# SONABEAM™

SONA
OPTICAL WIRELESS

# SONABEAM FROM FSONA

At fSONA, we deliver optical wireless connectivity solutions that bridge network gaps with unmatched simplicity and performance. From point-to-point connectivity to meshed networking architectures, the SONAbeam's protocol transparent technology gives military, government, service providers and enterprise customers alike the unique ability to integrate free space optics (FSO) quickly and easily into any existing network.

By transmitting through the atmosphere, the SONAbeam eliminates the substantial costs of digging up streets and sidewalks required to install fiber, and unlike other wireless solutions, the SONAbeam is immune to electro-magnetic (EM) and radio-frequency (RF) interference, as well as offering the benefit of eliminating the requirement for costly spectrum licenses. Plus; the SONAbeam's narrow, highly directional transmission all but eliminates eavesdropping or interception. Utilizing advanced FSO technology at the eye-safe 1550 nm wavelength, fSONA has created the most potent FSO systems ever brought to market.

## FORWARD THINKING IN FREE SPACE OPTICS (OPTICAL WIRELESS)

Key to SONAbeam's breakthrough laser technology is its operational wavelength of 1550 nm, which provides a broad spectrum of safety and performance advantages. Wavelengths longer than 1400 nm are safe to the human eye. Thus the SONAbeam is a true eyesafe platform that meets ANSI Class 1 and IEC Class 1M safety standards. Already operating with the highest output power levels in the industry, the SONAbeam still has room to grow; thanks to the benefits of the 1550 nm wavelength.

## SECURE WIRELESS

In today's environment, network security is critical to an organization's survival. The vulnerabilities of RF systems have led people to wrongly conclude that all wireless transmissions are highly vulnerable to interception. The SONAbeam's FSO technology is among the most secure of any wide-area connectivity solution; this is due to its inherent low probability of interception, its anti-jam characteristics and the stealth nature of the transmission.

## RUGGED AND ROBUST

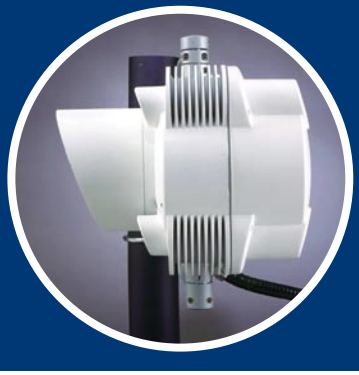
At fSONA, we explored every possible design consideration to ensure the SONAbeam transceivers are able to survive in even the most extreme weather conditions - from the intense cold of the north, to the blazing desert sun. The SONAbeam's superior environmentally sealed, cast-aluminum housing, is unique in the market and is impervious to water, sun and other environmental hazards. Its support infrastructure is rigid enough to maintain stability in winds up to 120 km/h and survive driving gales of up to 160 km/h, allowing for problem-free rooftop and tower installations. The SONAbeam has also been designed to operate through windows, again furthering the available deployment options.

## THE MOST RELIABLE PART OF YOUR NETWORK

Thorough product testing is one of the cornerstones of our business, and we consider our testing procedures to be the most rigorous in the industry. To ensure complete reliability throughout the SONAbeam's internal systems, we select and design the electronics to not only utilize the best components available, but to ensure these components operate at the lowest possible stress levels. We then subject every component and every subsystem to a battery of laboratory and real-world tests to confirm the integrity of our design.

## CARRIER-CLASS AVAILABILITY

The SONAbeam's high-powered laser transmitters are able to penetrate heavy rain, snow and fog far more effectively and consistently than any other available FSO technology. The ability to deliver the industry's highest link margins makes the SONAbeam ideal for use in hybrid networks; using complementary technologies to create fully protected, fully redundant, multi-media solutions - a requirement in today's networks. With up to four redundant transmitters, the SONAbeam produces up to 640mW of output power; 30-50 times more transmission power than most competing FSO products. With greater power comes enhanced weather penetration capabilities and more effective transmission over longer ranges.



