| Test specification: | FCC section 15.255(f)/RSS-210 section J.6, Frequency stability | | |
|---|---|---|---|
| Test procedure: | ANSI C63.10, Section 6.8.1 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 10-Mar-22 | | |
| Temperature: 25 ºC | Relative Humidity: 48 % | Air Pressure: 1018 hPa | Power: 48 VDC |
| Remarks: | | | |

## 7.5 Frequency stability test

### 7.5.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.5.1.

**Table 7.5.1 Frequency stability limits**

| Assigned frequency, MHz | Maximum allowed frequency displacement |
|---|---|
| 58320 | NA |
| 62640 | NA |
| 64800 | NA |

### 7.5.2 Test procedure

**7.5.2.1** The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.

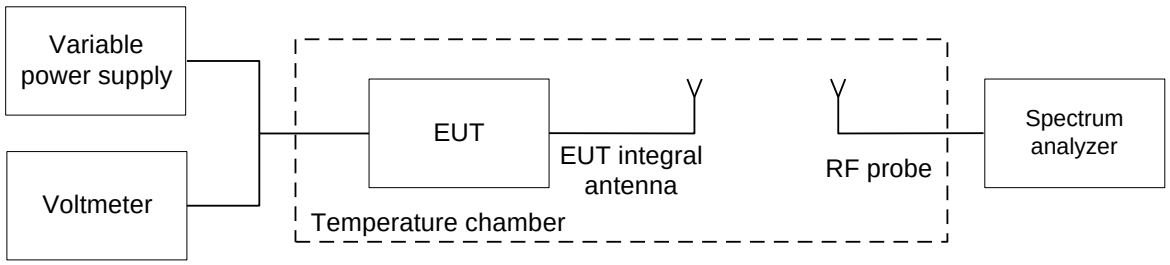
**7.5.2.2** The EUT power was turned off. Temperature within test chamber was set to +30˚C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.

**7.5.2.3** The EUT was powered on and carrier frequency was measured at start up moment +30˚C and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

**7.5.2.4** The above procedure was repeated at the rest of the test temperatures and voltages as provided in Table 7.5.2. The EUT was powered off.

**7.5.2.5** Frequency displacement was calculated and compared with the limit as provided in Table 7.5.2.

**Figure 7.5.1 Frequency stability test setup**



| **Test specification:** | **FCC section 15.255(f)/RSS-210 section J.6, Frequency stability** | | |
|---|---|---|---|
| **Test procedure:** | ANSI C63.10, Section 6.8.1 | | |
| **Test mode:** | Compliance | **Verdict:** | PASS |
| **Date(s):** | 10-Mar-22 | | |
| **Temperature:** 25 ºC | **Relative Humidity:** 48 % | **Air Pressure:** 1018 hPa | **Power:** 48 VDC |
| **Remarks:** | | | |

**Table 7.5.2 Frequency stability test results**

OPERATING FREQUENCY: 57000 – 71000 MHz
NOMINAL POWER VOLTAGE: 48 V
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Counter
RESOLUTION BANDWIDTH: 3 kHz
VIDEO BANDWIDTH: 10 kHz
MODULATION: Unmodulated

