FCC Test Report

Product Name	:	ML865C1-NA
Trade Name	:	Telit
Model No.	:	ML865C1-NA
FCC ID	:	RI7ML865C1NA

Applicant	:	Telit communications Spa
Address	:	Via Stazione di Prosecco 5/B
		34010 Sgonico
		Trieste-Italy

Date of Receipt	:	Aug. 09, 2018
Issued Date	:	Sep. 14, 2018
Report No.	:	1880135R-HPUSP50V00
Report Version	:	V1.0

Testing Laboratory
3024

Test Report Certification

Issued Date : Sep. 14, 2018
Report No. : 1880135R-HPUSP50V00

Product Name	:	ML865C1-NA
Applicant	:	Telit communications Spa
Address	:	Via Stazione di Prosecco 5/B 34010 Sgonico Trieste-Italy
Manufacturer	:	TELIT WIRELESS SOLUTIONS CO., LTD
Trade name	:	Telit
Model No.	:	ML865C1-NA
FCC ID	:	RI7ML865C1NA
EUT Voltage	:	DC 3.8V
Testing Voltage	:	DC 3.8V
Applicable Standard	:	FCC CFR Title 47 Part 24 Subpart E FCC CFR Title 47 Part 27 Subpart L, Subpart M, Subpart F ANSI/TIA-603 KDB 971168 D01 Power Meas License Digital Systems v03
Test Lab	:	Hsin Chu Laboratory
Address	:	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C. TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result	:	Complied

Documented By : (Carol Tsai / Senior Engineering Adm. Specialist)

Tested By : (Andy Tsai / Senior Engineer)

Approved By : (Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1880135R-HPUSP50V00	V1.0	Initial issue of report	Sep. 14, 2018

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1. General Information

1.1. EUT Description

Product Name	ML865C1-NA
Trade Name	Telit
Model No.	ML865C1-NA
Uplink Frequency Range (MHz)	Band 2: 1850~1910 Band 4: 1710~1755 Band 12: 699~716 Band 13: 777~787
Downlink Frequency Range (MHz)	Band 2: 1930~1990 Band 4: 2110~2115 Band 12: 729~746 Band 13: 746~756
Modulation	BPSK / QPSK
HW	0.0
SW	M0B.150003

Accessories Information	
Antenna	1 pes

Antenna Information	
Model No.	ATEL-CAB; T-AT305
Antenna Type	1/4 l Antenna
Antenna Gain	2.14 dBi

Note:

1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. We have pre-scanned the RF output power on all mode. According to the results, the worst case was selected from RF output power to test other test item

1.2. Mode of Operation

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: LTE_NB-IoT_Band 2 (Note)
Mode 2: LTE_NB-IoT_Band 4 (Note)
Mode 3: LTE_NB-IoT_Band 12 (Note)
Mode 4: LTE_NB-IoT_Band 13 (Note)

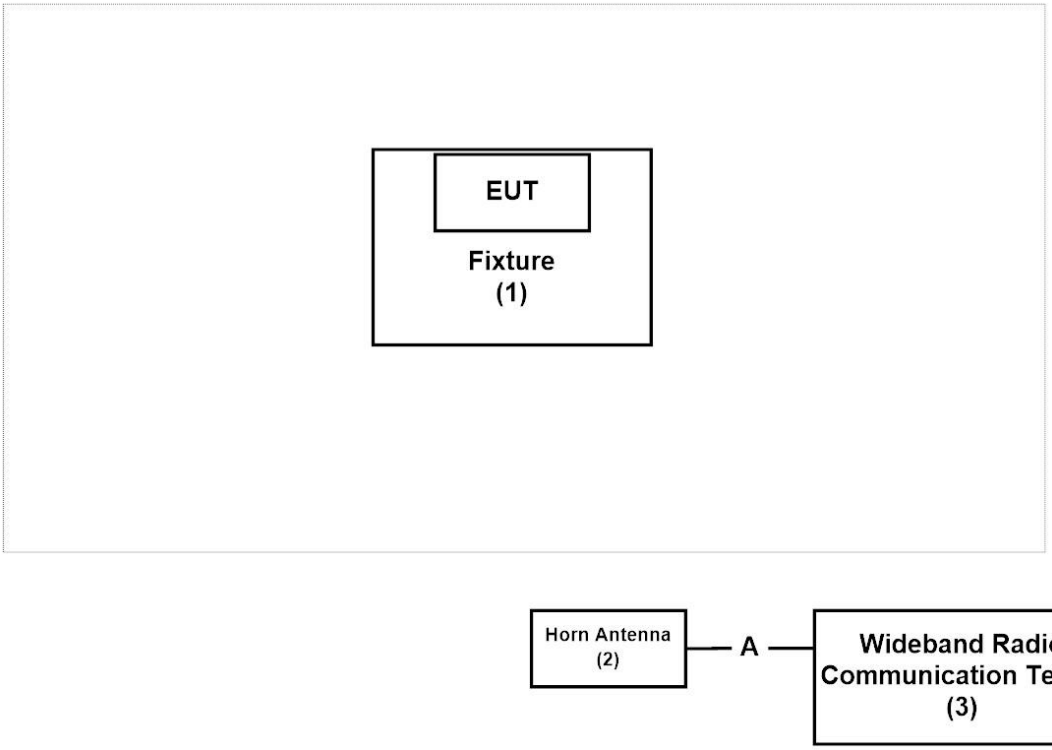
Note: We have pre-scanned all frequencies carriers of all modulations and only is shown the worst case on the report.

1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1	Fixture	Telit	LE922A6-E2	N/A	DoC	--
2	Horn Antenna	Schwarzbeck	BBHA 9120D	639	DoC	--
3	Wideband Radio Communication Tester	R&S	CMW500	150246	DoC	--

1.4. Configuration of Tested System

Connection Diagram


Signal Cable Type		Signal cable Description
A	RF Cable	Shielded, 2m

1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on 1.4.
2	Turn on the power of all equipment.
3	The EUT will continue receive the signal from LTE/NB-IoT function.
4	Repeat the above procedure (3)

2. Technical Test

2.1. Summary of Test Result

B2

Uplink: 1850-1910MHz

Downlink: 1930-1990MHz

LTE B2					
FCC Part 24 Subpart E					
Industry Canada RSS-133, issue6, Industry Canada RSS-GEN					
Test item	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1033 §2.1046 §24.232	<2 Watts	§6.4	<2 Watts	Pass
Occupied Bandwidth	§2.1049	N/A	RSS-GEN §4.2	N/A	Pass
Peak-to-average power ratio	§24.232	<13 dB	§6.4	<13 dB	Pass
Spurious Emissions	§2.1053 §24.238	<-13dBm	§6.5	<-13dBm	Pass
Spurious Emissions at Antenna Terminals	§27.238	<-13dBm	§6.5	<-13dBm	Pass
Frequency Stability	§2.1055 §24.235	<±2.5 ppm	§6.3	<±2.5 ppm	Pass

B4

Uplink: 1710-1755MHz

Downlink: 2100-2155MHz

LTE B4					
FCC Part 27 Subpart L					
Industry Canada RSS-139, issue3, Industry Canada RSS-GEN					
Test item	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1033 §2.1046 §27.50	<1 Watt	§6.5	<1 Watt	Pass
Occupied Bandwidth	§2.1049	N/A	RSS-GEN §4.2	N/A	Pass
Peak-to-average power ratio	§27.50	<13 dB	§6.5	<13 dB	Pass
Spurious Emissions	§2.1053 §27.53	<-13dBm	§6.6	<-13dBm	Pass
Spurious Emissions at Antenna Terminals	§27.53	<-13dBm	§6.6	<-13dBm	Pass
Frequency Stability	§2.1055 §27.54	<2.5 ppm	§6.4	Within the frequency range	Pass

B12

Uplink: 699-716MHz

Downlink: 729-746MHz

LTE B12					
FCC Part 27 Subpart F					
Industry Canada RSS-130, issue1, Industry Canada RSS-GEN					
Test item	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1033 §2.1046 §27.50	<3 Watts ERP	§4.4	<5 Watts E.I.R.P for portable equipment or for indoor fixed subscriber equipment	Pass
Occupied Bandwidth	§2.1049	N/A	§4.2	N/A	Pass
Peak-to-average power ratio	§27.50	<13 dB	§4.4	<13 dB	Pass
Spurious Emissions	§2.1053 §27.53	<-13dBm	§4.6	<-13dBm The e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.	Pass
Spurious Emissions at Antenna Terminals	§27.53	<-13dBm	§4.6	<-13dBm	Pass
Frequency Stability	§2.1055 §27.54	<±2.5 ppm	§4.3	Within the frequency range	Pass

B13

Uplink: 777-787MHz

Downlink: 746-756MHz

LTE B13					
FCC Part 27 Subpart F					
Industry Canada RSS-130, issue1, Industry Canada RSS-GEN					
Test item	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1055 §27.54	<3 Watts ERP	§4.3	<5 Watts	Pass
Occupied Bandwidth	§2.1033 §2.1046 §27.50	N/A	§4.4	N/A	Pass
Peak-to-average power ratio	§2.1049	<-13 dB	RSS-GEN §4.2	<-13 dB	Pass
Spurious Emissions	§27.50	<-13dBm	§4.4	<-13dBm	Pass
Spurious Emissions at Antenna Terminals	§2.1053 §27.53	<-13dBm	§4.6	<-13dBm	Pass
Frequency Stability	§27.53	<±2.5 ppm	§4.6	Within the frequency range	Pass

2.2. Test Environment

Items	Required (IEC 68-1)	Actual	Test Site
Temperature (°C)	15-35	23	2 & 3
Humidity (%RH)	25-75	52	
Barometric pressure (mbar)	860-1060	950-1000	

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA	**:**	**FCC Registration Number: TW3024**
Canada	**:**	**IC Registration Number: 22397-1 / 22397-2 / 22397-3**

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:
http://www.dekra.com.tw/english/about/certificates.aspx?bval=5
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our test sites as below:

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2.3. List of Test Equipment

RF Output Power / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2018/01/02	2019/01/01
Wideband Radio Communication Tester	R&S	CMW500	150246	2018/03/30	2019/03/29
Directional Coupler	Agilent	778D	20402	2017/09/25	2018/09/24
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

Occupied Bandwidth / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2017/11/21	2018/11/20
Wideband Radio Communication Tester	R&S	CMW500	150246	2018/03/30	2019/03/29
Directional Coupler	Agilent	778D	20402	2017/09/25	2018/09/24
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

Peak To Average Ratio / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2017/11/21	2018/11/20
Wideband Radio Communication Tester	R&S	CMW500	150246	2018/03/30	2019/03/29
Directional Coupler	Agilent	778D	20402	2017/09/25	2018/09/24
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

Conducted Band Edge Emissions / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2017/11/21	2018/11/20
Wideband Radio Communication Tester	R&S	CMW500	150246	2018/03/30	2019/03/29
Directional Coupler	Agilent	778D	20402	2017/09/25	2018/09/24
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

Spurious Emission / CB4-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2017/11/21	2018/11/20
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/10	2019/01/09
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04
Bilog Antenna	Teseq	CBL6112D	23191	2018/06/26	2019/06/25
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2018/06/01	2019/05/31
Horn Antenna	Schwarzbeck	BBHA 9170	202	2018/01/31	2019/01/30
Pre-Amplifier	Dekra	AP-025C	201801236	2018/02/26	2019/02/25
Pre-Amplifier	EMCI	EMC11830I	980366	2018/01/08	2019/01/07
Pre-Amplifier	Dekra	AP-400C	201801231	2017/12/13	2018/12/12
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

Spurious Emissions at Antenna Terminals / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2017/11/21	2018/11/20
Wideband Radio Communication Tester	R&S	CMW500	150246	2018/03/30	2019/03/29
Directional Coupler	Agilent	778D	20402	2017/09/25	2018/09/24
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

Frequency Stability Under Temperature & Voltage Variations / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2017/11/21	2018/11/20
Wideband Radio Communication Tester	R&S	CMW500	150246	2018/03/30	2019/03/29
Directional Coupler	Agilent	778D	20402	2017/09/25	2018/09/24
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

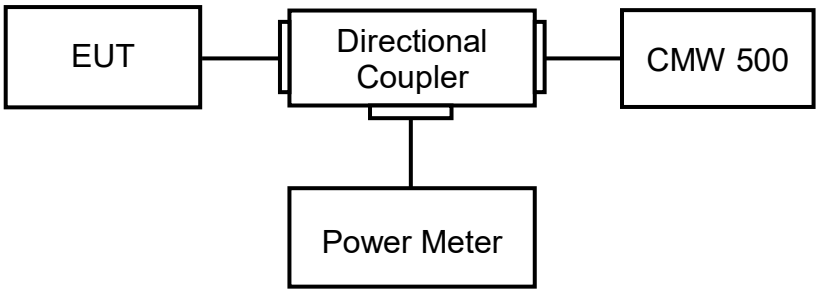
Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2.4. Uncertainty

Test Item	Uncertainty
RF Output Power	± 1.27 dB
Occupied Bandwidth	± 10 Hz
Peak To Average Ratio	not exceed 13 dB
Spurious Emissions	± 1.27 dB for Conducted Measurement ± 3.2 dB for Radiated Measurement
Spurious Emissions at Antenna Terminals	± 3.2 dB
Frequency Stability	± 10 Hz

3. RF Output Power

3.1. Test Setup



3.2. Test Procedure

a) The RF output of the transmitter was connected to base station simulator.
b) The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement..
c) Set EUT at maximum average power by base station simulator.
d) Measure lowest, middle, and highest channels for each bandwidth and different modulation.

Effective Isotropic Radiated Power = Conducted Power(dBm) + Antenna Gain(dBi)
Effective Radiated Power = Conducted Power(dBm) + Antenna Gain(dBi) - 2.15dB

3.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 5.2.4
ANSI C63.26: 2015 Sub-clause 5.2.4.2

3.4. Test Result

Product	ML865C1-NA		
Test Item	RF Output Power		
Test Mode	Mode 1: LTE_NB-IoT_Band 2		
Date of Test	2018/09/04	Test Site	SR10-H

Ch	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (Avg) (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
18601	1850.1	BPSK	3.75	1	0	22.41	0.285	2
				1	47	22.59	0.297	2
			15	1	0	22.28	0.277	2
				1	11	22.31	0.279	2
		QPSK	3.75	1	0	21.86	0.251	2
				1	47	21.88	0.252	2
			15	1	0	21.98	0.258	2
				1	11	21.99	0.259	2
				3	3	23.09	0.333	2
18900	1880.0	BPSK	3.75	1	0	22.25	0.275	2
				1	47	22.27	0.276	2
			15	1	0	22.18	0.27	2
				1	11	22.19	0.271	2
		QPSK	3.75	1	0	21.49	0.231	2
				1	47	21.51	0.232	2
			15	1	0	21.55	0.234	2
				1	11	21.55	0.234	2
				3	3	22.71	0.305	2
19199	1909.9	BPSK	3.75	1	0	22.51	0.292	2
				1	47	22.52	0.292	2
			15	1	0	22.42	0.286	2
				1	11	22.44	0.287	2
		QPSK	3.75	1	0	21.77	0.246	2
				1	47	21.79	0.247	2
			15	1	0	21.91	0.254	2
				1	11	21.92	0.255	2
				3	3	23.53	0.369	2

Product	ML865C1-NA		
Test Item	RF Output Power		
Test Mode	Mode 2: LTE_NB-IoT_Band 4		
Date of Test	2018/09/04	Test Site	SR10-H

Ch	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (Avg) (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
19951	1710.1	BPSK	3.75	1	0	23.64	0.378	1
				1	47	23.65	0.379	1
			15	1	0	23.56	0.372	1
				1	11	23.58	0.373	1
		QPSK	3.75	1	0	23.73	0.386	1
				1	47	23.74	0.387	1
			15	1	0	23.86	0.398	1
				1	11	23.87	0.399	1
				3	3	23.9	0.402	1
20175	1732.5	BPSK	3.75	1	0	22.87	0.317	1
				1	47	22.88	0.318	1
			15	1	0	22.76	0.309	1
				1	11	22.79	0.311	1
		QPSK	3.75	1	0	23.06	0.331	1
				1	47	23.03	0.329	1
			15	1	0	23.14	0.337	1
				1	11	23.05	0.330	1
				3	3	23.15	0.338	1
20399	1754.9	BPSK	3.75	1	0	22.82	0.313	1
				1	47	22.83	0.314	1
			15	1	0	22.65	0.301	1
				1	11	22.67	0.303	1
		QPSK	3.75	1	0	23.12	0.336	1
				1	47	23.13	0.337	1
			15	1	0	23.23	0.344	1
				1	11	23.25	0.346	1
				3	3	23.34	0.353	1

Product	ML865C1-NA		
Test Item	RF Output Power		
Test Mode	Mode 3: LTE_NB-IoT_Band 12		
Date of Test	2018/09/04	Test Site	SR10-H

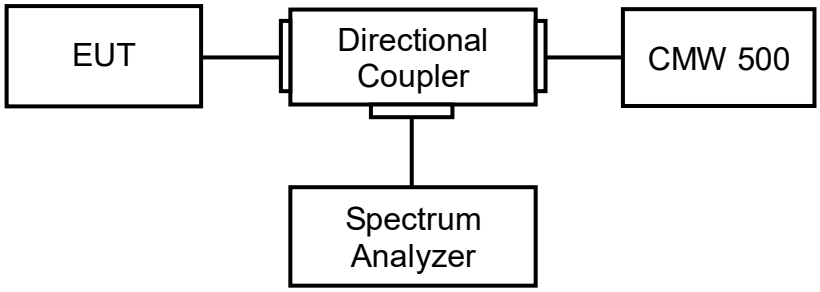
Ch	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (Avg) (dBm)	RF Output Power (W) ERP	Limit (W) ERP
23011	699.1	BPSK	3.75	1	0	23.27	0.212	3
				1	47	23.28	0.212	3
			15	1	0	23.15	0.206	3
				1	11	23.17	0.207	3
		QPSK	3.75	1	0	22.58	0.181	3
				1	47	22.52	0.178	3
			15	1	0	22.73	0.187	3
				1	11	22.62	0.182	3
				3	3	24.01	0.251	3
23095	707.5	BPSK	3.75	1	0	23.26	0.211	3
				1	47	23.27	0.212	3
			15	1	0	23.13	0.205	3
				1	11	23.14	0.206	3
		QPSK	3.75	1	0	22.58	0.181	3
				1	47	22.61	0.182	3
			15	1	0	22.66	0.184	3
				1	11	22.67	0.185	3
				3	3	23.72	0.235	3
.23179	715.9	BPSK	3.75	1	0	23.34	0.215	3
				1	47	23.47	0.222	3
			15	1	0	23.27	0.212	3
				1	11	23.32	0.214	3
		QPSK	3.75	1	0	22.51	0.178	3
				1	47	22.52	0.178	3
			15	1	0	22.67	0.185	3
				1	11	22.69	0.185	3
				3	3	23.79	0.239	3

Product	ML865C1-NA		
Test Item	RF Output Power		
Test Mode	Mode 4: LTE_NB-IoT_Band 13		
Date of Test	2018/09/04	Test Site	SR10-H

Ch	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (Avg) (dBm)	RF Output Power (W) ERP	Limit (W) ERP
23181	777.1	BPSK	3.75	1	0	22.94	0.196	3
				1	47	22.95	0.197	3
			15	1	0	22.82	0.191	3
				1	11	22.85	0.192	3
		QPSK	3.75	1	0	21.98	0.157	3
				1	47	22.01	0.158	3
			15	1	0	22.07	0.161	3
				1	11	22.08	0.161	3
				3	3	23.39	0.218	3
23230	782.0	BPSK	3.75	1	0	22.93	0.196	3
				1	47	22.94	0.196	3
			15	1	0	22.79	0.190	3
				1	11	22.82	0.191	3
		QPSK	3.75	1	0	22.02	0.159	3
				1	47	22.03	0.159	3
			15	1	0	22.09	0.161	3
				1	11	22.11	0.162	3
				3	3	23.38	0.217	3
23279	786.9	BPSK	3.75	1	0	22.85	0.192	3
				1	47	22.86	0.193	3
			15	1	0	22.77	0.189	3
				1	11	22.79	0.190	3
		QPSK	3.75	1	0	22.04	0.160	3
				1	47	22.02	0.159	3
			15	1	0	22.15	0.164	3
				1	11	22.11	0.162	3
				3	3	23.61	0.229	3

4. Occupied Bandwidth

4.1. Test Setup



4.2. Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The 26 dB bandwidth and 99% occupied bandwidth of the low & middle & high channel for the highest RF powers were measured.

4.3. Test Method

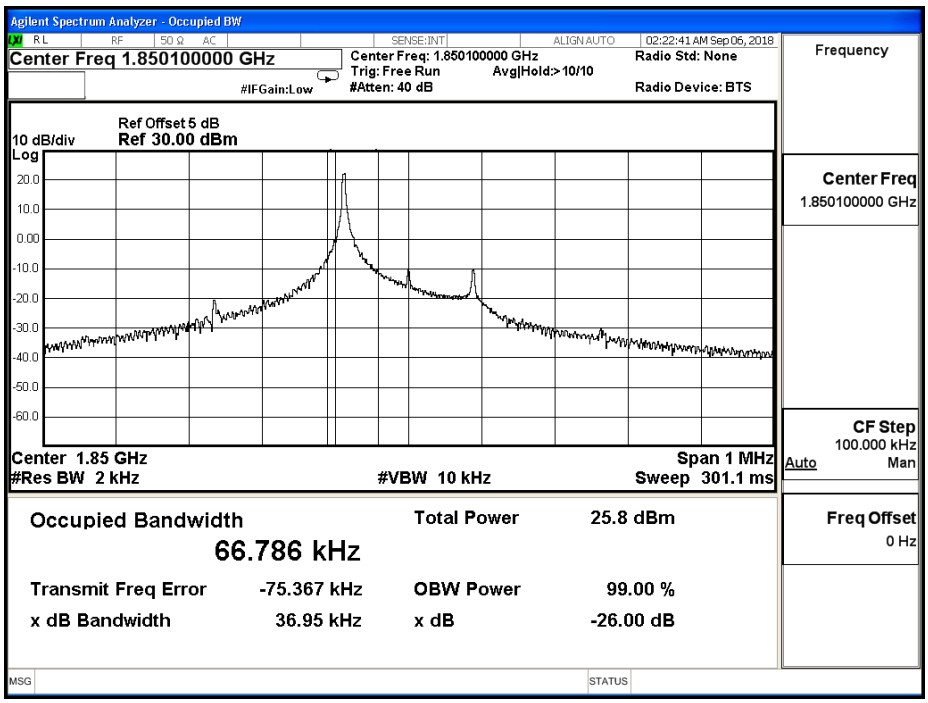
KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 4.2 & 4.3
ANSI C63.26: 2015 Sub-clause 5.4.3 & 5.4.4

4.4. Test Result

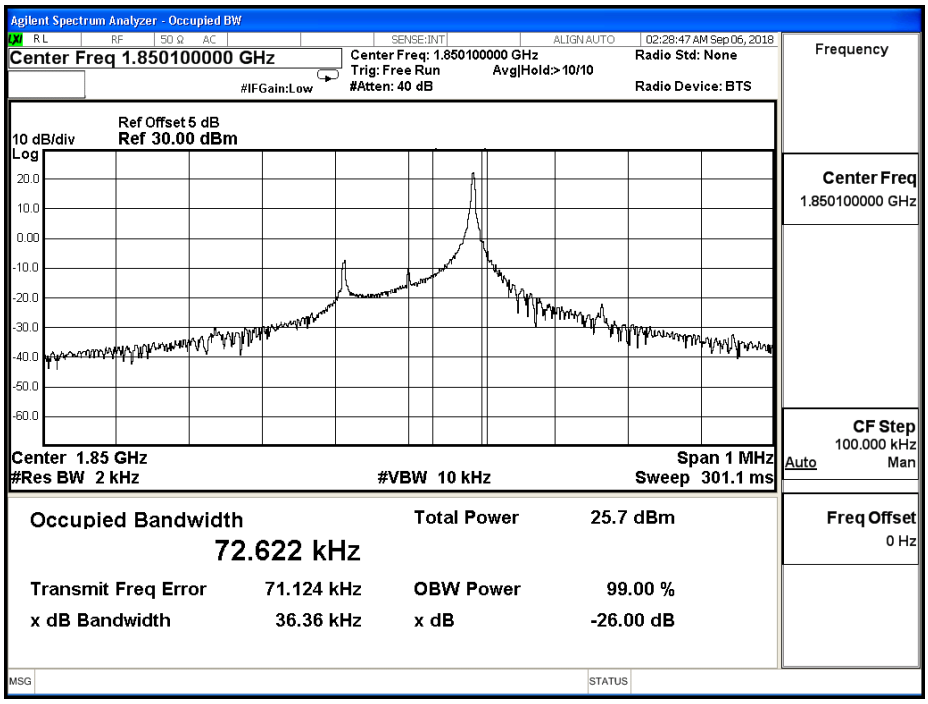
Product	ML865C1-NA		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: LTE_NB-IoT_Band 2		
Date of Test	2018/09/06	Test Site	SR10-H

Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Measure Level (kHz)		Limit (kHz)
						26dB BW	99% BW	
18601	1850.1	BPSK	3.75	1	0	36.950	66.786	NA
				1	47	36.360	72.622	NA
		QPSK	15	1	0	116.000	125.480	NA
				1	11	116.400	122.100	NA
				3	3	212.500	132.900	NA
18900	1880	BPSK	3.75	1	0	35.340	66.733	NA
				1	47	36.500	72.198	NA
		QPSK	15	1	0	115.400	124.080	NA
				1	11	129.700	119.210	NA
				3	3	200.100	135.000	NA
19199	1909.9	BPSK	3.75	1	0	34.170	64.881	NA
				1	47	35.720	68.514	NA
		QPSK	15	1	0	116.000	121.200	NA
				1	11	129.000	127.310	NA
				3	3	211.800	136.900	NA

