

# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMit 2023.02.14.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

| Description                  | Manufacturer       | Model                 | ID  | Last Cal.  | Cal. Due   |
|------------------------------|--------------------|-----------------------|-----|------------|------------|
| Attenuator                   | S.M. Electronics   | SA26B-20              | TZP | 2022-11-06 | 2023-11-06 |
| Block - DC                   | Fairview Microwave | SD3379                | AMZ | 2022-11-06 | 2023-11-06 |
| Cable                        | Micro-Coax         | UFD150A-1-0720-200200 | MNL | 2022-09-10 | 2023-09-10 |
| Generator - Signal           | Agilent            | N5182A                | TIF | 2020-08-29 | 2023-08-29 |
| Analyzer - Spectrum Analyzer | Keysight           | N9010A                | AFN | 2023-02-02 | 2024-02-02 |

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.

Equivalent Isotropic Radiated Power (EIRP) = Max Measured Power + Antenna gain (dBi)

# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TSMTx 2022.06.03.0 XMIR 2023.02.14.0

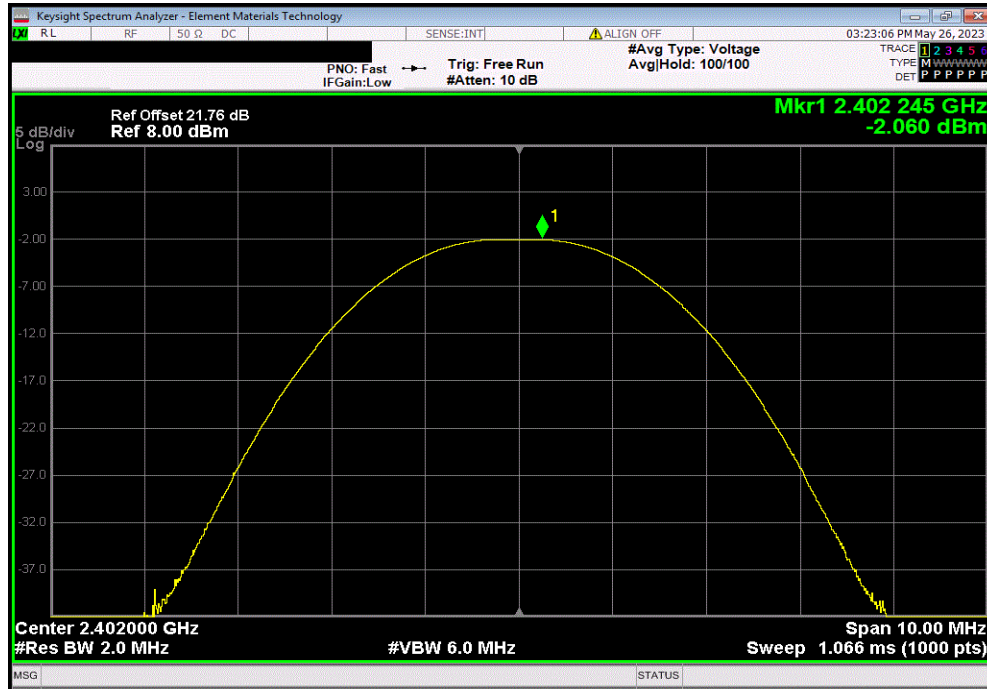
|                                                                                                                                                                                                                     |                                  |                                          |                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------------------------------|--------------------|
| EUT: TSI Inc. OmniTrak                                                                                                                                                                                              |                                  | Work Order: TSIN0196                     |                    |
| Serial Number: TSI5230200045                                                                                                                                                                                        |                                  | Date: 05/25/2023                         |                    |
| Customer: TSI, Incorporated                                                                                                                                                                                         |                                  | Temperature: 21.8°C                      |                    |
| Attendees: Micah Larson                                                                                                                                                                                             |                                  | Humidity: 40.9%                          |                    |
| Project: None                                                                                                                                                                                                       |                                  | Barometric Pres.: 1022 mbar              |                    |
| Tested by: Christopher Heintzelman                                                                                                                                                                                  | Power: Internal Battery (3.7VDC) | Job Site: MN11                           |                    |
| TEST SPECIFICATIONS                                                                                                                                                                                                 |                                  |                                          |                    |
| FCC 15.247:2023                                                                                                                                                                                                     |                                  | Test Method                              |                    |
| RSS-247 Issue 2:2017; RSS-Gen Issue 5:2018+A1:2019+A2:2021                                                                                                                                                          |                                  | ANSI C63.10:2013                         |                    |
|                                                                                                                                                                                                                     |                                  | ANSI C63.10:2013                         |                    |
| COMMENTS                                                                                                                                                                                                            |                                  |                                          |                    |
| Reference level offset includes measurement cable, attenuator, and DC block. The customer states that the USB does not charge the EUT while in the test mode, USB is for programming only. Payload length is 65535. |                                  |                                          |                    |
| DEVIATIONS FROM TEST STANDARD                                                                                                                                                                                       |                                  |                                          |                    |
| None                                                                                                                                                                                                                |                                  |                                          |                    |
| Configuration #                                                                                                                                                                                                     | TSIN0196-20                      | Signature <i>Christopher Heintzelman</i> |                    |
|                                                                                                                                                                                                                     |                                  | Out Pwr (dBm)                            | Antenna Gain (dBi) |
|                                                                                                                                                                                                                     |                                  | EIRP (dBm)                               | EIRP Limit (dBm)   |
|                                                                                                                                                                                                                     |                                  |                                          | Result             |
| BLE/GFSK 125 kbps                                                                                                                                                                                                   |                                  |                                          |                    |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -2.06                                    | 0.17               |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz            | -2.081                                   | 0.17               |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -2.042                                   | 0.17               |
| BLE/GFSK 500 kbps                                                                                                                                                                                                   |                                  |                                          |                    |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -1.993                                   | 0.17               |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz            | -2.029                                   | 0.17               |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -1.976                                   | 0.17               |
| BLE/GFSK 1 Mbps                                                                                                                                                                                                     |                                  |                                          |                    |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -2.004                                   | 0.17               |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz            | -2.021                                   | 0.17               |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -1.959                                   | 0.17               |
| BLE/GFSK 2 Mbps                                                                                                                                                                                                     |                                  |                                          |                    |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -1.901                                   | 0.17               |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz            | -1.899                                   | 0.17               |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -1.848                                   | 0.17               |

# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

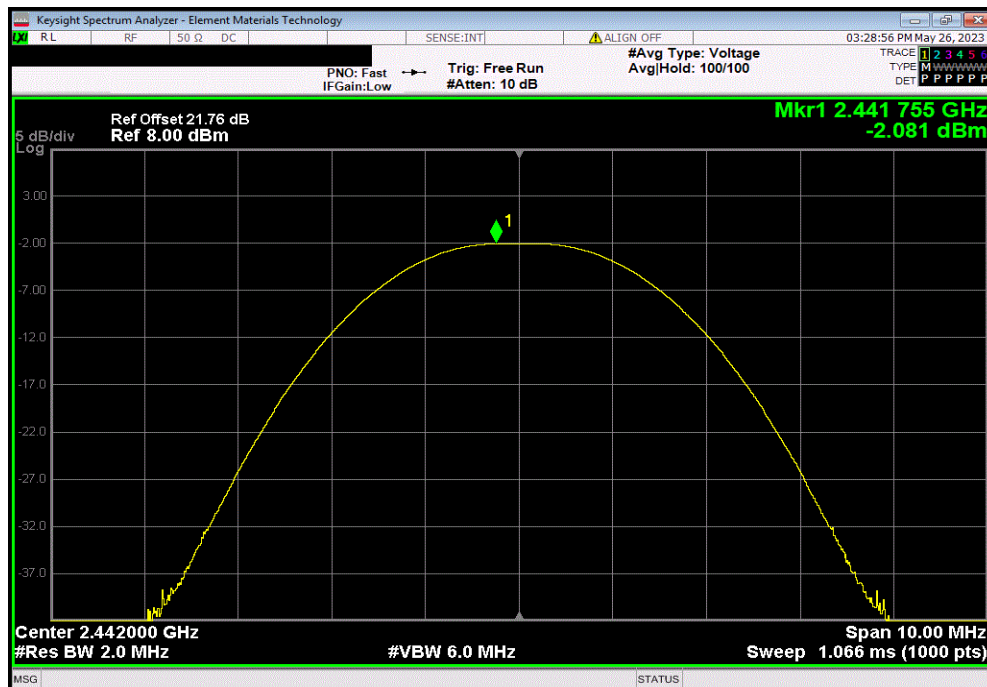


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 125 kbps, Low Channel, 2402 MHz |               |                    |            |                  |        |  |
|------------------------------------------|---------------|--------------------|------------|------------------|--------|--|
|                                          | Out Pwr (dBm) | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |
|                                          | -2.06         | 0.17               | -1.89      | 36               | Pass   |  |



| BLE/GFSK 125 kbps, Mid Channel, 2442 MHz |               |                    |            |                  |        |  |
|------------------------------------------|---------------|--------------------|------------|------------------|--------|--|
|                                          | Out Pwr (dBm) | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |
|                                          | -2.081        | 0.17               | -1.911     | 36               | Pass   |  |

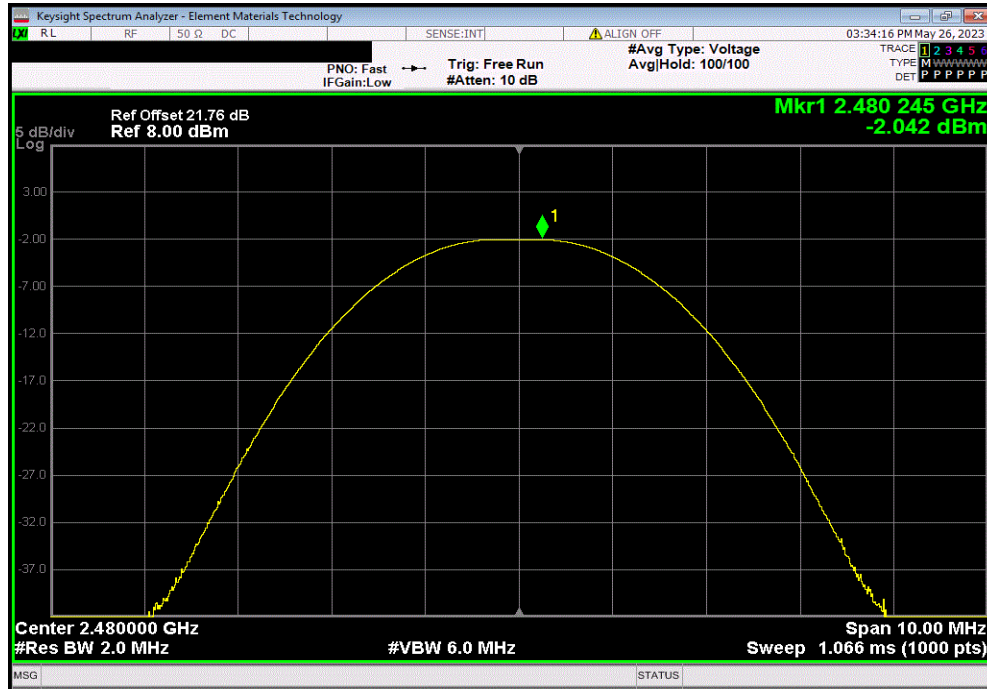


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

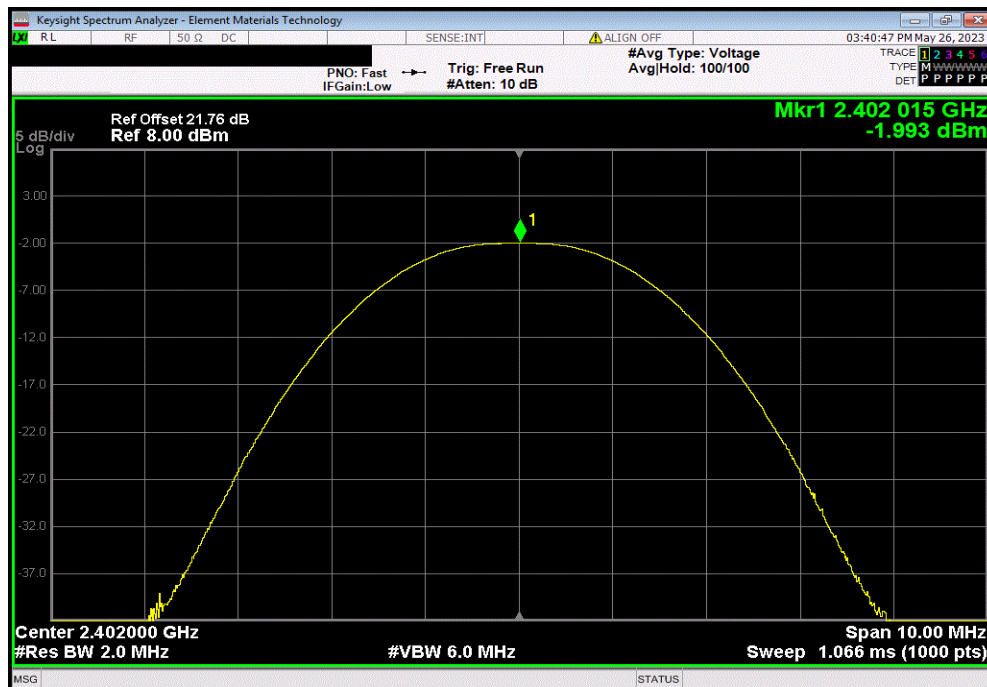


TbTtx 2022.06.03.0 XMR 2023.02.14.0

| BLE/GFSK 125 kbps, High Channel, 2480 MHz |                    |            |                  |        |  |  |
|-------------------------------------------|--------------------|------------|------------------|--------|--|--|
| Out Pwr (dBm)                             | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |  |
| -2.042                                    | 0.17               | -1.872     | 36               | Pass   |  |  |



| BLE/GFSK 500 kbps, Low Channel, 2402 MHz |                    |            |                  |        |  |  |
|------------------------------------------|--------------------|------------|------------------|--------|--|--|
| Out Pwr (dBm)                            | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |  |
| -1.993                                   | 0.17               | -1.823     | 36               | Pass   |  |  |

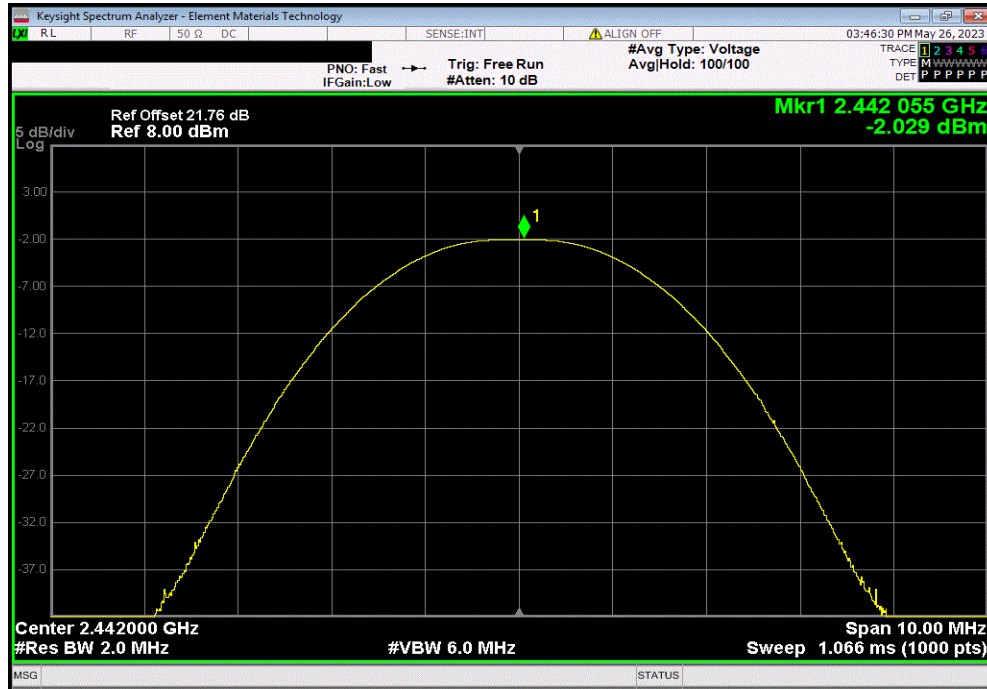


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

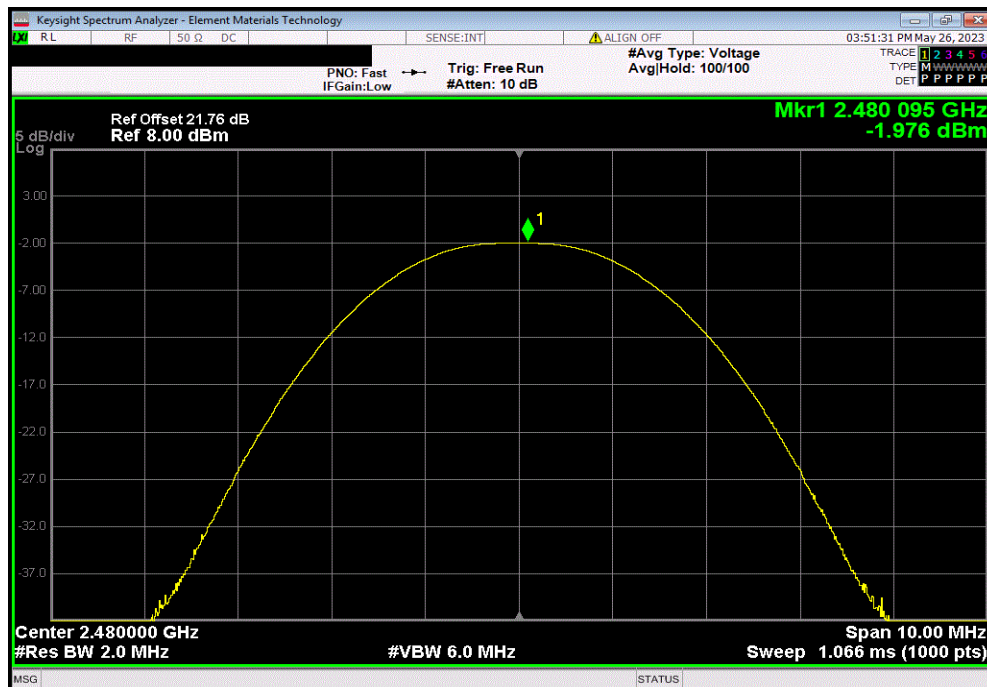


TbTx 2022.06.03.0 XbTx 2023.02.14.0

| BLE/GFSK 500 kbps, Mid Channel, 2442 MHz |                    |            |                  |        |  |  |
|------------------------------------------|--------------------|------------|------------------|--------|--|--|
| Out Pwr (dBm)                            | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |  |
| -2.029                                   | 0.17               | -1.859     | 36               | Pass   |  |  |



| BLE/GFSK 500 kbps, High Channel, 2480 MHz |                    |            |                  |        |  |  |
|-------------------------------------------|--------------------|------------|------------------|--------|--|--|
| Out Pwr (dBm)                             | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |  |
| -1.976                                    | 0.17               | -1.806     | 36               | Pass   |  |  |

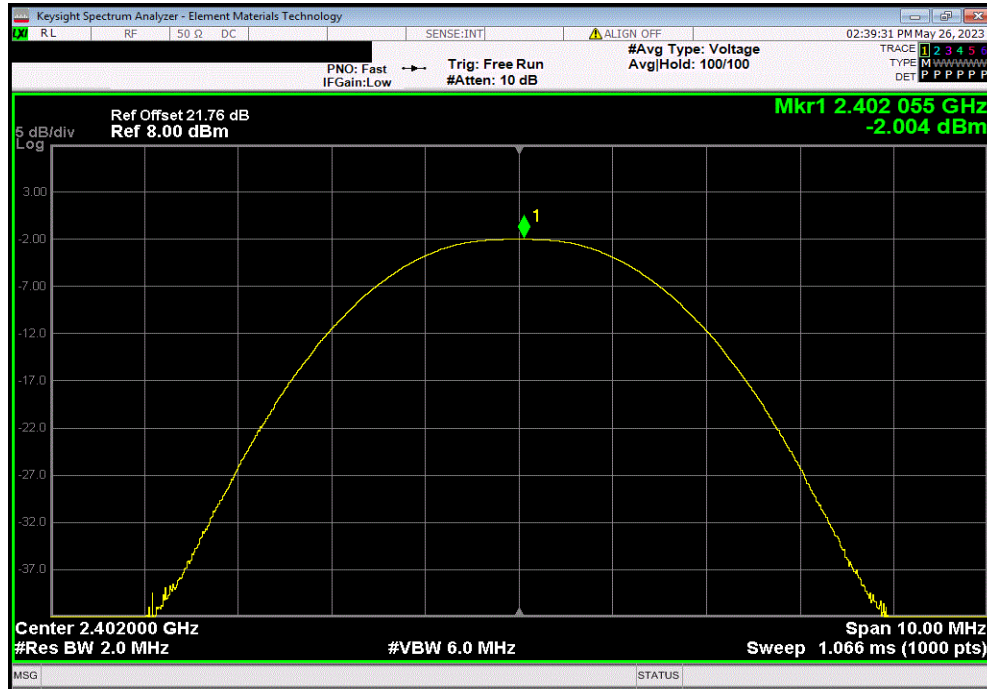


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

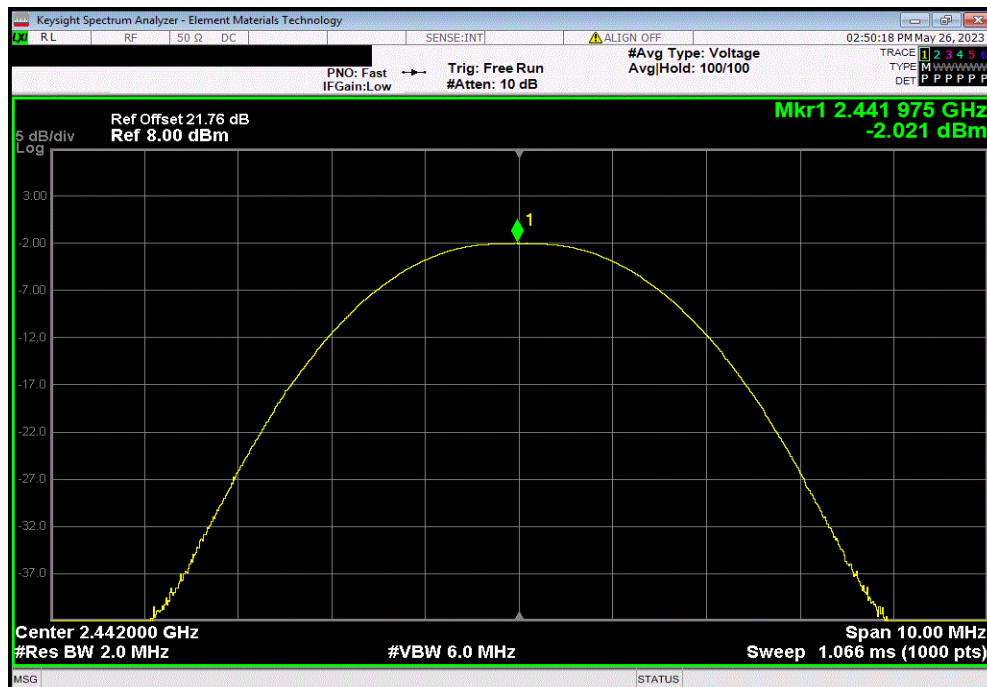


TbTx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 1 Mbps, Low Channel, 2402 MHz |                    |            |                  |        |  |  |
|----------------------------------------|--------------------|------------|------------------|--------|--|--|
| Out Pwr (dBm)                          | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |  |
| -2.004                                 | 0.17               | -1.834     | 36               | Pass   |  |  |



| BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz |                    |            |                  |        |  |  |
|----------------------------------------|--------------------|------------|------------------|--------|--|--|
| Out Pwr (dBm)                          | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |  |
| -2.021                                 | 0.17               | -1.851     | 36               | Pass   |  |  |

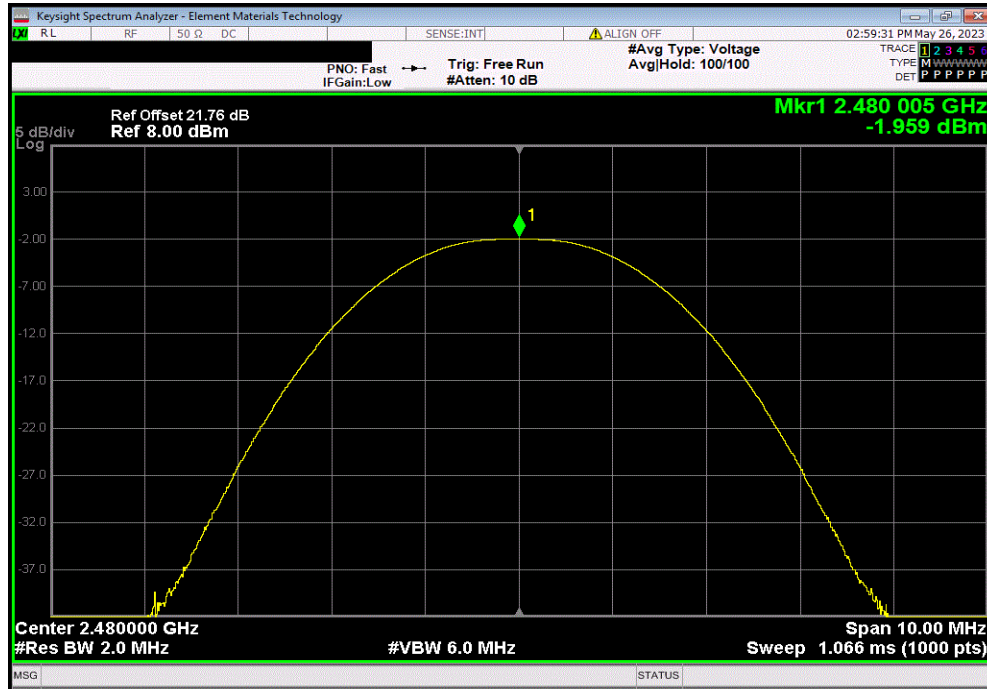


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

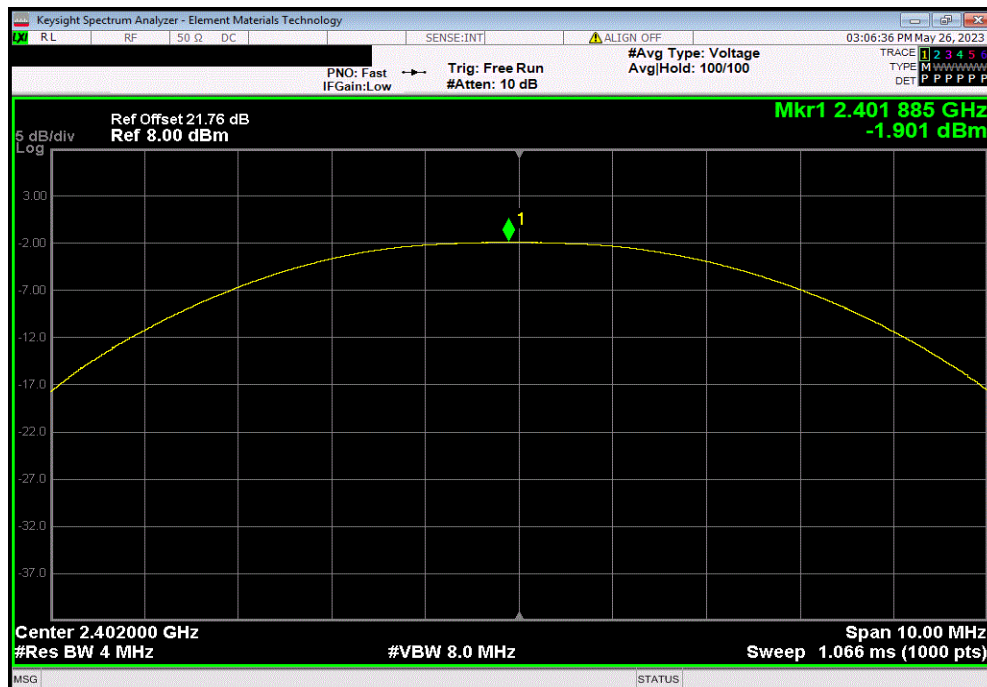


TbTx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 1 Mbps, High Channel, 2480 MHz |                    |            |                  |        |  |  |
|-----------------------------------------|--------------------|------------|------------------|--------|--|--|
| Out Pwr (dBm)                           | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |  |
| -1.959                                  | 0.17               | -1.789     | 36               | Pass   |  |  |



| BLE/GFSK 2 Mbps, Low Channel, 2402 MHz |                    |            |                  |        |  |  |
|----------------------------------------|--------------------|------------|------------------|--------|--|--|
| Out Pwr (dBm)                          | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |  |
| -1.901                                 | 0.17               | -1.731     | 36               | Pass   |  |  |



