FLEETPC-ARM-300 Series

Reference Manual

Release Notes

Version	Release Date	Notes	By
1.0	January , 2017	The 1st Release to Customer	
1.1	March, 2017	Add additional features	
1.2	June, 2017	Add GPIO device names Correct LED1 pin assignment	

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1 Precautions

1.1 Safety Precautions

In order to use this product safely, please take special note of the following precautions.

- Read all product manuals and related documentation before using this product. Use this product correctly and safely. Follow all warnings.
- If operating or extending this product in a manner not described in this manual, please do so at your own risk. Be sure to fully read this manual and other technical information on our website and proceed safely and responsibly.
- Do not install this product in a place with a lot of water, moisture, dust or soot. This could cause product failure, fire, or an electric shock.
- Some parts of this product generate heat and can reach high temperatures. This may cause burns if it is improperly handled. Do not touch the electronic components or surrounding area while powered on or immediately after being turned off.
- Carry out any design and development only after you have thoroughly read and understood this manual and any other related technical materials on the website or in the data sheets. Test your product thoroughly for reliability and safety.
- This product is not intended for applications that require extremely high reliability, safety, functionality and accuracy: including but not limited to medical equipment, traffic control systems, combustion control systems, and safety equipment. This company is not liable for death or injury if used in such systems.
- This product uses semiconductor components designed for generic electronics equipment such as office automation, communications, measurement equipment and machine tools. Foreign noise or a power surge may cause this product to malfunction or fail.
- To ensure there is no risk of bodily harm or property damage, be sure to take all electrical safety precautions such as protection circuits, limit switches, fuse breakers, or redundant systems. Only use the device after sufficient reliability and safety measures are in place.

1.2 Write Prohibited Regions

Data stored by the EEPROM, i.MX6 electrical fuse (e-Fuse) is used by the software contained in this product. Do not write to these regions as this may cause the product stop working correctly. Purposely writing to these regions voids the product warranty.

1.3 Warranty

As described in the Product Warranty Policy provided with this product, the main board is covered by a one year replacement warranty starting from the time of purchase. Please note that the other included goods and software are not covered under this warranty. Some knowledge used by CARTFT.COM is provided by third parties, and CARTFT.COM makes no representation or warranty as to the accuracy of such information.

2 Product Features

2.1 Overview

The FLEETPC-ARM-300 is a communication gateway designed for in-vehicle applications or IOT (Internet of Things) applications. The FLEETPC-ARM-300 offers some unique features, including the latest NXP iMX6 (ARM Cortex-A9) quad or dual cores application processor, an LTE modem socket with dual-sim card holder, a ublox GPS receiver, G-sensors, and software controlled power on/off.

With the latest Android/Linux kernel and tools, the FLEETPC-ARM-300 allows users to design and deploy custom software for various applications, such as vehicle tracking, fleet management and IOT communication gateway.

The FLEETPC-ARM-300 series of products include the following models:

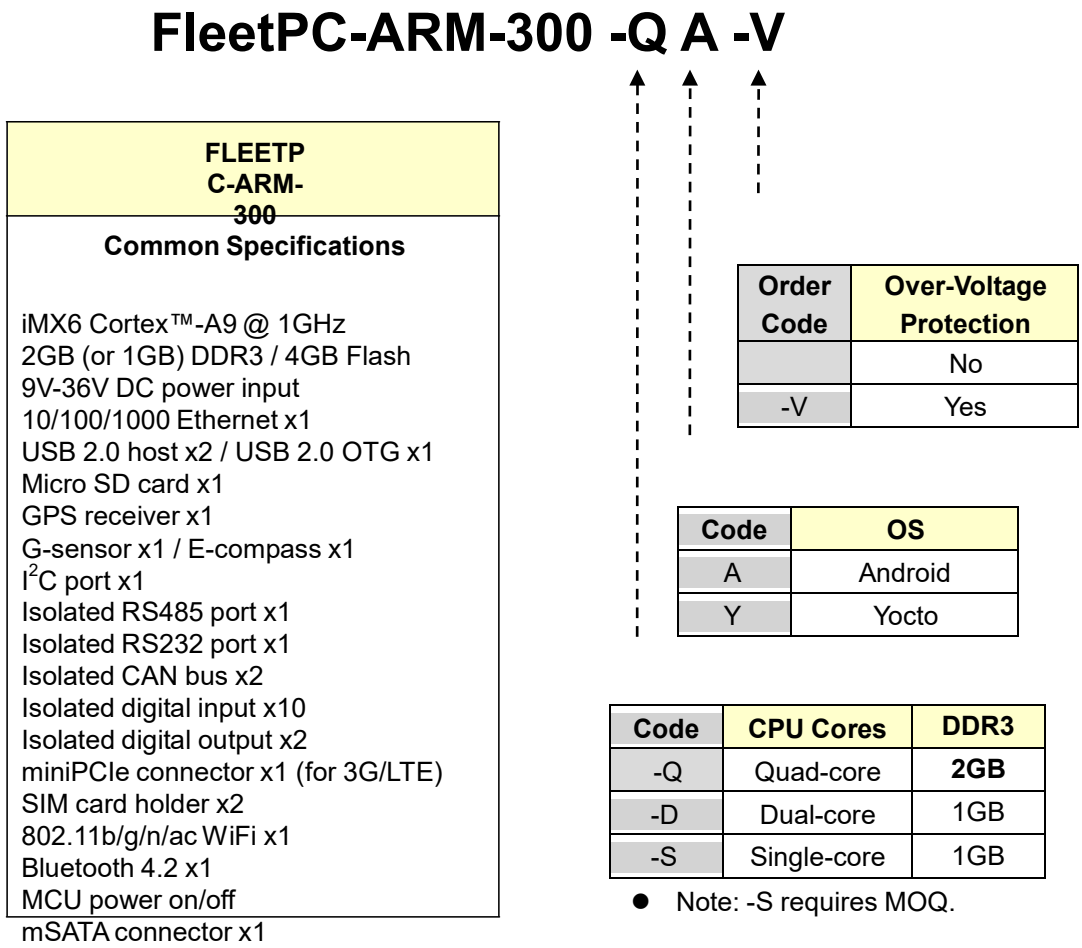


Figure 1: Product Naming Conventions

2.2 Features and Specifications

Features

- ARM Cortex processor with Android/Linux enables quick software development
- 9-36V wide input voltage range for vehicle application
- Photo-coupled GPIO for vehicle sensor input monitoring
- Sample OpenGTS server software for remote server demonstration

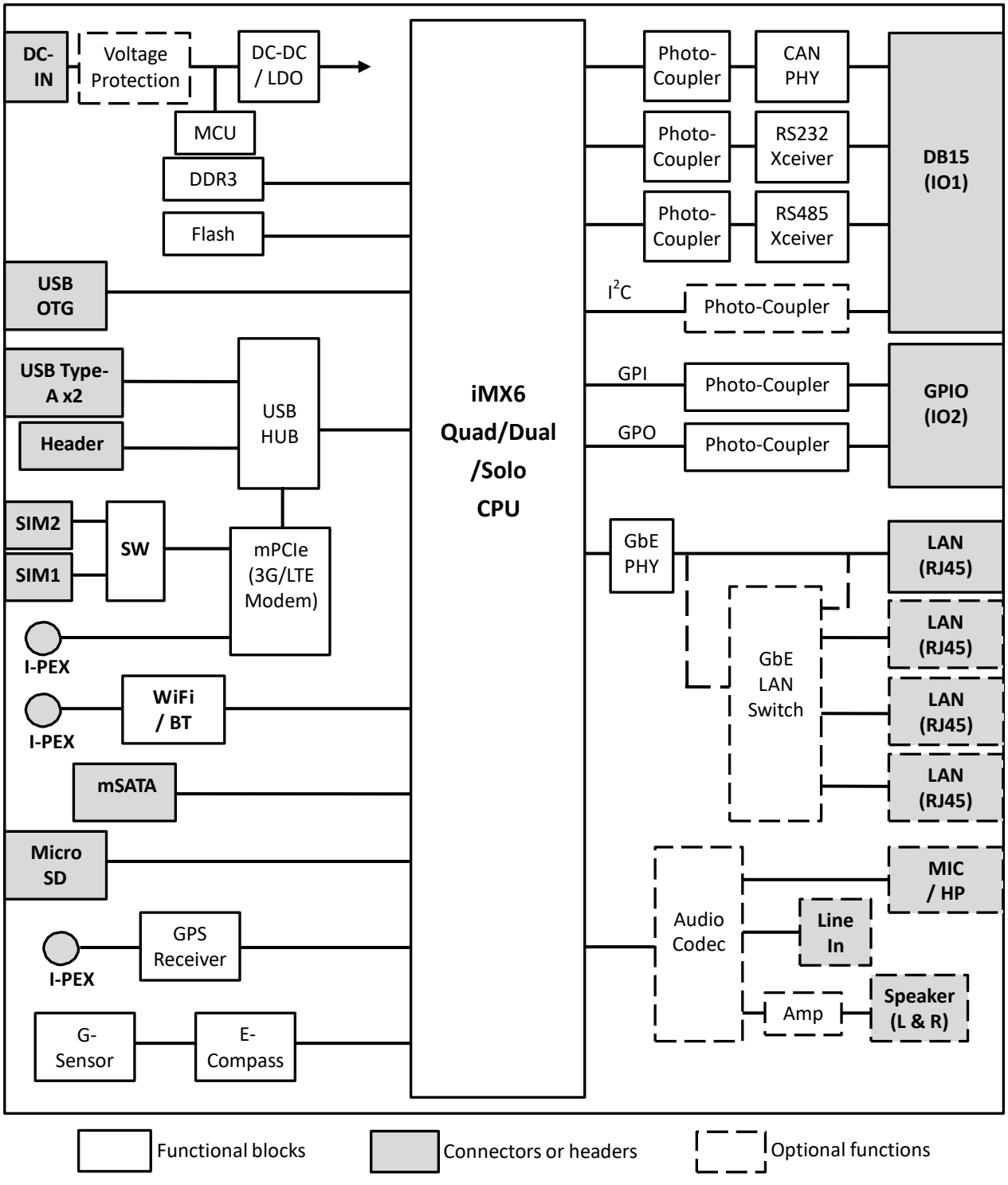
Hardware Specifications

- NXP iMX6 ARM Cortex™-A9 core @ 1GHz (quad-core, dual-core, single-core)
- 2GB (or 1GB) DDR3 + 4GB eMMC Flash
- 9V-36V DC power input
- **(optional)** Over-voltage protection (at DC input)
- USB 2.0 host port x2 + USB 2.0 OTG port x1 + Micro SD card socket x1
- Ublox GPS receiver x1
- miniPCI-e connector + SIM card holder x2
- 3-Axis G-sensor x1 + E-compass x1
- Isolated RS485 x1 + Isolated RS232 x1 + Isolated CAN bus x 2 + I^2C port x1
- Isolated digital input x 10 + Isolated digital output x 2
- 10/100/1000 Mbps Ethernet (RJ-45) x1
- 802.11a/b/g/n/ac WiFi x1 + Bluetooth 4.2 x1
- mSATA connector x1
- 3G/LTE modem module **(optional)**
- Audio (MIC and Headphone) **(optional)**
- Dimension: 138mm x 204mm x 48mm (L x W x H)

Software Specifications

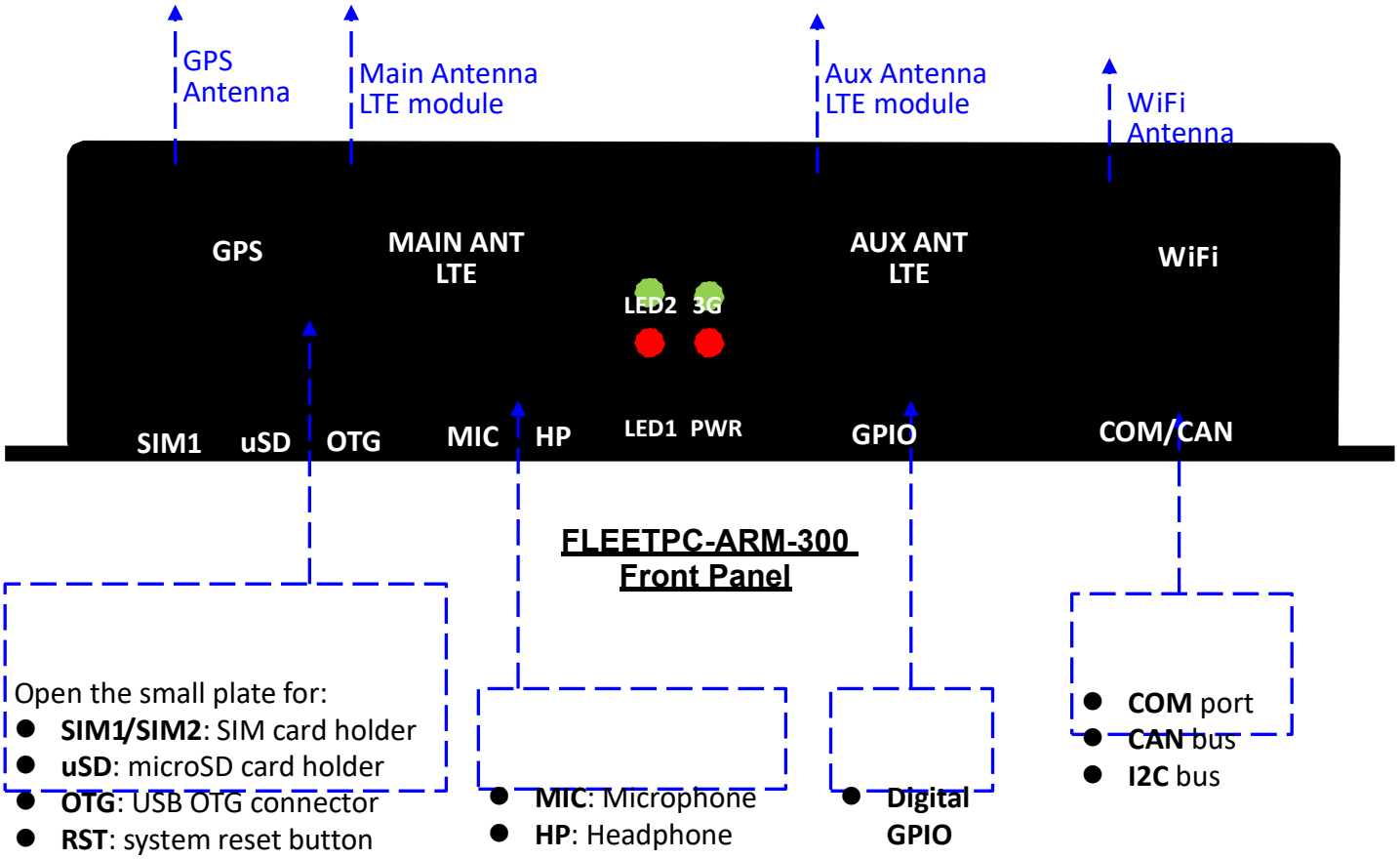
- Yocto 1.6 (or later)
- Android 6.0 (or later)

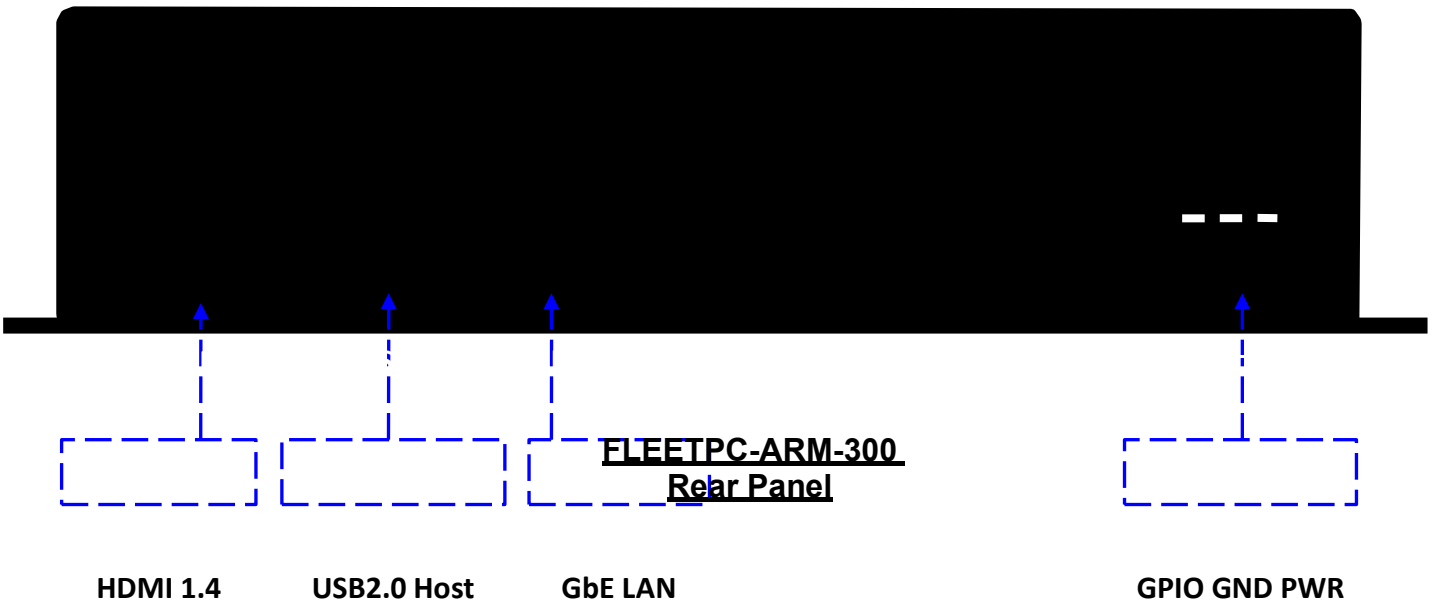
2.3 Block Diagram



3 Functional Descriptions

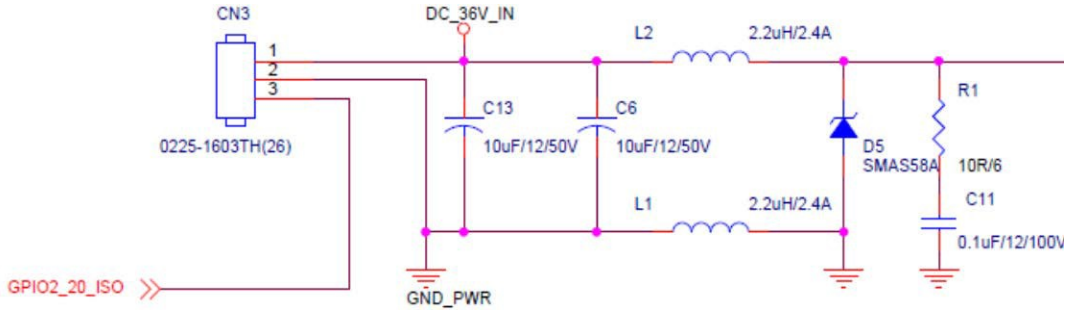
The following photos and diagrams show connector positions on the FLEETPC-ARM-300 series of products. The functional details of the connectors are described in subsequent sections.



