OEM718D Addendum

OEM718D Addendum

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1.1 OEM718D Technical Specifications

Table 1: OEM718D Physical Description

Size	46 mm x 71 mm x 10 mm
Weight	35 g

See the following sections for more information about the OEM718D:

1.2 OEM718D Performance Specifications

All specifications are subject to GNSS system characteristics.

Table 2: OEM718D Receiver Performance

Position Accuracy[1]	Single point	L1 only	1.5 m RMS
		L1/L2	1.2 m RMS
	NovAtel CORRECT	SBAS[2]	60 cm RMS
		DGPS	40 cm RMS
		RTK	1 cm + 1 ppm RMS
Signals Tracked Primary Antenna	GPS	L1 C/A, L1C, L2C, L2P, L5	
	GLONASS	L1 C/A, L2 C/A, L2P, L3, L5[3]	
	BeiDou	B1, B2	
	Galileo	E1, E5 AltBOC, E5a, E5b	
	NavIC (IRNSS)	L5	
	SBAS	L1, L5	
	QZSS	L1 C/A, L1C, L2C, L5	
Signals Tracked Secondary Antenna	GPS	L1 C/A, L1C, L2C, L2P	
	GLONASS	L1 C/A, L2 C/A, L2P	
	BeiDou	B1, B2	
	Galileo	E1, E5b	
	QZSS	L1 C/A, L1C, L2C	
ALIGN Heading Accuracy	2 m baseline	0.08 degrees	
	4 m baseline	0.05 degrees	
Time to First Fix	Hot: <26 s (Almanac and recent ephemeris saved and approximate position and time entered) Cold: <46 s (No almanac or ephemeris and no approximate position or time)		
Signal Reacquisition	<0.5 s L1 (typical) <1.0 s L2 and L5 (typical)		

[1]Typical values (open sky conditions). All position and velocity RMS values are based on Horizontal position accuracy. Performance specifications are subject to GNSS system characteristics, Signal-in-Space operational degradation, ionospheric and tropospheric conditions, satellite geometry, baseline length and multipath effects.
[2]GPS-only.

[3]Although hardware capable, GLONASS L5 is currently not available.

Data Rates	Measurements	up to 100 Hz			
	Position	up to 100 Hz			
Time Accuracy[1]	20 ns RMS				
Velocity Accuracy	<0.03 m/s RMS				
Measurement Precision		**GPS**		**GLONASS**	
		Code	**Carrier**	**Code**	**Carrier**
	L1 C/A	4 cm	0.5 mm	8 cm	1.0 mm
	L2 P(Y)[2]	8 cm	1.0 mm	8 cm	1.0 mm
	L2 C[3]	8 cm	0.5 mm	8 cm	1.0 mm
	L5	3 cm	0.5 mm	-	-
Velocity Limit	515 m/s[4]				

[1]Time accuracy does not include biases due to RF or antenna delay.

[2]L2 P for GLONASS

[3]L2 C/A for GLONASS

[4]Export licensing restricts operation to a maximum of 515 metres per second, message output impacted above 500 m/s.

1.3 OEM718D Mechanical Specifications

- *Figure 1: OEM718D Dimensions* below
- *Figure 2: OEM718D Keep-outs* on the next page
- *Figure 3: OEM718D Mounting Surfaces* on page 8

