Fiberoptics

DATA SHEET

GPS Over Fiber System

GPS-FOS-T1R8-SA3x

- High Dynamic Range GPS to Fiberoptic Transmitter and Fiberoptic to GPS Receiver
- Provides +5VDC Bias for GPS Antenna LNA
- Integrated Monitoring and Alarm
- Minimal form factor
- High reliability
- Ideal cost effective solution for distribution of GPS signal over long distances
- NEMA rated outdoor Fiber Transmitter designed for harsh environments
- Supports Hybrid Fiber/DC, 48VDC or AC Power Input

Overview

Communication Components, Inc. GPS Over Fiber Systems provides an innovative and cost effective means of routing the GPS signal over a fiberoptic network to a remote Base Station location. This system is ideal for CRAN (Centralized Radio Access Network) deployments and In-building DAS installations where the Base Station is located in a remote location with no direct availability of GPS signal.

The CCI GPS Over Fiber System consists of small footprint outdoor rated GPS to Fiberoptic Transmitter and an indoor Fiberoptic to GPS Receiver that are connected together using a SM single mode fiberoptic cable or alternatively a hybrid fiberoptic cable that concurrently provides DC power. The system is highly flexible and can be powered with AC or DC on the rooftop or from the GPS Receiver via a hybrid cable when neither power options are available.

Technical Description:

The GPS-FO-Tx-1*x* GPS to Fiberoptic Transmitter upconverts the GPS RF signal from any active GPS antenna to the optical band to enable transmission of the signal up to 4 kilometers over a single fiberoptic line. GPS Antenna bias current is provided and comprehensive alarm detection and reporting of the GPS antenna and the fiberoptic transmitter are delivered over the single fiber to the companion Fiberoptic to GPS Receiver for local display and monitoring. The Fiberoptic Transmitter can be powered via a hybrid fiberoptic cable or from any 48VDC source. An optional outdoor rated AC to 48VDC power supply is also available. The laser transmitter utilizes ultra-linear, high dynamic range DFB laser technology. APC (Automatic Power Control) is also used to stabilize the optical power.

The GPS-FO-Rx-8*x* Fiberoptic to GPS Receiver downconverts the optical signal from the GPS to Fiberoptic Transmitter back to its original RF signal level. Eight GPS RF outputs are available on the front panel. A 48VDC output power supply is also available to power the outdoor GPS Transmitter over a hybrid fiber cable. A 1 AMP resettable fuse is provided on the 48VDC output in order to insure the output power does not exceed the 100VA maximum mandated by many building electrical codes. CCI also offers the GPS-FO-Rx-8P Fiberoptic to GPS Receiver which is an optional configuration that supports sites that have a -48V supply with a positive ground.

Summary LED status indicators with corresponding dry-contact relay closure outputs are provided to monitor the status of the receiver as well as the companion Outdoor GPS Transmitter and active GPS antenna/LNA. Detailed status and control for the Receiver, Transmitter and Antenna are also available via a USB port command window. The optical receiver uses ultra-linear PIN photodiodes in unison with high linearity RF Amplifiers.

SPECIFICATIONS

GPS Over Fiber System

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Electrical

Description	Fiber Converter Unit	Outdoor Remote Unit
# of RF Channels	8 RX (GPS-FO-Rx-8P)	1 TX (2 TX W/Redundancy)
Band Supported	L1 (GPS, Galileo, BeiDou, and QZSS)	
RX Noise Figure	N/A	5 dB max.
RX Input IP3 (IIP3)	N/A	30 dBm max.
RX RF Return Loss	N/A	14 dB min.
Antenna Power Supply	N/A	+5VDC, 70 mA max.
TX RF Output Power	-70 dBm max.	N/A
TX Output IP3 (OIP3)	+10 dBm max.	N/A
TX Other Spurious Outputs	-75 dBm max.	N/A
RF Link Budget to Antenna	N/A	+13 dB
Optical Ports	SMF, SC/APC	SMF, SC/APC
Fiber Category	Single Mode (OS2)	
Fiber Data Rate	100 GB max.	
Fiber Core/Cladding Dimension	9/125 um	
Delay Efficiency	100 nS max.	
Optical Budget	Up to 4 Km @ 1310 nm	
Alarms	LEDs, Dry Contact Closures, USB readout	LED
	Laser warning:Invisible Laser Radiation emitting from Optical connector. Avoid direct exposure to beam. 20 mW max. A 1310 and 1550 nm CDRH Class IIIB.	

