CASTLES TECHNOLOGY

VEGA3000UltraLite

Book 2

User Manual

Confidential

Version1.1

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Revision History

Version	***Date***	***Descriptions***
1.0	Jul 12, 2016	Initial creation.
1.1	Aug 11,2016	1. Add “2.2. Power Supply”. 2. Add “2.3. Environment”.

Contents

1. Introduction

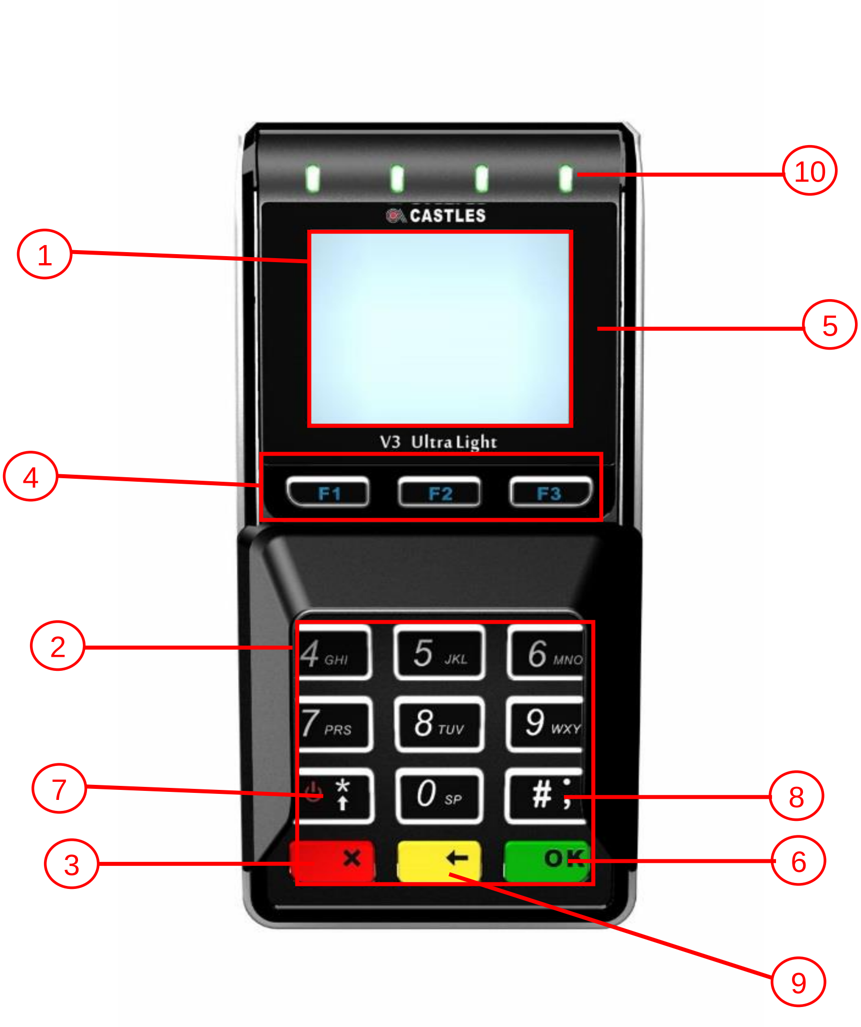
This document provides a guideline on operating and configuringCastles VEGA3000UltraLite.

The scope of this document includes setting up the terminal, basic operation, application life cycle, and some advance features.

2. Hardware Setup

2.1. Parts of the Surface

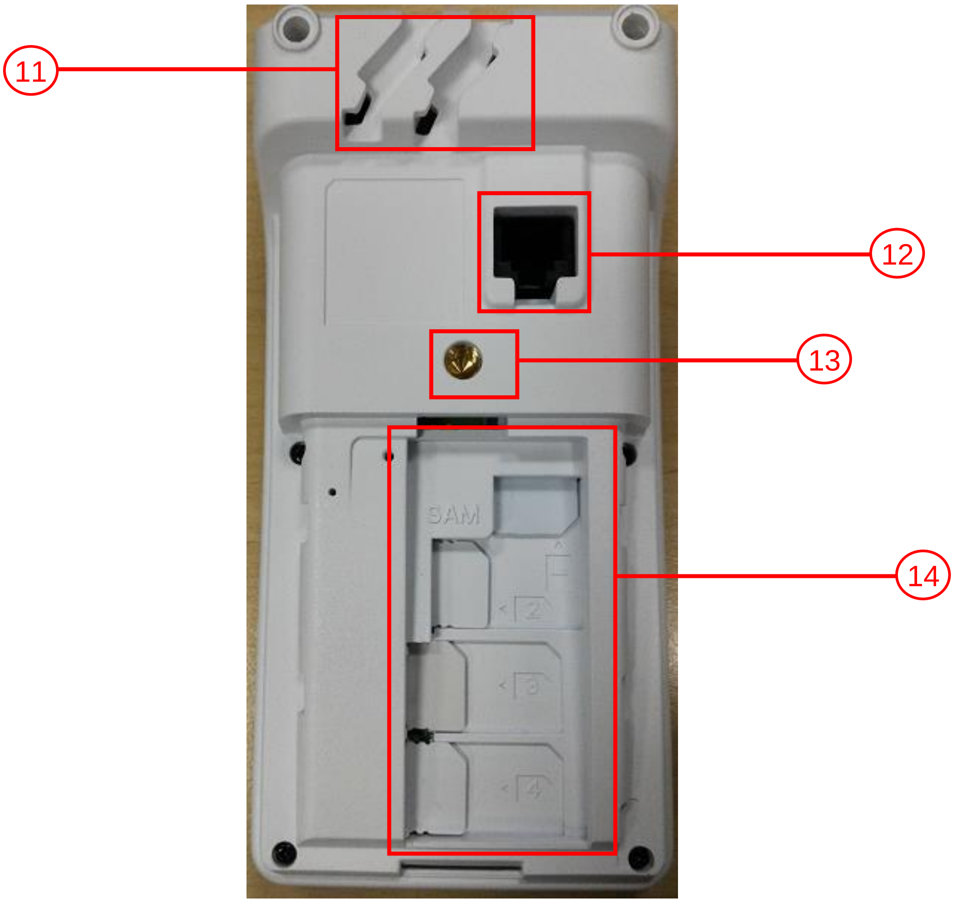
Front Side



VEGA3000 UltraLite

1. **LCD Display (MonoColor)**
2. **Keyboard**
3. **Cancel Key**
4. **0 / Funtion Key**
5. **Contactless Card Landing Zone**
6. **OK /Enter Key**
7. **Up Key**
8. **Down Key**
9. **Clear Key**
10. **Contactless LED**

__Rear Side__



11. Wiring Slot
12. COM Port
13. Anti-theft Lock
14. SAM Slot (SAM1, SAM2, SAM3, SAM4)

__Side__

2.2. Power Supply

- DC Input: 9V/1A
- USB: 5V/1A

2.3. Environment

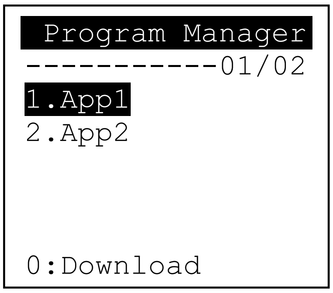
- Operating: 0℃~40℃,5% to 90% non-condensing
- Storage: -20℃~70℃

3. Basic Operation

3.1. Program Manager

Upon power on, terminal will enter Program Manager if not default application selected. All user applications are list in Program Manager. User may select an application and run the application or view the application info, delete the application or set to default run upon power on. User may enter System Menu to configure terminal settings.

Program Manager

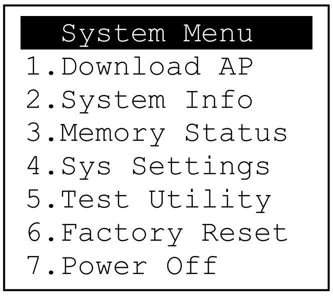


```
 Program Manager
-----------01/02
1.App1
2.App2



0:Download
```

- Press[0] button to enter System Menu.
- Press [1] button to toggle default application selection.
- Press [2] button to delete application.
- Press [3] button to view application info.
- Press [OK] button to run application.
- Press [*] or [#] toup and down for applicationselection.

System Menu

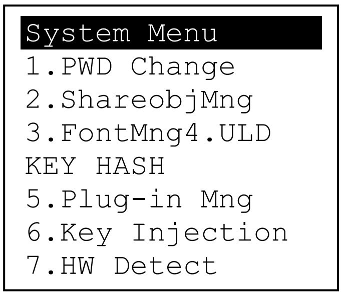
Page 1



```
  System Menu
1.Download AP
2.System Info
3.Memory Status
4.Sys Settings
5.Test Utility
6.Factory Reset
7.Power Off
```

- Press [#] button to page 2.

Page 2



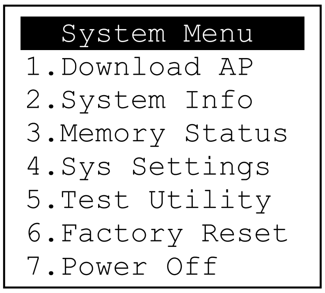
```
System Menu
1.PWD Change
2.ShareobjMng
3.FontMng4.ULD
KEY HASH
5.Plug-in Mng
6.Key Injection
7.HW Detect
```

- Press [*] button to page1.
- Press [#] button to page3.

3.2. Download AP

Download user application or kernel modules firmware.

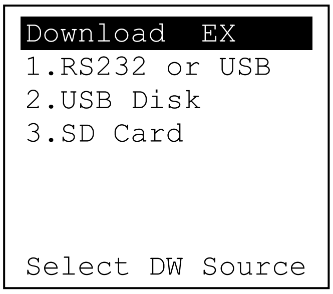
System Menu



```
  System Menu
1.Download AP
2.System Info
3.Memory Status
4.Sys Settings
5.Test Utility
6.Factory Reset
7.Power Off
```

- Press [1] button to enter Download AP menu.

Download AP Menu



```
Download  EX
1.RS232 or USB
2.USB Disk
3.SD Card



Select DW Source
```

Select download source:

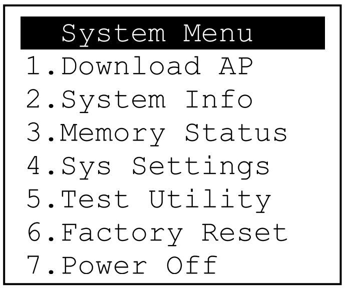
- Press [1] button to select source as RS232 or USB connection and enter ULD download mode.
- Press [2] button to select source as USB disk.

- Press [3] button to select source as SD card.

3.3. System Info

View kernel module firmware information.

System Menu

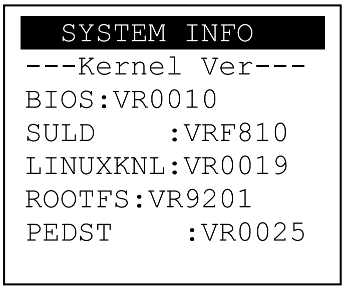


```
 System Menu
1.Download AP
2.System Info
3.Memory Status
4.Sys Settings
5.Test Utility
6.Factory Reset
7.Power Off
```

- Press [2] button to enter System Info menu.

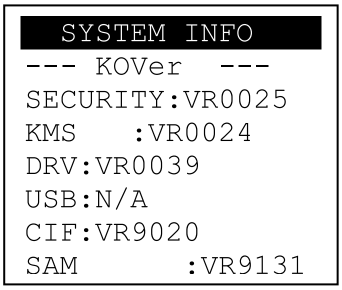
System Info Menu

Page 1



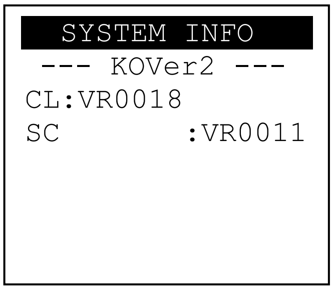
```
 SYSTEM INFO
---Kernel Ver---
BIOS:VR0010
SULD    :VRF810
LINUXKNL:VR0019
ROOTFS:VR9201
PEDST     :VR0025
```

Page 2



```
 SYSTEM INFO
--- KOVer  ---
SECURITY:VR0025
KMS    :VR0024
DRV:VR0039
USB:N/A
CIF:VR9020
SAM       :VR9131
```

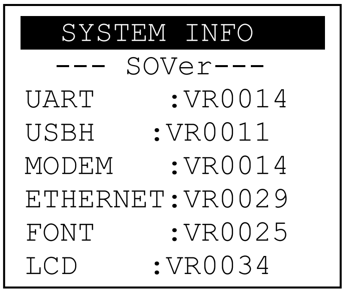
Page 3



```
 SYSTEM INFO
 --- KOVer2 ---
CL:VR0018
SC         :VR0011
```

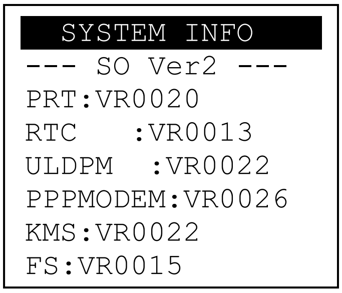
- Press [#] button to next page.

Page 4



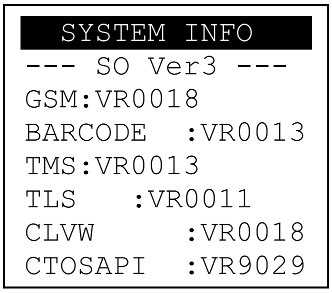
```
 SYSTEM INFO
  --- SOVer---
UART     :VR0014
USBH   :VR0011
MODEM    :VR0014
ETHERNET:VR0029
FONT     :VR0025
LCD    :VR0034
```

Page 5



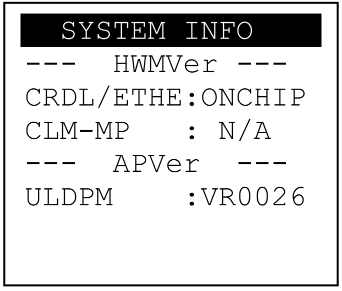
```
 SYSTEM INFO
--- SO Ver2 ---
PRT:VR0020
RTC    :VR0013
ULDPM   :VR0022
PPPMODEM:VR0026
KMS:VR0022
FS:VR0015
```

Page 6



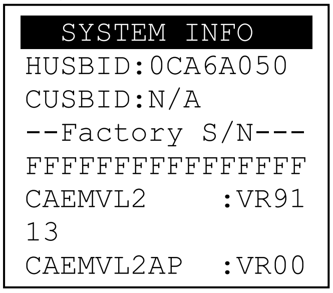
```
 SYSTEM INFO
--- SO Ver3 ---
GSM:VR0018
BARCODE   :VR0013
TMS:VR0013
TLS    :VR0011
CLVW      :VR0018
CTOSAPI   :VR9029
```

Page 8 Page9

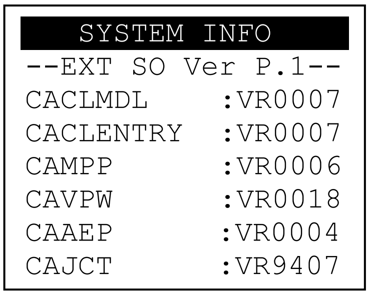


```
 SYSTEM INFO
---  HWMVer ---
CRDL/ETHE:ONCHIP
CLM-MP    : N/A
---  APVer  ---
ULDPM    :VR0026
```

Page 10

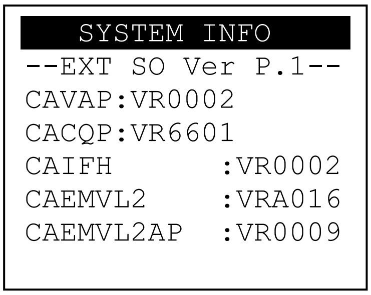


```
 SYSTEM INFO
HUSBID:0CA6A050
CUSBID:N/A
--Factory S/N---
FFFFFFFFFFFFFFF
CAEMVL2     :VR91
13
CAEMVL2AP   :VR00
```



```
 SYSTEM INFO
--EXT SO Ver P.1--
CACLMDL     :VR0007
CACLENTRY   :VR0007
CAMPP       :VR0006
CAVPW       :VR0018
CAAEP       :VR0004
CAJCT       :VR9407
```

Page 11

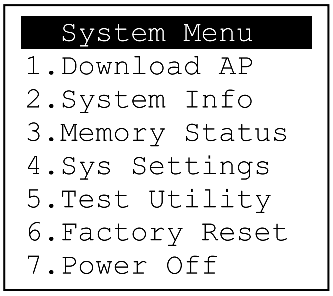


```
   SYSTEM INFO
--EXT SO Ver P.1--
CAVAP:VR0002
CACQP:VR6601
CAIFH      :VR0002
CAEMVL2    :VRA016
CAEMVL2AP  :VR0009
```

3.4. Memory Status

View terminal flash memory and RAM information.

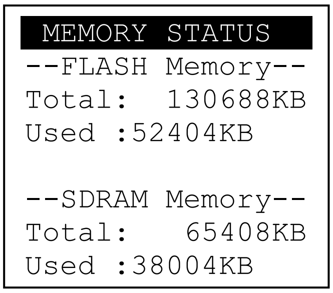
<u>System Menu</u>



```
  System Menu
1.Download AP
2.System Info
3.Memory Status
4.Sys Settings
5.Test Utility
6.Factory Reset
7.Power Off
```

- Press [3] button to enter Memory Status menu.

<u>Memory Status Menu</u>



```
 MEMORY STATUS
--FLASH Memory--
Total:  130688KB
Used :52404KB

--SDRAM Memory--
Total:   65408KB
Used :38004KB
```

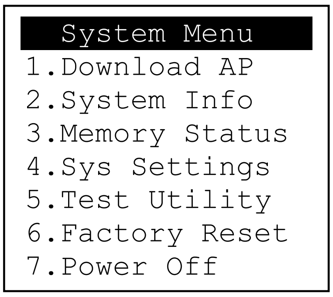
3.5. System Settings

View or change terminal system settings.

