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# 1. Safety Precautions

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## 1-1. Repair Precaution

Before attempting any repair or detailed tuning, shield the device from RF noise or static electricity discharges.

Use only demagnetized tools that are specifically designed for small electronic repairs, as most electronic parts are sensitive to electromagnetic forces.

Use only high quality screwdrivers when servicing products. Low quality screwdrivers can easily damage the heads of screws.

Use only conductor wire of the properly gauge and insulation for low resistance, because of the low margin of error of most testing equipment.

We recommend 22-gauge twisted copper wire.

Hand-soldering is not recommended, because printed circuit boards (PCBs) can be easily damaged, even with relatively low heat. Never use a soldering iron with a power rating of more than 100 watts and use only lead-free solder with a melting point below 250°C (482°F).

Prior to disassembling the battery charger for repair, ensure that the AC power is disconnected.

Always use the replacement parts that are registered in the SEC system. Third-party replacement parts may not function properly.

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# 1. Safety Precautions

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## 1-2. ESD(Electrostatically Sensitive Devices) Precaution

Many semiconductors and ESDs in electronic devices are particularly sensitive to static discharge and can be easily damaged by it. We recommend protecting these components with conductive anti-static bags when you store or transport them.

Always use an anti-static strap or wristband and remove electrostatic buildup or dissipate static electricity from your body before repairing ESDs.

Ensure that soldering irons have AC adapter with ground wires and that the ground wires are properly connected.

Use only desoldering tools with plastic tips to prevent static discharge.

Properly shield the work environment from accidental electrostatic discharge before opening packages containing ESDs.

The potential for static electricity discharge may be increased in low humidity environments, such as air-conditioned rooms. Increase the airflow to the working area to decrease the chance of accidental static electricity discharges.

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## 2. Specification

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### 2-1. GSM General Specification

Item		GSM850	EGSM 900	DCS1800	PCS1900
Freq. Band[MHz] Uplink/Downlink		824~849 869~894	880~915 925~960	1710~1785 1805~1880	1850~1910 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	0.3GMSK	0.3GMSK	0.3GMSK	GMSK/ 8PSK
MS Power		33dBm~ 5dBm	33dBm~ 5dBm	30dBm~ 0dBm	30dBm~ 0dBm
Power Class		5pcl ~ 19pcl	5pcl ~ 19pcl	0pcl ~ 15pcl	0pcl ~ 15pcl
Sensitivity		-102dBm	-102dBm	-100dBm	-100dBm
TDMA Mux		8	8	8	8
Cell Radius		35Km	35Km	2Km	2Km

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## 2. Specification

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### 2-2. GSM Tx Power Class

<b>TX Power control level</b>	<b>GSM850</b>	<b>TX Power control level</b>	<b>EGSM900</b>	<b>TX Power control level</b>	<b>DCS1800</b>	<b>TX Power control level</b>	<b>PCS1900</b>
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±3 dBm	17	9±3 dBm	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

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## 2. Specification

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### 2-3. WCDMA General Specification

Item	WCDMA 2100	WCDMA 1900	WCDMA 1700	WCDMA 900	WCDMA 850
Freq. Band[MHz] Uplink/Downlink	1922~1977 2112~2167	1852~1907 1932~1987	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	3.84Mcps	3.84Mcps	3.84Mcps	3.84Mcps	3.84Mcps
Time Slot Period/ Frame Period	FrameLength: 10ms Slotlength: 0.667ms	FrameLength: 10ms Slotlength: 0.667ms	FrameLength: 10ms Slotlength: 0.667ms	FrameLength: 10ms Slotlength: 0.667ms	FrameLength: 10ms Slotlength: 0.667ms
Modulation	QPSK HQPSK	QPSK HQPSK	QPSK HQPSK	QPSK HQPSK	QPSK HQPSK
MS Power (dBm)	24dBm~ -50dBm	24dBm~ -50dBm	24dBm~ -50dBm	24dBm~ -50dBm	24dBm~ -50dBm
Power Class	3(max+24dBm)	3(max+24dBm)	3(max+24dBm)	3(max+24dBm)	3(max+24dBm)
Sensitivity	-106.7dBm	-106.7dBm	-106.7dBm	-106.7dBm	-106.7dBm
TDMA Mux	8	8	8	8	8
Cell Radius	2Km	2Km	2Km	2Km	2Km

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## 2. Specification

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### 2-4. CDMA General Specification

Item	US PCS	CDMA	CDMA BC10	GPS
Tx Freq. range	1850 ~ 1910MHz	824.04 ~ 848.97MHz	817.9 ~ 823.1MHz	-
Rx Freq. range	1930 ~ 1990MHz	869.04 ~ 893.97MHz	862.9 ~ 868.1MHz	1575.42MHz
Channel Bandwidth	1.23MHz	1.23MHz	1.23MHz	-
Channel Spacing	50KHz	30KHz	25KHz	Not Used
Number of Channel	1200	832	205	1
Duplex Separation	80MHz	45MHz	45MHz	-
Type of Emission	1M28F9W	1M28F9W	1M28F9W	-
Tx Local Frequency	$F_{Tx} * 0.7999$	$F_{Tx} * 1.6666$	$F_{Tx} * 1.6666$	-
Rx Local Frequency	$F_{Rx} * 0.8888$	$F_{Rx} * 2$	$F_{Rx} * 2$	-
Frequency Stability	$(F_{Rx}-80\text{MHz})\pm 150\text{Hz}$	$(F_{Rx}-45\text{MHz})\pm 300\text{Hz}$	$(F_{Rx}-45\text{MHz})\pm 300\text{Hz}$	-
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C

## 2. Specification

### 2-5. LTE General Specification

Item	LTE FDD B1	LTE FDD B2	LTE FDD B3	LTE FDD B4
Tx Freq. range	1920~1980 MHz	1850 ~ 1910 MHz	1710 ~ 1785 MHz	1710~1755 MHz
Rx Freq. range	2110~2170 MHz	1930 ~ 1990 MHz	1805 ~ 1880 MHz	2110~2155 MHz
Channel Bandwidth	5, 10, 15, 20MHz	1.4, 3, 5, 10, 15, 20 MHz	1.4, 3, 5, 10, 15, 20 MHz	1.4, 3, 5, 10, 15, 20 MHz
Channel Spacing	180KHz	180KHz	180KHz	180KHz
Number of Channel	25, 50, 75, 100	6, 15, 25, 50, 75, 100	6, 15, 25, 50, 75, 100	6, 15, 25, 50, 75, 100
Duplex Separation	190 MHz	80 MHz	95 MHz	400 MHz
Type of Emission	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 4M50W7D (256QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 9M00W7D (256QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 13M5W7D (256QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM) 18M0W7D (256QAM)	1M09G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 1M11W7D (256QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 2M71W7D (256QAM) 4M57G7D (QPSK) 4M55W7D (16QAM) 4M55W7D (64QAM) 4M55W7D (256QAM) 9M05G7D (QPSK) 9M02W7D (16QAM) 9M02W7D (64QAM) 9M02W7D (256QAM) 13M6G7D (QPSK) 13M6W7D (16QAM) 13M6W7D (64QAM) 13M6W7D (256QAM) 18M1G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM) 18M0W7D (256QAM)	1M11G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 1M11W7D (256QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 2M71W7D (256QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 4M50W7D (256QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 9M00W7D (256QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 13M5W7D (256QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM) 18M0W7D (256QAM)	1M10G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 1M11W7D (256QAM) 2M71G7D (QPSK) 2M73W7D (16QAM) 2M73W7D (64QAM) 2M73W7D (256QAM) 4M55G7D (QPSK) 4M54W7D (16QAM) 4M54W7D (64QAM) 4M54W7D (256QAM) 9M04G7D (QPSK) 9M02W7D (16QAM) 9M02W7D (64QAM) 9M02W7D (256QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 13M5W7D (256QAM) 18M0G7D (QPSK) 18M1W7D (16QAM) 18M1W7D (64QAM) 18M1W7D (256QAM)
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C

## 2. Specification

Item	LTE FDD B5	LTE FDD B7	LTE FDD B8	LTE FDD B12
Tx Freq. range	824 ~ 849 MHz	2500~2570 MHz	880 ~ 915 MHz	699 ~ 716 MHz
Rx Freq. range	869 ~ 894 MHz	2620~2690 MHz	925 ~ 960 MHz	729 ~ 746 MHz
Channel Bandwidth	1.4, 3, 5, 10 MHz	5, 10,15, 20 MHz	1.4, 3, 5, 10 MHz	1.4, 3, 5, 10 MHz
Channel Spacing	180KHz	180KHz	180KHz	180KHz
Number of Channel	6, 15, 25, 50	25, 50, 75, 100	6, 15, 25, 50	25, 50, 75, 100
Duplex Separation	45 MHz	45 MHz	45 MHz	30 MHz
Type of Emission	1M10G7D (QPSK)	4M57G7D (QPSK)	1M11G7D (QPSK)	1M10G7D (QPSK)
	1M11W7D (16QAM)	4M54W7D (16QAM)	1M11W7D (16QAM)	1M10W7D (16QAM)
	1M11W7D (64QAM)	4M54W7D (64QAM)	1M11W7D (64QAM)	1M10W7D (64QAM)
	1M11W7D (256QAM)	4M54W7D (256QAM)	1M11W7D (256QAM)	1M10W7D (256QAM)
	2M72G7D (QPSK)	9M04G7D (QPSK)	2M71G7D (QPSK)	2M72G7D (QPSK)
	2M72W7D (16QAM)	9M05W7D (16QAM)	2M71W7D (16QAM)	2M72W7D (16QAM)
	2M72W7D (64QAM)	9M05W7D (64QAM)	2M71W7D (64QAM)	2M72W7D (64QAM)
	2M72W7D (256QAM)	9M05W7D (256QAM)	2M71W7D (256QAM)	2M72W7D (256QAM)
	4M59G7D (QPSK)	13M6G7D (QPSK)	4M50G7D (QPSK)	4M57G7D (QPSK)
	4M56W7D (16QAM)	13M6W7D (16QAM)	4M50W7D (16QAM)	4M53W7D (16QAM)
	4M56W7D (64QAM)	13M6W7D (64QAM)	4M50W7D (64QAM)	4M53W7D (64QAM)
	4M56W7D (256QAM)	13M6W7D (256QAM)	4M50W7D (256QAM)	4M53W7D (256QAM)
	9M03G7D (QPSK)	18M1G7D (QPSK)	9M00G7D (QPSK)	9M03G7D (QPSK)
	9M03W7D (16QAM)	18M1W7D (16QAM)	9M00W7D (16QAM)	9M03W7D (16QAM)
	9M03W7D (64QAM)	18M1W7D (64QAM)	9M00W7D (64QAM)	9M03W7D (64QAM)
	9M03W7D (256QAM)	18M1W7D (256QAM)	9M00W7D (256QAM)	9M03W7D (256QAM)
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C



