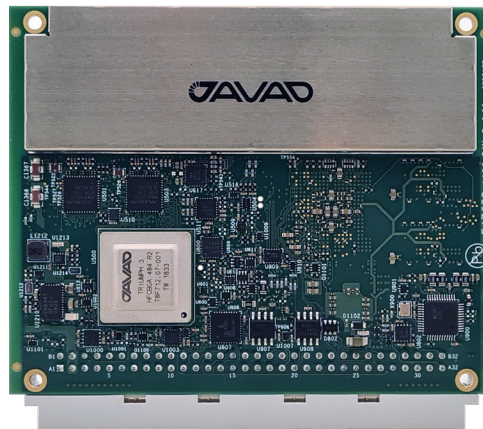




OEM BOARD

## TRE-3S\*



GPS L1/L2/L5, GALILEO E1/E5A/E5B/ALTBOC/E6,  
GLONASS L1/L2/L3, BEIDOU B1/B2A/B2B/ALTBOC/B3,  
QZSS L1/L2/L5/L6, SBAS L1/L5, IRNSS L5/S, L-BAND

874 GNSS channels of this board allow tracking all current and future satellite signals. TRE-3S is the only all-in-view receiver in the market that can track and decode the QZSS L6 (both L61 and L62) signal messages. We offer highly stable digital filters (band characteristics do not change with age, input voltages, or temperature), improved GLONASS inter-channel bias performance (due to our flat digital filter shape), excellent new multipath rejection technique, the best ever. Embedded calibrator measures phase and code delays of each signal of each band. External calibration is not required.

The in-built netBrowser allows communicating with the receiver via http using browser without the Internet.

TRE-3S is form, pin-out, and command compatible with the following OEM boards: TRE-G3T, TRE-3N, TRE-3, and TRE-3L.

