

FCC BT REPORT Certification

Applicant Name: SAMSUNG Electronics Co., Ltd.

Address:

APPLICANT:

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Test Site/Location: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2112-FC052

FCC ID: A3LSMA336M

SAMSUNG Electronics Co., Ltd.

| Model: | SM-A336M/DSN |
|-----------------------|---|
| Additional Model: | SM-A336M |
| EUT Type: | Mobile Phone |
| Max. RF Output Power: | 15.579 dBm (36.13 mW) |
| Frequency Range: | 2 402 MHz – 2 480 MHz (Bluetooth) |
| Modulation type | GFSK(Normal), π /4DQPSK and 8DPSK(EDR) |
| FCC Classification: | FCC Part 15 Spread Spectrum Transmitter (DSS) |
| FCC Rule Part(s): | Part 15 subpart C 15.247 |

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.



FCC ID: A3LSMA336M

REVIEWED BY

Not

Report prepared by : Sang Hoon Lee Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *. The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

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



<u>Version</u>

| TEST REPORT NO. | DATE | DESCRIPTION |
|-------------------|------------------|-------------------------|
| HCT-RF-2112-FC052 | January 06, 2022 | - First Approval Report |



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1. EUT DESCRIPTION

| Model | SM-A336M/DSN | |
|----------------------|---|--|
| Additional Model | SM-A336M | |
| EUT Type | Mobile Phone | |
| Power Supply | DC 3.86 V | |
| Frequency Range | 2 402 MHz ~ 2 480 MHz | |
| Max. RF Output Power | 15.579 dBm (36.13 mW) | |
| BT Operating Mode | Normal, EDR, AFH | |
| Modulation Type | GFSK(Normal), π/4DQPSK and 8DPSK(EDR) | |
| Modulation Technique | FHSS | |
| Number of Channels | 79 Channels, Minimum 20 Channels(AFH) | |
| Date(s) of Tests | December 08, 2021 ~ January 06, 2022 | |
| Serial number | Radiated : R3CRA0TYEFE Conducted: 5b225620bb337ece | |



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.

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 30 MHz 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 1 GHz. Above 1 GHz with 1.5 m 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 and add the DCCF calsulations.

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 equipment's, which is traceable to recognized national standards.

Especially, 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 (Confidence level about 95 %, <i>k</i> =2) |
| Radiated Disturbance (9 kHz ~ 30 MHz) | 3.40 (Confidence level about 95 %, k=2) |
| Radiated Disturbance (30 MHz ~ 1 GHz) | 4.80 (Confidence level about 95 %, k=2) |
| Radiated Disturbance (1 GHz ~ 18 GHz) | 5.70 (Confidence level about 95 %, <i>k</i> =2) |
| Radiated Disturbance (18 GHz ~ 40 GHz) | 5.05 (Confidence level about 95 %, k=2) |



8. DESCRIPTION OF TESTS

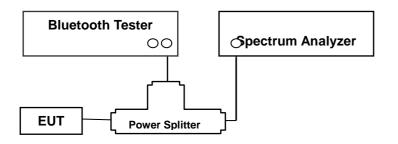
8.1. Conducted Maximum Peak Output Power

<u>Limit</u>

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

- 1. 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 ≥ RBW
- 4) Sweep = Auto
- 5) Detector = Peak
- 6) Trace = Max hold

Sample Calculation

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

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

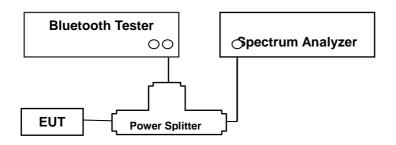


8.2. Conducted Band Edge(Out of Band Emissions)

<u>Limit</u>

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
- 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

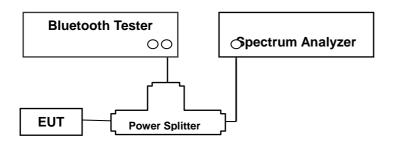


8.3. Frequency Separation & 20 dB Bandwidth

<u>Limit</u>

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 ≥ 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.



Test Procedure (20 dB Bandwidth)

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

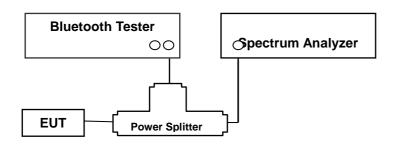


8.4. Number of Hopping Frequencies

<u>Limit</u>

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 ≥ RBW
- 4) Sweep: Auto
- 5) Detector: Peak
- 6) Trace: Max hold
- 7) Allow the trace to stabilize.

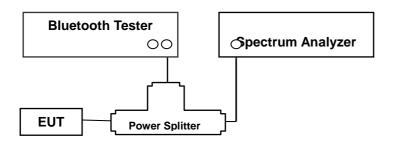


8.5. Time of Occupancy

<u>Limit</u>

According to \$15.247(a)(1)(iii), Frequency hopping systems operating in the 2400 MHz ~ 2483.5MHz 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
- RBW shall be ≤ 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.

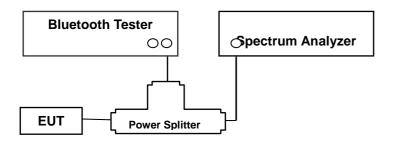
Dwell time = Tx-time x 106.667 = 308.27 (ms)



8.6. Conducted Spurious Emissions

<u>Limit</u> 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 | 16.09 |
| 100 | 16.19 |
| 200 | 16.26 |
| 300 | 16.37 |
| 400 | 16.43 |
| 500 | 16.46 |
| 600 | 16.46 |
| 700 | 16.50 |
| 800 | 16.53 |
| 900 | 16.57 |
| 1000 | 16.60 |
| 2000 | 16.88 |
| 2400 | 16.99 |
| 2480 | 16.99 |
| 2500 | 16.99 |
| 3000 | 17.09 |
| 4000 | 17.27 |
| 5000 | 17.43 |
| 5150 | 17.46 |
| 5850 | 17.55 |
| 6000 | 17.55 |
| 7000 | 17.72 |
| 8000 | 17.86 |
| 9000 | 17.99 |
| 10000 | 18.14 |
| 11000 | 18.21 |
| 12000 | 18.37 |
| 13000 | 18.55 |
| 14000 | 18.50 |
| 15000 | 18.57 |
| 16000 | 18.66 |
| 17000 | 18.74 |
| 18000 | 18.87 |
| 19000 | 18.94 |
| 20000 | 19.04 |
| 21000 | 19.42 |
| 22000 | 19.38 |
| 23000 | 19.61 |
| 24000 | 19.48 |
| 25000 | 19.55 |
| 26000 | 19.64 |

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

2. Factor = Attenuator loss(10 dB) + Cable loss(2 EA) + Splitter loss(6 dB) + EUT Cable loss



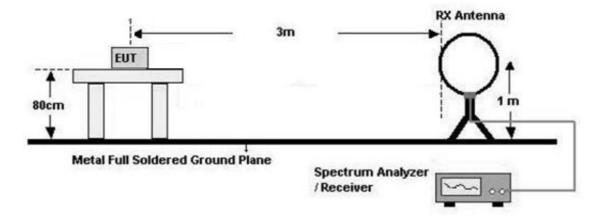
8.7. Radiated Test

<u>Limit</u>

| Frequency (MHz) | Field Strength (µV/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 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

Test Configuration

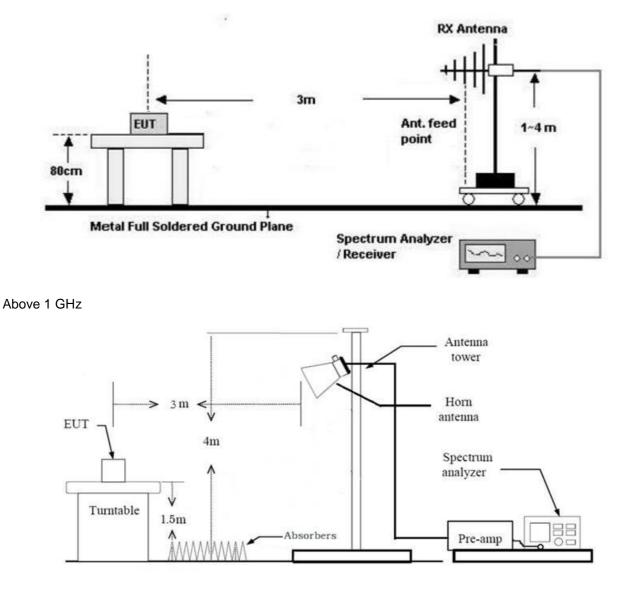
Below 30 MHz





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30 MHz - 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 3 m from the EUT
- 3. The EUT is placed on a turntable, which is 0.8 m 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.
- 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) = $40\log(3 \text{ m}/30 \text{ m}) = -40 \text{ dB}$

Measurement Distance : 3 m



- 8. Spectrum Setting
 - Frequency Range = 9 kHz ~ 30 MHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 9 kHz
 - VBW \ge 3 x RBW
- 9. Total = Measured 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 1 GHz)

