FCC TEST REPORT

Applicant	:	LEOTEK Electronics Corp.
Address	:	1955 Lundy Ave, San Jose, CA 95131 San Jose, California, United States
Equipment	:	Smart Node Control
Model No.	:	SN-NB10
Trade Name	:	Leotek
FCC ID.	:	2BAJFSN-NB10

I HEREBY CERTIFY THAT:

The sample was received on Mar. 06, 2023 and the testing was completed on Aug. 09, 2023 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.

Approved by:

Mark Liao / Supervisor

Laboratory Accreditation:

Cerpass Technology Corporation Test Laboratory

CONTENTS

History of this test report

Report No.	Issued Date	Description
22030345-TRFCC02	Aug. 18, 2023	Original

1. Summary of Test Procedure and Test Results

FCC 47 CFR PART 24 subpart E

ANSI C63.26: 2015

KDB 971168 Power Meas License Digital Systems

For Band II (1850MHz ~ 1910MHz)

FCC Rules	Test items	Measured	Result
2.1046 / 24.232 (c)	Equivalent Isotropically Radiated Poiwer	Meet the requirement of limit	PASS
2.1053 / 24.238 (a)	Radiated Emissions	Meet the requirement of limit	PASS
2.1051 / 24.238 (a)	Conducted Emissions	Meet the requirement of limit	PASS
2.1051 / 24.238 (a)	Band Edge	Meet the requirement of limit	PASS
2.1049 / 24.238 (b)	Occupied Bandwidth	Meet the requirement of limit	PASS
2.1051 / 24.232 (d)	Peak to Average Ratio	Meet the requirement of limit	PASS
2.1055 / 24.235	Frequency Stability	Meet the requirement of limit	PASS

*The lab has reduced the uncertainty risk factor from test equipment, environment and staff technicians which according to the standard on contract. Therefore, the test result will only be determined by standard requirement, measurement uncertainty evaluation is not considered.
*This EUT has been also tested and compiled with the requirement of FCC Part 15, Subpart B, recorded in a separate test report(22030345-TEFV01).

2. Test Configuration of Equipment under Test

2.1. Feature of Equipment under Test

Band	B2, B4, B5, B12, B13, B26
Antenna Type	PIFA
Antenna Gain	LTE Band 2: 2.29dBi LTE Band 4: 2.31dBi LTE Band 5: -1.15dBi LTE Band 12: -0.62dBi LTE Band 13: -1.4dBi LTE Band 26(Part 22): -1.15dBi LTE Band 26(Part 90): -1.51dBi

Note: For more details, please refer to the User's manual of the EUT.

2.2. Carrier Frequency of Channels

Cat M1

Band	UL Frequency (MHz)	Modulation
LTE Band 2	1850.7 ~ 1909.3	QPSK, 16QAM

NB-IoT

Band	UL Frequency (MHz)	Modulation
LTE Band 2	1850.2~1909.8	BPSK, QPSK

2.3. Test Mode and Test Software

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
b. The following test modes were performed for the test:

Radiated Emissions and RF Conducted	
Test Mode 1	Cat M1
Test Mode 2	NB-IoT

2.4. General Information of Test

Test Site	**Cerpass Technology Corporation Test Laboratory** Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel: +886-3-3226-888 Fax: +886-3-3226-881	
	FCC	TW1439, TW1079
	IC	4934E-1, 4934E-2
Frequency Range Investigated:	Radiation: from 30 MHz to 20,000MHz	
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.	

Cat M1

Test Item	Test Site	Test period	Environmental Conditions	Tested By
RF Conducted	RFCON01-NK	2203/04/29~ 2023/05/17	22.8~26.5°C / 48~50%	Dian Chen
Radiated Emissions	3M02-NK	2023/06/02~ 2023/06/14	23~25°C / 30~32%	Leon Huang

NB-IoT

Test Item	Test Site	Test period	Environmental Conditions	Tested By
RF Conducted	RFCON01-NK	2023/05/18~ 2023/08/09	23.2~26.5°C / 41~54%	Dian Chen
Radiated Emissions	3M02-NK	2023/06/02~ 2023/06/14	23~25°C / 30~32%	Leon Huang

2.5. Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

Test date before 2023/05/03

Measurement Item	Uncertainty
Equivalent Isotropically Radiated Power (Radiated)	±5.5dB
Conducted Spurious Emission	±2.0dB
Output Power(Conducted)	±1.07dB
Frequency Error	±0.17KHz
Occupied Channel Bandwidth	±4.4%
26dB Bandwidth	±4.4%
Peak to average ratio	±2.0dB
Temperature	±1.3°C
Humidity	±2.7%
Voltages(DC)	±4mV/V

Test date after 2023/05/03

Measurement Item	Uncertainty
Equivalent Isotropically Radiated Power (Radiated)	±5.6dB
Conducted Spurious Emission	±2.2dB
Output Power(Conducted)	±1.07dB
Frequency Error	±0.22KHz
Occupied Channel Bandwidth	±4.4%
26dB Bandwidth	±4.4%
Peak to average ratio	±2.0dB
Temperature	±1.4°C
Humidity	±2.8%
Voltages(DC)	±2mV/V

3. Test Equipment and Ancillaries Used for Tests

Test Item	Radiated Emissions (Cat M1)				
Test Site	Semi Anechoic Room(3M02-NK)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	275	2022/11/18	2023/11/17
Active Loop Antenna	Schwarzbeck	FMZB 1513	414	2023/02/03	2024/02/02
Horn Antenna	EMCO	3115	31589	2023/03/23	2024/03/22
Horn Antenna	EMCO	3116	31970	2023/03/03	2024/03/02
EMI Receiver	ROHDE & SCHWARZ	ESCI	101423	2022/07/05	2023/07/04
Spectrum Analyzer	ROHDE & SCHWARZ	FSV 40-N	102151	2022/08/19	2023/08/18
Preamplifier	Agilent	8449B	3008A01954	2023/03/08	2024/03/07
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2022/11/11	2023/11/10
Preamplifier	EM Electronics corp.	EM330	60659	2023/03/10	2024/03/09
Cable-4m(9k-3G)	EMEC	RG-223	18274M	2022/07/27	2023/07/26
Cable-3in1 (30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1315	2023/02/25	2024/02/24
Cable-0.5m (1G-40G)	HUBER SUHNER	SUCOFLEX 104	805443/4	2023/03/07	2024/03/06
Cable-3m (1G-40G)	HUBER SUHNER	SUCOFLEX 104	805796/4	2023/03/07	2024/03/06
Cable-8m (1G-26.5G)	WOKEN	WCBA-WCA203SM	CCE1374	2023/03/07	2024/03/06
Cable-0.5m (30M-40G)	HUBER SUHNER	SUCOFLEX 102	28420/2	2023/03/07	2024/03/06
Cable-3m (30M-40G)	HUBER SUHNER	SUCOFLEX 102	MY2608/2	2023/03/07	2024/03/06
Cable-0.5m (1G-40G)	Rapidtek	40GHZ 50CM	38MS-38MS50314	2023/03/07	2024/03/06
Cable-3m (1G-40G)	Rapidtek	40GHZ 300CM	38MS-38MS300314	2023/03/07	2024/03/06
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA
Radio Comnunication Analyzer	Anritsu	MT8821C	6261830569	2023/03/12	2024/03/11

Test Item	RF Conducted (Cat M1)				
Test Site	RFCON01-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
CAX Signal Analyzer	KEYSIGHT	N9000B	MY57100339	2022/11/29	2023/11/28
Radio Comnunication Analyzer	Anritsu	MT8821C	6261830569	2023/03/12	2024/03/11
TEMP & HUMI CHAMBER	T-MACHINE	TMJ-9712	T-12-040111	2022/08/15	2023/08/14

