TEST REPORT



CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501

Report No.: CTK-2021-02042 Page (1) / (71) Pages

1. Client

- ${}_{\circ}$ Name : ANOTO KOREA Corp.
- Address: 501, IRUM building, 225-18, Pangyoyeok-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
- Date of Receipt : 2021-04-29

2. Manufacturer

- Name : ANOTO KOREA Corp.
- Address: 501, IRUM building, 225-18, Pangyoyeok-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
- 3. Use of Report : For FCC & ISED Certification
- 4. Test Sample / Model: Digital Pen / echoII
- 5. Date of Test : 2021-06-02 to 2021-06-03
- 6. Test Standard(method) used : FCC 47 CFR part 15 subpart C 15.247

ANSI C63.10-2013, RSS-247, RSS-Gen

- **7. Testing Environment:** Temp.: (23 ± 1) °C, Humidity: (48 ± 5) % R.H.
- 8. Test Results : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

| Affirmation | Tested by Gwanyong Kim: (Signature) | Technical Manager Young-taek Lee: (Signature) | |
|---------------------------------|--|--|--|
| | | 2021-06-03 | |
| Republic of KOREA CTK Co., Ltd. | | | |



REPORT REVISION HISTORY

| Date | Revision | Page No |
|------------|-------------------------|---------|
| 2021-06-03 | Issued (CTK-2021-02042) | all |
| | · · · | |

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1. General Product Description

1.1 Client Information

| Company | ANOTO KOREA Corp. |
|----------------|--|
| Contact Point | 501, IRUM building, 225-18, Pangyoyeok-ro, Bundang-gu, Seongnam- |
| Contact Point | si, Gyeonggi-do, Republic of Korea |
| | Name : Changhoon Shin |
| Contact Person | E-mail : changhoon.shin@anoto.com |
| contact Person | Tel: +82-10-8009-3880 |
| | Fax : +82-31-600-0801 |

1.2 Product Information

| FCC ID | ADM-ECHOII |
|-----------------------------|--|
| Certification Number ISED | 23775-ECHOII |
| Product Description | Digital Pen |
| Basic model (HVIN) | echoII |
| Variant Model name | - |
| Operating Frequency | 2 402 MHz – 2 480 MHz |
| RF Output Power | GKSK : 4.57 dBm (2.864 mW) - Peak Conducted π/4 DQPSK : 4.22 dBm (2.642 mW) - Peak Conducted 8-DPSK : 4.44 dBm (2.780 mW) - Peak Conducted |
| Antenna type | Chip Antenna |
| Antenna gain | 3.4 dBi |
| Number of channels | 79 |
| Channel Spacing | 1 MHz |
| Type of Modulation | GFSK(1 Mbps), π/4 DQPSK(2 Mbps), 8-DPSK(3 Mbps) |
| Power Source | DC 3.7 V (Battery) |
| FVIN | 3.1.2.4 |
| Test Software(Version) | Tera term (Version 4.8.5) MediTek BT Tool (Version W1537) |
| RF Power setting in Test SW | Power Setting "7" |

1.3 Peripheral Devices

| Device | Manufacturer | Model No. | Serial No. |
|---------------|--|------------|-------------|
| Note Computer | Samsung Electronics | 550XDA | NT-21022303 |
| AC/DC Adapter | LITE-ON TECHNOLOGY CHANGZHOU CO., LTD | PA-1400-96 | AC-4019A |



2. Facility and Accreditations

2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea.

2.2 Laboratory Accreditations and Listings

| Country | Agency | Registration Number | |
|---------|--------|---------------------|--|
| USA | FCC | 805871 | |
| CANADA | ISED | 8737A-2 | |
| KOREA | NRRA | KR0025 | |

2.3 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.



3. Test Specifications

3.1 Standards

| Section in FCC | Section in RSS | Requirement(s) | Status (Note 1) | Test Condition | |
|--|--|-------------------------------------|--------------------|-------------------|--|
| 15.247(a) | RSS-247 5.1(b) | Carrier Frequency Separation C | | | |
| 15.247(a) | RSS-247 5.1(d) Number of Hopping Frequencies | | С | | |
| 15.247(a) | RSS-247 5.1(a) | 20 dB Bandwidth | С | | |
| 15.247(a) | RSS-247 5.1(d) | Time of occupancy (Dwell Time) | С | Conducted | |
| 15.247(b) | RSS-247 5.4(b) | Maximum peak conducted output power | С | | |
| 15.247(d) | RSS-247 5.5 | Unwanted emission | С | | |
| 15.209 | RSS-Gen 6.13 | Transmitter emission | С | Radiated | |
| 15.207(a) RSS-Gen 8.8 AC Conducted Emission | | С | Line Conducted | | |
| Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable Note 2: The data in this test report are traceable to the national or international standards. Note 3: The sample was tested according to the following specification: FCC Part 15.247, ANSI C63.10-2013, RSS-247 Issue 2, RSS-Gen Issue 5 Note 4: The tests were performed according to the method of measurements prescribed in KDB No.558074, ANSI C63.10-2013 | | | | | |

Note 5: This device is frequency hopping system(FHS), and complies frequency hopping system requirement.

3.2 Mode of operation during the test

The EUT is operated in a manner representative of the typical of the equipments. During at testing, system components were manipulated within the confines of typical usage to maximize each emission. All modulation modes were tests. The results are only attached worst cases.

Test Frequency

| Lowest channel | Middle channel | Highest channel | |
|----------------|----------------|-----------------|--|
| 2 402 MHz | 2 441 MHz | 2 480 MHz | |

Test mode

| Modulation | Packet type | Data rate | Data rate Duty Cycle | |
|------------|-------------|-----------|----------------------|---------|
| GFSK | DH5 | 1 Mbps | 57.20 % | 2.43 dB |
| π/4 DQPSK | 2-DH5 | 2 Mbps | 57.60 % | 2.40 dB |
| 8-DPSK | 3-DH5 | 3 Mbps | 57.60 % | 2.40 dB |



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3.3 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter. Coverage factor k = 2, Confidence levels of 95 %

| Description | Uncertainty |
|--------------------------------------|---|
| Conducted RF Output Power | 1.5 dB (C.L. : Approx. 95 %, <i>k</i> = 2) |
| Occupied Bandwidth | 0.1 MHz (C.L. : Approx. 95 %, <i>k</i> = 2) |
| Unwanted Emission(conducted) | 3.0 dB (C.L. : Approx. 95 %, <i>k</i> = 2) |
| Radiated Emissions (f \leq 30 MHz) | 1.5 dB (C.L. : Approx. 95 %, <i>k</i> = 2) |
| Radiated Emissions (f \leq 1 GHz) | 4.66 dB (C.L. : Approx. 95 %, <i>k</i> = 2) |
| Radiated Emissions (f > 1 GHz) | 4.76 dB (C.L. : Approx. 95 %, k = 2) |
| AC Conducted Emission | 1.96 dBµV (C.L. : Approx. 95 %, k = 2) |



4. Technical Characteristic Test

4.1 Carrier Frequency Separation

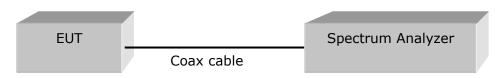
Test Procedures

ANSI C63.10-2013 7.8.2

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled. After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to :

- a) Span = 5 MHz (wide enough to capture the peaks of two adjacent channels)
- b) RBW = 30 kHz (Start with the RBW set to approximately 30 % of the channel spacing; adjust as necessary to best identify the center of each individual channel)
- c) VBW = 30 kHz (≥ RBW)
- e) Detector function = peak f) Trace = max hold



d) Sweep = auto

Figure 1 : Measurement setup for the carrier frequency separation

Limit

FHSS operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two thirds of the -20 dB bandwidth of the hopping channel, whichever is greater.

Test Results

Test mode : GFSK

| Channel | Adjacent Hopping Channel Separation [kHz] | Two-third of 20dB bandwidth [kHz] | Minimum Bandwidth [kHz] | Result |
|---------|---|---|-------------------------------|----------|
| Middle | 1000 | 693 | 25 | Complies |

Test mode : 8-DPSK

| Channel | Adjacent Hopping Channel Separation [kHz] | Two-third of 20dB bandwidth [kHz] | Minimum Bandwidth [kHz] | Result |
|---------|---|---|-------------------------------|----------|
| Middle | 940 | 865 | 25 | Complies |

See next pages for actual measured spectrum plots.



| | | ept SA | | | | | | | | |
|-------------|-------------------------|-----------------|----------------------|--------------------------|---------------|------------------------|------------------------|---------|------------------------|---------------|
| arkor 1 | RF 50 Ω | | | | ISE:INT | | ALIGNAUTO : Log-Pwr | | M Jun 02, 2021 | Marker |
| | <u>2 A</u> 1.000000 | PNC |): Wide 😱 iin:Low | Trig: Free #Atten: 30 | e Run) dB | Avg Hold: Ext Gain: | >100/100 -0.78 dB | TY D | | Select Marker |
| dB/div | Ref 20.00 d | dBm | | | | | | | .290 dB | 2 |
| 0.0 | | | 1 | | 2Δ1 | | | | | Norm |
| | man. | | In | | 1. 1. | W | MIN . | M | 10.01 | |
|).0 | N° Yh | N ^{II} | rh H | | | N | Cr. | M | M. | Delt |
| 0.0 pm | | М | Ŵ | M.M. | ٩١ | \sqrt{r} | ۷Ļ | AMN . | N | |
| 0.0 | | | | | | | | | | Fixed |
| .0 | | | | | | | | | | c |
| .0 | | | | | | | | | | |
| .0 | | | | | | | | | | Properties |
| | | | | | | | | | | |
| .0 | | | | | | | | | | Мо |
| | .441000 GHz / 30 kHz | | #\/B\M | 30 kHz | 1 | | Sween | Span 5 | .000 MHz (1001 pts) | 1 0 |
| ies BW | | | #VDW | JU KHZ | | | Sweep | 1 | (1001 pts) | |

Test mode : GFSK

Test mode : 8-DPSK





4.2 Number of Hopping Frequencies

Test Procedures

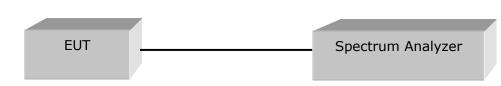
ANSI C63.10-2013 7.8.3

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to :

| a) Frequency range | 1: Start = 2 390.0 MHz, | Stop = 2 439.5 MHz |
|--------------------|-------------------------|--------------------|
| | 2: Start = 2 439.5 MHz, | Stop = 2 489.5 MHz |

- b) RBW = 300 kHz (To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller)
- c) VBW = 300 kHz (\geq RBW)
- e) Detector function = peak
- d) Sweep = autof) Trace = max hold



Limit

FHSs operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels.

Test Results

Test mode : GFSK

| Total number of Hopping Channels | Result |
|----------------------------------|----------|
| 79 | Complies |

Test mode : 8-DPSK

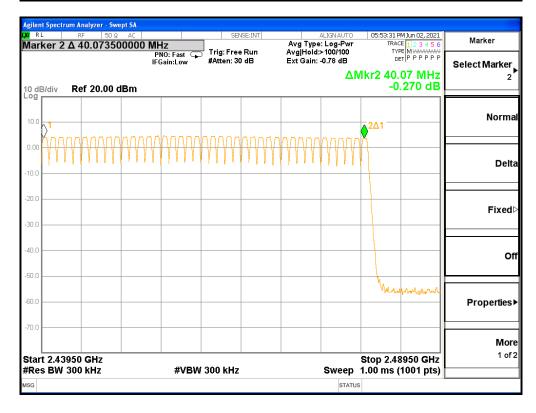
| Total number of Hopping Channels | Result |
|----------------------------------|----------|
| 79 | Complies |

See next pages for actual measured spectrum plots.



| L | RF 50 Ω | AC | | SEI | VSE:INT | | ALIGN AUTO | 05:52:44 PM Jun 02, 2021 | |
|---------|--------------------|----|--|-------------------------|---------|------------------------------------|------------|---|--------------------|
| arker 2 | Δ 37.273500 | | IHz PNO: Fast ⊂ FGain:Low | Trig: Free #Atten: 3 | | Avg Type Avg Hold: Ext Gain: | | TRACE 123456 TYPE MWWWW DET P P P P P P | Marker |
| dB/div | Ref 20.00 di | | FGain:Low | #Atten: 5 | , | Ext Gam. | | 2 37.273 5 MHz -0.278 dB | Select Marker 2 |
| g .0 | | 1 | | | | | | 2Δ1 | Norm |
| .0 | | | | | MM | MM | | | Delt |
| .0 | | | | | | | | | Fixed |
| .0 | | | | | | | | | |
| 0 | | | | | | | | | |
| | tarwander when the | | | | | | | | Properties |
| | 0000 GHz | | | | | | _ | Stop 2.43950 GHz | M a 1 o |
| es BW | 300 kHz | | #VBV | / 300 kHz | | | Sweep | 1.00 ms (1001 pts) | |

Test Mode : GFSK





| L | r <mark>um Analyzer - Swe</mark> RF 50 Ω | AC | | SEM | ISE:INT | | ALIGN AUTO | 06:11:11 P | M Jun 02, 2021 | |
|-------------|---|----|------------------------------|--------------------------|---------|------------------------------------|------------|--|--|--------------------|
| arker 2 | Δ 37.02600 | PN | IZ 10: Fast 😱 Gain:Low | Trig: Free #Atten: 30 | | Avg Type Avg Hold: Ext Gain: | | TYP | E 1 2 3 4 5 6 E M WWWWWW T P P P P P P | Marker |
| dB/div | Ref 20.00 d | | Junicow | | | | | 2 37.026 -0. | 0 MHz 239 dB | Select Marker 2 |
| g .0 | | 1 | | | | | | | 2Δ1 | Norm |
| 0 | | Yw | vvvvv | VVVV | www. | ~~~~~ | rvvvv | mm | rvvvv | |
| • | | | | | | | | | | De |
| | | N | | | | | | | | Fixe |
| | ^ | | | | | | | | | |
|) | - Ma | | | | | | | | | (|
| -) | howard | | | | | | | | | Propertie |
| | | | | | | | | | | Ма |
| | 000 GHz 300 kHz | | #VBW | 300 kHz | | | Sweep | Stop 2.43 1.00 ms (* | | 1 0 |
| | | | | | | | STATU | `````````````````````````````````````` | • • | |

Test Mode : 8-DPSK





4.3 20 dB bandwidth & 99 % Bandwidth

Test Procedures

ANSI C63.10-2013 6.9.2 RSS-GEN Issue 5 - Section 6.7

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

ANSI C63.10-2013 6.9.3 RSS-GEN Issue 5 - Section 6.7

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission.

Use the 99 % power bandwidth function of the instrument and report the measured bandwidth.