Setting	***Descriptions***
Key Sound	Enable (Y) or disable (N) the beep sound when pressing any key.
Exec DFLT AP	Enable (Y) or disable (N) execution of default selected application.
USB CDC Mode	Enable (Y) or disable (N) USB CDC mode.
FunKey PWD	Enable (Y) or disable (N) password protection to access function key (0, F1, F2, F3) in Program Manager.
PMEnter PWD	Enable (Y) or disable (N) password protection to enter Program Manager.
SET USB Host	Enable (Y) or disable (N) USB host mode.
Base USB CDC	Enable (Y) or disable (N) USB CDC mode in base unit. [Portable model only]
List SHR Lib	Enable (Y) or disable (N) to list all shared libraries in Program Manager.
Key MNG Mode	**<TBC>**
BATThreshld	Battery charging threshold value. [Portable model only]
Null Cradle	Enable (Y) if base is Type Acradle. [Portable model only]
Debug Mode	Enable (Y) or disable (N) console debug mode.
Debug Port	Serial port for console debug.
Mobil AutoON	Enable (Y) or disable (N) to auto turn on GSM module after start up the terminal.
Bklit Auto Off	Enable (Y) or disable (N) Auto OffLCDBacklight
Bklit Off Time	Thresholdof Auto Off LCD Backlight
PWR KEY OFF	Powerkeyfunction, power off (Y) or reboot(N)
RTC Time Zone	Set Time Zone of Real Time Clock.
NTP Enable	Enable (Y) or disable (N) Network Time Protocol.
NTP Update Freq	Frequency of Network Time Protocol updating.
BT DIRECT ACCESS	Enable (Y) or disable (N) Bluetooth direct access mode.

Halt Timeout	Set timeout for AP to back to Program Manager whenever AP is in halt state.
PWM Auto	Enable (Y) or disable (N) power saving mode.
PWM Mode	Select (STB) standby mode or (SLP) sleep mode for power saving mode.
PWM Time	Set time period by which to make terminal getting into power saving mode from idle state.
Auto Reboot	Terminal will reboot in specific time every day.
Reboot Hour	The specific hour of day for Auto Reboot.
Reboot Min	The specific minuteof day for Auto Reboot.

System Menu

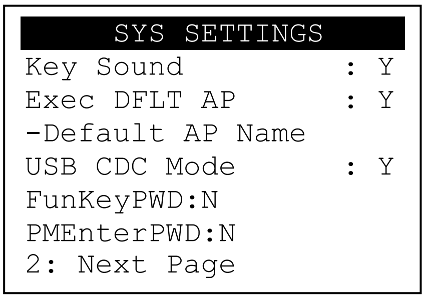


```
  System Menu
1.Download AP
2.System Info
3.Memory Status
4.Sys Settings
5.Test Utility
6.Factory Reset
7.Power Off
```

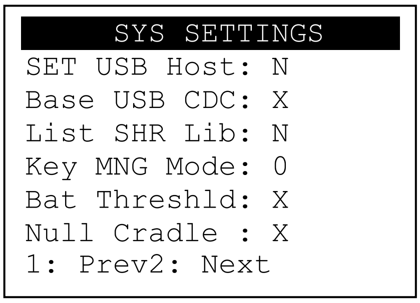
- Press [4] button to enter System Settings menu.

System Settings Menu

Page 1Page 2

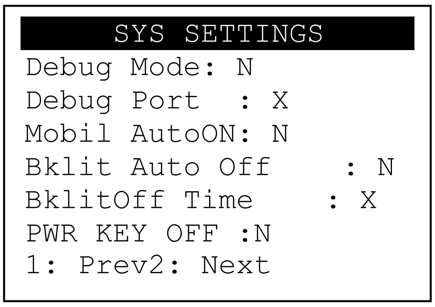


```
     SYS SETTINGS
Key Sound          : Y
Exec DFLT AP       : Y
-Default AP Name
USB CDC Mode       : Y
FunKeyPWD:N
PMEnterPWD:N
2: Next Page
```



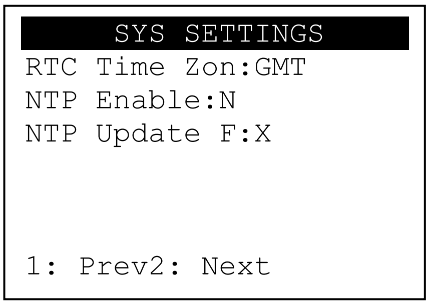
```
     SYS SETTINGS
SET USB Host: N
Base USB CDC: X
List SHR Lib: N
Key MNG Mode: 0
Bat Threshld: X
Null Cradle : X
1: Prev2: Next
```

Page 3



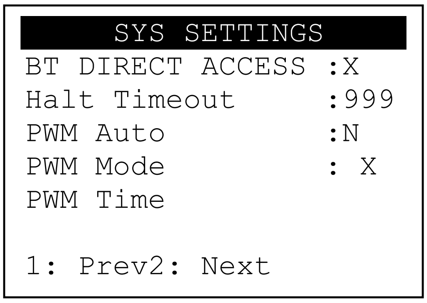
```
     SYS SETTINGS
Debug Mode: N
Debug Port  : X
Mobil AutoON: N
Bklit Auto Off     : N
BklitOff Time    : X
PWR KEY OFF :N
1: Prev2: Next
```

Page 4

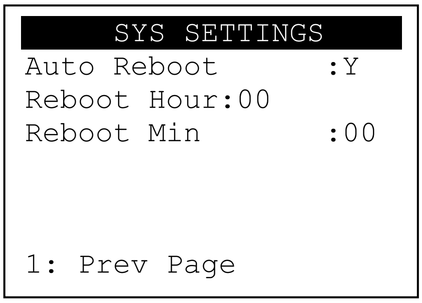


```
     SYS SETTINGS
RTC Time Zon:GMT
NTP Enable:N
NTP Update F:X




1: Prev2: Next
```

Page 5Page 6



```
      SYS SETTINGS
BT DIRECT ACCESS :X
Halt Timeout     :999
PWM Auto         :N
PWM Mode         : X
PWM Time

1: Prev2: Next
```



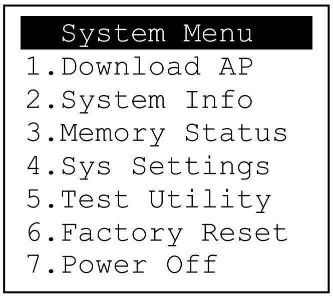
```
      SYS SETTINGS
Auto Reboot      :Y
Reboot Hour:00
Reboot Min       :00



1: Prev Page
```

- Press [*] or [#]button to select setting.
- Press [OK] button to change the setting value.
- Press [⇦] button to toggle Y ⇨ N ⇨ Y.
- Press [1] button to previous page.
- Press [2] button to next page.

3.6. Test Utility

Perform terminal hardware components diagnosis.

System Menu

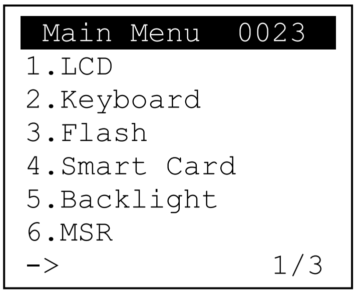


```
  System Menu
1.Download AP
2.System Info
3.Memory Status
4.Sys Settings
5.Test Utility
6.Factory Reset
7.Power Off
```

- Press [5] button to enter Test Utility menu.

Test Utility Menu

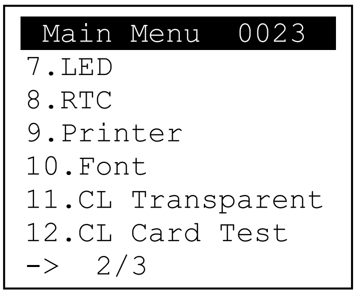
Page 1



```
 Main Menu  0023
1.LCD
2.Keyboard
3.Flash
4.Smart Card
5.Backlight
6.MSR
->            1/3
```

- Press [1] and [OK] to diagnose LCD.
- Press [2] and [OK] to diagnose keyboard.
- Press [3] and [OK] to diagnose flash memory.
- Press [4] and [OK] to diagnose smart card module.
- Press [5] and [OK] to diagnose backlight.
- Press [6] and [OK] to diagnose magnetic stripe card reader.
- Press [#] button to page 2.

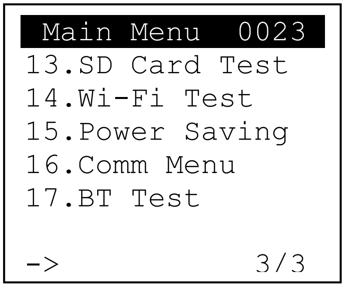
Page 2



```
 Main Menu  0023
7.LED
8.RTC
9.Printer
10.Font
11.CL Transparent
12.CL Card Test
->  2/3
```

- Press[7] and [OK] to diagnose LED.
- Press [8] and [OK] to diagnose RTC.
- Press [9] and [OK] to check Printer.
- Press [10] and [OK] to check FONT file in VEGA3000 UltraLite.
- Press [11] and [OK] to check CL transparent.
- Press [12] and [OK] to test Cantactless Card.
- Press [*] button to page 1.
- Press [#] button to page 3.

Page 2



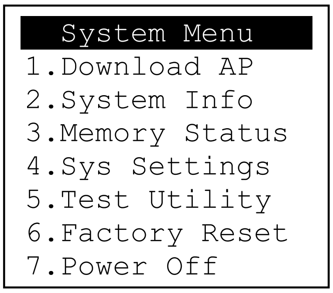
```
 Main Menu  0023
13.SD Card Test
14.Wi-Fi Test
15.Power Saving
16.Comm Menu
17.BT Test

->           3/3
```

- Press [13] and [OK] to execute SD Card Test.
- Press [14] and [OK] to testfunctionalityofWiFi.
- Press [15] and [OK] to test functionality of power saving.
- Press [16] and [OK] to test functionality of multiple communication ways.\
- Press [17] and [OK] to testfunctionality of Bluetooth.
- Press [*] button to page2.

3.7. Factory Reset

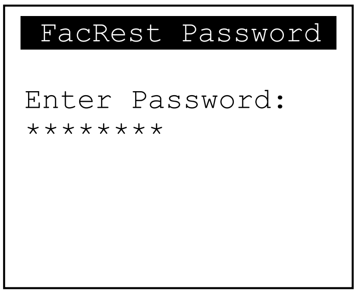
Perform factory reset, all user application, fonts and data will be deleted.

System Menu



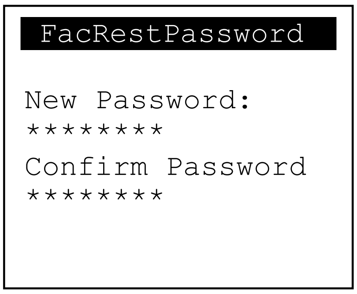
```
  System Menu
1.Download AP
2.System Info
3.Memory Status
4.Sys Settings
5.Test Utility
6.Factory Reset
7.Power Off
```

- Press [6] button to enter Factory Reset menu.



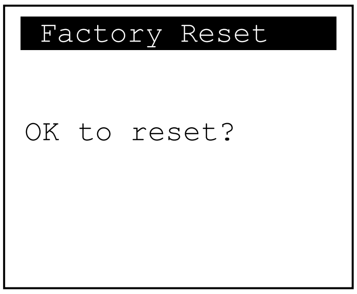
```
 FacRest Password

Enter Password:
********
```

- Enter password and press [OK].
- Enter factory reset password.(***Default password: 12345678)***



```
 FacRestPassword

New Password:
********
Confirm Password
********
```

- Enter new password.
- Enter new password again to confirm.



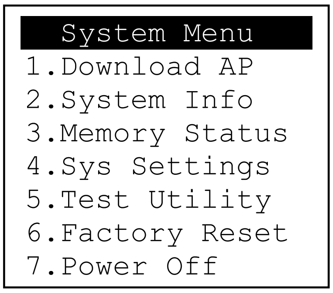
```
 Factory Reset


OK to reset?
```

- Press [OK] to execute the Factory Reset.

3.8. Power Off

Power offterminal.

System Menu



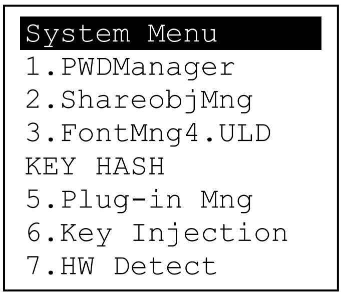
```
 System Menu
1.Download AP
2.System Info
3.Memory Status
4.Sys Settings
5.Test Utility
6.Factory Reset
7.Power Off
```

- Press [7] button to power off terminal.

3.9. Password Manager

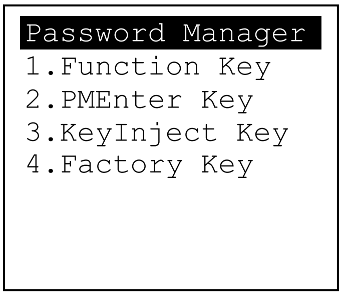
Change thekeysin Password Manager.

System Menu (Page 2)



```
System Menu
1.PWDManager
2.ShareobjMng
3.FontMng4.ULD
KEY HASH
5.Plug-in Mng
6.Key Injection
7.HW Detect
```

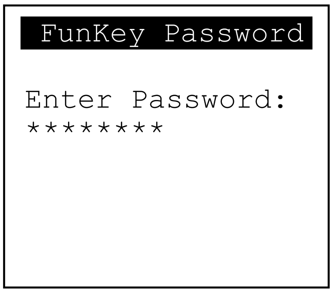
- Press [1] button to enterPasswordManagermenu.



```
Password Manager
1.Function Key
2.PMEnter Key
3.KeyInject Key
4.Factory Key
```

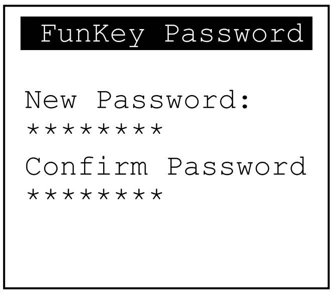
- Press [1] button to changeFunction Key password.
- Press [2] button to change Program Manager Key password.
- Press [3] button to change Key Injection Key password.
- Press [4] button to change Factory Reset Key password.

Please refer to the procedure of change Function Key password as below.



```
 FunKey Password

Enter Password:
********
```

- Enter current password. ***(Default password is "84188062")***



```
 FunKey Password

New Password:
********
Confirm Password
********
```

- Enter new password.
- Enter new password again to confirm.

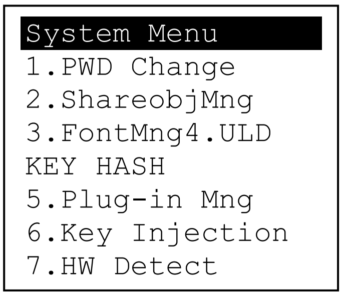
User must have to change the Default key to user own key at the first time. The Default Key Value in Password Manager is as below:

Function Key	**84188062**
PMEnter Key	**NA**
KeyInject Key	**87654321**
Factory Key	**12345678**

3.10. Share Object Management

View share object in terminal.

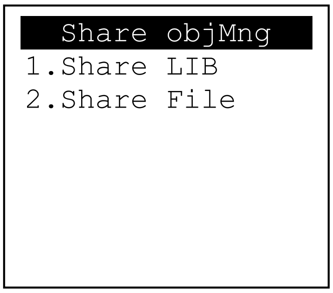
System Menu (Page 2)



```
System Menu
1.PWD Change
2.ShareobjMng
3.FontMng4.ULD
KEY HASH
5.Plug-in Mng
6.Key Injection
7.HW Detect
```

- Press [2] button to enter Share Object Management menu.

Share Object Management Menu



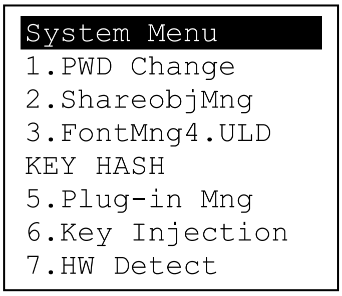
```
  Share objMng
1.Share LIB
2.Share File
```

- Press [1] button to view shared library.
- Press [2] button to view shared file.

3.11.Font Mng

View Font Management.

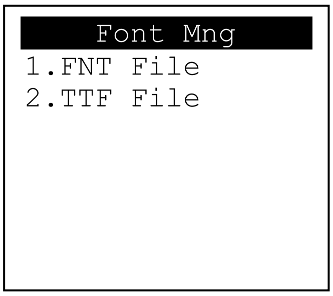
System Menu (Page 2)



```
System Menu
1.PWD Change
2.ShareobjMng
3.FontMng4.ULD
KEY HASH
5.Plug-in Mng
6.Key Injection
7.HW Detect
```

- Press [3] button to view Font Management.

FontManagment



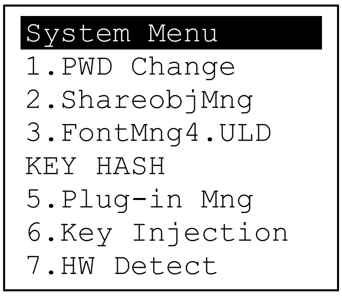
```
     Font Mng
1.FNT File
2.TTF File
```

- Press [1] button to view FNT Font list.
- Press [2] button to view TTF Font list.

3.12. ULD Key Hash

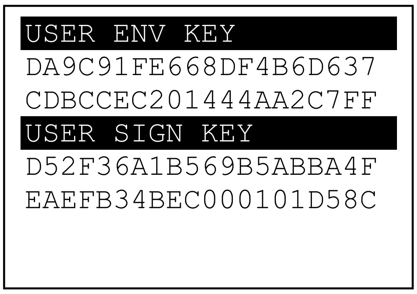
View ULD user key hash value.

System Menu (Page 2)



```
System Menu
1.PWD Change
2.ShareobjMng
3.FontMng4.ULD
KEY HASH
5.Plug-in Mng
6.Key Injection
7.HW Detect
```

- Press [4] button to view hash value.