| | sonaBeam 1250-M | sonaBeam 155-M |
|---|---|---|
| Transmission rates | 100 - 1448 Mbps (datarate transparent and reclocked) | 31 - 180 Mbps (datarate transparent and reclocked) |
| Transmission standards | OC-3/STM-1, OC-12/STM-4, 270 Mbps, 1064 Mbps, Fast/Gig Ethernet | OC-3/STM-1, Fast Ethernet |
| Range: 3 dB/km (clear air) | 400 m to 5300 m (1310 ft to 3.3 mi) | 300 m to 6400 m (980 ft to 4.0 mi) |
| 10 dB/km (extreme rain) | 400 m to 2325 m (1310 ft to 1.4 mi) | 300 m to 2675 m (980 ft to 1.7 mi) |
| Laser output power | 640 mW peak (4 x 160 mW) | 640 mW peak (4 x 160 mW) |
| Fiber xmtr output power | -11 dBm( min), -3 dBm (max) | -15 dBm (min), -8 dBm (max) |
| Fiber rcvr input power | -20 dBm (min), -3 dBm (max) | -31 dBm (min), -8 dBm (max) |
| Receive aperture | 20 cm (8 in) diameter, effective clear | 20 cm (8 in) diameter, effective clear |

| | sonaBeam 52-M |
|---|---|
| Transmission rates | 10 - 68 Mbps (datarate transparent and reclocked) |
| Transmission standards | E3, DS3, OC-1/STM-0 |
| Range: 3 dB/km (clear air) | 300 m to 7700 m (980 ft to 4.8 mi) |
| 10 dB/km (extreme rain) | 300 m to 3125 m (980 ft to 1.9 mi) |
| Laser output power | 640 mW peak (4 x 160 mW) |
| Fiber xmtr output power | -15 dBm (min) to -8 dBm (max) |
| Fiber rcvr input power | -31 dBm (min) to -8 dBm (max) |
| Receive aperture | 20 cm (8 in) diameter, effective clear |

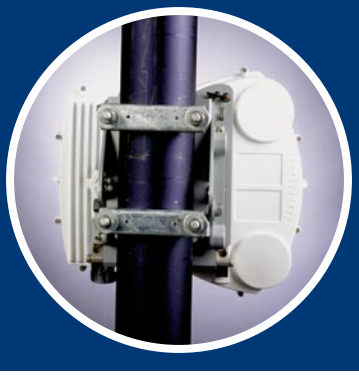
| FIBER-OPTIC INTERFACE | |
|---|---|
| Interface type | SM or MM fiber, SC terminated |
| Fiber xmtr wavelength | 1310 nm nominal (1280 nm to 1335 nm) |
| Fiber rcvr wavelength | 1310 nm nominal (1280 nm to 1335 nm) |

| MECHANICAL / ELECTRICAL / ENVIRONMENTAL | |
|---|---|
| Operating temperature | -40ºC to 60ºC (-40ºF to 140º F) |
| Solar filters | 2 spatial, 2 spectral |
| Pointing stability | 120 km/h (75 mph) operating, > 160 km/h (100 mph) survivability |
| Environmental seal | Water-tight, IP66 + NEMA-4 rated |
| Dimensions (W*H*D) | Centimeters: 41 x 41 x 46; Inches: 16 x 16 x 18 |
| Weight - kg (lbs) | Head: 20 kg (44 lbs); PCA: 8 kg (17 lbs); Yoke: 8 kg (17 lbs) |
| Input voltage | -48v DC nominal, Operational range (-40v to -57v) |
| Optional AC | External AC supply available: 85-260 VAC (50/60 Hz) |
| Power consumption | Transceiver: 55 watts, max; Heaters: 200 watts, max |

| CARRIER-CLASS RELIABILITY AND DURABILITY | |
|---|---|
| Heating | Internal, to 30ºC (86ºF), prevents optics fogging, snow/sleet accumulation |
| Laser cooling | Active solid state cooling to 35ºC (95ºF), even in desert conditions |
| Redundant transmitters | 4 independent lasers, drivers, coolers & cooler controllers |
| Power supply | Carrier-grade, 2 million hour MTBF for DC |
| Structure | Cast aluminum housing, yoke & mount |
| Adaptive power control | Adjusts laser power to changing weather conditions |



*Printed specifications subject to change. Please refer to www.fsona.com for current information*