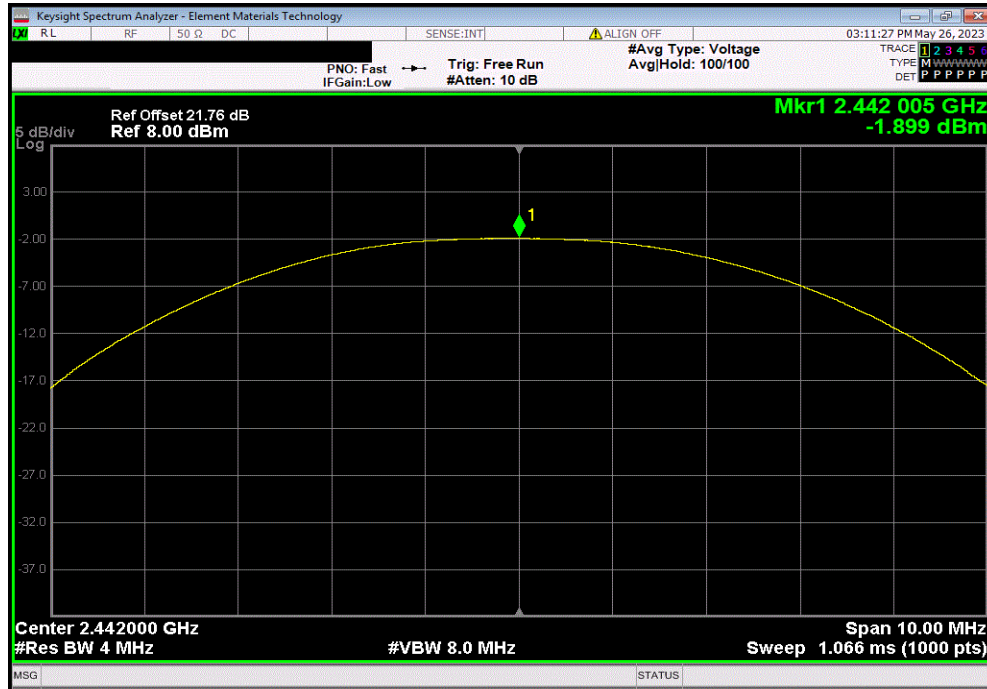


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

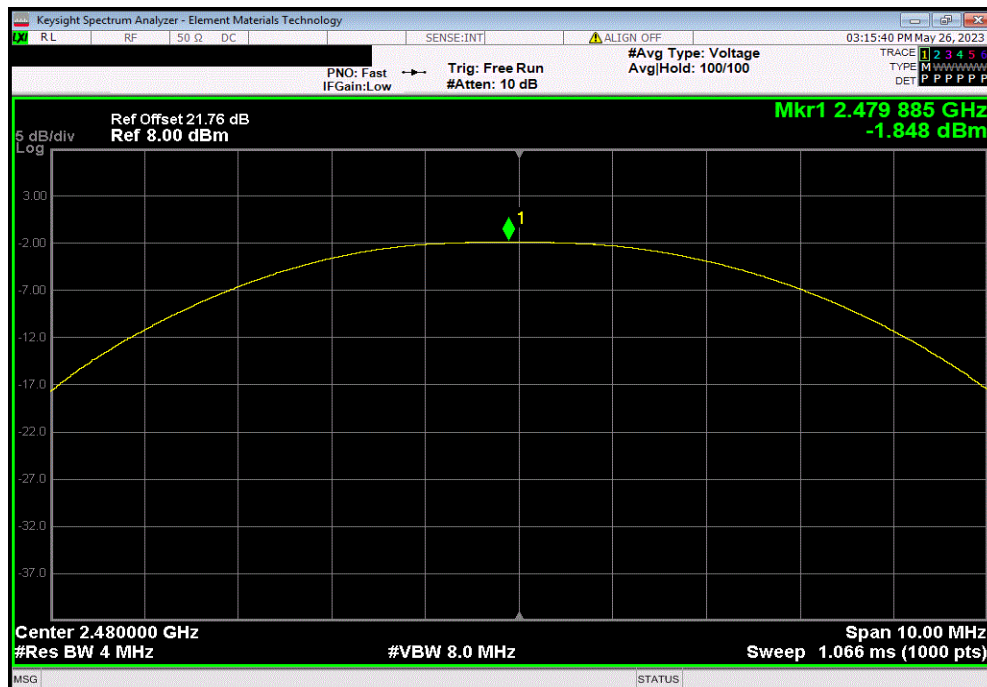


TbTtx 2022.06.03.0 XMR 2023.02.14.0

| BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz |                    |            |                  |        |  |  |
|----------------------------------------|--------------------|------------|------------------|--------|--|--|
| Out Pwr (dBm)                          | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |  |
| -1.899                                 | 0.17               | -1.729     | 36               | Pass   |  |  |



| BLE/GFSK 2 Mbps, High Channel, 2480 MHz |                    |            |                  |        |  |  |
|-----------------------------------------|--------------------|------------|------------------|--------|--|--|
| Out Pwr (dBm)                           | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |  |  |
| -1.848                                  | 0.17               | -1.678     | 36               | Pass   |  |  |





# POWER SPECTRAL DENSITY



XMR 2023.02.14.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

| Description                  | Manufacturer       | Model                 | ID  | Last Cal.  | Cal. Due   |
|------------------------------|--------------------|-----------------------|-----|------------|------------|
| Attenuator                   | S.M. Electronics   | SA26B-20              | TZP | 2022-11-06 | 2023-11-06 |
| Block - DC                   | Fairview Microwave | SD3379                | AMZ | 2022-11-06 | 2023-11-06 |
| Cable                        | Micro-Coax         | UFD150A-1-0720-200200 | MNL | 2022-09-10 | 2023-09-10 |
| Analyzer - Spectrum Analyzer | Keysight           | N9010A                | AFN | 2023-02-02 | 2024-02-02 |
| Generator - Signal           | Agilent            | N5182A                | TIF | 2020-08-29 | 2023-08-29 |

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

# POWER SPECTRAL DENSITY



TSMTx 2022.06.03.0 XMt 2023.02.14.0

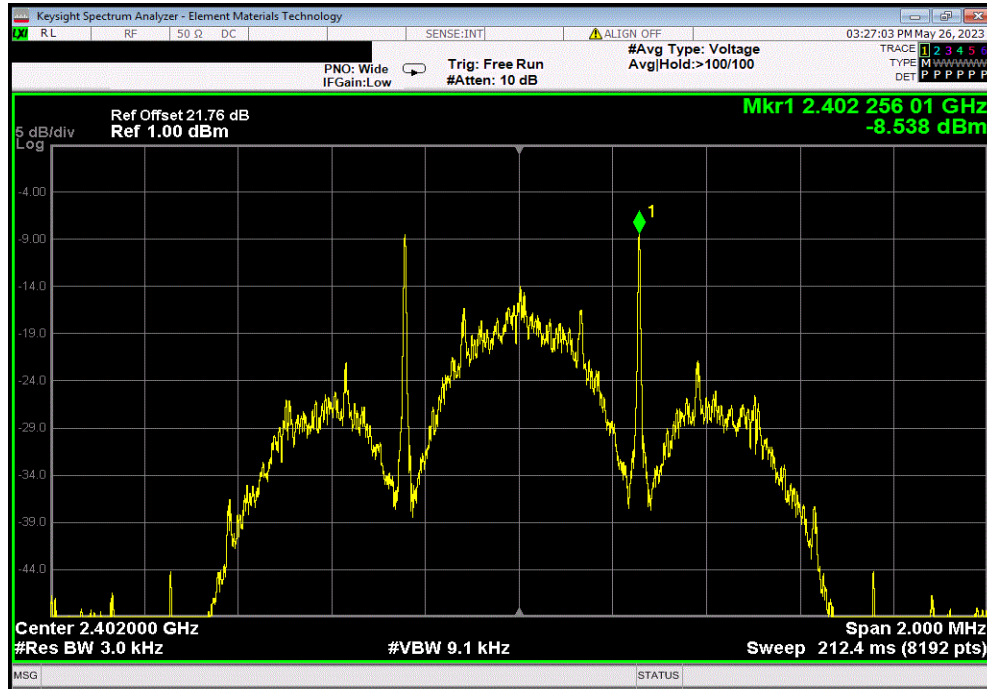
|                                                                                                                                                                                                                     |                                  |                                          |                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------------------------------|---------------------|
| EUT: TSI Inc. OmniTrak                                                                                                                                                                                              |                                  | Work Order: TSIN0196                     |                     |
| Serial Number: TSI5230200045                                                                                                                                                                                        |                                  | Date: 05/25/2023                         |                     |
| Customer: TSI, Incorporated                                                                                                                                                                                         |                                  | Temperature: 21.7°C                      |                     |
| Attendees: Micah Larson                                                                                                                                                                                             |                                  | Humidity: 40.8%                          |                     |
| Project: None                                                                                                                                                                                                       |                                  | Barometric Pres.: 1022 mbar              |                     |
| Tested by: Christopher Heintzelman                                                                                                                                                                                  | Power: Internal Battery (3.7VDC) | Job Site: MN11                           |                     |
| TEST SPECIFICATIONS                                                                                                                                                                                                 |                                  |                                          |                     |
| FCC 15.247:2023                                                                                                                                                                                                     |                                  | ANSI C63.10:2013                         |                     |
| RSS-247 Issue 2:2017                                                                                                                                                                                                |                                  | ANSI C63.10:2013                         |                     |
| COMMENTS                                                                                                                                                                                                            |                                  |                                          |                     |
| Reference level offset includes measurement cable, attenuator, and DC block. The customer states that the USB does not charge the EUT while in the test mode, USB is for programming only. Payload length is 65535. |                                  |                                          |                     |
| DEVIATIONS FROM TEST STANDARD                                                                                                                                                                                       |                                  |                                          |                     |
| None                                                                                                                                                                                                                |                                  |                                          |                     |
| Configuration #                                                                                                                                                                                                     | TSIN0196-20                      | Signature <i>Christopher Heintzelman</i> |                     |
|                                                                                                                                                                                                                     |                                  | Value<br>dBm/3kHz                        | Limit<br>< dBm/3kHz |
| BLE/GFSK 125 kbps                                                                                                                                                                                                   |                                  |                                          |                     |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -8.538                                   | 8                   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz            | -8.569                                   | 8                   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -8.533                                   | 8                   |
| BLE/GFSK 500 kbps                                                                                                                                                                                                   |                                  |                                          |                     |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -8.595                                   | 8                   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz            | -8.622                                   | 8                   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -8.644                                   | 8                   |
| BLE/GFSK 1 Mbps                                                                                                                                                                                                     |                                  |                                          |                     |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -18.357                                  | 8                   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz            | -18.431                                  | 8                   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -18.423                                  | 8                   |
| BLE/GFSK 2 Mbps                                                                                                                                                                                                     |                                  |                                          |                     |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -20.864                                  | 8                   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz            | -20.875                                  | 8                   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -20.809                                  | 8                   |

# POWER SPECTRAL DENSITY

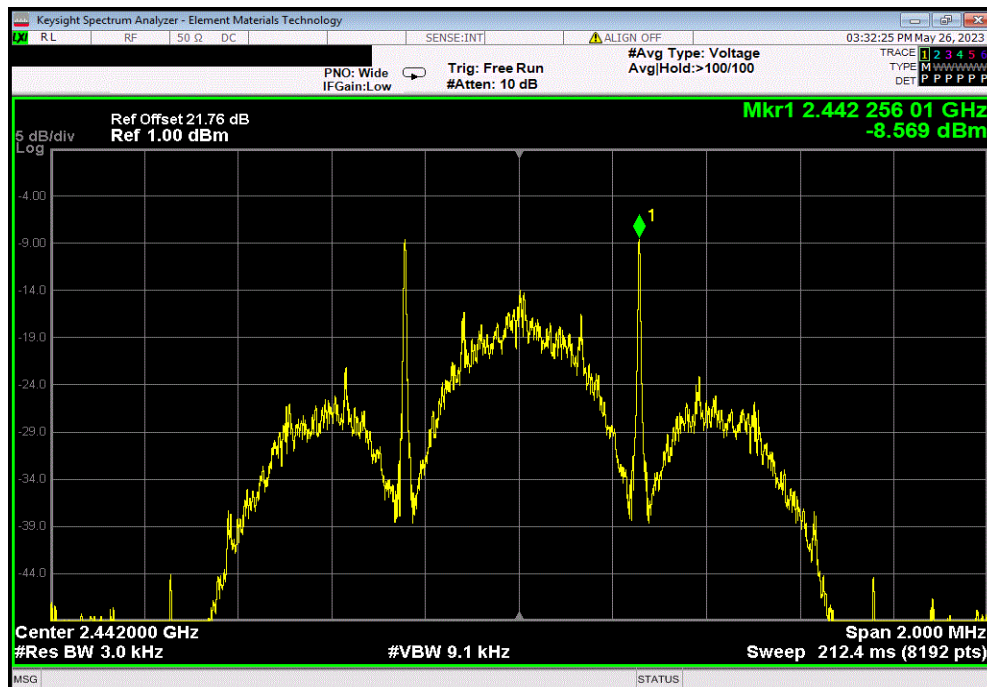


TbTtx 2022.06.03.0 XMR 2023.02.14.0

| BLE/GFSK 125 kbps, Low Channel, 2402 MHz |          |            |         |  |  |  |
|------------------------------------------|----------|------------|---------|--|--|--|
|                                          | Value    | Limit      | Results |  |  |  |
|                                          | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                          | -8.538   | 8          | Pass    |  |  |  |



| BLE/GFSK 125 kbps, Mid Channel, 2442 MHz |          |            |         |  |  |  |
|------------------------------------------|----------|------------|---------|--|--|--|
|                                          | Value    | Limit      | Results |  |  |  |
|                                          | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                          | -8.569   | 8          | Pass    |  |  |  |

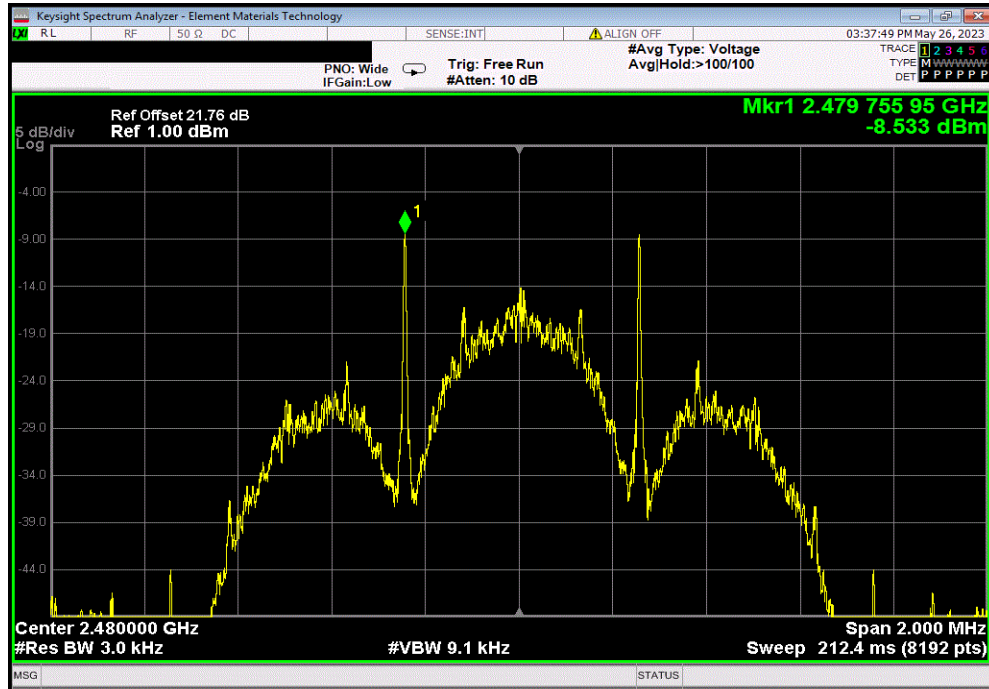


# POWER SPECTRAL DENSITY

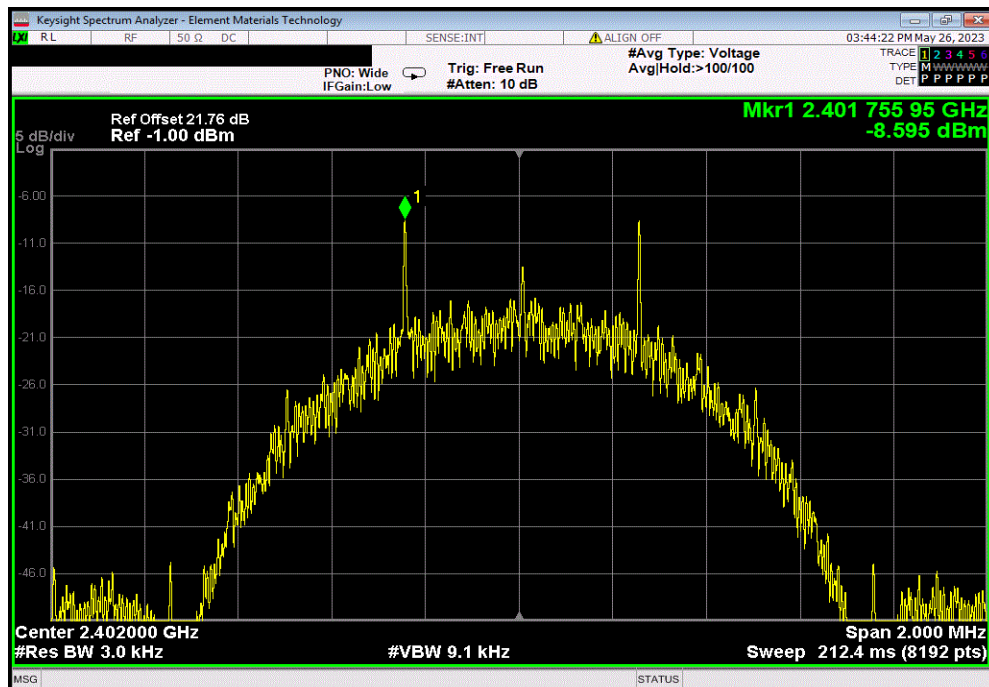


TbTx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 125 kbps, High Channel, 2480 MHz |          |            |         |  |  |  |
|-------------------------------------------|----------|------------|---------|--|--|--|
|                                           | Value    | Limit      | Results |  |  |  |
|                                           | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                           | -8.533   | 8          | Pass    |  |  |  |



| BLE/GFSK 500 kbps, Low Channel, 2402 MHz |          |            |         |  |  |  |
|------------------------------------------|----------|------------|---------|--|--|--|
|                                          | Value    | Limit      | Results |  |  |  |
|                                          | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                          | -8.595   | 8          | Pass    |  |  |  |

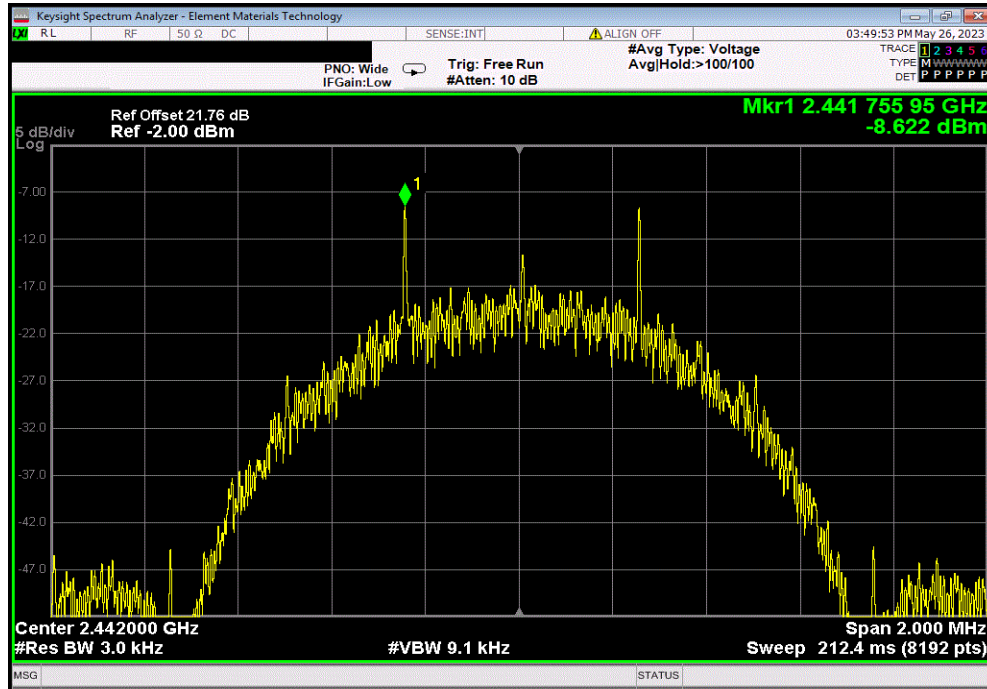


# POWER SPECTRAL DENSITY

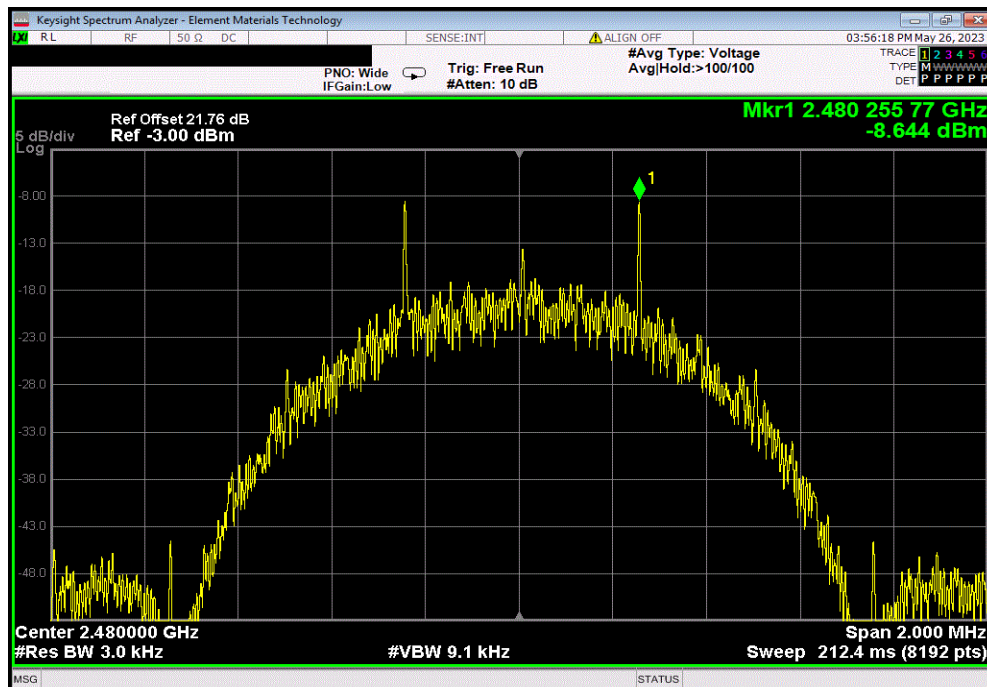


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 500 kbps, Mid Channel, 2442 MHz |          |            |         |  |  |  |
|------------------------------------------|----------|------------|---------|--|--|--|
|                                          | Value    | Limit      | Results |  |  |  |
|                                          | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                          | -8.622   | 8          | Pass    |  |  |  |



| BLE/GFSK 500 kbps, High Channel, 2480 MHz |          |            |         |  |  |  |
|-------------------------------------------|----------|------------|---------|--|--|--|
|                                           | Value    | Limit      | Results |  |  |  |
|                                           | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                           | -8.644   | 8          | Pass    |  |  |  |

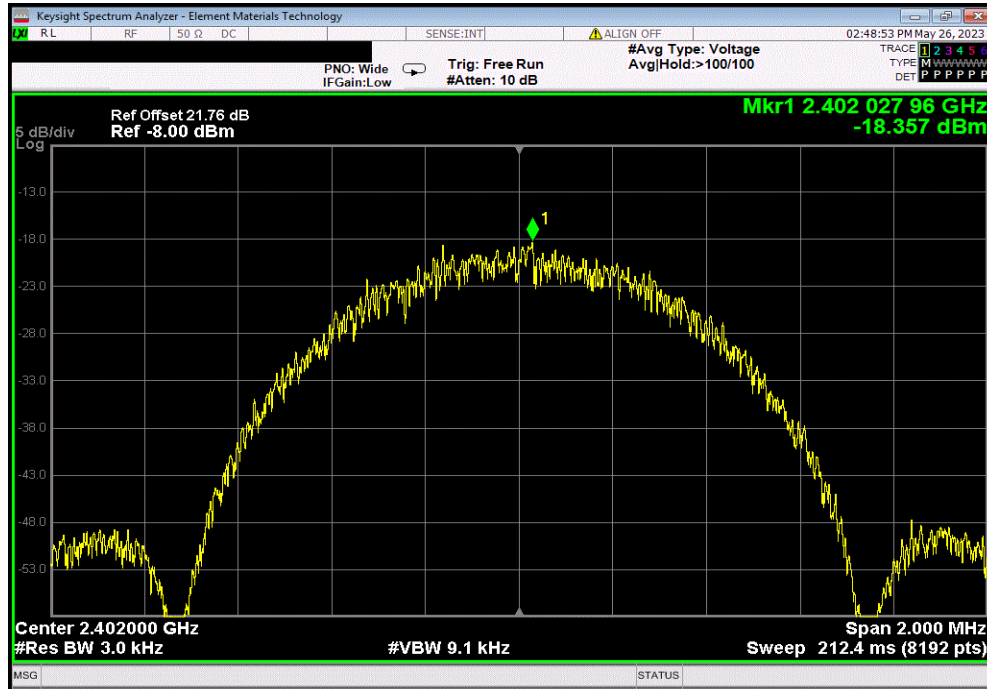


# POWER SPECTRAL DENSITY

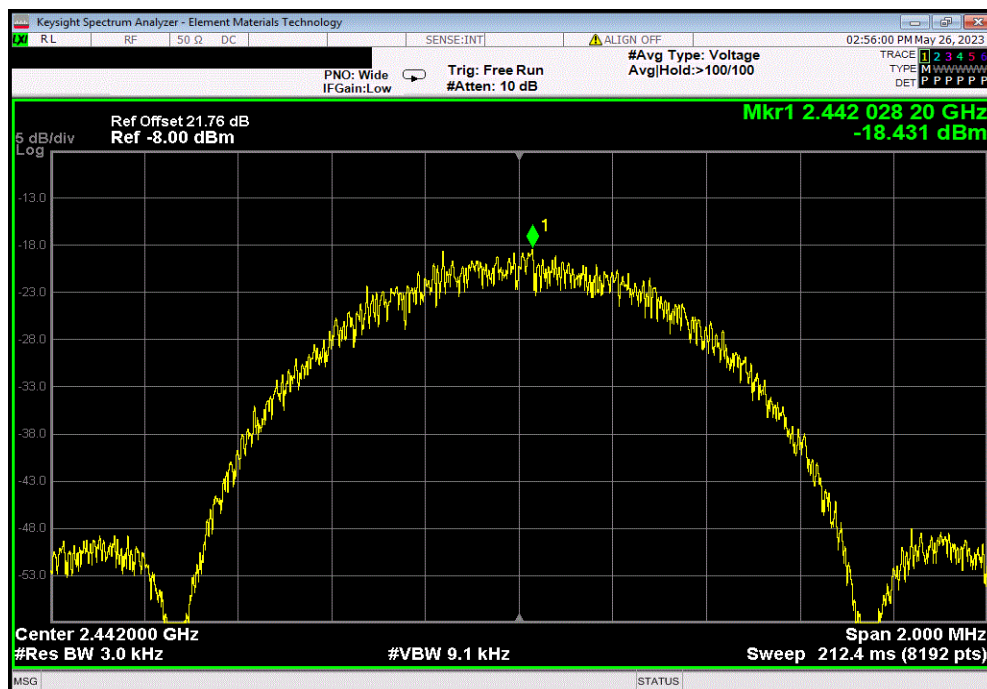


TbTx 2022.06.03.0 XMR 2023.02.14.0

| BLE/GFSK 1 Mbps, Low Channel, 2402 MHz |          |            |         |  |  |  |
|----------------------------------------|----------|------------|---------|--|--|--|
|                                        | Value    | Limit      | Results |  |  |  |
|                                        | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                        | -18.357  | 8          | Pass    |  |  |  |



| BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz |          |            |         |  |  |  |
|----------------------------------------|----------|------------|---------|--|--|--|
|                                        | Value    | Limit      | Results |  |  |  |
|                                        | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                        | -18.431  | 8          | Pass    |  |  |  |



