

FCC TEST REPORT

Product Name: Global LTE Cat.M1/lte Cat.nb2 Data-only Module
Trade Mark: CINTERION
Model No.: TX62-W-B
Report Number: 210804012RFM-1
Test Standards: FCC 47 CFR Part 27 P
FCC ID: QIPTX62-W-B
Test Result: PASS
Date of Issue: September 17, 2021

Prepared for:

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UTTR-RF-FCC4G-V1.1

Version

| Version No. | Date | Description |
|-------------|--------------------|-------------|
| V1.0 | September 17, 2021 | Original |

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

| | |
|---------------------------------|--|
| Applicant: | THALES DIS AIS Deutschland GmbH |
| Address of Applicant: | Siemensdamm 50, 13629 Berlin, Germany |
| Manufacturer: | Thales DIS AIS Deutschland GmbH |
| Address of Manufacturer: | Werinherstr. 81, 81541 Munich, Germany |

1.2 EUT INFORMATION

1.2.1 General Description of EUT

| | | | |
|-------------------------------|--|--|--|
| Product Name: | Global LTE Cat.M1/lte Cat.nb2 Data-only Module | | |
| Model No.: | TX62-W-B | | |
| Trade Mark: | CINTERION | | |
| DUT Stage: | Production Unit | | |
| EUT Supports Function: | E-UTRA Bands: | FDD Band 2/ Band 4/ Band 5/ Band8 / Band 12/ Band 13/ Band 25/ Band 26/ Band 66/ Band 71 | |
| Sample Received Date: | August 19, 2021 | | |
| Sample Tested Date: | August 19, 2021 to August 30, 2021 | | |

1.2.2 Description of Accessories

None.

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

| | | | |
|----------------------------------|------------------|------------------------|---------------------------|
| Support Networks: | LTE | | |
| Type of Modulation: | LTE Band 8: | CAT-M1 NB-IoT | QPSK, 16QAM BPSK, QPSK |
| Antenna Type: | External Antenna | | |
| Antenna Gain: | LTE Band 8: | 50 ohm terminal (0dBi) | |
| Normal Test Voltage: | 3.8 Vdc | | |
| Extreme Test Voltage: | 2.5 to 4.5Vdc | | |
| Extreme Test Temperature: | -40 °C to +70 °C | | |

| Summary of Results: | | | | | | | | |
|---------------------|-------|------------|-----------------|---------------------------|---------------|---------|---------|---------------------|
| Bands | BW | Modulation | Frequency Range | Max RF Output Power (dBm) | | ERP | 99% BW | Emission Designator |
| | (MHz) | | | Conducted (Average) | ERP (Average) | | | |
| 8 | 1.4 | QPSK | 897.5-900.5 | 22.93 | 22.93 | 0.19634 | 1.0966 | 1M10G7D |
| | | 16QAM | | 21.73 | 21.73 | 0.14894 | 0.93965 | 940KW7D |
| | 3 | QPSK | 897.5-900.5 | 22.94 | 22.94 | 0.19679 | 1.1354 | 1M14G7W |
| | | 16QAM | | 21.77 | 21.77 | 0.15031 | 0.97005 | 970KW7D |

| Summary of Results: | | | | | | | | |
|---------------------|---------------------|------------|-----------------|---------------------------|--------------------|----------|--------|---------------------|
| Bands | Sub-carrier spacing | Modulation | Frequency Range | Max RF Output Power (dBm) | | EIRP/ERP | 99% BW | Emission Designator |
| | (KHz) | | (MHz) | Conducted (Average) | ERP/EIRP (Average) | (W) | (kHz) | |
| 8 | 3.75 | BPSK | 897.5-900.5 | 23.37 | 23.37 | 0.21727 | 53.087 | 53K1G7D |
| | | QPSK | | 23.34 | 23.34 | 0.21577 | 60.096 | 60K1G7D |
| | 15 | BPSK | 897.5-900.5 | 22.13 | 22.13 | 0.16331 | 120.41 | 120KG7D |
| | | QPSK | | 22.15 | 22.15 | 0.16406 | 187.14 | 187KG7D |

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

| Description | Manufacturer | Model No. | Serial Number | Supplied by |
|-----------------|--------------|-----------|---------------|-------------|
| Adaptor | N/A | CD139 | 20359 | Applicant |
| PCB board | N/A | DSB75 | -- | Applicant |
| PCB board | N/A | AH8 | -- | Applicant |
| 50 ohm terminal | N/A | N/A | N/A | UnionTrust |

2) Support Cable

| Cable No. | Description | Connector | Length | Supplied by |
|-----------|---------------|-----------|-----------|-------------|
| 1 | Antenna Cable | SMA | 0.1 Meter | UnionTrust |
| 2 | RF Cable | SMA | 0.8 Meter | UnionTrust |
| 3 | RF Cable | SMA | 0.8 Meter | UnionTrust |

1.5 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Telephone: +86 (0) 755 2823 0888

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1.6 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the

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identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.7 DEVIATION FROM STANDARDS

None.

1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| No. | Item | Measurement Uncertainty |
|-----|---|--------------------------|
| 1 | Conducted emission 9kHz-150kHz | ±3.2 dB |
| 2 | Conducted emission 150kHz-30MHz | ±2.7 dB |
| 3 | Radiated spurious emissions 30MHz-1GHz | ± 4.9 dB |
| 4 | Radiated spurious emissions 1GHz-18GHz | ± 4.8 dB |
| 5 | Radiated spurious emissions 18GHz-40GHz | ± 5.1 dB |
| 6 | Occupied Bandwidth | ± 1.86 % |
| 7 | DC Supply Voltages | ± 0.68 % |
| 8 | Temperature | ± 0.62 °C |
| 9 | Humidity | ± 3.9 % |
| 10 | Conducted spurious emissions | ± 2.7 dB |
| 11 | DC Supply Voltages | ± 0.68 % |
| 12 | AC Supply Voltages | ± 1.2 % |
| 13 | Radio Frequency | ± 6.5 x 10 ⁻⁸ |
| 14 | RF Power, Conducted | ± 0.9 dB |

2. TEST SUMMARY

| FCC 47 CFR Part 27 Test Cases (LTE Band 8) | | | |
|---|---|---|--------|
| Test Item | Test Requirement | Test Method | Result |
| Equivalent Radiated Power (ERP) | FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.1507(a)(3) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS |
| Conducted Output Power | FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.1507(a)(3) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS |
| Peak-to-average ratio | FCC 47 CFR Part 27.1507(d) | KDB 971168 D01v03r01 | PASS |
| 99%&26dB Bandwidth | FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 27.1506 | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS |
| Band Edge at antenna terminals | FCC 47 CFR Part 27.1509(a) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS |
| Spurious emissions at antenna terminals | FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.1509(a) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS |
| Field strength of spurious radiation | FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.1509(a) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS |
| Frequency stability | FCC 47 CFR Part 2.1055 | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS |

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3. EQUIPMENT LIST

| Radiated Emission Test Equipment List | | | | | | |
|---------------------------------------|--|--------------|------------|----------------------------|-------------------------|-----------------------------|
| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
| <input checked="" type="checkbox"/> | 3m SAC | ETS-LINDGREN | 3M | N/A | Jan. 22, 2021 | Jan. 21, 2024 |
| <input type="checkbox"/> | Loop Antenna | ETS-Lindgren | 6502 | 00202525 | Nov. 14, 2020 | Nov. 13, 2021 |
| <input checked="" type="checkbox"/> | Receiver | R&S | ESIB26 | 100114 | Nov. 18, 2020 | Nov. 17, 2021 |
| <input checked="" type="checkbox"/> | Broadband Antenna | ETS-LINDGREN | 3142E | 00201566 | Nov. 14, 2020 | Nov. 13, 2021 |
| <input checked="" type="checkbox"/> | 6dB Attenuator | Talent | RA6A5-N-18 | 18103001 | Nov. 14, 2020 | Nov.13, 2021 |
| <input checked="" type="checkbox"/> | Preamplifier | HP | 8447F | 2805A02960 | Nov. 10, 2020 | Nov. 9, 2021 |
| <input checked="" type="checkbox"/> | Double-Ridged Waveguide Horn Antenna (Pre-amplifier) | ETS-LINDGREN | 3117-PA | 00201541 | Apr. 30, 2021 | Apr. 29, 2022 |
| <input checked="" type="checkbox"/> | Pre-amplifier | ETS-Lindgren | 00118385 | 00201874 | Nov. 10, 2020 | Nov. 9, 2021 |
| <input type="checkbox"/> | Double-Ridged Waveguide Horn Antenna (Pre-amplifier) | ETS-LINDGREN | 3116C-PA | 00202652 | Nov. 14, 2020 | Nov. 13, 2021 |
| <input type="checkbox"/> | Pre-amplifier | ETS-Lindgren | 00118384 | 00202652 | Nov. 14, 2020 | Nov. 13, 2022 |
| <input checked="" type="checkbox"/> | Multi device Controller | ETS-LINDGREN | 7006-001 | 00160105 | N/A | N/A |
| <input checked="" type="checkbox"/> | Test Software | Audix | e3 | Software Version: 9.160323 | | |

| RF Test Equipment List | | | | | | |
|-------------------------------------|-------------------------------------|--------------|-----------|----------------|-------------------------|-----------------------------|
| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
| <input checked="" type="checkbox"/> | Spectrum Analyzer | R&S | FSV40-N | 101653 | Apr. 22, 2021 | Apr. 21, 2022 |
| <input checked="" type="checkbox"/> | EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY51440197 | Nov. 10, 2020 | Nov. 9, 2021 |
| <input checked="" type="checkbox"/> | Wideband Radio Communication Tester | R&S | CMW500 | 120932 | Apr. 22, 2021 | Apr. 21, 2022 |
| <input type="checkbox"/> | Wideband Radio Communication Tester | R&S | CMW500 | 119583 | Apr. 22, 2021 | Apr. 21, 2022 |
| <input checked="" type="checkbox"/> | DC Source | KIKUSUI | PWR400L | LK003024 | N/A | N/A |
| <input checked="" type="checkbox"/> | Digital multimeter | FLUKE | 15B+ | 30701460WS15 | Nov. 12, 2020 | Nov. 11, 2021 |
| <input checked="" type="checkbox"/> | Temp & Humidity chamber | Votisch | VT4002 | 58566133290020 | Apr. 22, 2021 | Apr. 21, 2022 |

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4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

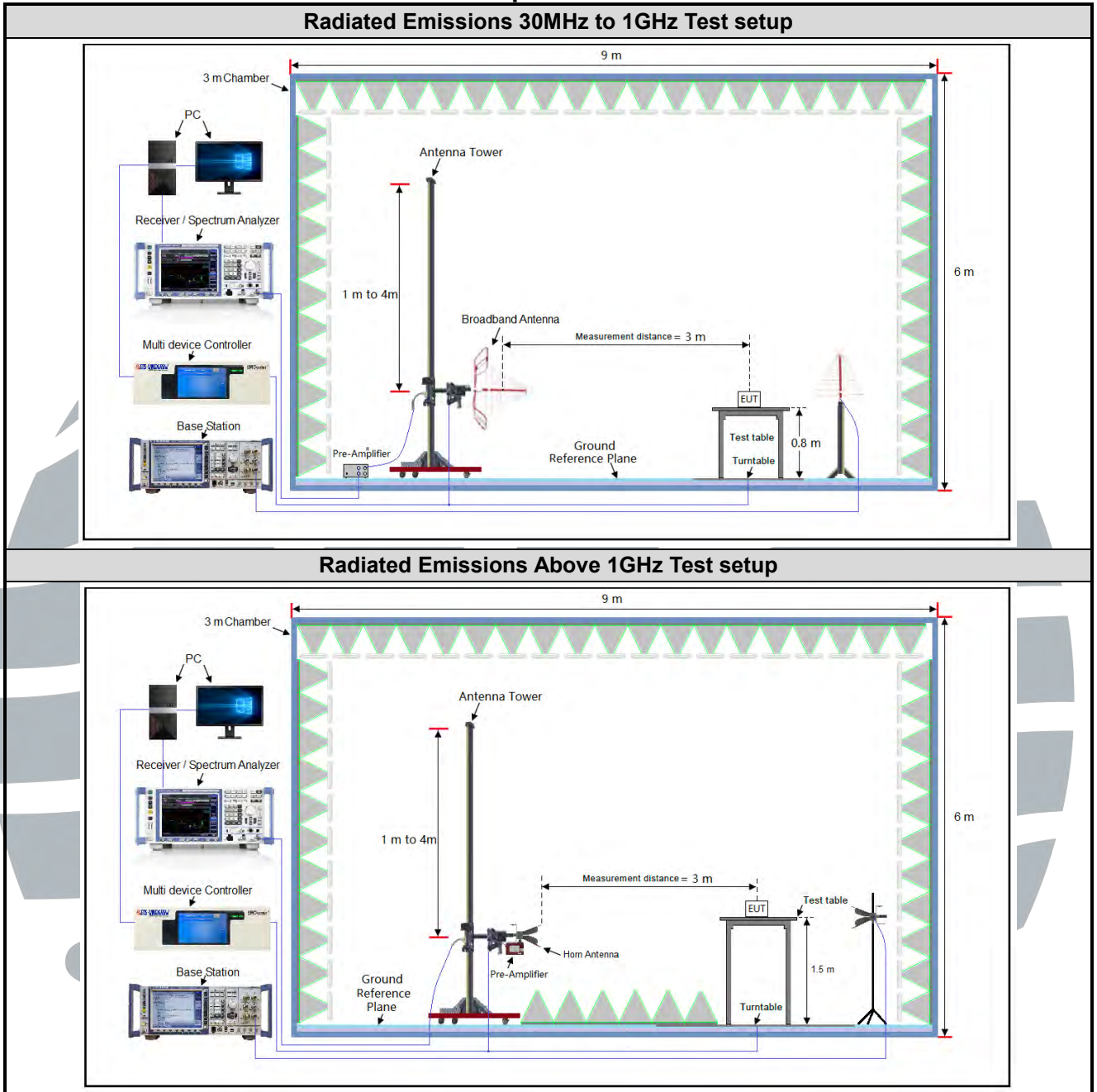
| Test Environment | Selected Values During Tests | | |
|------------------|------------------------------|-------------|-----------------------|
| Test Condition | Ambient | | |
| | Temperature (°C) | Voltage (V) | Relative Humidity (%) |
| TN/VN | +15 to +35 | 3.8 | 20 to 75 |
| TL/VL | -40 | 2.5 | 20 to 75 |
| TH/VL | +70 | 2.5 | 20 to 75 |
| TL/VH | -40 | 4.5 | 20 to 75 |
| TH/VH | +70 | 4.5 | 20 to 75 |

