TEST REPORT

FCC BT Test for IL7FB Certification

APPLICANT LG Electronics Inc.

REPORT NO. HCT-RF-2101-FC113

DATE OF ISSUE January 28, 2021

> Tested by Jin Gwan Lee

MAR BY

Technical Manager Jong Seok Lee

HCT CO., LTD. Soo Chan Lee SooChan Lee / CEO

HCT CO., LTD.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA Tel. +82 31 634 6300 F ax. +82 31 645 6401



HCT Co., Ltd.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA Tel. +82 31 634 6300 Fax. +82 31 645 6401

| TEST REPORT FCC BT Test for IL7FB | REPORT NO. HCT-RF-2101-FC113 DATE OF ISSUE January 28, 2021 Additional Model - | |
|--|---|--|
| Applicant | LG Electronics Inc. 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea | |
| Eut Type Model Name | Faceplate RADIO ASM-RECEIVER IL7FB | |
| FCC ID | BEJIL7FB2 | |
| Max. RF Output Power | 5.399 dBm (3.47 mW) | |
| Modulation type | GFSK(Normal), $\pi/4DQPSK$ and $8DPSK(EDR)$ | |
| FCC Classification | FCC Part 15 Spread Spectrum Transmitter | |
| FCC Rule Part(s) | Part 15 subpart C 15.247 | |
| | The result shown in this test report refer only to the sample(s) tested unless otherwise stated. This test results were applied only to the test methods required by the standard. | |



REVISION HISTORY

The revision history for this test report is shown in table.

| Revision No. | Date of Issue | Description |
|--------------|------------------|-----------------|
| 0 | January 28, 2021 | Initial Release |

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

* The report shall not be reproduced except in full(only partly) without approval of the laboratory.



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1. EUT DESCRIPTION

| Model | IL7FB | |
|----------------------|---|--|
| Additional Model | - | |
| ЕИТ Туре | Faceplate RADIO ASM-RECEIVER | |
| Power Supply | DC 12.0 V | |
| Frequency Range | 2402 MHz - 2480 MHz | |
| Max. RF Output Power | 5.399 dBm (3.47 mW) | |
| BT Operating Mode | Normal, EDR, AFH | |
| Modulation Type | GFSK(Normal), π/4DQPSK and 8DPSK(EDR) | |
| Modulation Technique | FHSS | |
| Number of Channels | 79Channels, Minimum 20 Channels(AFH) | |
| Antenna Peak Gain | 4.80 dBi | |
| Date(s) of Tests | December 11, 2020 ~ January 22, 2021 | |
| EUT serial numbers | Conduction : 012023413 Radiation : 012023422 | |



2. Requirements for Bluetooth transmitter(15.247)

This Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following:

- 1) This system is hopping pseudo-randomly.
- 2) Each frequency is used equally on the average by each transmitter.
- 3) The receiver input bandwidths that match the hopping channel bandwidths of their corresponding transmitters
- 4) The receiver shifts frequencies in synchronization with the transmitted signals.
 - 15.247(g): The system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this Section 15.247 should the transmitter be presented with a continuous data (or information) stream.

• 15.247(h): The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.



3. TEST METHODOLOGY

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Device (ANSI C63.10-2013, KDB 558074) is used in the measurement of the test device.

EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013). To record the final measurements, the analyzer detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 120 kHz for frequencies below 1 GHz or 1 MHz for frequencies above 1 GHz. For average measurements above 1 GHz, the analyzer was set to peak detector with a reduced VBW setting(RBW = 1 MHz, VBW = 1/T Hz, where T = Pulse width).



DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

Espectially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

5. FACILITIES AND ACCREDITATIONS

FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil,

Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



6. ANTENNA REQUIREMENTS

According to FCC 47 CFR § 15.203:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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."

(1) The antennas of this E.U.T are permanently attached.

(2) The E.U.T Complies with the requirement of \$15.203

7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of

ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

| Parameter | Expanded Uncertainty (±dB) |
|--|----------------------------|
| Conducted Disturbance (150 kHz ~ 30 MHz) | 1.82 |
| Radiated Disturbance (9 kHz ~ 30 MHz) | 3.40 |
| Radiated Disturbance (30 MHz ~ 1 GHz) | 4.80 |
| Radiated Disturbance (1 GHz ~ 18 GHz) | 5.70 |
| Radiated Disturbance (18 GHz ~ 40 GHz) | 5.05 |



8. DESCRIPTION OF TESTS

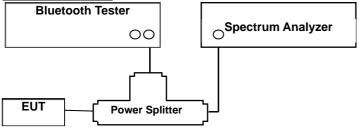
8.1. Conducted Maximum Peak Output Power

<u>Limit</u>

The maximum peak output power of the intentional radiator shall not exceed the following:

- For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 nonoverlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 W. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 W.
- 2. The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer. The Spectrum Analyzer is set to the peak detector mode. This test is performed with hopping off.

The Spectrum Analyzer is set to (7.8.5 in ANSI 63.10-2013 & Procedure 10(b)(6)(i) in KDB 558074 v05r02)

- 1) Span: approximately 5 times the 20 dB bandwidth, centered on a hopping channel
- 2) RBW > the 20 dB bandwidth of the emission being measured
- 3) VBW \geq RBW
- 4) Sweep = Auto
- 5) Detector = Peak
- 6) Trace = Max hold

Sample Calculation

Output Power = Spectrum Reading Power + Power Splitter loss + Cable loss(2 ea)

= 10 dBm + 6 dB + 1.5 dB = 17.5 dBm

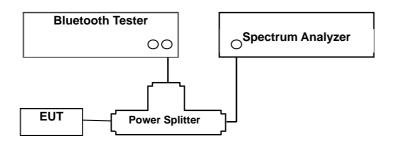


8.2. Conducted Band Edge(Out of Band Emissions)

Limit

According to § 15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 the transmitter demonstrates compliance with the peak conducted power limits.

Test Configuration



Test Procedure

This test is performed with hopping off and hopping on.

The Spectrum Analyzer is set to (6.10.4 in ANSI 63.10-2013 & Procedure 8.5 and 8.6 in KDB 558074 v05r02)

- 1) Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation
- 2) Reference level: As required to keep the signal from exceeding the maximum instrument input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level.
- 3) Attenuation: Auto (at least 10 dB preferred).
- 4) Sweep time: Coupled.
- 5) RBW: 100 kHz
- 6) VBW: 300 kHz
- 7) Detector: Peak
- 8) Trace: Max hold

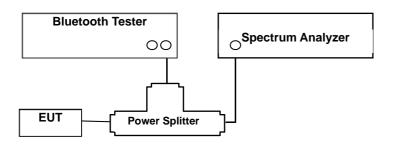


8.3. Frequency Separation & 20 dB Bandwidth

Limit

According to § 15.247(a)(1), Frequency hopping systems operating in the 2400–2483.5 MHz band 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 Configuration



Test Procedure(Frequency Separation)

The Channel Separation test is performed with hopping on. And the 20 dB Bandwidth test is performed with hopping off.

The Spectrum Analyzer is set to (7.8.2 in ANSI 63.10-2013 & Procedure 10(b)(6)(iii) in KDB 558074 v05r02)

- 1) Span: Wide enough to capture the peaks of two adjacent channels
- 2) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- 3) VBW \geq RBW
- 4) Sweep: Auto
- 5) Detector: Peak
- 6) Trace: Max hold
- 7) All the trace to stabilize.
- 8) Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report.

And the 20 dB Bandwidth test is performed with hopping off.

The Spectrum Analyzer is set to (6.9.2 in ANSI 63.10-2013)

- 1) Span: Set between two times and five times the OBW
- 2) RBW: 1% to 5% of the OBW.

Test Procedure (20 dB Bandwidth)

- 3) VBW \geq 3 x RBW
- 4) Sweep: Auto
- 5) Detector: Peak
- 6) Trace: Max hold
- 7) All the trace to stabilize.



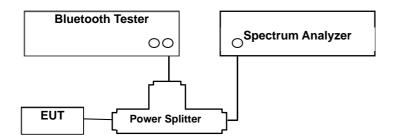


8.4. Number of Hopping Frequencies

Limit

According to § 15.247(a)(1)(iii), Frequency hopping systems operating in the 2400 MHz ~ 2483.5 MHz bands shall use at least 15 hopping frequencies.

Test Configuration



Test Procedure

The Bluetooth frequency hopping function of the EUT was enabled.

The Spectrum Analyzer is set to (7.8.3 in ANSI 63.10-2013 & Procedure 10(b)(4) in KDB 558074 v05r02)

- 1) Span: the frequency band of operation
- 2) RBW: 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.
- 3) VBW \geq RBW
- 4) Sweep: Auto
- 5) Detector: Peak
- 6) Trace: Max hold
- 7) Allow the trace to stabilize.

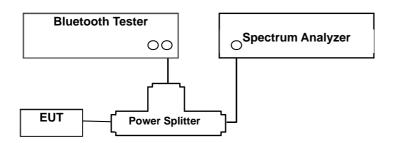


8.5. Time of Occupancy

Limit

According to § 15.247(a)(1)(iii), Frequency hopping systems operating in the 2400 MHz ~ 2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

Test Configuration



Test Procedure

This test is performed with hopping off.

The Spectrum Analyzer is set to (7.8.4 in ANSI 63.10-2013 & Procedure 10(b)(6)(iv) in KDB 558074 v05r02)

- 1) Span: Zero span, centered on a hopping channel
- 2) RBW shall be \leq channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
- 3) Sweep = as necessary to capture the entire dwell time per hopping channel
- 4) Detector: Peak
- 5) Trace: Max hold

The marker-delta function was used to determine the dwell time.



Sample Calculation

The following calculation process is not relevant to our measurement results. It is just an example.

- (1) Non-AFH Mode
- DH 5 (GFSK) : 2.890 x (1600/6)/79 x 31.6 = 308.27 (ms)
- 2-DH 5 (π/4DQPSK) : 2.890 x (1600/6)/79 x 31.6 = 308.27 (ms)
- 3-DH 5 (8DPSK) : 2.890 x (1600/6)/79 x 31.6 = 308.27 (ms)

(2) AFH Mode

- DH 5 (GFSK) : 2.890 x (800/6)/20 x 8.0 = 154.13 (ms)
- 2-DH 5 (π/4DQPSK) : 2.890 x (800/6)/20 x 8.0 = 154.13 (ms)
- 3-DH 5 (8DPSK) : 2.890 x (800/6)/20 x 8.0 = 154.13 (ms)

Note :

DH5 Packet need 5 time slot for transmitting and 1 time slot for receiving.

Then the system makes worst case 1600/6 hops per second with 79 channels. So the system have each channel 3.3755 times per second and so for 31.6 seconds the system have 106.667 times of appearance.

Each tx-time per appearance of DH5 is 2.890 ms. Dwell time = Tx-time x 106.667 = 308.27 (ms)



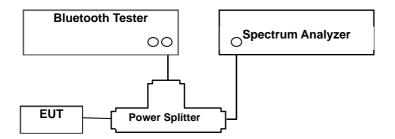


8.6. Conducted Spurious Emissions

Limit

Conducted > 20 dBc

Test Configuration



Test Procedure

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer.

The Spectrum Analyzer is set to (7.8.8 in ANSI 63.10-2013 & Procedure 8.5 and 8.6 in KDB 558074 v05r02)

- 1) Span: 30 MHz to 10 times the operating frequency in GHz.
- 2) RBW: 100 kHz
- 3) VBW: 300 kHz
- 4) Sweep: Coupled
- 5) Detector: Peak

Measurements are made over the 30 MHz to 25 GHz range with the transmitter set to the lowest, middle, and highest channels.

This test is performed with hopping off.



| Factors for | frequency |
|-------------|-----------|
|-------------|-----------|

| Freq(MHz) | Factor(dB) |
|-----------|------------|
| 30 | 6.59 |
| 100 | 6.69 |
| 200 | 6.79 |
| 300 | 6.88 |
| 400 | 7.00 |
| 500 | 7.00 |
| 600 | 7.00 |
| 700 | 7.06 |
| 800 | 7.08 |
| 900 | 7.11 |
| 1000 | 7.21 |
| 2000 | 7.53 |
| 2400 | 7.70 |
| 2500 | 7.69 |
| 3000 | 8.11 |
| 4000 | 7.85 |
| 5000 | 797 |
| 6000 | 8.18 |
| 7000 | 8.18 |
| 8000 | 8.28 |
| 9000 | 8.32 |
| 10000 | 8.53 |
| 11000 | 8.55 |
| 12000 | 8.66 |
| 13000 | 8.83 |
| 14000 | 8.92 |
| 15000 | 9.06 |
| 16000 | 9.11 |
| 17000 | 9.13 |
| 18000 | 9.34 |
| 19000 | 9.34 |
| 20000 | 9.59 |
| 21000 | 9.78 |
| 22000 | 9.65 |
| 23000 | 9.35 |
| 24000 | 9.51 |
| 25000 | 9.52 |
| 26000 | 9.54 |
| | |

Note : 1. 2400 ~ 2500 MHz is fundamental frequency range.