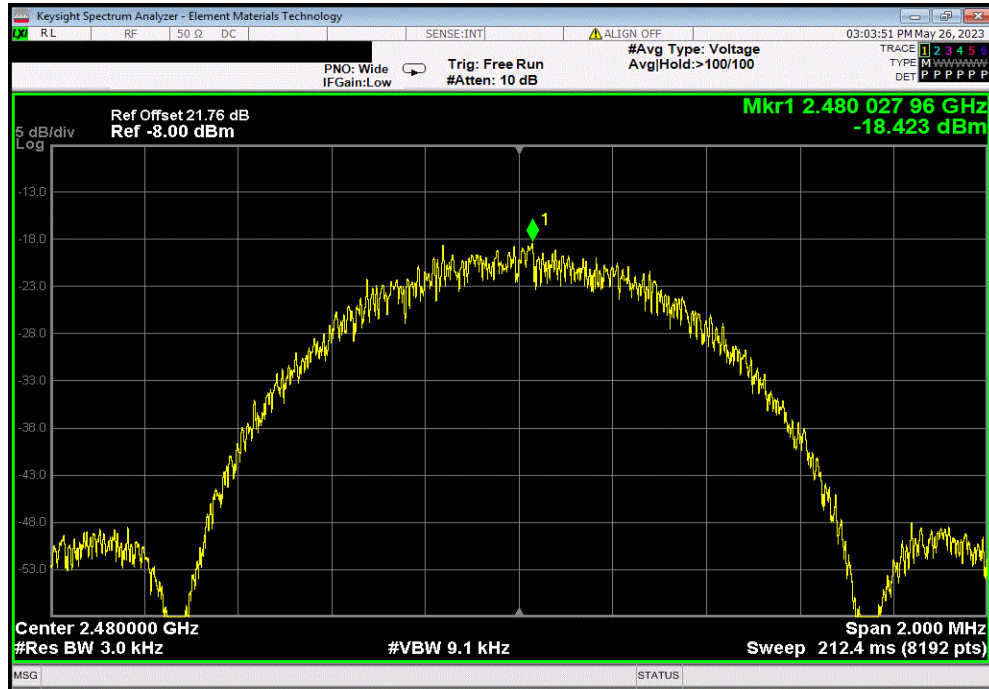


# POWER SPECTRAL DENSITY

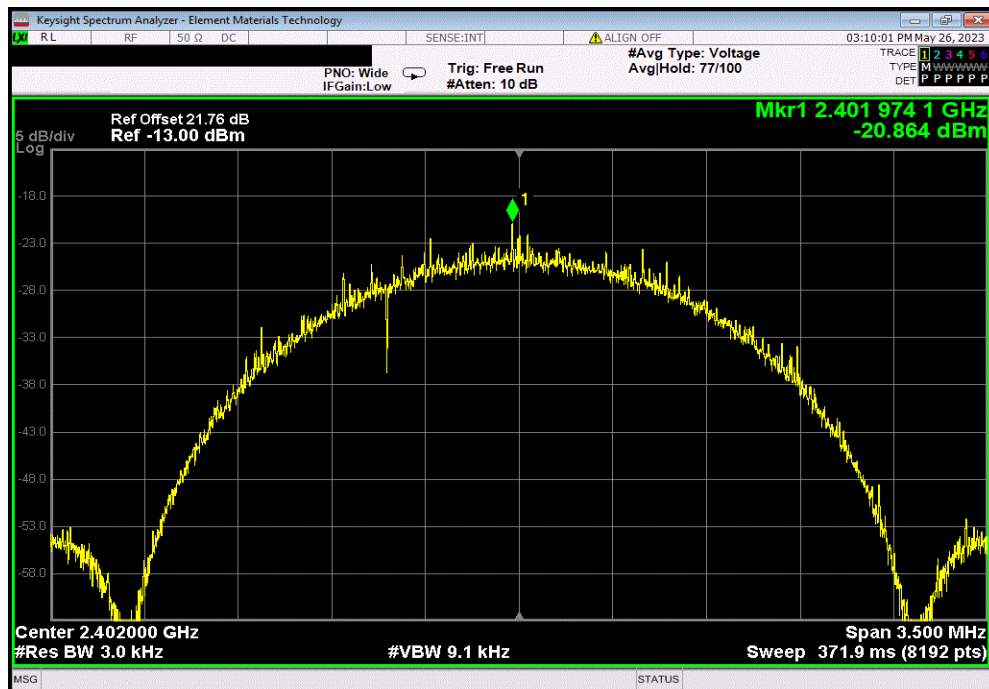


TbTx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 1 Mbps, High Channel, 2480 MHz |          |            |         |  |  |  |
|-----------------------------------------|----------|------------|---------|--|--|--|
|                                         | Value    | Limit      | Results |  |  |  |
|                                         | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                         | -18.423  | 8          | Pass    |  |  |  |



| BLE/GFSK 2 Mbps, Low Channel, 2402 MHz |          |            |         |  |  |  |
|----------------------------------------|----------|------------|---------|--|--|--|
|                                        | Value    | Limit      | Results |  |  |  |
|                                        | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                        | -20.864  | 8          | Pass    |  |  |  |

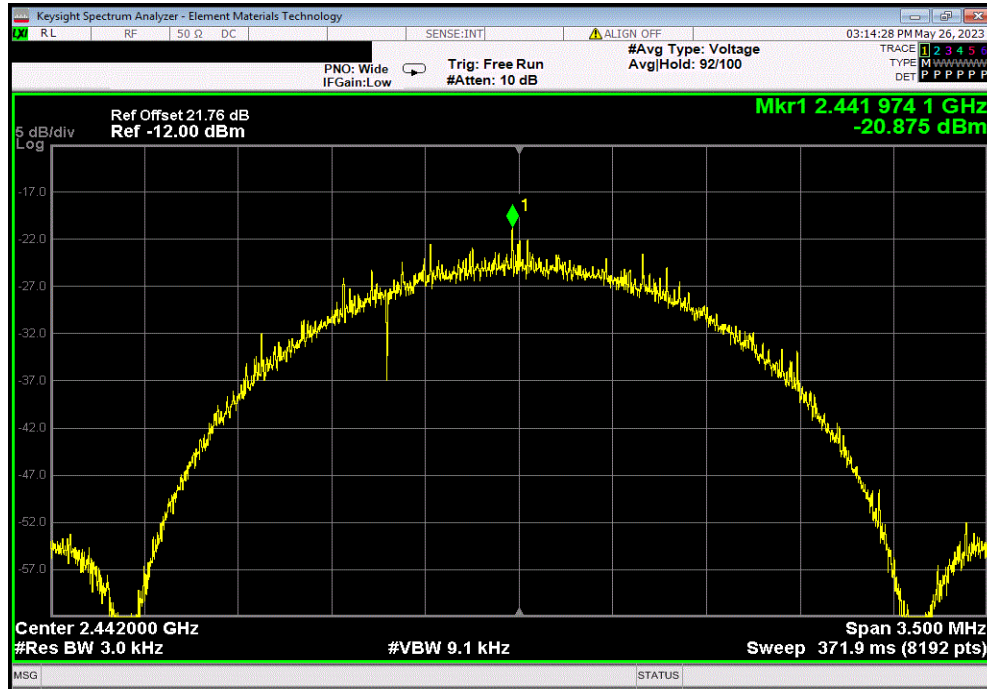


# POWER SPECTRAL DENSITY

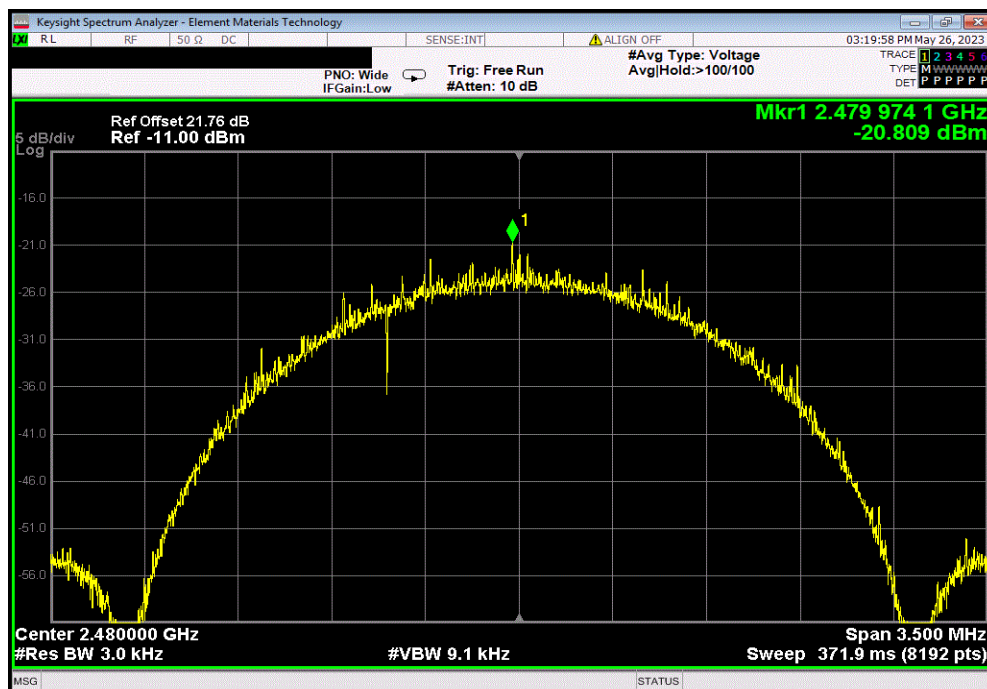


TbTx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz |          |            |         |  |  |  |
|----------------------------------------|----------|------------|---------|--|--|--|
|                                        | Value    | Limit      | Results |  |  |  |
|                                        | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                        | -20.875  | 8          | Pass    |  |  |  |



| BLE/GFSK 2 Mbps, High Channel, 2480 MHz |          |            |         |  |  |  |
|-----------------------------------------|----------|------------|---------|--|--|--|
|                                         | Value    | Limit      | Results |  |  |  |
|                                         | dBm/3kHz | < dBm/3kHz |         |  |  |  |
|                                         | -20.809  | 8          | Pass    |  |  |  |



# BAND EDGE COMPLIANCE



XMIT 2023.02.14.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

| Description                  | Manufacturer       | Model                 | ID  | Last Cal.  | Cal. Due   |
|------------------------------|--------------------|-----------------------|-----|------------|------------|
| Attenuator                   | S.M. Electronics   | SA26B-20              | TZP | 2022-11-06 | 2023-11-06 |
| Block - DC                   | Fairview Microwave | SD3379                | AMZ | 2022-11-06 | 2023-11-06 |
| Cable                        | Micro-Coax         | UFD150A-1-0720-200200 | MNL | 2022-09-10 | 2023-09-10 |
| Generator - Signal           | Agilent            | N5182A                | TIF | 2020-08-29 | 2023-08-29 |
| Analyzer - Spectrum Analyzer | Keysight           | N9010A                | AFN | 2023-02-02 | 2024-02-02 |

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

# BAND EDGE COMPLIANCE



TSMTx 2022.06.03.0 XMt 2023.02.14.0

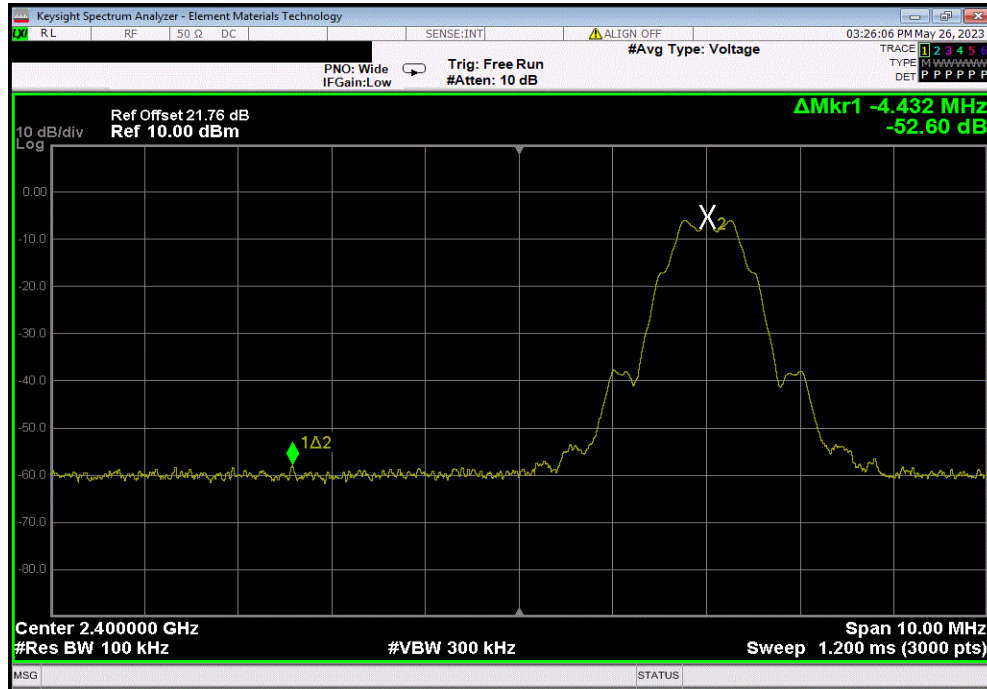
|                                                                                                                                                                                                                     |                                  |                                          |                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------------------------------|----------------------|
| EUT: TSI Inc. OmniTrak                                                                                                                                                                                              |                                  | Work Order: TSIN0196                     |                      |
| Serial Number: TSI5230200045                                                                                                                                                                                        |                                  | Date: 05/25/2023                         |                      |
| Customer: TSI, Incorporated                                                                                                                                                                                         |                                  | Temperature: 21.7°C                      |                      |
| Attendees: Micah Larson                                                                                                                                                                                             |                                  | Humidity: 40.9%                          |                      |
| Project: None                                                                                                                                                                                                       |                                  | Barometric Pres.: 1022 mbar              |                      |
| Tested by: Christopher Heintzelman                                                                                                                                                                                  | Power: Internal Battery (3.7VDC) | Job Site: MN11                           |                      |
| TEST SPECIFICATIONS                                                                                                                                                                                                 |                                  |                                          |                      |
| FCC 15.247:2023                                                                                                                                                                                                     |                                  | ANSI C63.10:2013                         |                      |
| RSS-247 Issue 2:2017                                                                                                                                                                                                |                                  | ANSI C63.10:2013                         |                      |
| COMMENTS                                                                                                                                                                                                            |                                  |                                          |                      |
| Reference level offset includes measurement cable, attenuator, and DC block. The customer states that the USB does not charge the EUT while in the test mode, USB is for programming only. Payload length is 65535. |                                  |                                          |                      |
| DEVIATIONS FROM TEST STANDARD                                                                                                                                                                                       |                                  |                                          |                      |
| None                                                                                                                                                                                                                |                                  |                                          |                      |
| Configuration #                                                                                                                                                                                                     | TSIN0196-20                      | Signature <i>Christopher Heintzelman</i> |                      |
|                                                                                                                                                                                                                     |                                  | Value (dBc)                              | Limit ≤ (dBc) Result |
| BLE/GFSK 125 kbps                                                                                                                                                                                                   |                                  |                                          |                      |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -52.6                                    | -20 Pass             |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -52.33                                   | -20 Pass             |
| BLE/GFSK 500 kbps                                                                                                                                                                                                   |                                  |                                          |                      |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -55.7                                    | -20 Pass             |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -54.82                                   | -20 Pass             |
| BLE/GFSK 1 Mbps                                                                                                                                                                                                     |                                  |                                          |                      |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -55.09                                   | -20 Pass             |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -55.32                                   | -20 Pass             |
| BLE/GFSK 2 Mbps                                                                                                                                                                                                     |                                  |                                          |                      |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz            | -31.26                                   | -20 Pass             |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz           | -54.38                                   | -20 Pass             |

# BAND EDGE COMPLIANCE

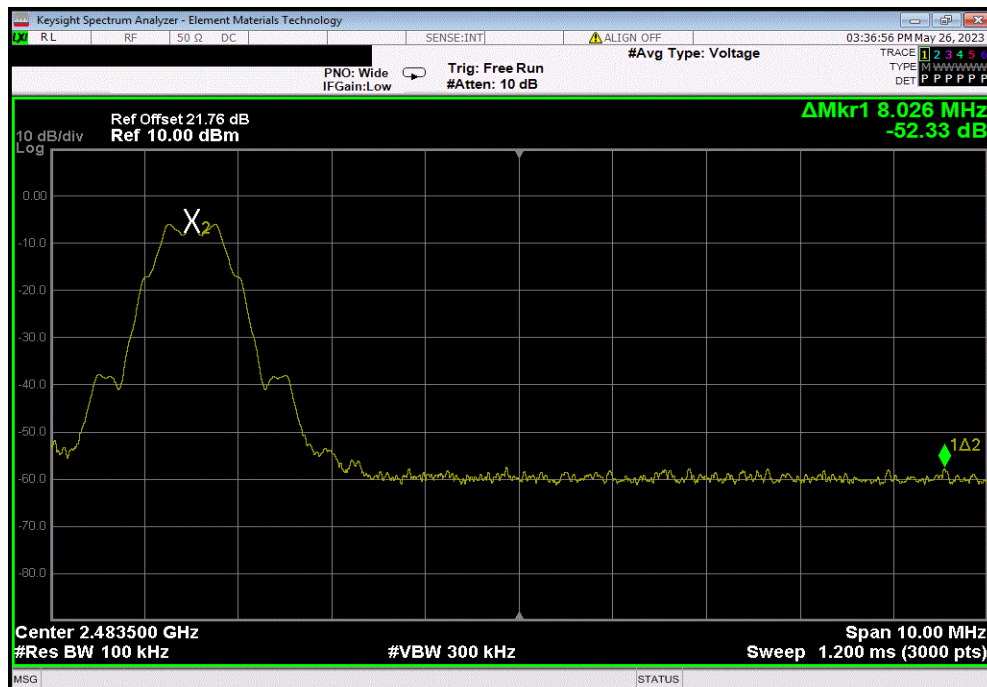


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 125 kbps, Low Channel, 2402 MHz |  |  |  |                |                  |        |
|------------------------------------------|--|--|--|----------------|------------------|--------|
|                                          |  |  |  | Value<br>(dBc) | Limit<br>≤ (dBc) | Result |
|                                          |  |  |  | -52.6          | -20              | Pass   |



| BLE/GFSK 125 kbps, High Channel, 2480 MHz |  |  |  |                |                  |        |
|-------------------------------------------|--|--|--|----------------|------------------|--------|
|                                           |  |  |  | Value<br>(dBc) | Limit<br>≤ (dBc) | Result |
|                                           |  |  |  | -52.33         | -20              | Pass   |

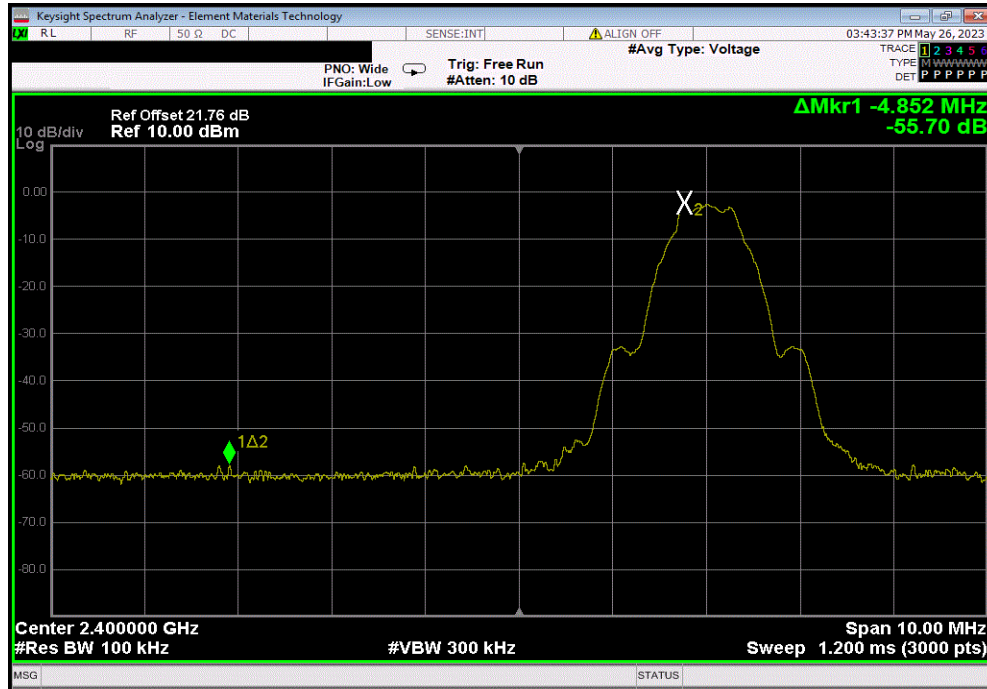


# BAND EDGE COMPLIANCE

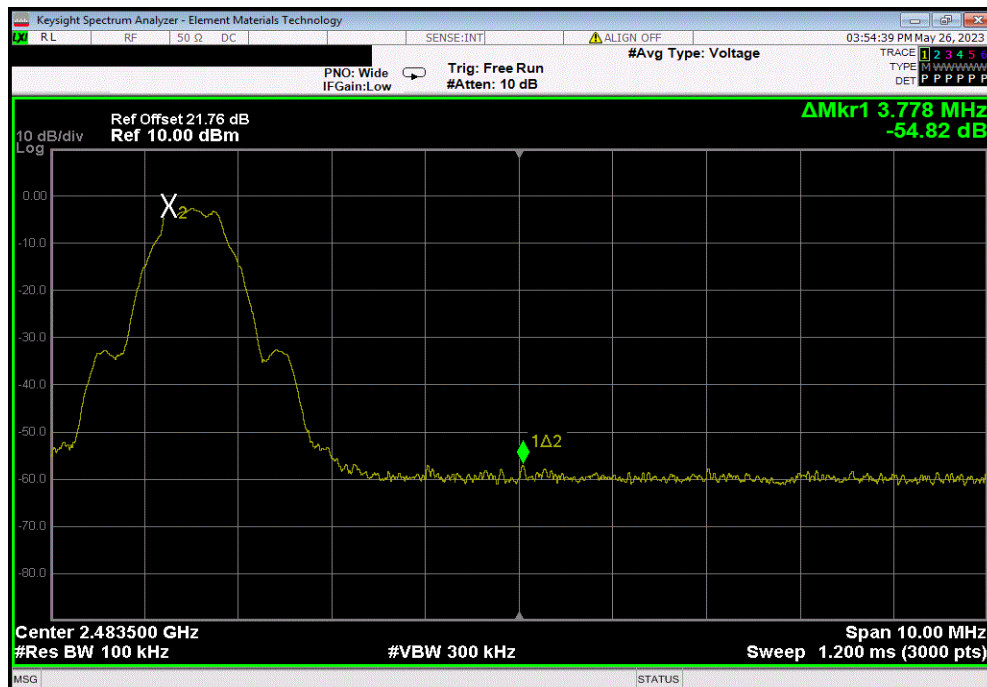


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 500 kbps, Low Channel, 2402 MHz |  |  |  |                |                  |        |
|------------------------------------------|--|--|--|----------------|------------------|--------|
|                                          |  |  |  | Value<br>(dBc) | Limit<br>≤ (dBc) | Result |
|                                          |  |  |  | -55.7          | -20              | Pass   |



| BLE/GFSK 500 kbps, High Channel, 2480 MHz |  |  |  |                |                  |        |
|-------------------------------------------|--|--|--|----------------|------------------|--------|
|                                           |  |  |  | Value<br>(dBc) | Limit<br>≤ (dBc) | Result |
|                                           |  |  |  | -54.82         | -20              | Pass   |