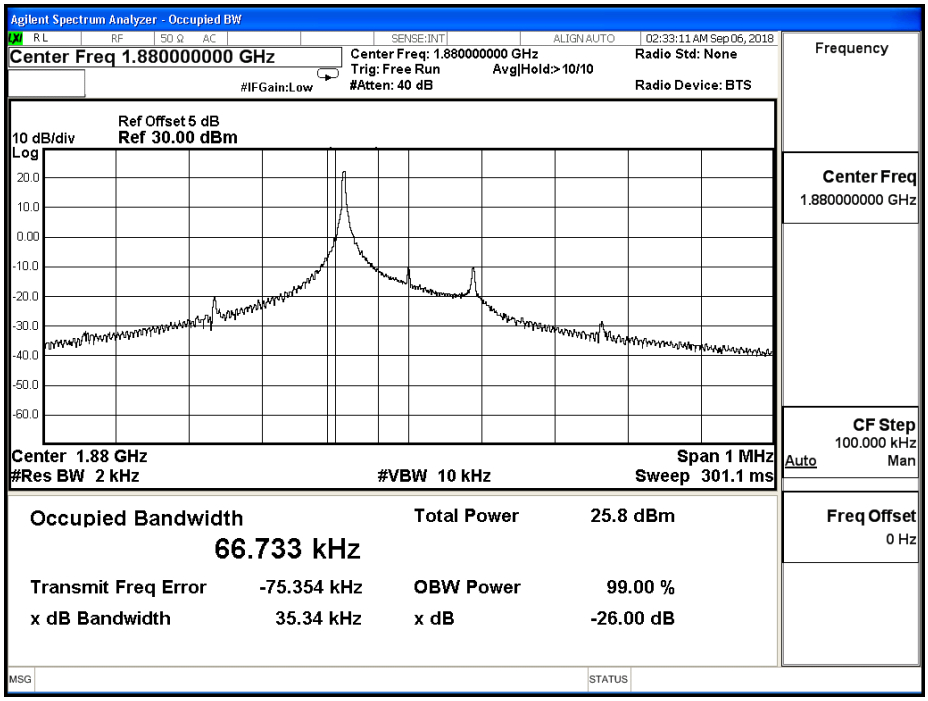
26dB & 99% BW_3.75K_CH18601_BPSK_1RB0



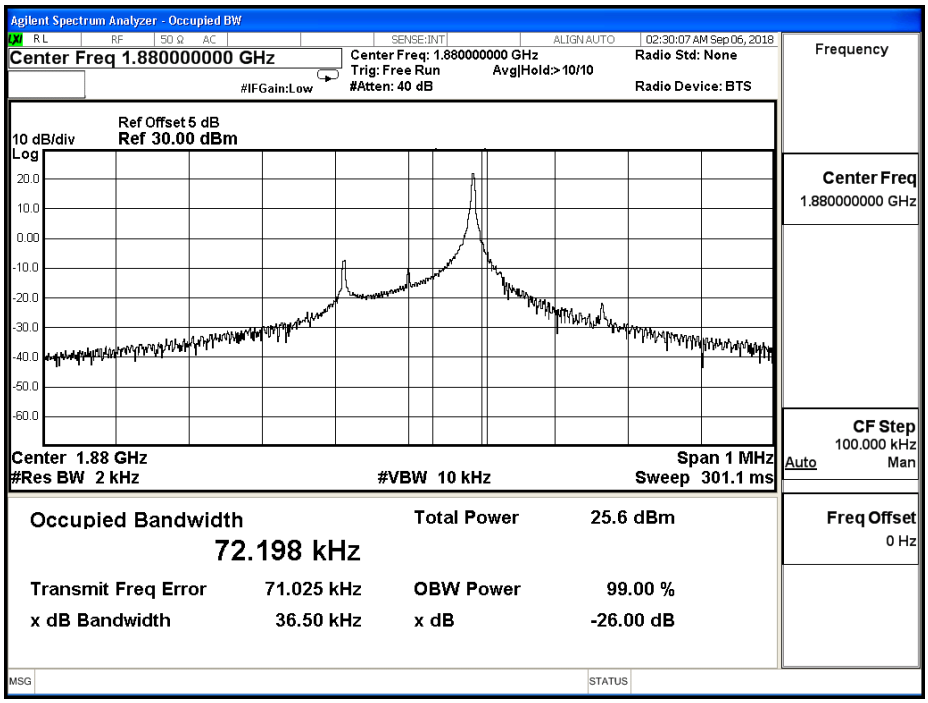
26dB & 99% BW_3.75K_CH18601_BPSK_1RB47



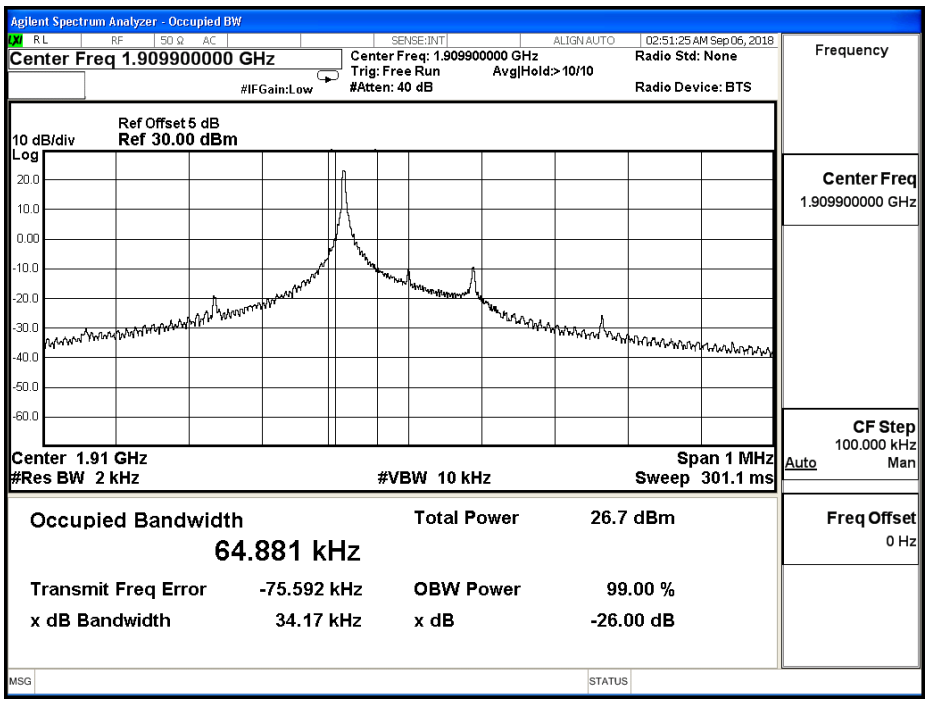
26dB & 99% BW_3.75K_CH18900_BPSK_1RB0



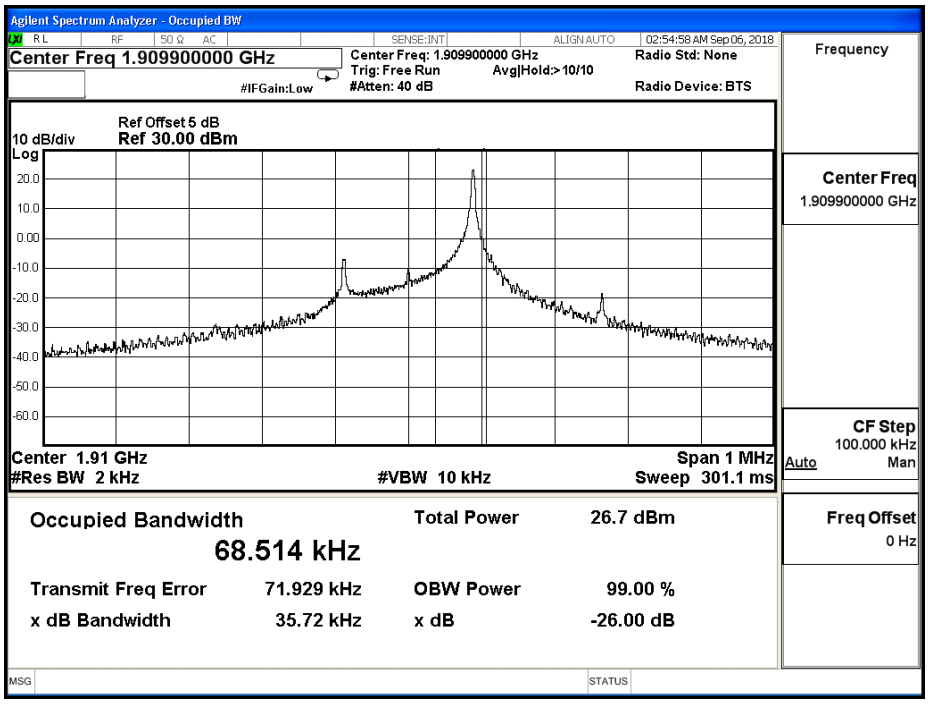
26dB & 99% BW_3.75K_CH18900_BPSK_1RB47



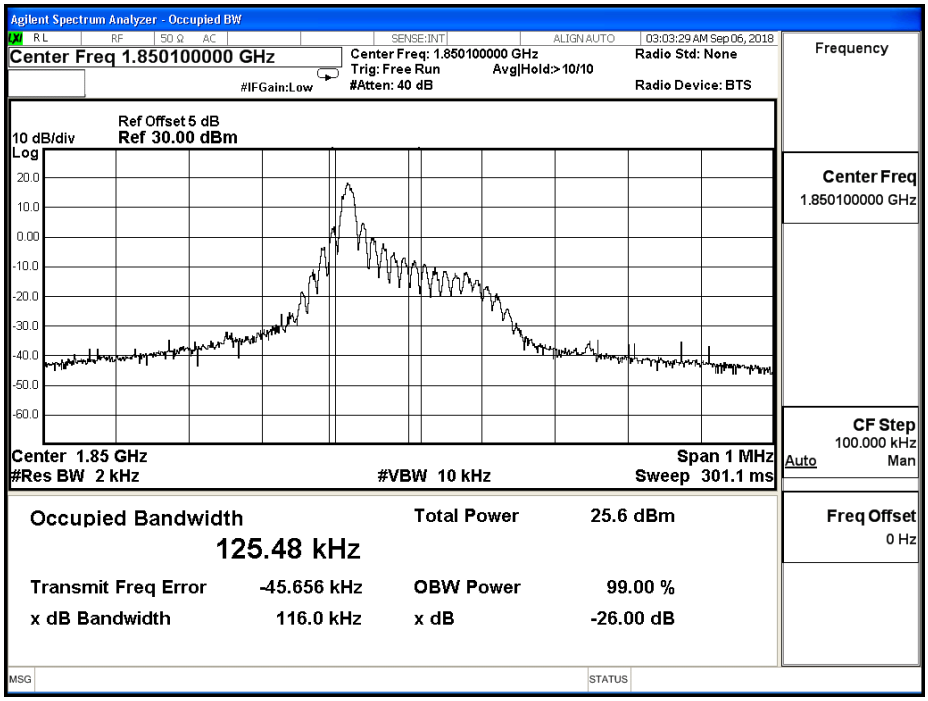
26dB & 99% BW_3.75K_CH19199_BPSK_1RB0



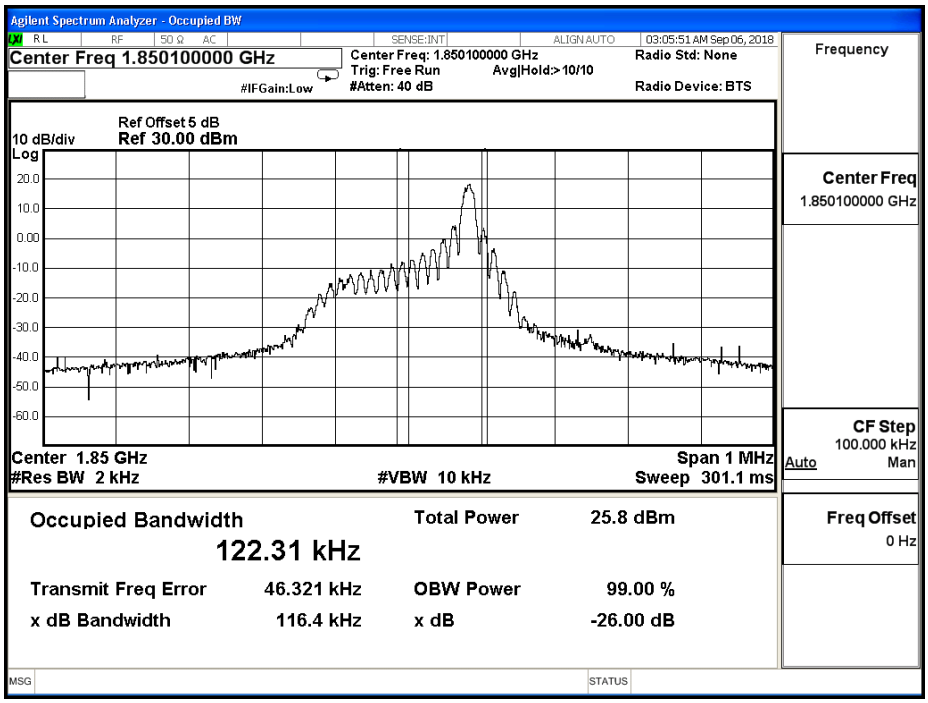
26dB & 99% BW_3.75K_CH19199_BPSK_1RB47



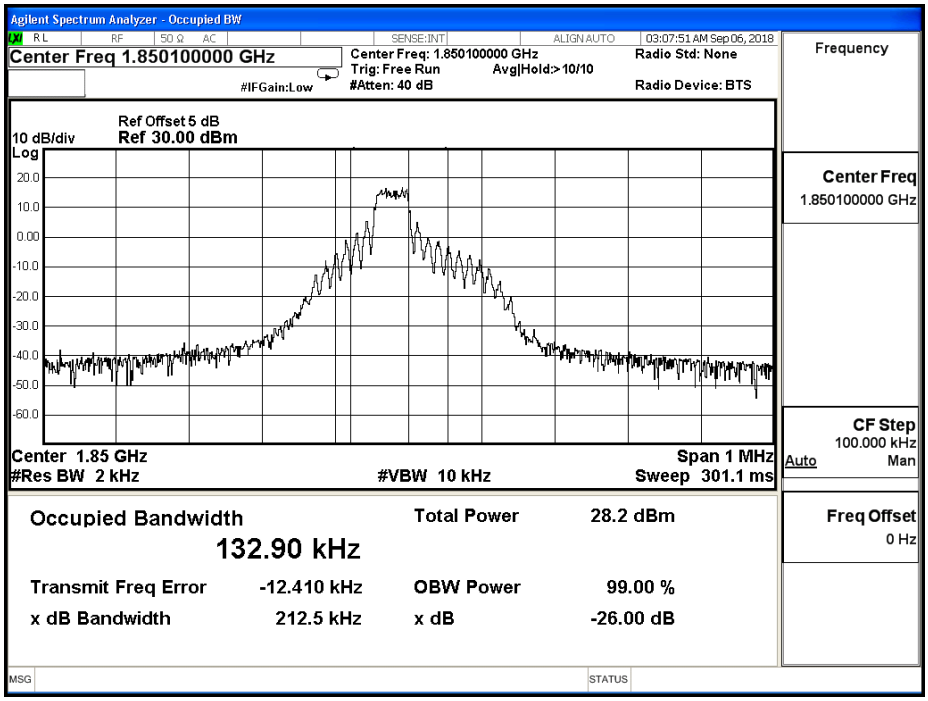
26dB & 99% BW_15K_CH18601_QPSK_1RB0



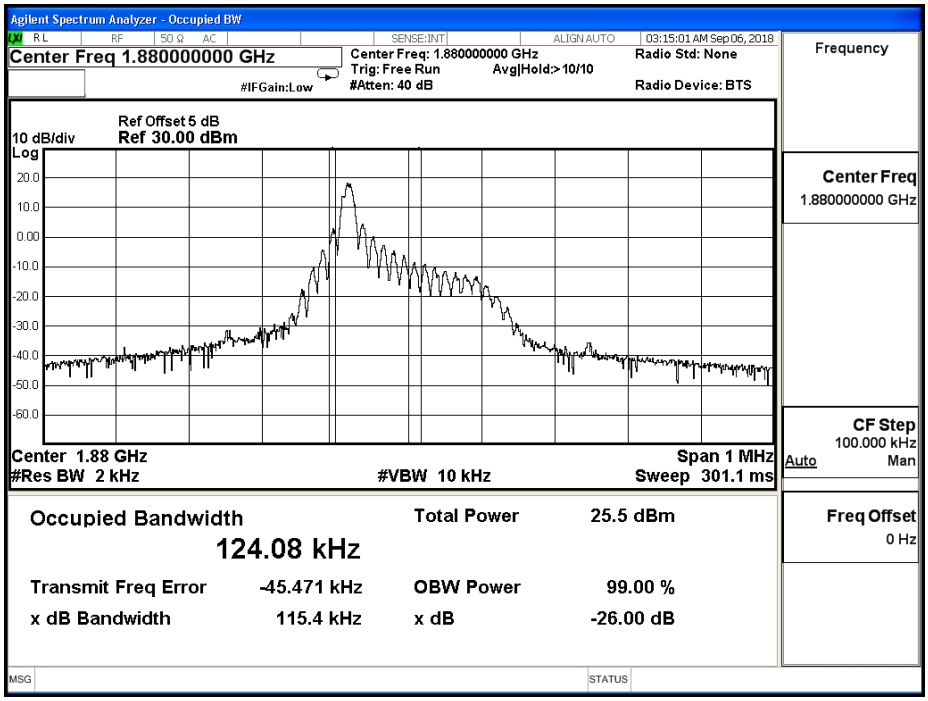
26dB & 99% BW_15K_CH18601_QPSK_1RB11



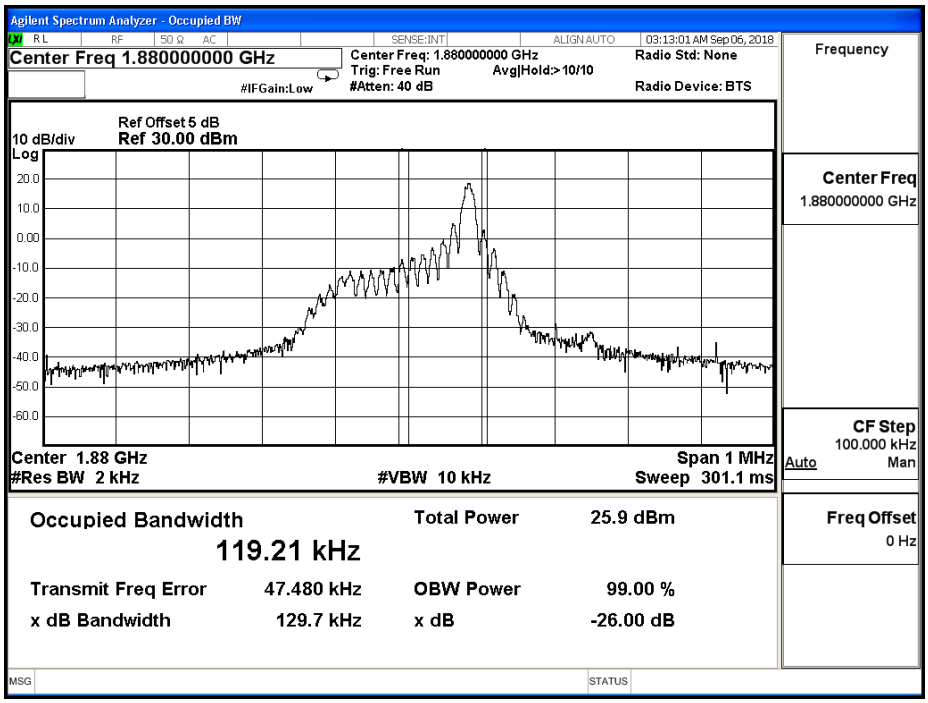
26dB & 99% BW_15K_CH18601_QPSK_3RB3



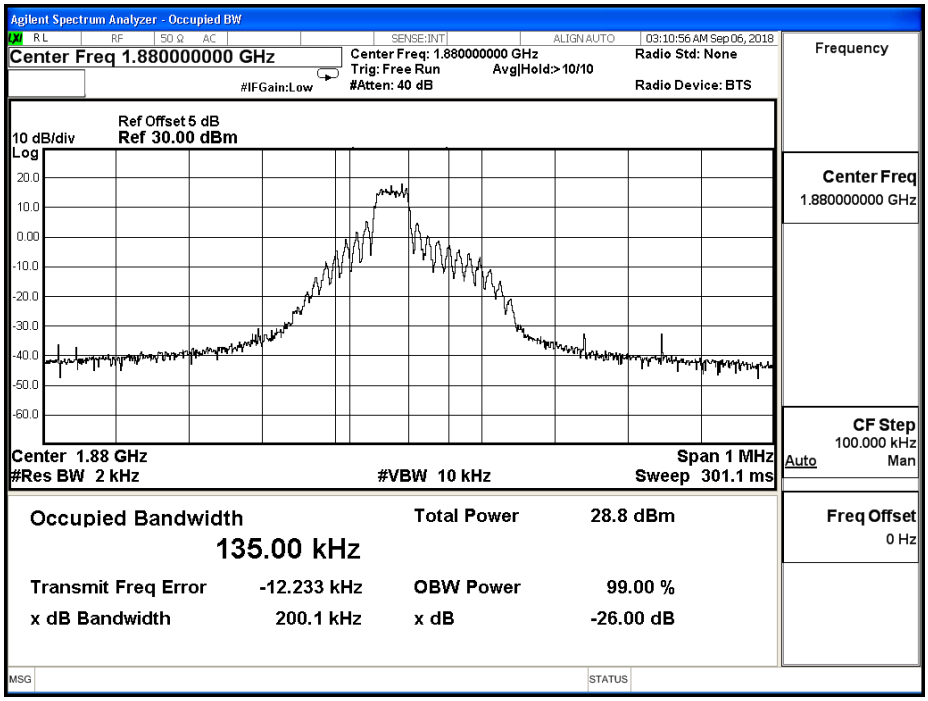
26dB & 99% BW_15K_CH18900_QPSK_1RB0



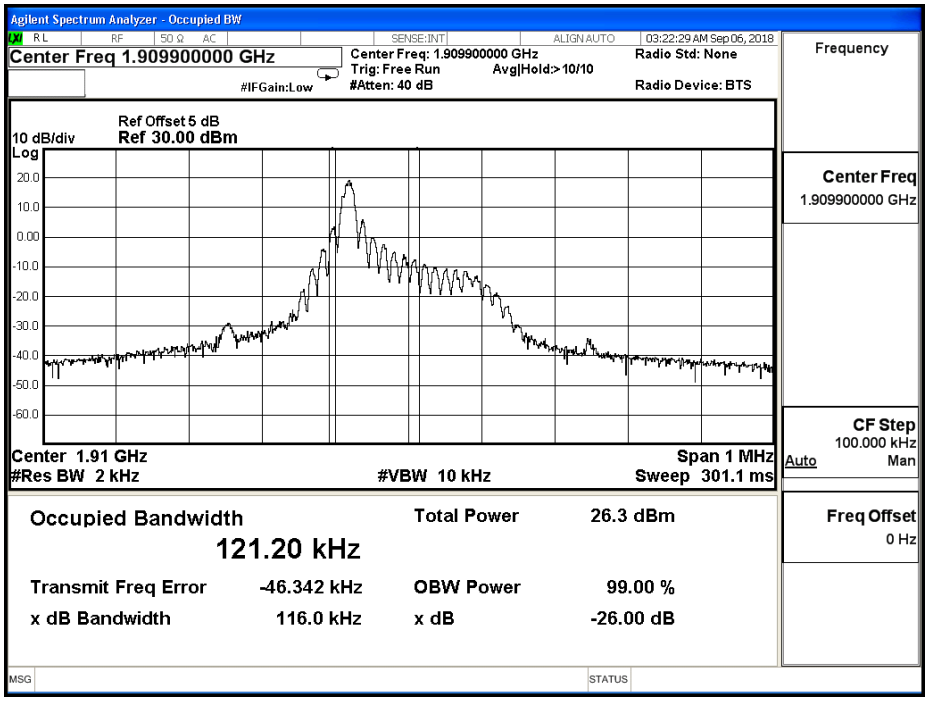
26dB & 99% BW_15K_CH18900_QPSK_1RB11



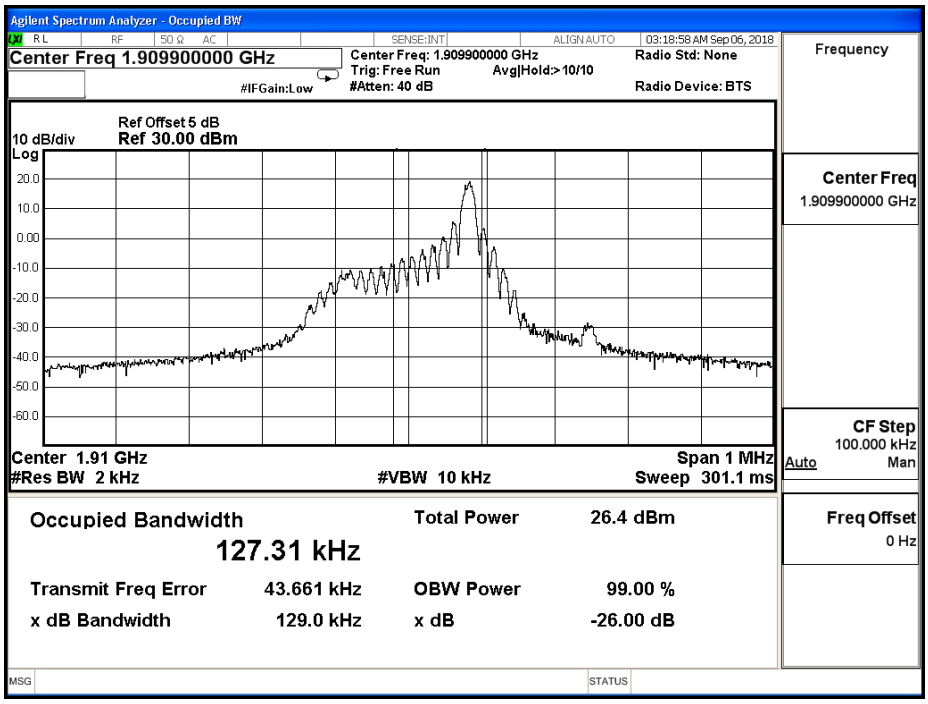
26dB & 99% BW_15K_CH18900_QPSK_3RB3



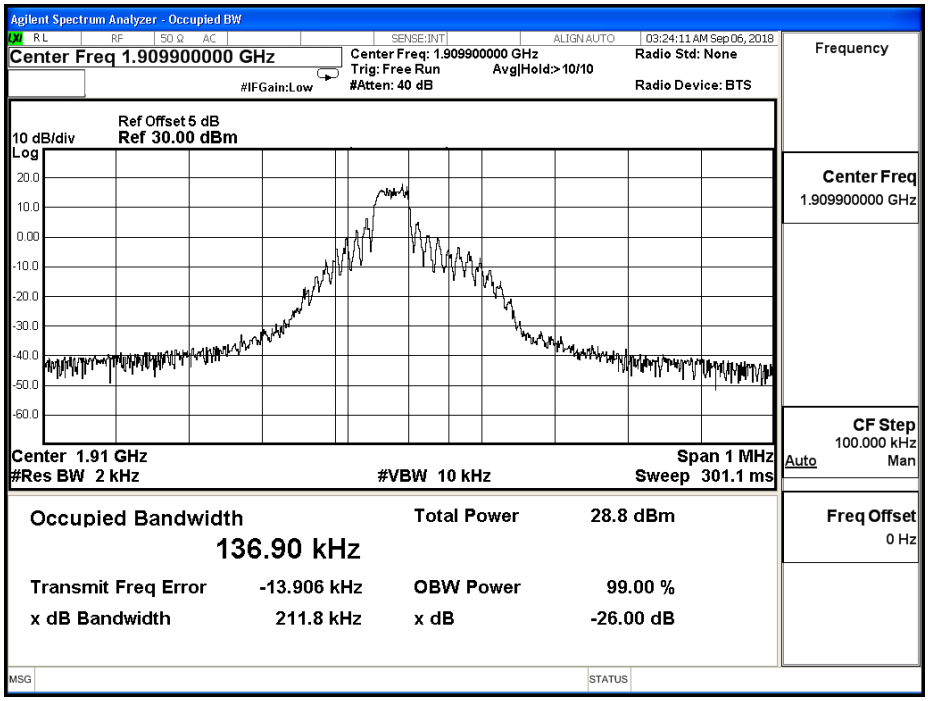
26dB & 99% BW_15K_CH19199_QPSK_1RB0



26dB & 99% BW_15K_CH19199_QPSK_1RB11



26dB & 99% BW_15K_CH19199_QPSK_3RB3



Product	ML865C1-NA		
Test Item	Occupied Bandwidth		
Test Mode	Mode 2: LTE_NB-IoT_Band 4		
Date of Test	2018/09/06	Test Site	SR10-H

Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Measure Level (kHz)		Limit (kHz)
						26dB BW	99% BW	
19951	1710.1	BPSK	3.75	1	0	36.780	64.905	NA
				1	47	36.860	70.866	NA
		QPSK	15	1	0	116.500	126.130	NA
				1	11	128.900	126.510	NA
				3	3	209.600	137.500	NA
20175	1732.5	BPSK	3.75	1	0	37.050	64.635	NA
				1	47	36.840	67.284	NA
		QPSK	15	1	0	142.000	126.750	NA
				1	11	129.800	128.550	NA
				3	3	198.400	132.010	NA
20399	1754.9	BPSK	3.75	1	0	33.930	61.162	NA
				1	47	32.670	62.629	NA
		QPSK	15	1	0	116.100	119.100	NA
				1	11	116.800	129.380	NA
				3	3	210.200	136.280	NA

Product	ML865C1-NA		
Test Item	Occupied Bandwidth		
Test Mode	Mode 3: LTE_NB-IoT_Band 12		
Date of Test	2018/09/06	Test Site	SR10-H

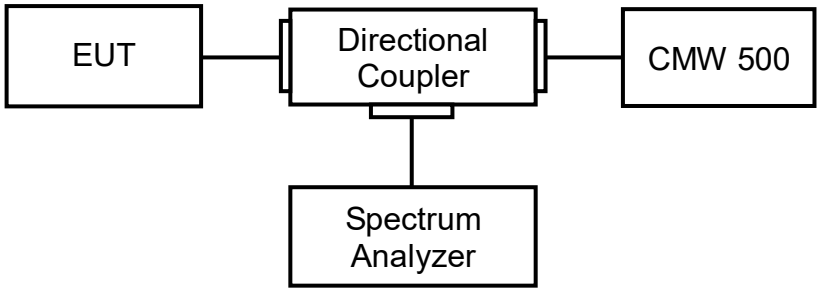
Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Measure Level (kHz)		Limit (kHz)
						26dB BW	99% BW	
23011	699.1	BPSK	3.75	1	0	36.840	57.402	NA
				1	47	35.800	56.305	NA
		QPSK	15	1	0	116.000	116.330	NA
				1	11	103.200	125.050	NA
				12	0	210.600	128.160	NA
23095	707.5	BPSK	3.75	1	0	37.050	58.793	NA
				1	47	37.080	58.030	NA
		QPSK	15	1	0	117.500	119.890	NA
				1	11	129.800	115.360	NA
				12	0	200.200	127.580	NA
23179	715.9	BPSK	3.75	1	0	36.880	57.328	NA
				1	47	36.340	57.043	NA
		QPSK	15	1	0	115.500	124.980	NA
				1	11	130.700	117.560	NA
				12	0	211.400	133.910	NA

Product	ML865C1-NA		
Test Item	Occupied Bandwidth		
Test Mode	Mode 4: LTE_NB-IoT_Band 13		
Date of Test	2018/09/11	Test Site	SR10-H

Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Measure Level (kHz)		Limit (kHz)
						26dB BW	99% BW	
23181	777.1	BPSK	3.75	1	0	40.850	60.180	NA
				1	47	40.590	60.155	NA
		QPSK	15	1	0	116.000	120.180	NA
				1	11	116.300	128.400	NA
				3	3	211.900	128.760	NA
23230	782	BPSK	3.75	1	0	41.290	62.012	NA
				1	47	40.790	59.683	NA
		QPSK	15	1	0	116.000	123.780	NA
				1	11	116.900	119.990	NA
				3	3	211.400	123.440	NA
23279	786.9	BPSK	3.75	1	0	38.950	54.537	NA
				1	47	35.080	55.936	NA
		QPSK	15	1	0	116.800	119.400	NA
				1	11	104.300	118.110	NA
				3	3	198.200	126.350	NA

5. Peak To Average Ratio

5.1. Test Setup



5.2. Test Procedure

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth.
2. Set the number of counts to a value that stabilizes the measured CCDF curve.
3. Record the maximum PAPR level associated with a probability of 0.1 %.

5.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 5.7.2
ANSI C63.26: 2015 Sub-clause 5.2.3.4

5.4. Limit

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13dB.

