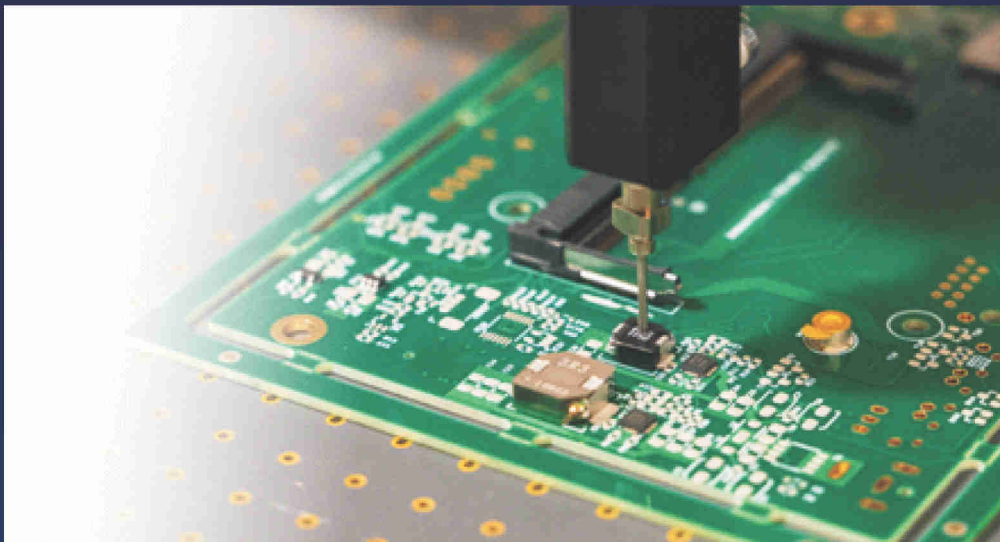




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SPTS Design Services

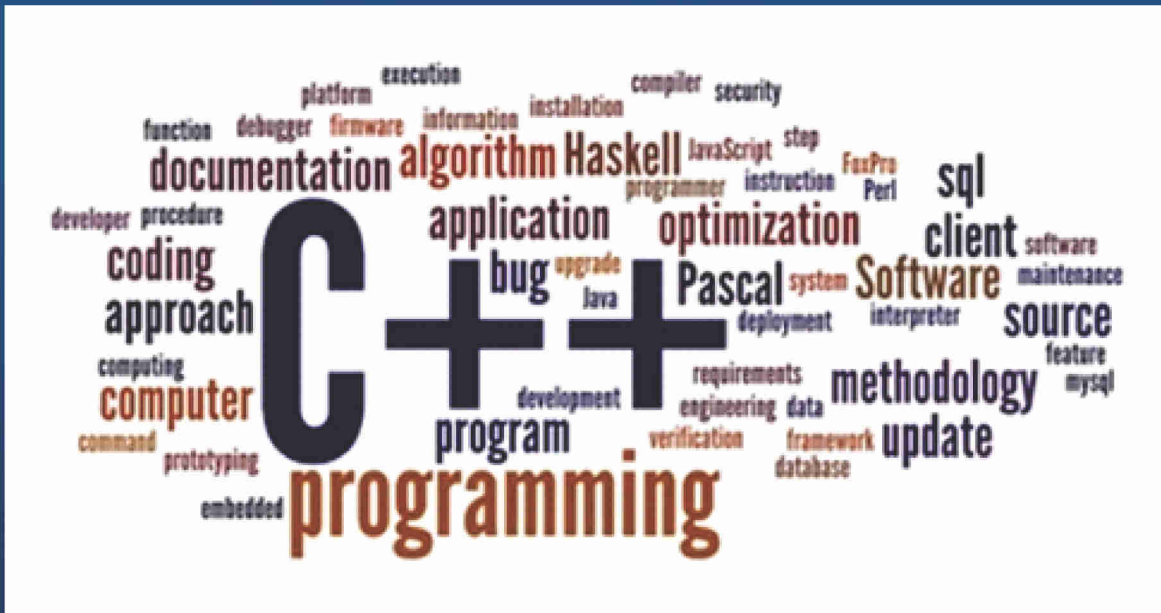
Hardware Design Services :



Space Pulse Techno Solutions (SPTS) offers various Hardware Design Services for Single board design, Multi-board system design, Mixed Signal board (Analog and Digital), Processor/Micro-controller based designs, FPGA based designs, Reference designs/ Evaluation platforms, Power optimized designs, Small form factor designs, High density boards. Our board design services include:

- Hardware board design : Schematics and PCB Layout development
 1. RF Transceiver and Digital Board design
 2. Software Defined Radio Cards
 3. Antenna Control Unit
 4. Wireless/ RF interfaces: Wi-Fi, Bluetooth, 3G, 4G LTE etc
 5. Analog and Mixed signal boards
 6. Multi-Layer high-speed boards. Hybrid Stack-up with Rogers/ Megtron 6 and FR408 dielectric
 7. Boards will be designed to meet the MIL / JSS 55555 qualification.
- Prototyping: PCB Fabrication & Assembly
- Testing: Board bring-up, Engineering Validation Tests, Design Verification Tests
- Production handover, Pilot production and Production support

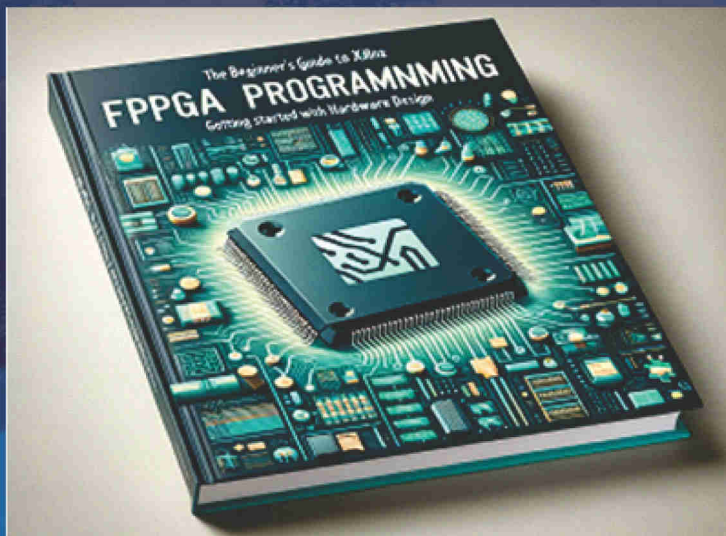
Embedded Software Design Services:



Software is most critical component of any system. Space Pulse Techno Solutions develops Software/Firmware for Embedded system, Microcontroller family, RTOS based application firmware, Processor family like Beagle Bone Black, Raspberry pi or equivalent processor firmware development.

- Bare Metal Application Software development/ porting/ integration
- Motor Controller
- Feature enhancement
- UX / UI Design
- Mobile application development
- Production Test Automation/ Test Software

FPGA Software Design Services :



SPTS has expertise in developing FPGA based designs. Our end-to-end capability in FPGA design and quick development cycle positions us to be the right partner for any FPGA based design activity. Our FPGA design services includes:

Rugged MIL Class Enclosure Design Services :

SPTS has expertise in developing FPGA based designs. Our end-to-end capability in FPGA design and quick development cycle positions us to be the right partner for any FPGA based design activity. Our FPGA design services includes:



Our Mechanical design team helps to realize the right enclosure or mechanicals required for a product, considering the aesthetics, cost, cooling requirements, durability, ruggedness, safety aspects etc. Our capabilities include designing of Rackmount Chassis, DIN rail systems, Desktop Enclosure, Handheld Enclosure, Box type Enclosure, NEMA Enclosure, and Rugged Enclosure. Some of the design services we offer are:

- Industrial design
- Conceptual drawing
- Rapid Prototyping
- Sheet metal / Plastic enclosures
- Drawing format conversion
- Packaging / Carton / Label design
- Thermal design and cooling solutions



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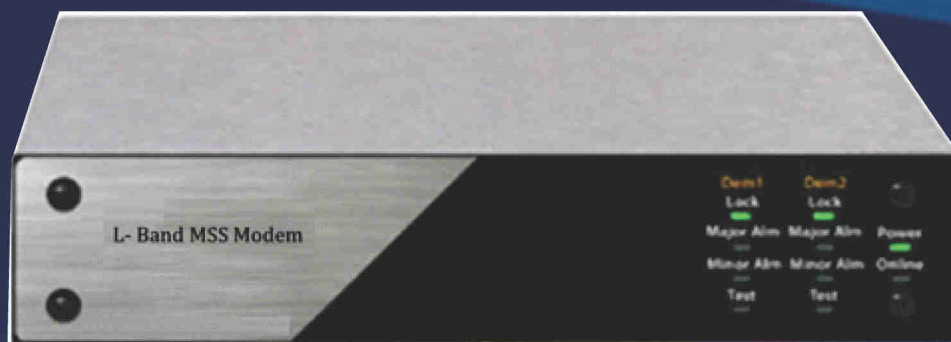
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SPACE PULSE TECHNO SOLUTIONS PVT. LTD.

L/S Band continuous-mode PSK Modem



Modem Features :

- BPSK/QPSK Modulation.
- Programmable symbol rate, up to 40 MSymbols/s
- Convolutional or Turbo code error correction.
- Nominal frequency of operation: 70 MHz – 6GHz for direct connection to external LNB or BUC.

