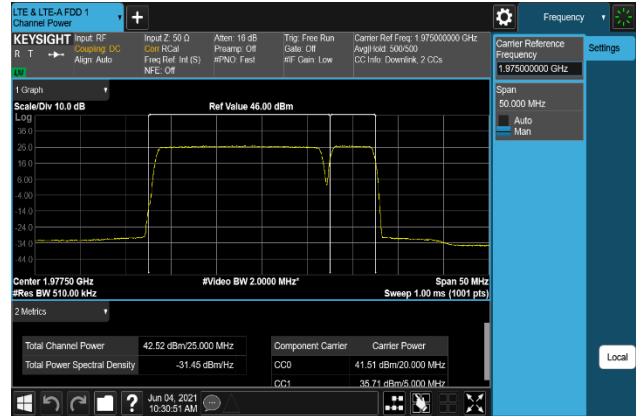




Plot 7-315. Conducted Average Output Power Plot  
(B2\_20M+5M\_64QAM - High Channel, Port 2)



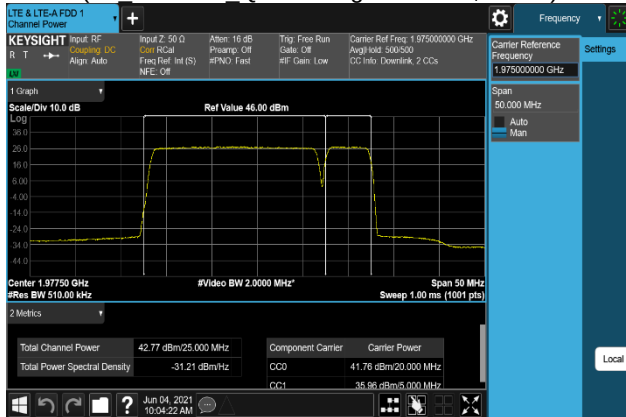
Plot 7-316. Conducted Average Output Power Plot  
(B2\_20M+5M\_256QAM - High Channel, Port 2)



Plot 7-317. Conducted Average Output Power Plot  
(B2\_20M+5M\_QPSK - High Channel, Port 3)



Plot 7-318. Conducted Average Output Power Plot  
(B2\_20M+5M\_16QAM - High Channel, Port 3)



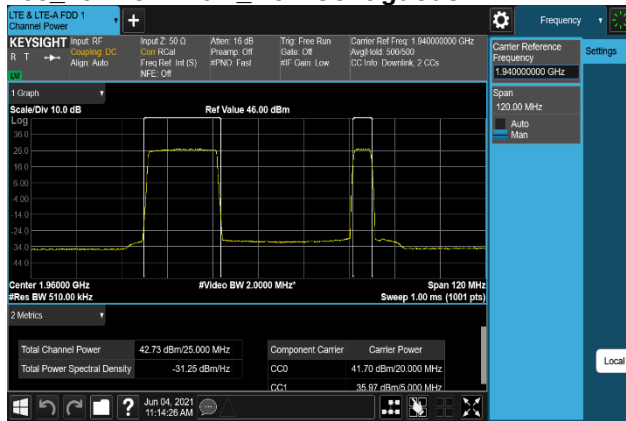
Plot 7-319. Conducted Average Output Power Plot  
(B2\_20M+5M\_64QAM - High Channel, Port 3)



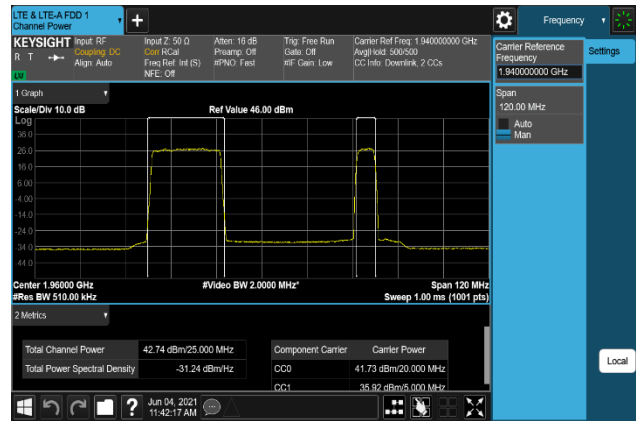
Plot 7-320. Conducted Average Output Power Plot  
(B2\_20M+5M\_256QAM - High Channel, Port 3)

|                                      |                                               |                                                           |                |                                   |
|--------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|-----------------------------------|
| FCC ID: A3LRF4402D-D1A               | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K21053101R1.A3L | Test Dates:<br>06/01/2021-06/15/2021          | EUT Type:<br>RRU(RF4402d)                                 |                | Page 77 of 515                    |

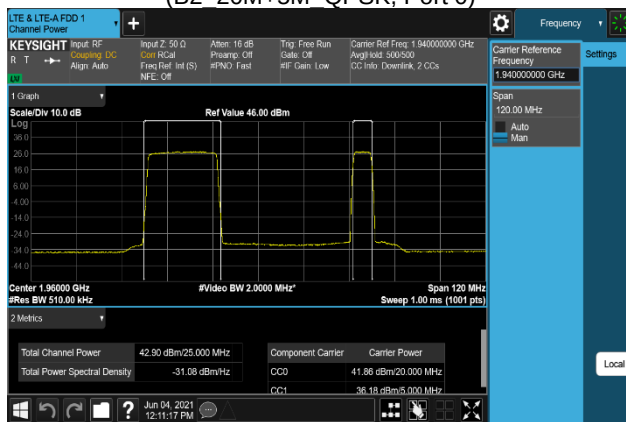
## - B66 20M+5M+10M Non-Contiguous



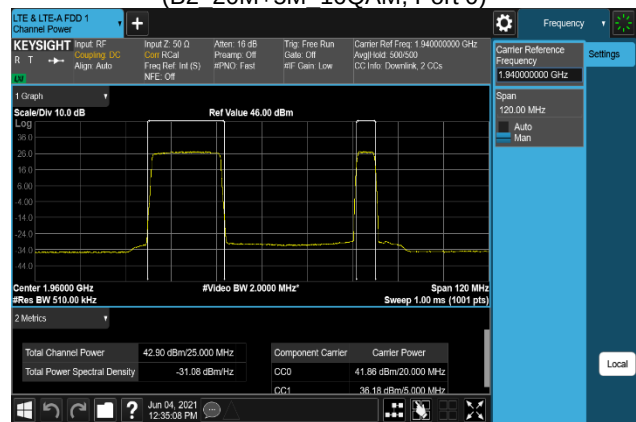
Plot 7-321. Conducted Average Output Power Plot  
(B2 20M+5M QPSK, Port 0)



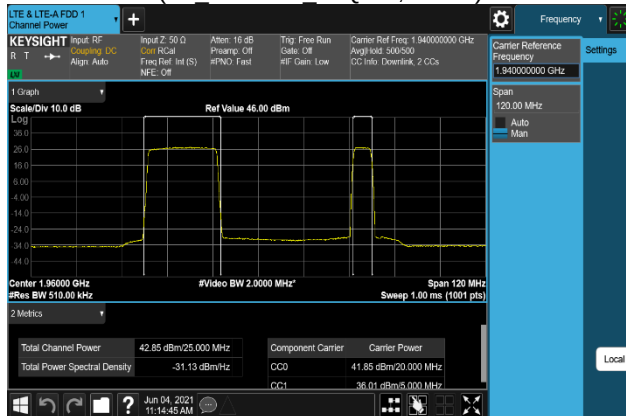
Plot 7-322. Conducted Average Output Power Plot  
(B2 20M+5M 16QAM, Port 0)



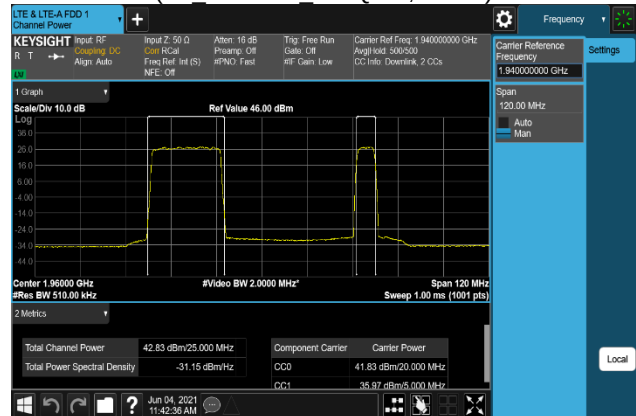
Plot 7-323. Conducted Average Output Power Plot  
(B2 20M+5M 64QAM, Port 0)



Plot 7-324. Conducted Average Output Power Plot  
(B2 20M+5M 256QAM, Port 0)

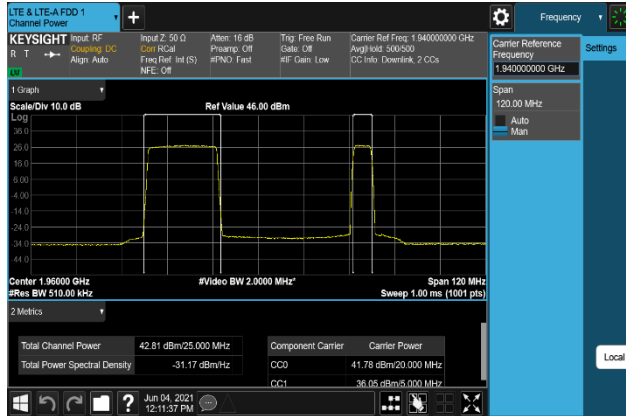


Plot 7-325. Conducted Average Output Power Plot  
(B2\_20M+5M\_QPSK, Port 1)

