FLEETPC-6-B
FLEETPC-6-B-OB (OBD II)

Fan-less In-Vehicle System

Apollo Lake SoC with Smart Power System

4G/LTE
Bluetooth
CAN Bus
0101 1010 Digital I/O
DVI-D
Fanless
GPS
VGA
Remote On/Off
6.0 Gb/s SATA III
SIM
Smart Power
SSD
USB 3.0
WatchDog Timer
Wi-Fi
TPM

User Manual

CarTFT.com e.K.
www.cartft.com

Industrial & Embedded Solutions

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Purpose

This document is intended to provide the information about the features and use of the product.

Audience

The intended audiences are technical personnel, not for general audiences.

Ver: 100-003
Date: Feb. 5, 2018

To read this User Manual on your smart phone, you will have to install an APP that can read PDF file format first. Please find the APP you prefer from the APP Market.

Table of Contents

1. System Introduction

The FLEETPC-6-B Series is a fanless In-Vehicle Computer using Intel Apollo Lake processor designed to perform multiple in-car applications. These designs include smart power management, high efficient thermal module, and diversity of integrated communication technology such as wireless connectivity powered by 4G LTE.

1.1. Specifications

System

CPU	• Intel® Pentium® N4200 (1.1GHz, 2M Cache, up to 2.50 GHz)
Memory	• 2x DDR3L SO-DIMM- 1866, (Up to 8GB/non-ECC)

Display

Graphic Controller	• Gen9 GPU
Video Interface	• 1x DVI-D • 1x VGA

Storage

SATA	• 2x SATA Connectors (Sata 3 signal) • 2x Power Connectors (JST 2.54mm, 1x4 pin)
Mini PCIe Slot	• 3x Mini PCI-e sockets • Mini PCI-e 1 for 4G & GPS (USB signal) (Full size) • Mini-PCI-e 2 for Wi-Fi + BT (PCI-e + USB signal) (Full size) • Mini-PCI-e 3 for reserved (PCI-e + USB signal) (Full size)
I^{2}C Pin Header	• 1x I^{2}C Pin Header (I^{2}c signal) for G Sensor Board
G Sensor	• 1x G Sensor Board Connect to I^{2}C Pin Header (3-axis Accelerometer)
Disk Bay	• 2x Swappable 2.5” HDD Bay with Anti-vibration

Communication and I/O

Ethernet

- 2x PCIE x 1 Intel i210 IT GbE chip via RJ-45 connector

USB

- 4x USB 3.0

Serial Ports

- 4x COM → DB9 (RS-232)
- 1x COM → DB9 (RS232/422/485)

VIDEO Input

- 1x DB9

CANBUS

- Use CAN/OBDII DB9 connection
  1. Support CAN bus 2.0B
  2. Programmable baud rate:

Unsigned Char	Baud Rate
1	10K
2	20K
3	50K
4	100K
5	125K
6	250K
7	500K
8	800K
9	1000K

  3. API library for user development
  4. CAN bus device status query

CAN/OBD II

- Use IC STN1110 design a module board for optional CAN BUS function

GPIO

- Digital Input

Input Channels	4
Input Voltage	0 to 36 VDC at 25 Hz
Digital Input Levels for Dry Contacts	• Logic level 0: Close to GND • Logic level 1: Open
Digital Input Levels for Wet Contacts	• Logic level 0: +3 V max. • Logic level 1: +10 V to +36 V (Source to DI)
Isolation	3 kV optical isolation

- Digital Output

Output Channels	4, sink type
On-State Voltage	24 VDC nominal, open collector to 36 VDC
Isolation	3 kV optical isolation

SIM

- 2x SIM Card Sockets

LED

- 1x3 LED for power & status (onboard)

Other Features

Audio	• 2x 3.5" Phone Jack: Pink: Mic In Green: Audio Out
Remote Switch	• 1x 3.5" Phone Jack (Blue)
CMOS	• RTC (+/- 2 seconds for 24hours) • Lithium Battery (3V) for CMOS Data Backup
Hardware Monitoring	• CPU Voltage • CPU and System Temperature
Watchdog Timer	• Software Programmable 0~255 Seconds, 0 = Disable Timer.

Antenna

Antenna type	• SMA-type antenna holes reserved for Wi-Fi, BT, 4G/LTE, or GPS.

Power Requirement

Power Supply	• Power Sub System: 9~36 V Power Input • 12V for System

Software

OS Support	• Windows 10 (64 bit) • Linux kernel 4.4 or above (64 bit)

Mechanical & Environment

Thermal Design	• Fanless (Heatsink)
Chassis	• Aluminum extrusion heat sink & metal chassis
Dimension	• 260mm (W) x 195mm(D) x 63mm(H)
Vibration	• IEC 60068-2-64, 5~500Hz, 3GRMS(CF/SSD) • For SSD only
Shock	• IEC 60068-2-27, 50G 500m/s2 11MS • For SSD only
Operating Temperature/Humidity	• -25°C ~ 60°C / 0~90% • -25°C ~ 55°C (+15°C) Follow EN50155 T1
Storage Temperature	• -40°C ~ 80°C
Certification	• CE / FCC class B / E Mark, EN50155

1.2. Package Contents

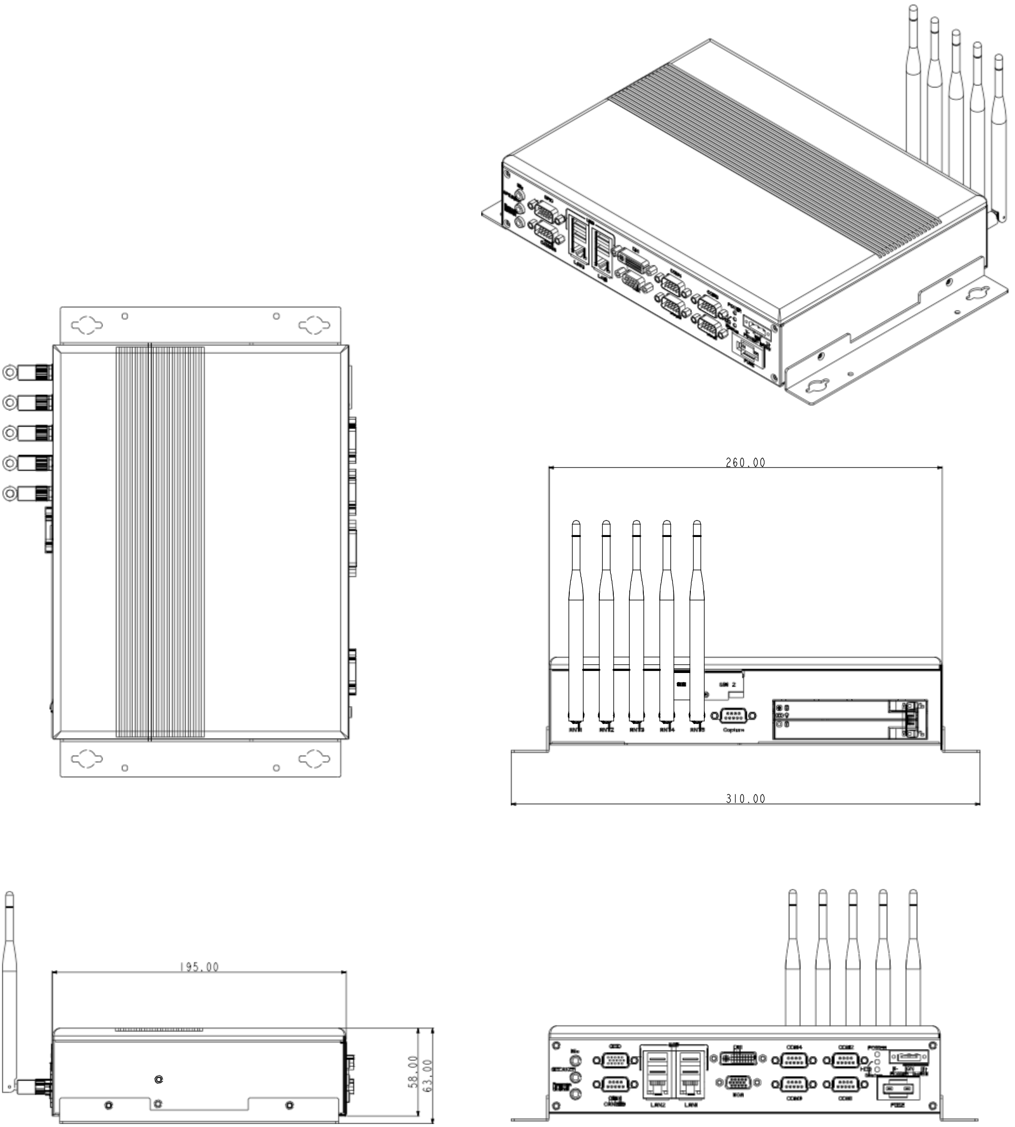
Check if the following items are included in the package.

	Item	Q'ty
☒	FLEETPC-6-B or FLEETPC-6-B-OB (OBD II) System	1
☒	Remote Switch Cable	1
☒	Driver CD	1
☒	Screw Pack (2.5"HDD bracket: 8 pcs)	1
☒	Terminal Block (Female 3-pin)	1
☒	Spare Fuse	1
☒	GPIO Cable	1
☒	Bracket	2
☒	Rubber	4

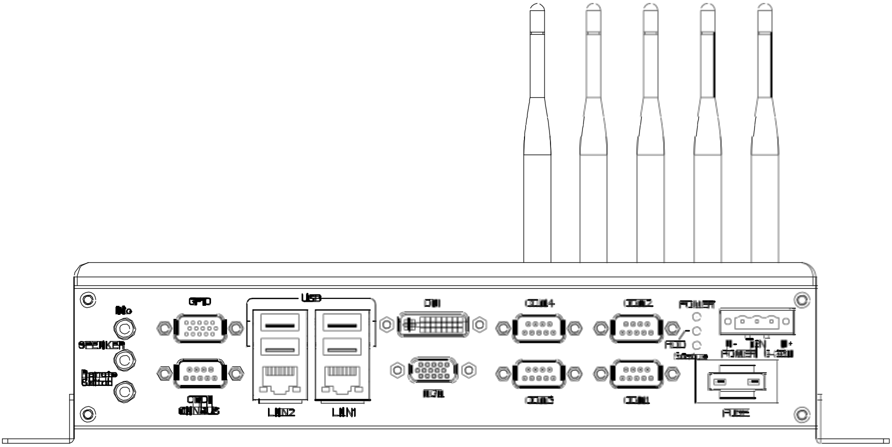
1.3. System Dissection

1.3.1. Dimensions

(Unit: mm)



1.3.2. Front I/O Panel



Mic (Pink)

Microphone input jack.

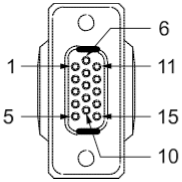
SPEAKER (Green)

Line out phone jack.

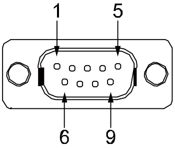
Remote Switch (Blue)

SPST (Single Pole, Single Throw) switch input.

GPIO

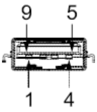
	Pin #	Definition	Wire Color	Pin #	Definition	Wire Color
 GPIO DB15 Cable	1	GPO0	Brown	2	GPO1	Orange
	3	GPO2	Green	4	GPO3	Blue
	5	GND	Black	6	GND	Gray
	7	N/A	Red/White	8	N/A	White
	9	GND	Red	10	N/A	Purple
	11	GPI4	Light Green	12	GPI5	Light Blue
	13	GPI6	Pink	14	GPI7	Brown/ White
	15	EXTPWR	Yellow			

OBDII CANBUS

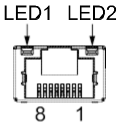
	ODBII		FLEETPC-6-B-PT1OB		FLEETPC-6-B-PT1	
	Pin #	Signal	Pin #	Signal	Pin #	Signal
	1	GND	1	GND	1	N/A
	2	GND	2	GND	2	N/A
	3	CAN_H	3	CAN_H	3	CAN_H
	4	K_LINE	4	K_LINE(RSV)	4	N/A
	5	CAN_L	5	CAN_L	5	CAN_L
	6	J1850_BUS-	6	J1850_BUS-(RSV)	6	N/A
	7	J1850_BUS+	7	J1850_ BUS+(RSV)	7	N/A
	8	L_LINE	8	L_LINE(RSV)	8	N/A
	9	DLC_RAW	9	DLC_RAW	9	N/A
	10	N/A	10	N/A	10	N/A

USB

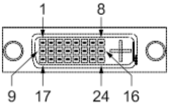
Standard USB 3.0 Type-A connectors.

	Pin #	Signal	Pin #	Signal
	1	VCC5	5	SS_RX -
	2	DATA-	6	SS_RX +
	3	DATA+	7	GND
	4	GND	8	SS_TX -
			9	SS_TX +

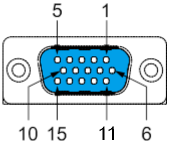
LAN1, LAN2

	LED	Light	Status
	LED1	Off	10Mbps
		Green	100Mbps
		Orange	1000Mbps
	LED2	Yellow	Link/Active
		Off	LAN Off

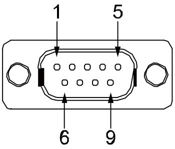
DVI

	Pin #	Signal	Pin #	Signal
	C1	VGA_RED	C2	VGA_GREEN
	C3	VGA_BLUE	C4	VGA_HSYNC
	D1	DATA2-	D2	DATA2+
	D3	GND	D4	VGA_SCL
	D5	VGA_SDA	D6	DDCCLK
	D7	DDCDATA	D8	VGA_VSYNC
	D9	DATA1-	D10	DATA1+
	D11	GND	D12	NC
	D13	NC	D14	VCC5
	D15	GND	D16	DVI_HPD
	D17	DATA0-	D18	DATA0+
	D19	GND	D20	NC
	D21	NC	D22	GND
	D23	CLK+	D24	CLK-

VGA

	Pin #	Signal	Pin #	Signal
	1	VGA_RED	2	VGA_GREEN
	3	VGA_BLUE	4	NC
	5	GND	6	GND
	7	GND	8	GND
	9	VCC5	10	CRT_PLUG
	11	NC	12	VGA_SDA
	13	VGA_HSYNC	14	VGA_VSYNC
	15	VGA_SCL		

COM1 ~ COM4

		COM1~3, COM4 (RS232)	COM4 (RS422)	COM4 (RS485)
	Pin #	Signal	Signal	Signal
	1	DCD	TX-	DATA-
	2	SIN	TX+	DATA+
	3	SOUT	RX+	
	4	DTR	RX-	
	5	GND		
	6	DSR		
	7	RTS		
	8	CTS		
	9	RI		

Status/HDD/Power LED Display

	LED	Light	Display
	G	Green	Status
	G	Green	HDD
	Y	Yellow	Power LED

Status LED Flashing Status:

A Status LED is used to indicate the status of the system. In normal condition, the LED will flash a number of blink to state the status. Each blink remains 200 ms ON followed by a 200 ms OFF. Each Cycle will have a 2-second OFF in between.

LED Flashing Numbers	Status
0 (Constant On)	Power output runs normally.
1	Standby Mode (System off)
3	Power On Delay
5	Boot Up Delay
6	Soft Off Delay
4	Shutdown Delay
2	Hard Off Delay

If abnormal condition occur, the LED will flash a 1.5-second pulse followed by numbers of 200 ms pulse to indicate the error status.

LED Flashing Numbers	Error Status
1 Long, 1 Short	System cannot be turned on or was turned off because battery voltage is below the Battery Low Voltage.
1 Long, 2 Short	System on/off fail. When motherboard cannot turn on or turn off after retry.

DC Power In

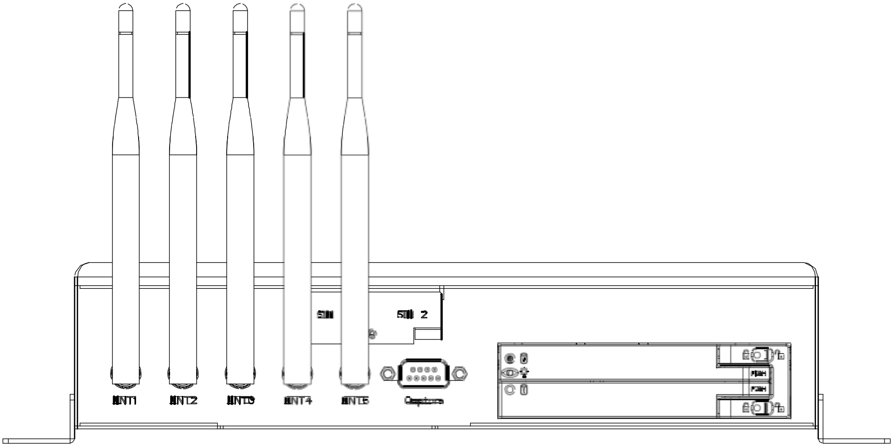
9V ~ 36V DC input connector Terminal Block: 3 pin Pitch: 5.08mm	Pin #	Signal
	V+	9V ~ 36V DC Power Input
	IGN	Ignition On (Hi Active)
	V-	GND

Blade-type Fuse Holder

Car Battery	Blade-type fuse suggestion	Remarks
12V System	CONQUER ATQ-10	Voltage Rating: 36V; Current Rating: 15A
24V System	CONQUER ATQ-5	Voltage Rating: 36V; Current Rating: 15A

Note: *You may have to use a needle-nose pliers to grip on the fuse and pull it out.*

1.3.3. Rear I/O Panel



Antenna Sockets

Reserved for installation of optional SMA-type antennas.

SIM Card Holders

Reserved for installation of your SIM cards.

Capture

Reserved for installation of optional capture card.

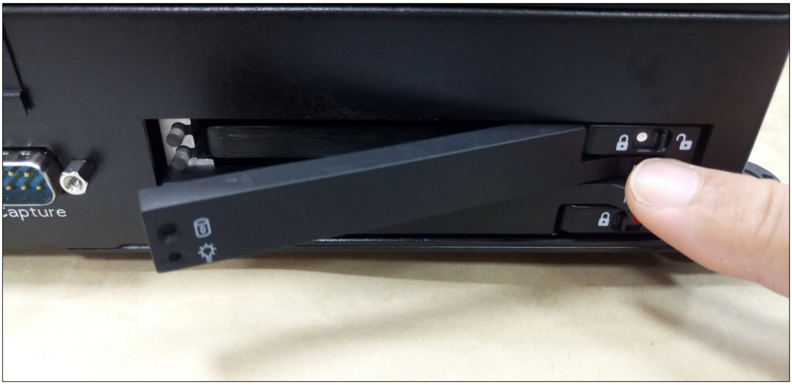
HDD Bays

Reserved for installation of your hard disks.

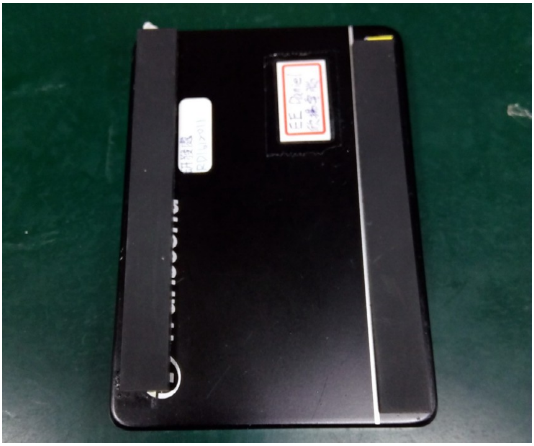
2. Components Assembly

2.1. 2.5” SATA SSD Installation

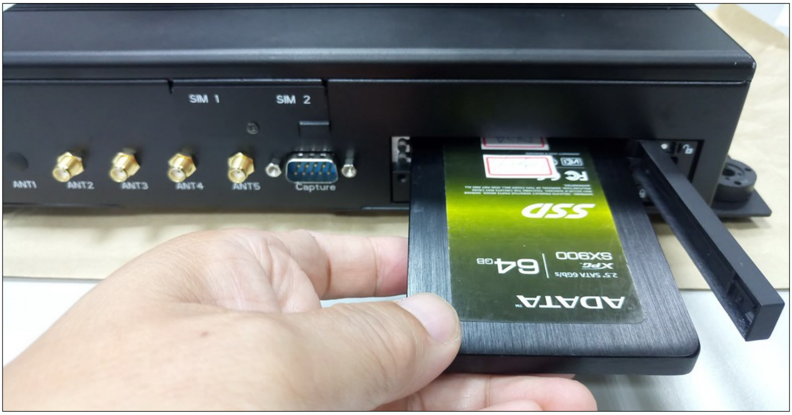
Step 1: Push the latch right, a white circle appears. The door is unlocked. Push the door-end marked with the word “PUSH“ to let the door opened.



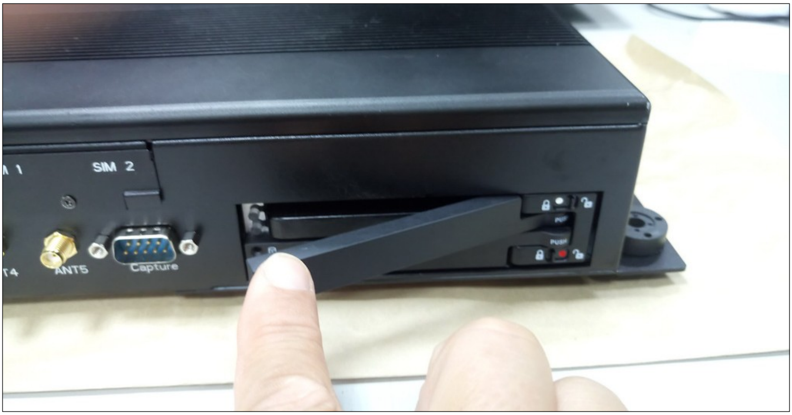
To install an SSD of 7mm thin, you will need to place two 2.5mm-thick spacers atop the SSD so as to fit in the 9.5mm bay.