- 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 0.8 m above ground plane.
- 3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1m to 4 m 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 \ge 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 = Measured 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 ≥ 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
 - (1)Measurement(Peak)

```
Reading Value(Peak) + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)
(2)Measurement(Avg)
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Reading Value(Peak) + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F) + + DCCF(AFH)

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- 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/ Δt [ms] = H \rightarrow Round up to next highest integer, H ' =1
 - c. Worst Case Dwell Time = T [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 = T [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 1 m to 4 m 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 \ge 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
- 9. 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.
- 10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)

11. Total

(1)Measurement(Peak)

Reading Value(Peak) + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F) (2)Measurement(Avg)

Reading Value(Peak) + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F) + + DCCF(AFH)



8.8. AC Power line Conducted Emissions

<u>Limit</u>

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 μ H/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) = Measured 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, Stand alone + External accessories (Earphone, etc)
- Worstcase : Stand alone
- 2. EUT Axis
 - Radiated Spurious Emissions : Y
 - 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
- $\pi/4DQPSK$: 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
- 5. SM-A336M/DSN, SM-A336Mwere tested and the worst case results are reported.

(Worst case : SM-A336M/DSN)

Radiated test(DBS)

- 1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : Stand alone, Stand alone + External accessories(Earphone, etc)
 - Worstcase : Stand alone
- 2. EUT Axis
 - Radiated Spurious Emissions : Y, Z
- 3. The following tables show the worst case configurations determined during testing.

| Description | Bluetooth Emission | 5 GHz Emission |
|-------------|--------------------|----------------|
| Antenna | WIFI/BT | WIFI/BT |
| Channel | 0 | 165 |
| Data Rate | 1 Mbps | MCS 0 |
| Mode | GFSK : DH5 | 802.11n(HT20) |



AC Power line Conducted Emissions

- 1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : Stand alone + External accessories(Earphone, etc)+Travel Adapter

Stand alone + Travel Adapter

- Worstcase : Stand alone + Travel Adapter
- 2. SM-A336M/DSN, SM-A336Mwere tested and the worst case results are reported.

(Worst case : SM-A336M/DSN)

Conducted test

- 1. The EUT was configured with data rate of highest power.
 - GFSK : DH5
 - $\pi/4DQPSK$: 2-DH5
 - 8DPSK : 3-DH5
- 2. AFH & Non-AFH were tested and the worst case results are reported.
 - (Worst case : Non-AFH)
- 3. SM-A336M/DSN, SM-A336Mwere tested and the worst case results are reported.
- (Worst case : SM-A336M/DSN)



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 20 dB BW | | PASS |
| Number of Hopping Frequencies | §15.247(a)(1)(iii) ≥ 15 | | Conducted | PASS |
| Time of Occupancy | §15.247(a)(1)(iii) | < 400 ms | | 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) | | | PASS |
| AC Power line Conducted Emissions | §15.207(a) | cf. Section 8.8 | | PASS |
| Radiated Spurious Emissions | §15.247(d), 15.205, 15.209 | cf. Section 8.7 | Radiated | PASS |
| Radiated Restricted Band Edge | §15.247(d), 15.205, 15.209 | cf. Section 8.7 | Kadiated | PASS |

Note: Average Power data refer to SAR report



10. TEST RESULT

10.1 PEAK POWER

| Channel | Frequency | Output Power (GFSK) | | Limit |
|---------|-----------|------------------------|-------|-------|
| | (MHz) | (dBm) | (mW) | (mW) |
| Low | 2402 | 15.579 | 36.13 | |
| Mid | 2441 | 15.236 | 33.39 | 125 |
| High | 2480 | 14.204 | 26.33 | |

| Channel | Frequency | Output Power (8DPSK) | | Limit |
|---------|-----------|-------------------------|-------|-------|
| | (MHz) | (dBm) | (mW) | (mW) |
| Low | 2402 | 14.604 | 28.87 | |
| Mid | 2441 | 14.273 | 26.75 | 125 |
| High | 2480 | 13.304 | 21.40 | |

| Channel | Frequency (MHz) | Outpu (π/4D | Limit (mW) | |
|---------|--------------------|----------------|---------------|---------|
| | (1917) | (dBm) | (mW) | (11177) |
| Low | 2402 | 13.998 | 25.11 | |
| Mid | 2441 | 13.646 | 23.15 | 125 |
| High | 2480 | 12.708 | 18.66 | |

Note:

1. Spectrum measured values are not plot data.

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

 Actual value of loss for the splitter and cable combination is 16.99 dB at 2400 MHz and is 16.99 dB at 2500 MHz. So, 16.99 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)

| enter F | RF 50 Ω AC req 2.402000000 | GHz PNO: Fast ↔ | SENSE:INT Trig: Free Run Atten: 20 dB | ALIGNAUTO #Avg Type: RMS Avg Hold: 1/1 | 05:52:46 PM Dec 15, 2021 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P P P P P P | Frequency |
|----------|--------------------------------------|--------------------|---|--|--|--|
| 0 dB/div | Ref Offset 16.99 dB Ref 25.00 dBm | IF Gall.LUW | | Mkr1 | 2.402 034 GHz 15.579 dBm | Auto Tur |
| 15.0 | | | ∳ ¹ | | | Center Fr 2.402000000 G |
| 5.00 | | | | | | Start Fr 2.399589753 G |
| 25.0 | | | | | | Stop Fr 2.404410247 G |
| 15.0 | | | | | | CF St 482.049 k <u>Auto</u> M |
| 55.0 | | | | | | Freq Offs 0 |
| 55.0 | 402000 GHz | | | | Span 4.820 MHz | |
| Res BW | | #VBN | 50 MHz | Sweep 1 | .000 ms (1001 pts) | |

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





Test Plots (GFSK)

Peak Power (CH.78)

| Agilent Spectr | rum Analyzer - Swept SA RF 50 Ω AC | | SENSE:INT | ALIGNAUTO | 05:53:09 PMDec 15, 2021 | |
|-----------------------|---------------------------------------|---------------|--------------------------------|---------------------------------|--|--|
| | req 2.480000000 | PNO: Fast +++ | Frig: Free Run Atten: 20 dB | #Avg Type: RMS Avg Hold: 1/1 | TRACE 1 2 3 4 5 6 TYPE MWWWW DET P P P P P | Frequency |
| 10 dB/div | Ref Offset 16.99 dB Ref 25.00 dBm | IFGain:Low | Atten: 20 dB | Mkr | 1 2.479 909 GHz 14.204 dBm | Auto Tune |
| 15.0 | | | ↓ ¹ | | | Center Fre 2.480000000 GH |
| -5.00 | | | | | | Start Fre 2.477593209 G⊦ |
| 25.0 | | | | | | Stop Fre 2.482406791 GF |
| 45.0 | | | | | | CF Ste 481.358 kl <u>Auto</u> M |
| 55.0 | | | | | | Freq Offs |
| 65.0 | | | | | | |
| Center 2.4 #Res BW | 480000 GHz 3.0 MHz | #VBW 5 | 0 MHz | Sweep | Span 4.814 MHz 1.000 ms (1001 pts) | |
| ISG | | | | STAT | us | |

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





Test Plots (8DPSK)

Peak Power (CH.39)

| #Res BW | 3.0 MHZ | #VBV | / 50 MHz | Sweep | 1.000 ms (1001 pts) | |
|------------------|---------------------------------------|----------------------|--------------|---------------------------------|--|------------------------------|
| | 441000 GHz | #1(5)4 | (50 MU- | | Span 6.665 MHz | |
| | | | | | | |
| -65.0 | | | | | | |
| -55.0 | | | | | | Freq Offse 0 H |
| -45.0 | | | | | | |
| | | | | | | 666.500 kH <u>Auto</u> Ma |
| -35.0 | | | | | | CF Ste |
| -25.0 | | | | | | 2.444332500 GF |
| -15.0 | | | | | | Stop Fre 2.444332500 G⊢ |
| | | | | | | |
| -5.00 | | | | | | 2.437667500 GH |
| 5.00 | | | | | | Start Fre |
| 15.0 | | | | | | 2.441000000 GH |
| | | | 1 | | | Center Fre |
| 10 dB/div Log | Ref Offset 16.99 dE Ref 25.00 dBm | } | | | 14.273 dBm | |
| | | IFGain:Low | Atten: 20 dB | | DET P P P P P P | Auto Tun |
| | req 2.44100000 | 0 GHz PNO: Fast ↔ | | #Avg Type: RMS Avg Hold: 1/1 | TRACE 123456 TYPE MWWWWW DET P P P P P | Frequency |
| XI RL | rum Analyzer - Swept SA RF 50 Ω AC | | SENSE:INT | ALIGNAUTO | 05:54:08 PMDec 15, 2021 | |

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





Test Plots (π/4DQPSK)

Peak Power (CH.0)

| enter Fre | RF 50 Ω AC 2 q 2.402000000 | GHz | SENSE:INT | ALIGNAUTO #Avg Type: RMS Avg Hold: 1/1 | 05:53:22 PM Dec 15, 2021 TRACE 1 2 3 4 5 6 TYPE MWWWWW | Frequency |
|------------------------|--------------------------------------|---------------------------|--------------|--|--|---------------------------|
| | | PNO: Fast ↔ IFGain:Low | Atten: 20 dB | | DETPPPP | Auto Tur |
| | Ref Offset 16.99 dB Ref 25.00 dBm | | | Mkr1 | 2.402 007 GHz 13.998 dBm | Auto Tur |
| | | | 1 | | | Center Fre |
| 15.0 | | | | | | 2.402000000 G |
| 5.00 | | | | | | |
| 5.00 | | | | | | Start Fr 2.398662500 G |
| 5.00 | | | | | | |
| 15.0 | | | | | | Stop Fr |
| 25.0 | | | | | | 2.405337500 G |
| | | | | | | CF St |
| 15.0 | | | | | | 667.500 k |
| 15.0 | | | | | | Auto M |
| 55.0 | | | | | | Freq Offs |
| | | | | | | 0 |
| 5.0 | | | | | | |
| | | | | | 0 | |
| enter 2.40 Res BW 3 | 02000 GHz .0 MHz | #VBV | V 50 MHz | Sweep 1 | Span 6.675 MHz 1.000 ms (1001 pts) | |