5.5. Test Result

Product	ML865C1-NA		
Test Item	Peak To Average Ratio		
Test Mode	Mode 1: LTE_NB-IoT_Band 2		
Date of Test	2018/09/11	Test Site	SR10-H

NB-IoT Band 2_3.75K_BPSK_1RB0			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
1850.1	24.52	22.41	2.11
1880	24.44	22.25	2.19
1909.9	25.07	22.51	2.56

NB-IoT Band 2_3.75K_BPSK_1RB47			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
1850.1	24.63	22.59	2.04
1880	24.48	22.27	2.21
1909.9	25.06	22.52	2.54

NB-IoT Band 2_15K_QPSK_1RB0			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
1850.1	23.56	21.98	1.58
1880	23.06	21.45	1.61
1909.9	23.73	21.91	1.82

NB-IoT Band 2_15K_QPSK_1RB11			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
1850.1	23.46	21.99	1.47
1880	22.95	21.45	1.5
1909.9	23.58	21.92	1.66

NB-IoT Band 2_15K_QPSK_3RB3			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
1850.1	27.16	23.09	4.07
1880	27.15	22.71	4.44
1909.9	28.07	23.53	4.54

Product	ML865C1-NA		
Test Item	Peak To Average Ratio		
Test Mode	Mode 2: LTE_NB-IoT_Band 4		
Date of Test	2018/09/11	Test Site	SR10-H

NB-IoT Band 2_3.75K_BPSK_1RB0			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
1710.1	25.38	23.64	1.74
1732.5	24.69	22.87	1.82
1754.9	24.72	22.82	1.9

NB-IoT Band 4_3.75K_BPSK_1RB47			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
1710.1	25.42	23.65	1.77
1732.5	24.64	22.88	1.76
1754.9	24.7	22.83	1.87

NB-IoT Band 4_15K_QPSK_1RB0			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
1710.1	25.29	23.86	1.43
1732.5	24.55	23.14	1.41
1754.9	24.62	23.23	1.39

NB-IoT Band 4_15K_QPSK_1RB11			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
1710.1	25.12	23.87	1.25
1732.5	24.35	23.05	1.3
1754.9	24.57	23.25	1.32

NB-IoT Band 4_15K_QPSK_3RB3			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
1710.1	27.1	23.9	3.2
1732.5	26.52	23.15	3.37
1754.9	26.75	23.34	3.41

Product	ML865C1-NA		
Test Item	Peak To Average Ratio		
Test Mode	Mode 3: LTE_NB-IoT_Band 12		
Date of Test	2018/09/11	Test Site	SR10-H

NB-IoT Band 13_3.75K_BPSK_1RB0			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
777.1	24.81	22.94	1.87
782	24.81	22.93	1.88
786.9	24.82	22.85	1.97

NB-IoT Band 13_3.75K_BPSK_1RB47			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
777.1	24.78	22.95	1.83
782	24.79	22.94	1.85
786.9	24.78	22.86	1.92

NB-IoT Band 13_15K_QPSK_1RB0			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
777.1	23.59	22.07	1.52
782	23.62	22.09	1.53
786.9	23.66	22.15	1.51

NB-IoT Band 13_15K_QPSK_1RB11			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
777.1	23.57	22.08	1.49
782	23.53	22.11	1.42
786.9	23.64	22.11	1.53

NB-IoT Band 13_15K_QPSK_3RB3			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
777.1	27.09	23.39	3.7
782	27.06	23.38	3.68
786.9	27.23	23.61	3.62

Product	ML865C1-NA		
Test Item	Peak To Average Ratio		
Test Mode	Mode 4: LTE_NB-IoT_Band 13		
Date of Test	2018/09/11	Test Site	SR10-H

NB-IoT Band 12_3.75K_BPSK_1RB0			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
699.1	25.3	23.27	2.03
707.5	25.17	23.26	1.91
715.9	25.22	23.34	1.88

NB-IoT Band 12_3.75K_BPSK_1RB47			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
699.1	25.32	23.28	2.04
707.5	25.18	23.27	1.91
715.9	25.42	23.47	1.95

NB-IoT Band 12_15K_QPSK_1RB0			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
699.1	24.14	22.73	1.41
707.5	24.24	22.66	1.58
715.9	24.21	22.67	1.54

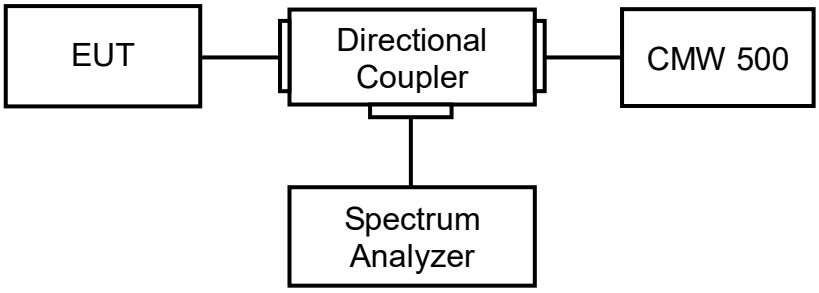
NB-IoT Band 12_15K_QPSK_1RB11			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
699.1	24.07	22.62	1.45
707.5	24.14	22.67	1.47
715.9	24.13	22.69	1.44

NB-IoT Band 12_15K_QPSK_3RB3			
Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
699.1	28.24	24.01	4.23
707.5	27.9	23.72	4.18
715.9	27.88	23.79	4.09

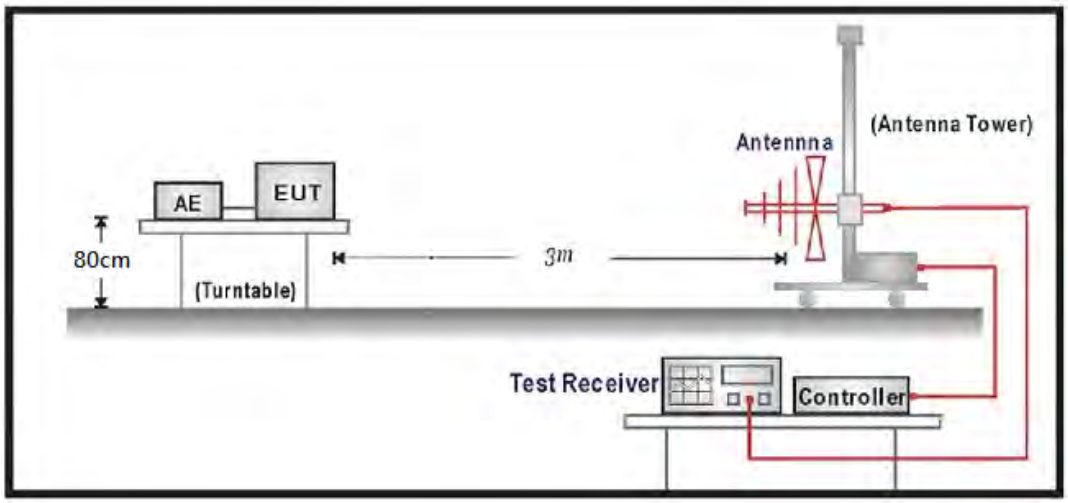
6. Spurious Emissions

6.1. Test Setup

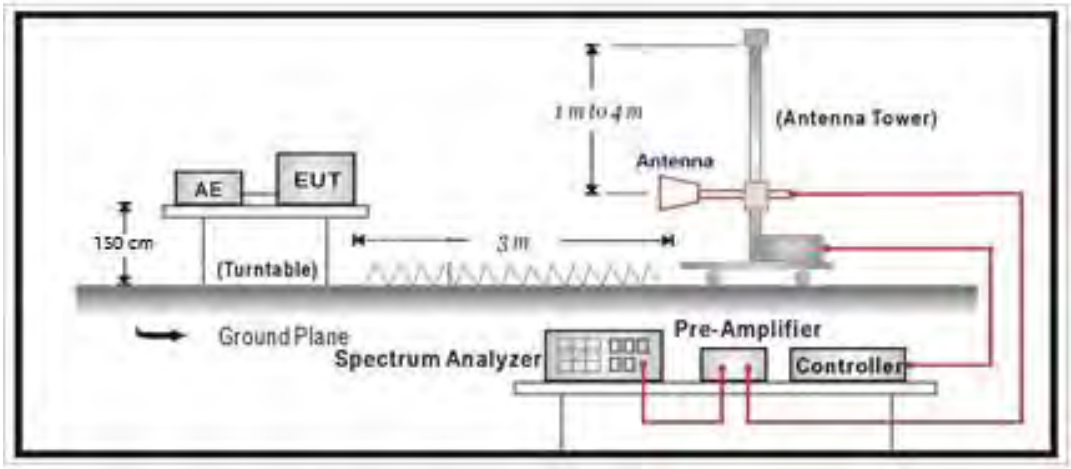
Conducted Spurious Measurement:



Radiated Spurious Measurement: below 1GHz



Radiated Spurious Measurement: above 1GHz



6.2. Test Procedure

Conducted Spurious Measurement:

a) Place the EUT on a bench and set it in transmitting mode.
b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
c) EUT Communicate with CMW500, then select a channel for testing.
d) Add a correction factor to the display of spectrum, and then test.
e) The resolution bandwidth of the spectrum analyzer was set at 1 MHz, sufficient scans were taken to show the out of band Emission if any up to 10^{th} harmonic.

Radiated Spurious Measurement:

a) The EUT was placed on a rotatable wooden table with 1.5 meter above ground.
b) The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
c) The table was rotated 360 degrees to determine the position of the highest spurious emission.
d) The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
e) Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 1MHz, Sweep 500ms, Taking the record of maximum spurious emission.
f) A horn antenna was substituted in place of the EUT and was driven by a signal generator.
g) Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
h) Taking the record of output power at antenna port
i) Repeat step 7 to step 8 for another polarization.
j) EIRP = SG - Cable loss + Antenna Gain

6.3. Test Method

Conducted Spurious Measurement:

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 6.1
ANSI C63.26: 2015 Sub-clause 5.7

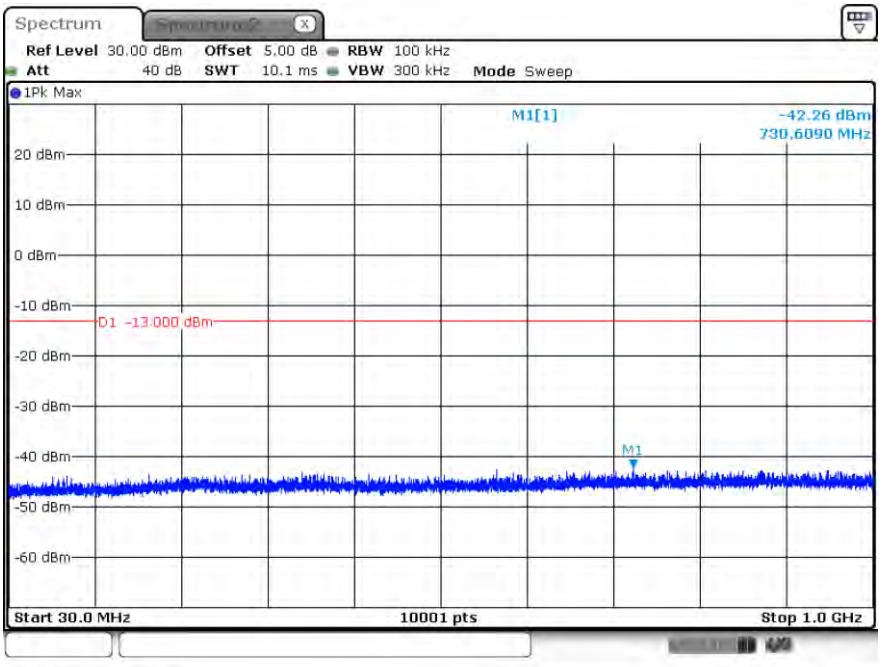
Radiated Spurious Measurement:

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 5.8
ANSI C63.26: 2015 Sub-clause 5.5.3.2

6.4. Test Result

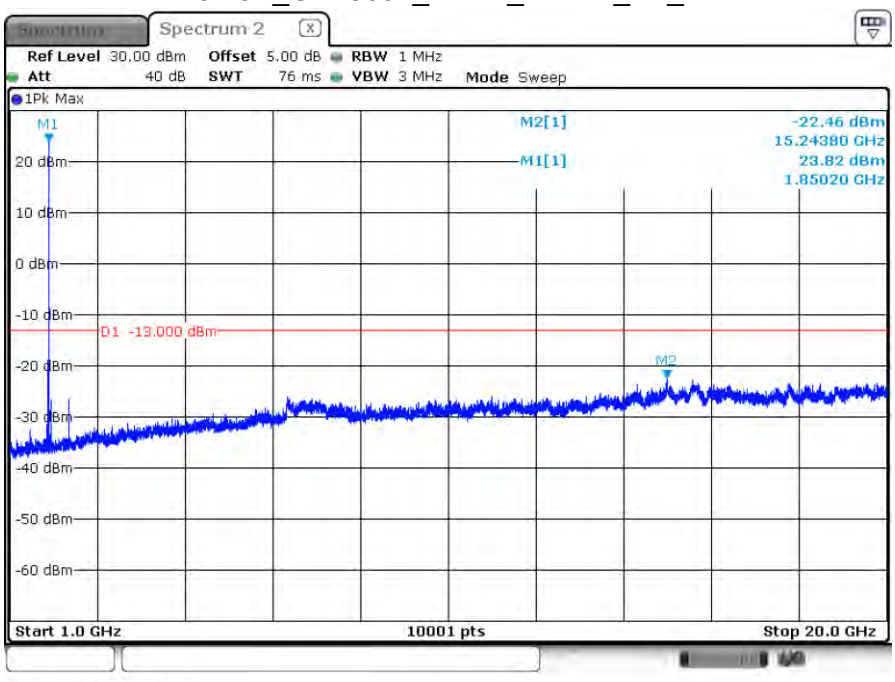
Product	ML865C1-NA		
Test Item	Conducted Spurious Emissions		
Test Mode	Mode 1: LTE_NB-IoT_Band 2		
Date of Test	2018/09/06	Test Site	SR10-H

3.75K_CH18601_BPSK_1RB47_TX_1



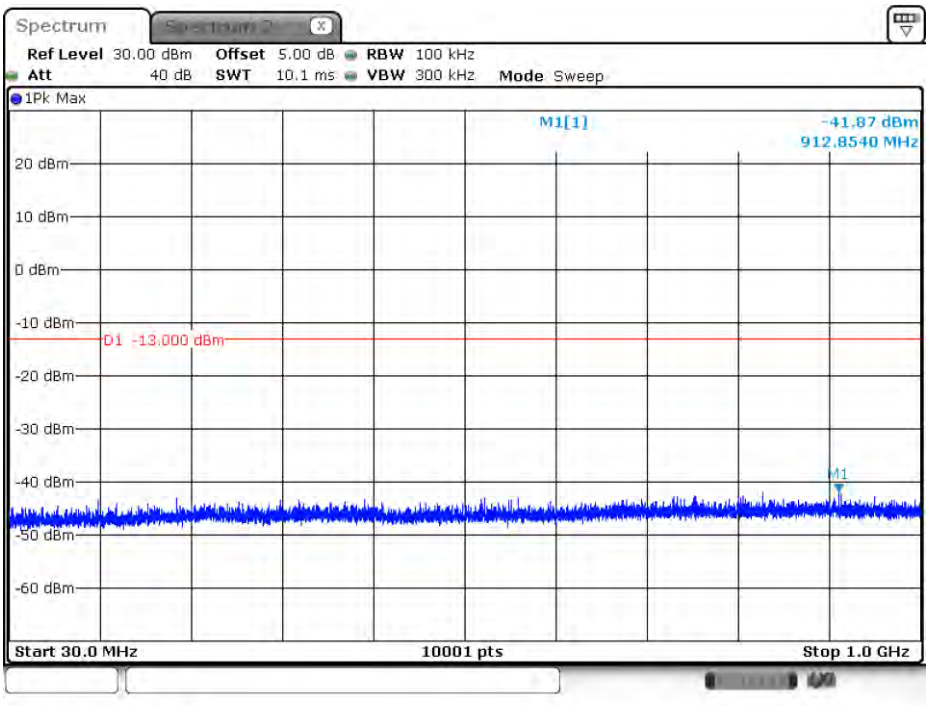
Date: 6.SEP.2018 06:51:07

3.75K_CH18601_BPSK_1RB47_TX_2



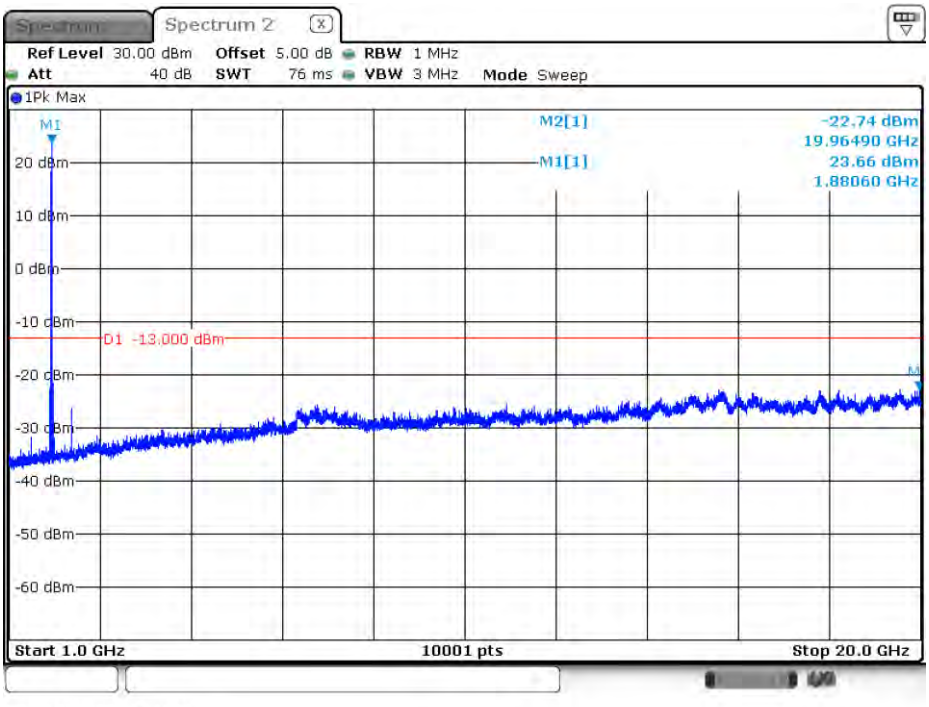
Date: 6.SEP.2018 06:52:13

3.75K_CH18900_BPSK_1RB47_TX_1



Date: 6.SEP.2018 06:54:40

3.75K_CH18900_BPSK_1RB47_TX_2



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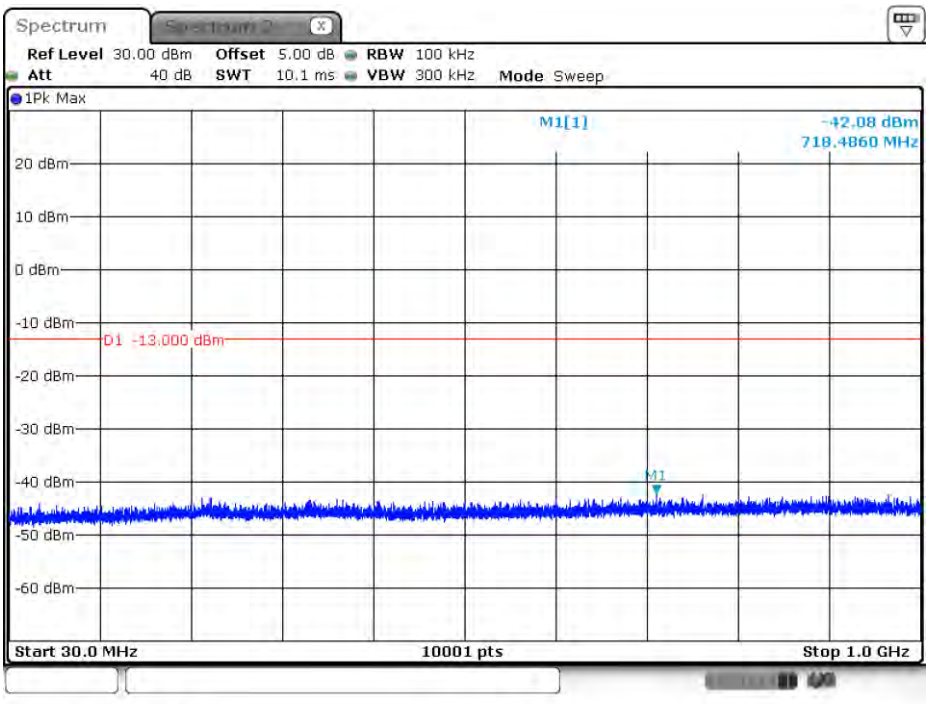
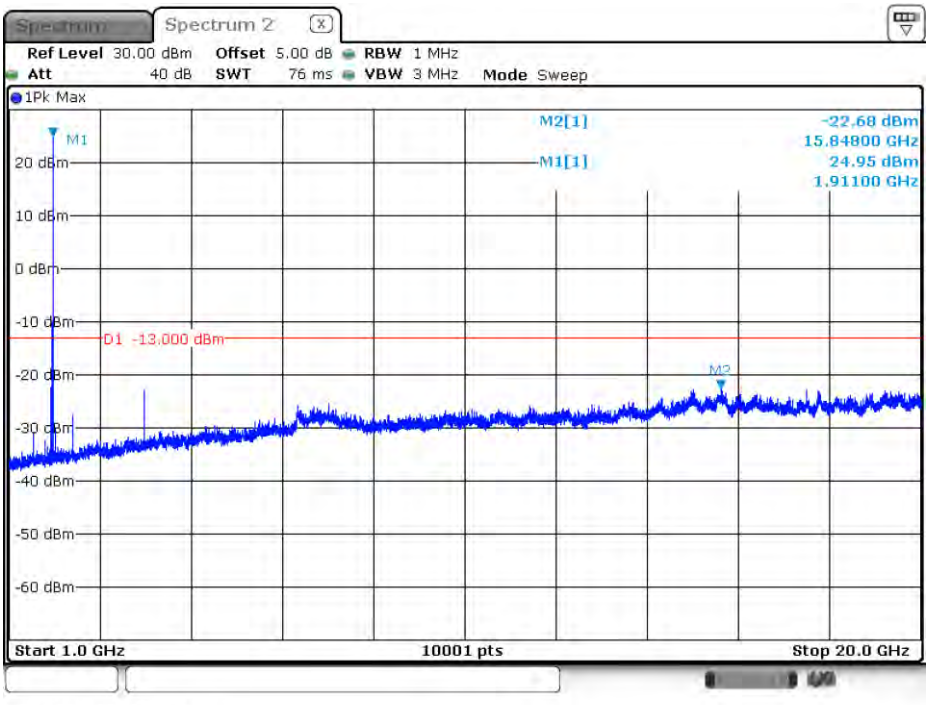
3.75K_CH19199_BPSK_1RB47_TX_1



