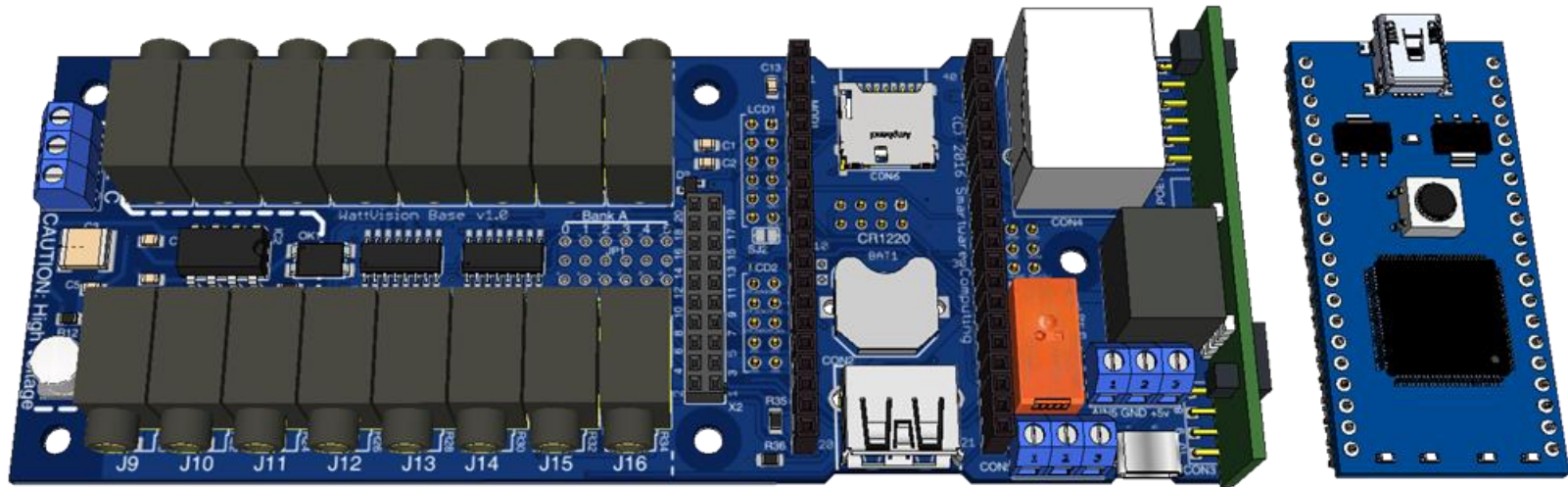


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1 WattVision Virtual Model



The WattVision v1.0 hardware supports population variants to serve different IOT applications. A network interface is a central part of the design.

- Boiler Control supporting 10 zones, with local display.
- Energy Monitor, 16-channels expandable to 48 channels.
- Display Appliance
- Network IOT device

2 Device Architecture

Block Diagram to appear here...

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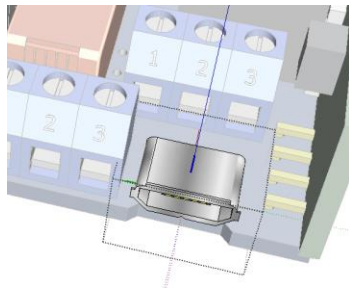
3 Function Blocks

3.1 Power Source

Only a single power source should be used at a time, although the design should permit using either power source, even when the PoE module is installed.

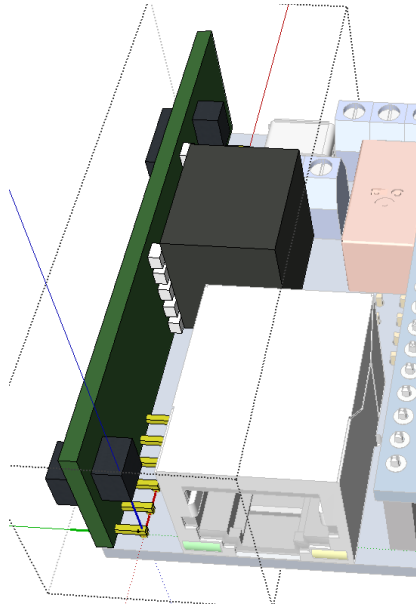
3.1.1 Power via micro USB

The module, and any connected display can be powered from the micro USB connector. Be sure to use a power adapter rated appropriately based on the module, options, and the connected display.