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





Test Plots (π /4DQPSK)

Peak Power (CH.78)

| RL RF 50Ω AC | SENSE:INT | | 05:53:44 PM Dec 15, 2021 | Frequency |
|---|---|---------------------------------|--|--|
| enter Freq 2.480000000 0 | PNO: Fast +++ Trig: Free Run IFGain:Low Atten: 20 dB | #Avg Type: RMS Avg Hold: 1/1 | TRACE 123456 TYPE MWWWWW DET PPPPP | |
| Ref Offset 16.99 dB dB/div Ref 25.00 dBm | | Mkr1 | 2.479 900 GHz 12.708 dBm | Auto Tu |
| 5.0 | ↓ 1 | | | Center Fr 2.480000000 G |
| | | | | Start Fr 2.476657500 G |
| 5.0 | | | | Stop Fr 2.483342500 G |
| 5.0 | | | | CF St 668.500 k <u>Auto</u> M |
| 5.0 | | | | Freq Offs 0 |
| 5.0 | | | | |
| enter 2.480000 GHz Res BW 3.0 MHz | #VBW 50 MHz | Sweep 1 | Span 6.685 MHz .000 ms (1001 pts) | |



10.2 BAND EDGES

Without hopping

| Outcido Eroquenov Band | GFSK | 8DPSK | π/4DQPSK | Limit |
|------------------------|--------|--------|----------|-------|
| Outside Frequency Band | (dB) | (dB) | (dB) | (dBc) |
| Lower | 55.015 | 52.113 | 52.034 | 00 |
| Upper | 61.311 | 58.814 | 57.930 | 20 |

With hopping

| Outside Francese Band | GFSK | 8DPSK | π/4DQPSK | Limit |
|------------------------|--------|--------|----------|-------|
| Outside Frequency Band | (dB) | (dB) | (dB) | (dBc) |
| Lower | 55.912 | 58.154 | 52.744 | 00 |
| Upper | 62.665 | 60.758 | 62.267 | 20 |

Note :

1. Spectrum measured levels are not plot data.

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

 Actual value of loss for the splitter and cable combination is 16.99 dB at 2400 MHz and is 16.99 dB at 2500 MHz. So, 16.99 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)



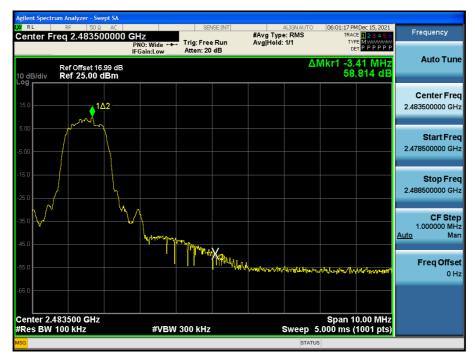


Test Plots without hopping (8DPSK)

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)



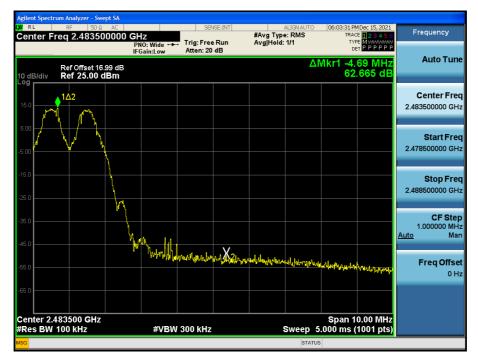


Test Plots with hopping (GFSK)

Band Edges (CH.0)



Test Plots with hopping (GFSK) Band Edges (CH.78)





Test Plots with hopping (8DPSK)

Band Edges (CH.0)



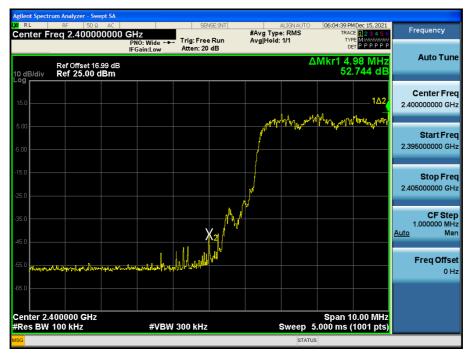
Test Plots with hopping (8DPSK) Band Edges (CH.78)





Test Plots with hopping (π /4DQPSK)

Band Edges (CH.0)



Test Plots with hopping (π /4DQPSK) Band Edges (CH.78)





10.3 FREQUENCY SEPARATION / OCCUPIED BANDWIDTH (99 % BW)

| 99 % BW (kHz) | | | | | | | | | | |
|-----------------------------|--------|--------|--------|--|--|--|--|--|--|--|
| Channel GFSK 8DPSK π/4DQPSK | | | | | | | | | | |
| CH.0 | 878.63 | 1193.4 | 1191.6 | | | | | | | |
| CH.39 | 877.37 | 1198.6 | 1193.8 | | | | | | | |
| CH.78 | 876.14 | 1193.6 | 1189.4 | | | | | | | |

| 20 dB BW (kHz) | | | | | | | | | | |
|-----------------------------|-------|------|------|--|--|--|--|--|--|--|
| Channel GFSK 8DPSK π/4DQPSK | | | | | | | | | | |
| CH.0 | 964.1 | 1320 | 1335 | | | | | | | |
| CH.39 | 964.6 | 1333 | 1340 | | | | | | | |
| CH.78 | 962.7 | 1320 | 1337 | | | | | | | |

| | Channel Separation(kHz) | | | | | | |
|------|-------------------------|------|----------------------|--|--|--|--|
| GFSK | GFSK 8DPSK π/4DQPSK | | | | | | |
| | | | >25 kHz | | | | |
| 998 | 991 | 1001 | or | | | | |
| | | | >2/3 of the 20 dB BW | | | | |



Test Plots (GFSK)

Channel Separation

| Agilent Spectrum Analyzer - Swept SA | |
|--|--------------------------------------|
| XI RL RF SD 0: AC SENSE:INT ALIONAUTO 06:08:58 FMDec 15: 2021 Center Freq 2.44410000000 GHz #Avg Type: RMS TRACE 23:44:00 12:3:4:0:00 PN0: Wide ↔ Trig: Free Run Avg[Hold: 1/1 TYPE Trace 12:3:4:0:0 | Frequency |
| Ref Offset 16.99 dB ΔMkr3 998 kHz 10 dB/div -0.009 dB | Auto Tune |
| $\begin{array}{c} Log \\ 150 \\ 500 \\ 600 \end{array}$ | Center Freq 2.441000000 GHz |
| -150 | Start Freq 2.439500000 GHz |
| -45.0 | Stop Freq 2.442500000 GHz |
| Center 2.441000 GHz Span 3.000 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 3.176 ms (900 pts) | CF Step 300.000 kHz Auto Man |
| MKR MODE TRC SCL X Y FUNCTION FUNCTION VALUE 1 Δ2 1 f (Δ) 1.021 MHz (Δ) -0.124 dB | <u>Auto</u> mari |
| 2 F 1 f 2.439 997 GHz 12.499 dBm 3 Δ4 1 f (Δ) 998 kHz Δ.009 dB 4 F 1 f 2.441 018 GHz 12.375 dBm 5 6 6 6 6 6 | Freq Offset 0 Hz |
| 7 | |
| KG STATUS | |

Test Plots (8DPSK)

Channel Separation





Test Plots (π/4DQPSK)

Channel Separation

| | n Analyzer - Swept SA | | | | | | | |
|---|--------------------------------------|--|--|---|---------------|----------------------------|---------|-------------------------------------|
| Center Fre | RF 50 Ω AC | | SENSE:IN | #Avg Typ | | 06:10:44 PM Dec TRACE | 3456 | Frequency |
| | | PNO: Wide ++ IFGain:Low | Trig: Free Ru #Atten: 20 dB | n Avg Hold | | | PPPP | Auto Tune |
| 10 dB/div | Ref Offset 16.99 dB Ref 25.00 dBm | | | | | lkr3 1.001 -0.02 | | Auto Func |
| Log 15.0 5.00 | ~~~X2~~~~ | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | 10 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | 2 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | ~~~~ | <u>3</u> ∆4 | ~~~ | Center Freq 2.441000000 GHz |
| -15.0 -25.0 -35.0 | | | | | | | | Start Freq 2.439500000 GHz |
| -45.0 -65.0 -65.0 | | | | | | | | Stop Freq 2.442500000 GHz |
| Center 2.44 #Res BW 3 | | #VBW | / 100 kHz | | Sweep 3 | Span 3.000 3.176 ms (90 | 0 pts) | CF Step 300.000 kHz |
| MKR MODE TRC | | 1.001 MHz (Δ) | ⊻ -0.085 dB | FUNCTION FU | INCTION WIDTH | FUNCTION VAL | .UE 🧧 🧍 | <u>luto</u> Man |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ | f 2.43 f (Δ) | 1.001 MHZ (Δ) 9 987 GHZ 1.001 MHZ (Δ) 0 988 GHZ | -0.085 dB 7.738 dBm -0.022 dB 7.653 dBm | | | | | Freq Offset 0 Hz |
| 6 6 7 8 9 1 0 | | | | | | | | |
| 11 | | | | | | | > | |
| MSG | | | | | STATUS | | | |



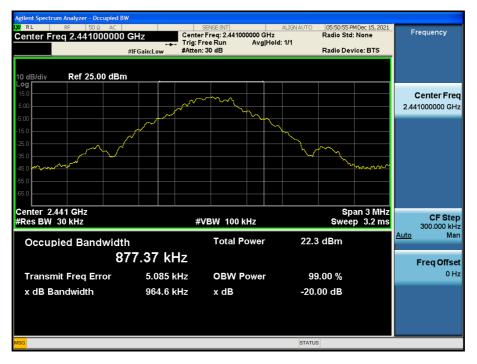
Test Plots (GFSK)

20 dB Bandwidth & Occupied Bandwidth (CH.0)



Test Plots (GFSK)

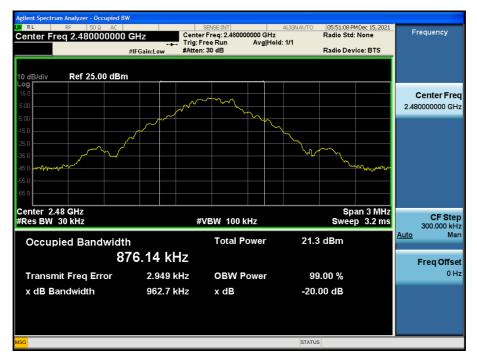
20 dB Bandwidth & Occupied Bandwidth (CH.39)





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

| | Result (No. of CH) | | | | | | |
|------|---------------------|----|-----|--|--|--|--|
| GFSK | GFSK 8DPSK π/4DQPSK | | | | | | |
| 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 - 2.483.5 GHz)





Test Plots (8DPSK)

Number of Channels (2.4 GHz - 2.441 GHz)

| RL R | F 50 Ω AC | | SENSE:I | NT | ALIGN AUTO | 06:16:51 PMDec 15, 2021 | |
|--------------|-----------------------------------|---|--------------------------------|-----------|-------------------|---|---|
| enter Freq | 2.42050000 | O GHz PNO: Wide ↔ IFGain:Low | Trig: Free Ru #Atten: 24 dB | n Avg Hol | pe: RMS d: 1/1 | TRACE 12345 TYPE MWWWWW DET P P P P P | # |
|) dB/div Re | f Offset 16.99 dB ef 25.00 dBm | | # KCC11 24 W2 | | | | Auto Tuno |
| og 16.0 | ᠾᠬ᠇ᢧᠬ᠇ᡘ | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | ᠾᠬᢧᠺ᠋ᡘ᠊ᡀᢉ᠇ᡘ᠊ᠰ | V WWW | ᠰᠰᠰᠰ | mar way | Center Fre 2.420500000 GH |
| 5.00 | | | | | | | Start Fre 2.400000000 G⊦ |
| 5.0 | | | | | | | Stop Fre 2.441000000 GH |
| 5.0 | | | | | | | CF Ste 4.100000 MI <u>Auto</u> Mi |
| 5.0 | | | | | | | Freq Offs |
| tart 2.40000 | | #VBV | V 240 kHz | | Sweep 1 | Stop 2.44100 GHz .000 ms (1001 pts | |
| G | | - La | | | STATUS | | 4 |

Test Plots (8DPSK)

Number of Channels (2.441 GHz - 2.483.5 GHz)





Test Plots (π/4DQPSK)

Number of Channels (2.4 GHz - 2.441 GHz)

| | RF 50 Ω | | | SEM | ISE:INT | | ALIGNAUTO | | Dec 15, 2021 | Frequency |
|--------------------------|-----------------------------|---------|---|----------------------------|---------|-----------------------|-----------|-------------------|--|--|
| enter Fred | 2.42050 | F | HZ NO: Wide ↔ Gain:Low | . Trig: Free #Atten: 24 | | #Avg Typ Avg Hold: | | TRAC TYF DE | E 123456 E M VWWWWW T P P P P P P | Trequency |
| 0 dB/div | ef Offset 16. ef 25.00 d | 99 dB | Sumeow | | | | | | | Auto Tune |
| og 15.0 | ᠬᡁᠬᡐᢦ᠈ᠰ | ᡃᡁᠬᡅᡢ᠊ᡪ | $\gamma \gamma $ | ᡔᡎᠬ᠆᠕ᠬ | ᡁᡗ᠊᠋᠂ᡎᠬ | ᢩ᠕ᡟᡗ᠉ᠬ᠕᠆᠋ | ᡟᠬᡃᠰ᠕᠆ᠡ | ww | ᠋᠂ᡣᠬᢦ᠂ᡞᠬᠬ | Center Fred 2.420500000 GH; |
| 5.00 | | | | | | | | | | Start Fred 2.400000000 GH; |
| 5.0 | | | | | | | | | | Stop Fre 2.441000000 GH |
| 5.0 | | | | | | | | | | CF Ste 4.100000 MH <u>Auto</u> Ma |
| 5.0 | | | | | | | | | | Freq Offse 0 H |
| tart 2.4000 Res BW 24 | | | #\/D\\\ | 240 kHz | | | Succes 1 | Stop 2.44 | 100 GHz 1001 pts) | |
| | UKHZ | | #VDVV | 240 KHZ | | | sweep 1 | | roorpisj | |

Test Plots (π/4DQPSK) Number of Channels (2.441 GHz - 2.483.5 GHz)



ec 15, 2021

TYPE MWWWWW DET P P P P P Frequency

Auto Tune

Center Freq 2.462250000 GHz



10.5 TIME OF OCCUPANCY (DWELL TIME)

| | Channel | GFSK | 8DPSK | π/4DQPSK |
|---------------|---------|-------|-------|----------|
| Pulse Time | Low | 2.885 | 2.890 | 2.895 |
| (ms) | Mid | 2.885 | 2.895 | 2.895 |
| | High | 2.885 | 2.895 | 2.895 |

Non-AFH Mode

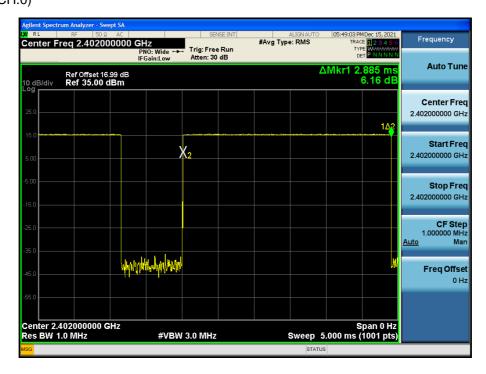
| | Channel | GFSK | 8DPSK | π/4DQPSK | Period Time (s) | Limit (ms) |
|-------------------|---------|--------|--------|----------|--------------------|---------------|
| Total of Dwell | Low | 307.73 | 308.27 | 308.80 | 31.6 | |
| (ms) | Mid | 307.73 | 308.80 | 308.80 | 31.6 | 400 |
| | High | 307.73 | 308.80 | 308.80 | 31.6 | |

