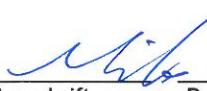



|  |  |   |                              |  |   |
|--|--|---|------------------------------|--|---|
| <b>Prüfbericht - Nr.:</b> 14029581 001   |  | <b>Seite 1 von 17</b>   |                              |  |   |
| <i>Test Report No.:</i>  |  | <i>Page 1 of 17</i>   |                              |  |   |
| <b>Auftraggeber:</b><br><i>Client:</i>   | Signeo International Limited<br>6/F, Enterprise Square Three<br>39 Wang Chiu Road<br>Kowloon Bay<br>Hong Kong  |   |                              |  |   |
| <b>Gegenstand der Prüfung:</b><br><i>Test Item:</i>  | Bluetooth Stereo Headset   |   |                              |  |   |
| <b>Bezeichnung:</b><br><i>Identification:</i>  | SRF01  | <b>Serien-Nr.:</b><br><i>Serial No.:</i>  | Engineering sample           |  |   |
| <b>Wareneingangs-Nr.:</b><br><i>Receipt No.:</i>   | 00120410061-007<br>00120410063-001<br>00120427001-001  | <b>Eingangsdatum:</b><br><i>Date of Receipt:</i>                                    | 10.04.2012<br>27.04.2012     |  |   |
| <b>Zustand des Prüfgegenstandes bei Anlieferung:</b><br><i>Condition of test item at delivery:</i>   | Test samples received are sufficient for testing and not damaged.  |   |                              |  |   |
| <b>Prüfört:</b><br><i>Testing Location:</i>  | Hong Kong Productivity Council<br>HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong<br><br>TÜV Rheinland Hong Kong Ltd.<br>8/F., First Group Centre, 14 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong |   |                              |  |   |
| <b>Prüfgrundlage:</b><br><i>Test Specification:</i>  | FCC Part 15 Subpart C<br>ANSI C63.4-2003<br>CISPR 22:1997  |   |                              |  |   |
| <b>Prüfresultat:</b><br><i>Test Results:</i>   | Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage.<br><br>The above mentioned product was tested and <b>passed</b> .   |   |                              |  |   |
| <b>Prüflaboratorium:</b><br><i>Testing Laboratory:</i>   | TÜV Rheinland Hong Kong Ltd.<br>8 - 10/F., Goldin Financial Global Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong  |   |                              |  |   |
| <b>geprüft/ tested by:</b>   | <b>kontrolliert/ reviewed by:</b>  |   |                              |  |   |
| 17.05.2012   | Mika Chan<br>Senior Project Engineer   |  | 17.05.2012                   |  |   |
|  |  |   | Sharon Li<br>Section Manager |  |   |
| <b>Datum</b><br><i>Date</i>  | <b>Name/Stellung</b><br><i>Name/Position</i>   | <b>Unterschrift</b><br><i>Signature</i>   | <b>Datum</b><br><i>Date</i>  | <b>Name/Stellung</b><br><i>Name/Position</i> | <b>Unterschrift</b><br><i>Signature</i>   |
|  |  |   |                              |  |  |
| <b>Sonstiges:</b><br><i>Other Aspects</i>  | FCCID: N5J-SRF01   |   |                              |  |   |
| <b>Abkürzungen:</b>  | P(ass) = entspricht Prüfgrundlage  | <b>Abbreviations:</b>   | P(ass) = passed              |  |   |
|  | F(ail) = entspricht nicht Prüfgrundlage  |   | F(ail) = failed              |  |   |
|  | N/A = nicht anwendbar  |   | N/A = not applicable         |  |   |
|  | N/T = nicht getestet   |   | N/T = not tested             |  |   |
| Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.<br><i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i> |  |   |                              |  |   |

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|   |                 |
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| <b>Appendix 3 – Photo documentation .....</b>   | <b>7 pages</b>  |
| <b>Appendix 4 – Product documentation .....</b> | <b>14 pages</b> |