Remark:

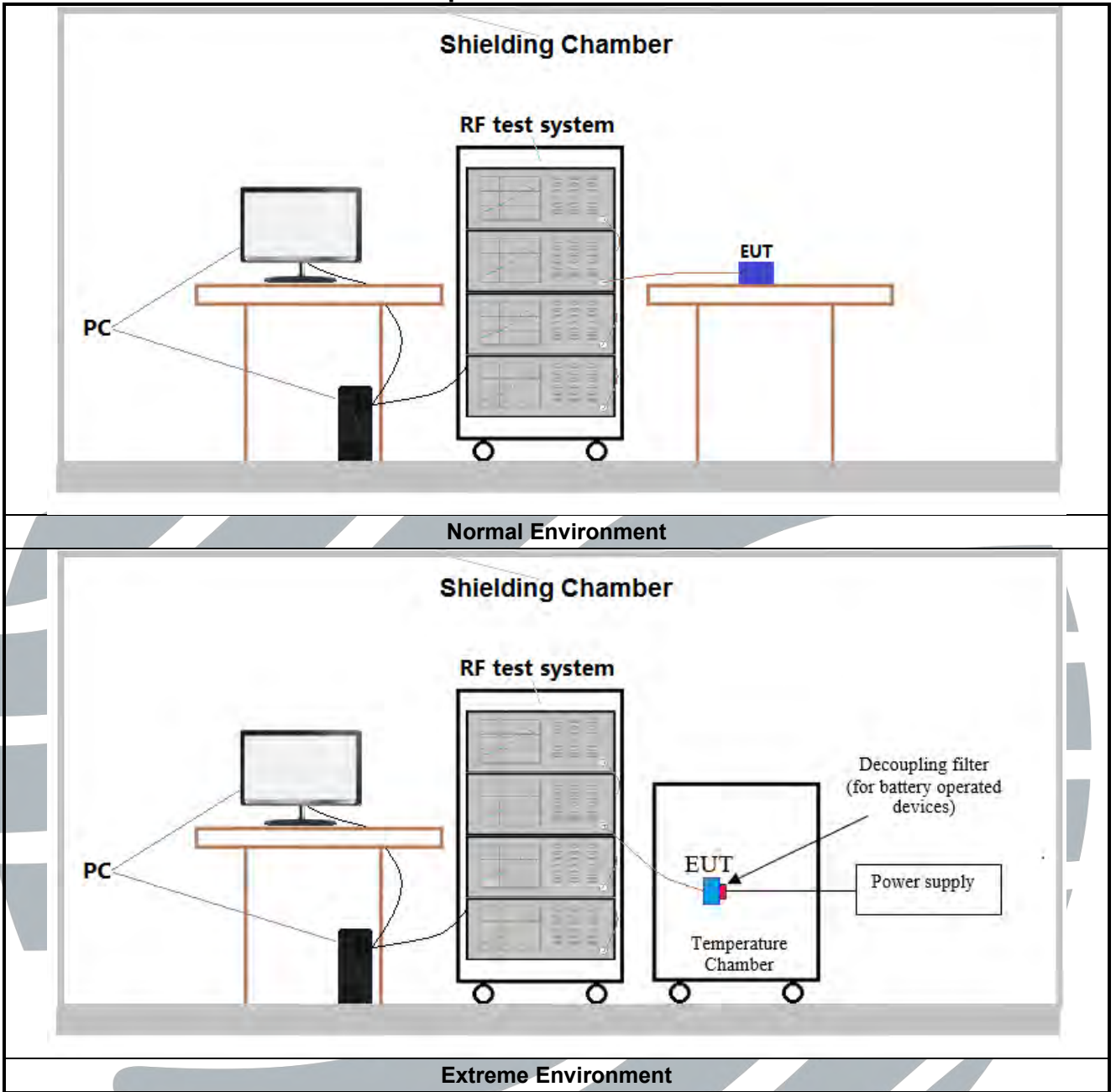
- 1) The EUT just work in such extreme temperature of -40 °C to +70 °C and the extreme voltage of 2.5 V to 4.5 V, so here the EUT is tested in the temperature of -40 °C to +70 °C and the voltage of 2.5 V to 4.5 V.
- 2) VN: Normal Voltage; TN: Normal Temperature;
 TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;
 VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

4.2 TEST SETUP

4.2.1 For Radiated Emissions test setup



4.2.2 For Conducted RF test setup



4.3 TEST CHANNELS

| Band | Test Frequency ID | Bandwidth (MHz) | Number [UL] | Frequency of Uplink (MHz) |
|---|-------------------|-----------------|-------------|---------------------------|
| CAT-M1 LTE Band 8 TX: 897.5-900.5MHz | Low Range | 1.4 | 21632 | 898.2 |
| | Middle Range | 1.4/3 | 21640 | 899 |
| | High Range | 1.4 | 21648 | 899.8 |

| Band | Test Frequency ID | Sub-carrier spacing (KHz) | Number [UL] | Frequency of Uplink (MHz) |
|---|-------------------|---------------------------|-------------|---------------------------|
| NB-IoT LTE Band 8 TX: 897.5-900.5MHz | Low Range | 3.75 or 15 | 21626 | 897.6 |
| | Middle Range | 3.75 or 15 | 21640 | 899 |
| | High Range | 3.75 or 15 | 21654 | 900.4 |



4.4 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. Only the worst case data were recorded in this test report.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X/Y/Z axis, and antenna ports.

The worst case was found when positioned as the table below.

| Band | Mode | Antenna Port | Worst-case axis positioning |
|------------|------|--------------|-----------------------------|
| LTE Band 8 | 1TX | Chain 0 | Z axis |

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.5 PRE-SCAN

Pre-scan under all rate at lowest middle and highest channel, find the transmitter power as below.

LTE Band 8

| CAT-M1 Maximum Average Power(dBm) | | | | | |
|-----------------------------------|----------------------------|-------|-------------|-----------------------|-------|
| Bandwidth | Channel/ Frequency(MHz) | Index | RB# RBstart | Conducted Power (dBm) | |
| | | | | QPSK | 16QAM |
| 1.4MHz | 21632/898.2 | 0 | 1#0 | 22.93 | 21.73 |
| | | 0 | 6#0 | 20.53 | 20.59 |
| | 21640/899 | 0 | 1#0 | 22.88 | 21.70 |
| | | 0 | 6#0 | 20.54 | 20.59 |
| | 21648/899.8 | 0 | 1#5 | 22.91 | 21.70 |
| | | 0 | 6#0 | 20.55 | 20.37 |
| 3MHz | 21640/899 | 0 | 1#0 | 22.94 | 21.77 |
| | | 0 | 6#0 | 20.58 | 20.59 |

| NB-IoT Maximum Average Power (dBm) | | | | | |
|------------------------------------|------------------------------|--------|--|-----------|-------------|
| Modulation | Sub-carrier spacing (KHz) | Ntones | Conducted Power (dBm) for low/mid/high channel | | |
| | | | 21626/897.6 | 21640/899 | 21654/900.4 |
| BPSK | 3.75 | 1@0 | 23.32 | 23.37 | 23.33 |
| | | 1@47 | 23.22 | 23.32 | 23.24 |
| | 15 | 1@0 | 22.06 | 22.04 | 22.13 |
| | | 1@11 | 21.96 | 21.93 | 21.98 |
| QPSK | 3.75 | 1@0 | 23.31 | 23.34 | 23.32 |
| | | 1@47 | 23.27 | 23.27 | 23.29 |
| | 15 | 1@0 | 22.05 | 22.13 | 22.15 |
| | | 1@11 | 21.95 | 22.03 | 22.05 |
| | | 12@0 | 21.16 | 21.13 | 21.20 |

Pre-scan all bandwidth and RB, find worse case mode are chosen to the report, the LTE worse case mode applicability and tested channel detail as below:

| CAT-M1 Item | Band | Bandwidth(MHz) | | | Modulation | | | RB | | | Test Channel | | |
|---|------|-------------------------------------|-------------------------------------|--|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | | 1.4 | 3 | | QPSK | 16QAM | 64QAM | 1 | Half | Full | L | M | H |
| ERP/EIRP | 8 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Conducted output power | 8 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 99%&26dB Bandwidth | 8 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| peak-to-average ratio | 8 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Band Edge at antenna terminals | 8 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Spurious emissions at antenna terminals | 8 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Field strength of spurious radiation | 8 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Frequency stability | 8 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Remark:
 The mark "" means is chosen for testing; The mark "" means is not chosen for testing;
 The mark "-" means is not supported bandwidth

| NB-IoT Item | Band | Sub-carrier spacing (KHz) | | Modulation | | Channel | | |
|---|------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | | 3.75 | 15 | BPSK | QPSK | L | M | H |
| ERP/EIRP | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Conducted output power | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 99%&26dB Bandwidth | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| peak-to-average ratio | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Band Edge at antenna terminals | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Spurious emissions at antenna terminals | 2 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Field strength of spurious radiation | 2 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Frequency stability | 2 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Remark:
 The mark "" means is chosen for testing; The mark "" means is not chosen for testing;
 The mark "-" means is not supported bandwidth

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

| No. | Identity | Document Title |
|-----|--------------------|--|
| 1 | FCC 47 CFR Part 27 | Miscellaneous Wireless Communications Services |

5.2 ERP

Test Requirement: FCC 47 CFR Part 2.1046(a)
LTE Band 8 : FCC 47 CFR Part 27.1507(a)(3)

Test Method: KDB 971168-D01v03r01 Section 5.6 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 27.1507(a)(3):

Mobile, control and auxiliary test stations. Mobile, control and auxiliary test stations must not exceed 10 watts ERP.

Test Procedure:

$$ERP \text{ or } EIRP = P_{Meas} + G_T - L_c$$

where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

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

1) L_c = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

Test Setup: Refer to section 4.2.1 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

LTE Band 8

| CAT-M1 Maximum ERP (dBm) | | | | | | |
|--------------------------|------------|----------------------------|-----|-------|-----------|------------|
| Bandwidth | Modulation | Channel/ Frequency(MHz) | RB | Index | EIRP(dBm) | Limit(dBm) |
| 1.4MHz | QPSK | 21632/898.2 | 1#0 | 0 | 22.93 | 40 |
| | | 21640/899 | 1#0 | 0 | 22.88 | 40 |
| | | 21648/899.8 | 1#5 | 0 | 22.91 | 40 |
| | 16QAM | 21632/898.2 | 1#0 | 0 | 21.73 | 40 |
| | | 21640/899 | 1#0 | 0 | 21.70 | 40 |
| | | 21648/899.8 | 1#5 | 0 | 21.70 | 40 |
| 3MHz | QPSK | 21640/899 | 1#0 | 0 | 22.94 | 40 |
| | 16QAM | 21640/899 | 1#0 | 0 | 21.77 | 40 |

| NB-IoT Maximum ERP (dBm) Standalone | | | | | | | |
|-------------------------------------|----------------|------------|---------------------------|--------|----------|------------|--------|
| Channel | Frequency(MHz) | Modulation | Sub-carrier spacing (KHz) | Ntones | ERP(dBm) | Limit(dBm) | Result |
| 21626 | 897.6 | BPSK | 3.75 | 1@0 | 23.32 | 40 | Pass |
| | | QPSK | 3.75 | 1@0 | 23.31 | 40 | Pass |
| | | BPSK | 15 | 1@0 | 22.06 | 40 | Pass |
| | | QPSK | 15 | 1@0 | 22.05 | 40 | Pass |
| 21640 | 899 | BPSK | 3.75 | 1@0 | 23.37 | 40 | Pass |
| | | QPSK | 3.75 | 1@0 | 23.34 | 40 | Pass |
| | | BPSK | 15 | 1@0 | 22.04 | 40 | Pass |
| | | QPSK | 15 | 1@0 | 22.13 | 40 | Pass |
| 21654 | 900.4 | BPSK | 3.75 | 1@0 | 23.33 | 40 | Pass |
| | | QPSK | 3.75 | 1@0 | 23.32 | 40 | Pass |
| | | BPSK | 15 | 1@0 | 22.13 | 40 | Pass |
| | | QPSK | 15 | 1@0 | 22.15 | 40 | Pass |

5.3 CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 2.1046(a)
LTE Band 8: FCC 47 CFR Part 27.1507(a)(3)
Test Method: KDB 971168 D01v03r01 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 27.1507(a)(3):

Mobile, control and auxiliary test stations. Mobile, control and auxiliary test stations must not exceed 10 watts ERP.