AFH Mode

| | Channel | GFSK | 8DPSK | π/4DQPSK | Period Time (s) | Limit (ms) |
|-------------------|---------|--------|--------|----------|--------------------|---------------|
| Total of Dwell | Low | 153.87 | 154.13 | 154.40 | 8.0 | |
| (ms) | Mid | 153.87 | 154.40 | 154.40 | 8.0 | 400 |
| | High | 153.87 | 154.40 | 154.40 | 8.0 | |



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



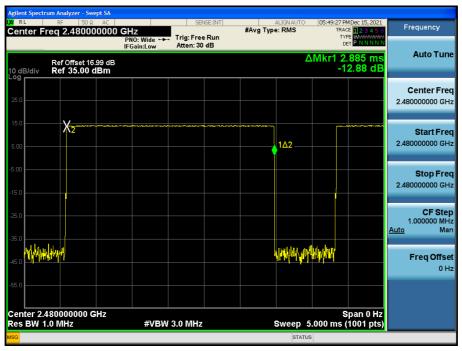
Test Plots (GFSK) Dwell Time (CH.39)



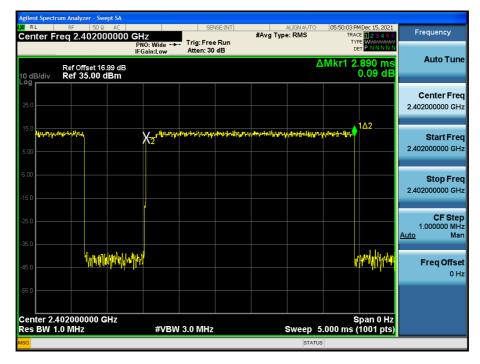


Test Plots (GFSK)

Dwell Time (CH.78)



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



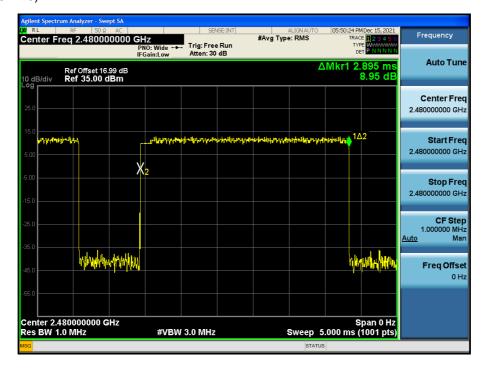


Test Plots (8DPSK)

Dwell Time (CH.39)



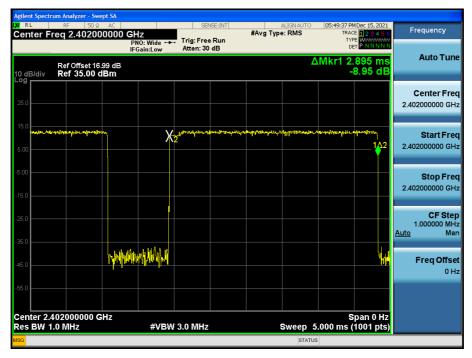
Test Plots (8DPSK) Dwell Time (CH.78)





Test Plots (π/4DQPSK)

Dwell Time (CH.0)



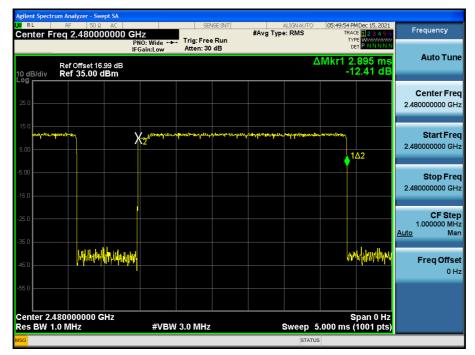
Test Plots (π/4DQPSK) Dwell Time (CH.39)





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.

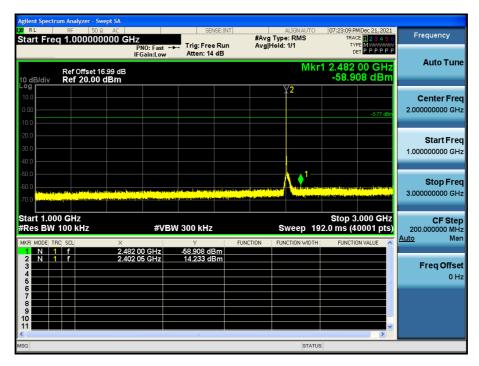


Test Plots (GFSK)- 30 MHz - 1 GHz

Spurious Emission (CH.0)

| Start 30.0 #Res BW | | | #VBW | 300 kHz | | s | weep 93 | Stop 1.0 .33 ms (2 | 0000 GHz 0000 pts) | |
|-----------------------|--|---------------------|----------------------|-----------|---------|-----------------------|---------------------------------------|------------------------|--|--------------------------------------|
| | | | | | | | | | | |
| -60.0 | al a faith i na faithean a tait Nga maint i na an taithean a sa | k partako an katoko | | | | an fan traffering fe | udhaasaratta kila Passing - Angela | | ahar mallandar Tasan sanatan ing | Freq Offset 0 Hz |
| -50.0 | | | | | | | | .1 | | |
| -40.0 | | | | | | | | | | CF Step 97.000000 MHz Auto Man |
| -30.0 | | | | | | | | | | Stop Freq 1.000000000 GHz |
| -20.0 | | | | | | | | | | Ctop Erog |
| -10.0 | | | | | | | | | -5.77 dBm | Start Freq 30.000000 MHz |
| 10.0 | | | | | | | | | | 515.000000 MHz |
| 10 dB/div Log | Ref 20.00 (| dBm | | | | | | -61.6 | 63 dBm 2 | Center Freg |
| | Ref Offset 16 | IF | NO: Fast Gain:Low | Atten: 14 | | | | ₀ (r1 852 . | 94 MHz | Auto Tune |
| Start Fre | RF 50 Ω cq 30.00000 | | NO: Fast ++ | Televine | NSE:INT | #Avg Typ AvgiHold: | | TRAC | ADec 21, 2021 E 1 2 3 4 5 6 E M 444444 | Frequency |

Test Plots (GFSK)- 1 GHz – 3 GHz



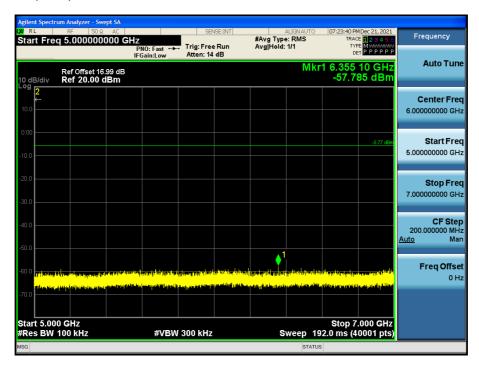


Test Plots(GFSK)- 3 GHz - 5 GHz

Spurious Emission (CH.0)

| Agilent Spe | ectrum Analyzer - S | wept SA Ω AC | | SEN | ISE:INT | | ALIGNAUTO | 07-23-29 DM | MDec 21, 2021 | |
|-------------------------|-------------------------------------|---|-----------------------|--|-----------------|------------------------|--|-----------------------------|-----------------------|------------------------------------|
| | req 3.00000 | 0000 GHz | PNO: Fast 🔸 | | | #Avg Type Avg Hold: | e: RMS | TRAC | E 123456 | Frequency |
| | | | Gain:Low | Atten: 14 | | 51 | | DE | I F F F F F F | Auto Tune |
| 10 dB/div Log | Ref Offset 1 • Ref 20.00 | | | | | | Mkr | | 30 GHz 30 dBm | Auto Func |
| _~~ <mark>2</mark> | | | | | | | | | | Center Freq |
| 10.0 | | | | | | | | | | 4.000000000 GHz |
| 0.00 | | | | | | | | | | Start Freq |
| -10.0 | | | | | | | | | -5.77 dBm | 3.000000000 GHz |
| | | | | | | | | | | |
| -20.0 | | | | | | | | | | Stop Freq 5.00000000 GHz |
| -30.0 | | | | | | | | | | |
| -40.0 | | | | | | | | | | CF Step 200.000000 MHz |
| -50.0 | | | | | | | | | 1 | <u>Auto</u> Man |
| | | | | | | | | | | Freq Offset |
| -60.0 <mark>1999</mark> | | | a and a second second | | New Youppo | e real district | an standardad bit | ie werde findere en en en | Philippi University | 0 Hz |
| -70.0 | in phalenning a state of the second | an panananan sa | M | al series of the second se | allowed for the | Matana kadyada | () y lift the lift of the lif | a contraction of the second | are the last the | |
| | 000 CH2 | | | | | | | Stan 5 | 000 CH | |
| | 000 GHz W 100 kHz | | #VBW | 300 kHz | | s | weep 19 | | .000 GHz 0001 pts) | |
| MSG | | | | | | | STATUS | 3 | | |

Test Plots (GFSK)- 5 GHz - 7 GHz



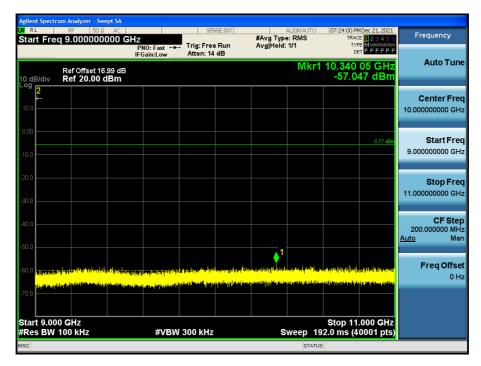


Test Plots(GFSK)- 7 GHz - 9 GHz

Spurious Emission (CH.0)

| | um Analyzer - Swep | | | | | | | | | |
|---------------------|----------------------------------|------------------|------------------------|-------------------------|--------------------|------------------------------|-------------------------|---|---|---------------------------|
| Start Fre | RF 50 Ω q 7.0000000 | | | | ISE:INT | #Avg Type | | TRAC | 1Dec 21, 2021 E 1 2 3 4 5 6 | Frequency |
| | | PN | IO: Fast ↔ iain:Low | Trig: Free Atten: 14 | | Avg Hold: | 1/1 | TYF | E MWWWWWW T P P P P P P | |
| 10 dB/div | Ref Offset 16.9 Ref 20.00 dE | 9 dB | dimeon | | | | Mkr | 1 7.420 | 00 GHz 24 dBm | Auto Tune |
| | 1(Cl 20.00 u | | | | | | | | | |
| + 10.0 | | | | | | | | | | Center Freq |
| 10.0 | | | | | | | | | | 8.00000000 GHz |
| 0.00 | | | | | | | | | | |
| | | | | | | | | | -5.77 dBm | Start Freq |
| -10.0 | | | | | | | | | | 7.00000000 GHz |
| | | | | | | | | | | |
| -20.0 | | | | | | | | | | Stop Freq |
| -30.0 | | | | | | | | | | 9.000000000 GHz |
| | | | | | | | | | | |
| -40.0 | | 1 | | | | | | | | CF Step 200.000000 MHz |
| | | | | | | | | | | <u>Auto</u> Man |
| -50.0 | | | | | | | | | | |
| -60.0 <mark></mark> | terlette kunnen it der jähre | A. R. Mar. J. A. | When the start | and a full disc of | | hotellulus bet an | distant costs | | | Freq Offset |
| i | Notes - States - States - States | and states and | idinatia maalaantaa | an and blits much diam | الالتاما فأتأت وير | and succession of the second | in second second second | omente en la secondada Al antinana de la fasta | Line of the second s | 0 Hz |
| -70.0 | | | | the off the state | | | In a block and a | an an a state l'Arthfal | aan waddal gaar e | |
| | | | | | | | | | | |
| Start 7.00 | | | | | | | | | .000 GHz | |
| #Res BW | 100 kHz | | #VBW | 300 kHz | | S | | 2.0 ms (4 | 0001 pts) | |
| MSG | | | | | | | STATUS | | | |

Test Plots(GFSK)- 9 GHz - 11 GHz



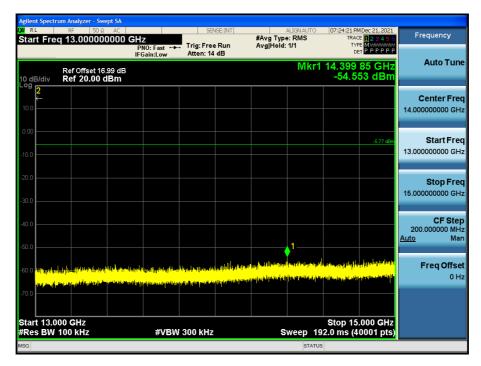


Test Plots(GFSK) 11 GHz - 13 GHz

Spurious Emission (CH.0)

| | um Analyzer - Swe | | | | | | | | | |
|-----------------------------|--|---|------------------------|---|--|---|---|------------------------------------|--|---|
| Start Fre | RF 50 Ω q 11.000000 | 0000 GH | | | ISE:INT | #Avg Type | | TRA | MDec 21, 2021 | Frequency |
| | | | NO: Fast 🔸 Gain:Low | Trig: Free Atten: 14 | | Avg Hold: | 1/1 | D | ЕМилиини ТРРРРРР | |
| 10 dB/div Log | Ref Offset 16. Ref 20.00 d | | | | | | Mkr1 | 12.756 -56.8 | 35 GHz 00 dBm | Auto Tune |
| 10.0 <mark>←</mark> | | | | | | | | | | Center Freq 12.000000000 GHz |
| -10.0 | | | | | | | | | -5.77 dBm | Start Freq 11.000000000 GHz |
| -20.0 | | | | | | | | | | Stop Freq 13.000000000 GHz |
| -40.0 | | | | | | | | | | CF Step 200.000000 MHz <u>Auto</u> Man |
| -60.0 <mark>headed()</mark> | leven kilvisstilleritaitet Asservise kan edipationite | a ka li ka na k | darred Harde derb | eleo co de de gelle Producente, fester | deserve geneligiet deserve geneligiet | a pilotagi kuta suka Kuta suka suka suka suka suka suka suka suk | ost fille (billed bi principality of the state | aladar Araba Man Warda Manazari | nd Jack Robert Biller March 1997 - March Baller | Freq Offset 0 Hz |
| -70.0 | | | | | | | | | | |
| Start 11.0 #Res BW | | | #VBW | 300 kHz | | s | weep 19 | Stop 13 2.0 ms (4 | .000 GHz 0001 pts) | |
| MSG | | | | | | | STATUS | 3 | | |

Test Plots (GFSK)- 13 GHz – 15 GHz



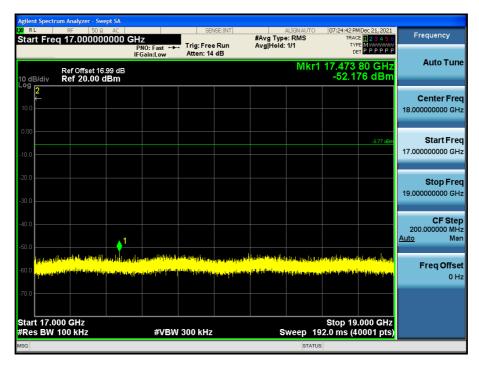


Test Plots(GFSK)- 15 GHz - 17 GHz

Spurious Emission (CH.0)

| Agilent Spectrum Analyzer - Swept SA | | | | | |
|--|---|--|---|----------------------------------|--|
| X RL RF 50 Ω AC Start Freq 15.000000000 |) GHz | #Avg Type | RMS TRAC | MDec 21, 2021 | Frequency |
| | PNO: Fast Trig: Free IFGain:Low Atten: 14 | | 1/1 | | |
| Ref Offset 16.99 di 10 dB/div Ref 20.00 dBm | В | | Mkr1 15.589 -53.7 | 05 GHz 69 dBm | Auto Tune |
| 2 ← 10.0 | | | | | Center Freq 16.000000000 GHz |
| -10.0 | | | | -5.77 dBm | Start Freq 15.000000000 GHz |
| -20.0 | | | | | Stop Freq 17.000000000 GHz |
| -40.0 | 1 | | | A | CF Step 200.000000 MHz <u>uto</u> Man |
| .en n | ng biggen ga ang san sa ting bana gan bang sa tang sa t | allanan oliti kalitildilika any dia ditti Markati ya afatikana kinan ya tamai a | A CONTRACT OF | undiganga danar Masa manganga | Freq Offset 0 Hz |
| Start 15.000 GHz | | | Stop 17 | .000 GHz | |
| #Res BW 100 kHz | #VBW 300 kHz | St | weep 192.0 ms (4 | 0001 pts) | |

Test Plots(GFSK)- 17 GHz - 19 GHz





Test Plots (GFSK)- 19 GHz - 21 GHz

Spurious Emission (CH.0)

| Frequency |
|---------------------------|
| |
| Auto Tune |
| |
| Center Freq |
| 0.000000000 GHz |
| |
| Start Freq |
| 9.000000000 GHz |
| |
| Stop Freq |
| 1.00000000 GHz |
| |
| CF Step 200.000000 MHz |
| <u>uto</u> Man |
| |
| Freq Offset 0 Hz |
| 0 Hz |
| |
| |
| |
| |
| 5 |

Test Plots (GFSK)- 21 GHz - 23 GHz

