High precision and dead reckoning GNSS modules

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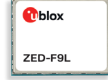|	High precision GNSS and dead reckoning modules						Standard precision GNSS dead reckoning modules		
	NEO-F9P	ZED-X20P	ZED-F9P	ZED-F9K	ZED-F9H	ZED-F9R	ZED-F9L	NEO-M9V	NEO-M9L
Grade									
Automotive				•			•		•
Professional	•	•	•		•	•		•	
Standard									
Physical									
Image	NEO-F9P	ZED-X20P		ZED-F9			ZED-F9L	NEO-M9V	NEO-M9L
Size [mm]	12.2 x 16.0 x 3.4	17.0 x 22.0 x 2.4					17.0 x 22.0 x 2.4	12.2 x 16.0 x 2.4	
Package & pins	LCC 24	LGA 54					LGA 54	LCC 24	
GNSS									
GPS, SBAS	•	•	•	•	•	•	•	•	•
QZSS	•	•	•	•	•	•	•	•	•
GLONASS	•	•	•	•	•	•	•	•	•
Galileo	•	•	•	•	•	•	•	•	•
BeiDou	•	•	•	•	•	•	•	•	•
NavIC	•	•	□	•			•		
Bands	L1/L5	L1/L2/L5/L6	L1/L2/L5	L1/L2/L5	L1/L2	L1/L2	L1/L5	L1	L1
Interfaces									
UART	2	2	2	2	2	2	2	1	2
USB	1		1	1	1	1	1	1	1
SPI	1	1	1	1	1	1	1	1	1
DDC (I2C compliant)	1	1	1	1	1	1	1	1	1
Features									
Galileo OSNMA	◊	•	•	◊			◊	◊	
Programmable (flash)	•	•	•	•	•	•	•	•	•
Data logging	•	•	•		•		•		
Carrier phase output	•	•	•	□		•			□
Data batching								•	•
Additional SAW	•	•	•	•	•	•		•	
Additional LNA	•							•	
RTC crystal	•	•	•	•	•	•	•	•	•
Oscillator	T	T	T	T	T	T	T	T	T
RTK rover	•	•	•	•		•			
RTK base station	•	•	•						
Moving base		◊	•						
Survey-in & fixed mode	•	•	•						
Built-in sensor				•		•	•	•	•
Time pulse output	1	1	1	1	1	1	2	1	1
Built-in antenna supply and supervisor	S	S	S	S	S	S	S	S	S
Power supply									
2.7 V – 3.6 V	•	•	•	•	•	•	•	•	•

□ = In some product versions
◊ = In development

S = Supported, may require ext. components

C/T = Crystal and TCXO supported
C = Crystal, T = TCXO

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Timing modules and GNSS correction modules

	Timing modules							Correction modules	
	RCB-F9T	M2-ZED-F9T	ZED-F9T	LEA-F9T	LEA-M8F	LEA-M8T	NEO-M8T	NEO-F10T	NEO-D9C	NEO-D9S
Grade										
Automotive									•	•
Professional		•	•	•	•	•	•	•	•	•
Standard	•									
Physical										
Image										
Size [mm]	31.7 x 67.2	30.5 x 43.4 x 3.3	17.0 x 22.0 x 2.4	17.0 x 22.4 x 2.4	17.0 x 22.4 x 3.5	17.0 x 22.4 x 2.4	12.2 x 16.0 x 2.4			
Package & pins	8 pins	M.2 Key E	LGA 54	LCC 28			LCC 24			
GNSS										
GPS, SBAS	•	•	•	•	•	•	•	•		
QZSS	•	•	•	•	•	•	•	•	•	
GLONASS	•	•	□	•	•	•	•	•		
Galileo	•	•	•	•		•	•	•		
BeiDou	•	•	•	•	•	•	•	•		
NavIC	□	•	□	•				•		
Bands	L1/L2/L5			L1/L2/L5	L1	L1	L1	L1/L5	L6	L
Interfaces										
UART	1	1	2	1	1	1	1	1	2	2
USB		1	1	1	1	1	1		1	1
SPI		1	1	1	1	1	1		1	1
DDC (I2C compliant)		1	1	1	1	1	1		1	1
Features										
Galileo OSNMA	•	•	•							
Programmable (flash)	•	•	•	•	•	•	•	•	•	•
Carrier phase output	•	•	•	•		•	•	•		
Additional SAW	•	•	•	•	•	•	•	•	•	•
Additional LNA				•	•		•			
RTC crystal	•	•	•	•		•	•	•	•	•
Oscillator	T	T	T	T	V	T	T	T	T	T
Survey-in & fixed mode	•	•	•	•	•	•	•	•		
Time pulse output	2	2	2	2	1	2	2	1		
Time mark input		2	2	2	2	2	2	1		
Frequency output					•					
Antenna supervisor	•	•				•				
Power supply										
2.7 V – 3.6 V	•	•	•	•		•	•	•	•	•
3.0 V – 3.6 V					•					

