SBC6845 Hardware Manual

Rev. 1.1

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（Rev 1.1）

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Shenzhen Embest Technology Co., Ltd

Tower B 4/F, Shanshui Building, Nanshan Yungu Innovation Industry Park, Liuxian Ave. No. 1183, Taoyuan St., Nanshan District, Shenzhen, China (518055)
Tel: +86-755-25635626-872/875
Fax: +86-755-25635626-666
Email: sales@embedinfo.com
http://www.embest-tech.com
http://www.armkits.com

Chapter 1 System Overview

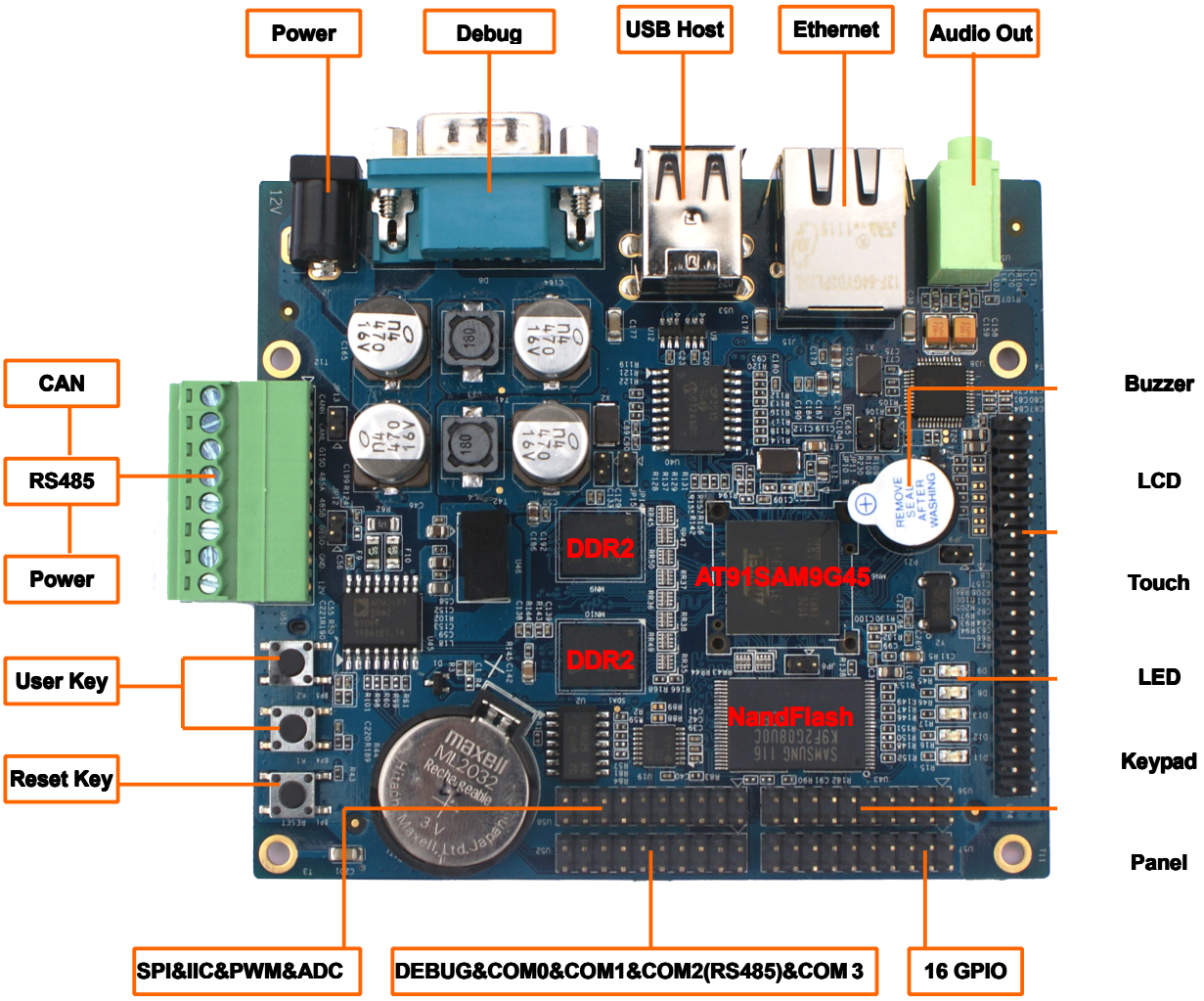
Embest SBC6845 is a high-performance ARM embedded single board computer (SBC) provided versatile communication interfaces to meet a wide variety of applications such as industrial control, automation, equipment monitoring, data logging, medical equipment, embedded web server etc. It is based on the 400MHz Atmel AT91SAM9G45 microprocessor and features wide input range from 8V to 23V(default 12V power input)

The SBC6845 board has128MB DDR2 SDRAM, 256MB Nand Flash, 4MB Data Flash and integrates UART, Ethernet, USB HOST, LCD, Touch screen, RTC on board. It also expand the SPI BUS、IIC（TWI1）BUS、PWM、ADC funtions . The SBC6845 also has expansion blocks such as CAN and SD card slot.

