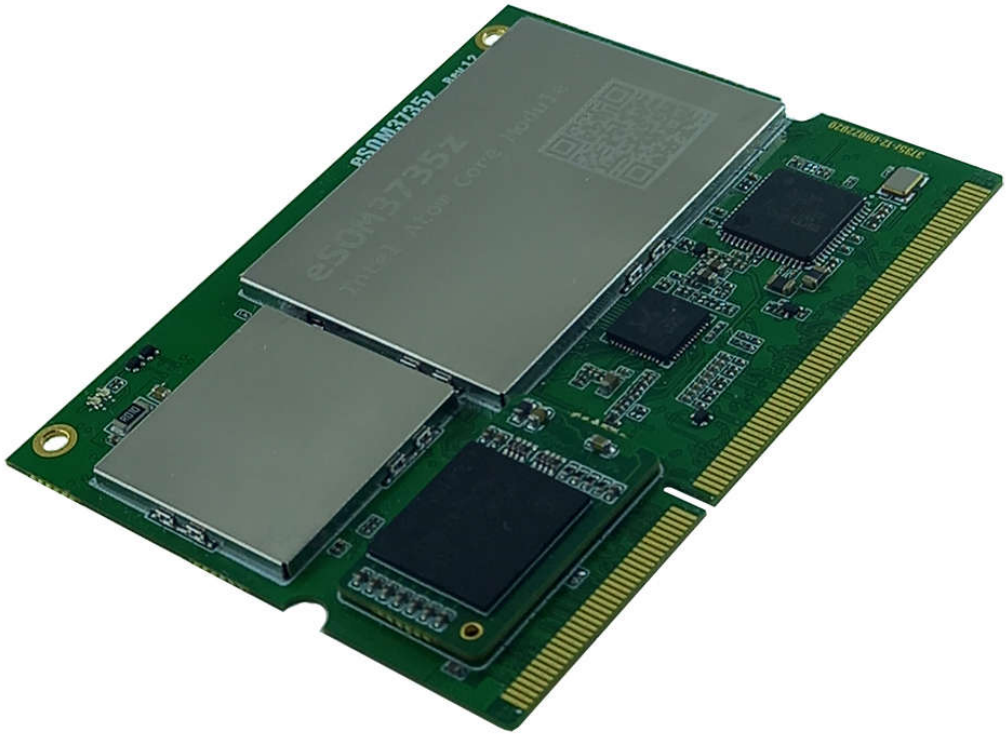
eSOM3735z

Hardware Manual



Contents

Introduction

The eSOM3735z is an easy to use 204 pin core board based on the power-efficient quad-core Atom Z3735G processor from Intel's 22nm Bay Trail line clocked at 1.33 - 1.83 GHz. It has 2MB L2 cache and integrated Intel HD Graphics GPU clocked at 311MHz to 646MHz.

The eSOM3735z comes with 1GB DDR3L RAM. The eMMC unit is designed modular and plug into coreboard through two 60pin specific connectors. The eMMC modules exist in 32GB with 8bit Bus width by default, and it is customizable with 8 16, 64GB versions. Upgrade, repair and troubleshooting in this way is easy, quick, and cost-effective and improve maintenance ability. The eSOM3735z integrated a PMU that reduces complexity of external power supply. The eSOM3735z support dual channel video output HDMI and MIPI-DSI interfaces with 24-bit depth color resolution. This SOM has extra IO interfaces like HDMI, LCD, Ethernet, USB, GPIO, UART, I2C and SPI that users can access them through DDR3-SODIMM 204 pin straight connector that enables hardware customization and gives more hardware flexibility to various projects.

The eSOM3735z can boots Windows 10 very quickly and allows x86 developers to use the single board software development without having to learn about embedded systems such as ARM processors. In addition, it is integrated many peripherals such as GPIOs and users challenge with microcontrollers is eliminated. It is a perfect platform for x86 developers to make devices like Thin client, HMI, Vending Machines, IoT etc.

Features

- Intel Atom® Z3735G quad core processor (2M Cache, up to 1.83 GHz) with Intel HD graphics
- 1GB DDR3L RAM
- Up to 64GB Replaceable eMMC module
- Support multiple displays HDMI, MIPI-DSI interfaces.
- Support 16x GPIO directly programmable
- Flexible hardware customization using DDR3-SODIMM 204 pin connector
- Very quick and easy OS installation through USB disk
- Windows 10 fast startup

Specification

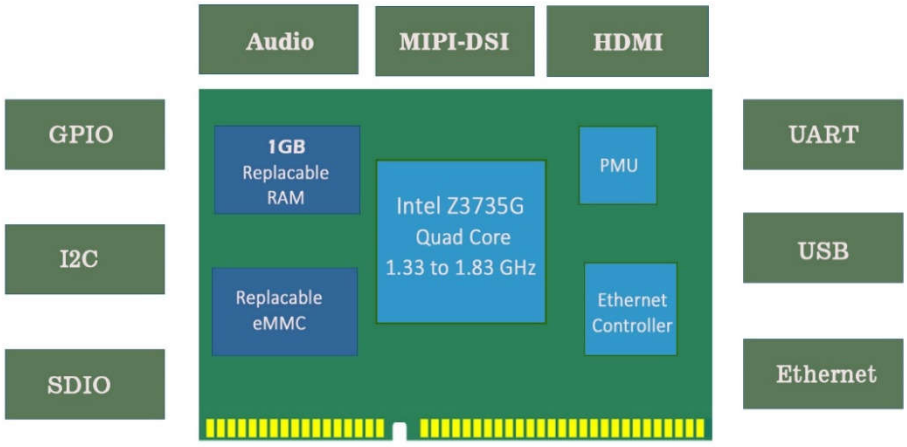
Characteristic	Standard	Customizable	Comment
Processor Details			
CPU Name	Intel Z3735G (Atom Z Series)		
CPU Type	Quad Core AI-Compatible		
CPU Clock	1.33 to 1.83 GHz		
Cache	32KB L1 + 24KB L1 Per Core 2MB L2 Total		
Memory			
RAM Capacity	1GB		
RAM Type	DDR3L		
RAM BUS Width	32bit		
RAM BUS Frequency	666MHz (1333MT/s)		
Non-Volatile Memory Type	eMMC 4.5 + ECC		
Non-Volatile Memory Capacity	32GB	8, 16, 64GB	
Bus Width	8bit		
Multimedia			
Display Type	Dual Channel 1- MIPI-DSI 2-HDMI 1.4 (1080p)		
Color Depth	24Bit		
Resolution	Up to 1920 * 1080		
Graphics Engine	Intel® HD Graphics for Intel Atom® Processor Z3700 Series 3D Hardware Acceleration (DirecX*11, OCL 1.2, OGL ES Halti/2.0/1.1, OGL 3.2) Video Decode Hardware Acceleration (H.264, MPEG2,MVC,VC-1,WMV9,VP8) Video Encode Hardware Acceleration (H.264, MPEG2,MVC)		
Camera	-	Dual MIPI-CSI Camera channel 1- Rear Camera 2-8MP (Dual Lane)	

