**Token Ring Product Options**

**TFC**

**Token Ring Fiber Optic Converter**

- Provides conversion between electrical and optical Token Ring signals
- Compatible with IEEE 802.5
- Operates at 4 and 16 Mbps
- Typical optical distances supported:
  - 3 km (1.9 miles) multimode
  - 20 km (12.4 miles) single mode

**FEATURES**

- Two versions:
  - Stand-alone
  - Card version for S-TAU
- Wide range of applications:
  - RI/RO mode for optical trunk
  - Lobe mode for optical lobes
  - Station mode for station connection over fiber optic
  - Satellite mode for workgroups
- Partitions the network upon cable break
- Provides noise immunity, electrical isolation and security
- Supports UTP (100Ω) and STP (150Ω)

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**Token Ring Product Options**

**TFC**

**Token Ring Fiber Optic Converter**

**DESCRIPTION**

- TFC, *Token Ring Fiber Optic Converter*, provides electrical-to-optical and optical-to-electrical conversion of an IEEE 802.5 signal, for communication over an optical link. Transmission distance can be up to 3 km (1.9 miles) for multimode and 20 km (12.4 miles) for single mode.

- An infrared LED transmitter converts the IEEE 802.5 electrical signal into an optical signal. At the receiver end, the optical signal is converted back into an electrical signal.

- TFC can be operated in various modes:
  - RI/RO mode: connects between adjacent Token Ring access units, such as S-TAUs via a fiber optic link
  - Lobe mode: converts the copper lobes of any access unit/hub to fiber lobes
  - Station mode: connects stations to the optical lobes of the RADring TL-2/F module
  - Satellite mode: connects workgroups over a single fiber connection.

- In Station mode, the insert/bypass command, originating at the Token Ring Adapter card in the form of a “phantom” current, is carried through the fiber using special signaling.

- TFC is available in two versions:
  - Stand-alone unit (**TFC-SA**)
  - Card for installation in S-TAU (**TFC**)
  - TFC can also be installed as a module in the RADring hub (**RR-TFC**). (See the **RR-TFC data sheet** for additional details).

**APPLICATION**

*Figure 1. TFC Application in Conjunction with S-TAU*
The stand-alone model has an integral power supply. The stand-alone unit is wall-mountable using the TR-WM brackets, or can be mounted in a 19" rack using the TR-RM hardware. This hardware can support up to four TFC units (see Ordering).

Multimode or single mode fiber optic options are available for both the stand-alone and the S-TAU card versions. In addition, an internal media filter is provided for the UTP option.

The TFC card for S-TAU is installed in the Ring In or Ring Out port of the Access Unit. The card is powered by a wall-mounted, external power supply. TFC provides an optical link between two S-TAU units. Alternatively, for start topology, the TFC card can provide an optical link between the lobe of a RADring and the Ring In port of another S-TAU.

Where retiming and jitter attenuation are required, the TFC operates with the TLR-FO for lobe conversion.

Fail-safe operation is provided by performing an automatic loop to the backup path, upon power off detection or optical signal loss detection.

Indicators include power on and fault indication for optical signal loss condition.

Figure 2. TFC Application in Conjunction with RADring Hub
Token Ring Fiber Optic Converter

## SPECIFICATIONS

### OPTICAL CHANNEL
- **Transmission Line**
  - Dual fiber optic cable
- **Transmission Mode**
  - Full duplex
- **Data Rate**
  - 4/16 Mbps
- **Transmission Range**
  - Multimode option: Up to 3 km (1.9 miles)
  - Single mode option: Up to 20 km (12.5 miles)
- **Wavelength**
  - Standard: 850 nm
  - Optional: 1300 nm
- **Optical Output Power**
  - -22 dBm into 50/125 fiber
  - -18 dBm into 62.5/125 fiber
  - -14 dBm into 100/140 fiber
  - -18 dBm into 9/125 fiber
- **Receiver Sensitivity**
  - -32 dBm minimum
- **Dynamic Range**
  - 20 dB minimum
- **Optical Power Budget**
  - For 50/125 fiber = 10 dB
  - For 62.5/125 fiber = 14 dB
  - For 100/140 fiber = 18 dB
  - For 9/125 fiber = 14 dB
- **Fiber Optic Connector**
  - Standard: SMA (for 850 nm only)
  - Optional: ST
- **Command Modes**
  - X.28, X.29

### ELECTRICAL INTERFACE
- **Transmission Line**
  - 4-wire (dual twisted pair)
- **Transmission Range (16 Mbps)**
  - 50m (164 feet) on IBM (Type 1) cable between TFC and previous workstation or repeater
- **Data Rate**
  - 4/16 Mbps
- **Data Format**
  - Balanced bipolar, Differential Manchester encoded
- **Output Level (nominal)**
  - 3-4V ptp (on 150Ω)
- **Connector (stand-alone model)**
  - STP: IBM data connector
  - RJ-45: data connector for UTP

### GENERAL
- **Power**
  - Stand-alone:
    - 115 or 230 VAC (+10%)
    - 47 - 63 Hz, 5W
  - S-TAU Card:
    - 550 mA, 7.5 VDC
- **Physical**
  - Stand-alone:
    - Height: 4.4 cm / 1.7 in (1U)
    - Width: 10.8 cm / 4.3 in
    - Depth: 24.0 cm / 9.4 in
    - Weight: 1.2 kg / 2.6 lb
  - S-TAU Card:
    - To be installed within the S-TAU
- **Environment**
  - Temperature: 0-40°C (32-104°F)
  - Humidity: Up to 90%, non-condensing

## ORDERING

**TFC/#/@**
- Fiber Optic Converter card plus installation kit (for integration in S-TAU)

**TFC-SA/#/@**
- Stand-alone unit
  - Specify power supply:
    - 115 for 115V supply
    - 230 for 230V supply
  - Specify optical connector:
    - ST for ST optical connectors (default is SMA)
  - $ Specify electrical interface:
    - RJ for RJ-45 connector (UTP) (default is IDC connector for STP)
  - @ Specify wavelength:
    - 1300 nm for single mode (default is 850 nm multimode)

**Note:** The TFC card may be ordered as an integral part of the S-TAU (see S-TAU data sheet for ordering)

**TR-RM**
- Hardware for mounting up to four stand-alone units in a 19” rack

**TR-WM**
- Brackets for mounting a single stand-alone unit on a wall. For the S-TAU card version, two wall-mounted external power supply models are available:
  - **PS-230/7.5/800** for 230 VAC
  - **PS-115/7.5/800** for 115 VAC

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