Figure 1: OEM718D Dimensions

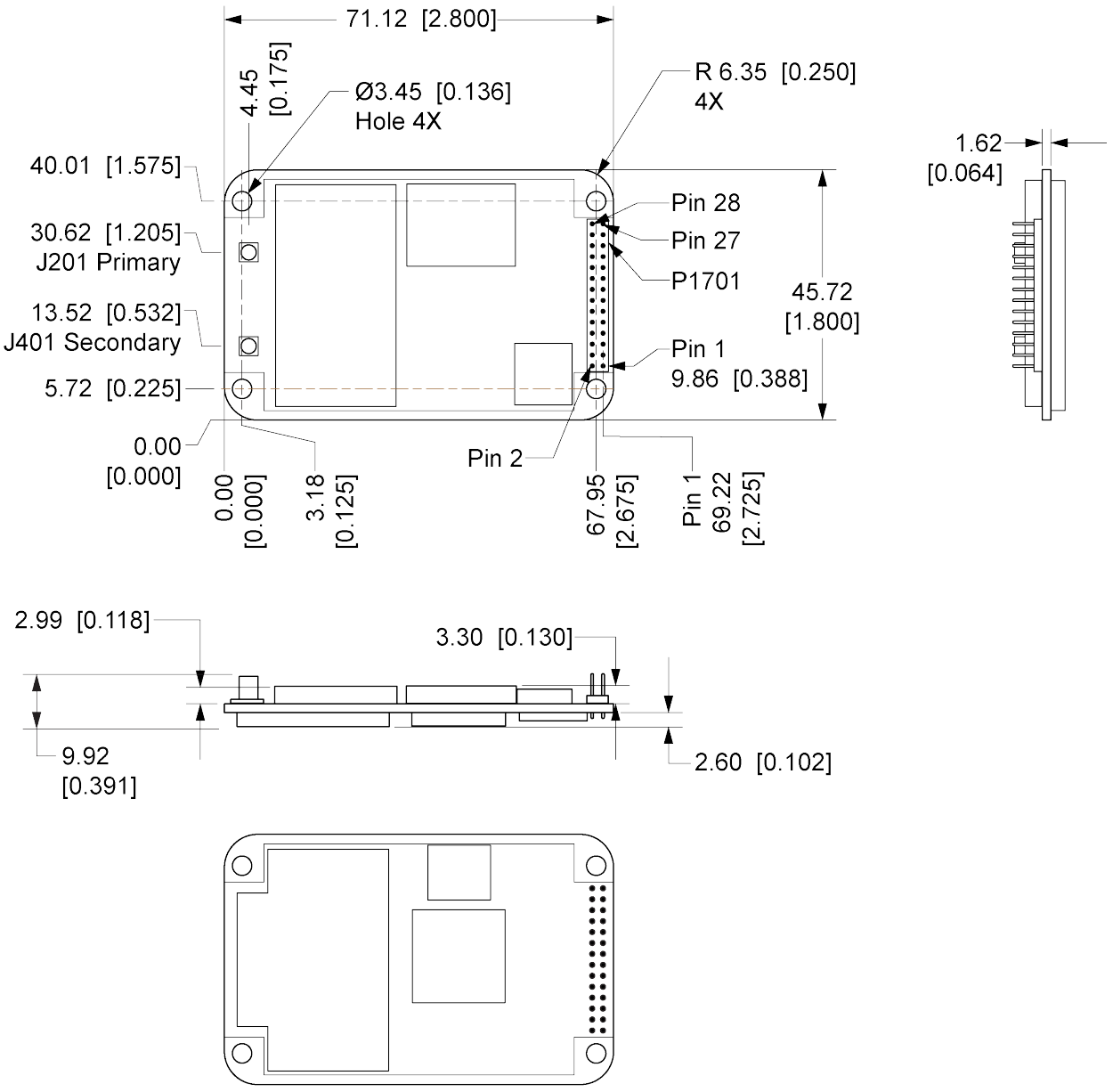


