2. Specification

2-1. GSM General Specification

	GSM850	EGSM 900	DCS1800	PCS1900	WCDMA 2100	WCDMA 900	WCMDA 850	WCDMA 1900
Freq. Band[MHz] Uplink/ Downlink	824~849 869~894	880~915 925~960	1710~1785 1805~1880	1850~1910 1930~1990	1922~1977 2112~2167	880~915 925~960	824~849 869~894	1852~1907 1932~1987
ARFCN range	128~251	0~124 & 975~1023	512~885	512~810	UL: 9612~9888 DL: 10562~10838	UL: 2712~2863 DL: 2937~3088	UL: 4132~4233 DL: 4357~4458	UL: 9612~9888 DL: 10562~10838
Tx/Rx spacing	45MHz	45MHz	95MHz	80MHz	190MHz	45MHz	45MHz	80MHz
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	3.8Mcps
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	FrameLength: 10ms Slotlength: 0.667ms
Modulation	0.3GMSK	0.3GMSK	0.3GMSK	0.3GMSK	QPSKHQPSK	QPSKHQPSK	QPSKHQPSK	QPSKHQPSK
MS Power	33dBm~5dBm	33dBm~5dBm	30dBm~0dBm	30dBm~0dBm	24dBm~ -50dBm	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)	3(max+24dBm)
Sensitivity	-102dBm	-102dBm	-100dBm	-100dBm	-106.7dBm	-106.7dBm	-106.7dBm	-106.7dBm
TDMA Mux	8	8	8	8	8	8	8	8
Cell Radius	35Km	35Km	2Km	2Km	2Km	2Km	2Km	2Km

2-2. GSM Tx Power Class

TX Power control level	GSM850
5	33±2 dBm
6	31±2 dBm
7	29±2 dBm
8	27±2 dBm
9	25±2 dBm
10	23±2 dBm
11	21±2 dBm
12	19±2 dBm
13	17±2 dBm
14	15±2 dBm
15	13±2 dBm
16	11±3 dBm
17	9±3dBm
18	7±3 dBm
19	5±3 dBm

TX Power control level	EGSM900
5	33±2 dBm
6	31±2 dBm
7	29±2 dBm
8	27±2 dBm
9	25±2 dBm
10	23±2 dBm
11	21±2 dBm
12	19±2 dBm
13	17±2 dBm
14	15±2 dBm
15	13±2 dBm
16	11±3 dBm
17	9±3dBm
18	7±3 dBm
19	5±3 dBm

TX Power control level	DCS1800
0	30±3 dBm
1	28±3 dBm
2	26±3 dBm
3	24±3 dBm
4	22±3 dBm
5	20±3 dBm
6	18±3 dBm
7	16±3 dBm
8	14±3 dBm
9	12±4 dBm
10	10±4 dBm
11	8±4 dBm
12	6±4 dBm
13	4±4 dBm
14	2±5 dBm
15	0±5 dBm

TX Power control level	PCS1900
0	30±3 dBm
1	28±3 dBm
2	26±3 dBm
3	24±3 dBm
4	22±3 dBm
5	20±3 dBm
6	18±3 dBm
7	16±3 dBm
8	14±3 dBm
9	12±4 dBm
10	10±4 dBm
11	8±4 dBm
12	6±4 dBm
13	4±4 dBm
14	2±5 dBm
15	0±5 dBm

2-3. LTE General Specification

	LTE Band1	LTE Band3	LTE Band5	LTE Band7	LTE Band8	LTE Band20
Freq. Band[MHz] Uplink/ Downlink	1920~1980 2110~2170	1710~1785 1805~1880	824~849 869~894	2500~2570 1805~1880	880~914.9 925~959.9	832~862 791~821
ARFCN range	UL: 18000~18599 DL: 0~599	UL: 19200~19950 DL: 1805~1880	UL: 20400~20649 DL: 2400~2649	UL: 2500~2570 DL: 2620~2690	UL: 21450-21799 DL: 3450-3799	UL: 24150~24450 DL: 6150~6450
Tx/Rx spacing	190MHz	95MHz	45MHz	120MHz	45MHZ	-41MHz
Channel Bandwidth	5/10/15/20 MHz	1.4/3/5/10/15/20 MHz	1.4/3/5/10 MHz	5/10/15/20 MHz	1.4/3/5/10MHz	5/10/15/20 MHz
Modulation	QPSK,16/64QAM	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	-35~25.7 dBm
Sensitivit (QPSK) (BW 10MHz)	-94 dBm	-92 dBm	-92 dBm	-95dBm	-95dBm	-94dBm
Cell Radius	>5Km	>5Km	>5Km	>5Km	>5Km	>5Km

3. Operation Instruction and Installation

Main Function

Phone (Dialer)

Contacts

Messaging

Samsung Apps

Calculator

Calendar

Camera

Clock

Email

Gallery

Internet

Memo

Mini diary

Music Player

My files

Settings

ThinkFree

Video player

Voice recorder

Widget

Picture frame
Widget

Days
Widget

Buddies now
Widget

Email
Widget

Dual clock

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 replac ement parts may not function properly.

1-2. ESD(Electrostatically Sensitive Devices) Precaution

Many semiconductors and ESDs in electronic devices are particularly sensitive to static discha rge and can be easily damaged by it. We recommend protecting these components with cond uctive 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.

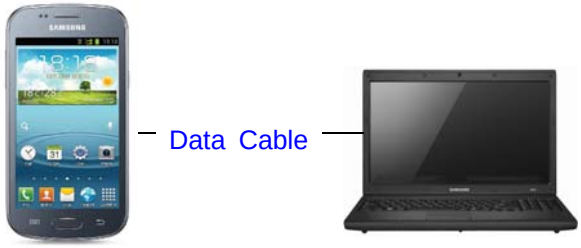
The potential for static electricity discharge may be increased in low humidity environments, such as air-conditioned rooms. Increase the airflow to the working area to decrease the chance of accidental static electricity discharges.

6. Level 1 Repair

6-1. S/W Download

6-1-1. Pre-requsite for S/W Downloading

- Diagram of connection



6-1-2. How to download S/W

1) Downloading Binary Files

• Binary file for downloadingI739.