		2- Front Camera 0.3MP (Single Lane)	
Analog Sound	HeadSet MIC(Mono) LineOut(Stereo)		
Connectivity			
USB	1 USB Host Root 4 USB Host Over HUB	-	
UART	3	-	1 (RX,TX) + 2 (RX, TX, RTS, CTS) One Normal UART (up to 115,200bps) Two HS UART (Up to 3,686,400bps)
SPI	-	-	
I2C	3	4	
Ethernet	1 (10/100)	-	Over USB
CAN	-	-	
SDIO	1 (4bit SD-Card Reader)	-	
Analog Input	-	-	
GPIO	16	25	
OS			
Windows	10	EFI Installer OS	32 bit
Physical			
Size	67.6 x 52.3 x 3.9		
Working Temperature	0 to +70		

Electrical Specification

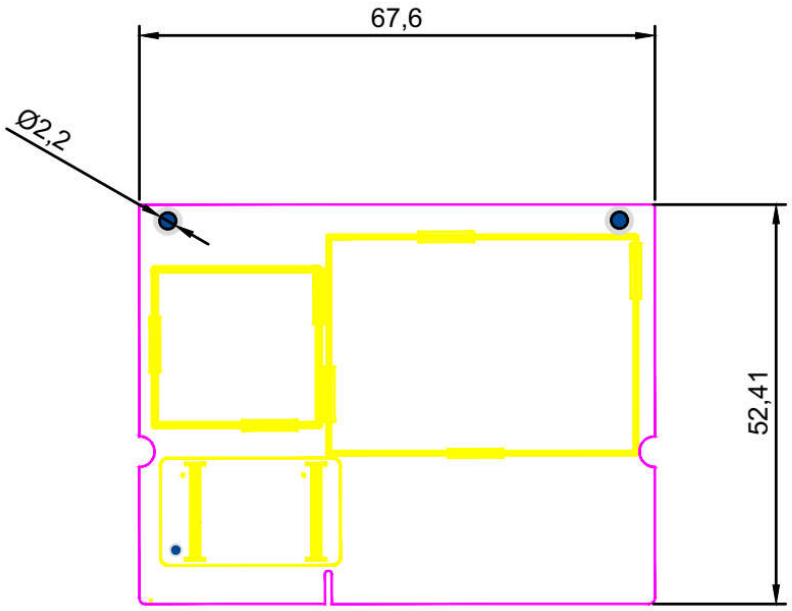
Symbol	Value	Comment
Power	3.7 to 4.2V 1500mA (Max)	Full Performance: 1500mA @ 3.7V Typical Performance: 400mA @ 3.7V Sleep Mode: 4mA @ 3.7V
VIO (General IO Voltage)	1.8V	
VSYS (Main Power)	3.7V to 4.2V	Li-Ion Battery (7000mAh) + Charger
VDD_5V (Battery Charger Input)	5V (1000mA)	
VRTC (Backup Battery for RTC)	3V	

Block Diagram



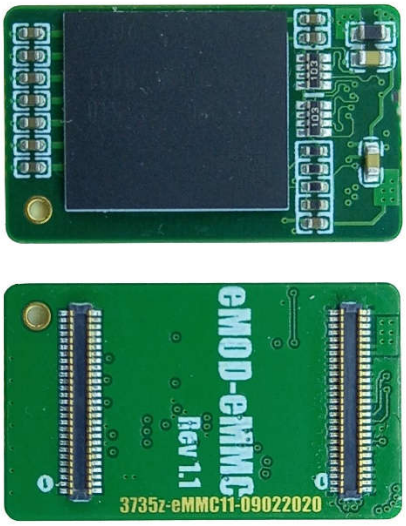
Mechanical Drawing

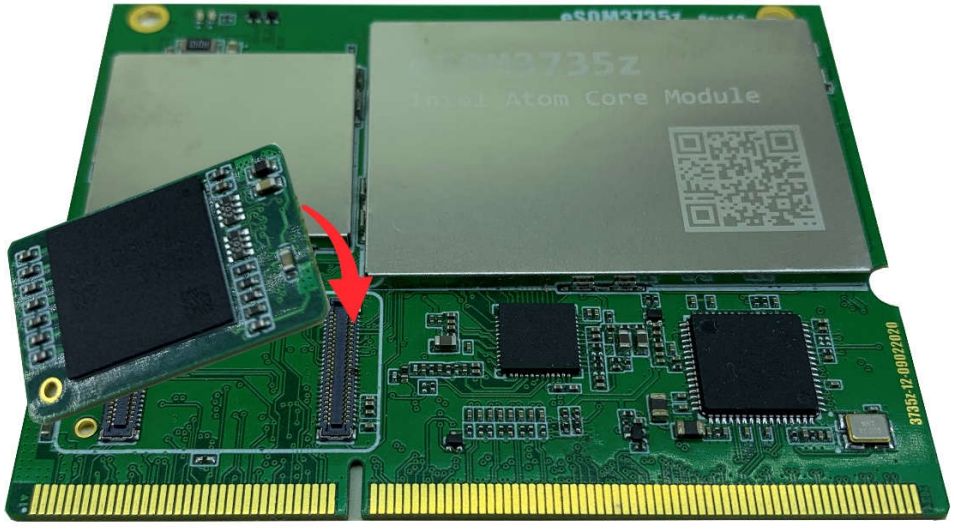
Dimension	
PCB	6 Layer, ENIG, 0.8mm
Weight	15g
Size	67.6mm × 52.41mm × 3.9mm



