
1. Safety Precautions

1-1. Repair Precaution

- Before attempting any repair or detailed tuning, shield the device from RF noise or static electricity discharges.
(Use only antistatic glove and strape.)
- Do not touch metallic parts or circuits with your bare hands as device(parts, circuits, etc) may be corroded.
- 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.

1. Safety Precautions

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.

2. Specification

2-1. GSM General Specification

Item	GSM 850	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)	GMSK / 8PSK	GMSK / 8PSK	GMSK / 8PSK	GMSK / 8PSK
MS Power (dBm)	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 (QPSK, BW 10MHz) (dBm)	-102dBm	-102dBm	-100dBm	-100dBm
TDMA Mux	8	8	8	8

2. Specification

2-2. 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±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

2. Specification

2-3. WCDMA General Specification

Item	WCDMA2100(B1)	WCDMA1900(B2)	WCDMA AWS(B4) [Only for A526B]	WCDMA850(B5)	WCDMA900(B8)
Freq. Band[MHz] Uplink/Downlink	1920~1980 2110~2170	1850~1910 1930~1990	1710~1755 2110~2155	824~849 869~894	880~915 925~960
ARFCN range	UL: 9612~9888 DL: 10562~10838	UL: 9262~9538 DL: 9662~9938	UL: 1312~1513 DL: 1537~1738	UL: 4132~4233 DL: 4357~4458	UL: 2712~2868 DL: 2937~3088
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)	42.2Mbps(DL) 5.42Mbps(UL)	42.2Mbps(DL) 5.42Mbps(UL)	42.2Mbps(DL) 5.42Mbps(UL)
Time Slot Period/ Frame Period	WCDMA 10ms/0.667ms HSPA 2ms/0.667ms	WCDMA 10ms/0.667ms HSPA 2ms/0.667ms	WCDMA 10ms/0.667ms HSPA 2ms/0.667ms	WCDMA 10ms/0.667ms HSPA 2ms/0.667ms	WCDMA 10ms/0.667ms HSPA 2ms/0.667ms
Modulation	QPSK 16QAM 64QAM	QPSK 16QAM 64QAM	QPSK 16QAM 64QAM	QPSK 16QAM 64QAM	QPSK 16QAM 64QAM
MS Power (dBm)	25.7 ~ -49(↓)	25.7 ~ -49(↓)	25.7 ~ -49(↓)	25.7 ~ -49(↓)	25.7 ~ -49(↓)
Power Class	3(max+24dBm)	3(max+24dBm)	3(max+24dBm)	3(max+24dBm)	3(max+24dBm)
Sensitivity (QPSK, BW 10MHz) (dBm)	-106dBm	-104dBm	-106dBm	-104dBm	-103dBm

2. Specification

2-4. LTE General Specification

Item	LTE Band1	LTE Band2	LTE Band3	LTE Band4	LTE Band5
Freq. Band[MHz] Uplink/Downlink	1920~1980 2110~2170	1850~1910 1930~1990	1710~1785 1805~1880	1710~1755 2110~2155	824~849 869~894
ARFCN range	UL:18000~18599 DL:0~599	UL:18600~19199 DL:600~1199	UL:19200~19949 DL:1200~1949	UL:19950~20399 DL:1950~2399	UL:20400~20649 DL:2400~2649
Tx/Rx spacing (MHz)	190	80	95	400	45
Channel Bandwidth (MHz)	5/10/15/20	1.4/3/5/10/15/20	1.4/3/5/10/15/20	1.4/3/5/10/15/20	1.4/3/5/10
Modulation	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)
MS Power (dBm)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)
Sensitivity (QPSK, BW 10MHz) (dBm)	-96.3	-94.3	-93.3	-96.3	-94.3

Item	LTE Band7	LTE Band8	LTE Band12	LTE Band17	LTE Band20
Freq. Band[MHz] Uplink/Downlink	2500~2570 2620~2690	880~915 925~960	699~716 729~746	704~716 734~746	832~862 791~821
ARFCN range	UL:20750~21449 DL:2750~3449	UL:21450~21799 DL:3450~3799	UL:23010~23179 DL:5010~5179	UL:23730~23849 DL:5730~5849	UL:24150~24449 DL:6150~6449
Tx/Rx spacing (MHz)	120	45	30	30	-41
Channel Bandwidth (MHz)	5/10/15/20	1.4/3/5/10	1.4/3/5/10	5/10	5/10/15/20
Modulation	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)
MS Power (dBm)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)
Sensitivity (QPSK, BW 10MHz) (dBm)	-94.3	-93.3	-93.3	-93.3	-93.3

2. Specification

Item	LTE Band26	LTE Band28	LTE Band32	LTE Band38
Freq. Band[MHz] Uplink/Downlink	859~894 814~849	703~748 758~803	N/A 1452~1496	2570~2620
ARFCN range	UL:26690~27039 DL:8690~9039	UL:27210~27659 DL:9210~9659	N/A DL:9920~10359	UL/DL:37750 ~ 38249
Tx/Rx spacing (MHz)	-45	55	DL Only	0
Channel Bandwidth (MHz)	1.4/3/5/10/15	3/5/10/15/20	5/10/15/20	5/10/15/20
Modulation	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)
MS Power (dBm)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)
Sensitivity (QPSK, BW 10MHz) (dBm)	-93.8	-94.8	-96.5	-96.3

Item	LTE Band40	LTE Band41	LTE Band66
Freq. Band[MHz] Uplink/Downlink	2300~2400	2496~2690	1710~1780 2110~2200
ARFCN range	UL/DL:38650 ~ 39649	UL/DL:39650 ~ 41589	UL:131972~132671 DL:66436~67335
Tx/Rx spacing (MHz)	0	0	400
Channel Bandwidth (MHz)	5/10/15/20	5/10/15/20	1.4/3/5/10/15/20
Modulation	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)	QPSK,16/64QAM 256QAM(DL only)
MS Power (dBm)	25.7~-39(↓)	PC2:28.7~-39(↓) PC3:25.7~-39(↓)	25.7~-39(↓)
Sensitivity (QPSK, BW 10MHz) (dBm)	-96.3	-94.3	-95.8

2. Specification

2-5. NR General Specification

Item	N1	N3	N5	N7
Freq. Band[MHz] Uplink/Downlink	1920~1980 2110~2170	1710~1785 1805~1880	824~849 869~894	2500~2570 2620~2690
ARFCN range	UL:384000~396000 DL:422000~434000	UL:342000~357000 DL:361000~376000	UL:164800~169800 DL:173800~178800	UL:500000~514000 DL:524000~538000
Channel Bandwidth (MHz)	5/10/15/20	5/10/15/20	5/10/15/20	5/10/15/20
Modulation	QPSK,16/64QAM 256QAM	QPSK,16/64QAM 256QAM	QPSK,16/64QAM 256QAM	QPSK,16/64QAM 256QAM
MS Power (dBm)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)
Sensitivity (QPSK, BW 10MHz) (dBm)	-96.8	-93.8	-94.8	-94.8

Item	N8	N20	N28	N38
Freq. Band[MHz] Uplink/Downlink	880~915 925~960	832~862 791~821	703~748 758~803	2570~2620
ARFCN range	UL:176000~183000 DL:185000~192000	UL:166400~172400 DL:158200~164200	UL:140600~149600 DL:151600~160600	514000~524000
Channel Bandwidth (MHz)	5/10/15/20	5/10/15/20	5/10/15/20	20
Modulation	QPSK,16/64QAM 256QAM	QPSK,16/64QAM 256QAM	QPSK,16/64QAM 256QAM	QPSK,16/64QAM 256QAM
MS Power (dBm)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)
Sensitivity (QPSK, BW 10MHz) (dBm)	-93.8	-93.8	-95.5	-97.1@ 30kHz

2. Specification

Item	N40	N41	N66	N78
Freq. Band[MHz] Uplink/Downlink	2300~2400	2496~2690	1710~1780 2110~2200	3300 ~ 3800
ARFCN range	460000~480000	499200~538000	UL:342000~356000 DL:422000~440000	620000 ~ 653332
Channel Bandwidth (MHz)	20/40/50/60/80	20/40/50/60/80/90/100	5/10/15/20	20/30/40/50/60/70/80/90 /100
Modulation	QPSK,16/64QAM 256QAM	QPSK,16/64QAM 256QAM	QPSK,16/64QAM 256QAM	QPSK,16/64QAM 256QAM
MS Power (dBm)	25.7~-39(↓)	25.7~-39(↓)	25.7~-39(↓)	19 ~ 25 (PC3)
Sensitivity (QPSK, BW 10MHz) (dBm)	-97.1@ 30kHz	-95.1 @ 30kHz	-96.3	-96.1@ 30kHz

3. Product Function

Main Function

Item	Description
OS	Android R OS V11.0
Network	GSM850 / GSM900 / DCS1800 / PCS1900 WCDMA : B1 / B2 / B4 / B5 / B8 LTE - FDD : B1 / B2 / B3 / B4 / B5 / B7 / B8 / B12 / B17 / B20 / B26 / B28 / B32 / B66 - TDD : B38 / B40 / B41 5G - N1 / N3 / N5 / N7 / N8 / N20 / N28 / N38 / N40 / N41 / N66 / N78
Battery	4,500mAh (TYP)
Processor	Qualcomm SM7325 - Octa core (4x 2.4GHz + 4x 1.8GHz)
Connectivity	GPS, Glonass, Galileo, Beidou BT5.0, USB 2.0, WIFI 802.11 a/b/g/n/ac/ax(2.4G, 5G), NFC
Camera	Rear : 64.0MP+12MP+5M 5MP Front : 32.0MP
Display	6,5" Super AMOLED, 1080 x 2400 (FHD+)
RAM	6 / 8GB
ROM	128 / 256GB
Sensor	Accelerometer, Fingerprint Sensor, Gyro Sensor, Geomagnetic Sensor, Hall Sensor, RGB Sensor, Virtual proximity sensing

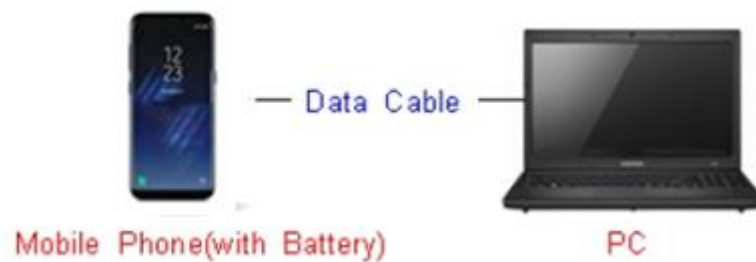
6. Level 1 Repair

6-1. S/W Update

6-1-1. Preparation

- S/W Update program: [Fenrir 5.20.xxxx](#)
- Mobile Phone
- Data Cable

※ Settings



Data Cable : [GH39-02026A](#)

6. Level 1 Repair

6-1-2. How to use 'Fenrir' S/W update program.



1) Launch Fenrir by clicking on the icon on the desktop

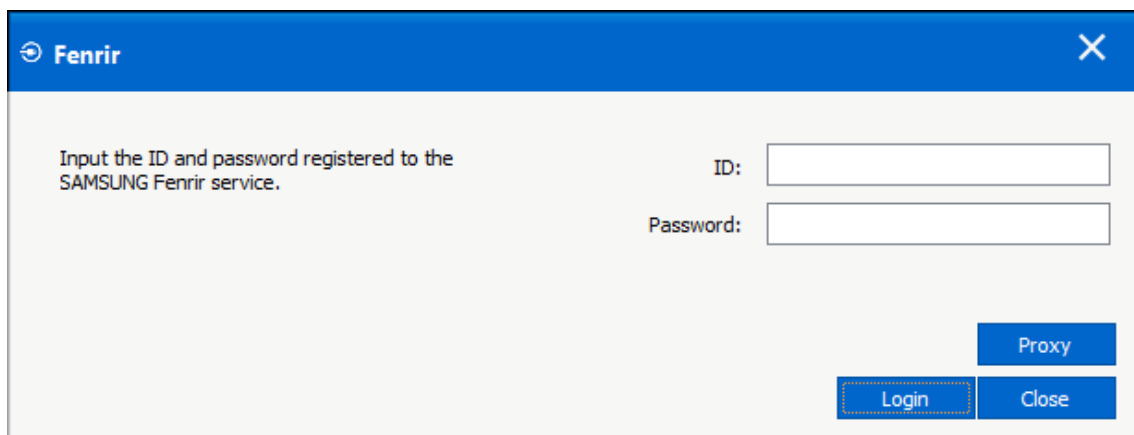
- SVH (Fenrir_Home) : It uses Home binary which does not have user data area in the memory when flashed to a device. (Keep user data)

- SVC (Fenrir_Factory) : It uses Factory binary which erases all user data in the memory when flashed to a device. (Clear user data)

- SVA (Fenrir_All) : It uses Factory and Home binaries. you can download Home and Factory binary in a PC. (but requires double HDD storage and NW traffic)

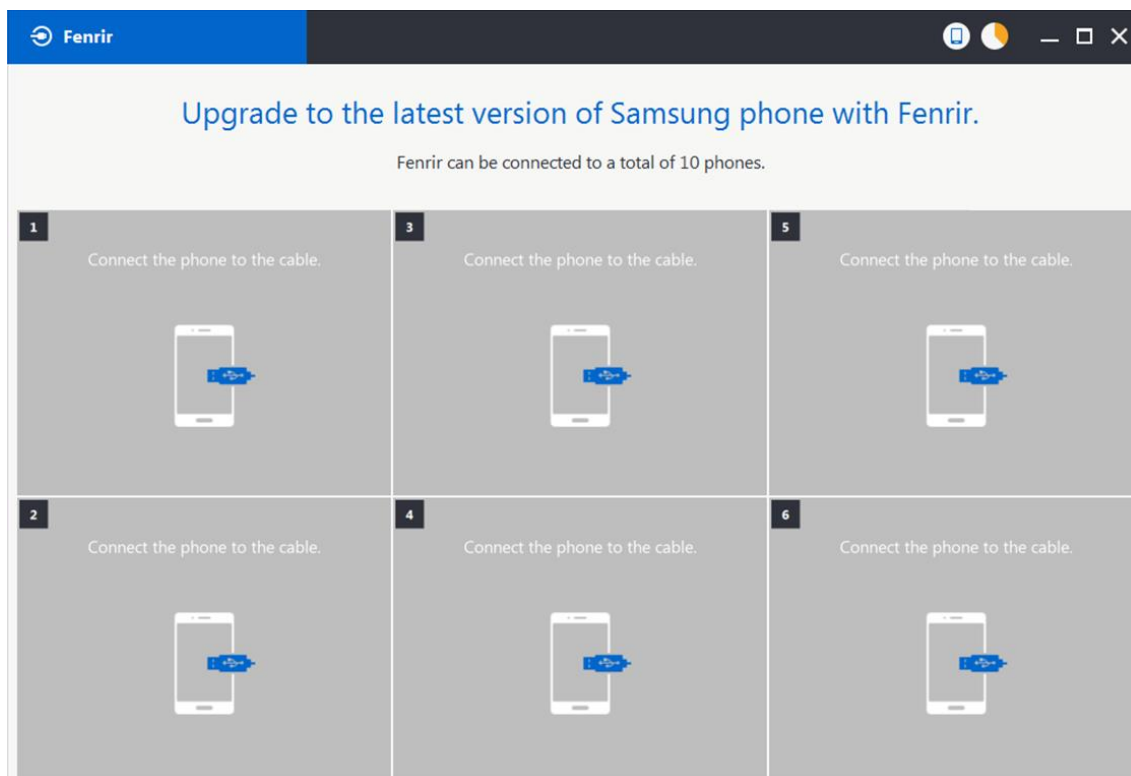
2) Input ID & password

※ You need to reset the ID information in case of PC change and format and repair, hard disk change.

A screenshot of the Fenrir software interface. It has a blue header bar with the 'Fenrir' logo and a close button (X). The main area is light gray. On the left, it says 'Input the ID and password registered to the SAMSUNG Fenrir service.' On the right, there are two input fields: 'ID:' and 'Password:'. Below these fields are three buttons: 'Login' (with a dashed border), 'Proxy', and 'Close'.

6. Level 1 Repair

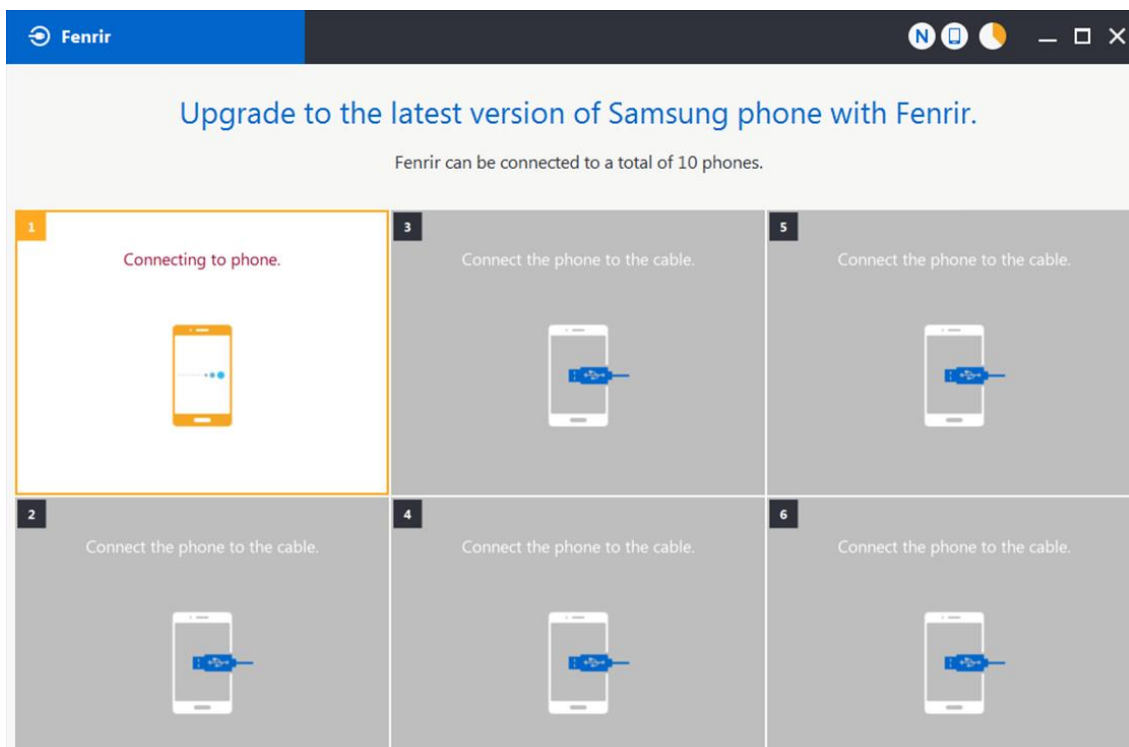
3) Ensure device has sufficient charge (at least 20%) to start firmware update.



4) Connect the device to PC via data cable.

6. Level 1 Repair

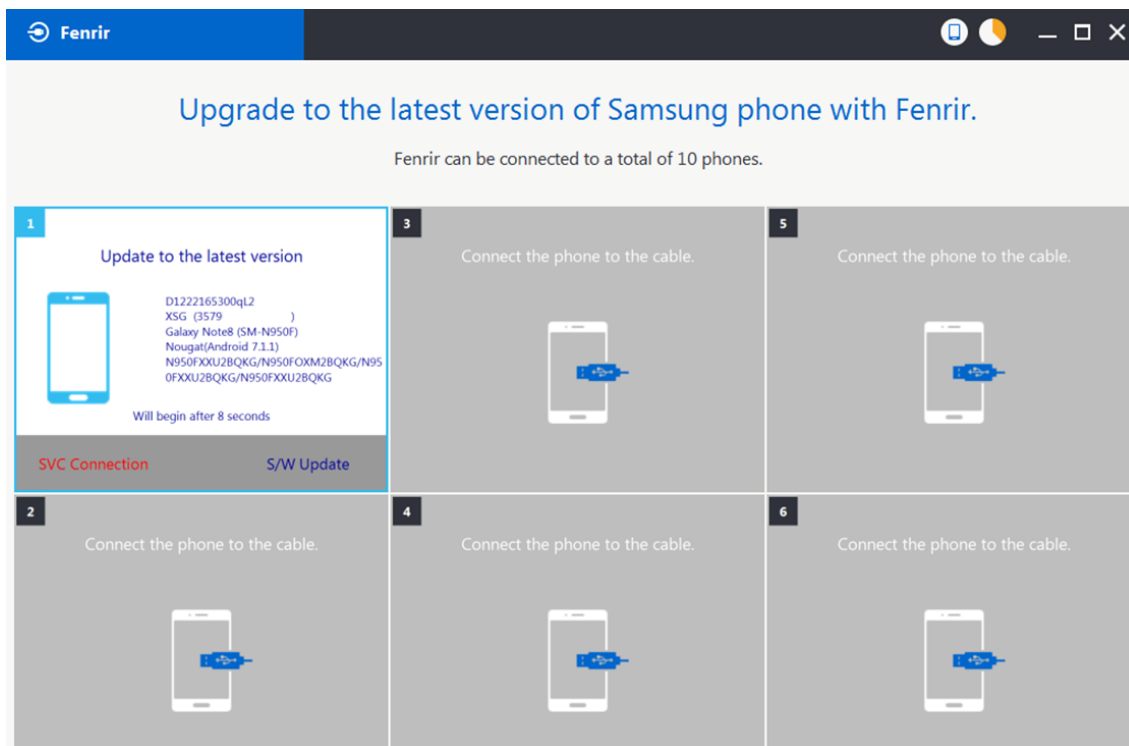
5) Upon USB connection, you will be presented with below screen.



6) Once device is detected, you will be presented with below screen.

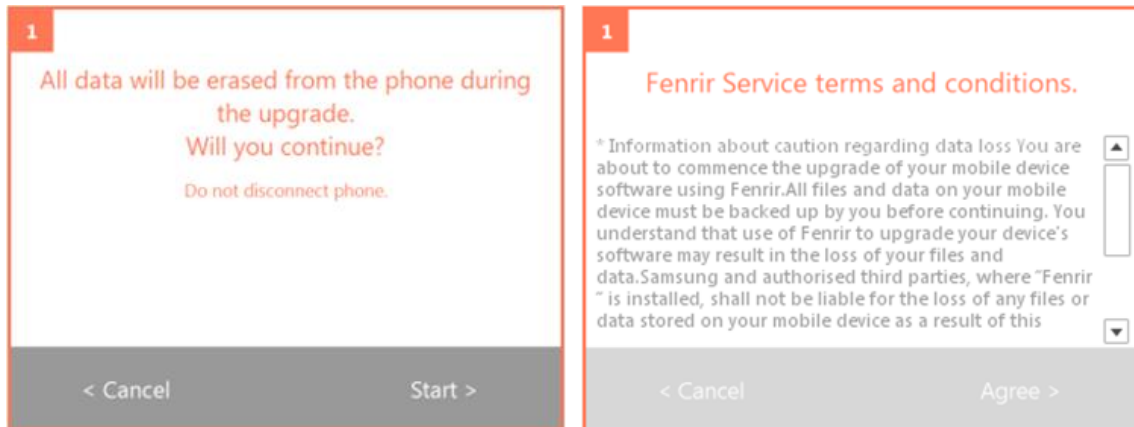
To update S/W, select “S/W Update” or to exit select “SVC Connection”.

If you select “SVC Connection”, only Fenrir connection history (record) will be stored in the FUS server to support warranty validation. (This is known as “Service Connection” history)

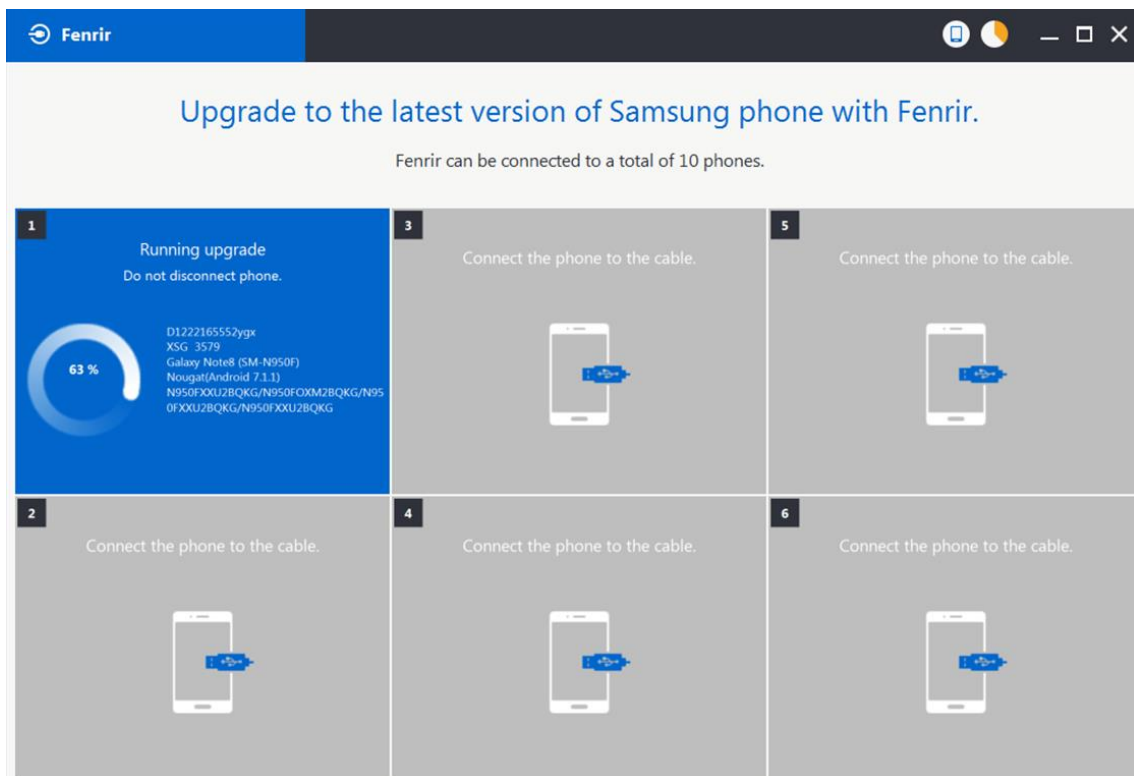


6. Level 1 Repair

7) Once Fenrir starts, application will display the below screen. And select the Start button & Agree button.

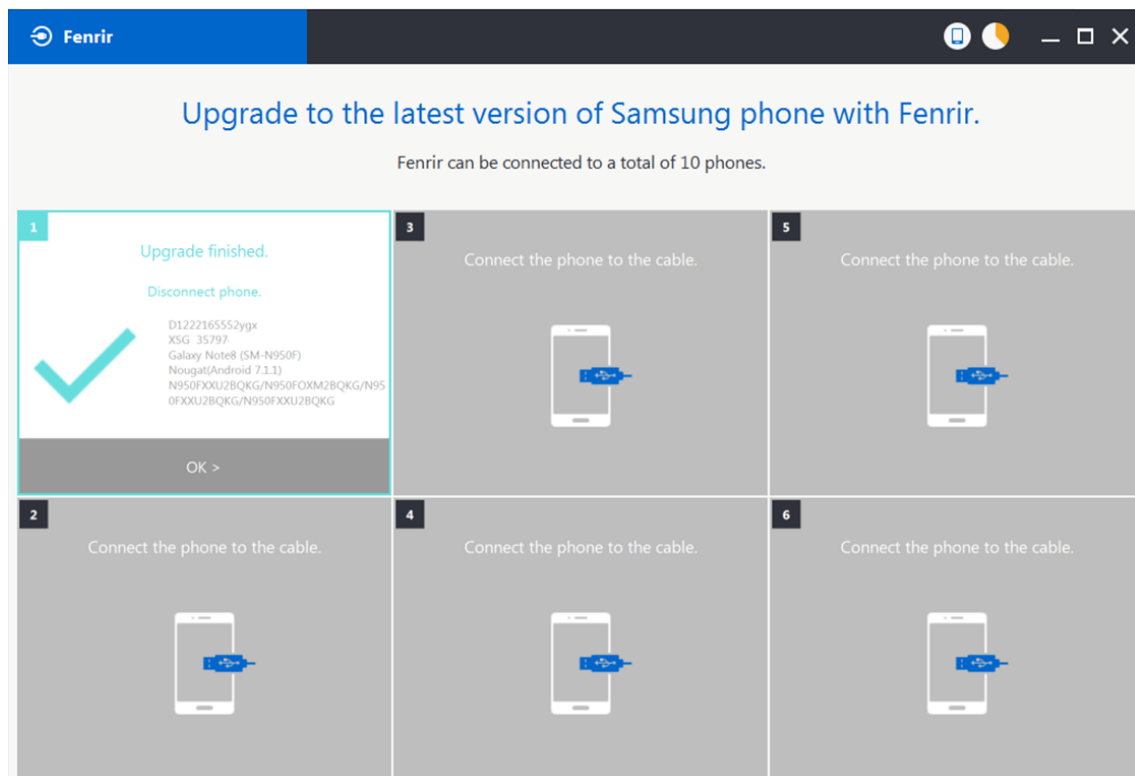


8) The status circle increases as the update installs.
The update process takes approximately 5-10 minutes to complete.
Do not disconnect the device from USB during processing.



6. Level 1 Repair

9) Once complete, application will present the below screen indicating update complete. Click Ok and detach device from USB.



6. Level 1 Repair

6-2. How to use 'Odin' program

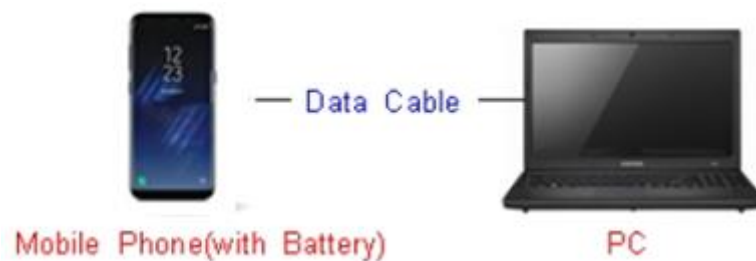
※ S/W Update via Fenrir is mandatory.

Below is the method to use 'Odin' program in any specific case.

6-2-1. Preparation

- Installation program: **Odin3 v3.14.4.exe or above**
- Mobile Phone
- Data Cable
- S/W Binary files (downloaded from GSPN)

※ Settings

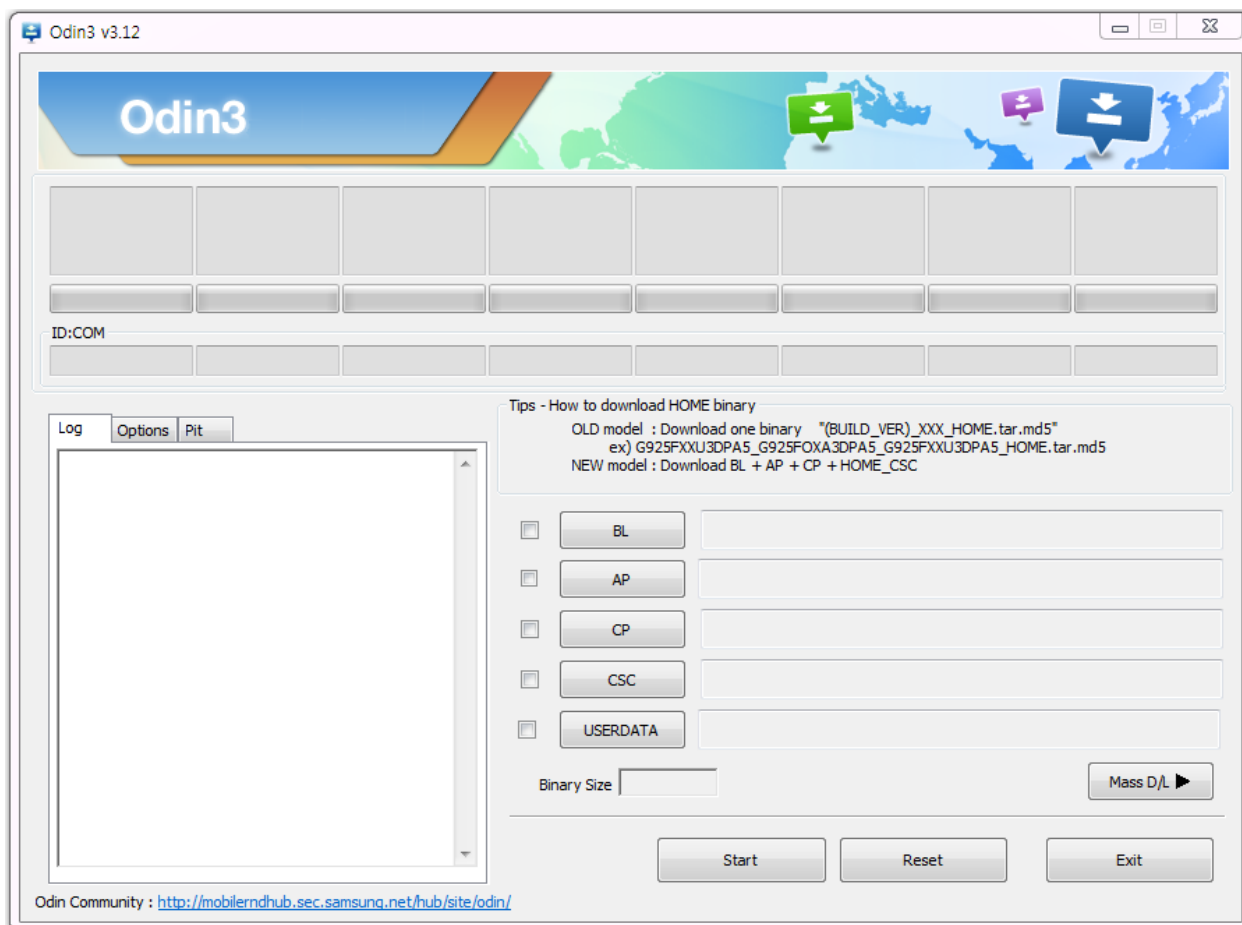


Data Cable : [GH39-02026A](#)

6. Level 1 Repair

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

Open up the S/W Installation Program by executing the "**Odin3 v3.14.4.exe**"

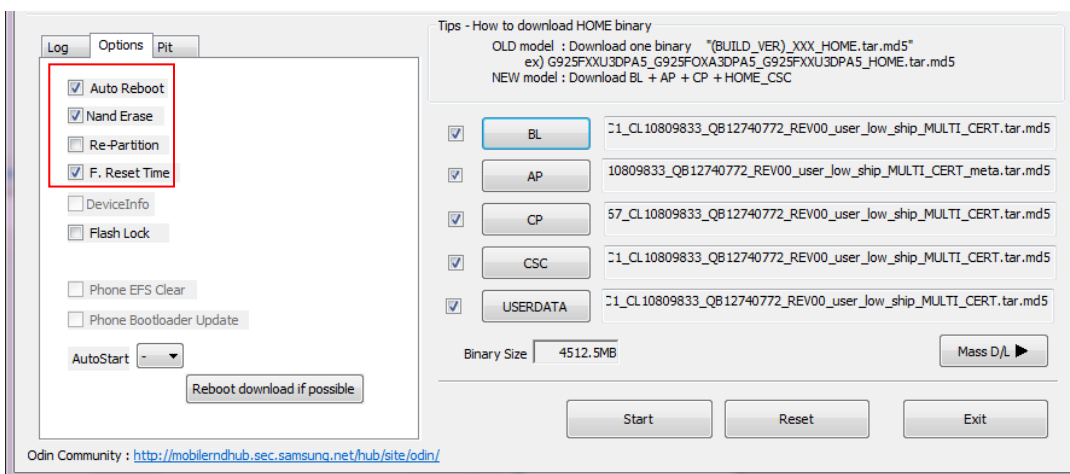
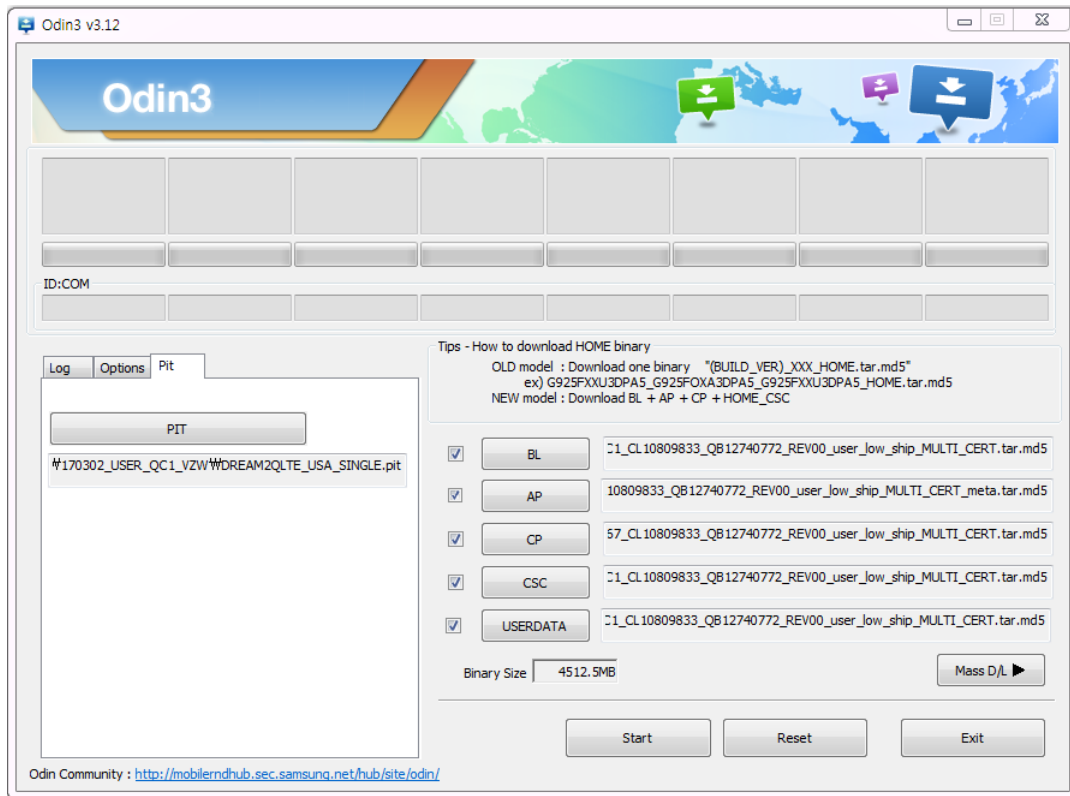


6. Level 1 Repair

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

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

* Note : "Odin v3.14.4 or above" checks MD5 checksum just after file selection.



6. Level 1 Repair

2. Enter into Download Mode

- Enter into Download Mode by pressing 2 button(Volume Up button + Volume Down) simultaneously and connect USB cable.
- Press volume up button after 'Warning' message and 'Downloading' message is displayed.



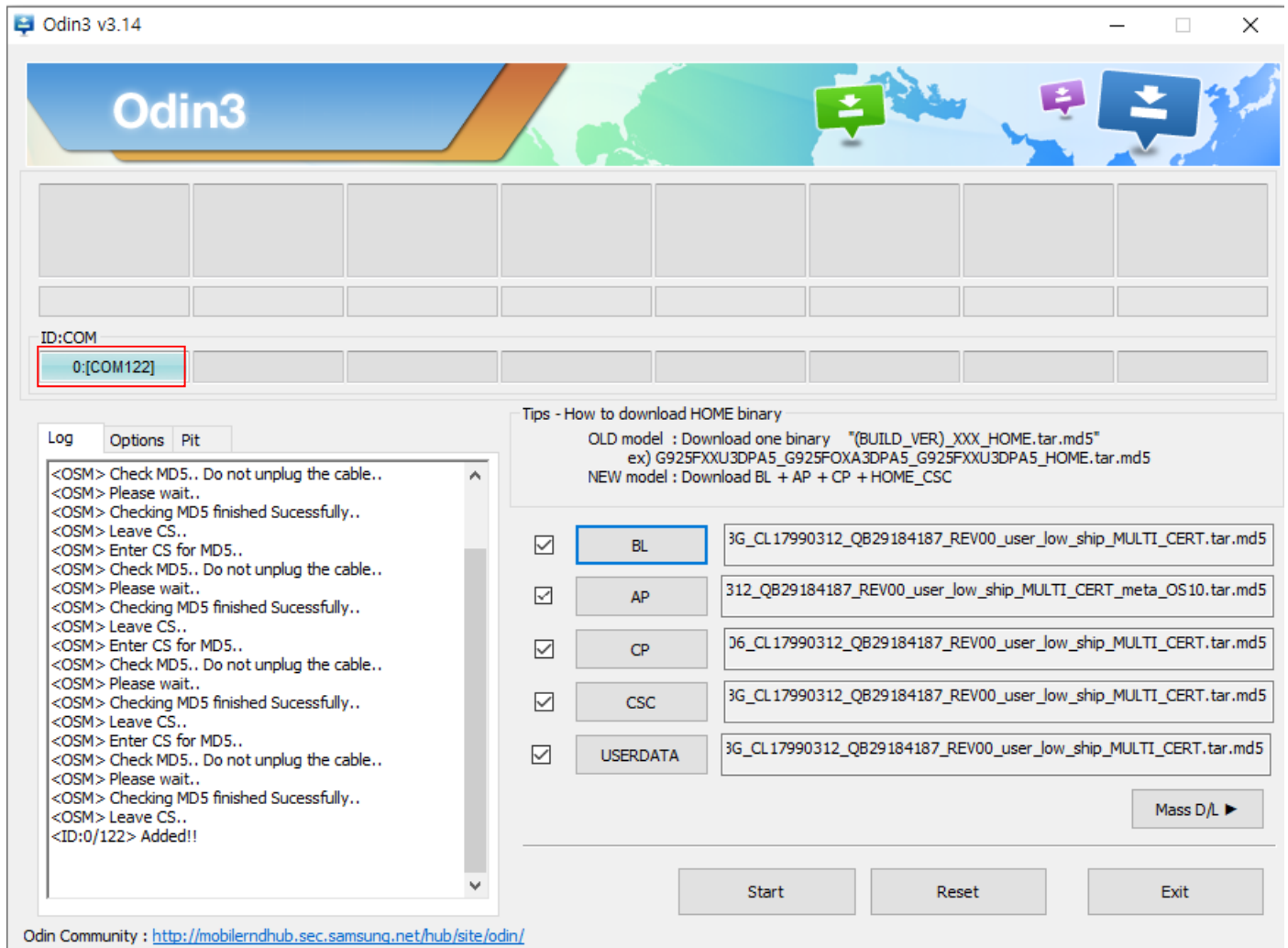
**Volume Up
+
Volume Down**

USB Cable

6. Level 1 Repair

3. Connect the device to PC via Data Cable.

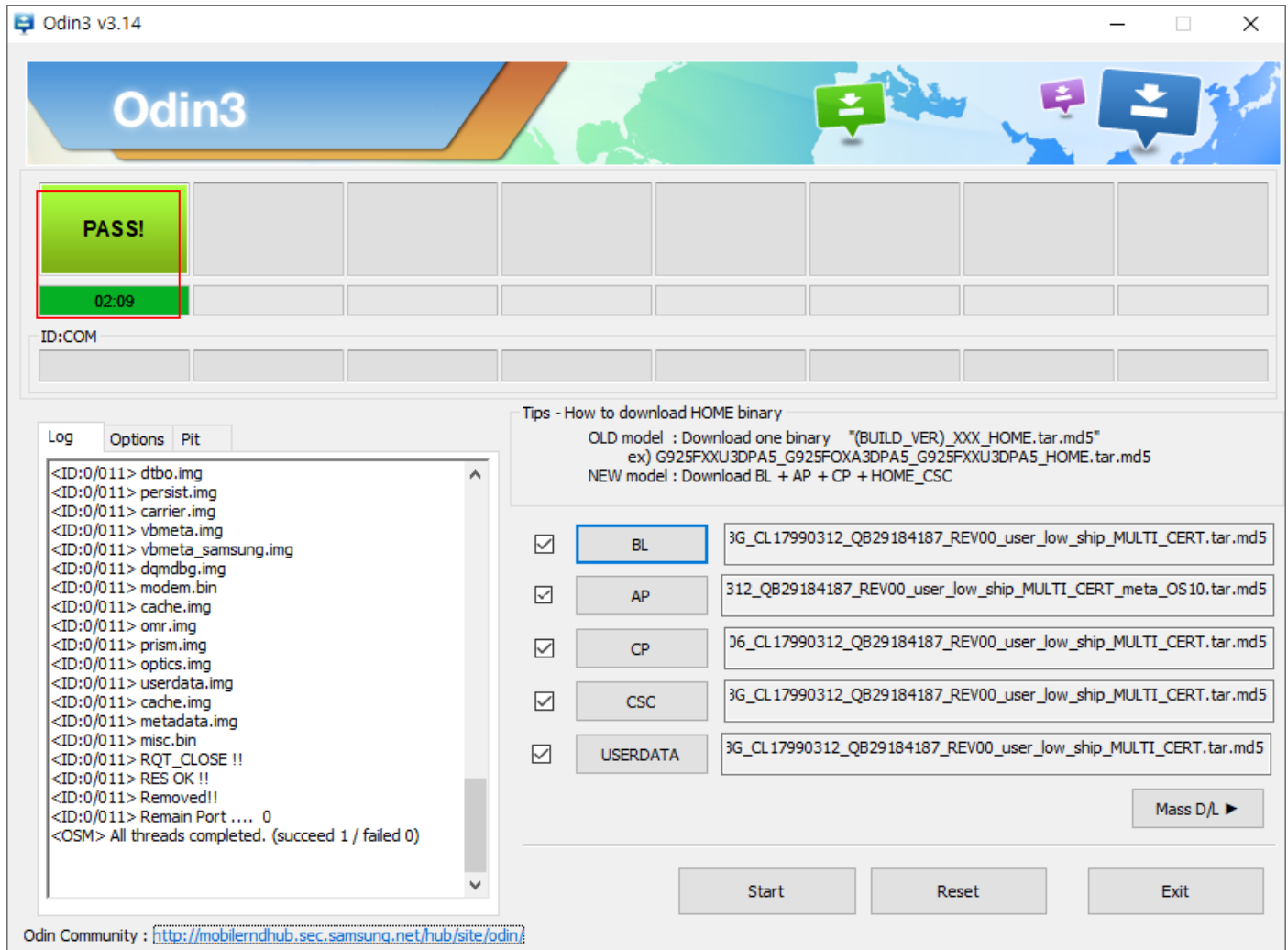
Make sure that the one of communication ports [ID:COM] box is highlighted in sky blue.
The device is now connected with the PC and ready to download the binary files in it.



6. Level 1 Repair

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.

6-3. IMEI writing

: Please check with the separate notice file about IMEI Guide.

9. Reference Abbreviation

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