

## Tune Up Procedure

### Tune-up procedure

GSM/WCDMA/LTE TEST

Measurement Procedure:

GSMWCDMA/LTE

1.Connect EUT with CMU200(E5515C)/CMW500, through RF cable. Make a call from CMU200(E5515C)/CMW500;

2.Measure the Output Power Average value;

3.Remarks: All Output Power are tested in Average Value specification.

For WIFI/BT

1: Connect to Power meter (NRVD) through RF cable and let the EUT Continuously transmit

2: Measure the Output Power Average value

### Manufacturing tolerance

#### GSM

| GSM 900 (GMSK) (Burst Average Power)  |             |             |             |
|---------------------------------------|-------------|-------------|-------------|
| Channel                               | Channel 975 | Channel 63  | Channel 124 |
| Target (dBm)                          | 31.5        | 32.0        | 32.0        |
| Tolerance $\pm$ (dB)                  | 1.0         | 1.0         | 1.0         |
| GSM 1800 (GMSK) (Burst Average Power) |             |             |             |
| Channel                               | Channel 512 | Channel 698 | Channel 885 |
| Target (dBm)                          | 29.0        | 29.0        | 29.0        |
| Tolerance $\pm$ (dB)                  | 1.0         | 1.0         | 1.0         |

| GSM 900 GPRS (GMSK) (Burst Average Power)  |                      |      |      |      |
|--|----------------------|------|------|------|
| Channel                                    |                      | 975  | 62   | 124  |
| 1 Txslot                                   | Target (dBm)         | 29.5 | 29.5 | 29.5 |
|  | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 2 Txslot                                   | Target (dBm)         | 28.0 | 28.0 | 28.0 |
|  | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 3 Txslot                                   | Target (dBm)         | 25.5 | 25.5 | 25.5 |
|  | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 4 Txslot                                   | Target (dBm)         | 24.5 | 24.5 | 24.5 |
|  | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| GSM 900 EGPRS (8PSK) (Burst Average Power) |                      |      |      |      |
| Channel                                    |                      | 975  | 62   | 124  |
| 1 Txslot                                   | Target (dBm)         | 25.5 | 25.5 | 25.5 |
|  | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 2 Txslot                                   | Target (dBm)         | 25.0 | 25.0 | 25.0 |
|  | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 3 Txslot                                   | Target (dBm)         | 22.0 | 22.0 | 22.0 |

|   |                      |      |      |      |
|---|----------------------|------|------|------|
|   | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 4 Txslot  | Target (dBm)         | 20.0 | 20.0 | 20.0 |
|   | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| <b>GSM 1800 GPRS (GMSK) (Burst Average Power)</b> |                      |      |      |      |
| Channel   |                      | 512  | 698  | 885  |
| 1 Txslot  | Target (dBm)         | 27.5 | 27.5 | 27.5 |
|   | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 2 Txslot  | Target (dBm)         | 25.5 | 25.5 | 25.5 |
|   | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 3 Txslot  | Target (dBm)         | 23.0 | 23.0 | 23.0 |
|   | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 4 Txslot  | Target (dBm)         | 20.5 | 20.5 | 20.5 |
|   | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| <b>GSM 1800 EDGE (8PSK) (Burst Average Power)</b> |                      |      |      |      |
| Channel   |                      | 512  | 698  | 885  |
| 1 Txslot  | Target (dBm)         | 25.5 | 25.5 | 25.5 |
|   | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 2 Txslot  | Target (dBm)         | 23.0 | 23.0 | 23.0 |
|   | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 3 Txslot  | Target (dBm)         | 20.5 | 20.5 | 20.5 |
|   | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |
| 4 Txslot  | Target (dBm)         | 20.0 | 20.0 | 20.0 |
|   | Tolerance $\pm$ (dB) | 1.0  | 1.0  | 1.0  |