eMMC

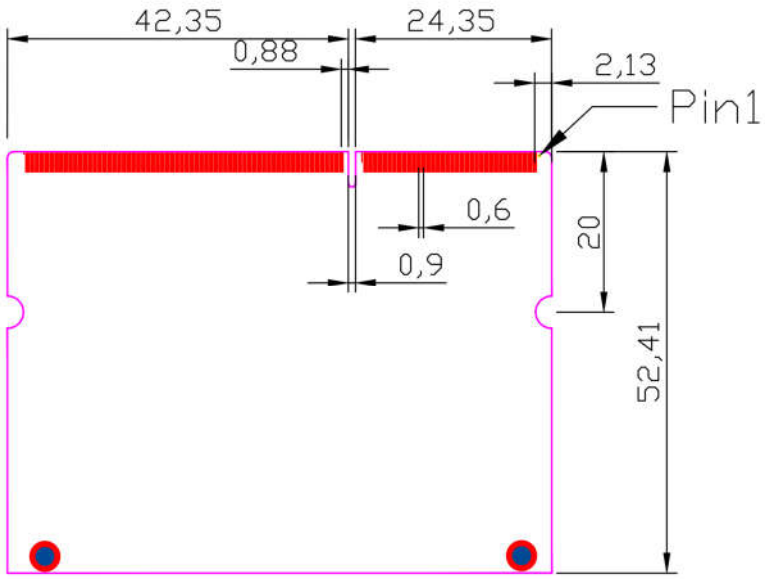
The eSOM3735z storage is based on eMMC modules, this module is designed modular and install on coreboard through two 60pin specific connectors. By default, a 32GB eMMC with 8bit BUS width is installed on eSOM3735z, and it is customizable with 8, 16, 64GB versions. therefore, users are free for selection eMMC module upon their needs. Upgrade, repair, and troubleshooting is easy, quick, and cost-effective in this approach and Improve maintenance ability in mass production.



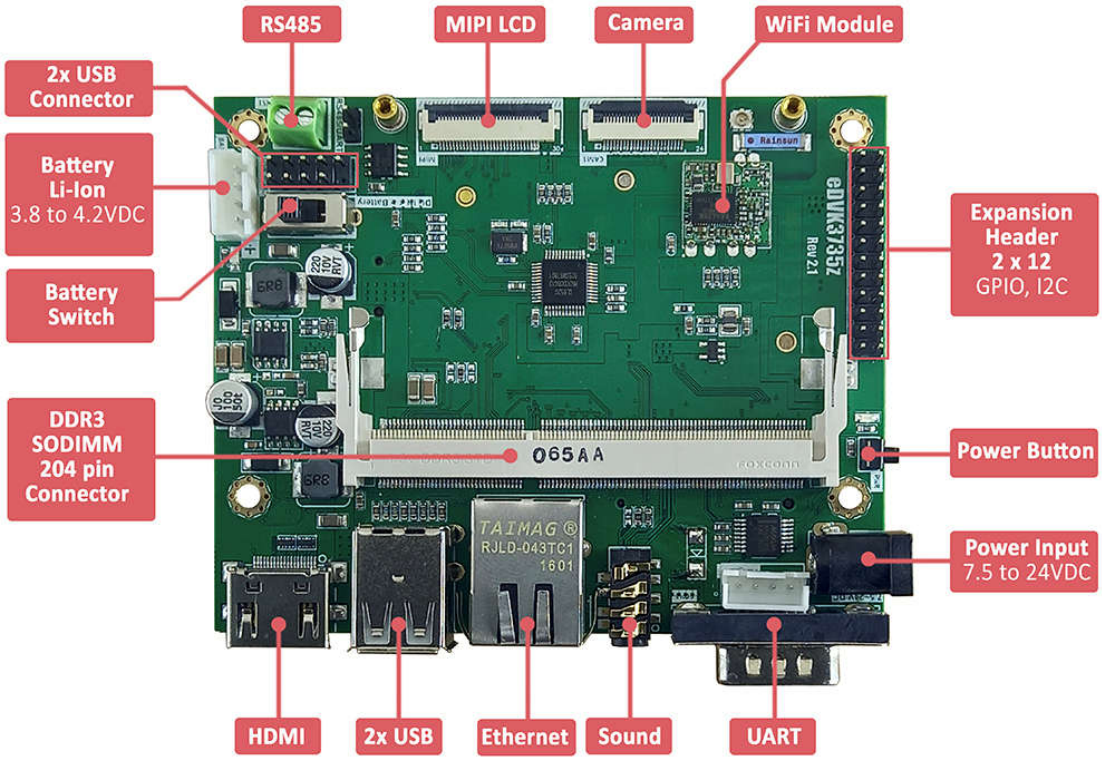


PIN Description

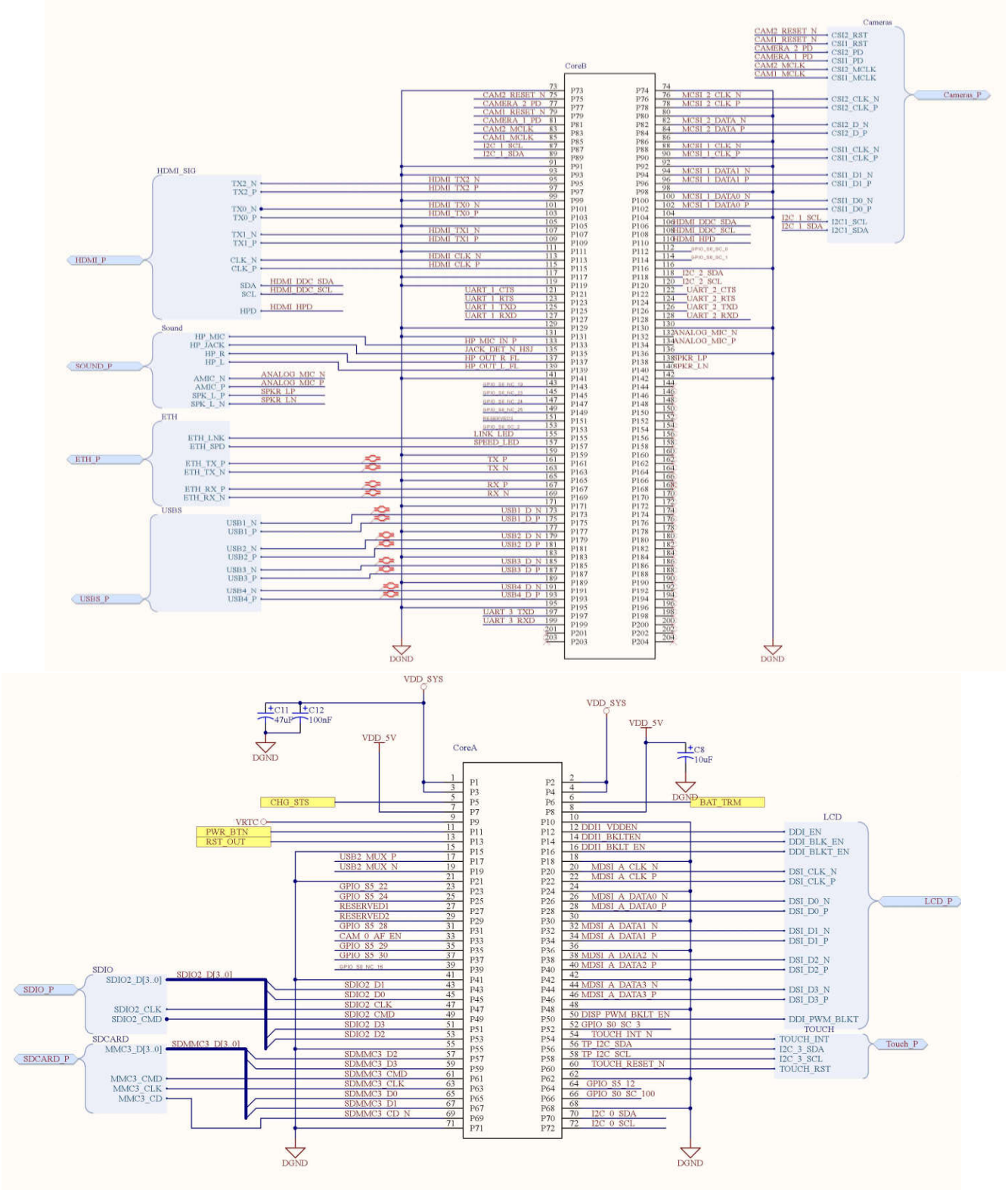
The eSOM3735z has DDR3-SODIMM 204 pin form factor, the diagrams in following figures show the pin numbering schema:



For set up of eSOM3735z, users need to design their carrier board. In addition, eDVK3735z is a standard 4-layer PCB carrier board is designed for eSOM3735z, users can design their carrier board even 2-layer PCB but 4-layer PCB for their carrier boards is recommended.



Following image shows pin assignment is used for eDVK3735z carrier board.

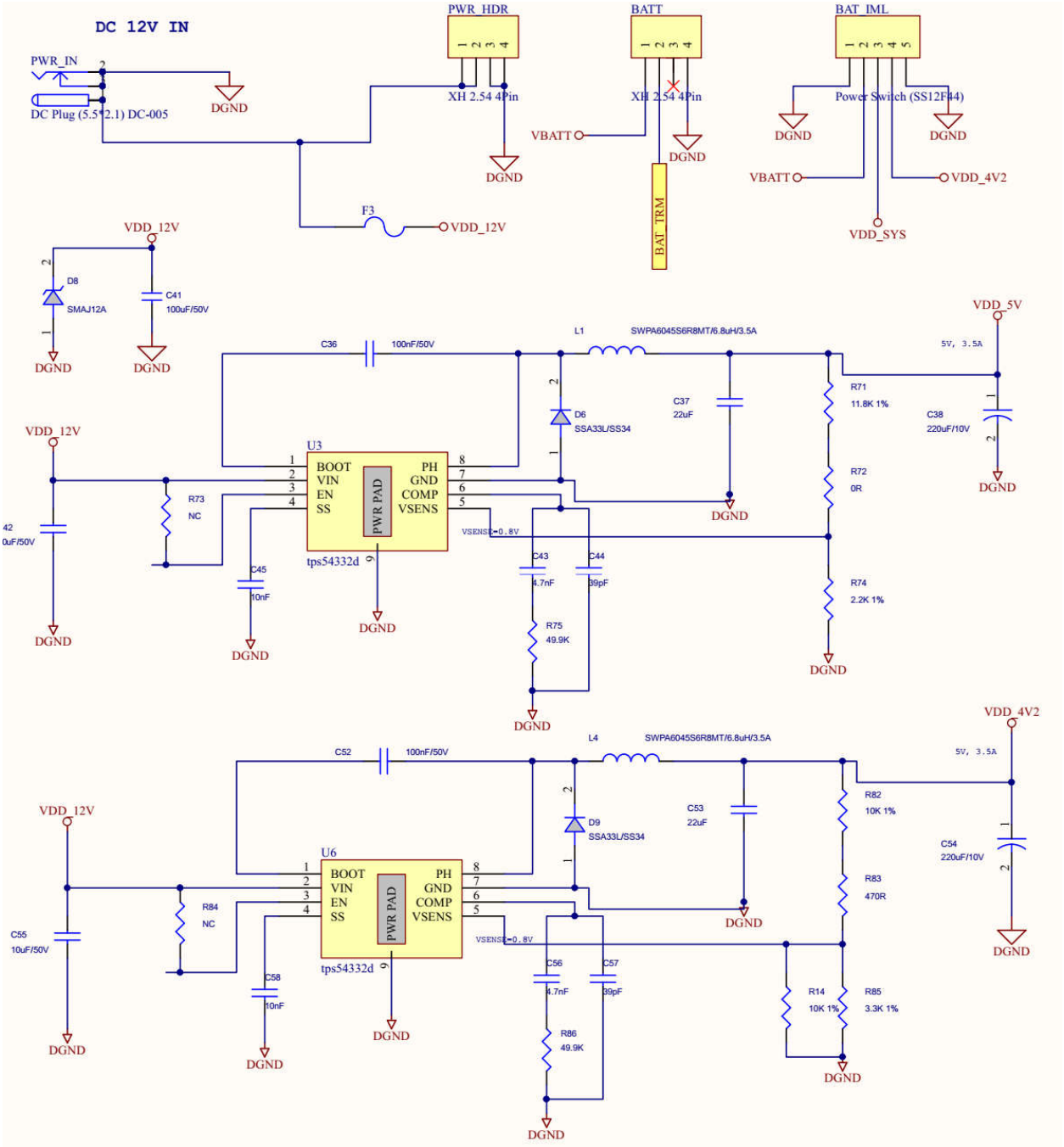


Power pin

Following table explained power pins in eSOM3735z:

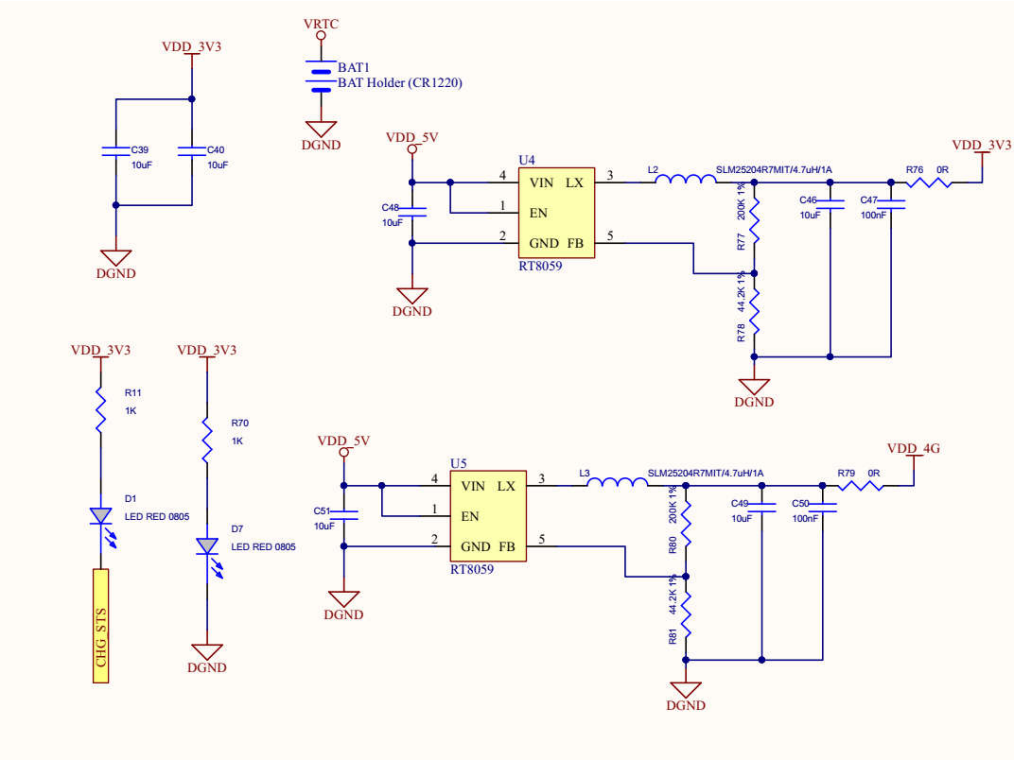
Power Signals	Core PIN number	Description
DGND	10	Digital Ground
DGND	15	
DGND	18	
DGND	21	
DGND	30	
DGND	36	
DGND	41	
DGND	42	
DGND	48	
DGND	55	
DGND	62	
DGND	68	
DGND	71	
DGND	73	
DGND	74	
DGND	80	
DGND	86	
DGND	91	
DGND	92	
DGND	93	
DGND	98	
DGND	99	
DGND	104	
DGND	111	
DGND	116	
DGND	117	
DGND	119	
DGND	129	
DGND	130	
DGND	131	
DGND	141	
DGND	142	
DGND	159	
DGND	165	
DGND	171	
DGND	177	
DGND	189	
DGND	195	
VBAT	1	Main Power: 3.7 to 4.2VDC
VBAT	2	
VBAT	3	
VBAT	4	
VBUS	7	USB Power 5V
VBUS	8	
VRTC	9	RTC Battery 3VDC

In eDVK3735z power circuit is implemented as following figure, power input voltage is acceptable from 7.5 to 24VDC and users can plug power from power jack and PWR_HDR 4pin XH Socket. Development board also has 4pin XH Socket battery input and users can connect Li-Ion 3.7V to 4.2VDC for battery powered applications.



Development board converts input power to +5VDC through a 3.5A, 1MHz Step-Down Converter. Output of this stage is used for VBUS pins of coreboard. VBUS is used for USB and its voltage is very important and must be +5V DC for good performance. This voltage is also used

Battery charger circuit. In addition, VBUS converted to +3.3VDC through two independent circuit for power 4G and other circuit like USB HUB.



Development board also converts input power to +4.2VDC. Output of this stage is used for VBAT pins of coreboard.

A RTC battery holder is considered in eDVK3735z to power up VRTC of coreboard and can power with CR1220 coin batteries with +3VDC.

Display and Touch

The eSOM3735z support HDMI and MIPI-DSI protocols for video outputs. The following tables list HDMI and MIPI signals on the eSOM3735z coreboard:

HDMI Signals	Core PIN
HDMI_TX2_N	95
HDMI_TX2_P	97
HDMI_TX0_N	101
HDMI_TX0_P	103
HDMI_TX1_N	107
HDMI_TX1_P	109
HDMI_CLK_N	113
HDMI_CLK_P	115
HDMI_DDC_SDA	106
HDMI_DDC_SCL	108
HDMI_HPD	110

MIPI-DSI Signals	Core PIN
DDI1_VDDEN	12
DDI1_BKLTEN	14
DDI1_BKLT_EN	16
MDSI_A_CLK_N	20
MDSI_A_CLK_P	22
MDSI_A_DATA0_N	26
MDSI_A_DATA0_P	28
MDSI_A_DATA1_N	32
MDSI_A_DATA1_P	34
MDSI_A_DATA2_N	38
MDSI_A_DATA2_P	40
MDSI_A_DATA3_N	44
MDSI_A_DATA3_P	46
DISP_PWM_BKLT_EN	50

In eDVK3735z a HDMI connector is considered, a 30 pins FPC connector is also used for connecting to MIPI LCDs. Currently capacitive and resistive touch is implemented through USB interface, and I2C signals is included in FPC pins for developers want to customize touch with I2C interface.

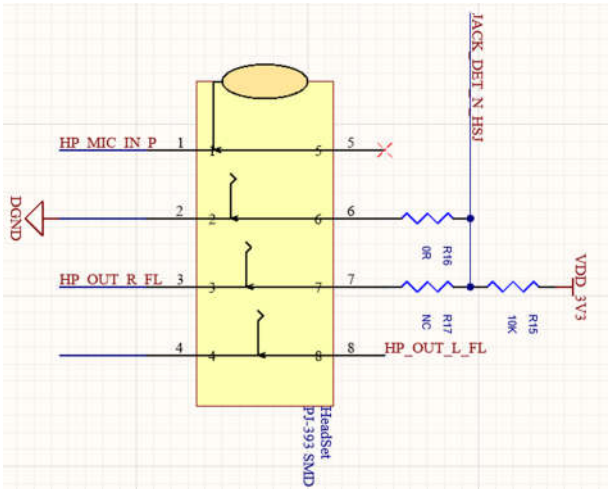
Touch signals	Core PIN number	FPC connector PIN
I2C0_SCL	18	2
I2C0_SDA	20	3
GPIO3[17]	36	4
GPIO3[18]	38	5
HUSB4_P	-	7
HUSB4_N	-	8

Sound

The eSOM3735z supports audio output and input functions. Following table describe assigned pins for audio functions.