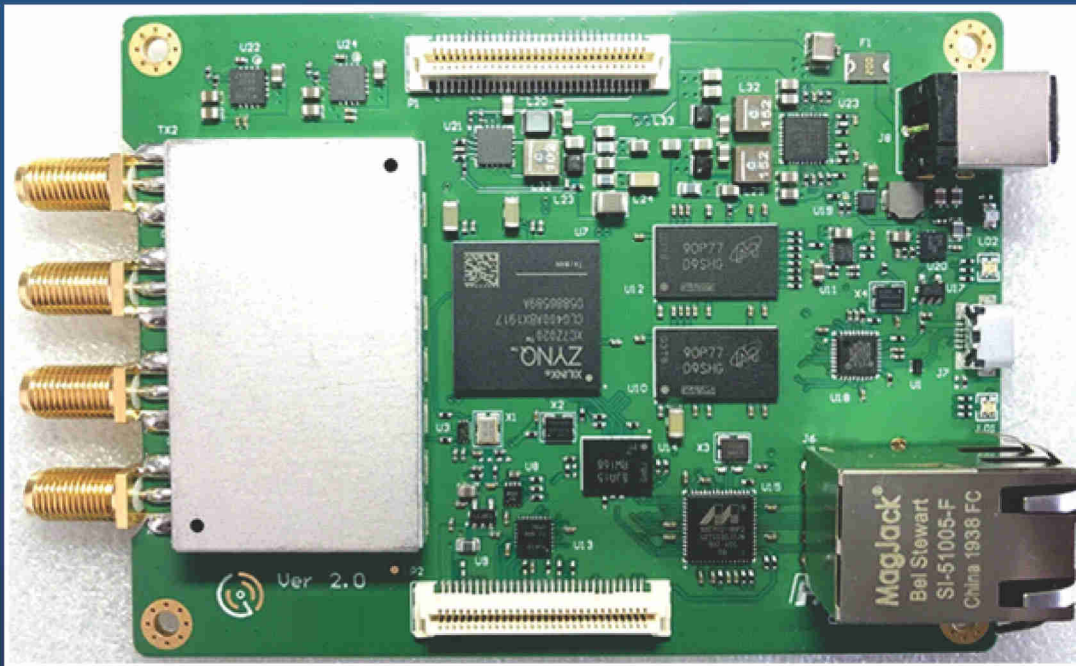
Burst mode operation

- Programmable fixed-length data frames from/to LAN/UDP ports
- Multiple frames transmitted efficiently with only 44-symbol separation
- Acquisition: 94-symbol preamble
- Large frequency acquisition range: $\pm 20\%$ of symbol rate
- Programmable symbol rate up to 40 MSymbols/s
- Supply voltage: 12VDC with reverse voltage and surge protection.
- Frequency reference: internal TCXO or input for an external, higher-stability 10 MHz frequency reference

Built-in tools: PRBS-11 pseudo-random test sequence, BER tester, AWGN generator, internal loopback mode.

Monitoring:

- Carrier frequency error
- SNR
- BER



Technical specification

S.No.	Parameter	Specification
1.	IF Frequency	950 MHz to 1750 MHz
2.	Frequency tuning step	1 KHz
3.	I/P Frequency acquisition range	± 5 KHz
4.	I/P Level Range	-45 to -55 dBm
5.	O/P RF Level Range	-10dBm Max
6.	I/P Impedance	50 Ω
7.	I/P return loss	>18 dB
8.	I/P spectrum selection	Normal, inverted
9.	Data rate	Programmable up to 40M symbols/s
10.	Modulation	BPSK, QPSK
11.	FEC encoding	R=1/2, K=7 G1=1718, G2=1338
12.	FEC decoding	K=9 rate 1/2 convolutional code with zero tail bits.
13.	Turbo code encoder rate	Rate 1/3, 1/2, 2/3, 3/4, 4/5, 5/6, 6/7, 7/8
14.	Turbo code decoder rate	Rate 1/3, 1/2, 2/3, 3/4, 4/5, 5/6, 6/7, 7/8

S.No.	Parameter	Specification
15.	Input selection	From UDP or TCP/IP
		Internal pseudo-random test sequence. 100ms repetition
		Internal pseudo-random test sequence continuous transmission
		Unmodulated test mode (carrier only)
16.	Phase ambiguity	By UW (64 bit programmable)
17.	Eb/No min for operation	5.0 dB
18.	Carrier recovery symbols	192 Symbol
19.	Clock recovery symbols	64 Symbol
20.	M & C Control	Ethernet TCP/IP
21.	Data port	Ethernet TCP/IP or UDP
22.	Power Supply	220VAC, 230VAC \pm 10%, 50Hz,
23.	Mechanical	Standard 19" Rack Mountable



