



Test report No:  
 NIE: 66136RRF.001

## Test Report

Reference Standard:  
 USA FCC Part 24  
 CANADA RSS-133

|                                           |                                                                                                                                                                             |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (*) Identification of item tested         | LTE Wireless module                                                                                                                                                         |
| (*) Trademark                             | Telit                                                                                                                                                                       |
| (*) Model and /or type reference          | LE910C1-SAX                                                                                                                                                                 |
| Other identification of the product       | HW version: 1.10<br>SW version: M0F.313002<br>FCC ID: R17LE910CXSA<br>IC: 5131A-LE910CXSA                                                                                   |
| (*) Features                              | GNSS, Audio: VoLTE                                                                                                                                                          |
| Applicant                                 | Telit Wireless Solutions Co., LTD<br>13th Fl., Shinyoung Securities Bld, 6, Gukjegeumyung-ro<br>8-gil, Yeongdeungpo-gu, Seoul, 07330, South Korea                           |
| Test method requested, standard           | USA FCC Part 24 (10-1-19 Edition).<br>CANADA RSS-133 Issue 6, Jan. 2018.<br>ANSI C63.26: 2015.<br>KDB 971168 D01 Power Meas License Digital Systems<br>v03r01, April. 2018. |
| Summary                                   | IN COMPLIANCE                                                                                                                                                               |
| Approved by (name / position & signature) | José Carlos Luque<br>RF Lab. Supervisor                                                                                                                                     |
| Date of issue                             | 2020-11-03                                                                                                                                                                  |
| Report template No                        | FDT08_22<br>(*) "Data provided by the client"                                                                                                                               |

# Index

|                                                    |   |
|----------------------------------------------------|---|
| Competences and guarantees .....                   | 3 |
| General conditions .....                           | 3 |
| Uncertainty .....                                  | 3 |
| Data provided by the client.....                   | 3 |
| Usage of samples .....                             | 4 |
| Test sample description .....                      | 5 |
| Identification of the client.....                  | 6 |
| Testing period and place.....                      | 6 |
| Document history.....                              | 6 |
| Environmental conditions .....                     | 6 |
| Remarks and comments .....                         | 7 |
| Testing verdicts.....                              | 8 |
| Summary .....                                      | 8 |
| Appendix A: Test results for FCC 24 / RSS-133..... | 9 |

## Competences and guarantees

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DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

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## General conditions

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1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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## Uncertainty

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Uncertainty (factor  $k=2$ ) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

## Data provided by the client

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The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample of the model LE910C1-SAX is a LTE Wireless module with LTE Cat.1; LTE bands: FDD B2, B4, B12, B66; Data Capability: LTE CAT1 10/5 Mb;

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

## Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

| Control Nº | Description         | Model       | Serial Nº | Date of reception |
|------------|---------------------|-------------|-----------|-------------------|
| 66136/011  | LTE Wireless module | LE910C1-SAX | --        | 2020/09/23        |
| 66136/017  | Antenna             | --          | --        | 2020/09/23        |
| 66136/018  | Antenna             | --          | --        | 2020/09/23        |
| 66136/020  | Antenna             | --          | --        | 2020/09/23        |

Auxiliary elements used with the Sample S/01:

| Control Nº | Description    | Model | Serial Nº | Date of reception |
|------------|----------------|-------|-----------|-------------------|
| 66136/012  | Cradle         | --    | --        | 2020/09/23        |
| 66136/026  | Power Cable DC | --    | --        | 2020/09/23        |

Sample S/01 has undergone the following test(s): The Radiated tests indicated in Appendix A.

- Sample S/02 is composed of the following elements:

| Control Nº | Description         | Model       | Serial Nº | Date of reception |
|------------|---------------------|-------------|-----------|-------------------|
| 66136/011  | LTE Wireless module | LE910C1-SAX | --        | 2020/09/23        |

Auxiliary elements used with the Sample S/01:

| Control Nº | Description    | Model | Serial Nº | Date of reception |
|------------|----------------|-------|-----------|-------------------|
| 66136/012  | Cradle         | --    | --        | 2020/09/23        |
| 66136/026  | Power Cable DC | --    | --        | 2020/09/23        |

Sample S/02 has undergone the following test(s): The Conducted tests indicated in Appendix A.

## Test sample description

|                                               |                                     |                                |                               |                          |                                   |                          |                          |
|-----------------------------------------------|-------------------------------------|--------------------------------|-------------------------------|--------------------------|-----------------------------------|--------------------------|--------------------------|
| Ports.....:                                   | Port name and description           | Cable                          |                               |                          |                                   |                          |                          |
|                                               |                                     | Specified max length [m]       | Attached during test          | Shielded                 | Coupled to patient <sup>(3)</sup> |                          |                          |
|                                               | Main(Primary) port                  | x                              | <input type="checkbox"/>      | <input type="checkbox"/> | <input type="checkbox"/>          |                          |                          |
|                                               | Diversity port                      | x                              | <input type="checkbox"/>      | <input type="checkbox"/> | <input type="checkbox"/>          |                          |                          |
|                                               | GNSS port                           | x                              | <input type="checkbox"/>      | <input type="checkbox"/> | <input type="checkbox"/>          |                          |                          |
|                                               |                                     |                                | <input type="checkbox"/>      | <input type="checkbox"/> | <input type="checkbox"/>          |                          |                          |
| Supplementary information to the ports.....:  | SMA type connectors                 |                                |                               |                          |                                   |                          |                          |
| Rated power supply 3.4~4.2V, typ 3.8V         | Voltage and Frequency               |                                | Reference poles               |                          |                                   |                          |                          |
|                                               |                                     |                                | L1                            | L2                       | L3                                | N                        | PE                       |
|                                               | <input type="checkbox"/>            | AC:                            | <input type="checkbox"/>      | <input type="checkbox"/> | <input type="checkbox"/>          | <input type="checkbox"/> | <input type="checkbox"/> |
|                                               | <input type="checkbox"/>            | AC:                            | <input type="checkbox"/>      | <input type="checkbox"/> | <input type="checkbox"/>          | <input type="checkbox"/> | <input type="checkbox"/> |
|                                               | <input checked="" type="checkbox"/> | DC: 3.4~4.2V, typ 3.8V         |                               |                          |                                   |                          |                          |
| <input type="checkbox"/>                      | DC:                                 |                                |                               |                          |                                   |                          |                          |
| Rated Power .....                             | 0.2W                                |                                |                               |                          |                                   |                          |                          |
| Clock frequencies.....:                       | 19.2MHz                             |                                |                               |                          |                                   |                          |                          |
| Other parameters .....                        |                                     |                                |                               |                          |                                   |                          |                          |
| Software version .....                        | M0F.313002                          |                                |                               |                          |                                   |                          |                          |
| Hardware version .....                        | 1.10                                |                                |                               |                          |                                   |                          |                          |
| Dimensions in cm (W x H x D) .....            | 28.2 x 28.2 x 2.2mm                 |                                |                               |                          |                                   |                          |                          |
| Mounting position .....                       | <input type="checkbox"/>            | Table top equipment            |                               |                          |                                   |                          |                          |
|                                               | <input type="checkbox"/>            | Wall/Ceiling mounted equipment |                               |                          |                                   |                          |                          |
|                                               | <input type="checkbox"/>            | Floor standing equipment       |                               |                          |                                   |                          |                          |
|                                               | <input type="checkbox"/>            | Hand-held equipment            |                               |                          |                                   |                          |                          |
|                                               | <input checked="" type="checkbox"/> | Other: Variable equipment      |                               |                          |                                   |                          |                          |
| Modules/parts.....:                           | Module/parts of test item           |                                | Type                          | Manufacturer             |                                   |                          |                          |
|                                               |                                     |                                |                               |                          |                                   |                          |                          |
|                                               |                                     |                                |                               |                          |                                   |                          |                          |
|                                               |                                     |                                |                               |                          |                                   |                          |                          |
| Accessories (not part of the test item) ..... | Description                         |                                | Type                          | Manufacturer             |                                   |                          |                          |
|                                               |                                     |                                |                               |                          |                                   |                          |                          |
|                                               |                                     |                                |                               |                          |                                   |                          |                          |
|                                               |                                     |                                |                               |                          |                                   |                          |                          |
|                                               |                                     |                                |                               |                          |                                   |                          |                          |
| Documents as provided by the applicant .....  | Description                         |                                | File name                     | Issue date               |                                   |                          |                          |
|                                               | Hardware_Design_Guide               |                                | LE910Cx_Hardware_Design_Guide | 2020-07-31               |                                   |                          |                          |

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

(3) Only for Medical Equipment

## Identification of the client

Telit Wireless Solutions Co., LTD  
13th Fl., Shinyoung Securities Bld, 6, Gukjegeumyung-ro 8-gil, Yeongdeungpo-gu, Seoul, 07330, South Korea

## Testing period and place

|               |                                        |
|---------------|----------------------------------------|
| Test Location | DEKRA Testing and Certification S.A.U. |
| Date (start)  | 2020-09-23                             |
| Date (finish) | 2020-10-02                             |

## Document history

| Report number | Date       | Description   |
|---------------|------------|---------------|
| 66136RRF.001  | 2020-11-03 | First release |

## Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

|                   |                              |
|-------------------|------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C |
| Relative humidity | Min. = 20 %<br>Max. = 75 %   |

In the semianechoic chamber, the following limits were not exceeded during the test.

|                   |                              |
|-------------------|------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C |
| Relative humidity | Min. = 20 %<br>Max. = 75 %   |

In the chamber for conducted measurements, the following limits were not exceeded during the test:

|                   |                              |
|-------------------|------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C |
| Relative humidity | Min. = 20 %<br>Max. = 75 %   |

## Remarks and comments

The tests have been performed by the technical personnel: Miguel Manuel López, Cristina Calle, Javier Miguel Nadales.

Used instrumentation:

### Conducted Measurements

|                                                                    | Last Calibration | Due Calibration |
|--------------------------------------------------------------------|------------------|-----------------|
| 1. Shielded Room ETS LINDGREN S101                                 | N.A.             | N.A.            |
| 2. Wideband Radio Communication Tester ROHDE AND SCHWARZ CMW500    | 2020/04          | 2021/04         |
| 3. DC Power Supply, 30V/5A KEYSIGHT TECHNOLOGIES U8002A            | N.A.             | N.A.            |
| 4. Digital multimeter FLUKE 179                                    | 2020/06          | 2021/06         |
| 5. Chamber HERAEUS VMT 04/35                                       | 2020/07          | 2022/07         |
| 6. RF Attenuator 10 dB, 5W, DC-40 GHz Aeroflex Weinschel 75A-10-11 | 2020/05          | 2021/05         |
| 7. EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7                  | 2018/10          | 2020/10         |
| 8. Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV40            | 2019/09          | 2021/09         |
| 9. Signal Analyzer 20 Hz to 8 GHz ROHDE AND SCHWARZ FSQ8           | 2020/10          | 2022/10         |

### Radiated Measurements

|                                                                             | Last Calibration | Due Calibration |
|-----------------------------------------------------------------------------|------------------|-----------------|
| 1. Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP          | N.A.             | N.A.            |
| 2. Shielded Room ETS LINDGREN S101                                          | N.A.             | N.A.            |
| 3. Horn Antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D            | 2019/11          | 2022/11         |
| 4. Broadband Horn Antenna 18 - 40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170 | 2018/07          | 2021/07         |
| 5. Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E                  | 2020/04          | 2023/04         |
| 6. RF Preamplifier, 40 dB ,1-18 GHz BONN ELEKTRONIK BLMA 0118-1M            | 2020/05          | 2021/05         |
| 7. Low Noise Amplifier G>30dB, 18 - 40 GHz BONN ELEKTRONIK BLMA 1840-1M     | 2019/02          | 2021/02         |
| 8. Preamplifier G>40dB 10MHz-6GHz, BONN ELEKTRONIK, BLNA 0160-01N           | 2020/02          | 2021/02         |
| 9. Spectrum Analyzer ROHDE AND SCHWARZ FSW50                                | 2020/07          | 2022/07         |
| 10. EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7                          | 2019/10          | 2021/10         |
| 11. Wideband Radio Communication Tester ROHDE AND SCHWARZ CMW500            | 2020/04          | 2021/04         |
| 12. DC Power Supply, 30V/5A KEYSIGHT TECHNOLOGIES U8002A                    | N.A.             | N.A.            |
| 13. Digital multimeter FLUKE 179                                            | 2020/06          | 2021/06         |

## Testing verdicts

|                 |     |
|-----------------|-----|
| Not applicable: | N/A |
| Pass:           | P   |
| Fail:           | F   |
| Not measured:   | N/M |

## Summary

| FCC PART 24 / RSS-133 PARAGRAPH                                   |         |        |
|-------------------------------------------------------------------|---------|--------|
| Requirement – Test case                                           | Verdict | Remark |
| FCC 24.232 / RSS-133 6.4: RF Output Power                         | P       |        |
| FCC 2.1047 / RSS-133 6.2: Modulation Characteristics              | P       |        |
| FCC 24.235 / RSS-133 6.3: Frequency Stability                     | P       |        |
| FCC 2.1049: Occupied Bandwidth                                    | P       |        |
| FCC 24.238 / RSS-133 6.5: Spurious Emissions at Antenna Terminals | P       |        |
| FCC 24.238 / RSS-133 6.5: Radiated Emissions                      | P       |        |
| <u>Supplementary information and remarks:</u><br>None.            |         |        |



## Appendix A: Test results for FCC 24 / RSS-133

## INDEX

|                                                              |    |
|--------------------------------------------------------------|----|
| TEST CONDITIONS .....                                        | 11 |
| RF Output Power .....                                        | 12 |
| Frequency Stability .....                                    | 26 |
| Modulation Characteristics .....                             | 29 |
| Occupied Bandwidth .....                                     | 31 |
| Spurious Emissions at Antenna Terminals .....                | 52 |
| Spurious Emissions at Antenna Terminals at Block Edges ..... | 63 |
| Radiated Emissions .....                                     | 77 |

## TEST CONDITIONS

### POWER SUPPLY (V):

Vn: 3.80 Vdc  
 Vmin: 3.23 Vdc  
 Vmax: 4.37 Vdc

Type of Power Supply: DC Voltage from external power supply.

The subscripts 'n', 'min' and 'max' indicate voltage test conditions (normal, minimum and maximum respectively), as declared by the applicant.

### ANTENNA:

| MIDDLE Band | GAIN     | ANTENNA TYPE      |
|-------------|----------|-------------------|
| LTE Band 2  | +3.5 dBi | External (Dipole) |

### TEST FREQUENCIES:

#### LTE Band 2. QPSK AND 16QAM MODULATIONS:

|        | Channel (Frequency, MHz) |                |                |              |                |              |
|--------|--------------------------|----------------|----------------|--------------|----------------|--------------|
|        | BW = 1.4 MHz             | BW = 3 MHz     | BW = 5 MHz     | BW = 10 MHz  | BW = 15 MHz    | BW = 20 MHz  |
| Low    | 18607 (1850.7)           | 18615 (1851.5) | 18625 (1852.5) | 18650 (1855) | 18675 (1857.5) | 18700 (1860) |
| Middle | 18900 (1880)             | 18900 (1880)   | 18900 (1880)   | 18900 (1880) | 18900 (1880)   | 18900 (1880) |
| High   | 19193 (1909.3)           | 19185 (1908.5) | 19175 (1907.5) | 19150 (1905) | 19125 (1902.5) | 19100 (1900) |

Note: LTE Category 1 device, so for BW=10 MHz, 15 MHz and 20 MHz the 16QAM modulation does not support transmission in RB=All.

## RF Output Power

### SPECIFICATION:

FCC §2.1046 and §24.232:

Mobile/portable stations are limited to 2 Watts (33 dBm) Effective Isotropic Radiated Power (E.I.R.P.).  
The peak-to-average ratio (PAR) of the transmission shall not exceed 13 dB.

RSS-133. Clause 6.4.:

The peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

### METHOD:

The conducted RF output power measurements were made at the RF output terminals of the EUT using the power meter of the Universal Radio Communication tester CMW500, selecting maximum transmission power of the EUT and different modes of modulation.

The maximum equivalent isotropically radiated power (e.i.r.p.) is calculated by adding the declared maximum antenna gain (dBi).

The peak-to-average power ratio (PAPR) is measured using an attenuator, power splitter and spectrum analyser with a Complementary Cumulative Distribution Function implemented.

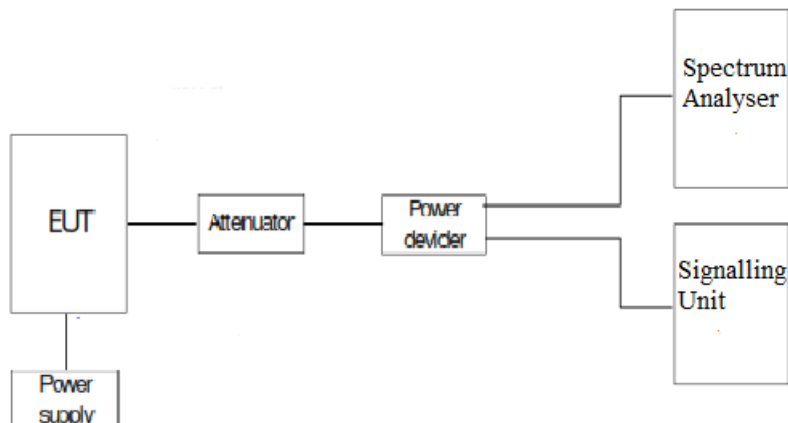
The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation.

### TEST SETUP:

#### 1. CONDUCTED AVERAGE POWER:



#### 2. PEAK-TO-AVERAGE POWER RATIO (PAPR):



**RESULTS:**

**1. CONDUCTED AVERAGE POWER**

**LTE BAND 2:**

LTE BAND 2. QPSK MODULATION. Bandwidth = 1.4 MHz.

| Channel                                                          | Low    | Middle | High  |
|------------------------------------------------------------------|--------|--------|-------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5   |
| Measured maximum average power (dBm) at antenna port             | 22.67  | 22.61  | 22.77 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 26.17  | 26.11  | 26.27 |
| PAPR (dB)                                                        | (*)    | (*)    | (*)   |
| Measurement uncertainty (dB)                                     | <±1.58 |        |       |

Worst case AVERAGE POWER: Modulation QPSK. RB Size: 3. RB Offset: 1.  
 (\*): Preliminary measurements determined that the modulation 16QAM, RB Size: 6, RB Offset: 0 as the worst case.  
 The results in the next tables shows the results for this configuration.

LTE BAND 2. 16QAM MODULATION. Bandwidth = 1.4 MHz.

| Channel                                                          | Low    | Middle | High  |
|------------------------------------------------------------------|--------|--------|-------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5   |
| Measured maximum average power (dBm) at antenna port             | 21.64  | 22.15  | 21.74 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 25.14  | 25.65  | 25.24 |
| PAPR (dB)                                                        | 5.98   | 5.72   | 5.59  |
| Measurement uncertainty (dB)                                     | <±1.58 |        |       |

Worst case AVERAGE POWER: Modulation 16QAM. RB Size: 3. RB Offset: 1.  
 Worst case PAPR: Modulation 16QAM. RB Size: 6. RB Offset: 0.

LTE BAND 2. QPSK MODULATION. Bandwidth = 3 MHz.

| Channel                                                          | Low    | Middle | High  |
|------------------------------------------------------------------|--------|--------|-------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5   |
| Measured maximum average power (dBm) at antenna port             | 22.79  | 22.38  | 22.76 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 26.29  | 25.88  | 26.26 |
| PAPR (dB)                                                        | (*)    | (*)    | (*)   |
| Measurement uncertainty (dB)                                     | <±1.58 |        |       |

Worst case AVERAGE POWER: Modulation QPSK. RB Size: 1. RB Offset: 0.  
 (\*): Preliminary measurements determined that the modulation 16QAM, RB Size: 15, RB Offset: 0 as the worst case.  
 The results in the next tables shows the results for this configuration.

LTE BAND 2. 16QAM MODULATION. Bandwidth = 3 MHz.

| Channel                                                          | Low    | Middle | High  |
|------------------------------------------------------------------|--------|--------|-------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5   |
| Measured maximum average power (dBm) at antenna port             | 22.15  | 21.43  | 21.93 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 25.65  | 24.93  | 25.43 |
| PAPR (dB)                                                        | 6.09   | 5.85   | 5.79  |
| Measurement uncertainty (dB)                                     | <±1.58 |        |       |

Worst case AVERAGE POWER: Modulation 16QAM. RB Size: 1. RB Offset: 0.  
 Worst case PAPR: Modulation 16QAM. RB Size: 15. RB Offset: 0.

LTE BAND 2. QPSK MODULATION. Bandwidth = 5 MHz.

| Channel                                                          | Low    | Middle | High |
|------------------------------------------------------------------|--------|--------|------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5  |
| Measured maximum average power (dBm) at antenna port             | 22.56  | 22.51  | 22.6 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 26.06  | 26.01  | 26.1 |
| PAPR (dB)                                                        | (*)    | (*)    | (*)  |
| Measurement uncertainty (dB)                                     | <±1.58 |        |      |

Worst case AVERAGE POWER: Modulation QPSK. RB Size: 1. RB Offset: 0.  
 (\*): Preliminary measurements determined that the modulation 16QAM, RB Size: 25, RB Offset: 0 as the worst case. The results in the next tables shows the results for this configuration.

LTE BAND 2. 16QAM MODULATION. Bandwidth = 5 MHz.

| Channel                                                          | Low    | Middle | High  |
|------------------------------------------------------------------|--------|--------|-------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5   |
| Measured maximum average power (dBm) at antenna port             | 21.93  | 21.77  | 21.53 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 25.43  | 25.27  | 25.03 |
| PAPR (dB)                                                        | 6.07   | 5.61   | 5.74  |
| Measurement uncertainty (dB)                                     | <±1.58 |        |       |

Worst case AVERAGE POWER: Modulation 16QAM. RB Size: 1. RB Offset: 0.  
 Worst case PAPR: Modulation 16QAM. RB Size: 25. RB Offset: 0.

LTE BAND 2. QPSK MODULATION. Bandwidth = 10 MHz.

| Channel                                                          | Low    | Middle | High  |
|------------------------------------------------------------------|--------|--------|-------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5   |
| Measured maximum average power (dBm) at antenna port             | 22.46  | 22.68  | 22.84 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 25.96  | 26.18  | 26.34 |
| PAPR (dB)                                                        | (*)    | (*)    | (*)   |
| Measurement uncertainty (dB)                                     | <±1.58 |        |       |

Worst case AVERAGE POWER: Modulation QPSK. RB Size: 1. RB Offset: 24.  
 (\*): Preliminary measurements determined that the modulation 16QAM, RB Size: 25, RB Offset: 0 as the worst case.  
 The results in the next tables shows the results for this configuration.

LTE BAND 2. 16QAM MODULATION. Bandwidth = 10 MHz.

| Channel                                                          | Low    | Middle | High  |
|------------------------------------------------------------------|--------|--------|-------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5   |
| Measured maximum average power (dBm) at antenna port             | 21.55  | 21.65  | 22.59 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 25.05  | 25.15  | 26.09 |
| PAPR (dB)                                                        | 5.83   | 5.48   | 5.75  |
| Measurement uncertainty (dB)                                     | <±1.58 |        |       |

Worst case AVERAGE POWER: Modulation 16QAM. RB Size: 1. RB Offset: 24.  
 Worst case PAPR: Modulation 16QAM. RB Size: 25. RB Offset: 0.