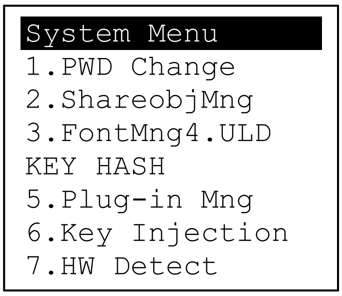


```
USER ENV KEY
DA9C91FE668DF4B6D637
CDBCCEC201444AA2C7FF
USER SIGN KEY
D52F36A1B569B5ABBA4F
EAEFB34BEC000101D58C
```

3.13.Plug-in Mng

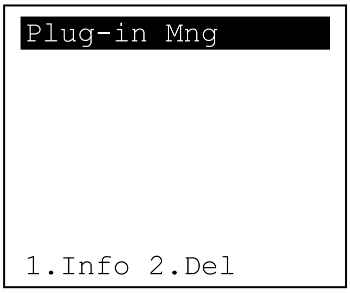
View Plug-in Management.

System Menu (Page 2)



```
System Menu
1.PWD Change
2.ShareobjMng
3.FontMng4.ULD
KEY HASH
5.Plug-in Mng
6.Key Injection
7.HW Detect
```

- Press [5] button to view Plug-in Management.



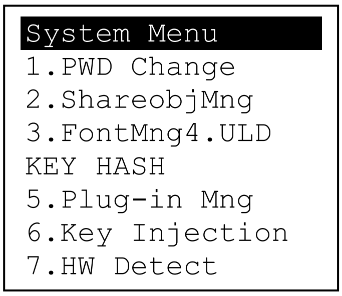
```
Plug-in Mng





1.Info 2.Del
```

- Press [*]or[#]button to select item.
- Press [1]button to get item information.
- Press [2]button to delete item.

3.14.Key Injection

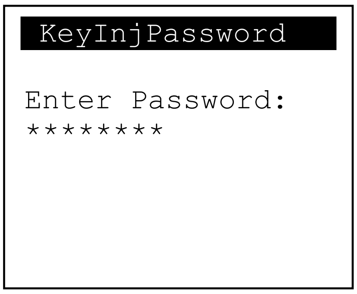
View Key Injection.

System Menu (Page 2)



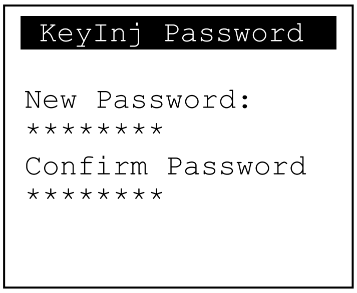
```
System Menu
1.PWD Change
2.ShareobjMng
3.FontMng4.ULD
KEY HASH
5.Plug-in Mng
6.Key Injection
7.HW Detect
```

- Press [6] button to view Key Injection.



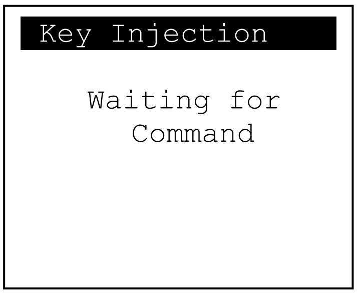
```
KeyInjPassword

Enter Password:
********
```

- Enter password and press [OK].
- Enter Key Injection password.(***Default password: 87654321)***



```
KeyInj Password

New Password:
********
Confirm Password
********
```

- Enter new password.
- Enter new password again to confirm.

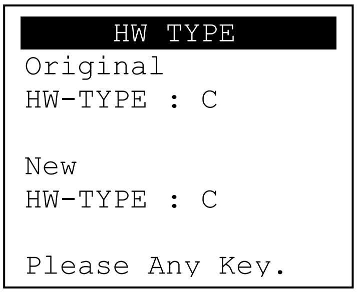


```
Key Injection

   Waiting for
     Command
```

- Please refer to document of Key Injection which is released by Castles Technology.

3.15.HW Detect

View Key Injection.



```
      HW TYPE
Original
HW-TYPE : C

New
HW-TYPE : C

Please Any Key.
```

- Press any key to go back to Program Manager.

4. Secure File Loading

Castles implemented an interface in terminal named User Loader(ULD) to provide secure file loading to system memory. Loading of user application, kernel firmware, font and others must use User Loader.

The loading process is secure by signing the files using ULD Key System.

4.1. ULD Key System

The ULD Key System uses two key sets for securely managing the kernel updating and application downloading. Each key set contains two RSA key pairs. One is used for key encryption and the other is used for signature. These two key sets are specified as below:

ULD Manufacturer Key Set

- ULD Manufacturer Key Encryption Key (RSA)
- ULD Manufacturer Signature Key (RSA)

ULD User Key Set

- ULD User Key Encryption Key (RSA)
- ULD User Signature Key (RSA)

For VEGA3000 UltraLite, the RSA key length is 2048bits.

4.1.1. ULD Manufacturer Key

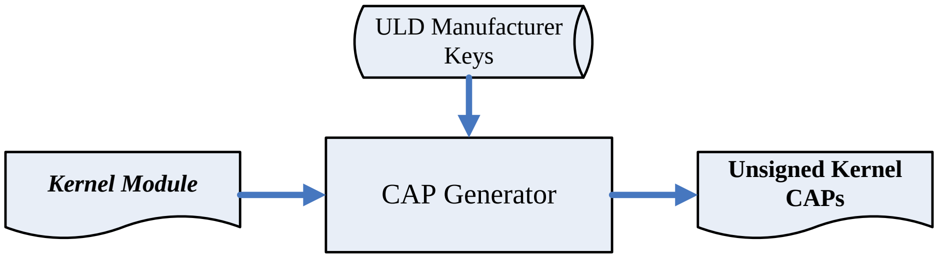
The system consists of several kernel modules. These kernel modules are provided by the Manufacturer, and released in CAP format file with encryption and signing via ULD Manufacturer Keys.

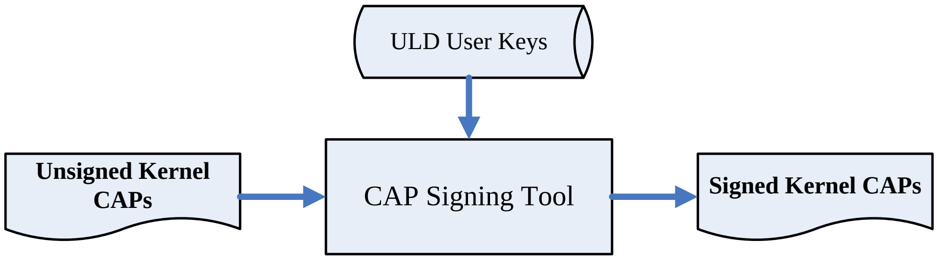
The ULD Manufacturer keys are managed and maintained by the manufacturer. The manufacturer uses these keys to generate kernel CAP files for updating the system. However, the system is not permitted to be updated with these kernel CAP files directly generated by the manufacturer. This is because only the user can have the privilege to decide whether the system is to be updated. Therefore, before system updating, the kernel CAP files must be “signed” via ULD User Key to get the user permission. For simple expression, we call the kernel CAP files generated by the manufacturer as “unsigned kernel CAP(s)” and call the kernel CAP files “signed” by the user later as “signed kenel CAP(s)”.

Notes:

1. The kernel modules are encrypted by a random-generated 3DES key, which is retrieved from the Key Encryption Block of the CAP by ULD Manufacturer Key Encryption Key, not directly encrypted by ULD RSA Key.

2. The “sign” action via ULD User Keys actually is done by” the second encryption”. “The second encryption” is done by using the random-generated 3DES key, which is encrypted by ULD User Key Encryption Key, to perform Triple DES encryption again on the cipher data segment of the kernel CAP files. This ensures that the system cannot retrieve the correct data from the kernel CAPs without the user permission.

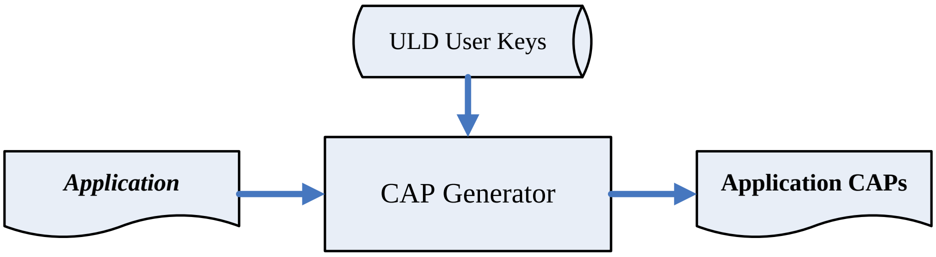




4.1.2. ULD User Key

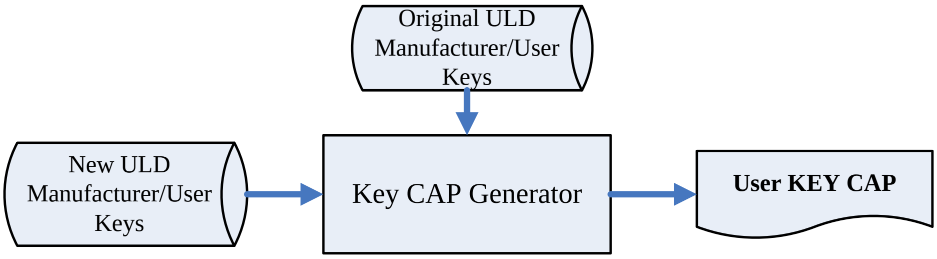
ULD User Key are used to encrypt and sign the user/shared applications. In addition, they are as goalkeepers to prevent the system updating without user permission. This is done by the kernel CAPs which are encrypted and signed by the manufacturer having to perform the “signed’ action via ULD User Keys.

Notes: Applications are encrypted by a random-generated 3DES key, which is retrieved from the Key Encryption Block of the CAP by ULD User Key Encryption Key, not directly encrypted by ULD RSA Key.



4.1.3. Key Change

The ULD RSA Keys are able to be changed. The system uses a special CAP file, KEY CAP, for the manufacturer and user to change their own keys. The KEY CAP contains a new set of ULD keys (Key Encryption Key and Signature Key). These new keys are encrypted and signed via the original keys. In other words, if the user would like to change the ULD User Keys, they have to use their original ULD User Keys with the new ULD User Keys to generate a KEY CAP.


Original ULD Manufacturer/User Keys
New ULD Manufacturer/User Keys
Key CAP Generator
User KEY CAP

4.2. File Signing

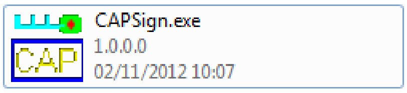
4.2.1. Signing Kernel Module

Castles will release new version of kernel module in “unsigned” form. This files required to sign with ULD User Key before it can load to terminal.

Castles Technology provideds a tool named “CAP Signing Tool” to perform this task.

The CAP Signing Tool is located at:
C:\Program Files\Castles\VEGA3000UL\tools\Signing Tool

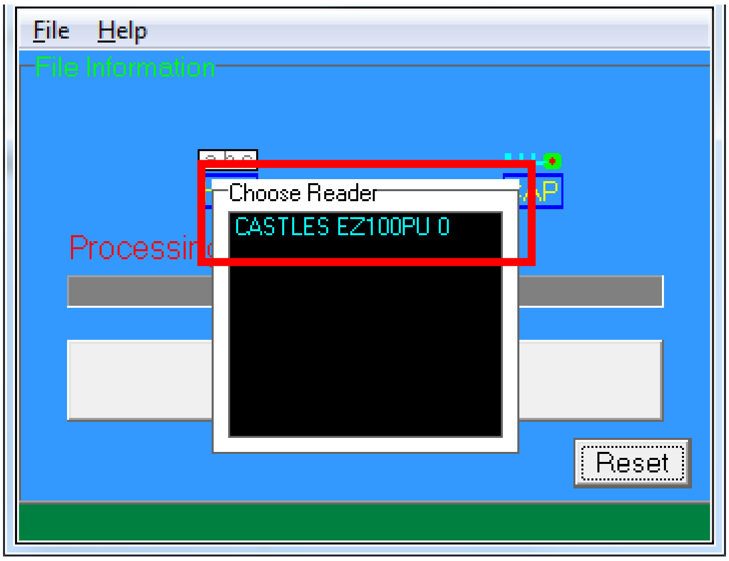
- Run CAP Signing Tool



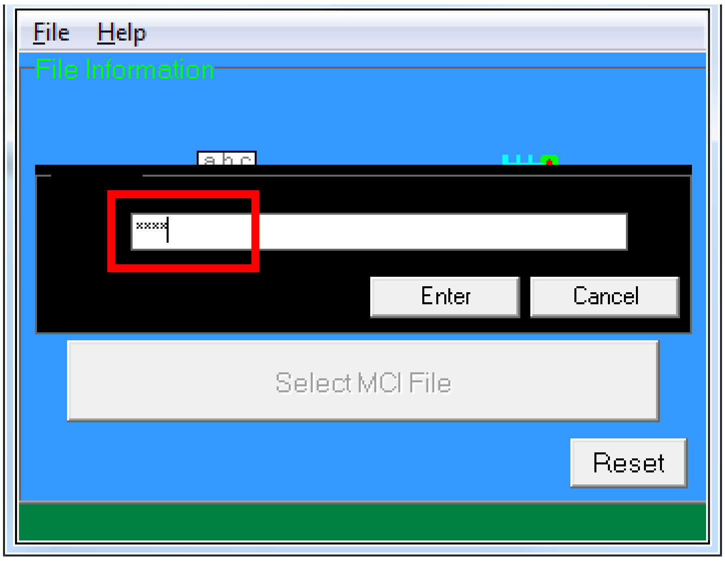
CAPSign.exe
1.0.0.0
02/11/2012 10:07

(VEGA3000 UltraLite)

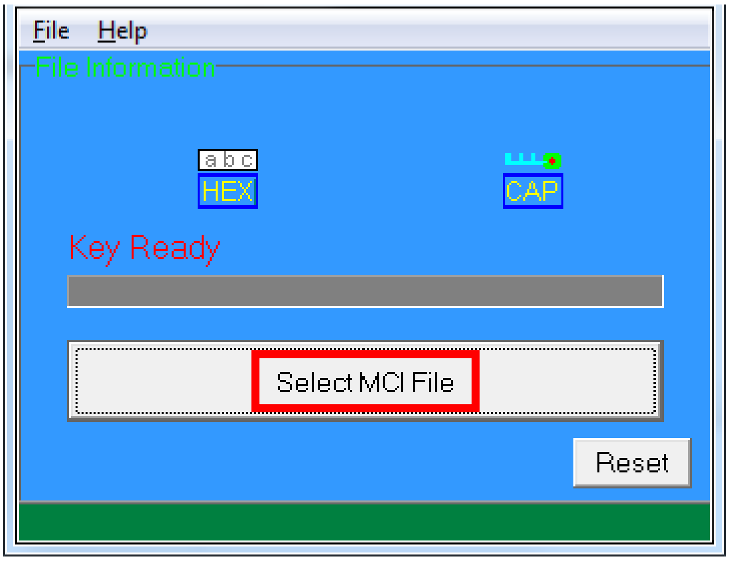
- Insert Key Card and select smart card reader



- Enter Key Card PIN



- CAP Signing Tool is ready, press “Select MCI File” button to browse the file.



- Output file will be located in “signed” folder.

4.2.2. Signing User Files

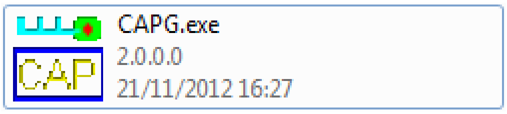
Following files are required to sign before load to terminal. This is to ensure the application data and codes confidential and integrity. The output file will be "CAP" file which is file format defined by Castles.

- User application
- User application data files
- User application library
- Font file
- Share library
- Share files
- System setting
- Key CAP (Manufacturer ULD Key Set)

Castles Technology provided a tool named "CAP Generator" to perform this task.