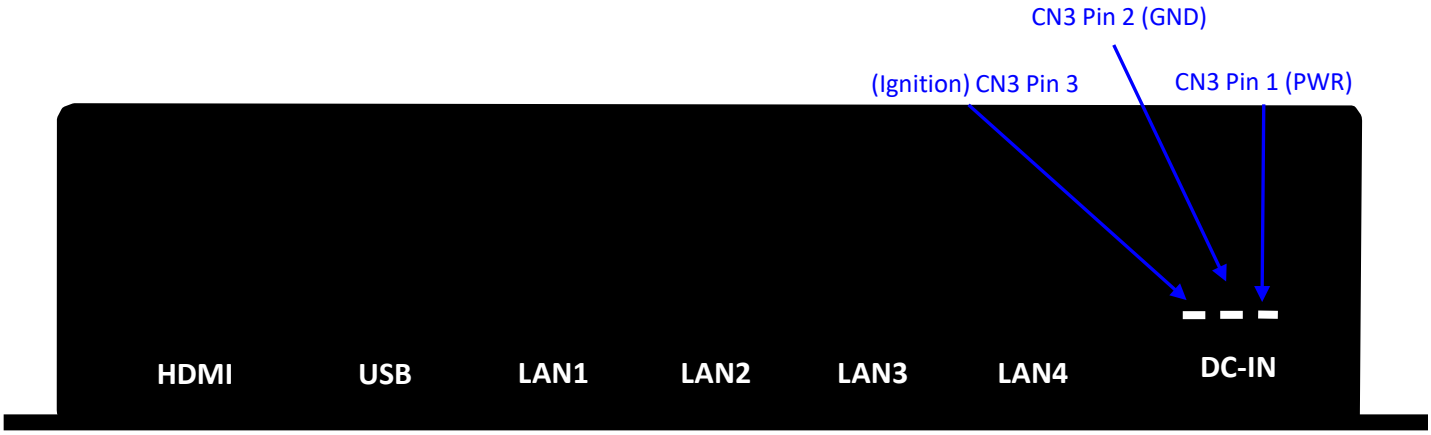


3.1 Power Supply and MCU Power ON/OFF

The FLEETPC-ARM-300 power input should be applied to the 3-pin DC-IN connector (CN3). Refer to Appendix C for DC-IN **mating** connector specification. Refer to Appendix D for DC-IN connector specification.



The input voltage can be in the range of DC 9V-36V. An Over-Voltage-Protection circuit (optional function) is implemented to protect FLEETPC-ARM-300 from over voltage damage.



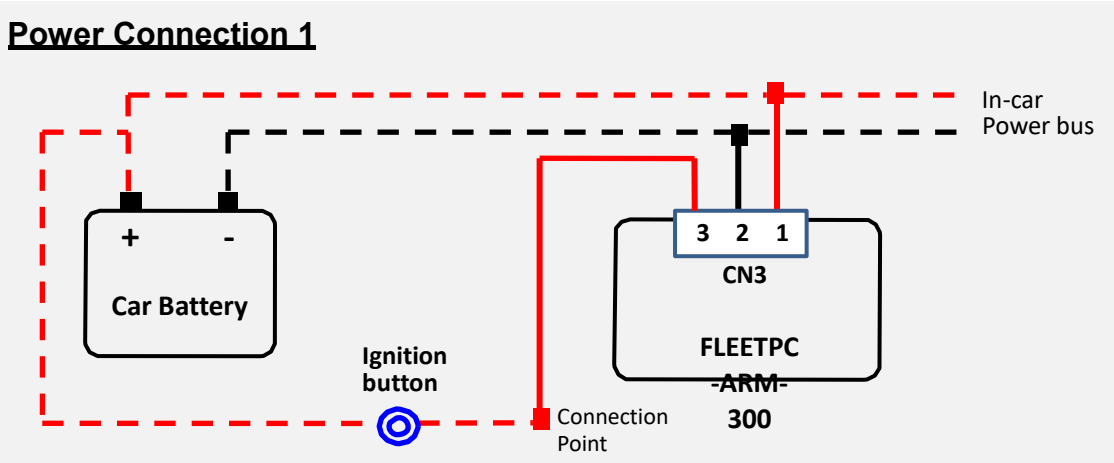
The pin 3 of DC-IN connector is a photo-coupled input (5KV isolation) dedicated for vehicle power ignition signal. The input is connected to FLEETPC-ARM-300 power on/off MCU. **If pin 3 is not connected to the ignition switch, it has to be connected to HIGH (+12V) to ensure a simulated ignition signal is sent to FLEETPC-ARM-300.**

Refer to Appendix A for brief specification of the photo-coupler IC.

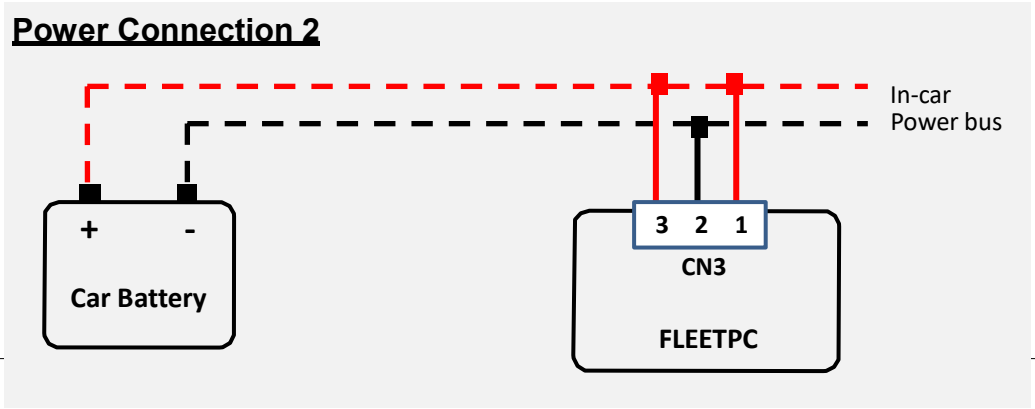
The input power connection is suggested in the following diagrams:

Power Connection 1 – The FLEETPC-ARM-300 CN3 pin1/2 are connected to car battery directly and
CN3 pin 3 is connected to ignition button.

When FLEETPC-ARM-300 MCU detects car ignition on, it will turn on FLEETPC-ARM-300 system power. When car ignition signal is off, MCU will inform iMX6 to execute a Linux shutdown command (shutdown –h +xx, where xx is **minute** of delay, and xx can be configured in FLEETPC-ARM-300 device manager) and turn off system power. See "MCU-controlled power on/off"
descriptions in this section.

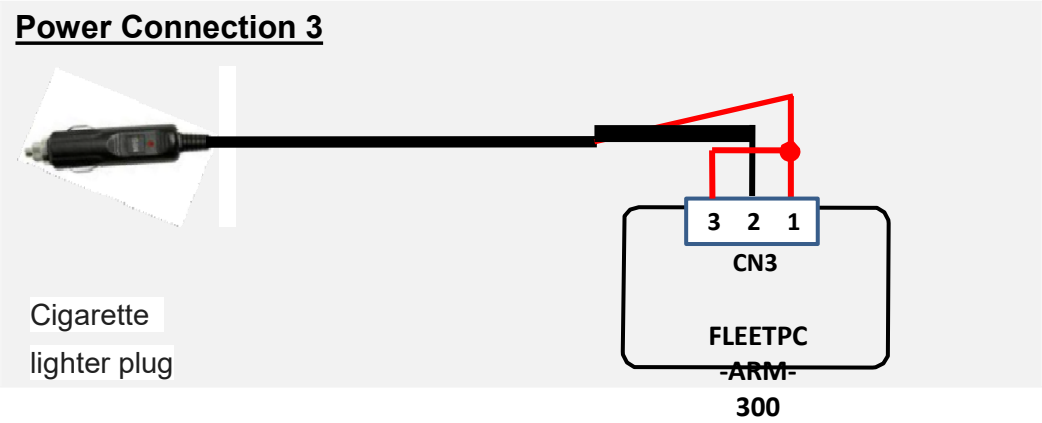


Power Connection 2 – The FLEETPC-ARM-300 CN3 pin1/2/3 are connected to car battery directly. This connection will make FLEETPC-ARM-300 **always ON**. Since CN3 pin3 is connected to high, MCU will always detect an ignition signal. Even software executes "shutdown –h now" or "echo 0
> /sys/class/leds/pwr_gpio/brightness" commands (see "MCU-controlled power on/off" descriptions in this section) to turn off system power, MCU will turn on power again in 5 seconds. Such connection is not suggested unless software developer knows when to turn off FLEETPC-ARM-300 power.

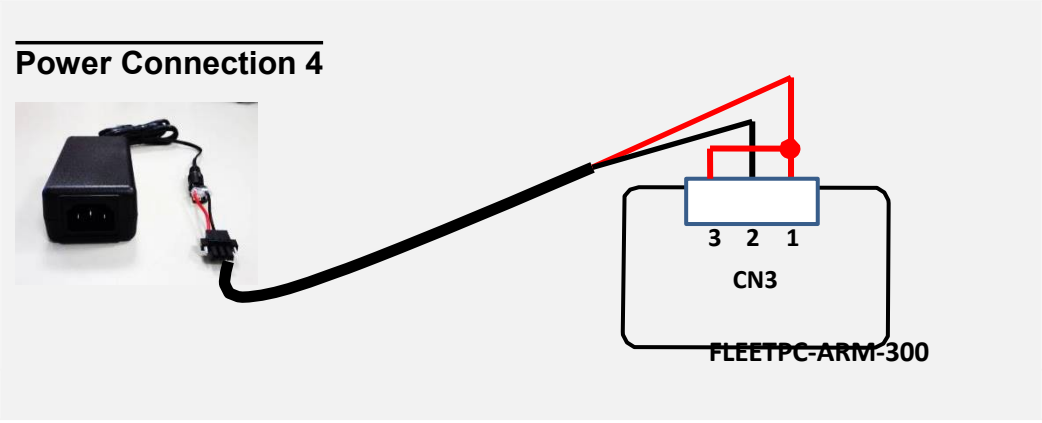


-
A
R
M
-
3
0
0

Power Connection 3 – The FLEETPC-ARM-300 CN3 pin1/2/3 are connected to a cigarette lighter socket. Since CN3 pin3 is connected to DC input, MCU will always detect an ignition signal as long as car power is on. Even software runs “shutdown –h now” or “echo 0 > /sys/class/leds/pwr_gpio/ brightness” commands (see “MCU-controlled power on/off” descriptions in this section) to turn off system power, MCU will turn on power again in 5 seconds. The FLEETPC-ARM-300 can only be turned off when the cigarette lighter socket power output is off.



Power Connection 4 – The FLEETPC-ARM-300 CN3 pin1/2/3 are connected to a +12V DC power adapter. Since CN3 pin3 is connected to DC input, MCU will always detect an ignition signal as long as DC adapter is on. Even software runs “shutdown –h now” or “echo 0 > /sys/class/leds/pwr_gpio/ brightness” commands (see “MCU-controlled power on/off” descriptions in this section) to turn off system power, MCU will turn on power again in 5 seconds. The FLEETPC-ARM-300 can only be turned off when the DC power adapter output is off.



MCU-controlled power on/off

The MCU-controlled power on/off allows software to turn off system power by issuing a command (via I^2C channel 1, or GPIO) to the MCU (an 8-bit STM8S MCU).
FLEETPC-ARM-300 provides applications (i2creboot and xsignal) in Linux for MCU's action:

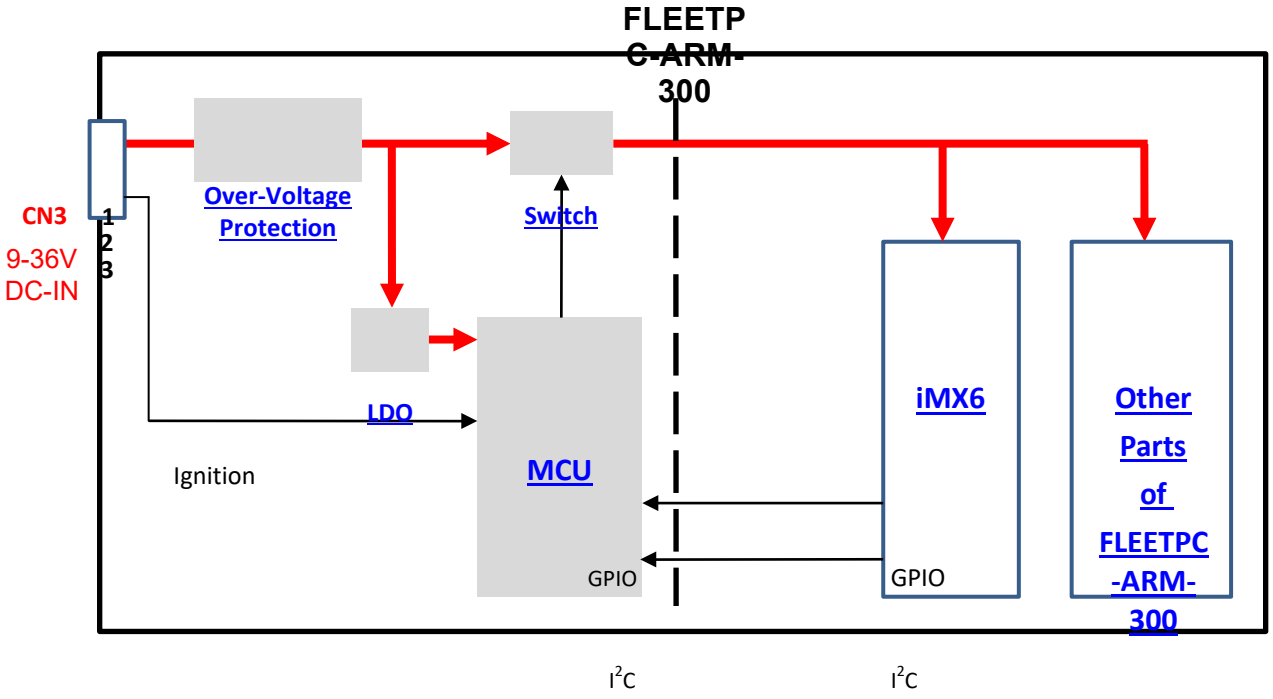
```
i2creboot –m 0          // this command will wait until Linux finishes normal
                        // system shutdown and then turn off system power.

i2creboot –d xxx –m 1   // this command will immediately turn off system power and
                        // then turn on system power after xxx seconds, where xxx
                        // is 1 to 65535. This can be used for system reboot (cold start).
```

```
echo 0 > /sys/class/leds/pwr_gpio/brightness
// this Linux command uses GPIO to inform MCU to turn off system power immediately
```

The xsignal is a background application persistently monitoring Linux RunLevel.
When Linux executes "reboot" command and RunLevel becomes 6, xsignal will issue command "i2creboot -d 2 -m 1" to turn off power and turn on power after 2 seconds.

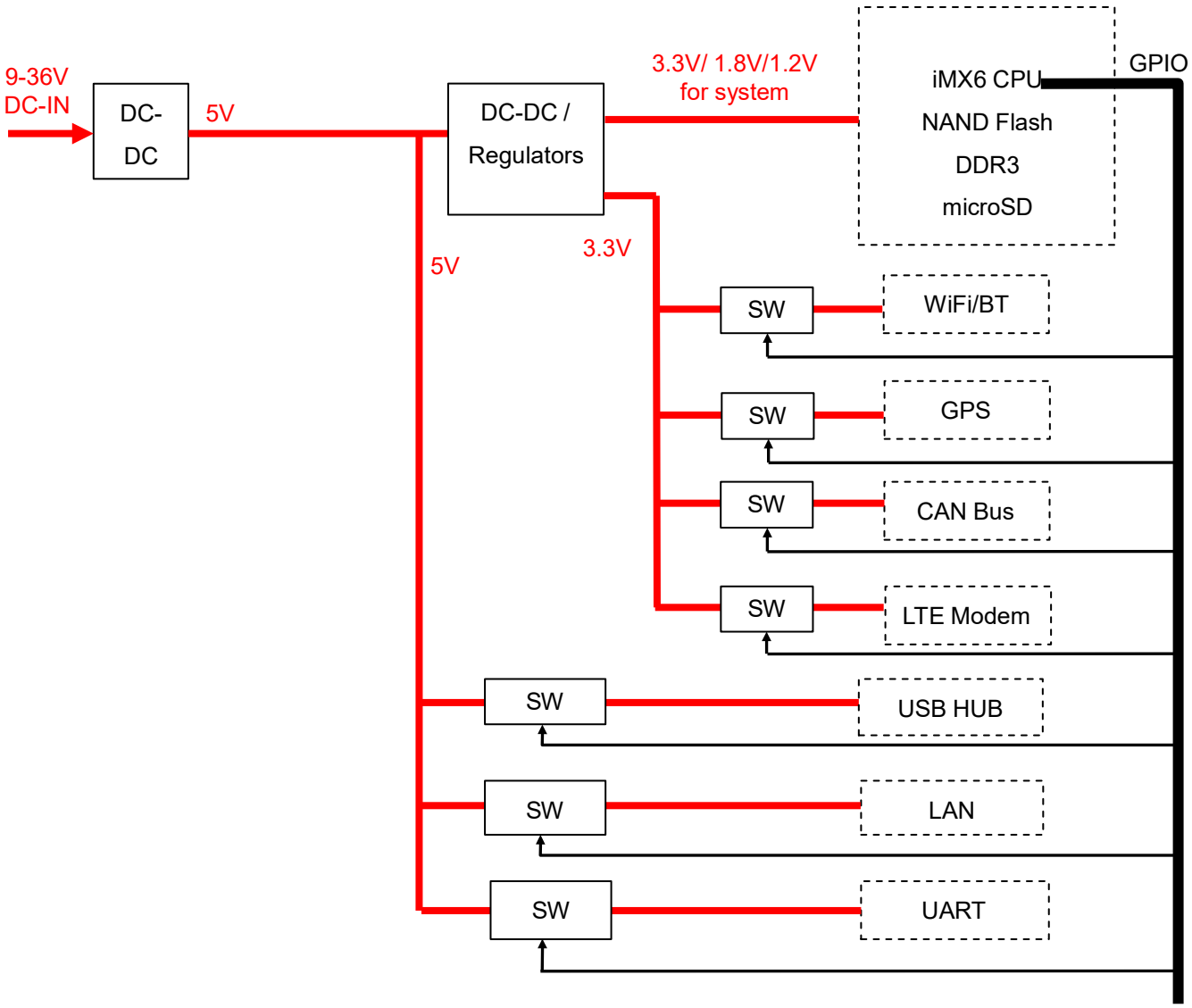
When Linux executes "shutdown –h now" command, RunLevel becomes 0, xsignal will issue command "echo 0 > /sys/class/leds/pwr_gpio/brightness" to turn off power immediately.

