

# LCD15W SERIES

DC-DC CONVERTER

4:1 ULTRA WIDE INPUT RANGE  
UP TO 15Watts



## FEATURES

- NO MINIMUM LOAD REQUIRED
- 1600VDC INPUT TO OUTPUT ISOLATION
- SMALL SIZE AND LOW PROFILE : 1.0 x 1.0 x 0.39 INCH
- SIX-SIDED CONTINUOUS SHIELD
- UL60950-1, EN60950-1, & IEC60950-1 SAFETY APPROVALS
- CE MARKED
- COMPLIANT TO RoHS II & REACH

## APPLICATIONS

- WIRELESS NETWORK
- TELECOM/DATACOM
- INDUSTRY CONTROL SYSTEM
- DISTRIBUTED POWER ARCHITECTURES
- SEMICONDUCTOR EQUIPMENT

| 1600VDC<br>ISOLATION | REMOTE<br>CONTROL | UVP | OCP | SCP | OVP |
|----------------------|-------------------|-----|-----|-----|-----|
|----------------------|-------------------|-----|-----|-----|-----|

## TECHNICAL SPECIFICATION

All specifications are typical at nominal input, full load and 25°C otherwise noted

| Model Number  | Input Range | Output Voltage | Output Current @Full Load | Input Current @ No Load | Efficiency | Maximum Capacitor Load (1) |
|---------------|-------------|----------------|---------------------------|-------------------------|------------|----------------------------|
|               | VDC         | VDC            | mA                        | mA                      | %          | μF                         |
| LCD15-24S3P3W | 9 ~ 36      | 3.3            | 4000                      | 45                      | 86         | 12000                      |
| LCD15-24S05W  | 9 ~ 36      | 5              | 3000                      | 70                      | 86         | 6000                       |
| LCD15-24S12W  | 9 ~ 36      | 12             | 1300                      | 20                      | 87         | 1000                       |
| LCD15-24S15W  | 9 ~ 36      | 15             | 1000                      | 20                      | 87         | 660                        |
| LCD15-24D05W  | 9 ~ 36      | ±5             | ±1500                     | 20                      | 85         | ±3000                      |
| LCD15-24D12W  | 9 ~ 36      | ±12            | ±625                      | 20                      | 87         | ±520                       |
| LCD15-24D15W  | 9 ~ 36      | ±15            | ±500                      | 20                      | 88         | ±330                       |
| LCD15-48S3P3W | 18 ~ 75     | 3.3            | 4000                      | 25                      | 86         | 12000                      |
| LCD15-48S05W  | 18 ~ 75     | 5              | 3000                      | 35                      | 87         | 6000                       |
| LCD15-48S12W  | 18 ~ 75     | 12             | 1300                      | 12                      | 87         | 1000                       |
| LCD15-48S15W  | 18 ~ 75     | 15             | 1000                      | 12                      | 87         | 660                        |
| LCD15-48D05W  | 18 ~ 75     | ±5             | ±1500                     | 12                      | 85         | ±3000                      |
| LCD15-48D12W  | 18 ~ 75     | ±12            | ±625                      | 15                      | 86         | ±520                       |
| LCD15-48D15W  | 18 ~ 75     | ±15            | ±500                      | 20                      | 87         | ±330                       |

## PART NUMBER STRUCTURE

| Series Name              | Input Voltage (VDC)   | Output Quantity          | Output Voltage (VDC)                                                  | Input Range | Option                                                                                                                                                                                                                                                                                                    | Assembly Option                                                                                         |
|--------------------------|-----------------------|--------------------------|-----------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| LCD15 - 48 S 05 W - A HS | 24: 9~36<br>48: 18~75 | S: Single<br><br>D: Dual | 3P3: 3.3<br>05: 5<br>12: 12<br>15: 15<br>05: ±5<br>12: ±12<br>15: ±15 | 4:1         | <input type="checkbox"/> : Negative logic remote ON/OFF(Standard)<br><b>A</b> : Positive logic remote ON/OFF<br><b>B</b> : Without Ctrl pin<br><b>C</b> : Negative logic remote ON/OFF without Trim pin<br><b>D</b> : Without Ctrl & Trim pin<br><b>E</b> : Positive logic remote ON/OFF without Trim pin | <input type="checkbox"/> : No Assembly Option<br><b>HS</b> : Heat-sink<br><b>HC</b> : Heat-sink & Clamp |