Test Item	Radiated Emissions (NB-IoT)				
Test Site	Semi Anechoic Room(3M02-NK)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	275	2022/11/18	2023/11/17
Active Loop Antenna	Schwarzbeck	FMZB 1513	414	2023/02/03	2024/02/02
Horn Antenna	EMCO	3115	31589	2023/03/23	2024/03/22
Horn Antenna	EMCO	3116	31970	2023/03/03	2024/03/02
EMI Receiver	ROHDE & SCHWARZ	ESCI	101423	2022/07/05	2023/07/04
Spectrum Analyzer	ROHDE & SCHWARZ	FSV 40-N	102151	2022/08/19	2023/08/18
Preamplifier	Agilent	8449B	3008A01954	2023/03/08	2024/03/07
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2022/11/11	2023/11/10
Preamplifier	EM Electronics corp.	EM330	60659	2023/03/10	2024/03/09
Cable-4m(9k-3G)	EMEC	RG-223	18274M	2022/07/27	2023/07/26
Cable-3in1 (30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1315	2023/02/25	2024/02/24
Cable-0.5m (1G-40G)	HUBER SUHNER	SUCOFLEX 104	805443/4	2023/03/07	2024/03/06
Cable-3m (1G-40G)	HUBER SUHNER	SUCOFLEX 104	805796/4	2023/03/07	2024/03/06
Cable-8m (1G-26.5G)	WOKEN	WCBA-WCA203SM	CCE1374	2023/03/07	2024/03/06
Cable-0.5m (30M-40G)	HUBER SUHNER	SUCOFLEX 102	28420/2	2023/03/07	2024/03/06
Cable-3m (30M-40G)	HUBER SUHNER	SUCOFLEX 102	MY2608/2	2023/03/07	2024/03/06
Cable-0.5m (1G-40G)	Rapidtek	40GHZ 50CM	38MS-38MS50314	2023/03/07	2024/03/06
Cable-3m (1G-40G)	Rapidtek	40GHZ 300CM	38MS-38MS300314	2023/03/07	2024/03/06
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA
Radio Comnunication Analyzer	Anritsu	MT8821C	6261830569	2023/03/12	2024/03/11

Test Item	RF Conducted (NB-IoT)				
Test Site	RFCON01-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
CAX Signal Analyzer	KEYSIGHT	N9000B	MY57100339	2022/11/29	2023/11/28
Radio Comnunication Analyzer	Anritsu	MT8821C	6261830569	2023/03/12	2024/03/11
TEMP & HUMI CHAMBER	T-MACHINE	TMJ-9712	T-12-040111	2022/08/15	2023/08/14

4. RF Output Power Test

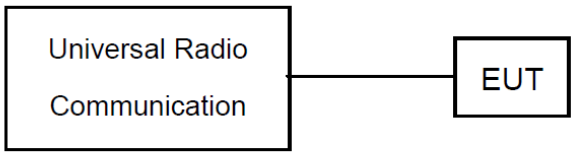
4.1 Test Limit

N/A

4.2 Test Procedures

1. The EUT was set up for the maximum power with simulator.
2. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.3 Test Setup



4.4 Test Result and Data

Cat M1

LTE Band 2

BW (MHz)	Opration Channel/ Frequency(MHz)	Index	RB size	RB offset	Conducted Power (dBm)	
					Moduration	
					QPSK	16QAM
1.4	18607/1850.7	0	1	0	20.04	19.11
		0	6	0	17.83	18.01
	18900/1880	0	1	0	19.88	18.93
		0	6	0	17.66	17.71
	19193/1909.3	0	1	5	19.66	18.77
		0	6	0	17.79	17.66

BW (MHz)	Opration Channel/ Frequency(MHz)	Index	RB size	RB offset	Conducted Power (dBm)	
					Moduration	
					QPSK	16QAM
3	18615/1851.5	0	1	0	19.95	19.43
		0	3	0	18.97	18.54
	18900/1880	0	1	0	19.79	18.69
		0	3	0	18.85	18.07
	19185/1908.5	1	1	5	19.59	18.79
		1	3	0	18.76	18.16

BW (MHz)	Opration Channel/ Frequency(MHz)	Index	RB size	RB offset	Conducted Power (dBm)	
					Moduration	
					QPSK	16QAM
5	18625/1852.5	3	1	0	19.48	19.58
		0	6	0	18.71	18.23
	18900/1880	0	1	0	19.72	19.33
		0	6	0	18.62	18.32
	19175/1907.5	0	1	5	19.26	19.33
		3	6	0	18.76	18.45

Cat M1

LTE Band 2

BW (MHz)	Opration Channel/ Frequency(MHz)	Index	RB size	RB offset	Conducted Power (dBm)	
					Moduration	
					QPSK	16QAM
10	18650/1855	3	1	0	19.58	19.51
		0	5	0	19.65	19.66
	18900/1880	0	1	0	19.52	19.4
		0	5	0	19.62	19.32
	19150/1905	4	1	5	19.04	18.99
		7	5	1	19.52	19.36

BW (MHz)	Opration Channel/ Frequency(MHz)	Index	RB size	RB offset	Conducted Power (dBm)	
					Moduration	
					QPSK	16QAM
15	18675/1857.5	3	1	0	19.94	19.57
		0	6	0	20.01	19.7
	18900/1880	0	1	0	19.53	19.35
		0	6	0	19.78	19.79
	19125/1902.5	8	1	5	19.22	19.18
		11	6	0	19.67	19.65

BW (MHz)	Opration Channel/ Frequency(MHz)	Index	RB size	RB offset	Conducted Power (dBm)	
					Moduration	
					QPSK	16QAM
20	18700/1860	3	1	0	19.98	19.65
		0	6	0	19.85	19.57
	18900/1880	0	1	0	19.95	19.51
		0	6	0	19.69	19.8
	19100/1900	12	1	5	19.2	19.16
		15	6	0	19.62	19.47

Note: All conducted measurements are based on a RMS detector.

NB-IoT
LTE Band 2

Modulation	Sub-carrier spacing (KHz)	Opration Channel/ Frequency(MHz)	Nltones	Conducted Power (dBm)
BPSK	3.75	18602/1850.2	1@0	20.80
			1@47	20.52
	15		1@0	20.83
			1@11	20.64
QPSK	3.75		1@0	21.07
			1@47	20.91
	15		1@0	20.76
			1@11	20.72
	15		12@0	18.77
BPSK	3.75	18900/1880	1@0	21.01
			1@47	20.83
	15		1@0	21.18
			1@11	21.03
QPSK	3.75		1@0	21.34
			1@47	21.28
	15		1@0	20.93
			1@11	21.00
	15		12@0	18.97
BPSK	3.75	19198/1909.8	1@0	20.40
			1@47	20.42
	15		1@0	20.59
			1@11	20.47
QPSK	3.75		1@0	20.93
			1@47	20.74
	15		1@0	20.49
			1@11	20.48
	15		12@0	18.47

5. Effective Radiated Power / Equivalent Isotropic Radiated Power Test

5.1. Test Limit

For FCC Part 24.232(b): The EIRP of mobile transmitters and auxiliary test transmitters must not exceed 2 Watts.

5.2. Test Procedures

For Conducted power measurement:

1. The EUT links up with simulator and is set to maximum output power level at low / middel / high channel.
2. Measure the output power of low / middle / high channel of the EUT.

For ERP measurement:

ERP can be calculated by below formula from ANSI C63.26.

1. EIRP = PT + GT - LC

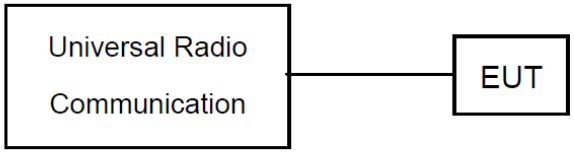
   PT= transmitter output power, in dBm.

   GT= gain of the transmitting antenna, in dBi (EIRP).

   LC= signal attenuation in the connecting cable between the transmitter and antenna, in dB.