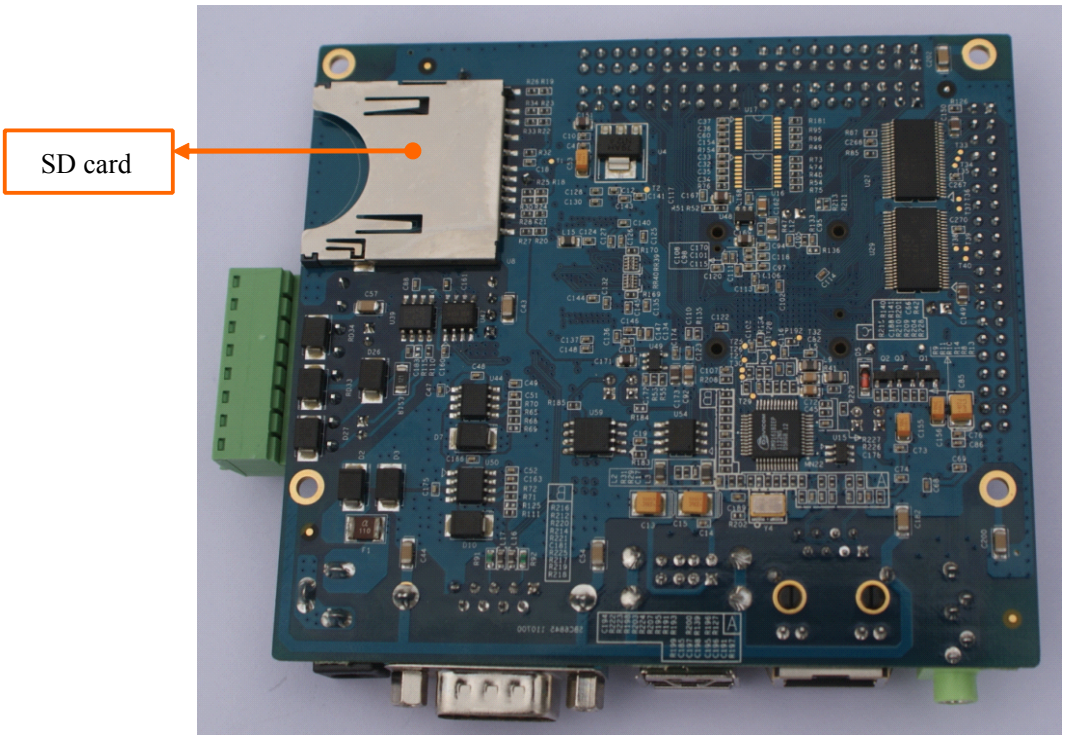
The board is capable of supporting Linux 2.6.30 open source operating system. Embest provides BSP package, user manual and some other tools and documents to help customer with their development. It would be a stand along platform ideal for your evaluation and fast your development work. It can be also used directly for your next product design.

Chapter 2 Hardware specifications

2.1 Hardware block diagram



Dimensions of PCB：106. 5*94mm（default without battery）



（LCD is optional）

SBC6845 consists of Two parts：

- Main Board（106.5*94mm）
- LCD module 4.3inch 480*272（optional）
- LCD module 7inch 800*480 （optional）

2.2 CPU characteristics

Processor:AT91SAM9G45，ARM926EJ-STM ARM

AT91SAM9G45 chip applies an ARM926EJ-S core with MMU function, which comprises a 64KB internal SRAM and a 64KB internal ROM,2 external bus interfaces. It can coordinate 4 Pieces DDR2/LPDDR,or 4 Pieces SDRAM/LPSDR， otherwise 4 Static Memory,or in the term of the same number of CF Flash Memories, SLC NAND Flash with ECC checking ability.

AT91SAM9G45 combines the function of User Interface and High Speed Data Connection together, such as LCD controller, Resistance Touch Screen, Camera input, Audio input, 10/100M Ethernet,High speed USB, SDIO and so on. AT91SAM9G45 provides user with outstanding experience through outstanding Internet and local memory media, operating at 400MHz and a number of external devices working at more than 100Mbps.

