

MYC-Y335X

CPU Module



Product Manual

Product Overall

The AM335x microprocessors based on the ARM Cortex-A8 are enhanced with image, graphics processing, peripherals and industrial interface options such as etherCAT and Profibus.

The MYC-Y335X CPU Module has integrated the AM335X processor, 512MB DDR3, 512MB Nand Flash and Gigabit Ethernet PHY chip on board and can be served as the core of your embedded system. It is ideal for industrial embedded applications such as automotive, control systems, lighting, refining and processing.

Product Feature

- ARM Cortex-A8 Processor
- 256MB DDR3, 256MB Nand Flash
- 10M/100M/1000M Ethernet MAC Controller
- Support CAN, USB HOST, USB OTG, Ethernet, UART, SPI Standard Communication Interfaces
- Support Maximum Display Resolution: 2048x2048 pixels
- 10 Laminates Design, Immersion Gold Process, Lead-Free
- Compact Dimensions (65mm x 35 mm)
- 146PIN stamp hole

Applications

- Gaming Peripherals, Advanced Toys
- Home and Industrial Automation
- Consumer Medical Appliances
- Printers Weighing Scales
- Smart Toll Systems, Connected Vending Machines
- Weighing Scales, Educational Consoles

Project customization

- Matching different sizes memory chips according to customer demand
- Cutting system according to customer demand
- Assist the development of related driver according to customer demand
- Custom motherboard according to the customer's specific needs

Correct Errors

- Silkscreen of Ethernet was labeled wrong. The left is ETH1, and the right is ETH0

Version History

Version	Des	Date
V1.0	Initial Version	2013.12.17
V1.1	Replace Figures, Correct some errors.	2014.03.17
V1.2	Support Linux3.2, Android 4.2.2	2014.04.01
V2.1	Document format unification	2016.12.21

According to the lasted naming rules of MYIR Product.

- ◆ Daughter board (CPU module board)have a prefix “MYC”
- ◆ Motherboard (baseboard) have a prefix “MYB”
- ◆ The HW Kits have a prefix “MYD”
- ◆ MYC-AM335X is renamed to MYC-C335X according to the naming rules.
- ◆ MCC-AM335X-J is renamed to MYC-J335X according to the naming rules.
- ◆ MCC-AM335X-Y is renamed to MYC-Y335X according to the naming rules.

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1. Product Introduction

TI AM335X microprocessors based on the ARM Cortex-A8 features PowerVR™ SGX530 for 2D and 3D graphics acceleration as well as PRU/ICSS supporting real-time protocols such as EtherCAT, PROFINET, EtherNet/IP, PROFIBUS, Ethernet Powerlink, Sercos, and others.

MYC-Y335X is a 65 mm x 35 mm core module as shown in Figure as follows.