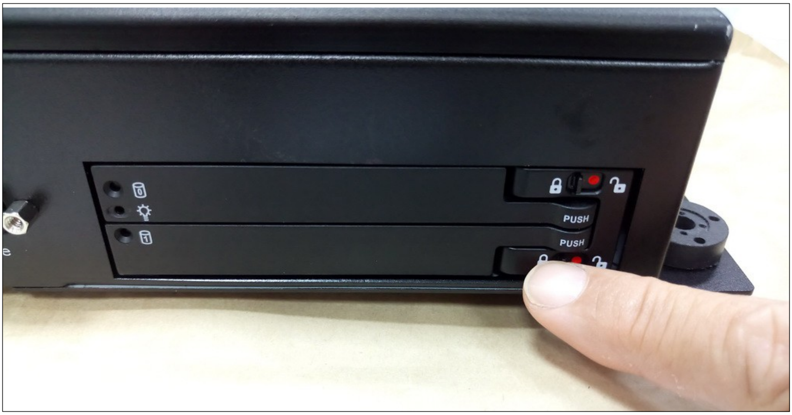
Step 2: Insert your SSD into the tray. (The contact pins face inward.)



Step 3: Firmly close the door so that the SSD will be slided into its contact position. (Failing to do so could cause a loose contact with the SSD.)

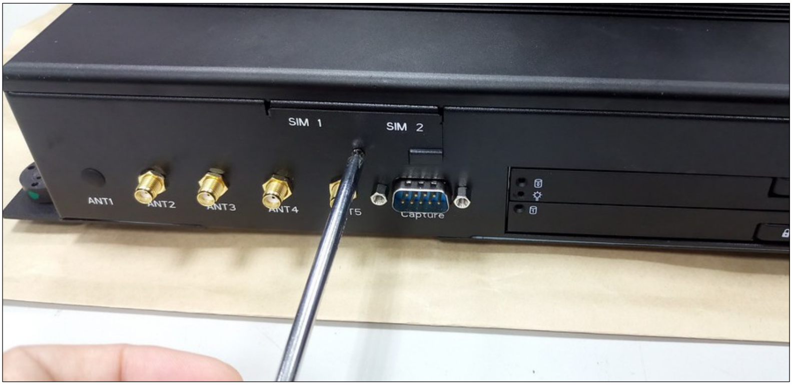


Step 4: Push the latch left, a red circle appears. The door is locked.

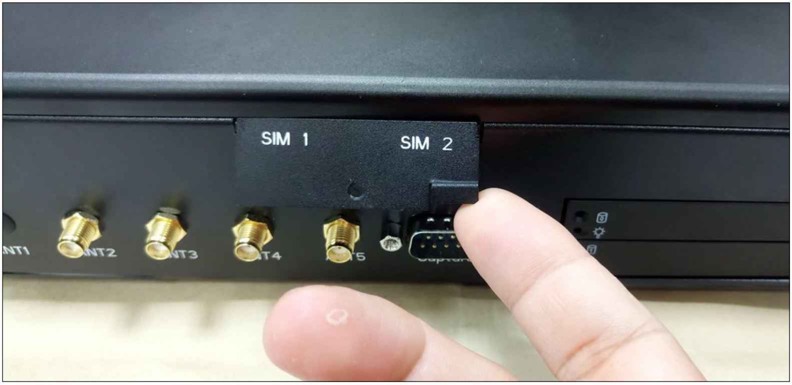


2.2. SIM Card Installation

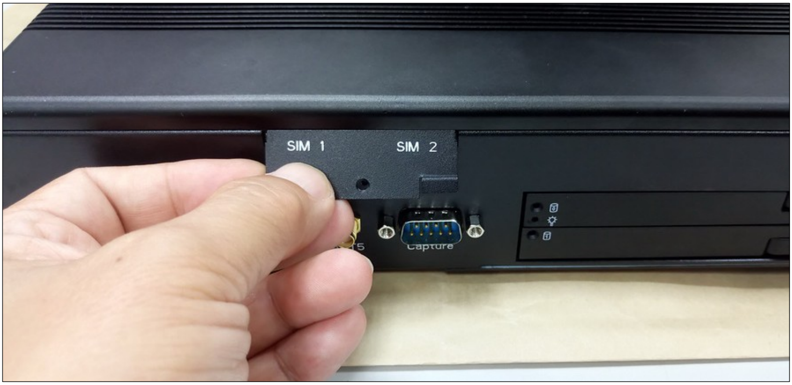
Step 1: Remove the screw that secure the cover plate.



Step 2: Lift the cover plate up a little to open the door. Gently hold the left side of the plate up a little and take it away from the notch.



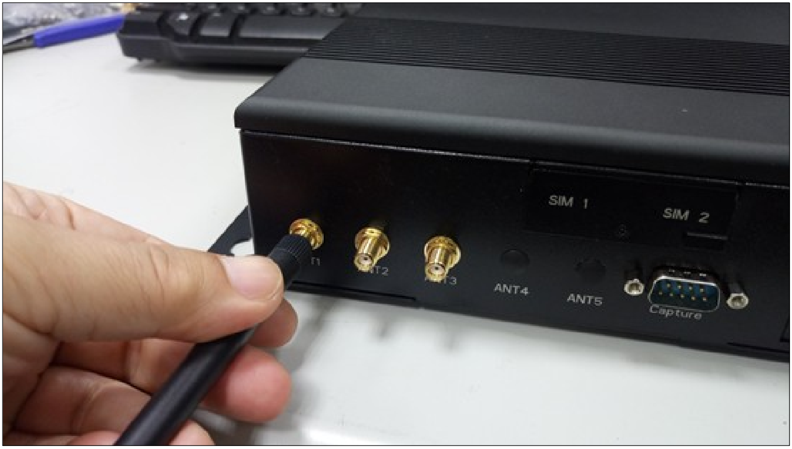
Step 3: Insert your SIM card. Secure the cover plate.



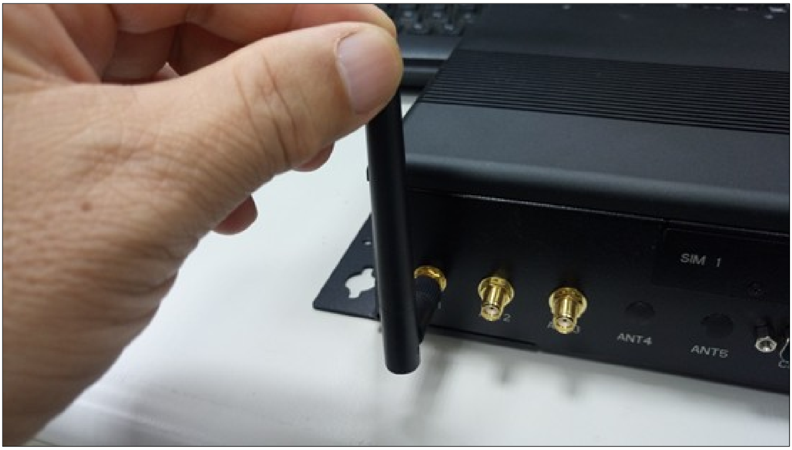
2.3. Antenna Connection

After havinf installed your wireless module into the mainboard and the antenna socket, you may connect your antennas needed according to your system configuration.

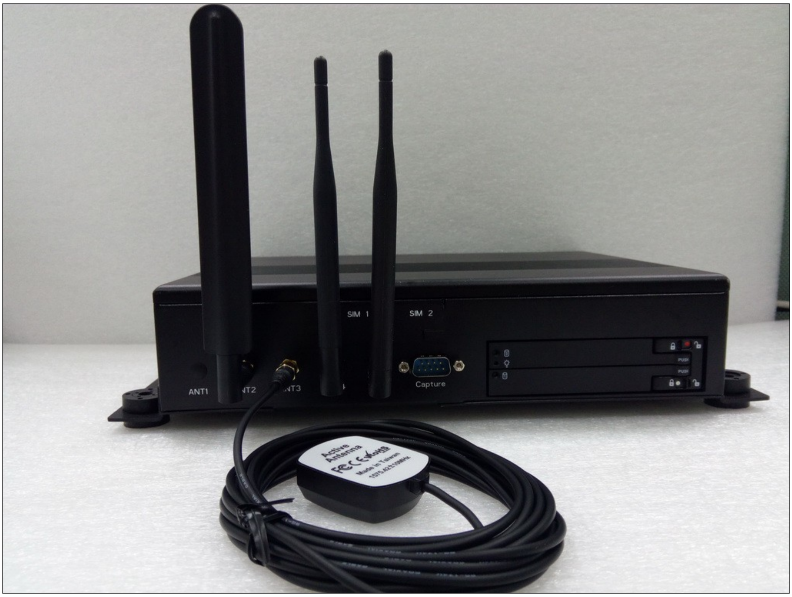
Step 1: Insert the antenna plug into the antenna socket.



Step 2: Turn the antenna body upright.

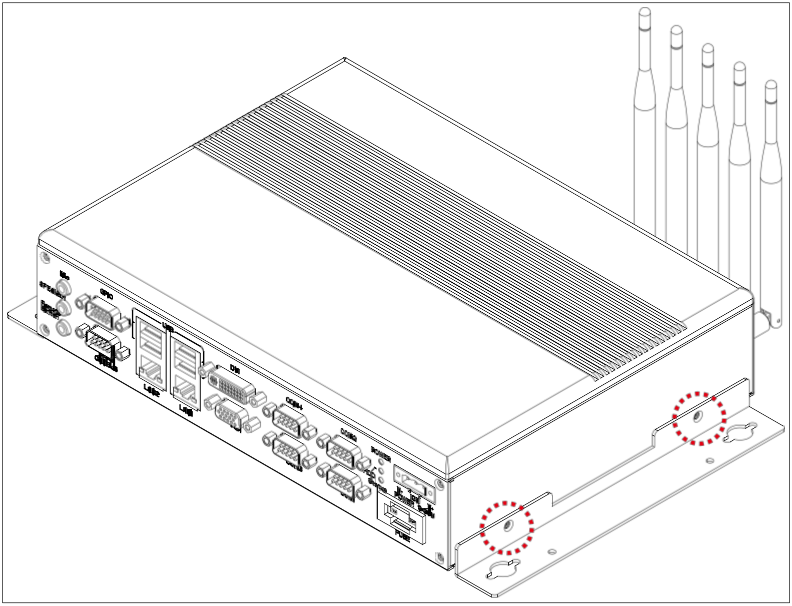


Step 3: Connect your antennas needed according to your system configuration. The photo shows antenna from left to right are: 4G LTE, GPS, WiFi, BT.

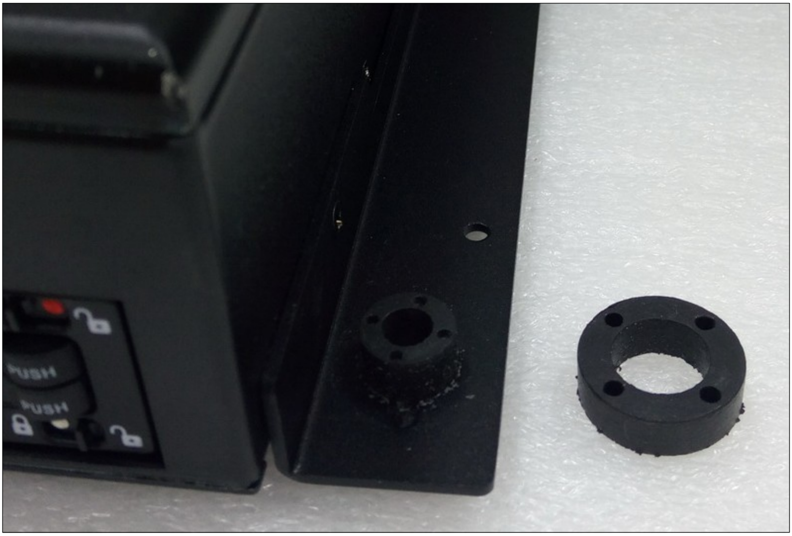


2.4. Brackets & Rubber Pads Installation

Step 1: Attach two brackets with screws to each side of the body.



Step 2: Attach four rubber pads to the bracket holes.



3. BIOS Settings

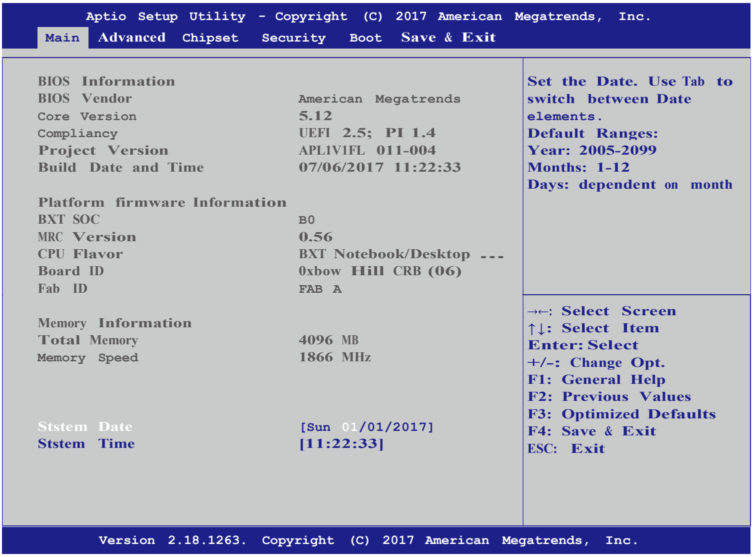
This chapter describes the BIOS menu displays and explains how to perform common tasks needed to get the system up and running. It also gives detailed explanation of the elements found in each of the BIOS menus. The following topics are covered:

- Main Setup
- Advanced Setup
- Chipset Setup
- Security Setup
- Boot Setup
- Save & Exit Setup

Once you enter the Award BIOS™ CMOS Setup Utility, the Main Menu will appear on the screen. Use the arrow keys to highlight the item and then use the <Pg Up> <Pg Dn> keys to select the value you want in each item.

3.1. Main Setup

The BIOS setup main menu includes some options. Use the [Up/Down] arrow key to highlight the option, and then press the <**Enter**> key to select the item and configure the functions.



```
        Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

    BIOS Information                                            Set the Date. Use Tab to
    BIOS Vendor                  American Megatrends            switch between Date
    Core Version                 5.12                           elements.
    Compliancy                   UEFI 2.5; PI 1.4               Default Ranges:
    Project Version              APL1V1FL 011-004               Year: 2005-2099
    Build Date and Time          07/06/2017 11:22:33            Months: 1-12
                                                                Days: dependent on month
    Platform firmware Information
    BXT SOC                      B0
    MRC Version                  0.56
    CPU Flavor                   BXT Notebook/Desktop ---
    Board ID                     0xbow Hill CRB (06)
    Fab  ID                      FAB A
                                                                →←: Select Screen
    Memory Information                                          ↑↓: Select Item
    Total Memory                 4096 MB                        Enter: Select
    Memory Speed                 1866 MHz                       +/-: Change Opt.
                                                                F1: General Help
                                                                F2: Previous Values
    Ststem Date                  [Sun 01/01/2017]               F3: Optimized Defaults
    Ststem Time                  [11:22:33]                     F4: Save & Exit
                                                                ESC: Exit

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```
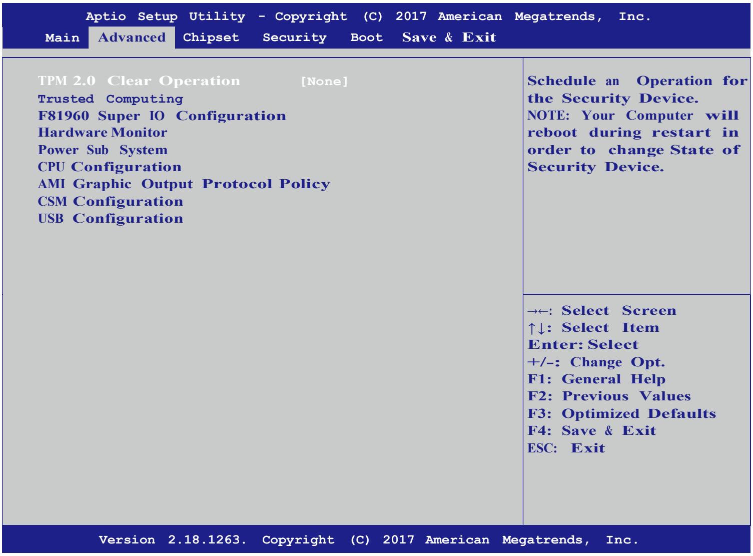

Note: *Listed at the bottom of the menu are the control keys. If you need any help with the item fields, you can press <***F1***> key, and it will display the relevant information.*

- **Display All Setup Item**
  Enable to show all setup items.
- **System Language**
  Choose the system default language.
- **System Date**
  Set the system date. Use Tab to switch between Date elements.
- **System Time**
  Set the system time. Use Tab to switch between Time elements.

3.2. Advanced Setup



```
        Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

    TPM 2.0 Clear Operation          [None]       Schedule an Operation for
    Trusted Computing                             the Security Device.
    F81960 Super IO Configuration                 NOTE: Your Computer will
    Hardware Monitor                              reboot during restart in
    Power Sub System                              order to change State of
    CPU Configuration                             Security Device.
    AMI Graphic Output Protocol Policy
    CSM Configuration
    USB Configuration

                                                  →←: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F3: Optimized Defaults
                                                  F4: Save & Exit
                                                  ESC: Exit

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```

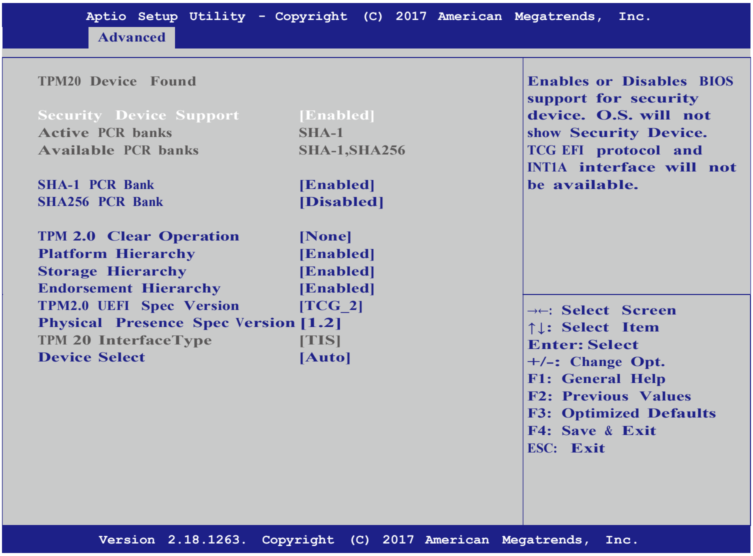
- **TPM 2.0 Clear Operation**
  Schedule an Operation for the Security Device.

  NOTE: Your Computer will reboot during restart in order to change State of Security Device.
- **Trusted Computing**
  Trusted Computing Settings.
- **F81960 Super IO Configuration**
  System Super IO Chip Parameters.
- **Hardware Monitor**
  Monitor hardware status.
- **Power Sub System**
  Power Sub System.

- **CPU Configuration**
  CPU Configuration Parameters.
- **AMI Graphic Output Protocol Policy**
  User Select Monitor Output by Graphic Output Protocol.
- **CSM Configuration**
  Compatibility Support Module Configuration. Enable/Disable Option ROM execution settings, etc.
- **USB Configuration**
  USB Configuration Parameters.