3. ERP = EIRP – 2.15 dB.

5.3. Test Setup



5.4. Test Result and Data

Cat M1

LTE Band2 1.4M QPSK

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
18607	1850.7	1	20.04	2.29	22.33	0.17	33.00	-10.67
		Full	17.83	2.29	20.12	0.10	33.00	-12.88
18900	1880	1	19.88	2.29	22.17	0.16	33.00	-10.83
		Full	17.66	2.29	19.95	0.10	33.00	-13.05
19193	1909.3	1	19.66	2.29	21.95	0.16	33.00	-11.05
		Full	17.79	2.29	20.08	0.10	33.00	-12.92

LTE Band2 1.4M 16QAM

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
18607	1850.7	1	19.11	2.29	21.40	0.14	33.00	-11.60
		Full	18.01	2.29	20.30	0.11	33.00	-12.70
18900	1880	1	18.93	2.29	21.22	0.13	33.00	-11.78
		Full	17.71	2.29	20.00	0.10	33.00	-13.00
19193	1909.3	1	18.77	2.29	21.06	0.13	33.00	-11.94
		Full	17.66	2.29	19.95	0.10	33.00	-13.05

LTE Band2 3M QPSK

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
8615	1851.5	1	19.95	2.29	22.24	0.17	33.00	-10.76
		Full	18.97	2.29	21.26	0.13	33.00	-11.74
18900	1880	1	19.79	2.29	22.08	0.16	33.00	-10.92
		Full	18.85	2.29	21.14	0.13	33.00	-11.86
19185	1908.5	1	19.59	2.29	21.88	0.15	33.00	-11.12
		Full	18.76	2.29	21.05	0.13	33.00	-11.95

Cat M1

LTE Band2 3M 16QAM

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
8615	1851.5	1	19.43	2.29	21.72	0.15	33.00	-11.28
		Full	18.54	2.29	20.83	0.12	33.00	-12.17
18900	1880	1	18.69	2.29	20.98	0.13	33.00	-12.02
		Full	18.07	2.29	20.36	0.11	33.00	-12.64
19185	1908.5	1	18.79	2.29	21.08	0.13	33.00	-11.92
		Full	18.16	2.29	20.45	0.11	33.00	-12.55

LTE Band2 5M QPSK

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
18625	1852.5	1	19.48	2.29	21.77	0.15	33.00	-11.23
		Full	18.71	2.29	21.00	0.13	33.00	-12.00
18900	1880	1	19.72	2.29	22.01	0.16	33.00	-10.99
		Full	18.62	2.29	20.91	0.12	33.00	-12.09
19175	1907.5	1	19.26	2.29	21.55	0.14	33.00	-11.45
		Full	18.76	2.29	21.05	0.13	33.00	-11.95

LTE Band2 5M 16QAM

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
18625	1852.5	1	19.58	2.29	21.87	0.15	33.00	-11.13
		Full	18.23	2.29	20.52	0.11	33.00	-12.48
18900	1880	1	19.33	2.29	21.62	0.15	33.00	-11.38
		Full	18.32	2.29	20.61	0.12	33.00	-12.39
19175	1907.5	1	19.33	2.29	21.62	0.15	33.00	-11.38
		Full	18.45	2.29	20.74	0.12	33.00	-12.26

Cat M1

LTE Band2 10M QPSK

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
18650	1855	1	19.58	2.29	21.87	0.15	33.00	-11.13
		Full	19.65	2.29	21.94	0.16	33.00	-11.06
18900	1880	1	19.52	2.29	21.81	0.15	33.00	-11.19
		Full	19.62	2.29	21.91	0.16	33.00	-11.09
19150	1905	1	19.04	2.29	21.33	0.14	33.00	-11.67
		Full	19.52	2.29	21.81	0.15	33.00	-11.19

LTE Band2 10M 16QAM

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
18650	1855	1	19.51	2.29	21.80	0.15	33.00	-11.20
		Full	19.66	2.29	21.95	0.16	33.00	-11.05
18900	1880	1	19.4	2.29	21.69	0.15	33.00	-11.31
		Full	19.32	2.29	21.61	0.14	33.00	-11.39
19150	1905	1	18.99	2.29	21.28	0.13	33.00	-11.72
		Full	19.36	2.29	21.65	0.15	33.00	-11.35

LTE Band2 15M QPSK

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
18675	1857.5	1	19.94	2.29	22.23	0.17	33.00	-10.77
		Full	20.01	2.29	22.30	0.17	33.00	-10.70
18900	1880	1	19.53	2.29	21.82	0.15	33.00	-11.18
		Full	19.78	2.29	22.07	0.16	33.00	-10.93
19125	1902.5	1	19.22	2.29	21.51	0.14	33.00	-11.49
		Full	19.67	2.29	21.96	0.16	33.00	-11.04

Cat M1

LTE Band2 15M 16QAM

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
18675	1857.5	1	19.57	2.29	21.86	0.15	33.00	-11.14
		Full	19.7	2.29	21.99	0.16	33.00	-11.01
18900	1880	1	19.35	2.29	21.64	0.15	33.00	-11.36
		Full	19.79	2.29	22.08	0.16	33.00	-10.92
19125	1902.5	1	19.18	2.29	21.47	0.14	33.00	-11.53
		Full	19.65	2.29	21.94	0.16	33.00	-11.06

LTE Band2 20M QPSK

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
18700	1860	1	19.98	2.29	22.27	0.17	33.00	-10.73
		Full	19.85	2.29	22.14	0.16	33.00	-10.86
18900	1880	1	19.95	2.29	22.24	0.17	33.00	-10.76
		Full	19.69	2.29	21.98	0.16	33.00	-11.02
19100	1900	1	19.2	2.29	21.49	0.14	33.00	-11.51
		Full	19.62	2.29	21.91	0.16	33.00	-11.09

LTE Band2 20M 16QAM

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (EIRP) (dBm)	Margin (dB)
18700	1860	1	19.65	2.29	21.94	0.16	33.00	-11.06
		Full	19.57	2.29	21.86	0.15	33.00	-11.14
18900	1880	1	19.51	2.29	21.80	0.15	33.00	-11.20
		Full	19.8	2.29	22.09	0.16	33.00	-10.91
19100	1900	1	19.16	2.29	21.45	0.14	33.00	-11.55
		Full	19.47	2.29	21.76	0.15	33.00	-11.24

NB-IoT
LTE Band2

Channel	Frequency (MHz)	Modulation	Sub-carrier spacing (KHz)	Nltones	Conducted Power (dBm)	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	Limit (dBm)	Margin (dB)
18602	1850.2	BPSK	3.75	1@0	20.8	2.29	23.09	0.20	33.00	-9.91
		QPSK	3.75	1@0	21.07	2.29	23.36	0.22	33.00	-9.64
		BPSK	15	1@0	20.83	2.29	23.12	0.21	33.00	-9.88
		QPSK	15	1@0	20.76	2.29	23.05	0.20	33.00	-9.95
18900	1880	BPSK	3.75	1@0	21.01	2.29	23.30	0.21	33.00	-9.70
		QPSK	3.75	1@0	21.34	2.29	23.63	0.23	33.00	-9.37
		BPSK	15	1@0	21.18	2.29	23.47	0.22	33.00	-9.53
		QPSK	15	1@0	20.93	2.29	23.22	0.21	33.00	-9.78
19198	1909.8	BPSK	3.75	1@0	20.4	2.29	22.69	0.19	33.00	-10.31
		QPSK	3.75	1@0	20.93	2.29	23.22	0.21	33.00	-9.78
		BPSK	15	1@0	20.59	2.29	22.88	0.19	33.00	-10.12
		QPSK	15	1@0	20.49	2.29	22.78	0.19	33.00	-10.22

6. Emission Bandwidth & Occupied Bandwidth Test

6.1. Test Limit

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

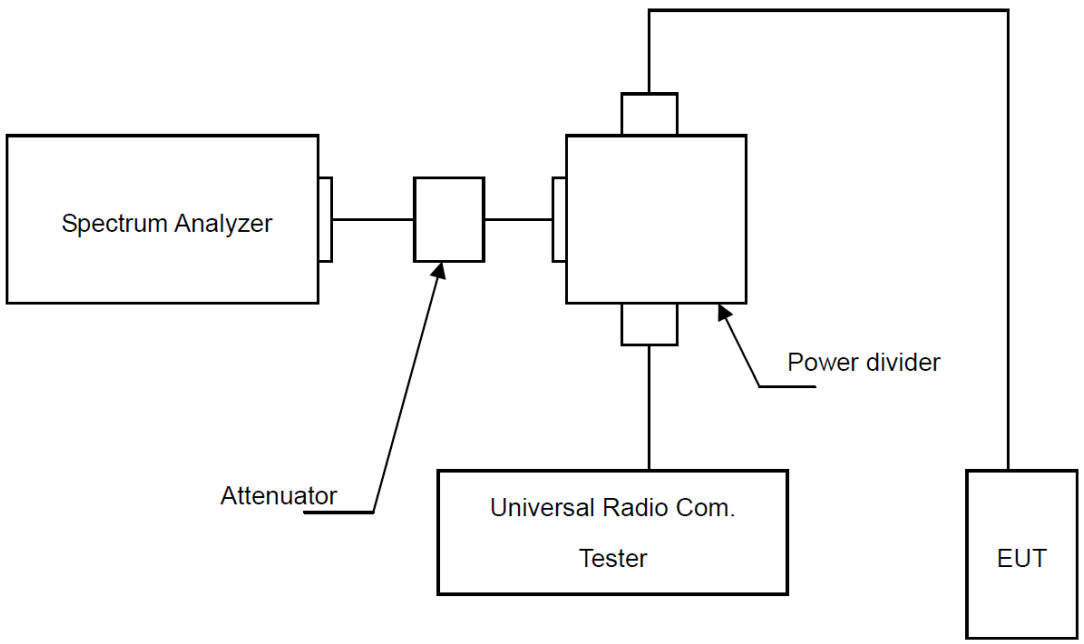
6.2. Test Procedures

a. The EUT makes a phone call to the communication simulator. The power was measured with Spectrum Analyzer.

b. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

c. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

6.3. Test Setup



6.4. Test Result and Data

Cat M1

LTE Band2

Moduration type	RB	Bandwidth (MHz)	Channel No.	Frequency (MHz)	-26dBc Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
QPSK	100%	1.4	18900	1880	1.3160	1.1185
		3	18900	1880	1.3340	1.1264
		5	18900	1880	1.3140	1.1073
		10	18900	1880	1.3280	1.1141
		15	18900	1880	1.3430	1.1221
		20	18900	1880	1.3660	1.1324
16QAM	100%	1.4	18900	1880	1.1660	0.9450
		3	18900	1880	1.1940	0.9648
		5	18900	1880	1.1740	0.9629
		10	18900	1880	1.1690	0.9676
		15	18900	1880	1.1850	0.9728
		20	18900	1880	1.2170	0.9808

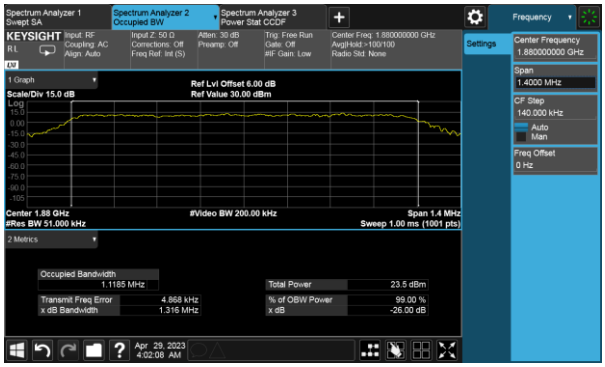
NB-IoT

LTE Band2

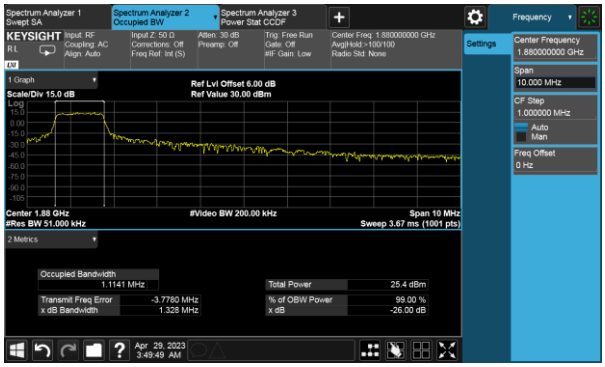
Moduration type	Sub-carrier spacing (KHz)	Nltones	Channel No.	Frequency (MHz)	-26dBc Occupied Bandwidth (KHz)	99% Occupied Bandwidth (KHz)
QPSK	3.75	1@0	18602	1850.2	42.78	69.616
QPSK	15	1@0	18602	1850.2	117.00	128.580
QPSK	15	12@0	18602	1850.2	261.30	183.980
BPSK	3.75	1@0	18602	1850.2	39.61	63.263
BPSK	15	1@0	18602	1850.2	112.80	119.590
QPSK	3.75	1@0	18900	1880	41.85	69.038
QPSK	15	1@0	18900	1880	116.80	118.600
QPSK	15	12@0	18900	1880	252.90	191.810
BPSK	3.75	1@0	18900	1880	41.36	62.906
BPSK	15	1@0	18900	1880	115.00	121.330
QPSK	3.75	1@0	19198	1909.8	42.26	68.864
QPSK	15	1@0	19198	1909.8	129.90	121.690
QPSK	15	12@0	19198	1909.8	251.00	187.030
BPSK	3.75	1@0	19198	1909.8	41.34	61.626
BPSK	15	1@0	19198	1909.8	116.20	119.880

