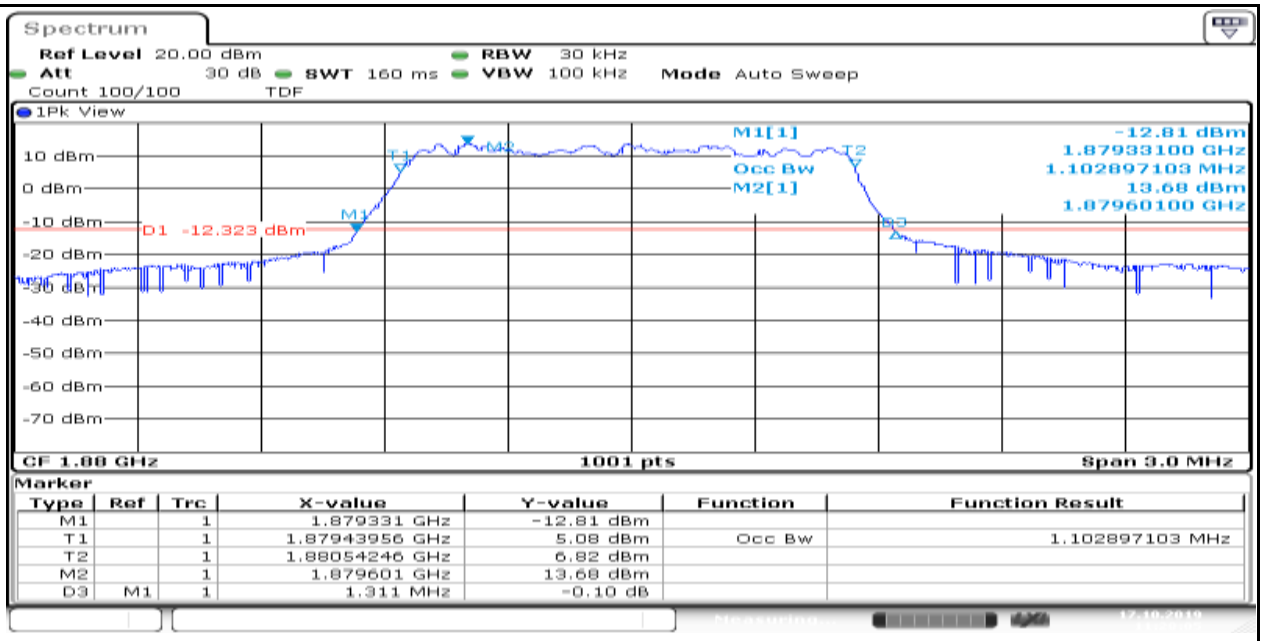
Band2_3MHz_QPSK_18900_6_0_Low



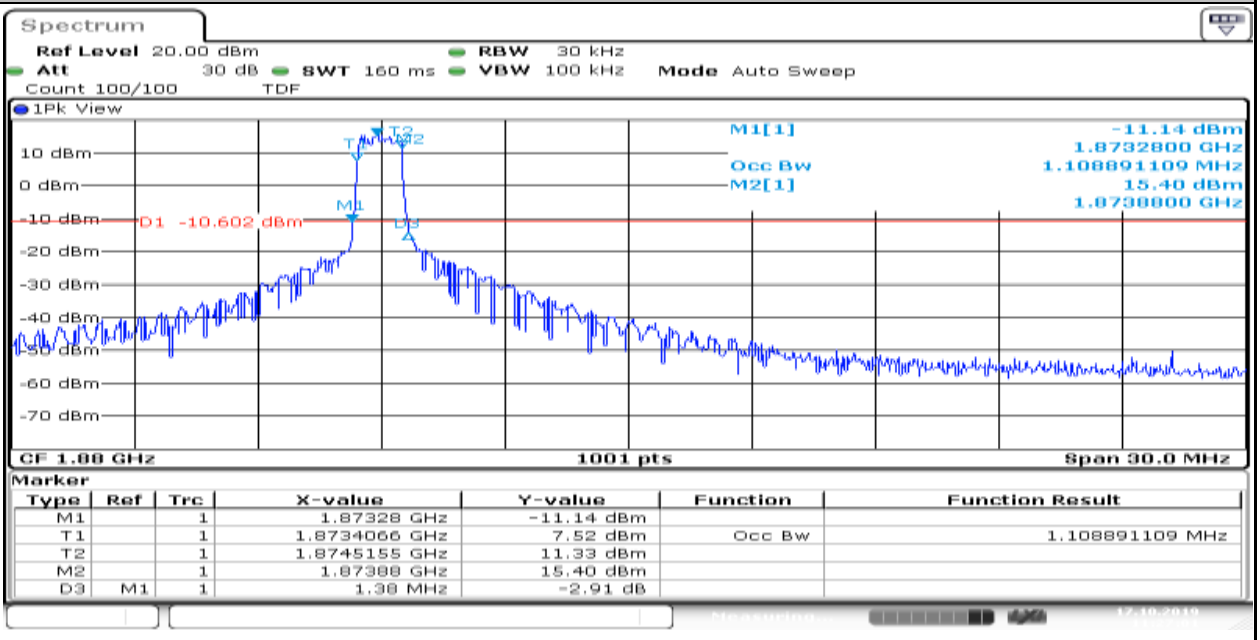
Band2_10MHz_QPSK_18900_6_0_Low



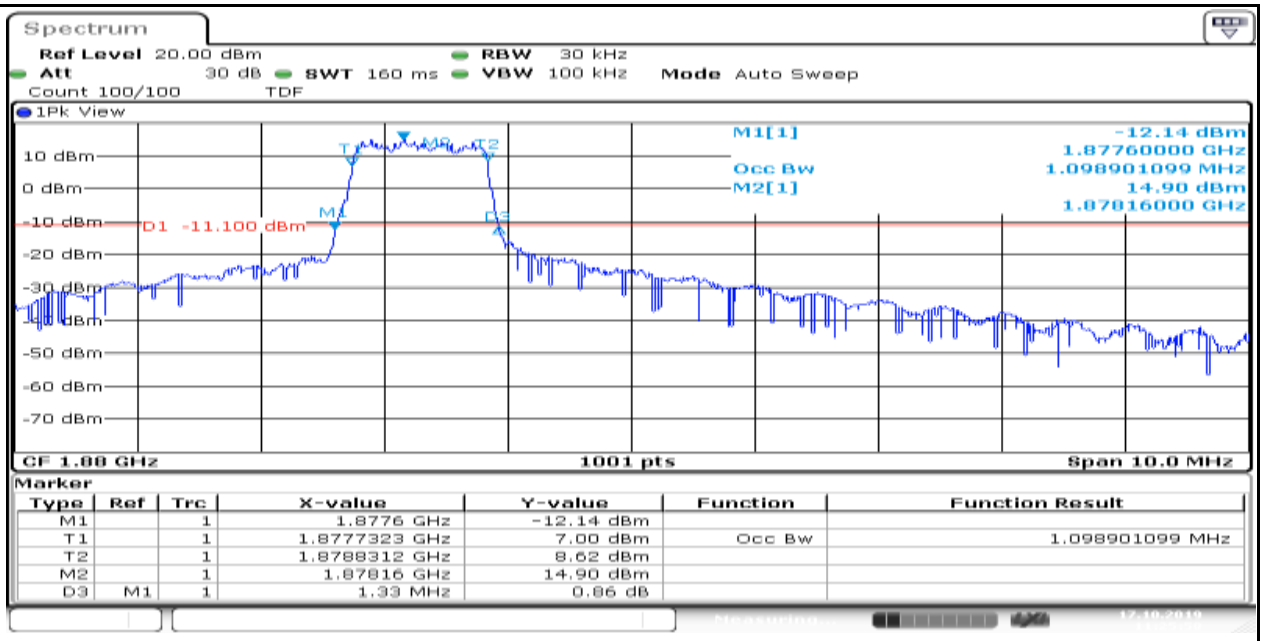
Band2_1.4MHz_QPSK_18900_6_0_Low



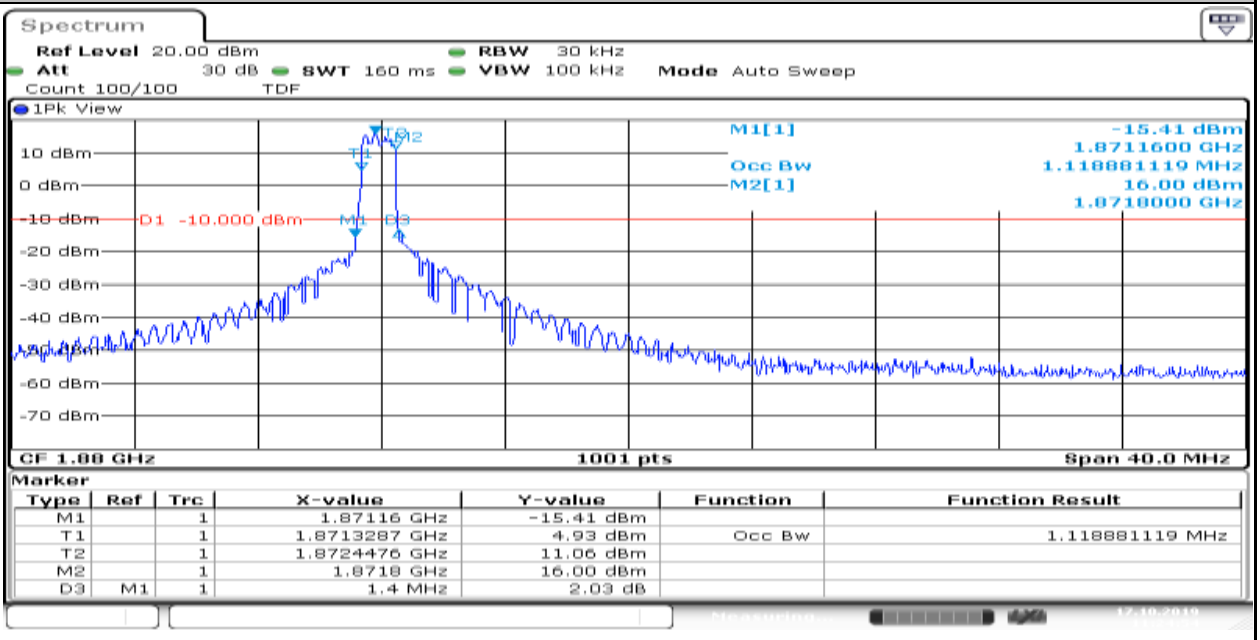
Band2_15MHz_QPSK_18900_6_0_Low



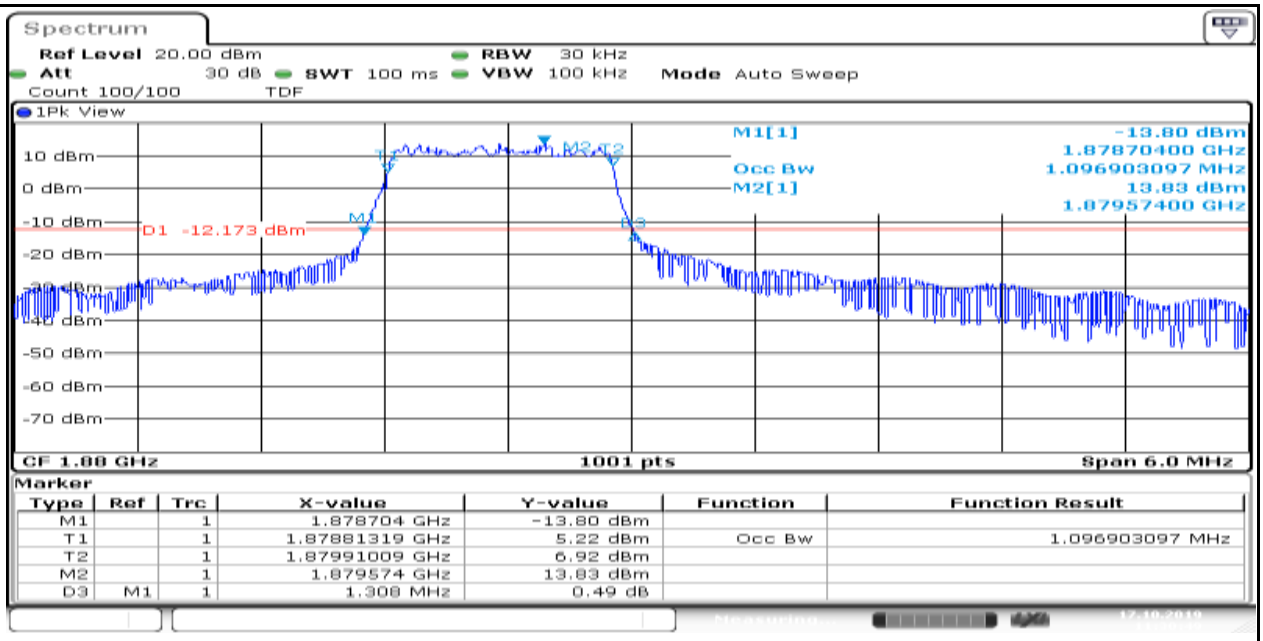
Band2_5MHz_QPSK_18900_6_0_Low



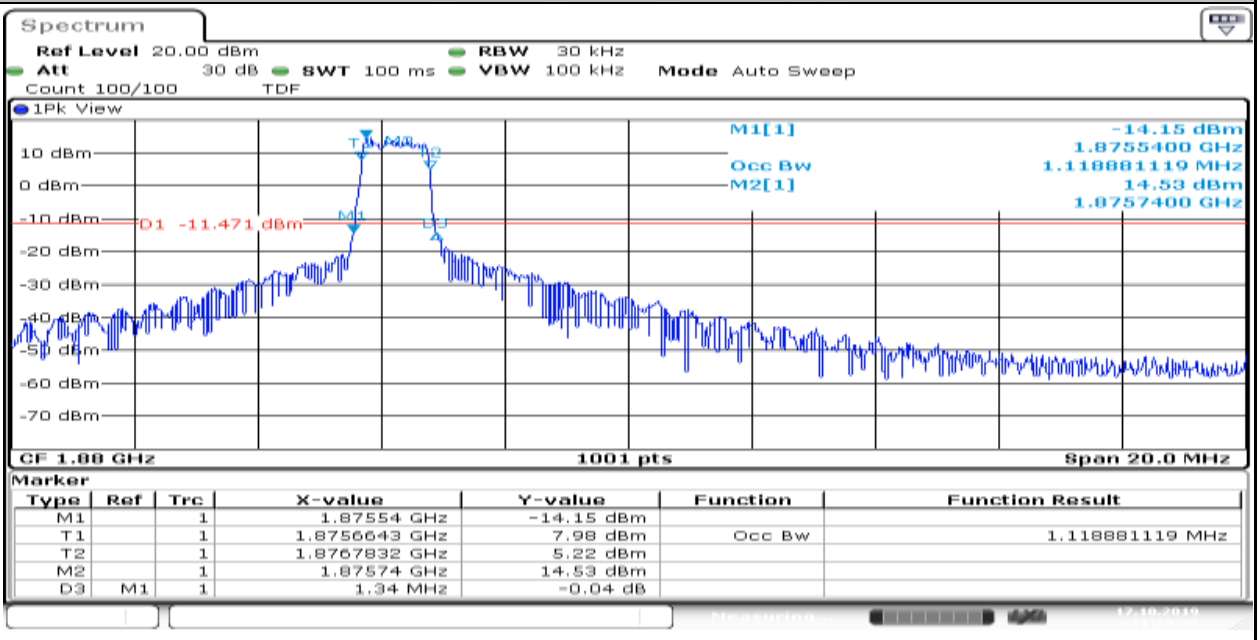
Band2_20MHz_QPSK_18900_6_0_Low



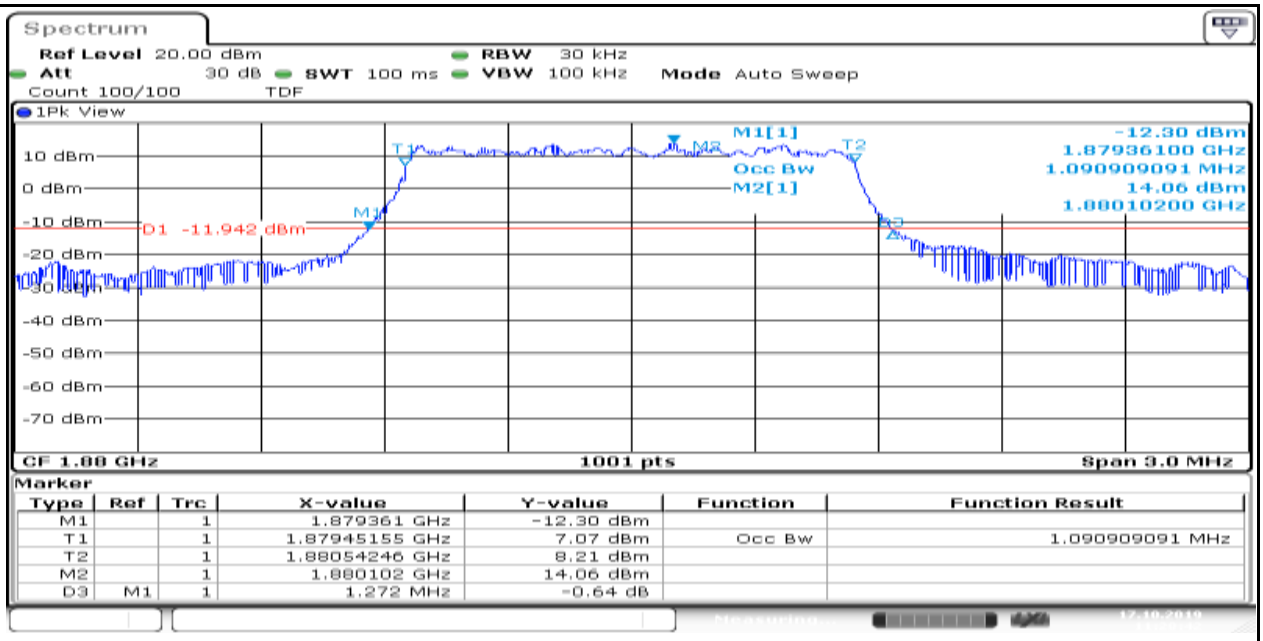
Band2_3MHz_16QAM_18900_6_0_Low



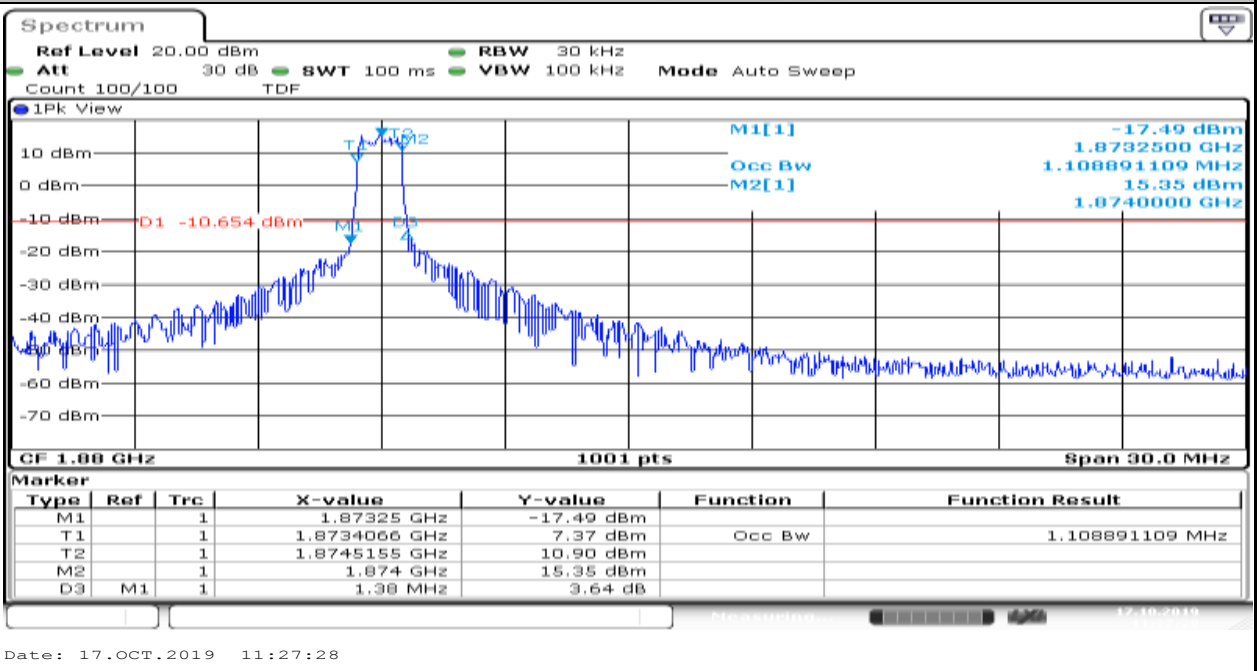
Band2_10MHz_16QAM_18900_6_0_Low



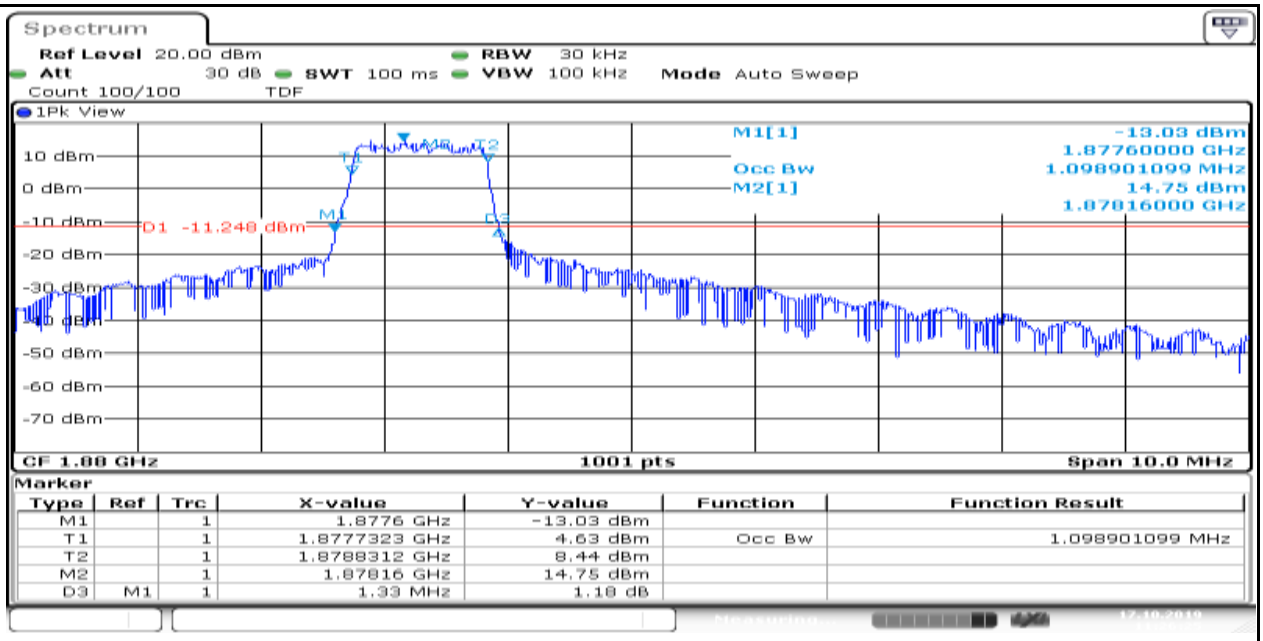
Band2_1.4MHz_16QAM_18900_6_0_Low



Band2_15MHz_16QAM_18900_6_0_Low



Band2_5MHz_16QAM_18900_6_0_Low



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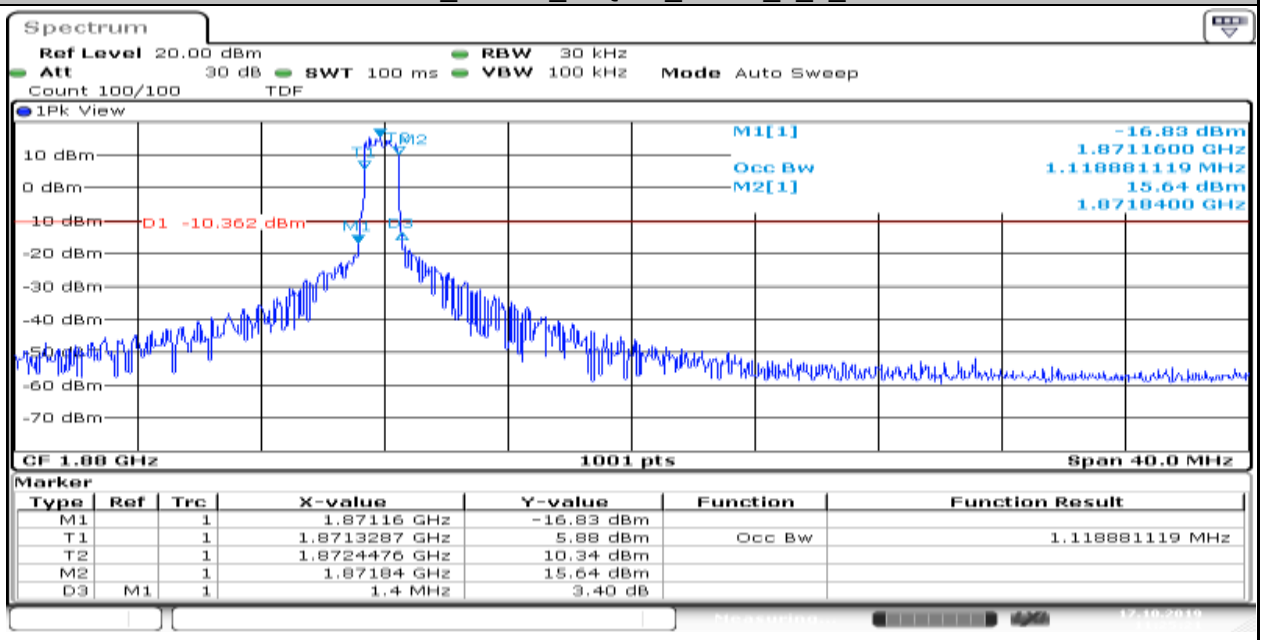
Band2_20MHz_16QAM_18900_6_0_Low



Date: 17.OCT.2019 11:25:22

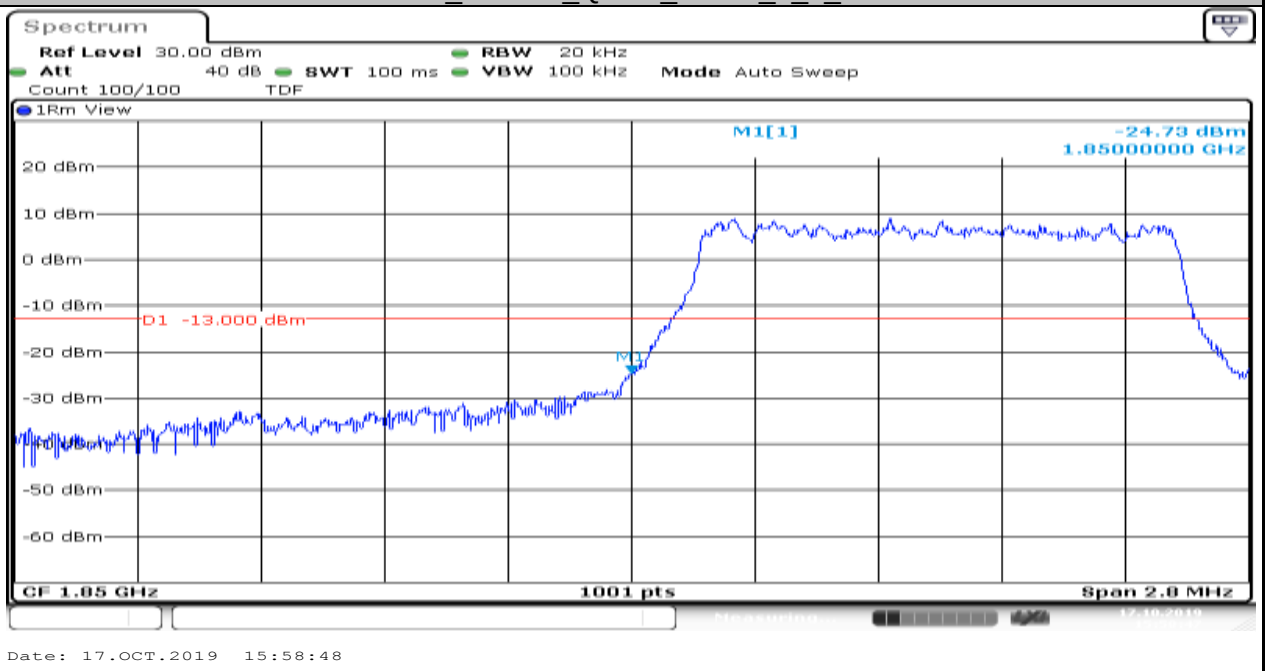
Appendix A.4: Band Edge for M1

Test Result

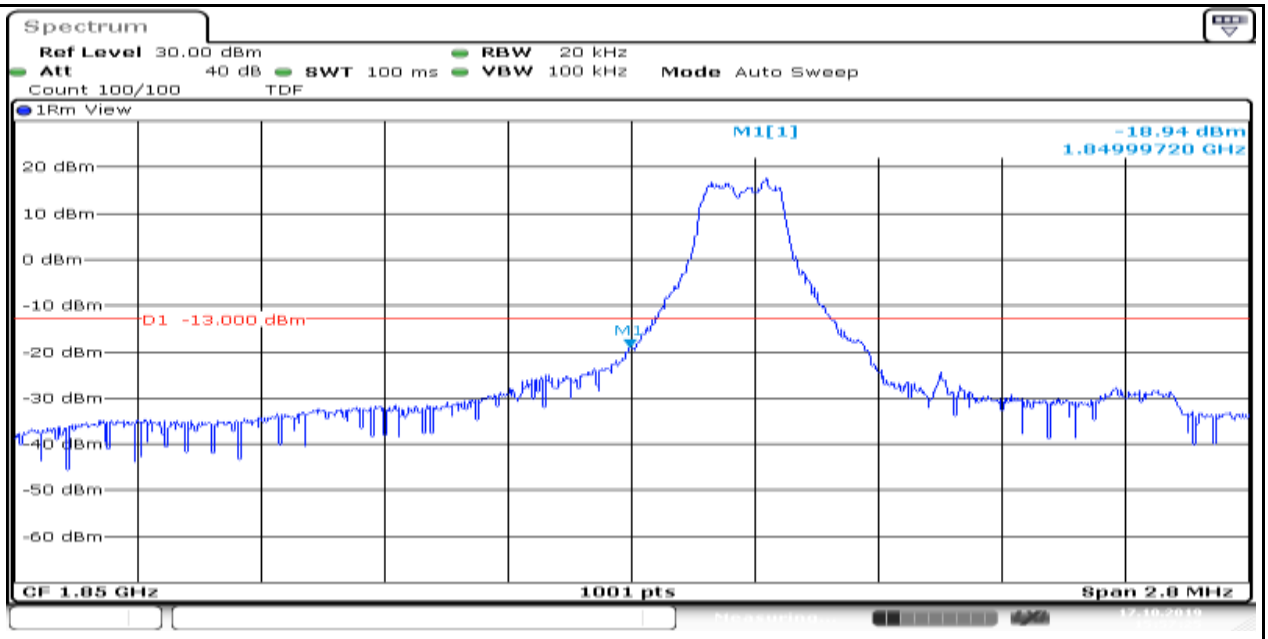
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Result (dBm)	Verdict
Band2	1.4MHz	QPSK	18607	6	0	Low	-24.73	PASS
Band2	1.4MHz	QPSK	18607	1	0	Low	-18.94	PASS
Band2	1.4MHz	QPSK	19193	6	0	Low	-21.06	PASS
Band2	1.4MHz	QPSK	19193	1	5	Low	-24.74	PASS
Band2	1.4MHz	16QAM	18607	6	0	Low	-24.87	PASS
Band2	1.4MHz	16QAM	18607	1	0	Low	-19.04	PASS
Band2	1.4MHz	16QAM	19193	6	0	Low	-20.62	PASS
Band2	1.4MHz	16QAM	19193	1	5	Low	-23.67	PASS

Test Graphs

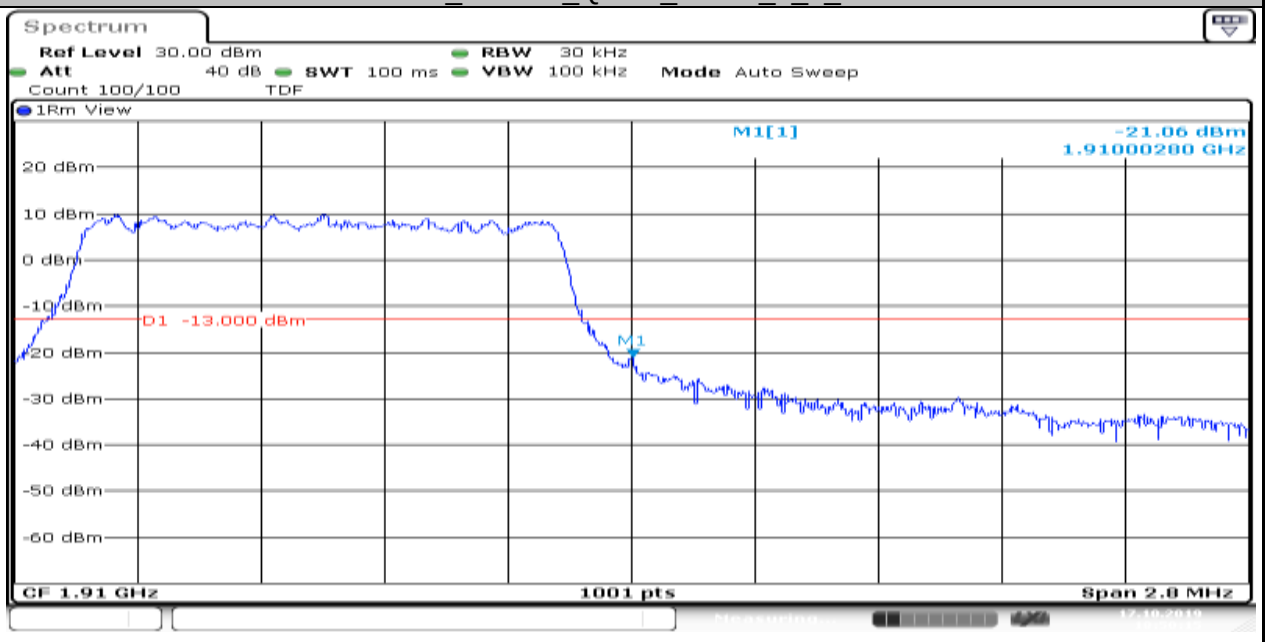
Band2_1.4MHz_QPSK_18607_6_0_Low



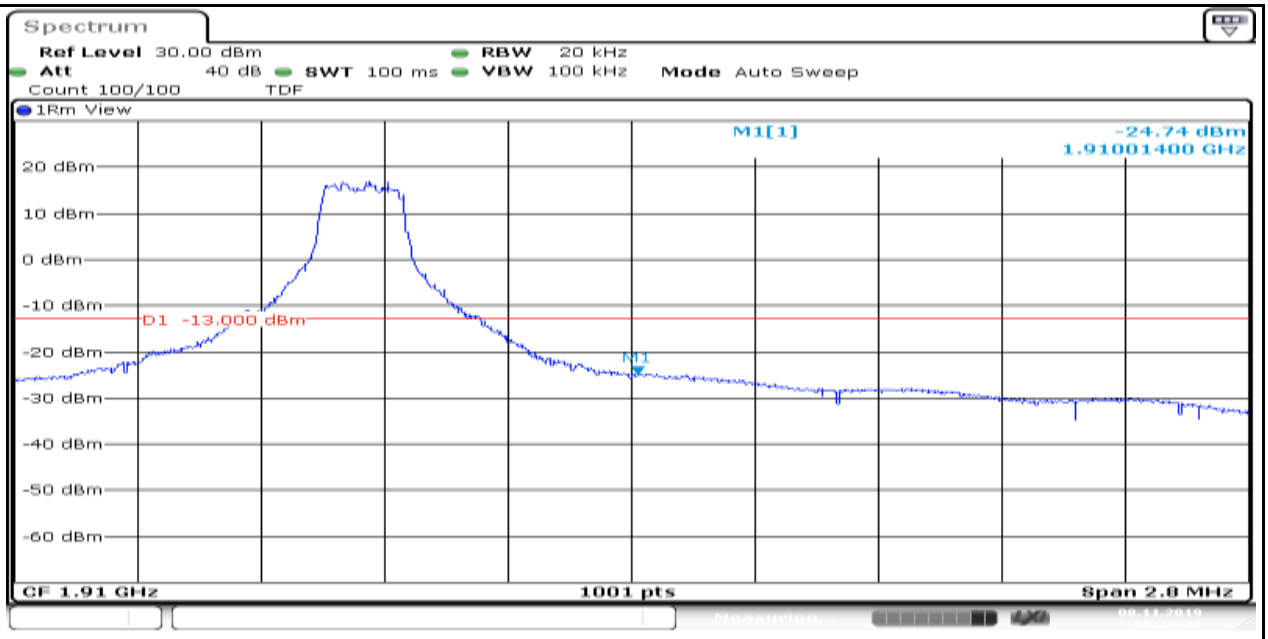
Band2_1.4MHz_QPSK_18607_1_0_Low



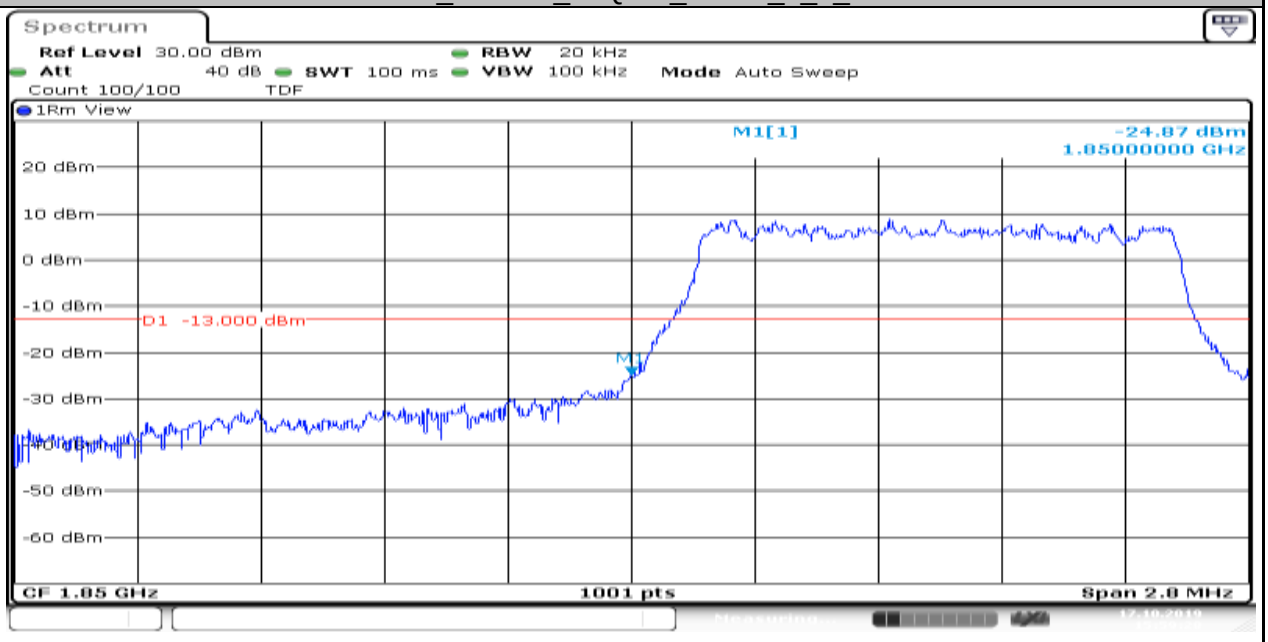
Band2_1.4MHz_QPSK_19193_6_0_Low



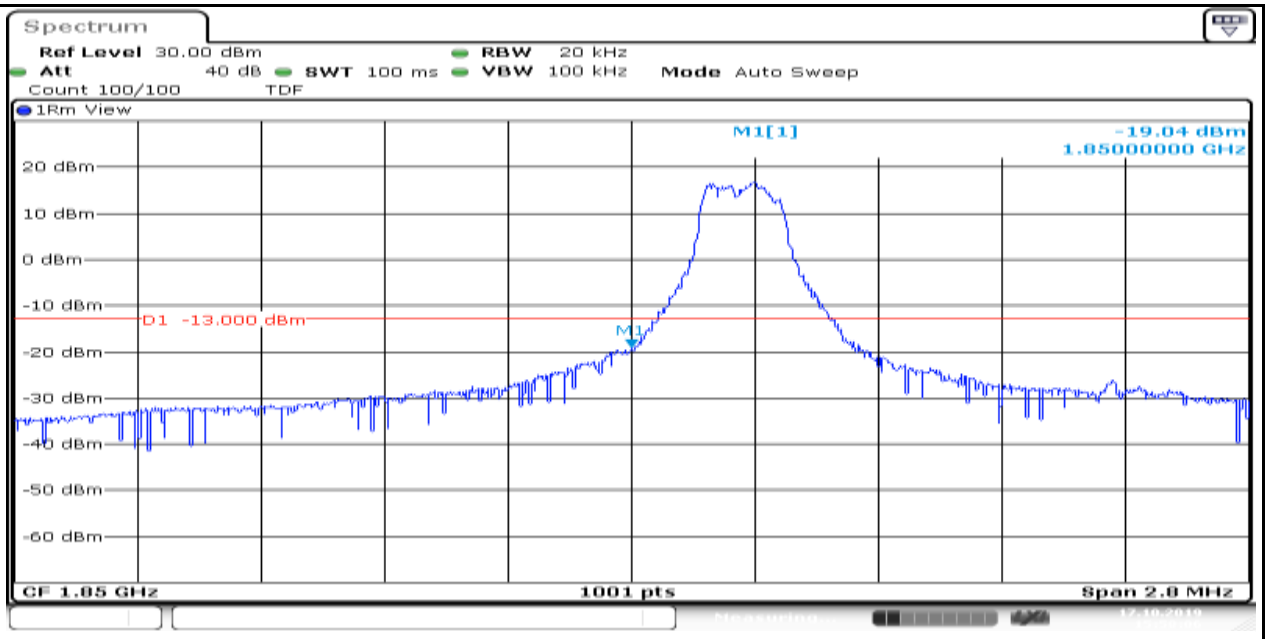
Band2_1.4MHz_QPSK_19193_1_5_Low



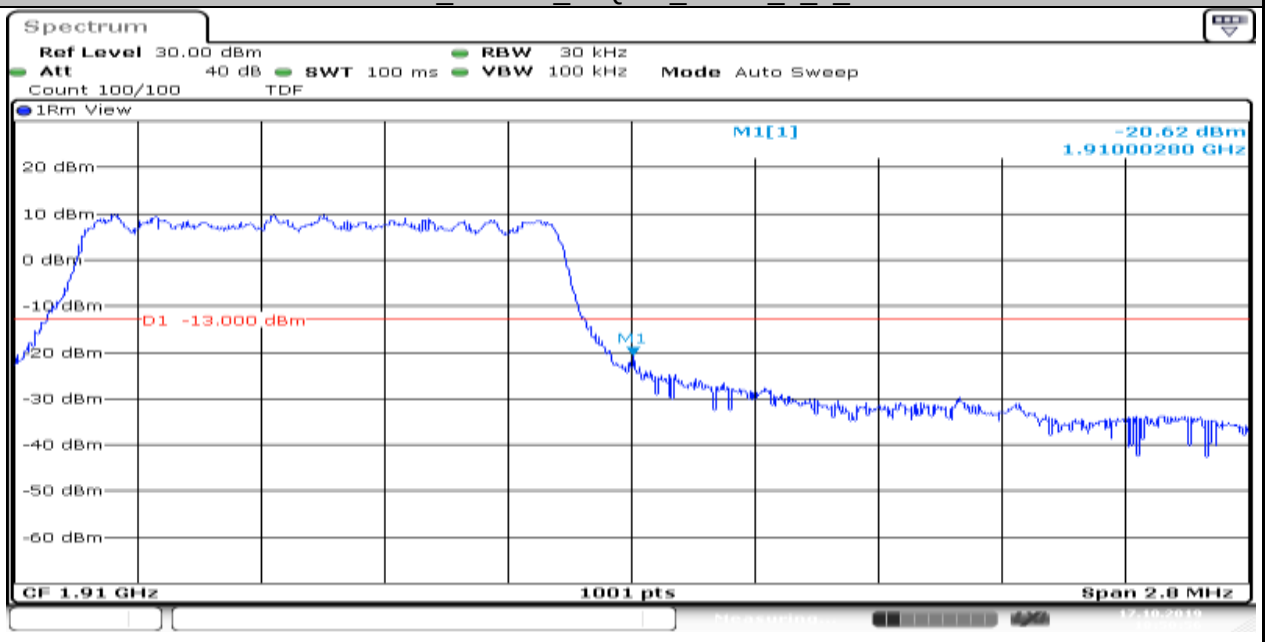
Band2_1.4MHz_16QAM_18607_6_0_Low



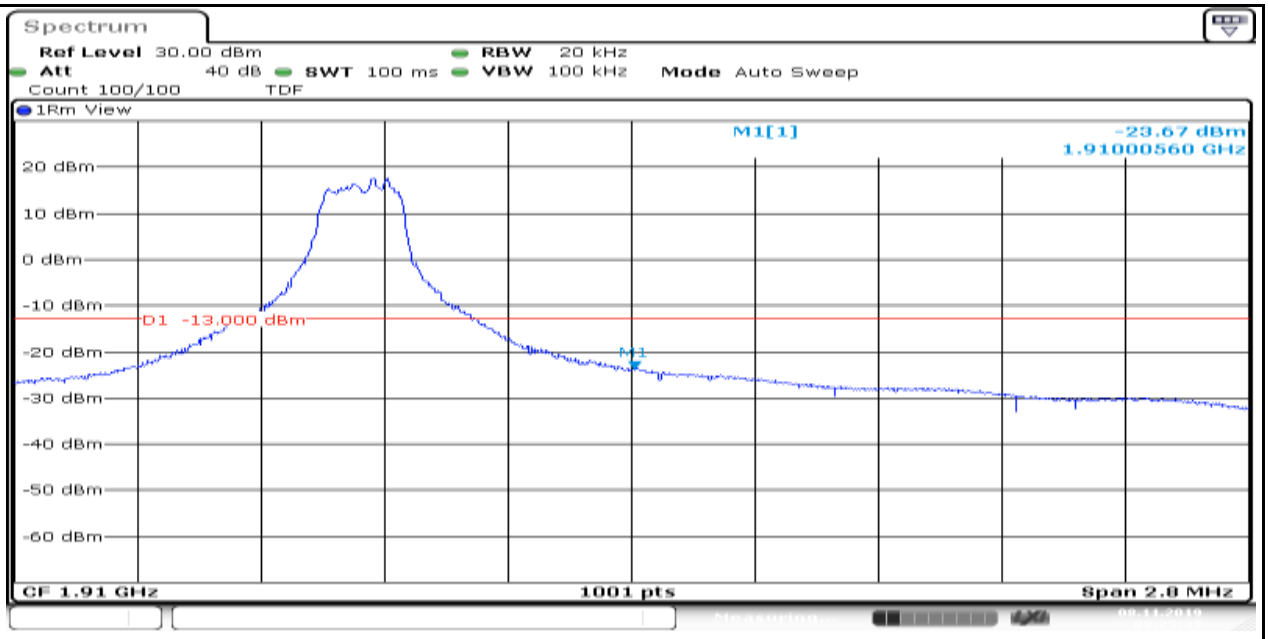
Band2_1.4MHz_16QAM_18607_1_0_Low



Band2_1.4MHz_16QAM_19193_6_0_Low



Band2_1.4MHz_16QAM_19193_1_5_Low



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Appendix A.5: Conducted Spurious Emission for M1

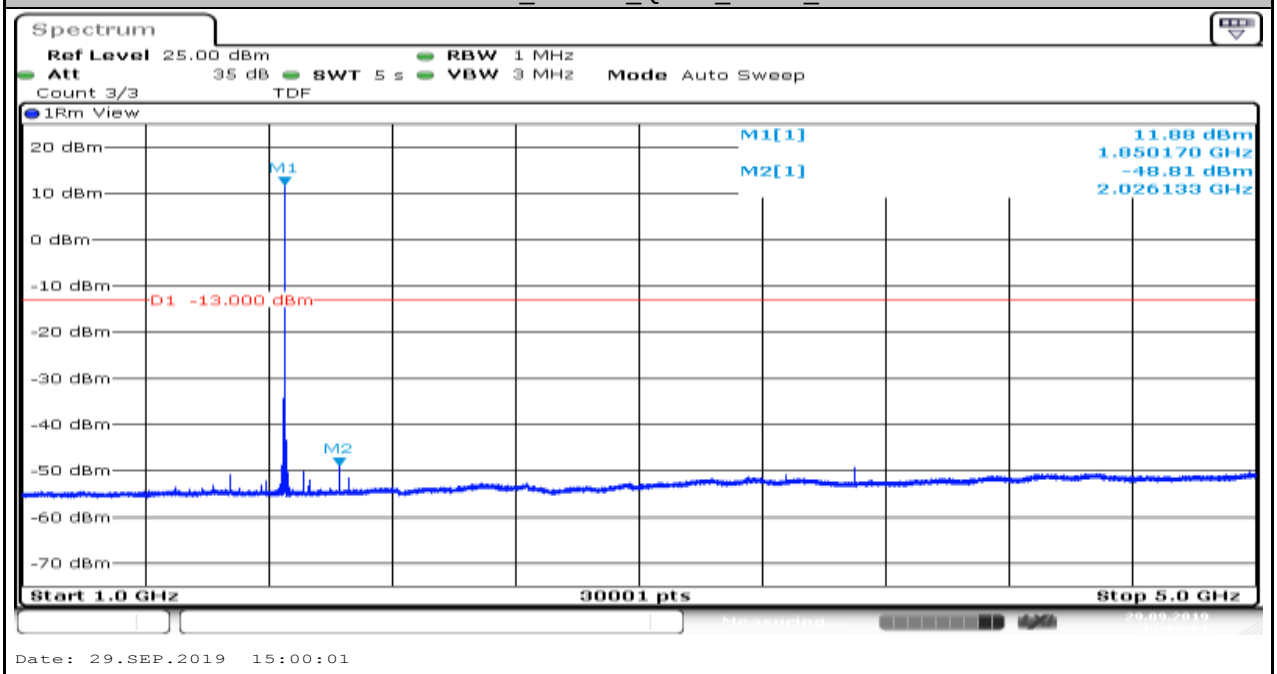
Test Result

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Start Freq	Stop Freq	Result (dBm)	Verdict
Band2	1.4MHz	QPSK	18607	1	0	Low	1000	5000	-48.81	PASS
Band2	1.4MHz	QPSK	18607	1	0	Low	5000	12000	-51.32	PASS
Band2	1.4MHz	QPSK	18607	1	0	Low	12000	26500	-59.55	PASS
Band2	1.4MHz	QPSK	18607	6	0	Low	1000	5000	-49.63	PASS
Band2	1.4MHz	QPSK	18607	6	0	Low	5000	12000	-56	PASS
Band2	1.4MHz	QPSK	18607	6	0	Low	12000	26500	-59.61	PASS
Band2	1.4MHz	QPSK	18607	1	0	Low	30	1000	-44.91	PASS
Band2	1.4MHz	QPSK	18607	6	0	Low	30	1000	-45.51	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	12000	26500	-59.43	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	1000	5000	-46.56	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	5000	12000	-50.77	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	30	1000	-44.65	PASS
Band2	1.4MHz	QPSK	18900	6	0	Low	30	1000	-44.55	PASS
Band2	1.4MHz	QPSK	18900	6	0	Low	1000	5000	-49.38	PASS
Band2	1.4MHz	QPSK	18900	6	0	Low	12000	26500	-59.57	PASS
Band2	1.4MHz	QPSK	18900	6	0	Low	5000	12000	-55.28	PASS
Band2	1.4MHz	QPSK	19193	1	5	Low	12000	26500	-59.56	PASS
Band2	1.4MHz	QPSK	19193	6	0	Low	12000	26500	-59.45	PASS
Band2	1.4MHz	QPSK	19193	6	0	Low	5000	12000	-54.49	PASS
Band2	1.4MHz	QPSK	19193	6	0	Low	1000	5000	-49.72	PASS
Band2	1.4MHz	QPSK	19193	1	5	Low	30	1000	-45.14	PASS
Band2	1.4MHz	QPSK	19193	1	5	Low	1000	5000	-46.24	PASS
Band2	1.4MHz	QPSK	19193	6	0	Low	30	1000	-45.26	PASS
Band2	1.4MHz	QPSK	19193	1	5	Low	5000	12000	-50.36	PASS
Band2	1.4MHz	16QAM	18607	6	0	Low	30	1000	-44.62	PASS
Band2	1.4MHz	16QAM	18607	6	0	Low	1000	5000	-48.9	PASS
Band2	1.4MHz	16QAM	18607	6	0	Low	5000	12000	-55.81	PASS
Band2	1.4MHz	16QAM	18607	6	0	Low	12000	26500	-59.6	PASS
Band2	1.4MHz	16QAM	18607	1	0	Low	5000	12000	-55.27	PASS
Band2	1.4MHz	16QAM	18607	1	0	Low	1000	5000	-48.78	PASS
Band2	1.4MHz	16QAM	18607	1	0	Low	30	1000	-45.05	PASS
Band2	1.4MHz	16QAM	18607	1	0	Low	12000	26500	-59.59	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	30	1000	-44.79	PASS
Band2	1.4MHz	16QAM	18900	6	0	Low	12000	26500	-59.62	PASS
Band2	1.4MHz	16QAM	18900	6	0	Low	5000	12000	-55.29	PASS
Band2	1.4MHz	16QAM	18900	6	0	Low	1000	5000	-50.24	PASS
Band2	1.4MHz	16QAM	18900	6	0	Low	30	1000	-45.19	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	1000	5000	-46.79	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	5000	12000	-52.22	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	12000	26500	-59.51	PASS
Band2	1.4MHz	16QAM	19193	1	5	Low	30	1000	-44.81	PASS
Band2	1.4MHz	16QAM	19193	1	5	Low	1000	5000	-46.56	PASS

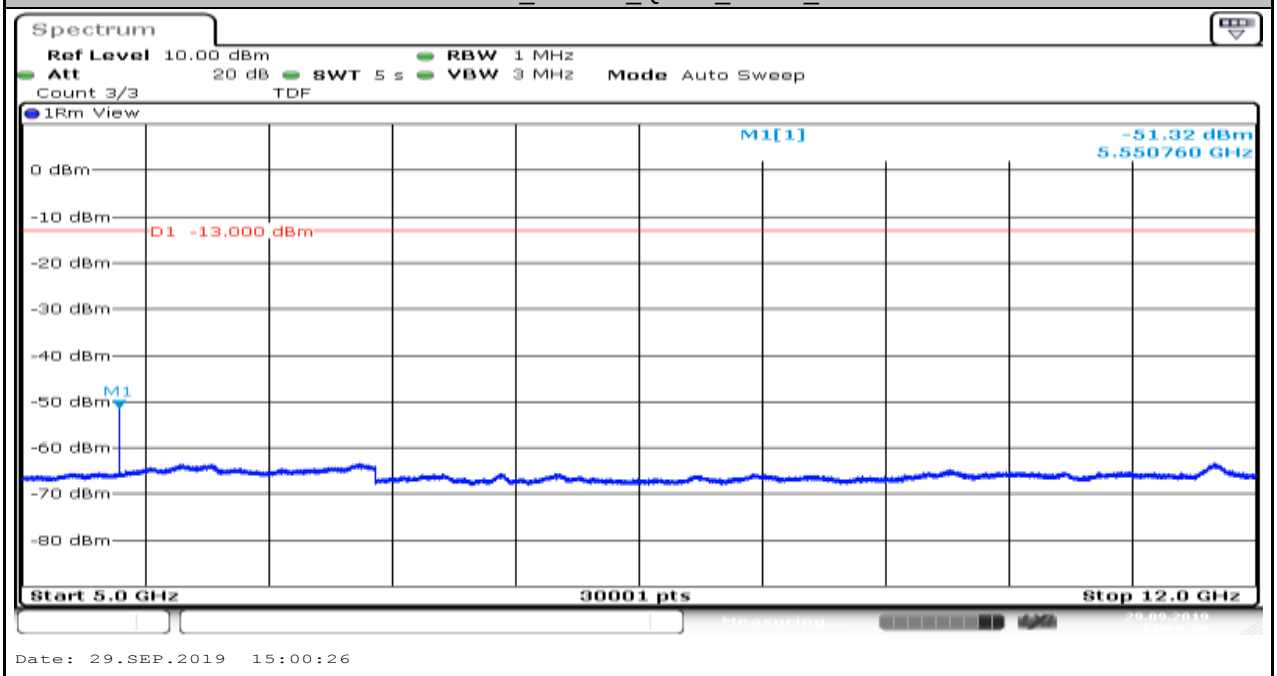
Band2	1.4MHz	16QAM	19193	1	5	Low	12000	26500	-59.39	PASS
Band2	1.4MHz	16QAM	19193	6	0	Low	12000	26500	-59.52	PASS
Band2	1.4MHz	16QAM	19193	6	0	Low	30	1000	-45.26	PASS
Band2	1.4MHz	16QAM	19193	6	0	Low	1000	5000	-49.73	PASS
Band2	1.4MHz	16QAM	19193	6	0	Low	5000	12000	-54.17	PASS
Band2	1.4MHz	16QAM	19193	1	5	Low	5000	12000	-50.85	PASS