2. Factor = Cable loss(2 EA) + Splitter loss(6 dB) + EUT Cable loss



8.7. Radiated Test

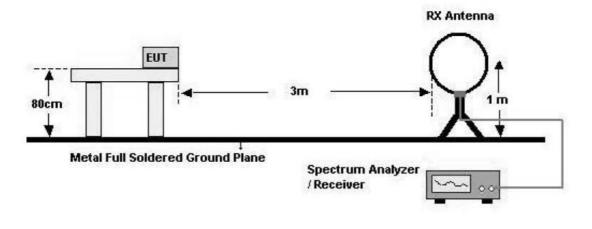
<u>Limit</u>

| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|-----------------|-----------------------|--------------------------|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30 | 30 | 30 |

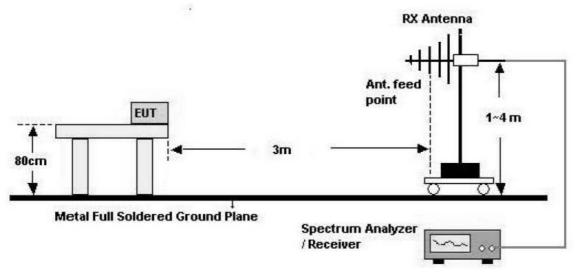


Test Configuration

Below 30 MHz

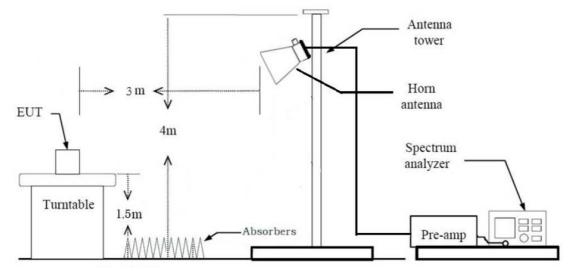


30 MHz - 1 GHz





Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

- 1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
- 2. The loop antenna was placed at a location 3m from the EUT
- 3. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.

5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

6. Distance Correction Factor(0.009 MHz - 0.490 MHz) = 40log(3 m/300 m) = - 80 dB

Measurement Distance : 3 m

7. Distance Correction Factor(0.490 MHz – 30 MHz) = $40\log(3 \text{ m}/30 \text{ m})$ = - 40 dB

Measurement Distance : 3 m

- 8. Spectrum Setting
 - Frequency Range = 9 kHz ~ 30 MHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 9 kHz
 - VBW \geq 3 x RBW

9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.

- 2. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.

4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

- 6. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 30 MHz 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Quasi-peak):
 - Measured Frequency Range : 30 MHz 1 GHz
 - Detector = Quasi-Peak
 - RBW = 120 kHz
 - %In general, (1) is used mainly
- 7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)
- 8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. Radiated test is performed with hopping off.

2. The EUT is placed on a turntable, which is 1.5 m above ground plane.



- 3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
- 4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 5. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 8. The unit was tested with its standard battery.
- 9. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 1 GHz 25 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 1 MHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Average):
 - Average value of pulsed emissions
 - Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission and pulsed operation is employed, the average measurement shall determined from the peak field strength after correcting for the worst-case duty cycle as described in Number.14 (On Page. 23)
 - * Duty Cycle Correction(AFH) = 20log (Worst Case Dwell Time/ 100ms) dB = -24.7314 dB
- 10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- 11. Distance extrapolation factor = 20log (test distance / specific distance) (dB)

12. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)



- 13. Duty Cycle Correction Factor (79 channel hopping)
 - a. Time to cycle through all channels = Δ t= τ [ms] x 79 channels = 229.100 ms, where τ = pulse width
 - b. 100 ms/ $\Delta t \, [ms]$ = H $\, \rightarrow \,$ Round up to next highest integer, H $\,^{\cdot}\,$ =1
 - c. Worst Case Dwell Time = τ [ms] x H ' = 2.9 ms
 - d. Duty Cycle Correction = 20log (Worst Case Dwell Time/ 100ms) dB = -30.752 dB
- 14. Duty Cycle Correction Factor(AFH mode minimum channel number case 20 channels)
 - a. Time to cycle through all channels = Δ t= τ [ms] x 20 channels = 58.00 ms, where τ = pulse width
 - b. 100 ms/ Δt [ms] = H \rightarrow Round up to next highest integer, H ' = 2
 - c. Worst Case Dwell Time = τ [ms] x H ' = 5.800 ms
 - d. Duty Cycle Correction(AFH) = 20log (Worst Case Dwell Time/ 100ms) dB = -24.7314 dB

Test Procedure of Radiated Restricted Band Edge

1. Radiated test is performed with hopping off.

- 2. The EUT is placed on a turntable, which is 1.5 m above ground plane.
- 3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
- 4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 5. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 7. The unit was tested with its standard battery.
- 8. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 1 MHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Average):
 - Average value of pulsed emissions
 - Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission and pulsed operation is employed, the average measurement shall determined from the peak field strength after correcting for the worst-case duty cycle as described in Number.13 (On Page. 24)
 - * Duty Cycle Correction(AFH) = 20log (Worst Case Dwell Time/ 100ms) dB = -24.7314 dB



- (3) Marker-delta method
- ANSI C63.10-2013(Section 6.10.6) Marker-delta method used.
- (For 2388 ~ 2390MHz & 2483.5 ~ 2485.5MHz) Measure according to the following procedure
- - Under 1GHz = RBW : 100kHz, VBW :300kHz
 - Above 1GHz = RBW : 1MHz, VBW : 3MHz (for Peak and Avg detector)
 - Note : Avg Result DCCF applied.
- 2 Band edge and maximum fundamental emission levels are measured with a marker delta.
 - Span encompass both Peak of the fundamental and band-edge under investigation.
 - Set RBW to 1% of hte total Span(At least 30 kHz)
 - VBW \geq 3 x RBW
- 3 subtract the 2 from 1 is the Result Field Strengths Level for Band edge
- 9. Distance extrapolation factor = 20log (test distance / specific distance) (dB)

10. Total

[1]Normal (Peak)

- = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) Amp Gain(A.G) + Attenuator(ATT)
 - + Distance Factor(D.F)

[2]Normal (Avg)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) – Amp Gain(A.G) + Attenuator(ATT) + Distance Factor(D.F) + D.C.C.F

[3]Marker-delta (Peak)

- ① Fundamental emission measurement
- = Fundamental Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) Amp Gain(A.G) + Attenuator(ATT) + Distance Factor(D.F)
- 2 marker delta. Value
- 3 (Total) = 1 2

[4]Marker-delta (Avg)

- ① Fundamental emission measurement
- = Fundamental Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) Amp Gain(A.G) + Attenuator(ATT) + Distance Factor(D.F)
- 2 marker delta. Value
- 3 (Total) = (1 2) +D.C.C.F



11. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.





8.8. AC Power line Conducted Emissions

Limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

| | Limits (dBµV) | | |
|-----------------------|-------------------------|-------------------------|--|
| Frequency Range (MHz) | Quasi-peak | Average | |
| 0.15 to 0.50 | 66 to 56 ^(a) | 56 to 46 ^(a) | |
| 0.50 to 5 | 56 | 46 | |
| 5 to 30 | 60 | 50 | |

^(a)Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

Test Procedure

- 1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
- 2. The EUT is connected via LISN to a test power supply.
- 3. The measurement results are obtained as described below:
- 4. Detectors : Quasi Peak and Average Detector.
- 5. The EUT is the device operating below 30 MHz.

- For unterminated the Antenna, the AC line conducted tests are performed with the antenna connected

- For terminated the Antenna, the AC line conducted tests are performed with a dummy load connected to the EUT antenna output terminal.

Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor



8.9. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.

- Mode : Stand alone
- Worstcase : Stand alone
- 2. EUT Axis

- Radiated Spurious Emissions : X

- Radiated Restricted Band Edge : X

3. All data rate of operation were investigated and the test results are worst case in highest datarate of each mode.

- GFSK : DH5
- π/4DQPSK : 2-DH5
- 8DPSK : 3-DH5

4. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.

- Position : Horizontal, Vertical, Parallel to the ground plane

AC Power line Conducted Emissions

1. We don't perform powerline conducted emission test. Because this EUT is used with vehicle.

Conducted test

- 1. The EUT was configured with data rate of highest power.
 - GFSK : DH5
 - π/4DQPSK : 2-DH5
 - 8DPSK : 3-DH5
- 2. AFH & Non-AFH were tested and the worst case results are reported.

(Worst case : Non-AFH)



9. SUMMARY OF TEST RESULTS

| Test Description | FCC Part Section(s) | Test Limit | Test Condition | Test Result |
|---|-----------------------------------|---|-------------------|-------------|
| 20 dB Bandwidth | § 15.247(a)(1) | N/A | | PASS |
| Occupied Bandwidth | N/A | N/A | | N/A |
| Conducted Maximum Peak Output Power | § 15.247(b)(1) | < 0.125 W | | PASS |
| Carrier Frequency Separation | § 15.247(a)(1) | > 25 kHz or >2/3 of the 20dB BW | | PASS |
| Number of Hopping Frequencies | § 15.247(a)(1)(iii) | ≥ 15 | | PASS |
| Time of Occupancy | § 15.247(a)(1)(iii) | < 400 ms | Conducted | PASS |
| Conducted Spurious Emissions | § 15.247(d) | > 20 dB for all out-of band emissions | | PASS |
| Band Edge (Out of Band Emissions) | § 15.247(d) | > 20 dB for all out-of band emissions | | PASS |
| AC Power line Conducted Emissions | § 15.207(a) | cf. Section 8.8 | | N/A(#Note) |
| Radiated Spurious Emissions | § 15.247(d), 15.205, 15.209 | cf. Section 8.7 | Dediated | PASS |
| Radiated Restricted Band Edge | § 15.247(d), 15.205, 15.209 | cf. Section 8.7 | Radiated | PASS |

#Note: Not Tested.



10. TEST RESULT

10.1 PEAK POWER

| Frequency Channel (MHz) | Output Power (GFSK) | | Limit | |
|----------------------------|------------------------|-------|-------|--------|
| | (MHZ) | (dBm) | (mW) | — (mW) |
| Low | 2402 | 2.140 | 1.64 | |
| Mid | 2441 | 2.837 | 1.92 | 125 |
| High | 2480 | 2.889 | 1.94 | |

| Channel | Frequency | Output Power (8DPSK) | | Limit |
|---------|-----------|-------------------------|------|-------|
| | (MHz) | (dBm) | (mW) | (mW) |
| Low | 2402 | 4.810 | 3.03 | |
| Mid | 2441 | 5.399 | 3.47 | 125 |
| High | 2480 | 5.172 | 3.29 | |

| FChannel | Frequency | Outpu (π/4D | Limit | |
|----------|-----------|----------------|-------|------|
| | (MHz) | (dBm) | (mW) | (mW) |
| Low | 2402 | 4.348 | 2.72 | |
| Mid | 2441 | 5.023 | 3.18 | 125 |
| High | 2480 | 4.775 | 3.00 | |

Note:

1. Spectrum reading values are not plot data.

The power results in plot is already including the actual values of loss for the splitter and cable combination.

2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the splitter and cable combination is 7.70 dB at 2400 MHz and is 7.70 dB at 2500 MHz.

So, 7.70 dB is offset. And the offset gap in the 2.4 GHz range do not affect the conducted peak power final result.



Test Plots (GFSK) Peak Power (CH.0)

| Reysight Spectrum Analyzer - Swept SA RL RF 50 Ω AC Center Freq 2.402000000 | | | ALIGN AUTO #Avg Type: RMS Avg Hold: 1/1 | 08:01:30 PM Jan 07, 2021 TRACE 2 3 4 5 TYPE MWWWWW DET PPPPP | Frequency |
|---|-------------|----------------|---|---|--------------------------------------|
| Ref Offset 7.7 dB 0 dB/div Ref 20.00 dBm | | | Mkr | 1 2.402 090 GHz 2.140 dBm | Auto Tun |
| 10.0 | | ↓ ¹ | | | Center Fre 2.402000000 GF |
| 0.00 | | | | | Start Fre 2.399504724 GF |
| 20.0 | | | | | Stop Fr 2.404495276 G |
| 40.0 | | | | | CF Ste 499.055 k <u>Auto</u> M |
| 60.0 | | | | | Freq Offs 01 |
| 70.0 | | | | | Scale Typ |
| Center 2.402000 GHz Res BW 3.0 MHz | #VBW 50 MHz | 2 | Sweep | Span 4.991 MHz 1.000 ms (1001 pts) | Log <u>L</u> |

Test Plots (GFSK) Peak Power (CH.39)

| Keysight Spectrum Analyzer - Swept SA RL RF 50 Ω AC | SENSE:INT | ALIGN AUTO | 08:02:18 PM Jan 07, 2021 | |
|--|-------------|---------------------------------|--|----------------------------|
| enter Freq 2.4410000 | PNO: Fast | #Avg Type: RMS Avg Hold: 1/1 | TRACE 1 2 3 4 5 0 TYPE M WWWWW DET PPPPP | Frequency |
| Ref Offset 7.7 dB | | Mkr1 | 2.440 824 GHz 2.837 dBm | Auto Tu |
| 0.0 | 1 | | | Center Fr 2.441000000 G |
| 0.00 | | | | Start Fi 2.438491705 0 |
| 0.0 | | | | Stop Fr 2.443508295 (|
| 0.0 | | | | CF S 501.659 Auto |
| 0.0 | | | | Freq Off |
| 0.0 | | | | C Scale Ty |
| enter 2.441000 GHz Res BW 3.0 MHz | #VBW 50 MHz | Sweep 1 | Span 5.017 MHz I.000 ms (1001 pts) | |
| o l | | STATU | s | |



Test Plots (GFSK) Peak Power (CH.78)

| RL RF 50 Q AC Center Freq 2.480000000 | GHz PNO: Fast | #Avg Type: RMS | 08:02:43 PM Jan 07, 2021 TRACE 2 3 4 5 0 TYPE MWWWWW DET P P P P P P | Frequency |
|---|------------------|----------------|---|---------------------------------|
| Ref Offset 7.7 dB 0 dB/div Ref 20.00 dBm | | Mkr | 2.480 145 GHz 2.889 dBm | Auto Tun |
| 10.0 | | ji | | Center Fre 2.480000000 GH |
| 0.00 | | | | Start Fre 2.477507488 GH |
| 20.0 | | | | Stop Fre 2.482492512 GH |
| ×0.0 | | | | CF Ste 498.502 ki Auto Ma |
| 50.0 | | | | Freq Offs 0 F |
| 70.0 | | | | Scale Typ |
| enter 2.480000 GHz Res BW 3.0 MHz | #VBW 50 MHz | Sweep 1 | Span 4.985 MHz 1.000 ms (1001 pts) | Log <u>L</u> |