## Product information

### Manufacturers declarations

|   | <b>Transceiver</b>  |
|---|---|
| Operating frequency range               | 2402 - 2480 MHz   |
| Type of modulation                      | GFSK; Pi/4 DQPSK; 8 DPSK  |
| Number of channels                      | 79  |
| Channel separation                      | 1 MHz   |
| Type of antenna                         | PCB Antenna   |
| Antenna gain (dBi)                      | 6   |
| Power level                             | fix   |
| Type of equipment                       | stand alone radio device  |
| Connection to public utility power line | No  |
| Nominal voltage                         | V <sub>nom</sub> : 3.7V   |
| Independent Operation Modes             | Page scan<br>Inquiry scan<br>Connection state - ACL Link<br>Connection state - SCO Link |

## Product function and intended use

The test item is a Bluetooth Stereo headset based on the Bluetooth technology.

Bluetooth is a short-range radio link intended to be a cable replacement between portable and/or fixed electronic devices.

Bluetooth operates in the unlicensed ISM Band at 2.4GHz. With the introduction of the enhanced data rate (EDR) feature, the data rates can be up to 3 Mb/s.

An increase in the peak data rate beyond the basic rate of 1 Mb/s is achieved by modulating the RF carrier using phase shift keying (PSK) techniques, resulting in an increase of two to three times the number of bits per symbol. The 2 Mb/s EDR packets use a Pi/4-DQPSK modulation and the 3 Mb/s EDR packets use 8DPSK modulation. The USB connector is for charging only, no data exchange supported.

## Submitted documents

Circuit Diagram  
Block Diagram  
Bill of material  
User Manual  
Label Artwork

## Remark

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases.

## Special accessories and auxiliary equipment

Laptop: IBM ThinkPad T61, serial no.: L3-X9333 08/05

## List of Test and Measurement Instruments

### Hong Kong Productivity Council (Registration number: 90656)

| Equipment                                  | Manufacturer | Type               | S/N               | Due Date  |
|--|--------------|--------------------|-------------------|-----------|
| Semi-anechoic Chamber                      | Frankonia    | Nil                | Nil               | 12-Apr-13 |
| Test Receiver                              | R & S        | ESU40              | 100190            | 26-May-12 |
| Bi-conical Antenna                         | R & S        | HK116              | 100241            | 05-May-13 |
| Log Periodic Antenna                       | R & S        | HL223              | 841516/020        | 06-May-13 |
| Coaxial cable 50ohm                        | Rosenberger  | RTK081-05S-05S-10m | LA2-001-10M / 001 | 15-Nov-13 |
| Microwave amplifier 0.5-26.5GHz, 25dB gain | HP           | 83017A             | 3950M00241        | 03-Oct-13 |
| High Pass Filter (cutoff freq. =1000MHz)   | Trilithic    | 23042              | 9829213           | 30-Oct-13 |
| Horn Antenna                               | EMCO         | 3115               | 9002-3351         | 11-May-13 |
| FSP 30 Spectrum Analyser                   | R & S        | FSP 30             | 100286            | 17-Sep-12 |
| Active Loop Antenna                        | EMCO         | 6502               | 9107-2651         | 19-Apr-12 |

## Results FCC Part 15 – Subpart C

|   |   |  |  |  |  |             |
|---|---|--|--|--|--|-------------|
| <b>Subclause 15.203 – Antenna Information</b> |   |  |  |  |  | <b>Pass</b> |
| <b>Requirement:</b>                           | No antenna other than that furnished by the responsible party shall be used with the device |  |  |  |  |             |
| <b>Results:</b>                               | Permanent attached antenna  |  |  |  |  |             |
| <b>Verdict:</b>                               | Pass  |  |  |  |  |             |

