

GNSS Open Signals Characteristics

System	Signal	Carrier frequency (MHz)	Channel combination	Channel	Bandwidth (MHz) ⁽¹⁾	Modulation	Sub-carrier frequency (MHz)	Primary code			Secondary code			Data rate (symbol/s)	Channel coding rate ⁽²⁾	Minimum received power (dBW)	ICD		
								Chip rate (Mchip/s)	Length		Chip rate (chip/s)	Length							
									(chip)	(ms)		(chip)	(ms)						
GPS	L1 C/A	1575.42	-	Data (Q)	2.046	BPSK(1)	-	1.023	1023	1	-	-	-	50	4/5	-158.5	IS-GPS-200		
	L1C	1575.42	Time & Code multiplexing	Data (I)	14.322	BOC(1,1)	1.023	1.023	10 230	10	-	-	-	100	1/2	-163.0	-157.0 IS-GPS-800		
				Pilot (I)	14.322	TMBOC(6,1,4/33)	1.023 & 6.138	1.023	10 230	10	100	1800 ⁽³⁾	18 000	-	-	-158.25			
	L2C	1227.60	Time multiplexing	Data (Q)	2.046	BPSK(0.5)	-	0.5515	10 230	20	-	-	-	50	1/2	-161.5	-158.5 ⁽⁴⁾ IS-GPS-200		
				Pilot (Q)	2.046	BPSK(0.5)	-	0.5515	767 250	1500	-	-	-	-	-	-161.5			
	L5	1176.45	Quadrature	Data (I)	20.46	BPSK(10)	-	10.23	10 230	1	1000	10	10	100	1/2	-157.0	-154.0 ⁽⁵⁾ IS-GPS-705		
Pilot (Q)				20.46	BPSK(10)	-	10.23	10 230	1	1000	20	20	-	-	-157.0				
Galileo	E1	1575.42	Code multiplexing	Data (I)	14.322	CBOC(6,1,1/11)	1.023 & 6.138	1.023	4092	4	-	-	-	250	1/2	-160.25	-157.25		
				Pilot (-I)	14.322	CBOC(6,1,1/11)	1.023 & 6.138	1.023	4092	4	250	25	100	-	-	-160.25			
	E5	1176.45	Quadrature	Data (I)	20.46	AltBOC	BPSK(10)	-	10.23	10 230	1	1000	20	20	50	1/2	-158.25	-155.25 Galileo OS SIS ICD	
				Pilot (Q)	20.46		BPSK(10)	-	10.23	10 230	1	1000	100	100	-	-	-158.25		
		1207.14	Quadrature	Data (I)	20.46		BPSK(10)	-	10.23	10 230	1	1000	4	4	250	1/2	-158.25		-155.25
				Pilot (Q)	20.46		BPSK(10)	-	10.23	10 230	1	1000	100	100	-	-	-158.25		
BeiDou	B1C	1575.42	Quadrature	Data (I)	14.322	BOC(1,1)	1.023	1.023	10 230	10	-	-	-	100	1/2	-165.0	-159.0 ⁽⁶⁾ BDS-SIS-ICD-B1C		
				Pilot (Q)	14.322	QMBOC(6,1,4/33)	1.023 & 6.138	1.023	10 230	10	100	1800 ⁽³⁾	18 000	-	-	-160.2			
	B1I	1561.098	-	Data	4.092	BPSK(2)	-	2.046	2046	1	1000	20	20	50 ⁽⁷⁾	11/15	-163.0	BDS-SIS-ICD-B1I		
	B2	1176.45	Quadrature	Data (I)	20.46	BPSK(10)	-	10.23	10 230	1	1000	5	5	200	1/2	-159.0	-156.0 ⁽⁶⁾ BDS-SIS-ICD-B2a		
				Pilot (Q)	20.46	BPSK(10)	-	10.23	10 230	1	1000	100	100	0	0	-159.0			
	B2b	1207.14	-	Data (I)	20.46	BPSK(10)	-	10.23	10 230	1	-	-	-	1000	1/2	-160.0 ⁽⁶⁾	BDS-SIS-ICD-B2b		
B3I	1268.52		Data	20.46	BPSK(10)	-	10.23	10 230	1	1000	20	20	50 ⁽⁷⁾	11/15	-163.0	BDS-SIS-ICD-B3I			
GLONASS	L10F	1602.00	-	Data	8.3345	BPSK(≈ 0.5)	-	0.511	511	1	100 ⁽⁸⁾	2 ⁽⁸⁾	20 ⁽⁸⁾	50	77/85	-161.0	ICD L1, L2 GLONASS		
	L20F	1246.00	-	Data	6.7095	BPSK(≈ 0.5)	-	0.511	511	1	100	2	20	50	77/85	-167.0			
	L10C	1600.995	Time multiplexing	Data (Q)	1.023	BPSK(0.5)	-	0.5115	1023	2	500	2	4	250	1/2	?	? ⁽⁹⁾ ICD GLONASS CDMA L1		
				Pilot (Q)	4.092	BOC(1,1)	1.023	0.5115	4092	8	-	-	-	-	-	?			
	L20C	1248.06	Time mult.	Pilot (Q)	4.092	BOC(1,1)	1.023	0.5115	10 230	20	50	50	1000	-	-	? ⁽⁹⁾	ICD GLONASS CDMA L2		
	L30C	1202.025	Quadrature	Data (I)	20.46	BPSK(10)	-	10.23	10 230	1	1000	5	5	200	1/2	?	? ⁽⁹⁾ ICD GLONASS CDMA L3		
Pilot (Q)				20.46	BPSK(10)	-	10.23	10 230	1	1000	10	10	-	-	?				

⁽¹⁾ Bandwidth of the main lobes only; ⁽²⁾ Rate for the main channel coding, there may be additional CRC; ⁽³⁾ For these signals, each satellite has its own secondary code; ⁽⁴⁾ -160.0 dBW on blocks IIR-M and IIF satellites; ⁽⁵⁾ -154.9 dBW on block IIF satellites; ⁽⁶⁾ The value is 2 dB lower for IGSO satellites; ⁽⁷⁾ Data rate for MEO/IGSO satellites, it is 500 symbol/s for GEO satellites; ⁽⁸⁾ Not a true a secondary code since it is not present for some parts of the data; ⁽⁹⁾ The edition 1.0 of the ICDs do not mention the power level.