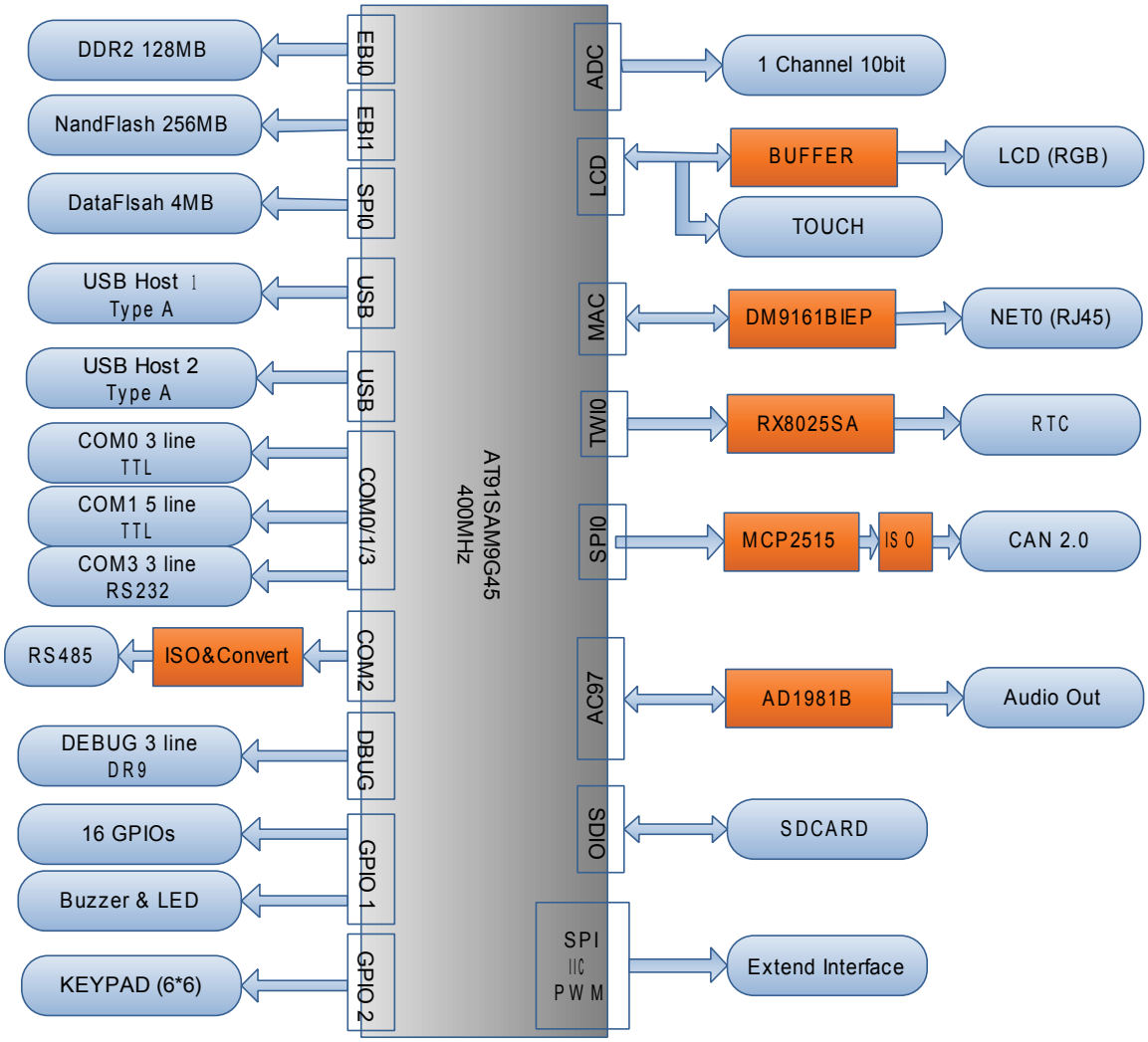
AT91SAM9G45 play the latest DDR2 and NAND flash memory interface for program and data storage. With a 133M internal multilayer bus interface of 37 DMA channels relative, a dual external bus interface, and a 64K byte distributed EMS memory which can deploy TCM, the necessary bandwidth for maintaining the communication between Processor and High speed external device is achievable.

AT91SAM9G45 efficient power management controller clock gating and battery backup part, AT91SAM9G45 power management controller in the power and standby mode reduces the power consumption to a minimum.