|   |   |             |  |  |  |             |
|---|---|-------------|--|--|--|-------------|
| <b>Subclause 15.204 – Antenna Information</b> |   |             |  |  |  | <b>Pass</b> |
| <b>Requirement:</b>                           | Provide information for every antenna proposed for the use with the EUT |             |  |  |  |             |
| <b>Results:</b>                               | a) Antenna type:  | PCB antenna |  |  |  |             |
|   | b) Manufacturer and model no:   | N.A.        |  |  |  |             |
|   | c) Gain with reference to an isotropic radiator:                        | 6 dBi       |  |  |  |             |
| <b>Verdict:</b>                               | Pass  |             |  |  |  |             |

| <b>Subclause 15.207 – Disturbance Voltage on AC Mains</b>  |   |                   |                |                 |                 | <b>Pass</b> |
|--|---|-------------------|----------------|-----------------|-----------------|-------------|
| Test Port: Laptop Computer AC Adaptor<br>Applied voltage: 120VAC<br>Mode of operation: Charging and Music playing Mode |   |                   |                |                 |                 |             |
| <b>Live measurement</b>  |   |                   |                |                 |                 |             |
| Frequency range (MHz)  | Frequency (MHz)   | Quasi-peak (dBµV) | Average (dBµV) | Limit QP (dBµV) | Limit AV (dBµV) | Verdict     |
| 0,15 – 0,5   | 0.150   | 58.4              | 37.3           | 66 - 56         | 56 - 46         | Pass        |
| > 0,5 - 5  | 0.546   | 33.3              | 30.1           | 56              | 46              | Pass        |
| > 5 - 30   | 7.578   | 34.0              | 28.9           | 60              | 50              | Pass        |
| <b>Neutral measurement</b>   |   |                   |                |                 |                 |             |
| Frequency range (MHz)  | Frequency (MHz)   | Quasi-peak (dBµV) | Average (dBµV) | Limit QP (dBµV) | Limit AV (dBµV) | Verdict     |
| 0,15 – 0,5   | 0.150   | 61.5              | 43.7           | 66 - 56         | 56 - 46         | Pass        |
| > 0,5 - 5  | 0.504   | 35.3              | 15.2           | 56              | 46              | Pass        |
| > 5 - 30   | 13.770  | 38.3              | 32.9           | 60              | 50              | Pass        |
| <b>Results:</b>  | The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz does not exceed the limits. For test Results plots refer to Appendix 1, page 2-3. |                   |                |                 |                 |             |

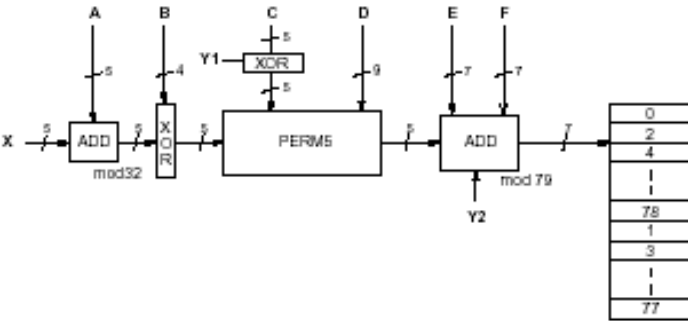
| <b>Subclause 15.247 (a)(1) – Carrier Frequency Separation</b> |   | <b>Pass</b> |
|---|---|-------------|
| <b>Requirement:</b>   | Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the $2/3 \cdot 20\text{dB}$ bandwidth of the hopping channel, whichever is greater.   |             |
| Test Specification  | : FCC Part 15 Subpart A – Subclause 15.31   |             |
| Mode of operation   | : Tx mode (hopping on), 8DPSK   |             |
| Port of testing   | : Temporary antenna port  |             |
| Detector  | : Peak  |             |
| RBW/VBW   | : 1 MHz / 3 MHz   |             |
| Supply voltage  | : 3.7VDC, internal battery  |             |
| Temperature   | : 23°C  |             |
| Humidity  | : 50%   |             |
| <b>Results:</b>   | <p>Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.</p> <p>The centre frequencies of the hopping channels are separated by more than the <math>2/3 \cdot 20\text{dB}</math> bandwidth. For test Results plots refer to Appendix 1, page 4.</p> |             |
| <b>Verdict:</b>   | Pass  |             |