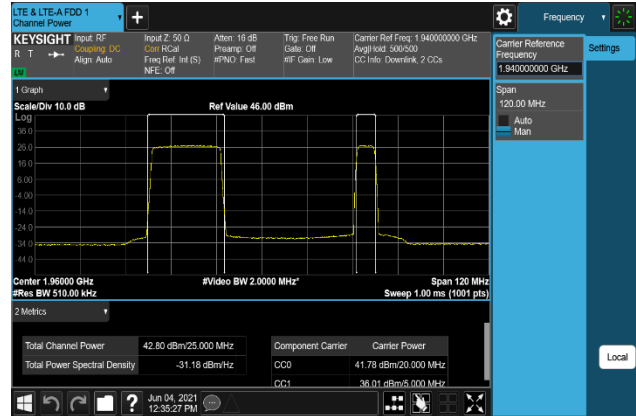


Plot 7-326. Conducted Average Output Power Plot  
(B2\_20M+5M\_16QAM, Port 1)

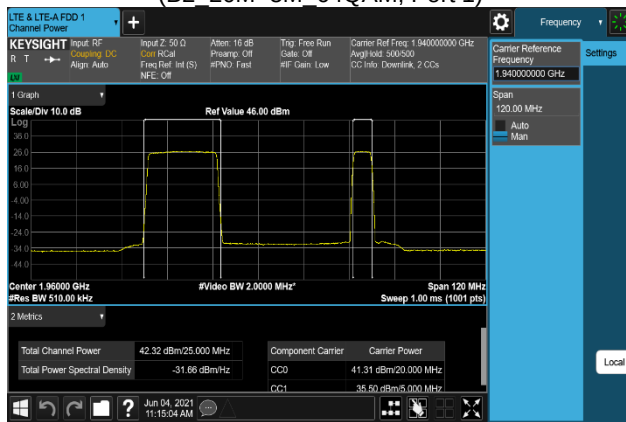
|                                             |                                               |                                                           |                |                                          |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021   | <b>EUT Type:</b><br>RRU(RF4402d)                          |                | Page 78 of 515                           |



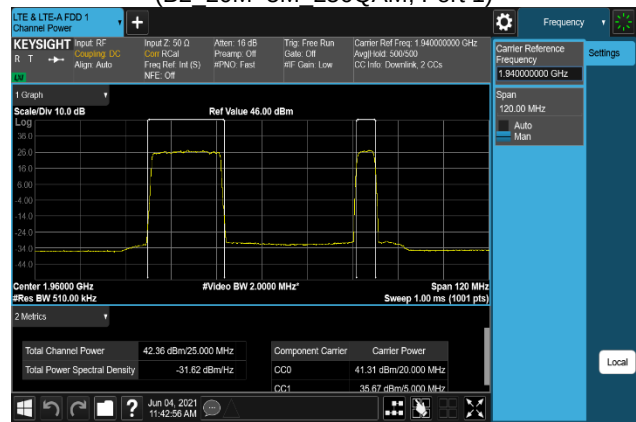
Plot 7-327. Conducted Average Output Power Plot  
(B2\_20M+5M\_64QAM, Port 1)



Plot 7-328. Conducted Average Output Power Plot  
(B2\_20M+5M\_256QAM, Port 1)



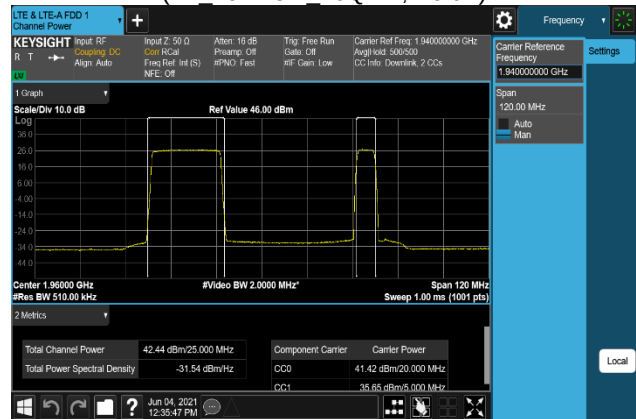
Plot 7-329. Conducted Average Output Power Plot  
(B2\_20M+5M\_QPSK, Port 2)



Plot 7-330. Conducted Average Output Power Plot  
(B2\_20M+5M\_16QAM, Port 2)

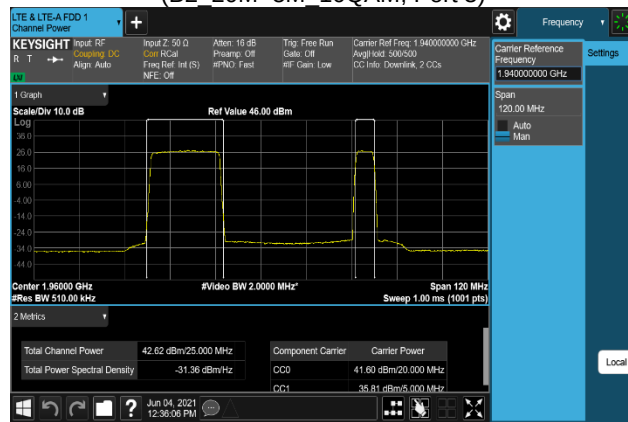
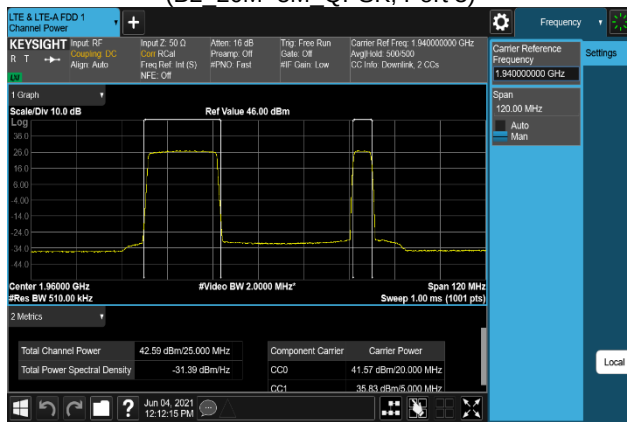
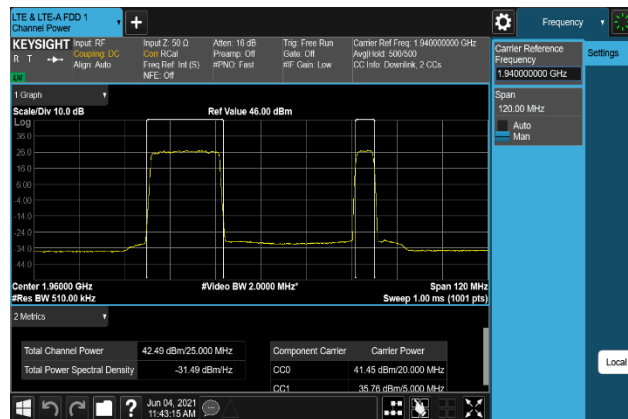
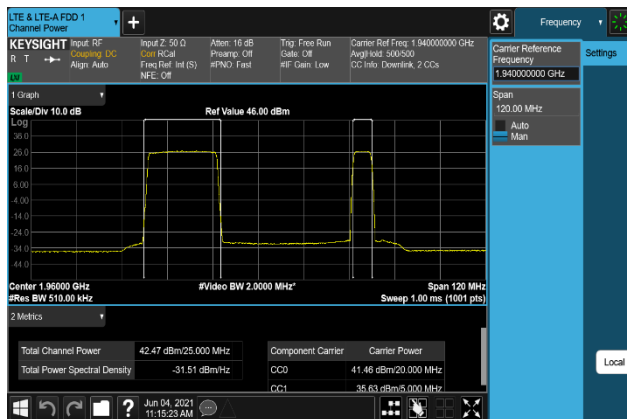


Plot 7-331. Conducted Average Output Power Plot  
(B2\_20M+5M\_64QAM, Port 2)



Plot 7-332. Conducted Average Output Power Plot  
(B2\_20M+5M\_256QAM, Port 2)

|                                             |                                               |                                                           |                |                                          |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021   | <b>EUT Type:</b><br>RRU(RF4402d)                          |                | Page 79 of 515                           |



|                                             |                                               |                                                           |                |                                          |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021   | <b>EUT Type:</b><br>RRU(RF4402d)                          |                | Page 80 of 515                           |

## 7.4 Peak Power Spectral Density

### § 2.1046

#### Test Overview

A transmitter port of EUT is connected to the input of a signal analyzer. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

#### Test Procedure Used

ANSI C63.26 - Section 5.2.4.5  
 ANSI C63.26 - Section 5.2.5.5  
 KDB 971168 D01 v0301 - Section 5.2

ANSI C63.26 - Section 6.4.3.2.3  
 KDB 662911 D01 v02r01  
 - Section E)2) In-Band Power Spectral Density (PSD) Measurements  
 b) Measure and sum spectral maxima across the outputs.

#### Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

The PSD is measured following the same procedures described in 5.2.4.4 of ANSI C63.26 for measuring the total average power, but with the RBW set to the reference bandwidth specified by the applicable regulatory requirement, and by using the marker function to identify the maximum PSD instead of summing the power across the OBW. If the fundamental measurement condition cannot be realized, then one of the alternative procedures in 5.2.4.4.2 or 5.2.4.4.3 should be selected, based on whether the transmitter duty cycle is constant (variations  $\leq \pm 2\%$ ) or non-constant (variations  $> \pm 2\%$ ), respectively.