### UMTS

|   |              |              |              |
|---|--------------|--------------|--------------|
| <b>UMTS Band VIII</b>                   |              |              |              |
| Channel                                 | Channel 2712 | Channel 2788 | Channel 2863 |
| Target (dBm)                            | 22.5         | 22.5         | 22.5         |
| Tolerance $\pm$ (dB)                    | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band VIII HSDPA(sub-test 1)</b> |              |              |              |
| Channel                                 | Channel 2712 | Channel 2788 | Channel 2863 |
| Target (dBm)                            | 21.5         | 21.5         | 21.5         |
| Tolerance $\pm$ (dB)                    | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band VIII HSDPA(sub-test 2)</b> |              |              |              |
| Channel                                 | Channel 2712 | Channel 2788 | Channel 2863 |
| Target (dBm)                            | 21.5         | 21.5         | 21.5         |
| Tolerance $\pm$ (dB)                    | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band VIII HSDPA(sub-test 3)</b> |              |              |              |
| Channel                                 | Channel 2712 | Channel 2788 | Channel 2863 |
| Target (dBm)                            | 21.5         | 21.5         | 21.5         |
| Tolerance $\pm$ (dB)                    | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band VIII HSDPA(sub-test 4)</b> |              |              |              |

|   |              |              |              |
|---|--------------|--------------|--------------|
| Channel                                 | Channel 2712 | Channel 2788 | Channel 2863 |
| Target (dBm)                            | 21.5         | 21.5         | 21.5         |
| Tolerance $\pm$ (dB)                    | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band VIII HSUPA(sub-test 1)</b> |              |              |              |
| Channel                                 | Channel 2712 | Channel 2788 | Channel 2863 |
| Target (dBm)                            | 21.5         | 21.5         | 21.5         |
| Tolerance $\pm$ (dB)                    | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band VIII HSUPA(sub-test 2)</b> |              |              |              |
| Channel                                 | Channel 2712 | Channel 2788 | Channel 2863 |
| Target (dBm)                            | 21.5         | 21.5         | 21.5         |
| Tolerance $\pm$ (dB)                    | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band VIII HSUPA(sub-test 3)</b> |              |              |              |
| Channel                                 | Channel 2712 | Channel 2788 | Channel 2863 |
| Target (dBm)                            | 21.5         | 21.5         | 21.5         |
| Tolerance $\pm$ (dB)                    | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band VIII HSUPA(sub-test 4)</b> |              |              |              |
| Channel                                 | Channel 2712 | Channel 2788 | Channel 2863 |
| Target (dBm)                            | 21.5         | 21.5         | 21.5         |
| Tolerance $\pm$ (dB)                    | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band VIII HSUPA(sub-test 5)</b> |              |              |              |
| Channel                                 | Channel 2712 | Channel 2788 | Channel 2863 |
| Target (dBm)                            | 21.5         | 21.5         | 21.5         |
| Tolerance $\pm$ (dB)                    | 1.0          | 1.0          | 1.0          |

|                                      |              |              |              |
|--------------------------------------|--------------|--------------|--------------|
| <b>UMTS Band I</b>                   |              |              |              |
| Channel                              | Channel 9612 | Channel 9750 | Channel 9888 |
| Target (dBm)                         | 23.0         | 23.0         | 23.0         |
| Tolerance $\pm$ (dB)                 | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band I HSDPA(sub-test 1)</b> |              |              |              |
| Channel                              | Channel 9612 | Channel 9750 | Channel 9888 |
| Target (dBm)                         | 22.0         | 22.0         | 22.0         |
| Tolerance $\pm$ (dB)                 | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band I HSDPA(sub-test 2)</b> |              |              |              |
| Channel                              | Channel 9612 | Channel 9750 | Channel 9888 |
| Target (dBm)                         | 22.0         | 22.0         | 22.0         |
| Tolerance $\pm$ (dB)                 | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band I HSDPA(sub-test 3)</b> |              |              |              |
| Channel                              | Channel 9612 | Channel 9750 | Channel 9888 |
| Target (dBm)                         | 22.0         | 22.0         | 22.0         |
| Tolerance $\pm$ (dB)                 | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band I HSDPA(sub-test 4)</b> |              |              |              |
| Channel                              | Channel 9612 | Channel 9750 | Channel 9888 |

