**AIR TRAFFIC AND NAVIGATION SERVICES CO. LTD**

**REPUBLIC OF SOUTH AFRICA**

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**REQUEST FOR PROPOSAL FOR THE APPOINTMENT OF A PANEL OF SUPPLIERS FOR SUPPLY, DELIVERY AND TRAINING OF STAFF FOR THE GENERAL:TEST EQUIPMENT AT AIR TRAFFIC AND NAVIGATION SERVICES (ATNS) CENTRES FOR A PERIOD OF FIVE (5) YEARS.**

**RFP NO: ATNS/TPQ/RFP050/22.23/GENERAL TEST EQUIPMENT PANEL**

**TECHNICAL SPECIFICATIONS**

**NOVEMBER 2022**

**The information contained within this document is confidential to ATNS in all respects and it is hereby acknowledged that the information as provided shall only be used for the preparation of a response to this document. The information furnished will not be used for any other purpose than stated and that the information will not directly or indirectly, by agent, employee or representative, be disclosed either in whole or in part, to any other third party without the express written consent by the Company or its representative.**

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| ABBREVIATIONS |

ACSA Airports Company South Africa

ATNS Air Traffic and Navigation Services Company

ATC Air Traffic Control

BERT Bit Error Rate Testing

CAT Cable and Antenna Tester

CD Compact Disk

CNS Communications, Navigation and Surveillance

COTS Commercially off the shelf

CRC Cyclic Redundancy Check

DB Distribution Board

HMI Human-Machine Interface

LLC Logic Link Control

NEMA National Environmental Management Act

OJT On the Job Training

PC Personal Computer

SLA Service Level Agreement

UDP User Datagram Protocol

VNA Vector Network Analyzer

VSWR Voltage Standing Wave Ration

1. **GENERAL INSTRUCTIONS TO BIDDERS**

The Bidder shall submit all responses, diagrams, project management documentation and drawings according to the GENERAL INFORMATION AND INSTRUCTIONS TO BIDDERS document and in the English language.

To assist Bidders only, each paragraph or article has been appended throughout with the letters “(M)”, “(D)”, “(O)” or “(I)”, to indicate whether the requirement is **M**andatory, **D**esirable, **O**ptional or for **I**nformation only.

**ALL RESPONSES TO THE REQUIREMENTS IN THIS DOCUMENT SHALL BE PROVIDED AS FOLLOWS:**

BIDDERS SHALL RESPOND IN FULL TO EACH ITEM IN THE FORMAT PROVIDED AND REFERENCES (CHAPTER, SECTION, PAGE NUMBER, PARAGRAPH NUMBER) TO DOCUMENTS AND RELEVANT INFORMATION SUPPORTING THE RESPONSES SHALL BE INDICATED IN THE SPACE PROVIDED. THIS INFORMATION WILL BE THE **ONLY RESPONSE USED FOR THE EVALUATION AND ASSESSMENT**.

Responses, provided in the space allowed, that are not clear or inadequate or the lack thereof shall be interpreted as **“Not Compliant”** even though the compliance column is declared as “Comply” and/or the Bidders offer meets the requirement. Bidders shall ensure that each response correctly addresses the requirement stated. Responses not addressing the requirement of the specific paragraph shall be interpreted as **“Not Compliant”**.

Bidders shall declare compliance to each and every paragraph of this document in the column labelled “Compliance” as follows:

C: fully compliant = 2 points:

PC: partly compliant = 1 point;

NC: not compliant = 0 points.

Noted: Noted and accepted (applicable to paragraphs marked as “I”, not containing requirements)

Bidders shall, for paragraphs declared “PC” or “NC”, include a statement as to the nature of the variation and may additionally supply supporting information in the space provided to demonstrate how the proposal meets the needs of ATNS.

Paragraphs marked “(M)”, indicates that the requirement is mandatory and proposals not compliant with the requirement shall be disqualified for further evaluation.

Paragraphs marked “(D)”, indicates that the requirement is desirable, and the Bidder is expected to declare their level of compliance, formal response and reference supporting documents.

Paragraphs marked “(I)”, indicates that the requirement is for information, however the Bidder is still expected to respond and provide information if requested. Any information gathered herein may form part of the contractual terms.

Paragraphs marked “(O)”, indicates that the requirement is optional, and the Bidder may decide how to respond.

CHAPTER 1: GENERAL SPECIFICATIONS FOR TEST EQUIPMENT

# Project Overview

## Introduction

This project calls for the appointment of a panel of suppliers for test equipment to be used at ATNS centres by technical personnel. This panel of suppliers will then be approached on the required test equipment, thereafter the successful supplier will supply and deliver the required test equipment to the ATNS centres, provide training to technical staff and include a warranty on the delivered test equipment. (I)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

## Scope of work

The scope of the project is to:

* Provide proof of obtaining each of the required test equipment;
* Provide assurance that all the required test equipment will be calibrated and their calibration certificate shall be provided;
* Technical training to be provided to ATNS staff; and
* Provide at least a one-year warranty on all equipment to be supplied.

The bidder shall describe their understanding of the scope of work.

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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

## List of equipment

The following equipment is required to be provided to various ATNS centres and stations: (I)

* + [AC Clamp Multi-meter](#_Toc71111680)
  + Audio Analyzer
  + Cable and Antenna Analyzer (100 kHz - 4500MHz)
  + Cable and Antenna Analyzer (100 kHz - 8GHz)
  + Cable and Antenna Analyzer with Spectrum Analyzer
  + [Communications Test Set](#_Toc71111675)
  + Data transmission Analyzer with E1 tester
  + [Digital Oscilloscope](#_Toc71111676)
  + [Digital Telephone Line Tester](#_Toc71111678)
  + Directional coupler
  + Directional power sensor
  + Dummy load
  + Earth ground tester
  + Earth leakage tester
  + Fibre line identifier
  + [Fibre Optic Test Kit](#_Toc71111671)
  + Fixed level attenuator
  + Frequency Counter
  + Handheld Communications Test Set
  + Handheld RF spectrum Analyzer with directional antenna (1 MHz – 9.4 GHz)
  + [LAN Tester Kit](#_Toc71111681)
  + [Microwave Analyzer](#_Toc71111668)
  + Modulation meter
  + [Multimeter](#_Toc71111674)
  + Navigation Systems Analyzer
  + Network Analyzer with VoIP function
  + Oil cooled dummy load
  + Optical time domain reflectometer
  + [Power Meter](#_Toc71111677) with directional head
  + [Protocol Analyzer](#_Toc71111669)
  + P-Series Power meter with wideband sensor
  + [Radar Peak Power Meter](#_Toc71111679)
  + [Radio Frequency Finder with Antenna](#_Toc71111670)
  + RF coaxial connector kit
  + RF signal generator
  + Scope meter
  + Spectrum Analyzer
  + [Thermometer](#_Toc71111672)
  + Triple Output Power Supply
  + UHF Peak Power Meter
  + Variable attenuator
  + [Wattmeter](#_Toc71111670)

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# Generic requirements

## General

1. A Turn-Key solution addressing all project requirements is required, all test equipment will be supplied and delivered with support.

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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. All test equipment shall have a design life of at least 10 years.

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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

## Environmental Conditions

1. The equipment / systems offered shall operate within specifications under the following environmental conditions and tolerances:

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| Indoor Conditions | Ambient Temperature | +10 °C to +40 °C |
| Relative humidity | 10 to 90%, non-condensing |
|  |  |  |
| Outdoor Conditions | Ambient Temperature | -10 °C to +50 °C |
| Temperature variations | Up to 16 °C within 24 hours |
| Relative humidity | 10 to 90%, non-condensing |

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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

## Regulations

1. The test equipment shall be in accordance with at least the following Acts and regulations:

* The Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended
* South African Bureau of Standards: Test methods for non-metallic materials Part 100: General (SANS 60811-100)
* Section 28: Duty of care, of the National Environmental Management Act (NEMA)

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## Manufacturing

1. The supplier’s product manufacturing processes shall consider environmental and social aspects.

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## Deviation from Specification

1. Any deviation from the specification shall be indicated.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

## Submittals

The bidder shall supply the following documentation:

1. Factory published specification sheet indicating standard and optional accessories, equipment ratings etc.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. All equipment manuals.