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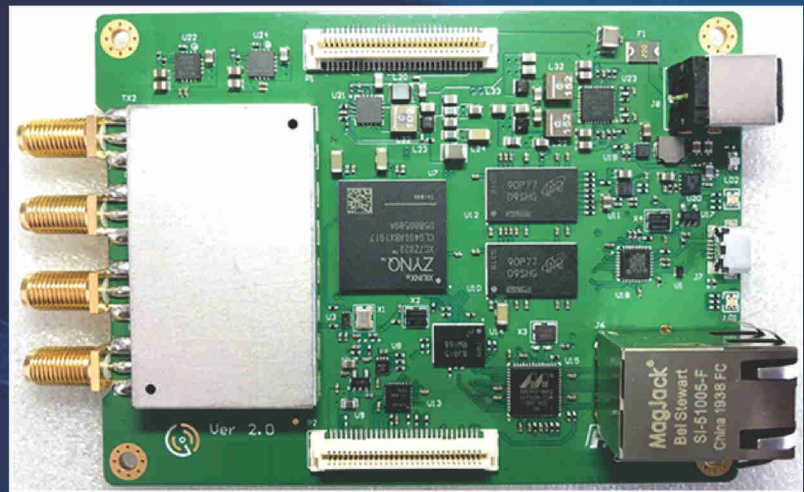
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L/S Band Direct-Sequence Spread-Spectrum (DSSS) Modem



Modem Features :

- Direct-Sequence Spread-Spectrum (DSSS) modulation.
- Programmable chip rate, up to 40 Mchips/s
- Nominal frequency of operation: 70 MHz – 6GHz for direct connection to external LNB or BUC.
- Large frequency acquisition range: $\pm(\text{chip_rate} / 256)$ Spreading codes: Gold, Maximal length, Barker, GPS C/A.
- Symbol rate: practical range from $\text{chip_rate}/2047$ to $\text{chip_rate}/3$. Maximum processing gain: 33 dB. Spreading factor: 3 to 2047.
- Demodulation performances: within 1.5 dB from theory at threshold E_b/N_0 of 2 dB.
- Convolutional or Turbo code error correction, programmable rate.
- Built-in IP router with gigabit Ethernet LAN port
- Supply voltage: 12VDC with reverse voltage and surge protection.
- Frequency reference: internal TCXO or input for an external, higher-stability 10 MHz frequency reference.



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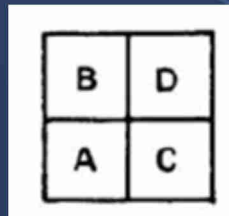
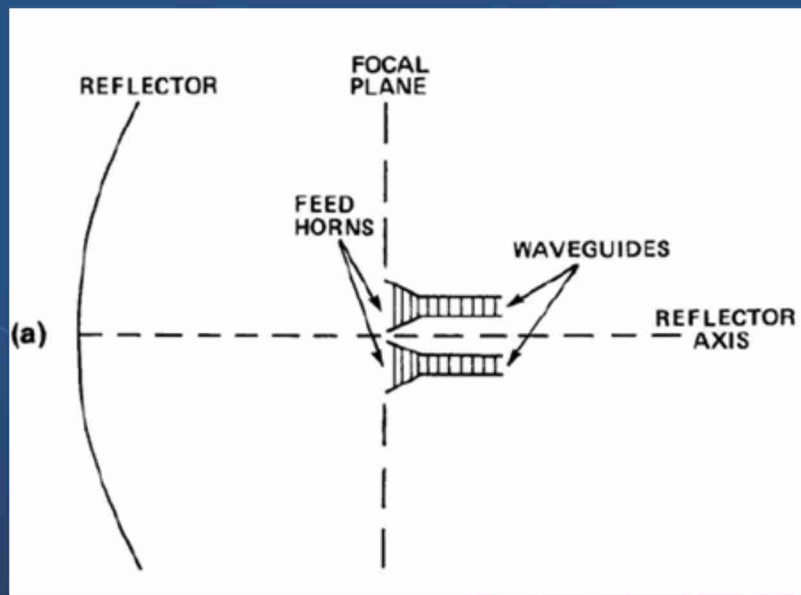
Dual Channel Monopulse Tracking Receiver

Monopulse, also known as simultaneous lobe comparison, is a technique for measuring the direction of arrival of radiation. The radiation may emanate from an active source such as a distant transmitting antenna, a beacon, a jammer, an astronomical body, or from a passive source—that is, a target or scatterer that reradiates some of the power incident on it.