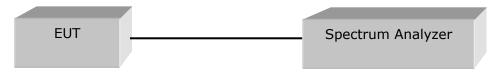
The spectrum analyzer is set to :

Center frequency = the highest, middle and the lowest channels

- a) Span = 3 MHz (between 2 times and 5 times the OBW)
- b) RBW = 30 kHz (1 % to 5 % of the OBW)
- c) VBW = 100 kHz (approximately 3 times RBW)
- d) Sweep = auto

e) Detector function = peak

f) Trace = max hold



Limit

Limit : N/A



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Test Results

Test mode : GFSK

| Channel | Frequency [MHz] | 20 dB Bandwidth [MHz] | 99 % Bandwidth [MHz] | Result |
|---------|--------------------|-----------------------------|----------------------------|----------|
| Lowest | 2 402 | 1.033 | 0.902 | Complies |
| Middle | 2 441 | 1.039 | 0.903 | Complies |
| Highest | 2 480 | 1.028 | 0.893 | Complies |

Test mode : 8-DPSK

| Channel | Frequency [MHz] [MHz] 20 dB Bandwidth [MHz] | | 99 % Bandwidth [MHz] | Result |
|---------|--|-------|----------------------------|----------|
| Lowest | 2 402 | 1.289 | 1.221 | Complies |
| Middle | 2 441 | 1.298 | 1.225 | Complies |
| Highest | 2 480 | 1.300 | 1.221 | Complies |

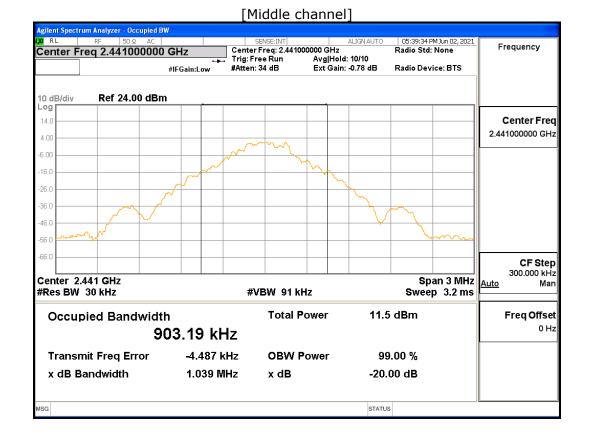
See next pages for actual measured spectrum plots.



20 dB bandwidth & 99 % Bandwidth - GFSK

| RL RF 50 Ω AC | 00 GHz | SENSE:INT Center Freq: 2.4020 | 00000 GHz | Radio Std: I | 1Jun 02, 2021 None | Frequency |
|--------------------------------|---------------|-----------------------------------|----------------------------------|--------------|-----------------------------|-----------------------------------|
| | +FGain:Low | , Trig: Free Run #Atten: 34 dB | Avg Hold: 10/ Ext Gain: -0.78 | | e: BTS | |
| dB/div Ref 24.00 dE | Sm | 1 | | | | |
| | | | | | | Center Fr 2.402000000 G |
| 0 | | | M | | | |
| | | | | | | |
| | | | | | ~~~~~ | |
| | | | | | | CF St 300.000 k |
| nter 2.402 GHz es BW 30 kHz | | #VBW 91 ki | Hz | Spa Sweep | n 3 MHz <u>Au</u> 3.2 ms | <u>Auto</u> Mar |
| Occupied Bandwic | Total P HZ | ower | 12.0 dBm | | Freq Offse 0 H: | |
| Transmit Freq Error | -4.047 k | (Hz OBW P | ower | 99.00 % | | |
| x dB Bandwidth | 1.033 N | lHz xdB | | -20.00 dB | | |
| | | | | | | |

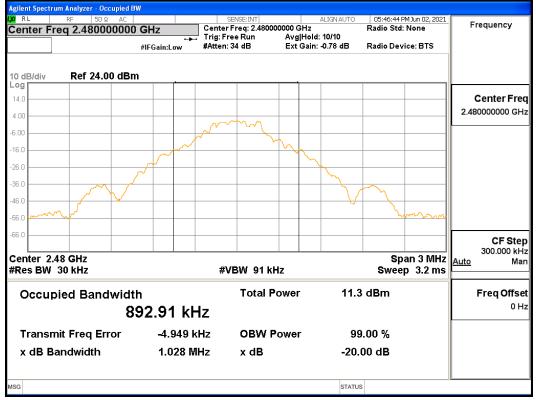
[Lowest channel]





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[Highest channel]



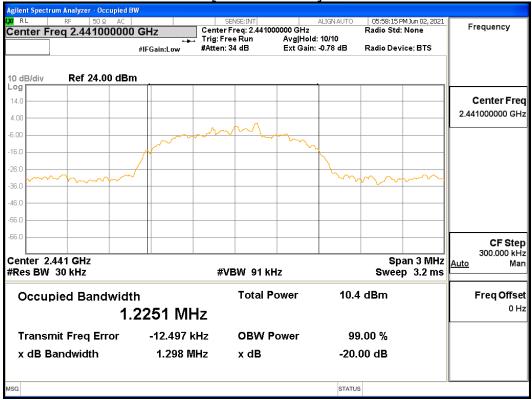


20 dB bandwidth & 99 % Bandwidth - 8-DPSK

gilent Spectrum Analyzer - Occupied BW 05:55:47 PM Jun 02, 2021 RL ALIGN AUTO Center Freq: 2.402000000 GHz Radio Std: None Frequency Center Freq 2.402000000 GHz Trig: Free Run #Atten: 34 dB Avg|Hold: 10/10 Ext Gain: -0.78 dB Radio Device: BTS #IEGain*Low Ref 24.00 dBm 10 dB/div Log 14.0 **Center Freq** 2.402000000 GHz 4.00 -6.00 -16.0 -26.0 36.0 46 D -56.0 -66.0 CF Step 300.000 kHz Center 2.402 GHz Span 3 MHz Auto Man #Res BW 30 kHz #VBW 91 kHz Sweep 3.2 ms **Total Power** 10.8 dBm Freq Offset **Occupied Bandwidth** 0 Hz 1.2209 MHz Transmit Freq Error -12.401 kHz **OBW Power** 99.00 % x dB Bandwidth 1.289 MHz x dB -20.00 dB STATUS

[Lowest channel]

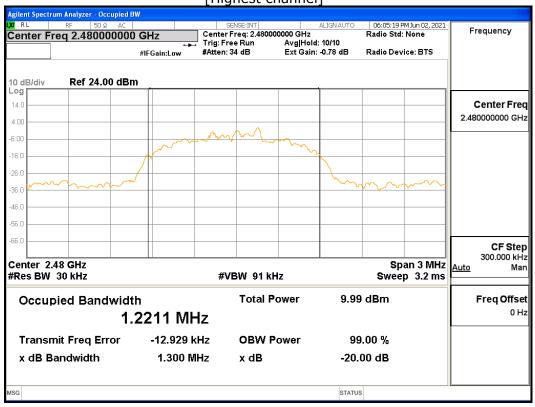
[Middle channel]





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[Highest channel]





4.4 Time of Occupancy (Dwell Time)

Test Procedures

ANSI C63.10-2013 7.8.4

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled.

a) Span: Zero span, centered on a hopping channel.

b) RBW shall be \leq channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.

c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel. d) Detector function : Peak.

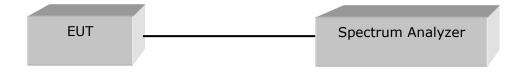
e) Trace: Max hold.

Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

Number of hops in the period specified in the requirements = (number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)

The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.



Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.



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Test Results

The requirements are: \square Complies

Test Data

| | | | Test n | node : GFSK | | | |
|-------|--|---|------------------------------------|--|--|---|-----------------|
| Mode | Number of hops on spectrum analyzer | period specified in the requirement (sec) | analyzer sweep time (sec) | Number of transmission in a period (channel number*0.4 sec) | Transmission time per hop (msec) | average time of occupancy (msec) | Limit (msec) |
| 1-DH1 | 24 | 31.6 | 5.0 | 151.68 | 0.365 | 55.363 | 400 |
| 1-DH3 | 24 | 31.6 | 5.0 | 151.68 | 1.620 | 245.722 | 400 |
| 1-DH5 | 15 | 31.6 | 5.0 | 94.80 | 2.860 | 271.128 | 400 |

Test mode : $\pi/4$ DQPSK

| Mode | Number of hops on spectrum analyzer | period specified in the requirement (sec) | analyzer sweep time (sec) | Number of transmission in a period (channel number*0.4 sec) | Transmission time per hop (msec) | average time of occupancy (msec) | Limit (msec) |
|-------|--|---|------------------------------------|--|--|---|-----------------|
| 2-DH1 | 24 | 31.6 | 5.0 | 151.68 | 0.374 | 56.728 | 400 |
| 2-DH3 | 30 | 31.6 | 5.0 | 189.60 | 1.629 | 308.858 | 400 |
| 2-DH5 | 16 | 31.6 | 5.0 | 101.12 | 2.879 | 291.124 | 400 |

Test mode : 8-DPSK

| Mode | Number of hops on spectrum analyzer | period specified in the requirement (sec) | analyzer sweep time (sec) | Number of transmission in a period (channel number*0.4 sec) | Transmission time per hop (msec) | average time of occupancy (msec) | Limit (msec) |
|-------|--|---|------------------------------------|--|--|---|-----------------|
| 3-DH1 | 22 | 31.6 | 5.0 | 139.04 | 0.370 | 51.445 | 400 |
| 3-DH3 | 21 | 31.6 | 5.0 | 132.72 | 1.620 | 215.006 | 400 |
| 3-DH5 | 10 | 31.6 | 5.0 | 63.20 | 2.880 | 182.016 | 400 |

Remark:

Number of transmission in a period(Channel number * 0.4) = Number of hops on spectrum analyzer × (period specified in the requirement / analyzer sweep time)

Average time of occupancy = Number of transmission in a period \times Transmission time per hop

See next pages for actual measured spectrum plots.



Time of Occupancy for Packet Type 1-DH1(GFSK)

| | | | | | | | | | | | | | | | | | | | | | | | - Swe | alyzer | | | trur | Spect | | |
|------------------------|----------------------------|--------------|-------|-----|---------------------|------|-------|---------|-------|--------|---|---|-------------|---|-----|--------|--------------|-------------|------------|---|----|----------|----------|--------|----|------|---------|--------|------|--------------|
| Trace/Det | un 02, 2021 1 2 3 4 5 6 | TRACE | | | auto j-Pw | | | g Ty | Av | | | | SEN: | | | | | | | | AC | , | 50 Ω | | RF | F | | | L | <u>.X</u> I |
| Select Trace | ₩₩₩₩₩₩ Р Р Р Р Р Р | DET | | | dB | 0.78 | in: · | Ga | Ext | | 1 | | ree : 30 | | | • | st ' ow | :Fa n:Lo | PNO Gai | F | m | зВ | 00 d | 20. | ef | R | | div | dB/ | |
| Clear Write | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | .og |
| Trace Average | | | | | | | | 1 | | | | 1 | | | | | | | | | | | | _ | | | | | | 0.00 10.0 |
| Max Hold | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 20.0 30.0 |
| Min Hold | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 40.0 |
| View/Blank Trace On | hudilarradofuar | WAYMKU | | | <u></u> | | | <u></u> | upuar | 126994 | | | | | | - Prop | њ , А | | Alf-yu | | | . | Jane Tra | **** | | 7104 | <i></i> | /1440/ | .0 - | 60.0 |
| More 1 of 3 | an 0 Hz)01 pts) | Sp: s (1(| 5.000 | n : | vee | S | | | | | | | -17 | M | 1.0 | w | VE | # | | | z | ;H |)0 G | | | | | | | |
| | | - , | | - | STA | - 1 | | | | | | | | | | | | | | | | | | | | | | | | MSG |

| | M Jun 02, 2021 | 05:41:59 P | SNAUTO | AL | NSE:INT | SEI | | | - <mark>Swept SA</mark> 50 Ω AC | | RF | | | L |
|------------------------|---|------------------|-------------------|--|---------------|----------------------------|-----------|----------------------------------|------------------------------------|------------|-------------|-----------------|---------------|-------------------|
| Marker Select Marke | CE 1 2 3 4 5 6 PE WWWWWW ET P N N N N N | TRAC | og-Pwr | Avg Type: Ext Gain: -0 | e Run | 1 | | PNO: Fas IFGain:Lo | 00 ms | | | r 1 / | (er | ł |
| | .130 ms 15 dBm | | | | | | | | 00 dBm | f 24. | Re | v | 3/div | E |
| Norn | | | <mark>∕3∆1</mark> | | | | | <u>2∆1</u> | | | | | |))) |
| De | | | | | | | | | | | | | |) -) - |
| Fixe | hille-hane-merlyt | holmynnorgstreda | | hand for the state of the state | hharapenparta | Hahahahahan Hahahahahan | Yillinimi | n.al.yop | -routinty | Mmmdu | hter | frepe le | (kay) |) -) -) - |
| (| | .000 ms (| veep 5 | | | 1.0 MHz | VBW | #\ | 0 GHz | IHz | 0 M | 2.44 V 1.0 | BW | nt s |
| Propertie | | FUNCTIO | JN WIDTH | TUN | Bm dB | 4.15 dE -0.04 -0.01 | (Δ) | 1.130 ms 365.0 μs 2.500 ms | ~ | (Δ) (Δ) | t t t | 1 | N 41 41 | - |
| Ma | | | | | | | | | | | | | | |



Time of Occupancy for Packet Type 1-DH3(GFSK)

| | | | | | | | | | | | | | | r - Swep | | | Spec | |
|------------------------|-----------------------|-----------|-----------------|------|-------|----|--------------|-----|------------------|-------|-----|----------------|---------------|----------|------|----------------|------|--------|
| Trace/Det | M Jun 02, 2021 | TRAC | AUTO -Pwr | | g Тур | A | VSE:IN | | | | | | AC | 50 Ω | F | RF | | L |
| Select Trace | Ε WWWWWWW ΤΡΡΡΡΡΡ | TYF De | dB | -0.7 | Gain: | E> | e Run 0dB | | , Trig: #Atte | | | NO: F Gain: | 3m | .00 dE | f 20 | Rei | /div |) dB/ |
| Clear Write | | 11 | | | | | | | | | | | | | | | | |
| Trace Average | | | | | | | | | | | 1 | | | | | | | 0.00 - |
| Max Hold | | | | | | | | | | | | | | | | | | 0.0 - |
| Min Hold | f - to A to a to a to | | <u>,</u> | | | | | | en de la | | | | , 11 Files | | | | | 0.0 - |
| View/Blank Trace On | | | The fire of the | | | | | | ant fordard o | 10.24 | | | | | | | | 0.0 - |
| | pan 0 Hz 1001 pts) | | /eep | s | | | | ЛНz | 1.0 N | вw | #VI | | Iz | 00 GH | | .4410 1.0 M | | |
| <u></u> | | | STATUS | | | | | | | | | | | | | | | G |

| Marker | 05:43:02 PM Jun 02, 2021 TRACE 1 2 3 4 5 6 | ALIGNAUTO : Log-Pwr | Avg T _i | SENSE:INT | | | 50 Ω AC 00 ms | | R ΒΔ2 | er∶ |
|--------------------------|---|------------------------|--------------------|--------------------------------|------------------|-------------------------|--------------------|--------|---------------------|---------------|
| Select Marke | DET P N N N N | -0.78 dB | Ext Ga | g: Free Run ten: 34 dB | | PNO: Fast IFGain:Lov | | | | |
| | /lkr3 2.500 ms 0.00 dB | ١Δ | | | | | 00 dBm | ef 24. | Re | div |
| Norn | | | 3. | <mark>2∆1</mark> | | | 1 | | | |
| De | | | | | | | | | | |
| Fixe | | | hermonia | With particular | | | | htyphy | nyuhay | 1 May |
| | Span 0 Hz 100 ms (1001 pts) | • | | | /BW [/] | #V | 0 GHz | /Hz | 1.0 N | w |
| | FUNCTION VALUE | ICTION WIDTH | INCTION | .09 dBm -0.06 dB 0.00 dB | | 745.0 μs 1.620 ms | X | (Δ) | RC SO 1 t 1 t | i 1 |
| Propertie | | | | 0.00 08 | (Δ) | 2.500 ms | | (Δ) | 1 t | 1 |
| Properties Mo 1 or | | | | 0.00 05 | (Δ) | 2.500 ms | | (Δ) | | 1 |