| T, ºC | Voltage, V | Frequency, MHz | | | | | | | Max frequency drift, kHz | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Start up | 1st min | 2nd min | 3rd min | 4th min | 5th min | 10th min | Positive | Negative |
| **Low frequency 58320 MHz** | | | | | | | | | | |
| -45 | nominal | 58419.862475 | NA | NA | NA | NA | NA | 58419.862489 | 66 | 0 |
| -40 | nominal | 58419.862430 | NA | NA | NA | NA | NA | 58419.862416 | 7 | -7 |
| -30 | nominal | 58419.862467 | NA | NA | NA | NA | NA | 58419.862437 | 44 | 0 |
| -20 | nominal | 58419.862478 | 58419.862476 | 58419.862471 | 58419.862478 | 58419.862472 | 58419.862479 | 58419.862476 | 56 | 0 |
| -10 | nominal | 58419.862460 | NA | NA | NA | NA | NA | 58419.862478 | 55 | 0 |
| 0 | nominal | 58419.862445 | 58419.862456 | 58419.862476 | 58419.862436 | 58419.862478 | 58419.862442 | 58419.862399 | 55 | -24 |
| 10 | nominal | 58419.862456 | NA | NA | NA | NA | NA | 58419.862472 | 49 | 0 |
| 20 | 15% | 58419.862421 | NA | NA | NA | NA | NA | 58419.862432 | 9 | -2 |
| 20 | nominal | 58419.862419 | NA | NA | NA | NA | NA | 58419.862423 | 0 | -4 |
| 20 | -15% | 58419.862432 | NA | NA | NA | NA | NA | 58419.862437 | 14 | 0 |
| 30 | nominal | 58419.862449 | 58419.862465 | 58419.862433 | 58419.862426 | 58419.862434 | 58419.862433 | 58419.862470 | 47 | 0 |
| 40 | nominal | 58419.862431 | NA | NA | NA | NA | NA | 58419.862447 | 24 | 0 |
| 50 | nominal | 58419.862457 | NA | NA | NA | NA | NA | 58419.862480 | 57 | 0 |
| 55 | nominal | 58419.862427 | NA | NA | NA | NA | NA | 58419.862438 | 15 | 0 |
| **Mid frequency 62640 MHz** | | | | | | | | | | |
| -45 | nominal | 62739.859070 | NA | NA | NA | NA | NA | 62739.859086 | 49 | 0 |
| -40 | nominal | 62739.859079 | NA | NA | NA | NA | NA | 62739.859074 | 42 | 0 |
| -30 | nominal | 62739.859048 | NA | NA | NA | NA | NA | 62739.859072 | 35 | 0 |
| -20 | nominal | 62739.859045 | 62739.859090 | 62739.859093 | 62739.859015 | 62739.859065 | 62739.859098 | 62739.859027 | 61 | -22 |
| -10 | nominal | 62739.859061 | NA | NA | NA | NA | NA | 62739.859047 | 24 | 0 |
| 0 | nominal | 62739.859021 | 62739.859043 | 62739.858999 | 62739.859034 | 62739.859074 | 62739.859060 | 62739.859054 | 37 | -38 |
| 10 | nominal | 62739.859065 | NA | NA | NA | NA | NA | 62739.859075 | 38 | 0 |
| 20 | 15% | 62739.859052 | NA | NA | NA | NA | NA | 62739.859059 | 22 | 0 |
| 20 | nominal | 62739.859046 | NA | NA | NA | NA | NA | 62739.859037 | 9 | 0 |
| 20 | -15% | 62739.859051 | NA | NA | NA | NA | NA | 62739.859048 | 14 | 0 |
| 30 | nominal | 62739.859045 | 62739.859045 | 62739.859087 | 62739.859043 | 62739.859012 | 62739.859023 | 62739.859056 | 50 | -25 |
| 40 | nominal | 62739.859056 | NA | NA | NA | NA | NA | 62739.859059 | 22 | 0 |
| 50 | nominal | 62739.859053 | NA | NA | NA | NA | NA | 62739.859046 | 16 | 0 |
| 55 | nominal | 62739.859058 | NA | NA | NA | NA | NA | 62739.859058 | 21 | 0 |
| **High frequency 64800 MHz** | | | | | | | | | | |
| -45 | nominal | 64899.858493 | NA | NA | NA | NA | NA | 64899.858490 | 46 | 0 |
| -40 | nominal | 64899.858498 | NA | NA | NA | NA | NA | 64899.858480 | 42 | 0 |
| -30 | nominal | 64899.85848 | NA | NA | NA | NA | NA | 64899.85849 | 43 | 0 |
| -20 | nominal | 64899.858412 | 64899.858478 | 64899.858445 | 64899.858456 | 64899.858485 | 64899.858467 | 64899.858467 | 41 | -32 |
| -10 | nominal | 64899.858448 | NA | NA | NA | NA | NA | 64899.858487 | 43 | 0 |
| 0 | nominal | 64899.858437 | 64899.858412 | 64899.858497 | 64899.858434 | 64899.858434 | 64899.858478 | 64899.858421 | 53 | -32 |
| 10 | nominal | 64899.85845 | NA | NA | NA | NA | NA | 64899.85846 | 15 | 0 |
| 20 | 15% | 64899.858446 | NA | NA | NA | NA | NA | 64899.858451 | 7 | 0 |
| 20 | nominal | 64899.858444 | NA | NA | NA | NA | NA | 64899.858450 | 6 | 0 |
| 20 | -15% | 64899.858442 | NA | NA | NA | NA | NA | 64899.858444 | 0 | -2 |
| 30 | nominal | 64899.858480 | 64899.858427 | 64899.858365 | 64899.858456 | 64899.858446 | 64899.858458 | 64899.858480 | 38 | -79 |
| 40 | nominal | 64899.858499 | NA | NA | NA | NA | NA | 64899.858439 | 55 | -5 |
| 50 | nominal | 64899.858429 | NA | NA | NA | NA | NA | 64899.858446 | 2 | -15 |
| 55 | nominal | 64899.858473 | NA | NA | NA | NA | NA | 64899.858454 | 29 | 0 |