Figure 2: OEM718D Keep-outs

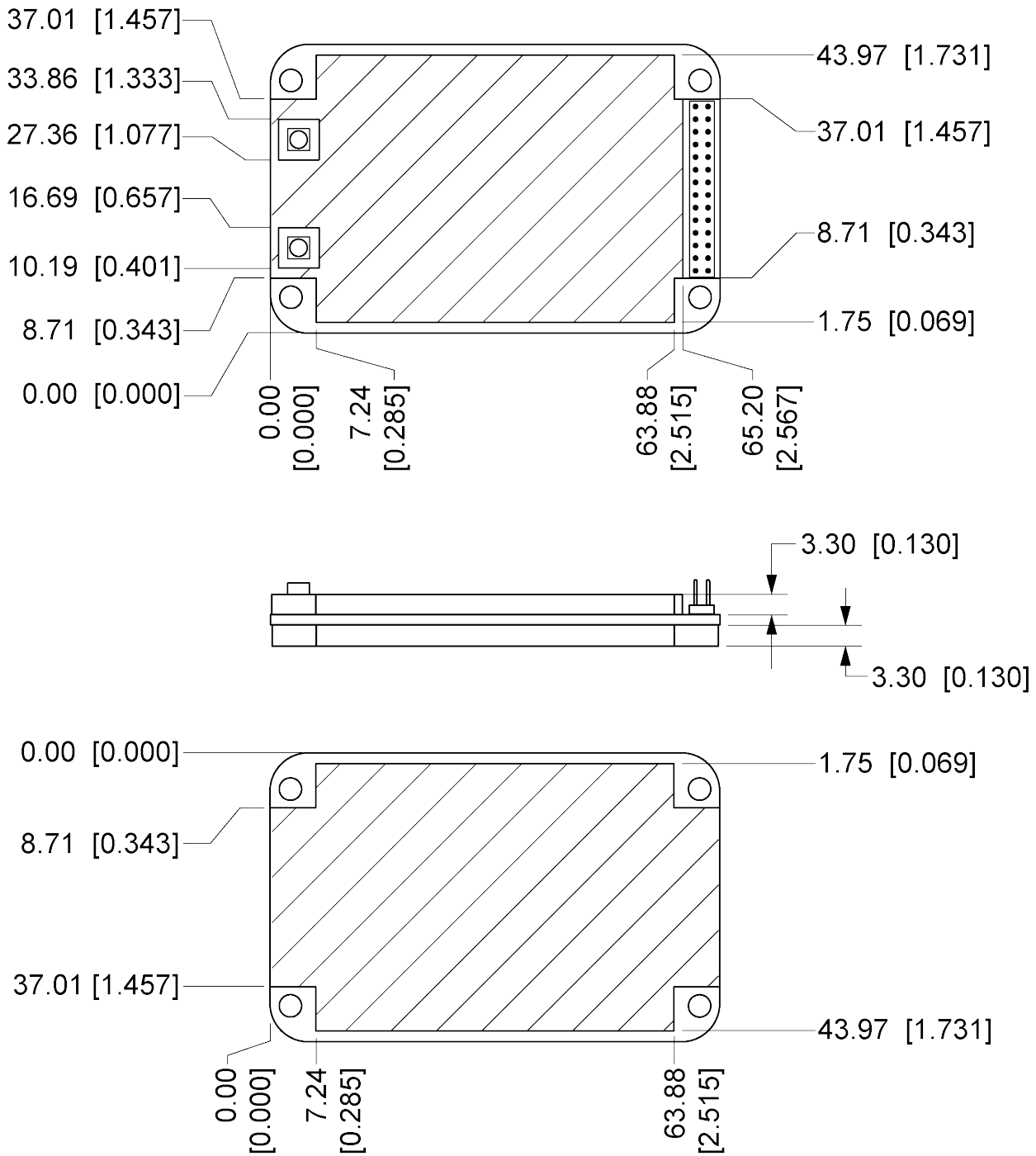