LTE BAND 2. QPSK MODULATION. Bandwidth = 15 MHz.

| Channel                                                          | Low    | Middle | High  |
|------------------------------------------------------------------|--------|--------|-------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5   |
| Measured maximum average power (dBm) at antenna port             | 22.79  | 22.66  | 22.83 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 26.29  | 26.16  | 26.33 |
| PAPR (dB)                                                        | (*)    | (*)    | (*)   |
| Measurement uncertainty (dB)                                     | <±1.58 |        |       |

Worst case AVERAGE POWER: Modulation QPSK. RB Size: 1. RB Offset: 37.  
 (\*): Preliminary measurements determined that the modulation 16QAM, RB Size: 1, RB Offset: 0 as the worst case.  
 The results in the next tables shows the results for this configuration.

LTE BAND 2. 16QAM MODULATION. Bandwidth = 15 MHz.

| Channel                                                          | Low    | Middle | High  |
|------------------------------------------------------------------|--------|--------|-------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5   |
| Measured maximum average power (dBm) at antenna port             | 22.27  | 22.23  | 22.12 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 25.77  | 25.73  | 25.62 |
| PAPR (dB)                                                        | 5.1    | 5.08   | 5.29  |
| Measurement uncertainty (dB)                                     | <±1.58 |        |       |

Worst case AVERAGE POWER: Modulation 16QAM. RB Size: 1. RB Offset: 37.  
 Worst case PAPR: Modulation 16QAM. RB Size: 1. RB Offset: 0.

LTE BAND 2. QPSK MODULATION. Bandwidth = 20 MHz.

| Channel                                                          | Low    | Middle | High  |
|------------------------------------------------------------------|--------|--------|-------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5   |
| Measured maximum average power (dBm) at antenna port             | 22.67  | 22.61  | 22.63 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 26.17  | 26.11  | 26.13 |
| PAPR (dB)                                                        | (*)    | (*)    | (*)   |
| Measurement uncertainty (dB)                                     | <±1.58 |        |       |

Worst case AVERAGE POWER: Modulation QPSK. RB Size: 1. RB Offset: 49.  
 (\*): Preliminary measurements determined that the modulation 16QAM, RB Size: 1, RB Offset: 99 as the worst case. The results in the next tables shows the results for this configuration.

LTE BAND 2. 16QAM MODULATION. Bandwidth = 20 MHz.

| Channel                                                          | Low    | Middle | High  |
|------------------------------------------------------------------|--------|--------|-------|
| Maximum declared antenna gain (dBi)                              | 3.5    | 3.5    | 3.5   |
| Measured maximum average power (dBm) at antenna port             | 21.73  | 21.08  | 21.63 |
| Maximum equivalent isotropically radiated power (E.I.R.P.) (dBm) | 25.23  | 24.58  | 25.13 |
| PAPR (dB)                                                        | 5.3    | 5.37   | 5.1   |
| Measurement uncertainty (dB)                                     | <±1.58 |        |       |

Worst case AVERAGE POWER: Modulation 16QAM. RB Size: 1. RB Offset: 49.  
 Worst case PAPR: Modulation 16QAM. RB Size: 1. RB Offset: 99.

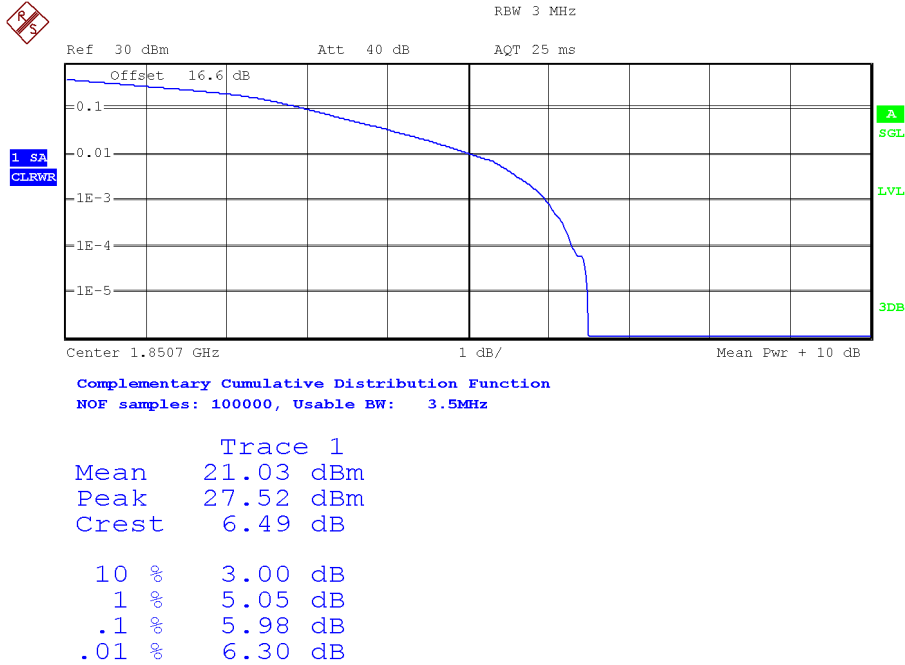
Verdict: PASS



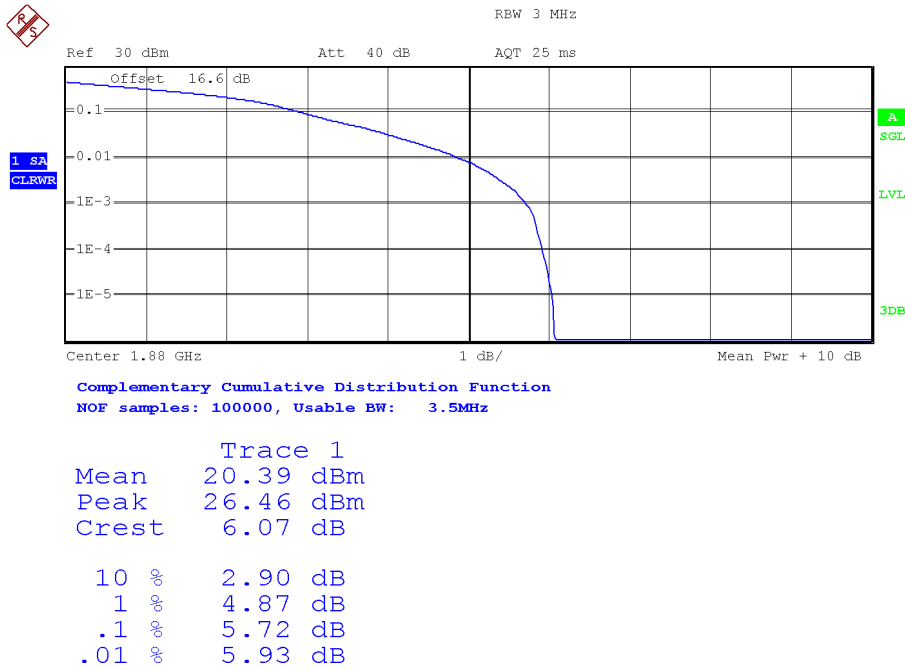
### 1. PEAK-TO-AVERAGE POWER RATIO (PAPR):

LTE Band 2. Bandwidth = 1.4 MHz. Modulation 16 QAM. RB Size: 6. RB Offset: 0.

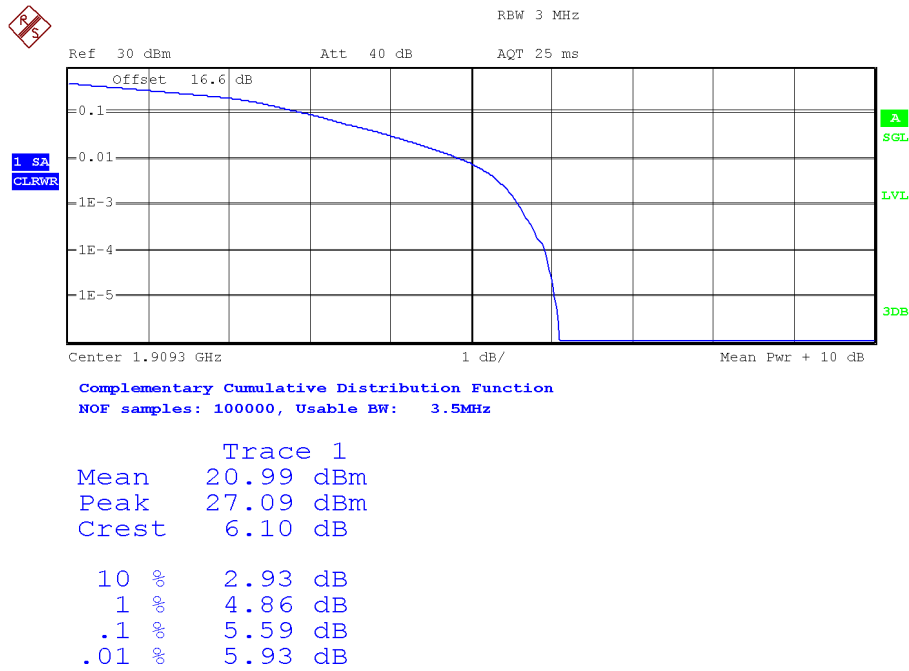
Low Channel:



Middle Channel:

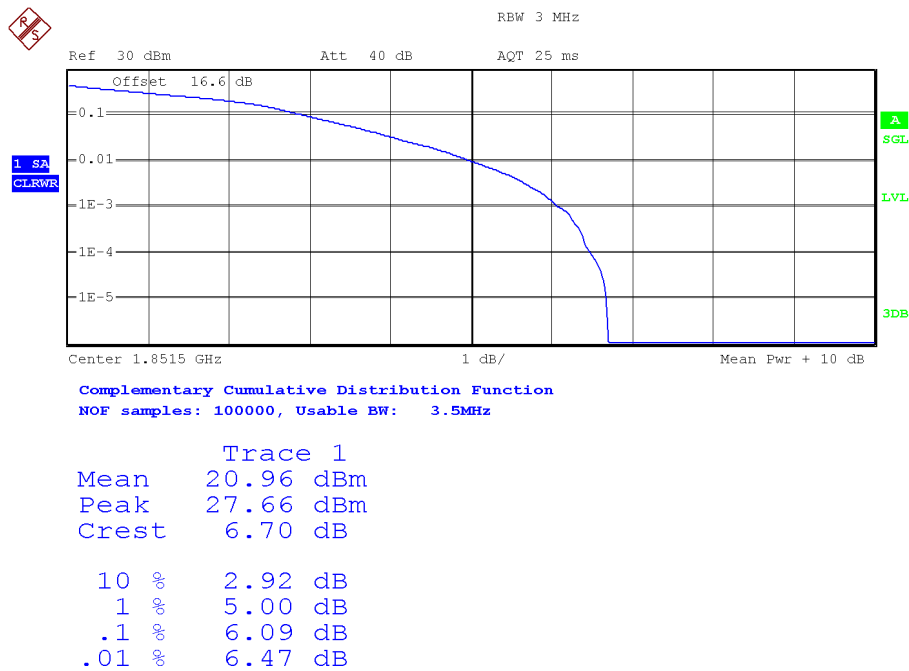


High Channel:

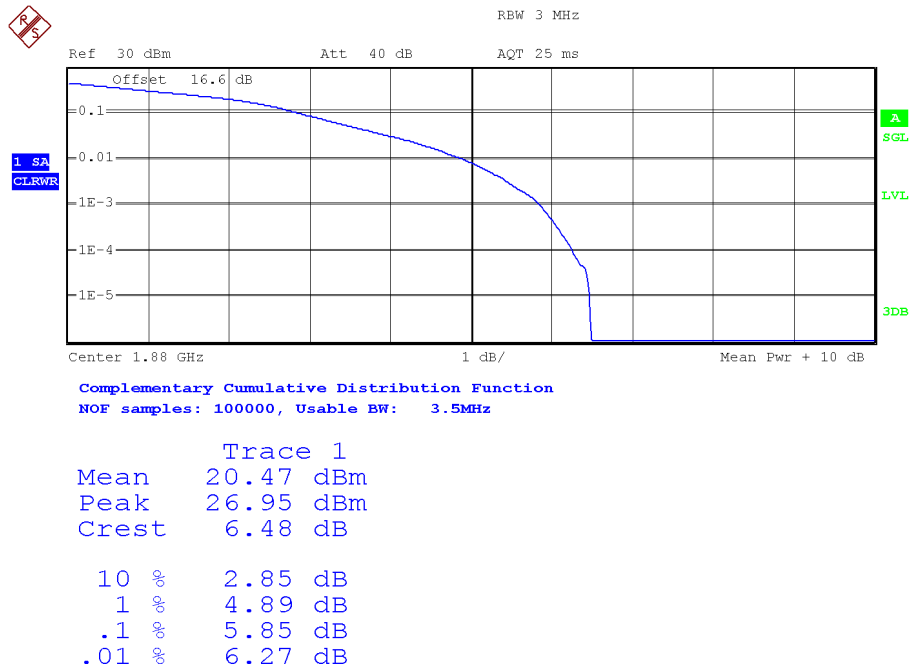


LTE Band 2. Bandwidth = 3 MHz. Modulation 16 QAM. RB Size: 15. RB Offset: 0.

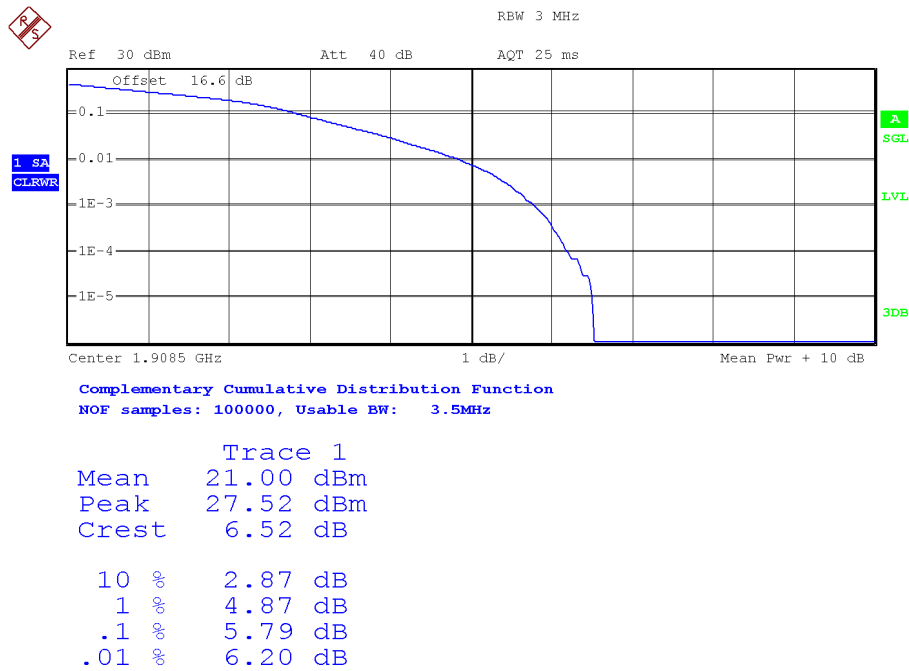
Low Channel:



Middle Channel:

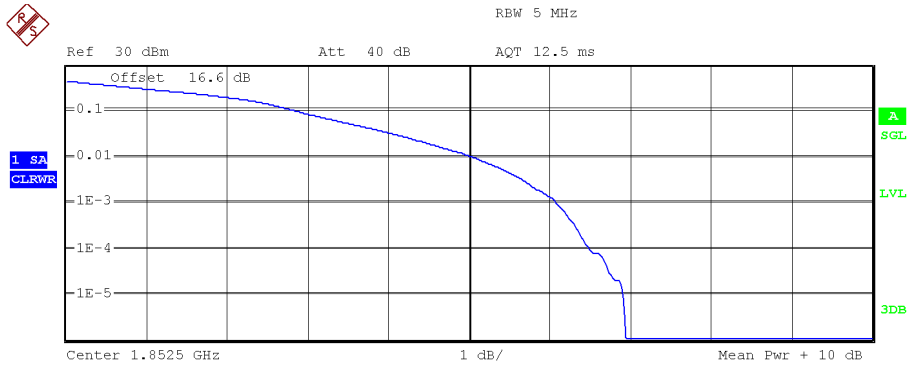


High Channel:



LTE Band 2. Bandwidth = 5 MHz. Modulation 16 QAM. RB Size: 25. RB Offset: 0.

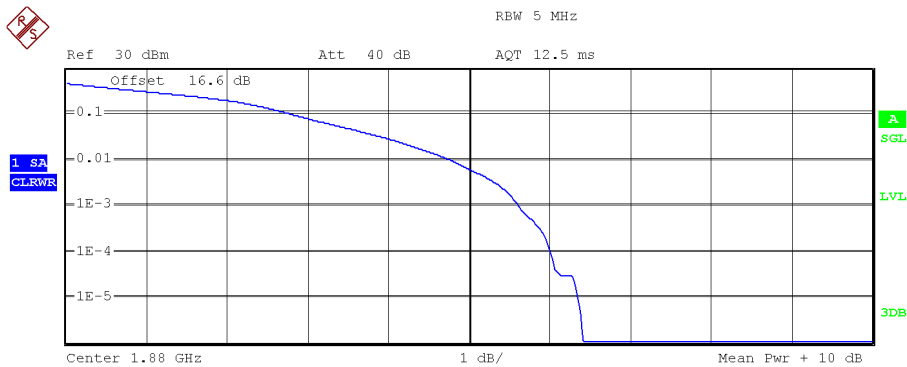
Low Channel:



Complementary Cumulative Distribution Function  
 NOF samples: 100000, Usable BW: 7.1MHz

| Trace 1 |           |
|---------|-----------|
| Mean    | 20.93 dBm |
| Peak    | 27.87 dBm |
| Crest   | 6.94 dB   |
| 10 %    | 2.85 dB   |
| 1 %     | 5.05 dB   |
| .1 %    | 6.07 dB   |
| .01 %   | 6.49 dB   |

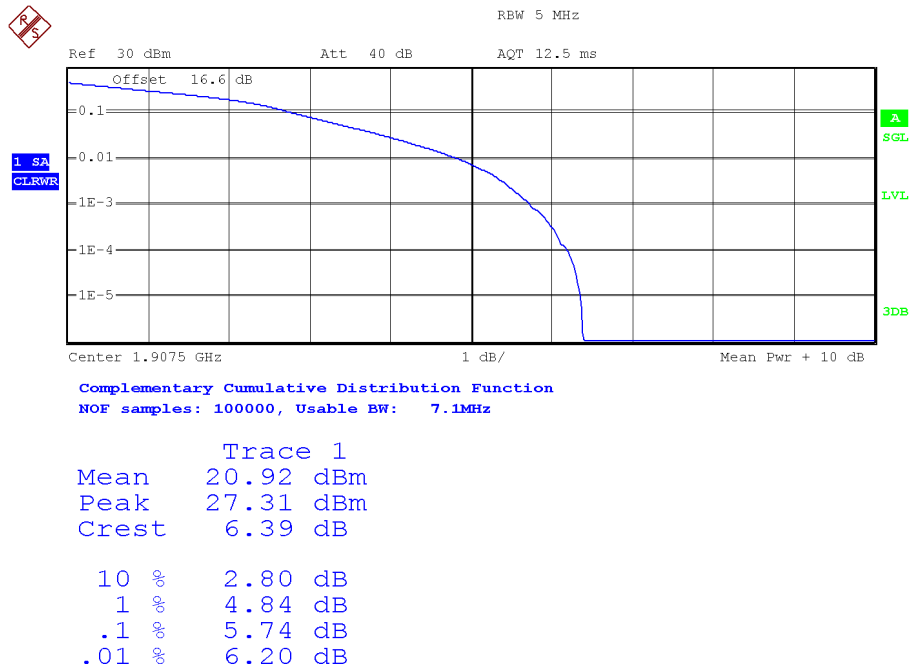
Middle Channel:



Complementary Cumulative Distribution Function  
 NOF samples: 100000, Usable BW: 7.1MHz

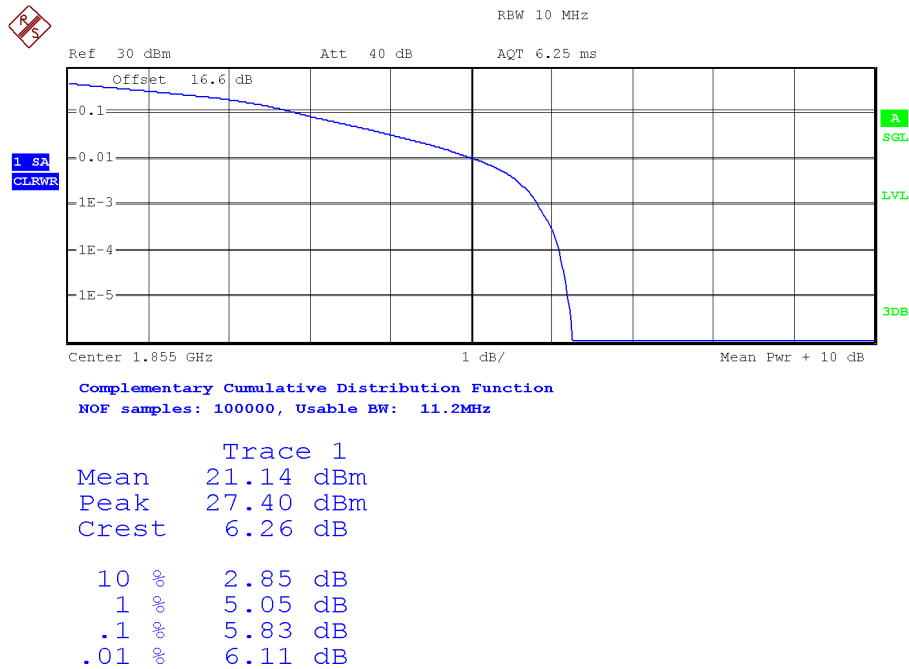
| Trace 1 |           |
|---------|-----------|
| Mean    | 20.68 dBm |
| Peak    | 27.09 dBm |
| Crest   | 6.41 dB   |
| 10 %    | 2.79 dB   |
| 1 %     | 4.76 dB   |
| .1 %    | 5.61 dB   |
| .01 %   | 6.01 dB   |

High Channel:

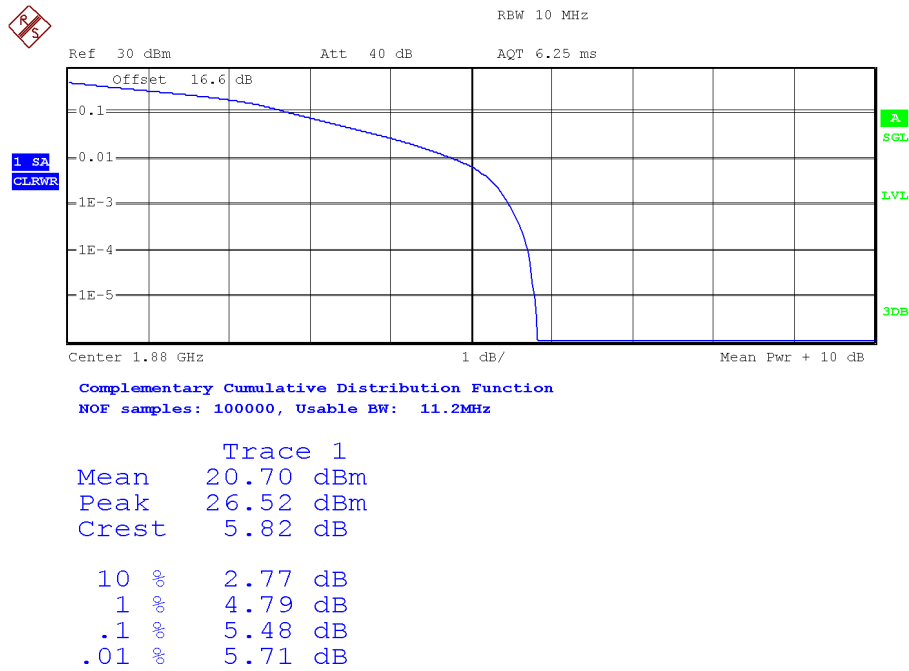


LTE Band 2. Bandwidth = 10 MHz. Modulation 16 QAM. RB Size: 25. RB Offset: 0.