* - Reference frequency

**Reference numbers of test equipment used**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| HL 0771 | HL 3286 | HL 3291 | HL 5376 | HL 5380 | HL 5391 | | |

Full description is given in Appendix A.

| Test specification: | FCC section 15.203/ RSS-Gen, Section 6.8, Antenna requirement | | |
|---|---|---|---|
| Test procedure: | Visual inspection / supplier declaration | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 10-Apr-22 | | |
| Temperature: 24 ºC | Relative Humidity: 40 % | Air Pressure: 1018 hPa | Power: 48 VDC |
| Remarks: | | | |

## 7.6 Antenna requirements

The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.
The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.6.1.

**Table 7.6.1 Antenna requirements**

| Requirement | Rationale | Verdict |
|---|---|---|
| The transmitter antenna is permanently attached | NA | Comply |
| The transmitter employs a unique antenna connector | NA | |
| The transmitter requires professional installation | Visual inspection | |

# 8 APPENDIX A Test equipment and ancillaries used for tests

| HL No | Description | Manufacturer | Model | Ser. No. | Last Cal./ Check | Due Cal./ Check |
|---|---|---|---|---|---|---|
| 0446 | Antenna, Loop, Active, 10 (9) kHz - 30 MHz | EMCO | 6502 | 2857 | 28-Feb-21 | 28-Feb-22 |
| 0747 | Mixer, Millimeter Wave Harmonic 90 - 140 GHZ | Oleson Microwave Labs | M08HW | F80429-1 | 19-May-20 | 19-May-23 |
| 0770 | Antenna Standard Gain Horn, 40-60 GHz WR-19, U-band, 24 dB mid-band gain | Quinstar Technology | QWH-1900-AA | 118 | 11-Nov-21 | 11-Nov-22 |
| 0771 | Antenna Standard Gain Horn, 60-90 GHz, WR-12, 24 dB mid-band gain | Quinstar Technology | QWH-1200-AA | 111 | 10-Aug-21 | 10-Aug-22 |
| 0772 | Antenna Standard Gain Horn, 75-110 GHz, WR-10, 24 dB mid-band gain | Quinstar Technology | QWH-0800-AA | 110 | 11-Nov-21 | 11-Nov-22 |
| 3235 | Harmonic mixer 40 to 60 GHz | Agilent Technologies | 11970U | MY30030182 | 30-Jan-20 | 30-Jan-23 |
| 3286 | Temperature Chamber, (-50 to +170) °C | Thermotron | EL-8-CH-1-1-CO2 | 21-9048 | 12-Dec-21 | 12-Dec-22 |
| 3290 | Attenuator, direct reading, 40 to 60 GHz, 0.4 W | Quinstar Technology | QAD-U00000 | 10381008 | 04-Nov-21 | 04-Nov-22 |
| 3291 | Attenuator, direct reading, 60 to 90 GHz, 0.2 W | Quinstar Technology | QAD-E00000 | 10381009 | 04-Nov-21 | 04-Nov-22 |
| 3293 | Frequency multiplier, input 20-30 GHz, output 60-90 GHz | Quinstar Technology | QPM-75003E | 10381003 | 11-Nov-21 | 11-Nov-22 |
| 3294 | Tapered transition, WR-28, UG-599 to WR-15, UG-385 (26.5-40 GHz to 50-75 GHz) | Quinstar Technology | QWP-AV0000 | 10381004 | 11-Nov-21 | 11-Nov-22 |