| Agilen | nt Spectru | ım Analyzer - Sw | ept SA | | | | | | | | |
|--------------|-------------------|--------------------------|-------------------------------|--|-----------------------|-------------------|-----------------|------------------|--|---------------------------------------|---------------------------|
| LXI RI | - | | AC | 1.1 | SEN | ISE:INT | #Avg Typ | ALIGNAUT | | MDec 21, 2021 E 1 2 3 4 5 6 | Frequency |
| Star | rt Fred | 21.00000 p | | PNO: Fast ++ | , Trig: Free | | Avg Hold: | | TY | | |
| | | | | IFGain:Low | Atten: 14 | dB | | | | | Auto Tune |
| | | Ref Offset 16 | | | | | | Mk | r1 22.683 | | Auto Tune |
| 10 dE Log | | Ref 20.00 | dBm | | | | | | -50.8 | 30 dBm | |
| 3 | 2 | | | | | | | | | | Center Freq |
| 10.0 | È | | | | | | | | | | 22.000000000 GHz |
| | | | | | | | | | | | 22.0000000000000 |
| 0.00 | L | | | | | | | | | | |
| | | | | | | | | | | -5.77 dBm | Start Freq |
| -10.0 | <u> </u> | | | | | | | | | | 21.000000000 GHz |
| | | | | | | | | | | | |
| -20.0 | <u> </u> | | | | | | | | | | Stop Freq |
| | | | | | | | | | | | 23.000000000 GHz |
| -30.0 | | | | | | | | | | | |
| | | | | | | | | | | | OF Otom |
| -40.0 | | | | | | | | | | | CF Step 200.000000 MHz |
| | | | | | | | | | <u>_</u> 1 | | <u>Auto</u> Man |
| -50.0 | | anos buyan da bayan | | | 1 I. | a shittar a | a a la chemiali | d. 16 1 1 | الترجيلة وورطهاويته | والمالية والمراجب | |
| | | | | | | | | | | the altitude | Freq Offset |
| -60.0 | Week produ | weighten Universitätigen | ^a jawa da Ukuwa je | it is a second of the second o | وريميها يتواتلوا أتلا | فالشريب والاجتراد | | and the states | <mark>depict for an instance of a started set of a started set of the start</mark> | A CONTRACTOR | 0 Hz |
| 70.0 | | | | | | | | | | | |
| -70.0 | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | 00 GHz | | | | | | | | .000 GHz | |
| #Re | sBW | 100 kHz | | #VBW | / 300 kHz | | S | weep | 192.0 ms (4 | 0001 pts) | |
| MSG | | | | | | | | ST/ | ATUS | | |



Test Plots (GFSK)- 23 GHz - 25 GHz

| Agilent Spectr LXI R L | r <mark>um Analyzer - Swept SA</mark> RF 50 Ω AC | | SEN | ISE:INT | | ALIGNAUTO | | 4Dec 21, 2021 | _ |
|-------------------------------|---|--|--|-----------------------------|---|-----------------|------------------------------|--|---------------------------------------|
| Start Fre | q 23.000000000 | GHz PNO: Fast ↔ IFGain:Low | Trig: Free Atten: 14 | | #Avg Type Avg Hold: | | TYP | E 1 2 3 4 5 6 E M + + + + + + + + + + + + + + + + + + | Frequency |
| 10 dB/div | Ref Offset 16.99 dB Ref 20.00 dBm | IFGam:Low | Aden. IA | | | Mkr | 1 24.871 -46.8 | 20 GHz 88 dBm | Auto Tune |
| 10.0 2 | | | | | | | | | Center Freq 24.000000000 GHz |
| -10.00 | | | | | | | | -5.77 dBm | Start Fred 23.000000000 GHz |
| -20.0 | | | | | | | | | Stop Freq 25.000000000 GHz |
| -40.0 | 11 And Alfred Actual Society and | te arte e est an statistifia | Press of the state | 1) In statement of the late | energi harder bliver by | | upper, thirty beyond the | 1 orgebogrædder | CF Step 200.000000 MHz Auto Mar |
| -60.0 <mark>114,444,44</mark> | ne er af fan fan fan fan fan fan fan fan fan | n an | anna ann an a | ala ang panganana kala d | <mark>de plante di la especial</mark> i | nia politicajem | and Statistics (1994) | aanagaliiMatal | Freq Offset 0 Hz |
| -70.0 Start 23.0 | | | | | | | | .000 GHz | |
| #Res BW | 100 kHz | #VBW | 300 kHz | | s | weep 1 | 192.0 ms (4 ^{US} | 0001 pts) | |



10.6.2 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30 MHz

| Frequency | Measured Value | A.F+C.L+D.F | A.F+C.L+D.F POL | | Limit | Margin | | |
|-------------------------|------------------------------|-------------|-----------------|------|-------|--------|--|--|
| [MHz] | [dBµV] [dB/m] [H/V] [dBµV/m] | | [dBµV/m] | [dB] | | | | |
| No Critical peaks found | | | | | | | | |

Note:

1. The Measured 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 ($dB\mu V$) + Distance extrapolation factor
- 4. Radiated test is performed with hopping off.

Frequency Range : Below 1 GHz

| Frequency | Measured Value | A.F+C.L POL | | Total | Limit | Margin | | | | | |
|-----------|-------------------------|-------------|-------|----------|----------|--------|--|--|--|--|--|
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dBµV/m] | [dBµV/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)

| | | A.F+C.L-A.G+D.F | Pol. | Duty Cycle Correction | Total | Limit | Margin | Measurement Type |
|-------------|-------------------|-----------------|-------|-----------------------------|----------|----------|--------|---|
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | .,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |
| 4804 | 39.94 | 5.14 | V | 0.00 | 45.08 | 73.98 | 28.90 | PK |
| 4804 | 39.94 | 5.14 | V | -24.73 | 20.35 | 53.98 | 33.63 | AV |
| 7206 | 39.74 | 12.89 | V | 0.00 | 52.63 | 73.98 | 21.35 | PK |
| 7206 | 39.74 | 12.89 | V | -24.73 | 27.90 | 53.98 | 26.08 | AV |
| 4804 | 41.34 | 5.14 | Н | 0.00 | 46.48 | 73.98 | 27.50 | PK |
| 4804 | 41.34 | 5.14 | Н | -24.73 | 21.75 | 53.98 | 32.23 | AV |
| 7206 | 39.96 | 12.89 | Н | 0.00 | 52.85 | 73.98 | 21.13 | PK |
| 7206 | 39.96 | 12.89 | н | -24.73 | 28.12 | 53.98 | 25.86 | AV |
| Operation N | lode: CH M | 1id(GFSK) | | | | | | |
| Frequency | Measured Value | A.F+C.L-A.G+D.F | Pol. | Duty Cycle Correction | Total | Limit | Margin | Measurement Type |
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | 71 |
| 4882 | 40.62 | 5.46 | V | 0.00 | 46.08 | 73.98 | 27.90 | PK |
| 4882 | 40.62 | 5.46 | V | -24.73 | 21.35 | 53.98 | 32.63 | AV |
| 7323 | 37.56 | 12.94 | V | 0.00 | 50.50 | 73.98 | 23.48 | PK |
| 7323 | 37.56 | 12.94 | V | -24.73 | 25.77 | 53.98 | 28.21 | AV |
| 4882 | 40.76 | 5.46 | Н | 0.00 | 46.22 | 73.98 | 27.76 | PK |
| 4882 | 40.76 | 5.46 | Н | -24.73 | 21.49 | 53.98 | 32.49 | AV |
| 7323 | 38.11 | 12.94 | Н | 0.00 | 51.05 | 73.98 | 22.93 | PK |
| 7323 | 38.11 | 12.94 | Н | -24.73 | 26.32 | 53.98 | 27.66 | AV |
| Operation M | | Ŭ (| | Dutu | | | | |
| Frequency | Measured Value | A.F+C.L-A.G+D.F | Pol. | Duty Cycle Correction | Total | Limit | Margin | Measurement Type |
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | |
| 4960 | 40.85 | 6.25 | V | 0.00 | 47.10 | 73.98 | 26.88 | PK |
| 4960 | 40.85 | 6.25 | V | -24.73 | 22.37 | 53.98 | 31.61 | AV |
| 7440 | 38.45 | 12.61 | V | 0.00 | 51.06 | 73.98 | 22.92 | PK |
| 7440 | 38.45 | 12.61 | V | -24.73 | 26.33 | 53.98 | 27.65 | AV |
| 4960 | 41.12 | 6.25 | Н | 0.00 | 47.37 | 73.98 | 26.61 | PK |
| 4960 | 41.12 | 6.25 | Н | -24.73 | 22.64 | 53.98 | 31.34 | AV |
| 7440 | 38.63 | 12.61 | Н | 0.00 | 51.24 | 73.98 | 22.74 | PK |
| 7440 | 38.63 | 12.61 | Н | -24.73 | 26.51 | 53.98 | 27.47 | AV |



Report No.: HCT-RF-2112-FC052

Operation Mode: CH Low(π/4DQPSK)

| | | A.F+C.L-A.G+D.F | Pol. | Duty Cycle Correction | Total | Limit | Margin | Measurement Type |
|-------------|-------------------|-----------------|-------|-----------------------------|----------|----------|--------|---|
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | - 71 |
| 4804 | 39.90 | 5.14 | V | 0.00 | 45.04 | 73.98 | 28.94 | PK |
| 4804 | 39.90 | 5.14 | V | -24.73 | 20.31 | 53.98 | 33.67 | AV |
| 7206 | 37.97 | 12.89 | V | 0.00 | 50.86 | 73.98 | 23.12 | PK |
| 7206 | 37.97 | 12.89 | V | -24.73 | 26.13 | 53.98 | 27.85 | AV |
| 4804 | 41.35 | 5.14 | Н | 0.00 | 46.49 | 73.98 | 27.49 | PK |
| 4804 | 41.35 | 5.14 | Н | -24.73 | 21.76 | 53.98 | 32.22 | AV |
| 7206 | 38.22 | 12.89 | Н | 0.00 | 51.11 | 73.98 | 22.87 | PK |
| 7206 | 38.22 | 12.89 | Н | -24.73 | 26.38 | 53.98 | 27.60 | AV |
| Operation N | lode: CH N | lid(π/4DQPSK) | | _ | | | | |
| Frequency | Measured Value | A.F+C.L-A.G+D.F | Pol. | Duty Cycle Correction | Total | Limit | Margin | Measurement Type |
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | .,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |
| 4882 | 40.28 | 5.46 | V | 0.00 | 45.74 | 73.98 | 28.24 | PK |
| 4882 | 40.28 | 5.46 | V | -24.73 | 21.01 | 53.98 | 32.97 | AV |
| 7323 | 37.84 | 12.94 | V | 0.00 | 50.78 | 73.98 | 23.20 | PK |
| 7323 | 37.84 | 12.94 | V | -24.73 | 26.05 | 53.98 | 27.93 | AV |
| 4882 | 40.49 | 5.46 | Н | 0.00 | 45.95 | 73.98 | 28.03 | PK |
| 4882 | 40.49 | 5.46 | Н | -24.73 | 21.22 | 53.98 | 32.76 | AV |
| 7323 | 38.27 | 12.94 | н | 0.00 | 51.21 | 73.98 | 22.77 | PK |
| 7323 | 38.27 | 12.94 | Н | -24.73 | 26.48 | 53.98 | 27.50 | AV |
| | | ligh(π/4DQPSK) | | Destas | | | | |
| Frequency | Measured Value | A.F+C.L-A.G+D.F | Pol. | Duty Cycle Correction | Total | Limit | Margin | Measurement Type |
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | |
| 4960 | 40.87 | 6.25 | V | 0.00 | 47.12 | 73.98 | 26.86 | PK |
| 4960 | 40.87 | 6.25 | V | -24.73 | 22.39 | 53.98 | 31.59 | AV |
| 7440 | 37.82 | 12.61 | V | 0.00 | 50.43 | 73.98 | 23.55 | PK |
| 7440 | 37.82 | 12.61 | V | -24.73 | 25.70 | 53.98 | 28.28 | AV |
| 4960 | 41.04 | 6.25 | Н | 0.00 | 47.29 | 73.98 | 26.69 | PK |
| 4960 | 41.04 | 6.25 | Н | -24.73 | 22.56 | 53.98 | 31.42 | AV |
