MINDRACER GEN.3 REDPOLL

Datasheet

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Introduction

MindRacer Gen.3 Redpoll is a new generation flight controller designed for racing drone and other miniature size drones. Within the same 35x35mm racing drone form-factor, the new generation features more powerful MCU, larger memory, and more I/O ports than its predecessors. The hardware is re-designed to be the essential part of modularized drone architecture.

Hardware specification

On-board elements

- STM32H743VIT6 MCU (400MHz, 2MB flash storage)
- IMU sensors
  - ICM20602 6-axis accelerometer & gyro (on SPI4)
  - QMC5883L compass (on I2C1)
  - DPS310 barometer (on I2C1)
- CAN bus transceiver (TJA1051TK/3)
- System status tricolor LED
- TF card slot (SPI3 to MMCSD)
- USB-C connector
- 6-pin Mini-debug port
- 12-pin isolated redundant IMU socket (shared bus)
- 98-pin WEP2 I/O connectors (48 (bottom) + 50 (top and bottom))

Top side

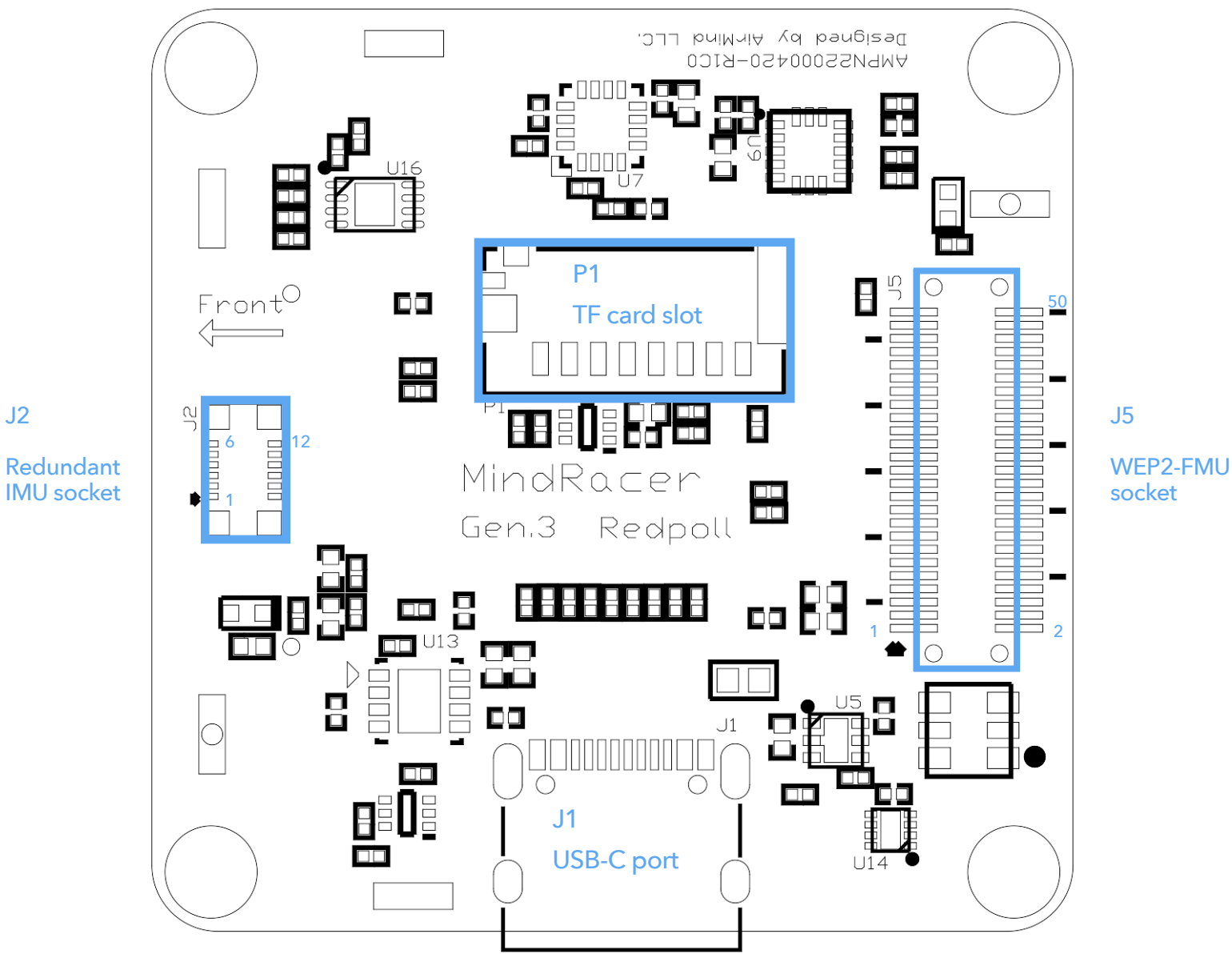

Fig.1 Top side

Bottom side (see through)