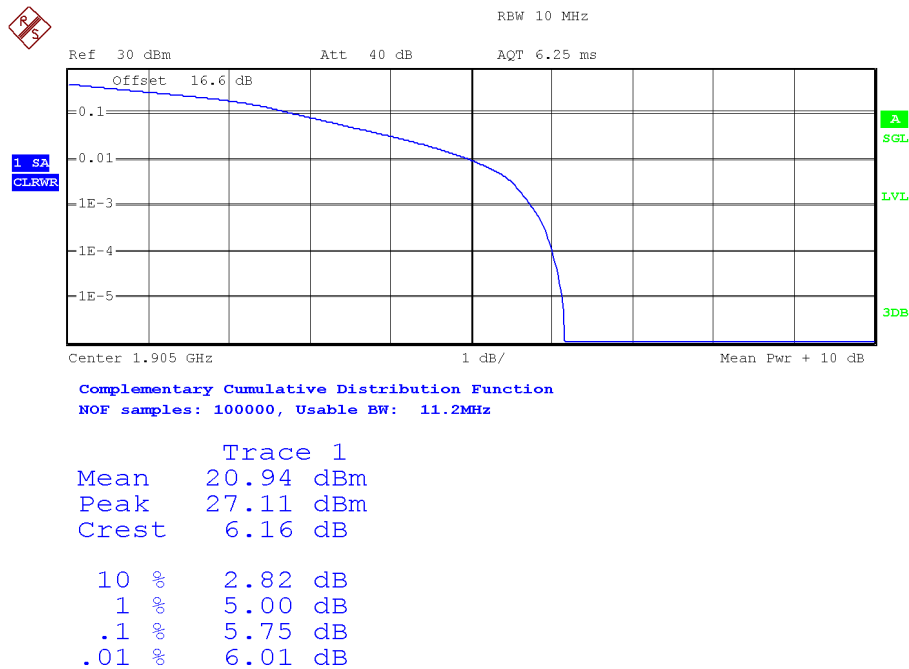
Low Channel:



Middle Channel:

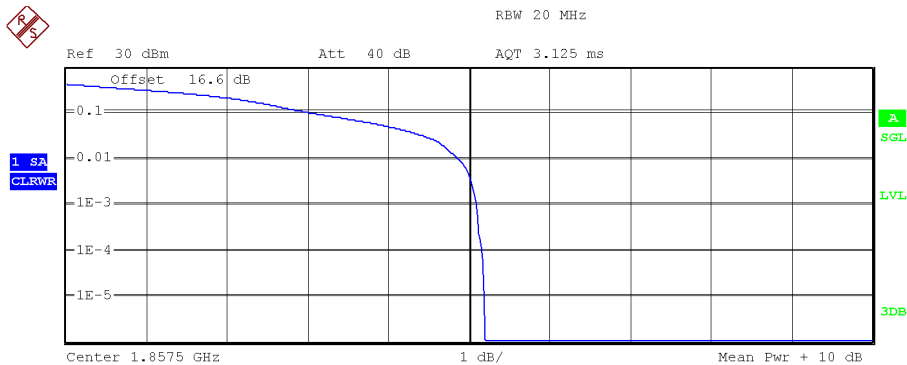


High Channel:



LTE Band 2. Bandwidth = 15 MHz. Modulation 16 QAM. RB Size: 1. RB Offset: 0.

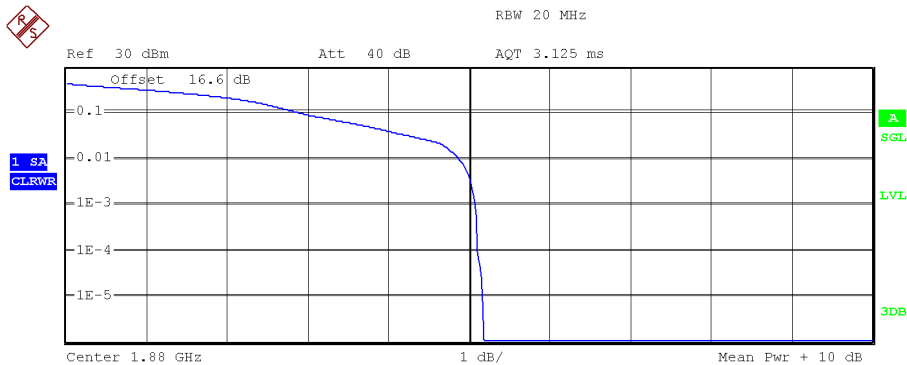
Low Channel:



Complementary Cumulative Distribution Function  
 NOF samples: 100000, Usable BW: 23.7MHz

| Trace 1 |           |
|---------|-----------|
| Mean    | 22.62 dBm |
| Peak    | 27.81 dBm |
| Crest   | 5.19 dB   |
| 10 %    | 3.04 dB   |
| 1 %     | 4.87 dB   |
| .1 %    | 5.10 dB   |
| .01 %   | 5.16 dB   |

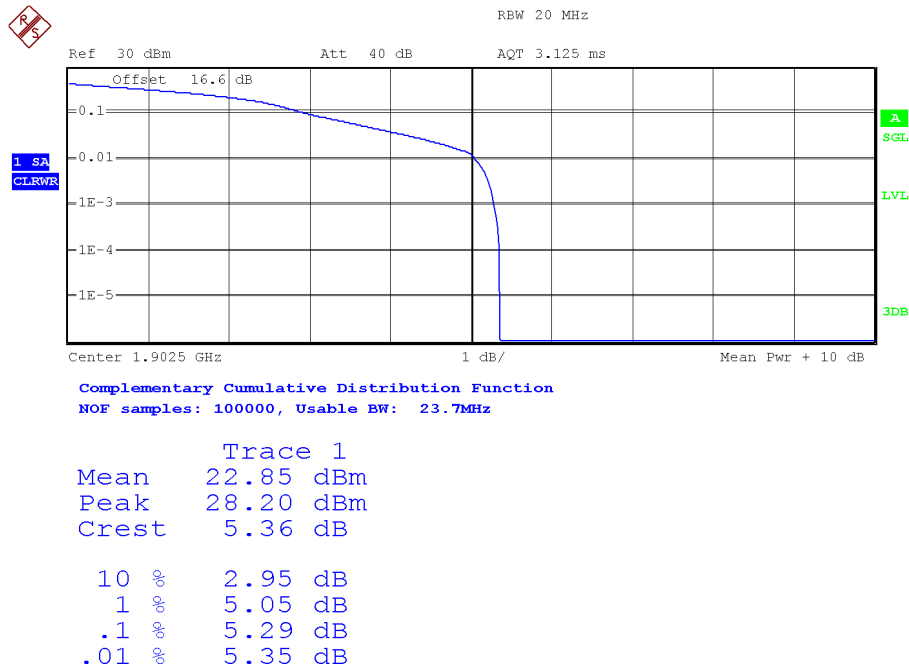
Middle Channel:



Complementary Cumulative Distribution Function  
 NOF samples: 100000, Usable BW: 23.7MHz

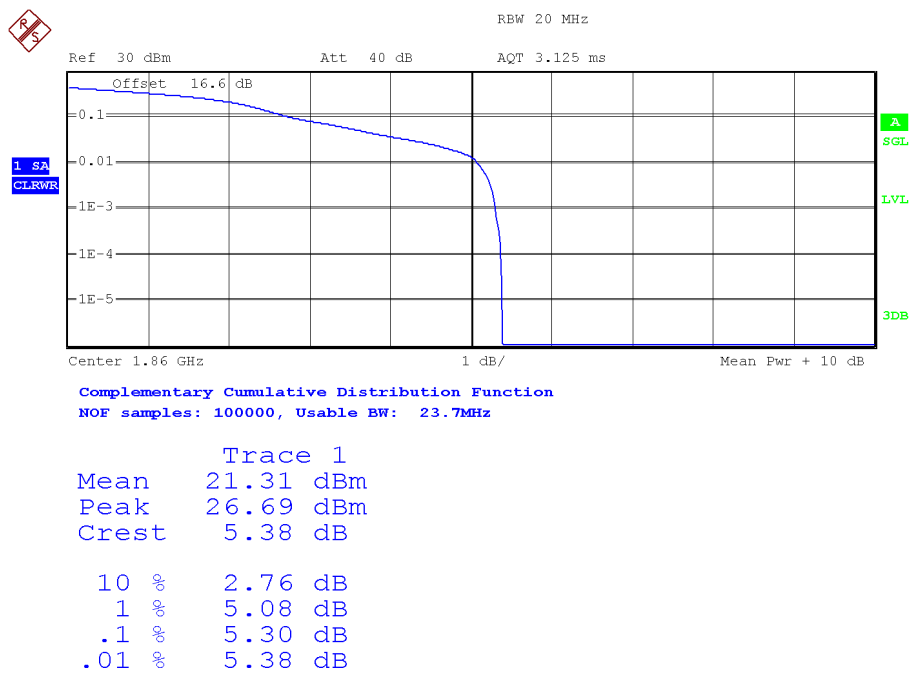
| Trace 1 |           |
|---------|-----------|
| Mean    | 21.75 dBm |
| Peak    | 26.92 dBm |
| Crest   | 5.17 dB   |
| 10 %    | 2.90 dB   |
| 1 %     | 4.87 dB   |
| .1 %    | 5.08 dB   |
| .01 %   | 5.11 dB   |

High Channel:



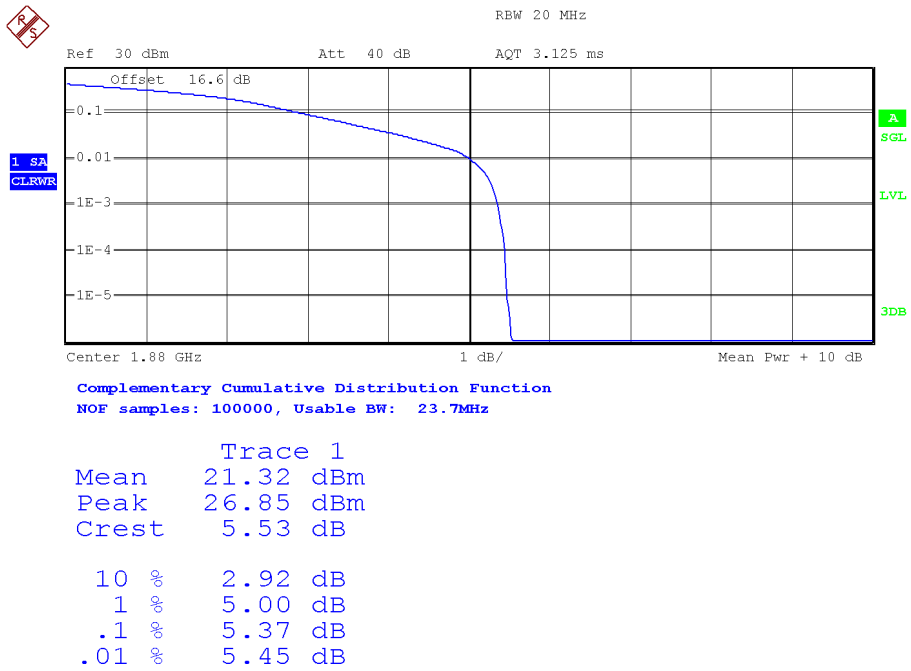
LTE Band 2. Bandwidth = 20 MHz. Modulation 16 QAM. RB Size: 1. RB Offset: 99.

Low Channel:

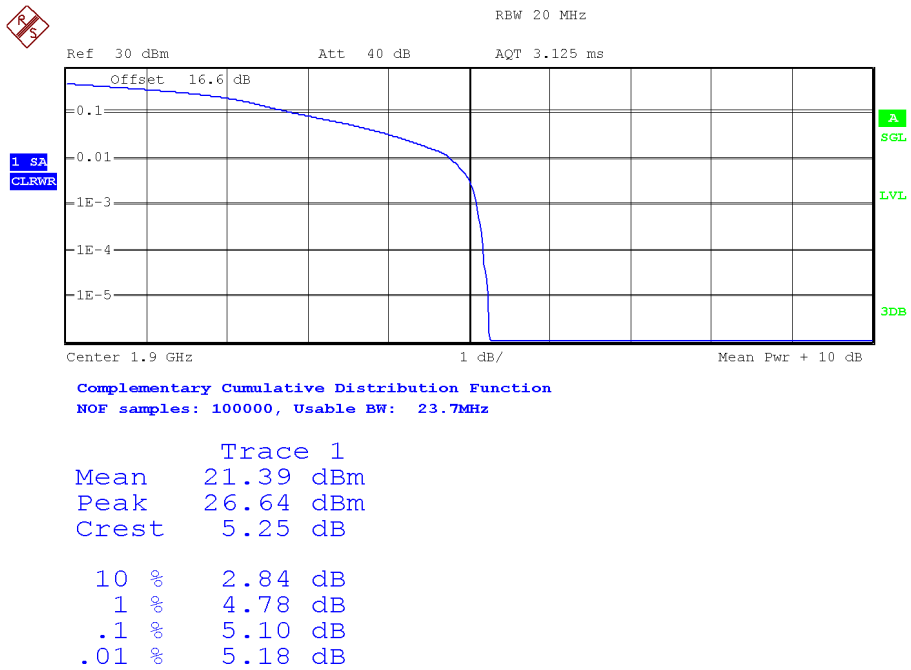




Middle Channel:



High Channel:



## Frequency Stability

### SPECIFICATION:

FCC §2.1055 and §24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

RSS-133. Clause 6.3. The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

### METHOD:

The frequency tolerance measurements over temperature variations were made over the temperature range of  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . The EUT was placed inside a climatic chamber and the temperature was raised hourly in  $10^{\circ}\text{C}$  steps from  $-30^{\circ}\text{C}$  up to  $+50^{\circ}\text{C}$ .

The supply voltage was varied between 85% and 115% of nominal voltage.

The EUT was set in "Radio Resource Control (RRC) mode" in the middle channel using the Universal Radio Communication tester R&S CMW500 and the maximum frequency error was measured using the built-in calibrated frequency meter.

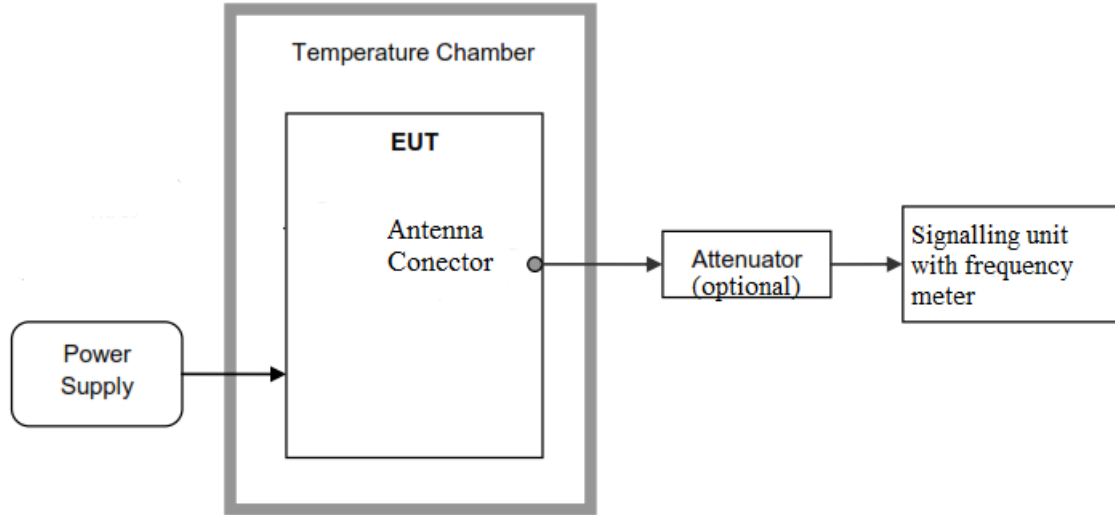
The worst case LTE mode for conducted power was used for the test.

In order to check that the frequency stability is sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point is established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and High Channel of operation are identified as fL and fH respectively. The worst-case frequency offset determined in the above methods is added or subtracted from the values of fL and fH to check that the resulting frequencies remain within the band.

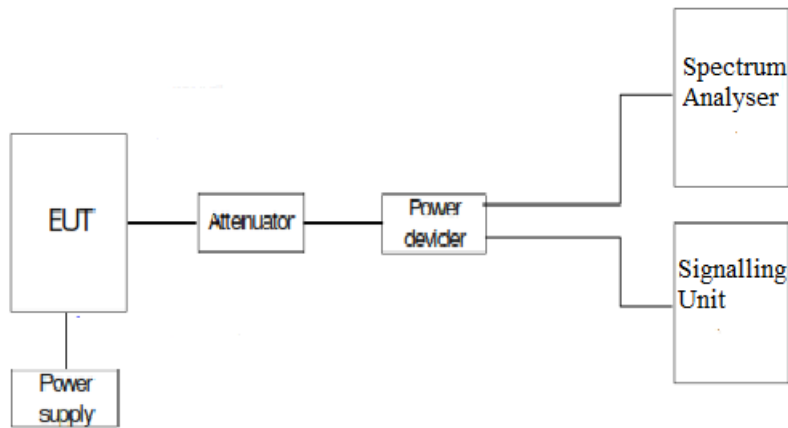
The reference point measurements were made at the RF output terminals of the EUT using an attenuator, Power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation.

TEST SETUP:

1. Frequency Tolerance:



2. Reference Frequency Points  $f_L$  and  $f_H$ :



**RESULTS:**

**1. Frequency Tolerance:**

• **Frequency Stability over Temperature Variations:**

LTE Band 2. QPSK MODULATION. BW = 10 MHz.

| Temperature (°C) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------|----------------------|-----------------------|
| +50              | -4.25                | -0.002260638          |
| +40              | -2.31                | -0.001228723          |
| +30              | -4.15                | -0.002207447          |
| +20              | -5.69                | -0.003026596          |
| +10              | -3.33                | -0.001771277          |
| 0                | -2.57                | -0.001367021          |
| -10              | -1.73                | -0.000920213          |
| -20              | -2.26                | -0.001202128          |
| -30              | -4.01                | -0.002132979          |

• **Frequency Stability over Voltage Variations.**

LTE Band 2. QPSK MODULATION. BW = 10 MHz.

| Battery Supply voltage | Voltage (V) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------------|-------------|----------------------|-----------------------|
| Vmax                   | 4.37        | -4.78                | -0.002542553          |
| Vmin                   | 3.23        | -4.49                | -0.002388298          |

**2. Reference Frequency Points  $f_L$  and  $f_H$ :**

The worst-case frequency offsets added or subtracted per band and bandwidth:

LTE Band 2:

|             | QPSK MODULATION<br>BW = 10 MHz |
|-------------|--------------------------------|
| $f_L$ (MHz) | 1850.1395                      |
| $f_H$ (MHz) | 1909.8606                      |

|                               |         |
|-------------------------------|---------|
| Measurement uncertainty (kHz) | <±11.17 |
|-------------------------------|---------|

The reference frequency points  $f_L$  and  $f_H$  stay within the authorized blocks for all the bands above.

Verdict: PASS

## Modulation Characteristics

### SPECIFICATION:

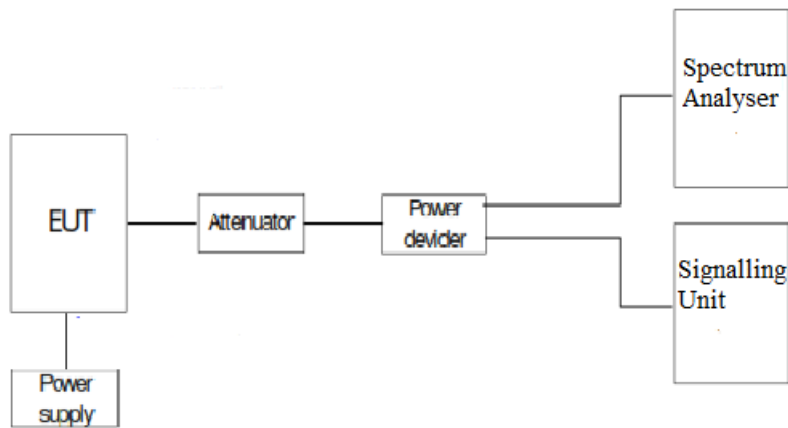
FCC §2.1047.

RSS-133. Clause 6.2. Equipment certified under this standard shall use digital modulation.

### METHOD:

For LTE the EUT operates with QPSK and 16QAM modulation modes in which the information is digitised and coded into a bit stream. The RF transmission is multiplexed using *Orthogonal Frequency Division Multiplexing (OFDM)* using different possible arrangement of subcarriers (Resource Blocks RB).

