



EngineerMode User Manual

Test Tool User Manual

Test & Assurance

MT8183

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1 Introduction

1.1 Purpose

This document provides the user guidelines for the EngineerMode. It describes how to use EngineerMode on the Android platform.

This document introduces how to start EngineerMode, and the detail function of each sub-item.

This manual also lists the notice items for using EngineerMode.

1.2 Scope

The document provides the usage details of the EngineerMode.

This document is just suitable for chip of MT6761.

This document is just suitable for Android version O.

1.3 Who Should Read This Document

This document is primarily intended for:

- Engineers who want to use EngineerMode to help development and verification

1.4 How to Use This Manual

This segment explains how information is distributed in this document, and presents some cues and examples to simplify finding and understanding information in this document. Table 1-1 presents an overview of the chapters and appendices in this document.

Table 1-1. Chapter Overview

#	Chapter	Contents
1	Introduction	Describes the scope and layout of this document.
2	Reference	Lists the reference of this document
3	Definitions	Lists the special definition used in the document
4	Abbreviations	Lists the special Abbreviations used in the document
5	Overview	Introduce the overall UI and feature category of EngineerMode
6	Telephony category	Introduce detail information of sub-items about telephony
7	Connectivity category	Introduce detail information of sub-items about connectivity
8	Hardware Testing category	Introduce detail information of sub-items about hardware testing
9	Location category	Introduce detail information of sub-items about location
10	Log and debugging category	Introduce detail information of sub-items about log and debuggin
11	Others cagetory	Introduce detail information of misc items
12	Use EngineerMode for security on user load	Introduce the configuration of EngineerMode on user load
13	Configuration/Customization Guideline	Introduce how to turn on/off and build EngineerMode related modules
14	Workflow	Introduce the detail work flow of EngineerMode general communication

#	Chapter	Contents
15	Troubleshooting	List the solution for some problems during EngineerMode usage
16	Frequently Asked Questions	List answer for FAQ

1.4.1 Terms and Conventions

This document uses special terms and typographical conventions to help you easily identify various information types in this document. These cues are designed to simply finding and understanding the information this document contains.

Table 1-2. Conventions

Convention	Usage	Example
[1]	Serial number of a document in the order of appearance in the References topic	Look up Chapter 2: System Architecture in [1]
void xx(zz)	Source code	static int __stdcall cb_download_bloader_init(void *usr_arg){}
<i>Important</i>		

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- [1] EngineerMode, source code: \vendor\mediatek\proprietary\packages\apps\EngineerMode

3 Definitions

For the purposes of the present document, the following terms and definitions apply:

4 Abbreviations

Please note the abbreviations and their explanations provided in Table 4-2. They are used in many fundamental definitions and explanations in this document and are specific to the information that this document contains.

Table 4-1. Abbreviations

Abbreviations	Explanation
MTK	MediaTek, Asia's largest fabless IC design company.
EM	EngineerMode

5 Overview

EngineerMode is an application used to assist feature development and debug, function verification and test configuration, including features in many domains, such as telephony, Bluetooth, Wi-Fi, GPS and so on. The function and workflow of sub-module is separatedly with each other.

EngineerMode is used for engineers. None of its function is for end user. So it is recommended to remove the function for end user.

5.1 User interface

EngineerMode shows 6 tab pages to users based on scope dividing. In each tab page, there are many sub-items for different function. EM supplies simple user interface for easy operation.



Figure 5-1 EngineerMode main UI

There are two ways to start EngineerMode.

1. Dial “*#*#3646633#*#*”

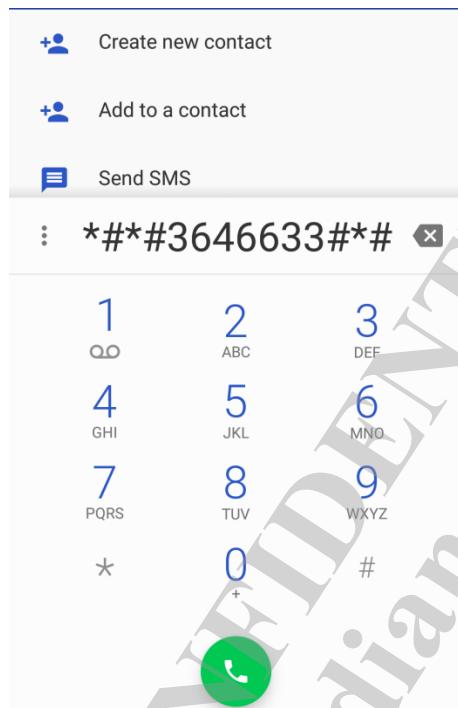


Figure 5-2. Dial to enter EngineerMode.

2. Use adb command: adb shell am start -n com.mediatek.engineermode/.EngineerMode

5.2 Feature category

EngineerMode has many items on different domain. For better usage, EM has divided these function into 6 categorises.

1. Telephony category: Provides items for telephony related configuration/development/verification. It is only shown on devices supporting telephony. This category owns the largest number of sub-items in EngineerMode.
2. Connectivity category: Provides items for configuration/development/verification of connectivity items, such as Wi-Fi, Bluetooth, NFC and so on.
3. Hardware testing category: Provides items for configuration/development/verification of device hardware, such as audio, power, memory, USB and so on.
4. Location category: Provides items for configuration/development/verification of location fix system.
5. Log and debugging category: Provides some log function and log application entrance.
6. Others category: Provide functions for items not devideed into above categories.

The following several chapters will introduce detail functions of each category.

6 Telephony category

6.1 AMR-WB on/off

Overall design

This module is used to enable/disable AMR-WB function, and now it is only used under SBP test mode, and other mode cannot work.

Detail design

In Engineer Mode telephony tab UI, add a item named AMR-WB on/off. It will show a UI contains two check-boxes: Enable GSM AMR-WB and Enable UMTS AMR-WB.

When entry this item, it will use AT command to query the state, AT+ESBP=3,59 for GSM AMR-WB and AT+ESBP=3,60 for UMTS AMR-WB, and the check-boxes will check if the response of AT Command is 1, otherwise the check-boxes will not check.

If users want to change the setting, click the checkbox will change the state, and if the GSM AMR-WB check-box is clicked, it will send AT+ESBP=1,59,x to modem, if the check-box is checked, the third parameter will be 1, and if the check-box is unchecked, the third parameter will be 0. if the UMTS AMR-WB check-box is clicked, it will send AT+ESBP=1,60,x to modem, if the check-box is checked, the third parameter will be 1, and if the check-box is unchecked, the third parameter will be 0.

UI design

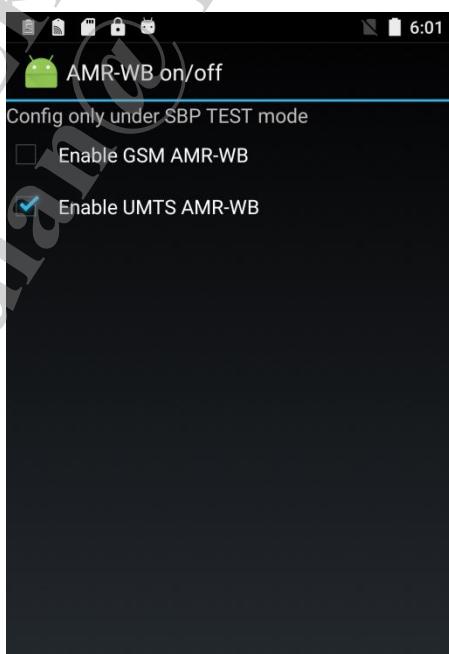


Figure 6-1 AMR-WB on/off

6.2 Ant Tuner Debug

Forced the customer need to be able to directly in the mould under debugging ANT tuner (RF front end components) value, and also convenient debug, the User can read/write MIPI/BPI the CW by EM - the UI or the AT command.

Forced the MIPI, BPI is front end components of two kinds of control interface, the front end is mainly the two control ways. Forced the customer need to be able to directly in the mould under debugging ANT tuner (RF front end components) value, and also convenient debug, the User can read/write MIPI/BPI the CW by EM - the UI or the AT command.

Forced the MIPI, BPI is front end components of two kinds of control interface, the front end is mainly the two kinds of control mode.

Detail design

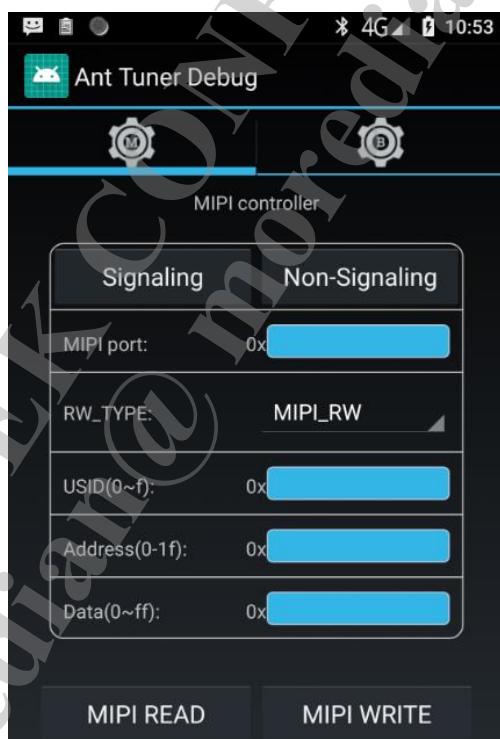


Figure 6-2 Ant Tuner Debug MAIN UI

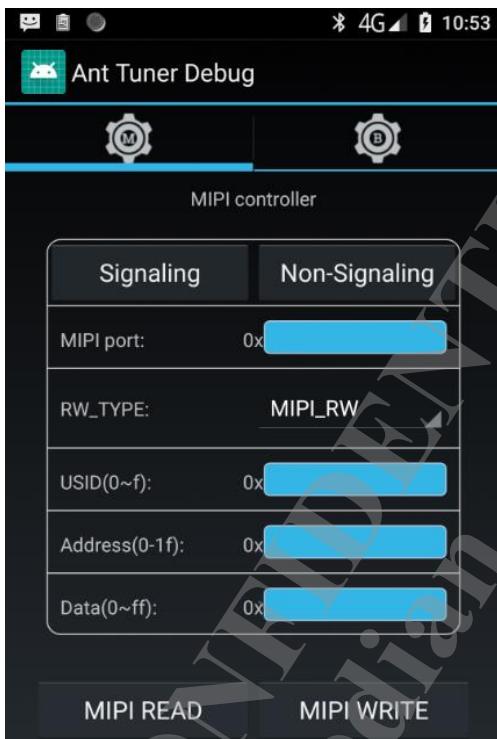


Figure 6-3 MIPI READ/WRITE



Figure 6-4 BPI READ/WRITE

6.3 Antenna Test

Overall design

Antenna Test is used to set Modem to use antenna RX1 or RX2 or both.

Detail design

Select RX1/RX2/RX1&RX2 from the dropdown list, it will notify modem to change the setting. The setting will be applied after REBOOT.

Note: if modem doesn't support some modes, they won't be displayed in the list.

UI design

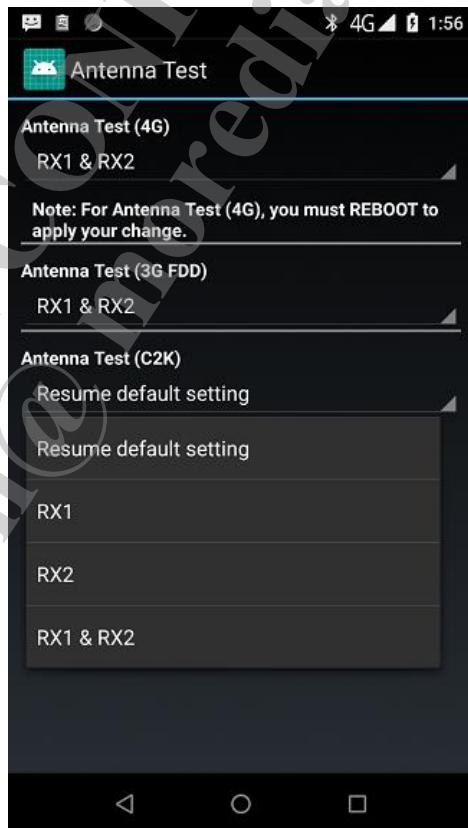


Figure 6-5 Antenna Test

6.4 APC Feature

Customers can directly in the mould detect and set the APC.

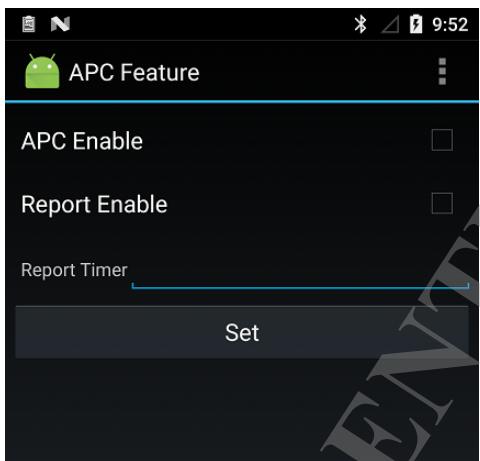


Figure 6-6 APC Feature

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6.5 AT Command Tool

Overall design

There is a config file for this item, the config will record the AT Command list for different purpose, it can send all the AT Command one by one automatically.

Detail design

When entry this item, it will read the config file at default path, if there is no config file, user can choose the file manually.

AP will parse the config file to display different items for different purpose, when user choose one item to test, it will switch to the page for the specific item, in this page, it will display all the AT Commands it needs, and user can input the time to send the AT Command list, and then click the send button, the AT Command will be sent one by one until send the exact times or user clicks the stop button, and the history part will record the AT Command has sent.

UI design

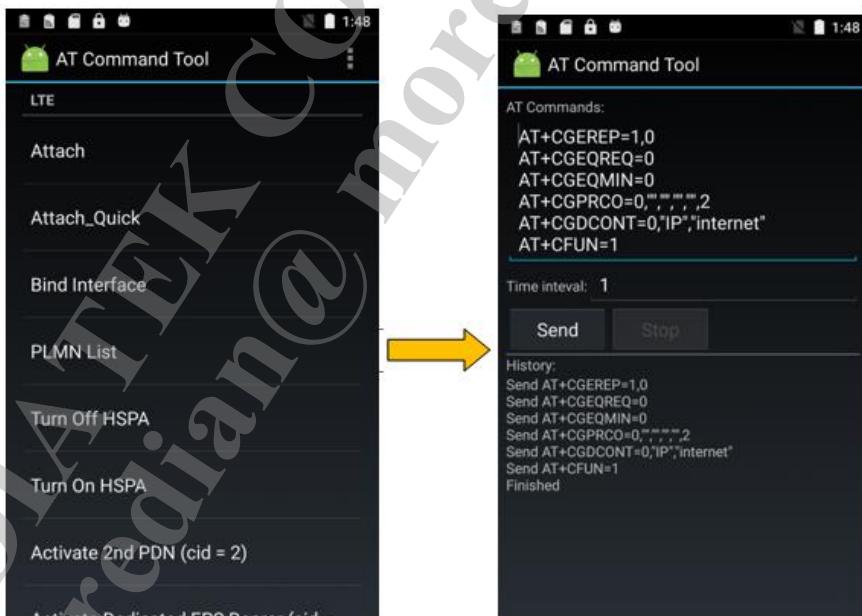


Figure 6-7 AT command tool

6.6 AutoAnswer

AutoAnswer Module is used to enable and disable auto-answer for incoming calls.

If auto-answer is disabled, it will show an "Enable" button:

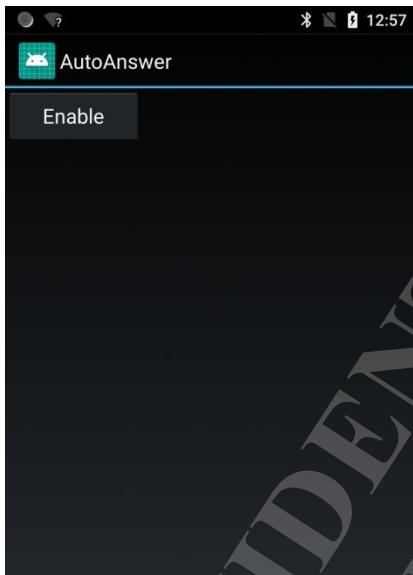


Figure 6-8 Auto answer enable

Press the button to enable auto-answer, while the button will be changed to “Disable”. Press the button again to disable it.

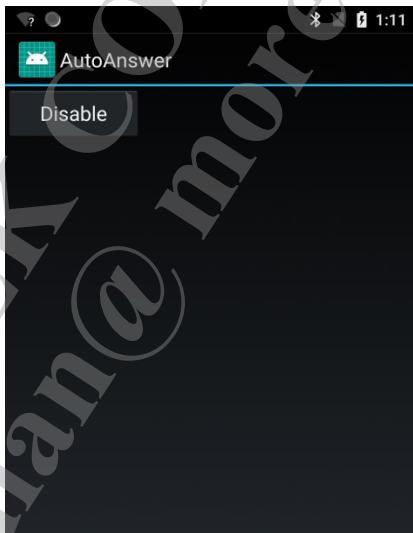


Figure 6-9 Auto Answer disable

6.7 Background Data Select

Overall design

This item will used to disable background data during machine test. When test CMCC case, maybe it needs to disable background to avoid the data glare

Detail design

When enter this item, EM will read the last record, if there is no record, it means the background data is enabled.

If user wants to disable background data, check the check-box disable background data select, it will call the framework API setlotFirewall() to disable background data, and write the record in sharedPreference for the next time. And if user uncheck the check-box, it will call the framework API clearlotFirewall() to enable background data again and also write the record again.

Warning: if disable background data, the phone will not use data any more.

UI design



Figure 6-10 Background Data Select

6.8 BandMode

BandMode Module is used to set GSM/UMTS/LTE bands.



Figure 6-11 GSM/UMTS Modes



Figure 6-12 LTE Modes

6.9 BIP

This feature is used for set a APN with BIP apn type to test BIP(Bear Independ protocol).

Detail design

BIP APN setting have three option:

“Add default+bip type APN” will insert a record to APN database with name ‘TestSIM’, apn ‘TestGp.rs’ and apn type “default|bip”;

“Add bip type APN” will insert a record to APN database with name ‘TestSIM’, apn ‘TestGp.rs’ and apn type “bip”;

“Remove All added Test SIM APN” will delete record with name ‘TestSIM’.

This feature is used for set a APN with BIP apn type to test BIP(Bear Independ protocol).

UI design



Figure 6-13 BIP

6.10 C2K modem setting

Overall design

This item is used to test USB by pass function

Detail design

When entry this item, it will query the current by pass mode and rndis setting, if the rndis setting is enabled, ets and data will be disabled. EM will start a receiver to receive the broad cast to update the status of by pass mode and rndis setting.

When the the by pass mode or rndis setting, EM will send broad cast to notify the system to modify the by pass mode or rndis setting, and wait the broadcast of the system to confirm the by pass mode or rndis setting is set successfully or not.

UI design

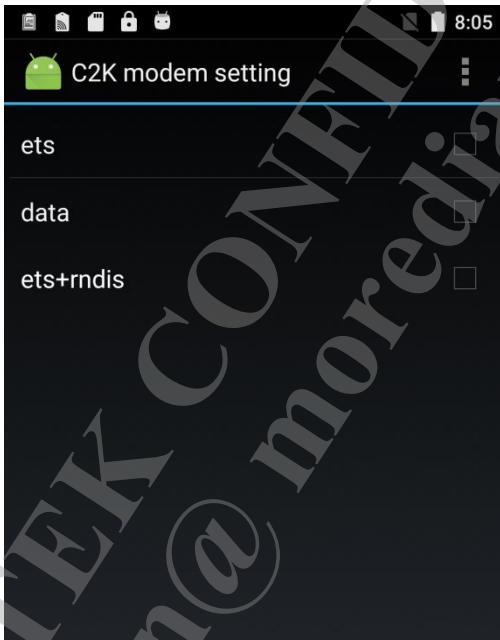


Figure 6-14 C2K modem setting

6.11 CFU

This module is used to control modem CFU (Call Forwarding Unconditional) setting. There're three choices:

- Always query: modem will always query CFU status when powered on.
- Always not query: modem will not query CFU status when powered on.
- Default: use modem default setting.

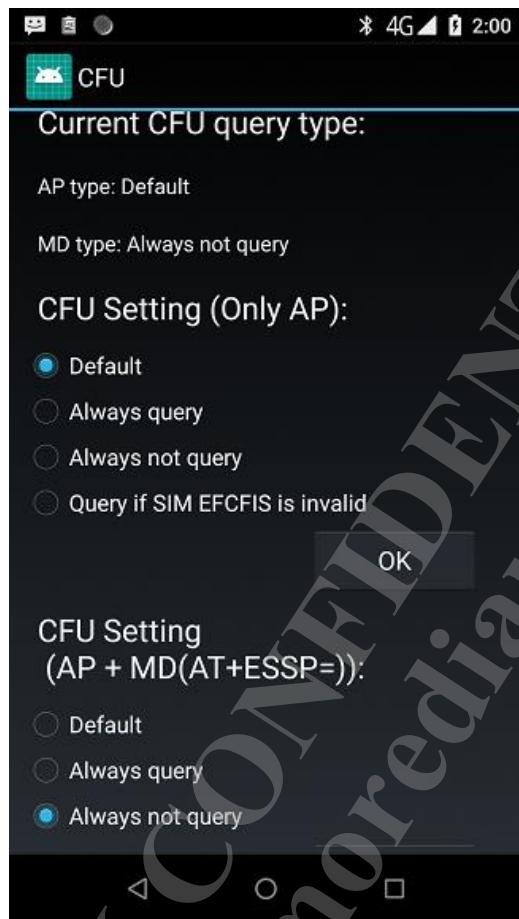


Figure 6-15 CFU

6.12 Channel Lock

Customers can directly in the mould on the fix channel on specific frequency.

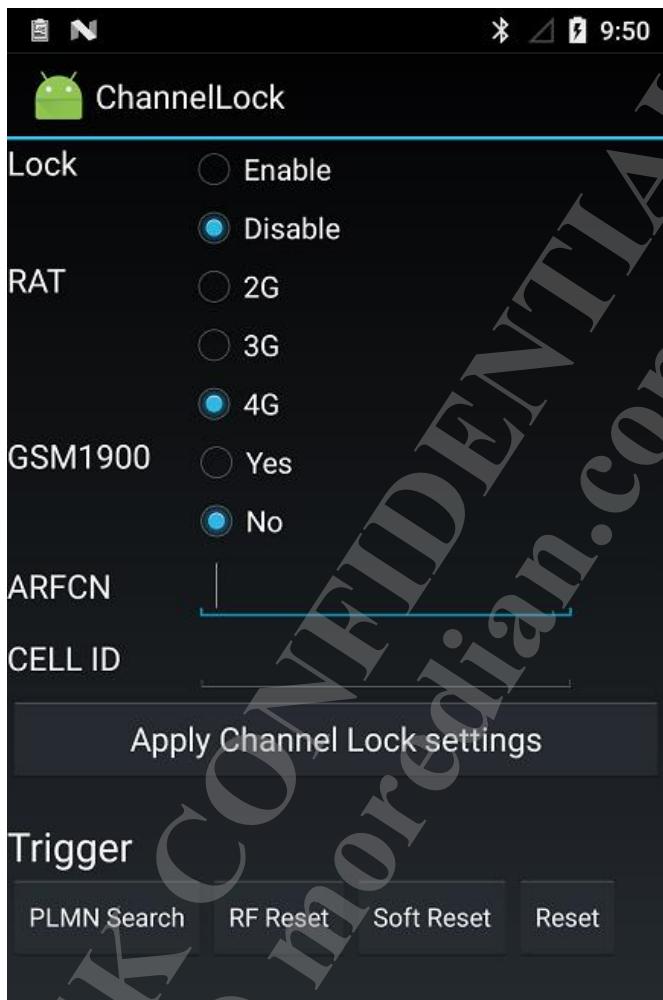


Figure 6-16 channel lock

6.13 CMAS

Change settings of CMAS (Commercial Mobile Alert System):

- Enable/Disable RMT Alerts
- Enable/Disable Exercise Alerts

When a feature was enabled or disabled, save the setting to preferences. CMAS receiver will read the preferences and apply it.

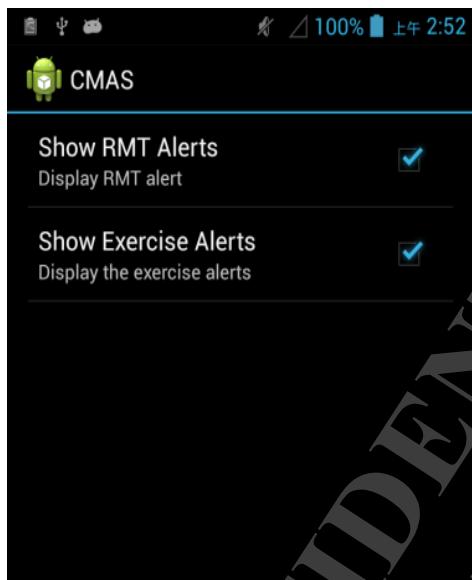


Figure 6-17 CMAS

6.14 Conference Test

This feature is used to test the conference without attendance.

Detail design

The UI contains only one button, when click the button, EM will send a broadcast to start the conference.