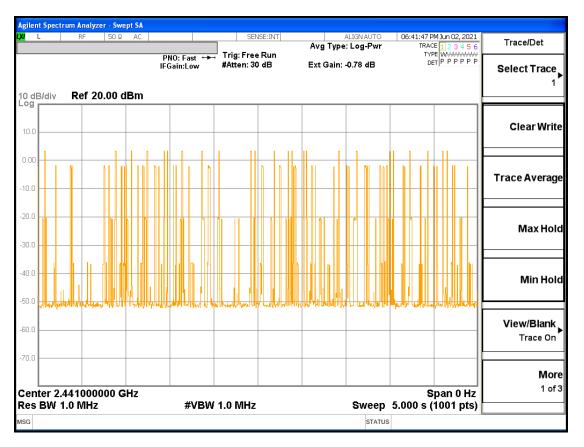


Time of Occupancy for Packet Type 1-DH5(GFSK)

| er - Swept SA | |
|--|------------------------|
| 50 Ω AC SENSE:INT ALIGN AUTO 06:47:16 PM Jun 02, Avg Type: Log-Pwr TRACE 1 2 3 | 456 Trace/Det |
| PNO: Fast ↔ Trig: Free Run TYPE WWWW IFGain:Low #Atten: 30 dB Ext Gain: -0.78 dB DET P P | Select Trace |
| | Clear Write |
| | Trace Average |
| | Max Hold |
| | Min Hold |
| Roberninen offenselsen Musician den allera, in den Todan Indan Indan Aler Aler ander Aler Aler Ander and Aler And Frankfin at | View/Blank Trace On |
| 000 GHz Span 0 #VBW 1.0 MHz Sweep 5.000 s (1001 | D Hz 1 of 3 |
| STATUS | <u>-</u> |

| L RF 50Ω AC | | SENSE:INT | ALIGNAUTO | 05:44:29 PM Jun 02, 2021 | |
|--|----------------------------|--------------------------------|---|--|------------------------|
| rker 3 Δ 5.00000 ms | PNO: Fast ↔→ IFGain:Low |]' | Avg Type: Log-Pwr Ext Gain: -0.78 dB | TRACE 1 2 3 4 5 6 TYPE WWWWWWW DET P N N N N N | Marker Select Marke |
| dB/div Ref 24.00 dBm | | | Δ | Mkr3 5.000 ms -0.05 dB | 3 |
| | | 241 | 3∆1 | | Norm |
| | | | | | De |
| | | หม่อนายีเขาแน่งรุงการเรียงเป็น | Wh | | Fixe |
| nter 2.441000000 GHz s BW 1.0 MHz MODE TRC SCL × | #VBW | 1.0 MHz | Sweep 1 | Span 0 Hz 0.00 ms (1001 pts) Function value | |
| | 1.205 ms 2.860 ms (Δ) | 4.04 dBm -0.03 dB | | | |
| $ \begin{array}{c cccc} N & 1 & t \\ \Delta 1 & 1 & t & (\Delta) \\ \Delta 1 & 1 & t & (\Delta) \\ \end{array} $ | 5.000 ms (Δ) | -0.05 dB | | | Propertie |
| Δ1 1 t (Δ) | | -0.05 dB | | | Propertie Mo 1 o |

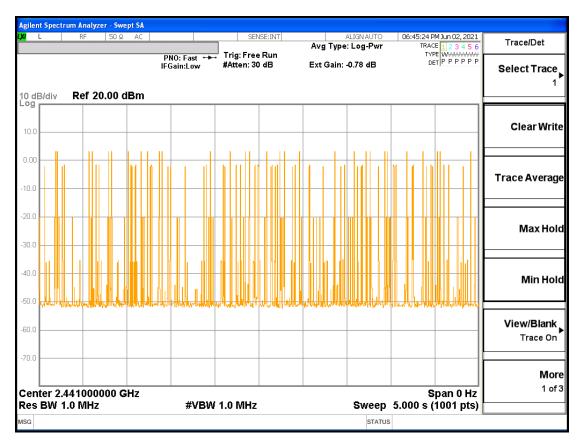




Time of Occupancy for Packet Type 2-DH1($\pi/4$ DQPSK)

| ilent Spectrum Analyzer - Swep L RF 50 Ω | | | ALIGN AUTO | | |
|---|------------------------------|--|-----------------------|---|---------------|
| arker 3 Δ 2.49941 m | AC S | SENSE:INT | Avg Type: Log-Pwr | 06:16:41 PM Jun 02, 2021 TRACE 1 2 3 4 5 6 | Marker |
| | PNO: Fast ↔ IFGain:Low | Trig: Free Run #Atten: 34 dB | Ext Gain: -0.78 dB | | Select Marker |
| dB/div Ref 24.00 dB | 3m | | Ĺ | Mkr3 2.499 ms 0.01 dB | 3 |
| 4.0 .00 | <2∆1 | | 3∆1 | | Norm |
| | | | | | |
| 6.0 | | | | | Del |
| 6.0 | | | | | |
| 6.0 | | transpolosperiol de la companya de la | alihoodiyyina yandaya | halana halan ya kata ka | Fixed |
| enter 2.441000000 GH es BW 1.0 MHz | | 1.0 MHz | Sweep 5 | Span 0 Hz .000 ms (1001 pts) | |
| R MODE TRC SCL 1 N 1 t | Χ 855.6 μs | 3.26 dBm | CTION FUNCTION WIDTH | FUNCTION VALUE | |
| 2 Δ1 1 t (Δ) 3 Δ1 1 t (Δ) 4 5 8 | 374.4 μs (Δ) 2.499 ms (Δ) | -0.55 dB 0.01 dB | | | Propertie |
| 7 3 9 0 | | | | | Mo |
| 2 | | | | | 1 0 |
| e | | | | | |





Time of Occupancy for Packet Type 2-DH3($\pi/4$ DQPSK)

| L RF 50Ω AC | | SENSE:INT | ALIGN AUTO | 06:18:57 PM Jun 02, 2021 | |
|---|--|-----------------------------------|--------------------|---|--------------|
| arker 3 Δ 2.49941 ms | | | Avg Type: Log-Pwr | TRACE 1 2 3 4 5 6 TYPE WWWWWW | Marker |
| | PNO: Fast ↔ IFGain:Low | , Trig: Free Run #Atten: 34 dB | Ext Gain: -0.78 dB | DET P P P P P | Select Marke |
| dB/div Ref 24.00 dBm | | | ۵ | Mkr3 2.499 ms 0.01 dB | Creetmane |
| | , ^{2/} | 31 | <u>\</u> | | Norn |
| | | | | | De |
| 0 0 0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/ | կլի | mpolitions/production | | Machinely.argumente | Fixe |
| nter 2.441000000 GHz s BW 1.0 MHz | | V 1.0 MHz | Sweep 5 | Span 0 Hz 5.000 ms (1001 pts) FUNCITION VALUE | |
| N 1 t Δ1 1 t (Δ) Δ1 1 t (Δ) | 165.6 μs 1.629 ms (Δ) 2.499 ms (Δ) | 3.06 dBm | | | Propertie |
| | | | | | M (|





| Agilent Spectru | | | | | | | | | |
|-----------------------------------|---------------------|-----|---|--------------------------|---------|--|--------------------------|--|------------------------|
| XI L | RF 50 Ω | AC | | | NSE:INT | | ALIGNAUTO E: Log-Pwr | 06:47:56 PM Jun 02, 2021 TRACE 1 2 3 4 5 6 | Trace/Det |
| 10 dB/div | Ref 20.00 (| | PNO: Fast ↔ IFGain:Low | Trig: Free #Atten: 30 | | Ext Gain: | -0.78 dB | TYPE WWWWWW DET P P P P P | Select Trace |
| 10.0 | | | | | | | | | Clear Write |
| .000 | | | | | | | | | Trace Average |
| 30.0 | | | | | | | | | Max Hold |
| 40.0 | | | | | | | | | Min Hol |
| 50.0 | | | 1974 1974 1974 1974 1974 1974 1974 1974 1974 1974 1974 1974 1974 1974 1974 1974 | e line declarité care | | and the second | Art n. Li nevi anterne u | A Line Land Martin Line also Article and A | View/Blank Trace On |
| 70.0 Center 2.44 Res BW 1.0 | 41000000 C 0 MHz | GHz | #VBW | 1.0 MHz | | | Sweep | Span 0 Hz 5.000 s (1001 pts) | Mor 1 of |
| ISG | | | | | | | STATUS | | L |

| RF | 50 Ω AC | | SENSE:INT | | 06:19:47 PM Jun 02, 2021 | |
|------------------------|------------------------|--|---------------------------------|---|---|-------------|
| r3∆4. | 99941 ms | PNO: Fast + IFGain:Low | Trig: Free Run #Atten: 34 dB | Avg Type: Log-Pwr Ext Gain: -0.78 dB | TRACE 1 2 3 4 5 6 TYPE WWWWWWWW DET P P P P P P | Marker |
| div Re f | ⁻ 24.00 dBm | IFGain:Low | #Atten: 34 dB | | Mkr3 4.999 ms 0.00 dB | Select Mark |
| | 1 | | 2Δ1 | 3∆1 | | Nor |
| | | | | | | D |
| nllphortschuler- | | | halmananan malan | NY 111 1 | nhatuwanharanah | Fixe |
| ter 2.4410 BW 1.0 M | 00000 GHz Hz | #VB | W 1.0 MHz | Sweep 1 | Span 0 Hz 0.00 ms (1001 pts) FUNCTION VALUE | |
| N 1 t Δ1 1 t | (Δ) (Δ) | 1.016 ms 2.879 ms (∆ 4.999 ms (∆ | | | | Properti |
| | | | | | | м |
| | | | | | | 1 |



Center 2.441000000 GHz

Res BW 1.0 MHz

MSG

#VBW 1.0 MHz



Time of Occupancy for Packet Type 3-DH1(8-DPSK)

| Marker | 05:59:36 PM Jun 02, 2021 TRACE 1 2 3 4 5 6 | LIGNAUTO | Avg Type | SENSE:INT | SE | | | 50 Ω .49500 | RF | er 3 | L rk |
|-------------|--|------------|--------------|----------------------------|------------------------|-----------------------|------------------|--------------------|-----------|----------|--------------------------|
| Select Mark | DET P N N N N | - | Ext Gain: | | Trig: Fre #Atten: 3 | 0: Fast ↔↔ ain:Low | | 43300 | | | |
| | Mkr3 2.495 ms 0.05 dB | Δ | | | | | dBm | f 24.00 (| Re | div | IB/ |
| Nor | | <u>3∆1</u> | | | | Δ1 | Q ¹ , | | | | |
| D | | | | | | | | | | | |
| | | | | | | | | | | | |
| Fix | ylyntressinger yn gynaraethan yn gynaraethan yn gynaraethan yn gynaraethan yn gynaraethan yn gynaraethan yn gyn Gwynaraethan yn gwynaraethan yn gwynaraethan yn gwynaraethan yn gwynaraethan yn gwynaraethan yn gwynaraethan yn | | n Manzara an | iddidwrwedi fydre d | Windowship | Mary Monder | h) | unir ulinis | lr velpne | tryllig. |) <mark>/</mark>) - |
| | Span 0 Hz 000 ms (1001 pts) | · · | | | 1.0 MHz | #VBW | | | .0 N | 3W 1 | 5 E |
| | FUNCTION VALUE | TION WIDTH | TION FUN | dBm 33 dB | 7 3.20 d -0.83 | 0 ms 1.0 μs (Δ) | 3 | (Δ) | t | 1 1 | ۱ ۵ |
| Properti | | | |)5 dB | 0.05 | 5 ms (∆) | 2. | (Δ) | t | .1 1 | Δ |
| N | | | | | | | | | | | |
| 1 | | | | | | | | | | | |

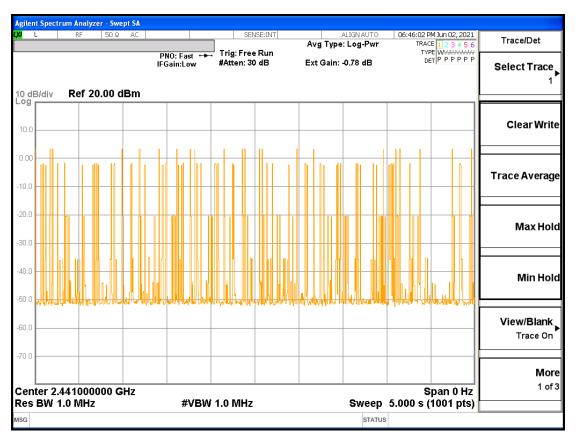
1 of 3

Span 0 Hz

Sweep 5.000 s (1001 pts)

STATUS

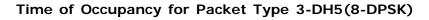


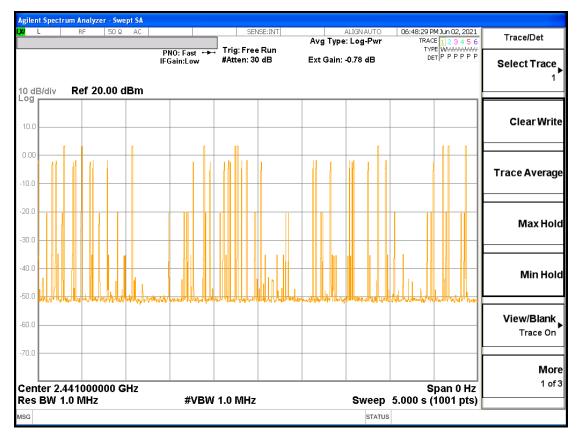


Time of Occupancy for Packet Type 3-DH3(8-DPSK)

| | | SENSE:INT | ALIGN AUTO | 06:00:31 PM Jun 02, 2021 | |
|---|-----------------------------|---------------------------------|---|---|-------------------------|
| L RF 50 Ω AC arker 3 Δ 2.50000 ms | PNO: Fast +++ IFGain:Low | Trig: Free Run #Atten: 34 dB | Avg Type: Log-Pwr Ext Gain: -0.78 dB | TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N | Marker Select Marker |
| dB/div Ref 24.00 dBm | | | Δ | Mkr3 2.500 ms 0.01 dB | Select Markel |
| | | 2Δ1 | 3∆1 | | Norm |
| 0 | | | | | |
| 0 | | | | | De |
| | | wypphiloppianthelip | , mw | | Fixe |
| nter 2.441000000 GHz s BW 1.0 MHz | #VBW | 1.0 MHz | - | Span 0 Hz .000 ms (1001 pts) | |
| | | | | | |
| Mode trc scl × N 1 t Δ1 1 t (Δ) | 620.0 μs 1.620 ms (Δ) | 3.25 dBm -0.31 dB | ICTION FUNCTION WIDTH | FUNCTION VALUE | |
| MODE TRC SCL X | | 3.25 dBm | FUNCTION WIDTH | FUNCTION VALUE | Propertie |
| R MODE TRC SCL × N 1 t Δ1 1 t (Δ) Δ1 1 t (Δ) | 1.620 ms (Δ) | 3.25 dBm -0.31 dB | FUNCTION FUNCTION WIDTH | FUNCTION VALUE | • |
| R MODE TRC SCL X N 1 t Δ1 1 t (Δ) Δ1 1 t (Δ) | 1.620 ms (Δ) | 3.25 dBm -0.31 dB | FUNCTION WIDTH | FUNCTION VALUE | Propertie Mc |







| RF 50 Ω AC | | SENSE:INT | ALIGN AUTO | 06:01:52 PM Jun 02, 2021 | Mandar |
|--|--|--|--------------------------------|---|-----------------------|
| r 3 Δ 5.00000 ms | PNO: Fast ↔ Tr IFGain:Low #A | rig: Free Run | Type: Log-Pwr ain: -0.78 dB | TRACE 123456 TYPE WWWWWWW DET P N N N N N | Marker Select Mark |
| iv Ref 24.00 dBm | | | الم | Mkr3 5.000 ms -0.01 dB | |
| Q1 | 2Δ1 | 3∆1 | | | Nor |
| | | | | | |
| | | | | | D |
| ljohnshkirepetel | Kaldyn | uhuhayaparanayaaraya | | hypertunitionshiperious | Fix |
| - 2.441000000 GHz № 1.0 MHz | #VBW 1.0 | | - | Span 0 Hz 1.00 ms (1001 pts) | |
| E TRC SCL Χ 1 t 1 t (Δ) 1 t (Δ) | 1.050 ms 2.880 ms (Δ) 5.000 ms (Δ) | Y FUNCTION 3.26 dBm -0.92 dB -0.01 dB | FUNCTION WIDTH | FUNCTION VALUE | Properti |
| | | | | | N |
| | | | | | 1 |



4.5 Maximum peak Conducted Output Power

Test Procedures

ANSI C63.10-2013 7.8.5

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test.