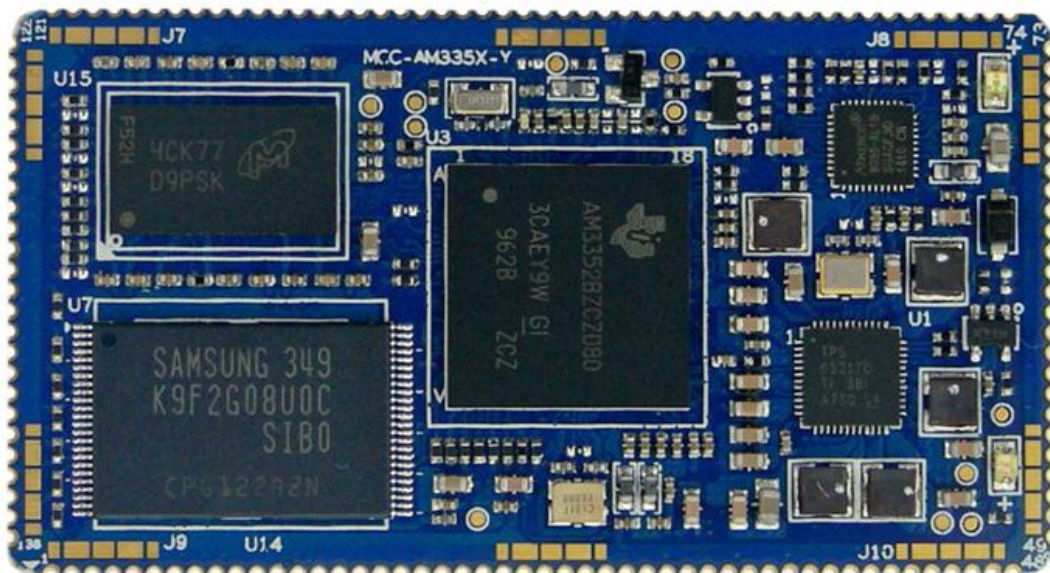


Figure 1-1 MYC-Y335X Top Side

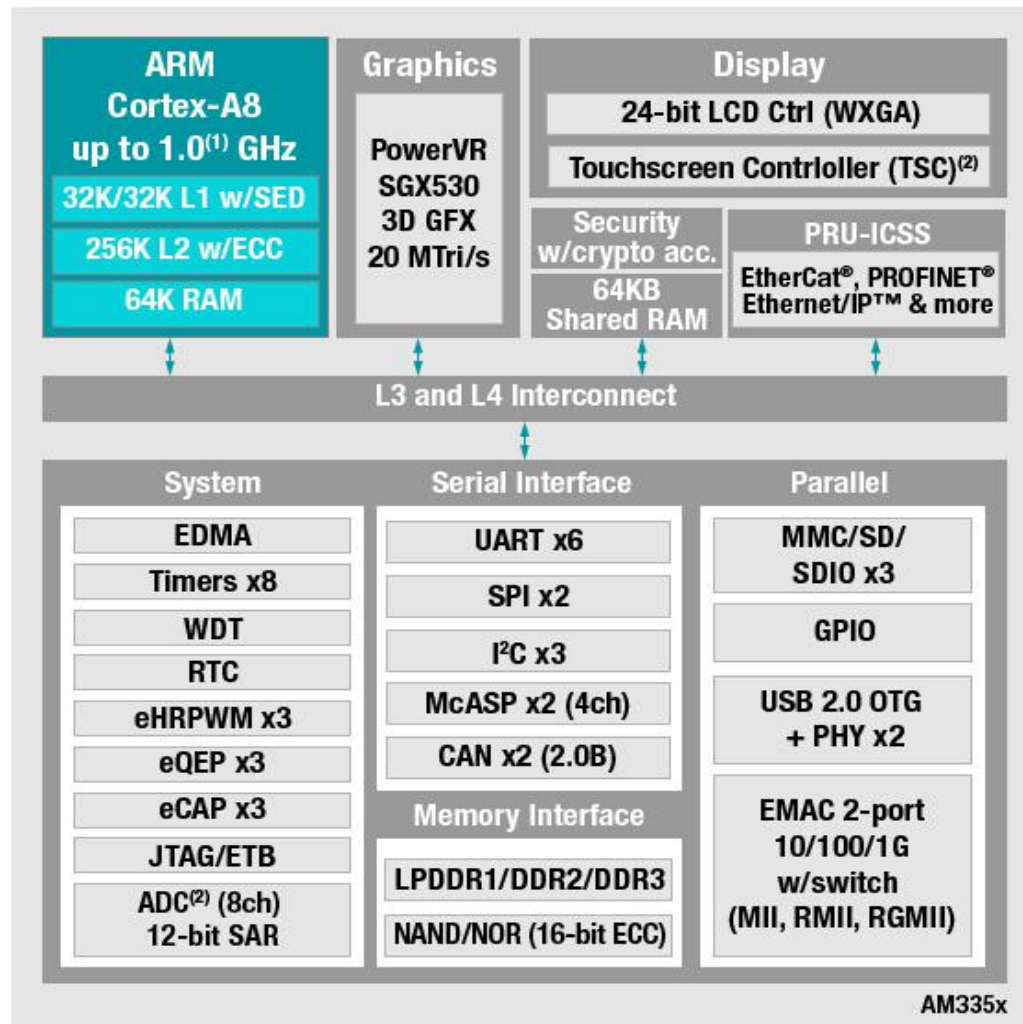
AM335X MPU have two kinds of package type. One is ZCZ (BGA324), and the other is ZCE. There are sharing the same pin-out with software fully compatible. The table shows the difference among the MPU.

Table 1-1 AM335X Series Product

MPU	AM3352	AM3354	AM3356	AM3357	AM3358	AM3359
Clock Speed	300 MHz	600 MHz	300 MHz	300 MHz	600 MHz	600 MHz
	600 MHz	800 MHz	600 MHz	600 MHz	800 MHz	800 MHz
	800 MHz	1000 MHz	800 MHz	800 MHz	1000 MHz	
	1000 MHz					
MIPS	600	1200	600	600	1200	1200
	1200	1600	1200	1200	1600	1600
	1600	2000	1600	1600	2000	
	2000		-	-		
3D	-	yes	-	-	yes	yes
RPU	-	-	PRU	PRU	PRU	PRU
			-	EtherCAT	-	EtherCAT

2. Hardware Parameter

2.1 CPU Property



NOTES:

⁽¹⁾ >800MHz available on 15x15 package, 13x13 supports up to 600MHz

⁽²⁾ Use of TSC will limit available ADC channels

SED: Single error detection/parity

Figure 2-1 AM335X Architecture

- ◆ Sitara™ ARM® Cortex®-A8 32-Bit RISC Microprocessor, Up to 1GHz
- ◆ NEON™ SIMD Co processor
- ◆ 32KB L1 Instruction /Data Cache with Single-Error Detection/parity

- ◆ 256KB of L2 Cache with Error Correcting Code (ECC)
- ◆ Emulation/Debug - JTAG
- ◆ mDDR(LPDDR)/DDR2/DDR3 Support. addressing space can be up to 1GB.
- ◆ General-Purpose Memory Support (Nand,NOR,SRAM)Supporting Up to 16-bit ECC
- ◆ SGX530 Graphics Engine
- ◆ Programmable Real-Time Unit Subsystem
- ◆ Real-Time Clock (RTC)
- ◆ Up to Two USB 2.0 High-Speed OTG Ports with Integrated PHY
- ◆ 10/100/1000 Ethernet Switch Supporting Up to Two Ports
- ◆ Two Controller Area Network Ports (CAN)
- ◆ Six UARTs, Two McASPs, Two McSPI, and Two I2C Ports
- ◆ 12-Bit Successive Approximation Register (SAR) ADC
- ◆ Up to Three 32-Bit Enhanced Capture Modules (eCAP)
- ◆ Up to Three Enhanced High-Resolution PWM Modules (eHRPWM)
- ◆ Crypto Hardware Accelerators (AES, SHA,PKA, RNG)

2.2 Hardware Resource on board

The MYC-Y335X CPU Module has integrated the AM335X processor, 256MB DDR3 SDRAM, 256MB Nand Flash and one Gigabit Ethernet PHY chip on board.It shows in figure 2-2.