– cpall_XXXX.rom: this is the code binary file.
(file size is about 40MB)

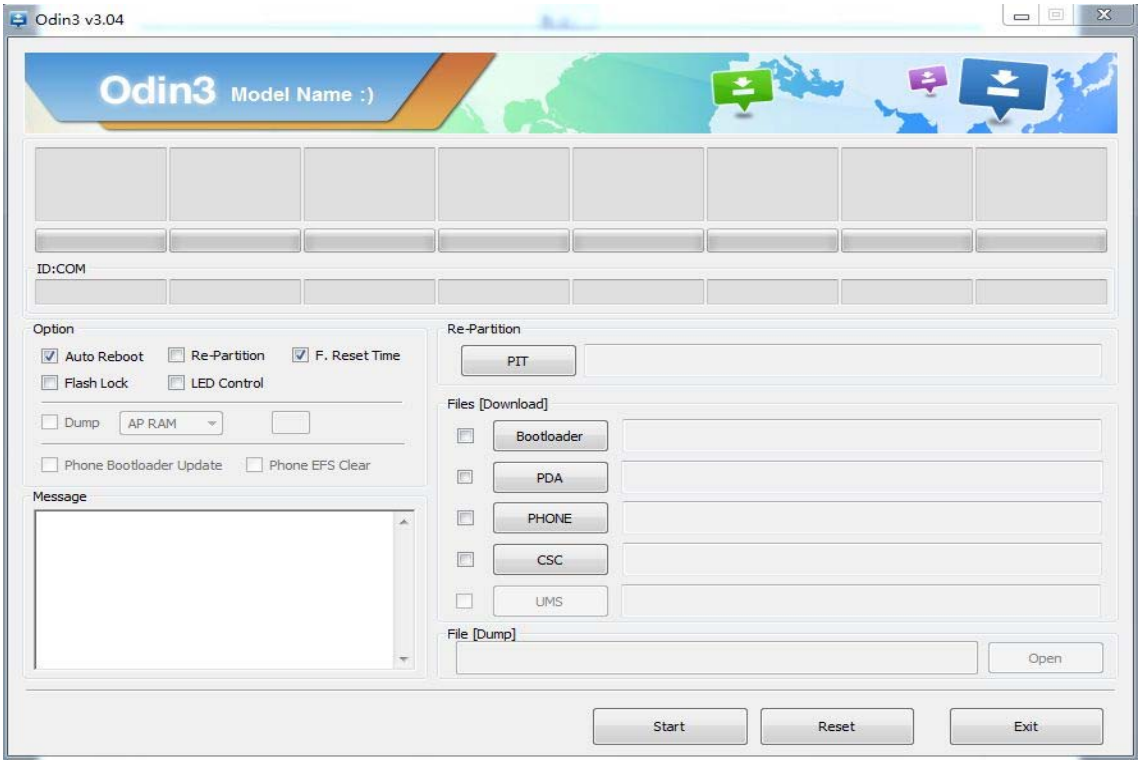
2) Pre-requidsite for Downloading

• Downloader Program (Odin3.exe)
• **I7**39 Mobile Phone
• Data Cable
• Binary file

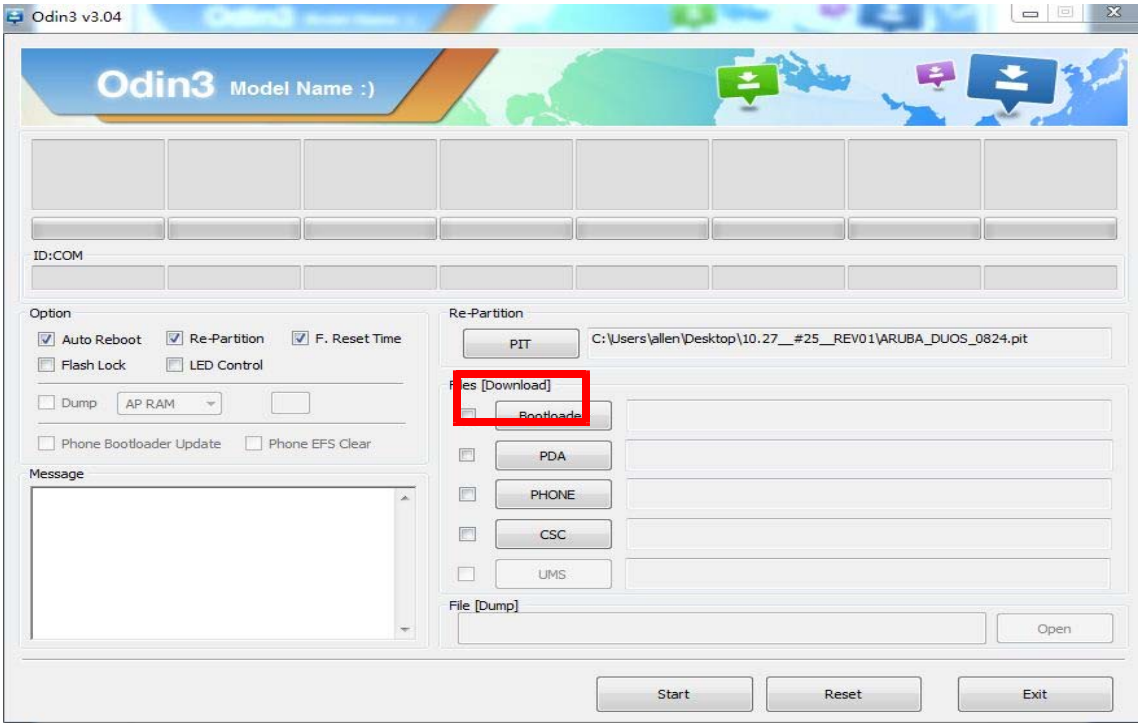
3) Boot the mobile phone by pressing **home** key + PWR key + **Voice down key** at the same time, If you do properly, you can see the some message on the main LCD, such as the following so to say.