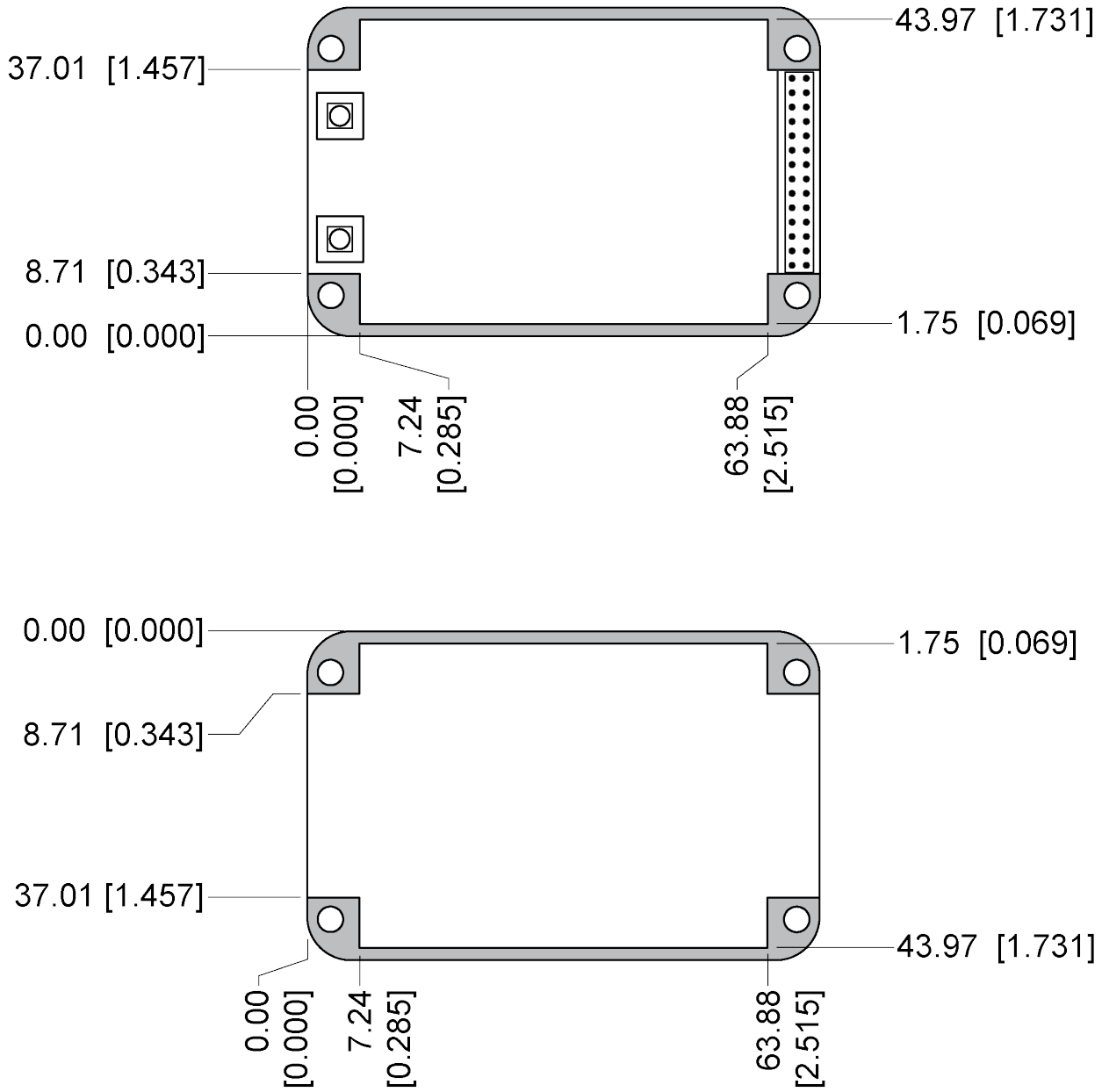