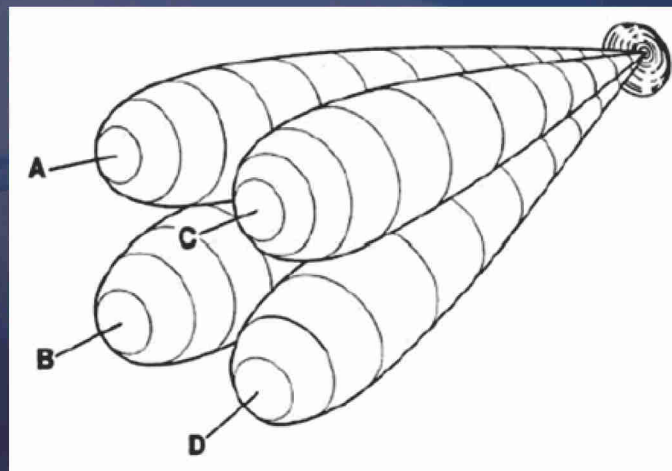
The basic functions of radar are to detect the presence of electromagnetic scatterers (radar targets) in the antenna beam and to determine their positions. In a typical radar the transmitter generates pulses of electromagnetic radiation, usually at a regular rate called the pulse repetition frequency. The antenna radiates the transmitter output into space, typically in a directional pattern that concentrates most of the power into a major lobe or beam which is narrow in one angular dimension (fan beam) or in both angular dimensions (pencil beam). The same antenna, in most cases, is also used for reception, but not necessarily with the same pattern. The received signals are converted from radio frequency (RF) to intermediate frequency (IF), amplified and filtered by one or more receivers, and then processed for visual display or for automatic (usually digital) detection and extraction of information.

A tracking radar is a radar that automatically keeps the antenna beam axis aligned with a selected target. Such a radar usually has a highly directional antenna pattern (i.e., a narrow beam). The beamwidth is typically of the order of 1° in each angular coordinate, but it varies considerably from one radar to another, and in any one radar it need not be the same in both coordinates. Any deviation of the target from the beam axis produces a correction signal (usually called an "error" signal) for each coordinate, approximately proportional to the angular deviation in that coordinate, with a sign or polarity that indicates the sense of the deviation (up or down, left or right). The correction signal is used to drive the axis toward the target.

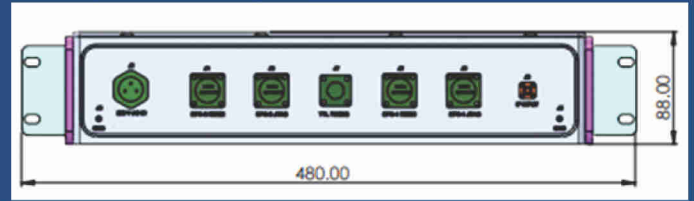
The radar that will serve as the model has a paraboloidal-reflector antenna fed by a cluster of four feed horns in the focal plane, symmetrically offset about the axis, as shown in Figure 1.3. The two feed horns that are visible in Figure 1.3(a) are displaced from the axis toward the viewer and the other two are displaced in the opposite direction. When viewed axially from the center of the reflector, the horns appear as in Figure 1.3(b). (Although drawn as squares, the horns are rectangular in many cases.) The four feed horns produce four squinted beams, as shown in Figure 1.4.3 Note that the upper horns produce the lower beams. The beams are such that if their outputs were connected to four separate, identical receivers, their responses to an incident plane wave (i.e., to the radiation also from a distant source or scatterer) would all be in the same phase but would generally differ in amplitude in accordance with the beam patterns and the direction of arrival of the wave.



The common crossover point is on the paraboloid axis. Only a target on the axis of symmetry of the antenna assembly gives equal amplitudes in the four beams. From the ratios of the amplitudes, the two angular components of the source direction relative to the axis can be determined. Three beams, yielding two independent ratios, would suffice to determine the two angular components of a single target. Four beams are generally used because of the practical advantages of symmetrical design.



Also Dual-channel Monopulse tracking receiver is one of the sub systems of auto-track system. The tracking receiver receives two RF signals at corresponding to the sum channel and error channel of the feed assembly. It uses AGC and coherent demodulation to derive digital output proportional to azimuth and elevation errors. These digital outputs are used by antenna control unit to correct off-pointing. The tracking receiver accepts sum and error 70 MHz to 6GHz signal from tracking down converter and provides digital output proportional to pointing error which is used to correct antenna pointing towards satellite/Aircraft/Helicopter. The tracking receiver design employs Automatic Gain Control (AGC) loop, phase Locked Loop (PLL) and AM demodulation detection for superior performance



