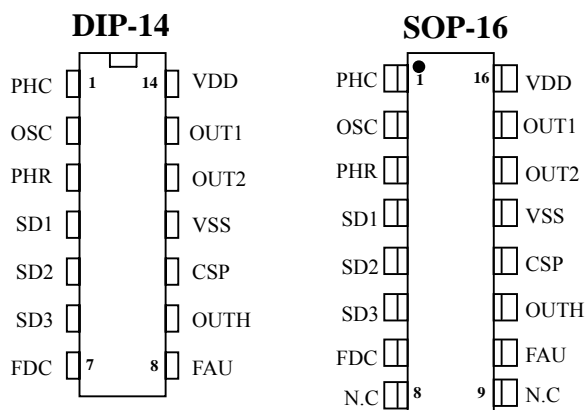




**FULLY PROTECTION
BALLAST CONTROLLER**

PIN ASSIGNMENT



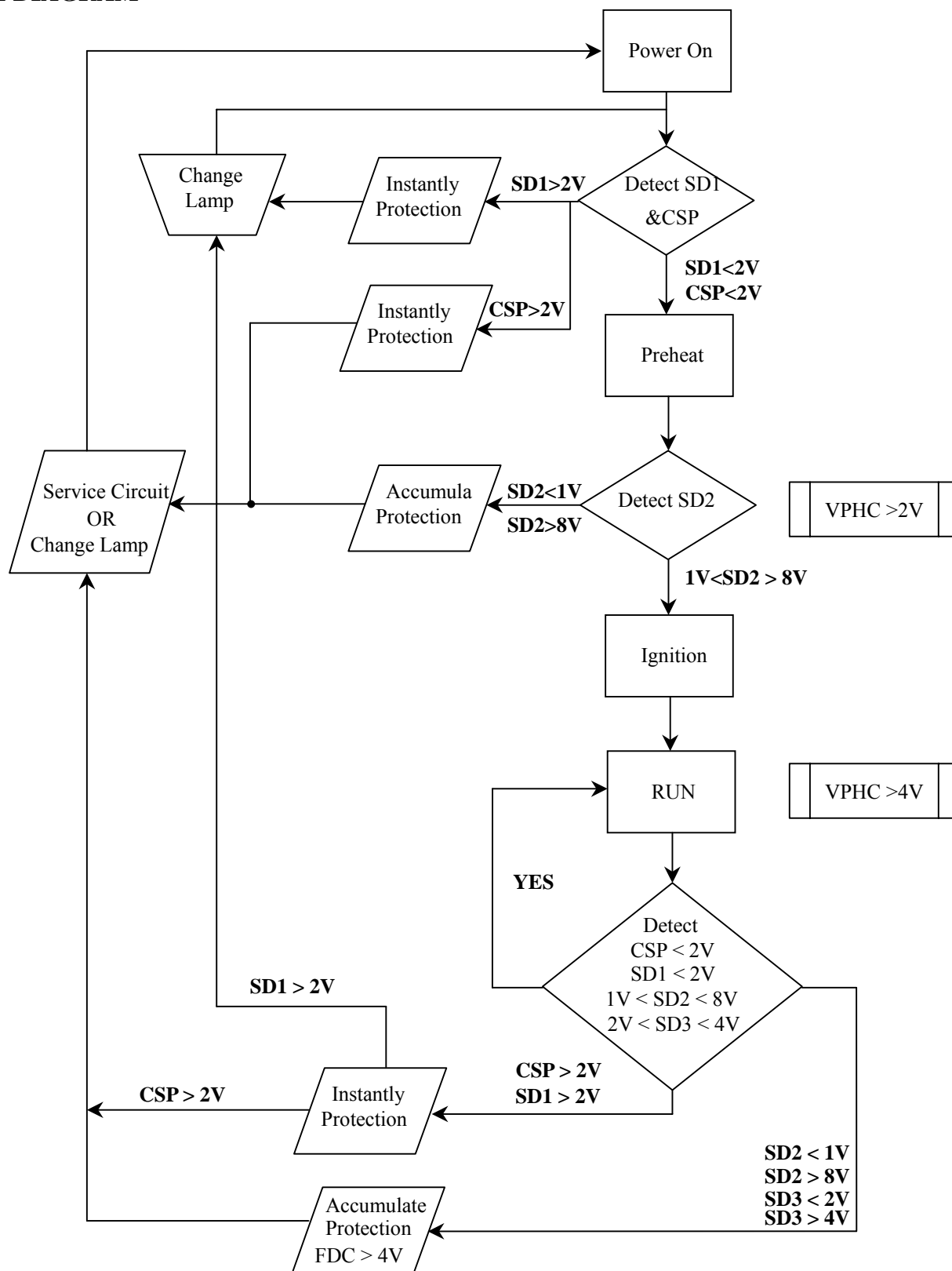
PIN DESCRIPTION

| Pin No. | | Pin Name | Description |
|---------|-------|----------|---|
| DIP14 | SOP16 | | |
| 1 | 1 | PHC | Preheat timing capacitor |
| 2 | 2 | OSC | Oscillator timing capacitor |
| 3 | 3 | PHR | Preheat frequency timing resistor |
| 4 | 4 | SD1 | Shutdown input 1 ; open-lamp protection |
| 5 | 5 | SD2 | Shutdown input 2 ; open-lamp protection & Lamp Leakage /Rectification effect/ End of Lamp Life Protection |
| 6 | 6 | SD3 | Shutdown input 3 ;Lamp Leakage / Rectification effect / End of Lamp Life Protection |
| 7 | 7 | FDC | Fault signal accumulate input |
| | 8 | N.C | No connected |
| | 9 | N.C | No connected |
| 8 | 10 | FAU | Lamp ignition fault detect input |
| 9 | 11 | OUTH | To driving high side driver . |
| 10 | 12 | CSP | Current sensor input |
| 11 | 13 | VSS | The ground potential of all the pins. |
| 12 | 14 | OUT2 | The output of a high-current power driver capable of driving the gate of a power MOSFET |
| 13 | 15 | OUT1 | The output of a high-current power driver capable of driving the gate of a power MOSFET. |
| 14 | 16 | VDD | The logic and control power supply connection. |



FULLY PROTECTION
BALLAST CONTROLLER

STAGE DIAGRAM





**FULLY PROTECTION
BALLAST CONTROLLER**

ELECTRICAL CHARACTERISTICS

VCC = 12V +/- 0.25V , RT = 43K , RPHR = 43K , CT = 270 pF , VPHC = 0.0V , TA = 25°C unless otherwise specified.