Sound Signal	Core PIN number
HP_MIC	133
HP_JACK	135
HP_R	137
HP_ L	139
ANALOG_MIC_N	132
ANALOG_MIC_P	134
SPKR_LP	138
SPKR_LN	140

In eDVK3735z a headset connector is integrated, the following figure shows this connector and associated pins, HP_L and HP_R signals is used for audio output and HP_MIC is considered as audio input.

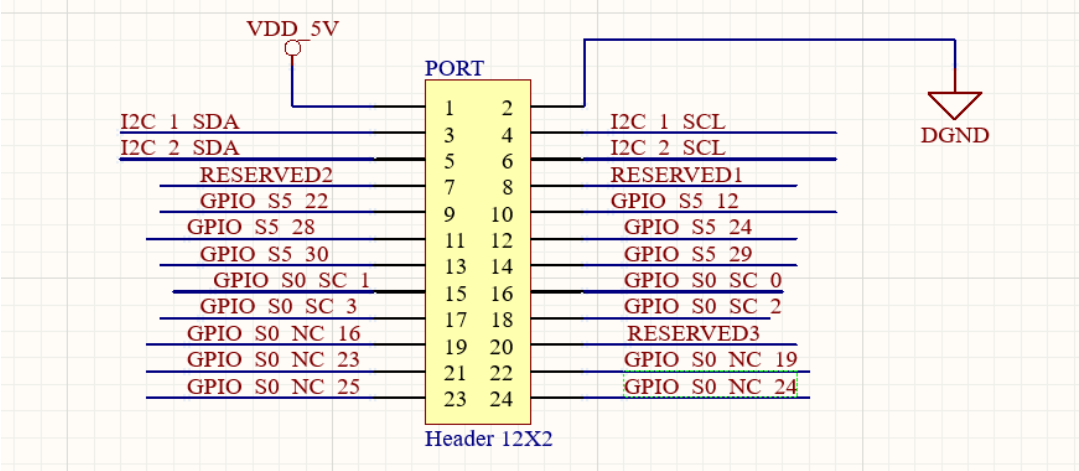


GPIO

Some of eSOM3735z pins can be used as GPIO, by default this coreboard support 16 GPIO, these pins are specified in the following table:

GPIO Signals	Core Pin number
GPIO_S0_SC_0	112
GPIO_S0_SC_1	114
GPIO_S0_SC_2	153
GPIO_S0_SC_3	52
GPIO_S0_SC_100	66
GPIO_S5_12	64
GPIO_S5_22	23
GPIO_S5_24	25
GPIO_S5_28	31
GPIO_S5_29	35
GPIO_S5_30	37
GPIO_S0_NC_16	39
GPIO_S0_NC_19	143
GPIO_S0_NC_23	145
GPIO_S0_NC_24	147
GPIO_S0_NC_25	149

All IO ports have 1.8V voltage level. If you are using eDVK3735z, some of GPIOs are accessible through a 2×12 pin header as shown in the following figure:

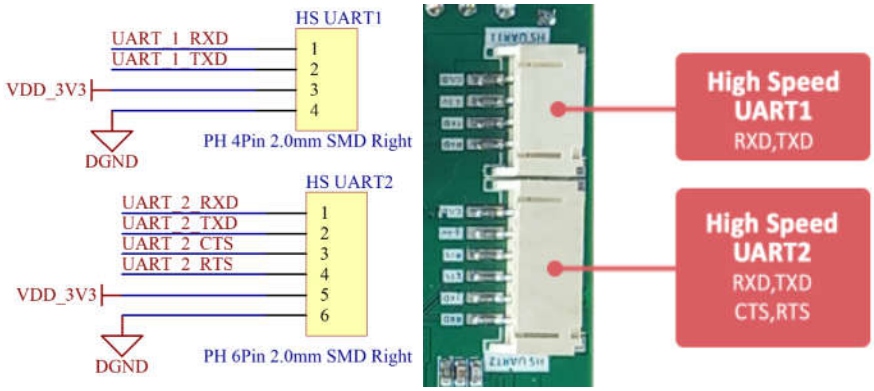


UART

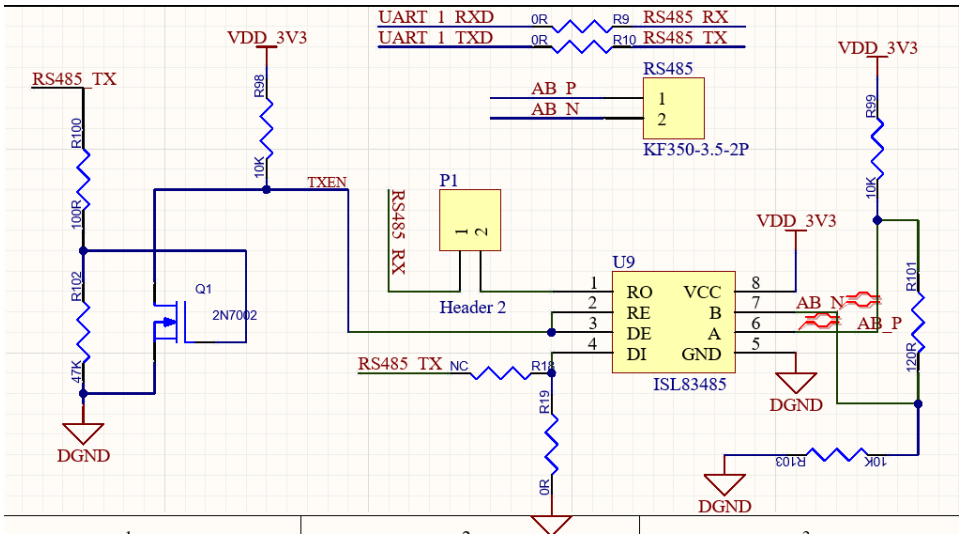
eSOM3735z support One Normal UART (up to 115,200bps) and Two HS UART (Up to 3,686,400bps). Respective pins are described in the following table:

UART Signals	Core PIN number
UART_1_RXD	127
UART_1_TXD	125
UART_1_RTS	123
UART_1_CTS	121
UART_2_RXD	128
UART_2_TXD	126
UART_2_RTS	124
UART_2_CTS	122
UART_3_RXD	199
UART_3_TXD	197

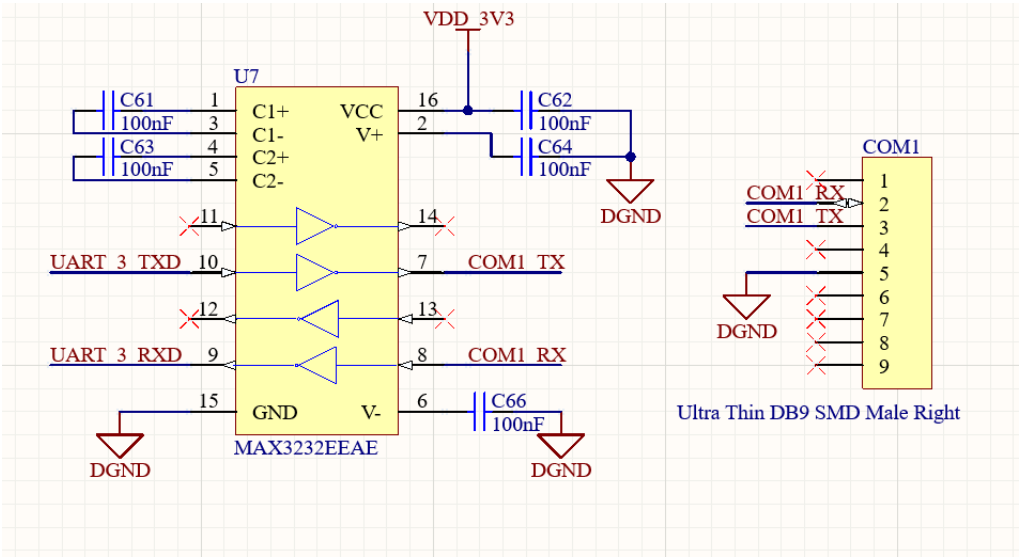
UART1 and UART2 is high speed UART. In eDVK3735z this HS UARTs is accessible through 2 connectors in bottom of this development board as shown in the following figures:



In eDVK3735z, UART1 is also used as RS485 communication, a jumper is considered to select or deselect this UART for act as RS485 or another function. If jumper is placed, UART2_RXD acts as RS485 receivers signal.



In eDVK3735z UART3 is considered as RS232 communication and a DB9 port is integrated in this development board.



I2C

The eSOM3735z supports three I2C communication by default, following table listed pins was assigned to I2C in this coreboard:

I2C Signals	Core PIN number
I2C_0_SDA	70
I2C_0_SCL	72
I2C_1_SDA	89
I2C_1_SCL	87
I2C_2_SDA	118
I2C_2_SCL	120

In eDVK3735z, I2C0 signals is also included in FPC pins for developers want to customize touch with I2C interface. In addition, I2C0 is accessible through ***eMOD*** connector mounted in bottom of this carrier board.

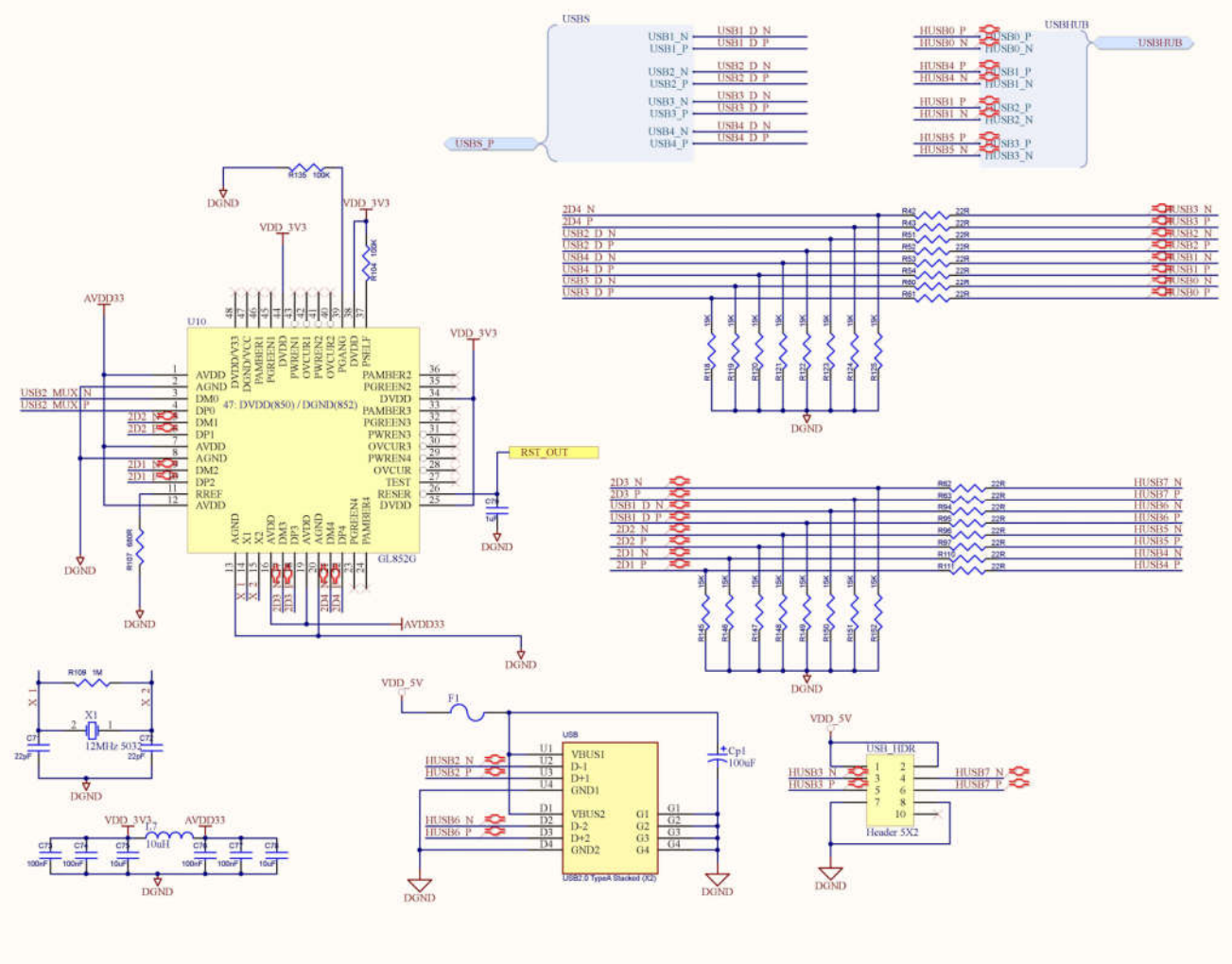
I2C1 and I2C2 are accessible in 2×12 pin header ***PORT*** connector . I2C1 is also connected to Camera FPC connectors for user developments.