Test Graphs

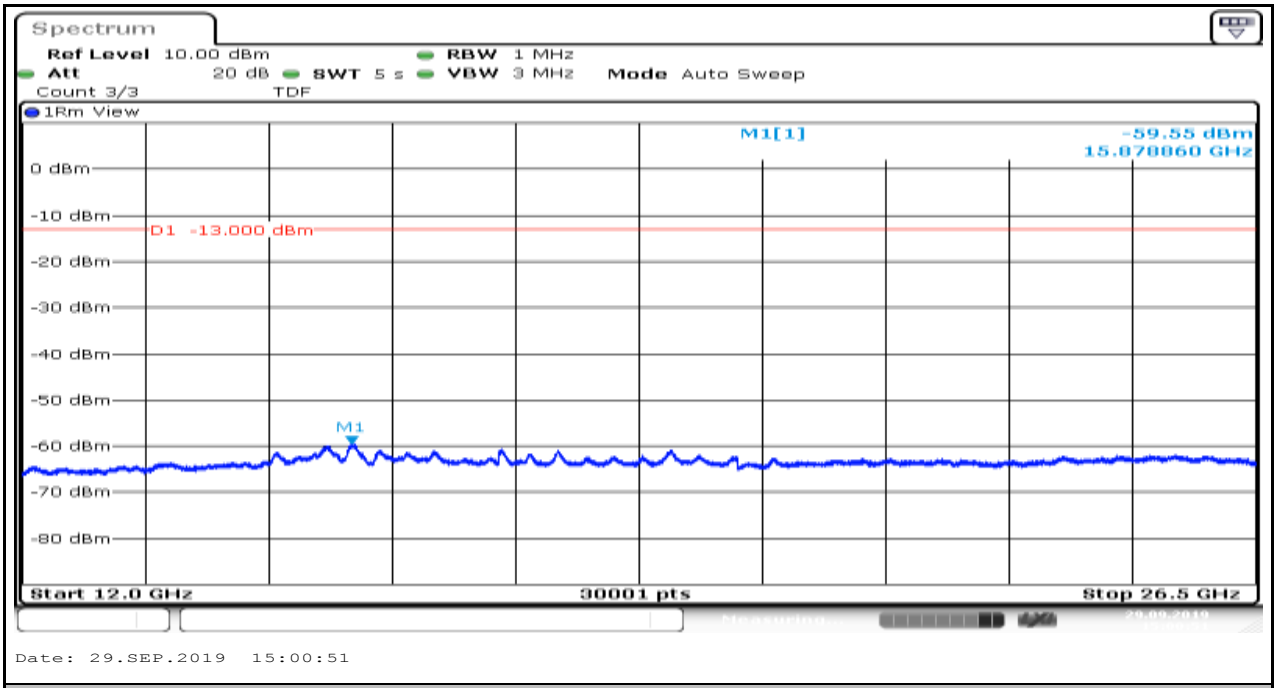
Band2_1.4MHz_QPSK_18607_1



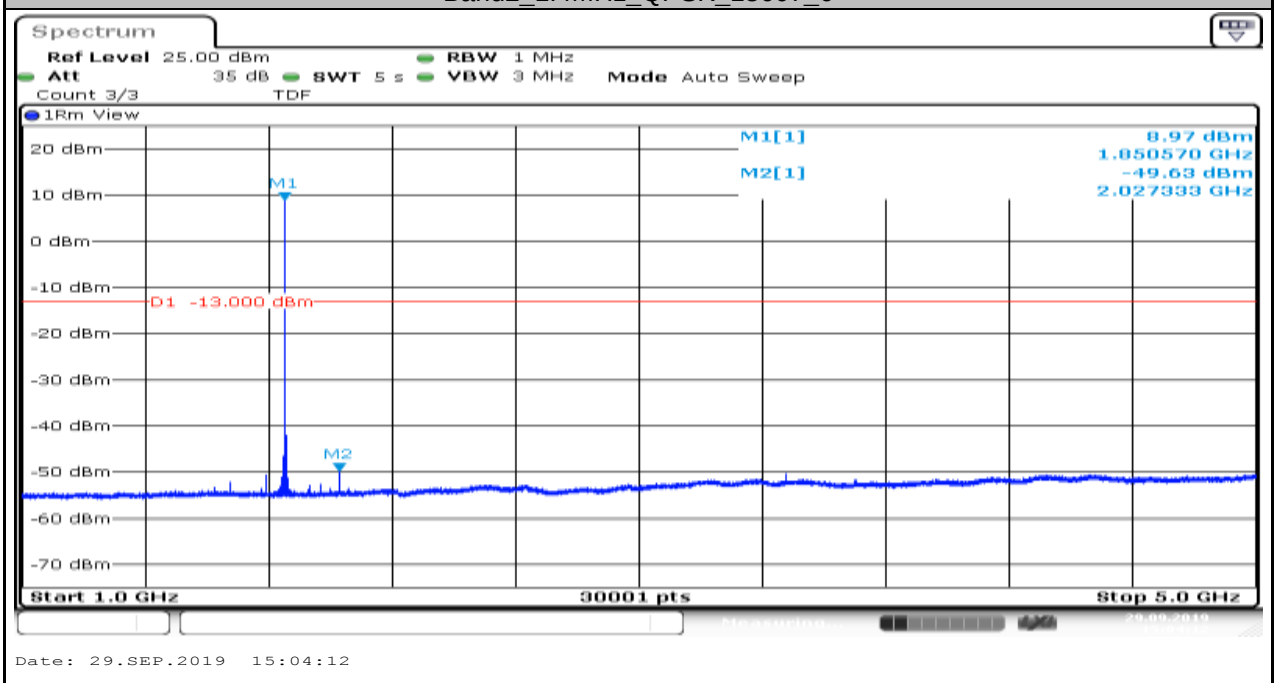
Band2_1.4MHz_QPSK_18607_1



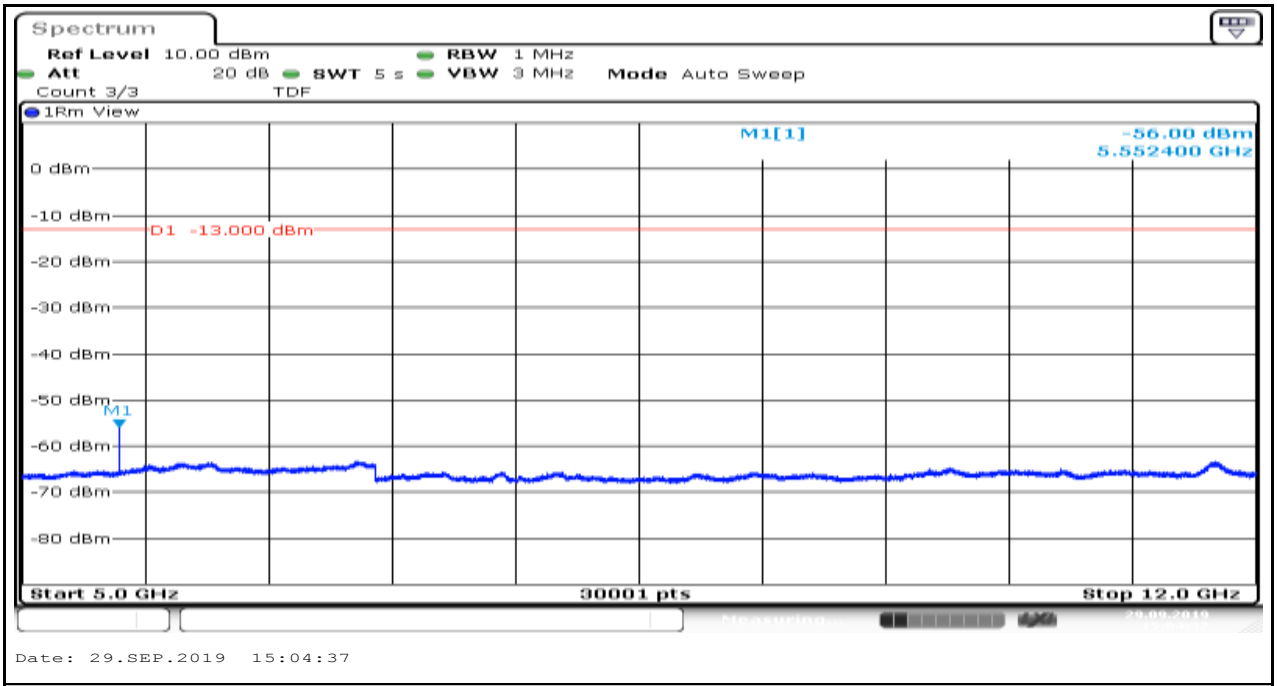
Band2_1.4MHz_QPSK_18607_1



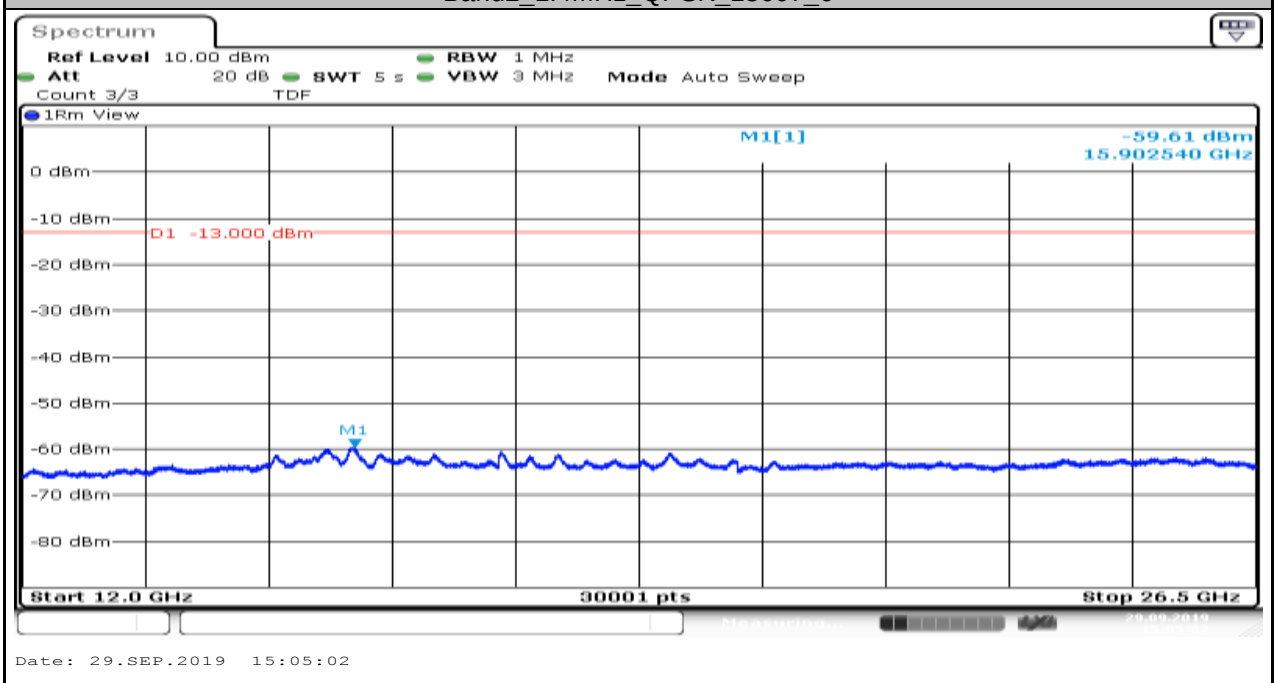
Band2_1.4MHz_QPSK_18607_6



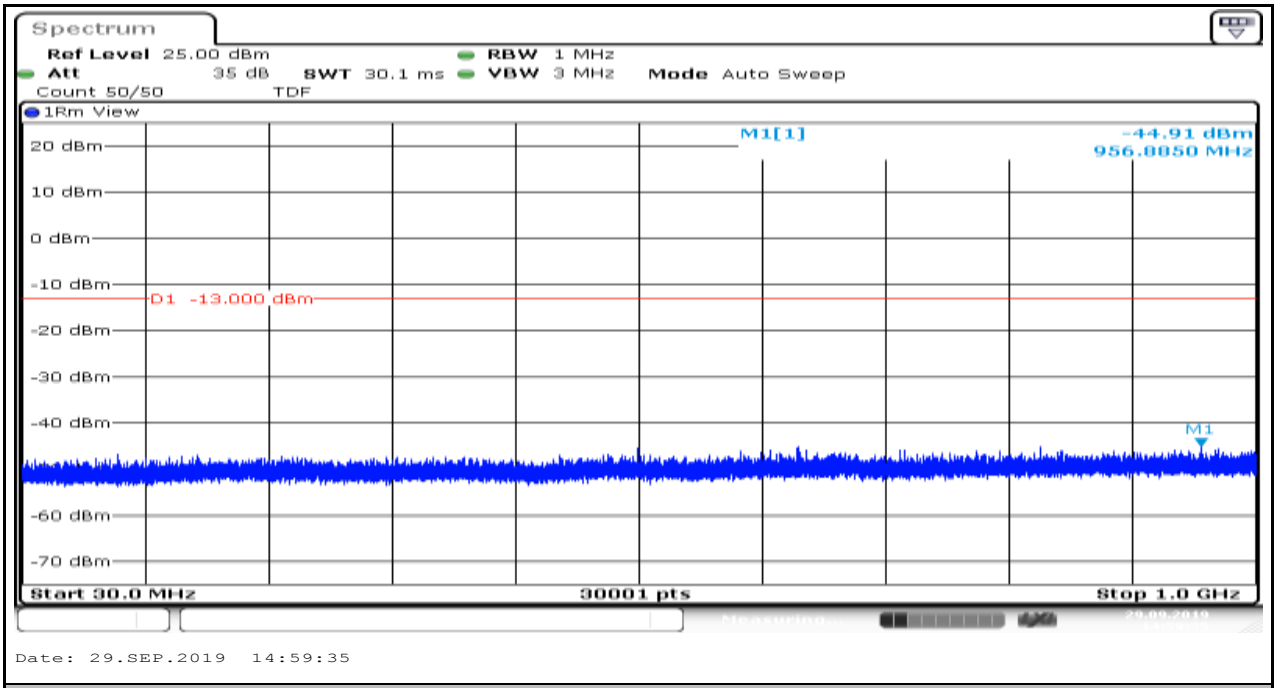
Band2_1.4MHz_QPSK_18607_6



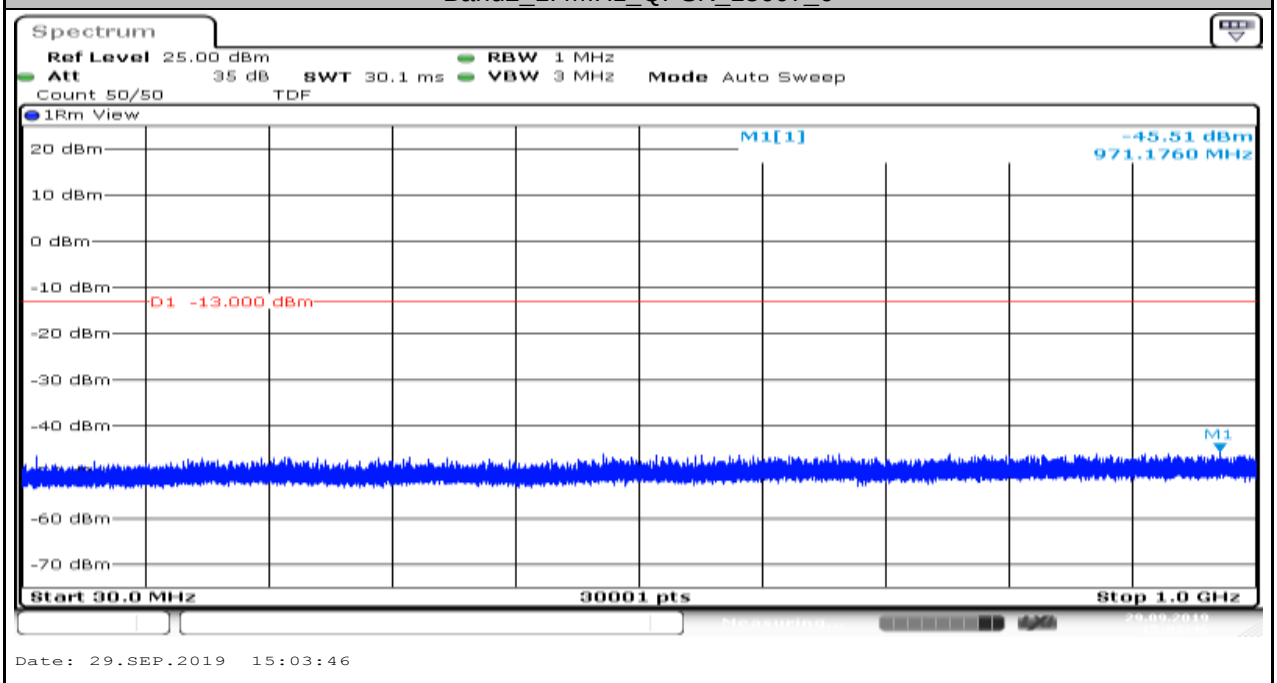
Band2_1.4MHz_QPSK_18607_6



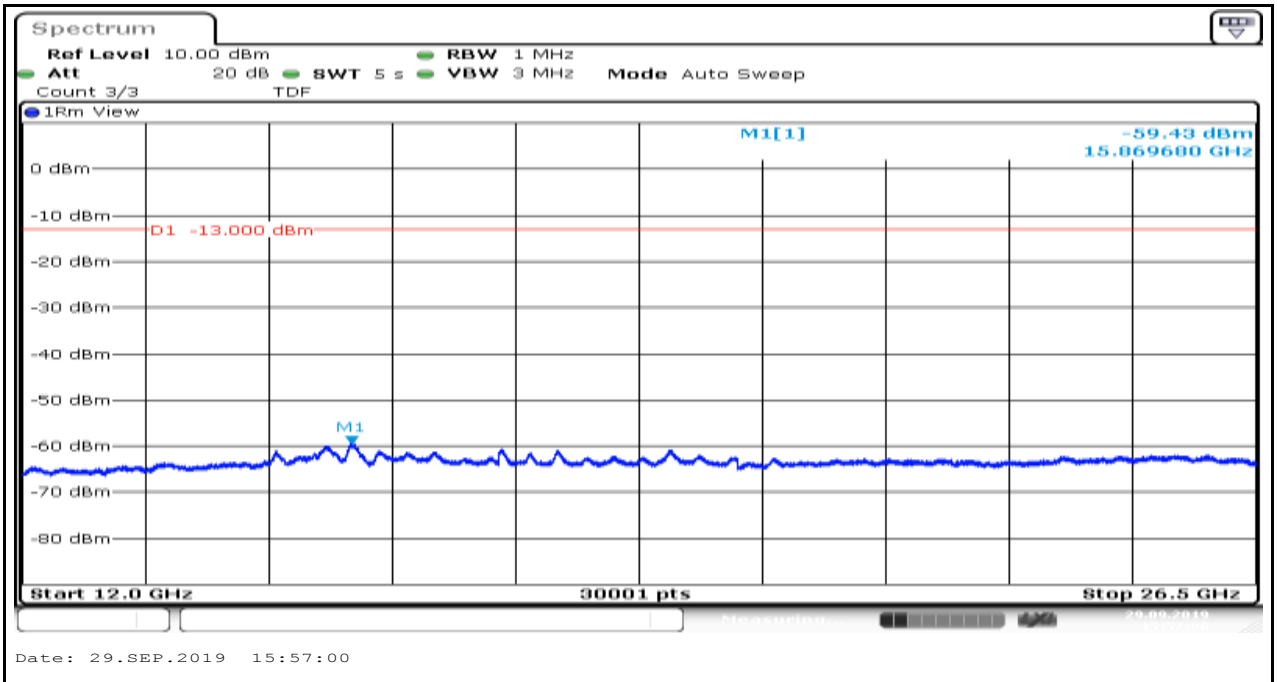
Band2_1.4MHz_QPSK_18607_1



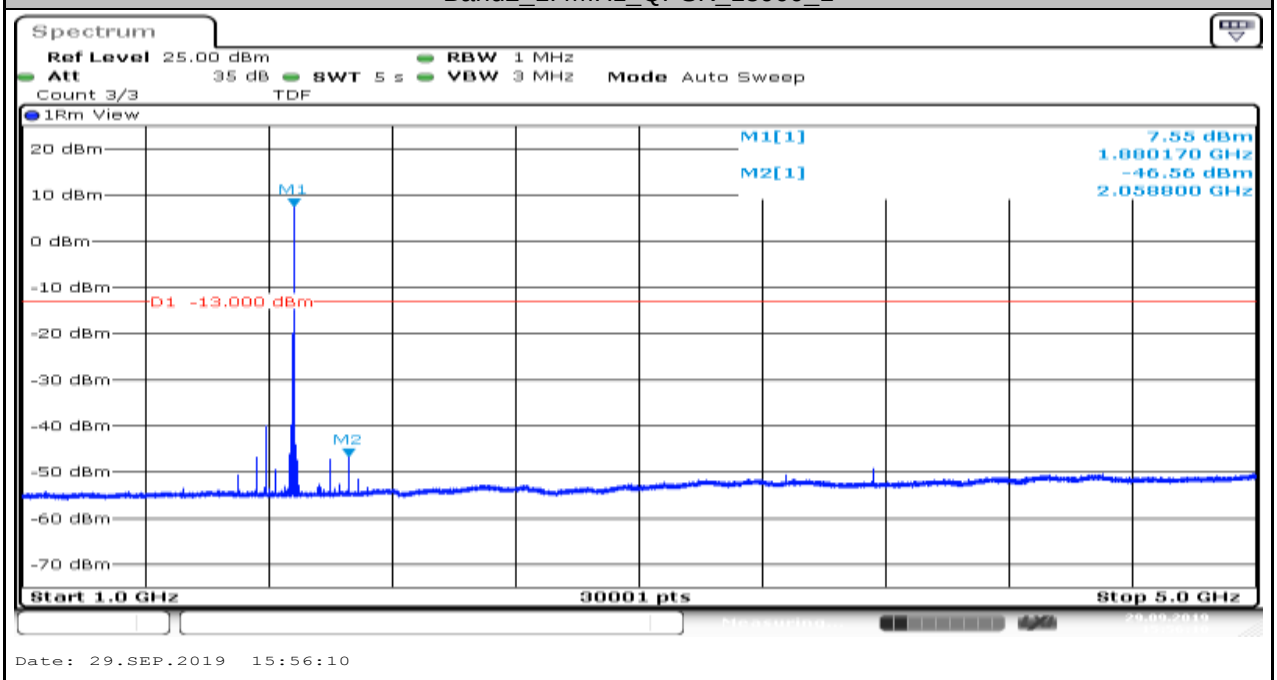
Band2_1.4MHz_QPSK_18607_6



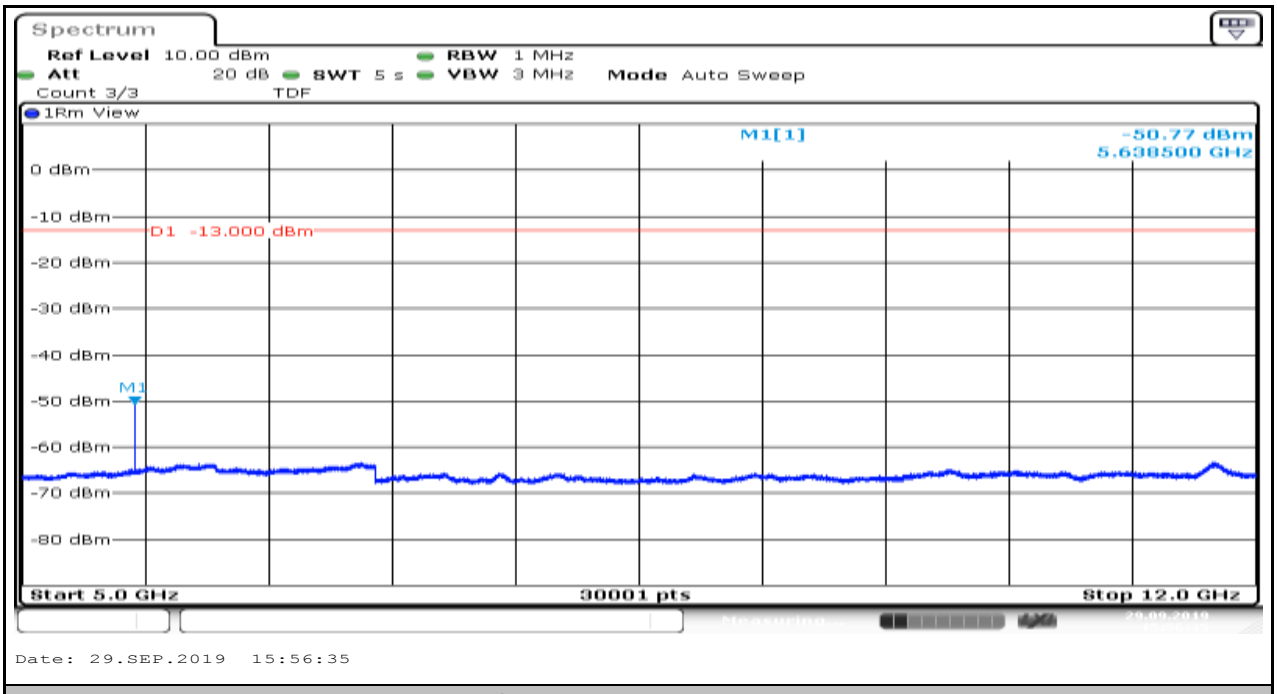
Band2_1.4MHz_QPSK_18900_1



Band2_1.4MHz_QPSK_18900_1



Band2_1.4MHz_QPSK_18900_1



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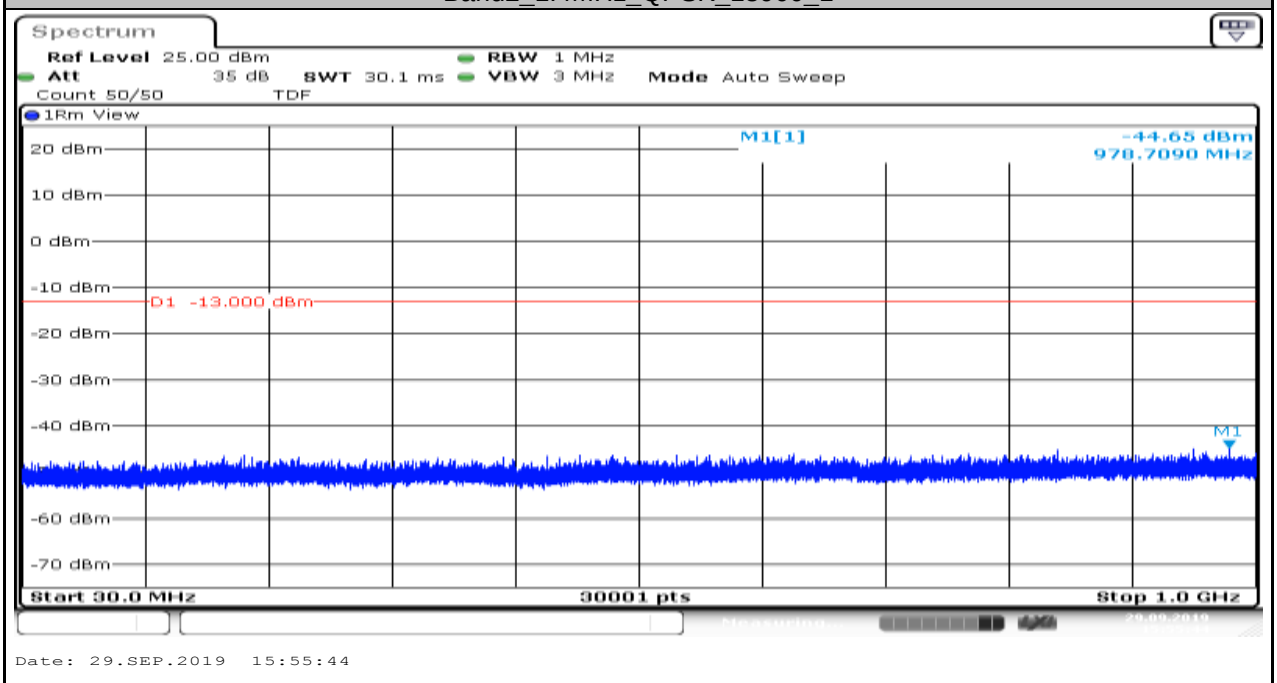

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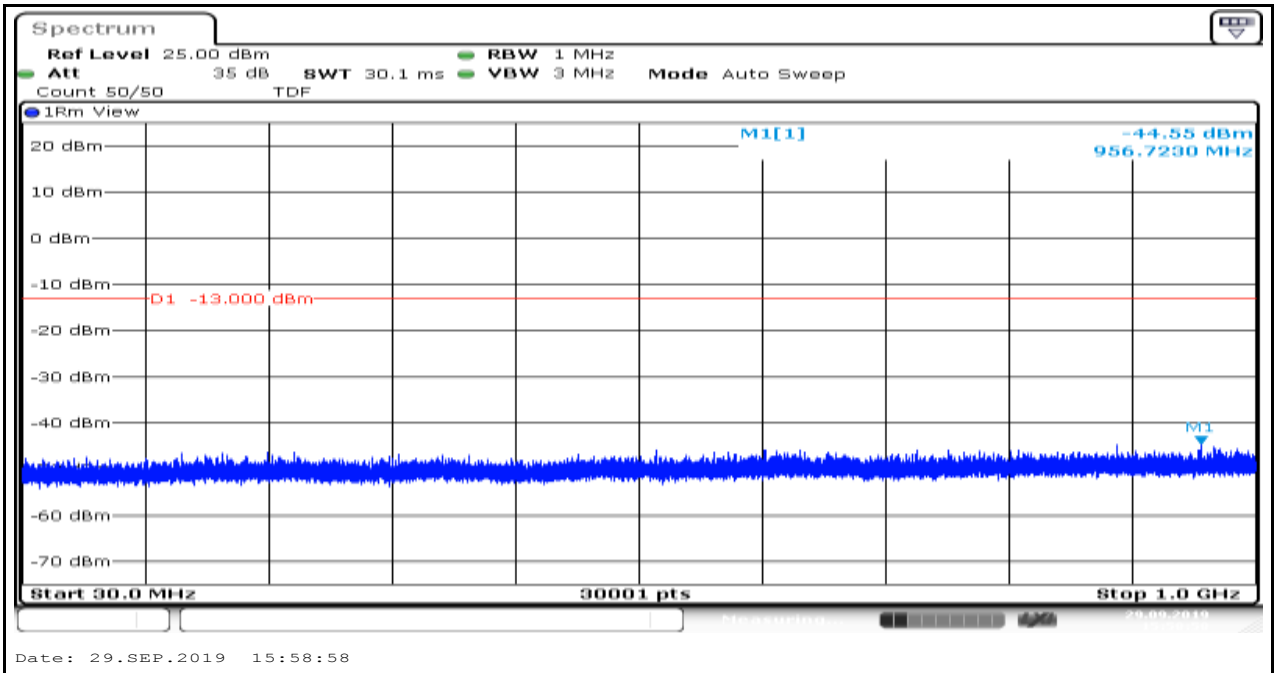

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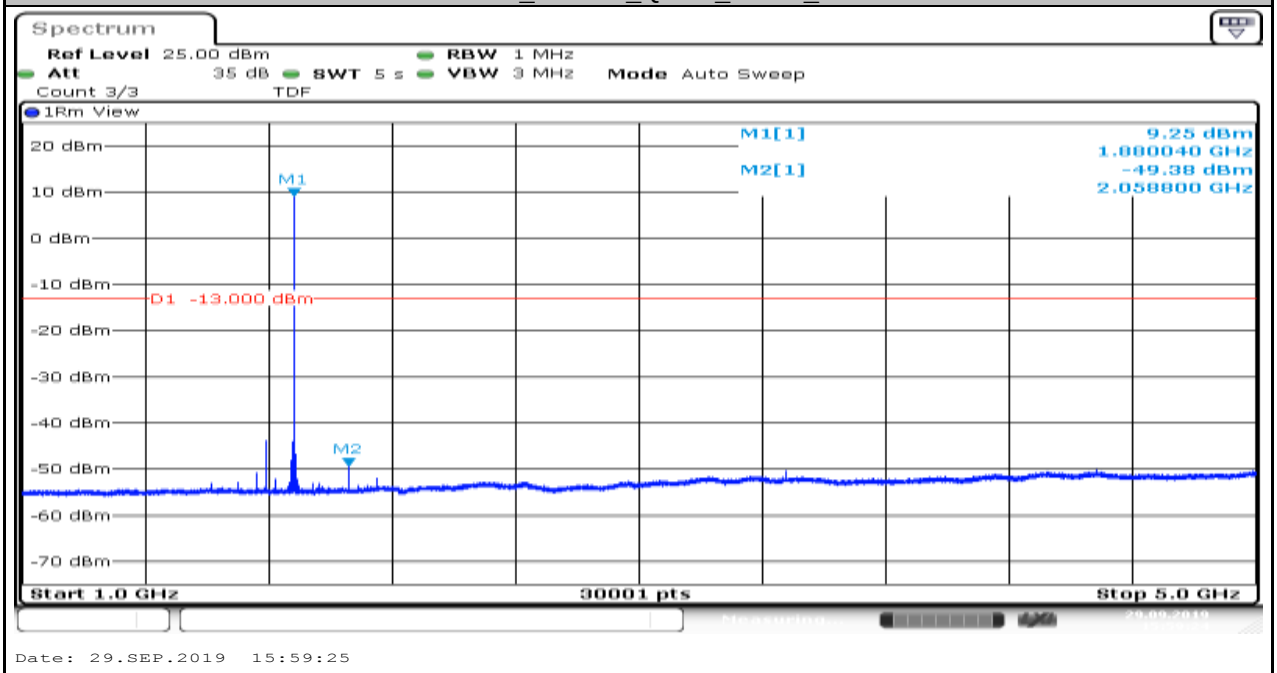

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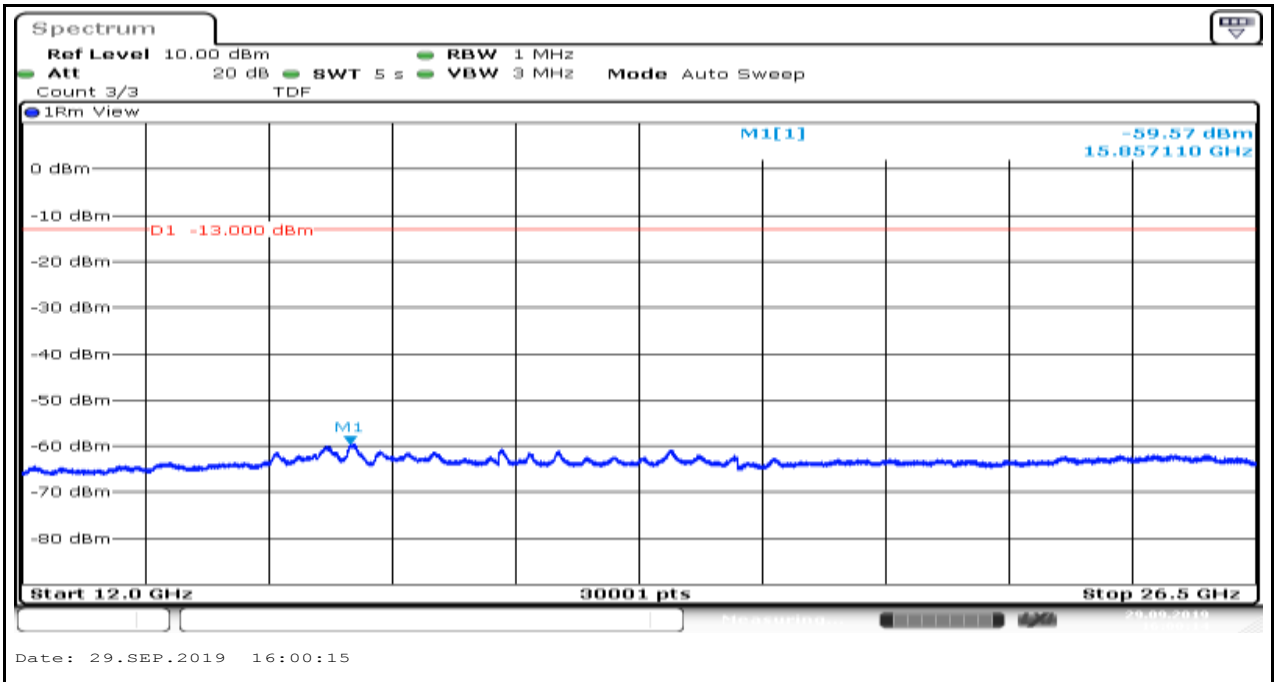

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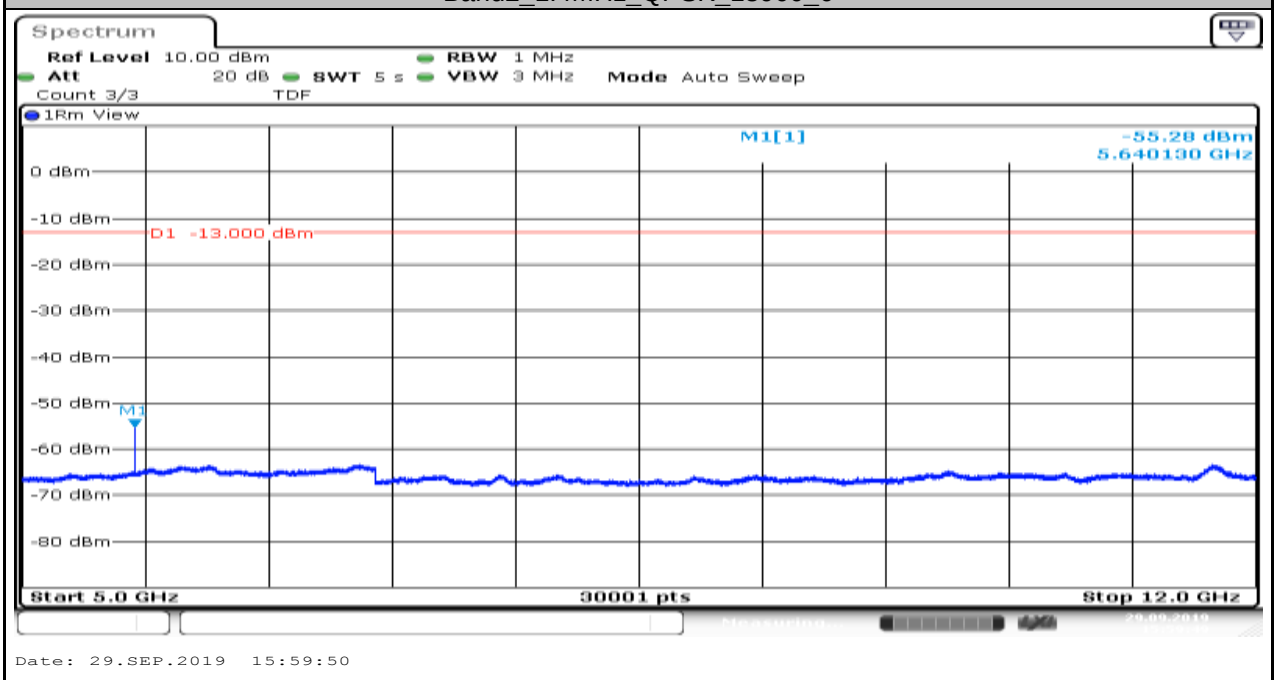

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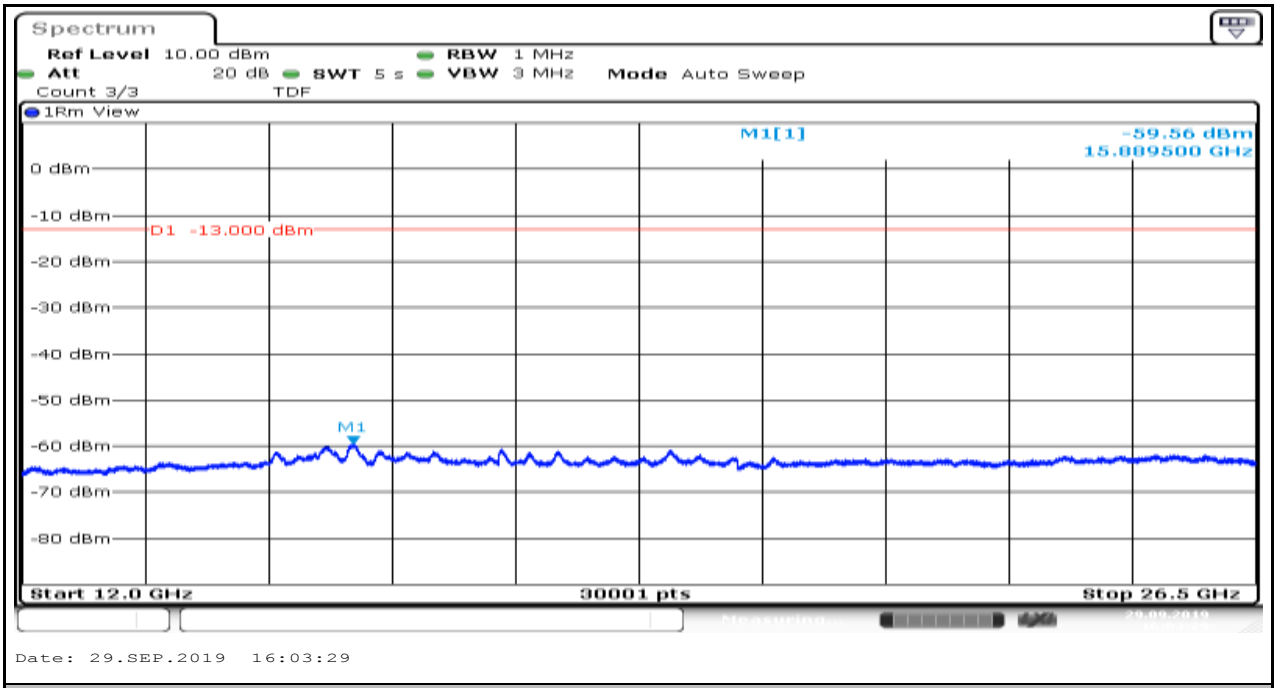

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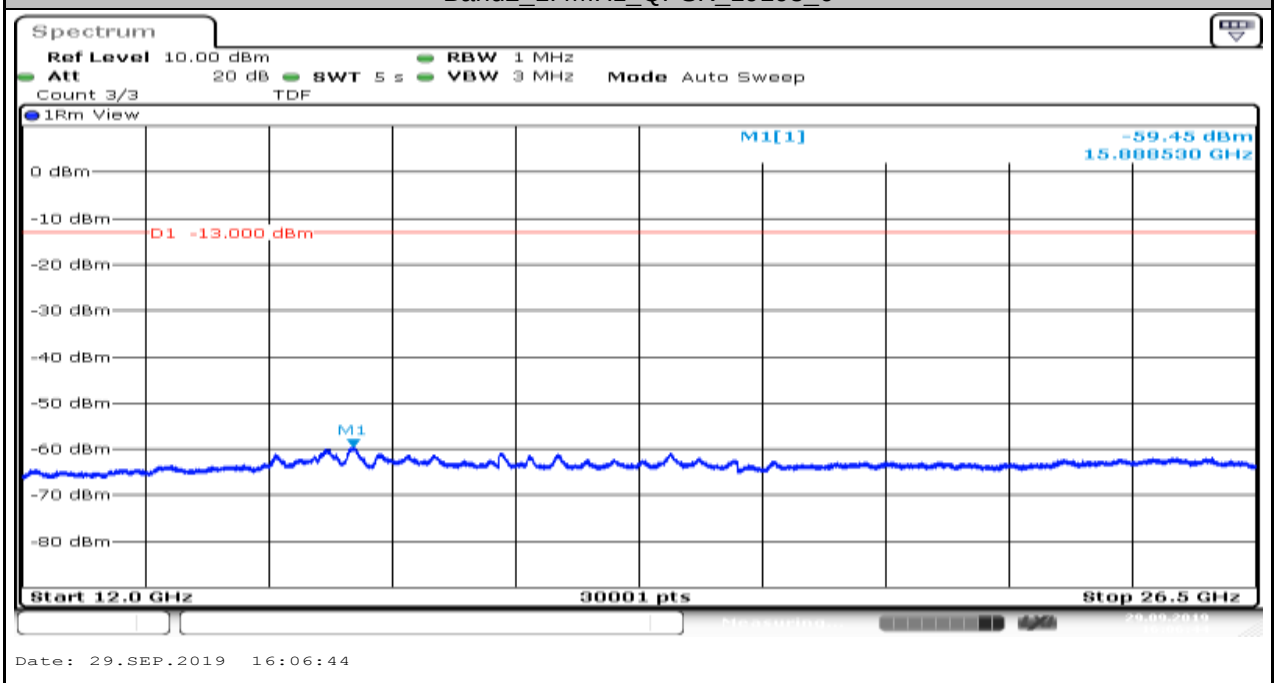

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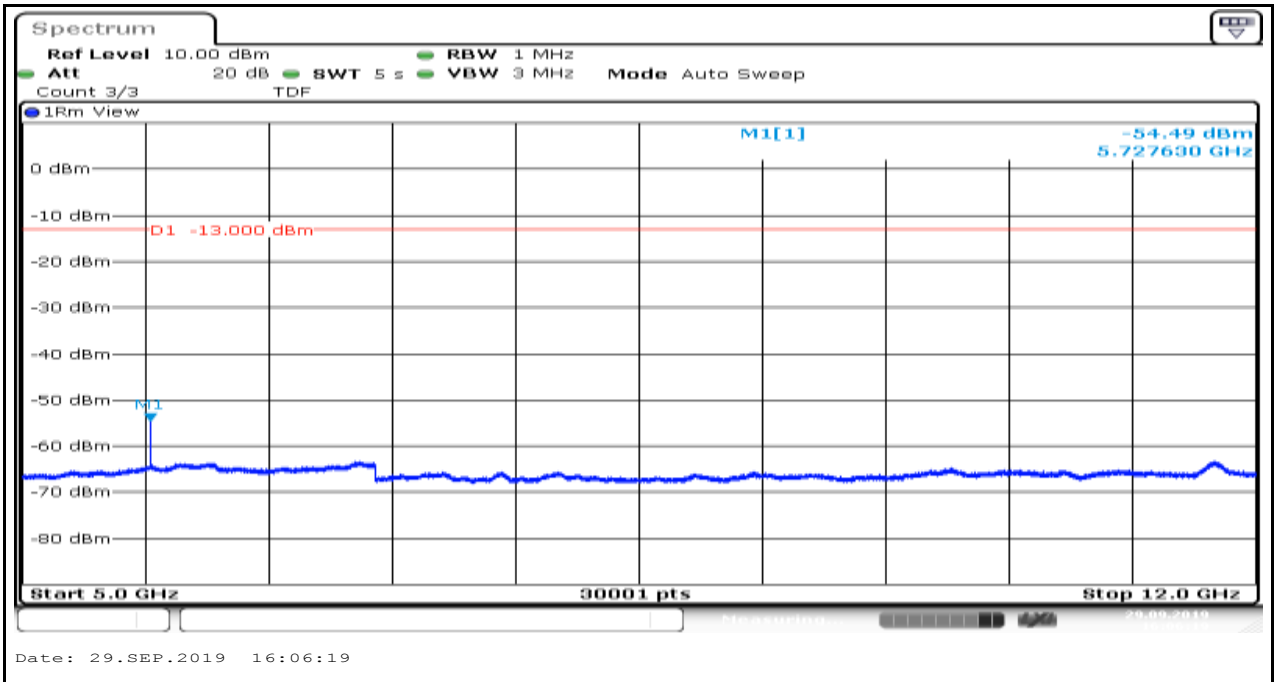

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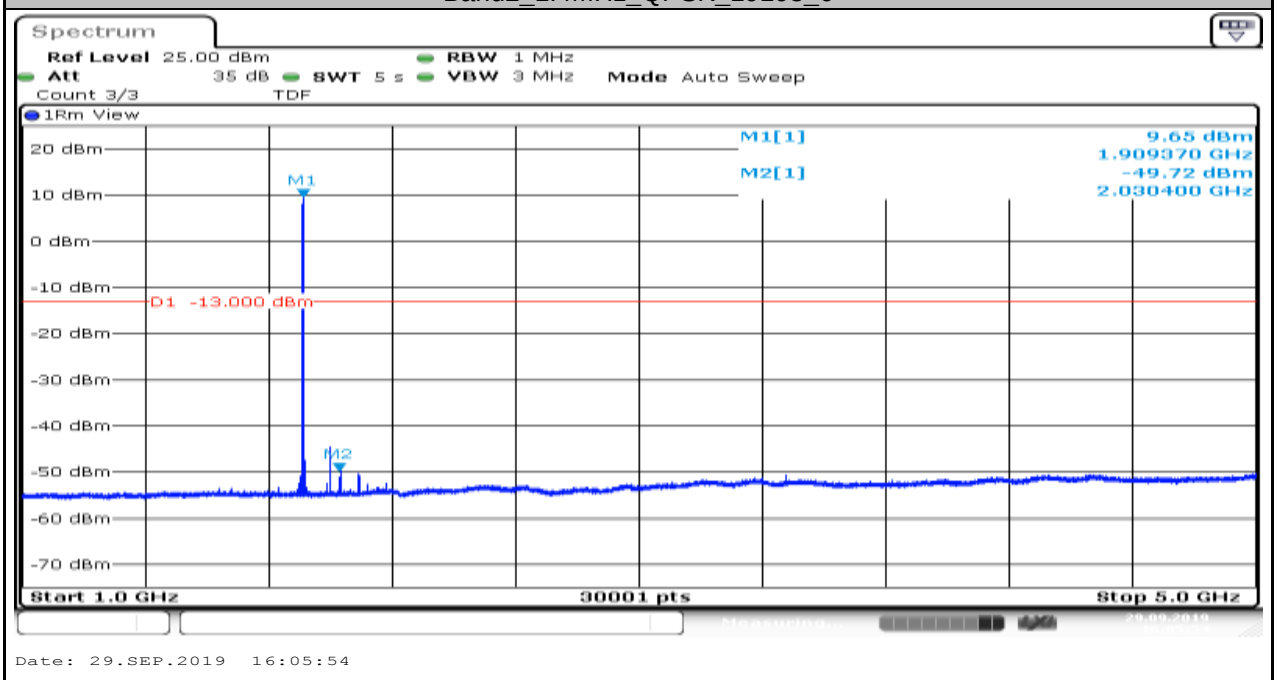

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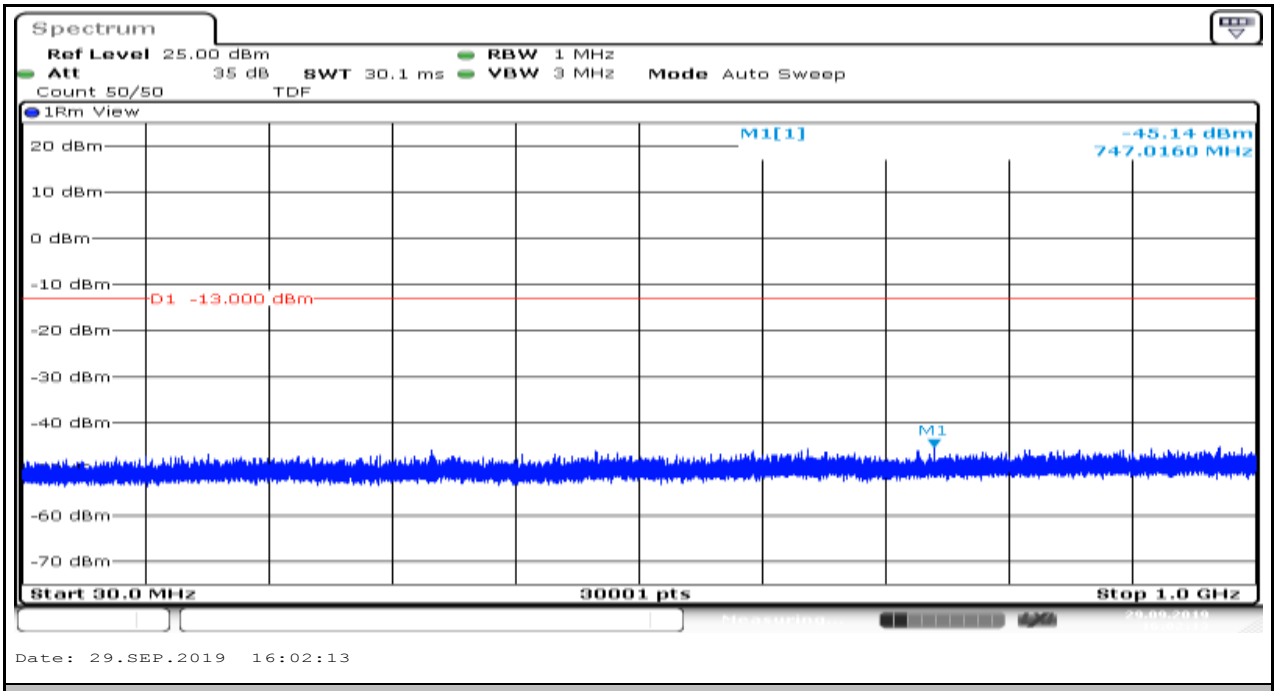

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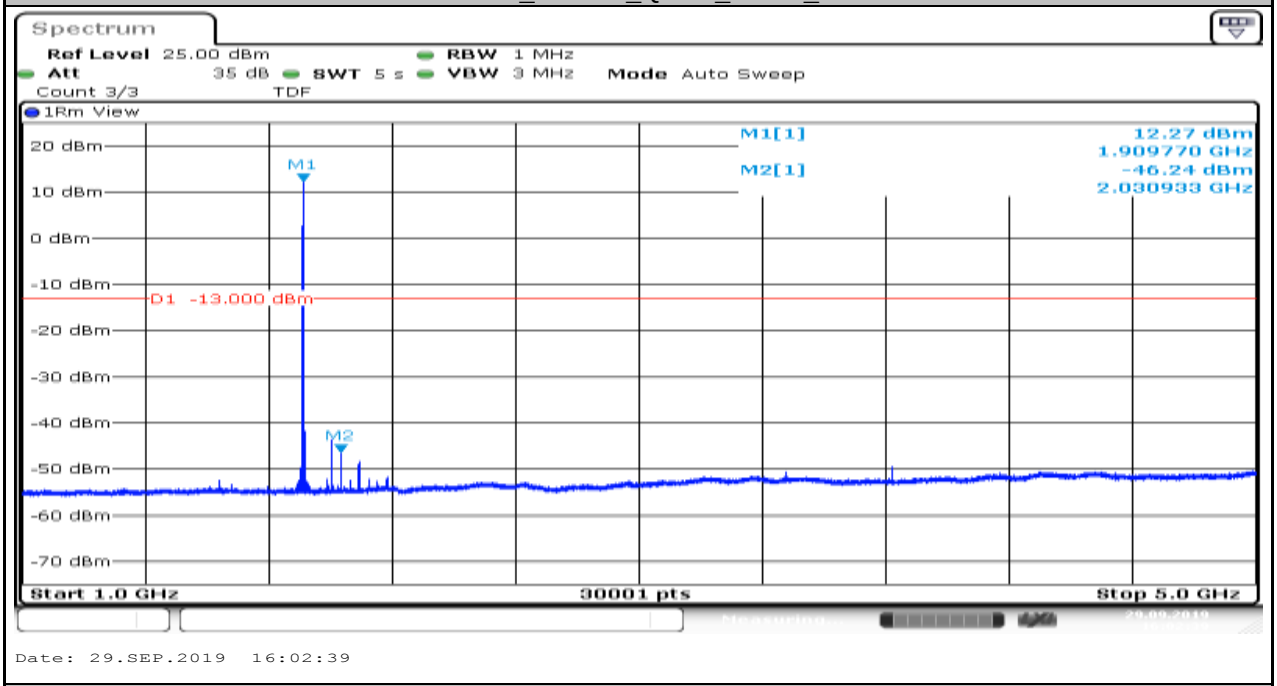

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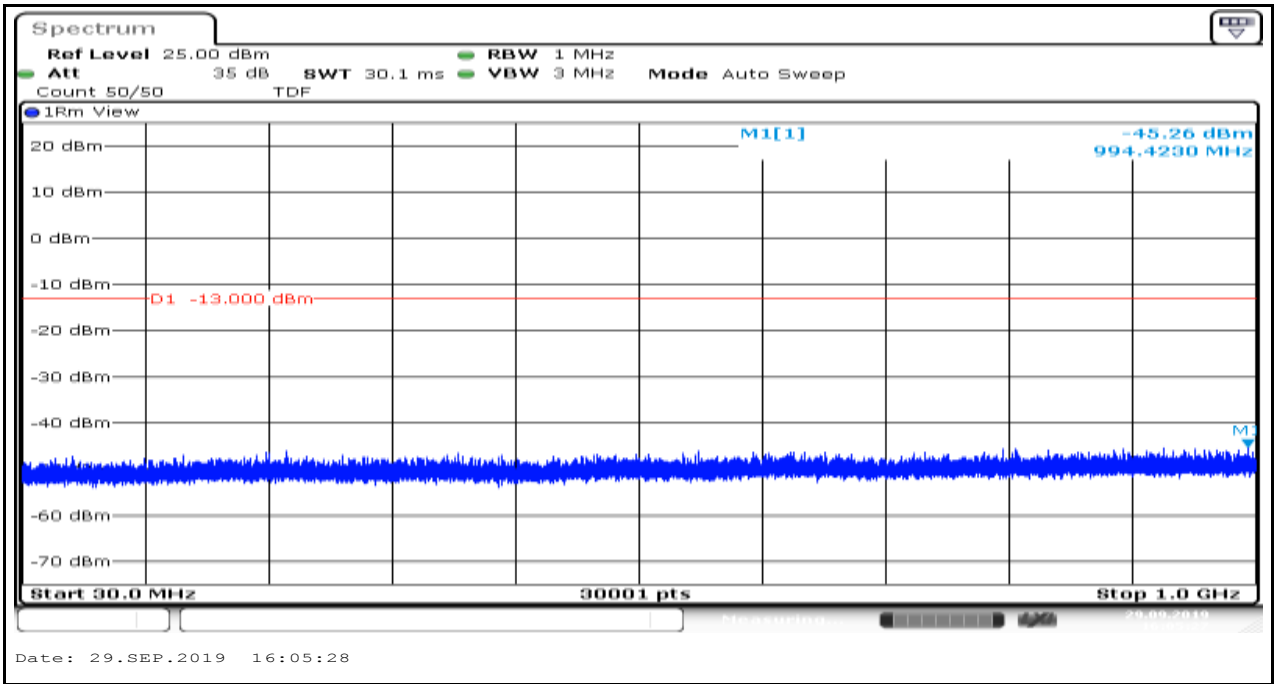

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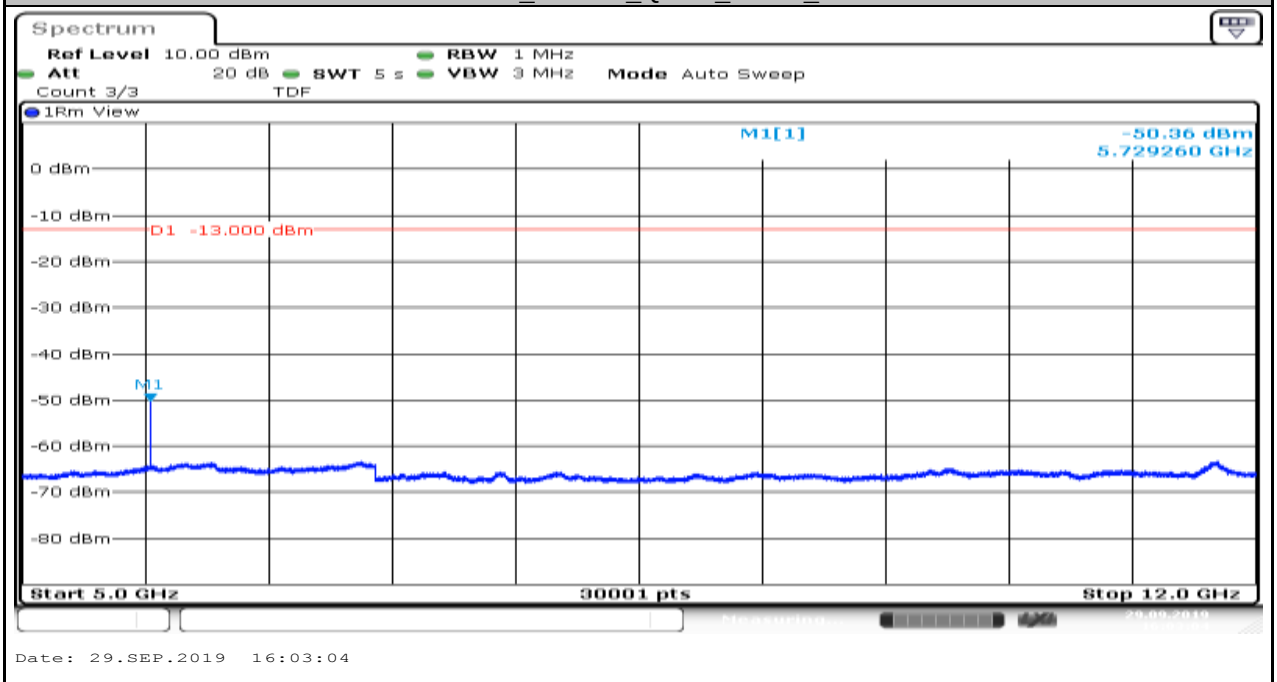

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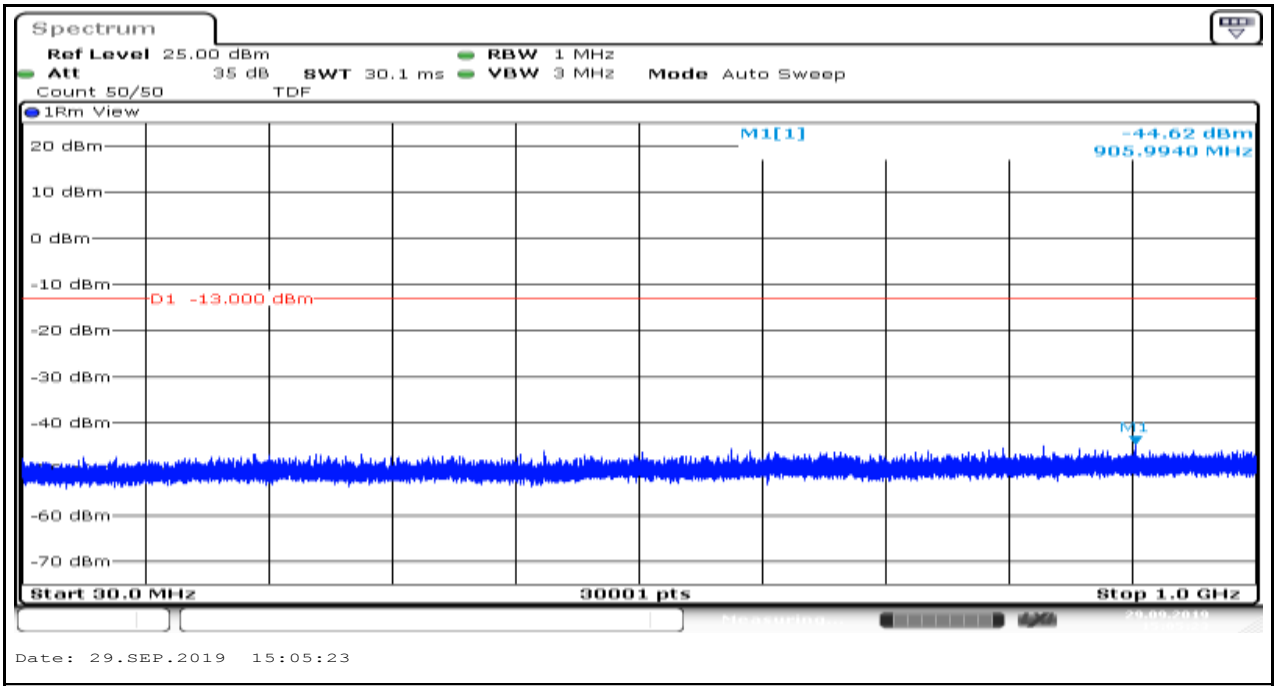

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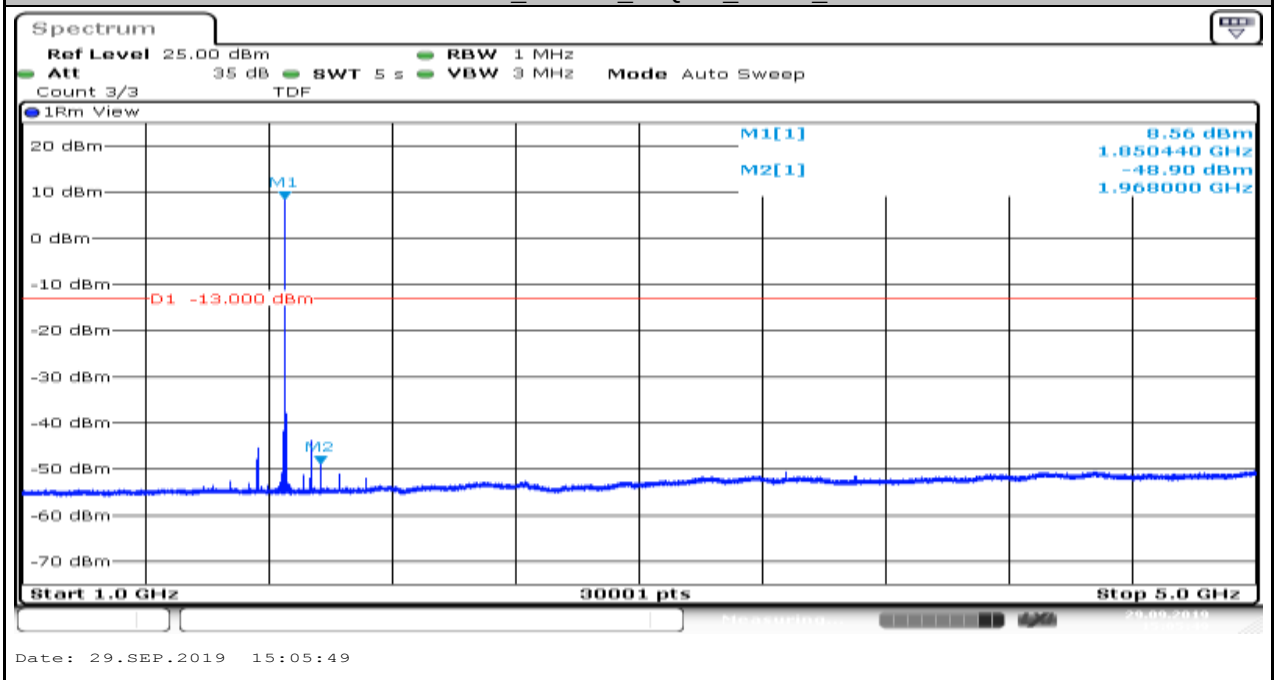

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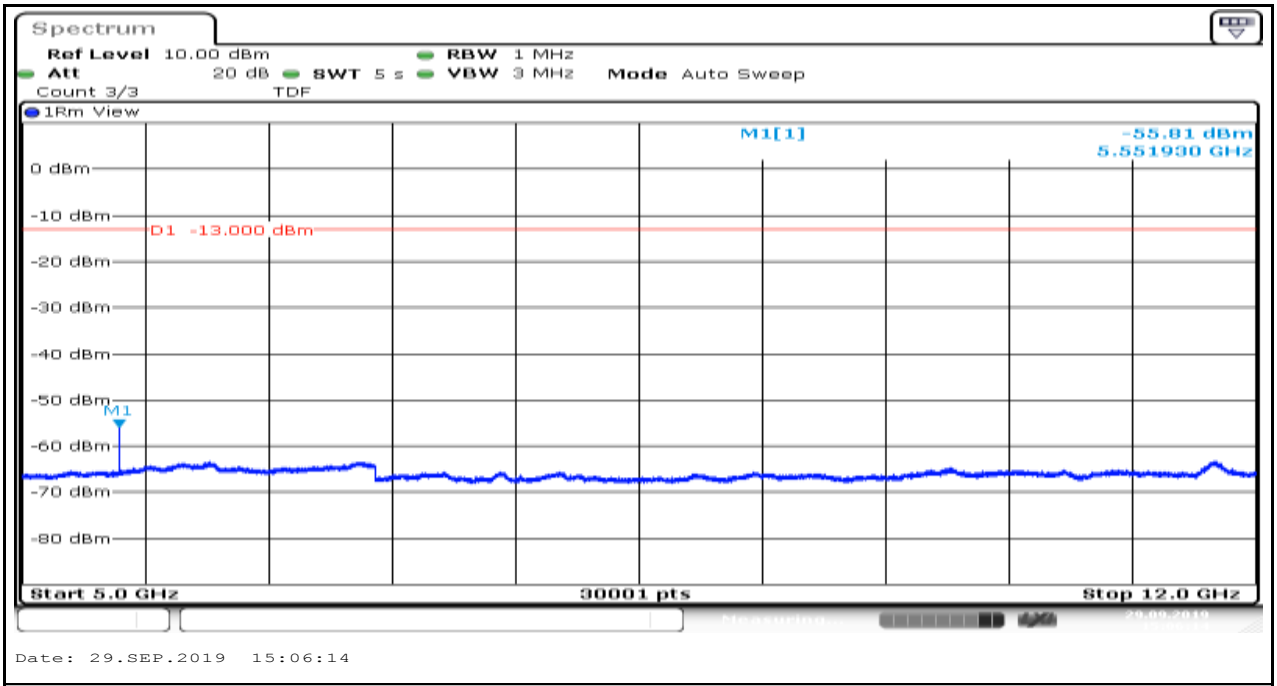

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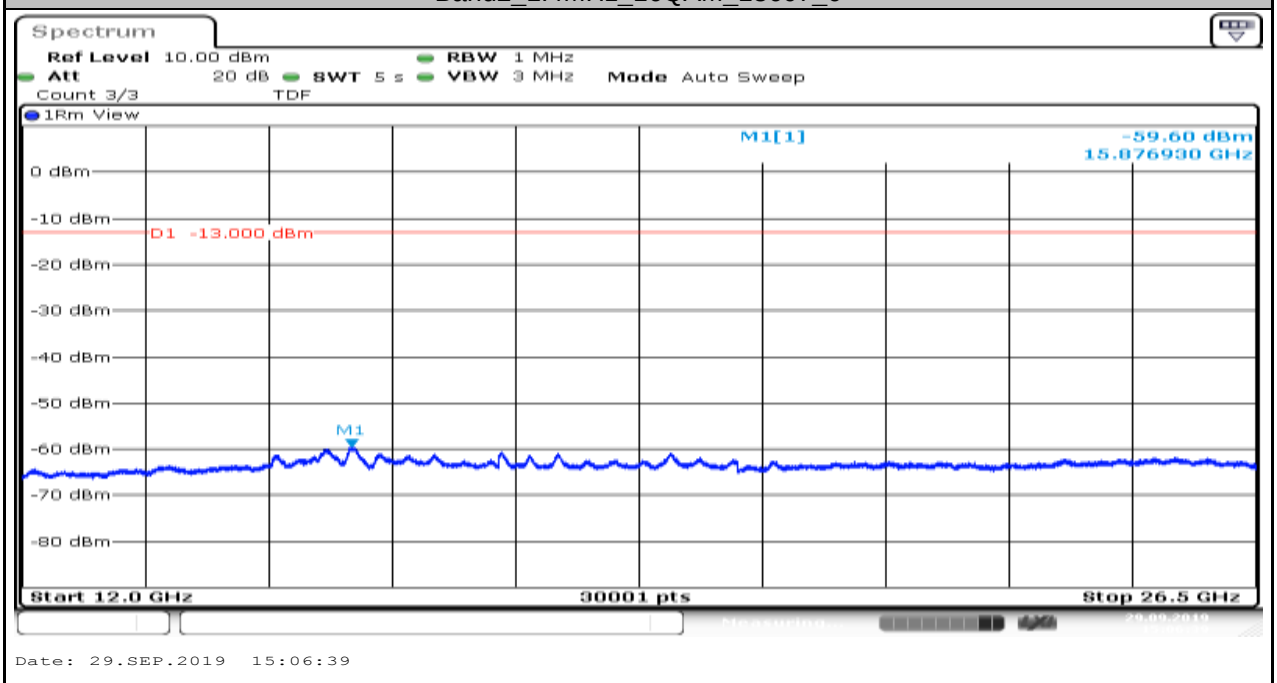

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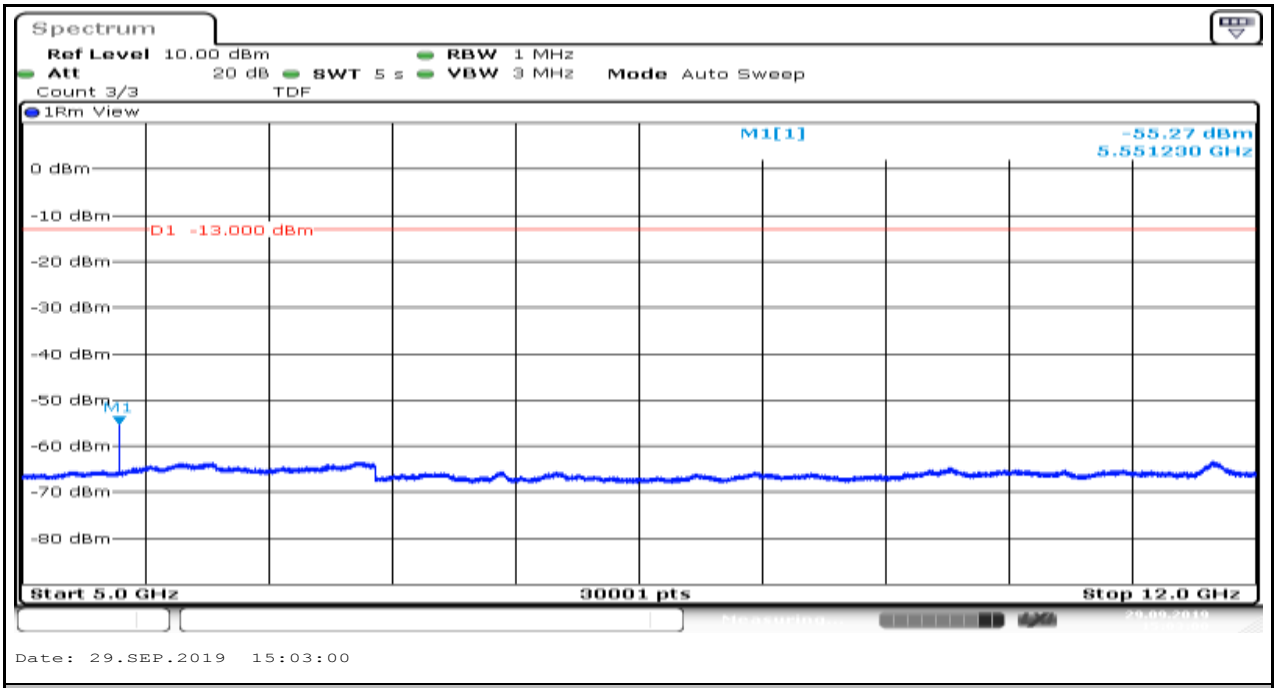

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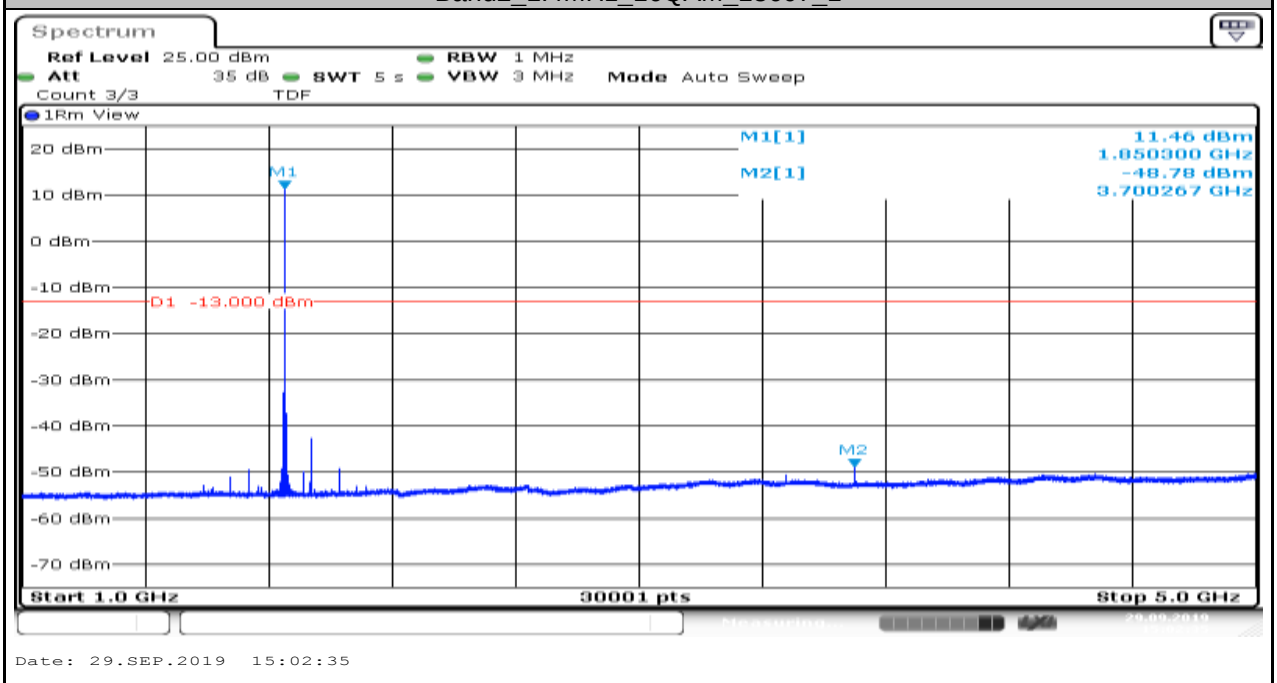

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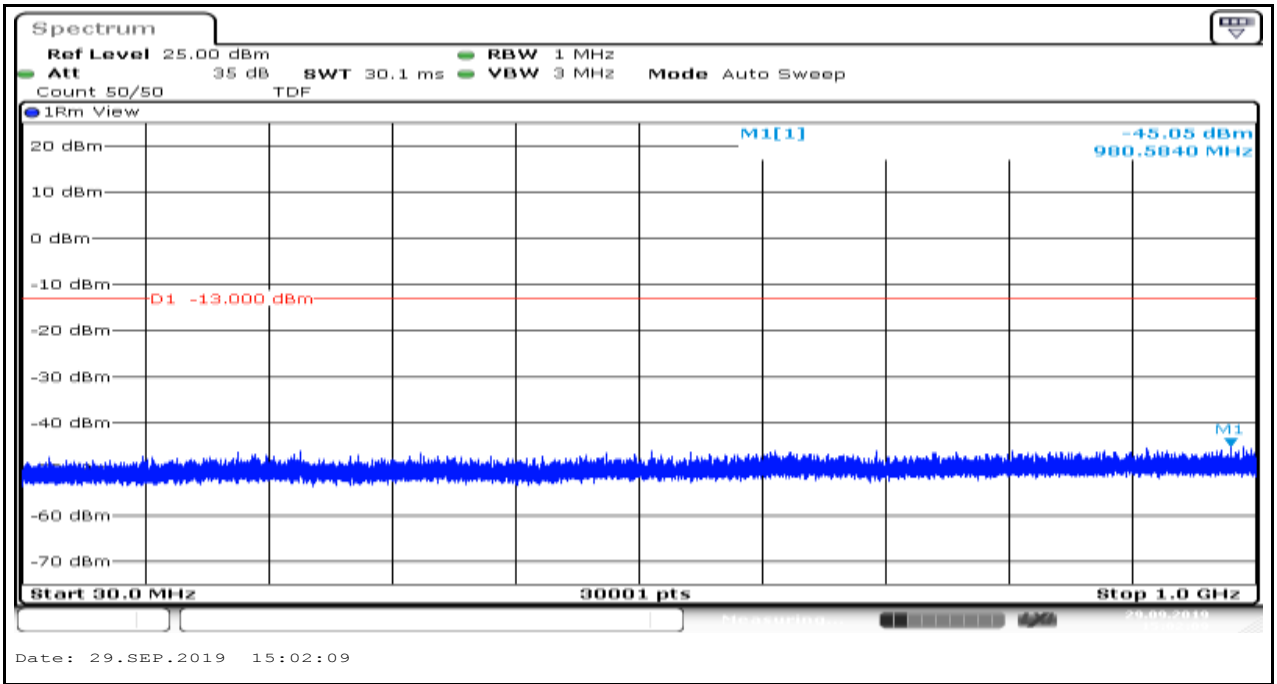