□ = In some product versions   T = TCXO   V = VCTCXO

Standard precision GNSS modules

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	Standard precision GNSS SiP modules				Standard precision GNSS modules		
	MIA-M10Q	MIA-M10C	EVA-M8M	EVA-M8Q	MAX-F10S	MAX-M10S	MAX-M10M
Grade							
Automotive							
Professional	•	•	•	•	•	•	•
Standard							
Physical							
Image							
Size [mm]	4.5 x 4.5 x 1.0		7.0 x 7.0 x 1.1		9.7 x 10.1 x 2.5		
Package & pins	S-LGA 53		LGA 43		LCC 18		
GNSS							
GPS, SBAS	•	•	•	•	•	•	•
QZSS	•	•	•	•	•	•	•
GLONASS	•	•	•	•		•	•
Galileo	•	•	•	•	•	•	•
BeiDou/BDSBAS	•/-	•/-	•/-	•/-	•/•	•/-	•/-
NavIC					•		
Bands	L1	L1	L1	L1	L1/L5	L1	L1
Interfaces							
UART	1	1	1	1	1	1	1
USB			1	1			
SPI			1	1			
DDC (I2C compliant)	1	1	1	1	1	1	1
Features							
Programmable (flash)			E	E			
Carrier phase output	□						
Data logging			E	E			
Data batching	•	•			•	•	•
Additional SAW	•				•	•	
Additional LNA	•				•	•	
RTC crystal	•	•	o	o	•	•	•
Oscillator	T	C	C	T	T	T	C
Time pulse output	1	1	1	1	1	1	1
Power supply							
1.3 V – 1.98 V		•					
1.76 V – 3.6 V	•				•	•	
1.8 V – 5.5 V							•
1.65 V – 3.6 V			•				
2.7 V – 3.6 V				•			

o = Optional, or requires external components   E = External flash required   C = Crystal, T = TCXO
□ = In some product versions

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Standard precision GNSS modules

	Standard precision GNSS modules					Standard precision GNSS antenna modules		
	NEO-F10N	NEO-M9N	NEO-M8J	NEO-M8M	NEO-M8Q-01A	CAM-M8Q	SAM-M10Q	DAN-F10N
Grade								
Automotive					*			
Professional	•	•	•	•		•	•	•
Standard								
Physical								
Image								
Size [mm]	12.2 × 16.0 × 2.4					9.6 x 14 x 1.95	15.5 x 15.5 x 6.3	20.0 x 20.0 x 11.6
Package & pins	LCC 24					LCC 31	LGA 20	LCC 56
GNSS								
GPS, SBAS	•	•	•	•	•	•	•	•
QZSS	•	•	•	•	•	•	•	•
GLONASS		•	•	•	•	•	•	
Galileo	•	•	•	•	•	•	•	•
BeiDou/BDSBAS	• / •	• / -	• / -	• / -	• / -	• / -	• / -	• / •
NavIC	•							•
Bands	L1/L5	L1	L1	L1	L1	L1	L1	L1/L5
Interfaces								
UART	1	1	1	1	1	1	1	1
USB		1	1	1	1			
SPI		1	1	1	1	1		
DDC (I2C compliant)		1	1	1	1	1	1	
Features								
Programmable (flash)	•	•	•					•
Carrier phase output	□							
Data logging		•	•					
Data batching		•					•	
Additional SAW	•	•	•			•	•	•
Additional LNA	•	•	•			•	•	•
RTC crystal	•	•	•	•	•	♦	•	•
Oscillator	T	T	C	C	T	T	T	T
Time pulse output	1	1	1	1	1	1	1	1
Built-in antenna						•	•	•
Power supply								
1.65 V – 3.6 V					•			
2.7 V – 3.6 V	•	•	•		•	•	•	•

♦ = Yes, but with higher backup current   * = Operating temperature –40 °C to +105 °C   C = Crystal, T = TCXO
□ = In some product versions