General Characteristics	Fiber Converter Unit	Outdoor Remote Unit
Power Consumption (@ 48 VDC)	350 mA Max. (Standalone)	250 mA Max., 200 mA Typ. (includes 70 mA @ 5 VDC provided to the GPS Antenna LNA)
Power Consumption	600 mA Max. (includes power supplied to outdoor unit)	
Input Fuse	2A Resettable	N/A
Output Fuse	1A Resettable (on 48 VDC Output Line)	N/A

Description	GPS-ANT-28-3 (GPS Antenna)
Frequency Range	1575.42 ± 10 MHz
LNA Gain	26.5 dB ± 3 dB
Element Gain	3.5 dBic
Out of Band Rejection	≥ 65 dB @ 1559 MHz, ≥ 65 dB @ 1625 MHz
VSWR (Return Loss)	≤ 1.5:1 (≥ 14.0 dB)
Noise Figure	≤ 4.0 dB @ 25°C (typ.), ≤ 4.5 dB @ 25°C (max.)
Current Draw	≤ 40 mA @ 5V
ESD Proterction	15 kV
DC Voltage	Operating: 3.3-12.0 VDC (regulated), Survival: 24 VDC
Nominal Impedance	50 ohms
Polarization	Right hand circular
Dimensions	5.0" (H) x 3.2" (D) (126 mm (H) x 81 mm (D))
Weight	0.6 lbs. (0.3 kg)
Temperature Range	-40°C to +85°C
Humidity	95%

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Description	GPS-AC-48V (Optional AC to DC Power Supply Specifications)	GPS-ACC-48V (Optional Outdoor AC to DC Power Supply Specifications)
DC Output Voltage (Nominal)	48 VDC	
Rated Current	1.9 A	1.3 A
Rated Power	90.24W	62.4W
Output Voltage Stability	±1.0%	
Input Voltage Range	90 - 264 VAC	
Input Frequency Range	47 - 63 Hz	
Power Factor (at full load)	90% typical	98% (115 VAC), 95% (230 VAC)
Efficiency	89.5% typ. (115 VAC), 91% (230 VAC)	90.5% typ. (115 VAC), 92% (230 VAC)
AC Current	0.95A typ.(115 VAC), 0.5A (230 VAC)	0.64A typ.(115 VAC), 0.32A (230 VAC)
Inrush Current	Cold Start 30A typ. (twidth = 550uS measured at 50% Ipeak) at 115 VAC, Cold Start 60A typ. (twidth = 550uS measured at 50% Ipeak) at 230 VAC	Cold Start 55A typ. (twidth = 265uS measured at 50% Ipeak) at 230 VAC
Overcurrent Protection	95-108% (Constant current limiting), recovers automatically after fault condition is removed)	
Short Circuit Protection	Hiccup mode (recovers automatically after fault condition is removed)	
Over Voltage Protection	54-60 V (Shut down output voltage, re-power on to recover)	54-65 V (Shut down output voltage, re-power on to recover)
Over Temperature	Shut down output voltage, re-power on to recover	
IEC Standard 60529 (Ingress Protection)	IP67 (Main Body only)	IP67
UL Certification	U_L	U_L, U_LC
Working Temperature	-40°C - +70°C	Tcase = -40°C - +80°C
Working Humidity	20 - 95 % RH (non-condensing)	
Storage Temperature, Humidity	-40°C - +80°C, 10 - 95 % RH	
Temp. Coefficient	±0.03%/°C (0°C - 50°C)	±0.03%/°C (0°C - 60°C)
Withstanding Voltage	I/P-O/P:3.75 KVAC	I/P-O/P:3.75KVAC I/P-FG:2KVAC O/P-FG:1.5KVAC
Isolation Resistance	I/P-O/P:100M Ohms (@500 VDC, 25°C, 70% RH)	I/P-O/P, I/P-FG, O/P-FG:100M Ohms (@500 VDC, 25°C, 70% RH)
EMC Emission	Compliance to FCC Part 15	Compliance to BS EN/EN61000-4-2,3,4,5,6,8,11; BS EN/EN61547, light industry level (surge immunity Line-Earth 4KV, Line-Line 2KV),EAC TP TC 020
MTBF	292.8K hrs. minimum	338K hrs. minimum
Dimensions	171 x 63 x 37.5 mm (6.73 x 2.48 x 1.48")	171 x 61.5 x 36.8 mm (6.73 x 2.42 x 1.45")
Weight	0.83 kg (1.82 Lbs.)	0.73 kg (1.6 Lbs.)