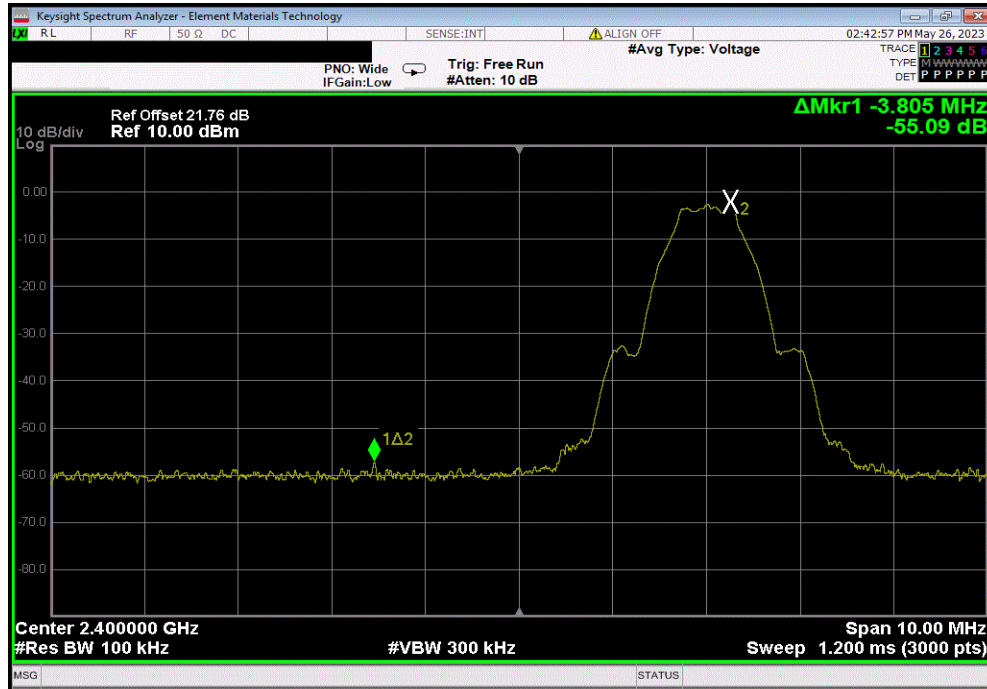


# BAND EDGE COMPLIANCE

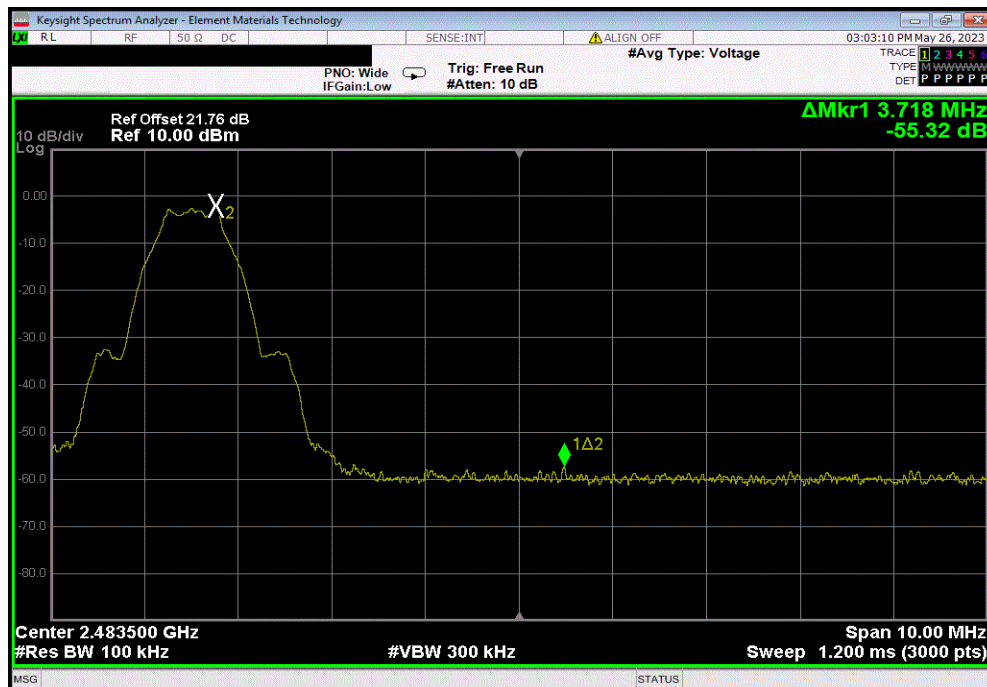


TbTtx 2022.06.03.0 XMt 2022.02.14.0

| BLE/GFSK 1 Mbps, Low Channel, 2402 MHz |  |  |  |                |                  |        |
|----------------------------------------|--|--|--|----------------|------------------|--------|
|                                        |  |  |  | Value<br>(dBc) | Limit<br>≤ (dBc) | Result |
|                                        |  |  |  | -55.09         | -20              | Pass   |



| BLE/GFSK 1 Mbps, High Channel, 2480 MHz |  |  |  |                |                  |        |
|-----------------------------------------|--|--|--|----------------|------------------|--------|
|                                         |  |  |  | Value<br>(dBc) | Limit<br>≤ (dBc) | Result |
|                                         |  |  |  | -55.32         | -20              | Pass   |



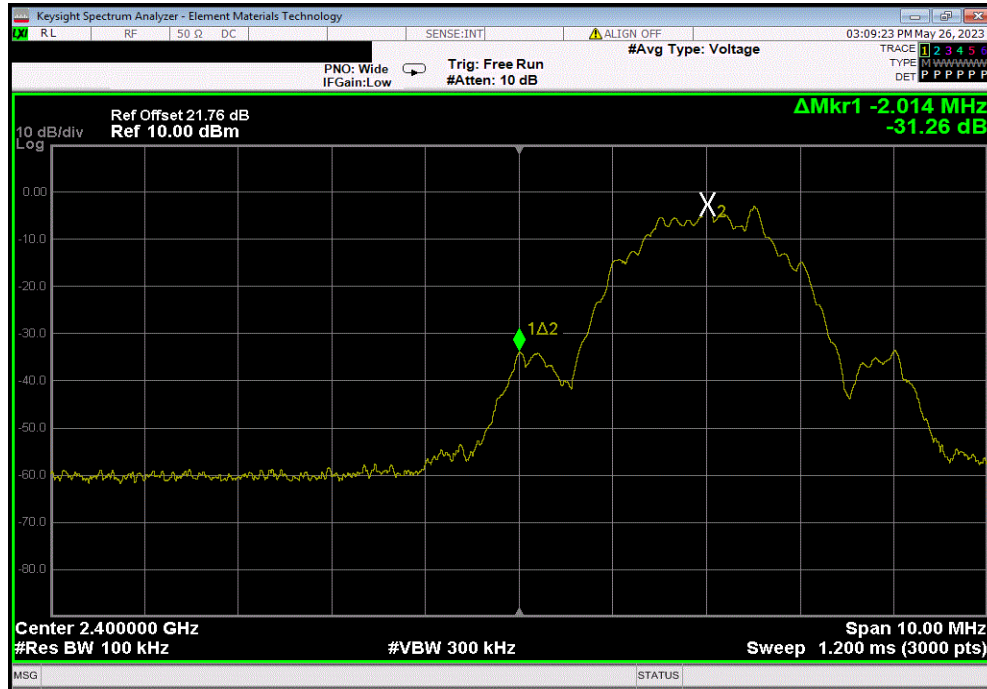


# BAND EDGE COMPLIANCE

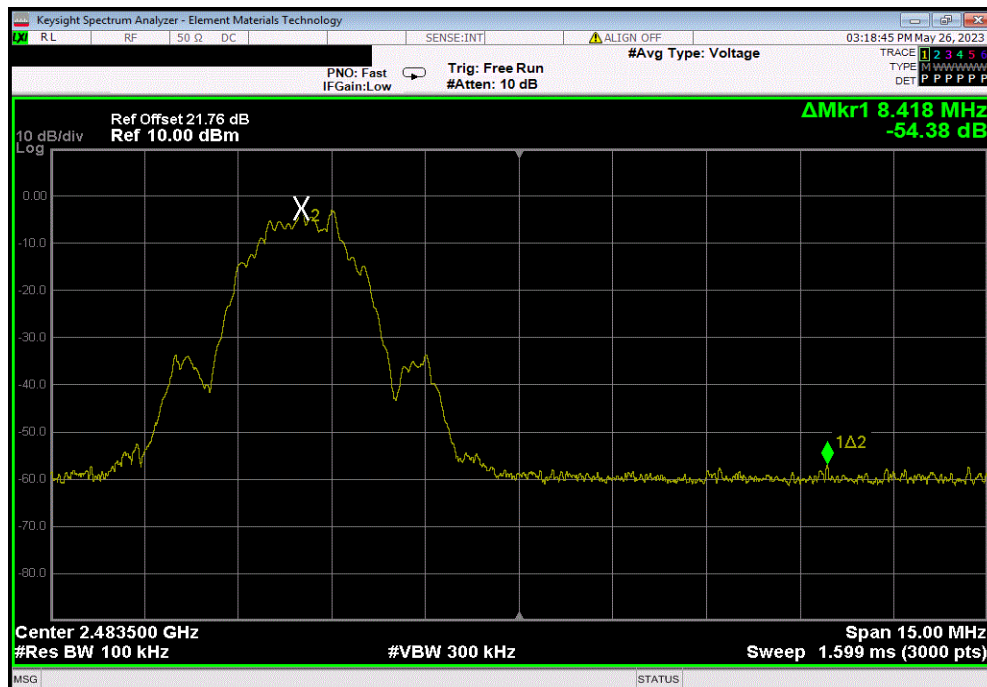


TbTtx 2022.06.03.0 XMR 2023.02.14.0

| BLE/GFSK 2 Mbps, Low Channel, 2402 MHz |  |  |  |                |                  |        |
|----------------------------------------|--|--|--|----------------|------------------|--------|
|                                        |  |  |  | Value<br>(dBc) | Limit<br>≤ (dBc) | Result |
|                                        |  |  |  | -31.26         | -20              | Pass   |



| BLE/GFSK 2 Mbps, High Channel, 2480 MHz |  |  |  |                |                  |        |
|-----------------------------------------|--|--|--|----------------|------------------|--------|
|                                         |  |  |  | Value<br>(dBc) | Limit<br>≤ (dBc) | Result |
|                                         |  |  |  | -54.38         | -20              | Pass   |



# SPURIOUS CONDUCTED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

| Description                  | Manufacturer       | Model                 | ID  | Last Cal.  | Cal. Due   |
|------------------------------|--------------------|-----------------------|-----|------------|------------|
| Attenuator                   | S.M. Electronics   | SA26B-20              | TZP | 2022-11-06 | 2023-11-06 |
| Block - DC                   | Fairview Microwave | SD3379                | AMZ | 2022-11-06 | 2023-11-06 |
| Cable                        | Micro-Coax         | UFD150A-1-0720-200200 | MNL | 2022-09-10 | 2023-09-10 |
| Generator - Signal           | Agilent            | N5182A                | TIF | 2020-08-29 | 2023-08-29 |
| Analyzer - Spectrum Analyzer | Keysight           | N9010A                | AFN | 2023-02-02 | 2024-02-02 |

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the fundamental was measured with a 100 kHz resolution bandwidth and the highest value was recorded. The rest of the spectrum was then measured with a 100 kHz resolution bandwidth and the highest value was found. The difference between the value found on the fundamental and the rest of the spectrum was compared against the limit to determine compliance.

The reference level offset for the fundamental screen capture was based on a measured value of the loss between the spectrum analyzer and the EUT which was verified at the time of test. The remaining screen capture(s) use an internal transducer factor on the analyzer to correct the displayed trace based on the cable loss over frequency. The reference level offset for the additional screen capture(s) is then based on the expected attenuator value and any other losses.

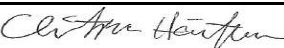
Fundamental Offset = Ref Lvl Offset showing measured composite factor of all losses

Remaining Screen capture(s) Offset = "Internal" cable loss factor not shown on screen capture + Ref Lvl Offset showing expected attenuator value and any other losses

# SPURIOUS CONDUCTED EMISSIONS



TSI 2022 06 03.0 XMR 2023 02 14.0

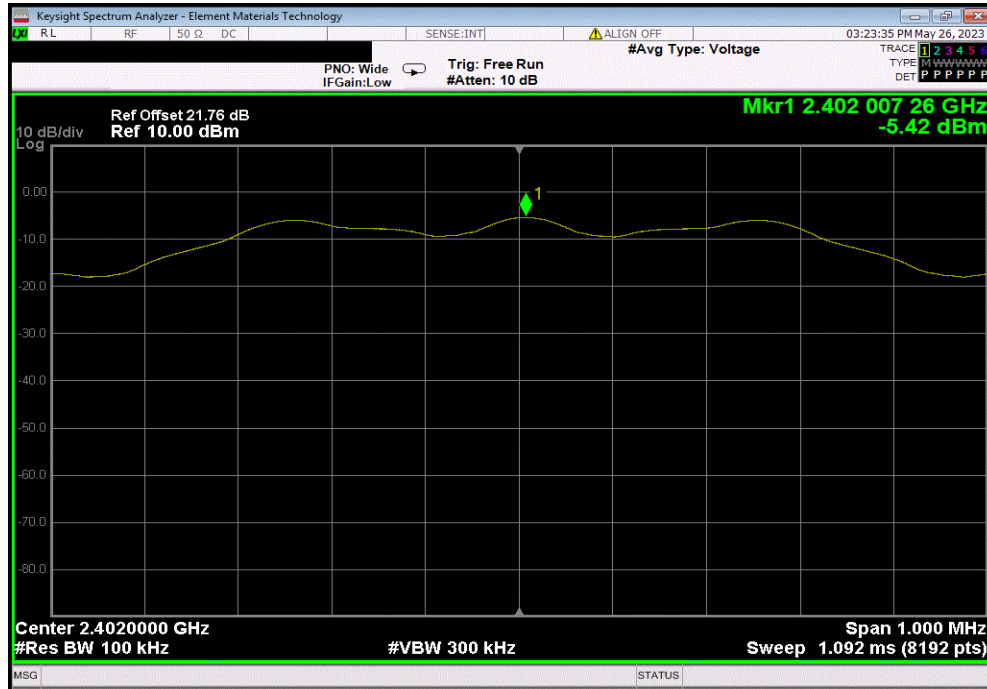
|                                                                                                                                                                                                                     |                        |                                                                                             |                     |                 |               |        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------|---------------------|-----------------|---------------|--------|
| EUT: TSI Inc. OmniTrak                                                                                                                                                                                              |                        | Work Order: TSIN0196                                                                        |                     |                 |               |        |
| Serial Number: TSI5230200045                                                                                                                                                                                        |                        | Date: 05/25/2023                                                                            |                     |                 |               |        |
| Customer: TSI, Incorporated                                                                                                                                                                                         |                        | Temperature: 21.6°C                                                                         |                     |                 |               |        |
| Attendees: Micah Larson                                                                                                                                                                                             |                        | Humidity: 40.8%                                                                             |                     |                 |               |        |
| Project: None                                                                                                                                                                                                       |                        | Barometric Pres.: 1022 mbar                                                                 |                     |                 |               |        |
| Tested by: Christopher Heintzelman                                                                                                                                                                                  |                        | Power: Internal Battery (3.7VDC)                                                            |                     |                 |               |        |
| Job Site: MN11                                                                                                                                                                                                      |                        |                                                                                             |                     |                 |               |        |
| TEST SPECIFICATIONS                                                                                                                                                                                                 |                        | Test Method                                                                                 |                     |                 |               |        |
| FCC 15.247:2023                                                                                                                                                                                                     |                        | ANSI C63.10:2013                                                                            |                     |                 |               |        |
| RSS-247 Issue 2:2017                                                                                                                                                                                                |                        | ANSI C63.10:2013                                                                            |                     |                 |               |        |
| COMMENTS                                                                                                                                                                                                            |                        |                                                                                             |                     |                 |               |        |
| Reference level offset includes measurement cable, attenuator, and DC block. The customer states that the USB does not charge the EUT while in the test mode, USB is for programming only. Payload length is 65535. |                        |                                                                                             |                     |                 |               |        |
| DEVIATIONS FROM TEST STANDARD                                                                                                                                                                                       |                        |                                                                                             |                     |                 |               |        |
| None                                                                                                                                                                                                                |                        |                                                                                             |                     |                 |               |        |
| Configuration #                                                                                                                                                                                                     | TSIN0196-20            | Signature  |                     |                 |               |        |
|                                                                                                                                                                                                                     |                        | Frequency Range                                                                             | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |
| BLE/GFSK 125 kbps                                                                                                                                                                                                   |                        |                                                                                             |                     |                 |               |        |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | Fundamental                                                                                 | 2402.01             | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | 30 MHz - 12.5 GHz                                                                           | 7269.02             | -48.3           | -20           | Pass   |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | 12.5 GHz - 25 GHz                                                                           | 24722.26            | -43.32          | -20           | Pass   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | Fundamental                                                                                 | 2442.01             | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | 30 MHz - 12.5 GHz                                                                           | 9752.06             | -48.35          | -20           | Pass   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | 12.5 GHz - 25 GHz                                                                           | 24194.24            | -44.01          | -20           | Pass   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | Fundamental                                                                                 | 2480.01             | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | 30 MHz - 12.5 GHz                                                                           | 9822.09             | -48.12          | -20           | Pass   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | 12.5 GHz - 25 GHz                                                                           | 23823.4             | -44.44          | -20           | Pass   |
| BLE/GFSK 500 kbps                                                                                                                                                                                                   |                        |                                                                                             |                     |                 |               |        |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | Fundamental                                                                                 | 2401.76             | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | 30 MHz - 12.5 GHz                                                                           | 1724.43             | -49.37          | -20           | Pass   |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | 12.5 GHz - 25 GHz                                                                           | 23838.66            | -47.5           | -20           | Pass   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | Fundamental                                                                                 | 2441.76             | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | 30 MHz - 12.5 GHz                                                                           | 10555.89            | -51.02          | -20           | Pass   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | 12.5 GHz - 25 GHz                                                                           | 24987.79            | -46.75          | -20           | Pass   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | Fundamental                                                                                 | 2479.76             | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | 30 MHz - 12.5 GHz                                                                           | 8063.72             | -51.28          | -20           | Pass   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | 12.5 GHz - 25 GHz                                                                           | 24844.34            | -46.61          | -20           | Pass   |
| BLE/GFSK 1 Mbps                                                                                                                                                                                                     |                        |                                                                                             |                     |                 |               |        |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | Fundamental                                                                                 | 2402.26             | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | 30 MHz - 12.5 GHz                                                                           | 9812.96             | -51.77          | -20           | Pass   |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | 12.5 GHz - 25 GHz                                                                           | 23814.25            | -46.72          | -20           | Pass   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | Fundamental                                                                                 | 2442.26             | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | 30 MHz - 12.5 GHz                                                                           | 9388.21             | -50.91          | -20           | Pass   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | 12.5 GHz - 25 GHz                                                                           | 23994.32            | -46.87          | -20           | Pass   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | Fundamental                                                                                 | 2480.26             | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | 30 MHz - 12.5 GHz                                                                           | 10607.65            | -51.95          | -20           | Pass   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | 12.5 GHz - 25 GHz                                                                           | 23652.48            | -46.36          | -20           | Pass   |
| BLE/GFSK 2 Mbps                                                                                                                                                                                                     |                        |                                                                                             |                     |                 |               |        |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | Fundamental                                                                                 | 2402                | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | 30 MHz - 12.5 GHz                                                                           | 10712.7             | -50.03          | -20           | Pass   |
|                                                                                                                                                                                                                     | Low Channel, 2402 MHz  | 12.5 GHz - 25 GHz                                                                           | 24928.27            | -46.22          | -20           | Pass   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | Fundamental                                                                                 | 2442.01             | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | 30 MHz - 12.5 GHz                                                                           | 1712.25             | -46.89          | -20           | Pass   |
|                                                                                                                                                                                                                     | Mid Channel, 2442 MHz  | 12.5 GHz - 25 GHz                                                                           | 23887.5             | -46.31          | -20           | Pass   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | Fundamental                                                                                 | 2480.01             | N/A             | N/A           | N/A    |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | 30 MHz - 12.5 GHz                                                                           | 1710.73             | -45.91          | -20           | Pass   |
|                                                                                                                                                                                                                     | High Channel, 2480 MHz | 12.5 GHz - 25 GHz                                                                           | 23542.61            | -45.36          | -20           | Pass   |

# SPURIOUS CONDUCTED EMISSIONS

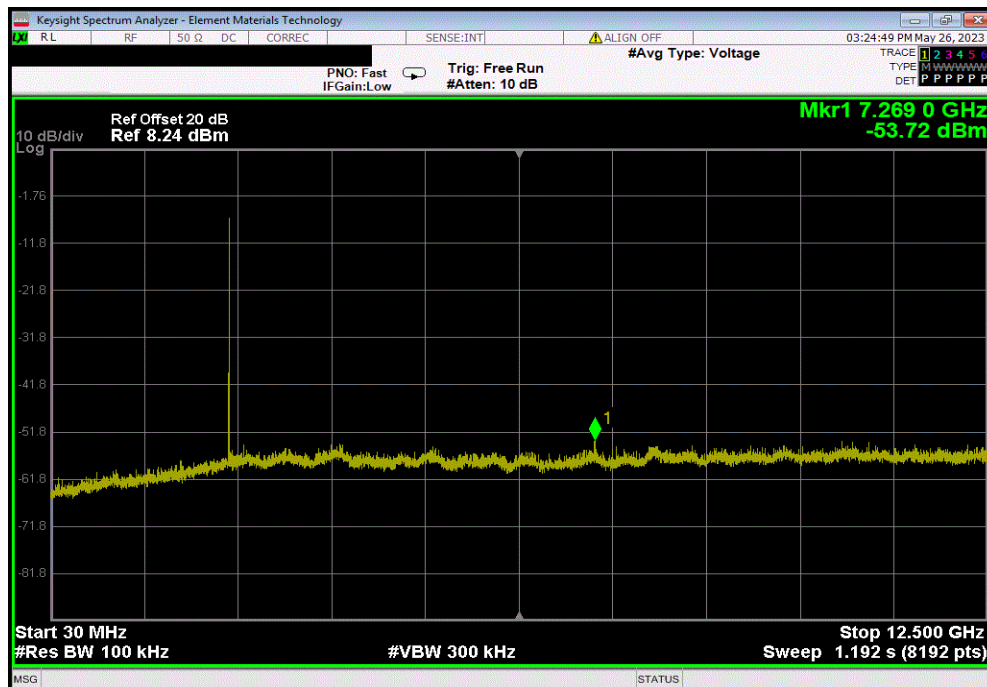


TbTx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 125 kbps, Low Channel, 2402 MHz |                     |                 |               |        |  |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |  |
| Fundamental                              | 2402.01             | N/A             | N/A           | N/A    |  |  |



| BLE/GFSK 125 kbps, Low Channel, 2402 MHz |                     |                 |               |        |  |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |  |
| 30 MHz - 12.5 GHz                        | 7269.02             | -48.3           | -20           | Pass   |  |  |

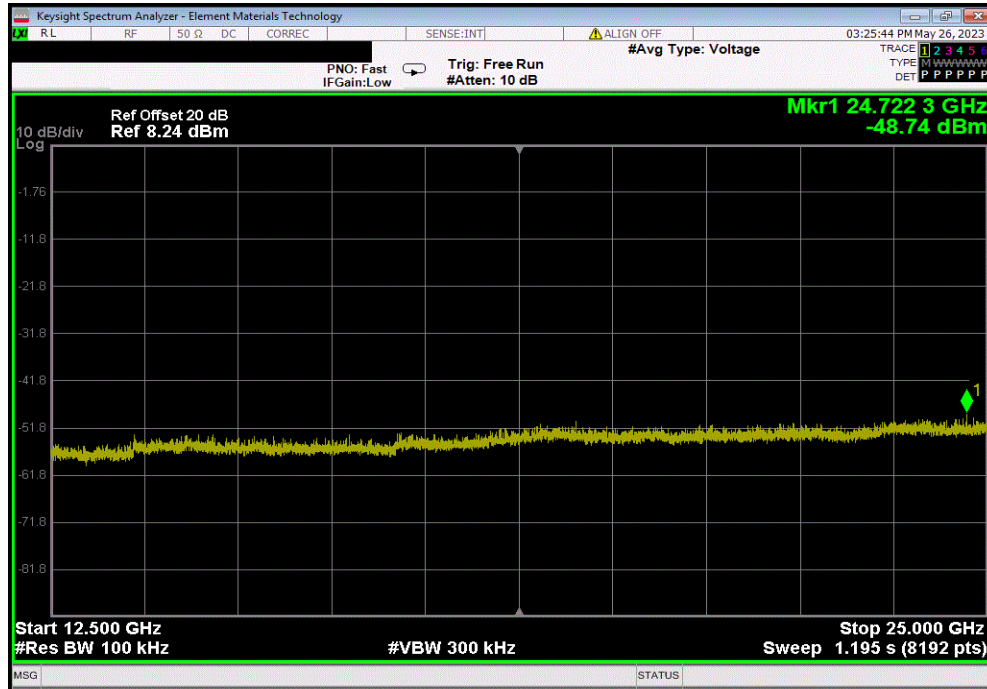


# SPURIOUS CONDUCTED EMISSIONS

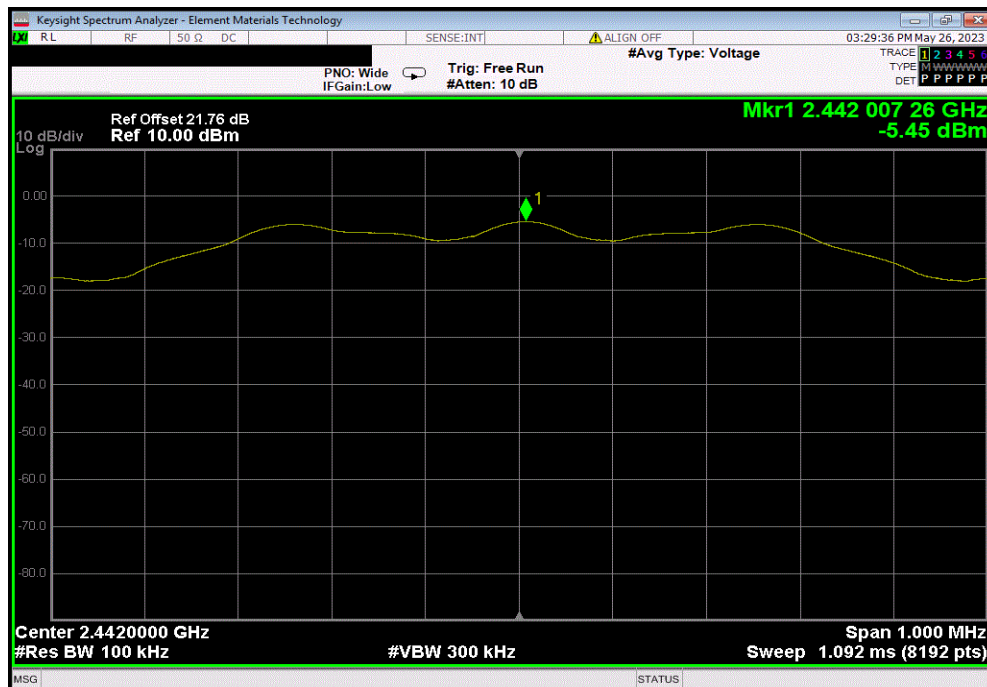


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 125 kbps, Low Channel, 2402 MHz |                     |                 |               |        |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                        | 24722.26            | -43.32          | -20           | Pass   |  |



| BLE/GFSK 125 kbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| Fundamental                              | 2442.01             | N/A             | N/A           | N/A    |  |

