The GDP model 4433 Multi-Channel Satellite Modem system is a digital signal / data processor. This highly flexible system provides comprehensive multi-link telemetry support for satellite ground stations in a single fully integrated package.

Advanced signal processing components allow signal generation and analysis for ranging and other signal processing.

An integrated simulator with RF modulators allows local and long loop tests as well as support for system simulations. Integrated recording with 1 Terabyte (1000 GB) capacity is included.

System level advantages include redundant power, built in test, self test and easy to use touch screen control.

In-the-field upgrade capability allows the user to install changes to enhance performance, add new features and extend capabilities.

The GDP 4433 offers an affordable high performance solution for spacecraft ground station operations.
**SPECIFICATIONS**

**General:**
- Max qty. of Receivers: 6
- 4 ea. Telemetry
- 2 ea Ranging
- Max freq. of 70 MHz Modulators: 6
- 4 ea. Command or Telemetry Simulator
- 2 ea Ranging
- Baseband Inputs: 4 ea Analog to 25 MHz

**IF Frequency:**
- 70 MHz, tunable +/- 10 MHz
- Frequency Accuracy: +/- 0.0116 Hz
- Tuning step size: 0.0233 Hz
- Optional: 720 MHz +/- 10 MHz

**RF/ Front End:**
- Dynamic Range: -100 to -10 dBm
- VSWR: 1.2:1 max. 1:1 typical
- Noise Figure: +4 dB max., +3 dB typical
- Maximum Safe Input: +10 dBm
- Limiting Threshold: 2 dB Ebn/No
- Nominal Impedance: 50Ω
- Spurious Rejection: 70 dB
- AFC Tracking: +/- 500 kHz of programmed center frequency with < 0.0233 Hz frequency resolution,
  Tracking Bandwidth: Programmable between 1Hz and 2kHz.
- AGC Type: Power envelope squared detection.
- AGC Control: AGC ON/OFF, Manual
- Gain control setting
- AGC Time Constants: 0.1, 10, 100, 1000 ms, Controls: Automatic, Manual
- IF Rejection: Input band pass SAW filter, 70 db min., > 75 dB typical
- Programmable digital IF Filters: IIR Polyphase filters selectable, 50 KHz to 30 MHz

**Beamforming / Combining:**
- Supported number of beams: 4
- Pre- and Post Detect Supports
- Polarization, Geo-Spatial Diversity
- Programmable Equalizer / Beam; 0-12.25 Sec
- Modes: Single Source; Best Source;
  - Optimal Ratio; Beamforming

**Waveform Processing:**
- Type: Multi Mode providing PM / BPSK, D/PSK/ QPSK, QPSK / OQPSK / ACPSK / UQPSK / USQPSK / FSK & others
- CCSDS Compatible waveforms
- Data Rates: to 40 Mbps (waveform dependent)
- Carrier Acquisition Modes: Sweep, ML-FFT, Phase Symmetry
- Loop bandwidth: 5Hz – 5 kHz

**Carrier Acquisition time:** 30 ms – 1 sec depending upon loop bandwidth
- Carrier Acquisition: Time: C/N0 = 17dB+Hz
- Waveform delay tolerance: 10 ns
- PM Phase Accuracy: 0.0055 degrees
- Doppler Rate: to < 15 kHz/sec
- Doppler measurement available
- Subcarriers Supported: 8
- Subcarrier Freq. Offset: < 10 MHz
- Subcarrier Data rate: < 4Mbps

**Bit Synchronization:**
- Loop Bandwidth: Programmable bandwidth 0.1 to 3% of the programmed data rate
- Capture Range: +/- 3 x the programmed Loop Bandwidth
- Tracking Range: Tracking Range +/- 5 X the programmed Loop Bandwidth
- Synch Acquisition: 32 bits nominal, 10 bits max.
- Data Rates: 1 bps to 25 Mbps, PCM
- Code Types: NRZ L/M/S, B8z L/M/S, DBi8, RZ, RNZRZ DM/M/S
- Bit Error Probability: < 1.5 dB
- Theoretical for all bit rates
- Viterbi (Convolutional FEC) Decoder: programmable constraint, fixed traceback; Custom decoders available
- Reed-Solomon & Turbo decoders

