

2. Specification

2-1. GSM General Specification

Item		GSM 850	EGSM 900	DCS1800	PCS1900
Freq. Band[MHz]		824~849	880~915	1710~1785	1850~1910
Uplink/Downlink		869~894	925~960	1805~1880	1930~1990
ARFCN range		128~251	0~124 & 975~1023	512~885	512~810
Tx/Rx spacing		45MHz	45MHz	95MHz	80MHz
Mod. Bit rate/ Bit Period		270.833kbps 3.692us	270.833kbps 3.692us	270.833kbps 3.692us	270.833kbps 3.692us
Time Slot Period/ Frame Period		576.9us 4.615ms	576.9us 4.615ms	576.9us 4.615ms	576.9us 4.615ms
Modulation	GSM/ EGPRS	GMSK/ 8PSK	GMSK/ 8PSK	GMSK/ 8PSK	GMSK/ 8PSK
MS Power		33dBm~5dBm	33dBm~5dBm	30dBm~0dBm	30dBm~0dBm
Power Class		4(GMSK) E2(8PSK)	4(GMSK) E2(8PSK)	1(GMSK) E2(8PSK)	1(GMSK) E2(8PSK)
Sensitivity		-102dBm	-102dBm	-100dBm	-100dBm
TDMA Mux		8	8	8	8

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2-2. WCDMA General Specification

Item	WCDMA 2100(B1)	WCDMA 1900(B2)	WCDMA 1700	WCDMA 900	WCDMA 850
Freq. Band[MHz] Uplink/Downlink	1920~1980 2110~2170	1850~1910 1930~1990	1710~1755 2110~2155	880~915 925~960	824~849 869~894
ARFCN range	UL: 9612~9888 DL: 10562~10838	UL: 9262~9538 DL: 9662~9938	UL: 1312~1513 DL: 1537~1738	UL: 2712~2863 DL: 2937~3088	UL: 4132~4233 DL: 4357~4458
Tx/Rx spacing	190MHz	80MHz	400MHz	45MHz	45MHz
Mod. Bit rate/ Bit Period	42.2Mbps(DL) 5.42Mbps(UL)	42.2Mbps(DL) 5.42Mbps(UL)	3.84Mcps	3.84Mcps	3.84Mcps
Time Slot Period/ Frame Period	WCDMA 10ms/0.667ms HSPA 2ms/0.667ms	WCDMA 10ms/0.667ms HSPA 2ms/0.667ms	FrameLength: 10ms Slotlength: 0.667ms	FrameLength: 10ms Slotlength: 0.667ms	FrameLength: 10ms Slotlength: 0.667ms
Modulation	QPSK 16QAM 64QAM	QPSK 16QAM 64QAM	QPSK HQPSK	QPSK HQPSK	QPSK HQPSK
MS Power (dBm)	25.7 ~ -49(↓)	25.7 ~ -49(↓)	24dBm~ -50dBm	24dBm~ -50dBm	24dBm~ -50dBm
Power Class	3(max+24dBm)	3(max+24dBm)	3(max+24dBm)	3(max+24dBm)	3(max+24dBm)
Sensitivity	-106dBm	-104dBm	-106.7dBm	-106.7dBm	-106.7dBm

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2-3. CDMA/LTE General Specification

Item	CDMA	GPS	LTE FDD B1
Tx Freq. range	824.04 ~ 848.97MHz	-	1920~1980 MHz
Rx Freq. range	869.04 ~ 893.97MHz	1575.42MHz	2110~2170 MHz
Channel Bandwidth	1.23MHz	-	5, 10, 15, 20MHz
Channel Spacing	30KHz	Not Used	180KHz
Number of Channel	832	1	25, 50, 75, 100
Duplex Separation	45MHz	-	190 MHz
Type of Emission	1M27F9W	-	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)
Tx Local Frequency	$F_{Tx} * 1.6666$	-	-
Rx Local Frequency	$F_{Rx} * 2$	-	-
Frequency Stability	$(F_{Rx}-45\text{MHz})\pm 300\text{Hz}$	-	-
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C

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Item	LTE FDD B2	LTE FDD B3	LTE FDD B4	LTE FDD B5	LTE FDD B7
Tx Freq. range	1850 ~ 1910 MHz	1710 ~ 1785 MHz	1710~1755 MHz	824 ~ 849 MHz	2500~2570 MHz
Rx Freq. range	1930 ~ 1990 MHz	1805 ~ 1880 MHz	2110~2155 MHz	869 ~ 894 MHz	2620~2690 MHz
Channel Bandwidth	1.4, 3, 5, 10, 15, 20 MHz	1.4, 3, 5, 10, 15, 20 MHz	1.4, 3, 5, 10, 15, 20 MHz	1.4, 3, 5, 10 MHz	5, 10,15, 20 MHz
Channel Spacing	180KHz	180KHz	180KHz	180KHz	180KHz
Number of Channel	6, 15, 25, 50, 75, 100	6, 15, 25, 50, 75, 100	6, 15, 25, 50, 75, 100	6, 15, 25, 50	25, 50, 75, 100
Duplex Separation	80 MHz	95 MHz	400 MHz	45 MHz	45 MHz
Type of Emission	1M11G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)	1M11G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)	1M11G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)	1M11G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C

