

METRIC

MIL-T-24721/1(NAVY)

27 June 1989

MILITARY SPECIFICATION SHEET

TRANSMITTER, DIGITAL, FIBER OPTIC, SHIPBOARD,
DC 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-T-24721.

CLASSIFICATION

Type: 1 (LED).

Wavelength class: A (1.31 μm).

Data signaling rate range: 2 (20 to 500 Mbps).

Style: A (Dual inline package using multimode pigtail).

REQUIREMENTS

Reliability: MTTF of 10^5 hours, where transmitter failure is defined as that time when the steady state optical power level is reduced 3 decibels from the initial steady state level, when measured at the same temperature.

Design and Construction:

Cable pigtail:

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

Fiber optic connector: N/A.

Optical source: LED.

Case:

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

AMSC N/A

FSC 6025

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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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:

Optical power spectrum:

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

Optical power levels:

Steady state: Minus 9 to minus 12 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.
Extinction ratio: 20:1 minimum

Optical waveform characteristics:

Rise and fall times: 10.0 nanoseconds (ns) (maximum).
Overshoot and undershoot: Less than or equal to 10 percent
(maximum).

Electro-optical characteristics:

Input-to-output signal phase: Noninverting.
Pulse-width distortion: 4 ns (maximum).
Propagation delay: 12 ns (maximum).

Power supply voltage and current: Plus 5.0 plus or minus 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.

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Electromagnetic effects: Below-deck application, in accordance with MIL-STD-61, 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 6.5 of MIL-T-24721 shall be marked on the transmitter 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 transmitters 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 not 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:

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.

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Solderability:

Three terminals on each transmitter shall be examined, according to MIL-STD-883, method 2003, with a soldering temperature of $245 \pm 5^{\circ}\text{C}$.

Performance inspections:

Standard electrical input characteristics:

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

Pulse-width: No maximum, 31 ns (minimum).

Duty cycle: 40 to 60 percent.

Rise and fall time: 4 ns (maximum).

Optical waveform characteristics:

For step 5, use TTL input signal corresponding to a logic high (one) to measure the steady state power level. Then measure the input signal corresponding to a logic low (zero) and calculate the extinction ratio (step 6).

Electro-optical characteristics:

For step 5, use a pulse width equal to the minimum pulse width specified herein.

Power supply voltage and current:

The current shall be measured at standard 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 the test chamber.

Test altitude - sea level.

Test temperature - plus 85°C .

Nuclear radiation resistance:

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

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

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Electromagnetic effects:

Tests shall be conducted in accordance with MIL-STD-462, over a frequency range of 14 kHz 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. Optical power and rise/fall times 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 transmitter 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 receivers specified in MIL-R-24720/1.

PART NUMBER: D24721/01-001.

PART DESIGNATOR: 1A2A.

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TABLE I. Pin assignment.

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

1/ Internal connection reserved for manufacturer.

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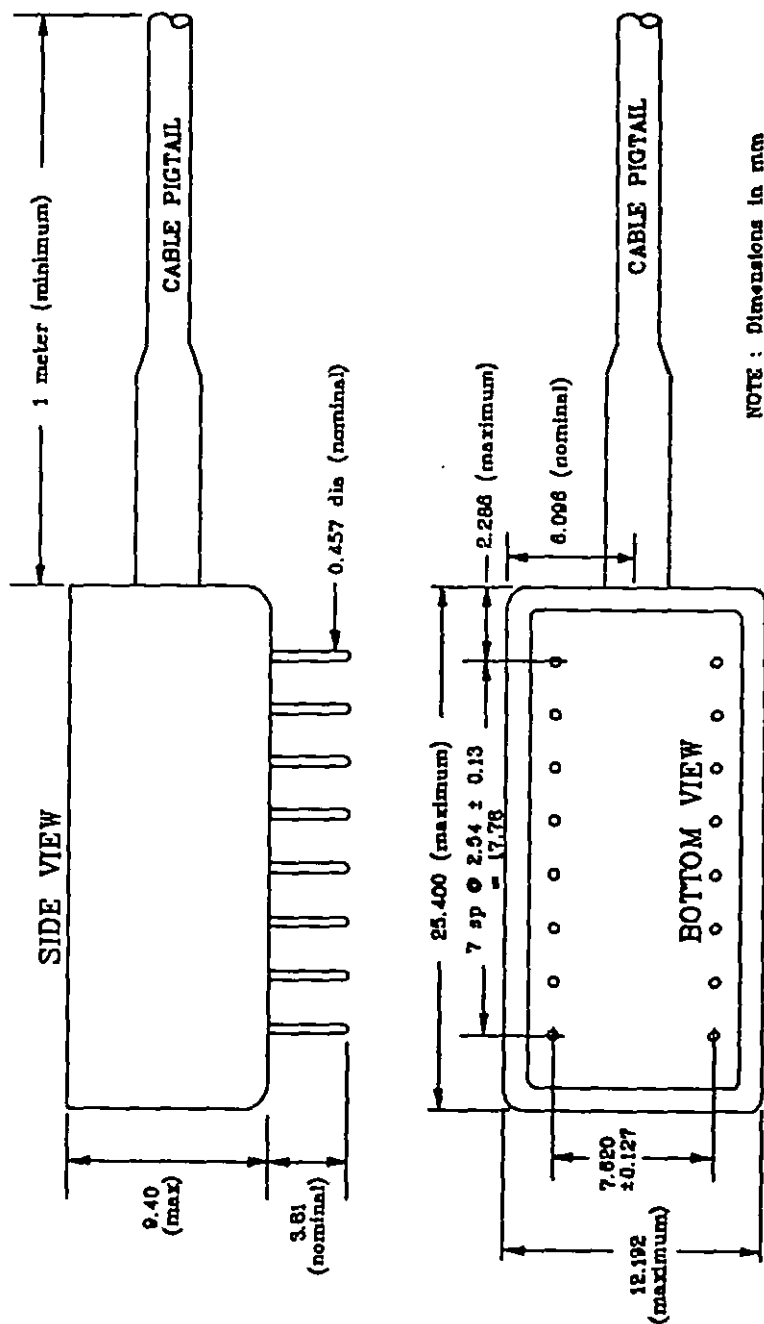


FIGURE 1. Transmitter case outline: 16 pin DIP with multimode pigtail.

Review activities:
Navy - EC, YD

Preparing activity:
Navy - SH
(Project 6025-N001-01)