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)	Length (ms)	Chip rate (chip/s)	Length (chip)	Length (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 ($L1C_D$ / $L1C_P$)	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 (E1-B / E1-C)	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	Galileo OS SIS ICD
				Pilot (−I)	14.322	CBOC(6,1,1/11)	1.023 & 6.138	1.023	4092	4	250	25	100	-	-	−160.25		
	E5 E5a	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	
				Pilot (Q)	20.46	AltBOC BPSK(10)	-	10.23	10 230	1	1000	100	100	-	-	−158.25		
	E5 E5b	1207.14	Quadrature	Data (I)	20.46	AltBOC BPSK(10)	-	10.23	10 230	1	1000	4	4	250	1/2	−158.25	−155.25	
				Pilot (Q)	20.46	AltBOC 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 B2a	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	L1OF	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
	L2OF	1246.00	-	Data	6.7095	BPSK(≈ 0.5)	-	0.511	511	1	100	2	20	50	77/85	−167.0		
	L1OC	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	-	-	-	-	-	?		
	L2OC	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
	L3OC	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.