| <b>Subclause 15.247 (a)(1)(iii) – Number of hopping channels</b> |   | <b>Pass</b> |
|--|---|-------------|
| <b>Requirement:</b>  | Frequency hopping systems operating in the 2400MHz-2483.5MHz bands shall use at least 15 hopping frequencies. |             |
| Test Specification   | : FCC Part 15 Subpart A – Subclause 15.31   |             |
| Mode of operation  | : Tx mode (hopping on), 8DPSK   |             |
| Port of testing  | : Temporary antenna port  |             |
| Detector   | : Peak  |             |
| RBW/VBW  | : 1 MHz / 3 MHz   |             |
| Supply voltage   | : 3.7VDC, internal battery  |             |
| Temperature  | : 23°C  |             |
| Humidity   | : 50%   |             |
| <b>Results:</b>  | The total number of hopping frequencies is more than 15. For test Results plots refer to Appendix 1, page 5.  |             |
| <b>Verdict:</b>  | Pass  |             |



|  |  |             |
|--|--|-------------|
| <b>Subclause 15.247 (a)(1)(iii) – Time of Occupancy (Dwell Time)</b> |  | <b>Pass</b> |
| <b>Requirement:</b>  | Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. |             |
| Test Specification :   | FCC Part 15 Subpart A – Subclause 15.31  |             |
| Mode of operation :  | Tx mode (hopping on), DH5 packet   |             |
| Port of testing :  | Temporary antenna port   |             |
| Detector :   | Peak   |             |
| RBW/VBW :  | 1 MHz / 3 MHz  |             |
| Supply voltage :   | 3.7VDC, internal battery   |             |
| Temperature :  | 23°C   |             |
| Humidity :   | 50%  |             |
| <b>Results:</b>  | Time period calculation = $0.4 \times 79 = 31.6\text{s}$<br>Dwell time = $64 \times 2.912 \times 10^{-3} = 186.37 \times 10^{-3} \text{ s}$<br>$\leq 400 \times 10^{-3} \text{ s}$   |             |
|  | For test protocols please refer to Appendix 1, page 6.   |             |
| <b>Verdict:</b>  | Pass   |             |

| <b>Subclause 15.247 (a) – 20 dB Bandwidth</b> |  | <b>Pass</b>       |                      |
|---|--|-------------------|----------------------|
| Requirement:                                  | Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.                     |                   |                      |
| Test Specification :                          | FCC Part 15 Subpart A – Subclause 15.31  |                   |                      |
| Mode of operation :                           | Tx mode (2402MHz, 2441MHz, 2480MHz)  |                   |                      |
| Port of testing :                             | Temporary antenna port   |                   |                      |
| Detector :                                    | Peak   |                   |                      |
| RBW/VBW :                                     | 30 kHz / 100 kHz   |                   |                      |
| Supply voltage :                              | 3.7VDC, internal battery   |                   |                      |
| Temperature :                                 | 23°C   |                   |                      |
| Humidity :                                    | 50%  |                   |                      |
| <b>Results:</b>                               | Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.<br><br>For test protocols refer to Appendix 1, page 7-9. |                   |                      |
| <b>GFSK Modulation</b>                        |  |                   |                      |
| Frequency (MHz)                               | 20 dB left (MHz)   | 20 dB right (MHz) | 20dB bandwidth (MHz) |
| 2402  | 0.456  | 0.480             | 0.936                |
| 2441  | 0.450  | 0.420             | 0.870                |
| 2480  | 0.444  | 0.426             | 0.870                |
| <b>8DPSK Modulation</b>                       |  |                   |                      |
| Frequency (MHz)                               | 20 dB left (MHz)   | 20 dB right (MHz) | 20dB bandwidth (MHz) |
| 2402  | 0.666  | 0.636             | 1.302                |
| 2441  | 0.642  | 0.654             | 1.296                |
| 2480  | 0.654  | 0.612             | 1.266                |

