Arduhoop

PRELIMINARY

BATTERY

MEC5 LiPo 18650 1S 2600mAh

MEC1 DF13 wire
MEC2 DF13 wire
MEC3 DF13 wire
MEC4 DF13 wire
DF13 housing
MEC7

DF13A-5P-1.25H(20)
J1

+BAT
TP 9

R2 100k ±1%
R3 100k ±1%
C4 0.1µF 16V
C6 0.1µF 16V
BAT_SENSE

Battery sense signal, 1:2 divisor ratio. 18uA consumption

Max 3A
Typical 1.5A
LP 190uA

MEC6 LiPo 18650 1S 2600mAh

GND GND GND GND

USB

VBUS supply: 500mA max

+VBUS

Molex 47346-0001
J2

D1_N D1_P
R8 R9 22R 22R
D_N D_P

ClassName: USB

UID pin (4) not used as uC is always device

GND

CHARGER

+VBUS +3.3V

R1 2.2k ±1%

U3 MCP73832
VDD VBAT PROG STAT VSS

+BAT

C2 0.1µF 16V
C9 1µF 16V
R5 2.2k ±1%
BAT_STAT

Charge current of 450mA (1000V/2.2k)

Charging: 451.5mA from VBUS
Normal operation: 5uA Max from +BAT

R5 may be removed if internal pull-up is used.

GND GND GND GND

LDO

+BAT +3.3V

U1 MIC5219
VIN VOUT EN GND BYP

C1 1µF 16V
C5 1µF 16V
C7 0.1µF 16V

LDO Max 500mA
Demand Max 120mA
Demand Typical 29mA
Demand LP 185uA

BYP (pin 4) left open as per datasheet

GND GND GND

AUDIO

+3.3V_AUDIO

Supply Current: Typical 155uA Max 220uA

U2 SPU0414HR5H
VDD OUT GND GAIN

C3 0.1µF 16V
MIC_OUT
C10 0.1µF 16V
R4 22R ±1%
C8 0.1µF 16V

+3.3V_AUDIO
R6 100k ±1%
AUDIO
R7 100k ±1%

Gain of 19.9dB. R17 is 22R to not add a new part to the BOM (0R). The exact amplification does not matter, and this allows for future modifications. Low-pass corner frequency is 650Hz with 0.1uF on the gain pin.

Decoupling network high-pass corner frequency is 30Hz

GND GND GND GND

MCU

Supply Current: Max 15mA Typical 5mA LP 10uA

+3.3V

C12 0.1µF 16V
C17 0.1µF 16V

U4 ATmega32U4-AU

VCC VCC AVCC AVCC AREF UVcc UCap VBus GND GND GND GND GND GND GND GND

AREF
UCAP
+VBUS

C13 1µF 16V
C15 1µF 16V

Bus powered application

D_N D_P

+3.3V
R10 2.2k
RESET

XTAL2 XTAL1
16MHz
C11 22pF 50V
C16 22pF 50V
X1

It might be possible to remove X1/C11/C16 if the application can run on low-speed USB. But the 32U4RC needs to

PF0 (ADC0) PF1 (ADC1) PF4 (ADC4/TCK) PF5 (ADC5/TMS)) PF6 (ADC6/TDO) PF7 (ADC7/TDI)
PE6 (INT.6/AIN0) PE2 (HWB)
PC7 (ICP3/CLK0/OC4A) PC6 (OC3A/OC4A)
PD7 (T0/OC4D/ADC10) PD6 (T1/OC4D/ADC9) PD5 (XCK1/CTS) PD4 (ICP1/ADC8) PD3 (TXD1/INT3) PD2 (RXD1/INT2) PD1 (SDA/INT1) PD0 (OC0B/SCL/INT0)
PB7 (PCINT7/OC0A/OC1C/RTS) PB6 (PCINT6/OC1B/OC4B/ADC13) PB5 (PCINT5/OC1A/OC4B/ADC12) PB4 (PCINT4/ADC11) PB3 (PDO/PCINT3/MISO) PB2 (PDI/PCINT2/MOSI) PB1 (PCINT1/SCLK) PB0 (SS/PCINT0)