|                                      |              |              |              |
|--------------------------------------|--------------|--------------|--------------|
| Target (dBm)                         | 22.0         | 22.0         | 22.0         |
| Tolerance $\pm$ (dB)                 | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band I HSUPA(sub-test 1)</b> |              |              |              |
| Channel                              | Channel 9612 | Channel 9750 | Channel 9888 |
| Target (dBm)                         | 22.0         | 22.0         | 22.0         |
| Tolerance $\pm$ (dB)                 | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band I HSUPA(sub-test 2)</b> |              |              |              |
| Channel                              | Channel 9612 | Channel 9750 | Channel 9888 |
| Target (dBm)                         | 22.0         | 22.0         | 22.0         |
| Tolerance $\pm$ (dB)                 | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band I HSUPA(sub-test 3)</b> |              |              |              |
| Channel                              | Channel 9612 | Channel 9750 | Channel 9888 |
| Target (dBm)                         | 22.0         | 22.0         | 22.0         |
| Tolerance $\pm$ (dB)                 | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band I HSUPA(sub-test 4)</b> |              |              |              |
| Channel                              | Channel 9612 | Channel 9750 | Channel 9888 |
| Target (dBm)                         | 22.0         | 22.0         | 22.0         |
| Tolerance $\pm$ (dB)                 | 1.0          | 1.0          | 1.0          |
| <b>UMTS Band I HSUPA(sub-test 5)</b> |              |              |              |
| Channel                              | Channel 9612 | Channel 9750 | Channel 9888 |
| Target (dBm)                         | 22.0         | 22.0         | 22.0         |
| Tolerance $\pm$ (dB)                 | 1.0          | 1.0          | 1.0          |

#### **LTE Band 1**

| <b>BW:5MHz [&lt;RB=1&gt;]</b>                   |               |       |               |       |               |       |
|---|---------------|-------|---------------|-------|---------------|-------|
| Channel   | Channel 18100 |       | Channel 18300 |       | Channel 18500 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 21.5          | 21.5  | 21.5          | 21.5  | 21.5          | 21.5  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:5MHz [&lt;RB=12&gt;, &lt;RB=25&gt;]</b>   |               |       |               |       |               |       |
| Channel   | Channel 18100 |       | Channel 18300 |       | Channel 18500 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 21.5          | 21.5  | 21.5          | 21.5  | 21.5          | 21.5  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:20MHz [&lt;RB=1&gt;]</b>                  |               |       |               |       |               |       |
| Channel   | Channel 18100 |       | Channel 18300 |       | Channel 18500 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 21.5          | 21.5  | 21.5          | 21.5  | 21.5          | 21.5  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:20MHz [&lt;RB=50&gt;, &lt;RB=100&gt;]</b> |               |       |               |       |               |       |
| Channel   | Channel 18100 |       | Channel 18300 |       | Channel 18500 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 21.5          | 21.5  | 21.5          | 21.5  | 21.5          | 21.5  |

|                      |     |     |     |     |     |     |
|----------------------|-----|-----|-----|-----|-----|-----|
| Tolerance $\pm$ (dB) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
|----------------------|-----|-----|-----|-----|-----|-----|

### **LTE Band 3**

| <b>BW:1.4MHz [&lt;RB=1&gt;]</b>                 |               |       |               |       |               |       |
|---|---------------|-------|---------------|-------|---------------|-------|
| Channel   | Channel 19300 |       | Channel 19575 |       | Channel 19850 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:1.4MHz [&lt;RB=3&gt;, &lt;RB=6&gt;]</b>   |               |       |               |       |               |       |
| Channel   | Channel 19300 |       | Channel 19575 |       | Channel 19850 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:5MHz [&lt;RB=1&gt;]</b>                   |               |       |               |       |               |       |
| Channel   | Channel 19300 |       | Channel 19575 |       | Channel 19850 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:5MHz [&lt;RB=12&gt;, &lt;RB=25&gt;]</b>   |               |       |               |       |               |       |
| Channel   | Channel 19300 |       | Channel 19575 |       | Channel 19850 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:20MHz [&lt;RB=1&gt;]</b>                  |               |       |               |       |               |       |
| Channel   | Channel 19300 |       | Channel 19575 |       | Channel 19850 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:20MHz [&lt;RB=50&gt;, &lt;RB=100&gt;]</b> |               |       |               |       |               |       |
| Channel   | Channel 19300 |       | Channel 19575 |       | Channel 19850 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |

### **LTE Band 7**

| <b>BW:5MHz [&lt;RB=1&gt;]</b>                 |               |       |               |       |               |       |
|---|---------------|-------|---------------|-------|---------------|-------|
| Channel                                       | Channel 20850 |       | Channel 21100 |       | Channel 21350 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                  | 21.5          | 21.5  | 21.5          | 21.5  | 21.5          | 21.5  |
| Tolerance $\pm$ (dB)                          | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:5MHz [&lt;RB=12&gt;, &lt;RB=25&gt;]</b> |               |       |               |       |               |       |
| Channel                                       | Channel 20850 |       | Channel 21100 |       | Channel 21350 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |

|   |               |       |               |       |               |       |
|---|---------------|-------|---------------|-------|---------------|-------|
| Target (dBm)  | 21.5          | 21.5  | 21.5          | 21.5  | 21.5          | 21.5  |
| Tolerance $\pm$ (dB)  | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:20MHz [<math>&lt;RB=1&gt;</math>]</b>                               |               |       |               |       |               |       |
| Channel   | Channel 20850 |       | Channel 21100 |       | Channel 21350 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)  | 21.5          | 21.5  | 21.5          | 21.5  | 21.5          | 21.5  |
| Tolerance $\pm$ (dB)  | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:20MHz [<math>&lt;RB=50&gt;</math>, <math>&lt;RB=100&gt;</math>]</b> |               |       |               |       |               |       |
| Channel   | Channel 20850 |       | Channel 21100 |       | Channel 21350 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)  | 21.5          | 21.5  | 21.5          | 21.5  | 21.5          | 21.5  |
| Tolerance $\pm$ (dB)  | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |

### LTE Band 8

|   |               |       |               |       |               |       |
|---|---------------|-------|---------------|-------|---------------|-------|
| <b>BW:1.4MHz [<math>&lt;RB=1&gt;</math>]</b>                              |               |       |               |       |               |       |
| Channel   | Channel 19300 |       | Channel 19575 |       | Channel 19850 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)  | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)  | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:1.4MHz [<math>&lt;RB=3&gt;</math>, <math>&lt;RB=6&gt;</math>]</b>   |               |       |               |       |               |       |
| Channel   | Channel 19300 |       | Channel 19575 |       | Channel 19850 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)  | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)  | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:5MHz [<math>&lt;RB=1&gt;</math>]</b>                                |               |       |               |       |               |       |
| Channel   | Channel 21500 |       | Channel 21625 |       | Channel 21750 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)  | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)  | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:5MHz [<math>&lt;RB=12&gt;</math>, <math>&lt;RB=25&gt;</math>]</b>   |               |       |               |       |               |       |
| Channel   | Channel 21500 |       | Channel 21625 |       | Channel 21750 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)  | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)  | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:20MHz [<math>&lt;RB=1&gt;</math>]</b>                               |               |       |               |       |               |       |
| Channel   | Channel 21500 |       | Channel 21625 |       | Channel 21750 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)  | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)  | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:20MHz [<math>&lt;RB=50&gt;</math>, <math>&lt;RB=100&gt;</math>]</b> |               |       |               |       |               |       |
| Channel   | Channel 21500 |       | Channel 21625 |       | Channel 21750 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)  | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |

|                      |     |     |     |     |     |     |
|----------------------|-----|-----|-----|-----|-----|-----|
| Tolerance $\pm$ (dB) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
|----------------------|-----|-----|-----|-----|-----|-----|

