



DATE: 29 August 2018

I.T.L. (PRODUCT TESTING) LTD. FCC Radio Test Report

For

Motorola Solutions, Inc.

Equipment under test:

MC-EDGE UHF-R2

F0016A (VA00712AA)

UHF R2 450-520MHz

FCC ID: AZ492FT7114

IC: 109U-92FT7114

Emission Designator: 8K10F1D (Digital Data, 12.5kHz channel)

Emission Designator: 8K10F1W (Digital TDMA, 12.5kHz channel)

| | | |
|------------------|-------------------|------------------|
| VA00715AA | FCC ID: N7NHL7588 | IC: 2417C-HL7588 |
| VA00726AA | FCC ID: SQG-1001 | IC: 3147A-1001 |

Tested by: _____


M. Zohar

Approved by: _____


D. Shidlow

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This report relates only to items tested.



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1. General Information

1.1 Administrative Information

| | |
|--------------------------------|--|
| Manufacturer: | Motorola Solutions, Inc. |
| Manufacturer's Address: | 2 Negev St. Airport City, 7019900 Israel Tel: +972-3-565-8888 |
| Manufacturer's Representative: | Alex Babaladze |
| Equipment Under Test (E.U.T): | MC-EDGE UHF-R2 |
| Equipment Model No.: | F0016A (VA00712AA) |
| Equipment Serial No.: | 2758UA0040 |
| Date of Receipt of E.U.T: | March 5, 2018 |
| Start of Test: | March 5, 2018 |
| End of Test: | May 10, 2018 |
| Test Laboratory Location: | I.T.L (Product Testing) Ltd. 1 Batsheva St, Lod, Israel 7120101 |



1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by/registered with the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), FCC Designation Number is IL1005.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025A-1, IC 4025A-2.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.



1.3 Test Methodology

Radiated and conducted testing was performed according to the procedures in ANSI C63.26: 2015 and ANSI/TIA-603-E: 2016, Section 2.2.12.

1.4 Product Description

The IoT Mission Critical EDGE is a part of MSI mission critical IoT portfolio which provides an ecosystem for IoT developers, integrators and users to build out an IoT base solutions.

The MC EDGE is a highly secured communication agnostic versatile IoT Gateway which uses LoRaWAN for Wireless Sensor Connectivity, extensive Physical I/O suite of interfaces.

The MC EDGE provides a suite of tools for edge analytics creation and data manipulation creation which varies from easy /intuitive Codeless web based tools to an highly suffictated C based SDK. The MC EDGE utilize an inherited LTE CAT- 4 and ASTRO (P25) connectivity capabilities

This solution is targeting two main markets: Mission critical with public safety oriented solution e.g. smart early warning, Safe city, Perimeter security etc. and critical infrastructure e.g. Smart water and electricity management.

On the mission critical side, highly secured mission critical IoT ecosystem will create a major differentiation points as well as migration path between LMR to PS LTE infrastructure. On the Critical infrastructure side, Communication agnosticism, highly reliable Industrial Gateway will provide a market differentiation and superiority.

Main

| | |
|-----------|---|
| F0016A | Main Model |
| VA00712AA | APX4000 UHF R2 FOR MC-EDGE |
| VA00715AA | LTE VERIZON USA/CANADA MODEM FOR MC-EDGE |
| VA00726AA | LORA 902 - 928 MHZ USA/CANADA MODEM FOR MC-EDGE |

I/Os

| | |
|----------|------------------------------|
| FLN0050A | 12DI/8AI MODULE 0-20MA |
| FLN0051A | 12DI/8AI MODULE 0-5V |
| FLN0052A | 8DO/2AO MODULE 0-20MA, 0-10V |
| FLN0116A | Mixed I/O |



| | |
|-----------------------|---|
| VA00007AA | 12DI/8AI 0- 20mA |
| VA00008AA | 8DO/2AO 0-20mA / 0-10V |
| VA00047AA | 12DI/8AI 0-5V |
| VA00149AA (VA00008AA) | 8DO/2AO HW ONLY NO LIC |
| VA00150AA | 12DI/8AI HW ONLY NO LIC |
| VA00151AA (VA00047AA) | 0 - 5V DI/AI |
| VA00152AA (VA00007AA) | 0 - 20MA DI/AI |
| VA00291AA | IOT MC-EDGE CPU PACKAGE |
| VA00290AA | IOT MC-EDGE PLUG-IN BOARD |
| VA00598AA | MIXED IO 7DI/6DO/1AO/4AI 0- 20MA |
| VA00599AA(VA00598AA) | MIXED IO 7DI/6DO/1AO/4AI HW ONLY NO LIC |
| Power Supply | |
| FLN0096A | AC POWER SUPPLY 12V/120W DC OUT |
| FLN0101A | AC POWER SUPPLY 24V/120W DC OUT |
| VA00009AA | AC POWER SUPPLY 12V/120W DC OUT |
| VA00130AA | AC POWER ;SUPPLY 24V / 120W DC OUTPUT |
| Antennas | |
| BMLPVMBLTENGP-VP | MLPV Low-Profile Vertical Antennas |
| MWU4002S | Wideband No Tune VHF Antennas |



2. System Test Configuration

2.1 Justification

1. The E.U.T contains the following 3 transceivers:
 - a) LTE cellular modular approved under FCC ID: N7NHL7588 and IC: 2417C-HL7588.
 - b) LoRa WAN modular approved under FCC ID: SQG-1001 and IC: 3147A-1001.
 - c) APX4000 (LMR) radio main board UHF R2.
2. Testing was performed with 2 modulations: digital data & digital TDMA each with 12.5kHz bandwidth.
3. The E.U.T can consist of 3 I/O configurations external modules: DI (data input), DO (data output), mixed I/O. Per customer declaration mixed I/O modular was chosen as the “worst case”.
4. The E.U.T can be used powered via the 2 below ac/dc adapters:

| Manufacturer: | Part Number: | Serial Number: |
|---------------|---------------|----------------------|
| Emerson | ADN5-24-1PM-C | 1679N2000TAEC |
| TDK Lambda | APP120-12-1 | 130958 9601431300353 |

5. Exploratory AC line conducted emission testing was performed to find the worst case power supply. The worst case was with the TDK Lambda power supply. See ITL Test Report no. E185051.00
6. Testing was therefore performed on the E.U.T. with the TDK Lambda adapter.

2.2 EUT Exercise Software

No special exercise software was used.

2.3 Special Accessories

1. AC/DC optional adapter:
Manufacturer: EMERSON
Part number: ADN5-24-1PM-C
Serial number: 1679N2000TAEC

2. AC/DC optional adapter:
Manufacturer: TDK Lambda
Part number: APP120-12-1
Serial number: 130958 9601431300353

3. Laptop
Manufacturer: Lenovo
Part number: 2519-A43
Serial number: R8-W3PZ8



2.4 *Equipment Modifications*

No modifications were necessary in order to achieve compliance.

2.5 Configuration of Tested System

| | |
|--|---|
| Product Name | MC-EDGE UHF-R2 |
| Model Name | F0016A (VA00712AA) |
| Working voltage | Nominal: 12VDC via AC/DC power supply 115VAC input |
| Mode of operation | Transceiver |
| Modulations | TDMA, digital data |
| Assigned Frequency Range | 450MHz-520MHz |
| Transmit power | ~37.4 dBm |
| Antenna Gain | 0 dBi |
| DATA rate | N/A |
| Modulation BW | 12.5kHz |
| DC Voltage and DC current applied to the final amplifying device | 1.94A @ 7.5VDC |