| 3306 | Harmonic mixer 75 to 110 GHz | Agilent Technologies | 11970W | MY25210273 | 30-Jan-20 | 30-Jan-23 |
| 3434 | Test Cable , DC-18 GHz, 1.5 m, SMA - SMA | Mini-Circuits | CBL-5FT-SMSM+ | 25683 | 19-Apr-21 | 19-Apr-22 |
| 3536 | Antenna Standard Gain Horn, 90-140 GHz, WR-8, 24 dB mid-band gain | Quinstar Technology | QWH-FPRR00 | 11159004001 | 11-Nov-21 | 11-Nov-22 |
| 3901 | Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA | Huber-Suhner | SUCOFLEX 102A | 1225/2A | 06-Apr-21 | 06-Apr-22 |
| 3903 | Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA | Huber-Suhner | SUCOFLEX 102A | 1226/2A | 06-Apr-21 | 06-Apr-22 |
| 4023 | Diplexer for use OML mixers with Agilent spectrum analyzer | Oleson Microwave Labs | DPL.26 | NA | 31-Mar-21 | 31-Mar-22 |
| 4360 | EMI Test Receiver, 20 Hz to 40 GHz. | Rohde & Schwarz | ESU40 | 100322 | 13-Jan-22 | 13-Jan-23 |
| 4483 | WR28 to WR22 Waveguide Transition, Freq. Range: 33-50GHz, Flange: FBP320/FUGP400 | A-info (HK) Limited | 2822WA-50 | J5031121024002 | 11-Nov-21 | 11-Nov-22 |

| HL No | Description | Manufacturer | Model | Ser. No. | Last Cal./ Check | Due Cal./ Check |
|---|---|---|---|---|---|---|
| 4856 | Amplifier, solid state, 18 GHz to 40 GHz, 20 dBm output power | Quinstar Technology | QGW-18402023-JO | 16779001001 | 30-May-21 | 30-May-22 |
| 4933 | Active Horn Antenna, 1 GHz to 18 GHz | COM-POWER CORPORATION | AHA-118 | 701046 | 13-Jan-22 | 13-Jan-23 |
| 4956 | Active horn antenna, 18 to 40 GHz | COM-POWER CORPORATION | AHA-840 | 105004 | 26-Jan-21 | 07-Mar-22 |
| 4956 | Active horn antenna, 18 to 40 GHz | COM-POWER CORPORATION | AHA-840 | 105004 | 07-Mar-22 | 07-Mar-23 |
| 5112 | RF cable, 40 GHz, 5.5 m, K-type | Huber-Suhner | SF102EA/11SK/11SK/5500MM | 502494/2EA | 19-Apr-21 | 19-Apr-22 |
| 5288 | Trilog Antenna, 25 MHz - 8 GHz, 100W | Frankonia | ALX-8000E | 00809 | 08-Feb-19 | 08-Mar-22 |
| 5371 | EXG Analog Signal Generator, 9 kHz - 40 GHz | Keysight Technologies | N5173B | MY57280540 | 28-Oct-21 | 28-Oct-22 |
| 5376 | EXA Signal Analyzer, 10 Hz - 32 GHz | Keysight Technologies | N9010B | MY57470404 | 01-Nov-21 | 01-Nov-22 |
| 5377 | USB Thermocouple Power Sensor, DC-120 GHz | Keysight Technologies | U8489A | US56430158 | 19-Oct-21 | 19-Oct-22 |
| 5380 | Waveguide Harmonic Mixer 55-90GHz | Keysight Technologies | M1971E | MY56130239 | 13-Nov-20 | 13-Nov-22 |
| 5391 | Temperature/Humidity Cycle Chamber, -77 - +177 deg., Humidity Range 20% RH to 95% RH | Thermotron | SM-8C | 27737 | 11-Nov-21 | 11-Nov-22 |
| 5902 | RF cable, 18 GHz, 6.0m, N-type | Huber-Suhner | SF126EA/11N/11N/6000 | NA | 16-Jan-22 | 16-Jan-23 |
| 5971 | Oscilloscope, 500 MHz, digital 4 channel | Rohde & Schwarz | RTM3004 | 104883 | 20-Feb-21 | 20-Apr-22 |