## 2. Specification

Item	LTE FDD B13	LTE FDD B14	LTE FDD B19	LTE FDD B20
Tx Freq. range	777~787 MHz	788 ~ 798 MHz	830 ~ 845 MHz	832 ~ 862 MHz
Rx Freq. range	746~756 MHz	758 ~ 768 MHz	875 ~ 890 MHz	791 ~ 821 MHz
Channel Bandwidth	5, 10 MHz	5, 10 MHz	5, 10, 15 MHz	5, 10, 15, 20 MHz
Channel Spacing	180KHz	180KHz	180KHz	180KHz
Number of Channel	25, 50	25, 50	25, 50, 75	25, 50, 75, 100
Duplex Separation	-31 MHz	-30 MHz	45 MHz	-41 MHz
Type of Emission	4M54G7D (QPSK) 4M53W7D (16QAM) 4M53W7D (64QAM) 4M53W7D (256QAM) 9M01G7D (QPSK) 9M02W7D (16QAM) 9M02W7D (64QAM) 9M02W7D (256QAM)	4M56G7D (QPSK) 4M54W7D (16QAM) 4M54W7D (64QAM) 4M54W7D (256QAM) 9M06G7D (QPSK) 9M03W7D (16QAM) 9M03W7D (64QAM) 9M03W7D (256QAM)	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 4M50W7D (256QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 9M00W7D (256QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 13M5W7D (256QAM) 13M5W7D (64QAM) 13M5W7D (256QAM)	4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 4M50W7D (256QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 9M00W7D (256QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 13M5W7D (256QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM) 18M0W7D (256QAM)
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C

## 2. Specification

Item	LTE FDD B25	LTE FDD B26	LTE FDD B28	LTE FDD B30
Tx Freq. range	1850~1915 MHz	814 ~ 849 MHz	703 ~ 748 MHz	2305 ~ 2315 MHz
Rx Freq. range	1930~1995 MHz	859 ~ 894 MHz	758 ~ 803 MHz	2350 ~ 2360 MHz
Channel Bandwidth	1.4, 3, 5, 10, 15, 20 MHz	1.4, 3, 5, 10, 15 MHz	3, 5, 10, 15, 20 MHz	5, 10 MHz
Channel Spacing	180KHz	180KHz	180KHz	180KHz
Number of Channel	6, 15, 25, 50, 75, 100	6, 15, 25, 50, 75	15, 25, 50, 75, 100	25, 50
Duplex Separation	80 MHz	45 MHz	55 MHz	45 MHz
Type of Emission	1M09G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 1M11W7D (256QAM) 2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 2M71W7D (256QAM) 4M57G7D (QPSK) 4M55W7D (16QAM) 4M55W7D (64QAM) 4M55W7D (256QAM) 9M05G7D (QPSK) 9M02W7D (16QAM) 9M02W7D (64QAM) 9M02W7D (256QAM) 13M6G7D (QPSK) 13M6W7D (16QAM) 13M6W7D (64QAM) 13M6W7D (256QAM) 18M1G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM) 18M0W7D (256QAM)	1M08G7D (QPSK) 1M09W7D (16QAM) 1M09W7D (64QAM) 1M09W7D (256QAM) 2M69G7D (QPSK) 2M70W7D (16QAM) 2M70W7D (64QAM) 2M70W7D (256QAM) 4M50G7D (QPSK) 4M51W7D (16QAM) 4M51W7D (64QAM) 4M51W7D (256QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 9M00W7D (256QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 13M5W7D (256QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 13M5W7D (256QAM)	2M71G7D (QPSK) 2M71W7D (16QAM) 2M71W7D (64QAM) 2M71W7D (256QAM) 4M50G7D (QPSK) 4M50W7D (16QAM) 4M50W7D (64QAM) 4M50W7D (256QAM) 9M00G7D (QPSK) 9M00W7D (16QAM) 9M00W7D (64QAM) 9M00W7D (256QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 13M5W7D (256QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM) 18M0W7D (256QAM)	4M53G7D (QPSK) 4M52W7D (16QAM) 4M52W7D (64QAM) 4M52W7D (256QAM) 9M02G7D (QPSK) 9M02W7D (16QAM) 9M02W7D (64QAM) 9M02W7D (256QAM)
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C

## 2. Specification

Item	LTE TDD B38	LTE TDD B39	LTE TDD B40	LTE TDD B41
Tx Freq. range	2570 ~ 2620 MHz	1880~1920 MHz	2300 ~ 2400 MHz	2496~ 2690 MHz
Rx Freq. range	2570 ~ 2620 MHz	1880~1920 MHz	2300 ~ 2400 MHz	2496~ 2690 MHz
Channel Bandwidth	5, 10, 15, 20 MHz	5, 10, 15, 20 MHz	5, 10, 15, 20 MHz	5, 10, 15, 20 MHz
Channel Spacing	180KHz	180KHz	180KHz	180KHz
Number of Channel	25, 50, 75, 100	25, 50, 75, 100	25, 50, 75, 100	25, 50, 75, 100
Duplex Separation	-	-	-	-
Type of Emission	4M54G7D (QPSK)	4M50G7D (QPSK)	4M50G7D (QPSK)	4M54G7D (QPSK)
	4M52W7D (16QAM)	4M50W7D (16QAM)	4M50W7D (16QAM)	4M52W7D (16QAM)
	4M52W7D (64QAM)	4M50W7D (64QAM)	4M50W7D (64QAM)	4M52W7D (64QAM)
	4M52W7D (256QAM)	4M50W7D (256QAM)	4M50W7D (256QAM)	4M52W7D (256QAM)
	9M00G7D (QPSK)	9M00G7D (QPSK)	9M00G7D (QPSK)	9M00G7D (QPSK)
	9M05W7D (16QAM)	9M00W7D (16QAM)	9M00W7D (16QAM)	9M05W7D (16QAM)
	9M05W7D (64QAM)	9M00W7D (64QAM)	9M00W7D (64QAM)	9M05W7D (64QAM)
	9M05W7D (256QAM)	9M00W7D (256QAM)	9M00W7D (256QAM)	9M05W7D (256QAM)
	13M5G7D (QPSK)	13M5G7D (QPSK)	13M5G7D (QPSK)	13M5G7D (QPSK)
	13M5W7D (16QAM)	13M5W7D (16QAM)	13M5W7D (16QAM)	13M5W7D (16QAM)
	13M5W7D (64QAM)	13M5W7D (64QAM)	13M5W7D (64QAM)	13M5W7D (64QAM)
	13M5W7D (256QAM)	13M5W7D (256QAM)	13M5W7D (256QAM)	13M5W7D (256QAM)
	18M0G7D (QPSK)	18M0G7D (QPSK)	18M0G7D (QPSK)	18M0G7D (QPSK)
	18M0W7D (16QAM)	18M0W7D (16QAM)	18M0W7D (16QAM)	18M0W7D (16QAM)
	18M0W7D (64QAM)	18M0W7D (64QAM)	18M0W7D (64QAM)	18M0W7D (64QAM)
	18M0W7D (256QAM)	18M0W7D (256QAM)	18M0W7D (256QAM)	18M0W7D (256QAM)
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C

## 2. Specification

Item	LTE TDD B48	LTE FDD B66	LTE FDD B71
Tx Freq. range	3550~ 3700 MHz	1710 ~ 1780 MHz	663 ~ 698 MHz
Rx Freq. range	3550~ 3700 MHz	2110 ~ 2200 MHz	617 ~ 652 MHz
Channel Bandwidth	5, 10, 15, 20 MHz	1.4, 3, 5, 10, 15, 20 MHz	5, 10, 15, 20 MHz
Channel Spacing	180KHz	180KHz	180KHz
Number of Channel	25, 50, 75, 100	6, 15, 25, 50, 75, 100	25, 50, 75, 100
Duplex Separation	-	400 MHz	-46 MHz
Type of Emission	4M54G7D (QPSK) 4M51W7D (16QAM) 4M51W7D (64QAM) 4M51W7D (256QAM) 9M05G7D (QPSK) 9M03W7D (16QAM) 9M03W7D (64QAM) 9M03W7D (256QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 13M5W7D (256QAM) 18M1G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM) 18M0W7D (256QAM)	1M10G7D (QPSK) 1M11W7D (16QAM) 1M11W7D (64QAM) 1M11W7D (256QAM) 2M71G7D (QPSK) 2M73W7D (16QAM) 2M73W7D (64QAM) 2M73W7D (256QAM) 4M55G7D (QPSK) 4M54W7D (16QAM) 4M54W7D (64QAM) 4M54W7D (256QAM) 9M04G7D (QPSK) 9M02W7D (16QAM) 9M02W7D (64QAM) 9M02W7D (256QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 13M5W7D (256QAM) 18M0G7D (QPSK) 18M1W7D (16QAM) 18M1W7D (64QAM) 18M1W7D (256QAM)	4M58G7D (QPSK) 4M53W7D (16QAM) 4M53W7D (64QAM) 4M53W7D (256QAM) 9M04G7D (QPSK) 9M03W7D (16QAM) 9M03W7D (64QAM) 9M03W7D (256QAM) 13M5G7D (QPSK) 13M5W7D (16QAM) 13M5W7D (64QAM) 13M5W7D (256QAM) 18M0G7D (QPSK) 18M0W7D (16QAM) 18M0W7D (64QAM) 18M0W7D (256QAM)
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C

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## 3. Product Function

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### Main Function

Item	Description
OS	Android V9.0
RF	<b>2G</b> CDMA : CDMA800 / USPCS1900 GSM : GSM850 / GSM900 / DCS1800 / PCS1900 <b>3G</b> CDMA : BC0 / BC1 / BC10 WCDMA : B1 / B2 / B4 / B5 / B8 TD-SCDMA : B34 / B39 <b>4G</b> (LTE) - FDD : B1 / B2 / B3 / B4 / B5 / B7 / B8 / B12 / B13 / B14 / B18 / B19 / B20 / B25 / B26 / B28 / B29 / B30 / B66 / B71 - TDD : B38 / B39 / B40 / B41 / B46 / B48
Battery	Typ : 4100mAh / Rated : 4000mAh
Base Band	SM8150 2.8GHz,2.4GHz,1.7GHz
Other RF	A-GPS, Glonass, BEIDOU, Galileo, BT5.0, USB 3.1 Type-C, WIFI 802.11 a/b/g/n/ac/ax MIMO, NFC,MST
Camera	Dual Camera ( Wide: 12M A/F, OIS, F1.5-2.4 / Tele - 12MP, A/F, OIS, F2.4 / Ultra Wide: 16M, F2.2) with LED Flash, Front Camera (10M A/F, F1.9) / 8MP, F/F, F2.2
LCD	6.4" Quad HD+, 3040 x 1440, Dual edge super AMOLED
RAM	8GB
ROM	128GB (up to 512GB)
Sensor	Accelerometer, Barometer, Fingerprint Sensor, Gyro Sensor, Geomagnetic Sensor, Hall Sensor, HR Sensor, Proximity Sensor, RGB Light Sensor
Accessory	Charger : 5V/2A or 9 V/1.67 A Data cable : USB Type-C Ear jack : 3.5pi, 4Pin

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## 6. Level 1 Repair

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### 6-1. S/W Download

#### 6-1-1. Prepare for S/W Downloading

- Installation program: Downloader Program ([Odin3 v3.13.3.exe](#))
- Mobile Phone
- Data Cable
- Mobile device specific S/W: Binary files