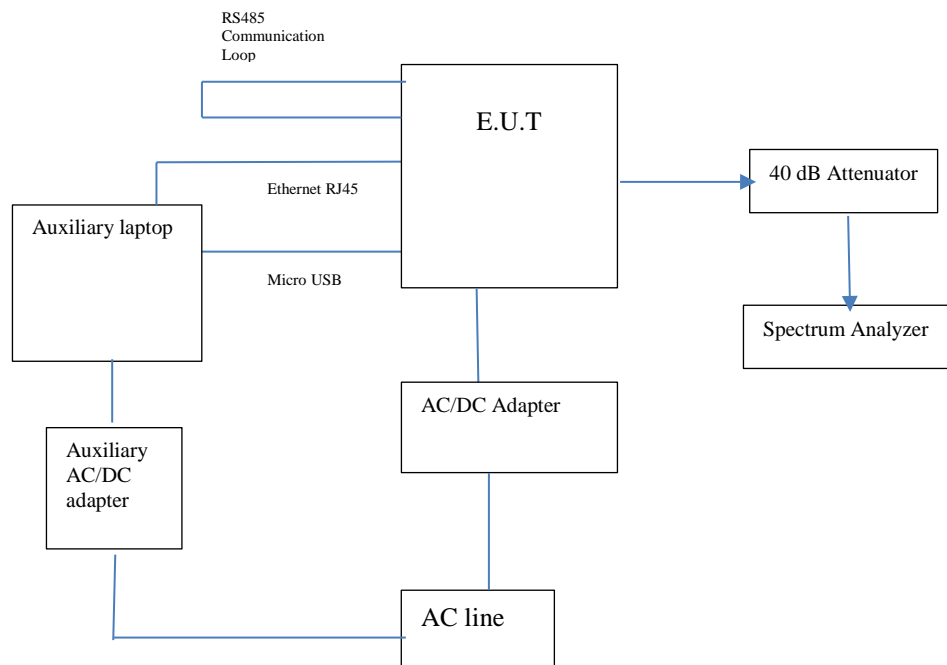


Figure 1. Conducted Test Set-Up

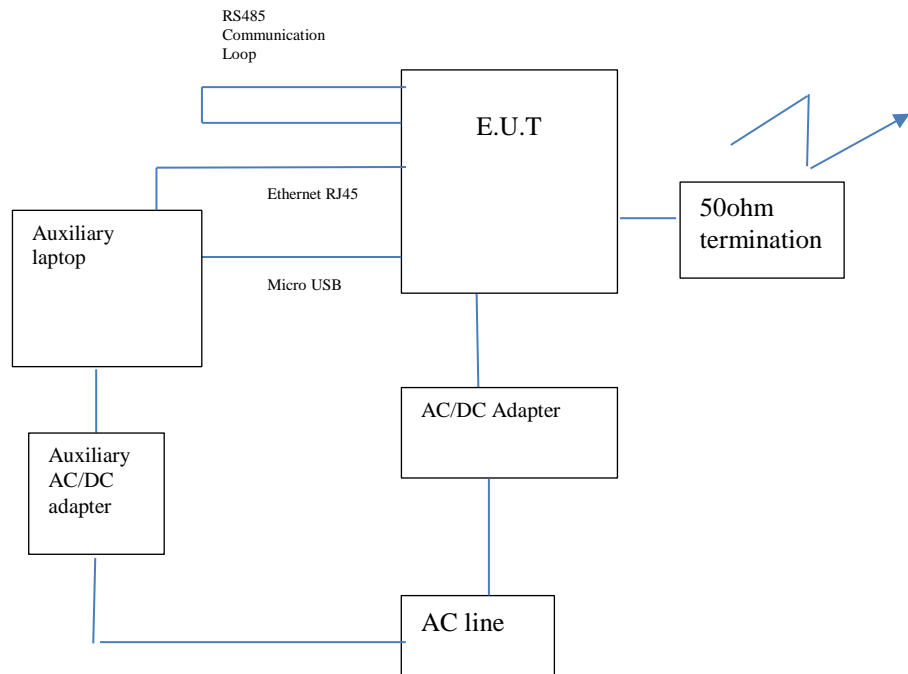


Figure 2. Radiated Test Set-Up

3. Test Set-Up Photos

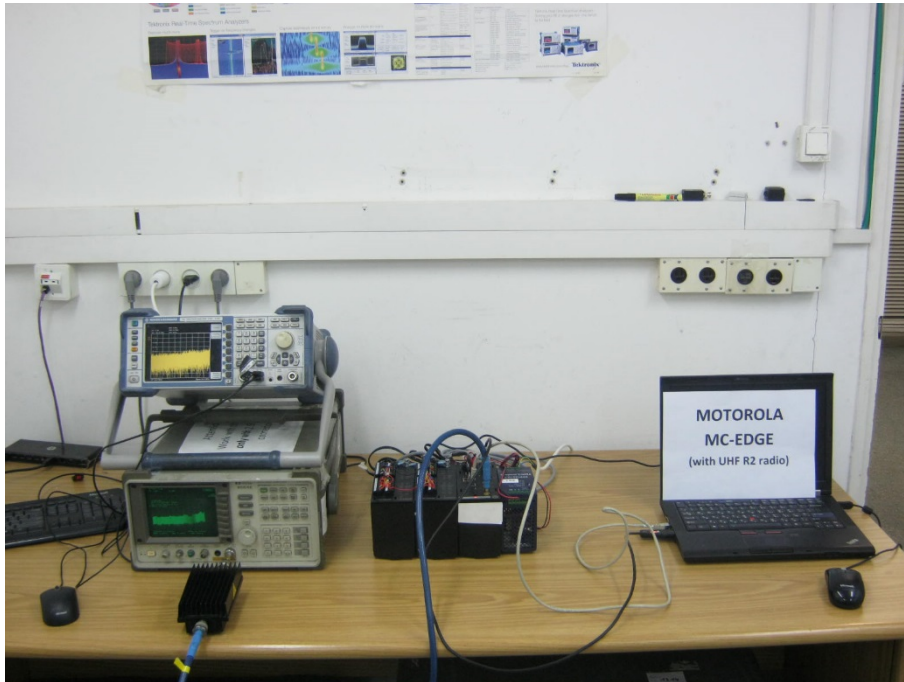


Figure 3. Conducted Emission From Antenna Port Test



Figure 4. Radiated Emission Test, 0.009-30MHz

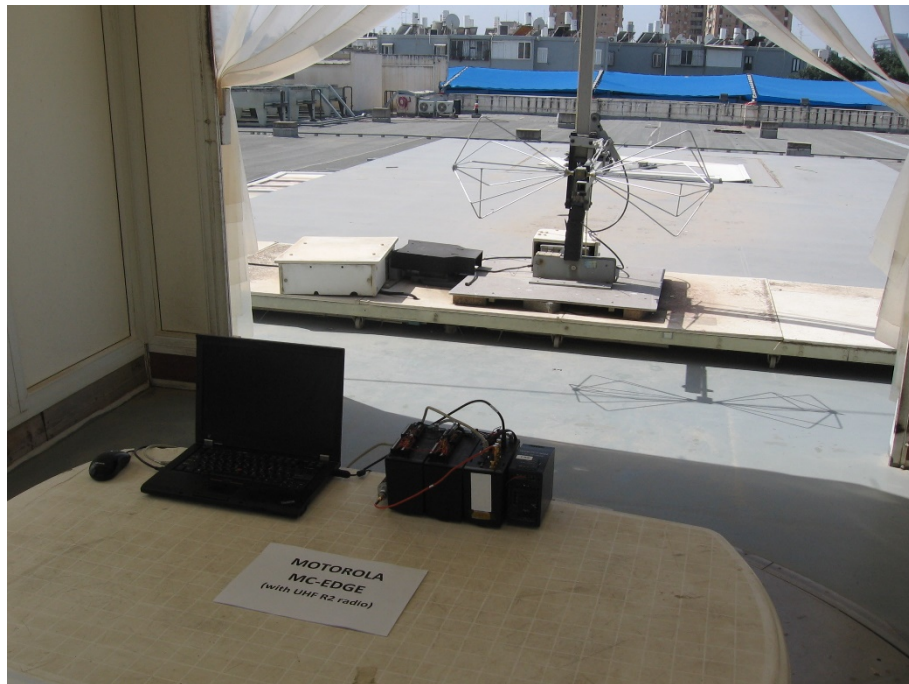


Figure 5. Radiated Emission Test, 30-200MHz

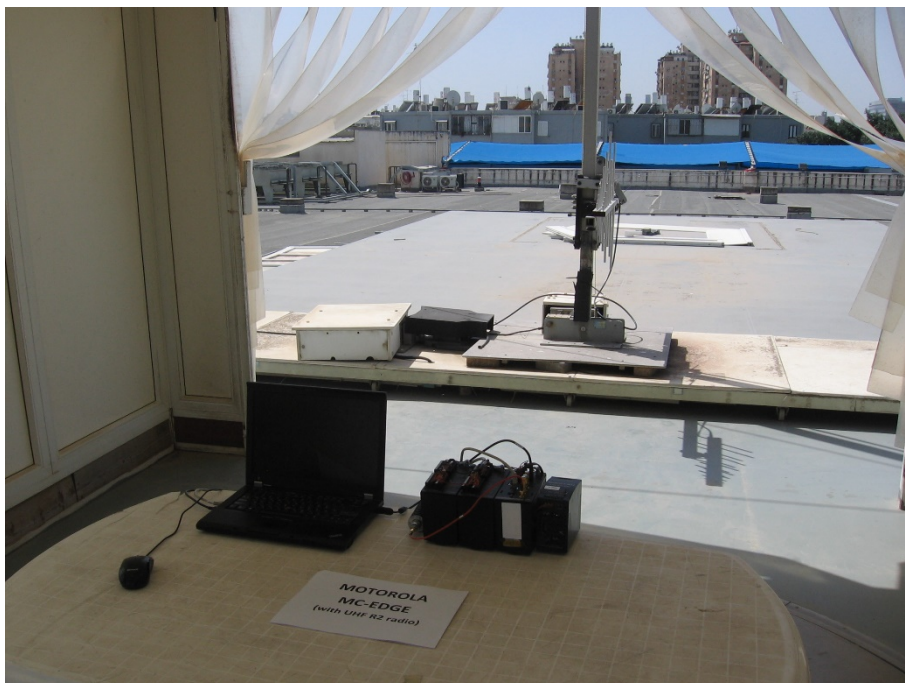


Figure 6. Radiated Emission Test, 200-1000MHz



Figure 7. Radiated Emission Test, 1000-6000MHz



Figure 8. Frequency Stability Test



4. RF Power Output Pursuant to 47 CFR 2.1046, 22.565, 74.461 & RSS Gen, RSS 119

4.1 Test Procedure

(Temperature (22°C)/ Humidity (52%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (total loss 39.8 dB) and an appropriate coaxial cable. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 30 kHz RBW.