Cat M1

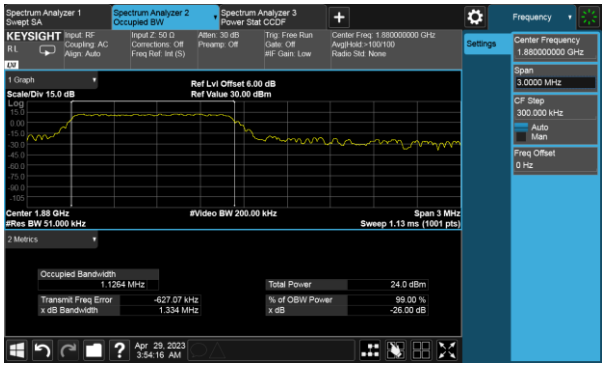
LTE Band 2 QPSK 1.4MHz, CH 18900



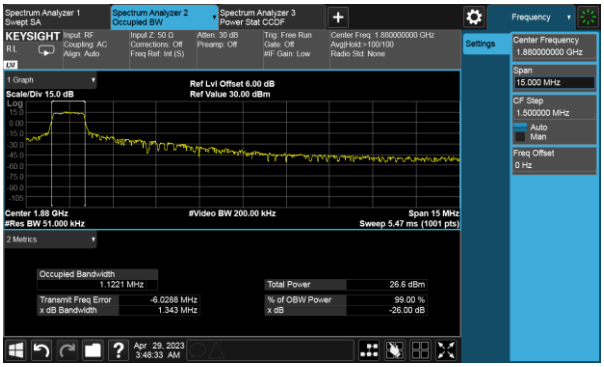
LTE Band 2 QPSK 10MHz, CH 18900



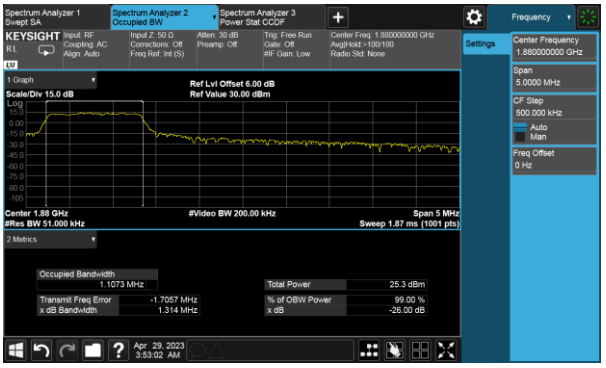
LTE Band 2 QPSK 3MHz, CH 18900



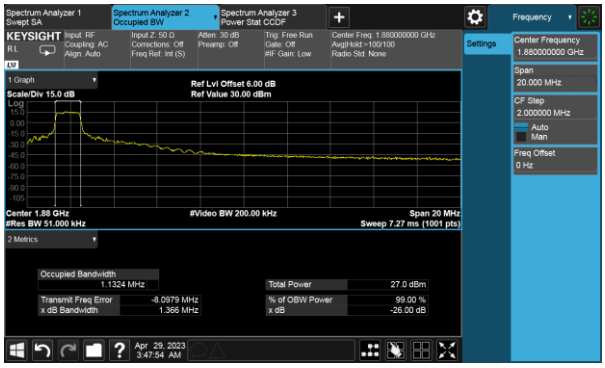
LTE Band 2 QPSK 15MHz, CH 18900



LTE Band 2 QPSK 5MHz, CH 18900

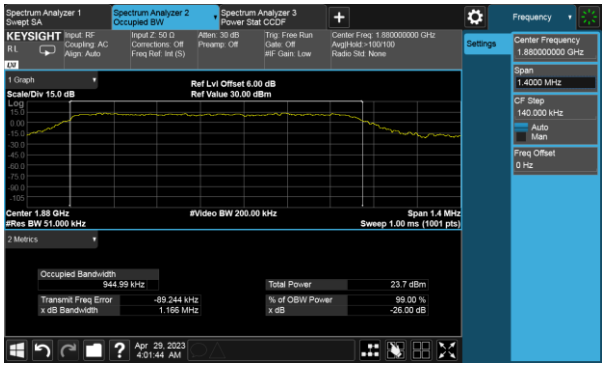


LTE Band 2 QPSK 20MHz, CH 18900

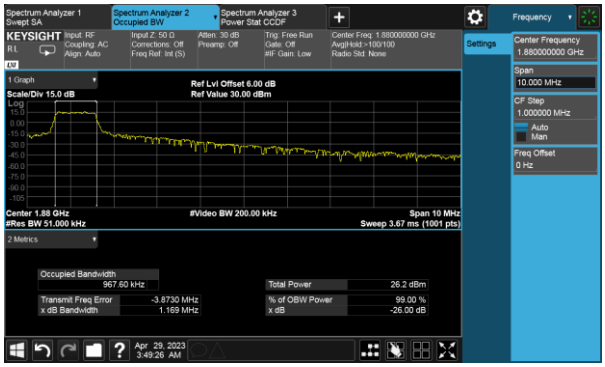


Cat M1

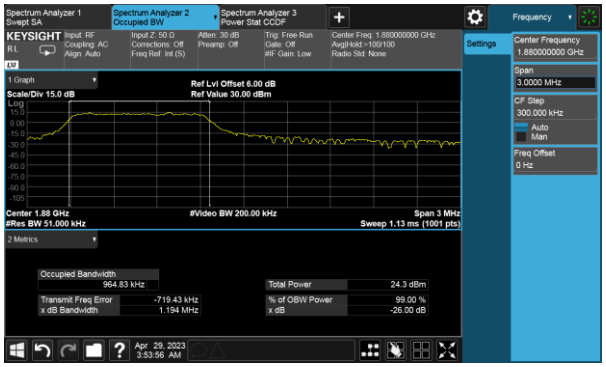
LTE Band 2 16QAM 1.4MHz, CH 18900



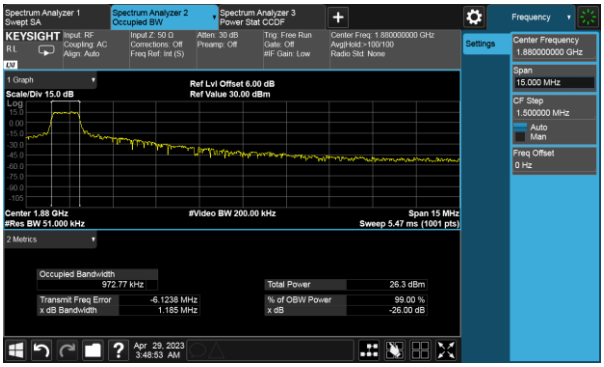
LTE Band 2 16QAM 10MHz, CH 18900



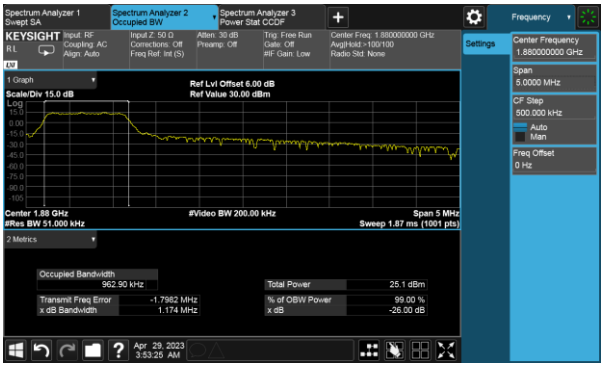
LTE Band 2 16QAM 3MHz, CH 18900



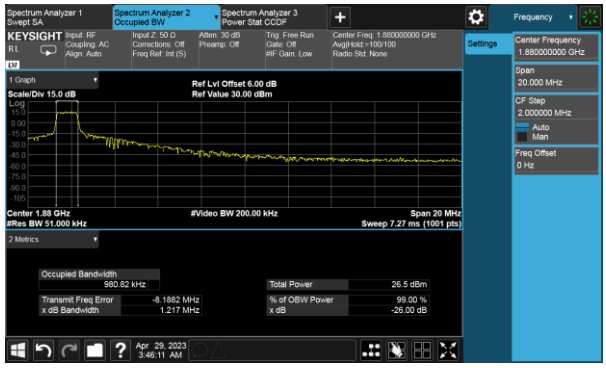
LTE Band 2 16QAM 15MHz, CH 18900



LTE Band 2 16QAM 5MHz, CH 18900

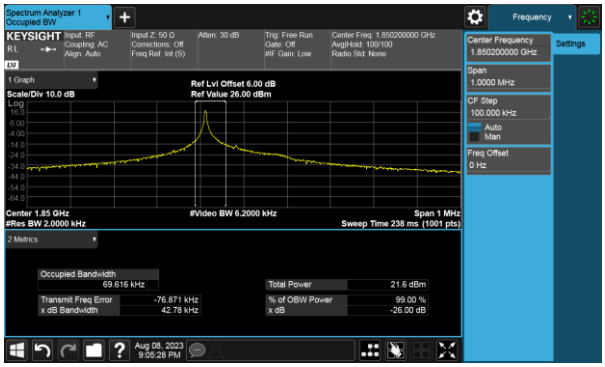


LTE Band 2 16QAM 20MHz, CH 18900

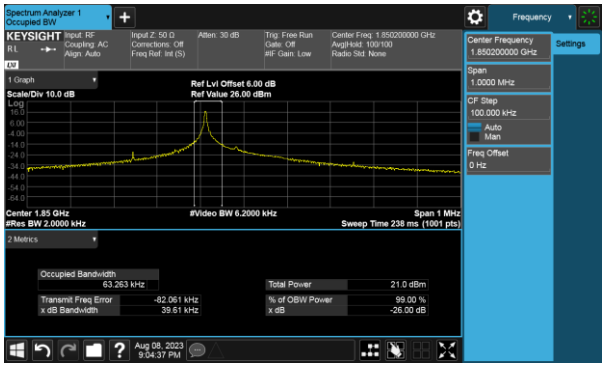


NB-IoT

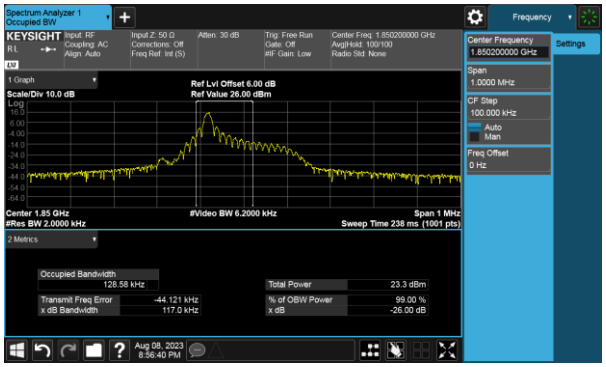
LTE Band 2 QPSK 3.75KHz 1@0 CH 18602



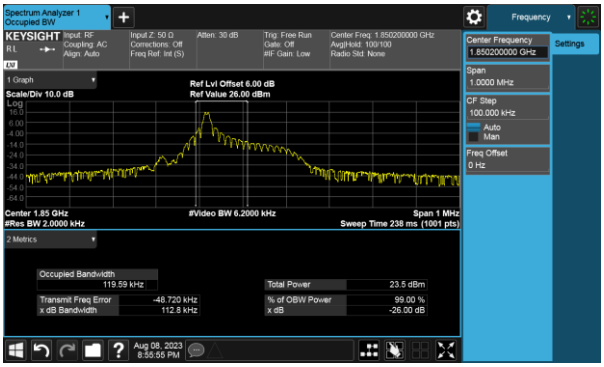