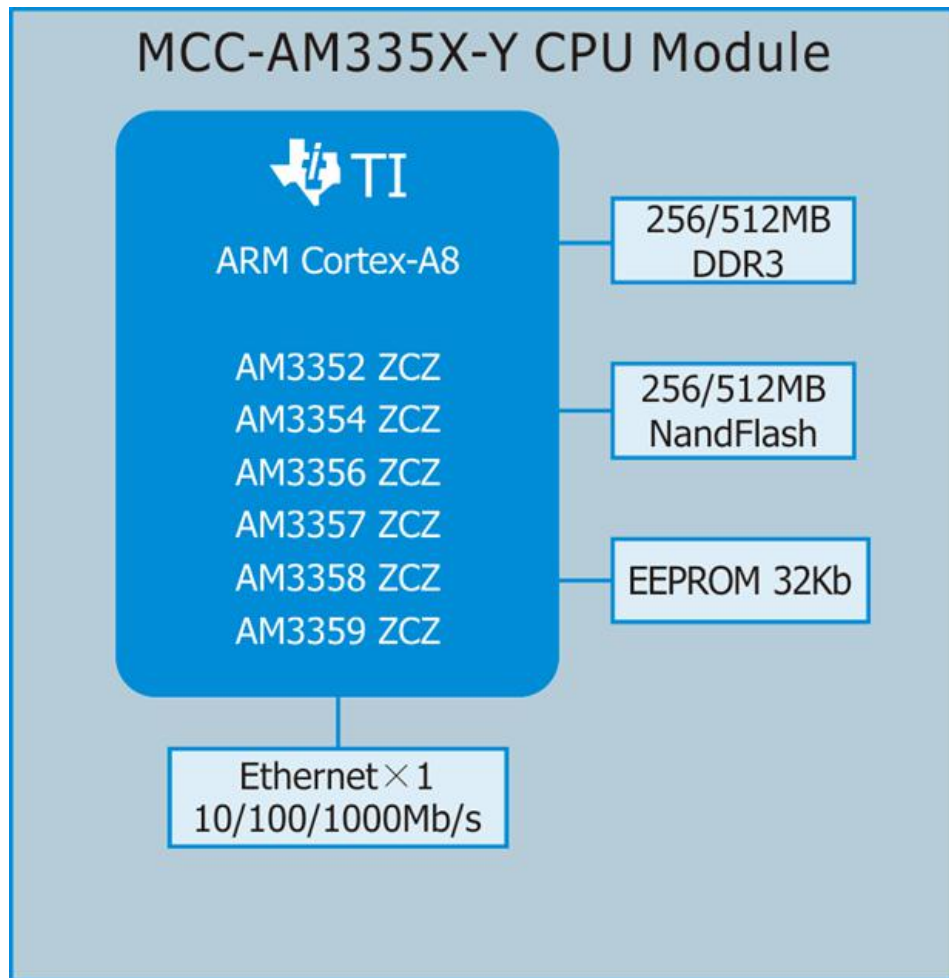


Figure 2-2 CPU Module Board

- ◆ 256MB DDR3 SDRAM
- ◆ 256MB Nand Flash
- ◆ 32KB EEPROM
- ◆ 10/100/1000M Ethernet PHY
- ◆ Power LED and User LED

2.3 Signals On Connector

MYC-Y335X provides many kinds of interfaces due to the reused function of IO. Table 2-1 shows the resource from the connector of CPU module board.

Table 2-1 Signals on Connector

Ethernet Interface	2
USB2.0 interface	2
UARTs Ports	6
I2C Interface	2
CAN Interface	2
SPI Interface	2
ADC Channels	7
MCASP Port	2
LCD Port	1
MMC/SD/SDIO	3
JTAG Port	1
GPIOs	many

3. Interface

3.1 PIN Order

MYC-AM335X provides signals with a 146Pin stamp hole footprint. The pin pitch is 1.27mm. The pin order shows in figure 3-1.

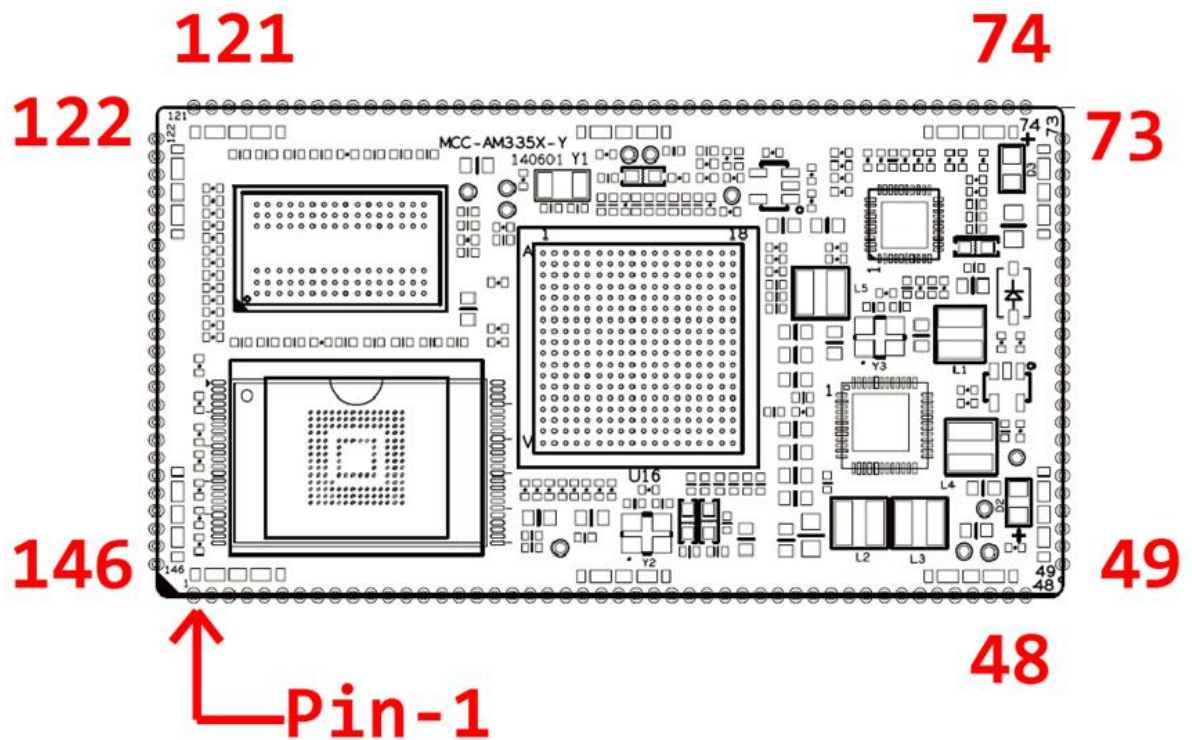


Figure 3-1 Pin Order

3.2 PIN List

For more function of PINs, please refer to the document *MYC-Y335X PIN LIST*.