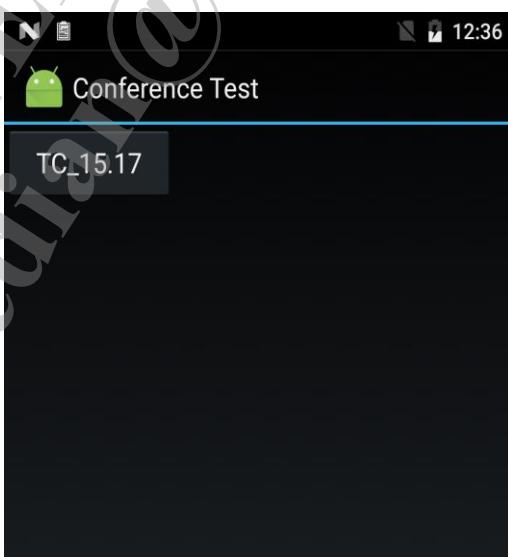


Figure 6-18 Conference

6.15 ePDG Config

Forced the Configure ePDG's parameters.

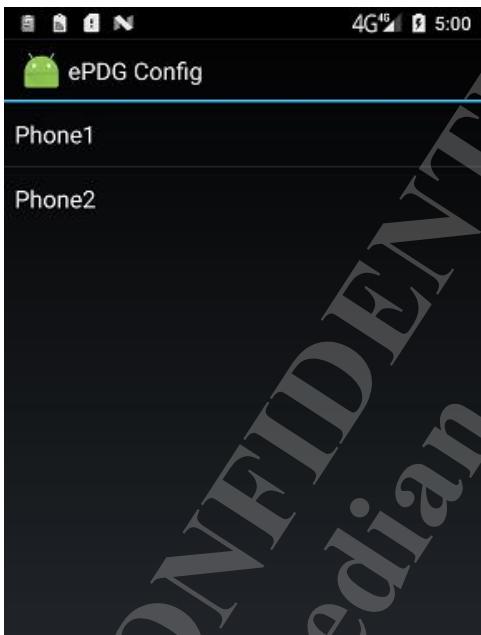


Figure 6-19 ePDG MIAN UI



Figure 6-20 General setting

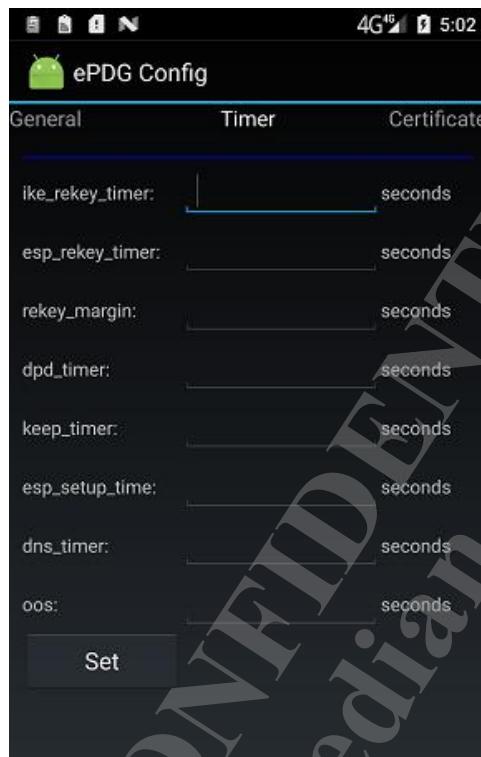
6 Telephony category

Figure 6-21 Timer setting



Figure 6-22 Certificate setting

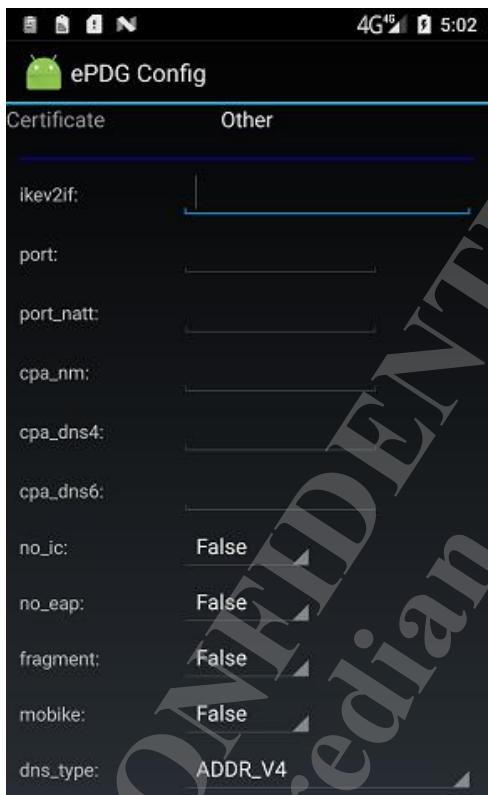


Figure 6-23 other setting

6.16 Fast Dormancy

Fast Dormancy is 3GPP R8 feature to provide the power-saving functionality on UE side by sending the RRC SCRI request to the network if there are no TX/RX IP packets are transmitted/received for a certain period. This module is used to change FD Screen on/off timers and turn on/off SCRI/FD, include R8 FD and Legacy FD.

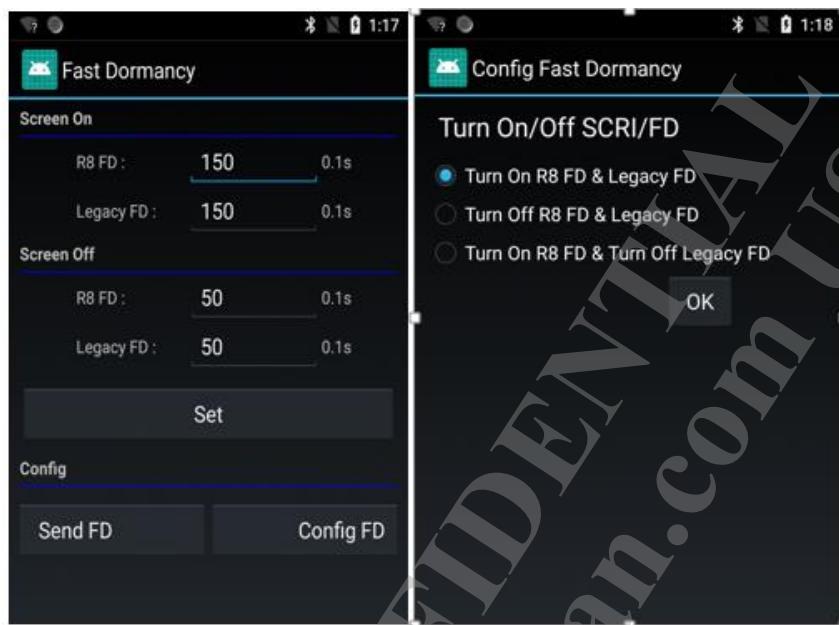


Figure 6-24 Fast Dormancy



Figure 6-25 Network information

Why need this item? *	May need to turn off SCRI/FD during some IOT/FTA/internal test ...ect.
Expected UI design *	Projects w/ SCRI/FD enabled should provide an option in EM for user to turn on/off SCRI/FD. Current setting of "Turn On SCRI/FD" or "Turn Off SCRI/FD" should be seen on UI.
Details of NVRAM LID if use	Yes

NVRAM*	<p>After user clicks "Turn On SCRI/FD", EM should notify L4 to turn on SCRI/FD by callback func or AT Cmd. Once L4 responds setting performed successfully, mark the setting as "Turn On SCRI/FD" on UI. The setting should be saved in NVRAM and kept after power-cycle.</p> <p>(Default setting is to "turn on SCRI/FD").</p> <p>Others for better understand or coding</p> <p>After user clicks "Turn Off SCRI/FD", EM should notify L4 to turn off SCRI/FD by callback func or AT Cmd. Once L4 responds setting performed successfully, mark the setting as "Turn Off SCRI/FD" on UI. The setting should be saved in NVRAM and kept after power-cycle.</p>
--------	--

Solution is use conformance test profile, let EM open and close SCRI/FD.

Test profile is a bit mask,

Each bit can define function is On or Off

Add 1 bit to represent disable SCRI/FD.

0: Enable SCRI/FD

1: Disable SCRI/FD

```
#define CTA_INTEGRITY_CHECK_BIT_FOR_MM      0x00000001
#define CTA_TL1_BIT_FOR_TL1                  0x00000002
#define CTA_K1297_BIT_FOR_RRCE              0x00000004
#define CTA_SNCONFLICT_BIT_FOR_RLC_RRCE    0x00000008
#define CTA_CFQUERY_BIT_FOR_SS             0x00000010
#define CTA_PLMN_LOCK_BIT_FOR_CSCE         0x00000020
```

```
#define CTA_OPEN_MEAS_BIT_FOR_CSCE      0x00000040
#define CTA_DISABLE_DPA_BIT_FOR_RRCE     0x00000080
#define CTA_OPEN_INVALID_INTRA_CELL_REPORT__BIT_FOR_MEME 0x00000100
#define FTA_MODEM_AUTO_BOOT_AND_AUTO_ANSWER_BIT_FOR_L4C 0x00000200
#define FACTORY_MODEM_VIRTUAL_SIM_ON_BIT_FOR_L4C 0x00000400
#define IOT_MODEM_DISABLE_SCRI_AND_FD_BIT_FOR_L4C 0x00000800
```

Feature phone: MMI ↔ L4C

MSG_ID_MMI_EM_GET_CONFORM_TEST_PARAM_REQ

```
// No parameter
```

MSG_ID_MMI_EM_GET_CONFORM_TEST_PARAM_RSP

```
typedef struct
{
    LOCAL_PARA_HDR
    kal_bool result;
    kal_uint8 conf_test_mode;
    kal_uint32 test_profile;
} mmi_em_get_conform_test_param_rsp_struct;
```

MSG_ID_MMI_EM_SET_CONFORM_TEST_PARAM_REQ

```
typedef struct
{
    LOCAL_PARA_HDR
    kal_uint8 conf_test_mode;
    kal_uint32 test_profile;
} mmi_em_set_conform_test_param_req_struct;
```

MSG_ID_MMI_EM_SET_CONFORM_TEST_PARAM_RSP

```
typedef struct
```

```
{  
    LOCAL_PARA_HDR  
    kal_int8 result;  
}  
mmi_em_set_conform_test_param_rsp_struct;
```

Smart phone: RIL ↔ modem

Query:

AT+EPCT?

+EPCT: <conf_test_mode>,<test_profile>

OK

Write:

AT+EPCT=<conf_test_mode>,<test_profile>

6.17 Force ANT

Customers can directly in the mould on the disable TAS, fixed TX on an antenna.

Transmission can Antenna Selection be used (TAS) : used to solve the metal shell phone, covered Antenna with hand-held effect caused by the signal problem, modem will according to the two Antenna measurement signal to select the best transmitting Antenna.

Detail design

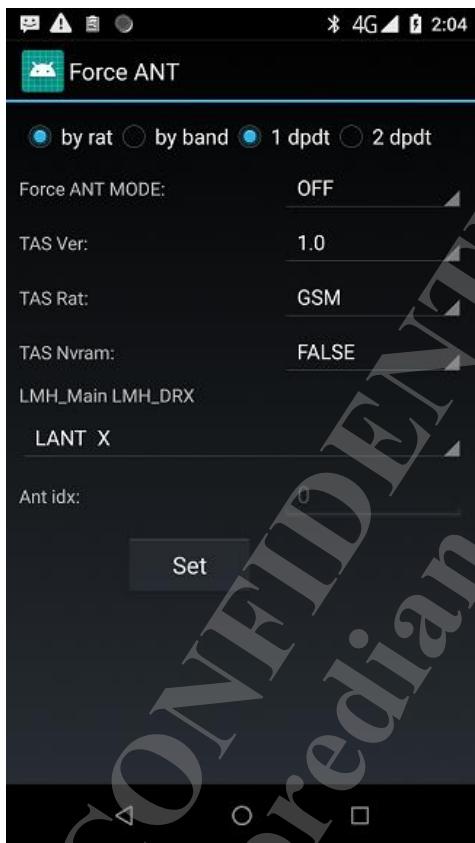


Figure 6-26 Force Tx Main UI

6.18 GPRS

This item is used to test the GPRS of SIM card, it is test the function of Attach and detach; and it can set the way to use attach, and which PDP to set, and the action set to PDP and so on.

UI design



Figure 6-27 GPRS

6.19 HSPA Info

Display HSDPA, HSUPA and HSPA+ status. There're 4 possible statuses:

- HSDPA off, UPA off
- HSDPA on, UPA off
- HSDPA on, UPA on, HSPA+ off(if UE support HSPA+)
- HSDPA on, UPA on, HSPA+ on(if UE support HSPA+)

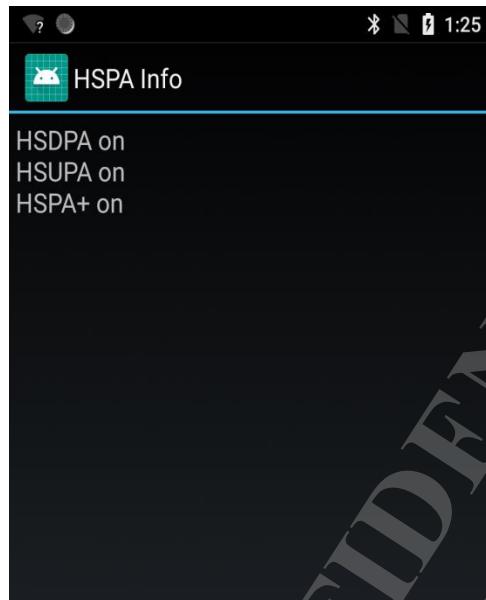


Figure 6-28 HSPA Info

6.20 IA

This feature is used to get the information of APN named IA, and through this feature, user can modify the protocol of IA.

Detail design

The UI contains two parts: The basic information display and protocol setting

Basic information contains Name, APN, Type, this information can get from database.

Protocol setting can select IP, IPV6, IPV4P6, when click the set button, the protocol value will save to database.

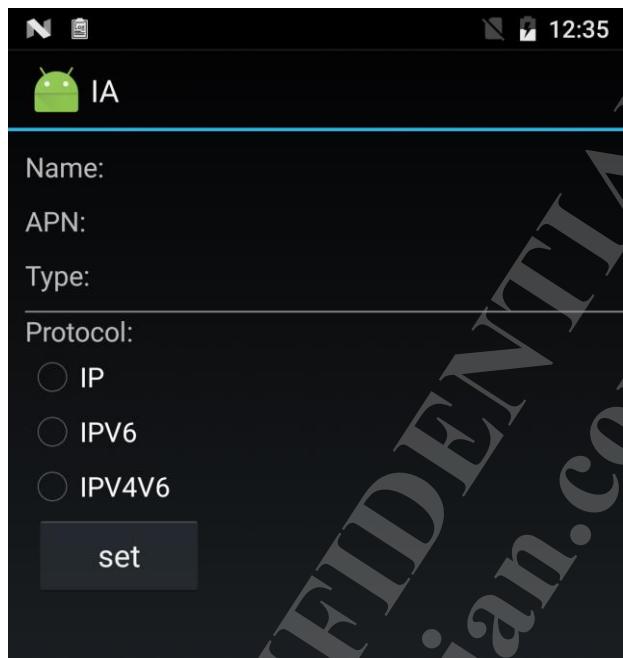


Figure 6-29 IA

6.21 IMS

Overall design

This item is used to set the parameter in NVRAM for VoLTE or WIFI call

Detail design

There are so many parameters to set in this item, when entry this item, it will send the AT Command AT+ECFGGET=name to get the parameter in modem, and if there is no response or no parameter, it will use the default value.

When user select one item to set the parameter, EM will use AT Command AT+ECFGSET=name, value to set the parameter.

UI design



Figure 6-30 IMS

6.22 IOT Easy Configuration

Overall design

This item is used to set the parameter of IMS APP related configuration

1. APN setting
2. XCAP, GBA
3. ViLTE

Detail design

APN setting: This feature is used to query apn by mccmnc. The mccmnc can be read from sim card, or input by user.

XCAP & GBA : This feature is network dependent features. We can custom some parameters by modify and reset the system property

6 Telephony category

VILTE: This function is to provide a method to configure media profiles in VILTE scenario, User can generate proper media profiles record by modify the profile template.

UI design

Figure 6-31 IOT Easy Configuration (APN)



Figure 6-32 IOT Easy Configuration (XCAP)



Figure 6-33 Vilde configuration(Vilte)

6.23 LTE CA configure

Customers can directly in the mould disable or enabled LTE CA feature.

6.24 MD EM Filter

Overall design

This module is used to dynamically enable/disable the modem EM filter from AP side by sending AT+EINFO to modem.

Detail design



Figure 6-34 LTE CA configure

In Engineer Mode telephony tab UI, add a "MD EM Filter" button. When "MD EM filter" button is pressed, it will show a UI contains "Enable All MD EM" check-box.

If user chooses "Enable All MD EM", UI pops up a notification to user "MD will enable all EM type, it may cause more power consumption!", and sends AT+EINFO=8, 4294967295, 0, 0 to MD.

If user unchoose "Enable all MD EM", AP sends AT+EINFO=8, 4294967295, 1, 0 to MD.

UI design

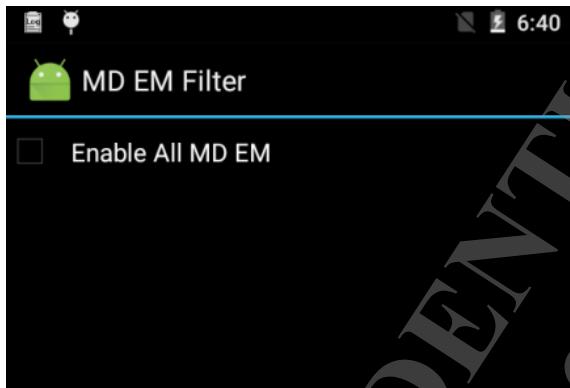


Figure 6-35 MD EM Filter

6.25 MD Notification

Overall design

This item is used to auto detect the situation meet some conditions, it will ring when the modem report the exact data to notify the tester.

Detail design

When entry this item, all the items are off. The user select the items to monitor, and select the on buttons to turn on the listener.

It will use registerForNetworkInfo() to register the handler to get URC from modem, and send AT Command AT+EINFO=x to notify modem to upload the data of specific type.

When AP receives the URC, it will parse the data meets the condition, if it doesnot meet, it will ignore, and the URC contains the exact data, AP will play the exact sound.

UI design

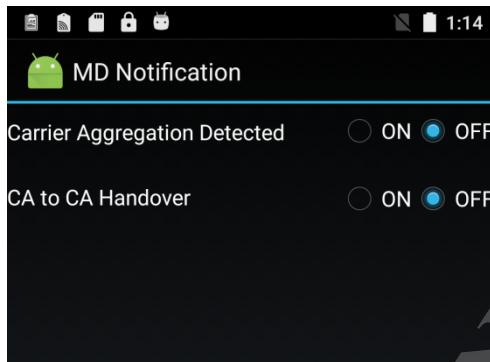


Figure 6-36 MD Notification

MediaTek Confidential

6.26 MDML EM Components

Overview

This menu is used to display 4G network information. Include 6 modules:

- General EM Component
- GSM EM Component
- UMTS FDD EM Component
- UMTS TDD EM Component
- LTE EM Component
- Inter-RAT EM Component

Detail design

Select the checkboxes and click "Check information" from option menu, the information will be displayed on screen:

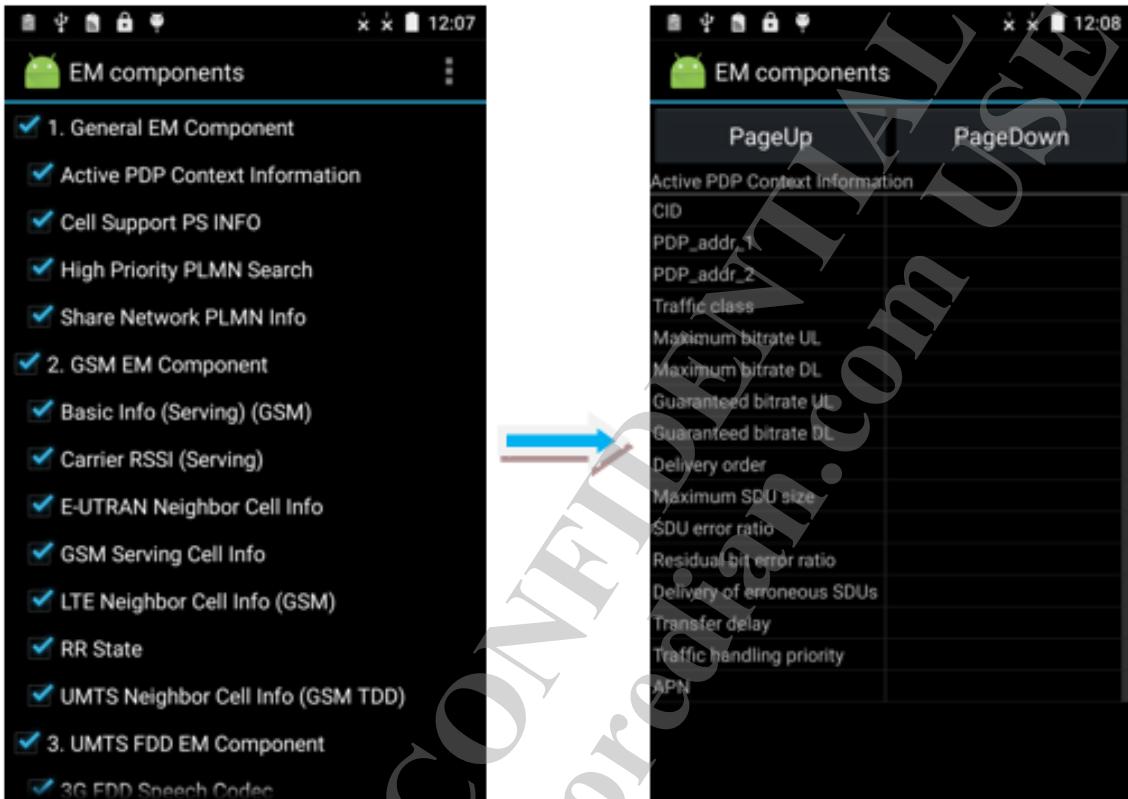


Figure 6-37. EM component main UI

- Active PDP Context Information

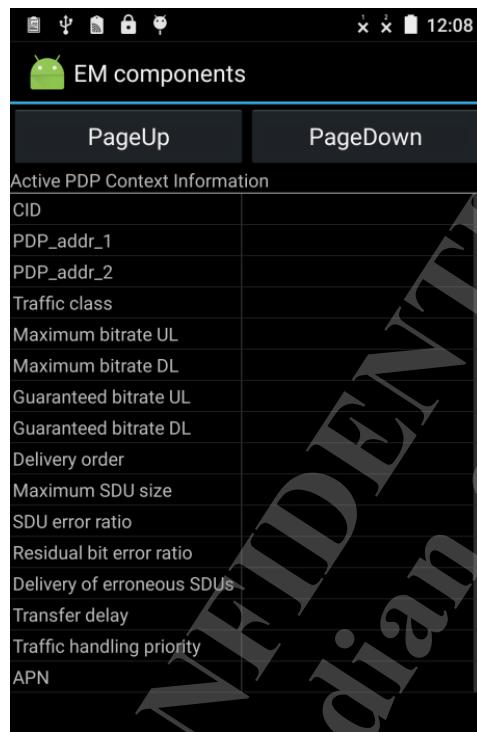


Figure 6-38 Active PDP Context Information

- Cell Support PS INFO

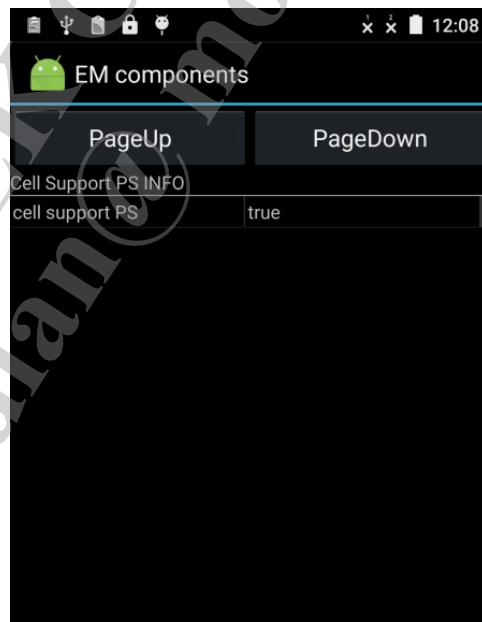


Figure 6-39 Cell Support PS INFO

- High Priority PLMN Search

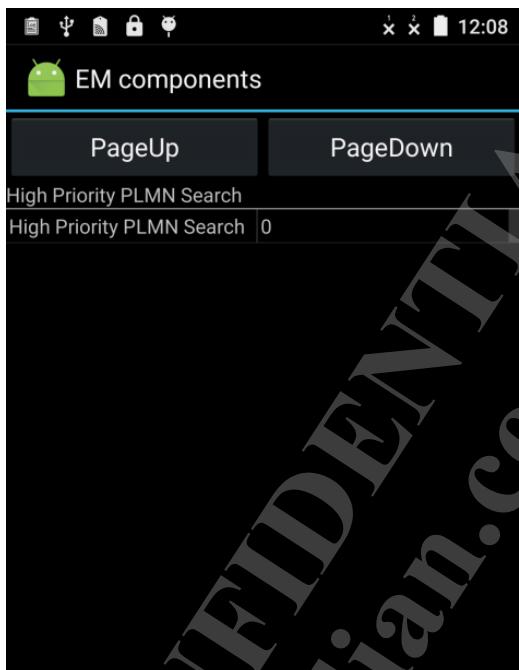


Figure 6-40 High Priority PLMN Search

- Share Network PLMN Info

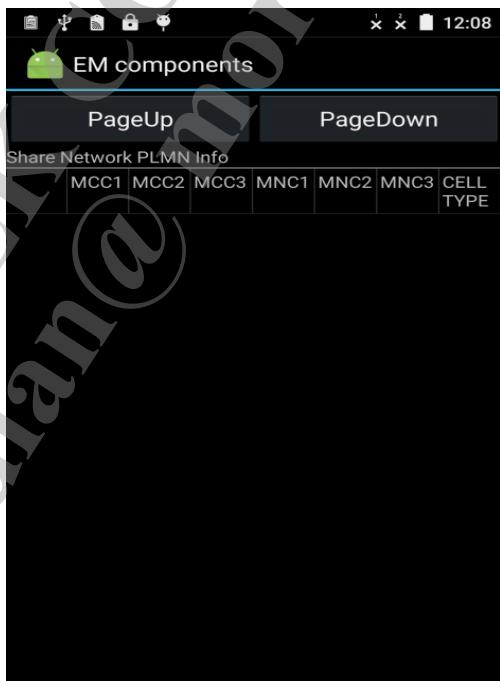


Figure 6-41 Share Network PLMN Info

- Basic Info(Serving)(GSM)

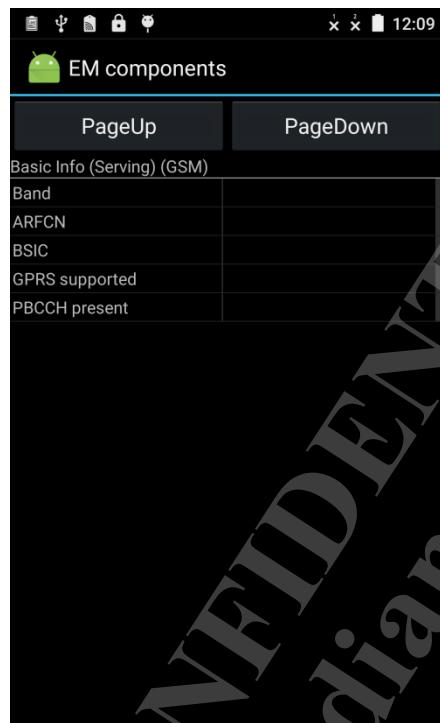


Figure 6-42 Basic Info(Serving)(GSM)

- Carrier RSSI(Serving)

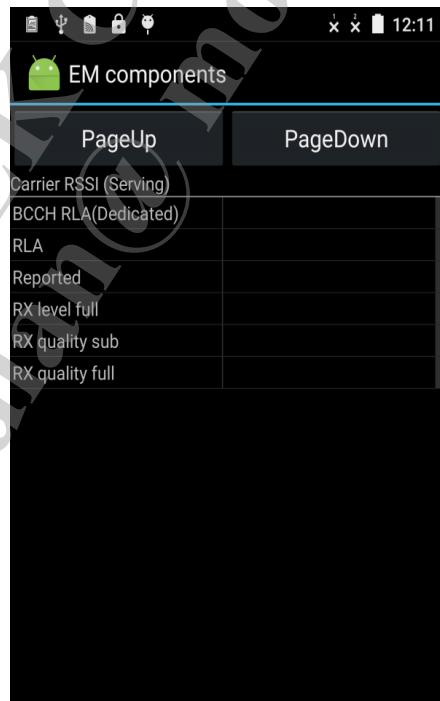


Figure 6-43 Carrier RSSI(Serving)

6.27 Misc Feature Config

Misc Feature Config is a common place for miscellaneous feature switches.

