MILITARY SPECIFICATION SHEET

RECEIVER, DIGITAL, FIBER OPTIC, SHIPBOARD, 0.5 TO 16 MBPS (MANCHESTER ENCODED) (METRIC)

This specification is approved for use by the Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and the issue of the following specification listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation: MIL-R-24720.

CLASSIFICATION

Wavelength class: A (1.10 through 1.60 μm).
Data signaling rate: Range 2 (20 to 500 Mbps).
Style: A (Dual inline package using pigtail).

REQUIREMENTS

Reliability: MTTF of 10^5 hours, where receiver failure is defined as that time when the receiver fails the BER test.

Design and Construction:

Cable pigtail:

The cable pigtail used in the construction of the receiver shall be a 62.5/125 μm fiber surrounded by aramid strength members and an outer jacket.

Fiber optic connector: N/A.

Case:

Receiver dimensions shall be as shown on figure 1. The pinouts of the hermetically sealed receiver shall be as shown in table I.

Terminals:

Terminal Strength:

Failure criteria shall be as specified in MIL-STD-883, method 2004. Electrical terminals shall be subjected to tension (A), bending stress (B1) and lead fatigue (B2) tests.

Performance:

Output electrical properties:

Logic family and drive capability: TTL, with electrical characteristics as specified in MIL-M-38510/330.

Optical-electrical properties:

Input-to-output signal phase: noninverting.
BER: 10^{-9} (maximum).
Pulse-width distortion: 3 nanoseconds (ns) (maximum).
Pulse jitter: 1 ns (maximum).
Propagation delay: 50 ns (maximum).
Acquisition time:

Acquisition time is defined as the number of bit periods between the application of the signal to the receiver until a stable output is reached. The acquisition time shall be less than 10 microseconds.

Power supply voltage and current: plus 5.0 ± 0.5 V, 150 mA (maximum).

Environmental:

Temperature extremes: Range 2 (operating: minus 28 to plus 85°C; nonoperating: minus 62 to plus 85°C).

Mechanical:

Connector pull-out force: N/A.
Fiber dynamic strength: N/A.

Electromagnetic effects: Below-deck application, in accordance with MIL-STD-461, part 5.

Conducted susceptibility: CS01, CS02, CS06, CS09.
Conducted emission: CE01, CE03, CE06.
Radiated emission: RE01, RE02, RE03.
Radiated susceptibility: RS01, RS02, RS03.

Dimensions: See figure 1.

Identification marking:

The part number as specified in MIL-R-24720 shall be marked on the receiver case, along with the following: inspection lot identification code, manufacturer's identification mark/designating symbol, pin 1 identifier, and electrostatic identifier (if required), all as defined in MIL-M-38510.

QUALITY ASSURANCE PROVISIONS

Screening:

All receivers to be delivered or submitted for first article inspection shall have been subjected to and passed all of the specified screening tests. Electrical/optical measurements are not required during the screening tests; however, after completion of all screening tests, the transmitters shall be subjected to group I or group A testing.

(a) Burn-in: Test condition B, with an ambient burn-in test temperature of plus 85°C for a minimum of 160 hours. The power supply voltage shall be no less than plus 5.3 V and the transmitter shall be operated at the maximum steady state optical power level.
(b) Random vibration: Test condition II, test condition letter C. No measurements are required during or after testing.
(c) Temperature cycling: In step 1, use minus 62°C (plus 0, minus 10) and in step 2 use plus 85°C (plus 10, minus 0), for 10 cycles. No end-point measurements are required.

Design and Construction Inspections:

Terminals:

Terminal strength:

Tension (test condition A): 5 newtons (minimum) for a period of 5 minutes (minimum).

Bending stress (test condition B1): Use procedure for DIP leads.

Lead fatigue (test condition B2):

Use procedure for DIP leads with force sufficient to bend the lead as specified in B1.

Solderability:

Three terminals on each transmitter shall be examined, according to MIL-STD-883, method 2003, with a soldering temperature of 245 ± 5°C.

Performance Inspections:

Standard optical input characteristics:

Optical power spectrum:

Peak wavelength: 1.27 to 1.35 μm.
Spectral width: 0.16 μm (maximum).

Optical power levels:

Steady state: Minus 9 to minus 35 dBm at 25°C out of the specified 62.5/125 μm fiber.
Pulsed output: Minus 3 dB plus or minus 0.5 dB from steady state.

Duty cycle: 40 to 60 percent.

Rise and fall time: 10 ns (maximum).

Pulse width: 1 μs (maximum)
31 ns (minimum).

Extinction ratio: 20:1 (minimum).

Overshoot and undershoot: 10 percent (maximum).

Optical-electrical properties: For step 6, use a pulse width equal to the minimum pulse width specified herein.

BER and pulse jitter: In step 7, the PRBS shall be a 127 pseudo-random word length.

Acquisition time: The test shall be conducted at minimum pulse width, average duty cycle, and average power level.

Power supply voltage and current: The current shall be measured at ambient test conditions at the minimum power supply voltage.

Environmental Inspections:

Explosive atmosphere: The values for the test conditions shall be:

Fuel - n-hexane (reagent grade or 95 percent).
Fuel amount - 3.8 percent by volume of test chamber.
Test altitude - sea level.
Test temperature - plus 85°C.