# 9 APPENDIX B Test equipment correction factors

**Antenna factor**
**loop antenna**
**Model 6502, S/N 2857, HL 0446**

| Frequency, MHz | Magnetic antenna factor, dB | Electric antenna factor, dB |
|---|---|---|
| 0.009 | -32.8 | 18.7 |
| 0.010 | -33.8 | 17.7 |
| 0.020 | -38.3 | 13.2 |
| 0.050 | -41.1 | 10.4 |
| 0.075 | -41.3 | 10.2 |
| 0.100 | -41.6 | 9.9 |
| 0.150 | -41.7 | 9.8 |
| 0.250 | -41.6 | 9.9 |
| 0.500 | -41.8 | 9.8 |
| 0.750 | -41.9 | 9.7 |
| 1.000 | -41.4 | 10.1 |
| 2.000 | -41.5 | 10.0 |
| 3.000 | -41.4 | 10.2 |
| 4.000 | -41.4 | 10.1 |
| 5.000 | -41.5 | 10.1 |
| 10.000 | -41.9 | 9.6 |
| 15.000 | -41.9 | 9.6 |
| 20.000 | -42.2 | 9.3 |
| 25.000 | -42.8 | 8.7 |
| 30.000 | -44.0 | 7.5 |

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field strength in dB(μV/m).

**Antenna factor**
**Standard gain horn antenna**
**Quinstar Technology**
**Model QWH**
**Ser.No.112, HL 0768, 0769, 0770, 0771, 0772**

| Frequency min, GHz | Frequency max, GHz | Antenna factor, dB(1/m) |
|---|---|---|
| 18.000 | 26.500 | 32.01 |
| 26.500 | 40.000 | 35.48 |
| 40.000 | 60.000 | 39.03 |
| 60.000 | 90.000 | 42.55 |
| 90.000 | 140.000 | 46.23 |
| 140.000 | 220.000 | 50.11 |

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

**Antenna factor**
**Trilog antenna**
**Model ALX-8000E, Frankonia, S/N 00809, HL 5288, 30-1000 MHz**

| Frequency, MHz | Antenna factor, dB/m | | |
|---|---|---|---|
| | Vert Up | Vert Down | Delta |
| 30 | -51.19 | -51.28 | 0.09 |
| 35 | -44.03 | -44.12 | 0.09 |
| 40 | -43.07 | -43.12 | 0.05 |
| 45 | -39.61 | -39.79 | 0.18 |
| 50 | -37.84 | -38.14 | 0.3 |
| 60 | -34.93 | -34.9 | 0.03 |
| 70 | -29.76 | -29.66 | 0.1 |
| 80 | -27.69 | -27.82 | 0.13 |
| 90 | -29.05 | -29.07 | 0.02 |
| 100 | -31.19 | -31.19 | 0 |
| 120 | -31.61 | -31.6 | 0.01 |
| 140 | -28.13 | -28.06 | 0.07 |
| 160 | -27.71 | -27.75 | 0.04 |
| 180 | -26.19 | -26.15 | 0.04 |
| 200 | -28.2 | -28.15 | 0.05 |
| 250 | -27.45 | -27.47 | 0.02 |
| 300 | -29.61 | -29.63 | 0.02 |
| 400 | -31.77 | -31.78 | 0.01 |
| 500 | -32.81 | -32.81 | 0 |
| 600 | -33.64 | -33.61 | 0.03 |
| 700 | -34.21 | -34.21 | 0 |
| 800 | -35.66 | -35.66 | 0 |
| 900 | -36.99 | -36.91 | 0.08 |
| 1000 | -38 | -37.91 | 0.09 |