### **LTE Band 20**

| <b>BW:5MHz [&lt;RB=1&gt;]</b>                   |               |       |               |       |               |       |
|---|---------------|-------|---------------|-------|---------------|-------|
| Channel   | Channel 24250 |       | Channel 24300 |       | Channel 24400 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:5MHz [&lt;RB=12&gt;, &lt;RB=25&gt;]</b>   |               |       |               |       |               |       |
| Channel   | Channel 24250 |       | Channel 24300 |       | Channel 24400 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:20MHz [&lt;RB=1&gt;]</b>                  |               |       |               |       |               |       |
| Channel   | Channel 24250 |       | Channel 24300 |       | Channel 24400 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |
| <b>BW:20MHz [&lt;RB=50&gt;, &lt;RB=100&gt;]</b> |               |       |               |       |               |       |
| Channel   | Channel 24250 |       | Channel 24300 |       | Channel 24400 |       |
|   | QPSK          | 16QAM | QPSK          | 16QAM | QPSK          | 16QAM |
| Target (dBm)                                    | 22.0          | 22.0  | 22.0          | 22.0  | 22.0          | 22.0  |
| Tolerance $\pm$ (dB)                            | 1.0           | 1.0   | 1.0           | 1.0   | 1.0           | 1.0   |

### **WiFi 2.4G**

| <b>802.11b (Average)</b>      |           |           |            |
|-------------------------------|-----------|-----------|------------|
| Channel                       | Channel 1 | Channel 7 | Channel 13 |
| Target (dBm)                  | 13.5      | 13.5      | 13.5       |
| Tolerance $\pm$ (dB)          | 1.0       | 1.0       | 1.0        |
| <b>802.11g (Average)</b>      |           |           |            |
| Channel                       | Channel 1 | Channel 7 | Channel 13 |
| Target (dBm)                  | 12.5      | 12.5      | 12.5       |
| Tolerance $\pm$ (dB)          | 1.0       | 1.0       | 1.0        |
| <b>802.11n HT20 (Average)</b> |           |           |            |
| Channel                       | Channel 1 | Channel 7 | Channel 13 |
| Target (dBm)                  | 12.5      | 12.5      | 12.5       |
| Tolerance $\pm$ (dB)          | 1.0       | 1.0       | 1.0        |
| <b>802.11n HT40 (Average)</b> |           |           |            |
| Channel                       | Channel 1 | Channel 7 | Channel 13 |
| Target (dBm)                  | 11.5      | 11.5      | 11.5       |
| Tolerance $\pm$ (dB)          | 1.0       | 1.0       | 1.0        |



**WiFi 5.2G**

| <b>802.11a (Average)</b>         |            |            |            |
|----------------------------------|------------|------------|------------|
| Channel                          | Channel 36 | Channel 40 | Channel 48 |
| Target (dBm)                     | 11.0       | 11.0       | 10.5       |
| Tolerance $\pm$ (dB)             | 1.0        | 1.0        | 1.0        |
| <b>802.11n(20MHz) (Average)</b>  |            |            |            |
| Channel                          | Channel 36 | Channel 40 | Channel 48 |
| Target (dBm)                     | 10.5       | 10.5       | 10.5       |
| Tolerance $\pm$ (dB)             | 1.0        | 1.0        | 1.0        |
| <b>802.11n(40MHz) (Average)</b>  |            |            |            |
| Channel                          | Channel 38 | Channel 46 |            |
| Target (dBm)                     | 10.5       | 10.5       |            |
| Tolerance $\pm$ (dB)             | 1.0        | 1.0        |            |
| <b>802.11ac(20MHz) (Average)</b> |            |            |            |
| Channel                          | Channel 36 | Channel 40 | Channel 48 |
| Target (dBm)                     | 10.5       | 10.5       | 10.5       |
| Tolerance $\pm$ (dB)             | 1.0        | 1.0        | 1.0        |
| <b>802.11ac(40MHz) (Average)</b> |            |            |            |
| Channel                          | Channel 38 | Channel 46 |            |
| Target (dBm)                     | 10.5       | 10.5       |            |
| Tolerance $\pm$ (dB)             | 1.0        | 1.0        |            |
| <b>802.11ac(80MHz) (Average)</b> |            |            |            |
| Channel                          | Channel 42 |            |            |
| Target (dBm)                     | 10.5       |            |            |
| Tolerance $\pm$ (dB)             | 1.0        |            |            |