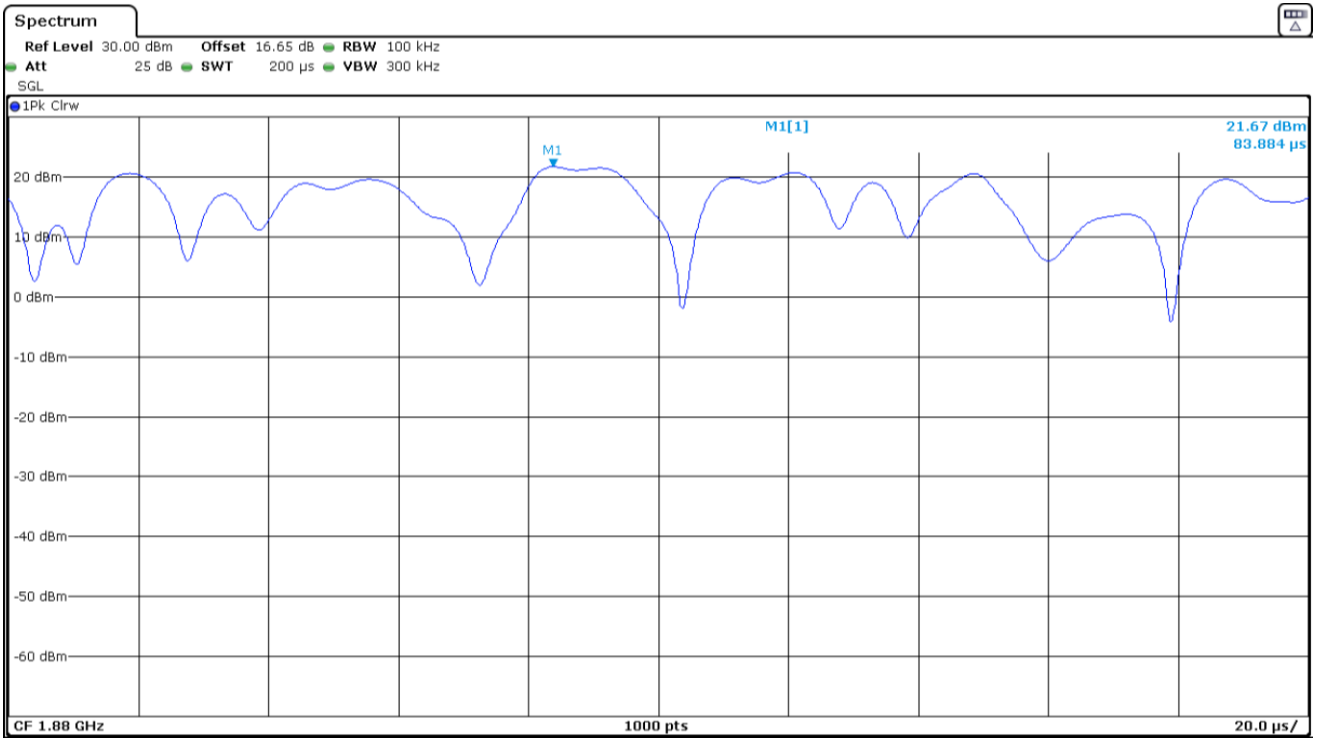
### TEST SETUP:



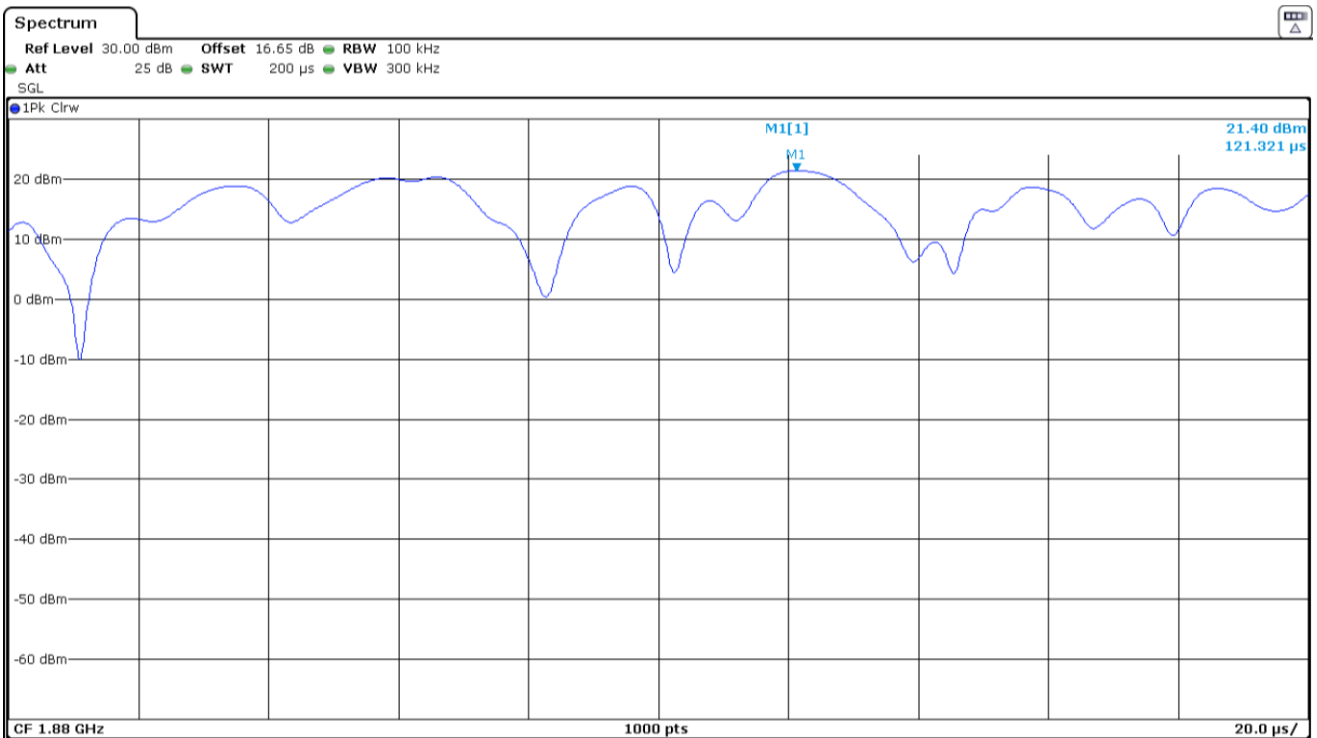
**RESULTS:**

The following plots show the modulation schemes in the EUT.

**LTE Band 2 QPSK MODULATION. BW = 10 MHz.**



**LTE Band 2. 16QAM MODULATION. BW = 10 MHz.**



## Occupied Bandwidth

### SPECIFICATION:

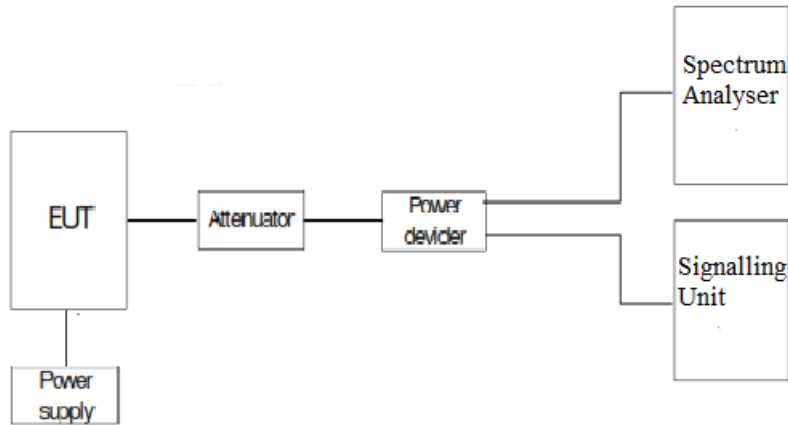
FCC §2.1049. Measurements required: Occupied bandwidth.

RSS-Gen Clause 6.7.

### METHOD:

The occupied bandwidth measurement was performed at the output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation. The 99% Occupied Bandwidth and the -26 dBc Bandwidth were measured directly using the built-in bandwidth measuring option of spectrum analyser.

### TEST SETUP:



**RESULTS:**

**LTE Bands:** The worst case of Occupied Bandwidth corresponds to all Resource Blocks (RB) with Offset 0, regardless the nominal bandwidth selected.

**LTE Band 2:**

LTE Band 2. QPSK MODULATION. BW = 1.4 MHz.

| Channel                       | Low    | Middle | High  |
|-------------------------------|--------|--------|-------|
| 99% Occupied Bandwidth (MHz)  | 1.089  | 1.097  | 1.100 |
| -26 dBc Bandwidth (MHz)       | 1.300  | 1.302  | 1.338 |
| Measurement uncertainty (kHz) | <±5.25 |        |       |

LTE Band 2. 16QAM MODULATION. BW = 1.4 MHz.

| Channel                       | Low    | Middle | High  |
|-------------------------------|--------|--------|-------|
| 99% Occupied Bandwidth (MHz)  | 1.094  | 1.107  | 1.094 |
| -26 dBc Bandwidth (MHz)       | 1.305  | 1.323  | 1.304 |
| Measurement uncertainty (kHz) | <±5.25 |        |       |

LTE Band 2. QPSK MODULATION. BW = 3 MHz.

| Channel                       | Low     | Middle | High  |
|-------------------------------|---------|--------|-------|
| 99% Occupied Bandwidth (MHz)  | 2.738   | 2.744  | 2.744 |
| -26 dBc Bandwidth (MHz)       | 3.065   | 3.083  | 3.082 |
| Measurement uncertainty (kHz) | <±15.03 |        |       |

LTE Band 2. 16QAM MODULATION. BW = 3 MHz.

| Channel                       | Low     | Middle | High  |
|-------------------------------|---------|--------|-------|
| 99% Occupied Bandwidth (MHz)  | 2.730   | 2.742  | 2.726 |
| -26 dBc Bandwidth (MHz)       | 3.073   | 3.063  | 3.072 |
| Measurement uncertainty (kHz) | <±15.03 |        |       |

LTE Band 2. QPSK MODULATION. BW = 5 MHz.

| Channel                       | Low     | Middle | High  |
|-------------------------------|---------|--------|-------|
| 99% Occupied Bandwidth (MHz)  | 4.537   | 4.513  | 4.497 |
| -26 dBc Bandwidth (MHz)       | 5.082   | 5.016  | 5.015 |
| Measurement uncertainty (kHz) | <±17.34 |        |       |

LTE Band 2. 16QAM MODULATION. BW = 5 MHz.

| Channel                       | Low     | Middle | High  |
|-------------------------------|---------|--------|-------|
| 99% Occupied Bandwidth (MHz)  | 4.513   | 4.506  | 4.493 |
| -26 dBc Bandwidth (MHz)       | 5.071   | 5.020  | 4.992 |
| Measurement uncertainty (kHz) | <±17.34 |        |       |



LTE Band 2. QPSK MODULATION. BW = 10 MHz.

| Channel                       | Low     | Middle | High   |
|-------------------------------|---------|--------|--------|
| 99% Occupied Bandwidth (MHz)  | 9.033   | 9.027  | 9.033  |
| -26 dBc Bandwidth (MHz)       | 10.182  | 10.205 | 10.065 |
| Measurement uncertainty (kHz) | <±46.21 |        |        |

LTE Band 2. 16QAM MODULATION. BW = 10 MHz.

| Channel                       | Low     | Middle | High  |
|-------------------------------|---------|--------|-------|
| 99% Occupied Bandwidth (MHz)  | 4,547   | 4,533  | 4,527 |
| -26 dBc Bandwidth (MHz)       | 5,351   | 5,232  | 5,303 |
| Measurement uncertainty (kHz) | <±46.21 |        |       |

LTE Band 2. QPSK MODULATION. BW = 15 MHz.

| Channel                       | Low     | Middle | High   |
|-------------------------------|---------|--------|--------|
| 99% Occupied Bandwidth (MHz)  | 13.460  | 13.430 | 13.410 |
| -26 dBc Bandwidth (MHz)       | 14.901  | 14.680 | 14.680 |
| Measurement uncertainty (kHz) | <±51.99 |        |        |

LTE Band 2. 16QAM MODULATION. BW = 15 MHz.

| Channel                       | Low     | Middle | High  |
|-------------------------------|---------|--------|-------|
| 99% Occupied Bandwidth (MHz)  | 4,530   | 4,530  | 4,530 |
| -26 dBc Bandwidth (MHz)       | 5,304   | 5,287  | 5,357 |
| Measurement uncertainty (kHz) | <±51.99 |        |       |

LTE Band 2. QPSK MODULATION. BW = 20 MHz.

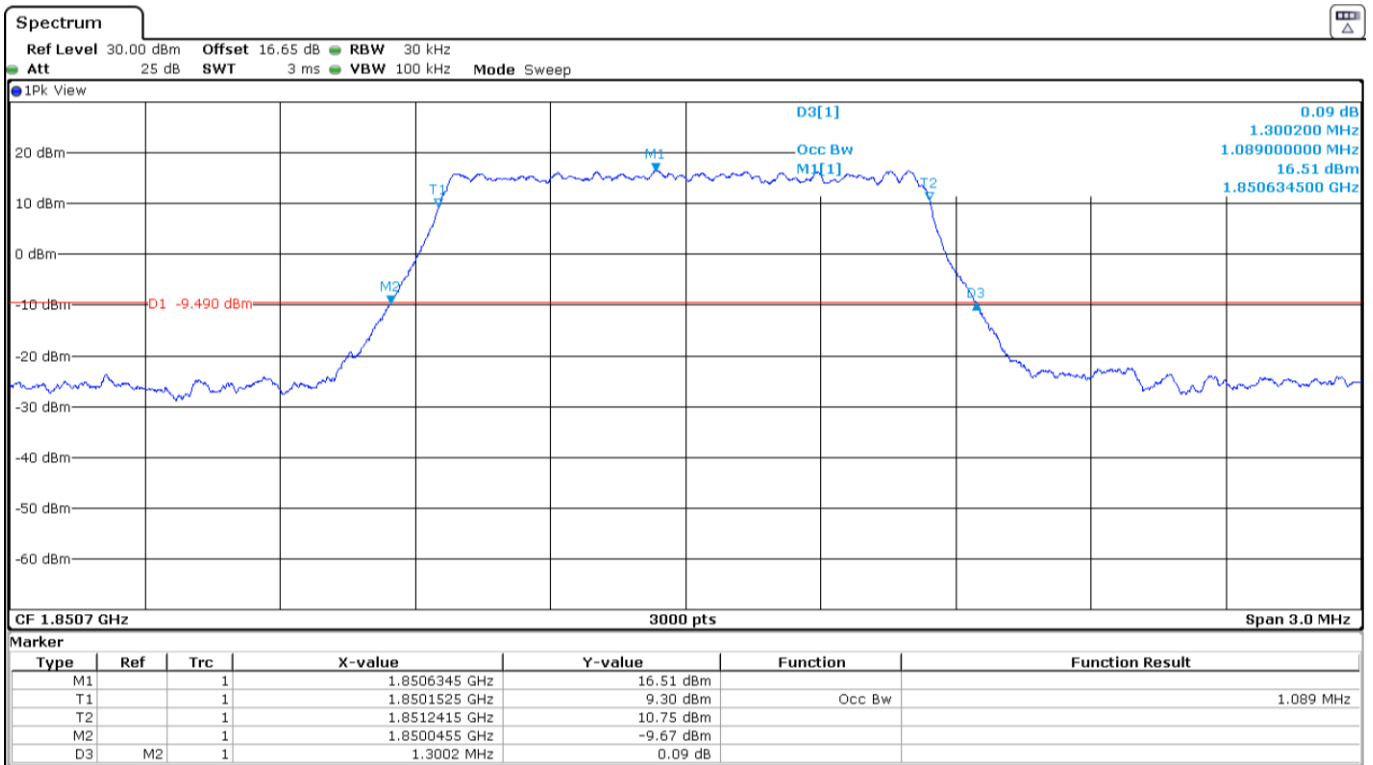
| Channel                       | Low     | Middle | High   |
|-------------------------------|---------|--------|--------|
| 99% Occupied Bandwidth (MHz)  | 17.880  | 17.893 | 17.853 |
| -26 dBc Bandwidth (MHz)       | 19.277  | 19.472 | 19.251 |
| Measurement uncertainty (kHz) | <±57.76 |        |        |

LTE Band 2. 16QAM MODULATION. BW = 20 MHz.

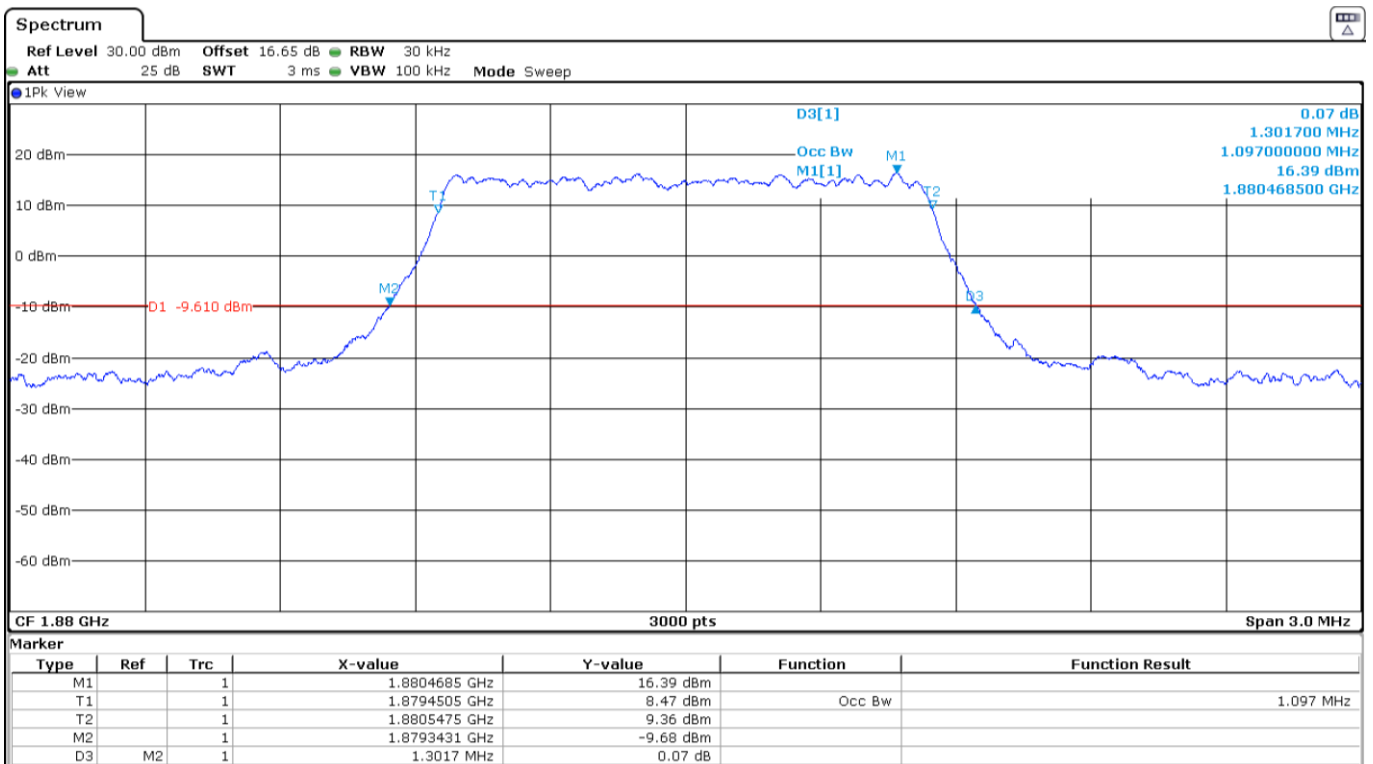
| Channel                       | Low     | Middle | High  |
|-------------------------------|---------|--------|-------|
| 99% Occupied Bandwidth (MHz)  | 4,573   | 4,573  | 4,547 |
| -26 dBc Bandwidth (MHz)       | 5,486   | 5,486  | 5,486 |
| Measurement uncertainty (kHz) | <±57.76 |        |       |

LTE Band 2. QPSK MODULATION. BW = 1.4 MHz.

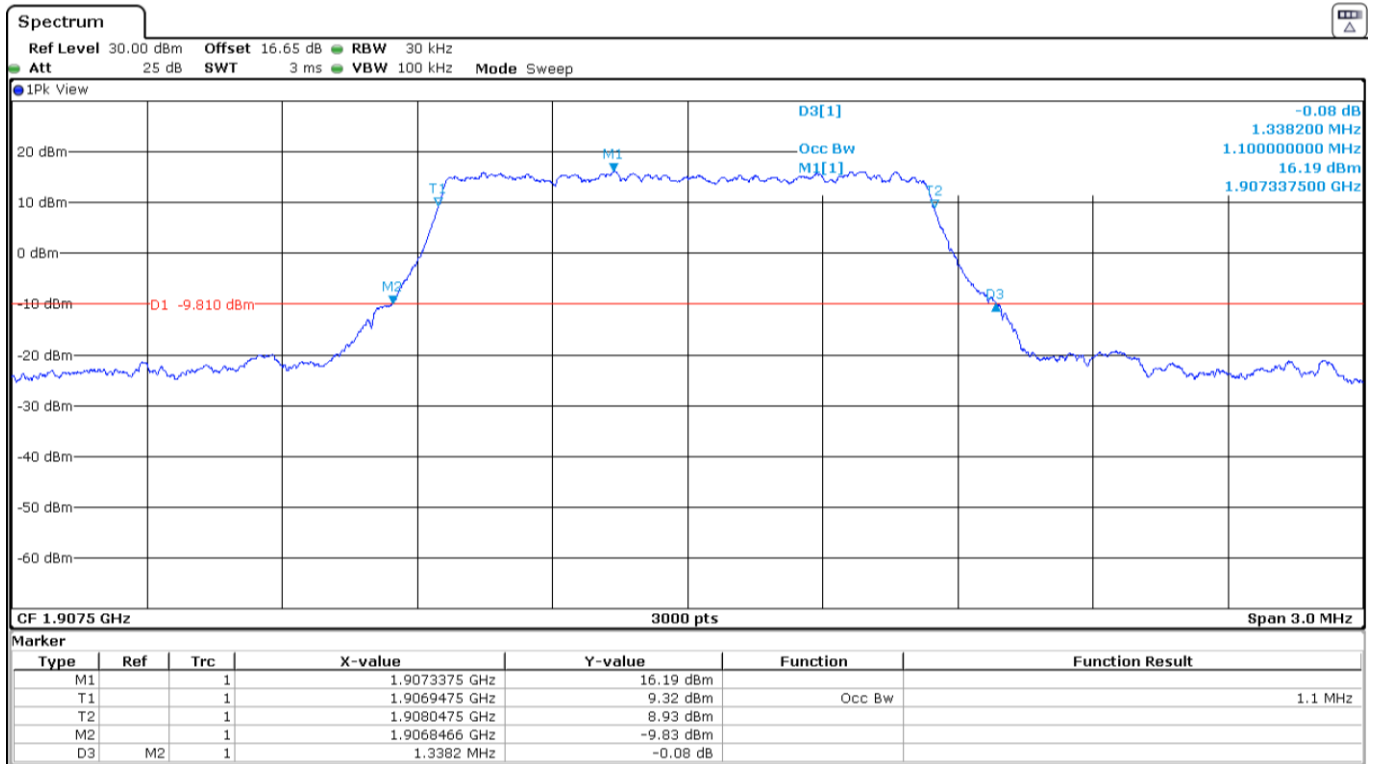
Low Channel:



Middle Channel:

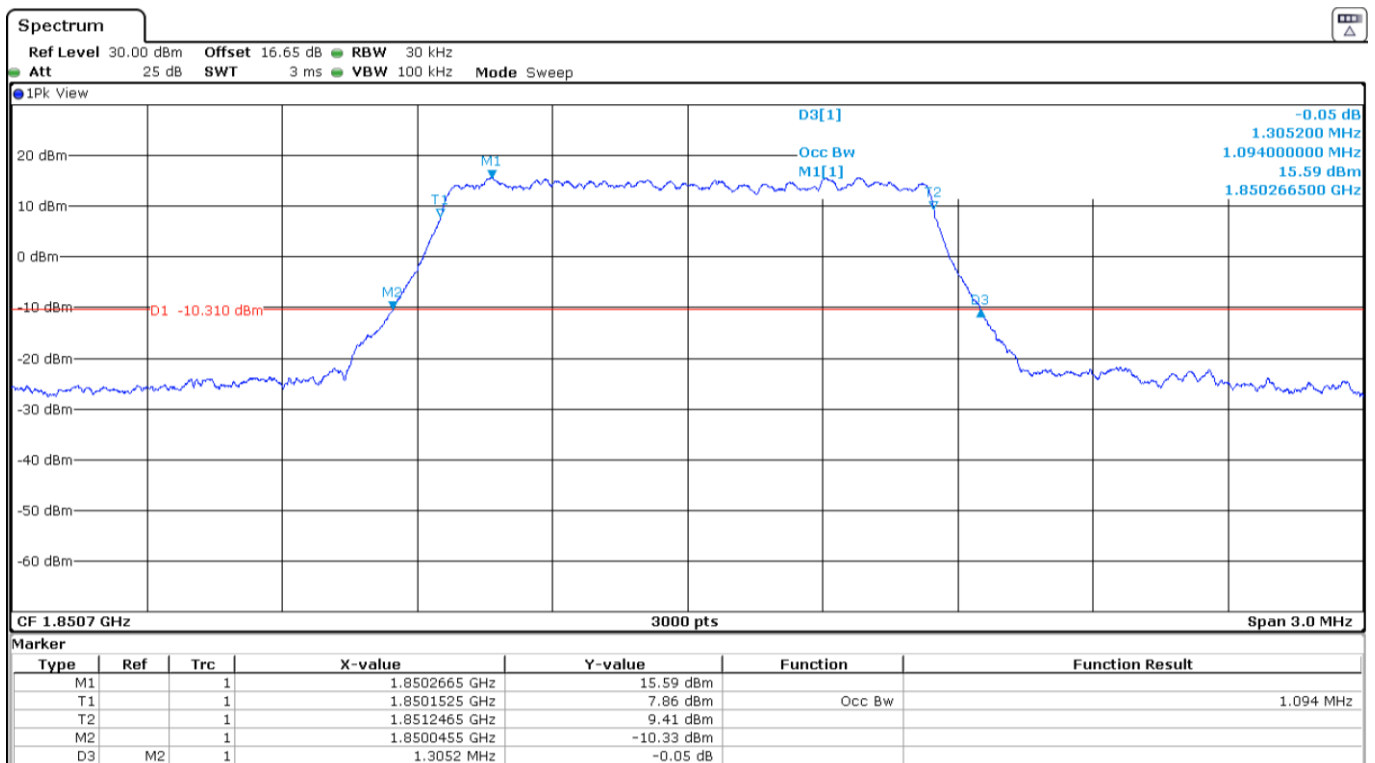


High Channel:

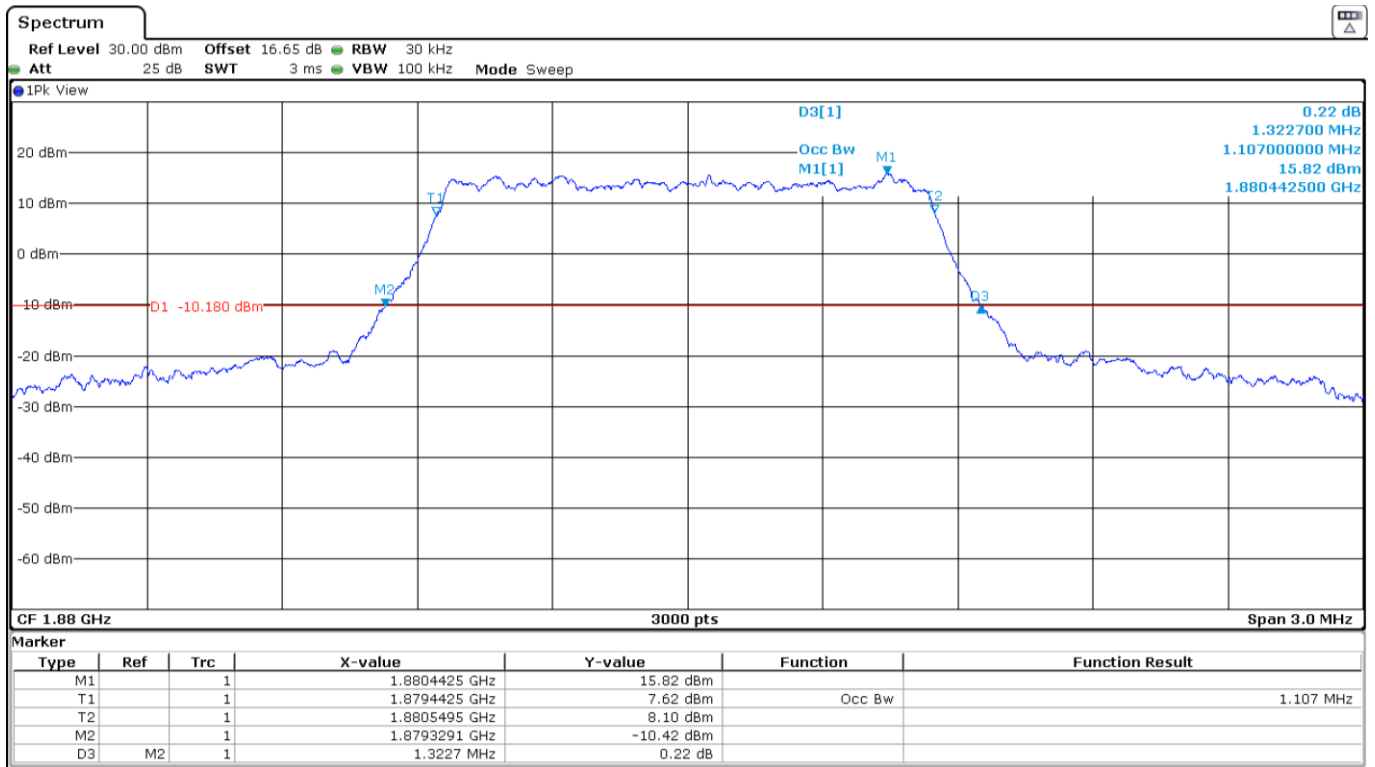


LTE Band 2. 16QAM MODULATION. BW = 1.4 MHz.

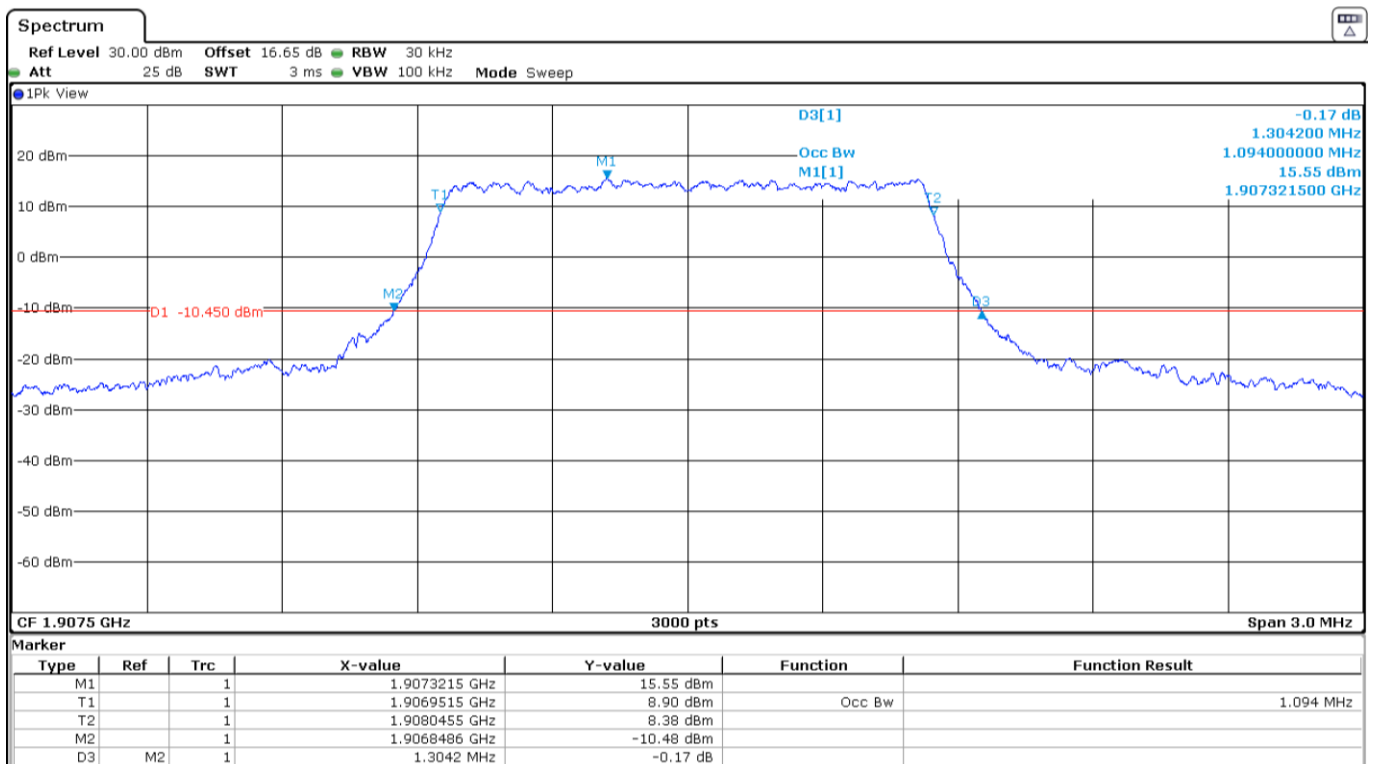
Low Channel:



Middle Channel:

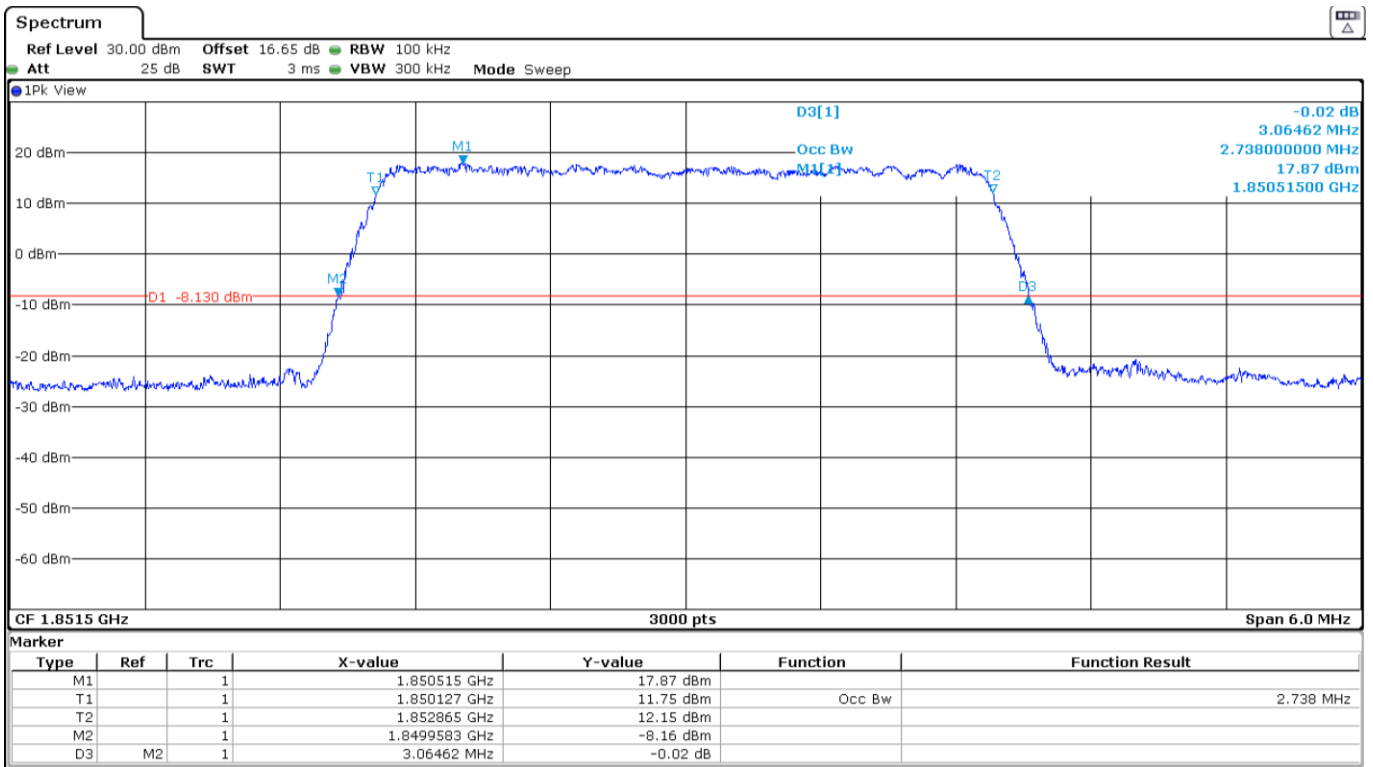


High Channel:

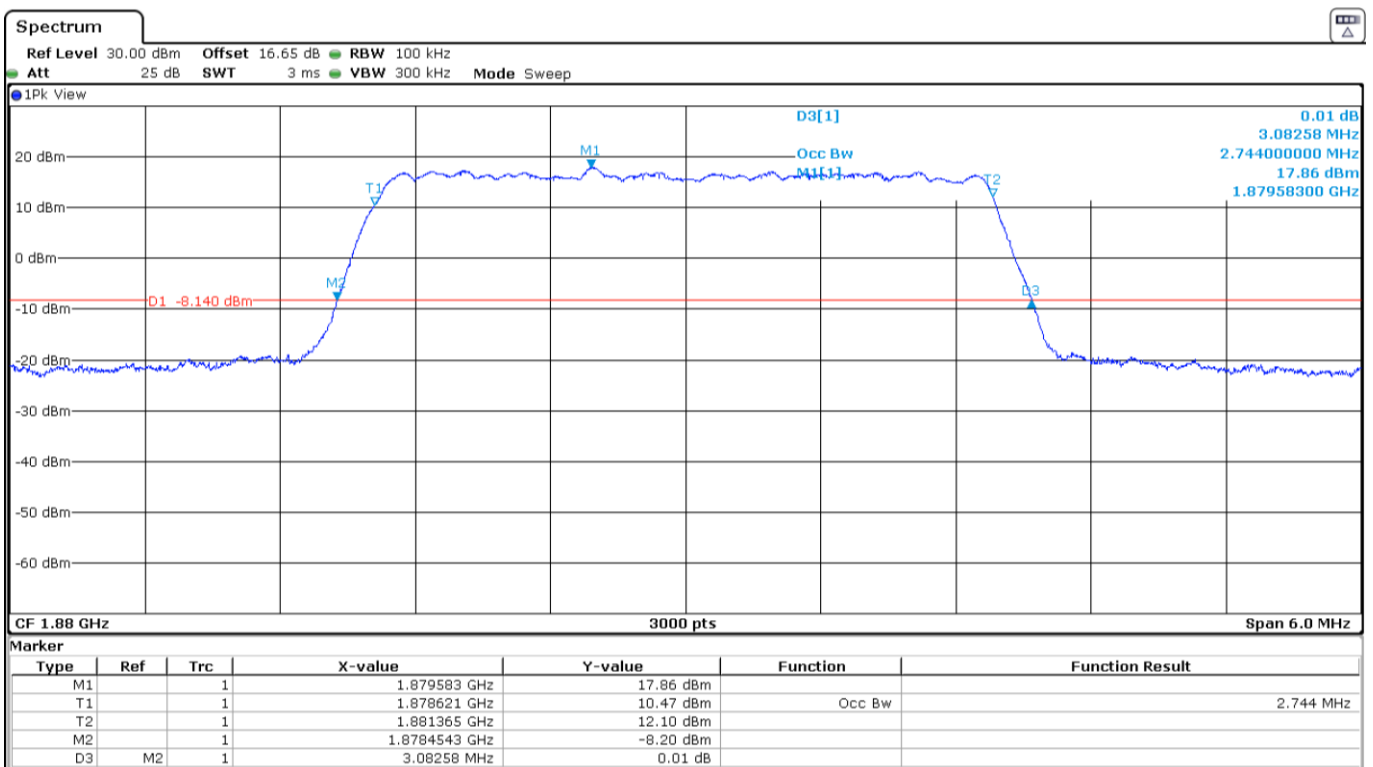


**LTE Band 2. QPSK MODULATION. BW = 3 MHz.**

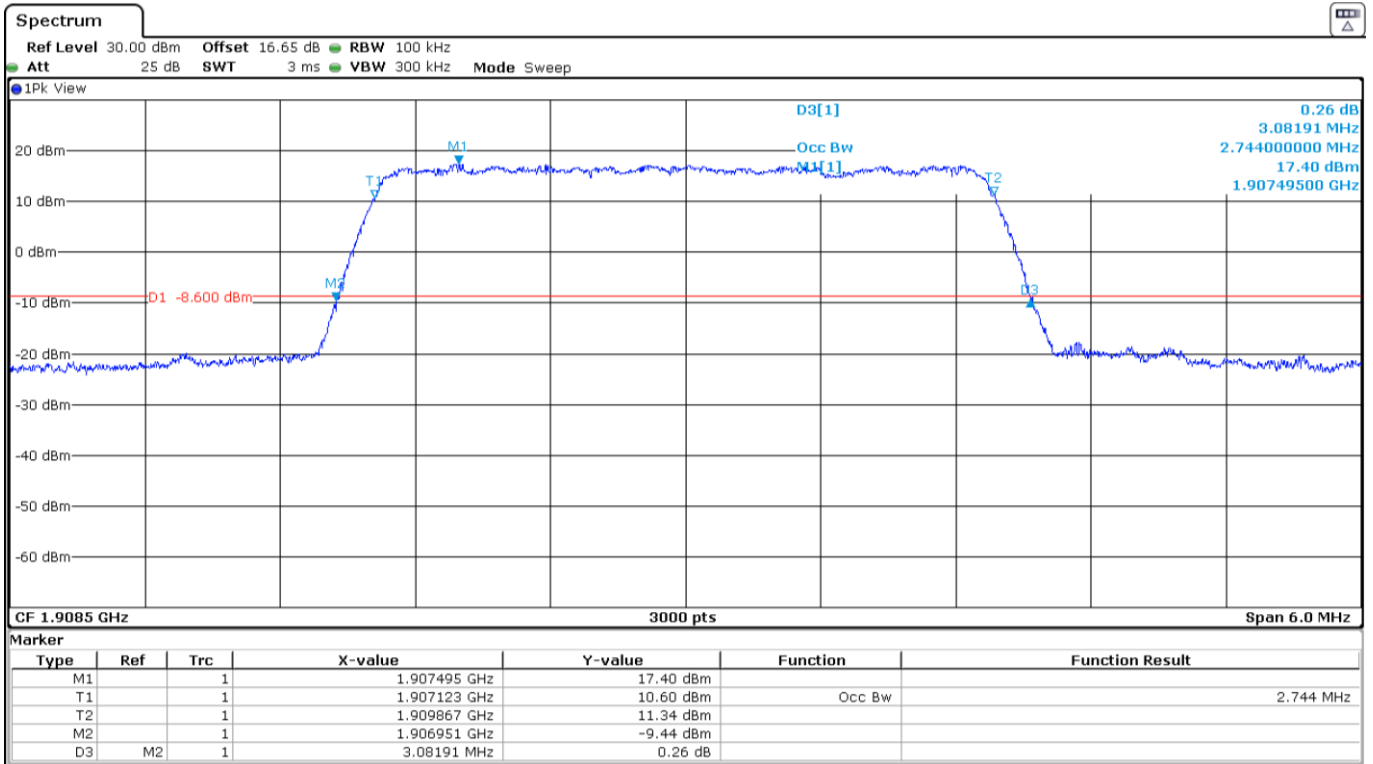
**Low Channel:**



**Middle Channel:**

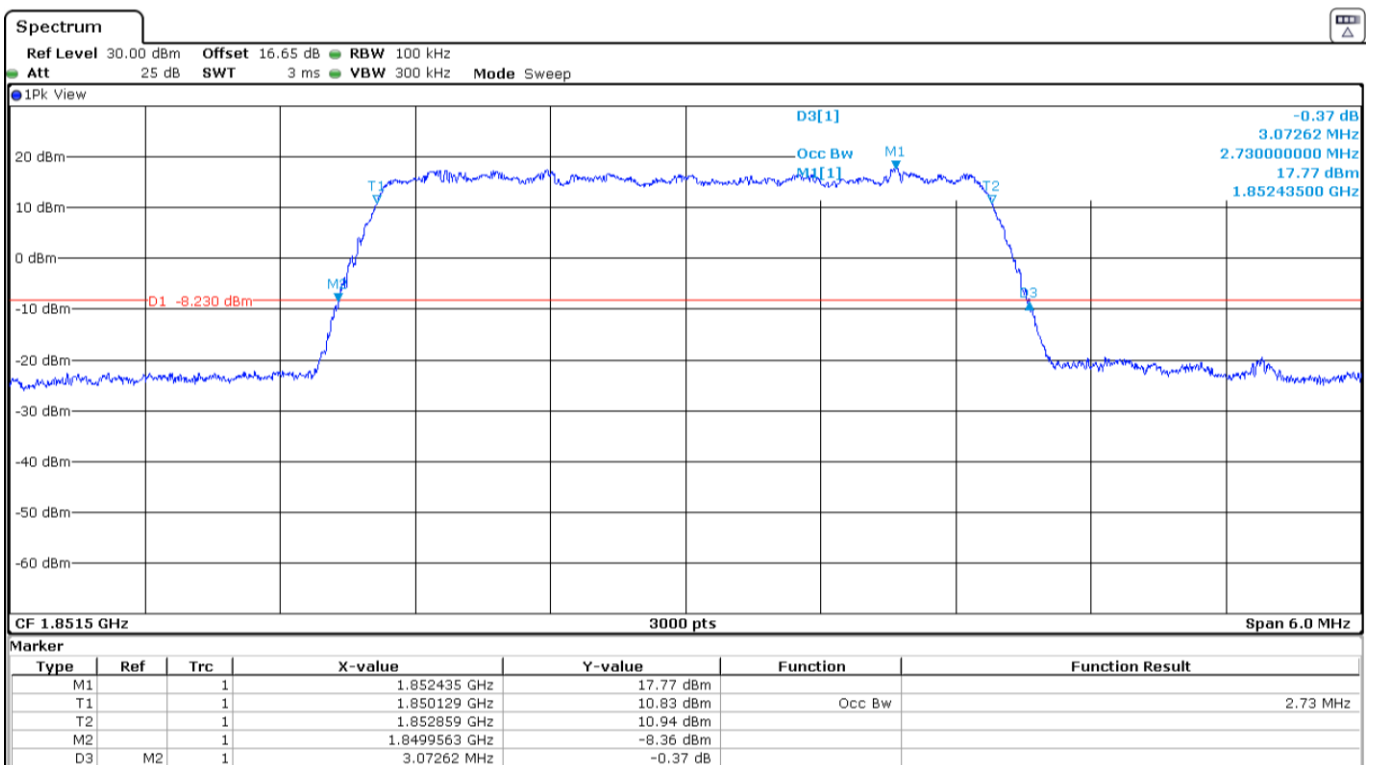


High Channel:

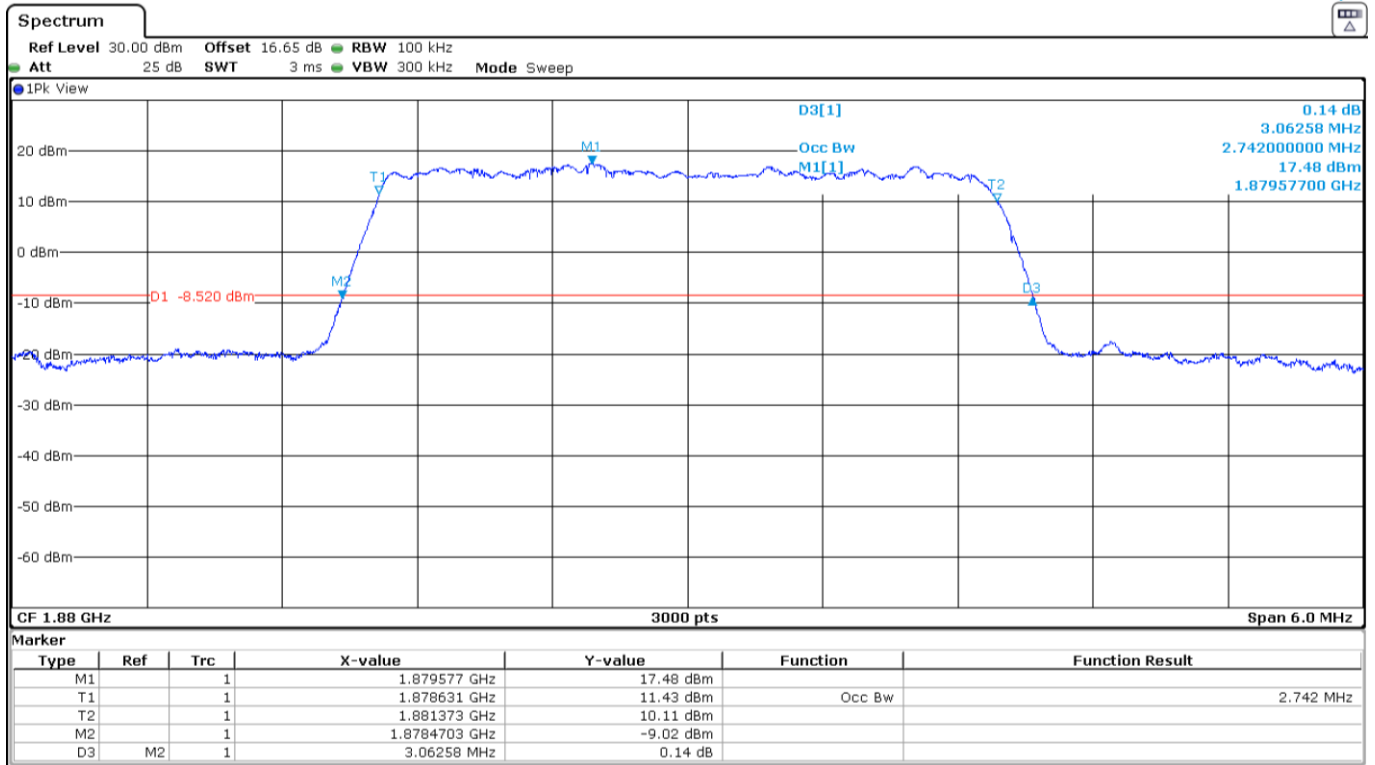


LTE Band 2. 16QAM MODULATION. BW = 3 MHz.