Test Procedure:

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

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: [The full result refer to section 4.5 for details.](#)

5.4 PEAK-TO-AVERAGE RATIO

Test Requirement: LTE Band 8: FCC 47 CFR Part 27.1507(d)
Test Method: KDB 971168 D01v03r01 Section 5.7
Limit: PAR limit. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.
Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

- a) Set resolution/measurement bandwidth \geq 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 %

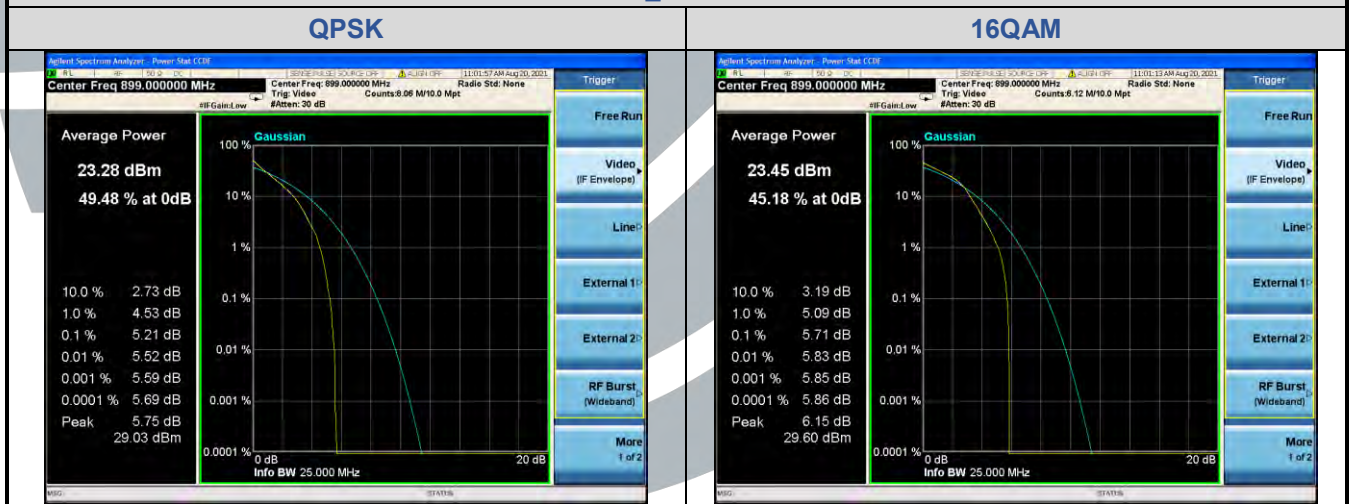
Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.
Instruments Used: Refer to section 3 for details
Test Mode: Link mode
Test Results: Pass
Test Data: See table below

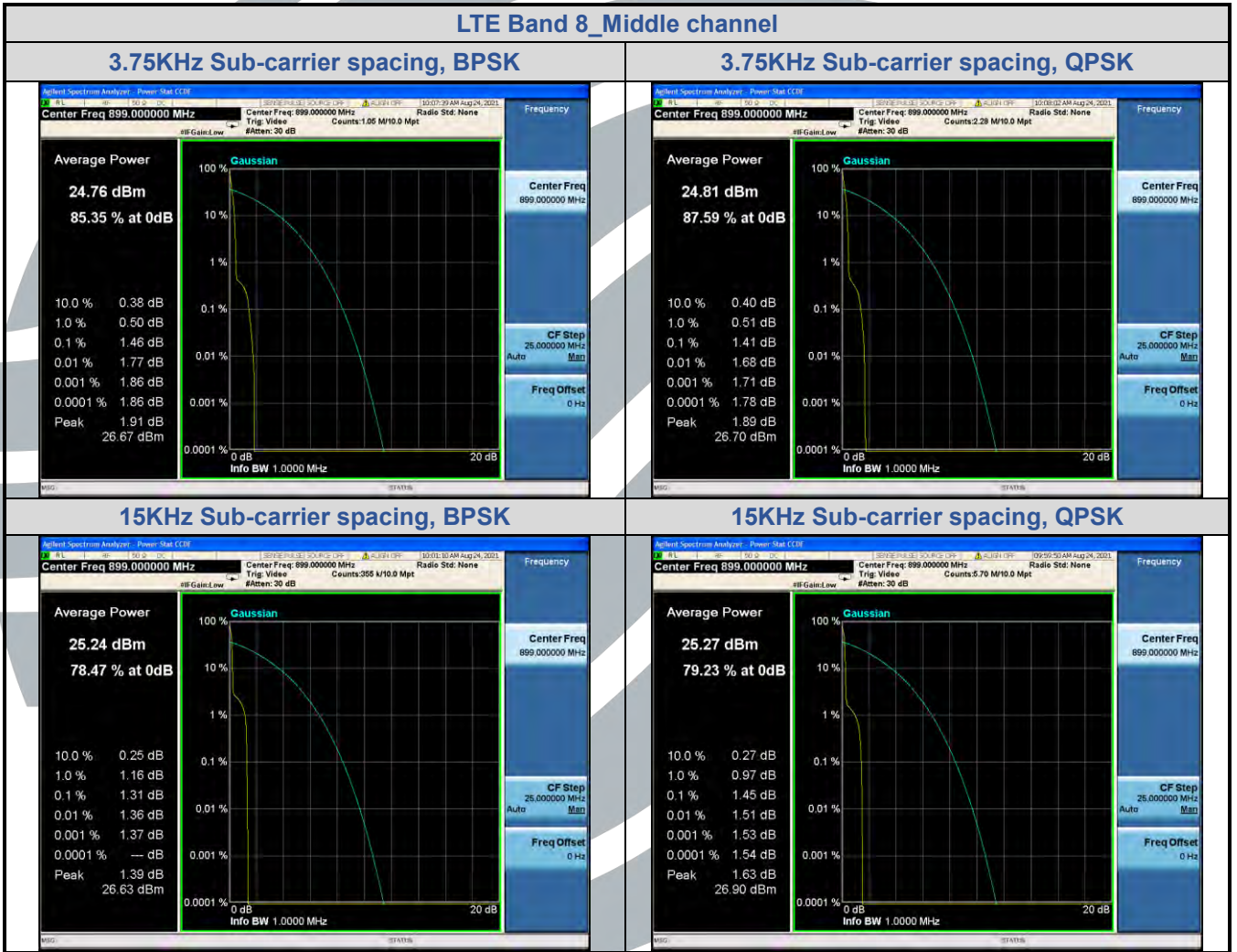
LTE Band 8

| CAT-M1 Peak-to-average ratio (dB) | | | | | |
|-----------------------------------|------------|----------------------------|---------------------------------------|---------------|--------|
| Bandwidth | Modulation | Channel/ Frequency(MHz) | Peak-to-Average Power Ratio (PAPR) | Limit (dB) | Result |
| 3MHz | QPSK | 21640/899 | 5.52 | 13 | Pass |
| | 16QAM | 21640/899 | 5.71 | 13 | Pass |

LTE Band 8_Middle channel



| NB-IoT Peak-to-average ratio (dB) | | | | | |
|-----------------------------------|---------------------------|-------------------------|----------|------------|--------|
| Modulation | Sub-carrier spacing (KHz) | Channel/Frequency (MHz) | PAPR(dB) | Limit (dB) | Result |
| BPSK | 3.75 | 21640/899 | 1.46 | 13 | Pass |
| QPSK | 3.75 | 21640/899 | 1.41 | 13 | Pass |
| BPSK | 15 | 21640/899 | 1.31 | 13 | Pass |
| QPSK | 15 | 21640/899 | 1.45 | 13 | Pass |



5.5 99%&26DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 2.1049(h)
Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01 Section 4
Limit: No Limit, for reporting purposes only.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.
Instruments Used: Refer to section 3 for details
Test Mode: Link mode
Test Results: Pass
Test Data: See table below

LTE Band 8

| CAT-M1 99%&26DB BANDWIDTH | | | | |
|---------------------------|------------|---------|----------------|--------|
| Bandwidth | Modulation | Channel | Bandwidth(MHz) | |
| | | | 99% Power | -26dBc |
| 1.4MHz | QPSK | Low | 1.0966 | 1.277 |
| | | Mid | 1.0965 | 1.277 |
| | | High | 1.0955 | 1.276 |
| | 16QAM | Low | 0.93634 | 1.141 |
| | | Mid | 0.93965 | 1.289 |
| | | High | 0.93525 | 1.271 |
| 3MHz | QPSK | Mid | 1.1354 | 1.391 |
| | 16QAM | Mid | 0.97005 | 1.191 |