| 7440 | 38.07 | 12.61 | Н | 0.00 | 50.68 | 73.98 | 23.30 | PK |
| 7440 | 38.07 | 12.61 | Н | -24.73 | 25.95 | 53.98 | 28.03 | AV |



Report No.: HCT-RF-2112-FC052

Operation Mode: CH Low(8DPSK)

| Frequency | | A.F+C.L-A.G+D.F | Pol. | Duty Cycle Correction | Total | Limit | Margin | Measurement Type |
|-------------|-------------------|-----------------|-------|-----------------------------|----------|----------|--------|---------------------|
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | 1,900 |
| 4804 | 39.84 | 5.14 | V | 0.00 | 44.98 | 73.98 | 29.00 | PK |
| 4804 | 39.84 | 5.14 | V | -24.73 | 20.25 | 53.98 | 33.73 | AV |
| 7206 | 38.12 | 12.89 | V | 0.00 | 51.01 | 73.98 | 22.97 | PK |
| 7206 | 38.12 | 12.89 | V | -24.73 | 26.28 | 53.98 | 27.70 | AV |
| 4804 | 41.07 | 5.14 | Н | 0.00 | 46.21 | 73.98 | 27.77 | PK |
| 4804 | 41.07 | 5.14 | Н | -24.73 | 21.48 | 53.98 | 32.50 | AV |
| 7206 | 38.49 | 12.89 | н | 0.00 | 51.38 | 73.98 | 22.60 | РК |
| 7206 | 38.49 | 12.89 | Н | -24.73 | 26.65 | 53.98 | 27.33 | AV |
| Operation M | lode: CH M | 1id(8DPSK) | | | | | | |
| Frequency | Measured Value | A.F+C.L-A.G+D.F | Pol. | Duty Cycle Correction | Total | Limit | Margin | Measurement Type |
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | 71 |
| 4882 | 40.50 | 5.46 | V | 0.00 | 45.96 | 73.98 | 28.02 | PK |
| 4882 | 40.50 | 5.46 | V | -24.73 | 21.23 | 53.98 | 32.75 | AV |
| 7323 | 37.96 | 12.94 | V | 0.00 | 50.90 | 73.98 | 23.08 | PK |
| 7323 | 37.96 | 12.94 | V | -24.73 | 26.17 | 53.98 | 27.81 | AV |
| 4882 | 40.75 | 5.46 | Н | 0.00 | 46.21 | 73.98 | 27.77 | PK |
| 4882 | 40.75 | 5.46 | Н | -24.73 | 21.48 | 53.98 | 32.50 | AV |
| 7323 | 38.35 | 12.94 | Н | 0.00 | 51.29 | 73.98 | 22.69 | PK |
| 7323 | 38.35 | 12.94 | Н | -24.73 | 26.56 | 53.98 | 27.42 | AV |
| Operation M | lode: CH ⊢ | ligh(8DPSK) | | Dutit | 1 | | | 1 |
| Frequency | Measured Value | A.F+C.L-A.G+D.F | | Duty Cycle Correction | Total | Limit | Margin | Measurement Type |
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | |
| 4960 | 41.12 | 6.25 | V | 0.00 | 47.37 | 73.98 | 26.61 | PK |
| 4960 | 41.12 | 6.25 | V | -24.73 | 22.64 | 53.98 | 31.34 | AV |
| 7440 | 38.04 | 12.61 | V | 0.00 | 50.65 | 73.98 | 23.33 | PK |
| 7440 | 38.04 | 12.61 | V | -24.73 | 25.92 | 53.98 | 28.06 | AV |
| 4960 | 41.30 | 6.25 | Н | 0.00 | 47.55 | 73.98 | 26.43 | PK |
| 4960 | 41.30 | 6.25 | Н | -24.73 | 22.82 | 53.98 | 31.16 | AV |
| 7440 | 38.16 | 12.61 | Н | 0.00 | 50.77 | 73.98 | 23.21 | PK |
| 7440 | 38.16 | 12.61 | Н | -24.73 | 26.04 | 53.98 | 27.94 | AV |



[DBS Mode]

| Frequency | Measured Value | A.F+C.L-A.G+D.F | e. | Duty Cycle Correction | | Limit | | Measurement Type |
|-----------|-------------------|-----------------|-------|-----------------------------|----------|----------|-------|---------------------|
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | |
| 4804 | 42.86 | 5.14 | V | 0.00 | 48.00 | 73.98 | 25.98 | PK |
| 4804 | 42.86 | 5.14 | V | -24.73 | 23.27 | 53.98 | 30.71 | AV |
| 7206 | 39.02 | 12.89 | V | 0.00 | 51.91 | 73.98 | 22.07 | PK |
| 7206 | 39.02 | 12.89 | V | -24.73 | 27.18 | 53.98 | 26.80 | AV |
| 4804 | 43.43 | 5.14 | н | 0.00 | 48.57 | 73.98 | 25.41 | PK |
| 4804 | 43.43 | 5.14 | н | -24.73 | 23.84 | 53.98 | 30.14 | AV |
| 7206 | 39.50 | 12.89 | Н | 0.00 | 52.39 | 73.98 | 21.59 | PK |
| 7206 | 39.50 | 12.89 | Н | -24.73 | 27.66 | 53.98 | 26.32 | AV |

WLAN/BT Ant : 802.11n(HT20) ch. 165 & Bluetooth Ch. 0 (GFSK)

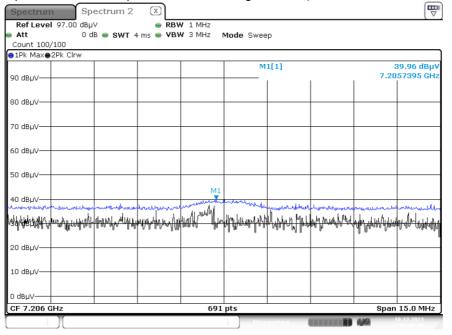
Note :

- 1. Used duty cycle correction factor.
- 2. WLAN DBS Data refer to UNII Test Report.



RESULT PLOTS

Radiated Spurious Emissions plot – Peak & Average Result (GFSK, Ch.0 3rd Harmonic, Z-H)



Radiated Spurious Emissions plot – Peak & Average Result (π/4DQPSK, Ch.39 3rd Harmonic, X-H)

| Ref Level 9 | 7.00 dBµ | v | ● RBV | V 1 MHz | | | | | (' |
|------------------|-----------------|---------------------|------------------------------|----------------|---------------------------|------------------------|---------------------|---------------|-------------------------|
| Att | | B 👄 SWT 4 | 1 ms 👄 VBV | N/3 MHz M | Mode Swee | p | | | |
| Count 100/10 | | | | | | | | | |
|)1Pk Max⊕2P | k Clrw | | | | | | | | |
| | | | | | M | 1[1] | | | 38.27 dBµ¥ 86657 GHz |
| 90 dBµV | | | | | | | | 7.52 | |
| | | | | | | | | | |
| 30 dBµV | | | | | | | | | |
| | | | | | | | | | |
| 70 dBµV | | | | | | | | | |
| | | | | | | | | | |
| 50 dBµV | | | | | | | | | |
| | | | | | | | | | |
| 50 dBµV | | | | | | | | | |
| | | | | | | | | М1 | |
| 40 dBµV | Jan Martin | who have a second | - COMPLETING AL AN | und a harmonia | Alc.L. consistence of the | mballingh | and the second | | un martine |
| أسالعان فاساليا | الألمهارية | | | WHINK HUNDLAND | | | | սել հավեխշվել | |
| MURPHIC CONTRACT | tilling filmand | <u>ha tarihinak</u> | <u>ᢥᢉᢦᢔᢔᠰ</u> ᠰ <u>ᢦ</u> ᢂᡃᢦ | ₩₩₽₩₩₩₩₩ | ₩₩₩₩₩₩ | <mark>┝┵╖┉┉┙</mark> ╢╢ | <u> Ա. ստվով Կա</u> | ┉┤╋╫╝╝┩ | արերունե |
| | | | | Ů | Ť | | Ů | - | |
| 20 dBµV | | | | | | | | | |
| | | | | | | | | | |
| LO dBµV | | | | | | | | | |
| | | | | | | | | | |
|) dBµV | | | | | | | | | |
| CF 7.323 GH | z | | | 691 | pts | | | Span | 15.0 MHz |



Radiated Spurious Emissions plot – Peak & Average Result (8DPSK, Ch.0 3rd Harmonic, Z-H)

| Spectrun | n Sp | ectrum 2 | \mathbf{X} | | | | | | [₩] |
|---------------|-------------|-------------------|--------------|------------|---|----------|---|----------------|-------------------------|
| Ref Leve | 97.00 dBµ | v | ● RBW | 1 MHz | | | | | |
| Att | | B 👄 SWT 4 | ms 😑 VBV | VI3 MHz I | Mode Swee | p | | | |
| Count 100, | | | | | | | | | |
| ●1Pk Max● | 2Pk Clrw | | | | | | | | |
| | | | | | M | 1[1] | | | 88.49 dBµV 57829 GHz |
| 90 dBµV— | | | | | | | | 7.20 | 57025 GHZ |
| | | | | | | | | | |
| 80 dBµV— | | | | | | | | | |
| | | | | | | | | | |
| 70 dBµV | | | | | | | | | |
| | | | | | | | | | |
| 60 dBµV | | | | | | | | | |
| | | | | | | | | | |
| 50 dBµV | | | | | | | | | |
| | | | | | | | | | |
| 40 dBµV | | | | M1 | | | | | |
| ohneren o | holinghours | an chant freedbar | werenteren | downland a | whenhow | monumber | mound | and the second | man |
| .egiva#Upp=46 | արհատությո | ՈՍԱԿԻՆԻՆ | Ň₩₩₩₩₽ | | ՝ արին կանաստա րին անդանություններու հարորություններու հարորական հարորական հարորական հարորական հարորական հարորական Աներանական հարորական հ | ₼₽₩₩₩₩₽₽ | CINER AND | <u>↓₩₩₩₩</u> | ╔╢╗╝┺╗╝╗ |
| | V. 1 | . h | վել Ու Ու ու | | 0 -0 0 | 0 .00 | · • ••• · · | 01 01 0 | 0 |
| 20 dBµV— | | | | | | | | | |
| | | | | | | | | | |
| 10 dBµV— | | | | | | | | | |
| | | | | | | | | | |
| 0 dBµV | | | | | | | | | |
| CF 7.206 (| GHz | | | 691 | pts | | 1 | Span | 15.0 MHz |
| |) (| | | | Mea | suring | | 4.86 | 8.12.2021 |
| | | | | | | | | | |

Note:

Plot of worst case are only reported.



RESULT PLOTS(DBS)

WLAN/BT Ant : 802.11n(HT20) ch. 165 & Bluetooth Ch. 0 (GFSK)

Radiated Spurious Emissions plot – Average & Peak Result (3rd Harmonic, Z-H)

| ●1Pk Max●2P | 9k Clrw | | | | | | | | |
|-------------|---------------|---|----------------|-------------|--------------|-------------|-------------------------|---------------|-----------------------------|
| 90 dBµV | | | | | M | 1[1] | I | | 39.50 dBµ' 62171 GH I |
| 30 dBµV | | | | | | | | | |
| O dBµV | | | | | | | | | |
| о авил | | | | | | | | | |
| io dBµV | | | | | | | | | |
| о авил | mAssAnddAltan | han pure for the harmonic of | and the second | manth Mar | M1 | | | | MALELANA |
| weinter | Muhana | han the the terms of terms | utine state | duhpyrhymly | uruwahahahah | แหล่ใหล่สาย | lillipething the second | anggarihinihi | Winth |
| о авил | | | | | | | | | |
| o dBµV | | | | | | | | | |
| | | | | | | | | | |

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 | Measured Level | A.F+C.L+D.F | Pol. | Duty Cycle Correction | Total | Limit | Margin | Measurement Type |
|-----------|-------------------|-------------|-------|-----------------------------|----------|----------|--------|---------------------|
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | |
| 2390.0 | 52.44 | 2.99 | Н | 0 | 55.43 | 73.98 | 18.55 | PK |
| 2390.0 | 52.44 | 2.99 | Н | -24.73 | 30.70 | 53.98 | 23.28 | AV |
| 2390.0 | 50.24 | 2.99 | V | 0 | 53.23 | 73.98 | 20.75 | PK |
| 2390.0 | 50.24 | 2.99 | V | -24.73 | 28.50 | 53.98 | 25.48 | AV |
| 2483.5 | 54.85 | 4.20 | Н | 0 | 59.05 | 73.98 | 14.93 | PK |
| 2483.5 | 54.85 | 4.20 | Н | -24.73 | 34.32 | 53.98 | 19.66 | AV |
| 2483.5 | 65.94 | 4.20 | V | 0 | 70.14 | 73.98 | 3.84 | PK |
| 2483.5 | 65.94 | 4.20 | V | -24.73 | 45.41 | 53.98 | 8.57 | AV |

Operation Mode

EDR(π/4DQPSK)

Operating Frequency

Channel No

2402 MHz, 2480 MHz

CH 0, CH 78

| Frequency [MHz] | Level | A.F+C.L+D.F | Pol. [H/V] | Duty Cycle Correction [dB] | | Limit | Margin | Measurement Type |
|--------------------|-----------------|----------------|-------------------|-------------------------------------|--------------------------|---------------------------|---------------|---------------------|