Test Plots (8DPSK) Peak Power (CH.0)

| Keysight Spectrum Analyzer - Swept | | | | | |
|---|----------|---|---------------------------------|---|----------------------------------|
| RL RF 50 Ω Center Freq 2.402000 | | SENSE:INT Trig: Free Run Atten: 24 dB | #Avg Type: RMS Avg Hold: 1/1 | 07:45:43 PM Jan 07, 2021 TRACE 1 2 3 4 5 1 TYPE M WWWW DET P P P P P P | Frequency |
| Ref Offset 7.7 o 0 dB/div Ref 20.00 dE | lB ≩m | | Mkr1 | 2.401 980 GHz 4.810 dBm | Auto Tu |
| 10.0 | | 1 | | | Center Fr 2.402000000 G |
| 0.00 | | | | | Start Fr 2.398647500 0 |
| 00 | | | | | Stop F 2.405352500 (|
| 0.0 | | | | | CF S 670.500 <u>Auto</u> I |
| 0.0 | | | | | Freq Off |
| 0.0 | | | | | Scale Ty |
| enter 2.402000 GHz Res BW 3.0 MHz | #VBW | 50 MHz | Sweep 1 | Span 6.705 MHz 1.000 ms (1001 pts) | Log |
| SG | | | STATU | s | |



Test Plots (8DPSK)

Peak Power (CH.39)

| RL RE 50.0 AC | | and the second s | | | - 6 |
|---|--------------|--|---------------------------------|---|---------------------------------------|
| RL RF 50 R AC enter Freq 2.441000000 | PNO: Fast | rig: Free Run | #Avg Type: RMS Avg Hold: 1/1 | 07:46:19 PM Jan 07, 2021 TRACE 1 2 3 4 5 5 TYPE M | Frequency |
| Ref Offset 7.7 dB dB/div Ref 20.00 dBm | IFGain:Low A | atten: 24 dB | Mkr1 | 2.441 013 GHz 5.399 dBm | Auto Tun |
| 0.0 | | 1 | | | Center Fre 2.441000000 GF |
| 0.0 | | | | | Start Fre 2.437647500 GF |
| 0.0 | | | | | Stop Fre 2.444352500 G |
| | | | | | CF Ste 670.500 ki <u>Auto</u> M |
| 0.0 | | | | | Freq Offs 0 |
| enter 2.441000 GHz | | | | Opull 0.705 Mill2 | Scale Typ |
| Res BW 3.0 MHz | #VBW 50 | MHz | Sweep 1 | .000 ms (1001 pts) | |

Test Plots (8DPSK) Peak Power (CH.78)

| | ectrum Analyzer - Swept SA | | | | | 6 |
|----------------------|------------------------------------|-----------|--------------------------------|---------------------------------|--|----------------------------------|
| Center Fi | RF 50 Ω AC req 2.480000000 | PNO: Fast | Trig: Free Run Atten: 24 dB | #Avg Type: RMS Avg Hold: 1/1 | 07:46:30 PM Jan 07, 2021 TRACE 2 3 4 5 TYPE M DET P P P P P P | Frequency |
| 0 dB/div | Ref Offset 7.7 dB Ref 20.00 dBm | | | Mkr | 1 2.479 940 GHz 5.172 dBm | Auto Tur |
| 10.0 | | | 1 | | | Center Fre 2.480000000 Gi |
| 10.0 | | | | | | Start Fr 2.476652500 G |
| 20.0 | | | | | | Stop Fr 2.483347500 G |
| ±0.0 | | | | | | CF St 669.500 F Auto M |
| 50.0 | | | | | | Freq Off 0 |
| 70.0 | | | | | | Scale Ty |
| Center 2.4 Res BW | 480000 GHz 3.0 MHz | #VBW | 50 MHz | Sweep | Span 6.695 MHz 1.000 ms (1001 pts) | Log j |
| ISG | | | | STAT | JS | |



Test Plots (π/4DQPSK)

Peak Power (CH.0)



Test Plots (π/4DQPSK) Peak Power (CH.39)

| Keysight Spectrum Analyzer - Swept SA RL RF 50 Ω AC | | SENSE:INT | ALIGN AUTO | 07:45:19 PM Jan 07, 2021 | 6 |
|---|---------|---------------|---------------------------------|---|---------------------------------|
| Center Freq 2.44100000 | O GHz | rig: Free Run | #Avg Type: RMS Avg Hold: 1/1 | TRACE 2 2 4 5 0 TYPE MWWWWW DET P P P P P | Frequency |
| Ref Offset 7.7 dB 0 dB/div Ref 20.00 dBm | | | Mkr1 | 2.441 007 GHz 5.023 dBm | Auto Tur |
| 10.0 | | 1 | | | Center Fre 2.441000000 GH |
| 0.00 | | | | | Start Fre 2.437607500 G |
| 20.0 | | | | | Stop Fr 2.444392500 G |
| 40.0 | | | | | CF Sto 678.500 k Auto M |
| 50.0 50.0 | | | | | Freq Offs 0 |
| 70.0 | | | | | Scale Ty |
| Center 2.441000 GHz Res BW 3.0 MHz | #VBW 50 | MHz | Sweep 1 | Span 6.785 MHz .000 ms (1001 pts) | Log <u>L</u> |
| SG | | | STATUS | | |



Lin

Span 6.780 MHz Log Sweep 1.000 ms (1001 pts)

Test

Center 2.480000 GHz #Res BW 3.0 MHz

| Test Plots (π/4DQPSK) | | | | | |
|---|------------------|--------------|---------------------------------|---|------------------------|
| Peak Power (CH.78) | | | | | |
| Keysight Spectrum Analyzer - Swept SA | | SENSE:INT | ALIGN AUTO | 07:45:30 PM Jan 07, 2021 | |
| Center Freq 2.48000000 | GHz PNO: Fast | | #Avg Type: RMS Avg Hold: 1/1 | TRACE 2 3 4 5 TYPE MWWWWW DET PPPPP | Frequency |
| | IFGain:Low | Atten: 24 dB | - | | |
| Ref Offset 7.7 dB 10 dB/div Ref 20.00 dBm Log | | | Mkr1 2.4 | 479 952 54 GHz 4.775 dBm | Auto Tune |
| | | l l | | | Center Freq |
| 10.0 | | | | | 2.48000000 GHz |
| 0.00 | | | | | Start Freq |
| -10.0 | | | | | 2.476610000 GHz |
| -20.0 | | | | | Stop Freq |
| -30.0 | | | | | 2.483390000 GHz |
| -40.0 | | | | | CF Step 678.000 kHz |
| -50.0 | | | | | Auto Man |
| | | | | | Freq Offset |
| -60.0 | | | | | 0 Hz |
| -70.0 | | | | | Scale Type |

#VBW 50 MHz



10.2 BAND EDGES

Without hopping

| Outside Frequency Band | GFSK | 8DPSK | π/4DQPSK | Limit |
|------------------------|--------|--------|----------|-------|
| | (dB) | (dB) | (dB) | (dBc) |
| Lower | 57.090 | 57.312 | 56.762 | 20 |
| Upper | 59.761 | 60.077 | 59.528 | 20 |

With hopping

| Outside Frequency Band | GFSK | 8DPSK | π/4DQPSK | Limit |
|------------------------|--------|--------|----------|-------|
| | (dB) | (dB) | (dB) | (dBc) |
| Lower | 54.201 | 55.832 | 54.707 | 20 |
| Upper | 50.273 | 50.820 | 50.048 | 20 |

Note :

1. Spectrum reading values are not plot data.

The power results in plot is already including the actual values of loss for the splitter and cable combination.

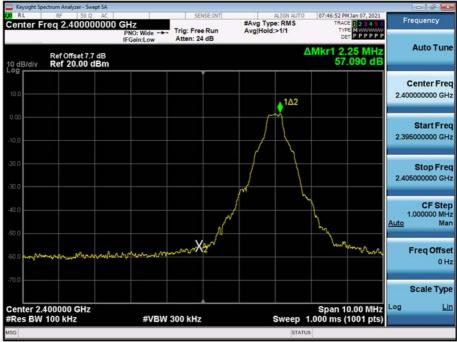
2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the splitter and cable combination is 7.70 dB at 2400 MHz and is 7.70 dB at 2500 MHz.

So, 7.70 dB is offset. And the offset gap in the 2.4 GHz range do not affect the conducted peak power final result.

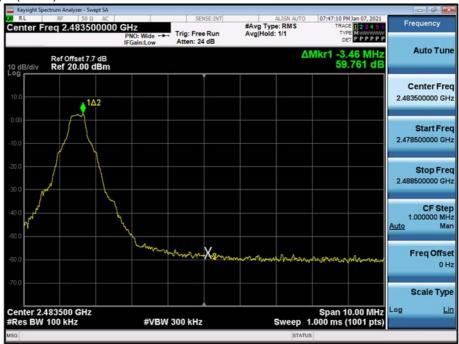


Test Plots without hopping (GFSK)

Band Edges (CH.0)



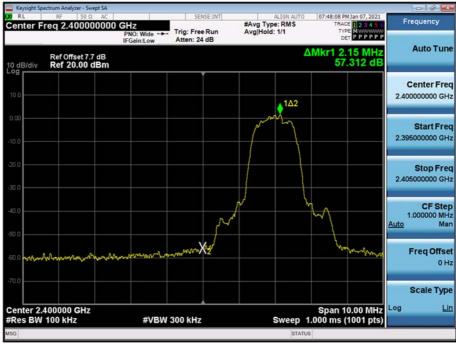
Test Plots without hopping (GFSK) Band Edges (CH.78)



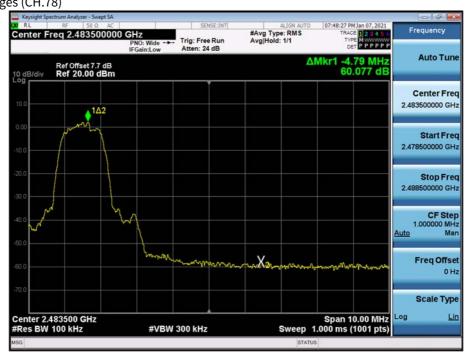


Test Plots without hopping (8DPSK)

Band Edges (CH.0)



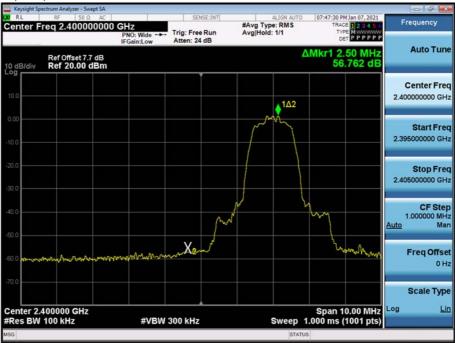
Test Plots without hopping (8DPSK) Band Edges (CH.78)





Test Plots without hopping (π /4DQPSK)

Band Edges (CH.0)



Test Plots without hopping (π /4DQPSK) Band Edges (CH.78)





Test Plots with hopping (GFSK)

Band Edges (CH.0)



Test Plots with hopping (GFSK)



Band Edges (CH.78)



Test Plots with hopping (8DPSK)

Band Edges (CH.0)



Test Plots with hopping (8DPSK)

Band Edges (CH.78) ALIGN AUTO #Avg Type: RMS Avg|Hold: 1/1 Center Freq 2.483500000 GHz PNO: Wide -IFGain:Low RI SENSE:IN 07:54:25 PM Jan 07, 2021 Frequency TYPE MULTINE Trig: Free Run Atten: 24 dB Auto Tune ΔMkr1 -7.82 MHz 50.820 dB Ref Offset 7.7 dB Ref 20.00 dBm 0 dB/d Center Freq 2.483500000 GHz ▲1∆2 Start Freq 2.478500000 GHz Stop Freq 2.488500000 GHz CF Step 1.000000 MHz Man mo Auto X2 11 m Freq Offset 0 Hz Scale Type Center 2.483500 GHz #Res BW 100 kHz Span 10.00 MHz Sweep 1.000 ms (1001 pts) Log Lin #VBW 300 kHz



Test Plots with hopping (π /4DQPSK)



Test Plots with hopping ($\pi/4DQPSK$)





10.3 FREQUENCY SEPARATION / OCCUPIED BANDWIDTH (99% BW)

| 99% BW (kHz) | | | | | | | | |
|--------------|--------|--------|----------|--|--|--|--|--|
| Channel | GFSK | 8DPSK | π/4DQPSK | | | | | |
| CH.0 | 904.76 | 1212.7 | 1208.4 | | | | | |
| CH.39 | 903.66 | 1212.3 | 1208.1 | | | | | |
| CH.78 | 904.23 | 1212.6 | 1208.2 | | | | | |

| 20dB BW (kHz) | | | | | | | | |
|---------------|-------|-------|----------|--|--|--|--|--|
| Channel | GFSK | 8DPSK | π/4DQPSK | | | | | |
| CH.0 | 998.1 | 1341 | 1356 | | | | | |
| CH.39 | 1003 | 1341 | 1357 | | | | | |
| CH.78 | 997.0 | 1339 | 1356 | | | | | |

| | Channel Separation(kHz) | | | | |
|------|-------------------------|----------|---------------------|--|--|
| GFSK | 8DPSK | π/4DQPSK | (kHz) | | |
| | | | >25 kHz | | |
| 1001 | 1001 | 1001 | or | | |
| | | | >2/3 of the 20dB BW | | |



Test Plots (GFSK)

Channel Separation



Test Plots (8DPSK) Channel Separation





Test Plots (π/4DQPSK)