| Symbol | Definition | Min. | Typ. | Max. | Units | Test Conditions |
|---|--|------|------|------|-------|---|
| Oscillator, Ballast Control, I/O Characteristics | | | | | | |
| Fosc | Oscillator frequency | 39 | 42 | 45 | KHz | RT=43K, RPHR = 43K CT = 270pF (see Figure1) |
| D | Oscillator duty cycle | — | 50 | — | % | |
| VCTFLT | Fault-mode CT pin voltage | — | 0 | — | mV | |
| Fss | Soft start frequency | 75 | 80 | 85 | KHz | VDD=12V, RT=43K |
| Preheat Characteristics | | | | | | |
| IPHC | PHC pin charging current | 15 | 20 | 25 | μA | VPHC=10V, CT =10V |
| VPHCFLT | Fault-mode PHC pin voltage | — | 0 | — | mV | |
| Output Characteristics | | | | | | |
| Tr | Rising time (note) | — | 100 | — | ns | Load = 2000pF |
| Tf | Falling time (note) | — | 100 | — | ns | Load = 2000pF |
| IOMAX | Maximum allowable output current (OUT1,OUT2) | — | 200 | — | mA | VDD=12V |
| UNDER VOLTAGE LOCK OUT Characteristics | | | | | | |
| VTH(st) | Upper threshold voltage | 8 | — | 10 | V | Ta = 25°C |
| HY(st) | Hysteresis | — | 2 | — | V | Ta = 25°C |



**FULLY PROTECTION
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FUNCTIONAL DESCRIPTION

Under-voltage Lock-Out Mode (UVLO)

The under-voltage lock-out mode (UVLO) is defined as the state the IC is in when VDD is below the turn-on threshold of the IC. The M8145 under voltage lock-out is designed to maintain an ultra low supply current of less than 200uA, and to guarantee the IC is fully functional before the output drivers are activated.

