

FCC - TEST REPORT

Report Number : **60.790.19.048.01R01** Date of Issue : January 31, 2020

Model : **E41227**

Product Type : **E-Bike HMI**

Applicant : DAYTON INDUSTRIAL CO., LTD

Address : 2-12 Kwai Fat Road, 11-A Kwai Chung, New Territories, Hong Kong

Production Facility : KENDY ENTERPRISE LTD

Address : 2-12 Kwai Fat Road, 11-A Kwai Chung, New Territories, Hong Kong

Test Result : Positive Negative

Total pages including Appendices : 36

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2 Description of Equipment Under Test

Description of the Equipment Under Test

| | |
|-----------------------------|-----------------------------|
| Product: | E-Bike HMI |
| Model no.: | E41227 |
| FCC ID: | O4GRE |
| Rating: | 12V DC (E-Bike battery) |
| Frequency: | 2402MHz-2480MHz (Tx and Rx) |
| Antenna gain: | 0 dBi |
| Number of operated channel: | 40 |
| Modulation: | GFSK |

Auxiliary Equipment and Software Used during Test:

| DESCRIPTION | MANUFACTURER | MODEL NO. | S/N |
|-------------|--------------|-----------|---------|
| Computer | Lenovo | X220 | 0A72168 |

Auxiliary Software Used during Test:

| DESCRIPTION | SOFTWARE NAME | VERSION | REMARK |
|-----------------------|---------------|---------|-----------------------|
| RF Test Mode Software | nRFgo | 1.16 | Provided by applicant |

3 Summary of Test Standards

| Test Standards |
|----------------|
|----------------|

| |
|---|
| FCC Part 15 Subpart C 10-1-18 Edition Federal Communications Commission, PART 15 — Radio Frequency Devices, Subpart C — Unintentional Radiators |
|---|

All the tests were performed using the procedures from ANSI C63.4(2014) and ANSI C63.10 (2013).

4 Details about the Test Laboratory

Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
 Building 12&13 Zhiheng Wisdomland Business Park,
 Nantou Checkpoint Road 2,
 Shenzhen 518052, P.R.China
 FCC Registration Number: 502708

| Emission Tests | |
|--|-----------|
| Test Item | Test Site |
| FCC Part 15 Subpart C | |
| FCC Title 47 Part 15.205, 15.209 & 15.247(d) Spurious Radiated Emission | Site 1 |
| FCC Title 47 Part 15.207 Conduct Emission | NIL |
| FCC Title 47 Part 15.247(a)(1) 6dB & 99% Bandwidth | Site 1 |
| FCC Title 47 Part 15.247(b) Peak Output Power | Site 1 |
| FCC Title 47 Part 2.1051 & 15.247(d) Spurious Emissions at Antenna Terminals | Site 1 |
| FCC Title 47 Part 15.247(d) 100kHz Bandwidth of band edges | Site 1 |
| FCC Title 47 Part 15.247(e) Power Spectral Density | Site 1 |
| FCC Title 47 Part 15.203 & 15.247(b) Antenna Requirement | Site 1 |

4.1 Test Equipment Site List

Radiated emission Test – Site 1

| DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | CAL. DUE DATE |
|-------------------------------------|-----------------|-------------------|-----------------|---------------|
| EMI Test Receiver | Rohde & Schwarz | ESR 26 | 101269 | 2020-6-28 |
| Signal Analyzer | Rohde & Schwarz | FSV40 | 101031 | 2020-6-28 |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100398 | 2020-7-7 |
| Trilog Super Broadband Test Antenna | Schwarzbeck | VULB 9163 | 707 | 2020-7-5 |
| Horn Antenna | Rohde & Schwarz | HF907 | 102294 | 2020-6-22 |
| Wideband Horn Antenna | Q-PAR | QWH-SL-18-40-K-SG | 12827 | 2020-7-5 |
| Pre-amplifier | Rohde & Schwarz | SCU 18 | 102230 | 2020-6-28 |
| Pre-amplifier | Rohde & Schwarz | SCU 40A | 100432 | 2020-6-28 |
| Attenuator | Agilent | 8491A | MY39264334 | 2020-6-28 |
| 3m Semi-anechoic chamber | TDK | 9X6X6 | ---- | 2020-7-7 |
| Test software | Rohde & Schwarz | EMC32 | Version 9.15.00 | N/A |

Conducted Emission Test – Site 1

| DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | CAL. DUE DATE |
|--------------------|-------------------|----------------|----------------|---------------|
| EMI Test Receiver | Rohde & Schwarz | ESR 3 | 101782 | 2020-6-28 |
| LISN | Rohde & Schwarz | ENV4200 | 100249 | 2020-6-28 |
| LISN | Rohde & Schwarz | ENV432 | 101318 | 2020-7-19 |
| LISN | Rohde & Schwarz | ENV216 | 100326 | 2020-6-28 |
| ISN | Rohde & Schwarz | ENY81 | 100177 | 2020-6-28 |
| ISN | Rohde & Schwarz | ENY81-CA6 | 101664 | 2020-6-28 |
| High Voltage Probe | Rohde & Schwarz | TK9420(VT9420) | 9420-584 | 2020-6-24 |
| RF Current Probe | Rohde & Schwarz | EZ-17 | 100816 | 2020-7-2 |
| Attenuator | Shanghai Huaxiang | TS2-26-3 | 080928189 | 2020-6-28 |
| Test software | Rohde & Schwarz | EMC32 | Version9.15.00 | N/A |

20dB & 99% Bandwidth, Peak Output Power, Spurious Emissions at Antenna Terminals, 100kHz Bandwidth of band edges, Power Spectral Density – Site 1

| DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | CAL. DUE DATE |
|------------------|-----------------|-----------------|---------------|---------------|
| Signal Analyzer | Rohde & Schwarz | FSV40 | 101030 | 2020-6-28 |
| RF Switch Module | Rohde & Schwarz | OSP120/OSP-B157 | 101226/100851 | 2020-6-28 |

4.2 Measurement System Uncertainty

Measurement System Uncertainty Emissions

| System Measurement Uncertainty | |
|---|--|
| Items | Extended Uncertainty |
| Uncertainty for Radiated Emission in 3m chamber 9kHz-30MHz | 4.46dB |
| Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz | Horizontal: 4.91dB; Vertical: 4.89dB; |
| Uncertainty for Radiated Emission in 3m chamber 1000MHz-25000MHz | Horizontal: 4.80dB; Vertical: 4.79dB; |
| Uncertainty for Conducted Emission at AC Power Line 150kHz-30MHz | 3.21dB |
| Uncertainty for frequency test | 0.6x10 ⁻⁷ |