Nuclear radiation resistance:

Total dose: Three receivers shall be subjected to this test, each tested at different temperatures: minus 28, plus 20, and plus 85°C.

Neutron: One receiver shall be subjected to this test at plus 20°C.

Electromagnetic effects:

Tests shall be conducted in accordance with MIL-STD-462, over a frequency range of 14 kHz to 500 kHz. The RS03 limit shall be 200 V/m. Tests shall be conducted at ambient conditions. Pre- or post-test evaluation shall include structural integrity and spectral distribution. BER shall be monitored during the test and shall meet the requirements specified herein. A square wave signal shall be used as an input signal.

INTENDED USE

The receiver specified herein is intended for use in Navy land-based or shipboard applications where data rates not greater than 16 Mbps (Manchester Encoded) are required. These transmitters are intended to be compatible with transmitters specified in MIL-T-24721/1.

PART NUMBER: D24720/01-001.

PART DESIGNATOR: A2A.

TABLE I. Pin assignment.

Pin number	Function
1	supply voltage
2	supply voltage
3	supply voltage
4	supply voltage
5	ground
6	ground
7	ground
8	ground
9	ground
10	ground
11	ground
12	ground
13	1/
14	1/
15	data
16	data

1/ Internal connection reserved for manufacturer.

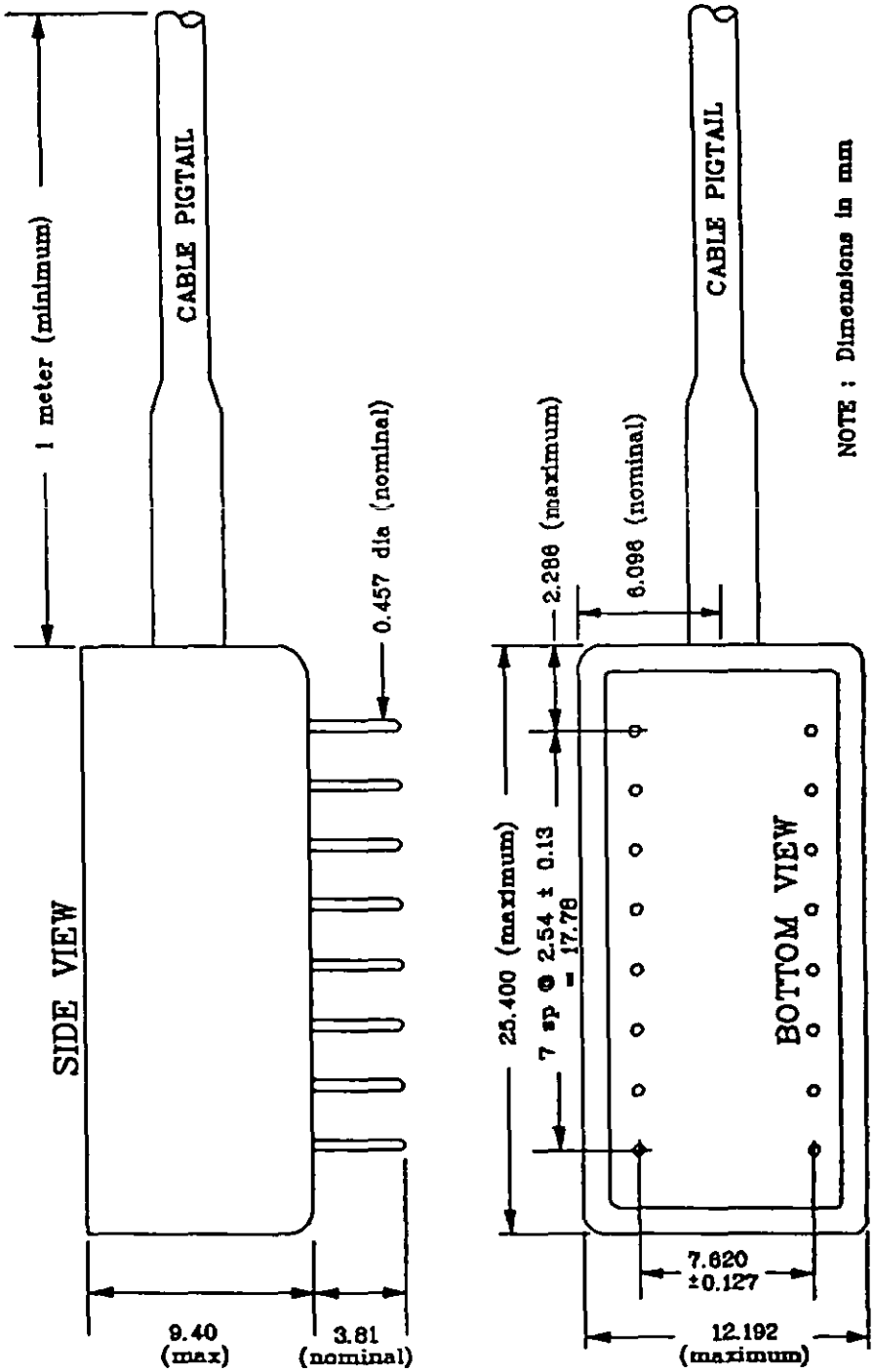

FIGURE 1. Receiver case outline: 16 pin DIP with multimode pigtail.

Review activities:
Navy - EC, YD

Preparing activity:
Navy - SH
(Project 6026-N001-01)

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