| Subclause 15.247 (a) – Hopping Sequence   | Pass |
|---|------|
| Requirement: The hopping sequence is generated and provided with an example.  |      |
| Hopping sequence  |      |
| <p>The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master. The X input determines the phase in the 32-hop segment, whereas Y1 and Y2 selects between master-to-slave and slave-to-master transmission. The inputs A to D determine the ordering within the segment, the inputs E and F determine the mapping onto the hop frequencies.</p> |      |
|    |      |

**Example data:**

Hop sequence {k} for CONNECTION STATE:

CLK start: 0x0000010

ULAP: 0x00000000

#ticks: 00 02 | 04 06 | 08 0a | 0c 0e | 10 12 | 14 16 | 18 1a | 1c 1e |

```

-----
0x0000010: 08 66 | 10 70 | 12 19 | 14 23 | 16 01 | 18 05 | 20 33 | 22 37 |
0x0000030: 24 03 | 26 07 | 28 35 | 30 39 | 32 72 | 34 76 | 36 25 | 38 29 |
0x0000050: 40 74 | 42 78 | 44 27 | 46 31 | 48 09 | 50 13 | 52 41 | 54 45 |
0x0000070: 56 11 | 58 15 | 60 43 | 62 47 | 32 17 | 36 19 | 34 49 | 38 51 |
0x0000090: 40 21 | 44 23 | 42 53 | 46 55 | 48 33 | 52 35 | 50 65 | 54 67 |
0x00000b0: 56 37 | 60 39 | 58 69 | 62 71 | 64 25 | 68 27 | 66 57 | 70 59 |
0x00000d0: 72 29 | 76 31 | 74 61 | 78 63 | 01 41 | 05 43 | 03 73 | 07 75 |
0x00000f0: 09 45 | 13 47 | 11 77 | 15 00 | 64 49 | 66 53 | 68 02 | 70 06 |
0x0000110: 01 51 | 03 55 | 05 04 | 07 08 | 72 57 | 74 61 | 76 10 | 78 14 |
0x0000130: 09 59 | 11 63 | 13 12 | 15 16 | 17 65 | 19 69 | 21 18 | 23 22 |
0x0000150: 33 67 | 35 71 | 37 20 | 39 24 | 25 73 | 27 77 | 29 26 | 31 30 |
0x0000170: 41 75 | 43 00 | 45 28 | 47 32 | 17 02 | 21 04 | 19 34 | 23 36 |
0x0000190: 33 06 | 37 08 | 35 38 | 39 40 | 25 10 | 29 12 | 27 42 | 31 44 |
0x00001b0: 41 14 | 45 16 | 43 46 | 47 48 | 49 18 | 53 20 | 51 50 | 55 52 |
0x00001d0: 65 22 | 69 24 | 67 54 | 71 56 | 57 26 | 61 28 | 59 58 | 63 60 |
0x00001f0: 73 30 | 77 32 | 75 62 | 00 64 | 49 34 | 51 42 | 57 66 | 59 74 |
0x0000210: 53 36 | 55 44 | 61 68 | 63 76 | 65 50 | 67 58 | 73 03 | 75 11 |
0x0000230: 69 52 | 71 60 | 77 05 | 00 13 | 02 38 | 04 46 | 10 70 | 12 78 |
0x0000250: 06 40 | 08 48 | 14 72 | 16 01 | 18 54 | 20 62 | 26 07 | 28 15 |
0x0000270: 22 56 | 24 64 | 30 09 | 32 17 | 02 66 | 06 74 | 10 19 | 14 27 |
0x0000290: 04 70 | 08 78 | 12 23 | 16 31 | 18 03 | 22 11 | 26 35 | 30 43 |
0x00002b0: 20 07 | 24 15 | 28 39 | 32 47 | 34 68 | 38 76 | 42 21 | 46 29 |
0x00002d0: 36 72 | 40 01 | 44 25 | 48 33 | 50 05 | 54 13 | 58 37 | 62 45 |
0x00002f0: 52 09 | 56 17 | 60 41 | 64 49 | 34 19 | 36 35 | 50 51 | 52 67 |
0x0000310: 38 21 | 40 37 | 54 53 | 56 69 | 42 27 | 44 43 | 58 59 | 60 75 |
0x0000330: 46 29 | 48 45 | 62 61 | 64 77 | 66 23 | 68 39 | 03 55 | 05 71 |
0x0000350: 70 25 | 72 41 | 07 57 | 09 73 | 74 31 | 76 47 | 11 63 | 13 00 |
0x0000370: 78 33 | 01 49 | 15 65 | 17 02 | 66 51 | 70 67 | 03 04 | 07 20 |
0x0000390: 68 55 | 72 71 | 05 08 | 09 24 | 74 59 | 78 75 | 11 12 | 15 28 |
0x00003b0: 76 63 | 01 00 | 13 16 | 17 32 | 19 53 | 23 69 | 35 06 | 39 22 |
0x00003d0: 21 57 | 25 73 | 37 10 | 41 26 | 27 61 | 31 77 | 43 14 | 47 30 |
0x00003f0: 29 65 | 33 02 | 45 18 | 49 34 | 19 04 | 21 08 | 23 20 | 25 24 |