5 Summary of Test Results

| Emission Tests | | | | |
|--|-------|-------------------------------------|--------------------------|-------------------------------------|
| FCC Part 15 Subpart C | | | | |
| Test Condition | Pages | Test Result | | |
| | | Pass | Fail | N/A |
| FCC Title 47 Part 15.205, 15.209 & 15.247(d) Spurious Radiated Emission | 12-15 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.207 Conduct Emission (1) | 16 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| FCC Title 47 Part 15.247(a)(2) 6dB & 99% Bandwidth | 17-19 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.247(b) Peak Output Power | 20-22 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 2.1051 & 15.247(d) Spurious Emissions at Antenna Terminals | 23-28 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.247(d) 100kHz Bandwidth of band edges | 29-31 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.247(e) Power Spectral Density | 32-34 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.203 & 15.247(b) Antenna Requirement | 35 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Remark:

- (1) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for **FCC ID: O4GRE**, complies with Section 15.203, 15.205, 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules for the DTS grant

The TX and RX range is 2402MHz-2480MHz.

SUMMARY:

- All tests according to the regulations cited on page 8 were

n - Performed

o - **Not** Performed

- The Equipment Under Test

n - **Fulfills** the general approval requirements.

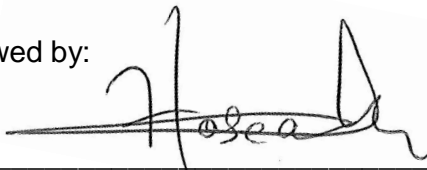
o - **Does not** fulfill the general approval requirements.

Sample Received Date: December 18, 2019

Testing Start Date: December 20, 2019

Testing End Date: January 7, 2020

Reviewed by:



Hosea CHAN
EMC Project Engineer

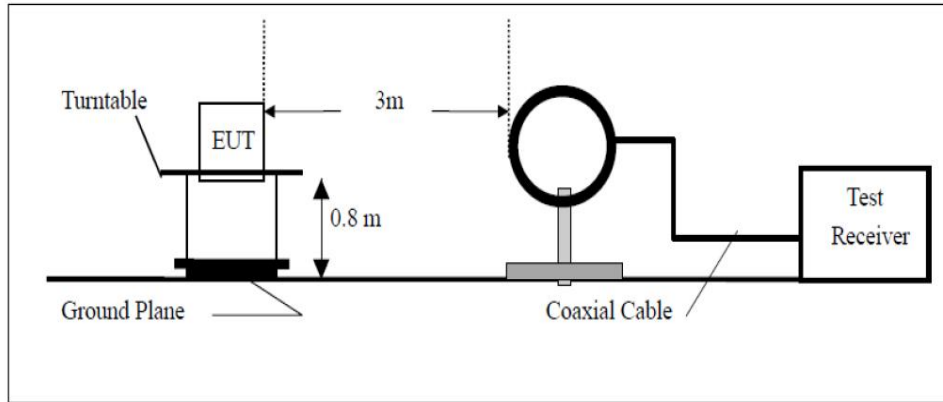
Prepared by:



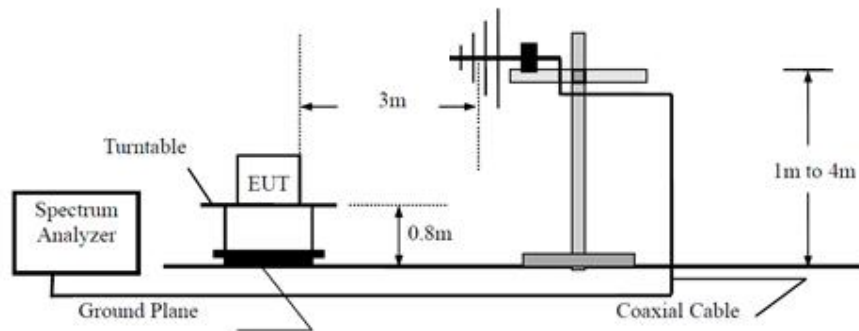
Eric LI
EMC Senior Project Engineer

7 Test Setups

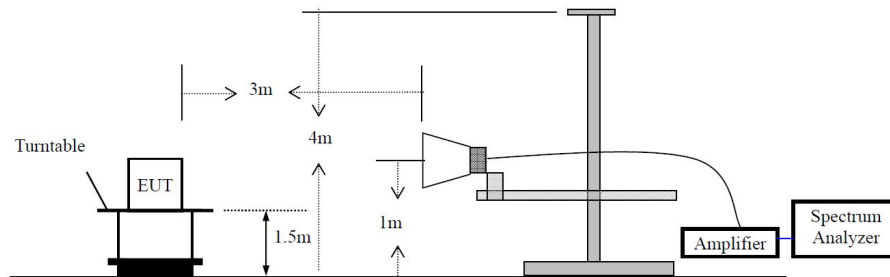
7.1 Radiated test setups 9kHz-30MHz



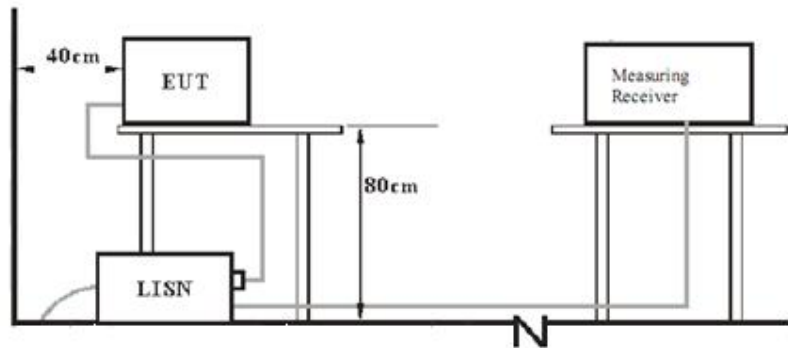
7.2 Radiated test setups Below 1GHz



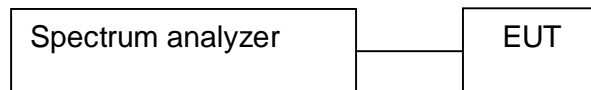
7.3 Radiated test setups Above 1GHz



7.4 AC Power Line Conducted Emission



7.5 Conducted RF test



8 Emission Test Results

8.1 Spurious Radiated Emission

EUT: E41227
 Op Condition: Operated, TX Mode
 (Low channel is the worst case)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: 12V DC
 Remark: 9kHz to 1GHz

| |
|--|
| Test Result |
| <input checked="" type="checkbox"/> Passed |
| <input type="checkbox"/> Not Passed |