USB DLOAD
VIA CHEKER BOOT
FIxx 11:05:08

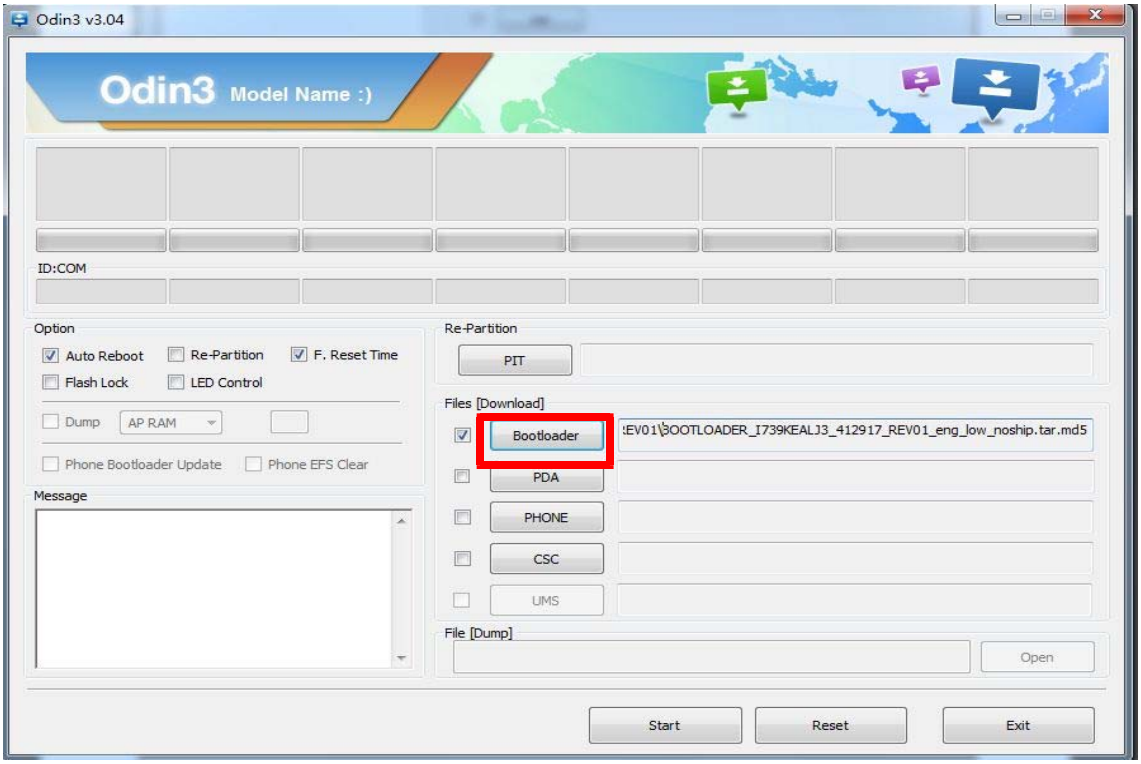
4) Load the binary download program by executing the "(Odin3.exe)"



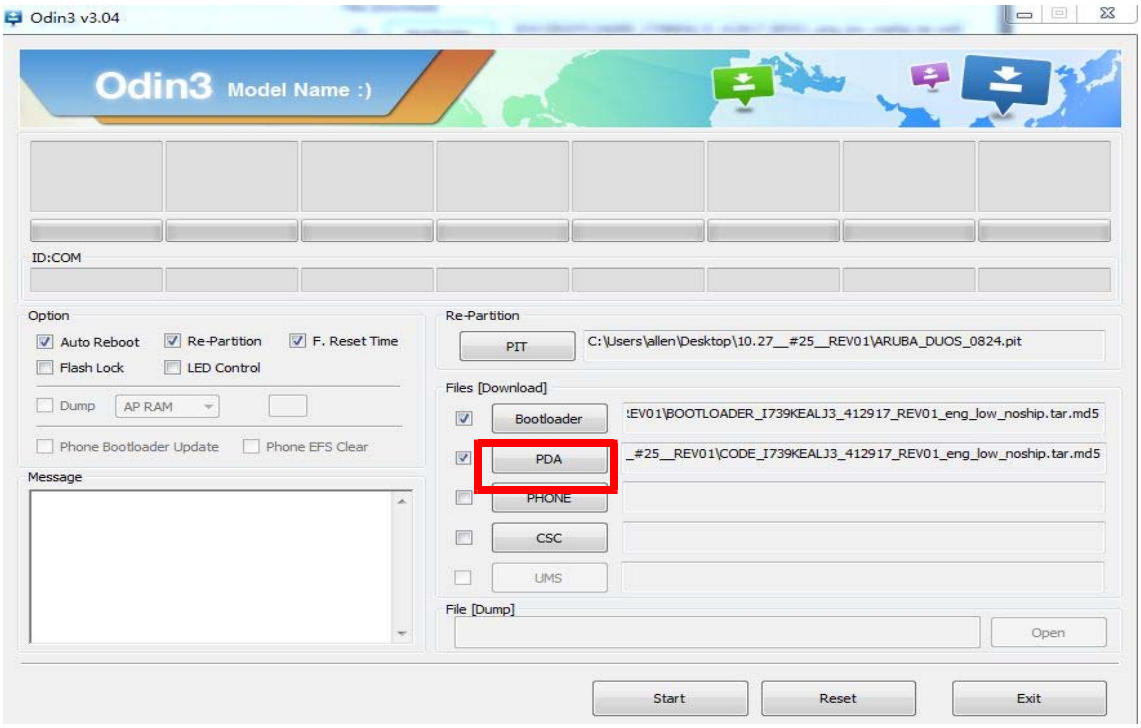
5) Press "PIT" button described in below picture to open the phone software. Then select "ARUBA_DUOS_XXX.pit"from the file directory.