3.2.1. Trusted Computing

Set trusted computing settings



```
         Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
          Advanced

    TPM20 Device Found                                   Enables or Disables BIOS
                                                         support for security
    Security Device Support          [Enabled]           device. O.S. will not
    Active PCR banks                 SHA-1               show Security Device.
    Available PCR banks              SHA-1,SHA256        TCG EFI protocol and
                                                         INT1A interface will not
    SHA-1 PCR Bank                   [Enabled]           be available.
    SHA256 PCR Bank                  [Disabled]

    TPM 2.0 Clear Operation          [None]
    Platform Hierarchy               [Enabled]
    Storage Hierarchy                [Enabled]
    Endorsement Hierarchy            [Enabled]
    TPM2.0 UEFI Spec Version         [TCG_2]             →←: Select Screen
    Physical Presence Spec Version   [1.2]               ↑↓: Select Item
    TPM 20 InterfaceType             [TIS]               Enter: Select
    Device Select                    [Auto]              +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit

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```

- **Security Device Support**
  Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
- **SHA-1 PCR Bank**
  Enables or Disables SHA-1 PCR Bank.
- **SHA256 PCR Bank**
  Enables or Disables SHA256 PCR Bank.
- **TPM 2.0 Clear Operation**
  Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.

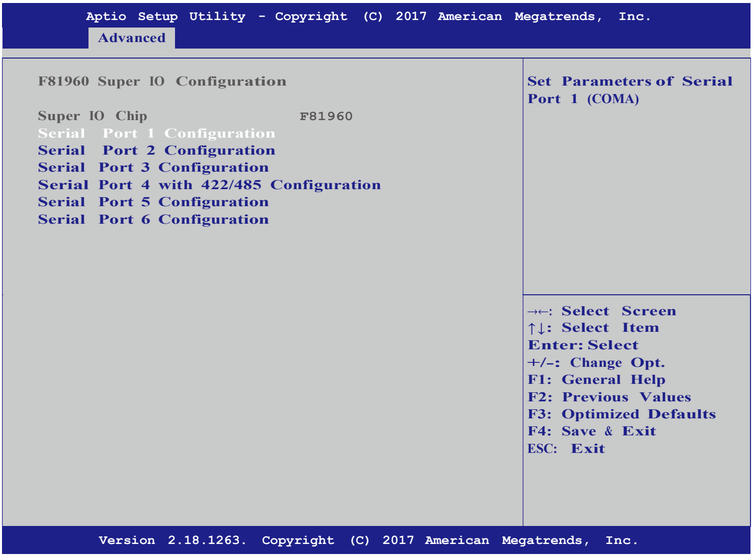
- **Platform Hierarchy**
  Enables or Disables Pateform Hierarchy.
- **Storage Hierarchy**
  Enables or Disables Storage Hierarchy.
- **Endorsement Hierarchy**
  Enables or Disables Endorsement Hierarchy.
- **TPM2.0 UEFI Spec Version**
  Select the TCG2 Spec Version Support,

  TCG_1_2: The Compatible mode for Win8/Win10.

  TCG_2: Support new TCG2 protocol and event format for Win10 or later.
- **Physical Presence Spec Version**
  Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.
- **Device Select**
  TPM 1.2 will restrict support to TPM 1.2 devices. TPM2.0 will restrict support to TPM 2.0 devices, Auto will support both with the default set to TPM2.0 devices if not found, TPM1.2 devices will be enumerated

3.2.2. F81960 Super IO Configuration

Set system super IO chip parameters.



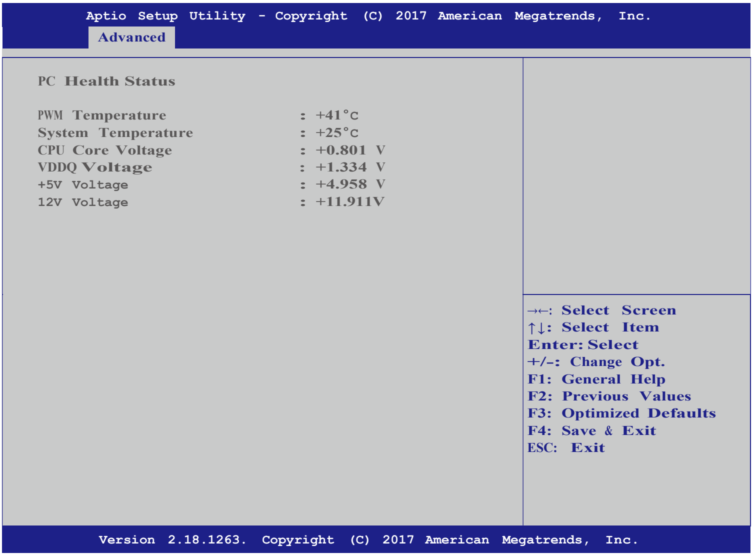
```
Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
Advanced

F81960 Super IO Configuration                          Set Parameters of Serial
                                                       Port 1 (COMA)
Super IO Chip                 F81960
Serial Port 1 Configuration
Serial Port 2 Configuration
Serial Port 3 Configuration
Serial Port 4 with 422/485 Configuration
Serial Port 5 Configuration
Serial Port 6 Configuration
                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit

Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

- **Serial Port 1 Configuration**
  Set Parameters of Serial Port 1 (COMA).

- **Serial Port 2 Configuration**
  Set Parameters of Serial Port 2 (COMB).
- **Serial Port 3 Configuration**
  Set Parameters of Serial Port 3 (COMC).
- **Serial Port 4 with 422/485 Configuration**
  Set Parameters of Serial Port 4 (COMD).
- **Serial Port 5 Configuration**
  Set Parameters of Serial Port 5 (COME).
- **Serial Port 6 Configuration**
  Set Parameters of Serial Port 6 (COMF).

3.2.3. Hardware Monitor

Dsiplay hardware monitor status.



```
Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
Advanced

PC Health Status

PWM Temperature                    : +41°C
System Temperature                 : +25°C
CPU Core Voltage                   : +0.801 V
VDDQ Voltage                       : +1.334 V
+5V Voltage                        : +4.958 V
12V Voltage                        : +11.911V

→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

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```
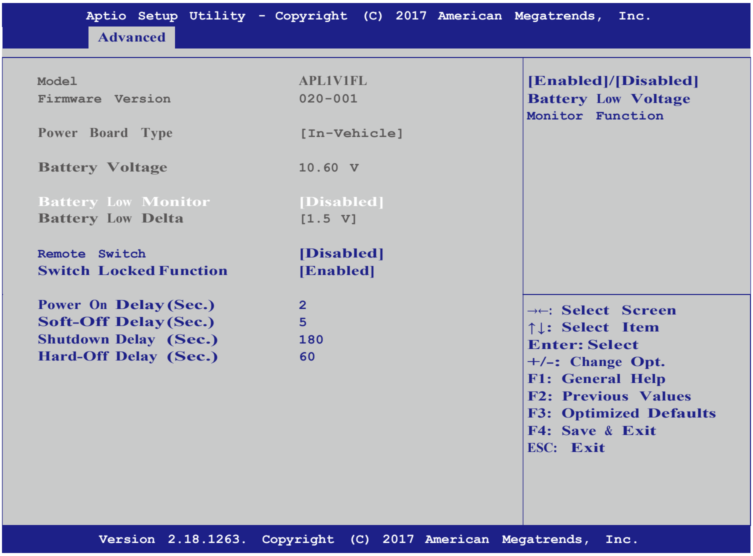

- **PWM Temperature**
  This item displays the PWM temperature.
- **System Temperature**
  This item displays the system temperature.
- **CPU Core Voltage**
  This item displays the VCORE voltage.
- **VDDQ Voltage**
  This item displays the VDDQ voltage.

- **+5V Voltage**
  This item displays the +5V voltage.
- **12V Voltage**
  This item displays the +12V voltage.

3.2.4. Power Sub System

Dsiplay hardware monitor status.



```
        Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
          Advanced

  Model                             APL1V1FL          [Enabled]/[Disabled]
  Firmware Version                  020-001           Battery Low Voltage
                                                      Monitor Function
  Power Board Type                  [In-Vehicle]

  Battery Voltage                   10.60 V

  Battery Low Monitor               [Disabled]
  Battery Low Delta                 [1.5 V]

  Remote Switch                     [Disabled]
  Switch Locked Function            [Enabled]

  Power On Delay(Sec.)              2                 →←: Select Screen
  Soft-Off Delay(Sec.)              5                 ↑↓: Select Item
  Shutdown Delay (Sec.)             180               Enter: Select
  Hard-Off Delay (Sec.)             60                +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Exit
                                                      ESC: Exit

        Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

- **Battery Low Monitor**
  Enables or disables the monitor function of low battery voltage.
- **Battery Low Delta**
  Sets the battery delta level. Once the battery voltage drops below this level, the battery will be detected as battery low.
- **Remote Switch**
  Enables or disables the function of remote switch.

  [Disabled]: Ignition only.

  [Enabled]: Ignition+Remote Switch.
- **Switch Locked Function**
  Enables or disables the function of switch lock.

  [Disabled]: No switch locked.

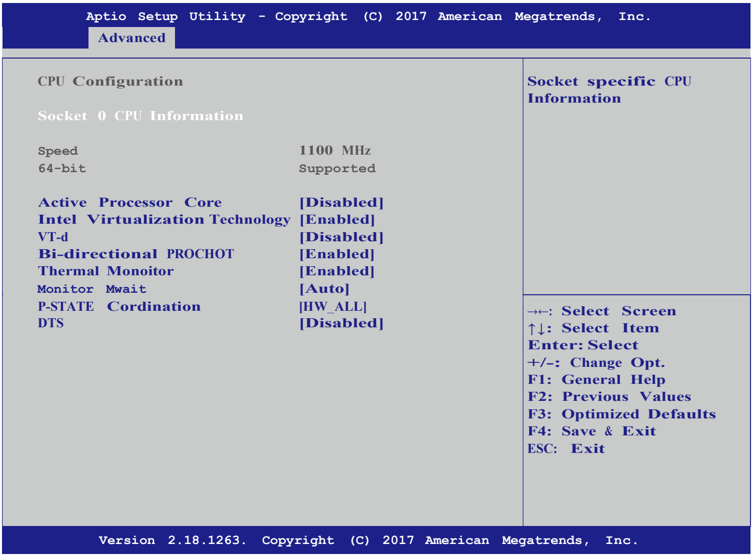
  [Enabled]: All switch will locked 3 min after power on.
- **Power On Delay (Sec.)**
  The delay between power on and system work.

2 seconds to 60 seconds with 1 second increment.

- **Soft-Off Delay (Sec.)**
  The delay before system shutdown.
  0 second to 3600 seconds with 1 second increment.
- **Shutdown Delay (Sec.)**
  The delay between system shutdown and system off.
  120 seconds to 3600 seconds with 1 second increment.
- **Hard-Off Delay (Sec.)**
  The delay before all power off.
  0 second to 3600 seconds with 1 second increment.

3.2.5. CPU Configuration

Set CPU configuration parameters.



```
        Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
          Advanced

   CPU Configuration                                   Socket specific CPU
                                                       Information
   Socket 0 CPU Information

   Speed                          1100 MHz
   64-bit                         Supported

   Active Processor Core          [Disabled]
   Intel Virtualization Technology [Enabled]
   VT-d                           [Disabled]
   Bi-directional PROCHOT         [Enabled]
   Thermal Monoitor               [Enabled]
   Monitor Mwait                  [Auto]
   P-STATE Cordination            [HW_ALL]
   DTS                            [Disabled]
                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit

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```
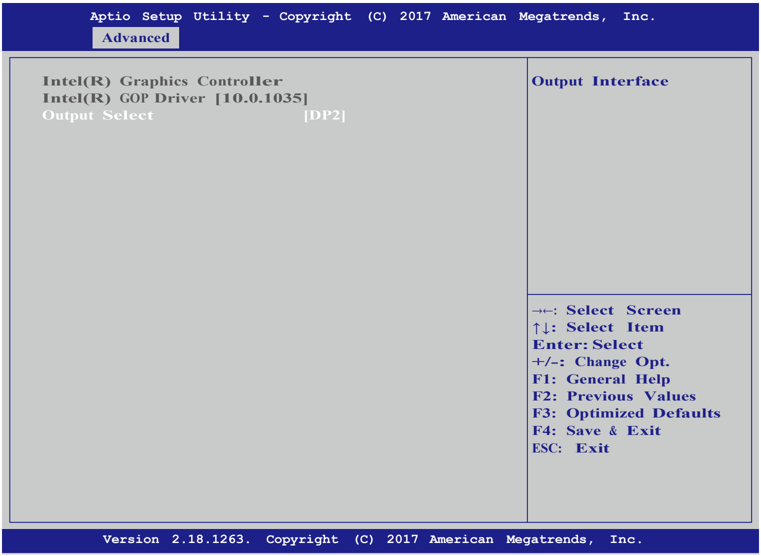

- **Socket 0 CPU Information**
  Socket specific CPU Information.
- **Active Processor Core**
  Number of cores to enable in each processor package.
- **Intel Virtualization Technology**
  When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- **VT-d**
  Enable/Disable CPU VT-d.

- **Bi-directional PROCHOT**
  When a processor thermal sensor trips (either core), the PROCHOT# will be driven. If bi-direction is enabled, external agents can drive PROCHOT# to throttle the processor.
- **Thermal Monitor**
  Enable/Disable Thermal Monitor.
- **Monitor Mwait**
  Enable/Disable Monitor Mwait.
- **P-STATE Coordination**
  Change P-STATE Coordination type.
- **DTS**
  Enabled/Disable Digital Thermal Sensor.

3.2.6. AMI Graphic Output Protocol Policy

User Select Monitor Output by Graphic Output Protocol.

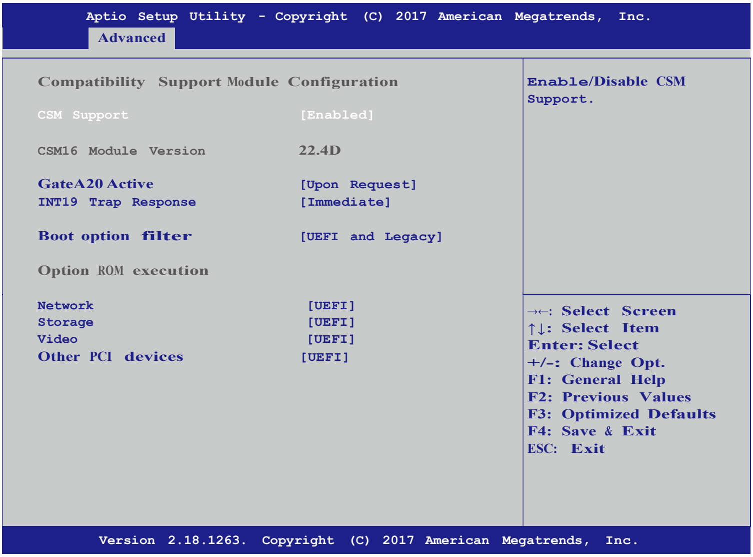


```
Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
Advanced

Intel(R) Graphics Controller
Intel(R) GOP Driver [10.0.1035]
Output Select                    [DP2]

Output Interface

→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

- **Output Select**
  Select output interface.

3.2.7. CSM Configuration

Set CSM configuration parameters.



```
        Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
          Advanced

 Compatibility Support Module Configuration            Enable/Disable CSM
                                                       Support.
 CSM Support                     [Enabled]

 CSM16 Module Version            22.4D

 GateA20 Active                  [Upon Request]
 INT19 Trap Response             [Immediate]

 Boot option filter              [UEFI and Legacy]

 Option ROM execution

 Network                          [UEFI]               →←: Select Screen
 Storage                          [UEFI]               ↑↓: Select Item
 Video                            [UEFI]               Enter: Select
 Other PCI devices               [UEFI]                +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit

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```

- **CSM Support**
  Enable/Disable CSM support.

- **GateA20 Active**
  [**UPON REQUEST**]: GA20 can be disabled using BIOS services.

  [**ALWAYS**]: Do not allow disabling GA20; this option is useful when any RT code is excuted above 1MB.

- **INT19 Trap Response**
  BIOS reaction on INT19 trapping by Option ROM.

  [**IMMEDIATE**]: Execute the trap right away.

  [**POSTONED**]: Execute the trap during legacy boot.

- **Boot option filter**
  This option controls Legacy/UEFI ROMs priority.

- **Network**
  Controls the execution of UEFI and Legacy PXE OpROM.

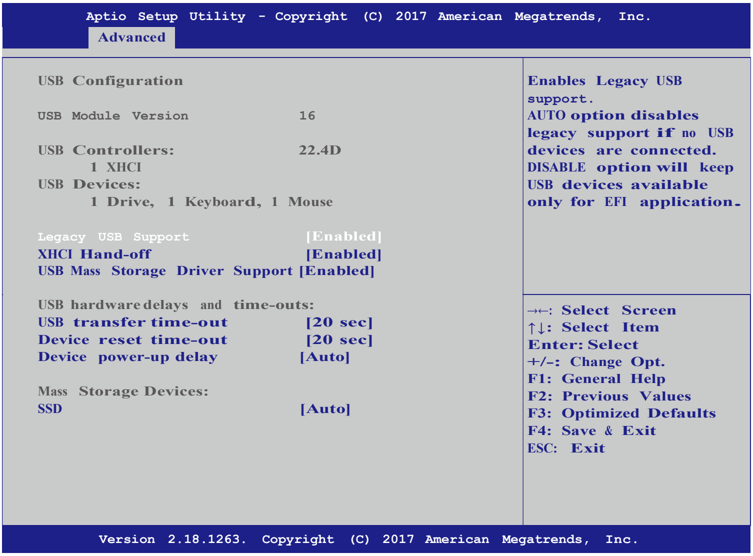
- **Storage**
  Controls the execution of UEFI and Legacy Storage OpROM.

- **Video**
  Controls the execution of UEFI and Legacy Video OpROM.

- **Other PCI devices**
  Determines OpROM execution policy for devices other than Network, Storage, or Video.

3.2.8. USB Configuration

Set USB configuration parameters.



```
        Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
          Advanced

   USB Configuration                                 Enables Legacy USB
                                                     support.
   USB Module Version              16                AUTO option disables
                                                     legacy support if no USB
   USB Controllers:                22.4D             devices are connected.
        1 XHCI                                       DISABLE option will keep
   USB Devices:                                      USB devices available
        1 Drive, 1 Keyboard, 1 Mouse                 only for EFI application.

   Legacy USB Support               [Enabled]
   XHCI Hand-off                    [Enabled]
   USB Mass Storage Driver Support [Enabled]

   USB hardware delays and time-outs:                →←: Select Screen
   USB transfer time-out            [20 sec]         ↑↓: Select Item
   Device reset time-out            [20 sec]         Enter: Select
   Device power-up delay           [Auto]            +/-: Change Opt.
                                                     F1: General Help
   Mass Storage Devices:                             F2: Previous Values
   SSD                             [Auto]            F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit

        Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

- **Legacy USB Support**
  Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

- **XHCI Hand-off**
  This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

- **USB Mass Storage Driver Support**
  Enable/Disable USB Mass Storage Driver Support.

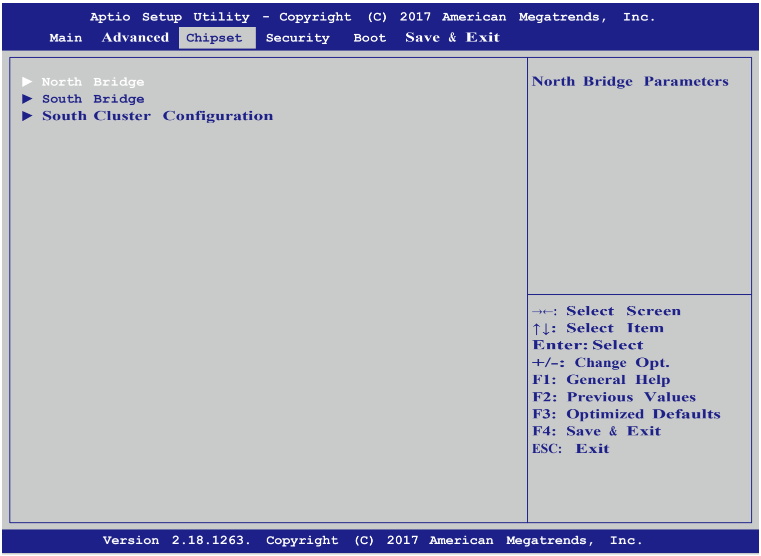
- **USB transfer time-out**
  The time-out value for Control, Bulk, and Interrupt transfers.

- **Device reset time-out**
  USB mass storage device Start Unit command time-out.

- **Device power-up delay**
  Maximum time the device will take before it properly reports itself to the Host Controller. ‘AUTO’ uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from Hub descriptor.

- **Mass Storage Devices**
  Mass storage device emulation type. ‘AUTO’ enumerates devices according to their media format. Optical drives are emulated as ‘CDROM’, drives with no media will be emulated according to a drive type.

3.3. Chipset Setup

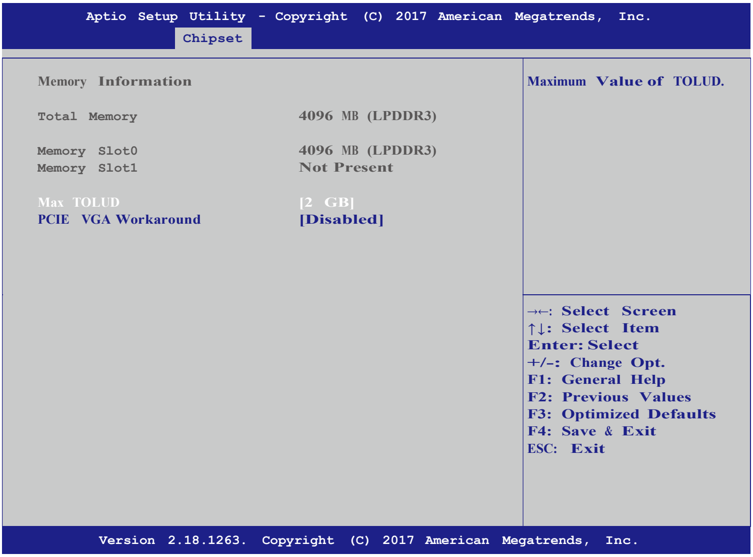


```
        Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

  ▶ North Bridge                                North Bridge Parameters
  ▶ South Bridge
  ▶ South Cluster Configuration

                                                →←: Select Screen
                                                ↑↓: Select Item
                                                Enter: Select
                                                +/-: Change Opt.
                                                F1: General Help
                                                F2: Previous Values
                                                F3: Optimized Defaults
                                                F4: Save & Exit
                                                ESC: Exit

          Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

- **North Bridge**
  North Bridge Parameters.
- **South Bridge**
  South Bridge Parameters.
- **South Cluster Configuration**
  South Cluster Configuration.

3.3.1. North Bridge

Set North Bridge configuration parameters.

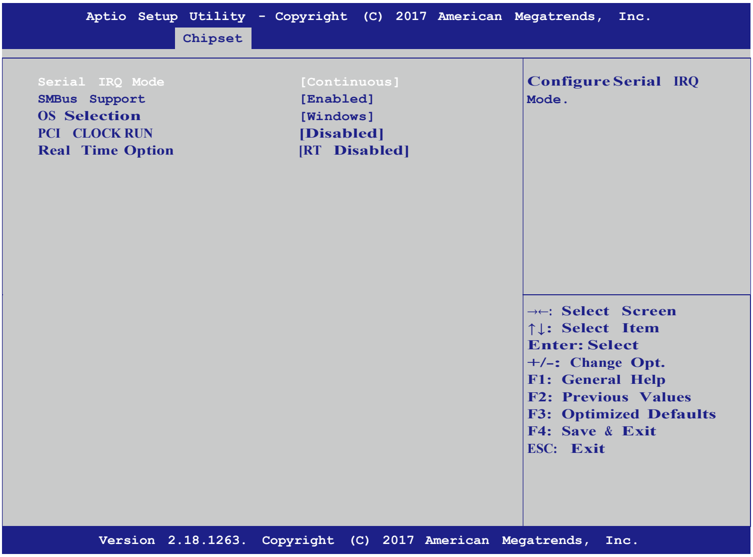


```
Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                 Chipset

Memory Information                                  Maximum Value of TOLUD.