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3.1.2 Power over Ethernet



3.1.3 Battery

Battery installation requires removal of the mbed module, therefore the unit should be fully powered down.

Additionally, and if the Wi-Fi interface is integrated, the connector for the Wi-Fi module must be installed not to protrude above the surface of the component side.

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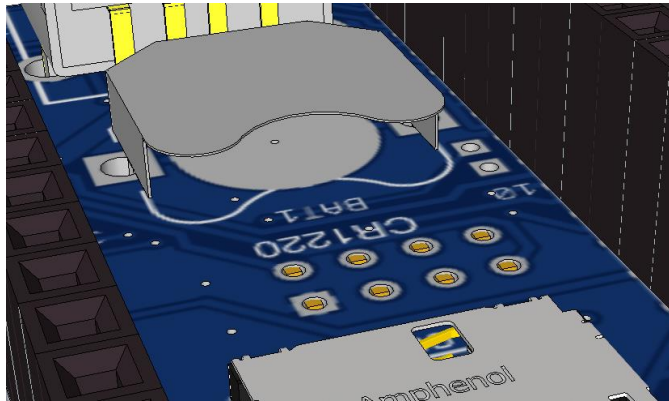


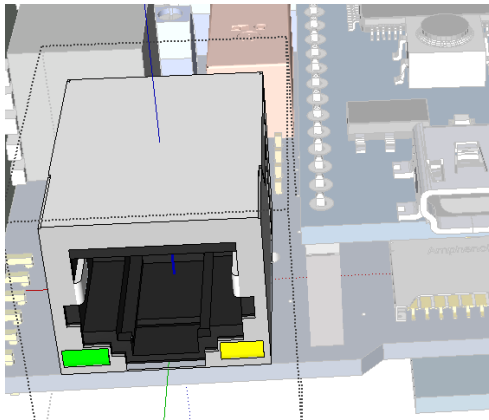
Figure 1 Wi-Fi Header Correct Installation