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

CHAPTER 2: TEST EQUIPMENT FUNCTIONAL SPECIFICATIONS

# Microwave Analyzer

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a microwave analyzer:

1. The microwave analyzer shall be a combination analyzer type with the following instruments integrated:

* Cable and Antenna Tester (CAT);
* Spectrum Analyzer; and
* Vector Network Analyzer (VNA)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The microwave analyzer shall have the following features:

* Built-in DC source;
* GPS Receiver; and
* Remote control capability

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The cable analyzer and the Vector Network Analyzer shall meet the following performance specifications:

|  |  |
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| **Frequency range** | 30 kHz – 14 GHz |
| **Frequency reference** | ± 0.7 ppm + aging |
| **Aging rate** | ± 1 ppm/year for 20 years, will not exceed ± 3.5 ppm |
| **Frequency resolution** | Frequency ≤ 5 GHz: 1 Hz  Frequency ≤ 10 GHz: 1.34 Hz  Frequency ≤ 20 GHz 2.68 Hz |
| **IF bandwidth (VNA)** | 3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz |
| **System impedance** | 50 Ω (nominal), 75 Ω with appropriate adapter and calibration kit |
| **Number of ports** | 2 ports |
| **Test port output power level** | -1 dBm |
| **Power level accuracy** | ± 1.5 dB at −15 dBm, for frequencies > 250 kHz |
| **Dynamic Range** | > 300 kHz to 9 GHz: 95  > 9 to 14 GHz: 91 97 |
| **Maximum input level** | Average CW power: +27 dBm, 0.5 watts ± 50 VDC |

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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The Cable and Antenna Tester shall perform the following measurements:

* Distance-to-fault (dB)
* Distance-to-fault (Lin)
* Distance-to-fault (VSWR)
* Return loss (dB)
* Return loss and DTF (dB)
* VSWR

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The integrated Cable and Antenna Tester shall meet the following performance specifications:

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| **Distance to fault** | Range = velocity factor x speed of light x (number of points -1) / frequency span x 2 Number of points auto coupled according to start and stop distance entered. |
| Resolution = range / (number of points -1) |
| **VNA Transmission/ Reflection** | S11, S21 magnitude and phase (requires option 210) |
| **VNA S-parameters** | S11, S21, S22, S12 magnitude and phase (requires options 210 and 211) |
| **Number of traces** | Four traces available: Tr1, Tr2, Tr3, Tr4 |
| **VNA trace formats** | Log magnitude, linear magnitude, VSWR, phase, Smith chart, polar, group delay, unwrapped phase, real impedance, imaginary impedance, Z magnitude |
| **Frequency sweep type** | Linear |
| **Sweet type trigger** | Continuous, single |
| **S11, log magnitude** | -500 to 500 dB |
| **Log magnitude resolution** | 0.01 dB |
| **VSWR** | 1.01 to 1000 |
| **VSWR resolution** | 0.01 |
| **Phase** | -180 to +180 degrees |
| **Phase resolution** | 0.01 degrees |
| **Phase offset** | -360 to +360 degrees |
| **Magnitude offset** | -100 to +100 dB |
| **Trace math** | Vector division or subtraction of current linear measurement values and memory data |
| **Marker format** | Default marker format is the trace format. Other formats: R + jX Z magnitude Phase Real Imaginary Mag & Phase dB Angle |

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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The spectrum analyzer shall have the following performance specifications:

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| **Frequency range** | 100 kHz to 4 GHz, Usable to 5 kHz |
| **Frequency accuracy** | ± 0.7 ppm (spec) + aging |
| **Aging rate** | ± 1 ppm/year for 20 years, will not exceed ± 3.5 ppm |
| **Marker frequency counter resolution** | 1 Hz |
| **Frequency span range** | 0 Hz (zero span), 10 Hz to maximum frequency range of instrument |
| **Frequency span resolution** | 1 Hz |
| **Sweep time readout** | Measured value of the time required to complete a sweep from start to finish, including time to tune receiver, acquire data, and process trace |
| **Trace update, nominal** | Span = 20 MHz, RBW, VBW = 3 kHz: 6.7 updates per second  Span = 100 MHz, RBW, VBW auto coupled: 15.4 updates per second. |
| **Sweep (trace) point range:**  **All spans** | 101, 201, 401, 601, 801, 1001 (defaults to 401); Arbitrary 2 to 20,001 settable through soft key |
| **Resolution Bandwidth:**  Zero span (-3 dB bandwidth) | 10 Hz to 5 MHz 1,3,10 sequence |
| Non-zero span (-3 dB bandwidth) | 1 Hz to 5 MHz |
| Selectivity (-60 dB / -3 dB) | 4:1 |
| **Bandwidth Accuracy:**  Zero span | 10 Hz to 1 MHz ± 5%  3 MHz ± 10%  5 MHz ± 15% |
| Non-zero span | 1 Hz to 100 kHz ± 1%  300 kHz to 1 MHz ± 5%  3 MHz ± 10%  5 MHz ± 15% |
| **Video bandwidth (VBW)** | 1 Hz to 5 MHz |
| **Amplitude Range:**  Measurement range | DANL to + 20 dBm |
| Input attenuator range | 0 to 30 dB, in 5 dB steps |
| **Pre-amplifier**  Frequency range | Full band (100 kHz to maximum frequency of instrument) |
| Gain | +20 dB, 100 kHz to 26.5 GH |
| **Max safe input level** | +27 dBm, 0.5 watts ± 50 VDC |
| **Total absolute amplitude accuracy (dB)** | (23 ± 5°C): ± 0.80  (-10 to 55°C): ± 1.00 |
| **Displayed average noise level (DANL)- (dBm) (Preamp off):** | < -122 |
| **Displayed average noise level (DANL)- (dBm) (Preamp on)** | < -141 |

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Radio Frequency Finder with Antenna

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a radio frequency finder with antenna:

1. The frequency finder shall enable the detection, analysis and location of VHF interference in the 130 MHz to 500 MHz frequency range.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The frequency finder shall be complete with the directional antenna and interference analyzer.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The frequency finder shall meet the following performance specifications:

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| **Frequency range** | 9 kHz to 500 MHz |
| **Sweep rate** | 12 GHz/s |
| **Real time resolution** | 32 ns |
| **Recording time** | Up to 24 h |
| **Noise figure of** | 7 dB |

1. The interference analyzer shall have a real time trigger and spectrogram with a resolution of 1 μs.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The frequency finder shall have a built in GPS receiver and electronic compass.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The frequency finder shall do automatic localization by bearing triangulation with results displayed on a map.

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1. The frequency finder should be able to switch between time and frequency domain as required.

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1. The frequency finder shall be handheld.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Fibre Optic Test Kit

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a fibre optic test kit:

1. Fibre Optic Tester Kit shall include a fibre optic power meter for carrying output level and power loss measurements.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The performance of the fibre optic power meter shall be as follows or better for both single-mode and multimode fibre links:

|  |  |
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| **Measurement Range** | +6 dBm to -50 dBm |
| **Resolution** | 0.01 dB |
| **Loss and Power Measurement Accuracy** | ±0.25 dB at 25 °C measurement accuracy and -10 dBm and -10 dBm |
| **Calibrated wavelength** | 1. , 1300 nm, 1310 nm, and 1550 nm |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power meter shall have a display that will display the measurements on 4-digit display at a minimum.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The optic fibre power meter shall store up to 500 measurements of each calibrated wavelength in a non-volatile memory.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The recordings of fibre test results shall be automatic.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The Optic fibre test kit shall perform test on 62.5 μm or 50.0 μm core multimode optical fibre at 850 nm and 1300 nm wavelengths, at minimum.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The Optic Fibre tester shall enable the location of cable faults, connector problems and polarity issues.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The kit shall include fibre optic light/optic field source, which shall generate to measure power loss on a multimode fibre and meet the following requirements:

|  |  |
| --- | --- |
| **Wavelength** | 850 nm ±30 nm; 1300 nm -10 nm/+50 nm |
| **Output power** | -20 dBm nominal into 62.5 μm multimode fibre |
| **Maximum output** | 200 μW (radiated into free space) |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The test kit shall enable the use of a single port for both output wavelengths, thus, eliminating the need to disconnect fibres when testing two wavelengths.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The test kit shall include a multimode fibre viewer for displaying and inspecting fibre end-faces.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The fibre optic test kit shall be portable and shall be provided in a carry case with a pull handle and wheels, for easy transportation.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Thermometer

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a thermometer:

1. The thermometer shall measure both infrared, ambient and contact temperatures.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The thermometer shall meet the following minimal performance specifications:

|  |  |
| --- | --- |
| **Temperature measurement range** | -40 °C to 550 °C |
| **Display resolution** | 0.1 °C of reading |
| **D:S (Distance to spot size)** | 12:1 |
| **Emissivity selector** | Adjustable with three settings: low (0.3), medium (0.7). high (0.95) |
| **Display accuracy [Assumes ambient operating temperature of 23 °C to 25 °C]** | ± 1.0 % of reading or ± 1 °C, whichever is greater; below 0 °C, ± 1 °C ± 0.1°/1° |
| **Response time** | 500 mSec (95 % of reading) |
| **Repeatability ±** | ± 0.5 % of reading or ± 1 °C, whichever is greater |
| **Spectral response** | 8 μm to 14 μm |
| **Laser sighting** | Single-point laser |
| **Laser shutoff** | Laser turns off above ambient temperature of 40 °C |
| **Laser power** | Class 2 (II) operation; output |

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The thermometer shall have a display for presenting measurements.