The spectrum analyzer is set to :

Center frequency = the highest, middle and the lowest channels

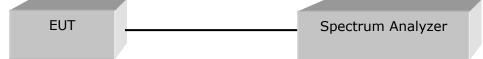
- a) Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)
- b) RBW = 3 MHz (greater than the 20 dB bandwidth of the emission being measured)
- c) VBW = 3 MHz (\geq RBW)

d) Detector = peakf) Sweep = auto

Allow trace to stabilize.

e) Trace = max hold

Use the marker-to-peak function to set the marker to the peak of the emission.



Limit

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p. shall not exceed 4 W



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Test Results

Test mode : GFSK

| Frequency [MHz] | Conducted Power [dBm] | Conducted power [mW] | e.i.r.p. [dBm] | e.i.r.p. [W] | Result |
|--------------------|--------------------------|-------------------------|-------------------|-----------------|----------|
| 2 402 | 4.57 | 2.864 | 7.97 | 0.006 3 | Complies |
| 2 441 | 4.22 | 2.642 | 7.62 | 0.005 8 | Complies |
| 2 480 | 3.75 | 2.371 | 7.15 | 0.005 2 | Complies |

Test mode : $\pi/4$ DQPSK

| Frequency [MHz] | | | e.i.r.p. [dBm] | e.i.r.p. [W] | Result |
|--------------------|------|-------|-------------------|-----------------|----------|
| 2 402 | 4.22 | 2.642 | 7.62 | 0.005 8 | Complies |
| 2 441 | 3.81 | 2.404 | 7.21 | 0.005 3 | Complies |
| 2 480 | 3.33 | 2.153 | 6.73 | 0.004 7 | Complies |

Test mode : 8-DPSK

| Frequency [MHz] | Conducted Power [dBm] | Conducted power [mW] | e.i.r.p. [dBm] | e.i.r.p. [W] | Result |
|--------------------|--------------------------|-------------------------|-------------------|-----------------|----------|
| 2 402 | 4.44 | 2.780 | 7.84 | 0.006 1 | Complies |
| 2 441 | 3.90 | 2.455 | 7.30 | 0.005 4 | Complies |
| 2 480 | 3.43 | 2.203 | 6.83 | 0.004 8 | Complies |

Remark

1. e.i.r.p.[dBm] = Conducted Power[dBm] + Antenna Gain[dBi]

2. Antenna Gain [dBi] = 3.4

See next pages for actual measured spectrum plots.



Test Mode : GFSK

| | | · | Channe | Lowest | | | |
|--|---|--|--------|---------------------------------|---------------------------|-------------------------------|----------|
| | | | | | | um Analyzer - Swept SA | |
| Frequency | 05:36:52 PM Jun 02, 2021 TRACE 1 2 3 4 5 6 | ALIGNAUTO e: Log-Pwr | Avg Tv | SENSE:INT | GH7 | RF 50 Ω AC req 2.402000000 | a RL |
| Auto Tur | 2.401 785 GHz 4.566 dBm | l:>30/30 :-0.78 dB <mark>Mkr1</mark> | | Trig: Free Run #Atten: 36 dB | PNO: Fast 😱 IFGain:Low | | |
| | 4.566 dBm | | | | | Ref 26.00 dBm |) dB/div |
| Center Fre 2.402000000 GF | | | | | | | 16.0 |
| | | | | ≬ 1 | | | 5.00 |
| Start Fre 2.399500000 GF | | | | | | | .00 |
| Stop Fr 2.404500000 G | | | | | | | 4.0 |
| CF St e 500.000 k <u>Auto</u> M | | | | | | | 4.0 |
| Freq Offs 0 | | | | | | | 4.0 |
| | | | | | | | 4.0 |
| | Span 5.000 MHz 1.00 ms (1001 pts) | Sweep | | 3.0 MHz | #VBW | 402000 GHz 3.0 MHz | |
| a | | STATUS | | | | | G |

[Lowest channel]

[Middle channel]

| 0 RL | um Analyzer - Swept SA RF 50 Ω AC | | SENSE:INT | ALIGNAUTO |) 05:39:19 PM Jun 02, 2021 | |
|---------------------|--------------------------------------|--------------------|----------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Center Fr | req 2.44100000 | 0 GHz PNO: Fast | Trig: Free Run | Avg Type: Log-Pwi Avg Hold:>30/30 | | Frequency |
| 10 dB/div | Ref 26.00 dBm | IFGain:Low | #Atten: 36 dB | Ext Gain: -0.78 dB Mkt | 1 2.440 860 GHz 4.221 dBm | Auto Tun |
| 16.0 | | | | | | Center Fre 2.441000000 GH |
| 5.00 4.00 | | | • ' | | | Start Fre 2.438500000 GF |
| 4.0 | | | | | | Stop Fr 2.443500000 G |
| 4.0 | | | | | | CF Sto 500.000 k <u>Auto</u> M |
| 4.0 | | | | | | Freq Offs 0 |
| 64.0 | | | | | | |
| enter 2.4 Res BW | 41000 GHz 3.0 MHz | #VBW | 3.0 MHz | Sweep | Span 5.000 MHz 1.00 ms (1001 pts) | |
| ISG | | | | STAT | rus | t. |



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[Highest channel]

| | um Analyzer - Swept SA | | | | | | |
|-----------|-------------------------------|--------------------------|-----------|-----------|----------------------------------|--|---|
| Center Fi | RF 50 Ω AC req 2.480000000 | GHz PNO: Fast 😱 Trig: | SENSE:INT | | ALIGNAUTO : Log-Pwr >30/30 | 05:46:30 PM Jun 02, 2021 TRACE 1 2 3 4 5 6 TYPE MWWWWW | |
| 10 dB/div | Ref 26.00 dBm | | n: 36 dB | Ext Gain: | -0.78 dB | _{DET} РРРРР 2.479 880 GHz 3.749 dBm | Auto Tune |
| 16.0 | | | a1 | | | | Center Fred 2.480000000 GH; |
| -4.00 | | | | | | | Start Fred 2.477500000 GH: |
| -14.0 | | | | | | | Stop Fre 2.482500000 GH |
| -34.0 | | | | | | | CF Stej 500.000 kH <u>Auto</u> Ma |
| -54.0 | | | | | | | Freq Offse 0 H |
| -64.0 | 180000 GHz | | | | | Span 5.000 MHz | |
| #Res BW | | #VBW 3.0 N | IHz | | Sweep | 1.00 ms (1001 pts) | |
| MSG | | | | | STATU | s | |



Test Mode : $\pi/4$ DQPSK

| | | | | | um Analyzer - Swept SA | Agilent Spectr |
|--------------|--------------------------|--|----------------|-------------|------------------------|----------------|
| Peak Search | 06:22:36 PM Jun 02, 2021 | ALIGNAUTO | SENSE:INT | | RF 50 Ω AC | |
| r can ocaron | | /g Type: Log-Pwr g Hold:>100/100 | Trig: Free Run | | 2.402025000000 | Marker 1 |
| | DET P P P P P | g 1010.2 1007100 t Gain: -0.78 dB | #Atten: 36 dB | PNO: Fast 😱 | | |
| NextPea | | | | IFGam.Low | | |
| Hoxer ou | 2.402 025 GHz | IVIKIT | | | | |
| | 4.215 dBm | | | | Ref 26.00 dBm | 10 dB/div |
| | | | | | | Log |
| | | | | | | |
| Next Pk Righ | | | | | | 16.0 |
| | | | | | | |
| | | | <u>1</u> | | | |
| | [| | V | | | 6.00 |
| Next Pk Lei | | | | | | |
| NEXTERLE | | | | | | -4.00 |
| | | | | | | -4.00 |
| | | | | | | |
| | | | | | | -14.0 |
| Marker Delt | | | | | | |
| | | | | | | -24.0 |
| | | | | | | -24.0 |
| | | | | | | |
| | | | | | | -34.0 |
| Mkr→C | | | | | | |
| | | | | | | |
| | | | | | | -44.0 |
| | | | | | | |
| Mkr→RefL | | | | | | -54.0 |
| | | | | | | |
| | | | | | | |
| | | | | | | -64.0 |
| Mor | | | | | | |
| 1 of: | | | | | | |
| 101 | Span 5.000 MHz | | | | 102000 GHz | |
| | 1.00 ms (1001 pts) 💾 | Sweep | .0 MHz | #VBW \$ | 3.0 MHz | #Res BW |
| | | STATUS | | | | ISG |
| | | STATUS | | | | 133 |

[Lowest channel]

[Middle channel]

| pectrum Analyzer - Swept 9 RF 50 Ω A | | SENSE:INT | ALIGNAUTO | 06:23:31 PM Jun 02, 2021 | |
|---|----------------------|---------------------------------|--|---|----------|
| er 1 2.441020000 | 000 GHz PNO: Fast | Trig: Free Run #Atten: 36 dB | Avg Type: Log-Pwr Avg Hold:>100/100 Ext Gain: -0.78 dB | TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P P | Peak Sea |
| div Ref 26.00 dBi | IFGain:Low | #Atten: 36 dB | | 2.441 020 GHz 3.805 dBm | Next |
| | | | | | Next Pk |
| | | 1 | | | |
| | | | | | Next P |
| | | | | | Marke |
| | | | | | |
| | | | | | Mk |
| | | | | | |
| | | | | | Mkr→F |
| | | | | | |
| er 2.441000 GHz BW 3.0 MHz | #VBW | 3.0 MHz | Sweep | Span 5.000 MHz 1.00 ms (1001 pts) | |
| | | | STATUS | · · · · L | |



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[Highest channel]

| Agilent Spectrum Ana | | | | | | | |
|-----------------------|-----------------------|---------------------------------------|---------------|---|--------------------------|------------------|------------------|
| Marker 1 2.48 | 50 Ω AC 0120000000 |) GHz PNO: Fast 😱 | SENSE:INT | ALIGN/ Avg Type: Log Avg Hold:>100/ | -Pwr TRACI | M Jun 02, 2021 | Peak Search |
| 10 dB/div Ref | 26.00 dBm | PNU: Fast IFGain:Low | #Atten: 36 dB | Ext Gain: -0.78 | 1kr1 2.480 1: | 20 GHz 32 dBm | NextPea |
| 16.0 | | | | | | | Next Pk Righ |
| 6.00 | | · · · · · · · · · · · · · · · · · · · | ∲ 1 | | | | Next Pk Le |
| 24.0 | | | | | | | Marker De |
| 34.0 | | | | | | | Mkr→C |
| 54.0 | | | | | | | Mkr→RefL |
| 64.0 Center 2.4800 | | | | | Span 5. | 000 MHz | Mo 1 o |
| #Res BW 3.0 N Isg | III Z | #VDVV | 3.0 MHz | | eep 1.00 ms (' status | iou i pts) | |



Test Mode : 8-DPSK

| Agilent Spectrum Anal | man Sumat SA | | | | | |
|----------------------------------|--------------|------------------|---------------------------------|---|-------------------------------|--|
| Agnent Spectrum Anar XI RL RF | 50 Ω AC | | SENSE:INT | ALIGNAUT | 05:55:33 PM Jun 02, 2021 | [|
| Center Freq 2. | | GHz PNO: Fast | Trig: Free Run #Atten: 36 dB | Avg Type: Log-Pw Avg Hold:>30/30 Ext Gain: -0.78 dB | | Frequency |
| 10 dB/div Ref : | 26.00 dBm | iFGain:Low | Materi oo de | | r1 2.401 935 GHz 4.441 dBm | Auto Tun |
| 16.0 | | | | | | Center Fre 2.402000000 GH |
| 4.00 | | | | | | Start Fre 2.399500000 GH |
| 24.0 | | | | | | Stop Fre 2.404500000 GH |
| 34.0 | | | | | | CF Ste 500.000 kH <u>Auto</u> Ma |
| 54.0 | | | | | | Freq Offso 0 H |
| 64.0 Center 2.40200 | 0 GHz | | | | Span 5.000 MHz | |
| Res BW 3.0 M | | #VBW | 3.0 MHz | Sweej | o 1.00 ms (1001 pts) | |

[Lowest channel]

[Middle channel]

| | | - | | • | | um Analyzer - Swept SA | Agilent Spect |
|--|--|--|---------|---------------|------------------|------------------------|---------------|
| Frequency | 05:58:00 PM Jun 02, 2021 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P P P P P P | ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>30/30 | | SENSE:INT | GHz PNO: Fast | RF 50 Ω AC | Center Fr |
| Auto Tune | 2.440 880 GHz 3.900 dBm | n: -0.78 dB Mkr1 | Ext Gai | #Atten: 36 dB | IFGain:Low | Ref 26.00 dBm | 10 dB/div |
| Center Fred 2.441000000 GH: | | | | | | | 16.0 |
| Start Fre 2.438500000 GH | | | | | | | -4.00 |
| Stop Fre 2.443500000 GH | | | | | | | -14.0 |
| CF Ste 500.000 kH <u>Auto</u> Ma | | | | | | | 34.0 |
| Freq Offse 0 H | | | | | | | -54.0 |
| | Span 5.000 MHz | | | | | 141000 GHz | -64.0 |
| | 1.00 ms (1001 pts) | Sweep STATUS | | 3.0 MHz | #VBW | 3.0 MHz | #Res BW |



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[Highest channel]

| | m Analyzer - Swept SA | | | | |
|-----------|------------------------------|---|--------------------|---|--|
| Center Fr | RF 50 Ω AC eq 2.480000000 | | Avg Type: Log-Pwr | TRACE 1 2 3 4 5 6 | Frequency |
| 10 dB/div | Ref 26.00 dBm | PN0: Fast 🕞 Trig: Free Ru IFGain:Low #Atten: 36 dB | Ext Gain: -0.78 dB | _{DET} РРРРРР 1 2.479 950 GHz 3.433 dBm | Auto Tune |
| 16.0 | | | | | Center Fred 2.480000000 GH; |
| -4.00 | | | | | Start Fred 2.477500000 GH: |
| -14.0 | | | | | Stop Free 2.482500000 GH |
| -34.0 | | | | | CF Ste 500.000 kH <u>Auto</u> Ma |
| -54.0 | | | | | Freq Offse |
| -64.0 | 80000 GHz | | | Span 5.000 MHz | |
| #Res BW 3 | | #VBW 3.0 MHz | Sweep | 1.00 ms (1001 pts) | |
| MSG | | | STAT | JS | |



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4.6 Unwanted Emissions (Conducted)

Test Procedures

ANSI C63.10-2013 7.8.6 / ANSI C63.10-2013 7.8.8

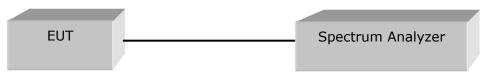
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB.