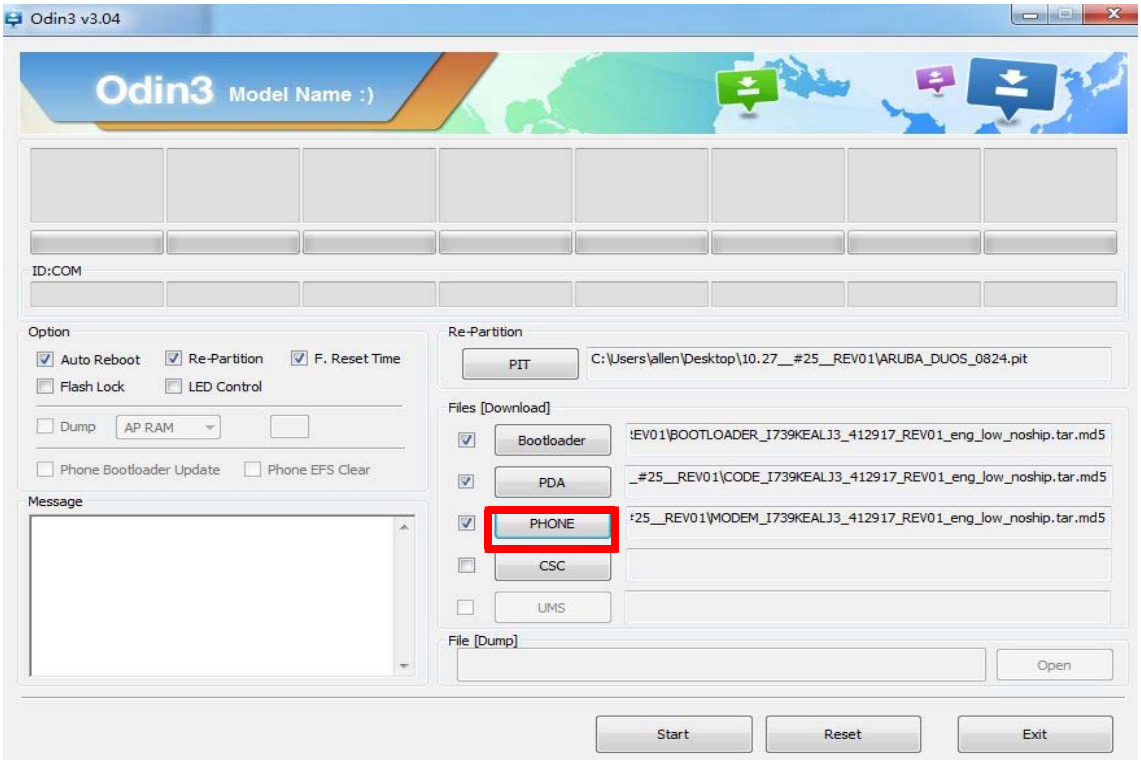
6) Press "Bootloader" button described in below picture to open the phone software and select "BOOTLOADER_I739KEALJ3_XXX.md5"from the file directory.



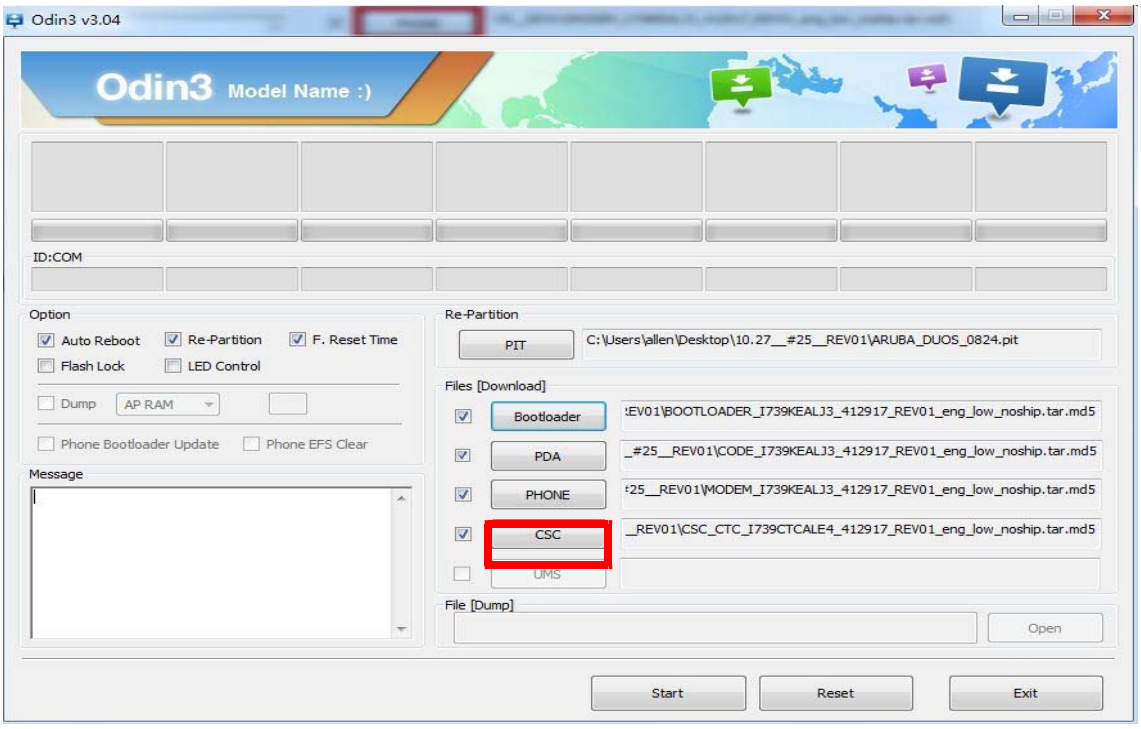
7) Press "PDA" button described in below picture to open the phone software and select "CODE_I739KEALJ3_XXX.md5"from the file directory.