Total Memory                4096 MB (LPDDR3)

Memory Slot0                4096 MB (LPDDR3)
Memory Slot1                Not Present

Max TOLUD                   [2 GB]
PCIE VGA Workaround         [Disabled]

                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit

Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

- **Max TOLUD**
  Maximum Value of TOLUD.
- **PCIE VGA Workaround**
  Enable it if your PCIe card cannot boot to DOS. This is for Test only.

3.3.2. South Bridge

Set South Bridge configuration parameters.

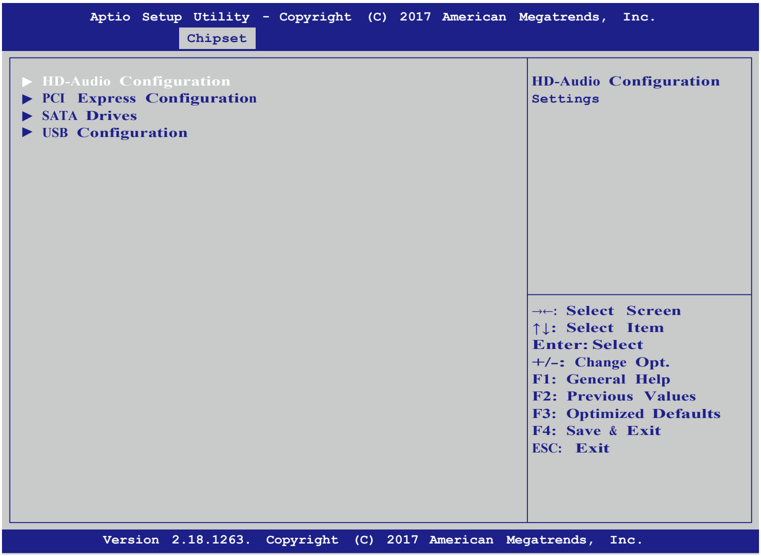


```
Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                    Chipset

Serial IRQ Mode          [Continuous]      Configure Serial IRQ
SMBus Support            [Enabled]         Mode.
OS Selection             [Windows]
PCI CLOCK RUN            [Disabled]
Real Time Option         [RT Disabled]

                                           →←: Select Screen
                                           ↑↓: Select Item
                                           Enter: Select
                                           +/-: Change Opt.
                                           F1: General Help
                                           F2: Previous Values
                                           F3: Optimized Defaults
                                           F4: Save & Exit
                                           ESC: Exit

Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

- **Serial IRQ Mode**
  Configure Serial IRQ Mode.
- **SMBus Support**
  Enable/Disable SMBus Support.
- **OS Selection**
  Select the target OS.
- **PCI CLOCK RUN**
  Enables CLKRUN# logic to stop PCI clocks.
- **Real Time Option**
  Select Read-Time Enable and IDI Agent Real-Time Traffic Mask Bits.

3.3.3. South Cluster Configuration

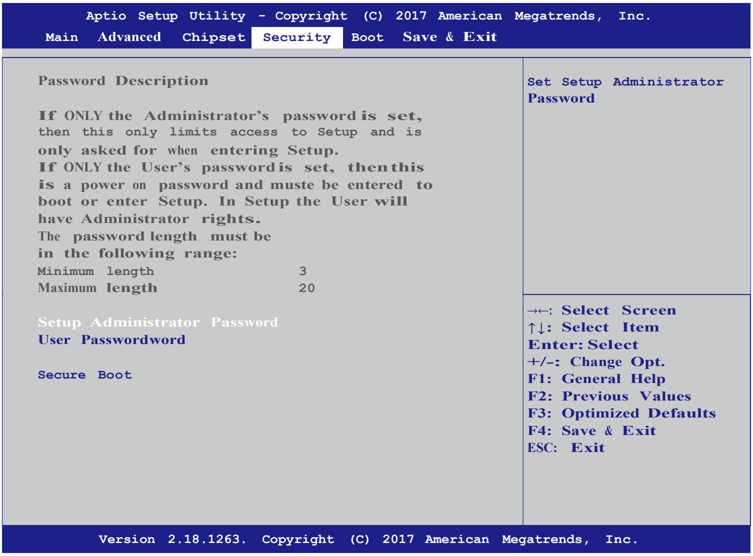
Set South Cluster configuration parameters.



```
Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                 Chipset

▶ HD-Audio Configuration            HD-Audio Configuration
▶ PCI Express Configuration         Settings
▶ SATA Drives
▶ USB Configuration

                                    →←: Select Screen
                                    ↑↓: Select Item
                                    Enter: Select
                                    +/-: Change Opt.
                                    F1: General Help
                                    F2: Previous Values
                                    F3: Optimized Defaults
                                    F4: Save & Exit
                                    ESC: Exit

Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

- **HD-Audio Configuration**
  HD-Audio Configuration Settings.
- **PCI Express Configuration**
  PCI Express Configuration Settings.
- **SATA Drives**
  Press <Enter> to select the SATA Device Configuration Setup options.
- **USB Configuration**
  USB Configuration Settings.

3.4. Security Setup



```
          Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  Save & Exit

    Password Description                                  Set Setup Administrator
                                                          Password
    If ONLY the Administrator's password is set,
    then this only limits access to Setup and is
    only asked for when entering Setup.
    If ONLY the User's password is set, then this
    is a power on password and muste be entered to
    boot or enter Setup. In Setup the User will
    have Administrator rights.
    The password length must be
    in the following range:
    Minimum length                3
    Maximum length                20
                                                          →←: Select Screen
    Setup Administrator Password                          ↑↓: Select Item
    User Passwordword                                     Enter: Select
                                                          +/-: Change Opt.
    Secure Boot                                           F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit

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```
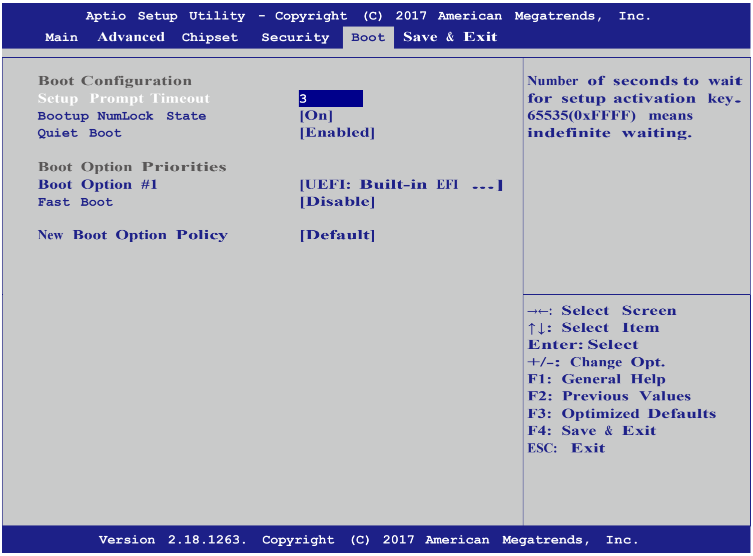

- **Setup Administrator Password**
  Set Setup Administrator Password.

- **User Password**
  Set User Password.

- **Secure Boot**
  Customizable Secure Boot settings.

3.5. Boot Setup



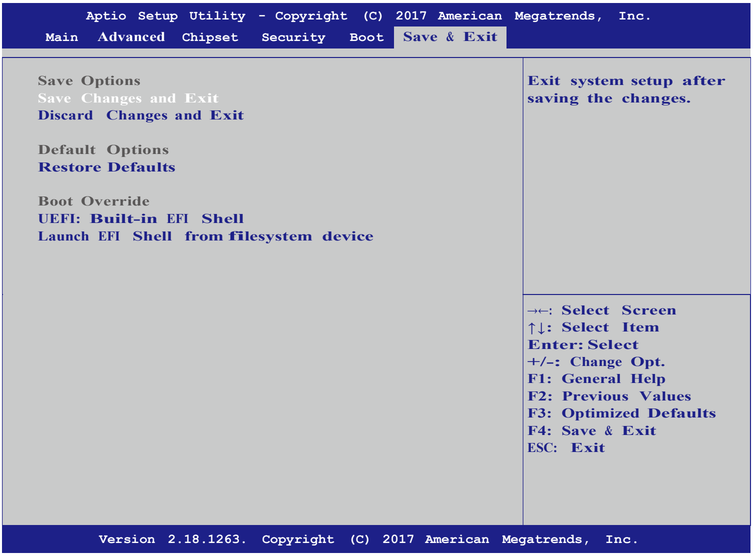
```
      Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
   Main  Advanced  Chipset  Security  Boot  Save & Exit

   Boot Configuration                                 Number of seconds to wait
   Setup Prompt Timeout           3                   for setup activation key.
   Bootup NumLock State           [On]                65535(0xFFFF) means
   Quiet Boot                     [Enabled]           indefinite waiting.

   Boot Option Priorities
   Boot Option #1                 [UEFI: Built-in EFI ...]
   Fast Boot                      [Disable]

   New Boot Option Policy         [Default]
                                                      →←: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Exit
                                                      ESC: Exit

      Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

- **Setup Prompt Timeout**
  Number of seconds to wait for setup activation key.

  65535(0xFFFF) means indefinite waiting.
- **Bootup NumLock State**
  Select the keyboard NumLock state.
- **Quiet Boot**
  Enables or disables Quiet Boot option.
- **Boot Option #1**
  Sets the system boot order.
- **Fast Boot**
  Enable or Disable FastBoot features.

  Most probes are skipped to reduce time cost during boot.
- **New Boot Option Policy**
  Controls the placement of newly detected UEFI boot optins.

3.6. Save & Exit Setup



```
        Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

   Save Options                                 Exit system setup after
   Save Changes and Exit                        saving the changes.
   Discard Changes and Exit

   Default Options
   Restore Defaults

   Boot Override
   UEFI: Built-in EFI Shell
   Launch EFI Shell from filesystem device
                                                →←: Select Screen
                                                ↑↓: Select Item
                                                Enter: Select
                                                +/-: Change Opt.
                                                F1: General Help
                                                F2: Previous Values
                                                F3: Optimized Defaults
                                                F4: Save & Exit
                                                ESC: Exit

          Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

- **Save Changes and Exit**
  Exit system setup after saving the changes.
- **Discard Changes and Exit**
  Exit system setup without saving any changes.
- **Restore Defaults**
  Restore/Load Default values for all the setup options.
- **Launch EFI Shell from filesystem device**
  Attemps to Launch EFI Shell application (shell.efi) from one of the available filesystem devices.

4. Function Description

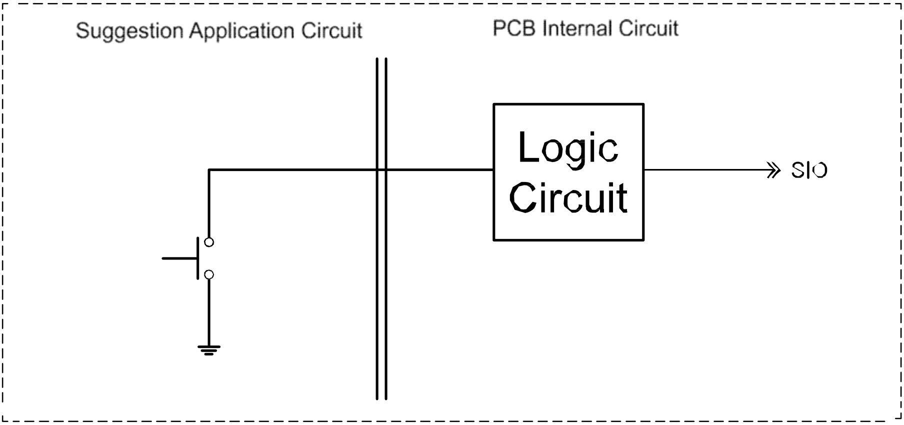
4.1. Power input connection

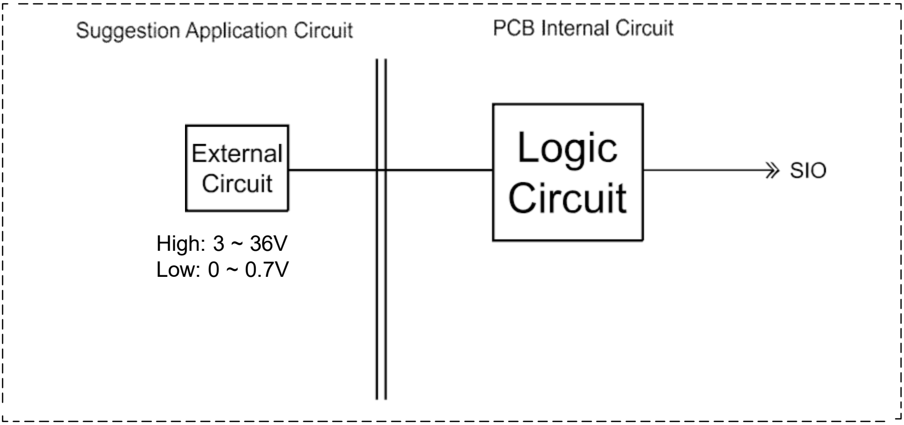
FLEETPC-6-B Series needs +9~36V to power the board.

4.2. Digital Inputs

There are 4 clamped diode protection digital inputs on GPIO1 connector. You can read the status of any input through the software API. These digital inputs are general purpose input. You can define their purpose for any digital input function. Please refer to the "**Software Installation and Programming Guide**" chapter for the detailed information on how to use the API.

The following diagrams state how to connect the digital inputs to devices on the embedded system.

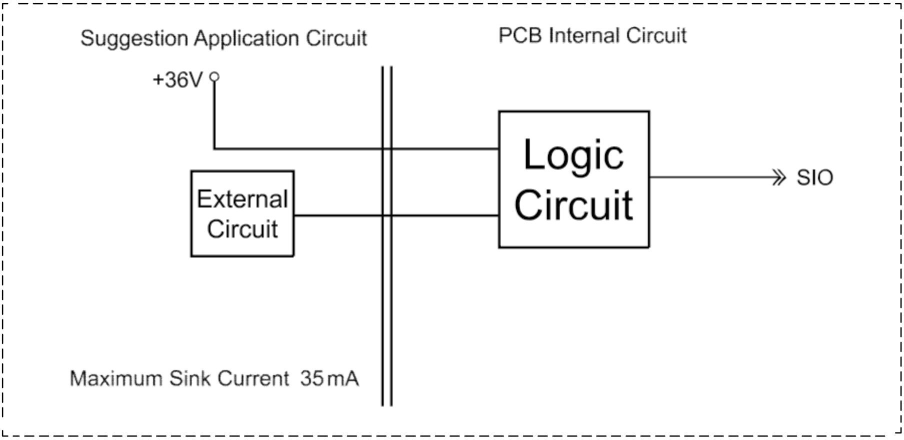




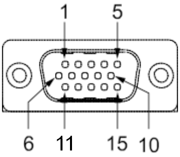
4.3. Digital Outputs

There are 4 clamped diode protection digital outputs on GPIO1 connector. You can control the output status of these digital outputs through the software API. The four digital outputs are capable sink maximum 35 mA current for each channel and maximum output voltage is 36V. The output reference voltage of device, please connect to GPIO #VCC12V(Pin15). These digital outputs are general purpose outputs. Please refer to the “**Software Installation and Programming Guide**” chapter for the detailed information on how to use the API.

The following diagrams state how to connect the digital outputs to the devices on the system.



GPIO pin definition:

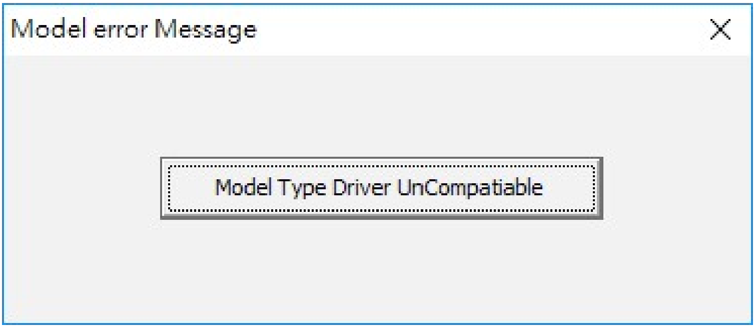
	Pin #	Signal	Pin #	Signal
	1	GPO0	2	GPO1
	3	GPO2	4	GPO3
	5	GND	6	GND
	7	N/A	8	N/A
	9	GND	10	N/A
	11	GPI4	12	GPI5
	13	GPI6	14	GPI7
	15	EXTPWR		

5. Driver and Utility Installation

5.1. Driver CD Interface Introduction

CarTFT.com provides a Driver CD compiled with all the drivers, utilities, applications and documents this product may need.

Put the Driver CD into your CD-ROM drive. The Driver CD will automatically detect the mainboard information to see if they are matched. The following error messages appear if you use an incorrect Driver CD version with your mainboard. Please find the correct Driver CD to proceed.

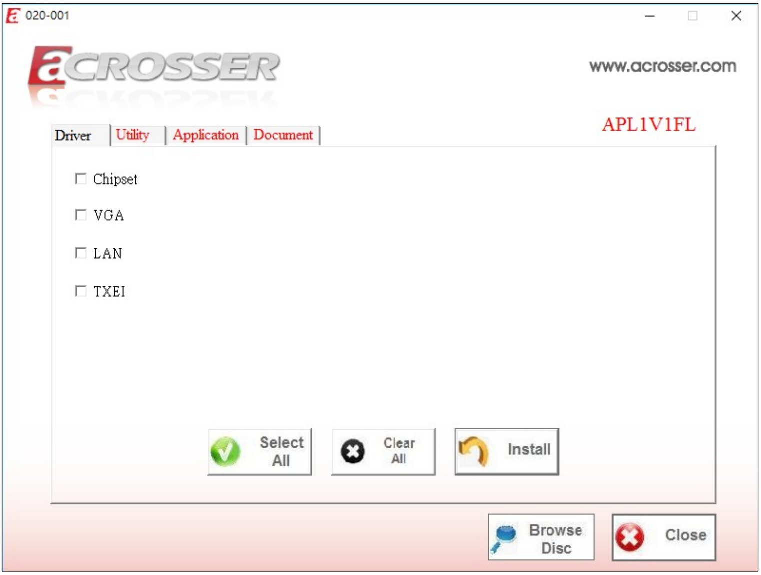


Model error Message

Model Type Driver UnCompatiable

5.2. Windows Installation

Put the correct Driver CD of your mainboard into your CD-ROM drive. The following installation screen should appear.



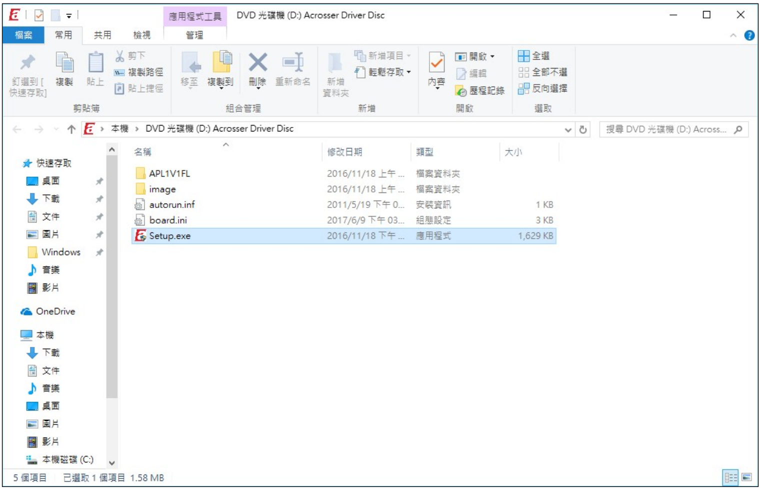
□ Chipset

□ VGA

□ LAN

□ TXEI

If not, enter the root folder of the Driver CD, run the excution file “**Setup.exe**“.

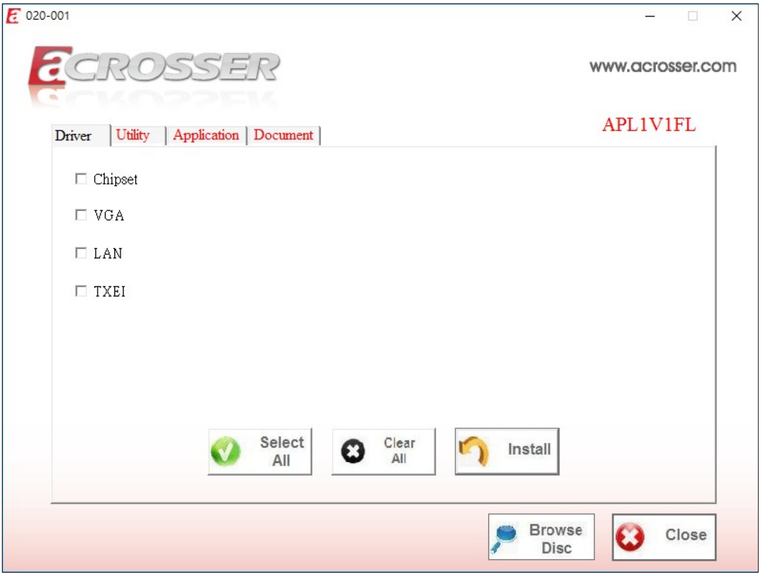


名稱	修改日期	類型	大小
APL1V1FL	2016/11/18 上午 ...	檔案資料夾	
image	2016/11/18 上午 ...	檔案資料夾	
autorun.inf	2011/5/19 下午 0...	安裝資訊	1 KB
board.ini	2017/6/9 下午 03...	組態設定	3 KB
Setup.exe	2016/11/18 下午 ...	應用程式	1,629 KB

5 個項目　已選取 1 個項目 1.58 MB

5.2.1. Driver Installation Page

Step 1: Select the “**Driver**” tab.



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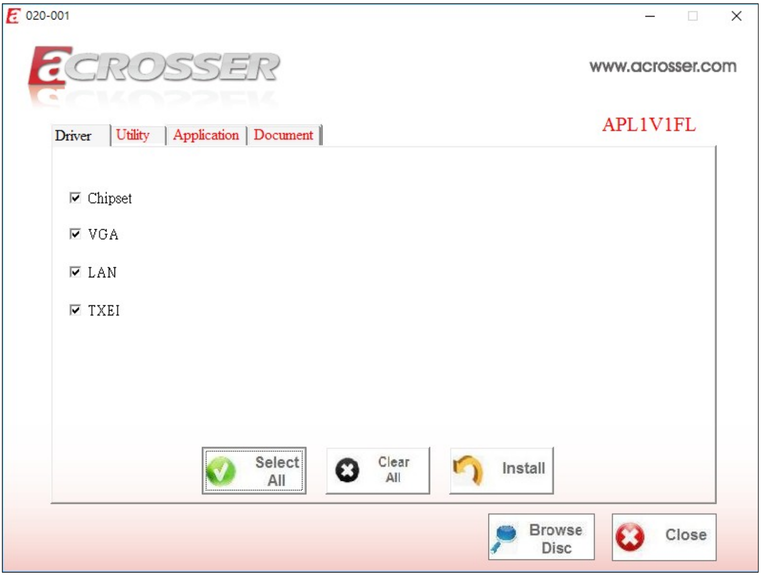
☐ Chipset

☐ VGA

☐ LAN

☐ TXEI

Step 2: Click the “**Select All**” button to select all the driver checkboxes, and then click “**Install**” button to start installing all the selected drivers.



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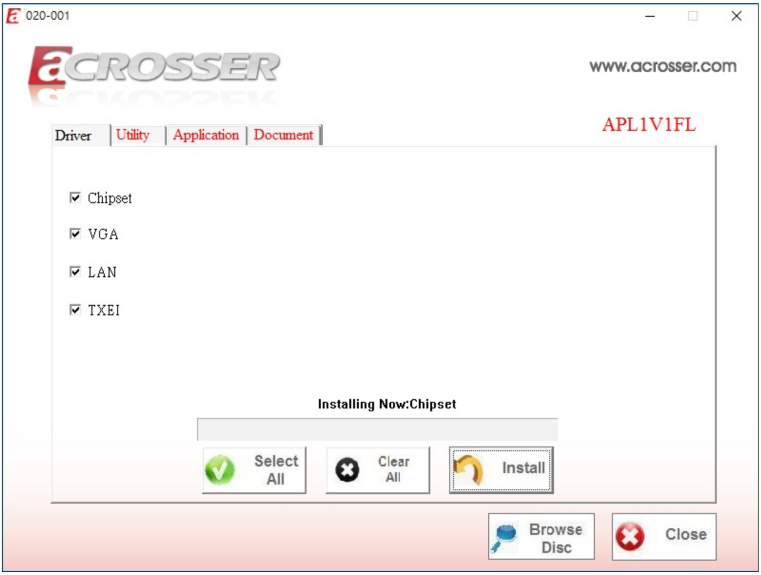
☑ Chipset

☑ VGA

☑ LAN

☑ TXEI



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APL1V1FL

Driver | Utility | Application | Document

☑ Chipset

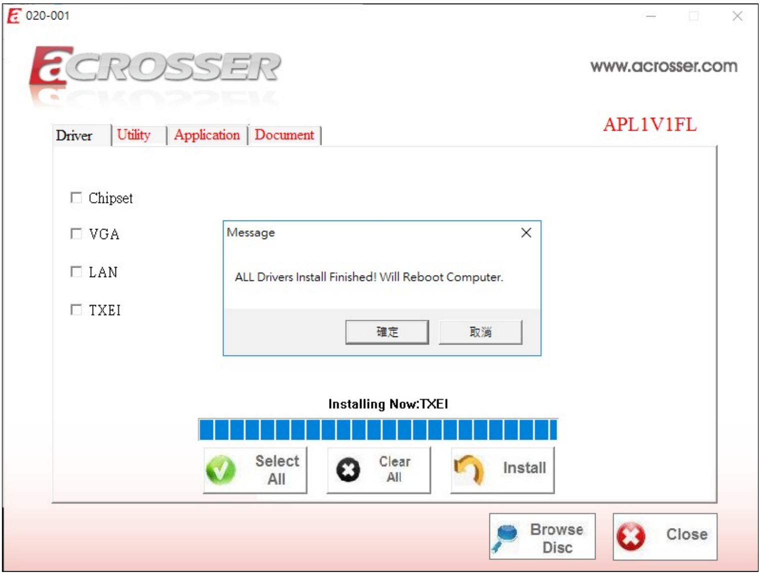
☑ VGA

☑ LAN

☑ TXEI

Installing Now:Chipset

Step 3: The driver installation completed. The configuration will be valid after reboot.



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APL1V1FL

Driver | Utility | Application | Document

□ Chipset

□ VGA

□ LAN

□ TXEI

Message

ALL Drivers Install Finished! Will Reboot Computer.

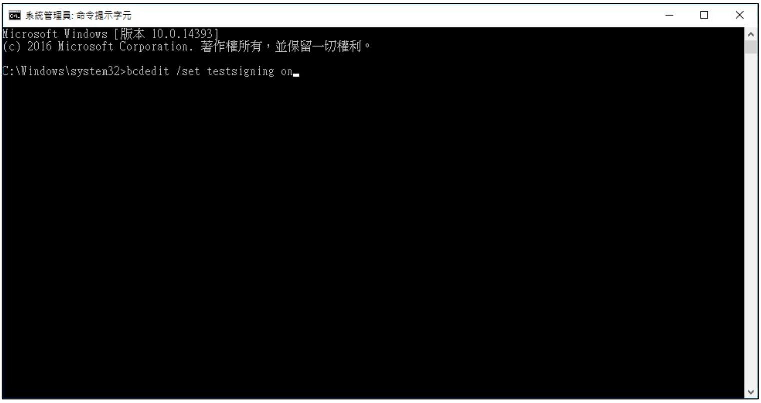
Installing Now:TXEI

*Note: Select the “**Clear All**“ button will clear all the selections, and then you can select the driver you want to install one by one, but the “**Chipset**” driver has to be installed before installing all the others.*

5.2.2. Utility Page

Before launching the utility, you should run the Windows test mode by running the command “**BCDEdit /set testsigning on**”, and restart the system.

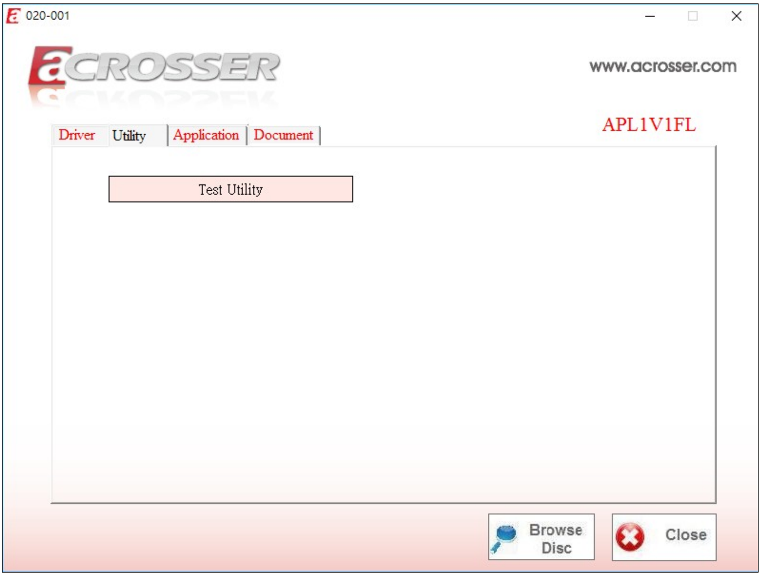
If you want to call this **CarTFT.comLib.dll** API file to initiate peripherals function, e.g. GPIO, PIC, or WatchDog, also run this command first, and restart the system.



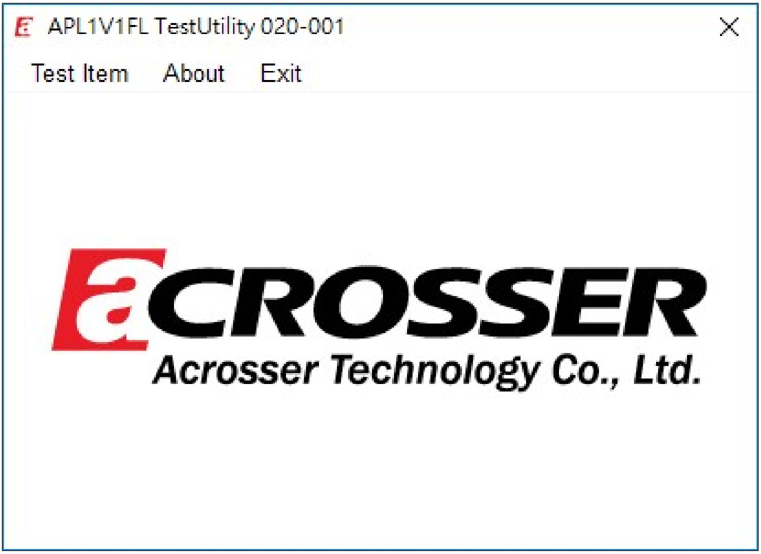
```
Microsoft Windows [版本 10.0.14393]
(c) 2016 Microsoft Corporation. 著作權所有，並保留一切權利。