4. Hardware Design

4.1 Power

TPS65217 is a single chip power management IC specifically designed to support the AM335X series of application processors in portable and 5-V, non-portable applications. It provides a linear battery charger for single-cell Li-ion and Li-Polymer batteries, dual-input power path, three step-down converters, four LDOs, and a high-efficiency boost converter to power two strings of up to 10 LEDs each. The system can be supplied by any combination of USB port, 5-V AC adapter, or Li-Ion battery. The device is characterized across a -40°C to +105°C temperature range which makes it suitable for industrial applications. The power supply distribution shows in figure 4-1.

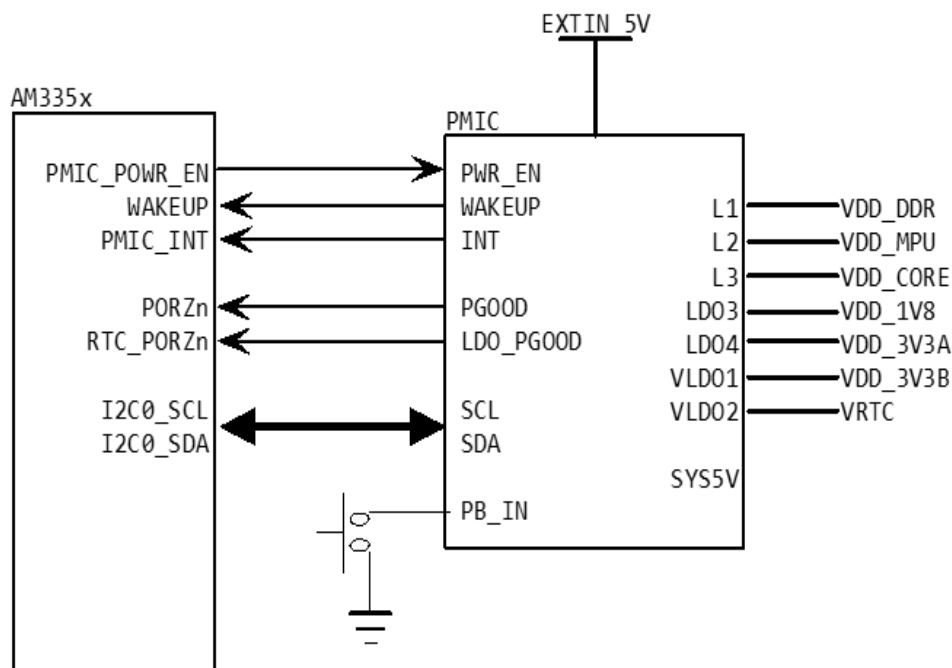


Figure 4-1 Power Supply For CPU Board

- ◆ VDD_MPU: Power for MPU, The MPU clock speed will be affect if change VDD_MPU voltage .

- ◆ VDD_CORE: MPU core voltage is 1.1V.
- ◆ VDDS_DDR: voltage for DDR, 1.5V.
- ◆ VDD_3V3: for CPU module board power supply
- ◆ VDD_1V8: for MPU
- ◆ VDD-3.3VA: for MPU
- ◆ VDD-3.3VB: for Nand Flash, EEPROM and others peripheral device.
- ◆ Power-on Order shows in figure 4-2.