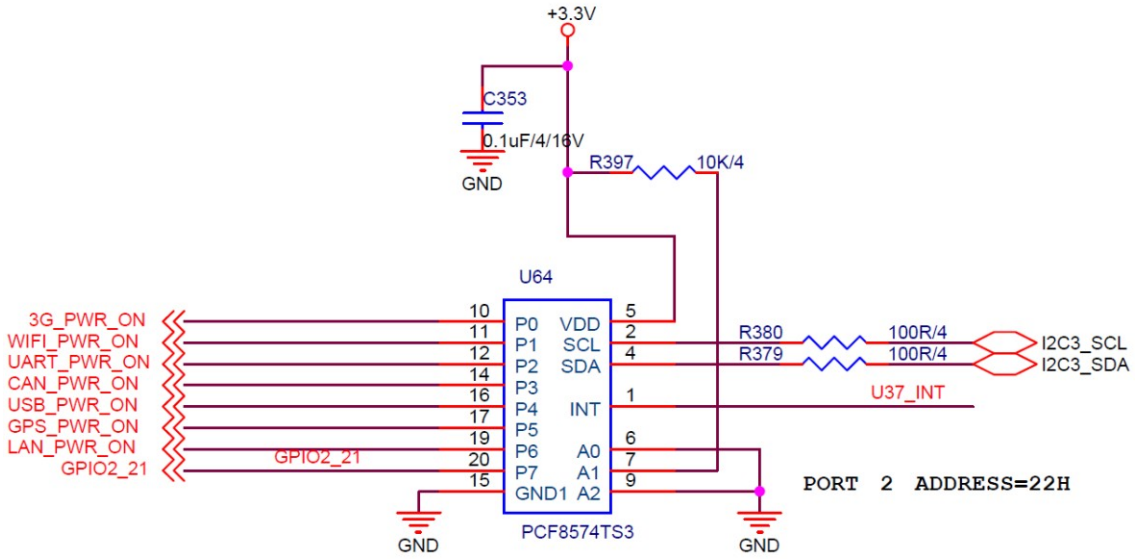
When the MCU turns off FLEETPC-ARM-300 system power, some components are still "ON" to monitor power input. These components include MCU, power regulars, power switches and
over-voltage protection circuit (The grey blocks in below diagram). This means a minimum power will be dissipated by these components.


FLEETPC-ARM-300
CN3
9-36V
DC-IN
1
2
3
Over-Voltage Protection
Switch
LDO
Ignition
MCU
GPIO
iMX6
GPIO
Other Parts of FLEETPC-ARM-300
I2C
I2C

3.2 System Power Management

The following diagram shows FLEETPC-ARM-300 peripherals power tree. The power supply of peripheral module is with an on/off switch controlled by a GPIO from GPIO expander. The GPIO is used to turn on/off power switch for power saving.





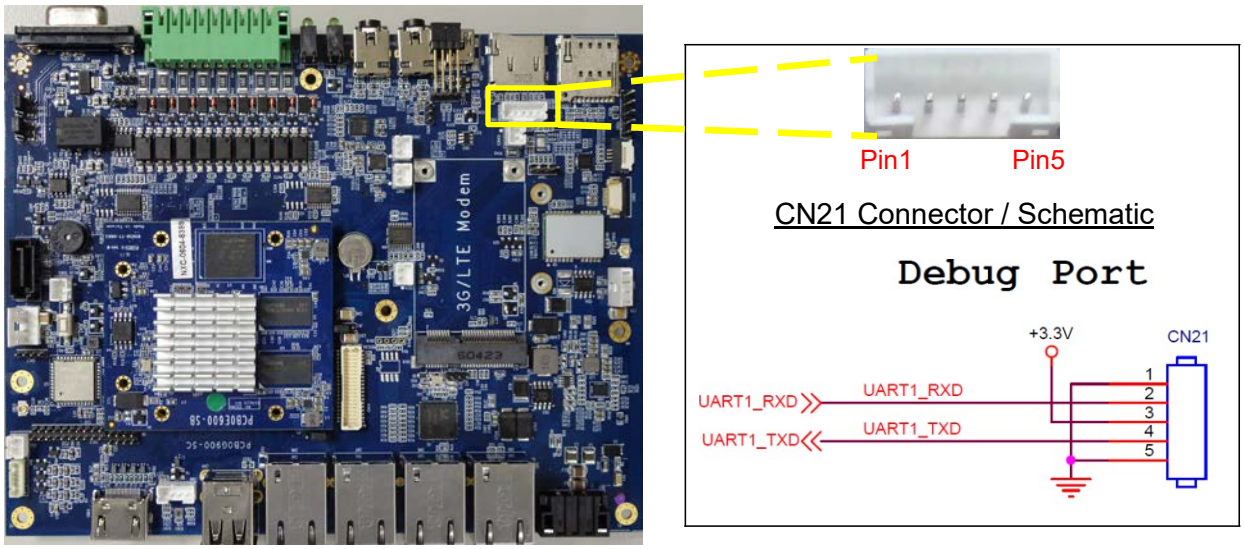
PCF8574 pin (I^2C3 = 22H)	Functions	I/O	Linux Name
3G_PWR_ON	3G/LTE modem power on/off	OUT	/sys/class/gpio/gpio240
WIFI_PWR_ON	WiFi/Bluetooth power on/off	OUT	/sys/class/gpio/gpio241
UART_PWR_ON	COM2/COM3 power on/off	OUT	/sys/class/gpio/gpio242
CAN_PWR_ON	CAN bus power on/off	OUT	/sys/class/gpio/gpio243
USB_PWR_ON	USB HUB power on/off	OUT	/sys/class/gpio/gpio244
GPS_PWR_ON	GPS module power on/off	OUT	/sys/class/gpio/gpio245
LAN_PWR_ON	LAN port power on/off	OUT	/sys/class/gpio/gpio246
GPIO2_21	Connect to IO2 connector (pin 18) via photo-coupler	IN	/sys/class/gpio/gpio247

There is limitation on using GPIO to turn on/off peripherals power supply. Incorrect use of GPIO could result to malfunction of peripherals or unstable system.
Please contact us for information on using the GPIOs.

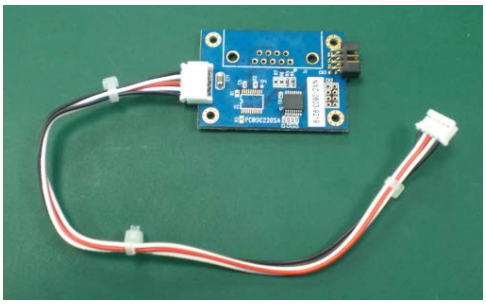
3.3 Console and Debug Port

The console port (or debug port) is located inside FLEETPC-ARM-300 box (CN21 of FleetPC-ARM-100 PCBA). Follow steps below to setup console port:

- Find CN21 console port connector on VPC100 PCB.



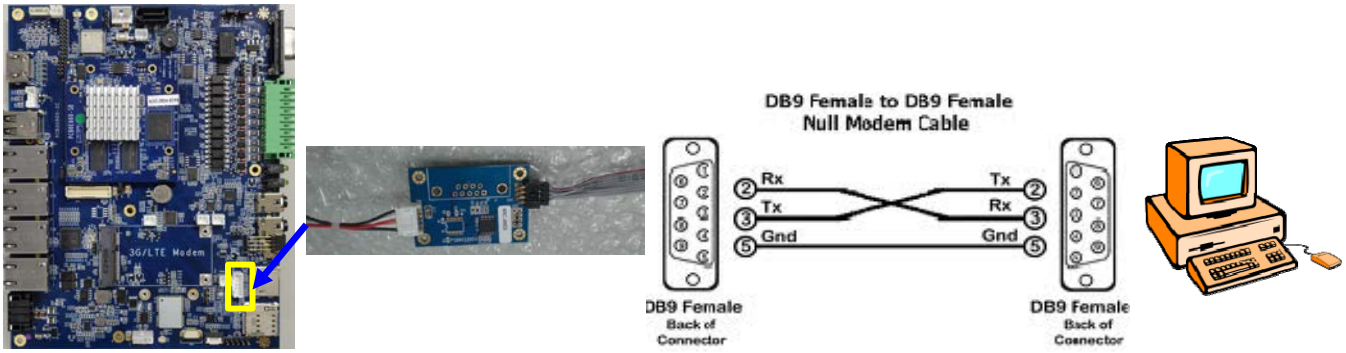
- Make sure you have C220 debug board and cable. Note that C220 board is not part of the FLEETPC-ARM-300 product. It has to be purchased separately.
- Connect C220 debug board cable to FLEETPC-ARM-300 PCB CN21.



- Connect the RS232 IDC cable to C220 debug board 2x4 box header (black connector):

- A DB9 **null modem cable** (or adapter) is required when you want to connect console port to a PC with terminal emulation software such as TeraTerm.

- Turn on PC, run the terminal emulation program (e.g. ***TeraTerm***), and open TeraTerm COM port.



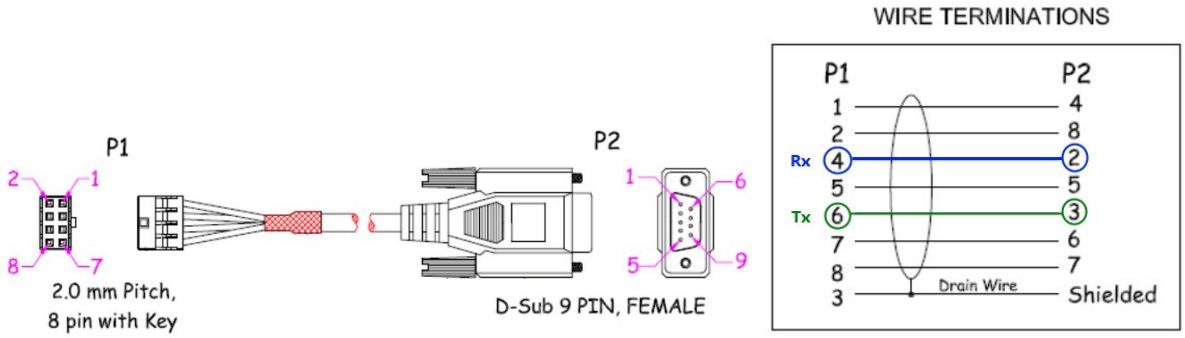
- Set COM port at **Baud Rate 115200, 8 data bits, no parity, 1 stop bit and no flow control**.

- After the above connection/setting, you will see Linux console prompt "$" in the PC TeraTerm.

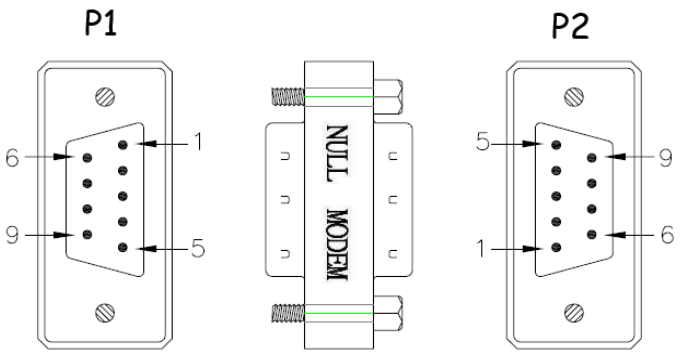
Pin Assignment: RS232 IDC Cable and Null Modem Adapter

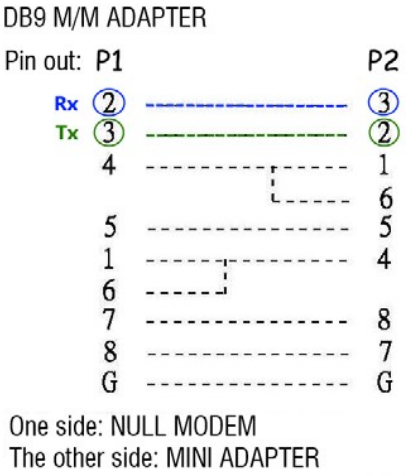
■ Console box header (CN3 on C220 board) pin assignment

■ RS232 IDC cable: pin header for DB9



- Null modem adapter: male-to-male for DB9



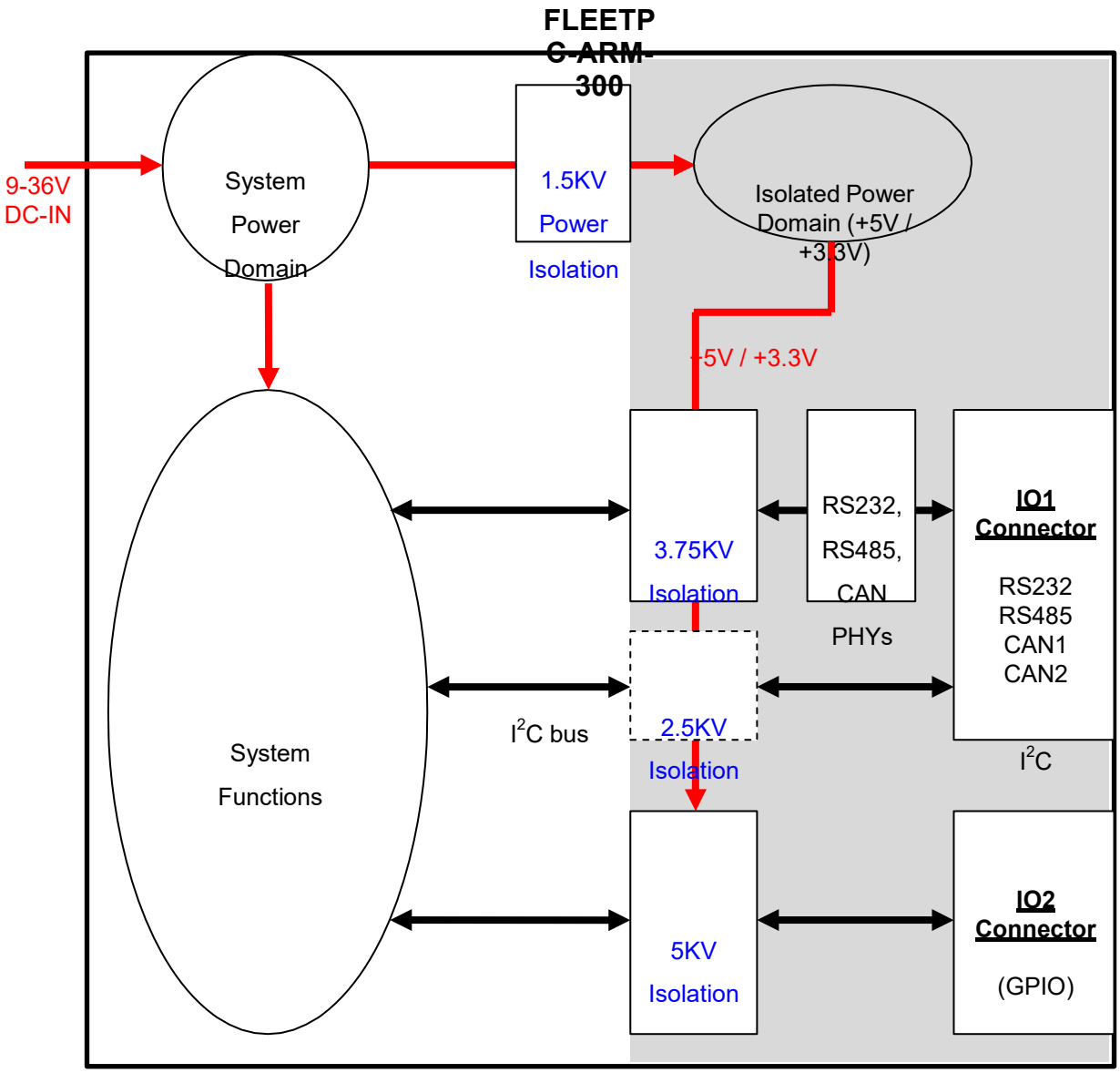


3.4 IO Isolation

The FLEETPC-ARM-300 IO isolation includes:

- 1.5KV power isolation
- 3.75KV signal isolation on RS232, RS485, CAN1 and CAN2 bus
- 5KV signal isolation on GPIO pin
- 2.5KV signal isolation on I^2C bus (**option**)

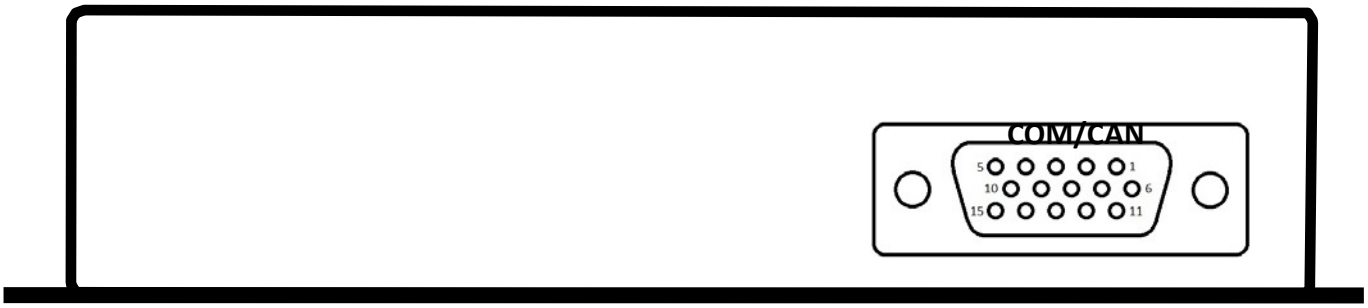
Note: I^2C bus is **NOT** isolated. The I^2C isolation is available as an option function.