LTE Band 8_ Channel Bandwidth: 1.4 MHz

QPSK

16QAM

Lowest Channel

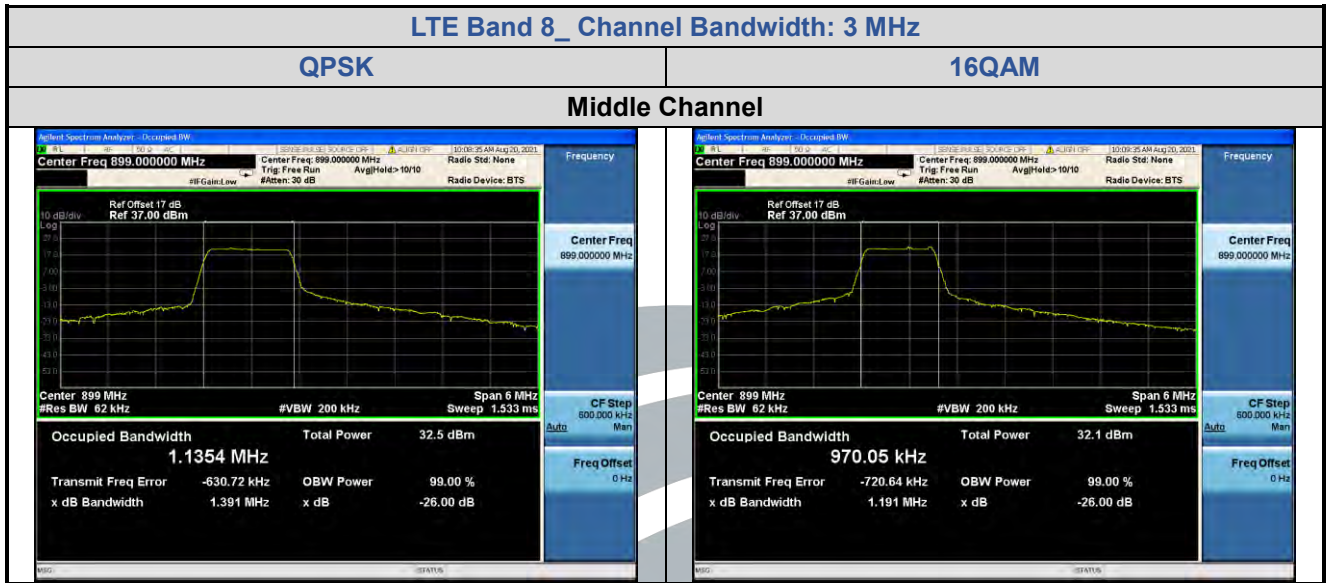


Middle Channel



Highest Channel





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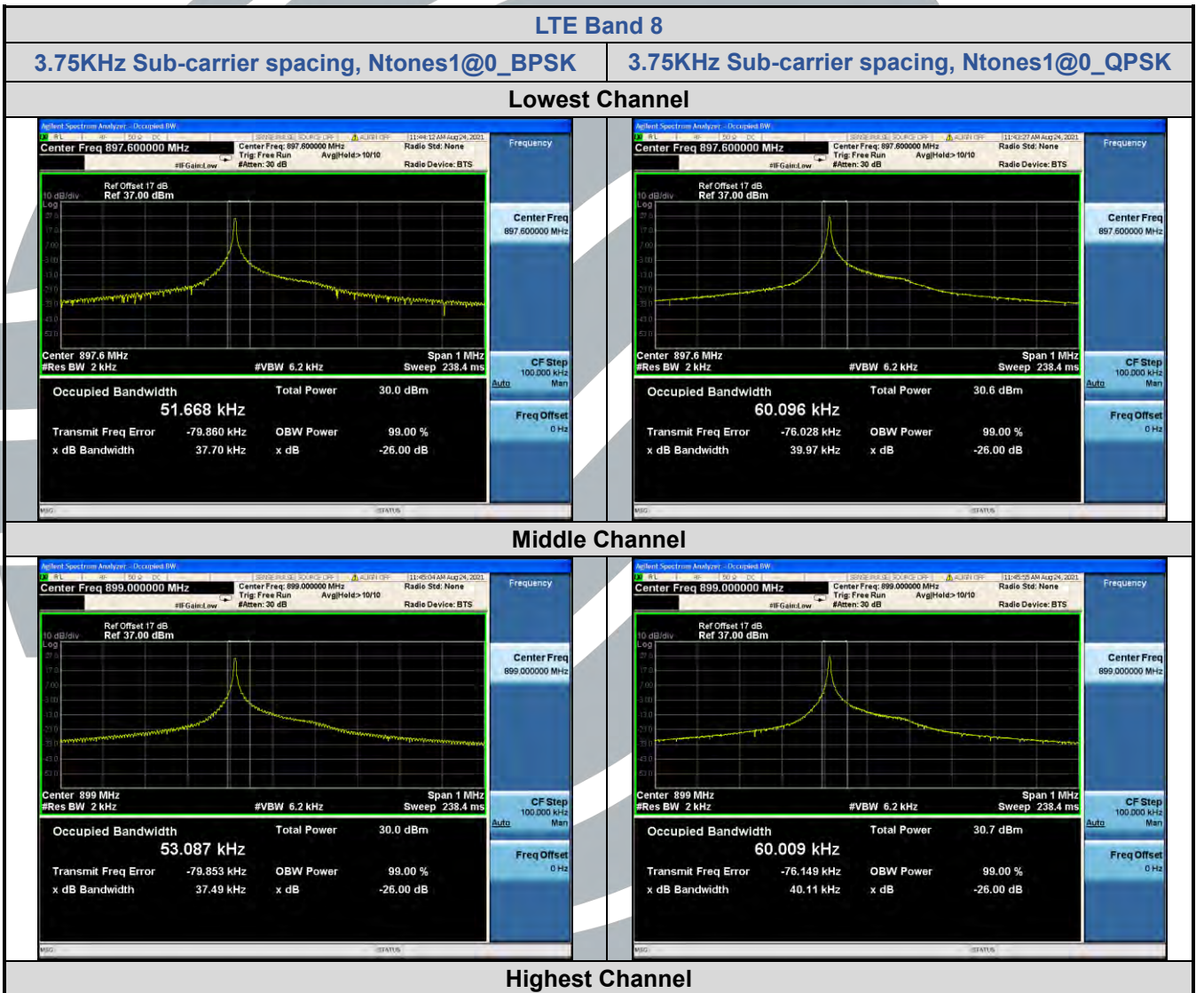
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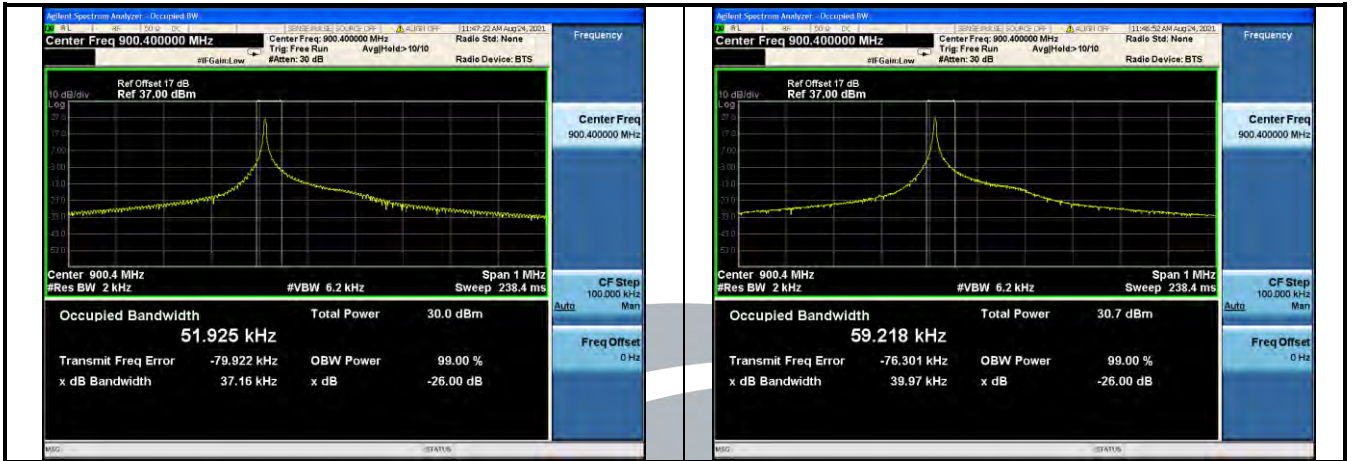
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| NB-IoT 99%&26DB BANDWIDTH | | | | | | | | |
|---------------------------|---------------------------|--------|---|--------------|-----------|--------------|-----------|--------------|
| Modulation | Sub-carrier spacing (KHz) | Ntones | Bandwidth(KHz) for low/mid/high channel | | | | | |
| | | | Low | | Mid | | High | |
| | | | 99% (KHz) | -26dBc (KHz) | 99% (KHz) | -26dBc (KHz) | 99% (KHz) | -26dBc (KHz) |
| BPSK | 3.75 | 1@0 | 51.668 | 37.70 | 53.087 | 37.49 | 51.925 | 37.16 |
| QPSK | 3.75 | 1@0 | 60.096 | 39.97 | 60.009 | 40.11 | 59.218 | 39.97 |
| BPSK | 15 | 1@0 | 119.83 | 104.8 | 119.81 | 104.1 | 120.41 | 116.5 |
| QPSK | 15 | 1@0 | 115.95 | 115.3 | 119.53 | 117.3 | 121.88 | 118.3 |
| QPSK | 15 | 12@0 | 185.12 | 247.0 | 187.14 | 247.4 | 185.70 | 246.6 |





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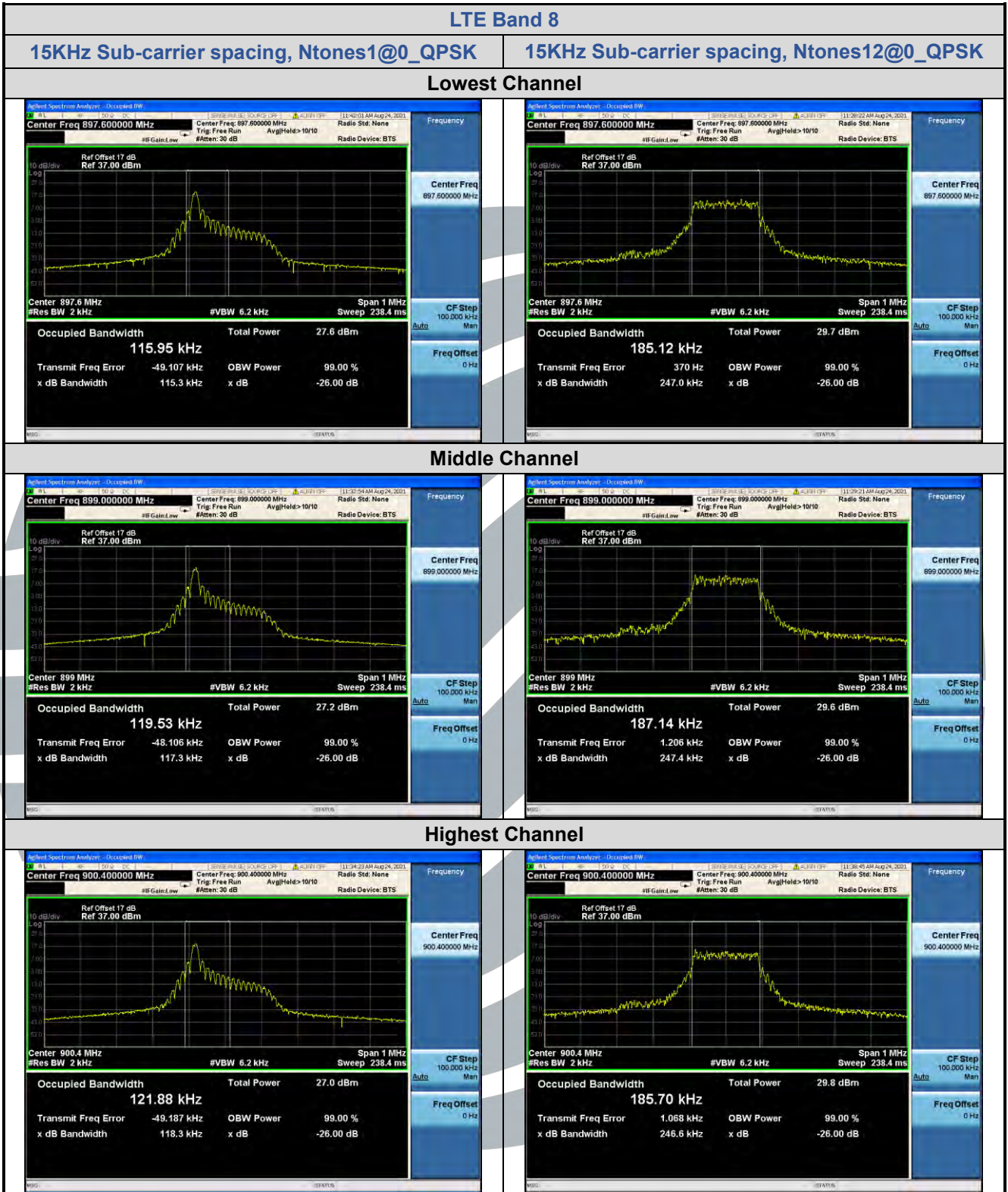
Tel: +86-755-28230888

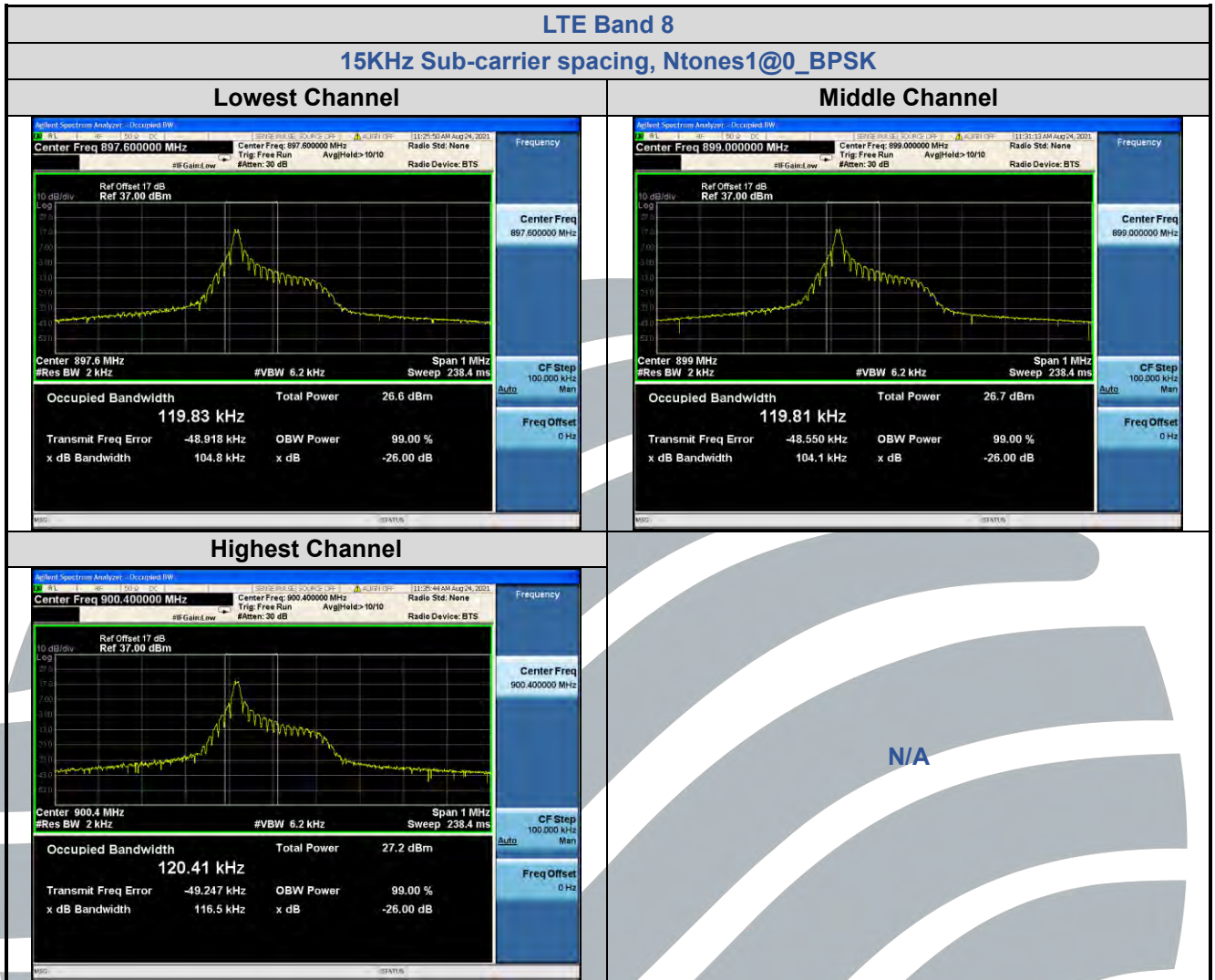
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5.6 BAND EDGE AT ANTENNA TERMINALS