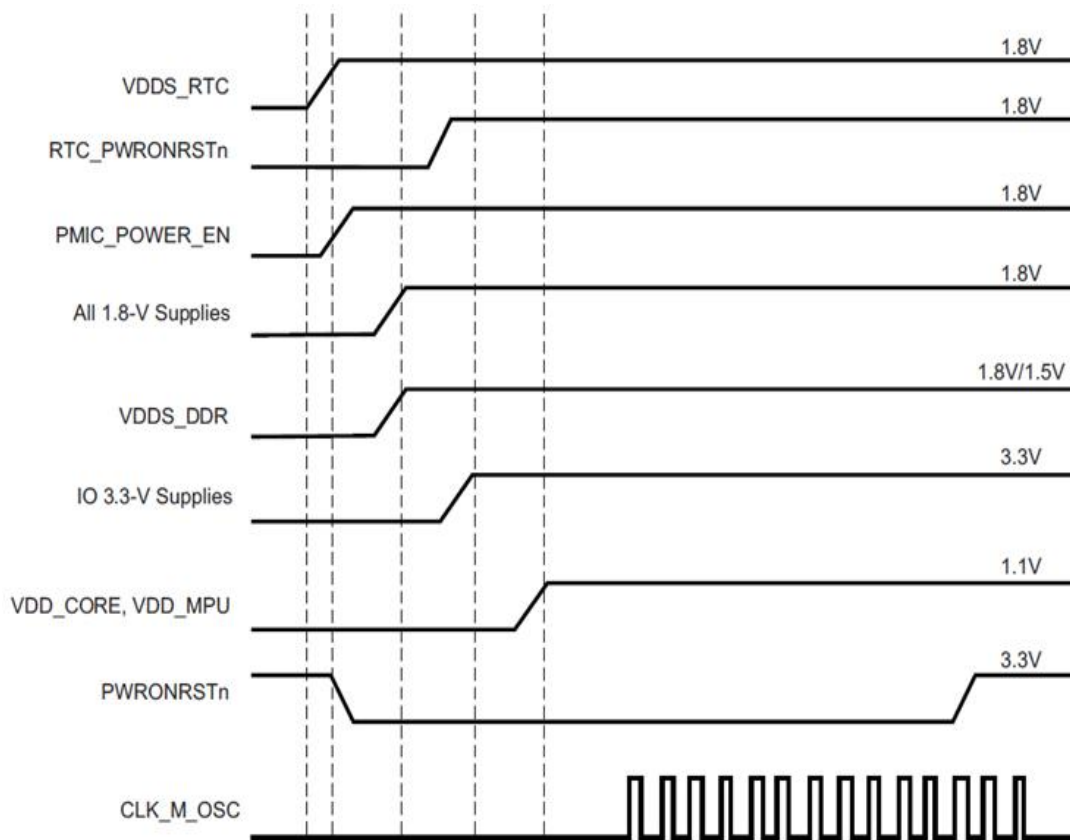


Figure 4-2 Power-on Order

4.2 DDR3 SDRAM

SDRAM controller supports up to 1GB addressing space. The interface circuit shows in figure 4-3.

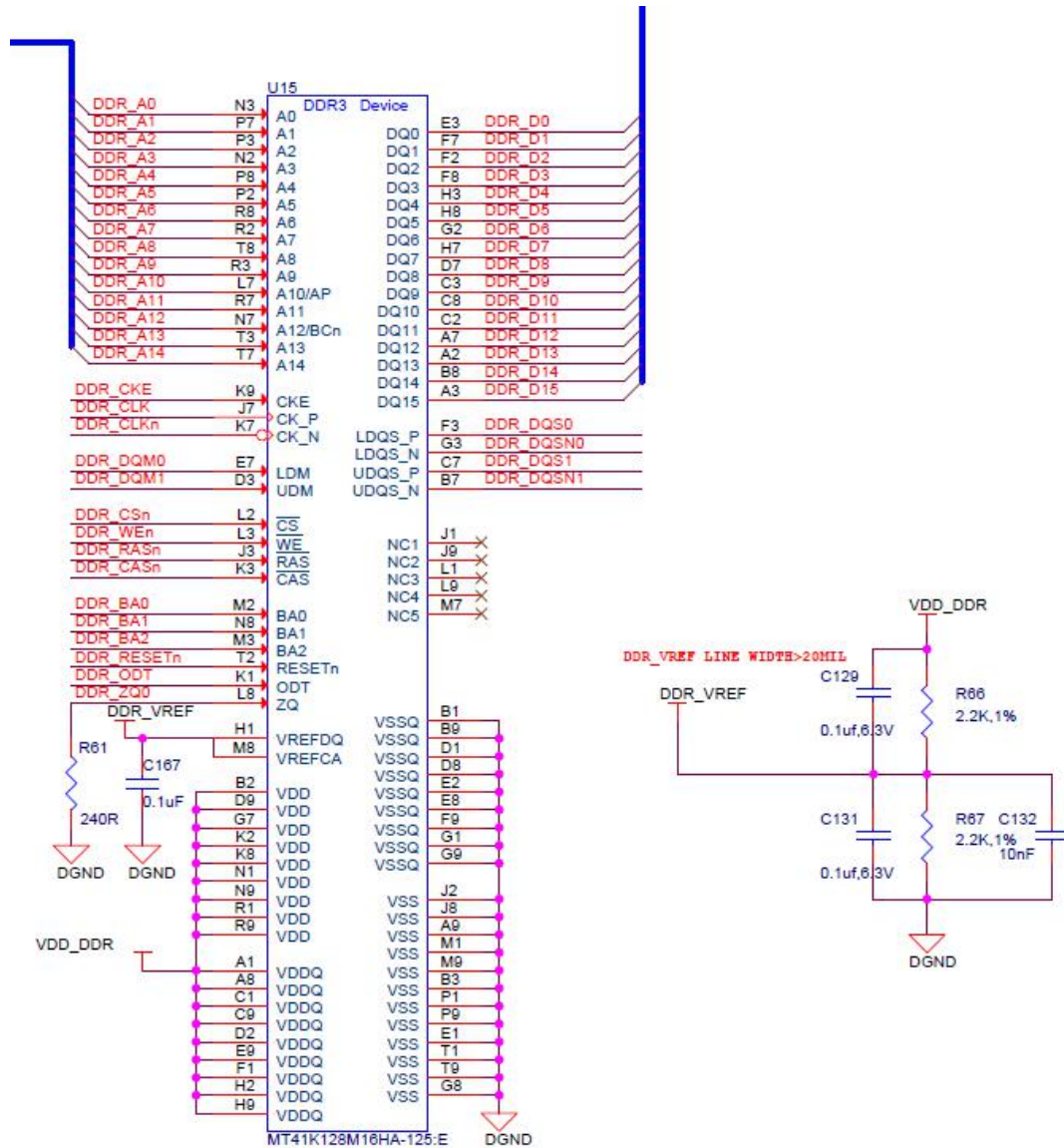


Figure 4-3 Interface Circuit of DDR3

eMMC and Nand Flash shares some of the same pins in AM335X MPU.MYC-Y335X keeps eMMC DNP by default.The interface circuit shows in figure 4-4.



4.4 Nand Flash

MYC-Y335X CPU module board has a Nand Flash with 256MB capacity by default ,and the Part type is MT29F2G08ABAEAWP.The interface circuit shows in figure 4-5.