Figure 2 Wi-Fi Header Incorrect Installation

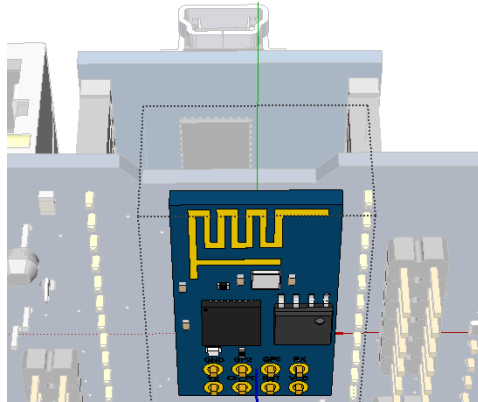
3.2 Network Interface

3.2.1 Wired Ethernet Interface



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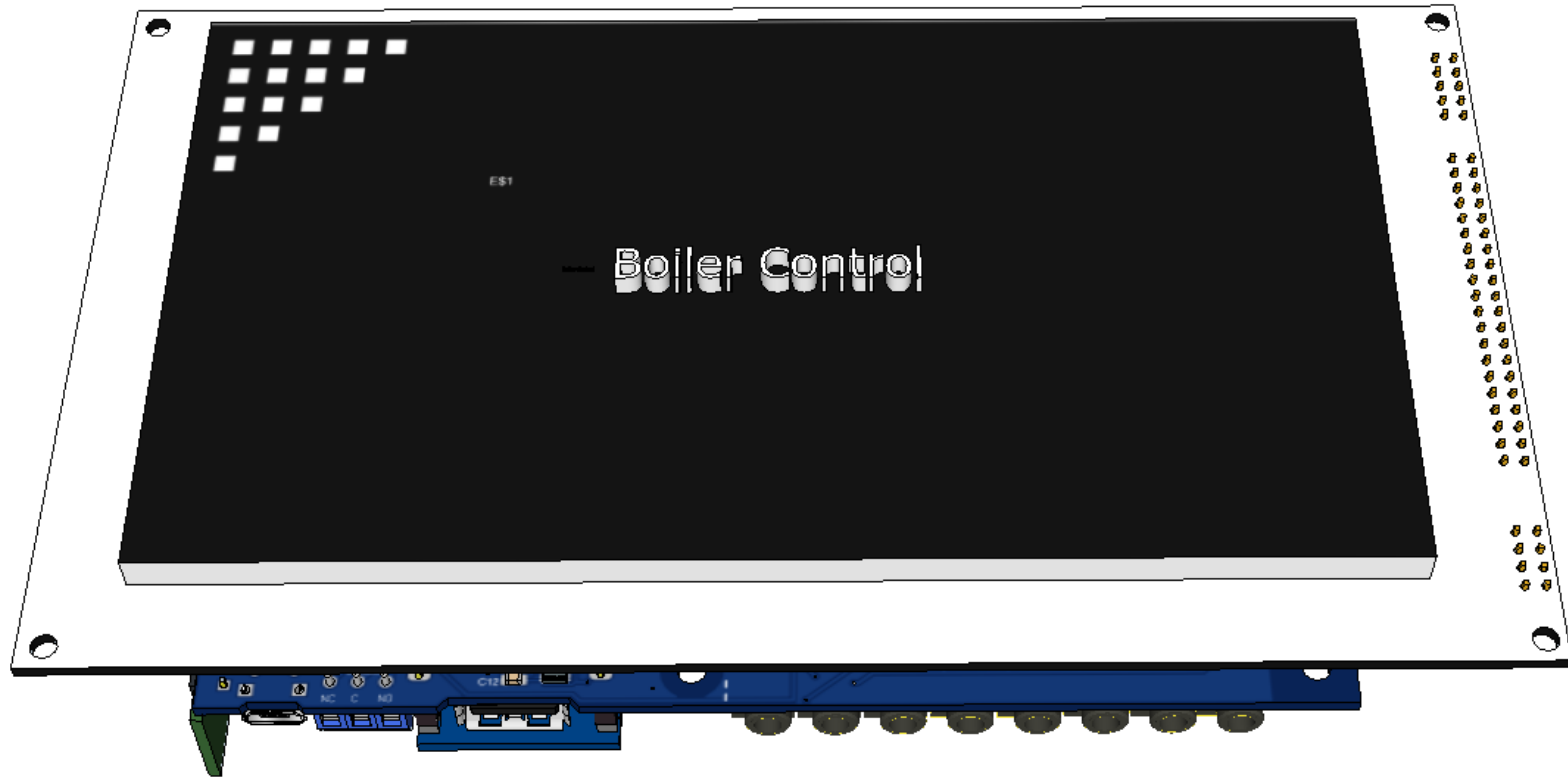
3.2.2 Wi-Fi Network Interface



3.3 Display Module

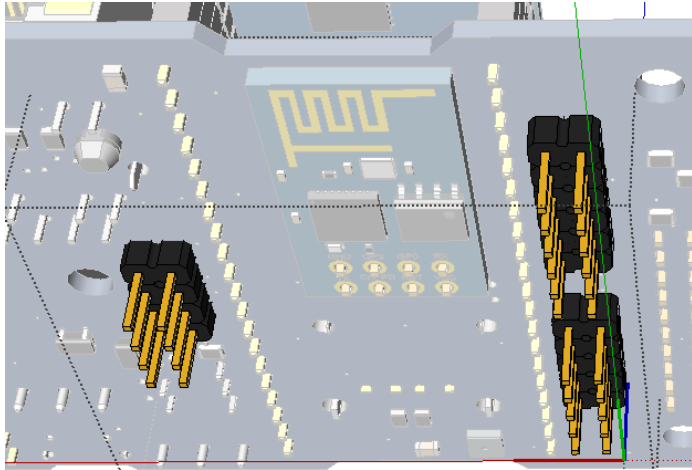
The WattVision design supports a display interface. The interface has optionality, from a basic display, to a display with either single, or multi-touch support, and independent of that is the support for a microSD card on the display module (in addition to the microSD module on the WattVision board).

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There are 3 total interfaces to the display module.