**INPUT SPECIFICATIONS**

| Parameter                      | Conditions                                                                                                                                                                        | Min.    | Typ.     | Max.                                                                                        | Unit     |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------|---------------------------------------------------------------------------------------------|----------|
| Operating input voltage range  | 24Vin(nom)<br>48Vin(nom)                                                                                                                                                          | 9<br>18 | 24<br>48 | 36<br>75                                                                                    | VDC      |
| Input reflected ripple current | Nominal input and Full load                                                                                                                                                       |         | 30       |                                                                                             | mAp-p    |
| Start-up voltage               | 24Vin(nom)<br>48Vin(nom)                                                                                                                                                          |         |          | 9<br>18                                                                                     | VDC      |
| Shutdown voltage               | 24Vin(nom)<br>48Vin(nom)                                                                                                                                                          |         | 8<br>16  |                                                                                             | VDC      |
| Start up time                  | Constant resistive load<br>Power up<br>Remote ON/OFF                                                                                                                              |         |          | 30<br>30                                                                                    | ms       |
| Input surge voltage            | 100ms, max.<br>24Vin(nom)<br>48Vin(nom)                                                                                                                                           |         |          | 50<br>100                                                                                   | VDC      |
| Input filter                   |                                                                                                                                                                                   |         |          | Pi type                                                                                     |          |
| Remote ON/OFF                  | Referred to -Vin pin<br>Positive logic DC-DC ON<br>(Option) DC-DC OFF<br>Negative logic DC-DC ON<br>(Standard) DC-DC OFF<br>Input current of Ctrl pin<br>Remote off input current | -0.5    | 2.5      | Open or 3 ~ 15VDC<br>Short or 0 ~ 1.2VDC<br>Short or 0 ~ 1.2VDC<br>Open or 3 ~ 15VDC<br>1.0 | mA<br>mA |

**OUTPUT SPECIFICATIONS**

| Parameter                        | Conditions                                                                                                    | Min.                       | Typ.             | Max.                           | Unit  |
|----------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------|------------------|--------------------------------|-------|
| Voltage accuracy                 |                                                                                                               | -1.0                       |                  | +1.0                           | %     |
| Line regulation                  | Low Line to High Line at Full Load<br>Single<br>Dual                                                          | -0.2<br>-0.5               |                  | +0.2<br>+0.5                   | %     |
| Load regulation                  | No Load to Full Load<br>Single<br>Dual                                                                        | -0.2<br>-1.0               |                  | +0.2<br>+1.0                   | %     |
| Cross regulation                 | Asymmetrical load 25%/100% FL<br>Dual                                                                         | -5.0                       |                  | +5.0                           | %     |
| Voltage adjustability (2)        | Single output                                                                                                 | -10                        |                  | +10                            | %     |
| Ripple and noise                 | Measured by 20MHz bandwidth; With a 1μF M/C X7R and a 10μF T/C<br>Single 3.3Vout, 5Vout<br>Others<br>Dual All |                            | 75<br>100<br>100 |                                | mVp-p |
| Temperature coefficient          |                                                                                                               | -0.02                      |                  | +0.02                          | %/°C  |
| Transient response recovery time | 25% load step change                                                                                          |                            | 250              |                                | μs    |
| Over voltage protection          | 3.3Vout<br>5Vout<br>12Vout<br>15Vout                                                                          | 3.7<br>5.6<br>13.5<br>16.8 |                  | 5.4<br>7.0<br>19.6<br>20.5     | VDC   |
| Over load protection             | % of Iout rated; Hiccup mode                                                                                  |                            | 150              |                                | %     |
| Short circuit protection         |                                                                                                               |                            |                  | Continuous, automatic recovery |       |