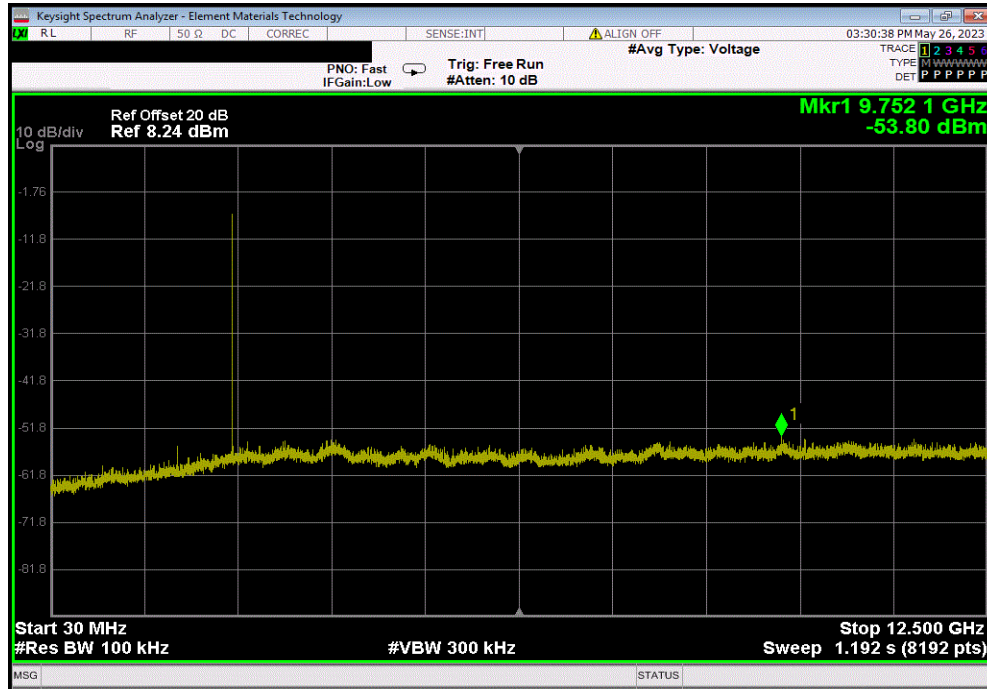


# SPURIOUS CONDUCTED EMISSIONS

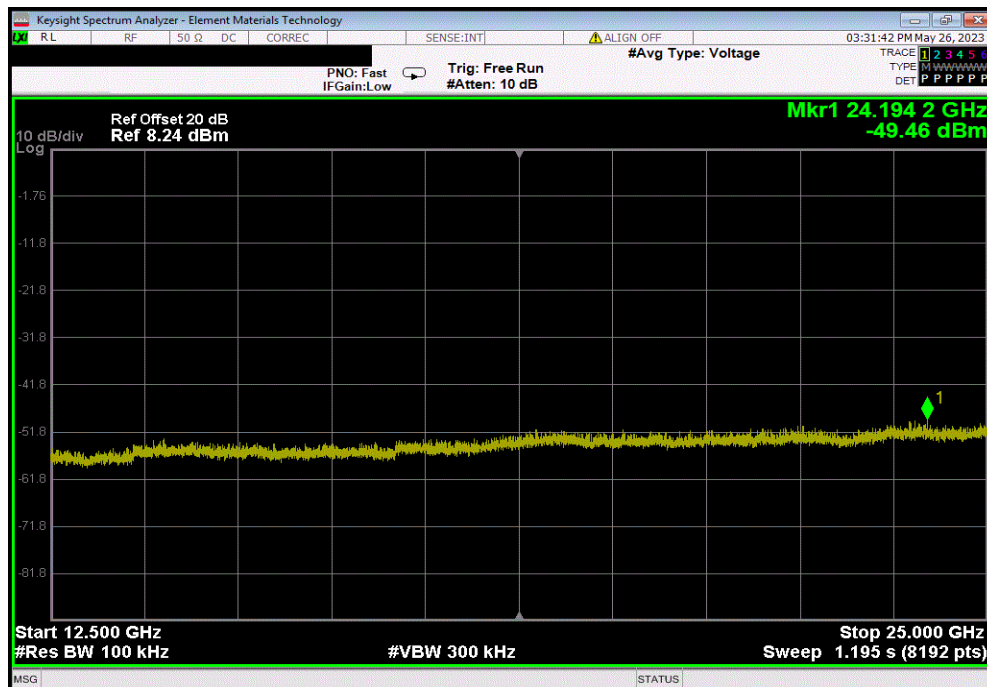


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 125 kbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 30 MHz - 12.5 GHz                        | 9752.06             | -48.35          | -20           | Pass   |  |



| BLE/GFSK 125 kbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                        | 24194.24            | -44.01          | -20           | Pass   |  |



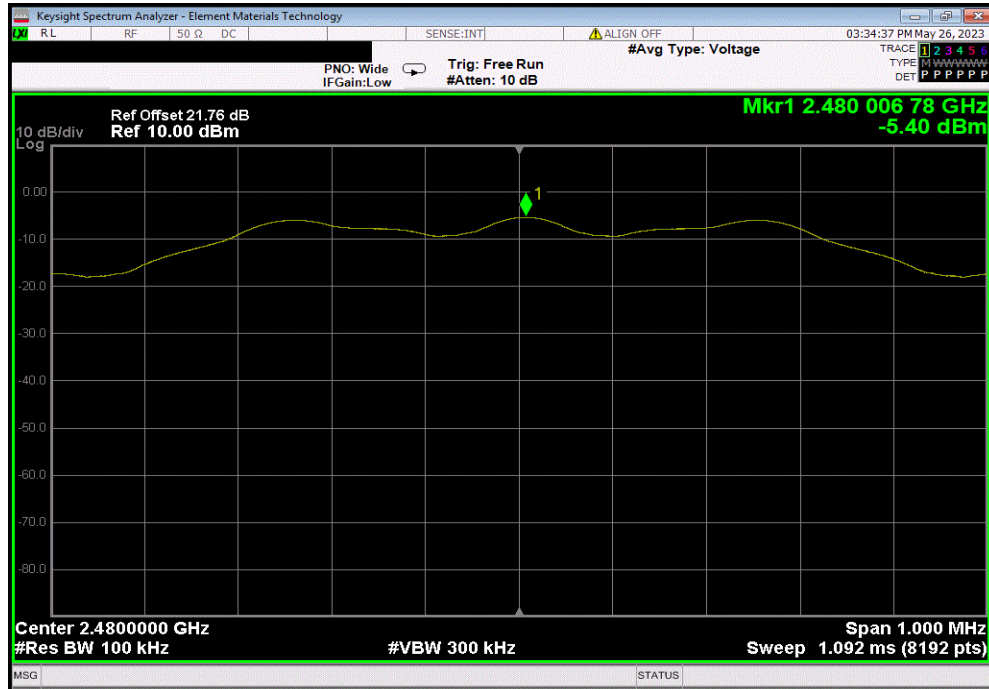


# SPURIOUS CONDUCTED EMISSIONS

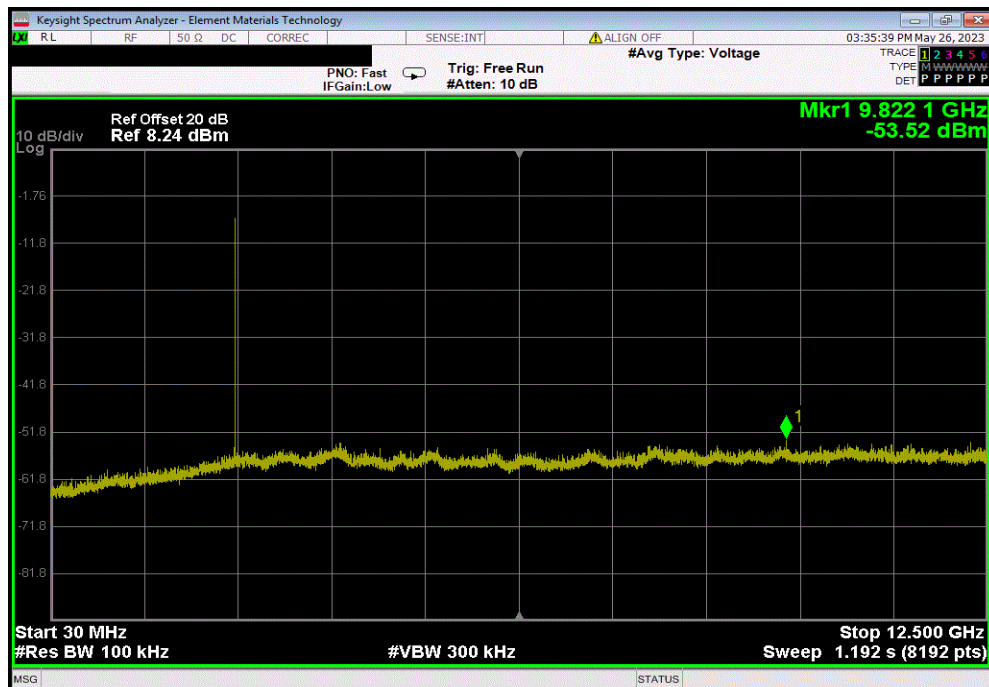


TbTx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 125 kbps, High Channel, 2480 MHz |                     |                 |               |        |  |
|-------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                           | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| Fundamental                               | 2480.01             | N/A             | N/A           | N/A    |  |



| BLE/GFSK 125 kbps, High Channel, 2480 MHz |                     |                 |               |        |  |
|-------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                           | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 30 MHz - 12.5 GHz                         | 9822.09             | -48.12          | -20           | Pass   |  |



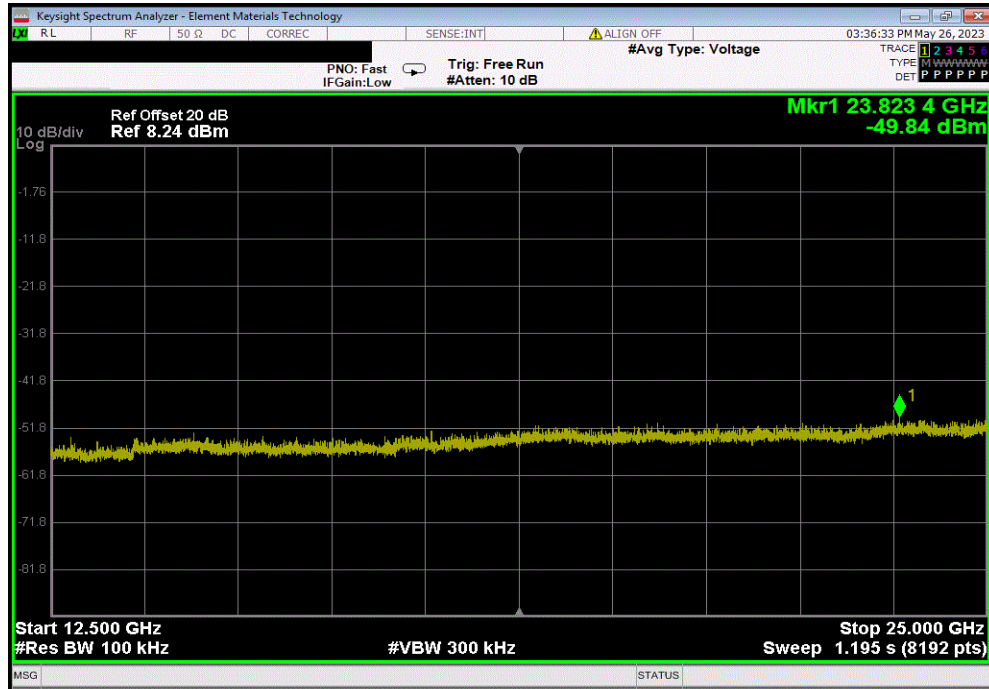


# SPURIOUS CONDUCTED EMISSIONS

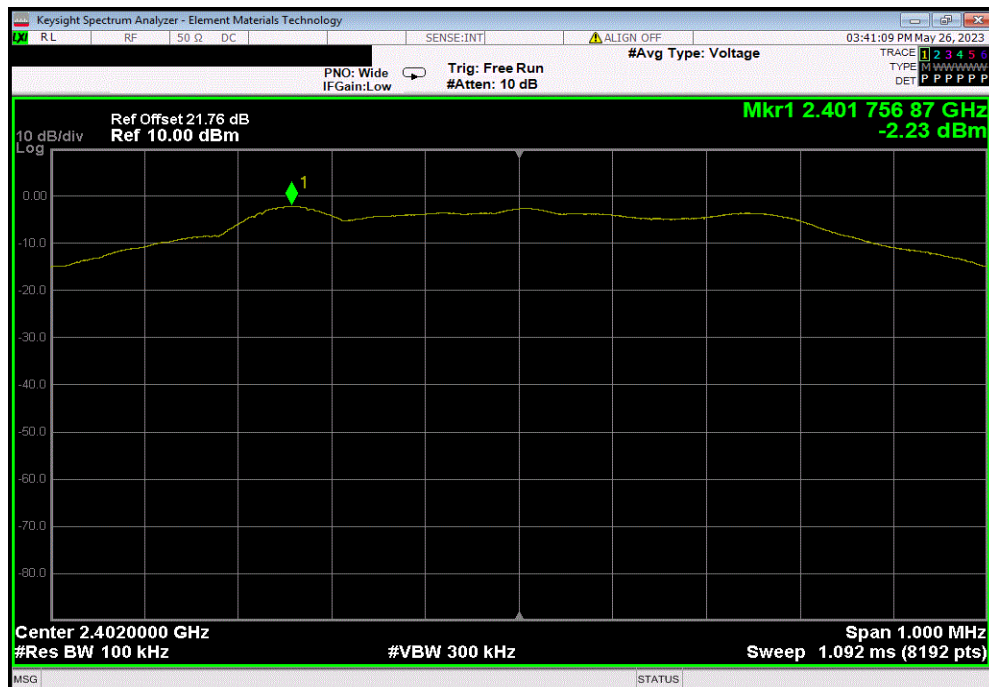


TbTtX 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 125 kbps, High Channel, 2480 MHz |                     |                 |               |        |  |
|-------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                           | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                         | 23823.4             | -44.44          | -20           | Pass   |  |



| BLE/GFSK 500 kbps, Low Channel, 2402 MHz |                     |                 |               |        |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| Fundamental                              | 2401.76             | N/A             | N/A           | N/A    |  |

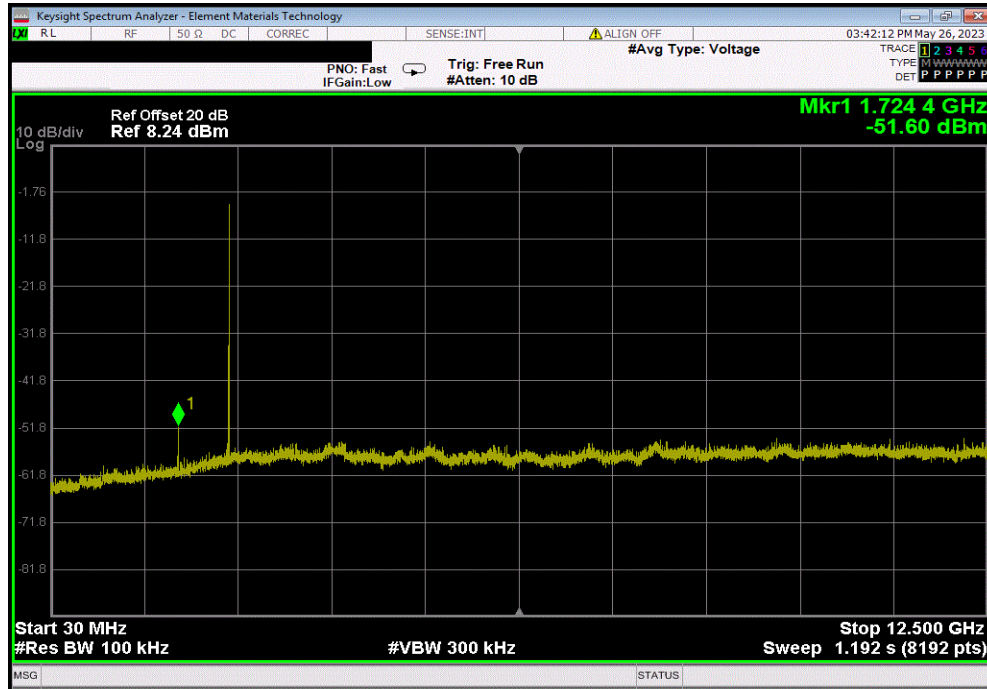


# SPURIOUS CONDUCTED EMISSIONS

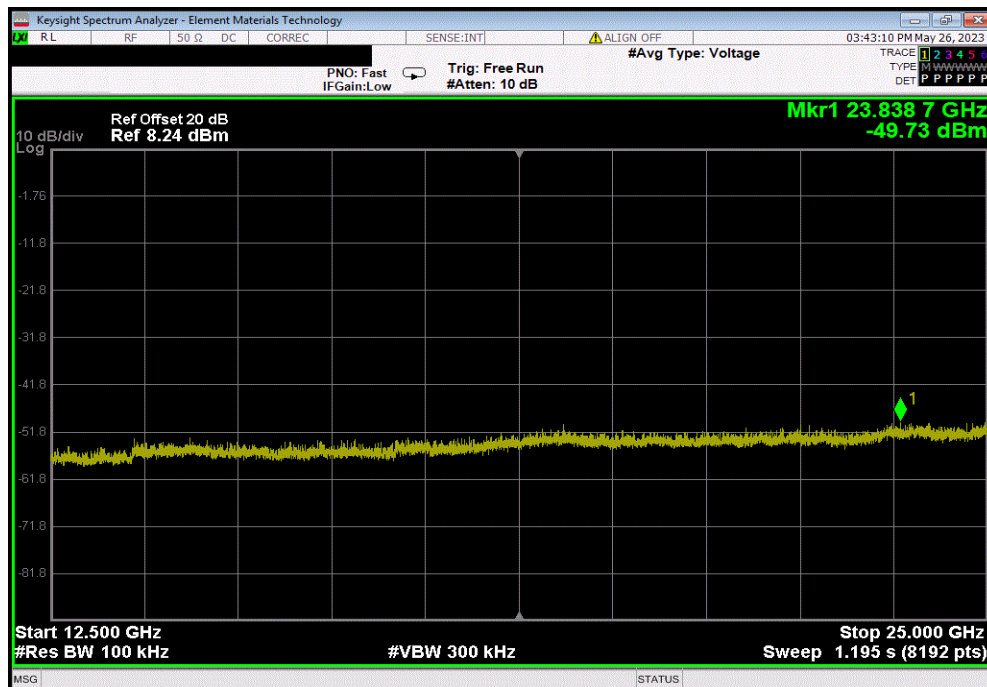


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 500 kbps, Low Channel, 2402 MHz |                     |                 |               |        |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 30 MHz - 12.5 GHz                        | 1724.43             | -49.37          | -20           | Pass   |  |



| BLE/GFSK 500 kbps, Low Channel, 2402 MHz |                     |                 |               |        |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                        | 23838.66            | -47.5           | -20           | Pass   |  |

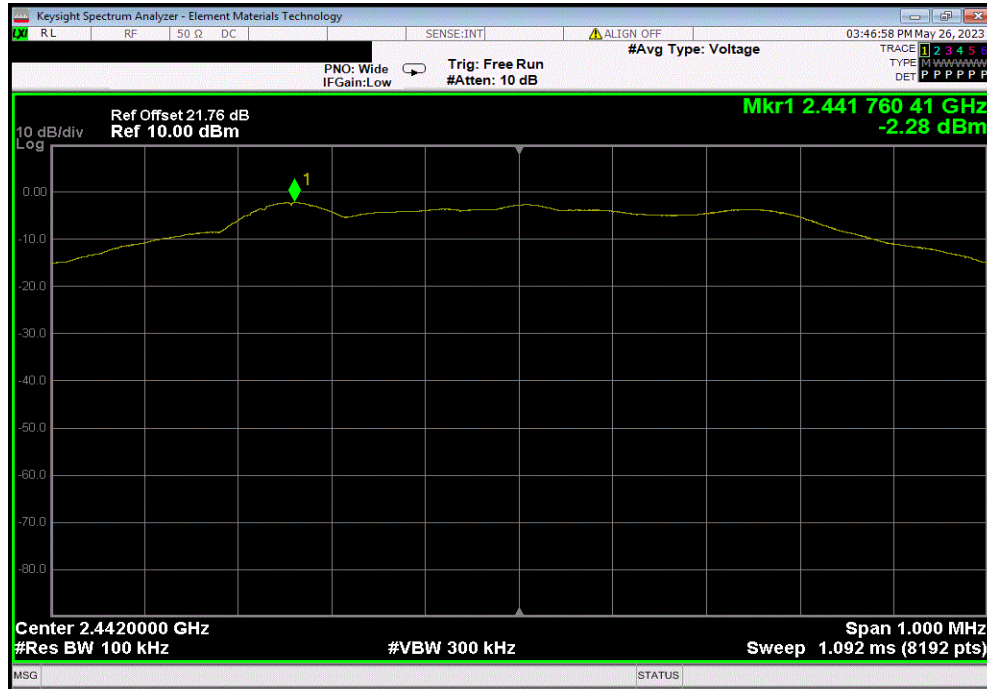


# SPURIOUS CONDUCTED EMISSIONS

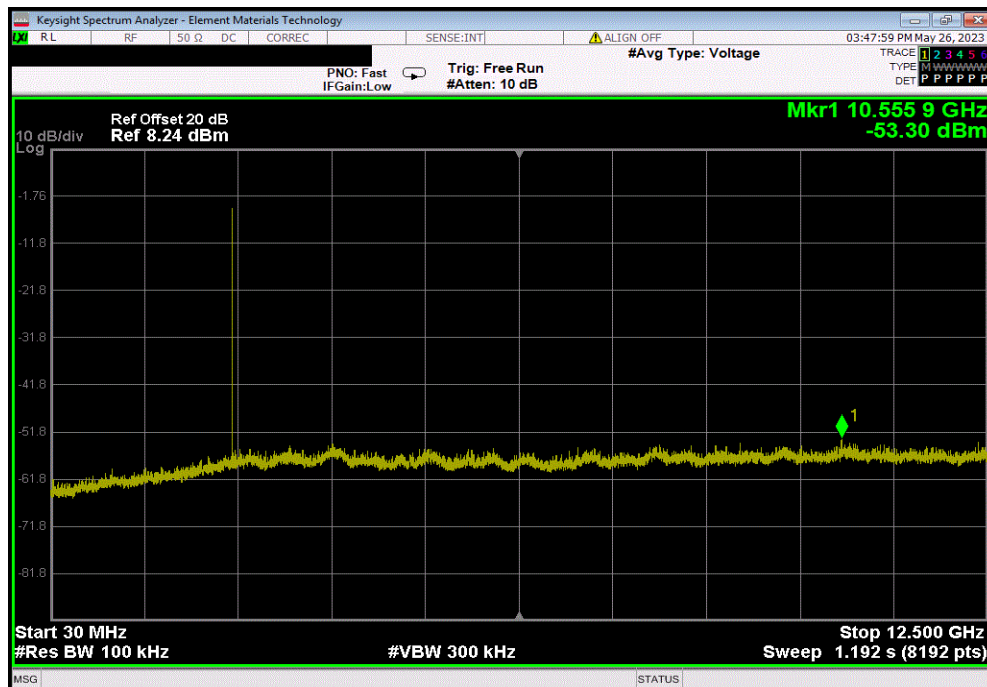


TbTx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 500 kbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| Fundamental                              | 2441.76             | N/A             | N/A           | N/A    |  |



| BLE/GFSK 500 kbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 30 MHz - 12.5 GHz                        | 10555.89            | -51.02          | -20           | Pass   |  |

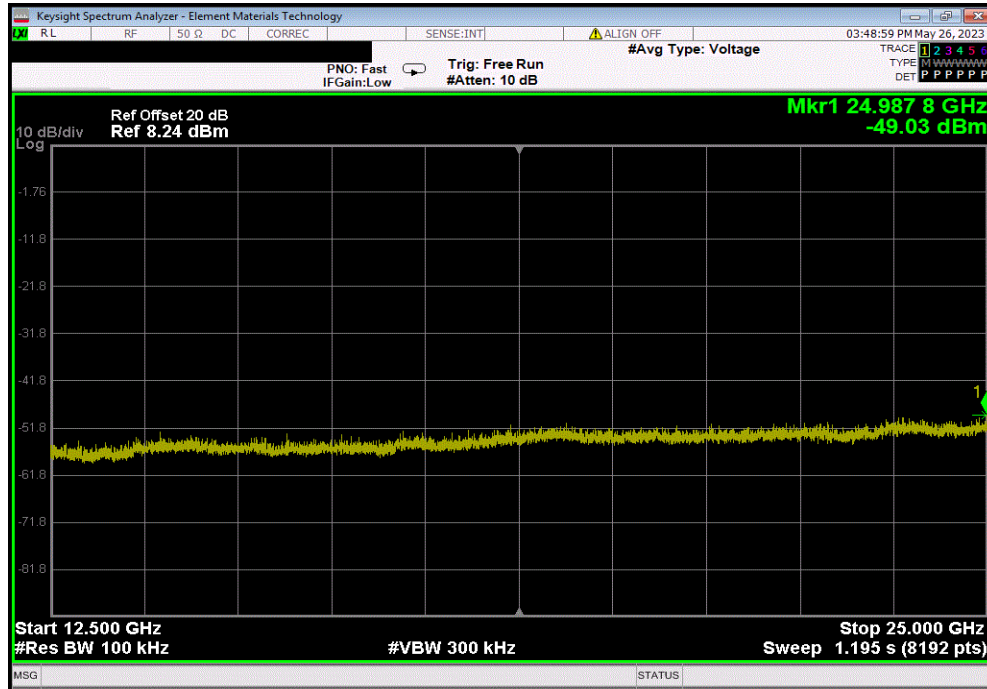


# SPURIOUS CONDUCTED EMISSIONS

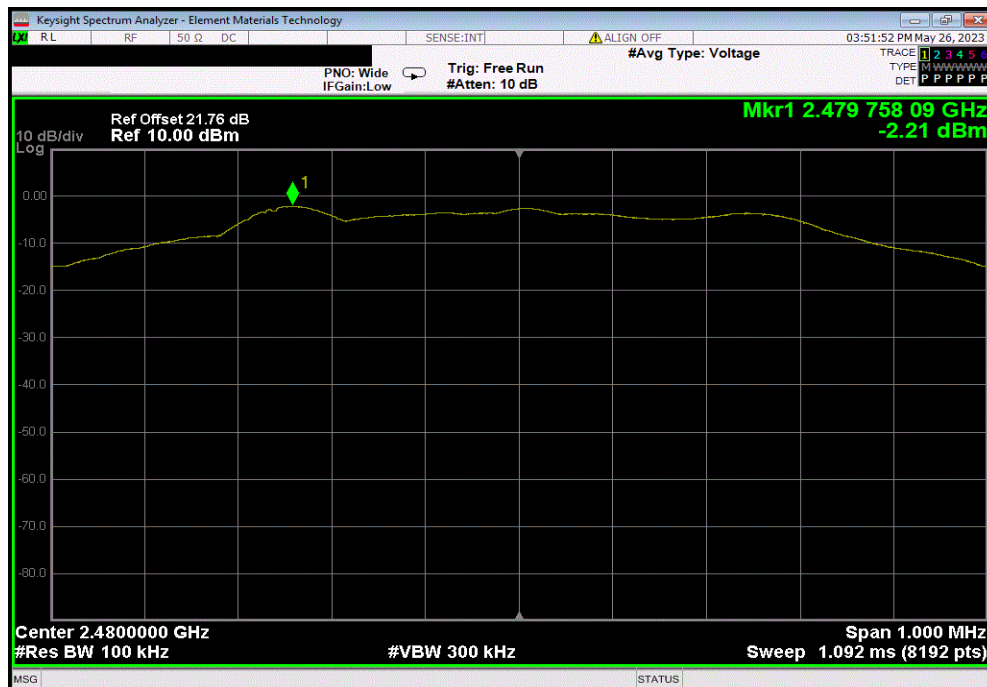


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 500 kbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                          | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                        | 24987.79            | -46.75          | -20           | Pass   |  |



| BLE/GFSK 500 kbps, High Channel, 2480 MHz |                     |                 |               |        |  |
|-------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                           | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| Fundamental                               | 2479.76             | N/A             | N/A           | N/A    |  |