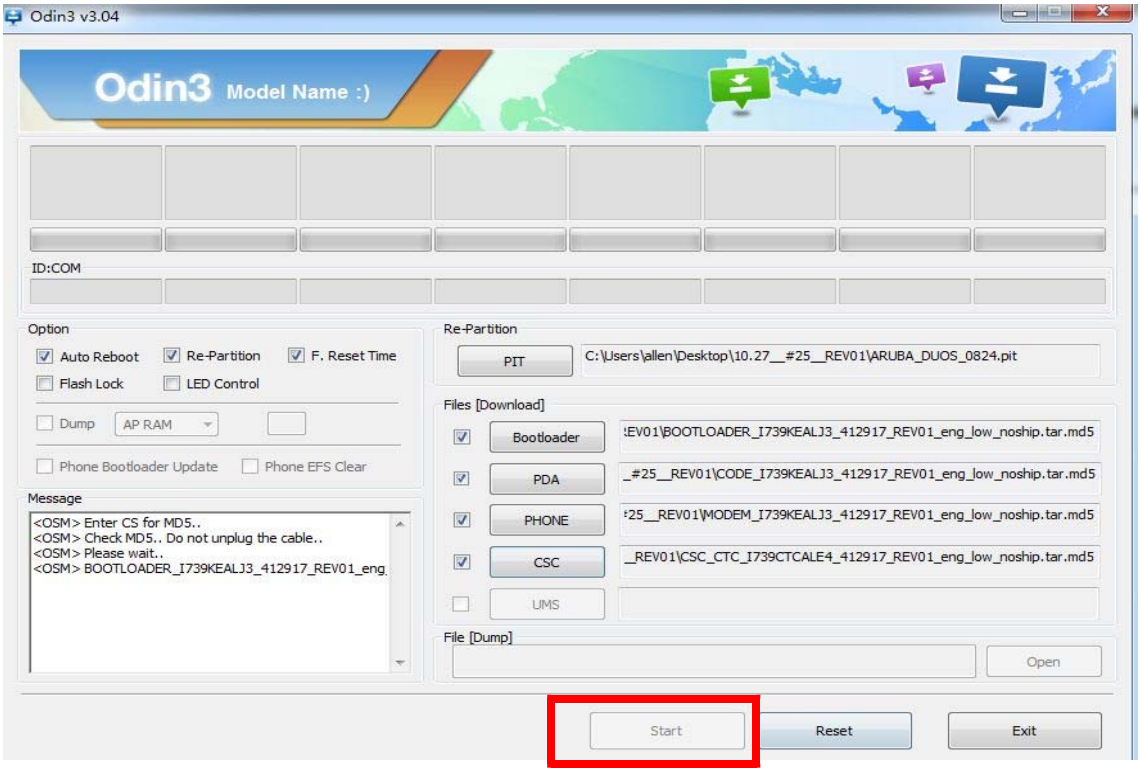
8) Press "PHONE" button described in below picture to open the phone software and select "MODEM_I739KEALJ3_XXX.md5"from the file directory.



9) Press "CSC" button described in below picture to open the phone software and select "csc_I739KEALJ3_XXX.md5"from the file directory.



10) Now press the button 'start' to download the software.



11) Well done. It's time to enjoy a break while waiting for the downloading.

After finishing the phone binary download, the Odin3 will show Pass, then download is completed.

[Option]

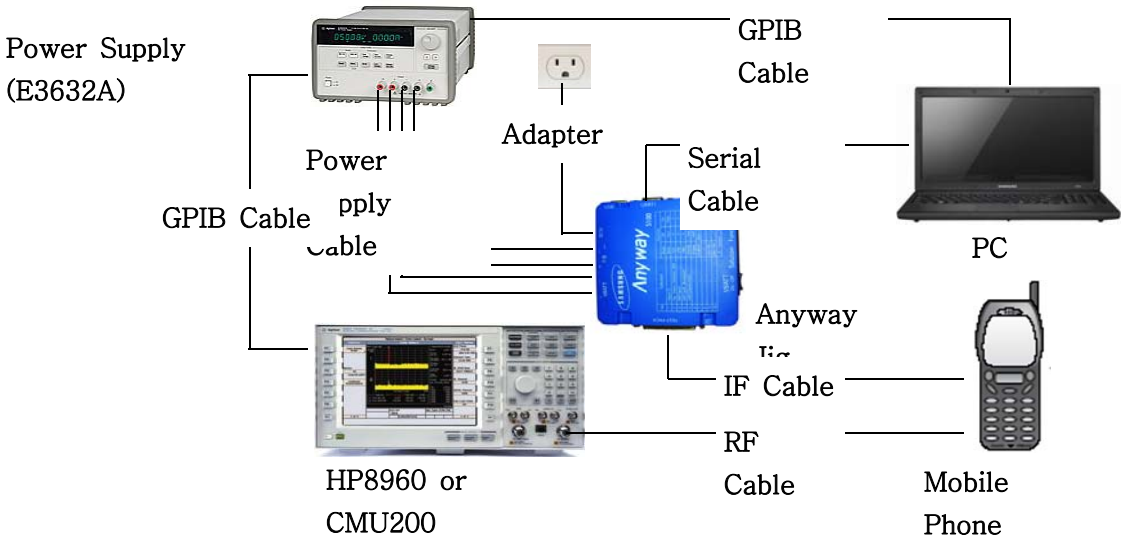
If you need rebuild again, you can rebuild using "home key + Power on + voice down" after finished downloading.

※ Caution. Do not disconnect during the S/W downloading.