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| **Display hold** | 7 seconds |
| **Backlit display** | Yes, LCD with dual temperatures (current and MAX/MIN/DIF/KTC), low battery, F/C indicator, and Scan/Hold options |

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Digital oscilloscope

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a digital oscilloscope:

1. The digital oscilloscope shall facilitate visual analysis of signals, transient and harmonic analysis. The performance of the oscilloscope shall meet the following specifications or better:

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| --- | --- |
| **Bandwidth (-3dB)** | 1000 MHz |
| **Bandwidth upgrade** | Available |
| **Calculated rise time (10 to 90%)** | ≤ 700 ps |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The oscilloscope shall meet the following specifications with regards to vertical system analogue channel:

|  |  |
| --- | --- |
| **Hardware bandwidth limits** | Approximately 20 MHz (selectable) |
| **Input impedance** | Selectable: 1 MΩ ± 1% (14 pF), 50 Ω ± 1.5% |
| **Input sensitivity range** | 1mV/div to 5 V/div 2 (1 MΩ and 50 Ω) |
| **Vertical resolution** | 8 bits (measurement resolution is 12 bits with averaging) |
| **Maximum input voltage** | 135 Vrms; 190 Vpk |
| **DC vertical accuracy** | ± [DC vertical gain accuracy + DC vertical offset accuracy + 0.25% full scale] |
| **DC vertical gain accuracy** | ± 2.0% full scale |
| **Offset range** | ± 2 V (1 mV/div to 200 mV/div) |
|  | ± 50 V (> 200 mV/div to 5 V/div) |
| **Input coupling** | AC, DC |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The oscilloscope shall meet the following specifications with regards to vertical system digital channels:

|  |  |
| --- | --- |
| **Digital input channels** | 8 digital (D0 to D7) |
| **Thresholds** | Threshold per pod |
| **User-defined threshold** | ± 8.0 V in 10 mV steps |
| **Maximum input voltage** | ± 40 V peak CAT I |
| **Threshold accuracy** | ± (100 mV + 3% of threshold setting) |
| **Maximum input dynamic range** | ± 10 V about threshold |
| **Minimum voltage swing** | 500 mVpp |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The oscilloscope shall meet the following specifications with regards to horizontal system analogue channels:

|  |  |
| --- | --- |
| **Analogue input channels** | 4 BNC analogue inputs |
| **Time base range** | 1 ns/div to 50 s/div |
| **Time base accuracy** | ± 1.6 ppm + aging factor |
| **Channel to channel deskew** | ± 100 ns |
| **Modes** | Main, zoom, roll, XY |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The oscilloscope shall meet the following specifications with regards to horizontal system digital channels:

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| **Minimum detectable pulse width** | 5ms |
| **Channel to channel skew** | 2 ns (typical); 3 ns (maximum) |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The oscilloscope shall meet the following specifications with regards to the acquisition system:

|  |  |
| --- | --- |
| **Maximum analogue channels sample rate** | 5 GSa/s half channel interleaved, 2.5 GSa/s all channel |
| **Maximum analogue channel record length** | 4 Mpts half channel interleaved, 2 Mpts all channels |
| **Maximum digital channels sample rate** | 1.25 GSa/s all pods |
| **Maximum digital channels record length** | 2 Mpts (with digital channels only) |
| **Acquisition modes:** | |
| Normal | Default mode |
| Peak detect | Capture glitches as narrow as 250 ps at all time base settings |
| averaging | Selectable from 2, 4, 8, 16, 64, ... to 65,536 |
| High resolution | Real time boxcar averaging reduces random noise and effectively increases vertical resolution 12 bits of resolution when ≥ 10 μs/div at 5 GSa/s or ≥ 20-μs/div at 2.5 GSa/s |
| Segmented | Segmented memory optimizes available memory for data streams that have long dead times between activity. Maximum segments = 1000. Re-arm time = 1 μs (minimum time between trigger events) |
| Digitizer | Allows independent selection of sample rate and memory depth |
| **Time modes:** | |
| Normal | Default mode |
| Roll | Displays the waveform moving across the screen from right to left. Available at the time base 50 ms/div or slower |
| XY | Displays the volts-versus-volts display. Time base can be set from 200 ns/div to 50 ms/div |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
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1. The oscilloscope shall meet the following specifications with regards to the Trigger system:

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| **Trigger modes** | Normal (triggered): Requires trigger event for scope to trigger  Auto: Triggers automatically in absence of trigger event  Single: Triggers only once on a trigger event, press [Single] again for scope to find another trigger event, or press [Run] to trigger continuously in either Auto or Normal mode Force: front panel button that forces a trigger |
| **Trigger types** | Zone, Edge, Edge then edge (B trigger), Pulse width, Runt, Setup and hold, rise/fall time, Nth edge burst and video |
| **Trigger sources** | Analog channel (1 ~ 4), digital channel (D0 ~ D15), line, external |
| **Trigger Sensitivity:** | |
| Internal | < 10 mV/div: Greater of 1 div or 5 mV; ≥ 10 mV/div: 0.6 div |
| External | 200 mVpp from DC to 100 MHz  350 mVpp 100 MHz to 200 MHz |

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The oscilloscope shall meet the following specifications with regards to waveform measurements:

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| --- | --- |
| **Cursors** | Single cursor accuracy: ± [DC vertical gain accuracy + DC vertical offset accuracy + 0.25% full scale] |
| Dual cursor accuracy: ± [DC vertical gain accuracy + 0.5% full scale] 1 |
| Units: Seconds(s), Hz (1/s), phase (degrees), ratio (%) |
| **Automatic measurements** | Snapshot All: Measure all single waveform measurements (31)  Vertical: Peak-to-peak, maximum, minimum, amplitude, top, base, overshoot, pre-shoot, average- N cycles, average full screen, DC RMS- N cycles, DC RMS- full screen, AC RMS- N cycles, |
|  | AC RMS- full screen (std deviation), ratio-N cycle, ratio- full screen, “Y at X”  Time: Period, frequency, counter, + width, - width, burst width, +duty cycle, -duty cycle, bit rate, rise time, fall time, delay, phase, X at min Y, X at max Y, “time at edge” Count: Positive pulse count, negative pulse count, rising edge count, falling edge count  Mixed: Area- N cycles, area- full screen, “slew rate” |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The oscilloscope shall meet the following specifications with regards to waveform math:

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| --- | --- |
| **Number of math functions** | Two, displays FFT and one math simultaneously. Math functions should be cascadable. |
| **Arithmetic** | Add, subtract, multiply, divide, differentiate, integrate, FFT, Ax + B, squared, square root, absolute value, common logarithm, natural logarithm, exponential, base 10 exponential, low pass filter, high pass filter, averaged value, smoothing, envelope, magnify, max hold, min hold, measurement trend, chart logic bus (Timing or State) |
| **Enhanced FFT:** | |
| Record size | Up to 64 kpts resolution |
| Window types | Hanning, Flat Top, Rectangular, Blackman-Harris, Bartlett |
| Time gated FFT | Gate the time range of data for FFT analysis in the zoom view. For time and frequency domain correlated analysis |
| Waveforms | FFT, max hold, min hold, average |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The oscilloscope shall have the search, navigate and list functions to navigate stored waveform data to find specific events of interest.

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The oscilloscope shall meet the following display specifications:

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| **Display** | 8.5-inch capacitive touch/gesture enabled |
| **Resolution** | 800 (H) x 480 (V) pixel format (screen area) |
| **Format** | YT, XY, and Roll |
| **Maximum waveform update** | > 1,000,000 wfms/s |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The oscilloscope shall have USB 2.0 (at minimum) port/s that support connection to a PC, mouse and keyboard.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The oscilloscope shall have its own steel carry case, with wheels and a pull handle.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Power Meter with Directional Head

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a power meter with directional head:

1. The power meter with directional head shall provide the following functions and performance specifications:

* Antenna and Cable VSWR and Return Loss calculation
* Measure forward and reflected power

|  |  |
| --- | --- |
| **Frequency range**  **base station** | 30 MHz to 6 GHz |
| **Frequency range directional head** | 25Mhz to 1 Ghz |
| **Directivity** | 30dB |
| **Dynamic Range** | 24dB @ 500mW Forward Power |
| **Mainline VSWR** | < 1.05:1 |
| **VSWR range** | 1:1 - 9:1 |
| **Power range** | 200μW to 1000W |
| **Impedance** | 50 Ω |
| **Connectors** | ≤ ± 0.2 dB |
| **Display Resolution** | –35 dBm to +20 dBm (> 500 M Hz) –30 dBm to +20 dBm (50 MHz to 500 MHz) |
| **Calibration storage** | 1 second |
| **USB Serial device (B type)** | 10 MHz (based on 10 samples per period)  (based on 10 samples per period) |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power meter shall include a display that should display pulse and modulation information.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power meter shall be an independent and stand-alone system.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power meter shall be easily portable.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The saved data from the power meter shall be easily downloaded onto a USB device.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Digital Telephone Line Tester

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a digital telephone line tester:

1. The test set shall incorporate a Time Domain Reflector (TDR), tone generator, and pair identify telephone test set into one tool for testing Voice/Data/Video (VDV) cabling as well as plain old telephone service (POTS) quality on live DSL lines without disrupting data.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The equipment shall provide the following test functions:

* TDR - Find cable length measurement and locate faults on cables including twisted pair, coaxial, and parallel conductors.