Channel Separation

| RL RL | Spectr | um A | nalyzer - Swept 50 Ω | | | SENSE:IN | 7 | ALIGN AUTO | 07-55-47 0 | 4 Jan 07, 2021 | _ | 0 0 |
|-------------------------|--------|-------------|--------------------------|---|--------------|--------------------------------|--------------|------------------------|-----------------|---|------|------------------------------|
| | Fre | | | 000 GHz PNO: Wid IFGain:Lo | | g: Free Run tten: 20 dB | #Avg | Type: RMS Hold: 1/1 | TRAC | E 1 2 3 4 5 6 E M | Fr | equency |
|) dB/div | | Ref Ref | Offset 7.7 d 17.70 dB | в | | | | ΔΝ | Akr3 1.0 -0. | 01 MHz 107 dB | | Auto Tur |
| 2.30 2.3 | ~ | ~ | ~X2~ | ```` | \sim | 1Δ2 | ? ^~~~~~~ | | 304 | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | | Center Fro |
| 2.3 — 2.3 — 2.3 — | | | | | | | | | | | 2.43 | Start Fr 9500000 G |
| 2.3 2.3 2.3 | | | | | | | | | | | 2.44 | Stop Fr 2500000 G |
| Res BV | N 3 | 0 k | 00 GHz Hz | | /BW 100 | kHz | | | 1.019 ms | | Auto | CF St 300.000 k M |
| KR MODE | | | (A) | × 1.001 MHz | (Δ) | 9 0.042 dB | FUNCTION | FUNCTION WIDTH | FUNCTIO | ON VALUE · | | |
| 2 F 3 Δ4 4 F 5 | 111 | f f f | (Δ) | 2.439 981 GHz 1.001 MHz 2.440 982 GHz | -0, (Δ) - | 434 dBm 0.107 dB 476 dBm | | | | | | Freq Offs 0 |
| 7 | | | | | | | | | | | | Scale Ty |
| 0 | | | | | | | | | | | Log | 1 |
| - | | _ | | | | m | | | 16 | | | |
| | | | | | | | | | | | | |



Test Plots (GFSK)

20 dB Bandwidth & Occupied Bandwidth (CH.0)



Test Plots (GFSK)

20 dB Bandwidth & Occupied Bandwidth (CH.39)





Test Plots (GFSK)

20 dB Bandwidth & Occupied Bandwidth (CH.78)



Test Plots (8DPSK)

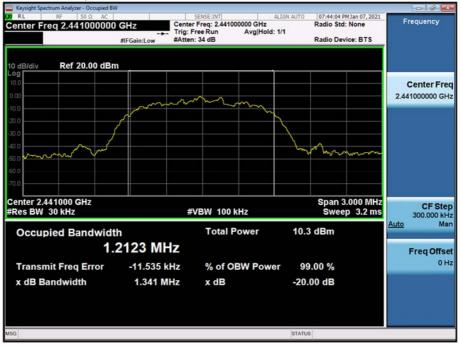
20 dB Bandwidth & Occupied Bandwidth (CH.0)





Test Plots (8DPSK)

20 dB Bandwidth & Occupied Bandwidth (CH.39)



Test Plots (8DPSK)

20 dB Bandwidth & Occupied Bandwidth (CH.78)





Test Plots (π /4DQPSK)

20 dB Bandwidth & Occupied Bandwidth (CH.0)



Test Plots (π /4DQPSK)

20 dB Bandwidth & Occupied Bandwidth (CH.39)





Test Plots (π /4DQPSK)

20 dB Bandwidth & Occupied Bandwidth (CH.78)





10.4 NUMBER OF HOPPING FREQUENCY

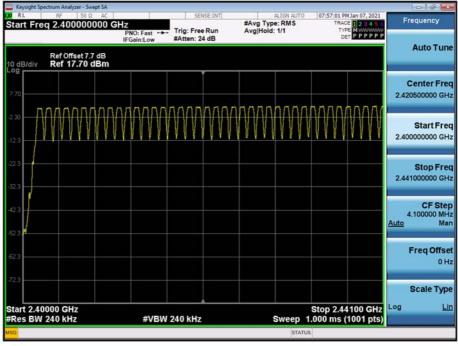
| GFSK | 8DPSK | π/4DQPSK | Limit |
|------|-------|----------|-------|
| 79 | 79 79 | | >15 |

Note :

In case of AFH mode, minimum number of hopping channels is 20.

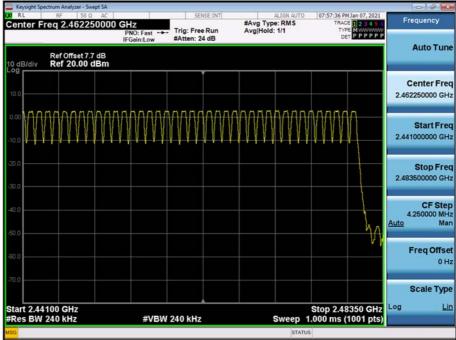


Test Plots (GFSK) Number of Channels (2.4 GHz - 2.441 GHz)



Test Plots (GFSK)

Number of Channels (2.441 GHz - 2.4835 GHz)

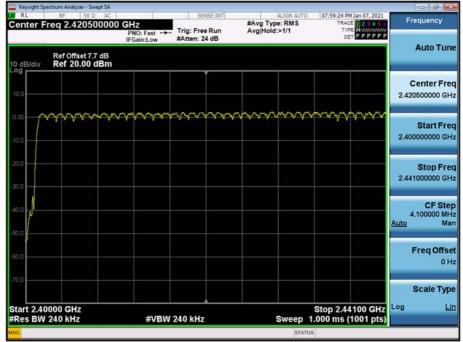


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Test Plots (8DPSK)

Number of Channels (2.4 GHz - 2.441 GHz)



Test Plots (8DPSK)

Number of Channels (2.441 GHz - 2.4835 GHz)

| Keysight Spectrum Analyzer - Swept SA | 1 1 2000000 | | | 000 |
|--|--|---------------------------------|---|----------------------------------|
| Center Freq 2.462250000 | | #Avg Type: RMS Avg Hold: 1/1 | 07:59:58 PM Jan 07, 2021 TRACE 1 2 3 4 5 0 TYPE | Frequency |
| Ref Offset 7.7 dB | PNO: Fast - Trig: Free Run IFGain:Low #Atten: 24 dB | Avgrou. In | DETPPPPP | Auto Tur |
| 10.0 | | | | Center Fre 2.462250000 G |
| 0.00 000 000 000 000 000 000 000 000 00 | | | ~~~~ | Start Fr 2.441000000 G |
| 20.0 | | | | Stop Fr 2.483500000 G |
| | | | | CF St 4.250000 M Auto N |
| 50.0 | | | | Freq Off 0 |
| 70.0 start 2.44100 GHz | | SI | op 2.48350 GHz | Scale Ty Log |
| Res BW 240 kHz | #VBW 240 kHz | Sweep 1.0 | 00 ms (1001 pts) | |





Test Plots (π/4DQPSK)

Number of Channels (2.4 GHz - 2.441 GHz)



Test Plots (π/4DQPSK)

Number of Channels (2.441 GHz - 2.4835 GHz)





10.5 TIME OF OCCUPANCY (DWELL TIME)

| | Channel | GFSK | 8DPSK | π/4DQPSK |
|---------------|---------|-------|-------|----------|
| Pulse Time | Low | 2.885 | 2.890 | 2.890 |
| (ms) | Mid | 2.885 | 2.890 | 2.890 |
| | High | 2.890 | 2.890 | 2.890 |

Non-AFH Mode

| Total of | Channel | GFSK | 8DPSK | π/4DQPSK | Period Time (s) | Limit (ms) |
|----------|---------|--------|--------|----------|-----------------------|---------------|
| Dwell | Low | 307.73 | 308.27 | 308.27 | 31.6 | |
| (ms) | Mid | 307.73 | 308.27 | 308.27 | 31.6 | 400 |
| | High | 308.27 | 308.27 | 308.27 | 31.6 | |

AFH Mode

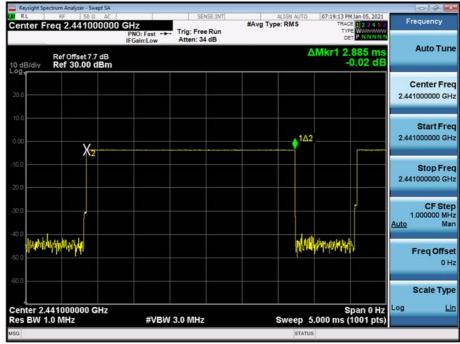
| Total of | Channel | GFSK | 8DPSK | π/4DQPSK | Period Time (s) | Limit (ms) |
|----------|---------|--------|--------|----------|-----------------------|---------------|
| Dwell | Low | 153.87 | 154.13 | 154.13 | 8.0 | |
| (ms) | Mid | 153.87 | 154.13 | 154.13 | 8.0 | 400 |
| | High | 154.13 | 154.13 | 154.13 | 8.0 | |



Test Plots (GFSK) Dwell Time (CH.0)

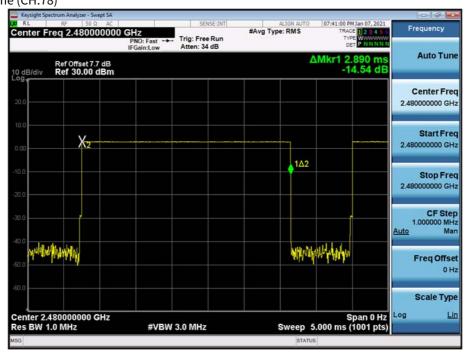


Test Plots (GFSK) Dwell Time (CH.39)





Test Plots (GFSK) Dwell Time (CH.78)



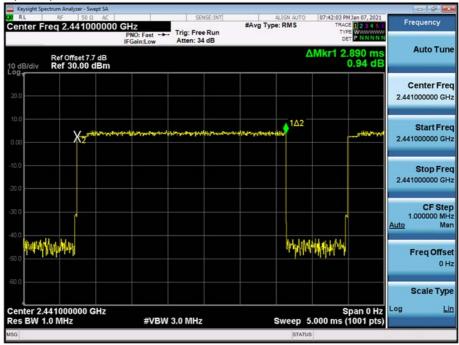
Test Plots (8DPSK) Dwell Time (CH.0)



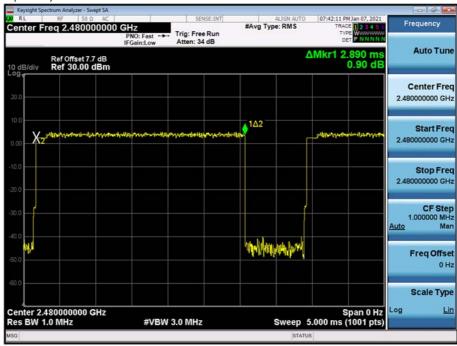


Test Plots (8DPSK)

Dwell Time (CH.39)



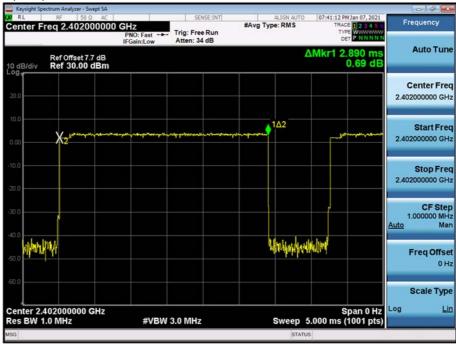
Test Plots (8DPSK) Dwell Time (CH.78)



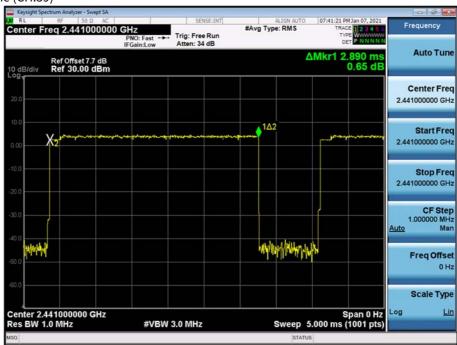


Test Plots (π/4DQPSK)

Dwell Time (CH.0)



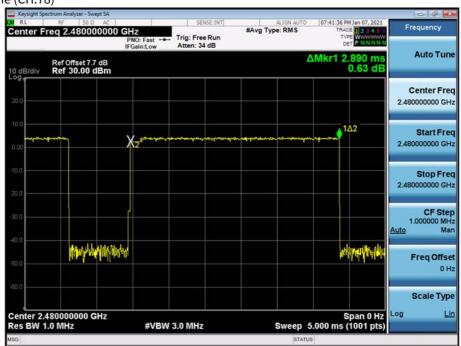
Test Plots (π/4DQPSK) Dwell Time (CH.39)





Test Plots (π/4DQPSK)

Dwell Time (CH.78)







10.6 SPURIOUS EMISSIONS

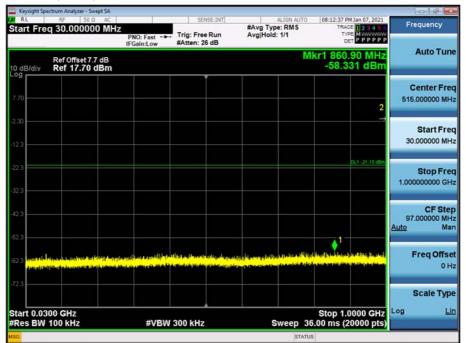
10.6.1 CONDUCTED SPURIOUS EMISSIONS

Test Result : please refer to the plot below. In order to simplify the report, attached plots were only the worst case channel and data rate.