LTE Band 2 BPSK 3.75KHz 1@0 CH 18602



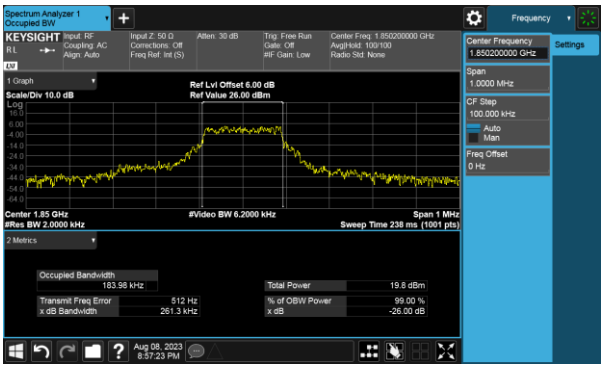
LTE Band 2 QPSK 15KHz 1@0 CH 18602



LTE Band 2 BPSK 15KHz 1@0 CH 18602

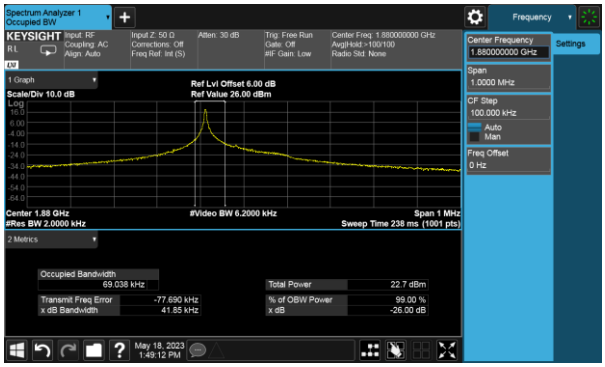


LTE Band 2 QPSK 15KHz 12@0 CH 18602

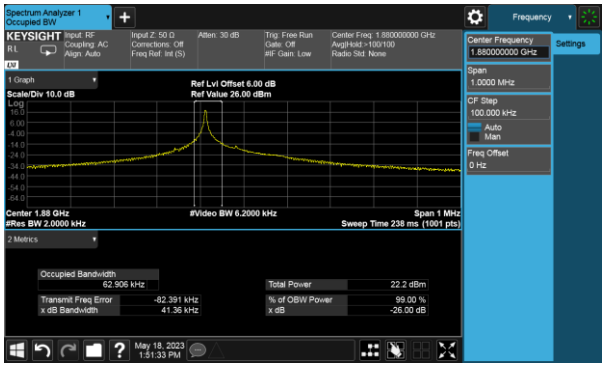


NB-IoT

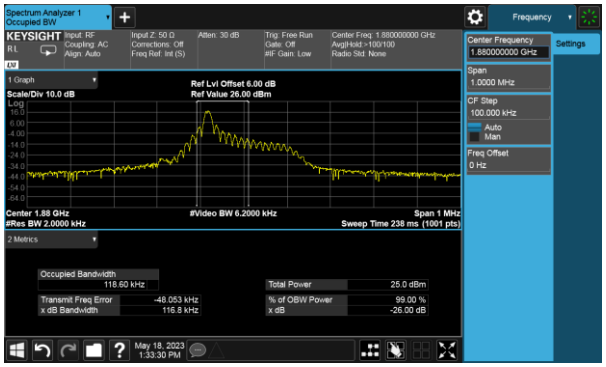
LTE Band 2 QPSK 3.75KHz 1@0 CH 18900



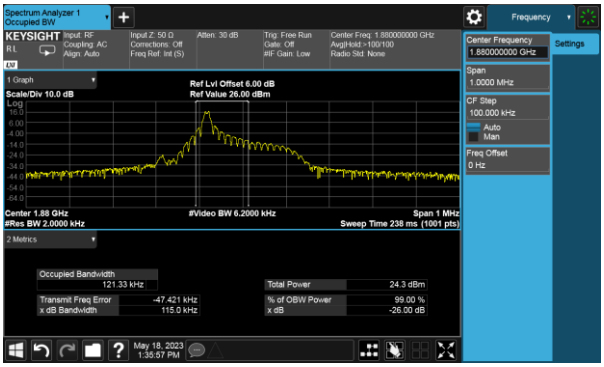
LTE Band 2 BPSK 3.75KHz 1@0 CH 18900



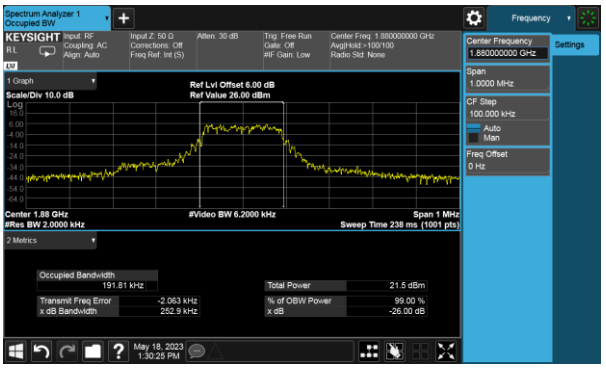
LTE Band 2 QPSK 15KHz 1@0 CH 18900



LTE Band 2 BPSK 15KHz 1@0 CH 18900

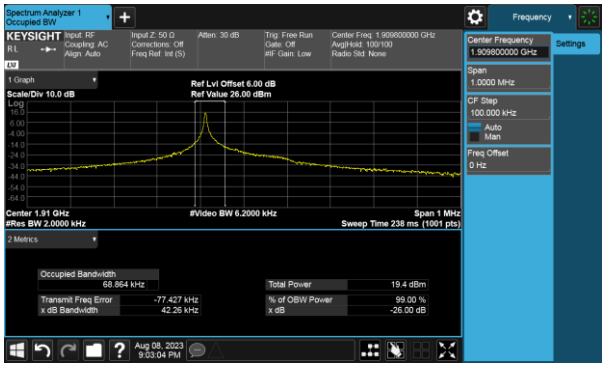


LTE Band 2 QPSK 15KHz 12@0 CH 18900

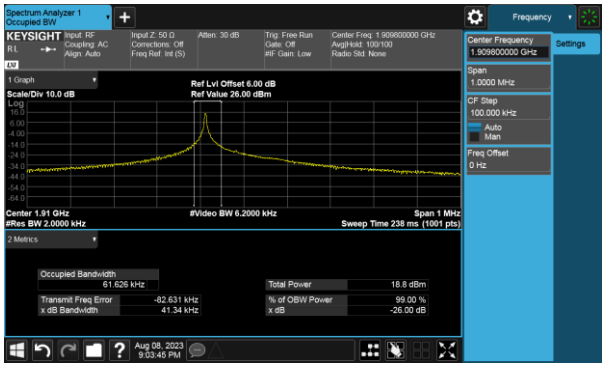


NB-IoT

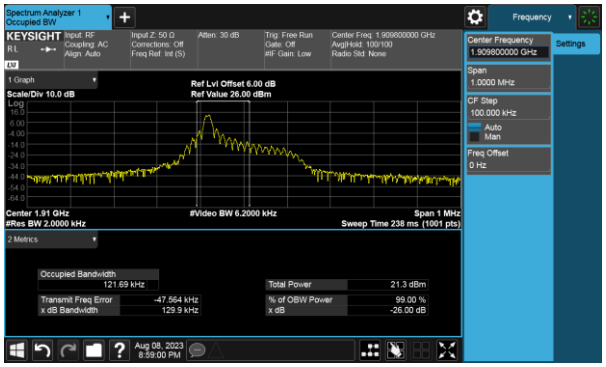
LTE Band 2 QPSK 3.75KHz 1@0 CH 19198



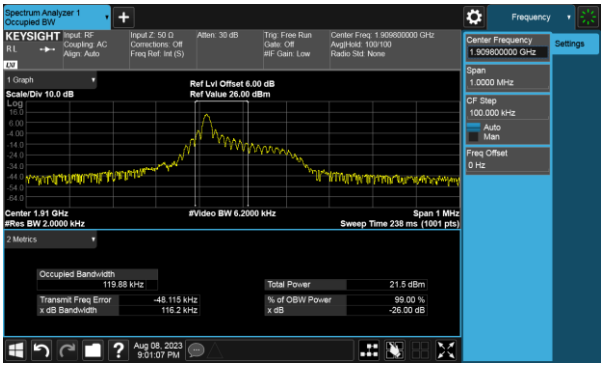
LTE Band 2 BPSK 3.75KHz 1@0 CH 19198



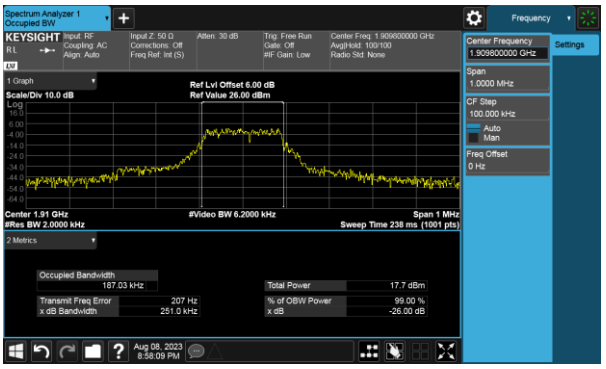
LTE Band 2 QPSK 15KHz 1@0 CH 19198



LTE Band 2 BPSK 15KHz 1@0 CH 19198



LTE Band 2 QPSK 15KHz 12@0 CH 19198



7. Peak to Average Ratio Test