C:\Windows\system32>bcdedit /set testsigning on
```

To shutdown the Windows test mode, run the command “**BCDEdit /set testsigning off**”, and restart the system.

Step 1: Select the “**Utility**” tab. Click the “**Test Utility**” box.

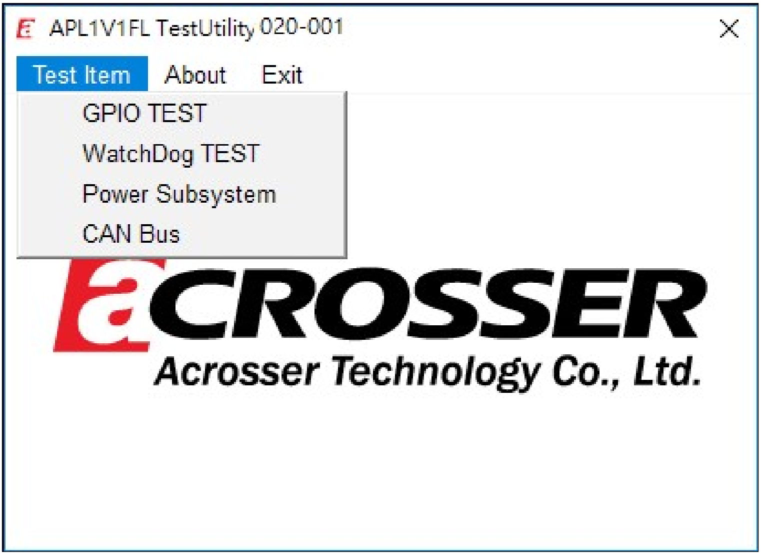


Step 2: The “**Test Utility**” screen appears.

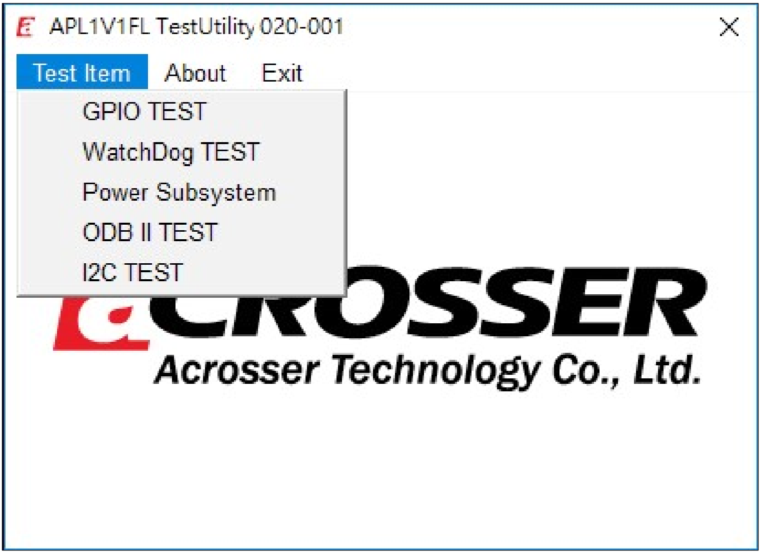


Click Test Item:

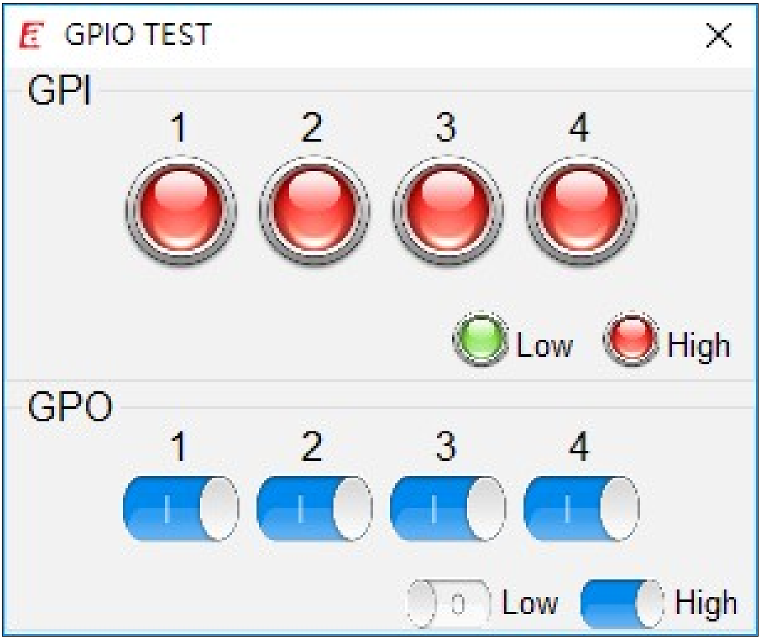
For model FLEETPC-6-B:



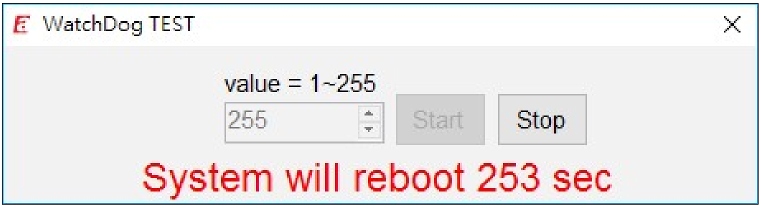
For model FLEETPC-6-B-OB:



Select (1) GPIO TEST Utility:

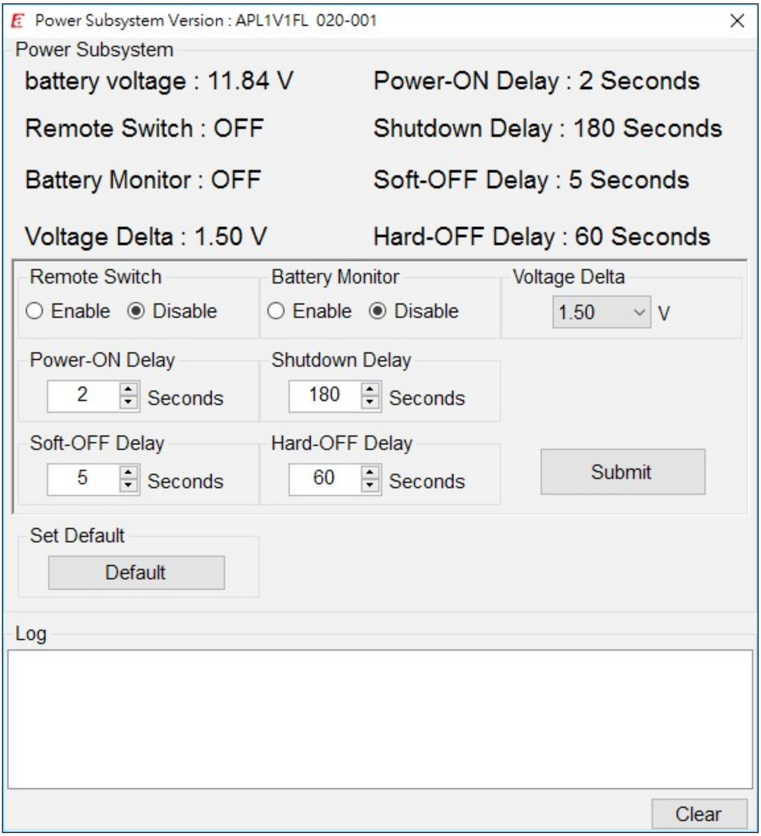


Select (2) WatchDog TEST Utility:



System will reboot 253 sec

Select (3) Power Subsystem:



battery voltage : 11.84 V

Power-ON Delay : 2 Seconds

Remote Switch : OFF

Shutdown Delay : 180 Seconds

Battery Monitor : OFF

Soft-OFF Delay : 5 Seconds

Voltage Delta : 1.50 V

Hard-OFF Delay : 60 Seconds

Remote Switch: ○ Enable ● Disable

Battery Monitor: ○ Enable ● Disable

Voltage Delta: 1.50 V

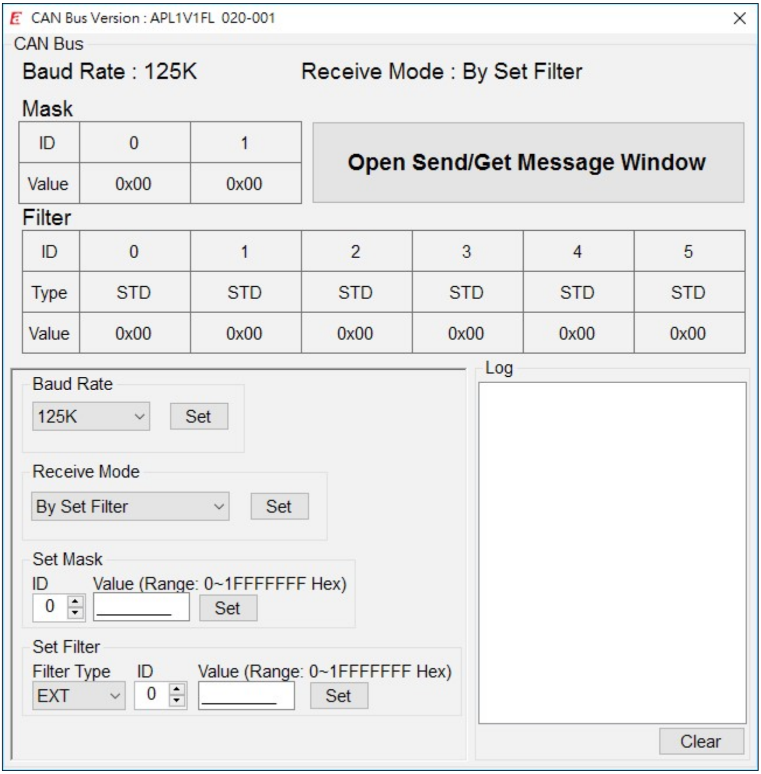
Power-ON Delay: 2 Seconds

Shutdown Delay: 180 Seconds

Soft-OFF Delay: 5 Seconds

Hard-OFF Delay: 60 Seconds

Select (4) CAN Bus: (For model FLEETPC-6-B)



CAN Bus Version : APL1V1FL 020-001

CAN Bus

Baud Rate : 125K

Receive Mode : By Set Filter

Mask

ID	0	1
Value	0x00	0x00

Filter

ID	0	1	2	3	4	5
Type	STD	STD	STD	STD	STD	STD
Value	0x00	0x00	0x00	0x00	0x00	0x00

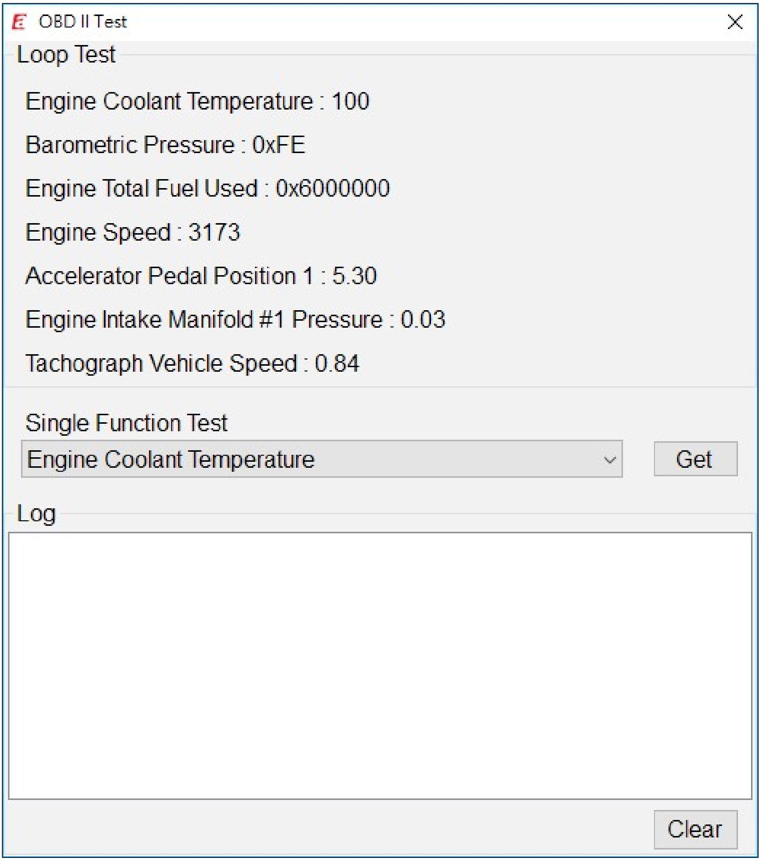
Baud Rate: 125K

Receive Mode: By Set Filter

Set Mask
ID: 0
Value (Range: 0~1FFFFFFF Hex)

Set Filter
Filter Type: EXT
ID: 0
Value (Range: 0~1FFFFFFF Hex)

Or select (4) OBD II Test: (For model FLEETPC-6-B-OB)



Engine Coolant Temperature : 100

Barometric Pressure : 0xFE

Engine Total Fuel Used : 0x6000000

Engine Speed : 3173

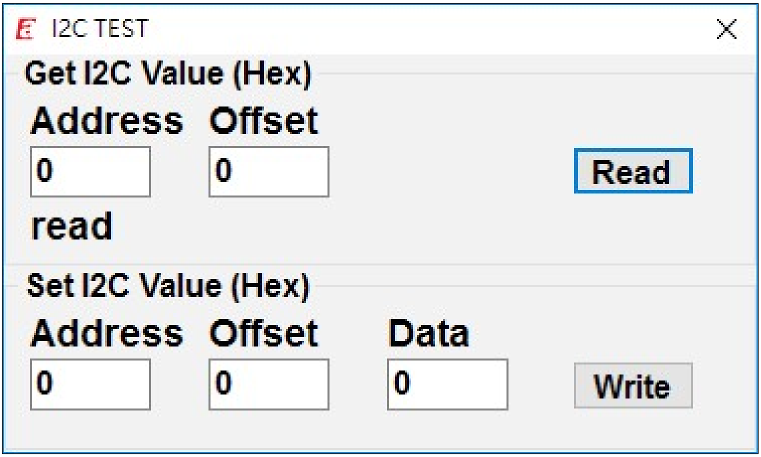
Accelerator Pedal Position 1 : 5.30

Engine Intake Manifold #1 Pressure : 0.03

Tachograph Vehicle Speed : 0.84

Single Function Test: Engine Coolant Temperature

Select (5) I2C TEST:



I2C TEST

Get I2C Value (Hex)

Address: 0

Offset: 0

read

Set I2C Value (Hex)

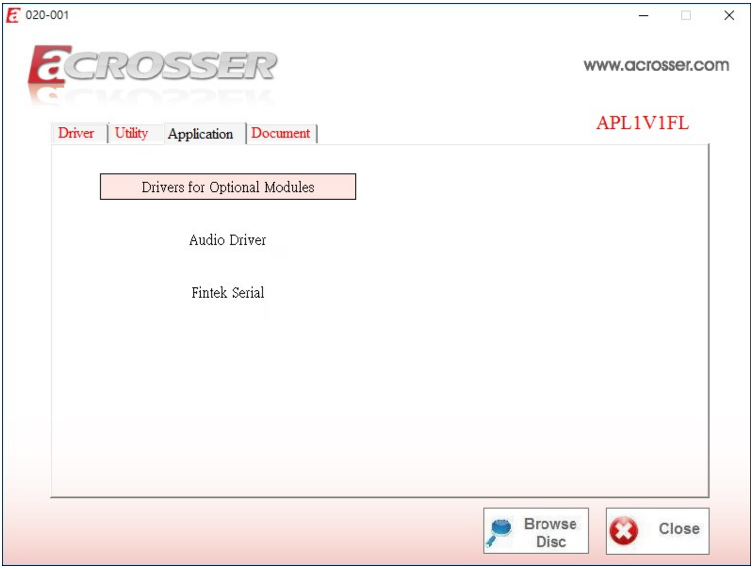
Address: 0

Offset: 0

Data: 0

5.2.3. Application Installation Page

Step 1: Select the “**Application**” tab. Click the “**Drivers for Optional Modules**” box.



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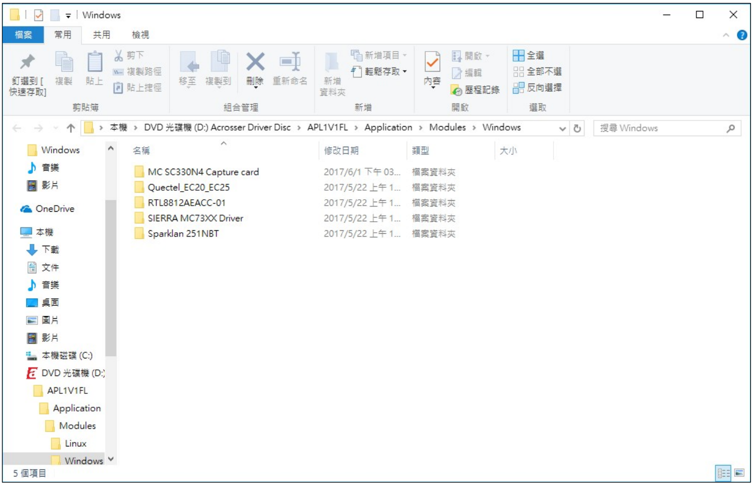
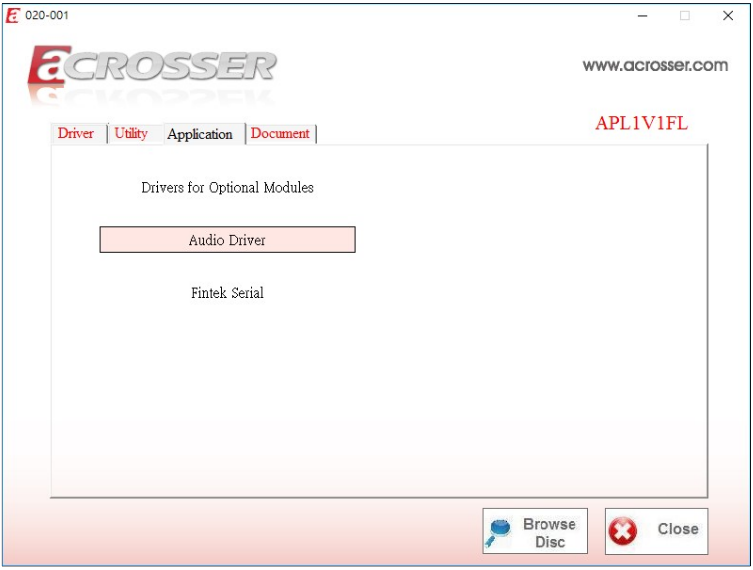
Step 2: Select the driver you want to install.



本機 › DVD 光碟機 (D:) Acrosser Driver Disc › APL1V1FL › Application › Modules › Windows

名稱	修改日期	類型	大小
MC SC330N4 Capture card	2017/6/1 下午 03...	檔案資料夾	
Quectel_EC20_EC25	2017/5/22 上午 1...	檔案資料夾	
RTL8812AEACC-01	2017/5/22 上午 1...	檔案資料夾	
SIERRA MC73XX Driver	2017/5/22 上午 1...	檔案資料夾	
Sparklan 251NBT	2017/5/22 上午 1...	檔案資料夾	

Step 3: Select the “**Application**” tab. Click the “**Audio Driver**” box.

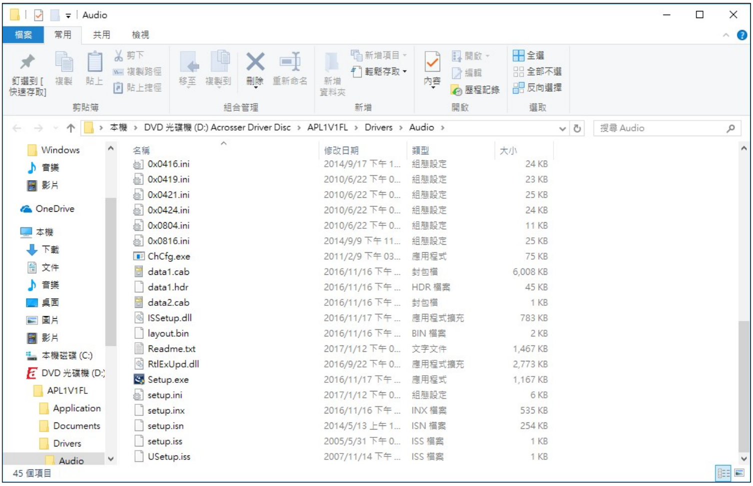


Drivers for Optional Modules

Audio Driver

Fintek Serial

Step 4: Click “**Setup.exe**” to install audio driver.

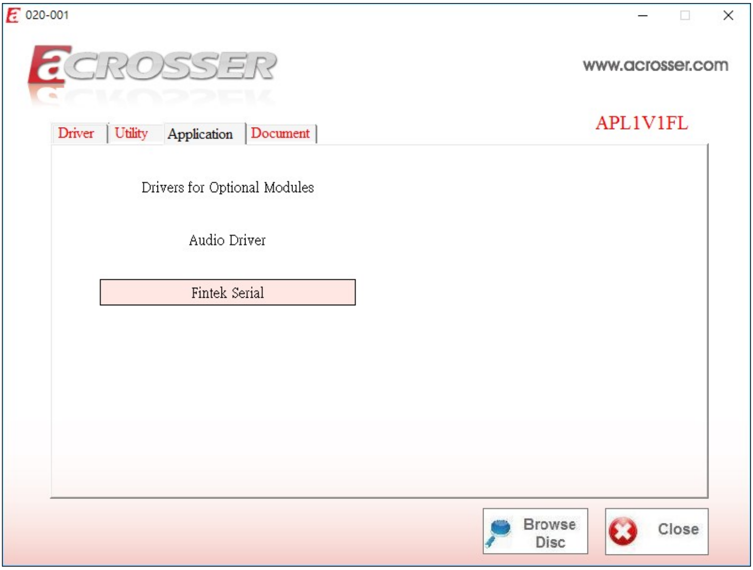


本機 › DVD 光碟機 (D:) Acrosser Driver Disc › APL1V1FL › Drivers › Audio ›

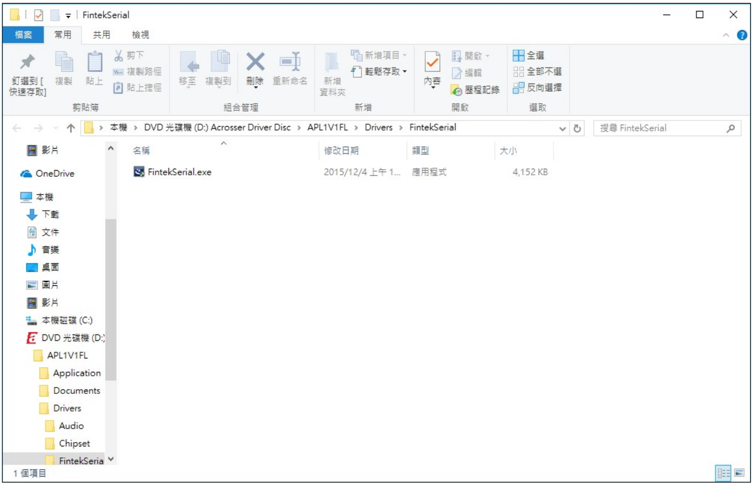
名稱	修改日期	類型	大小
0x0416.ini	2014/9/17 下午 1...	組態設定	24 KB
0x0419.ini	2010/6/22 下午 0...	組態設定	23 KB
0x0421.ini	2010/6/22 下午 0...	組態設定	25 KB
0x0424.ini	2010/6/22 下午 0...	組態設定	24 KB
0x0804.ini	2010/6/22 下午 0...	組態設定	11 KB
0x0816.ini	2014/9/9 下午 11...	組態設定	25 KB
ChCfg.exe	2011/2/9 下午 03...	應用程式	75 KB
data1.cab	2016/11/16 下午 ...	封包檔	6,008 KB
data1.hdr	2016/11/16 下午 ...	HDR 檔案	45 KB
data2.cab	2016/11/16 下午 ...	封包檔	1 KB
ISSetup.dll	2016/11/17 下午 ...	應用程式擴充	783 KB
layout.bin	2016/11/16 下午 ...	BIN 檔案	2 KB
Readme.txt	2017/1/12 下午 0...	文字文件	1,467 KB
RtlExUpd.dll	2016/9/22 下午 0...	應用程式擴充	2,773 KB
Setup.exe	2016/11/17 下午 ...	應用程式	1,167 KB
setup.ini	2017/1/12 下午 0...	組態設定	6 KB