Test Requirement: LTE Band 8: FCC 47 CFR Part 27.1509(a)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

FCC 47 CFR Part 27.1509(a):

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts:

(a) For 900 MHz broadband operations in 897.5-900.5 MHz band by at least $43 + 10 \log (P)$ dB.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

For each band edge measurement:

- 1) Set the spectrum analyzer span to include the block edge frequency.
- 2) Set a marker to point the corresponding band edge frequency in each test case.
- 3) Set display line at -13 dBm
- 4) Set resolution bandwidth to at least 1% of emission bandwidth.
- 5) Set spectrum analyzer with RMS detector.
- 6) Record the max trace plot into the test report

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

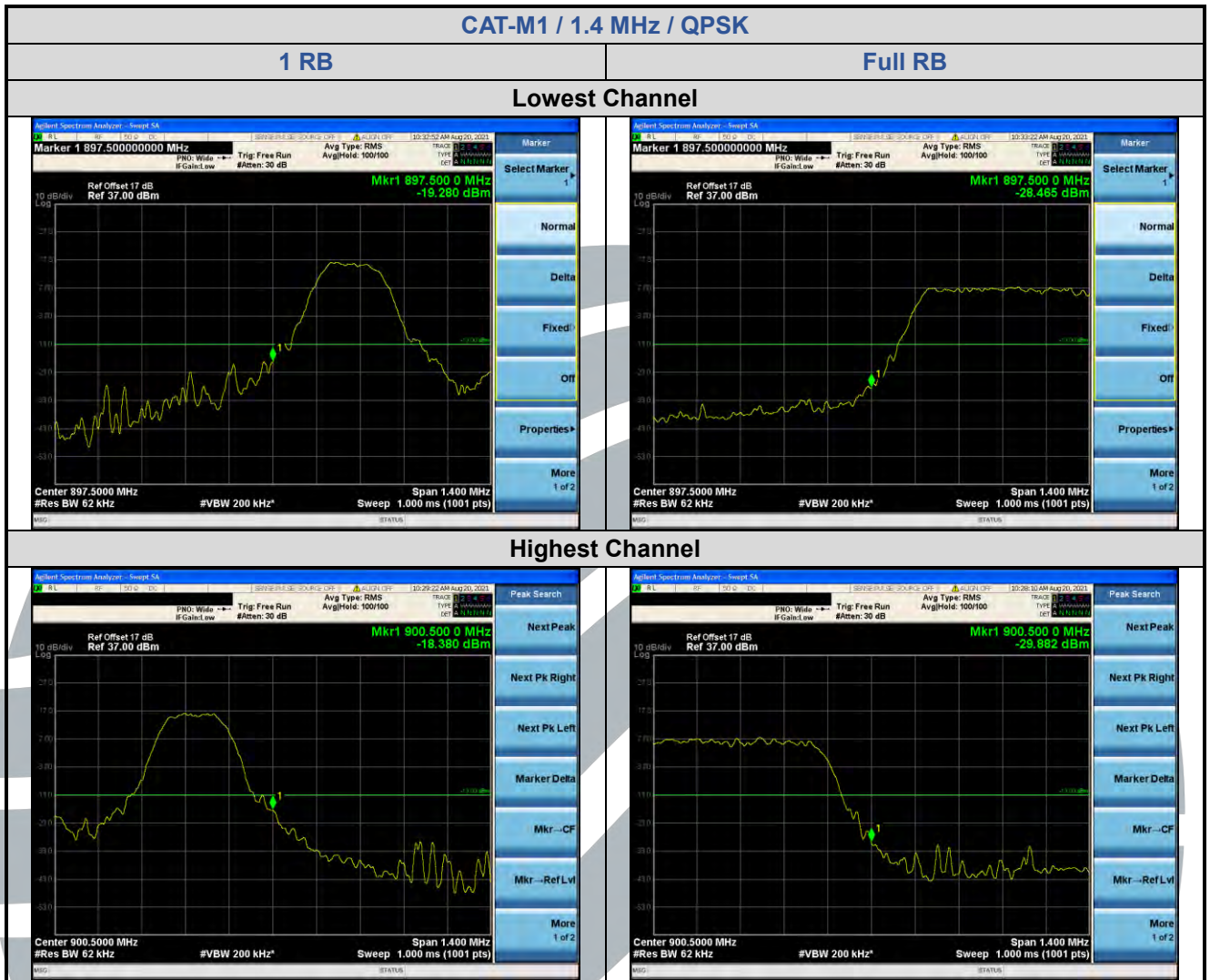
Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