| 2390.0 | [dBµV] 50.02 | [dB/m] 2.99 | <u>[п/v]</u> Н | 0 | <u>тавруліт</u> 53.01 | [dBµV/m] 73.98 | [dB] 20.97 | РК |
| 2390.0 | 50.0Z | 2.99 | П | 0 | 55.01 | 73.90 | 20.97 | FIX |
| 2390.0 | 50.02 | 2.99 | Н | -24.73 | 28.28 | 53.98 | 25.70 | AV |
| 2390.0 | 49.39 | 2.99 | V | 0 | 52.38 | 73.98 | 21.60 | PK |
| 2390.0 | 49.39 | 2.99 | V | -24.73 | 27.65 | 53.98 | 26.33 | AV |
| 2483.5 | 54.76 | 4.20 | Н | 0 | 58.96 | 73.98 | 15.02 | PK |
| 2483.5 | 54.76 | 4.20 | Н | -24.73 | 34.23 | 53.98 | 19.75 | AV |
| 2483.5 | 65.90 | 4.20 | V | 0 | 70.10 | 73.98 | 3.88 | PK |
| 2483.5 | 65.90 | 4.20 | V | -24.73 | 45.37 | 53.98 | 8.61 | AV |



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

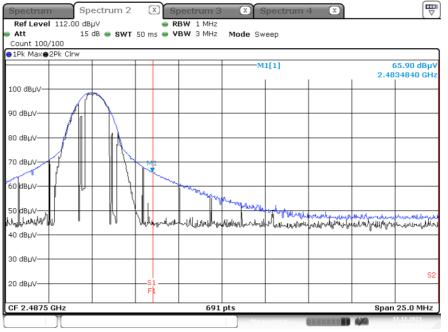
| Frequency | Measured Level | A.F+C.L+D.F | Pol. | Duty Cycle Correction | Total | Limit | Margin | Measurement Type |
|-----------|-------------------|-------------|-------|-----------------------------|----------|----------|--------|---------------------|
| [MHz] | [dBµV] | [dB/m] | [H/V] | [dB] | [dBµV/m] | [dBµV/m] | [dB] | |
| 2390.0 | 49.90 | 2.99 | н | 0 | 52.89 | 73.98 | 21.09 | PK |
| 2390.0 | 49.90 | 2.99 | н | -24.73 | 28.16 | 53.98 | 25.82 | AV |
| 2390.0 | 49.42 | 2.99 | V | 0 | 52.41 | 73.98 | 21.57 | PK |
| 2390.0 | 49.42 | 2.99 | V | -24.73 | 27.68 | 53.98 | 26.30 | AV |
| 2483.5 | 54.59 | 4.20 | н | 0 | 58.79 | 73.98 | 15.19 | PK |
| 2483.5 | 54.59 | 4.20 | н | -24.73 | 34.06 | 53.98 | 19.92 | AV |
| 2483.5 | 65.78 | 4.20 | V | 0 | 69.98 | 73.98 | 4.00 | PK |
| 2483.5 | 65.78 | 4.20 | ۷ | -24.73 | 45.25 | 53.98 | 8.73 | AV |



RESULT PLOTS

Radiated Restricted Band Edges plot - Average & Peak Result (GFSK, Ch.78, Y-V) P Spectrum 2 X (X Ref Level 112.00 dBµV RBW 1 MHz • Att 15 dB 👄 SWT 50 ms 👄 VBW 3 MHz Mode Sweep Count 100/100 ●1Pk Max●2Pk Clrw M1[1] 65.94 dBµV 2.4835200 GH 100 dBuV-90 dBµV 80 dBµV 70 dBµV 60 dBu\ ŞANCENIX and whether have warmight for the for and the for the f 40 dBuV 30 dBµV S2 20 dBuV F Start 2.475 GHz 691 pts Stop 2.5 GHz

Radiated Restricted Band Edges plot – Average & Peak Result (π/4DQPSK, Ch.78, Y-V)





Spectrum 2 Spectrum Spectrum 3 Spectrum 4 X Ref Level 112.00 dBμV RBW 1 MHz Att 15 dB SWT 50 ms VBW 3 MHz Mode Sweep Count 100/100 ●1Pk Max●2Pk Clrw 65.78 dBµ\ 2.4834840 GH M1[1] 100 dBµV-90 dBµV-80 dBµV 70 dBµV 60 dBµV da i 50 dBµV-T վես_{ես}ակե Willing rout of the of a flow will be a flow of the flow of the stand 40 dBµV-30 dBµV-S2 20 dBµV-F Stop 2.5 GHz Start 2.475 GHz 691 pts

Radiated Restricted Band Edges plot – Average & Peak Result (8DPSK, Ch.78, Y-V)

Note:

Plot of worst case are only reported.



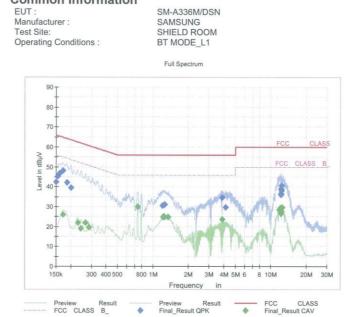
1/2

10.7 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

BT MODE_L1

Common Information



Test Report

Final_Result_QPK

| Frequency (MHz) | QuasiPeak (dBµV) | Limit (dBµV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|--------------------|---------------------|-----------------|----------------|--------------------|------|--------|---------------|
| 0.1500 | 42.43 | 66.00 | 23.57 | 9.000 | L1 | OFF | 9.6 |
| 0.1545 | 45.17 | 65.75 | 20.58 | 9.000 | L1 | OFF | 9.6 |
| 0.1613 | 46.61 | 65.40 | 18.78 | 9.000 | L1 | OFF | 9.6 |
| 0.1725 | 48.24 | 64.84 | 16.60 | 9.000 | L1 | OFF | 9.6 |
| 0.1860 | 42.26 | 64.21 | 21.96 | 9.000 | L1 | OFF | 9.6 |
| 0.2018 | 39.39 | 63.54 | 24.15 | 9.000 | L1 | OFF | 9.6 |
| 1.2043 | 30.62 | 56.00 | 25.38 | 9.000 | L1 | OFF | 9.7 |
| 1.2403 | 30.73 | 56.00 | 25.27 | 9.000 | L1 | OFF | 9.7 |
| 1.2628 | 31.15 | 56.00 | 24.85 | 9.000 | L1 | OFF | 9.7 |
| 3.8705 | 34.66 | 56.00 | 21.34 | 9.000 | L1 | OFF | 9.8 |
| 3.8750 | 34.74 | 56.00 | 21.26 | 9.000 | L1 | OFF | 9.8 |
| 4.1338 | 29.57 | 56.00 | 26.43 | 9.000 | L1 | OFF | 9.8 |
| 12.2113 | 36.06 | 60.00 | 23.94 | 9.000 | L1 | OFF | 10.1 |
| 12.2180 | 36.30 | 60.00 | 23.70 | 9.000 | L1 | OFF | 10.1 |
| 12.2225 | 36.62 | 60.00 | 23.38 | 9.000 | L1 | OFF | 10.1 |
| 12.2293 | 39.03 | 60.00 | 20.97 | 9.000 | L1 | OFF | 10.1 |
| 12.2900 | 37.99 | 60.00 | 22.01 | 9.000 | L1 | OFF | 10.1 |
| 12.2945 | 40.62 | 60.00 | 19.38 | 9.000 | L1 | OFF | 10.1 |

2021-12-18

오전 3:58:40



2/2

BT MODE_L1

Final_Result_CAV

| Frequency (MHz) | CAverage (dBµV) | Limit (dBµV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|--------------------|--------------------|-----------------|----------------|--------------------|------|--------|---------------|
| 0.1725 | 25.93 | 54.84 | 28.91 | 9.000 | L1 | OFF | 9.6 |
| 0.2288 | 21.81 | 52.50 | 30.69 | 9.000 | L1 | OFF | 9.6 |
| 0.2445 | 19.12 | 51.94 | 32.82 | 9.000 | L1 | OFF | 9.6 |
| 0.2670 | 22.04 | 51.21 | 29.17 | 9.000 | L1 | OFF | 9.6 |
| 0.2850 | 19.55 | 50.67 | 31.12 | 9.000 | L1 | OFF | 9.6 |
| 0.7430 | 29.87 | 46.00 | 16.13 | 9.000 | L1 | OFF | 9.7 |
| 1.2178 | 24.80 | 46.00 | 21.20 | 9.000 | L1 | OFF | 9.7 |
| 1.2335 | 24.80 | 46.00 | 21.20 | 9.000 | L1 | OFF | 9.7 |
| 1.2403 | 24.96 | 46.00 | 21.04 | 9.000 | L1 | OFF | 9.7 |
| 1.2538 | 24.91 | 46.00 | 21.09 | 9.000 | L1 | OFF | 9.7 |
| 1.3505 | 24.82 | 46.00 | 21.18 | 9.000 | L1 | OFF | 9.7 |
| 3.8728 | 23.69 | 46.00 | 22.31 | 9.000 | L1 | OFF | 9.8 |
| 11.8445 | 28.49 | 50.00 | 21.51 | 9.000 | L1 | OFF | 10.1 |
| 12.0245 | 29.41 | 50.00 | 20.59 | 9.000 | L1 | OFF | 10.1 |
| 12.2383 | 26.42 | 50.00 | 23.58 | 9.000 | L1 | OFF | 10.1 |
| 12.2990 | 27.51 | 50.00 | 22.49 | 9.000 | L1 | OFF | 10.1 |
| 12.3598 | 29.10 | 50.00 | 20.90 | 9.000 | L1 | OFF | 10.1 |
| 12.4205 | 29.58 | 50.00 | 20.42 | 9.000 | L1 | OFF | 10.1 |

2021-12-18

오전 3:58:40



BT 45W MODE_L1

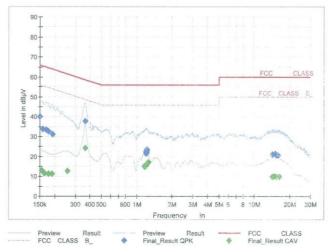
1/2

Test Report

Common Information

EUT : Manufacturer : Test Site: Operating Conditions : SM-A336M/DSN SAMSUNG SHIELD ROOM BT 45W MODE_L1





Final_Result_QPK

| Frequency (MHz) | QuasiPeak (dBuV) | Limit (dBuV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|--------------------|---------------------|-----------------|----------------|--------------------|------|--------|---------------|
| 0.1500 | 40.22 | 66.00 | 25.78 | 9.000 | L1 | OFF | 9.6 |
| 0.1590 | 33.77 | 65.52 | 31.74 | 9.000 | L1 | OFF | 9.6 |
| 0.1703 | 33.34 | 64.95 | 31.61 | 9.000 | L1 | OFF | 9.6 |
| 0.1770 | 32.64 | 64.63 | 31.99 | 9.000 | L1 | OFF | 9.6 |
| 0.1928 | 31.18 | 63.92 | 32.74 | 9.000 | L1 | OFF | 9.6 |
| 0.3638 | 37.68 | 58.64 | 20.96 | 9.000 | L1 | OFF | 9.6 |
| 1.1953 | 21.80 | 56.00 | 34.20 | 9.000 | L1 | OFF | 9.7 |
| 1.1998 | 21.47 | 56.00 | 34.53 | 9.000 | L1 | OFF | 9.7 |
| 1.2065 | 22.37 | 56.00 | 33.63 | 9.000 | L1 | OFF | 9.7 |
| 1.2133 | 22.22 | 56.00 | 33.78 | 9.000 | L1 | OFF | 9.7 |
| 1.2200 | 23.26 | 56.00 | 32.74 | 9.000 | L1 | OFF | 9.7 |
| 1.2335 | 23.41 | 56.00 | 32.59 | 9.000 | L1 | OFF | 9.7 |
| 14.3443 | 20.95 | 60.00 | 39.05 | 9.000 | L1 | OFF | 10.2 |
| 15.1453 | 21.35 | 60.00 | 38.65 | 9.000 | L1 | OFF | 10.2 |
| 15.1633 | 20.92 | 60.00 | 39.08 | 9.000 | L1 | OFF | 10.2 |
| 15.1813 | 20.95 | 60.00 | 39.05 | 9.000 | L1 | OFF | 10.2 |
| 15.5255 | 20.82 | 60.00 | 39.18 | 9.000 | L1 | OFF | 10.2 |
| 15.8923 | 20.50 | 60.00 | 39.50 | 9.000 | L1 | OFF | 10.3 |

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BT 45W MODE_L1

Final_Result_CAV

| Frequency (MHz) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|--------------------|--------------------|-----------------|----------------|--------------------|------|--------|---------------|
| 0.1545 | 12.85 | 55.75 | 42.91 | 9.000 | L1 | OFF | 9.6 |
| 0.1635 | 11.63 | 55.28 | 43.65 | 9.000 | L1 | OFF | 9.6 |
| 0.1770 | 11.18 | 54.63 | 43.45 | 9.000 | L1 | OFF | 9.6 |
| 0.1905 | 11.13 | 54.02 | 42.88 | 9.000 | L1 | OFF | 9.6 |
| 0.2580 | 12.79 | 51.50 | 38.70 | 9.000 | L1 | OFF | 9.6 |
| 0.3660 | 24.10 | 48.59 | 24.49 | 9.000 | L1 | OFF | 9.6 |
| 1.1615 | 15.13 | 46.00 | 30.87 | 9.000 | L1 | OFF | 9.7 |
| 1.1728 | 15.03 | 46.00 | 30.97 | 9.000 | L1 | OFF | 9.7 |
| 1.1930 | 15.14 | 46.00 | 30.86 | 9.000 | L1 | OFF | 9.7 |
| 1.2065 | 15.71 | 46.00 | 30.29 | 9.000 | L1 | OFF | 9.7 |
| 1.2178 | 16.29 | 46.00 | 29.71 | 9.000 | L1 | OFF | 9.7 |
| 1.2538 | 17.00 | 46.00 | 29.00 | 9.000 | L1 | OFF | 9.7 |
| 14.2340 | 9.80 | 50.00 | 40.20 | 9.000 | L1 | OFF | 10.2 |
| 14.6953 | 10.18 | 50.00 | 39.82 | 9.000 | L1 | OFF | 10.2 |
| 14.7583 | 10.09 | 50.00 | 39.91 | 9.000 | L1 | OFF | 10.2 |
| 15.4693 | 9.94 | 50.00 | 40.06 | 9.000 | L1 | OFF | 10.2 |
| 15.5075 | 9.71 | 50.00 | 40.29 | 9.000 | L1 | OFF | 10.2 |
| 16.3985 | 9.68 | 50.00 | 40.32 | 9.000 | L1 | OFF | 10.3 |

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Conducted Emissions (Line 2)

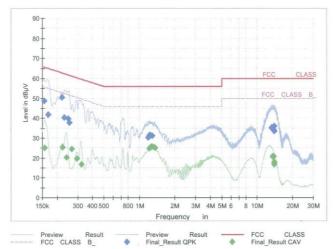
BT MODE_N

Test Report

Common Information

EUT : Manufacturer : Test Site: Operating Conditions : SM-A336M/DSN SAMSUNG SHIELD ROOM BT MODE_N

Full Spectrum



Final_Result_QPK

| Frequency (MHz) | QuasiPeak (dBuV) | Limit (dBuV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|--------------------|---------------------|-----------------|----------------|--------------------|------|--------|---------------|