setup.inx	2016/11/16 下午 ...	INX 檔案	535 KB
setup.isn	2014/5/13 上午 1...	ISN 檔案	254 KB
setup.iss	2005/5/31 下午 0...	ISS 檔案	1 KB
USetup.iss	2007/11/14 下午 ...	ISS 檔案	1 KB

45 個項目

Step 5: Select the “**Application**” tab. Click the “**Fintek Serial**” box.



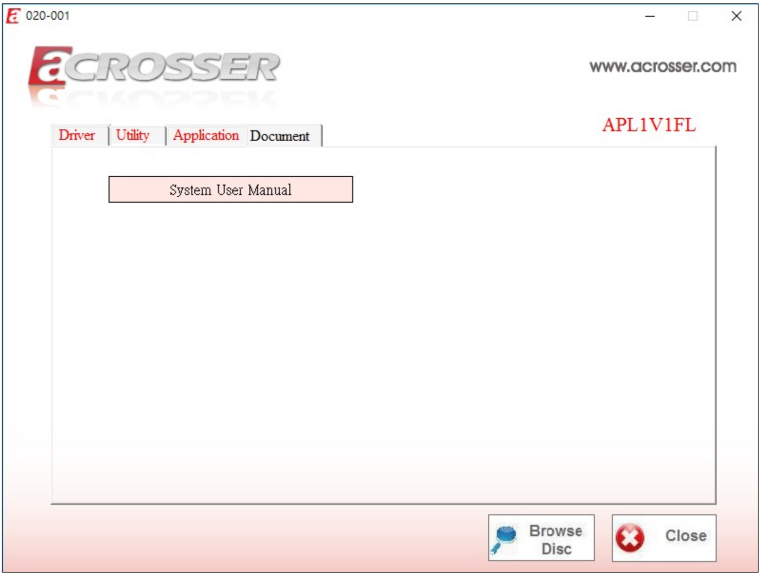
Step 6: Click “**FintekSerial.exe**” to install COM Port driver.



名稱	修改日期	類型	大小
FintekSerial.exe	2015/12/4 上午 1...	應用程式	4,152 KB

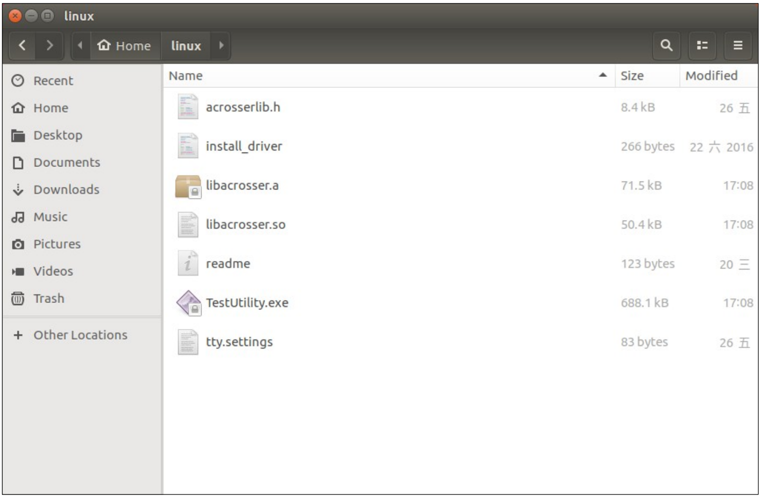
5.2.4. Document Page

The user manual is stored in the “**Document**” folder.



5.3. Linux Configuration

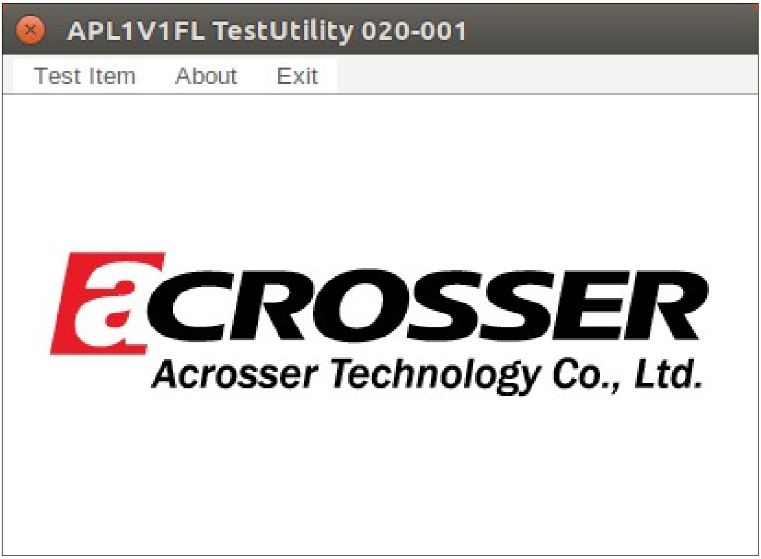
Step 1: Before running the shell script file install_driver to complete the utiltiy, make sure to have Internet access.



Name	Size	Modified
acrosserlib.h	8.4 kB	26 五
install_driver	266 bytes	22 六 2016
libacrosser.a	71.5 kB	17:08
libacrosser.so	50.4 kB	17:08
readme	123 bytes	20 三
TestUtility.exe	688.1 kB	17:08
tty.settings	83 bytes	26 五

Run the **sudo mono TestUtility.exe**.

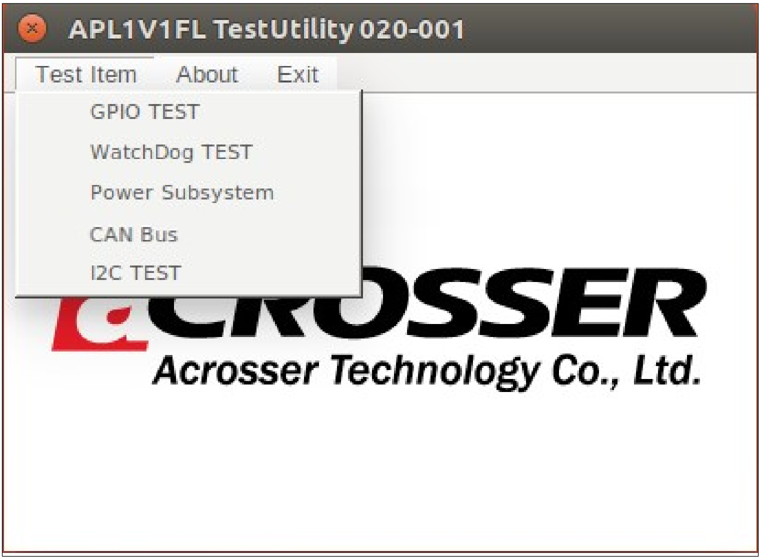
Step 2: The “**Test Utility**” screen appears.



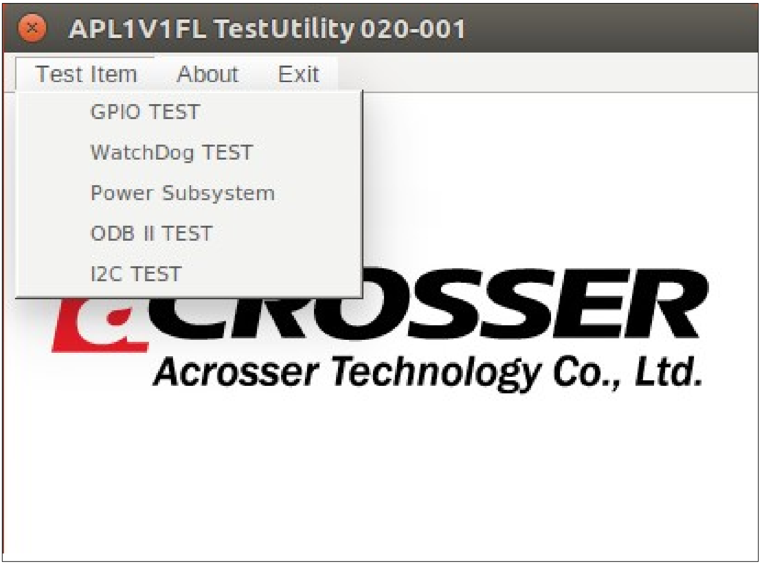
APL1V1FL TestUtility 020-001

Click Test Item:

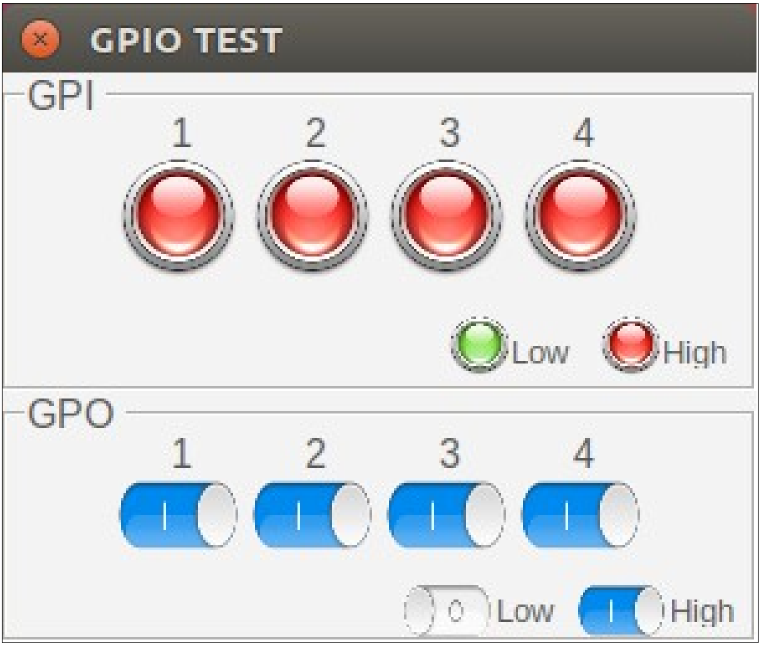
For model FLEETPC-6-B:



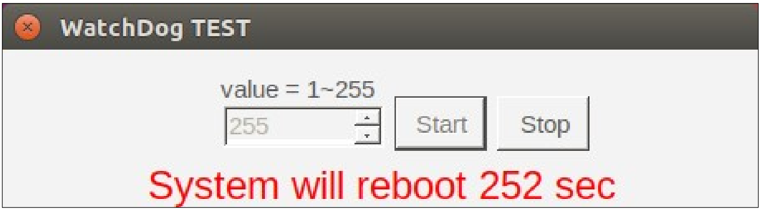
For model FLEETPC-6-B-OB:



Select (1) GPIO TEST Utility:

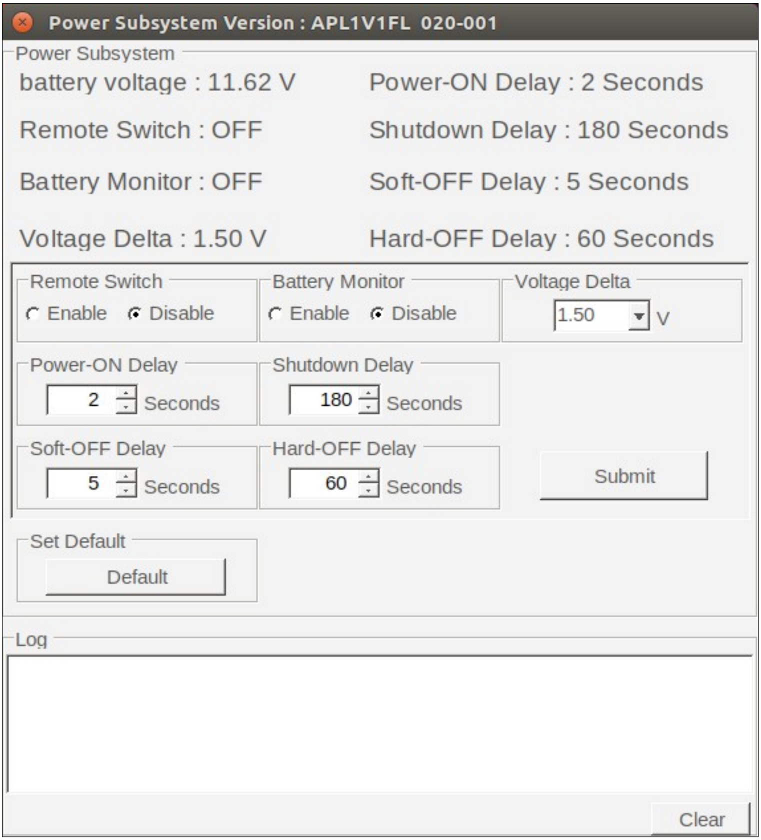


Select (2) WatchDog TEST Utility:



System will reboot 252 sec

Select (3) Power Subsystem:



Power Subsystem Version : APL1V1FL 020-001

Power Subsystem

battery voltage : 11.62 V

Power-ON Delay : 2 Seconds

Remote Switch : OFF

Shutdown Delay : 180 Seconds

Battery Monitor : OFF

Soft-OFF Delay : 5 Seconds

Voltage Delta : 1.50 V

Hard-OFF Delay : 60 Seconds

Remote Switch: ○ Enable ● Disable

Battery Monitor: ○ Enable ● Disable

Voltage Delta: 1.50 V

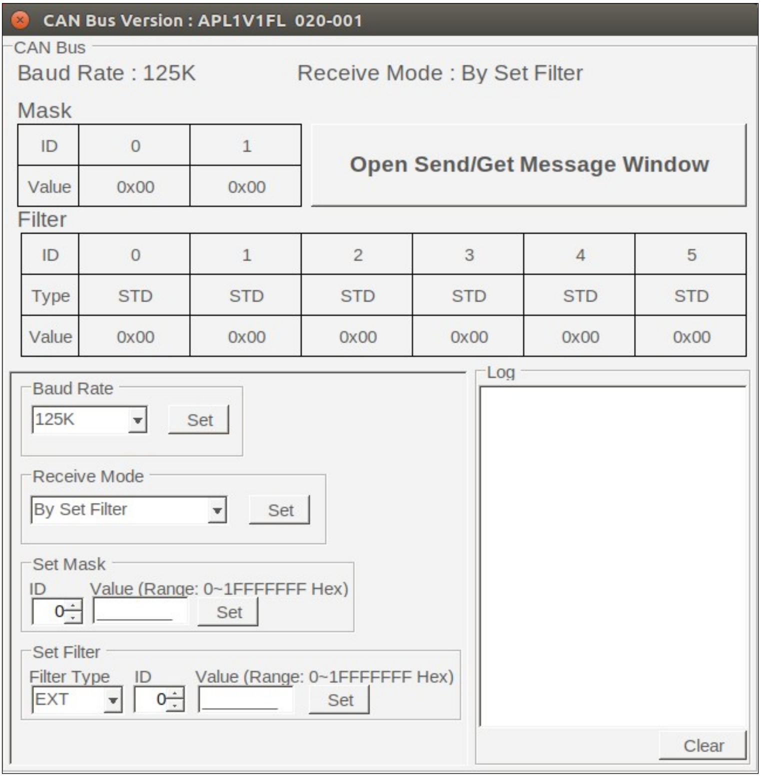
Power-ON Delay: 2 Seconds

Shutdown Delay: 180 Seconds

Soft-OFF Delay: 5 Seconds

Hard-OFF Delay: 60 Seconds

Select (4) CAN Bus: (For model FLEETPC-6-B)



CAN Bus Version : APL1V1FL 020-001

CAN Bus

Baud Rate : 125K

Receive Mode : By Set Filter

Mask

ID	0	1
Value	0x00	0x00

Filter

ID	0	1	2	3	4	5
Type	STD	STD	STD	STD	STD	STD
Value	0x00	0x00	0x00	0x00	0x00	0x00

Baud Rate: 125K

Receive Mode: By Set Filter

Set Mask

ID: 0

Value (Range: 0~1FFFFFFF Hex)

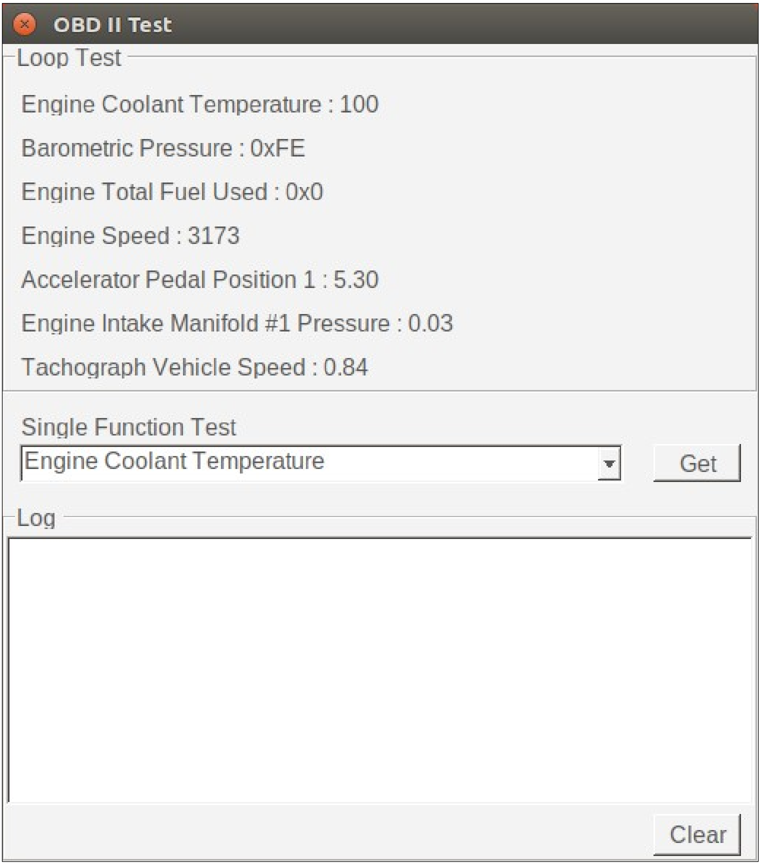
Set Filter

Filter Type: EXT

ID: 0

Value (Range: 0~1FFFFFFF Hex)

Or select (4) OBD II Test: (For model FLEETPC-6-B-OB)



Engine Coolant Temperature : 100

Barometric Pressure : 0xFE

Engine Total Fuel Used : 0x0

Engine Speed : 3173

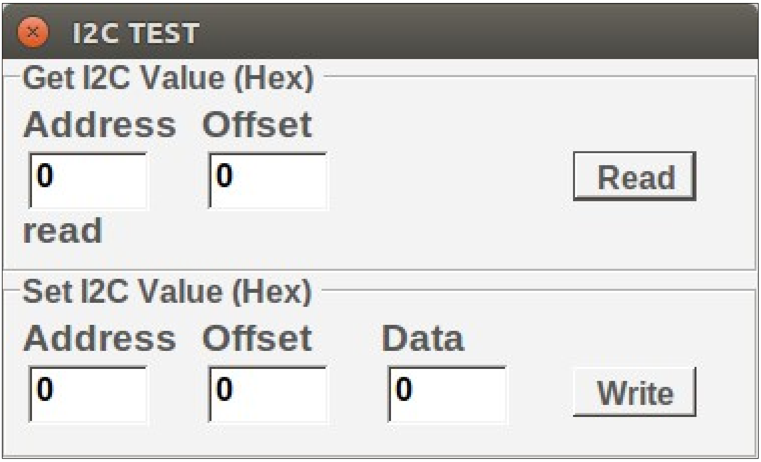
Accelerator Pedal Position 1 : 5.30

Engine Intake Manifold #1 Pressure : 0.03

Tachograph Vehicle Speed : 0.84

Single Function Test: Engine Coolant Temperature

Select (5) I2C TEST:



Get I2C Value (Hex)

Address: 0

Offset: 0

read

Set I2C Value (Hex)

Address: 0

Offset: 0

Data: 0

6. Software Installation and Programming Guide

6.1. Introduction

6.1.1. Environment

This test utility develop based on kernel 4.4 or above (Ubuntu 16.10 Desktop 64bit), and Windows 10 (64bit).

6.1.2. CAN Bus

6.1.2.1. Overview

The CAN bus APIs provide interfaces to CAN bus subsystem. By invoking these APIs, programmers can implement the applications which have the functions listed below:

1. Set the BAUD rate.
2. Send the CAN packages over the CAN bus.
3. Receive the CAN packages via the CAN bus hardware interface.
4. Set the CAN package filter to selectively receive CAN packages with specific ID.
5. Set the mask bits to selectively make some filter bits take effect.

In the folder ‘**APL1V1FL\\Utility\Windows**’ on the CD, we provide:

1. API header file.
2. API library in static library format and shared library format.
3. Test utility.

6.1.2.2. CAN Message Format

// TYPE DEFINITION