LTE Band 8



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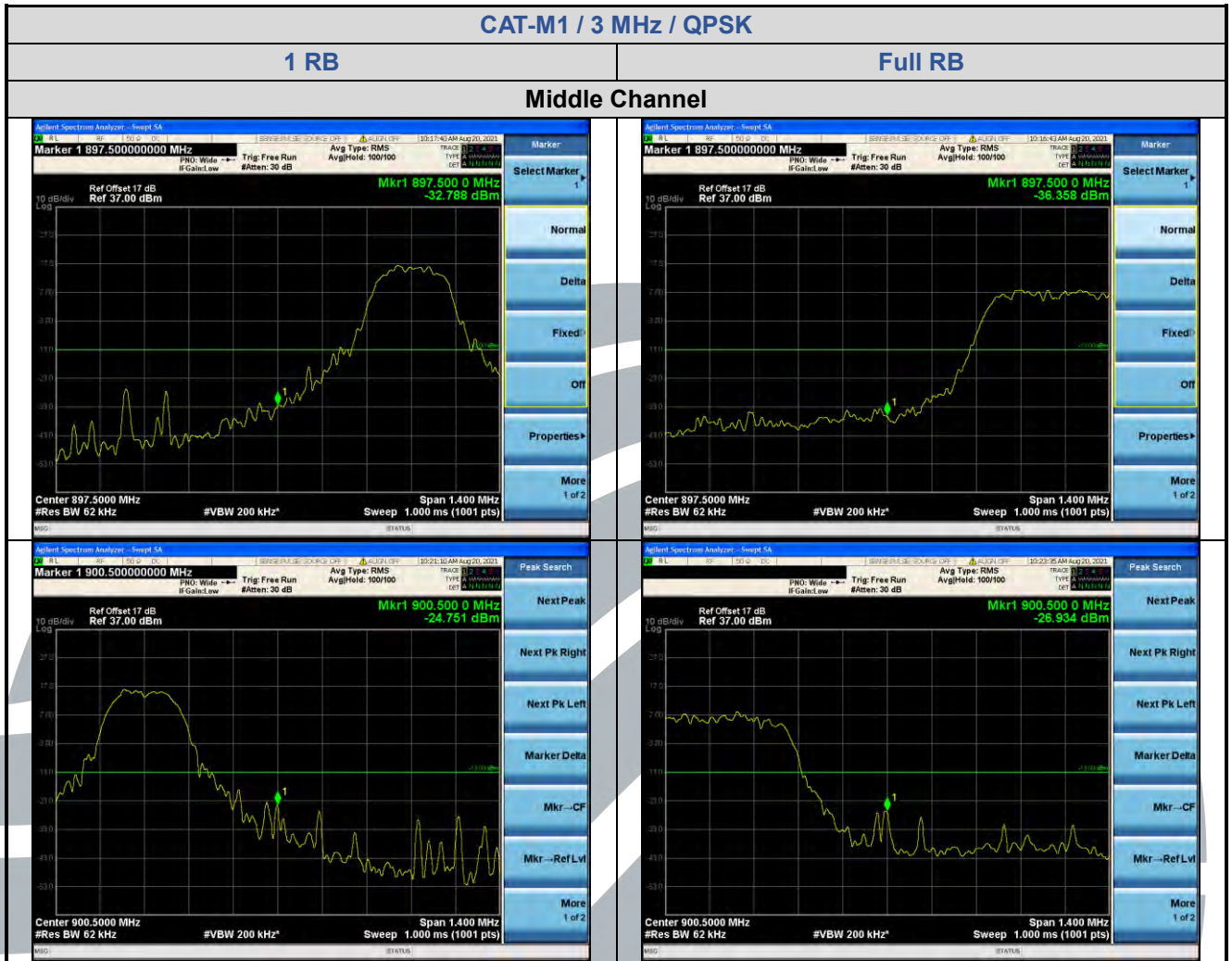
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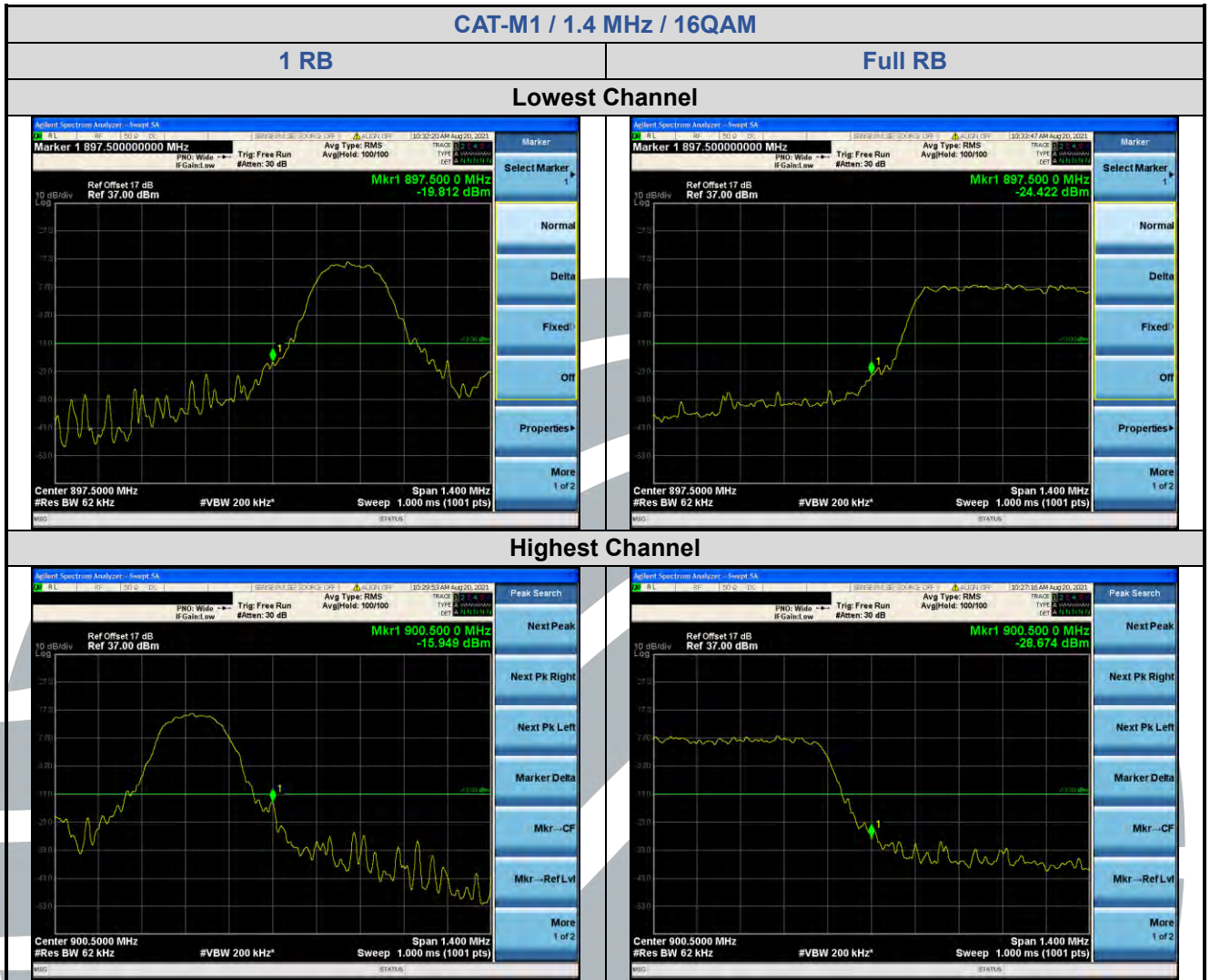
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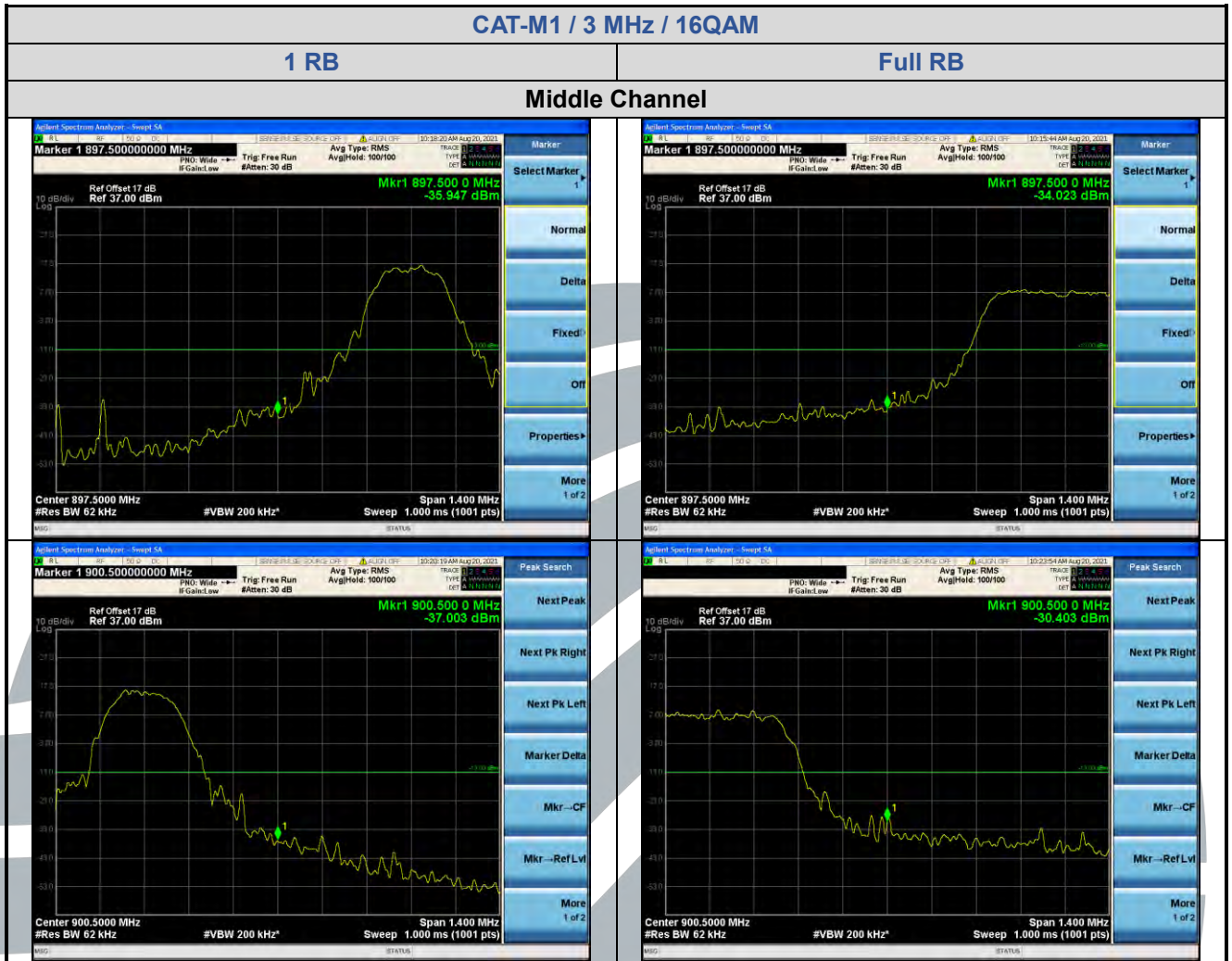
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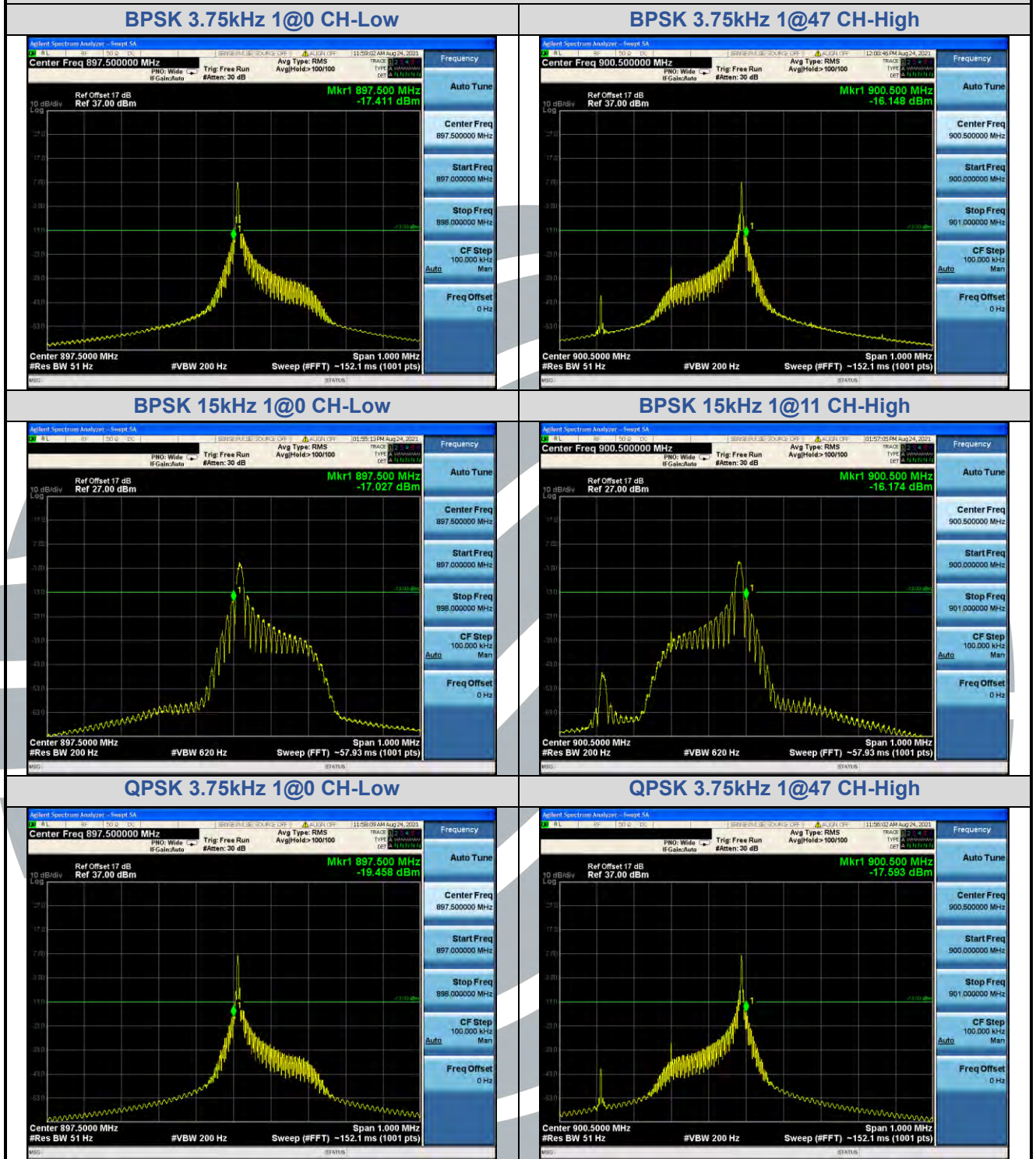
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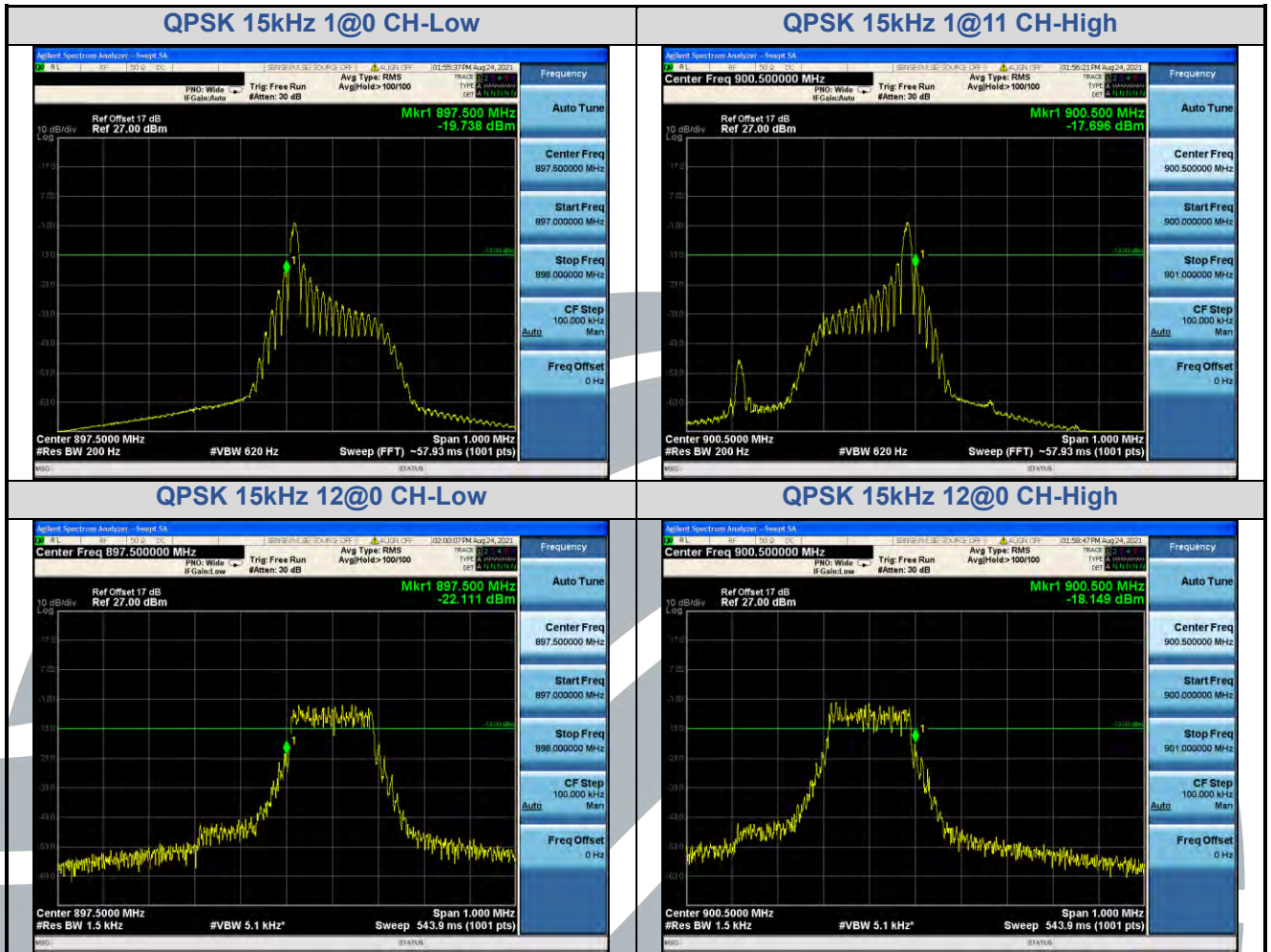
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5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement: LTE Band 8: FCC 47 CFR Part 27.1509(a)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

FCC 47 CFR Part 27.1509(a):

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts:

(a) For 900 MHz broadband operations in 897.5-900.5 MHz band by at least $43 + 10 \log (P)$ dB.