**Modulator:**
- Frequency: 70 MHz +/- 10 MHz
- Nominal Impedance: 50Ω
- Spurious Rejection: 70 dB
- Signal Generation: I/Q each at 16 bit resolution
- Input Source: Analog, PCM Data + Clock
- Modulation Modes: Direct + up to 6 subcarriers
- Mod Index Range: 0 – 3.14 radians
- Output Level: 0 to -60 dBm
- Frequency Deviation: 10 MHz
- Noise C/NO: 120 dBc
- AM Modulation Index Tolerance: 0.003%
- PSK Amplitude Imbalance: 0.00013 dB
- AM Phase Quadrant Spurs: -90 dBc
- Modulator DAC Spurious Free
- Dynamic Range: -79dBc
- 3rd Order Intercept: -83 dBc
- Modulation Phase Noise:
  - 1 Hz: -78dBc/Hz
  - 10 Hz: -105 dBc/Hz
  - 100 Hz: -126 dBc/Hz
  - 1 kHz: -135 dBc/Hz
  - 10 kHz: -139 dBc/Hz
  - 100 kHz: -139 dBc/Hz

**Data Processing:**
- Minor Frame Length: up to 64 k bits
- Major Frame Length: 1 to 1024 minor frames / major frame
- Frame Sync Pattern: 4 to 33 bits – includes IRIG Standard Patterns
- Frame Synch Strategy: Search / Check/Lock; programmable state counts
- Subframe Sync: FCC or Sub Frame ID (SFID)
- Synchron error Tolerance: 0.16 bits; programmable

**CCSDS Data Services:**
- Space Link Extension (SLE)
- Forward CLTU
- Return All Frames (RAF)
- Return Channel Frames (RCF)
- Frequency & Time Reference:
  - GPS based L1 Frequency, C/A code (SPS) 12 channel continuous tracking receiver
- 10 MHz sine wave
- Reference Phase Noise:
  - 10 Hz: -120dBc
  - 100 Hz: -135dBc
  - 1 kHz: -145dBc
  - 10kHz: -145dBc
  - 100kHz: -145dBc
- Bit Error Rate Test:
  - 10 ns measurement

**Ranging:**
- Input Channels: 2
- Standards Supported: ESA, Inmarsat, ESA Custom, PRN supporting Short, Med and Long codes
- Doppler support: Tracking Loop Bandwidth: 0.01 to 10 Hz
- Measurement Resolution: < 1ns
- Time Tag Accuracy: 100 nsec w/ GPS Time
- Digital Tone Generation: 1 Hz to 2 MHz
- Tone Accuracy: +/- 0.0116Hz

**Data Simulation:**
- Modulator Channels: 6
- Carrier & subcarrier simulation per waveform processor
- Integrated Stream Data Playback
- Internal or External simulation
- Sources:
  - baseband/file/network/simulator
  - Integrated Frame / Generator and Simulator
  - CCSDS Frame simulation
  - Viterbi decoding
  - Reed Solomon and Turbo encoding
  - Convolutional interleaving available

**Integrated PRN BERT:**
- 2 (each)
- Programmable Patterns: Quasi Random Signal Source (QRSS)
- Optional integrated Digital Gaussian White noise source
- Correlation with modulated output available

**Recording & Playback:**
- Integrated Stream Data Recording & Playback
- Capacity: 1TB
  - Internal or External source

**System Host:**
- CPU: 2.6 GHz Core Ii Duo
- Memory: 4GB DDR3 RAM 4.0 GB
- Type II HS-CFDD Boot Device
- Integrated 88 key keyboard in drawer
- LAN: 2 ea. 10/100/1000 Mbps
- USB: 2 ea.
- TFT LCD: 8.4"; 800 X 600 VGA
- Touchscreen

**Environmental:**
- Operating Temperature: 0°C to +40°C
- Storage Temperature: -25°C to +60°C
- Relative Humidity: 10-95%
- Vibration: 5 Hz to 500 Hz, 1g rms operating, 2 gms non-operating
- Shock (operating): 30g with 11 mSec duration, 0.5 sine wave
- Acoustic Noise: Less than 52 dBa sound pressure at +5°C to +28°C
  (+41°F to 82°F)
- Altitude: 0 to 3048 m (0 to 10,000 ft)
- Power:
  - Hot Swap Redundant Power Supply
  - 100-240 VAC 50/60 Hz; 600 W

**Mechanical:**
- 4U 19' rack mount
- 7”W x 19”D x 24” D

**Safety:**
- UL, cUL, CE, FCC & CCC

Recognizing that no standard product can meet all the needs of all users, GDP stands ready to provide units tailored to unique applications.

The statements in this data sheet are not intended to create any warranty, expressed or implied. Equipment specifications are subject to change without notice.