

Shenzhen Toby Technology Co., Ltd.

Report No.: TB-FCC141574

Page: 1 of 75

FCC Radio Test Report FCC ID: XMF-MID1008

Original Grant

Report No. : TB-FCC141574

Applicant: Lightcomm Technology Co., Ltd.

Equipment Under Test (EUT)

EUT Name : MID

Model No. : MID1008-L
Series Model : DL1010Q

No.

Brand Name : N/A

Receipt Date : 2014-08-11

Test Date : 2014-08-12 to 2014-08-22

Issue Date : 2014-08-26

Standards: FCC Part 15, Subpart C(15.247)

Test Method : ANSI C63.4:2003

Conclusions : PASS

In the configuration tested, the EUT complied with the standards specified above,

The EUT technically complies with the FCC requirements

Test/Witness Engineer :

Approved& Authorized :

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

TB-RF-074-1.0



Contents

| COI | NIENIS | |
|-----|--|----------|
| 1. | GENERAL INFORMATION ABOUT EUT | 4 |
| | 1.1 Client Information | ∠ |
| | 1.2 General Description of EUT (Equipment Under Test) | ∠ |
| | 1.3 Block Diagram Showing the Configuration of System Tested | |
| | 1.4 Description of Support Units | <i>.</i> |
| | 1.5 Description of Test Mode | <i>.</i> |
| | 1.6 Description of Test Software Setting | |
| | 1.7 Test Facility | 8 |
| 2. | TEST SUMMARY | 9 |
| 3. | CONDUCTED EMISSION TEST | 10 |
| | 3.1 Test Standard and Limit | 10 |
| | 3.2 Test Setup | |
| | 3.3 Test Procedure | |
| | 3.4 Test Equipment Used | 11 |
| | 3.5 EUT Operating Mode | 11 |
| | 3.6 Test Data | 11 |
| 4. | RADIATED EMISSION TEST | 14 |
| | 4.1 Test Standard and Limit | 14 |
| | 4.2 Test Setup | 15 |
| | 4.3 Test Procedure | |
| | 4.4 EUT Operating Condition | 16 |
| | 4.5 Test Equipment | 17 |
| 5. | RESTRICTED BANDS REQUIREMENT | 32 |
| | 5.1 Test Standard and Limit | 32 |
| | 5.2 Test Setup | 32 |
| | 5.3 Test Procedure | |
| | 5.4 EUT Operating Condition | 33 |
| | 5.5 Test Equipment | 33 |
| 6. | NUMBER OF HOPPING CHANNEL | 46 |
| | 6.1 Test Standard and Limit | 46 |
| | 6.2 Test Setup | |
| | 6.3 Test Procedure | 46 |
| | 6.4 EUT Operating Condition | 46 |
| | 6.5 Test Equipment | 46 |
| | 6.6 Test Data | 46 |
| 7. | AVERAGE TIME OF OCCUPANCY | 48 |
| | 7.1 Test Standard and Limit | |
| | 7.2 Test Setup | |
| | 7.3 Test Procedure | |
| | | |



Page: 3 of 75

| | 7.4 EUT Operating Condition | 48 |
|-----|---------------------------------------|----|
| | 7.5 Test Equipment | 48 |
| | 7.6 Test Data | 49 |
| 8. | CHANNEL SEPARATION AND BANDWIDTH TEST | 61 |
| | 8.1 Test Standard and Limit | 61 |
| | 8.2 Test Setup | 61 |
| | 8.3 Test Procedure | |
| | 8.4 EUT Operating Condition | 61 |
| | 8.5 Test Equipment | 62 |
| | 8.6 Test Data | 62 |
| 9. | PEAK OUTPUT POWER TEST | 70 |
| | 9.1 Test Standard and Limit | 70 |
| | 9.2 Test Setup | 70 |
| | 9.3 Test Procedure | 70 |
| | 9.4 EUT Operating Condition | 70 |
| | 9.5 Test Equipment | 70 |
| | 9.6 Test Data | 70 |
| 10. | ANTENNA REQUIREMENT | 75 |
| | 10.1 Standard Requirement | 75 |
| | 10.2 Antenna Connected Construction | |
| | 10.3 Result | 75 |



Page: 4 of 75

1. General Information about EUT

1.1 Client Information

Applicant: Lightcomm Technology Co., Ltd.

Address: RM 1708-10, 17/F, PROSPERITY CENTRE, 25 CHONG YIP

STREET, KWUN TONG, KOWLOON, HONG KONG

Manufacturer: Huizhou Hengdu Electronics Co., Ltd.

Address : DIP South Area, Huiao Highway, Huizhou, Guangdong, China

1.2 General Description of EUT (Equipment Under Test)

| | 1 | | |
|---|--|---|--|
| : | MID | | |
| : | MID1008-L, DL1010Q | | |
| : | All the other models are iden | tical in the same PCB layout, interior structure | |
| | and electrical circuits, The o | nly difference is model name for commercial | |
| | purpose. | | |
| | Operation Frequency: | | |
| | Bluetooth:2402~2480MHz | | |
| | Number of Channel: | Bluetooth:79 Channels see note (2) | |
| ŀ | Max Peak Output Power: | GFSK: 2.918 dBm (Conducted Power) | |
| | Antenna Gain: 0 dBi FPC Antenna | | |
| | Modulation Type: | GFSK 1Mbps(1 Mbps) | |
| | π /4-DQPSK(2 Mbps) | | |
| | 8-DPSK(3 Mbps) | | |
| : | DC power supplied by AC/DC Adapter | | |
| | DC Voltage supplied from | Li-Polymer battery. | |
| : | USB DC 5V form PC. | | |
| | AC/DC Adapter(TEKA012-0502000UK): | | |
| | Input: AC 100~240V 50/60Hz 0.35A Max. Output: DC 5V 2.0A | | |
| | DC 3.7V 5000mAh from Li-Polymer battery | | |
| : | The equipent have USB port for link with PC, so the equipment is | | |
| | considered as a Computing Device Peripheral. | | |
| | Please refer to the User's I | Manual | |
| | : | MID1008-L, DL1010Q All the other models are iden and electrical circuits, The opurpose. Operation Frequency: Bluetooth:2402~2480MHz Number of Channel: Max Peak Output Power: | |

Note: The equipment with Bluetooth and Wifi(802.11b/g/n) function, WiFi(802.11b/g/n) have test comply with FCC Part 15C Rules. More detailed features description, please refer to the manufacturer's specifications or the User's Manual.

Note:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) This Test Report is FCC Part 15.247 for Bluetooth, and test procedure in accordance with



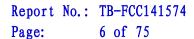
Page: 5 of 75

Public Notice: DA 00-705.

(3) Channel List:

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|---------|-----------|
| | (MHz) | | (MHz) | | (MHz) |
| 00 | 2402 | 27 | 2429 | 54 | 2456 |
| 01 | 2403 | 28 | 2430 | 55 | 2457 |
| 02 | 2404 | 29 | 2431 | 56 | 2458 |
| 03 | 2405 | 30 | 2432 | 57 | 2459 |
| 04 | 2406 | 31 | 2433 | 58 | 2460 |
| 05 | 2407 | 32 | 2434 | 59 | 2461 |
| 06 | 2408 | 33 | 2435 | 60 | 2462 |
| 07 | 2409 | 34 | 2436 | 61 | 2463 |
| 08 | 2410 | 35 | 2437 | 62 | 2464 |
| 09 | 2411 | 36 | 2438 | 63 | 2465 |
| 10 | 2412 | 37 | 2439 | 64 | 2466 |
| 11 | 2413 | 38 | 2440 | 65 | 2467 |
| 12 | 2414 | 39 | 2441 | 66 | 2468 |
| 13 | 2415 | 40 | 2442 | 67 | 2469 |
| 14 | 2416 | 41 | 2443 | 68 | 2470 |
| 15 | 2417 | 42 | 2444 | 69 | 2471 |
| 16 | 2418 | 43 | 2445 | 70 | 2472 |
| 17 | 2419 | 44 | 2446 | 71 | 2473 |
| 18 | 2420 | 45 | 2447 | 72 | 2474 |
| 19 | 2421 | 46 | 2448 | 73 | 2475 |
| 20 | 2422 | 47 | 2449 | 74 | 2476 |
| 21 | 2423 | 48 | 2450 | 75 | 2477 |
| 22 | 2424 | 49 | 2451 | 76 | 2478 |
| 23 | 2425 | 50 | 2452 | 77 | 2479 |
| 24 | 2426 | 51 | 2453 | 78 | 2480 |
| 25 | 2427 | 52 | 2454 | | |
| 26 | 2428 | 53 | 2455 | | |

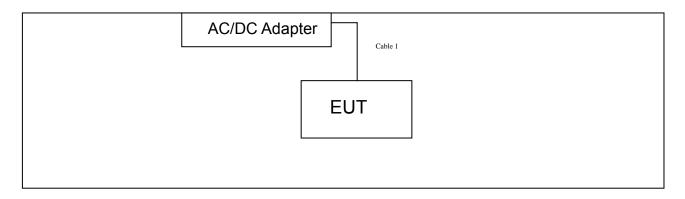
⁽⁴⁾ The Antenna information about the equipment is provided by the applicant.





1.3 Block Diagram Showing the Configuration of System Tested

TX Mode



1.4 Description of Support Units

| Equipment Information | | | | | | | | |
|---|---|--|--|-------------|--|--|--|--|
| Name Model FCC ID/DOC Manufacturer Used "√" | | | | | | | | |
| | | | | | | | | |
| | Cable Information | | | | | | | |
| Number | Number Shielded Type Ferrite Core Length Note | | | | | | | |
| Cable 1 No No 1.0M AC | | | | Accessories | | | | |

1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

| For Conducted Test | | |
|-----------------------------|----------------------------|--|
| Final Test Mode Description | | |
| Mode 1 | AC Charging with TX B Mode | |

| For Radiated Test | | | |
|-----------------------------|---------------------------------------|--|--|
| Final Test Mode Description | | | |
| Mode 1 | AC Charging with TX B Mode | | |
| Mode 2 | TX Mode(GFSK) Channel 00/39/78 | | |
| Mode 3 | TX Mode(π /4-DQPSK) Channel 00/39/78 | | |



Report No.: TB-FCC141574 Page: 7 of 75

| Mode 4 | TX Mode(8-DPSK) Channel 00/39/78 |
|--------|----------------------------------|
| Mode 5 | Hopping Mode(GFSK) |
| Mode 6 | Hopping Mode(π /4-DQPSK) |
| Mode 7 | Hopping Mode(8-DPSK) |

Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate. We have pretested all the test mode above.

According to ANSI C63.4 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

TX Mode: GFSK (1 Mbps)
TX Mode: 8-DPSK (3 Mbps)

(2) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis, X-plane, Y-plane and Z-plane. The worst case was found positioned on X-plane as the normal use. Therefore only the test data of this X-plane was used for radiated emission measurement test.

1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of Bluetooth mode.

| Test Software Version | Test Program: Test Program: MTK Engineer Mode Open. apk | | | |
|-----------------------|---|------------------|-----|--|
| Frequency | 2402 MHz | 2402 MHz 2441MHz | | |
| GFSK | DEF | DEF | DEF | |
| π /4-DQPSK | DEF | DEF | DEF | |
| 8-DPSK | DEF | DEF | DEF | |



Page: 8 of 75

1.7 Test Facility

The testing was performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at:

1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China.

At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.



Page: 9 of 75

2. Test Summary

| FCC Part 15 Subpart C(15.247) | | | | | |
|--|-------------------------------------|----------|--------|--|--|
| Standard Section Test Item | | Judgment | Remark | | |
| 15.203 | Antenna Requirement | PASS | N/A | | |
| 15.207 | Conducted Emission | PASS | N/A | | |
| 15.205 | Restricted Bands | PASS | N/A | | |
| 15.247(a)(1) | Hopping Channel Separation | PASS | N/A | | |
| 15.247(a)(1) | Dwell Time | PASS | N/A | | |
| 15.247(b)(1) | Peak Output Power | PASS | N/A | | |
| 15.247(b)(1) | Number of Hopping Frequency | PASS | N/A | | |
| 15.247(c) | Radiated Spurious Emission | PASS | N/A | | |
| 15.247(c) | Antenna Conducted Spurious Emission | PASS | N/A | | |
| 15.247(a) | 20dB Bandwidth | PASS | N/A | | |
| Note: N/A is an abbreviation for Not Applicable. | | | | | |



Page: 10 of 75

3. Conducted Emission Test

3.1 Test Standard and Limit

3.1.1Test Standard FCC Part 15.207

3.1.2 Test Limit

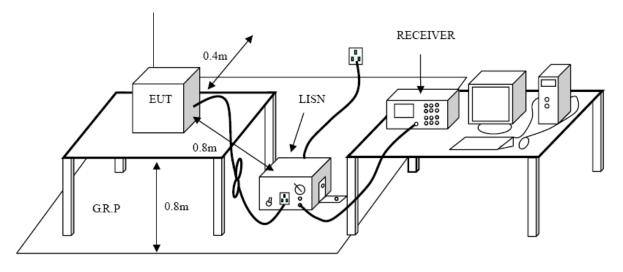
Conducted Emission Test Limit

| Fraguency | Maximum RF Line Voltage (dBμV) | | |
|---------------|--------------------------------|---------------|--|
| Frequency | Quasi-peak Level | Average Level | |
| 150kHz~500kHz | 66 ~ 56 * | 56 ~ 46 * | |
| 500kHz~5MHz | 56 | 46 | |
| 5MHz~30MHz | 60 | 50 | |

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3.2 Test Setup



3.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.



Report No.: TB-FCC141574 Page: 11 of 75

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

3.4 Test Equipment Used

| Description | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due Date |
|-------------|-----------------|-------------|------------|---------------|------------------|
| EMI Test | ROHDE& | | 400004 | Aug. 08, 2014 | Aug. 07, 2015 |
| Receiver | SCHWARZ | ESCI | 100321 | Aug. 00, 2014 | Aug. 07, 2015 |
| 50ΩCoaxial | Anritsu | MP59B | X10321 | Aug. 08, 2014 | Aug. 07, 2015 |
| Switch | Aiiiisu | MESSE | X10321 | Aug. 08, 2014 | Aug. 07, 2013 |
| L.I.S.N | Rohde & Schwarz | ENV216 | 101131 | Aug. 08, 2014 | Aug. 07, 2015 |
| L.I.S.N | SCHWARZBECK | NNBL 8226-2 | 8226-2/164 | Aug. 08, 2014 | Aug. 07, 2015 |

3.5 EUT Operating Mode

Please refer to the description of test mode.

3.6 Test Data

Please see the next page.