Test Procedure:

The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range. b. Measuring frequency range is from 30 MHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

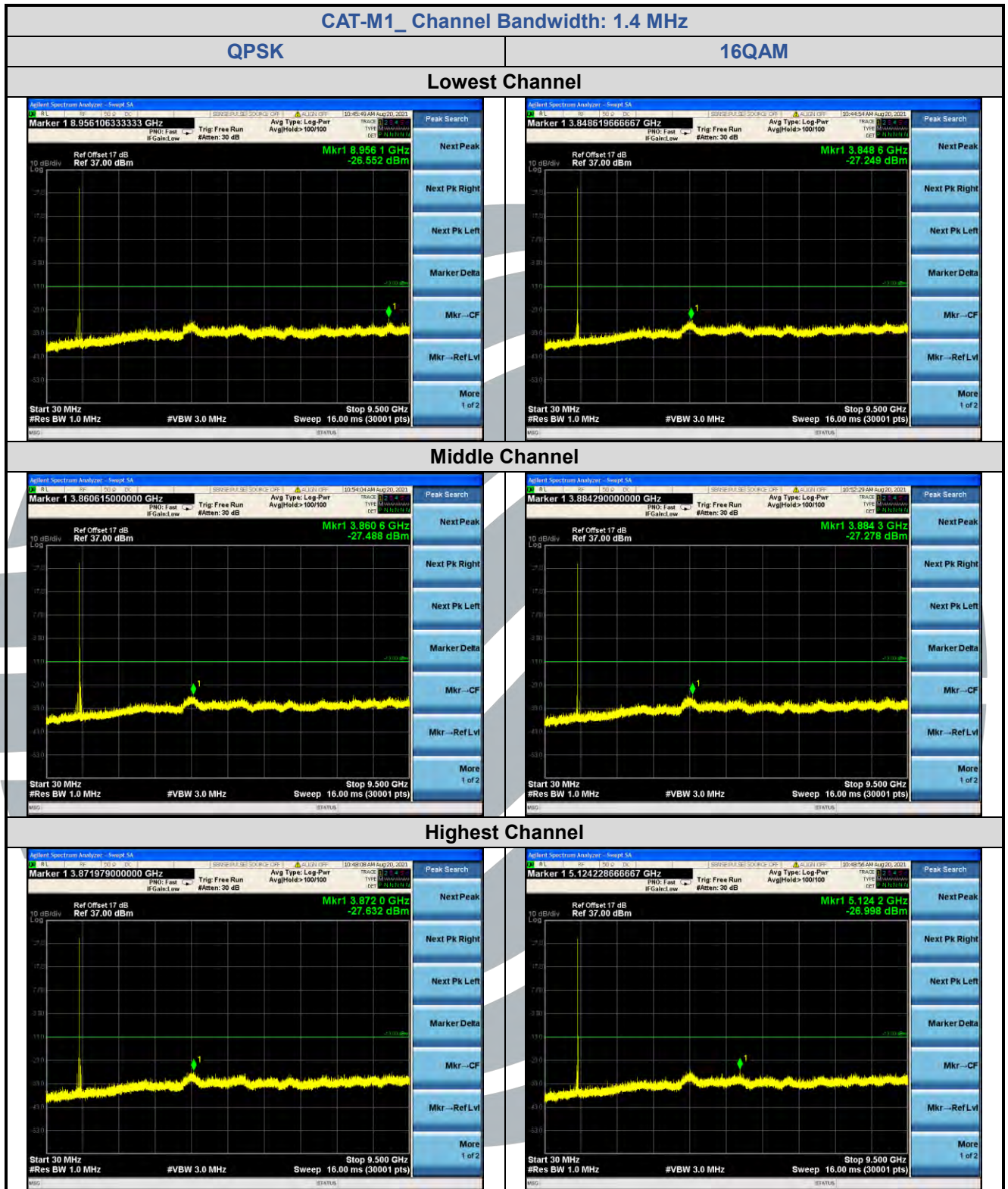
Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

LTE Band 8



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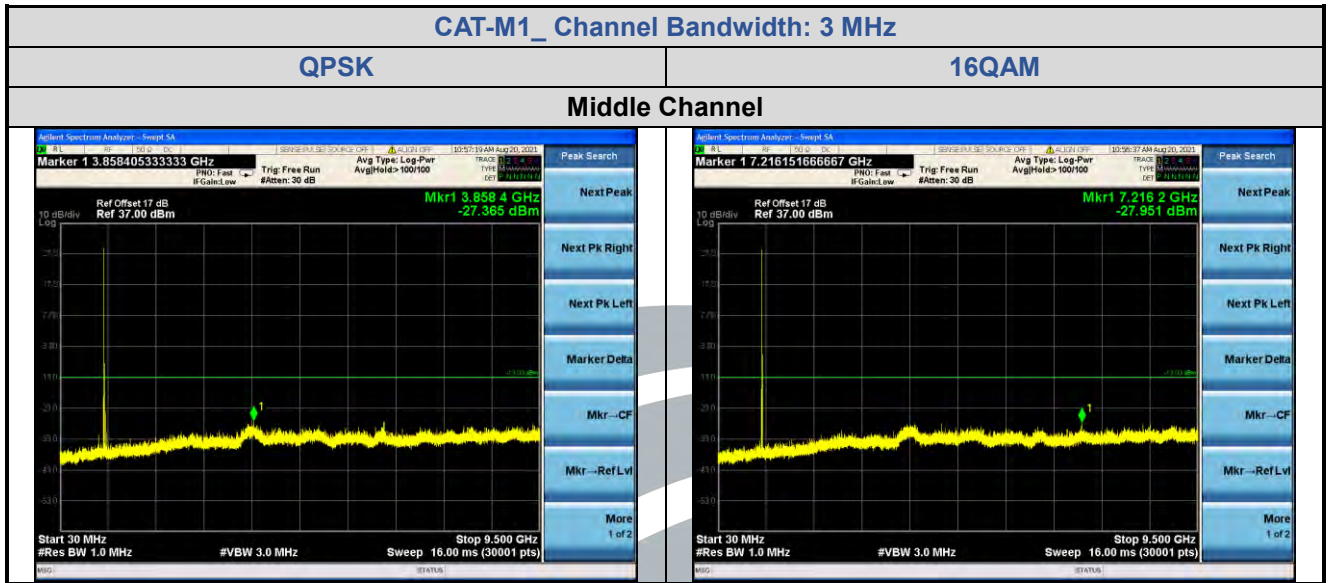
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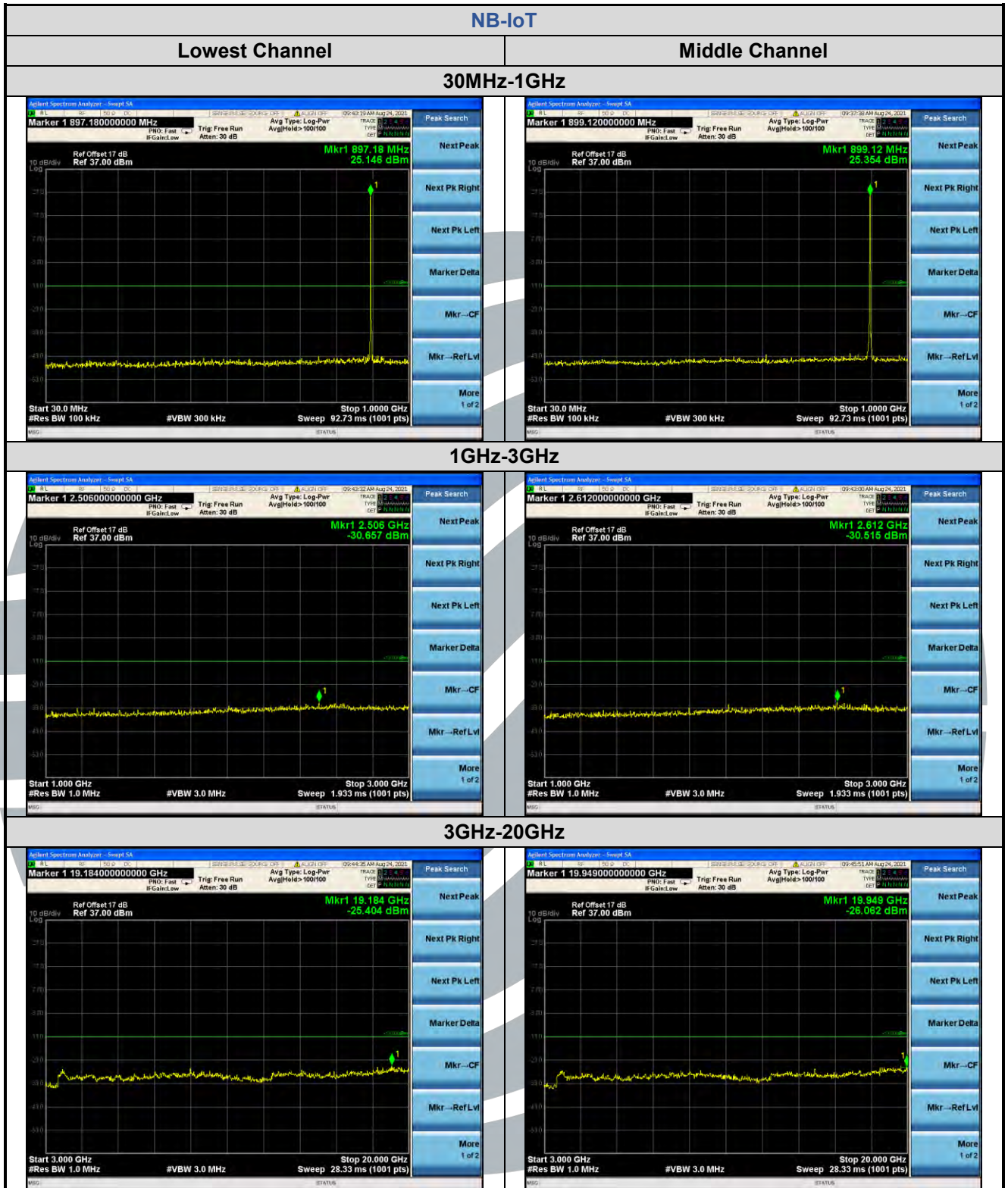
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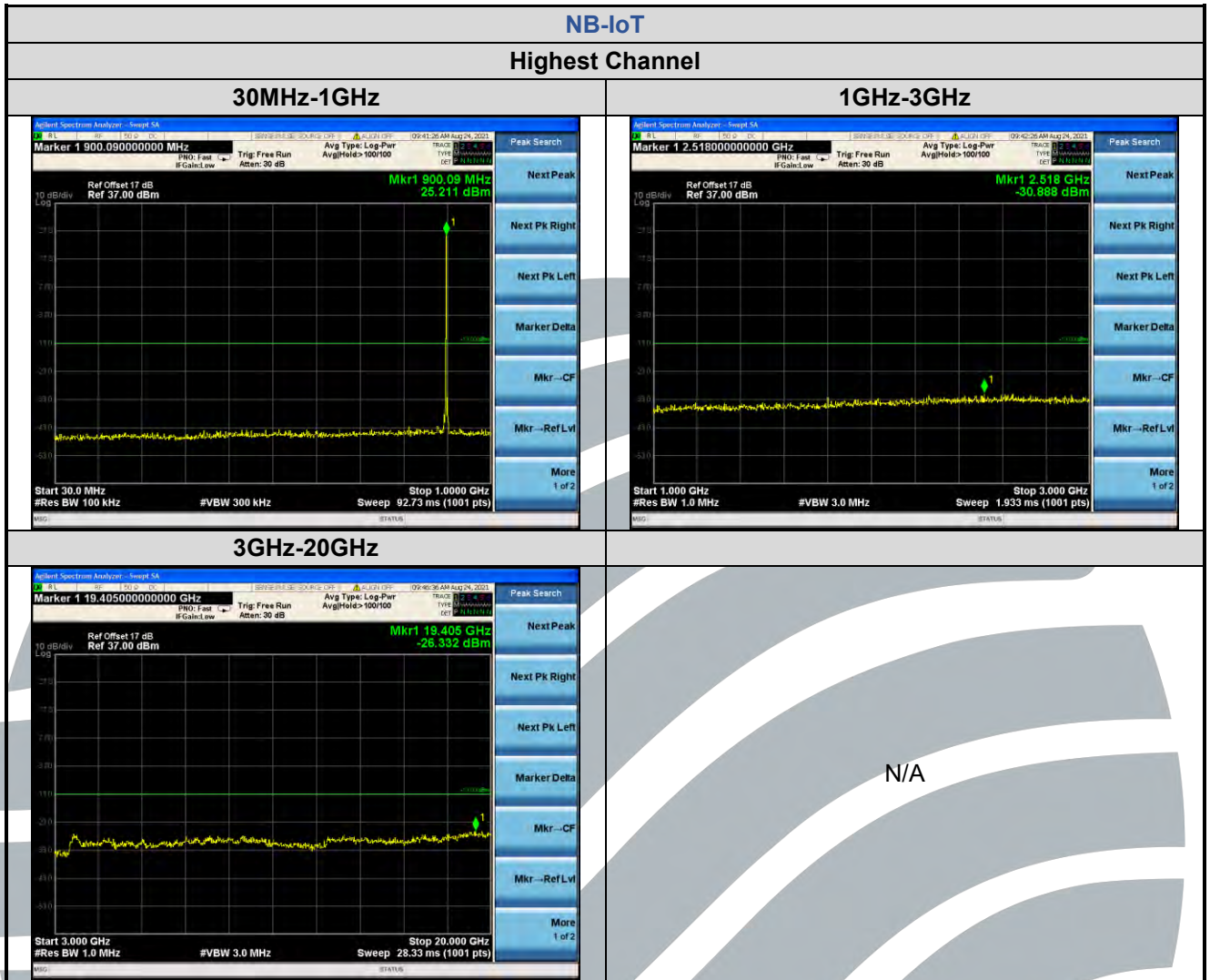
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Remark:

1) All the above radiation data, the fundamental frequency is not marked, it may exceed the limit, please ignore it.