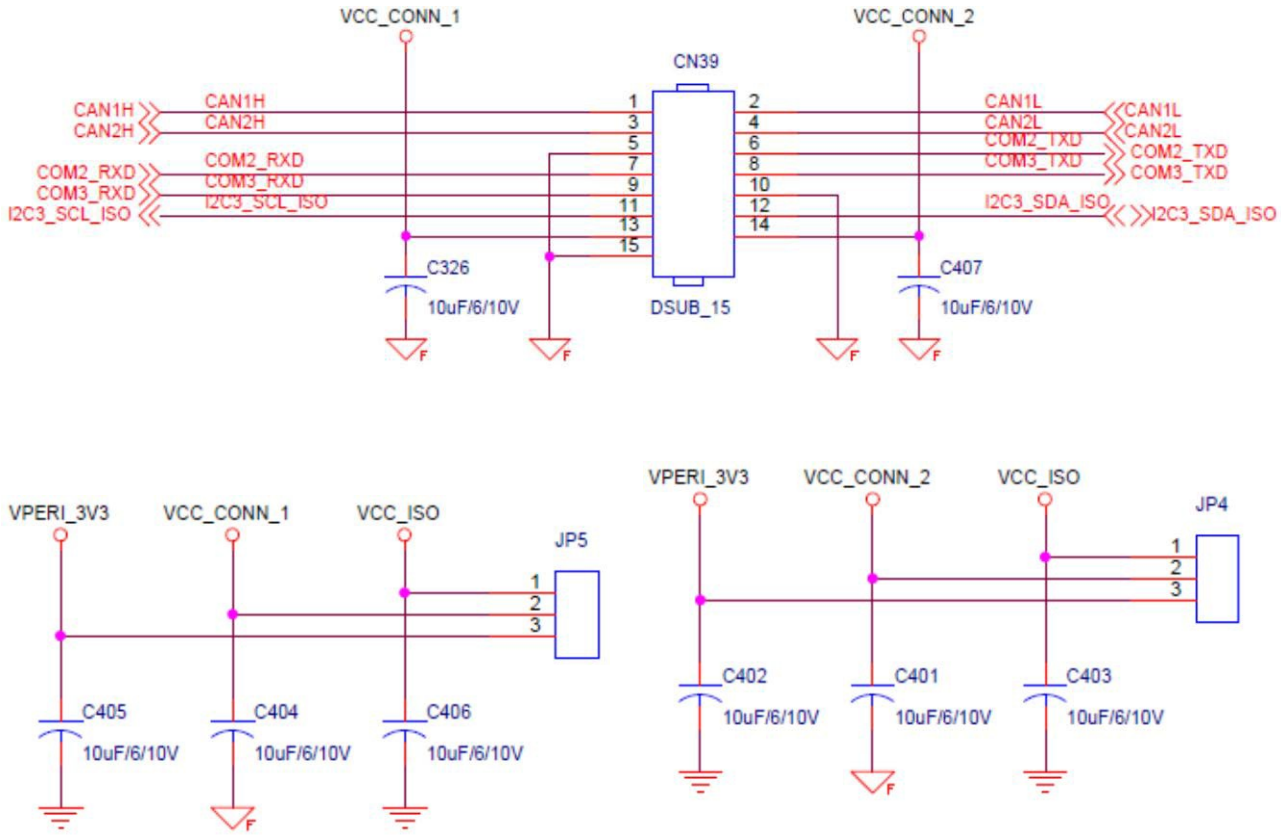
3.5 IO1 (COM/CAN) Connector

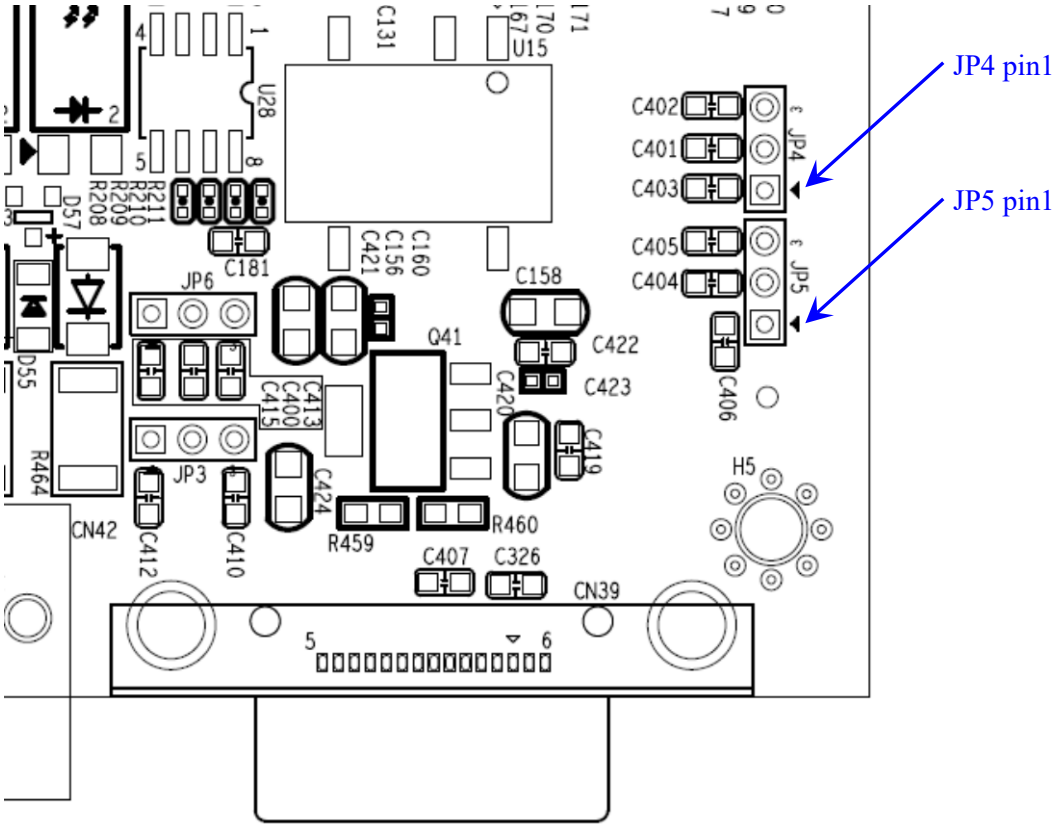
The IO1 connector is a DB15 female connector at the rear side of FLEETPC-ARM-300 box.

The COM2 (Linux device: /dev/ttymxc1), COM3 (Linux device: /dev/ttymxc2), CAN1 (Linux device: can0) and CAN2 (Linux device: can1) are with power and signal isolation, while I^2C bus isolation is an option. Refer to Section 3.5 for more information about isolation.



The schematic IO1 connector:

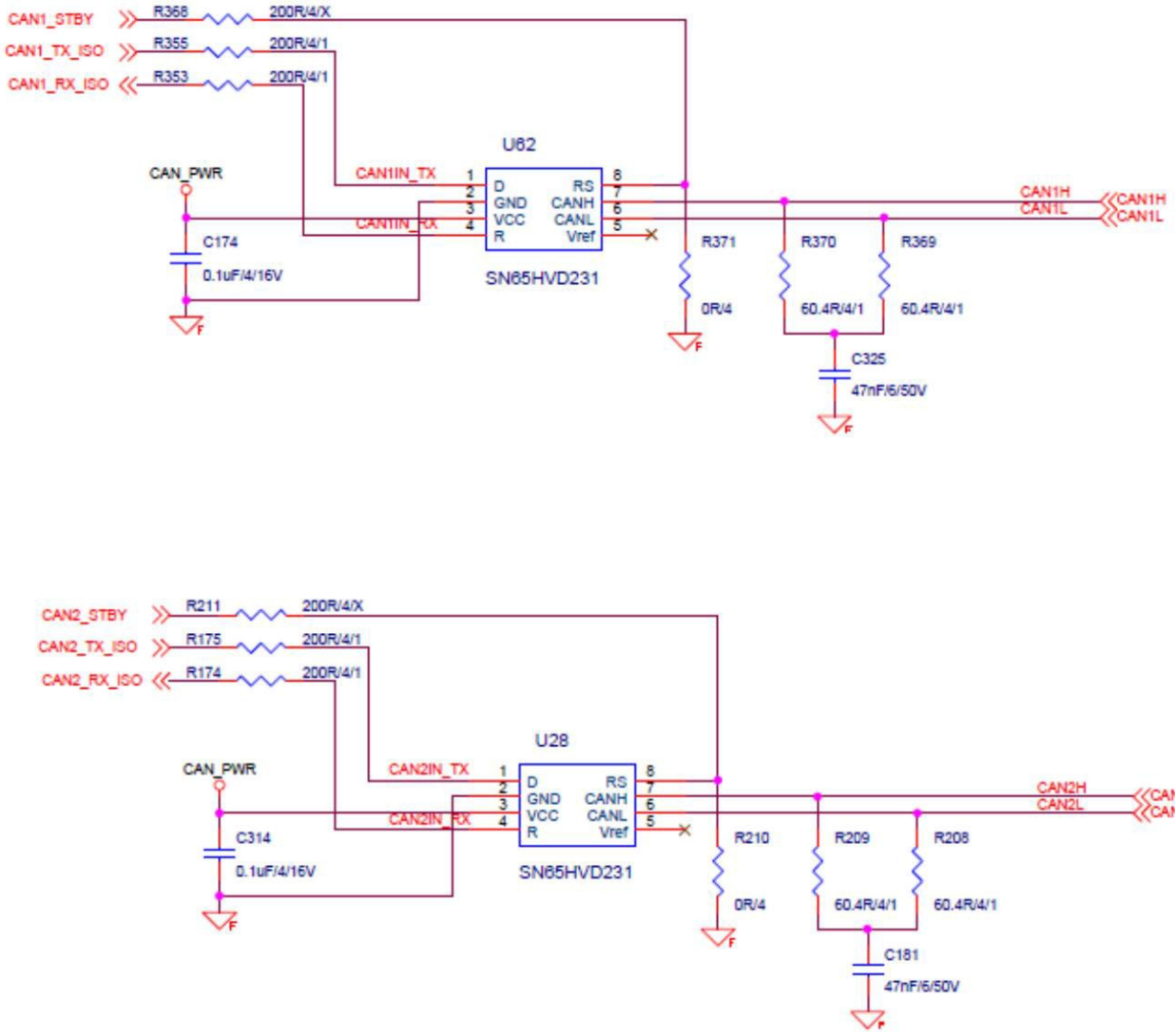




2x CAN2.0B bus interfaces, 2x COM port (RS232/ RS485), I^2C bus and power pins are available on the IO1 connector. On the standard FLEETPC-ARM-300 hardware, COM2 is configured as RS232 and COM3 is configured as RS485 port. Both COM2 and COM3 can be configured as either RS232 or RS485 port (on ordering FLEETPC-ARM-300 products).

Functions	Pin	Signals	Linux Device	Notes	Isolation
CAN1	1 2	CAN1H CAN1L	can0	CAN 2.0B protocol	Y
CAN2	3 4	CAN2H CAN2L	can1	CAN 2.0B protocol	Y
COM2 (RS232)	6 7	TXD RXD	/dev/ttymxc1	COM2_TXD = 485- COM2_RXD = 485+	Y
COM3 (RS485)	8 9	485- 485+	/dev/ttymxc2	COM3_RXD = 485- COM3_TXD = 485+	Y
I^2C Bus	11 12	SCL SDA	--	--	(option)
PWR	13 14	3.3V/5V	--	3.3V/5V configured by JP4 and JP5 (default +5V)	Y

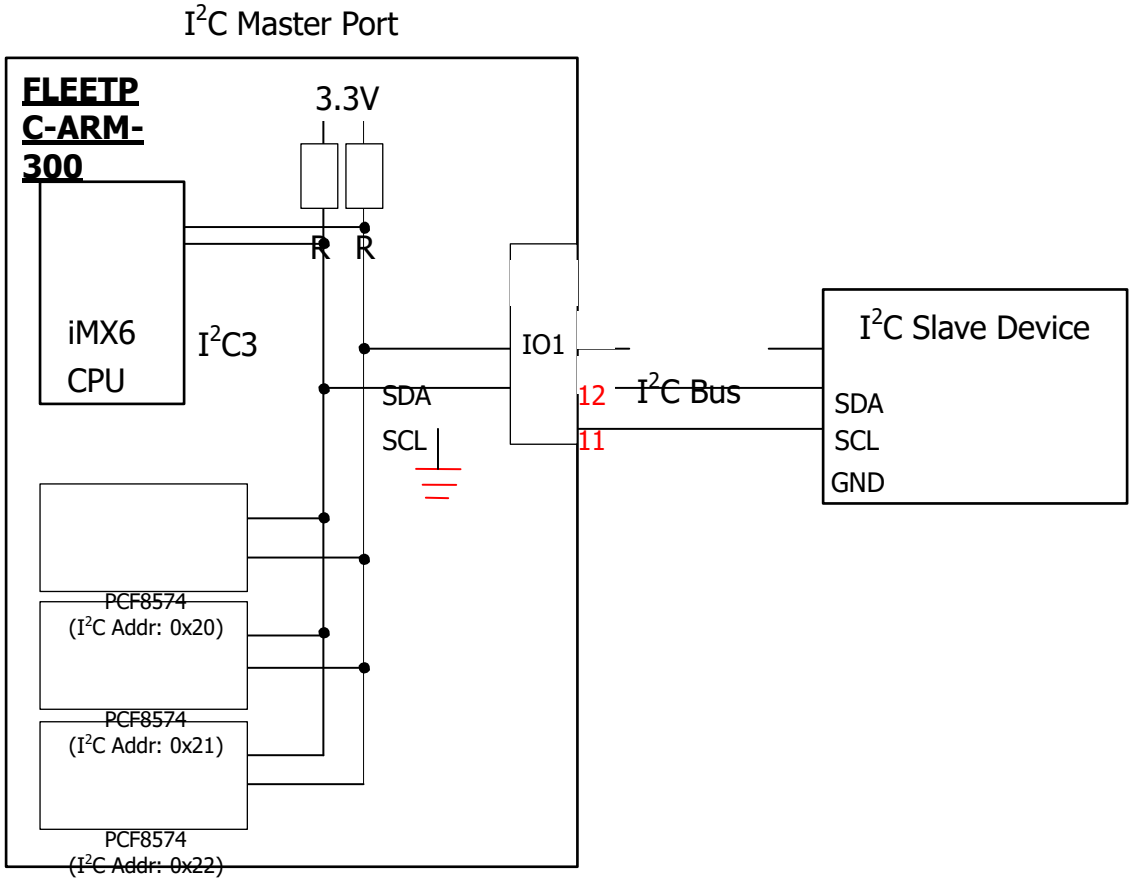
Schematic of CAN bus



I²C Bus

The I²C works as a master port by default: The master port is pulled high to +3.3V with 2 on-board resistors. The slave devices have to be connected directly without additional power supply on I²C bus.

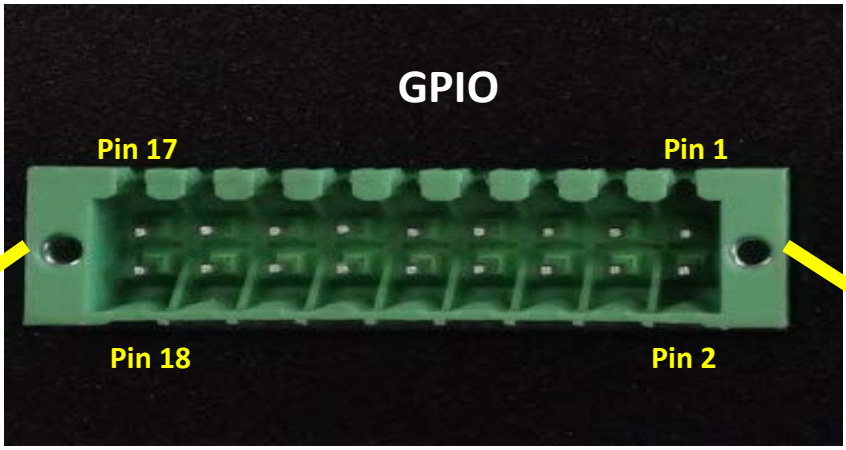
The I²C interface is connected to iMX6 I²C channel 3 and shared the same bus with on-board 3xPCF8574 I/O expander.


I2C Master Port
FLEETPC-ARM-300
3.3V
R
R
iMX6
CPU
I2C3
SDA
SCL
IO1
12
11
I2C Bus
I2C Slave Device
SDA
SCL
GND
PCF8574
(I2C Addr: 0x20)
PCF8574
(I2C Addr: 0x21)
PCF8574
(I2C Addr: 0x22)

3.6 IO2 (GPIO) Connector

The IO2 is an 18-pin connector for GPIO. Refer to Appendix E for IO2 (GPIO) **mating** connector specification. Refer to Appendix F for IO2 (GPIO) connector specification.

The connector pin assignment and pin functions are in the following table and diagrams:



Pin 17	15	13	11	9	7	5	3	Pin 1
GND	**PWR (+5V)**	GPO (GPIO2_15)	**Reserved**	**Reserved**	**Reserved**	GPO (GPIO2_13)	**PWR (+5V)**	**GND**
Pin 18	16	14	12	10	8	6	4	Pin 2
GPI (GPIO2_21)	GPI (GPIO4_28)	GPI (GPIO4_27)	GPI (GPIO4_26)	GPI (GPIO4_25)	GPI (GPIO4_24)	GPI (GPIO4_23)	GPI (GPIO4_22)	GPI (GPIO4_21)

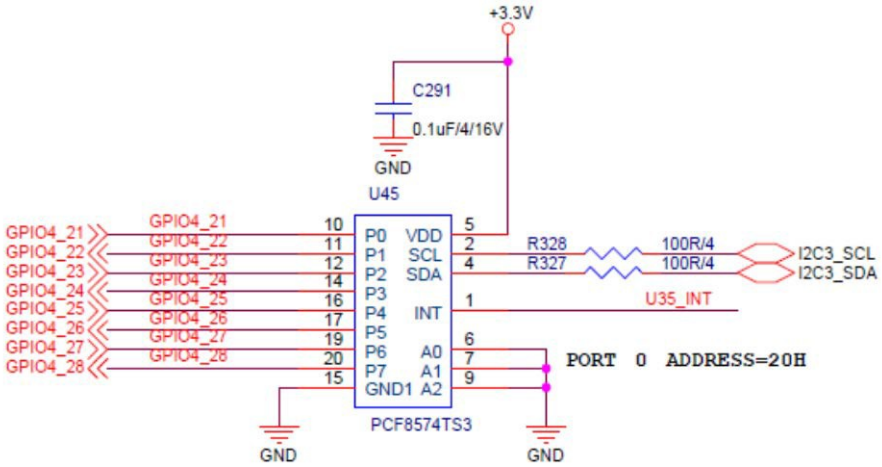
GPIO names in Linux:

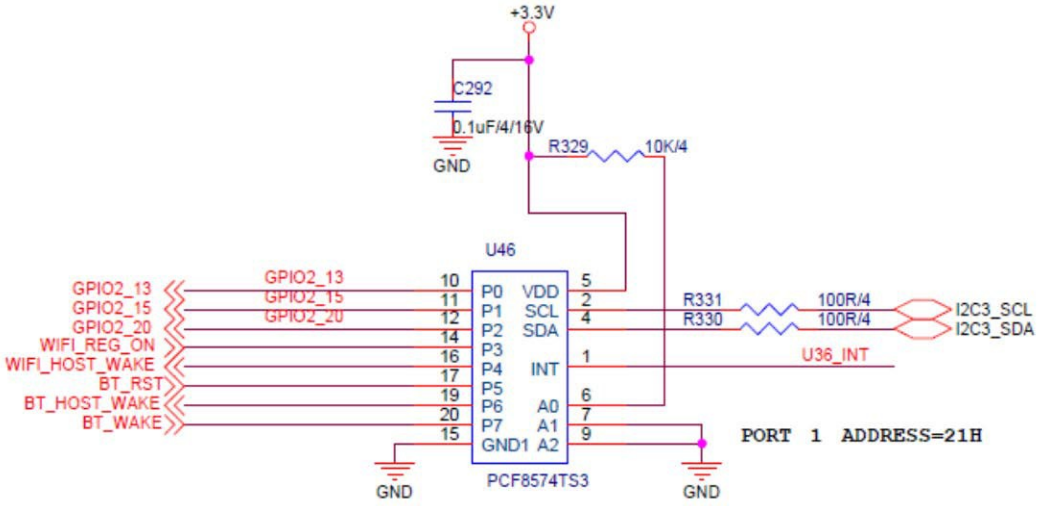
Connector Pin	GPIO Name	I/O	Linux Name
2	GPIO4_21	IN	/sys/class/gpio/gpio224
4	GPIO4_22	IN	/sys/class/gpio/gpio225
5	GPIO2_13	OUT	/sys/class/gpio/gpio232
6	GPIO4_23	IN	/sys/class/gpio/gpio226
8	GPIO4_24	IN	/sys/class/gpio/gpio227
10	GPIO4_25	IN	/sys/class/gpio/gpio228
12	GPIO4_26	IN	/sys/class/gpio/gpio229
13	GPIO2_15	OUT	/sys/class/gpio/gpio233
14	GPIO4_27	IN	/sys/class/gpio/gpio230
16	GPIO4_28	IN	/sys/class/gpio/gpio231
18	GPIO2_21	IN	/sys/class/gpio/gpio247