| Frequency MHz | Result dB μ V/m | Limit dB μ V/m | Margin dB | Detector PK/QP/AV | Ant. Polarity H/V | Corr. (dB) |
|------------------|------------------------|-----------------------|--------------|----------------------|----------------------|---------------|
| 54.142222 | 21.00 | 40.00 | -19.00 | Peak | H | -24.4 |
| 111.480000 | 16.93 | 43.50 | -26.57 | Peak | H | -28.7 |
| 194.684444 | 19.56 | 43.50 | -23.94 | Peak | H | -28.6 |
| 246.363889 | 20.04 | 46.00 | -25.96 | Peak | H | -26.9 |
| 570.397778 | 25.41 | 46.00 | -20.59 | Peak | H | -20.8 |
| 937.327222 | 32.02 | 46.00 | -13.98 | Peak | H | -15.8 |
| 43.310556 | 22.13 | 40.00 | -17.87 | Peak | V | -24.3 |
| 52.795000 | 21.61 | 40.00 | -18.39 | Peak | V | -24.2 |
| 105.660000 | 17.45 | 43.50 | -26.05 | Peak | V | -28.3 |
| 292.061667 | 21.90 | 46.00 | -24.10 | Peak | V | -26.1 |
| 633.124444 | 27.71 | 46.00 | -18.29 | Peak | V | -19.5 |
| 866.678889 | 33.07 | 46.00 | -12.93 | Peak | V | -16.6 |

Remark:

1. As the measured peak value not exceeded the Quasi-peak limit, Quasi-peak value no need to be measured.

Spurious Radiated Emission

EUT: E41227
 Op Condition: Operated, TX Mode (2402MHz)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: 12V DC
 Remark: 1GHz to 25GHz

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Frequency MHz | Result dBµV/m | Limit dBµV/m | Margin dB | Detector PK/QP/AV | Ant. Polarity H/V | Corr. (dB) |
|------------------|------------------|-----------------|--------------|----------------------|-------------------------|---------------|
| 1238.125000 | 37.18 | 54.00 | -16.82 | Peak | H | -13.1 |
| 1815.750000 | 39.65 | 54.00 | -14.35 | Peak | H | -9.1 |
| 2817.340000 | 38.65 | 54.00 | -15.35 | Peak | H | -6.5 |
| 4804.000000 | 45.91 | 54.00 | -8.09 | Peak | H | 1.3 |
| 8216.250000 | 36.51 | 54.00 | -17.49 | Peak | H | 6.4 |
| 15947.812500 | 49.63 | 54.00 | -4.37 | Peak | H | 20.8 |
| 1257.625000 | 37.59 | 54.00 | -16.41 | Peak | V | -13.0 |
| 1993.312500 | 44.96 | 54.00 | -9.04 | Peak | V | -7.9 |
| 2234.564300 | 41.32 | 54.00 | -12.68 | Peak | V | -7.2 |
| 4804.000000 | 37.61 | 54.00 | -16.39 | Peak | V | 1.3 |
| 9955.781250 | 39.68 | 54.00 | -14.32 | Peak | V | 8.5 |
| 15958.125000 | 48.97 | 54.00 | -5.03 | Peak | V | 20.6 |

Remark:
 1.As the measured peak value not exceeded the average limit, average value no need to be measured.

Spurious Radiated Emission

EUT: E41227
 Op Condition: Operated, TX Mode (2440MHz)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: 12V DC
 Remark: 1GHz to 25GHz

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Frequency MHz | Result dBµV/m | Limit dBµV/m | Margin dB | Detector PK/QP/AV | Ant. Polarity H/V | Corr. (dB) |
|------------------|------------------|-----------------|--------------|----------------------|-------------------------|---------------|
| 1245.000000 | 37.23 | 54.00 | -16.77 | Peak | H | -13.1 |
| 1822.437500 | 40.58 | 54.00 | -13.42 | Peak | H | -9.1 |
| 4880.000000 | 44.73 | 54.00 | -9.27 | Peak | H | 1.8 |
| 9996.093750 | 40.55 | 54.00 | -13.45 | Peak | H | 8.7 |
| 15968.437500 | 48.34 | 54.00 | -5.66 | Peak | H | 20.4 |
| 1239.000000 | 38.86 | 54.00 | -15.14 | Peak | V | -13.1 |
| 1984.375000 | 44.58 | 54.00 | -9.42 | Peak | V | -7.9 |
| 4880.000000 | 41.21 | 54.00 | -12.79 | Peak | V | 1.8 |
| 9957.187500 | 39.91 | 54.00 | -14.09 | Peak | V | 8.5 |
| 15952.031250 | 48.75 | 54.00 | -5.25 | Peak | V | 20.7 |

Remark:
 1.As the measured peak value not exceeded the average limit, average value no need to be measured.

Spurious Radiated Emission

EUT: E41227
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: 12V DC
 Remark: 1GHz to 25GHz

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Frequency MHz | Result dBµV/m | Limit dBµV/m | Margin dB | Detector PK/QP/AV | Ant. Polarity H/V | Corr. (dB) |
|------------------|------------------|-----------------|--------------|----------------------|-------------------------|---------------|
| 1243.187500 | 37.35 | 54.00 | -16.65 | Peak | H | -13.1 |
| 1828.875000 | 38.62 | 54.00 | -15.38 | Peak | H | -9.0 |
| 2712.812500 | 37.89 | 54.00 | -16.11 | Peak | H | -5.4 |
| 4960.000000 | 41.30 | 54.00 | -12.70 | Peak | H | 1.7 |
| 9301.875000 | 38.48 | 54.00 | -15.52 | Peak | H | 8.1 |
| 15914.062500 | 48.36 | 54.00 | -5.64 | Peak | H | 20.1 |
| 1251.000000 | 38.66 | 54.00 | -15.34 | Peak | V | -13.0 |
| 2002.937500 | 44.99 | 54.00 | -9.01 | Peak | V | -7.8 |
| 2512.062500 | 42.68 | 54.00 | -11.32 | Peak | V | -6.3 |
| 4960.000000 | 42.17 | 54.00 | -11.83 | Peak | V | 1.7 |
| 11402.812500 | 41.33 | 54.00 | -12.67 | Peak | V | 10.7 |
| 15928.593750 | 48.79 | 54.00 | -5.21 | Peak | V | 20.6 |

Remark:
 1.As the measured peak value not exceeded the average limit, average value no need to be measured.