1. Conducted power measurements are performed using the signal analyzer's "SA mode" measurement capability for signals with continuous operation.
2. Set span to  $2 \times$  to  $3 \times$  the OBW.
3. Set RBW = 1 MHz (the reference bandwidth)
4. Set VBW  $\geq 3 \times$  RBW.
5. Set number of measurement points in sweep  $\geq 2 \times$  span / RBW.
6. Sweep time:
  - a) Set  $\geq$  auto-couple, and enable trace averaging, or
  - b) Set  $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$  and enable a single sweep (automation-compatible) measurement. The sweep time should never be faster than the auto-coupled sweep time.
7. Detector = power averaging (rms).
8. Set sweep trigger to "free run."
9. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.
10. Use the peak marker function to determine the maximum amplitude level. ( $=P_{\text{Meas}}$ )

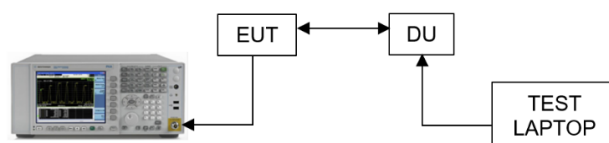
|                                             |                                                                                     |                                                           |                                                                                       |                                          |
|---------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      |  | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021                                         | <b>EUT Type:</b><br>RRU(RF4402d)                          |                                                                                       | Page 81 of 515                           |

11. The relevant equation for determining the maximum EIRP from the measured RF output power is given in Equation as follows:  

$$\text{EIRP} = P_{\text{Meas}} + G_T$$
 where  
 GT: gain of the transmitting antenna, in dBi (EIRP).

### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 7-3. Test Instrument & Measurement Setup**

### Limit

The EIRP limits are 1640 W/MHz

### Test Notes

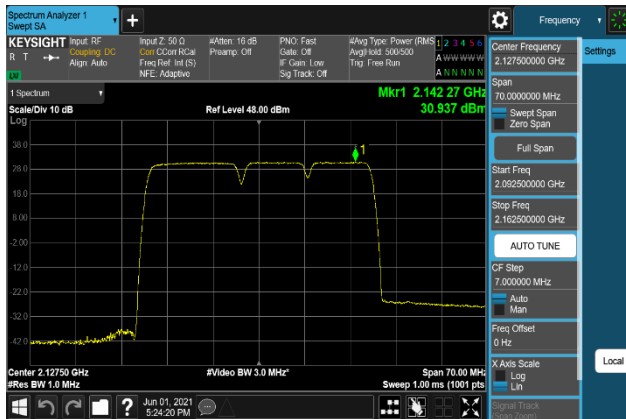
1. All the measurement has been tested but test plots are referred from the highest of value of each of modulation of each antenna ports.
2. Consider the following factors for MIMO Power Spectral Density:  
 The power spectral density is measured as dBm / MHz, with the resolution bandwidth of 1 MHz PSDs are summed up in linear using the measure-and-sum technique defined in KDB 971168 D01 v03r01 - Section E) 2).
3. PSD per port (dBm / MHz) is converted to a linear value (mW). A summation of linear powers for all ports gives us the total MIMO conducted Power (mW). We convert this back to logarithmic scale for further PSD calculations.
4. Antenna Gains (dBi) are provided by the client.
5. All transmit signals from different antennas are completely uncorrelated with each other. So the e.i.r.p. shall be calculated based on the aggregate power conducted across all antennas and maximum antenna gain  $G_{\text{max}}$
6. Sample Calculation:  
 Let us assume the following numbers:
  - a) Total MIMO Conducted Power as 21041.72 milliWatts.
  - b) Antenna Gain = 21.4 dBi

| Factors                                  |                                       | Value   | Unit        |
|------------------------------------------|---------------------------------------|---------|-------------|
| Summed MIMO Conducted Power (linear sum) |                                       | 4705.70 | mW / 1 MHz  |
| Summed MIMO Conducted Power (dBm)        | $= 10 * \log (21041.72) =$            | 36.73   | dBm / 1 MHz |
| Antenna Gain                             |                                       | 21.4    | dBi         |
| <b>Total MIMO EIRP</b>                   |                                       | 58.13   | dBm / 1 MHz |
| <b>Limit</b>                             | $= 1640 \text{ mW} / 1 \text{ MHz} =$ | 62.16   | dBm / 1 MHz |
| <b>Margin</b> = Limit - Total MIMO EIRP  | $= 59.43 - 62.16 =$                   | -4.02   | dB          |

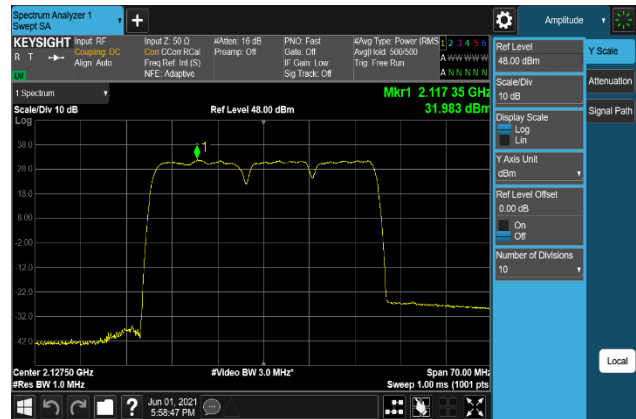
|                                             |                                               |                                                           |                |                                          |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021   | <b>EUT Type:</b><br>RRU(RF4402d)                          | Page 82 of 515 |                                          |

| Low Channel                           | Port | QPSK         | 16QAM        | 64QAM        | 256QAM       |
|---------------------------------------|------|--------------|--------------|--------------|--------------|
| Conducted Power (dBm/1MHz)            | 0    | <b>30.94</b> | <b>31.98</b> | <b>31.36</b> | <b>31.16</b> |
|                                       | 1    | 30.82        | 31.77        | 31.07        | 30.97        |
|                                       | 2    | 30.60        | 31.40        | 30.84        | 30.89        |
|                                       | 3    | 30.45        | 31.59        | 30.59        | 30.70        |
| Total MIMO Conducted Power (mW/1MHz)  |      | 4705.70      | 5904.41      | 5006.80      | 4959.33      |
| Total MIMO Conducted Power (dBm/1MHz) |      | 36.73        | 37.71        | 37.00        | 36.95        |
| Ant. Gain (dBi)                       |      | 21.40        | 21.40        | 21.40        | 21.40        |
| MIMO EIRP(dBm/1MHz)                   |      | 58.13        | 59.11        | 58.40        | 58.35        |
| EIRP Limit (W/1MHz)                   |      | 1640.00      | 1641.00      | 1642.00      | 1643.00      |
| EIRP Limit (dBm/1MHz)                 |      | 62.15        | 62.15        | 62.15        | 62.15        |
| Margin (dB)                           |      | -4.02        | -3.04        | -3.75        | -3.80        |

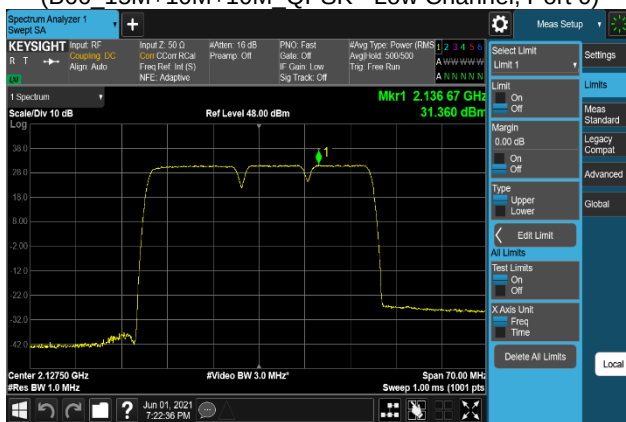
Table 4-17. EIRP Table (B66\_15M+10M+10M\_Contiguous - Low Channel\_4T)



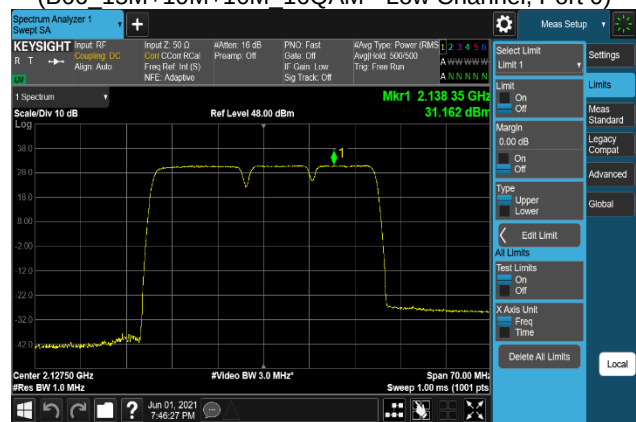
Plot 7-337. Peak To Average Power Radio Plot (B66\_15M+10M+10M\_QPSK - Low Channel, Port 0)



Plot 7-338. Peak To Average Power Radio Plot (B66\_15M+10M+10M\_16QAM - Low Channel, Port 0)



Plot 7-339. Peak To Average Power Radio Plot (B66\_15M+10M+10M\_64QAM - Low Channel, Port 0)

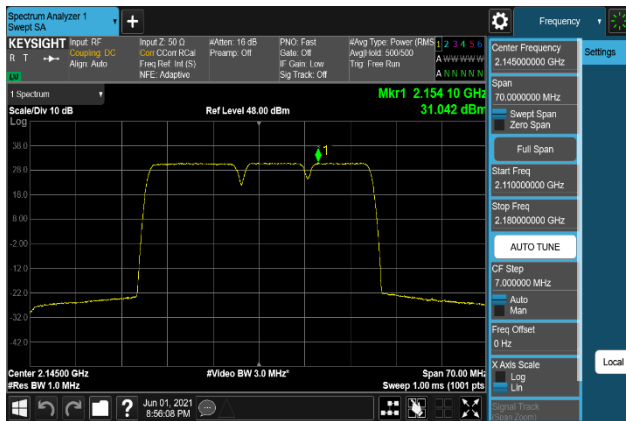


Plot 7-340. Peak To Average Power Radio Plot (B66\_15M+10M+10M\_256QAM - Low Channel, Port 0)