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| **TDR Range** | 914 m |
| **Accuracy** | ±2 m ±5 % |

* Toner – five separate tones for differentiation of between multiple wire pairs.
* Data indication – warns when data is present on the line
* Voltage indication/ measurement - identifies potential line problems

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| **Voltage Measurement Range** | 4 V dc to 140 V dc |

* Current indication/measurement – Verifies sufficient line current

|  |  |
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| **Current Measurement Range** | 0 mA to 100 mA |

* Caller-ID with Call Waiting CID – Verifies functional service
* DTMF Digit Grabbing – isolate faulty customer premise equipment

|  |  |
| --- | --- |
| **Tone frequency error** | ±1.5% maximum |
| **Tone Level** | -3 dBm combined (typical) |
| **High versus low tone difference** | 2 dB ± 2 dB |

* Polarity testing
* Detects dial tone, places and receives calls.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The line tester set shall have the following features:

* Headset connection;
* Protection from extreme weather;
* Prevention for disruption of data transmitted on the line;
* Firmware upgradable; and
* Last number redial

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The line tester set shall have an Angled Bed of Nails (ABN) connector and piercing pin.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The line tester set shall have its own backlit display as a user interface.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# LAN Tester Kit

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a LAN tester kit:

1. The LAN tester kit shall test the following connector types:

|  |  |
| --- | --- |
| **Connector types** | Twisted-pair: UTP, FTP, SSTP 8-pin modular jack accepts RJ45 and RJ11  Coax: F-connector for 75 Ω, 50 Ω, 93 Ω cables |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The LAN tester kit shall perform cable tests for the following:

* Open circuits;
* Short circuits;
* Cross-wired pairs;
* Wiremap to TIA-568A/B standards; and
* Remote ID locators

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The LAN tester shall test all network protocols such as ethernet/IP and profinet.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The LAN tester kit shall incorporate a length meter that shows the distance to termination, open, or short.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The LAN tester kit shall detect and show the type and location of cable faults including mis wired connections, reversals, split pairs, shorts and breaks.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The LAN tester kit shall indicate/ locate termination and faults up to 460 meters from where the testing is done.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The tester’s built-in feature shall enable precise location of cable and wire pairs as follows:

* High-grade data cabling (Cat 5e/6/6a) in bundles, or at switches, patch panels, or wall outlets
* Voice-grade cabling (Cat 3 and below), as well as coax, security/alarm, and speaker wiring.
* The tone probe shall be provided to enable a safe location of cables on active networks and isolating individual wire pairs.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The LAN tester kit shall have a graphical interface that graphically displays wire map, length, cable ID, and distance to fault on one screen.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The graphical display shall depict the end of any cable. These may include the 100/1000 Mbps switch, POTS service, short and cable ID.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The LAN tester kit shall verify media services, including 10/100/1000 Ethernet, POTS, and PoE.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The LAN tester kit shall have a tone generator:

|  |  |
| --- | --- |
| **Generated tone frequencies** | 500 kHz digital tone  400 Hz, 1kHz analogue tones |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The LAN tester kit shall have a built-in RJ11, RJ45 and coax support such that adapters are not required for testing various voice, data and video media types.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The wire map adapter shall be provided with the test kit.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Each LAN tester kit shall be provided with an all-in-one modular crimper that meets the following specifications:

* The tool shall be able to crimp 8-position RJ-45 connectors and 4- and 6- position RJ-11 and RJ-12 connectors.
* The crimper should have embedded flat cable cutter and stripper.

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Protocol Analyzer

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a protocol analyzer:

1. The analyzer shall test at least the following protocols:

* High-Level Datalink Control (HDLC);
* Serial RS232 synchronous and asynchronous data; and
* Have interface testing for X.21

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer shall perform the following checks at a minimum:

* Clock rates;
* Cyclic Redundancy Check (CRC);
* Protocol errors; and
* Bit Error Rate Testing (BERT)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer shall enable the user to conduct Ethernet data test that should include, but not be limited to the following:

* User Datagram Protocol (UDP) tests
* Logic Link Control (LLC) tests

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer shall record, playback and analyze raw data.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer shall provide protocol decode and analysis as well as enable raw data examination.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer shall be an independent and stand-alone system.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer shall be easily portable.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The saved data from the analyzer shall be easily downloaded onto a USB device.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer shall be able to generate external clocks for testing purposes.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer shall have its own digital display, which shall be contrast adjustable between outdoor and indoor conditions.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Wattmeter

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a wattmeter:

1. The wattmeter shall measure both forward and reflected continuous wave (CW) power in a coaxial transmission line under any load condition, and perform Peak Envelop (PEP) field power measurement.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The wattmeter shall meet the following minimal performance specifications:

|  |  |
| --- | --- |
| **Frequency range** | 450 kHz to 2.7 GHz |
| **Power range** | 100mW to 10 KW |
| **Insertion VSWR** | 1.05 max. to 1000 MHz (with N Connectors) |
| **Accuracy** | ± 5% of full scale |
| **Connectors** | QC Type (Female N normally supplied) |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Each wattmeter shall be provided with one of the plug-in wattmeter elements as specified below:

|  |  |
| --- | --- |
| **Power rating** | **Frequency (Hz)** |
| 1000 Watt | 960MHz - 1,2 GHz |
| 500 Watt | 960MHz - 1,2 GHz |
| 100 Watt | 960MHz - 1,2 GHz |
| 25 Watt | 960MHz - 1,2 GHz |
| 100 Watt | 96MHz - 200 MHz |
| 50 Watt | 96MHz - 200 MHz |
| 10 Watt | 96MHz - 200 MHz |
| 5 Watt | 96MHz - 200 MHz |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The wattmeter shall be digital.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Multimeter

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a multimeter:

1. The multimeter shall be of a true-RMS and digital type.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The multimeter shall perform measurements of the following basic electrical quantities as well as electronic components testing:

* Current;
* Voltage;
* Resistance; and
* Capacitance.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The multimeter shall meet the following minimal performance specifications:

|  |  |
| --- | --- |
| AC and DC Current Measurement | |
| **Maximum AC and DC current** | 10 A |
| **DC current accuracy** | ± (1.0% + 3) |
| **AC current accuracy** | ± (1.5% + 3) |
| **Maximum AC and DC Current Resolution** | Up to 0.01 mA |
|  |  |
| 1. AC and DC Voltage Measurement | |
| **Maximum AC and DC voltage** | 1000V |
| **DC voltage accuracy** | ± (0.09% + 2) |
| **AC voltage accuracy** | ± (1.0% + 3) |
| **Maximum AC and DC voltage resolution** | 0.1 mV |
|  |  |
| Resistance Measurement | |
| **Maximum Resistance** | 50 MΩ |
| **Resistance accuracy** | (0.9% + 1) |
| **Maximum Resolution** | 0.1 Ω |
|  |  |
| 1. Capacitance Measurements | |
| **Maximum capacitance** | 10,000 μF |
| **Capacitance accuracy** | ± (1.2% + 2) |
| **Capacitance resolution** | 1 nF |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The multimeter shall measure the frequency of AC signals:

|  |  |
| --- | --- |
| **Maximum frequency** | 200 kHz |
| **Frequency accuracy** | ± (0.1% + 1) |
| **Frequency resolution** | 0.01 Hz |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The multimeter shall have a built-in temperature measurements feature.

|  |  |
| --- | --- |
| **Temperature range** | -40°C - 400°C |
| **Temperature accuracy** | ± (1.0% + 10) |
| **Maximum resolution** | 0.1°C |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The multimeter shall perform conductance measurements.

|  |  |
| --- | --- |
| **Maximum conductance** | 60.00 nS |
| **Accuracy** | ±(1.0% + 10) |
| **Maximum resolution** | 0.01 nS |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The multimeter shall perform diode testing by measuring voltage drop of the diode when it is forward biased.

|  |  |
| --- | --- |
| **Range** | 3 V |
| **Accuracy** | 1 mV |
| **Maximum resolution** | ±(2% + 1) |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The multimeter shall perform duty cycle measurements.

|  |  |
| --- | --- |
| **Maximum duty cycle** | 99.9% |
| **Accuracy** | Within 0.2% per kHz + 0.1% |
| **Maximum resolution** | 0.1% |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The multimeter shall have a backlit display.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# AC Clamp multimeter

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of an AC Clamp Multimeter. The AC Clamp Multimeter shall satisfy the following functions and performances:

1. The clamp multimeter shall be of a true-RMS and digital type.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The clamp multimeter shall perform measurements of the following basic electrical quantities as well as electronic components testing:
   * + Current;
     + Voltage;
     + Resistance; and
     + Capacitance.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The Clamp Multimeter shall have the following digital multimeter and current sensing functions and corresponding performance or better:

* Current Measurement - The device shall measure both AC and DC current in a conductor:

|  |  |
| --- | --- |
| **AC and DC Current Range** | Up to 400A at an accuracy of 1.8% |
| **Current Resolution** | 0.1A |

* DC Voltage Measurement - The device shall measure DC voltage between two points in a circuit:

|  |  |
| --- | --- |
| **AC Voltage range** | Up to 600V at an accuracy of 1.5% |
| **Voltage Resolution** | 0.1V |

* Resistance Measurement - The device shall measure electrical resistance of a conductor or a circuit component:

|  |  |
| --- | --- |
| **Resistance range** | 400 Ohm (Ω) Up to 4000 Ω at an accuracy of 1 % |
| **Resistance Resolution** | 0.1 Ω |

* Continuity Measuring

|  |  |
| --- | --- |
| **Continuity Beeper** | ≤ 70 Ω |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The clamp multimeter shall measure AC current on live conductors by clamping current sensing jaws around conductor without the interruption of the DUT circuit.