```

**Subclause 15.247 (a) – Equal Hopping Frequency Use**
**Pass**

Requirement: Each of the transmitter's hopping channels is used equally on average.

Equal hopping frequency use

The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard.

|  |             |
|--|-------------|
| <b>Subclause 15.247 (a) – Receiver Input Bandwidth</b>   | <b>Pass</b> |
| Requirement: The associated receiver(s) complies with the requirement that its input bandwidth matches the bandwidth of the transmitted signal.  |             |
| Receiver input bandwidth<br>The receiver bandwidth is equal to the receiver bandwidth in the 79 hopping channel mode, which is 1 MHz. The receiver bandwidth was verified during Bluetooth RF conformance testing. |             |

|  |             |
|--|-------------|
| <b>Subclause 15.247 (a) – Receiver Hopping Capability</b>  | <b>Pass</b> |
| Requirement: The associated receiver has the ability to shift frequencies in synchronisation with the transmitted signals.         |             |
| Receiver hopping Capability<br>The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard. |             |

|   |  |                               |                           |                      |                |
|---|--|-------------------------------|---------------------------|----------------------|----------------|
| <b>Subclause 15.247 (b)(1) – Peak Output Power</b>  | <b>Pass</b>                            |                               |                           |                      |                |
| Test Specification : FCC Part 15 Subpart A – Subclause 15.31<br>Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz)<br>Port of testing : Temporary antenna port<br>Detector : Peak<br>RBW/VBW : 3 MHz / 10 MHz<br>Supply voltage : 3.7VDC, internal battery<br>Temperature : 23°C<br>Humidity : 50% |  |                               |                           |                      |                |
| Requirement: For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 Watt. For all other frequency hopping systems in the 2400 – 2483.5 MHz band: 0.125 Watts.                       |  |                               |                           |                      |                |
| <b>Results:</b> For test protocols please refer to Appendix 1, page 10-14.  |  |                               |                           |                      |                |
| <b>GFSK Modulation</b>  |  |                               |                           |                      |                |
| <b>Frequency (MHz)</b>  | <b>Maximum peak output power (dBm)</b> | <b>Cable attenuation (dB)</b> | <b>Output power (dBm)</b> | <b>Limit (W/dBm)</b> | <b>Verdict</b> |
| 2402  | -0.75                                  | 0.00                          | -0.750                    | 1 / 30.0             | Pass           |
| 2441  | -0.10                                  | 0.00                          | -0.100                    | 1 / 30.0             | Pass           |
| 2480  | -0.99                                  | 0.00                          | -0.990                    | 1 / 30.0             | Pass           |
| <b>Pi/4 DQPSK Modulation</b>  |  |                               |                           |                      |                |
| <b>Frequency (MHz)</b>  | <b>Maximum peak output power (dBm)</b> | <b>Cable attenuation (dB)</b> | <b>Output power (dBm)</b> | <b>Limit (W/dBm)</b> | <b>Verdict</b> |
| 2402  | 1.09                                   | 0.00                          | 1.090                     | 1 / 30.0             | Pass           |