Figure 3: OEM718D Mounting Surfaces



The mounting surfaces are shown in gray.

Assembly tolerances must be considered when using mounting rail features.

1.4 OEM718D Electrical and Environmental Specifications

Table 3: OEM718D Environmental Specifications

Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +95°C
Humidity	95% non-condensing
Random Vibration	MIL-STD 810G Method 514.7, Category 24 (20 g RMS)[1]
Sinusoidal Vibration	IEC 60068-2-6
Bump	ISO 9022-31-06 (25 g)
Shock Operating Non-operating	 MIL-STD-810G (40 g) MIL-STD-810G, Method 516.7 (75 g)
Acceleration, Operating	MIL-STD-810G, Method 513.7 (16 g)

Table 4: OEM718D Power Requirements

Voltage	+3.3 VDC ±5%
Allowable Input Voltage Ripple	100 mV p-p maximum
Power Consumption	1.3 W typical, GPS L1 only 1.8 W typical, all constellations/all frequencies These are typical values using serial ports without interference mitigation. Values can change with the number of satellites in view, firmware version, data logging rates and features in use. Use them as a guide for what you might expect but not as absolute values.
In-Rush Power Consumption	1.71 A for less than 1.5 ms (typical)

[1] Requires mechanical mounting rails to meet 20 g; meets 7.7 g without rails.

Table 5: OEM718D RF Input/LNA Power Output

Antenna Connectors	MMCX female, 50 Ω nominal impedance			
Cascaded antenna LNA gain	15 dB minimum, 26 dB to 30 dB typical (before receiver)			
RF Input Frequencies	GPS L1: GPS L2: GPS L5: BeiDou B1: BeiDou B2:	1575.42 MHz 1227.60 MHz 1176.45 MHz 1561.098 MHz 1207.14 MHz	GLONASS L1: GLONASS L2: GLONASS L3: Galileo E1: Galileo E5a: Galileo E5b: Galileo E5:	1593-1610 MHz 1237-1254 MHz 1202.025 MHz 1575.42 MHz 1176.45 MHz 1207.14 MHz 1191.795 MHz
LNA Power	+5.0 VDC ±5%, 0 mA to 200 mA (supplied by card through center conductor of RF connector). LNA Power is generated from the 3.3 V supply input for the OEM718D.			

1.5 OEM718D Data Communication Specifications

Table 6: Data Communications Interface

COM1	
Electrical format	LVCMOS
Data rates[1]	2400, 4800, 9600 (default), 19200, 38400, 57600, 115200, 230400 or 460800 bit/s.
Signals supported	COM1_Tx, COM1_Rx
Electrostatic discharge protection	No
COM2	
Electrical format	LVCMOS
Data rates[1]	2400, 4800, 9600 (default), 19200, 38400, 57600, 115200, 230400 or 460800 bit/s.
Signals supported	COM2_Tx, COM2_Rx
Electrostatic discharge protection	No
COM3	
Electrical format	LVCMOS [2, 3]
Data rates[1]	2400, 4800, 9600 (default), 19200, 38400, 57600, 115200, 230400 or 460800 bit/s.
Signals supported	COM3_Tx, COM3_Rx
Electrostatic discharge protection	No
CAN Bus	
Electrical Format	LVCMOS

[1]Data rates higher than 115200 bit/s are not supported by standard PC hardware. Special PC hardware may be required for higher rates, including 230400 bit/s and 460800 bit/s.

[2]Upon power-up, COM3 is enabled by default. COM3 is multiplexed with Event 2

[3]To enable EVENT2, issue the following commands:
INTERFACEMODE COM3 NONE NONE
MARKCONTROL MARK2 ENABLE

Data rates	1 Mbps maximum. CAN Bus throughput is determined by slowest device on the bus
Signals supported	CAN1 and CAN2
USB	
Electrical format	Conforms to USB 2.0
Data rates	Full-speed (12 Mb/s)
Signals supported	USB D (+), USB D (-)
ETHERNET	
Physical layer	10BASE-T/100BASE-TX