#### ※ Settings

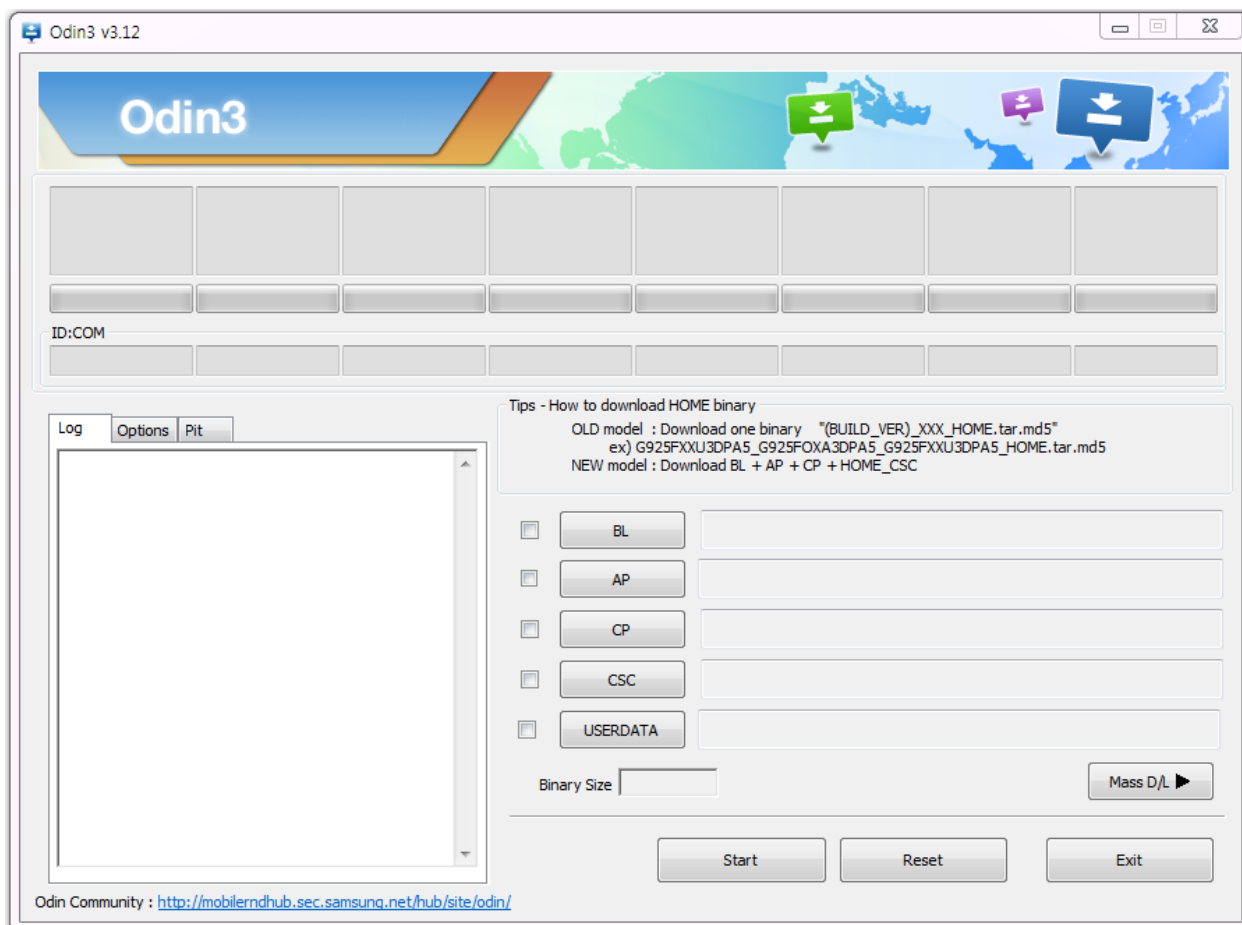


**Data Cable :**  
**[GH39-01949A](#)**  
**[GH39-01949A](#)**  
**[GH39-01951A](#)**

## 6. Level 1 Repair

### 6-1-2. S/W Installation Program (Downloader program)

- Open up the S/W Installation Program by executing the "**Odin3 v3.13.3.exe**"

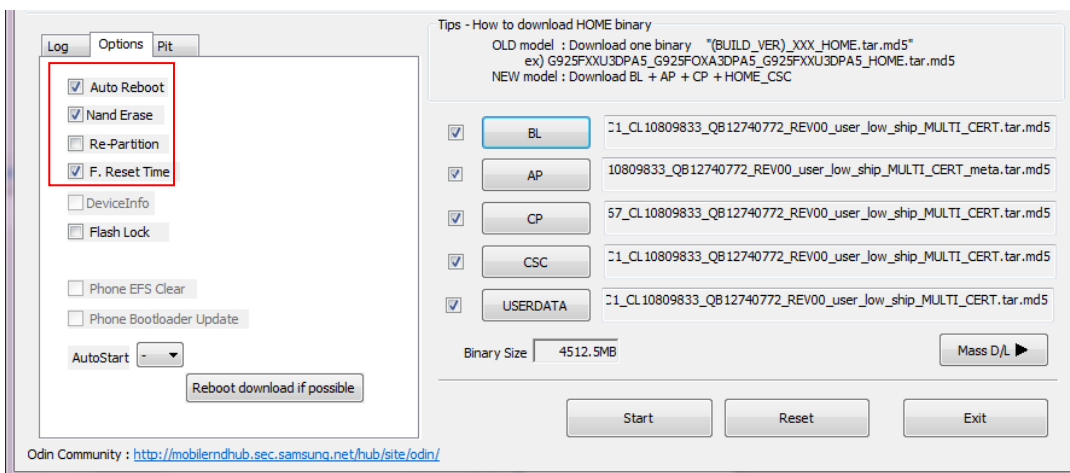
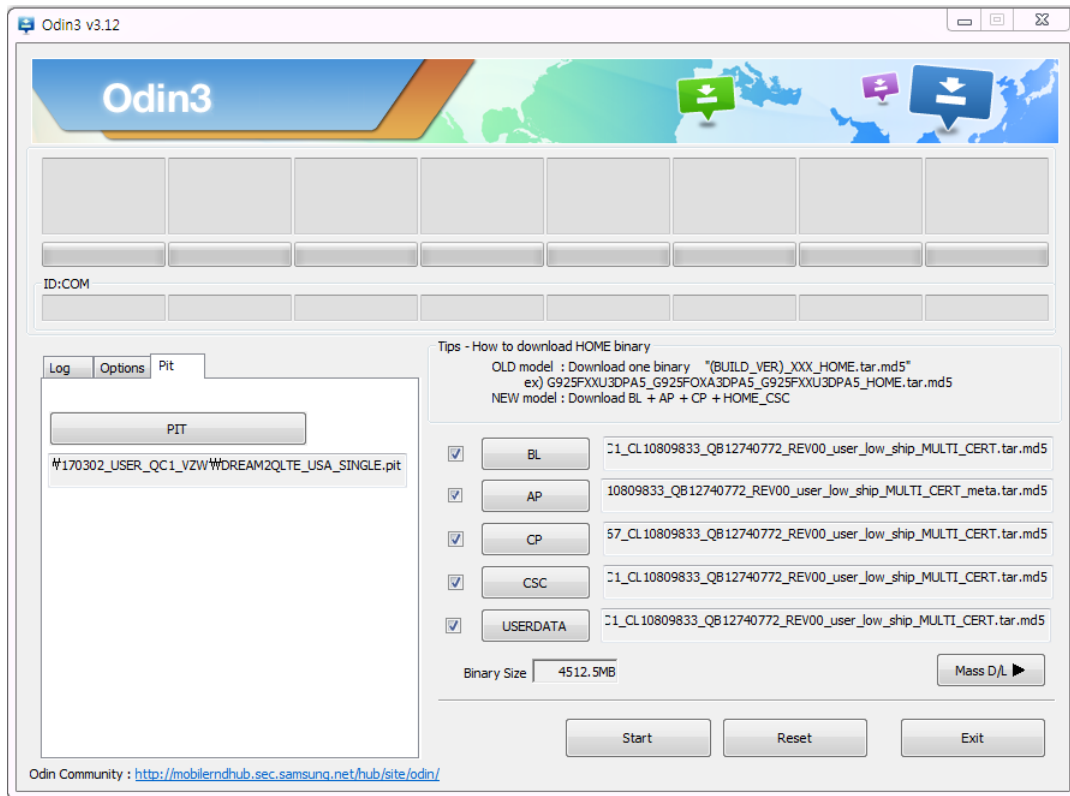


## 6. Level 1 Repair

1. Enable the check mark by click on the following options,

- Check Auto Reboot, F. Reset Time, Nand Erase
- Check PIT
- Check BOOTLOADER, PDA, PHONE, CSC and USERDATA Files

\* Note : "Odin v3.13.2 or above" checks MD5 checksum just after file selection.





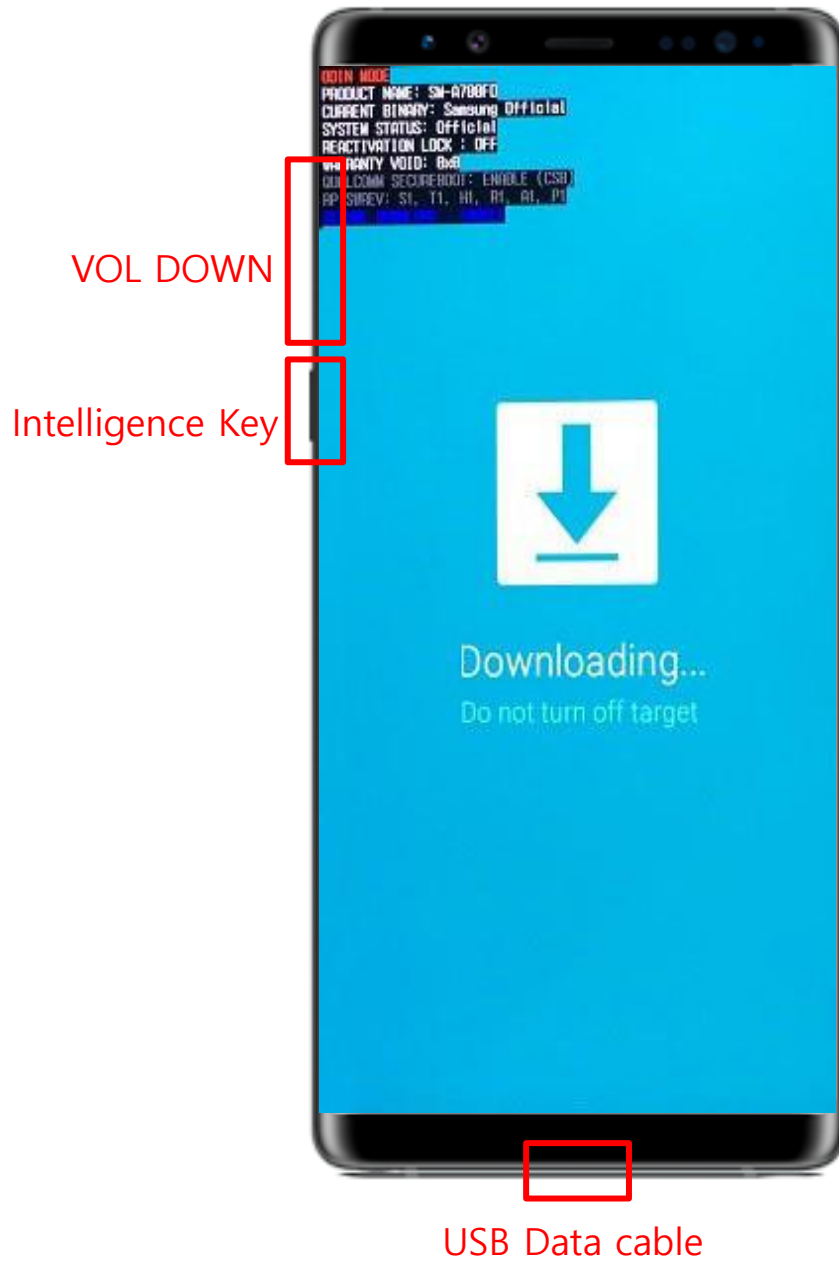
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## 6. Level 1 Repair