- 2G Only Roaming: enable the 2G only roaming feature. If the platform doesn't support this feature, this switch will be disabled.
- Vibrate when outgoing call connected: if unchecked, phone will not vibrate when outgoing call connected. (Default checked)

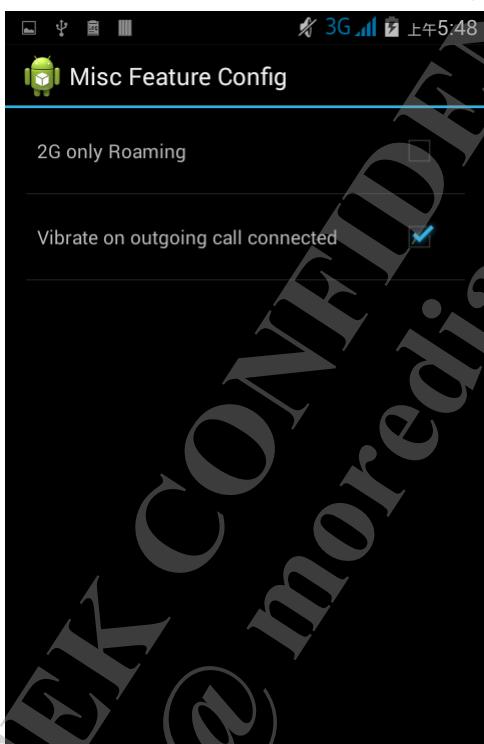


Figure 6-44 Misc Feature Config

6.28 Mobile data service preferred

This module is used to change GPRS transfer type to "data preferred".

Set the transfer type to data preferred will improve the data transmission efficiency, but at the cost of lower call receiving rate.

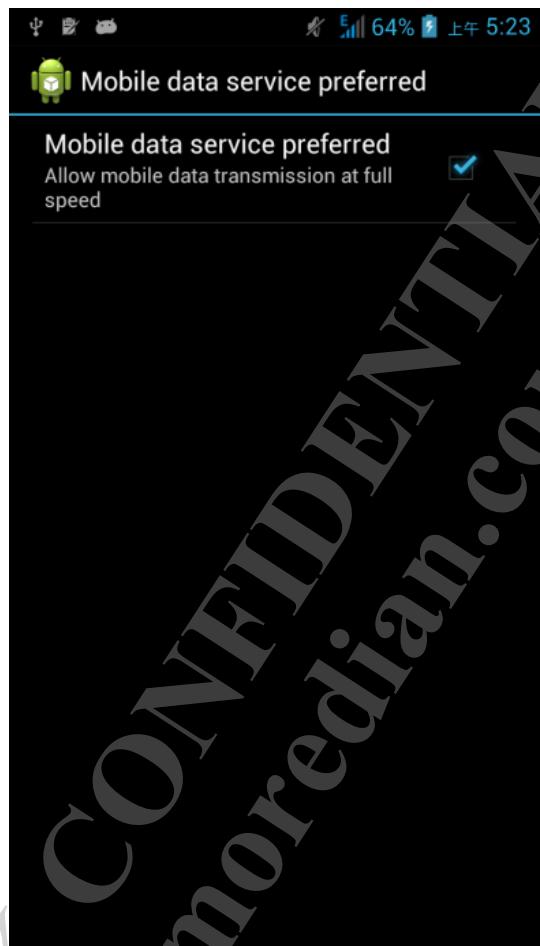


Figure 6-45 Mobile Data Preferred

6.29 Modem Test

The module is used in phone standard test before the phone is on the market. FTA (FULL TYPE APPROVAL) is the international standard. All mobile phone companies must get IMEI(INTERNATIAL MOBILE EQUIPMENT IDENTIFIER). The phone can't be used in the GSM network without IMEI. To get IMEI, it is must have to pass FTA authentication.FTA test to check if the phone is meet GSM standard. There are 3 hundreds test items, included software test, hardware test and electromagnetic compatible test.

The module switch different test standard (NONE, FTA, IOT, etd).

Send AT command "AT+EPCT" to set different standard.

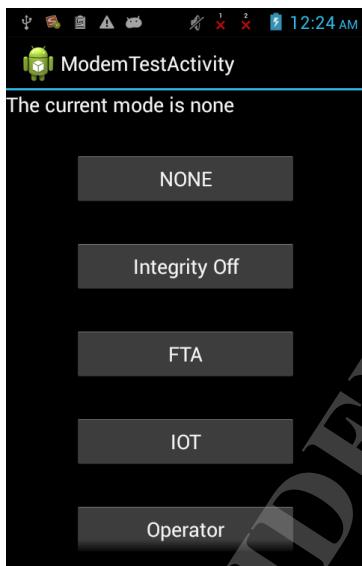


Figure 6-46 Modem Test

How to remove Unlock Test SIM option from this menu:

Modify file

vendor/mediatek/proprietary/packages/apps/EngineerMode/src/com/mediatek/engineermode/modemtest/ModemTestActivity.java, add the following code to the end of onCreate(), to remove the unlock option from UI:

```
@Override
protected void onCreate(Bundle savedInstanceState) {
    ...
    mUnlockCheckBox.setVisibility(View.GONE); // Add this line
}
```

And remove all content of setUnlockOption(), to make sure the functionality been removed:

```
private void setUnlockOption(Boolean unlock) {
    // Remove all code
}
```

6.30 Network Selecting

This module is used to change network preferred types. It supports both TD and FD phones.

TD network types:

- GSM/TD-SCDMA auto
- GSM only

- TD-SCDMA only
- LTE modes

FD network types:

- WCDMA preferred
- GSM/WCDMA auto
- GSM only
- WCDMA only
- LTE modes

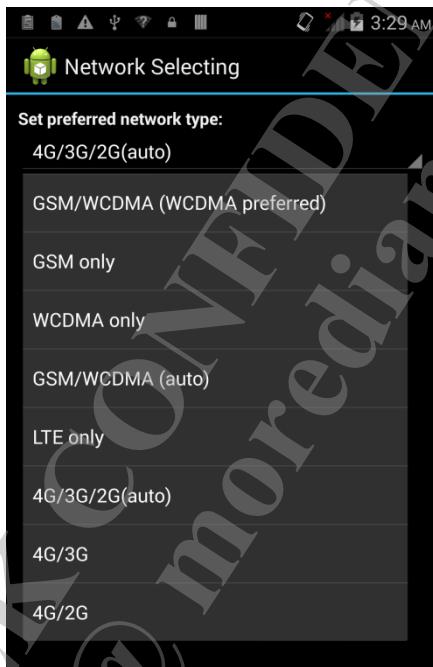


Figure 6-47 Network Selecting

6.31 RAT Configuration

This feature is used to set the RAT of SIM2 through set the property: persist.radio.mtk_ps2_rat.

Detail design

RAT Config has four options:

Select "C/W/G" and click set button will set the property to "C/W/G";

Select "C/G" and click set button will set the property to "C/G";

Select "W/G" and click set button will set the property to "W/G";

Select "G" and click set button will set the property to "G";



Figure 6-48 RAT Config

6.32 RF De-sense Test

This module is used for 2G/3G RF de-sense test. It supports to change 2G/3G cellular standalone TX power, band and channel.

- (1) When enter GSM or CDMA test, use AT command to force the phone to enter flight mode.

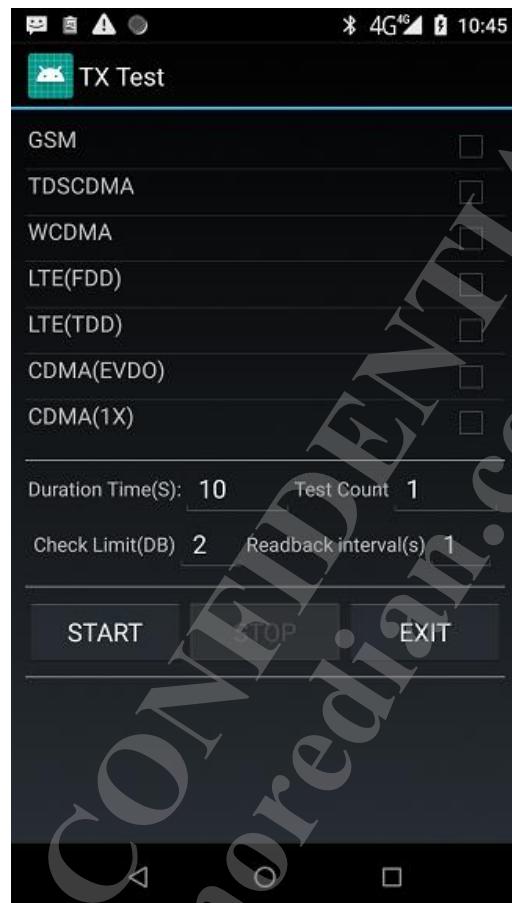


Figure 6-49 RF De-sense TX Test

(2) 2G RF TX test:

- Parameter select
 - Band: select test Band
 - Modulation: select modulation type: GMSK or EDGE
 - Channel: input ARFCN number
 - Power Level: input power level
 - AFC: input AFC value
 - TSC: input TSC value
 - Pattern: select burst pattern
- Function Select
 - Start: Send AT CMD to Modem, Start Test
 - Pause: Send AT CMD to Modem, Pause Test
 - Stop: Send AT CMD to reboot Phone

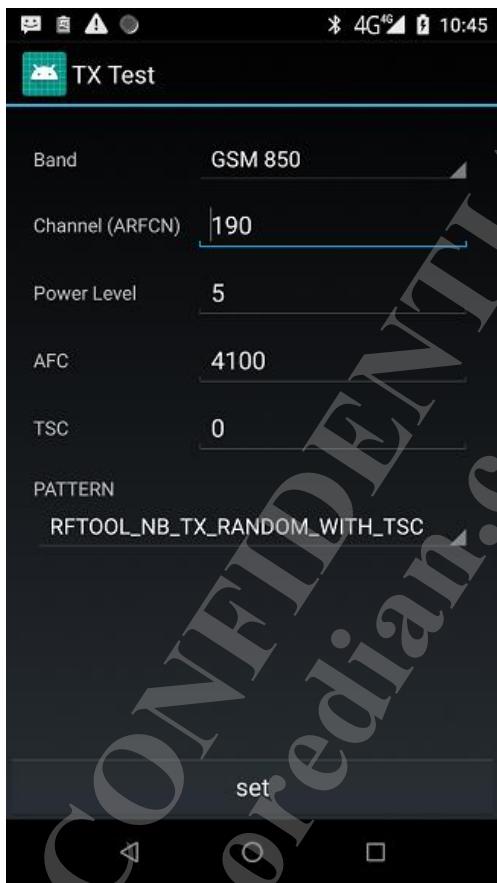


Figure 6-50 RF De-sense TX Test (GSM)

(3) 3G RF TX test settings:

- Parameter Select
 - Band: select test Band
 - Channel: input UARFCN number
 - Power Level: input power level
- Function Select
 - Start: Send AT CMD to Modem, Start Test
 - Pause: Send AT CMD to Modem, Pause Test
 - Stop: Send AT CMD to reboot Phone

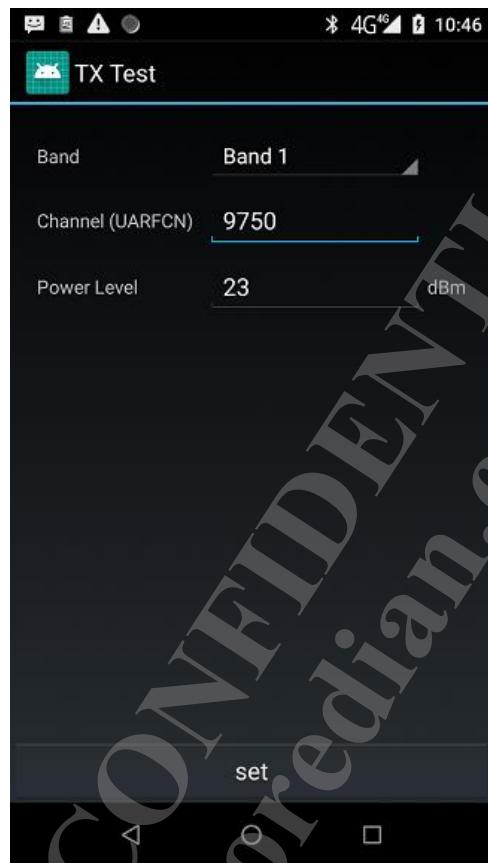


Figure 6-51 RF De-sense TX Test (WCDMA)

6.33 SBP

Overall design

This item will display the information of SBP

Detail design

The UI of SBP will display the SBP ID, SBP feature and SBP feature data

When entry this item, it will send AT Command AT+ESBP? to get the response of modem, parse the response to get three parameter, the first is ID, the second is feature and the third is feature data, and then update the UI.

UI design

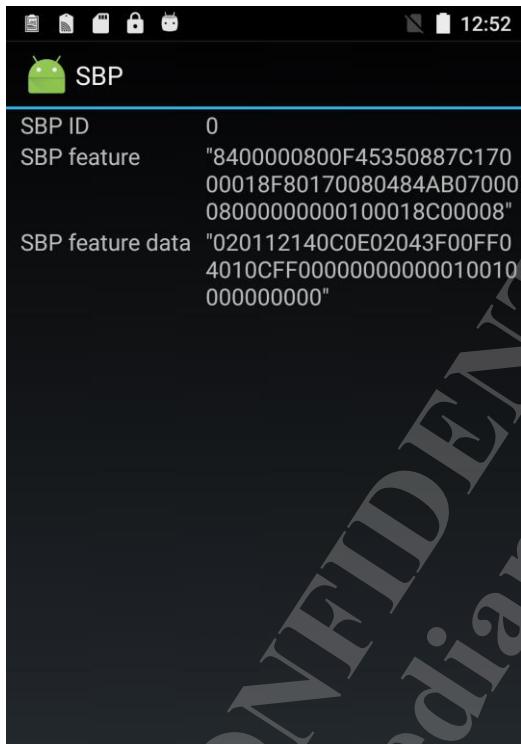


Figure 6-52 SBP

6.34 SIB Capture Support

- **MD PHY Capture Support Disabled/Enabled Options**
- **Allocated Storage Size: 32MB, 64MB, 128MB, MAX**
- MD PHY capture is a **MTK internal engineering function for RDs to capture modem IQ data**, which could be utilized by related modem's members and CSD members for issue debugging and performance analysis
- Previous chips' solution for MD PHY capture utilizes **U3PHY channel (5Gbps)** to transmit data, and store data first into a external SIB box (with **4GB DRAM**)
- However for M17/L17 (6293 modem series), U3PHY is removed for cost-down. **Therefore MD PHY captured data could only be stored into DRAM**
- This capture support shall be **disabled by default**. And only when needed, users **could enable the support via EM, and reboot to take effect**
- Existing viewable shared AP-MD DRAM size is **256MB**, but there are already other functions/features occupy some DRAM region. So maximum allocated DRAM size to MD PHY capture is expected to be **~220MB**

- Most users might be satisfied with **Max DRAM size allocation (by default)**, but for specific users/cases, **smaller size options (32MB, 64MB, 128MB)** are still needed since it will reduce captured data dump/analysis time

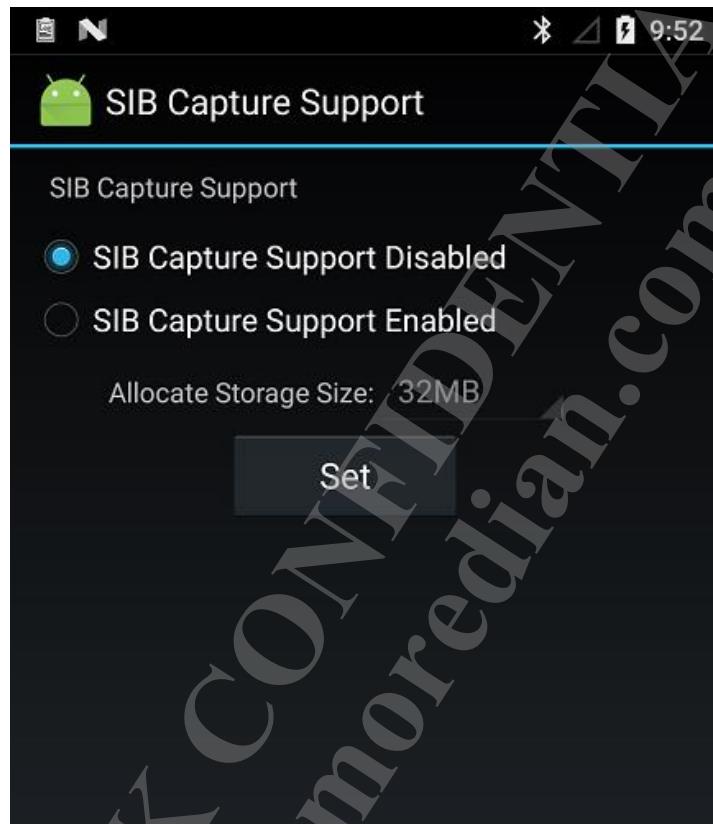


Figure 6-53 Capture Support

6.35 SIM Switch

Overall design

This module is used to enable or disable sim switch function.

Detail design

When entry this module, the button will display the text depending on query result. "Off" means sim switch is on now, click the button will disable this function, otherwise is the same.

UI design

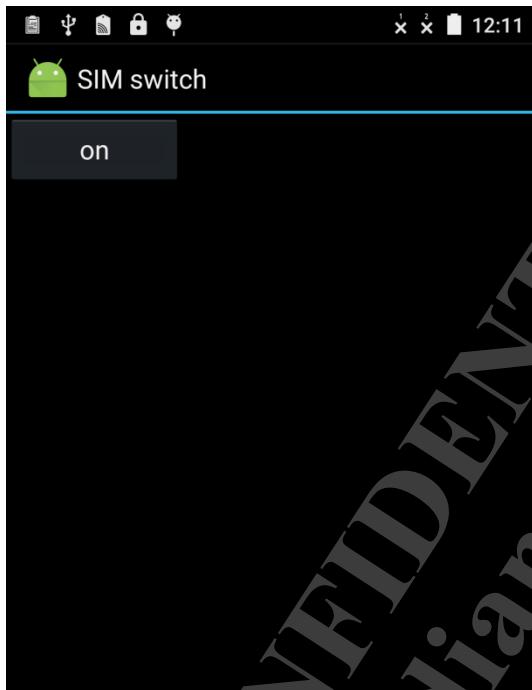


Figure 6-54 sim switch

6.36 Simme Lock

There are five sub modules, to lock/unlock Network, Network Subset, Service Provider, Corporate, SIM card. Each module have five functions: add a lock, delete a lock, remove a lock , unlock and Unlock permanently.

These functions are implemented by the interface of ICCcard.java

```
queryNetworkLock (int category, Message response) {
    RILRequest rr = RILRequest.obtain(RIL_REQUEST_QUERY_SIM_NETWORK_LOCK, response);

    if (RILJ_LOGD) riljLog(rr.serialString() + "> " + requestToString(rr.mRequest));
    riljLog("queryNetworkLock: " + category);

    rr.mp.writeInt(1);
    rr.mp.writeInt(category);
    send(rr);
}
```

Call different category parameter and lockup parameter to send different command to modem。



Figure 6-55 simme lock



Figure 6-56 SIM ME Lock(2)

6.37 SimRecoveryTestTool

RD development simulation validation of modem SIM Recovery feature of small tools

SIM Recovery is modem in SIM driver judgment SIM will take the initiative to recognize card again after assigned to take off a mechanism

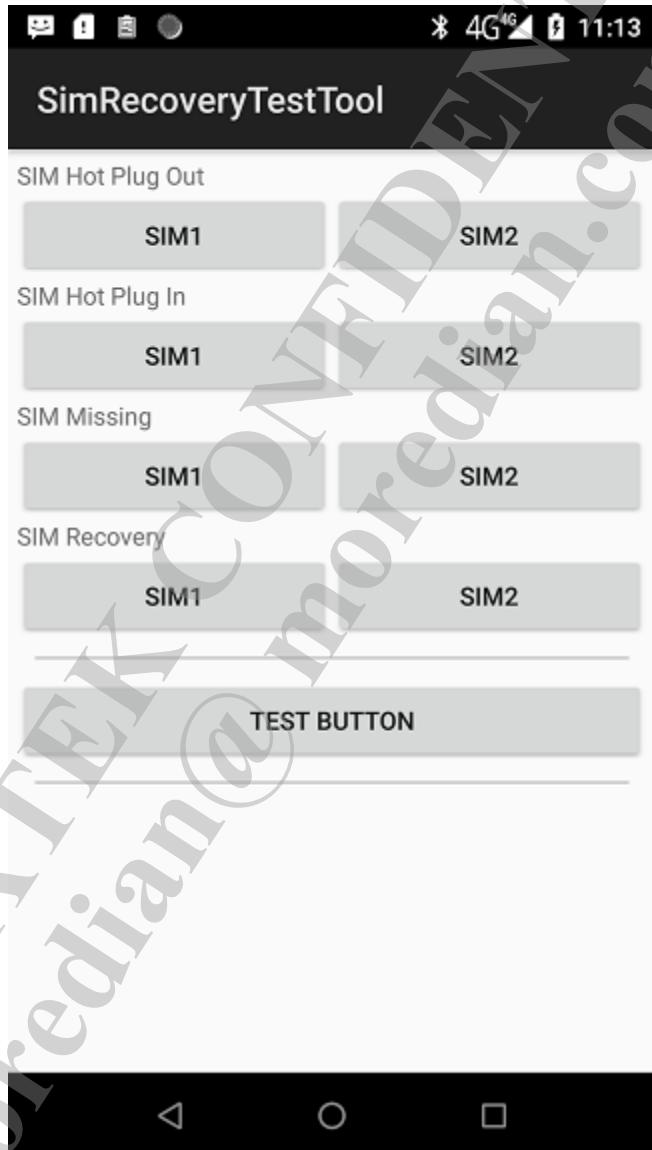


Figure 6-57 SimRecoveryTestTool

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6.38 USB Tethering

Enable usb tethering funtion

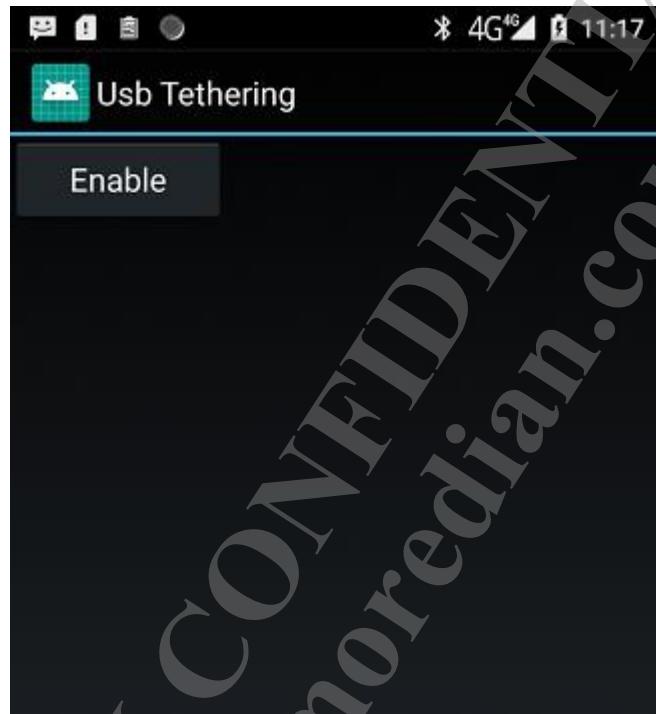


Figure 6-58 USB tering tool

6.39 ViLTE

Overall design

This item is used to set the property for Vilte

Detail design

There are some items to set the states for Vilte, and when entry this item, EM will get the properties for these items, and update the UI to display the current state. User can set the item he wants, and EM will modify the property depending on the setting value, and update UI again.