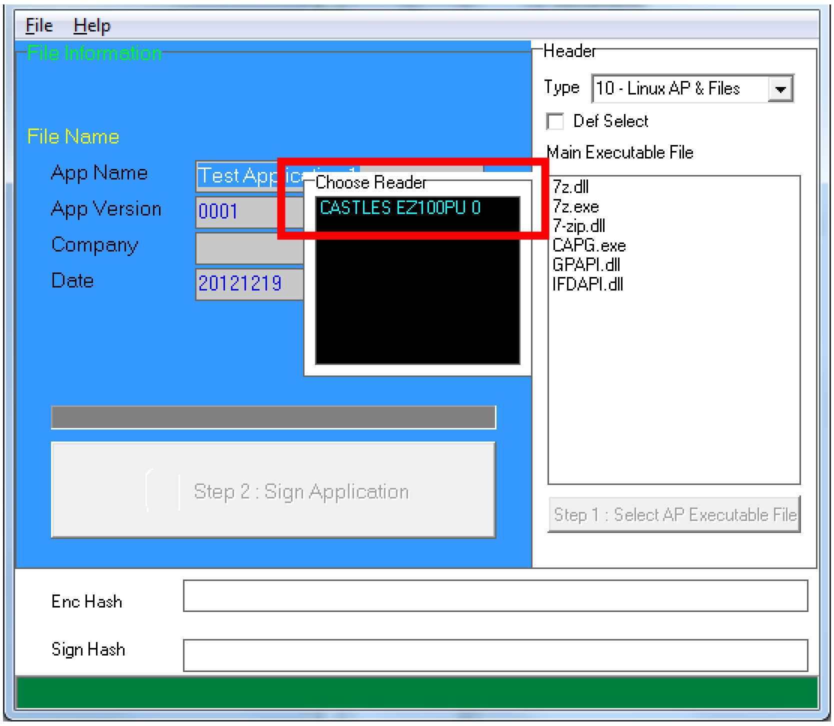
The CAP Generator is located at:
C:\Program Files\Castles\VEGA3000UL\tools\CAPG (KeyCard)

- Run CAP Generator



CAPG.exe
2.0.0.0
21/11/2012 16:27

- Insert Key Card and select smart card reader

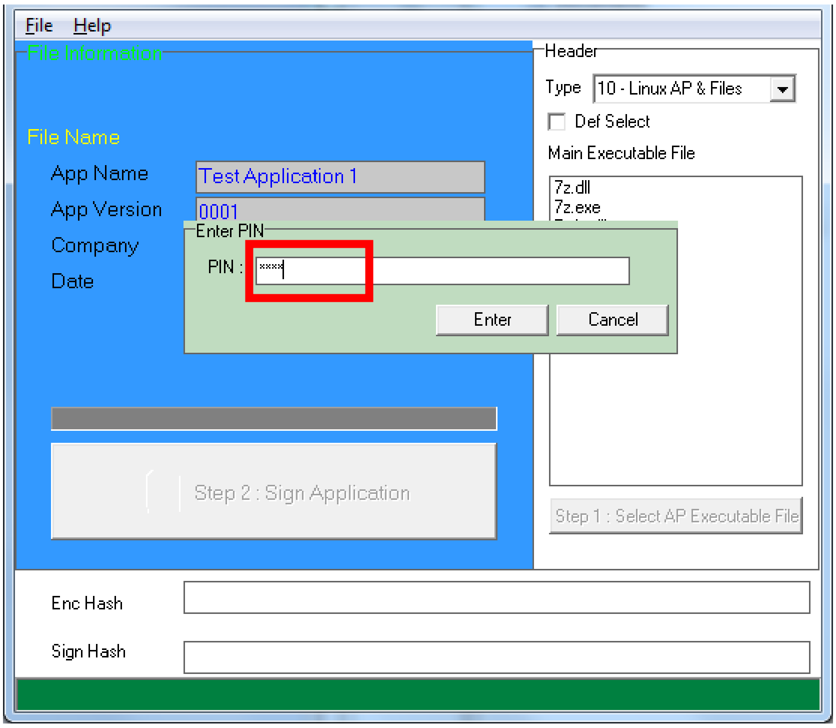


App Name: Test Applic
App Version: 0001
Company:
Date: 20121219

Header
Type: 10 - Linux AP & Files
□ Def Select
Main Executable File:
7z.dll
7z.exe
7-zip.dll
CAPG.exe
GPAPI.dll
IFDAPI.dll

Choose Reader
CASTLES EZ100PU 0

- Enter Key Card PIN

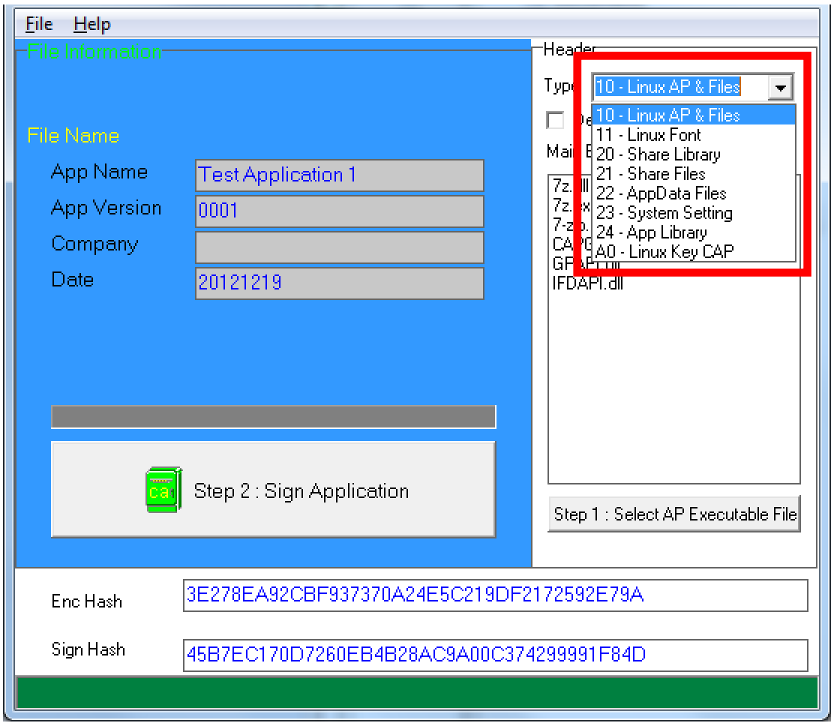


App Name: Test Application 1
App Version: 0001
Company
Date

Header
Type: 10 - Linux AP & Files
□ Def Select
Main Executable File:
7z.dll
7z.exe

Enter PIN
PIN : ****

- CAP Generator is ready, select the correct Type from the list.



File Name

App Name: Test Application 1

App Version: 0001

Company:

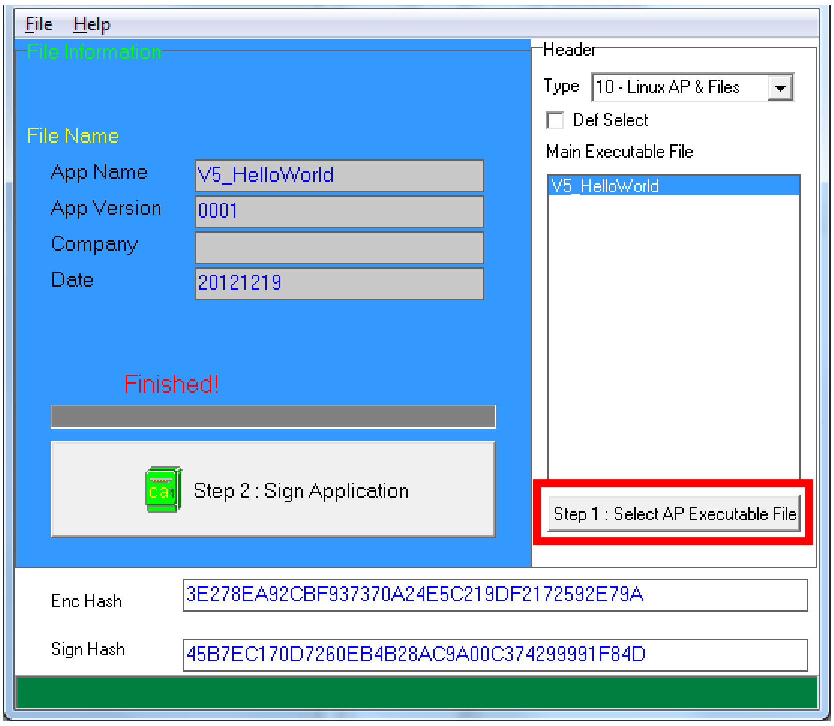
Date: 20121219

Type: 10 - Linux AP & Files

Enc Hash: 3E278EA92CBF937370A24E5C219DF2172592E79A

Sign Hash: 45B7EC170D7260EB4B28AC9A00C374299991F84D

- Press “Step 1: Select AP Executable File” to select file to sign. This is valid for all the files to sign.



File Name

App Name: V5_HelloWorld

App Version: 0001

Company:

Date: 20121219

Finished!

Type: 10 - Linux AP & Files

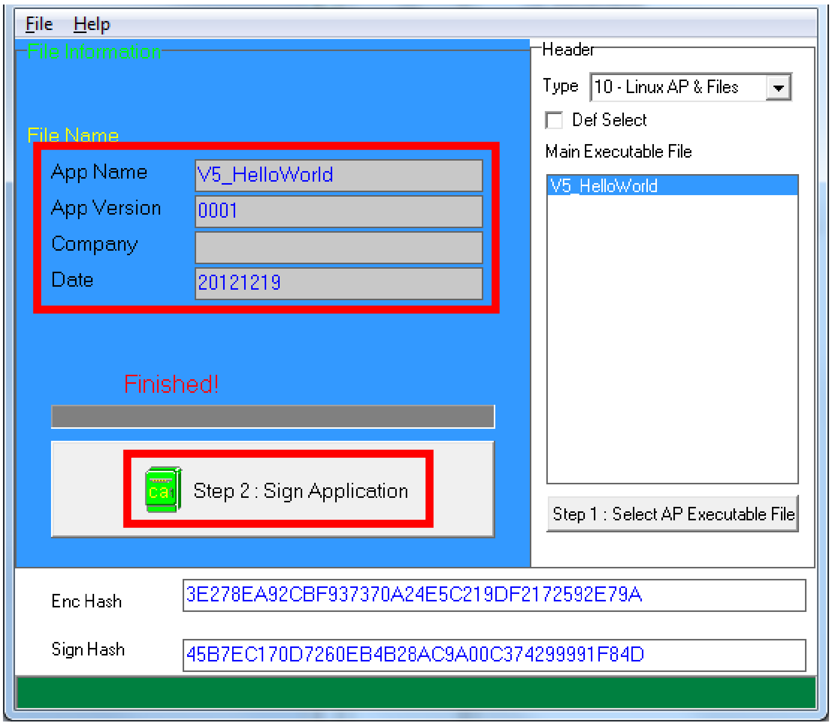
□ Def Select

Main Executable File: V5_HelloWorld

Enc Hash: 3E278EA92CBF937370A24E5C219DF2172592E79A

Sign Hash: 45B7EC170D7260EB4B28AC9A00C374299991F84D

- Enter file details and press “Step 2: Sign Application” to sign the file. This is valid for all the files to sign.



App Name: V5_HelloWorld
App Version: 0001
Company:
Date: 20121219

Type: 10 - Linux AP & Files
□ Def Select
Main Executable File: V5_HelloWorld

Enc Hash: 3E278EA92CBF937370A24E5C219DF2172592E79A
Sign Hash: 45B7EC170D7260EB4B28AC9A00C374299991F84D

- The output file will be in a set. A “mci” file with one or more “CAP” files.CAP file contents the signed file binaries, where MCI file contents the list of CAP files.

App.CAP

App.mci

Note: If user would like to load multiple set of signed file, create a new file with extension of “mmci”. Then put the mmci file contents with the list of mci file.

MultiApp.mmci

4.3. File Loading

There are several ways of loading file to VEGA3000 UltraLite.

- Download by User Loader
- Download by user application
- Download by Castles TMS

User Loader is a tool provided by Castles Technology. It's the formal way to download file to terminal.

User may implement their own ways of updating application or files using CTOS API provided, **CTOS_UpdateFromMMCI().**

Castles TMS (CTMS or CASTLES Terminal Management System) is provided by Castles Technology. It's use to perform remote download via Ethernet, GPRS/UMTS or modem.

4.3.1. Download by User Loader

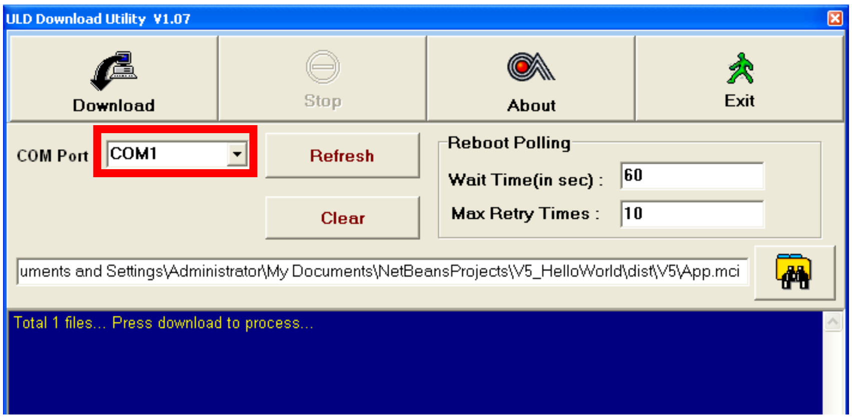
The User Loader works for VEGA3000 UltraLite.

The Loader is located at:
C:\Program Files\Castles\VEGA3000UL\tools\Loader

- Run User Loader

Loader.exe
20/08/2012 16:12
704 KB

- Select COM port



COM Port COM1

Reboot Polling

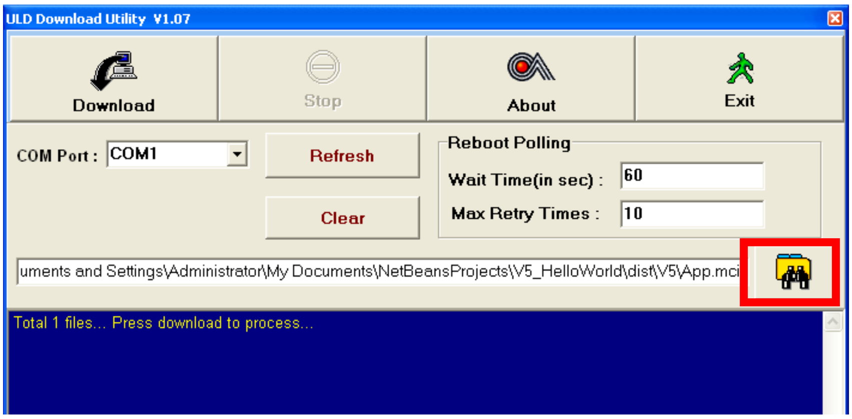
Wait Time(in sec) : 60

Max Retry Times : 10

uments and Settings\Administrator\My Documents\NetBeansProjects\V5_HelloWorld\dist\V5\App.mci

```
Total 1 files... Press download to process...
```

- Browse and select mci file or mmci file



COM Port : COM1

Reboot Polling

Wait Time(in sec) : 60

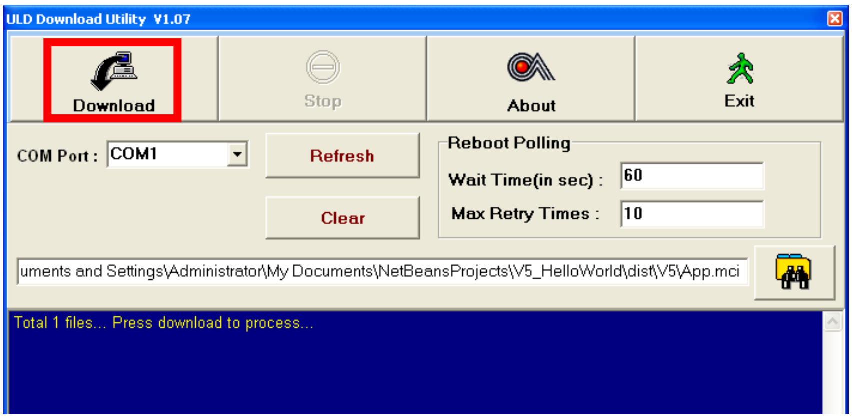
Max Retry Times : 10

uments and Settings\Administrator\My Documents\NetBeansProjects\V5_HelloWorld\dist\V5\App.mci

```
Total 1 files... Press download to process...
```

- Setup terminal to enter download mode
  - Press [0] button in Program Manager (PM)
  - Press [1] button to select “1. Download AP“
  - Press [1] button again to select download via RS232 or USB

- Press “Download” button to start.



COM Port : COM1

Reboot Polling

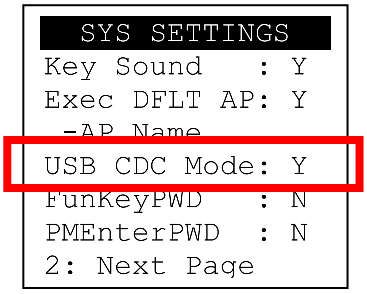
Wait Time(in sec) : 60

Max Retry Times : 10

uments and Settings\Administrator\My Documents\NetBeansProjects\V5_HelloWorld\dist\V5\App.mci

Total 1 files... Press download to process...

Note: To download using USB cable, terminal must enable CDC mode. Set USB CDC Mode to Y.

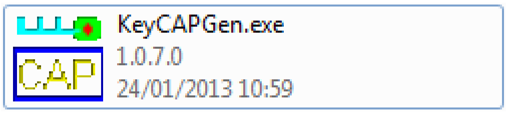


```
  SYS SETTINGS
Key Sound    : Y
Exec DFLT AP: Y
 -AP Name
USB CDC Mode: Y
FunKeyPWD    : N
PMEnterPWD   : N
2: Next Page
```

4.4. Changing ULD User Key

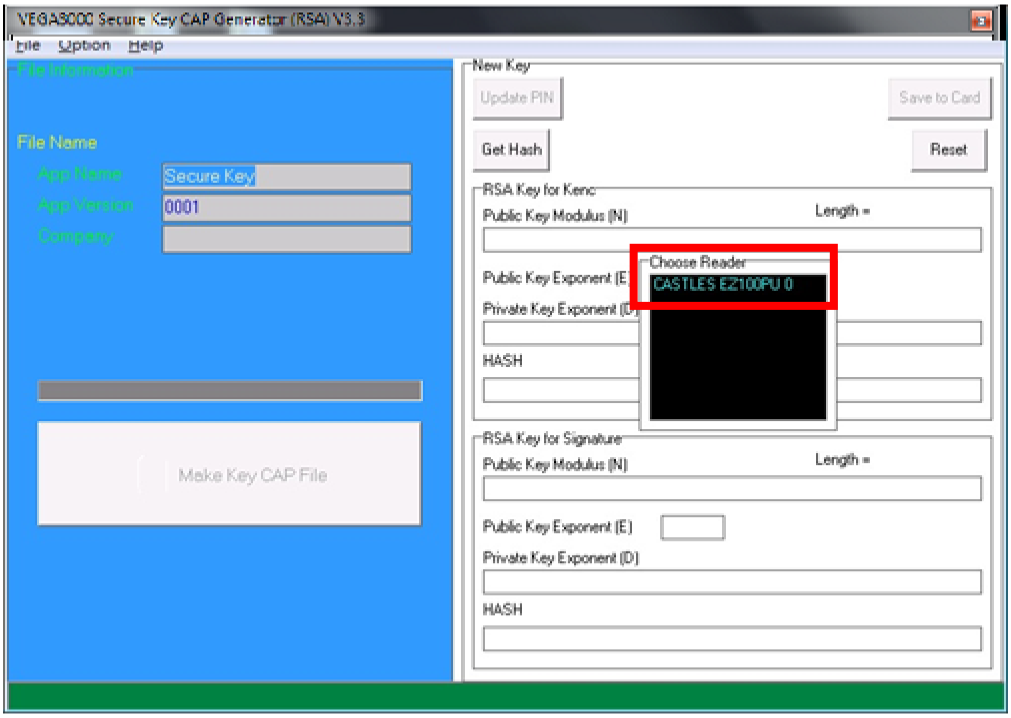
User may change their ULD User Key Set stored in Key Card. Castles Technology provided a tool named “Secure Key Generator” to perform this task.