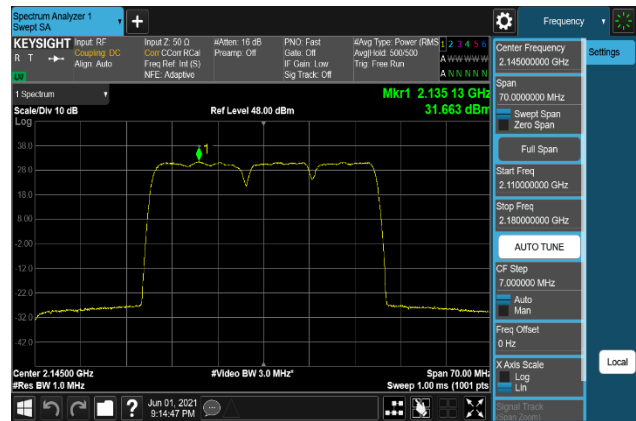
|                                             |                                               |                                                           |                |                                          |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>BK21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021   | <b>EUT Type:</b><br>RRU(RF4402d)                          |                | Page 83 of 515                           |

| Mid Channel                           | Port | QPSK         | 16QAM        | 64QAM        | 256QAM       |
|---------------------------------------|------|--------------|--------------|--------------|--------------|
| Conducted Power (dBm/1MHz)            | 0    | <b>31.04</b> | 31.59        | <b>31.00</b> | 30.91        |
|                                       | 1    | 30.99        | <b>31.66</b> | 30.95        | <b>31.01</b> |
|                                       | 2    | 30.72        | 31.33        | 30.61        | 30.66        |
|                                       | 3    | 30.62        | 31.28        | 30.73        | 30.71        |
| Total MIMO Conducted Power (mW/1MHz)  |      | 4861.46      | 5609.70      | 4837.53      | 4836.10      |
| Total MIMO Conducted Power (dBm/1MHz) |      | 36.87        | 37.49        | 36.85        | 36.84        |
| Ant. Gain (dBi)                       |      | 21.40        | 21.40        | 21.40        | 21.40        |
| MIMO EIRP(dBm/1MHz)                   |      | 58.27        | 58.89        | 58.25        | 58.24        |
| EIRP Limit (W/1MHz)                   |      | 1640.00      | 1641.00      | 1642.00      | 1643.00      |
| EIRP Limit (dBm/1MHz)                 |      | 62.15        | 62.15        | 62.15        | 62.15        |
| Margin (dB)                           |      | -3.88        | -3.26        | -3.90        | -3.91        |

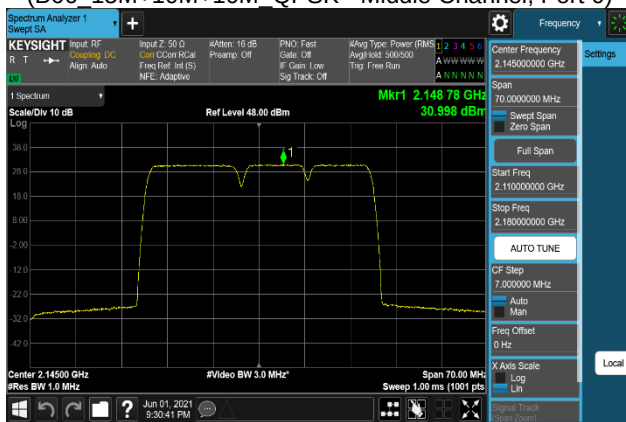
Table 4-18. EIRP Table (B66\_15M+10M+10M\_Contiguou - Middle Channel\_4T)



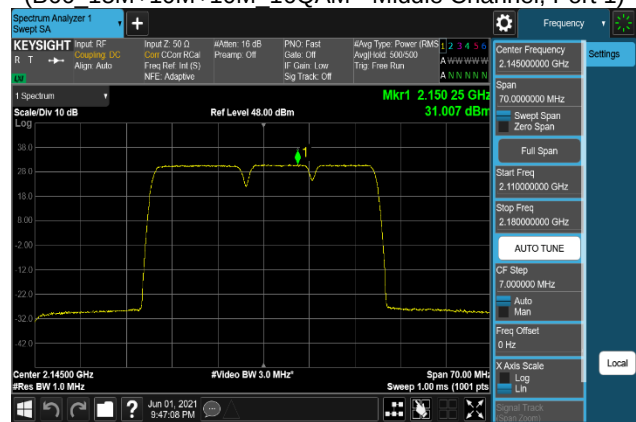
Plot 7-341. Peak To Average Power Ratio Plot (B66\_15M+10M+10M\_QPSK - Middle Channel, Port 0)



Plot 7-342. Peak To Average Power Ratio Plot (B66\_15M+10M+10M\_16QAM - Middle Channel, Port 1)



Plot 7-343. Peak To Average Power Ratio Plot (B66\_15M+10M+10M\_64QAM - Middle Channel, Port 0)

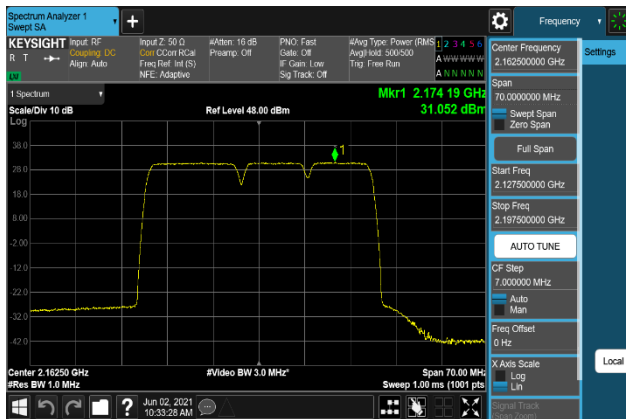


Plot 7-344. Peak To Average Power Ratio Plot (B66\_15M+10M+10M\_256QAM - Middle Channel, Port 1)

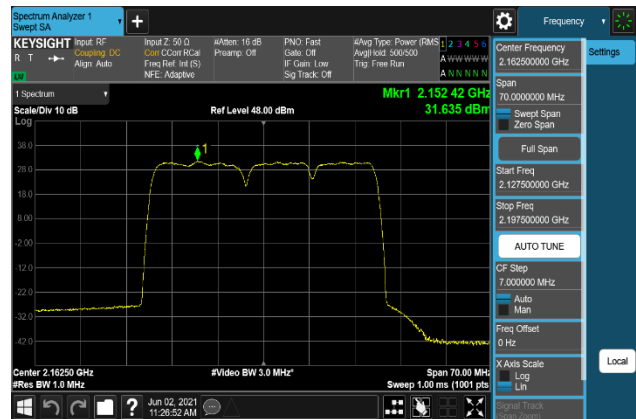
|                                      |                                               |                                                           |                |                |                                   |
|--------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|----------------|-----------------------------------|
| FCC ID: A3LRF4402D-D1A               | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) |                | <b>SAMSUNG</b> | Approved by:<br>Technical Manager |
| Test Report S/N:<br>BK21053101R1.A3L | Test Dates:<br>06/01/2021-06/15/2021          | EUT Type:<br>RRU(RF4402d)                                 | Page 84 of 515 |                |                                   |

| High Channel                          | Port | QPSK         | 16QAM        | 64QAM        | 256QAM       |
|---------------------------------------|------|--------------|--------------|--------------|--------------|
| Conducted Power (dBm/1MHz)            | 0    | <b>31.05</b> | 31.34        | <b>30.95</b> | <b>31.03</b> |
|                                       | 1    | 31.02        | 31.41        | 30.70        | 30.58        |
|                                       | 2    | 30.90        | 31.32        | 30.94        | 30.97        |
|                                       | 3    | 30.62        | <b>31.64</b> | 30.92        | 30.94        |
| Total MIMO Conducted Power (mW/1MHz)  |      | 4921.92      | 5556.70      | 4893.28      | 4899.96      |
| Total MIMO Conducted Power (dBm/1MHz) |      | 36.92        | 37.45        | 36.90        | 36.90        |
| Ant. Gain (dBi)                       |      | 21.40        | 21.40        | 21.40        | 21.40        |
| MIMO EIRP(dBm/1MHz)                   |      | 58.32        | 58.85        | 58.30        | 58.30        |
| EIRP Limit (W/1MHz)                   |      | 1640.00      | 1641.00      | 1642.00      | 1643.00      |
| EIRP Limit (dBm/1MHz)                 |      | 62.15        | 62.15        | 62.15        | 62.15        |
| Margin (dB)                           |      | -3.83        | -3.30        | -3.85        | -3.85        |

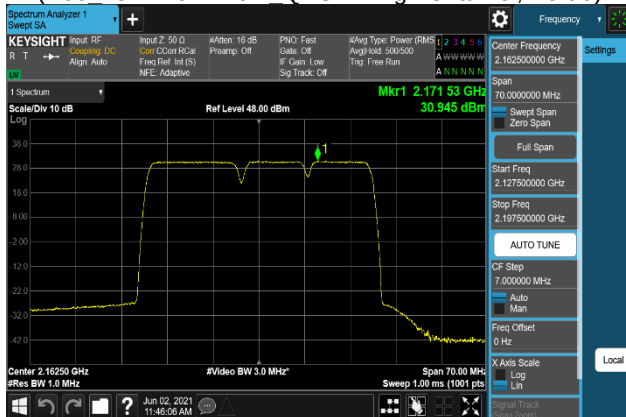
Table 4-19. EIRP Table (B66\_15M+10M+10M\_Contiguou - High Channel\_4T)



