

Bill of Materials

Bill of materials broken down by base package and optional solar and EPM add-on modules. Base package total cost is 271.37 USD, solar add-on cost is an additional 34.59 USD, and EPM add-on cost is an additional 32.66 USD.

Table 1: Base package bill of materials.

Designator	Component	Number of units	Cost per unit [USD]	Total cost [USD]	Source of materials	Material type
Arduino Nano	Arduino Nano	1	24.90	24.90	Arduino	Semiconductor
Micro SD card module	UMLIFE Micro SD SDHC TF card adaptor reader module with SPI interface	1	0.89	0.89	UMLIFE	Other
nRF24L01+	NRF24L01+ 2.4GHz Wireless RF Transceiver Module	1	1.30	1.30	Makerfire	Semiconductor
DS3231 real-time clock	DS3231M+	1	13.31	13.31	Maxim Integrated	Semiconductor
BME280 environmental sensor	BME280	1	15.00	15.00	Onyehn	Semiconductor
INA219 current sensor	INA219BIDR	1	2.51	2.51	Texas Instruments	Semiconductor
Electro-permanent magnet	OPENGRAB EPM V3 R5C	1	159.99	159.99	Nicadrone	Other
Ultrasonic sensor	RCWL-1601	1	3.95	3.95	Adafruit Industries LLC	Other
2s 7.4V LiPo battery	Zeee 2S Lipo Battery 1500mAh 7.4V 60C with Deans Plug	1	13.50	13.50	Zeee	Other
CR-1025 3V Li+ coin cell	CR-1025-ND	1	1.09	1.09	Jauch Quartz	Other
RTC coin cell holder	BK-870	1	0.58	0.58	MPD	Other
Main PCB	Main board	1	8.23	8.23	See repository	Other
Daughter PCB	Daughter board	1	4.13	4.13	See repository	Other

Micro card	SD	Gigastone 8GB 10-Pack Micro SD Card, Full HD Video 80MB/s Micro SDHC Class 10	1	3.00	3.00	Gigastone	Other
Slide switch		SS-12D07-VG 4 NS GA PA	1	0.85	0.85	C&K	Other
LED		L314ED	1	0.20	0.20	American Opto Plus LED	Semiconductor
PNP transistor		BCP51-16-TP	1	0.48	0.48	Micro Commercial Co	Semiconductor
NPN Transistor		BCP54	1	0.36	0.36	onsemi	Semiconductor
Resistors		RES SMD (100, 1k, 4.7k) OHM 1% 1/4W 1206	7	0.10	0.70	Digikey	Semiconductor
Shunt resistor		ERJ-8BSJR10V RES 0.1 OHM 5% 1/2W 1206	1	0.40	0.40	Panasonic	Semiconductor
Capacitors		C1206S104K5RACAUTO 0.1 μ F 10% 50V Ceramic Capacitor X7R 1206 (3216 Metric)	4	0.42	1.68	Kemet	Semiconductor
5V regulator		MIC5239-5.0YS-TR	2	3.25	6.50	Microchip Technology	Semiconductor
4" PVC pipe		Schedule 40 Clear Pipe, Non-threaded,	1	6.54	6.54	Grainger	Polymer
Dean's connector		PRT-11864	1	1.05	1.05	Sparkfun Electronics	Other
Female HC-SR04 connector		SSA-104-W-T	1	0.91	0.91	Samtec	Other
Female magnet connector		SSA-103-W-G	1	1.29	1.29	Samtec	Other
Female daughter board connector		PPPC071LGBN-RC	1	0.67	0.67	Sullins Connector Solutions	Other
Male daughter board connector		0022284070	1	0.30	0.30	Molex	Other