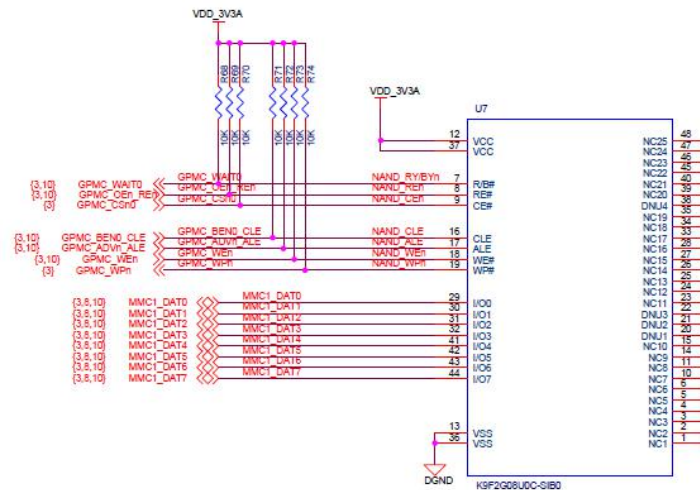


Figure 4-5 Interface Circuit of Nand Flash

4.5 EEPROM

EEPROM can be used for saving information like factory settings, device configuration and so on. The board has a EEPROM, and the part type is 24LC32A by default. The interface circuit shows in figure 4-6.

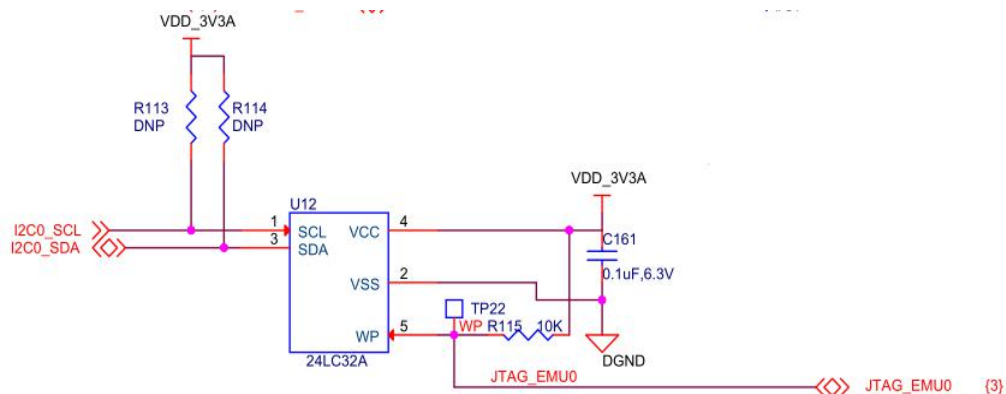


Figure 4-6 Interface Circuit of EEPROM

4.6 Ethernet

AM335X contains a 10/100/1000 Ethernet switch supporting up to two ports. MYC-Y335X CPU module board has one Ethernet PHY on board. The interface circuit shows in figure 4-7.

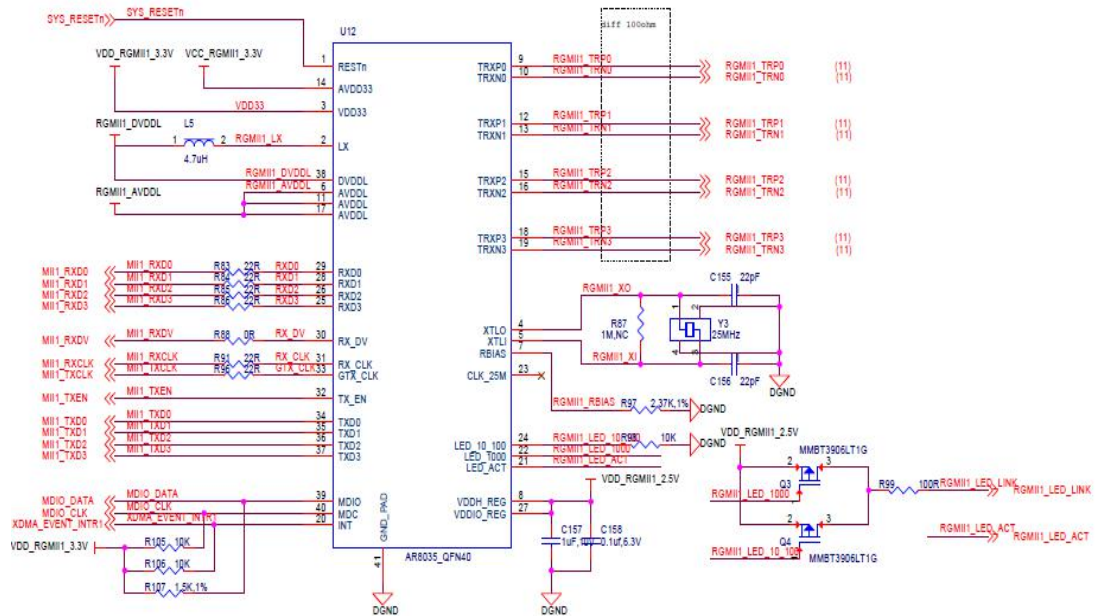


Figure 4-7 The Interface Circuit of Ethernet

4.7 Boot Mode

The ROM code performs platform configuration and initialization as part of the public start-up procedure. The booting device list is created based on the SYSBOOT pins. A booting device can be a memory booting device or a peripheral interface connected to a host. Once the booting device list is set up, the booting routine examines the devices enumerated in the list sequentially and either executes the memory booting or peripheral booting procedure depending on the booting device type.

For more about booting device, please refer to the documents of AM335X data sheet.

The interface circuit of booting configurations shows in figure 4-8.