- Run Secure Key Generator



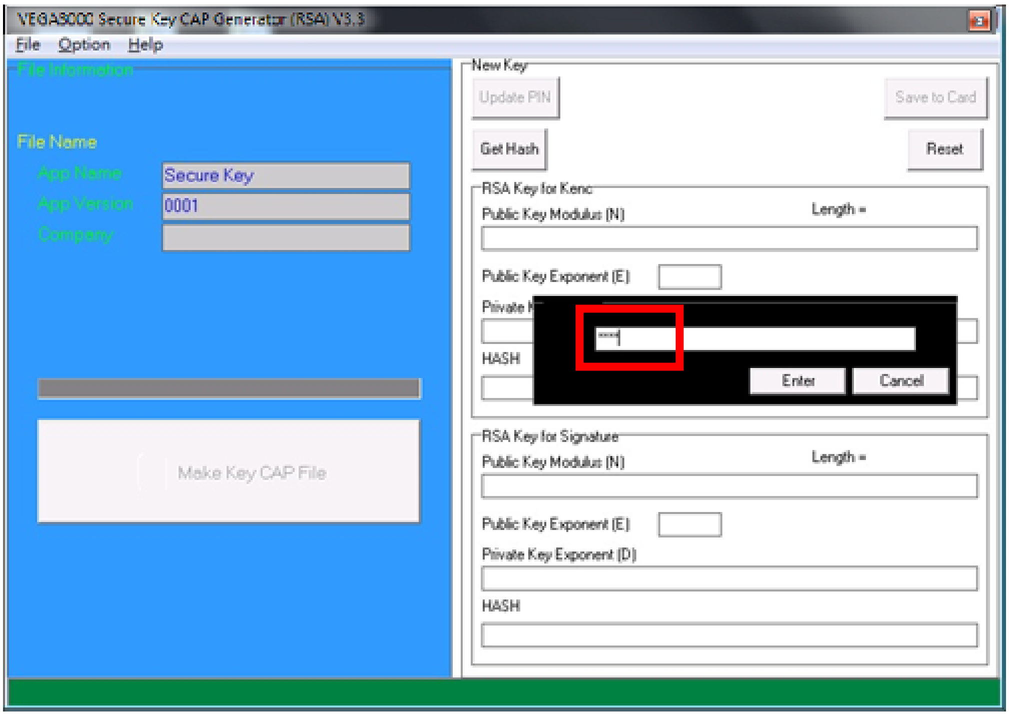
KeyCAPGen.exe
1.0.7.0
24/01/2013 10:59

- Insert Key Card and select smart card reader



App Name: Secure Key
App Version: 0001
Choose Reader: CASTLES EZ100PU 0

- Enter Key Card PIN, default PIN is “1234”.

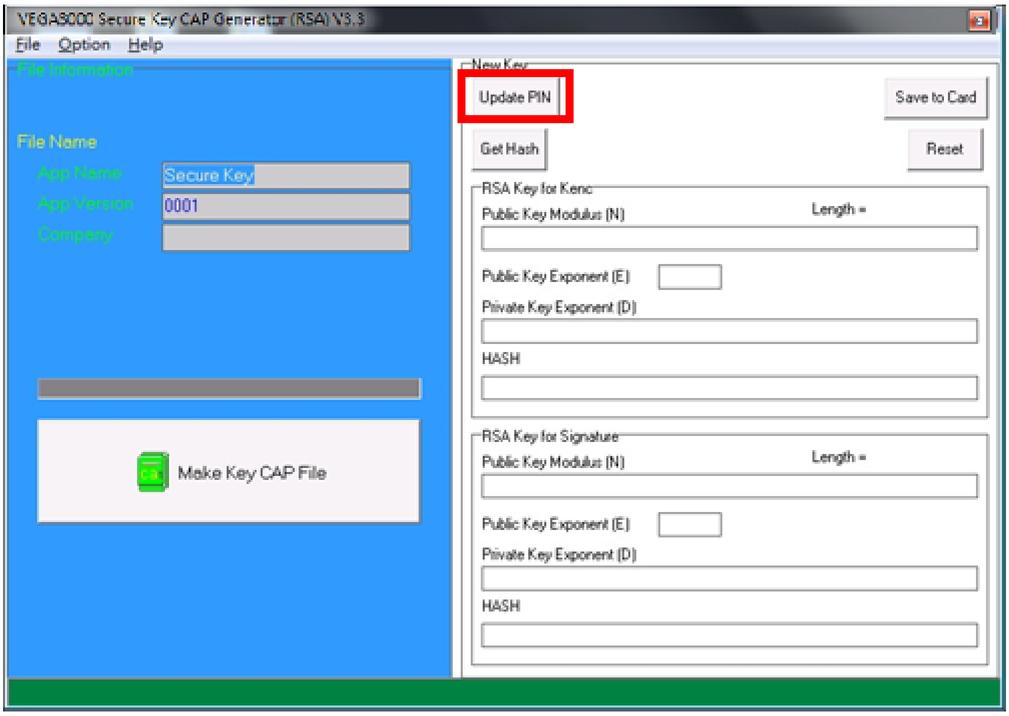


App Name: Secure Key

App Version: 0001

Company:

- To change Key Card PIN, press "Update PIN" button. If not, please skip this steps.

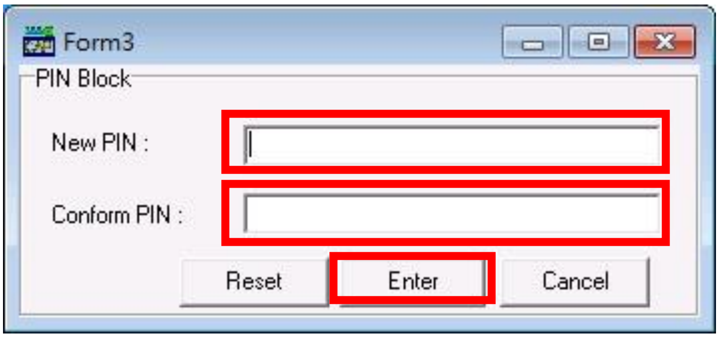


App Name: Secure Key

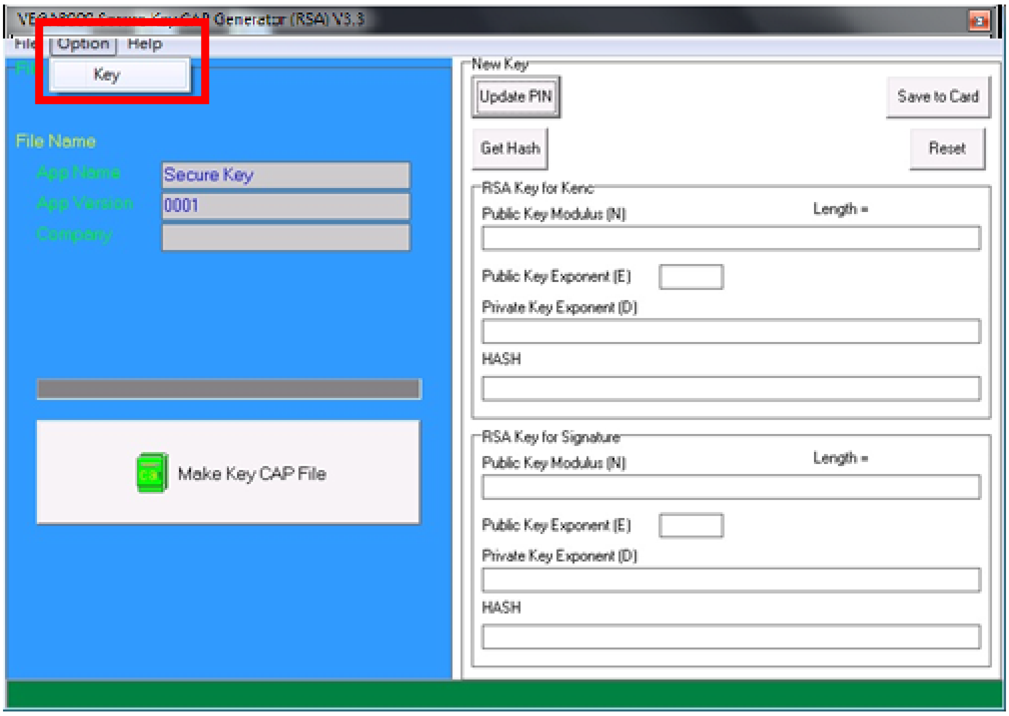
App Version: 0001

Company:

- Enter new PIN, enter new PIN again to confirm, then press [Enter] button to change PIN in Key Card.



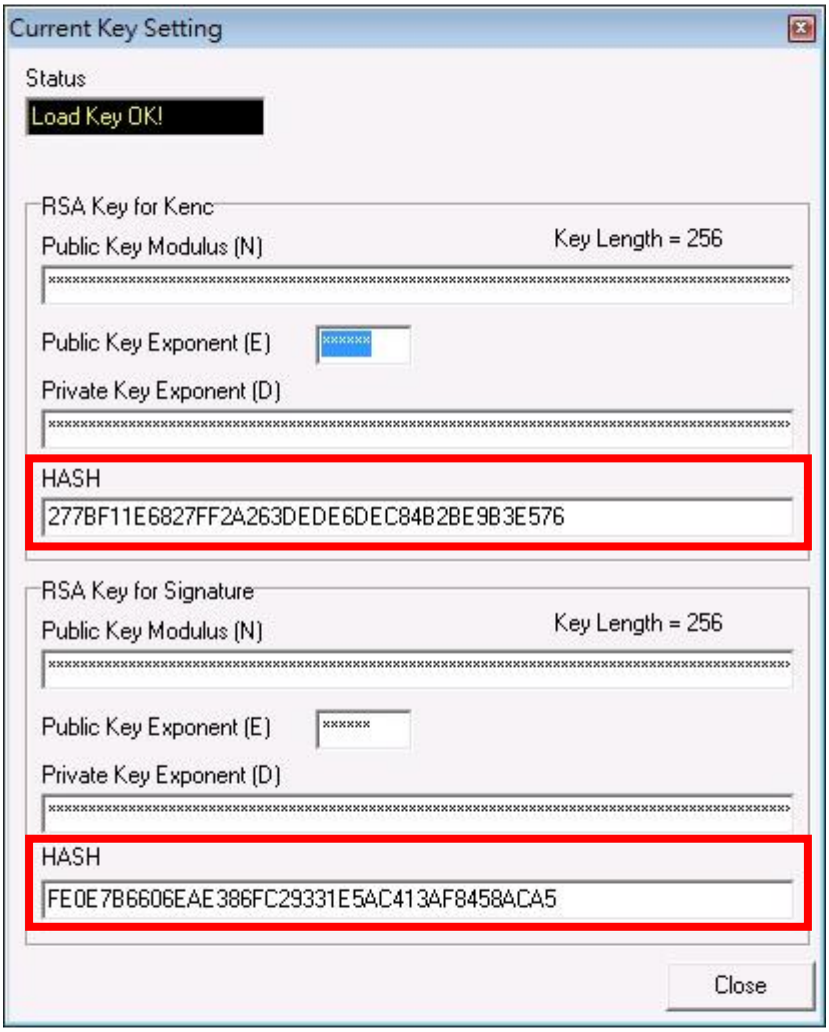
- To view current key set hash value, goto “Option” and select key.



App Name: Secure Key

App Version: 0001

Company:



Current Key Setting

Status

Load Key OK!

RSA Key for Kenc

Public Key Modulus (N) Key Length = 256

Public Key Exponent (E) ******

Private Key Exponent (D)

HASH

277BF11E6827FF2A263DEDE6DEC84B2BE9B3E576

RSA Key for Signature

Public Key Modulus (N) Key Length = 256

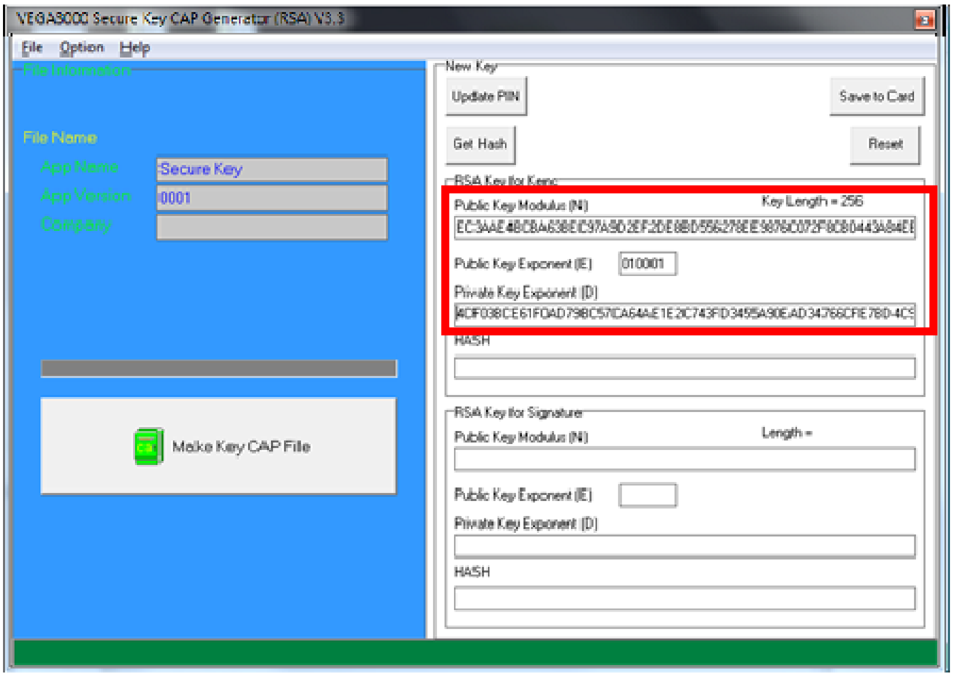
Public Key Exponent (E) ******

Private Key Exponent (D)

HASH

FE0E7B6606EAE386FC29331E5AC413AF8458ACA5

- To generate new user key set
  - Please generate the RSA key by yourself,thelengthof the RSA key set should be 2048 (bits).
  - Copy RSA key components to RSA Key for Kenc in Secure Key Generator.



App Name: Secure Key

App Version: 0001

Company:

RSA Key for Kenc

Public Key Modulus (N) Key Length = 256

EC3AAE4BCBA63BEC97A9D2EF2DE8BD556278EE9876C072F8CB0443A84EE

Public Key Exponent (E) 010001

Private Key Exponent (D)

4DF038CE61F0AD79BC57CA64AE1E2C743FD3455A90EAD34766CFE78D4C9

HASH

RSA Key for Signature

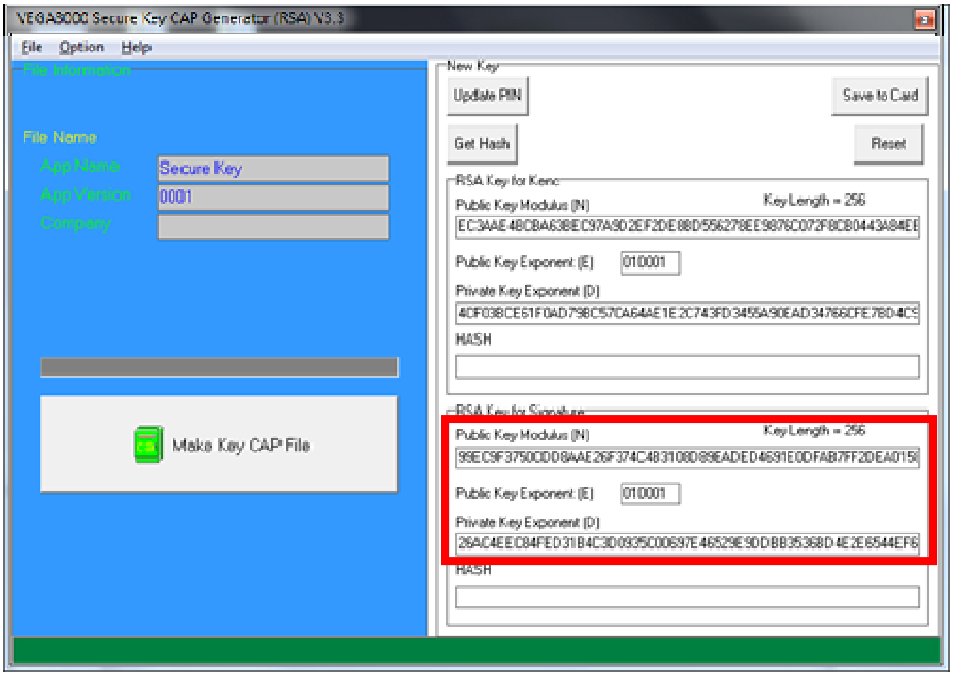
Public Key Modulus (N) Length =

Public Key Exponent (E)

Private Key Exponent (D)

HASH

- Generate second RSA key set for Signature.



