



## DS1 Filter TEK-100



- Ensures network timing cohesion
- Simple, economical timing solutions
- Eliminates timing transients
- Stabilizes timing of edge/remote elements
- Improves data/call continuity
- Automatic cut-thru on failure
- Mounts in existing switch cabinet
- Rack mount optional
- 5-Year limited warranty
- NEBS level III certified
- RoHS compliant

The TEK-100 DS1 Filter ensures network timing cohesion for remote and edge elements. In today's evolving network topologies, edge and remote network element deployments have increased. Most remotes, however, are still connected through DS1 lines, which traverse various multiplexers rather than physical copper T1 lines. The extracted DS1 timing can become corrupted by pointer adjustments and multiplexing queues. Spectracom's Timing Enhancement Kit (TEK™) provides a simple, economical solution to this problem.

Core and host systems accept timing references from a Building Integrated Timing Supply (BITS). Edge aggregation and remote switches generally do not have external clock inputs, instead deriving their timing from the lines connected to their hosts. The remote acts as a slave clock following the DS1 line input. This makes it susceptible to timing hops introduced by pointer adjustments and multiplexing schemes. These timing hops can cause the clock in the remote element to lose sync.

The TEK-100 uses a timing filter to maintain the phase integrity of the DS1 line clock during pointer adjustments and other timing anomalies caused by multiple multiplexer hops. With Spectracom's TEK, the client's clock does not lose lock, producing effective data movement and ensuring a graceful system recovery on rearrangement.

When the TEK-100 detects phase shifts that occur on the line, it removes them, maintaining less than 0.05 UI of phase movement on the delivered DS1 line. Removing the phase shifts allows the input circuits of downstream client devices to maintain lock on the host's clock.

The TEK-100 employs phase build-out techniques coupled with proprietary adaptive Frequency Locked Loop (FLL) algorithms. This prevents the client network element from falsely locking to multiple phase movements and from de-coupling caused by rapid or large magnitude transients. This ensures network timing cohesion for all edge elements connected to a master system.

The TEK is a compact, hard-wired device designed to mount inside the physical cabinet of the remote switch. Unlike external timing units, the TEK has no need for east/west coding, making the input and output designations more intuitive. This design also minimizes the risk of cascading errors caused by improper connections.

For installations external to the remote switch, Spectracom offers a rack kit for mounting in 19 inch EIA racks or 23 inch WeCo racks.

**PHYSICAL & ENVIRONMENTAL****DIGITAL PLL OPERATION:**

**Bandwidth:** 0.1 Hz (wide) or 0.005 Hz (narrow); switch-selectable

**Phase Buildout:** Input phase changes of  $\geq 3.5$   $\mu\text{sec}$  over an interval of  $\leq 0.1$  second are absorbed by DPLL without causing  $\geq 0.05$  UI (32 nsec at DS1 rate) phase change on the output.

Input phase changes of  $\leq 1.0$   $\mu\text{sec}$  over interval of  $\leq 0.1$  second are not built-out.

**JITTER FILTERING:**

When synced to an ideal (jitter-free) signal, the output jitter is  $< 32$  nsec (0.05 UI at DS1 rate) peak-to-peak

**WANDER TRANSFER:**

When receiving an input signal whose TDEV is less than or equal to the following levels:

Integration Time $\tau$ (seconds)	Input TDEV (nanoseconds)
$0.05 \leq \tau < 10$	100
$10 \leq \tau < 1000$	$31.6 \times \tau^{0.5}$
$1000 \leq \tau$	N/A

The TDEV of the output signals is less than or equal to the following levels:

Integration Time $\tau$ (seconds)	Output TDEV (nanoseconds)
$\tau < 0.05$	N/A
$0.05 \leq \tau < 0.1$	$1020 \times \tau$
$0.1 \leq \tau < 10$	102
$10 \leq \tau < 1000$	$32.2 \times \tau^{0.5}$
$1000 \leq \tau$	N/A

**RELIABILITY:**

Estimated MTBF  $> 400,000$  hours

**INPUTS/OUTPUTS****POWER INPUT:**

Dual (A & B) -48 VDC nominal; isolated lugs with protective covering

**AMI INPUT & OUTPUT, ALARM RELAY CONTACTS:**

Tip/ring; 0.045" wire-wrap leads with protective covering; alarm closure rated at 2A max

**ALARM CONDITIONS:**

Loss of one or both power inputs  
Internal failure of unit

**INPUT FRAMING:**

Operates with either Super-Frame (SF) or Extended Super Frame (ESF).

**LINE CODING SELECTION:**

AMI or zero-suppression

**OUTPUT IMPEDANCE:**

DS1: 100 ohm  $\pm 6\%$

**OUTPUT LEVEL (DS1):**

0 dB (default) or -7.5 dB; switch selectable

**OUTPUT SQUELCHING**

User settable output squelching on fault

**PHYSICAL & ENVIRONMENTAL****SUPPLY VOLTAGE:**

-36 to -72 VDC,  $\pm 2$  VDC

**SUPPLY CURRENT:**

**Steady-state:** Less than 100 mA (at -48 VDC)

**Start-up:** Less than 125 mA (at -48 VDC)

**START-UP VOLTAGE TRANSIENTS:**

0 V to -75 V

**ENVIRONMENTAL:**

**Operating Range:** 23° to 158°F (-5° to 70°C)

**Rate of Change:**  $\pm 86^\circ\text{F}/\text{hour}$  ( $\pm 30^\circ\text{C}/\text{hour}$ )

**Storage Range:** -40° to 185°F (-40° to 85°C)

**Relative Humidity:** 95% max., non-condensing

**Vibration:** 0.008  $\text{g}^2/\text{Hz}$  @ 5-20 Hz; 0.05  $\text{g}^2/\text{Hz}$  @ 20-100 Hz

**SIZE/WEIGHT:**

6.8125" W x 1.875" H x 4.0" D, 1.0 lbs  
(173.0 mm W x 48.0 mm H x 102.0 mm D, 0.45 kg)

**WARRANTY****FIVE YEAR LIMITED WARRANTY:**

Extended warranty is available

**ORDERING INFORMATION**

- Timing Enhancement Kit**  
TEK-100 Filter  
19" EIA /23" WeCo Rack Mounting Kit

**ADDITIONAL ACCESSORIES**

- Service Options**  
Premium Support Package  
Extended Warranty