INCH-POUND

A-A-59778
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COMMERCIAL ITEM DESCRIPTION
Signal Generator 10 MHz to 50 GHz

The General Services Administration has authorized the use of this commercial item description for all federal agencies.

1. SCOPE. This Commercial Item Description (CID) describes a 10 MHz to 50 GHz Signal Generator with AM, FM, pulse modulation (PM) and sweep capabilities. This CID is meant as a minimum requirement for the signal generator in which only those manufactures that meet or surpass the following requirements are qualified per this CID.

2. SALIENT CHARACTERISTICS. The equipment shall be capable of operation and product sample testing, if so requested, within the accuracies, limits, and specifications herein.

2.1 Classification. Equipment covered by this CID may be commercially available equipment modified to the extent necessary to meet the following description. The equipment shall be Class 3 in accordance with MIL-PRF-28800, except as specified herein.

2.2 Safety and Environmental. The equipment shall meet all safety and environmental requirements as specified in MIL-PRF-28800 for the classification as stated herein.

2.2.1 Temperature Operating. The equipment shall conform to its specified performance and accuracy while being operated as a volt meter in a temperature range of 0 °C to 50 °C.

2.2.2 Temperature Non-Operating. The equipment shall conform to its specified performance and accuracy after being stored in an environment in the temperature range of -40 °C to 71 °C.

2.3 Electrical Power Sources. The equipment shall operate from nominal single-phase commercial, military, and shipboard power sources of 110 and 220 volts AC (±10%) at line frequencies of 48 Hz to 63 Hz. Transient state conditions shall meet MIL-PRF-28800 requirements for the classification specified herein.

2.4 Reliability. The design of the equipment shall be such that under normal use and operation the equipment does not fail within 4,000 hours of operation with a statistical certainty of 95%.

Comments, suggestions, or questions on this document should be addressed to: 542 ATSG/GBTRND, 380 Richard Ray Blvd., Ste. 104, Robins AFB, GA 31098. Since information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil/.

2.5 Calibration and Maintenance Adjustments. The design of the system shall provide for readily accessible calibration and maintenance adjustments. These adjustments shall be provided by variable value components, which are adjustable, by the use of simple means. The calibration by substitution of selected components or parts is unacceptable unless specifically approved. The calibration adjustments, wherever possible, shall be accessible without removal of the instrument case or modules. The calibration interval shall be a period of one year or greater, based on an operating time of 2000 hours per year.

2.6 Performance Requirements. The instrument shall meet all requirements specified herein, after the warm-up period specified in MIL-PRF-28800, under all combinations of input power conditions, output signal conditions, and operating service condition as specified in MIL-PRF-28800.

2.6.1 Frequency Range. The signal generator shall have a frequency range of 10 MHz to 50 GHz

2.6.1.1 Resolution. The generator shall have a frequency resolution of $\leq$ 0.1 Hz.

2.6.1.2 Accuracy. The generator's internal oscillator shall have an accuracy of $\pm 1 \times 10^{-7}$ or better.

2.6.1.3 Aging Rate. The accuracy of the generator shall be $\pm 5 \times 10^{-10}$ /day or $\pm 1 \times 10^{-7}$ /year or better.

2.6.2 Spectral Purity.

2.6.2.1 Harmonics. The harmonics shall be as follows:

10 MHz to 50 MHz: $\leq$-20dBc
50 MHz to 2.2 GHz: $\leq$-30dBc
2.2 GHz to 26.5 GHz: $\leq$-50dBc
26.5 MHz to 50 GHz: $\leq$-40dBc

2.6.2.2 Sub-Harmonics. The sub-harmonics shall be as follows:

10 MHz to 2 GHz: <-40dBc
2 GHz to 50 GHz: <-60dBc

2.6.2.3 Non-Harmonics. The non-harmonics shall be as follows:

10 MHz to 2 GHz: <-40dBc
2 GHz to 50 GHz: <-60dBc

2.6.2.4 SSB Phase Noise. The generator shall have the following single sideband phase noise characteristics, at a 100kHz offset from the carrier:

10 MHz to ≤2 GHz: ≤-102 dBc/Hz
>2 GHz to ≤10 GHz: ≤-107 dBc/Hz
>10 GHz to ≤20 GHz: ≤-102 dBc/Hz
>20 GHz to ≤40 GHz: ≤-98 dBc/Hz
>40 GHz to 50 GHz: ≤-90 dBc/Hz

2.6.3 RF Output.

2.6.4 Output Range. The minimum output level range into 50 ohm nominal shall be as follows:

10 MHz to <26.5 GHz: +10 dBm to -20 dBm
≥ 26.5 GHz to <40 GHz: +5 dBm to -20 dBm
≥ 40 GHz: +2.5 dBm to -20 dBm

2.6.4.1 Output Resolution. The output resolution shall be 0.02dB or better.

2.6.4.2 Output Accuracy. The output accuracy shall at least meet the following:

≤ 40 GHz: ±1.0dB
> 40 GHz: ±1.5dB

2.6.4.3 Output Flatness. The output flatness shall at least meet the following:

≤ 40 GHz: ±0.9dB
> 40 GHz: ±1.5dB

2.6.5 Amplitude Modulation (AM).

2.6.5.1 AM Depth. The generator's AM depth shall be at least 0 to 90%.

2.6.5.2 AM Accuracy. At a 1 kHz rate and 30% depth, the linear accuracy shall be 6% or better.

2.6.5.3 AM Bandwidth. At 30% depth with pulse off, the 3dB point shall be 50 kHz or better.

2.6.6 Frequency Modulation (FM).

2.6.6.1 FM Rates. In locked mode the minimum rates shall be from 100 kHz to 8 MHz. In unlocked mode the minimum rates shall be from dc to 8 MHz. For both cases that is with 3dB bandwidth and 500 kHz deviation.