**WiFi 5.8G**

| <b>802.11a (Average)</b>         |             |             |             |
|----------------------------------|-------------|-------------|-------------|
| Channel                          | Channel 149 | Channel 157 | Channel 165 |
| Target (dBm)                     | 9.5         | 9.5         | 9.5         |
| Tolerance $\pm$ (dB)             | 1.0         | 1.0         | 1.0         |
| <b>802.11n(20MHz) (Average)</b>  |             |             |             |
| Channel                          | Channel 149 | Channel 157 | Channel 165 |
| Target (dBm)                     | 10.0        | 10.0        | 10.0        |
| Tolerance $\pm$ (dB)             | 1.0         | 1.0         | 1.0         |
| <b>802.11n(40MHz) (Average)</b>  |             |             |             |
| Channel                          | Channel 151 | Channel 159 |             |
| Target (dBm)                     | 9.5         | 9.5         |             |
| Tolerance $\pm$ (dB)             | 1.0         | 1.0         |             |
| <b>802.11ac(20MHz) (Average)</b> |             |             |             |
| Channel                          | Channel 149 | Channel 157 | Channel 165 |
| Target (dBm)                     | 9.5         | 9.5         | 9.5         |
| Tolerance $\pm$ (dB)             | 1.0         | 1.0         | 1.0         |



| 802.11ac(40MHz) (Average) |             |             |
|---------------------------|-------------|-------------|
| Channel                   | Channel 151 | Channel 159 |
| Target (dBm)              | 9.5         | 9.5         |
| Tolerance $\pm$ (dB)      | 1.0         | 1.0         |
| 802.11ac(80MHz) (Average) |             |             |
| Channel                   | Channel 155 |             |
| Target (dBm)              | 9.5         |             |
| Tolerance $\pm$ (dB)      | 1.0         |             |

#### Bluetooth V5.0

| BLE-GFSK (Average)      |           |            |            |
|-------------------------|-----------|------------|------------|
| Channel                 | Channel 0 | Channel 19 | Channel 39 |
| Target (dBm)            | -5.0      | -5.0       | -5.0       |
| Tolerance $\pm$ (dB)    | 1.0       | 1.0        | 1.0        |
| GFSK (Average)          |           |            |            |
| Channel                 | Channel 0 | Channel 78 |            |
| Target (dBm)            | 1.5       | 2.0        |            |
| Tolerance $\pm$ (dB)    | 1.0       | 1.0        |            |
| $\pi$ /4DQPSK (Average) |           |            |            |
| Channel                 | Channel 0 | Channel 78 |            |
| Target (dBm)            | 0.5       | 0.5        |            |
| Tolerance $\pm$ (dB)    | 1.0       | 1.0        |            |
| 8DPSK (Average)         |           |            |            |
| Channel                 | Channel 0 | Channel 78 |            |
| Target (dBm)            | 0.5       | 1.0        |            |
| Tolerance $\pm$ (dB)    | 1.0       | 1.0        |            |



## **Tune Up Procedure**

1. RX Gain Calibration
  - a. Put DUT in test mode
  - b. Put DUT in BCH mode
  - c. Put DUT in selected channel band
  - d. Total gain chain calibration at center ARFCN
  - e. Frequency Ripple calibration
  - f. Complete RX\_AGC Gain table
  
2. TX Power Calibration
  - a. Put DUT in test mode
  - b. Put DUT in BCH mode
  - c. Put DUT in selected channel band
  - d. Total gain chain calibration at center ARFCN
  - e. Frequency Ripple calibration
  - f. Complete TX\_APC Gain table
  
3. AFC calibration
  - a. Put DUT in test mode
  - b. Put DUT in selected channel mode
  - c. Calibration AFC at center ARFCN
  - d. Complete AFC result table