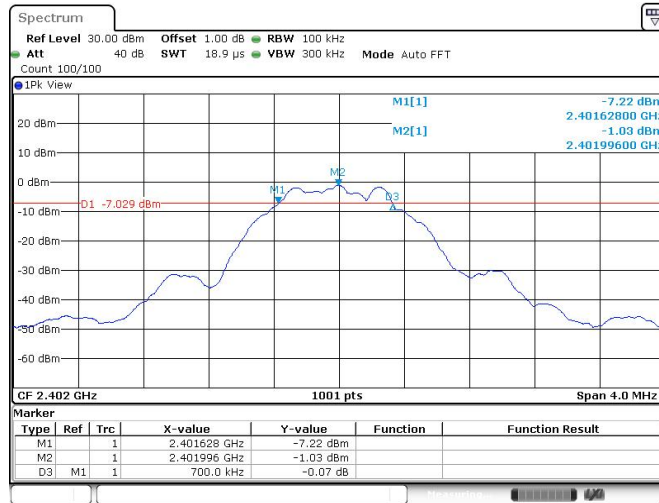
8.2 Conducted Emission at AC Power line

Conducted Emission testing is not applicable for this device as it is a battery operating device.

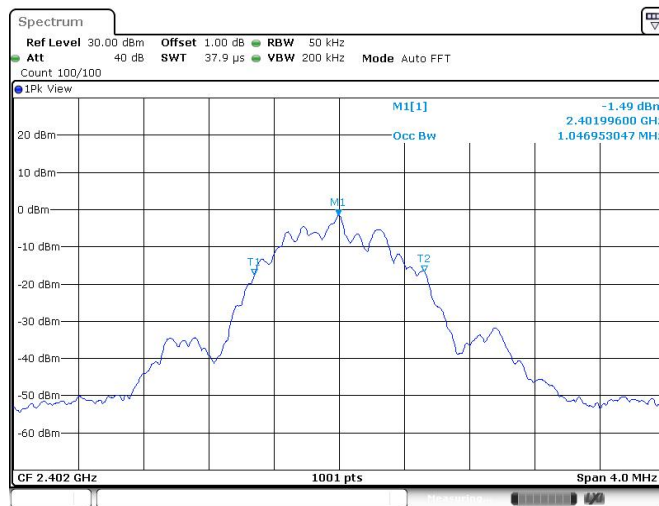
8.3 6dB & 99% Bandwidth

EUT: E41227
 Op Condition: Operated, TX Mode (2402MHz)
 Test Specification: FCC15.247(a)(2), 6dB Bandwidth & 99% Bandwidth
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



Date: 31 DEC 2019 15:39:52



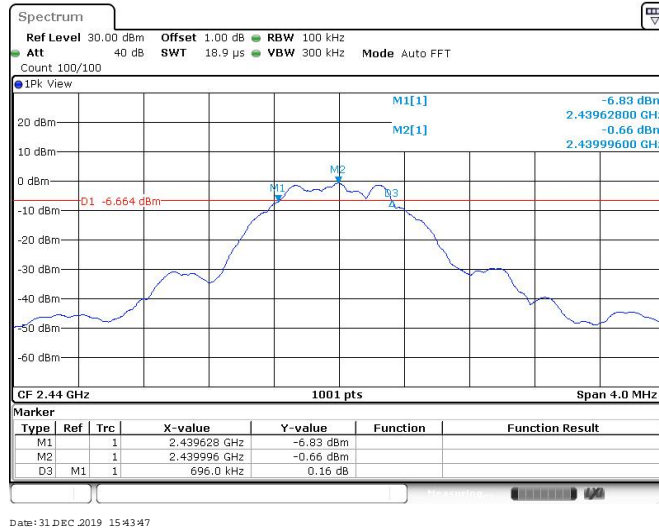
Date: 31 DEC 2019 15:40:03

| Bandwidth | Measured Value | Limit |
|---------------|----------------|----------|
| 6dB bandwidth | 0.700 MHz | > 0.5MHz |
| 99% OCB | 1.047 MHz | NA |

6dB & 99% Bandwidth

EUT: E41227
 Op Condition: Operated, TX Mode (2440MHz)
 Test Specification: FCC15.247(a)(2), 6dB Bandwidth & 99% Bandwidth
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



Date: 31.DEC.2019 15:43:47



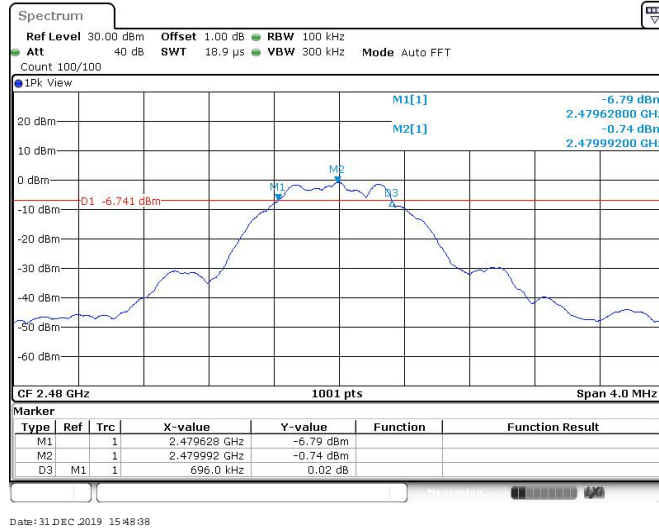
Date: 31.DEC.2019 15:43:58

| Bandwidth | Measured Value | Limit |
|---------------|----------------|-----------|
| 6dB bandwidth | 0.696 MHz | > 0.5 MHz |
| 99% OCB | 1.051 MHz | NA |

6dB & 99% Bandwidth

EUT: E41227
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC15.247(a)(2), 6dB Bandwidth & 99% Bandwidth
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

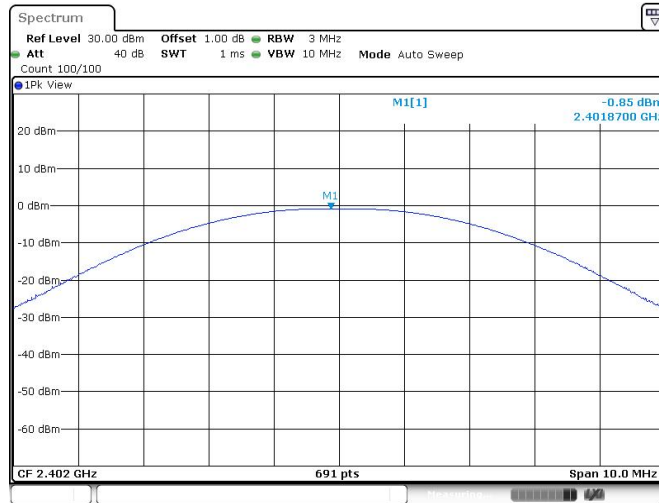


| Bandwidth | Measured Value | Limit |
|---------------|----------------|-----------|
| 6dB bandwidth | 0.696 MHz | > 0.5 MHz |
| 99% OCB | 1.051 MHz | NA |