| 2441                    | 0.17                            | 0.00                   | 0.170              | 1 / 30.0      | Pass    |
|-------------------------|---------------------------------|------------------------|--------------------|---------------|---------|
| 2480                    | -0.68                           | 0.00                   | -0.680             | 1 / 30.0      | Pass    |
| <b>8DPSK Modulation</b> |                                 |                        |                    |               |         |
| Frequency (MHz)         | Maximum peak output power (dBm) | Cable attenuation (dB) | Output power (dBm) | Limit (W/dBm) | Verdict |
| 2402                    | 1.45                            | 0.00                   | 1.450              | 1 / 30.0      | Pass    |
| 2441                    | 0.54                            | 0.00                   | 0.540              | 1 / 30.0      | Pass    |
| 2480                    | -0.41                           | 0.00                   | -0.410             | 1 / 30.0      | Pass    |

|   |   |             |
|---|---|-------------|
| <b>Subclause 15.247 (d) – Band edge compliance of conducted emissions</b>   |   | <b>Pass</b> |
| <p>Test Specification : FCC Part 15 Subpart A – Subclause 15.31<br/> Mode of operation : Tx mode (2402MHz, 2480MHz), 8DPSK<br/> Port of testing : Temporary antenna port<br/> Detector : Peak<br/> RBW/VBW : 100 kHz / 300 kHz<br/> Supply voltage : 3.7VDC, internal battery<br/> Temperature : 23°C<br/> Humidity : 50%</p> |   |             |
| Requirement:  | <p>In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.</p> |             |
| Results:  | <p>Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.</p> <p>There is no peak found outside any 100 kHz bandwidth of the operating frequency band. For test protocols refer to Appendix 1, page 15-16.</p>   |             |

|   |  |             |
|---|--|-------------|
| <b>Subclause 15.205 – Band edge compliance of radiated emissions</b>  |  | <b>Pass</b> |
| <p>Test Specification : FCC Part 15 Subpart A – Subclause 15.31<br/> Mode of operation : Tx mode (2402MHz, 2480MHz), 8DPSK<br/> Port of testing : Temporary antenna port<br/> Detector : Peak<br/> RBW/VBW : 1 MHz / 3 MHz<br/> Supply voltage : 3.7VDC, internal battery<br/> Temperature : 23°C<br/> Humidity : 50%</p> |  |             |
| Requirement:  | <p>Radiated emissions which fall in the restricted bands, as defined in 15.205 (a), must also comply with the radiated emission limits specified in 15.209(a).</p> |             |
| Results:  | <p>There is no peak found in the restricted bands. For test protocols refer to Appendix 1, page 17-24.</p>   |             |