AUDIO
+3.3V_AUDIO
I/O pin PF1 provides direct power to audio circuit.
BAT_SENSE
BAT_STAT
GND
hardware bootloader always enabled HWB = GND
SD_SW
TXLED
SW
TX
RX
SDA
SCL
LED_POWER
LED_DATA
MPU_INT
CS
MISO
MOSI
SCLK
RXLED

ClassName: AVR_SPI
+3.3V RESET MISO MOSI SCLK GND

FIRMWARE
FIRM1

IMU

Supply Current: Typical 3.8mA LP 20uA

U5 MPU6050
VDD CPOUT REGOUT CLKIN CLKOUT GND
VLOGIC AD0 SDA SCL FSYNC INT AUX_DA AUX_CL

+3.3V +3.3V +3.3V +3.3V
R11 2.2k ±1%
R12 2.2k ±1%
R13 2.2k ±1%

C14 0.1µF 16V
C18 2200pF 50V
C19 0.1µF 16V
C20 0.1µF 16V

SDA
SCL
MPU_INT

I2C address is 0x68

GND GND GND GND GND

SDCARD

+3.3V
R14 100k ±1%
SD_SW
GND

Supply Current: Max 100mA Typical 20mA Sleep 150 uA

R14 may be removed if internal pull-up is used.

ClassName: SPI

J3 DM3AT-SF-PEJM5
SW2 SW1 CASE1 CASE2 CASE3 CASE4
DAT1 DAT0 VSS CLK VDD CMD CD/DAT3 DAT2
DAT1 GND SCLK +3.3V MOSI CS DAT0

MEC14 uSD 4GB uSDCARD

R19 100k
R20 100k
R19/R20 may be needed to save power on sleep mode.

C21 0.1µF 16V

GND GND GND GND

LED STRING

DF13A-5P-1.25H(20)
J4

+BAT
LED_DATA R16 22R LED_DATA_O
LED_GND
LED_POWER R17 22R
R18 2.2k
Q1

DF13 housing
MEC10 DF13 wire MEC15 DF13 wire MEC16 DF13 wire MEC17 DF13 wire MEC18 DF13 wire MEC19

Supply Current: Max 2.82A Typical 1.5A Idle 0.17A Off 0A

MEC9 LED STRING WS2812 60 LED/M
LED STRING

GND GND

SWITCH

Supply Current: Max 33uA Typical 0uA

+3.3V
R15 100k ±1%
SW
SW1

R15 may be removed if internal pull-up is used. This can save power

GND GND

MEC11 HDPE TUBE 1" OD, 7/8" ID White
HDPE TUBE
MEC12 HEAT-SHRINK 4.5mm ID 4ft
MEC8 PCB ArduhoopPCB
MEC12 wire AWG24 2 pair 10ft
MEC13