**GENERAL SPECIFICATIONS**

| Parameter             | Conditions                                           | Min.         | Typ. | Max.                                 | Unit |
|-----------------------|------------------------------------------------------|--------------|------|--------------------------------------|------|
| Isolation voltage     | 1 minute<br>Input to Output<br>Input(Output) to Case | 1600<br>1000 |      |                                      | VDC  |
| Isolation resistance  | 500VDC                                               | 1            |      |                                      | GΩ   |
| Isolation capacitance |                                                      |              |      | 1000                                 | pF   |
| Switching frequency   |                                                      | 360          | 400  | 440                                  | kHz  |
| Safety approvals      |                                                      |              |      | UL60950-1<br>EN60950-1<br>IEC60950-1 |      |
| Case material         |                                                      |              |      | Nickel-coated copper                 |      |
| Base material         |                                                      |              |      | FR4 PCB                              |      |
| Potting material      |                                                      |              |      | Epoxy (UL94 V-0)                     |      |
| Weight                |                                                      |              |      | 15g (0.53oz)                         |      |
| MTBF                  | MIL-HDBK-217F, Full load                             |              |      | 1.459 x 10 <sup>6</sup> hrs          |      |

## ENVIRONMENTAL SPECIFICATIONS

| Parameter                     | Conditions                                                                              | Min.       | Typ.         | Max.        | Unit         |
|-------------------------------|-----------------------------------------------------------------------------------------|------------|--------------|-------------|--------------|
| Operating ambient temperature | Without derating<br>With derating                                                       | -40<br>+60 |              | +60<br>+105 | °C           |
| Maximum case temperature      |                                                                                         |            |              | 105         | °C           |
| Storage temperature range     |                                                                                         | -55        |              | +125        | °C           |
| Thermal impedance             | Vertical direction by natural convection (20LFM)<br>Without heat-sink<br>With heat-sink |            | 18.2<br>15.8 |             | °C/W         |
| Thermal shock                 |                                                                                         |            |              |             | MIL-STD-810F |
| Vibration                     |                                                                                         |            |              |             | MIL-STD-810F |
| Relative humidity             |                                                                                         |            |              |             | 5% to 95% RH |

## EMC SPECIFICATIONS

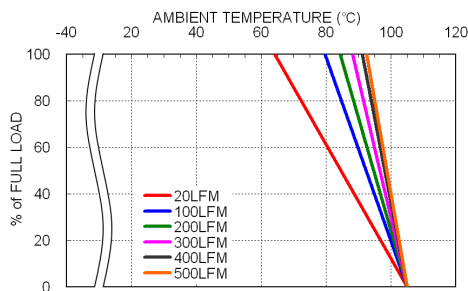
| Parameter          | Conditions                                        | Level            |
|--------------------|---------------------------------------------------|------------------|
| EMI (3)            | EN55022                                           | Class A, Class B |
| ESD                | EN61000-4-2 Air $\pm 8$ kV and Contact $\pm 6$ kV | Perf. Criteria A |
| Radiated immunity  | EN61000-4-3 10 V/m                                | Perf. Criteria A |
| Fast transient (4) | EN61000-4-4 $\pm 2$ kV                            | Perf. Criteria A |
| Surge (4)          | EN61000-4-5 $\pm 1$ kV                            | Perf. Criteria A |
| Conducted immunity | EN61000-4-6 3 Vr.m.s                              | Perf. Criteria A |