Technical Specification

Parameter	Specifications
No of Input Channels	Two
Input Frequencies	Programmable L Band frequency
Frequency Tuning	1 MHz step size
RF Signal Input Impedance	50 Ω
Acquisition Range	+/- 500KHz
Input Signal Level	-70 dBm to -10dBm
Input Power Without Damage	+5 dBm (Typical)
Pre Detection RF Bandwidth	100KHz, 300 KHz, 500 KHz, 1MHz, 3MHz,8MHz,10MHz,20MHz,30MHz (programmable)
IF (video) Bandwidth (programmable)	Envelope detector shall be capable of detecting 500 Hz, 1KHz, 2KHz, 5KHz, 10KHz and 1MHz information signals (Bandwidth should be selectable)
Output impedance	50 Ω
Output Signals	Auto track-video AM signals and AGC signals
Automatic Gain Control	Built In
AGC Time constant	0.1,10,100,1000 msec (selectable)
AM polarity	Normal, Inverted (Selectable)
BITE/Health Monitoring	<ul style="list-style-type: none"> • Receiver Health Status • Synthesizer Lock Status for both receive channels • Reference LO Status • Receiver 1 Input Frequency • Receiver 2 Input Frequency • Display of input signal in dBm for both receive channels • Display of AM1 and AM2 signal levels • Display of AGC1 and AGC2 signal levels • AM modulation depth
Output Monitoring	• AGC1, AGC2, AZ Error, EL Error
Control/Data interface	Ethernet/ RS232
Dimensions	3U 19" Rack Mount Chassis,

Applications :

- GEO Satellite Earth Station Antenna Tracking
- LEO Satellite Earth Station Antenna Tracking
- Aircraft/Helicopter Tracking



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SPACE PULSE TECHNO SOLUTIONS PVT. LTD.

Antenna Control Unit (ACU)

Welcome to the future of communication! Our Antenna Control System is designed to ensure optimal performance and reliability for your communication needs. Whether you're in telecommunications, broadcasting, or satellite communication, our system is the key to maintaining uninterrupted connectivity.



Features:

Control Interface : Modbus TCP/IP, Modbus RTU.

Position Control : Accurate azimuth and elevation control for precise antenna pointing. Fine-tuning capabilities to optimize signal reception.

Tracking Modes :

- **Manual Tracking:** Allows manual adjustment of antenna position by the operator.
- **Automatic Tracking:** Utilizes tracking algorithms to automatically follow designated targets, maintaining signal lock.
- **Search Mode:** Utilizes RF signal level to search the target and lock it and enable the Auto tracking feature.
- **Point Mode:** Predefined AZ, EL angle position control
- **Slew Mode:** Continuous CW/CCW movement
- **GPS Tracking:** Using local GPS coordinate and Target GPS coordinate values GPS tracking mode will be used to track the aircraft.

- **Remote Monitoring and Control:**Seamless integration with remote monitoring systems for real-time status updates.
- **Remote control capabilities** for adjusting settings and parameters from a centralized location.
- **Fault Detection and Diagnostics:**
- **Built-in diagnostics** for detecting faults or anomalies in the system.
- **Alerts and notifications** for proactive maintenance and troubleshooting.

Benefits :

- **Enhanced communication reliability and performance.**
- **Simplified operation with intuitive control interfaces.**
- **Increased operational efficiency with automated tracking and monitoring.**
- **Flexible configuration options to meet diverse application requirements.**

Applications :

- **Telecommunications Networks**
- **Satellite Communication Systems**
- **Earth Observation and Remote Sensing**
- **Military and Defense Operations**
- **Broadcast and Multimedia Distribution**



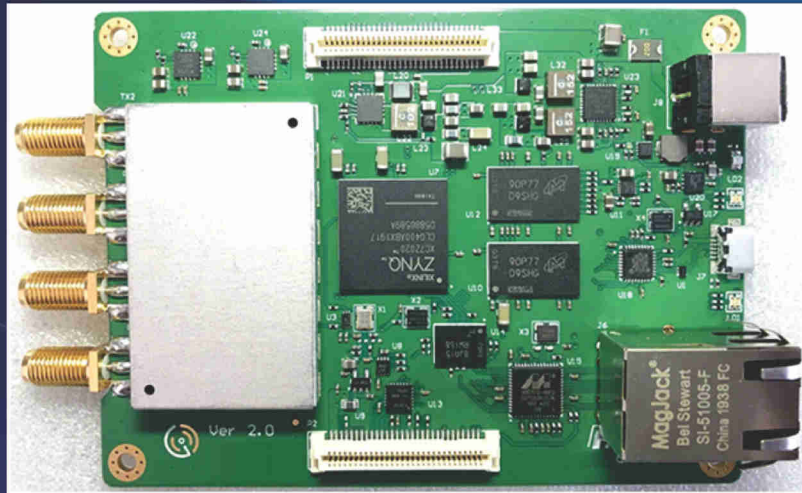
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Software Defined Radio (SDR) Hardware Platform



SDR Features:

- SDR hardware from RF to network interface.
- Custom radio-frequency bands within 70 MHz– 6GHz.
- Independently tunable low-phase noise RF frequency synthesizers for transmit and receive chain.
- Large digital signal processing capabilities:
 - Xilinx Zynq FPGA
 - RF Transceiver AD9364/AD9361IC
 - Microcontroller for configuration
- Radio-Frequency interfaces:
 - RF input: -50 to 0 dBm, 50 Ohm Direct LNB interface (10 MHz)
 - RF output: -30 to +0 dBm, 50 Ohm
- External data interface: Two
 - 10/100/1000 Ethernet LAN (RJ-45)
 - USB to UART Interface
 - FPGA JTAG ○ Controller JTAG
 - Frequency reference: internal TCXO or input for an external, higher-stability 10 MHz frequency reference.
 - Supply voltage: 12VDC with reverse voltage and surge protection.

