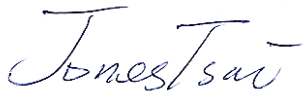
# FCC RADIO TEST REPORT

| | | |
|---|---|---|
| **FCC ID** | : | **XIA-NTC140** |
| **Equipment** | : | **LTE M2M Router**<br>**4G M2M Router** |
| **Brand Name** | : | **Netcomm Wireless** |
| **Model Name** | : | **NTC-140-01** |
| **Applicant** | : | **NetComm Wireless Limited**<br>**18-20 Orion Road Lane Cove, NSW 2066 Australia** |
| **Manufacturer** | : | **NetComm Wireless Limited**<br>**18-20 Orion Road Lane Cove, NSW 2066 Australia** |
| **Standard** | : | **FCC 47 CFR Part 2, and 90(S)** |

**The product was received on May 23, 2018 and testing was started from Jun. 05, 2018 and completed on Jun. 30, 2018. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.**

**The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.**

**The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.**



**Approved by: Jones Tsai**

***SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory***

*No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)*

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# History of this test report

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| FG441109-04B | 01 | Initial issue of report | Jul. 18, 2018 |
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# Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---|---|---|---|---|
| 3.2 | §2.1046<br>§90.635 | Conducted Output Power | Pass | - |
| 3.3 | - | Peak-to-Average Ratio | Reporting only | - |
| 3.4 | §2.1049<br>§90.209 | Bandwidth Limitations | Reporting only | - |
| 3.5 | §2.1051<br>§90.691 | Emission masks –<br>In-band emissions | Pass | - |
| 3.6 | §2.1051<br>§90.691 | Emission masks –<br>Out of band emissions | Pass | - |
| 3.7 | §2.1055<br>§90.213 | Frequency Stability for<br>Temperature & Voltage | Pass | - |
| 4.2 | §2.1053<br>§90.691 | Field Strength of Spurious Radiation | Pass | Under limit<br>38.02 dB at<br>1632.000 MHz |

**Reviewed by: Joseph Lin**

**Report Producer: Yuping Lin**

# 1 General Description

## 1.1 Feature of Equipment Under Test

GSM/CDMA/WCDMA/LTE

| Product Specification subjective to this standard | |
|---|---|
| **Sample 1** | EUT with Antenna 1 (ANT-0050) |
| **Sample 2** | EUT with Antenna 2 (ANT-0024) |
| **Antenna Type** | WWAN: Dipole Antenna |

**Remark:** All test items were performed with Sample 1.

## 1.2 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.3 Testing Site

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 and TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

| | |
|---|---|
| **Test Site** | SPORTON INTERNATIONAL INC. |
| **Test Site Location** | No.52, Huaya 1st Rd., Guishan Dist.,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |
| **Test Site No.** | **Sporton Site No.** |
| | TH03-HY |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

| | |
|---|---|
| **Test Site** | SPORTON INTERNATIONAL INC. |
| **Test Site Location** | No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist.,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-0868<br>FAX: +886-3-327-0855 |
| **Test Site No.** | **Sporton Site No.** |
| | 03CH12-HY |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

## 1.4 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR Part 2, 90
- ANSI / TIA-603-E
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

# 2 Test Configuration of Equipment Under Test

## 2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

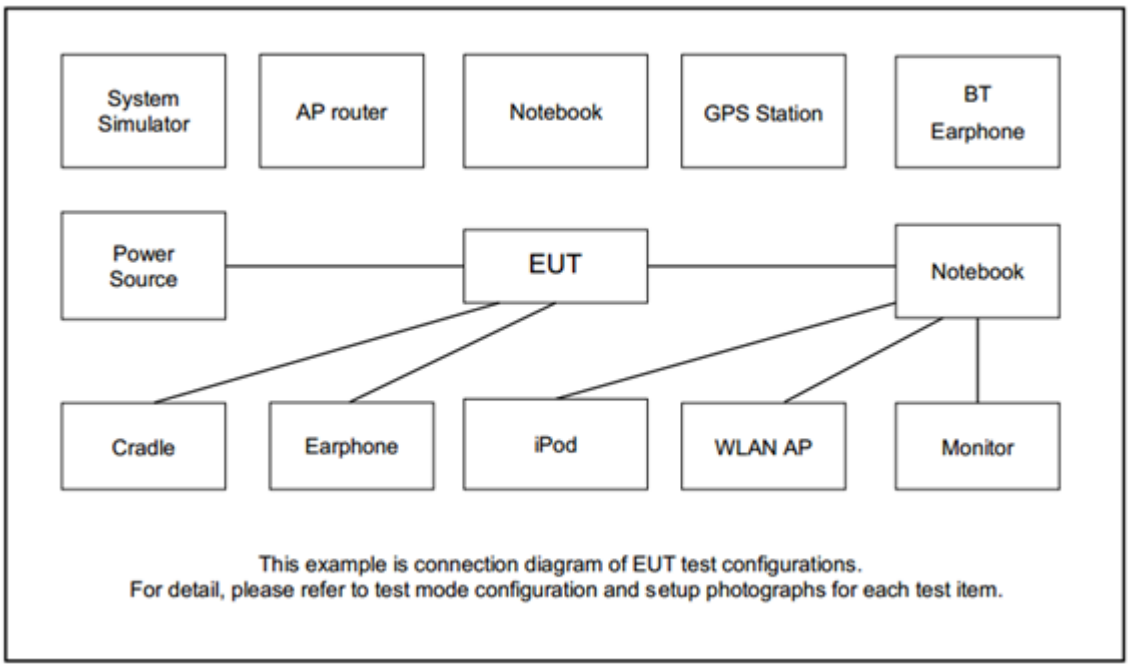
For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 9000 MHz for CDMA BC10.