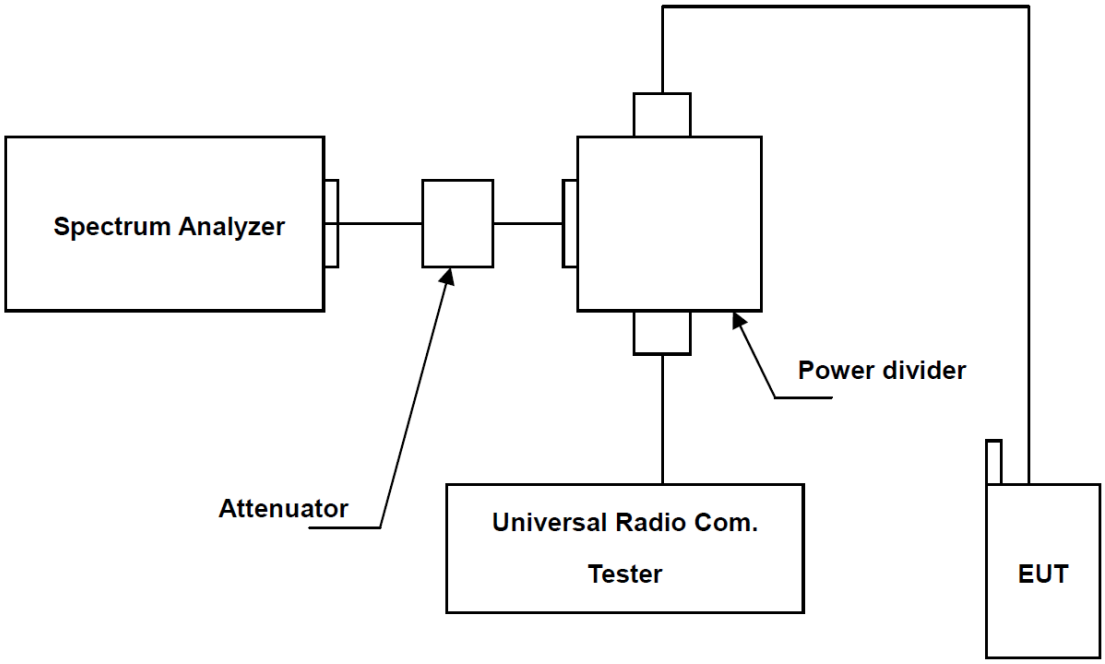
7.1. Test Limit

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

7.2. Test Procedures

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

7.3. Test Setup



7.4. Test Result and Data

Cat M1

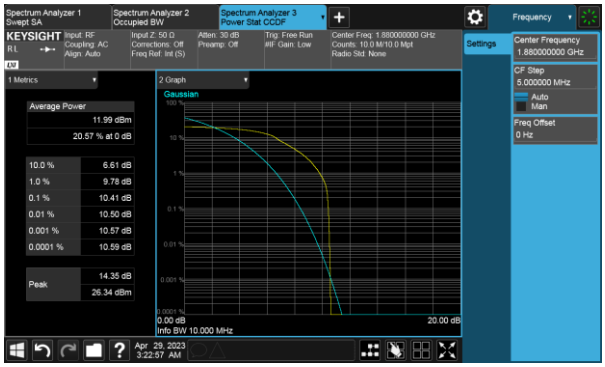
Band	Mode	Bandwidth (MHz)	RB size	Channel	Frequency (MHz)	PAR (dB)	Limit	Result
LTE Band 2	QPSK	1.4	1RB	18900	1880	10.41	13	Pass
	16QAM			18900	1880	11.46	13	Pass
	QPSK	3		18900	1880	9.56	13	Pass
	16QAM			18900	1880	10.18	13	Pass
	QPSK	5		18900	1880	9.07	13	Pass
	16QAM			18900	1880	9.36	13	Pass
	QPSK	10		18900	1880	9.1	13	Pass
	16QAM			18900	1880	10.31	13	Pass
	QPSK	15		18900	1880	9.58	13	Pass
	16QAM			18900	1880	10.08	13	Pass
	QPSK	20		18900	1880	9.44	13	Pass
	16QAM			18900	1880	10.28	13	Pass

NB-IoT

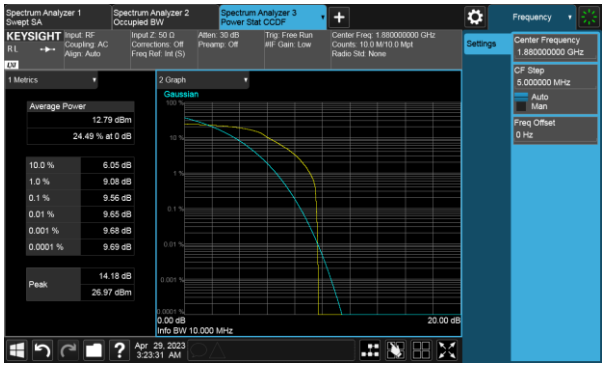
Band	Mode	Sub-carrier spacing (KHz)	Opration Channel/ Frequency(MHz)	PAR (dB)	Limit	Result
LTE Band 2	BPSK	3.75	18900/1880	2.83	13	Pass
	QPSK	3.75	18900/1880	3.33	13	Pass
	BPSK	15	18900/1880	4.68	13	Pass
	QPSK	15	18900/1880	6.14	13	Pass