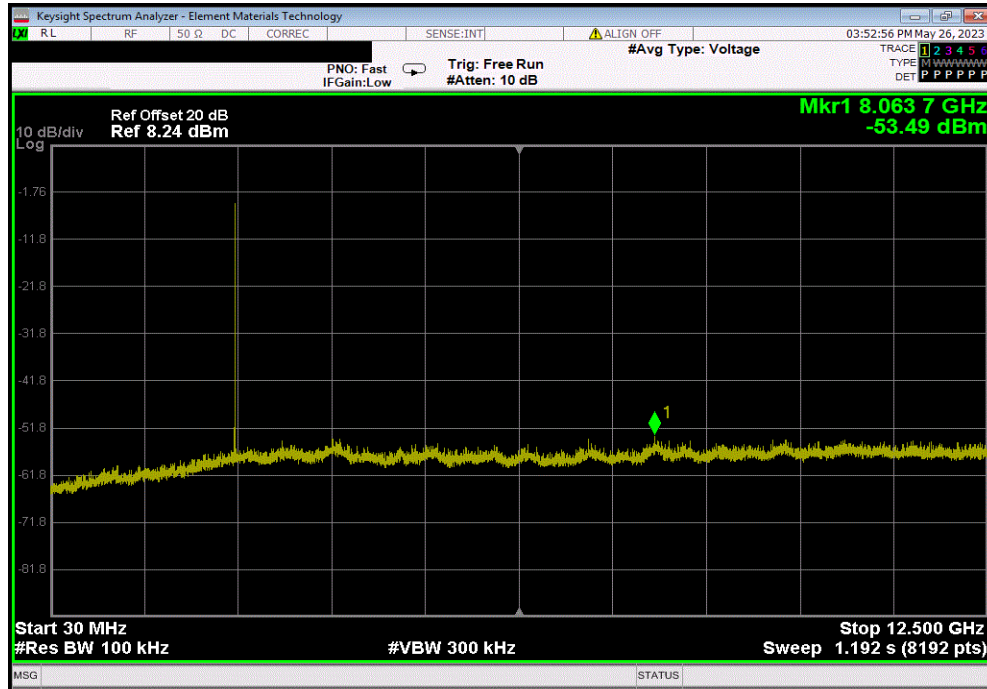


# SPURIOUS CONDUCTED EMISSIONS

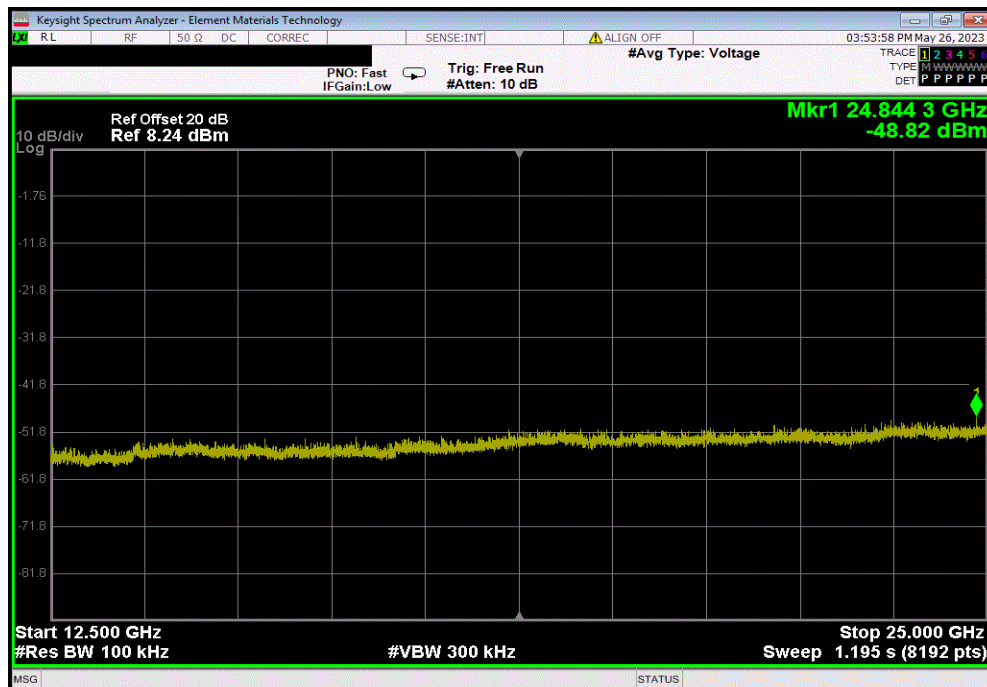


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 500 kbps, High Channel, 2480 MHz |                     |                 |               |        |  |
|-------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                           | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 30 MHz - 12.5 GHz                         | 8063.72             | -51.28          | -20           | Pass   |  |



| BLE/GFSK 500 kbps, High Channel, 2480 MHz |                     |                 |               |        |  |
|-------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                           | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                         | 24844.34            | -46.61          | -20           | Pass   |  |



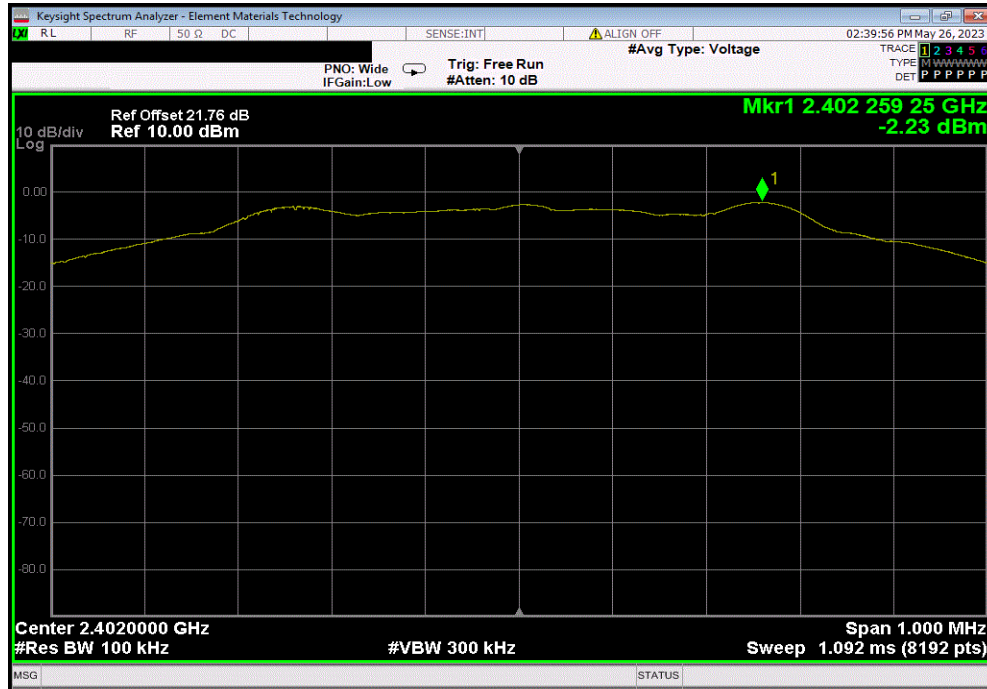


# SPURIOUS CONDUCTED EMISSIONS

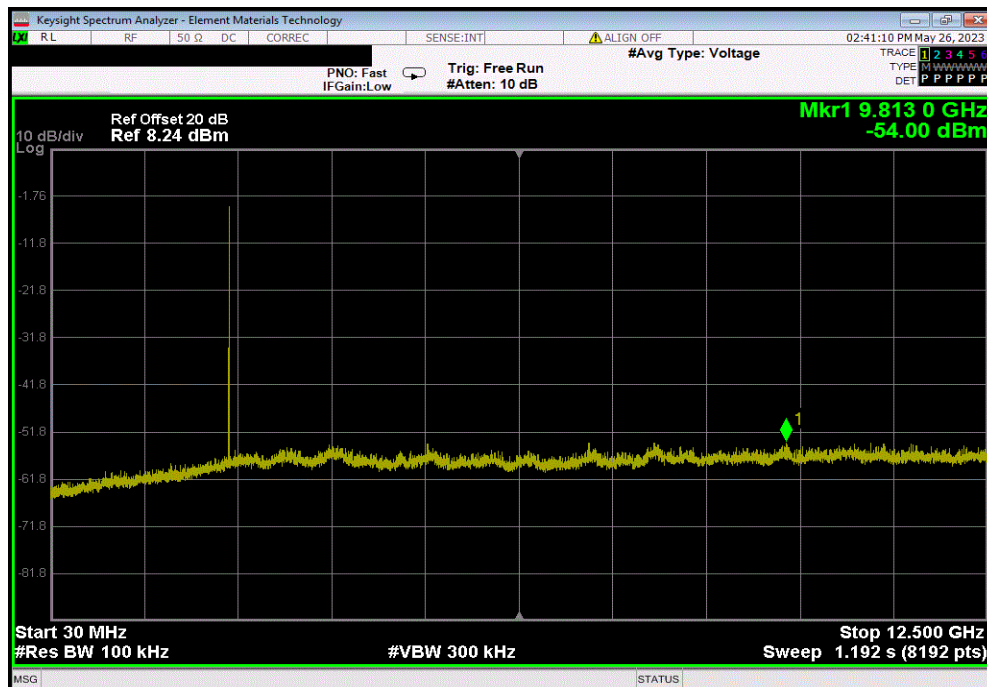


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 1 Mbps, Low Channel, 2402 MHz |                     |                 |               |        |  |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |  |
| Fundamental                            | 2402.26             | N/A             | N/A           | N/A    |  |  |



| BLE/GFSK 1 Mbps, Low Channel, 2402 MHz |                     |                 |               |        |  |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |  |
| 30 MHz - 12.5 GHz                      | 9812.96             | -51.77          | -20           | Pass   |  |  |



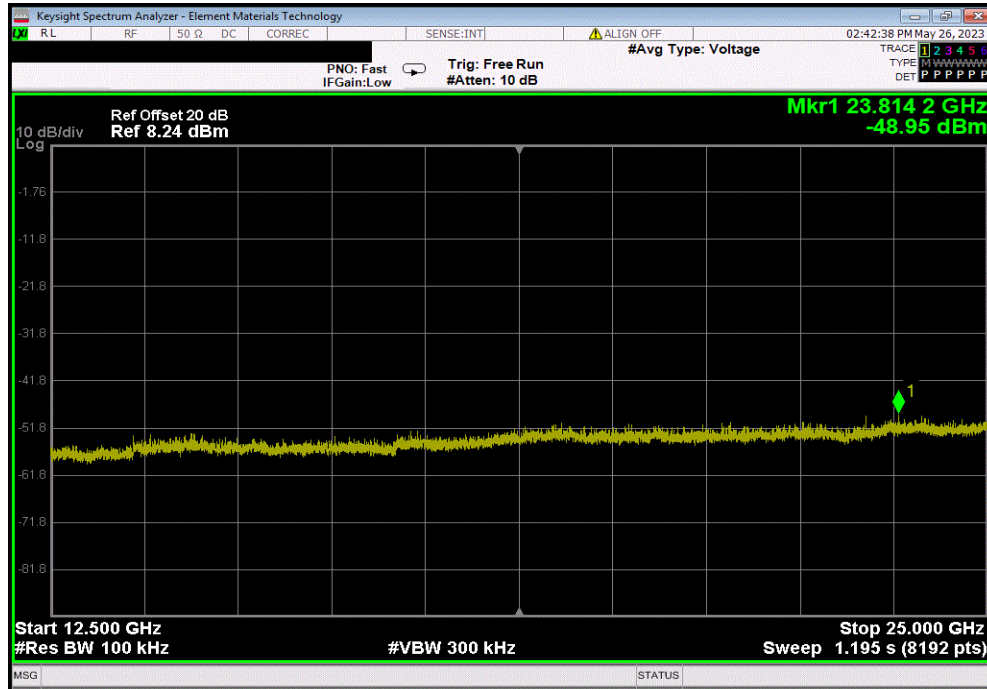


# SPURIOUS CONDUCTED EMISSIONS

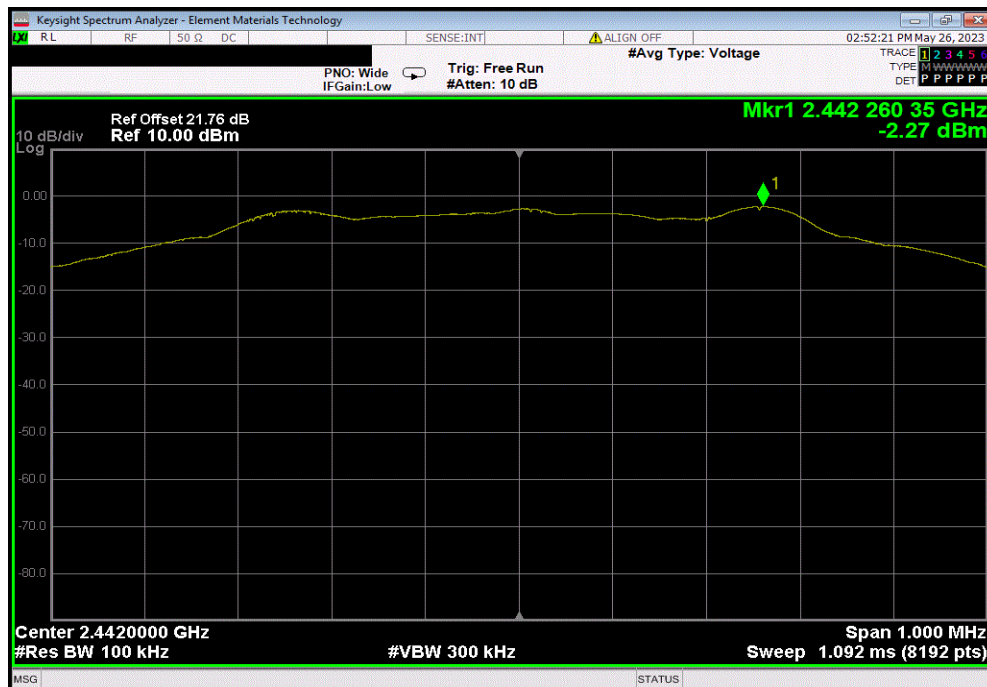


TbTtX 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 1 Mbps, Low Channel, 2402 MHz |                     |                 |               |        |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                      | 23814.25            | -46.72          | -20           | Pass   |  |



| BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| Fundamental                            | 2442.26             | N/A             | N/A           | N/A    |  |

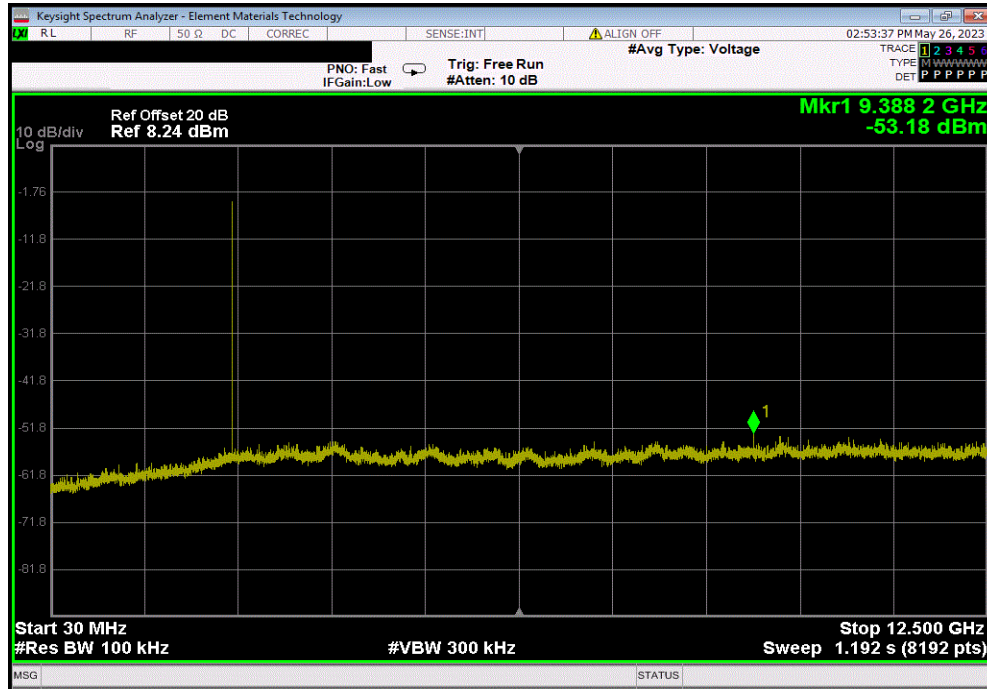


# SPURIOUS CONDUCTED EMISSIONS

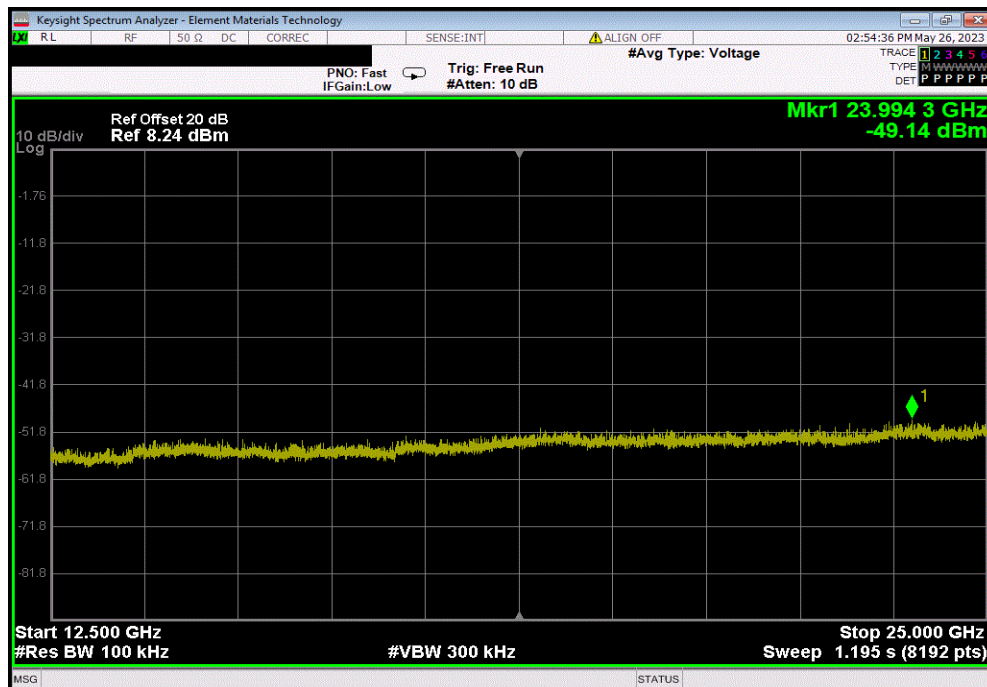


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 30 MHz - 12.5 GHz                      | 9388.21             | -50.91          | -20           | Pass   |  |



| BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                      | 23994.32            | -46.87          | -20           | Pass   |  |

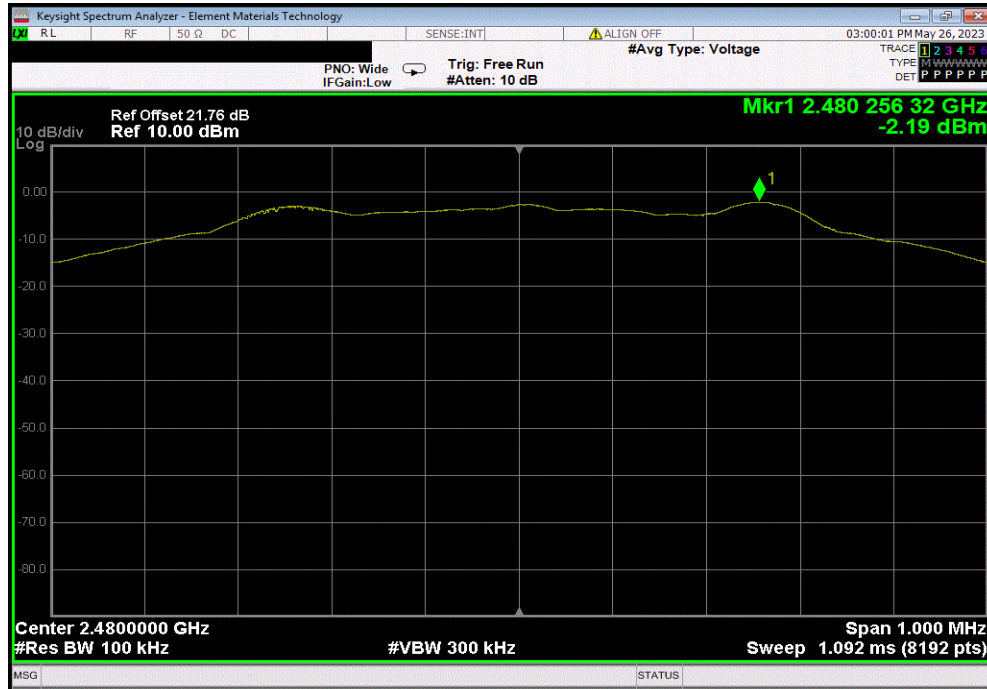


# SPURIOUS CONDUCTED EMISSIONS

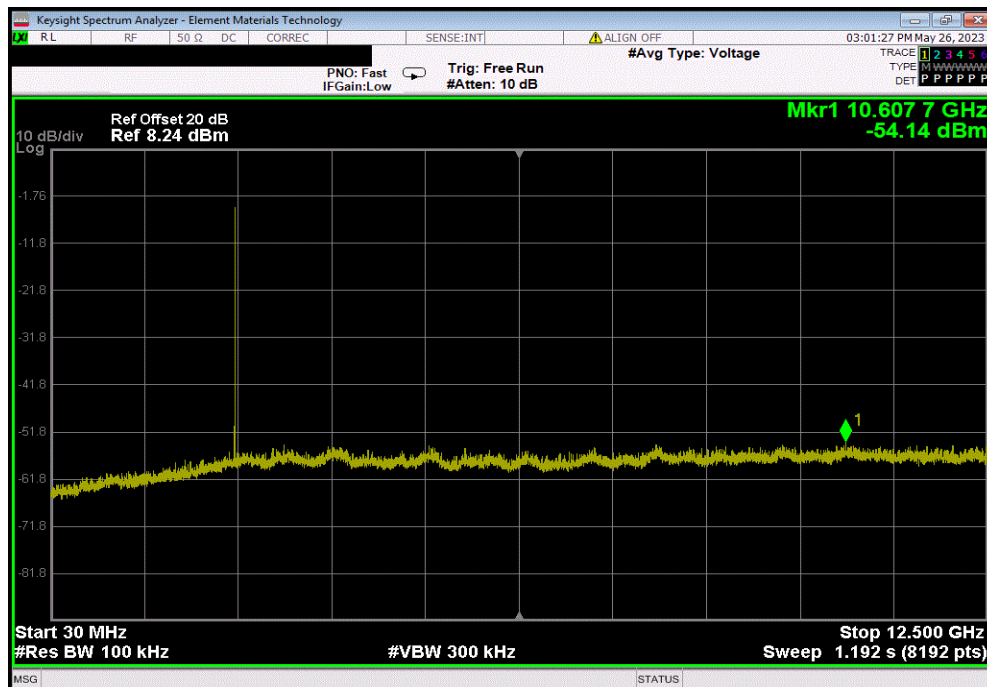


TbTx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 1 Mbps, High Channel, 2480 MHz |                     |                 |               |        |  |  |
|-----------------------------------------|---------------------|-----------------|---------------|--------|--|--|
| Frequency Range                         | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |  |
| Fundamental                             | 2480.26             | N/A             | N/A           | N/A    |  |  |



| BLE/GFSK 1 Mbps, High Channel, 2480 MHz |                     |                 |               |        |  |  |
|-----------------------------------------|---------------------|-----------------|---------------|--------|--|--|
| Frequency Range                         | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |  |
| 30 MHz - 12.5 GHz                       | 10607.65            | -51.95          | -20           | Pass   |  |  |

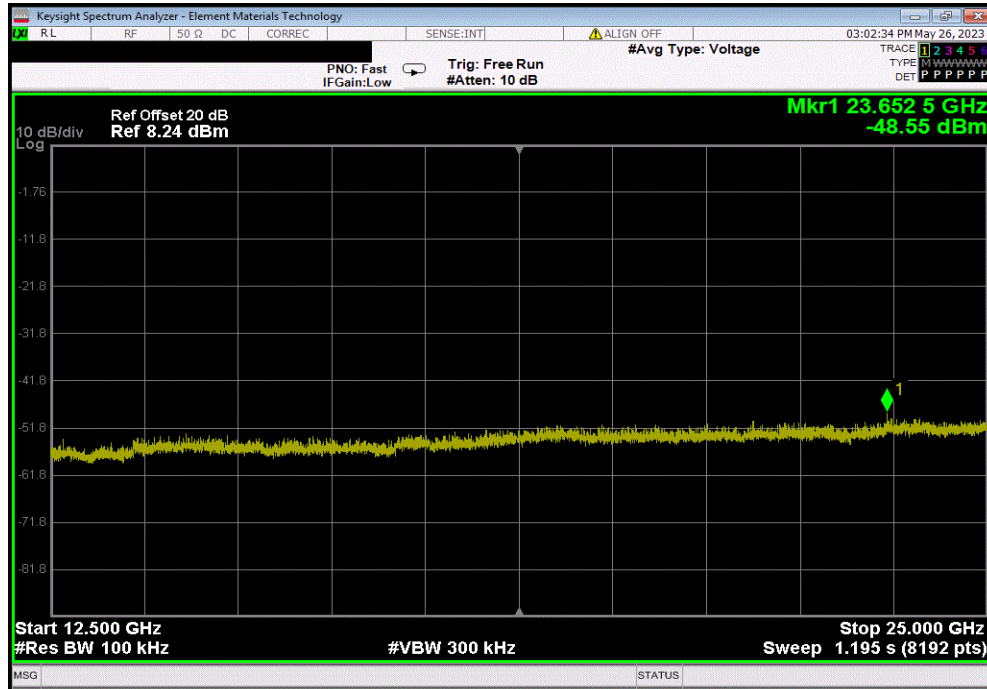


# SPURIOUS CONDUCTED EMISSIONS

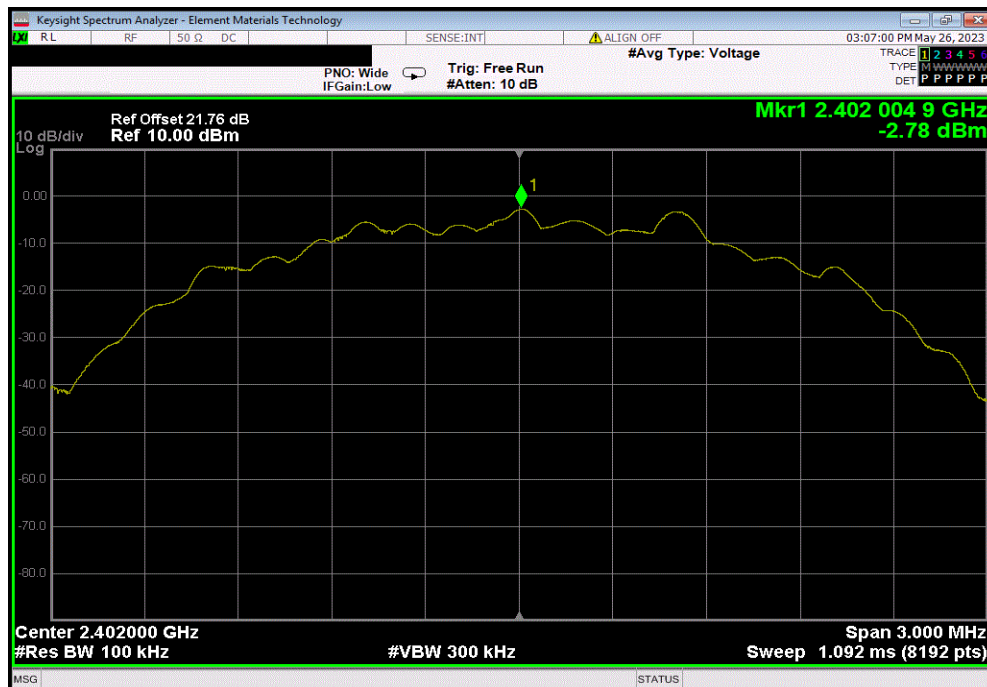


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 1 Mbps, High Channel, 2480 MHz |                     |                 |               |        |  |
|-----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                         | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                       | 23652.48            | -46.36          | -20           | Pass   |  |



| BLE/GFSK 2 Mbps, Low Channel, 2402 MHz |                     |                 |               |        |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| Fundamental                            | 2402                | N/A             | N/A           | N/A    |  |