EUT: MID Model Name: MID1008-L 25 ℃ Temperature: **Relative Humidity:** 55% **Test Voltage:** AC 120V/60 Hz Terminal: Line **Test Mode:** AC Charging with TX GFSK Mode 2402 MHz Remark: Only worse case is reported 90.0 dBuV QP: AVG: 40 -10 0.5 0.150 (MHz) 30.000 Reading Correct Measure-Over No. Mk. Freq. Limit Level Factor ment MHz dBuV dΒ dBuV dBuV dΒ Detector Comment 1 0.4380 34.56 10.02 44.58 57.10 -12.52 QΡ 2 0.4380 15.72 10.02 25.74 47.10 -21.36 AVG 43.24 56.00 -12.76 QΡ 3 0.6580 33.14 10.10 0.6580 18.66 10.10 28.76 46.00 -17.24 AVG 4 32.79 42.86 56.00 -13.14 5 0.9460 10.07 QP 18.38 46.00 -17.55 6 0.9460 10.07 28.45 AVG 56.00 -12.95 1.1980 32.99 10.06 43.05 QΡ 7 18.23 10.06 28.29 46.00 -17.71 8 1.1980 AVG 9 2.5940 32.04 10.04 42.08 56.00 -13.92 QΡ 10 2.5940 20.36 10.04 30.40 46.00 -15.60 AVG 11 QΡ 3.3940 30.38 10.01 40.39 56.00 -15.61 3.3940 28.96 46.00 -17.04 **AVG** 12 18.95 10.01 *:Maximum data x:Over limit !:over margin



Page: 13 of 75

| EUT: | | MID | | Model | l Name : | | MID1008 | -L | |
|---|--|---|--|---|---|--|---|---------------------------|--|
| Temperat | ure: | 25 ℃ | | Relati | ve Humi | idity: | 55% | | |
| Test Volta | ige: | AC 120V/60 |) Hz | | | | | | |
| Terminal: | | Neutral | Neutral | | | | | | |
| Test Mode | est Mode: AC Charging with TX GFSK Mode 2402 MHz | | | | | | | | |
| Remark: | | Only worse | case is rep | orted | | | | | |
| 90.0 dBuV | | | | | | | | | |
| | | | | | | | QP: AVG: | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 7 | Ü | | | × | X. | | | | |
| 40 | $\Lambda \Lambda_{\star}$ | Man Man dil | Da Mila Alaz dida | NAME OF THE PARTY | MANANTONIA, J | 1 | | | |
| | 7 Y V 1,149 | KT TAMANIYA KANA | ייניין אוריוני י יוניף אין יין | ואָר אָיו | Mu | ١ | | | |
| M///h | J \ [\ | '\ | 111 - 111 | | | W | للنا أشريش أوعد | ultillia. | |
| V { | KDP1W MN | M/L1. 1 11 1 | 1.1.55 | المراضيا | البدلا | " MAN | h.vhythilidhfithill | MMMM) | |
| | <u> </u> | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | Machael Market Miller Color | ML / \ /*** | North March | 1.1.1.17 | | peal | |
| | IMI |] | Middle modeld | V W | W | WHILI | | | |
| ~ | O W V | O N I . | | | | · · · · · · | A. Aradhalladladladladlad | Anti-lian-in-liabilia VAC | |
| | | | | | | | | | |
| -10 | | | | | | | | | |
| 0.150 | | 0.5 | (MI | łz) | 5 | | | 30.000 | |
| | | | | | | | | | |
| | _ | Reading | Correct | Measure- | | 0 | | | |
| No. Mk. | | l. Level | Factor | ment | Limit | Over | | | |
| | MHz | l. Level | Factor dB | ment dBuV | Limit dBuV | dB | Detector | Commer | |
| 1 | MHz 0.3300 | dBuV 0 31.26 | Factor dB 10.08 | ment dBuV 41.34 | Limit dBu√ 59.45 | dB -18.11 | Detector | Commer | |
| 1 2 | 0.3300 | D Level dBuV 31.26 15.72 | Factor dB 10.08 10.08 | ment dBuV 41.34 25.80 | Limit dBuV 59.45 49.45 | dB -18.11 -23.65 | Detector QP AVG | Commer | |
| 1 | 0.3300 0.3300 0.4340 | Devel dBuV 0 31.26 0 15.72 0 27.35 | Factor dB 10.08 10.08 10.04 | ment dBuV 41.34 | dBuV 59.45 49.45 57.18 | dB -18.11 -23.65 -19.79 | QP AVG QP | Commer | |
| 1 2 3 4 | 0.3300 0.3300 0.4340 0.4340 | Devel dBuV 0 31.26 0 15.72 0 27.35 0 2.75 | Factor dB 10.08 10.08 10.04 10.04 | ment dBuV 41.34 25.80 37.39 12.79 | Limit dBuV 59.45 49.45 57.18 47.18 | dB -18.11 -23.65 -19.79 -34.39 | QP AVG QP AVG | Commer | |
| 1 2 3 | 0.3300 0.3300 0.4340 | Devel dBuV 0 31.26 0 15.72 0 27.35 0 2.75 | Factor dB 10.08 10.08 10.04 | ment dBuV 41.34 25.80 37.39 | Limit dBuV 59.45 49.45 57.18 47.18 | dB -18.11 -23.65 -19.79 | QP AVG QP | Commer | |
| 1 2 3 4 | 0.3300 0.3300 0.4340 0.4340 | Devel dBuV 0 31.26 0 15.72 0 27.35 0 26.42 | Factor dB 10.08 10.08 10.04 10.04 | ment dBuV 41.34 25.80 37.39 12.79 | Limit dBuV 59.45 49.45 57.18 47.18 56.00 | dB -18.11 -23.65 -19.79 -34.39 | QP AVG QP AVG | Commer | |
| 1 2 3 4 5 | 0.3300 0.3300 0.4340 0.4340 0.9180 | Devel dBuV 0 31.26 0 15.72 0 27.35 0 26.42 0 4.04 | Factor dB 10.08 10.08 10.04 10.04 10.12 | ment dBuV 41.34 25.80 37.39 12.79 36.54 | Limit dBuV 59.45 49.45 57.18 47.18 56.00 46.00 | dB -18.11 -23.65 -19.79 -34.39 -19.46 | QP AVG QP AVG QP | Commer | |
| 1 2 3 4 5 6 | 0.3300 0.3300 0.4340 0.4340 0.9180 | Devel dBuV 0 31.26 0 15.72 0 27.35 0 26.42 0 4.04 0 25.82 | Factor dB 10.08 10.08 10.04 10.04 10.12 10.12 | ment dBuV 41.34 25.80 37.39 12.79 36.54 14.16 | Limit dBuV 59.45 49.45 57.18 47.18 56.00 46.00 56.00 | dB -18.11 -23.65 -19.79 -34.39 -19.46 -31.84 | Detector QP AVG QP AVG QP AVG | Commer | |
| 1 2 3 4 5 6 7 | 0.3300 0.3300 0.4340 0.4340 0.9180 0.9180 | Devel dBuV 0 31.26 0 15.72 0 27.35 0 26.42 0 4.04 0 25.82 0 8.58 | Factor dB 10.08 10.08 10.04 10.04 10.12 10.12 10.13 | ment dBuV 41.34 25.80 37.39 12.79 36.54 14.16 35.95 | Limit dBuV 59.45 49.45 57.18 47.18 56.00 46.00 46.00 | dB -18.11 -23.65 -19.79 -34.39 -19.46 -31.84 -20.05 | QP AVG QP AVG QP AVG QP AVG | Commer | |
| 1 2 3 4 5 6 7 8 | 0.3300 0.3300 0.4340 0.4340 0.9180 0.9180 1.3380 | Devel dBuV 0 31.26 0 15.72 0 27.35 0 26.42 0 4.04 0 25.82 0 8.58 0 28.14 | Factor dB 10.08 10.08 10.04 10.04 10.12 10.12 10.13 10.13 | ment dBuV 41.34 25.80 37.39 12.79 36.54 14.16 35.95 18.71 | Limit dBuV 59.45 49.45 57.18 47.18 56.00 46.00 56.00 56.00 | dB -18.11 -23.65 -19.79 -34.39 -19.46 -31.84 -20.05 -27.29 | QP AVG QP AVG QP AVG AVG QP AVG | Commer | |
| 1 2 3 4 5 6 7 8 9 * | 0.3300 0.3300 0.4340 0.4340 0.9180 0.9180 1.3380 2.5140 | Devel dBuV 0 31.26 0 15.72 0 27.35 0 26.42 0 4.04 0 25.82 0 8.58 0 28.14 0 11.21 | Factor dB 10.08 10.08 10.04 10.04 10.12 10.12 10.13 10.13 10.06 | ment dBuV 41.34 25.80 37.39 12.79 36.54 14.16 35.95 18.71 38.20 | Limit dBuV 59.45 49.45 57.18 47.18 56.00 46.00 56.00 46.00 46.00 | dB -18.11 -23.65 -19.79 -34.39 -19.46 -31.84 -20.05 -27.29 -17.80 | Detector QP AVG QP AVG QP AVG QP AVG QP AVG | Commer | |
| 1 2 3 4 5 6 7 8 9 * | 0.3300 0.3300 0.4340 0.4340 0.9180 1.3380 1.3380 2.5140 | Devel dBuV 0 31.26 0 15.72 0 27.35 0 2.75 0 26.42 0 4.04 0 25.82 0 8.58 0 28.14 0 11.21 0 25.86 | Factor dB 10.08 10.08 10.04 10.04 10.12 10.12 10.13 10.13 10.06 10.06 | ment dBuV 41.34 25.80 37.39 12.79 36.54 14.16 35.95 18.71 38.20 21.27 | Limit dBuV 59.45 49.45 57.18 47.18 56.00 46.00 56.00 46.00 56.00 56.00 | dB -18.11 -23.65 -19.79 -34.39 -19.46 -31.84 -20.05 -27.29 -17.80 -24.73 | QP AVG QP AVG QP AVG QP AVG QP AVG QP AVG | Commer | |



Page: 14 of 75

4. Radiated Emission Test

4.1 Test Standard and Limit

4.1.1 Test Standard FCC Part 15.209

4.1.2 Test Limit

Radiated Emission Limit (9 kHz~1000MHz)

| Madiated Lillission Lillit (5 KHZ 1000MHZ) | | | | | | | |
|--|----------------------------------|----------------------------------|--|--|--|--|--|
| Frequency (MHz | Field Strength (microvolt/meter) | Measurement Distance (meters) | | | | | |
| 0.009~0.490 | 2400/F(KHz) | 300 | | | | | |
| 0.490~1.705 | 24000/F(KHz) | 30 | | | | | |
| 1.705~30.0 | 30 | 30 | | | | | |
| 30~88 | 100 | 3 | | | | | |
| 88~216 | 150 | 3 | | | | | |
| 216~960 | 200 | 3 | | | | | |
| Above 960 | 500 | 3 | | | | | |

Radiated Emission Limit (Above 1000MHz)

| Frequency | Class B (dBuV/m)(at 3m) | | | |
|------------|-------------------------|---------|--|--|
| (MHz) | Peak | Average | | |
| Above 1000 | 74 | 54 | | |

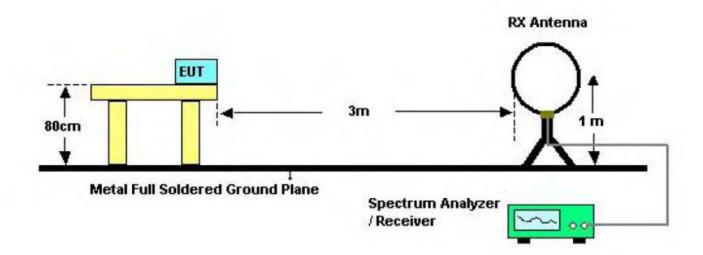
Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m)

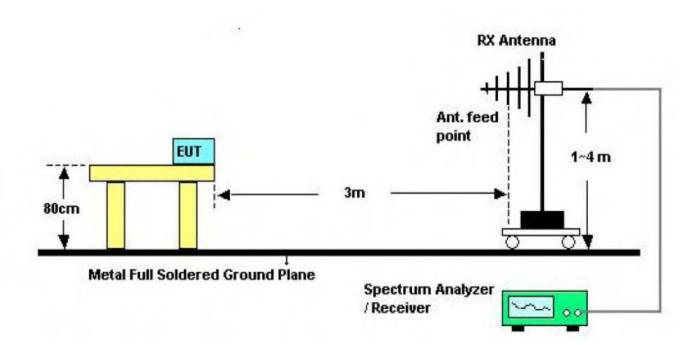


Page: 15 of 75

4.2 Test Setup



Bellow 30MHz Test Setup



Bellow 1000MHz Test Setup



Turntable

EUT

0.8 m lm to 4m

Coaxial Cable

Above 1GHz Test Setup

4.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above the ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (3) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (4) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (5) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (6) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (7) For the actual test configuration, please see the test setup photo.

4.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power in TX mode.



Page: 17 of 75

4.5 Test Equipment

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Due Date |
|---------------------------|-----------------|-----------|------------|---------------|------------------|
| Spectrum Analyzer | Agilent | E4407B | MY45106456 | Mar. 20, 2014 | Mar. 19, 2015 |
| Spectrum Analyzer | Rohde & Schwarz | FSP30 | DE25181 | Aug. 08, 2014 | Aug. 07, 2015 |
| EMI Test Receiver | Rohde & Schwarz | ESCI | 101165 | Aug. 08, 2014 | Aug. 07, 2015 |
| Bilog Antenna | ETS-LINDGREN | 3142E | 00117537 | Mar. 07, 2014 | Mar.06, 2015 |
| Horn Antenna | ETS-LINDGREN | 3117 | 00143207 | Mar. 07, 2014 | Mar.06, 2015 |
| Pre-amplifier | HP | 11909A | 185903 | Mar. 07, 2014 | Mar.06, 2015 |
| Pre-amplifier | HP | 8447B | 3008A00849 | Mar. 07, 2014 | Mar.06, 2015 |
| Cable | HUBER+SUHNER | 100 | SUCOFLEX | Mar. 07, 2014 | Mar.06, 2015 |
| Signal Generator | Rohde & Schwarz | SML03 | IKW682-054 | Feb. 11, 2014 | Feb.10, 2015 |
| Positioning Controller | ETS-LINDGREN | 2090 | N/A | N/A | N/A |

4.6 Test Data

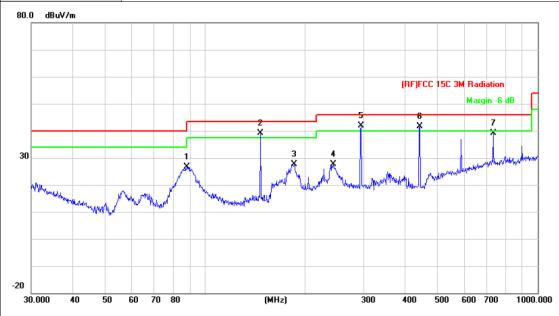
Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=1 KHz with Peak Detector for Average Values.

Test data please refer the following pages.