| Test Modes | | |
|---|---|---|
| **Band** | **Radiated TCs** | **Conducted TCs** |
| **CDMA2000 BC10** | ■ 1xEV-DO Rev. 0 Link | ■ 1xEV-DO Rev. 0 Link |

## 2.2 Connection Diagram of Test System




## 2.3 Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model No. | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | System Simulator | Anritsu | MT8820C | N/A | N/A | Unshielded, 1.8 m |

## 2.4 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

The following shows an offset computation example with RF cable loss 4.2 dB and a 10dB attenuator.

Example :

*Offset(dB) = RF cable loss(dB) + attenuator factor(dB).*

= 4.2 + 10 = 14.2 (dB)

## 2.5 Frequency List of Low/Middle/High Channels

| Frequency List | | | | |
|---|---|---|---|---|
| **Band** | **Channel/Frequency(MHz)** | **Lowest** | **Middle** | **Highest** |
| CDMA2000 BC10 | Channel | 476 | 580 | 684 |
| | Frequency | 817.9 | 820.5 | 823.1 |

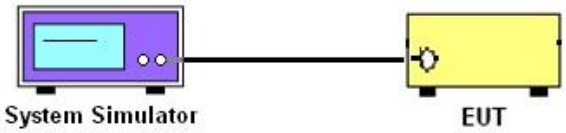
# 3 Conducted Test Items

## 3.1 Measuring Instruments

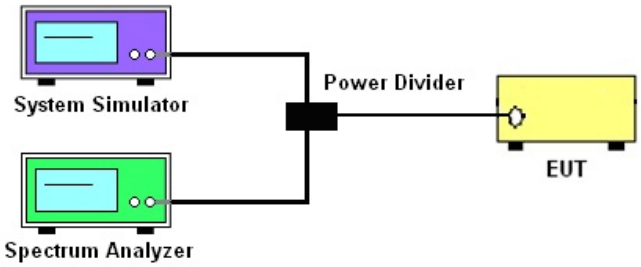
See list of measuring instruments of this test report.

### 3.1.1 Test Setup

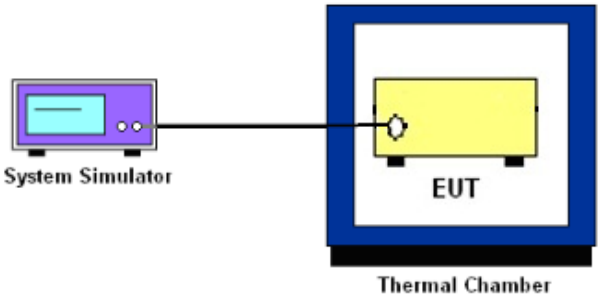
### 3.1.2 Conducted Output Power




### 3.1.3 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge, and Conducted Spurious Emission




### 3.1.4 Frequency Stability




### 3.1.5 Test Result of Conducted Test

Please refer to Appendix A.

## 3.2 Conducted Output Power Measurement

### 3.2.1 Description of the Conducted Output Power Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

### 3.2.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

# 3.3 Peak-to-Average Ratio

## 3.3.1 Description of the PAR Measurement

Reporting only

## 3.3.2 Test Procedures

1. The EUT was connected to spectrum and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.

# 3.4 Bandwidth Limitations Measurement

## 3.4.1 Description of (Occupied) Bandwidth Limitations Measurement

The 99% occupied bandwidth is 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 transmitted power.

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.

## 3.4.2 Test Procedures

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of the 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 99% occupied bandwidth were measured, set RBW= 1% of span, VBW≥ 3*RBW, sample detector, trace maximum hold.
4. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW≥ 3*RBW, peak detector, trace maximum hold.