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### 2. Enter into Download Mode

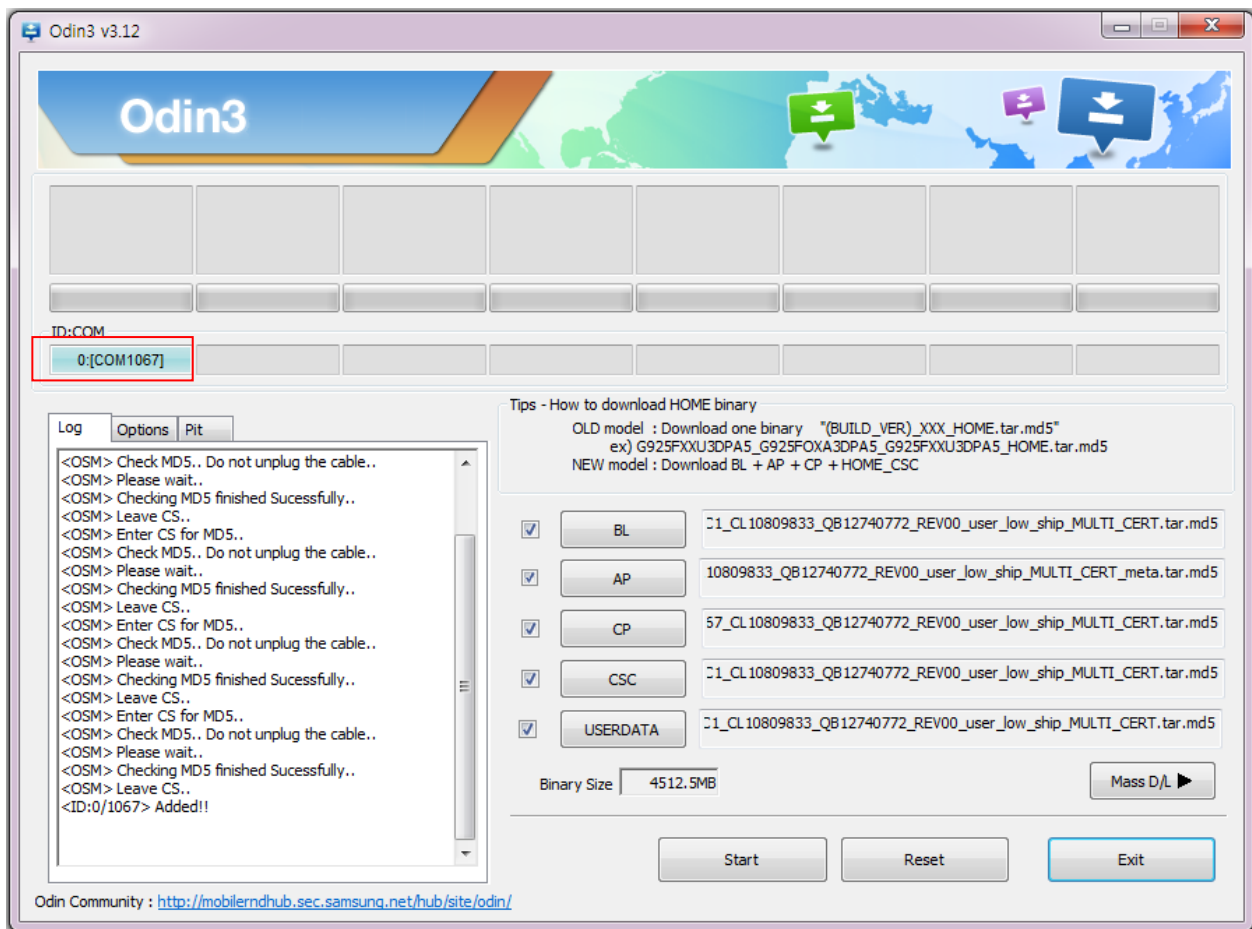
- Enter into Download Mode by pressing Volume Down button and Intelligence button simultaneously and connecting data cable followed by pressing Volume up button as a direction of the phone.



## 6. Level 1 Repair

### 3. Connect the device to PC via Data Cable.

Make sure that the one of communication ports [ID:COM] box is highlighted in sky blue.  
The device is now connected with the PC and ready to download the binary files in it.

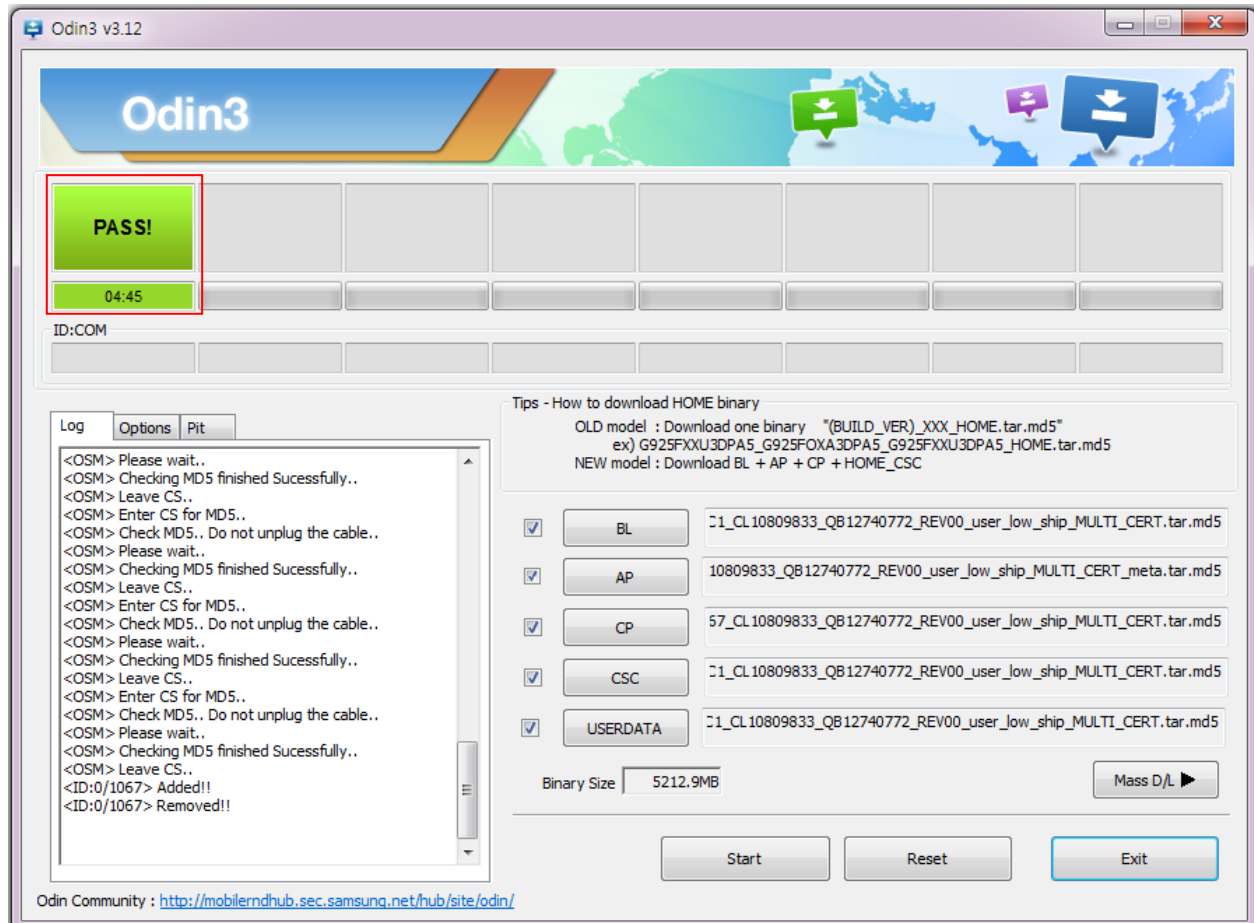


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## 6. Level 1 Repair

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4. Start downloading the binary files into the device by clicking Start button on the screen. The green colored "PASS!" sign will appear on the upper-left box if the binary files have been successfully downloaded into the device.



5. Disconnect the device from the Data cable.

6. Once the device boots up, you can check the version of the binary file or name by pressing the following code in sequence; **\*#1234#**

You can perform Factory data Reset by Settings → General Management → Reset

**※ Caution. Never disconnect during the S/W downloading.**

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## 6. Level 1 Repair

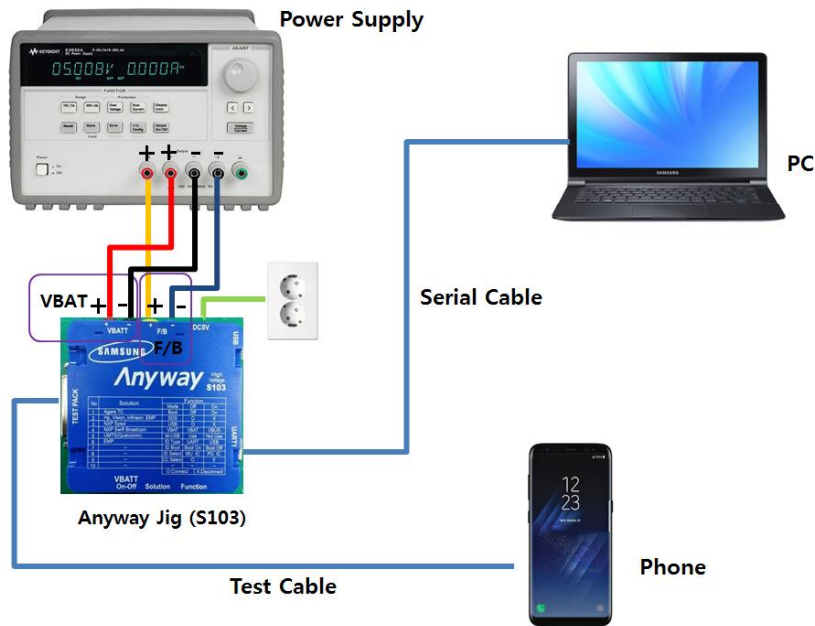
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### 6-2 IMEI writing

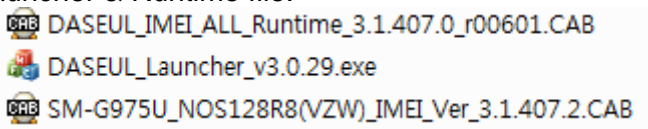
#### 6-2-1 Preparation

- New IMEI writing Program has been released.
- Supported Model : Models which CAB files are uploaded on HHPsvc INI File category, instead of ini file.
- Refer to below IMEI writing procedure.