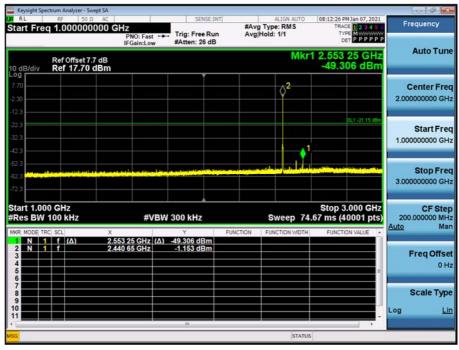


Test Plots (8DPSK)- 30 MHz - 1 GHz

Spurious Emission (CH.39)



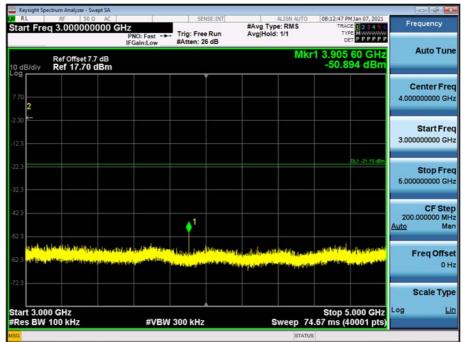
Test Plots (8DPSK)- 1 GHz – 3 GHz



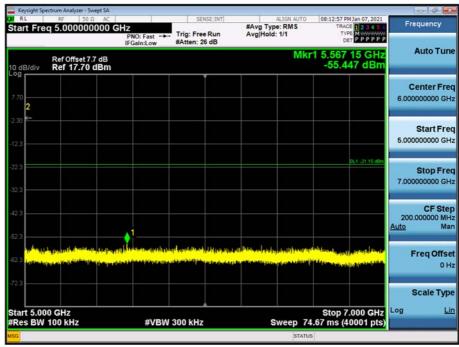


Test Plots (8DPSK)- 3 GHz - 5 GHz

Spurious Emission (CH.39)



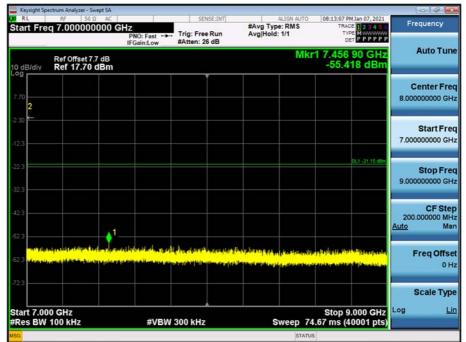
Test Plots (8DPSK)- 5 GHz - 7 GHz



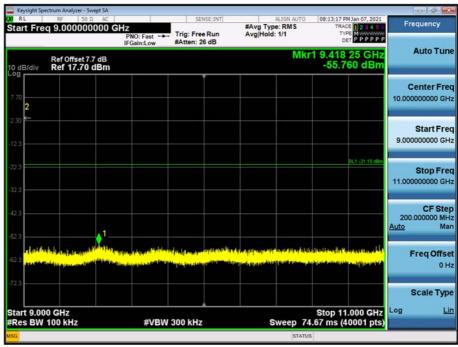


Test Plots (8DPSK)- 7 GHz - 9 GHz

Spurious Emission (CH.39)



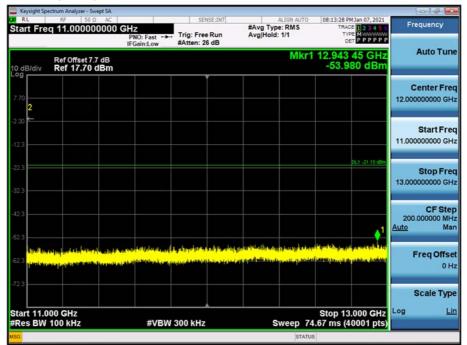
Test Plots (8DPSK)- 9 GHz - 11 GHz





Test Plots (8DPSK) 11 GHz - 13 GHz

Spurious Emission (CH.39)



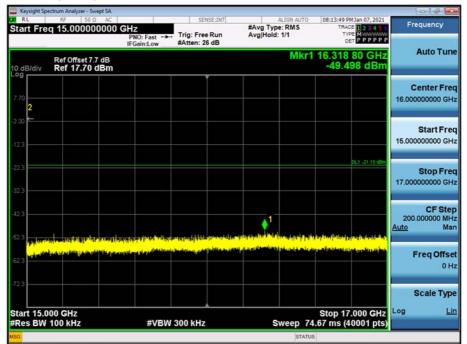
Test Plots (8DPSK)- 13 GHz - 15 GHz

| RL RL | RF 50 Q AC | SENSE:INT | ALIGN AUTO | 08:13:38 PM Jan 07, 2021 | |
|------------------------|--|--|---------------------------------|--|--|
| tart Fre | q 13.000000000 | | #Avg Type: RMS Avg Hold: 1/1 | TRACE 2 3 4 5 6 TYPE MWWWW DET P P P P P P | Frequency |
|) dB/div | Ref Offset 7.7 dB Ref 17.70 dBm | | Mkr1 | 14.951 65 GHz -52.681 dBm | Auto Tur |
| .70 2 | | | | | Center Fro 14.000000000 Gi |
| 2.3 | | | | | Start Fr 13.000000000 G |
| 2.3 | | | | 0L1-21.15 dBm | Stop Fr 15.00000000 G |
| 2.3 | | | | | CF St 200.000000 M <u>Auto</u> M |
| 2.3 ²⁴⁴ (.) | a an | a na sa atan da ka | | The second frequencies of the second | Freq Offs 0 |
| 2.3 | | | | | Scale Ty |
| | 000 GHz 100 kHz | #VBW 300 kHz | Sweep 74 | Stop 15.000 GHz .67 ms (40001 pts) | Log |
| G | | | STATU | 5 | |



Test Plots (8DPSK)- 15 GHz - 17 GHz

Spurious Emission (CH.39)



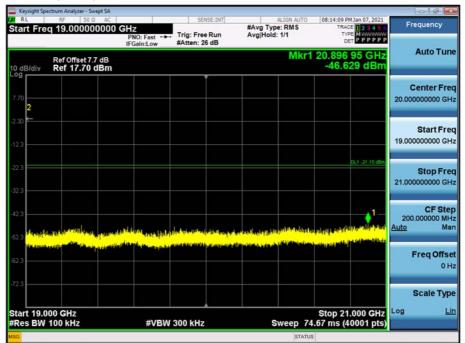
Test Plots (8DPSK)- 17 GHz - 19 GHz

| Keysight Spectrum Analyzer - Swept SA RL RF 50 Ω AC | SENSE:INT | ALIGN AUTO | 08:13:59 PM Jan 07, 2021 | |
|---|---|---------------------------------|---|--|
| tart Freq 17.000000000 | | #Avg Type: RMS Avg Hold: 1/1 | TRACE 2 3 4 5 0 TYPE M | Frequency |
| Ref Offset 7.7 dB dB/div Ref 17.70 dBm | | Mkr1 | 18.916 65 GHz -46.750 dBm | Auto Tur |
| .70 2 | | | | Center Fre 18.000000000 GF |
| 2.3 | | | | Start Fr 17.000000000 G |
| 23 | | | EL1 -21.15 dBm | Stop Fr 19.00000000 G |
| 23 | tra kandilikisi dafa ata sodi filasi judiba del | المتعادية ومتلاوم والماسط | 1- | CF St 200.000000 M <u>Auto</u> M |
| 2.3 And the state of the barrier in the state | | | e Regel Marson, se de la merio de la marson de la deplace | Freq Offs 0 |
| 2.3 tart 17.000 GHz | | | Stop 19.000 GHz | Scale Ty |
| Res BW 100 kHz | #VBW 300 kHz | Sweep 74 | .67 ms (40001 pts) | |



Test Plots (8DPSK)- 19 GHz - 21 GHz

Spurious Emission (CH.39)



Test Plots (8DPSK)- 21 GHz - 23 GHz

| RL RF 50 Ω AC | | SENSE:INT | ALIGN AUTO | 08:14:19 PM Jan 07, 2021 | Frequency |
|---|--------------------------|---------------------------------|--|---------------------------------------|--|
| tart Freq 21.00000000 | PNO: Fast | Trig: Free Run #Atten: 26 dB | #Avg Type: RMS Avg Hold: 1/1 | TYPE MWWWW DET PPPPP | Frequency |
| Ref Offset 7.7 dB dB/div Ref 17.70 dBm | | | Mkr1 | 21.229 15 GHz -45.921 dBm | Auto Tur |
| 2 2 | | | | | Center Fre 22.000000000 Gi |
| 2.3 | | | | | Start Fr 21.000000000 G |
| 2.3 | | | | CL1 -21.15 dBm | Stop Fr 23.00000000 G |
| | usuraathikanskolahaalaad | | and the state of the | lujtotok (relisitk) issoo | CF St 200.000000 M <u>Auto</u> N |
| 2.3 | | fraith free alter free affects | in the black of a basis of the bill of the second of the bill of the b | anne dan serietat i Rollinia dinerae. | Freq Offs 0 |
| 2.3 | | | | | Scale Ty |
| tart 21.000 GHz Res BW 100 kHz | #VBW 3 | 300 kHz | Sweep 74 | Stop 23.000 GHz .67 ms (40001 pts) | Log |



Test Plots (8DPSK)- 23 GHz - 25 GHz

| RL tart Fre | RF 50 Ω A | | | ISE:INT | #Avg Type | | TRAC | 4 Jan 07, 2021 E 1 2 3 4 5 0 | Fre | quency |
|-------------------------|--|--|-------------------------|---------------|-----------|---------|--------------------------------------|---------------------------------|----------------------|-----------------|
| | | PNO: Fast - IFGain:Low | Trig: Free #Atten: 2 | | Avg Hold: | | DE | T P P P P P P | | |
| 0 dB/div | Ref Offset 7.7 dB Ref 17.70 dBr | | | | | Mkr1 | | 15 GHz 81 dBm | - | Auto Tun |
| 7.70 2 | | | | | | | | | | enter Fre |
| 12.3 | | | | | | | | | | Start Fre |
| 32.3 | | | | | | | | DL1-21.15 dBm | | Stop Fre |
| 2.3 | wand strandstorth sta | in gung a spin kalden keiler | والمراجع والمراجع | Rifeen (j) en | | | an ya dindula in Mana a ma ƙasara | Contraction of | 200.0 <u>Auto</u> | CF Ste |
| 52.3 134-wir 52.3 | n na hadin di na katala di katala di katala Mangana mangana katala di katala katala katala katala katala katala | in an an the first first the first state of the fir | and the second second | | | | | | F | req Offs 0 I |
| 72.3 | 100 GHz | | | | | | Stop 25 | .000 GHz | S | cale Typ |
| | 100 kHz | #VB | W 300 kHz | | S | weep 74 | .67 ms (4 | 0001 pts) | | |



10.6.2 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30MHz

| Frequency | Reading | Ant. factor | Cable loss | Ant. POL | Total | Limit | Margin | | |
|-----------|-------------------------|-------------|------------|----------|--------|--------|--------|--|--|
| MHz | dBuV/m | dBm/m | dBm | (H/V) | dBuV/m | dBuV/m | dB | | |
| | No Critical peaks found | | | | | | | | |

Note:

1. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.

- 2. Distance extrapolation factor = 40log (specific distance / test distance) (dB)
- 3. Limit line = specific Limits (dBuV) + Distance extrapolation factor
- 4. Radiated test is performed with hopping off.

Frequency Range : Below 1 GHz

| Frequency | Reading | Ant. factor | Cable loss | Ant. POL | Total | Limit | Margin | | | |
|-----------|-------------------------|-------------|------------|----------|--------|--------|--------|--|--|--|
| MHz | dBuV/m | dBm/m | dBm | (H/V) | dBuV/m | dBuV/m | dB | | | |
| | No Critical peaks found | | | | | | | | | |

Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made

with an instrument using Quasi peak detector mode.

2. Radiated test is performed with hopping off.



Frequency Range : Above 1 GHz Operation Mode: CH Low(GFSK)

| Operation Mo | ode: CH Low(GF | SK) | | | | | |
|--------------|----------------|--------------|----------|----------|----------|--------|----------|
| Frequency | Reading | AN.+CL-AMP G | ANT. POL | Total | Limit | Margin | - Detect |
| [MHz] | dBuV | [dB] | [H/V] | [dBuV/m] | [dBuV/m] | [dB] | Delect |
| 4804 | 44.87 | 2.98 | V | 47.85 | 73.98 | 26.13 | PK |
| 4804 | 30.14 | 2.98 | V | 33.12 | 53.98 | 20.86 | AV |
| 7206 | 40.49 | 9.57 | V | 50.06 | 73.98 | 23.92 | PK |
| 7206 | 26.62 | 9.57 | V | 36.19 | 53.98 | 17.79 | AV |
| 4804 | 44.28 | 2.98 | Н | 47.26 | 73.98 | 26.72 | PK |
| 4804 | 30.08 | 2.98 | Н | 33.06 | 53.98 | 20.92 | AV |
| 7206 | 40.28 | 9.57 | Н | 49.85 | 73.98 | 24.13 | PK |
| 7206 | 26.58 | 9.57 | Н | 36.15 | 53.98 | 17.83 | AV |
| Operation Mo | ode: CH Mid(GF | SK) | 1 | | | | |
| Frequency | Reading | AN.+CL-AMP G | ANT. POL | Total | Limit | Margin | Detect |
| [MHz] | dBuV | [dB] | [H/V] | [dBuV/m] | [dBuV/m] | [dB] | Delect |
| 4882 | 42.71 | 3.33 | V | 46.04 | 73.98 | 27.94 | PK |
| 4882 | 28.78 | 3.33 | V | 32.11 | 53.98 | 21.87 | AV |
| 7323 | 40.71 | 10.20 | V | 50.91 | 73.98 | 23.07 | PK |
| 7323 | 27.12 | 10.20 | V | 37.32 | 53.98 | 16.66 | AV |
| 4882 | 41.99 | 3.33 | н | 45.32 | 73.98 | 28.66 | PK |
| 4882 | 28.64 | 3.33 | Н | 31.97 | 53.98 | 22.01 | AV |
| 7323 | 40.54 | 10.20 | Н | 50.74 | 73.98 | 23.24 | PK |
| 7323 | 27.09 | 10.20 | Н | 37.29 | 53.98 | 16.69 | AV |
| Operation Mo | ode: CH High(G | FSK) | | 1 | | | |
| Frequency | Reading | AN.+CL-AMP G | ANT. POL | Total | Limit | Margin | Detect |
| [MHz] | dBuV | [dB] | [H/V] | [dBuV/m] | [dBuV/m] | [dB] | Deteet |
| 4960 | 41.98 | 2.36 | V | 44.34 | 73.98 | 29.64 | PK |
| 4960 | 28.44 | 2.36 | V | 30.80 | 53.98 | 23.18 | AV |
| 7440 | 40.46 | 10.72 | V | 51.18 | 73.98 | 22.80 | PK |
| 7440 | 27.02 | 10.72 | V | 37.74 | 53.98 | 16.24 | AV |
| 4960 | 42.61 | 2.36 | Н | 44.97 | 73.98 | 29.01 | PK |
| 4960 | 28.64 | 2.36 | Н | 31.00 | 53.98 | 22.98 | AV |
| 7440 | 40.28 | 10.72 | Н | 51.00 | 73.98 | 22.98 | PK |
| 7440 | 27.00 | 10.72 | Н | 37.72 | 53.98 | 16.26 | AV |