Preheat Mode (PH)

The preheat mode is defined as the state the IC is in when the lamp filaments are being heated to their correct emission temperature. This is necessary for maximizing lamp life and reducing the required ignition voltage. The M8145 enters preheat mode when VDD exceeds the UVLO positive-going threshold. OUT1 and OUT2 begin to oscillate at the preheat frequency with 50% duty cycle, and with a dead-time which is set by the value of the external timing capacitor, CT, and internal dead-time resistor, preheat frequency which is set by the value of the external RPHC&CPHC (see Figure1)

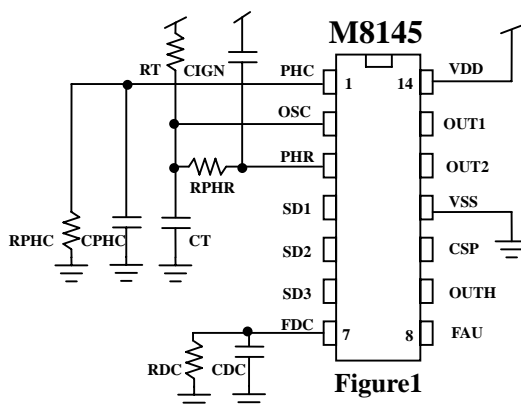


Figure1

Ignition Mode (IGN)

The ignition mode is defined as the state the IC is in when a high voltage is being established across the lamp necessary for igniting the lamp. The M8145 enters ignition mode when the voltage on pin#1(PHC) exceeds 2V. The operating frequency to ramp smoothly from the preheat frequency, through the ignition frequency, to the final run frequency. The ignition mode oscillating frequency is determined by the timing resistor RT and timing capacitor CIGN (see Figure1)

Run Mode (RUN)

Once the lamp has successfully ignited, the ballast enters run mode. The run mode is defined as the state the IC is in when the lamp arc is established and the lamp is being driven to a given power level. The run mode oscillating frequency is determined by the timing resistor RT and timing capacitor CT (see Figure1). Should hard-switching occur at the half-bridge at any time due to an open-filament or lamp removal, the voltage across the current sensing resistor, RDC (see Figure1), will exceed the internal threshold of 4.0 volts and the IC will enter FAULT mode and gate driver outputs OUT1, OUT2 and PFC IC will be latched low.



FULLY PROTECTION BALLAST CONTROLLER

Fault Mode (FAULT)