Title		
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Quantity	Description	Designator	Footprint	Manufacturer 1	Manufacturer Part Number 1	Supplier 1	Supplier Part Number 1
1	CONN MICRO SD CARD PUSH-PUSH R/A	J3	USD_DM3AT	Hirose Electric Co Ltd	DM3AT-SF-PEJM5	Digi-Key	HR1964CT-ND
1	MIC MEMS ANALOG OMNI -22DB	U2	SPU0414HR5H	Knowles	SPU0414HR5H-SB-7	Digi-Key	423-1134-1-ND
1	IC LI-ION/LI-POLY CTRLR SOT23-5	U3	SOT-23-5	Microchip Technology	MCP73832T-2ATI/OT	Digi-Key	MCP73832T-2ATI/OTCT-ND
1	IC REG LDO 3.3V 0.5A SOT23-5	U1	SOT-23-5	Microchip Technology	MIC5219-3.3YM5-TR	Digi-Key	576-1281-1-ND
1	MOSFET P-CH 30V 5.8A 8-SOIC	Q1	SO-8	Infineon Technologies Americas Corp.	IRF7406TRPBF	Digi-Key	IRF7406PBFCT-ND
1	CRYSTAL 16.0000MHZ 18PF SMD	X1	SMD4_3.2x2.50mm_ABM8	Abracon LLC	ABM8-16.000MHZ-B2-T	Digi-Key	535-9134-1-ND
5	RES SMD 22 OHM 1% 1/10W 0603	R4, R8, R9, R16, R17	R0603	Yageo	RC0603FR-0722RL	Digi-Key	311-22.0HRCT-ND
7	RES SMD 2.2K OHM 1% 1/10W 0603	R1, R5, R10, R11, R12, R13, R18	R0603	Yageo	RC0603FR-072K2L	Digi-Key	311-2.20KHRCT-ND
8	RES SMD 100K OHM 1% 1/10W 0603	R2, R3, R6, R7, R14, R15, R19, R20	R0603	Yageo	RC0603FR-07100KL	Digi-Key	311-100KHRCT-ND
1	GYRO/ACCELEROMETER 6AXIS 24QFN	U5	QFN24_4X4X0.9mm	InvenSense	MPU-6050	Digi-Key	1428-1007-1-ND
1		J2	Molex 47346-0001	Molex, LLC	473460001	Digi-Key	WM17141CT-ND
1	SWITCH TACTILE SPST-NO 0.02A 15V	SW1	EVPAEJB2A	Panasonic Electronic Components	EVP-AEJB2A	Digi-key	P17697CT-ND
2	CONN HEADER 5POS 1.25MM R/A TIN	J1, J4	DF13A-5P-1.25H	Hirose Electric Co Ltd	DF13A-5P-1.25H(20)	Digi-Key	H3370-ND
1	CAP CER 2200PF 50V X7R 0603	C18	C0603	Murata Electronics North America	GRM188R71H222KA01D	Digi-Key	490-1500-1-ND
13	CAP CER 0.1UF 16V X7R 0603	C2, C3, C4, C6, C7, C8, C10, C12, C14, C17, C19, C20, C21	C0603	Murata Electronics North America	GRM188R71C104KA01D	Digi-Key	490-1532-1-ND
2	CAP CER 22PF 50V NP0 0603	C11, C16	C0603	Murata Electronics North America	GRM1885C1H220JA01D	Digi-Key	490-1411-1-ND
5	CAP CER 1UF 16V X7R 0603	C1, C5, C9, C13, C15	C0603	Murata Electronics North America	GRM188R71C105KA12D	Digi-Key	490-3900-1-ND
1	IC MCU 8BIT 32KB FLASH 44TQFP	U4	ATMEL-TQFP44_ml	Atmel	ATMEGA32U4-AUR	Digi-Key	ATMEGA32U4-AURCT-ND
1	FIRMWARE	FIRM1					
1	HDPE TUBE 1" OD, 7/8" ID White 10 ft	MEC11		Supplier disabled	Supplier disabled	McMaster	50375K58
1	HEAT-SHRINK 3/16" ID Before, 3/32" ID After, 4' Length	MEC12		Supplier disabled	Supplier disabled	McMaster	7856K14
1	LED Strip WS2812B 60 LEDs/meter	MEC9		Supplier disabled	Supplier disabled	Amazon	B00LUAKB62
1	PCB	MEC8					
1	Sandisk 4GB microSDHC Card Class 2	MEC14		Supplier disabled	Supplier disabled	Amazon	B002T8GP8M
1	WIRE AWG24 2 conductors	MEC13		Supplier disabled	Supplier disabled	McMaster	9697T1
2	DF13 housing 5pos	MEC7, MEC10		Hirose Electric Co Ltd	DF13-5S-1.25C	Digi-Key	H2182-ND
2	Tenergy Li-Ion 18650 3.7V 2600mAh	MEC5, MEC6		Supplier disabled	Supplier disabled	Amazon	B003U7SUUM
9	DF13 pre-crimped 5" wire	MEC1, MEC2, MEC3, MEC4, MEC15,		Hirose Electric Co Ltd	H4BXG-10105-W6	Digi-Key	H4BXG-10105-W6-ND