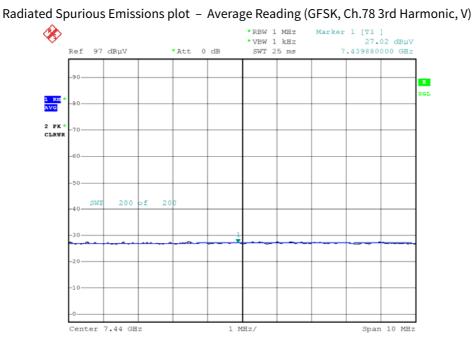
| FrequencyReadingAN.+CL-AMP GANT. POLTotalLimitMargin (MarginPeres[MH2]dBuV(dB](H/V)(dBuV/m)(dBU/m)(dBUPK480444.582.98V47.5673.9826.42PK480430.242.98V49.7673.9820.76AV720640.199.57V49.7673.9824.22PK720626.699.57V36.2653.9817.72AV480430.082.98H46.2473.9827.74PK480430.082.98H33.0653.9820.92AV720640.119.57H49.6873.9824.30PK720640.119.57H33.0653.9820.92AV720626.699.57H33.0653.9820.92AV720640.119.57H36.0653.9820.92AV7206RedingAN.+CL-MPGNT.POLTotalLimitMargin[m42]GBUV[dB1[H/V][dBU/m][dBU/m][dB1Y488228.923.33V46.2073.9823.18PK488228.923.33H31.9053.9816.73AV732340.6010.20FK31.9053.9823.44PK732327.0510.20H31.9053.9 | Operation Mo | ode: CH Low(π/ | 4DQPSK) | | | | | |
|--|--------------|-----------------|--------------|----------|----------|----------|--------|--------|
| [MH2]dBuV[dB][H/V][dBuV/m][dBuV/m][dB480444.582.98V47.5673.9826.42PK480430.242.98V33.2253.9820.76AV720640.199.57V49.7673.9824.22PK720626.699.57V36.2653.9817.72AV480443.262.98H46.2473.9827.74PK480430.082.98H36.0353.9820.92AV720640.119.57H36.0353.9824.30PK720626.649.57H36.0353.9824.30PK0peration Mote:CH Mid(n/UQPSK)TotalLimitMargin [dBuV/m]PeteeFrequencyReadingAN.+CL-AMP GANT. POLTotalLimitMargin [A333V32.2553.9821.73AV488242.873.33V32.2553.9816.73AVAV732327.0510.20V37.2553.9816.73AV732327.0510.20H37.2153.9816.73AV732327.0110.20H37.2153.9816.77AV732327.0110.20H37.2153.9816.77AV732327.0110.20H37.2153.9823.44PK7323 <td< td=""><td>Frequency</td><td>Reading</td><td>AN.+CL-AMP G</td><td>ANT. POL</td><td>Total</td><td>Limit</td><td>Margin</td><td>Dotoct</td></td<> | Frequency | Reading | AN.+CL-AMP G | ANT. POL | Total | Limit | Margin | Dotoct |
| 480430.242.98V33.2253.9820.76AV720640.199.57V49.7673.9824.22PK720626.699.57V36.2653.9817.72AV480443.262.98H46.2473.9827.74PK480430.082.98H33.0653.9820.92AV720640.119.57H49.6873.9824.30PK720626.469.57H36.0353.9817.75AVOperation Mode: CH Mid(n/JDQPSK)FrequencyReadingAN.+CL-AMP GANT. POLTotalLimitMargin[MH2]dBuV[dB][H/V][dBuV/m][dBuV/m][dB]PK488242.873.33V46.2073.9827.78PK488228.923.33V32.2553.9821.73AV732340.6010.20V50.8073.9823.18PK732327.0510.20V37.2553.9816.73AV488228.573.33H45.0273.9823.44PK732327.0110.20H37.2153.9816.77AVQperation Mode: CH High (π /DQPSK)FFFFFrequencyReadingAN.+CL-AMP GANT. POLTotalLimitMargin732327.0510.20H37.9153 | [MHz] | dBuV | [dB] | [H/V] | [dBuV/m] | [dBuV/m] | [dB] | Delect |
| 720640.199.57V49.7673.9824.22PK720626.699.57V36.2653.9817.72AV480443.262.98H46.2473.9827.74PK480430.082.98H33.0653.9820.92AV720626.469.57H49.6873.9824.30PK720626.469.57H36.073.9824.30PK720626.469.57H36.073.9824.30PK720626.469.57H36.073.9824.30PK720626.479.57H36.073.9824.30PK720626.469.57H36.073.9824.30PK720626.479.57H36.073.9824.30PK720626.469.57H36.07TotalLimitMargin[MH2]dBuV[MB][H/V][dBuV/m][dBuV/m][dB[MH2]dBuV[dB][H/V][dBuV/m][dBuV/m][dB733327.0510.20V37.2553.9823.48PK732327.0510.20H31.9053.9823.44PK732327.0110.20H31.9053.9823.44PK732327.0110.20H31.9053.9816.77AV732327.0 | 4804 | 44.58 | 2.98 | V | 47.56 | 73.98 | 26.42 | PK |
| 7206 26.69 9.57 V 36.26 53.98 17.72 AV 4804 43.26 2.98 H 46.24 73.98 27.74 PK 4804 30.08 2.98 H 33.06 53.98 20.92 AV 7206 40.11 9.57 H 49.68 73.98 24.30 PK 7206 26.46 9.57 H 36.03 53.98 17.95 AV $Operation Note: CH Mid(\pi/V UPSK)H36.0353.9817.95AVPrequencyReadingAN:-CL-AMP GANT.POLTotalLimitMargin[MH2]dBuV[dB][H/V][dBu//m][dB]PK488228.923.33V46.2073.9821.73AV732340.6010.20V37.2553.9816.73AV732327.0510.20V37.2553.9816.73AV488228.573.33H31.9053.9822.08AV732340.3410.20H37.2153.9816.77AV732340.3410.20H31.9053.9823.44PK732327.0110.20H37.2153.9816.77AV732340.3410.20H37.2153.9823.44$ | 4804 | 30.24 | 2.98 | V | 33.22 | 53.98 | 20.76 | AV |
| 480443.262.98H46.2473.9827.74PK480430.082.98H33.0653.9820.92AV720640.119.57H49.6873.9824.30PK720626.469.57H30.0353.9817.95AVOperation Mode: CH Mid(r/JUPSK)US3.9817.95AVSteadingAN.+CL-AMP GANT.POLTotalLimitMargin [dBuV/m][MHz]dBuV[dB][H/V][dBuV/m][dBuV/m][dB488228.923.33V46.2073.9827.78PK488228.923.33V32.2553.9816.73AV732340.6010.20V50.8073.9823.18PK732327.0510.20V37.2553.9816.73AV488228.573.33H45.0273.9828.96PK488228.573.33H31.9053.9816.77AV732327.0110.20H37.2153.9816.77AV732327.0110.20H37.2153.9816.77AV732327.0110.20H37.2153.9816.77AV732327.0110.20H37.2153.9816.77AV7400ABUV[dB][H/V][dBUV/m][dB]PK732327.01 | 7206 | 40.19 | 9.57 | V | 49.76 | 73.98 | 24.22 | PK |
| 4804 30.08 2.98 H 33.06 53.98 20.92 AV 7206 40.11 9.57 H 49.68 73.98 24.30 PK 7206 26.46 9.57 H 36.03 53.98 17.95 AV Operation Moter VEN V | 7206 | 26.69 | 9.57 | V | 36.26 | 53.98 | 17.72 | AV |
| 7206 40.11 9.57 H 49.68 73.98 24.30 PK 7206 26.46 9.57 H 36.03 53.98 17.95 AV Operation Model (TA/DQPSK) Frequency Reading AN.+CL-AMP G ANT.POL Total Limit Margin Peter [MHz] dBuV [dB] [H/V] [dBuVm] [dBuV/m] [dBuV/m] PK 4882 42.87 3.33 V 46.20 73.98 27.78 PK 4882 28.92 3.33 V 32.25 53.98 21.73 AV 7323 40.60 10.20 V 50.80 73.98 23.18 PK 4882 28.57 10.20 V 37.25 53.98 16.73 AV 7323 40.34 10.20 H 31.90 53.98 22.08 AV 7323 27.01 10.20 H 37.21 53.98 16.77 AV <t< td=""><td>4804</td><td>43.26</td><td>2.98</td><td>Н</td><td>46.24</td><td>73.98</td><td>27.74</td><td>PK</td></t<> | 4804 | 43.26 | 2.98 | Н | 46.24 | 73.98 | 27.74 | PK |
| 7206 26.46 9.57 H 36.03 53.98 17.95 AV Operation Mode: CH Mid(rat/DQPSK) Frequency Reading AN.+CL-AMP G ANT. POL Total Limit Margin Peteo [MHz] dBuV [dB] [H/V] [dBuV/m] [dBuV/m] [dB] PK 4882 42.87 3.33 V 46.20 73.98 27.78 PK 4882 28.92 3.33 V 32.25 53.98 21.73 AV 7323 40.60 10.20 V 50.80 73.98 23.18 PK 7323 27.05 10.20 V 37.25 53.98 16.73 AV 4882 28.57 3.33 H 45.02 73.98 28.96 PK 4882 28.57 3.33 H 31.90 53.98 16.73 AV 7323 40.34 10.20 H 31.90 53.98 23.44 PK | 4804 | 30.08 | 2.98 | Н | 33.06 | 53.98 | 20.92 | AV |
| Operation Mode: CH Mid(π/4DQPSK) Frequency Reading AN.+CL-AMP G ANT. POL Total Limit Margin Detect [MHz] dBuV [dB] [H/V] [dBuV/m] [dBU/m] [dB] PK 4882 42.87 3.33 V 46.20 73.98 27.78 PK 4882 28.92 3.33 V 32.25 53.98 21.73 AV 7323 40.60 10.20 V 50.80 73.98 23.18 PK 7323 27.05 10.20 V 37.25 53.98 16.73 AV 4882 28.57 3.33 H 45.02 73.98 28.96 PK 4882 28.57 3.33 H 31.90 53.98 16.73 AV 7323 40.34 10.20 H 37.21 53.98 16.77 AV Operation Mote: CH High (π/4DQPSK) [dBuV [dB] [H/V] [dBuV/m] [dB] P | 7206 | 40.11 | 9.57 | Н | 49.68 | 73.98 | 24.30 | PK |
| FrequencyReadingAN.+CL-AMP GANT. POLTotalLimitMargin <td>7206</td> <td>26.46</td> <td>9.57</td> <td>Н</td> <td>36.03</td> <td>53.98</td> <td>17.95</td> <td>AV</td> | 7206 | 26.46 | 9.57 | Н | 36.03 | 53.98 | 17.95 | AV |
| Image: MHz] dBuV [dB] [H/V] [dBuV/m] [dB] [dB] 4882 42.87 3.33 V 46.20 73.98 27.78 PK 4882 28.92 3.33 V 32.25 53.98 21.73 AV 7323 40.60 10.20 V 50.80 73.98 23.18 PK 7323 27.05 10.20 V 50.80 73.98 28.96 PK 4882 41.69 3.33 H 45.02 73.98 28.96 PK 4882 28.57 3.33 H 31.90 53.98 22.08 AV 7323 27.01 10.20 H 50.54 73.98 23.44 PK 4882 28.57 3.33 H 31.90 53.98 16.77 AV Operation Mode: CH High (π/4DQPSK) Integer (π/4DQPSK) Integer (π/4DQPSK) Integer (mHz) Margin Detecter (MHz) M460 28.42 2.36 <td>Operation Mo</td> <td>ode: CH Mid(π/4</td> <td>4DQPSK)</td> <td>1</td> <td></td> <td></td> <td></td> <td>1</td> | Operation Mo | ode: CH Mid(π/4 | 4DQPSK) | 1 | | | | 1 |
| [MHz] dBuV [dB] [H/V] [dBuV/m] [dBuV/m] [dB] 4882 42.87 3.33 V 46.20 73.98 27.78 PK 4882 28.92 3.33 V 32.25 53.98 21.73 AV 7323 40.60 10.20 V 50.80 73.98 23.18 PK 7323 27.05 10.20 V 37.25 53.98 16.73 AV 4882 41.69 3.33 H 45.02 73.98 28.96 PK 4882 28.57 3.33 H 31.90 53.98 22.08 AV 7323 40.34 10.20 H 31.90 53.98 23.44 PK 7323 27.01 10.20 H 37.21 53.98 16.77 AV Operation Mote: CH High (π/H2QPSK) Total Limit Margin Margin 10.72 V 30.78 53.98 23.20 PK | Frequency | Reading | AN.+CL-AMP G | ANT. POL | Total | Limit | Margin | Detect |
| 4882 28.92 3.33 V 32.25 53.98 21.73 AV 7323 40.60 10.20 V 50.80 73.98 23.18 PK 7323 27.05 10.20 V 37.25 53.98 16.73 AV 4882 41.69 3.33 H 45.02 73.98 28.96 PK 4882 28.57 3.33 H 31.90 53.98 22.08 AV 7323 40.34 10.20 H 50.54 73.98 23.44 PK 7323 27.01 10.20 H 37.21 53.98 16.77 AV Operation Mote: CH High (π/4DQPSK) Frequency Reading AN.+CL-AMP G ANT. POL Total Limit Margin PK 4960 41.93 2.36 V 44.29 73.98 29.69 PK 4960 28.42 2.36 V 30.78 53.98 23.20 AV 744 | [MHz] | dBuV | [dB] | [H/V] | [dBuV/m] | [dBuV/m] | [dB] | Delect |
| 732340.6010.20V50.8073.9823.18PK732327.0510.20V37.2553.9816.73AV488241.693.33H45.0273.9828.96PK488228.573.33H31.9053.9822.08AV732340.3410.20H50.5473.9823.44PK732327.0110.20H37.2153.9816.77AVOperation Mote: CH High (π/4DQPSK)H37.2153.9816.77AVFrequencyReadingAN.+CL-AMP GANT. POLTotalLimitMargin [dBuV/m]Detection[MHz]dBuV[dB][H/V][dBuV/m][dBuV/m][dB]PK496028.422.36V30.7853.9823.20AV744026.5510.72V37.2753.9816.71AV496028.582.36H44.6773.9829.69PK496042.312.36H44.6773.9829.31PK496042.312.36H30.9453.9823.04AV496028.582.36H30.9453.9823.04AV496028.582.36H30.9453.9823.04AV496028.582.36H30.9453.9823.04AV496028.582.36H30.945 | 4882 | 42.87 | 3.33 | V | 46.20 | 73.98 | 27.78 | PK |
| 732327.0510.20V37.2553.9816.73AV488241.693.33H45.0273.9828.96PK488228.573.33H31.9053.9822.08AV732340.3410.20H50.5473.9823.44PK732327.0110.20H37.2153.9816.77AVOperation K27.0110.20H37.2153.9816.77AVOperation K(High (π/4DQPSK))H37.2153.9816.77AVOperation Model: CH High (π/4DQPSK)ImitMargin (dB)Margin (dB)Detect[MHz]dBuV[dB][H/V][dBuV/m][dB]PK496041.932.36V44.2973.9829.69PK496028.422.36V30.7853.9823.20AV744040.4510.72V51.1773.9822.81PK744026.5510.72V37.2753.9816.71AV496042.312.36H44.6773.9829.31PK496028.582.36H30.9453.9823.04AV496028.582.36H30.9453.9823.04AV496028.582.36H30.9453.9823.04AV496028.582.36H30.9453.9823.04AV <td>4882</td> <td>28.92</td> <td>3.33</td> <td>V</td> <td>32.25</td> <td>53.98</td> <td>21.73</td> <td>AV</td> | 4882 | 28.92 | 3.33 | V | 32.25 | 53.98 | 21.73 | AV |
| 4882 41.69 3.33 H 45.02 73.98 28.96 PK 4882 28.57 3.33 H 31.90 53.98 22.08 AV 7323 40.34 10.20 H 50.54 73.98 23.44 PK 7323 27.01 10.20 H 37.21 53.98 23.44 PK 7323 27.01 10.20 H 37.21 53.98 16.77 AV Operation Mode: CH High (π/4DQPSK) Frequency Reading AN.+CL-AMP G ANT. POL Total Limit Margin Peter [MHz] dBuV [dB] [H/V] [dBuV/m] [dB] PK 4960 41.93 2.36 V 44.29 73.98 29.69 PK 4960 28.42 2.36 V 30.78 53.98 23.20 AV 7440 40.45 10.72 V 51.17 73.98 22.81 PK 4960 | 7323 | 40.60 | 10.20 | V | 50.80 | 73.98 | 23.18 | PK |
| 4882 28.57 3.33 H 31.90 53.98 22.08 AV 7323 40.34 10.20 H 50.54 73.98 23.44 PK 7323 27.01 10.20 H 37.21 53.98 16.77 AV Operation Mode: CH High (π/4DQPSK) 53.98 16.77 AV Image: CH High (π/4DQPSK) AN.+CL-AMP G ANT. POL Total Limit Margin Detect [MHz] dBuV [dB] [H/V] [dBuV/m] [dBu PK 4960 41.93 2.36 V 44.29 73.98 29.69 PK 4960 28.42 2.36 V 30.78 53.98 23.20 AV 7440 40.45 10.72 V 31.17 73.98 22.81 PK 4960 42.31 2.36 H 44.67 73.98 23.04 AV 4960 28.58 2.36 H 30.94 53.98 <td>7323</td> <td>27.05</td> <td>10.20</td> <td>V</td> <td>37.25</td> <td>53.98</td> <td>16.73</td> <td>AV</td> | 7323 | 27.05 | 10.20 | V | 37.25 | 53.98 | 16.73 | AV |
| 7323 40.34 10.20 H 50.54 73.98 23.44 PK 7323 27.01 10.20 H 37.21 53.98 16.77 AV Operation Model CH High (π /4DQPSK) 53.98 16.77 AV Frequency Reading AN.+CL-AMP G ANT. POL Total Limit Margin (dB) Detect [MHz] dBuV [dB] [H/V] [dBuV/m] [dBuV/m] [dB] Detect 4960 41.93 2.36 V 44.29 73.98 29.69 PK 4960 28.42 2.36 V 30.78 53.98 23.20 AV 7440 40.45 10.72 V 51.17 73.98 22.81 PK 4960 42.31 2.36 H 44.67 73.98 29.31 PK 4960 42.31 2.36 H 30.94 53.98 16.71 AV 4960 28.58 2.36 H | 4882 | 41.69 | 3.33 | Н | 45.02 | 73.98 | 28.96 | PK |
| 732327.0110.20H37.2153.9816.77AVOperation Mode: CH High (π/4DQPSK)FrequencyReadingAN.+CL-AMP GANT. POLTotalLimitMargin[MHz]dBuV[dB][H/V][dBuV/m][dBuV/m][dB]496041.932.36V44.2973.9829.69PK496028.422.36V30.7853.9823.20AV744040.4510.72V51.1773.9822.81PK744026.5510.72V37.2753.9816.71AV496042.312.36H44.6773.9829.31PK496028.582.36H30.9453.9823.04AV496040.1710.72H50.8973.9823.09PK | 4882 | 28.57 | 3.33 | Н | 31.90 | 53.98 | 22.08 | AV |
| Operation Mode: CH High (π/4DQPSK) Frequency Reading AN.+CL-AMP G ANT. POL Total Limit Margin Detect [MHz] dBuV [dB] [H/V] [dBuV/m] [dBuV/m] [dB] Detect 4960 41.93 2.36 V 44.29 73.98 29.69 PK 4960 28.42 2.36 V 30.78 53.98 23.20 AV 7440 40.45 10.72 V 51.17 73.98 22.81 PK 7440 26.55 10.72 V 37.27 53.98 16.71 AV 4960 42.31 2.36 H 44.67 73.98 29.31 PK 4960 28.58 2.36 H 30.94 53.98 23.04 AV 4960 28.58 2.36 H 30.94 53.98 23.04 AV 4960 28.58 2.36 H 30.94 53.98 23.09 PK 4 | 7323 | 40.34 | 10.20 | Н | 50.54 | 73.98 | 23.44 | PK |
| Frequency Reading AN.+CL-AMP G ANT. POL Total Limit Margin Deter [MHz] dBuV [dB] [H/V] [dBuV/m] [dBuV/m] [dB] 4960 41.93 2.36 V 44.29 73.98 29.69 PK 4960 28.42 2.36 V 30.78 53.98 23.20 AV 7440 40.45 10.72 V 51.17 73.98 22.81 PK 7440 26.55 10.72 V 37.27 53.98 16.71 AV 4960 42.31 2.36 H 44.67 73.98 29.31 PK 4960 28.58 2.36 H 30.94 53.98 16.71 AV 4960 28.58 2.36 H 30.94 53.98 23.04 AV 4960 28.58 2.36 H 30.94 53.98 23.04 AV 7440 40.17 10.72 <t< td=""><td>7323</td><td>27.01</td><td>10.20</td><td>Н</td><td>37.21</td><td>53.98</td><td>16.77</td><td>AV</td></t<> | 7323 | 27.01 | 10.20 | Н | 37.21 | 53.98 | 16.77 | AV |
| Image: MHz] dBuV [dB] [H/V] [dBuV/m] [dBuV/m] [dB] Detection 4960 41.93 2.36 V 44.29 73.98 29.69 PK 4960 28.42 2.36 V 30.78 53.98 23.20 AV 7440 40.45 10.72 V 51.17 73.98 22.81 PK 7440 26.55 10.72 V 37.27 53.98 16.71 AV 4960 42.31 2.36 H 44.67 73.98 29.31 PK 4960 28.58 2.36 H 30.94 53.98 16.71 AV 4960 28.58 2.36 H 30.94 53.98 23.04 AV 4960 28.58 2.36 H 30.94 53.98 23.04 AV 4960 28.58 2.36 H 50.89 73.98 23.09 PK 7440 40.17 10.72 | Operation Mo | ode: CH High (π | /4DQPSK) | | | | | |
| [MHz] dBuV [dB] [H/V] [dBuV/m] [dBuV/m] [dB] 4960 41.93 2.36 V 44.29 73.98 29.69 PK 4960 28.42 2.36 V 30.78 53.98 23.20 AV 7440 40.45 10.72 V 51.17 73.98 22.81 PK 7440 26.55 10.72 V 37.27 53.98 16.71 AV 4960 42.31 2.36 H 44.67 73.98 29.31 PK 4960 28.58 2.36 H 30.94 53.98 16.71 AV 4960 28.58 2.36 H 30.94 53.98 23.04 AV 4960 28.58 2.36 H 30.94 53.98 23.04 AV 7440 40.17 10.72 H 50.89 73.98 23.09 PK | Frequency | Reading | AN.+CL-AMP G | ANT. POL | Total | Limit | Margin | Detect |
| 496028.422.36V30.7853.9823.20AV744040.4510.72V51.1773.9822.81PK744026.5510.72V37.2753.9816.71AV496042.312.36H44.6773.9829.31PK496028.582.36H30.9453.9823.04AV744040.1710.72H50.8973.9823.09PK | [MHz] | dBuV | [dB] | [H/V] | [dBuV/m] | [dBuV/m] | [dB] | Dettet |
| 7440 40.45 10.72 V 51.17 73.98 22.81 PK 7440 26.55 10.72 V 37.27 53.98 16.71 AV 4960 42.31 2.36 H 44.67 73.98 29.31 PK 4960 28.58 2.36 H 30.94 53.98 23.04 AV 7440 40.17 10.72 H 50.89 73.98 23.09 PK | 4960 | 41.93 | 2.36 | V | 44.29 | 73.98 | 29.69 | PK |
| 7440 26.55 10.72 V 37.27 53.98 16.71 AV 4960 42.31 2.36 H 44.67 73.98 29.31 PK 4960 28.58 2.36 H 30.94 53.98 23.04 AV 7440 40.17 10.72 H 50.89 73.98 23.09 PK | 4960 | 28.42 | 2.36 | V | 30.78 | 53.98 | 23.20 | AV |
| 4960 42.31 2.36 H 44.67 73.98 29.31 PK 4960 28.58 2.36 H 30.94 53.98 23.04 AV 7440 40.17 10.72 H 50.89 73.98 23.09 PK | 7440 | 40.45 | 10.72 | V | 51.17 | 73.98 | 22.81 | PK |
| 4960 28.58 2.36 H 30.94 53.98 23.04 AV 7440 40.17 10.72 H 50.89 73.98 23.09 PK | 7440 | 26.55 | 10.72 | V | 37.27 | 53.98 | 16.71 | AV |
| 7440 40.17 10.72 H 50.89 73.98 23.09 PK | 4960 | 42.31 | 2.36 | Н | 44.67 | 73.98 | 29.31 | PK |
| | 4960 | 28.58 | 2.36 | Н | 30.94 | 53.98 | 23.04 | AV |
| 7440 26.27 10.72 H 36.99 53.98 16.99 AV | 7440 | 40.17 | 10.72 | Н | 50.89 | 73.98 | 23.09 | PK |
| | 7440 | 26.27 | 10.72 | Н | 36.99 | 53.98 | 16.99 | AV |