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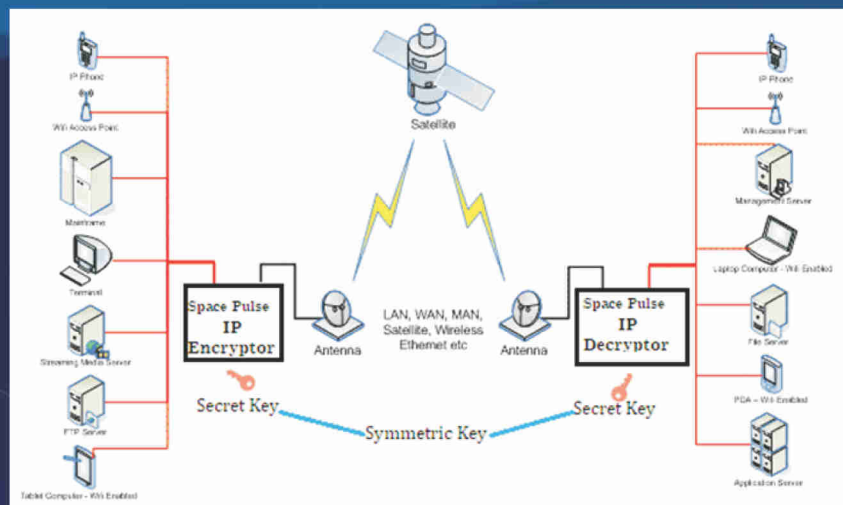
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SPACE PULSE TECHNO SOLUTIONS PVT. LTD.

AES 256 bit IP Encryptor/Decryptor



Features :

- In a context where data has become the priced entity, the risks related to data theft are constantly increasing.
- To address these threats, information flows are a significant concern and must be highly secure.
- Companies and Organizations entrust to manage data exchanges to ensure information confidentiality and integrity.
- Securing networks is the prime domain of the Space Pulse IP Encryptor (AES 256 bit).
- Simple use cases range from a point-to-point setup to connecting headquarters to its data center and expand to complex multi-site systems connecting hundreds of sites. Using the proven, industry standard 256-bit AES algorithm
- Space Pulse IP Encryptors operates at bandwidths up to 100Mbit/s.

Key features :

- Custom Keys
- Supports Transport & Tunnel Mode
- Full-Duplex Encryption and Decryption
- FPGA Based, No Operating System

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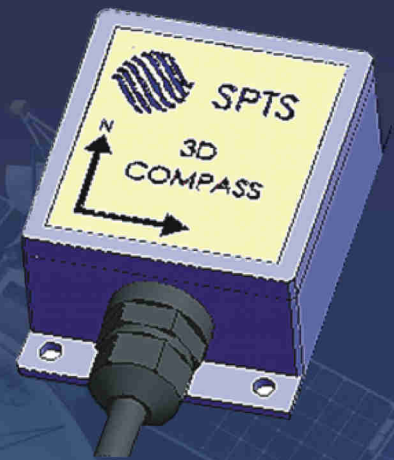
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3D Digital Compass

Introducing our state-of-the-art 3D Digital Compass, a revolutionary device designed to provide unparalleled accuracy and precision in determining orientation and direction. Whether you're exploring the great outdoors, navigating through urban landscapes, or enhancing the capabilities of your electronic devices, our 3D Digital Compass is your ultimate companion.

Features:

- **Three-Axis fluxgate sensor:** Accurate orientation detection in three dimensions.
- **Tilt Compensation:** Maintains accuracy even when not held level.
- **Calibration:** Easy calibration process for accurate readings.
- **Use Cases:** Ideal for outdoor navigation, automotive, aerospace, and more.
- **Precision Navigation:** Accurate direction detection in any environment.
- **Versatile Usage:** Suitable for a wide range of applications and activities.
- **User-Friendly:** Easy to calibrate and use, even for beginners.
- **Integration:** Enhances existing devices with compass functionality.
- **Portable:** Compact and lightweight design for on-the-go navigation.
- **Reliable:** Dependable performance in various conditions.