| <b>Subclause 15.247 (d) – Spurious Conducted Emissions</b>  |                                 |                             |                              |                   | <b>Pass</b>    |
|---|---------------------------------|-----------------------------|------------------------------|-------------------|----------------|
| Test Specification : FCC Part 15 Subpart A – Subclause 15.31<br>Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), 8DPSK<br>Port of testing : Temporary antenna port<br>Detector : Peak<br>RBW/VBW : 100 kHz / 300 kHz<br>Supply voltage : 3.7VDC, internal battery<br>Temperature : 23 °C<br>Humidity : 50 %   |                                 |                             |                              |                   |                |
| <b>Requirement:</b> In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.  |                                 |                             |                              |                   |                |
| <b>Results:</b> Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.<br><br>There is no peak found outside any 100kHz bandwidth of the operating frequency band in the three transmit frequency. All three transmit frequency modes comply with the limit stated in subclause 15.247(d). For test protocols refer to Appendix 1, page 25-26. |                                 |                             |                              |                   |                |
| <b>Operating frequency (MHz)</b>  | <b>Spurious frequency (MHz)</b> | <b>Spurious Level (dBm)</b> | <b>Reference value (dBm)</b> | <b>Delta (dB)</b> | <b>Verdict</b> |
| 2402  | no peak found                   | ---                         | ---                          | ---               | Pass           |
| 2441  | no peak found                   | ---                         | ---                          | ---               | Pass           |
| 2480  | no peak found                   | ---                         | ---                          | ---               | Pass           |

| <b>Subclause 15.247 (c) – Spurious Radiated Emissions</b>   |  | <b>Pass</b>                   |
|---|--|-------------------------------|
| Test Specification : ANSI C63.4 – 2003<br>Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), 8DPSK<br>Port of testing : Enclosure<br>Detector : Peak<br>RBW/VBW : 100 kHz / 300 kHz for f < 1 GHz<br>1 MHz / 3 MHz for f > 1 GHz<br>Supply voltage : 3.7VDC, internal battery<br>Temperature : 23°C<br>Humidity : 50% |  |                               |
| Requirement:  | In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.205(c). |                               |
| <b>Results:</b>   | Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.<br><br>All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz.              |                               |
| Tx frequency 2402MHz  |  | Vertical Polarization         |
| <b>Freq MHz</b>   | <b>Level dBuV/m</b>  | <b>Limit/ Detector dBuV/m</b> |
| 4804.399  | 58.45  | 74.0 / PK                     |
| 4804.030  | 40.39  | 54.0 / AV                     |
| Tx frequency 2402MHz  |  | Horizontal Polarization       |
| <b>Freq MHz</b>   | <b>Level dBuV/m</b>  | <b>Limit/ Detector dBuV/m</b> |
| 170.665   | 29.20  | 43.5 / QP                     |
| 1601.899  | 49.63  | 74.0 / PK                     |
| 1601.995  | 46.28  | 54.0 / AV                     |
| 4804.240  | 56.41  | 74.0 / PK                     |
| 4803.984  | 40.30  | 54.0 / AV                     |
| Tx frequency 2441MHz  |  | Vertical Polarization         |
| <b>Freq MHz</b>   | <b>Level dBuV/m</b>  | <b>Limit/ Detector dBuV/m</b> |
| 4882.205  | 58.13  | 74.0 / PK                     |
| 4881.981  | 39.81  | 54.0 / AV                     |
| Tx frequency 2441MHz  |  | Horizontal Polarization       |
| <b>Freq MHz</b>   | <b>Level dBuV/m</b>  | <b>Limit/ Detector dBuV/m</b> |
| 165.333   | 24.5   | 43.5 / QP                     |
| 1627.926  | 47.96  | 74.0 / PK                     |
| 1627.974  | 44.26  | 54.0 / AV                     |



| Tx frequency 2480MHz |                 | Vertical Polarization     |  |
|----------------------|-----------------|---------------------------|--|
| Freq<br>MHz          | Level<br>dBuV/m | Limit/ Detector<br>dBuV/m |  |
| 4959.936             | 58.31           | 74.0 / PK                 |  |
| 4960.000             | 40.22           | 54.0 / AV                 |  |
| Tx frequency 2480MHz |                 | Horizontal Polarization   |  |
| Freq<br>MHz          | Level<br>dBuV/m | Limit/ Detector<br>dBuV/m |  |
| 170.665              | 29.60           | 43.5 / QP                 |  |
| 4959.872             | 54.69           | 74.0 / PK                 |  |
| 4959.952             | 38.64           | 54.0 / AV                 |  |