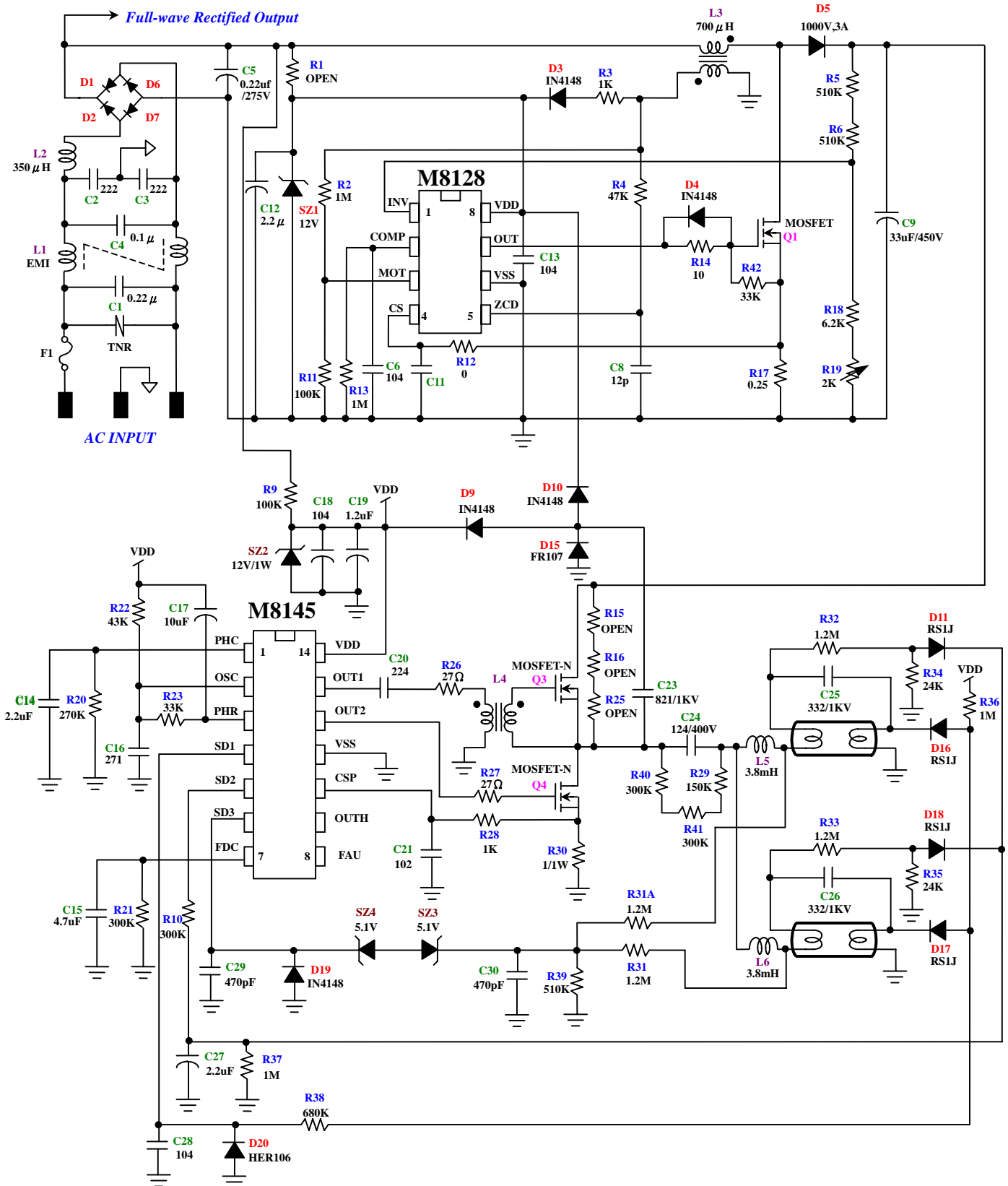
Should the voltage at the Pin#4 (SD1), exceed 2.0 volts at any time after the preheat mode, the voltage at the Pin#5(SD2) below 2.0 volts at any time after the ignition mode, the voltage at the Pin#6(SD3) exceed 4 volts or decrease below 2 volts and SD2 exceed 8.0 volts or below 1.0 volts or SD1 exceed 2 volts during RUN mode, IC enters fault mode and both OUT1 and OUT2 driver outputs are latched in the 'low' state. is discharged to VSS for resetting the preheat time, and Pin#2 (OSC) is discharged to VSS for disabling the oscillator. To exit fault mode, VDD must be recycled back below the UVLO negative going turn-off threshold, or, the Pin#4 (SD1), must be pulled above 2.0 volts. Either of these will force the IC to enter UVLO mode. Once VDD is above UVLO the turn on threshold and SD1 is below 2.0 volts, the IC will begin oscillating again in the preheat mode. These over-currents must occur during the on-time of LO. During run mode, a single pulse on the CSP pin above 2.0 volts will force the IC to enter FAULT mode.



| |
|---------|
| BALLAST |
| M8145 |

FULLY PROTECTION
BALLAST CONTROLLER

APPLICATION DIAGRAM (85~265V V_{AC} Input , 400V_{DC}, 28W X2 T5 Lamps Ballast)