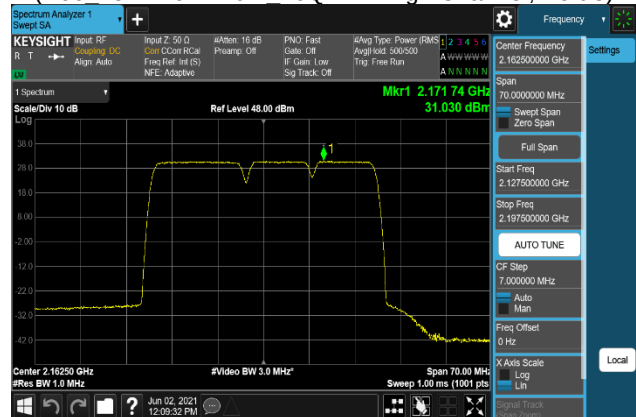
Plot 7-345. Peak To Average Power Radio Plot (B66\_15M+10M+10M\_QPSK - High Channel, Port 0)



Plot 7-346. Peak To Average Power Radio Plot (B66\_15M+10M+10M\_16QAM - High Channel, Port 3)



Plot 7-347. Peak To Average Power Radio Plot (B66\_15M+10M+10M\_64QAM - High Channel, Port 0)

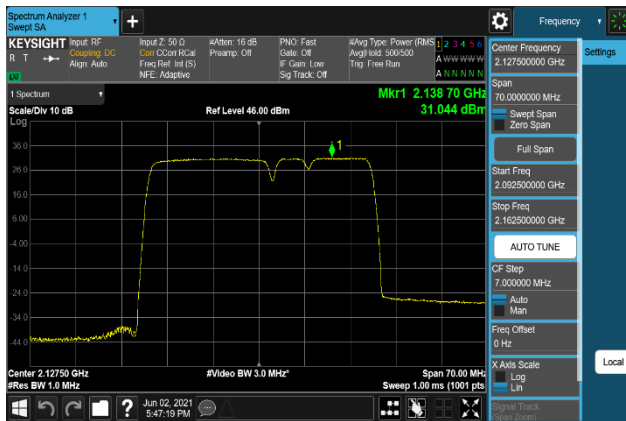


Plot 7-348. Peak To Average Power Radio Plot (B66\_15M+10M+10M\_256QAM - High Channel, Port 0)

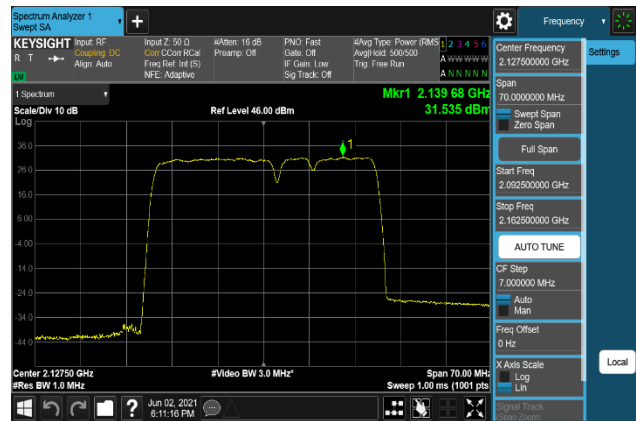
|                                             |                                               |                                                           |                |                                          |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021   | <b>EUT Type:</b><br>RRU(RF4402d)                          |                | Page 85 of 515                           |

| Low Channel                           | Port | QPSK         | 16QAM        | 64QAM        | 256QAM       |
|---------------------------------------|------|--------------|--------------|--------------|--------------|
| Conducted Power (dBm/1MHz)            | 0    | <b>31.04</b> | 31.28        | <b>31.13</b> | 31.10        |
|                                       | 1    | 30.94        | <b>31.54</b> | 31.08        | <b>31.13</b> |
|                                       | 2    | 30.42        | 30.65        | 30.48        | 30.54        |
|                                       | 3    | 30.67        | 30.76        | 30.74        | 30.72        |
| Total MIMO Conducted Power (mW/1MHz)  |      | 4781.80      | 5118.95      | 4880.81      | 4896.86      |
| Total MIMO Conducted Power (dBm/1MHz) |      | 36.80        | 37.09        | 36.88        | 36.90        |
| Ant. Gain (dBi)                       |      | 21.40        | 21.40        | 21.40        | 21.40        |
| MIMO EIRP(dBm/1MHz)                   |      | 58.20        | 58.49        | 58.28        | 58.30        |
| EIRP Limit (W/1MHz)                   |      | 1640.00      | 1640.00      | 1640.00      | 1640.00      |
| EIRP Limit (dBm/1MHz)                 |      | 62.15        | 62.15        | 62.15        | 62.15        |
| Margin (dB)                           |      | -3.95        | -3.66        | -3.87        | -3.85        |

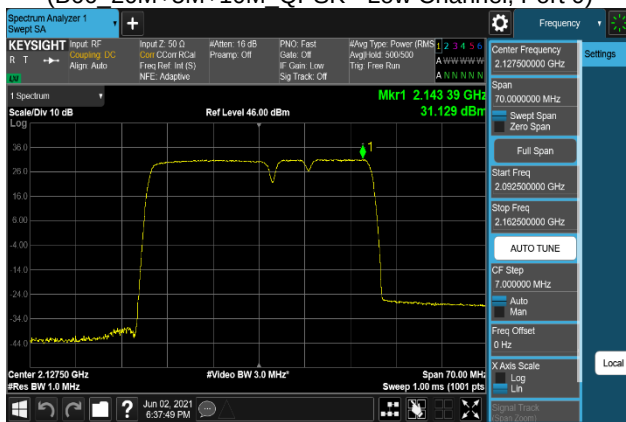
**Table 4-20. EIRP Table (B66\_20M+5M+10M\_Contiguous - Low Channel\_4T)**



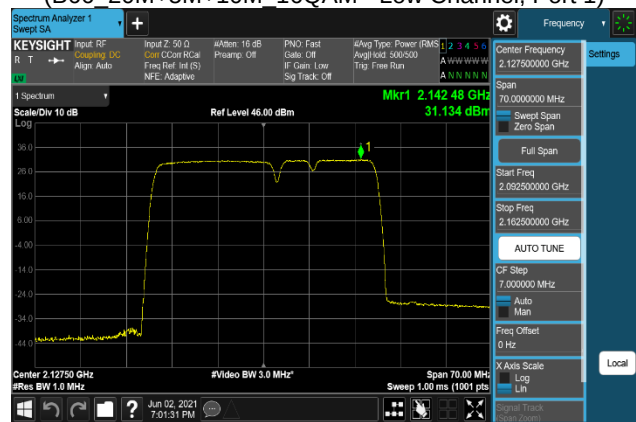
**Plot 7-349. Peak To Average Power Ratio Plot (B66\_20M+5M+10M\_QPSK - Low Channel, Port 0)**



**Plot 7-350. Peak To Average Power Ratio Plot (B66\_20M+5M+10M\_16QAM - Low Channel, Port 1)**



**Plot 7-351. Peak To Average Power Ratio Plot (B66\_20M+5M+10M\_64QAM - Low Channel, Port 0)**

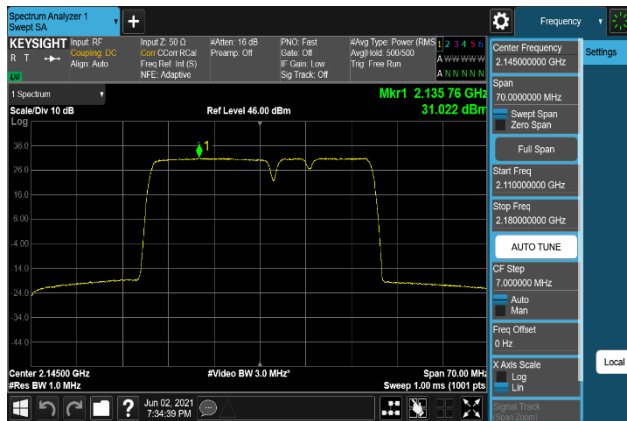


**Plot 7-352. Peak To Average Power Ratio Plot (B66\_20M+5M+10M\_256QAM - Low Channel, Port 1)**

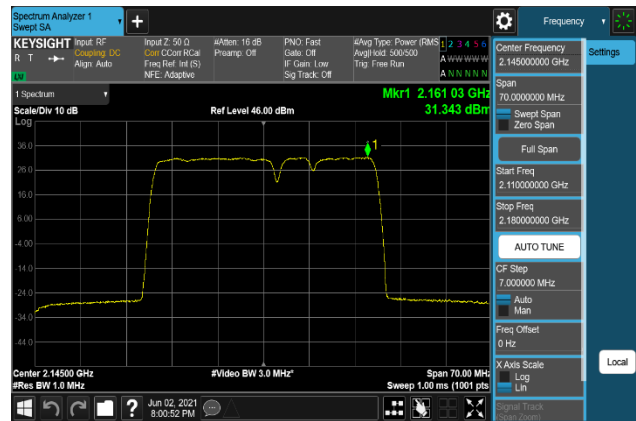
|                                             |                                               |                                                           |                |                                          |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>BK21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021   | <b>EUT Type:</b><br>RRU(RF4402d)                          |                | Page 86 of 515                           |

| Mid Channel                           | Port | QPSK         | 16QAM        | 64QAM        | 256QAM       |
|---------------------------------------|------|--------------|--------------|--------------|--------------|
| Conducted Power (dBm/1MHz)            | 0    | <b>31.02</b> | 31.29        | 30.97        | <b>31.07</b> |
|                                       | 1    | 30.97        | <b>31.34</b> | <b>31.09</b> | 30.94        |
|                                       | 2    | 30.59        | 30.89        | 30.51        | 30.49        |
|                                       | 3    | 30.81        | 30.68        | 30.67        | 30.67        |
| Total MIMO Conducted Power (mW/1MHz)  |      | 4863.61      | 5104.20      | 4827.15      | 4805.30      |
| Total MIMO Conducted Power (dBm/1MHz) |      | 36.87        | 37.08        | 36.84        | 36.82        |
| Ant. Gain (dBi)                       |      | 21.40        | 21.40        | 21.40        | 21.40        |
| MIMO EIRP(dBm/1MHz)                   |      | 58.27        | 58.48        | 58.24        | 58.22        |
| EIRP Limit (W/1MHz)                   |      | 1640.00      | 1640.00      | 1640.00      | 1640.00      |
| EIRP Limit (dBm/1MHz)                 |      | 62.15        | 62.15        | 62.15        | 62.15        |
| Margin (dB)                           |      | -3.88        | -3.67        | -3.91        | -3.93        |