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The clamp jaw diameter shall be 30 mm.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The device shall display measurements on a backlit display that forms part of the device.

|  |  |
| --- | --- |
| **Backlight display refresh rate** | 2 times/ sec. |
| **Display Size** | ≥ 1.6 inches |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The multimeter shall meet the following minimal performance specifications:

|  |  |
| --- | --- |
| Capacitance Measurements |  |
| **Maximum capacitance** | 100 μF |
| **Capacitance accuracy** | ± (1.2% + 2) |
| **Capacitance resolution** | 1 nF |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The multimeter shall measure the frequency of AC signals

|  |  |
| --- | --- |
| **Maximum frequency** | 200 kHz |
| **Frequency accuracy** | ± (0.1% + 1) |
| **Frequency resolution** | 0.01 Hz |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The multimeter shall have a built-in temperature measurements feature.

|  |  |
| --- | --- |
| **Temperature range** | -40°C - 400°C |
| **Temperature accuracy** | ± (1.0% + 10) |
| **Maximum resolution** | 0.1°C |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The device shall display measurements on its backlit display that forms part of the device. The backlit display shall have the following requirements:

|  |  |
| --- | --- |
| **Backlight display refresh rate** | 2 times/ sec. |
| **Display Size** | ≥ 1.6 inches |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Communications test set

The communication test set shall enable the technical personnel to conduct the following tests and analysis on VHF communication systems without the requirement of additional device/s that is not part of the test set. The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a communication test set:

1. Audio Signal Voltage Measurement: The device shall measure DC voltage between two points in a circuit

|  |  |
| --- | --- |
| **Input Voltage range** | Up to 30 VRMS, 50 Vdc |
| **Voltage Resolution** | 1mV or 1% of reading |
| **Frequency range** | 0.5 kHz 50 kHz  AC only 50 Hz to 50 kHz Polarized DC (below 1 Hz) |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Audio Signal-to-Noise and Distortion ratio (SINAD) Measurement

|  |  |
| --- | --- |
| **Frequency** | 1 kHz |
| **Range** | 0 to 18 dB and 0 to 50dB |
| **Sensitivity** | 50 mV |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Audio Distortion Measurement

|  |  |
| --- | --- |
| **Frequency** | 1 kHz |
| **Range** | 0 to 10%, 0 to 30% and 0 to 100% |
| **Sensitivity** | 50 mV |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Audio Signal to Noise ratio (S/N) Measurement

|  |  |
| --- | --- |
| **Range** | 0 to 30 dB and 0 to 100 dB |
| **Sensitivity** | 50 mV |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Audio Frequency Measurement

|  |  |
| --- | --- |
| **Frequency Range** | 20 Hz to 20kHz |
| **Frequency accuracy** | As frequency standard ± 1 digit ± resolution |
| **Sensitivity** | 50 mV |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. RF Frequency Measurement

|  |  |
| --- | --- |
| **Frequency Range** | 10 MHz to 1 GHz |
| **Resolution** | 1 Hz or 10 Hz, up to 1050 MHz, selectable  0.1 Hz, 1 Hz or 10 Hz up to 999 MHz, selectable |
| **Accuracy** | As frequency standard ± resolution |
| **Sensitivity** | Auto-tuned: 5 mW (N-Type) 0.05 mW (Antenna port) Manual Tuned: -34 dBm (N-Type) -60 dBm (Antenna port) Auto or manual control of input attenuator |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. RF Power Measurement

|  |  |
| --- | --- |
| **Dynamic Range** | 5 mW to 150 W (N-Type) 0.05 mW to 250 mW (Antenna port) |
| **Frequency Range** | 200 kHz to 1.05 GHz |
| **Resolution** | 0.1 dB max, typically 1% |
| **Accuracy** | ±10% ± resolution up to 1 GHz (FM & CW) |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Modulation Measurement
   * Sensitivity and Audio

|  |  |
| --- | --- |
| **Sensitivity** | Auto-tuned: 5 mW (N-Type) 0.05 mW (Antenna port) Manual Tuned: -34 dBm (N-Type) -60 dBm (Antenna port) Auto or manual control of input attenuator |
| **Audio & Modulation Filters** | Independently configurable Lowpass filters.  750/ μs de-emphasis High pass filters. Bandpass filters.  Any combination of Lowpass filters and the High pass filters. |

* + Amplitude Modulation

|  |  |
| --- | --- |
| **Frequency Range** | 100 kHz to 1.05 GHz |
| **Modulation Frequency Range** | 10 Hz to 15 kHz |
| **Depth Range** | 0 to 99% (manually tuned) 0 to 90% below 100 MHz 0 to 80% from 100 to 400 MHz Peak hold facility |

* + Frequency Modulation

|  |  |
| --- | --- |
| **Frequency Modulation (FM) Frequency Range** | 100 kHz to 1.05 GHz |
| **Modulation Frequency Range** | 10 Hz to 15 kHz |
| **FM Deviation Range** | 0,5 kHz to 75 kHz Peak hold facility |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Parameter analysis
   * An integrated audio oscilloscope to facilitate visual analysis of audio signals and RF signals, transient and harmonic analysis.

|  |  |
| --- | --- |
| **Frequency Range** | DC to 50 kHz, 3 Hz to 50 kHz AC coupled |
| **Voltage Range** | 10 mV to 20 V per division |
| **Voltage Accuracy** | ±5% of full scale |
| **Time base** | 50 μs/div to 5 s/div |
| **Display** | Colour transflective display (for improved sunlight readability) that forms part of the device. |

* + Harmonic and transient analysis

|  |  |
| --- | --- |
| **Harmonic Measurement** | Displays 1st to 5th harmonic of the selected carrier |
| **Maximum Harmonic Frequency** | 1.05 GHz |
| **Dynamic Range** | 60 dB below spectrum analyzer reference level |
| **Frequency Range** | 1 to 1050 MHz |

* + Full Scalar Spectrum Analysis

|  |  |
| --- | --- |
| **Frequency Range** | 100 kHz to 1.0 GHz |
| **Resolution Bandwidth** | 300 Hz, 3, 30, 300 kHz, 3 MHz |
| **Displayed Dynamic Range** | 80 dB |
| **Sensitivity** | 2 μV |
| **Tracking Generator Offset/ Frequency Range** | 0 to 999 MHz/400 kHz to 1000 MHz |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The communication test set shall have an integrated audio generator that meets the following requirements:

|  |  |
| --- | --- |
| **Output Audio Generator Frequency Range** | 5 Hz to 33 kHz (sine or square) |
| **Level Range** | 0.1 mV to 4V RMS |
| **Audio Monitor** | Demodulated signals and audio signals shall be monitored via the internal loudspeaker and the accessory socket output on the equipment. |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The communication test set shall have an RF signal generator that meets the following general requirements:

|  |  |
| --- | --- |
| **Frequency Range** | 400 KHz to 1.0 GHz |
| **Frequency Resolution** | 10 Hz |
| **Frequency Accuracy** | As standard frequency |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. A Consultative Committee for International Telephony and Telegraphy (CCITT) Filter should be fitted into the new communication test set for weighting, a CCITT filter shall be inserted into either the demodulated audio path or the audio input path.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The communication test set shall provide duplex operation to allow for testing of duplex radios as well as simultaneous testing of repeater transmit and receive paths.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The communication test set shall display measurements and signals waveform on a colour transflective display (for improved sunlight readability) that forms part of the device.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The communication test set shall be portable

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The communication test set shall have a battery operating time of more than 2 hours.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The communication test set shall have its own steel carry case, with wheels and a pull handle.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Audio Analyzer

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of an audio analyzer, **which is composed of an audio oscillator and an audio measuring set, the following are the required performance specifications:**

1. The audio oscillator shall provide the functionality stipulated below:

**Waveform generator**

* **Frequency range 5Hz – 38kHz, 3 steps (coarse) and 32**

**steps (fine) per octave**

* **Frequency accuracy Correct to 0.02% (200 ppm)**
* **Frequency stability ±30ppm**
* **Level accuracy ±0.03dB +26 to -60dBu, ±0.2 60 to**

**80dBu**

* **Amplitude range 100 to +26dBu in 1dB or 0.01dB steps**
* **Amplitude flatness ±0.05dB, 5Hz – 31.5kHz**
* **Waveforms Sine, square, triangular, sawtooth**

**(positive and negative going), DC+ and DC-.**

* **Tone burst Programmable frequency, level and**

**duration. A series of tones or tone bursts**

**should be programmable and must be**

**repeatable.**

* **Output impedance Fully floating 10,75- & 600-ohm outputs**

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The audio measuring set shall provide the functionality stipulated below:

* **Crosstalk -117 to +8dBu, narrow band**

**measurement,**

**automatic frequency. Selection.**

* **Level -95 to +28dBu in 10dB ranges (auto**

**ranging/manual).**

* **Level resolution Numeric: 0.01dB steps. Bar graph:**

**0.2dB/pixel (default) 0.04dB/pixel (zoomed).**

* **Level accuracy ±0.05dB +28 to -60dBu, ±0.2dB -60 to –**

**80dBu**

* **Input level range -60dBu to +28dBu, noise limits readings**

**below 0dBu**

* **Phase measurement range ±180º, 20Hz to 20kHz with ±2º accuracy**
* **Noise measurement range -105 to +8dBu in 10dB ranges**
* **Noise -117dBu at 1kHz, -111dBu at 6.3kHz**

**typical.**

* **Distortion THD+Noise, relative, with automatic**

**fundamental measurement and filter frequency selection.**

* **W&F range -80dB to -20dB (0.01% to 10%)**
* **Frequency range Reciprocal counting 20Hz-20kHz, 4-5**