# TRE-3S

## PINOUT

Description	I/O	Signal name	Pin #	Pin #	Signal name	I/O	Description
Power Ground		PGND	A1	B1	PGND		Power Ground
+4.5 to +40 VDC Power Input	I	PWR_IN	A2	B2	PWR_IN	I	+4.5 to +40 VDC Power Input
Factory use only, must be left open		FUO	A3	B3	COMMSW#	I	Active Low Command Input (FN Button) <sup>1</sup>
Selects between host and peripheral modes <sup>2</sup>	I	USB1_ID	A4	B4	KA_PWR	I	Keep-Alive Power input for Real-Time Clock (+4.5 to +40 VDC, 10µA typ)
External LED Control <sup>3</sup>	O	LED2_RED	A5	B5	LED1_RED	O	External LED Control <sup>3</sup>
External LED Control <sup>3</sup>	O	LED2_GRN	A6	B6	LED1_GRN	O	External LED Control <sup>3</sup>
Signal Ground		GND	A7	B7	USB1_PWR	I	USB port Power Input line
USB port D- line <sup>2</sup>	I/O	USB1_D-	A8	B8	USB1_D+	I/O	USB port D+ line <sup>2</sup>
Serial port A TXD line	O	TXDA	A9	B9	CTSA	I	Serial port A CTS line
Serial port A RXD line	I	RXDA	A10	B10	RTSA	O	Serial port A RTS line
Serial port C: RS232 TXD line or RS422 TX- line	O	TXDC/TXC-	A11	B11	CTSC/RXC+	I	Serial port C: RS232 CTS line or RS422 RX+ line
Serial port C: RS232 RXD line or RS422 RX- line	I	RXDC/RXC-	A12	B12	RTSC/TXC+	O	Serial port C: RS232 RTS line or RS422 TX+ line
Serial port D: RS232 RTS line or RS422 TX+ line	O	RTSD/TXD+	A13	B13	TXDD/TXD-	O	Serial port D: RS232 TXD line or RS422 TX- line
Serial port D: RS232 CTS line or RS422 RX+ line	I	CTSD/RXD+	A14	B14	RXDD/RXD-	I	Serial port D: RS232 RXD line or RS422 RX- line
Signal Ground		GND	A15	B15	USB2_PWR	I	USB port Power Input line <sup>2</sup>
USB port D- line <sup>2</sup>	I/O	USB2_D-	A16	B16	USB2_D+	I/O	USB port D+ line <sup>2</sup>
Serial port B TXD line	O	TXDB	A17	B17	CTSB	I	Serial port B CTS line
Serial port B RXD line	I	RXDB	A18	B18	RTSB	O	Serial port B RTS line
CAN1 port CAN-H line	I/O	CAN1H	A19	B19	CAN1L	I/O	CAN1 port CAN-L line
CAN2 port CAN-H line	I/O	CAN2H	A20	B20	CAN2L	I/O	CAN2 port CAN-L line
Factory use only, must be left open		FUO	A21	B21	USB2_ID	I	Selects between host and peripheral modes <sup>2</sup>
Signal Ground		GND	A22	B22	1PPSA	O	1 Pulse Per Second output A <sup>4</sup>
Signal Ground		GND	A23	B23	1PPSB	O	1 Pulse Per Second output B <sup>4</sup>
Signal Ground		GND	A24	B24	EVENTA	I	Event input A <sup>5</sup>
Signal Ground		GND	A25	B25	EVENTB	I	Event input B <sup>5</sup>
Configurable Logic-Level I/O 0 line	I/O	GPIO0	A26	B26	GPIO1	I/O	Configurable Logic-Level I/O 1 line
Configurable Logic-Level I/O 2 line	I/O	GPIO2	A27	B27	GPIO3	I/O	Configurable Logic-Level I/O 3 line
Signal Ground		GND	A28	B28	RESET_IN#	I	Active Low Reset input <sup>6</sup>
Ethernet port TX+ line	O	LAN_TX+	A29	B29	LAN_TX-	O	Ethernet port TX- line
Reserved		-	A30	B30	LAN_LED	O	Ethernet port control for external LED
Ethernet port RX+ line	I	LAN_RX+	A31	B31	LAN_RX-	I	Ethernet port RX- line
Active Low input for ON/OFF switch <sup>8</sup>	I	ONOFFSW#	A32	B32	IRIG_OUT	O	IRIG port output line <sup>7</sup>

1. Active Low input from the FN button of the MinPad. Must be left open if not used.

2. Simultaneous use of two USBs in HOST mode is not supported.

3. LED1\_GRN and LED1\_RED are used to control the STAT LED of the MinPad. LED2\_GRN and LED2\_RED are equivalent to the REC LED of the MinPad. The output is a +3.3V driver in series with 100 Ohm resistor for each LED. LEDs should be with common cathode.

4. Voh>1,8V at 50 Ohm load.

5. Internal pull-up 5 kOhm to +3.3V

6. Connect to ground to activate. Internal pull-up 10 kOhm to +3.3V

7. AM sine-wave signal; 2.1Vp-p (Mark), 0.7Vp-p (Space).

8. Active Low input which is equivalent to ON/OFF button of the MinPad. After abnormal turn off because of external power failure, the boards turn on automatically when external power is restored.

## TRACKING FEATURES

- GPS C/A, L1C(P+D) including TMBOC(6,1,4/33) , P1, P2, L2C(L+M), L5(I+Q)
- GLONASS C/A, P1, P2, L2C, L3(I+Q)
- Galileo E1(B+C) including CBOC(6,1,1/11), E5A(I+Q), E5B(I+Q), AltBoc, E6(B+C)
- QZSS C/A, L1C(P+D) including TMBOC(6,1,4/33) , L2C(L+M), L5(I+Q), L6(L61/L62), L1S, L1Sb, L5S
- BeiDou B1, B1C(P+D) including TMBOC(6,1,4/33) , B2B(I+Q), B2, B2A(I+Q), AltBoc, B3
- IRNSS L5, S
- L-band 1525-1560 MHz
- SBAS\* L1, L5(P+D)
- In-Band Interference Rejection (IBIR)
- Spoofing detection
- Advanced Multipath Reduction
- Fast acquisition channels
- High accuracy velocity measurement