2.3 Function parameters

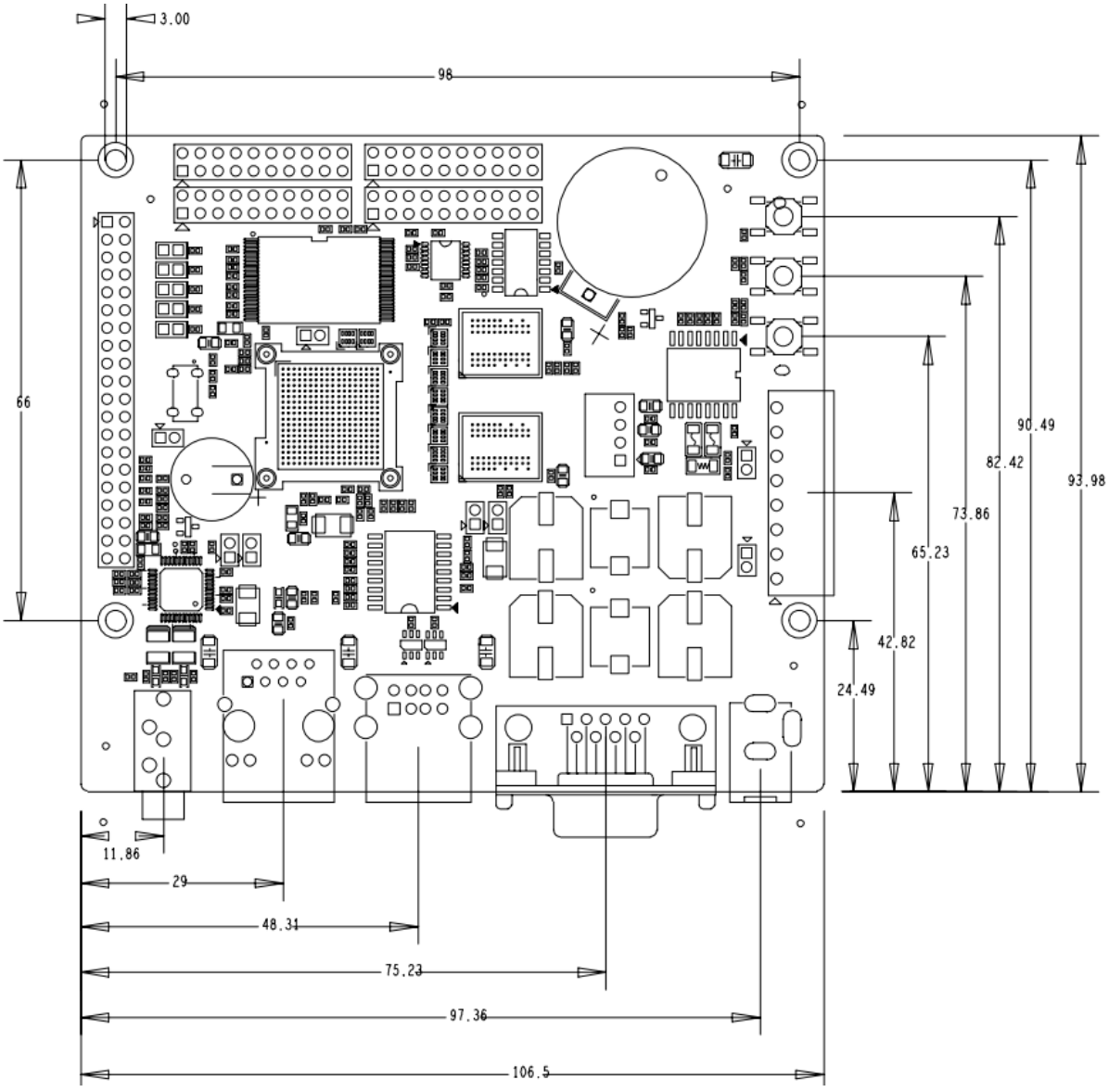
CLASS	FUNCTION	PARAMETER
Processor	CPU	Atmel AT91SAM9G45, ARM926EJ-S,400MHz
Memory	DDR2	128MB
	NandFlash	256MB
	DataFlash	4MB
	SD card	Support 4G SDIO mode Support hot-swappable
Communication	Serial port	DEBUG：3-wire RS232(TTL is designable)
		COM0： 3-wire TTL(RS232 is designable)
		COM1： 5-wire TTL(RS232 is designable)
		COM2： RS485 (with isolation)
		COM3： 3-wire RS232(TTL is designable)
	NET	MCU internal built-in controller, 10/100Mbps port with indicator
	USB HOST	2-channel USB 2.0 HOST; support USB Keyboard，USB Mouse, USB storage..
	CAN-BUS	1 CAN2.0 communication interfaces get power and isolate signal by a SPI expansion
Display	LCD	CPU supports a maximum resolution of 1280 * 860 pixel, 16 bit RGB color mode, the current4.3,7-inch screen matching well
Input/output	keypad	6x6 matrix keyboard interface
	Touch screen	4-line touch screen
	Buzzer	1 Buzzer
	Audio Out	Audio output support MP3
	GPIO	16 GPIO
Panel	Reset key	RESET
	LED	Power indicator light 、CPU status、IOs
	IO key	2 IO keys
Expansion	1 SPI	Supply to User
	1 IIC	Supply to User
	1 PWM	Supply to User
	1 ADC	10 bit AD
Others	RTC	RTC(default without battery)
	Power Supply	12V power input