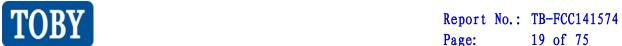
Page: 18 of 75

| EUT: | MID | Model Name : | MID1008-L | | | |
|---------------|-----------------------------|--------------------|-----------|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | |
| Test Voltage: | AC 120V/60 Hz | | | | | |
| Ant. Pol. | Horizontal | | | | | |
| Test Mode: | TX GFSK Mode 2402MH | z | | | | |
| Remark: | Only worse case is reported | | | | | |



| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure- ment | Limit | Over | |
|-----|-----|----------|------------------|-------------------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 88.0328 | 49.45 | -22.81 | 26.64 | 43.50 | -16.86 | peak |
| 2 | İ | 146.8876 | 60.50 | -21.42 | 39.08 | 43.50 | -4.42 | peak |
| 3 | | 185.1379 | 48.48 | -20.74 | 27.74 | 43.50 | -15.76 | peak |
| 4 | | 242.5252 | 46.08 | -18.47 | 27.61 | 46.00 | -18.39 | peak |
| 5 | * | 294.1136 | 59.11 | -17.20 | 41.91 | 46.00 | -4.09 | peak |
| 6 | İ | 441.7425 | 54.16 | -12.61 | 41.55 | 46.00 | -4.45 | peak |
| 7 | | 734.4913 | 46.13 | -7.12 | 39.01 | 46.00 | -6.99 | peak |

^{*:}Maximum data x:Over limit !:over margin



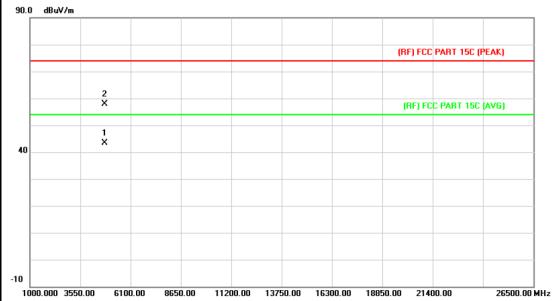
Page: 19 of 75

| | JT: MID | | | | | Model Name : | | | IV | MID1008-L | | | | | | | |
|-------------------------------------|--|---------------------------------------|-----------------------|---------|-----------------------------------|---|--|---------------------------|---|--|--------------------------|-------------------|--------|---------------------------|-------------|----------------------------|----------------|
| empe | rature: | 2 | 25 ° | С | | | | Re | elative Humidity: 55% | | | | | | | | |
| est Vo | oltage: | A | 4C 1 | 120\ | / /60 |) Hz | | | | | | | | | | | |
| nt. Po | ol. | ' | Vertical | | | | | | | | | | | | | | |
| est M | ode: | | TX G | SFS | ΚN | /lode | 2402MH | Ηz | | | | | | | | | |
| Remark: Only worse case is reported | | | | | | | | | | | | | | | | | |
| 80.0 dB | uV/m | | | | | | | | | | | | | | | | 1 |
| 30 | 1 8/4, 11/4 ^{1/4} / _{4/4} | ^~~ | <i></i> | Z X | | | 3 | | | 4 | | 5 X | 6 X | Margi | in -6 (| dB | |
| Martina | 1 - 90" | V.M | | | | Marson, | ML MAN W | Marriage | photos person person | White William | wholeway A | Net have | | | | | |
| 30.000 | | | GO 70 | R | | ding | Corre Fact | ect | Meas me | 300 Sure- | 40i | 0 5 | 500 E | 600 7 | 700 | 1000 | |
| 30.000 | 40 ! | 50 6 | ٦. | Re | ead | ding rel | (MH Corre | ect | Meas | 300 sure- nt | 400 | 0 5 | 500 E | | | 1000 | |
| 30.000 | 40 ! Mk. | Fred | q. : | R | ead Lev | ding rel | (MH Corre | ect | Meas me | 300 sure- nt //m | Lim dBu | o s | 500 E | ver | | | to |
| 30.000 No. | 40 ! Mk. | Fred MHz | q. : 58 | R: | ead Lev | ding rel | Corre Fact | ect or | Meas me | 300 sure- nt //m 36 | Lim dBu | o s nit | 500 6 | ver dB | [| Detec | to |
| 30.000 No. | Mk. 43 * 86 | Fred MHz 3.965 | 58 32 | Re L | ead Lev | ding rel uV 20 24 | Corre Fact dB/m | ect or 4 | Meas me dBu\ | 300 sure- nt //m 36 06 | Lim dBu 40. | o 5 nit N/m | 500 E | ver | 1 | Detec pea | to ak |
| 30.000 No. | Mk. 43 * 87 ! 14 | Fred MHz 3.968 | 58 32 376 | Ri L | ead Lev dBu 54.3 | ding rel 1V 20 24 25 | Corre Fact dB/m -21.8 | ect or 4 8 | Meas me dBu\ 32. | 300 sure- nt 36 06 83 | Lim dBu 40. 40. | 0 5 nit .00 | 500 E | dB 7.64 | 1 1 7 | Detec pea | to ak ak |
| No. 1 2 3 | Mk. 43 * 87 ! 14 ! 29 | Fred MHz 3.965 1.783 6.88 | 58 32 376 36 | Re L | ead Lev dBu 54.: 59.: | ding rel uV 20 24 25 65 | Corre Fact dB/m -21.8 -23.1 -21.4 | ect for 4 8 2 | Meas me dBu\ 32. 35. 37. | 300 sure- nt 36 06 83 45 | 400 400 400 430 | nit .00 .00 | | ver dB 7.64 4.94 | 1 1 7 5 | Detec pea pea pea | to ak ak |



Page: 20 of 75

| MID | Model Name : | MID1008-L | | | |
|--|--|---|--|--|--|
| 25 ℃ | Relative Humidity: | 55% | | | |
| AC 120V/60 Hz | | | | | |
| Horizontal | | | | | |
| TX GFSK Mode 2402MH | z | | | | |
| No report for the emission which more than 10 dB below the | | | | | |
| prescribed limit. | | | | | |
| | 25 °C AC 120V/60 Hz Horizontal TX GFSK Mode 2402MH No report for the emissio | 25 °C Relative Humidity: AC 120V/60 Hz Horizontal TX GFSK Mode 2402MHz No report for the emission which more than 10 co | | | |

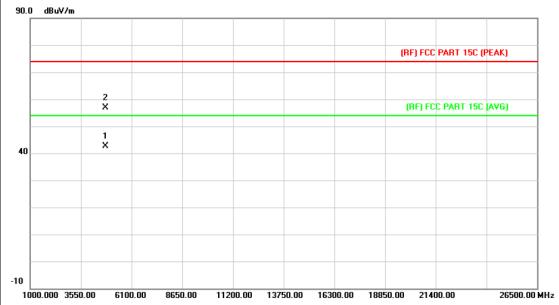


| No | . Mk | . Freq. | _ | Correct Factor | Measure- ment | Limit | Over | |
|----|------|----------|-------|-------------------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 4803.208 | 30.01 | 13.44 | 43.45 | 54.00 | -10.55 | AVG |
| 2 | | 4803.544 | 44.42 | 13.44 | 57.86 | 74.00 | -16.14 | peak |



Page: 21 of 75

| EUT: | MID | Model Name : | MID1008-L | | | |
|---------------|--|--------------------|-----------|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | |
| Test Voltage: | AC 120V/60 Hz | | | | | |
| Ant. Pol. | Vertical | | | | | |
| Test Mode: | TX GFSK Mode 2402MH | z | | | | |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. | | | | | |



| No | o. Mk | . Freq. | Reading Level | | Measure- ment | Limit | Over | |
|----|-------|----------|------------------|-------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 4803.214 | 29.25 | 13.44 | 42.69 | 54.00 | -11.31 | AVG |
| 2 | | 4803.365 | 43.54 | 13.44 | 56.98 | 74.00 | -17.02 | peak |



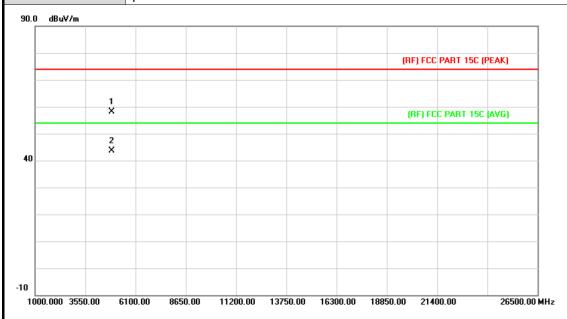
Report No.: TB-FCC141574
Page: 22 of 75

| EUT: | MID | Model Name : | MID1008-L |
|---------------|---------------|--------------------|-----------|
| Temperature: | 25 ℃ | Relative Humidity: | 55% |
| Test Voltage: | AC 120V/60 Hz | | |
| Ant. Pol. | Horizontal | | |

Test Mode: TX GFSK Mode 2441MHz

Remark: No report for the emission which more than 10 dB below the

prescribed limit.

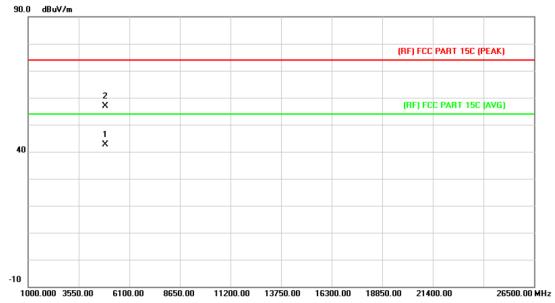


| No | . Mk | . Freq. | | Correct Factor | Measure- ment | Limit | Over | |
|----|------|----------|-------|-------------------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4881.654 | 44.31 | 13.90 | 58.21 | 74.00 | -15.79 | peak |
| 2 | * | 4881.954 | 29.78 | 13.90 | 43.68 | 54.00 | -10.32 | AVG |



Page: 23 of 75

| EUT: | MID | Model Name : | MID1008-L | | | | |
|---------------|--|--------------------|-----------|--|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | | |
| Test Voltage: | AC 120V/60 Hz | | | | | | |
| Ant. Pol. | Vertical | | | | | | |
| Test Mode: | TX GFSK Mode 2441MH | Z | | | | | |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. | | | | | | |
| | | | | | | | |

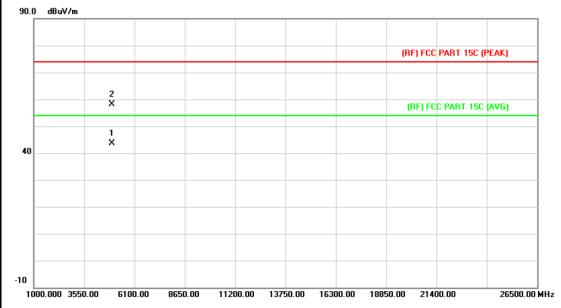


| N | o. Mk | . Freq. | Reading Level | | Measure- ment | Limit | Over | |
|---|-------|----------|------------------|-------|------------------|--------|--------|----------|
| | | MHz | dBu∀ | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 4881.324 | 28.77 | 13.90 | 42.67 | 54.00 | -11.33 | AVG |
| 2 | | 4881.647 | 43.07 | 13.90 | 56.97 | 74.00 | -17.03 | peak |



Page: 24 of 75

| EUT: | MID | Model Name : | MID1008-L | | | |
|---------------|--|--------------------|-----------|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | |
| Test Voltage: | AC 120V/60 Hz | | | | | |
| Ant. Pol. | Horizontal | | | | | |
| Test Mode: | TX GFSK Mode 2480MH | z | | | | |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. | | | | | |

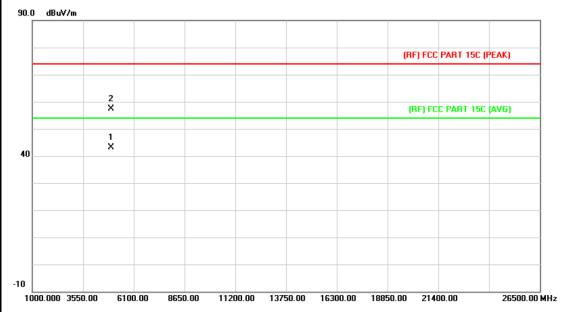


| 1 | Vo. | Mk. | Freq. | _ | Correct Factor | Measure- ment | Limit | Over | |
|---|-----|-----|----------|-------|-------------------|------------------|--------|--------|----------|
| | | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | * | 4959.324 | 29.26 | 14.36 | 43.62 | 54.00 | -10.38 | AVG |
| 2 | | | 4959.644 | 43.78 | 14.36 | 58.14 | 74.00 | -15.86 | peak |



Page: 25 of 75

| EUT: | MID | Model Name : | MID1008-L | | | |
|---------------|--|--------------------|-----------|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | |
| Test Voltage: | AC 120V/60 Hz | | | | | |
| Ant. Pol. | Vertical | | | | | |
| Test Mode: | TX GFSK Mode 2480MH | z | | | | |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. | | | | | |

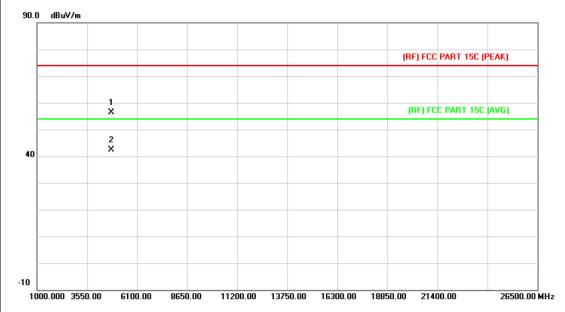


| No | o. Mk | . Freq. | | Correct Factor | Measure- ment | Limit | Over | |
|----|-------|----------|-------|-------------------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 4959.357 | 28.66 | 14.36 | 43.02 | 54.00 | -10.98 | AVG |
| 2 | | 4959.685 | 43.03 | 14.36 | 57.39 | 74.00 | -16.61 | peak |



Report No.: TB-FCC141574
Page: 26 of 75

| EUT: | MID | Model Name : | MID1008-L | | | |
|---------------|--|--------------------|-----------|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | |
| Test Voltage: | AC 120V/60 Hz | | | | | |
| Ant. Pol. | Horizontal | | | | | |
| Test Mode: | TX 8-DPSK Mode 2402N | 1Hz | | | | |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. | | | | | |

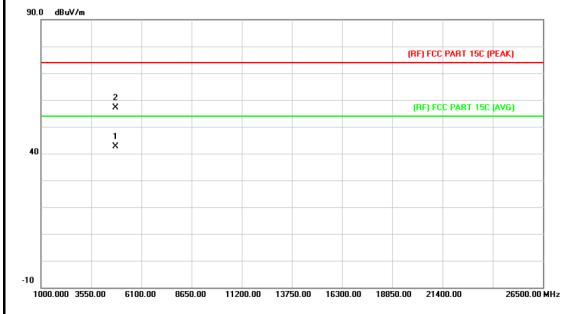


| No | . Mk | . Freq. | Reading Level | Correct Factor | Measure- ment | Limit | Over | |
|----|------|----------|------------------|-------------------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4803.215 | 42.97 | 13.44 | 56.41 | 74.00 | -17.59 | peak |
| 2 | * | 4803.611 | 28.92 | 13.44 | 42.36 | 54.00 | -11.64 | AVG |



Report No.: TB-FCC141574
Page: 27 of 75

| EUT: | MID | Model Name : | MID1008-L | | | |
|---------------|--|--------------------|-----------|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | |
| Test Voltage: | AC 120V/60 Hz | | | | | |
| Ant. Pol. | Vertical | | | | | |
| Test Mode: | TX 8-DPSK Mode 2402N | 1Hz | | | | |
| Remark: | No report for the emission which more than 10 dB below the prescribed limit. | | | | | |

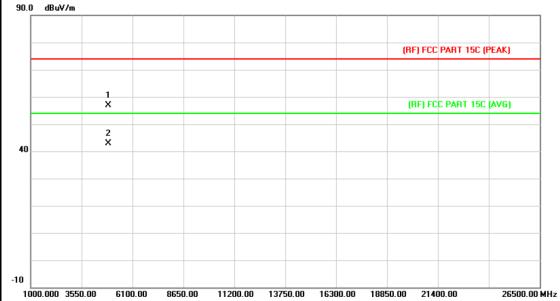


| No | o. Mk | . Freq. | _ | Correct Factor | Measure- ment | Limit | Over | |
|----|-------|----------|-------|-------------------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 4803.465 | 29.25 | 13.44 | 42.69 | 54.00 | -11.31 | AVG |
| 2 | | 4803.675 | 43.66 | 13.44 | 57.10 | 74.00 | -16.90 | peak |