App Name: Secure Key

App Version: 0001

Company:

RSA Key for Kenc

Public Key Modulus (N) Key Length = 256

EC3AAE4BCBA63BEC97A9D2EF2DE8BD556278EE9876C072F8CB0443A84EE

Public Key Exponent (E) 010001

Private Key Exponent (D)

4DF038CE61F0AD79BC57CA64AE1E2C743FD3455A90EAD34766CFE78D4C9

HASH

RSA Key for Signature

Public Key Modulus (N) Key Length = 256

99EC9F3750CDD8AAE26F374C4B3108D89EADED4691E0DFAB7FF2DEA015

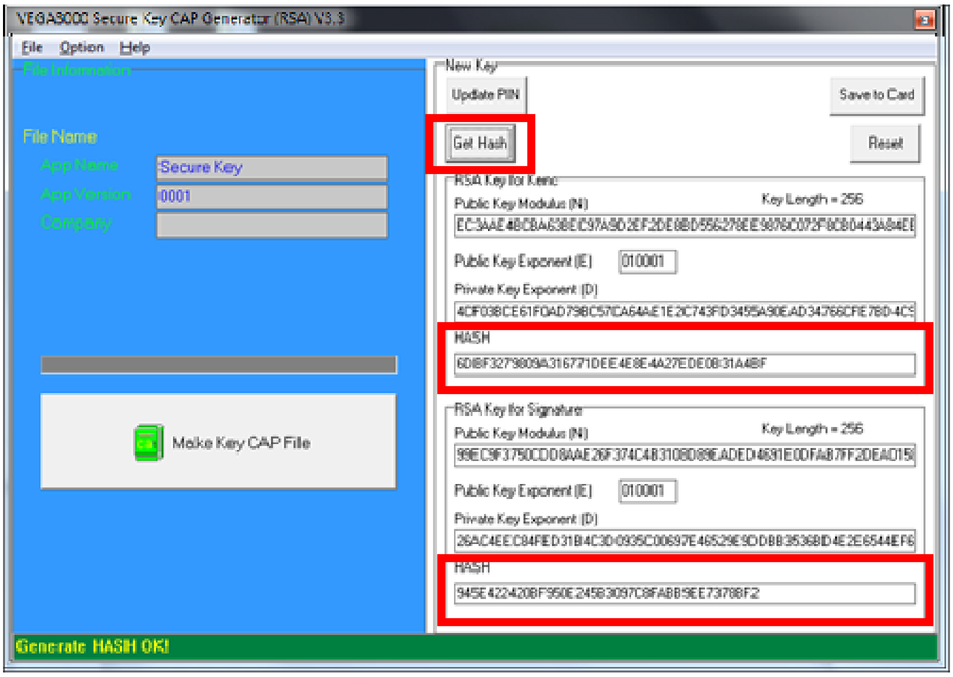
Public Key Exponent (E) 010001

Private Key Exponent (D)

26AC4EEC84FED31B4C3D0935C00697E46529E9DDBB35368D4E2E6544EF6

HASH

- Click [Get Hash] button to calculate the hash value for key sets.



File Name
App Name: Secure Key
App Version: 0001
Company:

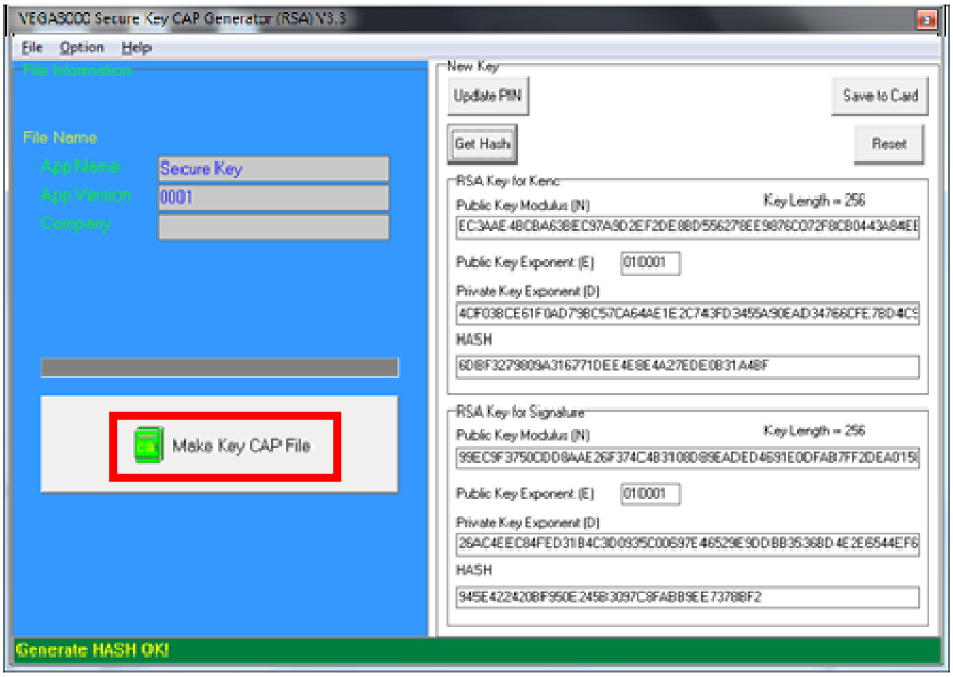
RSA Key for Kenc
Public Key Modulus (N) Key Length = 256
EC3AAE4BCBA638EC97A9D2EF2DE8BD556278EE9876C072F8CB0443A84EE
Public Key Exponent (E) 010001
Private Key Exponent (D)
4CF038CE61F0AD798C57CA64AE1E2C743FD3455A90EAD34766CFE78D4C5
HASH
6D8F3279809A316771DEE4E8E4A27EDE0831A48F

RSA Key for Signature
Public Key Modulus (N) Key Length = 256
99EC9F3750CDD8AAE26F374C483108D89EADED4691E0DFA87FF2DEA015
Public Key Exponent (E) 010001
Private Key Exponent (D)
26AC4EEC84FED31B4C3D0935C00697E46529E9DDBB35368D4E2E6544EF6
HASH
945E422420BF950E245B3097C8FABB9EE73788F2

Generate HASH OK!

- Please copy down all the values into a text file and keep in a safe place. You will need this if you need to create duplicate Key Card.

- To generate the key CAP for the newly generated user key set, press [Make Key CAP File] button.



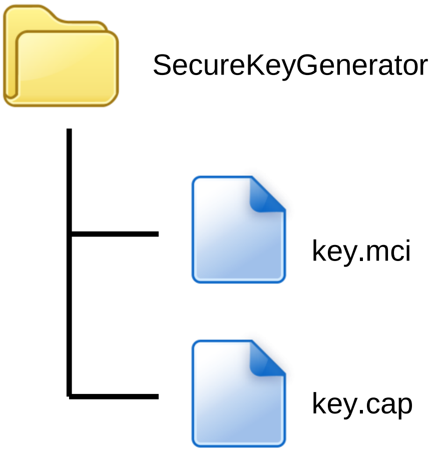
File Name
App Name: Secure Key
App Version: 0001
Company:

RSA Key for Kenc
Public Key Modulus (N) Key Length = 256
EC3AAE4BCBA638EC97A9D2EF2DE8BD556278EE9876C072F8CB0443A84EE
Public Key Exponent (E) 010001
Private Key Exponent (D)
4CF038CE61F0AD798C57CA64AE1E2C743FD3455A90EAD34766CFE78D4C5
HASH
6D8F3279809A316771DEE4E8E4A27EDE0831A48F

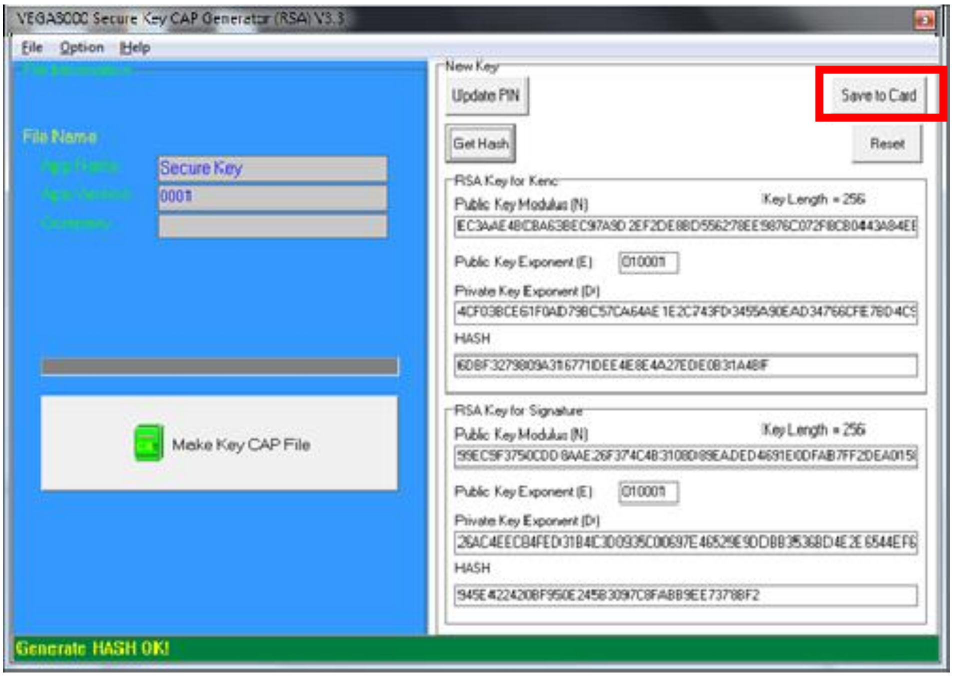
RSA Key for Signature
Public Key Modulus (N) Key Length = 256
99EC9F3750CDD8AAE26F374C483108D89EADED4691E0DFA87FF2DEA015
Public Key Exponent (E) 010001
Private Key Exponent (D)
26AC4EEC84FED31B4C3D0935C00697E46529E9DDBB35368D4E2E6544EF6
HASH
945E422420BF950E245B3097C8FABB9EE73788F2

Generate HASH OK!

- The output file will be located in the Secure Key Generator folder.



- To update the newly generated key set to Key Card, press [Save to Card] button to write the key set to Key Card.



File Name

Secure Key

0001

RSA Key for Kenc

Public Key Modulus (N) Key Length = 256

EC3AAE4BCBA63BEC97A9D 2EF2DE8BD556278EE9876C072F8C8044 3A84EE

Public Key Exponent (E) 010001

Private Key Exponent (D)

4CF03BCE61F0AD79BC57CA64AE 1E2C743FD3455A90EAD34766CFE78D4C9

HASH

6DBF3279809A316771DEE4E8E4A27EDE0831A48F

RSA Key for Signature

Public Key Modulus (N) Key Length = 256

99EC9F3750CDD 8AAE 26F374C4B3108D89EADED4691E0DFAB7FF2DEA015

Public Key Exponent (E) 010001

Private Key Exponent (D)

26AC4EECB4FED31B4C3D0935C00697E 46529E9DDBB35368D4E2E 6544EF6

HASH

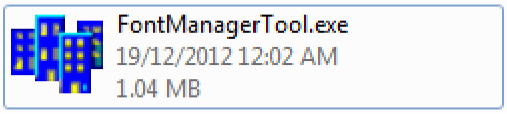
945E4224208F950E 2458 3097C8FABB9EE73788F2

Generate HASH OK!

5. Font Management

5.1. Loading New Font

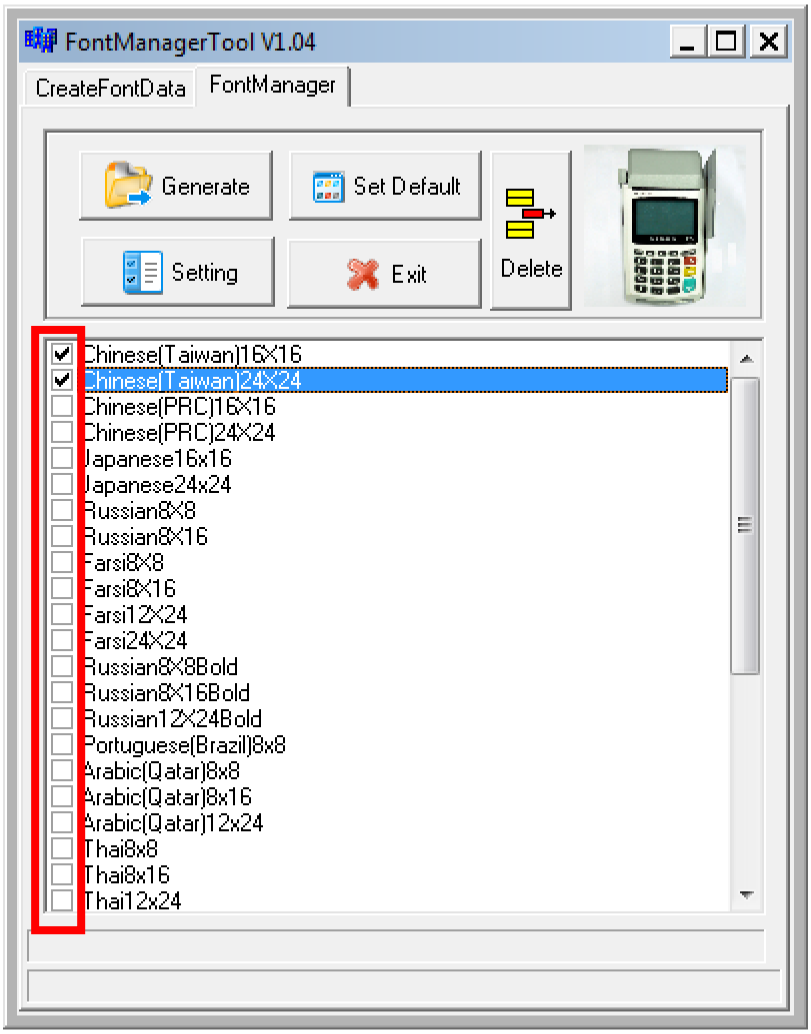
- Run FontManager.exe



FontManagerTool.exe
19/12/2012 12:02 AM
1.04 MB

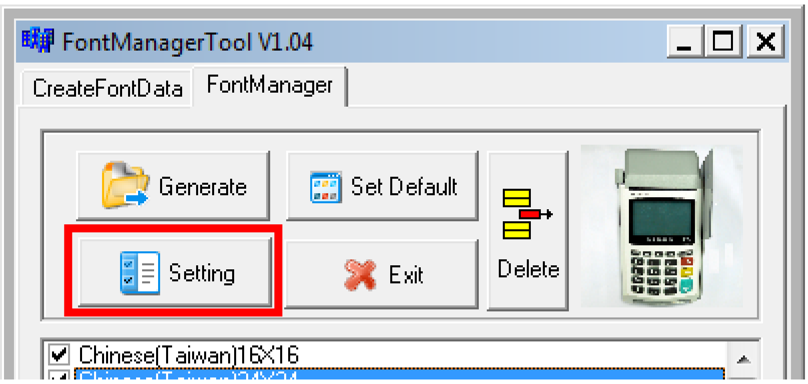
Located at C:\Program Files\Castles\Font Manager

- Select font to download



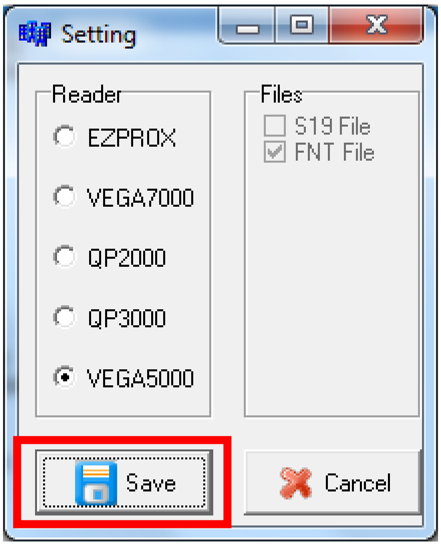
☑ Chinese(Taiwan)16X16
☑ Chinese(Taiwan)24X24
□ Chinese(PRC)16X16
□ Chinese(PRC)24X24
□ Japanese16x16
□ Japanese24x24
□ Russian8X8
□ Russian8X16
□ Farsi8X8
□ Farsi8X16
□ Farsi12X24
□ Farsi24X24
□ Russian8X8Bold
□ Russian8X16Bold
□ Russian12X24Bold
□ Portuguese(Brazil)8x8
□ Arabic(Qatar)8x8
□ Arabic(Qatar)8x16
□ Arabic(Qatar)12x24
□ Thai8x8
□ Thai8x16
□ Thai12x24

- Press [Setting] button to configure terminal type.



☑ Chinese(Taiwan)16X16

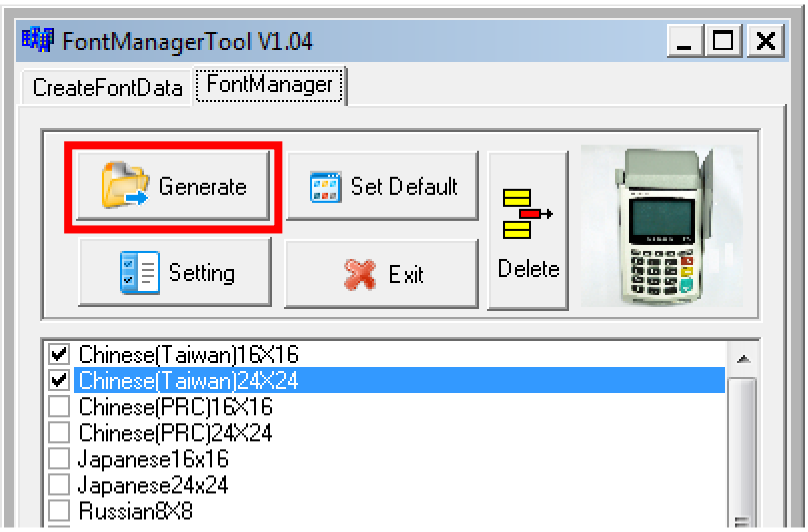
- Select **VEGA5000**, press [Save] button to save and return font manager.



Reader
○ EZPROX
○ VEGA7000
○ QP2000
○ QP3000
● VEGA5000

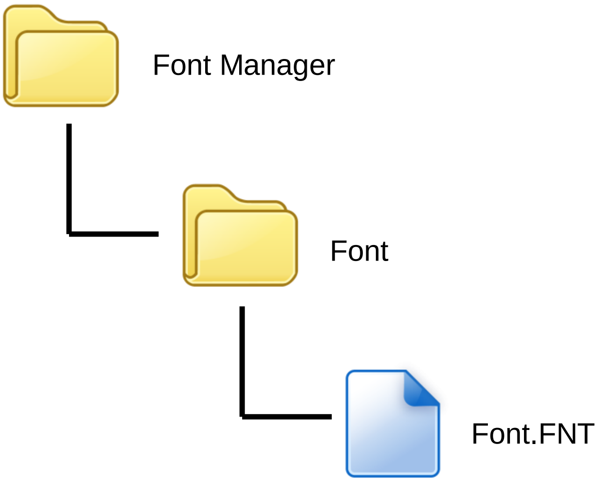
Files
☐ S19 File
☑ FNT File

- Press [Generate] to create the font file.