| 0.1545 | 48.89 | 65.75 | 16.86 | 9.000 | N | OFF | 9.6 |
| 0.1680 | 41.70 | 65.06 | 23.36 | 9.000 | N | OFF | 9.6 |
| 0.2198 | 50.34 | 62.83 | 12.49 | 9.000 | N | OFF | 9.6 |
| 0.2310 | 40.34 | 62.41 | 22.07 | 9.000 | N | OFF | 9.6 |
| 0.2490 | 39.90 | 61.79 | 21.89 | 9.000 | N | OFF | 9.6 |
| 0.2535 | 37.73 | 61.64 | 23.91 | 9.000 | N | OFF | 9.6 |
| 1.1908 | 30.21 | 56.00 | 25.79 | 9.000 | N | OFF | 9.7 |
| 1.2110 | 30.89 | 56.00 | 25.11 | 9.000 | N | OFF | 9.7 |
| 1.2155 | 31.52 | 56.00 | 24.48 | 9.000 | N | OFF | 9.7 |
| 1.2268 | 31.50 | 56.00 | 24.50 | 9.000 | N | OFF | 9.7 |
| 1.2403 | 31.47 | 56.00 | 24.53 | 9.000 | N | OFF | 9.7 |
| 1.2920 | 31.12 | 56.00 | 24.88 | 9.000 | N | OFF | 9.7 |
| 13.2148 | 35.09 | 60.00 | 24.91 | 9.000 | N | OFF | 10.2 |
| 13.2958 | 35.47 | 60.00 | 24.53 | 9.000 | N | OFF | 10.2 |
| 13.6018 | 34.23 | 60.00 | 25.77 | 9.000 | N | OFF | 10.2 |
| 13.7458 | 33.96 | 60.00 | 26.04 | 9.000 | N | OFF | 10.2 |
| 13.8830 | 35.97 | 60.00 | 24.03 | 9.000 | N | OFF | 10.2 |
| 14.0338 | 33.51 | 60.00 | 26.49 | 9.000 | N | OFF | 10.2 |

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BT MODE_N

| Final_Result_CAV |
|------------------|
|------------------|

| Frequency (MHz) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|--------------------|--------------------|-----------------|----------------|--------------------|------|--------|---------------|
| 0.1568 | 25.23 | 55.63 | 30.41 | 9.000 | N | OFF | 9.6 |
| 0.2220 | 25.46 | 52.74 | 27.28 | 9.000 | N | OFF | 9.6 |
| 0.2400 | 20.32 | 52.10 | 31.77 | 9.000 | N | OFF | 9.6 |
| 0.2648 | 24.62 | 51.28 | 26.66 | 9.000 | N | OFF | 9.6 |
| 0.2940 | 19.62 | 50.41 | 30.79 | 9.000 | N | OFF | 9.6 |
| 0.3210 | 16.80 | 49.68 | 32.89 | 9.000 | N | OFF | 9.6 |
| 1.2178 | 24.93 | 46.00 | 21.07 | 9.000 | N | OFF | 9.7 |
| 1.2403 | 25.27 | 46.00 | 20.73 | 9.000 | N | OFF | 9.7 |
| 1.2650 | 25.80 | 46.00 | 20.20 | 9.000 | N | OFF | 9.7 |
| 1.2898 | 25.75 | 46.00 | 20.25 | 9.000 | N | OFF | 9.7 |
| 1.3505 | 25.36 | 46.00 | 20.64 | 9.000 | N | OFF | 9.7 |
| 1.3618 | 25.03 | 46.00 | 20.97 | 9.000 | N | OFF | 9.7 |
| 13.4983 | 20.70 | 50.00 | 29.30 | 9.000 | N | OFF | 10.2 |
| 13.6018 | 20.50 | 50.00 | 29.50 | 9.000 | N | OFF | 10.2 |
| 13.7323 | 20.70 | 50.00 | 29.30 | 9.000 | N | OFF | 10.2 |
| 13.8988 | 16.77 | 50.00 | 33.23 | 9.000 | N | OFF | 10.2 |
| 13.9190 | 17.99 | 50.00 | 32.01 | 9.000 | N | OFF | 10.2 |
| 13.9550 | 17.61 | 50.00 | 32.39 | 9,000 | N | OFF | 10.2 |

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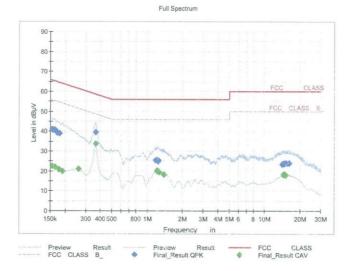
BT 45W MODE_N

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Test Report

Common Information

EUT : Manufacturer : Test Site: Operating Conditions : SM-A336M/DSN SAMSUNG SHIELD ROOM BT 45W MODE_N



Final_Result_QPK

| Frequency (MHz) | QuasiPeak (dBuV) | Limit (dBuV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|--------------------|---------------------|-----------------|----------------|--------------------|------|--------|---------------|
| 0.1545 | 40.95 | 65.75 | 24.80 | 9.000 | N | OFF | 9.6 |
| 0.1590 | 40.61 | 65.52 | 24.90 | 9.000 | N | OFF | 9.6 |
| 0.1635 | 40.58 | 65.28 | 24.71 | 9.000 | N | OFF | 9.6 |
| 0.1725 | 39.34 | 64.84 | 25.50 | 9.000 | N | OFF | 9.6 |
| 0.1793 | 39.03 | 64.52 | 25.49 | 9.000 | N | OFF | 9.6 |
| 0.3638 | 39.60 | 58.64 | 19.04 | 9.000 | N | OFF | 9.6 |
| 1.1795 | 25.25 | 56.00 | 30.75 | 9.000 | N | OFF | 9.7 |
| 1.2110 | 25.26 | 56.00 | 30.74 | 9.000 | N | OFF | 9.7 |
| 1.2178 | 25.62 | 56.00 | 30.38 | 9.000 | N | OFF | 9.7 |
| 1.2335 | 25.64 | 56.00 | 30.36 | 9.000 | N | OFF | 9.7 |
| 1.2380 | 25.29 | 56.00 | 30.71 | 9.000 | N | OFF | 9.7 |
| 1.2448 | 24.90 | 56.00 | 31.10 | 9.000 | N | OFF | 9.7 |
| 14.0450 | 23.47 | 60.00 | 36.53 | 9.000 | N | OFF | 10.2 |
| 14.4118 | 23.77 | 60.00 | 36.23 | 9.000 | N | OFF | 10.3 |
| 14.7380 | 23.78 | 60.00 | 36.22 | 9.000 | N | OFF | 10.3 |
| 14.9585 | 23.94 | 60.00 | 36.06 | 9.000 | N | OFF | 10.3 |
| 15.4198 | 23.83 | 60.00 | 36.17 | 9.000 | N | OFF | 10.3 |
| 16.0835 | 23.89 | 60.00 | 36.11 | 9.000 | N | OFF | 10.3 |

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BT 45W MODE_N

| F | i | r | 1 | a | F | R | e | s | u | I | t | С | A | 1 | V | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
| | | | | | | | | | | | | | | | | |

| Frequency (MHz) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|--------------------|--------------------|-----------------|----------------|--------------------|------|--------|---------------|
| 0.1545 | 22.55 | 55.75 | 33.21 | 9.000 | N | OFF | 9.6 |
| 0.1635 | 21.85 | 55.28 | 33.44 | 9.000 | N | OFF | 9.6 |
| 0.1770 | 20.88 | 54.63 | 33.75 | 9.000 | N | OFF | 9.6 |
| 0.1905 | 19.95 | 54.02 | 34.06 | 9.000 | N | OFF | 9.6 |
| 0.2603 | 20.93 | 51.42 | 30.50 | 9.000 | N | OFF | 9.6 |
| 0.3660 | 33.66 | 48.59 | 14.93 | 9.000 | N | OFF | 9.6 |
| 1.2088 | 20.04 | 46.00 | 25.96 | 9.000 | N | OFF | 9.7 |
| 1.2178 | 20.16 | 46.00 | 25.84 | 9.000 | N | OFF | 9.7 |
| 1.2313 | 19.98 | 46.00 | 26.02 | 9.000 | N | OFF | 9.7 |
| 1.2403 | 19.87 | 46.00 | 26.13 | 9.000 | N | OFF | 9.7 |
| 1.2650 | 19.44 | 46.00 | 26.56 | 9.000 | N | OFF | 9.7 |
| 1.3865 | 18.27 | 46.00 | 27.73 | 9.000 | N | OFF | 9.7 |
| 14.3780 | 18.08 | 50.00 | 31.92 | 9.000 | N | OFF | 10.3 |
| 14.4973 | 18.14 | 50.00 | 31.86 | 9.000 | N | OFF | 10.3 |
| 14.5558 | 18.10 | 50.00 | 31.90 | 9.000 | N | OFF | 10.3 |
| 14.7200 | 18.05 | 50.00 | 31.95 | 9.000 | N | OFF | 10.3 |
| 14.9968 | 18.11 | 50.00 | 31.89 | 9.000 | N | OFF | 10.3 |
| 15.1745 | 17.95 | 50.00 | 32.05 | 9.000 | N | OFF | 10.3 |

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11. LIST OF TEST EQUIPMENT

Conducted Test

| Equipment | Model | Manufacturer | Serial No. | Due to Calibration | Calibration Interval |
|--------------------------------|----------|-----------------|------------|-----------------------|-------------------------|
| LISN | ENV216 | Rohde & Schwarz | 102245 | 08/23/2022 | Annual |
| EMI Test Receiver | ESR | Rohde & Schwarz | 101910 | 06/17/2022 | Annual |
| Temperature Chamber | SU-642 | ESPEC | 0093008124 | 03/15/2022 | Annual |
| Signal Analyzer | N9030A | Agilent | MY49432108 | 03/09/2022 | Annual |
| Power Meter | N1911A | Agilent | MY45100523 | 04/08/2022 | Annual |
| Power Sensor | N1921A | Agilent | MY57820067 | 04/08/2022 | Annual |
| Power Splitter | 11667B | Hewlett Packard | 10545 | 02/09/2022 | Annual |
| DC Power Supply | E3632A | HP | MY50360067 | 02/26/2022 | Annual |
| Attenuator(10 dB)(DC-26.5 GHz) | 8493C | HP | 07560 | 06/18/2022 | Annual |
| Attenuator(10 dB)(DC-26.5 GHz) | 8493C | HP | 08285 | 06/28/2022 | Annual |
| Attenuator(20 dB) | 18N-20dB | Rohde & Schwarz | 8 | 03/08/2022 | Annual |
| Software | EMC32 | Rohde & Schwarz | N/A | N/A | N/A |
| FCC WLAN&BT&BLE Conducted | N/A | HCT CO., LTD. | N/A | N/A | N/A |
| Test Software v3.0 | | | | | |

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

| Equipment | Model | Manufacturer | Serial No. | Due to Calibration | Calibration Interval |
|--|--|---------------------------|-------------|-----------------------|-------------------------|
| Controller(Antenna mast) | CO3000 | Innco system | CO3000-4p | N/A | N/A |
| Antenna Position Tower | MA4640/800-XP-EP | Innco system | N/A | N/A | N/A |
| Controller | EM1000 | Audix | 060520 | N/A | N/A |
| Turn Table | N/A | Audix | N/A | N/A | N/A |
| Amp & Filter Bank Switch Controller | FBSM-01B | TNM system | TM19050002 | N/A | N/A |
| Loop Antenna | 1513 | Schwarzbeck | 1513-333 | 03/19/2022 | Biennial |
| Hybrid Antenna | VULB 9168 | Schwarzbeck | 9168-0895 | 09/04/2022 | Biennial |
| Horn Antenna | BBHA 9120D | Schwarzbeck | 02296 | 05/19/2022 | Biennial |
| Horn Antenna(15 GHz ~ 40 GHz) | BBHA9170 | Schwarzbeck | BBHA9170124 | 04/12/2023 | Biennial |
| Spectrum Analyzer | FSV(10 Hz ~ 40 GHz) | Rohde & Schwarz | 101055 | 05/14/2022 | Annual |
| Band Reject Filter | WRCJV2400/2483.5- 2370/2520-60/12SS | Wainwright Instruments | 2 | 01/06/2022 | Annual |
| Band Reject Filter | WRCJV12-4900- 5100-5900-6100- 50SS | Wainwright Instruments | 5 | 06/24/2022 | Annual |
| Band Reject Filter | WRCJV12-4900- 5100-5900-6100- 50SS | Wainwright Instruments | 6 | 06/24/2022 | Annual |
| Power Amplifier | CBL18265035 | CERNEX | 22966 | 12/02/2022 | Annual |
| Power Amplifier | CBL26405040 | CERNEX | 25956 | 03/23/2022 | Annual |
| HPF(3~18GHz) + LNA1(1~18GHz) | FMSR-05B | TNM system | F6 | 01/20/2022 | Annual |
| ATT(10dB) + LNA1(1~18GHz) | FMSR -05B | TNM system | None | 01/20/2022 | Annual |
| ATT(3dB) + LNA1(1~18GHz) | FMSR -05B | TNM system | None | 01/20/2022 | Annual |
| LNA1(1~18GHz) | FMSR -05B | TNM system | 25540 | 01/20/2022 | Annual |
| HPF(7~18GHz) + LNA2(6~18GHz) | FMSR -05B | TNM system | 28550 | 01/20/2022 | Annual |
| Thru(30MHz ~ 18GHz) | FMSR -05B | TNM system | None | 01/20/2022 | Annual |

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. Especially, 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-2112-FC052-P |