The bandwidth at 20 dB down from the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to :

Center frequency = the highest, middle and the lowest channels

a) RBW = 100 kHzb) VBW = 300 kHz (≥ RBW)c) Span = 30 MHz to 10 times the operating
frequency in GHzd) Detector = peake) Trace = max holdf) Sweep = auto



Limit

> 20 dBc

Test Results

All conducted emission in any 100 kHz bandwidth outside of the spectrum band was at least 20 dB lower than the highest level of the in-band spectral density. Therefore the applying equipment meets the requirement.

See next pages for actual measured spectrum plots.



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Band Edge



Test Mode : Hopping mode, GFSK





| Agilent Spectrum Analyzer - Swept SA | | | | | |
|---|--|-----------|--|---|--|
| 🗶 RL RF 50Ω AC | | NSE:INT | ALIGNAUTO | 06:07:24 PM Jun 02, 2021 | F arana and |
| Center Freq 2.40000000 (| GHZ PNO: Wide 🎧 Trig: Fre IFGain:Low #Atten: 2 | e Run Avg | g Type: Log-Pwr Hold:>30/30 Gain: -0.78 dB | TRACE 1 2 3 4 5 6 TYPE M WWWWWW DET P P P P P P | Frequency |
| 10 dB/div Ref 12.00 dBm | | | Mkr | 1 2.404 83 GHz 0.348 dBm | Auto Tune |
| | | | | <u> </u> | Center Fred |
| 2.00 | | | mann | www.www. | 2.40000000 GHz |
| 8.00 | | لير | | | Start Free |
| -18.0 | | ++ | | -19.65 dDm | 2.395000000 GHz |
| 28.0 | | MMM | | | Stop Free 2.405000000 GH |
| 38.0 | | | | | 2.403000000 GIT |
| 48.0 | - m | - | | | CF Step 1.000000 MH <u>Auto</u> Mar |
| 58.0 | Multime | | | | |
| 68.0 parts grow Marrow Margare July 414 | Y 1 | | | | Freq Offse 0 H |
| 78.0 | | | | | |
| Center 2.400000 GHz #Res BW 100 kHz | #VBW 300 kHz | <u> </u> | Sweep ′ | Span 10.00 MHz 1.00 ms (1001 pts) | |
| ASG | | | STATUS | | |

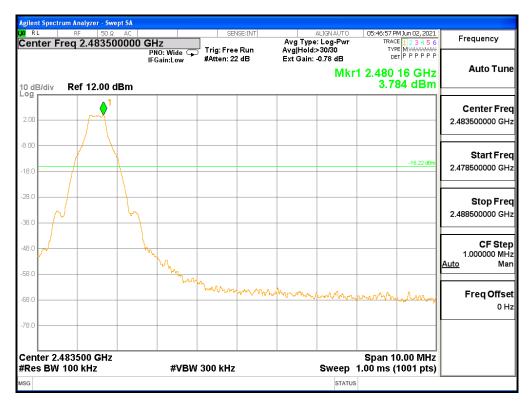
Test Mode : Hopping mode, 8-DPSK





| | 05:37:18 PM Jun 02, 2021 | ALIGN AUTO | | SENSE:INT | | AC | RF 50 Ω | RL |
|-----------------------------------|--|---------------------|----------------------------------|-------------------------------|----------------------------------|------|-----------------------|--------------|
| Frequency | TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P P | : Log-Pwr >30/30 | Avg Typ Avg Hold Ext Gain: | rig: Free Run Atten: 22 dB | GHz PNO: Wide 🖵 IEGain:Low | | req 2.40000 | |
| Auto Tun | 2.402 16 GHz 4.537 dBm | | | | IF Gall. LUW | 1Bm | Ref 12.00 d | 0 dB/div |
| Center Fre 2.400000000 G⊦ | | | | | | | | 2.00 |
| Start Fre 2.395000000 G⊦ | -15.46 dBm | | | | | | | 18.0 |
| Stop Fre 2.405000000 GH | | h | λ | | | | | 28.0 |
| CF Ste 1.000000 MH Auto Ma | how we have a second se | | | Marina | | | | 48.0 |
| Freq Offs 0 ⊦ | - M. | | | | mmm | ~~~~ | Mannar | 58.0 58.0 |
| | On on 40.00 Mile | | | | | | | 78.0 |
| | Span 10.00 MHz .00 ms (1001 pts) | Sweep 1 | | 0 kHz | #VBW : | | 100000 GHz 100 kHz | Res BW |
| | - <u> </u> | STATUS | | | | | | SG |

Test Mode : Non-Hopping mode, GFSK





| Agilent Spectrum Ana | | | | | | |
|---------------------------------|------------|---------------------------|---------------------------------|--------------------------------------|---|-----------------------------------|
| RL RF Center Freq 2 | 50 Ω AC | | SENSE:INT | ALIGNAUTO Avg Type: Log-Pwr | 05:56:00 PM Jun 02, 2021 TRACE 1 2 3 4 5 6 | Frequency |
| Senter Freq 2 | .400000000 | PNO: Wide 😱 IFGain:Low | Trig: Free Run #Atten: 22 dB | Avg Hold>30/30 Ext Gain: -0.78 dB | TYPE MWWWWW DET PPPPP | Auto Tun |
| IO dB/div Ref | 12.00 dBm | | | Mki | 1 2.402 16 GHz 3.775 dBm | Auto Tun |
| | | | | | | Center Fre |
| 2.00 | | | | - martin | | 2.400000000 GH |
| 8.00 | | | | | -16.23 dBm | Start Fre 2.395000000 GH |
| -18.0 | | | | | \sim | 2.39500000 GH |
| 28.0 | | | | | | Stop Fre 2.405000000 GH |
| 38.0 | | | mund | | W.M. | CF Ste |
| 48.0 | | m | ~ | | | 1.000000 M⊢ Auto Ma |
| 58.0 68.0 MMM | Man | , when with | | | | F O ff |
| 68.0 MMMMM | 2 ~ Y | | | | | FreqOffse 0⊦ |
| 78.0 | | | | | | |
| Center 2.40000 #Res BW 100 F | | #VBW | 300 kHz | Sweep | Span 10.00 MHz 1.00 ms (1001 pts) | |
| ISG | | | | STATU | e . | L |

Test Mode : Non-Hopping mode, 8-DPSK





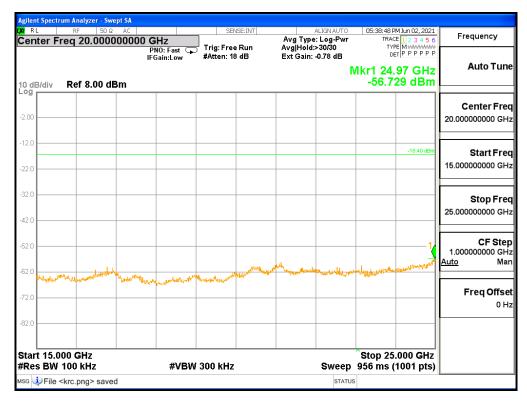
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Spurious Emission

Test Mode : GFSK

[Lowest Channel]

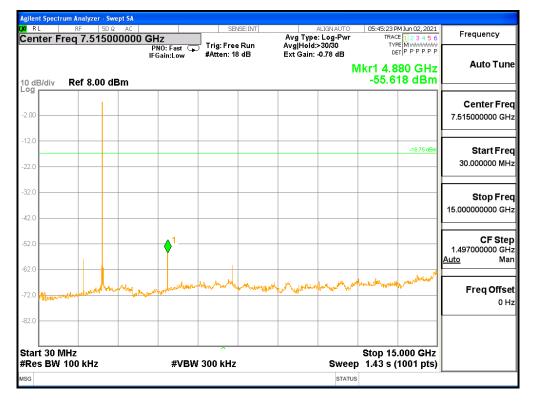
| Frequency | 05:38:13 PM Jun 02, 2021 | ALIGNAUTO | | NSE:INT | SE | | | | R |
|-------------------------|--------------------------------------|---------------------------------|-------|---------|------------------------|----------------------------------|--------|-----------|----------------------|
| Frequency | TRACE 1 2 3 4 5 6 TYPE M | ::Log-Pwr >30/30 -0.78 dB | Avgil | | Trig: Fre #Atten: 1 | GHz PNO: Fast 🖵 IEGain:Low | 00000 | 7.51500 | ter Freq |
| Auto Tu | kr1 4.805 GHz -51.955 dBm | М | | | | | Bm | f 8.00 di | i/div Re |
| Center Fr | | | | | | | | | |
| 7.515000000 G | | | | | | | | | |
| Start Fr | -16.40 dBm | | | | | | | | |
| 30.000000 M | | | | | | | | | |
| Stop Fr | | | | | | | | | |
| 15.00000000 G | | | | | | | | | |
| CF St | | | | | | ♦ ¹ | | | |
| 1.497000000 G Auto N | | | | | | | | | |
| Freq Offs | Margon and and man and | anner har | A Mar | | where the population | Mar Warpele Like and | A LAND | - Il lave | |
| 0 | | | | | | Mpt - WA | - Va-V | Mare. | the way and the |
| | | | | | | | | | |
| | Stop 15.000 GHz 1.43 s (1001 pts) | Sweep | | | , 300 kHz | #VBW | | kHz | : 30 MHz : BW 100 |
| | 1110 0 (1001 ptc) | STATUS | | | 000 1.112 | | | | |

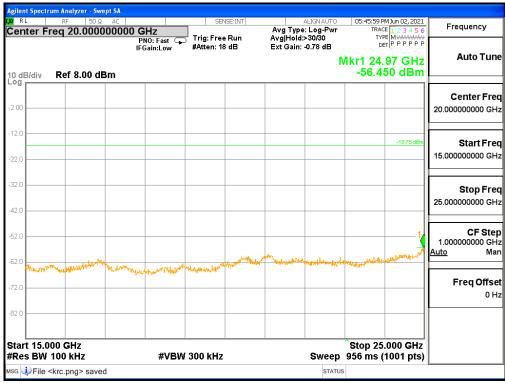




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[Middle Channel]

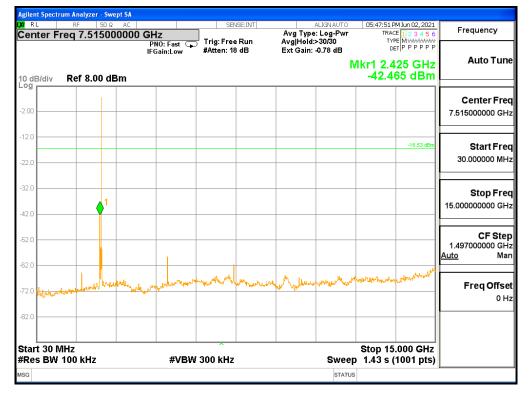


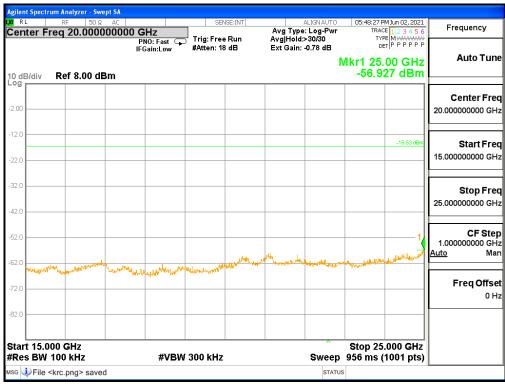




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[Highest Channel]





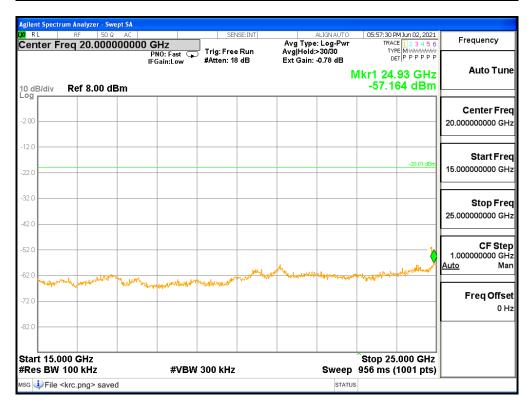


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Test Mode : 8-DPSK

| Res BW | 100 kHz | #VBW 300 kH; | 2 | Sweep | 1.43 s (1001 pts) | |
|---------------|-------------------------|--|-------------|--|--|------------------------------|
| start 30 M | | # (DW 000 LU) | | • | Stop 15.000 GHz | |
| 02.0 | | | | | | |
| 82.0 | | | | | | 0 Н |
| 72.0 1 | when we want walker and | land and and and and and and and and and | monument of | Www.an. any Muland | tolad Mary Mary Mary Mary Mary | Freq Offse |
| 52.0 | | | | | | <u>Auto</u> Ma |
| 52.0 | | ↓ 1 | | | | CF Ste 1.49700000 GH |
| 12.0 | | | | | | |
| 2.0 | | | | | | Stop Fre 15.00000000 GH |
| | | | | | | |
| 20 | | | | | -20.01 dBm | Start Fre 30.000000 MH |
| 2.0 | | | | | | |
| 2.00 | | | | | | Center Fre 7.515000000 GH |
| odB/div | Ref 8.00 dBm | | | | -56.724 dBm | |
| | | IFGain:Low #Atten: ' | | | lkr1 4.805 GHz | Auto Tur |
| enter F | req 7.5150000 | PNO: Fast 😱 Trig: Fre | e Run Av | g Type: Log-Pwr g Hold:>30/30 t Gain: -0.78 dB | TRACE 1 2 3 4 5 6 TYPE MWWWWWW DET P P P P P P | Frequency |
| RL | RF 50 Ω AC | SE | ENSE:INT | ALIGN AUTO | 05:56:54 PM Jun 02, 2021 | - |

[Lowest Channel]