# 3.5 Emissions Mask Measurement

## 3.5.1 Description of Emissions Mask Measurement

Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of FCC Part 90.691.(a)(1)

(a). Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

## 3.5.2 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via power divider.
2. The emissions mask of low and high channels for the highest RF powers were measured.
3. The measured RBW and the VBW set 3 times of RBW are then set in spectrum analyzer, and the RBW correction factor 10log (1% of OBW/measured RBW)(dB) was compensated, if required.
4. The test results were shown below plots with a correction offset factor including cable loss, insertion loss of power divider.

# 3.6 Emissions Mask – Out Of Band Emissions Measurement

## 3.6.1 Description of Conducted Spurious Emissions Out of band emissions measurement

The power of any emission FCC Part 90.691 (a)(2) on any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth at least 43 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

## 3.6.2 Test Procedures

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

# 3.7 Frequency Stability Measurement

## 3.7.1 Description of Frequency Stability Measurement

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

## 3.7.2 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

## 3.7.3 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at 20±5° C and connected with the base station.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

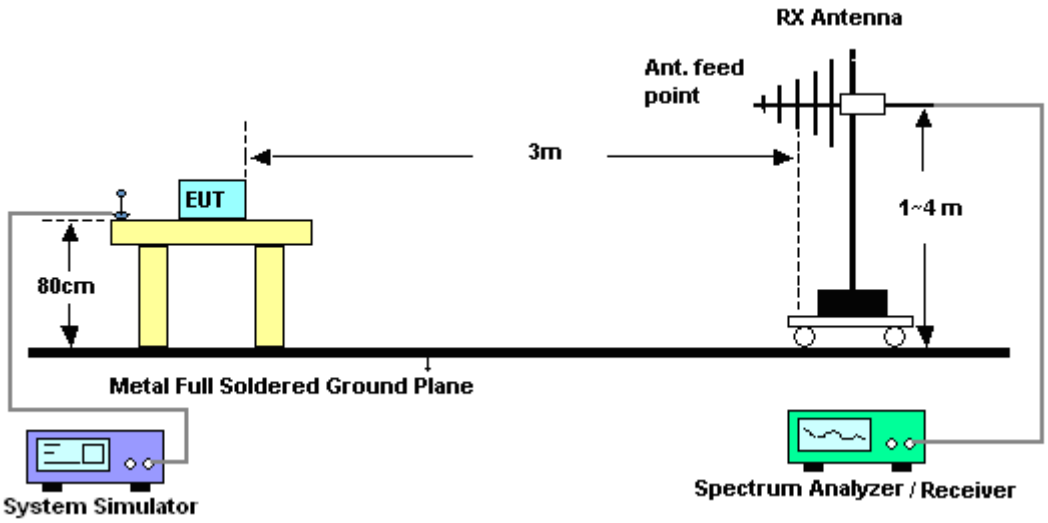
# 4 Radiated Test Items

## 4.1 Measuring Instruments

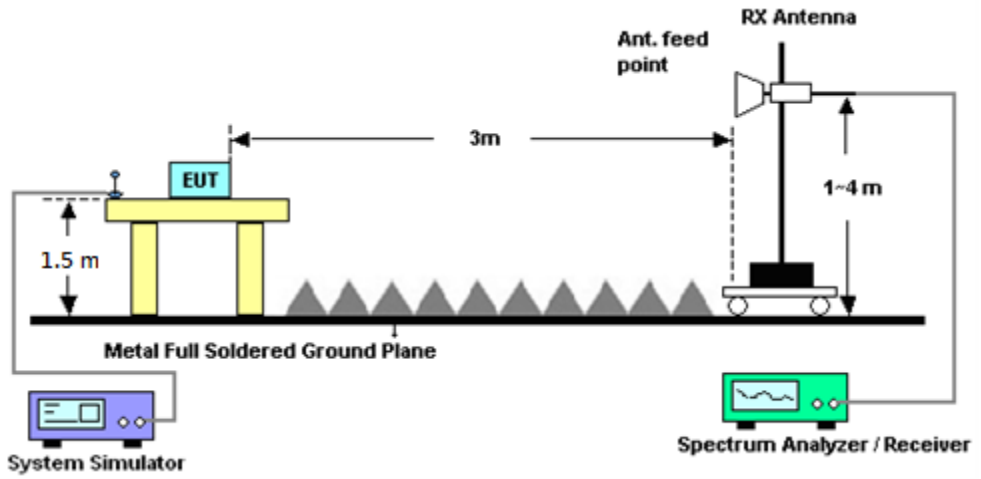
See list of measuring instruments of this test report.

### 4.1.1 Test Setup

**For radiated test from 30MHz to 1GHz**




**For radiated test above 1GHz**




### 4.1.2 Test Result of Radiated Test

Please refer to Appendix B.