USB

The eSOM3735z support 1 USB Host Root and 4 USB Host Over HUB. These pins are listed in the following table:

USB SIGNALS	Core PIN number
USB1_N	173
USB1_P	175
USB2_N	179
USB2_P	181
USB3_N	185
USB3_P	187
USB4_N	191
USB4_P	193
USB2_MUX_P	17
USB2_MUX_N	19

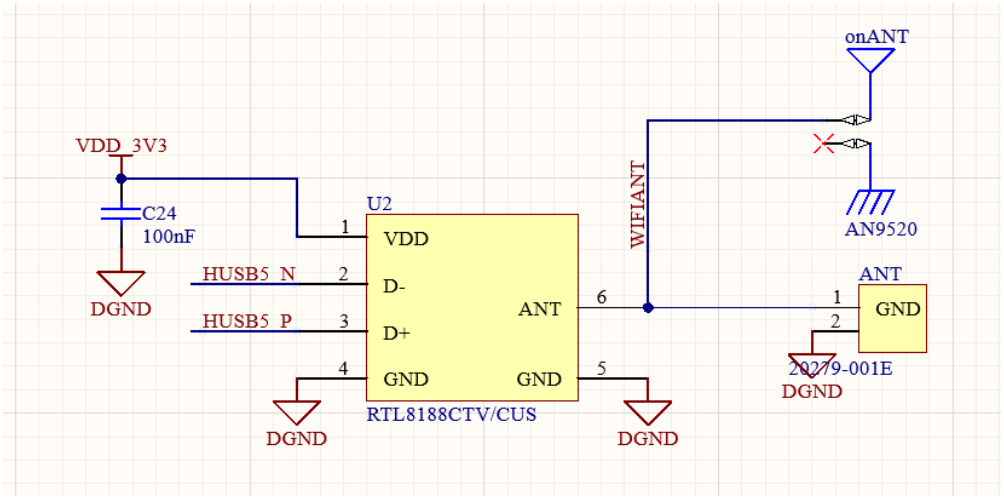
In eDVK3735z these ***USB2_MUX*** BUS is acquired with 1 USB HUB ICs and extended to 4 USB BUS. Finally, eDVK3735z development board have 8 USB Buses.



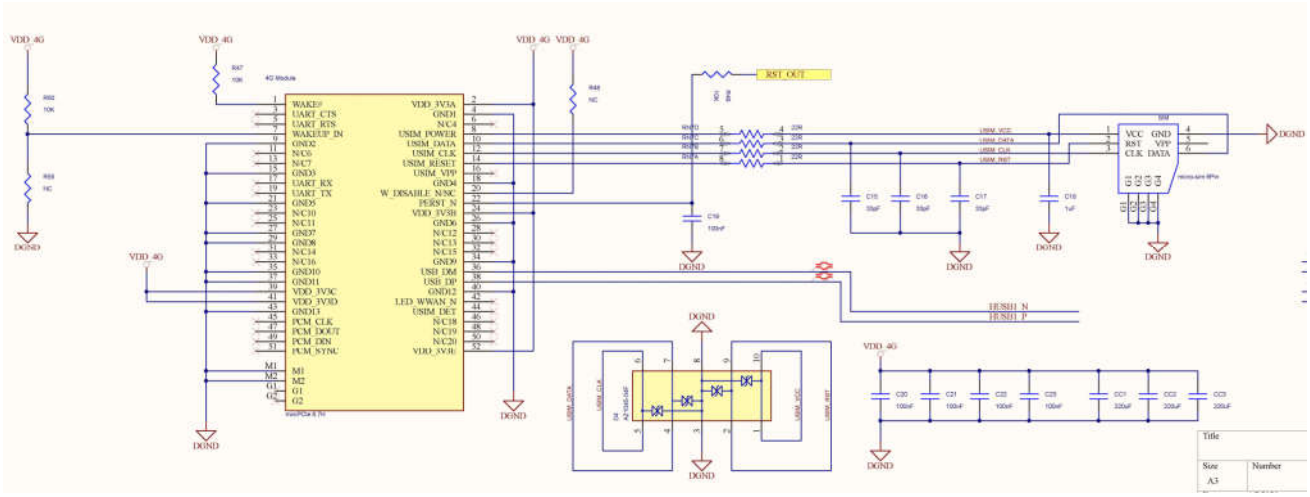
These USB Buses is used for various purposes in eDVK3735z as shown in the following table:

USB SIGNALS	Core PIN number
HUSB0	eMOD connector
HUSB1	miniPCIe Slot
HUSB2	USB Stacked Port
HUSB3	USB HDR Port
HUSB4	MIPI LCD connector
HUSB5	Wi-Fi module
HUSB6	USB Stacked Port
HUSB7	USB HDR Port

In eDVK3735z HUSB5 is acquired for WiFi module as shown in the following figure:



In eDVK3735z HUSB1 is acquired for miniPCIe module(only USB functions supported) as shown in the following figure:



Ethernet

The eSOM3735z supports (10/100) Ethernet communication over USB. Associated pins are accessible through 204 pin SODIMM connector as listed in following table:

Ethernet Signal	Core PIN number
ETH_LINK	155
ETH_SPD	157
ETH_TX_P	161
ETH_TX_N	163
ETH_RX_P	167
ETH_RX_N	169

SDIO

The eSOM3735z support SDIO interface for 4bit SD-Card Reader and assigned pins on coreboard are shown in the following table:

SDIO Signal	Core PIN number
SDMMC3_D2	57
SDMMC3_D3	59
SDMMC3_CMD	61
SDMMC3_CLK	63
SDMMC3_D0	65
SDMMC3_D1	67
SDMMC3_CD_N	69