UI design

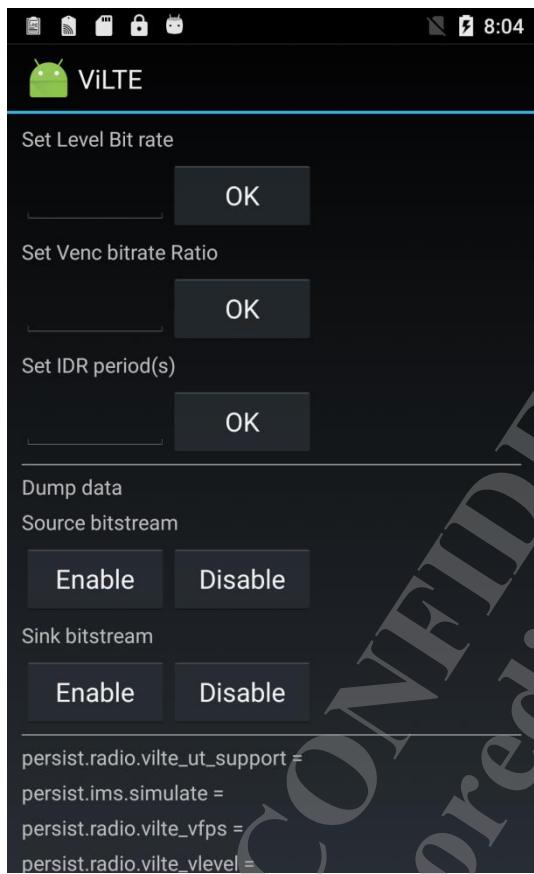


Figure 6-59 Vilte

6.40 World Mode

Overall design

This module is used to dynamically switch between FDD modem and TDD modem.

Detail design

When entering this menu, it will show current modem type. 3 types are supported:

- LtTG mode
- LWG mode
- Auto Switch

User can select modem type and it will notify telephony framework to dynamically switch the modem.

User also can set modem type by setting the mode value.

UI design

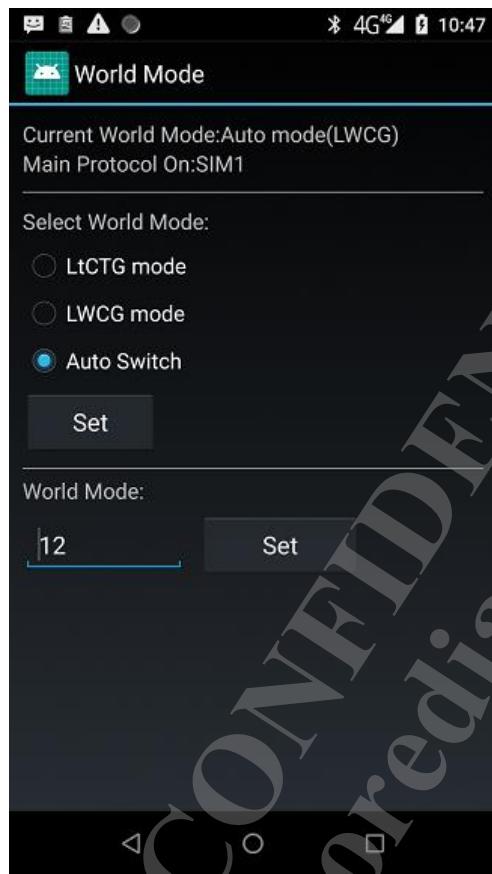


Figure 6-60 world mode

7 Connectivity category

7.1 Bluetooth

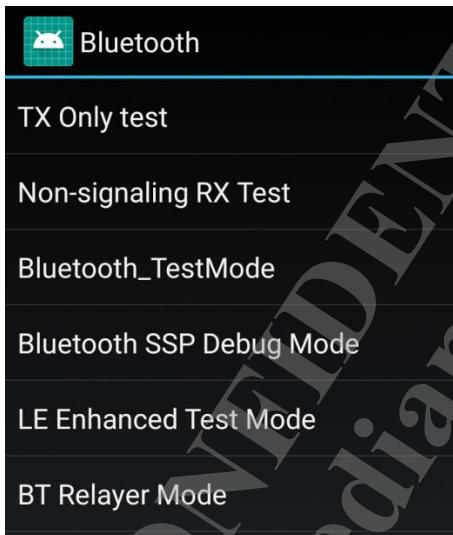


Figure 7-1 Bluetooth main UI

1. TX Only test item

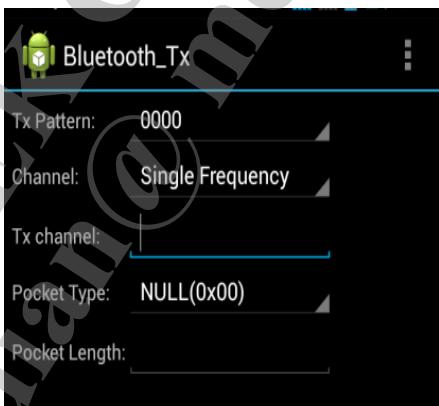


Figure 7-2 Tx Only Test

DUT can send non-modulated signal (single tone).

Flow:

- a. Change packet type as non-modulated
- b. Input TX channel
- c. Press Done in option menu, then send TX single tone

Data:

- HCI CMD & Event For Set Scan Response Data
 - If pressing "Done" button
 - TX: 01 15 FC 01 00
 - RX: 04 0E 04 01 15 FC 00
 - TX: 01 D5 FC 01 XX (XX = Channel)
 - RX: 04 0E 04 01 D5 FC 00

2. Non-signaling RX test item

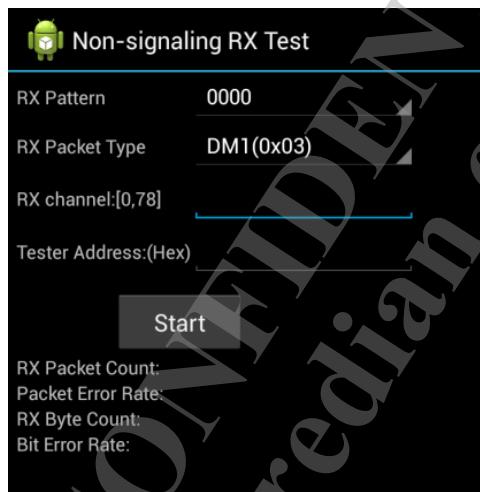


Figure 7-3 Non-signaling RX Test

3. Bluetooth_TestMode

User could enable/disable test mode by operation on checkbox on this menu.

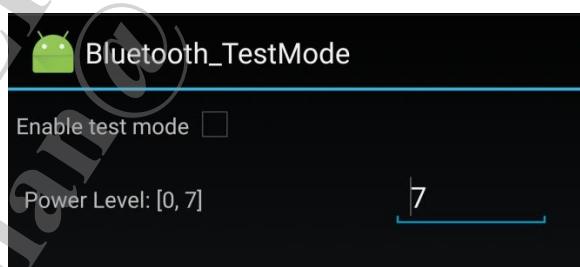


Figure 7-4 Bluetooth_TestMode

4. Bluetooth SSP Debug Mode

User could enable/disable SSP debug mode by operation on checkbox on this menu.

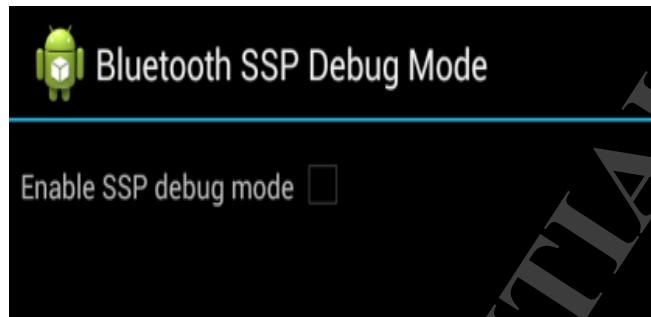


Figure 7-5 SSP debug mode

5. LE Enhanced Test Mode

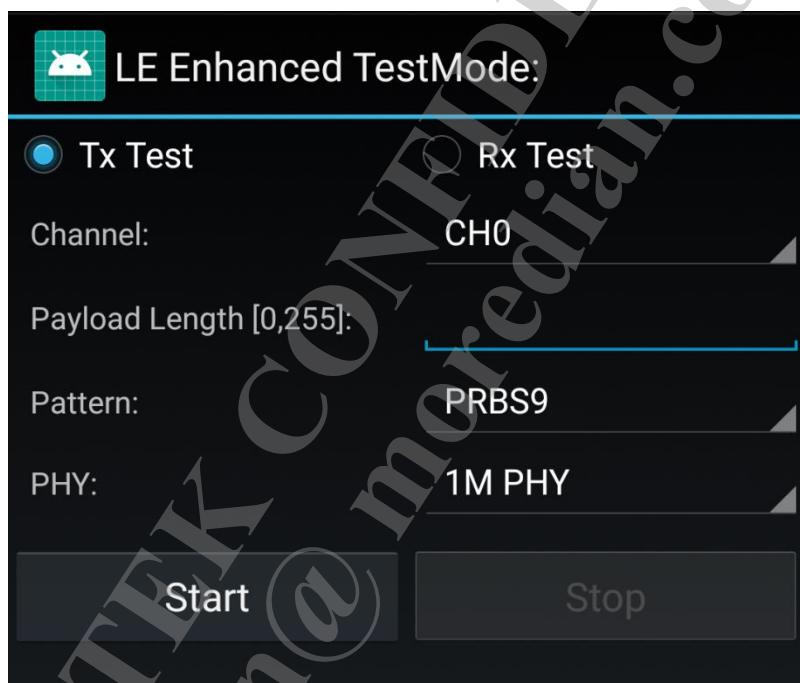


Figure 7-6 LE Enhanced Test Mode

- Start To Execute TX test
 - Notify driver initing
 - Send tx start cmd: 01 34 20 04 channel_value payload_length pattern_value phy_value
- Start To Execute RX test
 - Notify driver initing
 - Send rx start cmd: 01 33 20 03 channel_value phy_value 00
- Stop test
 - Send stop cmd: 01 1f 20 00
 - Notify driver uniniting

6. BT relayer mode

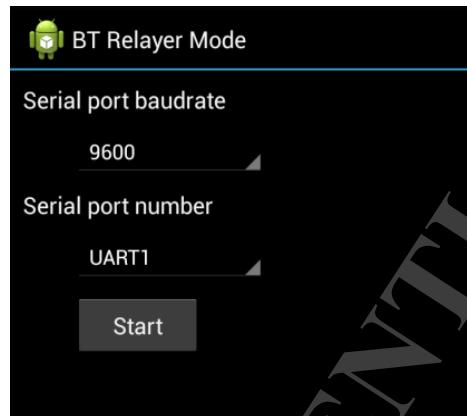


Figure 7-7 BT Relayer Mode

BT relayer mode is used for BLE verification test on MTK combo chip.

Steps:

- Choose the specific serial port and a suitable baud rate for test
- Click “Start” button to begin test. If BT relayer is initialized successfully, the button becomes “END Test”, and it is ready to run PC ATE tool BLE test cases.
- During test, BT relayer retrieves the HCI command from PC ATE tool and throws it to combo chip BT Controller; then receives the HCI event generated from BT Controller and sends it back to PC
- Click “END Test” button to end test

7.2 Bluetooth Test Tool

This function is used to make device always visible during BT scan if BT is enabled. The settings will remain unchanged after reboot

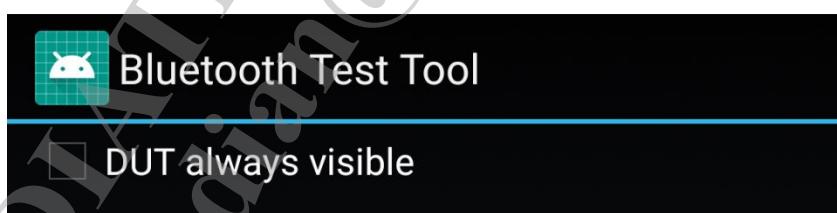


Figure 7-8 Bluetooth Test Tool main UI

7.3 CDS Information

Please refer to CDS_EM_4.X.docx on DMS.

7.4 FM Receiver

Test FM Radio hardware function and debug.

7.5 NFC(STMicro)

Near field communication (NFC) is a set of ideas and technology that enables smartphones and other devices to establish radio communication with each other by touching them together or bringing them into proximity, typically a distance of 10 cm (3.9 in) or less.

There are three main functions

- Reader/Write Mode
 - Do data's read/write with other device defined by NFC forum.
- Card Mode
 - Simulate NFC device as Card if it has secure element.
- Peer to Peer Mode
 - NFC device support Peer to Peer.

EngineerMode have seven main functions

- Always in reader mode
 - Let NFC chip always in the reader/write mode.
- Always in peer to peer mode
 - Let NFC chip always in the peer to peer mode.
- Always in card emulation mode
 - Let NFC chip always in the Card mode.
- Polling loop mode
 - Detect previous mode. Then let NFC chip always in it.
- TX carrier signal always on
 - for HW engineer , control NFC chip, let NFC RF print signal ,
- Virtual card function
 - MTK NFC chip can support Virtual Card function. Simulate nfc chip to cared if insert SIM/SD card without secure element.
- PNFC command
 - PNFC command can control NFC chip directly, to let RD to do some special test.
- Version query
 - Check version information.
- Option
 - External parameters.
- LoopBack Test
 - MTK RF Self test.
- SWP Test
 - SWP Self test.

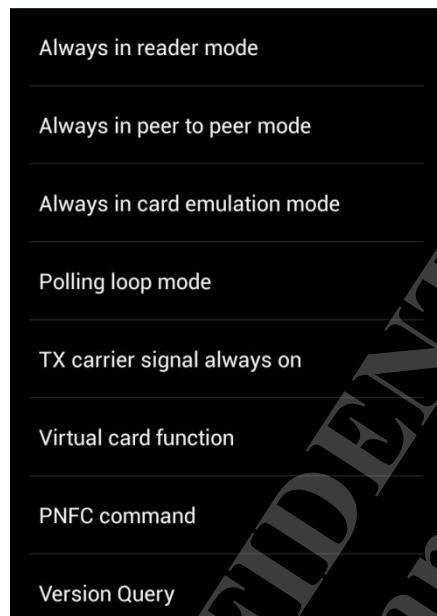


Figure 7-9 NFC main UI

1. Always in reader mode

NFC Forum defined Tag protocol/technology: Type A/B/V/F ...etc every Type has detail settings



Figure 7-10 Always in reader mode

Default setting:

- TYPE A/B: 106kbps
- TYPE F: 212kbps
- TYPE V: dual subcarrier, Coding Mode(1 out of 4), 6.62kbps
- TYPE Kovio

7 Connectivity category

After pressing Start button, send the settings and receive response, show result if detecting tag.

If result is NDEF, show read/write button, then do next actions.

2. Always in peer to peer mode

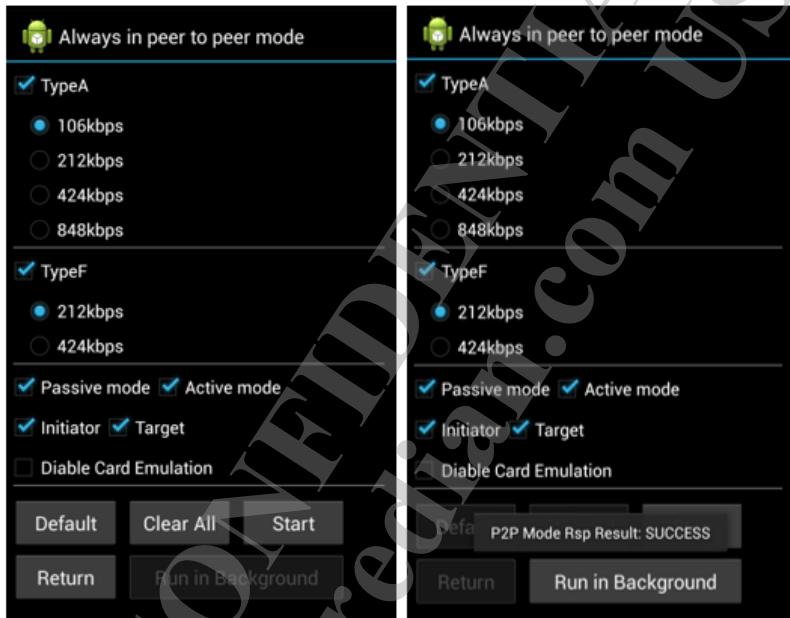


Figure 7-11 Always in peer to peer mode

Default settings:

- TypeA : 106kbps
- TypeF: 212kbps
- Passive mode Active mode Initiator Target

After pressing “start”, if receiving response, show pop window “p2p link is up”, close the window when receiving “link_status=down”.

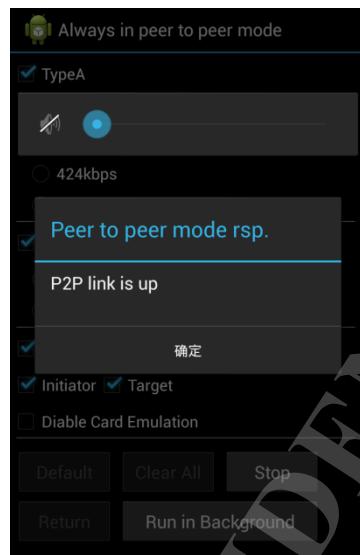


Figure 7-12 Peer to peer mode result

3. Always in card emulation mode



Figure 7-13 Always in card emulation mode

Default setting:

- SWIO1
- TypeA TypeB TypeF TypeB'
- Show toast result as success or fail.

4. Polling loop mode

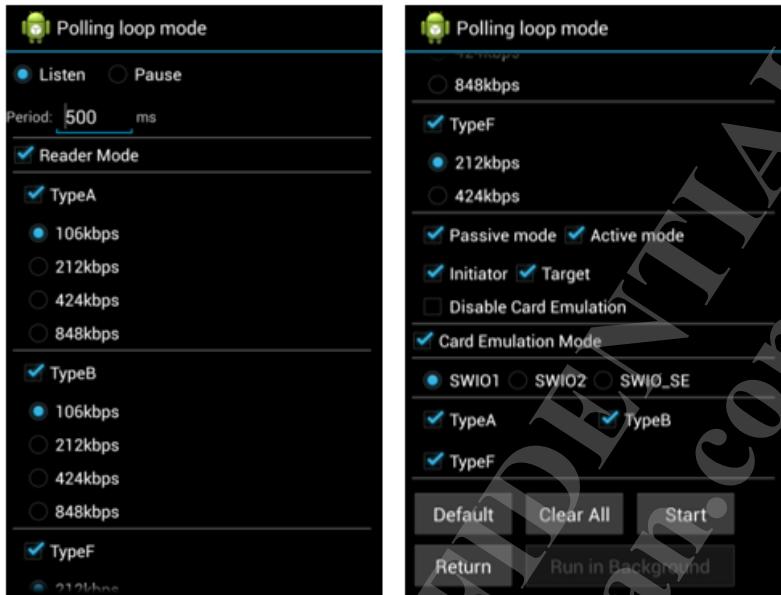


Figure 7-14 Polling loop mode

Default setting:

- Listen
- TypeA TypeB TypeF
- Show toast result as success or fail

5. Tx carrier signal always on



Figure 7-15 TX carrier signal always on

Start/Stop: after pressing Start button and receiving success response, show Stop button

6. Virtual card function

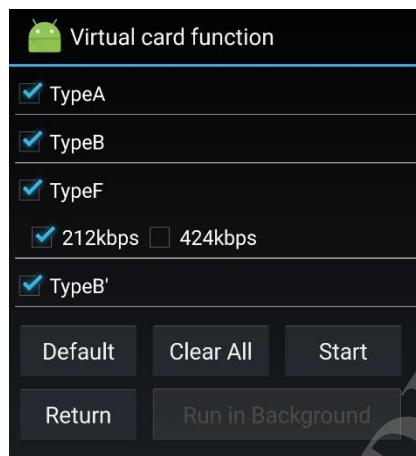


Figure 7-16 Virtual card function

Default settings:

TypeA, TypeB, TypeF: 212kbps, TypeB'

7. PNFC command



Figure 7-17 PNFC command

PNFC command send some special command to chip

8. Version Query

Get current chip version.

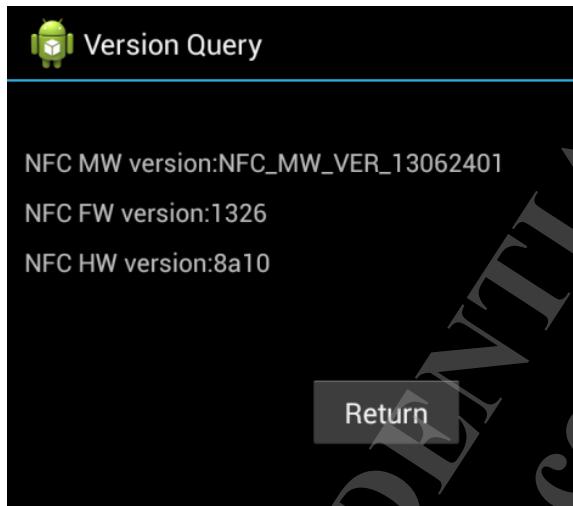


Figure 7-18 Version Query

9. Option

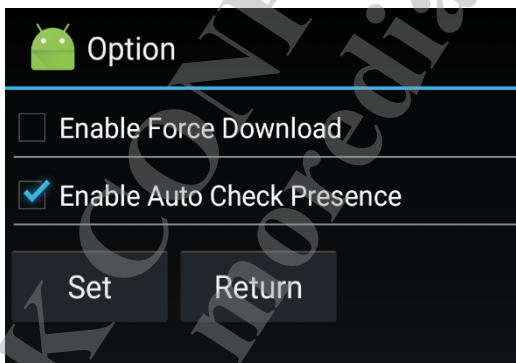


Figure 7-19 Option

Config external parameters. A toast will show with the result after user pressed the Set button.

10. Loopback Test

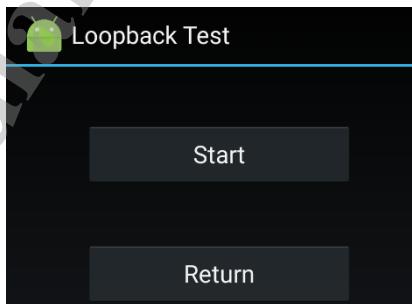


Figure 7-20 Loopback Test

MTK RF Self test. A toast will show with the result after user pressed the Set button.

11. SWP Test

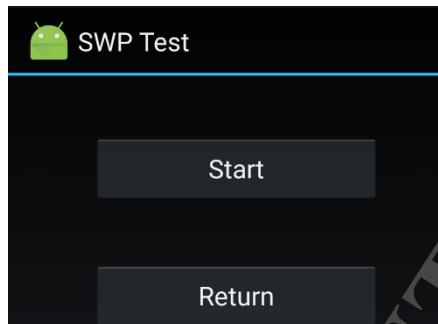


Figure 7-21 SWP Test

SWP Self test. A toast will show with the result after user pressed the Set button.

7.6 Wifi

There are 5 test items in Wifi EM: TX, RX, MCR, RFCR and NVRAM Access, and some check boxes as a switch.