```
typedef  char            i8;
typedef  unsigned char   u8;
typedef  short           i16;
typedef  unsigned short  u16;
typedef  unsigned long   u32;
typedef  int             i32;
```

```
struct CanMsg {
        u32   id;
        u8    id_type;
        u8    length;
        u8    data[8];
        }
```

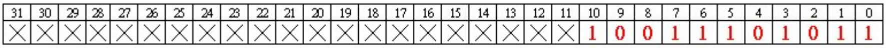
To transmit a CAN packet, the programmer has to fill in the fields in the variable of type CanMsg and pass this CanMsg variable as an argument to invoke the APIs. The fields in CAN message are described below:

id:

This field holds the ID information of the CAN packet. In a 'Standard Data Frame' CAN packet, the ID field consists of 11 bits of binary digitals. In an 'Extended Data Frame' CAN packet, the ID field consists of 29 bits of binary digitals. That the CAN packet is a 'Standard Data Frame' packet or an 'Extended Data Frame' packet is determined by the 'id_type' field in the CanMsg variable.

The 'id' field in the CanMsg variable is a 32-bit long space. If a CanMsg variable is configured as a 'Standard Data Frame' CAN packet, the bit[0] ~ bit[10] in the 'id' field is the ID of the CAN packet. The bit[11] ~ bit[31] are ignored when the APIs in the library processing the CanMsg variable.

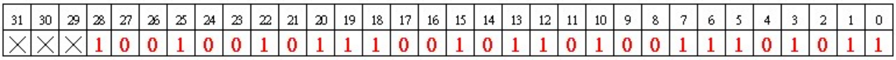
'id' field in the CanMsg variable



31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	1	0	0	1	1	1	0	1	0	1	1

If a CanMsg variable is configured as an 'Extended Data Frame' CAN packet, the bit[0] ~ bit[28] in the 'id' field is the ID of the CAN packet. The bit[29] ~ bit[31] are ignored when the APIs in the library processing the CanMsg variable.

'id' field in the CanMsg variable



31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☒	☒	☒	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	1	1	0	1	0	0	1	1	1	0	1	0	1	1

id_type:

This field identifies that the CAN packet is a 'Standard Data Frame' CAN packet or a 'Extended Data Frame' CAN packet:

```
struct CanMsg canMsg;

canMsg.id_type = EXT_ID;   // A 'Extended Data Frame'
packet

canMsg.id_type = STD_ID;   // A 'Standard Data Frame'
packet
```

length:

This field identifies the number of data bytes in the next field ‘data[8]’ which are filled with effective data. Because the ‘data’ field is an 8-byte long array, the range of this field ‘length’ is 0 ~ 8.

data[8]:

This array of data will be filled with effective data.

For example:

```
struct CanMsg msg;
msg.data[0] = 0xa1;
msg.data[1] = 0xb2;
msg.data[2] = 0xc3;
msg.length = 3;
```

6.1.3. GPIO and Watchdog

6.1.3.1. Overview

This model provides both a GPIO interface and a Watchdog timer. Users can use the GPIO and Watchdog APIs to configure and to access the GPIO interface and the Watchdog timer. The GPIO has four input pins and four output pins. The Watchdog timer can be set to 1~255 seconds. Setting the timer to zero disables the timer. The remaining seconds of the timer to reboot can be read from the timer.

6.1.3.2. Installing Device Driver

Before executing the applications which invoke the GPIO or Watchdog APIs, users should make sure that the Windows device driver has been installed.

On Windows platform, after successfully installing the device driver, there is a device which shows ‘CarTFT.com Device’ in the ‘Device Manager’. The APIs on Windows platform open this device implicitly.

6.1.4. Power Subsystem

6.1.4.1. Overview

The Power Subsystem APIs can be used to get and set the configuration of power subsystem. By invoking the Power Subsystem APIs, users can:

1. Get the firmware version number of the Power Subsystem.
2. Set all the settings of the Power Subsystem to the default values.
3. Get/Set the status of the remote switch(ENABLE or DISABLE).
4. Get the battery voltage.
5. Get/set the status of the battery monitor (ON or OFF).

6. Get/set the delta value which identifies how much the battery voltage can be lower than the nominal voltage. When the voltage is lower than the tolerable voltage, the power subsystem turns off the system.
7. Get/set the Soft Off deley.
8. Get/set the Hard Off delay.
9. Get/set the Power On delay.
10. Get/set the Shutdown delay.

The power subsystem connects to the main system via the COM port. On the Linux platform, the actual port number to which the Power Subsystem connects is determined by the Linux. The default supported COM interfaces on Linux are COM1~COM4. Users must take extra steps to configure Linux kernel in order to support COM ports which do not fall into the range COM1 ~ COM4. Please refer to Appendix A for more information. Users don't need extraordinary setup on Windows platform to support COM ports.

6.1.5. I^{2}C

6.1.5.1. Overview

The I^{2}C APIs can be used to get and set the configuration of I^{2}C, The I^{2}C Device address is Defined 0xA6 By invoking the I^{2}C APIs, the users can:

1. Read i2c index data
2. Write i2c index data

6.2. API List and Descriptions

6.2.1. General

Syntax:	**lib_init(void)**
Description:	library initialization, using this library must be call this function first. Note: initialization may be wait 1 mins, because scan pic port.
Parameters:	None.
Return Value:	0:Successful, -1:Fail.

Syntax:	lib_close(void)
Description:	library close, when you not used this library must be call this function.
Parameters:	None.
Return Value:	0:Successful, -1:Fail.

6.2.2. J1939(STN1110)

Syntax:	int get_engine_coolant_temperature(void)
Description:	This function can get the Engine Coolant Temperature.
Parameters:	None.
Return Value:	An integer.

Syntax:	int get_engine_fuel_temperature_1(void)
Description:	This function can get the Engine Fuel Temperature 1.
Parameters:	None.
Return Value:	80 fixed

Syntax:	unsigned short get_engine_oil_temperature_1(void)
Description:	This function can get the Engine Oil Temperature 1.
Parameters:	None.
Return Value:	0xFFFF (not yet implemented)

Syntax:	unsigned short get_engine_turbocharger_oil_ temperature(void)
Description:	This function can get the Engine turbocharger oil Temperature.
Parameters:	None.
Return Value:	0xFFFF (not yet implemented)

Syntax:	unsigned char get_engine_intercooler_ temperature(void)
Description:	This function can get the Engine Intercooler Temperature.
Parameters:	None.
Return Value:	0xFFFF (not yet implemented)

Syntax:	unsigned char get_engine_intercooler_thermostat_opening(void)
Description:	This function can get the Engine Intercooler Thermostat Opening.
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	unsigned char get_barometric_pressure(void)
Description:	This function can get the Barometric Pressure.
Parameters:	None.
Return Value:	0xFF (defective)

Syntax:	unsigned short get_cab_interior_temperature(void)
Description:	This function can get the Cab Interior Temperature.
Parameters:	None.
Return Value:	0xFFFF (not available)

Syntax:	int get_ambient_air_temperature(void)
Description:	This function can get the Ambient Air Temperature.
Parameters:	None.
Return Value:	25 (fixed)

Syntax:	int get_engine_air_inlet_temperature(void)
Description:	This function can get the Engine Air Inlet Temperature.
Parameters:	None.
Return Value:	35 (fixed)

Syntax:	unsigned short get_road_surface_temperature(void)
Description:	This function can get the Road Surface Temperature.
Parameters:	None.
Return Value:	0xFFFF (not available)

Syntax:	int get_engine_trip_fuel(void)
Description:	This function can get the Engine Trip Fuel.
Parameters:	None.
Return Value:	0xFFFFFFFF (not used)

Syntax:	int get_engine_total_fuel_used(void)
Description:	This function can get the Engine Total Fuel Used.
Parameters:	None.
Return Value:	incremented every 5 ms by simulator

Syntax:	unsigned char get_engine_torque_mode(void)
Description:	This function can get the Engine Torque Mode
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	unsigned char get_drivers_demand_engine_percent_torque(void)
Description:	This function can get the Driver's Demand Engine – Percent Torque
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	unsigned char get_actual_engine_percent_torque(void)
Description:	This function can get the Actual engine – Percent Torque
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	int get_engine_speed(void)
Description:	This function can get the Engine Speed
Parameters:	None.
Return Value:	An integer

Syntax:	**unsigned char get_source_address_of_controlling_ device(void)**
Description:	This function can get the Source Address of controlling device
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_engine_starter_mode(void)**
Description:	This function can get the Engine Starter Mode
Parameters:	None.
Return Value:	0xFF(not yet implemented)

Syntax:	**unsigned char get_engine_demand_percent_ torque(void)**
Description:	This function can get the Engine Demand – Percent Torque
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_accelerator_pedal_1_low_idle_ switch(void)**
Description:	This function can get the Accelerator Pedal 1 Low Idle Switch
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_accelerator_pedal_kickdown_ switch(void)**
Description:	This function can get the Accelerator Pedal kickdown Switch
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_road_speed_limit_status(void)**
Description:	This function can get the Road Speed Limit Status
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	unsigned char get_accelerator_pedal_2_low_idle_switch(void)
Description:	This function can get the Accelerator Pedal 2 Low Idle Switch
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	float get_accelerator_pedal_position_1(void)
Description:	This function can get the Accelerator Padal Position 1
Parameters:	None.
Return Value:	An float

Syntax:	unsigned char get_engine_percent_load_at_current_speed(void)
Description:	This function can get the Engine Percent Load At Current Speed
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	unsigned char get_remote_accelerator_pedal_position(void)
Description:	This function can get the Remote Accelerator Pedal Position
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	unsigned char get_accelerator_pedal_position_2(void)
Description:	This function can get the Accelerator Padal Position 2
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_vehicle_acceleration_rate_limit_status(void)**
Description:	This function can get the Vehicle Acceleration Rate Limit Status
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_actual_maximum_available_percent_torque(void)**
Description:	This function can get the Actual Maximum Available Percent Torque
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_engine_particulate_trap_inlet_pressure(void)**
Description:	This function can get the Engine Particulate Trap Inlet Pressure
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**float get_engine_intake_manifold_1_pressure(void)**
Description:	This function can get the Engine Intake Manifold 1 Pressure
Parameters:	None.
Return Value:	An float

Syntax:	**unsigned char get_engine_intake_manifold_1_temperature(void)**
Description:	This function can get the Engine Intake Manifold 1 Temperature
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_engine_air_inlet_pressure(void)**
Description:	This function can get the Engine Air Inlet Pressure
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_engine_air_filter_1_differential_pressure(void)**
Description:	This function can get the Engine Air Filter 1 Differential Pressure
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned short get_engine_exhaust_gas_temperature(void)**
Description:	This function can get the Engine Exhaust Gas Temperature
Parameters:	None.
Return Value:	0xFFFF (not yet implemented)

Syntax:	**unsigned char get_coolant_filter_differential_pressure(void)**
Description:	This function can get the Engine Coolant Filter Differential Pressure
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_driver_1_working_state(void)**
Description:	This function can get the Driver 1 working state
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_driver_2_working_state(void)**
Description:	This function can get the Driver 2 working state
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_vehicle_motion(void)**
Description:	This function can get the Vehicle motion
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_driver_1_time_related_states(void)**
Description:	This function can get the Driver 1 Time Related States
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_driver_card_drver_1(void)**
Description:	This function can get the Driver card, driver 1
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_vehicle_overspeed(void)**
Description:	This function can get the Vehicle Overspeed
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_driver_2_time_related_states(void)**
Description:	This function can get the Driver 2 Time Related States
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_driver_card_drver_2(void)**
Description:	This function can get the Driver card, driver 2
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	**unsigned char get_system_event(void)**
Description:	This function can get the System event
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	unsigned char get_handling_information(void)
Description:	This function can get Handling information
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	unsigned char get_tachograph_performance(void)
Description:	This function can get Tachograph performance
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	unsigned char get_direction_indicator(void)
Description:	This function can get Direction indicator
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	unsigned char get_tachograph_output_shaft_ speed(void)
Description:	This function can get Tachograph output shaft speed
Parameters:	None.
Return Value:	0xFF (not yet implemented)

Syntax:	float get_tachograph_vehicle_speed(void)
Description:	This function can get Tachograph vehicle speed
Parameters:	None.
Return Value:	An float

6.2.3. CAN Bus

Syntax:	i32 getCanFwVer(PicInfo *ver)
Description:	This function gets the version information of the CAN Bus firmware.

Parameters:	The definition of struct 'PicInfo' is:
	`struct PicInfo {`
	`u8 info[18];`
	`}`
	This API returns the version information and store the information in the memory which is pointed at by the pointer 'ver'.

Return Value:	If this function gets the version information successfully, it returns 0, any other returned value stands for error.

Syntax: **i32 getCanBaudRate(u8 *baud)**

Description: This function gets the current setting of the Baud Rate of the CAN Bus. This function gets an ‘unsigned char’ to represent the Baud Rate. Here is the table for the Baud Rate:

Unsigned Char	Baud Rate
1	10K
2	20K
3	50K
4	100K
5	125K
6	250K
7	500K
8	800K
9	1000K

Users can use the macros listed below to set the Baud Rate:

```
/* Baud Rate */
#define BAUD_RATE_10K        1
#define BAUD_RATE_20K        2
#define BAUD_RATE_50K        3
#define BAUD_RATE_100K       4
#define BAUD_RATE_125K       5
#define BAUD_RATE_250K       6
#define BAUD_RATE_500K       7
#define BAUD_RATE_800K       8
#define BAUD_RATE_1000K      9
```

Parameters: This function gets a number which represents the specific Baud Rate and stores it at the memory which is pointed at by the pointer ‘baud’.

Return Value: If this function gets the baud rate successfully, it returns 0, any other returned value stands for error.

Syntax:	i32 setCanBaudRate(u8 baud)
Description:	This function sets the Baud Rate of the CAN Bus.
Parameters:	It takes an 'unsigned char' as the parameter and sets the Baud Rate according to the value stored at the parameter 'baud'. The correspondence between the Baud rate and the value to set to the function is the same as the table listed in the previous API 'getCanBaudRate( )'
Return Value:	If this function sets the baud rate successfully, it returns 0, any other returned value stands for error.

Syntax:	i32 sendCanMessage(struct CanMsg *buffer, u8 count)
Description:	This function sends out CAN packages over the CAN bus.
Parameters:	If there is more than one CAN packet to send, these CAN packages are stored in an array of type 'CanMsg'. This function sends out packets in a sequential fashion. The memory address of the first CAN packet to be sent is pointed at by the parameter 'buffer'. The number of CAN packets to be sent is indicated by the parameter 'count'.

Return Value:	If this function sends the CAN packet successfully, it returns 0, any other returned value stands for error.
	Here is an example:
	If the CAN packets in the array 'canAry[]' have been initialized. The code listed below will send out the CAN packets in the 'canAry[]' over the CAN bus.
	`unsigned int result = 0;`
	`struct CanMsg canAry[30];`
	`/* …`
	`Initialize the CAN packages in the canAry[30]`
	`*/`
	`result = sendCanMessages( canAry, 30 );`
	`if( result != 0)`
	`fprintf( stderr, “Send CAN package error!\n”);`

Syntax:	**i32 getCanMessage(struct CanMsg *buffer, u8 count)**
Description:	This function receives CAN packets from the CAN bus subsystem.
Parameters:	This function stores received CAN packages sequentially at an array of type ‘CanMsg’. The number of packages to receive is indicated by the parameter ‘count’.

Return Value:	If this function receives the CAN packet successfully, it returns 0, any other returned value stands for error.
	Here is an example:
	If the array ‘canAry[]’ of type ‘CanMsg’ has been declared and allocated. The code listed below will receive 30 CAN packages from the CAN bus subsystem and stores the packages in the ‘canAry[]’.
	`unsigned int result = 0;`
	`struct CanMsg canAry[30];`
	
	`result = getCanMessage( canAry, 30 );`
	`if( result != 0)`
	`fprintf( stderr, “Fail to receive CAN packets!\n”);`

Syntax: **i32 getCanMask(struct CanMask *mask)**

Description:

This function gets the current setting of the acceptance masks. Masks are used to determine which bits in the ID field of the CAN packet are examined with the filters. There are two acceptance masks (mask0 and mask1) and six acceptance filters (filter0 ~ filter5) in the CAN Bus subsystem. Filter0 ~ filter1 are associated with mask0. Filter2 ~ filter4 are associated with mask1.

Here is the Mask/Filter truth table:

Mask bit n	Filter bit n	Message ID bit n	Accept or reject bit n
0	x	x	Accept
1	0	0	Accept
1	0	1	Reject
1	1	0	Reject
1	1	1	Accept

Note: x = don't care

Parameters:

This parameter 'mask' is a pointer to a variable of type 'CanMask'. Users use the field 'maskId' to indicate the mask they want and the API put the setting of the mask in the 'mask' field.

```
struct CanMask {

u8 maskId; // 0 or 1

u32 mask;

}
```

Return Value:

If this function receives the mask setting successfully, it returns 0, any other returned value stands for error.

```
For example:

struct CanMask a_mask;

a_mask.maskId = 0;  // indicate the
mask0

i32 result;

result = getCanMask(&a_mask);  // The
setting of the mask is put at
// a_mask.mask

if( result != 0)

printf("Fail to get mask!\n");
```

Syntax: **i32 setCanMask(struct CanMask mask)**

Description: This function sets the bit patterns to the indicated mask. The target mask is indicated by the ‘maskId’ field in a CanMask variable.

Parameters: This function takes a variable of type ‘CanMask’. User set the bit patterns they want to the ‘mask’ field in a ‘CanMask’ variable.

```
struct CanMask {
u8 maskId;   // 0 or 1
u32 mask;
}
For example:
struct CanMask varMask;
i32 result;

varMask.maskId = 1;
varMask.mask = 0x12345678;
result = setCanMask(varMask);
```

Return Value: If this function sets the mask setting successfully, it returns 0, any other returned value stands for error.

Syntax: **i32 getCanFilter(struct CanFilter *varFilter)**

Description: This function gets the current setting of the acceptance filter. Use the ‘filterId’ field in a ‘CanFilter’ variable to indicate the filter you want and the API puts the setting of the indicated filter in the ‘filter’ field in the CanFilter variable ‘varFilter’.

Parameters: This function takes a pointer to a ‘CanFilter’ type variable.

For example:

```
struct CanFilter varFilter;
i32 result;
result = getCanFilter(&varFilter);
if(result != 0)
printf(“Fail to get the filter!\n”);
```

Return Value: If this function gets the filter successfully, it returns 0, any other returned value stands for error.

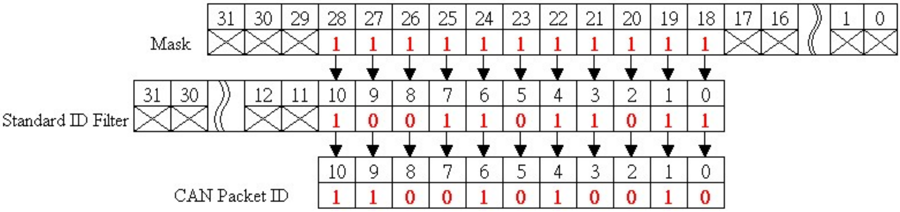
Syntax:	i32 setCanFilter(struct CanFilter *varFilter)

Description:

This function sets the bit pattern to the filter. By indicating the ‘filterType’ field in the ‘varFilter’ variable, the bit pattern in the ‘filter’ field will be taken as an ‘Standard ID’ filter or ‘Extended ID’ filter.

```
struct CanFilter {

u8  filterId; // There are six filters so
the filterId = 0 ~ 5

u8  filterType; // filterType = STD_ID or
filterType = EXT_ID

u32 filter;

}
```

If a filter is configured as a ‘Standard ID’ filter, only bit18 ~ bit28 in the mask take effect when filtering the CAN packet.



Mask	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	1	0
	☒	☒	☒	1	1	1	1	1	1	1	1	1	1	1	☒	☒	☒	☒

Standard ID Filter	31	30	12	11	10	9	8	7	6	5	4	3	2	1	0
	☒	☒	☒	☒	1	0	0	1	1	0	1	1	0	1	1

CAN Packet ID	10	9	8	7	6	5	4	3	2	1	0
	1	1	0	0	1	0	1	0	0	1	0

Parameters:	This function takes a pointer to a variable of type 'CanFilter' as the parameter. Users set up the 'filterId'. There are six filters so the 'filterId' could be 0 ~ 5. Filter0 and filter1 are associated with mask0. Filter2 ~ filter5 are associated with mask1.
	By setting up 'filterType', users indicate the type of the filter. Filter type could be 'STD_ID' or 'EXT_ID'.
	Depending on the filter type, the 'filter' field in the CanFilter variable could be 0x0 ~ 0x7FF (11 bits) when filter type is 'STD_ID'. If the filter type is 'EXT_ID', the 'filter' field in the CanFilter variable could be 0x0 ~ 0x1FFFFFFF (29 bits).
	For example:
	`struct CanFilter varFilter;`
	`i32   result;`
	`varFilter.filterId = 3;`
	`varFilter.filterType = STD_ID;`
	`varFilter.filter = 0x555;`
	`result = setCanFilter(&varFilter);`
	`if(result != 0)`
	`printf("Fail to set up the filter!\n");`

Return Value:	If this function sets the filter successfully, it returns 0, any other returned value stands for error.

6.2.4. GPIO and Watchdog

6.2.4.1. GPIO

Syntax:	**int get_gpo_status(int pin)**
Description:	Get the status of GPIO output pins.
Parameters:	This function fills in an integer variable as the parameter. The pin0 ~ 3 is the status of the output pins
Return Value:	0 or 1 (0 is Low, 1 is High)

Syntax:	int get_gpi_status(int pin)
Description:	Set the status of GPIO input pins.
Parameters:	This function fills in an integer variable as the parameter. The pin4 ~ pin7 is the status of the input pins.
Return Value:	0 or 1 (0 is Low, 1 is High)

Syntax:	void set_gpo_status(int pin, int value);
Description:	Set the status of GPIO Output pins and Value.
Parameters:	Set pin 0-3 value. 0 is Low, 1 is High
Return Value:	None.

6.2.4.2. Watchdog

Syntax:	void wdt_start(int timevalue)
Description:	This function sets the watchdog timer register to the value 'val' and starts to count down. The value could be 0 ~ 255. The unit is second. Setting the timer register to 0 disables the watchdog function and stops the countdown.
Parameters:	The parameter'timevalue' is the value to set to watchdog timer register. The range is 0~255.
Return Value:	None.

Syntax:	int get_wdt_count(void)
Description:	This function read the value of the watchdog time counter and retruns it to the caller
Parameters:	None.
Return Value:	This function returns the value of the time counter and return it to the caller as an integer.

Syntax:	void wdt_stop(void)
Description:	This function read the watchdog timer stop.
Parameters:	None.
Return Value:	None.

6.2.5. Power Subsystem

Syntax:	**i32 getPicFwVer(struct PicInfo *ver)**
Description:	This function gets the version information of the firmware of the Power Subsystem.

Parameters:	The definition of struct ‘PicInfo’ is:
	`struct PicInfo {`
	`u8 info[18];`
	`}`
	This API returns the version information and store the information in the memory which is pointed at by the pointer ‘ver’.

Syntax:	**i32 setPicDefault(void)**

Description:	The function restores the Power Subsystem to the default values. After calling this API, the items listed below are restored to its default value:
	`Remote Switch → Default: Disabled`
	`Battery Monitor → Default: Disabled`
	`Battery Voltage Delta Value → Default: 1.5V`
	`System Soft Off Delay → Default: 5 seconds`
	`System Hard Off Delay → Default: 1 minute`
	`System Power On Delay → Default: 2 seconds`
	`OS Shutdown Delay → Default: 3 minutes`

Parameters:	None.
Return Value:	If this function works successfully, the function will return 0, any other value stands for error.

<table>
<tr><th>Syntax:</th><th>i32 getRemoteSwitch(u8 *val)</th></tr>
<tr><td><b>Description:</b></td><td>The function gets the status of the Remote Switch.</td></tr>
<tr><td><b>Parameters:</b></td><td>This function takes a pointer to an unsigned char variable as the parameter. After calling this function, the status of the Remote Switch will be put at the memory which is pointed by the parameter ‘val’. If the Remote Switch is enabled, ‘*val’ is 0x5A. If the Remote Switch is disabled, the ‘*val’ is 0xA5. Users can use the macros ‘ENABLED’ (0x5A) and ‘DISABLED’(0xA5) to test the status value ‘*val’.
<pre>
For example:
u8 val;
i32 result;

result = getRemoteSwitch(&val);
if(result == 0) {
if(val == ENABLED)
printf(“Remote Switch is enabled.\n”);
else if(val == DISABLED)
printf(“Remote Switch is disabled.\n”);
}
</pre></td></tr>
<tr><td><b>Return Value:</b></td><td>If this function works successfully, it returns 0, any other value stands for error.</td></tr>
</table>

Syntax:	i32 setRemoteSwitch(u8 val)
Description:	The function sets the status of the Remote Switch.
Parameters:	This function takes an unsigned char as the parameter. The value of this parameter can be ‘ENABLED’ (0x5A) or ‘DISABLED’(0xA5).
Return Value:	If this function works successfully, it returns 0, any other value stands for error.

Syntax:	i32 getBattValt(float *vol)
Description:	This function gets the battery voltage ant put it in the memory which is pointed at by the pointer ‘vol’.
Parameters:	This function takes a pointer to a ‘float’ variable as the parameter. The reading of the battery voltage is put at the memory which is pointed at by the parameter ‘vol’.
Return Value:	If this function works successfully, it returns 0, any other value stands for error.

Syntax:	i32 getBattMonitor(u8 *val)
Description:	The function gets the status of the Battery Monitor.
Parameters:	This function takes a pointer to an unsigned char variable as the parameter. After calling this function, the status of the Battery Monitor will be put at the memory which is pointed by the parameter ‘val’. If the Battery Monitor is enabled, ‘*val’ is 0x5A. If the Battery Monitor is disabled, the ‘*val’ is 0xA5. Users can use the macros ‘ENABLED’ (0x5A) and ‘DISABLED’(0xA5) to test the status value ‘*val’.
Return Value:	If this function works successfully, it returns 0, any other value stands for error.

Syntax:	i32 setBattMonitor(u8 val)
Description:	The function sets the status of the Battery Monitor.
Parameters:	This function takes an unsigned char as the parameter. The value of this parameter can be ‘ENABLED’ (0x5A) or ‘DISABLED’(0xA5).
Return Value:	If this function works successfully, it returns 0, any other value stands for error.

Syntax:	i32 getBattDelta(float *val)
Description:	This function gets the delta value. The delta value is the maximum voltage deviation of the power from its nominal voltage. If the function of Battery Monitor is ON, the Power Subsystem shuts the system down when the voltage deviation of the power is larger than the delta value.
Parameters:	This function takes a pointer to a float variable as the parameter. The delta value will be put at the memory which is pointed by the parameter ‘val’.
Return Value:	If this function works successfully, it returns 0, any other value stands for error.

Syntax:	i32 setBattDelta(float val)
Description:	This function sets the voltage delta value. The range is 0.5V ~ 3.0V. The granularity is 0.5V.
Parameters:	This function takes a float variable as the parameter.
Return Value:	If this function works successfully, it returns 0, any other value stands for error.

Syntax:	i32 setSoftOffDelay(u32 setTime)
Description:	The Soft Off Delay is the interval between that the system receives a power off signal and that the system generates a power off signal. This function sets up the interval in seconds.
Parameters:	The parameter is of the type of unsigned long. The value of the parameter ranges from 0~3600. The unit of the value of the parameter is seconds.
Return Value:	If this function works successfully, it returns 0, any other value stands for error.

Syntax:	i32 setHardOffDelay(u32 setTime)
Description:	The Hard Off Delay is the interval between that the system is off and that the power 5VSB is off. This function sets up the interval in seconds.
Parameters:	The parameter is of the type of unsigned long. The value of the parameter ranges from 0~3600. The unit of the value of the parameter is seconds.
Return Value:	If the function works successfully, it returns 0, any other value stands for error.

Syntax:	i32 getSoftOffDelay(u32 *Time)
Description:	The Soft Off Delay is the interval between that the system receives a power off signal and that the system generates a power off signal. This function gets the interval.
Parameters:	The parameter is a pointer which points to an unsigned long variable. The returned value is stored at this variable. The unit of the returned value is in seconds.
Return Value:	If this function works successfully, the function returns 0, any other value stands for error.

Syntax:	i32 getHardOffDelay(u32 *Time)
Description:	The Hard Off Delay is the interval between that the system is off and that the power 5VSB is off. This function gets the interval.
Parameters:	The parameter is a pointer which points to an unsigned long variable. The returned value is stored at this variable. The unit of the returned value is in seconds.
Return Value:	If this function works successfully, the function returns 0, any other value stands for error.

Syntax:	i32 getPowerOnDelay(u32 *val)
Description:	This function gets the Power On delay.
Parameters:	This function takes a pointer to an unsigned long variable as the parameter. The delay time will be put at the memory which is pointed by the ‘val’.
Return Value:	If this function works successfully, the function returns 0, any other value stands for error.

Syntax:	i32 setPowerOnDelay(u32 val)
Description:	This function sets the Power On delay.
Parameters:	This function takes an unsigned long variable as the parameter. The range of the Power On delay is 2 ~ 60 seconds.
Return Value:	If this function works successfully, the function returns 0, any other value stands for error.

Syntax:	i32 getShutdownDelay(u32 *val)
Description:	This function gets the Shutdown delay.
Parameters:	This function takes a pointer to an unsigned long variable as the parameter. The delay time will be put at the memory which is pointed by the parameter ‘val’.
Return Value:	If this function works successfully, the function returns 0, any other value stands for error.

Syntax:	i32 setShutdownDelay(u32 val)
Description:	This function sets the Shutdown delay.
Parameters:	This function takes an unsigned long variable as the parameter. The range of the delay is 120 ~ 3600 seconds.
Return Value:	If this function works successfully, the function returns 0, any other value stands for error.

6.2.6. I^{2}c

Syntax:	int i2c_read_byte(unsigned char device_address, unsigned char index, unsigned char *data);
Description:	This function get the i2c index data. The data value save to pointer data.
Parameters:	If this function works successfully, the function returns 0, any other value stands for error.

Syntax:	int i2c_write_byte(unsigned char device_address,
Description:	This function write the i2c index data. .
Parameters:	If this function works successfully, the function returns 0, any other value stands for error.

6.3. Appendix A

Users have to modify the boot loader configuration to support COM6. Take the grub configuration file as an example. Add ‘8250.nr_uarts=XX noirqdebug’ at the setting of kernel. Here, XX represents the number of COM ports the system will support. Because the power subsystem connects to main system via COM6, the XX must be greater or equal to 6.

1. Modify the grub.conf.

```
[root@linux ~]# vi /boot/grub/grub.conf

default=0 timeout=5

splashimage=(hd0,0)/grub/splash.xpm.gz

hiddenmenu

title Fedora Core (2.6.27.5.117.FC10)

root (hd0,0)

kernel /vmlinuz-2.6.27.5.117.FC10 ro root=/dev/hda2 rhgb
   quiet

8250.nr_uarts=6 noirqdebug

initrd /initrd-2.6.27.5.117.FC10.img
```

2. List the status of the COM ports in the system.

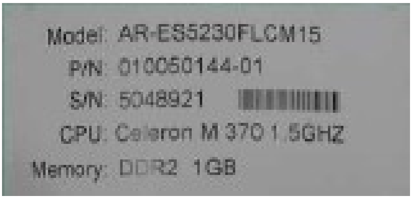
```
# setserial -g /dev/ttyS*

/dev/ttyS0, UART: 16550A, Port: 0x03f8, IRQ: 4

/dev/ttyS1, UART: 16550A, Port: 0x02f8, IRQ: 3

/dev/ttyS2, UART: 16550A, Port: 0x03e8, IRQ: 11

/dev/ttyS3, UART: 16550A, Port: 0x02e8, IRQ: 10

/dev/ttyS4, UART: 16550A, Port: 0x04f8, IRQ: 11

/dev/ttyS5, UART: 16550A, Port: 0x04e8, IRQ: 10
```

The node ‘/dev/ttyS5’ corresponds to COM6. The IO port is 0x4e8, IRQ 10.

7. FAQ

Q 1. Where is the serial number located on my system?

- The serial number (S/N) is an alpha-numeric character located on the bottom or side chassis.



Model: AR-ES5230FLCM15
P/N: 010050144-01
S/N: 5048921
CPU: Celeron M 370 1.5GHZ
Memory: DDR2 1GB

(for reference only)