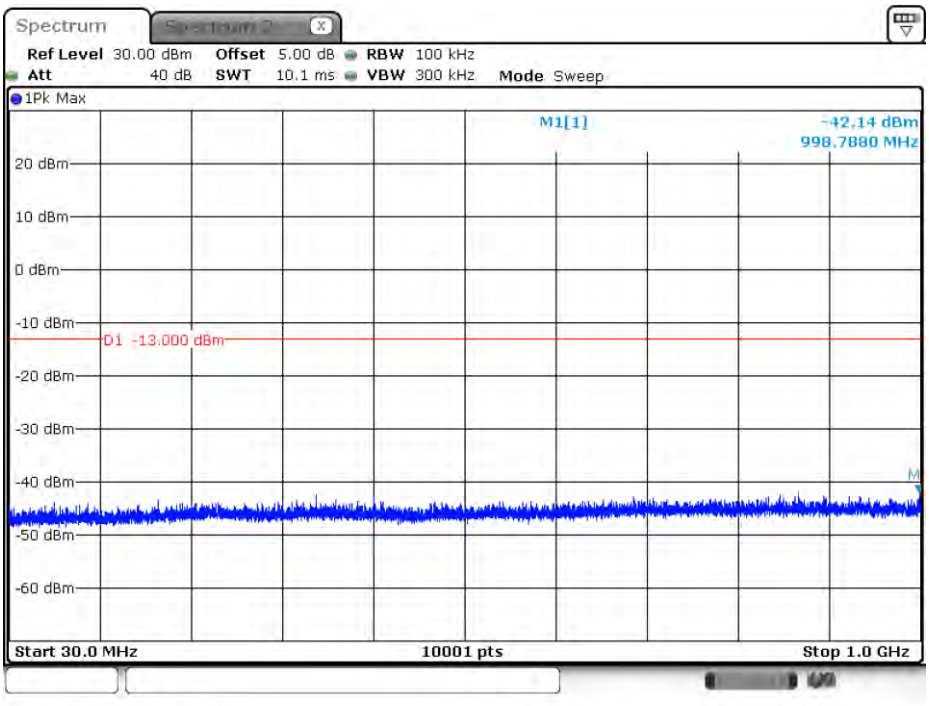
Date: 6.SEP.2018 06:55:59

3.75K_CH19199_BPSK_1RB47_TX_2



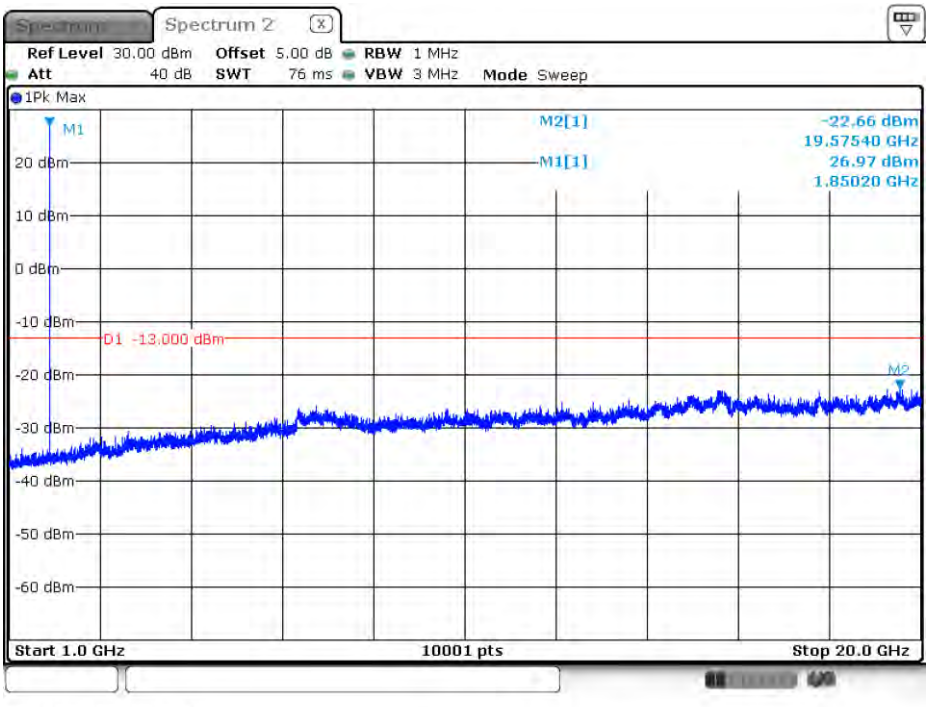
Date: 6.SEP.2018 06:57:06

15K_CH18601_QPSK_3RB3_TX_1



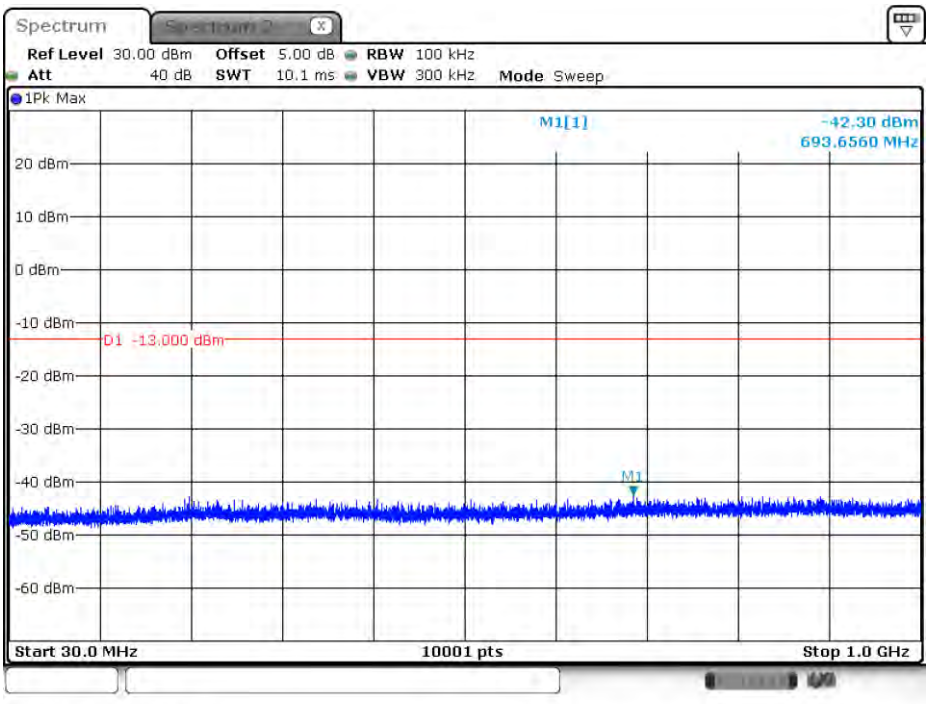
Date: 6.SEP.2018 06:48:06

15K_CH18601_QPSK_3RB3_TX_2



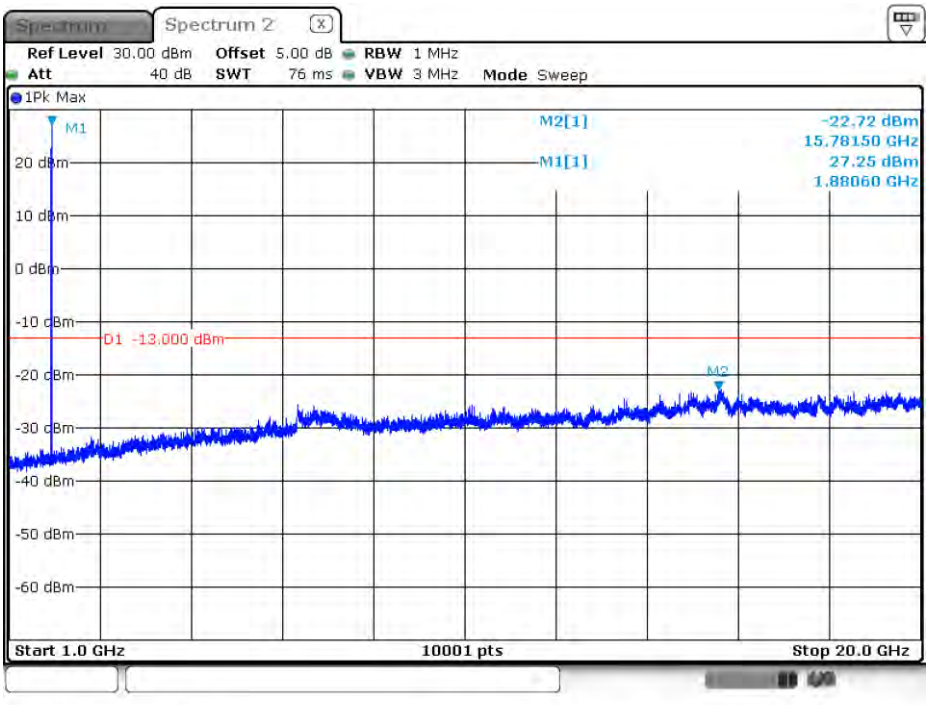
Date: 6.SEP.2018 06:49:32

15K_CH18900_QPSK_3RB3_TX_1



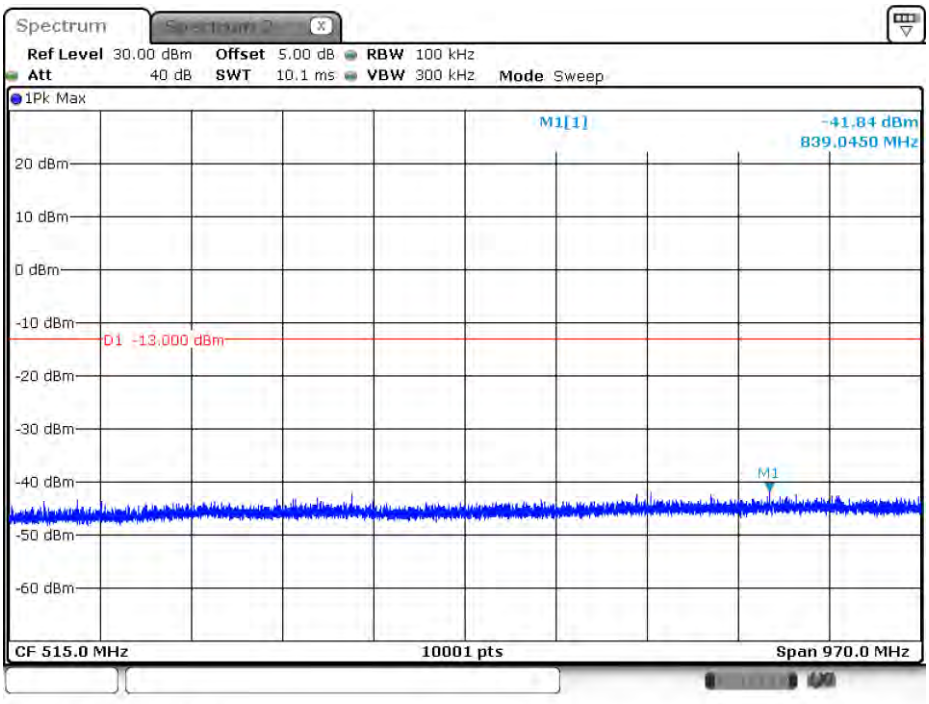
Date: 6.SEP.2018 06:46:00

15K_CH18900_QPSK_3RB3_TX_2



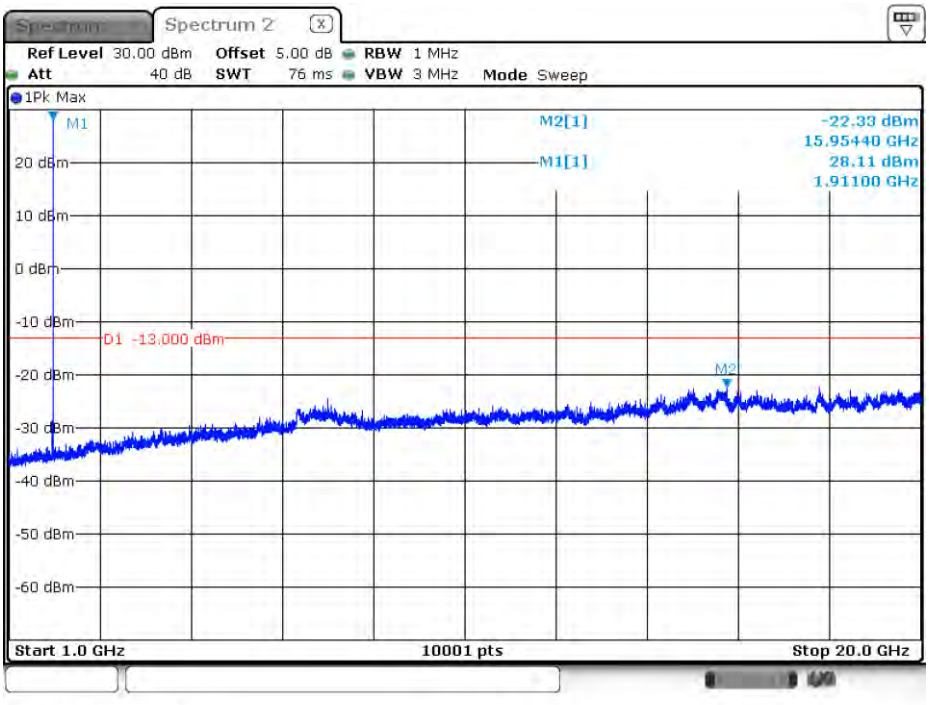
Date: 6.SEP.2018 06:46:56

15K_CH19199_QPSK_3RB3_TX_1



Date: 6.SEP.2018 06:42:01

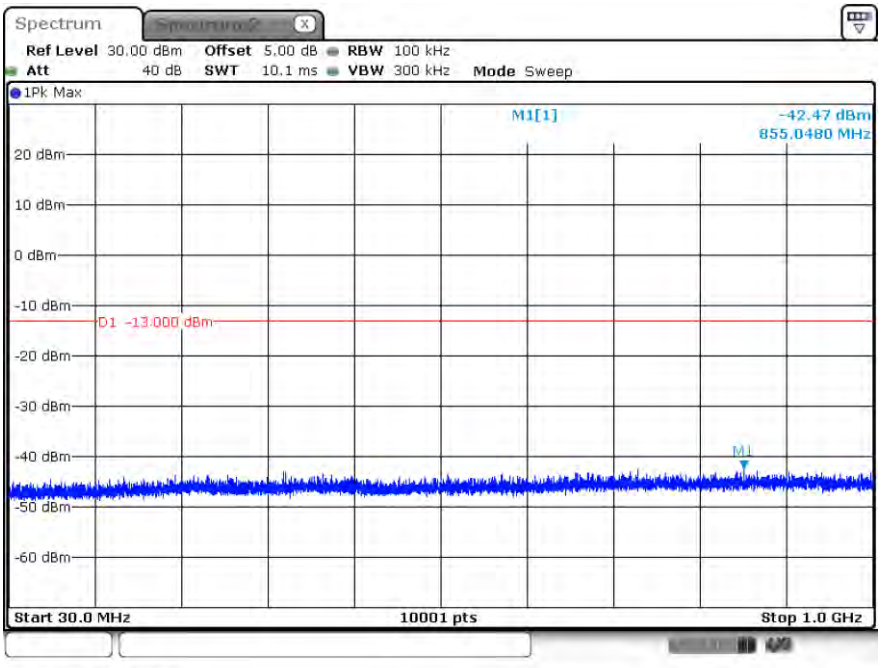
15K_CH19199_QPSK_3RB3_TX_2



Date: 6.SEP.2018 06:44:51

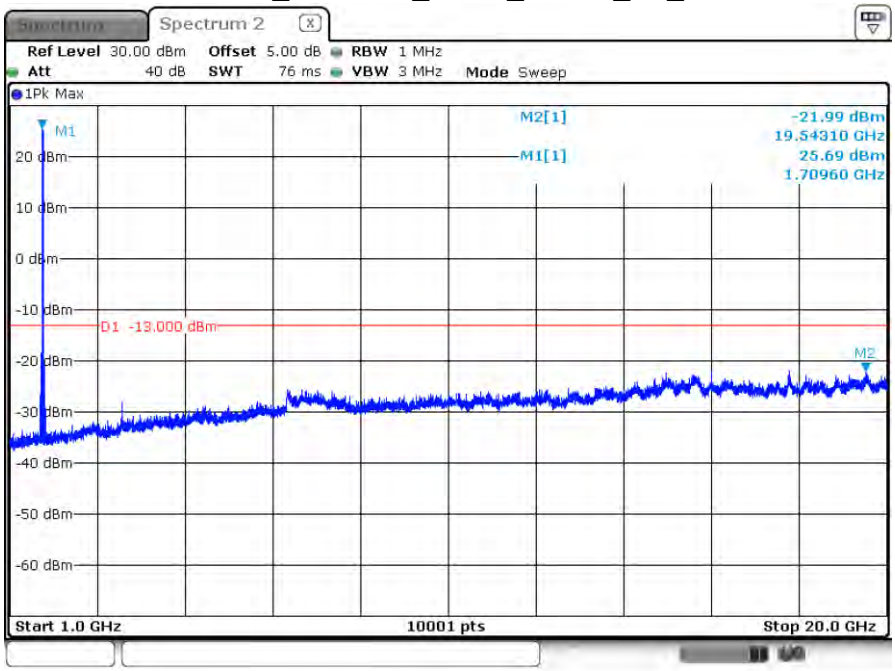
Product	ML865C1-NA		
Test Item	Conducted Spurious Emissions		
Test Mode	Mode 2: LTE_NB-IoT_Band 4		
Date of Test	2018/09/06	Test Site	SR10-H

3.75K_CH19951_BPSK_1RB47_TX_1



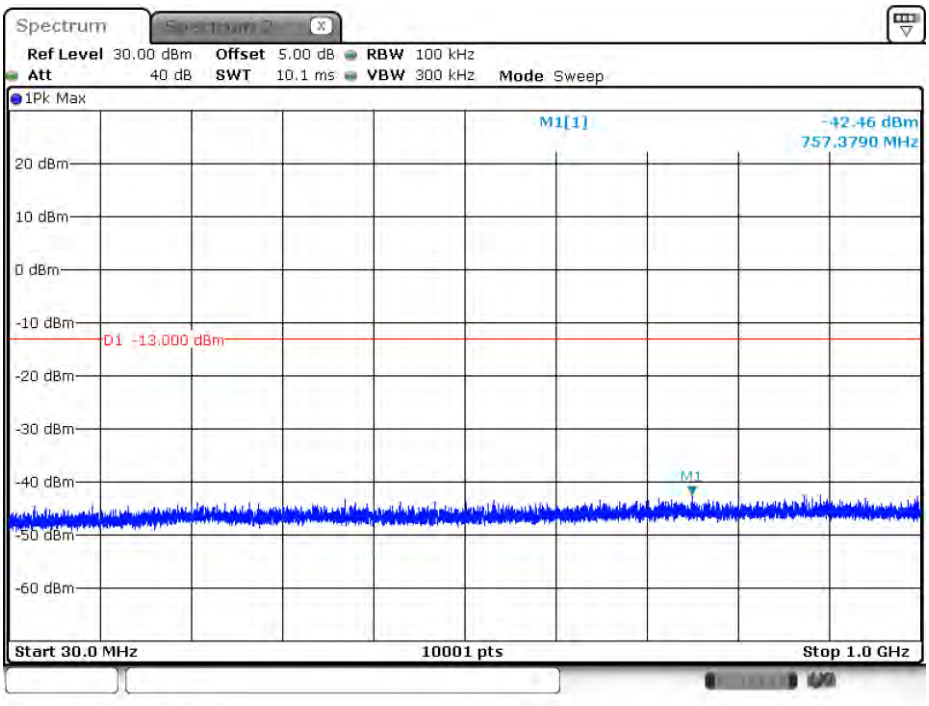
Date: 6.SEP.2018 06:14:23

3.75K_CH19951_BPSK_1RB47_TX_2



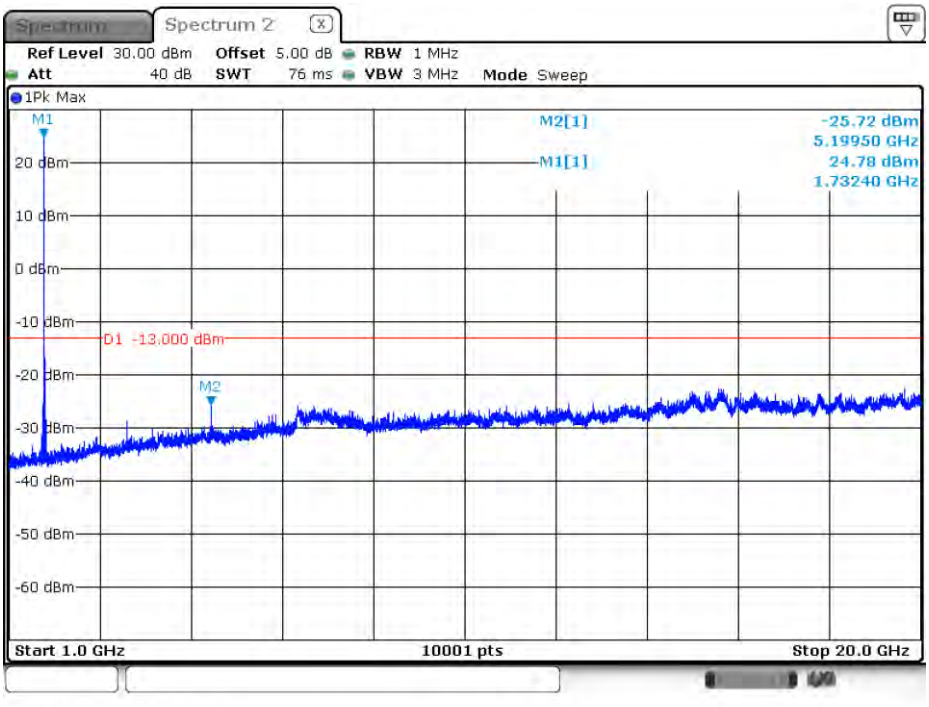
Date: 6.SEP.2018 06:19:03

3.75K_CH20175_BPSK_1RB47_TX_1



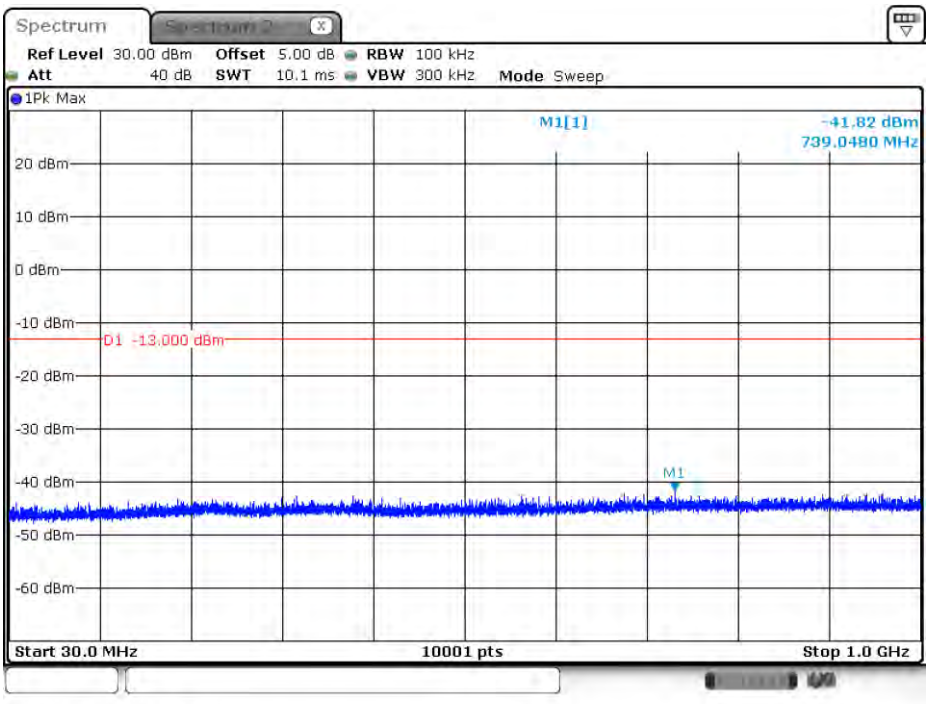
Date: 6.SEP.2018 06:19:56

3.75K_CH20175_BPSK_1RB47_TX_2



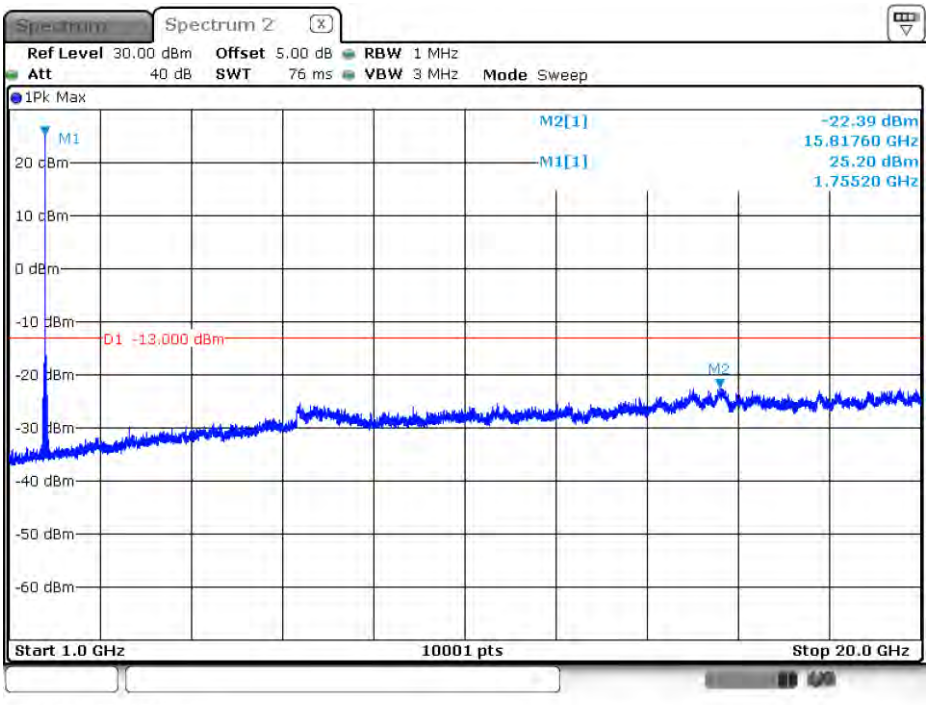
Date: 6.SEP.2018 06:21:11

3.75K_CH20399_BPSK_1RB47_TX_1



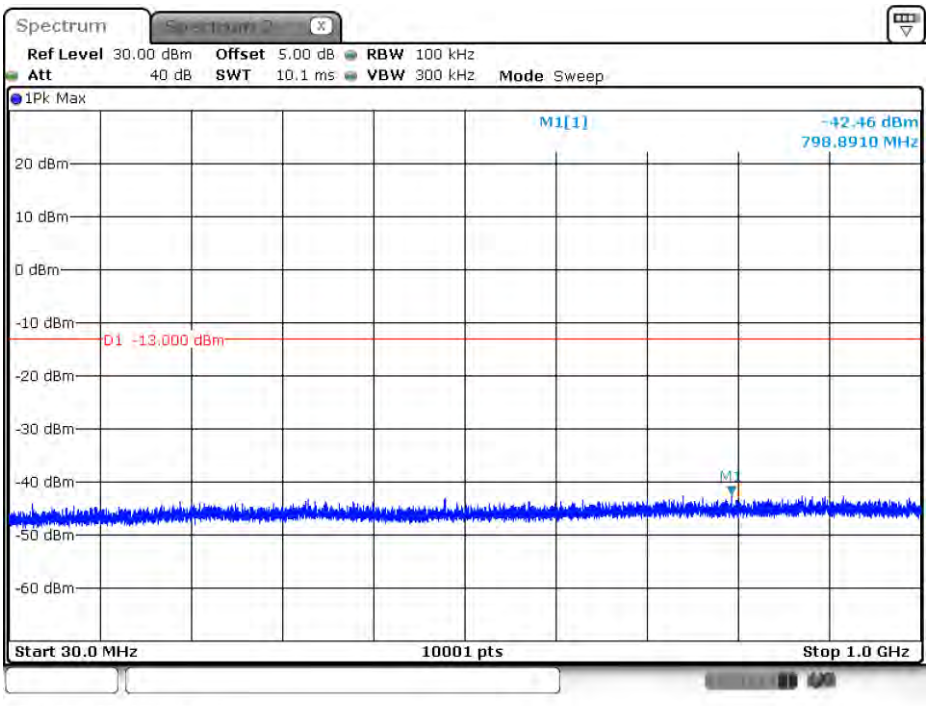
Date: 6.SEP.2018 06:24:24

3.75K_CH20399_BPSK_1RB47_TX_2



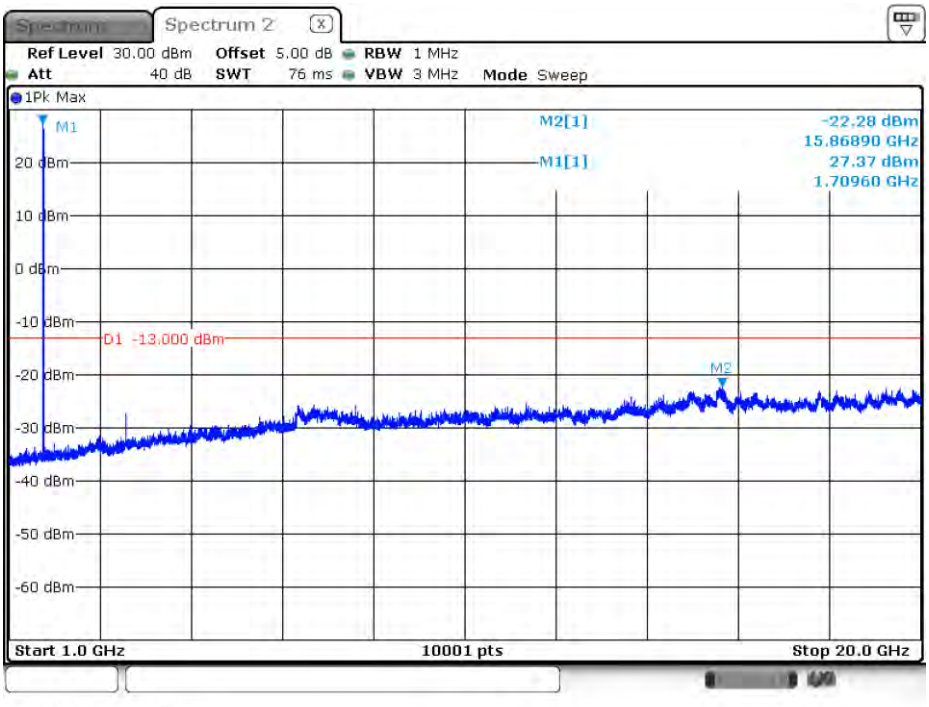
Date: 6.SEP.2018 06:28:43

15K_CH19951_QPSK_3RB3_TX_1



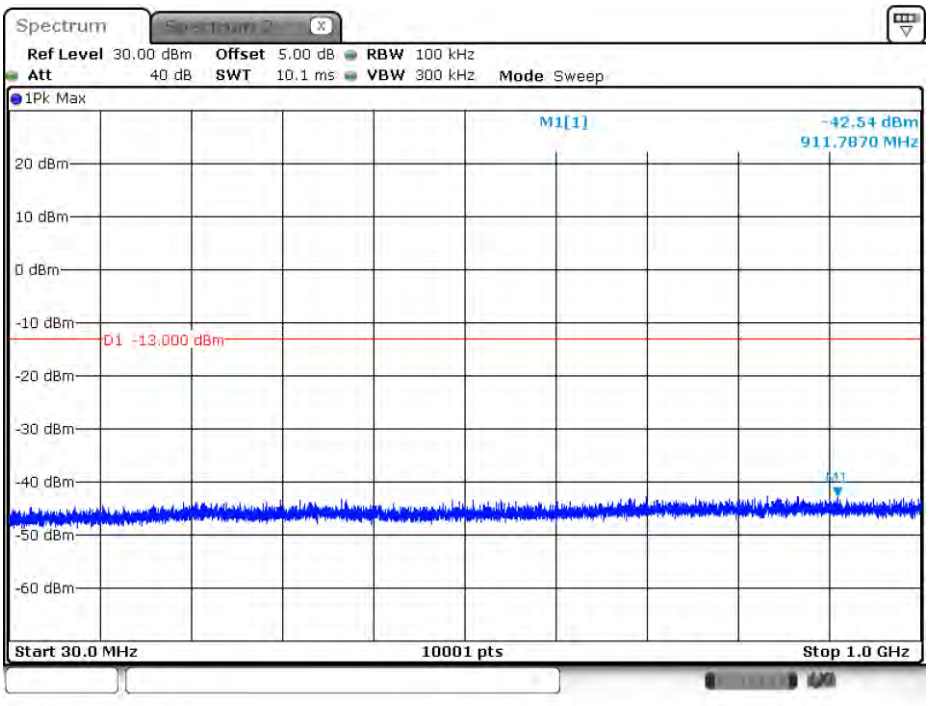
Date: 6.SEP.2018 06:32:23

15K_CH19951_QPSK_3RB3_TX_2



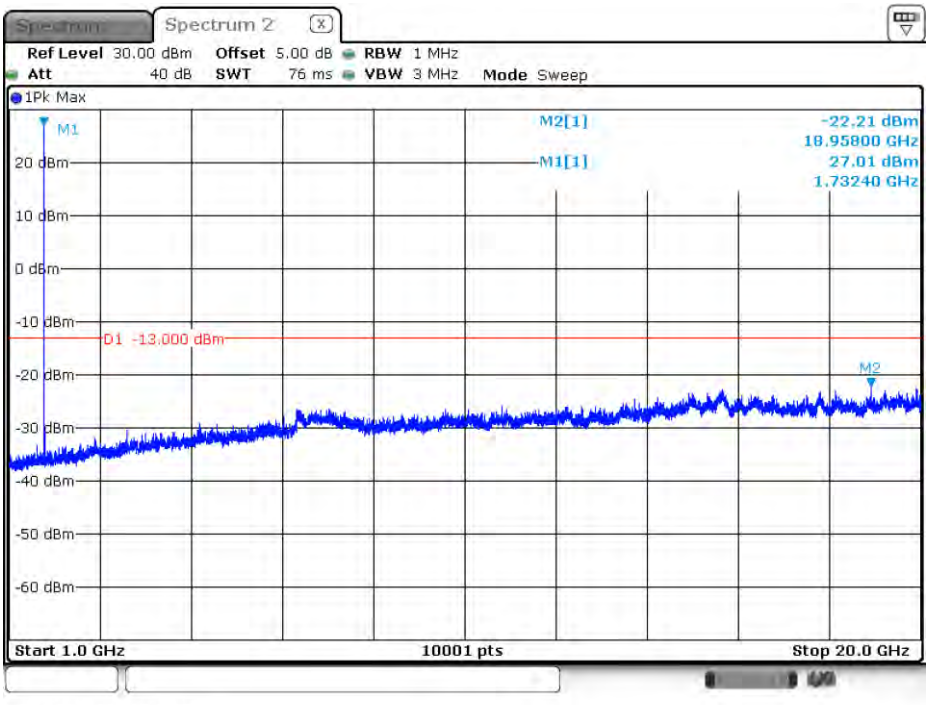
Date: 6.SEP.2018 06:35:19

15K_CH20175_QPSK_3RB3_TX_1



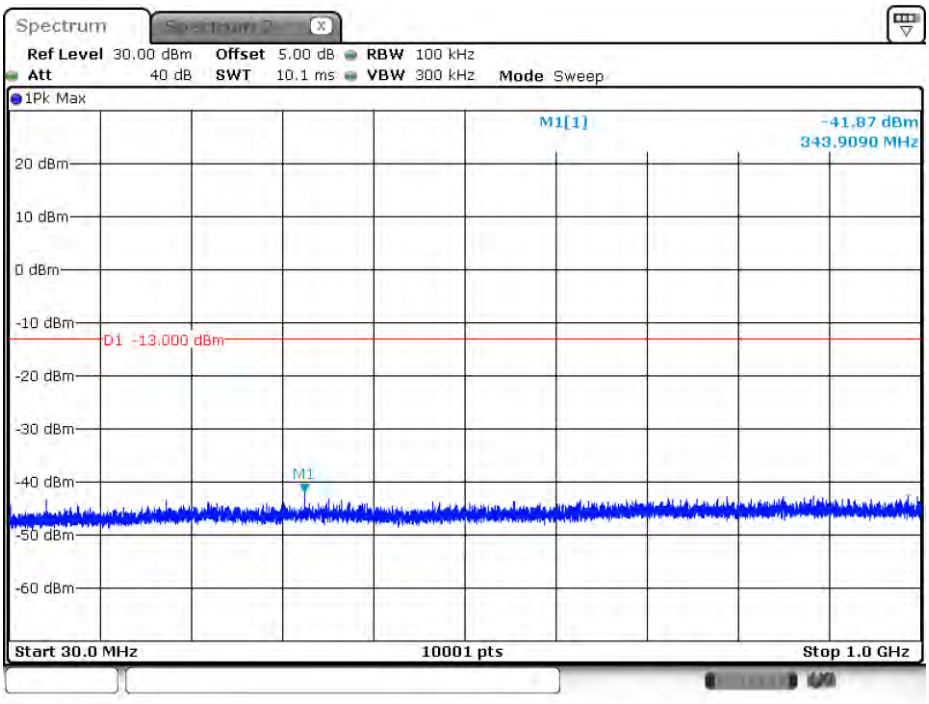
Date: 6.SEP.2018 06:37:15

15K_CH20175_QPSK_3RB3_TX_2



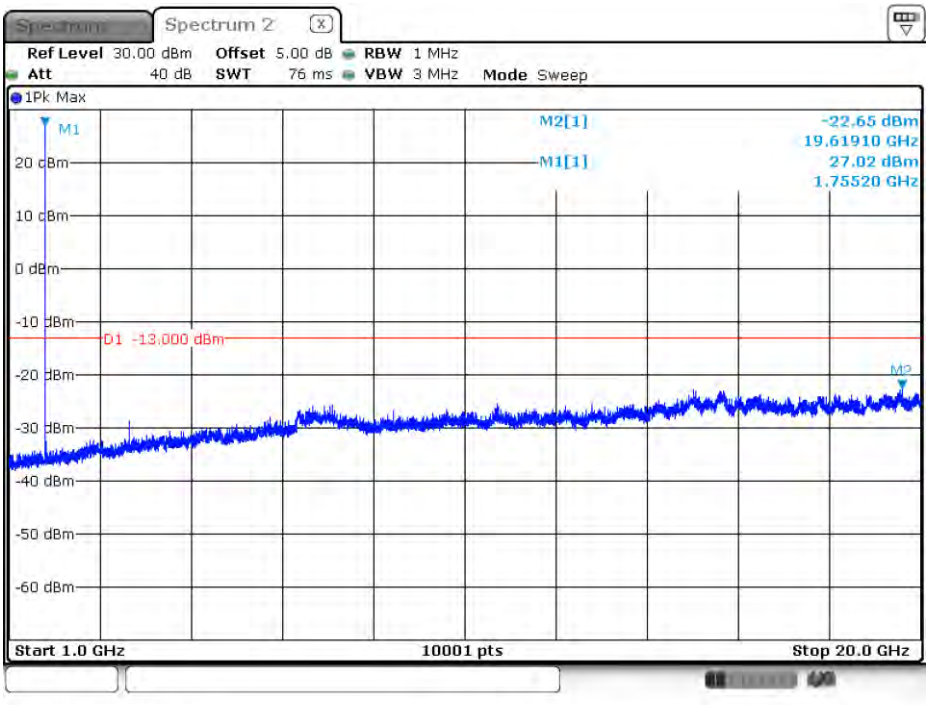
Date: 6.SEP.2018 06:36:25

15K_CH20399_QPSK_3RB3_TX_1



Date: 6.SEP.2018 06:29:58

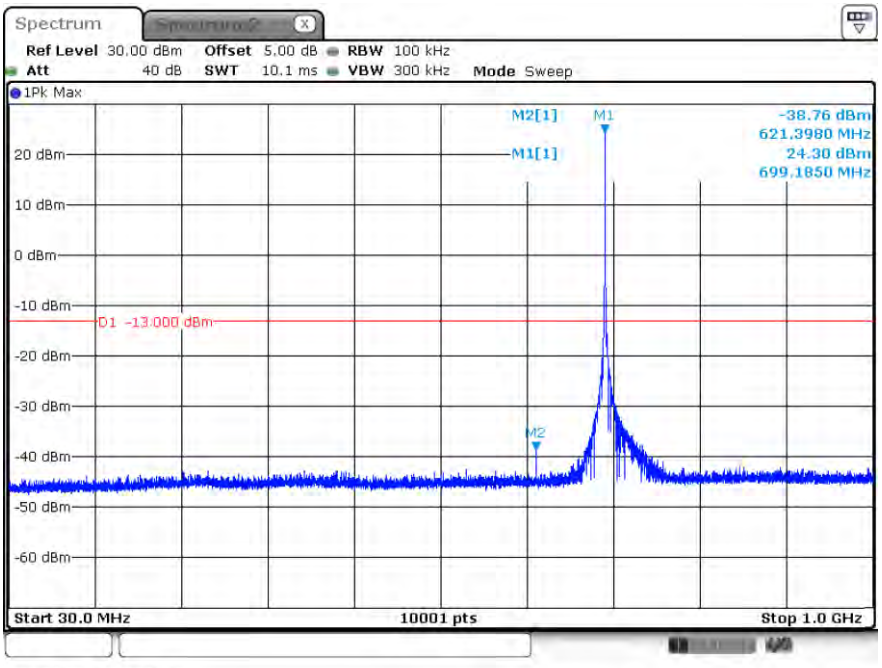
15K_CH20399_QPSK_3RB3_TX_2



Date: 6.SEP.2018 06:31:13

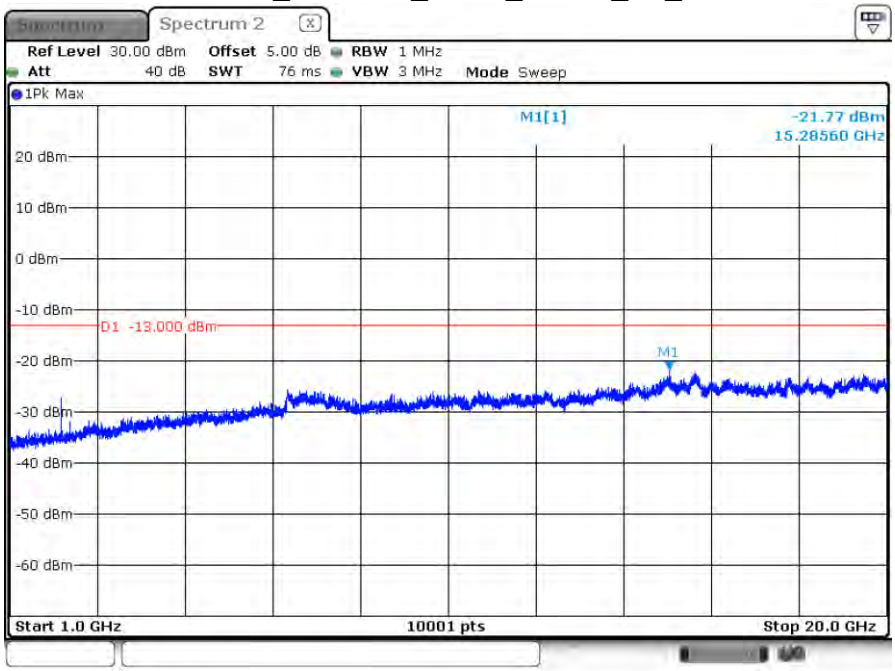
Product	ML865C1-NA		
Test Item	Conducted Spurious Emissions		
Test Mode	Mode 3: LTE_NB-IoT_Band 12		
Date of Test	2018/09/06	Test Site	SR10-H