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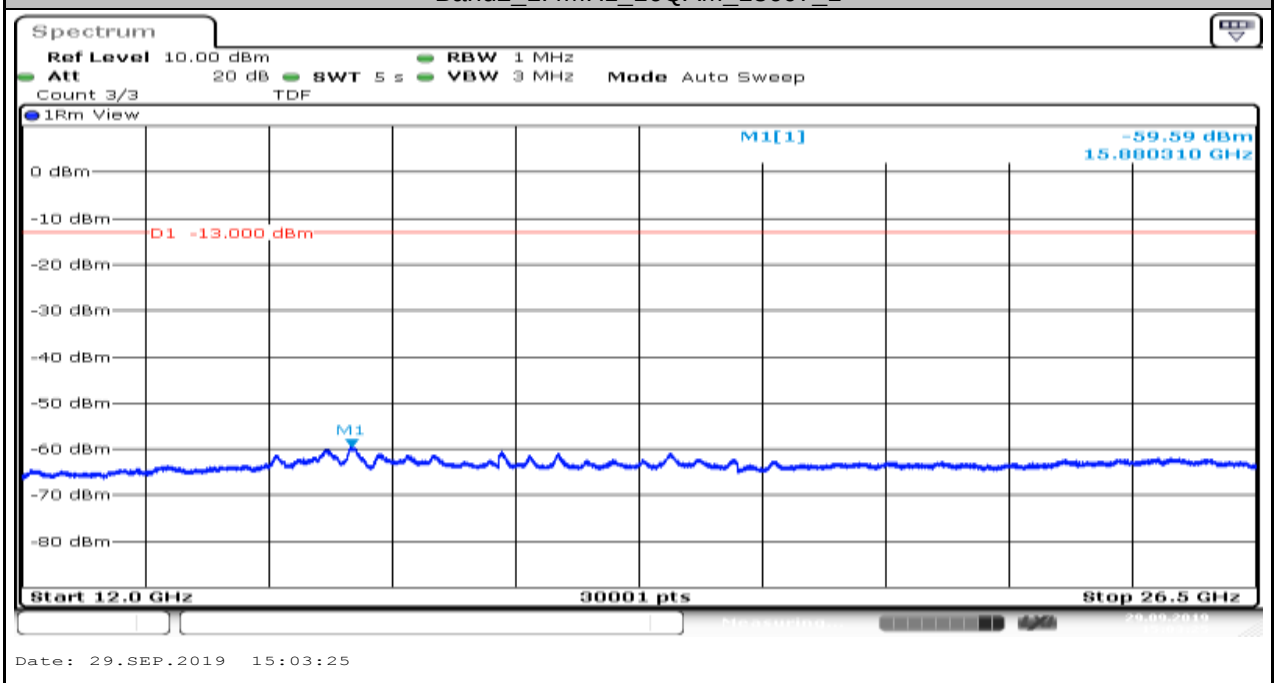

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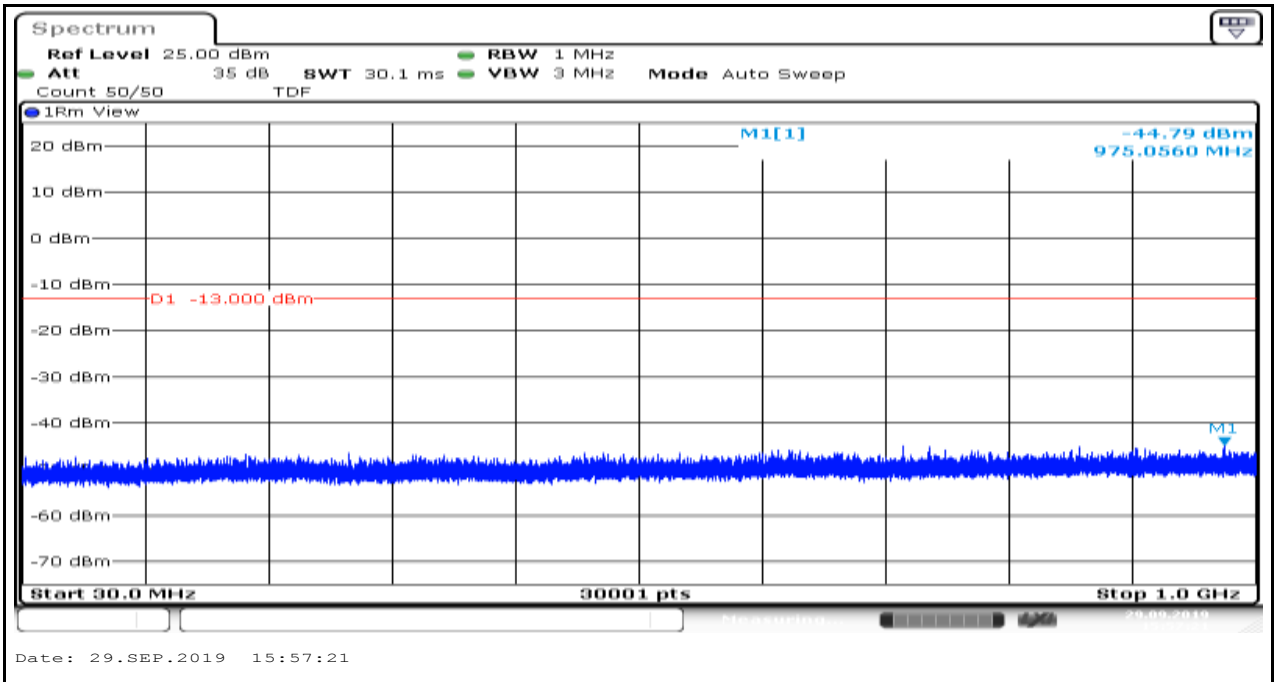

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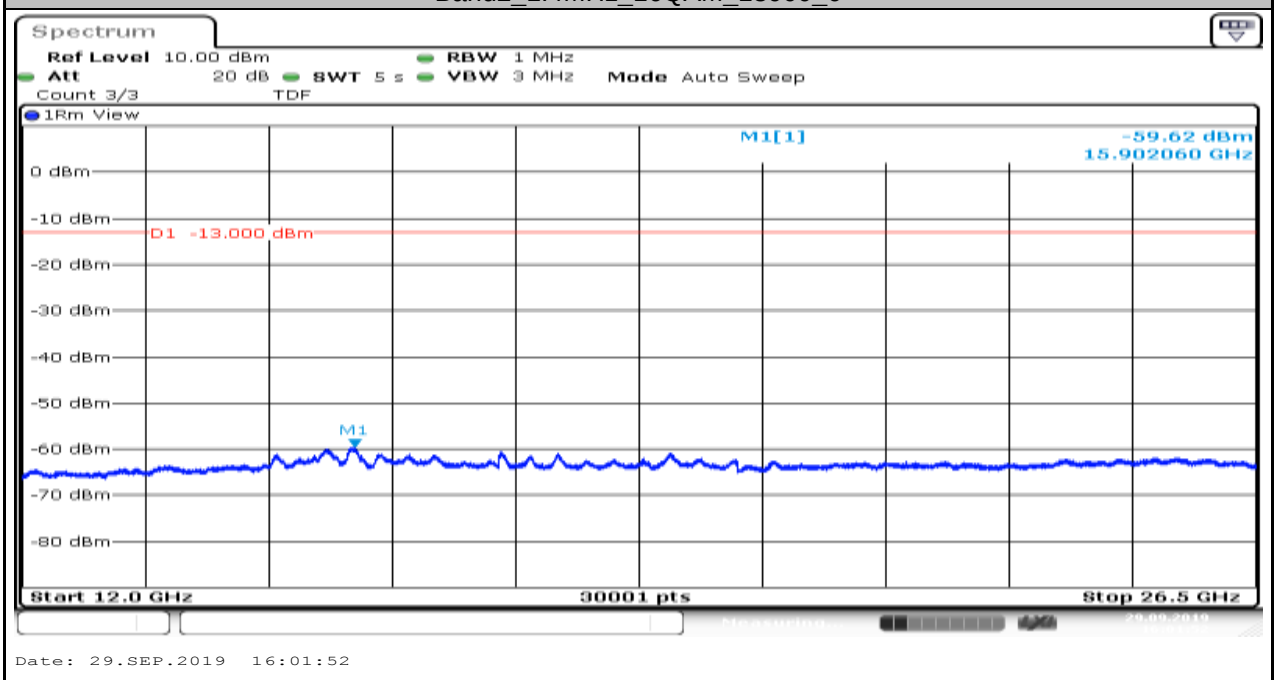

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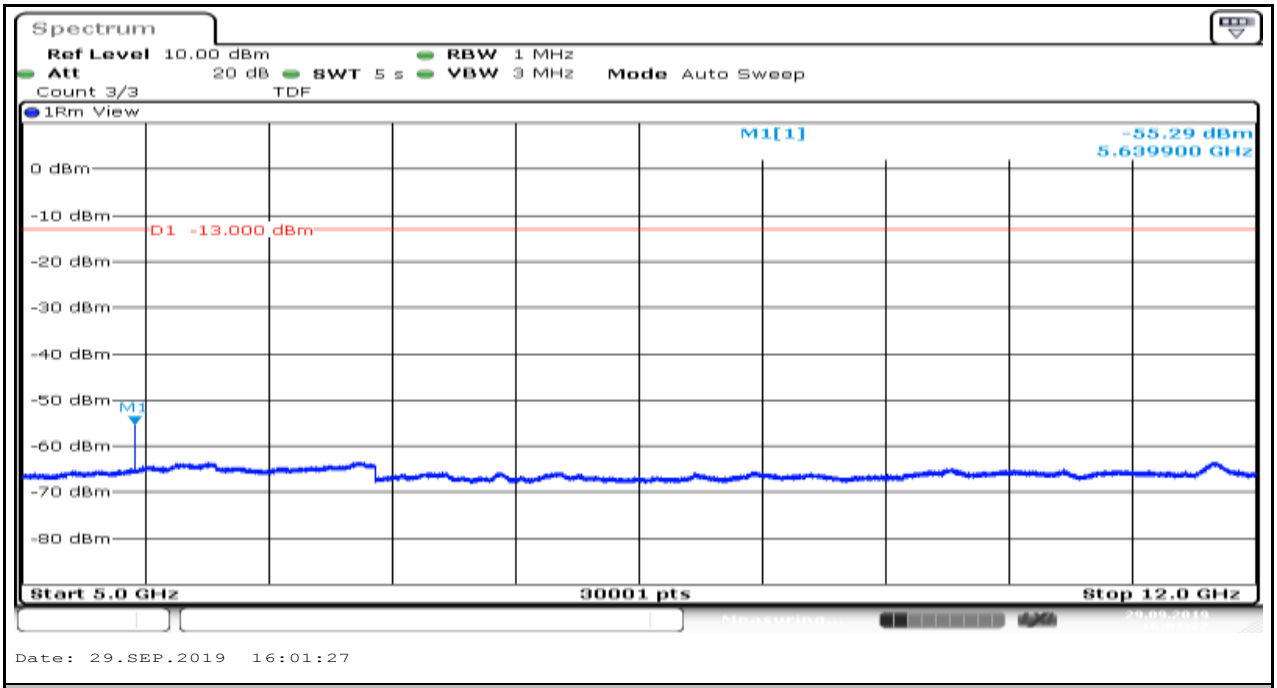

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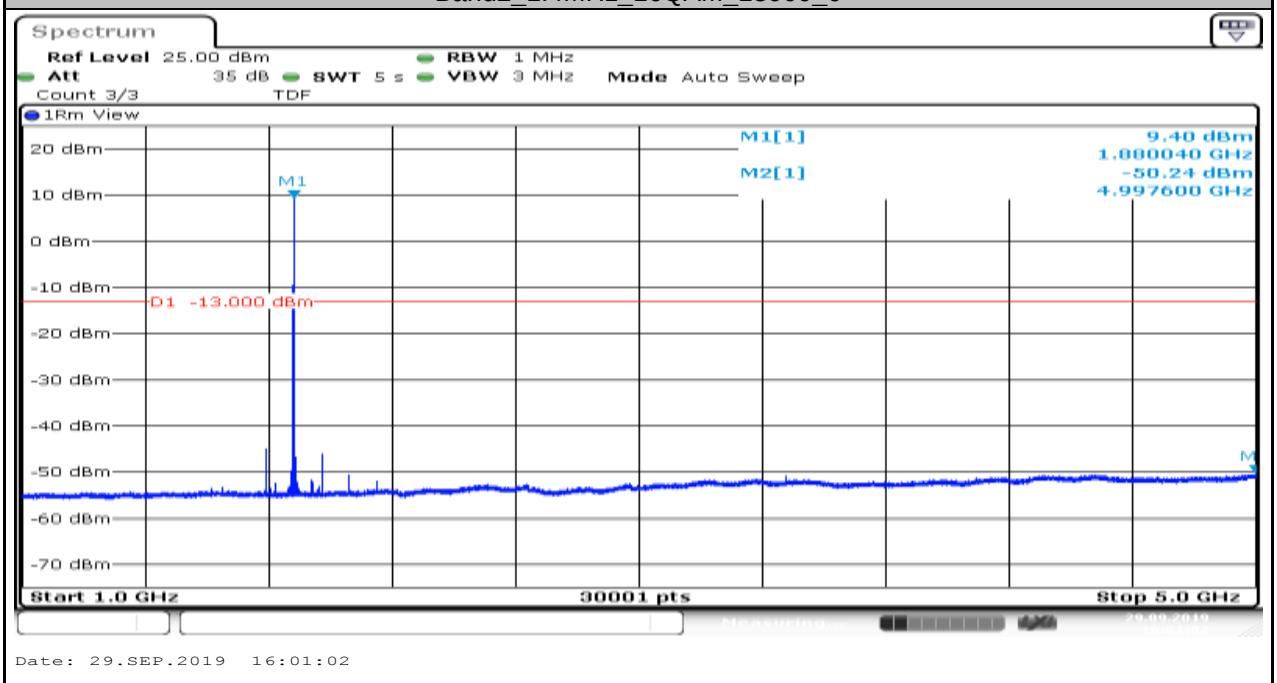

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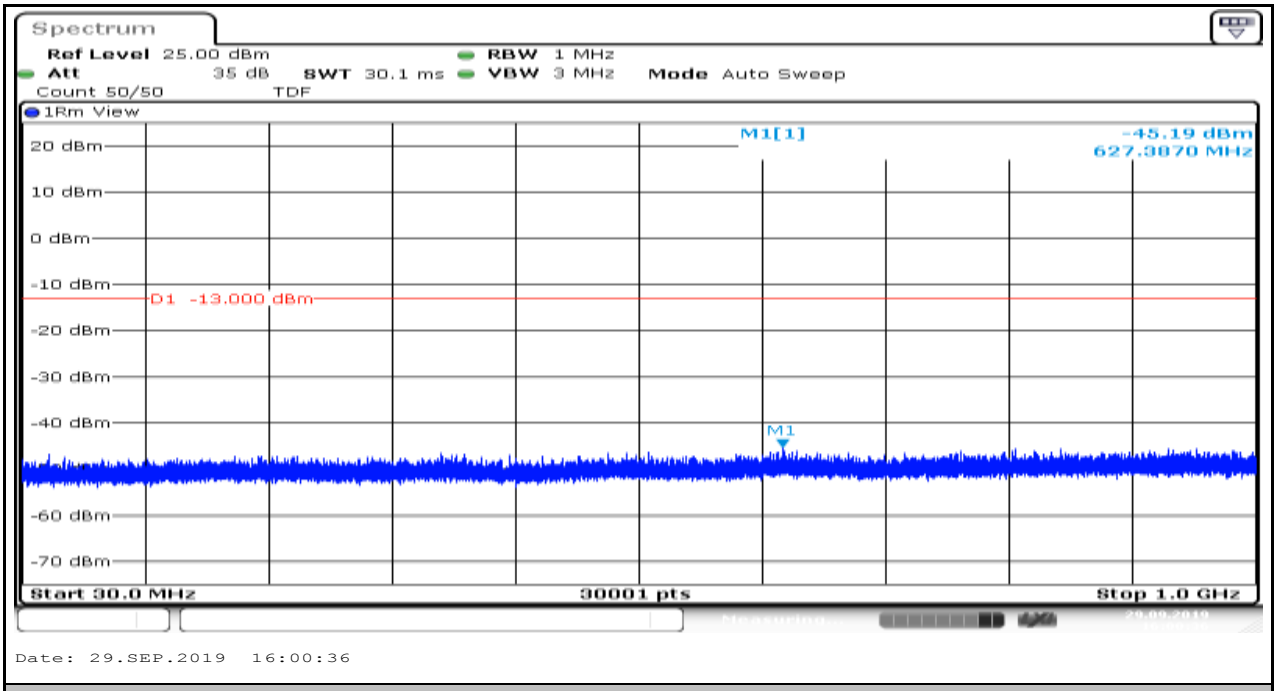

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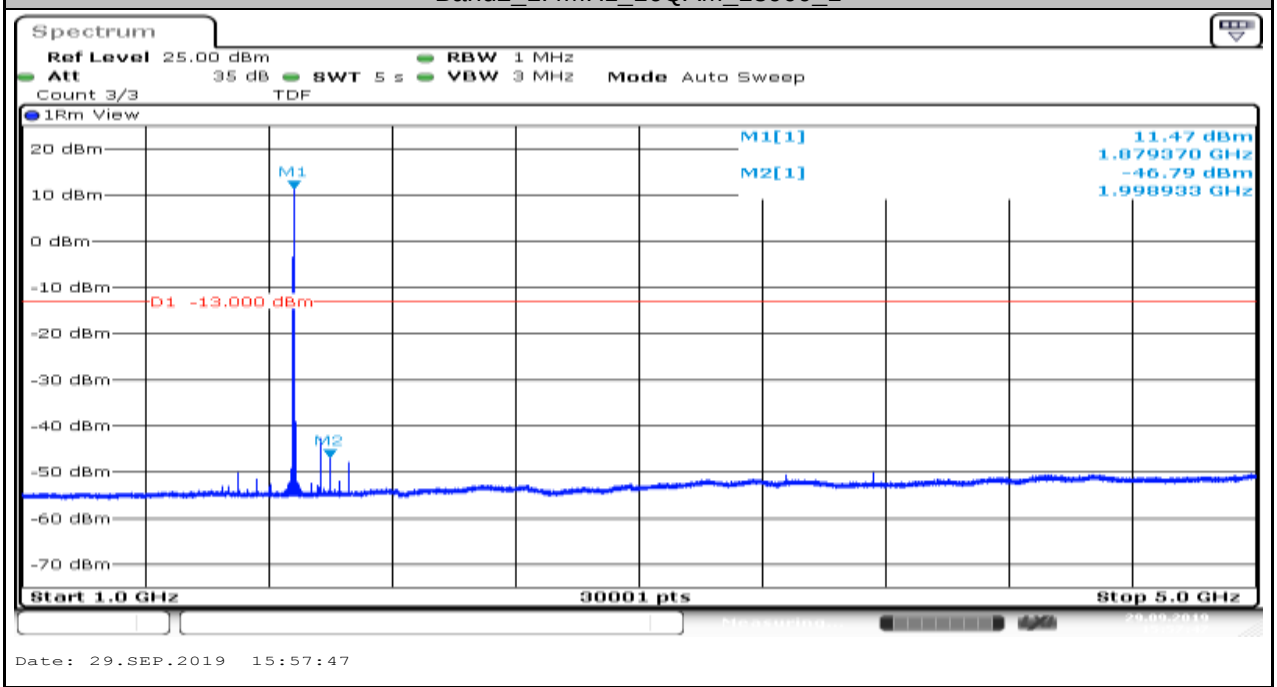

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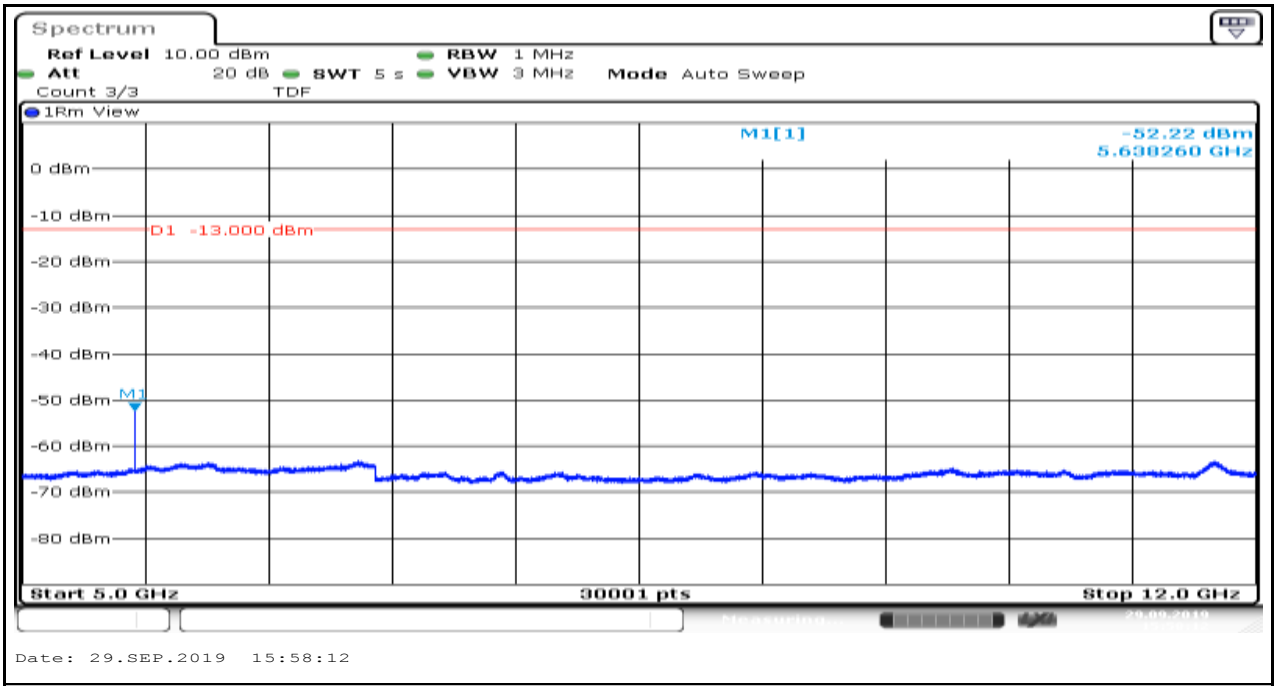

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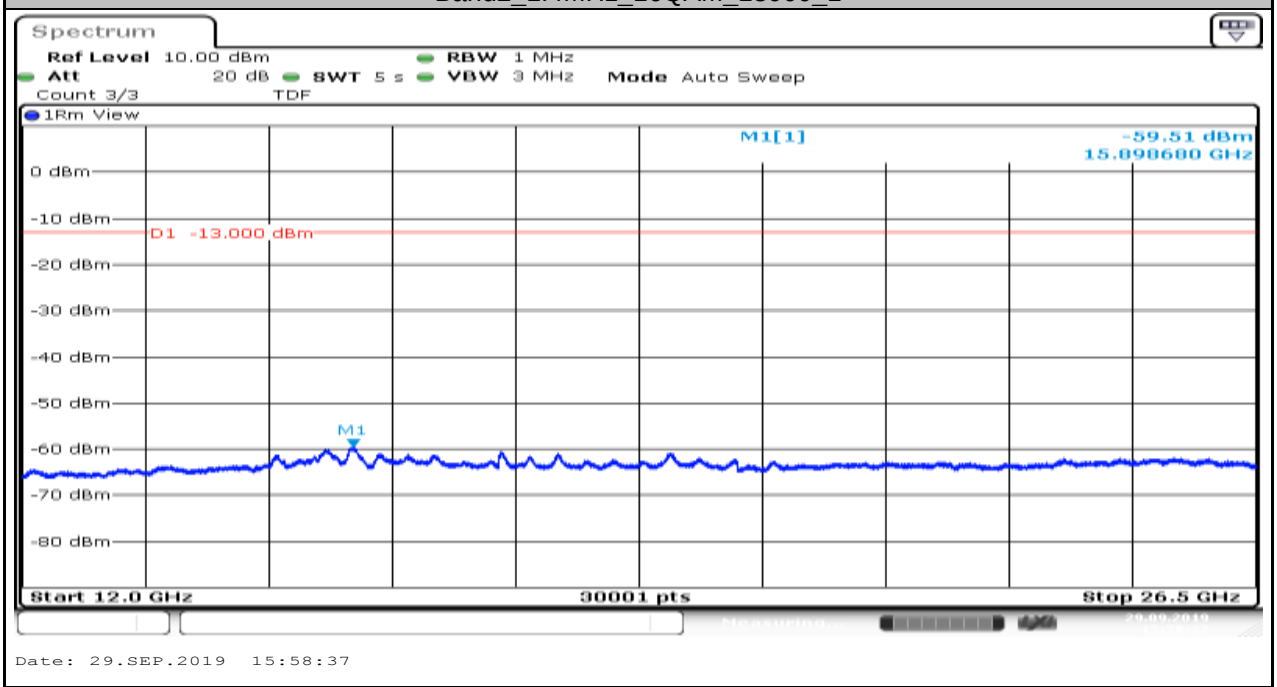

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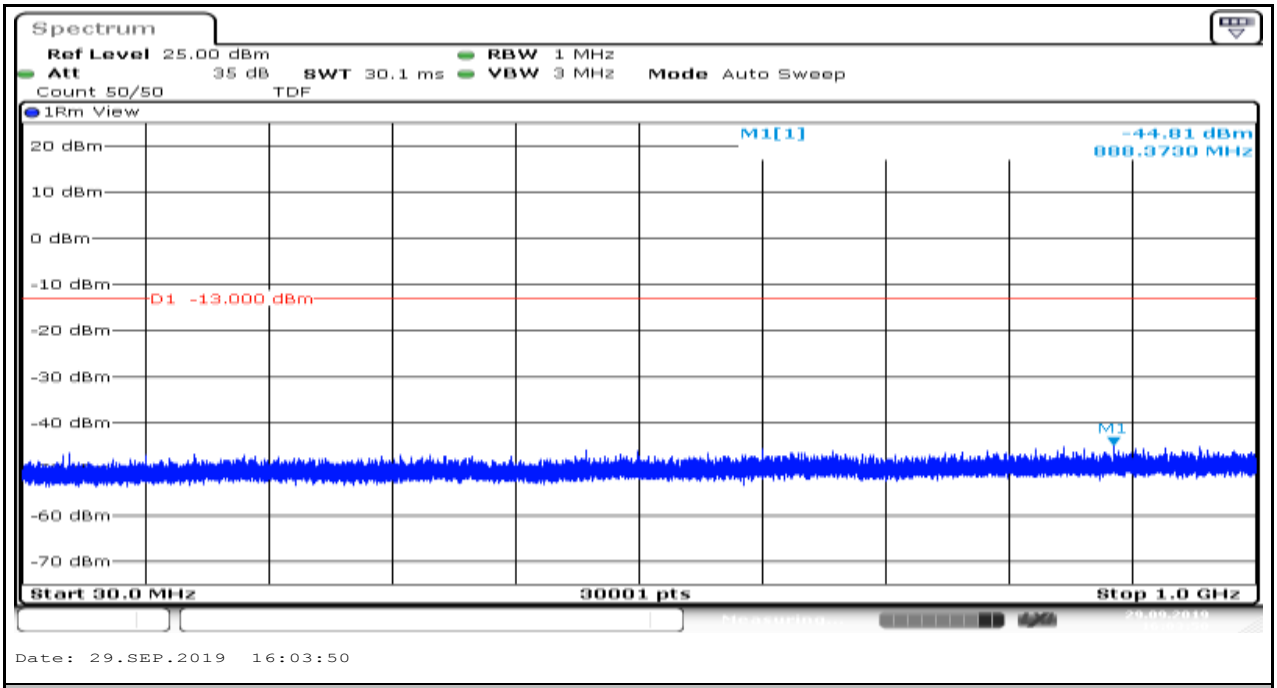

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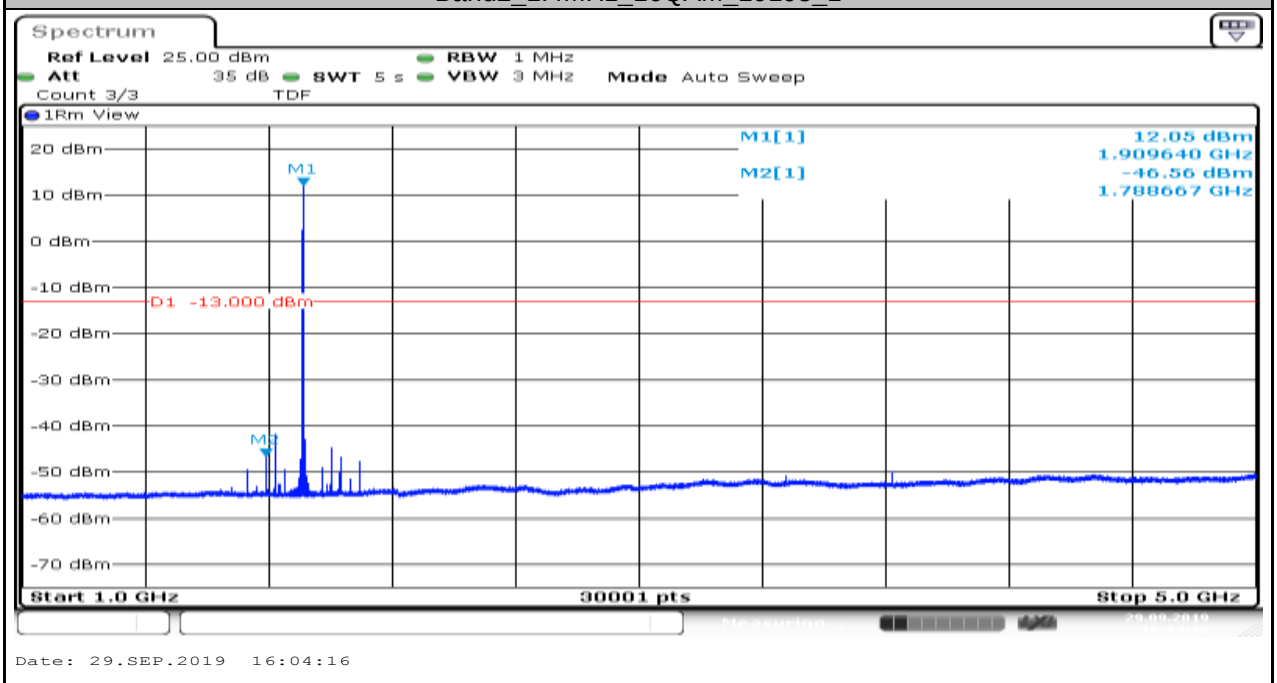

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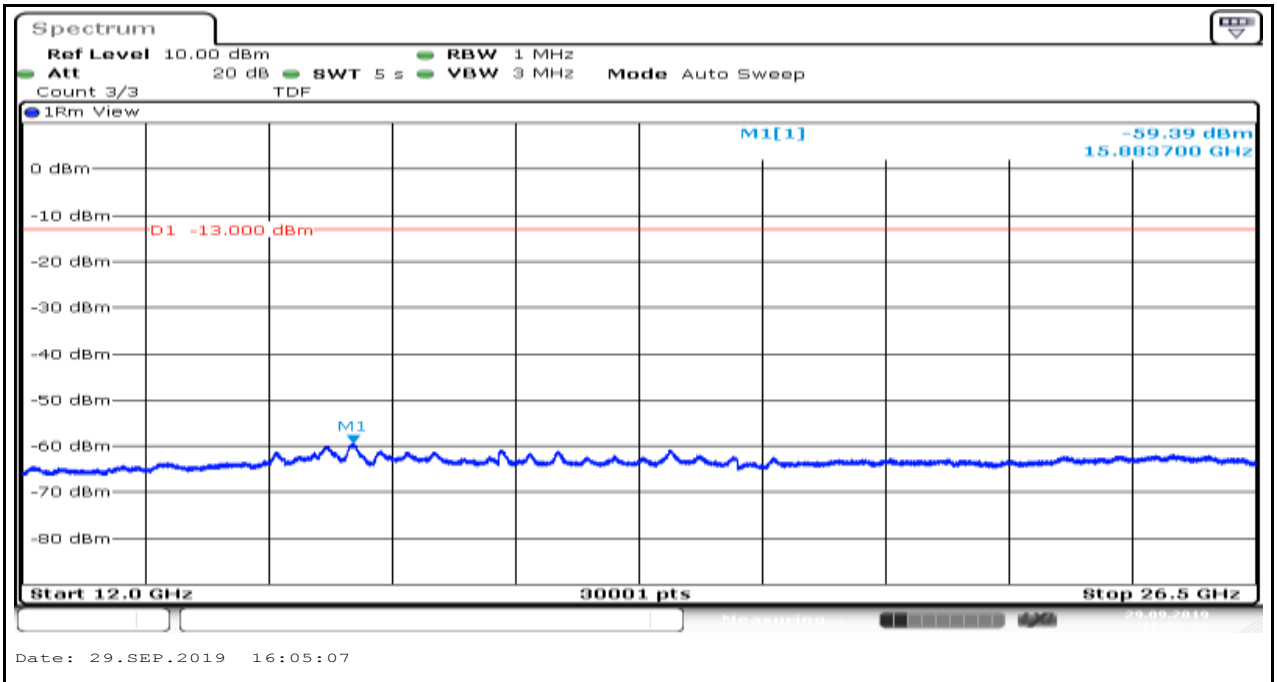

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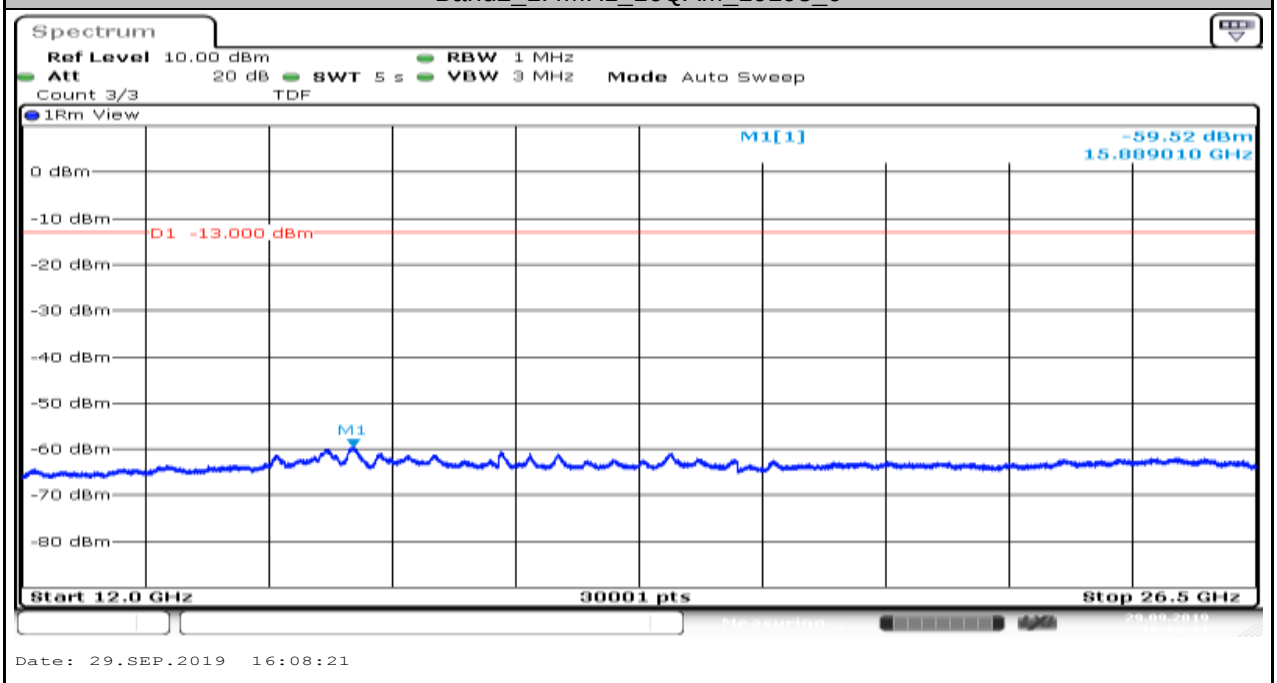

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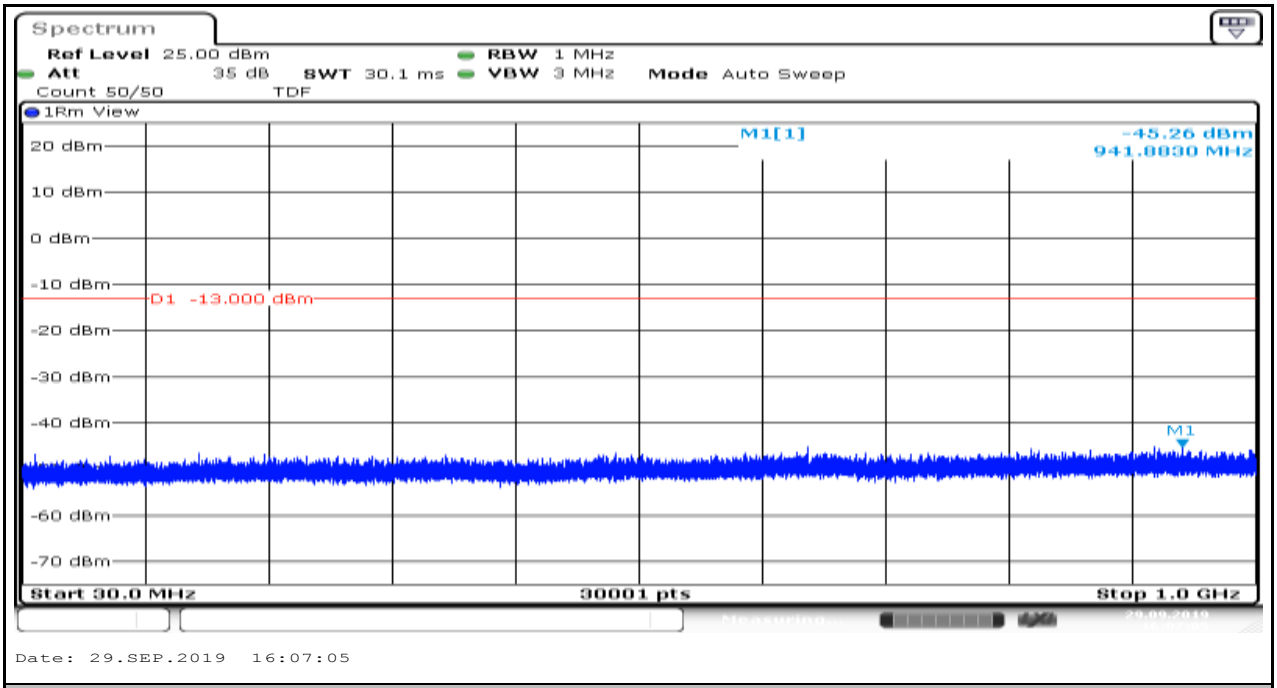

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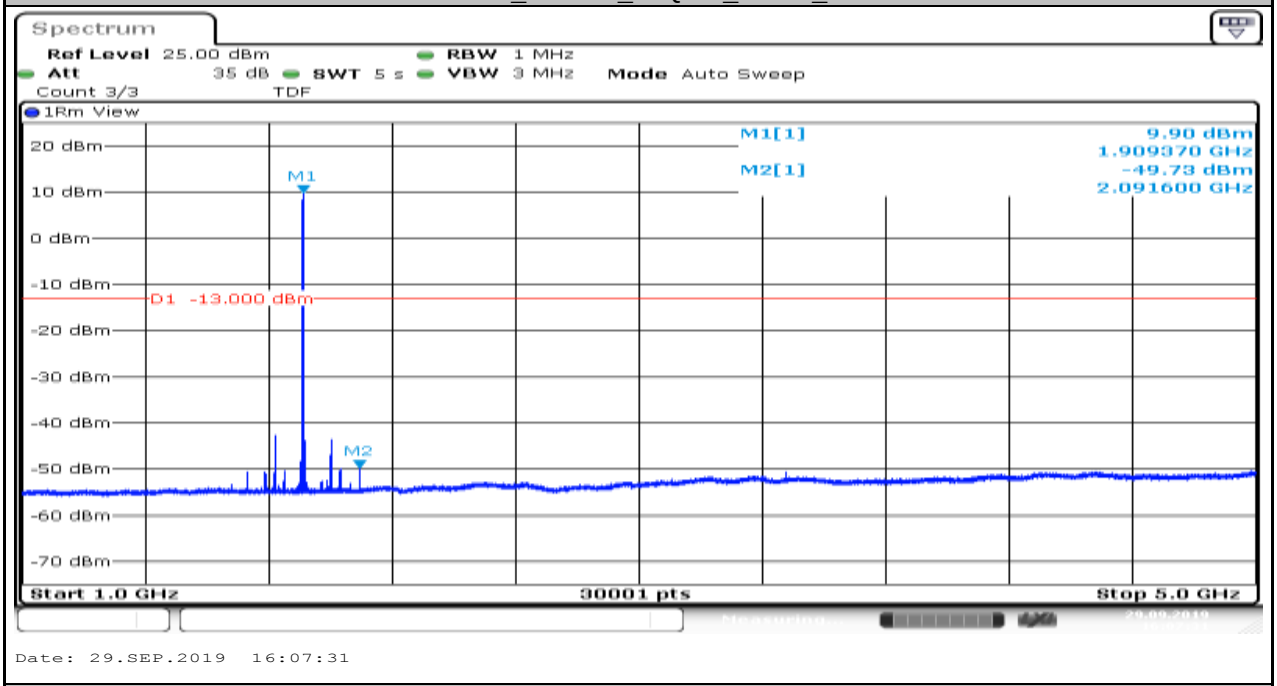
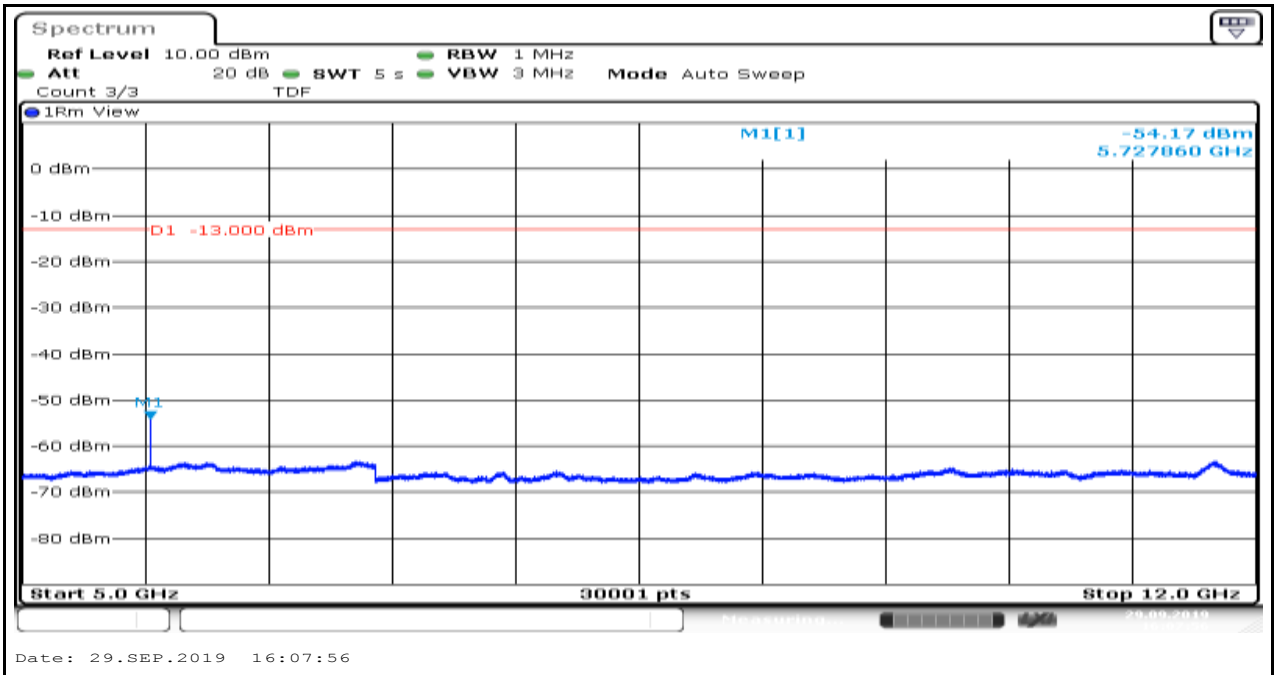


Band2_1.4MHz_16QAM_19193_6



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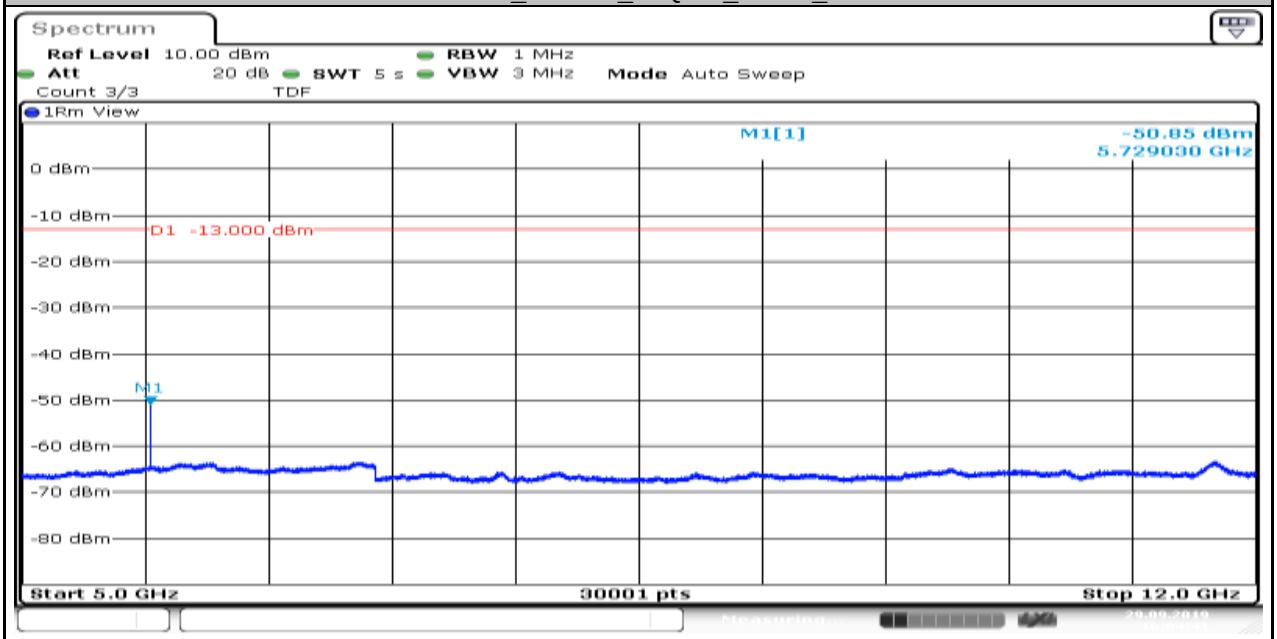
Band2_1.4MHz_16QAM_19193_1



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Appendix A.6: Frequency Stability for M1

Test Result

Voltage												
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band2	1.4MHz	QPSK	18900	1	0	Low	HV	NT	-31.14	-0.016564	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	LV	NT	-34.02	-0.018096	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	NT	-30.07	-0.015995	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	HV	NT	-26.38	-0.014032	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	LV	NT	-28.77	-0.015303	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	NT	-28.10	-0.014947	±2.5	PASS

Temperature												
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	85	-19.56	-0.010404	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	80	-18.97	-0.010090	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	70	-17.70	-0.009415	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	60	-17.45	-0.009282	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	50	-37.36	-0.019872	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	-20	-35.76	-0.019021	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	-10	-38.67	-0.020569	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	0	-36.66	-0.019500	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	10	-35.53	-0.018899	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	20	-36.61	-0.019473	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	30	-37.58	-0.019989	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	-30	-34.00	-0.018085	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	-40	-19.86	-0.010564	±2.5	PASS
Band2	1.4MHz	QPSK	18900	1	0	Low	NV	40	-37.74	-0.020074	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	50	-31.33	-0.016665	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	-20	-30.53	-0.016239	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	-10	-29.44	-0.015660	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	0	-30.03	-0.015973	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	10	-27.08	-0.014404	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	20	-29.94	-0.015926	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	30	-28.97	-0.015410	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	40	-31.73	-0.016878	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	-30	-30.78	-0.016372	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	85	-17.35	-0.009229	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	80	17.12	0.009106	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	70	15.66	0.008330	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	60	-19.54	-0.010394	±2.5	PASS
Band2	1.4MHz	16QAM	18900	1	0	Low	NV	-40	-19.25	-0.010239	±2.5	PASS

Appendix B: Test Results of Band 4 for eMTC operation

APPENDIX B: TEST RESULTS OF BAND 4 FOR EMTC OPERATION 1

APPENDIX B.1: RF POWER OUTPUT AND EFFECTIVE (ISOTROPIC) RADIATED POWER OUTPUT DATA FOR M1 2
Test Result 2

APPENDIX B.2: PEAK-TO-AVERAGE RATIO (CCDF) FOR M1 4
Test Result 4
Test Graphs 5

APPENDIX B.3: 26DB BANDWIDTH AND OCCUPIED BANDWIDTH FOR M1 11
Test Result 11
Test Graphs 12

APPENDIX B.4: BAND EDGE FOR M1 18
Test Result 18
Test Graphs 18

APPENDIX B.5: CONDUCTED SPURIOUS EMISSION FOR M1 23
Test Result 23
Test Graphs 24

APPENDIX B.6: FREQUENCY STABILITY FOR M1 53
Test Result 53

Appendix B.1: RF Power Output and Effective (Isotropic) Radiated Power Output Data for M1

Test Result

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NBIndex	Result (dBm)	EIRP dBm	EIRP Watts	Limit (watts)	Verdict
Band4	1.4MHz	QPSK	19957	6	0	Low	18.45	20.59	0.115	1	PASS
Band4	1.4MHz	QPSK	19957	1	0	Low	20.89	23.03	0.201	1	PASS
Band4	1.4MHz	QPSK	20175	6	0	Low	18.63	20.77	0.119	1	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	21.16	23.30	0.214	1	PASS
Band4	1.4MHz	QPSK	20393	1	5	Low	20.92	23.06	0.202	1	PASS
Band4	1.4MHz	QPSK	20393	6	0	Low	18.71	20.85	0.122	1	PASS
Band4	1.4MHz	16QAM	19957	1	0	Low	20.26	22.40	0.174	1	PASS
Band4	1.4MHz	16QAM	19957	6	0	Low	18.47	20.61	0.115	1	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	20.46	22.60	0.182	1	PASS
Band4	1.4MHz	16QAM	20175	6	0	Low	18.65	20.79	0.120	1	PASS
Band4	1.4MHz	16QAM	20393	6	0	Low	18.74	20.88	0.122	1	PASS
Band4	1.4MHz	16QAM	20393	1	5	Low	20.2	22.34	0.171	1	PASS
Band4	3MHz	QPSK	19965	6	0	Low	18.45	20.59	0.115	1	PASS
Band4	3MHz	QPSK	19965	1	0	Low	20.64	22.78	0.190	1	PASS
Band4	3MHz	QPSK	20175	1	0	Low	21.02	23.16	0.207	1	PASS
Band4	3MHz	QPSK	20175	6	0	Low	18.61	20.75	0.119	1	PASS
Band4	3MHz	QPSK	20385	1	5	High	20.73	22.87	0.194	1	PASS
Band4	3MHz	QPSK	20385	6	0	High	18.64	20.78	0.120	1	PASS
Band4	3MHz	16QAM	19965	6	0	Low	18.45	20.59	0.115	1	PASS
Band4	3MHz	16QAM	19965	1	0	Low	19.76	21.90	0.155	1	PASS
Band4	3MHz	16QAM	20175	1	0	Low	19.95	22.09	0.162	1	PASS
Band4	3MHz	16QAM	20175	6	0	Low	18.64	20.78	0.120	1	PASS
Band4	3MHz	16QAM	20385	6	0	High	18.64	20.78	0.120	1	PASS
Band4	3MHz	16QAM	20385	1	5	High	19.93	22.07	0.161	1	PASS
Band4	5MHz	QPSK	19975	1	0	Low	20.76	22.90	0.195	1	PASS
Band4	5MHz	QPSK	19975	6	0	Low	19.4	21.54	0.143	1	PASS
Band4	5MHz	QPSK	20175	1	0	Low	20.98	23.12	0.205	1	PASS
Band4	5MHz	QPSK	20175	6	0	Low	19.7	21.84	0.153	1	PASS
Band4	5MHz	QPSK	20375	3	3	High	20.72	22.86	0.193	1	PASS
Band4	5MHz	QPSK	20375	1	5	High	20.78	22.92	0.196	1	PASS
Band4	5MHz	16QAM	19975	1	0	Low	20.26	22.40	0.174	1	PASS
Band4	5MHz	16QAM	19975	6	0	Low	19.4	21.54	0.143	1	PASS
Band4	5MHz	16QAM	20175	6	0	Low	19.7	21.84	0.153	1	PASS
Band4	5MHz	16QAM	20175	1	0	Low	20.62	22.76	0.189	1	PASS
Band4	5MHz	16QAM	20375	1	5	High	20.41	22.55	0.180	1	PASS
Band4	5MHz	16QAM	20375	3	3	High	20.71	22.85	0.193	1	PASS
Band4	10MHz	QPSK	20000	5	0	Low	20.48	22.62	0.183	1	PASS
Band4	10MHz	QPSK	20000	1	0	Low	20.58	22.72	0.187	1	PASS
Band4	10MHz	QPSK	20175	1	0	Low	20.99	23.13	0.206	1	PASS
Band4	10MHz	QPSK	20175	5	0	Low	20.74	22.88	0.194	1	PASS
Band4	10MHz	QPSK	20350	5	1	High	20.85	22.99	0.199	1	PASS
Band4	10MHz	QPSK	20350	1	5	High	20.83	22.97	0.198	1	PASS
Band4	10MHz	16QAM	20000	1	0	Low	20.15	22.29	0.169	1	PASS
Band4	10MHz	16QAM	20000	5	0	Low	20.34	22.48	0.177	1	PASS
Band4	10MHz	16QAM	20175	1	0	Low	20.75	22.89	0.195	1	PASS
Band4	10MHz	16QAM	20175	5	0	Low	20.63	22.77	0.189	1	PASS
Band4	10MHz	16QAM	20350	1	5	High	20.43	22.57	0.181	1	PASS
Band4	10MHz	16QAM	20350	5	1	High	20.69	22.83	0.192	1	PASS
Band4	15MHz	QPSK	20025	1	0	Low	20.73	22.87	0.194	1	PASS

Band4	15MHz	QPSK	20025	6	0	Low	20.55	22.69	0.186	1	PASS
Band4	15MHz	QPSK	20175	6	0	Low	20.8	22.94	0.197	1	PASS
Band4	15MHz	QPSK	20175	1	0	Low	21.11	23.25	0.211	1	PASS
Band4	15MHz	QPSK	20325	6	0	High	20.8	22.94	0.197	1	PASS
Band4	15MHz	QPSK	20325	1	5	High	20.91	23.05	0.202	1	PASS
Band4	15MHz	16QAM	20025	1	0	Low	20.36	22.50	0.178	1	PASS
Band4	15MHz	16QAM	20025	6	0	Low	20.58	22.72	0.187	1	PASS
Band4	15MHz	16QAM	20175	1	0	Low	20.73	22.87	0.194	1	PASS
Band4	15MHz	16QAM	20175	6	0	Low	20.81	22.95	0.197	1	PASS
Band4	15MHz	16QAM	20325	6	0	High	20.8	22.94	0.197	1	PASS
Band4	15MHz	16QAM	20325	1	5	High	20.49	22.63	0.183	1	PASS
Band4	20MHz	QPSK	20050	1	0	Low	20.75	22.89	0.195	1	PASS
Band4	20MHz	QPSK	20050	6	0	Low	20.44	22.58	0.181	1	PASS
Band4	20MHz	QPSK	20175	1	0	Low	20.93	23.07	0.203	1	PASS
Band4	20MHz	QPSK	20175	6	0	Low	20.78	22.92	0.196	1	PASS
Band4	20MHz	QPSK	20300	6	0	High	20.8	22.94	0.197	1	PASS
Band4	20MHz	QPSK	20300	1	5	High	20.82	22.96	0.198	1	PASS
Band4	20MHz	16QAM	20050	1	0	Low	20.34	22.48	0.177	1	PASS
Band4	20MHz	16QAM	20050	6	0	Low	20.54	22.68	0.185	1	PASS
Band4	20MHz	16QAM	20175	6	0	Low	20.79	22.93	0.196	1	PASS
Band4	20MHz	16QAM	20175	1	0	Low	20.68	22.82	0.191	1	PASS
Band4	20MHz	16QAM	20300	6	0	High	20.8	22.94	0.197	1	PASS
Band4	20MHz	16QAM	20300	1	5	High	20.42	22.56	0.180	1	PASS

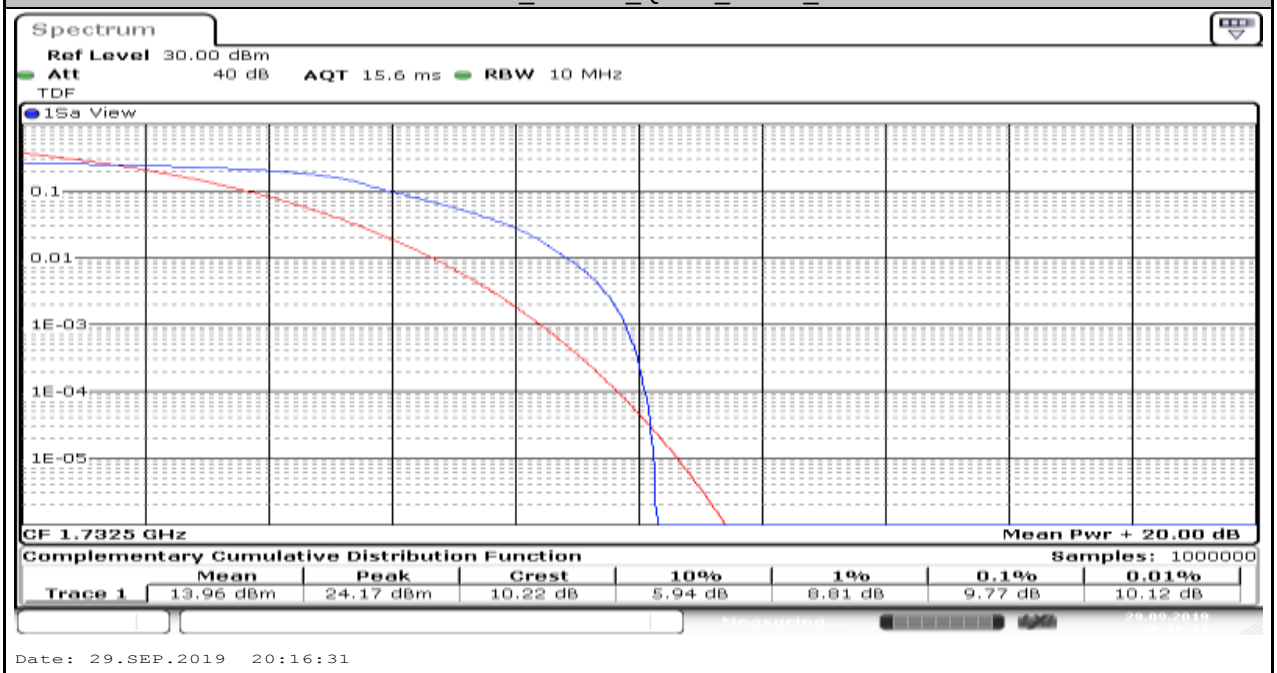
Appendix B.2: Peak-to-Average Ratio (CCDF) for M1

Test Result

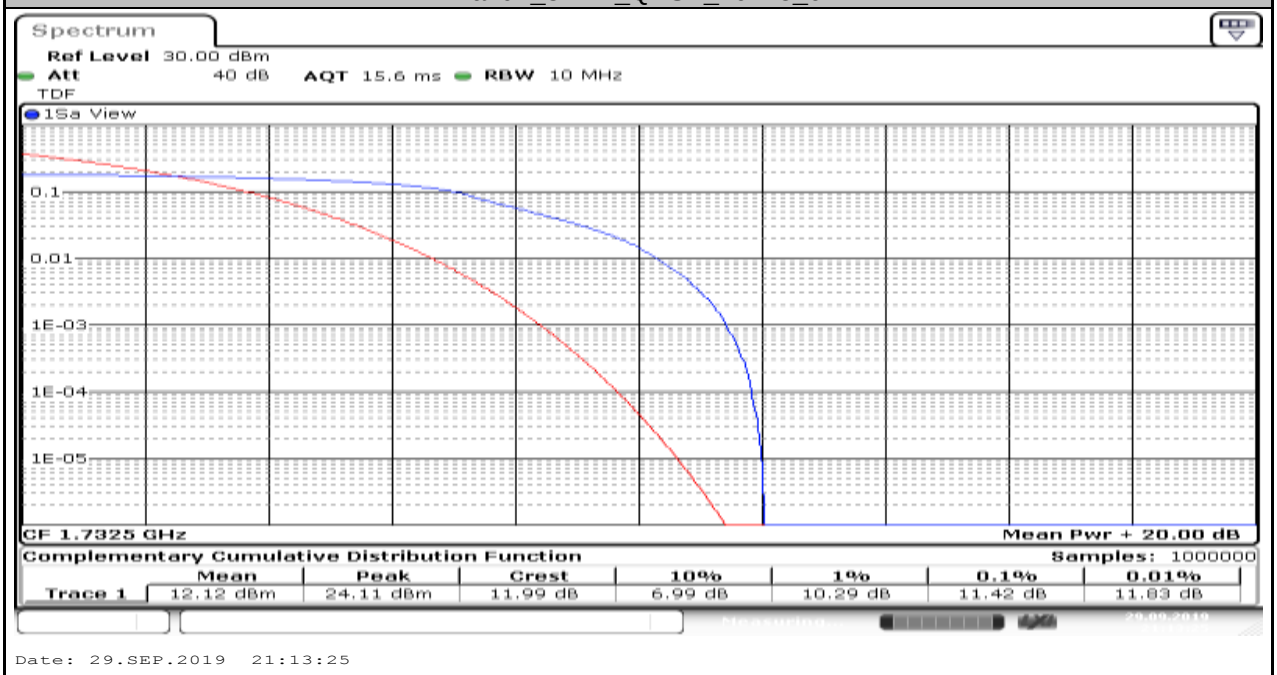
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NBIndex	Result(dB)	Limit(dB)	Verdict
Band4	1.4MHz	QPSK	20175	6	0	Low	9.77	<=13	PASS
Band4	3MHz	QPSK	20175	6	0	Low	11.42	<=13	PASS
Band4	5MHz	QPSK	20175	6	0	Low	11.33	<=13	PASS
Band4	10MHz	QPSK	20175	6	0	Low	8.49	<=13	PASS
Band4	20MHz	QPSK	20175	6	0	Low	9.22	<=13	PASS
Band4	15MHz	QPSK	20175	6	0	Low	10.23	<=13	PASS
Band4	1.4MHz	16QAM	20175	6	0	Low	11.57	<=13	PASS
Band4	5MHz	16QAM	20175	6	0	Low	8.99	<=13	PASS
Band4	15MHz	16QAM	20175	6	0	Low	8.06	<=13	PASS
Band4	10MHz	16QAM	20175	6	0	Low	10.90	<=13	PASS
Band4	20MHz	16QAM	20175	6	0	Low	8.06	<=13	PASS
Band4	3MHz	16QAM	20175	6	0	Low	9.07	<=13	PASS