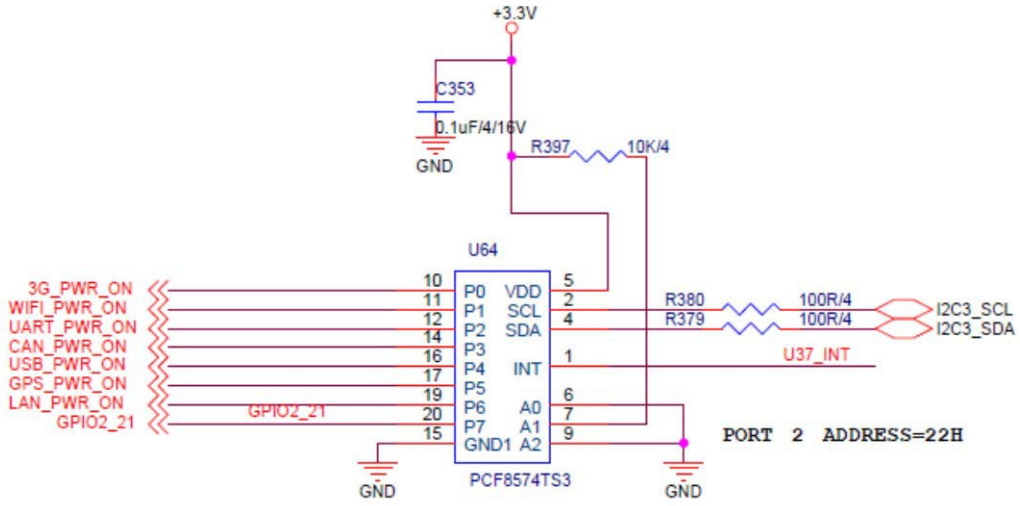
// Linux commands for GPIO
echo 1 > /sys/class/gpio/gpio232 // set gpio232 output high
echo 0 > /sys/class/gpio/gpio232 // set gpio232 output low

cat /sys/class/gpio/gpio224 // read gpio224 value

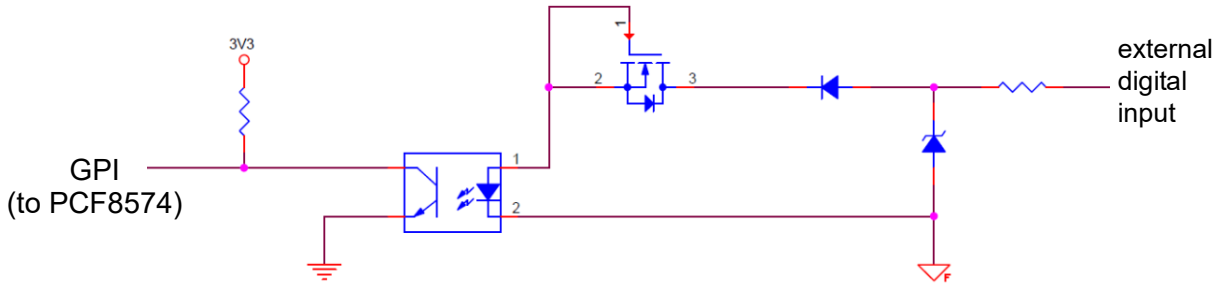
The GPIO pins are from 3 different PCF8574 I/O expanders, with I^2C addresses at 0x20, 0x21 and 0x22 respectively. The schematics and I^2C addresses are in below diagrams:



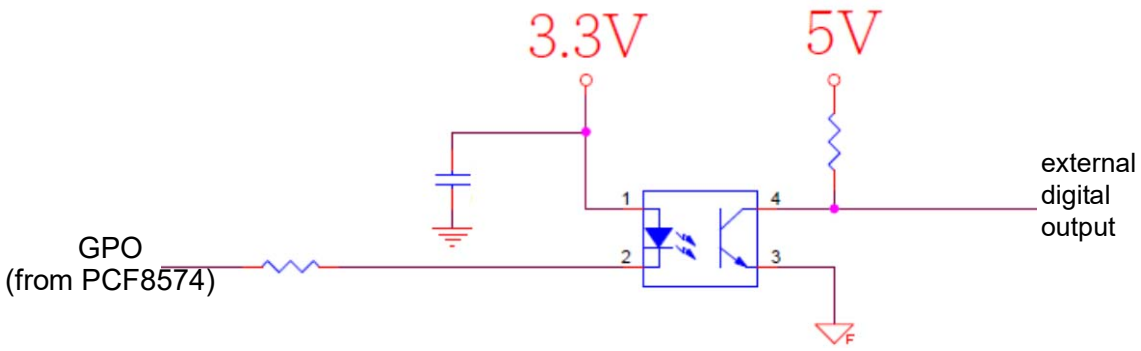




Each GPI is a photo-coupled (5KVrms) digital input with schematic shown below. The external digital input is clamped to 36V by a voltage suppressor. Refer to Appendix A for brief specification of the photo-coupler.



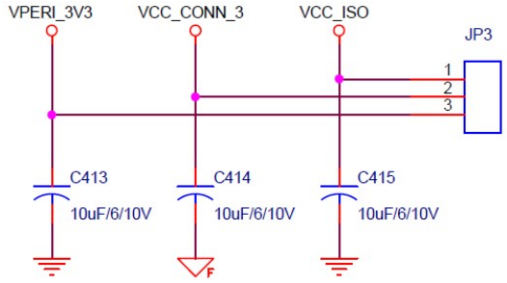
Each GPO is a photo-coupled digital output with schematic shown below. The GPO is an output from PCF8574 I/O expander and output level is pulled-up to 5V.

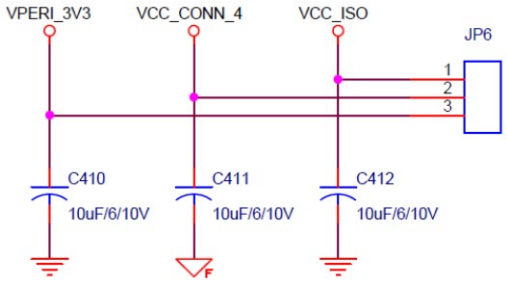


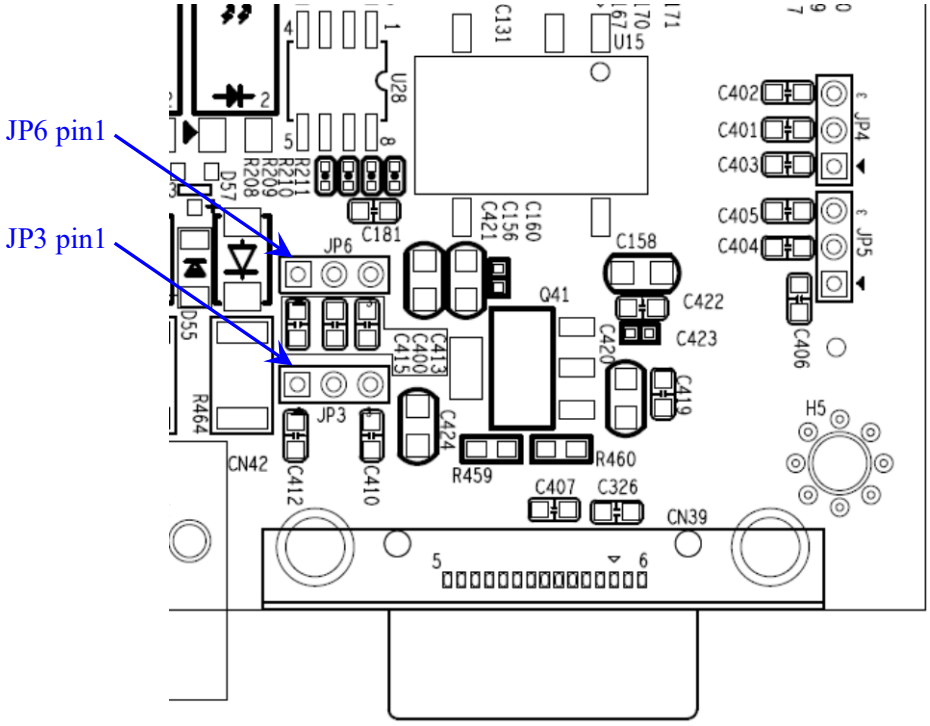
PWR pin

Connector pins 3 and 15 are power supply pins. The voltage level can be selected from JP3 or JP6. Default voltage is +5V.

Use JP3 to select pin 3 voltage level, and use JP6 to select pin 15







3.7 USB Connectors

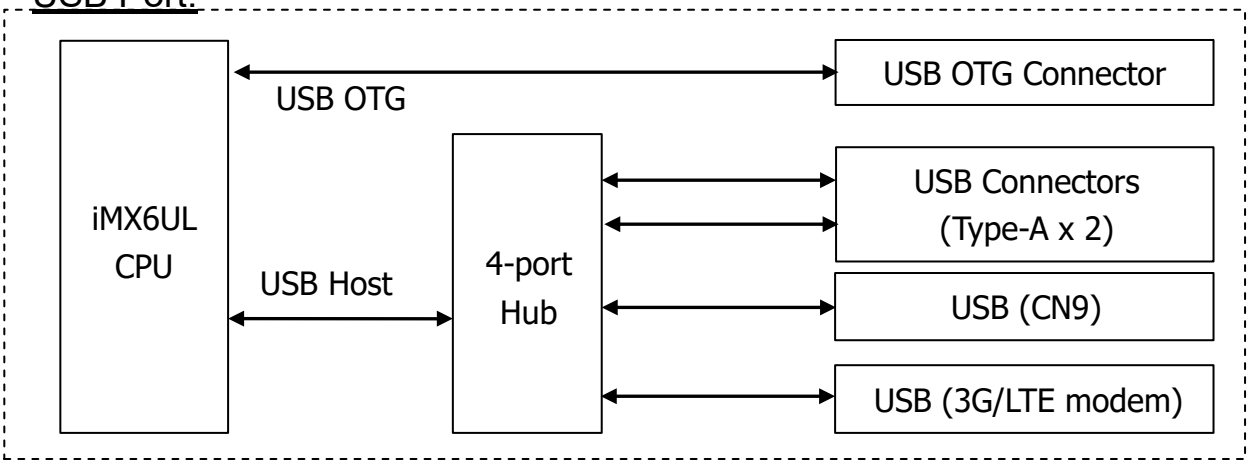
The USB interfaces on FLEETPC-ARM-300 include a USB OTG port and two USB host ports. All USB

ports support 480Mbps high speed.

The iMX6 USB host interface is connected to a hub controller to extend to 4x host ports:

- Two USB ports are available in standard Type A connectors for external connection.
- One USB port for 3G/LTE modem (to mini-PCIe connector)
- One USB port is available in on-board connector (CN9) for expansion use

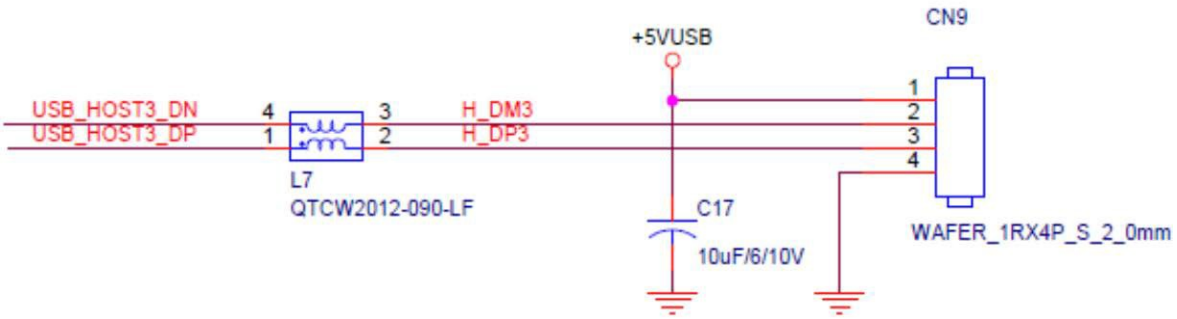
USB Port:

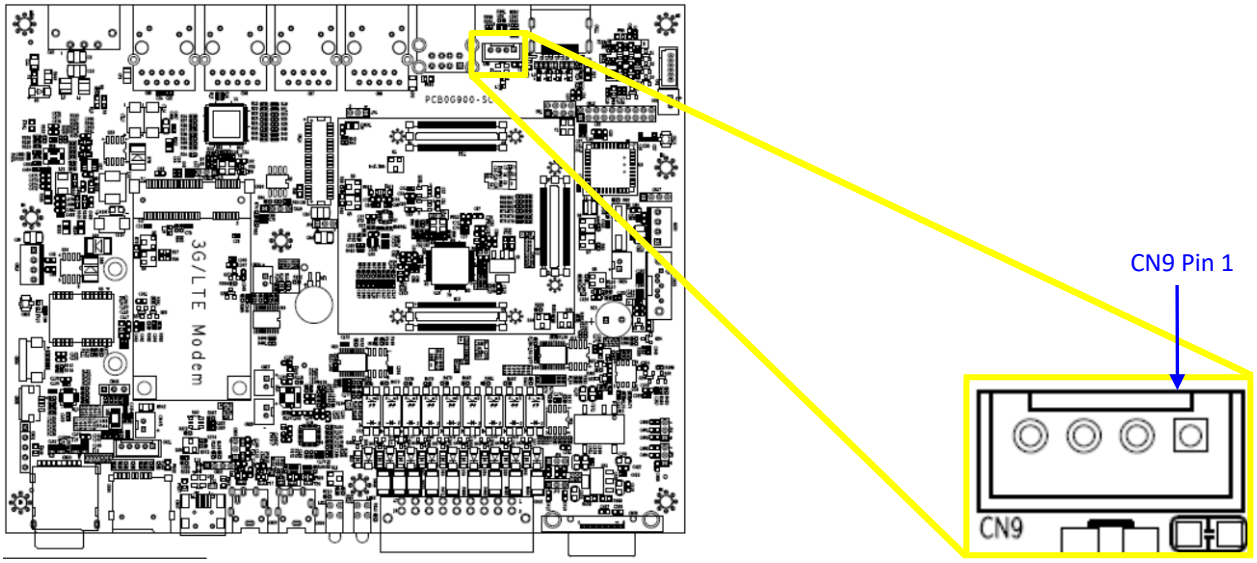


NOTE: The USB 2.0 OTG can be used in host mode or device mode. If you would like to use it in host mode, a separate OTG-to-host cable is required.

The USB host connector is a standard USB type A connector that can be connected to +5V USB storage device.

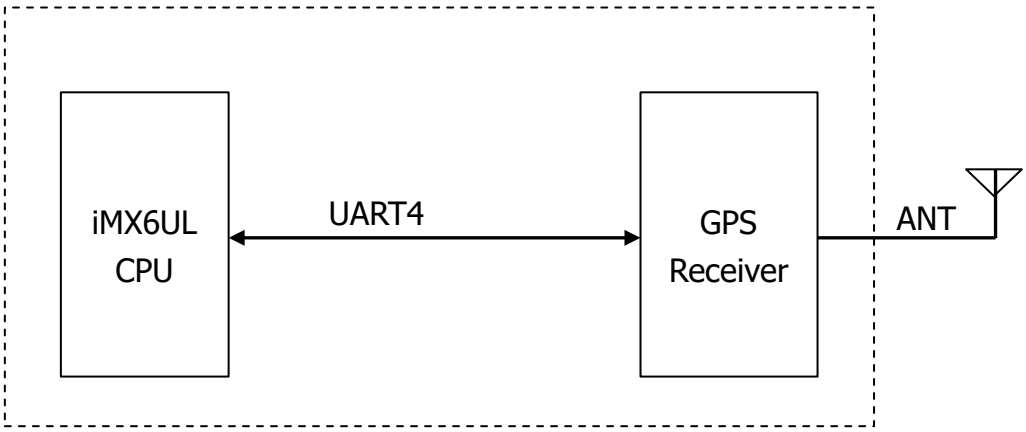
CN9 Schematic:




3G/LTE Modem
CN9 Pin 1
CN9

3.8 GPS Receiver

The GPS receiver function is implemented by a u-blox 7 GNSS chip (UBX-G7020-KT). It is connected to iMX6 via UART4 (Linux device name: /dev/ttymxc3) serial interface. The GPS antenna connector is CN22.



The brief characteristic of the receiver is in the table below:

Receiver type	56 channel (GPS, GLONASS)
Navigation update rate	Up to 10Hz
Protocol	NEMA 0183 v2.3
Accuracy	Position : 2.5m (GPS), 4m (GLONASS); SBAS: 2.0m
Acquisition	Cold Start: 29 seconds; Hot Start: 1 seconds
Sensitivity	Tracking: -162dBm Cold Starts: -148dBm Reacquisition: -160dBm
Supply Voltage	1.4V to 3.6V
Power Consumption	41mW @ 1.4V (Continuous) 9mW @ 1.4V Power Save mode
Operating temp	-40°C to 85°C

For more information about UBX-G7020-KT chip, please check it on u-blox web site.

3.9 miniPCIe Connector (for 3G/LTE modem)

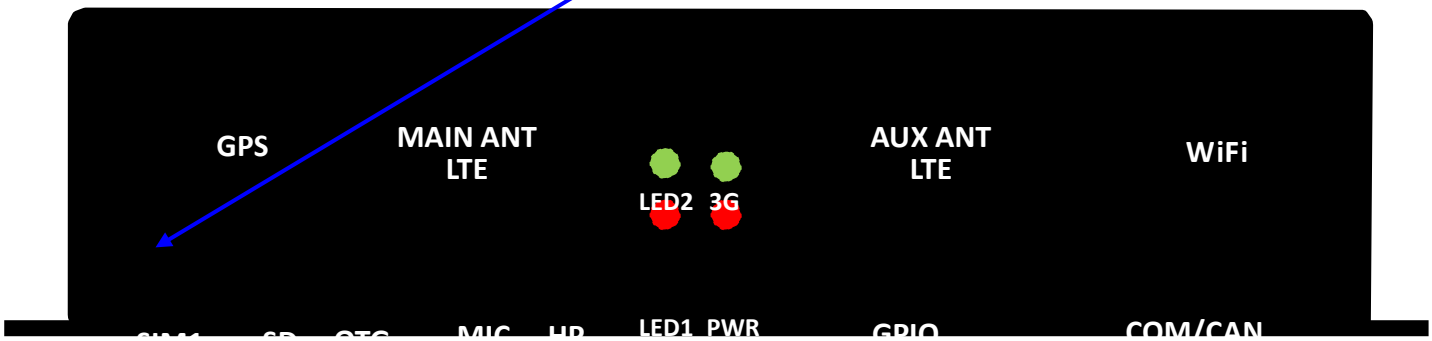
The FLEETPC-ARM-300 miniPCIe connector (3G/LTE modem) is connected to iMX6 CPU through

USB port.