3.75K_CH23011_BPSK_1RB47_TX_1



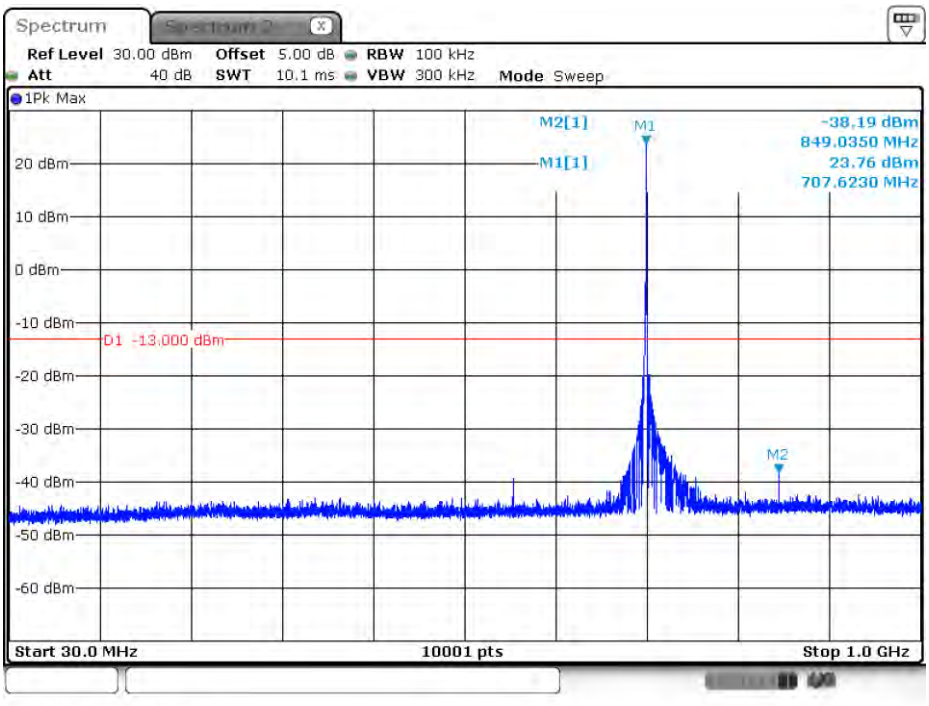
Date: 6.SEP.2018 07:11:25

3.75K_CH23011_BPSK_1RB47_TX_2



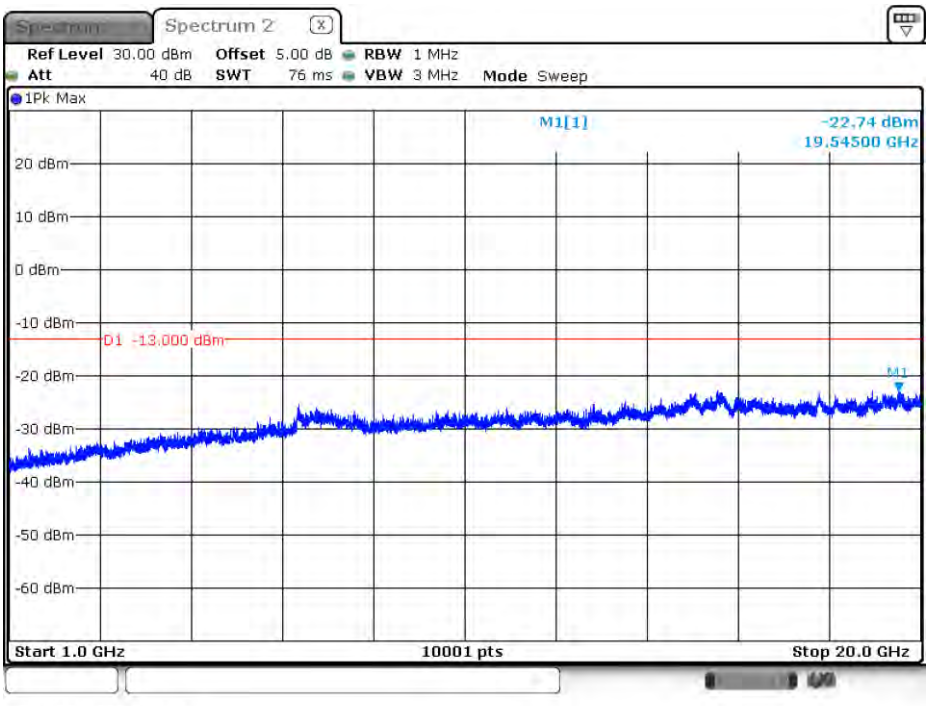
Date: 6.SEP.2018 07:19:03

3.75K_CH23095_BPSK_1RB47_TX_1



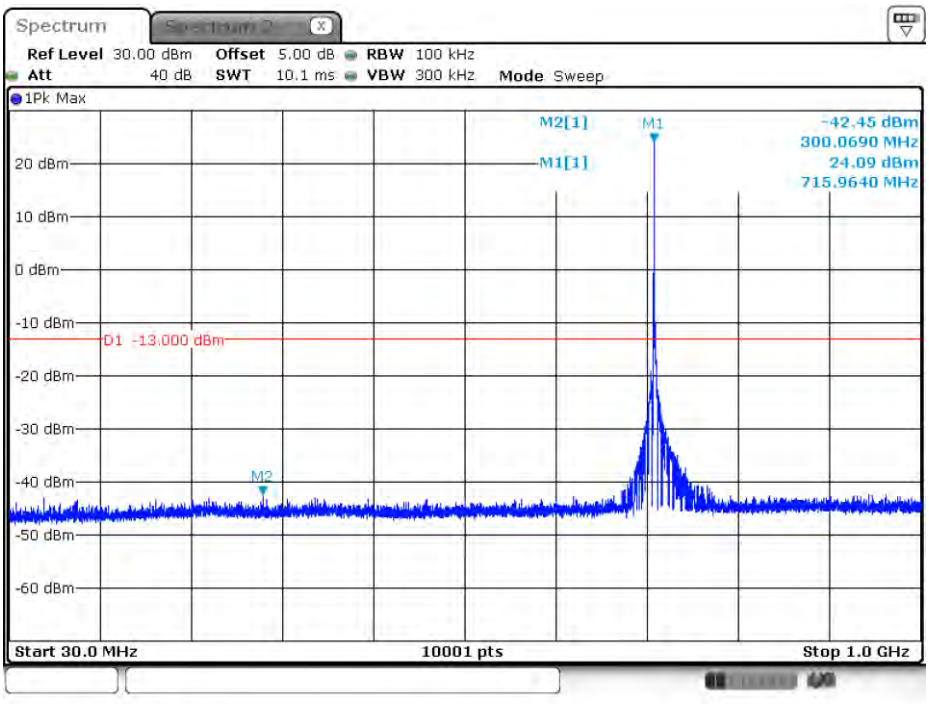
Date: 6.SEP.2018 07:06:25

3.75K_CH23095_BPSK_1RB47_TX_2



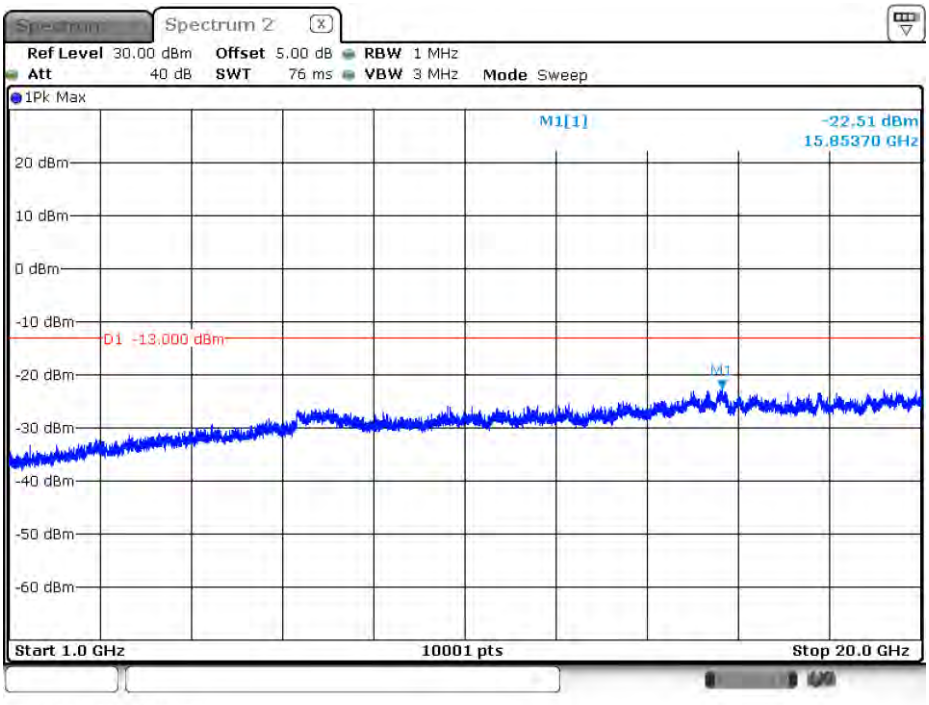
Date: 6.SEP.2018 07:07:32

3.75K_CH23179_BPSK_1RB47_TX_1



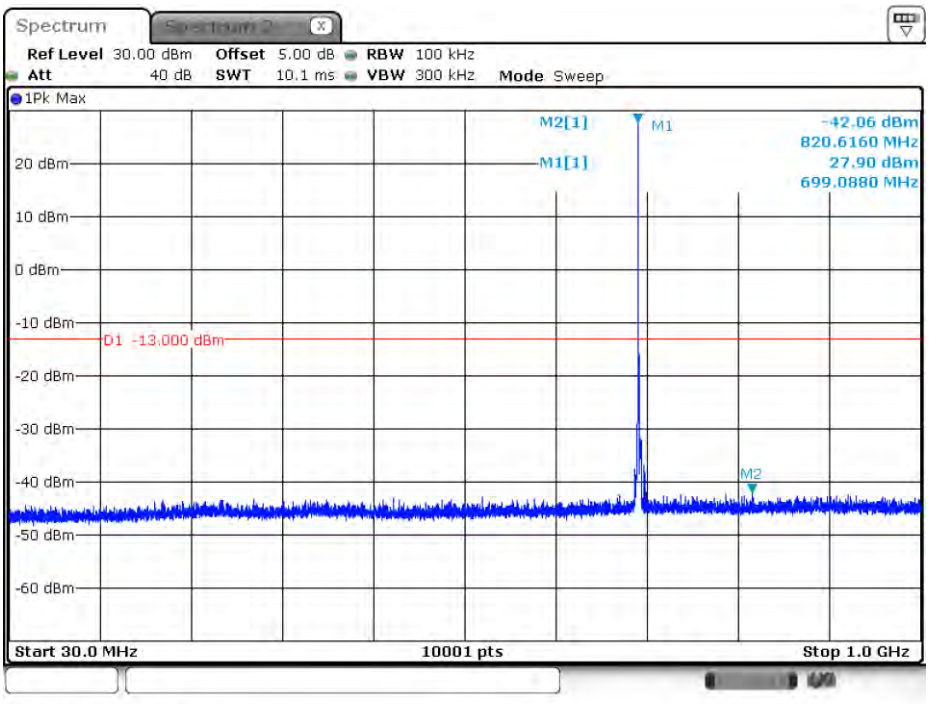
Date: 6.SEP.2018 07:02:11

3.75K_CH23179_BPSK_1RB47_TX_2



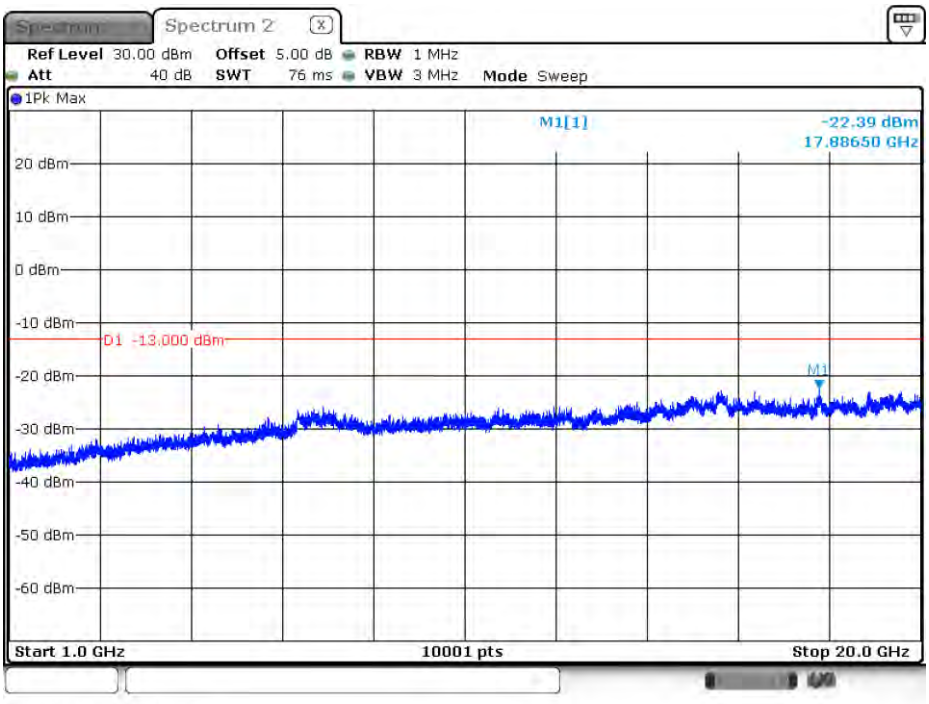
Date: 6.SEP.2018 07:03:35

15K_CH23011_QPSK_3RB3_TX_1



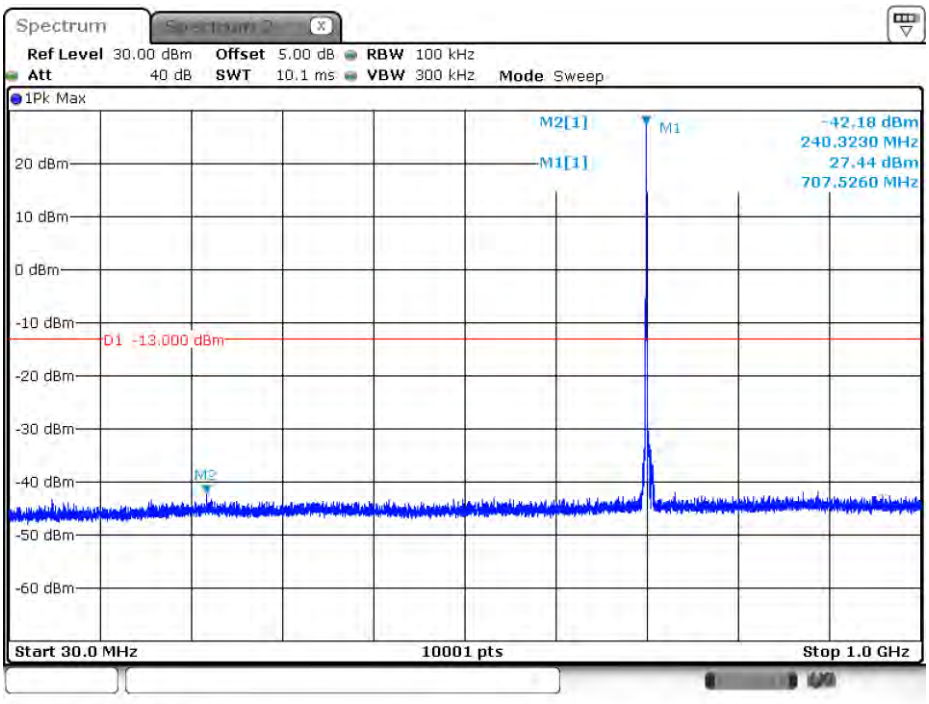
Date: 6.SEP.2018 07:24:51

15K_CH23011_QPSK_3RB3_TX_2



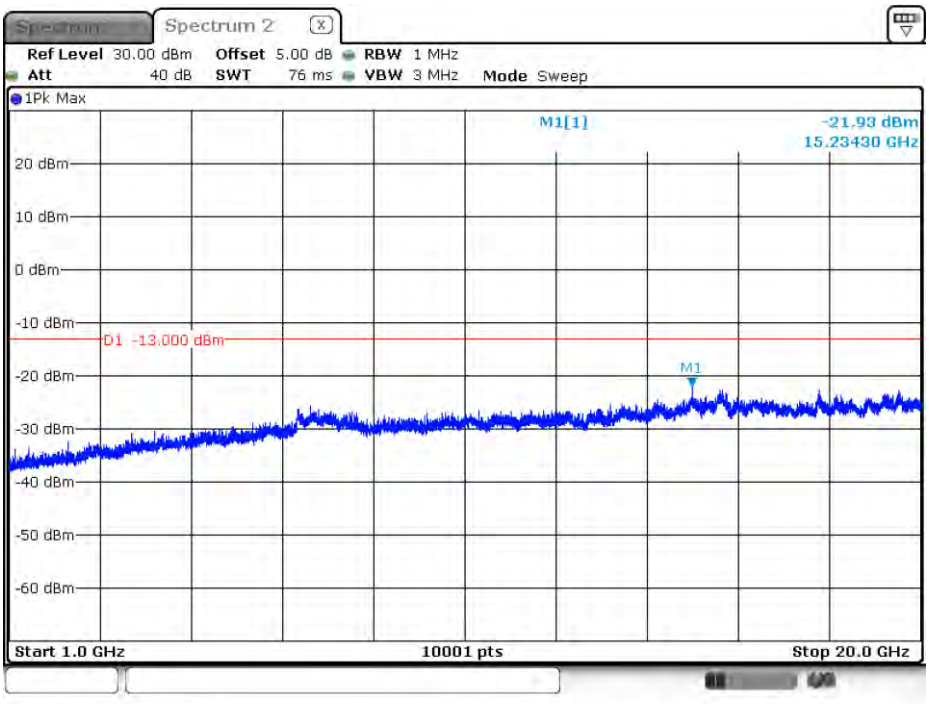
Date: 6.SEP.2018 07:26:04

15K_CH23095_QPSK_3RB3_TX_1



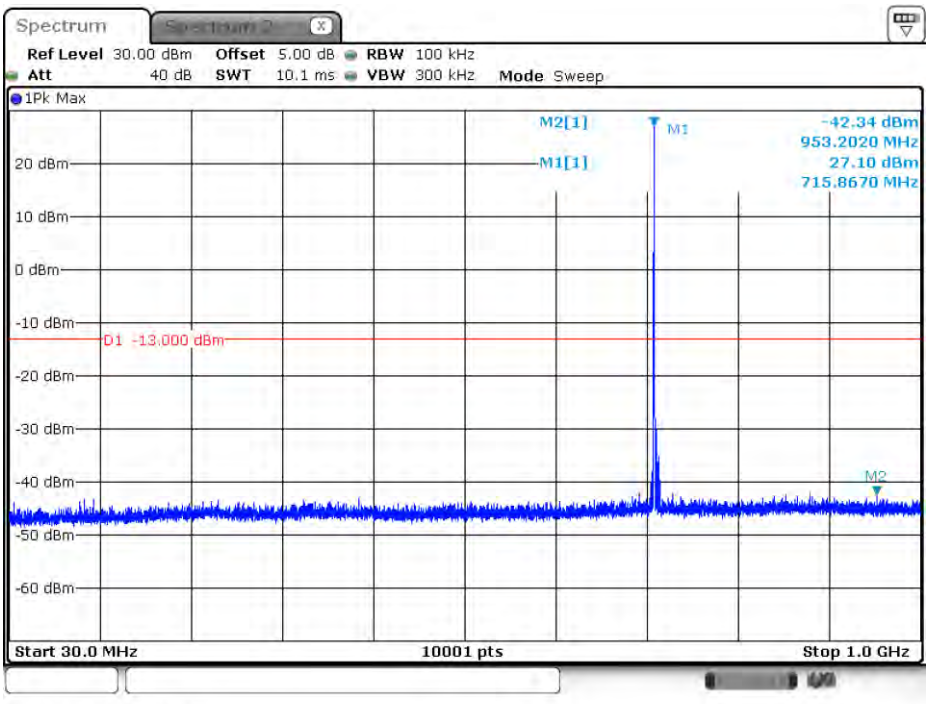
Date: 6.SEP.2018 07:28:38

15K_CH23095_QPSK_3RB3_TX_2



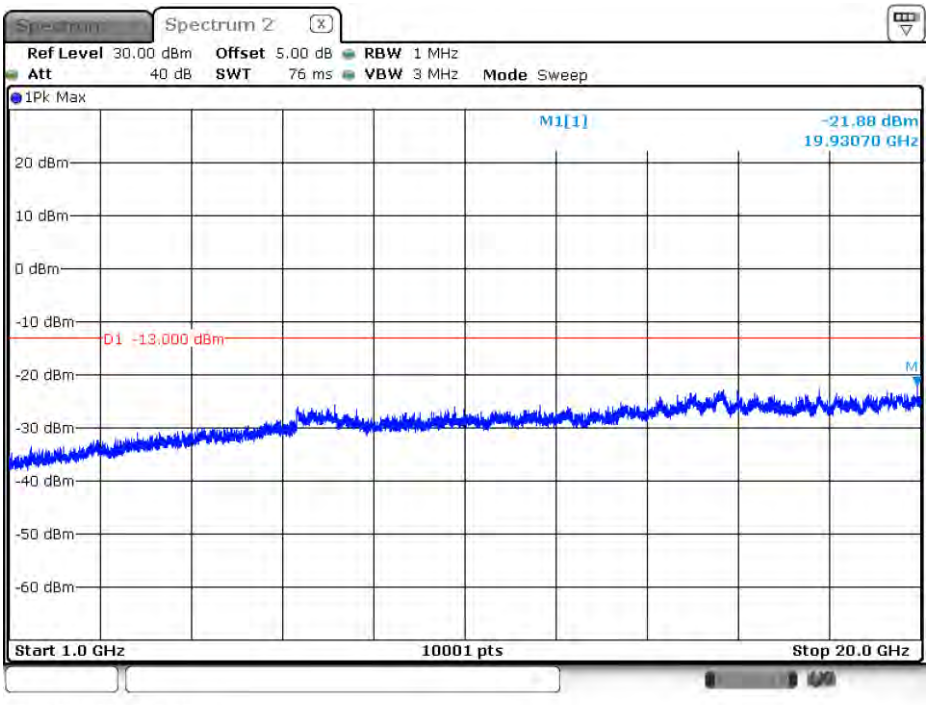
Date: 6.SEP.2018 07:30:25

15K_CH23179_QPSK_3RB3_TX_1



Date: 6.SEP.2018 07:33:10

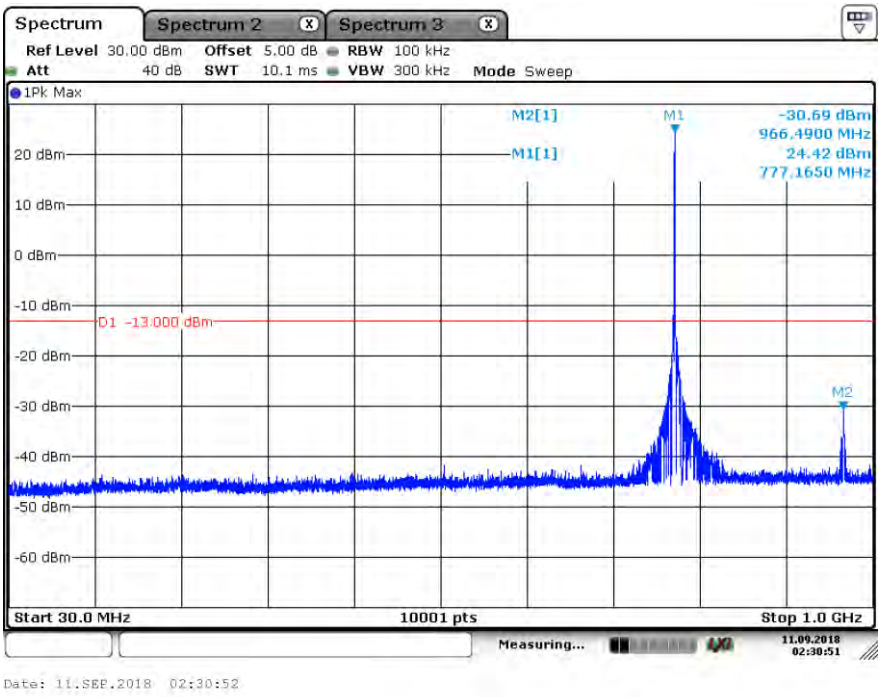
15K_CH23179_QPSK_3RB3_TX_2



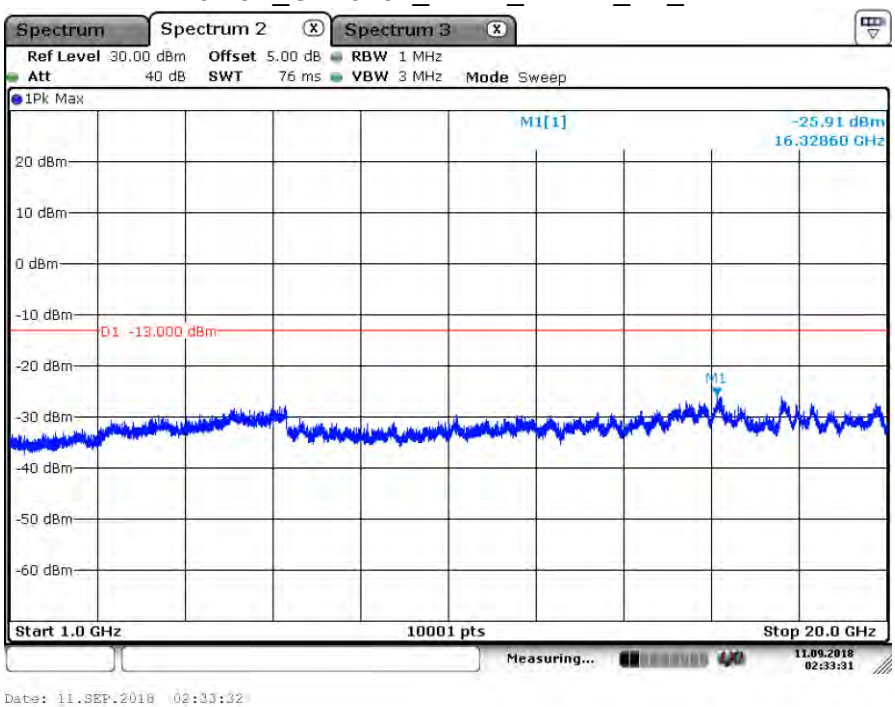
Date: 6.SEP.2018 07:32:09

Product	ML865C1-NA		
Test Item	Conducted Spurious Emissions		
Test Mode	Mode 4: LTE_NB-IoT_Band 13		
Date of Test	2018/09/11	Test Site	SR10-H