2.4 General system structure diagram



Chapter 3 Function Interfaces

3.1 LAYOUT



Interface Details

3.2 POWER(J2 OR U51）

- Configure DC jack connector（J1）and 3.5mm wiring devices（U51），power supply with

DC 12V

- Input voltage:DC 12V
- The power can be protected by fuse, 1.85A limited
- Interface pins are defined as follows: (FGND for the chassis ground)
- Onboard Item NO:J1

POWER (J2)	3	VDD12V
	2	GND
	1	GND

J2 definition

POWER (U51)	7	GND
	8	VDD12V

U51 definition

3.3 SD CARD (U8)

- High-speed SD card interface
- 4-bit parallel bus data transfer mode
- Compatible SD / MMC interface card
- SD / MMC interface reference CPU resources as follows:

SDCARD	PD10	SW_1
	PD11	SW_2
	PA2	DAT0
	PA3	DAT1
	PA4	DAT2
	PA5	DAT3
	PA1	DCMD
	PA0	CLK

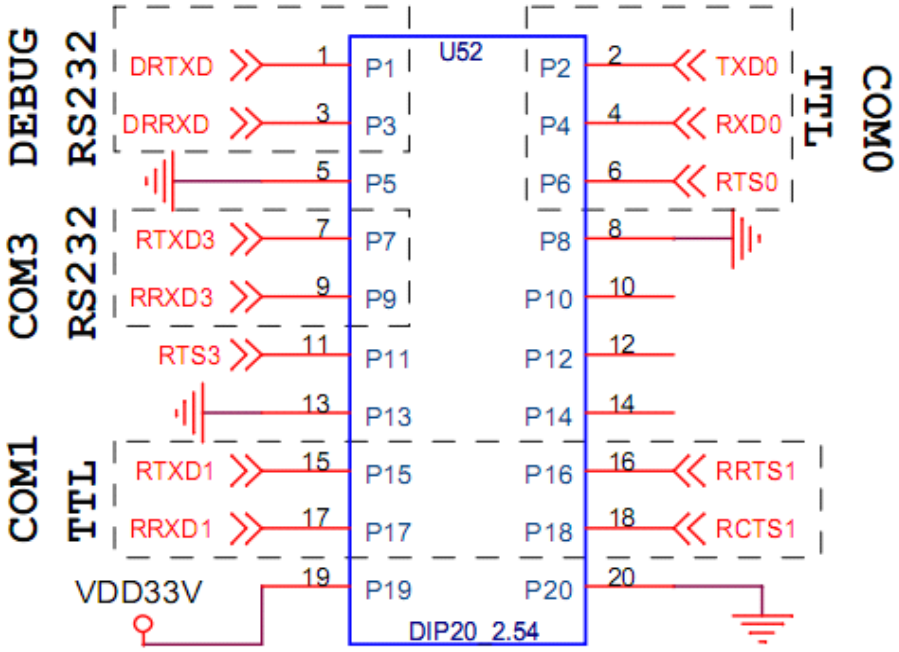
3.4 NET(J15)

- The CPU built-in controller
- Work speed: 100Mbps
- Work mode: RMII
- Output interface adopts RJ45 connectors
- CPU resources as follows:

NET	PA10	EXT0
	PA11	EXT1
	PA12	ERX0
	PA13	ERX1
	PA14	ETXEN
	PA15	ERXDV
	PA16	ERXER
	PA17	E_TXCK
	PA18	EMDC
	PA19	EMDIO
	PD5	MDINT

3.5 UART

UART (DEBUG, COM0, COM1, COM2,COM3), all comes from the MCU resource controller



2.54mm pitch connector

3 lines serial interface characteristics are as follows:

Signal input/output level: RS232

Maximum data rate: 115.2kbps

Flow Control: None

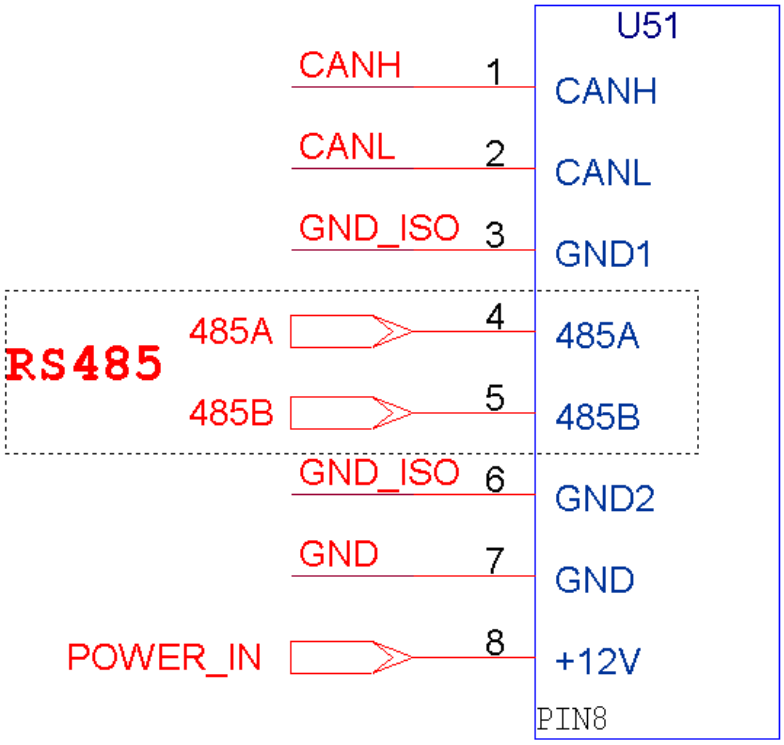
Connector: DR9 male/Pins

5 lines serial interface characteristics are as follows:

Signal input/output level: RS232

Maximum data rate: 115.2kbps

Flow Control: CTS, RTS



Connector: 2.54mm pitch connector（U52）/ 3.5mm pitch connector（U51）

NO.	Function	CPU Resource	Pins	Description
1	DEBUG(3lines)	PB12,PB13	D8(DB9)/U52 (PIN1、3)	RS232 (default) TTL-level be configured by optional resistor
2	COM0(3lines)	PB17(RTS0),PB18,PB19	U52 (PIN2、4、6)	TTL-level (default) RS232 be configured by optional IC
3	COM1(5 lines)	PB4,PB5,PD16,PD17	U52 (PIN15、16、17、18)	TTL-level (default) RS232 be configured by optional IC
4	COM2(3 lines)	PB6,PB7,PC9(RTS2)	U51 (PIN4、5)	RS485
5	COM3(3 lines)	PB8,PB9,PA23(RTS3)	U52 (PIN7、9、11)	RS232 (default) TTL-level be configured by optional resistor

3.6 BUZZER(PZ1)

- Resources：PB20

- Low voltage effective(Active low)

3.7 USB HOST(U53)

- Standard Type A connector with double port
- Resources（HDMA、HDPA、HDMB、HDPB）
- Onboard Item NO：U53
- High-speed USB 2.0 communication interface

3.8 AUDIO OUT(U55)

- Standard 3.5mm audio in/out connector
- 32 Ω Output Load (HP_OUT)
- Resources：

AC97	PD6	AC97RX
	PD7	AC97TX
	PD8	AC97FS
	PD9	AC97CK

3.9 LCD(U24)

- Connectors :dual row pin headers 40PIN(2*20) 2.54mm
- The CPU supports maximum definition of 1280*860
- Onboard Item NO：U24

Signal description：

R red data wire
G green data wire
B blue data wire
PWREN power en signal :PB28(active low)
PE3(VSYNC) VSYNC
PE4(HSYNC) HSYNC
PE5(DCLK) data clock
PD31(PWM) LCD brightness control
PE6(LCDDEN) LCDVDEN
GND Ground