# 4.2 Field Strength of Spurious Radiation Measurement

## 4.2.1 Description of Field Strength of Spurious Radiated Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission FCC Part 90.691 on any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43+10log10(P[Watts]) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

## 4.2.2 Test Procedures

1. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

# 5 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | FSP30 | 101329 | 9kHz~30GHz | Jun. 26, 2017 | Jun. 05, 2018~ Jun. 06, 2018 | Jun. 25, 2018 | Conducted (TH03-HY) |
| Temperature Chamber | ESPEC | SU-641 | 92013721 | -30℃ ~70℃ | Dec. 06, 2017 | Jun. 05, 2018~ Jun. 06, 2018 | Dec. 05, 2019 | Conducted (TH03-HY) |
| Programmable Power Supply | GW Instek | PSS-2005 | EL883644 | Voltage:0~20V; Current:0~5A | Dec. 06, 2017 | Jun. 05, 2018~ Jun. 06, 2018 | Dec. 05, 2019 | Conducted (TH03-HY) |
| Base Station (Measure) | Rohde & Schwarz | CMU200 | 117995 | GSM / GPRS / WCDMA / CDMA | Aug. 09, 2017 | Jun. 05, 2018~ Jun. 06, 2018 | Aug. 08, 2018 | Conducted (TH03-HY) |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100488 | 9 kHz~30 MHz | Nov. 23, 2017 | Jun. 27, 2018~ Jun. 30, 2018 | Nov. 22, 2018 | Radiation (03CH12-HY) |
| Bilog Antenna | TESEQ | CBL 6111D&00800 N1D01N-06 | 37059&01 | 30MHz~1GHz | Oct. 14, 2017 | Jun. 27, 2018~ Jun. 30, 2018 | Oct. 13, 2018 | Radiation (03CH12-HY) |
| Horn Antenna | SCHWARZBECK | BBHA 9120D | 9120D-1328 | 1GHz ~ 18GHz | Oct. 20, 2017 | Jun. 27, 2018~ Jun. 30, 2018 | Oct. 19, 2018 | Radiation (03CH12-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170584 | 18GHz ~ 40GHz | Nov. 27, 2017 | Jun. 27, 2018~ Jun. 30, 2018 | Nov. 26, 2018 | Radiation (03CH12-HY) |
| Preamplifier | COM-POWER | PA-103 | 161075 | 10MHz~1GHz | Mar. 26, 2018 | Jun. 27, 2018~ Jun. 30, 2018 | Mar. 25, 2019 | Radiation (03CH12-HY) |
| Preamplifier | Keysight | 83017A | MY53270148 | 1GHz~26.5GHz | Jan. 15, 2018 | Jun. 27, 2018~ Jun. 30, 2018 | Jan. 14, 2019 | Radiation (03CH12-HY) |
| Amplifier | MITEQ | TTA1840-35-HG | 1871923 | 18GHz~40GHz, VSWR : 2.5:1 max | Jul. 18, 2017 | Jun. 27, 2018~ Jun. 30, 2018 | Jul. 17, 2018 | Radiation (03CH12-HY) |
| EMI Test Receiver | Rohde & Schwarz | ESU26 | 100390 | 20Hz~26.5GHz | Dec. 25, 2017 | Jun. 27, 2018~ Jun. 30, 2018 | Dec. 24, 2018 | Radiation (03CH12-HY) |
| Horn Antenna | SCHWARZBECK | BBHA 9120D | 9120D-1522 | 1GHz ~ 18GHz | May 10, 2018 | Jun. 27, 2018~ Jun. 30, 2018 | May 09, 2019 | Radiation (03CH12-HY) |
| Signal Generator | Rohde & Schwarz | SMF100A | 101107 | 100kHz~40GHz | May 21, 2018 | Jun. 27, 2018~ Jun. 30, 2018 | May 20, 2019 | Radiation (03CH12-HY) |
| Base Station | Rohde & Schwarz | CMU200 | 106656 | GSM/GPRS/WCDMA/CDMA | Nov. 15, 2016 | Jun. 27, 2018~ Jun. 30, 2018 | Nov. 14, 2018 | Radiation (03CH12-HY) |
| Filter | Wainwright | WLKS1200-12SS | SN2 | 1.2G Low Pass | Jul. 17, 2017 | Jun. 27, 2018~ Jun. 30, 2018 | Jul. 16, 2018 | Radiation (03CH12-HY) |
| Notch Filter | Wainwright | WRCD1800/2000-20/40-10SSK | SN1 | LTE Band 25 | Aug. 24, 2017 | Jun. 27, 2018~ Jun. 30, 2018 | Aug. 23, 2018 | Radiation (03CH12-HY) |
| Notch Filter | Wainwright | WRCT/800/960-0.2/40-8SSK | SN11 | GSM850 | Aug. 24, 2017 | Jun. 27, 2018~ Jun. 30, 2018 | Aug. 23, 2018 | Radiation (03CH12-HY) |