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

**Antenna factor**
**Active Horn Antenna,**
**Com-Power Corporation, model: AHA-118, s/n 701046, HL 4933**

| Frequency, MHz | Measured antenna factor (with preamplifier), dB/m |
|---|---|
| 1000 | -16.1 |
| 1500 | -15.1 |
| 2000 | -10.9 |
| 2500 | -11.9 |
| 3000 | -11.1 |
| 3500 | -10.6 |
| 4000 | -8.6 |
| 4500 | -8.3 |
| 5000 | -5.9 |
| 5500 | -5.7 |
| 6000 | -3.3 |
| 6500 | -4.0 |
| 7000 | -2.2 |
| 7500 | -1.7 |
| 8000 | 1.1 |
| 8500 | -0.8 |
| 9000 | -1.5 |
| 9500 | -0.2 |

| Frequency, MHz | Measured antenna factor (with preamplifier), dB/m |
|---|---|
| 10000 | 1.8 |
| 10500 | 1.0 |
| 11000 | 0.3 |
| 11500 | -0.5 |
| 12000 | 3.1 |
| 12500 | 1.4 |
| 13000 | -0.3 |
| 13500 | -0.4 |
| 14000 | 2.5 |
| 14500 | 2.2 |
| 15000 | 1.9 |
| 15500 | 0.5 |
| 16000 | 2.1 |
| 16500 | 1.2 |
| 17000 | 0.6 |
| 17500 | 3.1 |
| 18000 | 4.2 |

The antenna factor shall be added to receiver reading in dBμV to obtain field strength in dBμV/m.

**Antenna factor**
**Active Horn Antenna,**
**Com-Power Corporation, model: AHA-840, s/n 105004, HL 4956**

| Frequency, MHz | Measured antenna factor (with preamplifier), dB/m |
|---|---|
| 18000 | 2.5 |
| 18500 | 0.5 |
| 19000 | -1.0 |
| 19500 | -2.4 |
| 20000 | -2.5 |
| 20500 | -2.2 |
| 21000 | -2.0 |
| 21500 | -2.7 |
| 22000 | -3.7 |
| 22500 | -3.8 |
| 23000 | -3.7 |
| 23500 | -5.0 |
| 24000 | -4.5 |
| 24500 | -5.0 |
| 25000 | -4.7 |
| 25500 | -4.4 |
| 26000 | -4.3 |
| 26500 | -5.6 |
| 27000 | -4.3 |
| 27500 | -4.9 |
| 28000 | -5.2 |
| 28500 | -4.4 |

| Frequency, MHz | Measured antenna factor (with preamplifier), dB/m |
|---|---|
| 29000 | -2.7 |
| 29500 | -2.6 |
| 30000 | -1.4 |
| 30500 | -1.5 |
| 31000 | -1.0 |
| 31500 | -2.6 |
| 32000 | -3.3 |
| 32500 | -3.3 |
| 33000 | -5.1 |
| 33500 | -5.2 |
| 34000 | -1.5 |
| 34500 | -5.4 |
| 35000 | -3.3 |
| 35500 | -4.2 |
| 36000 | -2.8 |
| 36500 | -2.6 |
| 37000 | -1.0 |
| 38000 | 1.8 |
| 38500 | 2.8 |
| 39000 | 1.3 |
| 39500 | 1.3 |
| 40000 | 0.3 |

The antenna factor shall be added to receiver reading in dBμV to obtain field strength in dBμV/m.