4.2 Test Limit

Peak Power Output must not exceed 5.6W (37.5dBm).

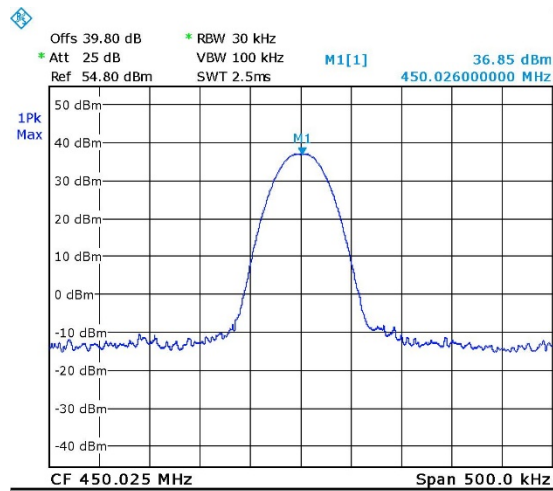
4.3 Test Results

| Modulation | Operation Frequency | Reading | Limit | Margin |
|------------|---------------------|---------|-------|--------|
| | (MHz) | (dBm) | (dBm) | (dB) |
| TDMA | 450.025 | 37.0 | 37.5 | -0.5 |
| | 481.015 | 37.1 | 37.5 | -0.4 |
| | 519.987 | 36.8 | 37.5 | -0.7 |
| DIGITAL | 450.025 | 36.9 | 37.5 | -0.6 |
| | 481.015 | 37.0 | 37.5 | -0.5 |
| | 519.987 | 36.8 | 37.5 | -0.7 |

Figure 9 RF Power Output

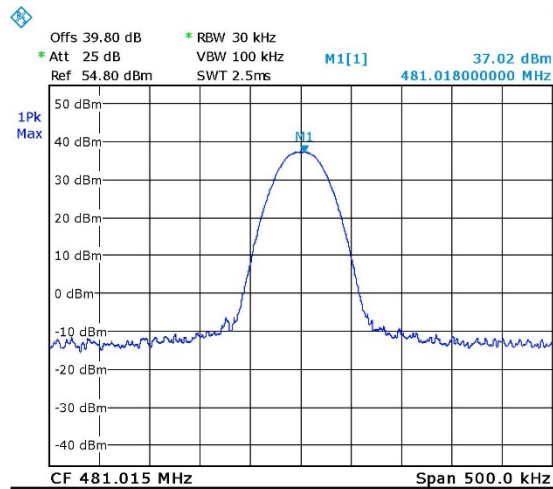
JUDGEMENT: Passed

See additional information in *Figure 10* to *Figure 15*.



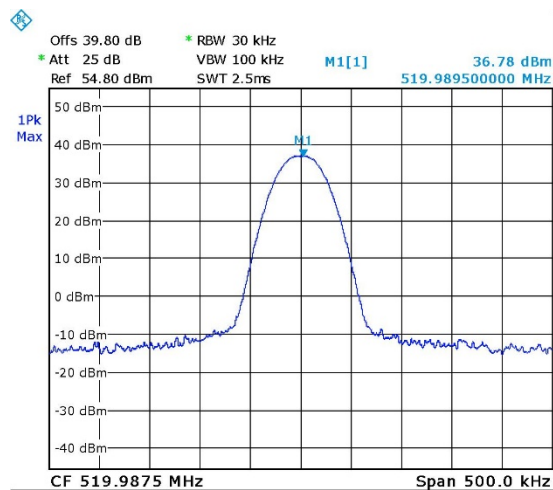
Date: 5.MAR.2018 09:10:53

Figure 10. 450.025MHz, Digital



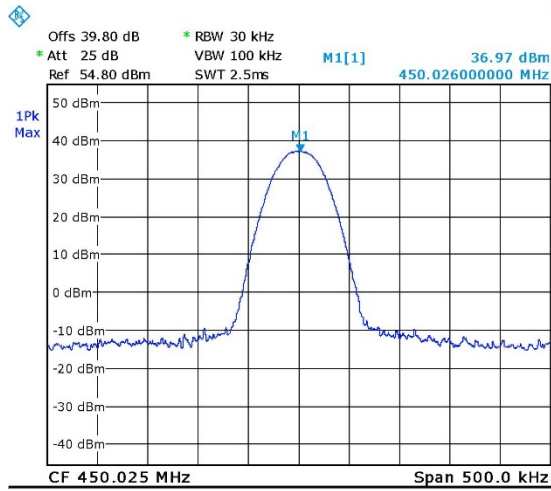
Date: 5.MAR.2018 09:15:02

Figure 11. 481.015MHz, Digital



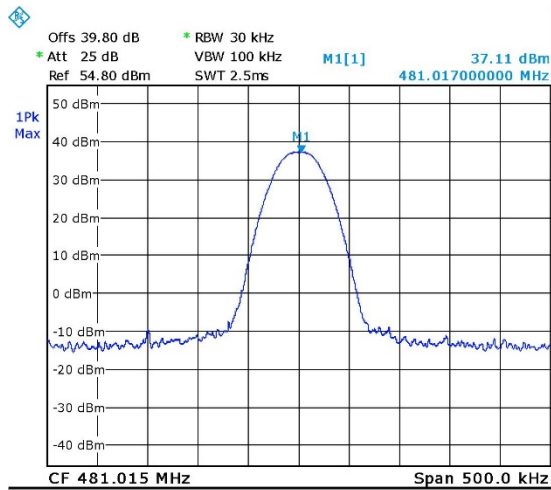
Date: 5.MAR.2018 09:17:08

Figure 12. 519.987MHz, Digital



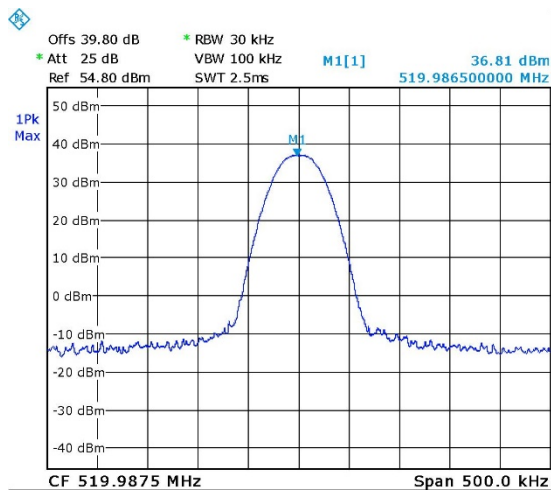
Date: 5.MAR.2018 09:12:01

Figure 13 450.025MHz, TDMA



Date: 5.MAR.2018 09:15:34

Figure 14 481.015MHz, TDMA



Date: 5.MAR.2018 09:16:35

Figure 15. 519.987MHz, TDMA



4.4 Test Equipment Used; RF Power Output

| Instrument | Manufacturer | Model | Serial Number | Calibration | |
|-------------------|--------------|-------------|---------------|-----------------------|----------------------|
| | | | | Last Calibration Date | Next Calibration Due |
| Spectrum Analyzer | R&S | FSL6 | 100194 | February 19, 2018 | February 19, 2019 |
| 40 dB Attenuator | Weinschel | WA 39-40-33 | A1323 | October 1, 2017 | October 1, 2018 |

Figure 16 Test Equipment Used



5. Occupied Bandwidth Pursuant to 47 CFR 2.1049, 22.359, 74.462, 90.210, & RSS Gen, RSS 119

5.1 Test Procedure

(Temperature (22°C)/ Humidity (53%RH))

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (total loss=39.8 dB).

For Mask D measurements, RBW of 100Hz was used.

For 99% occupied bandwidth measurements, RBW set to at least 1% from the OBW.

Occupied Bandwidth Data Designators:

For Digital Data, 12.5kHz channel: 8K10F1D;

For Digital TDMA, 12.5kHz channel: 8K10F1W

5.2 Test Limit

MASK D

5.3 Test Results

JUDGEMENT: Passed

See additional information in *Figure 17* to *Figure 24*.