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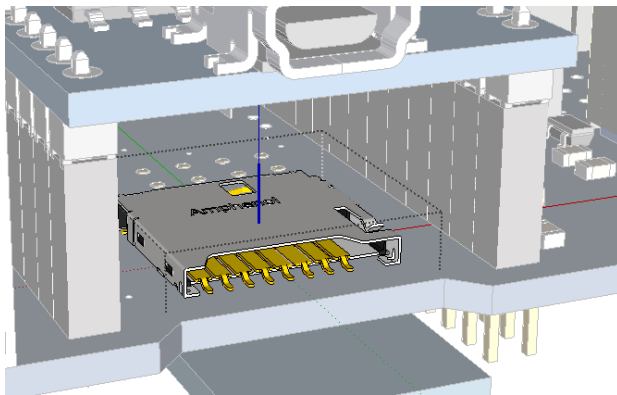


3.3.1 Display Interface

3.3.2 Touch Screen Interface

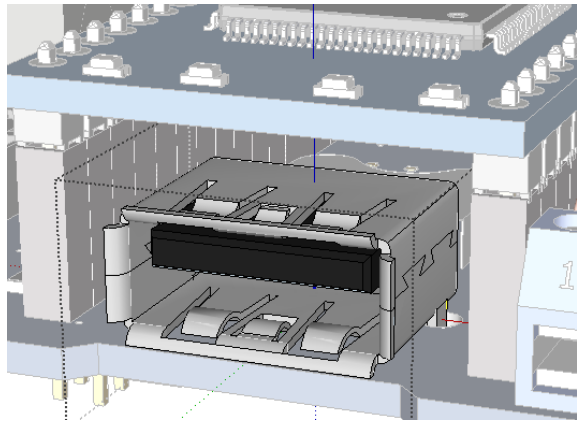
3.3.3 Display micro SD Interface

3.4 Micro SD card



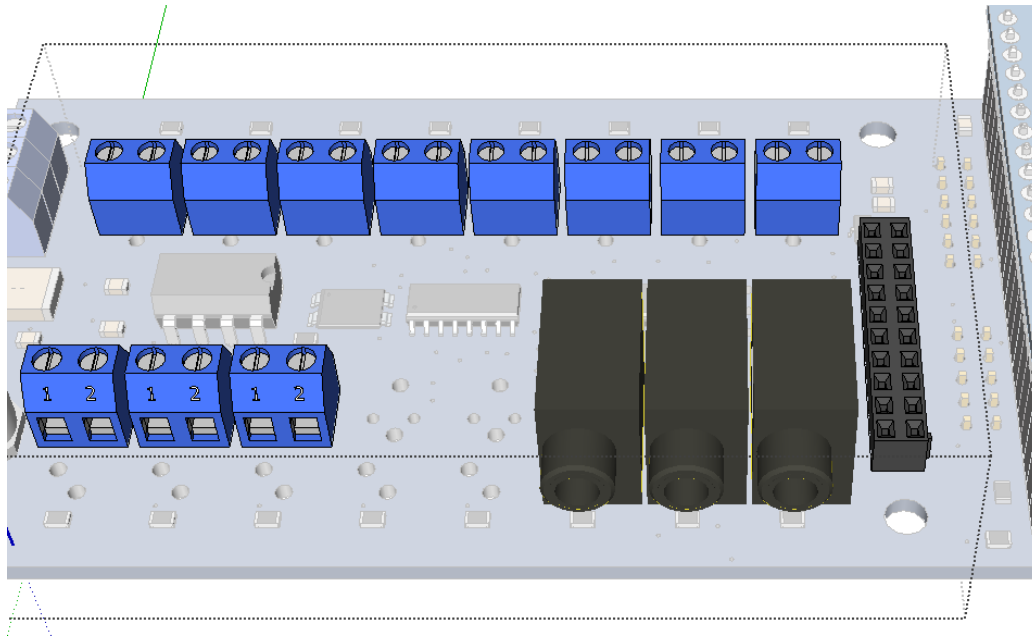
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3.5 USB Host