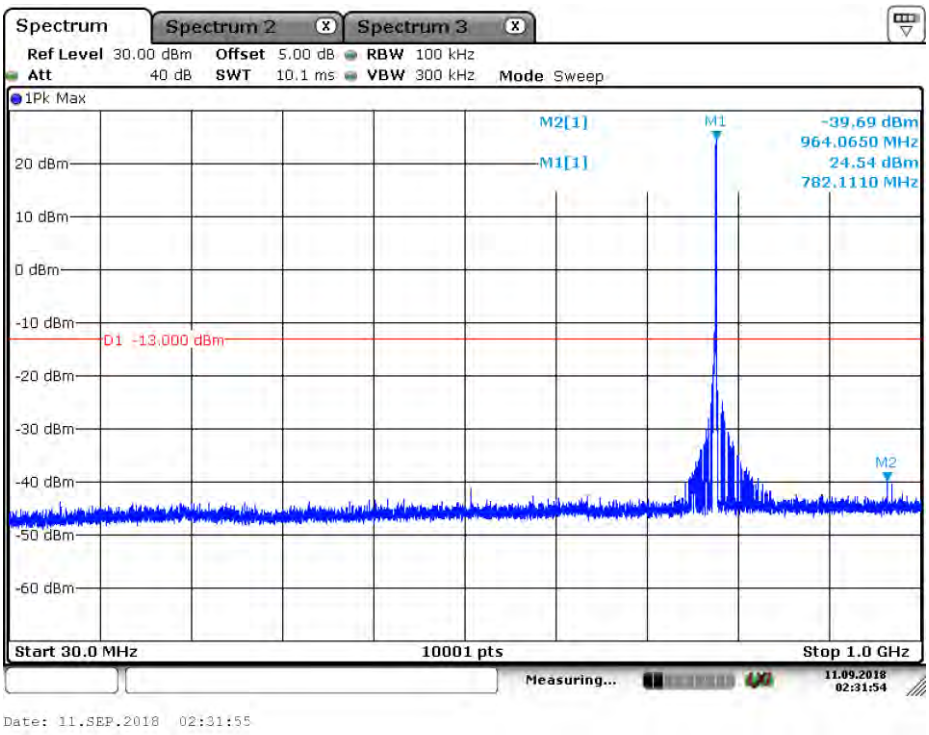
3.75K_CH23181_BPSK_1RB47_TX_1



3.75K_CH23181_BPSK_1RB47_TX_2

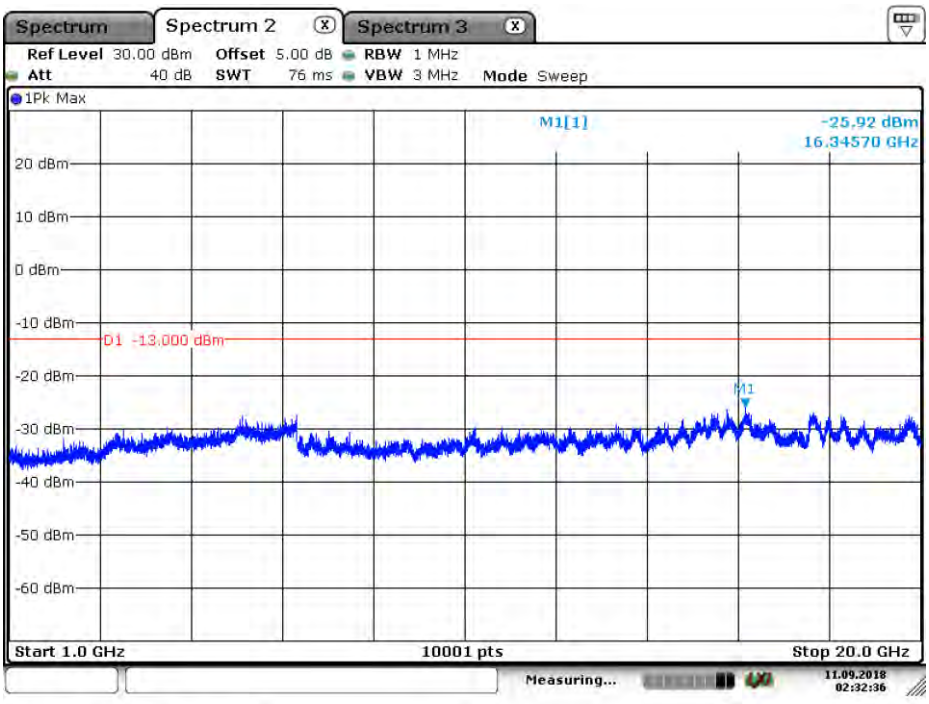


3.75K_CH23230_BPSK_1RB47_TX_1



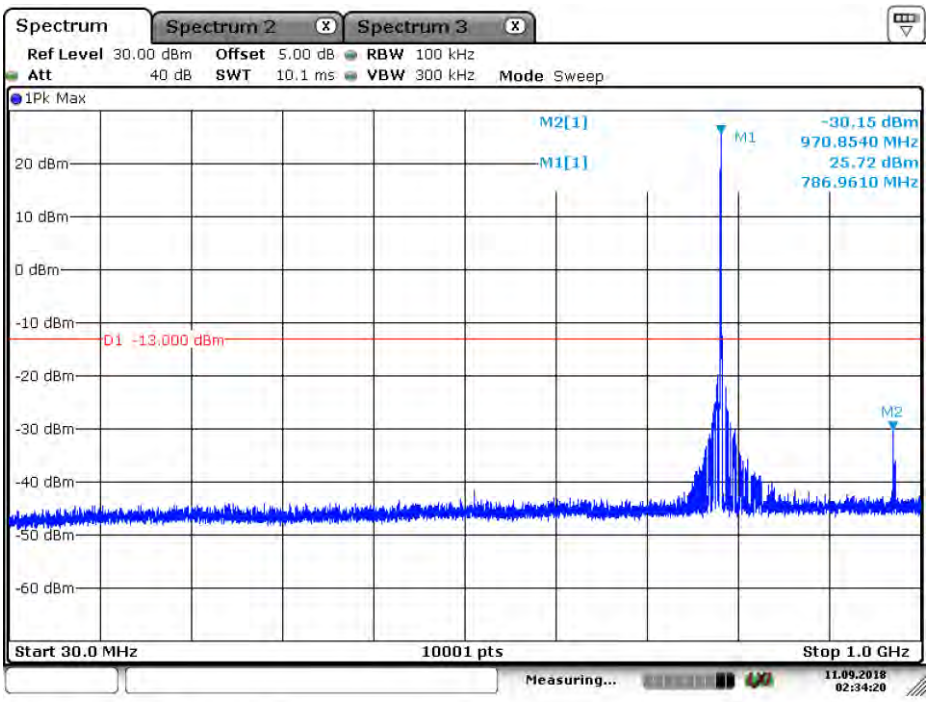
Date: 11.SEP.2018 02:31:55

3.75K_CH23230_BPSK_1RB47_TX_2



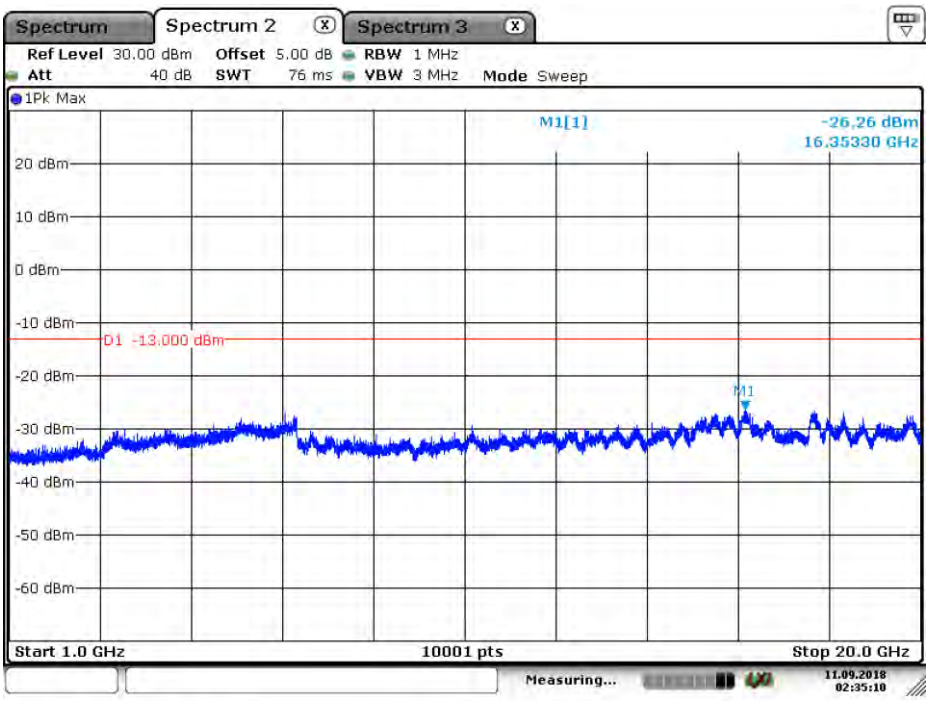
Date: 11.SEP.2018 02:32:37

3.75K_CH23279_BPSK_1RB47_TX_1



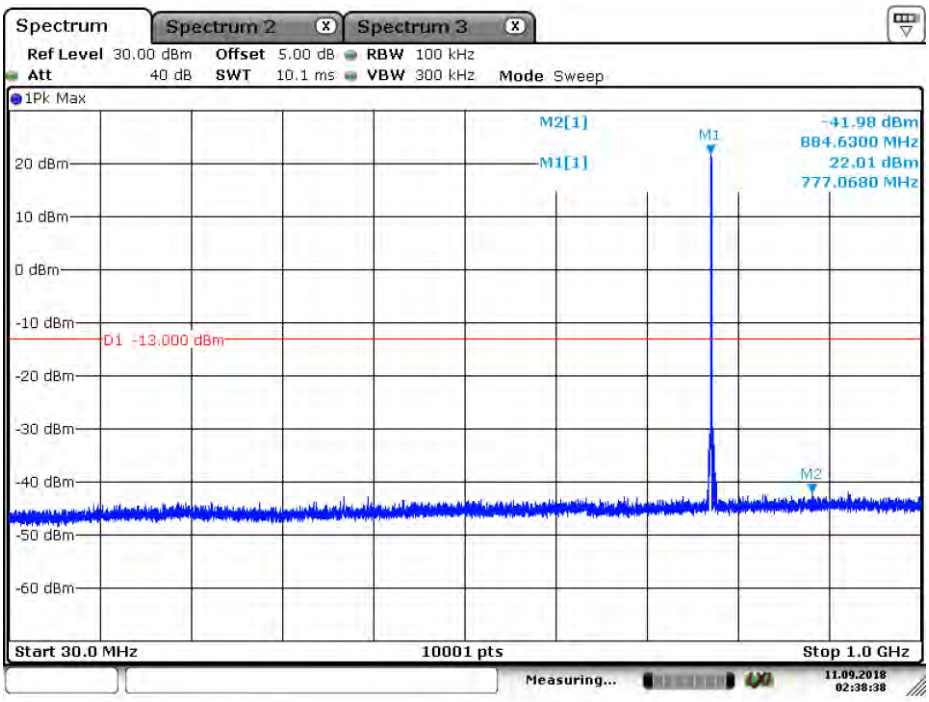
Date: 11.SEP.2018 02:34:20

3.75K_CH23279_BPSK_1RB47_TX_2



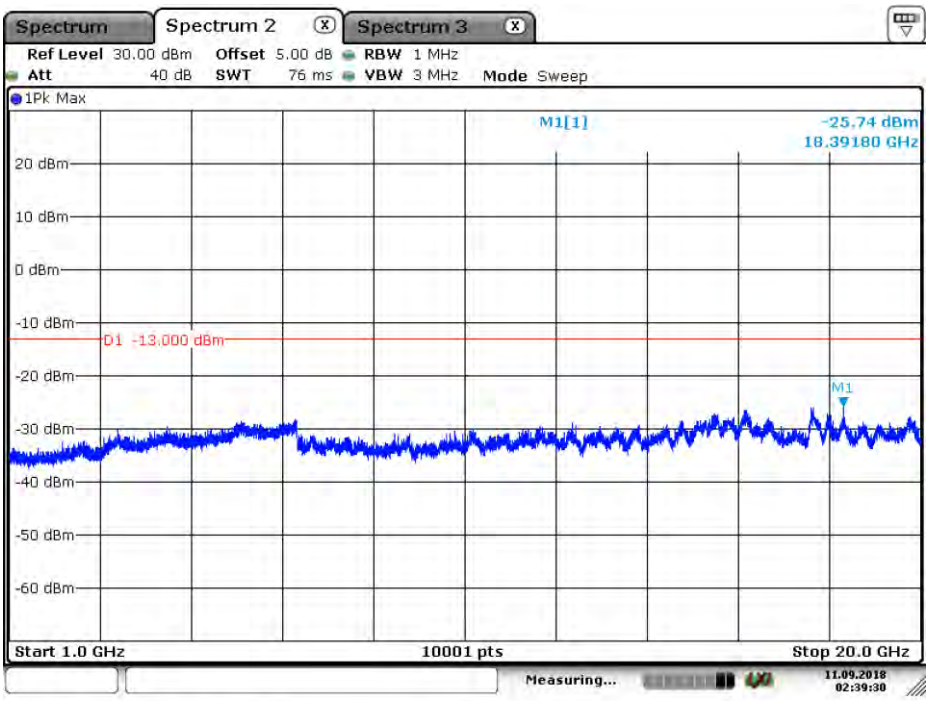
Date: 11.SEP.2018 02:35:11

15K_CH23181_QPSK_3RB3_TX_1



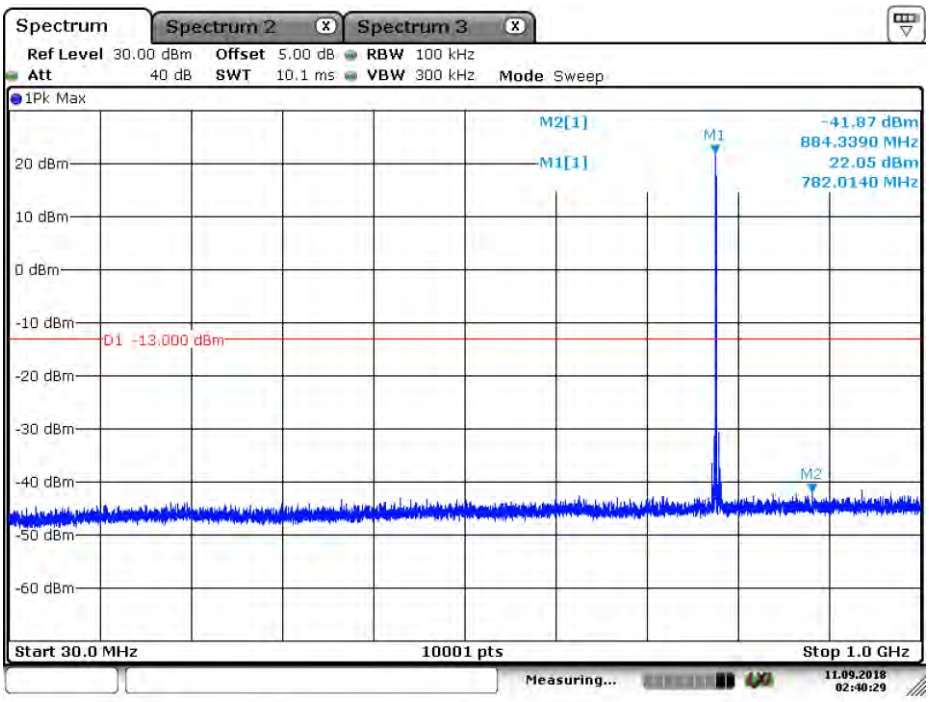
Date: 11.SEP.2018 02:38:39

15K_CH23181_QPSK_3RB3_TX_2



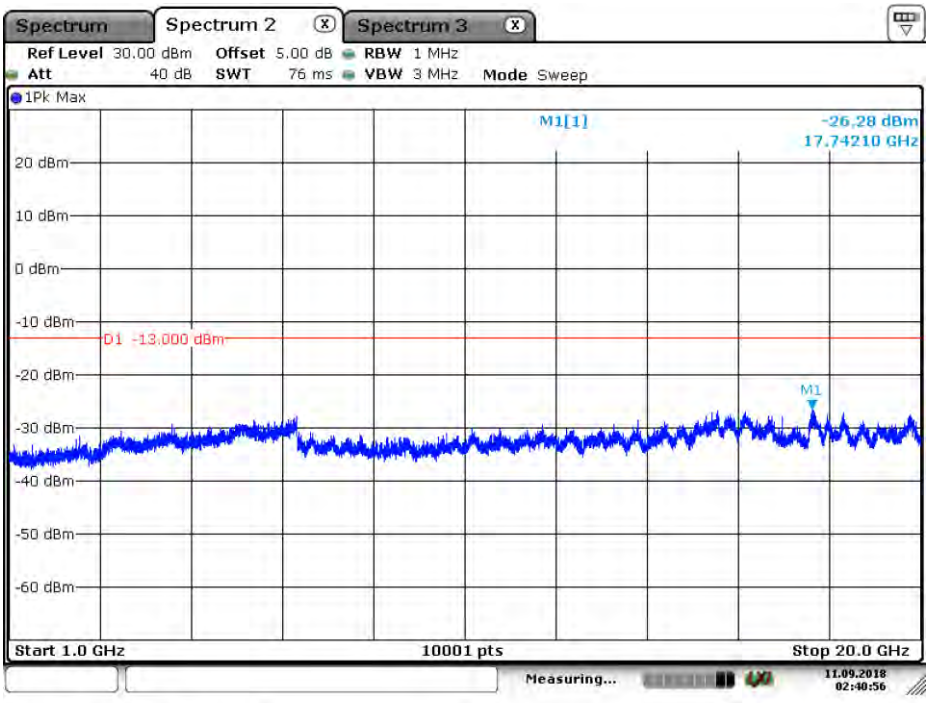
Date: 11.SEP.2018 02:39:30

15K_CH23230_QPSK_3RB3_TX_1



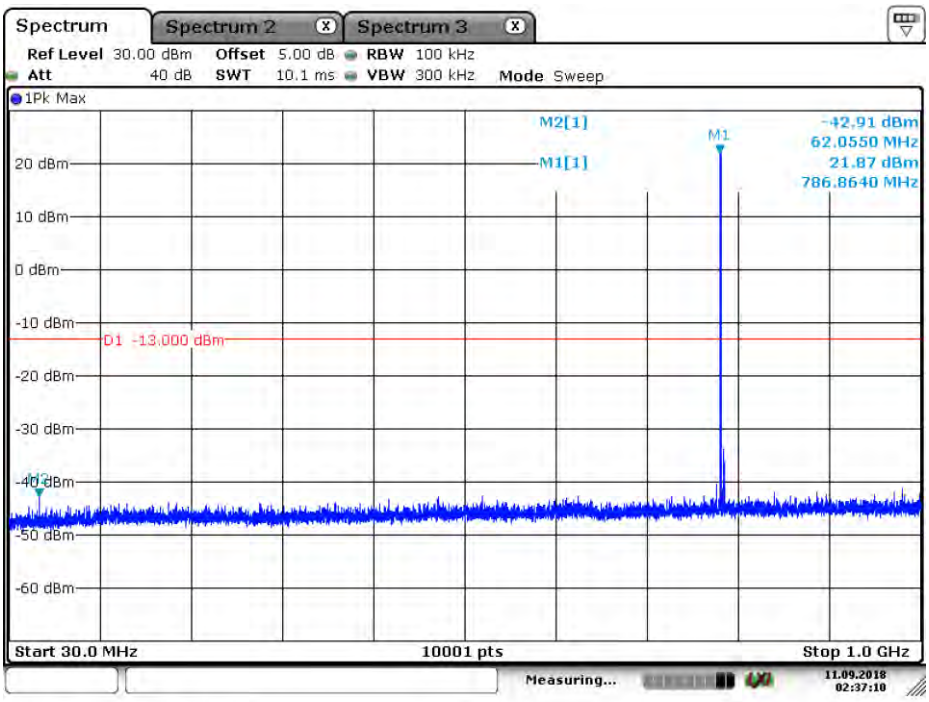
Date: 11.SEP.2018 02:40:30

15K_CH23230_QPSK_3RB3_TX_2



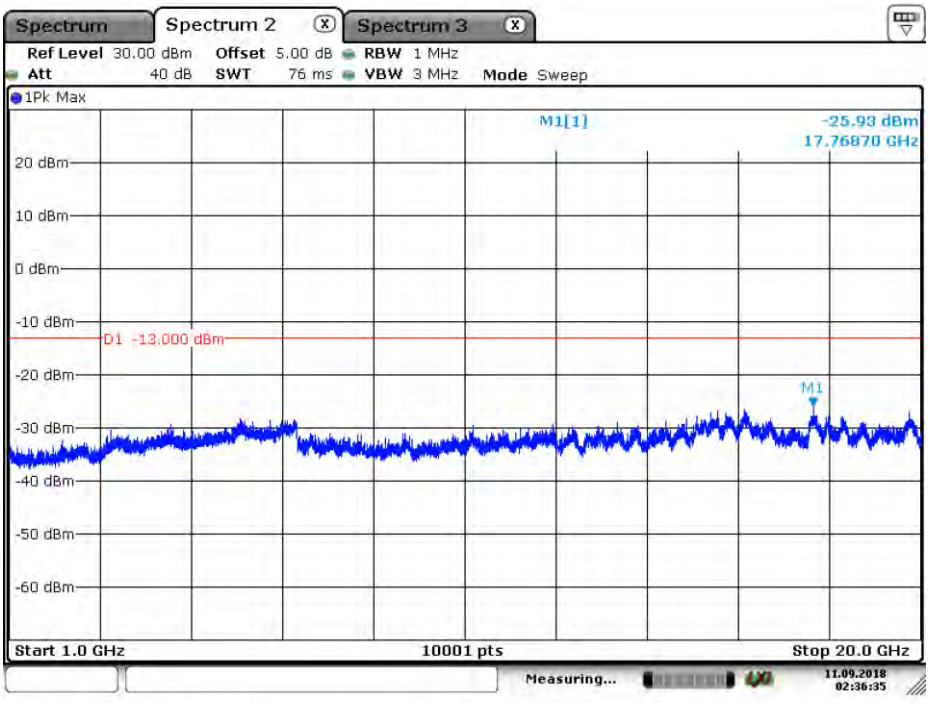
Date: 11.SEP.2018 02:40:57

15K_CH23279_QPSK_3RB3_TX_1



Date: 11.SEP.2018 02:37:11

15K_CH23279_QPSK_3RB3_TX_2



Date: 11.SEP.2018 02:36:35

Product	ML865C1-NA		
Test Item	Radiated Spurious Emissions		
Test Mode	Mode 1: LTE_NB-IoT_Band 2		
Date of Test	2018/09/08	Test Site	CB4-H

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
CH18601_3.75K_BPSK_1RB47								
3700.20	-42.890	H	-49.776	4.283	11.940	-42.120	-13	-29.120
5550.30	-43.750	H	-47.509	5.201	12.900	-39.810	-13	-26.810
3700.20	-33.740	V	-40.536	4.283	11.940	-32.880	-13	-19.880
5550.30	-46.390	V	-49.949	5.201	12.900	-42.250	-13	-29.250
CH18900_3.75K_BPSK_1RB47								
3760.00	-46.430	H	-53.247	4.335	11.832	-45.750	-13	-32.750
5640.00	-44.950	H	-48.305	5.235	12.900	-40.640	-13	-27.640
3760.00	-39.100	V	-45.797	4.335	11.832	-38.300	-13	-25.300
5640.00	-39.010	V	-42.195	5.235	12.900	-34.530	-13	-21.530
CH19199_3.75K_BPSK_1RB47								
3819.80	-44.600	H	-51.328	4.386	11.724	-43.990	-13	-30.990
5729.70	-48.260	H	-51.210	5.270	12.900	-43.580	-13	-30.580
3819.80	-36.360	V	-42.938	4.386	11.724	-35.600	-13	-22.600
5729.70	-39.080	V	-41.900	5.270	12.900	-34.270	-13	-21.270

Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
CH18601_15K_QPSK_3RB3								
3700.20	-60.640	H	-67.526	4.283	11.940	-59.870	-13	-46.870
5550.30	-63.980	H	-67.739	5.201	12.900	-60.040	-13	-47.040
3700.20	-50.800	V	-57.596	4.283	11.940	-49.940	-13	-36.940
5550.30	-44.030	V	-47.589	5.201	12.900	-39.890	-13	-26.890
CH18900_15K_QPSK_3RB3								
3760.00	-61.440	H	-68.257	4.335	11.832	-60.760	-13	-47.760
5640.00	-59.970	H	-63.325	5.235	12.900	-55.660	-13	-42.660
3760.00	-52.800	V	-59.497	4.335	11.832	-52.000	-13	-39.000
5640.00	-42.440	V	-45.625	5.235	12.900	-37.960	-13	-24.960
CH19199_15K_QPSK_3RB3								
3819.80	-61.370	H	-68.098	4.386	11.724	-60.760	-13	-47.760
5729.70	-61.570	H	-64.520	5.270	12.900	-56.890	-13	-43.890
3819.80	-50.710	V	-57.288	4.386	11.724	-49.950	-13	-36.950
5729.70	-42.670	V	-45.490	5.270	12.900	-37.860	-13	-24.860

Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

Product	ML865C1-NA		
Test Item	Radiated Spurious Emissions		
Test Mode	Mode 2: LTE_NB-IoT_Band 4		
Date of Test	2018/09/08	Test Site	CB4-H

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
CH19951_3.75K_BPSK_1RB47								
3420.20	-47.760	H	-55.089	4.064	12.093	-47.060	-13	-34.060
5130.30	-50.490	H	-52.910	5.075	12.235	-45.750	-13	-32.750
3420.20	-40.750	V	-48.019	4.064	12.093	-39.990	-13	-26.990
5130.30	-37.360	V	-40.350	5.075	12.235	-33.190	-13	-20.190
CH20175_3.75K_BPSK_1RB47								
3465.00	-43.050	H	-50.289	4.090	12.209	-42.170	-13	-29.170
5197.50	-45.550	H	-48.252	5.094	12.356	-40.990	-13	-27.990
3465.00	-42.890	V	-50.099	4.090	12.209	-41.980	-13	-28.980
5197.50	-36.060	V	-39.192	5.094	12.356	-31.930	-13	-18.930
CH20399_3.75K_BPSK_1RB47								
3509.80	-50.210	H	-57.363	4.119	12.282	-49.200	-13	-36.200
5264.70	-46.380	H	-49.373	5.113	12.476	-42.010	-13	-29.010
3509.80	-44.250	V	-51.383	4.119	12.282	-43.220	-13	-30.220
5264.70	-42.590	V	-45.873	5.113	12.476	-38.510	-13	-25.510

Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
CH19951_15K_QPSK_3RB3								
3420.20	-52.580	H	-59.909	4.064	12.093	-51.880	-13	-38.880
5130.30	-62.990	H	-65.410	5.075	12.235	-58.250	-13	-45.250
3420.20	-48.070	V	-55.339	4.064	12.093	-47.310	-13	-34.310
5130.30	-46.930	V	-49.920	5.075	12.235	-42.760	-13	-29.760
CH20175_15K_QPSK_3RB3								
3465.00	-49.130	H	-56.369	4.090	12.209	-48.250	-13	-35.250
5197.50	-64.740	H	-67.442	5.094	12.356	-60.180	-13	-47.180
3465.00	-49.970	V	-57.179	4.090	12.209	-49.060	-13	-36.060
5197.50	-48.700	V	-51.832	5.094	12.356	-44.570	-13	-31.570
CH20399_15K_QPSK_3RB3								
3509.80	-53.300	H	-60.453	4.119	12.282	-52.290	-13	-39.290
5264.70	-62.900	H	-65.893	5.113	12.476	-58.530	-13	-45.530
3509.80	-45.710	V	-52.843	4.119	12.282	-44.680	-13	-31.680
5264.70	-49.100	V	-52.383	5.113	12.476	-45.020	-13	-32.020

Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

Product	ML865C1-NA		
Test Item	Radiated Spurious Emissions		
Test Mode	Mode 3: LTE_NB-IoT_Band 12		
Date of Test	2018/09/08	Test Site	CB4-H

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
CH23011_3.75K_BPSK_1RB47								
1398.20	-52.040	H	-63.520	2.571	7.811	-58.280	-13	-45.280
2097.30	-38.700	H	-49.868	3.177	9.956	-43.090	-13	-30.090
1398.20	-48.910	V	-60.380	2.571	7.811	-55.140	-13	-42.140
2097.30	-26.790	V	-37.748	3.177	9.956	-30.970	-13	-17.970
CH23095_3.75K_BPSK_1RB47								
1415.00	-51.100	H	-62.557	2.585	7.892	-57.250	-13	-44.250
2122.50	-38.420	H	-49.631	3.195	9.996	-42.830	-13	-29.830
1415.00	-49.020	V	-60.467	2.585	7.892	-55.160	-13	-42.160
2122.50	-28.130	V	-39.131	3.195	9.996	-32.330	-13	-19.330
CH23179_3.75K_BPSK_1RB47								
1431.80	-45.210	H	-56.664	2.599	7.973	-51.290	-13	-38.290
2147.70	-37.000	H	-48.244	3.212	10.036	-41.420	-13	-28.420
1431.80	-46.810	V	-58.264	2.599	7.973	-52.890	-13	-39.890
2147.70	-28.920	V	-39.954	3.212	10.036	-33.130	-13	-20.130

Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
CH23011_15K_QPSK_3RB3								
1398.20	-52.090	H	-63.570	2.571	7.811	-58.330	-13	-45.330
2097.30	-64.540	H	-75.708	3.177	9.956	-68.930	-13	-55.930
1398.20	-47.140	V	-58.610	2.571	7.811	-53.370	-13	-40.370
2097.30	-56.080	V	-67.038	3.177	9.956	-60.260	-13	-47.260
CH23095_15K_QPSK_3RB3								
1415.00	-48.090	H	-59.547	2.585	7.892	-54.240	-13	-41.240
2122.50	-61.960	H	-73.171	3.195	9.996	-66.370	-13	-53.370
1415.00	-48.080	V	-59.527	2.585	7.892	-54.220	-13	-41.220
2122.50	-53.420	V	-64.421	3.195	9.996	-57.620	-13	-44.620
CH23179_15K_QPSK_3RB3								
1431.80	-42.800	H	-54.254	2.599	7.973	-48.880	-13	-35.880
2147.70	-62.430	H	-73.674	3.212	10.036	-66.850	-13	-53.850
1431.80	-43.300	V	-54.754	2.599	7.973	-49.380	-13	-36.380
2147.70	-56.510	V	-67.544	3.212	10.036	-60.720	-13	-47.720

Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

Product	ML865C1-NA		
Test Item	Radiated Spurious Emissions		
Test Mode	Mode 4: LTE_NB-IoT_Band 13		
Date of Test	2018/09/08	Test Site	CB4-H

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
CH23181_3.75K_BPSK_1RB47								
1554.20	-39.900	H	-51.298	2.704	8.463	-45.540	-13	-32.540
2331.30	-25.820	H	-37.301	3.339	10.330	-30.310	-13	-17.310
1554.20	-41.530	V	-52.888	2.704	8.463	-47.130	-13	-34.130
2331.30	-20.330	V	-31.631	3.339	10.330	-24.640	-13	-11.640
CH23230_3.75K_BPSK_1RB47								
1564.00	-36.040	H	-47.419	2.713	8.492	-41.640	-13	-28.640
2346.00	-23.630	H	-35.124	3.349	10.354	-28.120	-13	-15.120
1564.00	-40.010	V	-51.349	2.713	8.492	-45.570	-13	-32.570
2346.00	-18.190	V	-29.504	3.349	10.354	-22.500	-13	-9.500
CH23279_3.75K_BPSK_1RB47								
1573.80	-35.040	H	-46.419	2.722	8.521	-40.620	-13	-27.620
2360.70	-24.990	H	-36.508	3.360	10.377	-29.490	-13	-16.490
1573.80	-38.820	V	-50.149	2.722	8.521	-44.350	-13	-31.350
2360.70	-19.640	V	-30.978	3.360	10.377	-23.960	-13	-10.960

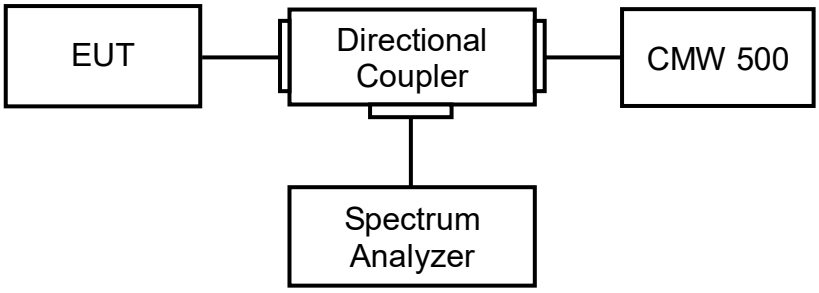
Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
CH23181_15K_QPSK_3RB3								
1554.20	-49.230	H	-60.628	2.704	8.463	-54.870	-13	-41.870
2331.30	-58.660	H	-70.141	3.339	10.330	-63.150	-13	-50.150
1554.20	-55.190	V	-66.548	2.704	8.463	-60.790	-13	-47.790
2331.30	-55.090	V	-66.391	3.339	10.330	-59.400	-13	-46.400
CH23230_15K_QPSK_3RB3								
1564.00	-52.080	H	-63.459	2.713	8.492	-57.680	-13	-44.680
2346.00	-56.600	H	-68.094	3.349	10.354	-61.090	-13	-48.090
1564.00	-54.070	V	-65.409	2.713	8.492	-59.630	-13	-46.630
2346.00	-51.840	V	-63.154	3.349	10.354	-56.150	-13	-43.150
CH23279_15K_QPSK_3RB3_								
1573.80	-52.950	H	-64.329	2.722	8.521	-58.530	-13	-45.530
2360.70	-57.680	H	-69.198	3.360	10.377	-62.180	-13	-49.180
1573.80	-53.810	V	-65.139	2.722	8.521	-59.340	-13	-46.340
2360.70	-52.620	V	-63.958	3.360	10.377	-56.940	-13	-43.940

Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

7. Spurious Emissions at Antenna Terminals

7.1. Test Setup



7.2. Test Procedure

a) Place the EUT on a bench and set it in transmitting mode.
b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
c) EUT Communicate with CMW500, then select a channel for testing.
d) Add a correction factor to the display of spectrum, and then test.
e) The resolution bandwidth of the spectrum analyzer was set at 1 MHz, sufficient scans were taken to show the out of band Emission if any up to 10th harmonic.