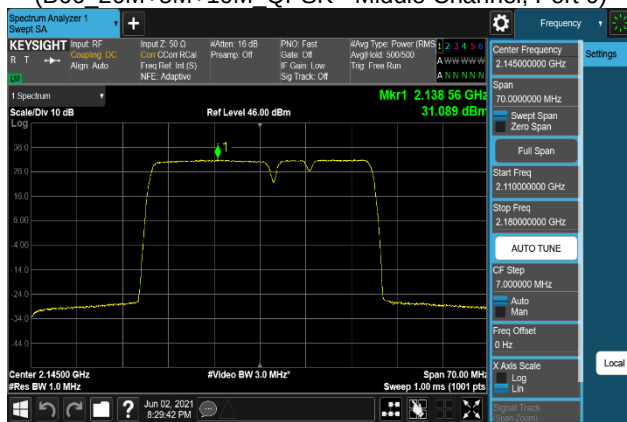
Table 4-21. EIRP Table (B66\_20M+5M+10M\_Contiguous - Middle Channel\_4T)



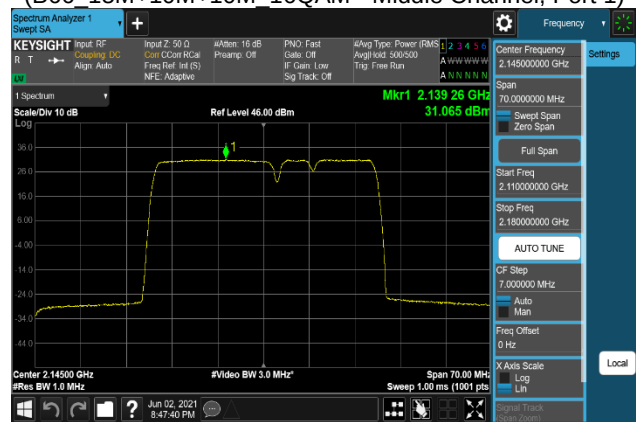
Plot 7-353. Peak To Average Power Ratio Plot (B66\_20M+5M+10M\_QPSK - Middle Channel, Port 0)



Plot 7-354. Peak To Average Power Ratio Plot (B66\_15M+10M+10M\_16QAM - Middle Channel, Port 1)



Plot 7-355. Peak To Average Power Ratio Plot (B66\_15M+10M+10M\_64QAM - Middle Channel, Port 1)



Plot 7-356. Peak To Average Power Ratio Plot (B66\_15M+10M+10M\_256QAM - Middle Channel, Port 0)

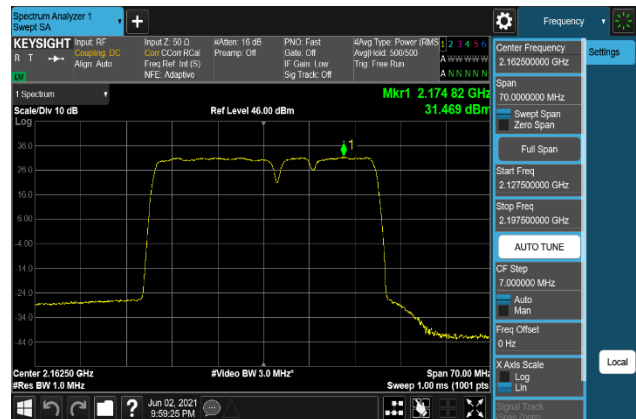
|                                             |                                               |                                                           |                |                                          |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>BK21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021   | <b>EUT Type:</b><br>RRU(RF4402d)                          |                | Page 87 of 515                           |

| High Channel                          | Port | QPSK                | 16QAM               | 64QAM               | 256QAM              |
|---------------------------------------|------|---------------------|---------------------|---------------------|---------------------|
| Conducted Power (dBm/1MHz)            | 0    | <u><b>31.23</b></u> | 31.45               | 31.13               | <u><b>31.23</b></u> |
|                                       | 1    | 31.11               | <u><b>31.47</b></u> | <u><b>31.21</b></u> | 31.02               |
|                                       | 2    | 30.74               | 31.02               | 30.77               | 30.72               |
|                                       | 3    | 30.83               | 30.98               | 30.74               | 30.79               |
| Total MIMO Conducted Power (mW/1MHz)  |      | 5015.46             | 5318.61             | 4995.31             | 4969.74             |
| Total MIMO Conducted Power (dBm/1MHz) |      | 37.00               | 37.26               | 36.99               | 36.96               |
| Ant. Gain (dBi)                       |      | 21.40               | 21.40               | 21.40               | 21.40               |
| MIMO EIRP(dBm/1MHz)                   |      | 58.40               | 58.66               | 58.39               | 58.36               |
| EIRP Limit (W/1MHz)                   |      | 1640.00             | 1640.00             | 1640.00             | 1640.00             |
| EIRP Limit (dBm/1MHz)                 |      | 62.15               | 62.15               | 62.15               | 62.15               |
| Margin (dB)                           |      | -3.75               | -3.49               | -3.76               | -3.79               |

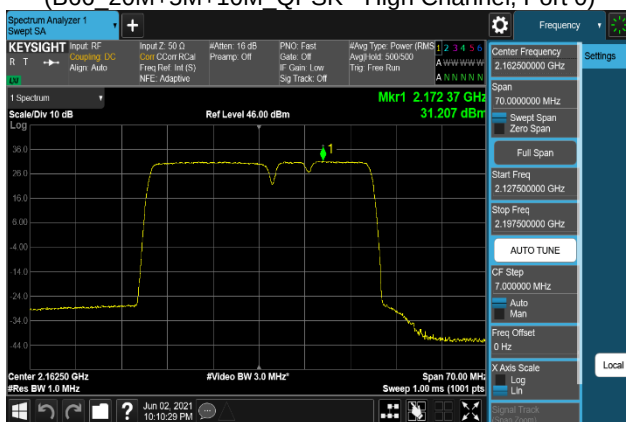
**Table 4-22. EIRP Table (B66\_20M+5M+10M\_Contiguous - High Channel\_4T)**



**Plot 7-357. Peak To Average Power Ratio Plot (B66\_20M+5M+10M\_QPSK - High Channel, Port 0)**



**Plot 7-358. Peak To Average Power Ratio Plot (B66\_20M+5M+10M\_16QAM - High Channel, Port 1)**



**Plot 7-359. Peak To Average Power Ratio Plot (B66\_20M+5M+10M\_64QAM - High Channel, Port 1)**

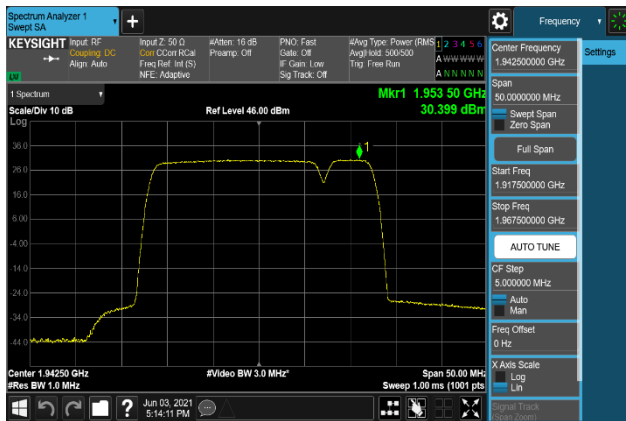


**Plot 7-360. Peak To Average Power Ratio Plot (B66\_20M+5M+10M\_256QAM - High Channel, Port 0)**

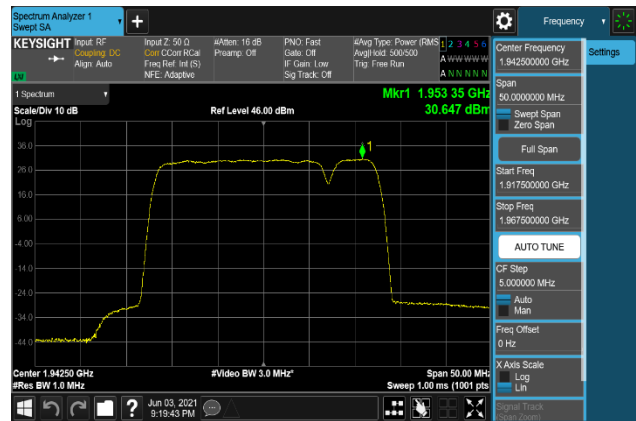
|                                             |                                               |                                                           |                |                                          |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021   | <b>EUT Type:</b><br>RRU(RF4402d)                          |                | Page 88 of 515                           |

| Low Channel                           | Port | QPSK         | 16QAM        | 64QAM        | 256QAM       |
|---------------------------------------|------|--------------|--------------|--------------|--------------|
| Conducted Power (dBm/1MHz)            | 0    | 30.06        | 30.35        | 30.21        | 30.16        |
|                                       | 1    | <b>30.40</b> | <b>30.65</b> | <b>30.41</b> | <b>30.49</b> |
|                                       | 2    | 29.79        | 29.90        | 29.78        | 29.95        |
|                                       | 3    | 29.70        | 30.05        | 30.03        | 29.95        |
| Total MIMO Conducted Power (mW/1MHz)  |      | 3996.65      | 4234.14      | 4106.36      | 4131.65      |
| Total MIMO Conducted Power (dBm/1MHz) |      | 36.02        | 36.27        | 36.13        | 36.16        |
| Ant. Gain (dBi)                       |      | 21.40        | 21.40        | 21.40        | 21.40        |
| MIMO EIRP(dBm/1MHz)                   |      | 57.42        | 57.67        | 57.53        | 57.56        |
| EIRP Limit (W/1MHz)                   |      | 1640.00      | 1640.00      | 1640.00      | 1640.00      |
| EIRP Limit (dBm/1MHz)                 |      | 62.15        | 62.15        | 62.15        | 62.15        |
| Margin (dB)                           |      | -4.73        | -4.48        | -4.62        | -4.59        |