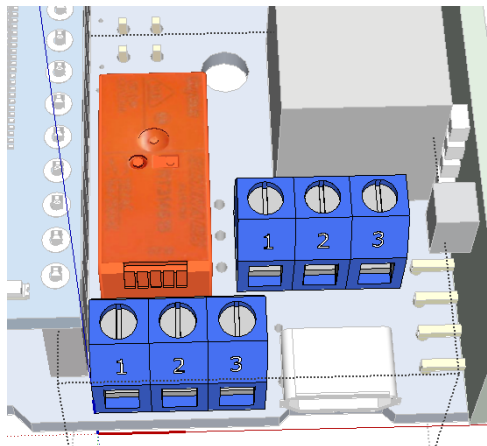


3.6 Data Acquisition

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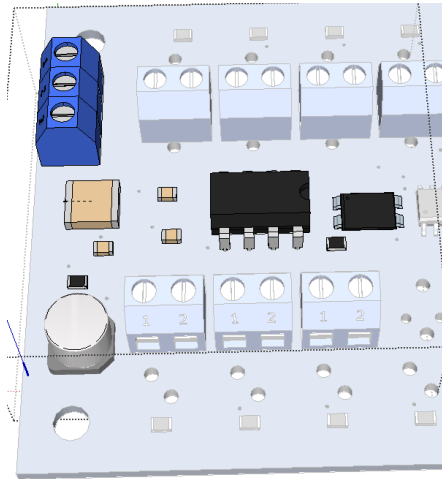


3.7 Relay Driver



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3.8 High Voltage Sensing



4 Special Instructions and Build Errata for v1.0

4.1 Air Wire

One air-wire is required. Connect IC4 pin 3 to pin 4. Suggestion is to bare the copper and create a solder bridge from pin 3 to pin 4.

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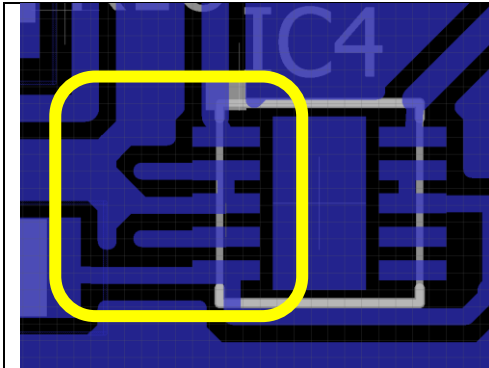


Figure 3 Missing Circuit Trace

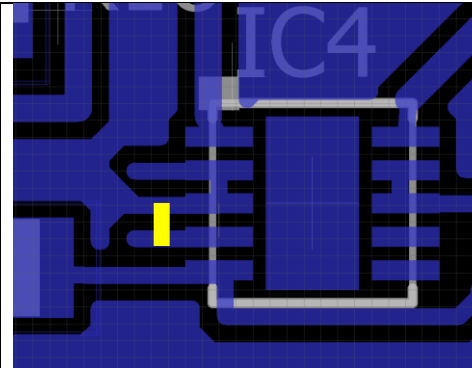


Figure 4 Air Wire Location

4.2 Component Footprint

Part OK1 PCB footprint is a little too narrow for the part. The leads can be gently crimped inward to match the pad layout.

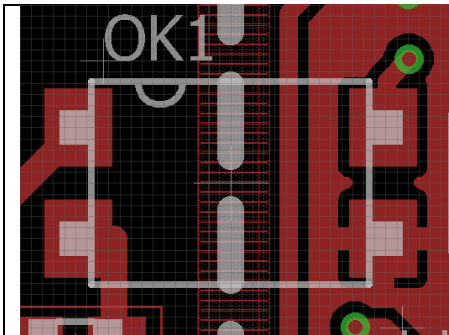


Figure 5 OK1 Footprint



Figure 6 OK1 Component

4.3 Component Labels

- Part X2 should be labeled designator HD4.
- Connector ??? is the wrong part number.

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4.4 PoE Bulk Capacitance


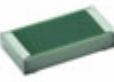

Capacitor C10 is labeled as 10 uF. The PoE module requires a much larger bulk capacitance of 470 uF is recommended, and even larger depending on the load transient conditions.

4.5 I2C Pull-up Resistors

R39 and R40, as shown in the schematic, did not exist for the first generation of PCB and were patches in under the micro. These are required if the temp sensor is required and the display is not installed (the display had effective pullup resistors).

5 Assembly Guide

Follow this guide for the suggested order of assembly. First low profile surface mount devices will be installed on the solder side (SS), then on the component side (CS). Following the surface mount installation, through hole parts will be installed. Finally, a few offboard (OFF) components will be listed for the ribbon cable assemblies, even though the ribbon cable itself is not shown.