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COMPONENT LISTING

| Designator | Value | Description | Quantity |
|--------------------------------|------------|---|----------|
| C1, C5 | 0.22uF | BOX Capacitor, POLYPROPYLENE FILM Capacitor | 2 |
| C4 | 0.1uF | BOX Capacitor, POLYPROPYLENE FILM Capacitor | 1 |
| C2, C3 | 222 | Y Capacitor | 2 |
| C8 | 12pF | Ceramic Capacitor | 1 |
| C9 | 33u/450V | Electrolytic Capacitor | 1 |
| C11 | OPEN | Ceramic Capacitor | 1 |
| C6, C13, C18, C28 | 104 | Ceramic Capacitor | 4 |
| C15 | 4.7uF | Electrolytic Capacitor | 1 |
| C12, C14, C19, C27 | 2.2uF | Electrolytic Capacitor | 4 |
| C16 | 271 | Ceramic Capacitor | 1 |
| C17 | 10uF | Electrolytic Capacitor | 1 |
| C20 | 224 | Ceramic Capacitor | 1 |
| C21 | 102 | Ceramic Capacitor | 1 |
| C23 | 821/1KV | POLYPROPYLENE FILM Capacitor | 1 |
| C24 | 124/400V | POLYPROPYLENE FILM Capacitor | 1 |
| C25, C26 | 332/1KV | POLYPROPYLENE FILM Capacitor | 2 |
| C29, C30 | 470pF | Ceramic Capacitor | 2 |
| CNR1 | 10D511K | Varistor | 1 |
| D1, D2, D6, D7 | 1N4007 | Diode 1000V, 1A | 4 |
| D3, D4, D9, D10, D11, D18, D19 | 1N4148 | Diode 75V,1A | 7 |
| D5 | HER306 | Diode HIGH EFFICIENCY RECTIFIERS 600V, 3A | 1 |
| D15 | FR107 | Diode FAST RECOVERY RECTIFIER 700V,1A | 1 |
| D16, D17 | S1M | Diode FAST RECOVERY RECTIFIER 700V,1A | 2 |
| D20 | HER106 | Diode HIGH EFFICIENCY RECTIFIERS 600V, 1A | 1 |
| F1 | 3.15A/250V | Fuse | 1 |
| L1 | | EE19 Inductor | 1 |
| L2 | 350uH | DR1012 Inductor | 1 |
| L3 | 700uH | EE25 Inductor | 1 |
| L4 | 40T:80T | EE08 Inductor | 1 |
| L5, L6 | 3.8mH | EE25 Inductor | 2 |



**FULLY PROTECTION
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| Designator | Value | Description | Quantity |
|----------------------|---------|------------------------------|----------|
| Q1 | 2SK2996 | Transistor, MOSFET 600V, 10A | 1 |
| Q3, Q4 | 2SK2628 | Transistor, MOSFET 600V, 6A | 2 |
| R1, R15, R16, R25 | OPEN | Resistor 1/4W | 4 |
| R2, R13, R36, R37 | 1M | Resistor 1/4W | 4 |
| R3, R28 | 1K | Resistor 1/4W | 2 |
| R4 | 47K | Resistor 1/4W | 1 |
| R5, R6, R39 | 510K | Resistor 1/4W | 3 |
| R9, R11 | 100K | Resistor 1/4W | 2 |
| R10, R21, R40, R41 | 300K | Resistor 1/4W | 4 |
| R12 | 0 | Resistor 1/4W | 1 |
| R14, R26, R27 | 10Ω | Resistor 1/4W | 3 |
| R17 | 0.25/1W | Resistor 1W | 1 |
| R18 | 6.2K | Resistor 1/4W | 1 |
| R19 | VR2K | VR Resistor | 1 |
| R20 | 270K | Resistor 1/4W | 1 |
| R22 | 43K | Resistor 1/4W | 1 |
| R23, R42 | 33K | Resistor 1/4W | 2 |
| R29 | 150K | Resistor 1/4W | 1 |
| R30 | 1/1W | Resistor 1W | 1 |
| R31, R31A, R32, R33, | 1.2MEG | Resistor 1/4W | 4 |
| R34, R35 | 24K | Resistor 1/4W | 2 |
| R38 | 680K | Resistor 1/4W | 1 |
| SZ1, SZ2 | 12V | Zener Diode 1/2W | 2 |
| SZ3, SZ4 | 5.1V | Zener Diode 1/4W | 2 |
| U1 | M8128 | IC, Power Factor Controller | 1 |
| U2 | M8145 | IC, Ballast Driver | 1 |

* All specs and applications shown above subject to change without prior notice.