Manifest information is shown at the bottom of the UI,

1. Test Mode

- 1) Enter to Test Mode, Leave from Test Mode
- 2) Switch into test mode when starting Wi-Fi engineer mode
- 3) Return to normal operation mode when quit from Wi-Fi engineer mode
- 4) EM-Wifi UI



Figure 7-22 WiFi Test Main UI

2. TX: Do tx test with different parameters

- 1) Parameters: Channel/Power/Packet Length/Packet Count/Rate/Mode/Bandwidth/Guard Interval/Preamble
 - Channel: Get from driver dynamically
 - Pkt length: default 1024, unsigned int
 - Pkt cnt: default 3000, unsigned int
 - Tx gain: default 22, unsigned int
 - Rate: option listed based on other parameter
 - Mode:
 - 0 continuous packet TX
 - 1 100% duty cycle
 - 2 carrier suppression
 - 3 local leakage
 - Preamble: option listed based on other parameter
 - BandWidth: option listed based on other parameter
 - GuardInterval:
 - Normal GI: 800ns
 - Short GI: 400ns
- 2) UI



Figure 7-23 TX UI

3. RX: do rx test with different parameters and show FCS Error/RX OK/PER/RSSI(WiFi0)/RSSI(WiFi1)

- 1) Parameters: Channel/DBW/Bandwidth
 - Channel: Get from driver dynamically
 - DBW: option listed based on other parameter
 - BandWidth: option listed based on other parameter
- 2) UI



Figure 7-24 RX UI

4.MCR

- 1) MCR Read/Write Access
- 2) UI



Figure 7-25 MCR UI

5.RFCR

- 1) RFCR Read/Write Access
- 2) UI

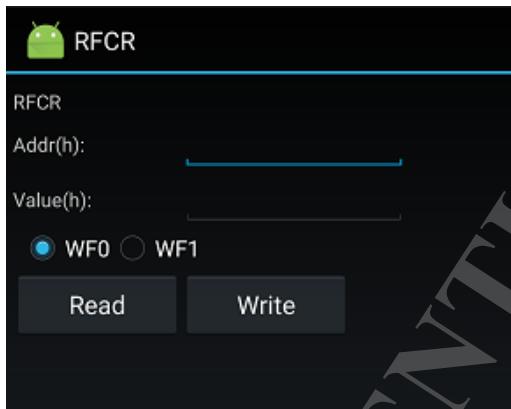


Figure 7-26 RFCR UI

6. NVRAM Access

- 1) NVRAM Read/Write Access: WORD Access and Byte String Access
- 2) UI

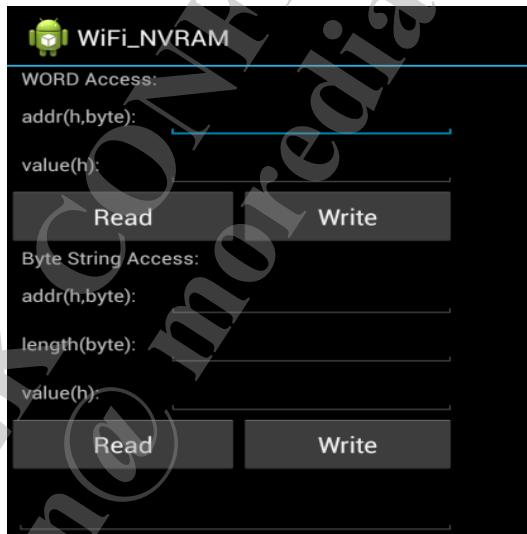


Figure 7-27 NVRAM UI

7.7 WIFI CTIA

WIFI CTIA test config

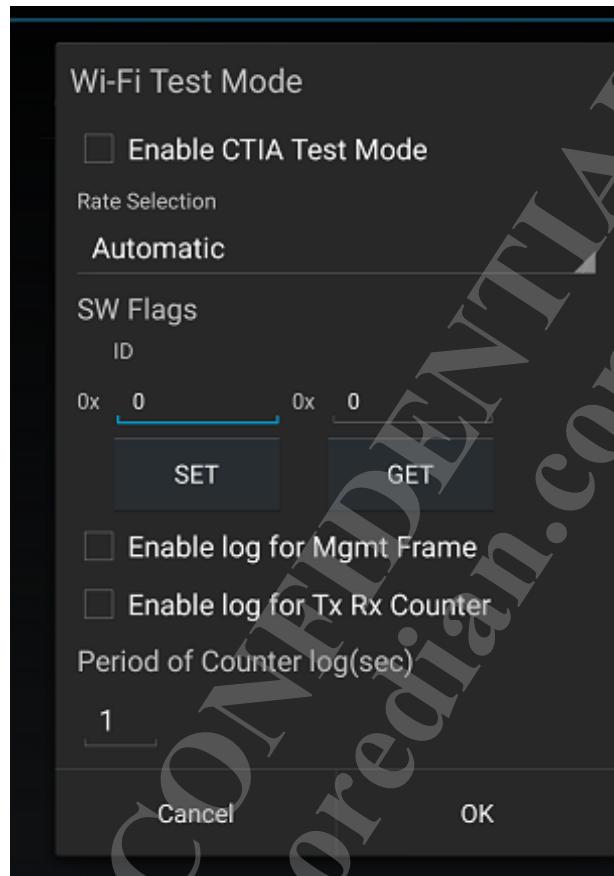


Figure 7-28 WiFi CTIA test config UI

7.8 WiFi Display

The item is used to configure WiFi Display.

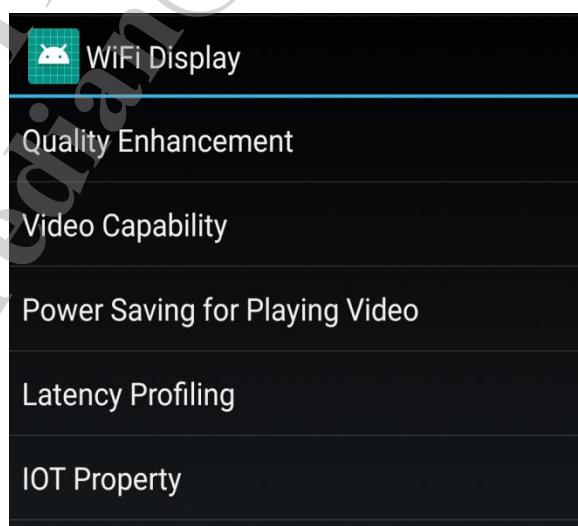


Figure 7-29 WiFi Display main UI

1. Quality Enhancement

- Wifi display display toast time
- Wifi display notification time
- Whether enable sqc info (RD used)
- Whether enable quality enhancement.
- Whether enable WFD auto channel selection

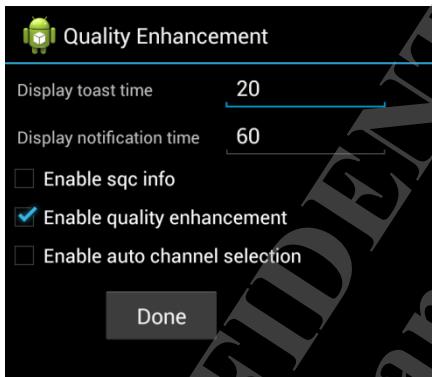


Figure 7-30 Quality Enhancement

1. Video Capability : Configure max resolution



Figure 7-31 Video Capability

2. Power Saving for Playing Video: Configure power saving style

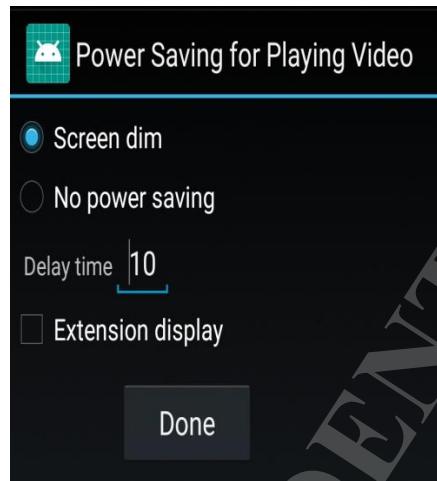


Figure 7-32 Power Saving for Playing Video

3. Latency profiling

- Display wifi info
- Whether enable profiling on screen

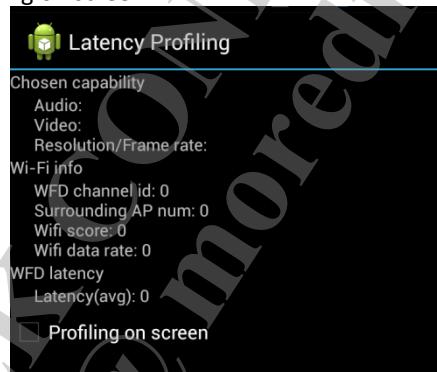


Figure 7-33 Latency Profiling

4. IOT Property

- Whether enable scenario mode
- Whether enable drop dummy-nal
- Whether enable av sync

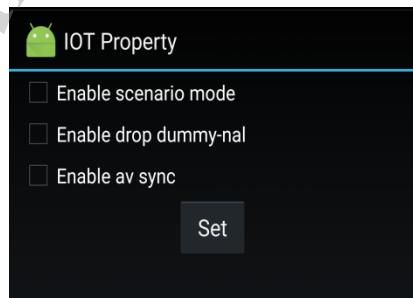


Figure 7-34 IOT Property

8 Hardware Testing category

8.1 AAL

Dynamically adjust the backlight



Figure 8-1 AAL UI

8.2 Audio

1. UI

In the main view of Engineer mode click Audio item enter the Audio module as following view. Audio module is used to set a series parameters of each mode of Audio. Audio module is divided into following functions: Volume, Speech Enhancement, Debug Session, Speech Logger, Audio Logger and Audio Wake Lock.

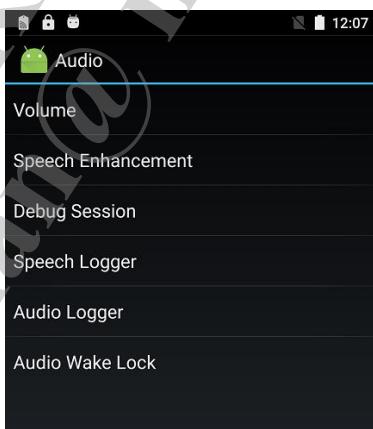


Figure 8-2 Audio Entrance

2. Functions

(1). Volume

Volume module is used to set Voice\VoIP\Audio Playback\Audio Record values . UI is following:

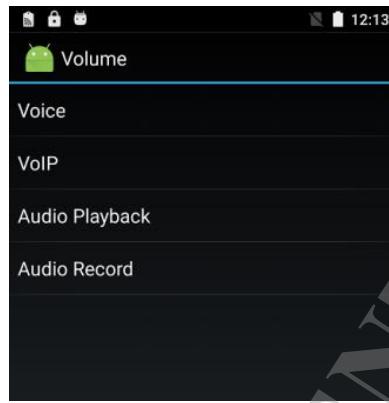


Figure 8-3 Audio Volume List

1) Voice

Voice Mode module is used to set different type audio sound of Voice mode. UI is following:



Figure 8-4 Audio Volume Voice

Select “NB” and “Receive” items to determine the location, then input a value and press Set button, the audio value of the unique location will be changed to input value.

2) Voip

Voip Mode module is used to set different type audio sound of Voip mode. UI is following:

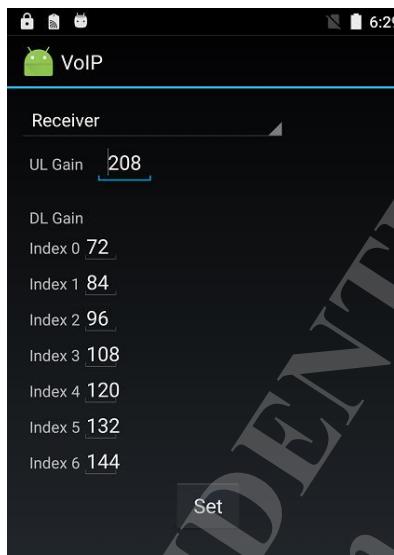
8 Hardware Testing category

Figure 8-5 Audio Volume VoIP

Select “receive” items to determine the location, then input a value and press Set button, the audio value of the unique location will be changed to input value.

3) Audio playback

Audio playback Mode module is used to set different type audio sound of playback mode. UI is following:

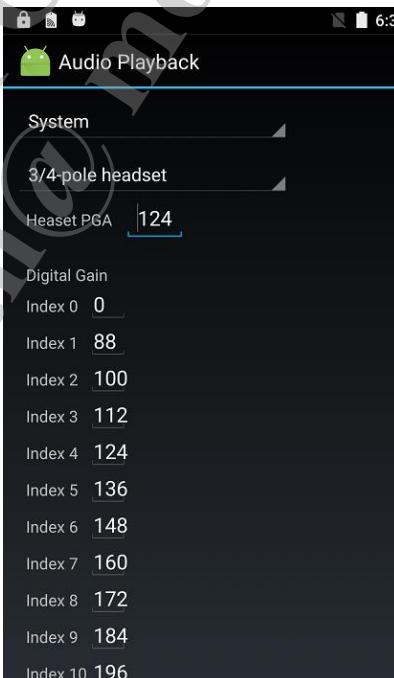


Figure 8-6 Audio Volume Playback

Select “system” and “3/4-pole headset” items to determine the location, then input a value and press Set button, the audio value of the unique location will be changed to input value.

4) Audio recording

Audio recording Mode module is used to set different type audio sound of recording mode. UI is following:

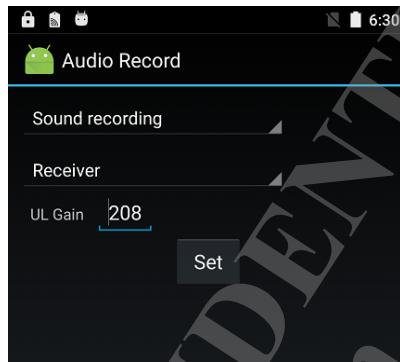


Figure 8-7 Audio Recording

Select “sound recording” and “Receiver” items to determine the location, then input a value and press Set button, the audio value of the unique location will be changed to input value.

(2). Speech Enhancement

The purpose of Speech Enhancement function is enhancement selected mode’s speech. Such as the common parameter\Debug info\Narrow Band\Wide Band mode. The UI display as following:

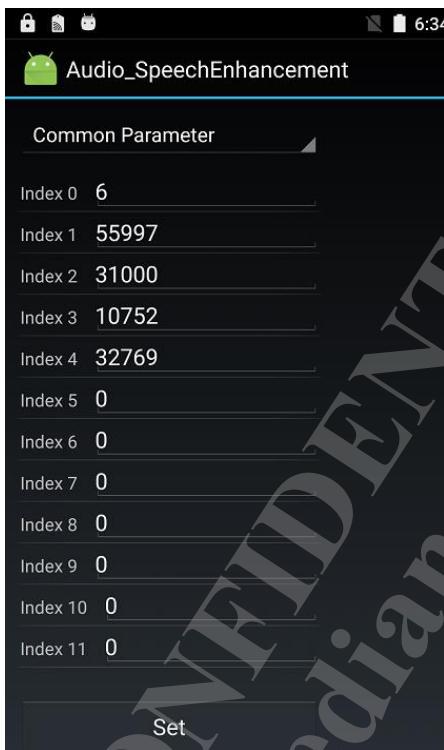


Figure 8-8 Audio Speech Enhancement

Select “Common Parameter” to choice which mode wanted to be changed ,then input the value and press the Set button, the corresponding model and parameter value will be changed.

(3). Debug session

Debug session is used to enable MagiASR verify mode, enable Record with AEC, detect headset jak and enable customized audio parameter enable. The UI display as following:

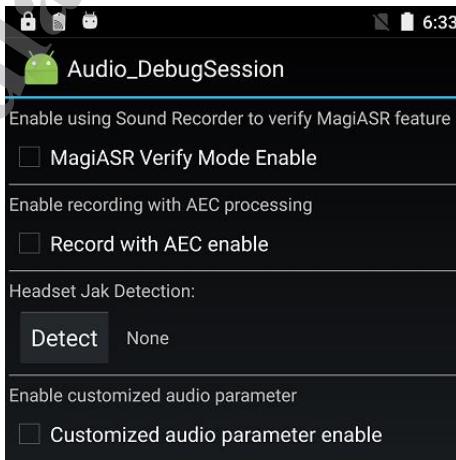


Figure 8-9 Audio Debug Session

(4). Speech Logger

Speech Logger function is used to control Log of Audio module, which is divided into four areas:

Whether enable speech log to /sdcard/mtklog/audio_dump/VM_log;

Whether enable VOIP switch log to /sdcard/VOIP_DebugInfo;

Whether enable CTM4WAY Logger.

Dump speech debug info.

Following UI can display the Speech Logger module:

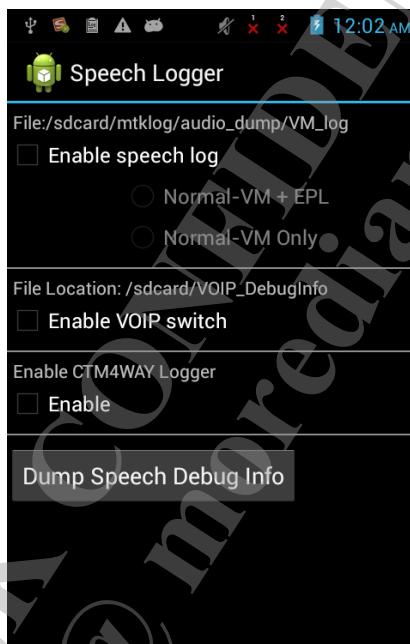


Figure 8-10 Audio Speech Logger

(5). Audio Logger

Speech Logger function is used to set/get audio debug info. UI is following:

**Figure 8-11 Audio Logger**

(6). Audio Wake lock

Audio Wake lock is used to lock or unlock wake Lock . ([Phaseout](#))

8.3 Camera

Camera module is used to test the capture function of each AF Mode of camera. User can set each parameters of camera, then start preview for capture photos, use the results to see the correctness of the camera.

1. UI

Click Camera item in the main view of the Engineer Mode, user can enter Camera view as following:



Figure 8-12 Camera Settings Main UI

Camera Sensor, Capture Mode, ISO functions, Flicker, Strobe, HDR, Shutter delay, Shading, NR, Scene mode, AWB Verification, AF, Custom Parameter and ADB commands are used to set parameters of the Camera; **Start Preview** function use the parameters have been set to take a real camera action; **EV Calibration, GIS Calibration, Capture Calibration** are used to calibration.

2. Functions

(1). Camera Sensor

User can choose Camera sensor to test.

(2). Capture Mode

There are two capture modes: Normal capture and Video Clip Raw Dump.

2.1 Normal Capture

- ISP profile

There are 3 types: Preview, Capture, Video

- Sensor mode

There are 11 value to choose: Preview size, Capture size (It's the picture size), Video Size, Slim Video1 ~3, Custom1 ~5

Size	"rawsave-mode"	Picture size	Support ?
Preview Size	1	½(Max picture size)	Yes
Capture Size	2	Max picture size (4:3 or 16:9)	Yes
Video Size	4	Sync with normal camera video (Fine Quality)	Yes
Slim Video1 ~ 2	5 ~ 6	Sync with normal camera video (Fine Quality)	Check "sv1-s" and "sv2-s"
Custom1 ~ 5	7 ~ 11	Max picture size (4:3)	Check "sen-mode-s", the first 5 bits

Table 8-1 Camera Sensor Mode

If capture type is JPG ONLY, the "rawsave-mode" set as 3.

- Capture ratio

Set Picture size ratio is 4:3 or 16:9, default is 4:3

- Capture type

There are 3 types: Processed Raw, Pure Raw, Jpeg Only

- Capture number

It decides how many pictures to take once press the capture button.

- Manual ISO
 - ON: set ISO speed in following edittext view
 - OF: use the selection in “ISO Speed” menu
- Shutter speed
 - Set Shutter speed from 1 ~ 999999
- Sensor gain
 - Set sensor gain from 1 ~ 999999

2.2 Video Clip Raw Dump



Figure 8-13 Camera Video Clip Raw Dump

- Dump Buffer
There are 2 types: IMGO , RRZO
- ISP profile
There are 2 profiles: Preview, Video
- Sensor mode
There are 2 mode: Preview, Video
- Resolution
There are 5 Resolutions: Keep resolution, Crop resolution, Resize to 2M, Resize to 4K2K, Crop at center to 2M
- Frame rate
If turn on Frame rate, there are two options: Low Frame Rate and High Frame Rate.

(3). ISO

3.1 Set ISO speed

Set ISO speed of Camera, There are 24 ISO speeds for choose: Auto, ISO100, ISO1.5x, ISO2x, ISO3x, ISO4x, ISO6x, ISO8x, ISO12x, ISO16x, ISO20x, ISO24x, ISO28x, ISO32x, ISO40x, ISO48x, ISO56x, ISO64x, ISO72x, ISO80x, ISO88x, ISO96x, ISO112x, ISO128x.

8 Hardware Testing category

If AF mode chooses Auto, it can be choose more than one ISO speed, and every speed will take "capture number" pictures; otherwise, AF mode is not Auto, it can only choose one ISO speed.



Figure 8-14 Camera ISO list

3.2 ISO Interpolation

If interpolation = ON, select more ISO values (ex: ISO100, ISO400, ISO1600), select min and max ISO (ISO100, ISO1600), and set ratio 10.ISO = iso_base + iso_base * ratio. So the result is ISO100, ISO110,ISO120,ISO130,...ISO200, ISO220,ISO240,ISO260,...ISO400,ISO440, ISO480, ...ISO800,ISO880, ISO960

(4). Flicker

Set flicker of camera, Flicker contain 50HZ and 60HZ.

(5). Strobe

Strobe is to set flash mode. It would list all supported strobe mode, such as "off", "auto", "on", "torch", "red-eye".

(6). HDR

HDR is High Dynamic Range Imaging.

6.1 HDR debug

Set HDR debug ON or OFF

6.2 VHDR

Set Video HDR ON or OFF.

If ON, add sub item to select iVHDR, mVHDR, sVHDR; add sub item to fill ratio. . And Scene mode would be "scene-mode-hdr" instead of user's selection.

(7). Shutter delay

Set delay for capture pictures. Can set delay 0s, 5s, 10s.

(8). Shading**8.1 Shading table**

Set shading Automatic/Low/Middle/High/TSF/Disable.

8.2 Shading verification**(9). NR**

NR is noise reduction

9.1 Multi Pass NR

An NR algorithm, can choose one of Automatic/HWNR/SWNR/Disable

9.2 MFLL

It's also an NR algorithm; full name is Multi-frame low light. Can set it AUTO/ ON/OFF. If ON, should set use how many frames to reduce noise.

(10). Scene mode

Set Scene mode as Auto / Night / Sunset / Party / Portrait / Landscape / Night portrait / Theatre / Beach / Snow / Steady photo / Fireworks / Sports / Candle light. If VHDR ON, the selection would be disabled.

(11). FPS Range

Set the FPS Range list in supported FPS ranges.

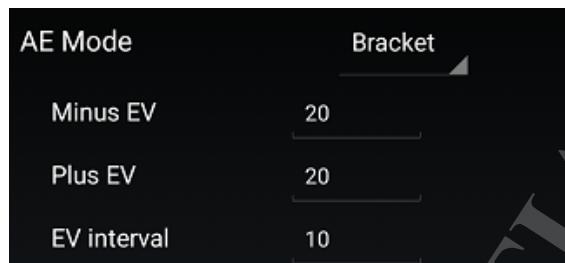
(12). AWB Verification**(13). AE Mode**

Used to set AE bracket parameters.

If AE mode is bracket, configure all AE bracket parameters as you want.

- Input:
Minus EV: can be set from 0 to 200
Plus EV: can be set from 0 to 200
EV interval: can be set from 0 to 200
- Output:
 1. EM will continue to take pictures, save all JPG & Raw Data between "**Minus EV**" and "**Plus EV**" (step: "**EV interval**").
 2. Shading tables (Hardware shading table and Cmodel shading table)

Save Path: /DCIM/CameraEM/AE/EvBracket/CapturexxxXStartEVEndEVxEV. [JPG/raw]

**Figure 8-15 Camera AE Mode****(14). AF**

User can use AF EM function to set the camera mode.

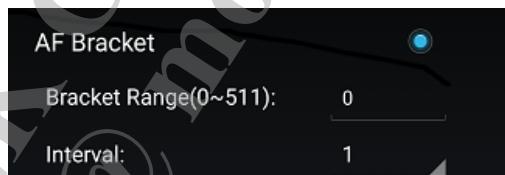
If Af There are six camera models: Auto, AF Bracket, Full Scan, Through Focus Dump, Continuous and Temperature Calibration. And if the sensor is Fixed Focus, only shows the Auto menu.

14.1Auto

Auto focus. And it can take "Capture number" pictures for each ISO speed automatically.

14.2AF Bracket

Take a series of pictures for specified focus step. For the first capture, focus mode is FOCUS_MODE_AUTO, and shows the Focus rectangle; others, focus mode is FOCUS_MODE_MANUAL.

**Figure 8-16 Camera AF Bracket****14.3Full Scan**

Take only one picture. AF focus mode is FOCUS_MODE_FULL_SCAN.

- Frame Interval
- DAC Step
- Focus Win Width Ratio

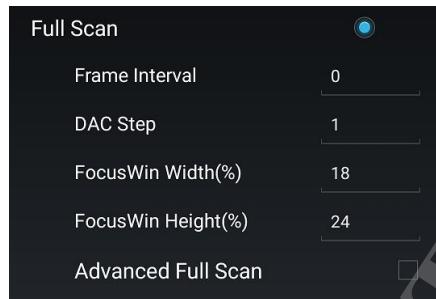
It's a ratio used to calculate Focus window width. Width = ratio x Preview window width

- Focus Win Height Ratio

It's a ratio used to calculate Focus window height. Height = ratio x Preview window height

- Advanced Full Scan

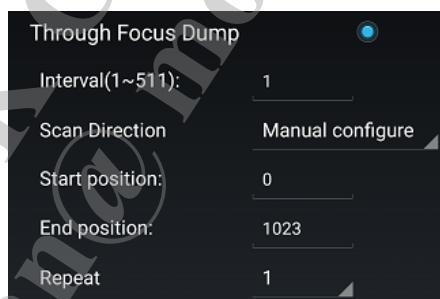
If enabled, It would focus 4 times without take picture.

**Figure 8-17 Camera AF Fullscan**

14.4 Through Focus Dump

Take a series of pictures for specified focus step. Its focus mode is FOCUS_MODE_MANUAL.

- Interval
Focus step's move interval
- Interval
There are three options: Macro to Inf.; Inf. To Macro; Manual configure
If choose Manual configure, must specify the start position and end position
- Repeat
Set each step capture repeat times.

