



# 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 ISOLATION	REMOTE 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
LCD15-24S24W	9 ~ 36	24	625	12	90	200
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
LCD15-24D24W	9 ~ 36	±24	±315	15	91	±100
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
LCD15-48S24W	18 ~ 75	24	625	10	91	200
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
LCD15-48D24W	18 ~ 75	±24	±315	10	91	±100

## 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 48: 18-75	S: Single	3P3: 3.3 05: 5 12: 12 15: 15 24: 24	4:1	□: Negative logic remote ON/OFF(Standard) A: Positive logic remote ON/OFF B: Without Ctrl pin C: Negative logic remote ON/OFF without Trim pin D: Without Ctrl & Trim pin E: Positive logic remote ON/OFF without Trim pin	□: None HS: Heat-sink HC: Heat-sink & Clamp
		D: Dual	05: ±5 12: ±12 15: ±15 24: ±24			

**INPUT SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit	
Operating input voltage range	24Vin(nom)		9	24	36	VDC	
	48Vin(nom)		18	48	75		
Input reflected ripple current	Nominal input and Full load		30			mAp-p	
Start-up voltage	24Vin(nom)					9	
	48Vin(nom)						18
Shutdown voltage	24Vin(nom)					8	
	48Vin(nom)						16
Start up time	Constant resistive load	Power up				30	
		Remote ON/OFF				30	
Input surge voltage	100ms, max.	24Vin(nom)				50	
		48Vin(nom)				100	
Input filter			Pi type				
Remote ON/OFF	Referred to -Vin pin	Positive logic	DC-DC ON				Open or 3 ~ 15VDC
		(Option)	DC-DC OFF				
		Negative logic	DC-DC ON				
		(Standard)	DC-DC OFF				
		Input current of Ctrl pin					
Remote off input current			2.5	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	Single	-0.2		+0.2	%			
		Dual	-0.5		+0.5				
Load regulation	No Load to Full Load	Single	-0.2		+0.2	%			
		Dual	-1.0		+1.0				
Cross regulation	Asymmetrical load 25%/100% FL		-5.0		+5.0	%			
Voltage adjustability (2)	Single output	24Vout	-10		+20	%			
		Others	-10		+10				
Ripple and noise	Measured by 20MHz bandwidth					mVp-p			
	With a 1µF M/C X7R and a 10µF T/C	Single							
		3.3Vout, 5Vout							75
		12Vout, 15Vout							100
	With a 6.8µF/50V X7R MLCC	24Vout					100		
With a 4.7µF/50V X7R MLCC for each output	Dual								
	24Vout			100					
With a 1µF M/C X7R and a 10µF T/C for each output	others	100							
Temperature coefficient			-0.02		+0.02	%/°C			
Transient response recovery time	25% load step change					250	µs		
Over voltage protection			3.3Vout			3.7	VDC		
			5Vout			5.6		7.0	
			12Vout			13.5		19.6	
			15Vout			16.8		20.5	
			24Vout			29.1		32.5	
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	Input to Output	1600			VDC
		Input(Output) to Case	1000			
Isolation resistance	500VDC		1			GΩ
Isolation capacitance			1000			pF
Switching frequency			360	400	440	kHz
Safety approvals	Pending: LCD15-□□S24W, LCD15-□□D24W					UL60950-1
						EN60950-1
						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	-40		+60	°C
	With derating	+60		+105	
Maximum case temperature				105	°C
Storage temperature range		-55		+125	°C
Thermal impedance	Natural convection (20LFM)		18.2		°C/W
	With heat-sink		15.8		
Thermal shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH

## EMC SPECIFICATIONS

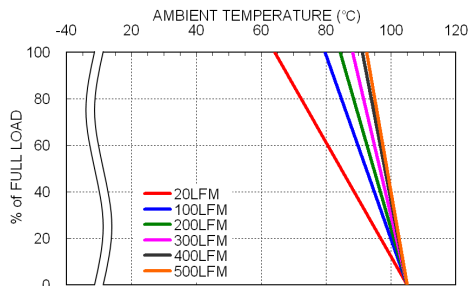
Parameter	Conditions	Level
EMI <sup>(3)</sup>	EN55022	Class A, Class B
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient <sup>(4)</sup>	EN61000-4-4 ± 2kV	Perf. Criteria A
Surge <sup>(4)</sup>	EN61000-4-5 ± 1kV	Perf. Criteria A
Conducted immunity	EN61000-4-6 3 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8 100A/m continuous; 1000A/m 1 second	Perf. Criteria A

### Note:

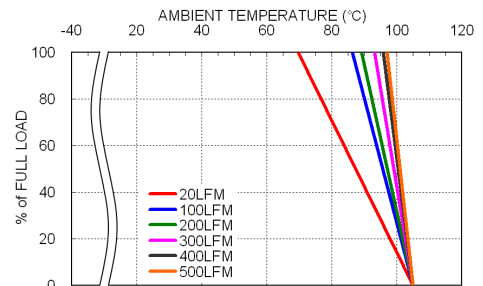
1. Test by minimum input and constant resistive load.
2. Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +Vout pin or -Vout pin.
3. The standard module meets EN55022 Class A and Class B with external components. For further information, please contact with P-DUKE.
4. 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, 220µF/100V.

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

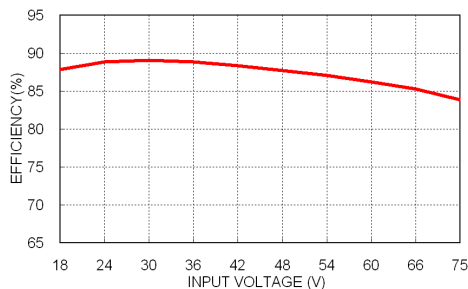
## CHARACTERISTIC CURVE



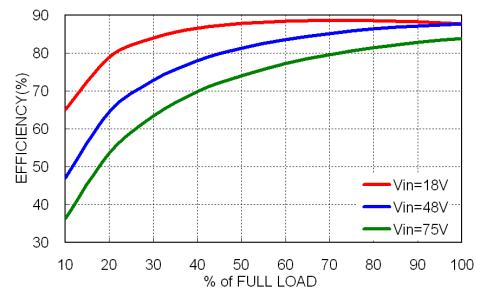
LCD15-48S05W Derating Curve



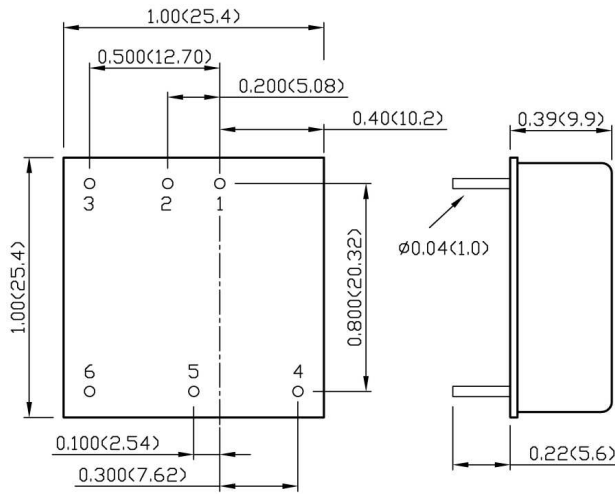
LCD15-48S05W Derating Curve With Heat-sink



LCD15-48S05W Efficiency vs. Input Voltage



LCD15-48S05W Efficiency vs. Output Load



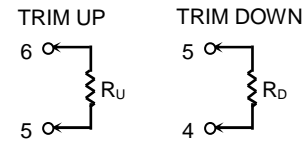
BOTTOM VIEW

**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)