#### - H/W




#### - S/W

① Library Install	To use Daseul, library files should be installed. Refer to SVC Bulletin “(11-82) Daseul (New IMEI writing Program) Library Install guide_rev1.0”
② Launcher	<b>DASEUL_SVC_Launcher_v3.0.29</b> or higher -Uploaded on HHPsvc Notice
③ Runtime File	1. <b>DASEUL_IMEI_ALL_Runtime_3.1.407.0_r00601.CAB</b> or higher -Uploaded on HHPsvc Notice 2. Make ‘ModelName’ folder at the same position with launcher & Runtime file. 
④ Model File	Copy Model File under the ‘Model Name’ folder

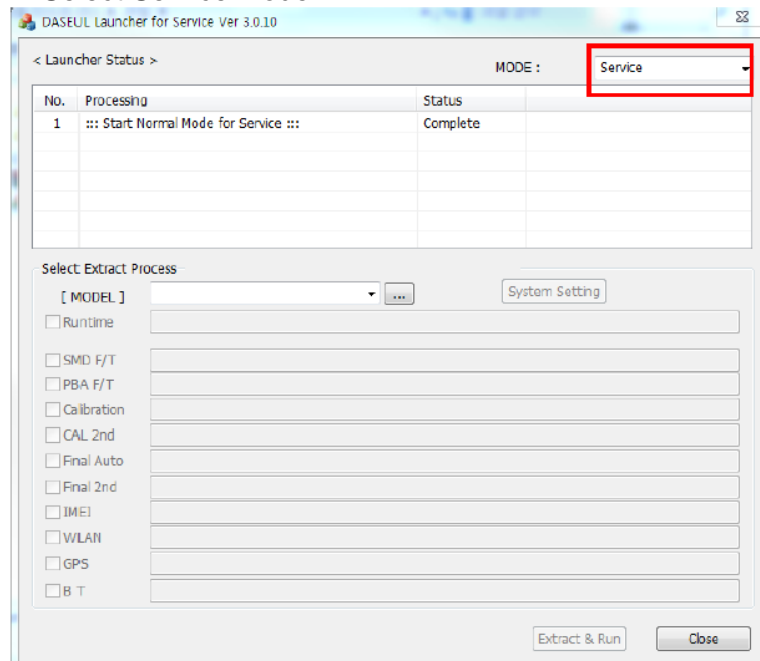
## 6. Level 1 Repair

### 6-2-2 IMEI writing Process

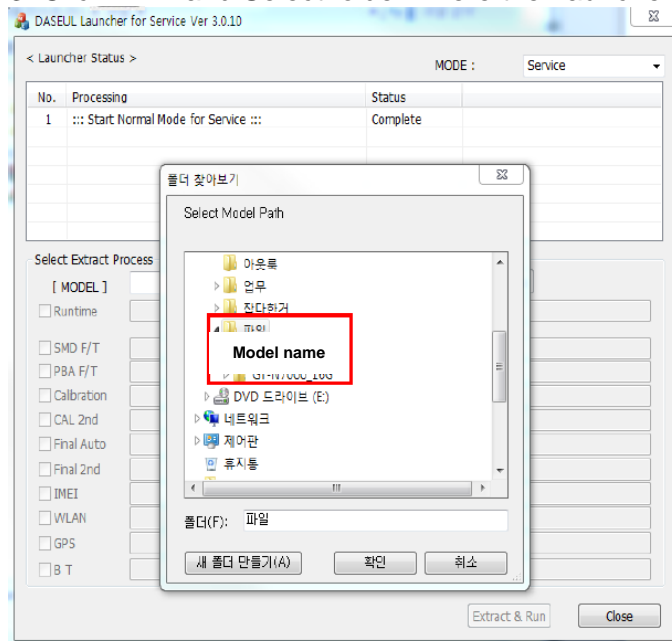
1. Run DASEUL\_SVC\_Launcher\_v3.0.29.exe

 DASEUL\_SVC\_Launcher\_v3.0.12.exe

2. Select Service Mode

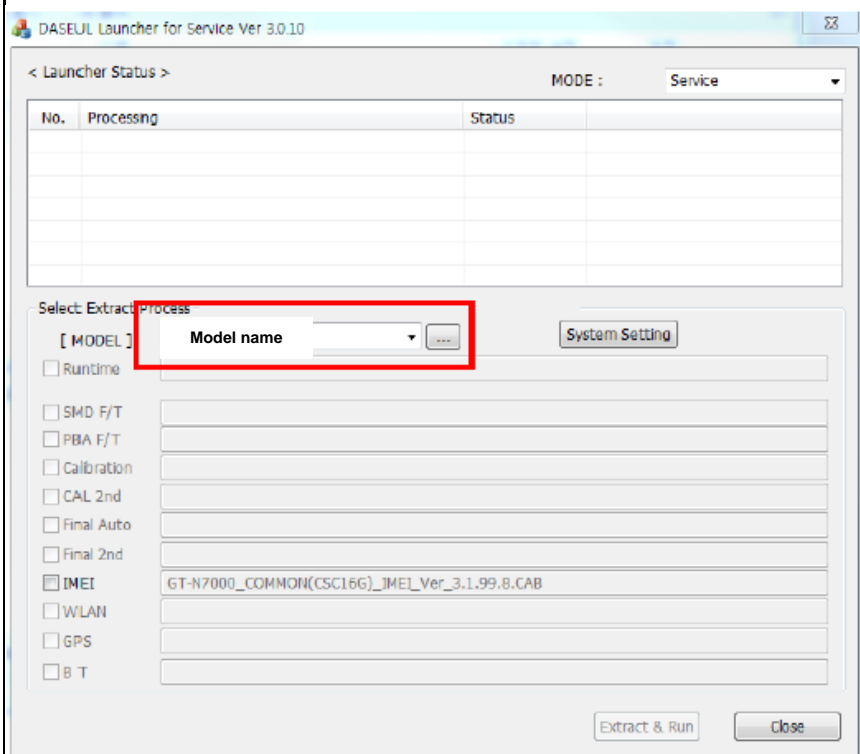


3. Click  and Select folder where the Launcher exists



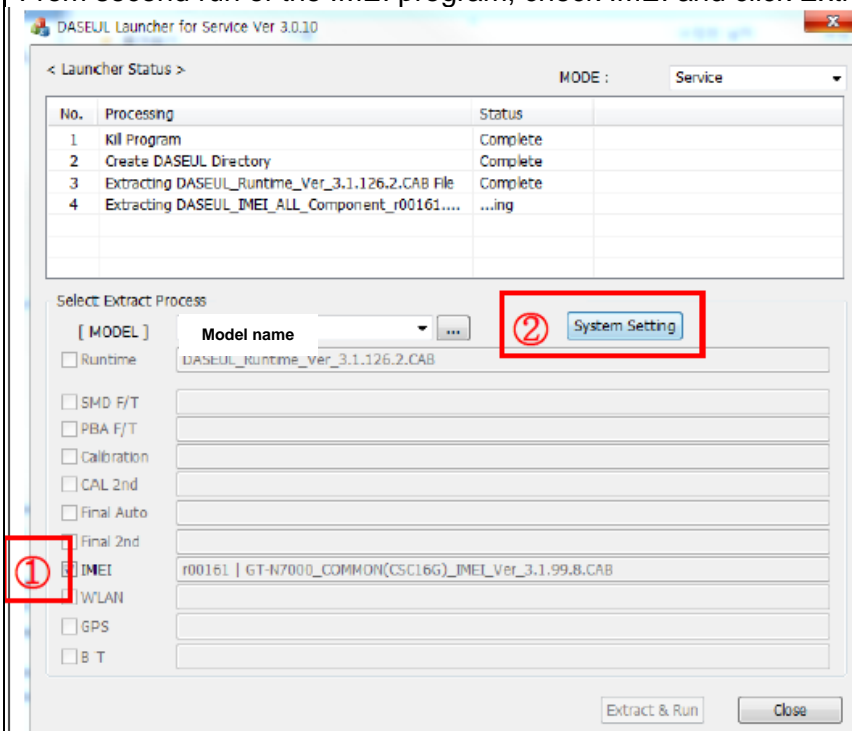
## 6. Level 1 Repair

### 4. Select Model



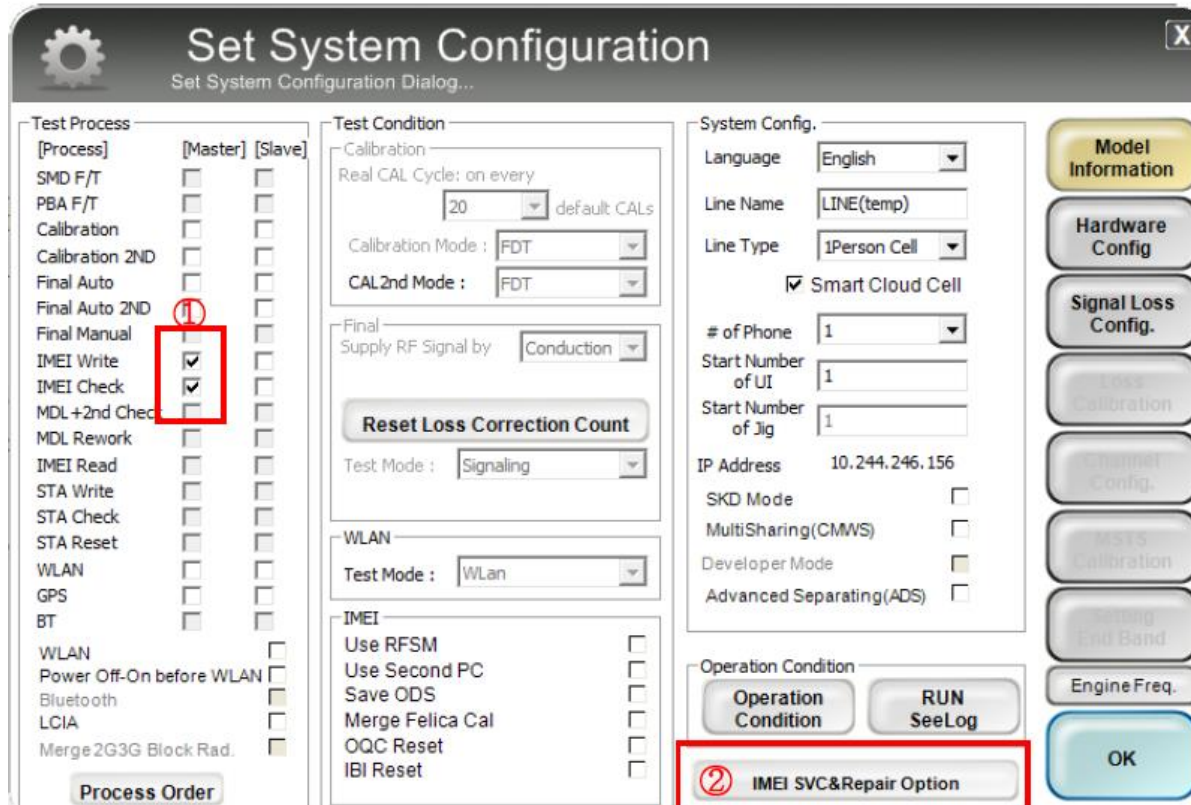
### 5. Check IMEI and click System Setting

※Once you setup the setting, you don't have to do it again, unless there is change.  
From second run of the IMEI program, check IMEI and click Extract & Run.