Test Graphs

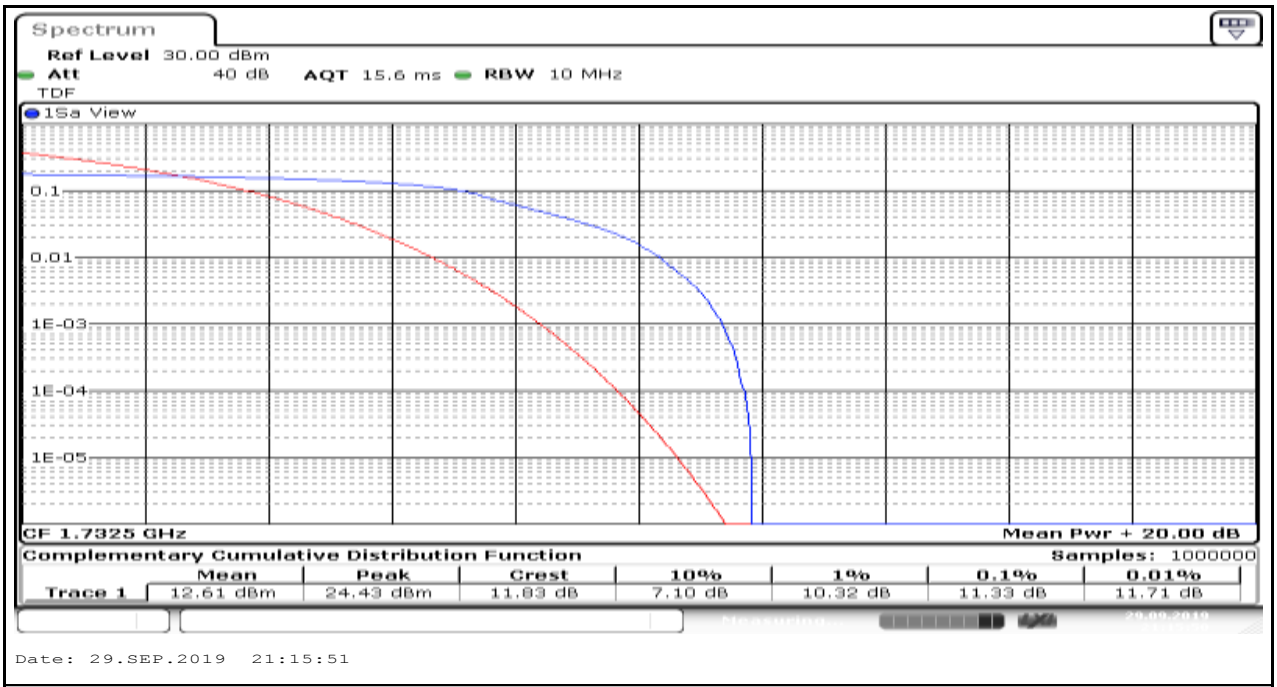
Band4_1.4MHz_QPSK_20175_6



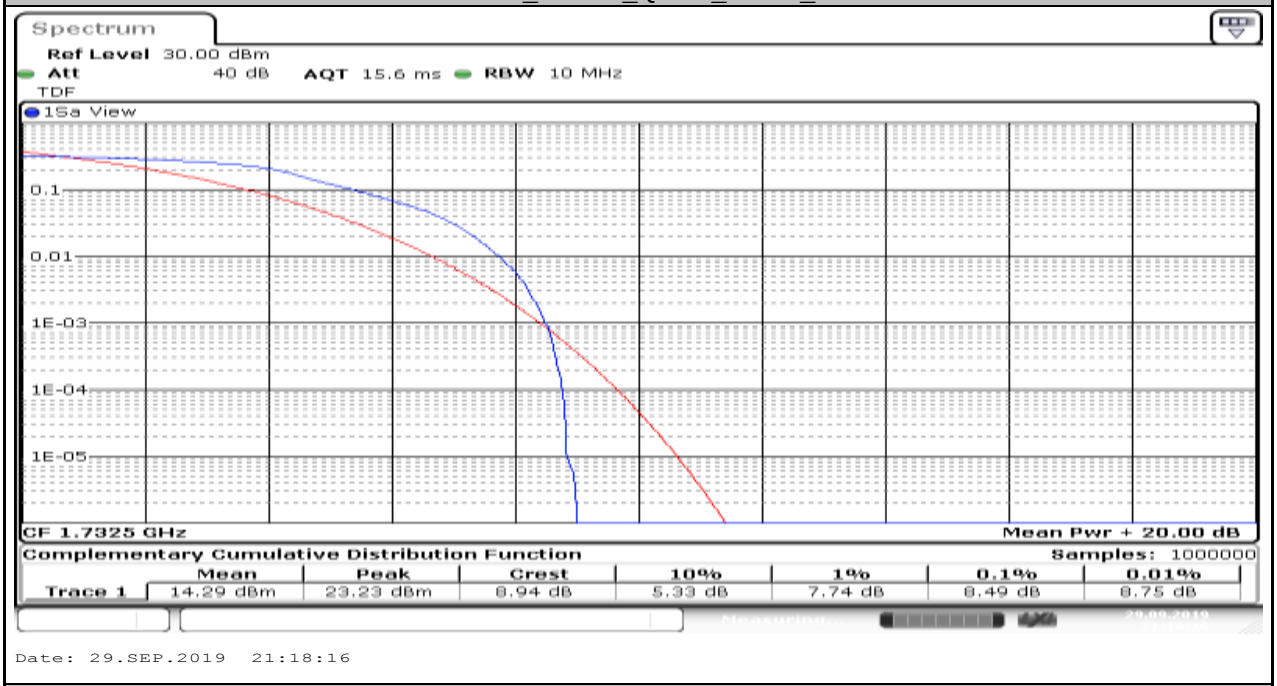
Band4_3MHz_QPSK_20175_6



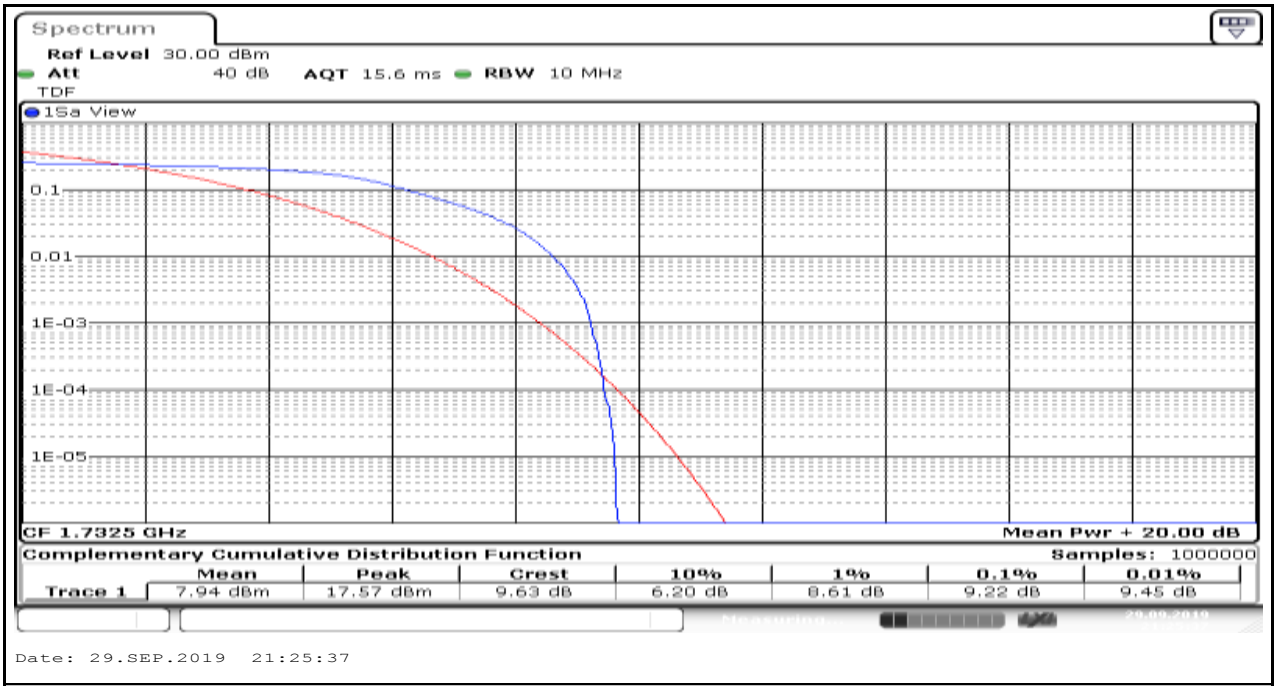
Band4_5MHz_QPSK_20175_6



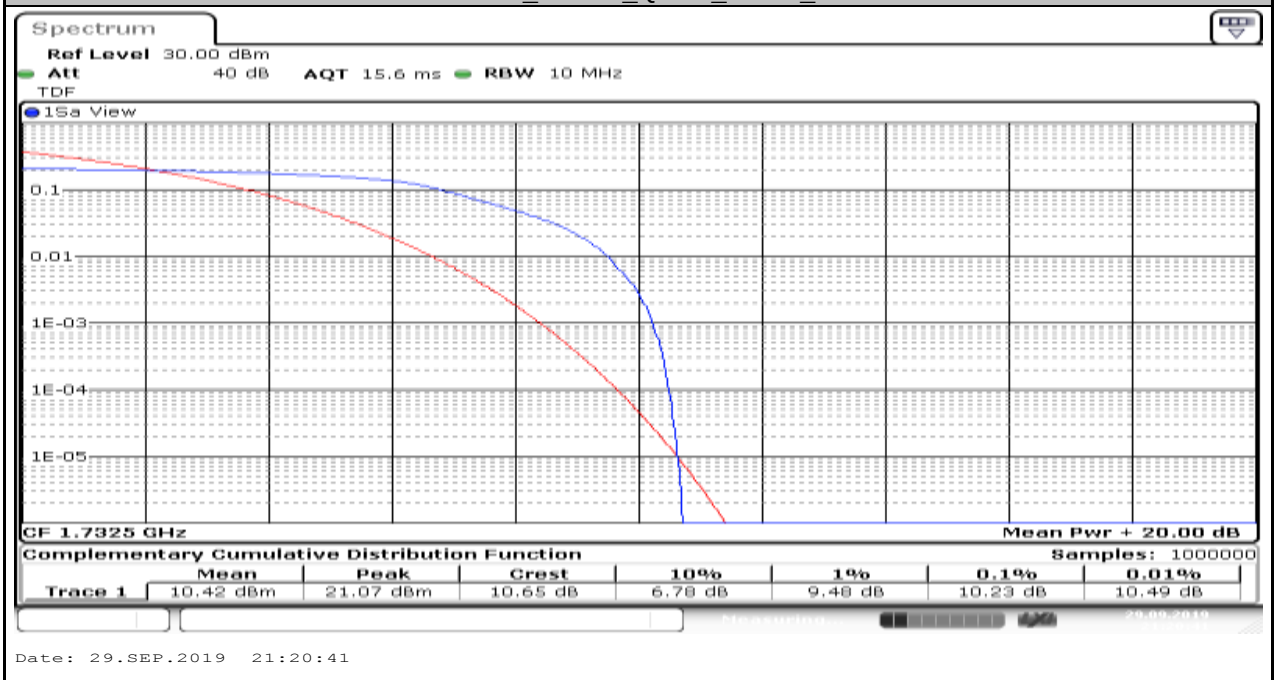
Band4_10MHz_QPSK_20175_6



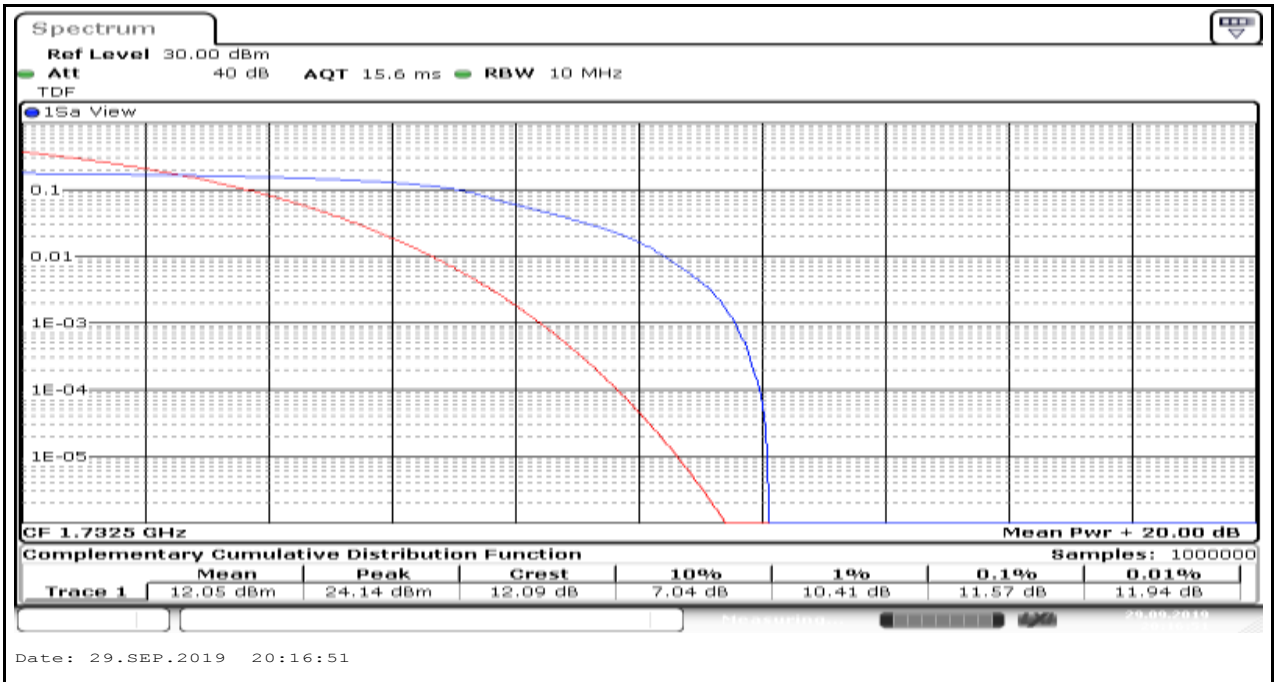
Band4_20MHz_QPSK_20175_6



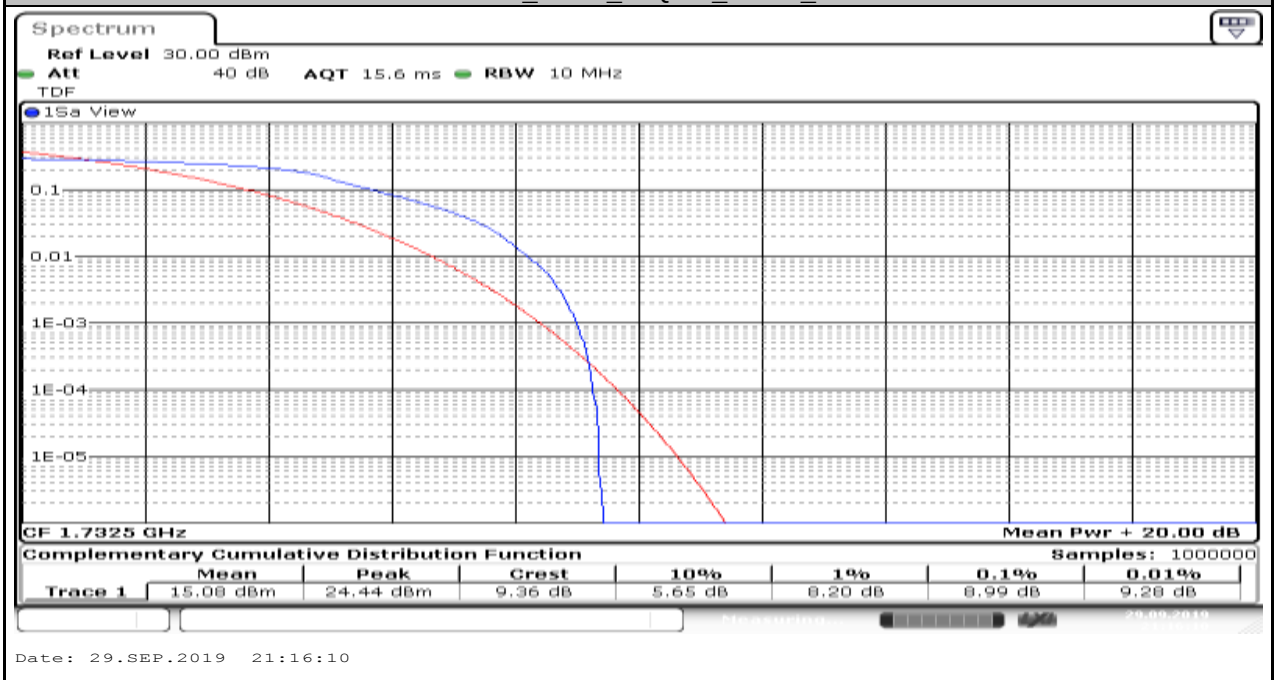
Band4_15MHz_QPSK_20175_6



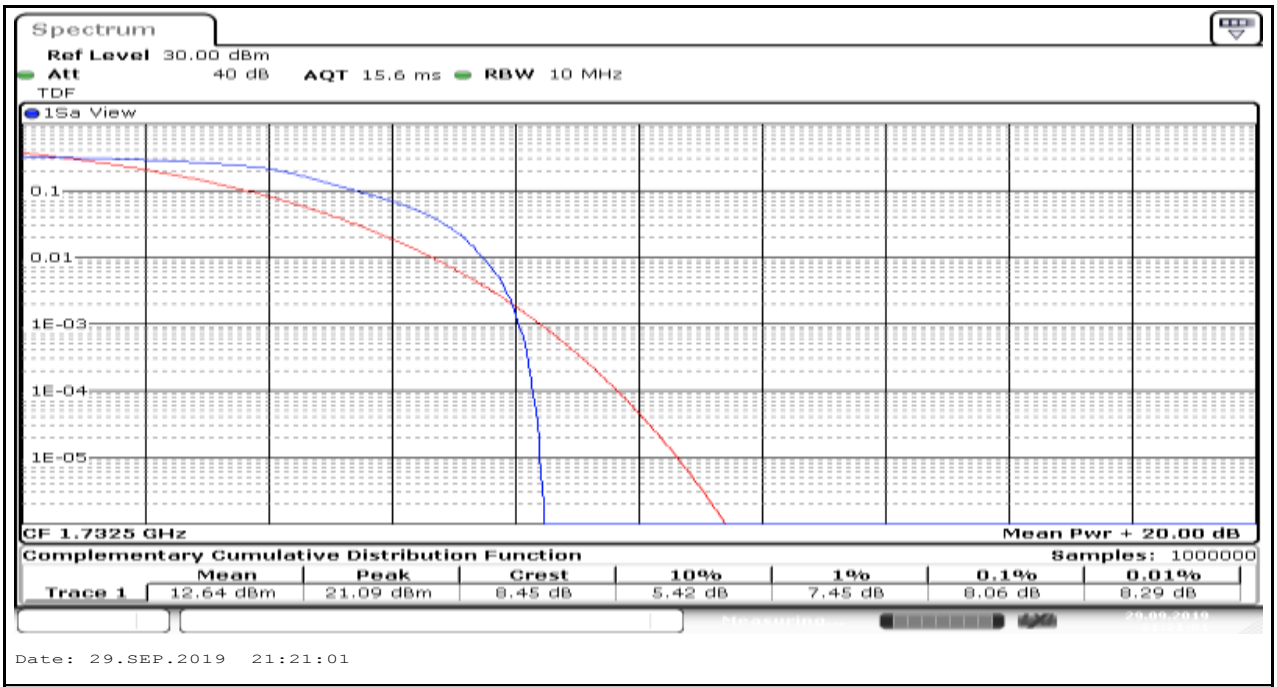
Band4_1.4MHz_16QAM_20175_6



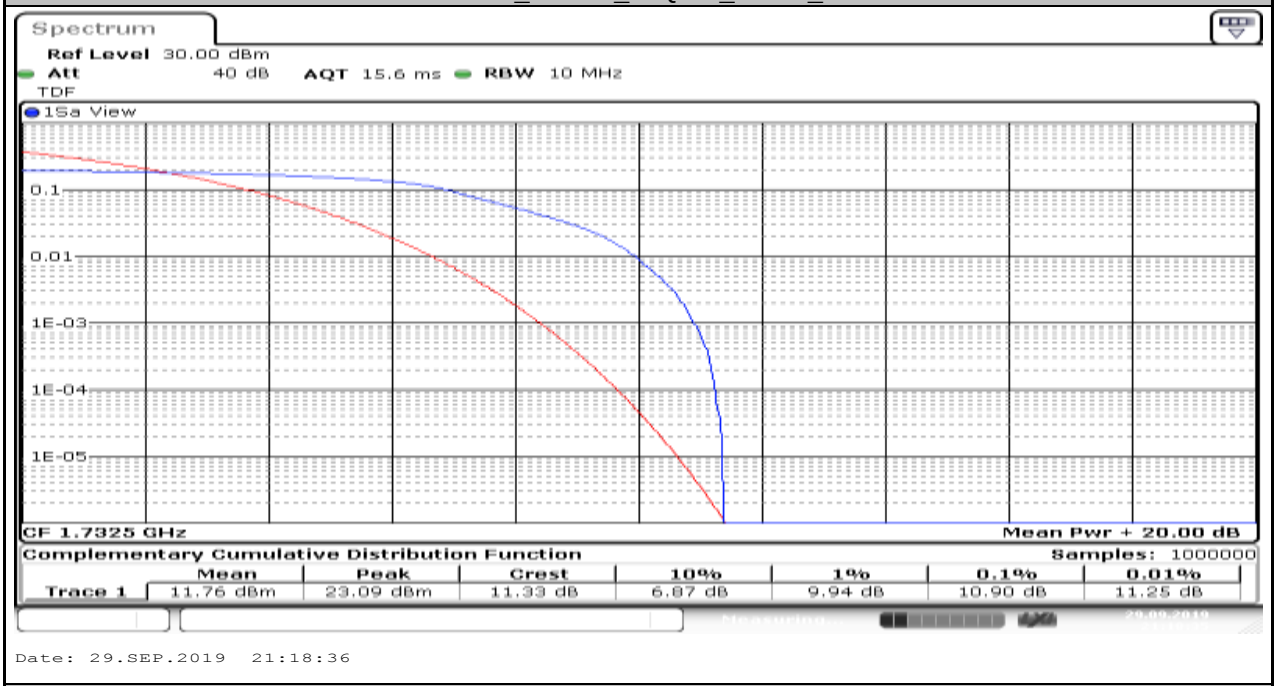
Band4_5MHz_16QAM_20175_6



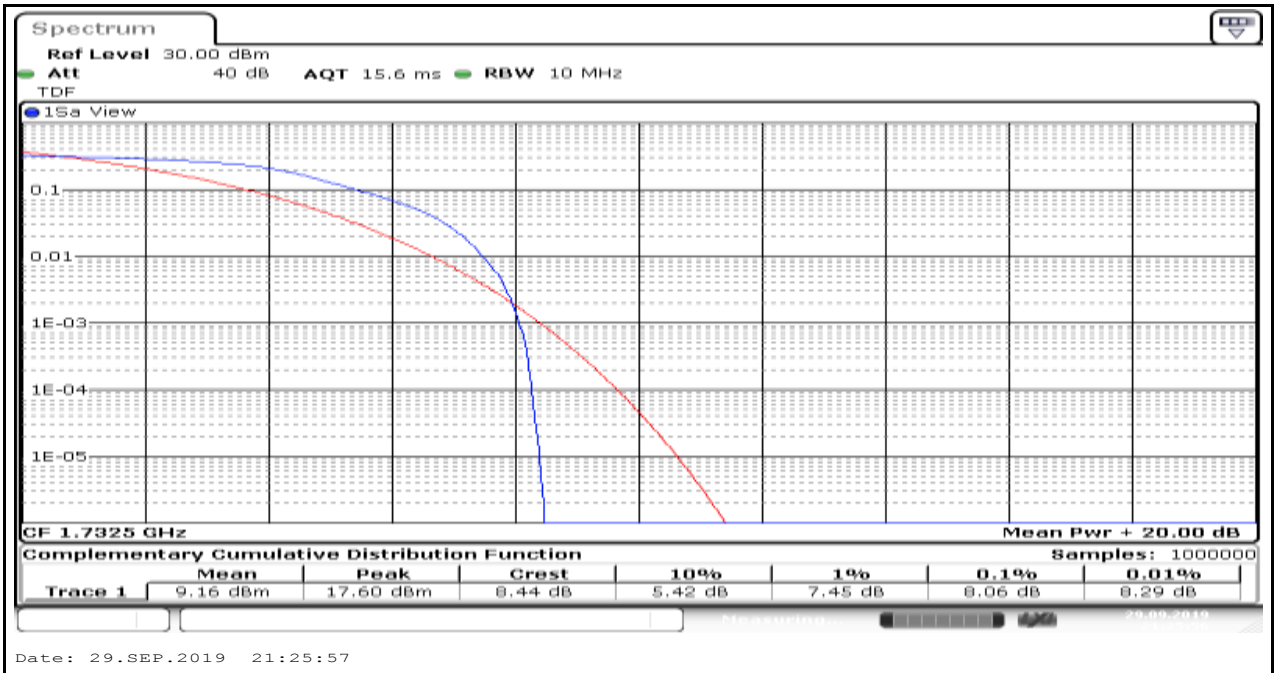
Band4_15MHz_16QAM_20175_6



Band4_10MHz_16QAM_20175_6

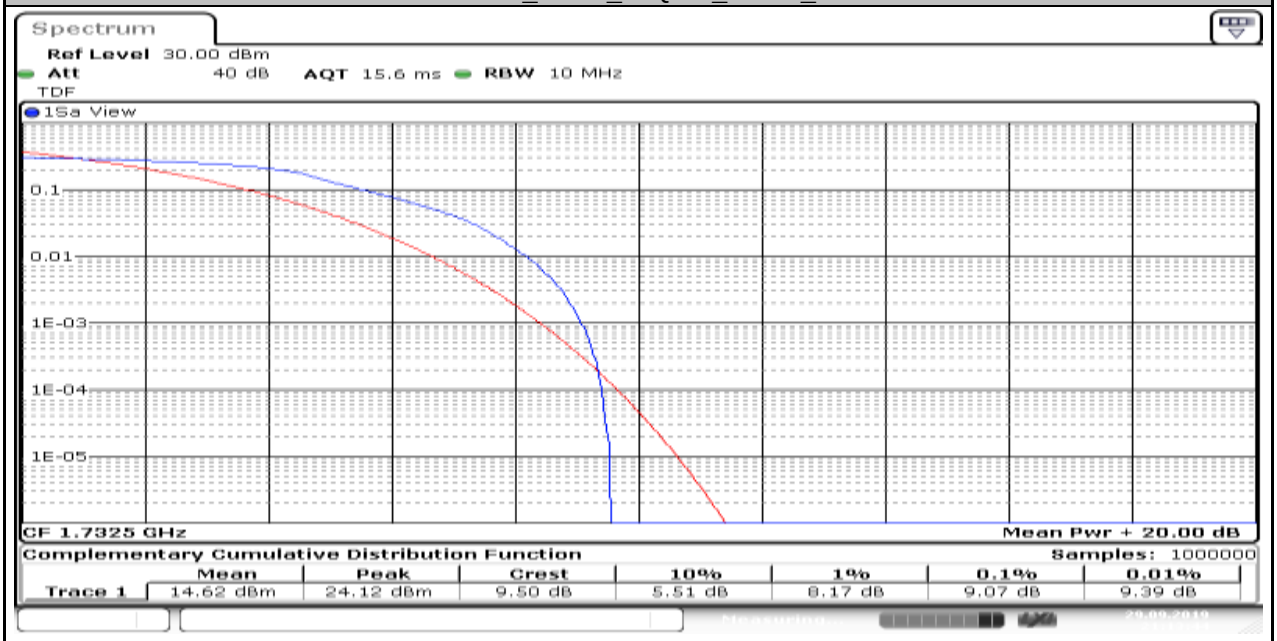


Band4_20MHz_16QAM_20175_6



Date: 29.SEP.2019 21:25:57

Band4_3MHz_16QAM_20175_6



Date: 29.SEP.2019 21:13:45

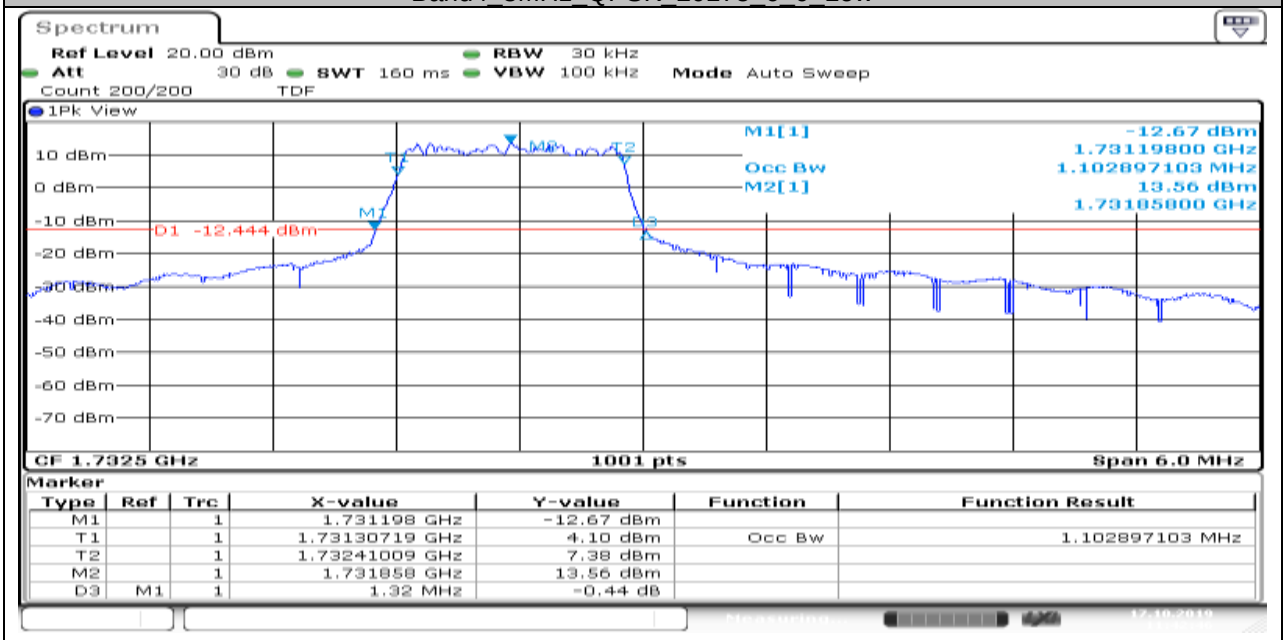
Appendix B.3: 26dB Bandwidth and Occupied Bandwidth for M1

Test Result

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)	Verdict
Band4	3MHz	QPSK	20175	6	0	Low	1.103	1.320	PASS
Band4	15MHz	QPSK	20175	6	0	Low	1.109	1.380	PASS
Band4	5MHz	QPSK	20175	6	0	Low	1.099	1.330	PASS
Band4	10MHz	QPSK	20175	6	0	Low	1.099	1.320	PASS
Band4	20MHz	QPSK	20175	6	0	Low	1.119	1.400	PASS
Band4	1.4MHz	QPSK	20175	6	0	Low	1.103	1.314	PASS
Band4	3MHz	16QAM	20175	6	0	Low	1.103	1.314	PASS
Band4	15MHz	16QAM	20175	6	0	Low	1.109	1.350	PASS
Band4	5MHz	16QAM	20175	6	0	Low	1.099	1.330	PASS
Band4	10MHz	16QAM	20175	6	0	Low	1.099	1.340	PASS
Band4	20MHz	16QAM	20175	6	0	Low	1.119	1.360	PASS
Band4	1.4MHz	16QAM	20175	6	0	Low	1.091	1.275	PASS

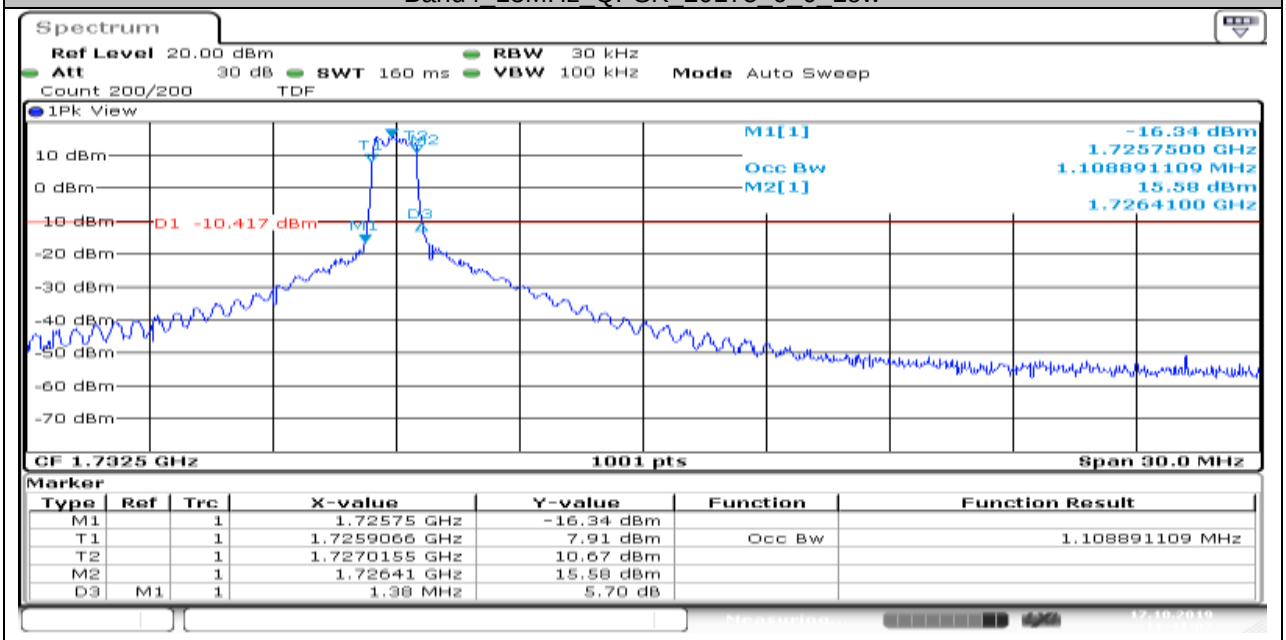
Test Graphs

Band4_3MHz_QPSK_20175_6_0_Low



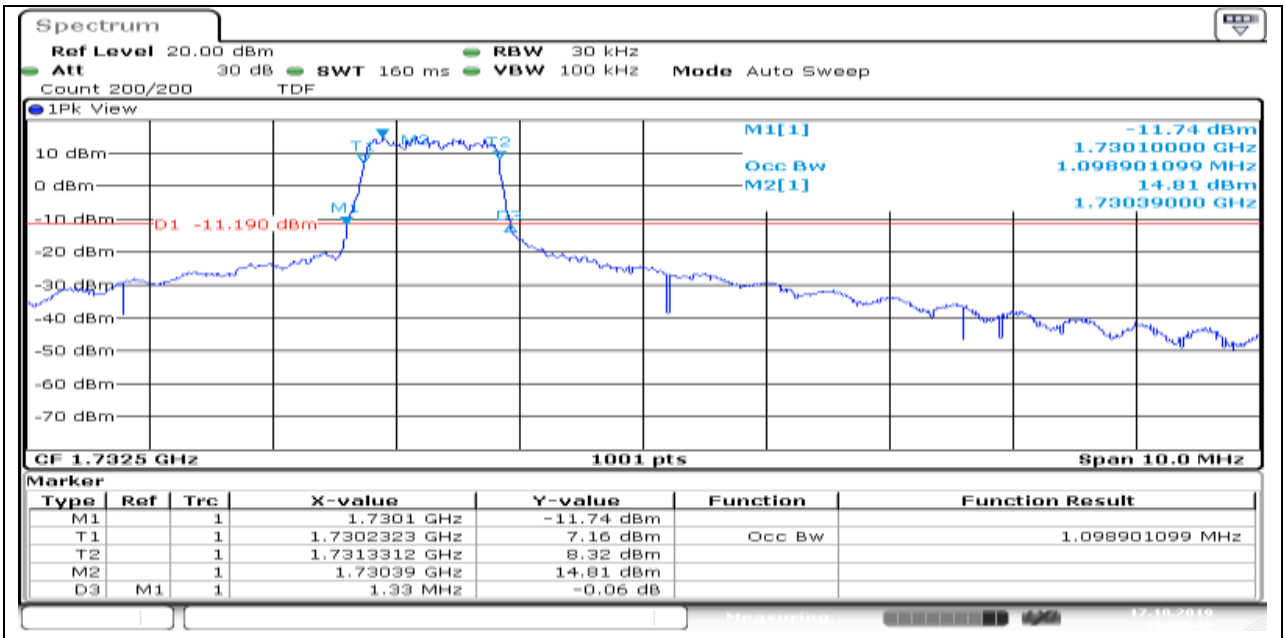
Date: 17.OCT.2019 11:42:46

Band4_15MHz_QPSK_20175_6_0_Low

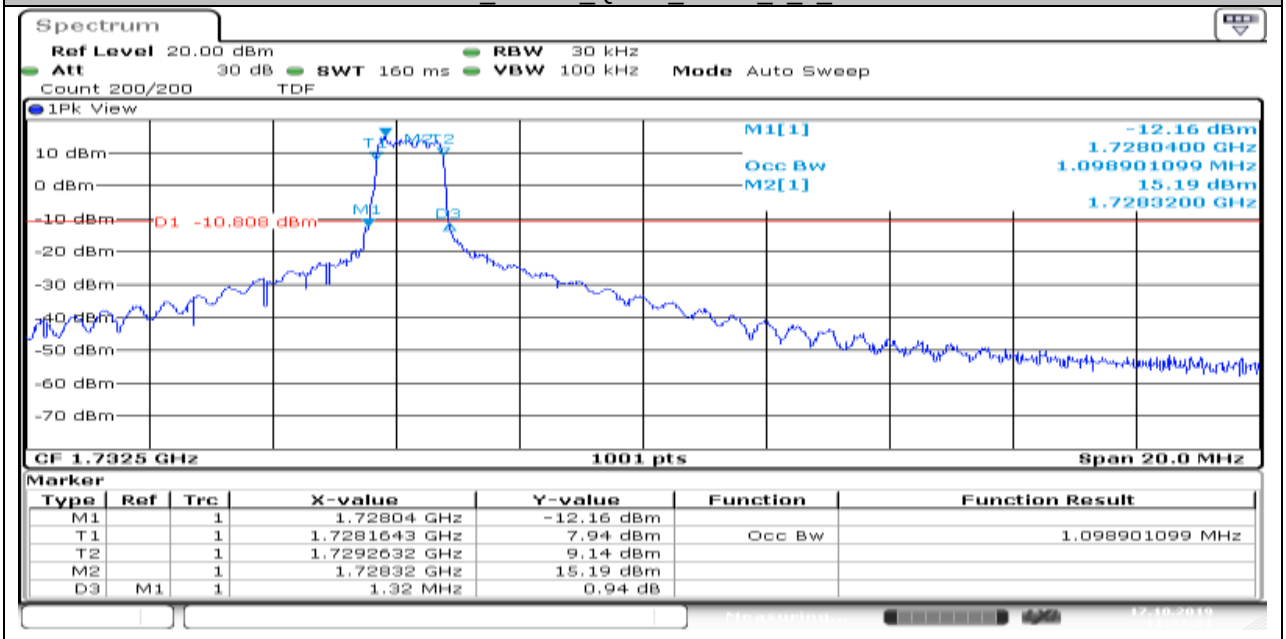


Date: 17.OCT.2019 11:41:07

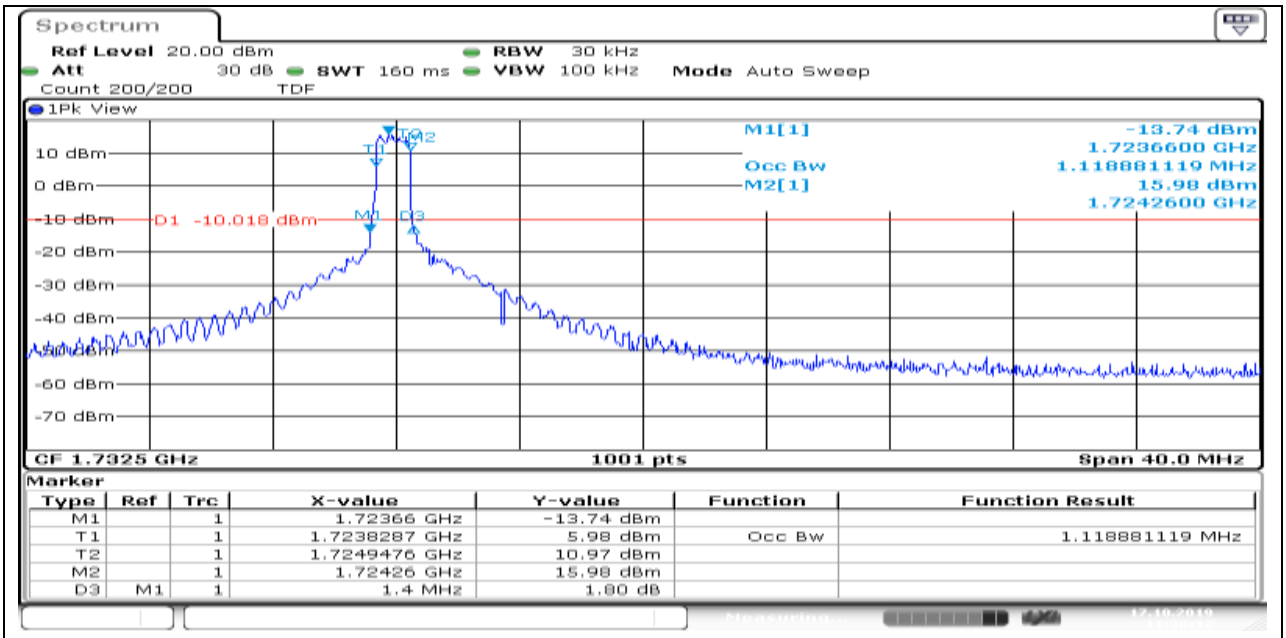
Band4_5MHz_QPSK_20175_6_0_Low



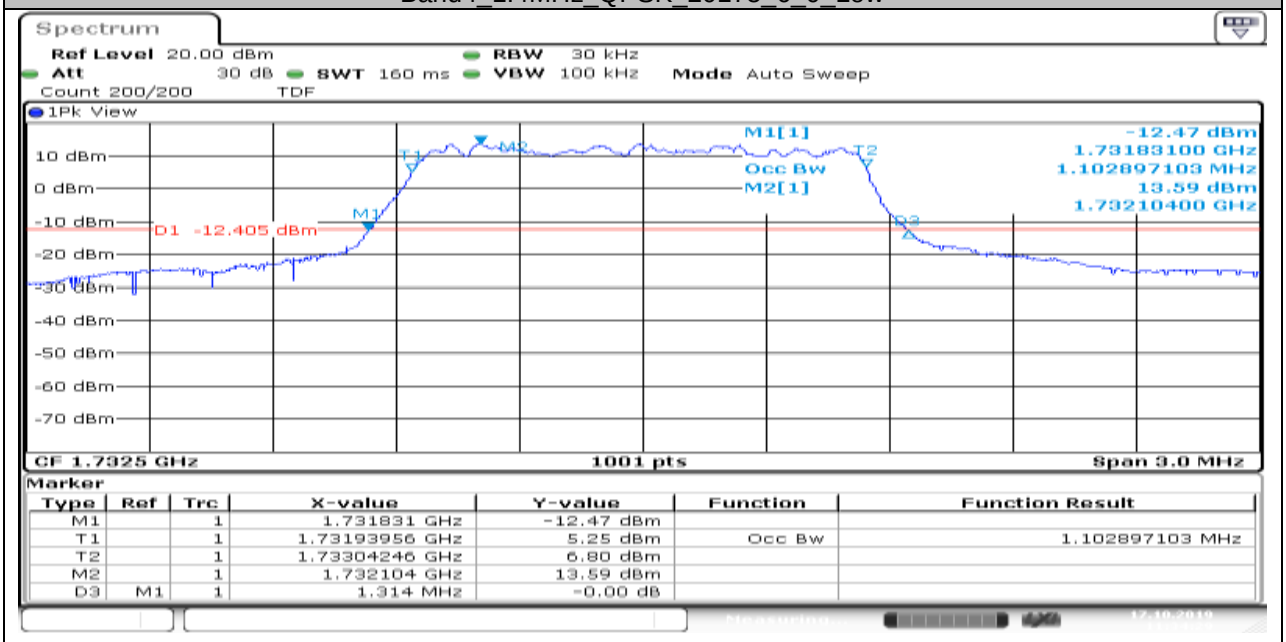
Band4_10MHz_QPSK_20175_6_0_Low



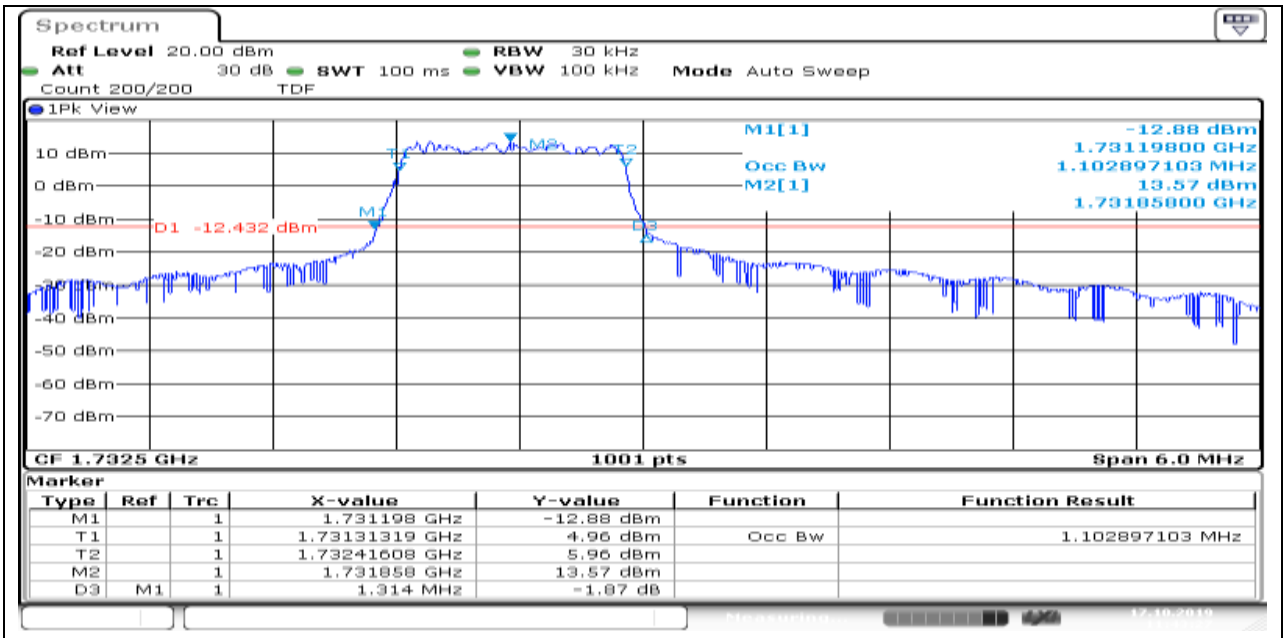
Band4_20MHz_QPSK_20175_6_0_Low



Band4_1.4MHz_QPSK_20175_6_0_Low



Band4_3MHz_16QAM_20175_6_0_Low



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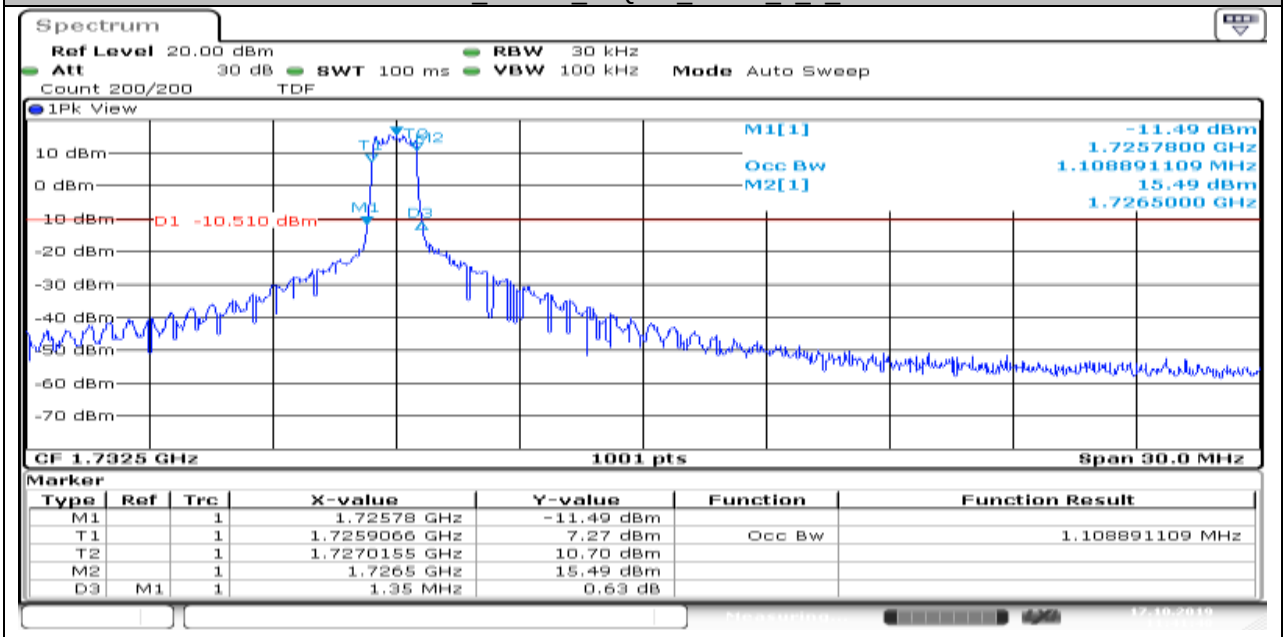
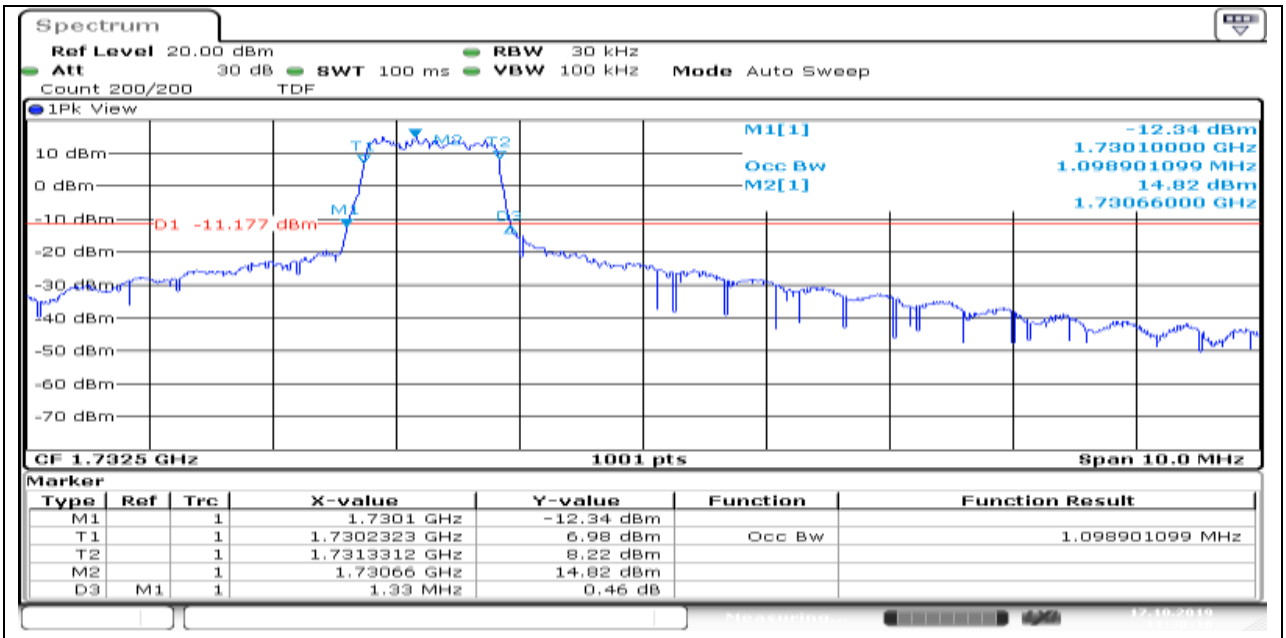
Band4_15MHz_16QAM_20175_6_0_Low

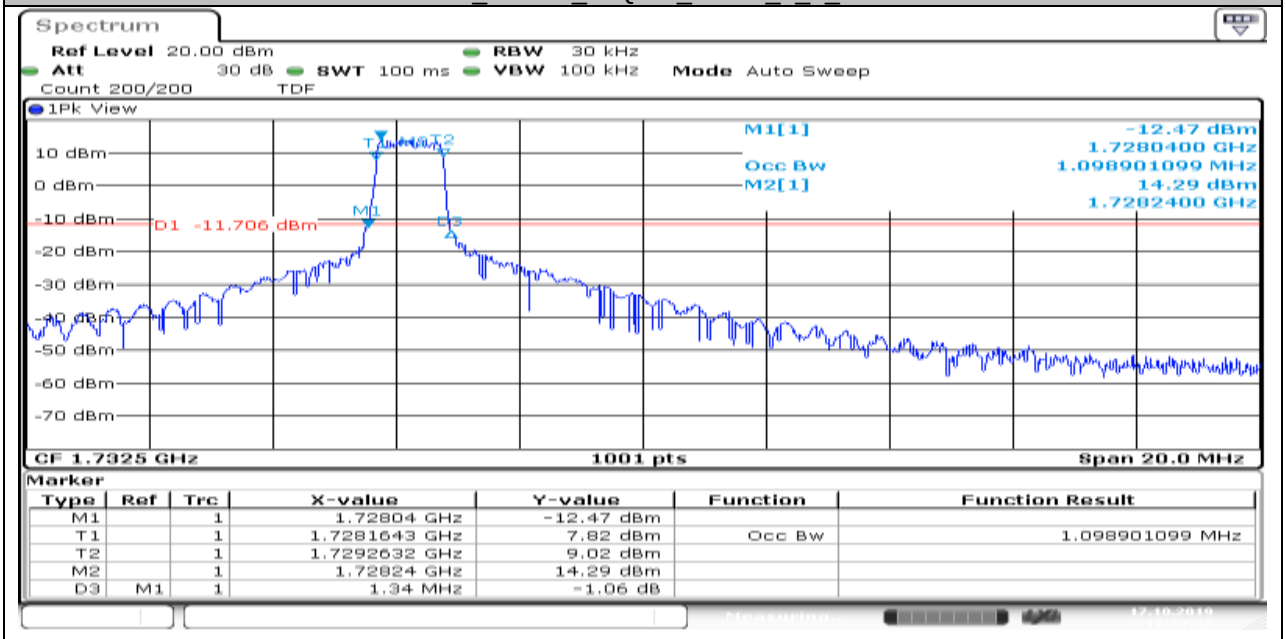


Date: 17.OCT.2019 11:41:48

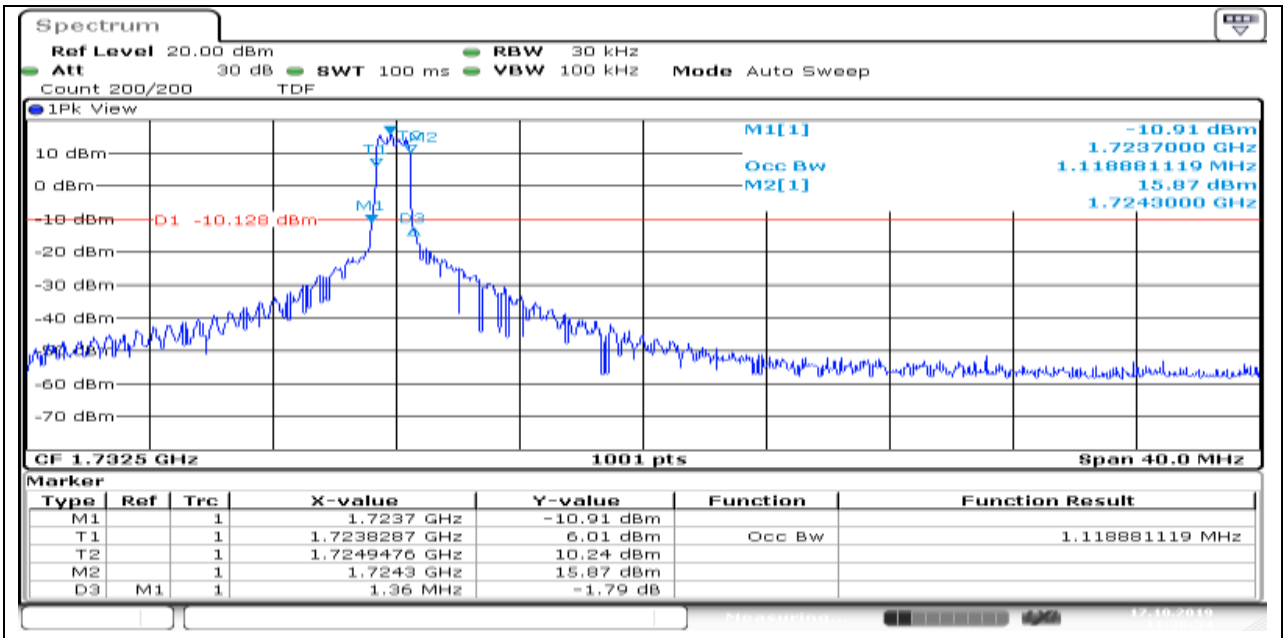
Band4_5MHz_16QAM_20175_6_0_Low



Band4_10MHz_16QAM_20175_6_0_Low



Band4_20MHz_16QAM_20175_6_0_Low



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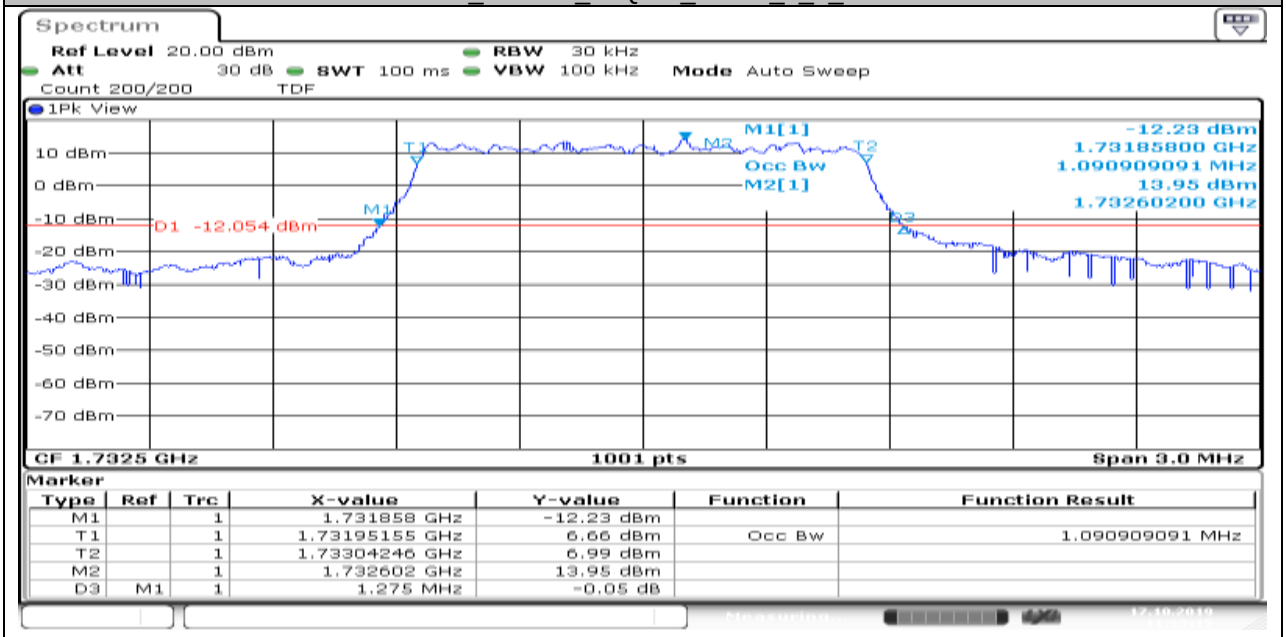
Band4_1.4MHz_16QAM_20175_6_0_Low



Date: 17.OCT.2019 11:35:15

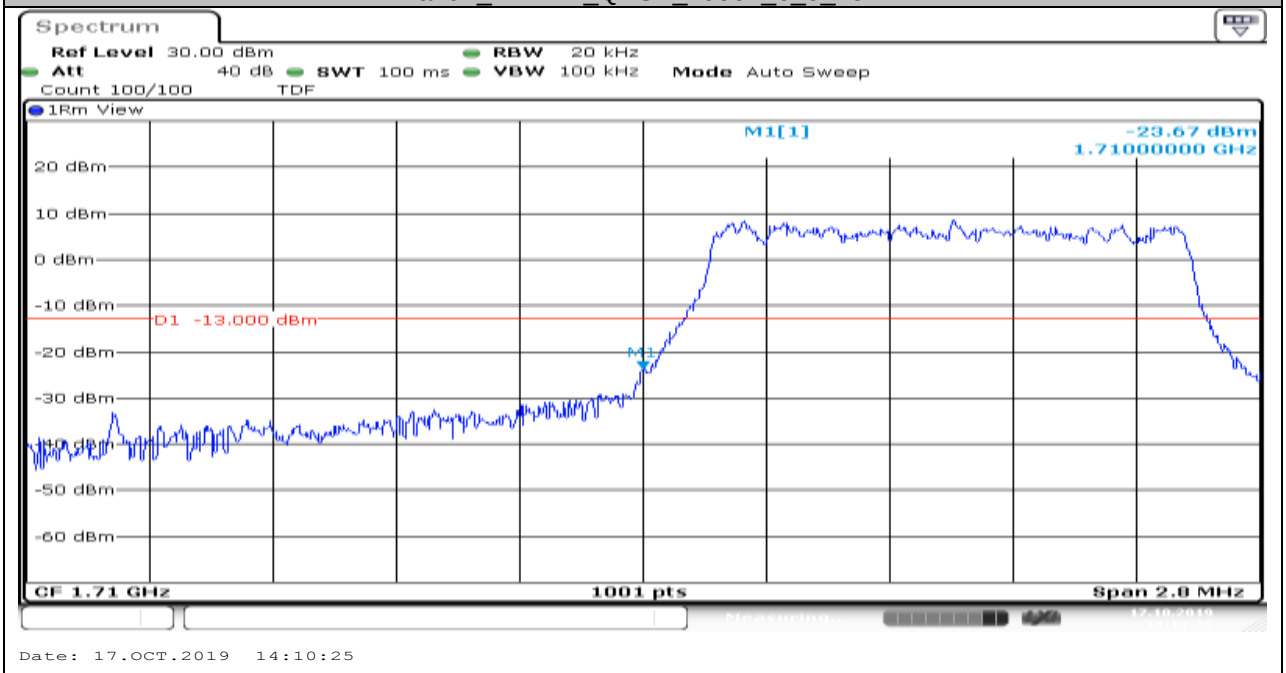
Appendix B.4: Band Edge for M1

Test Result

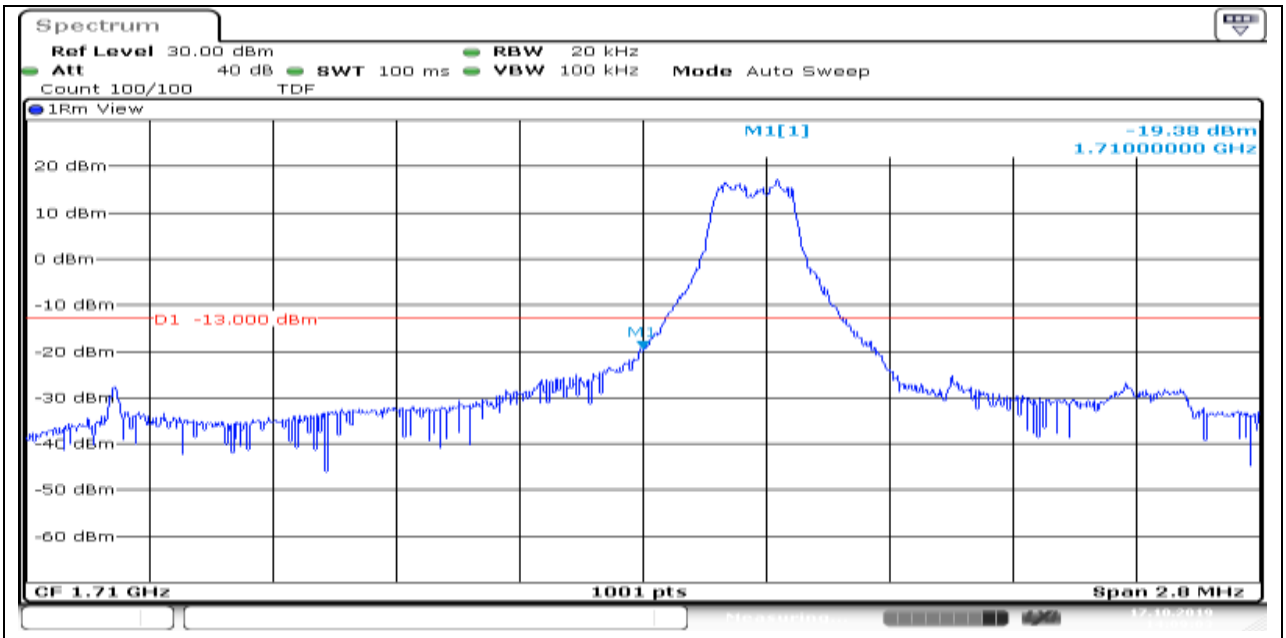
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Result (dBm)	Verdict
Band4	1.4MHz	QPSK	19957	6	0	Low	-23.67	PASS
Band4	1.4MHz	QPSK	19957	1	0	Low	-19.38	PASS
Band4	1.4MHz	QPSK	20393	6	0	Low	-26.26	PASS
Band4	1.4MHz	QPSK	20393	1	5	Low	-19.32	PASS
Band4	1.4MHz	16QAM	19957	6	0	Low	-27.50	PASS
Band4	1.4MHz	16QAM	19957	1	0	Low	-19.20	PASS
Band4	1.4MHz	16QAM	20393	6	0	Low	-25.06	PASS
Band4	1.4MHz	16QAM	20393	1	5	Low	-19.82	PASS

Test Graphs

Band4_1.4MHz_QPSK_19957_6_0_Low

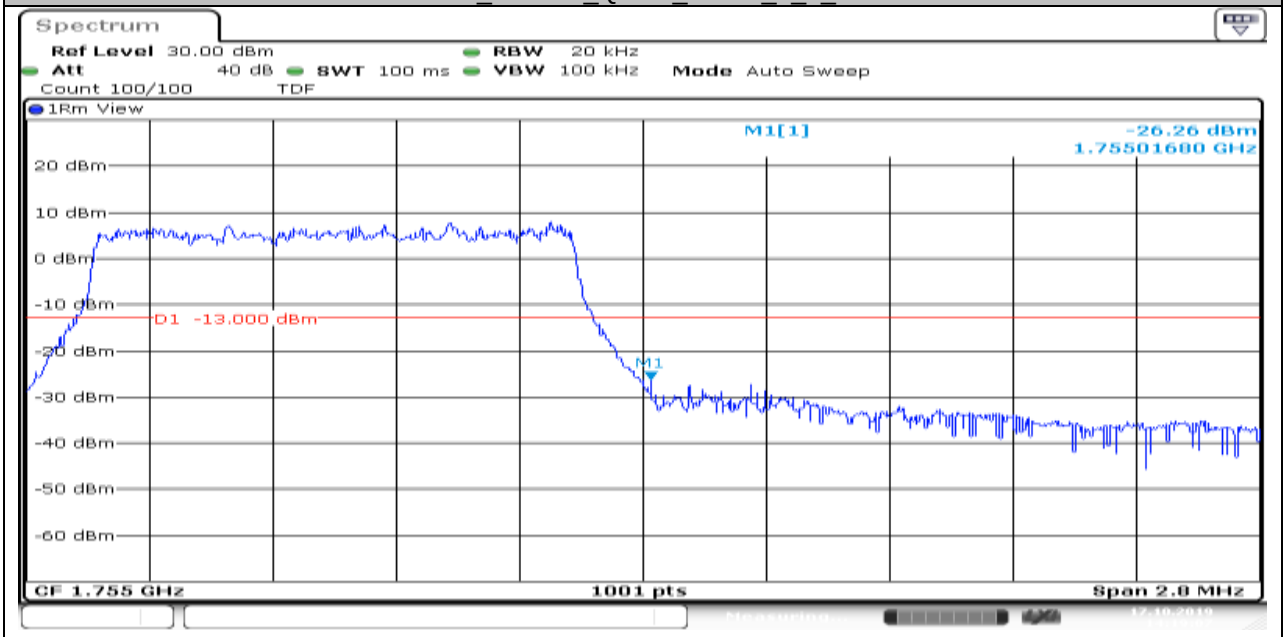


Band4_1.4MHz_QPSK_19957_1_0_Low



Date: 17.OCT.2019 14:09:04

Band4_1.4MHz_QPSK_20393_6_0_Low



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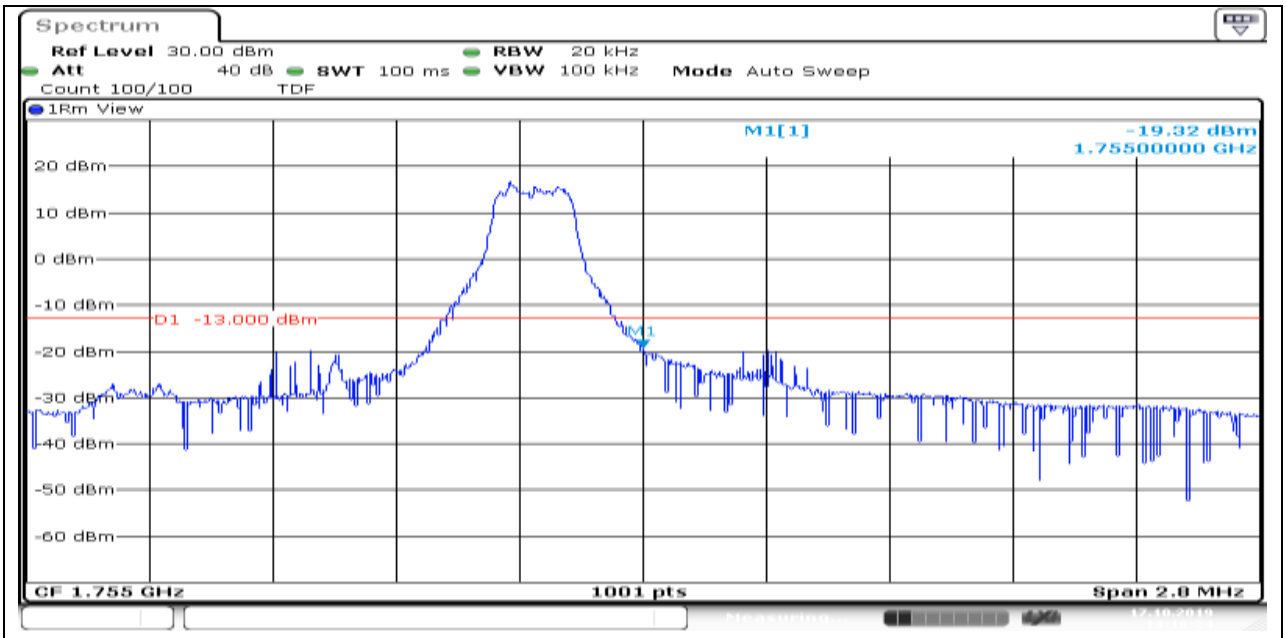
Band4_1.4MHz_QPSK_20393_1_5_Low



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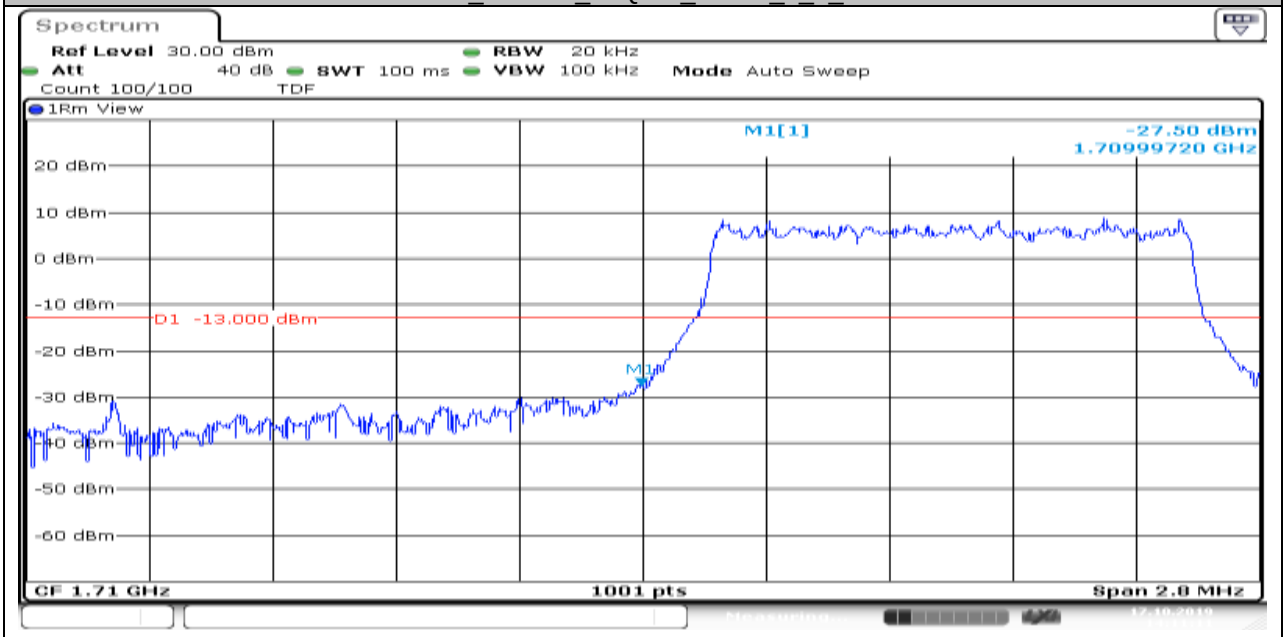
Band4_1.4MHz_16QAM_19957_6_0_Low