6-2. Calibration

6-2-1. Pre-requsite for calibration

- Diagram of connection



- Service Parts

Anyway Jig	Adaptor	IF Cable	RF Cable
			
GH99-36900B	ETA0U42CBC	GH39-01290A	GH39-00985A

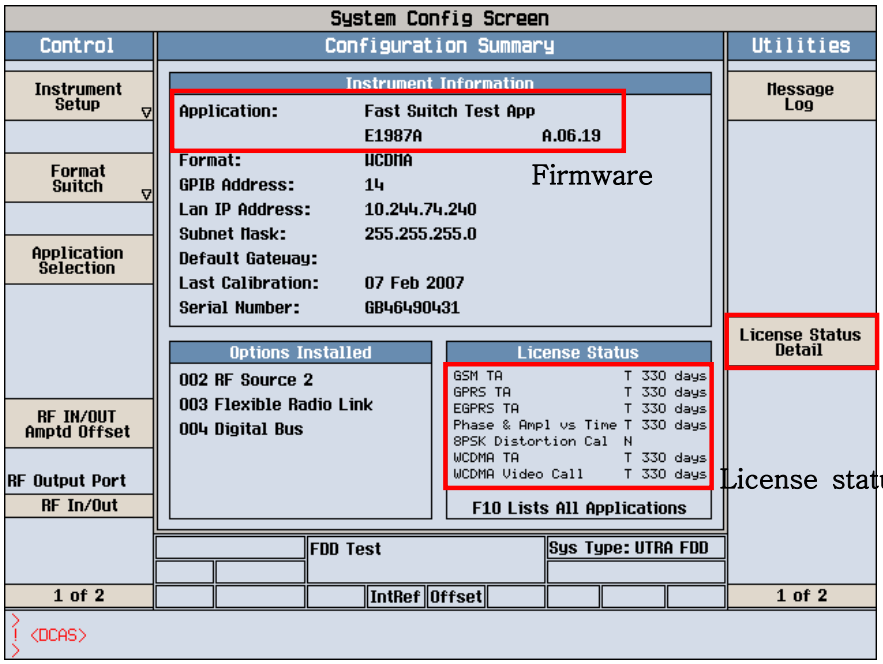
- Standard Parts

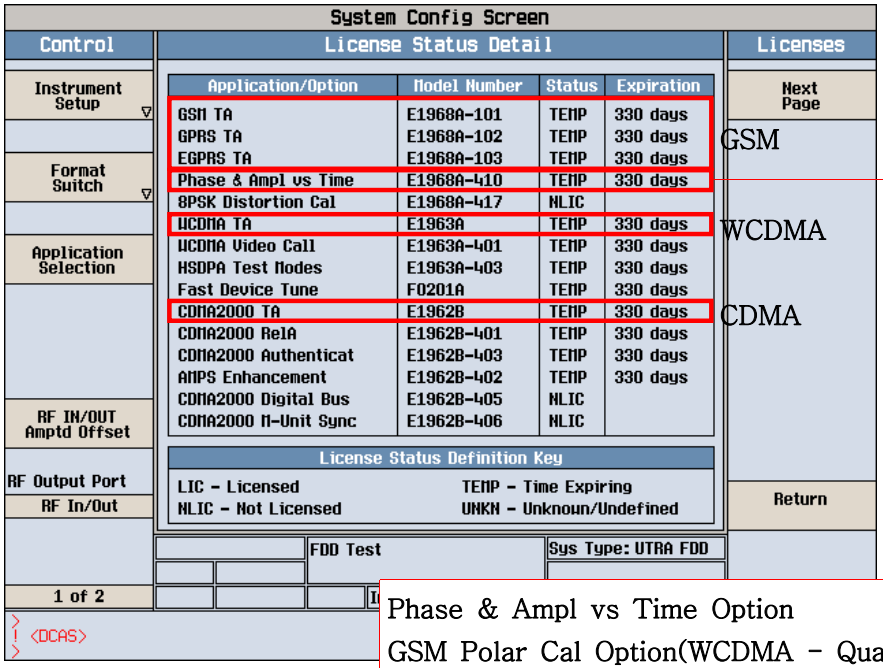
Power Supply Cable	Serial Cable	GPIB Cable
		

- HP8960 has to be satisfied the condition like below to do calibration.

Option list	E1968A-202	GSM & EDGE mobile test application

upgrade need	Phase & Ampl vs Time	GSM Polar cal option (WCDMA - Qualcomm solution)
	CDMA2000 TA	CDMA2000 mobile test
Firmware	E1968A A.06.56	GSM/GPRS/EDGE
	E1987A Fast switching A.06.19	GSM/GPRS/EDGE/WCDMA/HSDPA/CDMA2000
	E1962B B.10.11	IS-2000/IS-95/AMPS
Hardware	002	002 RF source 2
	003	003 Flexible radio





Phase & Ampl vs Time Option
GSM Polar Cal Option(WCDMA - Qualcomm Solution),
If no option, it is impossible to do GSM EDGE cal of WCDMA.
(GSM Tx Power error)

- CMU200 has to be satisfied the condition like below to do calibration.

	H/W Option		
	Option No.	Option Name	Option Description
GSM/ EGPRS GPRS/	CMU200	Main Frame	
	CMU-B11/B12	OCXO	Need to have one of those.
	CMU-B21(v14)	Universal Signaling Unit	It may needed when the DUT based on AGERE chipset, because it need a live for GSM, it need CMU-B54(v14). BCH signal for Calibration. To working
	CMU-B54(v14)*		This is daughter board for GSM Signaling. It's attached on the B21(v14).
	CMU-U65(v04)	DSP for Wideband Measurement	Support DSP measurement, and also works as a buffer. It needed to support support up to 128 steps, CMU-U65(v04) support up to 500 steps. Dynamic Power" Calibration. In case of "Polar Modulation" CMU-U65(v02) only "Polar Modulation" test and "EDGE
WCDMA/ GSM/ EGPRS GPRS/	CMU200	Main Frame	
	CMU-B11/B12	OCXO	Need to have one of those.
	CMU-B21(v14)	Universal Signaling Unit	It may needed when the DUT based on AGERE chipset, because it need a live for GSM, it need CMU-B54(v14). BCH signal for Calibration. To working
	CMU-B66**	Versatile Baseband Unit (Tx)	Baseband board for UL, but it's now included in CMU-B68. So no longer exist.
	CMU-B68	Versatile Baseband Unit (Tx + Rx)	Baseband board for WCDMA UL/DL
	CMU-U65(v04)***	DSP for Wideband Measurement	Support DSP measurement, and also works as a buffer. It needed to support "Polar Modulation" test and "EDGE Dynamic Power" Calibration.

	S/W Option		
	Option No.	Option Name	Option Description
GSM/	CMU-K21*	GSM900-MS	Signaling SW for GSM 900 Band

GPRS/ EGPRS	CMU-K22*	GSM1800-MS	Signaling SW for GSM 1800 Band
	CMU-K23*	GSM1900-MS	Signaling SW for GSM 1900 Band
	CMU-K24*	GSM850-MS	Signaling SW for GSM 850 Band
WCDMA/ GSM/ GPRS/ EGPRS	CMU-K48	IQvsSlot	SW support "Polar Modulation Calibration"
	CMU-K65	WCDMA-UE : Tx-tests(3GPP/FDD)	SW support Tx Measurement of WCDMA
	CMU-K66	WCDMA-UE : DL-Generator(3GPP/FDD)	SW Support DL Generator for WCDMA.

*These options were needed because some old phones needed to have a live BCH to do a Rx Calibration(AFC and AGC).

**CMU-B66 may can be found at the HW option list. But this option is no longer exist, because it's now included in the option CMU-B68, only in case of very old CMU200 which supporting the WCDMA Testing.