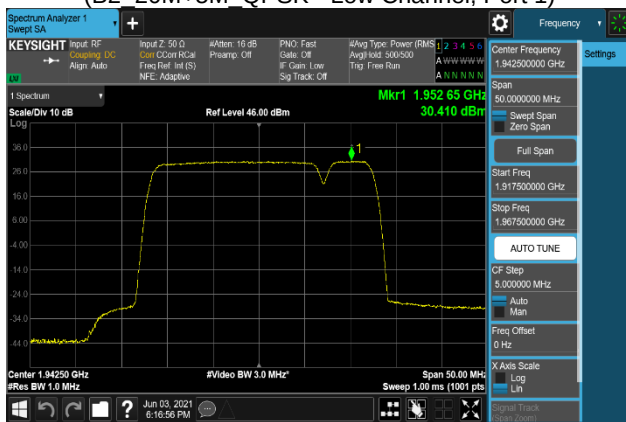
Table 4-23. EIRP Table (B2\_20M+5M\_Contiguous - Low Channel\_4T)



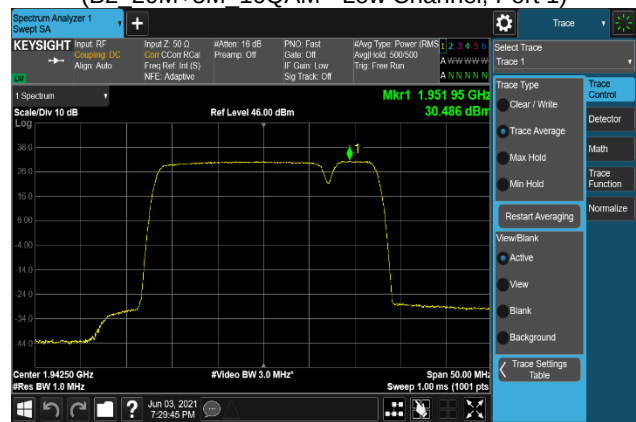
Plot 7-361. Peak To Average Power Ratio Plot (B2\_20M+5M\_QPSK - Low Channel, Port 1)



Plot 7-362. Peak To Average Power Ratio Plot (B2\_20M+5M\_16QAM - Low Channel, Port 1)



Plot 7-363. Peak To Average Power Ratio Plot (B2\_20M+5M\_64QAM - Low Channel, Port 1)

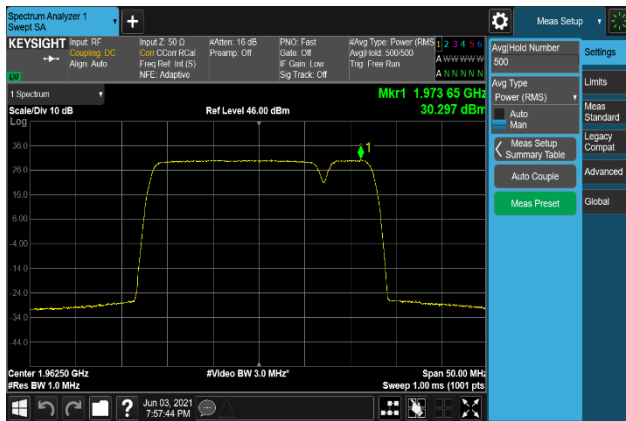


Plot 7-364. Peak To Average Power Ratio Plot (B2\_20M+5M\_256QAM - Low Channel, Port 1)

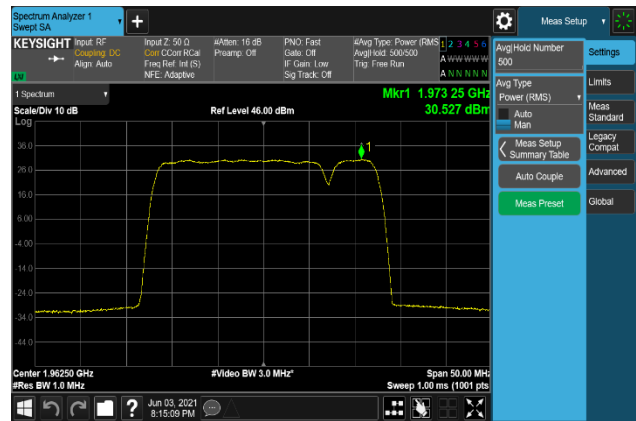
|                                      |                                               |                                                           |                |                                          |
|--------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A               | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| Test Report S/N:<br>BK21053101R1.A3L | Test Dates:<br>06/01/2021-06/15/2021          | EUT Type:<br>RRU(RF4402d)                                 |                | Page 89 of 515                           |

| Mid Channel                           | Port | QPSK         | 16QAM        | 64QAM        | 256QAM       |
|---------------------------------------|------|--------------|--------------|--------------|--------------|
| Conducted Power (dBm/1MHz)            | 0    | 30.05        | <u>30.53</u> | 30.15        | 30.13        |
|                                       | 1    | <u>30.30</u> | 30.52        | <u>30.36</u> | <u>30.23</u> |
|                                       | 2    | 29.65        | 30.10        | 29.89        | 29.88        |
|                                       | 3    | 29.73        | 30.09        | 29.76        | 29.72        |
| Total MIMO Conducted Power (mW/1MHz)  |      | 3943.52      | 4299.76      | 4040.67      | 3993.48      |
| Total MIMO Conducted Power (dBm/1MHz) |      | 35.96        | 36.33        | 36.06        | 36.01        |
| Ant. Gain (dBi)                       |      | 21.40        | 21.40        | 21.40        | 21.40        |
| MIMO EIRP(dBm/1MHz)                   |      | 57.36        | 57.73        | 57.46        | 57.41        |
| EIRP Limit (W/1MHz)                   |      | 1640.00      | 1640.00      | 1640.00      | 1640.00      |
| EIRP Limit (dBm/1MHz)                 |      | 62.15        | 62.15        | 62.15        | 62.15        |
| Margin (dB)                           |      | -4.79        | -4.42        | -4.69        | -4.74        |

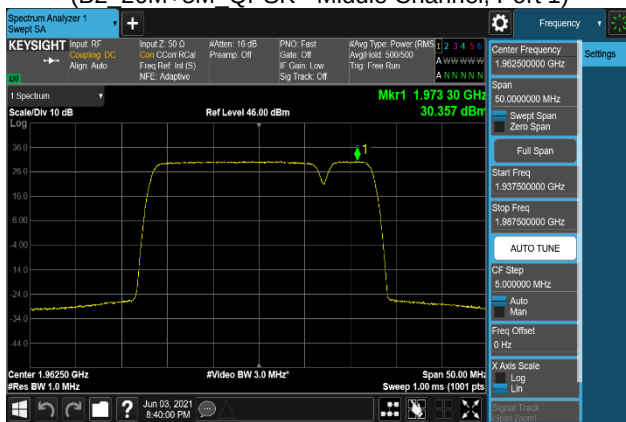
Table 4-24. EIRP Table (B66\_20M+5M\_Contiguous - Middle Channel\_4T)



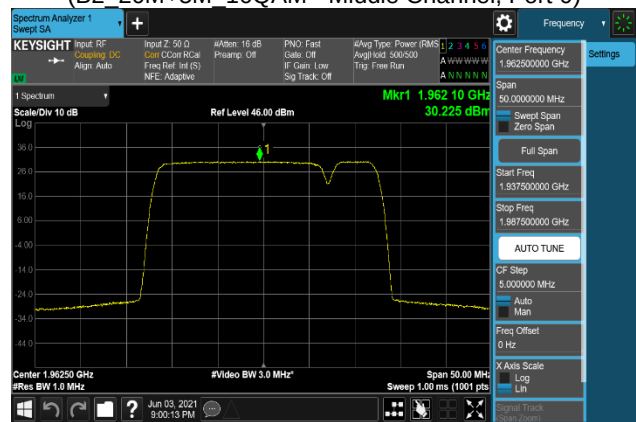
Plot 7-365. Peak To Average Power Ratio Plot (B2\_20M+5M\_QPSK - Middle Channel, Port 1)



Plot 7-366. Peak To Average Power Ratio Plot (B2\_20M+5M\_16QAM - Middle Channel, Port 0)



Plot 7-367. Peak To Average Power Ratio Plot (B2\_20M+5M\_64QAM - Middle Channel, Port 1)



Plot 7-368. Peak To Average Power Ratio Plot (B2\_20M+5M\_256QAM - Middle Channel, Port 1)

|                                      |                                               |                                                           |                |                                          |
|--------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A               | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| Test Report S/N:<br>8K21053101R1.A3L | Test Dates:<br>06/01/2021-06/15/2021          | EUT Type:<br>RRU(RF4402d)                                 |                | Page 90 of 515                           |

| High Channel                          | Port | QPSK         | 16QAM        | 64QAM        | 256QAM       |
|---------------------------------------|------|--------------|--------------|--------------|--------------|
| Conducted Power (dBm/1MHz)            | 0    | 30.16        | 30.43        | 30.29        | 30.38        |
|                                       | 1    | <b>30.30</b> | <b>30.50</b> | <b>30.52</b> | <b>30.49</b> |
|                                       | 2    | 29.71        | 29.94        | 29.84        | 29.73        |
|                                       | 3    | 29.71        | 30.08        | 30.11        | 29.95        |
| Total MIMO Conducted Power (mW/1MHz)  |      | 3977.31      | 4232.86      | 4183.89      | 4137.02      |
| Total MIMO Conducted Power (dBm/1MHz) |      | 36.00        | 36.27        | 36.22        | 36.17        |
| Ant. Gain (dBi)                       |      | 21.40        | 21.40        | 21.40        | 21.40        |
| MIMO EIRP(dBm/1MHz)                   |      | 57.40        | 57.67        | 57.62        | 57.57        |
| EIRP Limit (W/1MHz)                   |      | 1640.00      | 1640.00      | 1640.00      | 1640.00      |
| EIRP Limit (dBm/1MHz)                 |      | 62.15        | 62.15        | 62.15        | 62.15        |
| Margin (dB)                           |      | -4.75        | -4.48        | -4.53        | -4.58        |