A GPIO pin is used to control 3G/LTE modem power on/off. Refer to Section 3-2 for this GPIO.

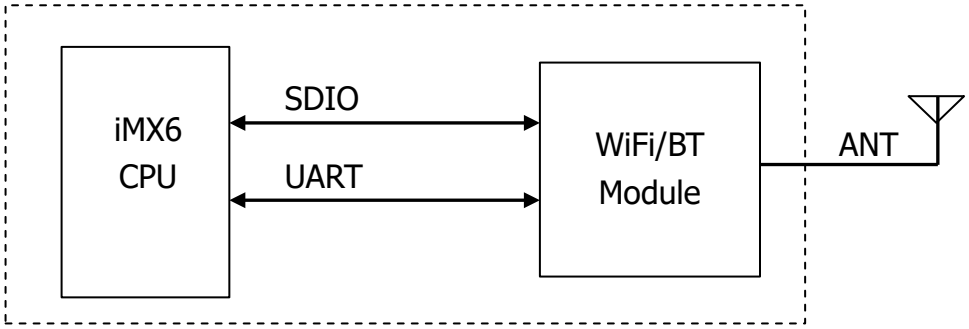
To insert SIM card to FLEETPC-ARM-300, you have to unscrew and open FLEETPC-ARM-300 small front plate,

locate SIM slot at the area marked with SIM1/SIM2.



3.10 WiFi and Bluetooth

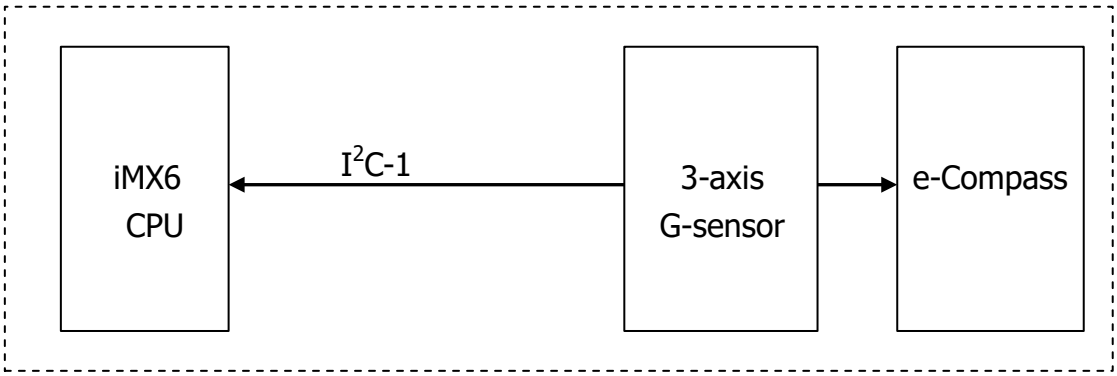
The FLEETPC-ARM-300 WiFi and Bluetooth module is connected to iMX6 CPU through SDIO and UART port. The WiFi and Bluetooth function is based on a Broadcom BCM43455 combo chip. The antenna connector is CN13.



Function	Features
WiFi	● Dual band (2.4GHz/5GHz) 802.11a/b/g/n/ac single stream up to 433Mbps data rate
Bluetooth	● Bluetooth V4.2 of 1,2 and 3 Mbps

3.11 G-Sensor & e-Compass

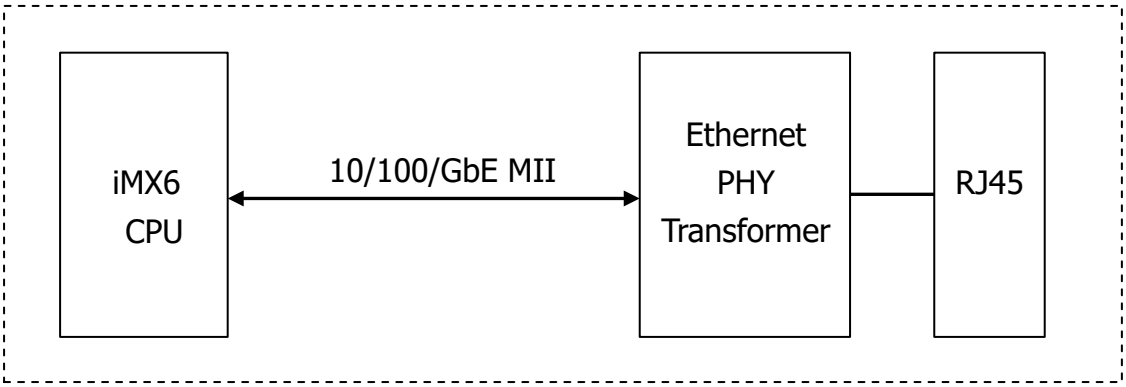
The FLEETPC-ARM-300 has built-in 3-axis G-sensor and e-compass functions.
The 3-axis G-sensor function is based on NXP MMA8451QT chip and e-compass function is based on NXP MAG3110 chip.
Both chips are connected to iMX6 cpu via I^2C bus channel 1.



For more information about G-sensor and e-Compass, refer to NXP product data sheet.

3.12 Ethernet

The FLEETPC-ARM-300 is with a 10/100M/1Gb bps Ethernet interface on the industrial standard RJ45 connector.



An optional LAN switch is available to extend to 4x GbE LAN port.

3.13 mSATA Connector

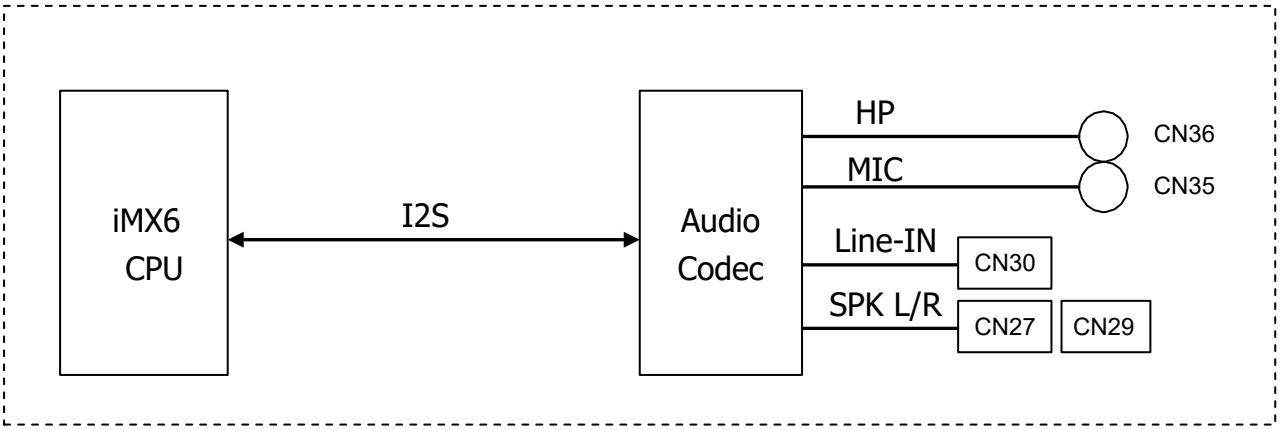
The FLEETPC-ARM-300 is with an mSATA connector for installing mSATA SSD. The mSATA connector supports the following SATA specifications:

- AHCI Revision 1.3
- SATA 1.5 Gb/s and SATA 3.0 Gb/s speed

Please make sure your mSATA SSD module supports both the above specifications before installing it onto the connector.

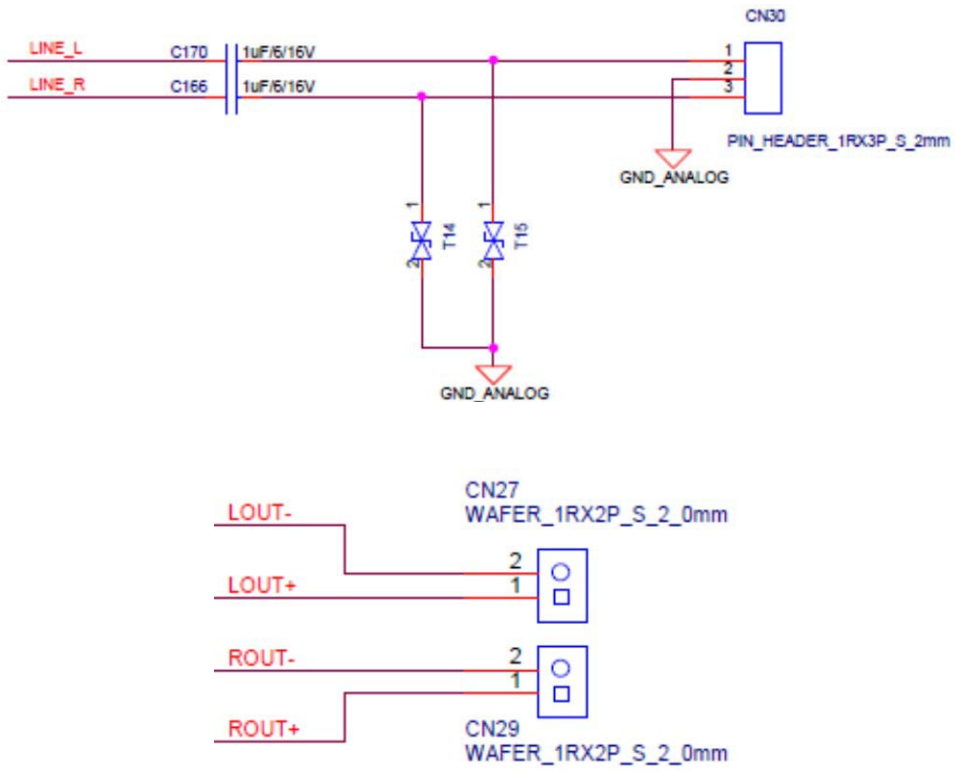
3.14 Audio (optional)

The FLEETPC-ARM-300 audio interface is with 1x audio jack available for external headphone and microphone.



The line-in and speaker interfaces are at CN30, CN27 and CN29 connectors on FLEETPC-ARM-300

PCB. The schematics are here:



3.15 Unique CPU ID

Each FLEETPC-ARM-300 product is with a unique Serial Number on iMX6. The unique serial number allows software developer to identify (or protect) their software by the unique number.

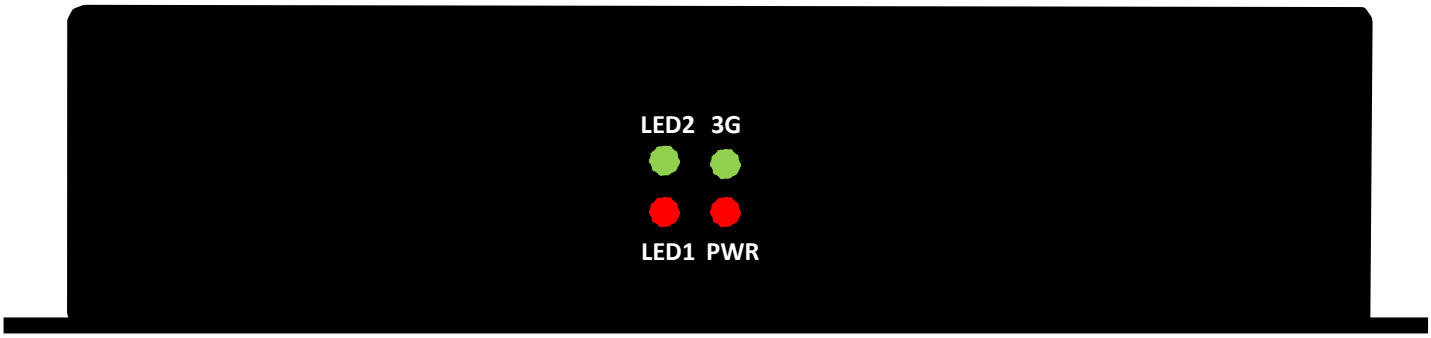
Use the following Linux commands to read CPU ID:

```
# cat /sys/fsl_otp/HW_OCOTP_CFG0
0xe301388d              // sample output
# cat /sys/fsl_otp/HW_OCOTP_CFG1
0x220f11d4              // sample output
```

You can concatenate CFG0 and CFG1 together to form a unique ID.
For example, the unique ID is: 0xe301388d220f11d4 .

3.16 LED

There are 4x LEDs at the FLEETPC-ARM-300 front panel:



- When DC power is applied, PWR LED is on
- 3G LED mode is in below table:

Mode	Operating Status	LED ON/OFF
1	No service/Restricted service	ON(0.1s) - OFF(0.1s) - ON(0.1s) - OFF(1.7s) 2-second cycle
2	Register to the network	ON(0.1s) - OFF (1.9s) 2-second cycle
3	Dial-up successfully	ON

When FLEETPC-ARM-300 is connected to 3G/LTE network, the LED is ON. In searching 3G/LTE network, the LED keeps blinking.

- LED1, LED2 are connected to below iMX6 pads directly and can be turned on/off by software.

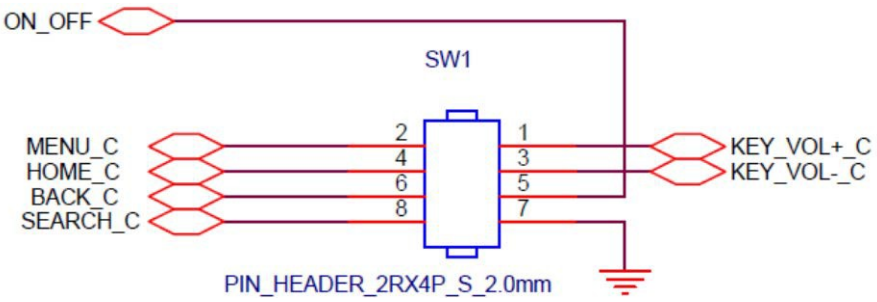
LED name	iMX6 Ball	iMX6 Pad Name	iMX6 Signal
LED1	R7	GPIO_3	GPIO1_IO03
LED2	W5	KEY_COL0	GPIO4_IO06

// Linux commands to turn on/off LED1 or LED2:

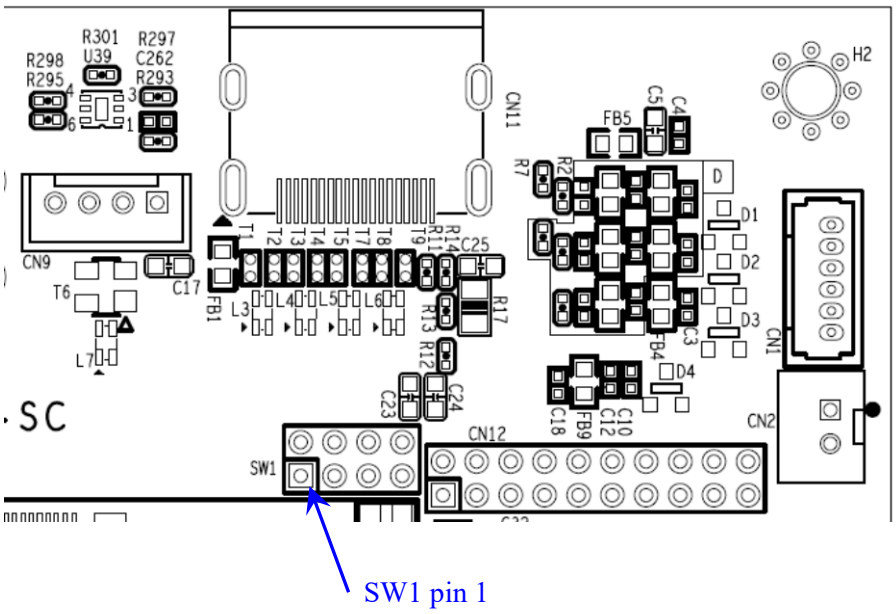
```
# echo 1 > /sys/class/leds/led1/brightness        // led1 off
# echo 0 > /sys/class/leds/led1/brightness        // led1 on

# echo 1 > /sys/class/leds/led2/brightness        // led2 off
# echo 0 > /sys/class/leds/led2/brightness        // led2 on
```

3.17 Keypad Connector

The SW1 keypad connector provides several IO pins connected directly to iMX6 CPU. These pins can be used for Android function keys, for general GPIOs in Android or Linux, or for external interrupt to iMX6 CPU. Note that these GPIOs are NOT isolated.



SW1 pin name	iMX6 Ball	iMX6 Pad Name
1 : KEY_VOL+	P5	GPIO_19
2 : MENU	C17	NANDF_D1
3: KEY_VOL-	P6	GPIO_18
4: HOME	A19	NANDF_D4
5: ON_OFF	D12	ONOFF
6: BACK	F16	NANDF_D2
7: GND	--	--
8: SEARCH	D17	NANDF_D3



3.18 MicroSD Connector

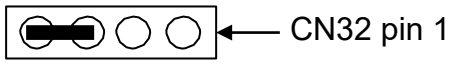
The microSD host connector is an industrial standard connector and has the following specification:

- SD Host Controller Standard Specification version 3.0
- MMC System Specification version 4.2/4.3/4.4
- SD Memory Card Specification version 3.0 and supports the Extended Capacity SD Memory Card
- SDIO Card Specification version 3.0

3.19 BM Connectors (Firmware Update)

The CN32 connector is used to select FLEETPC-ARM-300 mode: Normal Operation mode or Firmware

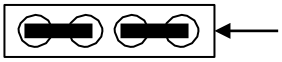
Download mode. The Firmware Download mode is for Android/Linux OS update only. If you would like to update your application software, **do not** use this Firmware Update function.