Page: 28 of 75

| EUT: | MID | Model Name : | MID1008-L | | | |
|---------------|--|--------------------|-----------|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | |
| Test Voltage: | AC 120V/60 Hz | | | | | |
| Ant. Pol. | Horizontal | | | | | |
| Test Mode: | TX 8-DPSK Mode 2441M | 1Hz | | | | |
| Remark: | No report for the emission which more than 10 dB below the | | | | | |
| | prescribed limit. | | | | | |

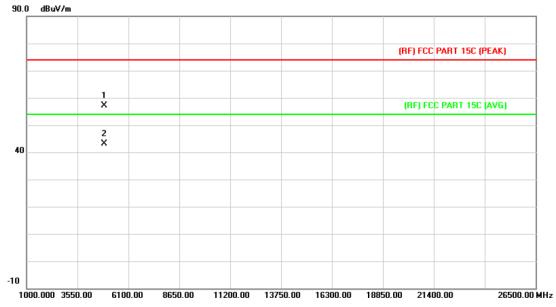


| No | . Mk | . Freq. | Reading Level | | Measure- ment | Limit | Over | |
|----|------|----------|------------------|-------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4881.457 | 42.88 | 13.90 | 56.78 | 74.00 | -17.22 | peak |
| 2 | * | 4881.914 | 29.07 | 13.90 | 42.97 | 54.00 | -11.03 | AVG |



Page: 29 of 75

| EUT: | MID | Model Name : | MID1008-L | | | | |
|---------------|-----------------------------|--------------------|-----------|--|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | | |
| Test Voltage: | Test Voltage: AC 120V/60 Hz | | | | | | |
| Ant. Pol. | Vertical | | | | | | |
| Test Mode: | TX 8-DPSK Mode 2441M | 1Hz | | | | | |
| Remark: | | | | | | | |
| | prescribed limit. | | | | | | |
| 00.0 ID 141 | 00 C ID 111 | | | | | | |

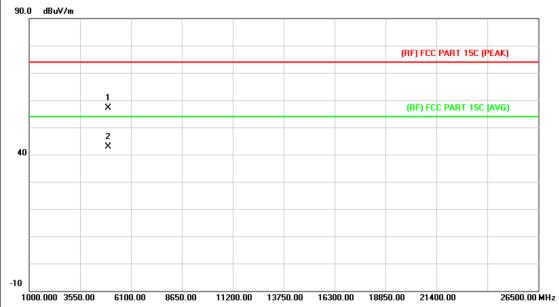


| No | . Mk | . Freq. | Reading Level | | Measure- ment | Limit | Over | |
|----|------|----------|------------------|-------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4881.356 | 43.28 | 13.90 | 57.18 | 74.00 | -16.82 | peak |
| 2 | * | 4881.546 | 29.22 | 13.90 | 43.12 | 54.00 | -10.88 | AVG |



Report No.: TB-FCC141574
Page: 30 of 75

| EUT: | MID | Model Name : | MID1008-L | | | |
|--|-----------------------------|--------------------|-----------|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | |
| Test Voltage: | Test Voltage: AC 120V/60 Hz | | | | | |
| Ant. Pol. | Horizontal | | | | | |
| Test Mode: | TX 8-DPSK Mode 2480N | 1Hz | | | | |
| Remark: No report for the emission which more than 10 dB below the prescribed limit. | | | | | | |
| | presented innit. | | | | | |

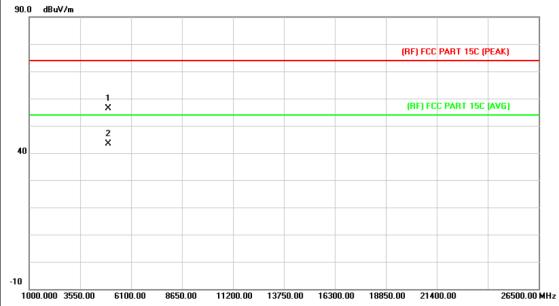


| No | . Mk. | Freq. | Reading Level | | Measure- ment | Limit | Over | |
|----|-------|----------|------------------|-------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4959.784 | 42.81 | 14.36 | 57.17 | 74.00 | -16.83 | peak |
| 2 | * | 4960.011 | 28.58 | 14.36 | 42.94 | 54.00 | -11.06 | AVG |



Page: 31 of 75

| EUT: | MID | Model Name : | MID1008-L | | | | |
|--|----------------------|--------------|-----------|--|--|--|--|
| Temperature: | emperature: 25 °C | | 55% | | | | |
| Test Voltage: | AC 120V/60 Hz | | | | | | |
| Ant. Pol. | Vertical | | | | | | |
| Test Mode: | TX 8-DPSK Mode 2480N | 1Hz | | | | | |
| Remark: No report for the emission which more than 10 dB below the prescribed limit. | | | | | | | |



| No | . Mk | . Freq. | Reading Level | Correct Factor | Measure- ment | Limit | Over | |
|----|------|----------|------------------|-------------------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4959.154 | 41.95 | 14.36 | 56.31 | 74.00 | -17.69 | peak |
| 2 | * | 4959.786 | 28.96 | 14.36 | 43.32 | 54.00 | -10.68 | AVG |



Page: 32 of 75

5. Restricted Bands Requirement

5.1 Test Standard and Limit

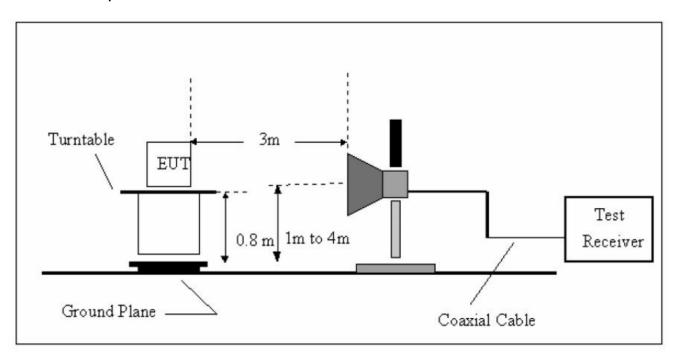
5.1.1 Test Standard FCC Part 15.209 FCC Part 15.205

5.1.2 Test Limit

| Class B (dBuV/m)(at 3m) | | | | |
|-------------------------|---------|--|--|--|
| Peak | Average | | | |
| 74 | 54 | | | |
| 74 | 54 | | | |
| | Peak 74 | | | |

Note: All restriction bands have been tested, only the worst case is reported.

5.2 Test Setup



5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (3) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked



Report No.: TB-FCC141574 Page: 33 of 75

and then Quasi Peak detector mode re-measured.

(4) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.

- (5) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (6) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (7) For the actual test configuration, please see the test setup photo.

5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Equipment

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Due Date |
|---------------------------|------------------|-----------|------------|---------------|------------------|
| Spectrum Analyzer | Agilent | E4407B | MY45106456 | Mar. 20, 2014 | Mar. 19, 2015 |
| Spectrum Analyzer | Rohde & Schwarz | FSP30 | DE25181 | Aug. 08, 2014 | Aug. 07, 2015 |
| EMI Test Receiver | Rohde & Schwarz | ESCI | 101165 | Aug. 08, 2014 | Aug. 07, 2015 |
| Bilog Antenna | ETS-LINDGREN | 3142E | 00117537 | Mar. 07, 2014 | Mar.06, 2015 |
| Horn Antenna | ETS-LINDGREN | 3117 | 00143207 | Mar. 07, 2014 | Mar.06, 2015 |
| Pre-amplifier | HP | 11909A | 185903 | Mar. 07, 2014 | Mar.06, 2015 |
| Pre-amplifier | HP | 8447B | 3008A00849 | Mar. 07, 2014 | Mar.06, 2015 |
| Cable | HUBER+SUHNE R | 100 | SUCOFLEX | Mar. 07, 2014 | Mar.06, 2015 |
| Signal Generator | Rohde & Schwarz | SML03 | IKW682-054 | Feb. 11, 2014 | Feb.10, 2015 |
| Positioning Controller | ETS-LINDGREN | 2090 | N/A | N/A | N/A |

5.6 Test Data

All restriction bands have been tested, only the worst case is reported.

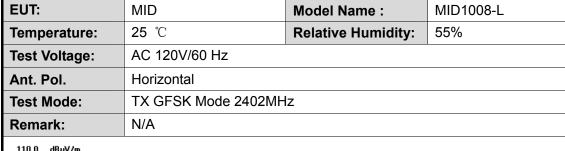
Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=1 KHz with Peak Detector for Average Values.

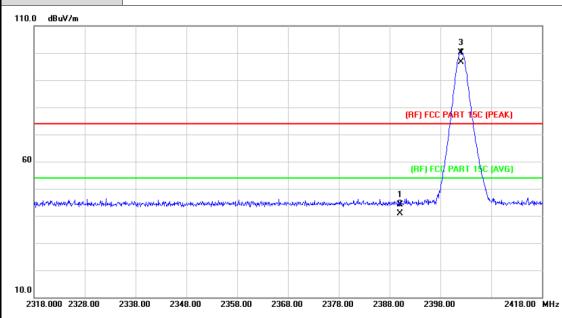
Test data please refer the following pages.



Page: 34 of 75

(1) Radiation Test



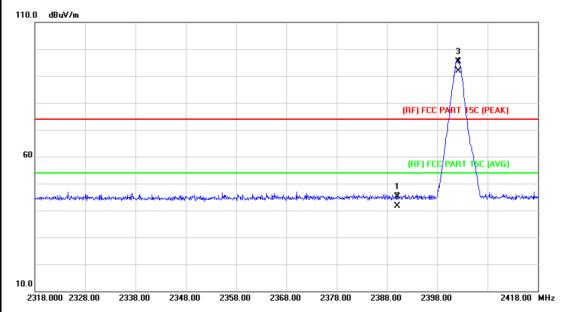


| No | . Mk | . Freq. | Reading Level | Correct Factor | Measure- ment | Limit | Over | |
|----|------|----------|------------------|-------------------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2390.000 | 43.43 | 0.77 | 44.20 | 74.00 | -29.80 | peak |
| 2 | | 2390.000 | 39.99 | 0.77 | 40.76 | 54.00 | -13.24 | AVG |
| 3 | Χ | 2402.100 | 99.34 | 0.82 | 100.16 | 74.00 | 26.16 | peak |
| 4 | * | 2402.100 | 95.90 | 0.82 | 96.72 | 54.00 | 42.72 | AVG |



Page: 35 of 75

| EUT: | MID | MID Model Name : | | | | |
|-----------------------------|---------------------|------------------|--|--|--|--|
| Temperature: | 25 ℃ | 55% | | | | |
| Test Voltage: AC 120V/60 Hz | | | | | | |
| Ant. Pol. | Vertical | | | | | |
| Test Mode: | TX GFSK Mode 2402MF | z | | | | |
| Remark: | N/A | | | | | |
| 110.0 dBuV/m | | | | | | |
| | | | | | | |

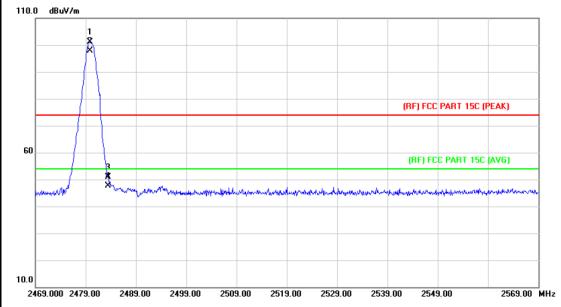


| Ν | 10. l | Mk. | Freq. | Reading Level | Correct Factor | Measure- ment | Limit | Over | |
|---|-------|-----|----------|------------------|-------------------|------------------|--------|--------|----------|
| | | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | | 2390.000 | 44.31 | 0.77 | 45.08 | 74.00 | -28.92 | peak |
| 2 | | | 2390.000 | 40.87 | 0.77 | 41.64 | 54.00 | -12.36 | AVG |
| 3 | > | X | 2402.200 | 94.61 | 0.82 | 95.43 | 74.00 | 21.43 | peak |
| 4 | * | ŀ | 2402.200 | 91.17 | 0.82 | 91.99 | 54.00 | 37.99 | AVG |



Page: 36 of 75

| EUT: | MID | Model Name : | | | | | | | |
|---------------|-----------------------|--------------------|-----|--|--|--|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | | | | |
| Test Voltage: | AC 120V/60 Hz | | | | | | | | |
| Ant. Pol. | Horizontal | | | | | | | | |
| Test Mode: | TX GFSK Mode 2480 MHz | | | | | | | | |
| Remark: | Remark: N/A | | | | | | | | |
| 110.0 dBuV/m | | | | | | | | | |
| | | | | | | | | | |

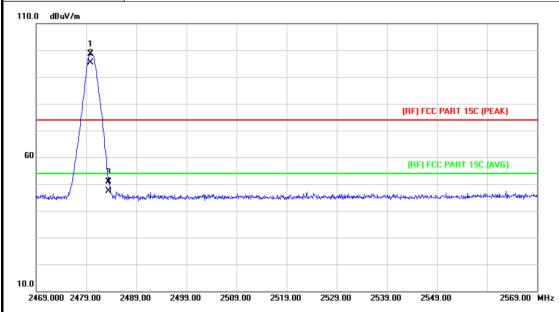


| No | o. Mk | . Freq. | Reading Level | Correct Factor | Measure- ment | Limit | Over | |
|----|-------|----------|------------------|-------------------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | Χ | 2479.800 | 100.05 | 1.15 | 101.20 | 74.00 | 27.20 | peak |
| 2 | * | 2479.800 | 96.61 | 1.15 | 97.76 | 54.00 | 43.76 | AVG |
| 3 | | 2483.500 | 49.83 | 1.17 | 51.00 | 74.00 | -23.00 | peak |
| 4 | | 2483.500 | 46.39 | 1.17 | 47.56 | 54.00 | -6.44 | AVG |



Page: 37 of 75

| EUT: | MID | Model Name : | MID1008-L | | |
|---------------|-----------------------|--------------------|-----------|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | |
| Test Voltage: | AC 120V/60 Hz | | | | |
| Ant. Pol. | Vertical | | | | |
| Test Mode: | TX GFSK Mode 2480 MHz | | | | |
| Remark: | N/A | | | | |



| No | . Mk | . Freq. | Reading Level | Correct Factor | Measure- ment | Limit | Over | |
|----|------|----------|------------------|-------------------|------------------|--------|--------|----------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | Χ | 2479.900 | 97.58 | 1.15 | 98.73 | 74.00 | 24.73 | peak |
| 2 | * | 2479.900 | 94.14 | 1.15 | 95.29 | 54.00 | 41.29 | AVG |
| 3 | | 2483.500 | 49.66 | 1.17 | 50.83 | 74.00 | -23.17 | peak |
| 4 | | 2483.500 | 46.22 | 1.17 | 47.39 | 54.00 | -6.61 | AVG |