8.4 Peak Output Power

EUT: E41227
 Op Condition: Operated, TX Mode (2402MHz)
 Test Specification: FCC15.247(b)
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



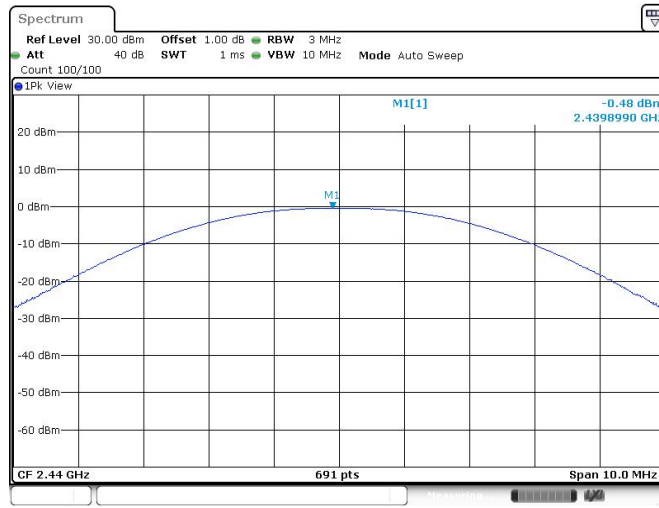
Date: 31 DEC 2019 15:40:40

| Conducted Output Power | Limit |
|------------------------|---------|
| -0.85 dBm | < 30dBm |

Peak Output Power

EUT: E41227
 Op Condition: Operated, TX Mode (2440MHz)
 Test Specification: FCC15.247(b)
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



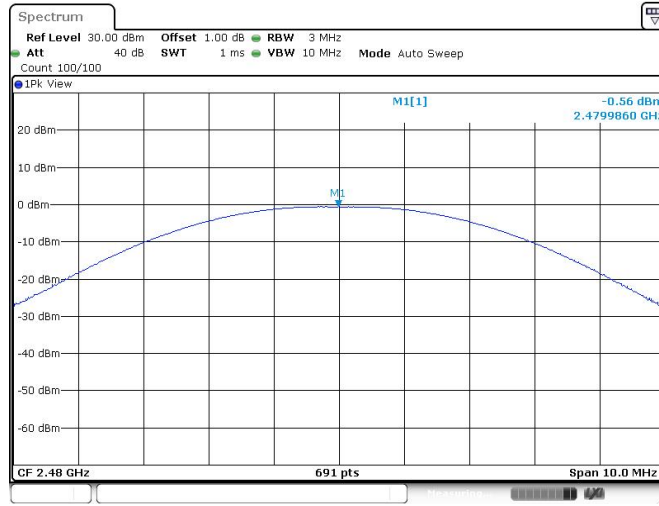
Date: 31 DEC 2019 15:44:05

| Conducted Output Power | Limit |
|------------------------|---------|
| -0.48 dBm | < 30dBm |

Peak Output Power

EUT: E41227
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC15.247(b)
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



Date: 31 DEC 2019 15:48:56

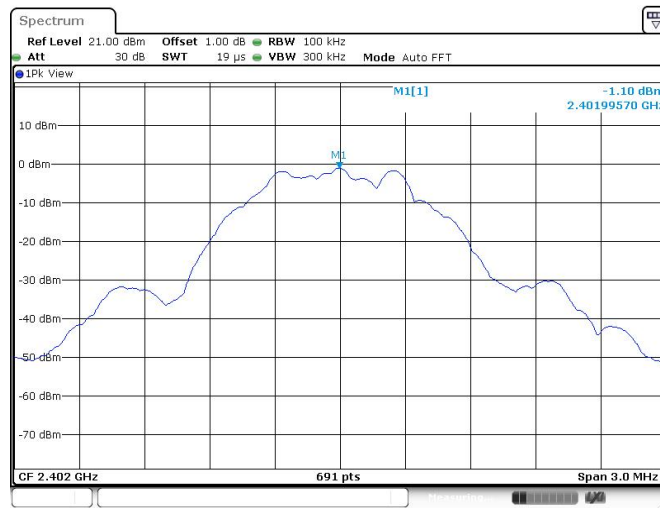
| Conducted Output Power | Limit |
|------------------------|---------|
| -0.56 dBm | < 30dBm |

8.5 Spurious Emissions at Antenna Terminals

EUT: E41227
 Op Condition: Operated, TX Mode (2402MHz)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: 12V DC

| |
|--|
| Test Result |
| <input checked="" type="checkbox"/> Passed |
| <input type="checkbox"/> Not Passed |

| Channel | FreqRange | RefLevel | Result | Limit | Verdict |
|---------|------------|----------|--------|---------|---------|
| 2402 | Reference | -1.10 | -1.10 | --- | PASS |
| 2402 | 30~1000 | -1.10 | -67.7 | <=-21.1 | PASS |
| 2402 | 1000~26500 | -1.10 | -51.31 | <=-21.1 | PASS |

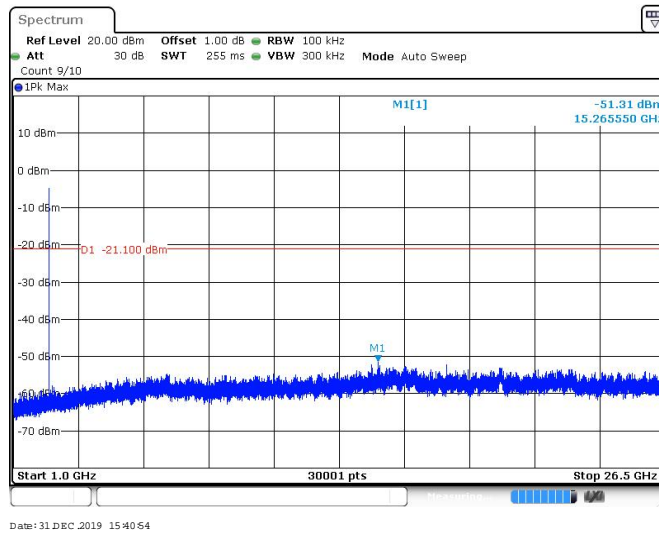
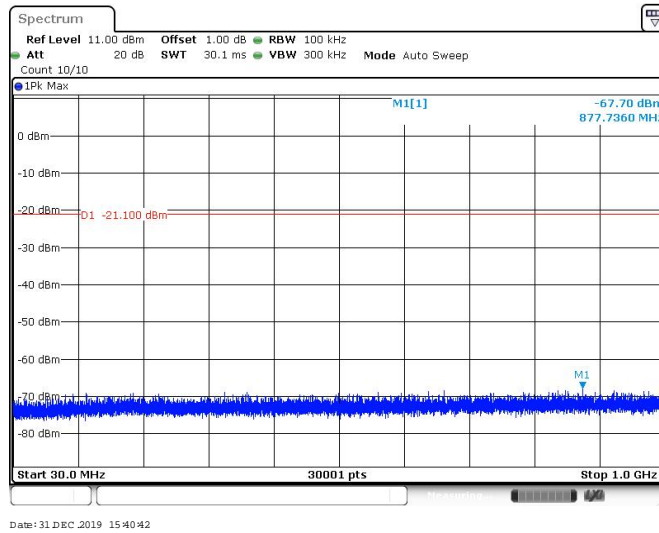