**digit readout**

* **Rumble measurement Weighted slow (IEC98) & Unweighted**

**slow (IEC98)**

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The audio testing set shall have a graphical frequency response display.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The audio testing set should have a serial computer interface for remote personal computer (PC) control.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# RF signal generator

The bidder shall indicate sufficient information from datasheets or documentation the requirements of an RF signal generator, which shall provide a signal source/s that can be used to test the operation of the circuit being tested or developed whilst satisfying the following requirements:

1. Frequency

* **Frequency range 10kHz to 3GHz**
* **Frequency resolution 0.01 Hz**
* **Setting time < 10 ms**
* **Impedance 50 ohms**

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Internal reference frequency

* **Temperature stability < 2 ppm in the temperature range of 0 ℃**

**to 50 ℃, reference to 25 ℃**

* **Aging rate < 1 ppm/year**

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Frequency sweep

* **Sweep type Step sweep (equally or logarithmically**

**spaced frequency steps)**

* **List sweep (list with arbitrary frequency)**
* **Sweep mode Single, continuous**
* **Sweep range Full frequency range**
* **Sweep shape Triangle and ramp**
* **Step change Linear and logarithmic**
* **Number of points Step sweep: 2 to 65535**
* **List sweep: 1 to 6001**
* **Dwell time 20 ms to 100 s**
* **Triggering Auto, key, external, bus (USB, LAN)**

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Spectral Purity

* **SSB phase noise < -100 dBc/Hz**

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Output level

* **Output level range -110 dBm to 10 dBm (up to 20 dBm**

**when frequency ≥ 10 MHz)**

* **Setting resolution 0.01 dB**
* **Amplitude accuracy Up to 0.5 dB**

The RF generator shall provide standard Amplitude Modulation (AM), Frequency Modulation (FM) and Phase Modulation (PM) functions:

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Internal Modulation Generator

* **Modulation types (generator) Amplitude Modulation (AM), Frequency**

**Modulation (FM), Phase Modulation (PM)**

* **Simultaneous modulation Frequency and Phase modulation**
* **Waveform Sine, square**
* **Frequency range Sine: DC to 200kHz**

**Square DC to 20kHz**

* **Resolution 0.01 Hz**
* **Voltage range AC: 0 to 3 Vp**

**DC: -3 V to 3 V**

* **Voltage resolution 2 mV**

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Amplitude modulation

* **Modulation source Internal, external**
* **Modulation depth 0% to 100%**
* **Resolution 0.1 %**
* **Setting uncertainty fmod = 1 kHz < setting value × 4% + 1%**
* **Distortion fmod = 1 kHz, m < 30%, level = 0 dBm <**

**3% (typ.)**

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Frequency modulation

* **Modulation source Internal, external**
* **Maximum deviation N x 1 MHz**
* **Resolution < 0.1% of the deviation or 0.01 rad, take**

**the greater one (nom.)**

* **Setting uncertainty fmod = 1 kHz, internal modulation <**

**setting value × 2% + 20 Hz**

* **Distortion fmod = 1 kHz, deviation = N × 50 kHz <**

**2% (typ.)**

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Phase modulation

* **Modulation source Internal, external**
* **Maximum deviation N x 5 rad (nom.)**
* **Resolution < 0.1% of the deviation or 0.01 rad, take**

**the greater one (nom.)**

* **Setting uncertainty fmod = 1 kHz, internal modulation <**

**setting value × 1% + 0.1 rad**

* **Distortion fmod = 1 kHz, deviation = N × 5 rad <**

**1% (typ.)**

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The RF generator shall be durable and have protection functions:

* **Maximum DC voltage 50 V**
* **Maximum reverse power**

**(1 MHz < f < 3GHz) 1 W**

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The RF generator shall have the following communication and data storage interfaces:

* **USB host A plug connector, USB 2.0 or latest protocol**
* **USB device B plug connector, USB 2.0 or latest protocol**
* **LAN 10/100, RJ-45**

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Triple Output Power Supply

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a triple output power supply :

1. The power supply shall have three variable voltage output

* **Output range 0 – 30 V/ 0 -3A on 2 outputs and**

**0 – 5V/ 0-3A on 1 output**

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power supply shall meet the following specifications:

* **Load regulation Voltage: ≤ 0.02% + 4mV**

**Current: ≤ 0.2% + 3mA**

* **Line regulation Voltage: ≤ 0.01% + 3mV**

**Current: ≤ 0.2% + 3mA**

* **Readback resolution Voltage: 10mV**

**Current: 1mA**

* **Programming resolution Voltage: 10mV**

**Current: 1mA**

* **Ripple & Noise Voltage: ≤ 1mVrms/5mVp-p**

**Current: ≤ 6mArms**

* **Temperature coefficient Voltage: 250ppm/℃**

**Current: 250ppm/℃**

* **Series Accuracy Voltage: ≤ 0.5% + 30mV**

**Current: ≤ 0.2% + 15mA**

* **Parallel Accuracy Voltage: ≤ 0.2% + 30mV**

**Current: ≤ 0.2% + 25mA**

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Each output shall be fully floating.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power supply outputs shall be independently adjustable outputs or connected in parallel to produce higher voltages or currents.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power supply shall have overload and short circuit protection.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power supply shall have 3 digits digital display for monitoring voltage meters and monitoring current meters.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Radar Peak Power Meter

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a radar peak power meter, which shall be a wideband power meter able to conduct the following measurements and meet the performance stated hereunder:

1. Average, peak and peak-to-average ratio power measurements.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Able to Free-run or make use of an external trigger.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The radar peak power meter shall be an RF meter that measures peak power.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The radar peak power meter shall be a handheld and an independent system that does not interface to a laptop.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The radar peak power meter shall be easily portable, with its own steel carry case.

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. To be provided with the appropriate power sensor.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The saved data results from the radar power meter shall be easily downloaded onto a USB device.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Time parameter measurements of pulse rise time, fall time, pulse width, time to positive occurrence and time to negative occurrence shall adhere to the following specifications:

|  |  |
| --- | --- |
| **Number of channels** | Single channel |
| **Frequency range** | 10 MHz to 18 GHz |
| **Maximum sampling rate** | 100 M samples/sec, continuous sampling |
| **Video bandwidth** | ≥ 30 MHz |
| **Single short bandwidth** | ≥ 30 MHz |
| **Rise time and fall time** | ≤ 13 ns (for frequencies ≥ 500 MHz) |
| **Minimum pulse width** | 50 ns |
| **Overshoot** | ≤ 5 % |
| **Average power measurement accuracy** | ≤ ± 0.2 dB |
| **Dynamic range** | –35 dBm to +20 dBm (> 500 MHz)  –30 dBm to +20 dBm (50 MHz to 500 MHz) |
| **Maximum capture length** | 1 second |
|  |  |
| **Time base:** | |
| Time base range | 2 ns to 100 msec/div |
| Accuracy | ± 10 ppm |
| Jitter | ≤ 1ns |
|  |  |
| **Internal Trigger:** | |
| Range | –20 to +20 dBm |
| Resolution | 0.1 dB |
| Level accuracy | ± 0.5 dB |
| Latency | 160 ns ± 10 ns |
| Jitter | ≤ 5 ns rms |
|  |  |
| **External TTL trigger input:** | |
| High | > 2.4 V |
| Low | < 0.7 V |
| Latency | 90 ns ± 10 ns |
| Minimum trigger pulse width | 15 ns |
| Minimum trigger period | 50 ns |
| Impedance | 50 Ω |
| Jitter | ≤ 5 ns rms |
|  |  |
| **External TTL trigger output:** | |
| High | > 2.4 V |
| Low | < 0.7 V |
| Latency | 30 ns ± 10 ns |
| Minimum trigger period | 5 ns |
| Impedance | 50 Ω |
| Jitter | ≤ 5 ns rms |
| **Trigger Delay:** | |
| Delay range | ± 1.0 s |
| Maximum delay resolution | 1% of delay setting |
| **Trigger hold-off:** | |
| Range | 1 μs to 400 ns |
| Resolution | 1% of selected value (to a minimum of 10 ns) |
| Jitter | ≤ 5 ns rms |
|  |  |
| **Trigger level threshold hysteresis** | |
| Range | ± 3 dB |
| Resolution | 0.05 dB |

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power sensor shall meet the following specifications:

|  |  |
| --- | --- |
| **Frequency range** | 10 MHz to 18 GHz |
| **Dynamic range** | -35 dBm to +20 dBm (500 MHz); -30 dBm to +20 dBm (50 MHz to 500 MHz) |
| **Damage level** | +23 dBm (average power); +30 dBm (<1 μs duration) (peak Power) |
| **Connector type** | Type N (m) |
| **Maximum SWR** | 50 MHz to 10 GHz = 1.2  10 GHz to 18 GHz = 1.26  18 GHz to 26.5 GHz = 1.3 |
| **Sensor calibration uncertainty** | 50 Hz to 500MHz = 4.5%  500 MHz to 1 GHz 4.0 %  1 GHz to 10 GHz 4.0 %  10 GHz to 18 GHz 5.0 % |
| **Power Reference** | | |
| Power output | 1.00 mW (0.0 dBm). Factory set ± 0.4 % | |
| Accuracy | ± 1.2 % (0 to 55 °C) ± 0.4 % (25 to 10 °C) | |
| Frequency | 50 MHz nominal | |
| SWR | 1.08 (0 to 55 °C) 1.05 typical | |
| Connector type | Type N (f), 50 Ω | |