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| RF Cable | HUBER + SUHNER | SUCOFLEX 126E | 0058/126E | 30M-18G | Mar. 14, 2018 | Jun. 27, 2018~ Jun. 30, 2018 | Mar. 13, 2019 | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 505134/2 | 30M~40GHz | Oct. 17, 2017 | Jun. 27, 2018~ Jun. 30, 2018 | Oct. 16, 2018 | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 800740/2 | 30M~40GHz | Oct. 17, 2017 | Jun. 27, 2018~ Jun. 30, 2018 | Oct. 16, 2018 | Radiation (03CH12-HY) |
| Antenna Mast | EMEC | AM-BS-4500-B | N/A | 1m~4m | N/A | Jun. 27, 2018~ Jun. 30, 2018 | N/A | Radiation (03CH12-HY) |
| Turn Table | EMEC | TT2000 | N/A | 0~360 Degree | N/A | Jun. 27, 2018~ Jun. 30, 2018 | N/A | Radiation (03CH12-HY) |
| Software | Audix | E3 6.2009-8-24 | RK-000989 | N/A | N/A | Jun. 27, 2018~ Jun. 30, 2018 | N/A | Radiation (03CH12-HY) |

# 6 Uncertainty of Evaluation

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.36** |

**Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.70** |

**Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.98** |

# Appendix A. Test Results of Conducted Test

## Conducted Output Power(Average power)

| Conducted Power (*Unit: dBm) | | | |
|---|---|---|---|
| Band | CDMA 2000 BC10 | | |
| Channel | 476 | 580 | 684 |
| Frequency | 817.9 | 820.5 | 823.1 |
| 1xRTT RC1 SO55 | 23.64 | 23.56 | 23.61 |
| 1xRTT RC3 SO55 | **23.65** | 23.60 | 23.62 |
| 1xRTT RC3 SO32 (+ F-SCH) | **23.65** | 23.54 | 23.59 |
| 1xRTT RC3 SO32 (+SCH) | 23.63 | 23.55 | 23.64 |
| 1xEVDO RTAP 153.6Kbps | **23.66** | 23.62 | 23.65 |
| 1xEVDO RETAP 4096Bits | 23.61 | 23.59 | 23.62 |

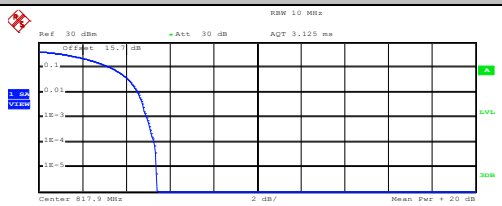
# A3. CDMA

## Peak-to-Average Ratio

| Mode | CDMA BC10 | Limit: 13dB |
|---|---|---|
| Mod. | 1xEV-DO Rev. 0 | Result |
| Lowest CH | 4.96 | PASS |
| Middle CH | 4.76 | |
| Highest CH | 4.92 | |

## CDMA BC 10(1xEV-DO Rev. 0)

### Lowest Channel




Complementary Cumulative Distribution Function (100000 samples)

| | Trace 1 |
|---|---|
| Mean | 23.17 dBm |
| Peak | 28.56 dBm |
| Crest | 5.40 dB |
| 10 % | 3.32 dB |
| 1 % | 4.56 dB |
| .1 % | 4.96 dB |
| .01 % | 5.28 dB |

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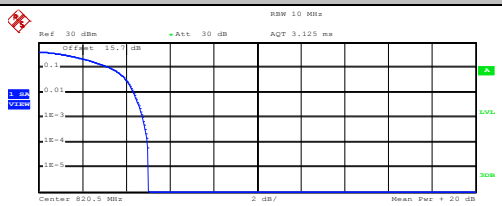
### Middle Channel




Complementary Cumulative Distribution Function (100000 samples)

| | Trace 1 |
|---|---|
| Mean | 23.40 dBm |
| Peak | 28.42 dBm |
| Crest | 5.02 dB |
| 10 % | 3.32 dB |
| 1 % | 4.36 dB |
| .1 % | 4.76 dB |
| .01 % | 5.00 dB |

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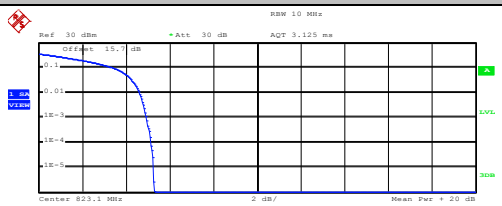
### Highest Channel




Complementary Cumulative Distribution Function (100000 samples)

| | Trace 1 |
|---|---|
| Mean | 23.08 dBm |
| Peak | 28.35 dBm |
| Crest | 5.27 dB |
| 10 % | 3.48 dB |
| 1 % | 4.64 dB |
| .1 % | 4.92 dB |
| .01 % | 5.16 dB |