| | sonaBeam 1250-S | sonaBeam 155-S |
|---|---|---|
| Transmission rates | 100 - 1448 Mbps (datarate transparent and reclocked) | 31 - 180 Mbps (datarate transparent and reclocked) |
| Transmission standards | OC-3/STM-1, OC-12/STM-4, 270 Mbps, 1064 Mbps, Fast/Gig Ethernet | OC-3/STM-1, Fast Ethernet |
| Range: 3 dB/km (clear air) | 100 m to 3600 m (330 ft to 2.0 mi) | 100 m to 4450 m (330 ft to 2.8 mi) |
| 10 dB/km (extreme rain) | 100 m to 1710 m (330 ft to 1.1 mi) | 100 m to 2000 m (330 ft to 1.25 mi) |
| Laser output power | 320 mW (2 x 160 mW) | 320 mW (2 x 160 mW) |
| Fiber xmtr output power | -11 dBm (min), -3 dBm (max) | -15 dBm (min), -8 dBm (max) |
| Fiber rcvr input power | -20 dBm (min), -3 dBm (max) | -31 dBm (min), -8 dBm (max) |
| Receive aperture | 10 cm (4 in) diameter, effective clear | 10 cm (4 in) diameter, effective clear |
| **FIBER-OPTIC INTERFACE** | | |
| Interface type | SM or MM fiber, SC terminated | |
| Fiber xmtr wavelength | 1310 nm nominal (1280 nm to 1335 nm) | |
| Fiber rcvr wavelength | 1310 nm nominal (1280 nm to 1335 nm) | |
| **MECHANICAL / ELECTRICAL / ENVIRONMENTAL** | | |
| Operating temperature | -40ºC to 60ºC (-40ºF to 140ºF) | |
| Solar filters | 2 spatial, 2 spectral | |
| Pointing stability | 120 km/h (75 mph) operating, > 160 km/h (100 mph) survivability | |
| Environmental seal | Water-tight, IP66 + NEMA-4 rated | |
| Dimensions (W*H*D) | Centimeters: 40 x 40 x 36; Inches: 16 x 16 x 14 | |
| Weight - kg (lbs) | Head: 17 kg (37 lbs); Mount: 6 kg (13 lbs) | |
| Input voltage | 85-260 VAC (50/60 Hz) | |
| Power consumption | Transceiver: 40 watts, max; Heaters: 200 watts, max | |
| **CARRIER-CLASS RELIABILITY AND DURABILITY** | | |
| Heating | Internal, to 25ºC (77ºF), prevents optics fogging, snow/sleet accumulation | |
| Laser cooling | Active solid state cooling to 35ºC (95ºF), even in desert conditions | |
| Redundant transmitters | 2 independent lasers, drivers, coolers & cooler controllers | |
| Power supply | Carrier-grade, 1 million hour MTBF | |
| Structure | Cast aluminum housing & mount | |
| Adaptive power control | Adjusts laser power to changing weather conditions | |

| | sonaBeam 155-E | sonaBeam 52-E |
|---|---|---|
| Transmission rates | 31 - 180 Mbps (datarate transparent or reclocked) | 10 - 68 Mbps (datarate transparent or reclocked) |
| Transmission standards | E3, DS3, OC-1/STM-0, OC-3/STM-1, Fast Ethernet | E3, DS3, OC-1/STM-0, Ethernet 10baseT |
| Range: 3 dB/km (clear air) | 50 m to 3300 m (160 ft to 2.1 mi) | 50 m to 3850 m (160 ft to 2.3 mi) |
| 10 dB/km (extreme rain) | 50 m to 1620 m (160 ft to 1.0 mi) | 50 m to 1820 m (160 ft to 1.1 mi) |
| Laser output power | 100 mW peak (2 x 50mW) | 100 mW peak (2 x 50mW) |
| Receive aperture | 10 cm (4 in) diameter | 10 cm (4 in) diameter |
| **MULTI-MODE FIBER-OPTIC INTERFACE CARD** | | |
| Data physical interface | Multi-mode fiber, SC terminated | Multi-mode fiber, SC terminated |
| Fiber xmtr output power | -20 dBm (min), -14 dBm (max) | -20 dBm (min), -14 dBm (max) |
| Fiber rcvr input power | -30 dBm (min), -14 dBm (max) | -30 dBm (min), -14 dBm (max) |
| 3R clock & data recovery (CDR) | User selectable, bypass for rate-transparency or mux | User selectable, bypass for rate-transparency or mux |
| **SINGLE-MODE FIBER-OPTIC INTERFACE CARD** | | |
| Data physical interface | Single-mode fiber, SC terminated | Single-mode fiber, SC terminated |
| Fiber xmtr output power | -15 dBm (min), -8 dBm (max) | -15 dBm (min), -8 dBm (max) |
| Fiber rcvr input power | -31 dBm (min), -8 dBm (max) | -31 dBm (min), -8 dBm (max) |
| 3R clock & data recovery (CDR) | User selectable, bypass for rate-transparency or mux | User selectable, bypass for rate-transparency or mux |