Firmware Download:

Pin 1, 2 open

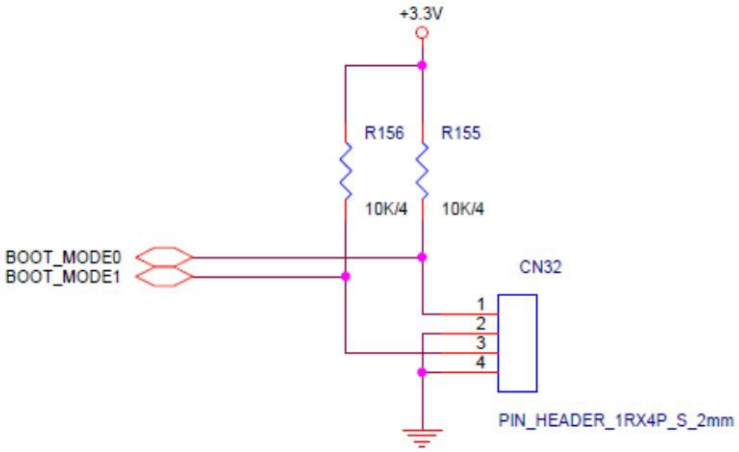
Pin 3, 4 short

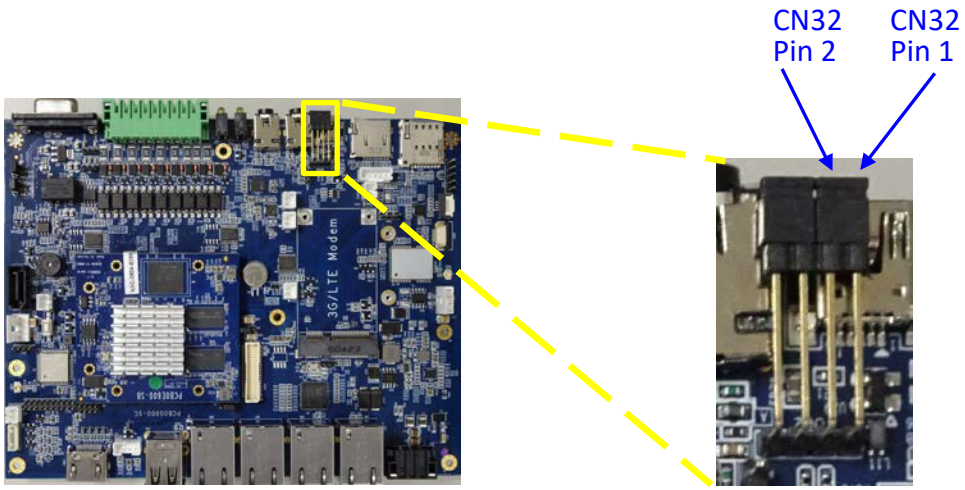


Normal Operation:

Pin 1, 2 short

Pin 3, 4 short



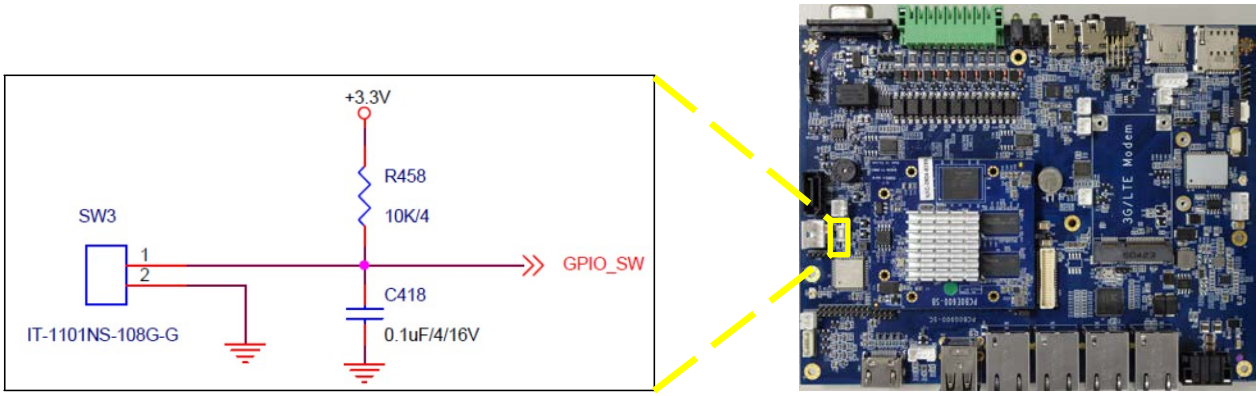


3.20 Other functions

The other additional functions on FLEETPC-ARM-300 include:

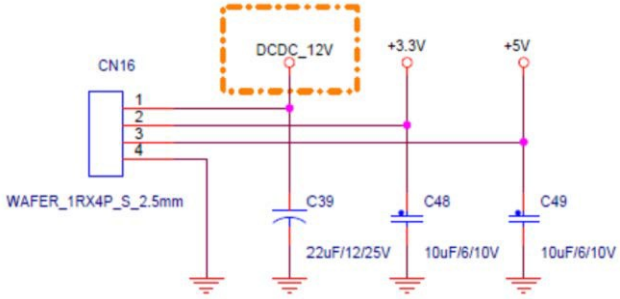
Tact Switch

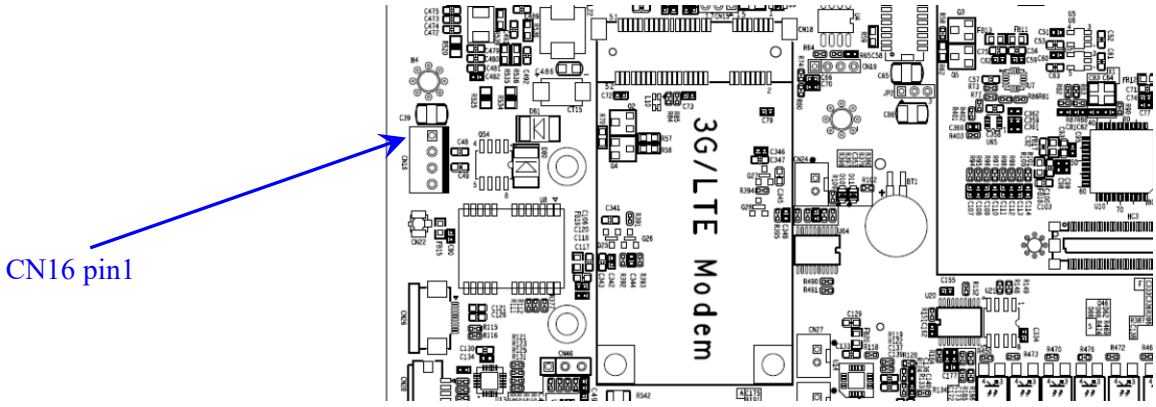
SW3 is a tact switch connected directly to iMX6 cpu pin. The GPIO_SW (in below schematic) is connected to iMX6 pad name: CSI0_VSYNC (ball name N2). Contact us for the Linux device name, if you plan to use this switch.



Power Output Connector

The CN16 power output connector provides +3.3V, +5V, +12V power to external devices with limited current (about a few hundred mA for each voltage).

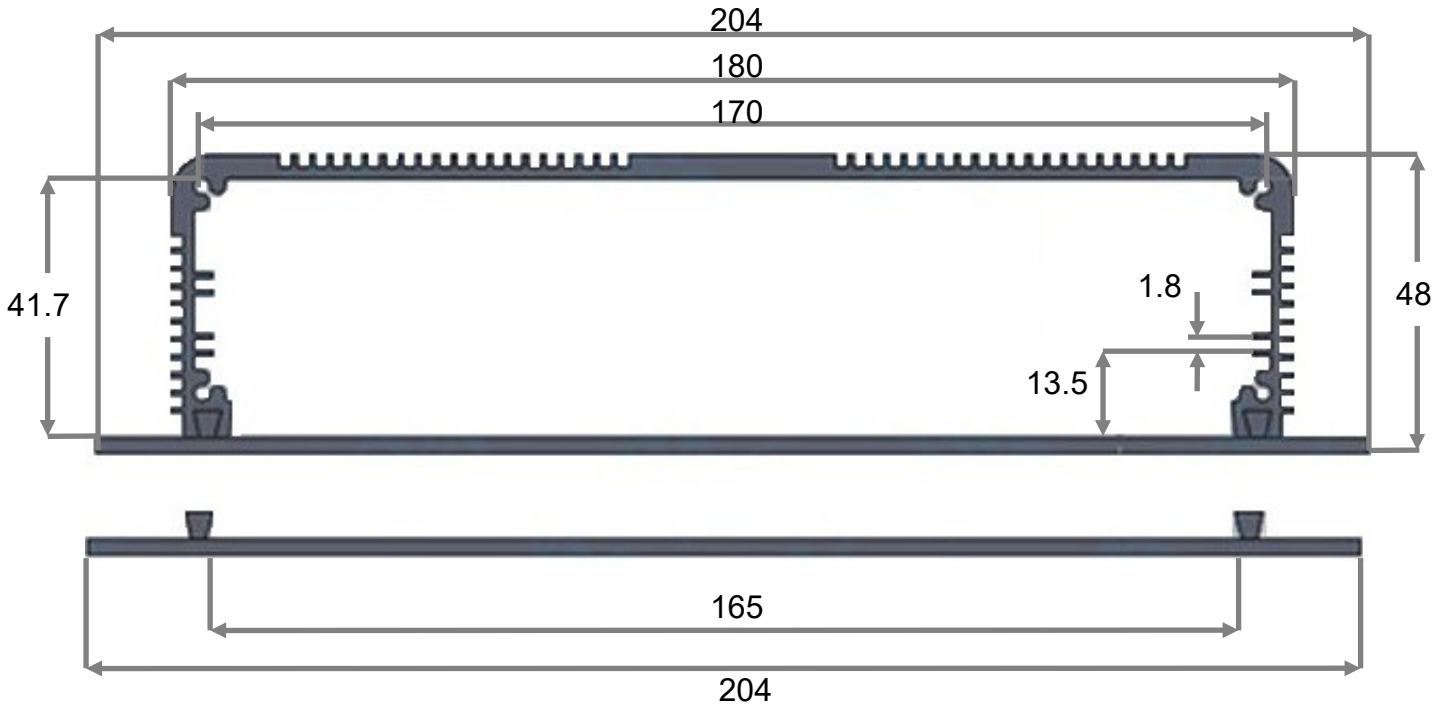




4 Outline Drawing

FLEETPC-ARM-300 aluminum enclosure outline drawing (cross section):

unit: mm



5 Electrical Specifications

Absolute Maximum Ratings

	Min	Max	Unit	Note
Main Power Supply (DC-IN)	8.55	37.8	V	
Operating Temperature	-20	+70	°C	FLEETPC-

Operating Range:

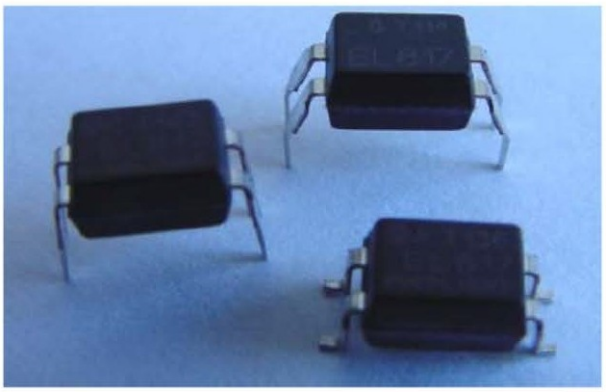
	Min	Max	Unit	Note
Main Power Supply (DC-IN)	9	36	V	

VSS = 0V. VDD = +3.3V

Appendix A: GPIO Photo-Coupler Spec

Features:

- Gurrent transfer ratio (GTR:MIN.50% at IF =5mA ,VGE =SV)
- Highisolation valtage between input and output (Viso=S000 V rms)
- Gompact dual-in-line package EL817*:1-channel type
- Pb free



- UL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approved (No. 0143133/01-03)
- NEMKO approved (No. P00102385)
- DEMKO approved (No. 310352-04)
- FIMKO approved (No. FI 16763A2)
- GSA approved (No. 1143601)
- BSI approved (No. 8592 / 8593)

Absolute Maximum Ratings **(Ta=25°C)**

Parameter		Symbol	Rating	Unit
Input	Forward Gurrent	IF	50	mA
	Reverse Voltage	VR	6	V
	Power Dissipation	p	70	mW
Output	Goileetor Power Dissipation	Pc	150	mW
	Goileetor Current	Ic	50	mA
	Gollector-Emitter Valtage	VcEo	35	V
	Emitter-Gollector Valtage	VEco	6	V
Total Power Dissipation		Ptot	200	mW
*1 Isolation Valtage		Viso	5000	V rms
Operating Temperature		Topr	-55–+110	0G
Storage Temperature		Tstg	-55–+125	0G
*2 Soldering Temperature		Tsol	260	0C

*1 AC for 1 minute, R.H= 40– 60%RH

-Isolation voltage shall be measured using the following method.

(1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.

(2) The isolation voltage tester with zero-cross circuit shall be used.

(3) The waveform of applied voltage shall be a sine wave

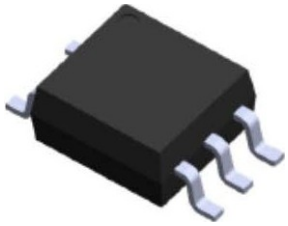
*2 For 10 seconds

Electro-Optical Characteristics

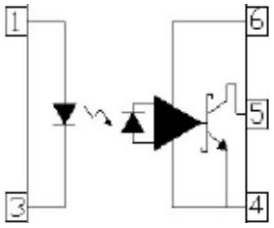
(Ta=25°C)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Condition
Input	Forward	VF	-	1.2	1.4	V	IF=20mA
	Reverse Current	IR	-	-	10	uA	VR=4V
	Terminal	Ct	-	30	250	pF	V=0,f=1kHz
Output	*Collector Dark current*	IcE0	-	-	100	nA	VcE=20V
	Collector-Emitter breakdown voltage	BVcEo	35	-	-	V	Ic=0.1mA
Transter Characteristics	Current Transfer ratio	CTR	50	-	600	%	IF=5mA ,Vce=5V
	Collector-Emitter saturation voltage	VcE(sat)	-	0.1	0.2	V	IF=20mA ,Ic=1 mA
	Isolation resistance	Riso	$5x10^{10}$	10^{11}	-	Q	DC500V,40-60%R.H
	Floation capacitance	Cf	-	0.6	1.0	pF	V=0, f=1MHz
	Cut-off frequency	fc	-	80	-	kHz	Vce=5V, Ic=2 mA RL=100n, -3dB
	Rise time	tr	-	4	18	us	Vce=2V Ic=2mA,RL=100Q
	Fall time	tr	-	3	18	us	

Appendix B: UART/CAN Photo-Coupler Spec



Schematic



Pin Gonfiguration
1, Anode
3, Cathode
4, Gnd
5, Vout
6, Vcc

Features

- High speed 1OMbiVs
- Guaranteed performance from -40 to 85 C
- Logic gate output
- High isolationvaltage between input and output (Viso=3750 V rms)
- Pb free and RoHS compliant.
- UL approved (No. 214129)
- VDE approved (No.40028116)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved

Absolute Maximum Ratings {Ta:25℃)

	Parameter	Symbol	Rating	Unit
Input	Forward current	IF	50	mA
	Reverse voltage	Vr..	5	V
	Power dissipation	Po	100	mW
Output	Power dissipation	Pc	85	mW
	Output current	Io	50	mA
	Output voltage	Vo	7.0	V
	Supply voltage	Vcc	7.0	V
Output Power Dissipation		Po	85	mW
Isolation Voltage•[1]		Viso	3750	Vrms
Operating Tamperature		ToPR	-40- +85	0C
Storage Tamperature		Tsm	-55 – +125	0C
Soldering Temperature•[2]		TsoL	260	0C

Notes:
"1 AC for 1 minute, R.H.= 40 – 60% R.H. In this lest, pins 1 & 3 are shorted together, and pins 4, 5 & 6 are shorted together.

•2 For 10 seconds

Electrical Characteristics (T_3 -40 to SS0C unless specified otherwise)

In ut

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	VF		1.45	1.8	V	IF = 10mA
Reverse voltage	VR	5.0			V	IR= 10IJA, TA=25 C
Tamperature coefficient of torward volta e	flV dflTA		-1.9		mV/0C	IF =10mA
Input capacitance	eiN		70		pF	VF=0, f=1MHz

Out ut

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
High level supply current	IecH		6.0	9	mA	IF=0mA, Vcc=5.5V
Low level supply current	IccL		7.5	10	mA	IF=10mA, Vcc=5.5V

Transfer Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
HIGH Level Output Current	IoH		2.1	30	uA	Vcc=5.5V, Vo=5.5V, IF=250uA
LOW Level Output Current	Vm		0.4	0.6	V	Vcc = 5.5V, IF=5mA, IoL(Sinking)=13mA
Input Threshold Current	IFT		2.4	5	mA	Vcc= 5.5V, Vo=0.6V, IoL(Sinking)=13mA

Switching Characteristics (Ta=-40 to 85 "C, Vcc=5V, IF=7.5mA unless specified otherwise)

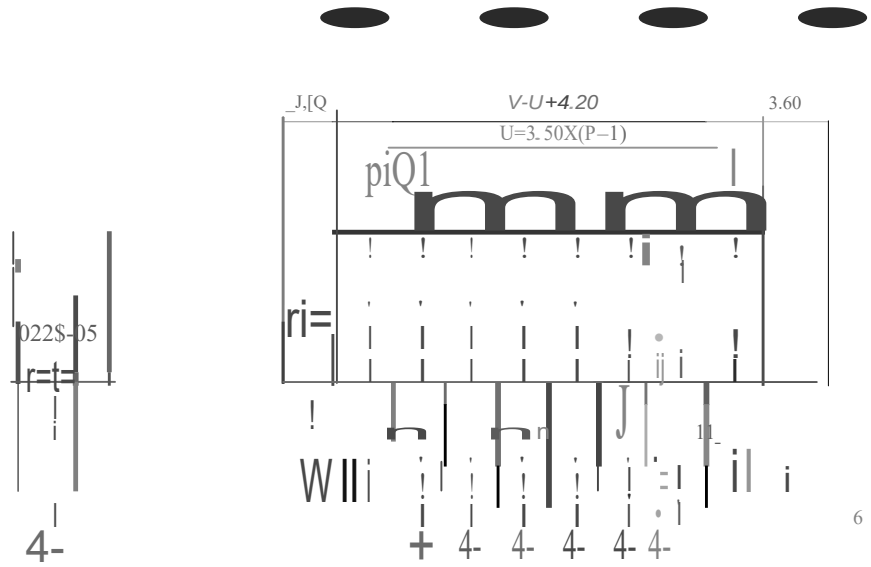
Parameter		Symbol	Min	Typ.	Max.	Unit	Condition
Propagation delay time to outpulHigh level*3 (Fig.12)		TPHL		41	100	ns	CL = 15pFI AL=3500I TA=25"C
Propagation delay time to outpu ILow level*3 (Fig.12)		TPLH		50	100	ns	CL = 15pFI AL=3500I TA=25"C
Pulse width distortion		ITphI – T IhI		9	35	ns	CI = 15pFI AL=350O
Propagation Delay Skew*4		tpSK			40	ns	CI = 15pFI AL=3500
Output rise time (F" .12)		tr		40		ns	CI = 15pFI AL=3500
Output fall time (F" .12)		tf		10		ns	CI = 15pFI AL=3500
Common Mode Transient Immunity at Logic High •6(Fig.14)	M600	CMH				VI S	IF= 7.5mA IV01-1=2.0VI AL=3500I TA=25"C Vo..,=10Vp-p
	M601		51000				IF= 7.5mA , V01-1=2.0V, AL=3500, TA=25"C VcM=50VQ-Q
	M611		201000				IF= 7.5mA IVOH=2.0VI AL=3500I TA=25"C VcM=1000V Q
Common Mode Transient Immunity at Logic Low •7(Fig.14)	M600	CML				V/ S	IF = OmA IVoL=0.8V, AL=3500, TA=25"C V<u>O..,</u>=10Vp-p
	M601		5,000				IF = OmA IVoL=0.8VI AI=3500, TA=25"C VcM=50Vp-p
	M611		20,000				k= OmA IVoL=0.8VI A =350O, TA=25"C VcM=1000Vp-p

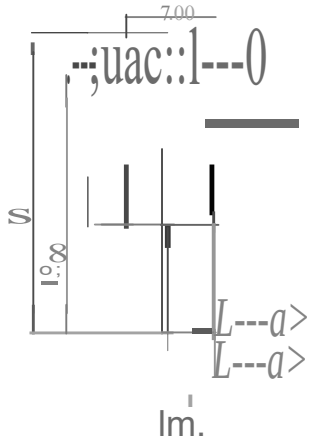
*All typicals at Ta = 25'C, VCC = 5 V.