**Figure 8-18 Camera AF Through Focus Dump**

14.5 Continuous

Take only one picture. AF focus mode is FOCUS_MODE_CONTINUOUS_PICTURE, would not show focus rectangle.

14.6 Temperature Calibration

Take only one picture. AF focus mode is FOCUS_MODE_FULL_SCAN.

(15). Custom Parameter

It's used to **3A Database Collection**. There are 3 columns for input.

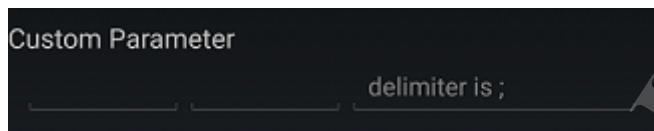


Figure 8-19 Camera DB3A

15.1DB3A AF

1. Test method:

Step1: AF set as Through Focus Dump input interval, scan Direction, Repeat

Step2: Custom Parameter setting

Column 1: input "AF"

Column 2: input test name. ex: test1

Column 3: EV step(at least :1), ex: 5

Step3: Press Capture button

2. Output:

EM will continue to take pictures, save each AF step's Raw & JPG files.

Save Path : DCIM/CameraEM/AF/Colum2Name+serial number/;

15.2DB3A AWB

• Test method:

Step1: Custom Parameter setting

Column 1: input "AWB"

Column 2: input number (ex. 123)

Column 3: input number (ex. 456)

Step2: Press Capture button

• Output:

1. EM will continue to take pictures, save all JPG & Raw Data Each +1EV, 0EV, -1EV data.

2. Shading tables (Hardware shading table and Cmodel shading table)

3. AWB log .txt (AWB algorithm log) and AWBSta.bin (AWB statistic data)

Save Path: DCIM/CameraEM/AWB/CustomParaters2/CustomParameter3/

15.3DB3A Flash

• Test method:

Step1: Custom Parameter setting

Column 1: input "F" (or "f")

Don't care the other two columns.

Step2: Press Capture button

- Output:
 1. EM will continue to take 2 pictures, save all JPG & Raw Data for flash on and off.
 2. Shading tables (Hardware shading table and Cmodel shading table)
 3. AWB log, AE log, Flash AWB log and AWBSta.bin

Save Path: DCIM/CameraEM/Flash/serial number/

(16). ADB commands

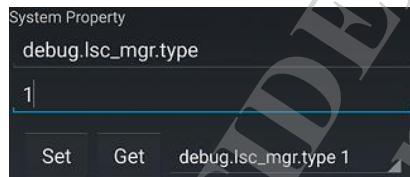


Figure 8-20 Camera ADB Commands

Set mediatek.*/debug.* related properties at EM Camera GUI.

- Supports commands:

```
setprop debug.lsc_mgr.type 1  
setprop debug.awb_mngr.lock 1  
setprop debug.ae.enable 9  
setprop debug.shot.forcenr 0  
setprop mediatek.hdr.debug 1  
setprop debug.lsc_mngr.manual_tsf 0  
setprop debug.lsc_mngr.ct 0  
setprop debug.lsc_mngr.enable 0
```

(17). Start Preview

This function based on the above steps to set the parameters of the camera began to really capture action.

(18). EV Calibration

It's used to test the input Exposure Value is valid or not

- Test method:
 - Step1: Enter EV Calibration to start preview
 - Step2: Input value
 - Step3: Press "EV Calibration" button
- Result:
 1. A dialog popup to show the input value is valid or not.

(19). Flash Calibration

It's used to test the input Flash intensity is valid or not

- Test method:
 - Step1: Turn on “Flash Calibration”
 - Step2: Start preview
 - Step3: Press “Capture” button
- Result:
 1. A dialog popup to show whether flash calibration success.

(20). GIS Calibration

- Test method:
 - Step1: Enter GIS Calibration to start preview
 - Step2: Press “GIS Calibration”button
- Output:
 1. CalibrationInfo display at UI and GIS_default_parameter stored.

Save Path:

storage/sdcard0/GIS_default_parameter_main.txt (for main sensor)
storage/sdcard0/GIS_default_parameter_sub.txt (for sub sensor)

8.4 De-Sense

De-Sense module have one sub modules: Frequency Hopping Setting.

Frequency Hopping Setting:

1. Get all PLL name and status: cat /proc/freqhopping/freqhopping_debug
2. Enable freqhopping:
No input: echo 1 <pll position> > /proc/freqhopping/status
With input: (1) echo 3 0 <pll position> <Edit input> >
/proc/freqhopping/freqhopping_debug
(2) echo 1 1 <pll position> 1 0 0 0 0 > /proc/freqhopping/freqhopping_debug
3. Disable freqhopping:
echo 2 3 <pll position> 0 0 0 0 > /proc/freqhopping/freqhopping_debug

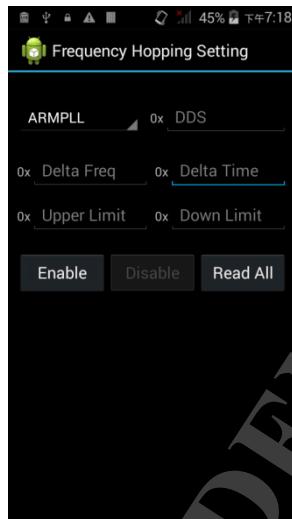


Figure 8-21 Desense Frequency Hopping Setting

8.5 IO

MSDC Module is used to set the IO capability of four SD card's pin.

hostNum: host port number which can be set to 0, 1, 2, 3.

clkPU: It is used to set the value of CLK Pad TX Pull-Up Driving Strength Control, which can be 0, 1,2,3,4,5,6,7.

clkPN: It is used to set the value of CLK Pad TX Pull-Down Driving Strength Control, which can be 0, 1,2,3,4,5,6,7.

cmdPU: It is used to set the value of CMD Pad TX Pull-Up Driving Strength Control, which can be 0, 1,2,3,4,5,6,7.

cmdPN: It is used to set the value of CMD Pad TX Pull-Down Driving Strength Control, which can be 0, 1,2,3,4,5,6,7.

dataPU: It is used to set the value of DAT Pad TX Pull-Up Driving Strength Control, which can be 0, 1,2,3,4,5,6,7.

dataPN: It is used to set the value of DAT Pad TX Pull-Down Driving Strength Control, which can be 0, 1,2,3,4,5,6,7.



Figure 8-22 MSDC UI

8.6 Memory

Memory module has two sub module: Flash , Help

“NAND Flash” module display NAND Flash information, like ID, Partitions, Size, File System , Partitions and so on.

Information about NAND Flash could get from “proc” file system. Here are three files related with NAND Flash.

/proc/driver/nand: contains NAND Flash ID, Size and working mode.

/proc/mounts: contains system mounted file system information, like mount device, mount point, FS type and so on.

/proc/mtd: contains NAND Flash partitions

1. Flash

Shows the file system information and patition information. It supports EMMC and NAND flash.

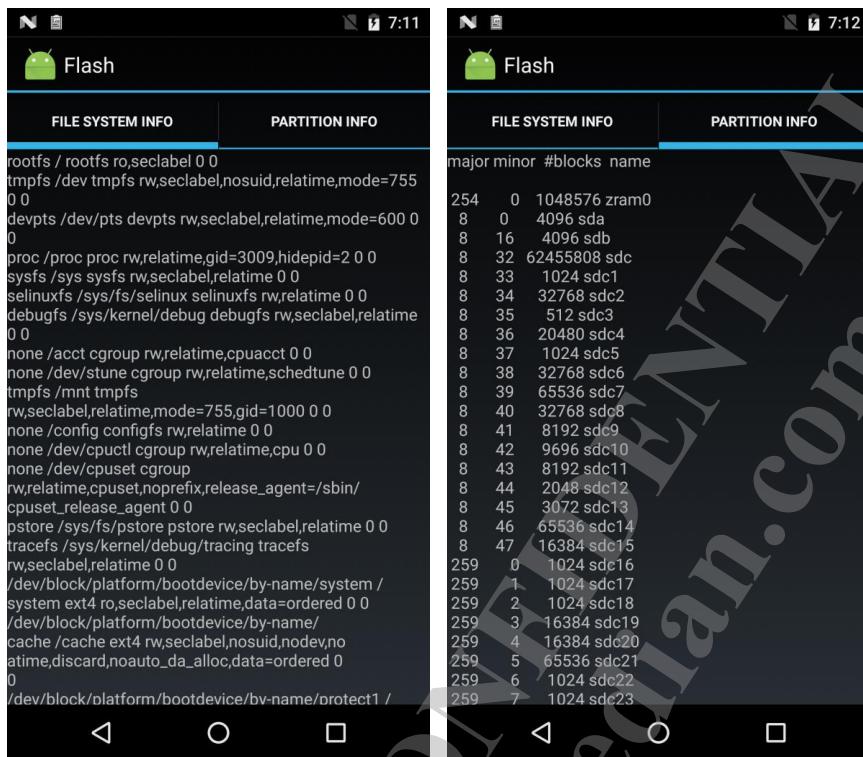


Figure 8-23 Memory Flash

2. Help

Shows the help of EngineerMode Memory->Flash feature.

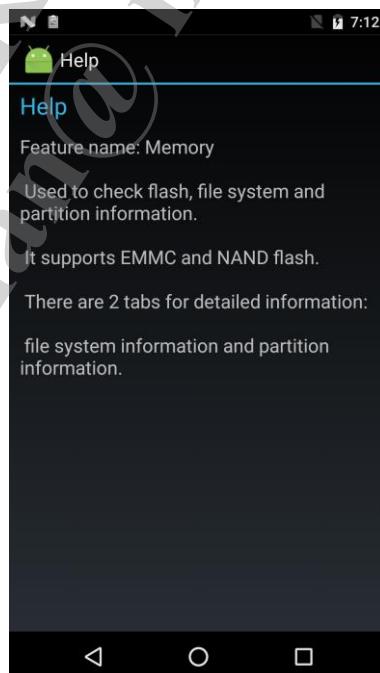


Figure 8-24 Memory Help

8.7 Non-sleep mode

Overall design

This module can keep the LCD lighted if non-sleep mode was enabled, whatever user switch to any UI;

Detail design

In android, the WakeLock of PowerManager is qualified for this aim; but the wake lock must be released, when the android component destroy(such as Activity, Service); so in order to keep LCD lighted across UI, the wake lock can't be used in Activity as usual; we need wrap a wake lock in a bound service; because the service is used only by EM, so we can use internal bound service to implement, in case other app use it too;

Wrap wake lock with internal bound service

In the internal bound service, a wake lock object was maintained; when the service was created, the wake lock object should be initialized, and when the service was destroyed, the wake lock must be released definitely;

To wrap acquire wake lock

As we know, the service will be killed, if long time no interoperation; in order to avoid this, we need to raise the priority of process service host; so we can set the service as foreground; but it is not necessary to keep the service as foreground service always, only the wake lock was acquired, it is reasonable to set service as foreground service;

To wrap release wake lock

As above mentioned, it's not necessary to keep the service as foreground, when the wake lock was released, the foreground service should be canceled;

To wrap query held state of wake lock

Provide a way to query the held state of wake lock was android do;

Init by the state of non-sleep mode

When enter non-sleep mode, the module should query the held state of wake lock, if wake lock was held, the button text should be set as disable non-sleep mode, so the user can click it to shut down non-sleep mode; otherwise, the button text should be set as enable non-sleep mode to let user open non-sleep mode;

Enable non-sleep mode

When user click enable button, use wrapped interface of the wake lock service to acquire wake lock; meanwhile, change button text to disable so that user click it to disable non-sleep mode

Disable non-sleep mode

When user click disable button, use wrapped interface of the wake lock service to release wake lock; meanwhile, change button text to enable so that user click it to enable non-sleep mode

UI design



Figure 8-25 Non-sleep Mode

8.8 Power

Power module has five sub modules: PMU \ Charge Battery \ Low Power Project Debug \ Debug Log .

- 1、 Charge Battery is used to show charging current, charger voltage, ADC Calibration value (slope &offset.)
- 2、 Used to disable GM30, or disable/enable NAFG.**CAUTION:** if GM30 is disabled, can't be enable again.

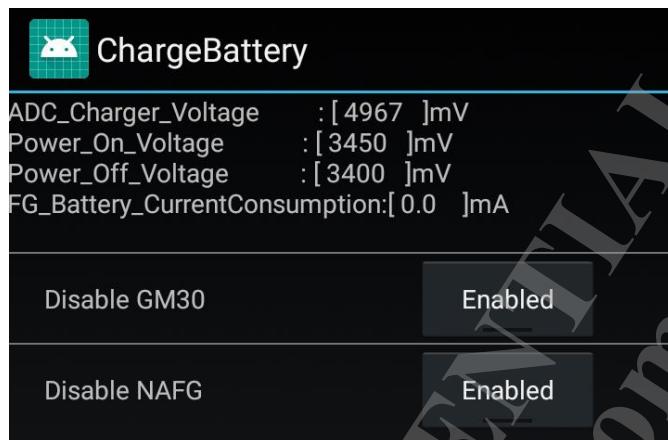


Figure 8-26 Power - Charge Battery

2、PMU is used to read and write all registers of PMIC/PMU, and show all voltages and on/off state of LDO/Buck/Booster.

The address format is x00xxxxx, such as 70001234.

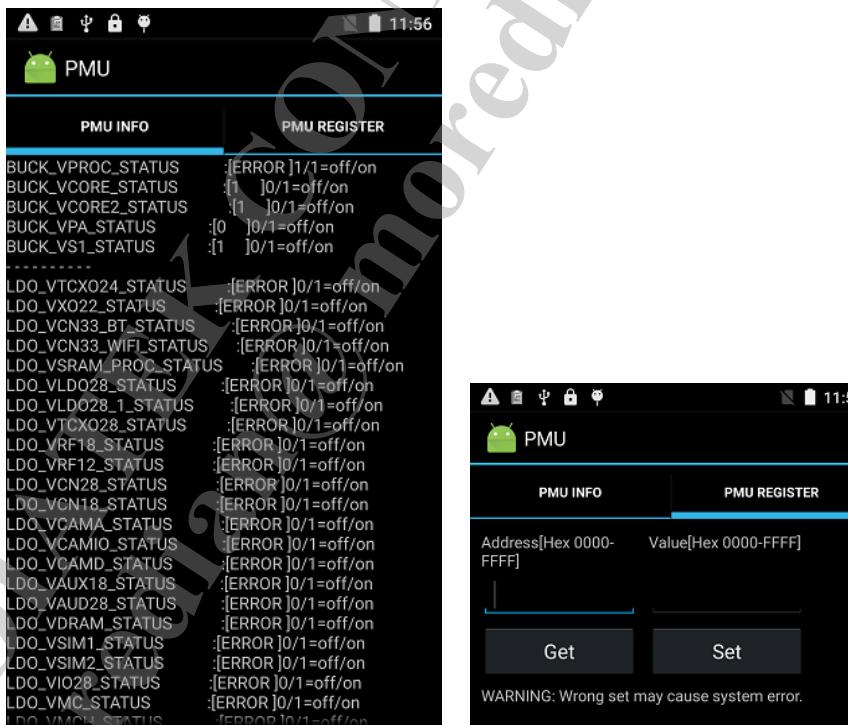


Figure 8-27 Power - PMU

3、Low Power Protect Debug

Is user to Low Power debug setting

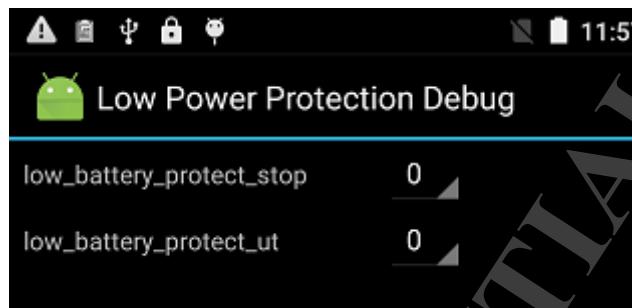


Figure 8-28 Power - Low Power Debug

5、Debug log

It used to show debug info and set debug settings.

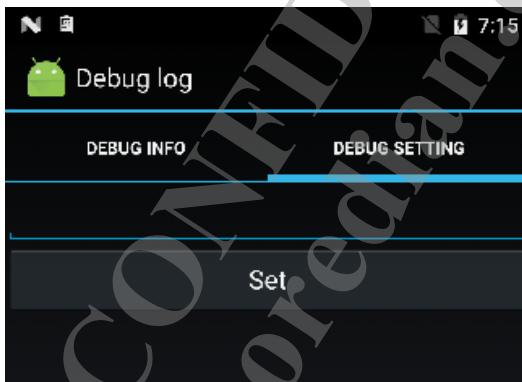


Figure 8-29 Power - Debug log

8.9 Sensor

Overall design

This module is used for sensor calibration and showing sensor information, includes:

- M-Sensor current information
- P-Sensor calibration and data collection

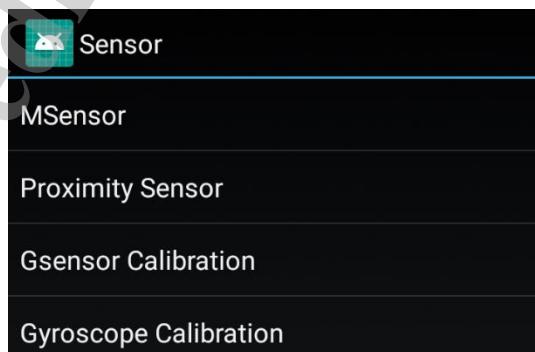


Figure 8-30 Sensor Entrance

Detail design**1. MSensor**

Show MSensor current information.

X-axis is time. And y-axis show two fields: DATA and ACC.

DATA is red, ACC is green.

The max DATA value is 1088, if DATA value is larger than the max, then set it same as the max value.

ACC is accuracy. 0, 1, 2 means the “DATA is not Good”. 3 means the “DATA is Good”.



Figure 8-31 MSensor Data Collection

2. Light/Proximity Sensor

Select “Light/Proximity Sensor” in main menu to do P-Sensor calibration and P-Sensor data collection:



Figure 8-32 PSensor Entrance

1) PS Calibration

In PS Calibration menu you can do P-Sensor calibration or change the threshold:

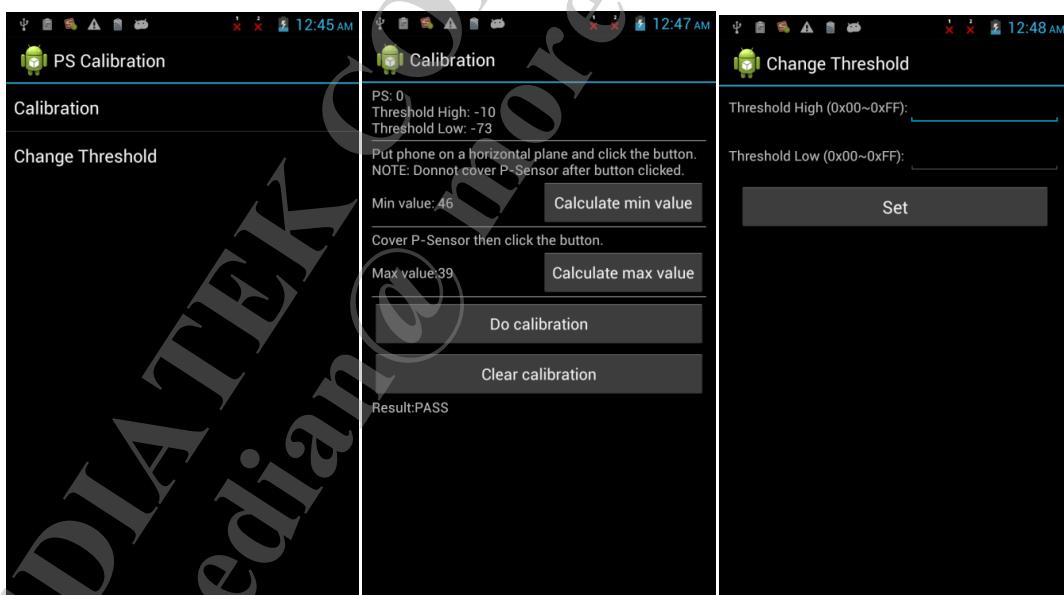


Figure 8-33 PSensor Calibration

Click the buttons to calculate min/max value, do calibration or clear calibration. It will show the result (PASS or FAIL) on screen when calibration done.

2) PS data collection

In PS data collection, you can collect data by different distances.

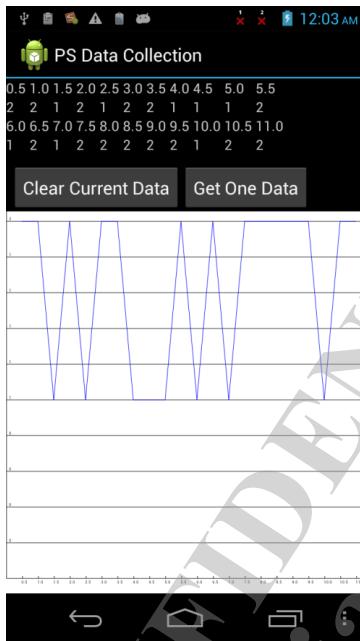


Figure 8-34 PSensor Data Collection

Click “Get One Data” to receive one data as current distance value. The last distance 11.0 means the infinitely large. When fill the last Data, the curve will be shown.

Click “Clear One Data” to clear one data in current distance value. You can get data again for the distance.

3. GSensor Calibration and Gyroscope Calibration

4. Show MSensor current information.

- 1) Show GSensor/Gyroscope current information
- 2) Start static calibration and show the calibration result and status

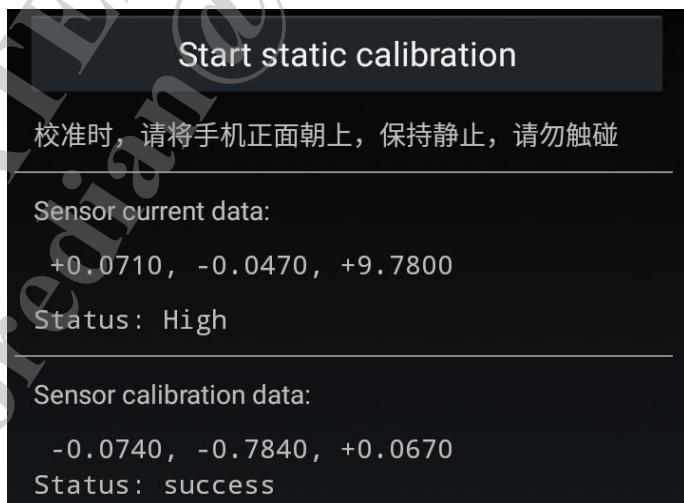


Figure 8-35 GSensor Calibration and Gyroscope Calibration

8.10 Sensor hub test

The sensor test items

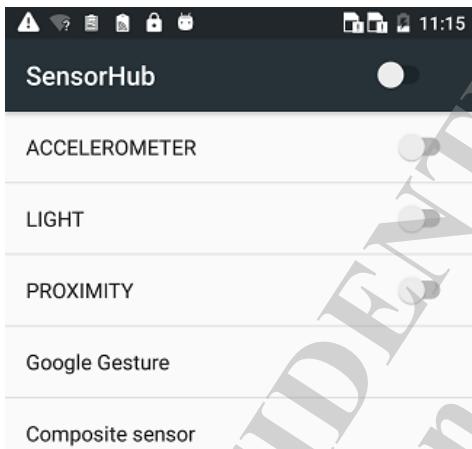


Figure 8-36 Sensor Hub Test

8.11 TouchScreen

TouchScreen item belongs to the tab of Hardware Testing. There are five list items: HandWriting, Verification, Settings, Rate Report, MultiTouch.

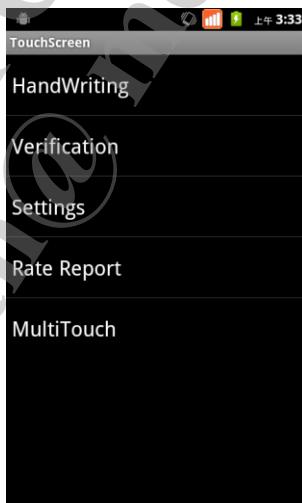


Figure 8-37 TouchScreen Entrance

HandWriting is used to test handwriting, and show outputs: the coordinates of x and y, pressure value, the speeds of x and y. User can clear the screen by pressing menu key.

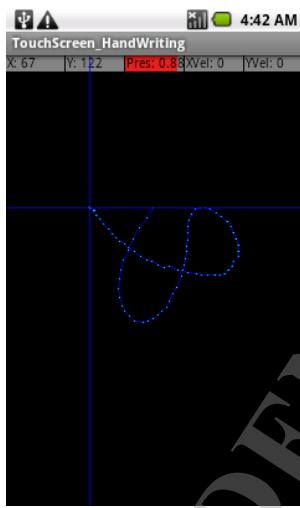
8 Hardware Testing category

Figure 8-38 TouchScreen HandWriting

Verification includes PointVerification, LineVefification and ShakingVerification.

PointVerification implements the computation of point error for one click.

point error : 35.35533905932738



Figure 8-39 TouchScreen Verification Point

LineVerification implements the computation of line error for one orientation, include vertical, horizontal, two diagonals. Press Menu to compute and test next line after user finish current line.



Figure 8-40 TouchScreen Verification Line

ShakingVerification implements the computation of shaking error. User maybe input many points for shaking when clicking screen, the test will show average shaking error of all points.

Average shaking error : 43.84494891329255



Figure 8-41 TouchScreen Verification Shaking

MultiTouch implements the test of multi touch, clear screen by pressing menu key.

