

## RF & Microwave Delay Lines

Emcore's fiber-optic based microwave Delay Line System (DLS) offers superior performance for radar testing, signal processing and phased array antennas. Delay lengths of greater than 2,000  $\mu\text{sec}$  are available.

The DLS provides convenient RF input/outputs that connect to an internal RF transmitter and RF receiver. Internally, the RF signal is converted to an optical signal and transmitted over a fiber optic link to the receiver and provides the proper signal delay time. Frequency range, delay length, and link performance requirements can be tailored over a wide range of performance levels to meet specific requirements. These options include RF & microwave amplification in the transmitter and receiver as well as optical amplification for longer delays. The DLS can be designed with either standard single mode or dispersion shifted fibers. Dispersion compensation fibers are also available.

Emcore's DLS offers compelling size, weight and performance advantages over traditional coax or waveguide solutions. A wide range of RF and optical performance options and packages are available. The system is supplied as a complete solution with all modules mounted in 19" racks that use standard AC power. Packaging options for the system include various rack configurations and temperature stabilized optical fiber.

### Applications

- Radar testing
- Phase array antennas
- Signal Processing
- Electronic Warfare

### Features & Benefits

- **> 2,000  $\mu\text{sec}$  Delays:**
  - More flexibility than coax or waveguide solutions
- **Smaller Size:**
  - Conserves rack space
- **Less Weight:**
  - Enables airborne and mobile solutions
- **0.05 – 40 GHz Bandwidth:**
  - Replaces multiple waveguide systems with a single link
- **Flat Phase Response**
- **Minimal Triple-Transit Echoes**
- **Format Independence:**
  - Delay line system supports changing modulation schemes
- **Low link loss options**
- **Low temperature sensitivity**

### Specifications

#### Typical RF Characteristics/Standard Features\* measured with SITU3000 TX and SIRU3000RX

Parameter	Value	Unit	Comments
Frequency Range	0.05 - 40	GHz	
Delay Range	3 to >2,000	$\mu\text{sec}$	
Delay Tolerance	$\leq \pm 2$	%	
Phase Stability	$\Delta\Phi \leq 1^\circ$ per 10 sec		Typical for 400 $\mu\text{s}$ DLS
Relative Delay vs. Frequency	$\pm 500$	ps	
Relative Delay vs. Temperature	$\leq 6.5$	ppm/ $^\circ\text{C}$	
Deviation from Linear Phase	$\leq 5$	$^\circ$	Typical (up to 18 GHz) ↓
Amplitude Flatness	$\leq \pm 2$	dB	
Amplitude Linearity	$\leq \pm 1$	dB	
RF Input Level	-5 to +20	dBm	
Gain	-30 $\pm 1$	dB	
Return Loss/VSWR	>20/<1.22:1	dB	
Spur Level	<-60	dBc	
Input 1 dB Compression Point	+20	dBm	
2 <sup>nd</sup> Harmonic (@ 0 dBm RF <sub>in</sub> )	$\leq -45$	dBc	
Input Third Order Intercept	>25	dBm	
Noise Figure	$\leq 70$	dB	
RF Connectors	SMA (F) <18 GHz K (F) >18 GHz		Typical

**For more information on this and other products:**

Contact Sales at Emcore 626-293-3400, or visit [www.emcore.com](http://www.emcore.com).

**Typical Optical Characteristics**

Parameter	Value	Unit
Optical Fiber	Single Mode	
Optical Connectors	SC/APC	

**General Characteristics - Typical**

Parameter	Value	Unit
Package	19" Rack	
AC Input	110 or 220	V
Operating Temperature Range	+25 to +35	°C
Storage Temperature Range	0 to +50	°C

\*Typical values can be tailored to meet specific customer requirements. Please contact Emcore with your specific needs.

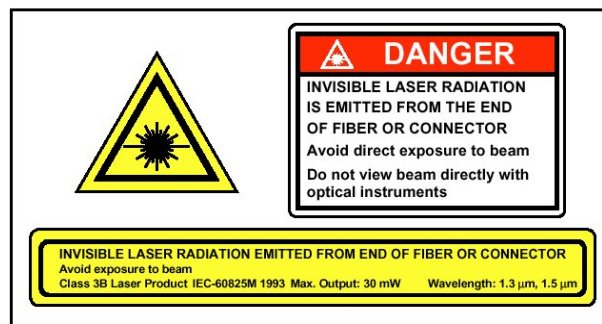
Emcore designs and builds fiber optic delay lines to address a wide range of applications, performance levels and packaging configurations. Our extensive experience in high performance RF and microwave photonics provides Emcore with a breadth of capabilities unmatched in the industry. For a comprehensive review of your specifications and application, please contact Emcore directly.

**Laser Safety****Class IIIb Laser Product**

FDA/CDRH Class IIIb laser product. All transmitters are Class IIIB laser products per CDRH, 21 CFR 2040 Laser Safety requirements. All versions are Class 3B laser products per IEC\*60825-1:1993.

**Caution: Use of controls, adjustments and procedures other than those specified herein may result in hazardous laser radiation exposure.**

\*IEC is a registered trademark of the International Electrotechnical Commission.



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