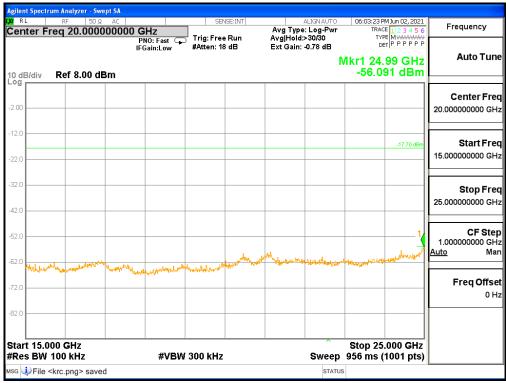




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[Middle Channel]

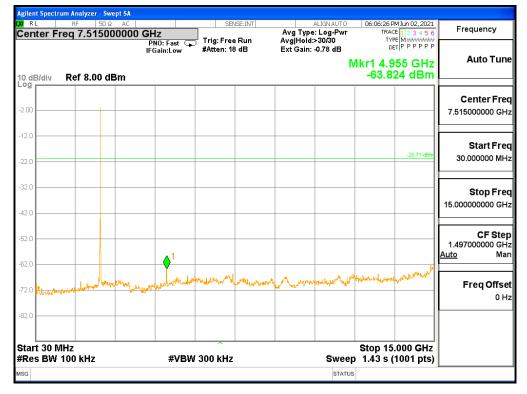


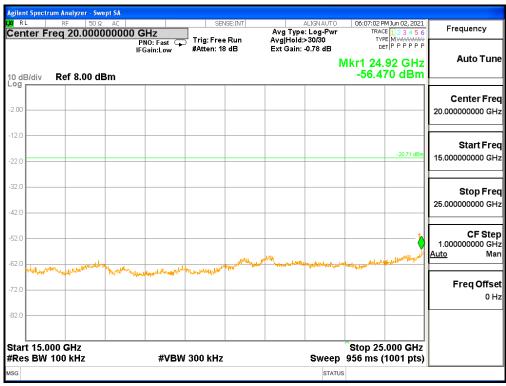




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[Highest Channel]







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4.7 Radiated Emission

Test Location

 \boxtimes 10 m SAC (test distance : \square 10 m, \boxtimes 3 m) \boxtimes 3 m SAC (test distance : 3 m)

Test Procedures

ANSI C63.10-2013 - Section 6.5, 6.6 RSS-Gen - Section 6.13

- 1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- 2) In the frequency rage above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

Instrument Settings

Frequency Range = 9 kHz ~ 26.5 GHz (2.4 GHz 10th harmonic)

a) RBW = 1 MHz for f \geq 1 GHz, 100 kHz for f < 1 GHz, 9 kHz for f < 30 MHz

200 Hz for f < 150 kHz

- b) VBW \geq RBW
- c) Sweep time = auto couple



Limit :

Unwanted emissions that do not fall within the restricted frequency bands of Table 1 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

FCC Part 15 § 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| | | | 1 5 | | |
|--------------------------|-------------------|-------------------------|---------------|-------------|-------------------------|
| MHz | MHz | MHz | MHz | MHz | GHz |
| 0.09-0.11 | 8.37626-8.38675 | 73-74.6 | 399.9-410 | 2690-2900 | 10.6-12.7 |
| ¹ 0.495-0.505 | 8.41425-8.41475 | 74.8-75.2 | 608-614 | 3260-3267 | 13.25-13.4 |
| 2.1735-2.1905 | 12.29-12.293 | 108-121.94 | 960-1240 | 3332-3339 | 14.47-14.5 |
| 4.125-4.128 | 12.51975-12.52025 | 123-138 | 1300-1427 | 3345.8-3358 | 15.35-16.2 |
| 4.17725-4.17775 | 12.57675-12.57725 | 149.9-150.05 | 1435-1626.5 | 3600-4400 | 17.7-21.4 |
| 4.20725-4.20775 | 13.36-13.41 | 156.52475- 156.52525 | 1645.5-1646.5 | 4500-5150 | 22.01-23.12 |
| 6.215-6.218 | 16.42-16.423 | 156.7-156.9 | 1660-1710 | 5350-5460 | 23.6-24 |
| 6.26775-6.26825 | 16.69475-16.69525 | 162.0125-167.17 | 1718.8-1722.2 | 7250-7750 | 31.2-31.8 |
| 6.31175-6.31225 | 16.80425-16.80475 | 167.72-173.2 | 2200-2300 | 8025-8500 | 36.43-36.5 |
| 8.291-8.294 | 25.5-25.67 | 240-285 | 2310-2390 | 9000-9200 | ² Above 38.6 |
| 8.362-8.366 | 37.5-38.25 | 322-335.4 | 2483.5-2500 | 9300-9500 | |

 Table 1. Restricted Frequency Bands

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

*Certain frequency bands listed in Table 1 and in band above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in the 200- and 300-series of RSSs, such as RSS-210 and RSS-310, which contain the requirements that apply to licence-exempt radio apparatus



FCC Part 15 § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 2 :

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in table 2 Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

| Frequency(MHz) | Field Strength (uV/m) | Field Strength (dBuV/m) | Deasurement Distance (meters) |
|----------------|--------------------------|----------------------------|-------------------------------------|
| 0.009-0.490 | 2400/F(kHz) | 48.5 - 13.8 | 300 |
| 0.490-1.705 | 24000/F(kHz) | 33.8 - 23 | 30 |
| 1.705-30 | 30 | 29.5 | 30 |
| 30-88 | 100** | 40 | 3 |
| 88-216 | 150** | 43.5 | 3 |
| 216-960 | 200** | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Table 2. General Field Strength Limits for Licence-Exempt Transmitters

** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Note :

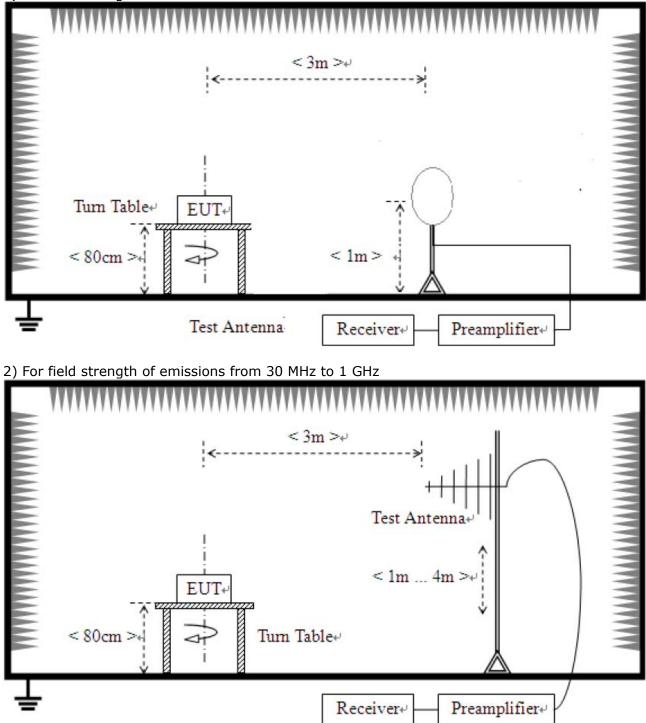
- For above 1 GHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
- For above 1 GHz, limit field strength of harmonics : 54 dBuV/m@3m (AV) and 74 dBuV/m@3m (PK)
- 3) For measurement above 1GHz, the resolution bandwidth is set to 1 MHz and video bandwidth is set to 3 MHz for peak measurement.



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Test Setup:

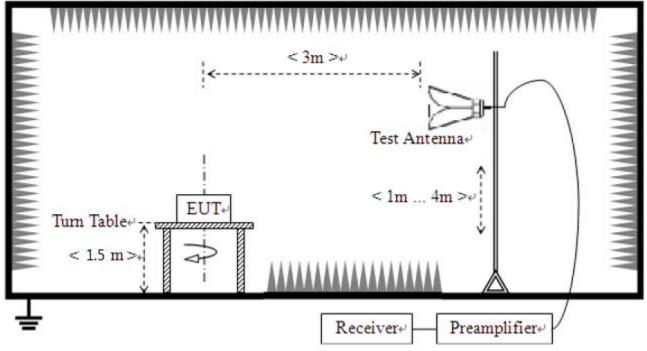
1) For field strength of emissions from 9 kHz to 30 MHz





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3) For field strength of emissions above 1 GHz





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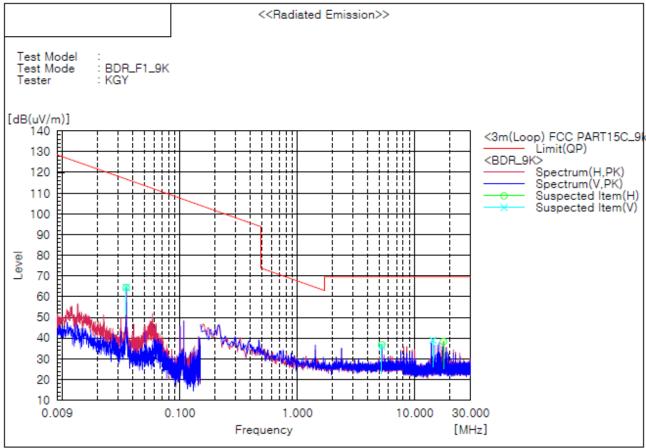
Test results

1) 9 kHz to 30 MHz

Test mode : Transmission status GFSK Lowest channel (Worst case)

The requirements are: \square Complies

Test Data



Result : There are more than 20 dB of margin compared to the reference value.

- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(correction factor)
- 3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
- 4. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
- 5. This data is the Peak(PK) value.

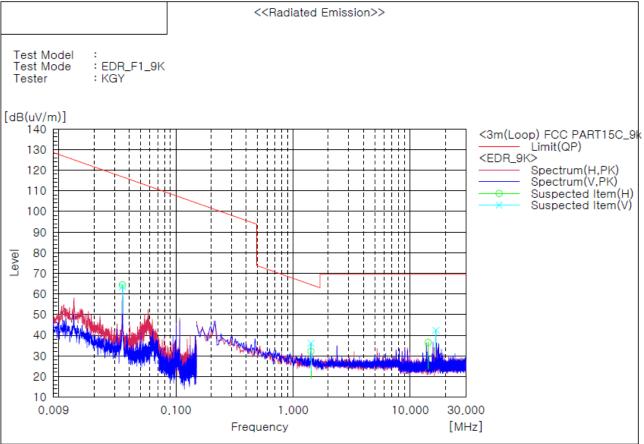


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Test mode : Transmission status 8-DPSK Lowest channel (Worst case)

The requirements are: Complies

Test Data



Result : There are more than 20 dB of margin compared to the reference value.

- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(correction factor)
- 3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
- 4. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
- 5. This data is the Peak(PK) value.



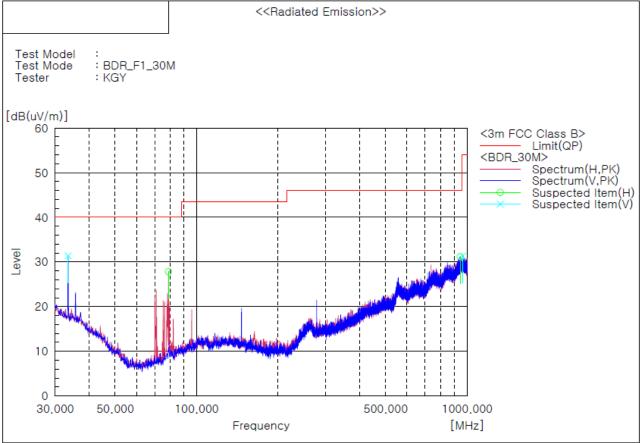
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2) 30 MHz to 1 GHz

Test mode : Transmission status GFSK Lowest channel (Worst case)

The requirements are: \square Complies

Test Data



Spectrum Selection

| No. | Frequency | (P) | Reading | c.f | Result PK | Limit | Margin QP | Height | Angle |
|-----|-----------|-----|----------|-----------|--------------|------------|--------------|--------|-------|
| | [MHz] | | [dB(uV)] | [dB(1/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB] | [cm] | [deg] |
| 1 | 33.516 | V | 38.5 | -7.1 | 31.4 | 40.0 | 8.6 | 101.0 | 339.0 |
| 2 | 943.983 | Н | 23.0 | 8.2 | 31.2 | 46.0 | 14.8 | 306.0 | 301.0 |
| 3 | 963.746 | V | 22.7 | 8.6 | 31.3 | 54.0 | 22.7 | 101.0 | 200.0 |
| 4 | 78.743 | Н | 44.0 | -16.2 | 27.B | 40.0 | 12.2 | 209.0 | 339.0 |

- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(Correction factor)
- 3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator Amp Gain
- 4. This data is the Peak(PK) value.

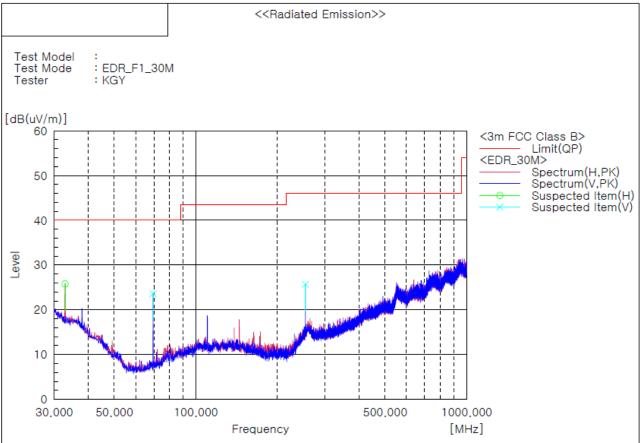


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Test mode : Transmission status 8-DPSK Lowest channel (Worst case)

The requirements are: \square Complies

Test Data



Spectrum Selection

| No. | Frequency | (P) | Reading | c.f | Result PK | Limit QP | Margin QP | Height | Angle |
|-----|-----------|-----|----------|-----------|--------------|-------------|--------------|--------|-------|
| | [MHz] | | [dB(uV)] | [dB(1/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB] | [cm] | [deg] |
| 1 | 32.910 | Н | 32.6 | -6.8 | 25.8 | 40.0 | 14.2 | 210.0 | 339.0 |
| 2 | 69.528 | V | 41.4 | -17.8 | 23.6 | 40.0 | 16.4 | 291.0 | 339.0 |
| 3 | 253.949 | V | 34.4 | -8.7 | 25.7 | 46.0 | 20.3 | 101.0 | 339.0 |

- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(Correction factor)
- 3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator Amp Gain
- 4. This data is the Peak(PK) value.



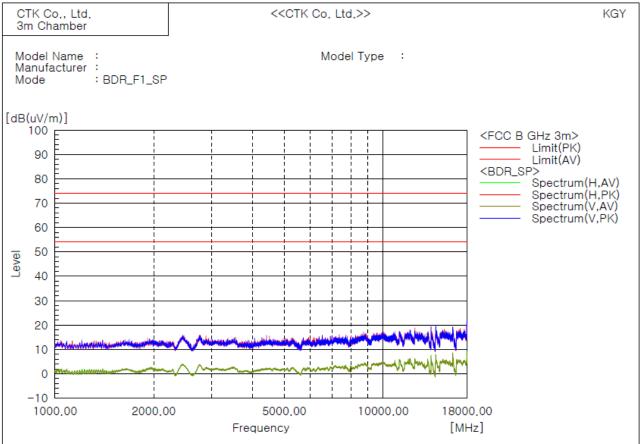
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3) 1 GHz to 18 GHz

Test mode : Transmission status GFSK Lowest channel (Worst case)

The requirements are: \square Complies

Test Data



Result : There are more than 20 dB of margin compared to the reference value.