Cat M1

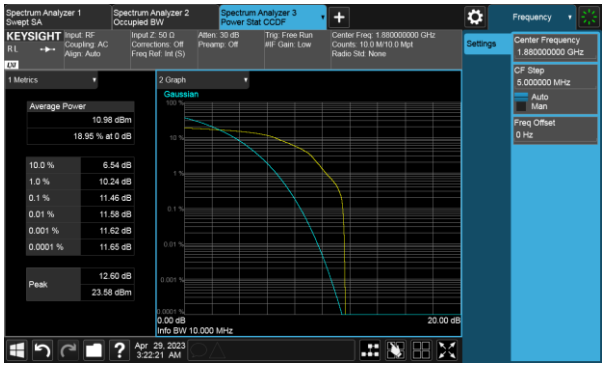
LTE Band 2 QPSK 1.4MHz, CH 18900



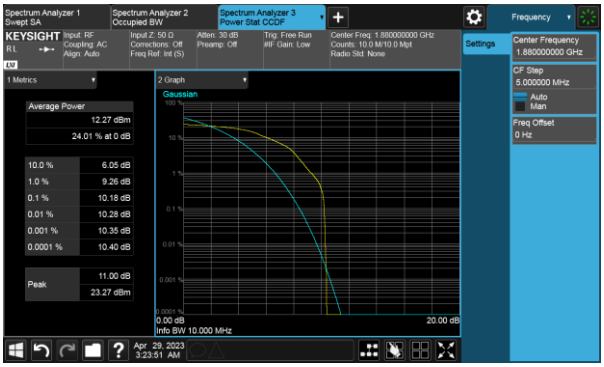
LTE Band 2 QPSK 3MHz, CH 18900



LTE Band 2 16QAM 1.4MHz, CH 18900

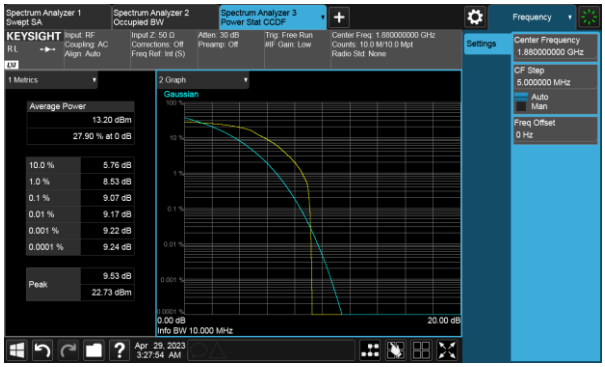


LTE Band 2 16QAM 3MHz, CH 18900

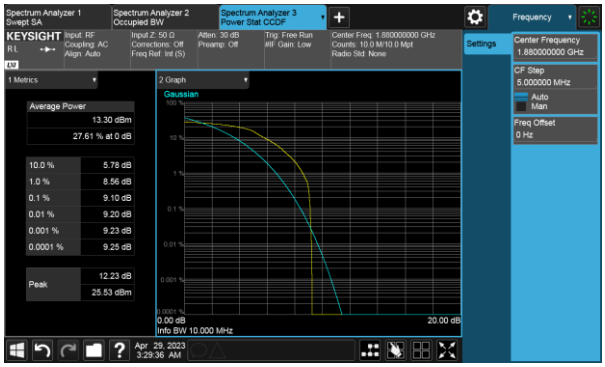


Cat M1

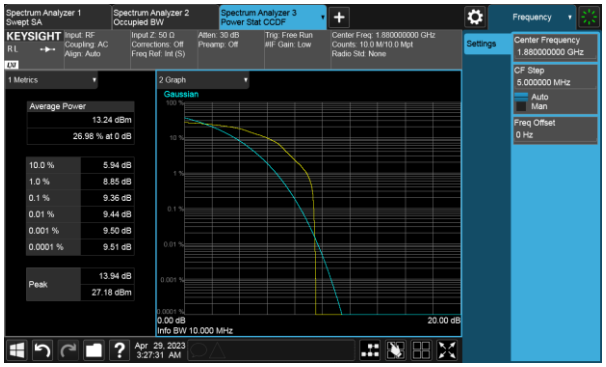
LTE Band 2 QPSK 5MHz, CH 18900



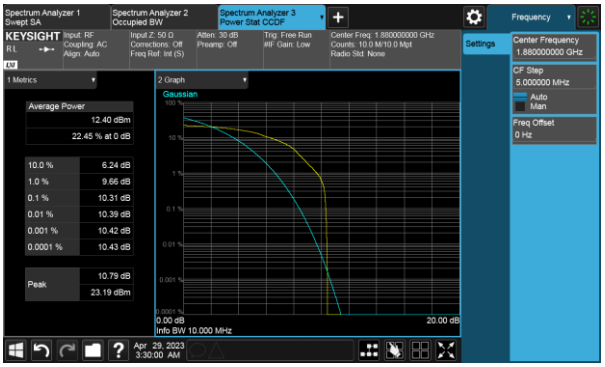
LTE Band 2 QPSK 10MHz, CH 18900



LTE Band 2 16QAM 5MHz, CH 18900

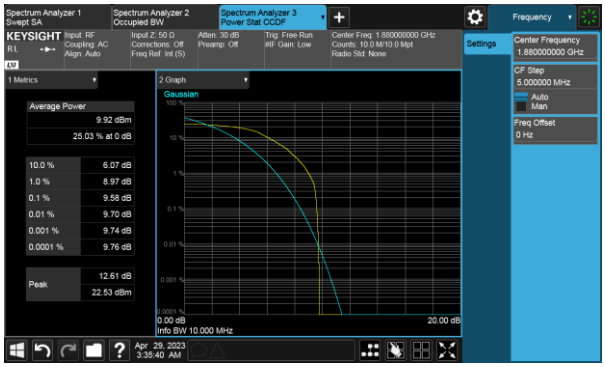


LTE Band 2 16QAM 10MHz, CH 18900

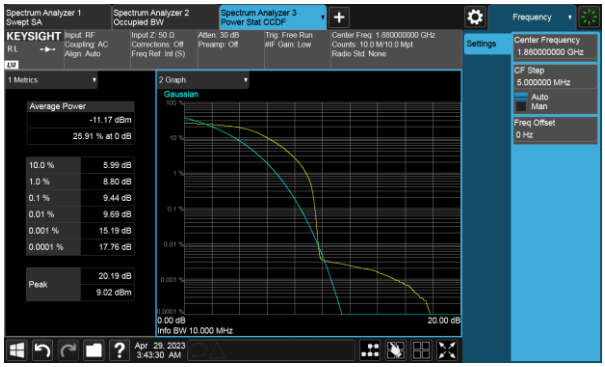


Cat M1

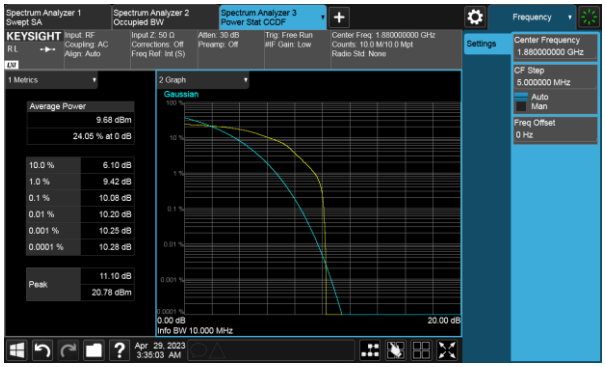
LTE Band 2 QPSK 15MHz, CH 18900



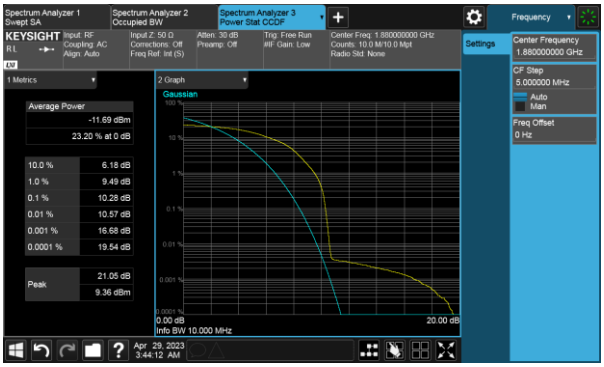
LTE Band 2 QPSK 20MHz, CH 18900



LTE Band 2 16QAM 15MHz, CH 18900

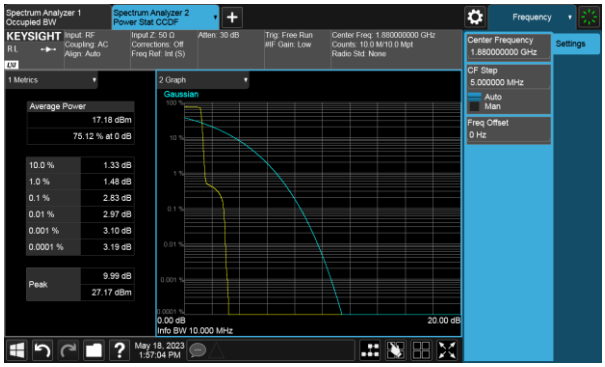


LTE Band 2 16QAM 20MHz, CH 18900

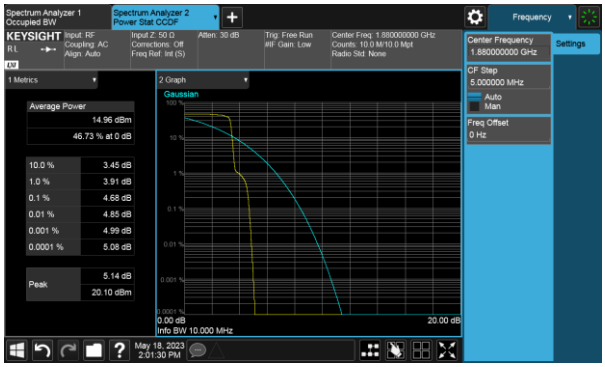


NB-IoT

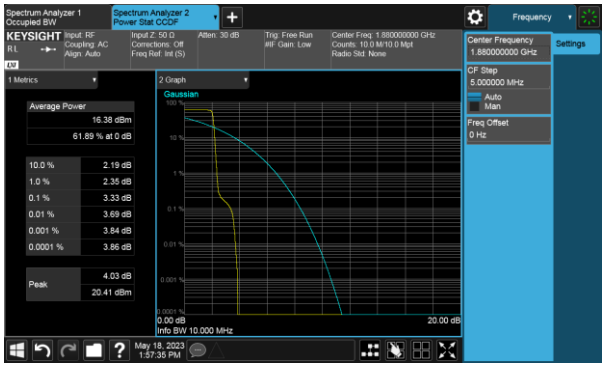
LTE Band 2 BPSK 3.75KHz, CH 18900



LTE Band 2 BPSK 15KHz, CH 18900



LTE Band 2 QPSK 3.75KHz, CH 18900



LTE Band 2 QPSK 15KHz, CH 18900