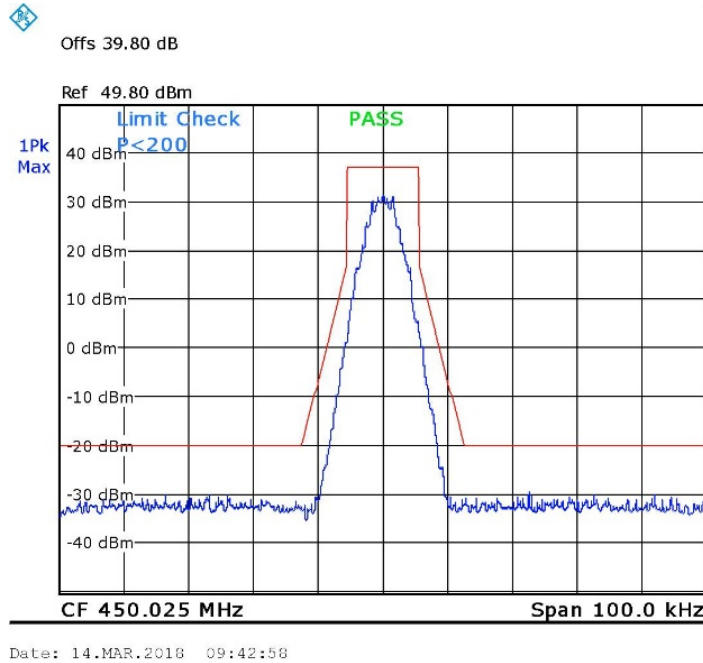


Figure 17. 450.025MHz, Digital

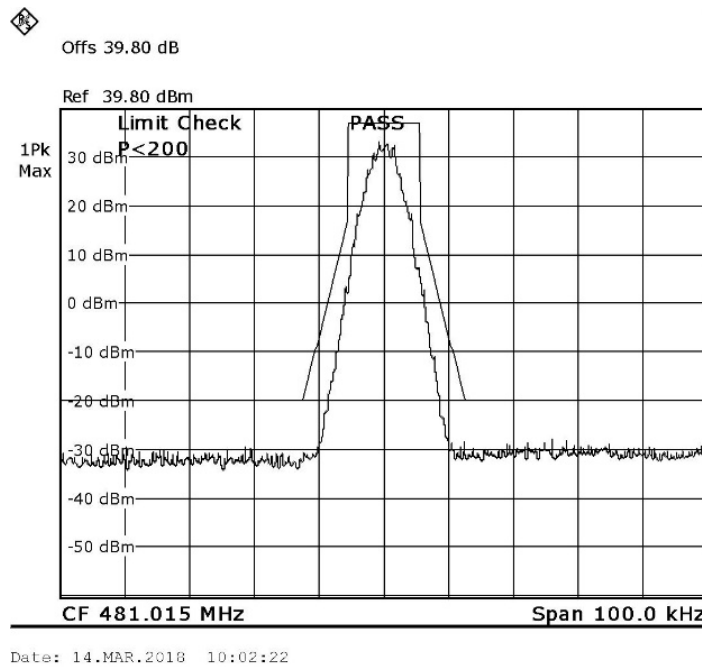
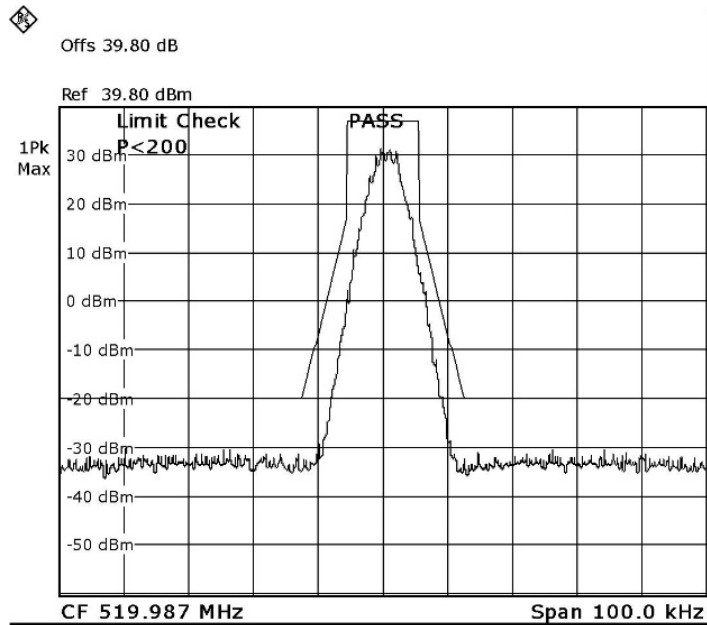
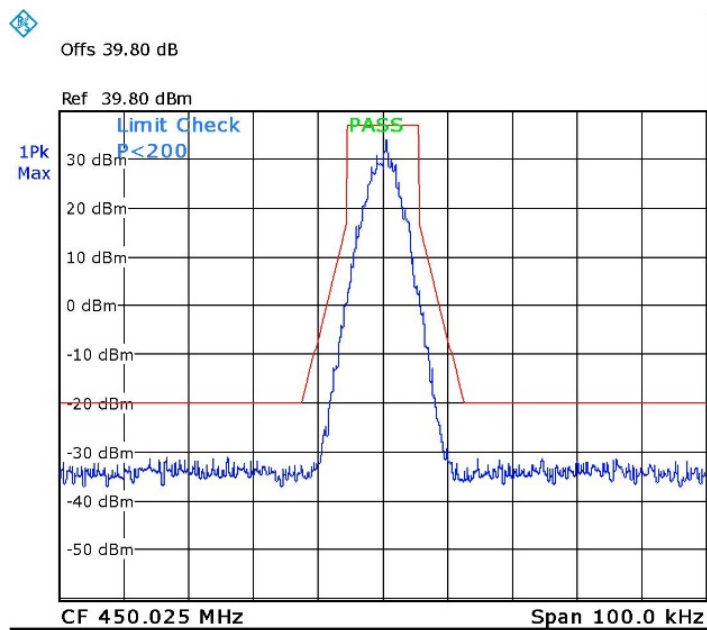