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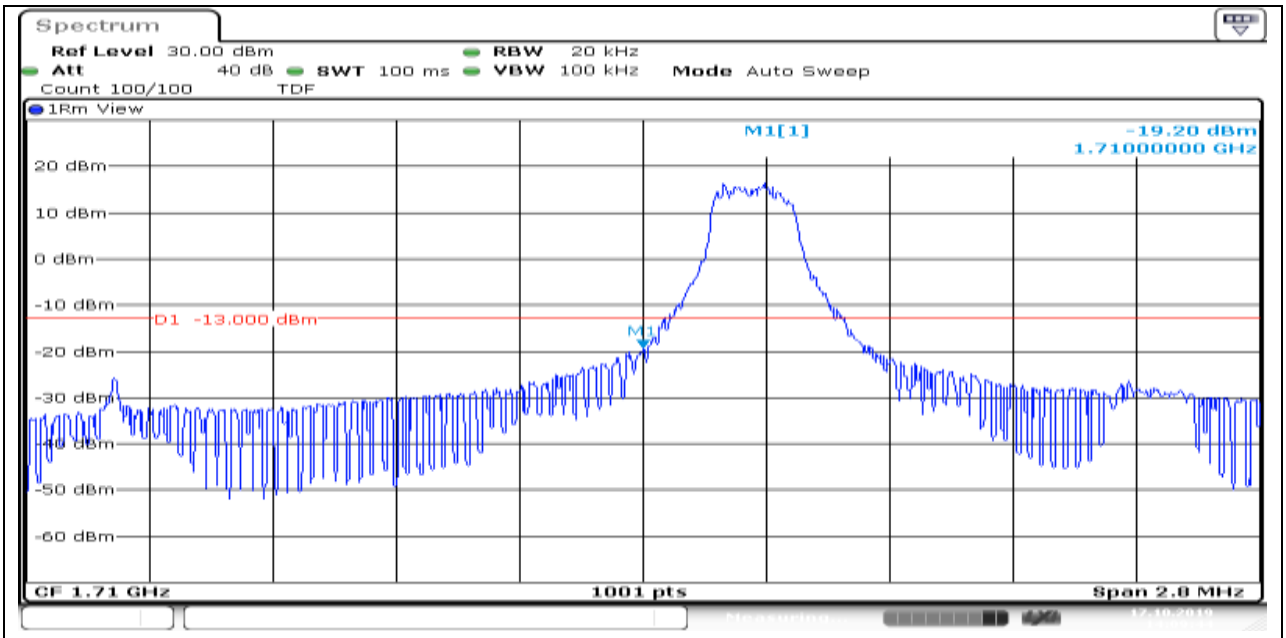
Band4_1.4MHz_16QAM_19957_1_0_Low



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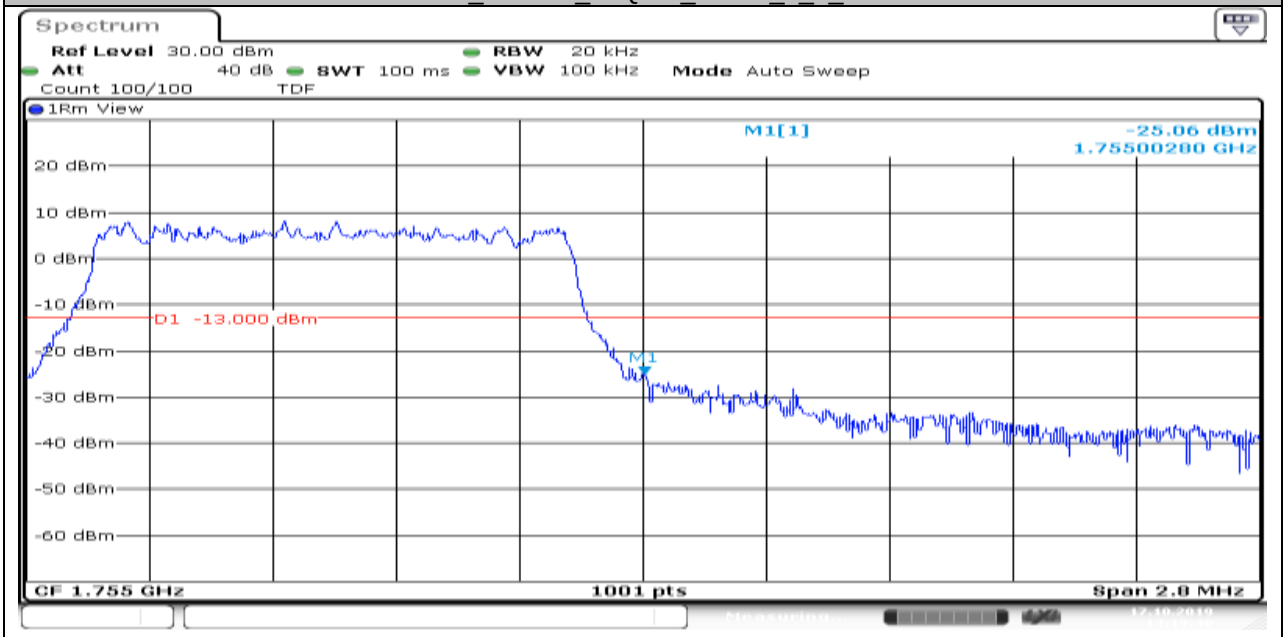

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Band4_1.4MHz_16QAM_20393_1_5_Low

Date: 17.OCT.2019 14:18:30

Appendix B.5: Conducted Spurious Emission for M1

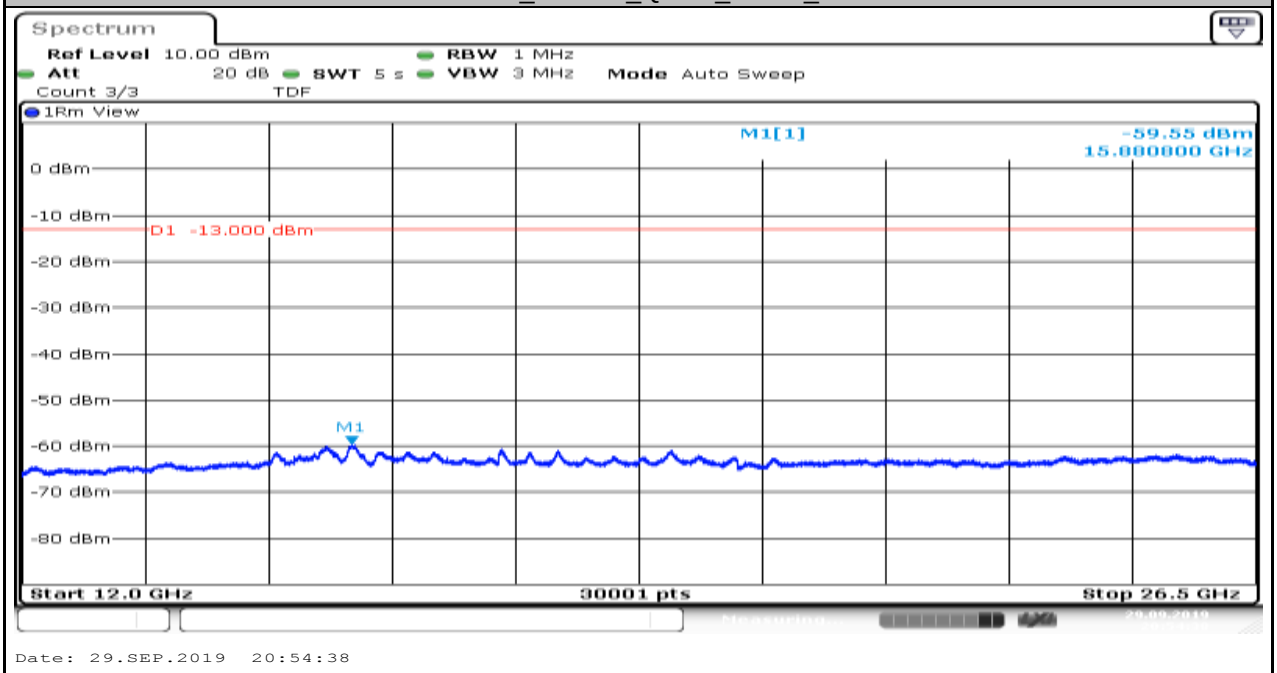
Test Result

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Start Freq	Stop Freq	Result (dBm)	Verdict
Band4	1.4MHz	QPSK	19957	6	0	Low	12000	26500	-59.55	PASS
Band4	1.4MHz	QPSK	19957	1	0	Low	1000	5000	-46.67	PASS
Band4	1.4MHz	QPSK	19957	1	0	Low	5000	12000	-54.68	PASS
Band4	1.4MHz	QPSK	19957	1	0	Low	12000	26500	-59.68	PASS
Band4	1.4MHz	QPSK	19957	6	0	Low	30	1000	-44.66	PASS
Band4	1.4MHz	QPSK	19957	6	0	Low	1000	5000	-50.59	PASS
Band4	1.4MHz	QPSK	19957	6	0	Low	5000	12000	-58.74	PASS
Band4	1.4MHz	QPSK	19957	1	0	Low	30	1000	-44.11	PASS
Band4	1.4MHz	QPSK	20175	6	0	Low	1000	5000	-50.42	PASS
Band4	1.4MHz	QPSK	20175	6	0	Low	30	1000	-45.33	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	12000	26500	-59.59	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	5000	12000	-61.8	PASS
Band4	1.4MHz	QPSK	20175	6	0	Low	5000	12000	-58.26	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	30	1000	-45.49	PASS
Band4	1.4MHz	QPSK	20175	6	0	Low	12000	26500	-59.71	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	1000	5000	-46.97	PASS
Band4	1.4MHz	QPSK	20393	6	0	Low	5000	12000	-58.36	PASS
Band4	1.4MHz	QPSK	20393	1	5	Low	1000	5000	-48.22	PASS
Band4	1.4MHz	QPSK	20393	1	5	Low	30	1000	-45	PASS
Band4	1.4MHz	QPSK	20393	1	5	Low	12000	26500	-59.48	PASS
Band4	1.4MHz	QPSK	20393	1	5	Low	5000	12000	-54.3	PASS
Band4	1.4MHz	QPSK	20393	6	0	Low	12000	26500	-59.67	PASS
Band4	1.4MHz	QPSK	20393	6	0	Low	1000	5000	-50.4	PASS
Band4	1.4MHz	QPSK	20393	6	0	Low	30	1000	-44.88	PASS
Band4	1.4MHz	QPSK	20393	5	1	Low	30	1000	-45.17	PASS
Band4	1.4MHz	QPSK	20393	5	1	Low	1000	5000	-49	PASS
Band4	1.4MHz	QPSK	20393	5	1	Low	5000	12000	-56.98	PASS
Band4	1.4MHz	QPSK	20393	5	1	Low	12000	26500	-59.58	PASS
Band4	1.4MHz	16QAM	19957	1	0	Low	1000	5000	-47.14	PASS
Band4	1.4MHz	16QAM	19957	6	0	Low	30	1000	-45.47	PASS
Band4	1.4MHz	16QAM	19957	6	0	Low	1000	5000	-50.47	PASS
Band4	1.4MHz	16QAM	19957	6	0	Low	5000	12000	-58.59	PASS
Band4	1.4MHz	16QAM	19957	6	0	Low	12000	26500	-59.56	PASS
Band4	1.4MHz	16QAM	19957	1	0	Low	12000	26500	-59.74	PASS
Band4	1.4MHz	16QAM	19957	1	0	Low	5000	12000	-55.38	PASS
Band4	1.4MHz	16QAM	19957	1	0	Low	30	1000	-44.18	PASS
Band4	1.4MHz	16QAM	20175	6	0	Low	12000	26500	-59.65	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	12000	26500	-59.64	PASS
Band4	1.4MHz	16QAM	20175	6	0	Low	30	1000	-44.85	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	5000	12000	-54.98	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	30	1000	-45.09	PASS
Band4	1.4MHz	16QAM	20175	6	0	Low	1000	5000	-49.58	PASS
Band4	1.4MHz	16QAM	20175	6	0	Low	5000	12000	-57.84	PASS

Band4	1.4MHz	16QAM	20175	1	0	Low	1000	5000	-47.31	PASS
Band4	1.4MHz	16QAM	20393	1	5	Low	30	1000	-45.44	PASS
Band4	1.4MHz	16QAM	20393	1	5	Low	1000	5000	-48.4	PASS
Band4	1.4MHz	16QAM	20393	1	5	Low	5000	12000	-55.18	PASS
Band4	1.4MHz	16QAM	20393	6	0	Low	12000	26500	-59.72	PASS
Band4	1.4MHz	16QAM	20393	6	0	Low	5000	12000	-57.82	PASS
Band4	1.4MHz	16QAM	20393	6	0	Low	30	1000	-45.05	PASS
Band4	1.4MHz	16QAM	20393	5	1	Low	12000	26500	-59.74	PASS
Band4	1.4MHz	16QAM	20393	1	5	Low	12000	26500	-59.57	PASS
Band4	1.4MHz	16QAM	20393	5	1	Low	30	1000	-45.55	PASS
Band4	1.4MHz	16QAM	20393	5	1	Low	1000	5000	-48.47	PASS
Band4	1.4MHz	16QAM	20393	5	1	Low	5000	12000	-57.7	PASS
Band4	1.4MHz	16QAM	20393	6	0	Low	1000	5000	-50.13	PASS

Test Graphs

Band4_1.4MHz_QPSK_19957_6



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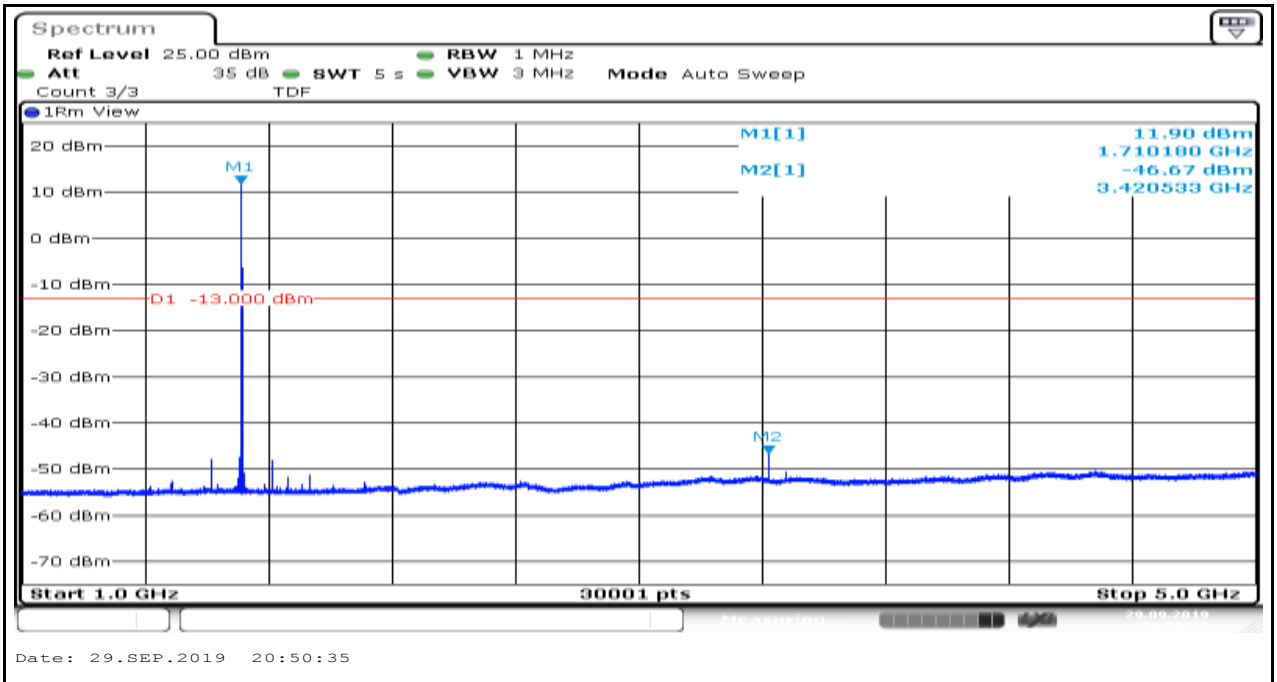

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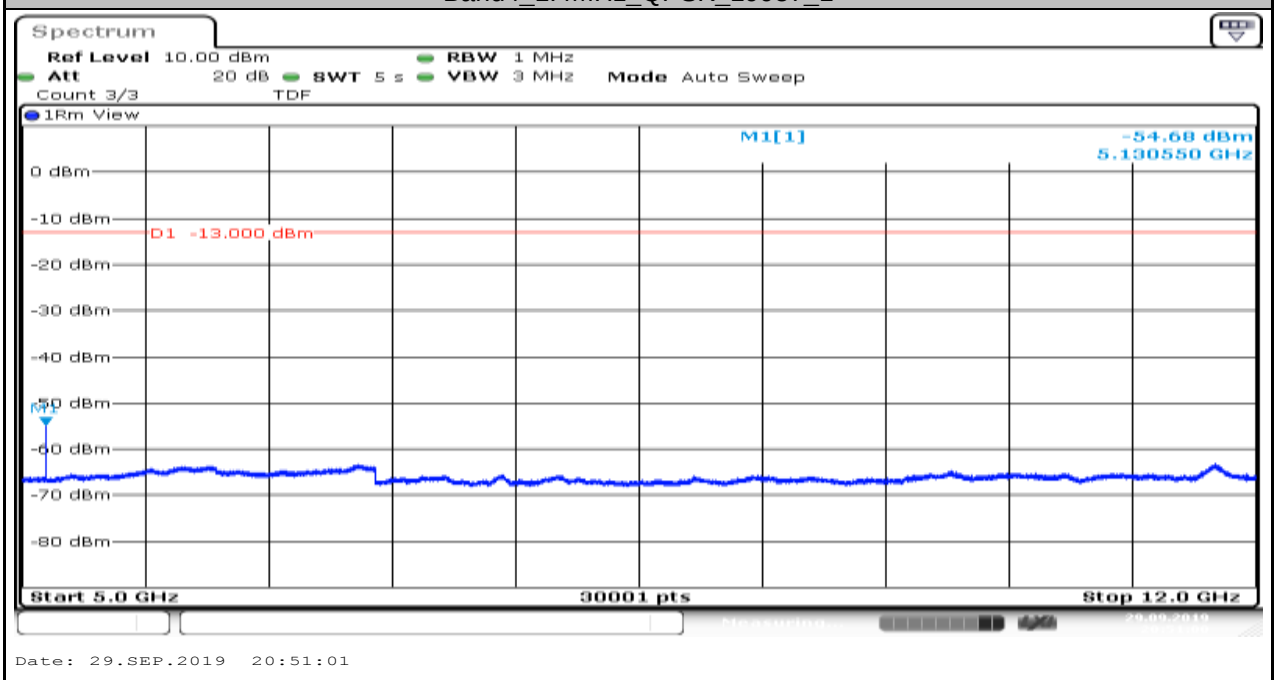

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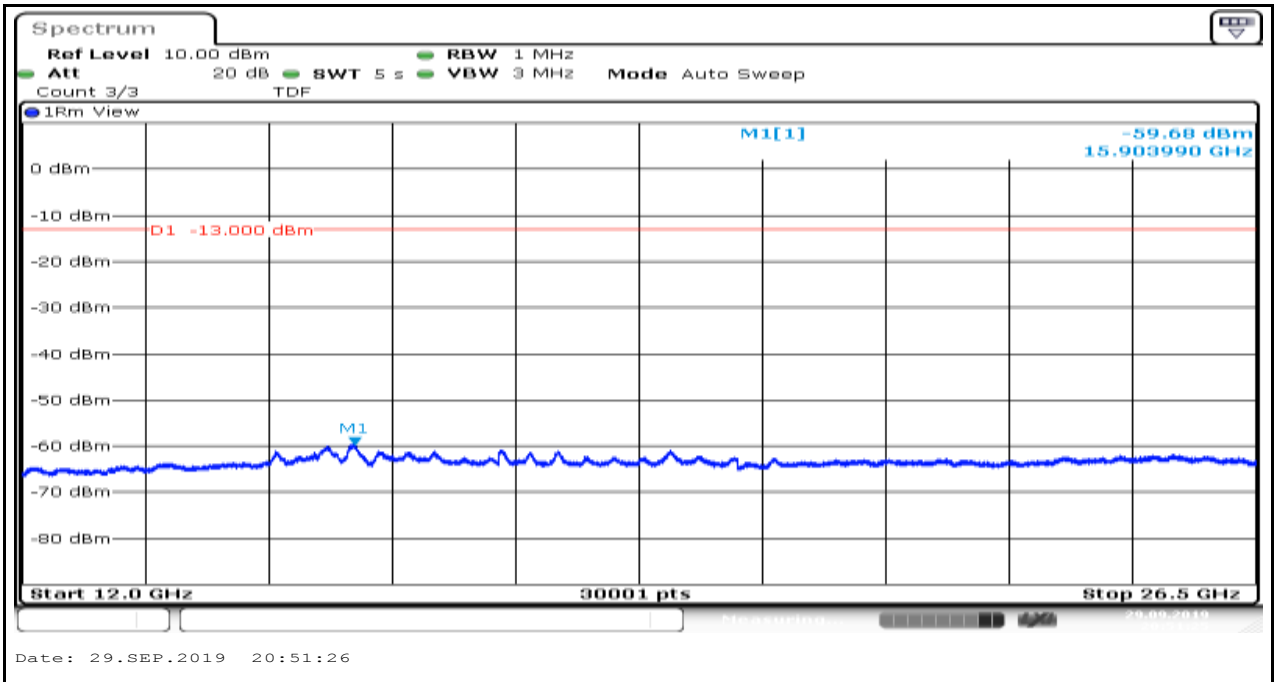

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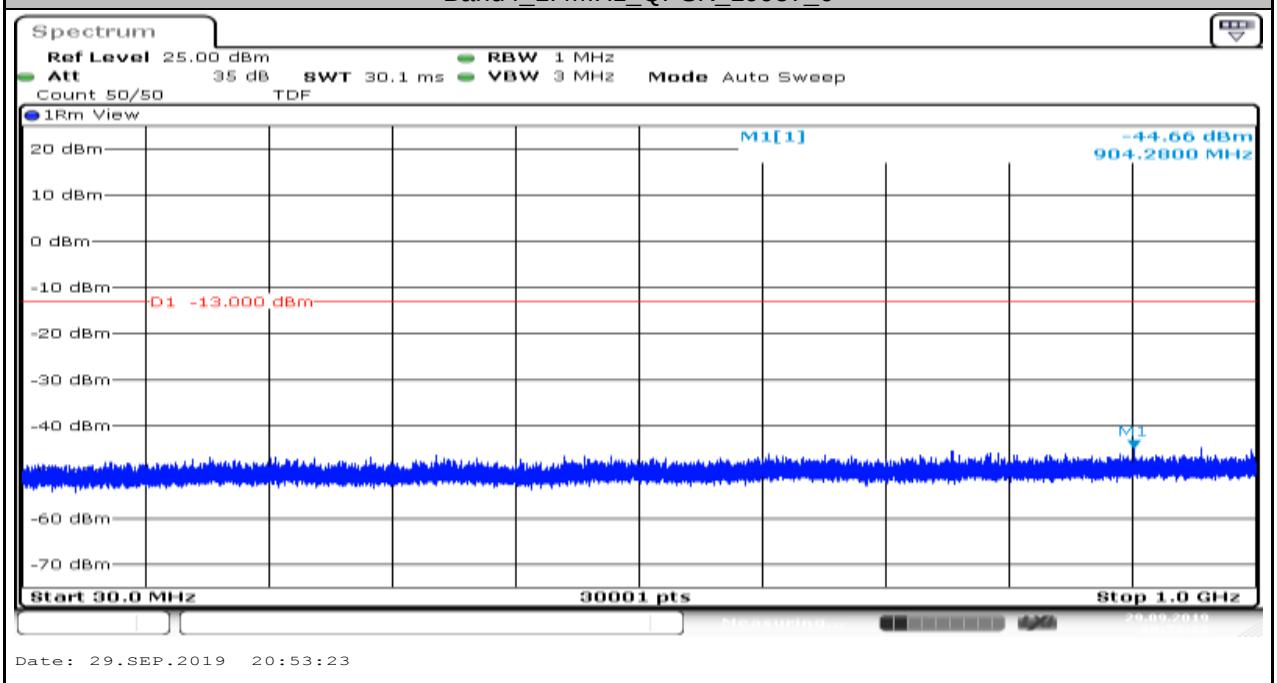

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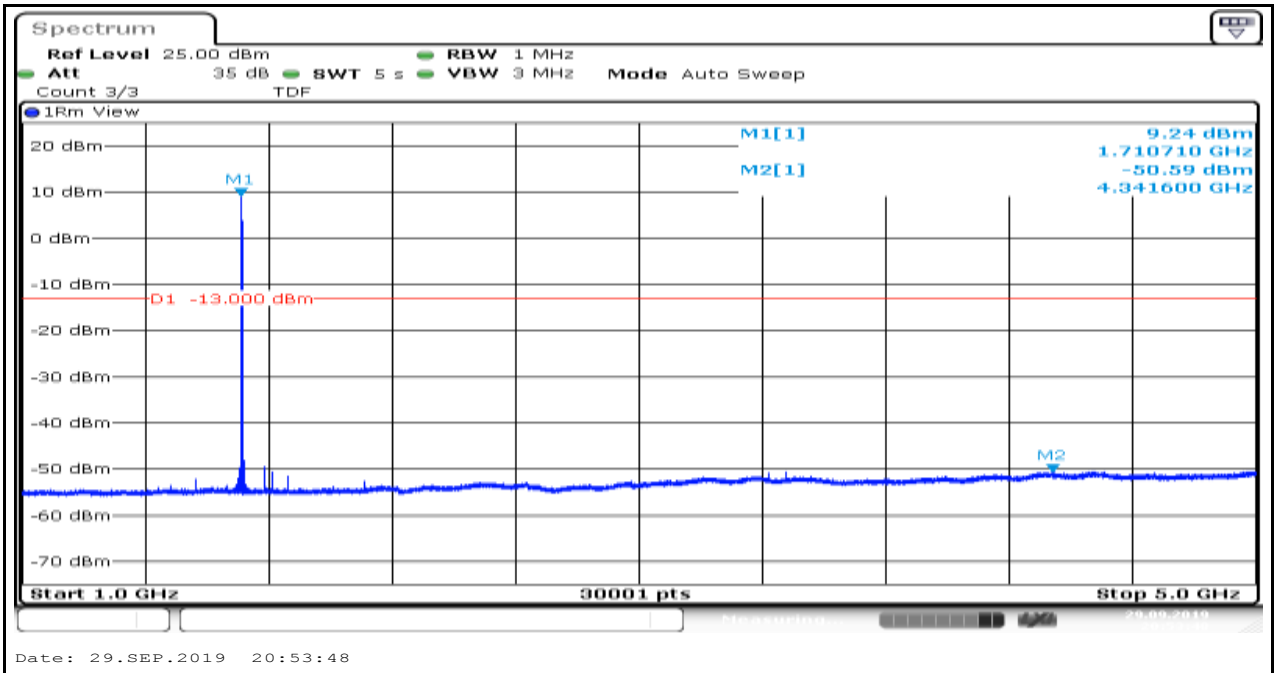

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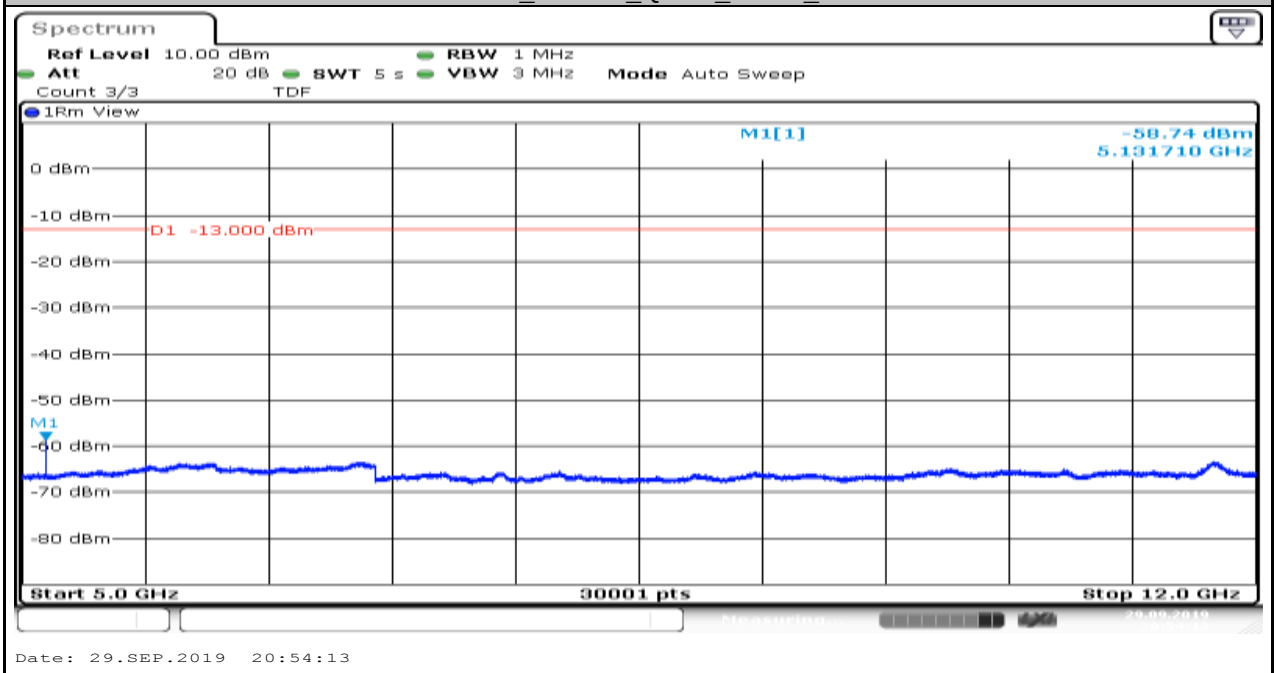

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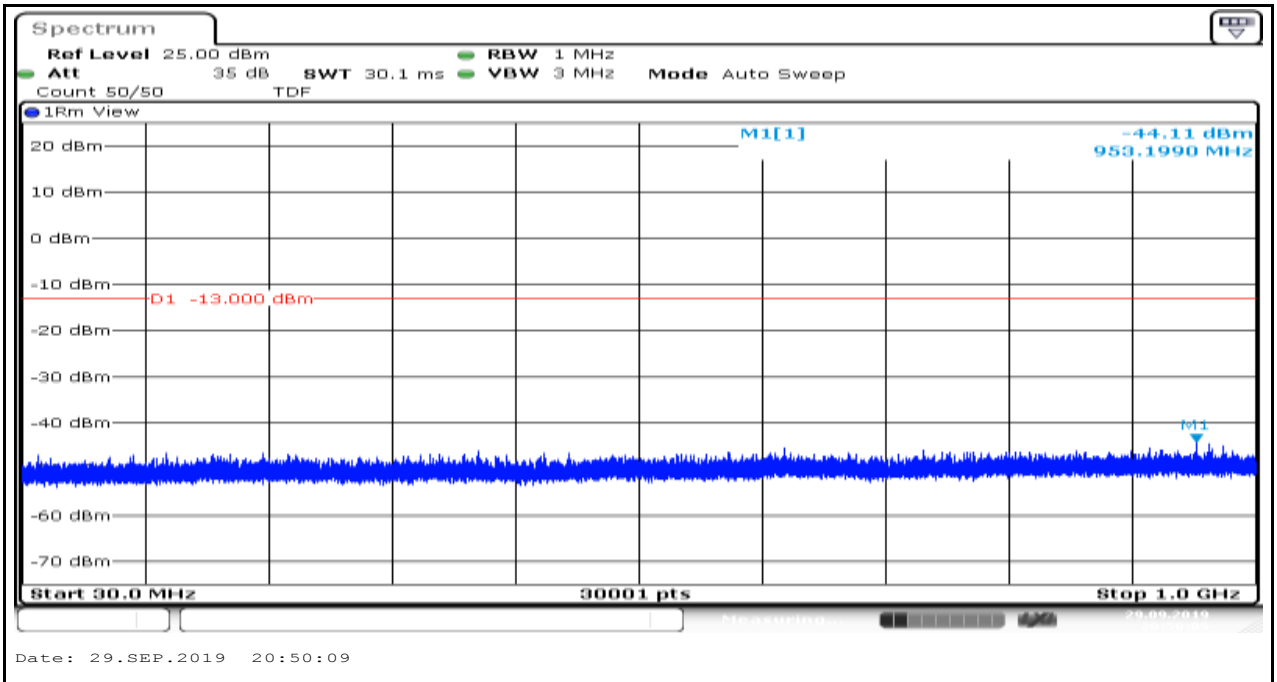

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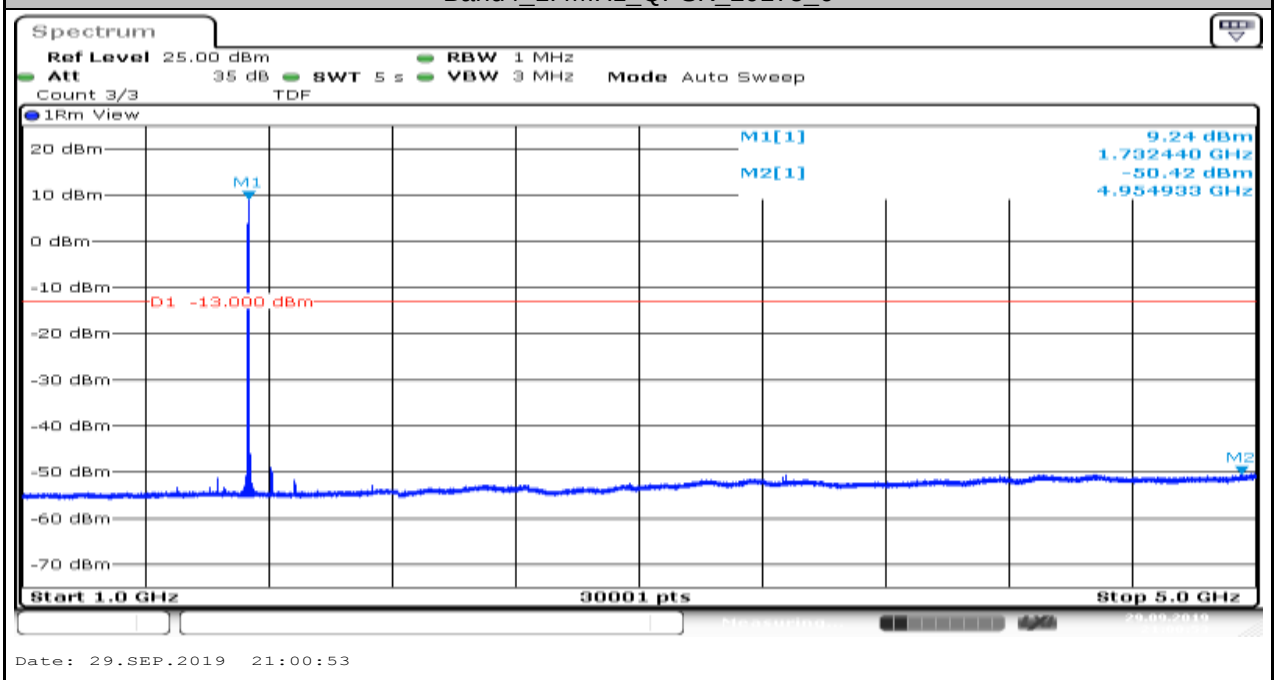

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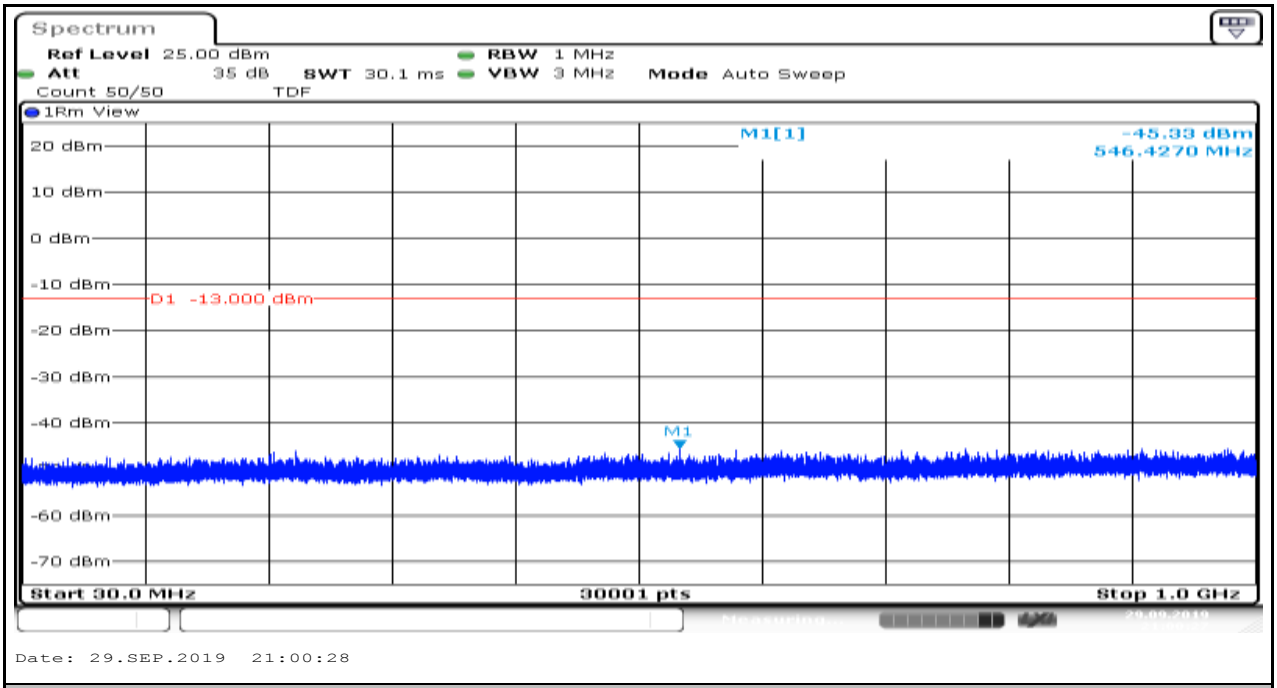

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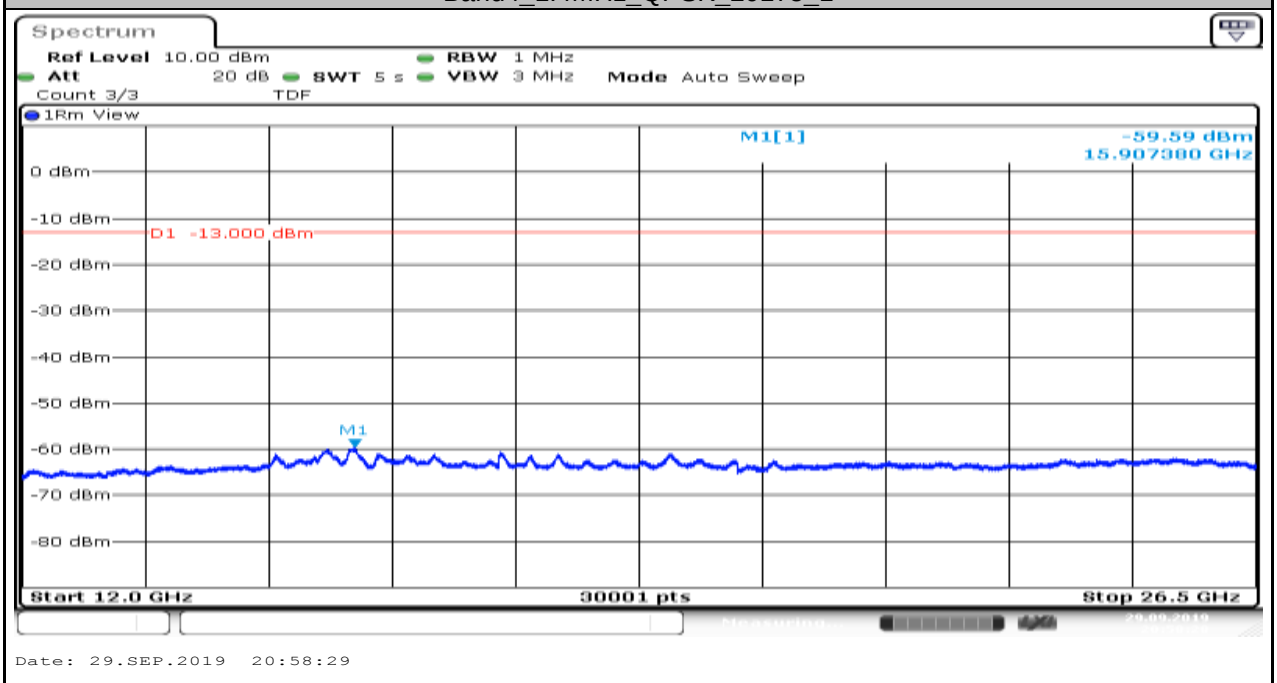

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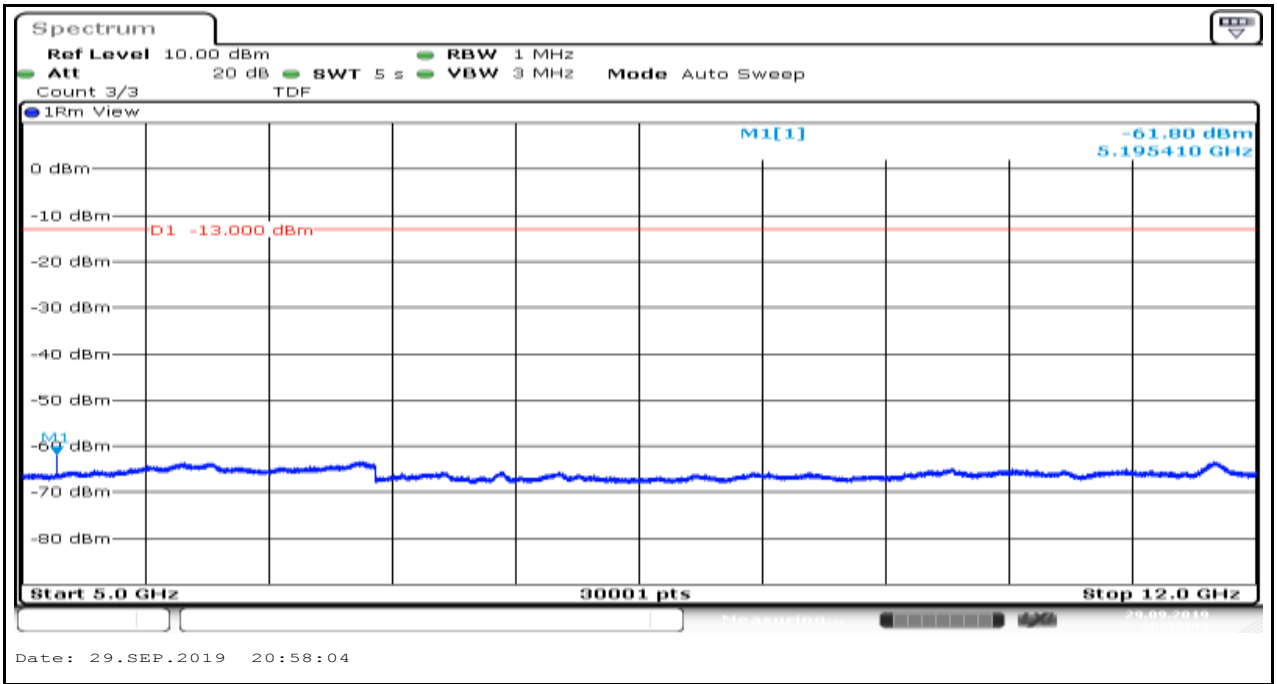

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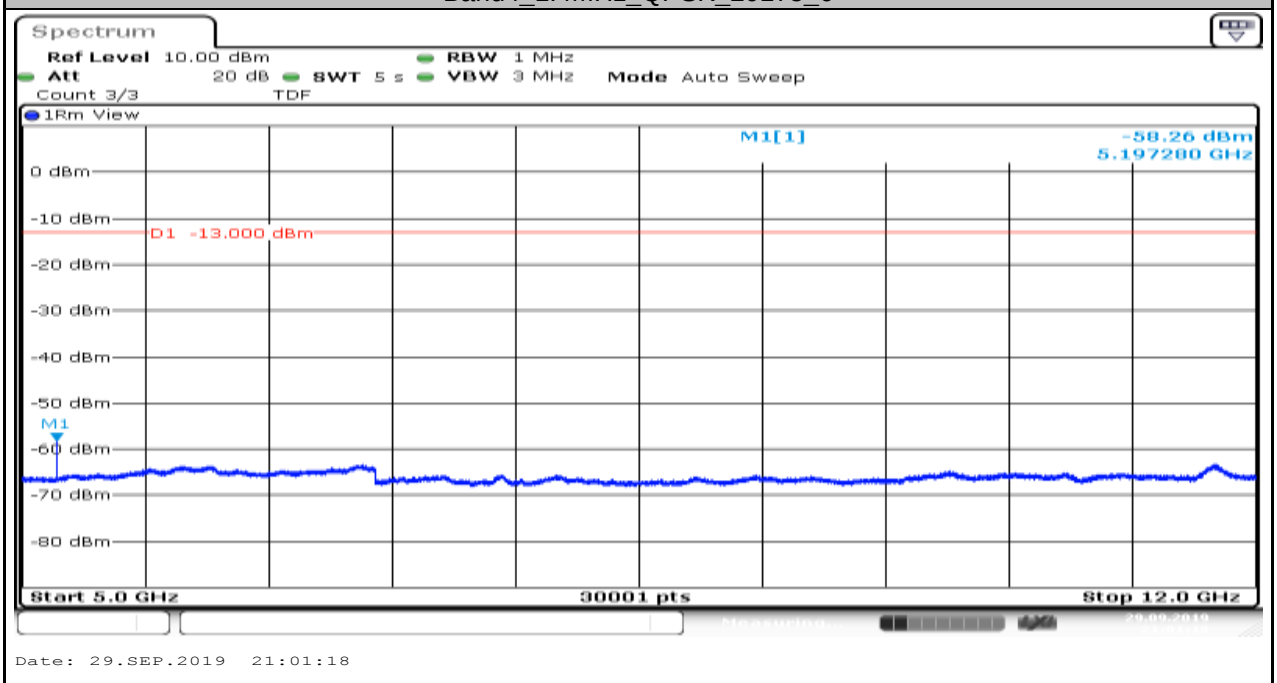

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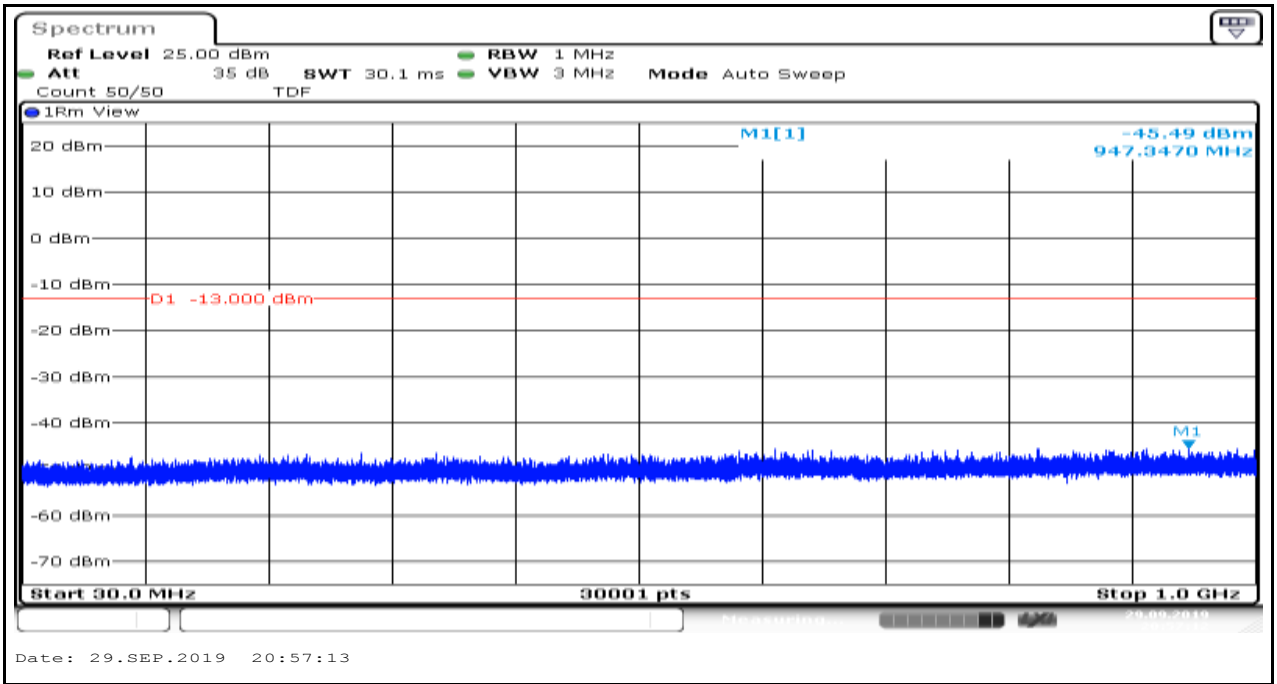

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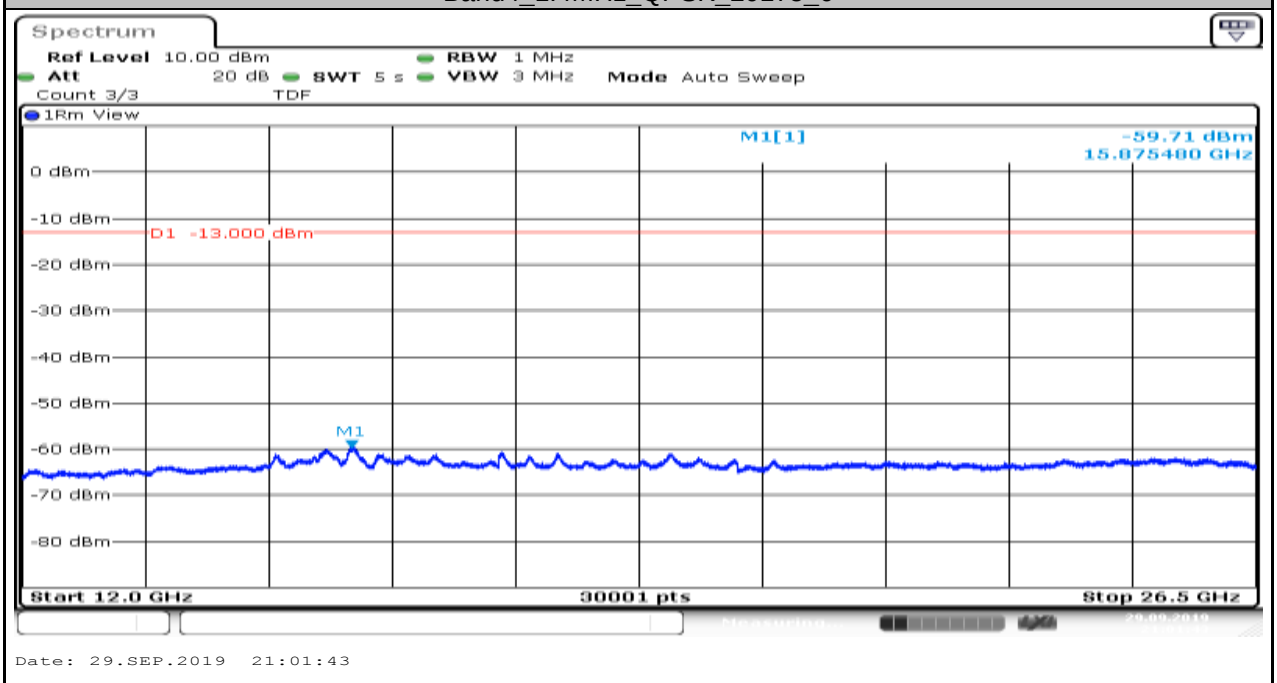

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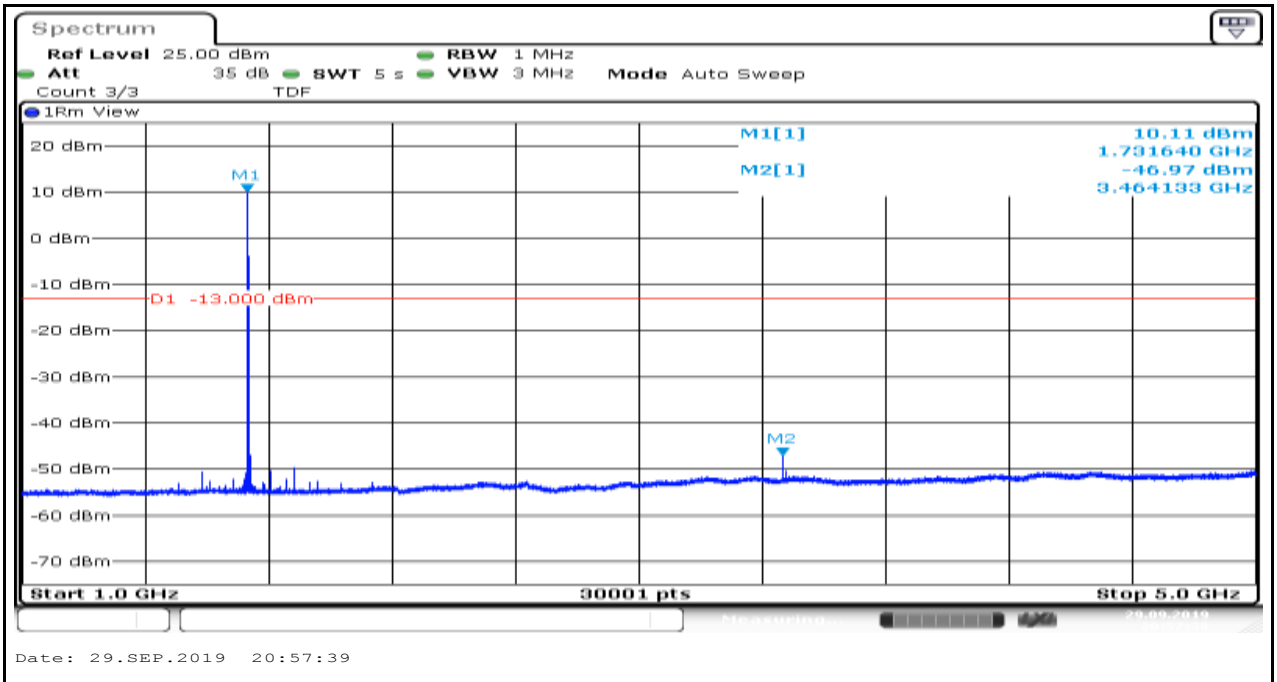

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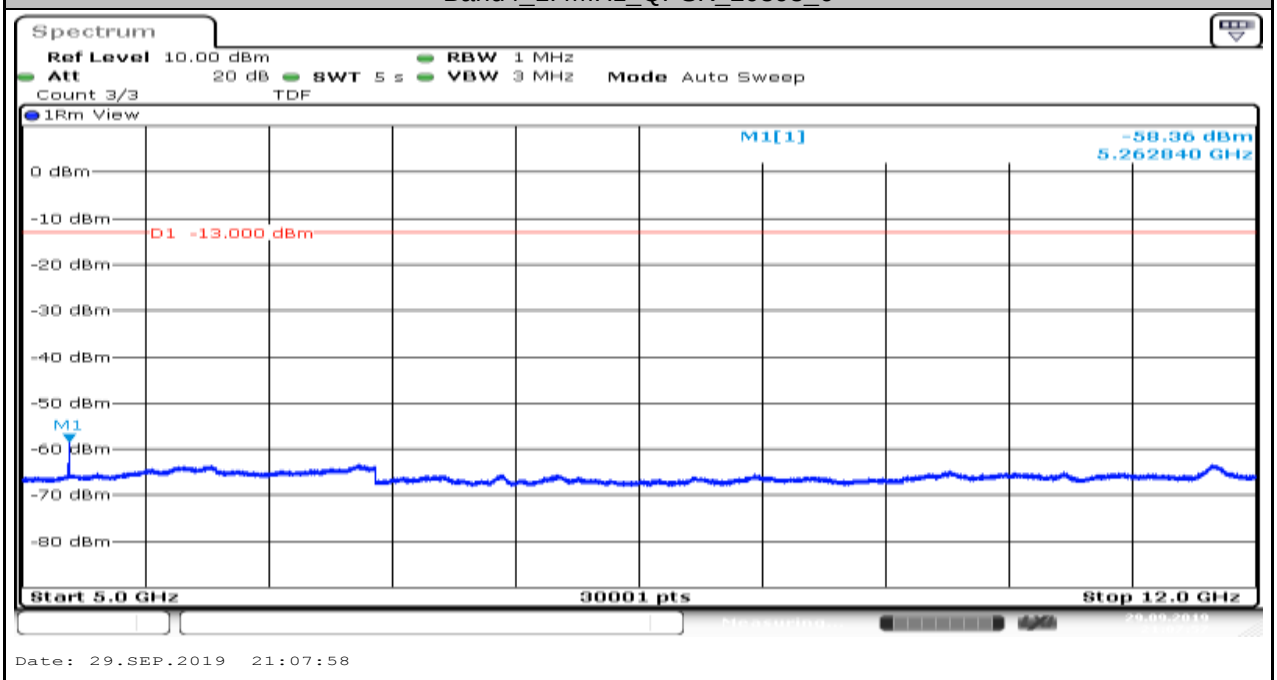

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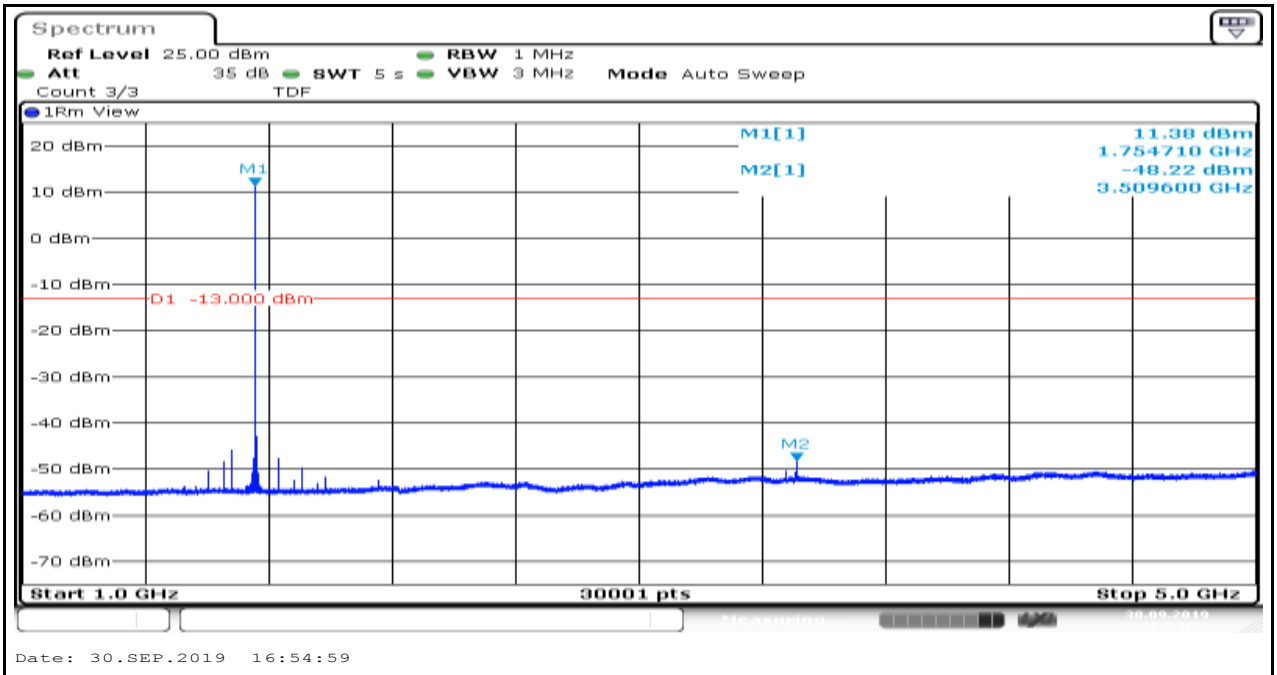

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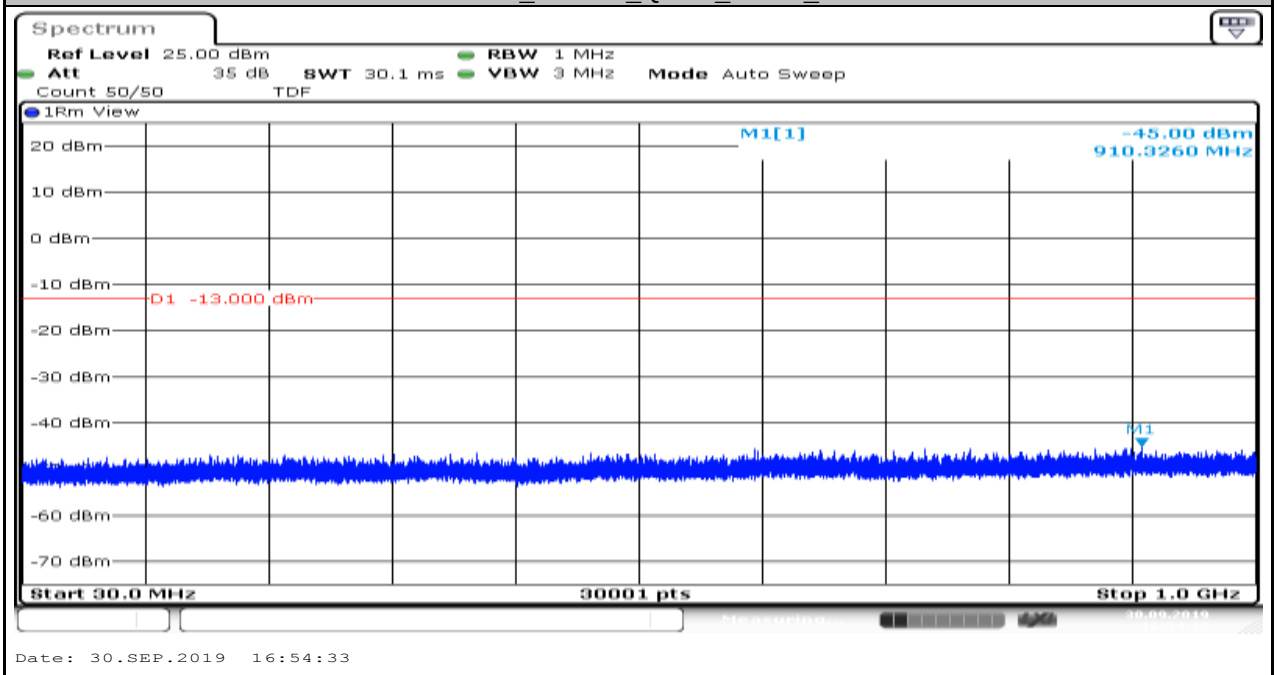

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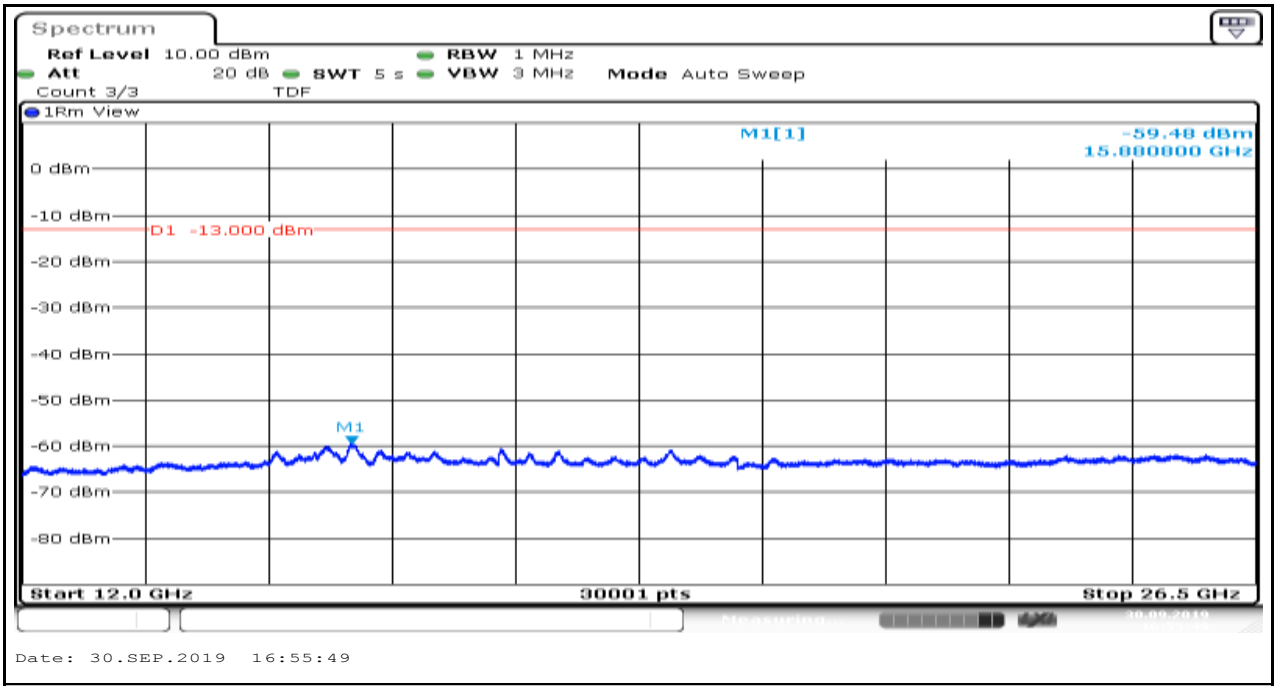

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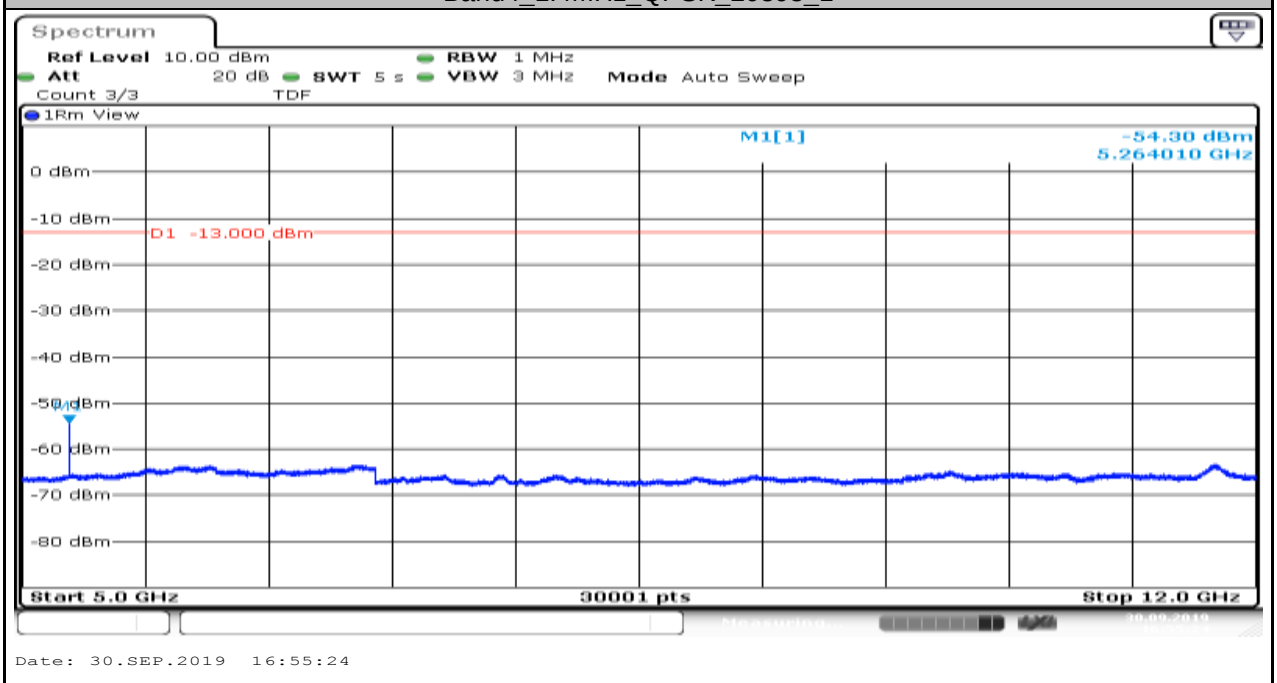

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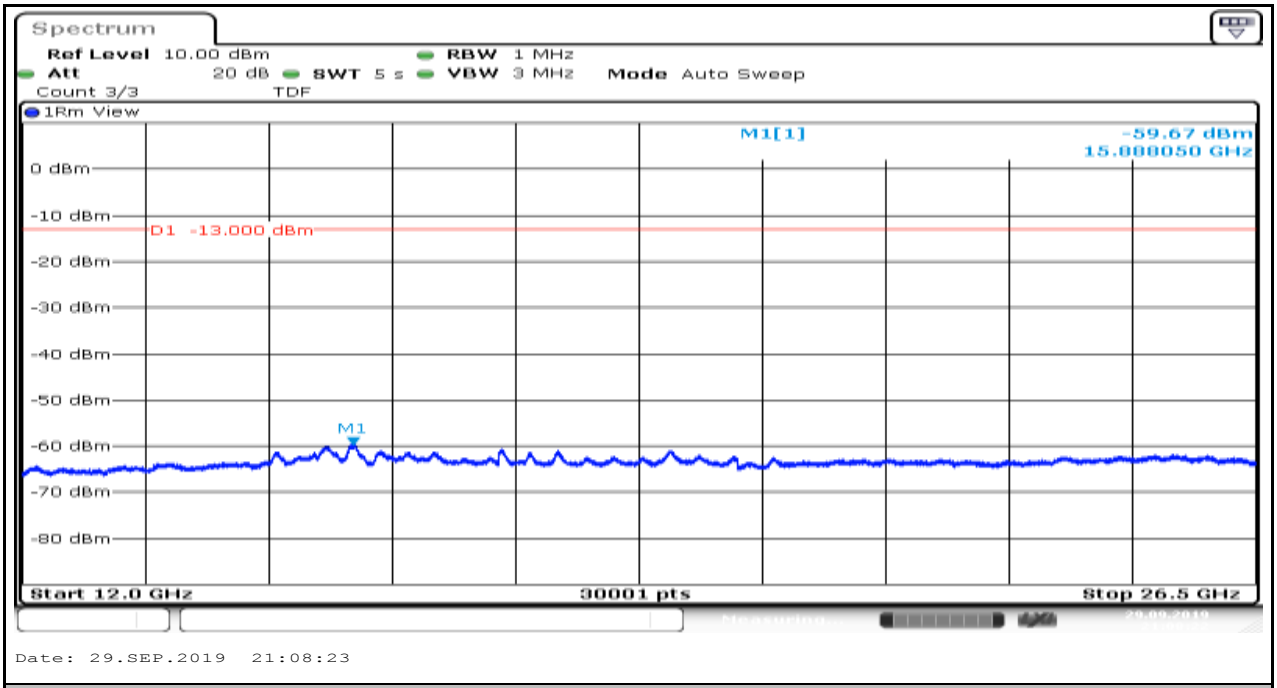