Technical specification for a 3D digital compass:

Features :

Heading accuracy:

- o 0.8° tilt <10°
- o 1.5° tilt <30°
- o 2.0° tilt <40°
- o Resolution: 0.1°

Pitch accuracy:

- o 0.1° <15°
- o 0.2° <30°
- o 0.3° <60°
- o Pitch range: ±85°

Rolling accuracy:

- o 0.1° <15°
- o 0.2° <30°
- o 0.3° <60°
- o Roll range: ±85°
- o Resolution: 0.1°

Calibration:

- o Hard iron calibration
- o Soft iron calibration
- o Magnetic field interference calibration method

Interface:

- o RS232/RS485/TTL
- o Output rate: 20Hz/s Programmable
- o Baud rate: 2400 to 19200baud
- o Output format: Binary high-performance protocol

Power Supply:

- o Operating Voltage: 9V to 36V DC
- o Operating Current: <50 mA
- o Standby Current: <20 mA

Dimensions:

- o Length: 60 mm
- o Width: 40 mm
- o Height: 25 mm
- o Weight: <150 grams

Environment

- o Operating Temperature Range: -40°C to +85°C
- o Storage Temperature Range: -40°C to +100°C
- o MTBF: \wedge 40000 hours/time

Applications :

- Aerospace: Guidance systems for drones, UAVs, and other aerial vehicles.
- Satellite Tracking and Positioning
- Robotics: Orientation sensing for robotic systems and vehicles.
- Virtual Reality: Immersive VR experiences with accurate orientation tracking.
- Outdoor Recreation: Hiking, camping, boating, and exploring.
- Automotive Navigation: Enhance driving experiences with accurate direction.



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Rugged GNSS Receiver

Introduction:

A GNSS (Global Navigation Satellite System) receiver is a device used to determine the geographic location of a receiver anywhere on Earth's surface. It works by receiving signals from satellites orbiting the Earth.



GNSS Constellation Support: NavIC L5/S, GPS: L1C/A, L2C, L5, GLONASS: L1OF, L2OF, Galileo: E1B/C, E5a, E5b, BeiDou: B1I, B1C, B2a, QZSS: L1C/A, L2C, L5, SBAS GAGAN.

Positioning Accuracy:

- Horizontal Accuracy: ± 2.5 meters (95%)
- Vertical Accuracy: ± 5 meters (95%)

Channels:

- Simultaneously track up to 72 channels

Update Rate:

- High update rate up to 20 Hz

Time to First Fix (TTFF):

- Cold Start: <30 seconds
- Hot Start: <5 seconds
- Autonomous: <3 minutes

Sensitivity:

- Tracking: -160 dBm
- Cold Start: -148 dBm
- Reacquisition: -160 dBm

Dynamic Performance :

- Velocity Accuracy: 0.1 m/s
- Acceleration: 4 g

Operating Temperature Range :

- 40°C to +85°C

Storage Temperature Range :

- 55°C to +105°C

Input Voltage :

- 9V to 36V DC

Power Consumption : <1 Watt

Interfaces :

- RS-232 Serial

Dimension :

- Length: 180 mm
- Width: 110 mm
- Height: 40 mm
- Weight: <1.5Kg

Antenna :

- Connector: SMA female
- Active antenna support



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3RF Jammer

Introduction:

In the modern battlefield, information is power. Gain the upper hand with our cutting-edge Electronic Warfare Jammer. Designed to disrupt enemy communications and thwart hostile threats, our jammer is your ultimate tactical solution.

Key Features:

- **Advanced Signal Disruption:** Our jammer employs state-of-the-art technology to effectively disrupt enemy communications and radar systems, rendering them ineffective.
- **Adaptive Frequency Range:** With a wide frequency range, our jammer can target multiple communication channels simultaneously, ensuring comprehensive coverage.
- **Compact and Portable Design:** Built for versatility, our jammer is compact and portable, allowing for easy deployment in various operational environments.
- **User-Friendly Interface:** Intuitive controls make operation seamless, enabling quick configuration and adjustment in the field.
- **Enhanced Security:** Protect your operations with enhanced security features that prevent unauthorized access and ensure mission integrity.

Benefits :

- **Maintain Operational Supremacy:** By disrupting enemy communications, our jammer enables you to maintain control of the battlefield, giving you the strategic advantage.
- **Protect Personnel and Assets:** Safeguard your personnel and assets from hostile threats by neutralizing enemy surveillance and targeting systems.
- **Flexible Deployment:** Whether mounted on vehicles, drones, or deployed on foot, our jammer adapts to your operational needs, providing flexible and scalable solutions.
- **Mission Success:** Ensure mission success with reliable jamming capabilities that neutralize enemy threats and facilitate mission objectives.

Technical Specifications :

- **Frequency Range:** 30MHz to 3000MHz
- **Power Output:** 500W
- **Jamming Radius:** 12km
- **Dimensions:** 220x150x100mm (L x W x H)
- **Weight:** <10Kg
- **Power Supply:** 9-36V DC

Applications :

- **Military Operations**
- **Counter-Terrorism**
- **Border Security**
- **Law Enforcement**
- **Critical Infrastructure Protection**



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