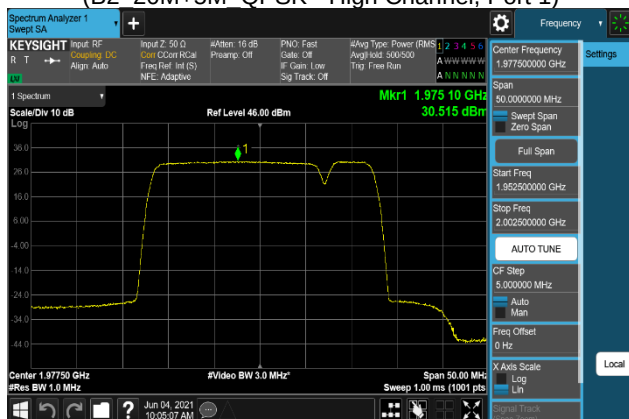
Table 4-25. EIRP Table (B2\_20M+5M\_Contiguous - High Channel\_4T)



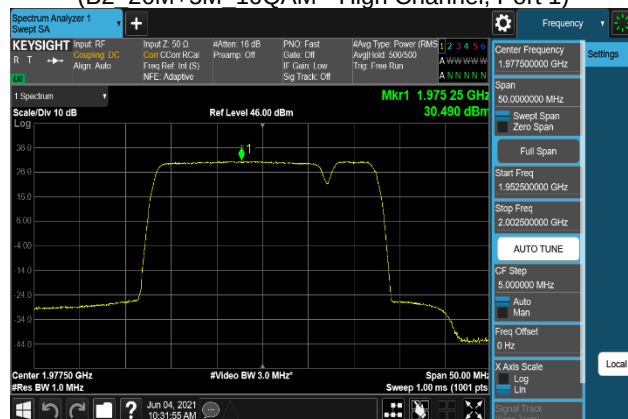
Plot 7-369. Peak To Average Power Ratio Plot (B2\_20M+5M\_QPSK - High Channel, Port 1)



Plot 7-370. Peak To Average Power Ratio Plot (B2\_20M+5M\_16QAM - High Channel, Port 1)



Plot 7-371. Peak To Average Power Ratio Plot (B2\_20M+5M64QAM - High Channel, Port 1)



Plot 7-372. Peak To Average Power Ratio Plot (B2\_20M+5M\_256QAM - High Channel, Port 1)

|                                      |                                               |                                                           |                |                                   |
|--------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|-----------------------------------|
| FCC ID: A3LRF4402D-D1A               | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K21053101R1.A3L | Test Dates:<br>06/01/2021-06/15/2021          | EUT Type:<br>RRU(RF4402d)                                 |                | Page 91 of 515                    |

## 7.5 Peak To Average Power Ratio (PAPR)

**§ 24.232(d), § 27.50(b)**

### Test Overview

The peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

### Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7

ANSI C63.26-2015 – Section 5.2.3.4

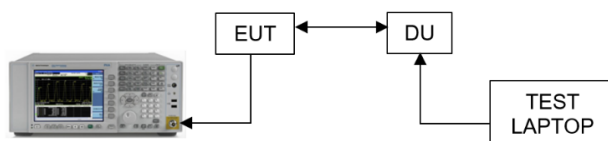
### Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer setting were as follows:

1. The signal analyzer's CCDF function is enabled.
2. Frequency = carrier center frequency
3. Measurement BW  $\geq$  OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 7-4. Test Instrument & Measurement Setup**

### Limit

The peak-to-average power ratio (PAPR) limit shall not exceed 13 dB for more than 0.1% of the time.

|                                             |                                               |                                                           |                |                                          |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021   | <b>EUT Type:</b><br>RRU(RF4402d)                          |                | Page 92 of 515                           |

**- B66\_15M+10M+10M\_Contiguous**

| Channel | Port | PAPR (dB) |       |       |        | Limit (dB) |
|---------|------|-----------|-------|-------|--------|------------|
|         |      | QPSK      | 16QAM | 64QAM | 256QAM |            |
| Low     | 0    | 8.11      | 8.12  | 8.13  | 8.10   | < 13       |
|         | 1    | 8.12      | 8.13  | 8.13  | 8.11   | < 13       |
|         | 2    | 8.13      | 8.11  | 8.12  | 8.13   | < 13       |
|         | 3    | 8.13      | 8.12  | 8.12  | 8.13   | < 13       |
| Middle  | 0    | 8.09      | 8.08  | 8.08  | 8.08   | < 13       |
|         | 1    | 8.08      | 8.09  | 8.08  | 8.08   | < 13       |
|         | 2    | 8.12      | 8.09  | 8.08  | 8.09   | < 13       |
|         | 3    | 8.11      | 8.09  | 8.09  | 8.08   | < 13       |
| High    | 0    | 8.13      | 8.09  | 8.11  | 8.10   | < 13       |
|         | 1    | 8.12      | 8.07  | 8.11  | 8.07   | < 13       |
|         | 2    | 8.12      | 8.10  | 8.12  | 8.10   | < 13       |
|         | 3    | 8.12      | 8.11  | 8.13  | 8.10   | < 13       |

**Table 7-26. Peak To Average Power Ratio Summary Data (B66\_15M+10M+10M)**

|                                             |                                                                                                                                               |                                  |                                                                                       |                                          |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      |  <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) |                                  |  | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021                                                                                                   | <b>EUT Type:</b><br>RRU(RF4402d) | Page 93 of 515                                                                        |                                          |



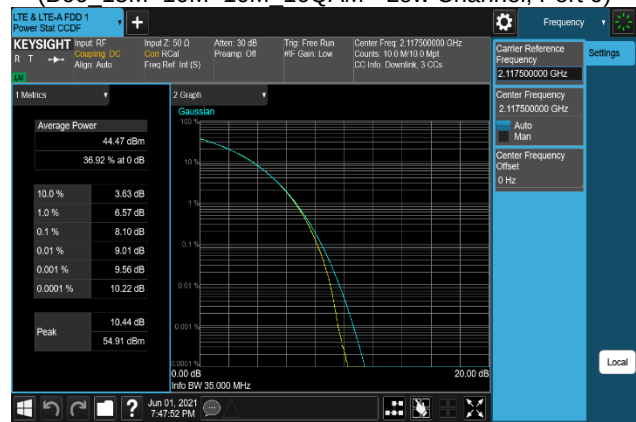
Plot 7-373. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_QPSK - Low Channel, Port 0)



Plot 7-374. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_16QAM - Low Channel, Port 0)



Plot 7-375. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_64QAM - Low Channel, Port 0)



Plot 7-376. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_256QAM - Low Channel, Port 0)



Plot 7-377. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_QPSK - Low Channel, Port 1)



Plot 7-378. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_16QAM - Low Channel, Port 1)

|                                      |                                               |                                                           |                |                                   |
|--------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|-----------------------------------|
| FCC ID: A3LRF4402D-D1A               | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | Approved by:<br>Technical Manager |
| Test Report S/N:<br>8K21053101R1.A3L | Test Dates:<br>06/01/2021-06/15/2021          | EUT Type:<br>RRU(RF4402d)                                 |                | Page 94 of 515                    |



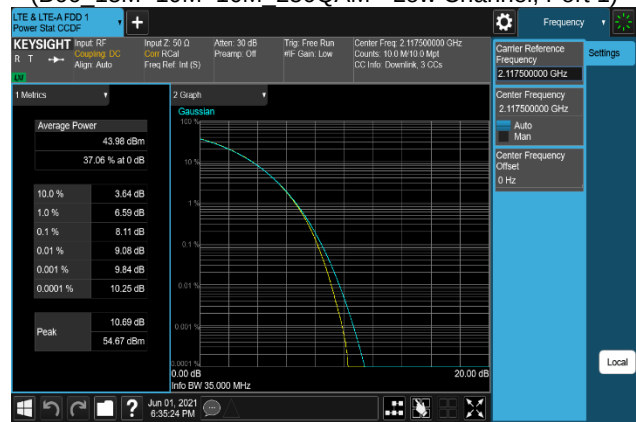
Plot 7-379. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_64QAM - Low Channel, Port 1)



Plot 7-380. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_256QAM - Low Channel, Port 1)



Plot 7-381. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_QPSK - Low Channel, Port 2)



Plot 7-382. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_16QAM - Low Channel, Port 2)



Plot 7-383. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_64QAM - Low Channel, Port 2)



Plot 7-384. Peak To Average Power Ratio Plot  
(B66\_15M+10M+10M\_256QAM - Low Channel, Port 2)

|                                             |                                               |                                                           |                |                                          |
|---------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|----------------|------------------------------------------|
| FCC ID: A3LRF4402D-D1A                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(Class II Permissive Change) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Technical Manager |
| <b>Test Report S/N:</b><br>8K21053101R1.A3L | <b>Test Dates:</b><br>06/01/2021-06/15/2021   | <b>EUT Type:</b><br>RRU(RF4402d)                          |                | Page 95 of 515                           |