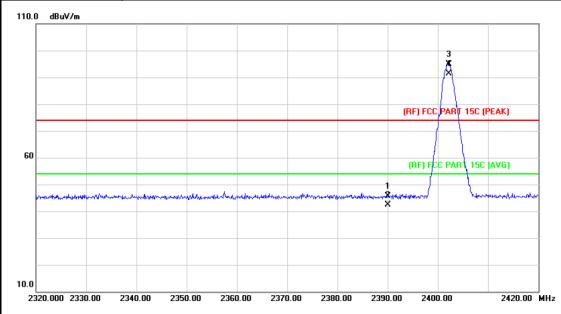
Page: 38 of 75

| est \ \nt. I | oeratur Voltag | e: | 25 °(| ~ | MID Model Name : | | | | | | | | |
|-----------------|------------------------|-------------|-------------------------|--|------------------|----------------------------|-----------|-----------|-----------------------|-----------|--------|------------|-----------------------|
| Ant. I | Voltage | | | | | | | ative | e Humi | dity: | 55% | 6 | |
| | · oitag | e: | AC 1 | 20V/60 | Hz | | | | | | | | |
| est I | Pol. | | Horiz | zontal | | | | | | | | | |
| | Mode: | | TX 8 | -DPSK I | Mode | 2402N | lHz | | | | | | |
| Rema | ark: | | N/A | | | | | | | | | | |
| 110.0 | dBuV/m | | | | | | | | | | | | |
| | | | | | | | | | | | 3 | | |
| | | | | | | | | | | | Å | | |
| | | | | | | | | | | | /\ | | |
| | | | | | | | | | | (RF) F | CC PAR | 15C (PEAI | K) |
| | | | | | | | | | | | 1 | | |
| 60 | | | | | | | | | | (BE) | CC PA | RT\15C (AV | G) |
| | | | | | | | | | | | | | , |
| | ماجيد المديدية المديدة | woodbaarawa | passaghiliproduction po | والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع وا | a/Phablelhea/Ja | peddonidana ddilwywyna ywn | mark-dela | and mount | en market flight from | Xmm/mdd X | | morning | and phone of property |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 10.0 | | | | | | | | | | | | | |
| | 20.000 233 | 0.00 | 2340.00 | 2350.00 | 2360 | .00 237 | 0.00 | 2380 | .00 239 | 00.00 24 | 100.00 | | 2420.00 MH |
| | | | | | | | | | | | | | |
| | | | | Readi | ng | Corre | ct N | Иеа | sure- | | | | |
| No | o. Mk. | Fr | eq. | Leve | el | Facto | or | me | ent | Limit | | Over | |
| | | M | Hz | dBu∖ | / | dB/m | | dBı | uV/m | dBuV/ | m | dB | Detecto |
| 1 | | 2390 | .000 | 44.1 | 3 | 0.77 | | 44 | .90 | 74.0 | 0 | -29.10 | peak |
| 2 | | 2390 | .000 | 40.6 | 9 | 0.77 | | 41 | .46 | 54.0 | 0 | -12.54 | AVG |
| 3 | Х | 2402 | .300 | 99.6 | 6 | 0.82 | | 100 | 0.48 | 74.0 | 0 | 26.48 | peak |
| 4 | * | 2402 | .300 | 96.2 | 2 | 0.82 | | 97 | .04 | 54.0 | 0 | 43.04 | AVG |



Report No.: TB-FCC141574 Page: 39 of 75

| EUT: | MID | Model Name : | MID1008-L | | | | |
|---------------|----------------------|--------------------|-----------|--|--|--|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | | |
| Test Voltage: | AC 120V/60 Hz | AC 120V/60 Hz | | | | | |
| Ant. Pol. | Vertical | | | | | | |
| Test Mode: | TX 8-DPSK Mode 2402N | 1Hz | | | | | |
| Remark: | N/A | | | | | | |
| 4400 10 111 | | | | | | | |



| No | . Mk | . Freq. | Reading Level | Correct Factor | Measure- ment | Limit | Over | |
|----|------|----------|------------------|-------------------|------------------|--------|--------|----------|
| | | MHz | dBu∀ | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2390.000 | 44.96 | 0.77 | 45.73 | 74.00 | -28.27 | peak |
| 2 | | 2390.000 | 41.52 | 0.77 | 42.29 | 54.00 | -11.71 | AVG |
| 3 | Χ | 2402.200 | 94.01 | 0.82 | 94.83 | 74.00 | 20.83 | peak |
| 4 | * | 2402.200 | 90.57 | 0.82 | 91.39 | 54.00 | 37.39 | AVG |



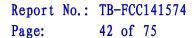
Page: 40 of 75

| UT: | | MID | | Model Name : | | | | | MID1008 | B-L | |
|-----------------|---|---------------|---------------------|----------------|--------------------------------|---------------------------|---|-------------------------|--------------------------|-----------|--------------------|
| emper | ature: | 25 °C | C | | F | Relativ | e Hum | idity: | 55% | | |
| est Vo | ltage: | AC 1 | 20V/60 | Hz | | | | | | | |
| nt. Po | l. | Horiz | zontal | | | | | | | | |
| est Mo | de: | TX 8 | -DPSK N | Vlode 2 | 480MH | Z | | | | | |
| emark | | N/A | | | | | | | | | |
| 110.0 dB | luV/m | | | | | | | | | | 7 |
| 60 | T W X X X X X X X X X X X X X X X X X X | ritari destro | -p-y-new de Argones | manufaccustram | worth for the form of the com- | ang gari pak magadi da da | -confected+0/18 ^N 19 ¹ ,2 | (RF) F | C PART 15C (P | | |
| 10.0 2469.00 | 0 2479.00 | 2489.00 | 2499.00 | 2509.00 | 2519.00 | 0 2529 | .00 25 | 39.00 254 | 9.00 | 2569.00 | МН |
| | | | | | | | | | | | |
| No. | Mk. F | req. | Readi Leve | _ | Correct Factor | | asure- ent | Limit | Ove | r | |
| No. | | req. 1Hz | | el | | m | | Limit dBuV/r | | r Dete | ecto |
| | N | • | Leve | el | Factor | m dB | ent | | n dB | Dete | |
| | N X 2479 | 1Hz | Leve dBu\ | el / / 3 | Factor _{dB/m} | m dB 10 | ent uV/m | dBuV/r | n dB) 26.1 | Dete | ector eak VG |
| 1 | X 2479 * 2479 | 1Hz 9.600 | dBu\ | 3 | Factor dB/m 1.15 | m dB 10 | ent uV/m 0.18 | dBuV/r 74.0 0 | m dB) 26.1) 42.7 | Dete | ak |



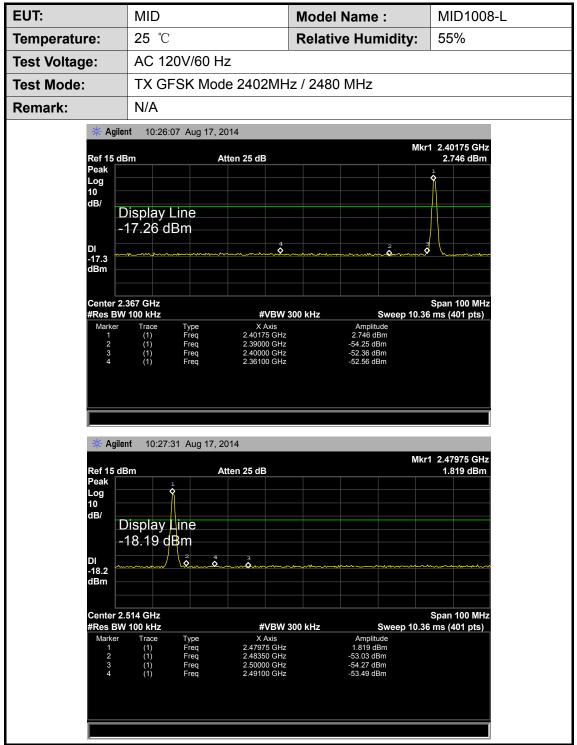
Page: 41 of 75

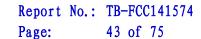
| EUT: | | MID | | M | odel Name : | N | MID1008-L | |
|------------------------|---------------------|-------------------------|--|-----------------------------------|---|--------------------------|------------------------|------------------|
| Temper | rature: | 25 ℃ | | Re | elative Humi | dity: 5 | 55% | |
| Test Vo | ltage: | AC 12 | 20V/60 Hz | | | | | |
| Ant. Po | ol. | Vertica | al | | | | | |
| Test Mo | ode: | TX 8-I | DPSK Mode | e 2480MHz | | | | |
| Remark | k: | N/A | | | | | | |
| 110.0 dE | BuV/m | | | | | | | |
| 60 | 1 X | | | | | | PART 15C (PEA | |
| 10.0 2469.00 | 00 2479.00 | 2489.00 | 2499.00 2509 | | 2529.00 253 | | | 2569.00 MH |
| 10.0 | 00 2479.00 | and the second second | | | | | | 2569.00 MH |
| 10.0 | 00 2479.00 Mk. F | 2489.00 | 2499.00 2509 Reading | 9.00 2519.00 Correct | 2529.00 253 Measure- | 39.00 254 | 9.00 Over | |
| 10.0 2469.00 | 00 2479.00 Mk. F | 2489.00 Freq. | 2499.00 2509 Reading Level | 2519.00 Correct Factor | 2529.00 253 Measure- ment | 39.00 2549 Limit | 9.00 Over | |
| 10.0 2469.00 No. | 00 2479.00 Mk. F | 2489.00 Freq. | Reading Level | 2519.00 Correct Factor dB/m | 2529.00 253 Measure- ment dBuV/m | 2549 Limit dBuV/m | 9.00 Over | Detector |
| 10.0 2469.00 No. | 00 2479.00 Mk. F | 2489.00 Freq. MHz | 2499.00 2509 Reading Level dBuV 96.71 | Correct Factor dB/m 1.15 | 2529.00 253 Measurement dBuV/m 97.86 | Limit dBuV/m 74.00 | Over dB 23.86 40.42 | Detector peak |





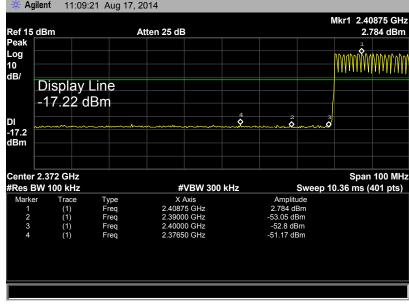
(2) Conducted Test

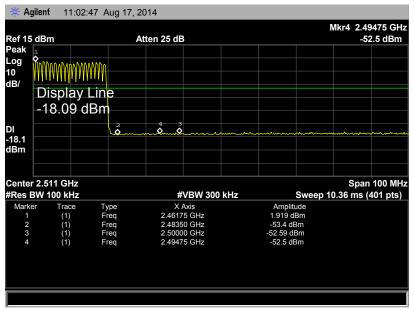


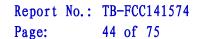




EUT: MID **Model Name:** MID1008-L 25 ℃ **Relative Humidity:** Temperature: 55% **Test Voltage:** AC 120V/60 Hz **Test Mode: GFSK Hopping Mode** Remark: N/A * Agilent 11:09:21 Aug 17, 2014 Mkr1 2.40875 GHz

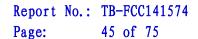








EUT: MID **Model Name:** MID1008-L 25 ℃ Temperature: **Relative Humidity:** 55% **Test Voltage:** AC 120V/60 HZ **Test Mode:** TX 8-DPSK Mode 2402MHz / 2480 MHz Remark: N/A * Agilent 10:24:40 Aug 17, 2014 Mkr1 2.40175 GHz Ref 15 dBm Peak Log 10 dB/ Atten 25 dB 1.937 dBm Display Line -18.07 dBm 2 **Q** -18.1 dBm Center 2.367 GHz #Res BW 100 kHz Span 100 MHz #VBW 300 kHz Sweep 10.36 ms (401 pts) X Axis 2.40175 GHz 2.39000 GHz 2.40000 GHz 2.35825 GHz Type Freq Freq Freq Freq Amplitude 1.937 dBm -53.09 dBm (1) (1) (1) (1) (1) Agilent 10:22:29 Aug 17, 2014 Mkr1 2.47975 GHz Ref 15 dBm Peak Atten 25 dB 0.976 dBm Log 10 dB/ Display Line -19.0<mark>2 d</mark>Bm 3 ♦ DI -19.0 dBm Center 2.518 GHz #Res BW 100 kHz Span 100 MHz **#VBW 300 kHz** Sweep 10.36 ms (401 pts) X Axis 2.47975 GHz 2.48350 GHz 2.50000 GHz 2.49050 GHz Amplitude 0.976 dBm -53.32 dBm -51.72 dBm -52.46 dBm Type Freq Freq Freq Freq (1) (1) (1) (1)





EUT: MID **Model Name:** MID1008-L 25 ℃ **Relative Humidity:** Temperature: 55% **Test Voltage:** AC 120V/60 HZ **Test Mode:** 8-DPSK Hopping Mode Remark: N/A * Agilent 10:53:06 Aug 17, 2014 Mkr1 2.41275 GHz Ref 15 dBm Peak Atten 25 dB 1.987 dBm Log 10 dB/ Display Line -18.02 dBm **4** 0 -18.0 dBm Center 2.372 GHz #Res BW 100 kHz Span 100 MHz #VBW 300 kHz Sweep 10.36 ms (401 pts) X Axis 2.41275 GHz 2.39000 GHz 2.40000 GHz 2.35750 GHz Amplitude 1.987 dBm -52.85 dBm -52.45 dBm -51.71 dBm Type Freq Freq Freq Freq (1) (1) (1) (1) (1) Agilent 10:57:22 Aug 17, 2014 Mkr1 2.46975 GHz 1.004 dBm Ref 15 dBm Peak Atten 25 dB MMMMMM Display Line Log 10 dB/ -19.00 dBm $\overset{4}{\diamond}$ DI -19.0 dBm Center 2.511 GHz #Res BW 100 kHz Span 100 MHz **#VBW 300 kHz** Sweep 10.36 ms (401 pts) X Axis 2.46975 GHz 2.48350 GHz 2.50000 GHz 2.49475 GHz Amplitude 1.004 dBm -52.85 dBm -53.2 dBm -52.17 dBm Type Freq Freq Freq Freq (1) (1) (1) (1)



Page: 46 of 75

6. Number of Hopping Channel

6.1 Test Standard and Limit

6.1.1 Test Standard FCC Part 15.247 (a)(1)

6.1.2 Test Limit

| Section | Test Item | Limit |
|---------|------------------------------|-------|
| 15.247 | Number of Hopping Channel | >15 |

6.2 Test Setup



6.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: RBW=100 KHz, VBW=100 KHz, Sweep time= Auto.

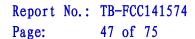
6.4 EUT Operating Condition

The EUT was set to the Hopping Mode by the Customer.