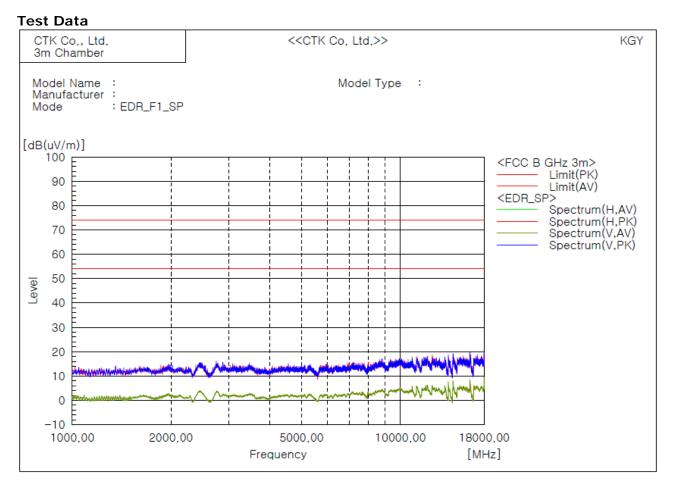
- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(correction factor)
- 3. Correction factor = Antenna factor + Cable loss Amp Gain
- 4. Band reject filter was used from 1 GHz to 18 GHz



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Test mode : Transmission status 8-DPSK Lowest channel (Worst case)

The requirements are: Complies



Result : There are more than 20 dB of margin compared to the reference value.

- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(correction factor)
- 3. Correction factor = Antenna factor + Cable loss Amp Gain
- 4. Band reject filter was used from 1 GHz to 18 GHz



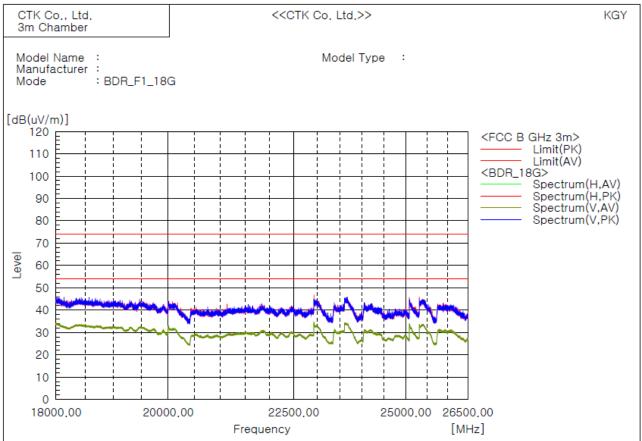
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4) 18 GHz to 26.5 GHz

Test mode : Transmission status GFSK Lowest channel (Worst case)

The requirements are: \square Complies

Test Data



Result : There are more than 20 dB of margin compared to the reference value.

- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(correction factor)
- 3. Correction factor = Antenna factor + Cable loss Amp Gain

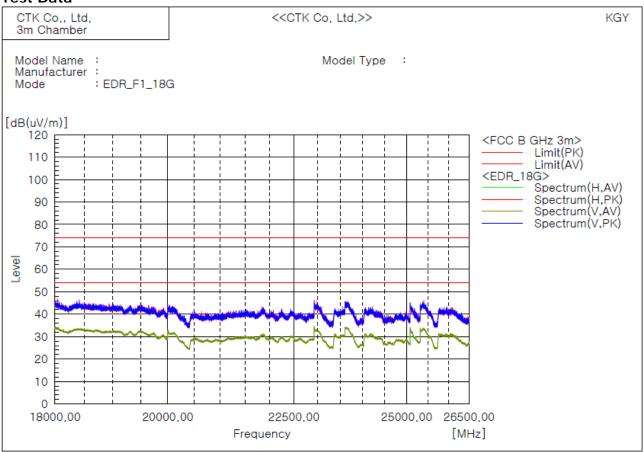


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Test mode : Transmission status 8-DPSK Lowest channel (Worst case)

The requirements are: Complies

Test Data



Result : There are more than 20 dB of margin compared to the reference value.

- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(correction factor)
- 3. Correction factor = Antenna factor + Cable loss Amp Gain



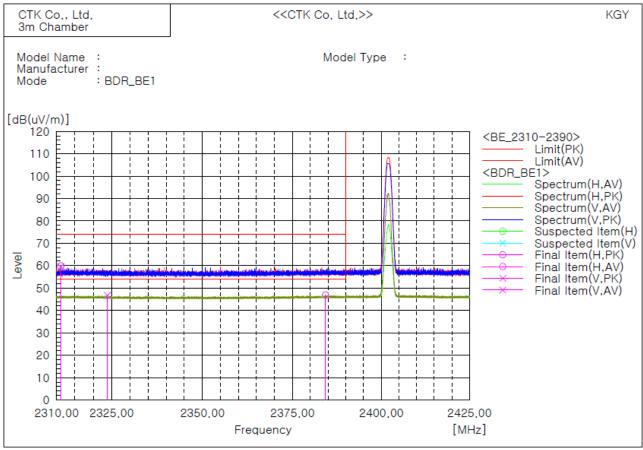
Report No.: CTK-2021-02042 Page (62) / (71) Pages

5) Restricted Frequency Bands

Test mode : Transmission status GFSK Lowest channel (Test frequency range : 2 310 MHz – 2 390 MHz)

The requirements are: \square Complies

Test Data



Final Result

| No. | Frequency | (P) | Reading | Reading | o.f | Result | Result | Limit | Limit | Margin | Margin | Height | Angle |
|-----|-----------|-----|----------|----------|-----------|------------|------------|------------|------------|--------|--------|--------|-------|
| | | | PK | AV | | PK | AV | PK | AV | PK | AV | | |
| | [MHz] | | [dB(uV)] | [dB(uV)] | [dB(1/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB] | [dB] | [cm] | [deg] |
| 1 | 2311.165 | н | 53.7 | | 6.2 | 59.9 | | 74.0 | 54.0 | 14.1 | | 235.8 | 26.0 |
| 2 | 2311.179 | V | 53.3 | | 6.2 | 59.5 | | 74.0 | 54.0 | 14.5 | | 464.0 | 5.0 |
| 3 | 2323.858 | V | | 40.7 | 6.0 | | 46.7 | 74.0 | 54.0 | | 7.3 | 222.3 | 0.1 |
| 4 | 2384.290 | Н | | 40.7 | 6.2 | | 46.9 | 74.0 | 54.0 | | 7.1 | 99.8 | 0.1 |

- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(correction factor)
- 3. Correction factor = Antenna factor + Cable loss Amp Gain

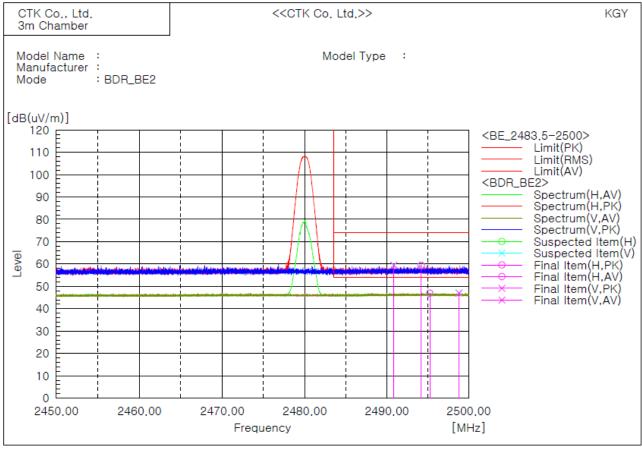


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Test mode : Transmission status GFSK Highest channel (Test frequency range : 2 483.5 MHz – 2 500 MHz)

The requirements are: \square Complies

Test Data



Final Result

| No. | Frequency | (P) | Reading | Reading | o.f | Resul t | Result | Limit | Limit | Margin | Margin | Height | Angle |
|-----|-----------|-----|----------|----------|-----------|------------|------------|------------|------------|--------|--------|--------|-------|
| | | | PK | AV | | PK | AV | PK | AV | PK | AV | | |
| | [MHz] | | [dB(uV)] | [dB(uV)] | [dB(1/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB] | [dB] | [cm] | [deg] |
| 1 | 2490.863 | V | 53.1 | | 6.3 | 59.4 | | 74.0 | 54.0 | 14.6 | | 99.8 | 255.9 |
| 2 | 2494.200 | н | 53.1 | | 6.3 | 59.4 | | 74.0 | 54.0 | 14.6 | | 99.8 | 62.3 |
| 3 | 2495.250 | н | | 40.7 | 6.3 | | 47.0 | 74.0 | 54.0 | | 7.0 | 354.5 | 359.9 |
| 4 | 2498.819 | V | | 40.7 | 6.3 | | 47.0 | 74.0 | 54.0 | | 7.0 | 344.1 | 0.1 |

- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(correction factor)
- 3. Correction factor = Antenna factor + Cable loss Amp Gain

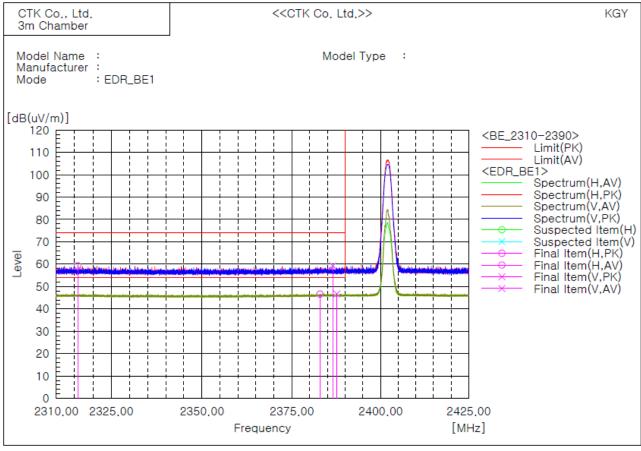


Report No.: CTK-2021-02042 Page (64) / (71) Pages

Test mode : Transmission status 8-DPSK Lowest channel (Test frequency range : 2 310 MHz – 2 390 MHz)

The requirements are: \square Complies

Test Data



Final Result

| No. | Frequency | (P) | Reading | Reading | o.f | Result | Result | Limit | Limit | Margin | | Height | Angle |
|-----|-----------|-----|----------|----------|-----------|------------|------------|------------|------------|--------|------|--------|-------|
| | | | PK | AV | | PK | AV | PK | AV | PK | AV | | |
| | [MHz] | | [dB(uV)] | [dB(uV)] | [dB(1/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB] | [dB] | [cm] | [deg] |
| 1 | 2315.894 | н | 53.1 | | 6.2 | 59.3 | | 74.0 | 54.0 | 14.7 | | 235.8 | 355.3 |
| 2 | 2382.925 | н | | 40.4 | 6.2 | | 46.6 | 74.0 | 54.0 | | 7.4 | 464.3 | 359.9 |
| 3 | 2386.518 | V | 53.0 | | 6.2 | 59.2 | | 74.0 | 54.0 | 14.8 | | 100.0 | 349.8 |
| 4 | 2387.639 | V | | 40.5 | 6.2 | | 46.7 | 74.0 | 54.0 | | 7.3 | 464.3 | 0.0 |

- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(correction factor)
- 3. Correction factor = Antenna factor + Cable loss Amp Gain

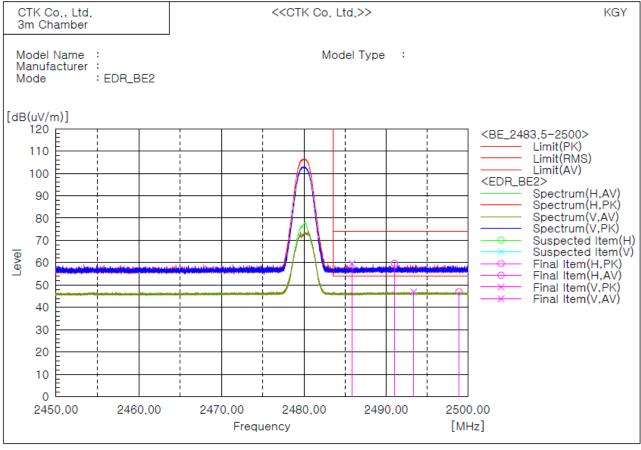


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Test mode : Transmission status 8-DPSK Highest channel (Test frequency range : 2 483.5 MHz – 2 500 MHz)

The requirements are: \square Complies

Test Data



Final Result

| No. | Frequency | (P) | Reading | Reading | o.f | Result | Result | Limit | Limit | Margin | Margin | Height | Angle |
|-----|-----------|-----|------------------|----------------|-----------|------------------|------------|--------------------|------------|--------|--------|--------|-------|
| | fuer-1 | | PK Function 1 | AV LUD(UV)1 | Lin(4/-)1 | PK FID(IV(I)) | AV | PK Function (1) | AV | PK | AV | r 1 | f |
| | [MHz] | | [dB(uV)] | [dB(uV)] | [dB(1/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB] | [dB] | [om] | [deg] |
| 1 | 2485.831 | V | 53.4 | | 6.2 | 59.6 | | 74.0 | 54.0 | 14.4 | | 343.6 | 4.9 |
| 2 | 2491.019 | Н | 53.4 | | 6.3 | 59.7 | | 74.0 | 54.0 | 14.3 | | 355.3 | 354.8 |
| 3 | 2493.375 | v | | 40.6 | 6.3 | | 46.9 | 74.0 | 54.0 | | 7.1 | 99.8 | 359.9 |
| 4 | 2498.925 | н | | 40.7 | 6.3 | | 47.0 | 74.0 | 54.0 | | 7.0 | 355.3 | 359.9 |

- Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
- 2. Result = Reading + c.f(correction factor)
- 3. Correction factor = Antenna factor + Cable loss Amp Gain



4.8 AC Power Line Conducted Emissions

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits.

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

ANSI C63.10-2013 - Section 6.2.2 RSS-Gen - Section 8.8

The EUT was placed on a non-metallic table 0.8 m above the metallic, grounded floor and 0.4 m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8 m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

| Frequency | Conducted | l Limit (dBuV) |
|------------|------------|----------------|
| (MHz) | Quasi-peak | Average** |
| 0.15 ~ 0.5 | 66 to 56* | 56 to 46* |
| 0.5 ~ 5 | 56 | 46 |
| 5 ~ 30 | 60 | 50 |

* The level decreases linearly with the logarithm of the frequency. ** A linear average detector is required.