## PERFORMANCE SPECIFICATIONS

- Autonomous: < 2 m
- Static, Fast Static Accuracy:
  - Horizontal:  $0.3 \text{ cm} + 0.1 \text{ ppm} * \text{base\_line\_length}^{**}$
  - Vertical:  $0.35 \text{ cm} + 0.4 \text{ ppm} * \text{base\_line\_length}$
- Kinematic Accuracy:
  - Horizontal:  $1 \text{ cm} + 1 \text{ ppm} * \text{base\_line\_length}$
  - Vertical:  $1.5 \text{ cm} + 1 \text{ ppm} * \text{base\_line\_length}$
- RTK (OTF) Accuracy:
  - Horizontal:  $1 \text{ cm} + 1 \text{ ppm} * \text{base\_line\_length}$
  - Vertical:  $1.5 \text{ cm} + 1 \text{ ppm} * \text{base\_line\_length}$
- DGPS Accuracy:
  - < 0.25 m post processing; < 0.5 m real-time
- Real-time heading accuracy:
  - $0.004/L$  [rad] RMS, where L is the antenna separation in [m]
- Cold/Warm Start/ Reacquisition:
  - < 35 seconds / < 5 seconds / < 1 second

## DATA FEATURES

- Up to 100 Hz update rate for real time position and raw data (code and carrier)
- 10 cm code phase and 1 mm carrier phase precision
- IEEE 1588 protocol support
- Hardware Viterbi decoder
- Hardware Reed-Solomon and LDPC decoders
- RTCM SC104 versions 2.x and 3.x Input/Output
- NMEA 0183 versions 2.x and 3.0 Output
- Spectrum data output
- RINEX / BINEX data output

- In-built netBrowser
- Code Differential Base/Rover
- Geoid and Magnetic Variation models
- RAIM
- Different DATUMs support
- Output of grid coordinates

## DATA STORAGE

- Up to 64 GB of on board non-removable memory for data storage.

## INPUT/OUTPUT

- Two high speed RS232 serial ports (up to 460.8 Kbps)
- Two high speed configurable RS232/RS422 serial ports (up to 460.8 Kbps)
- Two high speed USB 2.0 dual-role port (device or host)
- Full-duplex 10BASE-T/100BASE-TX Ethernet port
- Two CAN 2.0 A/B ports
- IRIG timecode output A134, A137, B124, B137
- Two 1 PPS outputs
  - Synchronized to UTC or any selected satellite system time.
  - Voltage level:  $V_{oh} > 1.8V$  at 50 Ohm load
  - Output Impedance: 25 to 30 Ohm (typ)
- Two Event Marker inputs
- External Reference Frequency Input/Output
- MinPad interface: Four external LED drivers, ON/OFF control and External Command inputs
- Four Configurable Lodic-Level GPIO ports  $V=3.3V$

## ELECTRICAL

- On-board power supply accepts any unregulated voltage between +4.5 to +40 Volts
- Keep-Alive Power input accepts any unregulated voltage between +4.5 to +40 Volts
- The central pin of the antenna connector outputs +5 VDC to power LNA. The sourced current is 0.12A max.
- Power consumption\*\*\*:
  - GPS+GLO+GAL+BDS: 3.7-3.9 (IBIR off)/4.4-4.6 W (IBIR on)
  - All in view - S-Band & L-Band off: 3.8-4.0 (IBIR off)/4.2-4.4 W (IBIR on)
  - All In view -L-Band off: 4.3-4.5 (IBIR off)/4.9-5.1 W (IBIR on)
  - All in view: 4.5-4.7 (IBIR off)/5.1-5.6 W (IBIR on)