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Item	LTE FDD B8	LTE FDD B12	LTE FDD B13	LTE FDD B17
Tx Freq. range	880 ~ 915 MHz	699 ~ 716 MHz	777~787 MHz	704 ~ 716 MHz
Rx Freq. range	925 ~ 960 MHz	729 ~ 746 MHz	746~756 MHz	734 ~ 746 MHz
Channel Bandwidth	1.4, 3, 5, 10 MHz	1.4, 3, 5, 10 MHz	5, 10 MHz	5, 10 MHz
Channel Spacing	180KHz	180KHz	180KHz	180KHz
Number of Channel	6, 15, 25, 50	25, 50, 75, 100	25, 50	25, 50
Duplex Separation	45 MHz	30 MHz	-31 MHz	30 MHz
Type of Emission	1M11G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM)	1M11G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM)	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM)	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM)
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C

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Item	LTE FDD B18	LTE FDD B19	LTE FDD B20	LTE FDD B25	LTE FDD B26
Tx Freq. range	815 ~ 830 MHz	830 ~ 845 MHz	832 ~ 862 MHz	1850~1915 MHz	814 ~ 849 MHz
Rx Freq. range	860 ~ 875 MHz	875 ~ 890 MHz	791 ~ 821 MHz	1930~1995 MHz	859 ~ 894 MHz
Channel Bandwidth	5, 10, 15 MHz	5, 10, 15 MHz	5, 10, 15, 20 MHz	1.4, 3, 5, 10, 15, 20 MHz	1.4, 3, 5, 10, 15 MHz
Channel Spacing	180KHz	180KHz	180KHz	180KHz	180KHz
Number of Channel	25, 50, 75	25, 50, 75	25, 50, 75, 100	6, 15, 25, 50, 75, 100	6, 15, 25, 50, 75
Duplex Separation	45 MHz	45 MHz	-41 MHz	80 MHz	45 MHz
Type of Emission	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM)	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM)	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)	1M11G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)	1M11G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM)
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C

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Item	LTE FDD B28	LTE TDD B34	LTE TDD B38	LTE TDD B39	LTE TDD B40
Tx Freq. range	703 ~ 748 MHz	2010 ~ 2025 MHz	2570 ~ 2620 MHz	1880~1920 MHz	2300 ~ 2400 MHz
Rx Freq. range	758 ~ 803 MHz	2010 ~ 2025 MHz	2570 ~ 2620 MHz	1880~1920 MHz	2300 ~ 2400 MHz
Channel Bandwidth	3, 5, 10, 15, 20 MHz	5, 10,15 MHz	5, 10, 15, 20 MHz	5, 10, 15, 20 MHz	5, 10, 15, 20 MHz
Channel Spacing	180KHz	180KHz	180KHz	180KHz	180KHz
Number of Channel	15, 25, 50, 75, 100	25, 50, 75	25, 50, 75, 100	25, 50, 75, 100	25, 50, 75, 100
Duplex Separation	55 MHz	-	-	-	-
Type of Emission	2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)
Operating Temperature	-30℃ ~ +60℃	-30℃ ~ +60℃	-30℃ ~ +60℃	-30℃ ~ +60℃	-30℃ ~ +60℃

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Item	LTE TDD B41	LTE FDD B66
Tx Freq. range	2496~ 2690 MHz	1710 ~ 1780 MHz
Rx Freq. range	2496~ 2690 MHz	2110 ~ 2200 MHz
Channel Bandwidth	5, 10, 15, 20 MHz	1.4, 3, 5, 10, 15, 20 MHz
Channel Spacing	180KHz	180KHz
Number of Channel	25, 50, 75, 100	6, 15, 25, 50, 75, 100
Duplex Separation	-	400 MHz
Type of Emission	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)	1M11G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM)
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C

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2-4. GSM Tx Power Class

TX Power control level	GSM850	TX Power control level	EGSM900	TX Power control level	DCS1800	TX Power control level	PCS1900
5	33±2 dBm	5	33±2 dBm	0	30±3 dBm	0	30±3 dBm
6	31±2 dBm	6	31±2 dBm	1	28±3 dBm	1	28±3 dBm
7	29±2 dBm	7	29±2 dBm	2	26±3 dBm	2	26±3 dBm
8	27±2 dBm	8	27±2 dBm	3	24±3 dBm	3	24±3 dBm
9	25±2 dBm	9	25±2 dBm	4	22±3 dBm	4	22±3 dBm
10	23±2 dBm	10	23±2 dBm	5	20±3 dBm	5	20±3 dBm
11	21±2 dBm	11	21±2 dBm	6	18±3 dBm	6	18±3 dBm
12	19±2 dBm	12	19±2 dBm	7	16±3 dBm	7	16±3 dBm
13	17±2 dBm	13	17±2 dBm	8	14±3 dBm	8	14±3 dBm
14	15±2 dBm	14	15±2 dBm	9	12±4 dBm	9	12±4 dBm
15	13±2 dBm	15	13±2 dBm	10	10±4 dBm	10	10±4 dBm
16	11±3 dBm	16	11±3 dBm	11	8±4 dBm	11	8±4 dBm
17	9±3dBm	17	9±3dBm	12	6±4 dBm	12	6±4 dBm
18	7±3 dBm	18	7±3 dBm	13	4±4 dBm	13	4±4 dBm
19	5±3 dBm	19	5±3 dBm	14	2±5 dBm	14	2±5 dBm
-	-	-	-	15	0±5 dBm	15	0±5 dBm