## 6. Level 1 Repair

6. Check IMEI Write / IMEI Check and click IMEI SVC & Repair Option.



The 'Set System Configuration' dialog box is shown. It has a title bar with a gear icon and a close button. The main area is divided into several sections: 'Test Process' (a table with checkboxes for various tests), 'Test Condition' (fields for calibration and RF signal), 'System Config.' (fields for language, line name, and other settings), and a right-hand sidebar with buttons for 'Model Information', 'Hardware Config', 'Signal Loss Config.', 'Loss Calibration', 'Channel Config.', 'MMS Calibration', 'Setting End Band', and 'Engine Freq.'. At the bottom, there are buttons for 'Operation Condition', 'RUN SeeLog', and 'IMEI SVC&Repair Option'. A red box highlights the 'IMEI SVC&Repair Option' button, and another red box highlights the 'IMEI Write' and 'IMEI Check' checkboxes in the 'Test Process' table.

[Process]	[Master]	[Slave]
SMD F/T	<input type="checkbox"/>	<input type="checkbox"/>
PBA F/T	<input type="checkbox"/>	<input type="checkbox"/>
Calibration	<input type="checkbox"/>	<input type="checkbox"/>
Calibration 2ND	<input type="checkbox"/>	<input type="checkbox"/>
Final Auto	<input type="checkbox"/>	<input type="checkbox"/>
Final Auto 2ND	<input type="checkbox"/>	<input type="checkbox"/>
Final Manual	<input type="checkbox"/>	<input type="checkbox"/>
IMEI Write	<input checked="" type="checkbox"/>	<input type="checkbox"/>
IMEI Check	<input checked="" type="checkbox"/>	<input type="checkbox"/>
MDL +2nd Check	<input type="checkbox"/>	<input type="checkbox"/>
MDL Rework	<input type="checkbox"/>	<input type="checkbox"/>
IMEI Read	<input type="checkbox"/>	<input type="checkbox"/>
STA Write	<input type="checkbox"/>	<input type="checkbox"/>
STA Check	<input type="checkbox"/>	<input type="checkbox"/>
STA Reset	<input type="checkbox"/>	<input type="checkbox"/>
WLAN	<input type="checkbox"/>	<input type="checkbox"/>
GPS	<input type="checkbox"/>	<input type="checkbox"/>
BT	<input type="checkbox"/>	<input type="checkbox"/>
WLAN	<input type="checkbox"/>	<input type="checkbox"/>
Power Off-On before WLAN	<input type="checkbox"/>	<input type="checkbox"/>
Bluetooth	<input type="checkbox"/>	<input type="checkbox"/>
LCIA	<input type="checkbox"/>	<input type="checkbox"/>
Merge 2G3G Block Rad.	<input type="checkbox"/>	<input type="checkbox"/>

Test Condition

Calibration

Real CAL Cycle: on every 20 default CALs

Calibration Mode: FDT

CAL2nd Mode: FDT

Final

Supply RF Signal by: Conduction

Reset Loss Correction Count

Test Mode: Signaling

WLAN

Test Mode: WLAN

IMEI

Use RFSM ☐

Use Second PC ☐

Save ODS ☐

Merge Felica Cal ☐

OQC Reset ☐

IBI Reset ☐

System Config.

Language: English

Line Name: LINE(temp)

Line Type: 1Person Cell

☒ Smart Cloud Cell

# of Phone: 1

Start Number of UI: 1

Start Number of Jlg: 1

IP Address: 10.244.246.156

SKD Mode ☐

MultiSharing(CMWS) ☐

Developer Mode ☐

Advanced Separating(ADS) ☐

Operation Condition

Operation Condition

IMEI SVC&Repair Option

Model Information

Hardware Config

Signal Loss Config.

Loss Calibration

Channel Config.

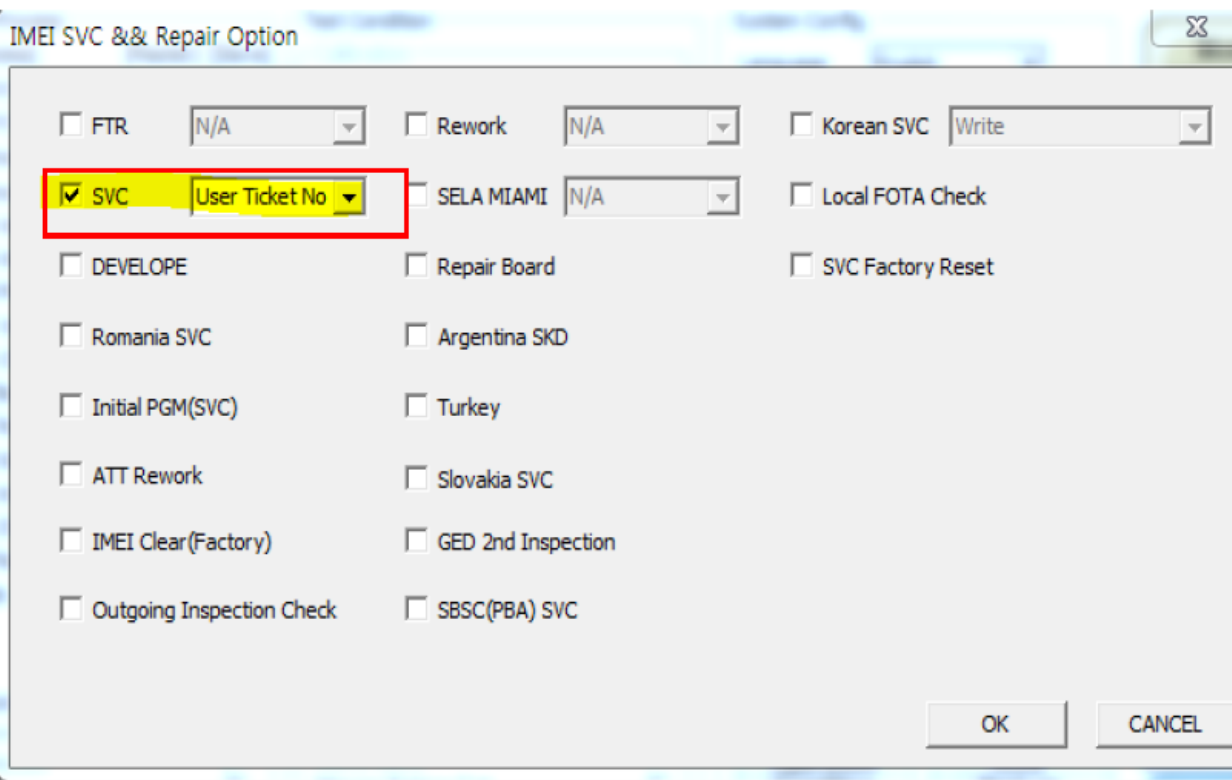
MMS Calibration

Setting End Band

Engine Freq.

OK

7. Check 'SVC , User Ticket No' and click OK



The 'IMEI SVC && Repair Option' dialog box is shown. It has a title bar with a close button. The main area contains several checkboxes and dropdown menus. A red box highlights the 'SVC' checkbox and the 'User Ticket No' dropdown menu. Other options include 'FTR', 'Rework', 'Korean SVC', 'SELA MIAMI', 'Local FOTA Check', 'DEVELOPE', 'Repair Board', 'SVC Factory Reset', 'Romania SVC', 'Argentina SKD', 'Initial PGM(SVC)', 'Turkey', 'ATT Rework', 'Slovakia SVC', 'IMEI Clear(Factory)', 'GED 2nd Inspection', 'Outgoing Inspection Check', and 'SBSC(PBA) SVC'. At the bottom, there are 'OK' and 'CANCEL' buttons.

IMEI SVC && Repair Option

☐ FTR N/A ☐ Rework N/A ☐ Korean SVC Write

☒ SVC User Ticket No ☐ SELA MIAMI N/A ☐ Local FOTA Check

☐ DEVELOPE ☐ Repair Board ☐ SVC Factory Reset

☐ Romania SVC ☐ Argentina SKD

☐ Initial PGM(SVC) ☐ Turkey

☐ ATT Rework ☐ Slovakia SVC

☐ IMEI Clear(Factory) ☐ GED 2nd Inspection

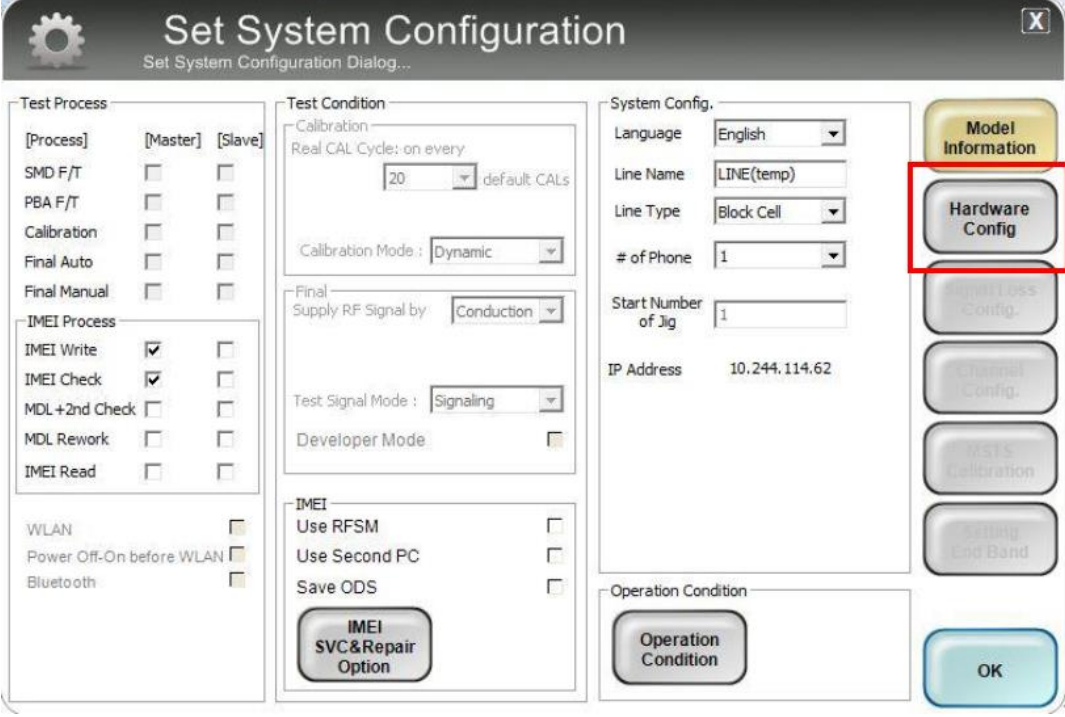
☐ Outgoing Inspection Check ☐ SBSC(PBA) SVC