WattVision	Boiler	Display	Side	Image	Part Number	Description	Designator
2	2	2	SS		A110543CT-ND 1-2176092-8	RES SMD 1K OHM 0.1% 1/4W 0805	R1 R5
2	0	0	SS		541-2322-1-ND TNPV12061M50BEEN	RES SMD 1.5M OHM 0.1% 1/4W 1206	R2 R3
1	0	0	SS		408-1923-1-ND HRG3216P-4700-D-T1	RES SMD 470 OHM 0.5% 1W 1206	R4

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WattVision	Boiler	Display	Side	Image	Part Number	Description	Designator
2	0	0	SS		RG32P13.0KBCT-ND RG3216P-1302-B-T1	RES SMD 13K OHM 0.1% 1/4W 1206	R6 R7
1	1	1	SS		RMCF0805JT470RCT-ND RMCF0805JT470R	RES SMD 470 OHM 5% 1/8W 0805	R8
3	0	0	SS		P680KDACT-ND ERA-6AEB684V	RES SMD 680K OHM 0.1% 1/8W 0805	R9 R10 R11
2	2	2	SS		RMCF0805JT390RCT-ND RMCF0805JT390R	RES SMD 390 OHM 5% 1/8W 0805	R14 R15
0	2	0	SS		RMCF0805JT10K0CT-ND RMCF0805JT10K0	RES SMD 10K OHM 5% 1/8W 0805	R16 R37
2	2	2	SS		RMCF0805JT15K0CT-ND RMCF0805JT15K0	RES SMD 15K OHM 5% 1/8W 0805	R17 R18
2	0	0	SS		490-8169-1-ND GRM1555C1E120GA01D	CAP CER 12PF 25V NP0 0402	C8 C9
1	0	1	SS		490-1709-1-ND GRM21BR61A106KE19L	CAP CER 10UF 10V X5R 0805	C10
0	0	0	SS		490-1709-1-ND GRM21BR61A106KE19L	CAP CER 10UF 10V X5R 0805	C11

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WattVision	Boiler	Display	Side	Image	Part Number	Description	Designator
1	1	1	SS		478-7962-1-ND 0805ZC104KAT2A	CAP CER 0.1UF 10V X7R 0805	C12
2	2	0	SS		732-8017-1-ND 885012207007	CAP CER 1000PF 10V X7R 0805	C14 C15
1	0	0	SS		887-1740-1-ND 7A-8.000MAAE-T	CRYSTAL 8.000MHZ 12PF SMD	X1
17	17	17	SS		BAS40-04FDICT-ND BAS40-04-7-F	DIODE ARRAY SCHOTTKY 40V SOT23-3	D3 - D20
1	1	1	SS		336-3128-ND SI7013-A20-GM	IC TEMP SENSOR RH 2% DFN	IC4
1	0	0	SS		497-1241-1-ND LD1117S33CTR	IC REG LDO 3.3V 0.8A SOT223	IC1
0	0	0	SS		497-1241-1-ND LD1117S33CTR	IC REG LDO 3.3V 0.8A SOT223	IC3
1	0	0	SS		SMBJ5352B-TPMSCT-ND SMBJ5352B-TP	DIODE ZENER 15V 5W DO214AA	D1
0	1	0	SS		568-4866-1-ND BC846A,215	TRANS NPN 65V 0.1A SOT23	T1

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WattVision	Boiler	Display	Side	Image	Part Number	Description	Designator
1	0	0	CS		P680KDACT-ND ERA-6AEB684V	RES SMD 680K OHM 0.1% 1/8W 0805	R12
1	0	0	CS		RMCF0805JT120RCT-ND RMCF0805JT120R	RES SMD 120 OHM 5% 1/8W 0805	R13
0	16	0	CS		RMCF0805FT150KCT-ND RMCF0805FT150K	RES SMD 150K OHM 1% 1/8W 0805	R19 - R34
0	2	0	CS		RMCF0805JT10K0CT-ND RMCF0805JT10K0	RES SMD 10K OHM 5% 1/8W 0805	R35 R36
3	2	1	CS		490-1709-1-ND GRM21BR61A106KE19L	CAP CER 10UF 10V X5R 0805	C1 C7 C13
1	1	1	CS		478-7962-1-ND 0805ZC104KAT2A	CAP CER 0.1UF 10V X7R 0805	C2
1	0	0	CS		445-7776-1-ND C5750X7T2W684K200KA	CAP CER 0.68UF 450V X7T 2220	C3
2	0	0	CS		732-7657-1-ND 885012207025	CAP CER 4.7UF 10V X7R 0805	C5 C6
1	0	0	CS		1189-2433-1-ND 25SEV47M6.3X5.5	CAP ALUM 47UF 20% 25V SMD	C4