| Operation Mo | ode: CH Low(8[| PSK) | | | | | |
|--------------|----------------|--------------|----------|----------|----------|--------|---------|
| Frequency | Reading | AN.+CL-AMP G | ANT. POL | Total | Limit | Margin | Detect |
| [MHz] | dBuV | [dB] | [H/V] | [dBuV/m] | [dBuV/m] | [dB] | Delect |
| 4804 | 45.30 | 2.98 | V | 48.28 | 73.98 | 25.70 | PK |
| 4804 | 30.29 | 2.98 | V | 33.27 | 53.98 | 20.71 | AV |
| 7206 | 41.41 | 9.57 | V | 50.98 | 73.98 | 23.00 | PK |
| 7206 | 26.55 | 9.57 | V | 36.12 | 53.98 | 17.86 | AV |
| 4804 | 44.26 | 2.98 | Н | 47.24 | 73.98 | 26.74 | PK |
| 4804 | 30.14 | 2.98 | Н | 33.12 | 53.98 | 20.86 | AV |
| 7206 | 41.07 | 9.57 | Н | 50.64 | 73.98 | 23.34 | PK |
| 7206 | 26.42 | 9.57 | Н | 35.99 | 53.98 | 17.99 | AV |
| Operation Mo | ode: CH Mid(8D | PSK) | 1 | | | | |
| Frequency | Reading | AN.+CL-AMP G | ANT. POL | Total | Limit | Margin | Detect |
| [MHz] | dBuV | [dB] | [H/V] | [dBuV/m] | [dBuV/m] | [dB] | Dettett |
| 4882 | 42.49 | 3.33 | V | 45.82 | 73.98 | 28.16 | PK |
| 4882 | 28.91 | 3.33 | V | 32.24 | 53.98 | 21.74 | AV |
| 7323 | 41.04 | 10.20 | V | 51.24 | 73.98 | 22.74 | PK |
| 7323 | 27.03 | 10.20 | V | 37.23 | 53.98 | 16.75 | AV |
| 4882 | 41.75 | 3.33 | Н | 45.08 | 73.98 | 28.90 | PK |
| 4882 | 28.49 | 3.33 | н | 31.82 | 53.98 | 22.16 | AV |
| 7323 | 41.00 | 10.20 | Н | 51.20 | 73.98 | 22.78 | PK |
| 7323 | 27.02 | 10.20 | Н | 37.22 | 53.98 | 16.76 | AV |
| Operation Mo | ode: CH High(8 | DPSK) | 1 | | | | 1 |
| Frequency | Reading | AN.+CL-AMP G | ANT. POL | Total | Limit | Margin | Detect |
| [MHz] | dBuV | [dB] | [H/V] | [dBuV/m] | [dBuV/m] | [dB] | |
| 4960 | 42.07 | 2.36 | V | 44.43 | 73.98 | 29.55 | PK |
| 4960 | 28.45 | 2.36 | V | 30.81 | 53.98 | 23.17 | AV |
| 7440 | 39.87 | 10.72 | V | 50.59 | 73.98 | 23.39 | PK |
| 7440 | 26.44 | 10.72 | V | 37.16 | 53.98 | 16.82 | AV |
| 4960 | 42.52 | 2.36 | Н | 44.88 | 73.98 | 29.10 | PK |
| 4960 | 28.74 | 2.36 | Н | 31.10 | 53.98 | 22.88 | AV |
| 7440 | 39.57 | 10.72 | Н | 50.29 | 73.98 | 23.69 | PK |
| 7440 | 26.28 | 10.72 | Н | 37.00 | 53.98 | 16.98 | AV |