1.6 OEM718D Strobe Specifications

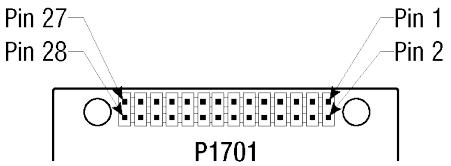
Table 7: OEM718D Strobes Description

Strobes	Input/Output	Factory Default	Comment
EVENT_IN1	Input Leading edge triggered	Active low	Input marks for which a pulse greater than 150 ns triggers certain logs to be generated. (Refer to the MARKPOS and MARKTIME logs and ONMARK trigger.) Polarity is configurable using the **MARKCONTROL** command. **Note**: Event1 is the default behavior for pin 13 of connector P1701. The secondary behavior for pin 13 is COM3_Tx. If COM3 is enabled, the Event1 input is disabled.
EVENT_IN2	Input Leading edge triggered	Active low	Input marks for which a pulse greater than 150 ns triggers certain logs to be generated. (Refer to the MARKPOS and MARKTIME logs and ONMARK trigger.) Polarity is configurable using the **MARKCONTROL** command. **Note**: Event2 is the default behavior for pin 11 of connector P1701. The secondary behavior for pin 11 is CAN1_Tx. If CAN1 is enabled, the Event2 input is disabled.
PPS	Output	Active low	A time synchronization output. This is a pulse where the leading edge is synchronized to receiver calculated GNSS Time. The polarity, period and pulse width can be configured using the **PPSCONTROL** command
PV (Position Valid)	Output	Active high	Indicates a valid GNSS position solution is available.
nRESET_IN	Input	Active low	Reset signal input from external system; active low, 50 ms duration. Hold the nRESET_IN pin low for >150 ms after power is applied
VARF	Output	Active low	Programmable variable frequency outputs ranging from 0 Hz to 50 MHz (refer to the **EVENTOUTCONTROL** command). **Note**: EVENT_OUT1 can also be controlled by the **FREQUENCYOUT** command. **Note**: VARF is the default behavior for pin 10 of connector P1701. The secondary behavior for pin 10 is CAN1Rx. If CAN1 is enabled, the VARF output is disabled.

Table 8: OEM718D Strobe Electrical Specification

Strobe	Sym	Min (V)	Typ (V)	Max (V)	Current (mA)
Event1 (Mark1) Event2 (Mark2)	V_{IL}			0.7	-
	V_{IH}	2.1			
PPS	V_{OL}			0.4	16
	V_{OH}	2.9			
PV	V_{OL}			0.4	4
	V_{OH}	2.9			
nRESET_IN	V_{IL}			0.8	-
	V_{IH}	2.3			
VARF	V_{OL}			0.4	4
	V_{OH}	2.9			

1.7 OEM718D Interface Connector



Pin	Signal Name	Signal Type	Signal Direction	V_{IL} Max (V)	V_{IH} Min (V)	V_{OL} Max (V)	V_{OH} Min (V)	Drive (mA)	Description
1	UID	3.3V CMOS	Input/ Output	-	-	-	-	-	USB Port Mode Select. Leave this pin floating to put the USB port into Device mode. Tie this pin to GND to put the USB port into Host mode. Internal 10 kΩ pull up
2	USB_ VBUS	Power	Input/ Output	3.3	5.25	-	-	-	When the USB port mode is set to Host, this pin is an output. When the USB port mode is set to Device, this pin is an input. Host or Device mode is set using the UID pin (Pin 1). When an input, requires a voltage between 3.3 V and 5.25 V. When an output, provides 5 V for hosted devices. USB_VBUS is capable of providing up to 200 mA to a hosted USB device. Devices that require more than 200 mA must be powered separately.