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GNSS chips

	Functional safe chip	Dead reckoning / high precision GNSS chips				Standard precision GNSS chips					
	UBX-A9940-KA	UBX-F9940-KA-DR	UBX-F9140-KA-DR	UBX-M9140-KA-DR	UBX-M9340-KB	UBX-F10150-KB	UBX-F10050-KB	UBX-M10050-KB	UBX-M10150-CC	UBX-M9140-KA	UBX-M9140-KB
Grade											
Automotive	*	*	*	*						*	
Professional					•	•	•	•			•
Standard									•		
Physical											
Image											
Size [mm]	5.0 x 5.0 x 0.59	5.0 x 5.0 x 0.59				5.0 x 5.0 x 0.55	4.0 x 4.0 x 0.55		2.39 x 2.39 x 0.55	5.0 x 5.0 x 0.59	
Package & pins	QFN40	QFN40					QFN28		WL-CSP33	QFN40	
GNSS											
GPS, SBAS	•	•	•	•	•	•	•	•	•	•	•
QZSS		•	•	•	•	•	•	•	•	•	•
GLONASS		•	•	•	•			•		•	•
Galileo	•	•	•	•	•	•	•	•	•	•	•
BeiDou/BDSBAS	•/-	•/-	•/-	•/-	•/-	•/•	•/•	•/-	•/-	•/-	•/-
NavIC			•			•	•				
Bands	L1/L2/L5	L1/L2/L5	L1/L5	L1	L1	L1/L5	L1/L5	L1	L1	L1	L1
Interfaces											
UART		2	2	1	2	1	1	1	1	2	2
USB		1	1	1	1					1	1
SPI	1	1	1	1	1	1	1	1	1	1	1
DDC (I2C compliant)		2	1	1	1	1	1	1	1	1	1
Features											
Dual output		•	•	•							
Programmable (flash)		E	E	E	E	E			E	E	E
Carrier phase output							□	□			
Data logging										S	S
Data batching						•	•	•	•	•	•
RTC crystal		S	S	S	S	S	S	S	S	S	S
Oscillator	T	T	T	T	T	C/T	C/T	C/T	C/T	T	T
Antenna supply / supervisor		S		S	S	S	S	S	S	S	S
RTK rover		•									
Sensor-based spoofing detection		•	•	•							
Time pulse output		2	1	1	2	1	1	1	1	2	2
Measurement pulse	1										
Power supply											
1 V – 1.8 V						•	•	•	•		
1.4 V – 3.6 V											
1.65 V – 2.0 V					•						
1.65 V – 3.6 V		•									
1.8 V – 3.6 V				•							
2.25 V – 3.6 V										•	•
3.0 V – 3.6 V	•										

* = Operating temperature –40 °C to +105 °C
S = Supported, may require ext. components
□ = In some product versions

E = External flash required

C/T = Crystal and TCXO supported
T = TCXO supported

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GNSS antennas

	L1 / L2	L1 / L5		All bands
	ANN-MB	ANN-MB1	ANN-MB5	ANN-MB2
Physical				
Image				
Size [mm]	60.0 x 82.0 x 22.5	60.0 x 82.0 x 22.5	46.1 x 49.1 x 15.9	92.9 x 108.5 x 24.7
Cable length [m]	5	5	3	5
Mechanical				
Connector	SMA, SMB, MCX	SMA	SMA	SMA
Mounting	Magnetic base, fixed installation option (screw)	Magnetic base, fixed installation option (screw)	Magnetic base	Magnetic base, fixed installation option (screw)
GNSS				
Frequency [MHz]	1559 - 1606, 1197 - 1249	1559 - 1606, 1164 - 1188	1559 - 1608, 1164 - 1186	1535 - 1602, 1166 - 1285
Bands	L1, L2, E5b, B2I, B2b	L1, L5, E5a, B2a, NavIC	L1, L5, E5a, B2a, NavIC	L, L1, L2, L5, E5, E6, B2, B3, NaVIC
Environmental				
Operation temp.	−40 °C to +85 °C	−40 °C to +85 °C	−40 °C to +85 °C	−40 °C to +85 °C
Water proof	IP67	IP67	IPX7	IP67
Compatible products				
Platform and bands	u-blox F9: L1/L2 high precision / dead reckoning / timing	u-blox F9: L1/L5 high precision / dead reckoning / timing	u-blox F10: L1/L5 dual-band standard precision / dead reckoning	u-blox X20: all bands u-blox F9: L1/L2, L1/L5 high precision / dead reckoning / timing
Recommended to use with these modules	ZED-F9K ZED-F9H ZED-F9P-0xB ZED-F9R ZED-F9T-00B	NEO-F9P ZED-F9K ZED-F9P-15B ZED-F9T-10B NEO-F10T	MAX-F10S MIA-F10Q NEO-F10N ZED-F9L	ZED-X20P ZED-F9K ZED-F9P ZED-F9T LEA-F9T
Power supply				
3.0 V – 5.0 V	•	•	•	•