2.6.6.2 FM Deviation (Locked). In locked mode, the generator shall have a maximum deviation of ±8 MHz or better.

2.6.6.3 FM Deviation (Unlocked). In unlocked mode, the generator shall have a maximum deviation of ± 10 MHz or better for rates ≤100 Hz and ± 8 MHz or better for rates >100Hz.

2.6.6.4 FM Sensitivity. The generator shall have a sensitivity of ± 1 V_{peak} of the indicated deviation.

2.6.6.5 FM Accuracy. The generator shall have an accuracy within ± 10% (at a 1 kHz rate).

2.6.7 Pulse Modulation (PM).

2.6.7.1 PM Range. External PM shall be applicable for output frequencies of ≥ 400 MHz.

2.6.7.2 On/Off Ratio. The generator shall have an on/off ration of ≥ 80 dB.

2.6.7.3 Rise/Fall Time. The generator shall have a rise/fall time of 25 nanoseconds or less.

2.6.7.4 Pulse Width. The generator shall have an internally leveled pulse width of 1 microsecond or better for frequencies < 2 GHz. For frequencies ≥2 GHz the minimum leveled pulse width shall be 100 nanoseconds or better.

2.6.7.5 Pulse Accuracy. The pulse accuracy shall be ± 0.5 dB for pulse widths of ≥ 1 microsecond.

2.6.8 Sweep Mode.

2.6.8.1 Modes. The generator shall have analog frequency sweep capability.

2.6.8.2 Sweep Time. The generator shall have a minimum sweep time of 45 milliseconds or less.

2.6.8.3 Switching Time. The generator shall switch frequencies in 50 milliseconds or less.

2.6.9 Remote interface. The generator shall come with an IEEE 488.2 standard interface.

2.6.10 Dimensions. The width and depth of the equipment shall be compatible with mounting in an ANSI/EIA-310-D standard equipment rack. The height shall be compatible with four standard height units, 4U. One unit or "U" is defined by ANSI/EIA-310-D to be 1.75 inches or 44.45 mm.

2.6.11 Weight. The total weight of the equipment, excluding accessories and manuals, shall not exceed a two-person lift of 74 pounds, (33.6 kilograms).

2.6.12 Rack Mount. The analyzer shall be capable of being rack-mounted in a standard ANSI/EIA-310-D equipment rack.

2.7 Manuals. The equipment shall be delivered with operator, maintenance/service, illustrated parts, and calibration manuals. Format and quantity shall be as specified in the contract or order. Level of maintenance philosophy, as defined in MIL-PRF-28800, shall be as specified in the contract or order.

If evidence substantiating that the Mean Time Between Failures (MTBF) of the instrument exceeds 20,000 hours is submitted, the maintenance/service manual shall not be required.

3. REGULATORY REQUIREMENTS.

3.1.1 The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

4. PRODUCT CONFORMANCE.

4.1 The products provided shall meet the salient characteristics of this CID, conform to the producer's own drawings, specifications, standards and quality assurance practices, and be the same product offered for sale in the commercial market. The government reserves the right to require proof of such conformance.

5. PACKAGING.

5.1 Preservation, Packing, and Marking. Preservation, packing, and marking shall be as specified in the contract or order.

6. NOTES.

6.1 Metric Products. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, provided they fall within the specified tolerances using conversion tables contained in the latest revision of Federal Standard No. 376, and all other requirements of this CID are met. If a product manufactured to metric dimensions exceeds the tolerances specified in the inch/pound units, a request should be made to the contracting officer to determine if the product is acceptable. The contracting officer has the option of accepting or rejecting the product.

6.2 Sources of documents.

6.2.1 Military Specifications, Standards, and Handbooks referenced herein may be obtained at http://assist.daps.dla.mil/ or from the Standardization Documents Order Desk, 700 Robbins Ave, Bldg 4, Section D, Philadelphia, PA 19111-5094.

MIL-PRF-28800F, 24 June 1996, Test Equipment for Use with Electrical and Electronic Equipment, General Specification for

6.2.2 The Code of Federal Regulations (CFR) may be obtained at http://www.gpoaccess.gov/cfr/index.html or from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC, 20402.

6.2.3 Institute of Electrical and Electronics Engineers (IEEE) standards products can be ordered directly at http://www.gpoaccess.gov/cfr/index.html or at the IEEE Operations Center. Phone: (800)678-IEEE. Mail: IEEE Operations Center, Sales Office, 445 Hoes Lane, PO Box 1331, Piscataway, NJ, 08855-1331, USA.

IEEE Std 488.2-1992, IEEE Standard Codes, Formats, Protocols, and Common Commands for Use With IEEE Std 488.1-1987, IEEE Standard Digital Interface for Programmable Instrumentation.

IEEE Std 488.1-2003, Standard for Higher Performance Protocol for the Standard Digital Interface for Programmable Instrumentation

7.2.4 ANSI/EIA standards can be obtained at http://global.ihs.com or from the Electronics Industry Association, Engineering Department, 2001 Pennsylvania Ave., N.W., Washington, D.C., 20006. Phone: 1-800-854-7179 (USA and Canada).

ANSI/EIA-310-D, 24 August 1992, Cabinets, Racks, Panels, and Associated Equipment

MILITARY INTEREST

Custodian:
Air Force - 99

Preparing Activity:
Air Force - 84

Agent:
Air Force - 99

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