**Cable loss**
**Microwave Cable Assembly, Huber-Suhner, 40 GHz, 1.5 m, SMA-SMA, S/N 1226/2A**
**HL 3903**

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|---|---|---|---|---|---|
| 10 | -0.02 | 9500 | 1.84 | 21000 | 2.98 |
| 100 | 0.15 | 10000 | 1.86 | 22000 | 3.07 |
| 500 | 0.38 | 10500 | 1.93 | 23000 | 3.13 |
| 1000 | 0.56 | 11000 | 1.99 | 24000 | 3.21 |
| 1500 | 0.69 | 11500 | 2.04 | 25000 | 3.26 |
| 2000 | 0.82 | 12000 | 2.10 | 26000 | 3.48 |
| 2500 | 0.90 | 12500 | 2.15 | 27000 | 3.44 |
| 3000 | 0.98 | 13000 | 2.21 | 28000 | 3.53 |
| 3500 | 1.06 | 13500 | 2.25 | 29000 | 3.59 |
| 4000 | 1.11 | 14000 | 2.29 | 30000 | 3.66 |
| 4500 | 1.17 | 14500 | 2.34 | 31000 | 3.70 |
| 5000 | 1.24 | 15000 | 2.36 | 32000 | 3.79 |
| 5500 | 1.32 | 15500 | 2.40 | 33000 | 3.88 |
| 6000 | 1.40 | 16000 | 2.45 | 34000 | 3.94 |
| 6500 | 1.50 | 16500 | 2.48 | 35000 | 3.91 |
| 7000 | 1.56 | 17000 | 2.56 | 36000 | 4.05 |
| 7500 | 1.62 | 17500 | 2.58 | 37000 | 4.22 |
| 8000 | 1.68 | 18000 | 2.60 | 38000 | 4.25 |
| 8500 | 1.74 | 19000 | 2.84 | 39000 | 4.27 |
| 9000 | 1.78 | 20000 | 2.88 | 40000 | 4.33 |

# 10 APPENDIX C Measurement uncertainties

**Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements**

| Test description | Expanded uncertainty |
|---|---|
| Conducted emissions with LISN | 9 kHz to 150 kHz: ± 3.9 dB<br>150 kHz to 30 MHz: ± 3.8 dB |
| Radiated emissions at 10 m measuring distance<br>Horizontal polarization<br><br><br><br>Vertical polarization | <br>Biconilog antenna: ± 5.0 dB<br>Biconical antenna: ± 5.0 dB<br>Log periodic antenna: ± 5.1 dB<br>Double ridged horn antenna: ± 5.3 dB<br>Biconilog antenna: ± 5.5 dB<br>Biconical antenna: ± 5.5 dB<br>Log periodic antenna: ± 5.6 dB<br>Double ridged horn antenna: ± 5.8 dB |
| Radiated emissions at 3 m measuring distance<br>Horizontal polarization<br><br><br><br>Vertical polarization | <br>Biconilog antenna: ± 5.3 dB<br>Biconical antenna: ± 5.0 dB<br>Log periodic antenna: ± 5.3 dB<br>Double ridged horn antenna: ± 5.3 dB<br>Biconilog antenna: ± 6.0 dB<br>Biconical antenna: ± 5.7 dB<br>Log periodic antenna: ± 6.0 dB<br>Double ridged horn antenna: ± 6.0 dB |
| Conducted emissions at RF antenna connector | 9 kHz to 2.9 GHz: ± 2.6 dB<br>2.9 GHz to 6.46 GHz: ± 3.5 dB<br>6.46 GHz to 13.2 GHz: ± 4.3 dB<br>13.2 GHz to 22.0 GHz: ± 5.0 dB<br>22.0 GHz to 26.8 GHz: ± 5.5 dB<br>26.8 GHz to 40.0 GHz: ± 4.8 dB |