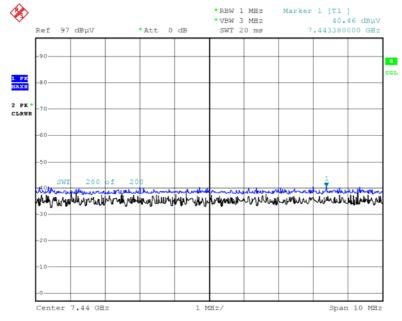


HCT



Date: 6.JAN.2021 20:08:44

Radiated Spurious Emissions plot - Peak Reading (GFSK, Ch.78 3rd Harmonic, V)



Date: 6.JAN.2021 20:08:58

Note:

Plot of worst case are only reported.



10.6.3 RADIATED RESTRICTED BAND EDGES

| Operation Mode | Normal(GFSK) | | |
|---------------------|--------------------|--|--|
| Operating Frequency | 2402 MHz, 2480 MHz | | |
| Channel No | CH 0, CH 78 | | |

| Frequency | Reading | AN.+CL -AMP G | ANT. POL | Duty Cycle Correction | Total | Limit | Margin | Detect |
|-----------|---------|------------------|-------------|--------------------------|----------|----------|--------|--------|
| [MHz] | dBuV | [dB] | [H/V] | [dB] | [dBuV/m] | [dBuV/m] | [dB] | [dB] |
| 2390.0 | 47.26 | 0.94 | н | 0 | 48.20 | 73.98 | 25.78 | PK |
| 2390.0 | 37.68 | 0.94 | Н | -24.73 | 13.89 | 53.98 | 40.09 | AV |
| 2390.0 | 48.07 | 0.94 | V | 0 | 49.01 | 73.98 | 24.97 | PK |
| 2390.0 | 38.56 | 0.94 | V | -24.73 | 14.77 | 53.98 | 39.21 | AV |
| 2483.5 | 56.48 | 1.20 | н | 0 | 57.68 | 73.98 | 16.30 | PK |
| 2483.5 | 52.45 | 1.20 | Н | -24.73 | 28.91 | 53.98 | 25.07 | AV |
| 2483.5 | 57.79 | 1.20 | V | 0 | 58.99 | 73.98 | 14.99 | PK |
| 2483.5 | 55.08 | 1.20 | V | -24.73 | 31.54 | 53.98 | 22.44 | AV |

Operation Mode Operating Frequency

Channel No

EDR(π/4DQPSK) 2402 MHz, 2480 MHz CH 0, CH 78

| Frequency | Reading | AN.+CL -AMP G | ANT. POL | Duty Cycle Correction | Total | Limit | Margin | Detect |
|-----------|---------|------------------|-------------|--------------------------|----------|----------|--------|--------|
| [MHz] | dBuV | [dB] | [H/V] | [dB] | [dBuV/m] | [dBuV/m] | [dB] | [dB] |
| 2390.0 | 47.99 | 0.94 | н | 0 | 48.93 | 73.98 | 25.05 | PK |
| 2390.0 | 37.74 | 0.94 | Н | -24.73 | 13.95 | 53.98 | 40.03 | AV |
| 2390.0 | 48.55 | 0.94 | V | 0 | 49.49 | 73.98 | 24.49 | PK |
| 2390.0 | 38.13 | 0.94 | V | -24.73 | 14.34 | 53.98 | 39.64 | AV |
| 2483.5 | 59.00 | 1.20 | Н | 0 | 60.20 | 73.98 | 13.78 | PK |
| 2483.5 | 52.54 | 1.20 | Н | -24.73 | 29.00 | 53.98 | 24.98 | AV |
| 2483.5 | 60.43 | 1.20 | V | 0 | 61.63 | 73.98 | 12.35 | PK |
| 2483.5 | 55.66 | 1.20 | V | -24.73 | 32.12 | 53.98 | 21.86 | AV |

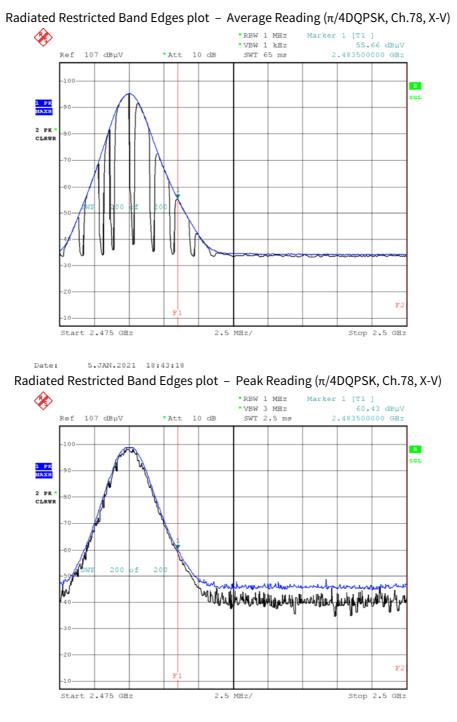


| Operation Mode | EDR(8DPSK) |
|---------------------|--------------------|
| Operating Frequency | 2402 MHz, 2480 MHz |
| Channel No | СН 0, СН 78 |

| Frequency | Reading | AN.+CL -AMP G | ANT. POL | Duty Cycle Correction | Total | Limit | Margin | Detect |
|-----------|---------|------------------|-------------|--------------------------|----------|----------|--------|--------|
| [MHz] | dBuV | [dB] | [H/V] | [dB] | [dBuV/m] | [dBuV/m] | [dB] | [dB] |
| 2390.0 | 47.60 | 0.94 | Н | 0 | 48.54 | 73.98 | 25.44 | PK |
| 2390.0 | 37.56 | 0.94 | Н | -24.73 | 13.77 | 53.98 | 40.21 | AV |
| 2390.0 | 48.11 | 0.94 | V | 0 | 49.05 | 73.98 | 24.93 | PK |
| 2390.0 | 38.03 | 0.94 | V | -24.73 | 14.24 | 53.98 | 39.74 | AV |
| 2483.5 | 58.96 | 1.20 | Н | 0 | 60.16 | 73.98 | 13.82 | PK |
| 2483.5 | 52.42 | 1.20 | Н | -24.73 | 28.88 | 53.98 | 25.10 | AV |
| 2483.5 | 60.25 | 1.20 | V | 0 | 61.45 | 73.98 | 12.53 | PK |
| 2483.5 | 55.83 | 1.20 | V | -24.73 | 32.29 | 53.98 | 21.69 | AV |



RESULT PLOTS



Date: 5.JAN.2021 18:43:38

Note:

Plot of worst case are only reported.



11. LIST OF TEST EQUIPMENT

Conducted Test

| Manufacture | | Calibratio | Calibratio | | |
|---------------|----------------------------------|--------------|------------|------------|--|
| | Model / Equipment | n | n | Serial No. | |
| r | | Date | Interval | | |
| Rohde & | | 00/04/2020 | امريم | 102245 | |
| Schwarz | ENV216 / LISN | 09/04/2020 | Annual | 102245 | |
| Rohde & | ESCI / Test Receiver | 06/10/2020 | Annual | 100584 | |
| Schwarz | ESCI / Test Receiver | 06/10/2020 | Annual | 100564 | |
| ESPAC | SU-642 /Temperature Chamber | 03/18/2020 | Annual | 0093008124 | |
| Agilent | N9030A / Signal Analyzer | 01/11/2021 | Annual | MY49431210 | |
| Rohde & | OSD 120 / Dowor Moscuroment Set | - 07/02/2020 | Annual | 101231 | |
| Schwarz | OSP 120 / Power Measurement Set | 07/02/2020 | Annual | 101231 | |
| Agilent | N1911A / Power Meter | 04/07/2020 | Annual | MY45100523 | |
| Keysight | N1921A / Power Sensor | 06/08/2020 | Annual | MY57820067 | |
| Agilent | 87300B / Directional Coupler | 11/10/2020 | Annual | 3116A03621 | |
| Hewlett | 11007D / Dower Calitter | 05/25/2020 | معمدها | 05001 | |
| Packard | 11667B / Power Splitter | 05/25/2020 | Annual | 05001 | |
| Hewlett | E3632A / DC Power Supply | 06/12/2020 | Annual | KD75202060 | |
| Packard | ES032A/ DC Power Supply | 00/12/2020 | Annual | KR75303960 | |
| Agilent | 8493C / Attenuator(10 dB) | 06/26/2020 | Annual | 07560 | |
| Rohde & | EMC32 / Software | N/A | N/A | N/A | |
| Schwarz | | IN/A | IN/A | IN/A | |
| HCT CO., LTD. | FCC WLAN&BT&BLE Conducted | N/A | N/A | N/A | |
| ner co., ETD. | Test Software v3.0 | 11/74 | IN/A | N/A | |
| Rohde & | CBT / Bluetooth Tester | 05/12/2020 | Annual | 100422 | |
| Schwarz | | 03/12/2020 | Aiiiuat | 100422 | |
| Agilent | 11636A / Power Divider | 07/24/2020 | Annual | 9109 | |
| Agilent | N5182A / Vector Signal Generator | 08/26/2020 | Annual | MY50140312 | |

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.

2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.



Radiated Test

| Manufacturer | Model / Equipment | Calibration Date | Calibration Interval | Serial No. |
|---------------------------|--|---------------------|-------------------------|-------------|
| Innco system | CO3000 / Controller(Antenna mast) | N/A | N/A | CO3000-4p |
| Innco system | MA4640/800-XP-EP / Antenna Position Tower | N/A | N/A | N/A |
| Emco | 2090 / Controller | N/A | N/A | 060520 |
| Ets | Turn Table | N/A | N/A | N/A |
| Rohde & Schwarz | Loop Antenna | 05/18/2020 | Biennial | 1513-175 |
| Schwarzbeck | VULB 9160 / Hybrid Antenna | 08/19/2020 | Biennial | 9160-3368 |
| Schwarzbeck | VULB 9168 / Hybrid Antenna | 09/04/2020 | Biennial | 9168-0895 |
| Schwarzbeck | BBHA 9120D / Horn Antenna | 11/18/2019 | Biennial | 9120D-1191 |
| Schwarzbeck | BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz) | 11/29/2019 | Biennial | BBHA9170541 |
| Rohde & Schwarz | FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer | 09/14/2020 | Annual | 836650/016 |
| Rohde & Schwarz | FSV40-N / Spectrum Analyzer | 09/22/2020 | Annual | 101068-SZ |
| Wainwright Instruments | WRCJV2400/2483.5-2370/2520- 60/12SS / Band Reject Filter | 01/06/2021 | Annual | 2 |
| Wainwright Instruments | WRCJV5100/5850-40/50-8EEK / Band Reject Filter | 02/10/2020 | Annual | 1 |
| CERNEX | CBLU1183540B-01/Broadband Bench Top LNA 56-10 / Attenuator(10 dB) | 12/23/2020 | Annual | N/A |
| CERNEX Api tech. | CBL06185030 / Broadband Low Noise Amplifier 18B-03 / Attenuator (3 dB) | 12/23/2020 | Annual | N/A |
| Wainwright Instruments | WHKX10-2700-3000-18000-40SS / High Pass Filter | 12/23/2020 | Annual | N/A |
| Wainwright Instruments | WHKX8-6090-7000-18000-40SS / High Pass Filter | 12/23/2020 | Annual | N/A |
| T&M SYSTEM | COAXIAL ATTENUATOR / Thru | 12/23/2020 | Annual | N/A |
| CERNEX | CBL18265035 / Power Amplifier | 12/04/2020 | Annual | 22966 |
| CERNEX | CBL26405040 / Power Amplifier | 03/23/2020 | Annual | 25956 |
| TESCOM | TC-3000C / Bluetooth Tester | 03/18/2020 | Annual | 3000C000276 |

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the

calibration.

2. Equipment listed above that has a calibration due date during the testing period, the testing is

completed before equipment expiration date.

3. Espectially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017).





12. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

| No. | Description | |
|-----|---------------------|--|
| 1 | HCT-RF-2101-FC113-P | |