36C3 Badge — Hardware Schematic

Battery Protection
U2 DW01
+BATT, R1 100R, PWR_FLAG
C3 100n, R3 1k
Q1 FS8205A
VCC, CS, TD, GND, OC, OD
-BATT, GND

Battery
+BATT
BT1 1S LiIon
PWR_FLAG
-BATT

Battery Charging and Load Sharing Controller
U3 MCP73871-2CCI
+5V_USB, VCC, +BATT, +5V_USB
R4 330k, R5 120k
R2 2k, R6 18k, R7 10k
C1 10µ/25V
VPCC, SEL, PROG1, PROG2, PROG3, THERM, TE, CE, VSS
IN, OUT, VBAT, Vbat_SENSE, PG, STAT1/LBO, STAT2
R10 1k
D3 USB
green — PMIC_PG
PMIC_STAT1_LBO
C7 4.7µ/25V, C8 4.7µ/25V
GND

VPCC: Current reduction threshold approx. 4.42V
SEL: Non-USB mode (VPCC to limit current)
PROG1: L=USB-500mA
PROG2: 500mA if USB is used
PROG3: L=termination=0.5mA
THERM: 10k as a dummy NTC
TE: Safety timer enabled
CE: Charging enabled

USB Serial Interface
J1 MicroUSB
VBUS, D-, D+, ID, GND
D1 USBLC6-2SC6
IO1, IO2
+5V_USB
D6 BAT46W
U4 CH330N
VCC, GND, V3, UD-, UD+, RXD, TXD, RTS#
C4 100n, C5 100n
D4 Rx, D5 Tx orange
R11 1k, R12 1k
UART_RX, UART_TX, UART_RTS, +5V_USB
GND

5V Boost Converter
VCC, L1 4.7µ/1.25A
D2 SK110, approx. 500mA, +5V, PWR_FLAG
U1 MIC2288B
VIN, SW, EN, FB, GND
C2 4.7µ/25V
R8 5.6k, R9 1.82k
C6 22µ/25V
GND

VFD Grid & Filament Supply
+5V
C9 100n
U5 74LVC2G17
VFD_SUP_CLK_B, 1A, 1Y
VFD_SUP_CLK_A, 2A, 2Y
GND
D32 BAT54S, D33 BAT54S, D49 BAT54S, D56 BAT46W
R35 470R, +30V, PWR_FLAG
C11 470n/50V, C13 470n/50V, C15 470n/50V, C17 470n/50V
C10 470n/50V, C12 470n/50V, C14 470n/50V, C16 470n/50V, GND
+5V
R21 1k, Q4 BC807, Q8 BC807, R31 1k
PWR_FLAG, FIL-, FIL+, PWR_FLAG
R22 1k, Q5 BC817, Q9 BC817, R32 1k
D57 1N4148, D58 1N4148
JP1 ISP
GND

Illuminated Cracks LED Control
D7 Destruction3, R14D 470R
D8 Destruction3, R14C 470R
D9 Destruction3, R14B 470R
D10 Destruction3, R14A 470R
D11 Destruction3, R15D 470R
D12 Destruction3, R15C 470R
D13 Destruction3, R15B 470R
Q2 BC817, R16 4.7k, LED_D3

D14 Destruction2, R17D 470R
D15 Destruction2, R17C 470R
D16 Destruction2, R17B 470R
D17 Destruction2, R17A 470R
D18 Destruction2, R18D 470R
D19 Destruction2, R18C 470R
D20 Destruction2, R18B 470R
D21 Destruction2, R18A 470R
D22 Destruction2, R19D 470R
D23 Destruction2, R19C 470R
D24 Destruction2, R19B 470R
Q3 BC817, R20 4.7k, LED_D2

D25 Destruction1, R23D 470R
D26 Destruction1, R23C 470R
D27 Destruction1, R23B 470R
D28 Destruction1, R23A 470R
D29 Destruction1, R24D 470R
D30 Destruction1, R24C 470R
D31 Destruction1, R24B 470R
Q6 BC817, R25 4.7k, LED_D1

D34 Hope2, R26D 2.2k
D35 Hope2, R26C 2.2k
D36 Hope2, R26B 2.2k
D37 Hope2, R26A 2.2k
D38 Hope2, R27D 2.2k
D39 Hope2, R27C 2.2k
D40 Hope2, R27B 2.2k
D41 Hope2, R27A 2.2k
D42 Hope2, R28D 2.2k
D43 Hope2, R28C 2.2k
D44 Hope2, R28B 2.2k
D45 Hope2, R28A 2.2k
D46 Hope2, R29D 2.2k
D47 Hope2, R29C 2.2k
D48 Hope2, R29B 2.2k
Q7 BC817, R30 4.7k, LED_H2
GND

D50 Hope1, R33D 2.2k
D51 Hope1, R33C 2.2k
D52 Hope1, R33B 2.2k
D53 Hope1, R33A 2.2k
D54 Hope1, R34D 2.2k
D55 Hope1, R34C 2.2k
Q10 BC817, R36 4.7k, LED_H1

Microcontroller
U6 ATMEGA328P-AU
+5V
VCC, VCC, AVCC, AREF
C18 100n, C19 100n, C20 100n
ADC6, ADC7
(PCINT0/CLKO/ICP1)PB0 — VFD_CS
(PCINT1/OC1A)PB1 — VFD_SUP_CLK_A
(PCINT2/OC1B/SS)PB2 — VFD_SUP_CLK_B
(PCINT3/OC2A/MOSI)PB3 — VFD_DIN
(PCINT4/MISO)PB4
(PCINT5/SCK)PB5 — VFD_CLK
(PCINT6/XTAL1/TOSC1)PB6
(PCINT7/XTAL2/TOSC2)PB7
(PCINT8/ADC0)PC0 — LED_H2
(PCINT9/ADC1)PC1 — PMIC_STAT1_LBO
(PCINT10/ADC2)PC2 — PMIC_PG
(PCINT11/ADC3)PC3 — LED_D1
(PCINT12/SDA/ADC4)PC4 — LED_D2
(PCINT13/SCL/ADC5)PC5
(PCINT14/RESET)PC6 — UART_TX
(PCINT16/RXD)PD0 — UART_RX
(PCINT17/TXD)PD1 — SW_STBY
(PCINT18/INT0)PD2 — SW_BTN1
(PCINT19/OC2B/INT1)PD3 — SW_BTN2
(PCINT20/XCK/T0)PD4 — LED_H1
(PCINT21/OC0B/T1)PD5 — LED_D3
(PCINT22/OC0A/AIN0)PD6 — VFD_RST
(PCINT23/AIN1)PD7
GND, GND, GND
+BATT
R43 10k
R42 100R
C27 1µ, SW_RESET, UART_RTS
J2 ISP: MISO, MOSI, SCK, RST, VCC, GND
Y1 16MHz, C26 18p, C28 18p
GND

Vacuum Fluorescent Display
+5V
R39 8.2k
C23 82p, +30V
VFD_RST, VFD_CS, VFD_CLK, VFD_DIN
VFD1 HCS-12SS59T
VDISP, VDD1, FIL+, FIL-, GND
+5V

Buttons
SW1 Reset: R37 1k, C21 100n, SW_RESET
SW3 Button2: R40 1k, C24 100n, SW_BTN2
SW2 Button1: R38 1k, C22 100n, SW_BTN1
SW4 Standby: R41 1k, C25 100n, SW_STBY
GND