Date: 31 DEC 2019 15:40:32

Spurious Emissions at Antenna Terminals

EUT: E41227
Op Condition: Operated, TX Mode (2402MHz)
Test Specification: FCC2.1051 & 15.247(d)
Comment: 12V DC

| |
|--|
| Test Result |
| <input checked="" type="checkbox"/> Passed |
| <input type="checkbox"/> Not Passed |

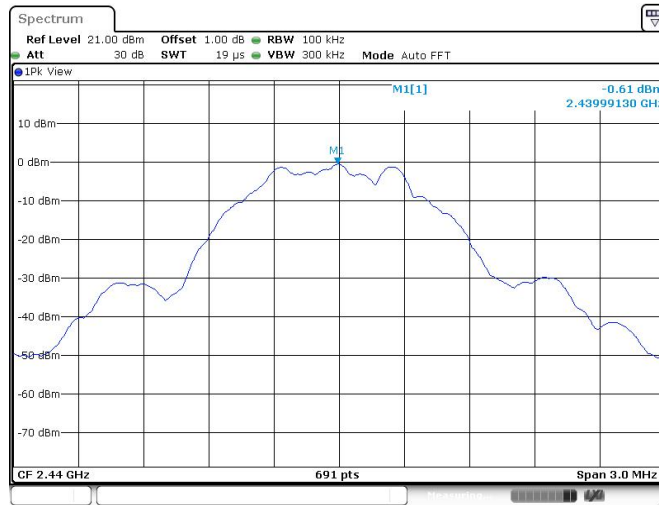


Spurious Emissions at Antenna Terminals

EUT: E41227
 Op Condition: Operated, TX Mode (2440MHz)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Channel | FreqRange | RefLevel | Result | Limit | Verdict |
|---------|------------|----------|--------|----------|---------|
| 2440 | Reference | -0.61 | -0.61 | --- | PASS |
| 2440 | 30~1000 | -0.61 | -67.52 | <=-20.61 | PASS |
| 2440 | 1000~26500 | -0.61 | -52.17 | <=-20.61 | PASS |

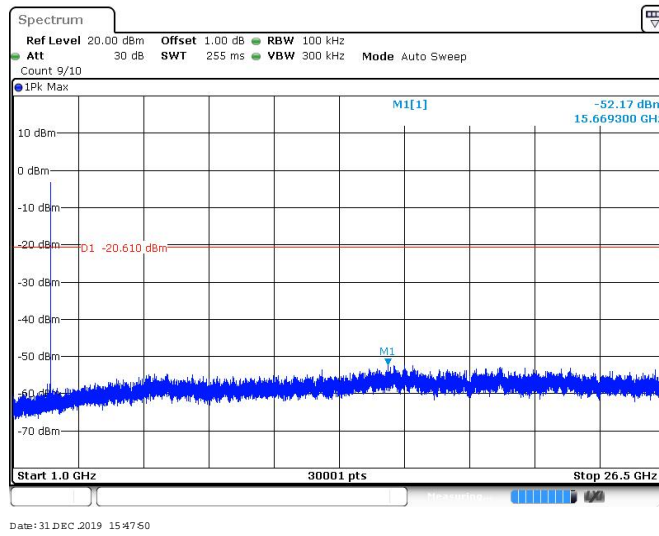
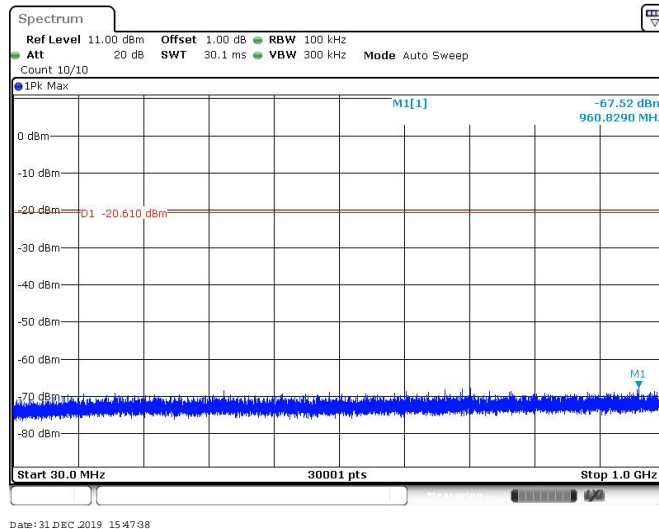


Date: 31 DEC. 2019 15:47:28

Spurious Emissions at Antenna Terminals

EUT: E41227
 Op Condition: Operated, TX Mode (2440MHz)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