6.5 Test Equipment

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Due Date |
|----------------------|--------------|-----------|------------|---------------|------------------|
| Spectrum Analyzer | Agilent | E4407B | MY45106456 | Mar. 20, 2014 | Mar. 19, 2015 |

6.6 Test Data





EUT: MID Model: MID1008-L

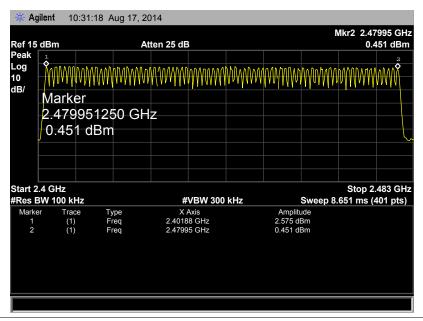
Temperature: 25 °C Relative Humidity: 55%

Test Voltage: AC 120V/60 HZ

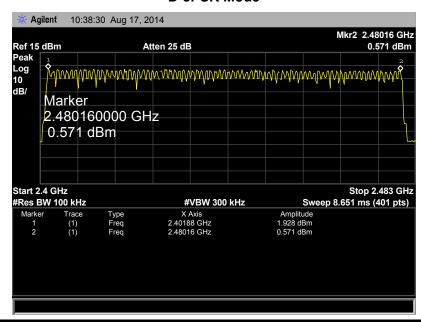
Test Mode: Hopping Mode (GFSK/ 8-DPSK)

| Frequency Range | Quantity of Hopping Channel | Limit |
|-----------------|--------------------------------|----------------|
| 2402MU2400MU- | 79 | >4 E |
| 2402MHz~2480MHz | 79 | >15 |

GFSK Mode



D-8PSK Mode





Page: 48 of 75

7. Average Time of Occupancy

7.1 Test Standard and Limit

5.1.1 Test Standard FCC Part 15.247 (a)(1)

5.1.2 Test Limit

| Section | Test Item | Limit |
|-----------------------|-----------------|---------|
| 15.247(a)(1)/ RSS-210 | Average Time of | 0.4.000 |
| Annex 8(A8.1d) | Occupancy | 0.4 sec |

7.2 Test Setup



7.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: RBW=1MHz, VBW=1MHz.
- (3) Use video trigger with the trigger level set to enable triggering only on full pulses.
- (4) Sweep Time is more than once pulse time.
- (5) Set the center frequency on any frequency would be measure and set the frequency span to zero.
- (6) Measure the maximum time duration of one single pulse.
- (7) Set the EUT for packet transmitting.
- (8) Measure the maximum time duration of one single pulse.

7.4 EUT Operating Condition

The EUT was set to the Hopping Mode by the Customer.

7.5 Test Equipment

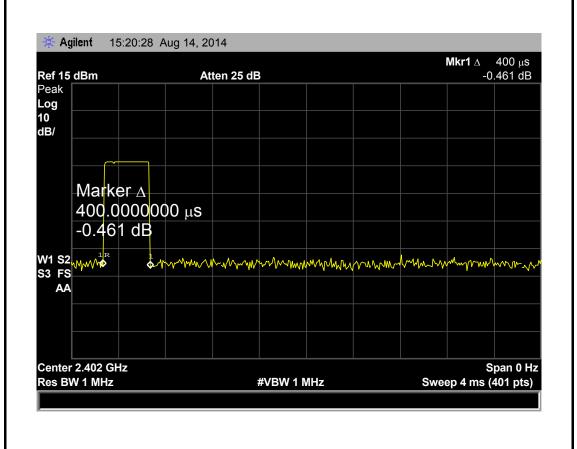
| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Due Date |
|----------------------|--------------|-----------|------------|---------------|------------------|
| Spectrum Analyzer | Agilent | E4407B | MY45106456 | Mar. 20, 2014 | Mar. 19, 2015 |

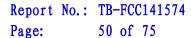


7.6 Test Data

| EUT: | | MID | | Model: | | MID10 | MID1008-L | |
|---------------|----|---------------|--------------|-------------------------------|-----|----------|-----------|--|
| Temperature: | 1 | 25 ℃ | | Relative Humidity: 55% | | | | |
| Test Voltage: | | AC 120V/60 HZ | | | | | | |
| Test Mode: | | Hopping I | Mode (GFSK D | H1) | | | | |
| Channel | Pu | Ise Time | Total of | Period Time | Lir | nit | Result | |
| (MHz) | | (ms) | Dwell (ms) | (s) | (m | ıs) | Result | |
| 2402 | | 0.400 | 128.00 | | | | | |
| 2441 | | 0.410 | 131.20 | 31.60 | 40 | 400 PASS | | |
| 2480 | | 0.410 | 131.20 | | | | | |

GFSK Hopping Mode DH1







GFSK Hopping Mode DH1 2441 MHz Agilent 15:21:33 Aug 14, 2014 Mkr1 Δ $410~\mu s$ 1.7 dB Ref 15 dBm Atten 25 dB Peak Log 10 dB/ Marker ∆ 410.0000000 μs 1.7 dB W1 S2 MMm Jush Jumm graper and many my lingle \$mymmmm S3 FS AA Center 2.441 GHz Span 0 Hz Res BW 1 MHz #VBW 1 MHz Sweep 4 ms (401 pts) **GFSK Hopping Mode DH1** 2480 MHz Agilent 15:22:25 Aug 14, 2014 **Mkr1** Δ 410 μ s -0.916 dB Ref 15 dBm Atten 25 dB Peak Log 10 dB/ Marker ∆

#VBW 1 MHz

410.0000000 μs

-0.916 dB

S3 FS AA

Center 2.48 GHz

Res BW 1 MHz

Span 0 Hz

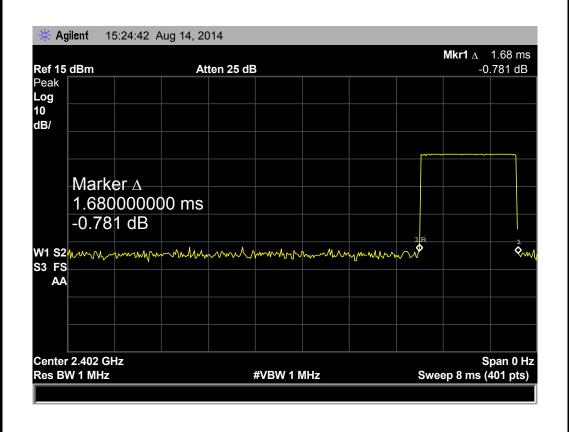
Sweep 4 ms (401 pts)

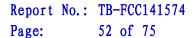


Page: 51 of 75

| EUT: | | MID | | Model: | Model: | | 08-L |
|---------------|----|------------------------------|--------------|-------------|--------|-----|--------|
| Temperature: | | 25 °C Relative Humidity: 55% | | | | | |
| Test Voltage: | | AC 120V/ | 60 HZ | | | | |
| Test Mode: | | Hopping I | Mode (GFSK D | H3) | | | |
| Channel | Pu | Ise Time | Total of | Period Time | Lir | nit | Result |
| (MHz) | | (ms) | Dwell (ms) | (s) | (ms) | | Result |
| 2402 | | 1.680 | 268.80 | | | | |
| 2441 | | 1.700 | 272.00 | 31.60 | 400 PA | | PASS |
| 2480 | | 1.680 | | | | | |
| | | | GFSK Hoppin | ng Mode DH3 | | | |

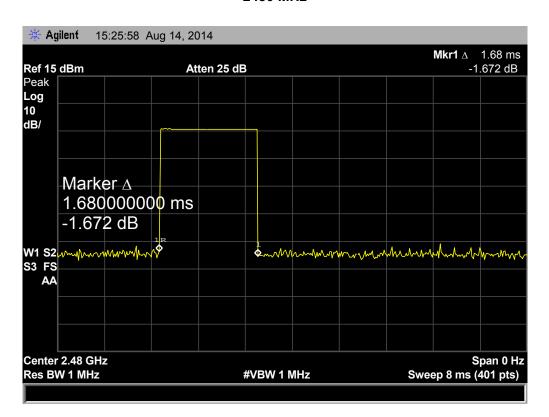
it Hopping Mode







GFSK Hopping Mode DH3 2441 MHz Agilent 15:25:26 Aug 14, 2014 Mkr1 Δ 1.7 ms -1.016 dB Ref 15 dBm Atten 25 dB Peak Log 10 dB/ Marker ∆ 1.700000000 ms -1.016 dB W1 S2 1 my my hours promount of the S3 FS AA Center 2.441 GHz Span 0 Hz Res BW 1 MHz #VBW 1 MHz Sweep 8 ms (401 pts) **GFSK Hopping Mode DH3** 2480 MHz Agilent 15:25:58 Aug 14, 2014 **Mkr1** Δ 1.68 ms Ref 15 dBm Atten 25 dB -1.672 dB Peak Log

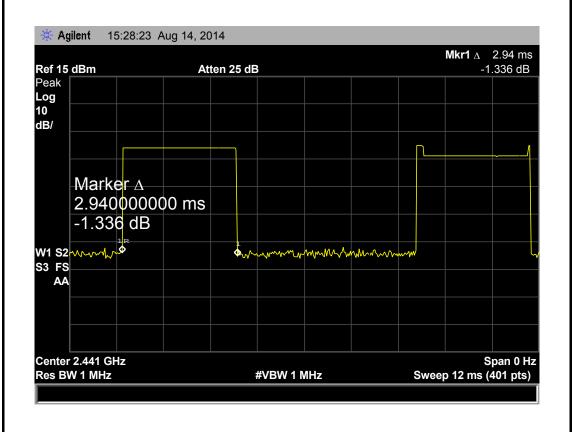


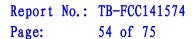


Page: 53 of 75

| EUT: | | MID | | Model: | Model: | | 008-L |
|---------------|----|------------------------------|--------------|-------------|--------|-----------------|--------|
| Temperature: | | 25 °C Relative Humidity: 55% | | | | | |
| Test Voltage: | | AC 120V/ | 60 HZ | | | | |
| Test Mode: | | Hopping I | Mode (GFSK D | H5) | | | |
| Channel | Pu | Ise Time | Total of | Period Time | Lir | nit | Result |
| (MHz) | | (ms) | Dwell (ms) | (s) | (m | ıs) | Result |
| 2402 | | 2.940 | 313.60 | | | | |
| 2441 | | 2.940 | 313.60 | 31.60 | 40 | 400 PASS | |
| 2480 | | 2.970 | 316.80 | | | | |
| | | | GFSK Hoppii | ng Mode DH5 | | | |

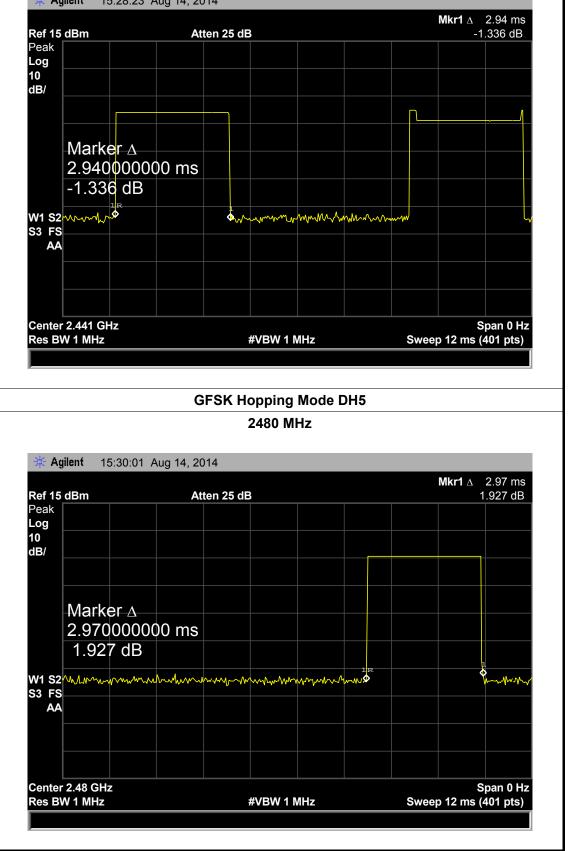
ok nopping wou







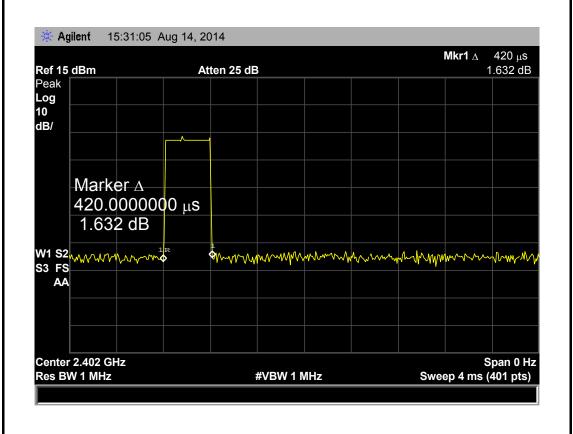
GFSK Hopping Mode DH5 2441 MHz Agilent 15:28:23 Aug 14, 2014 Mkr1 Δ 2.94 ms -1.336 dB Ref 15 dBm Atten 25 dB Peak Log 10 dB/ Marke<mark>r</mark> ∆ 2.940000000 ms -1.336 dB . W1 S2 www.mmh.Mmh.mm. S3 FS AA Center 2.441 GHz Span 0 Hz Res BW 1 MHz #VBW 1 MHz Sweep 12 ms (401 pts) **GFSK Hopping Mode DH5** 2480 MHz Agilent 15:30:01 Aug 14, 2014 **Mkr1** \triangle 2.97 ms Ref 15 dBm Atten 25 dB 1.927 dB Peak

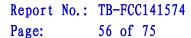




Page: 55 of 75

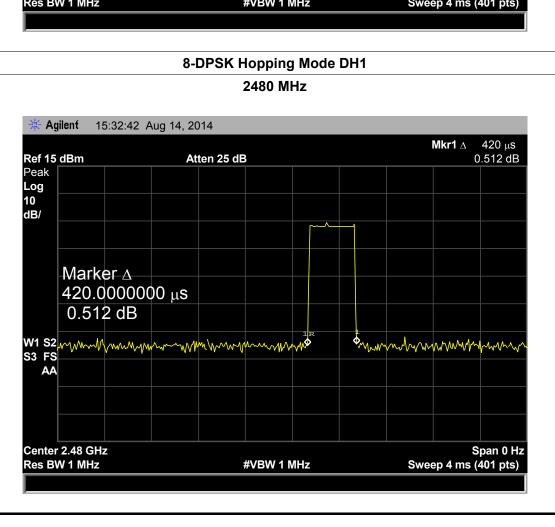
| EUT: | | MID | | Model: | | MID10 | 08-L |
|---------------|----|-----------------------------|--------------|--------------|-----|-----------------|--------|
| Temperature: | | 25 ℃ Relative Humidity: 55% | | | | | |
| Test Voltage: | | AC 120V/ | 60 HZ | | | | |
| Test Mode: | | Hopping I | Mode (8-DPSK | DH1) | | | |
| Channel | Pu | Ise Time | Total of | Period Time | Lir | nit | Result |
| (MHz) | | (ms) | Dwell (ms) | (s) | (m | ıs) | Result |
| 2402 | | 0.420 | 134.40 | | | | |
| 2441 | | 0.410 | 131.20 | 31.60 | 40 | 400 PASS | |
| 2480 | | 0.420 | 0.420 134.40 | | | | |
| | | | 8-DPSK Hopp | ing Mode DH1 | | | |







