CC-218 MCU BOARD Design

2024/03/26
2025/04/07

Specifications

Outline spec

MCU: Microchip PIC18F2520, 28pin slim DIP
Sensors: IR receiver (Vishay TSOP34838)
Interface: RS232C for console and DVCS, I^2C Bus for display driver IC, Dedicated serial bus for volume IC
Volume sensor: 1kohm VR
Power supply: DC+5V ~~2A~~3A ==> supply to Display Board and VOL Board from this board
2025/04/07

Interface spec

*** Volume IC (PGA2310)**

6 signals, ZCEN, nCS, SCLK, SDI, SDO, nMUTE, are connected to general I/O pins
Firmware controls these 6 signals

*** Display driver (AS1115)**

I^2C Bus: SDA, SCL
Interrupt: IRQ (when the state of Rotary Switch changes)
Master: MCU, Slave: AS1115

*** RS232C**

EUSART, asynchronous, 3-wire: TX, RX, GND

*** TSOP34838**

Connected to general I/O pin

*** VR**

10kHz square wave generated by timer ==> 10kHz sine wave ==> Divided by VR ==> Rectified ==> ADC

*** Debugger/Programmer**

In-Circuit Debugger/Programmer Microchip PICkit 5 supported
ICSP (In-Circuit Serial Programming) supported
SK1 (3-pin header, the designator should be PL307): 1-2: Normal, 2-3: Program

PCB spec

*** Basic spec**

t=1.6mm, double-sided PCB
Substrate: FR-4
Copper: Tough pitch, t=35um
Finish: LeadFree HASL
Track width (signal): 0.152mm (min), 0.2mm (norm)
Track width (power/GND): 0.152mm (min), 0.5mm (norm)
Spacing track to track: 0.152mm
Spacing track to via: 0.304mm
Spacing track to pad: 0.152mm
Small via (for signal track): hole: 0.3mm, width: 0.6mm
Large via (for power/GND track): hole: 0.6mm, width: 1.2mm

*** Dimension**

See the sheet "PcbDesign".

*** Layout of the key parts**

See the sheet "PcbDesign".

MCU spec

*** Port definition of MCU**

2024/11/02

Port	I/O	D/A	Name	Pin#	Function
A	I	A	AN0	2	Input from VR (analog)
	O	D	RA1	3	ZCEN (to PGA2310)
	O	D	RA2	4	nCS (to PGA2310)
	O	D	RA3	5	SCLK (to PGA2310)
	O	D	RA4	6	SDI (to PGA2310)
	I	D	RA5	7	SDO (from PGA2310)
	O	D	RA6	10	nMUTE (to PGA2310)
	O	D	RA7	9	(unused)
B	O	D	RB0	21	SEL_P
	O	D	RB1	22	SEL_D
	O	D	RB2	23	SEL_A
	O	D	RB3	24	(unused)
	I	D	RB4	25	nIR_IN (from TSOP34838)
	I	D	PGM	26	(unused, pulled down)
	I	D	PGC	27	Clock (from debugger)
	I/O	D	PGD	28	Data (to/from debugger)
C	O	D	RC0	11	(unused)
	O	D	RC1	12	IRQ (from AS1115)
	O	D	CCP1	13	SQ_WAVE (10kHz square wave)
	O	D	SCL	14	Clock of I^2C (to AS1115)
	I/O	D	SDA	15	I^2C data/address (to/from AS1115)
	I	D	RC5	16	(unused)… used for test LED
	O	D	DVCS_TX	17	Async Tx of RS232C
	I	D	DVCS_RX	18	Async Rx of RS232C
E	I	P	Vpp	1	Programing power (from debugger)

*** Master clock for MCU**

Freuency: 8MHz

Internal oscillator used

*** Reset Circuit for MCU**

Internal reset circuit used

*** Debugger/Programmer support**

Interface to PICkit 5 is equipped

Connector spec

*** PL301: +5V**

Connected with: PS3 (AC/DC converter, 5V/2A)

Connector: S4B-XH-A (4-pin SIL, 2.5mm spacing)

Pin assignment:

Pin#	Signal	Function	Note
1	DGND	Digital ground	
2	DGND	Digital ground	
3	+5V	Power supply for digital circuits	
4	+5V	Power supply for digital circuits	

*** PL302: Display**

Connected with: BD1 Display Board

Connector: S8B-XH-A (8-pin SIL, 2.5mm spacing)

Pin assignment:

Pin#	Signal	Function	Note
1	DGND	Digital ground	
2	SDA	Data of I^2C Bus	
3	SCL	Clock of I^2C Bus	
4	IRQ	Interrupt request	
5	+5V	Power supply for digital circuits	
6	+5V	Power supply for digital circuits	
7	DGND	Digital ground	
8	DGND	Digital ground	

*** PL303: SEL**

Connected with: BD4 VOL Board

Connector: S14B-XH-A (14-pin SIL, 2.5mm spacing)

Pin assignment:

Pin#	Signal	Function	Note
1	nMUTE	Mute	Active low
2	ZCEN	Zero Crossing Enable Input	
3	nCS	Chip Select	Active low
4	SCLK	Serial Clock	
5	SDI	Serial Data In	
6	SDO	Serial Data Out	
7	+5V	Power supply for digital circuits	
8	+5V	Power supply for digital circuits	
9	DGND	Digital ground	
10	DGND	Digital ground	
11	nSEL_PHONO	Select PHONO	Active low
12	nSEL_DAC	Select DAC	Active low
13	nSEL_AUX	Select AUX	Active low
14	DGND	Digital ground	

*** PL304: DVCS**

Connected with: DVCS Jack in Back Panel

Connector: B3B-XH-A (3-pin SIL, 2.5mm spacing)

Pin assignment:

Pin#	Signal	Function	Note
1	DGND	Digital ground	
2	TX	Transmitted Data	Complied to RS232C spec
3	RX	Received Data	Complied to RS232C spec

*** PL305: VR**

Connected with: Variable Resistor in VOL Compartment

Connector: B3B-XH-A (3-pin SIL, 2.5mm spacing)

Pin assignment:

Pin#	Signal	Function	Note
1	COLD	Cold (=DGND)	Connected to P1 of VR
2	WIPER	Wiper	Connected to P2 of VR
3	HOT	Hot	Connected to P3 of VR

*** PL306: Debugger**

Connected with: MPLAB PICkit 5 (in-circuit debugger/programmer)

Connector: B3B-XH-A (3-pin SIL, 2.5mm spacing)

Pin assignment:

Pin#	Signal	Function	Note
1	TVPP	Power supply for programming	Connected to VPP of MCU
2	TVDD	Power supply for MCU/Debugger	Connected to +5V
3	GND	Digital ground	Connected to DGND
4	PGD	Data to be programmed	Connected to PGD of MCU
5	PGC	Clock for programming	Connected to PGC of MCU
6	TAUX	(Signal for other types of MCU)	(Unused)
7	TIDI	(Signal for other types of MCU)	(Unused)
8	TIMS	(Signal for other types of MCU)	(Unused)

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