Bill of Materials for PCB-based IV Swinger 2

PV type — PV module (red)

Relay Type — EMR (red)

Description	Quantity	Name(s)	Unit Price	Total Price	Purchase From	Notes
On-PCB parts						
10-pin stackable female header	1	A1				Purchased as a kit of all four. Note, however, that A4 is not needed at all, and A1 can be 8-pin instead of 10-pin (pins 9 and 10 are not used). Digi-Key PN: 1568-1413-ND
8-pin stackable female header	2	A2, A3	$1.50	$1.50	Digi-Key	
6-pin stackable female header	0	A4				
1000µF 100V capacitors	2	C1, C2	$2.42	$4.84	Digi-Key	Digi-Key PN: 1572-1313-ND
0.1µF capacitor	2	C3, C6	$0.28	$0.56	Digi-Key	Op amp and ADC Vdd filter. Digi-Key PN: BC2665CT-ND
2.2nF (2200 pF) capacitor	2	C4, C5	$0.35	$0.70	Digi-Key	Voltmeter and ammeter op amp circuits. Digi-Key PN: 399-4166-ND
4-pin female header	1	FH	$0.47	$0.47	Digi-Key	Extra +5V and GND for temperature and irradiance sensors. Can be omitted if no plans for those (or can be added later). Digi-Key PN: S7037-ND
2-pin or 3-pin screw-terminal block	2	J1, J2	$0.96	$1.92	Digi-Key	Can 'steal' 3-pin screw-terminal blocks from spare relay modules. Otherwise, can use 2-pin. Digi-Key PN: A97996-ND
8-pin DIP socket (optional)	2	MCP3202, TLV2462	$0.47	$0.94	Digi-Key	IC sockets. Recommended so ICs can be replaced more easily. Digi-Key PN: 1212-1003-ND
ADC - MCP3202	1	MCP3202	$2.98	$2.98	Digi-Key	Digi-Key PN: MCP3202-BI/P-ND
Op amp – TLV2462	1	TLV2462	$2.67	$2.67	Digi-Key	Ammeter. Digi-Key PN: 296-1892-5-ND
150kΩ resistor - 1/4W	1	R1	$0.01	$0.01	Amazon	Voltmeter - divider
7.5kΩ resistor - 1/4W	1	R2	$0.01	$0.01	Amazon	Voltmeter - divider
1kΩ resistor - 1/4W	3	R3, R4, RG	$0.01	$0.02	Amazon	Voltmeter and ammeter op amp circuits, relay input
22kΩ resistor - 1/4W	2	R5, R6	$0.01	$0.01	Amazon	Arduino output pull-ups
Not present in EMR version	0	R7-R11	$0.01	$0.00	Amazon	SSR pull up/downs
75kΩ resistor - 1/4W	1	RF	$0.01	$0.01	Amazon	Ammeter - op amp circuit
Not present in module version	0	RF1	$0.01	$0.00	Amazon	Ammeter - op amp circuit
47Ω 5W resistor	1	RB	$0.78	$0.78	Digi-Key	Bleed resistor. Needs to be able to handle 6.4J pulse energy (for 80V Voc; less for lower Voc: $0.5 * 0.002F * Voc^2$). Digi-Key PN:PPC5W47.0CT-ND
0.005Ω shunt resistor	1	SHUNT	$2.12	$2.12	Digi-Key	Ammeter. Digi-Key PN: LVRB-.005RCT-ND
Not present in module version	0	JP	$0.13	$0.00	Digi-Key	Low current jumper header. Digi-Key PN: 732-5315-ND
Not present in module version	0	JP	$0.11	$0.00	Digi-Key	Low current jumper. Digi-Key PN: S9337-ND
Not present in module version	0	OFF=LO_CUR	$0.88	$0.00	Digi-Key	Alternate to jumper. Digi-Key PN: 732-3831-5-ND
Not present in EMR version	0	SSR1-SSR6	$6.55	$0.00	Digi-Key	Solid State Relays (SSRs). Digi-Key PN: CLA315-ND
15SQ100 Schottky bypass diode	1	D1,D4	$0.75	$0.75	Digi-Key	Reverse connection bypass diode. Connect one 15SQ100 (100V) between pads D1 and D4 or connect one 15SQ045 (45V) between pads D1 and D2 and another between pads D3 and D4. Digi-Key PN: 1655-1355-1-ND (100) Digi-Key PN: 1655-1354-1-ND (45)
Off-PCB parts						
Arduino Uno clone	1	Arduino	$10.86	$10.86	Amazon	Elegoo UNO R3 Board ATmega328P ATMEGA16U2 with USB Cable Compatible With Arduino UNO R3
Donation to arduino.cc	1	Donation	$5.00	$5.00	arduino.cc	
Binding posts	1	Binding posts	$3.69	$3.69	Digi-Key	Digi-Key PN: 501-1713-ND
Relay module, active-low trigger	1	EMR	$1.80	$1.80	Amazon	5V 1 Channel Relay Shield Module Optocoupler For PIC AVR DSP ARM Arduino TE213
18ga solid wire or zip cord	1	Load circuit wire	$0.96	$0.96	Amazon	For load circuit wires: MC-4 to binding posts, binding posts to relay/PCB, relay to PCB. Scrap appliance cord is fine. Just want a heavier duty than hookup wire.
Cable ring connectors	2	Cable rings	$0.20	$0.40	Digi-Key	Binding post internal connections. Digi-Key PN: 277-11154-ND
4 inch Male to Female jumpers (1 blue, 1 red, 1 black)	3	Jumpers	$0.07	$0.22	Amazon	Relay to stack connector wires. GenBasic 80 Piece Male to Female Solderless Ribbon Dupont Jumper Wires (4 and 8 Inch) for Breadboard Prototyping
Enclosure						
Ultra Pro Baseball Clear Square Holder	1	Case	$5.75	$5.75	Amazon	Price goes up in baseball season
M3 15mm body, 6mm thread nylon male-female standoff spacer	8	Standoffs	$0.05	$0.44	Amazon	uxcell 50pcs M3 15+6mm Male Female Thread Nylon Hex Standoff Spacer Screws PCB Pillar Black (also available from Digi-Key or eBay)
M3 screws (1/4 inch)	8	Screws	$0.10	$0.83	Amazon	StarTech PC Mounting Computer Screws M3 x 1/4-Inches Long Standoff - 50 Pack SCREWM3 (also available from Digi-Key or eBay)
M3 nuts	8	Nuts	$0.06	$0.45	Amazon	Shapenty 100PCS 3mm Small Stainless Steel Female Thread Hex Screw Nut Fastener Tool, M3 (also available from Digi-Key or eBay)
MC-4 connector (male/female pair)	1	MC-4	$1.60	$1.60	Amazon	Sun YOBA 5 Pairs of MC4 Male/ Female Solar Panel Cable Connectors
Bias Battery						
Not present in module version	0		$2.64	$0.00	Digi-Key	Digi-Key PN: BH2DL-ND
Not present in module version	0		$7.47	$0.00	Amazon	Or at grocery store, Target, etc.
Total				**$52.28**		

Amazon wish list: http://a.co/eATZzyu

Digi-Key cart: https://www.digikey.com/short/p7m857

Only purchase items with *ALTERNATE* in Customer Reference if primary has Availability = "Backorder"