8-DPSK Hopping Mode DH1 2441 MHz 15:32:01 Aug 14, 2014 Agilent Mkr1 Δ 410 μ s -1.335 dB Ref 15 dBm Atten 25 dB Peak Log 10 dB/ Marker ∆ 410.0000000 μs -1.335 dB homburgh W1 S2 and market from a formation of the market ma S3 FS AA Center 2.441 GHz Span 0 Hz Res BW 1 MHz #VBW 1 MHz Sweep 4 ms (401 pts) 8-DPSK Hopping Mode DH1 2480 MHz Agilent 15:32:42 Aug 14, 2014 Mkr1 Δ 420 μs Ref 15 dBm Atten 25 dB 0.512 dB Peak Log

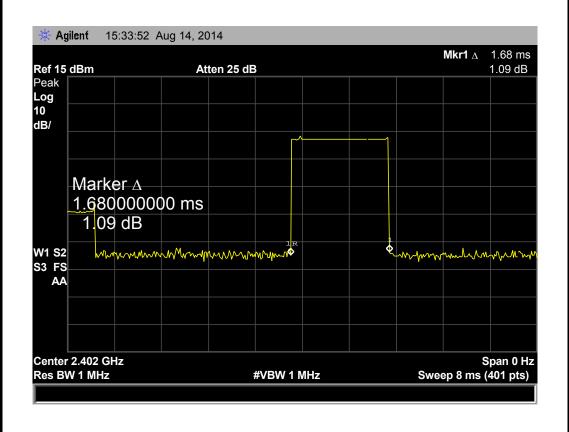


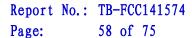


Page: 57 of 75

| EUT: | | MID | | Model: | | MID10 | 008-L |
|---------------|----|-----------------------------|--------------|--------------|-----|----------------|--------|
| Temperature | | 25 ℃ Relative Humidity: 55% | | | | | |
| Test Voltage: | | AC 120V/ | 60 HZ | | | | |
| Test Mode: | | Hopping I | Mode (8-DPSK | DH3) | | | |
| Channel | Pu | lse Time | Total of | Period Time | Lir | nit | Result |
| (MHz) | | (ms) | Dwell (ms) | (s) | (m | ıs) | Result |
| 2402 | | 1.680 | 268.80 | | | | |
| 2441 | | 1.720 | 275.20 | 31.60 | 40 | 400 PAS | |
| 2480 | | 1.700 | 272.00 | | | | |
| | • | | 8-DPSK Hopp | ina Mode DH3 | | | |

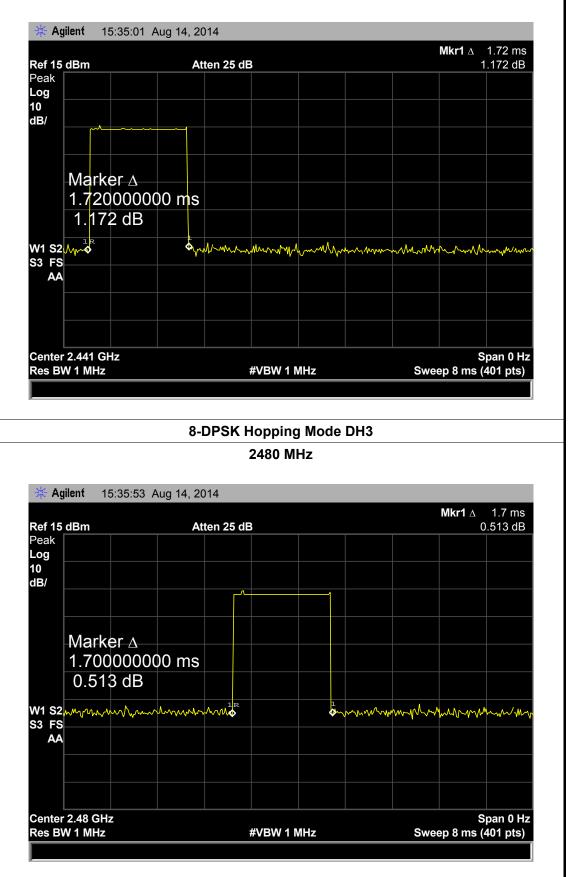
8-DPSK Hopping Mode DH3







8-DPSK Hopping Mode DH3 2441 MHz Agilent 15:35:01 Aug 14, 2014 **Mkr1** Δ 1.72 ms 1.172 dB Ref 15 dBm Atten 25 dB Peak Log 10 dB/ Marker A 1.720000000 ms 1.172 dB mysm W1 S2 /∧ S3 FS AA Center 2.441 GHz Span 0 Hz Res BW 1 MHz #VBW 1 MHz Sweep 8 ms (401 pts) 8-DPSK Hopping Mode DH3 2480 MHz Agilent 15:35:53 Aug 14, 2014 **Mkr1** Δ 1.7 ms Ref 15 dBm Atten 25 dB 0.513 dB Peak Log 10 dB/

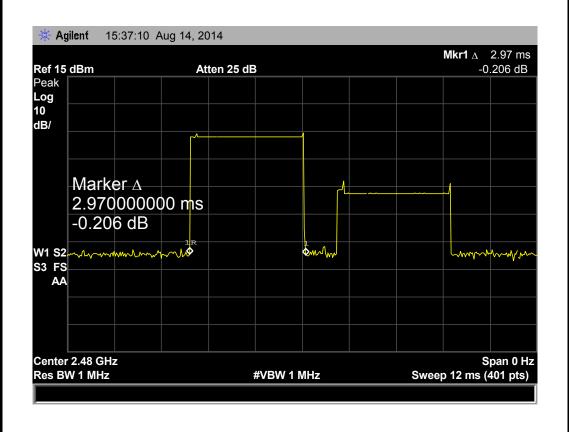


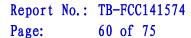


Page: 59 of 75

| EUT: | | MID | | Model: | | MID10 | 08-L |
|---------------|----|-----------------------------|--------------|--------------|-----|----------------|--------|
| Temperature: | | 25 ℃ Relative Humidity: 55% | | | | | |
| Test Voltage: | | AC 120V/ | 60 HZ | | | | |
| Test Mode: | | Hopping I | Mode (8-DPSK | DH5) | | | |
| Channel | Pu | Ise Time | Total of | Period Time | Lir | nit | Result |
| (MHz) | | (ms) | Dwell (ms) | (s) | (m | ıs) | Result |
| 2402 | | 2.970 | 316.80 | | | | |
| 2441 | | 3.000 | 320.00 | 31.60 | 40 | 400 PAS | |
| 2480 | | 3.000 | 320.00 | | | | |
| | | | 8-DPSK Hopp | ing Mode DH5 | | | |

8-DPSK Hopping Mode DH5



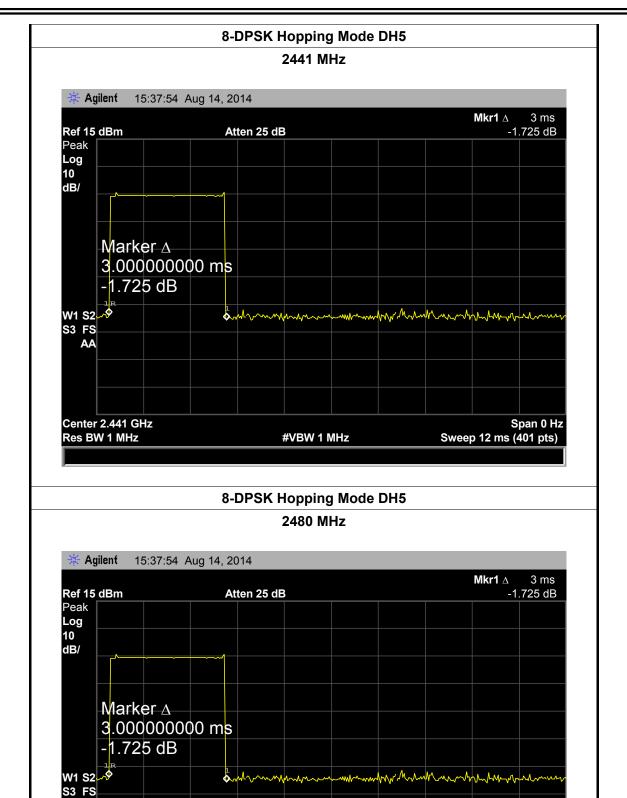




AΑ

Center 2.441 GHz

Res BW 1 MHz



#VBW 1 MHz

Span 0 Hz

Sweep 12 ms (401 pts)



Report No.: TB-FCC141574 Page: 61 of 75

8. Channel Separation and Bandwidth Test

8.1 Test Standard and Limit

8.1.1 Test Standard FCC Part 15.247

8.1.2 Test Limit

| Test Item | Limit | Frequency Range(MHz) |
|--------------------|--------------------------|----------------------|
| Bandwidth | <=1 MHz | 2400~2483.5 |
| | (20dB bandwidth) | |
| | >25KHz or >two-thirds of | |
| Channel Separation | the 20 dB bandwidth | 2400~2483.5 |
| | Which is greater | |

8.2 Test Setup



8.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:

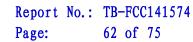
Channel Separation: RBW=30 kHz, VBW=100 kHz.

Bandwidth: RBW=30 kHz, VBW=100 kHz.

- (3) The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
- (4) Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:30 kHz, and Video Bandwidth:100 kHz. Sweep Time set auto.

8.4 EUT Operating Condition

The EUT was set to the Hopping Mode for Channel Separation Test and continuously transmitting for the Bandwidth Test.



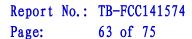


8.5 Test Equipment

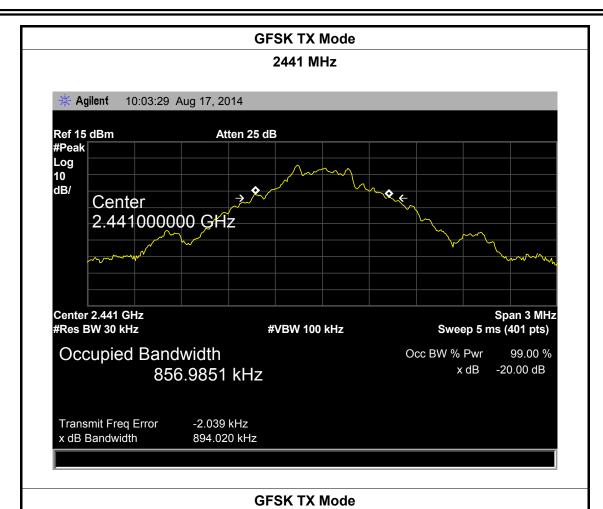
| Description | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due Date |
|----------------------|--------------|-----------|------------|---------------|------------------|
| Spectrum Analyzer | Agilent | E4407B | MY45106456 | Mar. 20, 2014 | Mar. 19, 2015 |

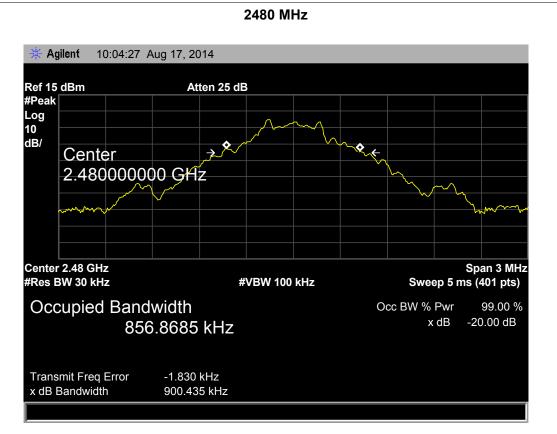
8.6 Test Data

| EUT: | | MID | | | | | del: | | | MID1008-L | | | |
|--|---|--------------------|--------------------------|----------|----------------|----------|-------------|----------|------|-----------|--------|----------------------------|--|
| Temperature | : | 25 ° | C | | | Rela | ative | Humid | ity: | 55% | | | |
| Test Voltage: | | AC 1 | 20V/6 | 0 HZ | | · | | | | | | | |
| Test Mode: | | TX N | lode (0 | GFSK) | | | | | | | | | |
| Channel freq | el frequency 99% OBW (kHz) | | | 20 | 20dB Bandwidth | | | | | | | | |
| (MHz) | | | | | | | (k | (Hz) | | | | | |
| 2402 | 2402 | | 85 | 6.3104 | 4 | | 889 | 9.736 | | | | | |
| 2441 | | | 85 | 6.985 | 1 | | 894 | 4.020 | | | | | |
| 2480 | | | 85 | 6.868 | 5 | | 900 | 0.435 | | | | | |
| | | | | (| GFSK | TX Mo | de | | | | | | |
| | | | | | 240 | 2 MHz | | | | | | | |
| Ref 15 dBm #Peak Log | | | Aug 17, 2 | Atten 25 | کمر | \ | √ | | | | | | |
| Ref 15 dBm #Peak Log 10 dB/ | enter | | | Atten 25 | کمر | | √ √ | * | | | 4 | | |
| Ref 15 dBm #Peak Log 10 dB/ | enter | | , | Atten 25 | کمر | | 1 | * | | | Ly day | | |
| Ref 15 dBm #Peak Log 10 dB/ | enter 1020 | | , | Atten 25 | | / 100 kH | lz | ** | Si | weep 5 | | an 3 MHz 401 pts) | |
| Ref 15 dBm #Peak Log 10 dB/ | enter 4020 | 0000 Sand | 00 GH | Atten 25 | #VBW | / 100 kF | iz. | | St. | % Pwr | ms (4 | 401 pts) 99.00 % | |
| Ref 15 dBm #Peak Log 10 dB/ Ce 2.4 | enter 4020 | 0000 Sand |)0 G f | Atten 25 | #VBW | / 100 kH | lz | | | | ms (4 | 401 pts) | |
| Ref 15 dBm #Peak Log 10 dB/ Ce 2.4 | enter 1020 12 GHz 0 kHz ied B | 0000 and 856 | 00 GH width 3.3104 | Atten 25 | #VBW | / 100 kF | \frac{1}{2} | | | % Pwr | ms (4 | 401 pts) 99.00 % | |







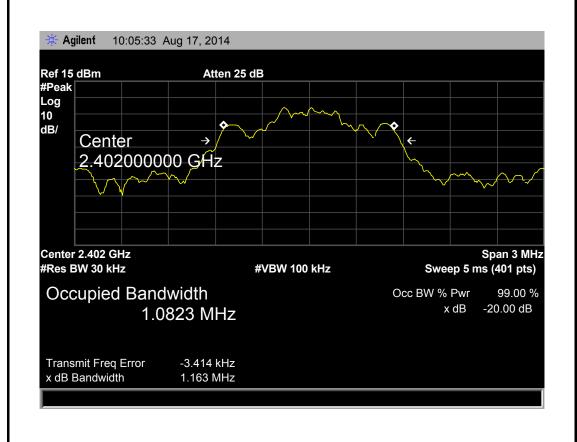


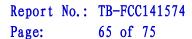


64 of 75 Page:

| EUT: | MID | Model: | MID1008-L | | | |
|-------------------|------------------|--------------------|-----------------|--|--------|--|
| Temperature: | 25 ℃ | Relative Humidity: | 55% | | | |
| Test Voltage: | AC 120V/60 HZ | | | | | |
| Test Mode: | TX Mode (8-DPSK) | | | | | |
| Channel frequence | cy 99% OBW (kHz) | 20dB Bandwidth | 20dB Bandwidth | | | |
| (MHz) | | (kHz) | *2/3 (kHz) | | | |
| 2402 | 1082.30 | 1163.00 | 775.33 | | | |
| 2441 | 2441 1084.10 | | 1084.10 1163.00 | | 775.33 | |
| 2480 | 1081.20 | 1164.00 | 776.00 | | | |