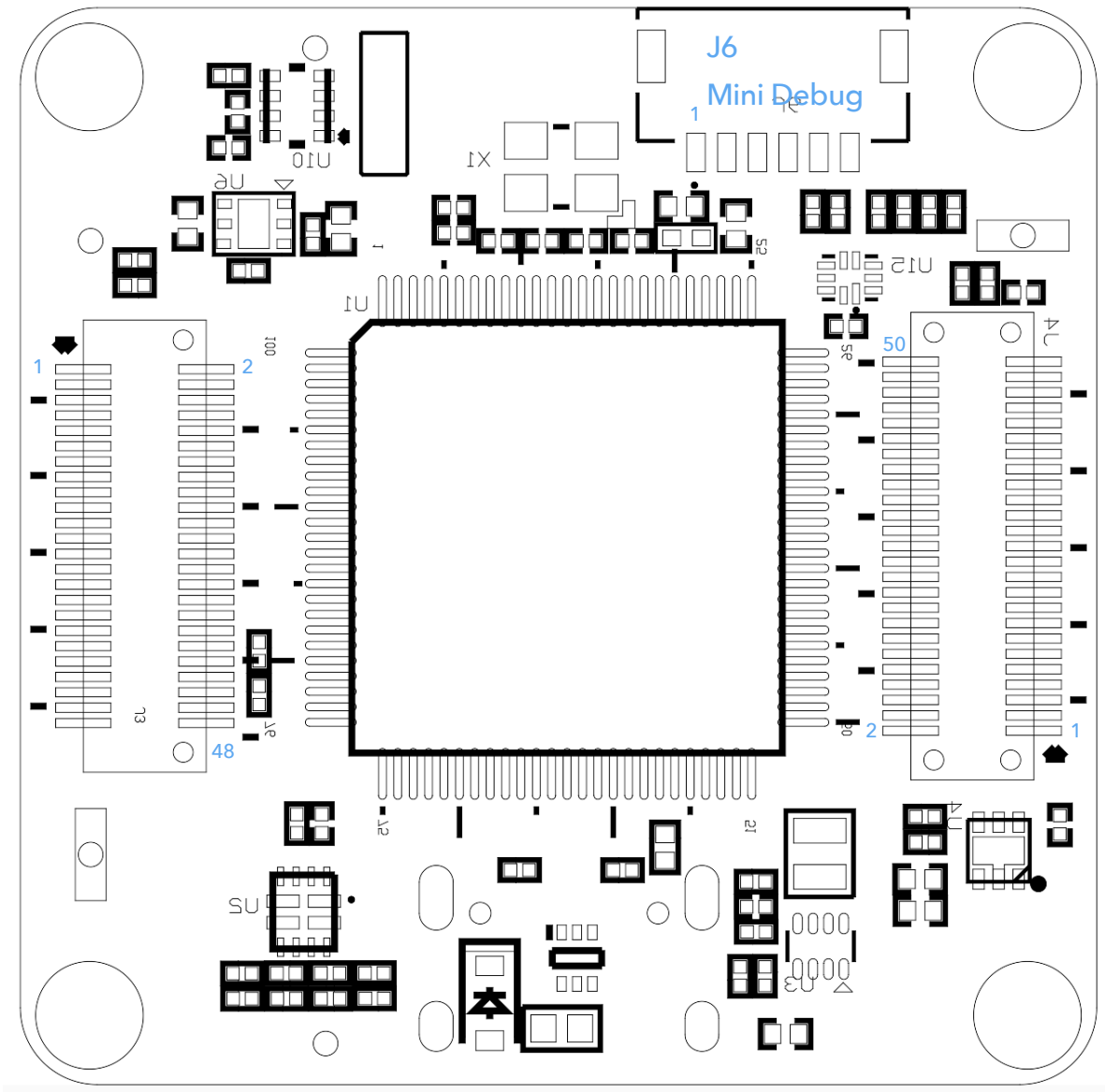

Fig.2 Bottom side (see through)

I/O specification

- Total 14 PWM outputs (8 AUX channels + 6 FMU channels)
- Spare ADC 6.6V x 1
- PWM capture input channel x 1
- External SPI bus x 1
- S.Bus input/output
- ESC telemetry input x 1
- CAN x 1
- ETH RMII x 1
- Full UART x 1 (with flow control), USART x 2
- I2C x 2

Connector specification

O - Output direction (From MCU to device)

I - Input direction (From device to MCU)

I/O - bi-direction

NC - no connection

Mini-debug port specification (J6)

Pin #	Signal name	Direction	Level/default	pin#	Signal name	Direction	Level/default
1	VRef	O	3.3V	4	FMU_SWDIO	I/O	3.3V
2	FMU_USART3_TX	O	3.3V	5	FMU_SWCLK	O	3.3V
3	FMU_USART3_TX	I	3.3V	6	GND	N/A	N/A

Table.1 Mini-debug port

Redundant IMU socket specification (J2)

Pin #	Signal name	Direction	Level/default	pin#	Signal name	Direction	Level/default
1	FMU_SPIx_SYNC	O	3.3V	7	FMU_SPI4_DRDY2_SENSOR	I	3.3V
2	NC	N/A	N/A	8	FMU_SPI4_nCS2_SENSOR	O	3.3V
3	GND	N/A	N/A	9	FMU_SPI4_MOSI_SENSOR	O	3.3V
4	FMU_Heater	O	3.3V	10	FMU_SPI4_MISO_SENSOR	I	3.3V
5	FMU_I2C1_SDA	I/O	3.3V	11	FMU_SPI4_SCK_SENSOR	O	3.3V
6	FMU_I2C1_SCL	O	3.3V	12	VENSOR_3V3	O	3.3V

Table.2 Redundant IMU socket (Panasonic AXE512127)

WEP2 interface specification (J3, J4, J5)

WEP2 interface brings out total 98 I/O signals, provided by one 48-pin connector (named WEP2_DOWN) and one 50-pin connector(named WEP2_FMU). The connectors can be either plug (bottom side mount) or socket (top side mount).

Note: The WEP2 plug's pin definition is a swap of even pin column and odd pin column in following tables of socket. E.g., WEP2-DOWN plug's pin #1 is pin #2 of WEP2-DOWN socket, etc.

WEP2-DOWN (socket)