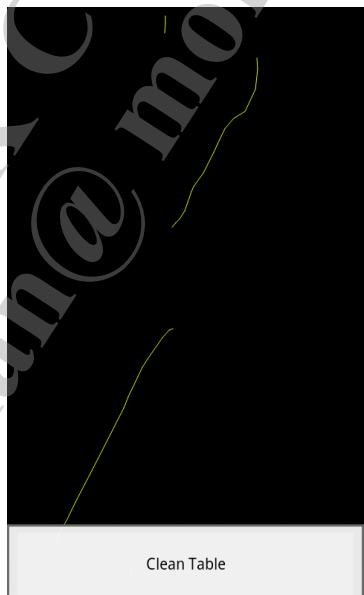


Figure 8-42 TouchScreen Verification MultiTouch

Touch Screen Settings set the style of touch log(output to uart or sd card), and other settings, such as debounce time, pressure threshold, calibration offset, idle time.

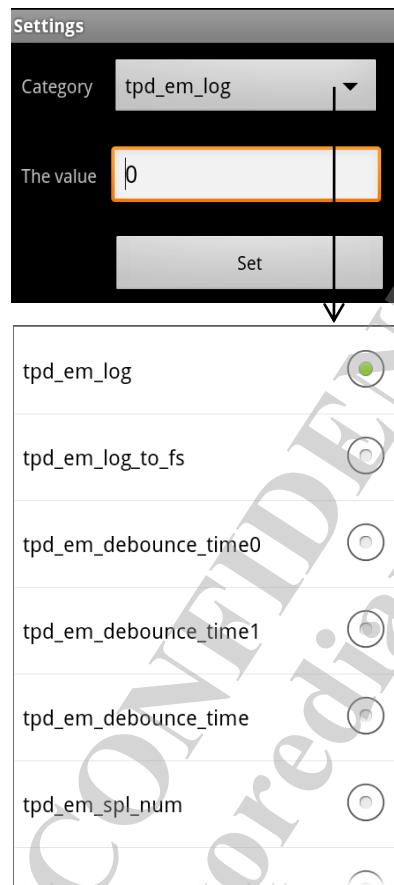
8 Hardware Testing category

Figure 8-43 TouchScreen Settings

RateReport show the position, speed, timestamp and click counts.

```
Pointer number detected: 0
pid= 0, X=127, Y=446,
Rate=70Hz, Count=49, Time=700ms
pid= 1, X=437, Y=236,
Rate=73Hz, Count=44, Time=596ms
pid= 2, X=212, Y=712,
Rate=69Hz, Count=264, Time=3809ms
pid= 3, X=411, Y=486,
Rate=73Hz, Count=159, Time=2170ms
pid= 4, X=282, Y=171,
Rate=78Hz, Count=43, Time=548ms
```

Figure 8-44 TouchScreen Rate Report

8.12 UART/USB switch

Overall design

This module can display current USB port mode; and switch USB port mode to UART or USB;

Detail design

Display current USB port mode

When enter this module, need get usb port mode and display it on UI;

To get usb port mode

```
cat /sys/devices/platform/mt_usb/portmode
```

0: USB

1: UART

Switch USB port mode to UART/USB

Use radio button to let user switch UART or USB;

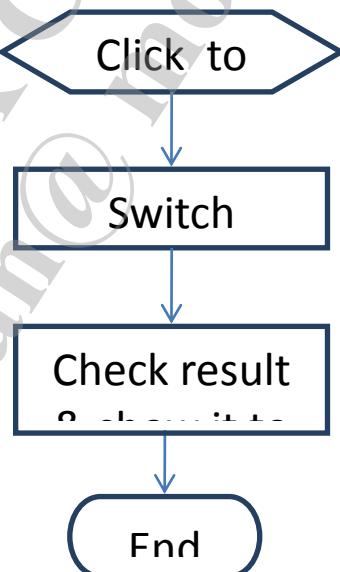


Figure 8-45 UART/USB Switch Flow

To switch usb/uart

```
SystemProperties.set("mediate.usb.port.mode", "usb"/"uart")
```

To check switch result

Get value from SystemProperties.get("mediate.usb.port.mode"); if the value equals the set value, then switch operation succeed, otherwise fail;

UI design

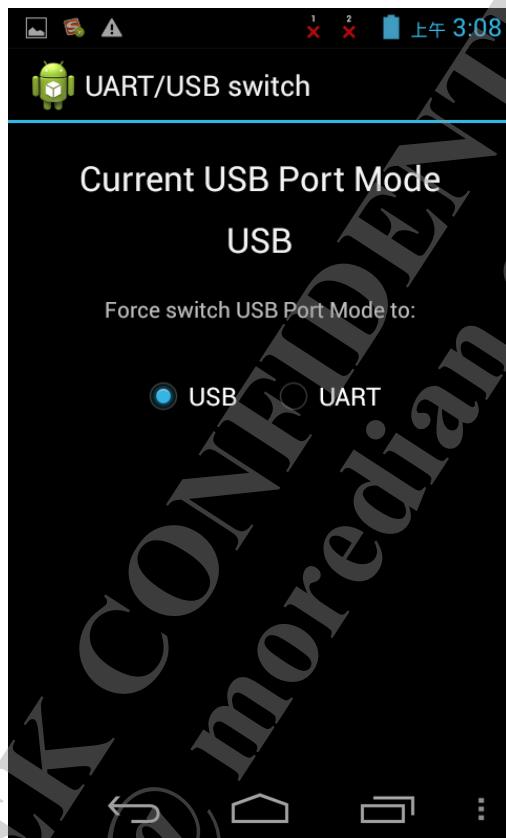


Figure 8-46 UART/USB Switch UI

8.13 USB

This module is used for testing USB's driver function.

USB IF test\USB Ex Test

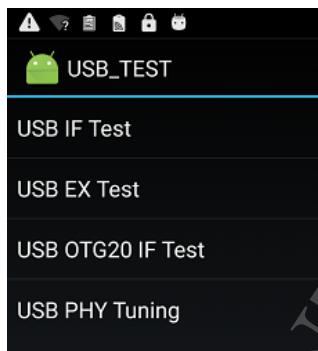
8 Hardware Testing category

Figure 8-47 USB Entrance

USB OTG20 IF Test



Figure 8-48 USB OTG2.0 IF Test

USB PHY Tuning

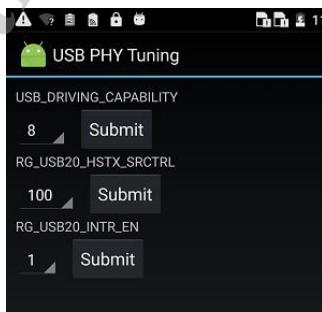


Figure 8-49 USB PHY Tuning

8.14 Video

Demo and adjust video post processing feature.

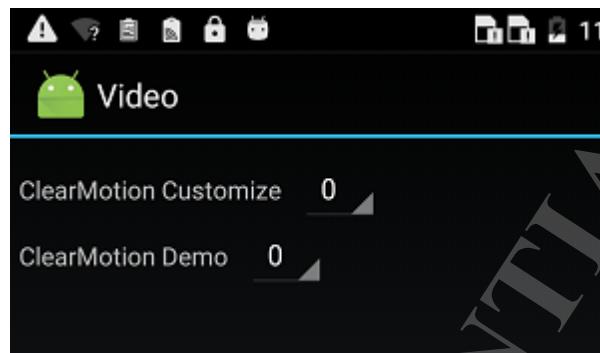


Figure 8-50 Video UI

9 Location category

9.1 Auto Dialer

This item is used to do A-GPS performance test during Emergency Call for WWOP operator.

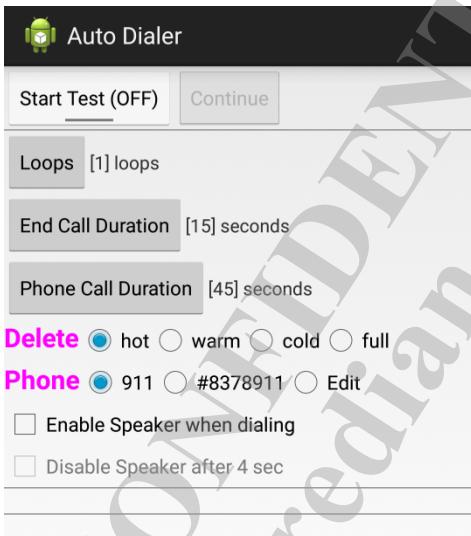


Figure 9-1 Auto Dialer main UI

9.2 Clock Quality Auto-Test tool

This item is used to do clock quality test automatically to test impact of heat source caused by different behaviors;

1. Base Function
 - List test items and test modes for user to select to test
 - Show test result in data and curve
2. Do clock quality auto test



Figure 9-2 Clock quality test tool main UI

1) Test Items select:

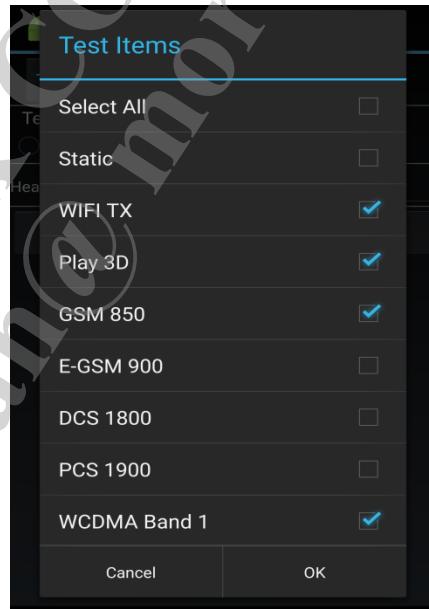


Figure 9-3 Test Items selection

- For Band test, detail test items
- 2) ClkType: Please select correct clock type before testing
- 3) Test modes:
- Signal Mode: Test with the simulate satellite signal generated by a satellite simulator in lab.
 - CW Mode: Carrier Wave test mode, test with a pure sine wave generated by a signal generator in lab.

- 4) Heating time: Period for test item opened and working
- 5) Cool time: Period for test item paused and no working
- 1) Test operation flow
 - a) Precondition:
 - Settings->Display->Screen timeout: Set to max value
 - Settings->Security->Screen lock: Set to none
 - b) Steps
 - i. ---- Select Test Items
 - ii. ---- Select test modes
 - iii. ---- Press Start button
 - iv. ---- Wait until all test done (Notification alarm will ring repeatedly)
 - c) Result
 - The result value shows in main UI
 - The detail information shows in curve after you click on the item in the test result area. Clkdriftrate is shown on the upper part, Comclkdriftrate is shown on the lower part.

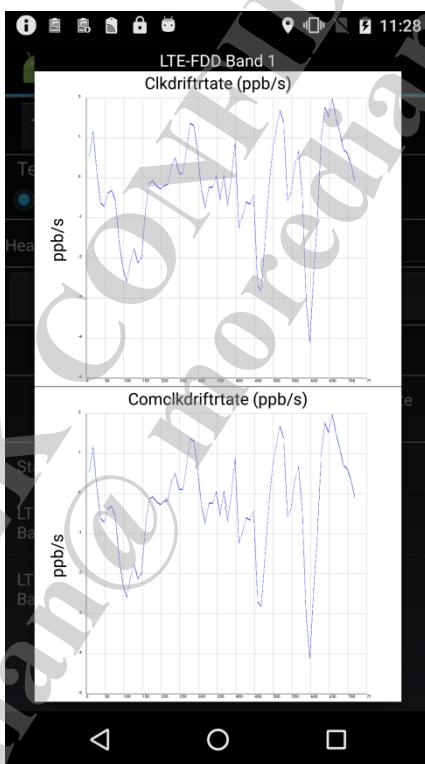


Figure 9-4 Test result chart

9.3 CW Test

This item is used to do CW test and show result.

For whole CW Test, please refers to GPS CW Test Introduction.pdf on DMS

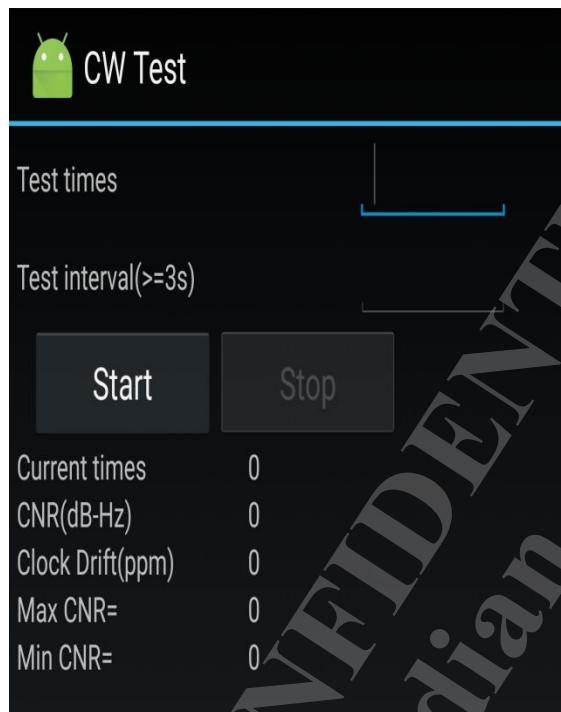


Figure 9-5 CW Test main UI

When click start button to start test, request command would be sent with socket to GPS for testing CW; when receive response of request command from GPS server, program will parse the information of the test to display on UI, such as CNR, Clock Drift and so on.

9.4 GNSS De-sense Auto Test

This item is used to do GNSS de-sense test automatically to test impact of different behavior on CNR.



Figure 9-6 GNSS De-sense Auto test main UI

1. Base Function
 - List test items, GNSS band and test modes for user to select to test
 - Show test result in data and curve
 - Support API test function for user to check the test item is supported
 - User could configure RF band for related test
 - Save and show recent 5 test result
2. Do de-sense auto test
 - 2) Test items select

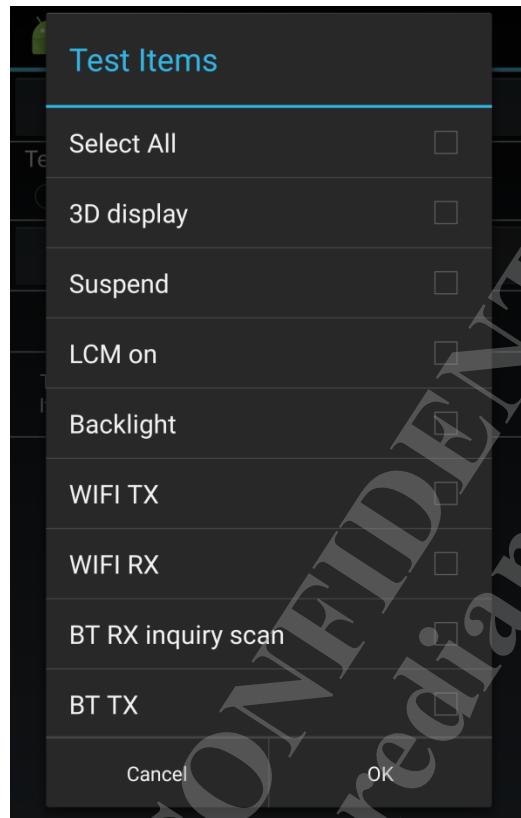


Figure 9-7 Test item selection

- To test MP3 playing: Put a MP3 file named as DesenseAT.mp3 in root path of primary storage path
 - To test Video playing: Put a 3gp file named as DesenseAT.3gp in root path of primary storage path
 - To test External SD card reading/Writing: Insert a SD card
 - To test live wallpaper: Install live wallpaper of HoloSpiralWallpaper
 - For Band test, detail test items will be generated based on config and selection on RF Band config
- 3) GNSS Band configuration: Must select detail for signal mode. GPS is the default value for CW mode

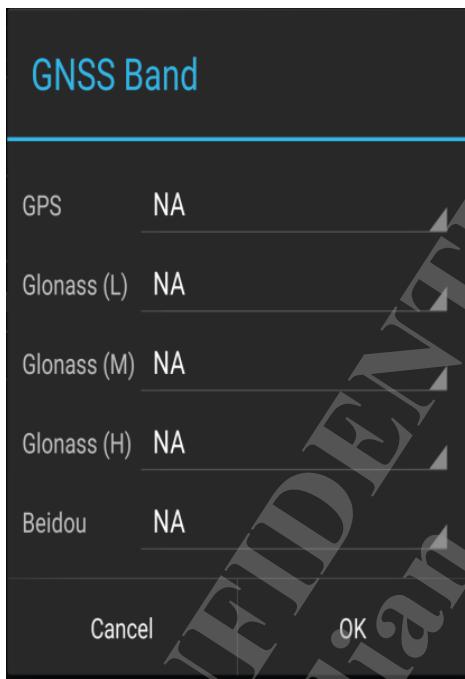


Figure 9-8 GNSS Band configuration

- 4) Test modes:
 - CW Mode: Carrier Wave test mode, test with a pure sine wave generated by a signal generator in lab
 - Signal Mode: Test with the simulate satellite signal generated by a satellite simulator in lab
- 5) Test operation flow
 - a) Steps
 - i. Select Test Items
 - ii. Select GNSS Band (Only for Signal test)
 - iii. Select test modes
 - iv. Press Start button
 - v. Wait until all test done (Notification alarm will ring repeatedly)
 - b) Result
 - The average result value shows in main UI
 - The detail information shows in curve after you click on the item in the test result area. Different color indicates different satellites system

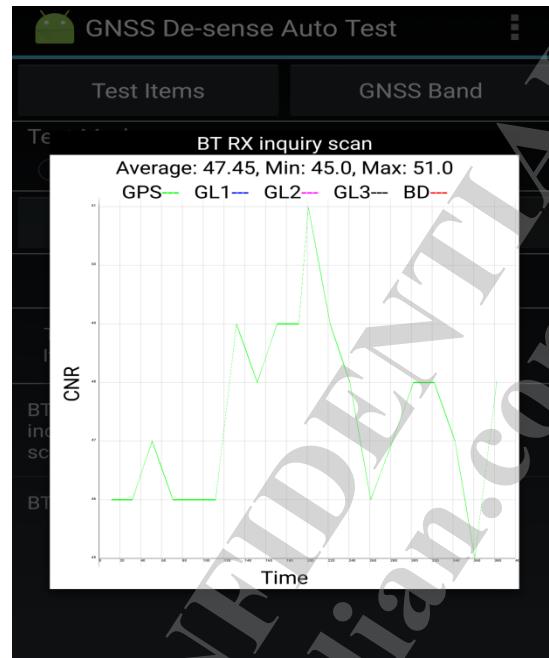


Figure 9-9 Test result chart

3. RF Band config (In option menu)

Configure detail channel and PWR for different RF band, which will effect on the test item of ***BandTest in main view. For example, If you select GSMBandTest in Test Items, 4 test items will be generated and executed during the de-sense test based on the config as the chart below.



Figure 9-10 RF Band configuration

4. API Test (In option menu)

Check if the test items are supported on the device.

The screenshot shows a mobile application titled "API Test". At the top is a "Start" button. Below it is a table with two columns: "Test Item" and "Result". The "Test Item" column lists various system functions, and the "Result" column shows "PASS" for all of them. The table rows are as follows:

Test Item	Result
Backlight	PASS
WIFI TX	PASS
WIFI RX	PASS
BT RX inquiry scan	PASS
BT TX	PASS
Live wallpaper	PASS
MP3 playing	PASS
Video playing	PASS
Phone storage reading	PASS
Phone storage writing	PASS

Figure 9-11 API Test

5. History (In option menu)

Show recent 5 history test result with both data and curve.

9.5 Location Based Service

Please refer to document of LBS_Customer_Support_Document_v5.0.pdf on DMS

9.6 YGPS

1. Base Function

- Display current satellites information in chart
- Display location fix related parameters and information about chip and clock. Supply interface for some function control
- Show and save NMEA Logs
- Supply interface for GPS auto test of different restart type, and show test result

2. Satellites tab

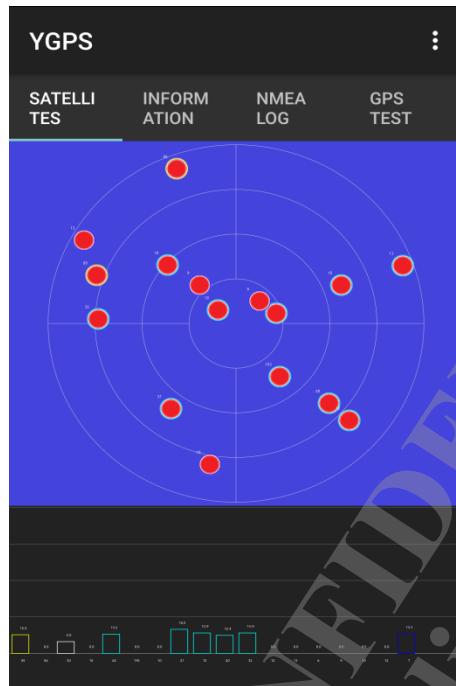


Figure 9-12 Satellites tab

After a group of GSV NMEA logs are received, the satellites information in GSV NMEA logs will display on the satellites tab view.

On the above blue view, satellites show with the location calculated based on elevation and azimuth.

1). The color of the point means different status:

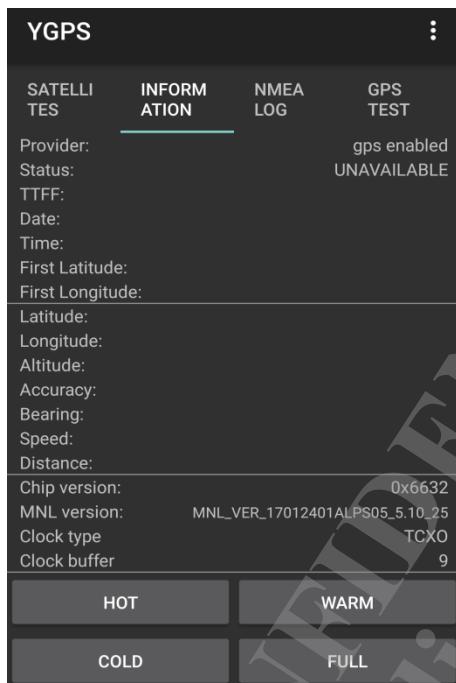
- a. Red: When fixed, means the signal is zero or not available; when not fixed, all satellites would be showed with this color
- b. Yellow: Fixed, but not used to compute location information
- c. Green: Fixed, and used to compute location information

2). The color of the circul around the point means different satellites system:

- a. Cyan: GPS
- b. Yellow: Glonass
- c. White: Galileo
- d. Blue: Beidou

On the below black view, satellites SNR displays in chart. The height indicates the SNR, and detail SNR value and satellites PRN number are both listed. The color shows same information as the satellites location chart.

3. Information tab

**Figure 9-13 Information tab**

- 1) This tab shows following information:
 - GPS provider status and location fix status
 - First location fix latitude /longitude/ TTFF
 - Latest location latitude/longitude/altitude/accuracy/Bearing/Speed/Date/Time
 - Distance between latest two location
 - Chip/MNL version
 - Clock information
- 2) This tab supplies following function with buttons:
 - Hot/Warm/Cold/Full restart
 - EPO/QEPO
 - AGPS restart
 - GPS log enable/disable
4. NMEA log tab

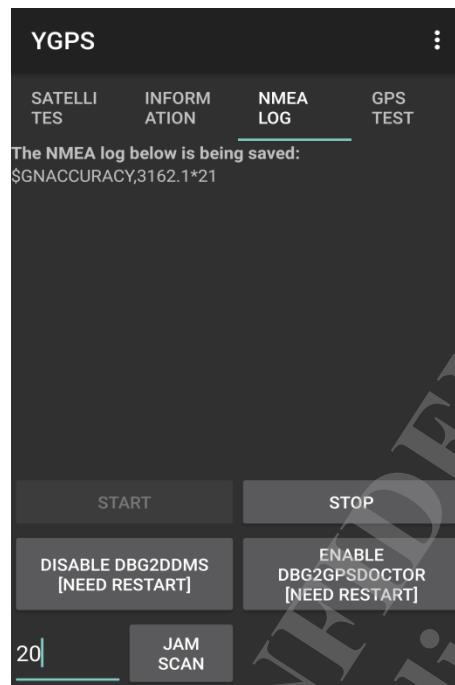


Figure 9-14 NMEA log tab

This tab supplies following function with buttons:

- Show current received NMEA log
- DBG2DDMS/DBG2GPSDoctor enable/disable
- JAM scan

5. GPS test tab



Figure 9-15 GPS test tab

9 Location category

This tab supplies GPS auto test function. User could set some parameters, such as number of tests, time interval between two tests, and GPS start type, to start location fix to test GPS stability, and get performance and accuracy data during the auto test.

The data after the tests includes:

- 1) 68% TTFF, 95% TTFF, last TTFF, Max TTFF and mean TTFF
- 2) 68% CEP, 95% CEP, last CEP, Max CEP and mean CEP

6. Other function

In the option menu, there are two function:

- 1) Show location: After enabling this function, a toast will show with the location information each time location changes
- 2) Run in BG: After enabling this function, YGPS could work on background when it is switch out from foreground, and could be entered through notification on notification bar.

10 Log and Debugging category

Log and debugging category provides some log function and log application entrance.

10.1 ATCI

ATCI test case is for setting a switch for ATCI on user load and userdebug load . On eng load , ATCI is always enable.

