HS402 DIY Oscilloscope
Components List

PCB Version: 3.1

Designator	Quantity	Value	Description	Footprint	Comment	Photo
R1, R4, R5	3	1K	Resistor	0805		
R2, R6	2	910K	Resistor	0805	1% tolerance	
R3, R7	2	100K	Resistor	0805	1% tolerance	
R8, R18	2	5.1K	Resistor	0805	*it can be also lower like 4.7K*	
R9	1	1K	Potentiometer	VR5		
C1, C5	2	20pF var	Adjustable Capacitor	Capacitor Var	3*4mm	
C2, C6, C12	3	100nF	Capacitor	0805	*use 1uF to improve AC bandwidth at lower frequencies (<100Hz)*	
C3, C7	2	47pF	Capacitor	0805		
C4	1	10uF - 16V	Capacitor	0805	Option 2 or Option 3	
C8	1	47uF - 6.3V	Capacitor	0805	*can be 47-100uF*	
C9	1	470nF	Capacitor	0805		
C11	1	47uF - 6.3V	Capacitor	0805		
D1, D2	2	BAV99	Diodes	SOT23		
U1, U3	2	MCP6S21	PGA	SOP-8 or SOIC-8		
U2	1	AMS1117-1.2	Linear Regulator	SOT223		
U5	1	AMS1117-3.3	Linear Regulator	SOT223	Option 2 (indipendent 3V3)	
U6	1	TPS73733	Linear Regulator	SOT223-6	Option 3 (accurate 3V3, lowest noise)	
L1	1	10uH - 2A	Inductor	0402		
C10	1	47uF	Capacitor	0805		
K1, K2	2	AQY210EH	PhotoMOS	PNSC-DIP4(SMT)_V		
MCU	1	STM32F411	STM32 Black Pill Dev. Board	Black Pill	Or STM32F401. Female header on PCB 5mm tall, 20 pins x2.	

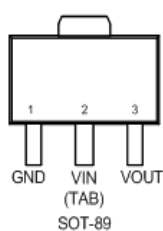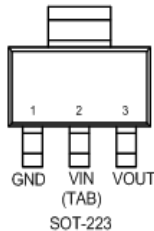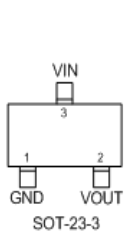| Designator	Quantity	Value	Description	Footprint	Comment	Photo
P2, P5	2	BNC	BNC Elbow Connector	BNC		
IN	1	Header 5	Male Header, 5-Pin	HDR1X5	I2C Input Buttons Module	
BAT	1	Header 2	Male Header, 2-Pin	HDR1X2	Battery power	
UART	1	Header 4	Female Header, 4-Pin	HDR1X4	Serial Port (flashing & Wifi module)	Can use a single
PWM	1	Header 2	Female Header, 2-Pin	HDR1X2	PWM Output	Female Header, 9-
SPI	1	Header 3	Female Header, 3-Pin	HDR1X3	SPI port (Wifi module)	Pin for WiFi

Revision History:

V3.1: Updated Inductor L1 to support more size of inductors (big and small). Added C12 as for STM instructions. Removed R10,R11,R12,R14, L10, changed value of R13.

V3.0: Reformulated hardware options (3 total). 1.6V reference block is used in all options. REF2033 removed for TPS73733 in Option 3. Added R8, R18 to lower noise from WiFi module. Removed additional header for I2C.

V2.1: C1, C5 to 20pF since the value needed is quite low, some 30pF var capacitor do not allow to regulate around 6pF.
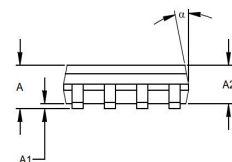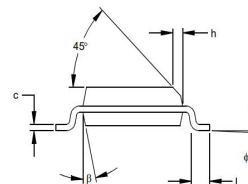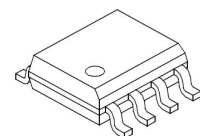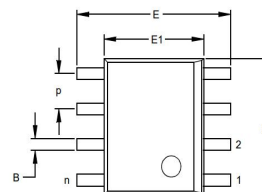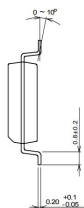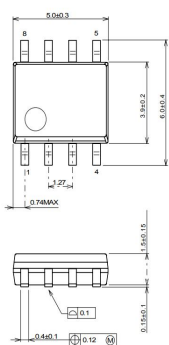
V2.0: Removed J1, directly use PA2 pin for Vref, PWM become 2 pin header, added SP header (Serial Port), U1,U3 use SOP module.