Environmental

Operating Temperature	0˚C to +50˚C (Indoor FO/GPS Receiver) / -20˚C to +50˚C (Outdoor GPS/FO Transmitter)
Enclosure	Indoor FO/GPS Receiver (IP11) / Outdoor GPS/FO Transmitter (IP67)
Relative Humidity	0 - 45 % (Indoor) / 0 - 99% (Outdoor)
MTBF	>500,000 hours
Lightning Protection	8/20uS, ±20KA max., 10 strikes each, IEC61000-4-5

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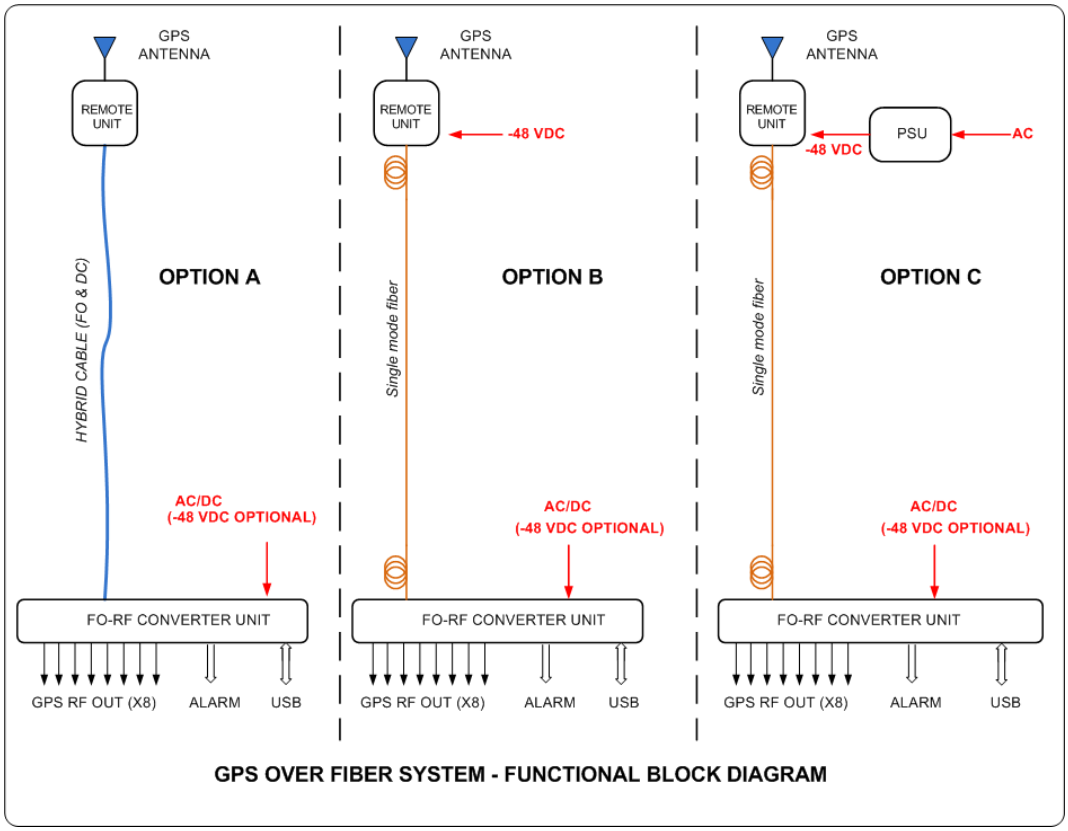
Mechanical

Outdoor GPS to Fiberoptic Transmitter	
GPS Antenna Input Connector	1 x N-Type male
Fiberoptic Connector	SC/APC
DC Input Connector	2 Position Terminal Block
Dimensions (with connectors & panel) - (HxWxD)	9.13 x 4.80 x 2.95 in (232 x 122 x 75 mm)
Weight (w/o Bracket)	< 2.75 lb
Mounting	Pole/Wall Mount