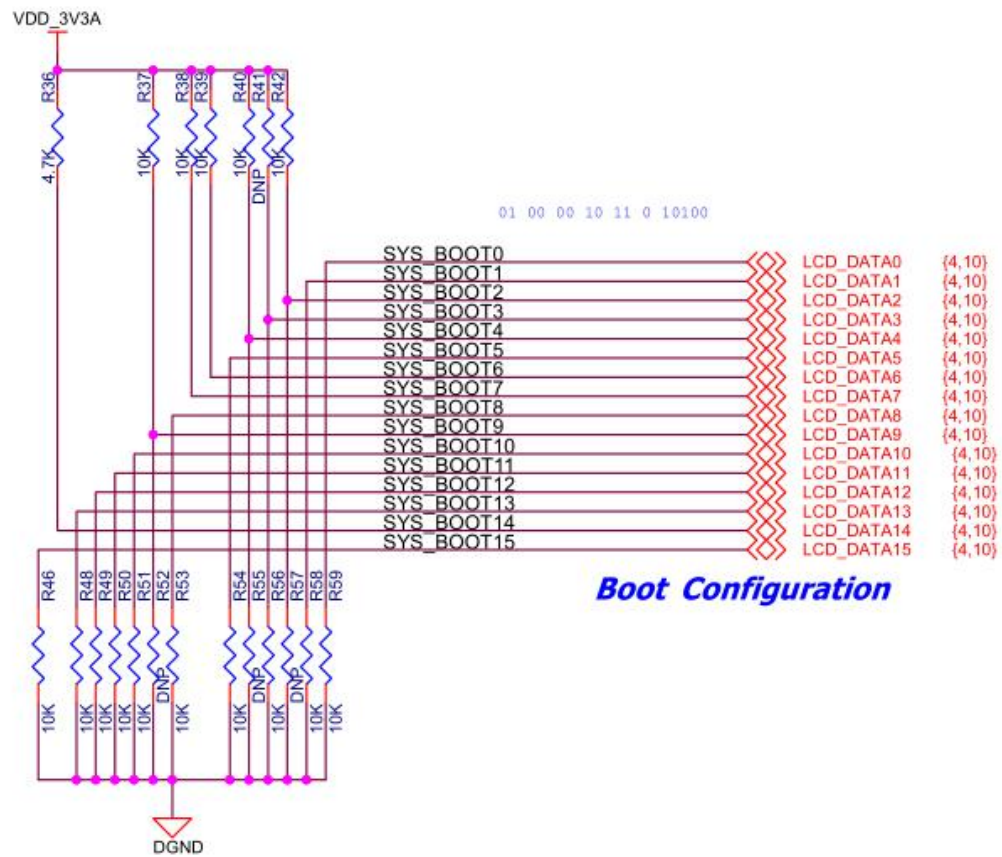


Figure 4-8 SYS_BOOT PINs Configurations

5. Electrical Parameter

5.1 Operate Temperature

Application Scenarios	Parameter					Des.
	MIN	Nor.	Max	Unit		
Commercial Level	0	—	+70	°C		—
Industrial Level	-40	—	+85	°C		—

5.2 GPIO Voltage

GPIO Voltage	Label	Parameter				Des.
		MIN	Nor.	MAX	Unit	
Input High voltage	V _{IH}	2.0	—	3.6	V	—
Input Low voltage	V _{IL}	-0.3	—	0.8	V	—
Output High Voltage	V _{OH}	2.9	—	—	V	—
Input Low Voltage	V _{OL}	—	—	0.4	V	—

5.3 Power Supply

Voltage	Label	Parameter				Des
		MIN	Nor	MAX	Unit	
Input Voltage	5V	4.75	—	5.25	V	—
Input Current	I _{5V}	—	280	—	mA	—
ADC ref Vol	VDDA_ADC0	—	1.8	—	V	Had Connected to 1.8V

6. Mechanical Parameter

- ◆ Operate Temperature:
 - ❖ Industrial Level Temperature: -40~+85 Degree
 - ❖ Commercial Level temperature: 0~+70 Degree
- ◆ Humidity: 20%~90%, Non-Condensing
- ◆ Mechanical Dimensions: 65 mm x 35 mm x 1.2mm
- ◆ Weight: 12g
- ◆ PCB Technical: 10 Layers PCB, Immersion Gold Process, Lead-Free
- ◆ Interface Type: 147 Pin stamp hole, pinpitch 1.27mm.
- ◆ Mechanical Size

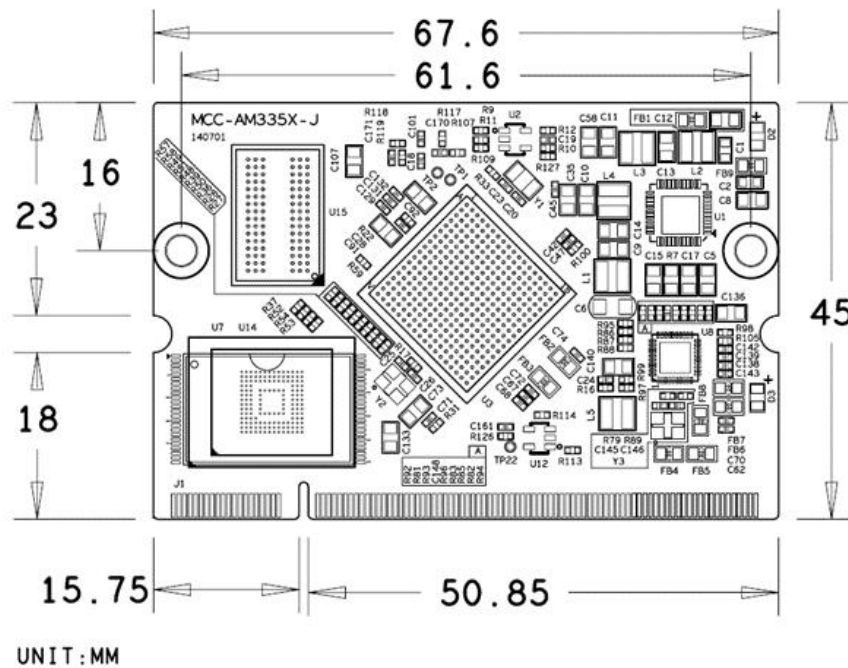


Figure 6-1 CPU Module Board Size Information

7. HW Development Kits

7.1 MYD-Y335X Development board

MYD-Y335X is using the MYC-Y335X CPU module as the core controller board and connected to base board through 1.27mm pitch 146-pin stamp hole interface. The board can work in harsh environment supporting -40 to +85 Celsius extended temperature operation for industrial embedded applications.