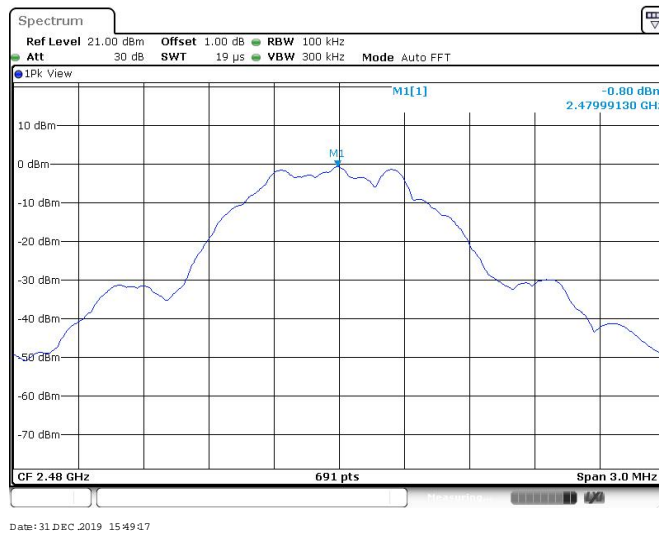


Spurious Emissions at Antenna Terminals

EUT: E41227
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

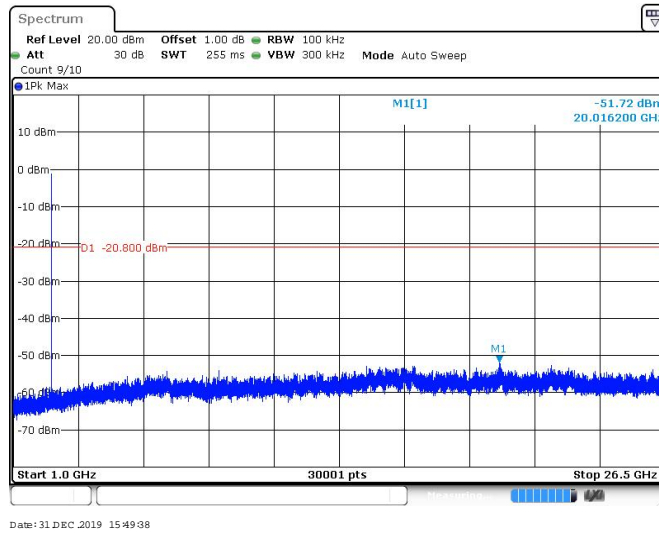
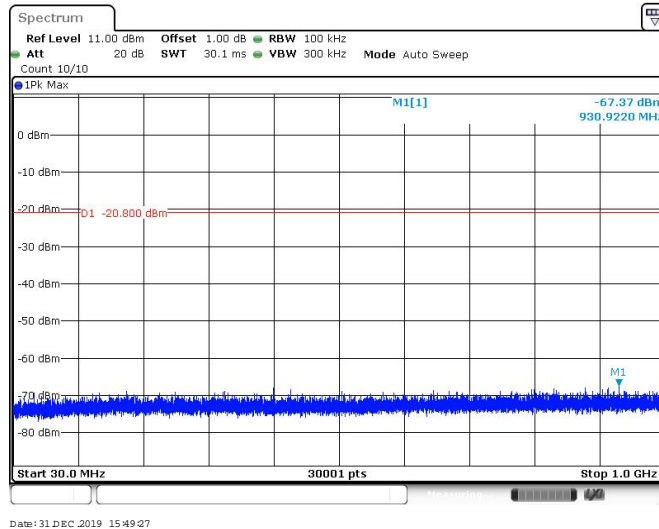
| Channel | FreqRange | RefLevel | Result | Limit | Verdict |
|---------|------------|----------|--------|---------|---------|
| 2480 | Reference | -0.61 | -0.80 | --- | PASS |
| 2480 | 30~1000 | -0.61 | -67.37 | <=-20.8 | PASS |
| 2480 | 1000~26500 | -0.61 | -51.72 | <=-20.8 | PASS |



Spurious Emissions at Antenna Terminals

EUT: E41227
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: 12V DC

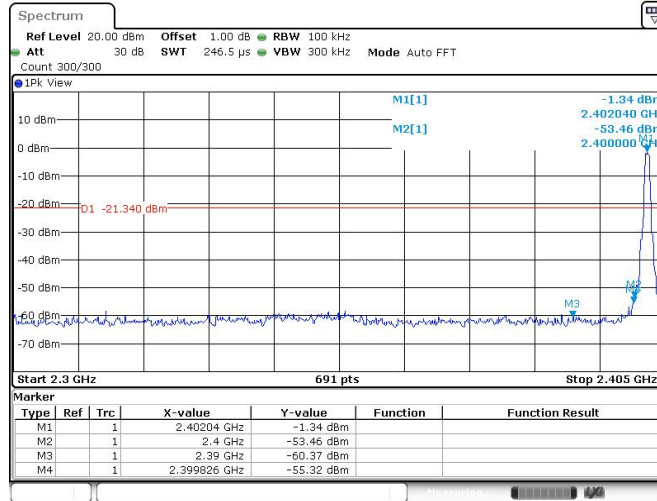
| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



8.6 100kHz Bandwidth of band edges

EUT: E41227
 Op Condition: Operated, TX Mode (2402MHz)
 Test Specification: FCC15.247(d), Conducted
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



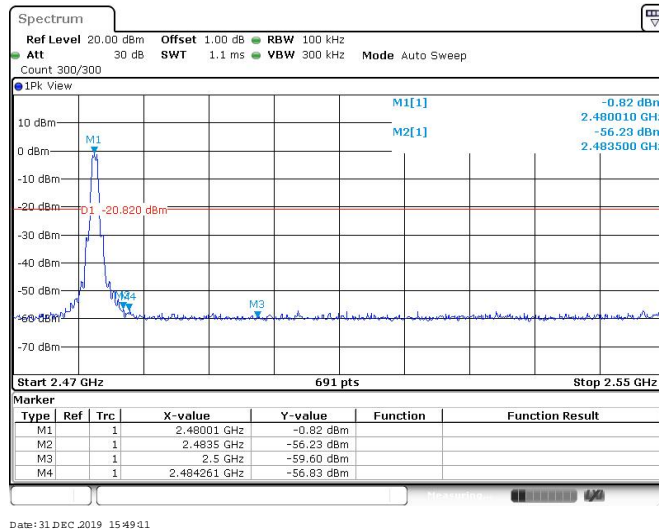
Date: 31 DEC 2019 15:40:26

| Band edges | Limit |
|------------|--------|
| 52.12 dB | > 20dB |

100kHz Bandwidth of band edges

EUT: E41227
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC15.247(d), Conducted
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



| | |
|-------------------|--------------|
| Band edges | Limit |
| 55.41 dB | > 20dB |

100kHz Bandwidth of band edges

EUT: E41227
 Op Condition: Operated, TX Mode (2402MHz & 2480MHz)
 Test Specification: FCC15.247(d), Radiated method
 Comment: 12V DC