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WattVision	Boiler	Display	Side	Image	Part Number	Description	Designator
1	1	1	CS		BAS40-04FDICT-ND BAS40-04-7-F	DIODE ARRAY SCHOTTKY 40V SOT23-3	D2
1	0	0	CS		160-1892-1-ND LTV-816S-TA1	OPTOISOLATR 5KV TRANSISTOR 4-SMD	OK1
2	2	0	CS		296-14530-1-ND CD74HC4051M96	IC MUX/DEMUX 8X1 16SOIC	IC5 IC6
1	1	1	CS		114-00841-68-1-ND 114-00841-68	CONN MICRO SD CARD PUSH-PULL R/A	CON6
0	1	0	CS		609-4618-1-ND 10118194-0001LF	CONN USB MICRO B RECPT SMT R/A	CON3
2	2	2	CS		3M9521-ND 960120-6202-AR	CONN SOCKET SGL VERT 20POS GOLD	SO1
1	0	0	CS		3M5473-ND 4808-3004-CP	CONN IC DIP SOCKET 8POS TIN	SO2
1	1	1	CS		36-3001-ND 3001	HOLDER BATTERY COIN 12MM DIA THM	BAT1
1	1	1	CS		36-921-ND 921	CONN SOCKET USB SGL A-TYPE HORZ	CON2
0	1	1	SS		952-1788-ND M20-9760446	04+04 DIL VERT PIN HDR	HD3

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WattVision	Boiler	Display	Side	Image	Part Number	Description	Designator
0	1	1	SS		952-1795-ND M20-9760546	05+05 DIL VERT PIN HDR	HD2
0	1	1	SS		A122662-ND 826942-6	CONN HEADER BRKWY 12POS VERT TIN	HD1
1	0	0	CS		S6106-ND PPPC102LFBN-RC	CONN HEADER FEM 20POS.1" DL GOLD	X2
3	3	0	CS		CP1-3533NG-ND SJ1-3533NG	CONN JACK STEREO 3.5MM R/A	J1 – J3
13	0	0	CS		CP1-3533NG-ND SJ1-3533NG	CONN JACK STEREO 3.5MM R/A	J4 - J16
1	0	0	CS		ED2636-ND OSTTE030161	TERM BLOCK 3.5MM VERT 3POS PCB	CON1
0	2	0	CS		ED2636-ND OSTTE030161	TERM BLOCK 3.5MM VERT 3POS PCB	CON5 CON7
0	0	0	CS		ED2635-ND OSTTE020161	TERM BLOCK 3.5MM VERT 2POS PCB	CON8 CON9, CON21 - CON23
0	11	0	CS		ED2635-ND OSTTE020161	TERM BLOCK 3.5MM VERT 2POS PCB	CON10 – CON20

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WattVision	Boiler	Display	Side	Image	Part Number	Description	Designator
0	1	0	CS		399-11052-5-ND EC2-5NU	RELAY GEN PURPOSE DPDT 2A 5V	K1
1	1	1	CS		732-4977-ND 7499211122A	CONN MAGJACK 1PORT 100 BASE-T	CON4
1	0	0	CS		ATTINY85-20PU-ND ATTINY85-20PU	IC MCU 8BIT 8KB FLASH 8DIP	IC2
1	1	1	CS		568-4916-ND OM11043	DEVELOPMENT BOARD LPC1768 MBED	MOD1
0	2	2	OFF		609-3568-ND 71600-008LF	CONN SOCKET IDC 8POS DL SR 30AU	SO3
0	2	2	OFF		609-3561-ND 71600-310LF	CONN SOCKET IDC 10POS DL SR 30AU	SO4
0	2	2	OFF		609-5077-ND 20021444-00012T4LF	CONN RECPT 12POS GOLD IDC DL	SO5

The ribbon cable assemblies are built with SO3 – SO5.