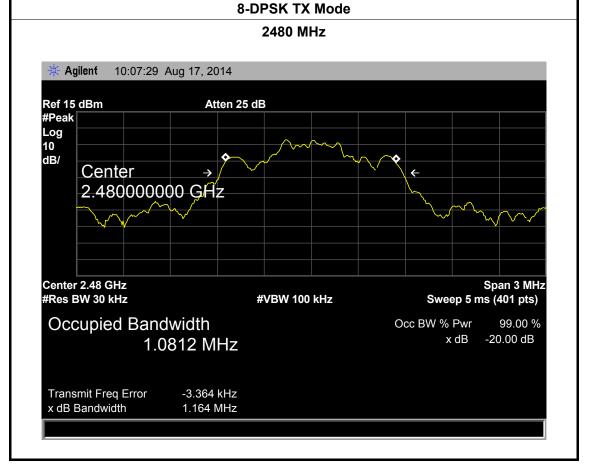
8-DPSK TX Mode 2402 MHz







8-DPSK TX Mode 2441 MHz 10:06:23 Aug 17, 2014 Agilent Ref 15 dBm Atten 25 dB #Peak Log 10 **\$** dB/ Center 2.441000000 GHz Center 2.441 GHz Span 3 MHz #Res BW 30 kHz **#VBW 100 kHz** Sweep 5 ms (401 pts) Occupied Bandwidth 99.00 % Occ BW % Pwr -20.00 dB 1.0801 MHz x dB Transmit Freq Error -2.477 kHz x dB Bandwidth 1.163 MHz





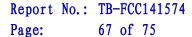
Page: 66 of 75

| EUT: | MID | Model: | MID1008-L |
|---------------|---------------|--------------------|-----------|
| Temperature: | 25 ℃ | Relative Humidity: | 55% |
| Test Voltage: | AC 120V/60 HZ | | |

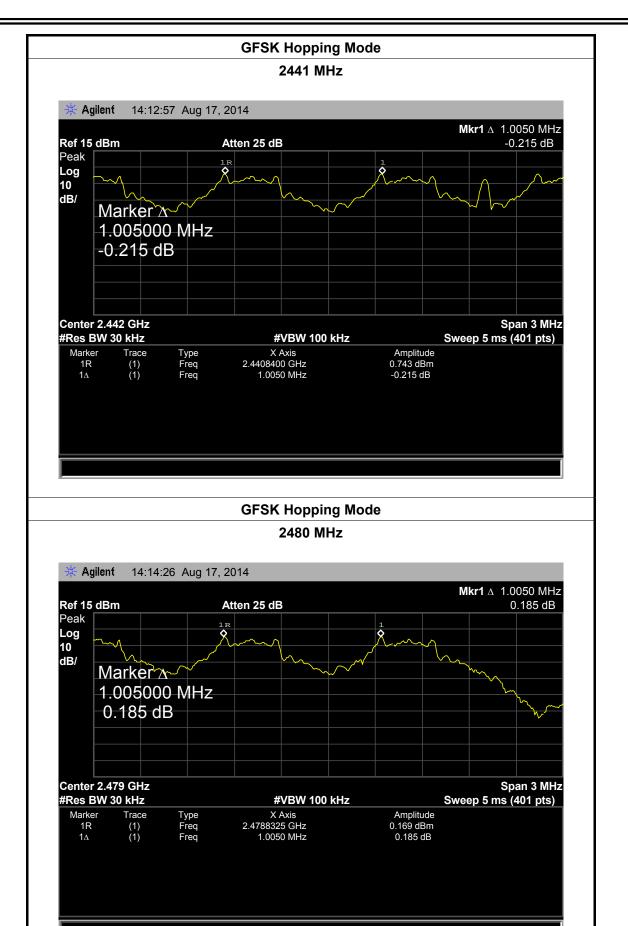
| Test Mode: | Hopping I | Mode (GFSK) | | |
|-------------------------|-----------|-----------------------|------------------------|--|
| Channel frequency (MHz) | | Separation Read Value | Separation Limit (kHz) | |
| | | (kHz) | | |
| 2402 | | 1005.00 | 889.736 | |
| 2441 | | 1005.00 | 894.020 | |
| 2480 | | 1005.00 | 900.435 | |

GFSK Hopping Mode







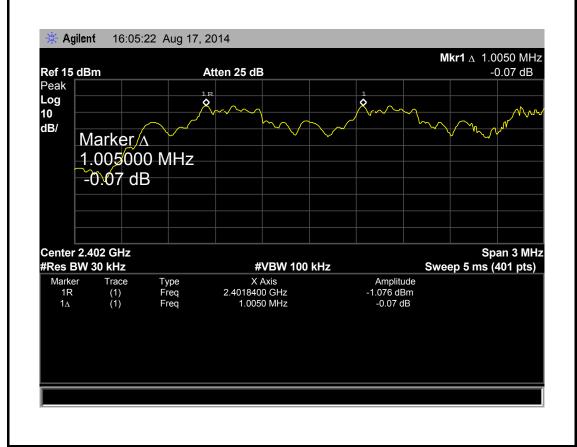


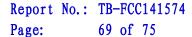


Page: 68 of 75

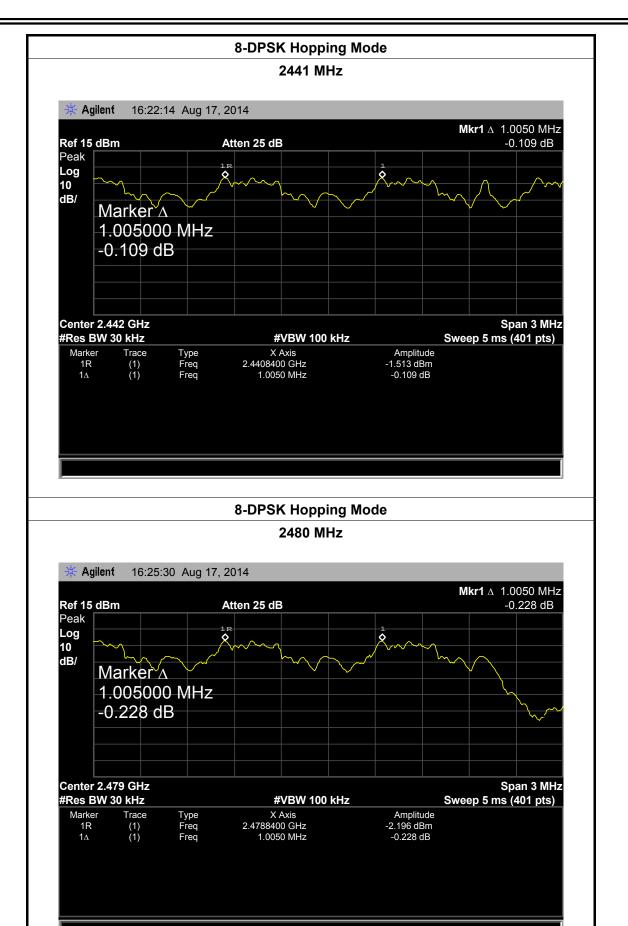
| EUT: | MID | | Model: | | MID1008-L | |
|-------------------------|-----------------------|-----------------------|--------------------|------------------------|-----------|--|
| Temperature: | 25 ℃ | | Relative Humidity: | | 55% | |
| Test Voltage: | AC 120V/60 HZ | | | | | |
| Test Mode: | Hopping Mode (8-DPSK) | | | | | |
| Channel frequency (MHz) | | Separation Read Value | | Separation Limit (kHz) | | |
| (kHz) | | | | | | |
| 2402 | | 100 | 5.00 | | 775.33 | |
| 2441 | | 100 | 1005.00 | | 775.33 | |
| 2480 | | 100 | 1005.00 | | 776.00 | |

8-DPSK Hopping Mode











Page: 70 of 75

9. Peak Output Power Test

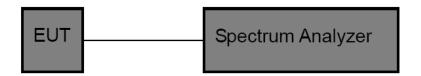
9.1 Test Standard and Limit

9.1.1 Test Standard FCC Part 15.247 (b) (1)

9.1.2 Test Limit

| Test Item | Limit | Frequency Range(MHz) | | |
|-------------------|--|----------------------|--|--|
| Peak Output Power | Hopping Channels>75 Power<1W(30dBm) | 2400~2483.5 | | |
| | Other <125 mW(21dBm) | | | |

9.2 Test Setup



9.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:

Peak Detector: RBW=1 MHz, VBW=3 MHz for bandwidth less than 1MHz. RBW=3 MHz, VBW=3 MHz for bandwidth more than 1MHz.

9.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

9.5 Test Equipment

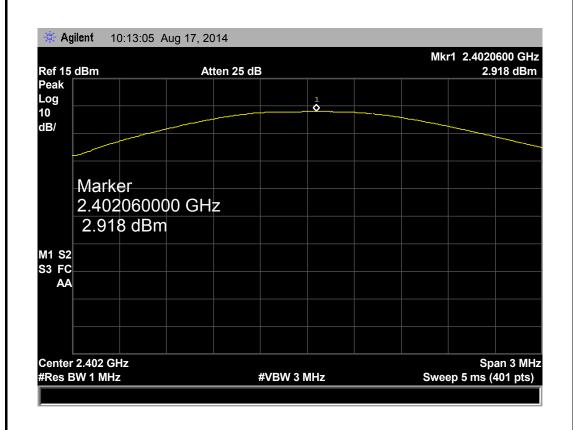
| Description | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due Date |
|----------------------|--------------|-----------|------------|---------------|------------------|
| Spectrum Analyzer | Agilent | E4407B | MY45106456 | Mar. 20, 2014 | Mar. 19, 2015 |

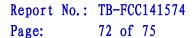
9.6 Test Data



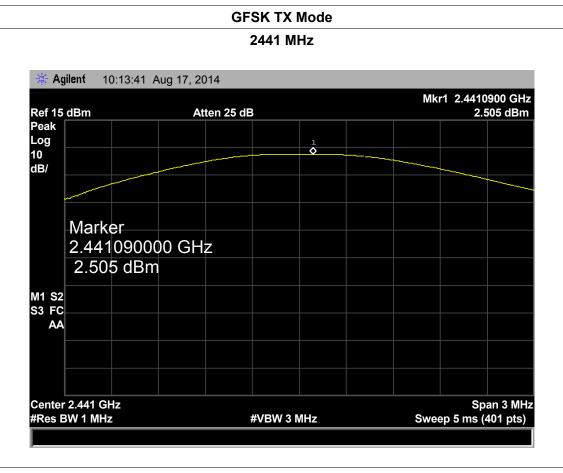
Page: 71 of 75

| EUT: | MID | | Model: | | MID1008-L | |
|---|----------------|-------|--------------------|-------------|-----------|--|
| Temperature: | 25 ℃ | | Relative Humidity: | | 55% | |
| Test Voltage: | AC 120V/60 HZ | | | | | |
| Test Mode: | TX Mode (GFSK) | | | | | |
| Channel frequency (MHz) Test Result (dBm) | | | ult (dBm) | Limit (dBm) | | |
| 2402 | | 2.918 | | | | |
| 2441 | | 2.505 | | | 30 | |
| 2480 | 2480 | | 31 | | | |
| GFSK TX Mode | | | | | | |

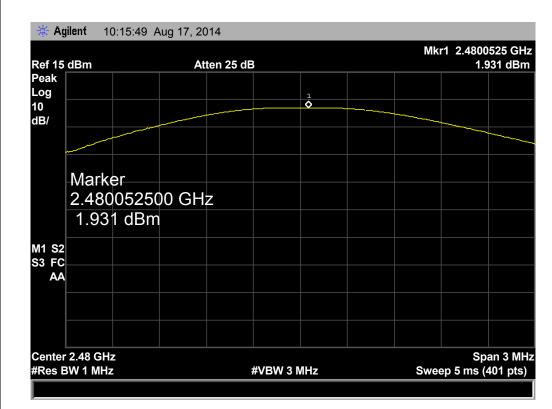








GFSK TX Mode

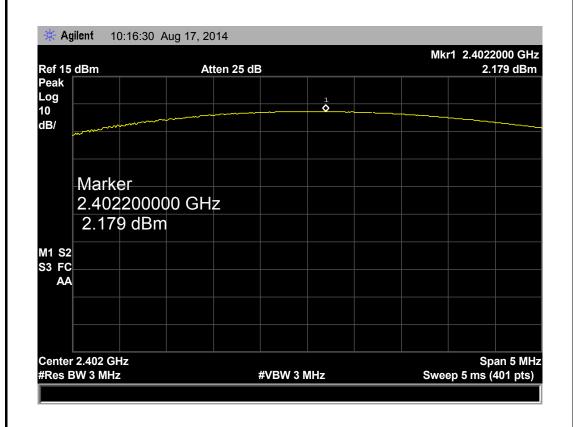


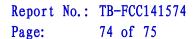


Page: 73 of 75

| EUT: | MID | | Model: | | MID1008-L | |
|---------------------------------|------------------|----------|--------------------|-------------|-----------|--|
| Temperature: | 25 ℃ | | Relative Humidity: | | 55% | |
| Test Voltage: | AC 120V/60 HZ | | | | | |
| Test Mode: | TX Mode (8-DPSK) | | | | | |
| Channel frequency (MHz) Test Re | | Test Res | ult (dBm) | Limit (dBm) | | |
| 2402 | | 2.1 | 79 | | | |
| 2441 | | 1.8 | 1.889 | | 21 | |
| 2480 | 2480 1.230 | | | | | |
| a provery March | | | | | | |

8-DPSK TX Mode

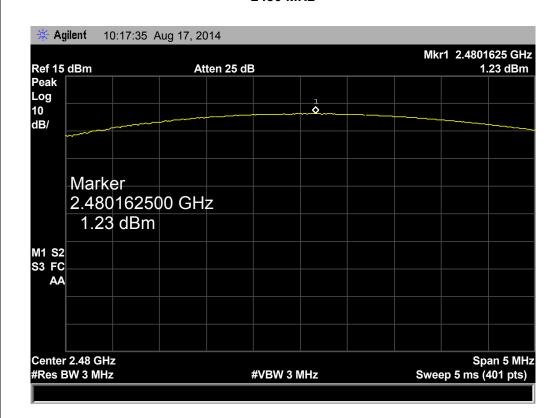






8-DPSK TX Mode 2441 MHz Agilent 10:17:05 Aug 17, 2014 Mkr1 2.4411250 GHz 1.889 dBm Ref 15 dBm Atten 25 dB Peak Log <u>1</u> 10 dB/ Marker 2.441125000 GHz 1.889 dBm M1 S2 S3 FC AA Center 2.441 GHz Span 5 MHz #Res BW 3 MHz #VBW 3 MHz Sweep 5 ms (401 pts)

8-DPSK TX Mode





Page: 75 of 75

10. Antenna Requirement

10.1 Standard Requirement

10.1.1 Standard FCC Part 15.203

10.1.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

10.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 0 dBi, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

10.3 Result

The EUT antenna is a FPC Antenna. It complies with the standard requirement.