***CMU-U65 has 2 kind of revision. The difference is the amount of buffer memory inside. This influence to the "Polar Modulation Calibration" test, in case of CMU-U65(v02) only supports up to 128 steps of test, CMU-U65(v04) supports up to 500 Steps. Currently Samsung UMTS calibration doing that with about 300 steps, so it requires CMU-U65(v0.4)

6-2-2. How to do calibration

1) Download the the latest calibration program from anysvc, and unpack the .zip file in the same folder.

- SCH-I699_RFCAL_VXXX.exe
- SCH-I699_RFCAL_VXXX.zip

2) Check solution and the relay control switch setting of anyway jig.

- Solution switch : 4

No	Solution
4	NXP Swift, Broadcom

- Relay control switch : all switches must be turn off.

3) Run the execution file(.exe).

- SCH-I699_RFCAL_VXXX.exe

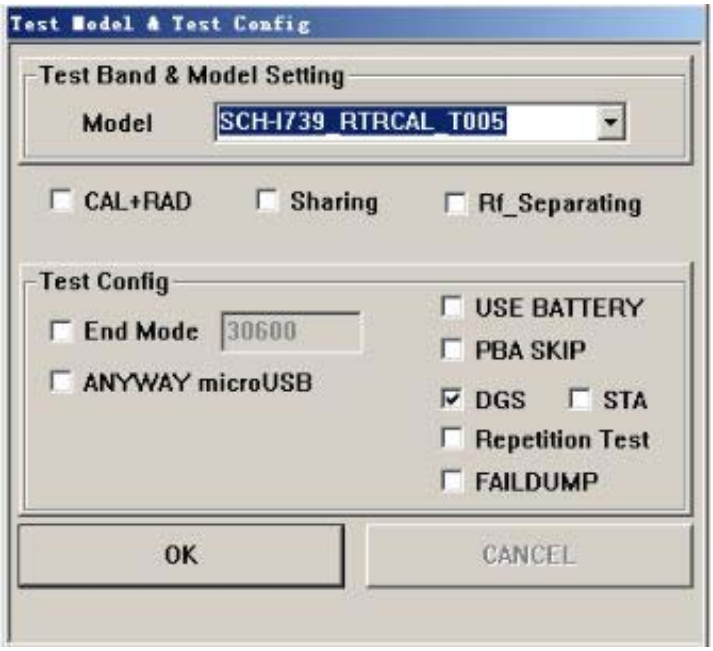
4) Setting the Config Test

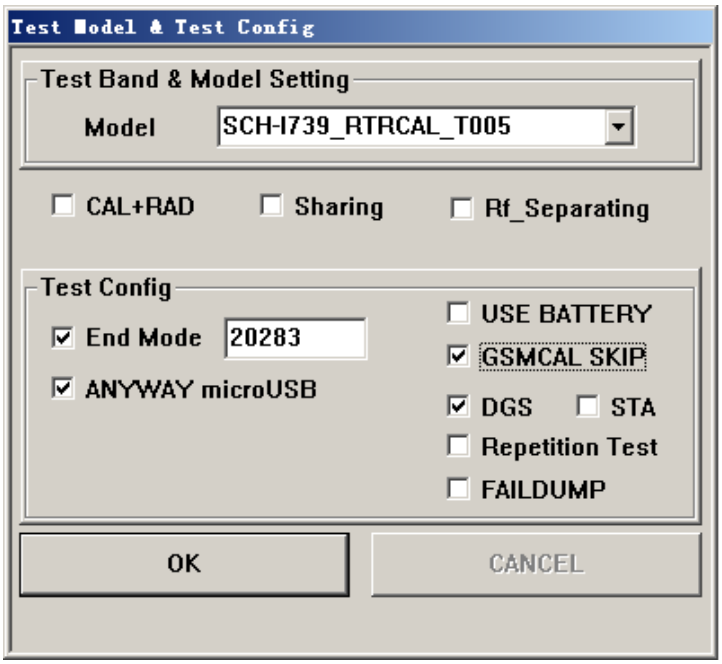
① Select a final calibration program version.

② Select "PBA SKIP"

③ Select "End Mode", enter the channel "2XXXX". (eg. 20283)