Figure 18. 481.015MHz, Digital



Date: 14.MAR.2018 10:05:29

Figure 19. 519.987MHz, Digital



Date: 14.MAR.2018 09:53:09

Figure 20. 450.025MHz, TDMA

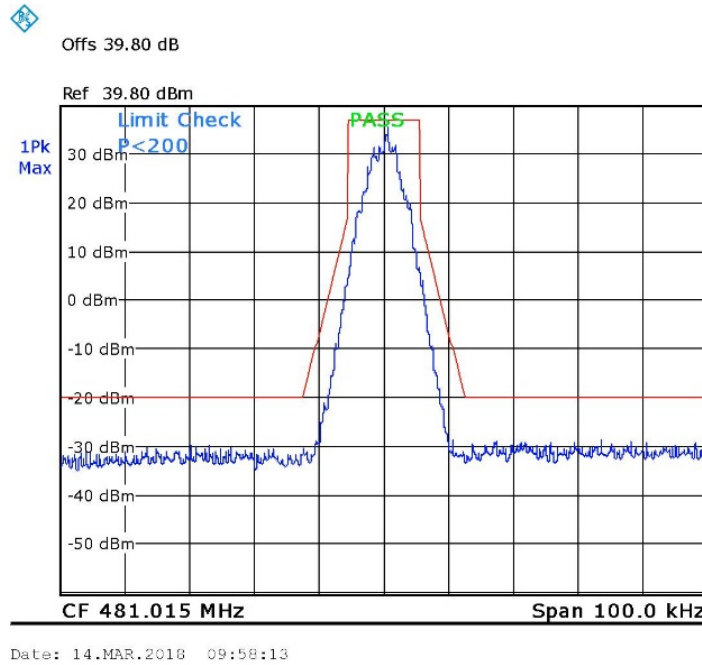


Figure 21. 481.015MHz, TDMA

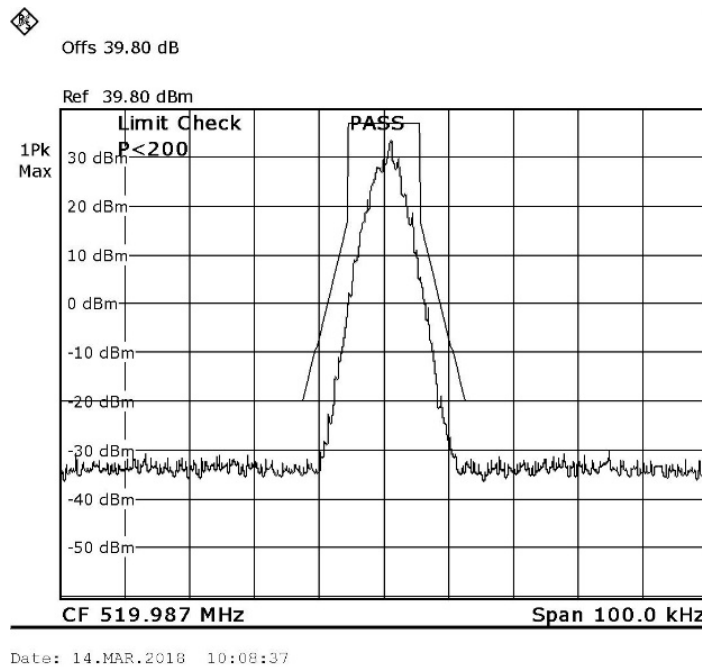
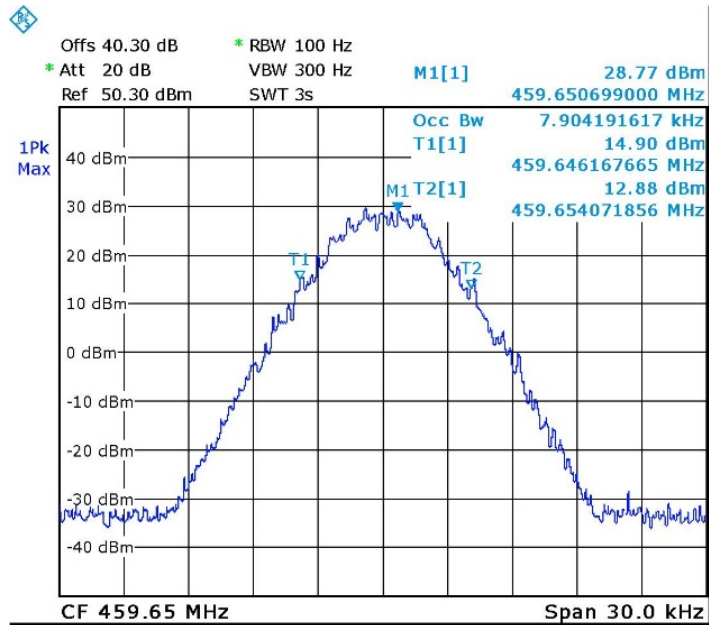
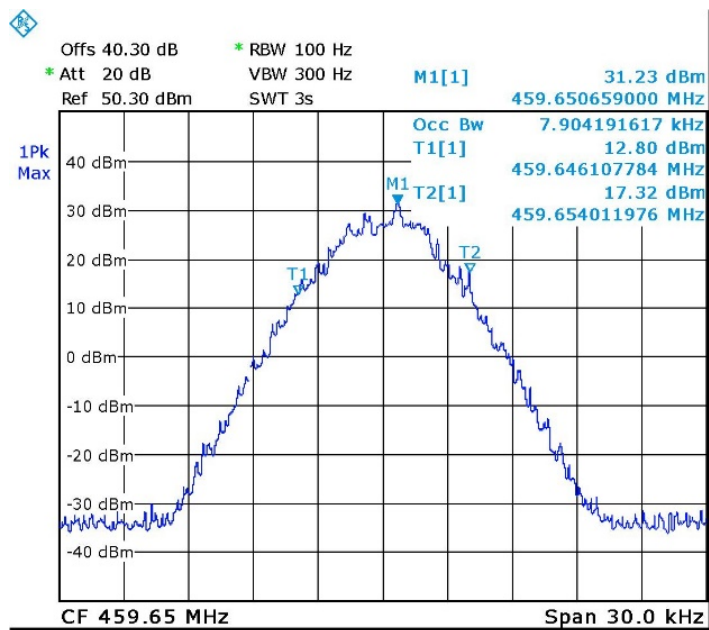


Figure 22. 519.987MHz, TDMA



Date: 5.MAR.2018 11:28:44

Figure 23. 99% Occupied BW, Digital



Date: 5.MAR.2018 11:33:00

Figure 24. 99% Occupied BW, TDMA



5.4 Test Equipment Used; Occupied Bandwidth

| Instrument | Manufacturer | Model | Serial Number | Calibration | |
|-------------------|--------------|-------------|---------------|-----------------------|----------------------|
| | | | | Last Calibration Date | Next Calibration Due |
| Spectrum Analyzer | R&S | FSL6 | 100194 | February 19, 2018 | February 19, 2019 |
| 40 dB Attenuator | Weinschel | WA 39-40-33 | A1323 | October 1, 2017 | October 1, 2018 |

Figure 25 Test Equipment Used



6. Spurious Emissions at Antenna Terminals Pursuant to 47 CFR 2.1051 & RSS Gen

6.1 Test Procedure

(Temperature (20°C)/ Humidity (50%RH))

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (max loss =41.0 dB). The spectrum analyzer was set to 300Hz RBW for the frequency range 9.0-150.0 kHz, 10kHz for the frequency range 150.0kHz–30.0MHz, 100kHz for the frequency range 30.0–1000.0MHz, and 1MHz for the frequency range 1.0- 6.0 GHz.

6.2 Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of $50 + 10 \cdot \log(P)$ dB, yielding -20dBm.

6.3 Test Results

JUDGEMENT: Passed

See additional information in *Figure 26* to *Figure 31*.