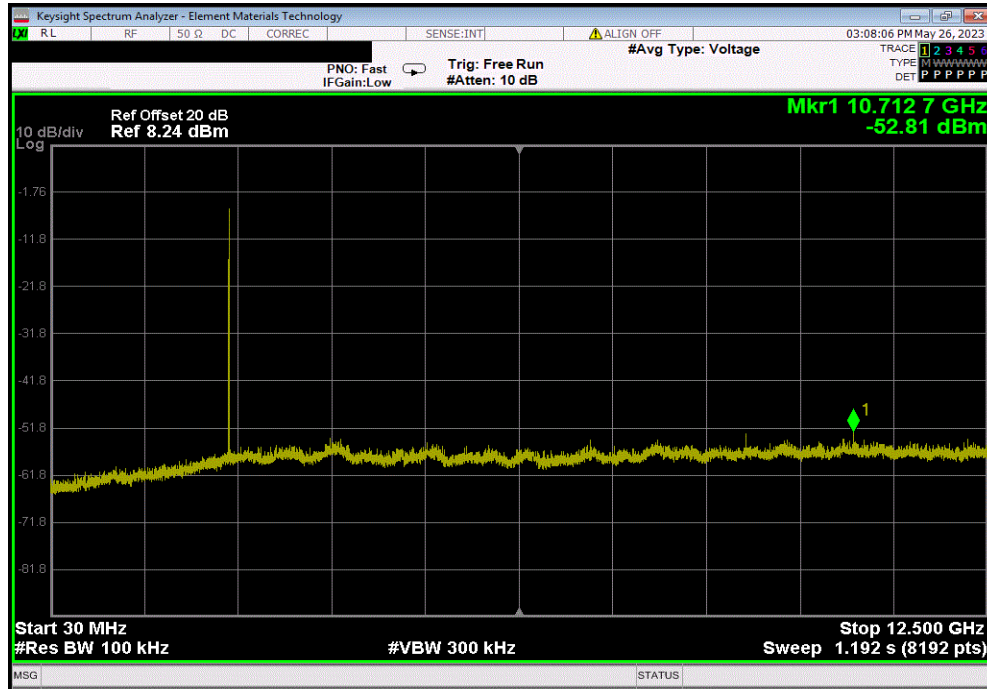


# SPURIOUS CONDUCTED EMISSIONS

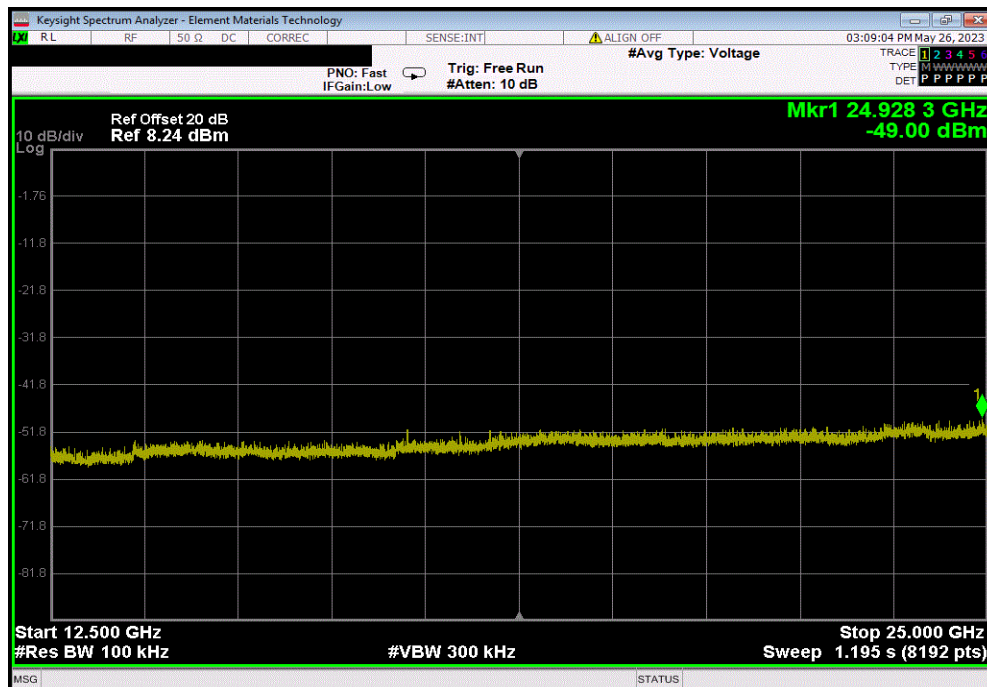


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 2 Mbps, Low Channel, 2402 MHz |                     |                 |               |        |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 30 MHz - 12.5 GHz                      | 10712.7             | -50.03          | -20           | Pass   |  |



| BLE/GFSK 2 Mbps, Low Channel, 2402 MHz |                     |                 |               |        |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                      | 24928.27            | -46.22          | -20           | Pass   |  |



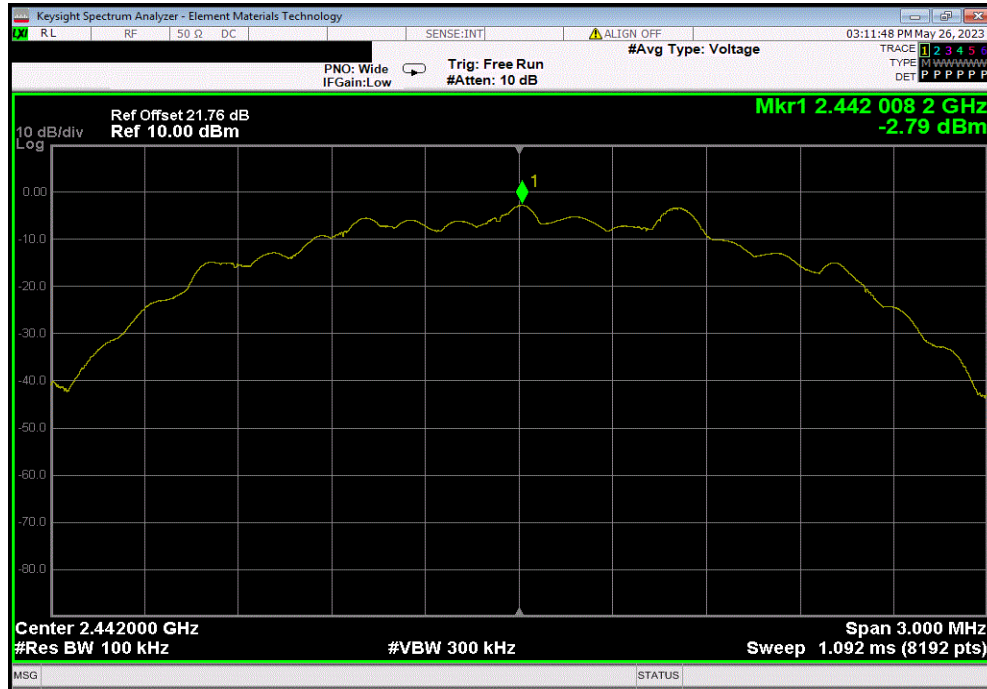


# SPURIOUS CONDUCTED EMISSIONS

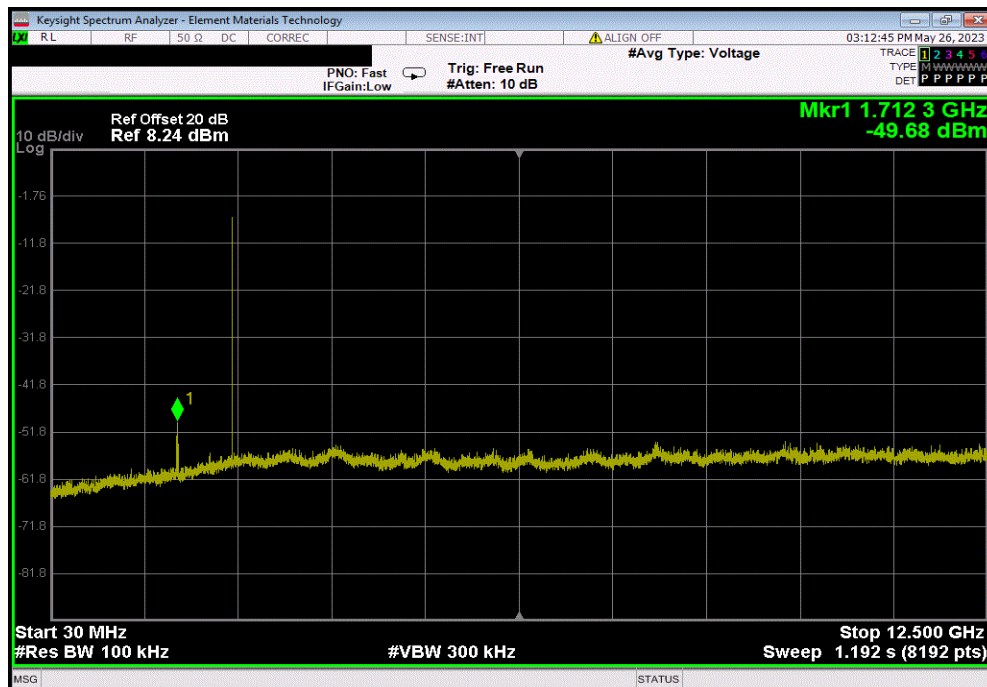


TbTx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| Fundamental                            | 2442.01             | N/A             | N/A           | N/A    |  |



| BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 30 MHz - 12.5 GHz                      | 1712.25             | -46.89          | -20           | Pass   |  |



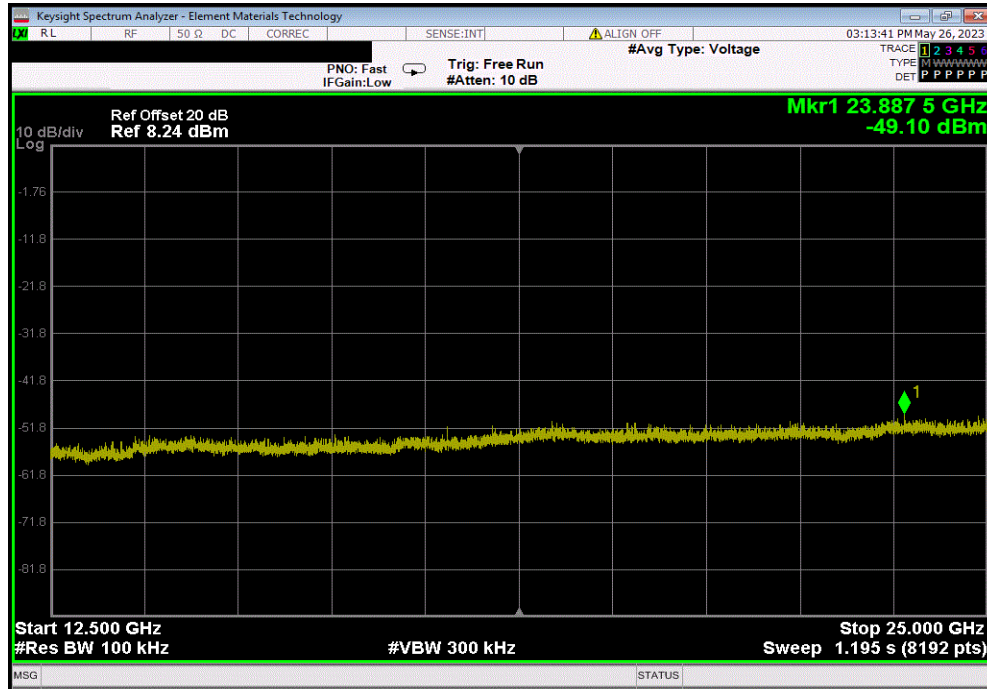


# SPURIOUS CONDUCTED EMISSIONS

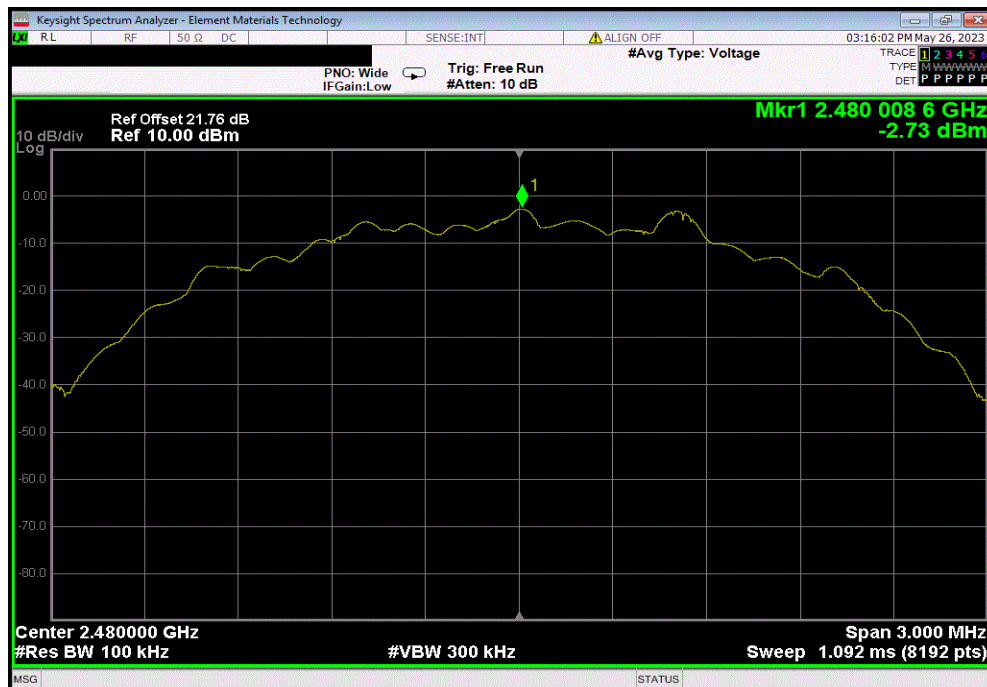


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz |                     |                 |               |        |  |
|----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                        | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                      | 23887.5             | -46.31          | -20           | Pass   |  |



| BLE/GFSK 2 Mbps, High Channel, 2480 MHz |                     |                 |               |        |  |
|-----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                         | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| Fundamental                             | 2480.01             | N/A             | N/A           | N/A    |  |

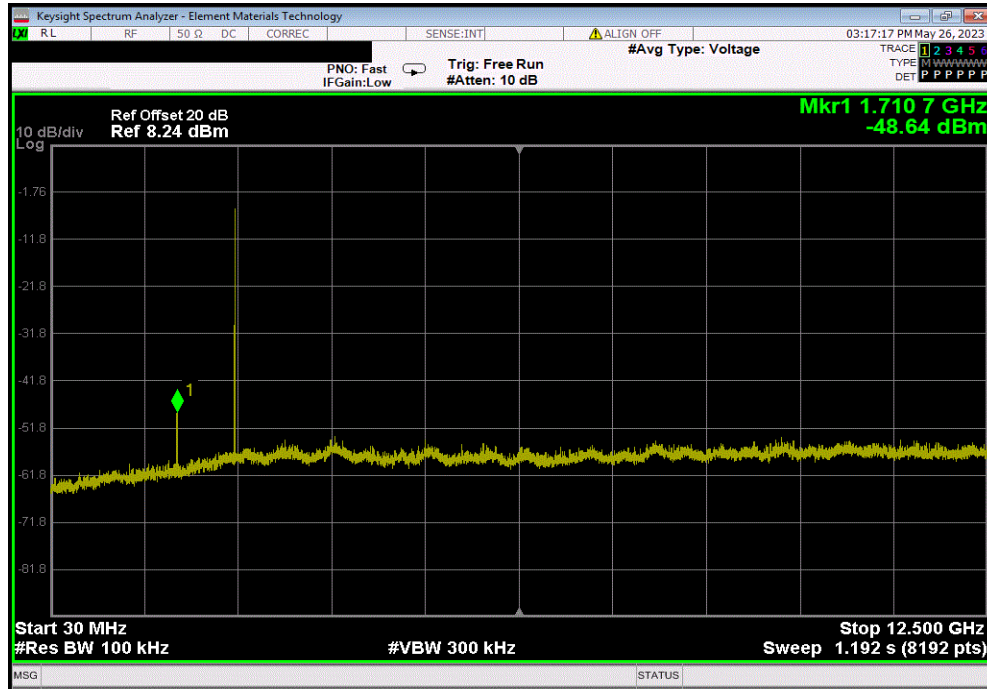


# SPURIOUS CONDUCTED EMISSIONS

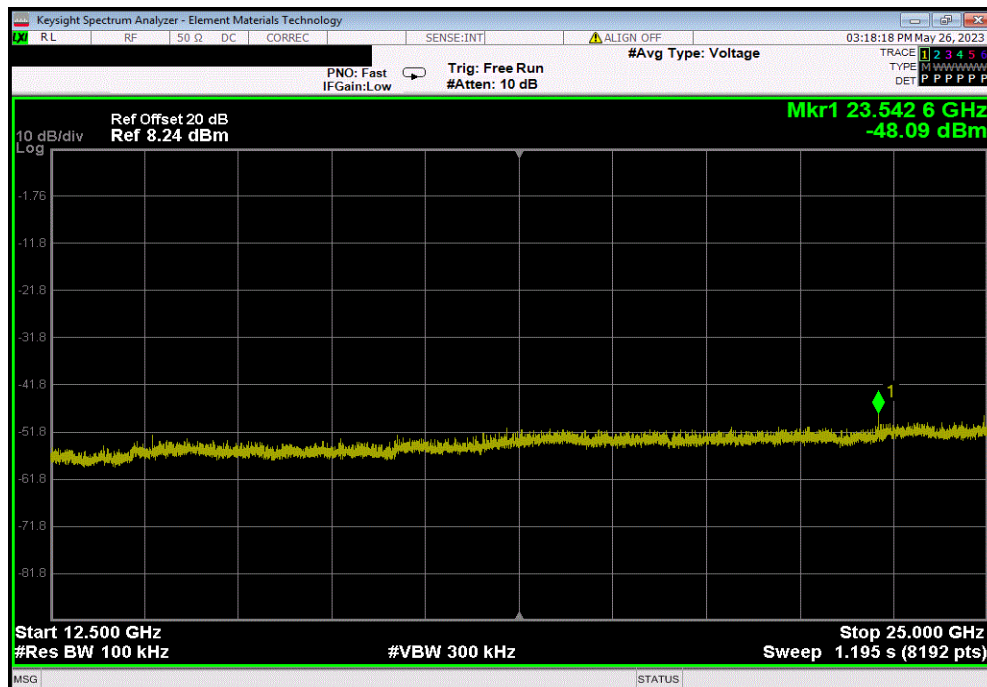


TbTtx 2022.06.03.0 XMt 2023.02.14.0

| BLE/GFSK 2 Mbps, High Channel, 2480 MHz |                     |                 |               |        |  |
|-----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                         | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 30 MHz - 12.5 GHz                       | 1710.73             | -45.91          | -20           | Pass   |  |



| BLE/GFSK 2 Mbps, High Channel, 2480 MHz |                     |                 |               |        |  |
|-----------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                         | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                       | 23542.61            | -45.36          | -20           | Pass   |  |



# SPURIOUS RADIATED EMISSIONS

## TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These "pre-scans" are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector  
PK = Peak Detector  
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements within 2 MHz of the allowable band may have been taken using the integration method from ANSI C63.10 clause 11.13.3. This procedure uses the channel power feature of the spectrum analyzer to integrate the power of the emission within a 1 MHz bandwidth.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of  $10 \cdot \log(1/dc)$ .

## TEST EQUIPMENT

| Description                  | Manufacturer       | Model                     | ID  | Last Cal.  | Cal. Due   |
|------------------------------|--------------------|---------------------------|-----|------------|------------|
| Antenna - Double Ridge       | ETS Lindgren       | 3115                      | AIP | 2022-07-20 | 2024-07-20 |
| Amplifier - Pre-Amplifier    | Miteq              | AMF-3D-00100800-32-13P    | AVT | 2023-01-14 | 2024-01-14 |
| Attenuator                   | Fairview Microwave | SA18E-20                  | TWZ | 2022-08-27 | 2023-08-27 |
| Analyzer - Spectrum Analyzer | Agilent            | E4446A                    | AAQ | 2023-02-06 | 2024-02-06 |
| Filter - High Pass           | Micro-Tronics      | HPM50111                  | LFN | 2022-08-27 | 2023-08-27 |
| Antenna - Standard Gain      | ETS Lindgren       | 3160-07                   | AXP | NCR        | NCR        |
| Cable                        | ESM Cable Corp.    | Standard Gain Horn Cables | MNJ | 2023-01-14 | 2024-01-14 |
| Amplifier - Pre-Amplifier    | Miteq              | AMF-6F-08001200-30-10P    | AVV | 2023-01-14 | 2024-01-14 |
| Antenna - Standard Gain      | ETS Lindgren       | 3160-08                   | AIQ | NCR        | NCR        |
| Amplifier - Pre-Amplifier    | Miteq              | AMF-6F-12001800-30-10P    | AVW | 2023-01-14 | 2024-01-14 |
| Antenna - Biconilog          | ETS Lindgren       | 3142D                     | AXO | 2021-09-14 | 2023-09-14 |
| Cable                        | ESM Cable Corp.    | Bilog Cables              | MNH | 2022-10-08 | 2023-10-08 |
| Amplifier - Pre-Amplifier    | Miteq              | AM-1616-1000              | AVO | 2022-10-08 | 2023-10-08 |
| Filter - Low Pass            | Micro-Tronics      | LPM50004                  | LFK | 2022-08-27 | 2023-08-27 |
| Antenna - Standard Gain      | ETS Lindgren       | 3160-09                   | AHG | NCR        | NCR        |
| Cable                        | ESM Cable Corp.    | TTBJ141 KMKM-72           | MNP | 2022-09-10 | 2023-09-10 |
| Amplifier - Pre-Amplifier    | Miteq              | JSD4-18002600-26-8P       | APU | 2022-09-10 | 2023-09-10 |
| Analyzer - Spectrum Analyzer | Agilent            | E4440A                    | AFG | 2022-05-18 | 2023-05-18 |

# SPURIOUS RADIATED EMISSIONS

## MEASUREMENT UNCERTAINTY

| Description  |        |         |
|--------------|--------|---------|
| Expanded k=2 | 5.2 dB | -5.2 dB |

## FREQUENCY RANGE INVESTIGATED

|                     |
|---------------------|
| 30 MHz TO 26500 MHz |
|---------------------|

## POWER INVESTIGATED

|                           |
|---------------------------|
| Internal Battery (3.7VDC) |
|---------------------------|

## CONFIGURATIONS INVESTIGATED

|            |
|------------|
| TSIN0196-7 |
|------------|

## MODES INVESTIGATED

|                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------|
| Transmitting BLE Low and High Channels (2402 and 2480 MHz) 1 Mbps, 2 Mbps, 500 kbps and 125 kbps, Modulated. PRBS9         |
| Transmitting BLE Low, Mid and High Channels (2402, 2442, 2480 MHz) 1 Mbps, 2 Mbps, 500 kbps and 125 kbps, Modulated. PRBS9 |

# SPURIOUS RADIATED EMISSIONS

|                   |                           |                       |            |
|-------------------|---------------------------|-----------------------|------------|
| EUT:              | TSI Inc. OmniTrak         | Work Order:           | TSIN0196   |
| Serial Number:    | TSI55221200061            | Date:                 | 2023-03-15 |
| Customer:         | TSI, Incorporated         | Temperature:          | 22.7°C     |
| Attendees:        | Andrew Bentley            | Relative Humidity:    | 21.1%      |
| Customer Project: | None                      | Bar. Pressure (PMSL): | 1026 mb    |
| Tested By:        | Marcelo Aguayo            | Job Site:             | MN05       |
| Power:            | Internal Battery (3.7VDC) | Configuration:        | TSIN0196-7 |

## TEST SPECIFICATIONS

|                                      |                  |
|--------------------------------------|------------------|
| Specification:                       | Method:          |
| FCC 15.247:2023                      | ANSI C63.10:2013 |
| RSS-247 Issue 2:2017                 |                  |
| RSS-Gen Issue 5:2018+A1:2019+A2:2021 | ANSI C63.10:2013 |

## TEST PARAMETERS

|        |    |                    |   |                     |           |
|--------|----|--------------------|---|---------------------|-----------|
| Run #: | 77 | Test Distance (m): | 3 | Ant. Height(s) (m): | 1 to 4(m) |
|--------|----|--------------------|---|---------------------|-----------|

## COMMENTS

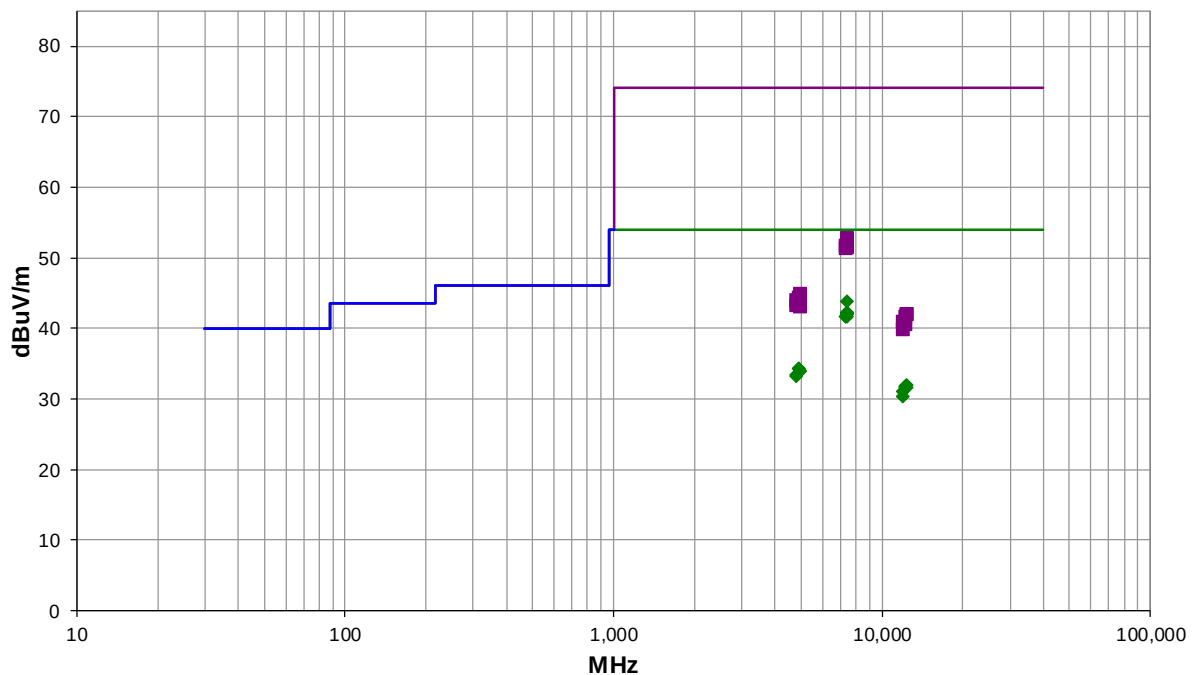
Test mode duty cycle is 85.4% (1 Mbps), 57.6% (2 Mbps), 97.4% (125 kbps), 91.2% (500 kbps).  
Duty cycle correction factor (DCCF) applied using  $DCCF = [10 \cdot \log(1/\text{test mode DC})]$ .  
Total correction applied: 1Mbps= +0.7 dB, 2Mbps= +2.4 dB, 125kbps= +0.1 dB, 500kbps= +0.4 dB