### Note:

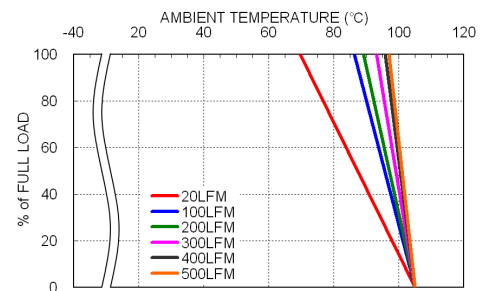
- Test by minimum input and constant resistive load.
- Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +Vout pin or -Vout pin.
- The standard modules meet EN55022 Class A and Class B with external components. For further information, please contact with P-DUKE.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.  
The filter capacitor Power Mate suggest: Nippon chemi-con KY series, 220 $\mu$ F/100V.

**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

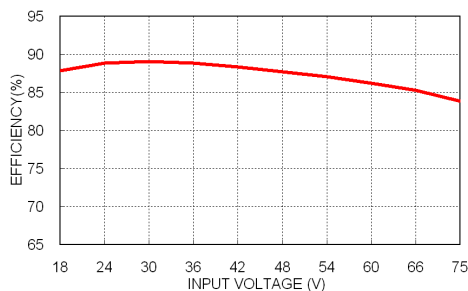
## CHARACTERISTIC CURVE



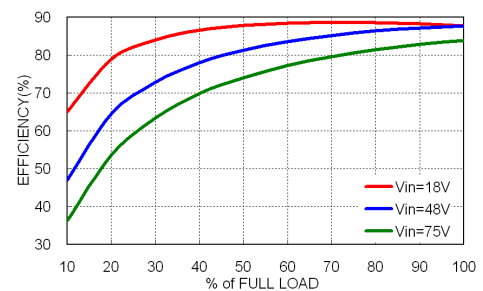
LCD15-48S05W Derating Curve



LCD15-48S05W Derating Curve With Heat-sink

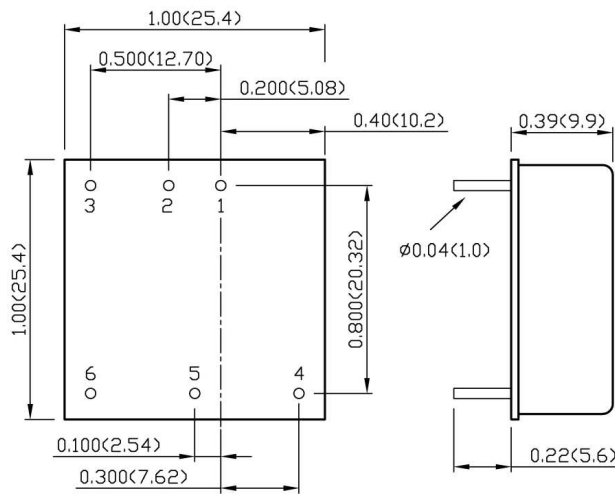


LCD15-48S05W Efficiency vs. Input Voltage



LCD15-48S05W Efficiency vs. Output Load

**MECHANICAL DRAWING**



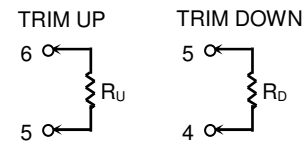
BOTTOM VIEW

**PIN CONNECTION**

| PIN | SINGLE | DUAL   |
|-----|--------|--------|
| 1   | +Vin   | +Vin   |
| 2   | -Vin   | -Vin   |
| 3   | Ctrl   | Ctrl   |
| 4   | +Vout  | +Vout  |
| 5   | Trim   | Common |
| 6   | -Vout  | -Vout  |

**EXTERNAL OUTPUT TRIMMING**

Output can be externally trimmed by using the method shown below.



1. All dimensions in inch (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)  
x.xxx±0.01 (x.xx±0.25)
3. Pin pitch tolerance ±0.01 (0.25)
4. Pin dimension tolerance ±0.004(0.1)