## ENVIRONMENTAL

- Temperature:
  - 40°F to 176°F (-40°C to +80°C) (Operational)
  - 40°F to +185°F (-40°C to +85°C) (Storage)
- High shock and vibration resistance

\* US WAAS, European EGNOS, Russian SDCM, Indian GAGAN, Japanese MSAS, and similar future satellite systems

\*\* For good observation conditions and proper length of observation session

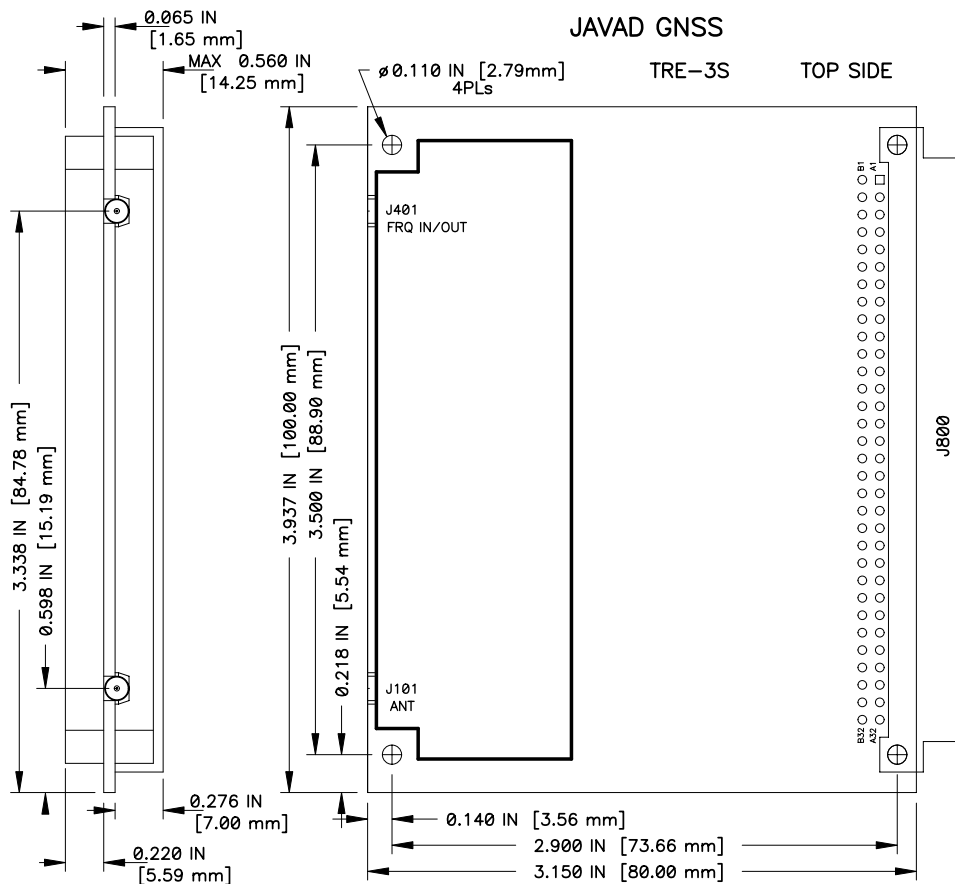
\*\*\* Ethernet enabled +0.2W to all modes

# TRE-3S

## PHYSICAL CHARACTERISTICS

- Dimensions: 3.9 x 3.1 inches (100x80 mm)
- Weight: 0.19 lbs (87 g)
- Digital connector: 64-pin DIN41612 type B Right Angle, AMP p/n 536052-5.
- RF connectors: MMCX Jack, edge mount, AMPHENOL, p/n 908-22100

- J101 is GNSS antenna input connector.
- J401 is External Reference Frequency connector.
- Analog reference clock input: 0.6Vpp to 3Vpp, 5/10/20 MHz.
- Reference oscillator output with frequency values 5, 10, and 20 MHz (all sinlike) (about 0.5Vpp@50 Ohm load).



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