Pin #	Signal name	Direction	Level/default	pin#	Signal name	Direction	Level/default
1	FMU_CH1	O	3.3V	2	AUX_CH1	O	3.3V
3	FMU_CH2	O	3.3V	4	AUX_CH2	O	3.3V
5	FMU_CH3	O	3.3V	6	AUX_CH3	O	3.3V
7	FMU_CH4	O	3.3V	8	AUX_CH4	O	3.3V
9	FMU_SPI2_EXT_nRST	O	3.3V	10	AUX_CH5	O	3.3V
11	FMU_SPIx_SYNC	O	3.3V	12	AUX_CH6	O	3.3V
13	Reserved			14	AUX_CH7	O	3.3V
15	FMU_I2C1_SCL	O	3.3V	16	AUX_CH8	O	3.3V
17	FMU_I2C1_SDA	I/O	3.3V	18	Reserved		
19	GND	N/A	N/A	20	Reserved		
21	FMU_UART5_TX_SBUS_TX	O	3.3V	22	ETH_MDIO	I/O	3.3V
23	ESC_TELEM_UART5_RX	I	3.3V	24	ETH_MDC	O	3.3V
25	Reserved			26	FMU_SPI2_EXT_DRDY1	I	3.3V
27	Reserved			28	FMU_SPI2_EXT_nCS1	O	3.3V
29	Reserved			30	Reserved		
31	GND			32	Reserved		
33	RC_RSSI	I	3.3V	34	Reserved		
35	GND	N/A	N/A	36	GND	N/A	N/A
37	BAT_VOL_SENSE	I	3.3V	38	Reserved		
39	BAT_CUR_SENSE	I	3.3V	40	Reserved		
41	GND	N/A	N/A	42	GND	N/A	N/A
43	VBAT_FC_5V	I	5V	44	VBAT_FC_5V	I	5V
45	VBAT_FC_5V	I	5V	46	VBAT_FC_5V	I	5V
47	VBAT_FC_5V	I	5V	48	VBAT_FC_5V	I	5V

Table.3 WEP2-DOWN socket pin definition

WEP2-FMU (socket)

Pin #	Signal name	Direction	Level/default	pin#	Signal name	Direction	Level/default
1	VBAT_12V	I	12V	2	VPE_5V	O	5V
3	VBAT_12V	I	12V	4	VPE_5V	O	5V
5	VBAT_12V	I	12V	6	VPE_5V	O	5V
7	FMU_USART1_TX	O		8	VPE_3V3	O	3.3V
9	FMU_USART2_RX_SBUS_IN	I		10	BUZZ	O	
11	ETH_TX_EN	O		12	GND	N/A	N/A
13	nARMED	I/O		14	ETH_TXD0	O	
15	Reserved			16	ETH_TXD0	O	
17	Reserved			18	GND	N/A	N/A
19	Reserved			20	FMU_CAP1	I	
21	Reserved			22	Reserved		
23	FMU_UART7_CTS_TELEM1	O		24	Reserved		
25	FMU_UART7_RTS_TELEM1	I		26	FMU_SPI2_EXT_SCK	O	
27	FMU_UART7_TXD_TELEM1	O		28	FMU_CH6	O	
29	FMU_UART7_RXD_TELEM1	I		30	FMU_CH5	O	
31	FMU_USART1_RX	I		32	FMU_SPI2_EXT_nCS2	O	
33	GND	N/A	N/A	34	FMU_SPI2_EXT_MISO	I	
35	ETH_RXD1	I		36	FMU_SPI2_EXT_MOSI	O	
37	ETH_RXD0	I		38	GND	N/A	N/A
39	GND	N/A	N/A	40	FMU_I2C4_SCL	O	
41	ETH_REF_CLK	I/O		42	FMU_I2C4_SDA	I/O	
43	GND	N/A	N/A	44	FMU_UART8_RX	I	
45	ETH_CRS_DV	I		46	FMU_UART8_TX	O	
47	ADC_6V6	I		48	CANN_L	I/O	
49	GND	N/A	N/A	50	CANN_H	I/O	

Table.4 WEP2-FMU socket pin definition

Electrical Characteristics

	Voltage	Current	USB version	USB data rate	Min	Max	Unit
USB-C Input voltage*	5		2.0	12Mbps	4.75	5.25	V
USB-C Input current		0.5			0.5	3	A
Battery Input voltage*	5				4.75	5.25	V
Battery Input current		0.5			0.5	6	A
VPE_5V output voltage	5				4.75	5.25	V
VPE_5V current						3	A
VPE_3V3 output voltage	3.3				3.0	3.5	V
VPE_3V3 current		0.1				0.5	A

Table.5 Electrical characteristics

* USB-C input takes priority over Battery input when both connected.

Mechanical form-factors

Dimension:	35 x 35mm
PCB thickness:	1.0mm
Height(maximum):	9.0mm
WEP2 connector mated height:	6.0mm
Mounting hole to mounting hole distance:	30.5mm
Weight:	6g