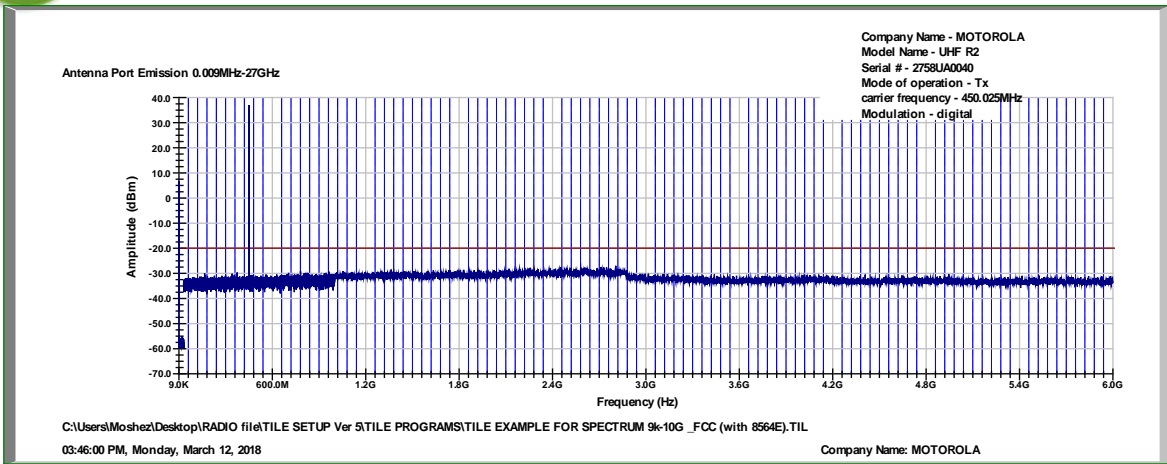


Figure 26 Spurious Emissions at Antenna Terminals, 450.025MHz, Digital

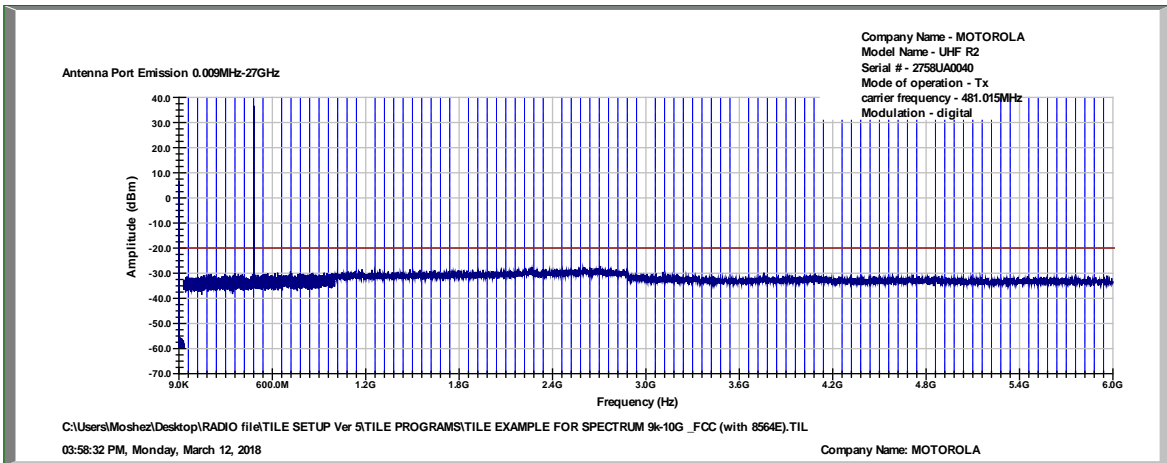


Figure 27 Spurious Emissions at Antenna Terminals, 481.015MHz, Digital

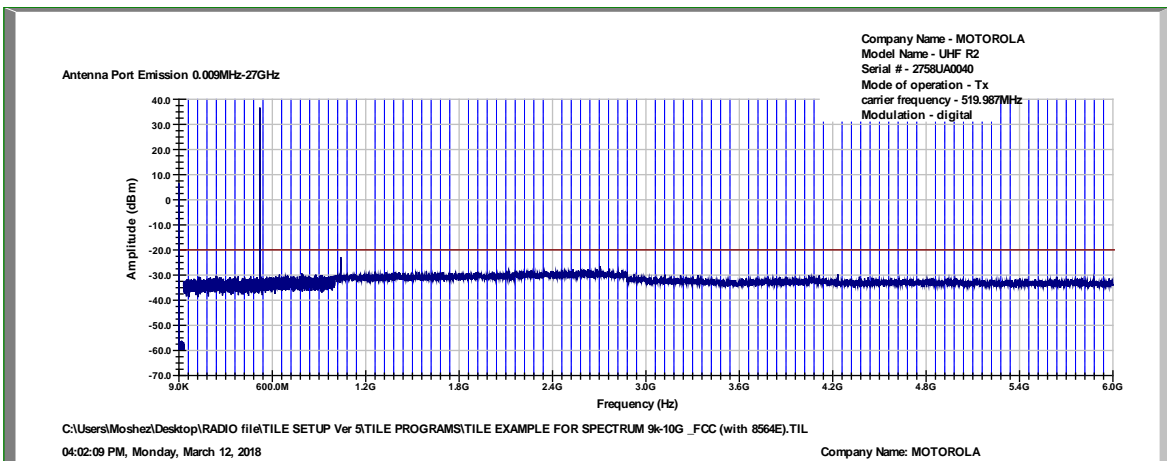


Figure 28 Spurious Emissions at Antenna Terminals, 519.987MHz, Digital

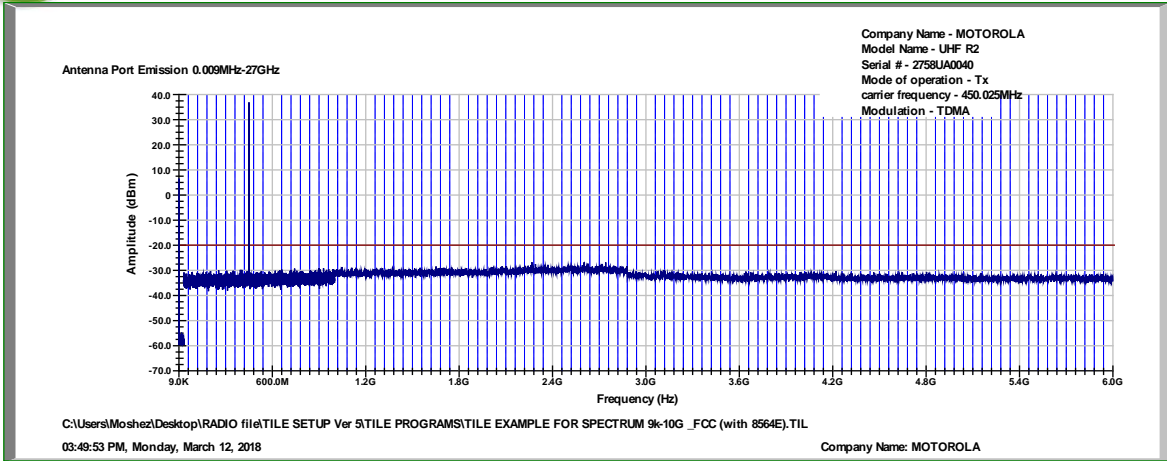


Figure 29 Spurious Emissions at Antenna Terminals, 450.025MHz, TDMA

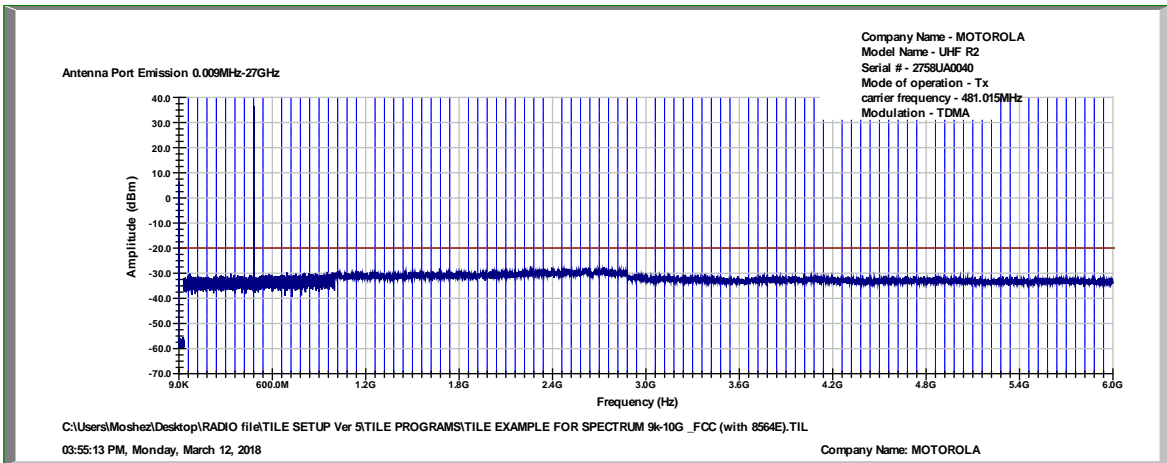


Figure 30 Spurious Emissions at Antenna Terminals, 481.015MHz, TDMA

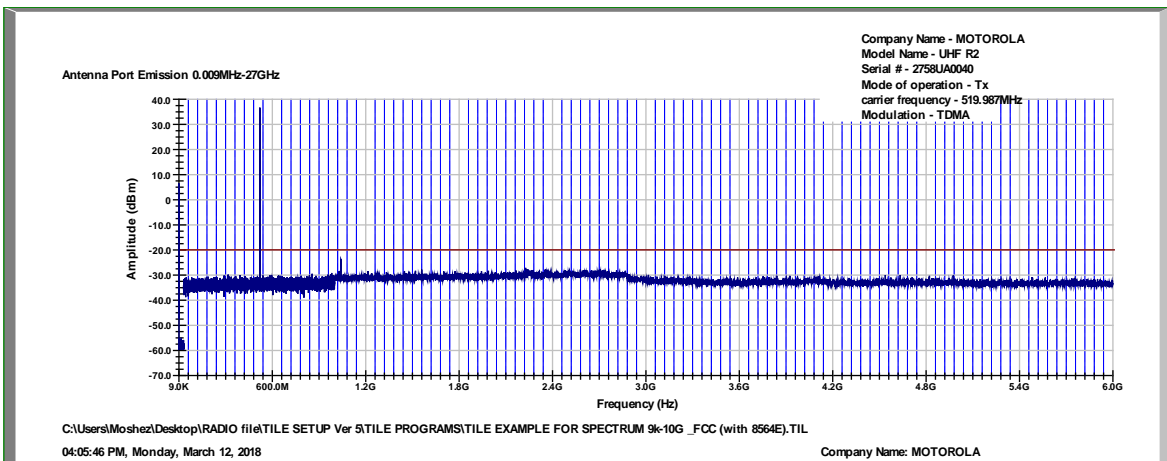


Figure 31 Spurious Emissions at Antenna Terminals, 519.987MHz, TDMA



6.4 Test Equipment Used; Spurious Emissions at Antenna Terminals

| Instrument | Manufacturer | Model | Serial Number | Calibration | |
|-------------------|--------------|-------------|---------------|-----------------------|----------------------|
| | | | | Last Calibration Date | Next Calibration Due |
| Spectrum Analyzer | HP | 8564E | 3442A00275 | February 28, 2018 | February 28, 2019 |
| 40 dB Attenuator | Weinschel | WA 39-40-33 | A1323 | October 1, 2017 | October 1, 2018 |

Figure 32 Test Equipment Used



7. Band Edge Spectrum Pursuant to 47 CFR 22.359 & RSS Gen, RSS 119

7.1 Test Procedure

(Temperature (22°C)/ Humidity (52%RH))

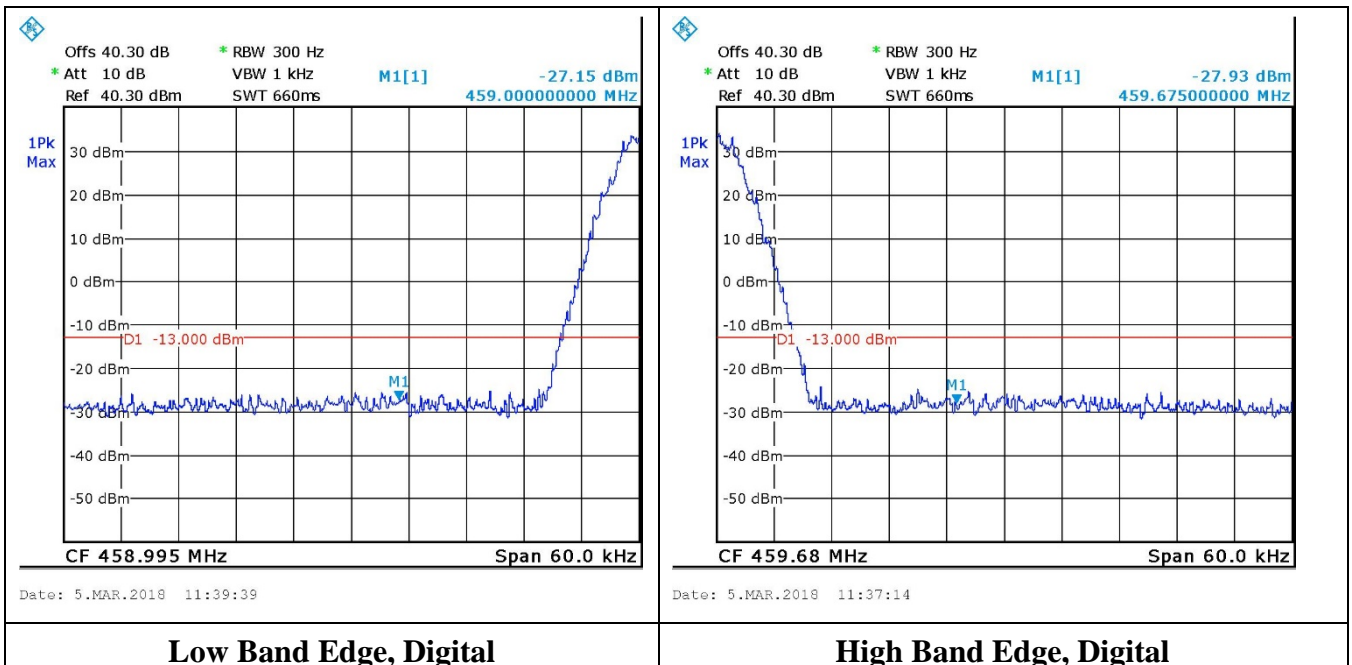
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (40.3 dB).