Pin	Signal Name	Signal Type	Signal Direction	V_{IL} Max (V)	V_{IH} Min (V)	V_{OL} Max (V)	V_{OH} Min (V)	Drive (mA)	Description
3	ETH_ LINK_ ACT	3.3V CMOS	Output	-	-	0.2	3.1	8	Ethernet Link and Activity LED indicator. Polarity of the indicator signal is low. When there is an active link, the pin is low. When there is activity on the link, the pin outputs a blink signal. **Caution**: Do not use ETH_BIAS to supply the LED.
4	ETH_ BIAS	Power	Output	-	-	-	-	-	DC Bias source for the Ethernet magnetics. Do not use ETH_BIAS to supply any other circuitry.
5	NC	-	-	-	-	-	-	-	No internal connection on OEM718D receiver.
6	3V3	Power	-	-	-	-	-	-	3.3 V ±5% supply voltage. This is now monitored by the receiver itself. (Out-of-tolerance supply inputs may generate warning or error messages.)
7	USB_D-	Analog	Input/ Output	-	-	-	-	-	This is one half of a USB differential pair (pins 3 and 4), match lengths and route as 90 Ω differential pair if USB is used.

Pin	Signal Name	Signal Type	Signal Direction	V_{IL} Max (V)	V_{IH} Min (V)	V_{OL} Max (V)	V_{OH} Min (V)	Drive (mA)	Description
8	USB_ D+/ RXD3	Analog /3.3V CMOS	USB_D+: Input/ Output	-	-	-	-	-	This pin is internally multiplexed. USB_D+ is the default. USB_D+: This is one half of a USB differential pair (pins 3 and 4), match lengths and route as 90 Ω differential pair if USB is used. RXD3: COM3 Receive Data (UART). Internal weak (40 kΩ to 100 kΩ) pullup.
			RXD3 Input	0.7	2.1	-	-	-	
9	nRESET_ IN	3.3V CMOS	Input	0.8	2.3	-	-	-	Active Low. Resets the OEM719 receiver card. This pin must be held low for a minimum of 100 microseconds to guarantee operation. Internal 10 kΩ pullup.
10	VARF/ CAN1RX	3.3V CMOS	VARF: Output	-	-	0.4	2.9	4	This pin is internally multiplexed. VARF is the default. VARF: Variable Frequency Output. Rising or falling edge active. CAN1RX: a CMOS-level signal, requiring an external CAN transceiver. Internal 10 kΩ pullup.
			CAN1RX: Input	0.7	2.1	-	-	-	

Pin	Signal Name	Signal Type	Signal Direction	V_{IL} Max (V)	V_{IH} Min (V)	V_{OL} Max (V)	V_{OH} Min (V)	Drive (mA)	Description
11	EVENT2/ CAN1TX	3.3V CMOS	EVENT2: Input	0.7	2.1	-	-	-	This pin is internally multiplexed. EVENT2 is the default. EVENT2: Rising edge triggered.
			CAN1TX: Output	-	-	0.4	2.9	4	CAN1TX is a CMOS-level signal, requiring an external CAN transceiver. Internal 10 kΩ pullup.
12	CAN2RX	3.3V CMOS	Input	0.7	2.1	-	-	-	CAN2RX is a CMOS-level signal, requiring an external CAN transceiver.
13	EVENT1/ TXD3	3.3V CMOS	EVENT1: Input	0.7	2.1	-	-	-	This pin is internally multiplexed. EVENT1 is the default. EVENT1: Rising edge triggered.
			TXD3: Output	-	-	0.4	2.9	4	TXD3: COM3 Transmit Data (UART) Internal 10 kΩ pullup.
14	GND	Power	-	-	-	-	-	-	Supply Return (Ground)
15	TXD1	3.3V CMOS	Output	-	-	0.8	2.0	16	COM1 Transmit Data (UART) For SPAN applications, this pin can be configured to output a timing signal periodically (generally 1PPS).
16	RXD1	3.3V CMOS	Input	0.7	2.1	-	-	-	COM1 Receive Data (UART) Internal weak (40 kΩ to 100 kΩ) pullup.
17	GND	Power	-	-	-	-	-	-	Supply Return (Ground)