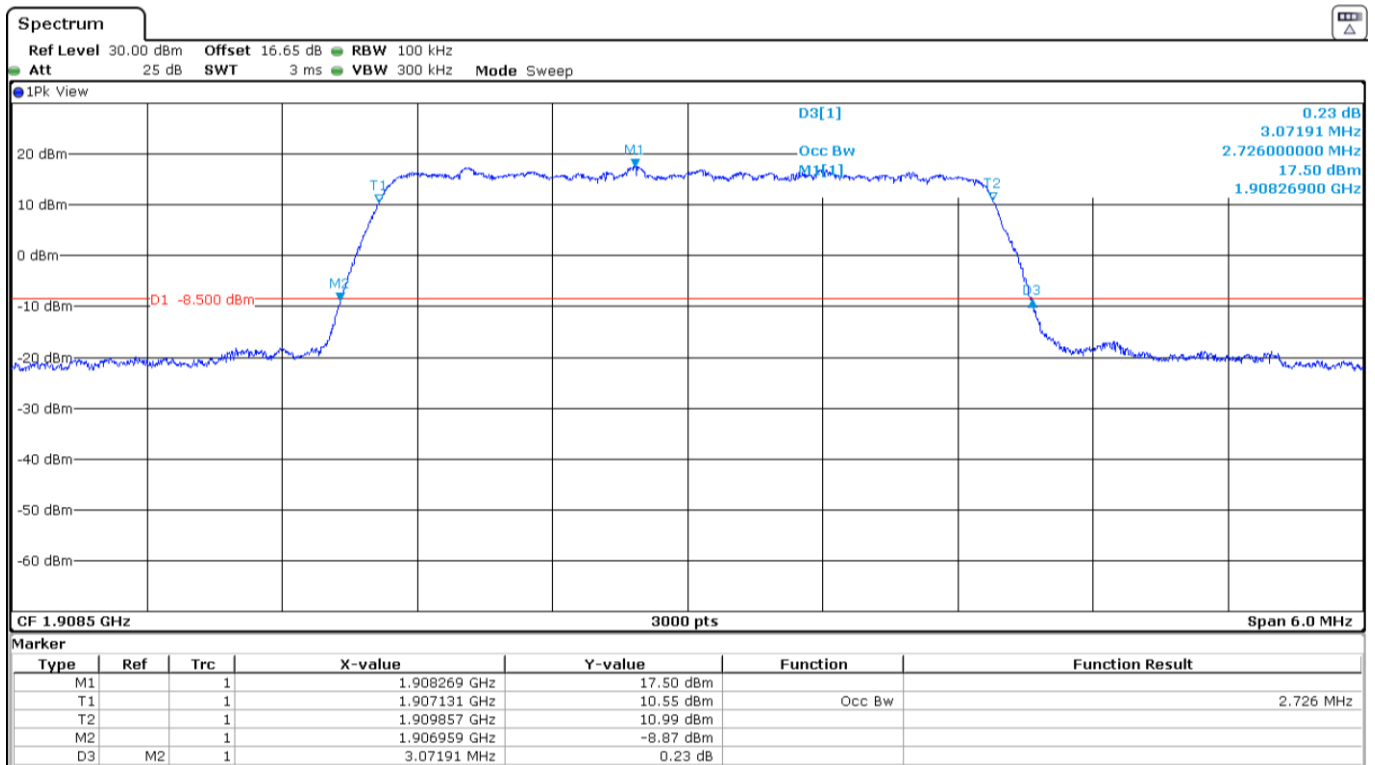
Low Channel:



Middle Channel:

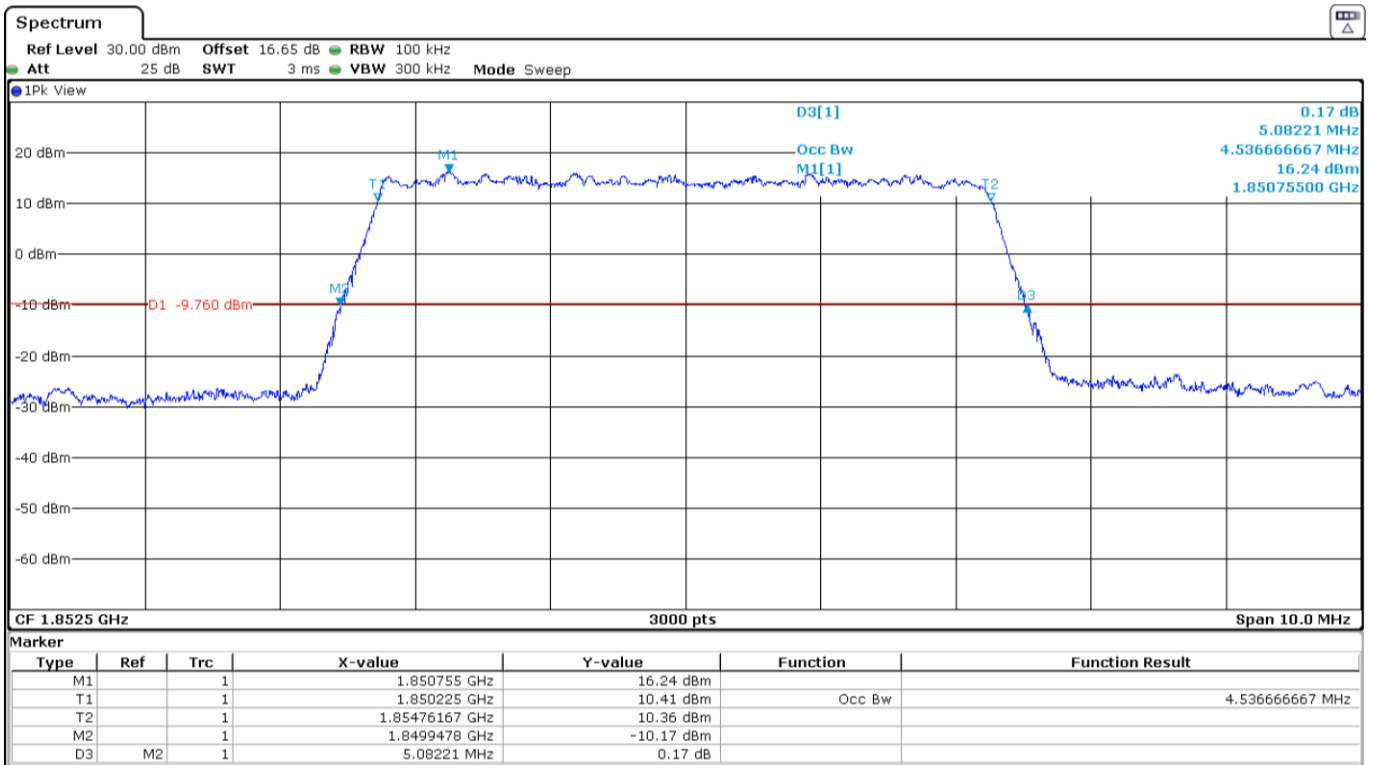


High Channel:

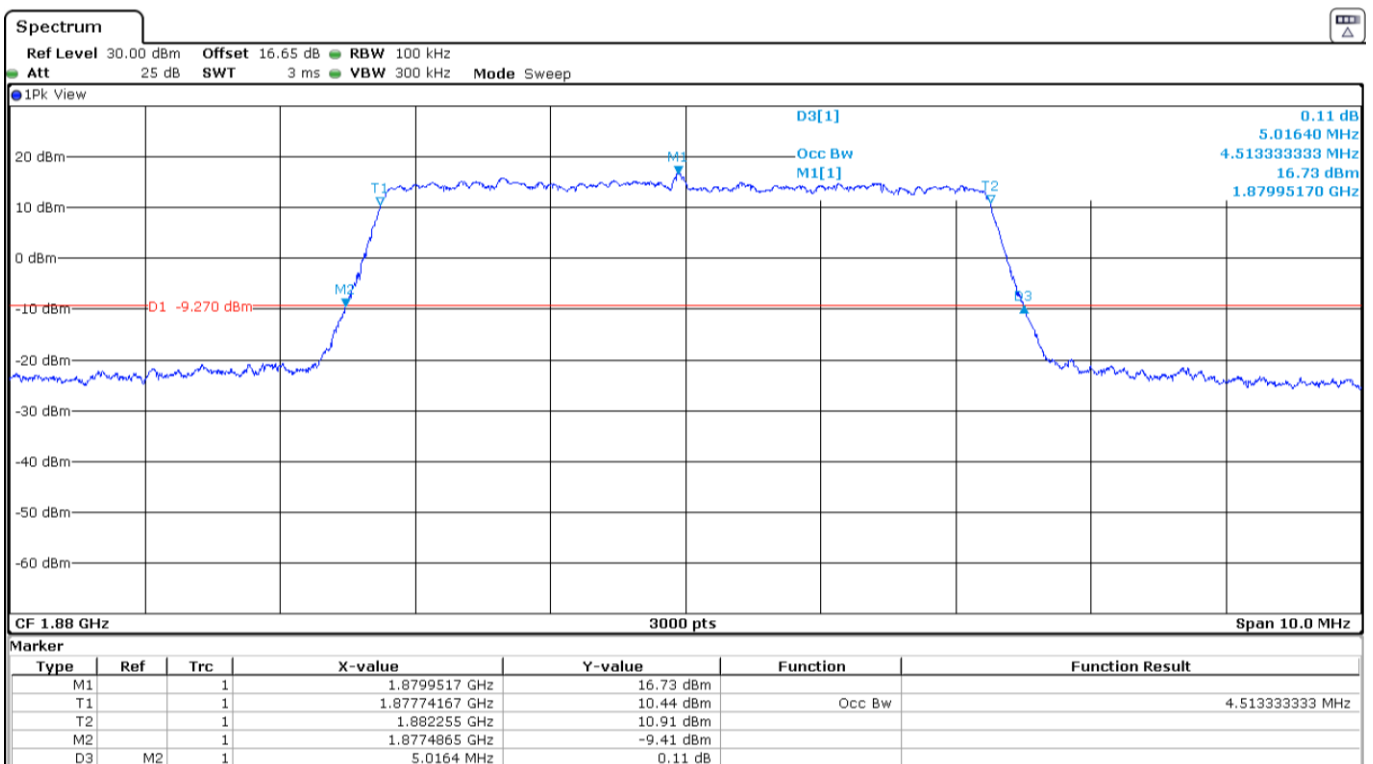


LTE Band 2. QPSK MODULATION. BW = 5 MHz.

Low Channel:

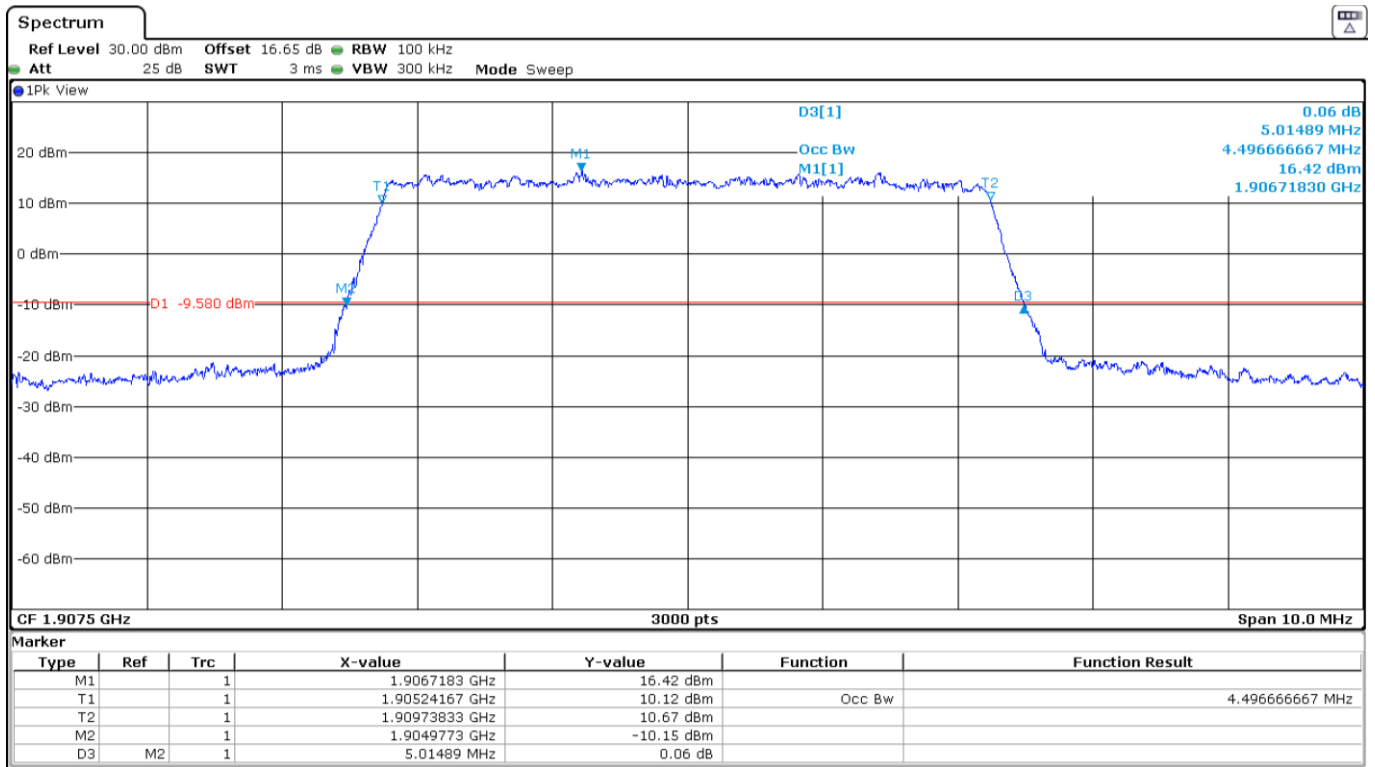


Middle Channel:



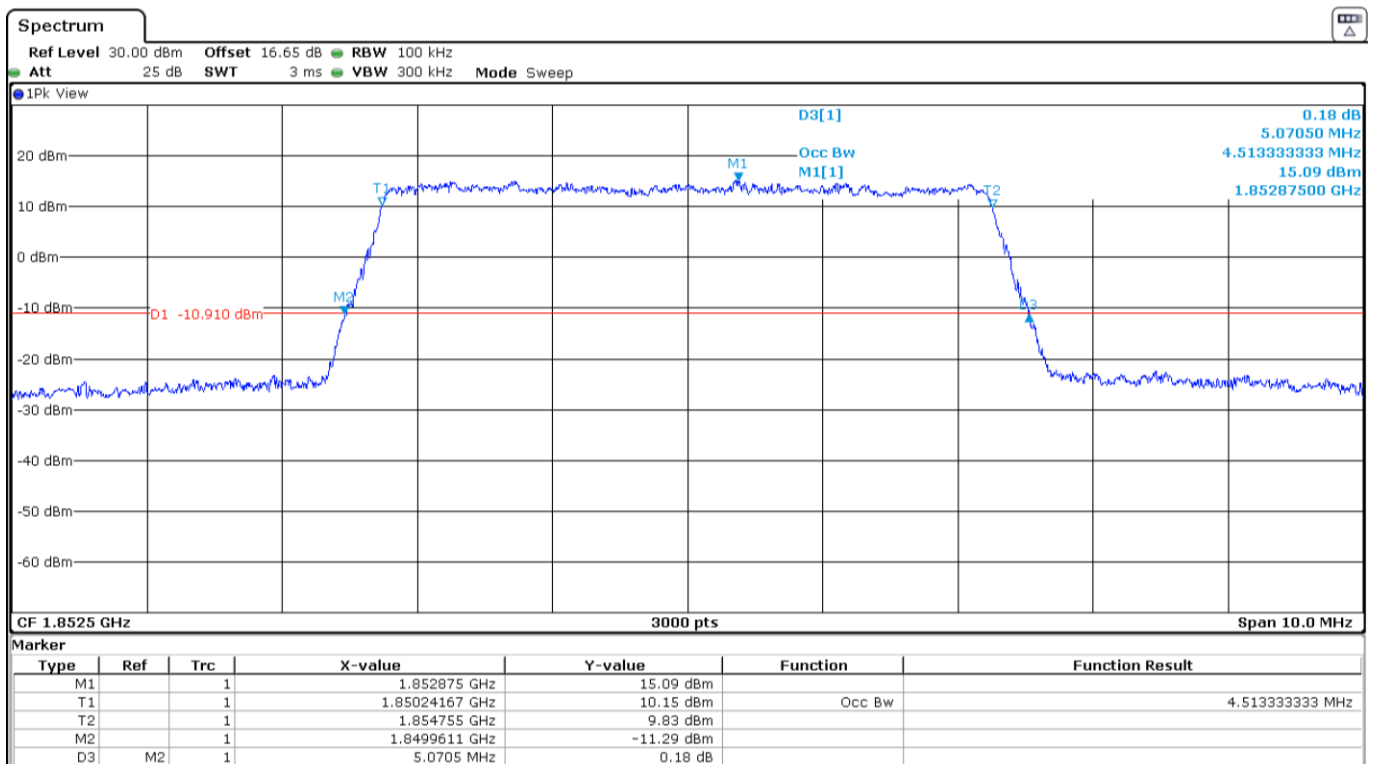


High Channel:

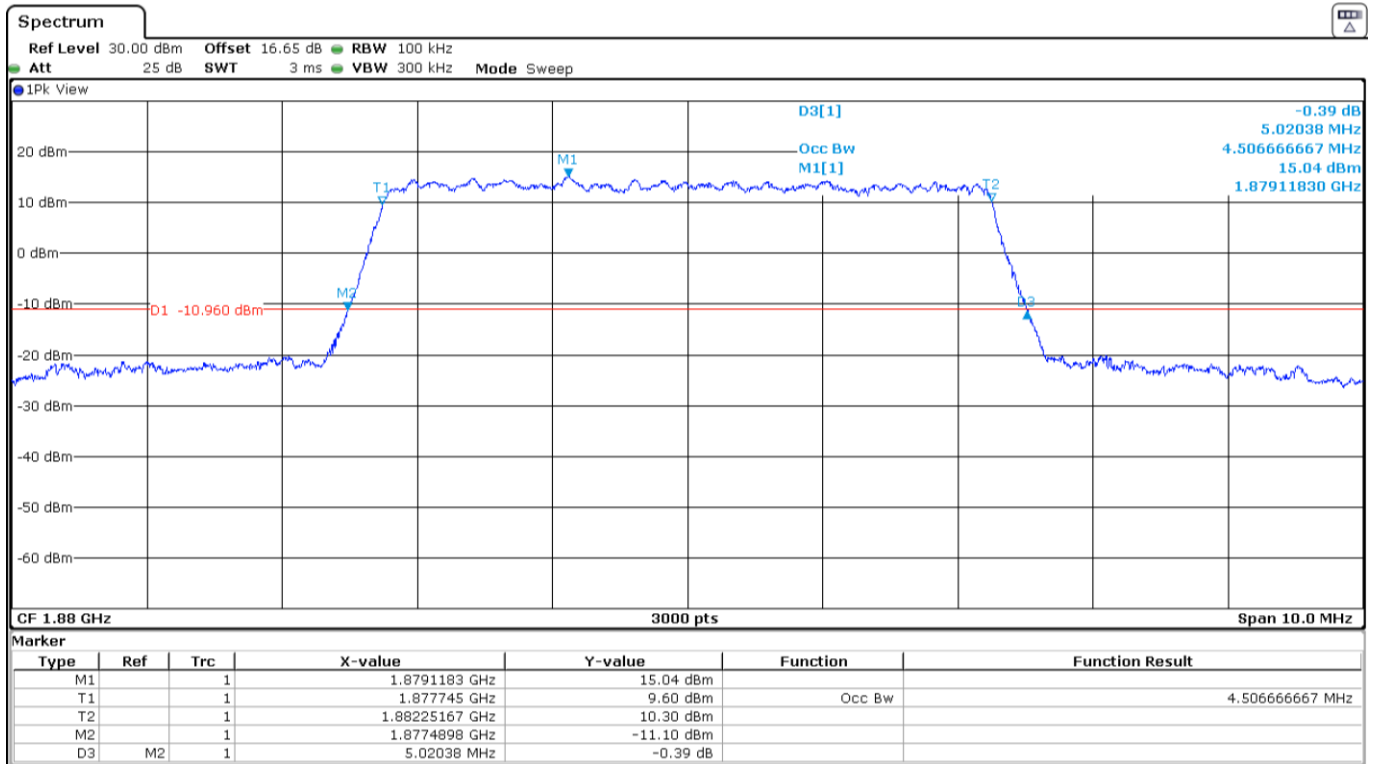


LTE Band 2. 16QAM MODULATION. BW = 5 MHz.