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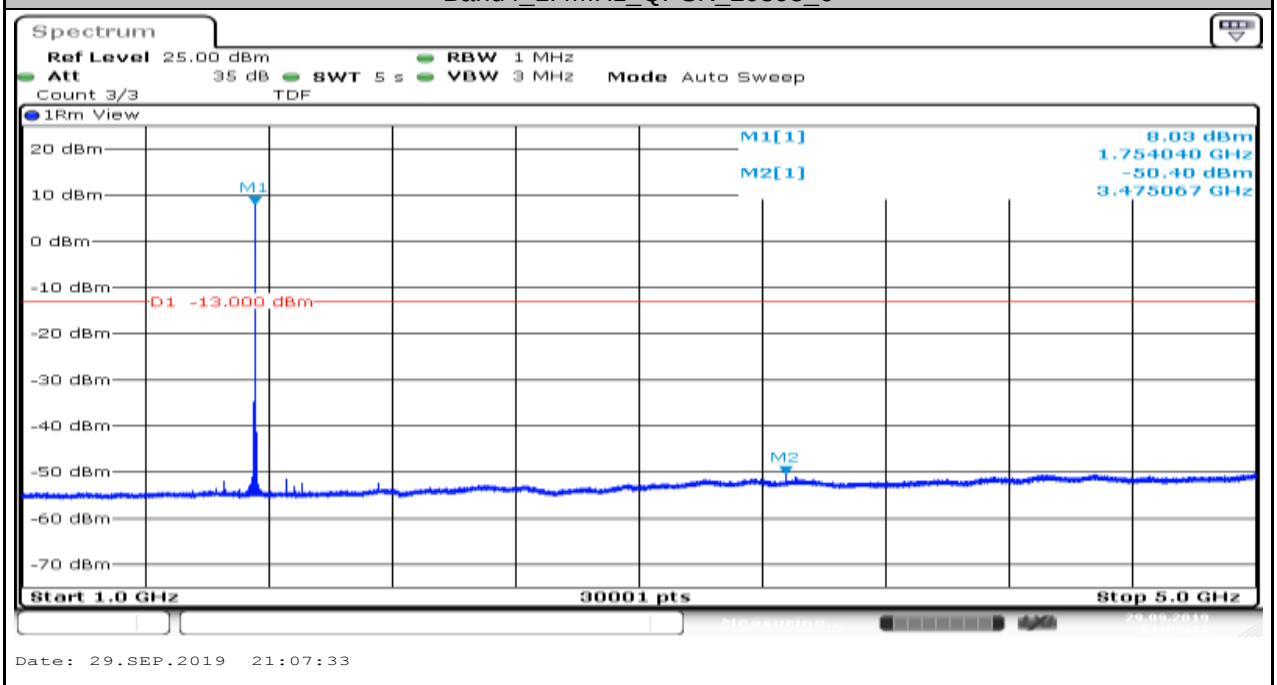

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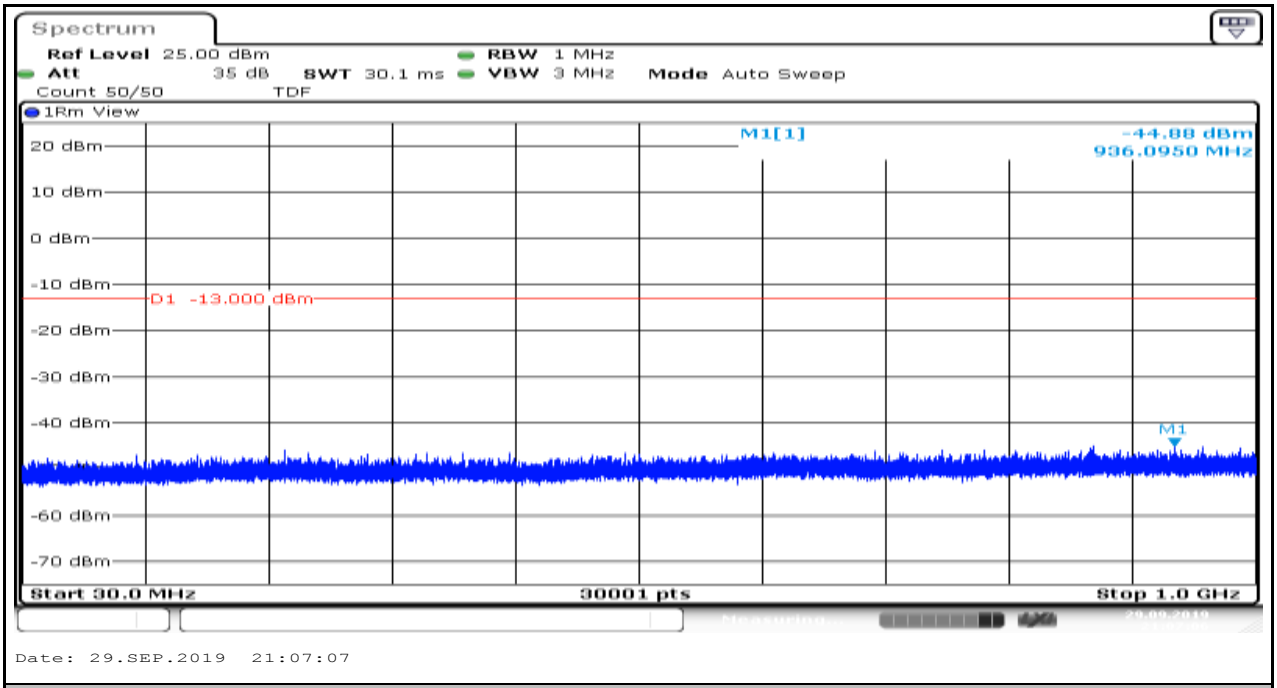

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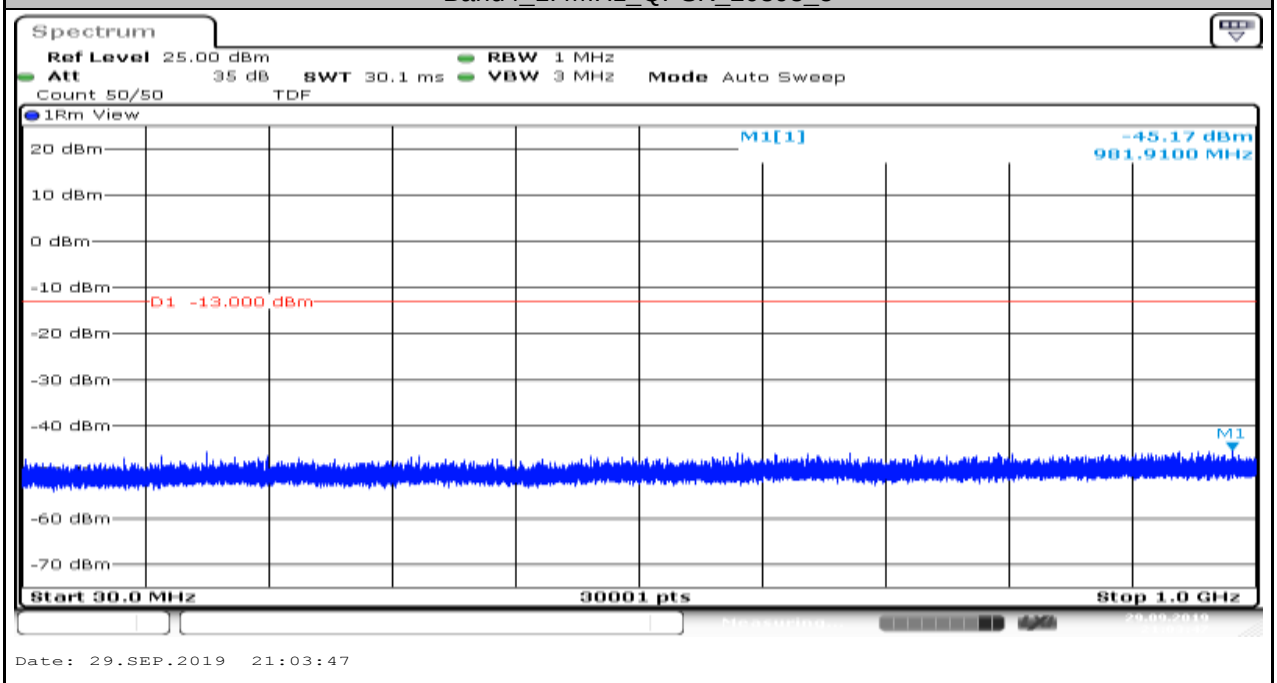

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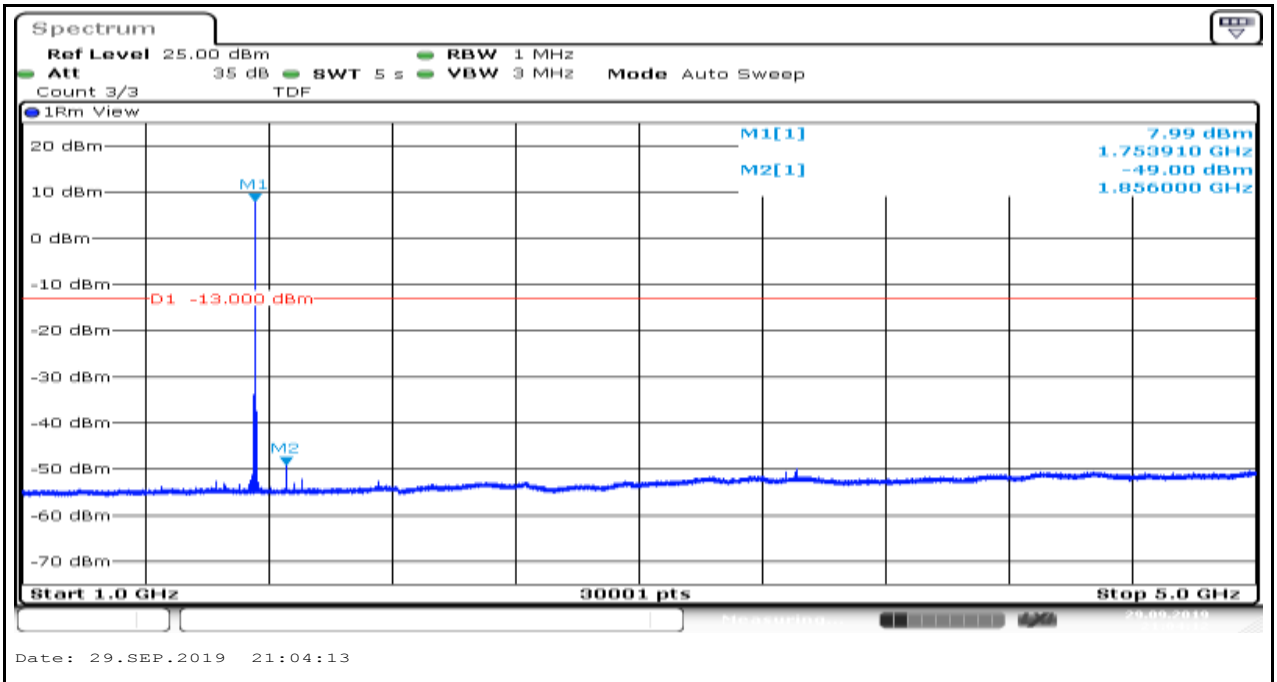

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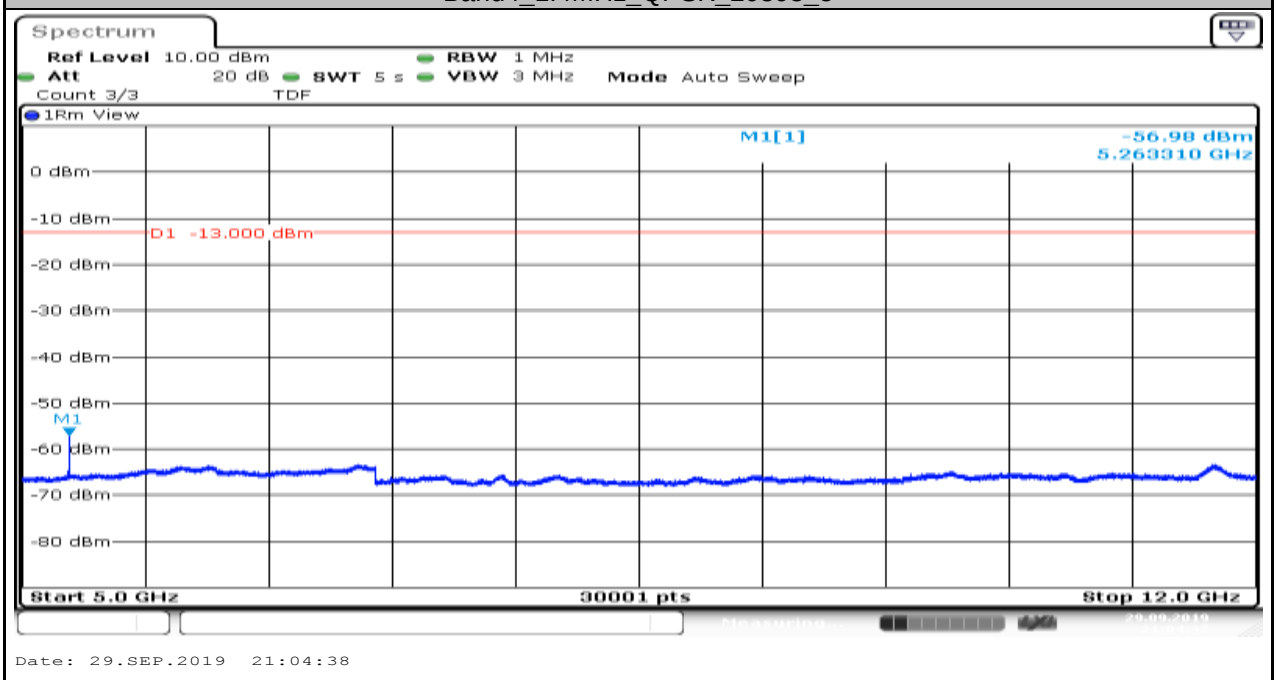

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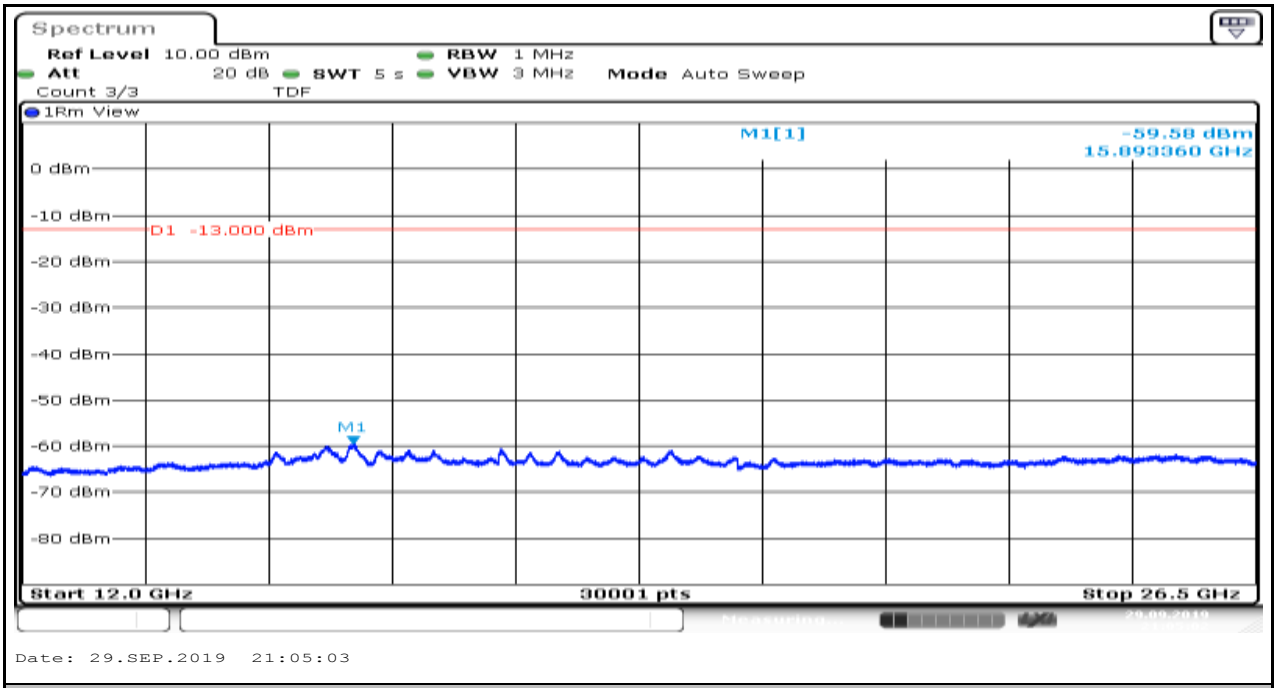

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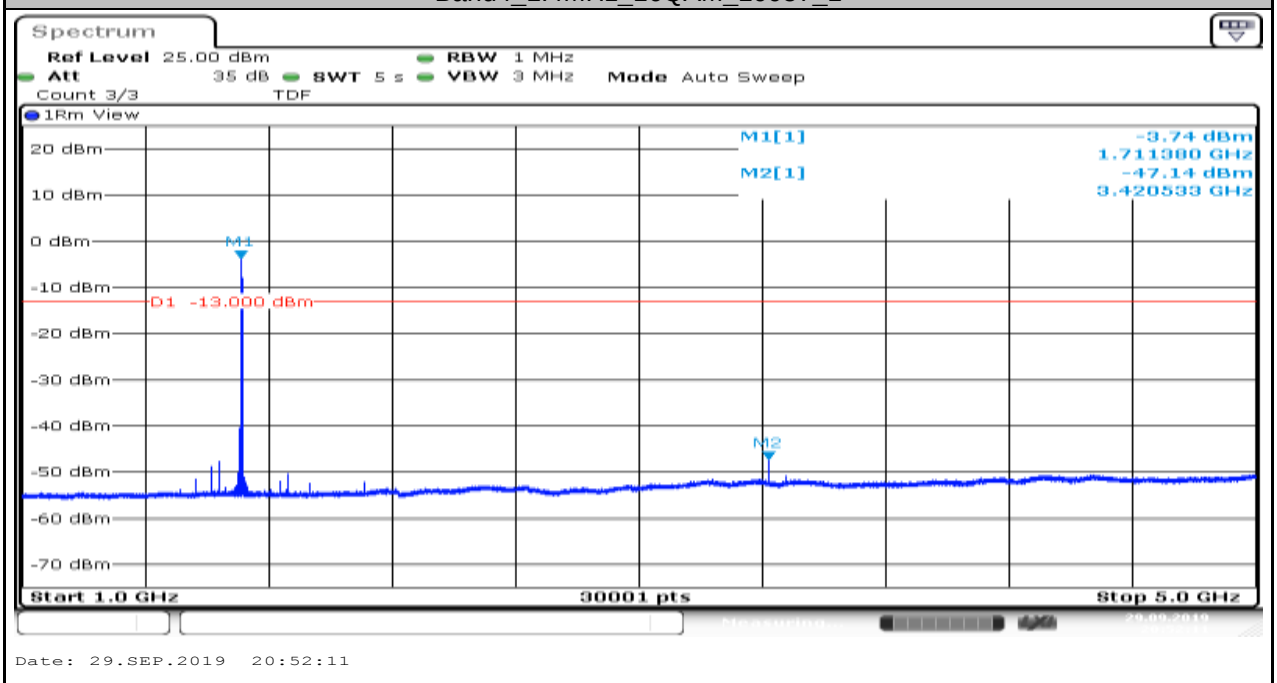

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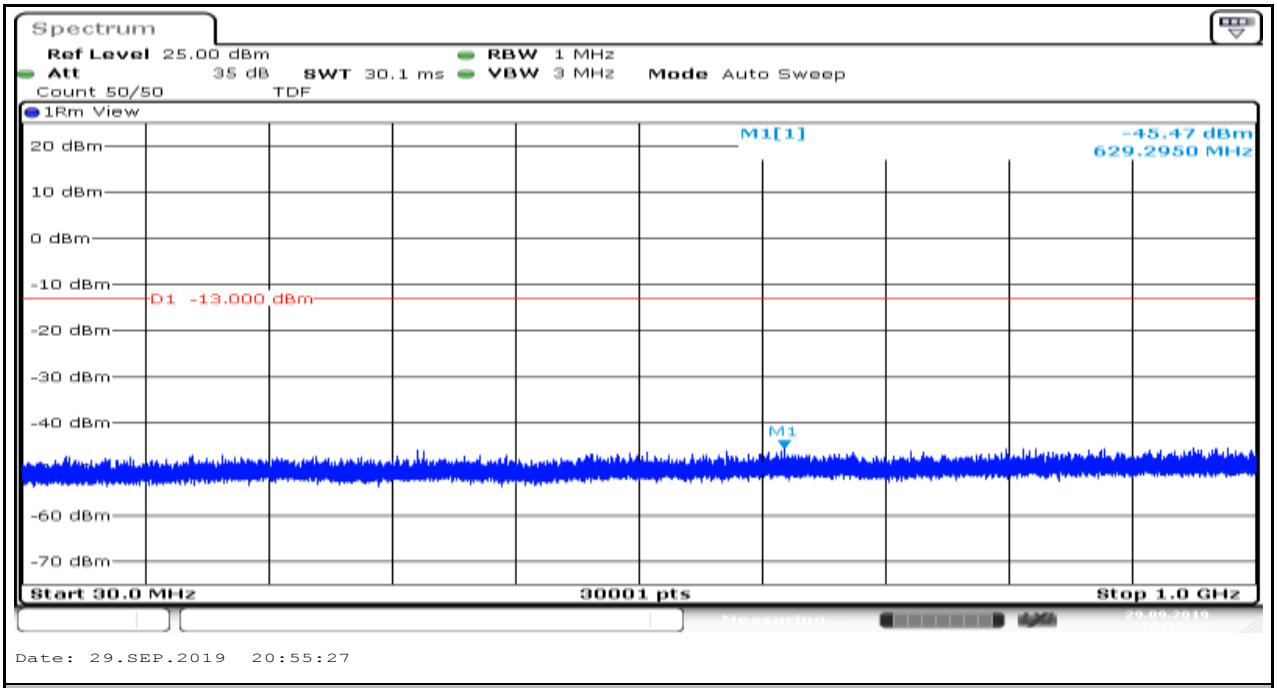

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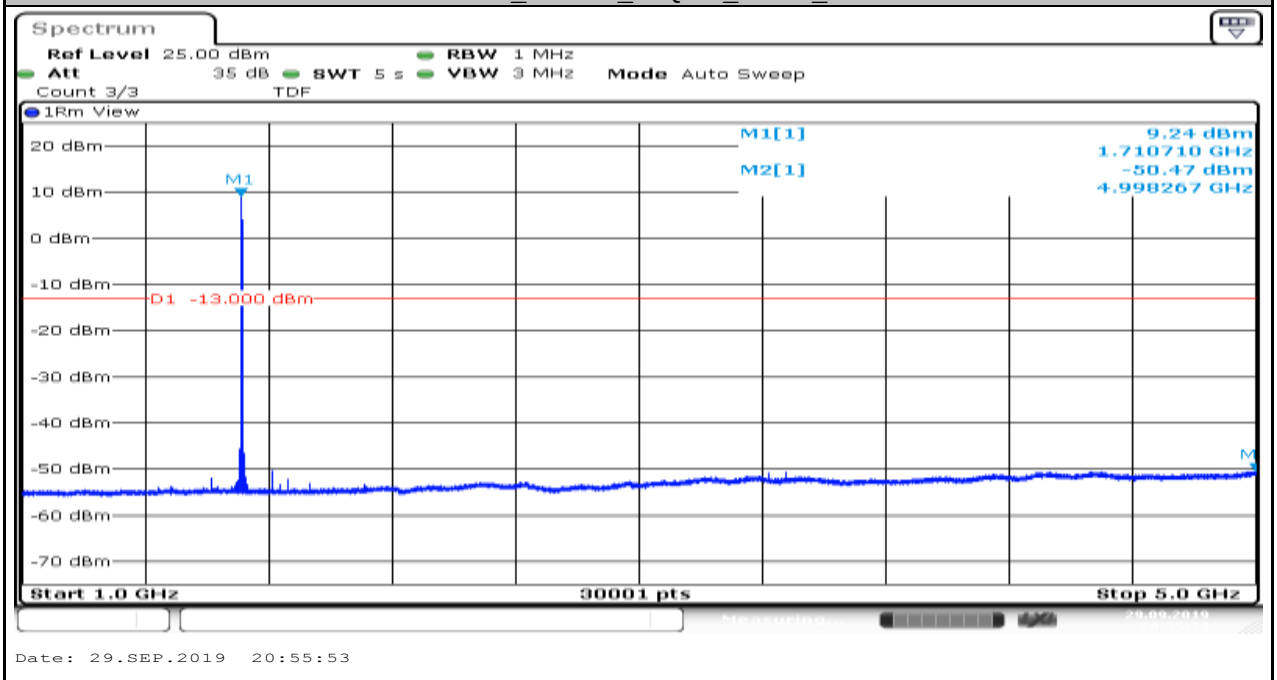

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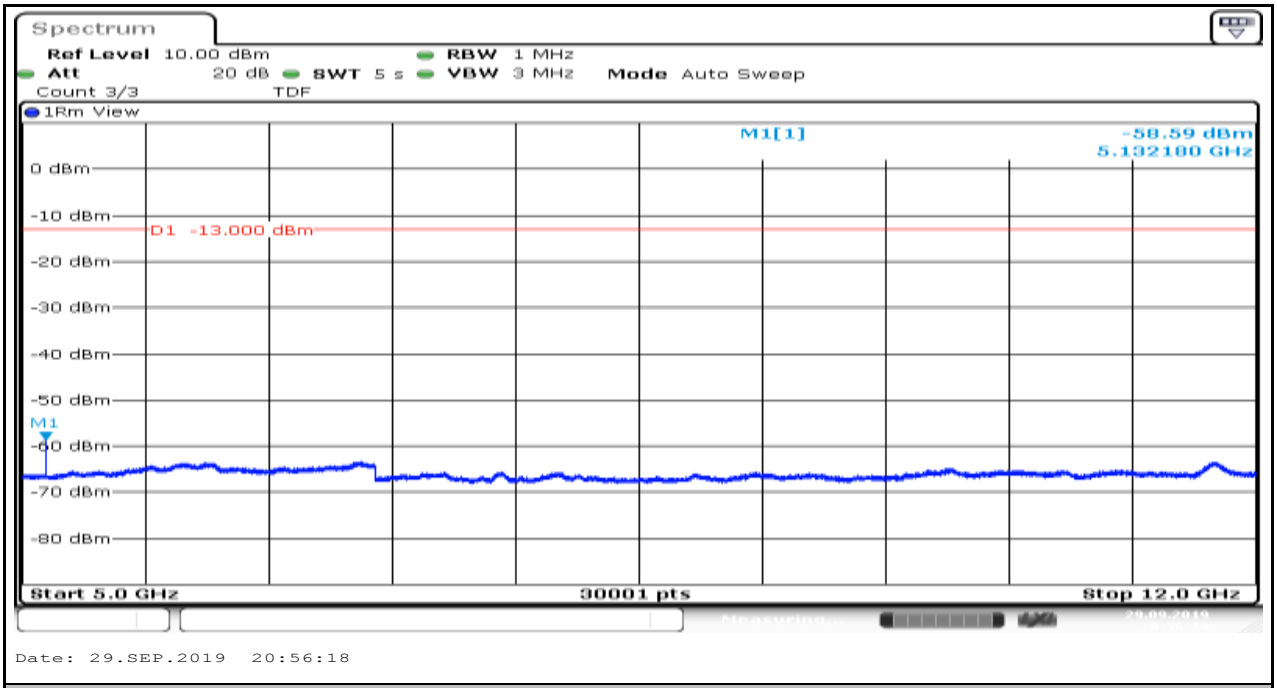

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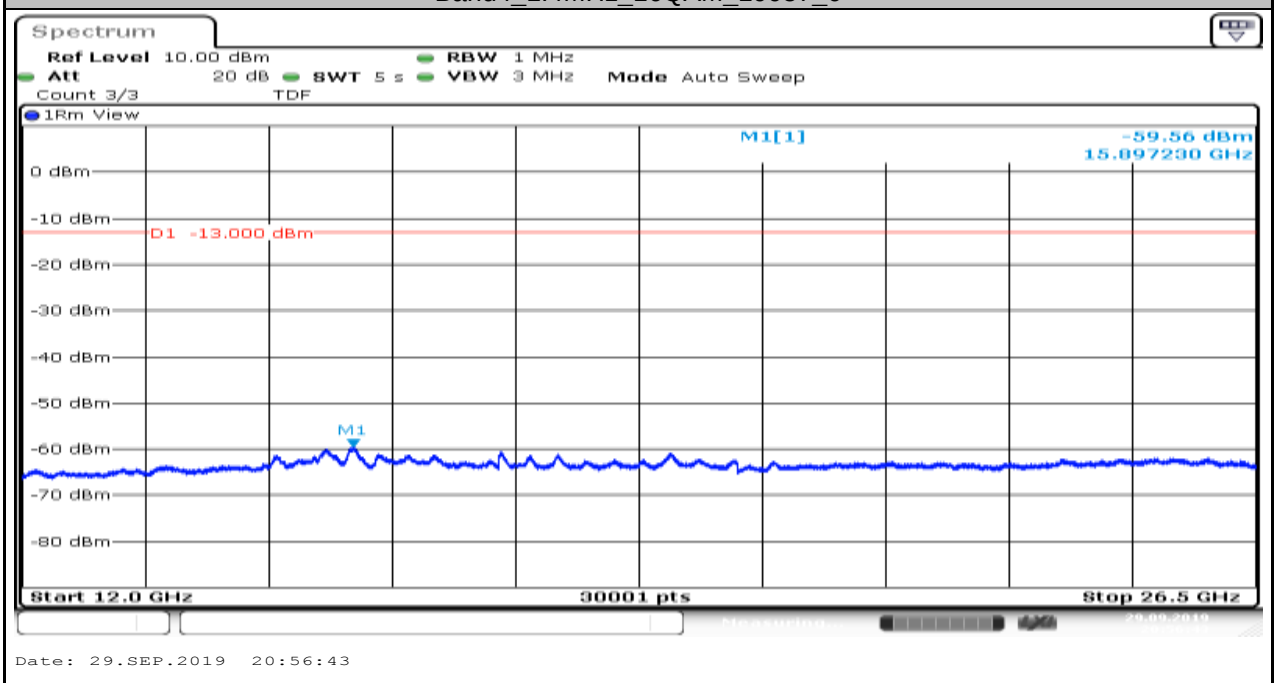
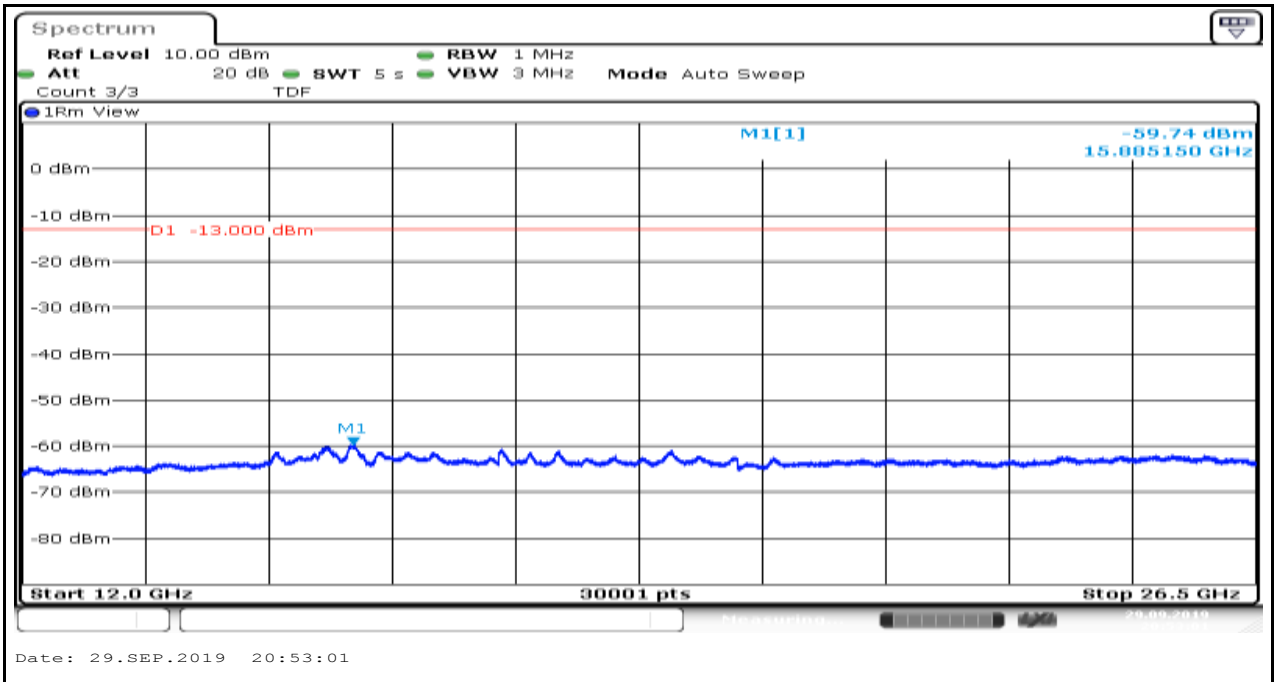


Band4_1.4MHz_16QAM_19957_1



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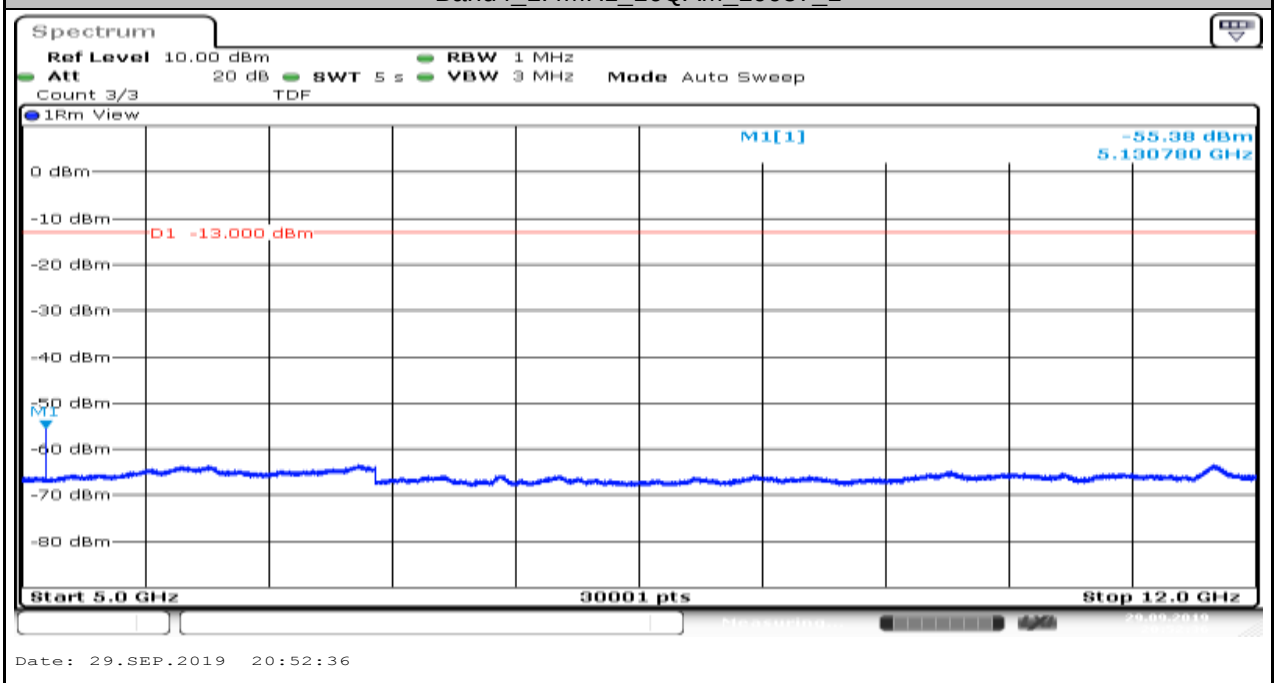

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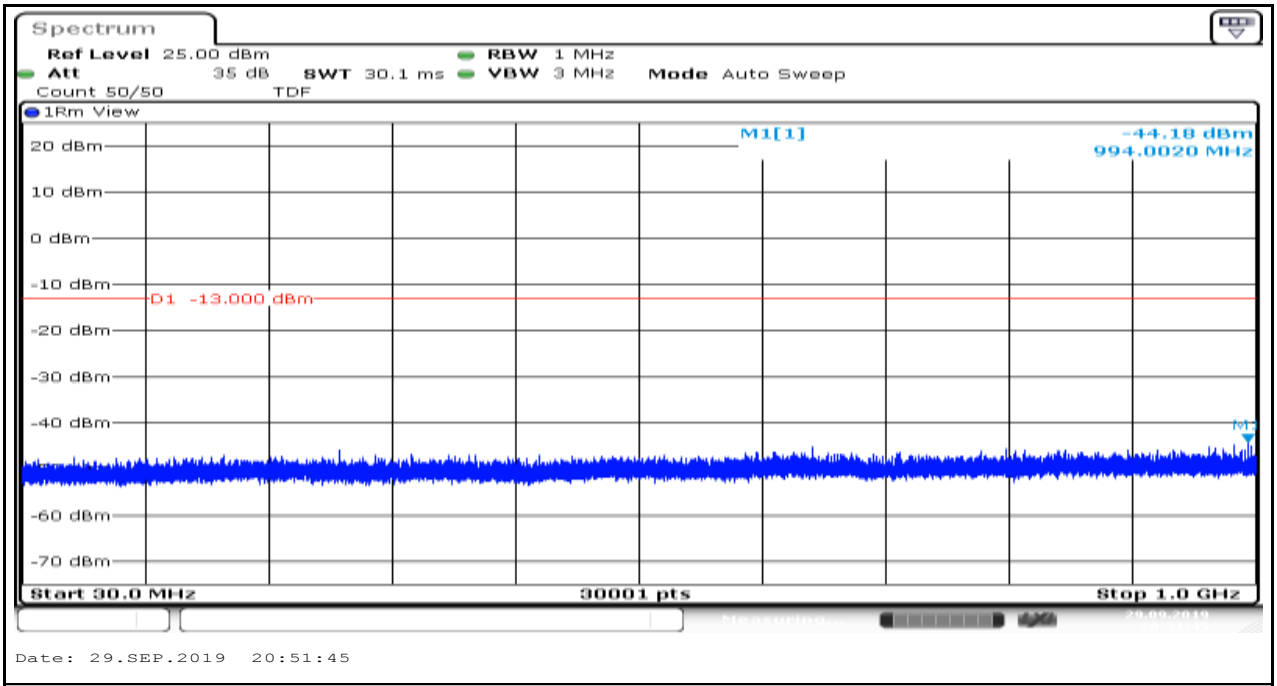
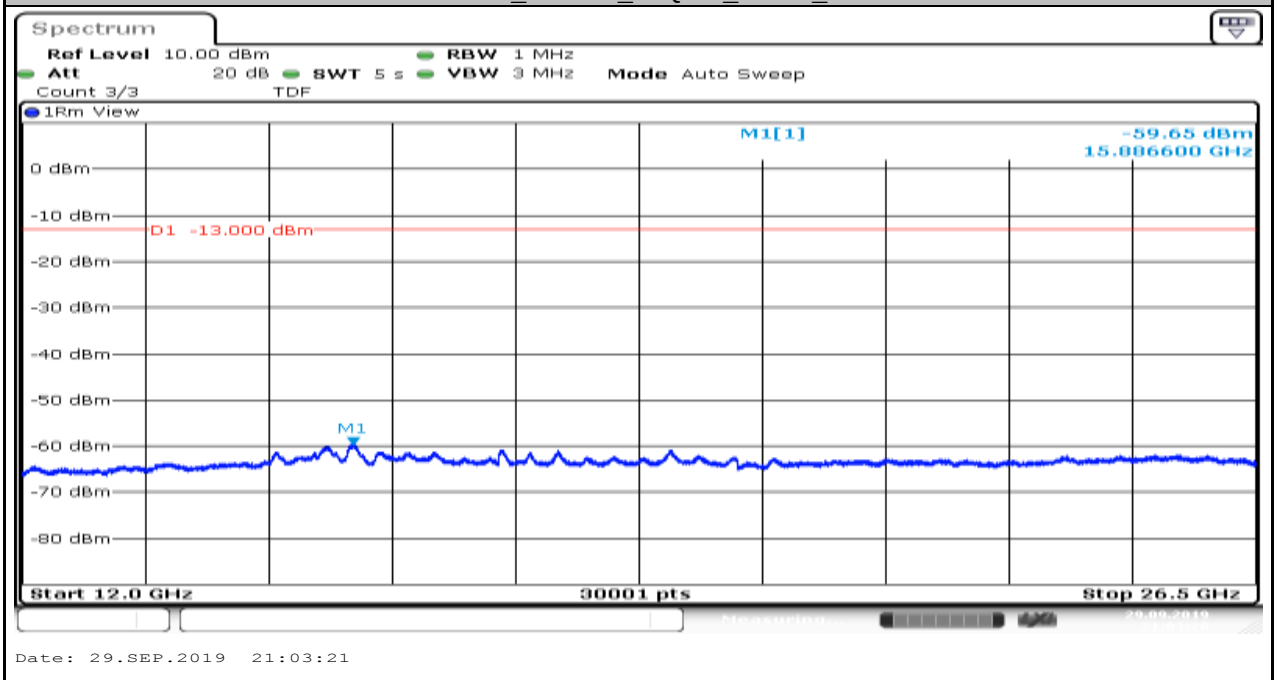


Band4_1.4MHz_16QAM_20175_6



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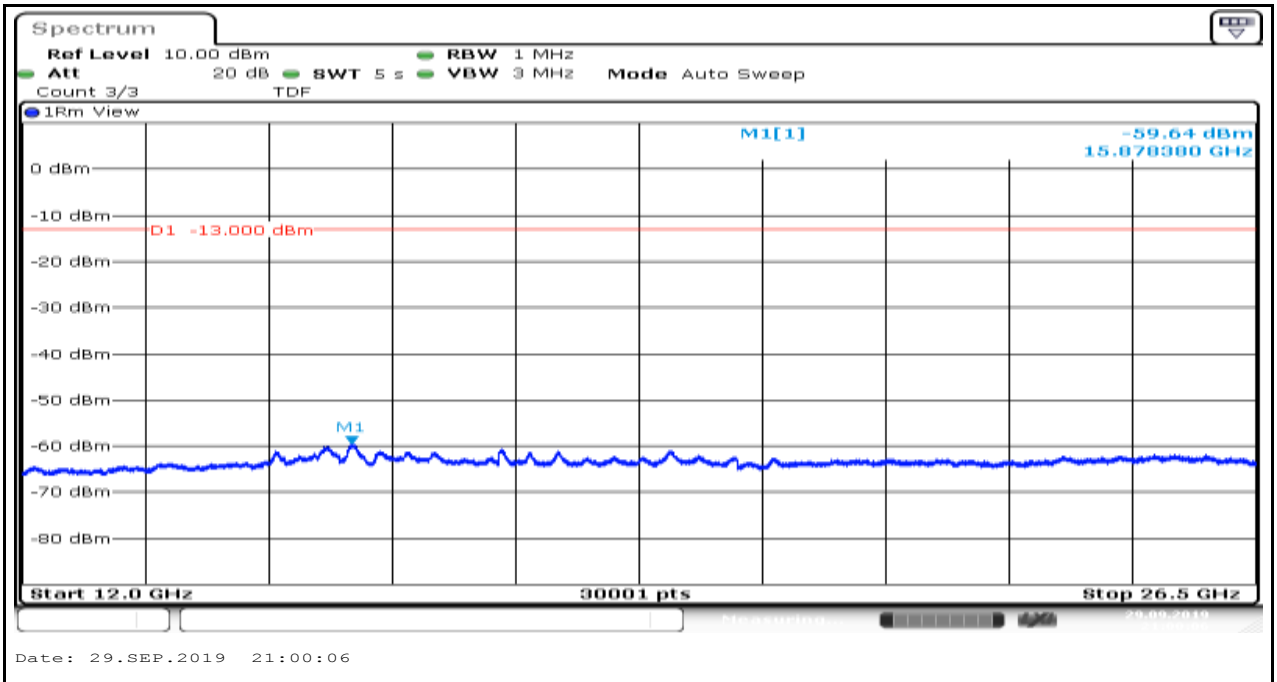

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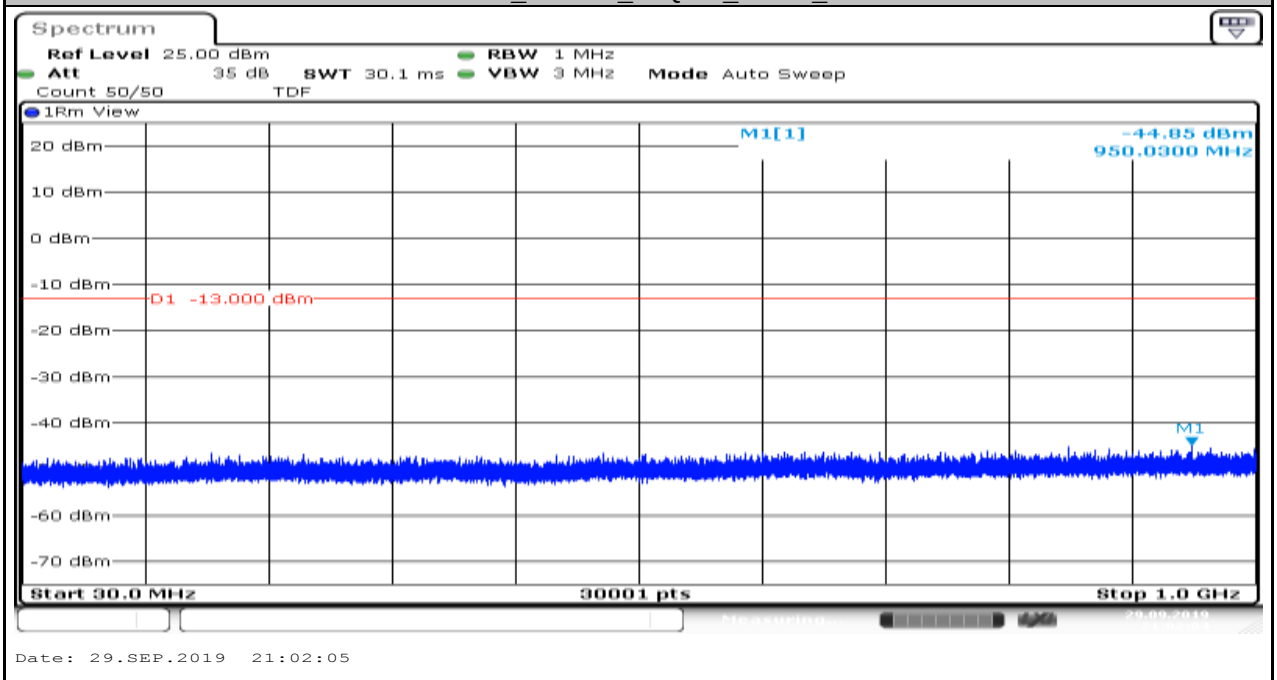

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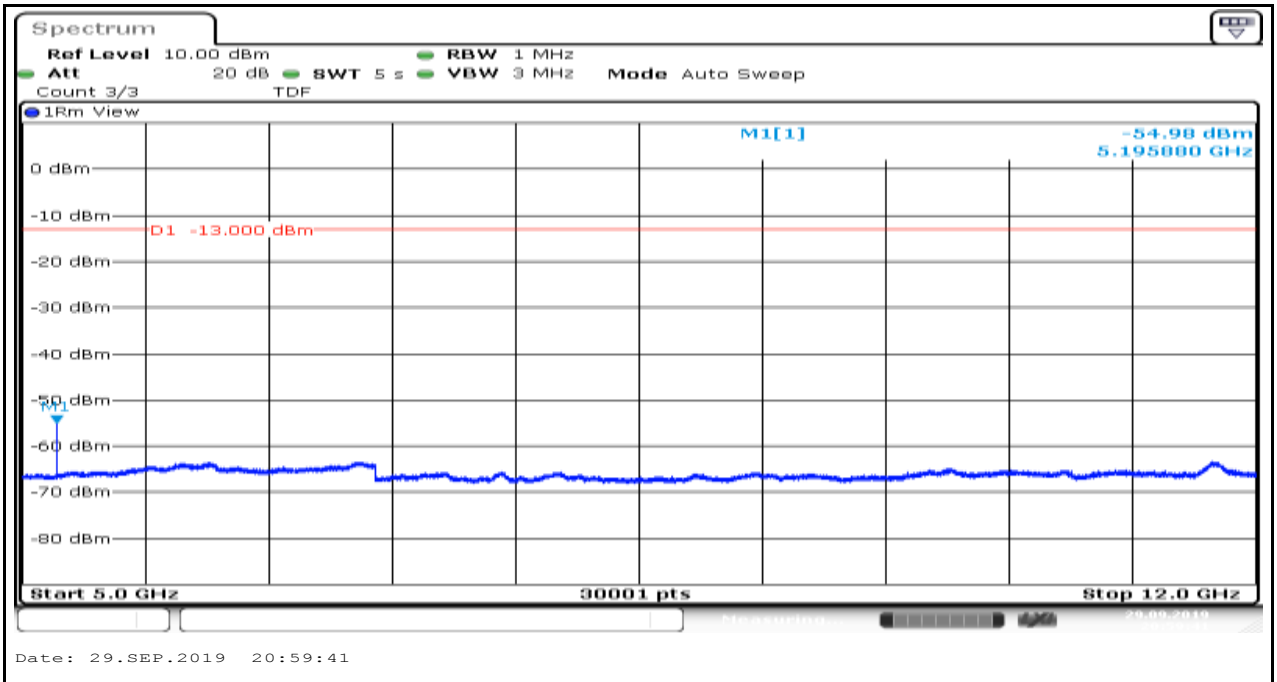

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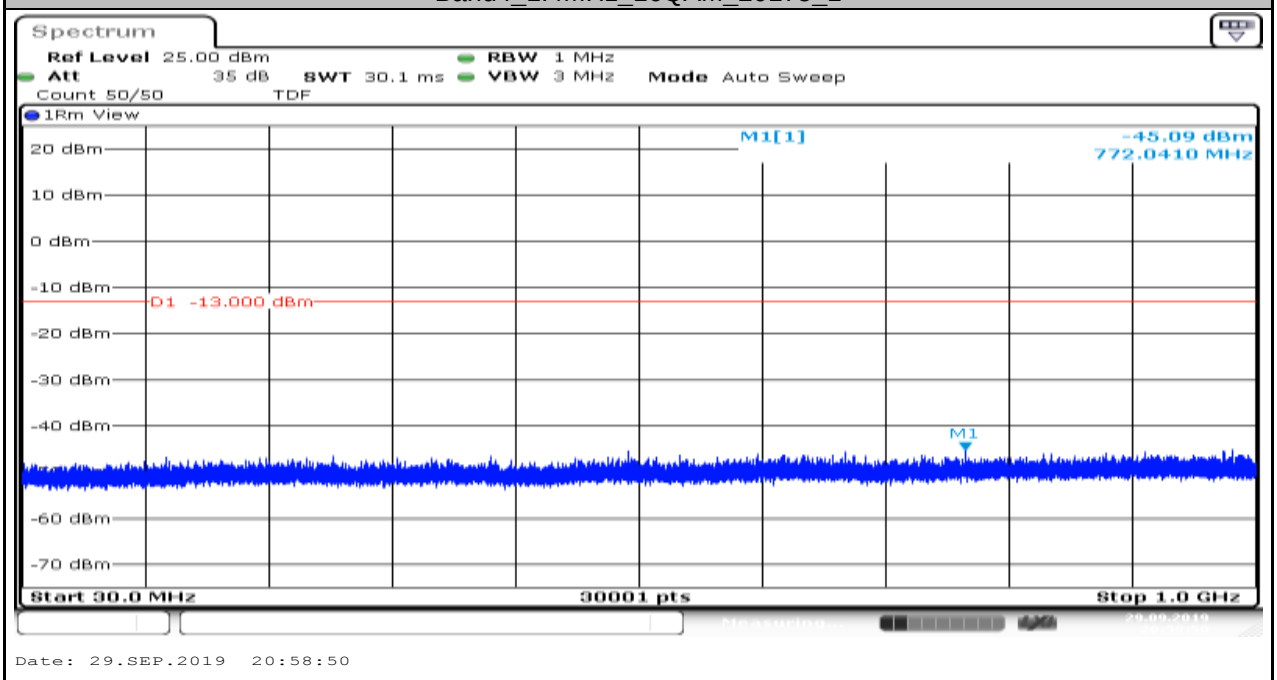
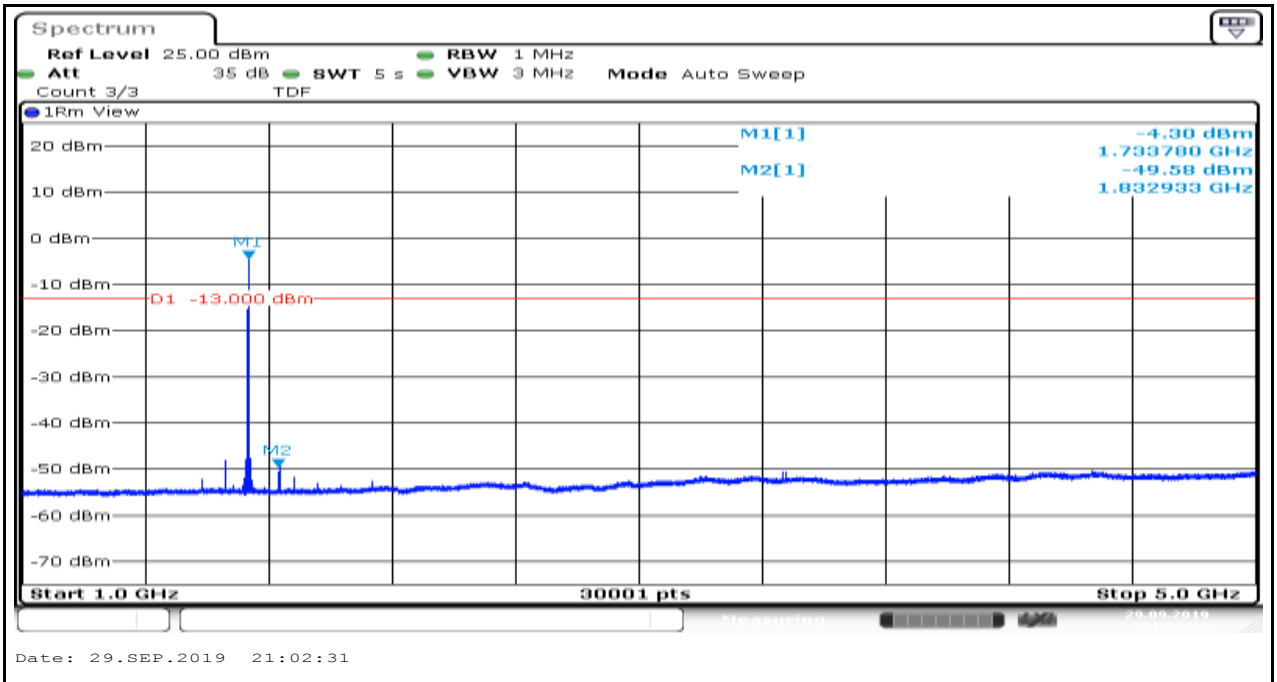


Band4_1.4MHz_16QAM_20175_6



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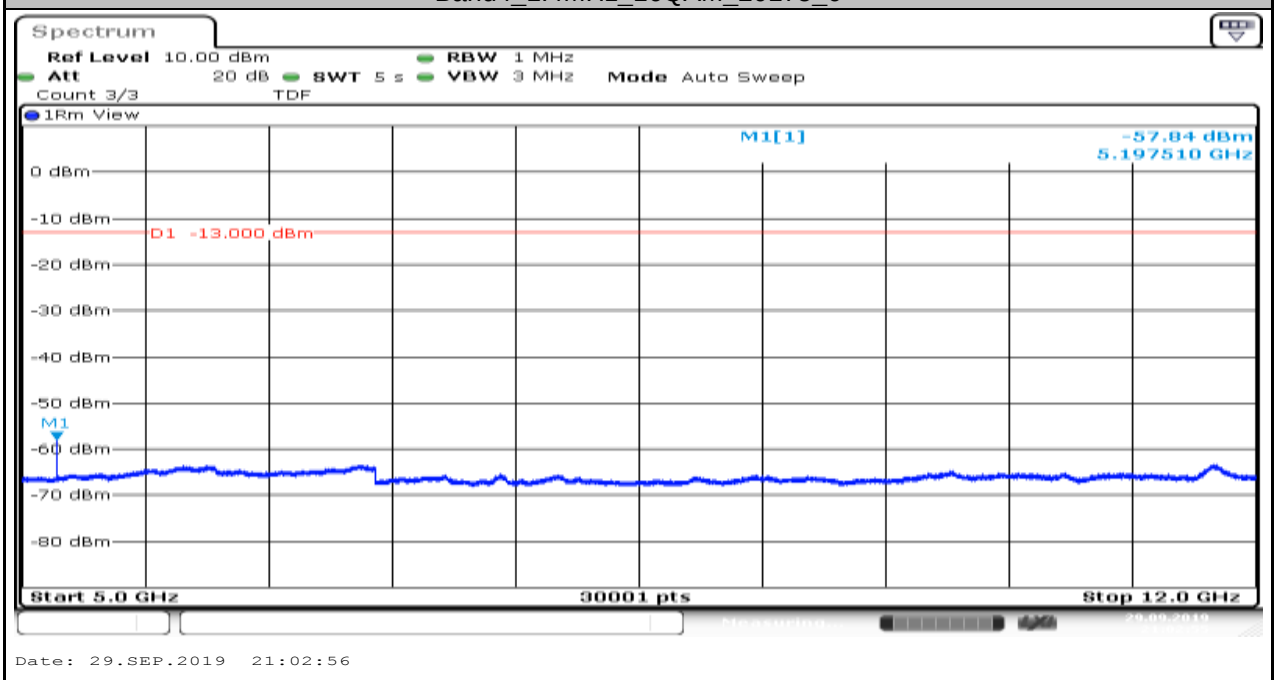
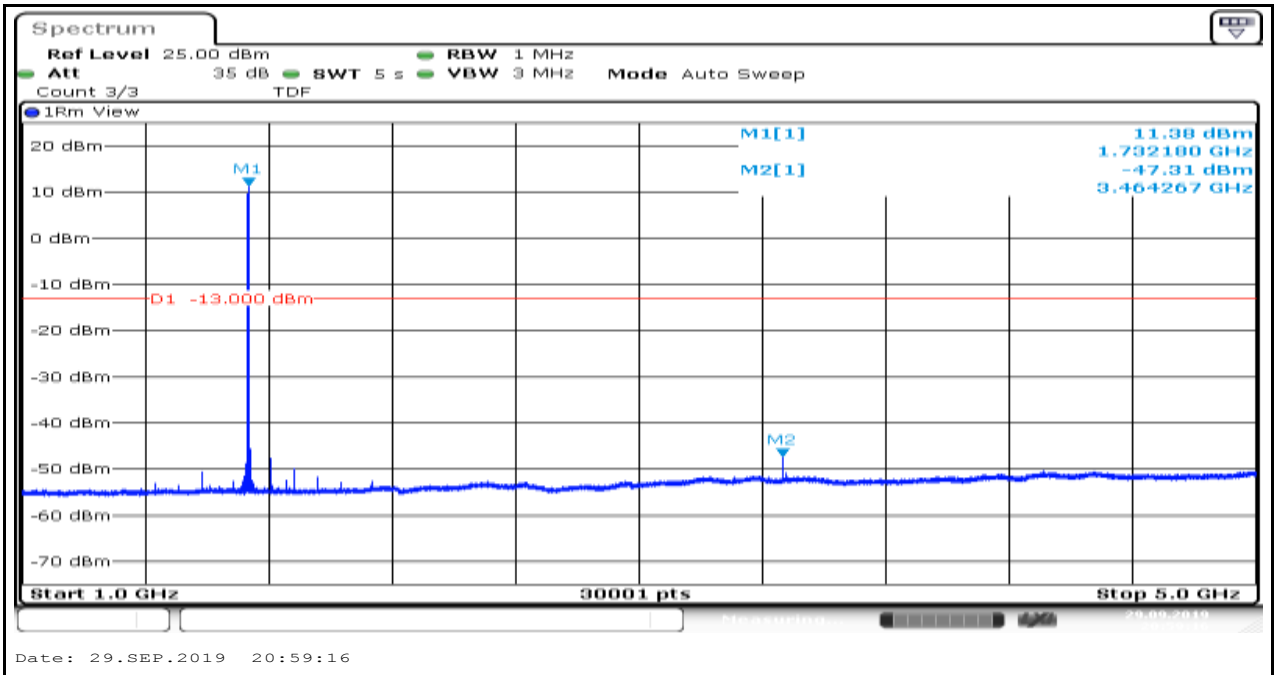


Band4_1.4MHz_16QAM_20175_1



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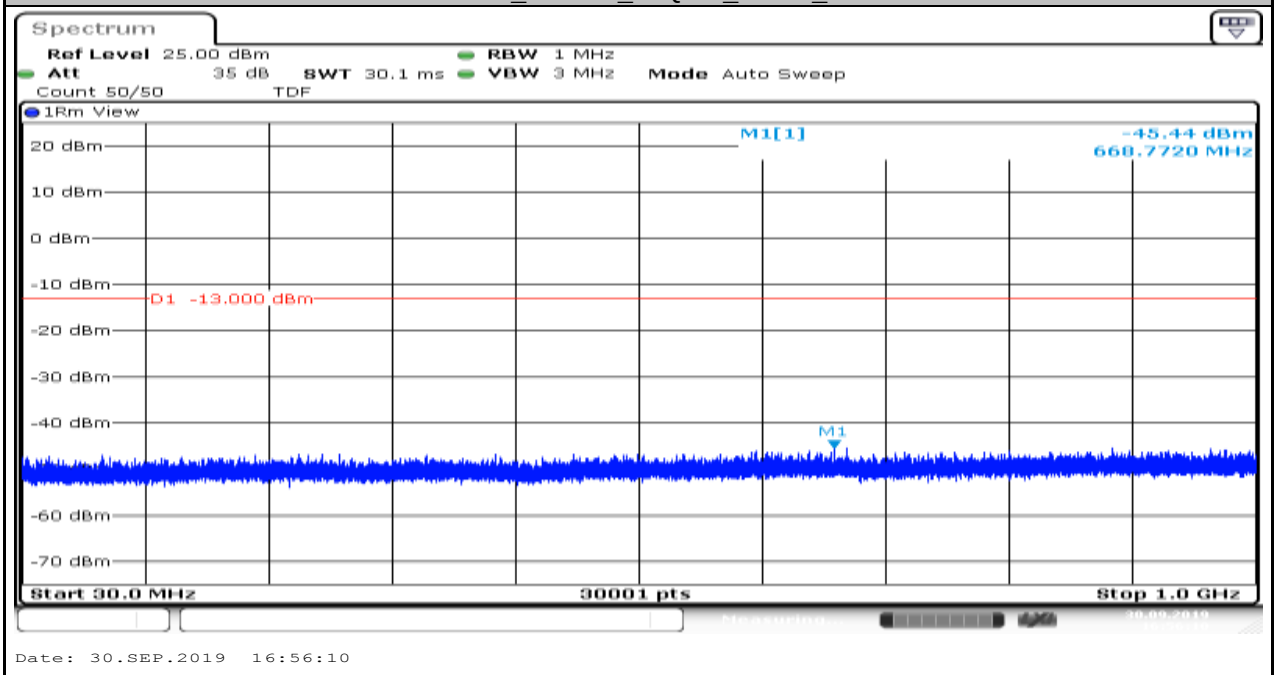

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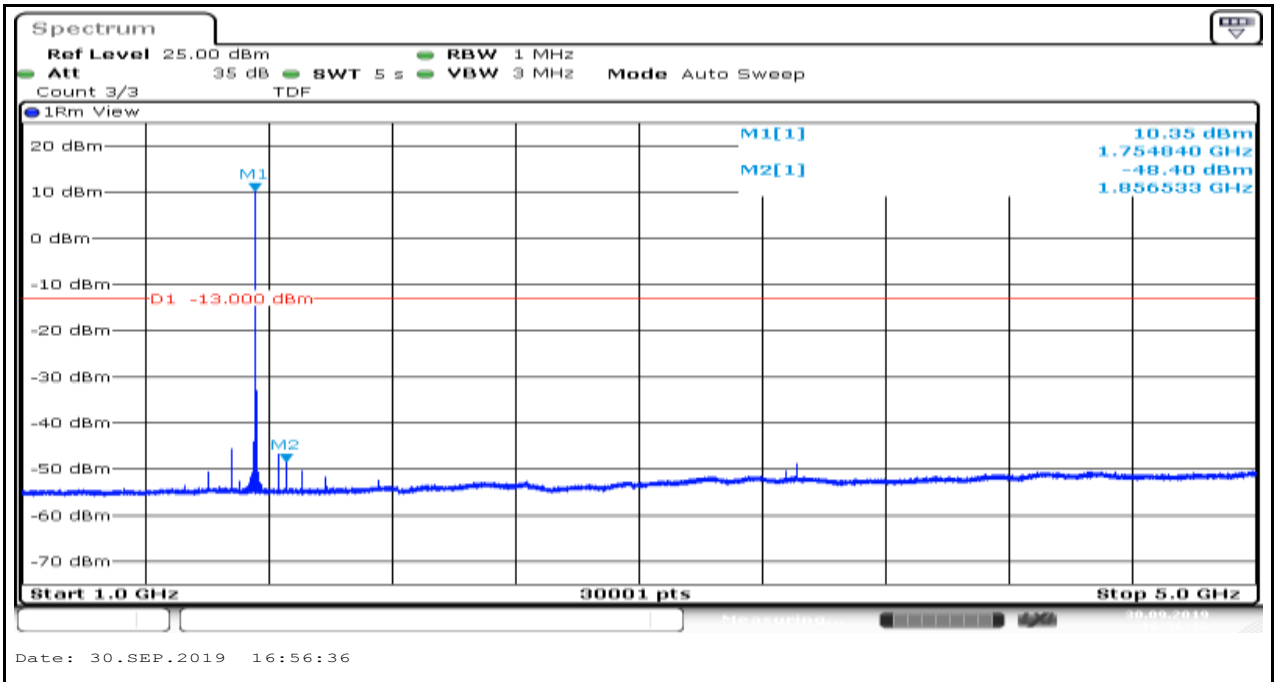

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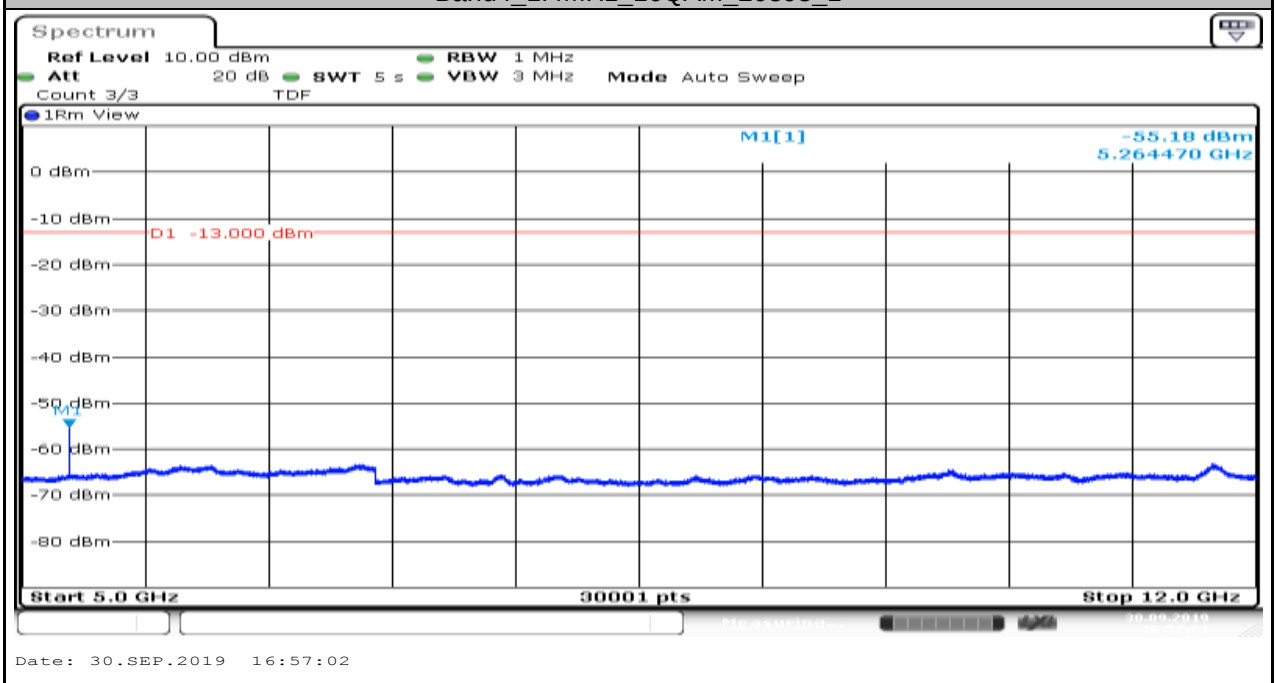