Pin	Signal Name	Signal Type	Signal Direction	V_{IL} Max (V)	V_{IH} Min (V)	V_{OL} Max (V)	V_{OH} Min (V)	Drive (mA)	Description
18	TXD2	3.3V CMOS	Output	-	-	0.4	2.9	4	COM2 Transmit Data (UART) For SPAN applications, this pin can be configured to output a timing signal periodically (generally 1PPS).
19	RXD2	3.3V CMOS	Input	0.7	2.1	-	-	-	COM2 Receive Data (UART) Internal weak (40 kΩ to 100 kΩ) pullup.
20	GND	Power	-	-	-	-	-	-	Supply Return (Ground)
21	PV	3.3V CMOS	Output	-	-	0.4	2.9	4	Active High. Position Valid Indicator. Indicates that the receiver has computed a position. Active high output.
22	GND	Power	-	-	-	-	-	-	Supply Return (Ground)
23	PPS	3.3V CMOS	Output	-	-	0.55	2.4	16	Rising or Falling Edge active. (Software-configurable active edge.) This pin can be configured to provide a GNSS-synchronized time output (commonly Pulse Per Second but can operate at other rates as well).
24	CAN2TX	3.3V CMOS	Output	-	-	0.4	2.9	4	CAN2TX is a CMOS-level signal, requiring an external CAN transceiver.

Pin	Signal Name	Signal Type	Signal Direction	V_{IL} Max (V)	V_{IH} Min (V)	V_{OL} Max (V)	V_{OH} Min (V)	Drive (mA)	Description
25	ETH_ TD+	Analog	Output	-	-	-	-	-	Ethernet Transmit One half of the Ethernet transmit differential pair. ETH_TX+ and ETH_ TX- must be routed as a 100 Ω differential pair.
26	ETH_ RD+	Analog	Input	-	-	-	-	-	Ethernet Receive One half of the Ethernet receive differential pair. ETH_RX+ and ETH_RX- must be routed as a 100 Ω differential pair.
27	ETH_TD-	Analog	Output	-	-	-	-	-	Ethernet Transmit One half of the Ethernet transmit differential pair. ETH_TX+ and ETH_ TX- must be routed as a 100 Ω differential pair.
28	ETH_ RD-	Analog	Input	-	-	-	-	-	Ethernet Receive One half of the Ethernet receive differential pair. ETH_RX+ and ETH_RX- must be routed as a 100 Ω differential pair.

1.8 OEM718D Command and Log Differences

The following changes have been made to the OEM7 commands and logs to support the dual antenna functionality of the OEM718D.

1.8.1 Binary Header

The binary message header has been modified to show if the log contains information from the secondary antenna.

Table 9: Binary Message Header Structure

Field	Field Name	Field Type	Description	Binary Bytes	Binary Offset	Ignored on Input
6	Message Type	Char	Bits 0-4 = Measurement source Bits 5-6 = Format 00 = Binary 01 = ASCII 10 = Abbreviated ASCII, NMEA 11 = Reserved Bit 7 = Response bit (see Responses) 0 = Original Message 1 = Response Message	1	6	N

Bits 0-4 of are used to indicate the measurement source. For OEM718D receivers, if bit 0 is set, the log is from the secondary antenna.

1.8.2 ANTENNAPOWER command

When the antenna power is switched on, the power is enabled on both the primary and secondary antennas.

When the antenna power is switched off, the power is disabled on both the primary and secondary antennas.

1.8.3 RXSTATUS log

Two status bits in the Receiver Status word have been changed to show the dual antenna power status.

Nibble	Bit	Mask	Description	Bit = 0	Bit = 1
N0	3	0x00000008	Dual Antenna Power Flag Indicates power is applied to both primary and secondary antennas. See the **ANTENNAPOWER** command	Powered	Not Powered
N1	6	0x00000040	Dual Antenna Short Circuit Flag Indicates that either the primary or secondary antenna has caused a short circuit fault. Both antennas should be checked for the problem before power is reapplied with the **ANTENNAPOWER** command.	OK	Shorted