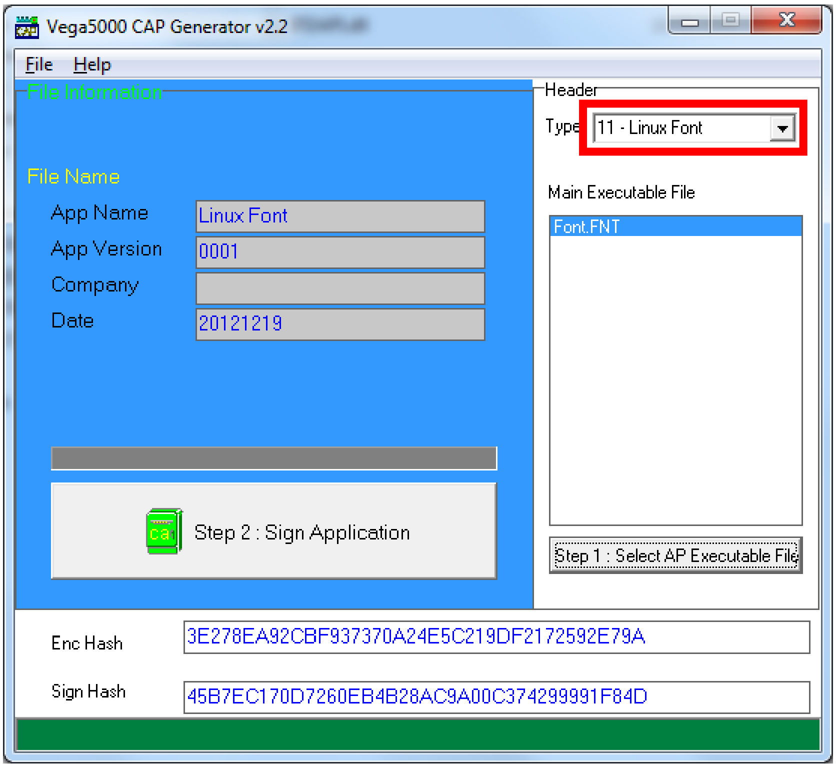


☑ Chinese(Taiwan)16X16
☑ Chinese(Taiwan)24X24
☐ Chinese(PRC)16X16
☐ Chinese(PRC)24X24
☐ Japanese16x16
☐ Japanese24x24
☐ Russian8X8

- Output file “Font.FNT” will be located at sub-directory named “Font” in “Font Manager” folder.



- Sign the file using CAP Generator, the type must set to “11 – Linux Font”.


Vega5000 CAP Generator v2.2
File
Help
File Information
Header
Step 2 : Sign Application
Step 1 : Select AP Executable File

Type: 11 - Linux Font

Main Executable File: Font.FNT

File Name

App Name: Linux Font

App Version: 0001

Company:

Date: 20121219

Enc Hash: 3E278EA92CBF937370A24E5C219DF2172592E79A

Sign Hash: 45B7EC170D7260EB4B28AC9A00C374299991F84D

- Lastly, download the signed file (CAP file) to terminal using Loader.

5.2. Custom Font

User may create font they preferred for displaying or printing on terminal.

There are two zone defined:

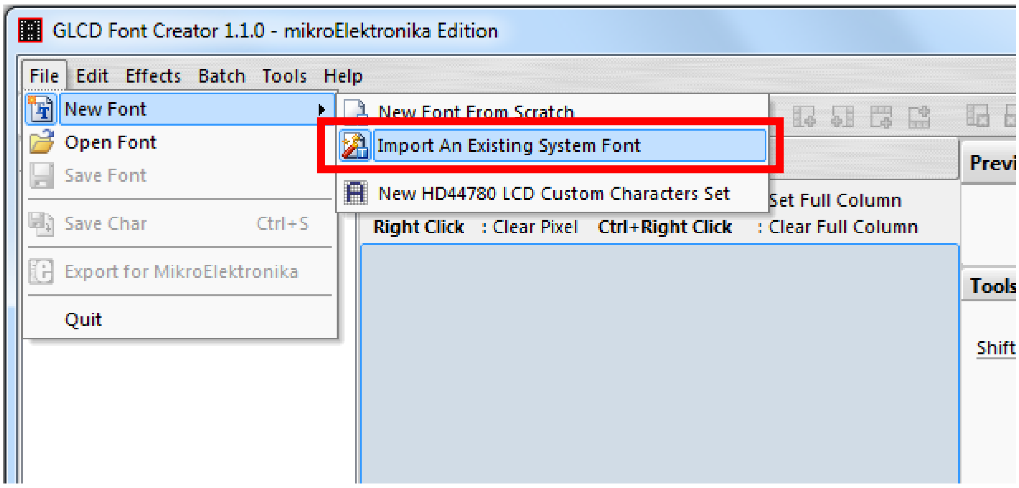
Zone 0x00 ~ 0x7F – ASCII characters, you may replace with the font type preferred or your own language character set.

Zone 0x80 ~ 0xFF – Free to use, you may use for symbols.

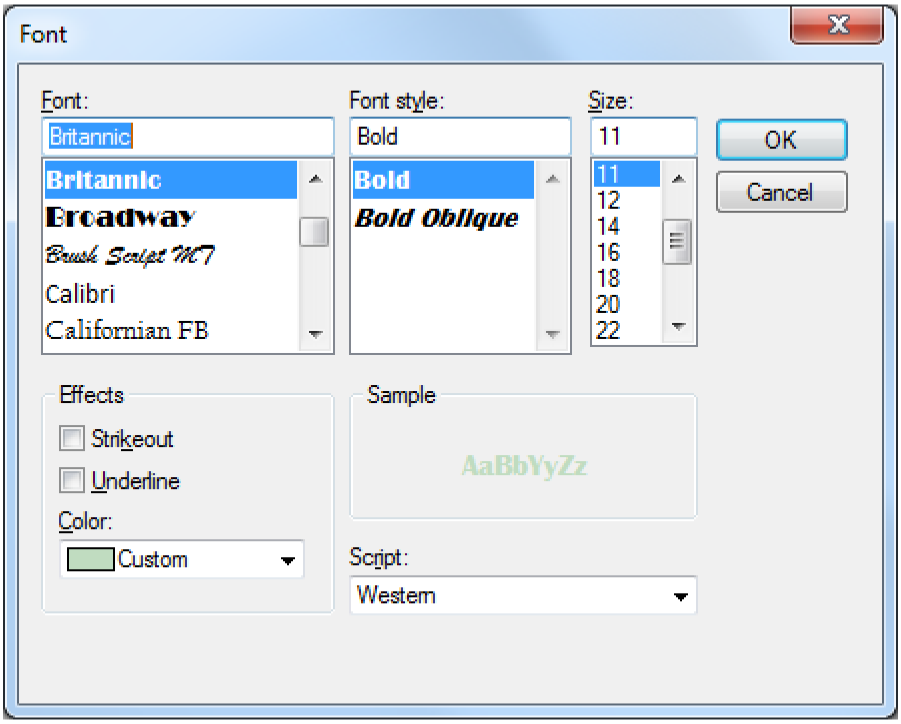
Following steps demonstrate how to create a 12x24 font.

- Run GLCD Font Creator

- Select [File] ⇨ [New Font] ⇨ [Import An Existing System Font]


GLCD Font Creator 1.1.0 - mikroElektronika Edition
File
Edit
Effects
Batch
Tools
Help
New Font
Open Font
Save Font
Save Char Ctrl+S
Export for MikroElektronika
Quit
New Font From Scratch
Import An Existing System Font
New HD44780 LCD Custom Characters Set
Set Full Column
Right Click : Clear Pixel
Ctrl+Right Click : Clear Full Column
Previ
Tools
Shift

- Select the font needed, simply choose a font size. The final value of font size should be determine by the minimum pixel width. You may need to repeat this steps few times to find the best fit font size.



Font

Font: Britannic
Font style: Bold
Size: 11

Effects

□ Strikeout

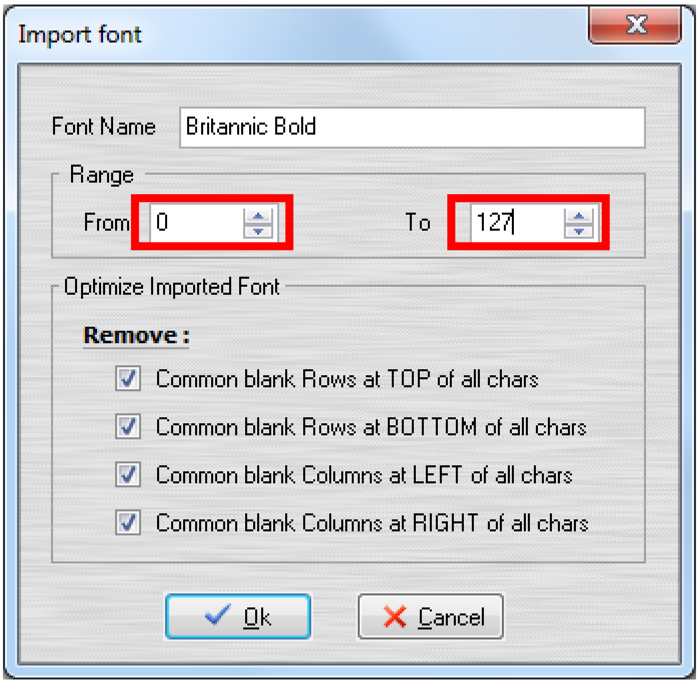
□ Underline

Color: 🟩 Custom

Sample

Script: Western

- Set the import range from 0 to 127.



Import font

Font Name: Britannic Bold

Range

From: 0 To: 127

Optimize Imported Font

Remove :

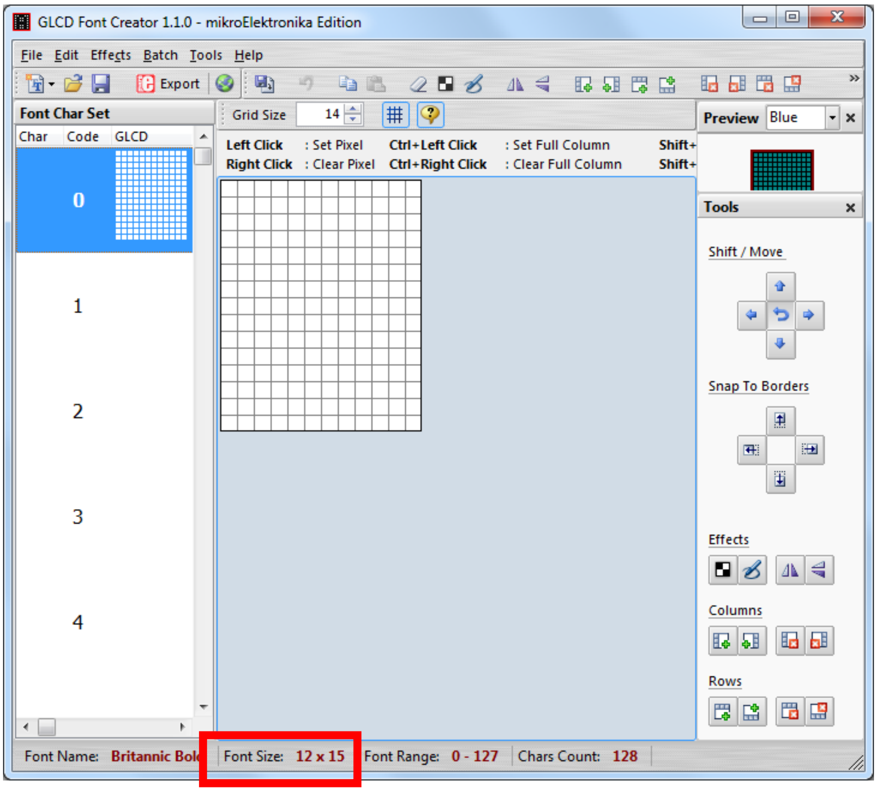
☑ Common blank Rows at TOP of all chars

☑ Common blank Rows at BOTTOM of all chars

☑ Common blank Columns at LEFT of all chars

☑ Common blank Columns at RIGHT of all chars

- Check the minimum pixel width and height.


GLCD Font Creator 1.1.0 - mikroElektronika Edition
File Edit Effects Batch Tools Help
Export
Font Char Set
Char Code GLCD
0
1
2
3
4
Left Click : Set Pixel
Right Click : Clear Pixel
Ctrl+Left Click : Set Full Column
Ctrl+Right Click : Clear Full Column
Shift+
Shift+
Preview
Tools
Shift / Move
Snap To Borders
Effects
Columns
Rows

Grid Size: 14

Preview: Blue

Font Name: Britannic Bol

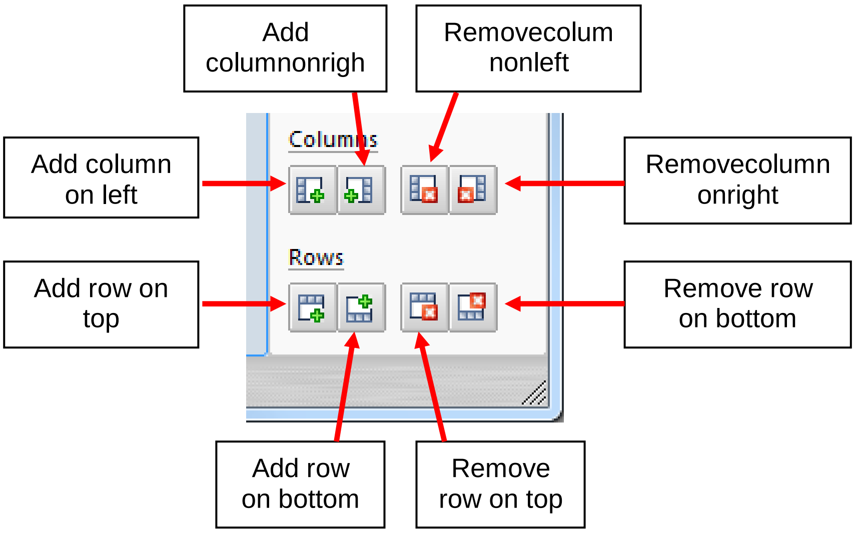
Font Size: 12 x 15

Font Range: 0 - 127

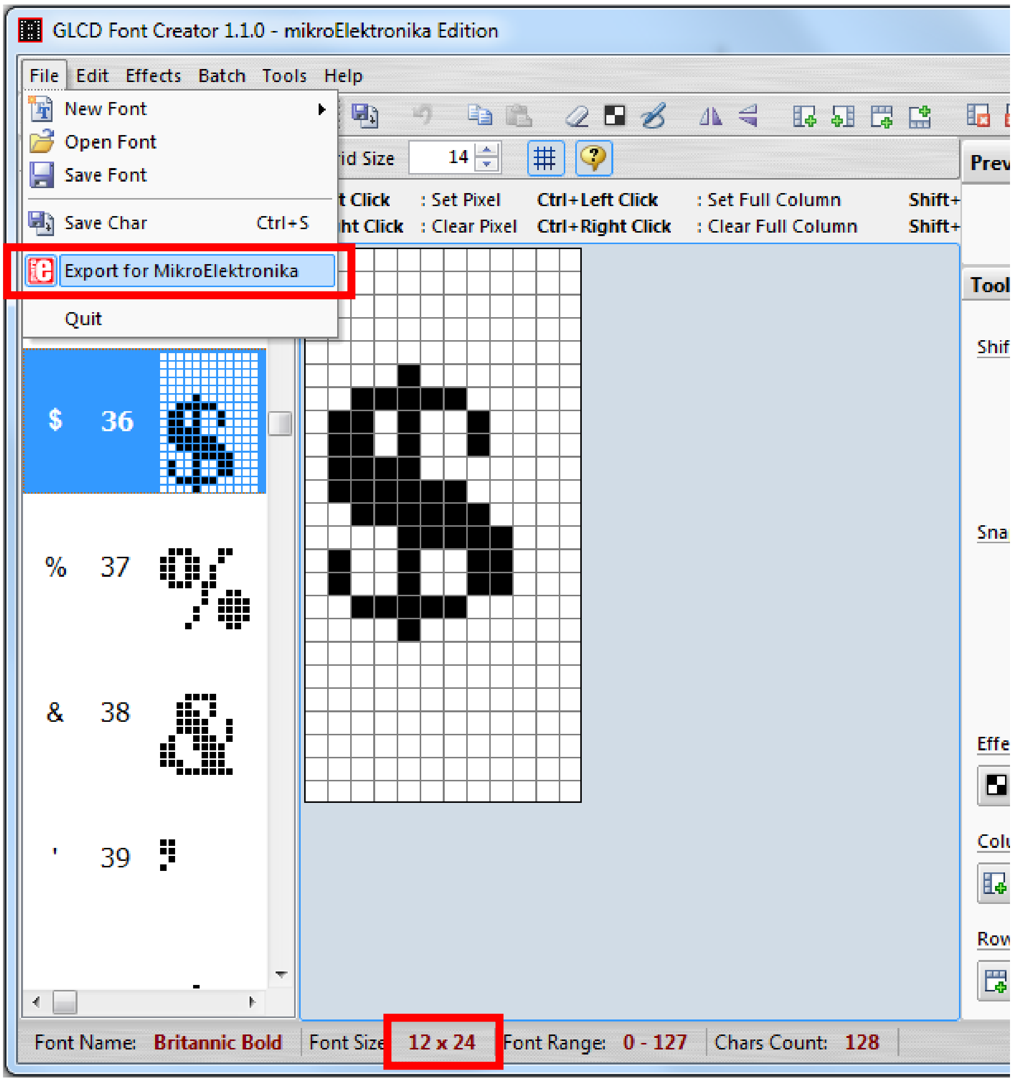
Chars Count: 128

- If the pixel width of the font size is larger than expected, then you have to repeat the previous steps to import font with smaller size.

- Use the following buttons to adjust the font size to match with expected font size.



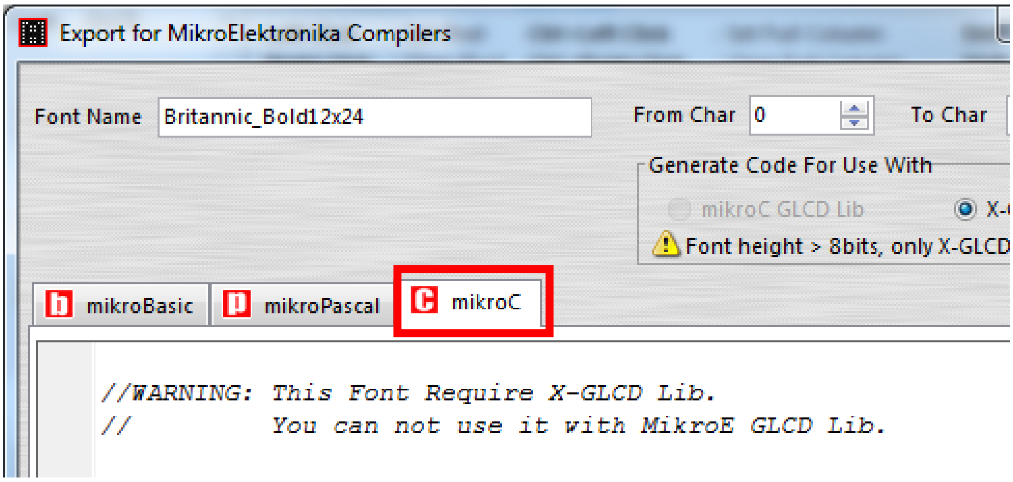
- After adjust font size, select [File] ⇨ [Export for MicroElektronika].



id Size 14

Font Name: Britannic Bold | Font Size 12 x 24 | Font Range: 0 - 127 | Chars Count: 128

- Select output format as [mikroC].


Export for MikroElektronika Compilers
Generate Code For Use With
mikroC GLCD Lib
X-
mikroBasic
mikroPascal
mikroC

Font Name Britannic_Bold12x24

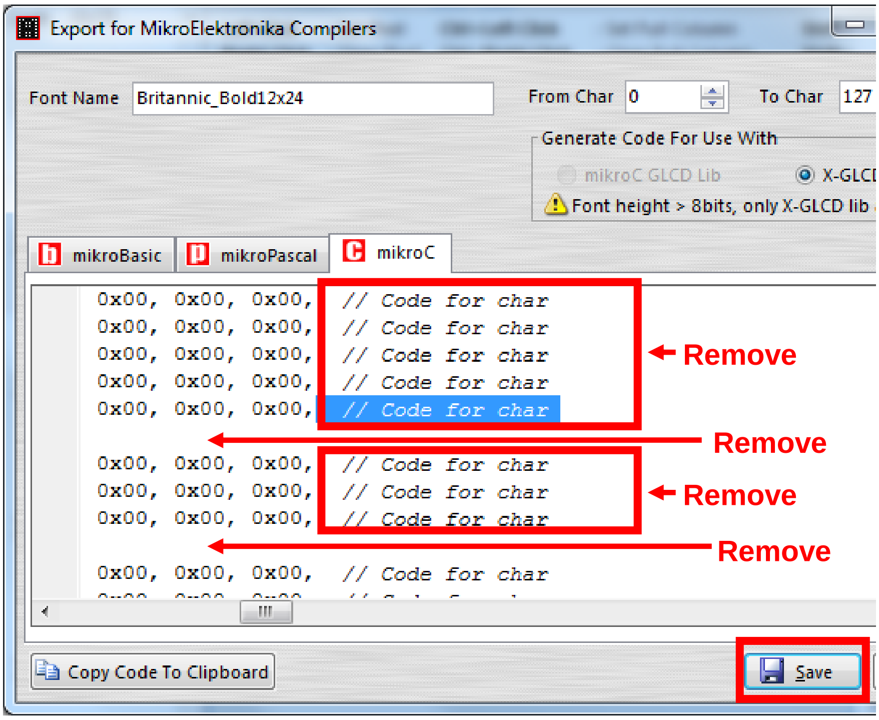
From Char 0

To Char

Font height > 8bits, only X-GLCD

```
//WARNING: This Font Require X-GLCD Lib.
//         You can not use it with MikroE GLCD Lib.
```

- Remove comment "// Code for char " from offset 0x00 to 0x1F. Remove empty line if found. Then click [Save] button to save to file.



Export for MikroElektronika Compilers

Font Name: Britannic_Bold12x24

From Char: 0

To Char: 127

Generate Code For Use With

○ mikroC GLCD Lib ● X-GLCD

⚠ Font height > 8bits, only X-GLCD lib

```
0x00, 0x00, 0x00,  // Code for char
0x00, 0x00, 0x00,  // Code for char
0x00, 0x00, 0x00,  // Code for char
0x00, 0x00, 0x00,  // Code for char
0x00, 0x00, 0x00,  // Code for char

0x00, 0x00, 0x00,  // Code for char
0x00, 0x00, 0x00,  // Code for char
0x00, 0x00, 0x00,  // Code for char

0x00, 0x00, 0x00,  // Code for char
```

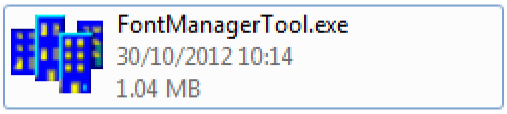
Remove

Remove

Remove

Remove

- Run Font Manager Tool.

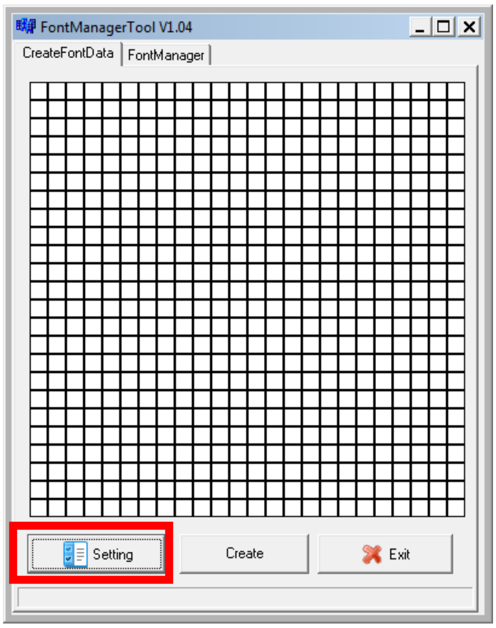


FontManagerTool.exe

30/10/2012 10:14

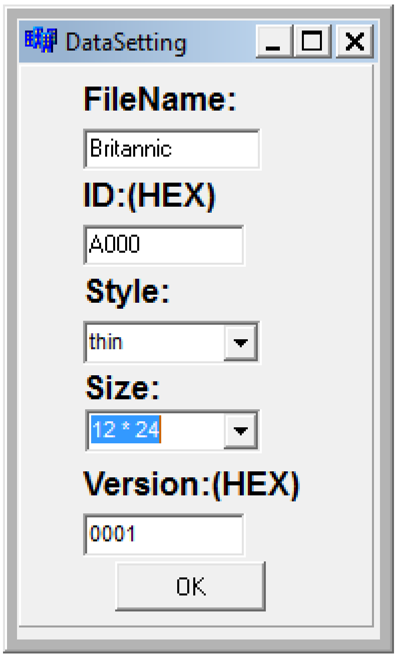
1.04 MB

- Click [Setting] button



FontManagerTool V1.04

- Enter the file name, font id, and select the size.



DataSetting

FileName: Britannic

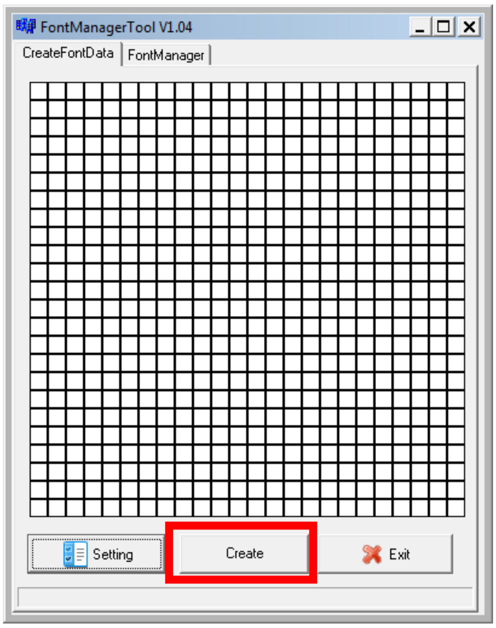
ID:(HEX) A000

Style: thin

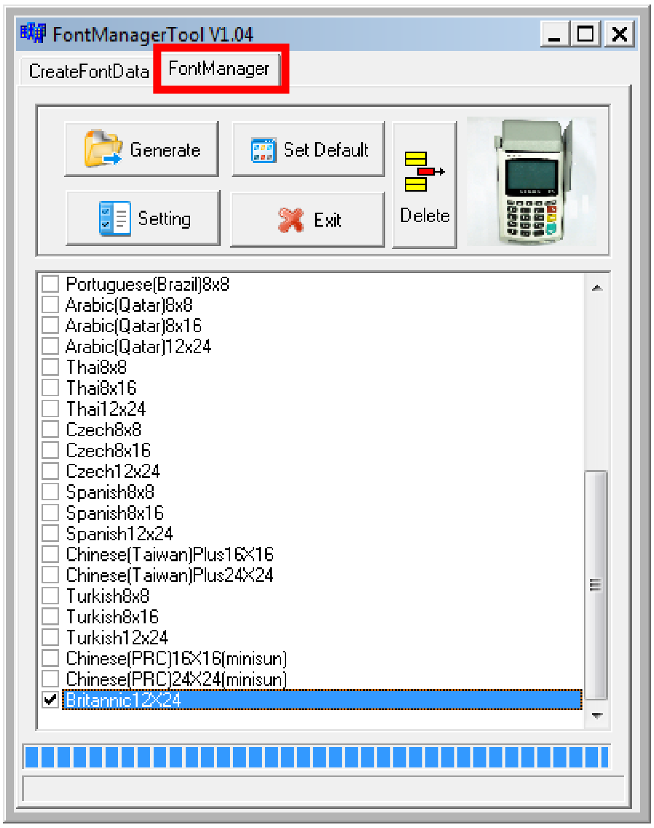
Size: 12 * 24

Version:(HEX) 0001

- Click [Create] button, and select the C file previously created using GLCD Font Generator.



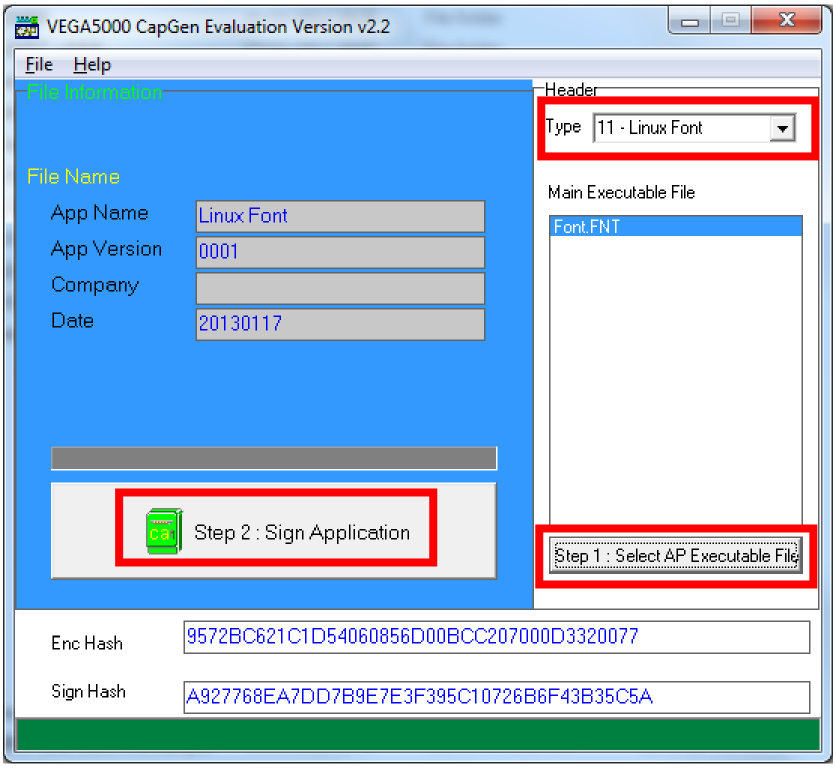
- Select [Font Manager] tab and tick the newly createdfont, and press [Generate] button to export to FNT file.



□ Portuguese(Brazil)8x8
□ Arabic(Qatar)8x8
□ Arabic(Qatar)8x16
□ Arabic(Qatar)12x24
□ Thai8x8
□ Thai8x16
□ Thai12x24
□ Czech8x8
□ Czech8x16
□ Czech12x24
□ Spanish8x8
□ Spanish8x16
□ Spanish12x24
□ Chinese(Taiwan)Plus16X16
□ Chinese(Taiwan)Plus24X24
□ Turkish8x8
□ Turkish8x16
□ Turkish12x24
□ Chinese(PRC)16X16(minisun)
□ Chinese(PRC)24X24(minisun)
☑ Britannic12X24

- Use CAP Generator to conver the FNT file to CAP.

  Set type to [11 – Linux Font], press [Step 1] button select the FNT file. Then press [Step 2] to generate CAP file.



VEGA5000 CapGen Evaluation Version v2.2

Type: 11 - Linux Font

File Name

App Name: Linux Font

App Version: 0001

Company:

Date: 20130117

Font.FNT

Enc Hash: 9572BC621C1D54060856D00BCC207000D3320077

Sign Hash: A927768EA7DD7B9E7E3F395C10726B6F43B35C5A

- Download the font CAP file to terminal.
- In terminal application, add following code to display message using the newly created font.

```
CTOS_LanguageConfig(0xA000,d_FONT_12x24,0,d_FALSE);
CTOS_LanguageLCDSelectASCII(0xA000);
CTOS_LCDTPrintXY(1, 1, "ABCDEFGH");
```

Or print message using the newly created font.

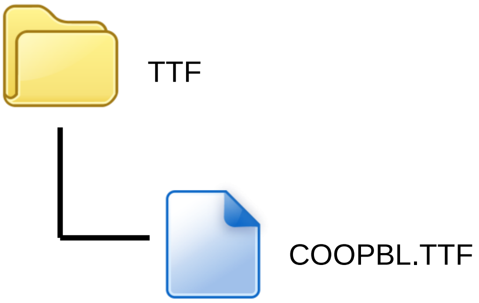
```
CTOS_LanguagePrinterSelectASCII(0xA000);
CTOS_PrinterPutString("ABCDEFGH");
```

5.3. Using TrueType Font (TTF)

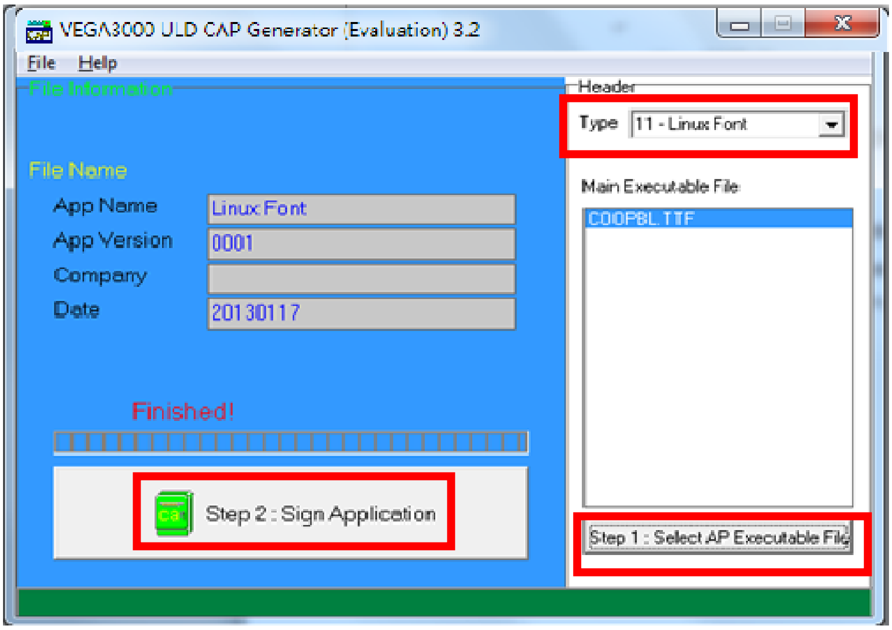
TrueType Font (TTF) is supported in VEGA3000 UltraLite.You may download the TrueType font preferred to terminal for displaying or printing.

Following steps demonstrate how to use “Cooper Black” TrueType font.

- Copy the TTF file needed to a empty folder.



- Use CAP Generator to conver the TTF file to CAP.
  Set type to [11 – Linux Font], press [Step 1] button select the TTF file.
  Then press [Step 2] to generate CAP file.


VEGA3000 ULD CAP Generator (Evaluation) 3.2
File
Help
File Information
Header
Step 2 : Sign Application
Step 1 : Select AP Executable File

File Name

App Name: Linux Font

App Version: 0001

Company:

Date: 20130117

Finished!

Type: 11 - Linux Font

Main Executable File: COOPBL.TTF

- Download the font CAP file to terminal.

- In terminal application, add following code to display message using the newly added font.

```
CTOS_LCDTTFSelect("COOPBL.TTF", 0);
CTOS_LCDFontSelectMode(d_FONT_TTF_MODE);
CTOS_LCDTSelectFontSize(0x203C); // 32x60
CTOS_LCDTClearDisplay();
CTOS_LCDTPrintXY(1, 1, "Hello World");
```

Or print message using the newly added font.

```
CTOS_PrinterTTFSelect("COOPBL.TTF", 0);
CTOS_PrinterFontSelectMode(d_FONT_TTF_MODE);
CTOS_LanguagePrinterFontSize(0x203C, 0, 0); // 32x60
CTOS_PrinterPutString("Hello World");
```

6. FCC Warning

Federal Communication Commission interference statement.This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: -Reorient or relocate the receiving antenna. -Increase the separation between the equipment and receiver. -Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. -Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference and
(2) this device must accept any interference received, including interference that may cause undesired operation

RF Exposure Warning

The equipment complies with RF exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

7. NCCWarning

根據 **NCC** 低功率電波輻射性電機管理辦法規定**:**	
第十二條	經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
第十四條	低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。 前項合法通信，指依電信法規定作業之無線電通信。 低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。