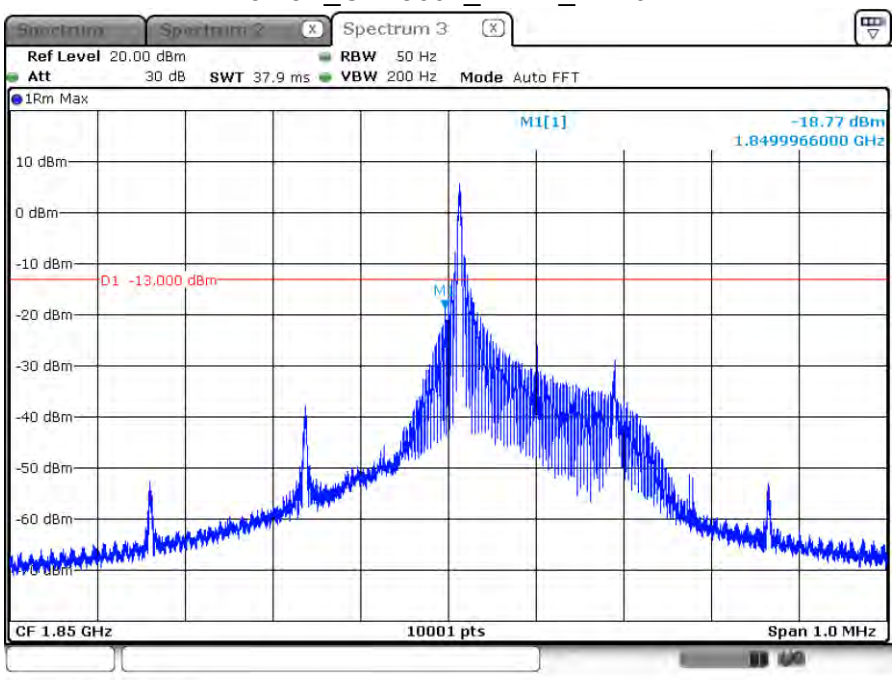
7.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 6.1
ANSI C63.26: 2015 Sub-clause 5.7

7.4. Test Result

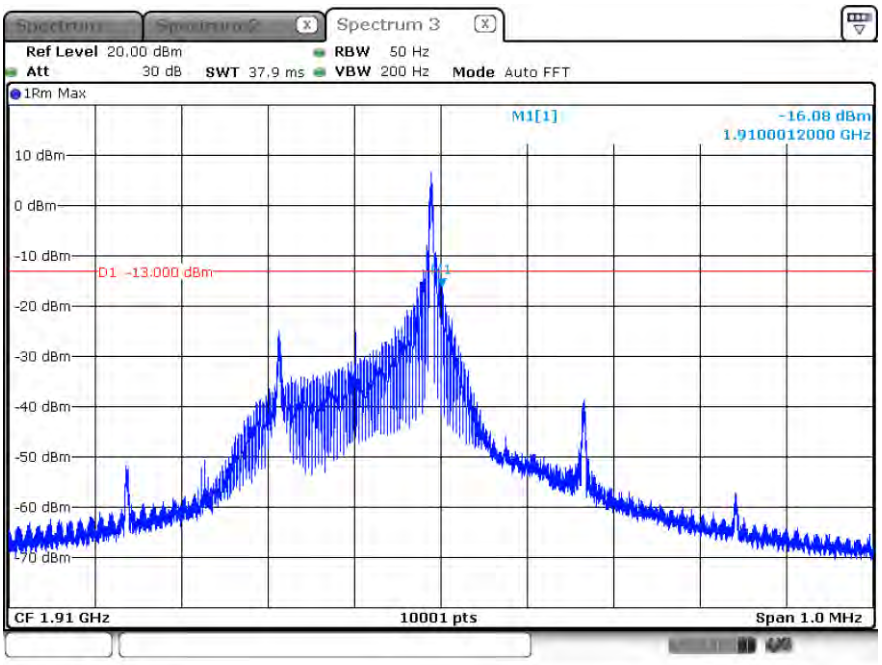
Product	ML865C1-NA		
Test Item	Spurious Emissions at Antenna Terminals		
Test Mode	Mode 1: LTE_NB-IoT_Band 2		
Date of Test	2018/09/05	Test Site	SR10-H

3.75K_CH18601_BPSK_1RB0



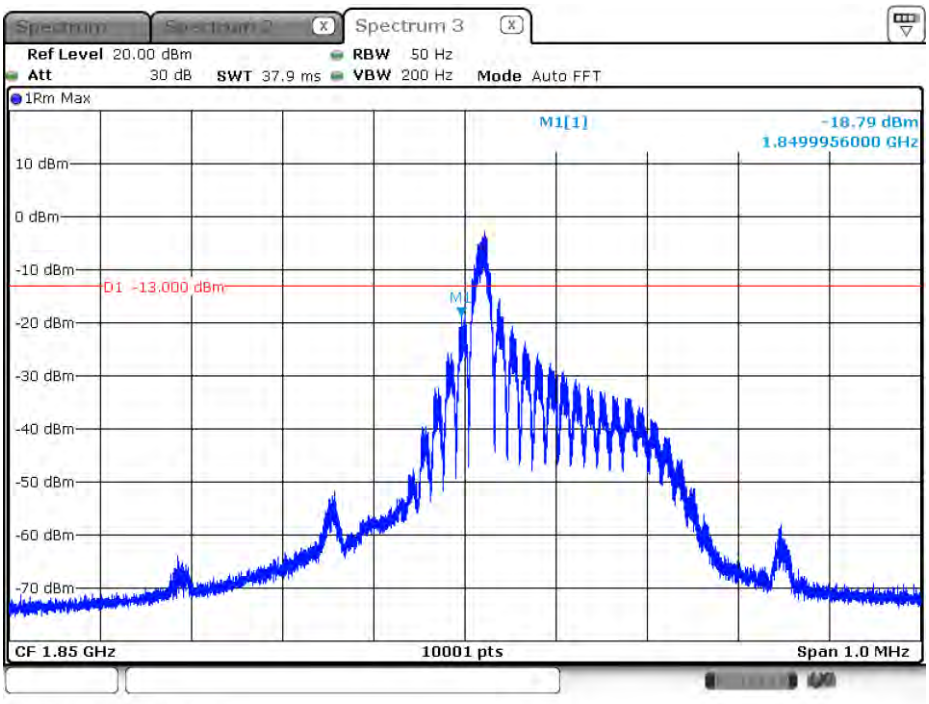
Date: 5.SEP.2018 07:15:54

3.75K_CH19199_BPSK_1RB47



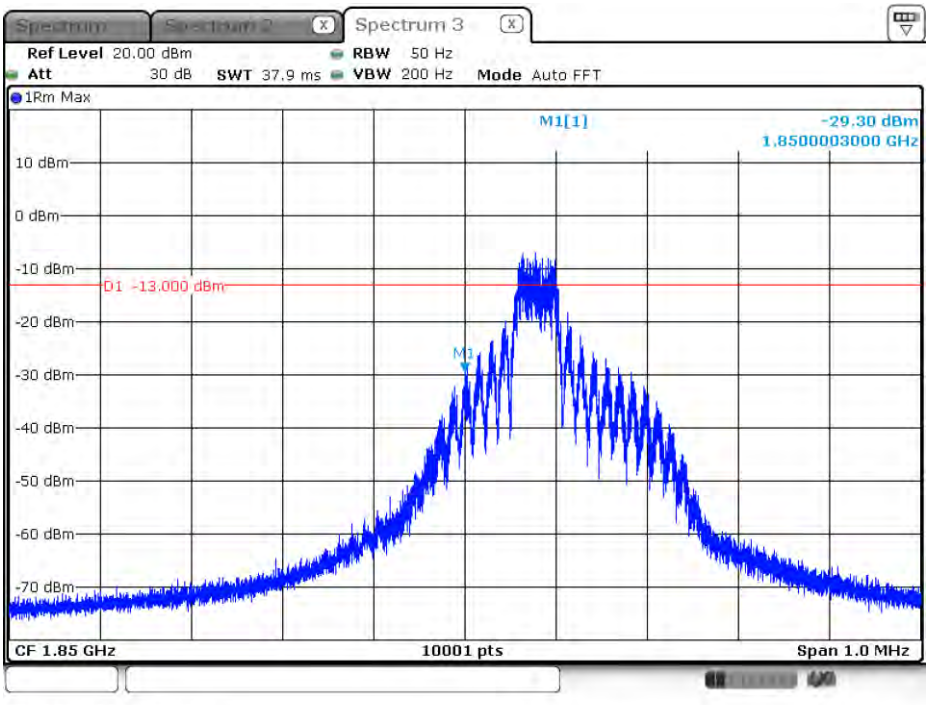
Date: 5.SEP.2018 07:12:58

15K_CH18601_QPSK_1RB0



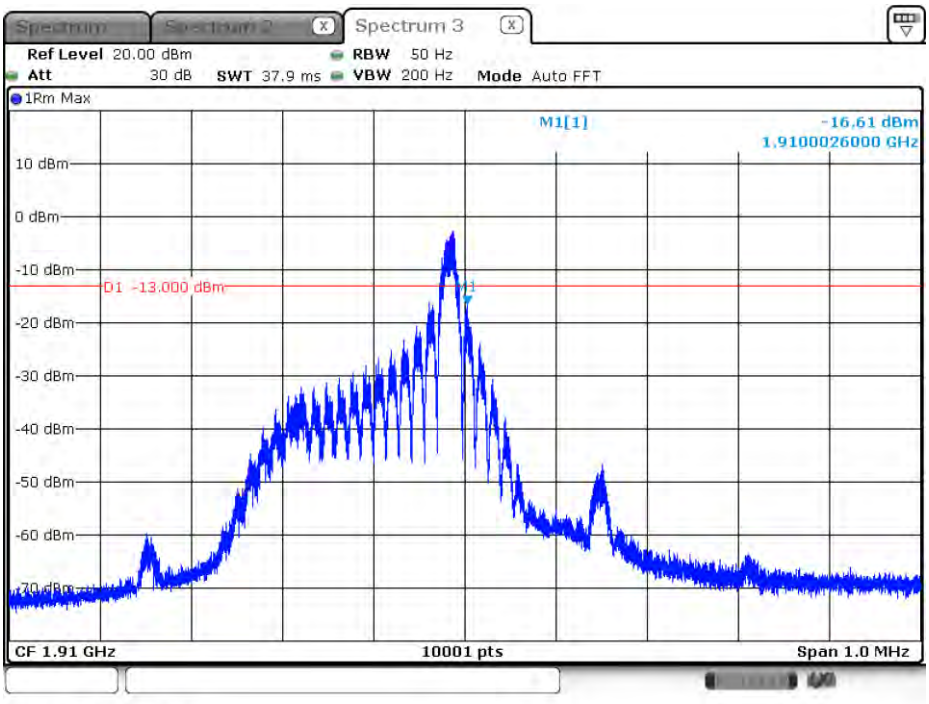
Date: 5.SEP.2018 07:03:11

15K_CH18601_QPSK_3RB3



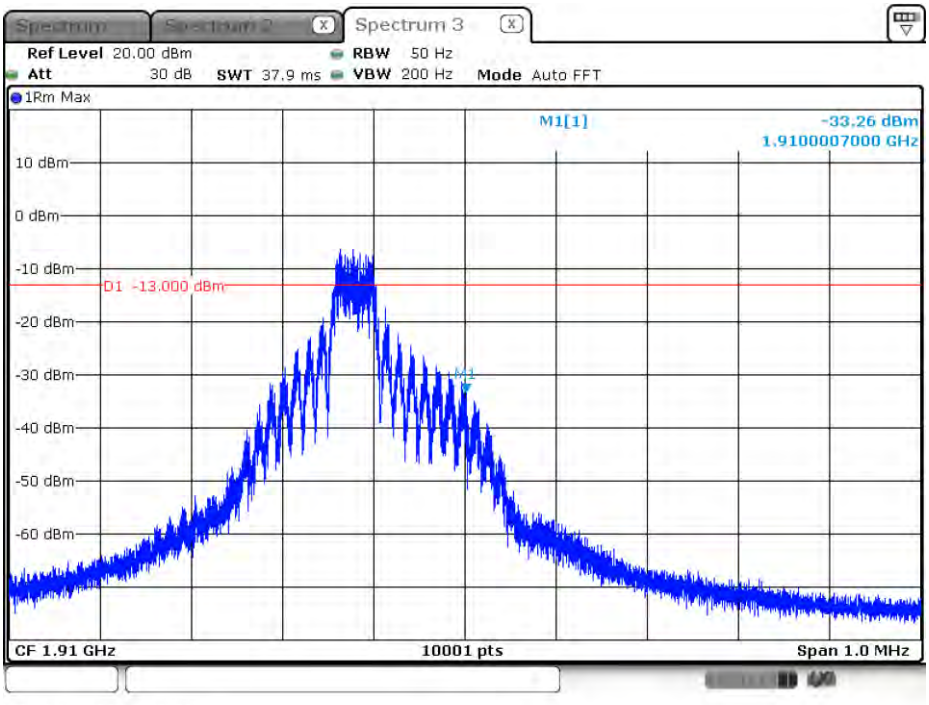
Date: 5.SEP.2018 07:04:41

15K_CH19199_QPSK_1RB11



Date: 5.SEP.2018 07:10:19

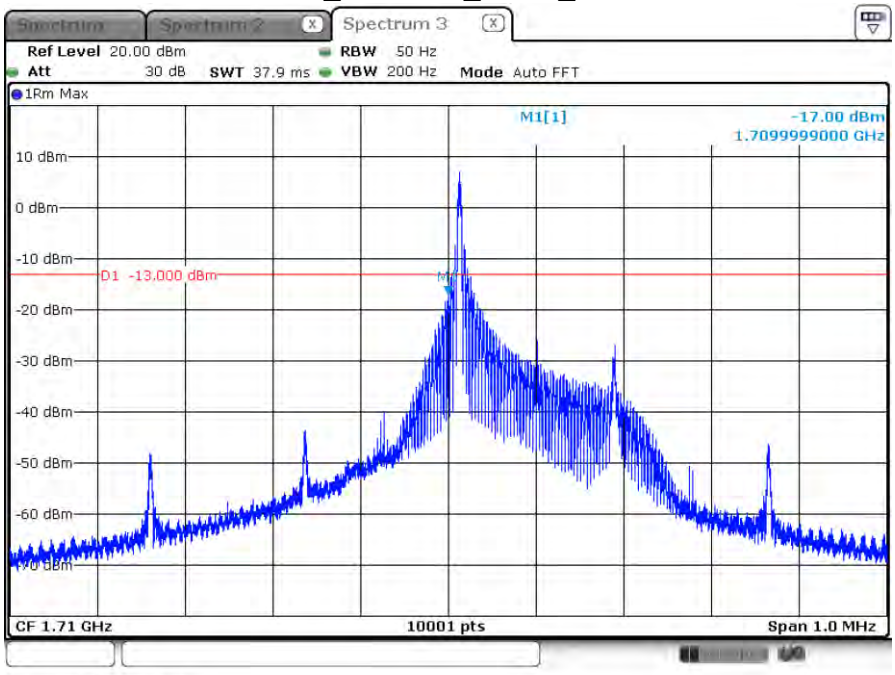
15K_CH19199_QPSK_3RB3



Date: 5.SEP.2018 07:09:14

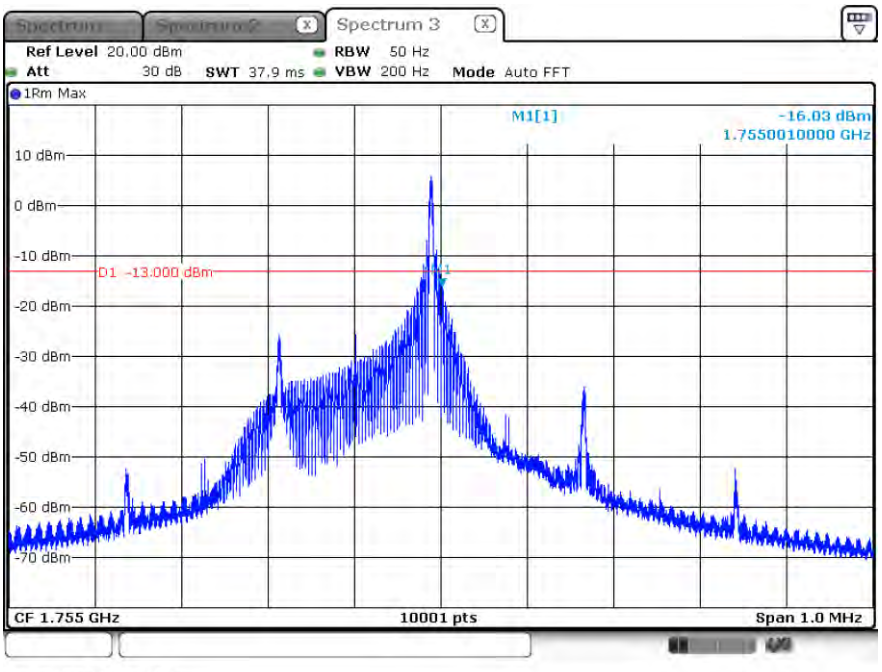
Product	ML865C1-NA		
Test Item	Spurious Emissions at Antenna Terminals		
Test Mode	Mode 2: LTE_NB-IoT_Band 4		
Date of Test	2018/09/05	Test Site	SR10-H

3.75K_CH19951_BPSK_1RB0



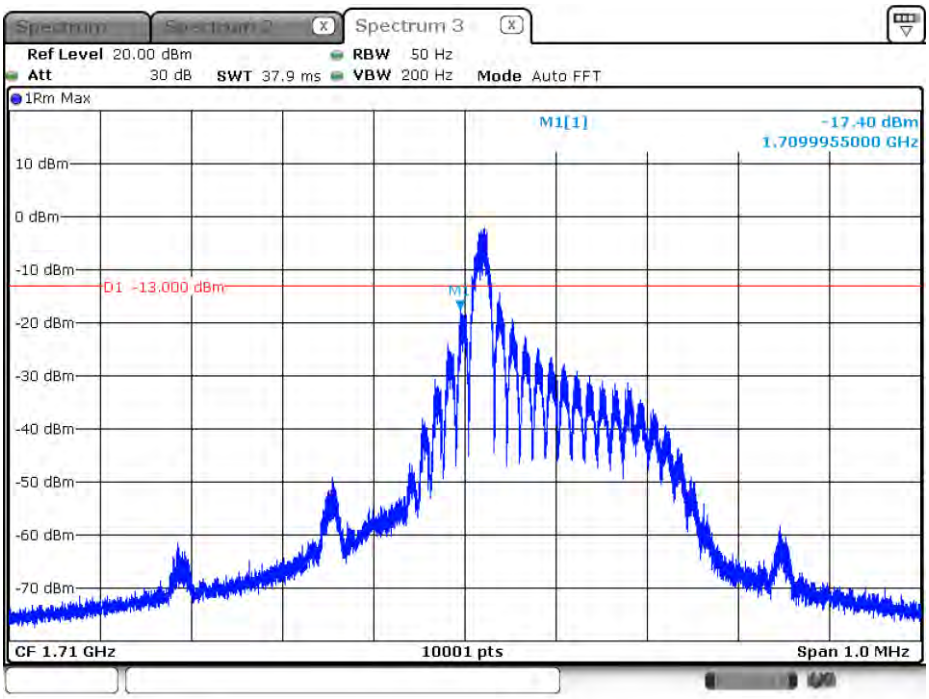
Date: 5.SEP.2018 07:56:10

3.75K_CH20399_BPSK_1RB47



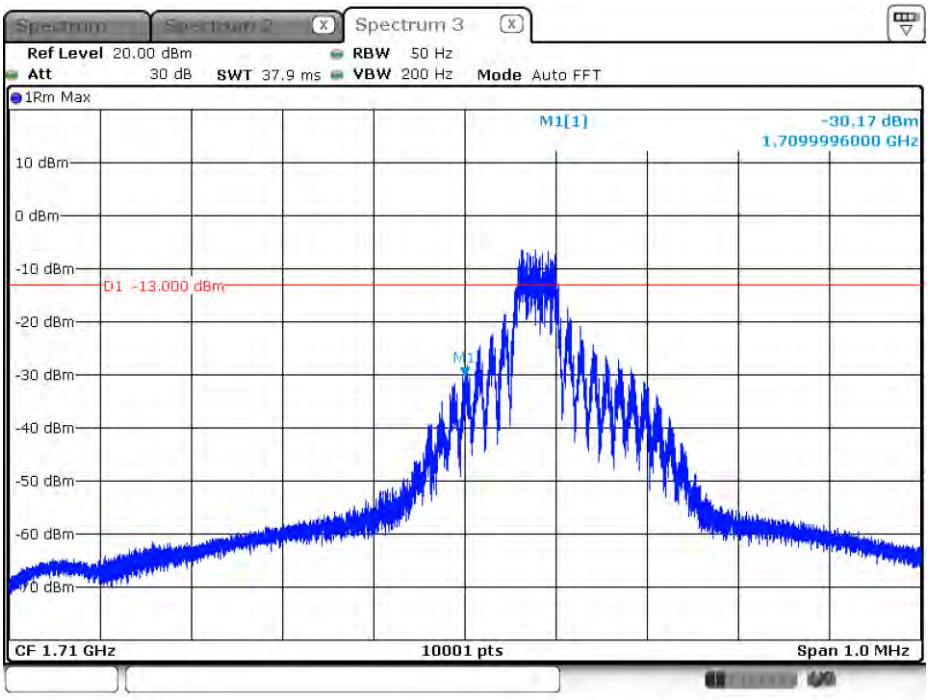
Date: 5.SEP.2018 07:58:21

15K_CH19951_QPSK_1RB0



Date: 5.SEP.2018 08:07:16

15K_CH19951_QPSK_3RB3



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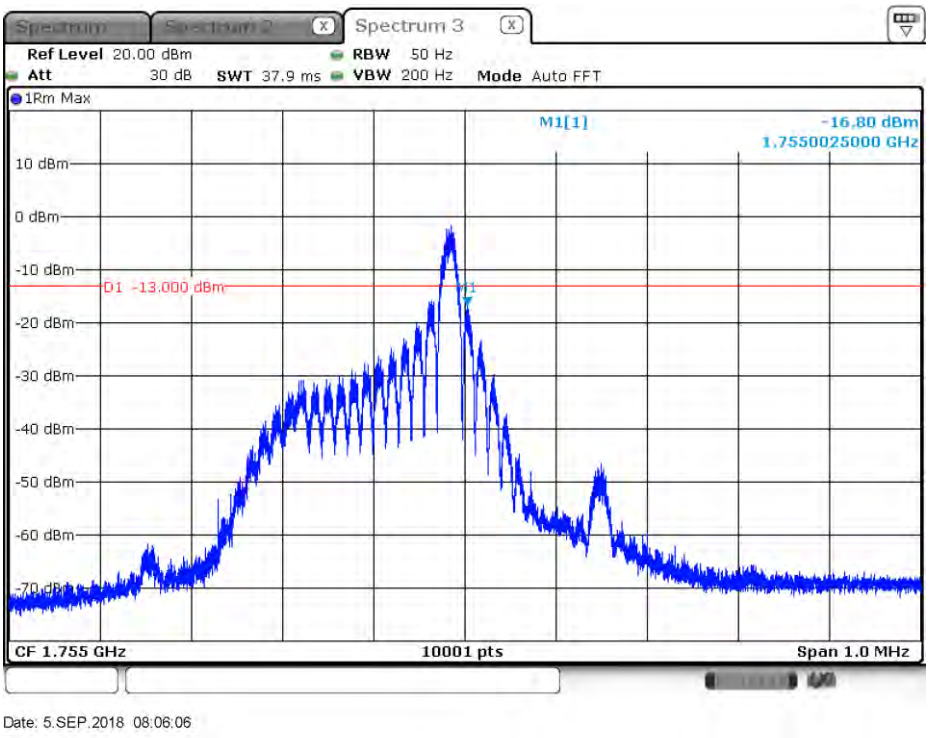
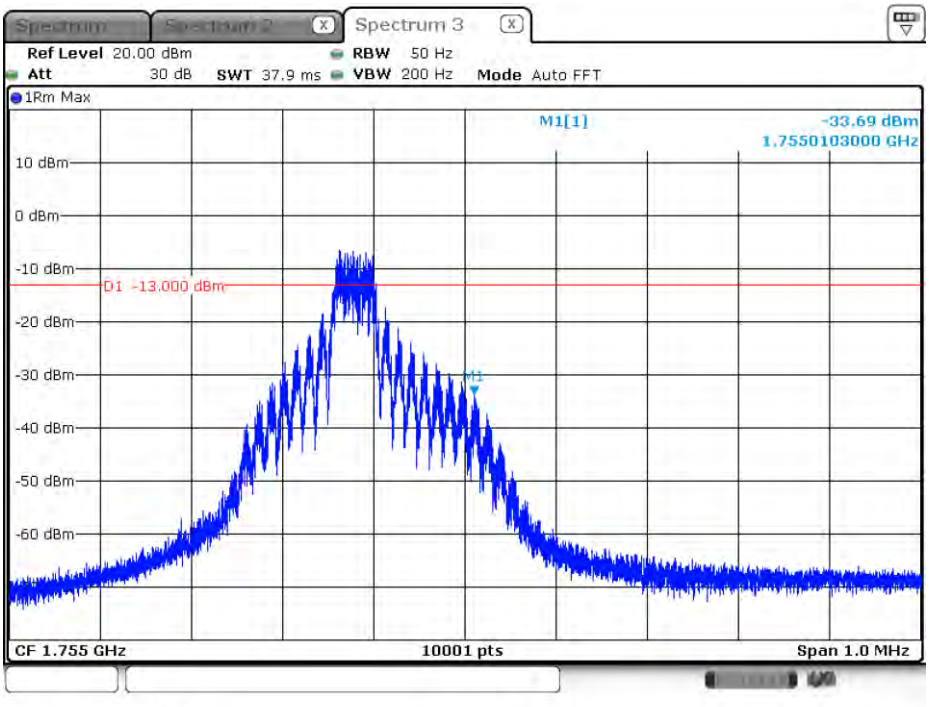
15K_CH20399_QPSK_1RB11



