

# NIC<sup>®</sup> PDH/T-Carrier Jitter and Wander Specifications

(Supplement to NIC PDH/T-Carrier Testing Module Specifications Datasheet)

## About NIC Jitter and Wander Analysis

Jitter and wander testing is vital to detect flaws and inconsistencies in timing systems that would hamper the ability to transfer data at high rates. Jitter testing is used in the design of equipment, manufacturing test, field implementation and maintenance.

The NIC PDH/T-Carrier Testing Module with Jitter and Wander options provide Jitter generation and measurement for DS1 (1.5M), E1 (2M), E3 (34M), DS3 (45M) and E4 (139M) in accordance with O.171 and O.172.

The NIC PDH/T-Carrier Testing Module can be used to perform:

- Intrinsic Jitter Measurement
- Jitter Transfer Testing
- Jitter Tolerance Testing
- Complete Wander Analysis

Digital Lightwave offers Jitter and Wander testing at PDH/T-Carrier rates, as well as SONET/SDH/OTN rates up to 10.7Gbps. See [www.lightwave.com](http://www.lightwave.com) for additional Jitter and Wander datasheets.

### JITTER AND WANDER TESTING SPECIFICATIONS

*Note: E1, E3 and E4 testing require A12 or A14 module; DS1 and DS3 testing require A13 or A14 module*

#### Jitter/Wander Related I/O

Demod. Jitter Output	Provides an analog output of the measured jitter.
Secondary Clock	Provides the ability to measure clock wander
Reference Input	This BITS/SETS input can accept either a framed all 1's data signal or a sine wave clock as a master reference

#### Generic Jitter/Wander Specifications

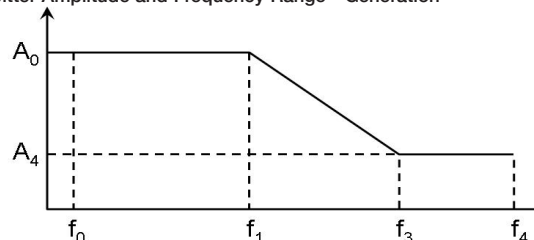
##### Adjustable Jitter Hit Thresholds

Jitter Statistics and Measurements	Jitter Threshold Counts, Jitter Hit Seconds, Peak-to-Peak Jitter, Max Peak Jitter, RMS Jitter
RMS Averaging Interval	The RMS jitter averaging period shall have programmable values of 1s, 60s, and infinite.
Simultaneous Filtering and Measurements	Simultaneous filtering paths feed an associated set of Jitter Hit Counters and measurement circuits to allow testing at all filter bandwidths simultaneously

#### Jitter Specifications

Standards Compliance	DS1/E1/E3/DS3/E4 Jitter generation and Measurement exceed O.171 and O.172
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Jitter Amplitude and Frequency Range - Generation



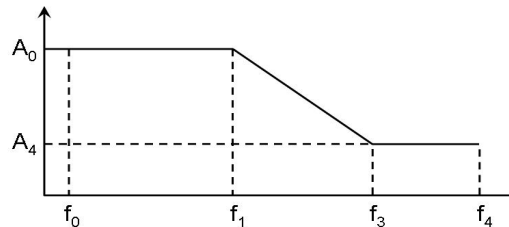
Bit Rate (Mbps)	A0 (U)	A4 (U)	f0 (hz)	f1 (hz)	f3 (hz)	f4 (hz)
1.544	100	1.5	2	400	8k	40k
2.048	100	1.5	10	900	18k	100k
34.368	100	1.5	100	1000	20k	800k
44.736	100	1.5	2	5000	100k	400k
139.264	100	1.5	100	500	10k	3500k

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## Jitter Specifications (Continued)

### Jitter Amplitude and Frequency Range - Measurement



Bit Rate (Mbps)	A0 (UI)	A4 (UI)	f0 (hz)	f1 (hz)	f3 (hz)	f4 (hz)
1.544	100	1.5	10	400	8k	40k
2.048	100	1.5	20	900	18k	100k
34.368	100	1.5	100	1000	20k	800k
44.736	100	1.5	10	5000	100k	400k
139.264	100	1.5	200	500	10k	3.5M

Measurement Range Peak to Peak Minimum measurement range exceeds O.171 and O.172 (see table below)

Measurement Resolution 0.001 UI for peak-to-peak jitter; 0.0005 for RMS jitter

### Jitter Modulation Frequency Resolution

Bit Rate (Mbps)	Modulation Frequency	Minimum Resolution
1.544/44.736	<10kHz	1Hz
	10 to 99.9kHz	10Hz
	100 to 400kHz	100Hz
2.048/34.368/ 139.264	<10kHz	1Hz
	10 to 99.9kHz	10Hz
	100 to 999.99kHz	100Hz
	1 to 3.5MHz	1000Hz

Jitter Measurement Accuracy As per O.171/O.172

### Filtering

Bit Rate (Mbps)	Measurement Mode	High Pass	Low Pass
1.544	Wide Band	10Hz	40kHz
	High Band	8kHz	40kHz
2.048	Wide Band	20kHz	100kHz
	High Band 1	700Hz	100kHz
	High Band 2	18kHz	100kHz
34.368	Wide Band	100Hz	800kHz
	High Band	10kHz	800kHz
44.736	Wide Band	10Hz	400kHz
	High Band	30kHz	400kHz
139.264	Wide Band	200Hz	3.5MHz
	High Band	10kHz	3.5MHz

### Wander Measurement Specifications

Wander Client A wander client software package running on Windows XP, 2000, 95 or 98 is required for performing wander measurement.

Sampling Rate - Low Pass Filter - Test Duration 1000/s — 300Hz

Amplitude Range ±1 nanoseconds to ±10 microseconds minimum

Measurement Accuracy As per O.172

Measurement Statistics A measurement/calculation of Time Interval Error (TIE), Maximum Time Interval Error (MTIE), Time Deviation (TDEV), Maximum Relative Time Interval Error (MRTIE), and ADEV (per G.810) must be provided.

### Wander Generation Specifications

Note: A0 is defined between f0 and f1. A1 is defined at f2.

Bit Rate (Mbps)	f0 (μHz)	f1 (MHz)	f2 (Hz)	A0 (UIp-p)	A1 (UIp-p)
1.544	10	20	10	200K	800
2.048	10	20	10	200K	800
34.368	10	400	10	200K	16K
44.736	10	400	10	200K	16K
139.264	10	2000	10	200K	80K

Wander Accuracy As per O.172

Generated Wander Resolution 1μHz