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Frequency Counter

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a frequency counter:

1. The frequency counter shall carry out frequency and period measurements.

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The frequency counter shall measure pulse width, frequency ratio, the duty cycle, and perform events counting.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The frequency counter shall have the following performance specifications:

* Frequency range 0.01 Hz – 2.0 GHz
* Sensitivity 10mV typical, 50mV maximum
* Impedance 1 MΩ

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The frequency counter shall have a display for measurement or displaying settings as follows:

* Indication 8 digits with Hz, kHz, MHz, GHz, s, ms, μs, and overflow

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Cable and Antenna Analyzer (100kHz - 8GHz)

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a cable and antenna analyzer:

1. Conduct tests in 100 kHz to 8GHz frequency range.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Test RF cables and antennas at the frequency or operation.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Should have features to allow the technicians to preconfigure test set-up before going to the field.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall have free software to remote control the analyzer, preconfigure measurement settings, perform post analysis and generate reports.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Should have a 100dB dynamic range for transmission measurements.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Cable and Antenna Analyzer (100kHz - 4500MHz)

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a cable and antenna analyzer:

1. Shall test RF cables and antennas at the frequency or operation.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Conduct tests in the 100 kHz to 4500MHz frequency range and test FR cables.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall test RF Cables and Antennas.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall locate RF cable, connector and antenna problems at source.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall locate faults or plots VSWR or Return Loss Level at each distance along the cable or antenna system length.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Conduct Insertion loss measurement of a cable over a given range.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Fixed level attenuator

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a fixed level attenuator:

1. The attenuator shall reduce the output power of the system being tested without distorting the output signal.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The attenuator shall have a frequency range of at least 0,5kHz to 2 GHz.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall have Female-Female N type coaxial connection.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall have power handling of up to 100 Watts at 20dB.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The attenuator shall have self-cooling.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Variable attenuator

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a variable attenuator:

1. The variable attenuators’ attenuation shall be variable for 1 dB to 20dB.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The attenuator shall reduce the output power of the system being tested without distorting the output signal.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The attenuator shall have impedance of 50 Ohms.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The attenuator shall have a frequency range of at least dc to 2 GHz.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall have BNC connection.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall have power handling of up to 1.0 Watt.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Data transmission Analyzer with E1 tester

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a data transmission analyzer with E1 tester:

1. Frame synchronisation code monitoring, signal wave analysis, error analysis.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Perform error code testing at a rate of 50 b/s to 2048 kb/s.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Online Monitoring for routine maintenance, repair and operations monitoring of communication equipment.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Have functions for testing G.703, V.24/RS232, V.35, V.36/RS449, X.21, EIA-530/530A.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Supports RJ45 interface and complete TCP/IP protocols.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Directional coupler

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a directional coupler:

The coupler shall meet the following requirements:

1. Have an impedance of at least 50 Ohms.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Have a maximum power output of 20W.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall have 4 ports:

* Input port;
* Reflection port;
* Incident port; and
* Test port.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Can measure from 0,5kHz to 2 GHz

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Directional power sensor

1. The power sensor shall capture, display, analyze and characterize microwave and RF power in both the time and statistical domains.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power sensor shall be for the verification and troubleshooting of pulsed and noise-like signals used in radar.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power sensor shall have frequency selective power measurements from 50 MHz to 6 GHz.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power sensor shall have 100 MHz measurement bandwidth.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power sensor output level:

* **Output level range** -130 dBm to +20 dBm
* **Setting resolution 0.01 dB**
* **Amplitude accuracy Up to 0.5 dB**

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power sensor shall perform I/Q data capturing for RF vector signal analysis.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power sensor shall phase coherent measurements for low-powered modulated signals.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Dummy load

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a dummy load:

1. The dummy load shall be used for testing Coaxial systems so that testing and adjustment may easily be carried out.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The dummy load shall cover the frequency band of 118 to 136MHz for VHF radio tests.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The device shall have power handling capacity of up to 150 W.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The device shall have an impedance of 50 Ohms.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The dummy load shall be air cooled type.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Earth leakage tester

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of an earth leakage tester:

1. Test the earth connection and functioning of the earth leakage circuit.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The tester shall test three-wire 230 V ac circuits and the earth leakage circuit breaker.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall have voltage indication.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Should measure a range of 18 to 340 V.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall be rated at the current of 10mA – 500mA.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Test for system with frequency response of 50/60Hz.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Earth ground tester

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of an earth ground tester:

1. Conduct ground electrode testing to ensure a reliable connection to earth.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Test the resistance of soil to the passage of electric current to determine the adequacy of the grounding of an electrical system by ensuring an adequately large path for fault currents.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Should have automatic frequency control to minimise the effect of interference.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Should perform 3-and 4-pole fall of potential, and 4-pole soil resistivity test.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Should perform stakeless earth ground rod testing.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Should perform selective earth ground rod testing (clamp + stakes).

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall include a rugged carry case.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. To be used to conduct tests on Radar, VSAT and navigation systems.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Fibre line identifier

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a fibre line identifier:

1. The identifier shall transmit light signal on one end of the fibre cable and detect the light signal or lack of it at the other end of the cable.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Carries out non-destructive fibre identification of both single modes.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Identified Wavelength Range 800nm -1700nm.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Handheld RF spectrum Analyzer with directional antenna (1 MHz – 9.4 GHz)

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a handheld RF spectrum analyzer with directional antenna:

1. The system shall identify, characterises, and locate typical interference sources to the aviation CNS systems.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The system shall characterise and locate interference source operating in the 1MHz – 9.4 GHz range.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The system shall be complete with the directional antenna.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The system shall perform automatic localization of the interference by bearing triangulation with results displayed on a map.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The frequency finder shall be handheld.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Modulation meter

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a modulation meter:

1. The modulation meter shall measure the degree of modulation of modulated wave signal used in VHF radios.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The modulation test shall include the frequency band of 118 to 136MHz.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Network Analyzer with VoIP function

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a network analyzer with voip function:

1. Provides many automated tests in a single product to detect and locate illicit surveillance devices (wiretaps and electronic surveillance/eavesdropping products) on telephones, communication, and other types of wiring.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Enable the user to identify port-based security threats and troubleshoot connectivity problems in 802.1X secured environments.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Provide VoIP test and troubleshooting.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Carry-out PoE measurements.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Provide test reports.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Enable the user to verify, isolate, and document network connectivity and application port response problems.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Have a troubleshooting tool with inline vision into 10, 100 and Gigabit links to see the actual traffic between the network and end devices like PCs, VoIP phones, access points and security cameras.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Oil cooled dummy load

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of an oil cooled dummy load:

1. The coaxial loads shall be designed to safely dissipate their specified rated maximum of electrical energy within a frequency range of DC to 1 GHz in the regular series, and 470-890 MHz.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Optical time domain reflectometer (OTDR)

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of an optical time domain reflectometer:

1. The OTDR shall test components along fibre cables e.g connection points, bents, or splices.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall be used for building, certifying, maintaining and troubleshooting of fibre optic systems.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The OTDR shall carryout tests for both Single Mode and Multimode fibre cable installations.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# P-Series Power meter with wideband sensor

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a p-series power meter with wideband sensor:

1. The system shall measure average (or envelope) RF power for VHF radios, DMEs, VORs, ILS applications.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power meter shall have a single channel.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power meter shall provide the following functionality or performance:
2. peak, peak to average ratio, average power, rise time, fall time and pulse width measurements.
3. 30 MHz video bandwidth.
4. Single-shot real time and repetitive capture at 100 M-samples/s.
5. ≤ 13 ns rise and fall time.
6. One screen view for pulse measurement analysis: Auto Scale, Auto Gate, Rise/Fall Time, Duty Cycle, etc.
7. Internal zeroing and calibration while connecting to the DUT.
8. Connectivity, control of instruments and automation of test sequences.
9. Difference and ratio functions (A-B, B-A, A/B and B/A).