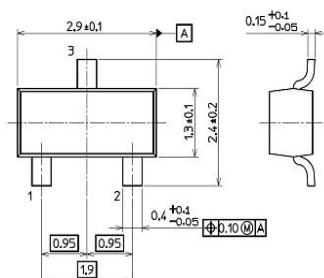V1.6: Removed duplicated R8, Added comment for C2, C6.
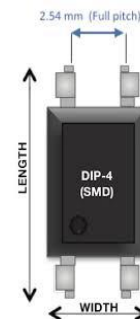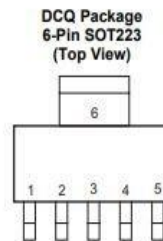
8-Lead Plastic Small Outline (SN) – Narrow, 150 mil (SOIC) or SOP8
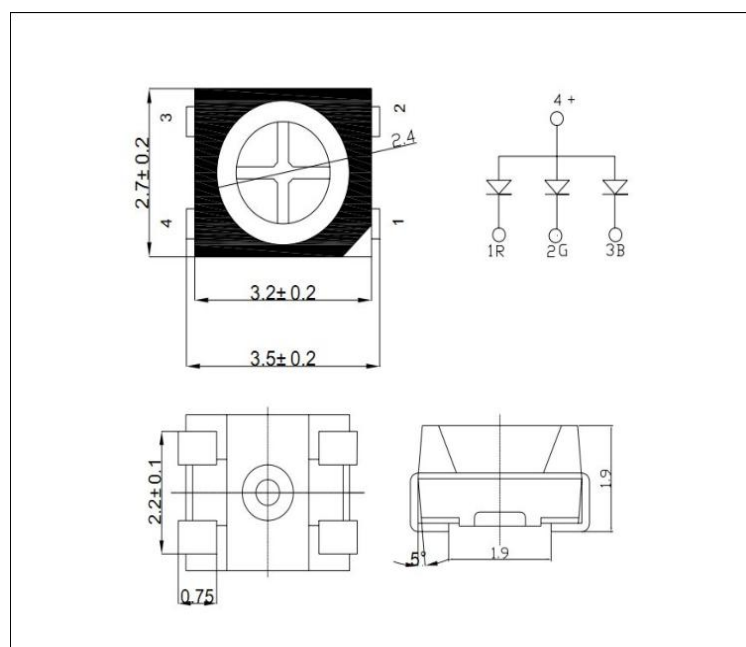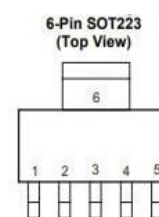

SOT-23

WIFI Module (PCB Built)
Components List

PCB Version: 3.1

Designator	Quantity	Value	Description	Footprint	Comment	Photo
R13	1	68K	Resistor	0805		
R15, R16, R17	3	1K	Resistor	0805		
C20, C21	2	1uF	Capacitor	0805		
C22	2	47uF	Capacitor	0805		
C3, C7	2	47pF	Capacitor	0805		
C23	1	47-100uF	Capacitor Pol	B_3528	Thantalum	
C24	1	100-150uF	Capacitor Pol	B_3528		
S1	1	-	Button	1206 (or 3x4mm)		
LED	1	RGB LED 3528	Common anode	1210		
U10	1	ESP32-WROOM-32D or ESP32-WROOM-32E	MCU	-	Older model is ok	
U11 (or U11-1)	1	AMS1117-3.3	Linear Regulator	SOT223 (or SOT89)	Option W1 (to use when power with 5V)	
U12	1	TPS73733	Linear Regulator	SOT223-6	Option W2 (to use when power directly with 3.7 Lithium battery)	
WIFI	1	Male Header 9	Header, 9-Pin	HDR1X9	Main connector	
SP	1	Male Header 2 - 90 degrees	Header, 2-Pin	HDR1X2	Serial connector (for flashing)	

φ1.8

φ0.8mm Travel

1.5

2±0.1

5

1.35

3±0.2

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1 2 3

GND VIN VOUT
(TAB)
SOT-223

1 2 3

GND VIN VOUT
(TAB)
SOT-89

6-Pin SOT223
(Top View)

6

1 2 3 4 5

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3 2

4 1

2.4

2.7±0.2

3.2±0.2

3.5±0.2

4 +

1R 2G 3B

2.2±0.1

0.75

1.9

1.9

5°

WIFI Module (no PCB)
Components List

HS402 PCB Ver: 1.7-3.1

Notes: The Wifi module can be implemented easily without the custom PC just by using this ESP32 Development Board.

Designator	Quantity	Value	Comment	Photo
MCU	1	ESP32 Development Board 30-pins	Based of ESP32 WROOM 32D (dual core)	
LED	1	RGB LED Module	Optional, it could be common catode or anode	