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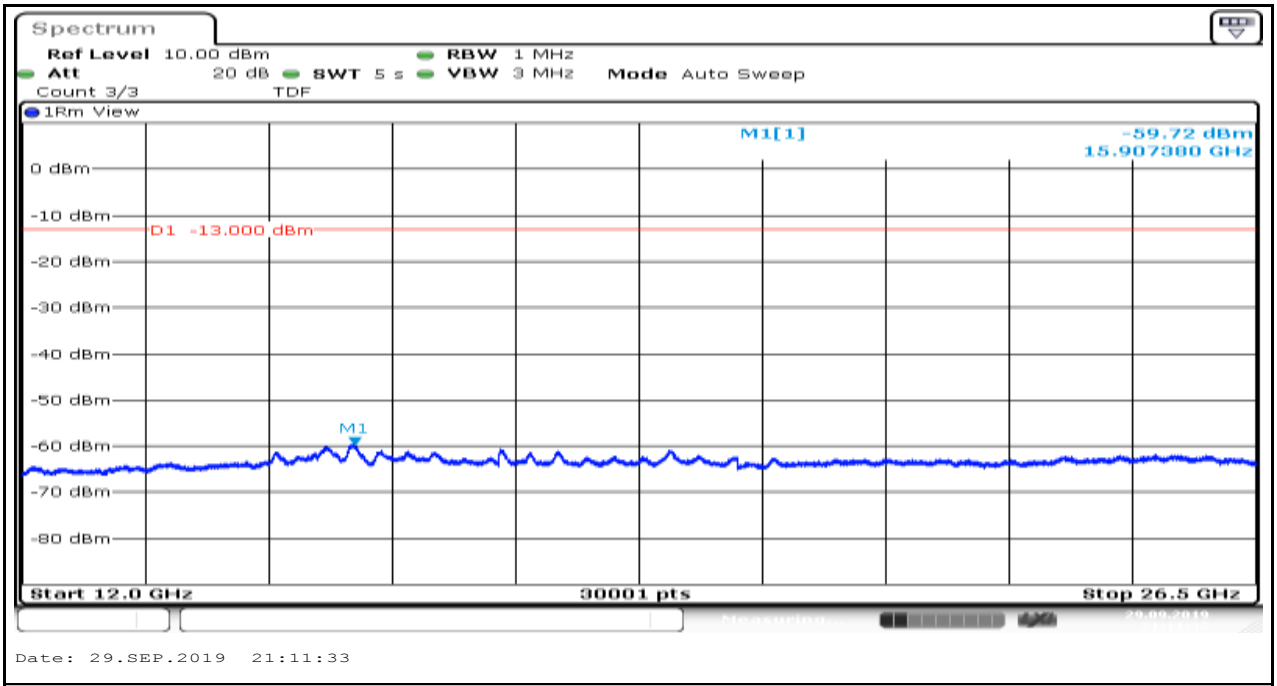
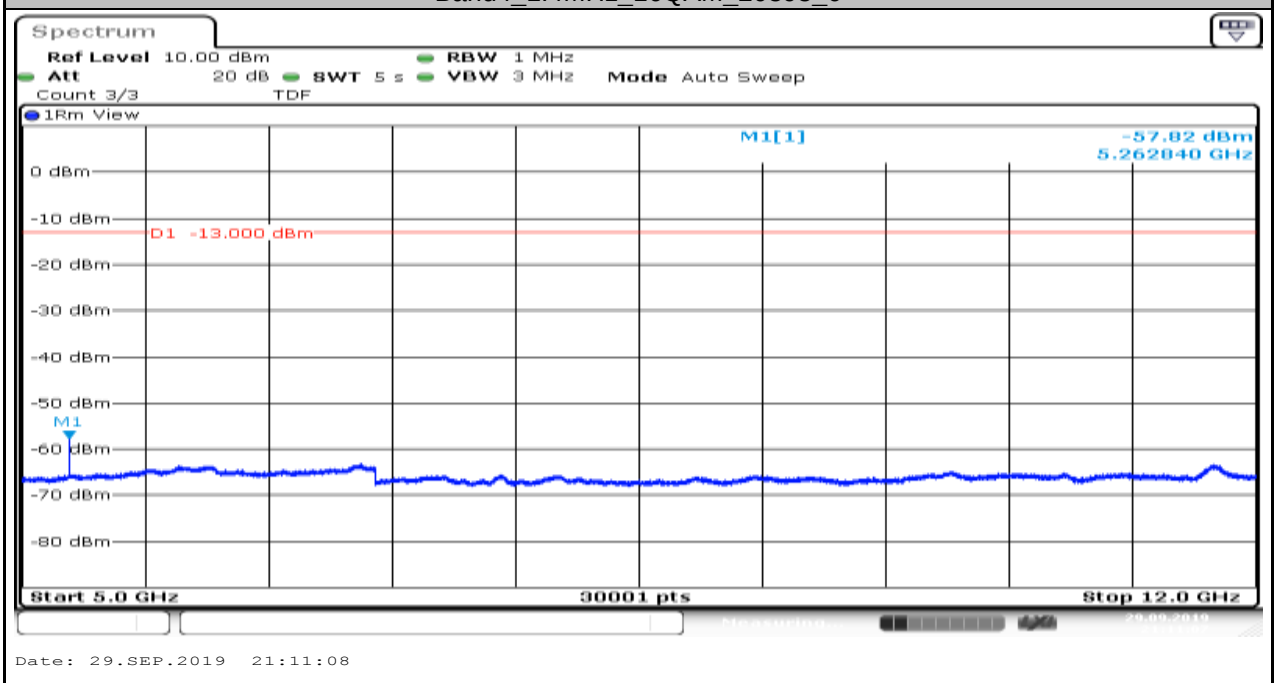
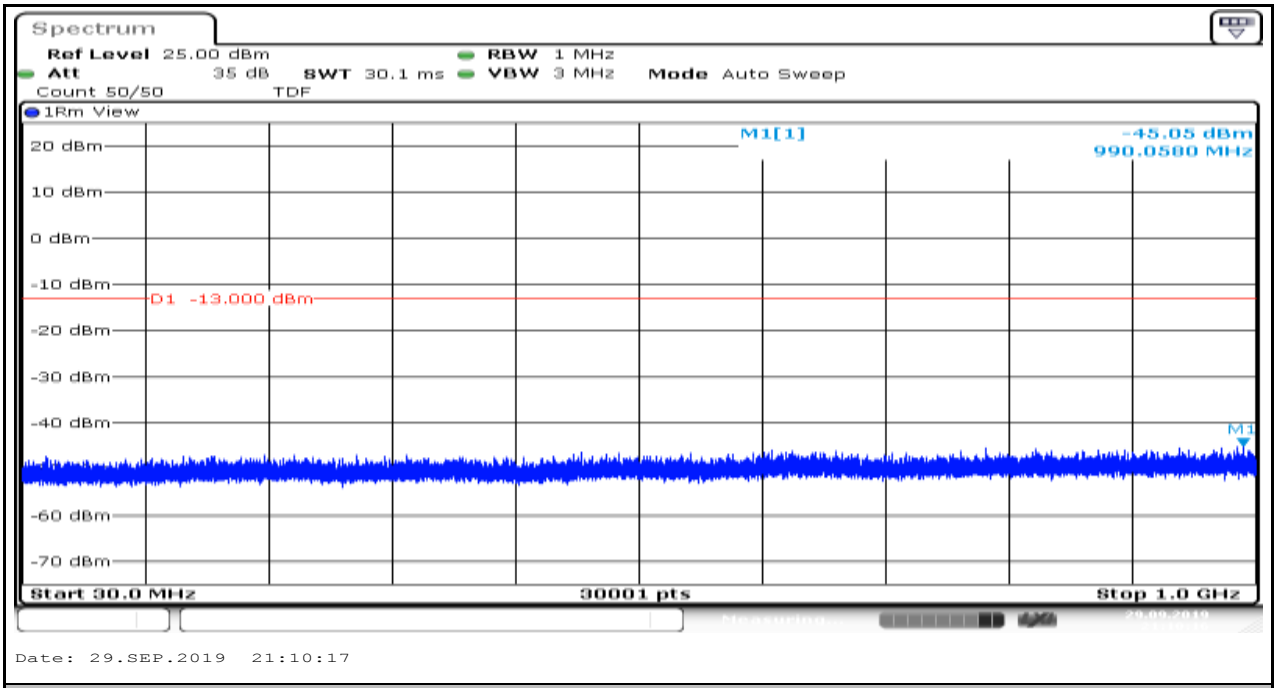


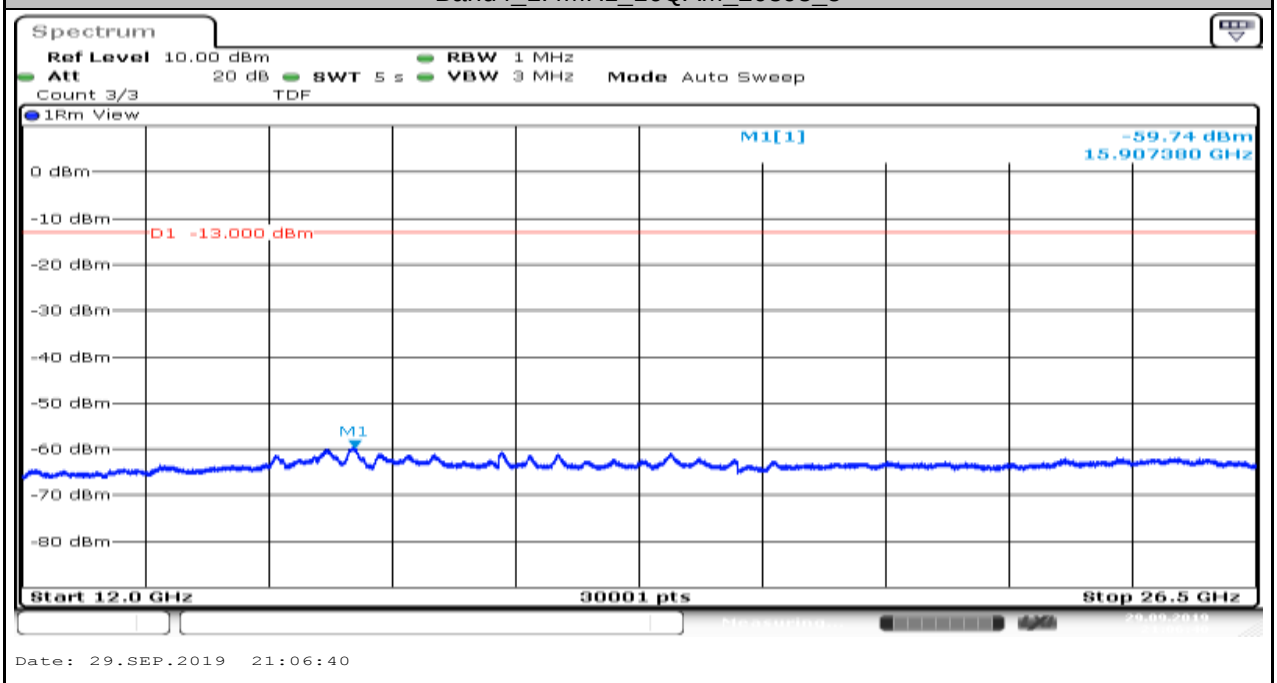
Band4_1.4MHz_16QAM_20393_6



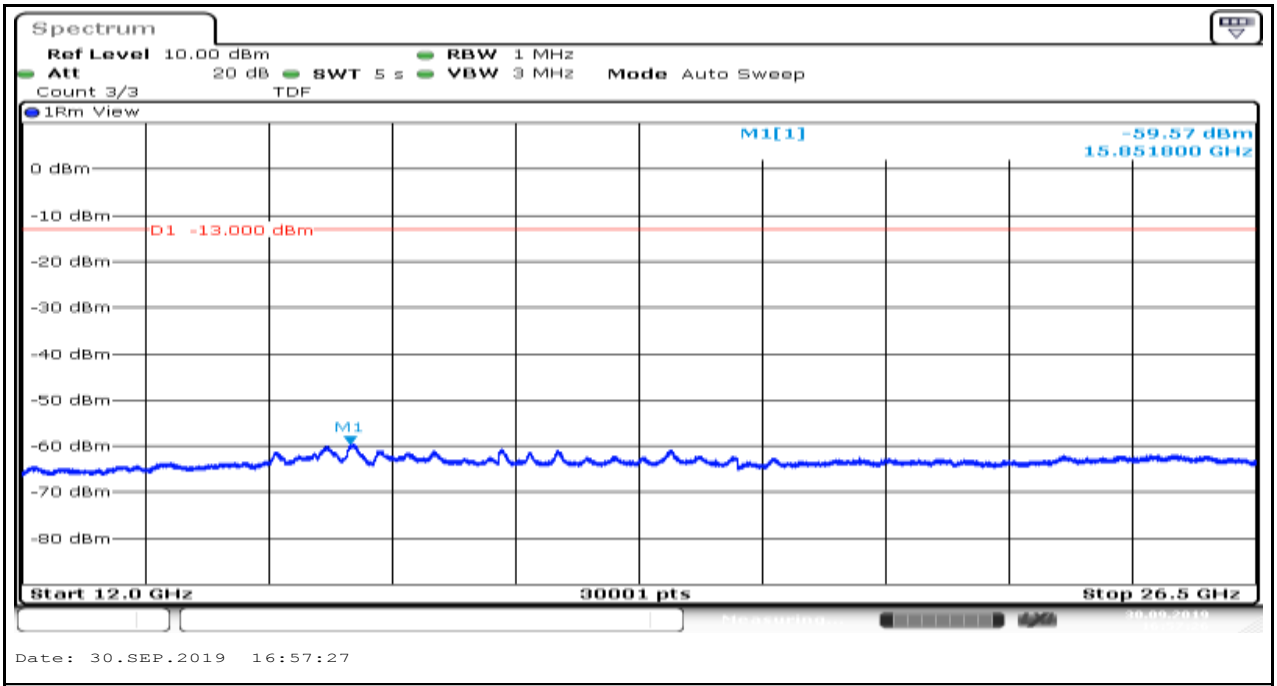
Band4_1.4MHz_16QAM_20393_6



Band4_1.4MHz_16QAM_20393_5



Band4_1.4MHz_16QAM_20393_1



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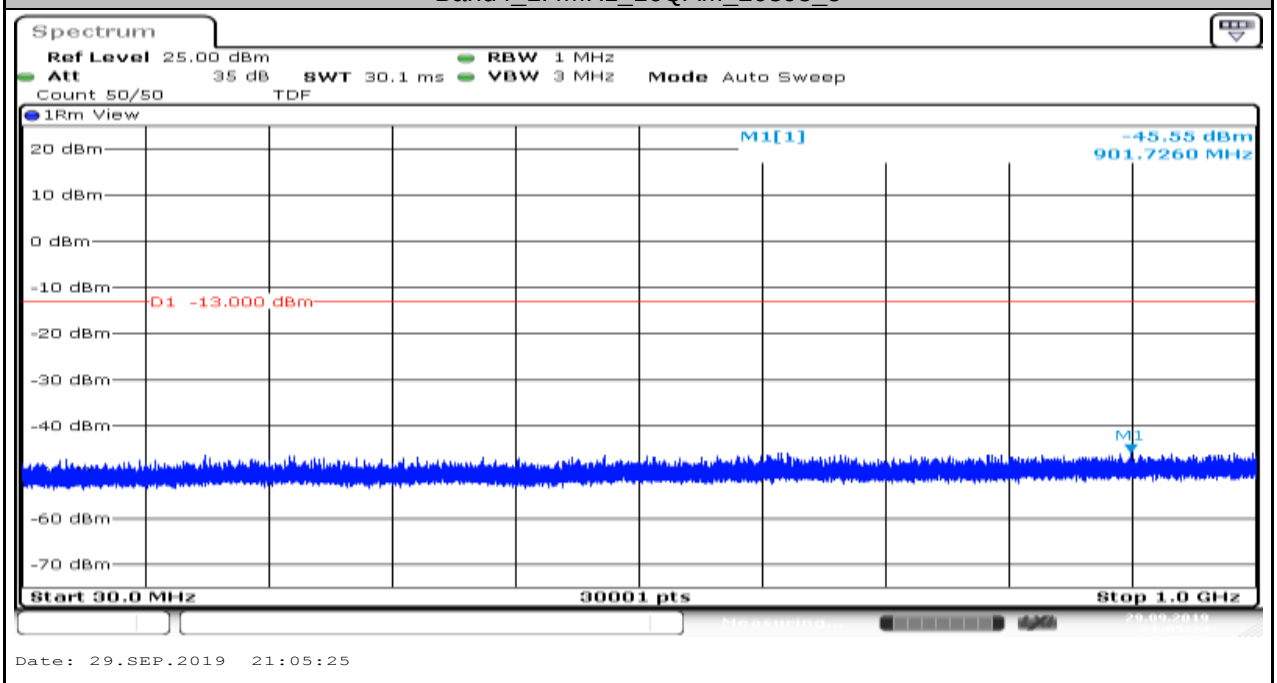

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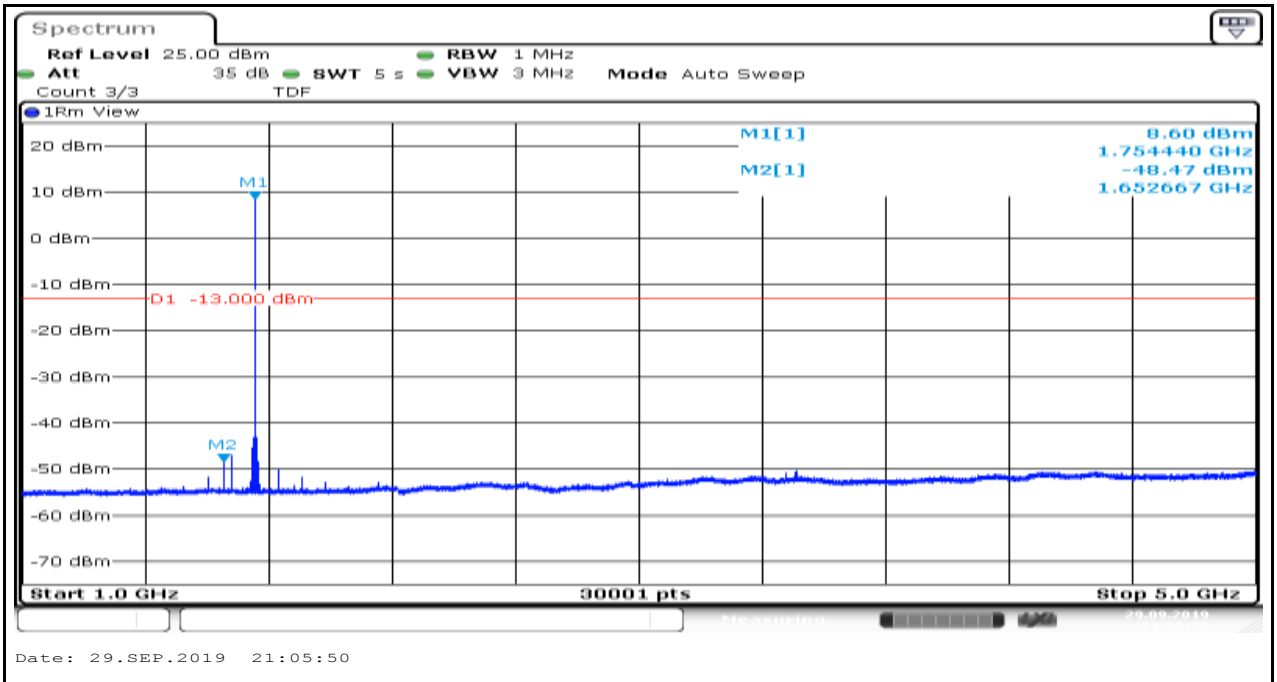

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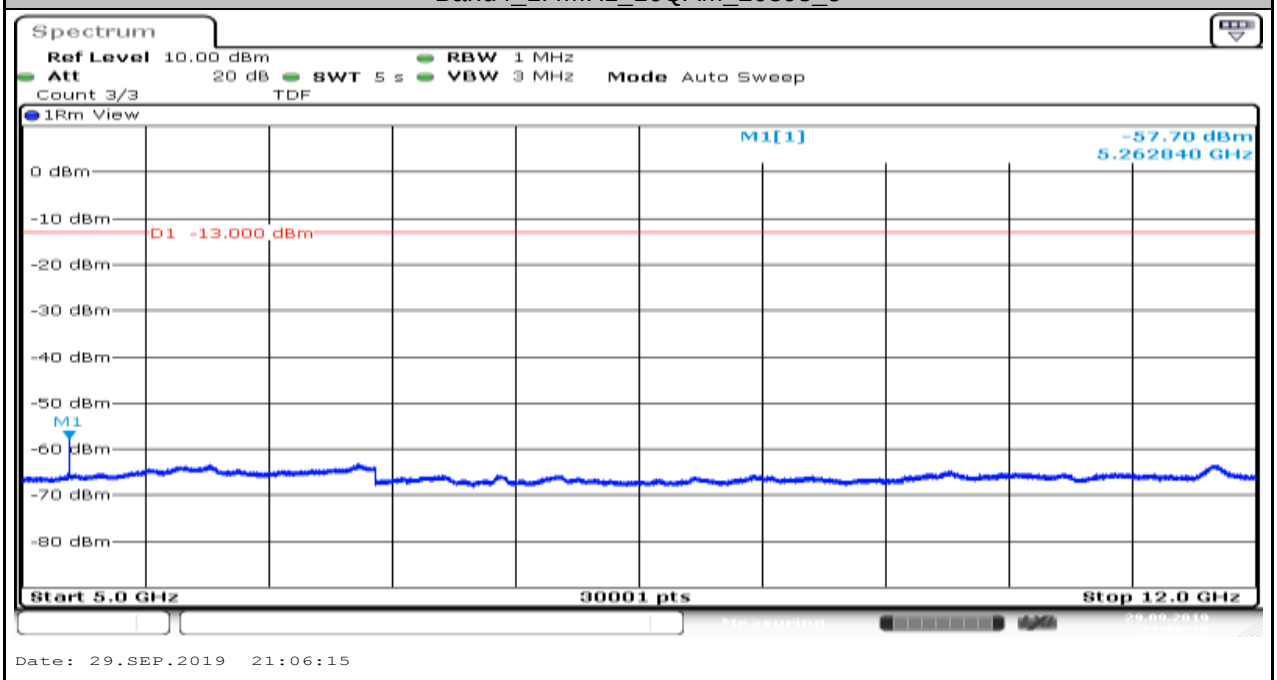

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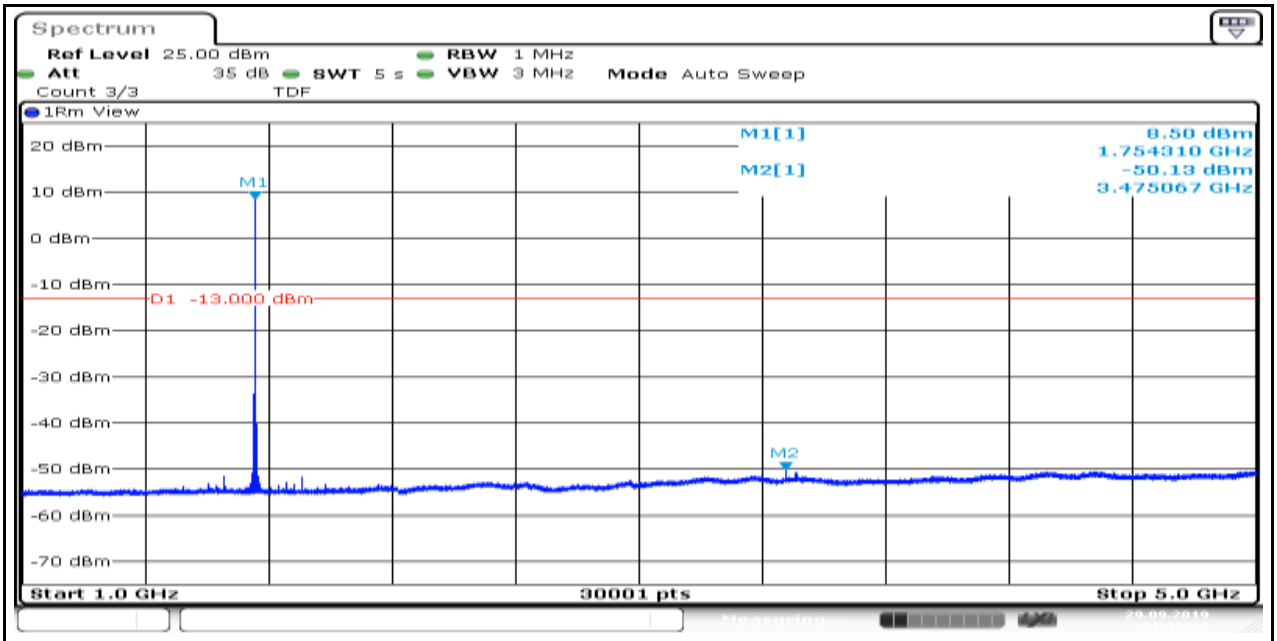

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Appendix B.6: Frequency Stability for M1

Test Result

Voltage												
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band4	1.4MHz	QPSK	20175	1	0	Low	HV	NT	8.41	0.004854	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	LV	NT	8.55	0.004935	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	NT	9.00	0.005195	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	HV	NT	9.10	0.005253	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	LV	NT	10.31	0.005951	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	NT	10.19	0.005882	±2.5	PASS

Temperature												
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	50	-6.67	-0.003850	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	-20	9.54	0.005506	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	-10	10.51	0.006066	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	0	9.70	0.005599	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	10	9.04	0.005218	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	20	8.85	0.005108	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	30	9.58	0.005530	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	-30	8.77	0.005062	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	40	10.79	0.006228	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	50	9.57	0.005524	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	-20	8.97	0.005177	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	-10	9.46	0.005460	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	0	10.96	0.006326	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	10	10.31	0.005951	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	20	11.73	0.006771	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	30	10.84	0.006257	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	40	13.70	0.007908	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	-30	10.60	0.006118	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	85	-47.95	-0.027677	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	80	-49.98	-0.028848	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	70	-50.98	-0.029426	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	60	-51.86	-0.029934	±2.5	PASS
Band4	1.4MHz	QPSK	20175	1	0	Low	NV	-40	-49.90	-0.028802	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	85	-50.44	-0.029114	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	80	-49.18	-0.028387	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	70	-49.44	-0.028537	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	60	-47.75	-0.027561	±2.5	PASS
Band4	1.4MHz	16QAM	20175	1	0	Low	NV	-40	-50.01	-0.028866	±2.5	PASS

Appendix C: Test Results of Band 5 for eMTC operation

APPENDIX C: TEST RESULTS OF BAND 5 FOR EMTC OPERATION 1
APPENDIX C.1: RF POWER OUTPUT AND EFFECTIVE (ISOTROPIC) RADIATED POWER OUTPUT DATA FOR M1 2
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Test Result 43

Appendix C.1: RF Power Output and Effective (Isotropic) Radiated Power Output Data for M1

Test Result

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NBIndex	Result (dBm)	ERP dBm	ERP Watts	Limit (watts) FCC	Limit (watts) ISED	Verdict
Band5	1.4MHz	QPSK	20407	6	0	Low	19.44	19.43	0.088	7	11.5	PASS
Band5	1.4MHz	QPSK	20407	1	0	Low	21.88	21.87	0.154	7	11.5	PASS
Band5	1.4MHz	QPSK	20525	6	0	Low	19.28	19.27	0.085	7	11.5	PASS
Band5	1.4MHz	QPSK	20525	1	0	Low	21.53	21.52	0.142	7	11.5	PASS
Band5	1.4MHz	QPSK	20643	1	5	Low	21.05	21.04	0.127	7	11.5	PASS
Band5	1.4MHz	QPSK	20643	6	0	Low	19.15	19.14	0.082	7	11.5	PASS
Band5	1.4MHz	16QAM	20407	1	0	Low	20.55	20.54	0.113	7	11.5	PASS
Band5	1.4MHz	16QAM	20407	6	0	Low	19.52	19.51	0.089	7	11.5	PASS
Band5	1.4MHz	16QAM	20525	1	0	Low	20.34	20.33	0.108	7	11.5	PASS
Band5	1.4MHz	16QAM	20525	6	0	Low	19.29	19.28	0.085	7	11.5	PASS
Band5	1.4MHz	16QAM	20643	1	5	Low	20.18	20.17	0.104	7	11.5	PASS
Band5	1.4MHz	16QAM	20643	6	0	Low	19.17	19.16	0.082	7	11.5	PASS
Band5	3MHz	QPSK	20415	1	0	Low	21.58	21.57	0.144	7	11.5	PASS
Band5	3MHz	QPSK	20415	6	0	Low	19.41	19.4	0.087	7	11.5	PASS
Band5	3MHz	QPSK	20525	1	0	Low	21.12	21.11	0.129	7	11.5	PASS
Band5	3MHz	QPSK	20525	6	0	Low	19.11	19.1	0.081	7	11.5	PASS
Band5	3MHz	QPSK	20635	1	5	High	20.94	20.93	0.124	7	11.5	PASS
Band5	3MHz	QPSK	20635	6	0	High	19.09	19.08	0.081	7	11.5	PASS
Band5	3MHz	16QAM	20415	1	0	Low	20.8	20.79	0.120	7	11.5	PASS
Band5	3MHz	16QAM	20415	6	0	Low	19.43	19.42	0.087	7	11.5	PASS
Band5	3MHz	16QAM	20525	1	0	Low	20.56	20.55	0.114	7	11.5	PASS
Band5	3MHz	16QAM	20525	6	0	Low	19.11	19.1	0.081	7	11.5	PASS
Band5	3MHz	16QAM	20635	6	0	High	19.09	19.08	0.081	7	11.5	PASS
Band5	3MHz	16QAM	20635	1	5	High	20.46	20.45	0.111	7	11.5	PASS
Band5	5MHz	QPSK	20425	6	0	Low	20.52	20.51	0.112	7	11.5	PASS
Band5	5MHz	QPSK	20425	1	0	Low	21.44	21.43	0.139	7	11.5	PASS
Band5	5MHz	QPSK	20525	6	0	Low	20.19	20.18	0.104	7	11.5	PASS
Band5	5MHz	QPSK	20525	1	0	Low	21.15	21.14	0.130	7	11.5	PASS
Band5	5MHz	QPSK	20625	3	3	High	20.85	20.84	0.121	7	11.5	PASS
Band5	5MHz	QPSK	20625	1	5	High	20.73	20.72	0.118	7	11.5	PASS
Band5	5MHz	16QAM	20425	6	0	Low	20.55	20.54	0.113	7	11.5	PASS
Band5	5MHz	16QAM	20425	1	0	Low	20.99	20.98	0.125	7	11.5	PASS
Band5	5MHz	16QAM	20525	1	0	Low	20.66	20.65	0.116	7	11.5	PASS
Band5	5MHz	16QAM	20525	6	0	Low	20.18	20.17	0.104	7	11.5	PASS
Band5	5MHz	16QAM	20625	1	5	High	20.35	20.34	0.108	7	11.5	PASS
Band5	5MHz	16QAM	20625	3	3	High	20.63	20.62	0.115	7	11.5	PASS
Band5	10MHz	QPSK	20450	5	0	Low	21.42	21.41	0.138	7	11.5	PASS
Band5	10MHz	QPSK	20450	1	0	Low	21.34	21.33	0.136	7	11.5	PASS
Band5	10MHz	QPSK	20525	5	0	Low	21.14	21.13	0.130	7	11.5	PASS
Band5	10MHz	QPSK	20525	1	0	Low	21.21	21.2	0.132	7	11.5	PASS
Band5	10MHz	QPSK	20600	5	1	High	21.16	21.15	0.130	7	11.5	PASS
Band5	10MHz	QPSK	20600	1	5	High	20.79	20.78	0.120	7	11.5	PASS
Band5	10MHz	16QAM	20450	5	0	Low	21.13	21.12	0.129	7	11.5	PASS
Band5	10MHz	16QAM	20450	1	0	Low	20.96	20.95	0.124	7	11.5	PASS
Band5	10MHz	16QAM	20525	1	0	Low	20.69	20.68	0.117	7	11.5	PASS
Band5	10MHz	16QAM	20525	5	0	Low	20.99	20.98	0.125	7	11.5	PASS
Band5	10MHz	16QAM	20600	5	1	High	20.88	20.87	0.122	7	11.5	PASS
Band5	10MHz	16QAM	20600	1	5	High	20.4	20.39	0.109	7	11.5	PASS

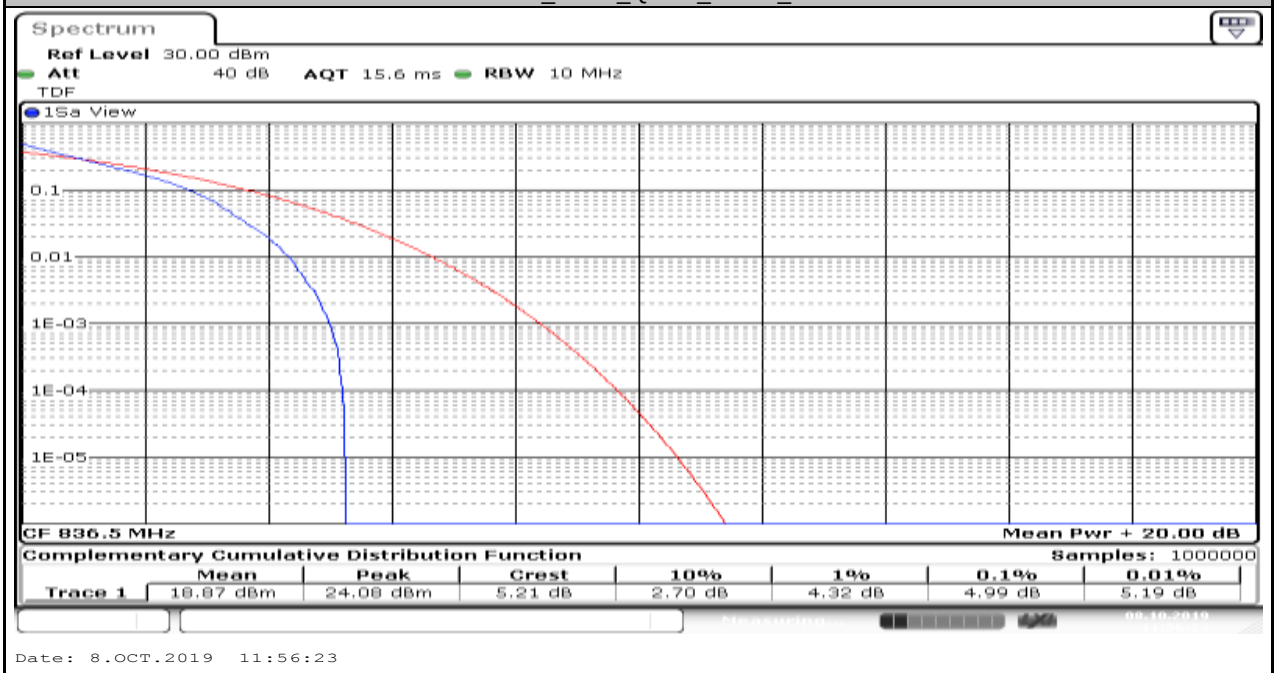
Appendix C.2: Peak-to-Average Ratio (CCDF) for M1

Test Result

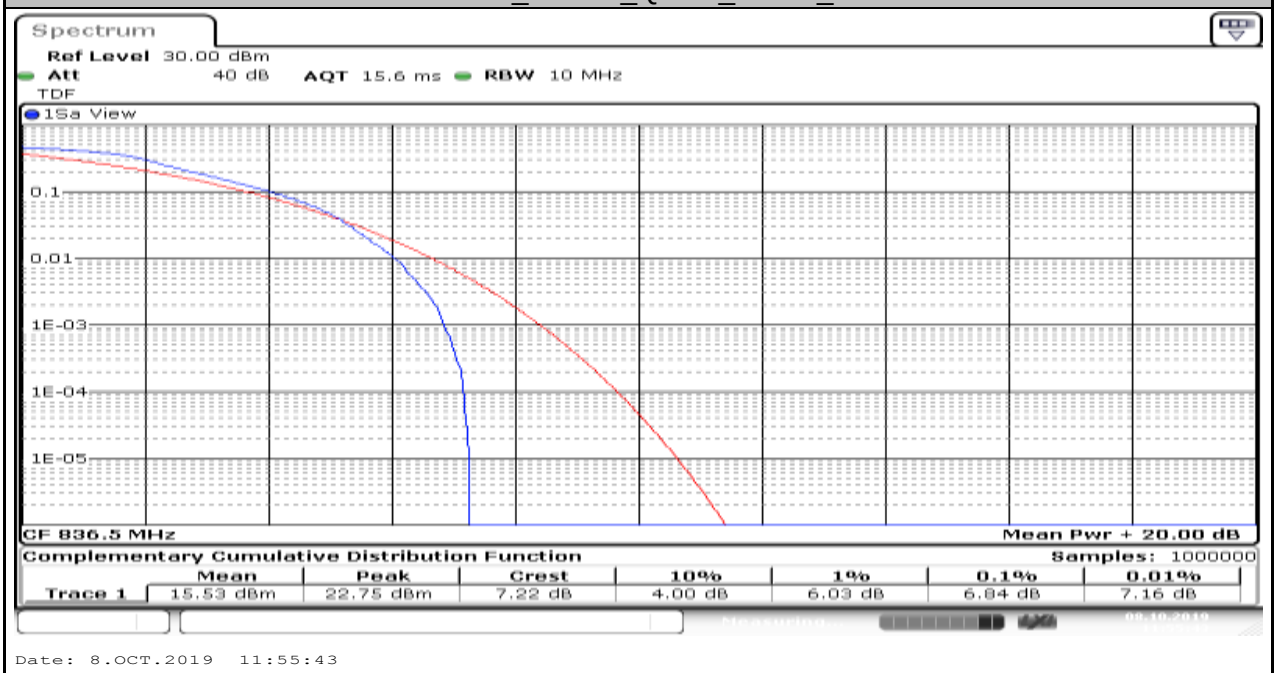
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NBIndex	Result(dB)	Limit(dB)	Verdict
Band5	5MHz	QPSK	20525	6	0	Low	4.99	<=13	PASS
Band5	10MHz	QPSK	20525	6	0	Low	6.84	<=13	PASS
Band5	3MHz	QPSK	20525	6	0	Low	8.52	<=13	PASS
Band5	1.4MHz	QPSK	20525	6	0	Low	8.43	<=13	PASS
Band5	5MHz	16QAM	20525	6	0	Low	8.96	<=13	PASS
Band5	10MHz	16QAM	20525	6	0	Low	11.71	<=13	PASS
Band5	3MHz	16QAM	20525	6	0	Low	9.16	<=13	PASS
Band5	1.4MHz	16QAM	20525	6	0	Low	11.80	<=13	PASS

Test Graphs

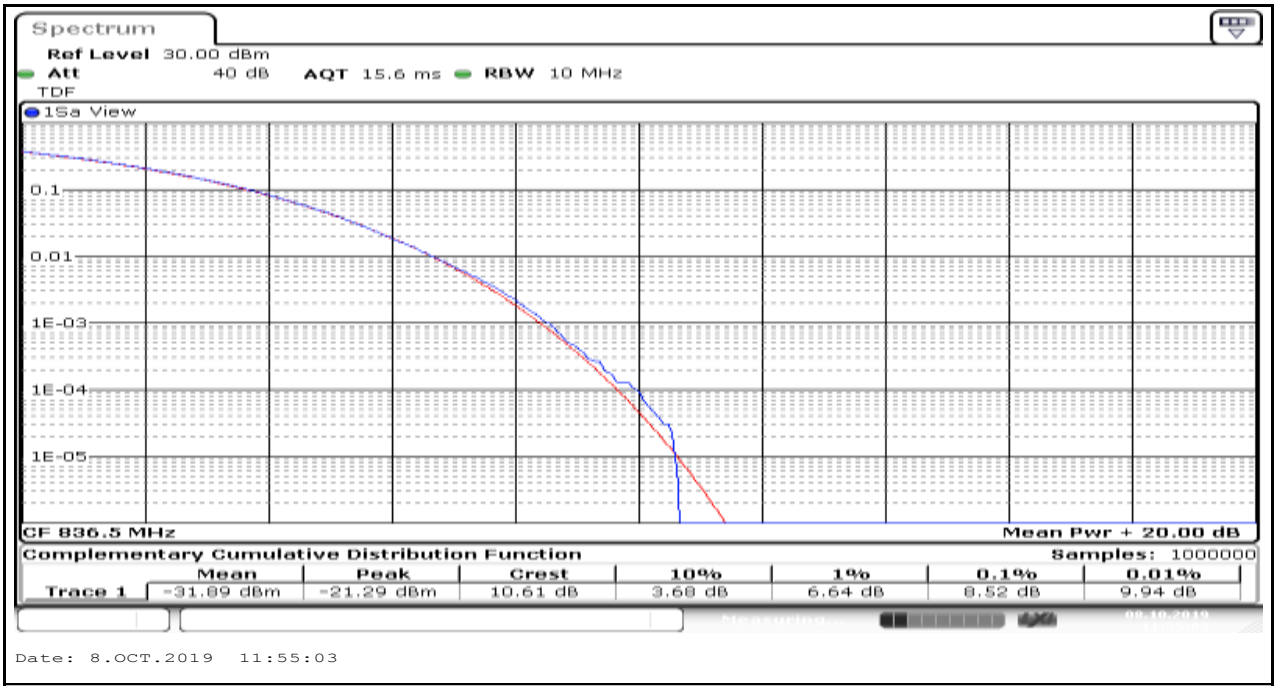
Band5_5MHz_QPSK_20525_6



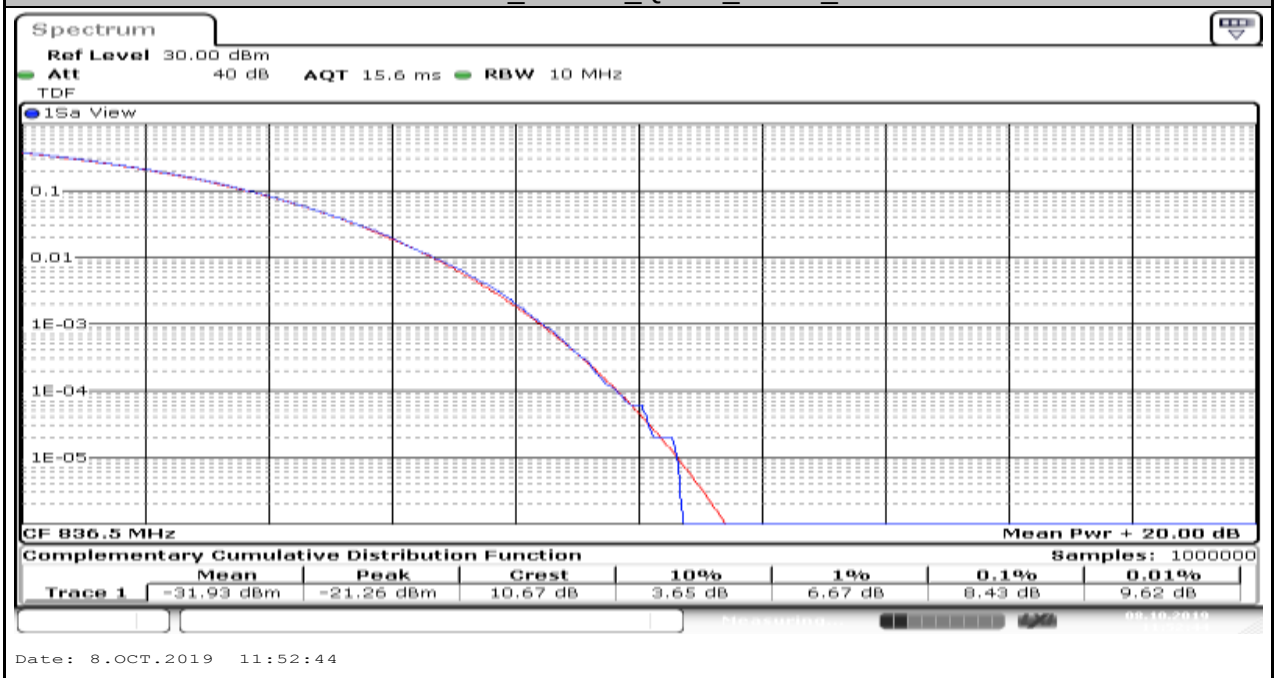
Band5_10MHz_QPSK_20525_6



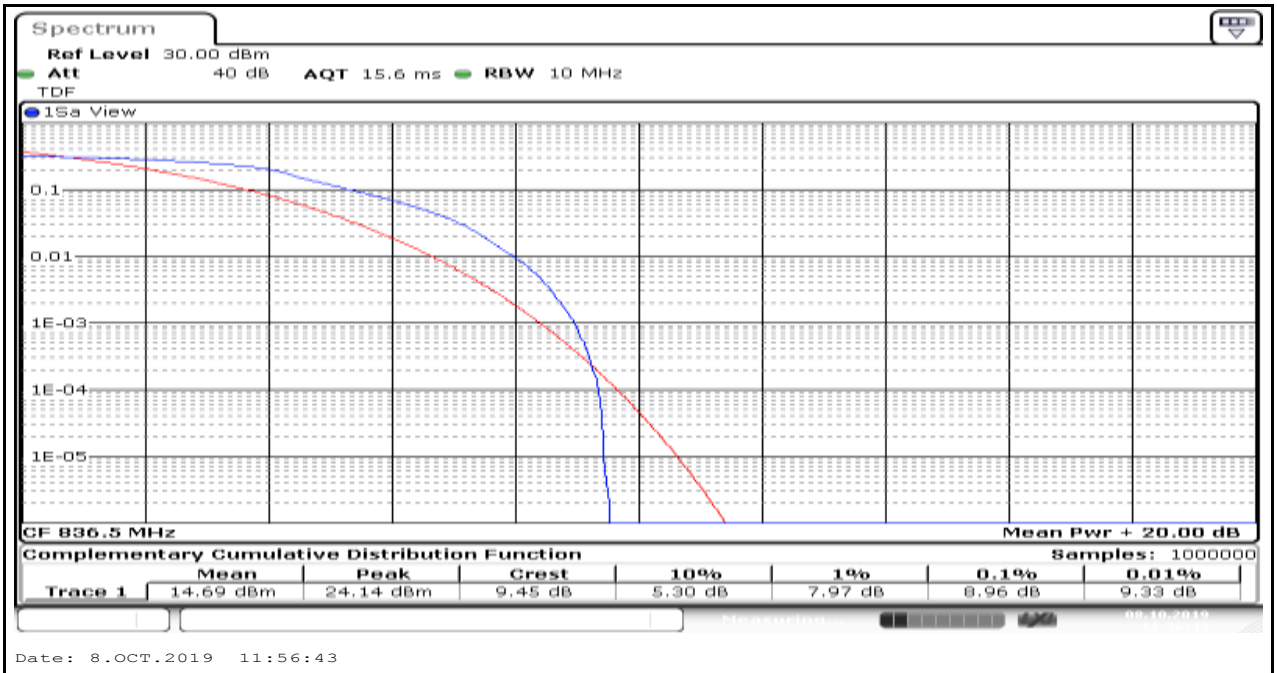
Band5_3MHz_QPSK_20525_6



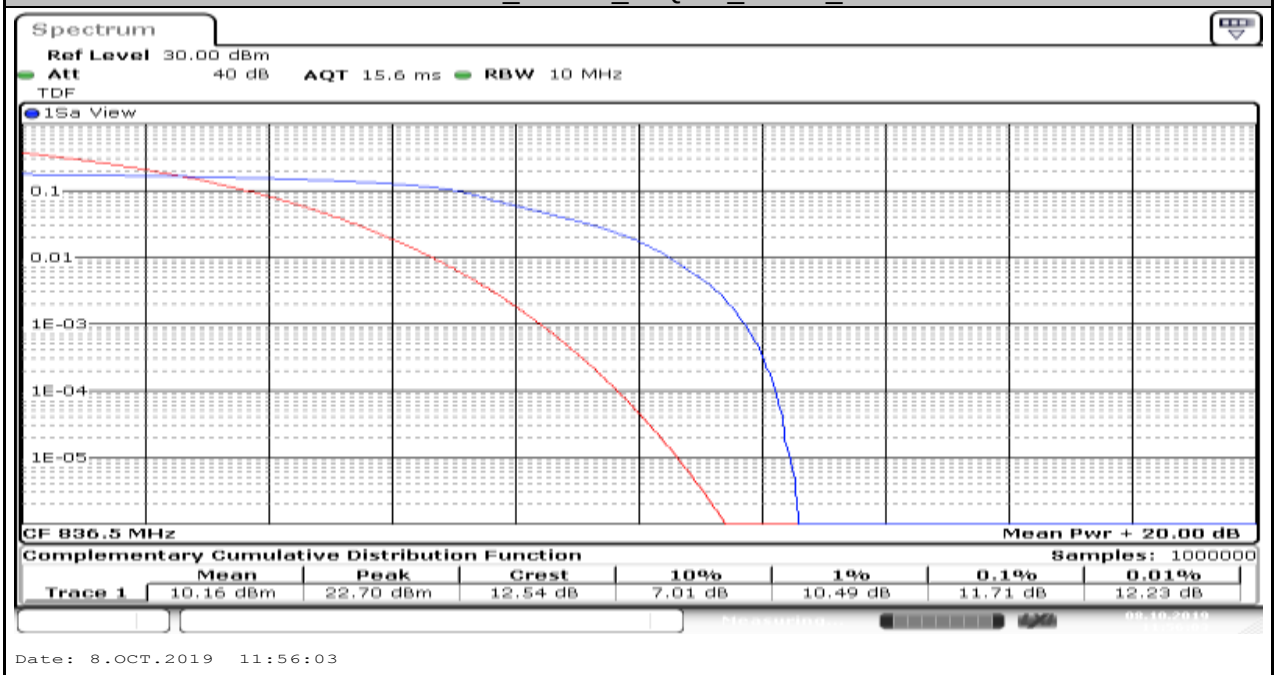
Band5_1.4MHz_QPSK_20525_6



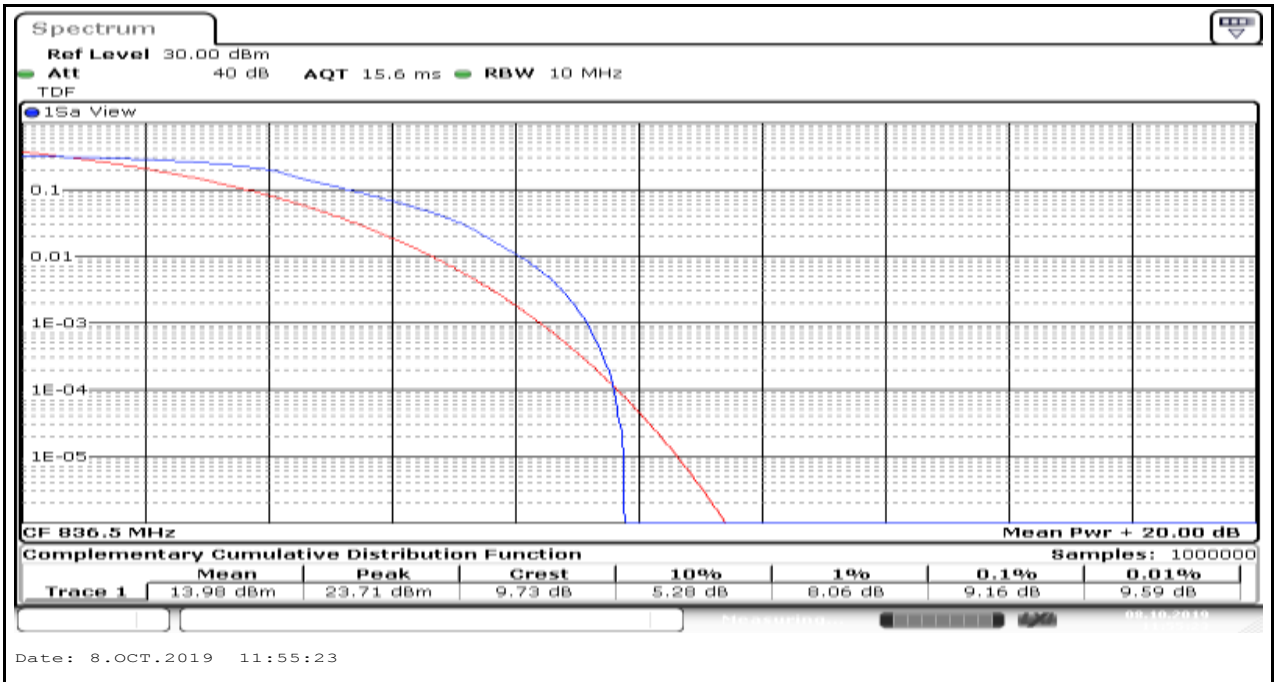
Band5_5MHz_16QAM_20525_6



Band5_10MHz_16QAM_20525_6



Band5_3MHz_16QAM_20525_6



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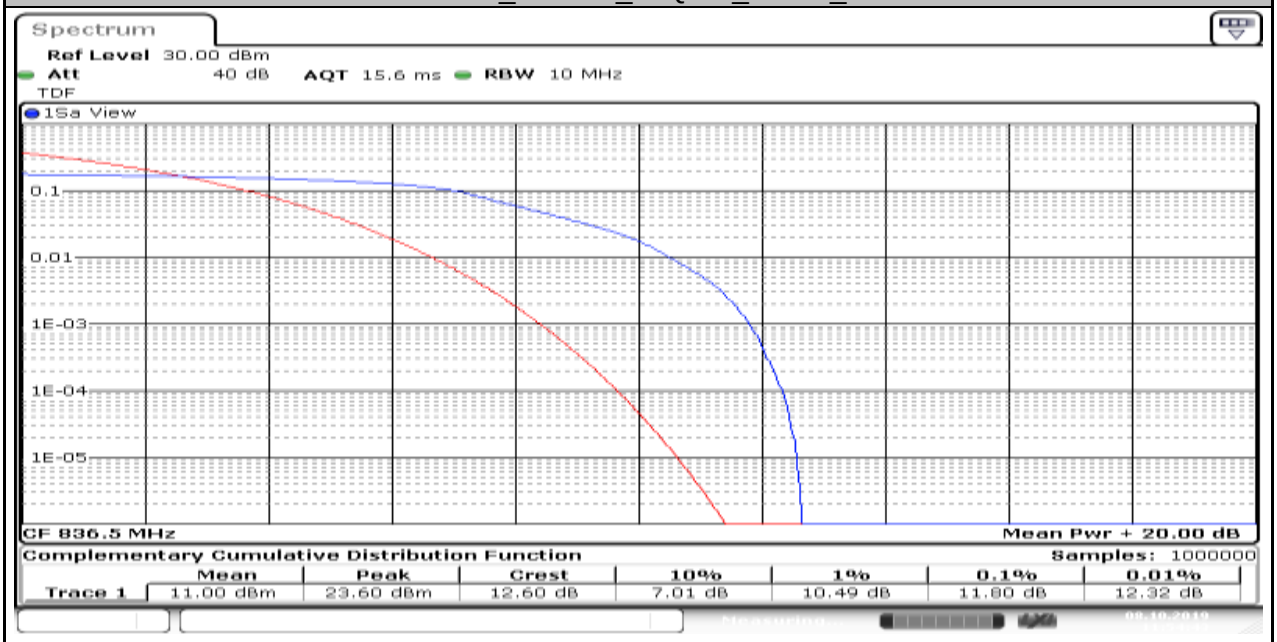
Band5_1.4MHz_16QAM_20525_6



Date: 8.OCT.2019 11:54:42

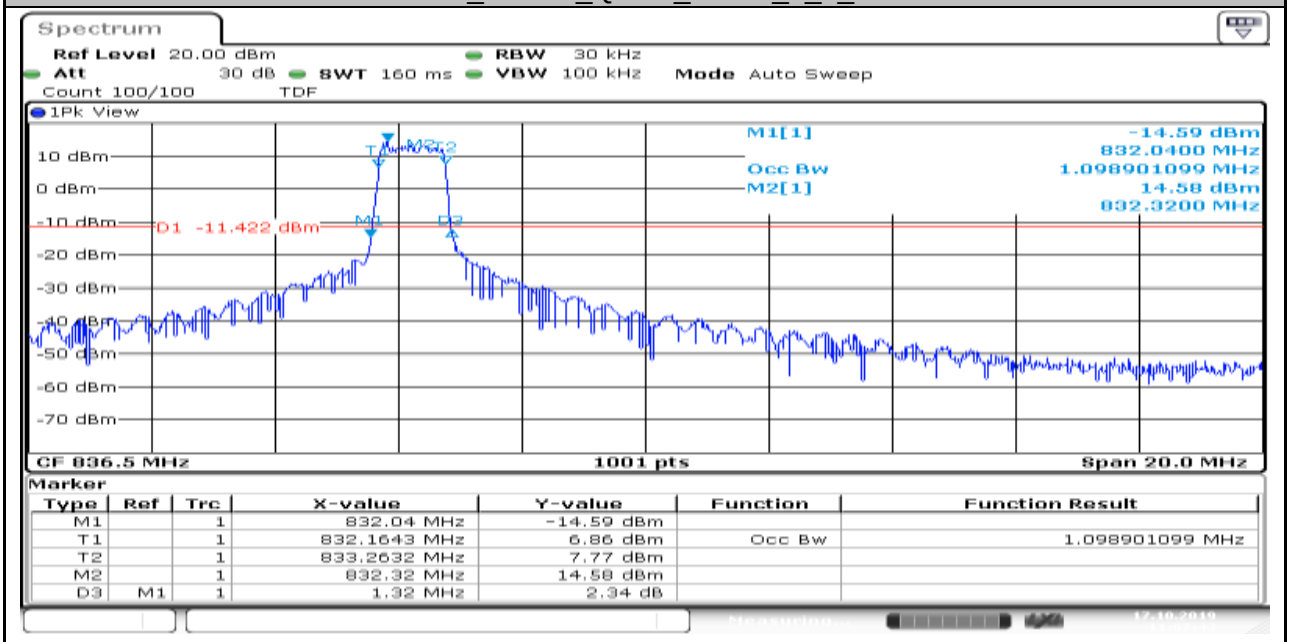
Appendix C.3: 26dB Bandwidth and Occupied Bandwidth for M1

Test Result

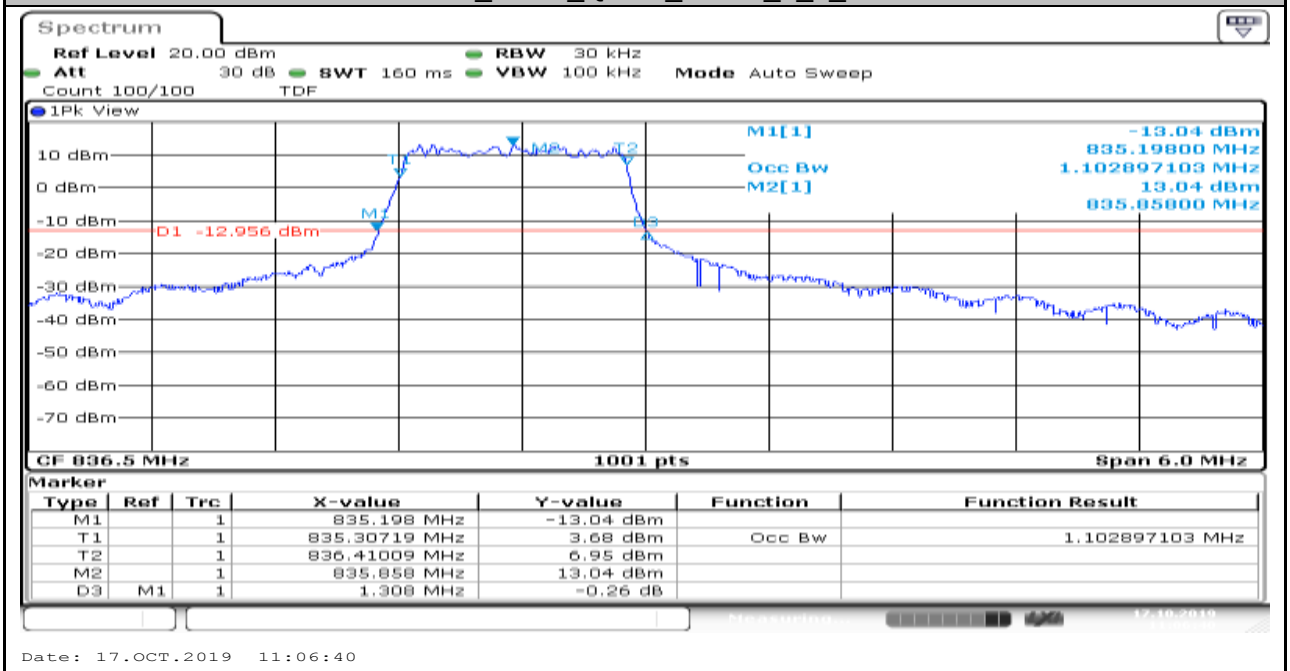
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)	Verdict
Band5	10MHz	QPSK	20525	6	0	Low	1.099	1.320	PASS
Band5	3MHz	QPSK	20525	6	0	Low	1.103	1.308	PASS
Band5	5MHz	QPSK	20525	6	0	Low	1.099	1.330	PASS
Band5	1.4MHz	QPSK	20525	6	0	Low	1.1	1.305	PASS
Band5	10MHz	16QAM	20525	6	0	Low	1.099	1.320	PASS
Band5	3MHz	16QAM	20525	6	0	Low	1.097	1.302	PASS
Band5	5MHz	16QAM	20525	6	0	Low	1.099	1.330	PASS
Band5	1.4MHz	16QAM	20525	6	0	Low	1.094	1.284	PASS

Test Graphs

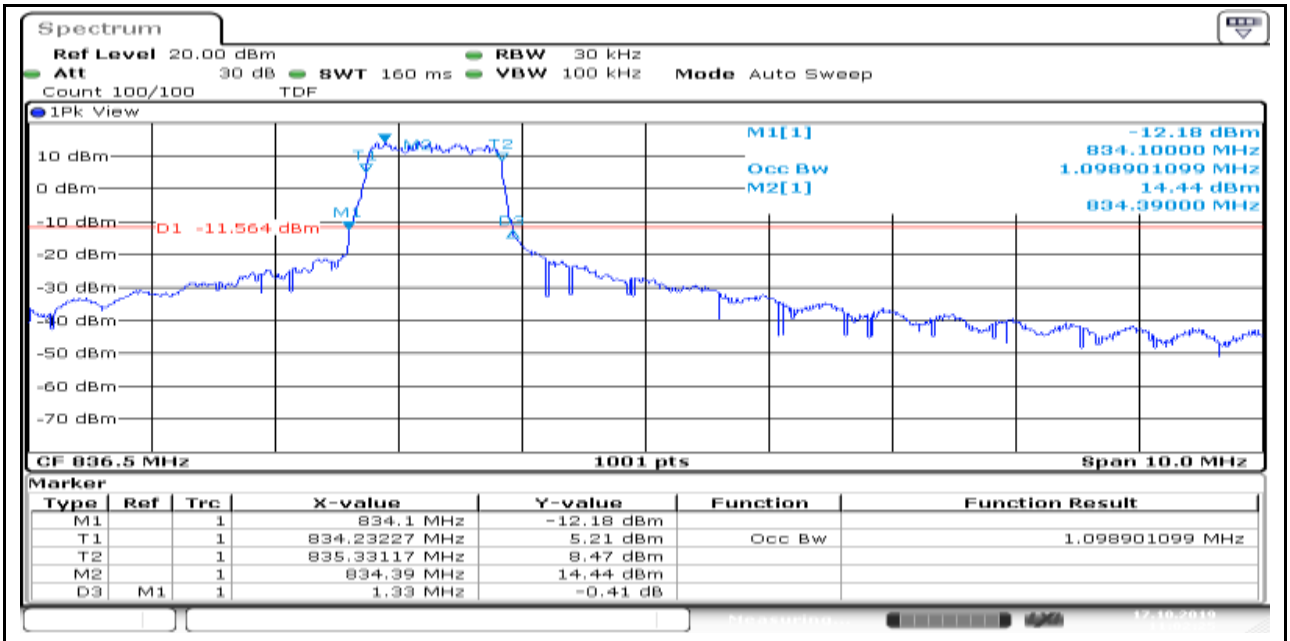
Band5_10MHz_QPSK_20525_6_0_Low



Band5_3MHz_QPSK_20525_6_0_Low

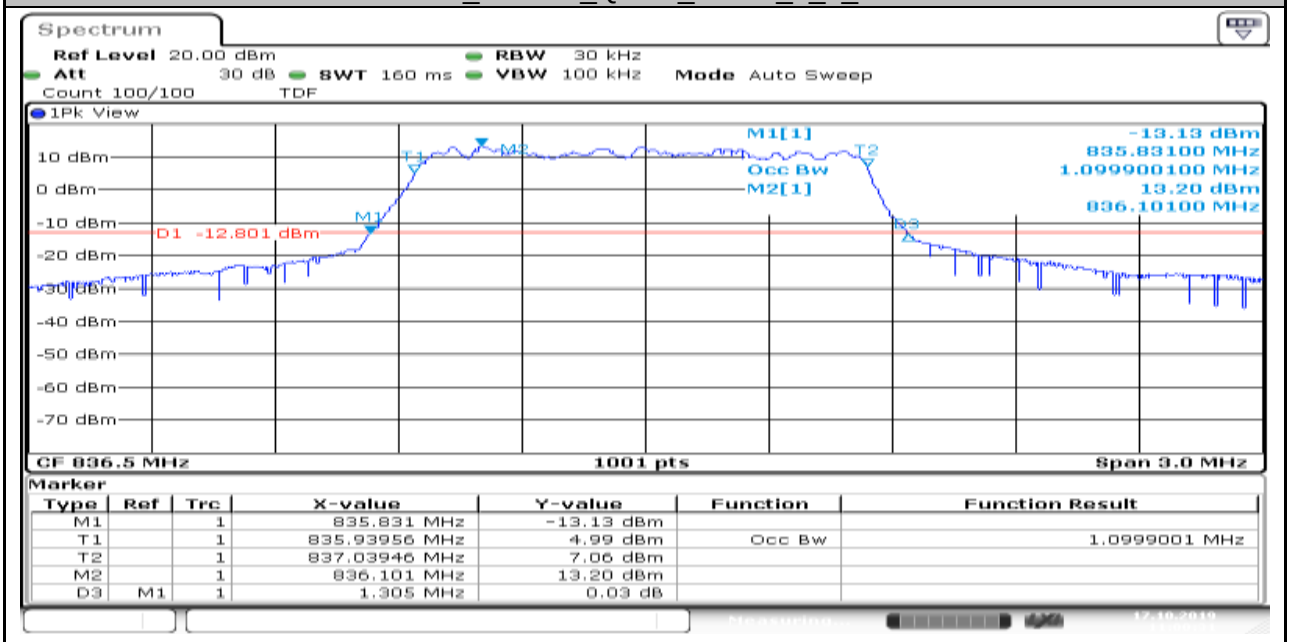


Band5_5MHz_QPSK_20525_6_0_Low



Date: 17.OCT.2019 11:02:25

Band5_1.4MHz_QPSK_20525_6_0_Low



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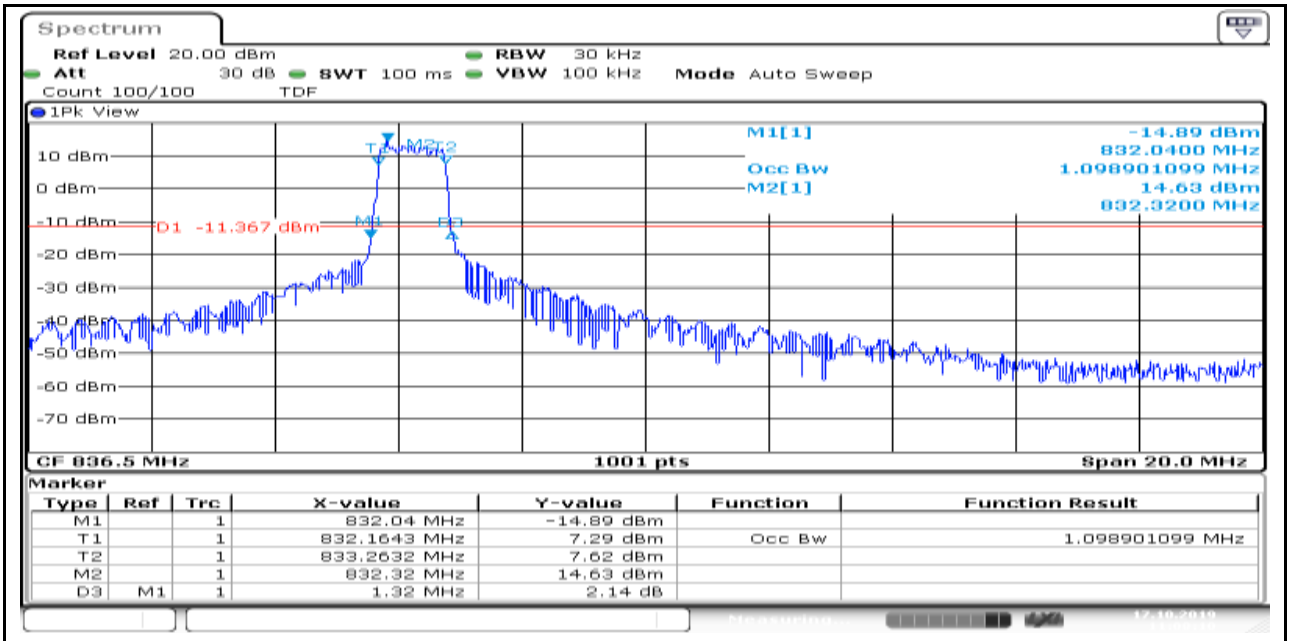
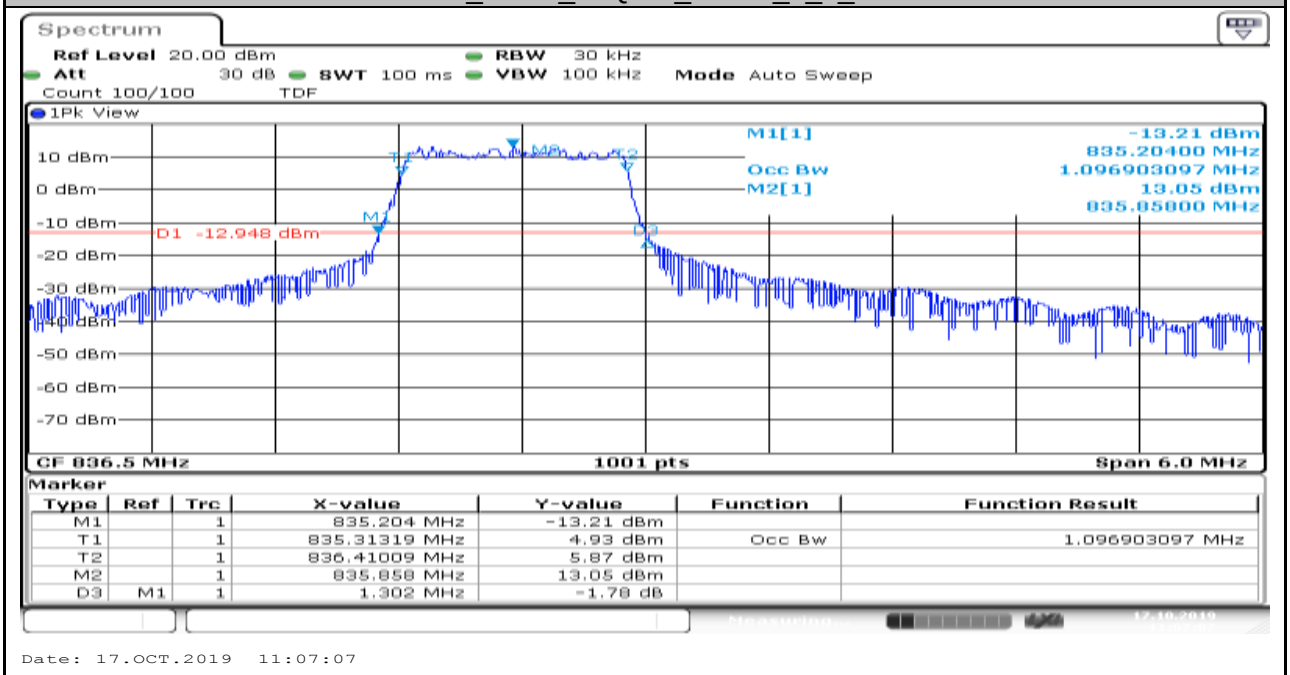
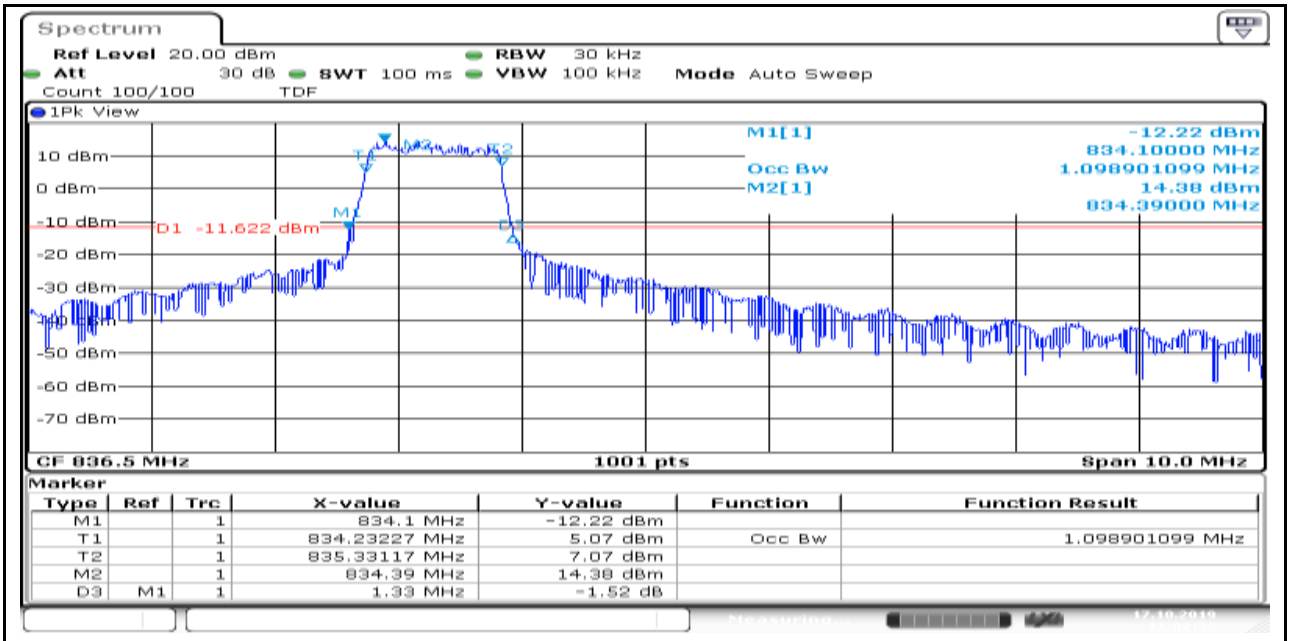
Band5_10MHz_16QAM_20525_6_0_Low