Outdoor Fiberoptic to GPS Receiver	
GPS RF Output RF Connectors	8 x N-Type female (GPS-FO-Rx-8)
Fiberoptic Input Connector	SC/APC
DC Input Connector	2 Position Terminal Block
DC Output Connector	2 Position Terminal Block
Communications & Control Connector	USB
Alarm Connector	6 Position Terminal Block
Dimensions - (H x W x D) - with Faceplate	1.72 x 19 x 8 in (43.69 x 482.6 x 203.2 mm)
Dimensions - (H x W x D) - Body Only	1.72 x 17 x 8 in (43.69 x 431.8 x 203.2 mm)
Weight	6 lbs
Mounting	19 in. rack mountable 1U

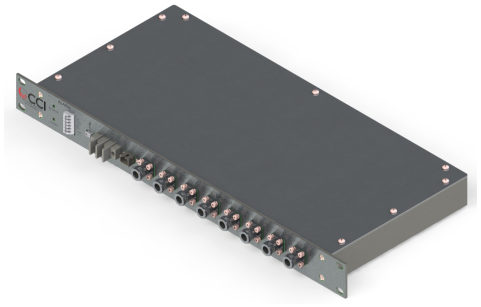
GPS-FO-Tx-1A (GPS to Fiberoptic Transmitter) Drawing

Block Diagram



GPS Over Fiber System (GPS-FOS-T1R8-SA3) Functional Block Diagram

GPS-FO-Tx-1A (GPS to Fiberoptic Transmitter)



GPS-FO-Rx-8P (Fiberoptic to GPS Receiver) Front Panel View

STANDARDS & CERTIFICATIONS

GPS Over Fiber System

GPS-FOS-T1R8-SA3x

Parts & Accessories

GPS-FOS-T1R8-SA3P	This Generation One GPS Over Fiber System includes one outdoor Generation One GPS to Fiberoptic Transmitter (GPS-FO-Tx-1P) and one Generation One 8 Channel Indoor Fiberoptic to GPS Receiver with -48V positive ground standard (GPS-FO-Rx-8P)
GPS-FOS-T1R8-SA3P-K	This Generation One GPS Over Fiber System includes one outdoor Generation One GPS to Fiberoptic Transmitter (GPS-FO-Tx-1P), one Generation One 8 Channel Indoor Fiberoptic to GPS Receiver with -48V positive ground standard (GPS-FO-Rx-8P) and one outdoor 48 VDC AC to DC Power Supply
GPS-FOS-T1R8-SA3A	This Generation Two (current Gen) GPS Over Fiber System includes one outdoor Generation Two GPS to Fiberoptic Transmitter (GPS-FO-Tx-1A) and one Generation Two 8 Channel Indoor Fiberoptic to GPS Receiver with -48V positive ground standard (GPS-FO-Rx-8A)
GPS-FOS-T1R8-SA3A-K	This Generation Two (current Gen) GPS Over Fiber System includes one outdoor Generation One GPS to Fiberoptic Transmitter (GPS-FO-Tx-1A), one Generation One 8 Channel Indoor Fiberoptic to GPS Receiver with -48V positive ground standard (GPS-FO-Rx-8A) and one outdoor 48 VDC AC to DC Power Supply
GPS-FO-Tx-1P	Generation One Outdoor GPS to Fiberoptic Transmitter
GPS-FO-Tx-1A	Generation Two (current Gen) Outdoor GPS to Fiberoptic Transmitter
GPS-FO-Rx-8P	Generation One 8 Channel Indoor Fiberoptic to GPS Receiver with -48V positive ground standard
GPS-FO-Rx-8A	Generation Two (Current Gen) 8 Channel Indoor Fiberoptic to GPS Receiver with -48V positive ground standard
GPS-ANT-28-3	GPS Antenna
GPS-ACC-48	Optional Outdoor 48V AC to DCPower Supply with Canadian UL Certification

Standards & Compliance

Safety	UL 60950-1
Environmental	EN 60529 IP11 (Indoor FO/GPS Receiver), IP 67 (Outdoor GPS/FO Transmitter)

Certifications

CE, CSA US, ISO 9001