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power meter shall provide USB, LAN and GPIB connectivity.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Internal zeroing and calibration while connecting to the DUT.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power meter shall be provided with the appropriate power sensor to provide measurement frequency range of 50 MHz to 6GHz:
2. with frequency range of up to 6GHz
3. The power sensor shall have dynamic range of -35dBm to +20dBm
4. Shall have power linearity of less than 1%.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# RF coaxial connector kit

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of an RF coaxial connector kit:

1. Adaptors to connect BNC, TNC, N, SMA, UHF, Mini UHF, F and phono (RCA).

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. 4mm adaptors provide cross connectivity.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. 'T' piece with BNC socket included.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. 41 adaptors.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Scope meter

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a scope meter:

1. Shall measure audio line input/output level.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The scope meter shall have 20 MHz bandwidth.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The scope meter shall have up to 2.5 GS/s real time sampling per input or better.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The scope meter shall have dual-input digital oscilloscope and multimeter.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The scope meter shall produce dual-input waveform.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The scope meter shall have a meter reading recorder for trending data over extended periods.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Cable and Antenna Analyzer with Spectrum Analyzer

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a cable and antenna analyzer with spectrum analyzer:

1. The system shall be a cable and antenna analyzer combined with spectrum analyzer.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The system shall test signals with frequency range of up to 3GHz.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The cable and antenna analyzer shall meet the following specification:

* Measurements: Return Loss, VSWR, Cable Loss, Distance-To-Fault, Phase
* 2-port Transmission Measurement: High/Low Power
* Sweep Speed: 1 msec/data point, typical
* Display: Single or Dual Measurement Touchscreen

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The spectrum analyzer shall meet the following specifications and features or better:

* Measurements: Occupied Bandwidth, Channel Power, ACPR, C/I, Spectral Emission Mask, PIM Hunting
* Interference Analyzer: Spectrogram, Signal Strength, RSSI, Signal ID
* Dynamic Range: > 95 dB in 10 Hz RBW
* DANL: -152 dBm in 10 Hz RBW
* Frequency Accuracy: < ±50 ppb with GPS On

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The system shall allow users to create, deliver and display on-screen work instructions for Cable and Antenna testers.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Spectrum Analyzer

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a spectrum analyzer:

1. The analyzer shall test for spurious frequencies and to measure the frequency harmonics.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Shall meet the following specifications or better:

* Frequency 9kHz to 9GHz,
* Resolution Bandwidth 1Hz – 10MHz,
* Sweep time 10microseconds – 6000seconds,
* Test interface: RF input Type N (female)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The Spectrum Analyzer shall provide full scalar spectrum analysis.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# UHF Peak Power Meter

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a UHF peak power meter:

1. Carryout Peak pulse RF power measurement for DME and radar (MSSR, S-Band and X-Band) signal application.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Be provided with the appropriate directional coupler:
2. Wide Band Power Sensor with 50 MHz to 18 GHz frequency range
3. Power range -60 to +20dBm (CW Mode) / -25 to +20dBm (Pulse/Modulated Mode)
4. Connector N male, 50 Ohm

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Measure peak power up 1 Kilowatt.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. Measure true RMS power, making them ideal for measuring CW, modulated RF waveforms (ex. 3G, 4G, and OFDM signals), and multi-tone signals with input signals.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The power meter should be provided with a wideband power sensor designed for use with it.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The sensor should provide peak, crest factor, average power, rise time, fall time, maximum power, minimum power and statistical data of wideband signals.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Navigation Systems Analyzer

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a navigation systems analyzer:

1. Shall be used to adjust, verify and record parameters of ILS (Localizer, Glide Path, Marker Beacon), DME and VOR ground systems according to ICAO doc 8071.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer measurement range should cover the frequency range of 108 MHz to 1215 MHz. The following are frequency of operation for aviation navigational aids:

* ILS: Localizer- 108 MHz -112 MHz

: Glide Path -329.15 MHz -335 MHz

* DME: 960 MHz – 1215 MHz
* VOR/DVOR: 108 MHz -117.975 MHz

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer shall facilitate measurement of the following:
2. Carrier and audio frequencies, Modulation depth (DDM and SDM), RF level and Ident/Voice.
3. Phase measurements of 30Hz tones for bearing information of VOR.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer shall include all ILS and VOR channels selectable without any tuning or equipment changes.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The analyzer shall be portable, battery operated and weatherproof.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Handheld Communications Test Set

The bidder shall indicate sufficient information from datasheets or documentation the following requirements of a handheld communications test set:

1. The communication test set shall be integrated test system for complete radio receiver and transmitter performance testing, cable fault and antenna system analysis as follows or better:
2. RF Signal Generator

|  |  |
| --- | --- |
| **Frequency Range** | 2 MHz to 1.0 GHz |
| **Frequency Resolution** | 1 Hz |
| **Output Level** | Transmitter /Receiver port: -50 to -125 dBm/707.107 μV to 0.126 μV  Antenna port: -30 to -90 dBm/7071.068 μV to 7.071 μV  SWR port: -5 to -65 dBm/125743.344 μV to 125.743 μV |

1. Audio Frequency Generator

|  |  |
| --- | --- |
| **Frequency Range** | 30 Hz to 5 kHz |
| **Frequency Resolution** | 0.1 Hz |
| **Accuracy** | ± 2 Hz |
| **Output Level** | 0 to 1.57 Vrms |

1. RF Frequency Error Meter

|  |  |
| --- | --- |
| **Frequency Range** | ± 200 kHz |
| **Frequency Resolution** | 1 Hz |
| **Accuracy** | ± 2Hz |

1. RF Power Meter

|  |  |
| --- | --- |
| **Display Range** | 0 to 43 dBm |
| **Input Level Range** | 0.1 W - 20 W (20 dBm – 43 dBm) |
| **Resolution** | 0.01 W/0.1 dBm |
| **Accuracy** | 1 dB |

1. FM Deviation Meter

|  |  |
| --- | --- |
| **Frequency Range** | 500 Hz to ± 100 kHz |
| **Frequency Resolution** | 1 Hz |
| **Accuracy** | ±10 % of reading 500 Hz to 100 kHz |

1. AM Percentage Meter

|  |  |
| --- | --- |
| **Range** | 5% to 100% |
| **Frequency** | 1 % |

1. Antenna and Cable Test

|  |  |
| --- | --- |
| **Frequency Range** | 2 MHz to 1.0 GHz |
| **Span Range** | 10.0 MHz to 990.0 MHz |
| **Frequency Resolution** | 0.1 MHz |
| **Markers** | 2 |

1. SWR Measurement

|  |  |
| --- | --- |
| **VSWR Range** | 1.00 to 20.0 |
| **Resolution** | 0.02 |
| **Accuracy** | ± 20% of SWR reading |

1. Return Loss Measurements

|  |  |
| --- | --- |
| **Range** | 0.0 to 50.0 dB |
| **Resolution** | 0.01 dB |

1. Cable Loss Measurements

|  |  |
| --- | --- |
| **Range** | 1 m to 100 m |
| **Resolution** | 0.01 Db |

1. Distance to Fault Measurement

|  |  |
| --- | --- |
| **Range** | 0.0 to 50.0 dB |
| **Return Loss Range** | 0.0 to 50.0 dB |
| **Loss** | 0.00 to 100.00 dB per 100 ft |
| **Cable Types** | USER, RG-8x, RG-8, RG-8foam, RG-8A, RG-55, RG-55A, RG-55B,  RG-58, RG-58foam, RG-58A, RG-58B, RG-58C, RG-174, RG-213,  RG-214, RG-223, RG-400 |

1. Audio Meter (Audio Input)

|  |  |
| --- | --- |
| **Source** | BNC Input on front panel |
| **Frequency Range** | 300 Hz to 10 kHz |
| **Level Range** | 0.2 Vp-p to 5 Vp-p |

1. SINAD Meter

|  |  |
| --- | --- |
| **Measurement Source** | Audio in, demod |
| **Audio Frequency** | 1 kHz |
| **Display Range** | 0 to 40 dB |
| **Resolution** | 0.1 dB |
| **Accuracy** | 1.5 dB |

1. Distortion Meter

|  |  |
| --- | --- |
| **Measurement Source** | Audio in, demod |
| **Audio Frequency** | 1 kHz |
| **Display Range** | 0% to 100% |
| **Resolution** | 0.1% |

1. Audio Frequency Counter

|  |  |
| --- | --- |
| **Frequency Range** | FM: 15 Hz to 20 kHz  AM: 100 Hz to 10 kHz |
| **Audio Input Range** | 15 Hz to 20 kHz |
| **Audio Input Level** | 10 mV p-p to 5 V p-p |
| **Resolution** | 0.1 Hz |
| **Accuracy** | ± 1 Hz |

1. Audio Frequency Level Meter

|  |  |
| --- | --- |
| **Frequency Range** | FM: 15 Hz to 20 kHz  AM: 100 Hz to 10 kHz |
| **Input Level** | 15 Hz to 20 kHz |
| **Display Unit Resolution** | 10 mV p-p to 5 V p-p |
| **Accuracy** | 5% |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The communication test set shall have a battery operating time of more than 4 hours on one charge.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The system shall have a touch screen interface.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

****CHAPTER 2: PROJECT MANAGEMENT****

1. Leadtime for all equipment described in this bid shall be indicated for all the stations. The bidder shall with this bid submit a lead time schedule for all the stations taking into account all the required test equipment.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

****CHAPTER 3: LOGISTICS & MAINTENANCE****

# Warranty

1. All test equipment shall have a minimum 1 (one)-year warranty.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The warranty commences once all test equipment has been delivered and shall cover all system malfunctions as well as their auxiliaries.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Technical Training

1. Technical training shall be provided to three technical staff at each station.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The Technical training shall be for basic familiarization purposes, under the assumption that the technical staff understands the function of the test equipment. The bidder shall describe their approach towards the training of technical staff.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The Technical training shall be provided at least on the following test equipment:

* Communication test set;
* Optic fibre test kit.
* Oscilloscope;
* Power meter with directional head;
* Protocol analyzer; and
* RF generator

1. In lieu of physical training, ATNS preference is for a technical familiarization training video to be provided for each of the test equipment supplied.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

1. The following documents shall be provided for all deliverables, in English, prior to delivery acceptance. (D)

* Standard COTS and OEM Documentation
* Users Manuals
* Warranty documentation

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Delivery

1. ATNS will not bear any costs for breakages of any test equipment during transport. The supplier remains responsible for the test equipment until delivery to the relevant ATNS station. (I)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |

# Calibration

1. Information regarding the test equipment which require calibration as well as the frequency of their calibration shall be provided.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* | | |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* | | |