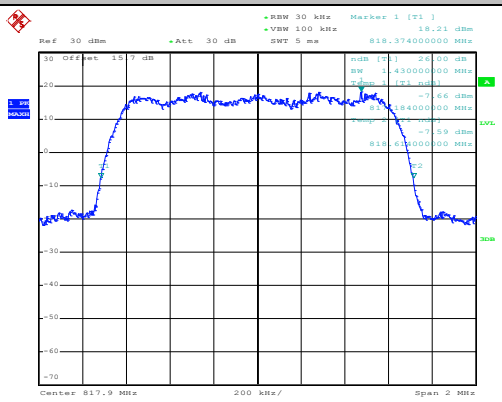
Date: 6.JUN.2018 18:44:57

# 26dB Bandwidth

| Mode | CDMA BC10 |
|---|---|
| Mod. | 1xEV-DO Rev. 0 |
| Lowest CH | 1.43 |
| Middle CH | 1.42 |
| Highest CH | 1.43 |

## CDMA BC10 (1xEV-DO Rev. 0)

### Lowest Channel

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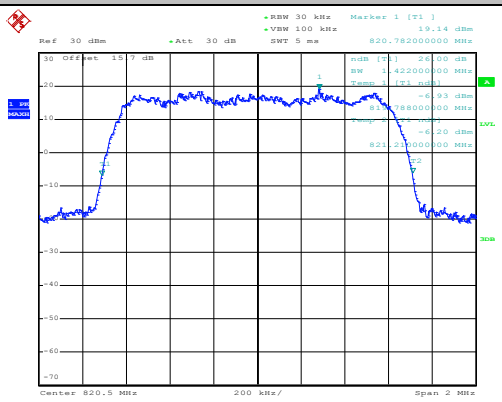
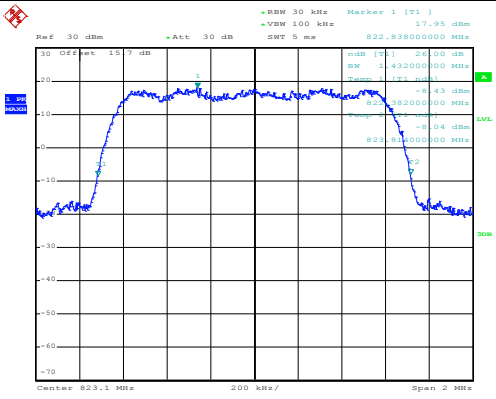
### Middle Channel




Date: 6.JUN.2018 18:32:58

### Highest Channel

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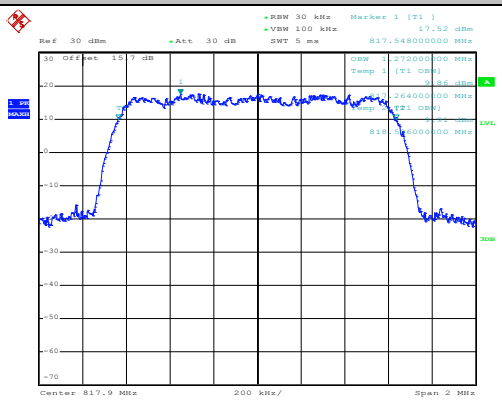
# Occupied Bandwidth

| Mode | CDMA BC10 |
|---|---|
| Mod. | 1xEV-DO Rev. 0 |
| Lowest CH | 1.27 |
| Middle CH | 1.27 |
| Highest CH | 1.27 |

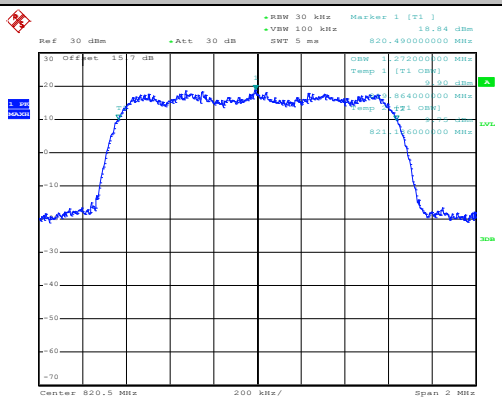
## CDMA BC10 (1xEV-DO Rev. 0)