5.8 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: LTE Band 8: FCC 47 CFR Part 27.1509(a)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Receiver Setup:

| Frequency | Detector | RBW | VBW | Remark |
|------------------|------------|---------|---------|--------|
| 0.009 MHz-30 MHz | Peak | 10 kHz | 30 KHz | Peak |
| 30 MHz-1 GHz | Quasi-peak | 100 kHz | 300 KHz | Peak |
| Above 1 GHz | Peak | 1 MHz | 3 MHz | Peak |

Limits:

FCC 47 CFR Part 27.1509(a):

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts:

(a) For 900 MHz broadband operations in 897.5-900.5 MHz band by at least $43 + 10 \log (P)$ dB.

Test Setup: Refer to section 4.2.1 for details.

Test Procedures: KDB 971168 D01v03r01 Section 7

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

LTE Band 8

| CAT-M1_ 1.4 MHz_ QPSK | | | | | | | |
|------------------------|--------------------|---------------------|--------------------------------|----------------------|----------------|----------------|------------|
| No. | Frequency (MHz) | SA Reading (dBm) | Correction factor (dB/m) | EIRP Result (dBm) | Limit (dBm) | Margin (dB) | Ant. Pol. |
| Lowest Channel | | | | | | | |
| 1 | 586.217 | -88.85 | 38.05 | -50.80 | -13.00 | -37.80 | Horizontal |
| 2 | 693.910 | -89.45 | 40.62 | -48.83 | -13.00 | -35.83 | Horizontal |
| 3 | 781.961 | -88.90 | 41.05 | -47.85 | -13.00 | -34.85 | Horizontal |
| 4 | 1796.400 | -60.69 | 0.94 | -59.75 | -13.00 | -46.75 | Horizontal |
| 5 | 2694.600 | -64.44 | 3.38 | -61.06 | -13.00 | -48.06 | Horizontal |
| 6 | 578.036 | -88.70 | 38.30 | -50.40 | -13.00 | -37.40 | Vertical |
| 7 | 703.731 | -88.08 | 39.62 | -48.46 | -13.00 | -35.46 | Vertical |
| 8 | 798.620 | -88.00 | 40.59 | -47.41 | -13.00 | -34.41 | Vertical |
| 9 | 1796.400 | -61.05 | 0.27 | -60.78 | -13.00 | -47.78 | Vertical |
| 10 | 2694.600 | -64.46 | 2.82 | -61.64 | -13.00 | -48.64 | Vertical |
| Middle Channel | | | | | | | |
| 1 | 535.038 | -89.65 | 37.47 | -52.18 | -13.00 | -39.18 | Horizontal |
| 2 | 611.462 | -89.32 | 39.04 | -50.28 | -13.00 | -37.28 | Horizontal |
| 3 | 713.692 | -88.92 | 40.45 | -48.47 | -13.00 | -35.47 | Horizontal |
| 4 | 1798.000 | -60.82 | 0.95 | -59.87 | -13.00 | -46.87 | Horizontal |
| 5 | 2697.000 | -63.94 | 3.38 | -60.56 | -13.00 | -47.56 | Horizontal |
| 6 | 558.079 | -88.88 | 38.02 | -50.86 | -13.00 | -37.86 | Vertical |
| 7 | 703.731 | -88.69 | 39.62 | -49.07 | -13.00 | -36.07 | Vertical |
| 8 | 821.387 | -87.64 | 41.12 | -46.52 | -13.00 | -33.52 | Vertical |
| 9 | 1798.000 | -59.66 | 0.29 | -59.37 | -13.00 | -46.37 | Vertical |
| 10 | 2697.000 | -64.61 | 2.83 | -61.78 | -13.00 | -48.78 | Vertical |
| Highest Channel | | | | | | | |
| 1 | 523.876 | -88.10 | 37.44 | -50.66 | -13.00 | -37.66 | Horizontal |
| 2 | 689.051 | -89.77 | 40.52 | -49.25 | -13.00 | -36.25 | Horizontal |
| 3 | 862.802 | -88.14 | 41.30 | -46.84 | -13.00 | -33.84 | Horizontal |
| 4 | 1799.600 | -61.20 | 0.96 | -60.24 | -13.00 | -47.24 | Horizontal |
| 5 | 2699.400 | -61.67 | 3.40 | -58.27 | -13.00 | -45.27 | Horizontal |
| 6 | 427.292 | -90.34 | 35.47 | -54.87 | -13.00 | -41.87 | Vertical |
| 7 | 538.811 | -88.32 | 37.64 | -50.68 | -13.00 | -37.68 | Vertical |
| 8 | 754.963 | -88.56 | 38.98 | -49.58 | -13.00 | -36.58 | Vertical |
| 9 | 1799.600 | -61.92 | 0.30 | -61.62 | -13.00 | -48.62 | Vertical |
| 10 | 2699.400 | -64.85 | 2.84 | -62.01 | -13.00 | -49.01 | Vertical |

| CAT-M1_ 3 MHz_ QPSK | | | | | | | |
|-----------------------|-----------|------------|-------------------|-------------|--------|--------|------------|
| No. | Frequency | SA Reading | Correction factor | EIRP Result | Limit | Margin | Ant. Pol. |
| | (MHz) | (dBm) | (dB/m) | (dBm) | (dBm) | (dB) | |
| Middle Channel | | | | | | | |
| 1 | 418.378 | -89.44 | 34.96 | -54.48 | -13.00 | -41.48 | Horizontal |
| 2 | 527.571 | -89.40 | 37.49 | -51.91 | -13.00 | -38.91 | Horizontal |
| 3 | 698.804 | -88.87 | 40.73 | -48.14 | -13.00 | -35.14 | Horizontal |
| 4 | 1798.000 | -61.03 | 0.95 | -60.08 | -13.00 | -47.08 | Horizontal |
| 5 | 2697.000 | -65.16 | 3.38 | -61.78 | -13.00 | -48.78 | Horizontal |
| 6 | 546.437 | -89.44 | 37.78 | -51.66 | -13.00 | -38.66 | Vertical |
| 7 | 698.804 | -88.35 | 39.59 | -48.76 | -13.00 | -35.76 | Vertical |
| 8 | 868.886 | -88.43 | 41.30 | -47.13 | -13.00 | -34.13 | Vertical |
| 9 | 1798.000 | -62.41 | 0.29 | -62.12 | -13.00 | -49.12 | Vertical |
| 10 | 2697.000 | -64.44 | 2.83 | -61.61 | -13.00 | -48.61 | Vertical |

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| NB-IoT _ QPSK | | | | | | | |
|------------------------|-----------|------------|-------------------|-------------|--------|--------|------------|
| No. | Frequency | SA Reading | Correction factor | EIRP Result | Limit | Margin | Ant. Pol. |
| | (MHz) | (dBm) | (dB/m) | (dBm) | (dBm) | (dB) | |
| Lowest Channel | | | | | | | |
| 1 | 602.929 | -89.02 | 38.90 | -50.12 | -13.00 | -37.12 | Horizontal |
| 2 | 693.910 | -89.59 | 40.62 | -48.97 | -13.00 | -35.97 | Horizontal |
| 3 | 798.620 | -88.91 | 41.42 | -47.49 | -13.00 | -34.49 | Horizontal |
| 4 | 1795.200 | -62.63 | 0.93 | -61.70 | -13.00 | -48.70 | Horizontal |
| 5 | 2692.800 | -64.38 | 3.38 | -61.00 | -13.00 | -48.00 | Horizontal |
| 6 | 495.238 | -88.78 | 36.72 | -52.06 | -13.00 | -39.06 | Vertical |
| 7 | 703.731 | -89.58 | 39.62 | -49.96 | -13.00 | -36.96 | Vertical |
| 8 | 821.387 | -88.24 | 41.12 | -47.12 | -13.00 | -34.12 | Vertical |
| 9 | 1795.200 | -60.78 | 0.27 | -60.51 | -13.00 | -47.51 | Vertical |
| 10 | 2692.800 | -64.10 | 2.82 | -61.28 | -13.00 | -48.28 | Vertical |
| Middle Channel | | | | | | | |
| 1 | 562.014 | -88.85 | 37.42 | -51.43 | -13.00 | -38.43 | Horizontal |
| 2 | 708.694 | -88.81 | 40.56 | -48.25 | -13.00 | -35.25 | Horizontal |
| 3 | 793.028 | -87.65 | 41.30 | -46.35 | -13.00 | -33.35 | Horizontal |
| 4 | 1798.000 | -62.40 | 0.95 | -61.45 | -13.00 | -48.45 | Horizontal |
| 5 | 2697.000 | -65.03 | 3.38 | -61.65 | -13.00 | -48.65 | Horizontal |
| 6 | 554.171 | -89.98 | 37.93 | -52.05 | -13.00 | -39.05 | Vertical |
| 7 | 628.894 | -89.36 | 37.85 | -51.51 | -13.00 | -38.51 | Vertical |
| 8 | 827.179 | -88.60 | 41.18 | -47.42 | -13.00 | -34.42 | Vertical |
| 9 | 1798.000 | -62.46 | 0.29 | -62.17 | -13.00 | -49.17 | Vertical |
| 10 | 2697.000 | -63.67 | 2.83 | -60.84 | -13.00 | -47.84 | Vertical |
| Highest Channel | | | | | | | |
| 1 | 484.907 | -88.95 | 36.16 | -52.79 | -13.00 | -39.79 | Horizontal |
| 2 | 642.292 | -89.03 | 39.29 | -49.74 | -13.00 | -36.74 | Horizontal |
| 3 | 765.648 | -87.81 | 40.69 | -47.12 | -13.00 | -34.12 | Horizontal |
| 4 | 1800.800 | -62.68 | 0.97 | -61.71 | -13.00 | -48.71 | Horizontal |
| 5 | 2701.200 | -61.82 | 3.40 | -58.42 | -13.00 | -45.42 | Horizontal |
| 6 | 554.171 | -89.65 | 37.93 | -51.72 | -13.00 | -38.72 | Vertical |
| 7 | 693.910 | -89.42 | 39.32 | -50.10 | -13.00 | -37.10 | Vertical |
| 8 | 809.924 | -88.79 | 40.87 | -47.92 | -13.00 | -34.92 | Vertical |
| 9 | 1800.800 | -61.46 | 0.31 | -61.15 | -13.00 | -48.15 | Vertical |
| 10 | 2701.200 | -64.32 | 2.84 | -61.48 | -13.00 | -48.48 | Vertical |

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

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5.9 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 &

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limits:

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Setup: Refer to section 4.2.2 for details.

Test Procedures:

- 1) Use CMW 500 or CMU 200 with Frequency Error measurement capability.
 - a) Temp. = -30° to + 50°C
 - b) Voltage =low voltage, 2.5 Vdc, Normal, 3.8 Vdc and High voltage, 4.5 Vdc.
- 2) Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50°C is reached.

- 3) Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

Equipment Used: Refer to section 3 for details.

Test Result: Pass

LTE Band 8

| Modulation | Channel/ Frequency (MHz) | Voltage (Vdc) | Temperatur e (°C) | Deviation (Hz) | Deviation (ppm) | Limit (ppm) | Pass/ Fail |
|--------------------------------|--------------------------------|------------------|-------------------------|-------------------|--------------------|----------------|------------|
| CAT-M1 / 3MHz / Full RB | | | | | | | |
| QPSK | 21640 / 899.0 | VL | TN | -5.46 | -0.0029 | N/A | Pass |
| | | VN | | -4.09 | -0.0022 | | Pass |
| | | VH | | -5.39 | -0.0029 | | Pass |
| | | VN | 50 | -6.45 | -0.0034 | | Pass |
| | | | 40 | -4.48 | -0.0024 | | Pass |
| | | | 30 | -5.51 | -0.0029 | | Pass |
| | | | 20 | -5.78 | -0.0031 | | Pass |
| | | | 10 | -6.51 | -0.0035 | | Pass |
| | | | 0 | -4.75 | -0.0025 | | Pass |
| | | | -10 | -4.89 | -0.0026 | | Pass |
| | | | -20 | -6.15 | -0.0033 | | Pass |
| | | | -30 | -4.33 | -0.0023 | | Pass |

| Modulation | Channel/ Frequency | Voltage | Temperature | Deviation | Deviation | Limit | Pass/ Fail |
|--------------------------|-----------------------|---------|-------------|-----------|-----------|-------|------------|
| | (MHz) | (Vdc) | (°C) | (Hz) | (ppm) | (ppm) | |
| NB-IoT LTE Band 8 | | | | | | | |
| QPSK | 21640 / 899.0 | VL | TN | -4.78 | -0.0028 | N/A | Pass |
| | | VN | | -6.46 | -0.0037 | | Pass |
| | | VH | | -6.30 | -0.0036 | | Pass |
| | | VN | 50 | -7.52 | -0.0043 | | Pass |
| | | | 40 | -8.75 | -0.0051 | | Pass |
| | | | 30 | -4.87 | -0.0028 | | Pass |
| | | | 20 | -9.05 | -0.0052 | | Pass |
| | | | 10 | -7.27 | -0.0042 | | Pass |
| | | | 0 | -5.07 | -0.0029 | | Pass |
| | | | -10 | -5.11 | -0.0029 | | Pass |
| | | | -20 | -6.33 | -0.0037 | | Pass |
| | | | -30 | -5.79 | -0.0033 | | Pass |

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APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