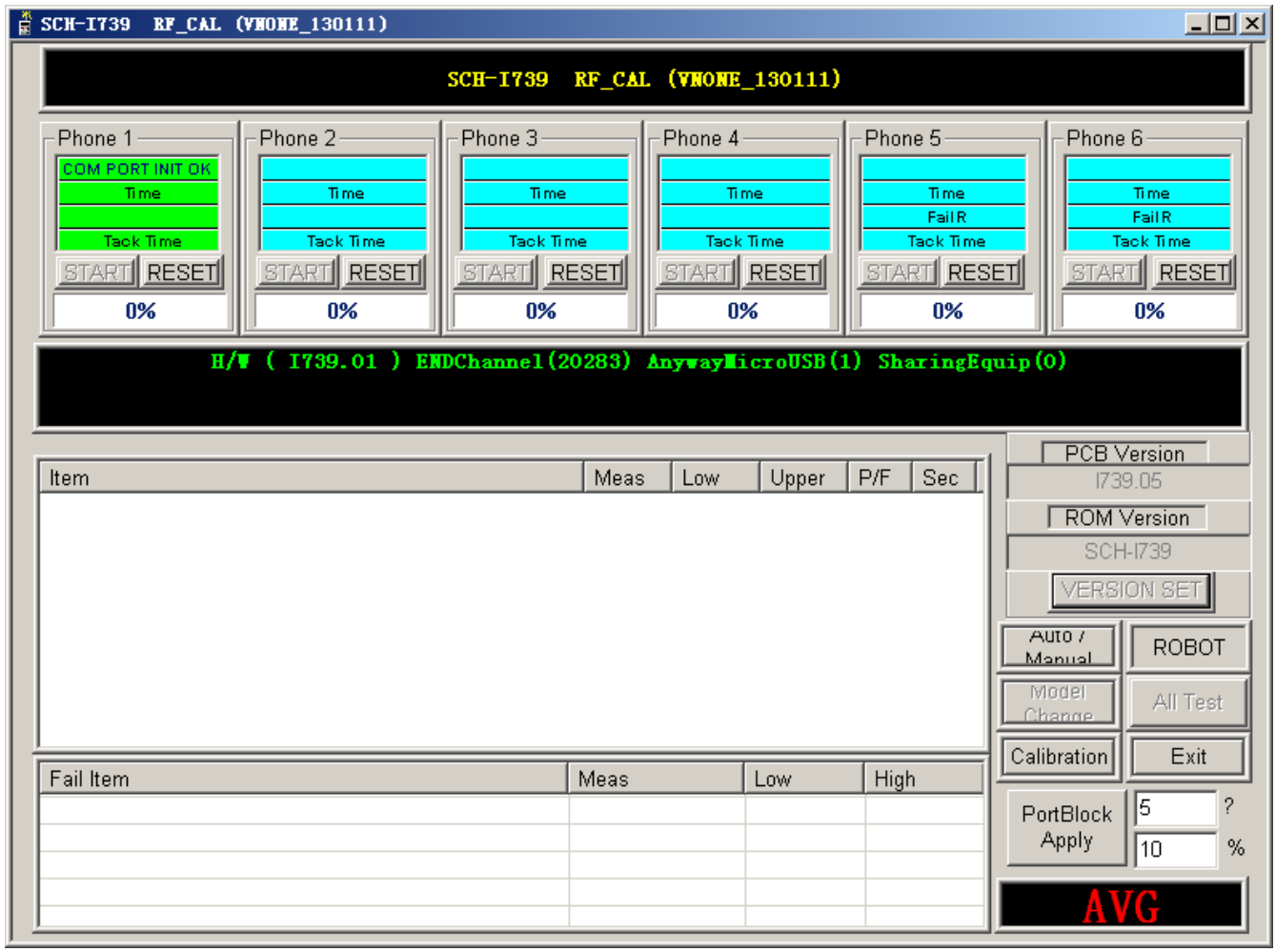
④ Click the button, 'OK'.



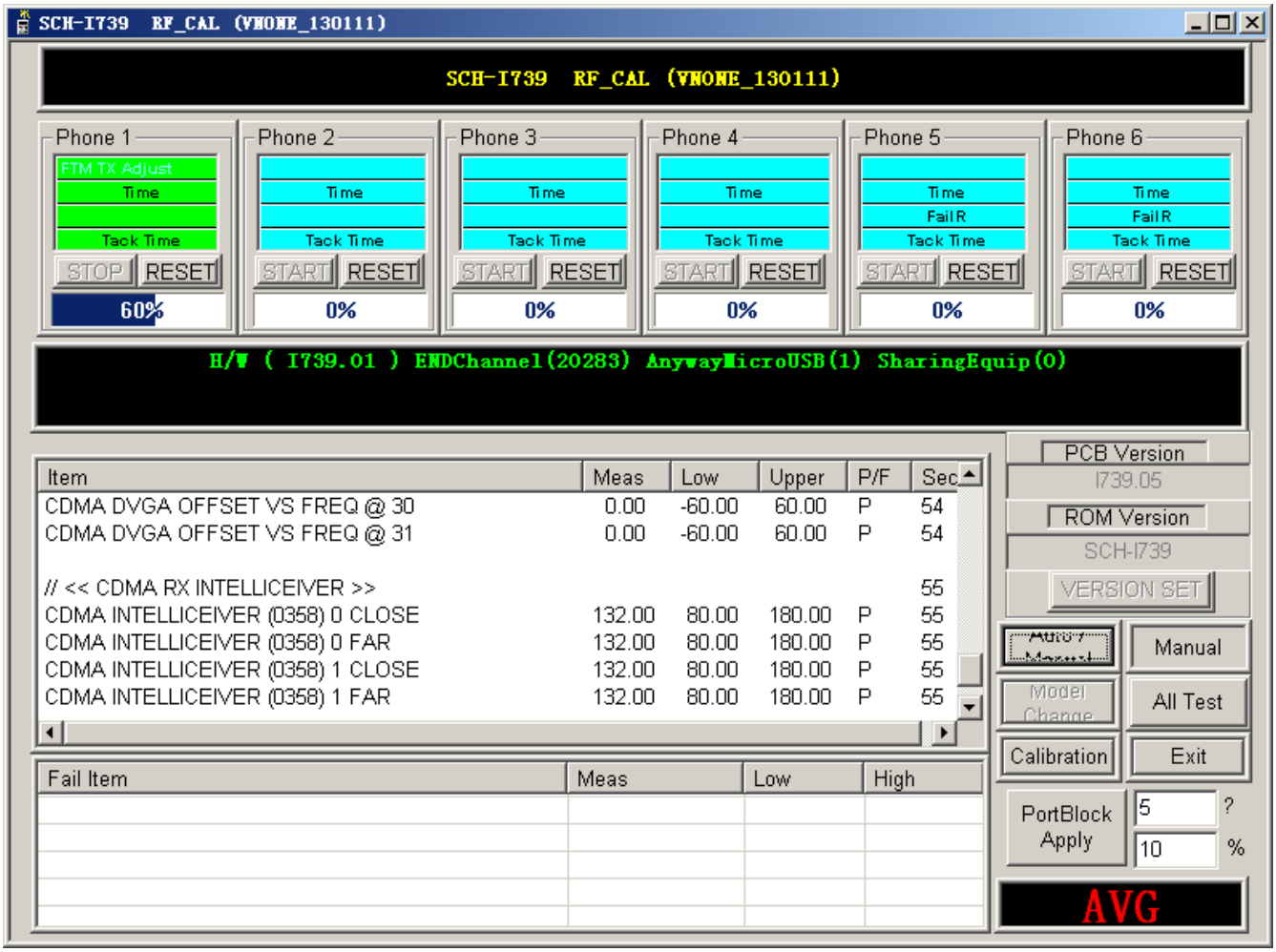


5) ① Write the "PCB Version" and "ROM Version ", and click "VERSION SET" button.

② After ① ,you click "Auto/Manual" button when the button changed to be available.



6) Connect a mobile phone, The calibration is progressed automatically.



8) If the calibration is completed rightly, it shows the content, 'PASS'.