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

# 11 APPENDIX D Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, Radio, Safety, Environmental and Telecommunication testing facility.
Hermon Laboratories is recognized and accredited by the Federal Communications Commission (USA) for relevant parts of Code of Federal Regulations 47 (CFR 47), Test Firm Registration Number is 927748, Designation Number is IL1001; Recognized by Innovation, Science and Economic Development Canada for wireless and terminal testing (ISED), ISED #2186A, CAB identifier is IL1001; Certified by VCCI, Japan (the registration numbers for OATS are R-10808 for RE measurements below 1 GHz, G-20112 for RE measurements above 1 GHz, R-11082 for anechoic chamber for RE measurements below 1 GHz, G-10869 for RE measurements above 1 GHz, C-10845 for conducted emissions site and T-11606 for conducted emissions at telecommunication ports).
The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing, environmental simulation and calibration (for exact scope please refer to Certificate No. 839.01, 839.03 and 839.04).

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Telephone: +972 4628 8001
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e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Michael Nikishin, EMC&Radio group manager

# 12 APPENDIX E Specification references

| | |
|---|---|
| FCC 47CFR part 15: 2020 | Radio Frequency Devices |
| ANSI C63.10: 2013 | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |
| RSS-210 Issue 10: 2019 | Licence-Exempt Radio Apparatus:Category I Equipment |
| RSS-Gen Issue 5 with Am.1: 2019 | General Requirements for Compliance of Radio Apparatus |

# 13 APPENDIX F Abbreviations and acronyms

| | |
|---|---|
| A | ampere |
| AC | alternating current |
| A/m | ampere per meter |
| AM | amplitude modulation |
| AVRG | average (detector) |
| cm | centimeter |
| dB | decibel |
| dBm | decibel referred to one milliwatt |
| dB(μV) | decibel referred to one microvolt |
| dB(μV/m) | decibel referred to one microvolt per meter |
| dB(μA) | decibel referred to one microampere |
| DC | direct current |
| EIRP | equivalent isotropically radiated power |
| ERP | effective radiated power |
| EUT | equipment under test |
| F | frequency |
| GHz | gigahertz |
| GND | ground |
| H | height |
| HL | Hermon laboratories |
| Hz | hertz |
| k | kilo |
| kHz | kilohertz |
| LO | local oscillator |
| m | meter |
| MHz | megahertz |
| min | minute |
| mm | millimeter |
| ms | millisecond |
| μs | microsecond |
| NA | not applicable |
| NB | narrow band |
| OATS | open area test site |
| Ω | Ohm |
| PM | pulse modulation |
| PS | power supply |
| ppm | part per million ($10^{-6}$) |
| QP | quasi-peak |
| RE | radiated emission |
| RF | radio frequency |
| rms | root mean square |
| Rx | receive |
| s | second |
| T | temperature |
| Tx | transmit |
| V | volt |
| WB | wideband |

# 14 APPENDIX G Manufacturer's declaration

Siklu

## Declaration of Identity

We, the undersigned,

Company: Siklu Communication Ltd.
Address: 43 Hasivim St, Petah Tikva
Country: Israel
Telephone number: +972-3-9214015
Fax number: +972-3-9214162

declare under our sole responsibility that the following equipment:

| Brand/Item | Type/Model | Short Product description |
|---|---|---|
| MultiHaul™ TG | MH-N367-CCP-PoE-MWB | MultiHaul™ TG point to Multipoint wireless V-Band System |

Is identical to the following equipment with the following changes:

1. Main housing modifications for antennas mechanical housing (separated from main housing)
2. External cables from main chassis to Antenna's
3. External decorative plastic covers that exist on N367 are nonsexist in N880

| Brand/Item | Type/Model | Short Product description |
|---|---|---|
| MultiHaul™ TG | MH-N880-CCP-PoE-MWB | MultiHaul™ TG point to Multipoint wireless V-Band System |

29.08.2022
(date)

M.K (signature)

Michael Kopit
(printed name)

PM and Regulation Manager
(position)

Siklu Communication Ltd.

.....
(company stamp)

END OF DOCUMENT