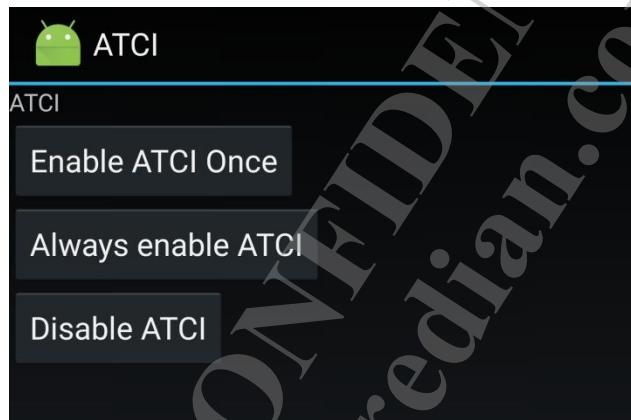


Figure 10-1 ATCI main UI

10.2 Battery Log

BatteryLog includes battery information as below:

1. Battery status
2. Battery level
3. Battery scale
4. Battery health
5. Battery voltage
6. Battery temperature
7. Battery technology
8. Time since boot

Start to record Battery log when user press start button. The logs will be saved in the folder /sdcard/batterylog/. File name is the system time of starting to record. Stop to record when user press stop button. User can set different record intervals. If there is no sdcard, user will be informed.

Stop and restart charging by press Stop and Restart button.

Rise and reduce current by press Rise and Reduce button.

Set battery temperature by fill Battery temperature textview and set the temperature by press Set button.

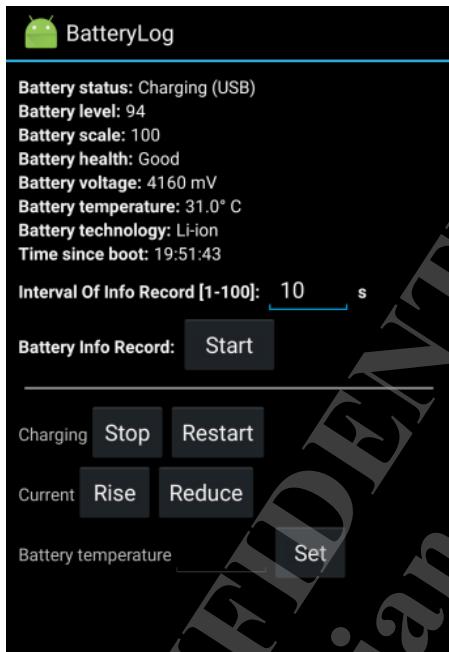
10 Log and Debugging category

Figure 10-2 Battery Log main UI

10.3 Debug Utils

Debug Utils is for setting AE level and enable or disable Red screen.

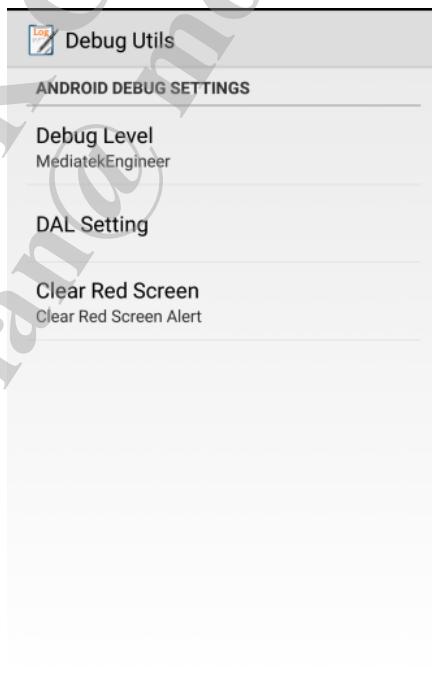


Figure 10-3 Debug Utils main UI

10.4 MD Log Filters

MD Log Filters is used to config different Modem Log filter files.

The pre-built in filters will be listed on the UI by default.

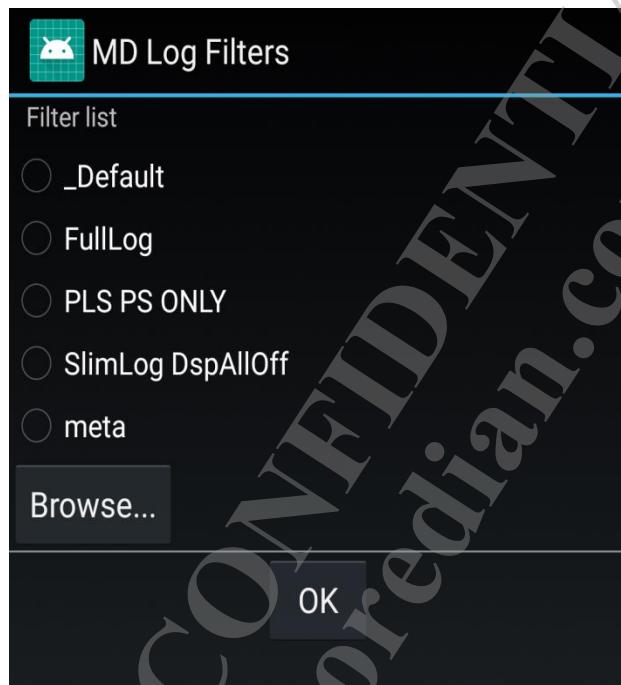


Figure 10-4 MD Log Filters

There are two ways to replace MD log filter file

1. Use pre-built in filter
 1. Select filter in the filter list
 2. Press OK button
 3. A toast will show the result
2. Use customized filter
 - a. Push the customized filter file to device storage
 - b. Press Browse button to show File browser
 - c. Select valid filter file, and the file name will show on the Filter list
 - d. Select the new added item in filter list
 - e. Press OK button
 - f. A toast wil show the result

10.5 Modem Reset Delay Setting

Modem Reset Delay Setting set the time for modem exchange to catch modem log.

Fill the time on the textview , and press the Set button to set the time

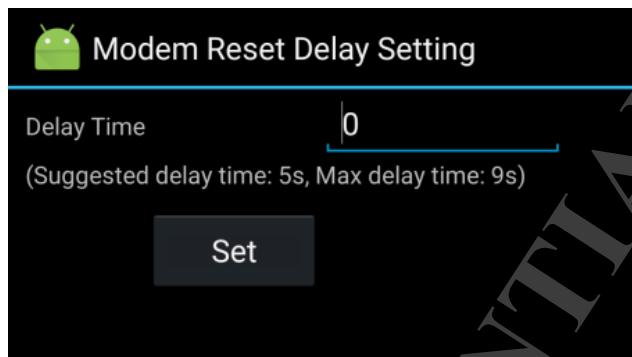


Figure 10-5 Modem Reset Delay Setting main UI

10.6 Modem Warning Setting

Modem Warning Setting is used to turn on/off Yellow Screen feature. When Modem Warning happens, it will show a yellow screen with necessary information to user.

Select “Modem Warning Setting” in Log and Debugging tab to enter the menu. And use the checkbox to switch on/off it.

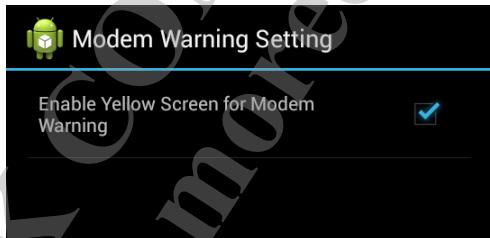


Figure 10-6 Modem warning setting main UI

10.7 MTKLogger

Please refer to MTKLogger_Introduction_for_SmartPhone.pptx on DMS.

10.8 Telephony Log Setting

To reduce log amount, some telephony and incall UI log is disabled by default. User could turn on/off these logs by clicking button on this item.

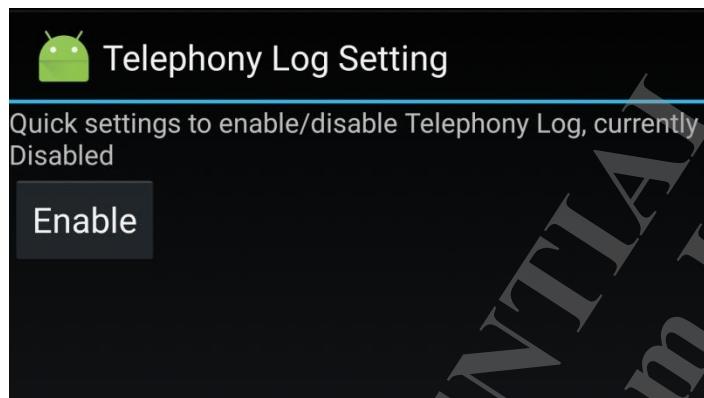


Figure 10-7 Telephony Log Setting main UI

10.9 Video Log

To reduce log amount, some video related log is disabled by default. User could turn on/off these logs by clicking checkbox on this item.



Figure 10-8 Video Log main UI

10.10 Wcn coredump

Wcn coredump is used to enable/disable wcn coredump function by checking/unchecking the checkbox.

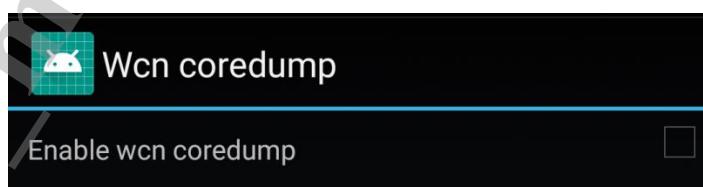


Figure 10-9 Wcn coredump

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11 Others category

Others category includes items not devided into above category.

11.1 MDM Configure

This item is used to enable/disable MDM service for FT.

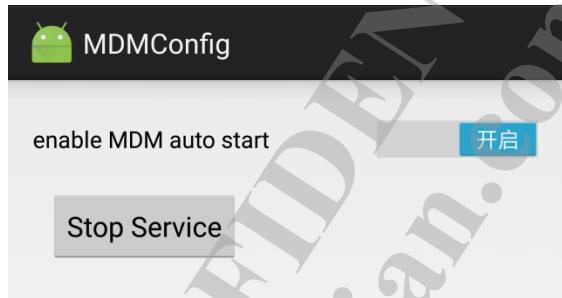


Figure 11-1 MDM Configure main UI

11.2 MDML Sample

This item is a sample for MDM framework rds to study how to use MDM framework.

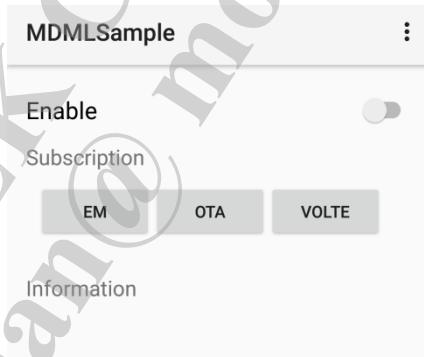


Figure 11-2 MDML Sample main UI

11.3 MoMs

This item is used to disable MoMs for CTS test and Reenable MoMs.

User should disable MoMs before run CTS, otherwise it will cause CTS fail.

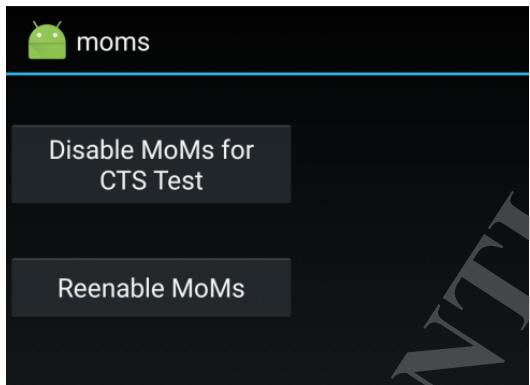


Figure 11-3 MoMs main UI

11.4 SWLA

This item is used to assert Modem and Enable Software LA. If modem assertion is valid, toast report success.

User could force modem Exception to gen coredump for debugging and simulate TRM flow.

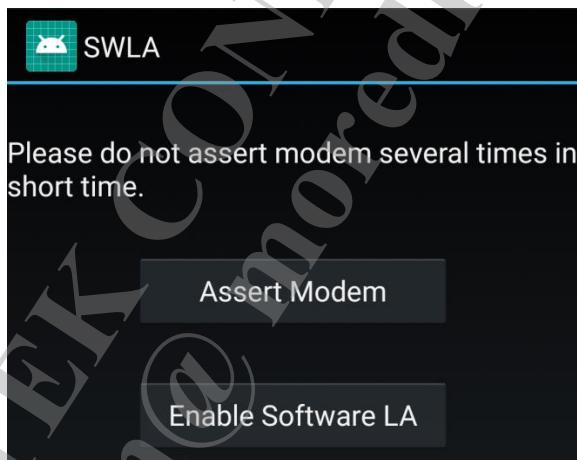


Figure 11-4 SWLA main UI

11.5 System Update

This item is used to provide system update option

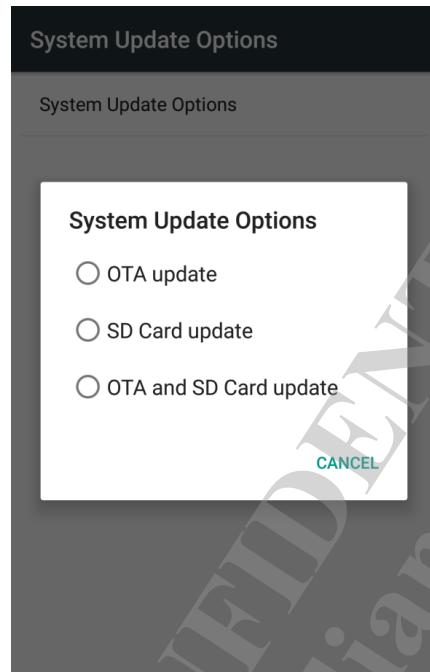


Figure 11-5 System Update main UI

11.6 USB ACM

This module is used to open or close USB ACM port.

Press “Open GS0/GS1/GS2/GS3 port” buttons to open corresponding ACM port. And pressing “Close port” button will reset the setting.

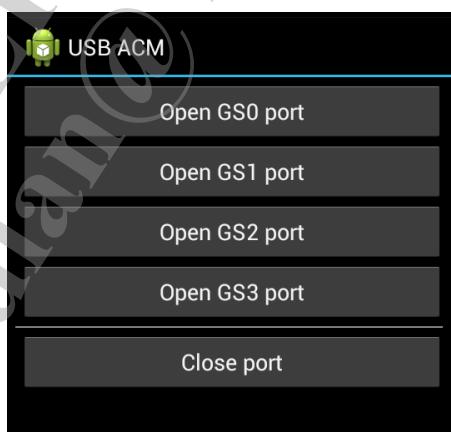


Figure 11-6 USB ACM main UI

12 Use EngineerMode for security on user load

This chapter gives a description about EngineerMode on user load.

12.1 EngineerMode on\off on user load

Engineer Mode is mainly for developer, and none of EngineerMode function is for end user. So it is recommended to remove the function for end user.

If you want to remove EngineerMode from user load, you can do as below.

Table 12-1 How to remove EngineerMode

Module	Module Name	Config method	Unauthorized reproduction or disclosure of this information in whole or in part is strictly prohibited.
Engineer Mode	Engineer Mode	Update /device MEDIATEK/projectXXX/ProjectConfig.mk Before: MTK_ENGINEERMODE_APP = yes After: MTK_ENGINEERMODE_APP = no Then rebuild your load. The Engineer Mode will not build into your load	<small>© 2018 MediaTek Inc.</small>

12.2 EngineerMode keep on user load

Some of the function in Engineer Mode is for Bluetooth qualification, Wi-Fi qualification, and operator lab test or debug. So qualification/test may be affected if this feature is removed from user load.

Some function may be quite helpful for customer user load verification.

So we keep EngineerMode on user load with less feature scope. The feature not required on user load will be hidden by default.

There are two types of such hidden items

12.2.1 No need for user load by default

You can see the items at:

`vendor MEDIATEK proprietary packages apps EngineerMode src com MEDIATEK engineermode PrefsFragment.java`

```
private void removeUnsupportedItems() {
    if (FeatureSupport.isUserLoad()) {
```

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```

removePreference(screen, "mbim");
removePreference(screen, "rat_config");
removePreference(screen, "msim");
removePreference(screen, "iatype");
removePreference(screen, "vt_3g");
removePreference(screen, "conference");
//connectivity
removePreference(screen, "bt_profile");
removePreference(screen, "cds_information");
removePreference(screen, "cm_settings");
removePreference(screen, "nfc");

.....
}

}

```

Some of the source code for above hidden items are not built in on user load to save memory. You can check the Android.mk for details.

12.2.2 No need for customer user load by default

Some of items that only use at MTK internal development, which are not needed for customer usage . Such kind of items will be hidden for customer user load.

If users want to use these function, user must set feature option like below.

Table 12-2 How to enable customer user load feature

Module	Module Name	Config method
Engineer Mode	Engine Mode	<p>Update /device/mediatek/projectXXX/ProjectConfig.mk</p> <p>Before:</p> <p>MTK_CUSTOM_USERLOAD_ENGINEERMODE = no</p> <p>After:</p> <p>MTK_CUSTOM_USERLOAD_ENGINEERMODE = yes</p> <p>Then rebuild your load.</p> <p>The limit as below will remove, you can the full funtions</p>

The function is:

1 Sub-items in EM menu

- auto_answer(if your sim card is test sim,can use without open the option)
- bip

12 Use EngineerMode for security on user load

- atci

2 EM server

The em_srv will not build at customer user load. Function depending on em_svr will not work (All of the items shown on customer user load by MTK default configuration do not depend on em_svr).

3 User reminder dialog

If your load is customer user load, and you want to dial *#*#3646633#*#* to entry EM

You will see the dialog:

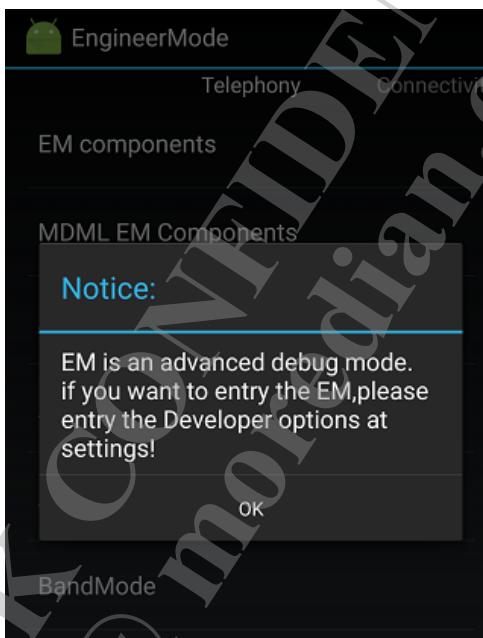


Figure 12-1 Developer option warning dialog

You should switch to developer option by below steps:

Settings->about phone->press build number t times->develop options->switch button on

12 Use EngineerMode for security on user load

Figure 12-2 Enable developer options

13 Configuration/Customization Guideline

This chapter gives a description of a group of features' configurations guideline.

13.1 EngineerMode Configuration/Customization

13.1.1 Options.

EngineerMode apk could be controlled by feature option of MTK_ENGINEERMODE_APP.

If EngineerMode is needed, please set MTK_ENGINEERMODE_APP = yes

If EngineerMode is not needed, please set MTK_ENGINEERMODE_APP = no

13.1.2 Source Code Modifications

All EngineerMode apk source code could be modified in the path of

alps\vendor\mediatek\proprietary\packages\apps\EngineerMode

13.1.3 Build Commands

mmm -B vendor/mediatek/proprietary/packages/apps/EngineerMode

13.2 YGPS Configuration/Customization

13.2.1 Options

YGPS apk could be controlled by feature option of MTK_GPS_SUPPORT.

If YGPS is needed, please set MTK_GPS_SUPPORT = yes

If YGPS is not needed, please set MTK_GPS_SUPPORT = no

13.2.2 Source Code Modifications

All YGPS apk source code could be modified in the path of

alps\vendor\mediatek\proprietary\packages\apps\YGPS

13.2.3 Build Commands

```
mmm -B vendor MEDIATEK/proprietary/packages/apps/YGPS
```

14 Workflow

EngineerMode is a Java application, including Jni implementation with C++. EM supply user interface and has many ways to interact with lower layer for function implementation.

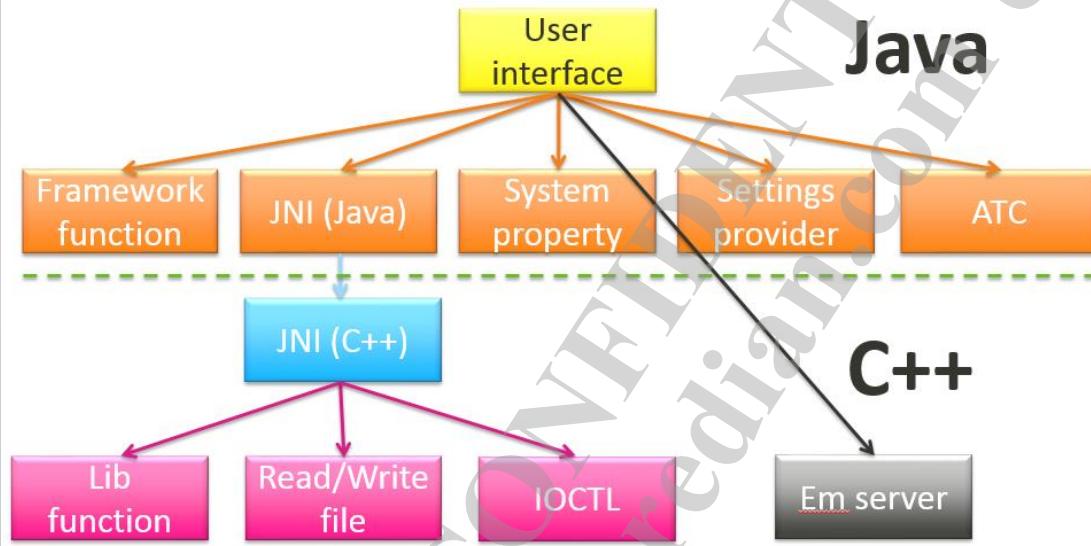


Figure 14-1 EM application interact with lower layer

14.1 EM server workflow

EM server is a Linux process, and is started during the phone startup. EM server could be configured in init.rc file.

EngineerMode application interacts with EM server by TCP connection for some function implementation.

The interaction work flow is as below:

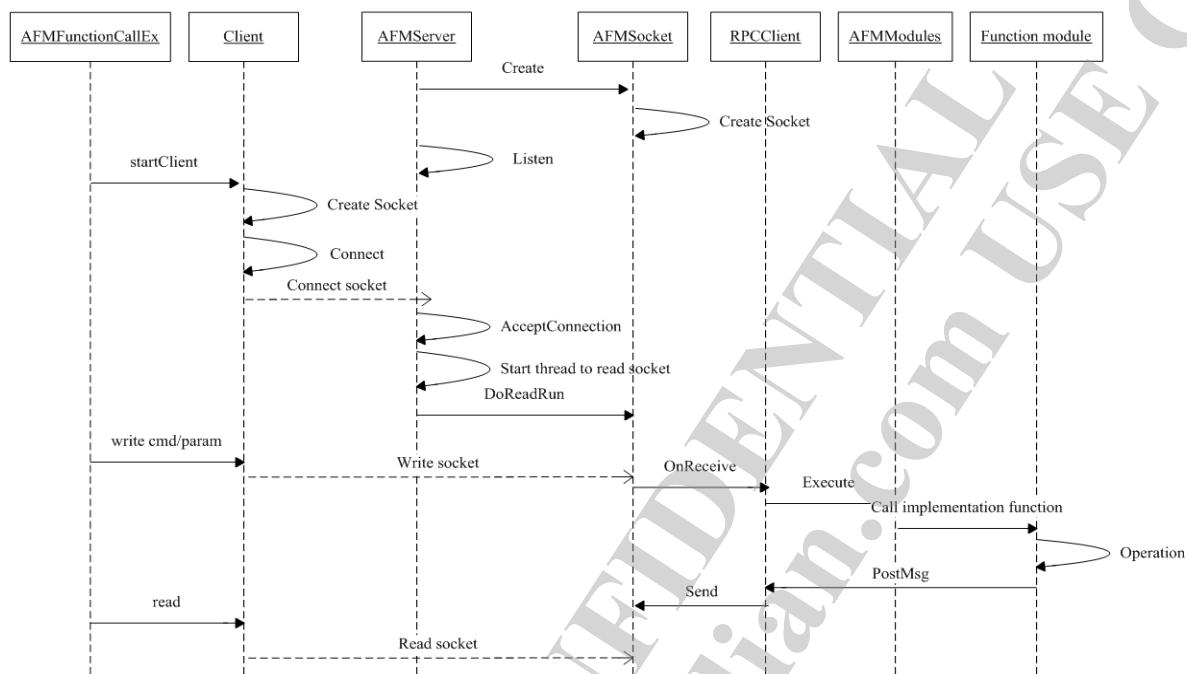


Figure 14-2 EM application interact with EM server

15 Troubleshooting

15.1 Why there is no Em server on load?

1. Check if MTK_GMO_RAM_OPTIMIZE is yes. If yes, to save memoy on GMO load, Em server is not built in.
2. Check if customer user load. If yes, please turn on MTK_CUSTOM_USERLOAD_ENGINERMODE feature option (We recommend to turn off the whole EngineerMode feature for customer user load. So please be carefull about turning on features for user security consideration)

16 Frequently Asked Questions

16.1 FAQ - How to remove EM from user load?

Update /device MEDIATEK/projectXXX/ProjectConfig.mk

Before:

MTK_ENGINEERMODE_APP = yes

After:

MTK_ENGINEERMODE_APP = no

Then rebuild your load.

16.2 FAQ - How to start YGPS by adb command?

adb shell am start -n com MEDIATEK.ygps /. YgpsActivity

16.3 FAQ – Why the item of *** is not found?

The most possible reason is that the item is hidden on user load. Please refer to Chapter 12

16.4 FAQ – Why the menu of *** is grey?

The menu for some items in EngineerMode is just an entrance, which means the implementation is in other application. If the corresponding application is not installed, the menu will turn grey.