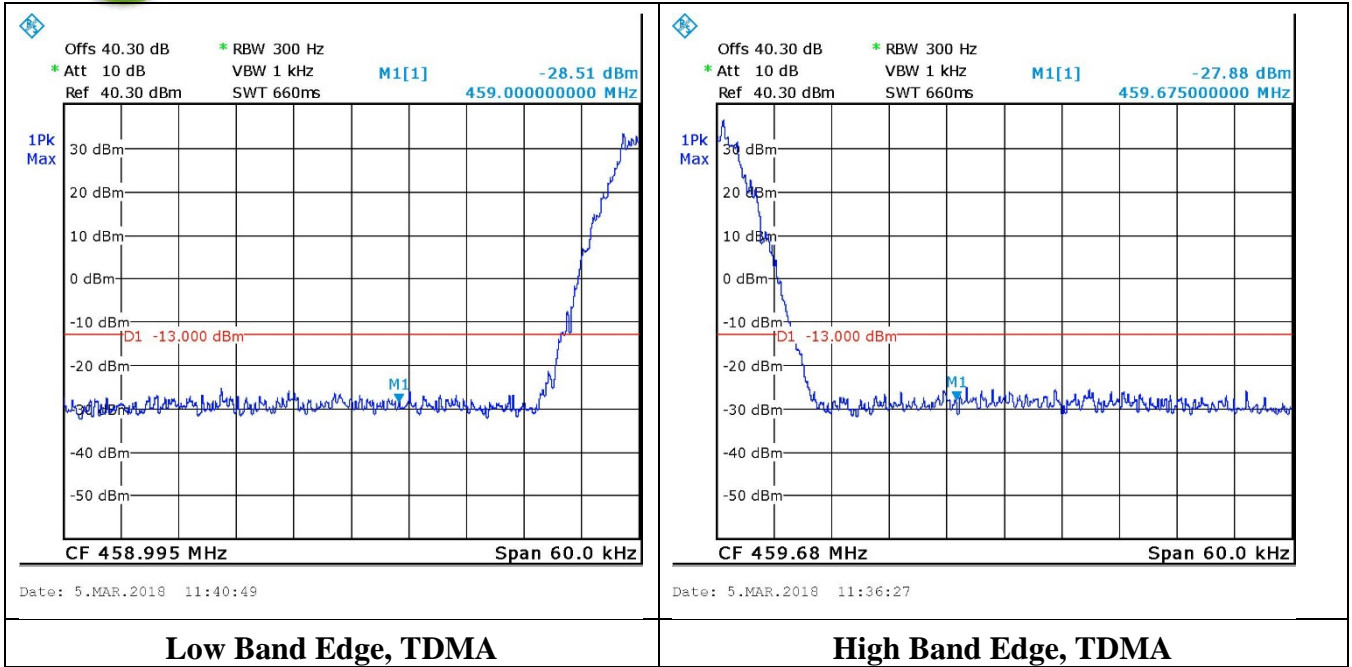
The RBW was set to at least 1% from the OBW.

7.2 Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \cdot \log(P)$ dB, yielding -13dBm.

7.3 Test Results





7.4 Test Equipment Used; Band Edge

| Instrument | Manufacturer | Model | Serial Number | Calibration | |
|-------------------|--------------|-------------|---------------|-----------------------|----------------------|
| | | | | Last Calibration Date | Next Calibration Due |
| Spectrum Analyzer | R&S | FSL6 | 100194 | February 19, 2018 | February 19, 2019 |
| 40 dB Attenuator | Weinschel | WA 39-40-33 | A1323 | October 1, 2017 | October 1, 2018 |

Figure 33 Test Equipment Used



8. Spurious Radiated Emission Pursuant to 47 CFR 2.1053, 22.359, 74.462 & RSS Gen, RSS 119

8.1 Test Procedure

(Temperature (27°C)/ Humidity (68%RH))

The test method was based on ANSI C63.26: 2015.

For measurements between 0.009MHz-30.0MHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 0.8 meters above the ground. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization. The emissions were measured at a distance of 3 meters.

The frequency range 0.009MHz-30MHz was scanned.

For measurements between 30.0MHz-1.0GHz:

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground, at a distance of 3 meters. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 30.0MHz -1.0GHz was scanned and the list of the highest emissions was verified and updated accordingly.

For measurements between 1.0GHz-6.0GHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 1.5 meters above the ground. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization. The emissions were measured at a distance of 3 meters.

The frequency range 1.0GHz -6.0GHz was scanned.

The E.U.T. was replaced by a substitution antenna driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver

The signals observed were converted to radiated power using:

$$P_d(\text{dBm}) = P_g(\text{dBm}) - \text{Cable Loss (dB)} + \text{Substitution Antenna Gain (dBd)}$$

P_d = Dipole equivalent power (result).

P_g = Signal generator output level.

A Peak detector was using for this test.

The test was performed with all the modulations.

Testing was performed when the RF port was connected to 50 Ω termination.

The table below describe only results with the highest radiation.



8.2 Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $50 + 10 \cdot \log(P)$ dB, yielding -20dBm.

8.3 Test Results

| Carrier Channel | Freq. | Antenna Pol. | Maximum Peak Level | Signal Generator RF Output | Cable Loss | Antenna Gain | Effective Radiated Power Level | Limit | Margin |
|-----------------|----------|--------------|--------------------|----------------------------|------------|--------------|--------------------------------|-------|--------|
| (MHz) | (MHz) | (V/H) | (dB μ V/m) | (dBm) | (dB) | (dBd) | (dBm) | (dBm) | (dB) |
| 450.025 | 1350.075 | V | 52.3 | -47.7 | 0.5 | 5.0 | -43.2 | -20.0 | -23.2 |
| | 1350.075 | H | 56.9 | -44.3 | 0.5 | 5.0 | -39.8 | -20.0 | -19.8 |
| 481.015 | 1443.075 | V | 52.8 | -47.2 | 0.5 | 5.0 | -42.7 | -20.0 | -22.7 |
| | 1443.075 | H | 52.6 | -48.7 | 0.5 | 5.0 | -44.2 | -20.0 | -24.2 |
| 519.987 | 1559.961 | V | 52.0 | -50.6 | 0.5 | 4.9 | -46.2 | -20.0 | -26.2 |
| | 1559.961 | H | 51.5 | -51.3 | 0.5 | 4.9 | -46.9 | -20.0 | -26.9 |

Figure 34 Spurious Radiated Emission

JUDGEMENT:

Passed by 19.8 dB



8.4 Test Instrumentation Used; Radiated Measurements

| Instrument | Manufacturer | Model | Serial Number | Calibration | |
|-----------------------------|-----------------|------------------|---------------|-----------------------|----------------------|
| | | | | Last Calibration Date | Next Calibration Due |
| EMI Receiver | HP | 85422E | 3906A00276 | February 19, 2018 | February 19, 2019 |
| RF Filter Section | HP | 85420E | 3705A00248 | February 19, 2018 | February 19, 2019 |
| EMI Receiver | R&S | ESCI7 | 100724 | February 19, 2018 | March 19, 2019 |
| Spectrum Analyzer | HP | 8593EM | 3536A00120ADI | February 20, 2018 | March 20, 2019 |
| Active Loop Antenna | EMCO | 6502 | 9506-2950 | October 19, 2017 | October 19, 2018 |
| Antenna Biconical | EMCO | 3110B | 9912-3337 | March 24, 2016 | March 24, 2018 |
| Antenna Log Periodic | EMCO | 3146 | 9505-4081 | May 15, 2017 | May 15, 2018 |
| Horn Antenna 1G-18G | ETS | 3115 | 29845 | May 19, 2015 | May 19, 2018 |
| Low Noise Amplifier | Narda | LNA-DBS-0411N313 | 013 | October 1, 2017 | October 1, 2018 |
| Low Noise Amplifier | Sophia Wireless | LNA 28-B | 232 | October 1, 2017 | October 1, 2018 |
| Semi Anechoic Civil Chamber | ETS | S81 | SL 11643 | N/A | N/A |
| Antenna Mast | ETS | 2070-2 | - | N/A | N/A |
| Turntable | ETS | 2087 | - | N/A | N/A |
| Mast & Table Controller | ETS/EMCO | 2090 | 9608-1456 | N/A | N/A |

Figure 35 Test Equipment Used



9. Transmitter Frequency Stability Pursuant to 47 CFR 2.1055, 22.355, 74.464 & RSS Gen, RSS 119

9.1 Test Procedure

(Temperature (27°C)/ Humidity (68%RH))

The E.U.T operation mode and test setup are as described in Section 2 of this report.