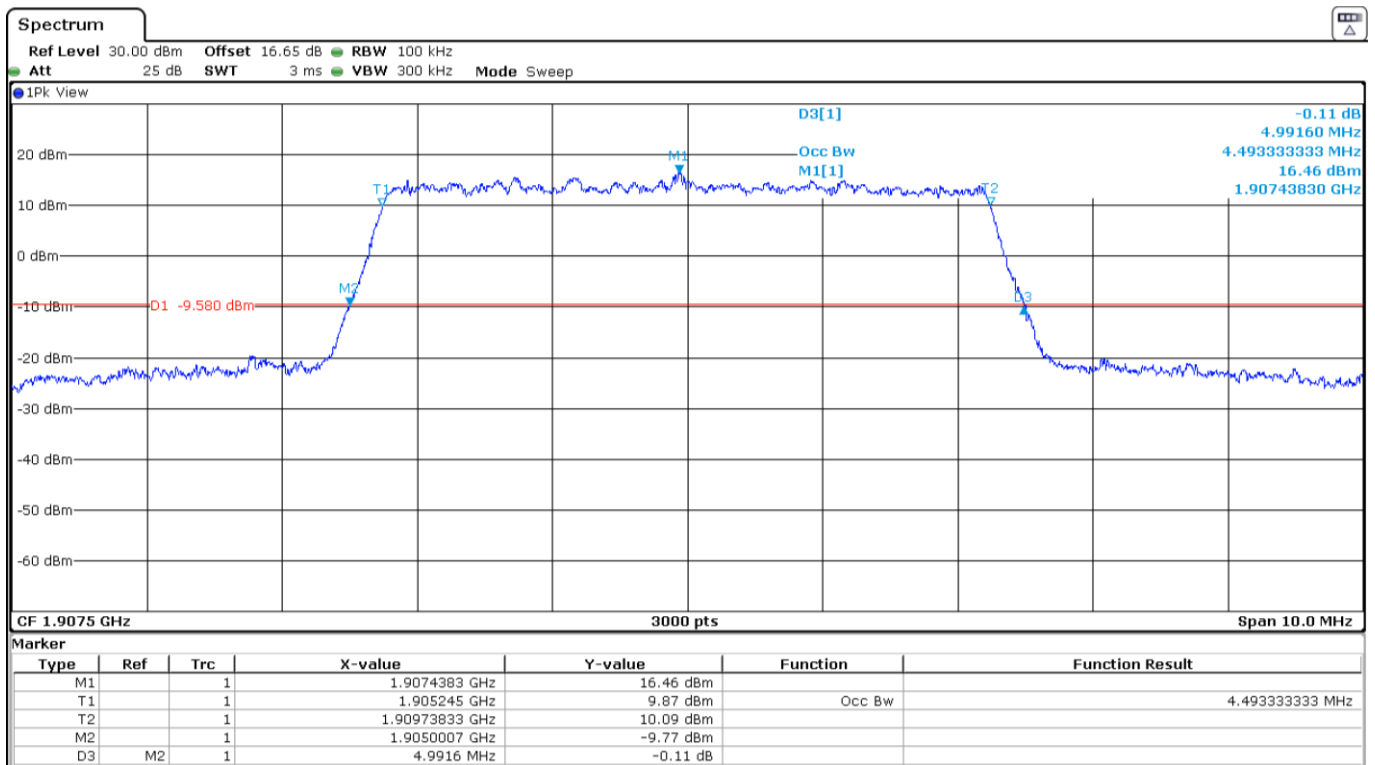
Low Channel:



Middle Channel:

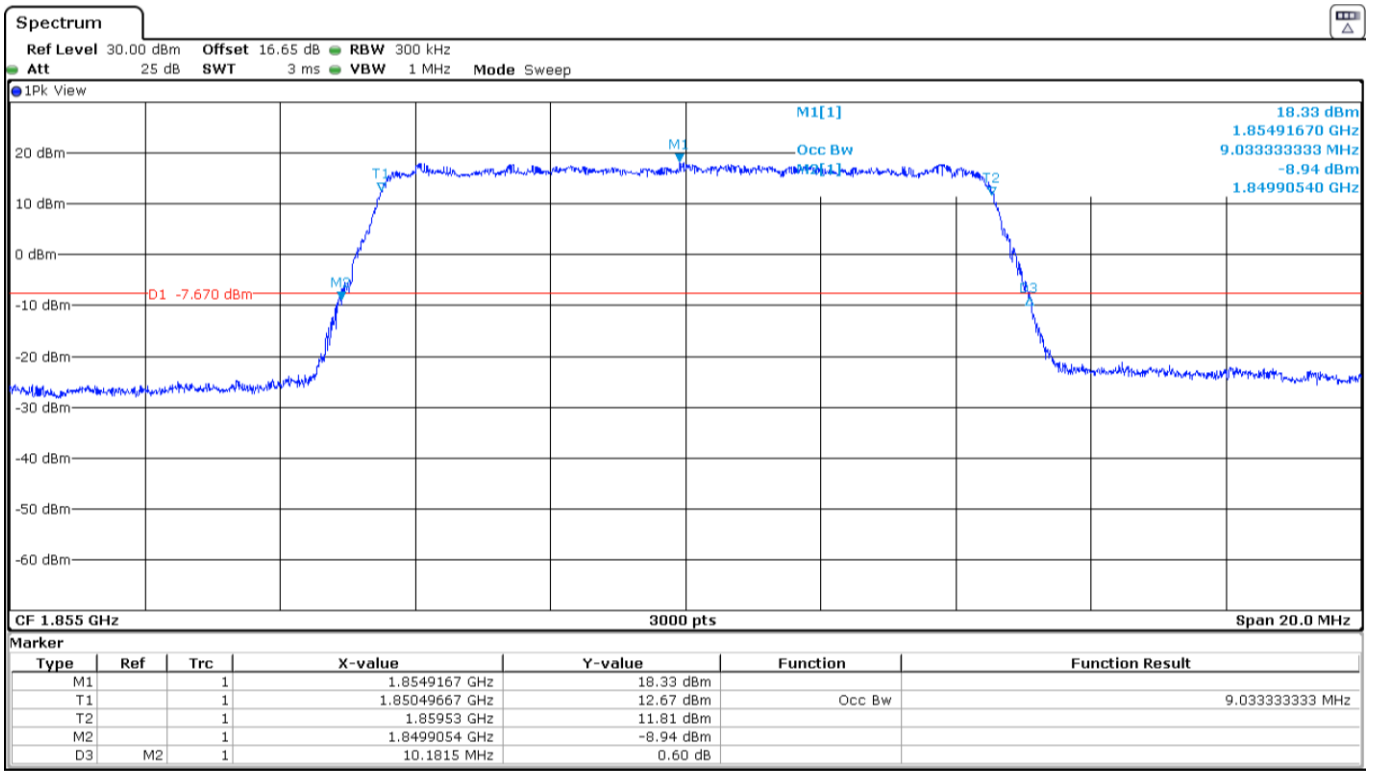


High Channel:

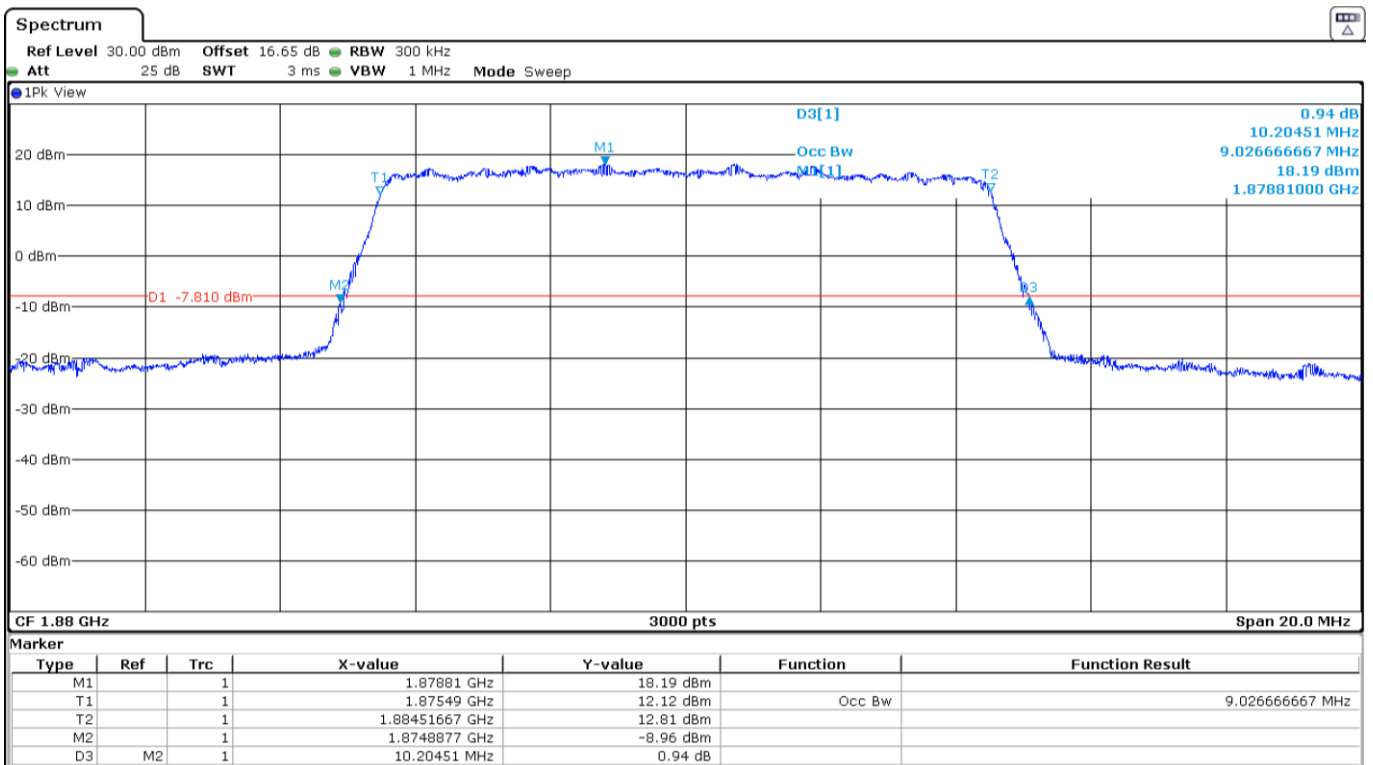


LTE Band 2. QPSK MODULATION. BW = 10 MHz.

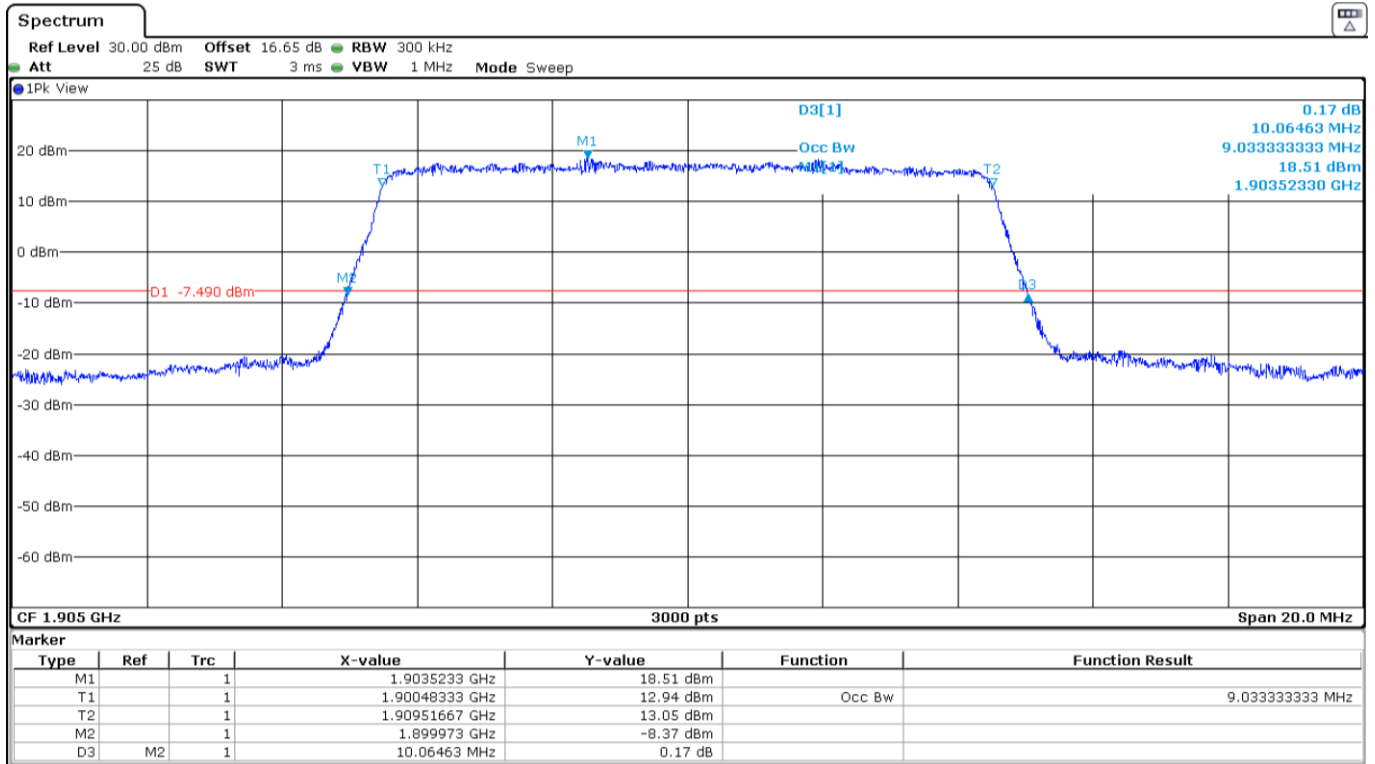
Low Channel:



Middle Channel:

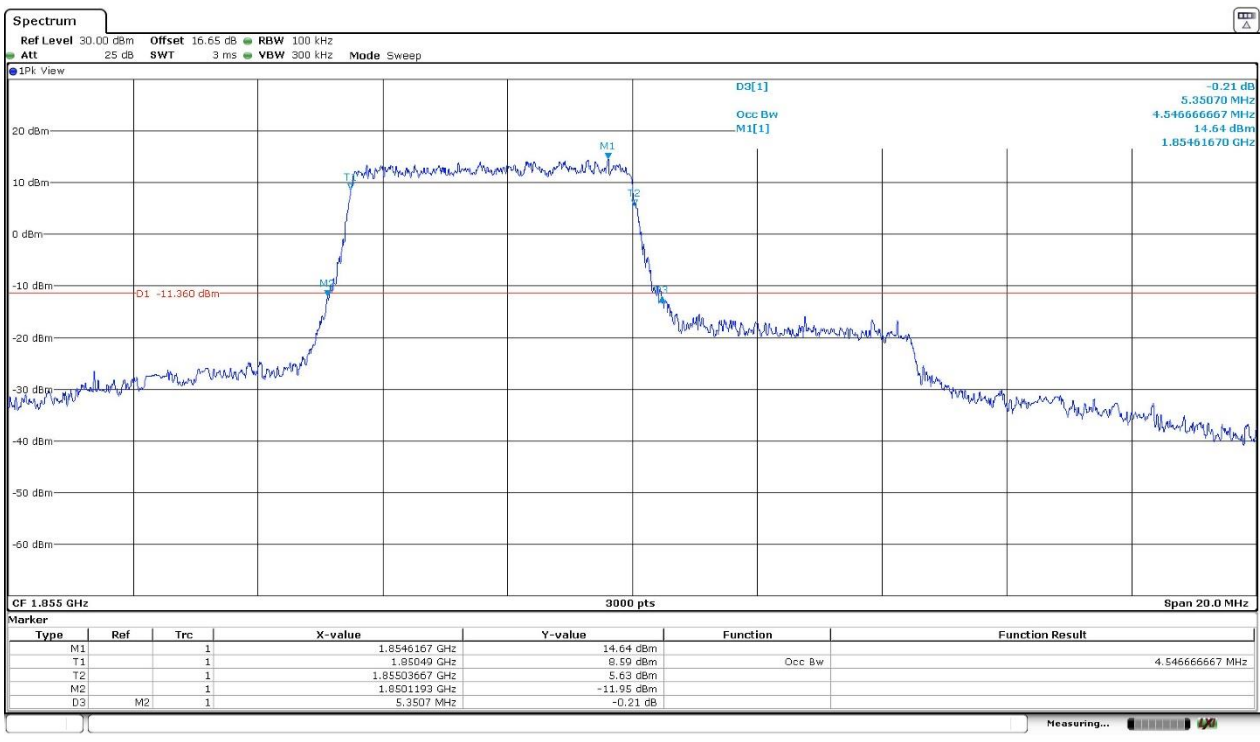


High Channel:

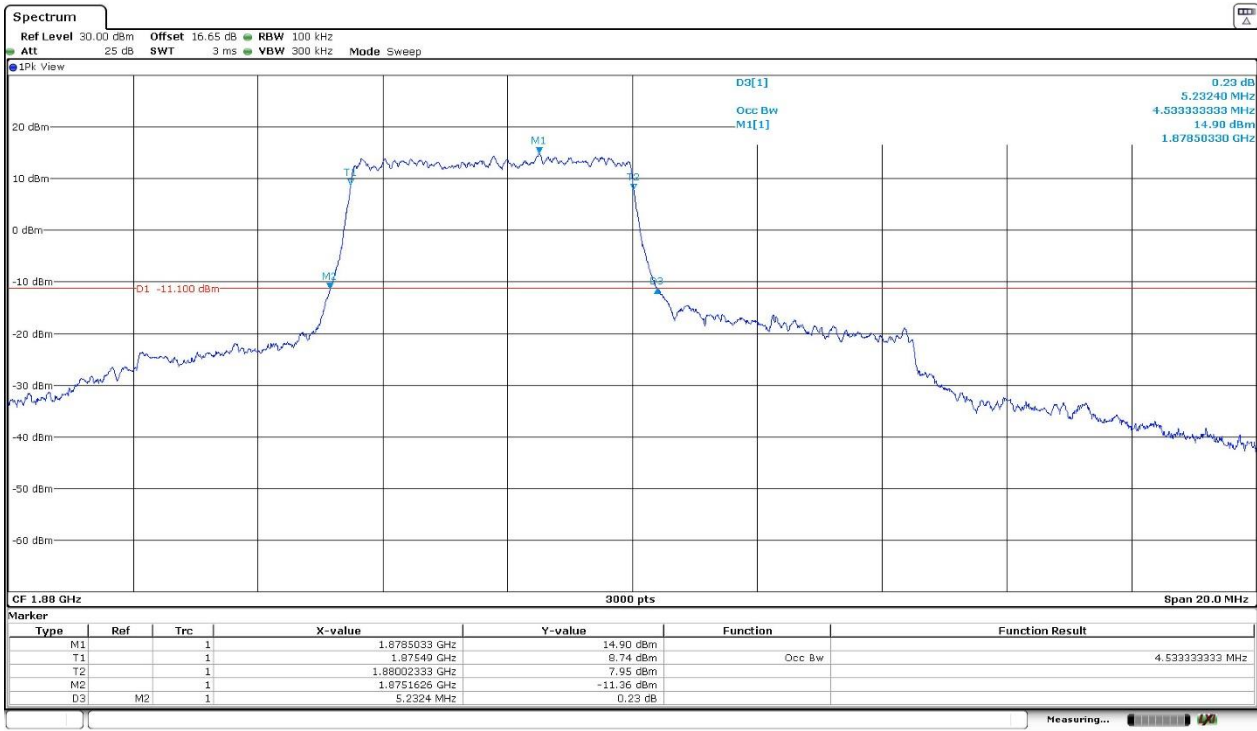


LTE Band 2. 16QAM MODULATION. BW = 10 MHz.