Appendix C: DC-IN Matina Connector Specifications

FLEI0225\O225–06XX I

P	2	3	4	5	6	7	8	9	10	I I	12	13
u	3.5	7.0	10.5	14.0	17.5	21.0	24.5	28.0	31.5	35.0	38.5	42.0
V	7.7	11.2	14.7	17.2	21.7	25.2	28.7	32.2	35.7	39.2	42.7	46.2
P	14	15	16	17	18	19	20	21	22	23	24	
u	455	49.0	52.5	55.0	59.5	63.0	66.5	70.0	73.5	n.0	80.5	
V	49.7	53.2	56.7	60.2	63.7	67.2	70.7	74.2	n.7	81.2	84.7	





NOTES 1:

UlStanderd :

1. Rating: 300V 8A
   PITCH: 3.50mm
2. Insulation Withstonds Voltage:
3. Using Tempereture Range:
4. Suitable Electric 'Nre:

   AWG 28–16

I. Rating: 630V I SA
2. Rote Impulse
3. nsulotion Resistonce:
   500Mtlor more ot DCSOOV
4. Material G•oup : I
5. Pollut'on Degree : 2

7. Using Tempereture Range:
   -40'C-+120'C

6	SCREW	STI:EL	M2/IA Piloicd
5	LEVER	POM	ORANGE
4	S-CAGE	STAINLESS STEEL	
3	CLAAP	AIIOY	I0ñ F"otod
2	COVER	PA66	UL94 VO BIACK
			IltACK
1	HOUSING	PA66	UL94–VO
ITEM	NAME OF PART	t.IATERIAL	!I.OTES

Normol Geometrie Toleroncing

100 to 150 03 0.3 10 0.3

0 to 100 0.2

to 10 0.2

over 150 O. 5

otet Pitch Toleranees	NOITI\ol cfmen'IS...on Tohw-onces		
0<11<=30	:t;0. 20	o-30	:1:0.25
30<U<= 5.J	:1:0.25	O– 3D-53	:1:030
53<1!<-70	:1:0.30	O– 53-70	:1:0.35
70<U<-90	:I:0.35	Ovef 7()-90	:1:0.44
90<U<=115	±0.-H	()— 9D-115	:1:0.55
115<U<=150	±0.55	owr 115-150	±0.70

OTES 2:

1. RoHS complionce
2. Strio length8-9mm

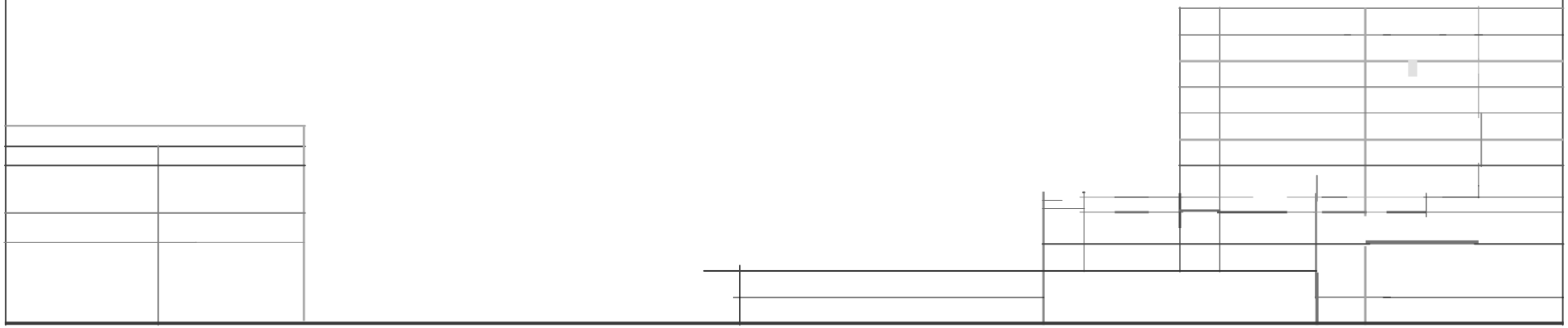
DIVG. LII'F DATE *14.05.29* UNITS: MM SHEET/OFI 1 / 1

CHK. DATE SCALE: 3:1 (: >|WE:t

APP. DATE

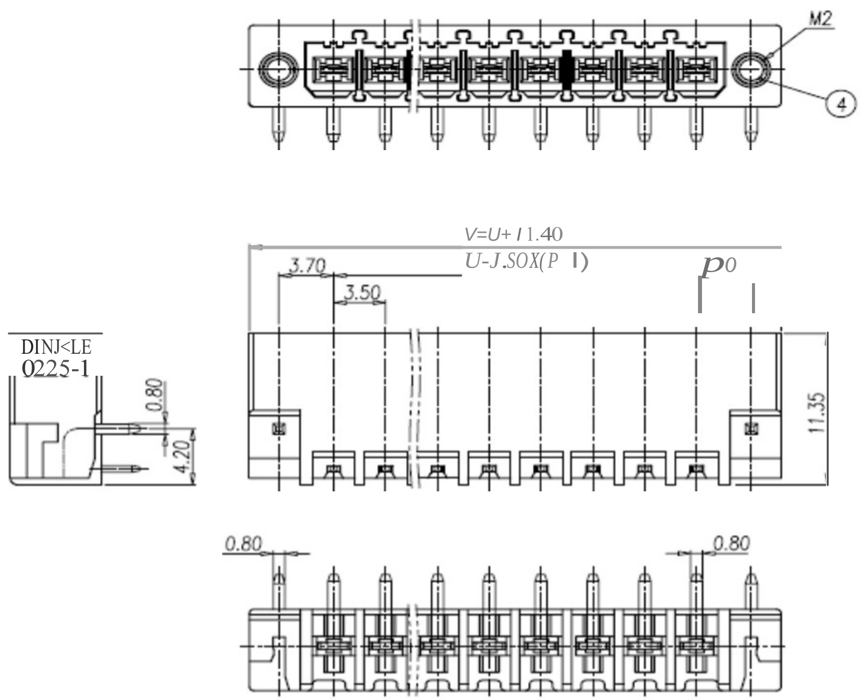
1.11 _IREV. CONTENT CHK. DATE

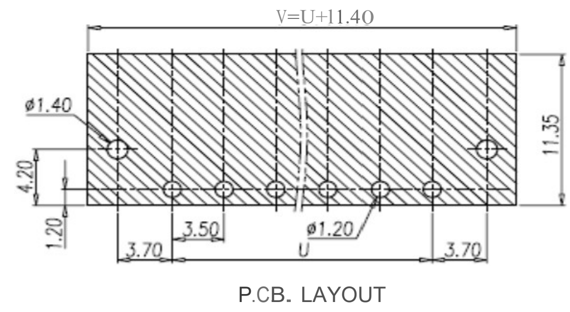
DINKLE NTERPRISE CO.• LTD poll'G NO 0225–06XX SP-03-02250600

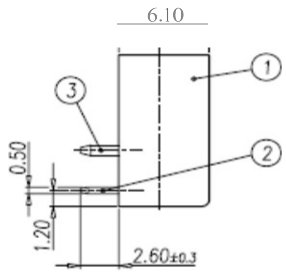


Appendix D: DC-IN Connector Specification

FIlE 0225\0225－16XXTH







p	2	J		5	6	7	8	9
U	J.5	7.0	10.5	14.0	17.5	21.0	24.5	280
V	14.9	18.4	21.9	25.4	28.9	J2.4	J59	J9.4
p	10	II	12	IJ	14	15	16	17
U	31.5	J5.0	38.5	42.0	45.5	49.0	52.5	56.0
V	42.9	46.4	49.9	53 4	56.9	60.4	63.9	67.4
p	18	19	20	21	22	23	24	
U	59.5	63.0	66.5	70.0	73.5	77.0	80.5	
V	70.9	74.4	77.9	81.4	84.9	88.4	91.9	

NOTES 1:

UL Standard

1. Rating: 300V 8A
   P TCH: 3.50mm
2. Insulotion Withstonds Voltoge:
   AC 2000V ot I m'nu e
3. Using Tempereture Range:
   −40°C−+110°C

IEC Standard :

1. Rot' ng: 630V 15A
2. Rote Impulse Voltoge: 4000V
3. Insulotion Resistonce:
   500\In or more ot DCSOOV

4. Materio Group : I
5. Pollution Degree : 2
6. Overvoltage Cotegory. II
7. Using Tempereture Range:

−40°C−+110°C

NOTES 2:

1. RehS complionce
2. Through hole reflow soldering
   Temperoture: 245°C

N«mo Ceometric To=crone ng			
//		..L	
0 to 100	0.2	0 to 10	0.2
owiir 100 to 150	O.J	o.:S over 10	0.3
o..... 150	0.5		

Totol Piten Tolerences		Normet dimension Toloronces	
0<U""30	±0.20	O30	±0 25
30<U<-53	±0.25	over 30−53	±0.30
5J<U<=70	±0.30	over 5J-70	±0.35
70<U<:90	±0.35	0"" 790	±0.44
90<lJ< 115	±0 H	over 90-115	±0.55
115<U< 150	x055	O- II 150	±0.70

4	NUT	STEEL	W2/Zn Plated
3	SOLDER PIN 2	COl'PER	Tin Pleted
2	SOLDER PIN 1	COl'POI AU.oY	Tin Ploted
	HOUSNC	PA+CF'	UL9•-V0 BLACK
ITEM	NAME OF PART	ATERIAL	NOTES

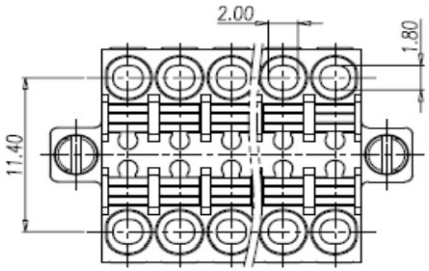
DWC.	LlrF	DATE	14.05.29
CHK.		DATE	
APP.		DATE	

UNITS MM　SHEET/OF 1/1
SCALE 3:1
NAME 0225-16XXTH/26
DINKLE ENTERPRISE CO.,LTD
NO SP-03-02251626

REV. | CONTENT | CHK. | DATE

Appendix E: 102 (GPIO) Mating Connector Specification

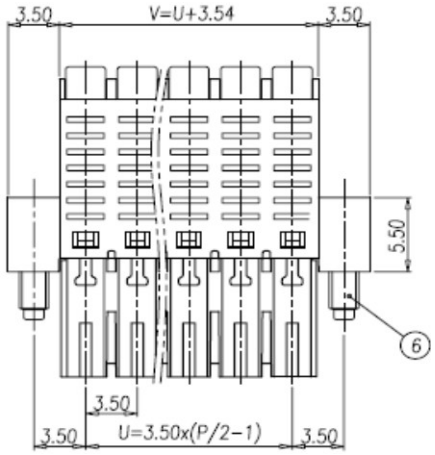
FILE 0156\0156-2AXX

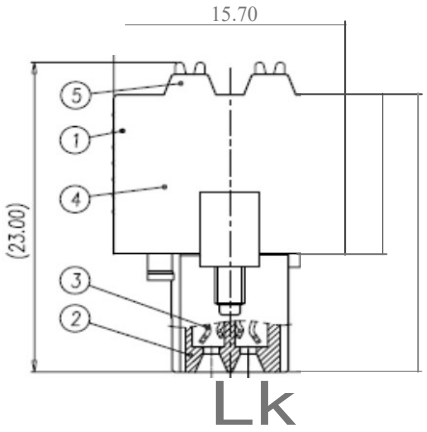


p	6	8	10	12	14	16	18	20	22
u	7.0	10.5	14.0	17.5	21.0	24.5	28.0	31.5	35.0
V	10.54	4.04	17.54	21.04	24.5	28.04	J1.5	J5.04	IJB.54
p	24	26	28	JO	32	34	36	38	40
u	38.5	42.0	45.5	49.0	52.5	56.0	59.5	6J.O	66.5
V	2.04	5.54	9.04	52.54	6.04	59.54	3.04	6.54	0.04

NOTES:

1 Roting: 150V BA (UL)
320V IO A (VOE)
PITCH:3.50mm
2. nsulol•on Vliths ands Volloge:
AC 2000V at 1 minu e
3.Insulotion Res'stonce:
500\An or more ot DC500V
4. Using Temperoture Ro'lge:
—40'C-..-105'C
5. su·toole Electric Wire:
UL:28-16AWG
VDE: Rigid: 0.2-1.0mm²
Flexib y. 0.2-1.5mm²
Strip ength:7-Bmm
6.RoB complicnce





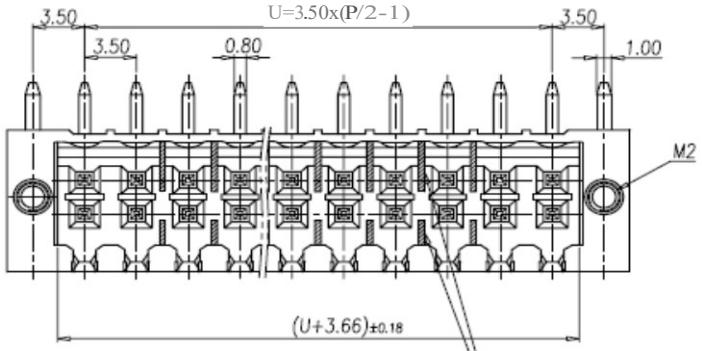
Normo Ceometr-c TO'eronc ng				
//			...l..	
O IO 100 O—100 to 1 O— 150	0.2 O.J O.:;	O.J	0 to 10 o'"r 10	0.2 0.3
Total Pitch Tolerances		Normal dimension Tolerances		
O<U<JO	±0.20	Q-.)0		±0.25
JO<U<= J	±0.2over	JO- 3		:tO.::IO
S3<U<=70	±0.30	over 53-70		:t0.35
70<U<:=90	±0.35	ovcr 7Q-90		±0.44
90<U<=I15	:t0 44	ovor 115		:t0.55
II <U<-150	:tO.5	Ove< 115-150		:t0.70

ITEM	NAME OF PART	RIAL	NOTES
6	SCREW	STEEL	112/Zn Flotod
5	LEVER	POW	CMW<CE
4	WIRE CAGE	STEEL	
3	CLAMP	COPPER AI.OY	Tin Plated
2	COVER	P..66	UL94-VO CREF:
	HOUS.NG	PA66	UL94-VO CR EN

DWG.	LIff	DATE	13.05.02	UNITS	MM SHEET/OF 1/1
CHK.		DATE		SCALE	3:1
APP.		DATE		NAME	0156-2AXX
CONTENT		DATE	DTNKLE ENTERPRISE CO.,LTD	WG NO	SP—03—01562AXX

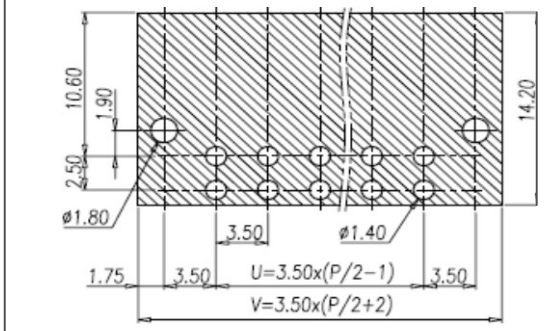
Appendix F: 102 (GPIO) Connector Specification

FilE 0156\0156-28XX



NOTES:

1. Rating:150V 8A (UL)
   320V 10A (VOE)
   P TCH:3.50mm
2. Insulotlon Withstonds Voltoge:
   AC 2000V ot 1 m·nute
3. 1nsulotlon Res"stonce:
   SOOMO or more ot DCSOOV
** - Us'ng Tempereture Range:
   −40"C-+105'C
S. RoHS complionce

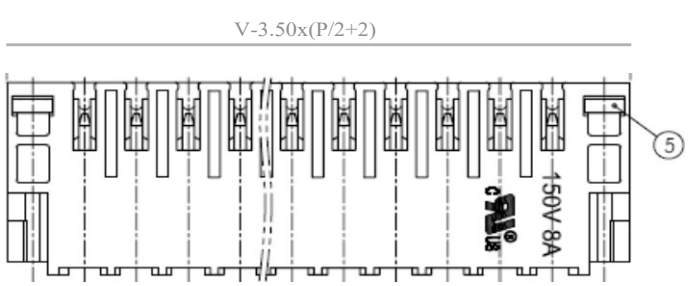


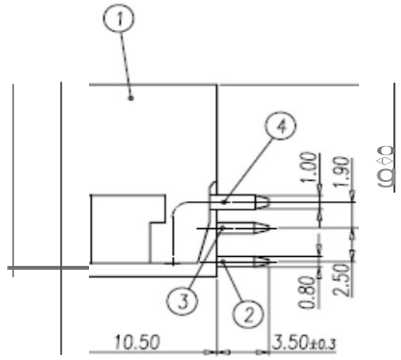
P.C.B. LAYOUT

明影肋的数量表

P	6	8	10	12	14	16	18	20	22
肋数量	6-18P之间都有肋							7	8
P	24	26	28	30	32	34	36	38	40
肋数量	7	8	7	8	7	8	9	10	11

p	6	8	10	12	14	16	18	20	22
u	7.0	10.5	14.0	17.5	21.0	24.5	28.0	31.5	35.0
v	17.5	21.0	24.5	28.0	31.5	35.0	38.5	42.0	45.5
p	24	26	28	30	32	34	36	38	40
u	38.5	42.0	45.5	49.0	52.5	56.0	59.5	63.0	66.5
v	49.0	52.5	56.0	59.5	63.0	66.5	70.0	73.5	77.0





Normo Ceometr'c Toleronc'ng					
//			j_		
0 to 100	0.2		0 to 10	0.2	
O− 100 to I	0. 3	0.3	o""r 10	0.3	
O− ISO	0.!)				

Totot Pitcn Tolercnc:et:		Normal cii'fC:'; es	
O<U<•30	:!:0.20	Cl-30	:!:0.25
30<U<•53	±0.25	o"" lo-53	±0.JO
53<U<=70	±0.30	O− 53-70	;1;03!)
70<U<-90	±035	ovor 7C>-90	±0.44
90<1.1<=115	:I;O.H	over 9Cl-115	±05!>
115<1J<= I 50	;1;055	ove- 115-150	±0. 70

S	NUT	STECL	112/Zn Pietod
4	SOLDER PIN 3	COPPER ALLOY	Tin Ploted
3	SOLDER PIN 2	COPPER ALLOY	Tin Plolc:d
2	SOLDER PIN 1	COPPER ALLOY	Tin Pieted
	HOUS,NG	PA66(C30)	UL94 −IIO CRtCN
ITEM	NAME OF PART	:RIAL	NOTES

DWG.	Llrf'	DATE	13.10.16	UNITS	MM	SHEET/OF	1 / 1
CHK.		DATE		SCALE	3:1 (:)		
APP.		DATE					
				NAME	0156-2BXX		
CONTENT		DATE	DTNKLE ENTERPRISE CO..LTD	G NO	SP-03-01562800		