Date: 5.SEP.2018 08:06:06

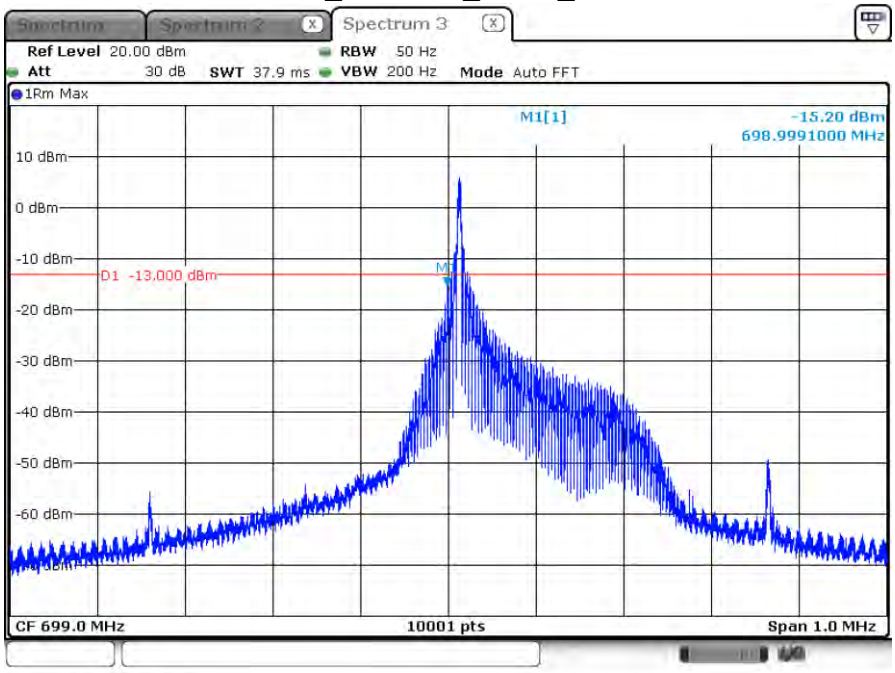
15K_CH20399_QPSK_3RB3



Date: 5.SEP.2018 08:05:01

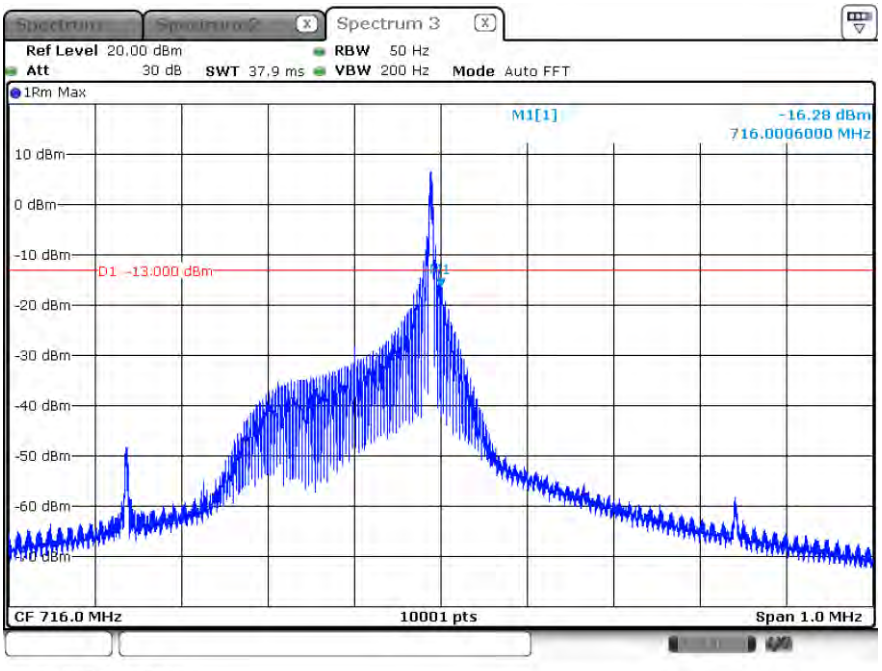
Product	ML865C1-NA		
Test Item	Spurious Emissions at Antenna Terminals		
Test Mode	Mode 3: LTE_NB-IoT_Band 12		
Date of Test	2018/09/05	Test Site	SR10-H

3.75K_CH23011_BPSK_1RB0



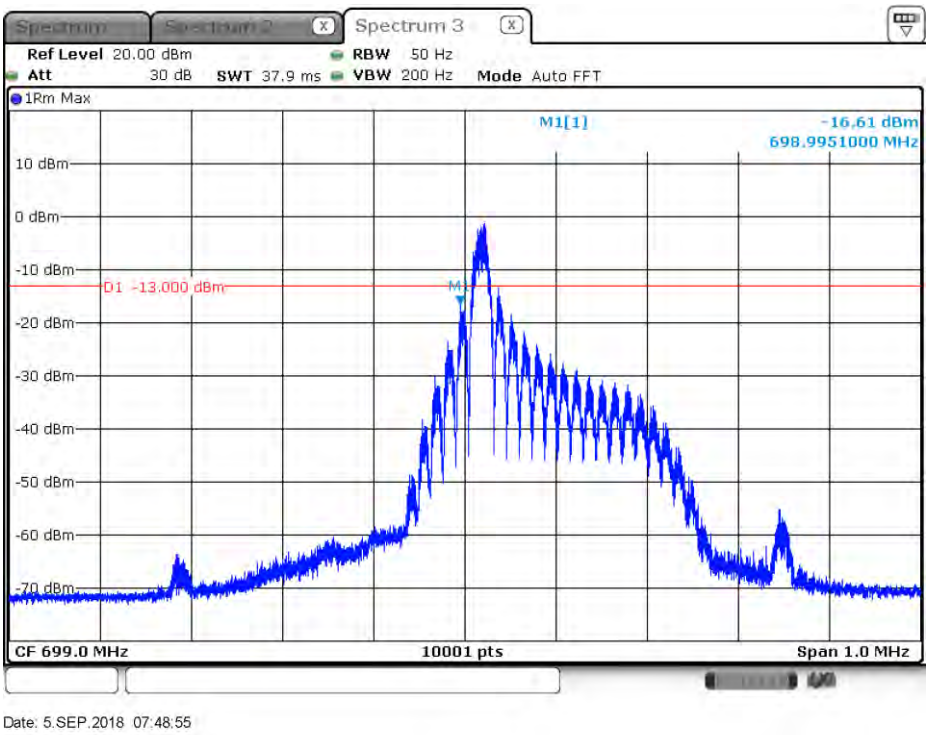
Date: 5.SEP.2018 07:31:58

3.75K_CH23179_BPSK_1RB47



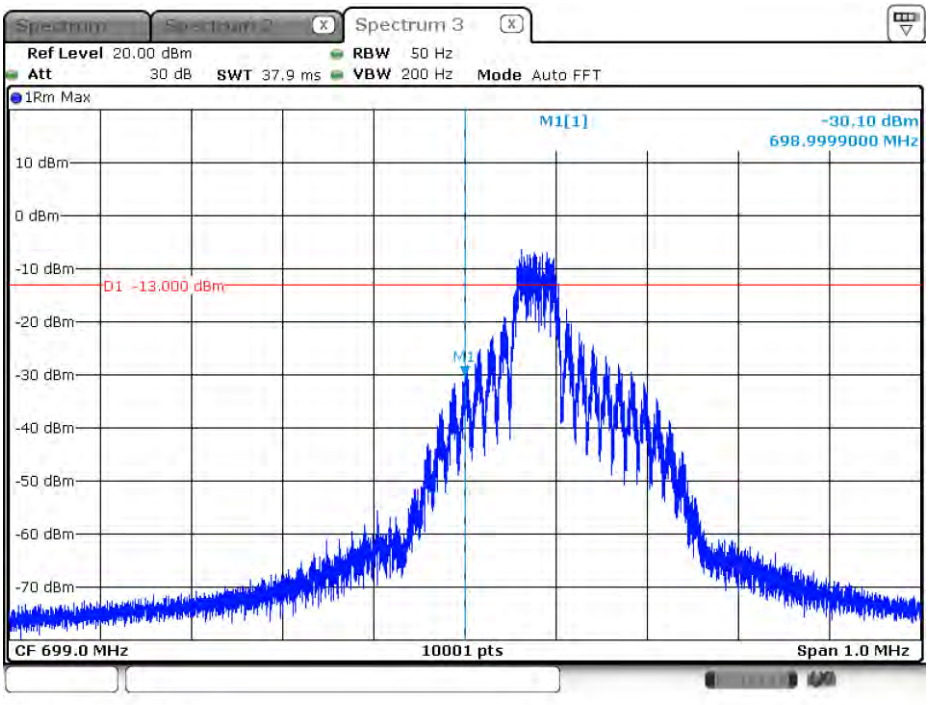
Date: 5.SEP.2018 07:51:53

15K_CH23011_QPSK_1RB0



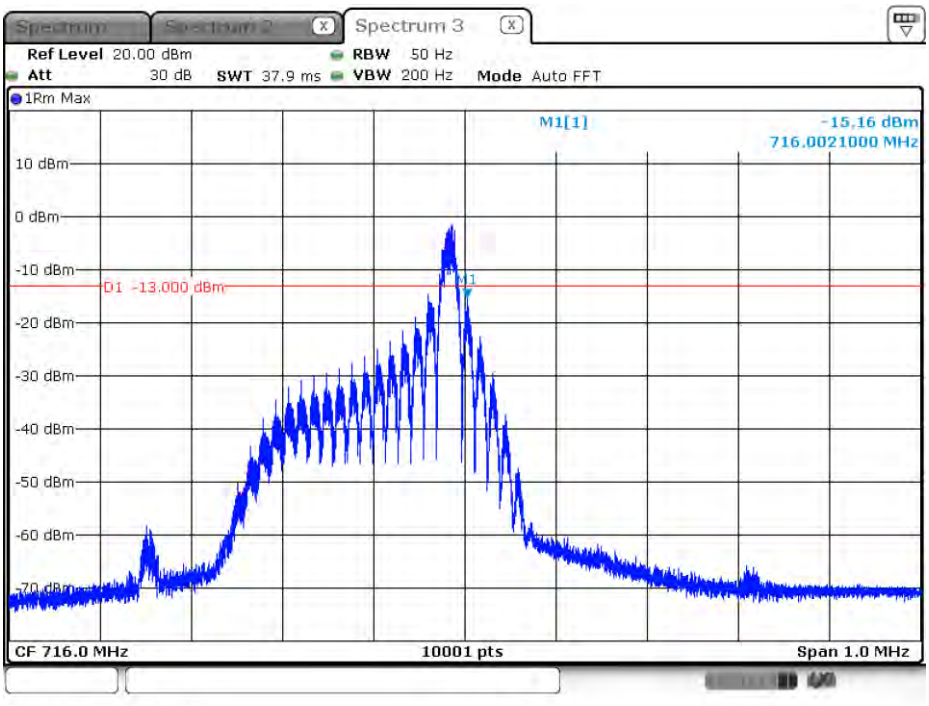
Date: 5.SEP.2018 07:48:55

15K_CH23011_QPSK_3RB3



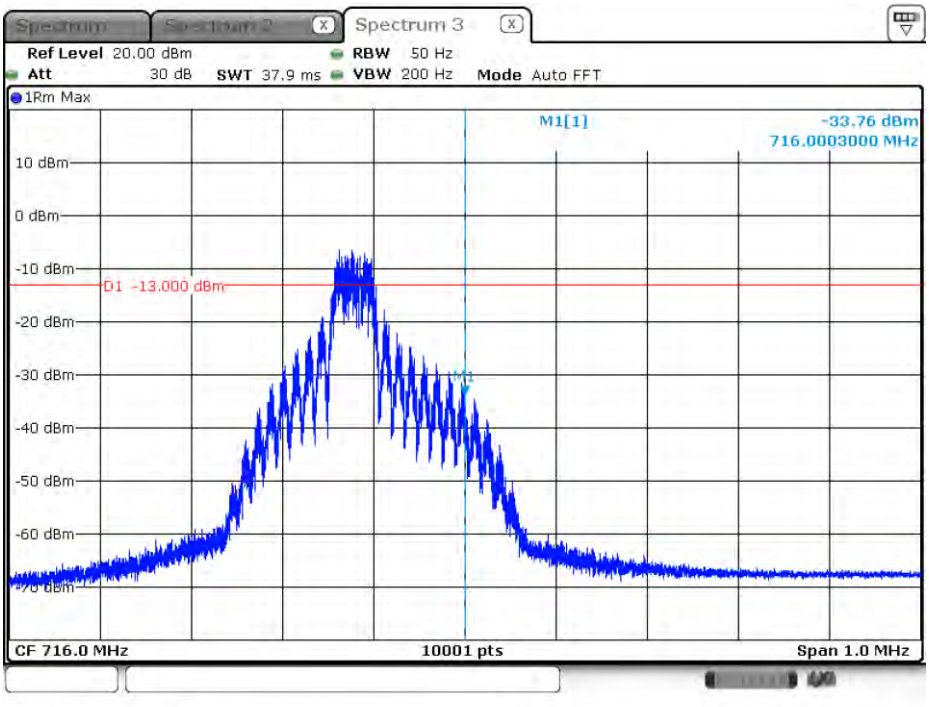
Date: 5.SEP.2018 07:47:16

15K_CH23179_QPSK_1RB11



Date: 5.SEP.2018 07:35:30

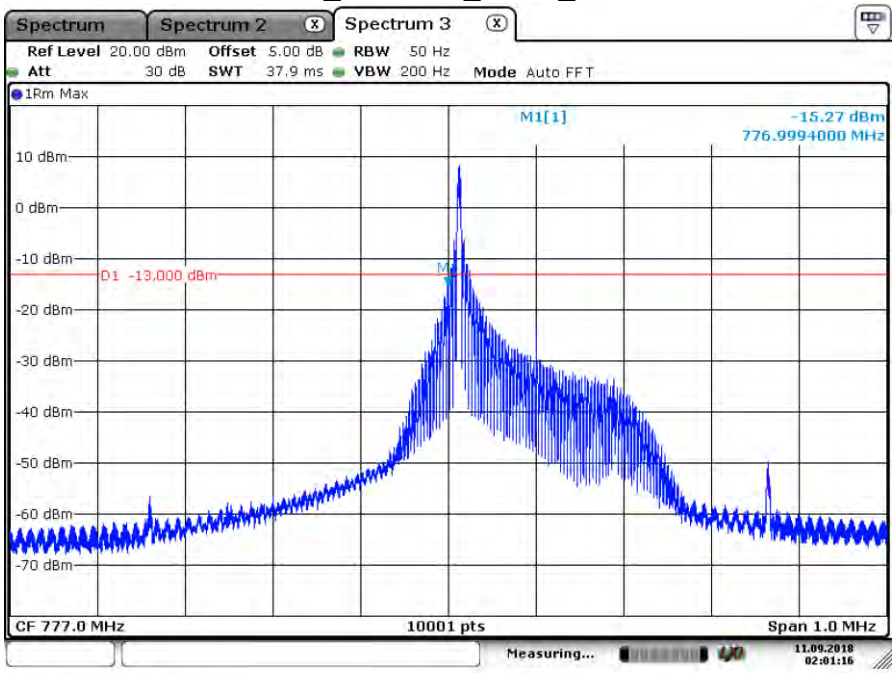
15K_CH23179_QPSK_3RB3



Date: 5.SEP.2018 07:42:37

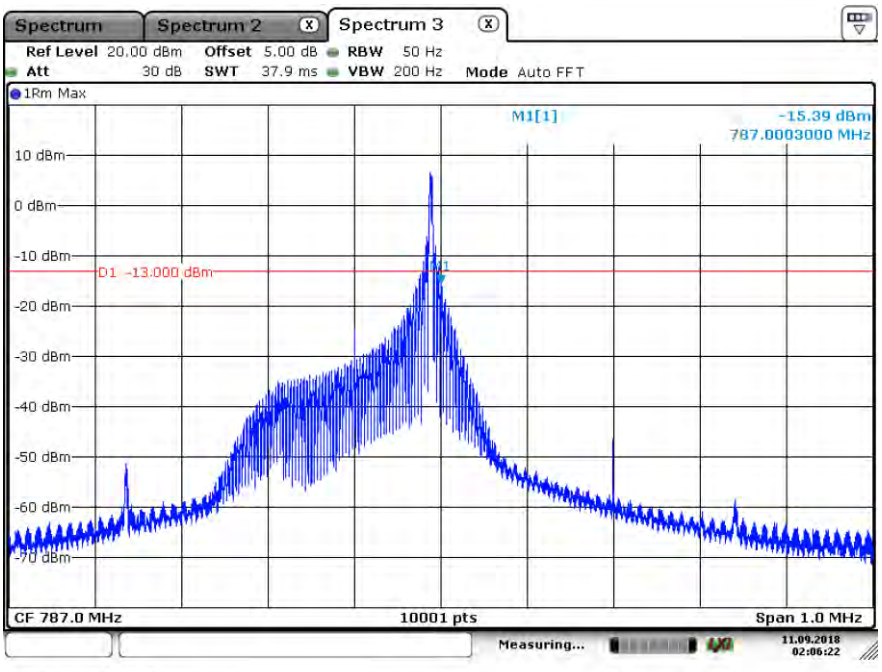
Product	ML865C1-NA		
Test Item	Spurious Emissions at Antenna Terminals		
Test Mode	Mode 4: LTE_NB-IoT_Band 13		
Date of Test	2018/09/11	Test Site	SR10-H

3.75K_CH23181_BPSK_1RB0



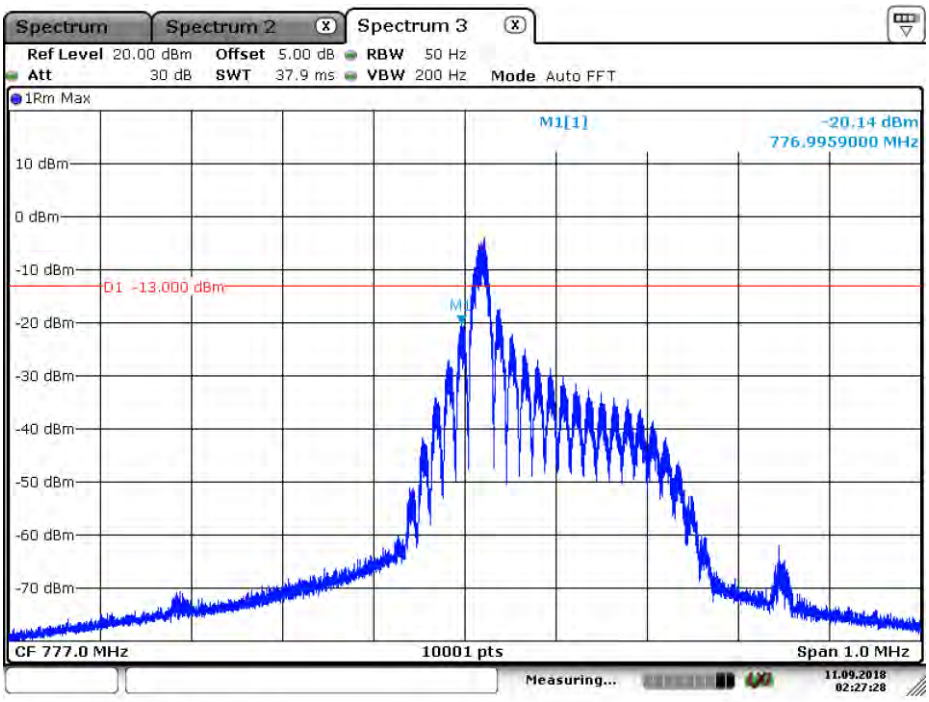
Date: 11.SEP.2018 02:01:17

3.75K_CH23279_BPSK_1RB47



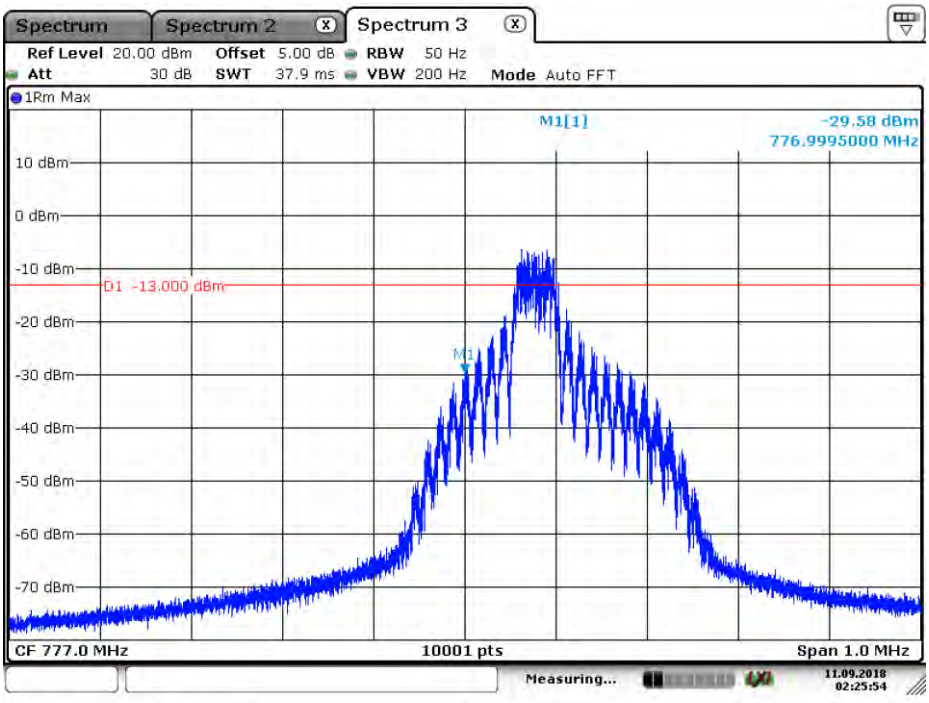
Date: 11.SEP.2018 02:06:22

15K_CH23181_QPSK_1RB0



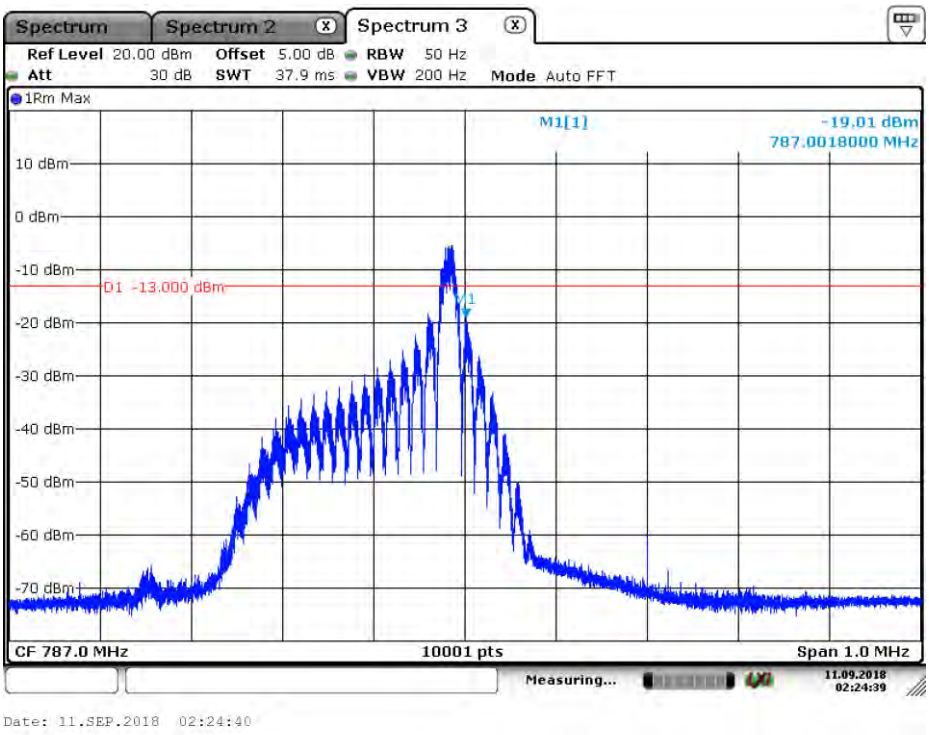
Date: 11.SEP.2018 02:27:29

15K_CH23181_QPSK_3RB3



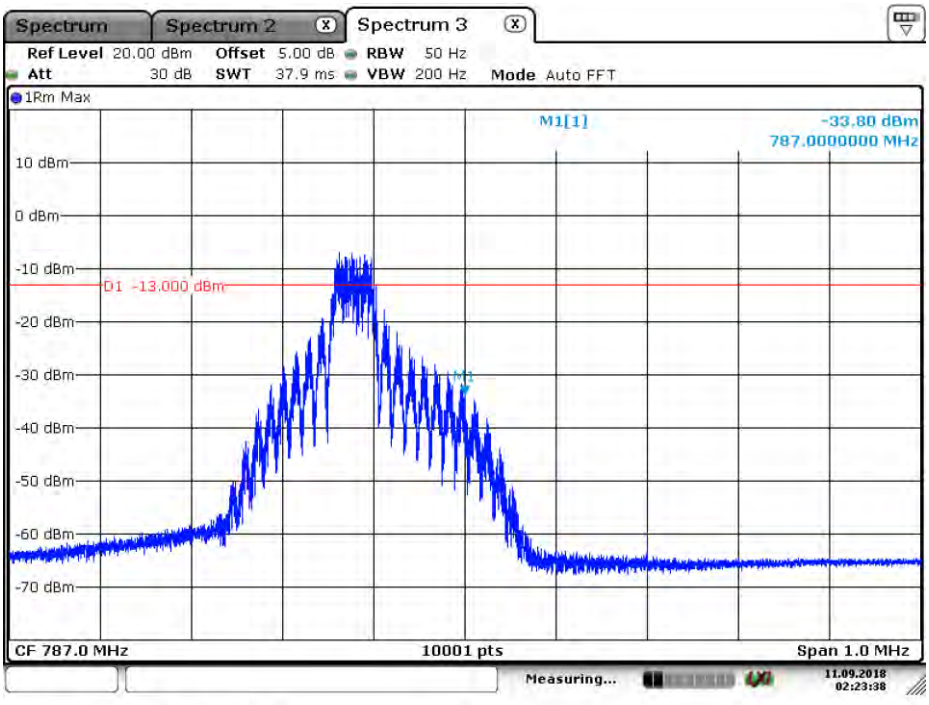
Date: 11.SEP.2018 02:25:55

15K_CH23279_QPSK_1RB11



Date: 11.SEP.2018 02:24:40

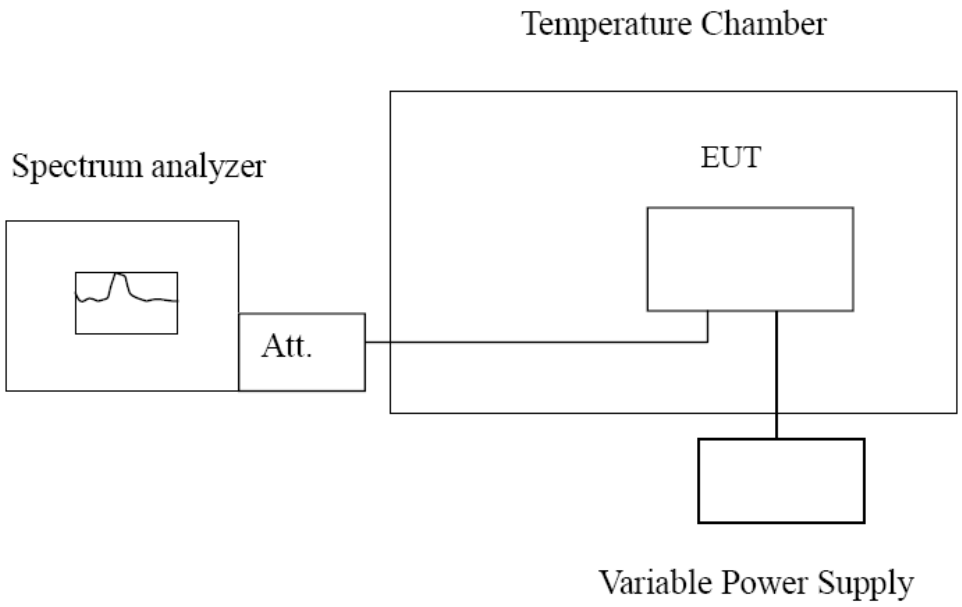
15K_CH23279_QPSK_3RB3



Date: 11.SEP.2018 02:23:39

8. Frequency Stability

8.1. Test Setup



8.2. Test Procedure

Frequency Stability Under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

8.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 9
ANSI C63.26: 2015 Sub-clause 5.6

8.4. Test Result

Product	ML865C1-NA		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 1: LTE_NB-IoT_Band 2		
Date of Test	2018/09/12	Test Site	SR10-H

3.75K BPSK_1880MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.2	-7	0.0037
3.8	-6	0.0032
3.4	7	-0.0037

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-40	12	-0.0064
-30	6	-0.0032
-20	-11	0.0059
-10	-9	0.0048
0	-11	0.0059
10	3	-0.0016
20	0	0.0000
30	11	-0.0059
40	-8	0.0043
50	-10	0.0053
60	2	-0.0011
70	12	-0.0064
80	-8	0.0043
85	7	-0.0037

15K QPSK_1880MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.2	12	-0.0064
3.8	-8	0.0043
3.4	7	-0.0037

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-40	4	-0.0021
-30	-9	0.0048
-20	11	-0.0059
-10	-2	0.0011
0	0	0.0000
10	6	-0.0032
20	-1	0.0005
30	-7	0.0037
40	-5	0.0027
50	-4	0.0021
60	-2	0.0011
70	-12	0.0064
80	7	-0.0037
85	11	-0.0059

Product	ML865C1-NA		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 2: LTE_NB-IoT_Band 4		
Date of Test	2018/09/12	Test Site	SR10-H

3.75K BPSK_1732.5MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.2	1	-0.0006
3.8	3	-0.0017
3.4	-4	0.0023

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-40	0	0.0000
-30	2	-0.0012
-20	3	-0.0017
-10	3	-0.0017
0	11	-0.0063
10	-12	0.0069
20	-9	0.0052
30	11	-0.0063
40	7	-0.0040
50	8	-0.0046
60	-9	0.0052
70	11	-0.0063
80	-5	0.0029
85	7	-0.0040

15K QPSK_1732.5MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.2	6	-0.0035
3.8	7	-0.0040
3.4	-10	0.0058

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-40	1	-0.0006
-30	-4	0.0023
-20	-12	0.0069
-10	5	-0.0029
0	-5	0.0029
10	-10	0.0058
20	-3	0.0017
30	7	-0.0040
40	5	-0.0029
50	5	-0.0029
60	2	-0.0012
70	11	-0.0063
80	-5	0.0029
85	11	-0.0063

Product	ML865C1-NA		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 3: LTE_NB-IoT_Band 12		
Date of Test	2018/09/12	Test Site	SR10-H

3.75K BPSK_707.5MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.2	5	-0.0071
3.8	8	-0.0113
3.4	-12	0.0170

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-40	10	-0.0141
-30	1	-0.0014
-20	-7	0.0099
-10	9	-0.0127
0	6	-0.0085
10	1	-0.0014
20	-2	0.0028
30	-7	0.0099
40	-1	0.0014
50	5	-0.0071
60	0	0.0000
70	-1	0.0014
80	-10	0.0141
85	2	-0.0028

15K QPSK_707.5MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.2	9	-0.0127
3.8	-11	0.0155
3.4	-2	0.0028

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-40	9	-0.0127
-30	6	-0.0085
-20	-4	0.0057
-10	-6	0.0085
0	-9	0.0127
10	-9	0.0127
20	4	-0.0057
30	-10	0.0141
40	-4	0.0057
50	8	-0.0113
60	-5	0.0071
70	6	-0.0085
80	3	-0.0042
85	-2	0.0028

Product	ML865C1-NA		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 4: LTE_NB-IoT_Band 13		
Date of Test	2018/09/12	Test Site	SR10-H

3.75K BPSK_782MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.2	-9	0.0115
3.8	-3	0.0038
3.4	12	-0.0153

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-40	8	-0.0102
-30	6	-0.0077
-20	-8	0.0102
-10	3	-0.0038
0	11	-0.0141
10	-2	0.0026
20	10	-0.0128
30	-5	0.0064
40	3	-0.0038
50	12	-0.0153
60	10	-0.0128
70	-5	0.0064
80	12	-0.0153
85	4	-0.0051

15K QPSK_782MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.2	-5	0.0064
3.8	5	-0.0064
3.4	-8	0.0102

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-40	-6	0.0077
-30	3	-0.0038
-20	5	-0.0064
-10	10	-0.0128
0	4	-0.0051
10	10	-0.0128
20	11	-0.0141
30	4	-0.0051
40	-12	0.0153
50	0	0.0000
60	-2	0.0026
70	11	-0.0141
80	-7	0.0090
85	-3	0.0038