## EUT OPERATING MODES

Transmitting BLE Low, Mid and High Channels (2402, 2442, 2480 MHz) 1 Mbps, 2 Mbps, 500 kbps and 125 kbps, Modulated. PRBS9

## DEVIATIONS FROM TEST STANDARD

None



Run #: 77

■ PK ◆ AV ● QP

# SPURIOUS RADIATED EMISSIONS

## RESULTS - Run #77

| Freq (MHz) | Amplitude (dBuV) | Factor (dB/m) | Antenna Height (meters) | Azimuth (degrees) | Duty Cycle Correction Factor (dB) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments                    |
|------------|------------------|---------------|-------------------------|-------------------|-----------------------------------|---------------------------|---------------------------|----------|--------------------------|-------------------|----------------------|------------------------|-----------------------------|
| 7439.392   | 29.8             | 11.9          | 1.5                     | 247.9             | 0.4                               | 0.0                       | Horz                      | AV       | 0.0                      | 42.1              | 54.0                 | -11.9                  | EUT Horz, Low Ch 500 kbps   |
| 7441.850   | 29.6             | 11.9          | 3.5                     | 303.0             | 0.7                               | 0.0                       | Horz                      | AV       | 0.0                      | 42.2              | 54.0                 | -11.8                  | EUT Horz, High Ch 1 Mbps    |
| 7439.467   | 29.6             | 11.9          | 2.9                     | 210.9             | 0.7                               | 0.0                       | Vert                      | AV       | 0.0                      | 42.2              | 54.0                 | -11.8                  | EUT Horz, High Ch 1 Mbps    |
| 7438.933   | 29.6             | 11.9          | 1.5                     | 95.0              | 0.7                               | 0.0                       | Horz                      | AV       | 0.0                      | 42.2              | 54.0                 | -11.8                  | EUT Vert, High Ch 1 Mbps    |
| 7438.450   | 29.6             | 11.9          | 1.5                     | 206.0             | 0.7                               | 0.0                       | Horz                      | AV       | 0.0                      | 42.2              | 54.0                 | -11.8                  | EUT On Side, High Ch 1 Mbps |
| 7438.692   | 29.6             | 11.9          | 3.5                     | 329.0             | 0.7                               | 0.0                       | Vert                      | AV       | 0.0                      | 42.2              | 54.0                 | -11.8                  | EUT Vert, High Ch 1 Mbps    |
| 7441.333   | 29.6             | 11.9          | 1.2                     | 193.9             | 2.4                               | 0.0                       | Horz                      | AV       | 0.0                      | 43.9              | 54.0                 | -10.1                  | EUT Horz, High Ch 2 Mbps    |
| 7440.183   | 29.6             | 11.9          | 1.5                     | 232.0             | 0.1                               | 0.0                       | Horz                      | AV       | 0.0                      | 41.6              | 54.0                 | -12.4                  | EUT Horz, Low Ch 125 kbps   |
| 7439.833   | 29.5             | 11.9          | 1.5                     | 203.0             | 0.7                               | 0.0                       | Vert                      | AV       | 0.0                      | 42.1              | 54.0                 | -11.9                  | EUT On Side, High Ch 1 Mbps |
| 7324.192   | 29.2             | 11.7          | 2.0                     | 189.9             | 0.7                               | 0.0                       | Horz                      | AV       | 0.0                      | 41.6              | 54.0                 | -12.4                  | EUT Horz, Mid Ch 1 Mbps     |
| 7323.692   | 29.2             | 11.7          | 1.5                     | 113.9             | 0.7                               | 0.0                       | Vert                      | AV       | 0.0                      | 41.6              | 54.0                 | -12.4                  | EUT Horz, Mid Ch 1 Mbps     |
| 7438.858   | 40.9             | 11.9          | 3.5                     | 329.0             | 0.0                               | 0.0                       | Vert                      | PK       | 0.0                      | 52.8              | 74.0                 | -21.2                  | EUT Horz, High Ch 1 Mbps    |
| 4883.800   | 30.2             | 3.4           | 1.5                     | 315.0             | 0.7                               | 0.0                       | Horz                      | AV       | 0.0                      | 34.3              | 54.0                 | -19.7                  | EUT Horz, Mid Ch 1 Mbps     |
| 4884.725   | 30.2             | 3.4           | 1.2                     | 141.0             | 0.7                               | 0.0                       | Vert                      | AV       | 0.0                      | 34.3              | 54.0                 | -19.7                  | EUT Horz, Mid Ch 1 Mbps     |
| 7440.050   | 40.5             | 11.9          | 1.5                     | 203.0             | 0.0                               | 0.0                       | Vert                      | PK       | 0.0                      | 52.4              | 74.0                 | -21.6                  | EUT On Side, High Ch 1 Mbps |
| 4961.883   | 29.6             | 3.6           | 1.5                     | 77.9              | 0.7                               | 0.0                       | Horz                      | AV       | 0.0                      | 33.9              | 54.0                 | -20.1                  | EUT Horz, High Ch 1 Mbps    |
| 4959.750   | 29.6             | 3.6           | 1.3                     | 85.9              | 0.7                               | 0.0                       | Vert                      | AV       | 0.0                      | 33.9              | 54.0                 | -20.1                  | EUT Horz, High Ch 1 Mbps    |
| 7440.175   | 40.0             | 11.9          | 1.5                     | 206.0             | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 51.9              | 74.0                 | -22.1                  | EUT Horz, High Ch 1 Mbps    |
| 7442.500   | 40.0             | 11.9          | 1.5                     | 247.9             | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 51.9              | 74.0                 | -22.1                  | EUT Horz, Low Ch 500 kbps   |
| 7440.058   | 39.9             | 11.9          | 3.5                     | 303.0             | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 51.8              | 74.0                 | -22.2                  | EUT Vert, High Ch 1 Mbps    |
| 7440.867   | 39.9             | 11.9          | 2.9                     | 210.9             | 0.0                               | 0.0                       | Vert                      | PK       | 0.0                      | 51.8              | 74.0                 | -22.2                  | EUT Vert, High Ch 1 Mbps    |
| 7438.917   | 39.9             | 11.9          | 1.2                     | 193.9             | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 51.8              | 74.0                 | -22.2                  | EUT Horz, High Ch 2 Mbps    |
| 7327.342   | 40.0             | 11.7          | 2.0                     | 189.9             | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 51.7              | 74.0                 | -22.3                  | EUT Horz, Mid Ch 1 Mbps     |
| 4805.033   | 29.4             | 3.3           | 1.5                     | 339.0             | 0.7                               | 0.0                       | Vert                      | AV       | 0.0                      | 33.4              | 54.0                 | -20.6                  | EUT Horz, Low Ch 1 Mbps     |
| 7442.092   | 39.7             | 11.9          | 1.5                     | 95.0              | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 51.6              | 74.0                 | -22.4                  | EUT On Side, High Ch 1 Mbps |
| 7438.067   | 39.7             | 11.9          | 1.5                     | 232.0             | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 51.6              | 74.0                 | -22.4                  | EUT Horz, Low Ch 125 kbps   |
| 4805.350   | 29.3             | 3.3           | 1.5                     | 23.9              | 0.7                               | 0.0                       | Horz                      | AV       | 0.0                      | 33.3              | 54.0                 | -20.7                  | EUT Horz, Low Ch 1 Mbps     |
| 7325.075   | 39.7             | 11.7          | 1.5                     | 113.9             | 0.0                               | 0.0                       | Vert                      | PK       | 0.0                      | 51.4              | 74.0                 | -22.6                  | EUT Horz, Mid Ch 1 Mbps     |
| 12398.860  | 29.4             | 1.9           | 1.2                     | 120.9             | 0.7                               | 0.0                       | Vert                      | AV       | 0.0                      | 32.0              | 54.0                 | -22.0                  | EUT Horz, High Ch 1 Mbps    |
| 12210.620  | 29.2             | 1.8           | 1.5                     | 105.0             | 0.7                               | 0.0                       | Vert                      | AV       | 0.0                      | 31.7              | 54.0                 | -22.3                  | EUT Horz, Mid Ch 1 Mbps     |
| 12397.500  | 29.0             | 1.9           | 1.5                     | 293.0             | 0.7                               | 0.0                       | Horz                      | AV       | 0.0                      | 31.6              | 54.0                 | -22.4                  | EUT Horz, High Ch 1 Mbps    |
| 12209.870  | 29.1             | 1.8           | 2.7                     | 217.0             | 0.7                               | 0.0                       | Horz                      | AV       | 0.0                      | 31.6              | 54.0                 | -22.4                  | EUT Horz, Mid Ch 1 Mbps     |
| 12011.690  | 29.8             | 0.5           | 1.5                     | 278.0             | 0.7                               | 0.0                       | Vert                      | AV       | 0.0                      | 31.0              | 54.0                 | -23.0                  | EUT Horz, Low Ch 1 Mbps     |
| 12012.120  | 29.1             | 0.5           | 1.5                     | 314.0             | 0.7                               | 0.0                       | Horz                      | AV       | 0.0                      | 30.3              | 54.0                 | -23.7                  | EUT Horz, Low Ch 1 Mbps     |
| 4959.217   | 41.3             | 3.6           | 1.3                     | 85.9              | 0.0                               | 0.0                       | Vert                      | PK       | 0.0                      | 44.9              | 74.0                 | -29.1                  | EUT Horz, High Ch 1 Mbps    |
| 4885.833   | 40.9             | 3.4           | 1.2                     | 141.0             | 0.0                               | 0.0                       | Vert                      | PK       | 0.0                      | 44.3              | 74.0                 | -29.7                  | EUT Horz, Mid Ch 1 Mbps     |
| 4803.025   | 40.7             | 3.3           | 1.5                     | 339.0             | 0.0                               | 0.0                       | Vert                      | PK       | 0.0                      | 44.0              | 74.0                 | -30.0                  | EUT Horz, Low Ch 1 Mbps     |
| 4885.508   | 40.5             | 3.4           | 1.5                     | 315.0             | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 43.9              | 74.0                 | -30.1                  | EUT Horz, Mid Ch 1 Mbps     |
| 4803.692   | 40.0             | 3.3           | 1.5                     | 23.9              | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 43.3              | 74.0                 | -30.7                  | EUT Horz, Low Ch 1 Mbps     |
| 4959.483   | 39.5             | 3.6           | 1.5                     | 77.9              | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 43.1              | 74.0                 | -30.9                  | EUT Horz, High Ch 1 Mbps    |



# SPURIOUS RADIATED EMISSIONS

| Freq (MHz) | Amplitude (dBuV) | Factor (dB/m) | Antenna Height (meters) | Azimuth (degrees) | Duty Cycle Correction Factor (dB) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments                 |
|------------|------------------|---------------|-------------------------|-------------------|-----------------------------------|---------------------------|---------------------------|----------|--------------------------|-------------------|----------------------|------------------------|--------------------------|
| 12398.530  | 40.1             | 1.9           | 1.5                     | 293.0             | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 42.0              | 74.0                 | -32.0                  | EUT Horz, High Ch 1 Mbps |
| 12398.340  | 40.1             | 1.9           | 1.2                     | 120.9             | 0.0                               | 0.0                       | Vert                      | PK       | 0.0                      | 42.0              | 74.0                 | -32.0                  | EUT Horz, High Ch 1 Mbps |
| 12211.480  | 39.8             | 1.8           | 1.5                     | 105.0             | 0.0                               | 0.0                       | Vert                      | PK       | 0.0                      | 41.6              | 74.0                 | -32.4                  | EUT Horz, Mid Ch 1 Mbps  |
| 12009.640  | 40.5             | 0.4           | 1.5                     | 278.0             | 0.0                               | 0.0                       | Vert                      | PK       | 0.0                      | 40.9              | 74.0                 | -33.1                  | EUT Horz, Low Ch 1 Mbps  |
| 12211.330  | 38.8             | 1.8           | 2.7                     | 217.0             | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 40.6              | 74.0                 | -33.4                  | EUT Horz, Mid Ch 1 Mbps  |
| 12010.150  | 39.3             | 0.5           | 1.5                     | 314.0             | 0.0                               | 0.0                       | Horz                      | PK       | 0.0                      | 39.8              | 74.0                 | -34.2                  | EUT Horz, Low Ch 1 Mbps  |

## CONCLUSION

Pass



Tested By

# SPURIOUS RADIATED EMISSIONS

|                   |                           |                       |            |
|-------------------|---------------------------|-----------------------|------------|
| EUT:              | TSI Inc. OmniTrak         | Work Order:           | TSIN0196   |
| Serial Number:    | TSI55221200061            | Date:                 | 2023-03-15 |
| Customer:         | TSI, Incorporated         | Temperature:          | 22.7°C     |
| Attendees:        | Andrew Bentley            | Relative Humidity:    | 21.1%      |
| Customer Project: | None                      | Bar. Pressure (PMSL): | 1026 mb    |
| Tested By:        | Marcelo Aguayo            | Job Site:             | MN05       |
| Power:            | Internal Battery (3.7VDC) | Configuration:        | TSIN0196-7 |

## TEST SPECIFICATIONS

|                                      |                  |
|--------------------------------------|------------------|
| Specification:                       | Method:          |
| FCC 15.247:2023                      | ANSI C63.10:2013 |
| RSS-247 Issue 2:2017                 |                  |
| RSS-Gen Issue 5:2018+A1:2019+A2:2021 | ANSI C63.10:2013 |

## TEST PARAMETERS

|        |    |                    |   |                     |           |
|--------|----|--------------------|---|---------------------|-----------|
| Run #: | 85 | Test Distance (m): | 3 | Ant. Height(s) (m): | 1 to 4(m) |
|--------|----|--------------------|---|---------------------|-----------|

## COMMENTS

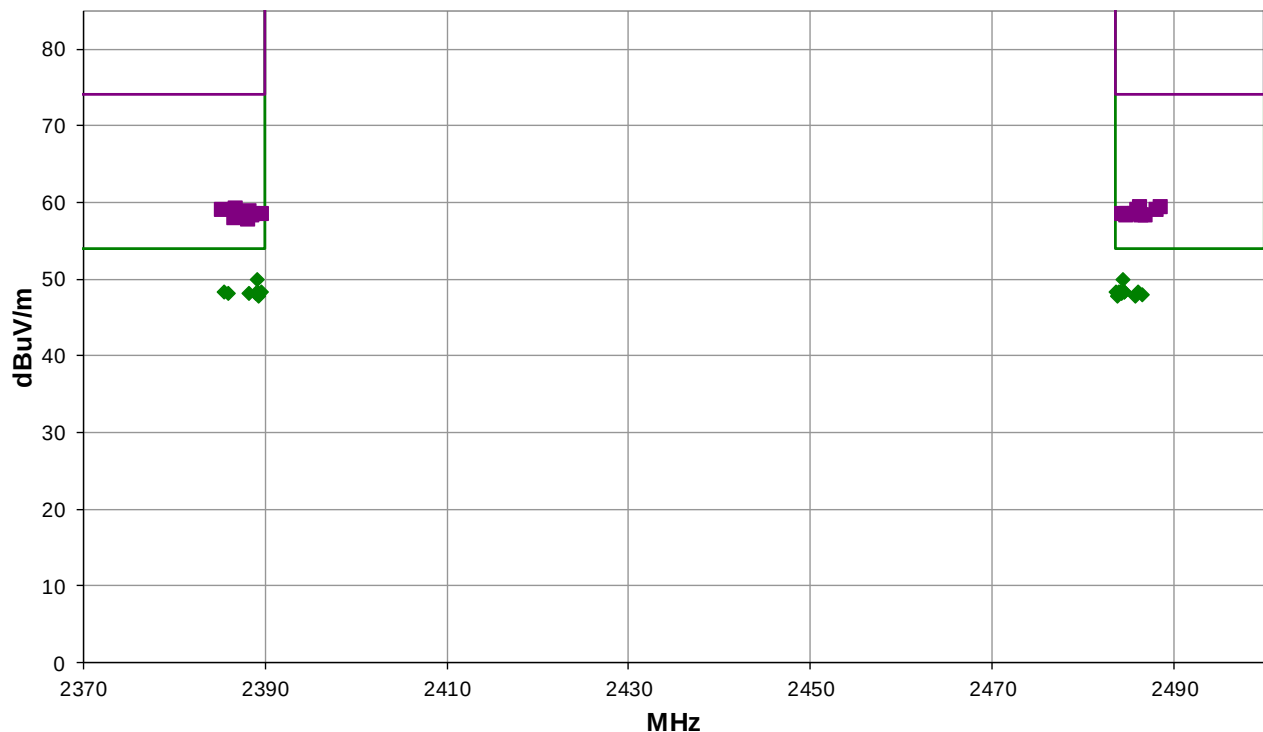
Test mode duty cycle is 85.4% (1 Mbps), 57.6% (2 Mbps), 97.4% (125 kbps), 91.2% (500 kbps).  
Duty cycle correction factor (DCCF) applied using  $DCCF = [10 \cdot \log(1/\text{test mode DC})]$ .  
Total correction applied: 1Mbps= +0.7 dB, 2Mbps= +2.4 dB, 125kbps= +0.1 dB, 500kbps= +0.4 dB

## EUT OPERATING MODES

Transmitting BLE Low and High Channels (2402 and 2480 MHz) 1 Mbps, 2 Mbps, 500 kbps and 125 kbps, Modulated.  
PRBS9

## DEVIATIONS FROM TEST STANDARD

None



Run #: 85

■ PK ◆ AV ● QP

# SPURIOUS RADIATED EMISSIONS

## RESULTS - Run #8

| Freq (MHz) | Amplitude (dBuV) | Factor (dB/m) | Antenna Height (meters) | Azimuth (degrees) | Duty Cycle Correction Factor (dB) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments                    |
|------------|------------------|---------------|-------------------------|-------------------|-----------------------------------|---------------------------|---------------------------|----------|--------------------------|-------------------|----------------------|------------------------|-----------------------------|
| 2483.608   | 31.9             | -4.2          | 1.5                     | 41.0              | 0.7                               | 20.0                      | Vert                      | AV       | 0.0                      | 48.4              | 54.0                 | -5.6                   | EUT Horz, High Ch 1 Mbps    |
| 2486.008   | 31.9             | -4.2          | 1.2                     | 94.0              | 0.7                               | 20.0                      | Vert                      | AV       | 0.0                      | 48.4              | 54.0                 | -5.6                   | EUT Vert, High Ch 1 Mbps    |
| 2484.208   | 31.9             | -4.2          | 1.5                     | 336.0             | 0.4                               | 20.0                      | Horz                      | AV       | 0.0                      | 48.1              | 54.0                 | -5.9                   | EUT Horz, High Ch 500 kbps  |
| 2389.517   | 32.0             | -4.3          | 1.5                     | 84.9              | 0.7                               | 20.0                      | Horz                      | AV       | 0.0                      | 48.4              | 54.0                 | -5.6                   | EUT Horz, Low Ch 1 Mbps     |
| 2484.100   | 31.8             | -4.2          | 1.5                     | 347.9             | 0.7                               | 20.0                      | Horz                      | AV       | 0.0                      | 48.3              | 54.0                 | -5.7                   | EUT Horz, High Ch 1 Mbps    |
| 2484.583   | 31.8             | -4.2          | 1.5                     | 30.9              | 0.7                               | 20.0                      | Horz                      | AV       | 0.0                      | 48.3              | 54.0                 | -5.7                   | EUT Vert, High Ch 1 Mbps    |
| 2483.917   | 31.8             | -4.2          | 1.6                     | 263.0             | 0.7                               | 20.0                      | Horz                      | AV       | 0.0                      | 48.3              | 54.0                 | -5.7                   | EUT On Side, High Ch 1 Mbps |
| 2484.558   | 31.8             | -4.2          | 2.3                     | 168.9             | 0.7                               | 20.0                      | Vert                      | AV       | 0.0                      | 48.3              | 54.0                 | -5.7                   | EUT On Side, High Ch 1 Mbps |
| 2484.400   | 31.8             | -4.2          | 1.5                     | 132.9             | 2.4                               | 20.0                      | Horz                      | AV       | 0.0                      | 50.0              | 54.0                 | -4.0                   | EUT Horz, High Ch 2 Mbps    |
| 2486.492   | 31.8             | -4.2          | 1.4                     | 144.0             | 0.4                               | 20.0                      | Vert                      | AV       | 0.0                      | 48.0              | 54.0                 | -6.0                   | EUT Horz, High Ch 500 kbps  |
| 2483.758   | 31.8             | -4.2          | 1.5                     | 37.9              | 0.1                               | 20.0                      | Horz                      | AV       | 0.0                      | 47.7              | 54.0                 | -6.3                   | EUT Horz, High Ch 125 kbps  |
| 2485.825   | 31.8             | -4.2          | 1.5                     | 214.0             | 0.1                               | 20.0                      | Vert                      | AV       | 0.0                      | 47.7              | 54.0                 | -6.3                   | EUT Horz, High Ch 125 kbps  |
| 2385.425   | 31.9             | -4.3          | 1.5                     | 156.9             | 0.7                               | 20.0                      | Vert                      | AV       | 0.0                      | 48.3              | 54.0                 | -5.7                   | EUT Vert, Low Ch 1 Mbps     |
| 2389.175   | 31.9             | -4.3          | 1.5                     | 175.9             | 2.4                               | 20.0                      | Horz                      | AV       | 0.0                      | 50.0              | 54.0                 | -4.0                   | EUT Horz, Low Ch 2 Mbps     |
| 2389.342   | 31.9             | -4.3          | 1.5                     | 30.0              | 0.4                               | 20.0                      | Horz                      | AV       | 0.0                      | 48.0              | 54.0                 | -6.0                   | EUT Horz, Low Ch 500 kbps   |
| 2389.242   | 31.9             | -4.3          | 1.5                     | 66.9              | 0.1                               | 20.0                      | Horz                      | AV       | 0.0                      | 47.7              | 54.0                 | -6.3                   | EUT Horz, Low Ch 125 kbps   |
| 2388.158   | 31.8             | -4.3          | 1.5                     | 84.0              | 0.7                               | 20.0                      | Vert                      | AV       | 0.0                      | 48.2              | 54.0                 | -5.8                   | EUT On Side, Low Ch 1 Mbps  |
| 2388.975   | 31.8             | -4.3          | 1.5                     | 199.9             | 0.7                               | 20.0                      | Horz                      | AV       | 0.0                      | 48.2              | 54.0                 | -5.8                   | EUT Vert, Low Ch 1 Mbps     |
| 2389.308   | 31.8             | -4.3          | 2.1                     | 160.0             | 0.7                               | 20.0                      | Vert                      | AV       | 0.0                      | 48.2              | 54.0                 | -5.8                   | EUT Vert, Low Ch 1 Mbps     |
| 2385.983   | 31.7             | -4.3          | 1.5                     | 289.0             | 0.7                               | 20.0                      | Horz                      | AV       | 0.0                      | 48.1              | 54.0                 | -5.9                   | EUT On Side, Low Ch 1 Mbps  |
| 2486.292   | 43.6             | -4.2          | 1.5                     | 41.0              | 0.0                               | 20.0                      | Vert                      | PK       | 0.0                      | 59.4              | 74.0                 | -14.6                  | EUT Horz, High Ch 1 Mbps    |
| 2488.475   | 43.4             | -4.0          | 1.5                     | 37.9              | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 59.4              | 74.0                 | -14.6                  | EUT Horz, High Ch 125 kbps  |
| 2386.775   | 43.5             | -4.3          | 1.5                     | 84.9              | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 59.2              | 74.0                 | -14.8                  | EUT Horz, Low Ch 1 Mbps     |
| 2485.908   | 43.3             | -4.2          | 1.5                     | 347.9             | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 59.1              | 74.0                 | -14.9                  | EUT Horz, High Ch 1 Mbps    |
| 2487.992   | 43.1             | -4.1          | 1.5                     | 336.0             | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 59.0              | 74.0                 | -15.0                  | EUT Horz, High Ch 500 kbps  |
| 2385.167   | 43.3             | -4.3          | 1.5                     | 84.0              | 0.0                               | 20.0                      | Vert                      | PK       | 0.0                      | 59.0              | 74.0                 | -15.0                  | EUT On Side, Low Ch 1 Mbps  |
| 2388.175   | 43.2             | -4.3          | 1.5                     | 30.0              | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 58.9              | 74.0                 | -15.1                  | EUT Horz, Low Ch 500 kbps   |
| 2484.792   | 42.8             | -4.2          | 1.6                     | 263.0             | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 58.6              | 74.0                 | -15.4                  | EUT On Side, High Ch 1 Mbps |
| 2484.300   | 42.8             | -4.2          | 1.4                     | 144.0             | 0.0                               | 20.0                      | Vert                      | PK       | 0.0                      | 58.6              | 74.0                 | -15.4                  | EUT Horz, High Ch 500 kbps  |
| 2485.575   | 42.8             | -4.2          | 1.5                     | 214.0             | 0.0                               | 20.0                      | Vert                      | PK       | 0.0                      | 58.6              | 74.0                 | -15.4                  | EUT Horz, High Ch 125 kbps  |
| 2388.733   | 42.9             | -4.3          | 1.5                     | 175.9             | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 58.6              | 74.0                 | -15.4                  | EUT Vert, Low Ch 2 Mbps     |
| 2484.742   | 42.7             | -4.2          | 1.2                     | 94.0              | 0.0                               | 20.0                      | Vert                      | PK       | 0.0                      | 58.5              | 74.0                 | -15.5                  | EUT Vert, High Ch 1 Mbps    |
| 2389.650   | 42.8             | -4.3          | 1.5                     | 199.9             | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 58.5              | 74.0                 | -15.5                  | EUT Vert, Low Ch 1 Mbps     |
| 2388.275   | 42.8             | -4.3          | 2.1                     | 160.0             | 0.0                               | 20.0                      | Vert                      | PK       | 0.0                      | 58.5              | 74.0                 | -15.5                  | EUT Vert, Low Ch 1 Mbps     |
| 2486.325   | 42.6             | -4.2          | 2.3                     | 168.9             | 0.0                               | 20.0                      | Vert                      | PK       | 0.0                      | 58.4              | 74.0                 | -15.6                  | EUT On Side, High Ch 1 Mbps |
| 2486.858   | 42.6             | -4.2          | 1.5                     | 132.9             | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 58.4              | 74.0                 | -15.6                  | EUT Horz, High Ch 2 Mbps    |
| 2484.717   | 42.5             | -4.2          | 1.5                     | 30.9              | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 58.3              | 74.0                 | -15.7                  | EUT Vert, High Ch 1 Mbps    |
| 2388.525   | 42.6             | -4.3          | 1.5                     | 66.9              | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 58.3              | 74.0                 | -15.7                  | EUT Horz, Low Ch 125 kbps   |
| 2386.600   | 42.3             | -4.3          | 1.5                     | 156.9             | 0.0                               | 20.0                      | Vert                      | PK       | 0.0                      | 58.0              | 74.0                 | -16.0                  | EUT Horz, Low Ch 1 Mbps     |
| 2388.108   | 42.1             | -4.3          | 1.5                     | 289.0             | 0.0                               | 20.0                      | Horz                      | PK       | 0.0                      | 57.8              | 74.0                 | -16.2                  | EUT On Side, Low Ch 1 Mbps  |

# SPURIOUS RADIATED EMISSIONS

## CONCLUSION

Pass



Tested By

End of Test Report