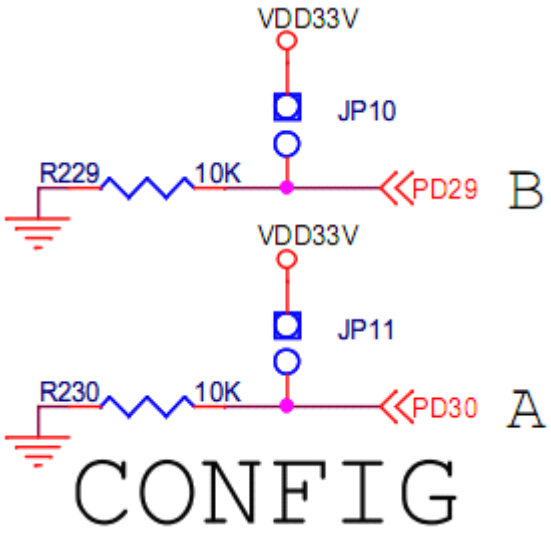
U24 definition：

LCD		GND	1	2	DCLK	PE5

	PE4	HSYNC	3	4	VSYNC	PE3
		GND	5	6	--	
	PE10	R3	7	8	R4	PE11
	PE12	R5	9	10	R6	PE13
	PE14	R7	11	12	GND	
	PE17	G2	13	14	G3	PE18
	PE19	G4	15	16	G5	PE20
	PE21	G6	17	18	G7	PE22
		GND	19	20	--	
	PE26	B3	21	22	B4	PE27
	PE28	B5	23	24	B6	PE29
	PE30	B7	25	26	GND	
	PE6	LCDDEN	27	28	VDD33V	
		VDD33V	29	30	PE1_IO	PE1
	PE2	PE2_IO	31	32	Y+	
		X-	33	34	Y-	
		X+	35	36	PWREN	PB28
		VDD5V	37	38	PWM	PD31
		VDD5V	39	40	VIN_12V	

Reminder: before you use a LCD,you must config the jumper（JP10，JP11）

JP11	JP10	LCD TYPE
0	0	4.3 inch LCD（480x272）
0	1	5.6 inch LCD（640x480）
1	0	7 inch LCD（800x480）
1	1	10.4 inch LCD（800x600）



When the system started, it will read the config pins, then the right LCD driver will be loaded.

3.10 LED

- Resources and NO：PB21(D12)、PB22（D13）、PD0（D6）、PA25（D9）
- Low voltage effective(Active low)
- LED use：

LED	PB21	D12	system status indicator（default）
	PB22	D13	status indicator
	PD0	D6	USER LED
	PA25	D9	
	VDD33	D11	POWER indicator

3.11 CAN(U51)

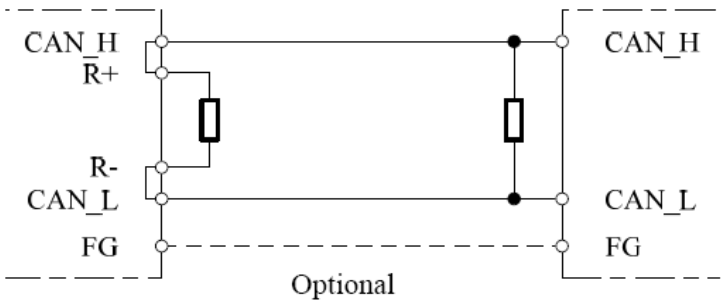
- CAN2.0 is extended through MCP2515 and led out through connector（NO U51）, It is with isolated resource and digital signal isolator
- 1 CAN communication interface are extended through one groups of SPI controller
- DC/DC power isolating module
- Magnetic isolating protection
- Max communication speed is 1Mbps
- Supports CAN2.0B protocol
- Terminal resistor connection (Onboard configuration JP13)
- Onboard Item NO：U51
- Resources：

CAN	PB0	SPI0_MISO
	PB1	SPI0_MOSI
	PB2	SPI0_SPCK
	PD24	SPI0_NPCS1
	PD25	INT

- CAN communication interface output to U51 Wiring connector is defined as follows：

PIN（U51）	Signal	Remark
1	CANH	
2	CANL	
3	GND_ISO	Isolate ground

If the establishment of CAN networking needs terminal resistance ,it can be achieved by applying the jumper cap U51 of matching resistor.
(Note: This terminal matching resistance can only be used at both ends of UTP, meanwhile mid device does not require)



3.12 RTC

- Precise RTC, 3.0V battery backed (user need to prepare the battery themselves, recommended Model: CR2032)

- The data of clock will not be lost even in case of power failure.
- Accurate time keeping
- Low power consumption
- Resources：TWI（PA20、PA21）

3.13 KEY

- 3 key: Reset、K1、K2
- Resources：NRST、 PB25、PB26、
- Key use：

NO.	Function
RESET	System reset
K1	User Key
K2	

3.14 GPIO (U57)

- Connector: (U57)20PIN（10*2）straight pin headers，2.54mm
- GPIO voltage 0V（low），3.3V（high）
- 16 GPIOs come from CPU
- All of them can be configured as interruption mode
- Programmable 100 kΩ pull up register is installed inside the chip.
- Input voltage：VIL=-0.3~0.8v，VIH=2~3.6v
- Output voltage：Vol=<0.1v，VoH=2.9~3.3v
- Output current：8mA
- Onboard Item NO.：U57
- U57 definition：