### Lowest Channel



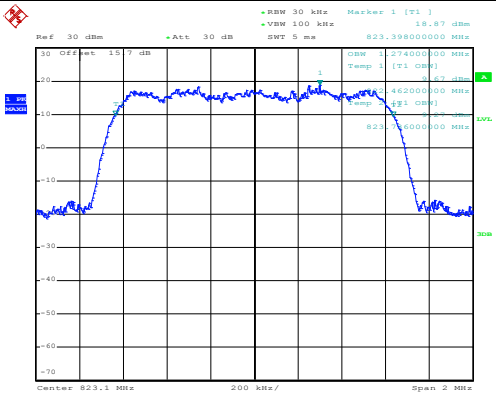

Date: 6.JUN.2018 18:37:12

### Middle Channel




Date: 6.JUN.2018 18:37:46

### Highest Channel

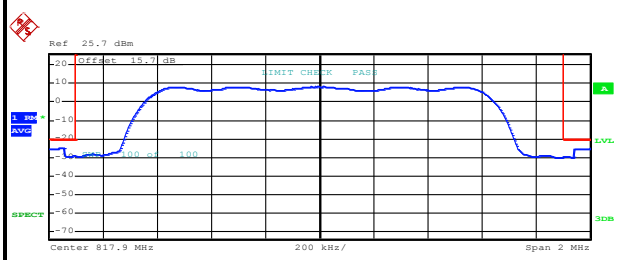



Date: 6.JUN.2018 18:38:20

# Conducted Band Edge

## CDMA BC10 (1xEV-DO Rev. 0)

### Lowest Band Edge




Tx Channel
Bandwidth 1.4 MHz Power 22.66 dBm

| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | PwrRel [dBc] | ΔLimit [dB] |
|---|---|---|---|---|---|---|
| -1.000 M | -937.500 k | 100.00 k | 816.956000 M | -24.98 | -47.64 | -4.98 |
| -937.500 k | -900.000 k | 30.00 k | 816.996000 M | -29.24 | -51.90 | -9.24 |
| 900.000 k | 937.500 k | 30.00 k | 818.812000 M | -29.73 | -52.38 | -9.73 |
| 937.500 k | 1.000 M | 100.00 k | 818.900000 M | -25.18 | -47.83 | -5.18 |

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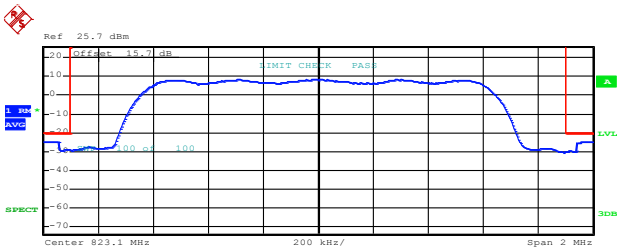
### Highest Band Edge




Tx Channel
Bandwidth 1.4 MHz Power 22.75 dBm

| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | PwrRel [dBc] | ΔLimit [dB] |
|---|---|---|---|---|---|---|
| -1.000 M | -937.500 k | 100.00 k | 822.156000 M | -24.65 | -47.40 | -4.65 |
| -937.500 k | -900.000 k | 30.00 k | 822.196000 M | -29.06 | -51.81 | -9.06 |
| 900.000 k | 937.500 k | 30.00 k | 824.016000 M | -29.80 | -52.56 | -9.80 |
| 937.500 k | 1.000 M | 100.00 k | 824.100000 M | -24.96 | -47.72 | -4.96 |

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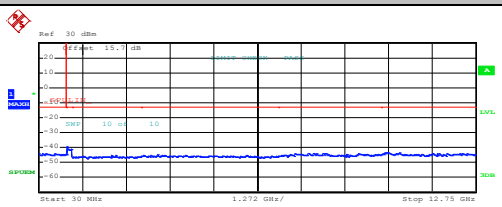
# Conducted Spurious Emission

## CDMA BC10 (1xEV-DO Rev. 0)

### Lowest Channel




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 30.000 M | 813.250 M | 100.00 k | 234.036625 M | -43.91 | -30.91 |
| 827.750 M | 1.000 G | 100.00 k | 850.745375 M | -39.50 | -26.50 |
| 1.000 G | 3.000 G | 100.00 k | 2.267000 G | -45.07 | -32.07 |
| 3.000 G | 7.000 G | 100.00 k | 3.490000 G | -44.67 | -31.67 |
| 7.000 G | 10.000 G | 100.00 k | 7.483000 G | -43.87 | -30.87 |
| 10.000 G | 12.750 G | 100.00 k | 10.100375 G | -43.22 | -30.22 |

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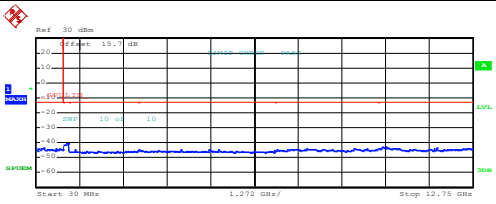
### Middle Channel




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 30.000 M | 813.250 M | 100.00 k | 269.282875 M | -43.28 | -30.28 |
| 827.750 M | 1.000 G | 100.00 k | 983.636250 M | -40.32 | -27.32 |
| 1.000 G | 3.000 G | 100.00 k | 1.176000 G | -44.53 | -31.53 |
| 3.000 G | 7.000 G | 100.00 k | 5.346000 G | -44.34 | -31.34 |
| 7.000 G | 10.000 G | 100.00 k | 9.661000 G | -43.83 | -30.83 |
| 10.000 G | 12.750 G | 100.00 k | 10.127875 G | -42.53 | -29.53 |