OK CANCEL



## 6. Level 1 Repair

### 8. Click 'Hardware Config'



**Set System Configuration**  
Set System Configuration Dialog...

**Test Process**

[Process]	[Master]	[Slave]
SMD F/T	<input type="checkbox"/>	<input type="checkbox"/>
PBA F/T	<input type="checkbox"/>	<input type="checkbox"/>
Calibration	<input type="checkbox"/>	<input type="checkbox"/>
Final Auto	<input type="checkbox"/>	<input type="checkbox"/>
Final Manual	<input type="checkbox"/>	<input type="checkbox"/>

**IMEI Process**

IMEI Write	<input checked="" type="checkbox"/>	<input type="checkbox"/>
IMEI Check	<input checked="" type="checkbox"/>	<input type="checkbox"/>
MDL+2nd Check	<input type="checkbox"/>	<input type="checkbox"/>
MDL Rework	<input type="checkbox"/>	<input type="checkbox"/>
IMEI Read	<input type="checkbox"/>	<input type="checkbox"/>

WLAN ☐  
Power Off-On before WLAN ☐  
Bluetooth ☐

**Test Condition**

Calibration  
Real CAL Cycle: on every  default CALs

Calibration Mode:

Final  
Supply RF Signal by:

Test Signal Mode:

Developer Mode ☐

**IMEI**  
Use RFSM ☐  
Use Second PC ☐  
Save ODS ☐

**IMEI SVC&Repair Option**

**System Config.**

Language

Line Name

Line Type

# of Phone

Start Number of Jig

IP Address

**Operation Condition**

**Model Information**

**Hardware Config**

Signal Loss Config.

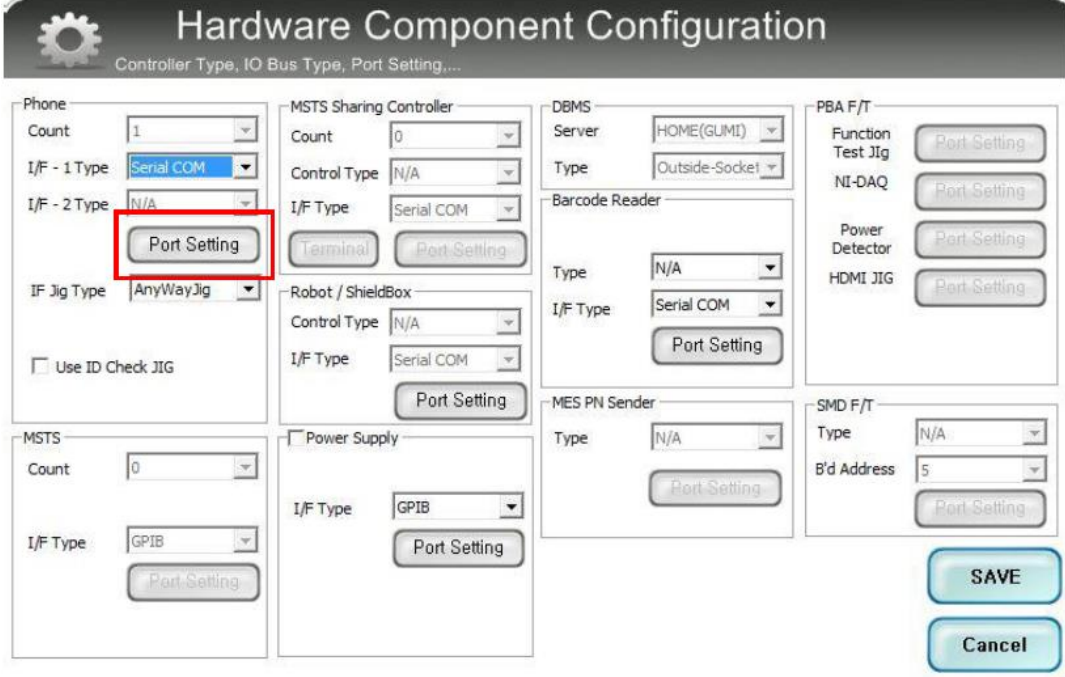
Channel Config.

W/S Calibration

Setting End Band

**OK**

### 9. Click 'Port Setting'



**Hardware Component Configuration**  
Controller Type, IO Bus Type, Port Setting,...

**Phone**

Count

I/F - 1 Type

I/F - 2 Type

**Port Setting**

IF Jig Type

☐ Use ID Check JIG

**MSTS**

Count

I/F Type

**Port Setting**

**MSTS Sharing Controller**

Count

Control Type

I/F Type

**Terminal** **Port Setting**

**Robot / ShieldBox**

Control Type

I/F Type

**Port Setting**

**Power Supply**

I/F Type

**Port Setting**

**DBMS**

Server

Type

**Barcode Reader**

Type

I/F Type

**Port Setting**

**MES PN Sender**

Type

**Port Setting**

**PBA F/T**

Function Test Jig **Port Setting**

NI-DAQ **Port Setting**

Power Detector **Port Setting**

HDMI JIG **Port Setting**

**SMD F/T**

Type

B'd Address

**Port Setting**

**SAVE**

**Cancel**



## 6. Level 1 Repair

### 10. Select Port Number and SAVE

Set IO BUS Configuration

Phone IO Bus Setting

**Common**

BaudRate: 115200  
Data Bit: 8  
Parity: No  
Stop Bit: 1

No.	Port #1
1	1

SAVE

Cancel

### 11. Click OK to proceed

Set System Configuration

Set System Configuration Dialog...

Test Process

[Process] [Master] [Slave]

SMD F/T ☐ ☐

PBA F/T ☐ ☐

Calibration ☐ ☐

Final Auto ☐ ☐

Final Manual ☐ ☐

IMEI Process

IMEI Write ☒ ☐

IMEI Check ☒ ☐

MDL+2nd Check ☐ ☐

MDL Rework ☐ ☐

IMEI Read ☐ ☐

WLAN ☐

Power Off-On before WLAN ☐

Bluetooth ☐

Test Condition

Calibration

Real CAL Cycle: on every 20 default CALs

Calibration Mode: Dynamic

Final

Supply RF Signal by: Conduction

Test Signal Mode: Signaling

Developer Mode ☐

IMEI

Use RFSM ☐

Use Second PC ☐

Save ODS ☐

IMEI SVC&Repair Option

System Config.

Language: English

Line Name: LINE(temp)

Line Type: Block Cell

# of Phone: 1

Start Number of Jig: 1

IP Address: 10.244.114.62

Operation Condition

Operation Condition

Model Information

Hardware Config

Power Loss Config.

Channel Config.

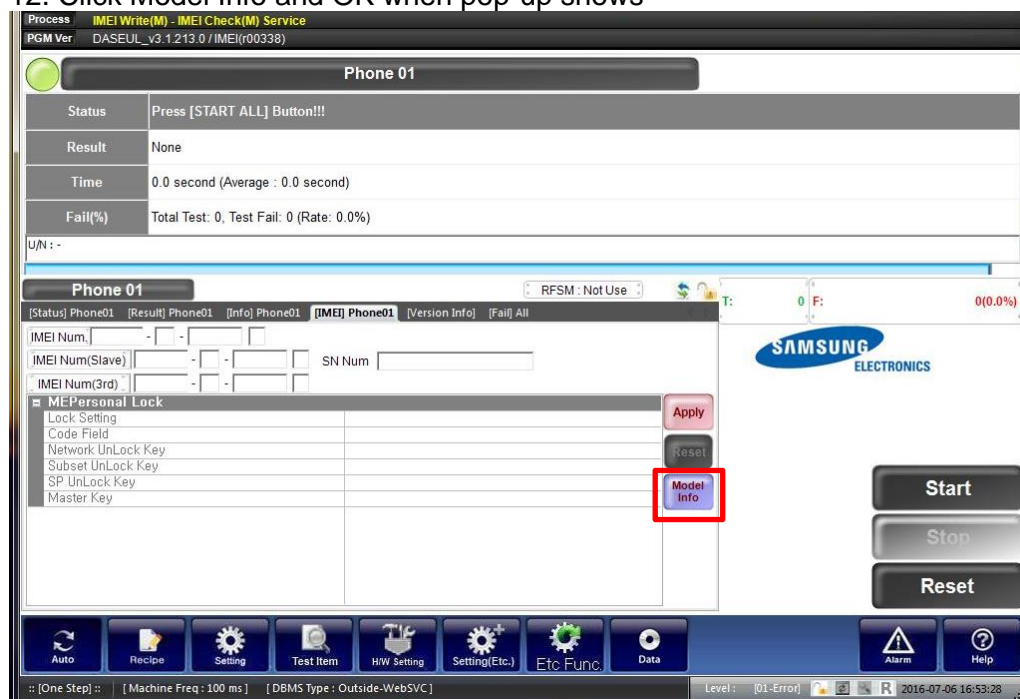
WATS Calibration

Setting End Band

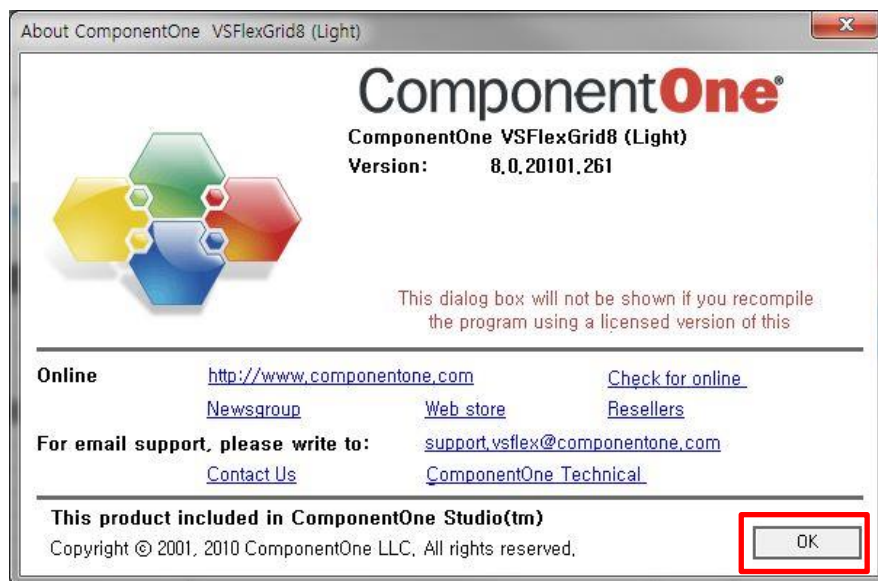
OK

## 6. Level 1 Repair

### 12. Click Model Info and OK when pop-up shows



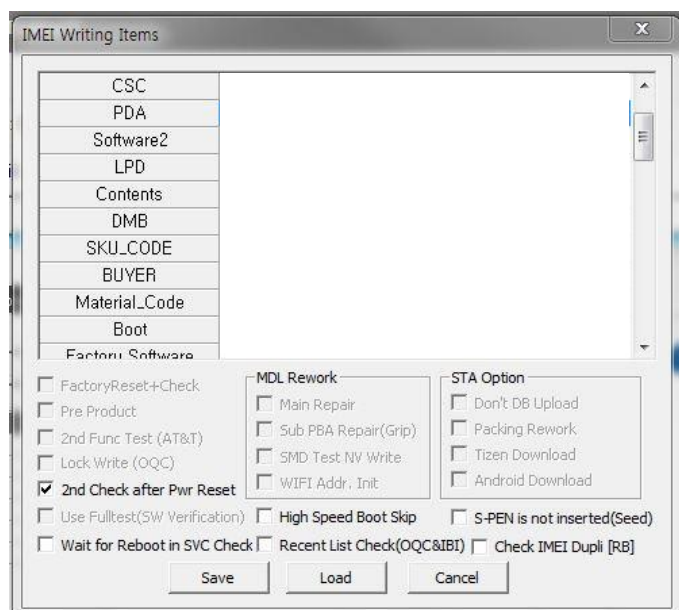
### 13. Click OK



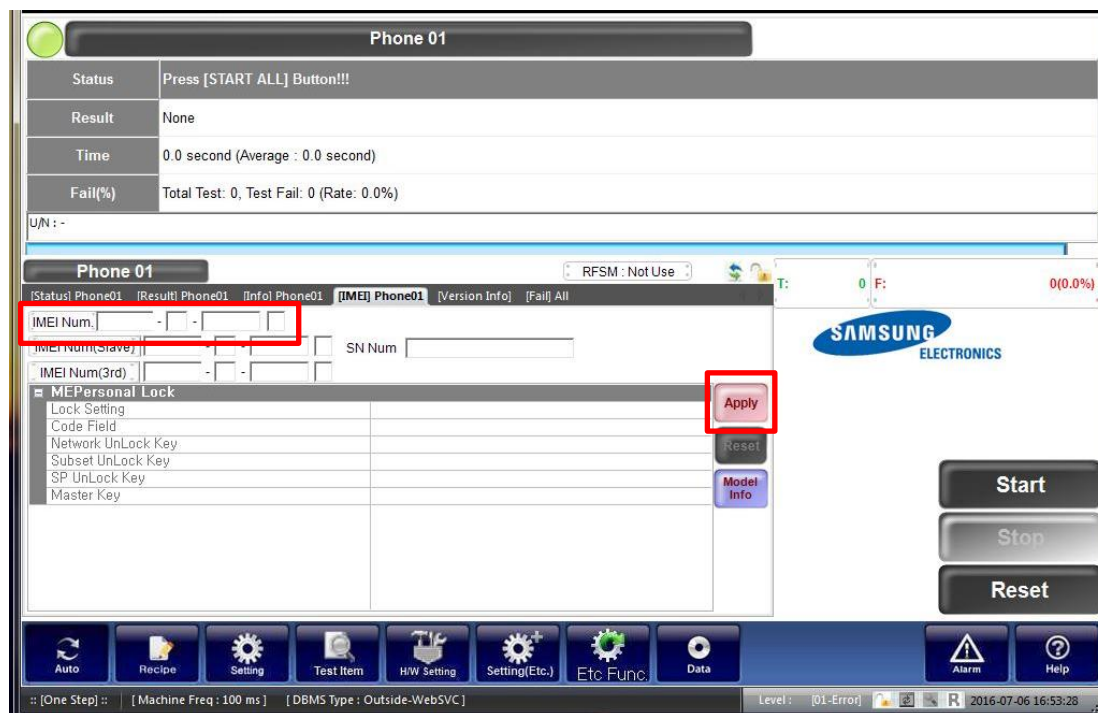
## 6. Level 1 Repair

14. Input SKU\_CODE and BUYER, then click Save button.

※ Refer to HHPsvc→IMEI Review to check SKU Code and buyer

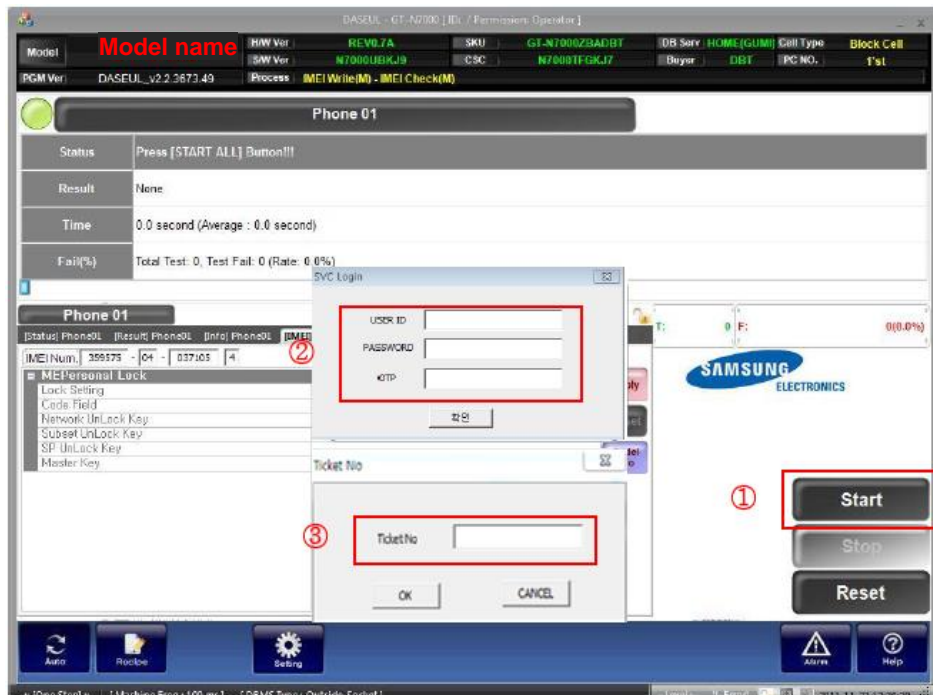


15. Input IMEI Number and click Apply



## 6. Level 1 Repair

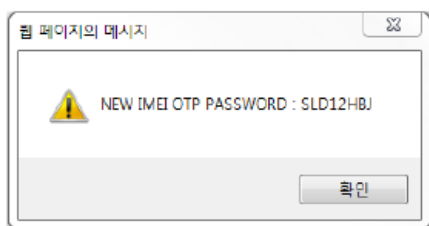
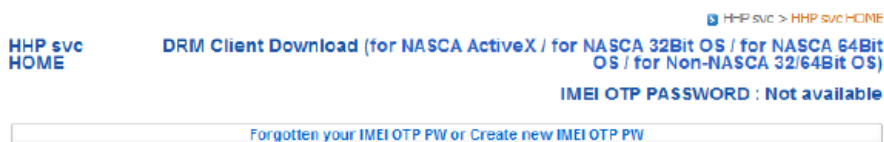
16. ① Click Start → ② Input IMEI writing ID and Password & OTP → ③ Input Ticket No



※ OTP(One time Password) : OTP is valid for 6 hours.

After that, you can get new OTP by click the “Forgotten your IMEI OTP PW or Create new IMEI OTP PW” button.

🔗 OTP Location : GSPN → Knowledge → HHP svc → Home

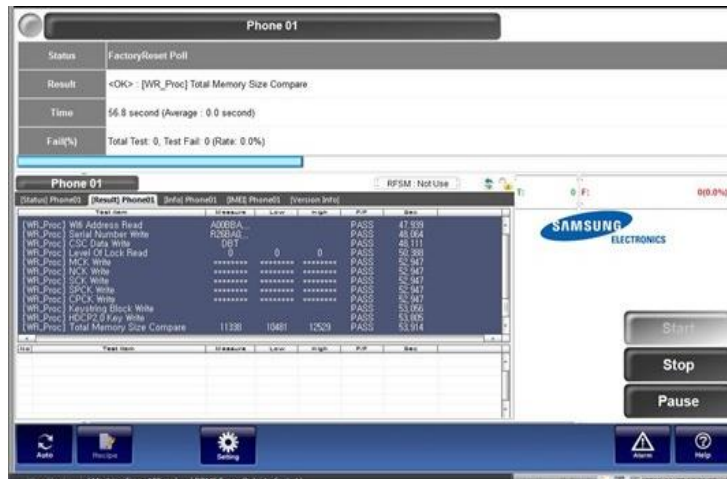


## 6. Level 1 Repair

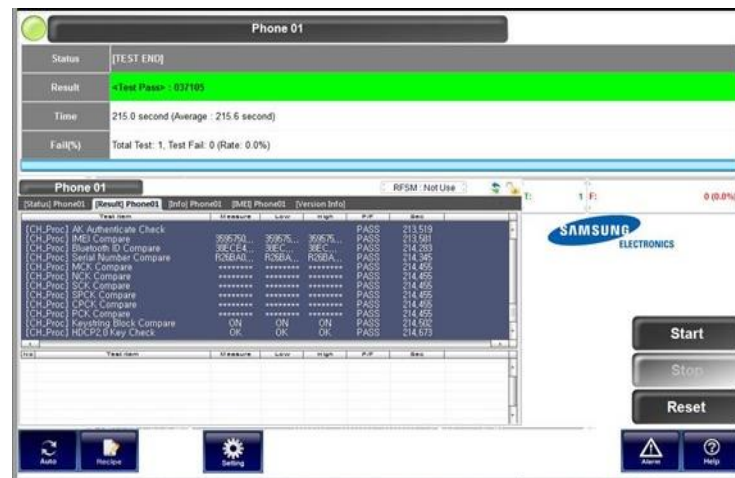
### 17. Connect the phone to Anyway JIG

- ※ When you connect the phone, the phone should be turned off.  
After connecting the phone, the phone will be booted automatically.

### 18. IMEI Writing Proceeding



### 19. IMEI Writing Success



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## 9. Reference Abbreviation

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### Reference Abbreviation

- **AAC**: Advanced Audio Coding.
- **AVC** : Advanced Video Coding.
- **BER** : Bit Error Rate
- **BPSK**: Binary Phase Shift Keying
- **CA** : Conditional Access
- **CDM** : Code Division Multiplexing
- **C/I** : Carrier to Interference
- **DMB** : Digital Multimedia Broadcasting
- **EN** : European Standard
- **ES** : Elementary Stream
- **ETSI**: European Telecommunications Standards Institute
- **MPEG**: Moving Picture Experts Group
- **PN** : Pseudo-random Noise
- **PS** : Pilot Symbol
- **QPSK**: Quadrature Phase Shift Keying
- **RS** : Reed-Solomon
- **SI** : Service Information
- **TDM** : Time Division Multiplexing
- **TS** : Transport Stream