Test Results

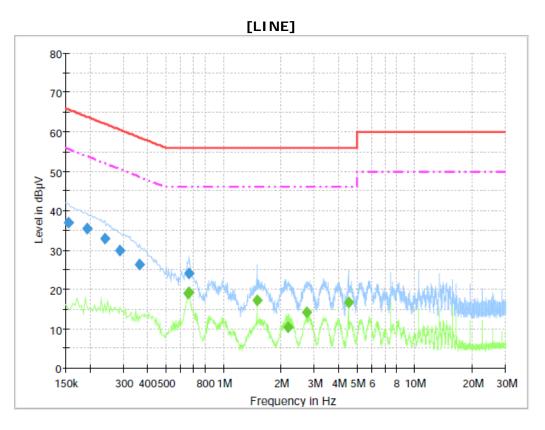
The requirements are: \square Complies



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Test Data

Test mode : GFSK lowest channel(Worst case)



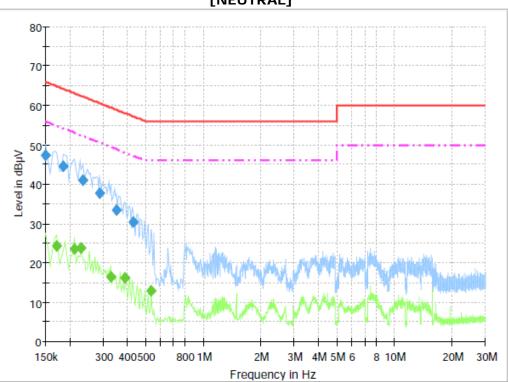
Final Result 1

| Frequency | QuasiPeak | Meas. | Bandwidth | Filter | Line | Corr. | Margin | Limit |
|-----------|-----------|--------|-----------|--------|------|-------|--------|--------|
| (MHz) | (dBµV) | Time | (kHz) | | | (dB) | (dB) | (dBµV) |
| | | (ms) | | | | | | |
| 0.154500 | 37.0 | 1000.0 | 9.000 | On | L1 | 9.7 | 28.8 | 65.8 |
| 0.195000 | 35.5 | 1000.0 | 9.000 | On | L1 | 9.7 | 28.3 | 63.8 |
| 0.240000 | 32.9 | 1000.0 | 9.000 | On | L1 | 9.7 | 29.2 | 62.1 |
| 0.289500 | 29.8 | 1000.0 | 9.000 | On | L1 | 9.7 | 30.7 | 60.5 |
| 0.366000 | 26.3 | 1000.0 | 9.000 | On | L1 | 9.7 | 32.3 | 58.6 |
| 0.663000 | 23.9 | 1000.0 | 9.000 | On | L1 | 9.7 | 32.1 | 56.0 |

| Frequency | CAverage | Meas. | Bandwidth | Filter | Line | Corr. | Margin | Limit |
|-----------|----------|--------|-----------|--------|------|-------|--------|--------|
| (MHz) | (dBµV) | Time | (kHz) | | | (dB) | (dB) | (dBµV) |
| | | (ms) | | | | | | |
| 0.654000 | 18.9 | 1000.0 | 9.000 | On | L1 | 9.7 | 27.1 | 46.0 |
| 0.663000 | 19.2 | 1000.0 | 9.000 | On | L1 | 9.7 | 26.8 | 46.0 |
| 1.504500 | 17.3 | 1000.0 | 9.000 | On | L1 | 9.8 | 28.7 | 46.0 |
| 2.188500 | 10.4 | 1000.0 | 9.000 | On | L1 | 9.8 | 35.6 | 46.0 |
| 2.742000 | 14.2 | 1000.0 | 9.000 | On | L1 | 9.8 | 31.8 | 46.0 |
| 4.510500 | 16.8 | 1000.0 | 9.000 | On | L1 | 9.9 | 29.2 | 46.0 |



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[NEUTRAL]

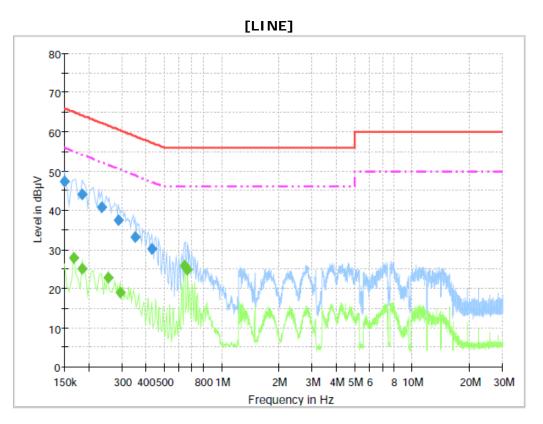
Final Result 1

| Frequency | QuasiPeak | Meas. | Bandwidth | Filter | Line | Corr. | Margin | Limit |
|-----------|-----------|--------|-----------|--------|------|-------|--------|--------|
| (MHz) | (dBµV) | Time | (kHz) | | | (dB) | (dB) | (dBµV) |
| | | (ms) | | | | | | |
| 0.150000 | 47.5 | 1000.0 | 9.000 | On | Ν | 9.7 | 18.5 | 66.0 |
| 0.186000 | 44.6 | 1000.0 | 9.000 | On | N | 9.7 | 19.6 | 64.2 |
| 0.235500 | 41.1 | 1000.0 | 9.000 | On | N | 9.7 | 21.1 | 62.3 |
| 0.289500 | 37.8 | 1000.0 | 9.000 | On | Ν | 9.7 | 22.8 | 60.5 |
| 0.352500 | 33.5 | 1000.0 | 9.000 | On | Ν | 9.7 | 25.4 | 58.9 |
| 0.433500 | 30.4 | 1000.0 | 9.000 | On | N | 9.7 | 26.8 | 57.2 |

| Frequency (MHz) | CAverage (dBµV) | Meas. Time | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|--------------------|--------------------|---------------|--------------------|--------|------|---------------|----------------|-----------------|
| | | (ms) | | - | | | | |
| 0.172500 | 24.3 | 1000.0 | 9.000 | On | N | 9.7 | 30.6 | 54.8 |
| 0.213000 | 23.6 | 1000.0 | 9.000 | On | N | 9.7 | 29.5 | 53.1 |
| 0.231000 | 23.8 | 1000.0 | 9.000 | On | N | 9.7 | 28.6 | 52.4 |
| 0.330000 | 16.6 | 1000.0 | 9.000 | On | N | 9.7 | 32.9 | 49.5 |
| 0.388500 | 16.1 | 1000.0 | 9.000 | On | N | 9.7 | 32.0 | 48.1 |
| 0.537000 | 13.0 | 1000.0 | 9.000 | On | Ν | 9.7 | 33.0 | 46.0 |



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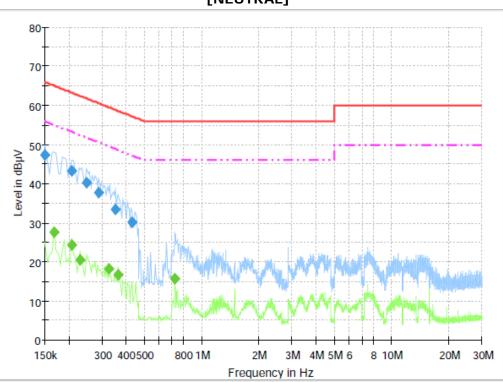
Test mode : 8-DPSK lowest channel (Worst case)

| Frequency | QuasiPeak | Meas. | Bandwidth | Filter | Line | Corr. | Margin | Limit |
|-----------|-----------|--------|-----------|--------|------|-------|--------|--------|
| (MHz) | (dBµV) | Time | (kHz) | | | (dB) | (dB) | (dBµV) |
| | | (ms) | | | | | | |
| 0.150000 | 47.3 | 1000.0 | 9.000 | On | L1 | 9.7 | 18.7 | 66.0 |
| 0.186000 | 44.1 | 1000.0 | 9.000 | On | L1 | 9.7 | 20.1 | 64.2 |
| 0.235500 | 40.8 | 1000.0 | 9.000 | On | L1 | 9.7 | 21.4 | 62.3 |
| 0.289500 | 37.5 | 1000.0 | 9.000 | On | L1 | 9.7 | 23.0 | 60.5 |
| 0.352500 | 33.2 | 1000.0 | 9.000 | On | L1 | 9.7 | 25.7 | 58.9 |
| 0.433500 | 30.2 | 1000.0 | 9.000 | On | L1 | 9.7 | 27.0 | 57.2 |

| Frequency | CAverage | Meas. | Bandwidth | Filter | Line | Corr. | Margin | Limit |
|-----------|----------|--------|-----------|--------|------|-------|--------|--------|
| (MHz) | (dBµV) | Time | (kHz) | | | (dB) | (dB) | (dBµV) |
| | | (ms) | | | | | | |
| 0.168000 | 28.0 | 1000.0 | 9.000 | On | L1 | 9.7 | 27.1 | 55.1 |
| 0.186000 | 25.0 | 1000.0 | 9.000 | On | L1 | 9.7 | 29.2 | 54.2 |
| 0.253500 | 22.7 | 1000.0 | 9.000 | On | L1 | 9.7 | 28.9 | 51.6 |
| 0.294000 | 19.1 | 1000.0 | 9.000 | On | L1 | 9.7 | 31.3 | 50.4 |
| 0.640500 | 25.9 | 1000.0 | 9.000 | On | L1 | 9.7 | 20.1 | 46.0 |
| 0.663000 | 24.8 | 1000.0 | 9.000 | On | L1 | 9.7 | 21.2 | 46.0 |



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[NEUTRAL]

Final Result 1

| Frequency | QuasiPeak | Meas. | Bandwidth | Filter | Line | Corr. | Margin | Limit |
|-----------|-----------|--------|-----------|--------|------|-------|--------|--------|
| (MHz) | (dBµV) | Time | (kHz) | | | (dB) | (dB) | (dBµV) |
| | | (ms) | | | | | | |
| 0.150000 | 47.3 | 1000.0 | 9.000 | On | Ν | 9.7 | 18.7 | 66.0 |
| 0.208500 | 43.3 | 1000.0 | 9.000 | On | Ν | 9.7 | 20.0 | 63.3 |
| 0.249000 | 40.1 | 1000.0 | 9.000 | On | N | 9.7 | 21.7 | 61.8 |
| 0.289500 | 37.6 | 1000.0 | 9.000 | On | Ν | 9.7 | 22.9 | 60.5 |
| 0.352500 | 33.5 | 1000.0 | 9.000 | On | Ν | 9.7 | 25.4 | 58.9 |
| 0.433500 | 30.3 | 1000.0 | 9.000 | On | Ν | 9.7 | 26.9 | 57.2 |

| Frequency | CAverage | Meas. | Bandwidth | Filter | Line | Corr. | Margin | Limit |
|-----------|----------|--------------|-----------|--------|------|-------|--------|--------|
| (MHz) | (dBµV) | Time (ms) | (kHz) | | | (dB) | (dB) | (dBµV) |
| 0.168000 | 27.5 | 1000.0 | 9.000 | On | Ν | 9.7 | 27.6 | 55.1 |
| 0.208500 | 24.3 | 1000.0 | 9.000 | On | N | 9.7 | 29.0 | 53.3 |
| 0.231000 | 20.6 | 1000.0 | 9.000 | On | N | 9.7 | 31.8 | 52.4 |
| 0.325500 | 18.1 | 1000.0 | 9.000 | On | N | 9.7 | 31.4 | 49.6 |
| 0.366000 | 16.7 | 1000.0 | 9.000 | On | N | 9.7 | 31.8 | 48.6 |
| 0.726000 | 15.6 | 1000.0 | 9.000 | On | N | 9.7 | 30.4 | 46.0 |



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5. APPENDIX A – Test Equipment Used For Tests

| | Name of Equipment | Manufacturer | Model No. | Serial No. | Cal Date | Due Date |
|----|----------------------------------|---|------------|---------------|------------|------------|
| 1 | Signal Analyzer | Agilent | N9020A | US46470483 | 2021-02-16 | 2022-02-16 |
| 2 | Signal Generator | Rohde & Schwarz | SMB100A | 175528 | 2021-04-12 | 2022-04-12 |
| 3 | EMI Test Receiver | Rohde & Schwarz | ESCI7 | 100814 | 2020-10-20 | 2021-10-20 |
| 4 | Bilog Antenna | SCHAFFNER | CBL6111C | 2551 | 2021-03-22 | 2023-03-22 |
| 5 | Active Loop Antenna | SCHWARZBECK | FMZB 1513 | 1513-126 | 2020-05-20 | 2022-05-20 |
| 6 | 6dB Attenuator | BIRD | 5W 6dB | 1744 | 2020-12-16 | 2021-12-16 |
| 7 | 6dB Attenuator | Rohde & Schwarz | DNF | 272.4110.50-2 | 2020-10-23 | 2021-10-23 |
| 8 | AMPLIFIER | SONOMA | 310 | 291721 | 2021-01-22 | 2022-01-22 |
| 9 | EMI Test Receiver | Rohde & Schwarz | ESU40 | 100336 | 2021-01-12 | 2022-01-12 |
| 10 | Preamplifier | Agilent | 8449B | 3008A02011 | 2020-11-30 | 2021-11-30 |
| 11 | Double Ridged Guide Antenna | ETS-Lindgren | 3117 | 00154525 | 2019-10-14 | 2021-10-14 |
| 12 | Horn Antenna | SCHWARZBECK | BBHA9170 | 00967 | 2020-05-25 | 2022-05-25 |
| 13 | Band Reject Filter | Micro Tronics | BRM50702 | G444 | 2020-10-14 | 2021-10-14 |
| 14 | DC Power Supply | НР | E3632A | KR75301278 | 2020-07-23 | 2021-07-23 |
| 15 | Dual-Tracking DC Power Supply | Topward Electric Instruments Co.,Ltd. | 6303D | 711196 | 2021-01-14 | 2022-01-14 |
| 16 | Low Noise Amplifier | TESTEK | TK-PA1840H | 200115-L | 2021-05-21 | 2022-05-21 |
| 17 | LISN | Rohde & Schwarz | ENV216 | 101236 | 2020-10-20 | 2021-10-20 |
| 18 | EMI Test Receiver | Rohde & Schwarz | ESCI3 | 100032 | 2021-01-15 | 2022-01-15 |

| | Cable | Manufacturer | Model No. | Serial No. | Check Date |
|----|----------------|--------------------|--------------|------------|------------|
| 1 | RF Cable | Canare Corporation | L-5D2W | N/A | 2020-10-20 |
| 2 | RF Cable | Junkosha Inc. | MWX221 | 2005S321 | 2021-06-02 |
| 3 | RF Cable | HUBER+SUHNER | SUCOFLEX 102 | MY073/2 | 2021-02-20 |
| 4 | RF Cable | HUBER+SUHNER | SUCOFLEX 102 | MY4728/2 | 2021-02-20 |
| 5 | RF Cable | HUBER+SUHNER | SUCOFLEX 104 | MY27558/4 | 2021-02-20 |
| 6 | RF Cable | HUBER+SUHNER | SUCOFLEX 104 | N/A | 2021-02-20 |
| 7 | RF Cable | HUBER+SUHNER | SUCOFLEX 104 | MY27573/4 | 2021-02-20 |
| 8 | RF Cable | HUBER+SUHNER | SUCOFLEX 106 | N/A | 2021-02-20 |
| 9 | RF Cable | HUBER+SUHNER | SUCOFLEX 102 | 803010/2 | 2021-02-20 |
| 10 | RF Cable | HUBER+SUHNER | SUCOFLEX 102 | 803742/2 | 2021-02-20 |
| 11 | RF Cable | HUBER+SUHNER | SUCOFLEX 102 | MY4728/2 | 2021-02-20 |
| 12 | Extension cord | - | - | - | 2020-10-20 |