The E.U.T. was operated with a CW signal at 485.025MHz

The E.U.T. was placed inside a temperature chamber.

The spectrum analyzer was set to 20.0 kHz span and 1.0 kHz RBW, 3.0 kHz VBW.

Counter function was set for this evaluation.

The E.U.T. was operated from external VAC at nominal temperature (+25.0°C).

The carrier frequency was measured and recorded (reference frequency reading).

The carrier frequency was measured and recorded after at least 20 minutes of exposing the E.U.T. to the temperature.

9.2 Test Limit

1.5 ppm

9.3 Test Results

JUDGEMENT: Passed

The details of the results are given in *Figure 36*.



| Temperature | Voltage | Frequency | Drift | Limit |
|--------------|--------------|------------|-------|-------|
| (°C) | (VAC) | (MHz) | (Hz) | (Hz) |
| +20.0 | 97.7 | 485.025095 | +17.0 | 727.5 |
| | 115.0 | 485.025078 | - | 727.5 |
| | 132.2 | 485.025077 | -1.0 | 727.5 |
| -30.0 | 115.0 | 485.025148 | +70.0 | 727.5 |
| -20.0 | 115.0 | 485.025080 | +2.0 | 727.5 |
| -10.0 | 115.0 | 485.025072 | -6.0 | 727.5 |
| 0.0 | 115.0 | 485.025065 | -13.0 | 727.5 |
| +10.0 | 115.0 | 485.025074 | -4.0 | 727.5 |
| +30.0 | 115.0 | 485.025093 | +15.0 | 727.5 |
| +40.0 | 115.0 | 485.025128 | +50.0 | 727.5 |
| +50.0 | 115.0 | 485.025125 | +47.0 | 727.5 |
| +60.0 | 115.0 | 485.025116 | +38.0 | 727.5 |

Figure 36. Frequency Stability Test Results

9.4 Test Equipment Used; Frequency Stability

| Instrument | Manufacturer | Model | Serial No. | Last Calibration Date | Next Calibration Due |
|-------------------|--------------|-------------|------------|-----------------------|----------------------|
| Spectrum Analyzer | R&S | FSL6 | 100194 | February 19, 2018 | February 19, 2019 |
| Climatic Chamber | Thermotron | SM-32C | 251030 | February 26, 2018 | February 26, 2019 |
| 40dB Attenuator | Weinschel | WA 39-40-33 | A1323 | October 1, 2017 | October 1, 2018 |

Figure 37 Test Equipment Used



10. APPENDIX A - CORRECTION FACTORS

10.1 Correction factors for RF OATS Cable 35m ITL #1879

| Frequency (MHz) | Cable loss (dB) |
|-----------------|-----------------|
| 30.0 | 1.1 |
| 50.0 | 1.1 |
| 100.0 | 1.7 |
| 150.0 | 2.1 |
| 200.0 | 2.5 |
| 250.0 | 2.7 |
| 300.0 | 2.9 |
| 350.0 | 3.1 |
| 400.0 | 3.5 |
| 450.0 | 3.7 |
| 500.0 | 3.9 |
| 550.0 | 4.0 |
| 600.0 | 4.2 |
| 650.0 | 4.4 |
| 700.0 | 4.9 |
| 750.0 | 5.0 |
| 800.0 | 5.0 |
| 850.0 | 4.9 |
| 900.0 | 5.0 |
| 950.0 | 5.1 |
| 1000.0 | 5.4 |



10.2 Correction factor for RF CABLE for Semi Anechoic Chamber
ITL # 1841

| FREQ (MHz) | LOSS (dB) |
|------------|-----------|
| 1000.0 | 1.5 |
| 2000.0 | 2.1 |
| 3000.0 | 2.7 |
| 4000.0 | 3.1 |
| 5000.0 | 3.5 |
| 6000.0 | 4.1 |
| 7000.0 | 4.6 |
| 8000.0 | 4.9 |
| 9000.0 | 5.7 |
| 10000.0 | 5.7 |
| 11000.0 | 6.1 |
| 12000.0 | 6.1 |
| 13000.0 | 6.2 |
| 14000.0 | 6.7 |
| 15000.0 | 7.4 |
| 16000.0 | 7.5 |
| 17000.0 | 7.9 |
| 18000.0 | 8.1 |
| 19000.0 | 8.8 |
| 20000.0 | 9.1 |

NOTES:

- 1. The cable is manufactured by Commscope*
- 2. The cable type is 0623 WBC-400, serial # G020132 and 10m long*



11.3 Correction factors for Active Loop Antenna
Model 6502 S/N 9506-2950
ITL # 1075:

| f(MHz) | MAF(dBs/m) | AF(dB/m) |
|--------|------------|----------|
| 0.01 | -33.1 | 18.4 |
| 0.02 | -37.2 | 14.3 |
| 0.03 | -38.2 | 13.3 |
| 0.05 | -39.8 | 11.7 |
| 0.1 | -40.1 | 11.4 |
| 0.2 | -40.3 | 11.2 |
| 0.3 | -40.3 | 11.2 |
| 0.5 | -40.3 | 11.2 |
| 0.7 | -40.3 | 11.2 |
| 1 | -40.1 | 11.4 |
| 2 | -40 | 11.5 |
| 3 | -40 | 11.5 |
| 4 | -40.1 | 11.4 |
| 5 | -40.2 | 11.3 |
| 6 | -40.4 | 11.1 |
| 7 | -40.4 | 11.1 |
| 8 | -40.4 | 11.1 |
| 9 | -40.5 | 11 |
| 10 | -40.5 | 11 |
| 20 | -41.5 | 10 |
| 30 | -43.5 | 8 |



11.4 Correction factors for biconical antenna – ITL # 1356

Model: EMCO 3110B

Serial No.:9912-3337

| Frequency | ITL 1356 AF |
|------------------|--------------------|
| [MHz] | [dB/m] |
| 30 | 13.00 |
| 35 | 10.89 |
| 40 | 10.59 |
| 45 | 10.63 |
| 50 | 10.12 |
| 60 | 9.26 |
| 70 | 7.74 |
| 80 | 6.63 |
| 90 | 8.23 |
| 100 | 11.12 |
| 120 | 13.16 |
| 140 | 13.07 |
| 160 | 14.80 |
| 180 | 16.95 |
| 200 | 17.17 |



11.5 Correction factors for log periodic antenna – ITL # 1349
Model: EMCO 3146
Serial No.:9505-4081

| Frequency | ITL 1349 AF |
|------------------|--------------------|
| [MHz] | [dB/m] |
| 200 | 11.58 |
| 250 | 12.04 |
| 300 | 14.76 |
| 400 | 15.55 |
| 500 | 17.85 |
| 600 | 18.66 |
| 700 | 20.87 |
| 800 | 21.15 |
| 900 | 22.32 |
| 1000 | 24.22 |



11.6 Correction factors for Double –Ridged Waveguide Horn ANTENNA

Model: 3115
Serial number:29845
3 meter range; ITL # 1352

| FREQUENCY | AFE | FREQUENCY | AFE |
|------------------|---------------|------------------|---------------|
| (GHz) | (dB/m) | (GHz) | (dB/m) |
| 0.75 | 25 | 9.5 | 38 |
| 1.0 | 23.5 | 10.0 | 38.5 |
| 1.5 | 26.0 | 10.5 | 38.5 |
| 2.0 | 29.0 | 11.0 | 38.5 |
| 2.5 | 27.5 | 11.5 | 38.5 |
| 3.0 | 30.0 | 12.0 | 38.0 |
| 3.5 | 31.5 | 12.5 | 38.5 |
| 4.0 | 32.5 | 13.0 | 40.0 |
| 4.5 | 32.5 | 13.5 | 41.0 |
| 5.0 | 33.0 | 14.0 | 40.0 |
| 5.5 | 35.0 | 14.5 | 39.0 |
| 6.0 | 36.5 | 15.0 | 38.0 |
| 6.5 | 36.5 | 15.5 | 37.5 |
| 7.0 | 37.5 | 16.0 | 37.5 |
| 7.5 | 37.5 | 16.5 | 39.0 |
| 8.0 | 37.5 | 17.0 | 40.0 |
| 8.5 | 38.0 | 17.5 | 42.0 |
| 9.0 | 37.5 | 18.0 | 42.5 |