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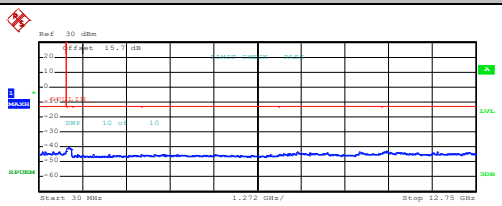
### Highest Channel




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 30.000 M | 813.250 M | 100.00 k | 812.858375 M | -43.09 | -30.09 |
| 827.750 M | 1.000 G | 100.00 k | 897.080625 M | -40.33 | -27.33 |
| 1.000 G | 3.000 G | 100.00 k | 1.106000 G | -45.23 | -32.23 |
| 3.000 G | 7.000 G | 100.00 k | 3.002000 G | -45.05 | -32.05 |
| 7.000 G | 10.000 G | 100.00 k | 7.564000 G | -43.43 | -30.43 |
| 10.000 G | 12.750 G | 100.00 k | 10.152625 G | -43.04 | -30.04 |

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# Frequency Stability

| Test Conditions | Middle Channel | CDMA BC10 (1xEV-DO Rev. 0) | Limit Note 2. |
|---|---|---|---|
| Temperature (°C) | Voltage (Volt) | Deviation (ppm) | Result |
| 50 | Normal Voltage | 0.0012 | PASS |
| 40 | Normal Voltage | 0.0000 | |
| 30 | Normal Voltage | 0.0000 | |
| 20(Ref.) | Normal Voltage | 0.0000 | |
| 10 | Normal Voltage | 0.0012 | |
| 0 | Normal Voltage | 0.0000 | |
| -10 | Normal Voltage | 0.0000 | |
| -20 | Normal Voltage | 0.0012 | |
| -30 | Normal Voltage | 0.0012 | |
| 20 | Maximum Voltage | 0.0000 | |
| 20 | Normal Voltage | 0.0000 | |
| 20 | Battery End Point | 0.0000 | |

**Note:**

**1.** Normal Voltage = 12 V. ；Battery End Point (BEP) = 8 V.；Maximum Voltage = 40 V

**2.** The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

# Appendix B. Test Results of Radiated Test

## Part90S CDMA BC10 1xEVDO

| Mode 1_CDMA BC10 1xEVDO | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Channel | Frequency ( MHz ) | ERP ( dBm ) | Limit ( dBm ) | Over Limit ( dB ) | SPA Reading (dBm) | S.G. Power ( dBm ) | TX Cable loss ( dB ) | TX Antenna Gain (dBi) | Polarization (H/V) |
| Lowest | 1632 | -59.67 | -13 | -46.67 | -70.86 | -65.21 | 0.91 | 8.60 | H |
| | 2456 | -56.82 | -13 | -43.82 | -72.83 | -64.17 | 1.14 | 10.64 | H |
| | 3272 | -56.06 | -13 | -43.06 | -73.82 | -64.54 | 1.32 | 11.95 | H |
| | 1632 | -51.02 | -13 | -38.02 | -61.74 | -56.56 | 0.91 | 8.60 | V |
| | 2456 | -53.88 | -13 | -40.88 | -70.02 | -61.23 | 1.14 | 10.64 | V |
| | 3272 | -55.97 | -13 | -42.97 | -74.2 | -64.45 | 1.32 | 11.95 | V |
| Middle | 1640 | -60.89 | -13 | -47.89 | -72.12 | -66.45 | 0.92 | 8.63 | H |
| | 2464 | -56.54 | -13 | -43.54 | -72.55 | -63.90 | 1.14 | 10.65 | H |
| | 3280 | -56.45 | -13 | -43.45 | -74.21 | -64.95 | 1.32 | 11.97 | H |
| | 1640 | -54.04 | -13 | -41.04 | -64.73 | -59.60 | 0.92 | 8.63 | V |
| | 2464 | -52.22 | -13 | -39.22 | -68.36 | -59.58 | 1.14 | 10.65 | V |
| | 3280 | -55.99 | -13 | -42.99 | -74.22 | -64.49 | 1.32 | 11.97 | V |
| Highest | 1648 | -61.88 | -13 | -48.88 | -73.11 | -67.47 | 0.92 | 8.66 | H |
| | 2472 | -57.61 | -13 | -44.61 | -73.63 | -64.98 | 1.14 | 10.66 | H |
| | 3292 | -56.68 | -13 | -43.68 | -74.41 | -65.21 | 1.32 | 12.00 | H |
| | 1648 | -58.46 | -13 | -45.46 | -69.15 | -64.05 | 0.92 | 8.66 | V |
| | 2472 | -53.70 | -13 | -40.70 | -69.9 | -61.07 | 1.14 | 10.66 | V |
| | 3292 | -56.05 | -13 | -43.05 | -74.24 | -64.58 | 1.32 | 12.00 | V |

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.