Low Channel:

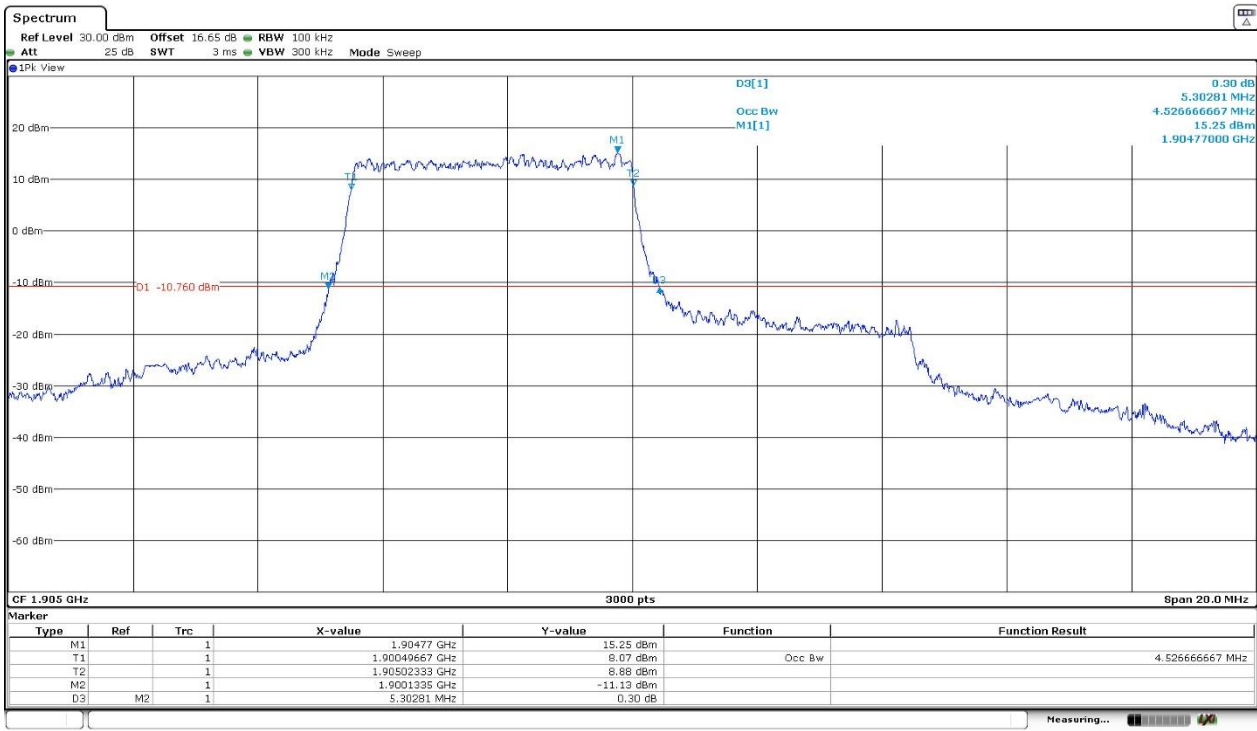


Middle Channel:



Date: 21.OCT.2020 17:29:43

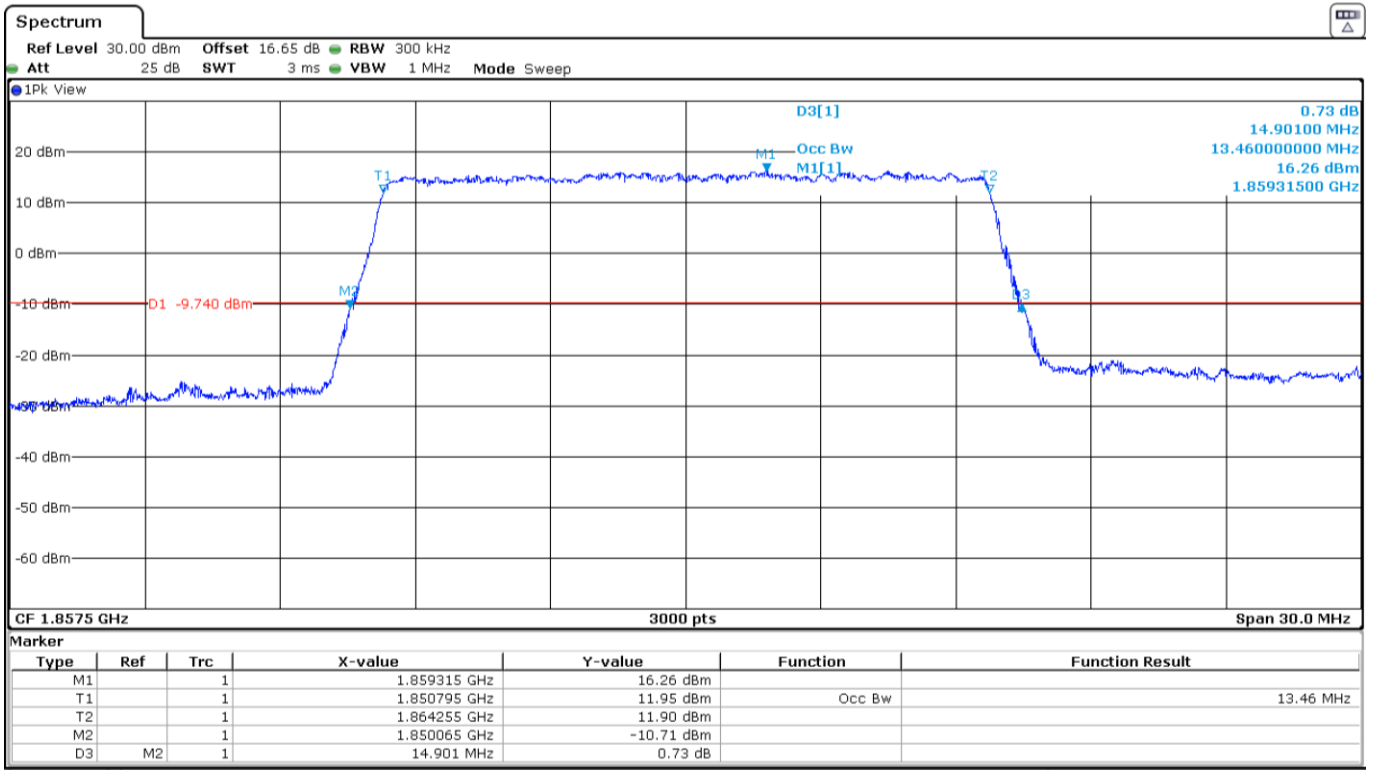
High Channel:



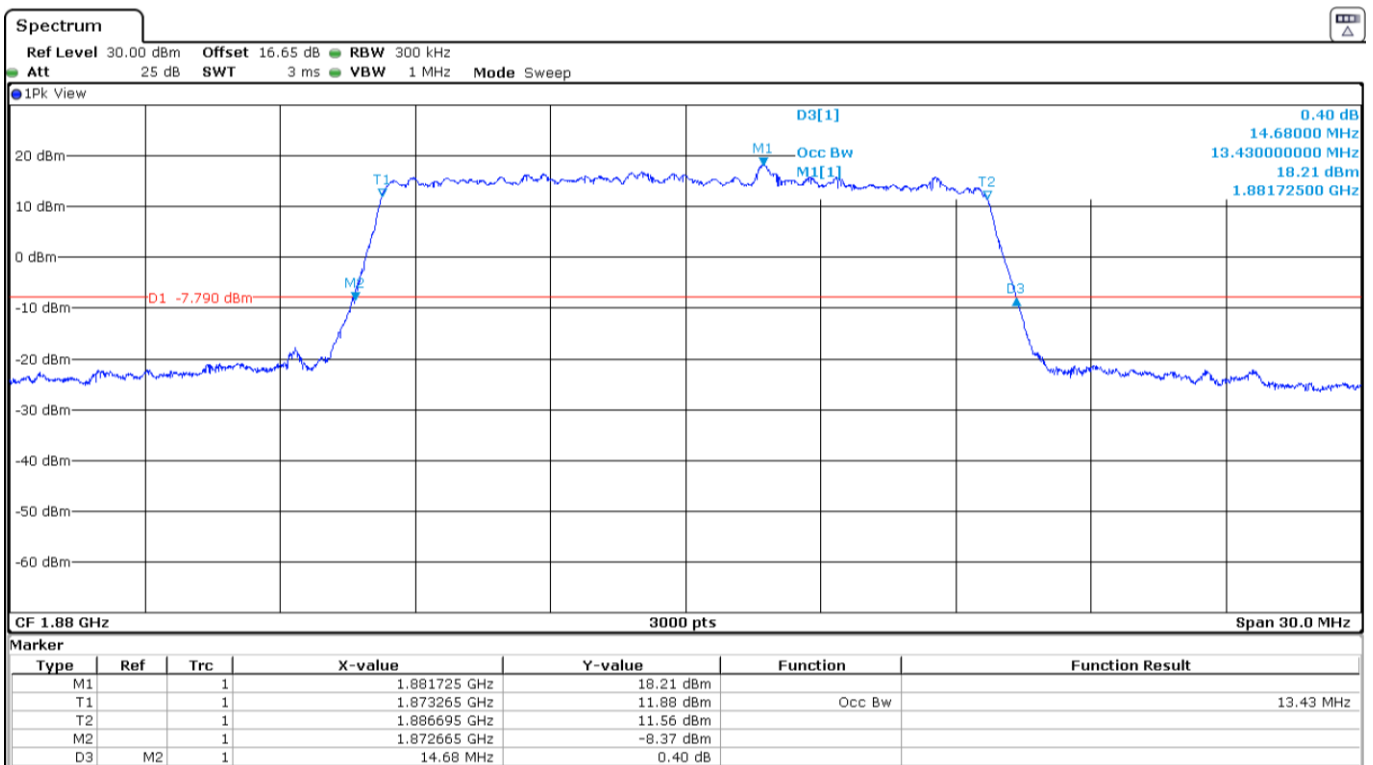
Date: 21.OCT.2020 17:32:05

**LTE Band 2. QPSK MODULATION. BW = 15 MHz.**

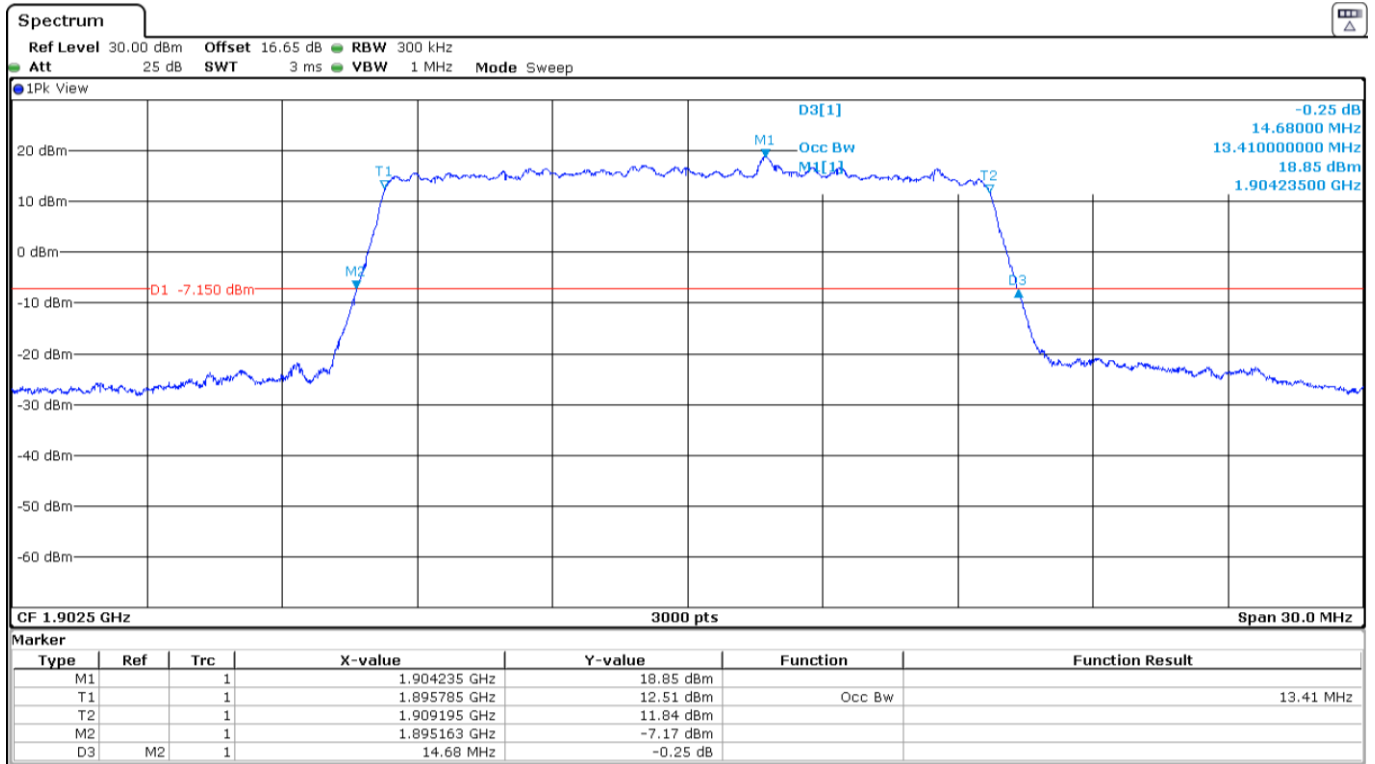
**Low Channel:**



**Middle Channel:**

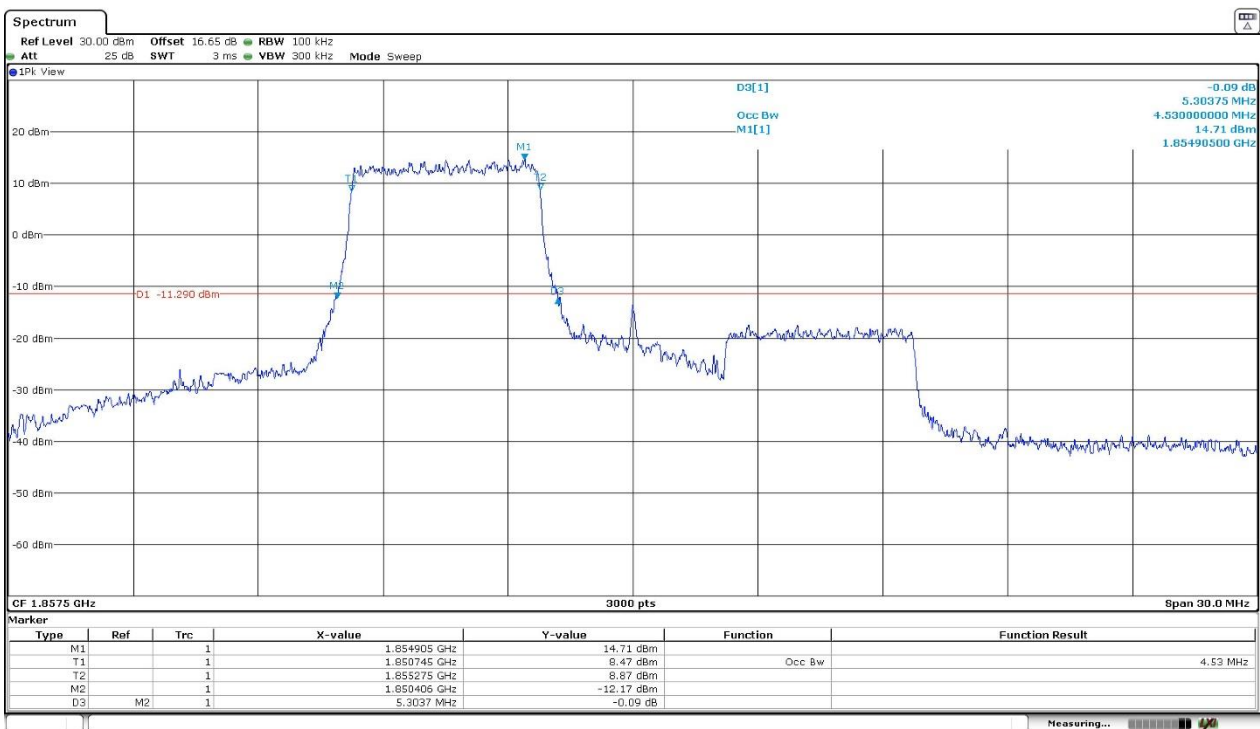


High Channel:



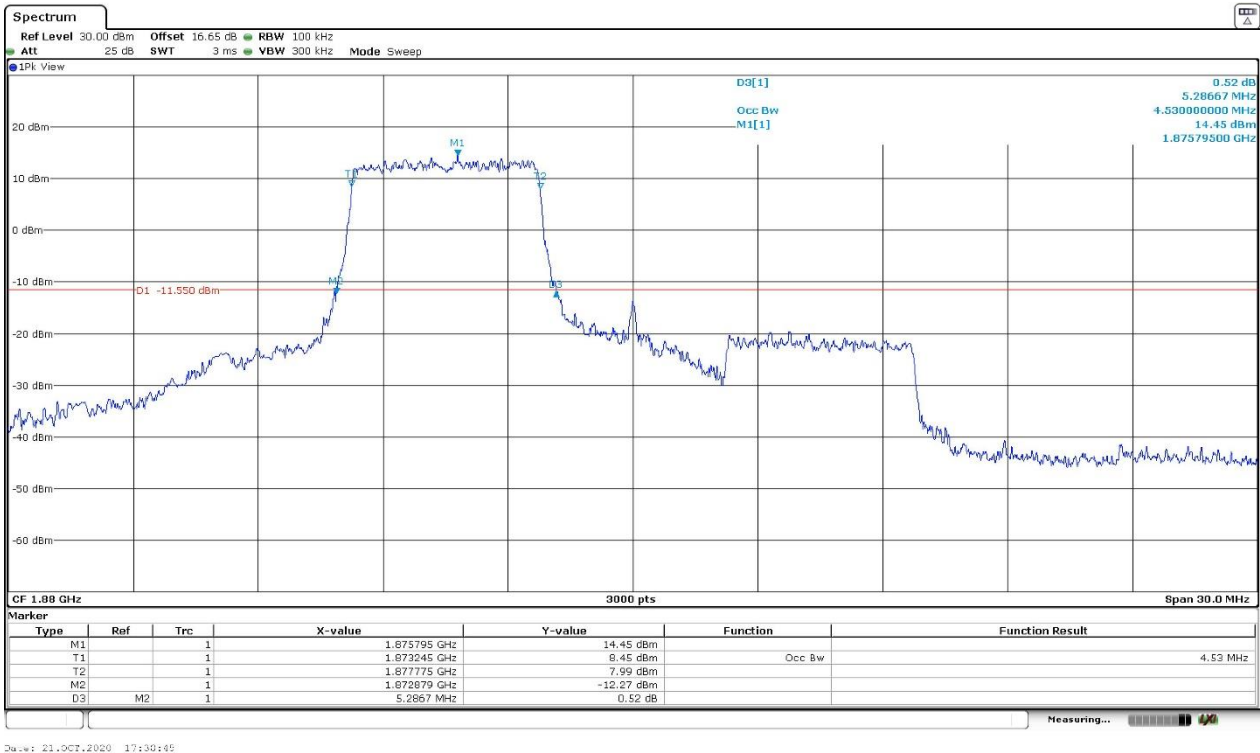
LTE Band 2. 16QAM MODULATION. BW = 15 MHz.

Low Channel:

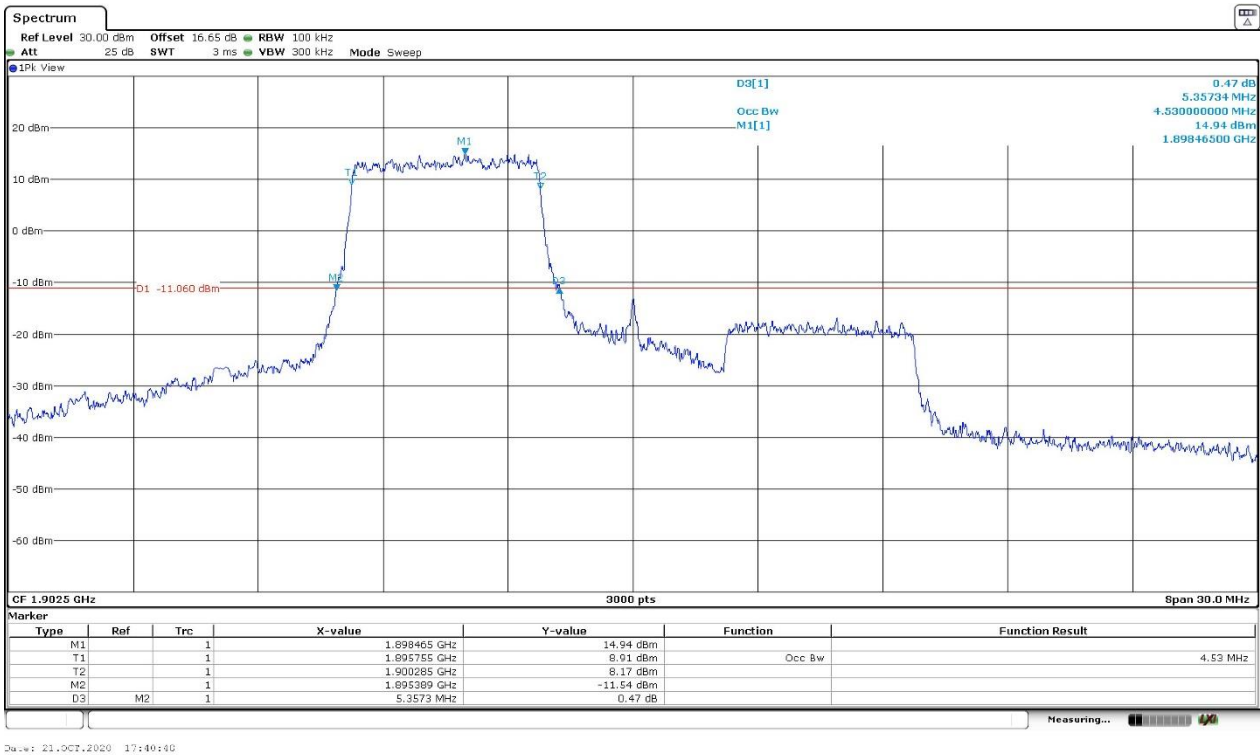


Date: 21.OCT.2020 17:36:34

Middle Channel:



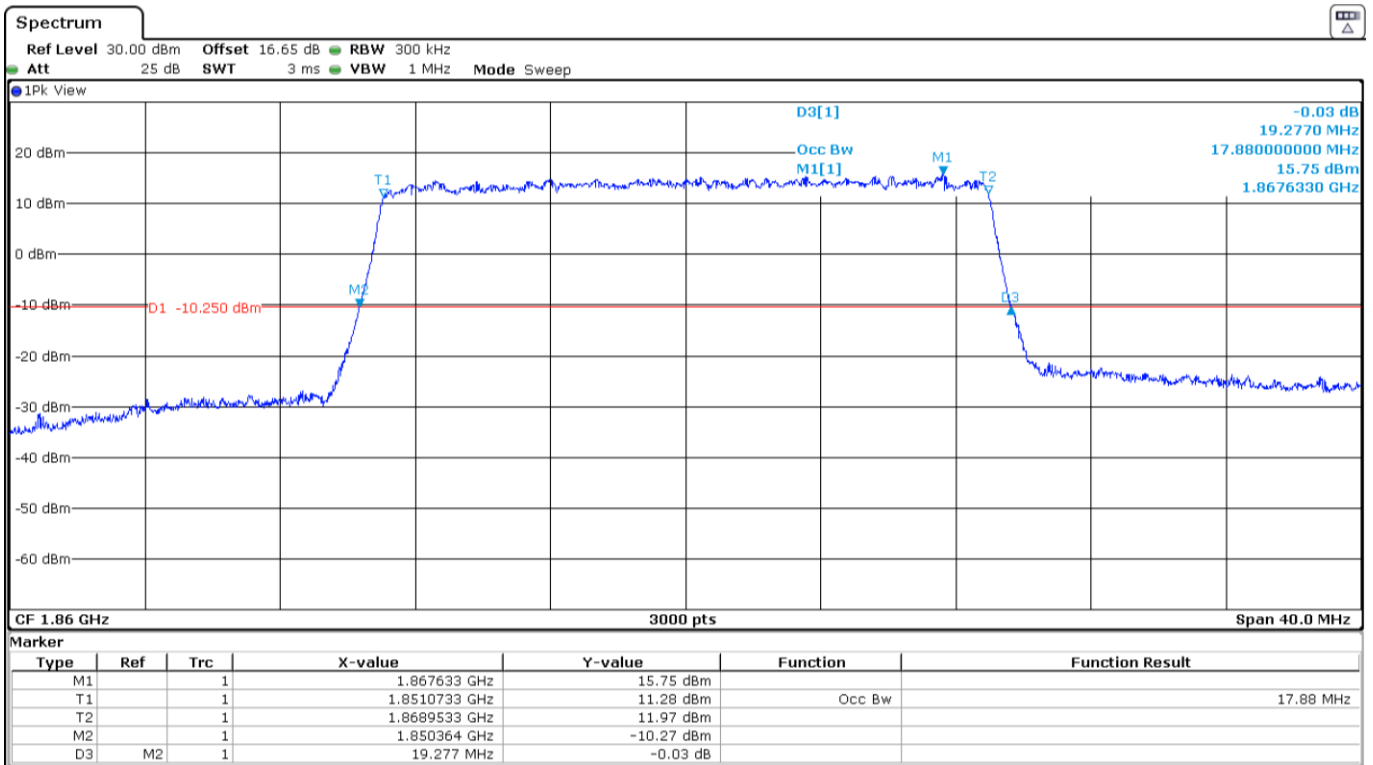
High Channel:





LTE Band 2. QPSK MODULATION. BW = 20 MHz.

Low Channel:



Middle Channel:

