2. Specification

2-1. GSM & WCDMA General Specification

	GSM850	EGSM 900	DCS1800	PCS1900	WCDMA 2100	WCDMA 1900	WCMDA 850
Freq. Band[MHz] Uplink/ Downlink	824.2~848.8 869.2~893.8	876.2~914.8 921.2~959.8	1710.2~1784.8 1805.2~1879.8	1850.2~1909.8 1930.2~1989.8	1922.4~1977.6 2112.4~2167.6	1852.4~1907.6 1932.4~1987.6	826.4~846.6 871.4~891.6
ARFCN range	128~251	0~124 & 975~1023	512~885	512~810	UL: 9612~9888 DL: 10562~10838	UL: 9262~9538 DL: 9662~9938	UL: 4132~4233 DL: 4357~4458
Tx/Rx spacing	45MHz	45MHz	95MHz	80MHz	190MHz	80MHz	45MHz
Mod. Bit rate/ Bit Period	270.833kbps 3.692us	270.833kbps 3.692us	270.833kbps 3.692us	270.833kbps 3.692us	3.84Mcps	3.84Mcps	3.84Mcps
Time Slot Period/ Frame Period	576.9us 4.615ms	576.9us 4.615ms	576.9us 4.615ms	576.9us 4.615ms	FrameLength: 10ms Slotlength: 0.667ms	FrameLength: 10ms Slotlength: 0.667ms	FrameLength: 10ms Slotlength: 0.667ms
Modulation	0.3GMSK	0.3GMSK	0.3GMSK	0.3GMSK	QPSK/16QAM	QPSK/16QAM	QPSK/16QAM
MS Power	33dBm~5dBm	32.5dBm~5dBm	29.5dBm~0dBm	29.5dBm~0dBm	24dBm~ -50dBm	24dBm~ -50dBm	24dBm~ -50dBm
Power Class	5pcl ~ 19pcl	5pcl ~ 19pcl	0pcl ~ 15pcl	0pcl ~ 15pcl	3(max+24dBm)	3(max+24dBm)	3(max+24dBm)
Sensitivity	-102dBm	-102dBm	-100dBm	-100dBm	-106.7dBm	-104.7dBm	-104.7dBm
TDMA Mux	8	8	8	8			
Cell Radius	35Km	35Km	35Km	35Km	2Km	2Km	2Km

2. Specification

	WCDMA 1700	WCDMA 900	TDSCDMA 2000	TDSCDMA 1900
Freq. Band[MHz] Uplink/ Downlink	1712.4~1752.6 2112.4~2152.6	882.4~912.6 927.4~957.6	2010 ~ 2025	1880 ~ 1920
ARFCN range	UL: 9612~9888 DL: 10562~10838	UL: 9262~9538 DL: 9662~9938	10050 ~ 10125	9400 ~ 9600
Tx/Rx spacing	400MHz	45MHz	-	-
Mod. Bit rate/ Bit Period	3.84Mcps	3.84Mcps	1.28Mcps	1.28Mcps
Time Slot Period/ Frame Period	FrameLength: 10ms Slotlength: 0.667ms	FrameLength: 10ms Slotlength: 0.667ms	FrameLength: 10ms Slotlength: 0.675ms	FrameLength: 10ms Slotlength: 0.675ms
Modulation	QPSK/16QAM	QPSK/16QAM	QPSK/8PSK	QPSK/8PSK
MS Power	24dBm~ -50dBm	24dBm~ -50dBm	24dBm~ -48dBm	24dBm~ -48dBm
Power Class	3(max+24dBm)	3(max+24dBm)	2(max+24dBm)	2(max+24dBm)
Sensitivity	-106.7dBm	-103.7dBm	-107.3dBm	-107.3dBm
TDMA Mux				
Cell Radius	2Km	2Km	11.25Km	11.25Km

2. Specification

2-2. LTE General Specification

	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	190MHz	80MHz	95MHz	400MHz	45MHz
Channel Bandwidth	5/10/15/20 MHz	1.4/3/5/10/15/20 MHz	1.4/3/5/10/15/20 MHz	1.4/3/5/10/15/20 MHz	1.4/3/5/10 MHz
Modulation	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM
MS Power (MPR)	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm
Sensitivit (QPSK) (BW 10MHz)	-96.3 dBm	-94.3 dBm	-93.3 dBm	-96.3 dBm	-94.3 dBm
Cell Radius	>5Km	>5Km	>5Km	>5Km	>5Km

2. Specification

	LTE Band7	LTE Band8	LTE Band12	LTE Band13	LTE Band17
Freq. Band[MHz] Uplink/ Downlink	2500~2570 2620~2690	880~915 925~960	699~716 729~746	777~787 746~756	704~716 734~746
ARFCN range	UL: 20750~21449 DL: 2750~3449	UL: 2712~2863 DL: 2937~3088	UL: 23010~23179 DL: 5010~5179	UL: 23180~23279 DL: 5180~5279	UL: 23730~23849 DL: 5730~5849
Tx/Rx spacing	120MHz	45MHz	30MHz	-31MHz	30MHz
Channel Bandwidth	5/10/15/20 MHz	1.4/3/5/10 MHz	1.4/3/5/10 MHz	5/10 MHz	5/10 MHz
Modulation	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM
MS Power (MPR)	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm
Sensitivit (QPSK) (BW 10MHz)	-94.3 dBm	-93.3 dBm	-93.3 dBm	-93.3 dBm	-93.3 dBm
Cell Radius	>5Km	>5Km	>5Km	>5Km	>5Km

2. Specification

	LTE Band18	LTE Band19	LTE Band20	LTE Band25	LTE Band26
Freq. Band[MHz] Uplink/ Downlink	815~830 860~875	830~845 875~890	832~862 791~821	1850~1915 1930~1995	814~849 859~894
ARFCN range	UL: 23850~23999 DL: 5850~5999	UL: 24000~24190 DL: 6000~6149	UL: 24150~24449 DL: 6150~6449	UL: 26040~26689 DL: 8040~8689	UL: 26690~27039 DL: 8690~9039
Tx/Rx spacing	45MHz	45MHz	-41MHz	80MHz	45MHz
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
Modulation	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM
MS Power (MPR)	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm
Sensitivit (QPSK) (BW 10MHz)	-96.3 dBm	-96.3 dBm	-93.3dBm	-92.8 dBm	-93.8dBm
Cell Radius	>5Km	>5Km	>5Km	>5Km	>5Km

2. Specification

	LTE Band28	LTE Band38	LTE Band39	LTE Band40	LTE Band41
Freq. Band[MHz] Uplink/ Downlink	703~748 758~803	2570~2620	1880~1920	2300~2400	2496~2690
ARFCN range	UL: 27210~27659 DL: 9210~9659	37750~38249	38250~38649	38650~39649	39650~41589
Tx/Rx spacing	55MHz	—	—	—	—
Channel Bandwidth	3/5/10/15/20 MHz	5/10/15/20 MHz	5/10/15/20 MHz	5/10/15/20 MHz	5/10/15/20 MHz
Modulation	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM	QPSK,16/64QAM
MS Power (MPR)	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm	-35~25.7 dBm
Sensitivit (QPSK) (BW 10MHz)	-94.8 dBm	-96.3 dBm	-96.3dBm	-96.3 dBm	-94.3dBm
Cell Radius	>5Km	>5Km	>5Km	>5Km	>5Km

3. Operation Instruction and Installation

Main Function

Item	Description
OS	Android V6.0.1 (Marshmallow)
RF	2G : 850/900/1800/1900 3G : 850/900/1700/1900/2100 TDSCDMA : 34/39 LTE : Band 1/2/3/4/5/7/8/12/13/17/18/19/20/25/26/28/38/39/40/41
Battery	3,000mAh
Base Band	Exynos8890 2.3GHz Octa-Core
Other RF	GPS, Glonass, Beidou, BT 4.2, USB 2.0, NFC, WIFI 802.11 a/b/g/n/ac MIMO, MST
Camera	12.0MP Rear, 5.0MP Front
LCD	5.1", On-Cell Touch AMOLED, 2560 x 1440(QHD)
RAM	4GB RAM + 32GB eMMC
Sensor	Accelerometer, Barometer, Fingerprint Sensor, Gyro Sensor, Geomagnetic Sensor, Hall Sensor, HR Sensor, Proximity Sensor, RGB Light Sensor
Accessory	Charger: 5V/2A (AFC: 9V/1.67A) Data cable: 2.7pi, 1.2m OTG gender Ear phone: 3.5pi, 4pin

9. Reference Abbreviate

Reference Abbreviate

- **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

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 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.

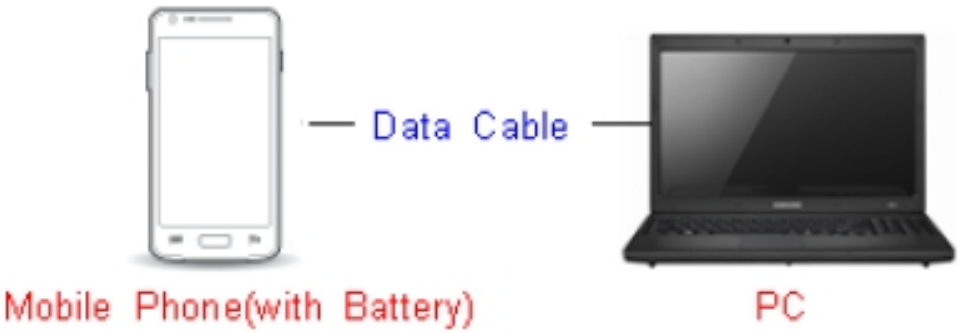
6. Level 1 Repair

6-1. S/W installation

6-1-1. Required items in order to install S/W

- Installation program: Downloader Program (**Odin3 v3.11.1.exe**)
- Mobile Phone
- Data Cable
- Mobile device specific S/W: Binary files

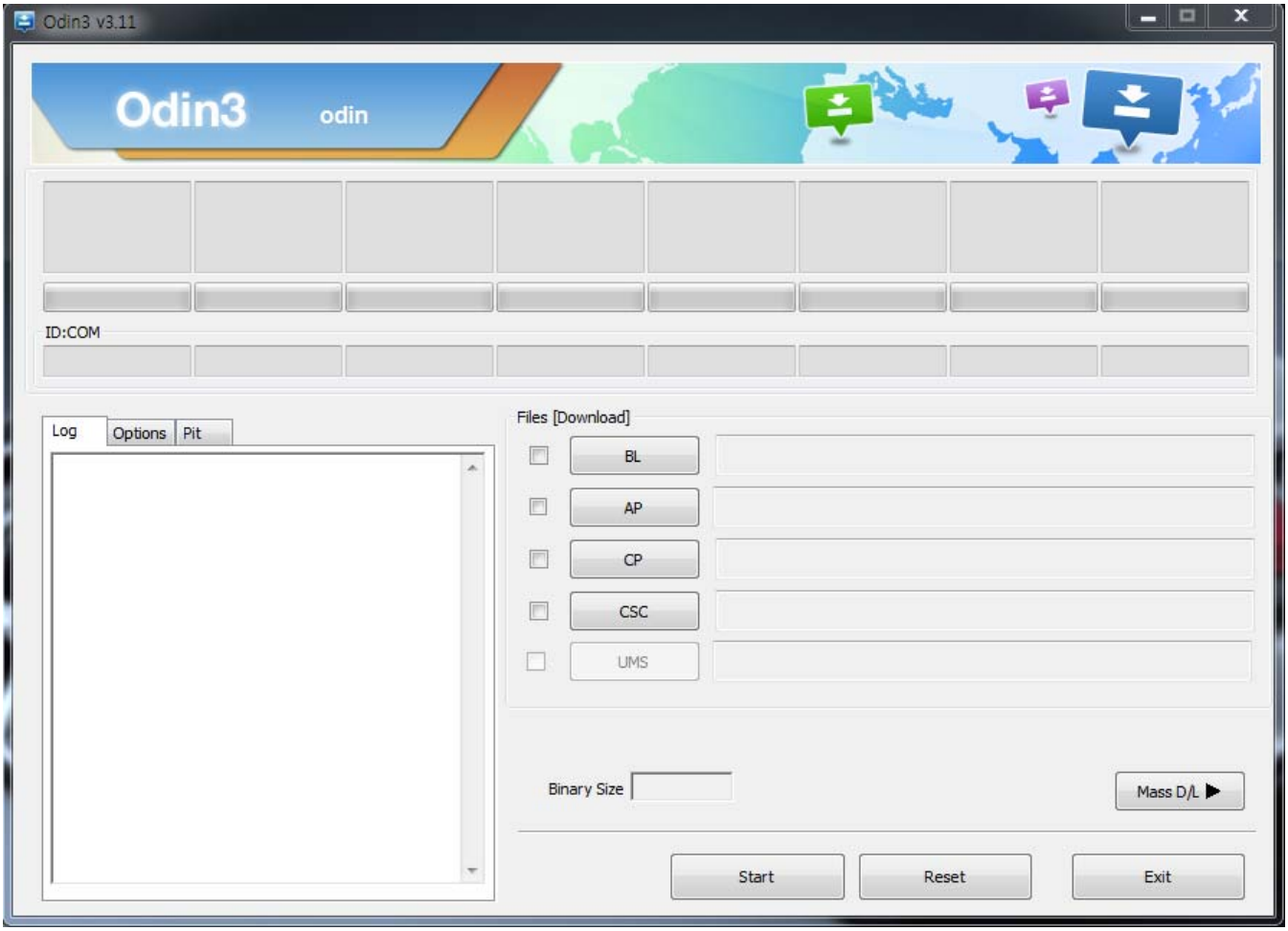
※ Settings



Data Cable : GH-01801B

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

■ Open up the S/W Installation Program by executing the **"Odin3 v3.11.1.exe"**

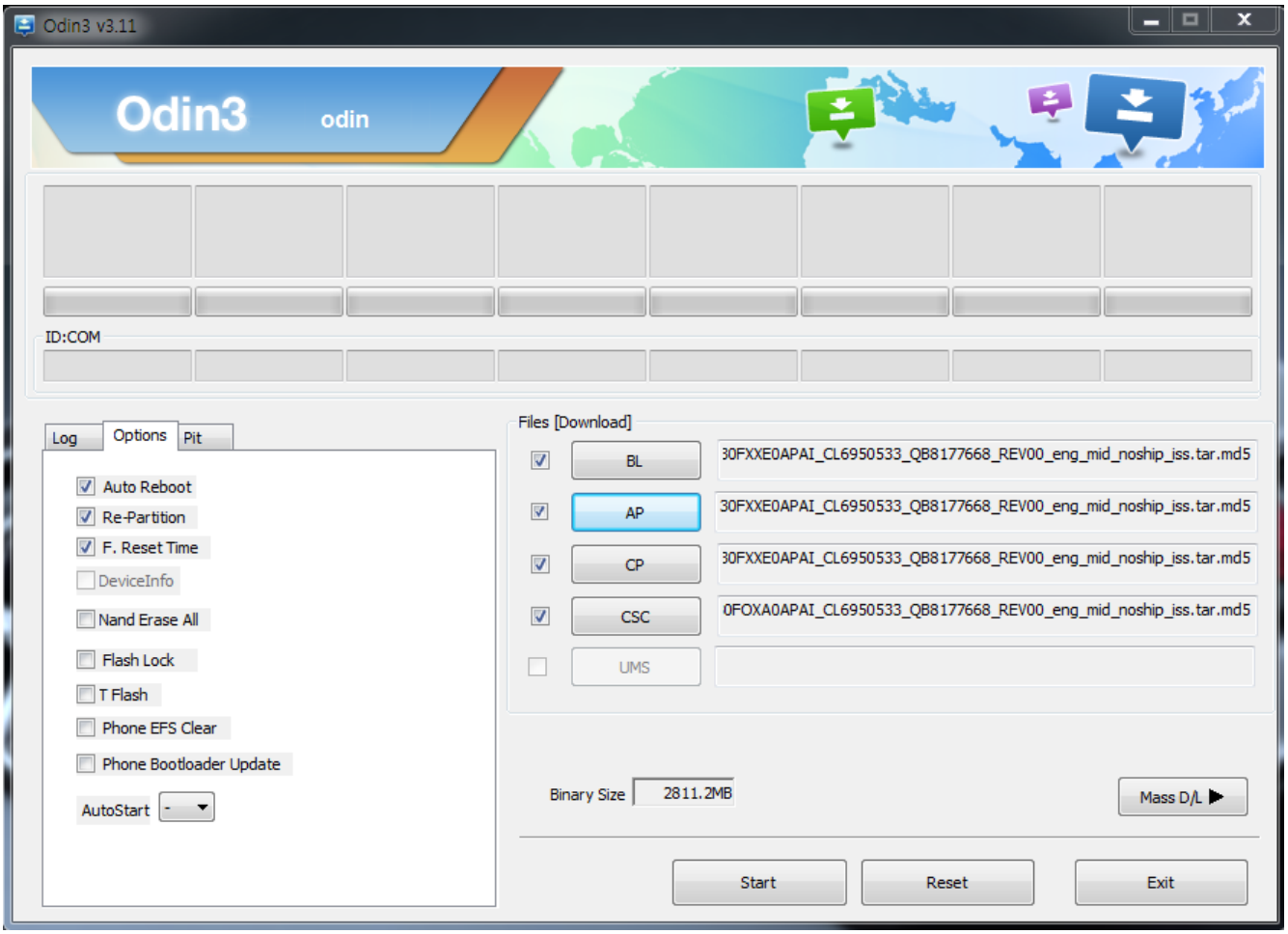


6. Level 1 Repair

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

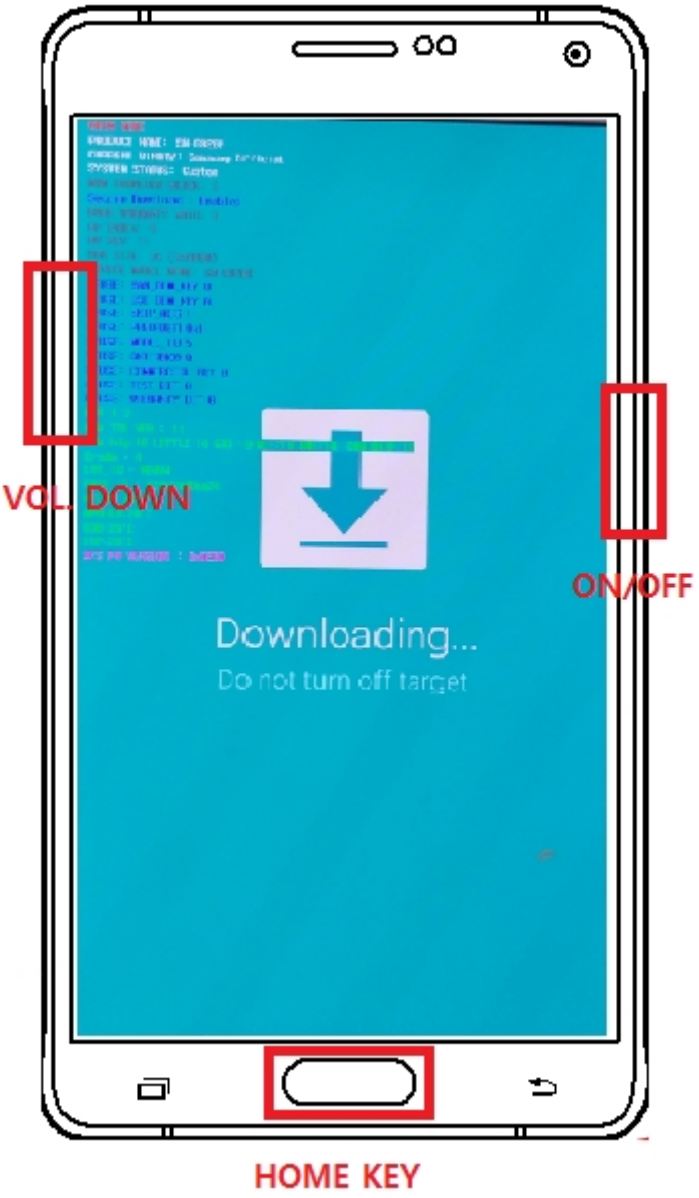
- Check Auto Reboot, Re-Partition, and F. Reset Time
- Check PIT
- Check BL, AP, CP, and CSC Files

  * Note : "Odin v3.10 or above" checks MD5 checksum just after file selection.

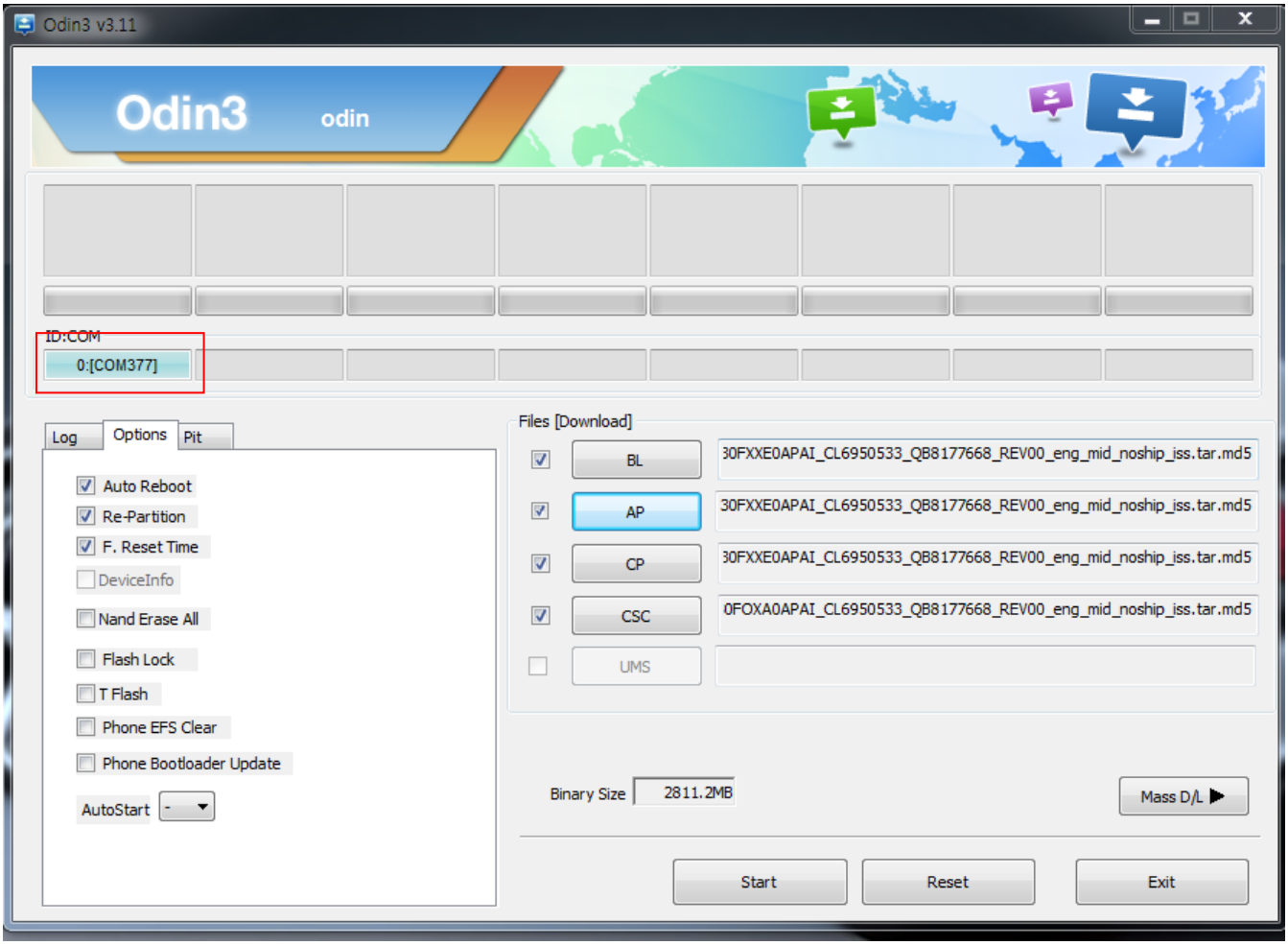


2. Enter into Download Mode

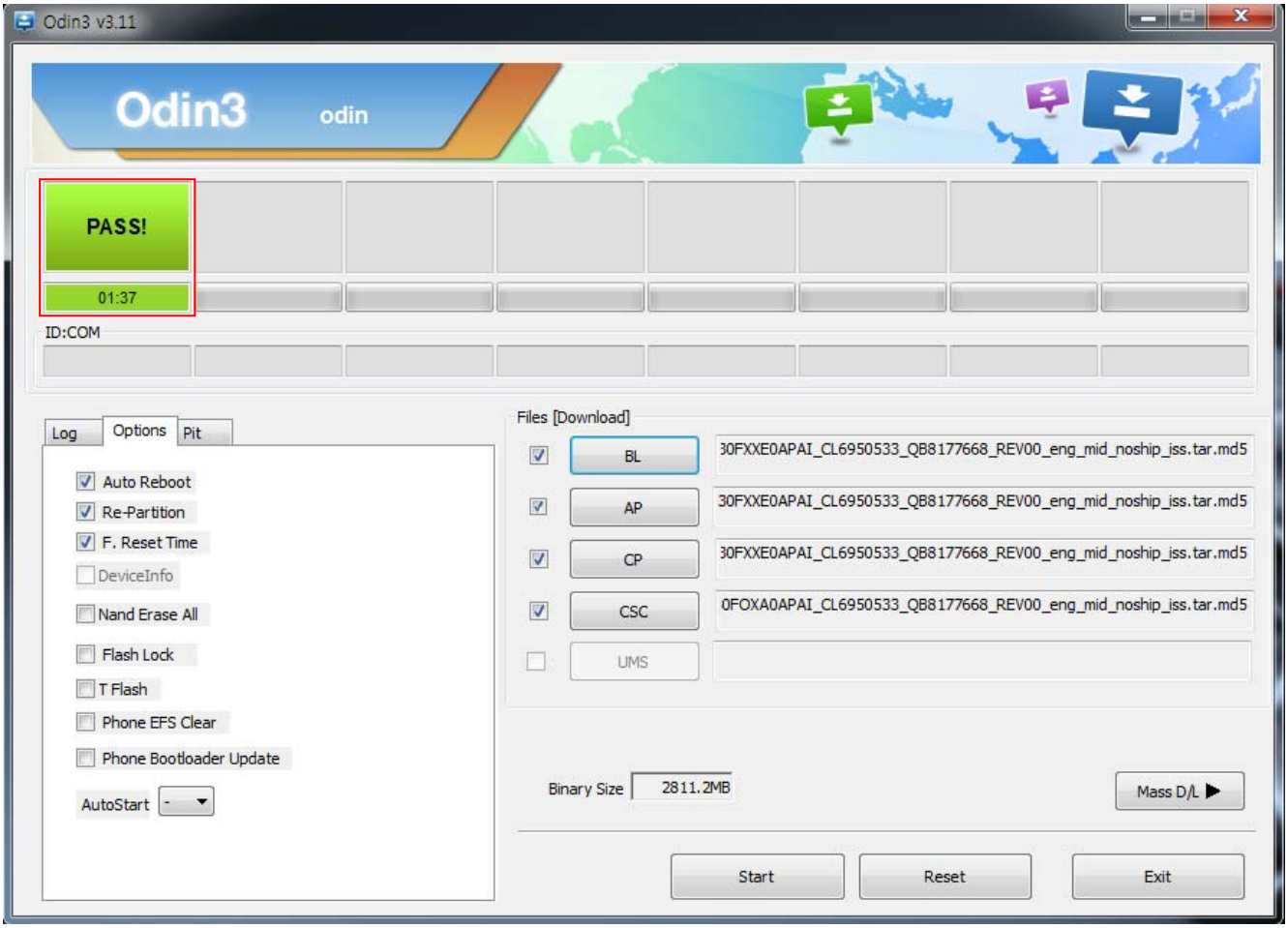
- Enter into Download Mode by pressing Home button, Volume Down button and Power On/Off Button simultaneously followed by pressing Volume up button as a direction of the phone.



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.



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#**

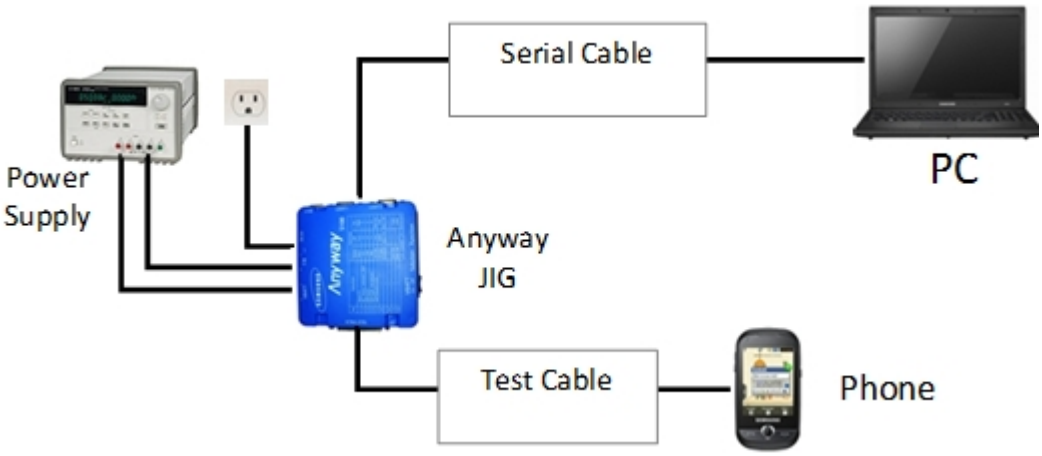
You can perform Factory Reset by Settings → Accounts → Backup and reset

6. Level 1 Repair

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

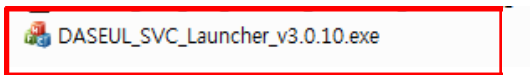


- S/W

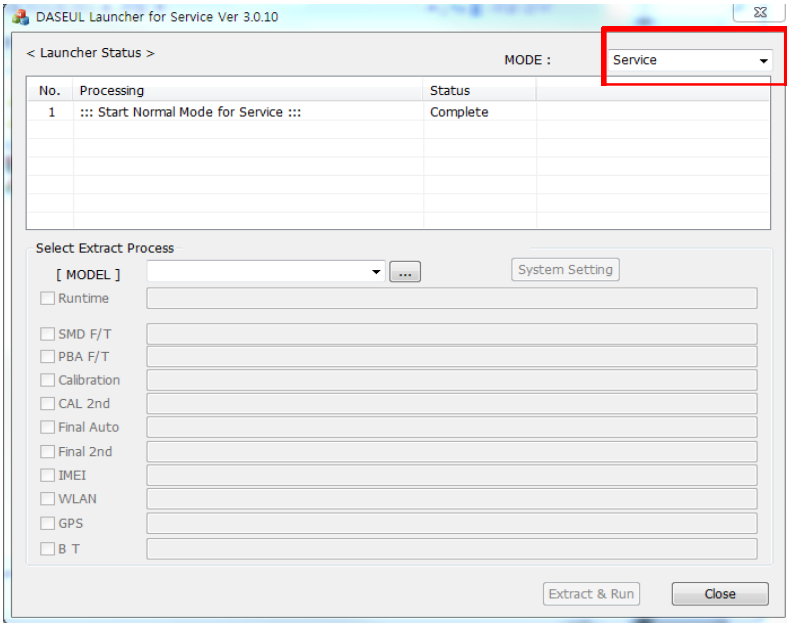
① Library Install	To use Daseul, library files should be installed. Refer to SVC Bulletin "(11-82) Daseul (New IMEI writing Program) Library Install guide_rev1.0"
②Launcher	DASEUL_SVC_Launcher_v3_0_25 or higher -Uploaded on HHPsvc Notice
③ Runtime File	1. DASEUL_Runtime_Ver_3.1.139.0.CAB or higher -Uploaded on HHPsvc Notice 2. Make 'ModelName' folder at the same position with launcher & Runtime file.
④Model File	Copy Model File under the 'Model Name' folder

6-2-2 IMEI writing Process

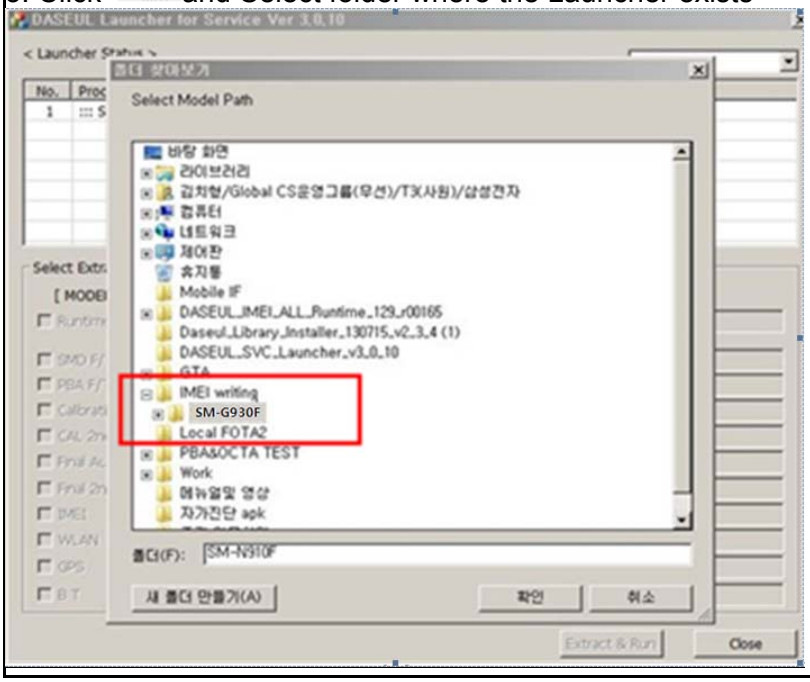
1. Run DASEUL_SVC_Launcher_v3.0.10.exe



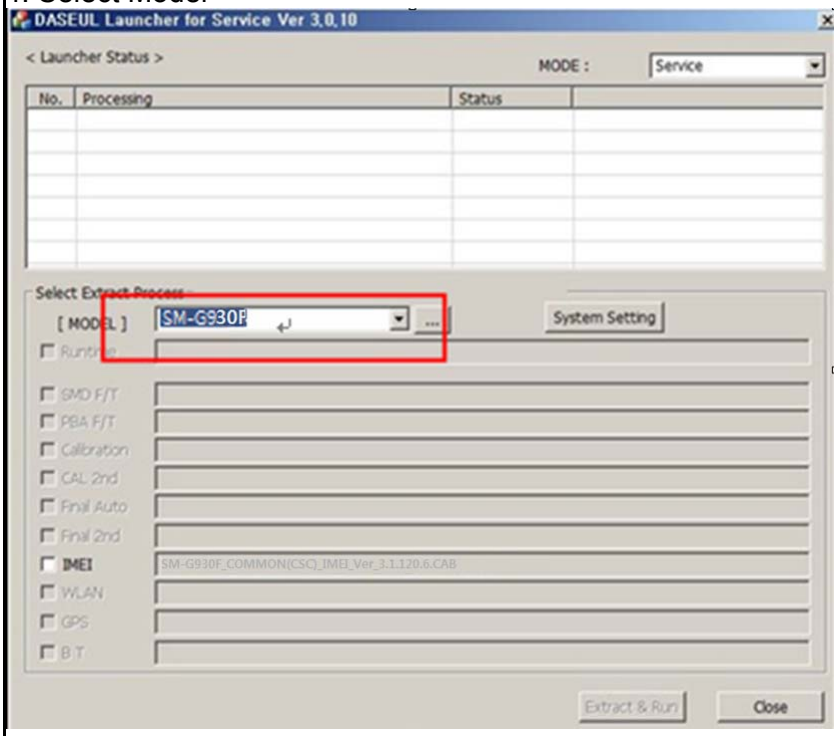
2. Select Service Mode



3. Click and Select folder where the Launcher exists

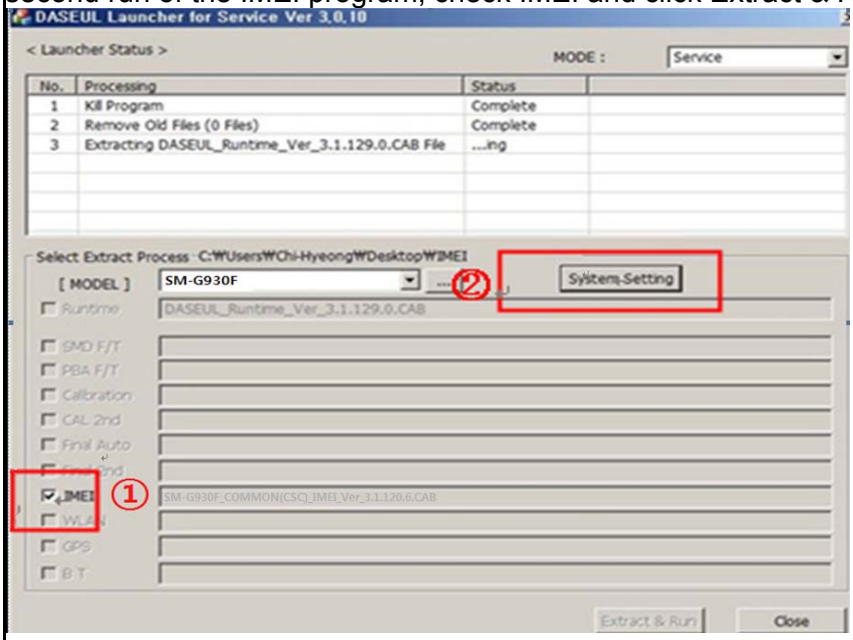


4. Select Model



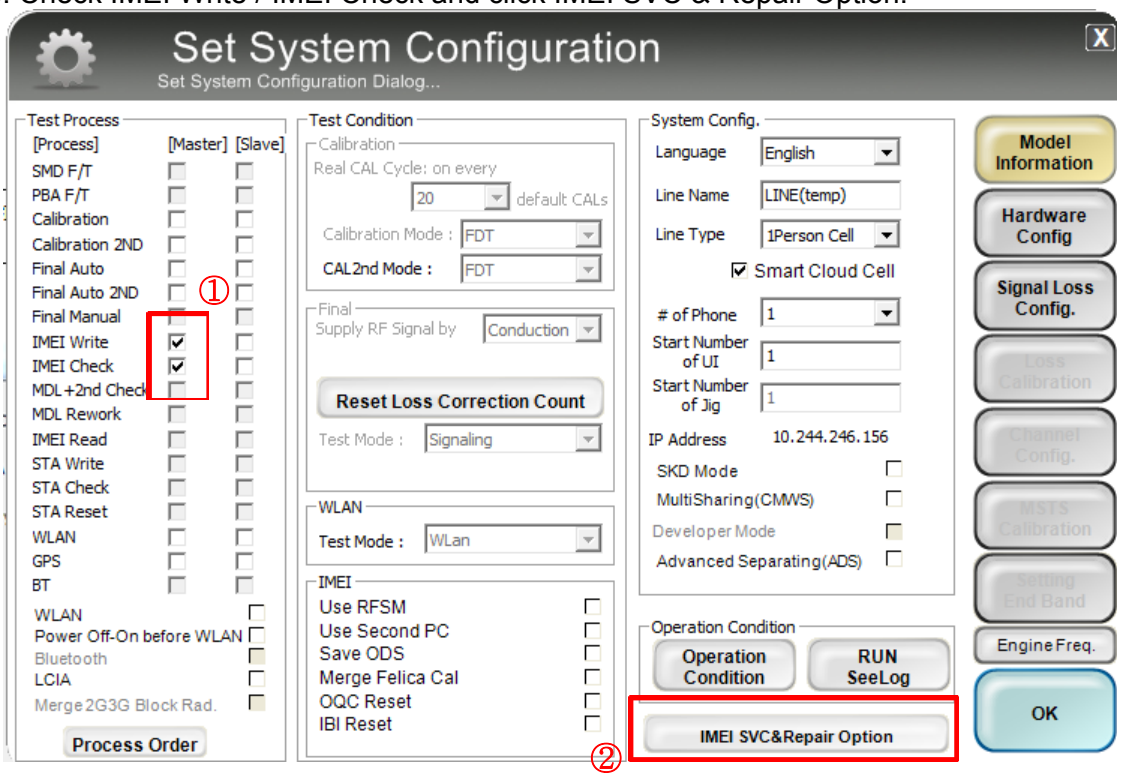
5. Check IMEI and click System Setting

※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.

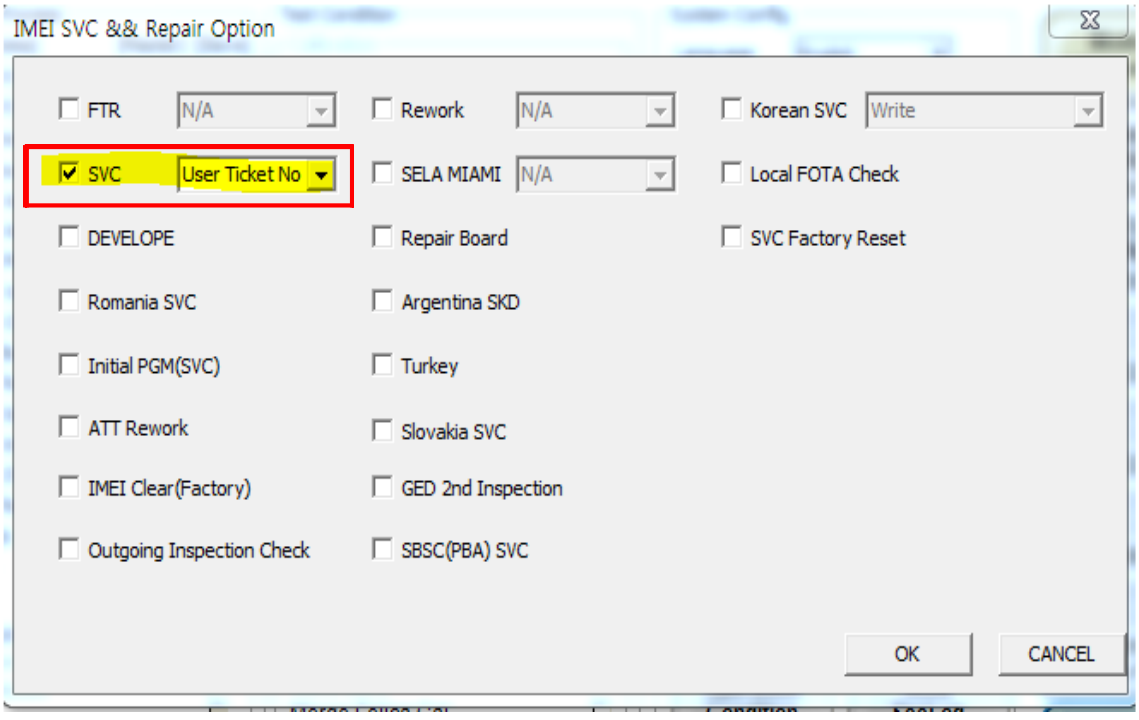


6. Level 1 Repair

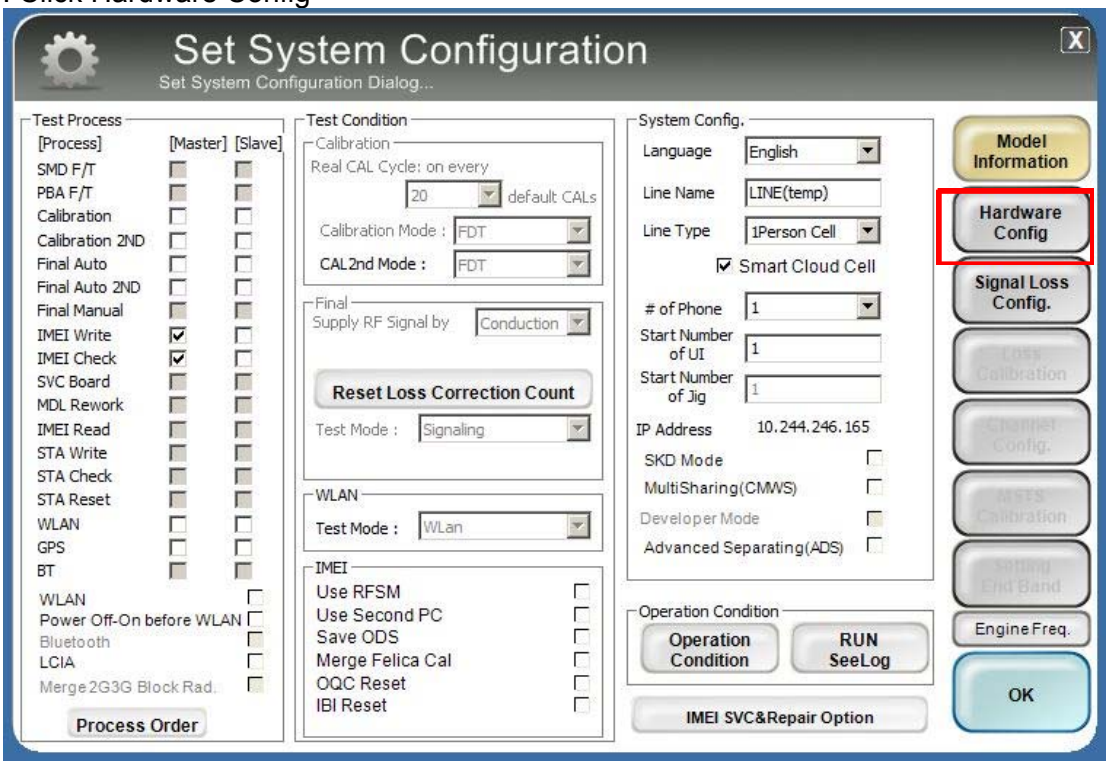
6. Check IMEI Write / IMEI Check and click IMEI SVC & Repair Option.



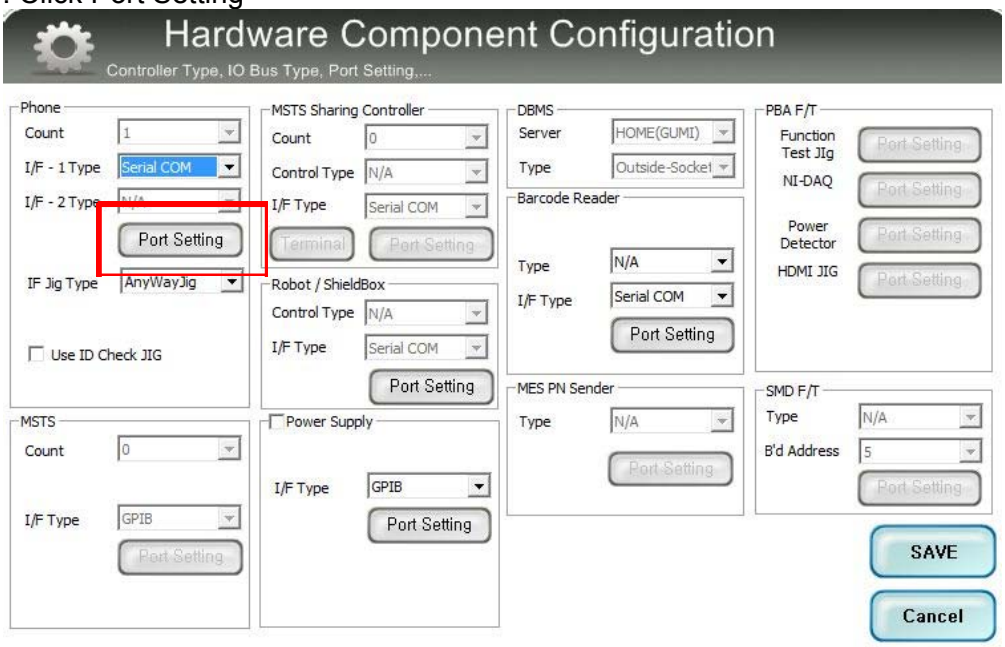
7. Check SVC , User Ticket No and click OK



8. Click Hardware Config

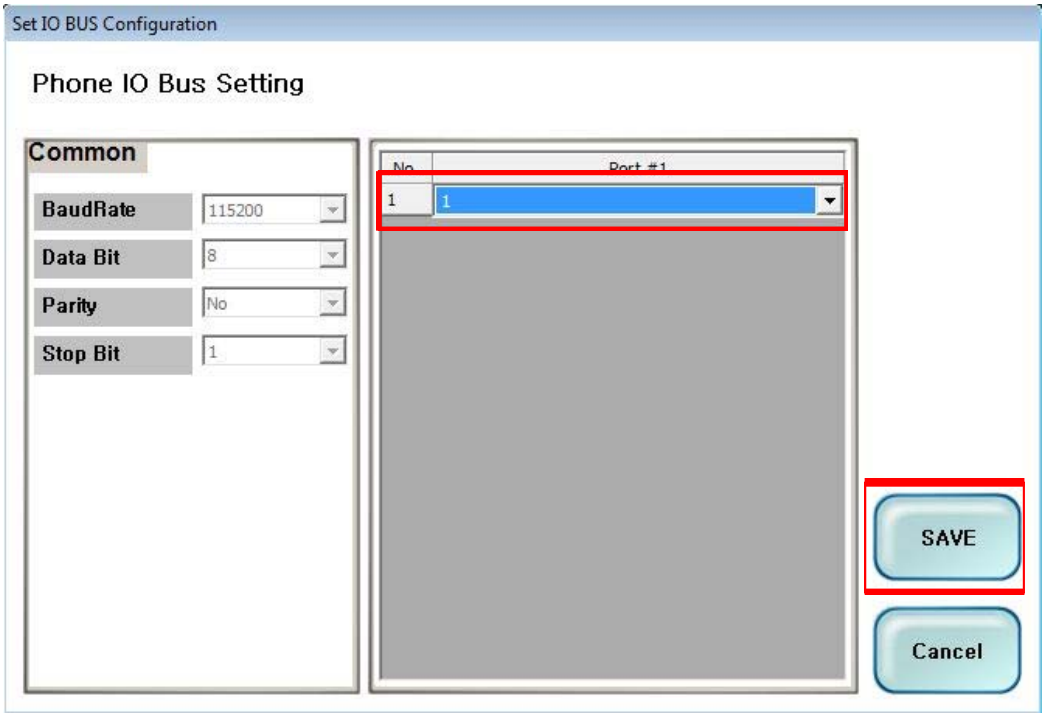


9. Click Port Setting

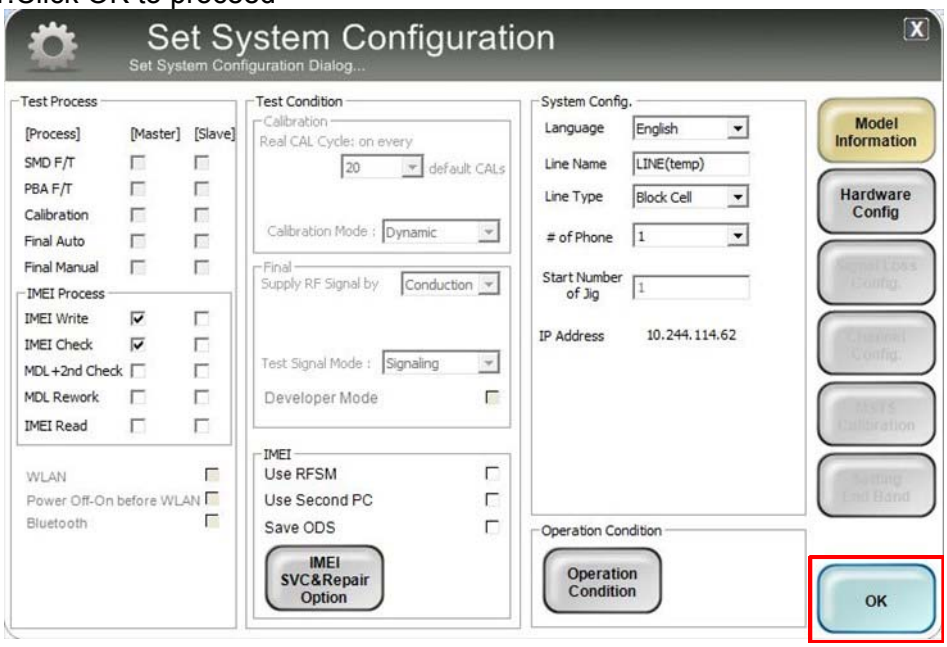


6. Level 1 Repair

10. Select Port Number and SAVE

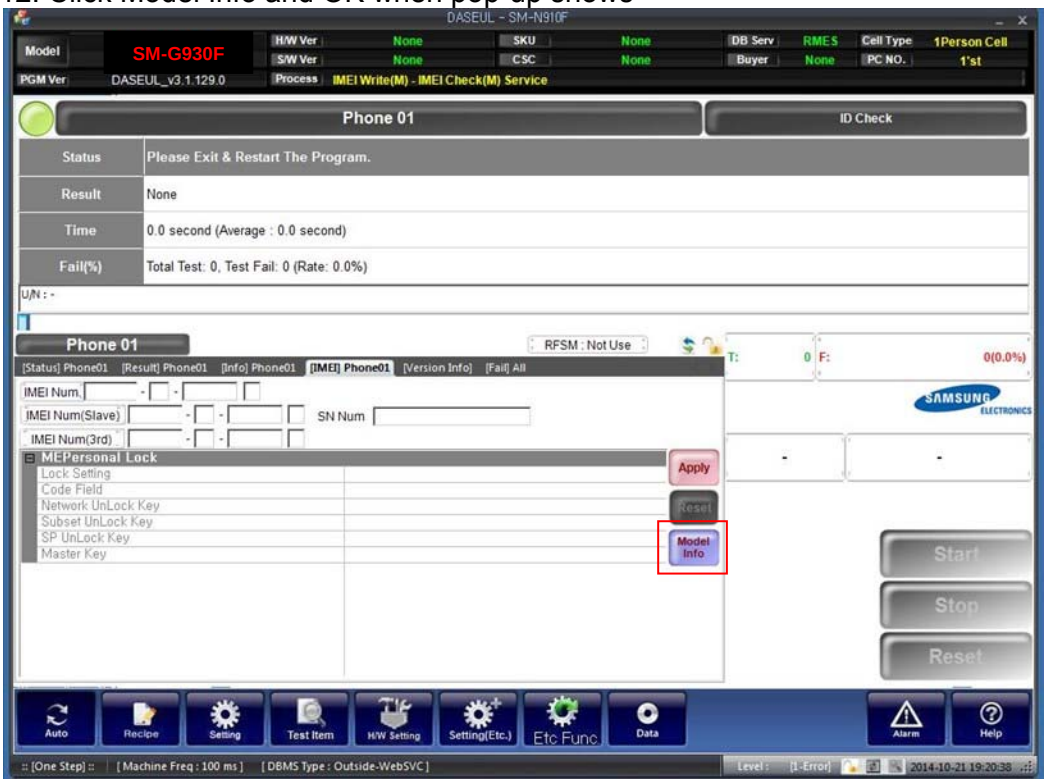


11.Click OK to proceed



6. Level 1 Repair

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

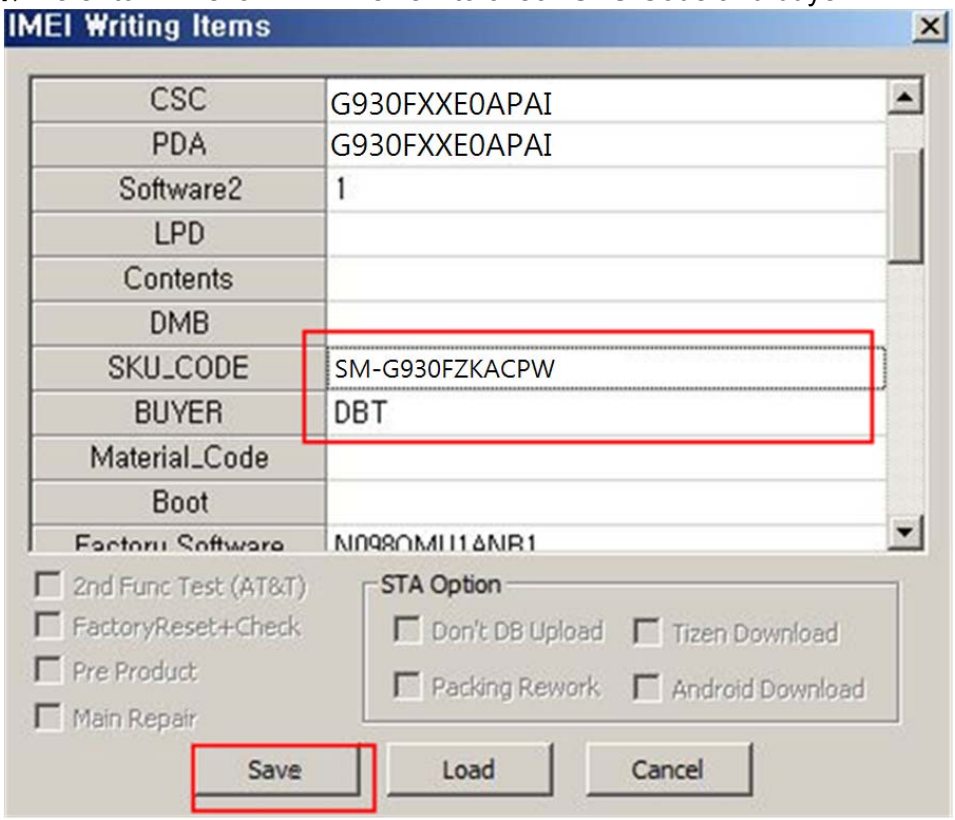


13. Click OK

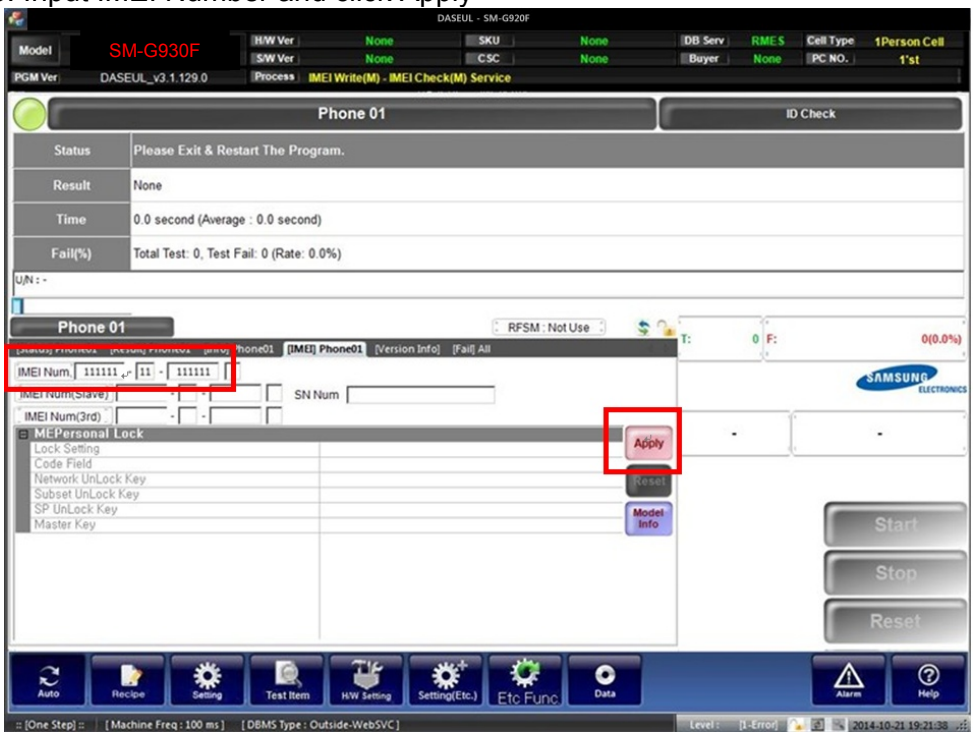
6. Level 1 Repair

14. Input SKU_CODE and BUYER, then click Save button.

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

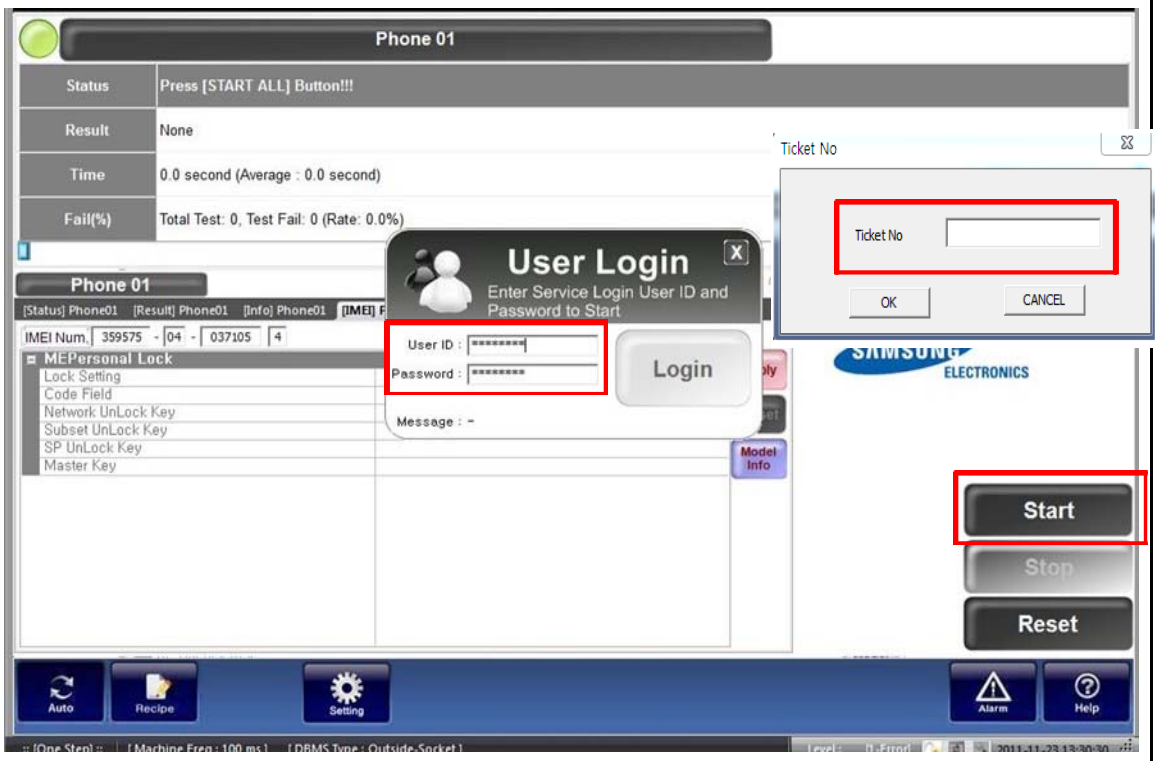


15. Input IMEI Number and click Apply



6. Level 1 Repair

16. ① Click Start, and input IMEI writing ID and Password →②input Ticket No

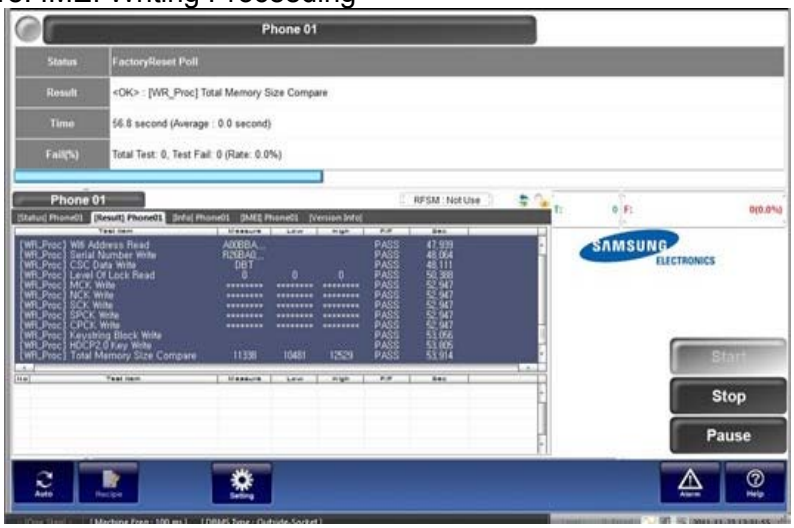


17. Connect the phone to Anyway JIG

※ When you connect the phone, the phone should be turned off.

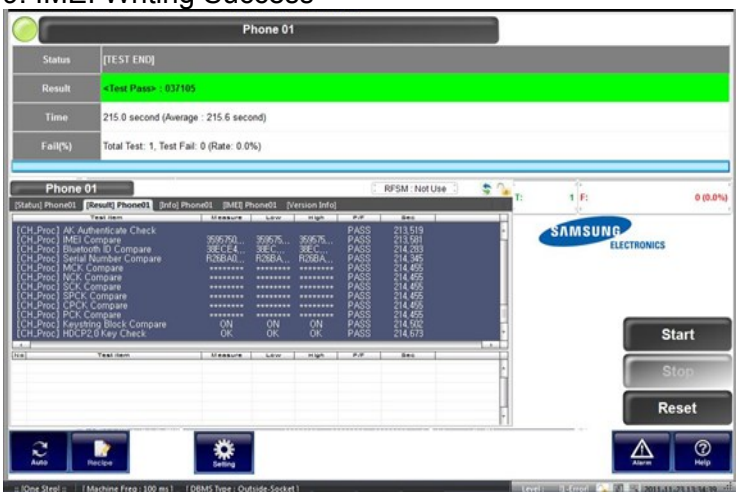
After connecting the phone, the phone will be booted automatically.

18. IMEI Writing Proceeding



6. Level 1 Repair

19. IMEI Writing Success



6. Level 1 Repair

6-4. RF Calibration

6-1-1. Required items in order to calibrate RF

- Installation program: RF Calibration Program
  - DASEUL_Launcher_v4.0.0.exe
  - DASEUL_CAL_ALL_Runtime_3.1.185.0_r00351.CAB
  - Model File (SM-G930F_OPEN_CALIBRATION_Ver_3.1.185.6.CAB)

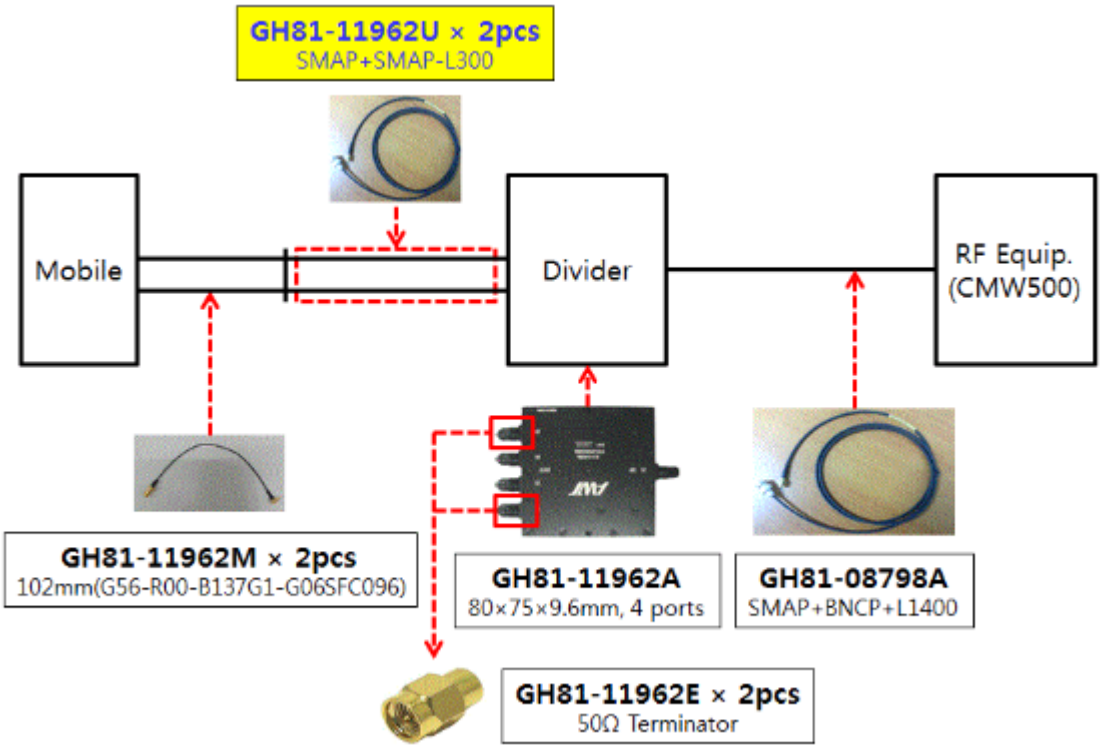
※ It is required to use the latest program.

- Mobile Phone
- E3632A Power Supply
- JIG BOX (GH81-11888A)
- UART Serial Cable
- R&S CMW500
- GPIB Cable (2ea)
- Adapter (GH81-11888K)
- Table of test cables

RF Cable (Manual)	GH81-11962M	GH81-11962U	
	1.2T, 102mm 	1.2T, 102mm 	
4 Port Divider	GH81-11962A	GH81-08798A	GH81-11962E
	Divider 	Divider Cable 	50Ω terminator 

6. Level 1 Repair

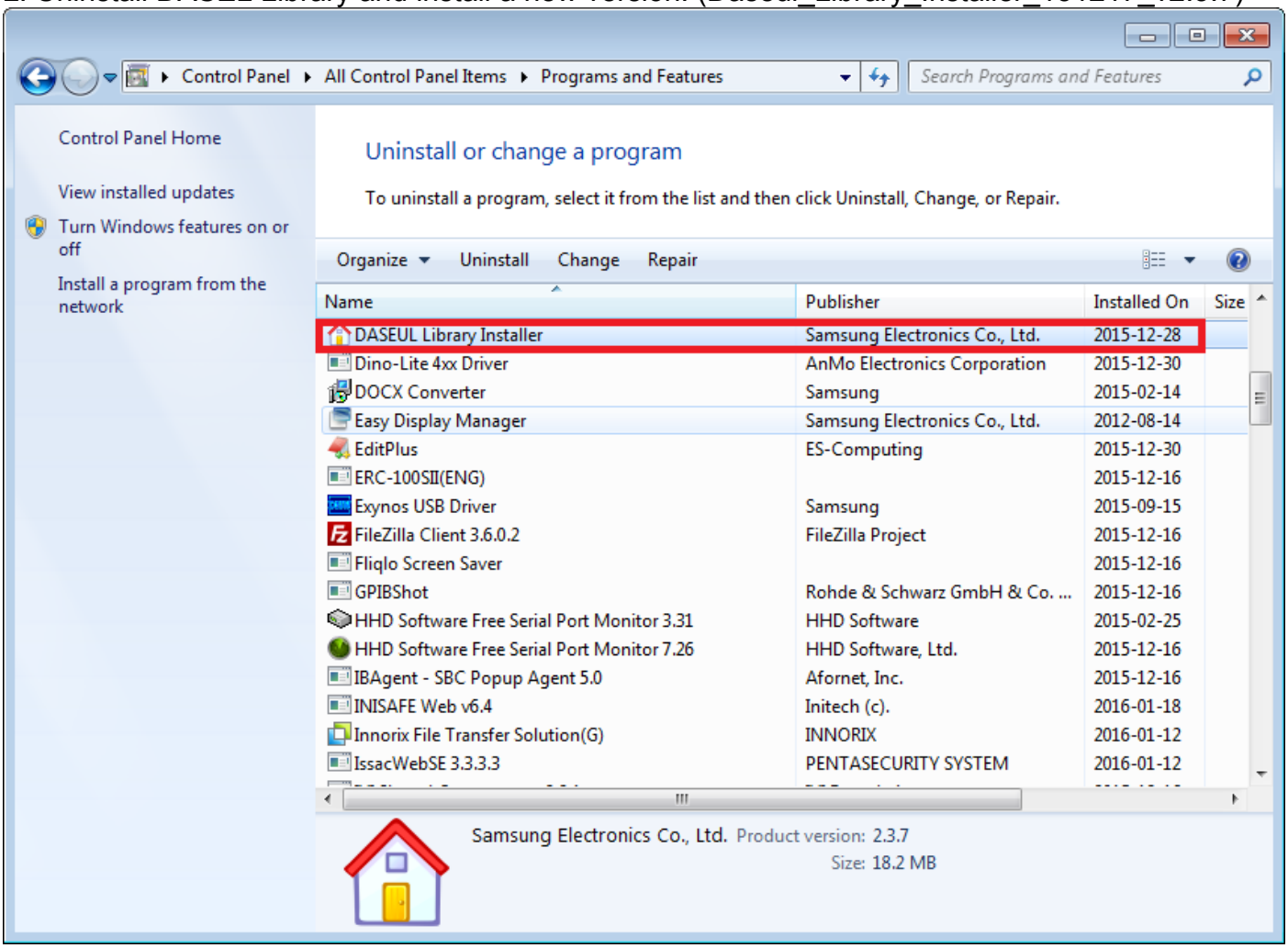
- SETTING



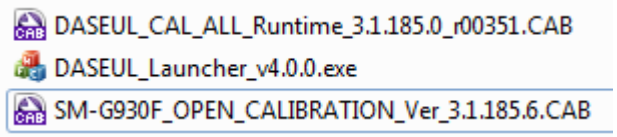
6. Level 1 Repair

6-1-2. RF Calibration Program

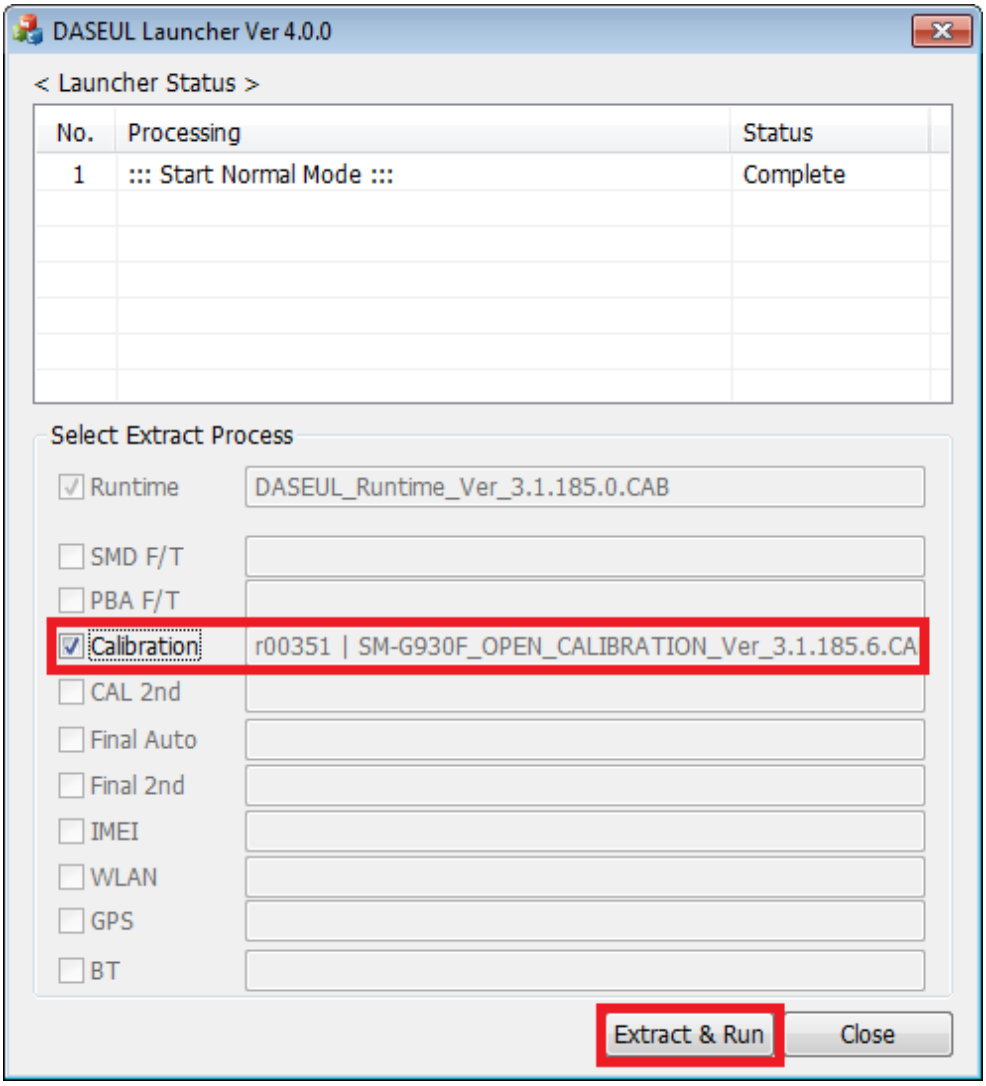
1. Uninstall DASEL Library and install a new version. (Daseul_Library_Installer_151217_v2.3.7)



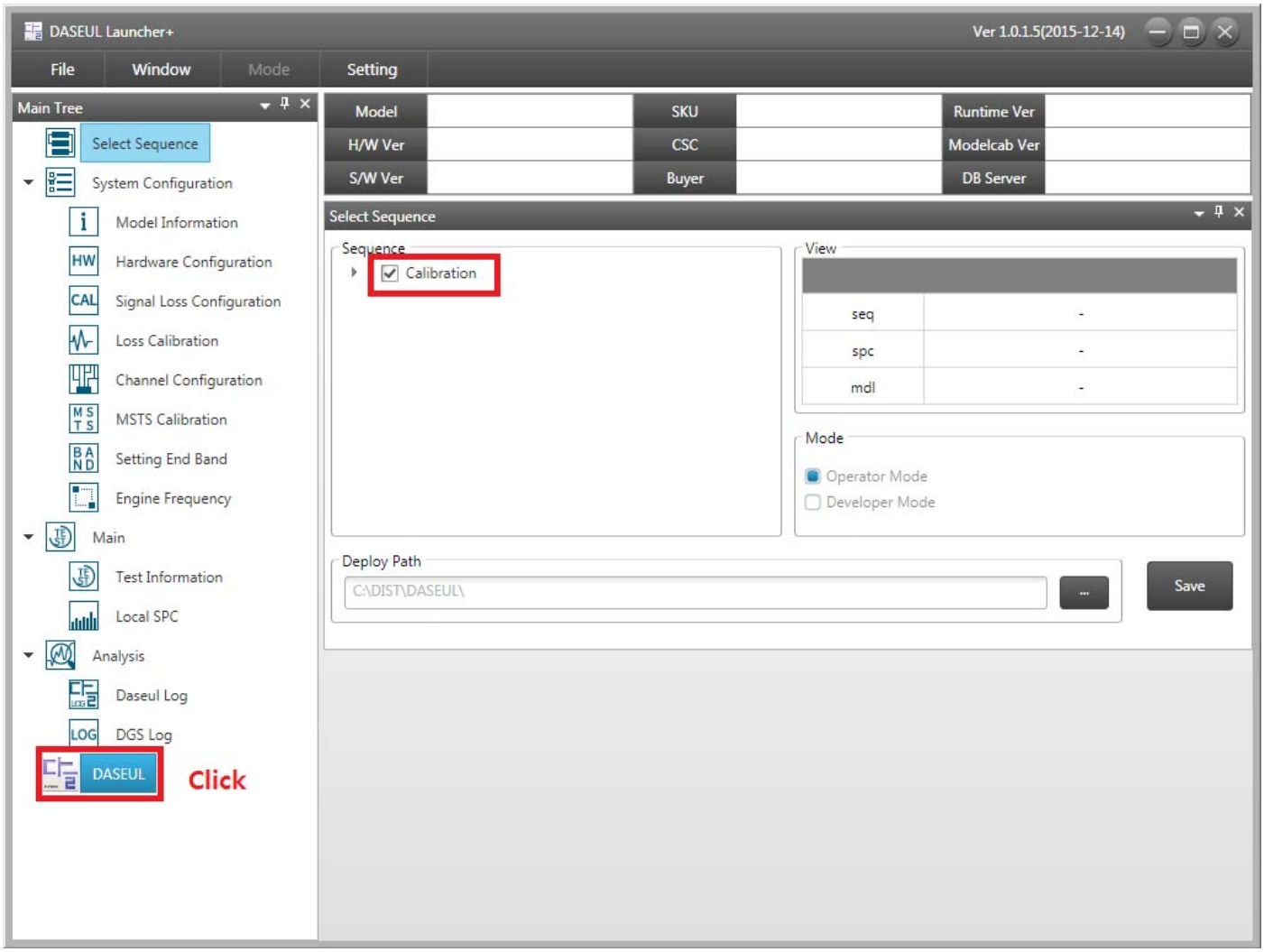
2. Run the RF Calibration Program Launcher, 'DASEUL_Launcher_v4.0.0.exe'.



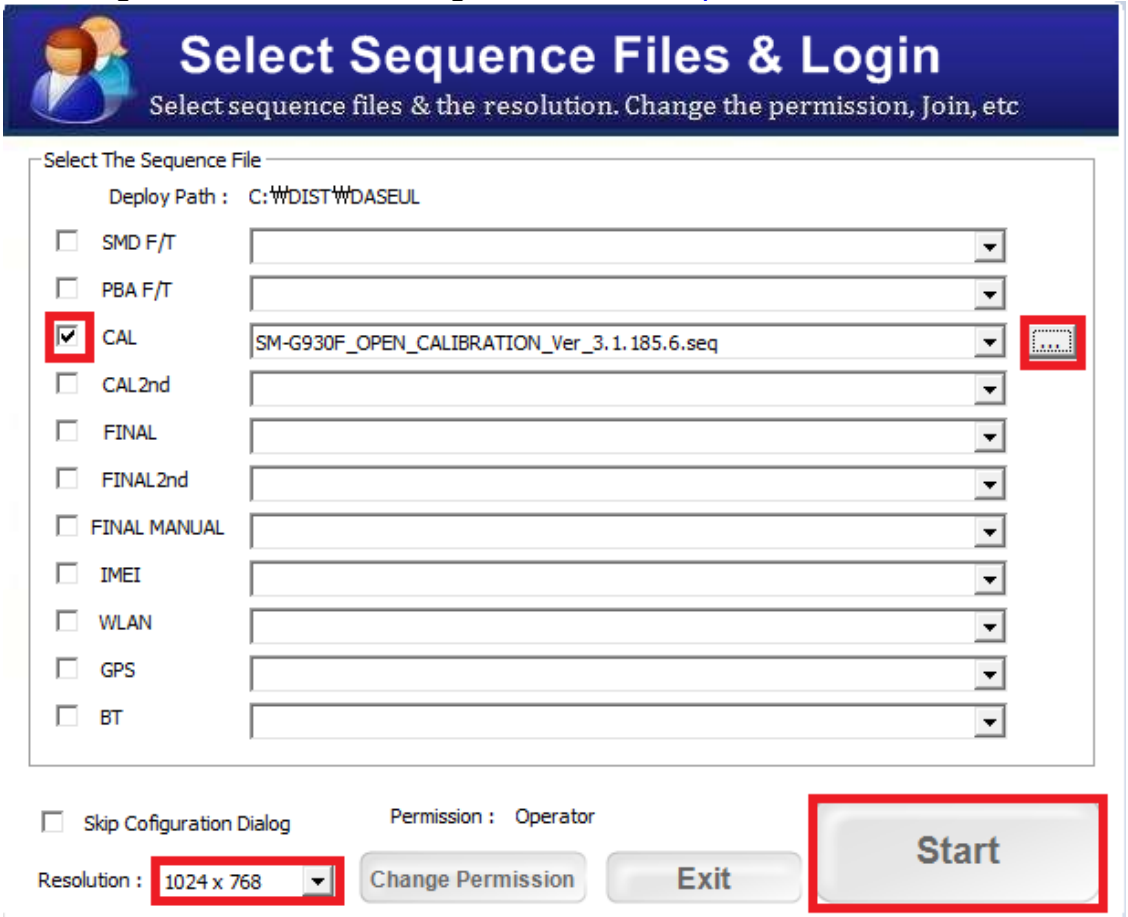
3. Check the 'Calibration' menu, and select 'Extract & Run'.

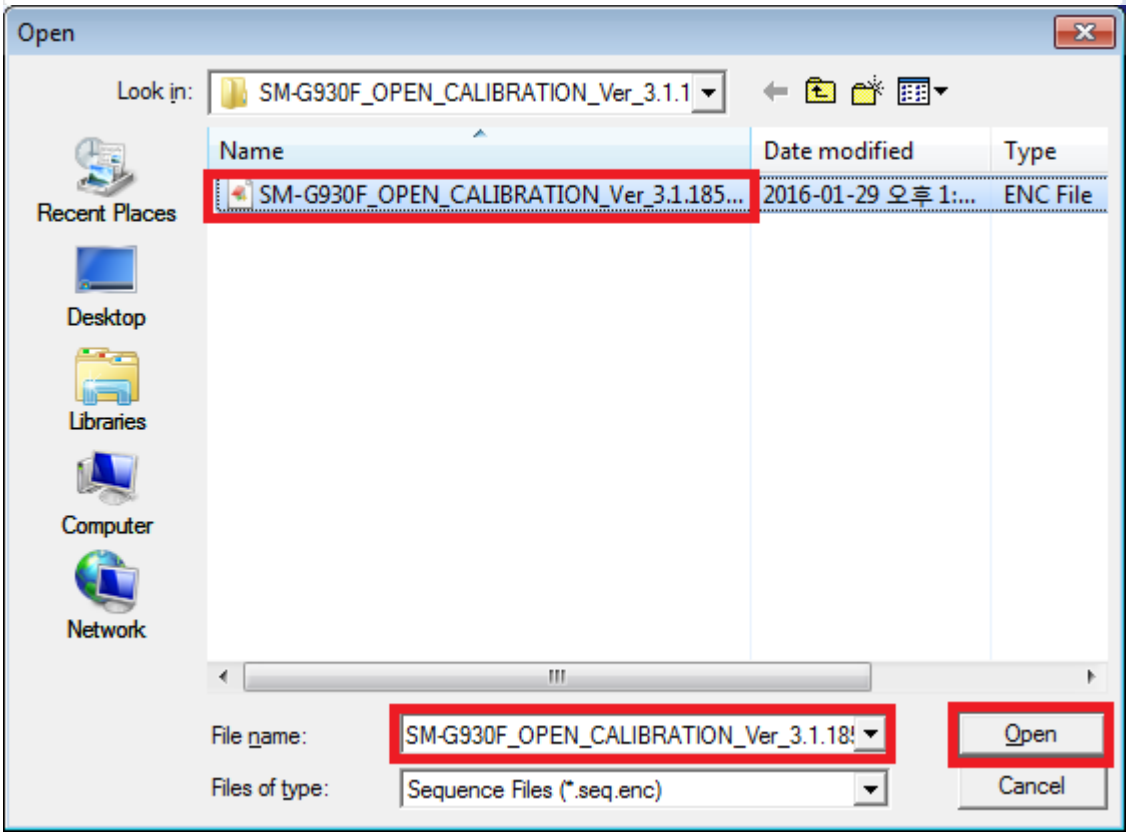


4. Check the 'Calibration' option and Click DASEUL Icon on your left side.

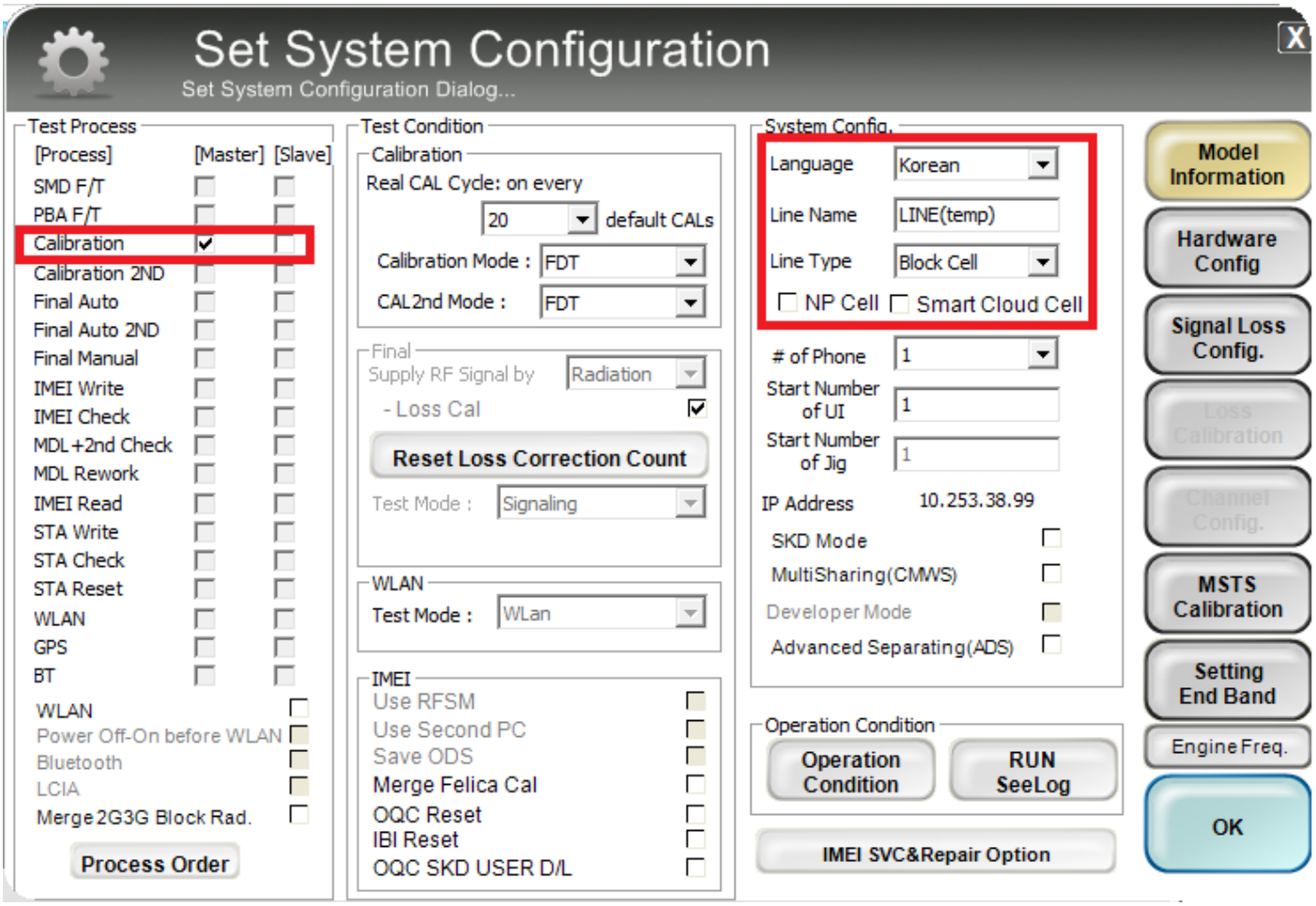


5. Change the Resolution setting and select a sequence file and Click Start Button.

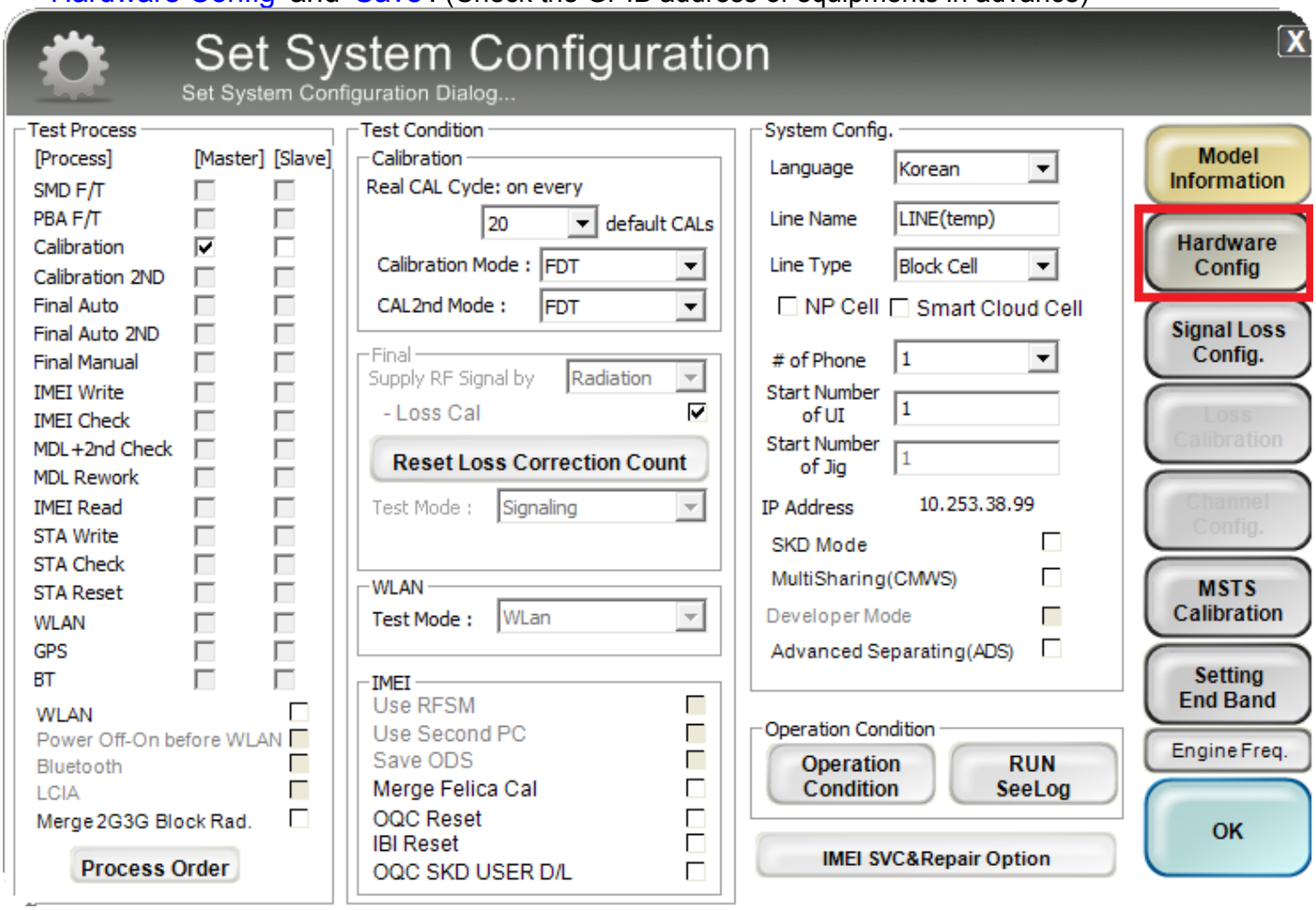




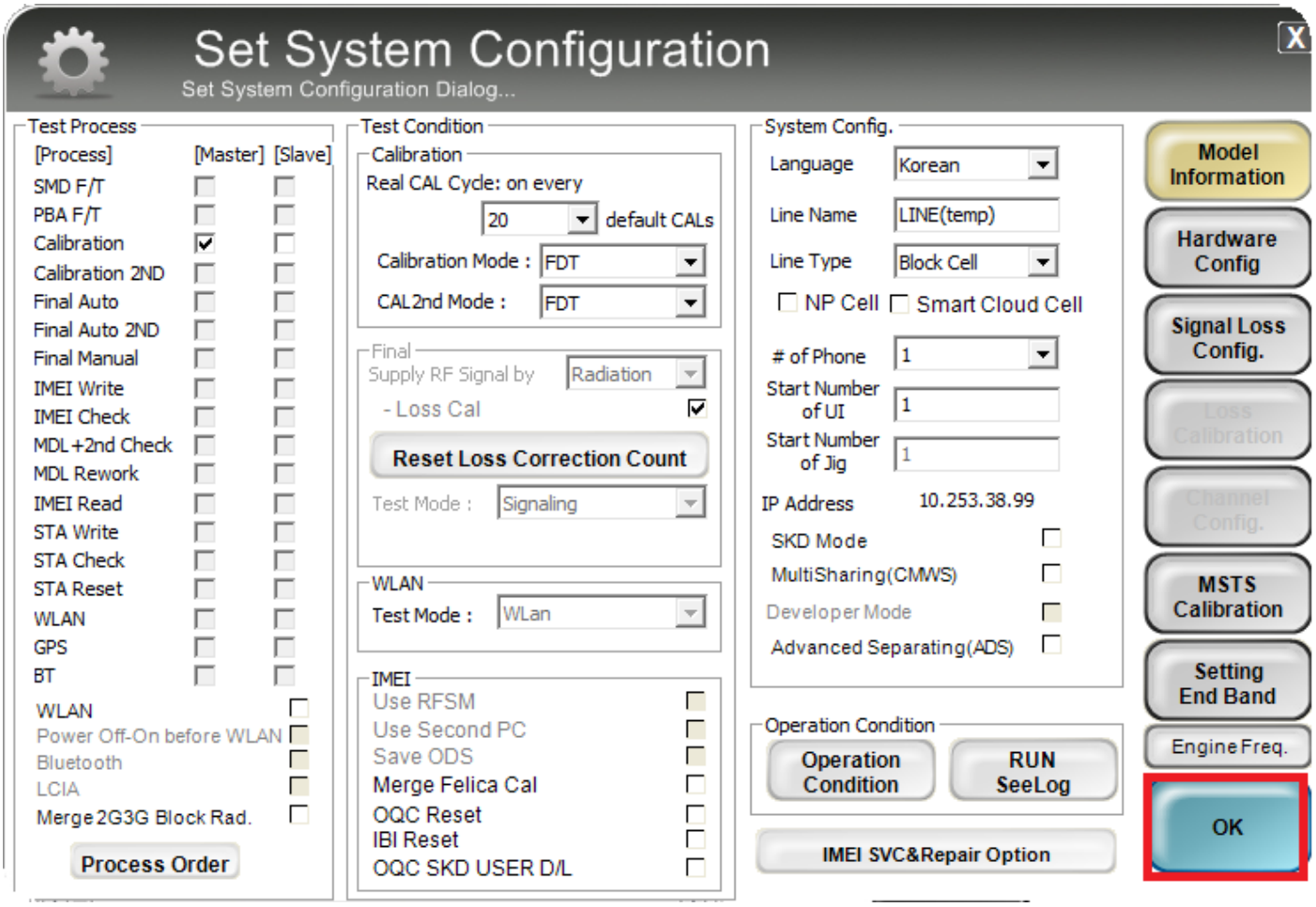
6. Select Master Calibration Process and Change the Line Type to 'Block Cell' and disable 'Smart Cloud Cell'.



7. Set the GPIB address of MSTS(CMW500) and Power Supply(E3632A) to enter 'Hardware Config' and 'Save'. (Check the GPIB address of equipments in advance)

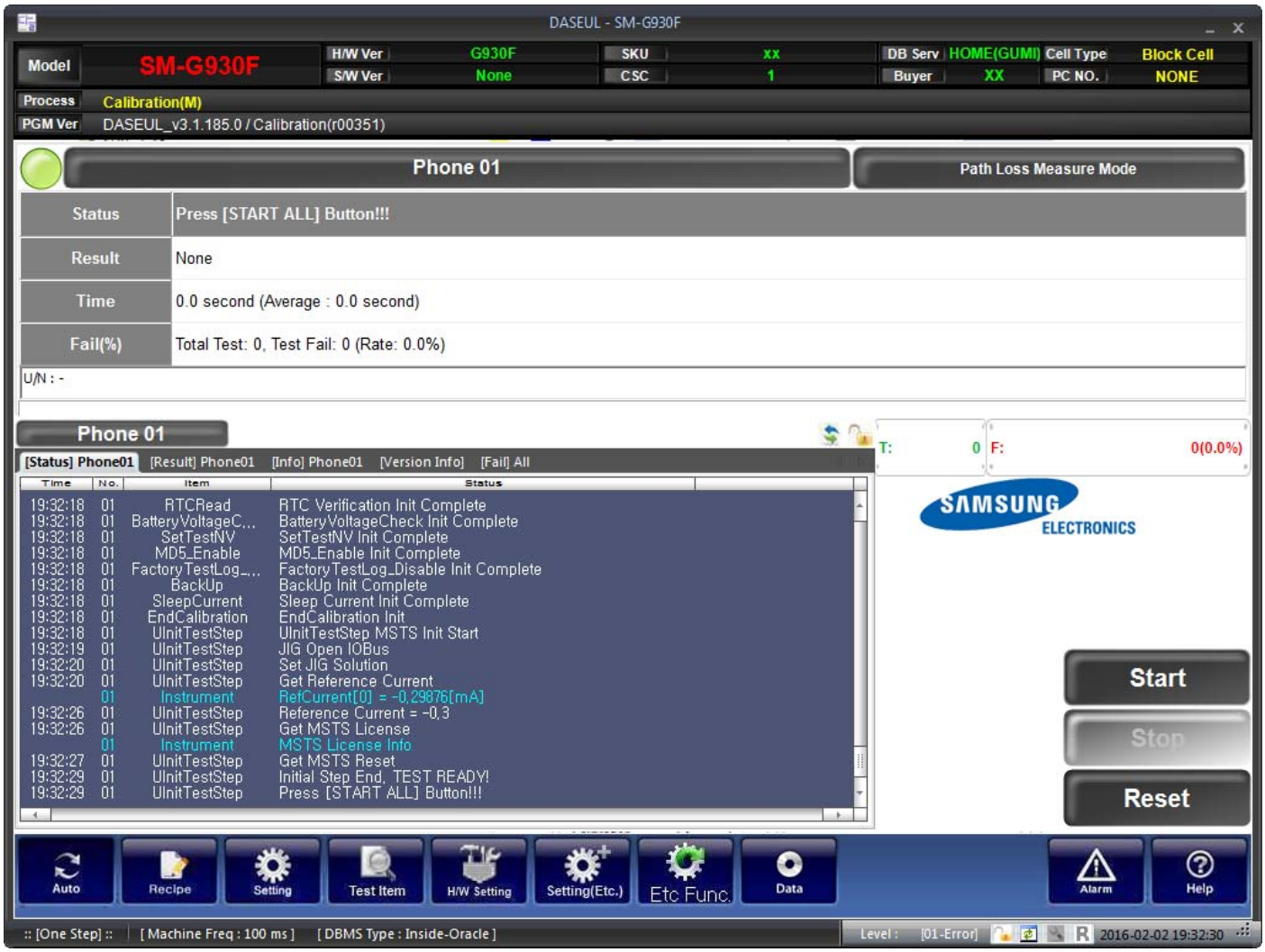


8. Press 'OK' to start RF Calibration after completing all settings.



6. Level 1 Repair

9. Use Start Button to Calibrate



6. Level 1 Repair

7-1. Speaker Calibration

7-1-1 Notice

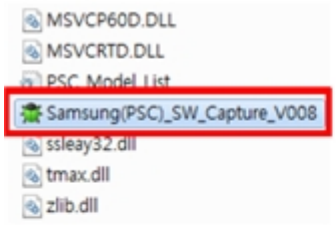
- It is necessary to calibrate the speaker for all cases of replacing the speakers.

7-1-2 You need :

- Mobile device
- Laptop or Note PC
- Anyway Jig
- UART Serial Cable
- IF Test Cable (Different by models)

7-1-3 Lay-out

7-1-4 How to Calibrate Speaker

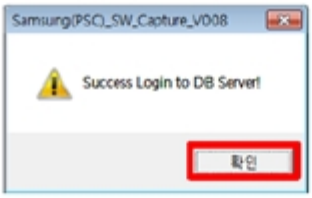


① Run 'Samsung(PSC)_SW_Capture_V008.exe'.

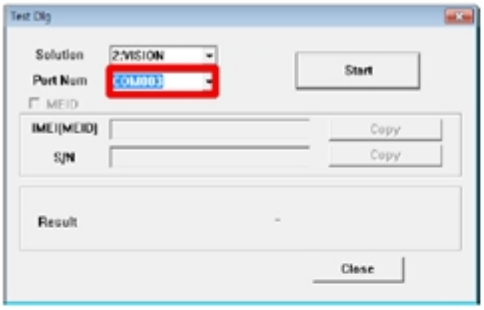
② Check 'SPK' item in the box.

6. Level 1 Repair

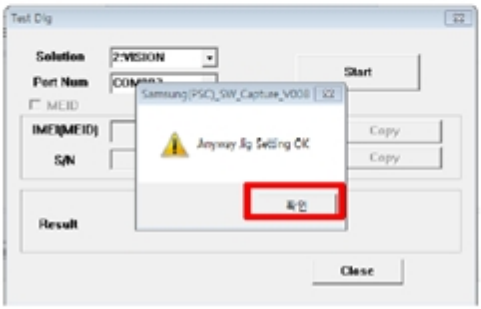
③ Input GSPN ID and Password, then press 'OK'.



④ Confirm Login to DB Server to press '확인'.



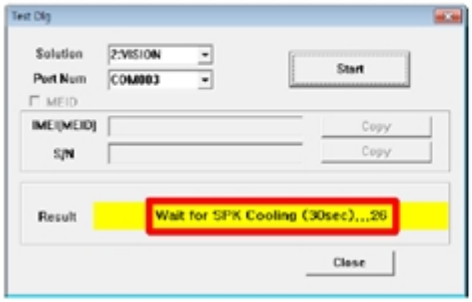
⑤ Set Port Number and press 'Start'.



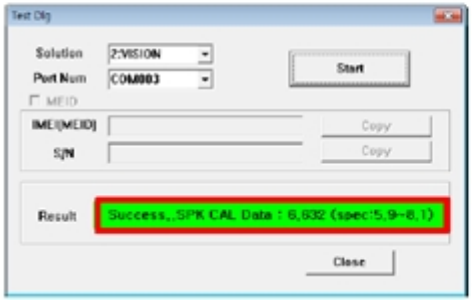
⑥ Confirm the Anyway Jig Setting to press '확인'.

⑦ Connect Mobile device to IF Test cable, then power on to press power key.
※ Phone should be powered off before test.

6. Level 1 Repair



⑦ Speaker Calibration will start within 30 seconds after Booting complete.
※ LCD must be turned on in order to test properly.



⑧ Confirm whether the Speaker Calibration is done successfully.

6. Level 1 Repair

7-2. Battery Accumulated Usage Initialization

7-2-1 Notice

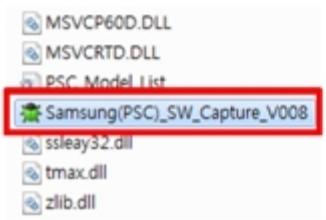
- It is necessary to initialize the battery accumulated usage for all cases of replacing the batteries.

7-2-2 You need :

- Mobile device
- Laptop or Note PC
- Anyway Jig
- UART Serial Cable
- IF Test Cable (Different by models)

7-2-3 Lay-out

7-2-4 How to Initialize Battery Accumulated Usage

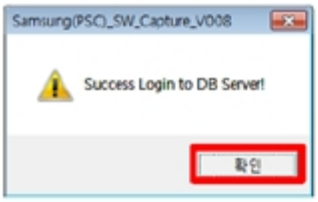


① Run 'Samsung(PSC)_SW_Capture_V008.exe'.

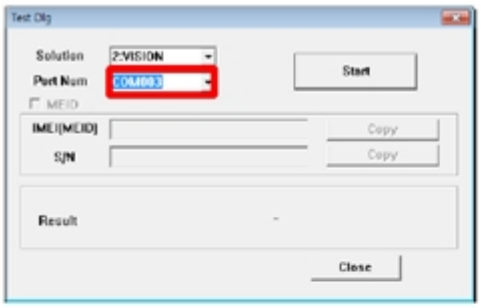
② Check 'Battery' item in the box.

6. Level 1 Repair

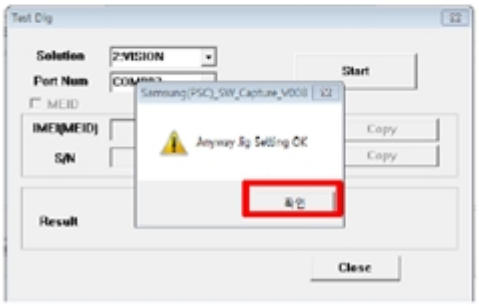
③ Input GSPN ID and Password, then press 'OK'.



④ Confirm Login to DB Server to press '확인'.

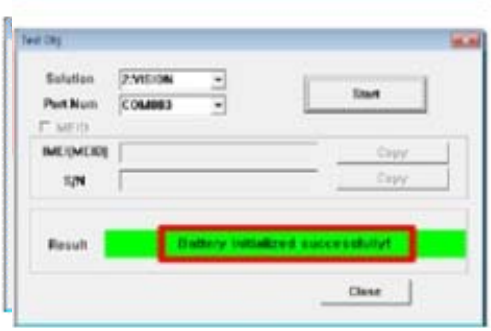


⑤ Set Port Number and press 'Start'.



⑥ Confirm the Anyway Jig Setting to press '확인'.

⑦ Connect Mobile device to IF Test cable, then power on to press power key.
※ Phone should be powered off before test.



⑧ Battery Accumulated Usage Initialization will start as soon as Booting complete.
※ LCD must be turned on in order to test properly.