Band5_3MHz_16QAM_20525_6_0_Low



Band5_5MHz_16QAM_20525_6_0_Low



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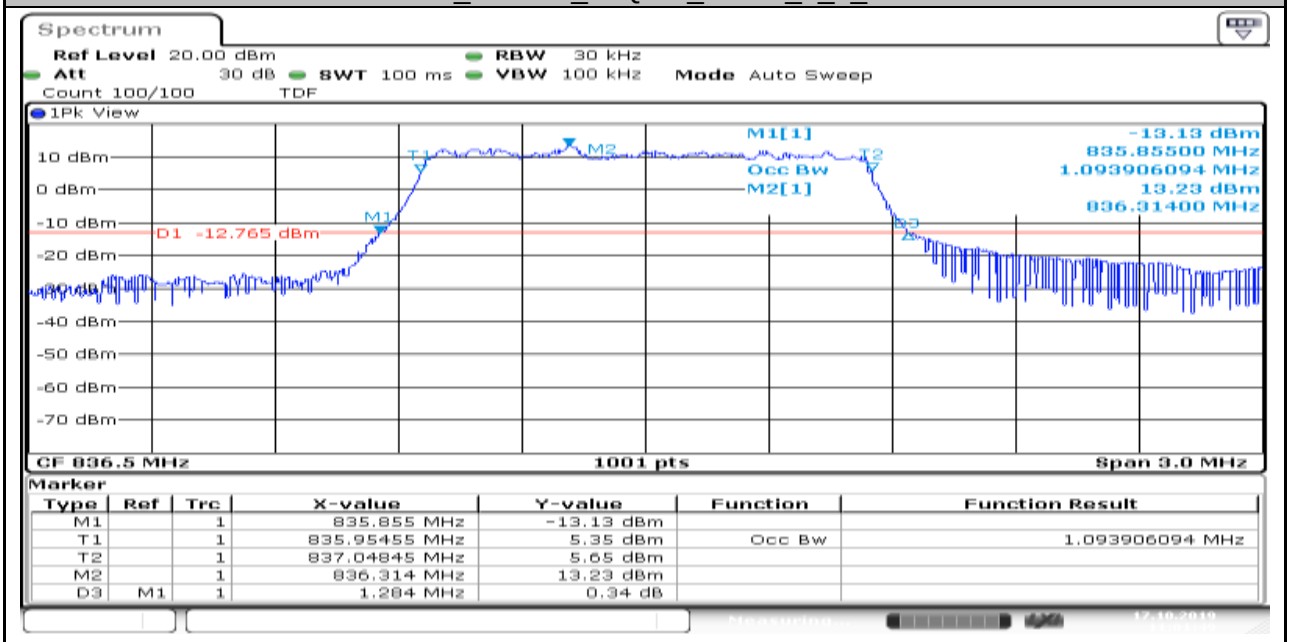
Band5_1.4MHz_16QAM_20525_6_0_Low



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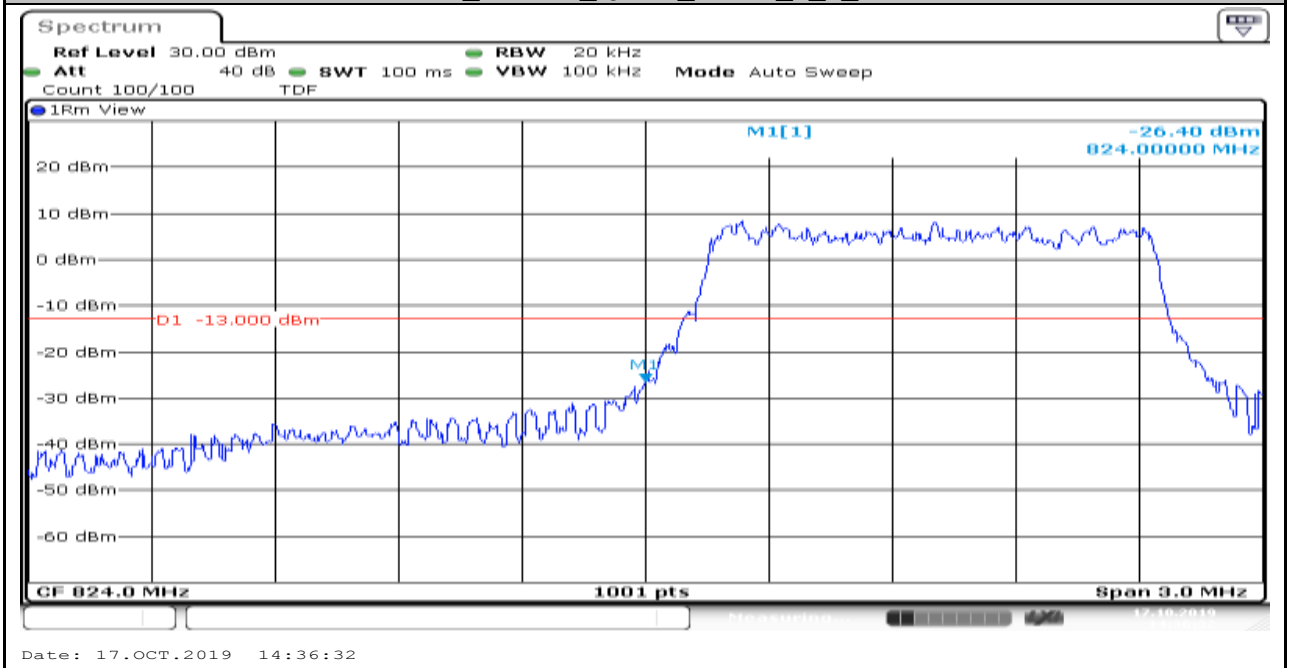
Appendix C.4: Band Edge for M1

Test Result

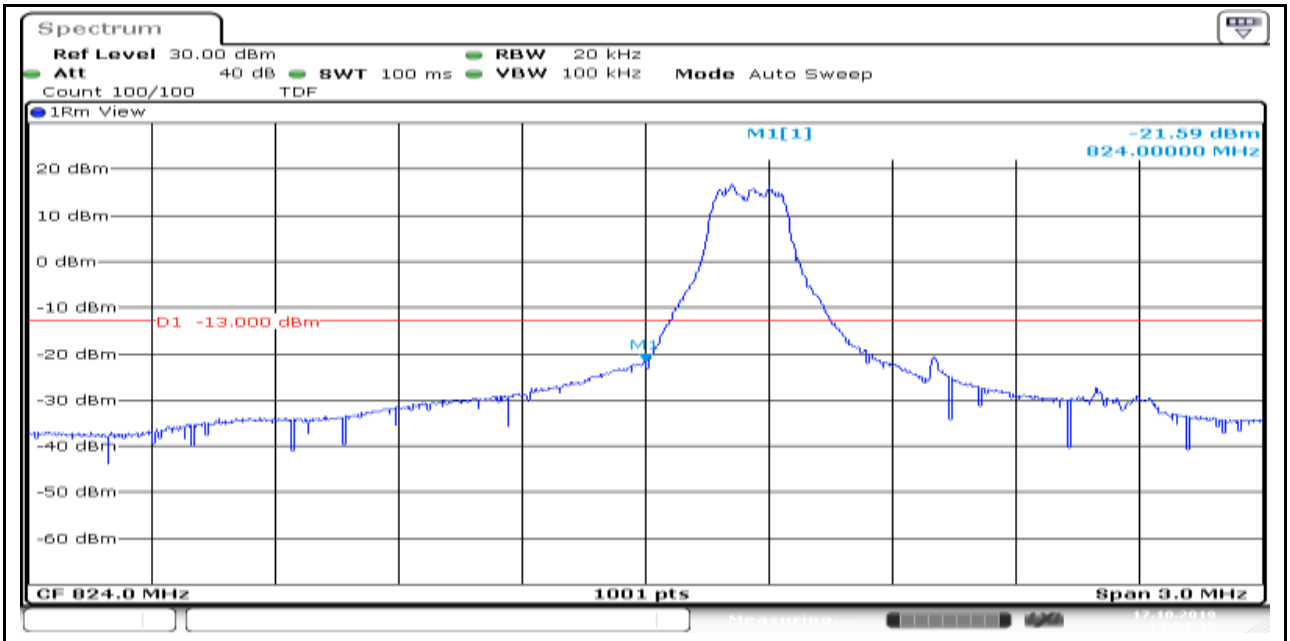
Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Result (dBm)	Verdict
Band5	1.4MHz	QPSK	20407	6	0	Low	-26.40	PASS
Band5	1.4MHz	QPSK	20407	1	0	Low	-21.59	PASS
Band5	1.4MHz	QPSK	20643	6	0	Low	-25.98	PASS
Band5	1.4MHz	QPSK	20643	1	5	Low	-19.14	PASS
Band5	1.4MHz	16QAM	20407	6	0	Low	-26.48	PASS
Band5	1.4MHz	16QAM	20407	1	0	Low	-19.68	PASS
Band5	1.4MHz	16QAM	20643	6	0	Low	-25.84	PASS
Band5	1.4MHz	16QAM	20643	1	5	Low	-20.19	PASS

Test Graphs

Band5_1.4MHz_QPSK_20407_6_0_Low



Band5_1.4MHz_QPSK_20407_1_0_Low



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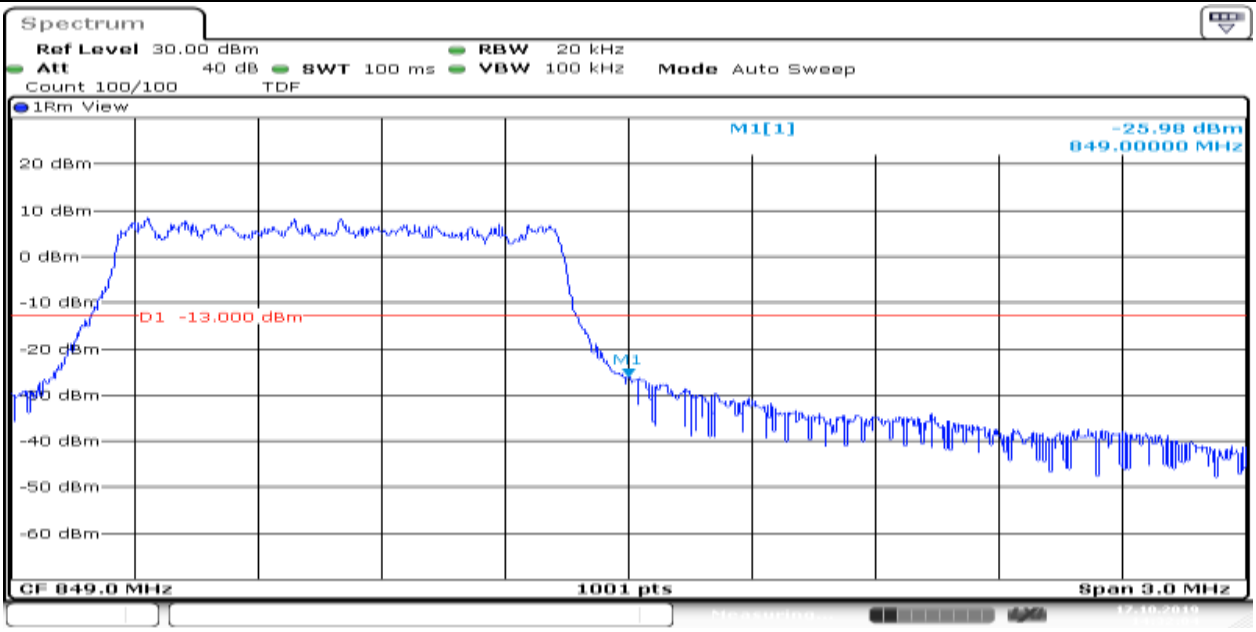
Band5_1.4MHz_QPSK_20643_6_0_Low



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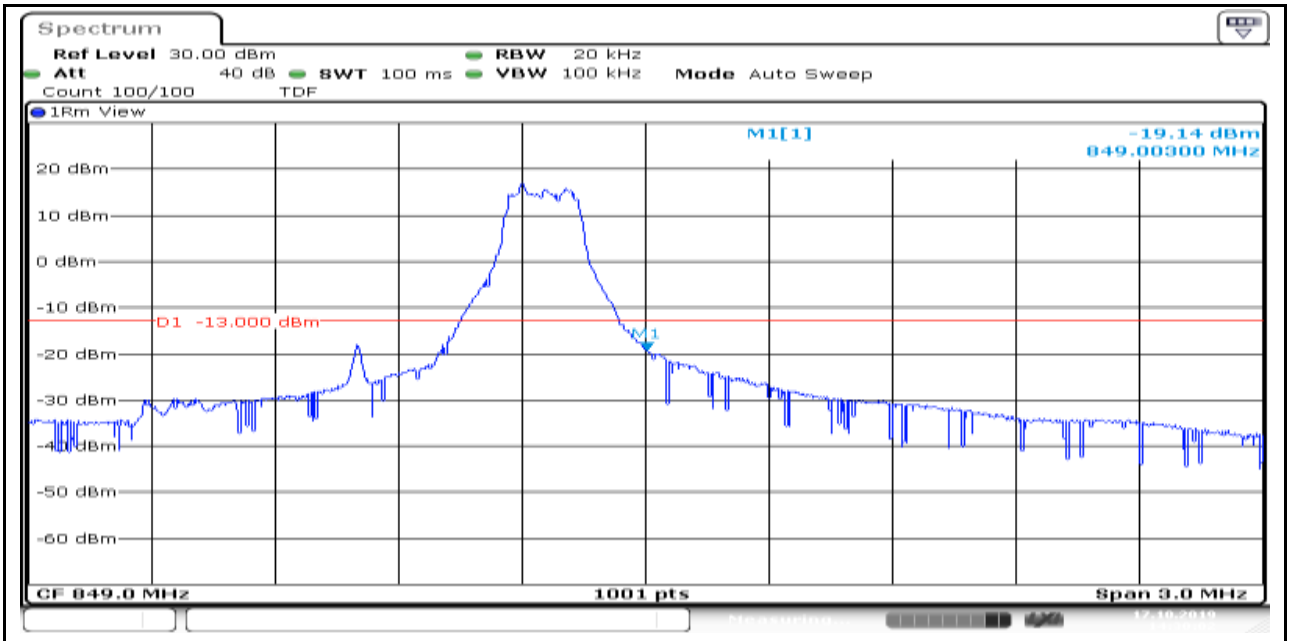
Band5_1.4MHz_QPSK_20643_1_5_Low



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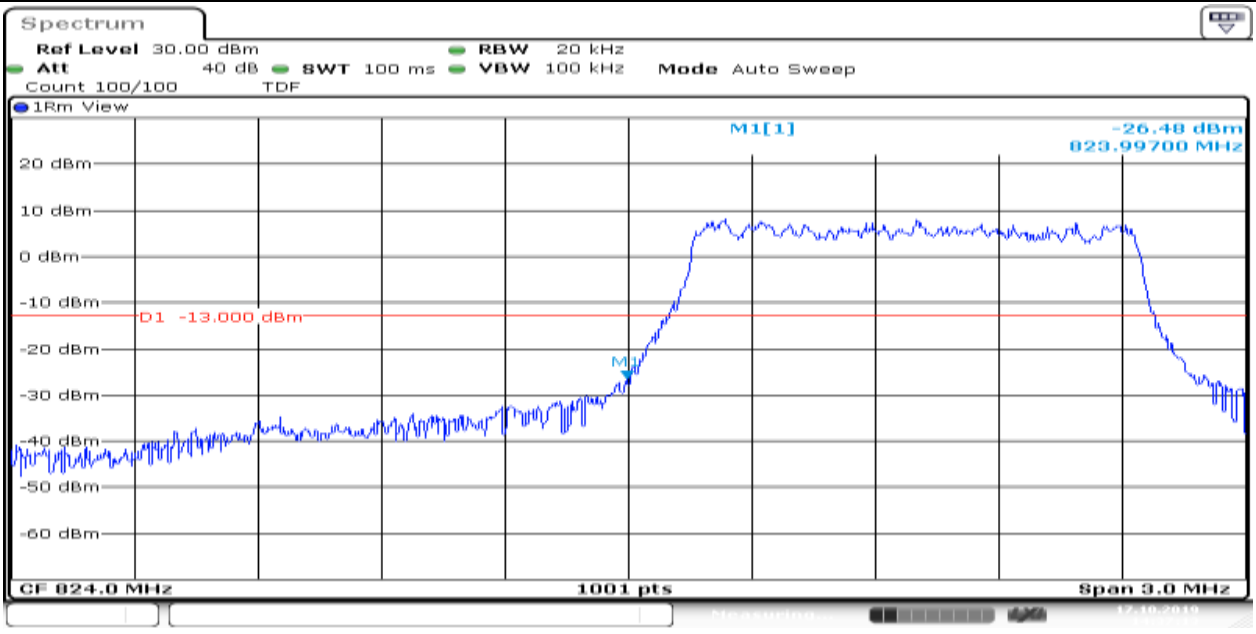
Band5_1.4MHz_16QAM_20407_6_0_Low



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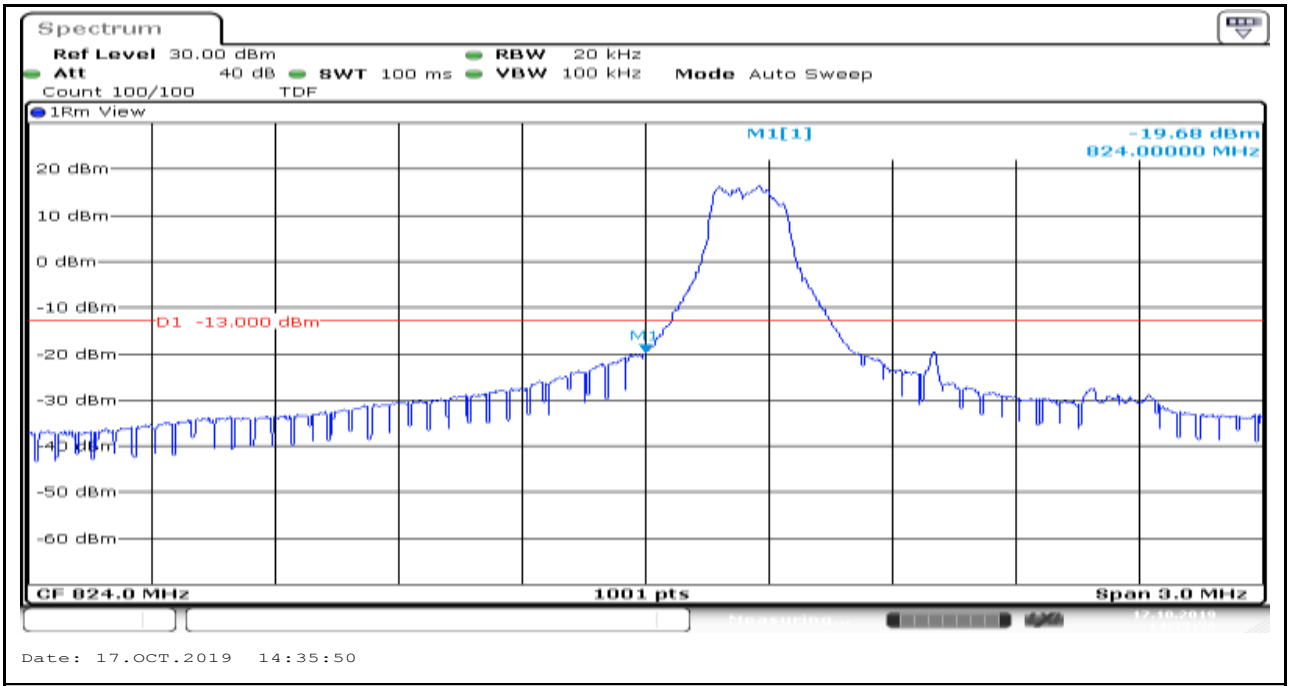
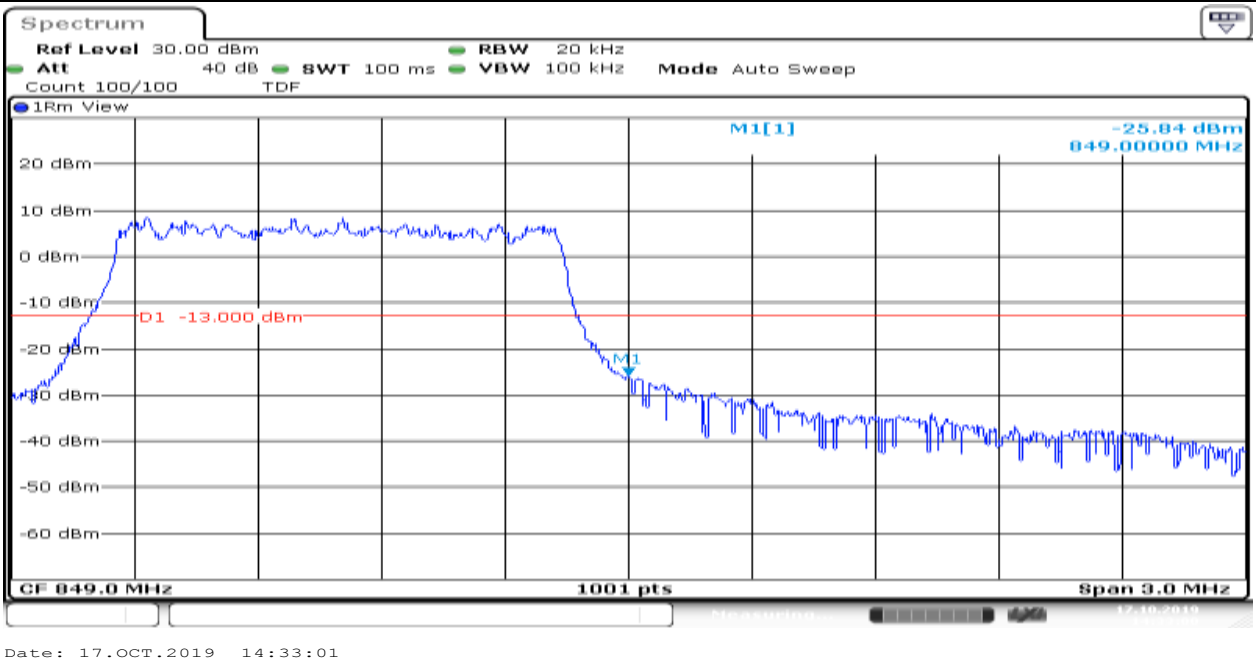
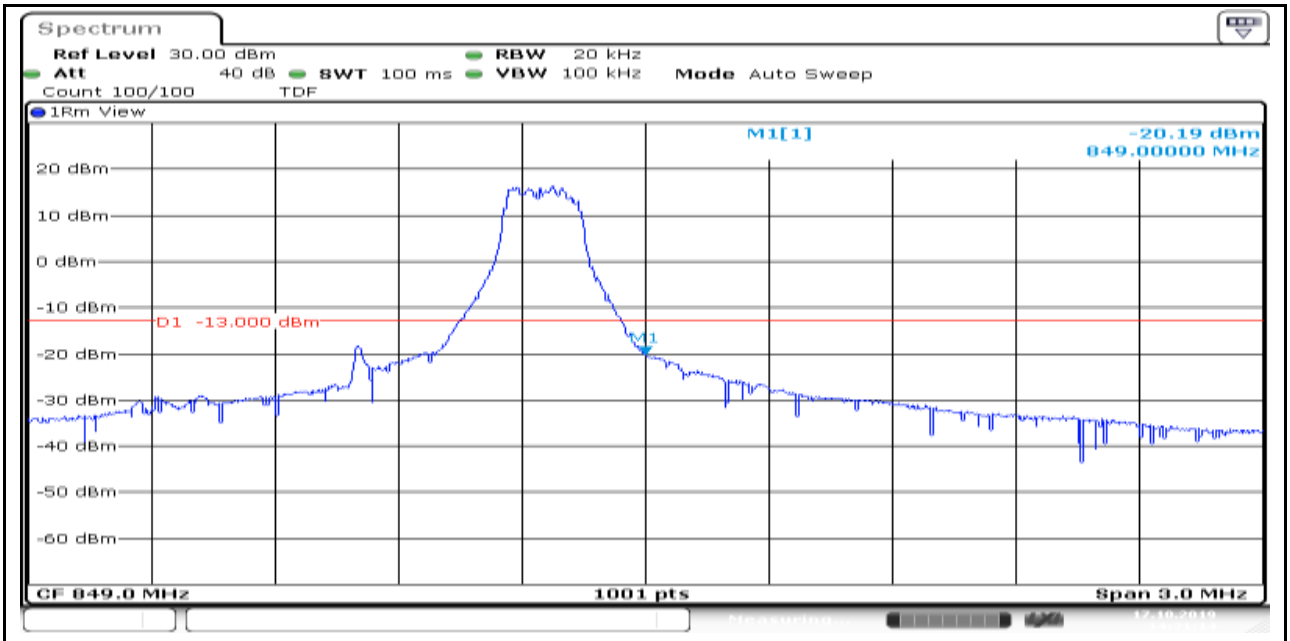
Band5_1.4MHz_16QAM_20407_1_0_Low



Band5_1.4MHz_16QAM_20643_6_0_Low



Band5_1.4MHz_16QAM_20643_1_5_Low



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Appendix C.5: Conducted Spurious Emission for M1

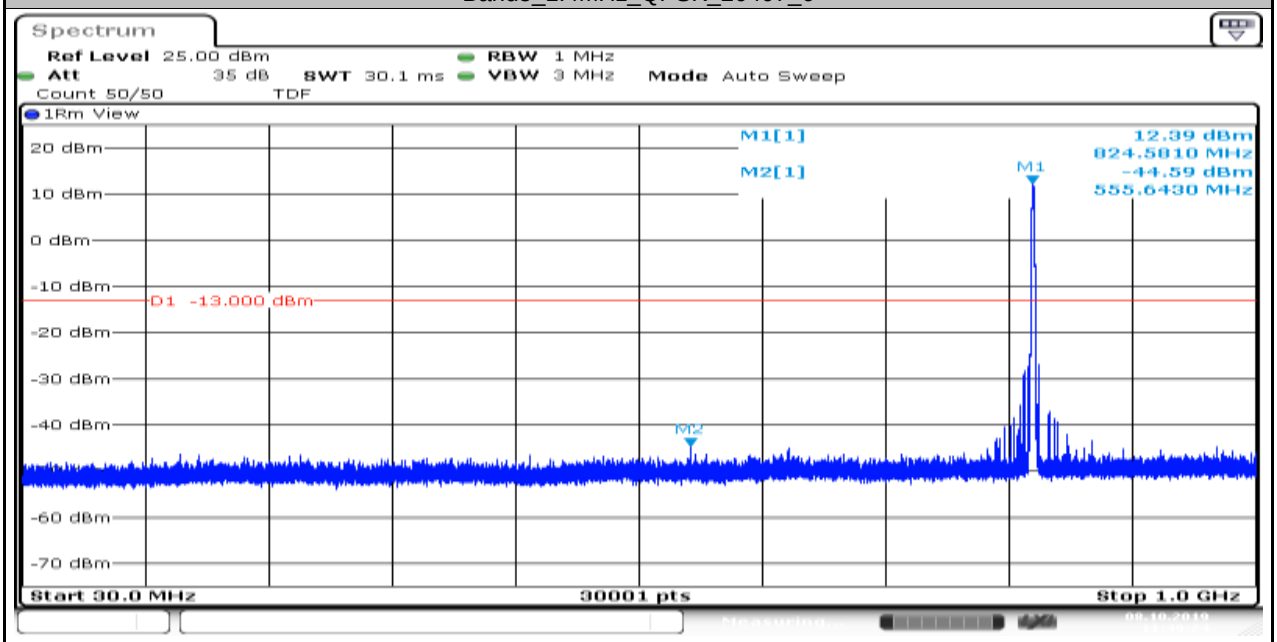
Test Result

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NB Index	Start Freq	Stop Freq	Result (dBm)	Verdict
Band5	1.4MHz	QPSK	20407	6	0	Low	30	1000	-44.59	PASS
Band5	1.4MHz	QPSK	20407	1	0	Low	1000	5000	-50.4	PASS
Band5	1.4MHz	QPSK	20407	1	0	Low	5000	12000	-63.33	PASS
Band5	1.4MHz	QPSK	20407	1	0	Low	12000	26500	-59.64	PASS
Band5	1.4MHz	QPSK	20407	1	0	Low	30	1000	-44.75	PASS
Band5	1.4MHz	QPSK	20407	6	0	Low	1000	5000	-50.5	PASS
Band5	1.4MHz	QPSK	20407	6	0	Low	5000	12000	-63.55	PASS
Band5	1.4MHz	QPSK	20407	6	0	Low	12000	26500	-59.72	PASS
Band5	1.4MHz	QPSK	20525	6	0	Low	1000	5000	-50.57	PASS
Band5	1.4MHz	QPSK	20525	1	0	Low	30	1000	-44.91	PASS
Band5	1.4MHz	QPSK	20525	6	0	Low	12000	26500	-59.6	PASS
Band5	1.4MHz	QPSK	20525	1	0	Low	12000	26500	-59.74	PASS
Band5	1.4MHz	QPSK	20525	1	0	Low	5000	12000	-63.44	PASS
Band5	1.4MHz	QPSK	20525	1	0	Low	1000	5000	-50.49	PASS
Band5	1.4MHz	QPSK	20525	6	0	Low	30	1000	-42.74	PASS
Band5	1.4MHz	QPSK	20525	6	0	Low	5000	12000	-63.4	PASS
Band5	1.4MHz	QPSK	20643	6	0	Low	5000	12000	-63.34	PASS
Band5	1.4MHz	QPSK	20643	1	5	Low	30	1000	-42.47	PASS
Band5	1.4MHz	QPSK	20643	6	0	Low	12000	26500	-59.94	PASS
Band5	1.4MHz	QPSK	20643	6	0	Low	1000	5000	-50.49	PASS
Band5	1.4MHz	QPSK	20643	6	0	Low	30	1000	-42.08	PASS
Band5	1.4MHz	QPSK	20643	1	5	Low	12000	26500	-59.76	PASS
Band5	1.4MHz	QPSK	20643	1	5	Low	1000	5000	-50.6	PASS
Band5	1.4MHz	QPSK	20643	1	5	Low	5000	12000	-63.5	PASS
Band5	1.4MHz	16QAM	20407	6	0	Low	12000	26500	-59.67	PASS
Band5	1.4MHz	16QAM	20407	1	0	Low	30	1000	-42.87	PASS
Band5	1.4MHz	16QAM	20407	1	0	Low	1000	5000	-50.59	PASS
Band5	1.4MHz	16QAM	20407	1	0	Low	5000	12000	-63.42	PASS
Band5	1.4MHz	16QAM	20407	1	0	Low	12000	26500	-59.8	PASS
Band5	1.4MHz	16QAM	20407	6	0	Low	30	1000	-45.33	PASS
Band5	1.4MHz	16QAM	20407	6	0	Low	1000	5000	-50.53	PASS
Band5	1.4MHz	16QAM	20407	6	0	Low	5000	12000	-63.54	PASS
Band5	1.4MHz	16QAM	20525	6	0	Low	30	1000	-44.12	PASS
Band5	1.4MHz	16QAM	20525	6	0	Low	12000	26500	-59.74	PASS
Band5	1.4MHz	16QAM	20525	6	0	Low	5000	12000	-63.48	PASS
Band5	1.4MHz	16QAM	20525	6	0	Low	1000	5000	-50.54	PASS
Band5	1.4MHz	16QAM	20525	1	0	Low	30	1000	-43.89	PASS
Band5	1.4MHz	16QAM	20525	1	0	Low	1000	5000	-50.58	PASS
Band5	1.4MHz	16QAM	20525	1	0	Low	12000	26500	-59.82	PASS
Band5	1.4MHz	16QAM	20525	1	0	Low	5000	12000	-63.53	PASS
Band5	1.4MHz	16QAM	20643	1	5	Low	30	1000	-43.92	PASS
Band5	1.4MHz	16QAM	20643	1	5	Low	1000	5000	-50.41	PASS
Band5	1.4MHz	16QAM	20643	1	5	Low	12000	26500	-59.78	PASS
Band5	1.4MHz	16QAM	20643	6	0	Low	12000	26500	-59.83	PASS
Band5	1.4MHz	16QAM	20643	6	0	Low	30	1000	-45.55	PASS
Band5	1.4MHz	16QAM	20643	6	0	Low	1000	5000	-50.32	PASS
Band5	1.4MHz	16QAM	20643	6	0	Low	5000	12000	-63.45	PASS

Band5	1.4MHz	16QAM	20643	1	5	Low	5000	12000	-63.27	PASS

Test Graphs

Band5_1.4MHz_QPSK_20407_6



Date: 8.OCT.2019 11:49:25

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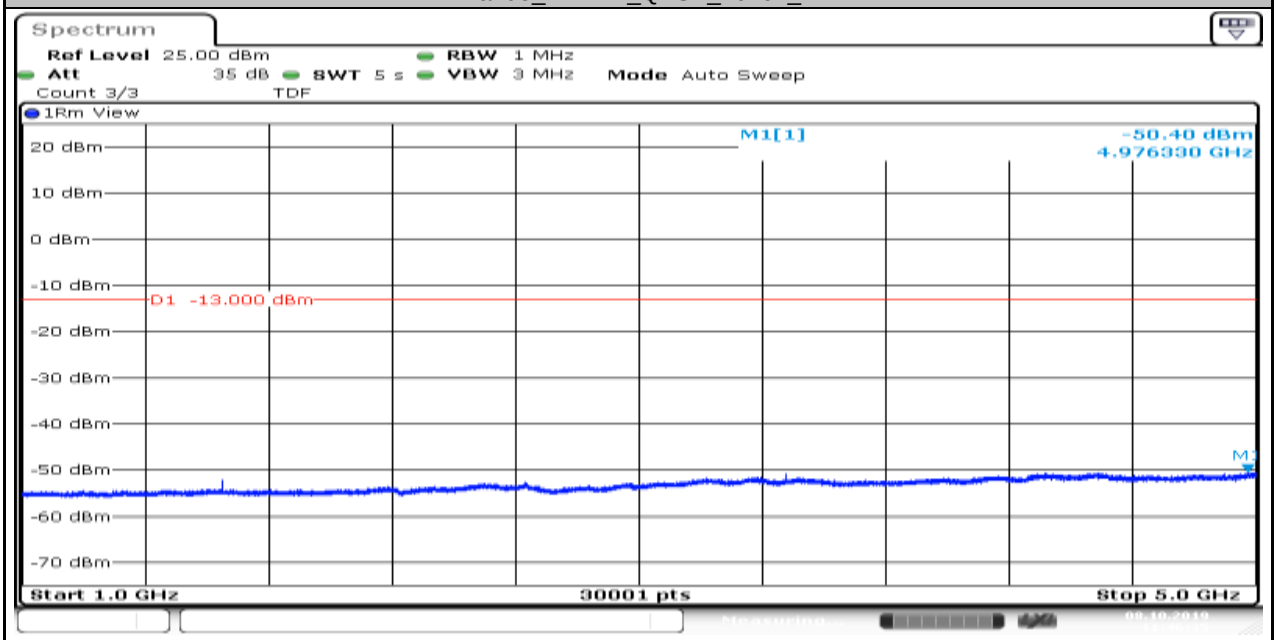

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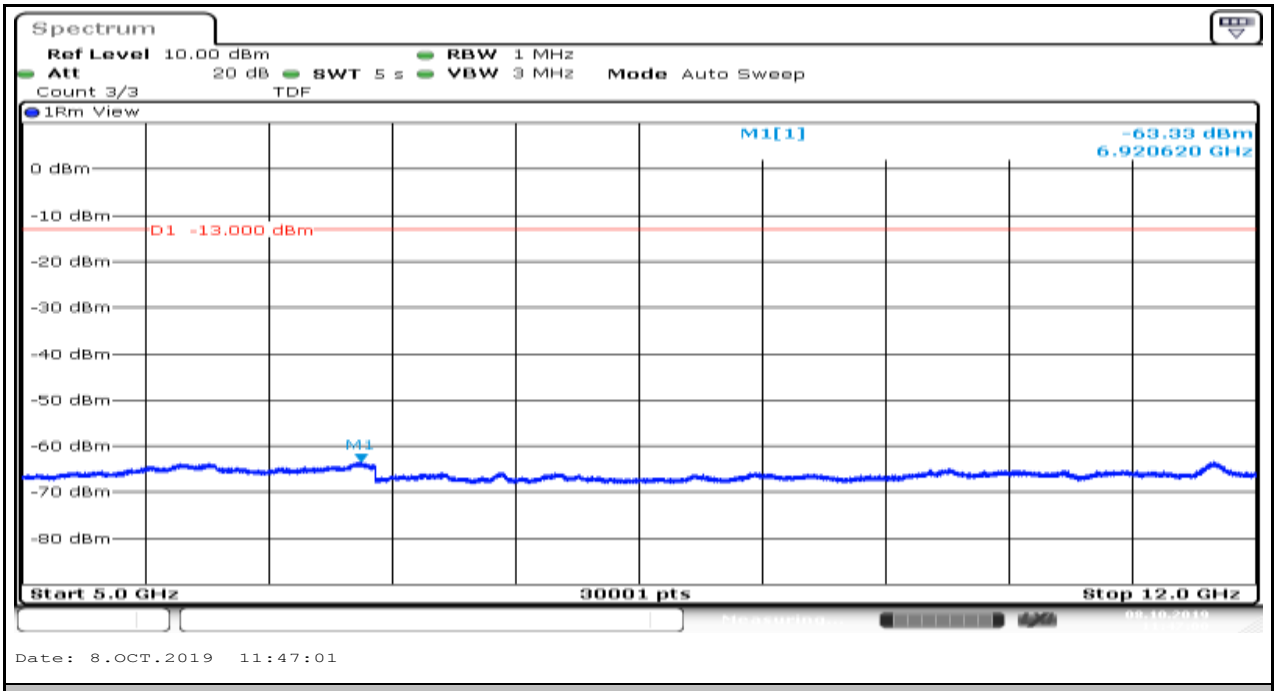
Band5_1.4MHz_QPSK_20407_1



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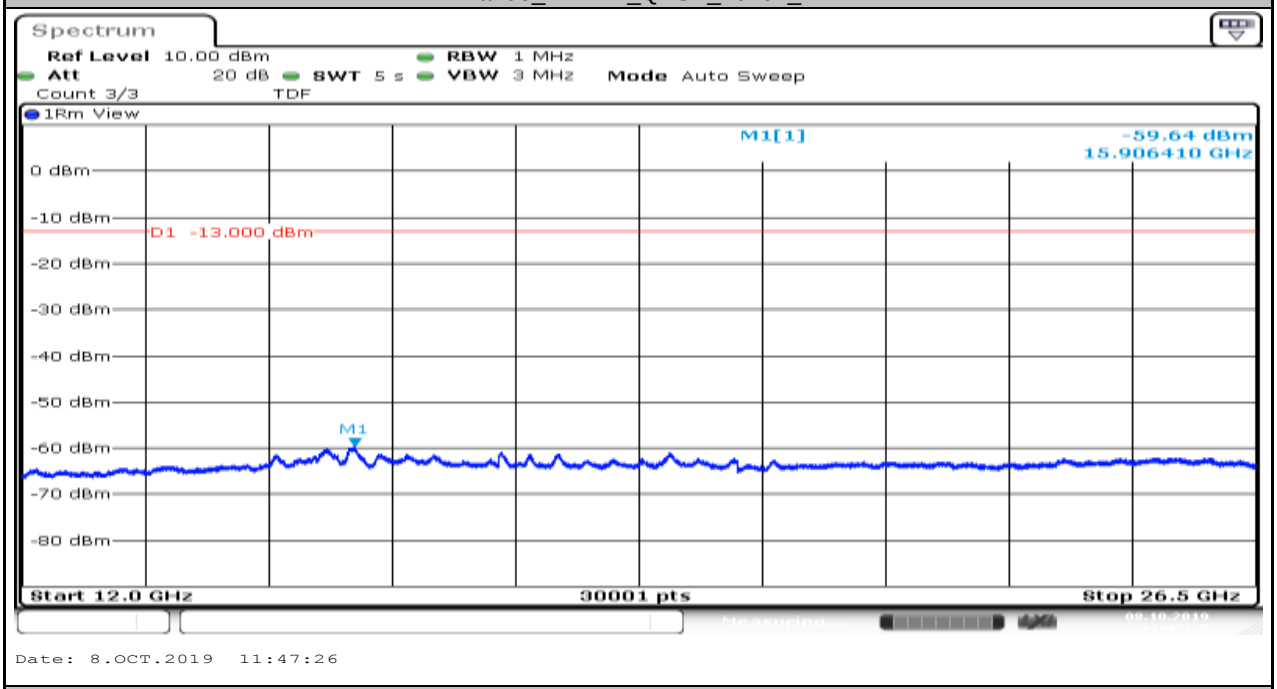

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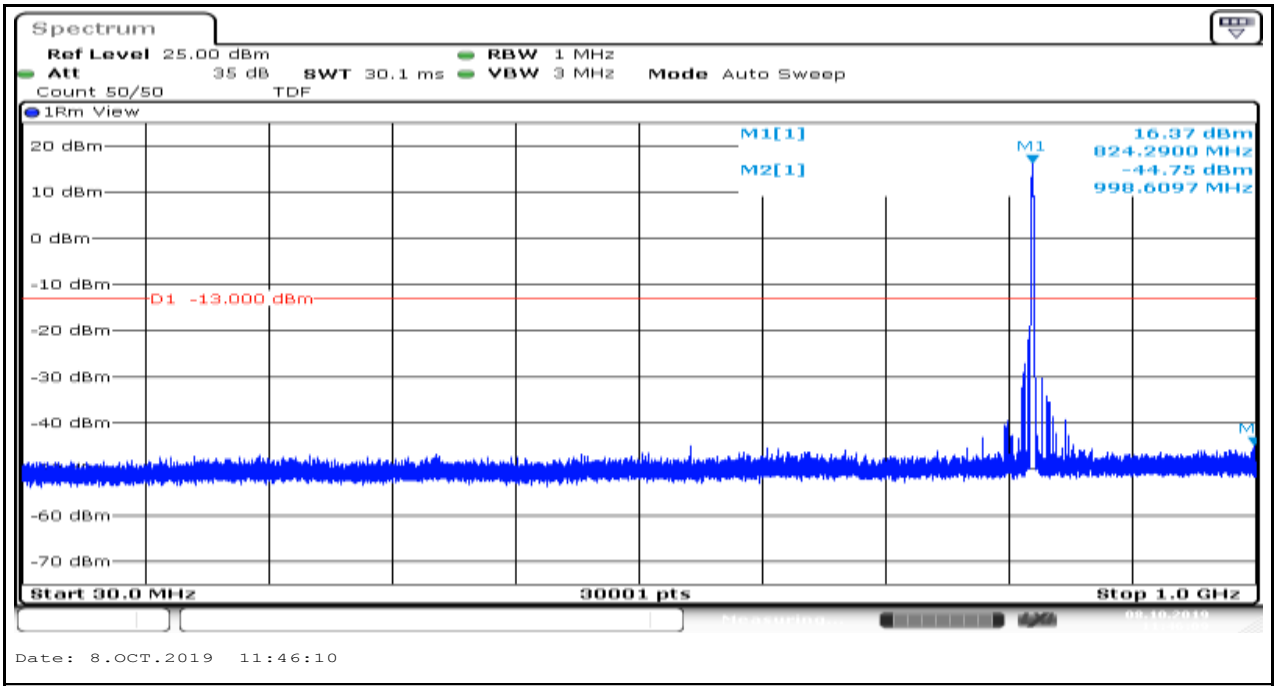

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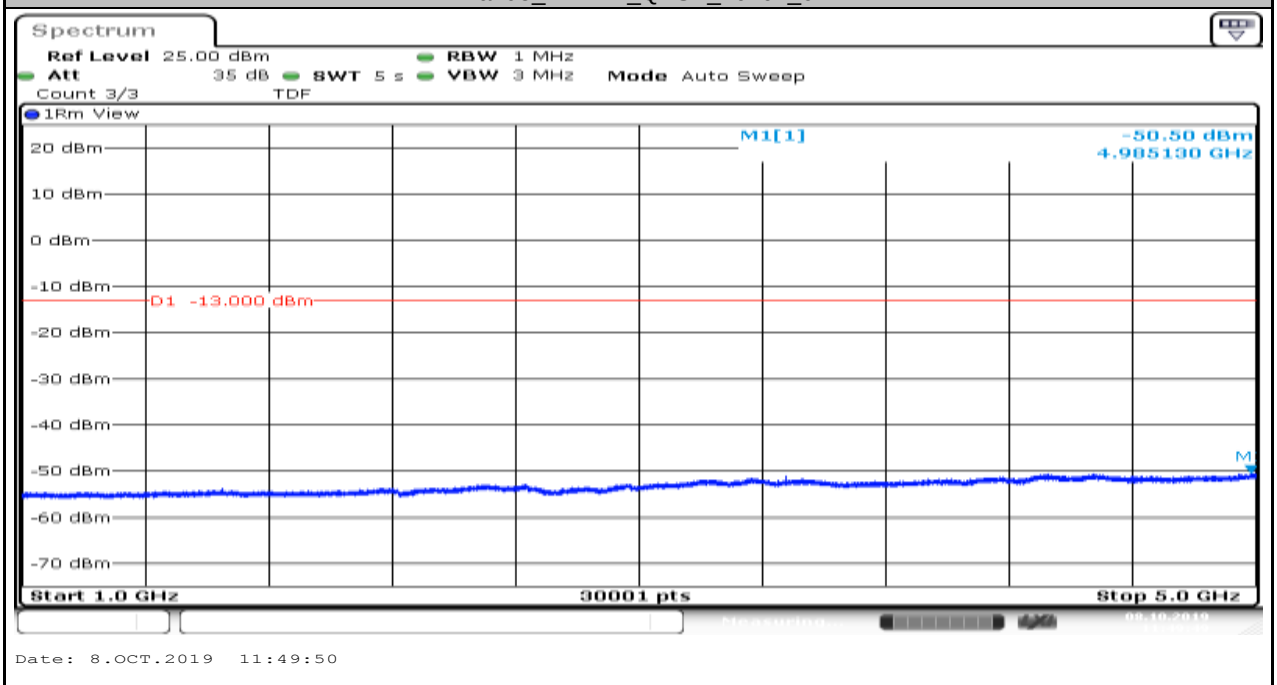
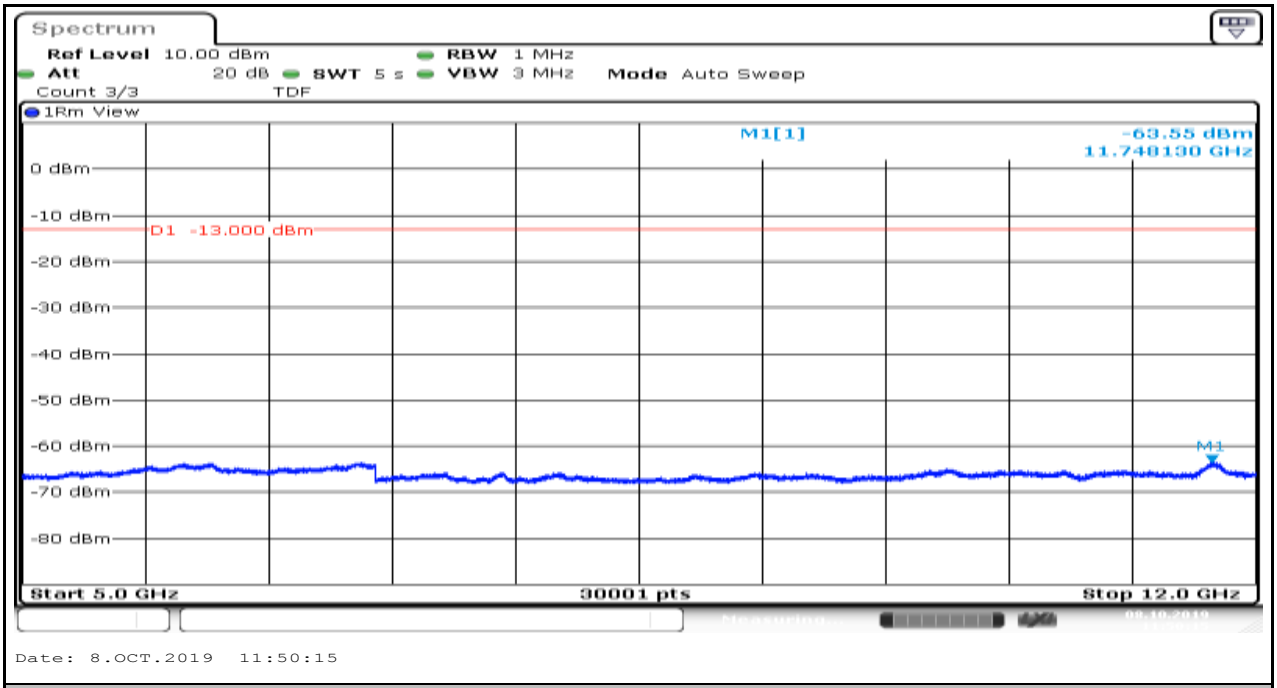
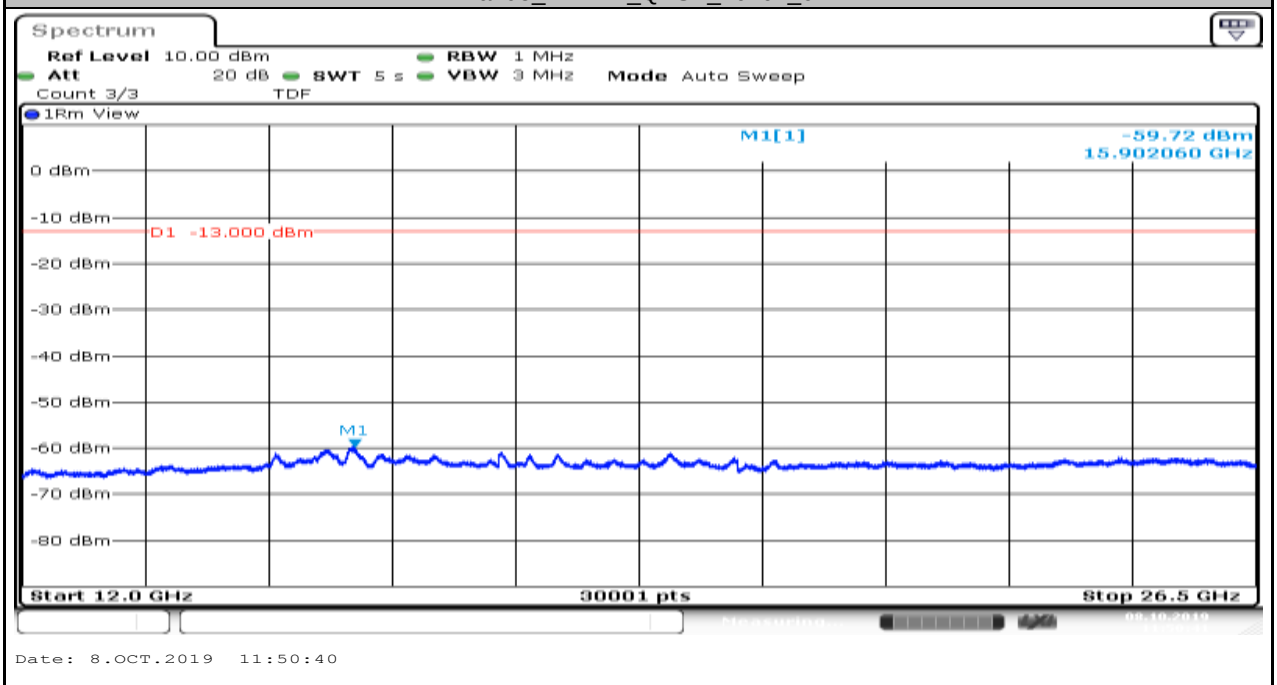


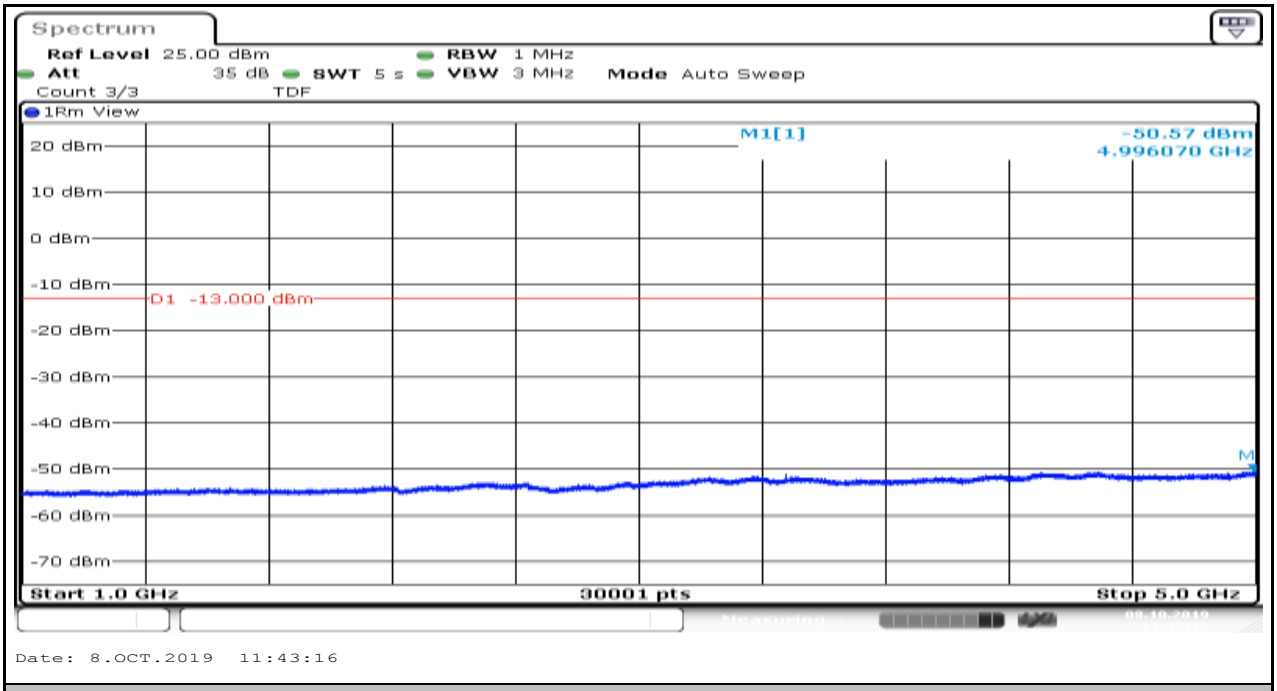
Band5_1.4MHz_QPSK_20407_6



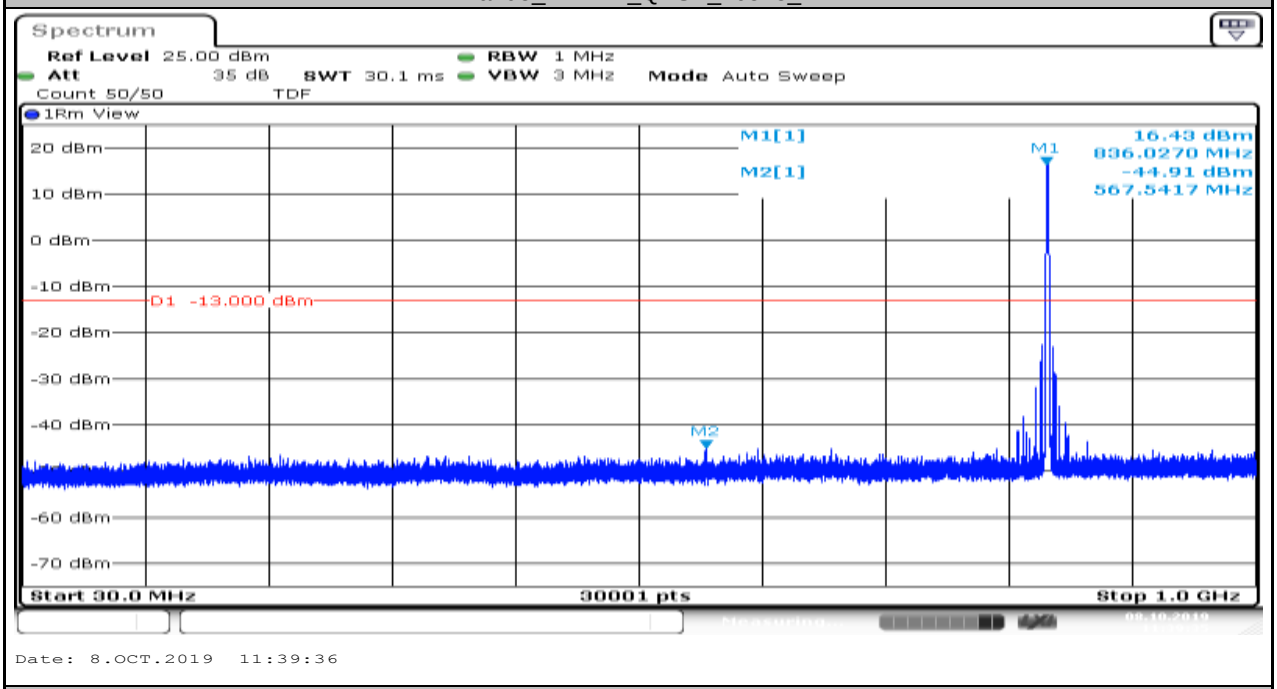
Band5_1.4MHz_QPSK_20407_6



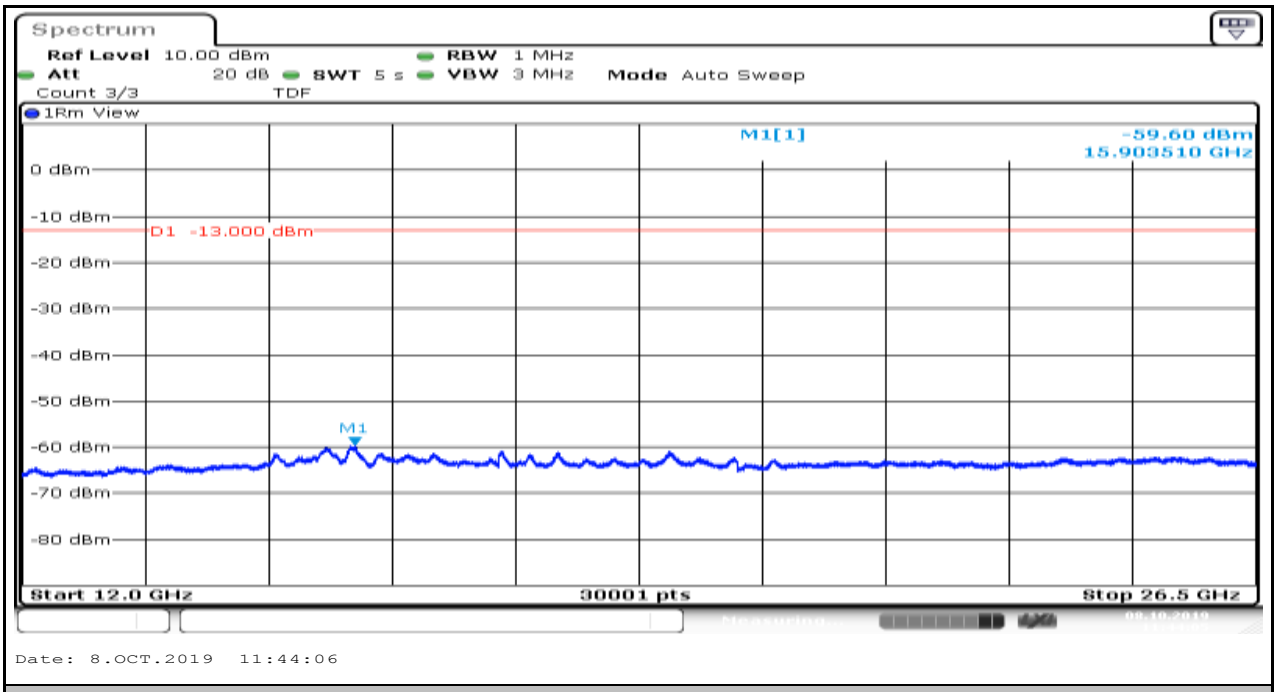
Band5_1.4MHz_QPSK_20525_6



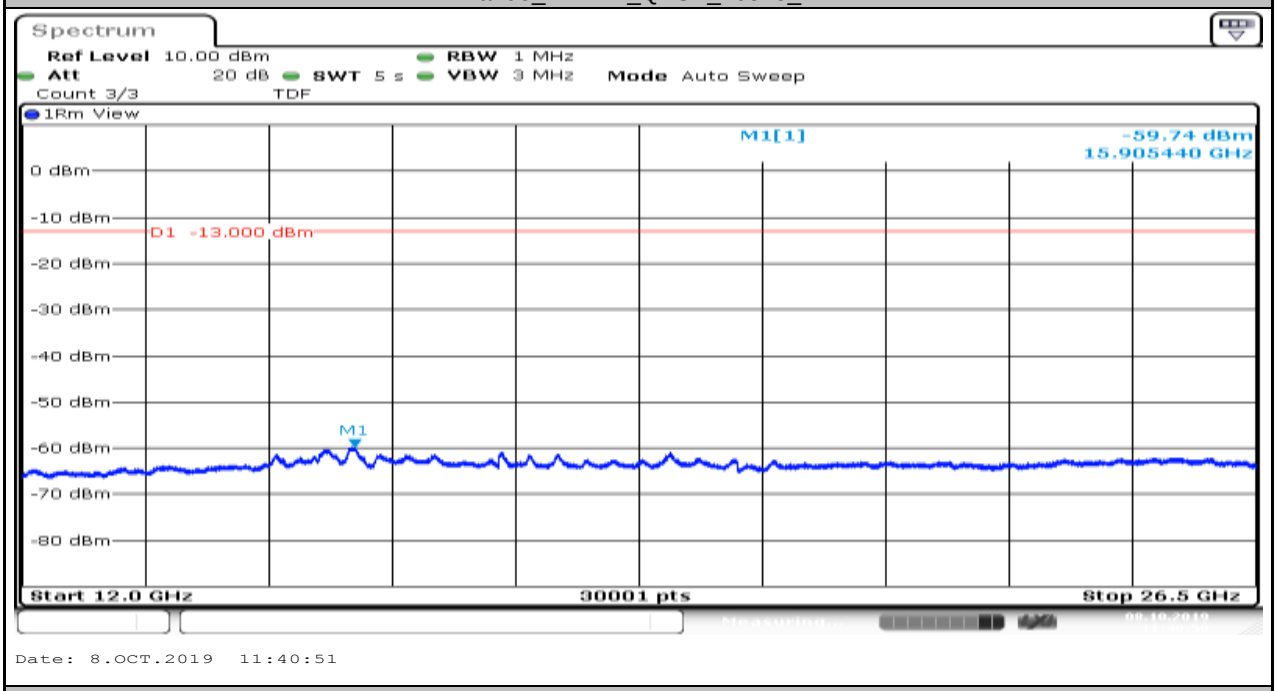
Band5_1.4MHz_QPSK_20525_1



Band5_1.4MHz_QPSK_20525_6



Band5_1.4MHz_QPSK_20525_1



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