| | sonaBeam 1250-E |
|---|---|
| Transmission rates | 100 - 1602 Mbps (datarate transparent or reclocked) |
| Transmission standards | Fast Ethernet , OC-3/STM-1, OC-12/STM-4, Gigabit Ethernet (1.25 Gbps) |
| Range: 3 dB/km (clear air) | 50 m to 3600 m (160 ft to 2.0 mi) |
| 10 dB/km (extreme rain) | 50 m to 1710 m (160 ft to 1.1 mi) |
| Laser output power | 320 mW (2 x 160 mW) Directly modulated laser diode |
| Receive aperture | 10 cm (4 in) diameter, effective clear |
| Free space wavelength | 1550 nm |

| INTERFACE CARDS | 1000-base-SX (850nm) | 1000-base-TX | 1000-base-LX (1310nm) |
|---|---|---|---|
| Data physical interface | MM fiber, LC | RJ45 copper interface | SM + MM fiber, LC |
| Data transmission | 100 to 1602 Mbps | 100 and 1000 Mbps | 100 to 1602 Mbps |
| Fiber xmtr/rcvr wavelength | 850 nm nominal | Not applicable | 1310 nominal |
| Fiber xmtr output power | 802.3z compliant | Not applicable | -11 dBm(min), -03 dBm(max) |
| Fiber rcvr input power | 802.3z compliant | Not applicable | -20 dBm(min), -03 dBm(max) |
| 3R clock & data recovery (CDR) | Configurable (rate specific or bypass | 100-base-t Ethernet 1000-base-t Ethernet | Configurable (rate specific or bypass |



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| FIBER-OPTIC INTERFACE | |
|---|---|
| Interface type | SM or MM fiber, SC terminated |
| Fiber xmtr wavelength | 1310 nm nominal (1280 nm to 1335 nm) |
| Fiber rcvr wavelength | 1310 nm nominal (1280 nm to 1335 nm) |

| MECHANICAL / ELECTRICAL / ENVIRONMENTAL | |
|---|---|
| Operating temperature | -40ºC to 60ºC (-40ºF to -140ºF) |
| Solar filters | 2 spatial, 2 spectral |
| Pointing stability | 120 km/h (75 mph) operating, > 160 km/h (100 mph) survivability |
| Environmental seal | Water-tight, IP66 + NEMA-4 Certified |
| Dimensions (W*H*D) | Centimeters: 25 x 33 x 46; Inches: 10 x 13 x 18 |
| Weight - kg (lbs) | Head: 10 kg (22 lbs) |
| Input voltage | 22-57 VDC or 100-240 VAC |
| Power consumption | Transceiver & heater: 155-E/52-E: 30 watts, max; 1250-E: 50 watts max |

| CARRIER-CLASS RELIABILITY AND DURABILITY | |
|---|---|
| Heating | Window heating prevents optics fogging, snow/sleet accumulation |
| Laser cooling | Cast aluminum heat sink |
| Redundant transmitters | 2 independent lasers and drivers |
| Power supply | Telco grade - >550,000 hr demonstrated at 25ºC (77ºF) |
| Structure | Cast aluminum and steel housing & mount |

| ELEMENT MANAGEMENT AND CONTROL | M / S SERIES | E SERIES |
|---|---|---|
| Management interface | Serial (DB9 or RJ-45) and 10-base-t | Serial (DB9 or RJ-45) and 10-base-t |
| SNMP | Embedded v.1 agent | Embedded v.1 agent |
| GUI control program | SONAbeam™ Terminal Controller | SONAbeam™ Terminal Controller |
| Command line interface | Via RS232 or IP address | Via RS232 or IP address |
| Key parameters monitored | Receive signal strength, Power supply currents and voltages, Laser currents, Laser powers (APC levels), Laser temperatures, Internal temperature and humidity, Clock recovery / sync status, Network interface signal status | Receive signal strength, Laser modulation current, 5V internal supply voltage, 5V internal supply current, Internal temperature, Interface card type inserted, Input signal presence, FSO data lock |
| Historical logging | Internal data and event logging | N/A |

| CERTIFICATIONS AND CLASSIFICATIONS | *US/Canada* | *International* |
|---|---|---|
| Laser safety | CDRH 21 CFR including Laser Notice 50, Class 1M; ANSI Z136.1 & Z136.6, Class 1 | IEC 60825-1, Class 1M<br>EN 55022 - emissions |
| EMC | FCC - Pat 15 / ICES - 003 | EN 55024 - immunity |
| Electrical | UL 60950 / CSA 60950 | EN 60950 (CB scheme) |

FSONA
OPTICAL WIRELESS


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**fSONA's Authorized Reseller:**