PA22	1	2	PB29
PA24	3	4	PB30
PA26	5	6	PB23
PA27	7	8	PB24
PA28	9	10	PD12
PA29	11	12	PD13
PA30	13	14	PD14
PA31	15	16	PD28
VDD33V	17	18	GND
VDD5V	19	20	GND

3.15 Keyboard (U56)

- Connector: (U56) 20PIN（10*2）straight pin headers，2.54mm

- Support 6*6 matrix key board
- IOs come from CPU
- Resources（PC16、PC17、PC18、PC19、PC20、PC21、PC22、PC23、PC24、PC25、PC26、PC27）
- Onboard Item NO.：U56
- U56 definition：

PC22_C1	1	2	PC16_R1
PC23_C2	3	4	PC17_R2
PC24_C3	5	6	PC18_R3
PC25_C4	7	8	PC19_R4
PC26_C5	9	10	PC20_R5
PC27_C6	11	12	PC21_R6
GND	13	14	GND

3.16 Panel (U56)

- Connector: (U56) 20PIN（10*2）straight pin headers，2.54mm
- Panel can be redefined by user

  Explanation:

  NRST Reset active low

  PB21 Status indicator（With D12 multiplexed IO onboard）

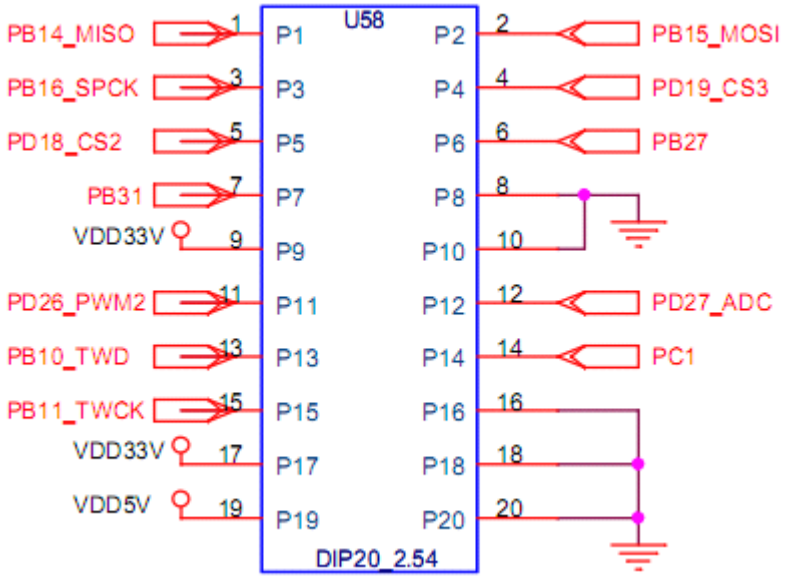
  PB22 Status indicator（With D13 multiplexed IO onboard）
- U56 definition：

PB21	15	16	470 Ω GND
PB22	17	18	470 Ω GND
NRST	19	20	GND

（Customers can directly access to device panel used for status indication）

3.17 SPI&IIC&PWM&ADC (U58)

- Connector: (U58) 20PIN（10*2）straight pin headers，2.54mm
- Expand Functions：1 SPI1 BUS、1 IIC（TWI1）BUS、1 PWM、1 ADC
- SPI Resources：PB14（SPI1_MISO）、PB15（SPI1_MOSI）、PB16（SPI1_SPCK）、PB17（SPI1_NPCS0）、PD18（SPI1_NPCS2）、PD19（SPI1_NPCS3）、PB27
- IIC（TWI1）Resource：PB10（TWD1）、PB11（TWCK1）、PC1
- PWM Resource：PD26（PWM come from CPU）
- ADC Resource：PD27，10bit，Maximum sampling rate：384K
- Onboard Item NO：U58
- U58 definition：



PB14	1	2	PB15
PB16	3	4	PD19
PD18	5	6	PB27
PB31	7	8	GND
VDD33V	9	10	GND
PD26	11	12	PD27
PB10	13	14	PC1
PB11	15	16	GND
VDD33V	17	18	GND
VDD55V	19	20	GND

Chapter 4 System electrical description

- Power input：DC 12V(default)
- Power input range：DC (8-24V)
- Kinds of power：+1V，+1.8V，+3.3V，+5V，+12V
- Total power consumption：12V/0.16A(Without LCD Screen)
- Ambient temperature：-40-85℃