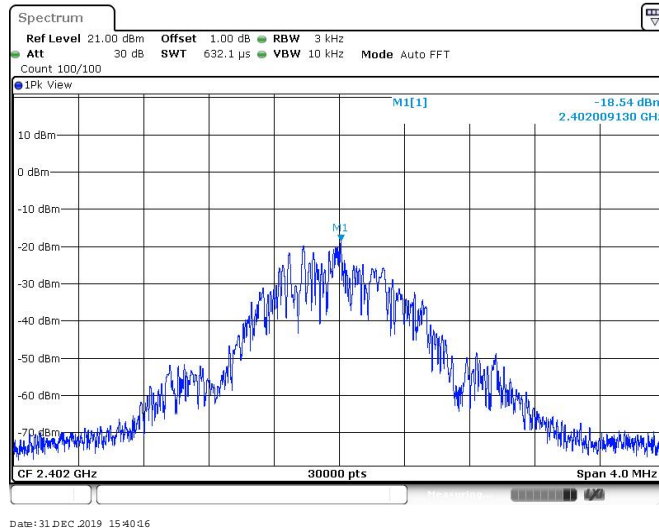
| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Channel | Frequency MHz | Result dB μ V/m | Limit dB μ V/m | Margin dB | Detector PK /AV | Ant. Polarity H/V | Corr. (dB) |
|---------|------------------|------------------------|-----------------------|--------------|--------------------|----------------------|---------------|
| 2402 | 2400.00 | 55.31 | 74.00 | -18.69 | Peak | H | -5.5 |
| 2402 | 2400.00 | 46.34 | 54.00 | -7.66 | Average | H | -5.5 |
| 2402 | 2400.00 | 53.81 | 74.00 | -20.19 | Peak | V | -5.5 |
| 2402 | 2400.00 | 47.22 | 54.00 | -6.78 | Average | V | -5.5 |
| 2480 | 2483.50 | 52.24 | 74.00 | -21.76 | Peak | H | -4.8 |
| 2480 | 2483.50 | 40.68 | 54.00 | -13.32 | Average | H | -4.8 |
| 2480 | 2483.50 | 53.25 | 74.00 | -20.75 | Peak | V | -4.8 |
| 2480 | 2483.50 | 44.77 | 54.00 | -9.23 | Average | V | -4.8 |

8.7 Power Spectral Density

EUT: E41227
 Op Condition: Operated, TX Mode (2402MHz)
 Test Specification: FCC15.247(e)
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

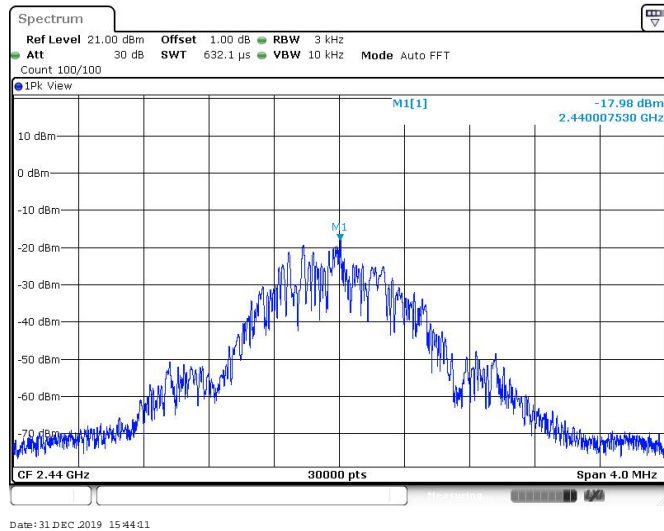


| PSD | Limit |
|------------|---------|
| -18.54 dBm | < 8 dBm |

Power Spectral Density

EUT: E41227
 Op Condition: Operated, TX Mode (2440MHz)
 Test Specification: FCC15.247(e)
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

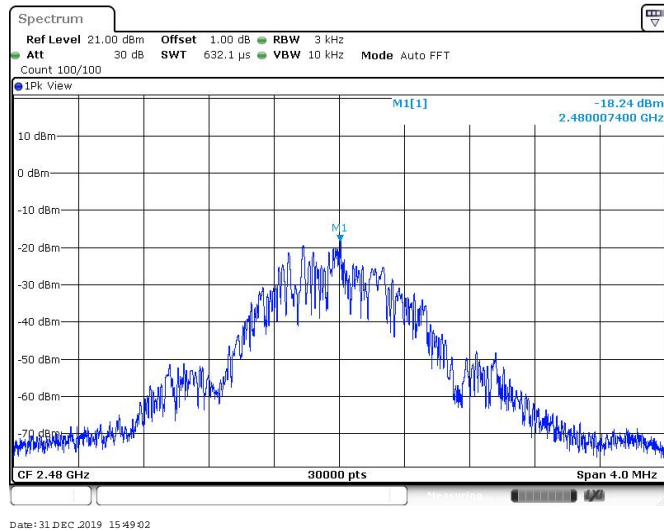


| PSD | Limit |
|------------|---------|
| -17.98 dBm | < 8 dBm |

Power Spectral Density

EUT: E41227
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC15.247(e)
 Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



| PSD | Limit |
|------------|---------|
| -18.24 dBm | < 8 dBm |

8.8 Antenna Requirement

EUT: E41227
Op Condition: Operated, TX Mode
Test Specification: FCC15.203 & 15.247(b)
Comment: 12V DC

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

Limit

For intentional device, according to FCC Title 47 Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC Title 47 Part 15.247(b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The antenna used in this product is build-in antenna on PCB, and the maximum gain of this antenna is 0.0 dBi.

9 Appendix A - General Product Information

Radiofrequency radiation exposure evaluation

This exposure evaluation is intended for **FCC ID: O4GRE**

According to KDB 447498 D01v06 section 4.3.1, For frequencies between 100 MHz to 6GHz and test separation distances ≤ 50 mm, the Numeric threshold is determined as:

Step a)

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR

>> The fundamental frequency of the EUT is 2402-2480MHz,
the test separation distance is ≤ 50 mm.
(Manufacturer specified the separation distance is: 5mm)

Step a)

>> Numeric threshold (2402MHz), $\text{mW} / 5\text{mm} \cdot \sqrt{2.402\text{GHz}} \leq 3.0$
Numeric threshold (2402MHz) $\leq 9.678\text{mW}$

>> Numeric threshold (2440MHz), $\text{mW} / 5\text{mm} \cdot \sqrt{2.440\text{GHz}} \leq 3.0$
Numeric threshold (2440MHz) $\leq 9.602\text{mW}$

>> Numeric threshold (2480MHz), $\text{mW} / 5\text{mm} \cdot \sqrt{2.480\text{GHz}} \leq 3.0$
Numeric threshold (2480MHz) $\leq 9.525\text{mW}$

>> The power of EUT measured (2402MHz) is: $-0.85\text{dBm} = 0.822\text{mW}$
The power of EUT measured (2440MHz) is: $-0.48\text{dBm} = 0.895\text{mW}$
The power of EUT measured (2480MHz) is: $-0.56\text{dBm} = 0.879\text{mW}$

Which is smaller than the Numeric threshold.

Therefore, the device is exempt from stand-alone SAR test requirements.