For more information, please visit the website <http://www.myirtech.com>.



Figure 7-1 MYD-Y335X Development Board

Appendix 1 Warranty & Technical Support Services

MYIR Tech Limited is a global provider of ARM hardware and software tools, design solutions for embedded applications. We support our customers in a wide range of services to accelerate your time to market.

MYIR is an ARM Connected Community Member and work closely with ARM and many semiconductor vendors. We sell products ranging from board level products such as development boards, single board computers and CPU modules to help with your evaluation, prototype, and system integration or creating your own applications. Our products are used widely in industrial control, medical devices, consumer electronic, telecommunication systems, Human Machine Interface (HMI) and more other embedded applications. MYIR has an experienced team and provides custom design services based on ARM processors to help customers make your idea a reality.

The contents below introduce to customers the warranty and technical support services provided by MYIR as well as the matters needing attention in using MYIR's products.

◆ Service Guarantee

MYIR regards the product quality as the life of an enterprise. We strictly check and control the core board design, the procurement of components, production control, product testing, packaging, shipping and other aspects and strive to provide products with best quality to customers. We believe that only quality products and excellent services can ensure the long-term cooperation and mutual benefit.

◆ Price

MYIR insists on providing customers with the most valuable products. We do not pursue excess profits which we think only for short-time cooperation. Instead, we hope to establish long-term cooperation and win-win business with customers. So we will offer reasonable prices in the hope of making the business greater with the customers together hand in hand.

◆ Delivery Time

MYIR will always keep a certain stock for its regular products. If your order quantity is less than the amount of inventory, the delivery time would be within three days; if your order quantity is greater than the number of inventory, the delivery time would be always four to six weeks. If for any urgent delivery, we can negotiate with customer and try to supply the goods in advance.

◆ Technical Support

MYIR has a professional technical support team. Customer can contact us by email (support@myirtech.com), we will try to reply you within 48 hours. For mass production and customized products, we will specify person to follow the case and ensure the smooth production.

◆ After-sale Service

MYIR offers one year free technical support and after-sales maintenance service from the purchase date. The service covers:

1. Technical support service

- a) MYIR offers technical support for the hardware and software materials which have provided to customers;
- b) To help customers compile and run the source code we offer;
- c) To help customers solve problems occurred during operations if users follow the user manual documents;
- d) To judge whether the failure exists;
- e) To provide free software upgrading service.

However, the following situations are not included in the scope of our free technical support service:

- a) Hardware or software problems occurred during customers' own development;
- b) Problems occurred when customers compile or run the OS which is tailored by themselves;
- c) Problems occurred during customers' own applications development;
- d) Problems occurred during the modification of MYIR's software source code.

2. After-sales maintenance service

The products except LCD, which are not used properly, will take the twelve months free maintenance service since the purchase date. But following situations are not included in the scope of our free maintenance service:

- a) The warranty period is expired;
- b) The customer cannot provide proof-of-purchase or the product has no serial number;
- c) The customer has not followed the instruction of the manual which has caused the damage the product;
- d) Due to the natural disasters (unexpected matters), or natural attrition of the components, or unexpected matters leads the defects of appearance/function;

- e) Due to the power supply, bump, leaking of the roof, pets, moist, impurities into the boards, all those reasons which have caused the damage of the products or defects of appearance;
- f) Due to unauthorized weld or dismantle parts or repair the products which has caused the damage of the products or defects of appearance;
- g) Due to unauthorized installation of the software, system or incorrect configuration or computer virus which has caused the damage of products.

Warm tips:

- 1) MYIR does not supply maintenance service to LCD. We suggest the customer first check the LCD when receiving the goods. In case the LCD cannot run or no display, customer should contact MYIR within 7 business days from the moment get the goods.
- 2) Please do not use finger nails or hard sharp object to touch the surface of the LCD.
- 3) MYIR suggests user purchasing a piece of special wiper to wipe the LCD after long time use, please avoid clean the surface with fingers or hands to leave fingerprint.
- 4) Do not clean the surface of the screen with chemicals.
- 5) Please read through the product user manual before you using MYIR's products.
- 6) For any maintenance service, customers should communicate with MYIR to confirm the issue first. MYIR's support team will judge the failure to see if the goods need to be returned for repair service, we will issue you RMA number for return maintenance service after confirmation.

3. Maintenance period and charges

- 1) MYIR will test the products within three days after receipt of the returned goods and inform customer the testing result. Then we will arrange shipment within one week for the repaired goods to the customer. For any special failure, we will negotiate with customers to confirm the maintenance period.
- 2) For products within warranty period and caused by quality problem, MYIR offers free maintenance service; for products within warranty period but out of free maintenance service scope, MYIR provides maintenance service but shall charge some basic material cost; for products out of warranty period, MYIR provides maintenance service but shall charge some basic material cost and handling fee.

4. Shipping cost

During the warranty period, the shipping cost which delivered to MYIR should be responsible by user; MYIR will pay for the return shipping cost to users when the product is repaired. If the warranty period is expired, all the shipping cost will be responsible by users.

5. Products Life Cycle

MYIR will always select mainstream chips for our design, thus to ensure at least ten years continuous supply; if meeting some main chip stopping production, we will inform customers in time and assist customers with products updating and upgrading.

◆ Value-added Services

MYIR provides services:

- ❖ driver development base on MYIR's products, like USB, Ethernet, LCD, etc.
- ❖ BSP drivers' development, API software development, etc.
- ❖ other products like power adapter, LCD panel, etc.
- ❖ ODM/OEM services.



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