

# LCD15 SERIES

DC-DC CONVERTER

2:1 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
LCD15-12S3P3	9 ~ 18	3.3	4000	120	84	12000
LCD15-12S05	9 ~ 18	5	3000	90	88	6000
LCD15-12S12	9 ~ 18	12	1300	30	86	1000
LCD15-12S15	9 ~ 18	15	1000	30	88	660
LCD15-12S24	9 ~ 18	24	625	12	90	200
LCD15-12D05	9 ~ 18	±5	±1500	30	85	±3000
LCD15-12D12	9 ~ 18	±12	±625	30	87	±520
LCD15-12D15	9 ~ 18	±15	±500	30	88	±330
LCD15-12D24	9 ~ 18	±24	±315	17	90	±100
LCD15-24S3P3	18 ~ 36	3.3	4000	50	86	12000
LCD15-24S05	18 ~ 36	5	3000	65	88	6000
LCD15-24S12	18 ~ 36	12	1300	20	87	1000
LCD15-24S15	18 ~ 36	15	1000	20	88	660
LCD15-24S24	18 ~ 36	24	625	10	90	200
LCD15-24D05	18 ~ 36	±5	±1500	15	85	±3000
LCD15-24D12	18 ~ 36	±12	±625	15	88	±520
LCD15-24D15	18 ~ 36	±15	±500	25	88	±330
LCD15-24D24	18 ~ 36	±24	±315	12	90	±100
LCD15-48S3P3	36 ~ 75	3.3	4000	25	86	12000
LCD15-48S05	36 ~ 75	5	3000	35	88	6000
LCD15-48S12	36 ~ 75	12	1300	12	88	1000
LCD15-48S15	36 ~ 75	15	1000	12	88	660
LCD15-48S24	36 ~ 75	24	625	10	91	200
LCD15-48D05	36 ~ 75	±5	±1500	12	85	±3000
LCD15-48D12	36 ~ 75	±12	±625	15	89	±520
LCD15-48D15	36 ~ 75	±15	±500	20	88	±330
LCD15-48D24	36 ~ 75	±24	±315	10	91	±100

## PART NUMBER STRUCTURE

<b>LCD15</b> - <b>48</b> <b>S</b> <b>05</b> - <b>A</b> <b>HS</b>					
<b>Series Name</b>	<b>Input Voltage (VDC)</b>	<b>Output Quantity</b>	<b>Output Voltage (VDC)</b>	<b>Option</b>	<b>Assembly Option</b>
	12: 9~18 24: 18~36 48: 36~75	S: Single  D: Dual	3P3: 3.3 05: 5 12: 12 15: 15 24: 24 05: ±5 12: ±12 15: ±15 24: ±24	□: 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

## INPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating input voltage range	12Vin(nom) 24Vin(nom) 48Vin(nom)	9 18 36	12 24 48	18 36 75	VDC
Input reflected ripple current	Nominal input and Full load		30		mAp-p
Start-up voltage	12Vin(nom) 24Vin(nom) 48Vin(nom)			9 18 36	VDC
Shutdown voltage	12Vin(nom) 24Vin(nom) 48Vin(nom)		8 14.5 30.5		VDC
Start up time	Constant resistive load Power up Remote ON/OFF			30 30	ms
Input surge voltage	100ms, max. 12Vin(nom) 24Vin(nom) 48Vin(nom)			36 50 100	VDC
Input filter			Pi type		
Remote ON/OFF	Referred to -Vin pin Positive logic DC-DC ON (Option) Negative logic DC-DC ON (Standard) DC-DC OFF DC-DC OFF Input current of Ctrl pin Remote off input current	-0.5		Open or 3 ~ 15VDC Short or 0 ~ 1.2VDC Short or 0 ~ 1.2VDC Open or 3 ~ 15VDC 1.0	mA 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 Dual	-0.2 -0.5		+0.2 +0.5	%
Load regulation	No Load to Full Load Single Dual	-0.2 -1.0		+0.2 +1.0	%
Cross regulation	Asymmetrical load 25%/100% FL Dual	-5.0		+5.0	%
Voltage adjustability <sup>(2)</sup>	Single output 24Vout Others	-10 -10		+20 +10	%
Ripple and noise	Measured by 20MHz bandwidth  Single With a 1μF M/C X7R and a 10μF T/C With a 1μF M/C X7R and a 10μF T/C With a 6.8μF/50V X7R MLCC  Dual With a 4.7μF/50V X7R MLCC for each output With a 1μF M/C X7R and a 10μF T/C for each output		75 100 100  100 100		mVp-p
Temperature coefficient		-0.02		+0.02	%/°C
Transient response recovery time	25% load step change		250		μs
Over voltage protection	3.3Vout 5Vout 12Vout 15Vout 24Vout	3.7 5.6 13.5 16.8 29.1		5.4 7.0 19.6 20.5 32.5	VDC
Over load protection	% of lout rated; Hiccup mode		150		%
Short circuit protection			Continuous, automatics recovery		

## GENERAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage	1 minute Input to Output Input(Output) to Case	1600 1000			VDC
Isolation resistance	500VDC	1			GΩ
Isolation capacitance				1000	pF
Switching frequency		360	400	440	kHz
Safety approvals					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				1.600 x 10 <sup>6</sup> hrs

## ENVIRONMENTAL SPECIFICATIONS

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

## EMC SPECIFICATIONS

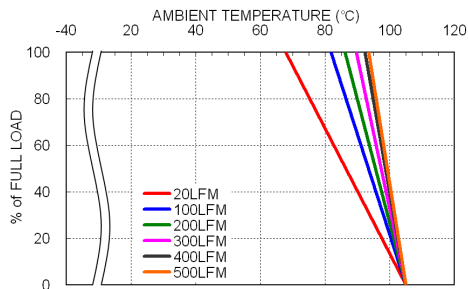
Parameter	Conditions	Level
EMI <sup>(3)</sup>	EN55022	Class A, Class B
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient <sup>(4)</sup>	EN61000-4-4 ± 2kV	Perf. Criteria A
Surge <sup>(4)</sup>	EN61000-4-5 ± 1kV	Perf. Criteria 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:

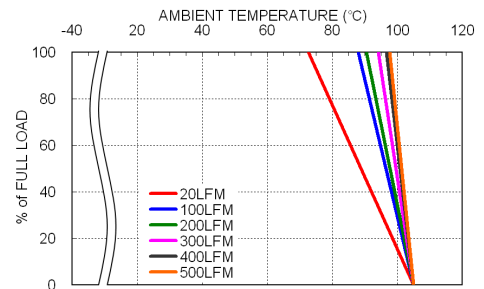
1. Test by minimum input and constant resistive load.
2. Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +Vout pin or -Vout pin.
3. The standard modules meet EN55022 Class 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.

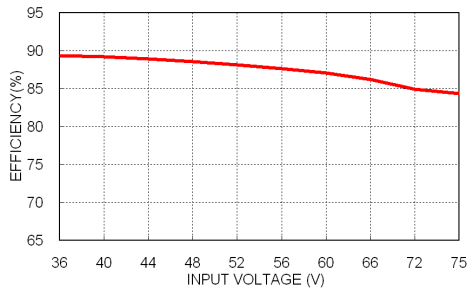
## CHARACTERISTIC CURVE



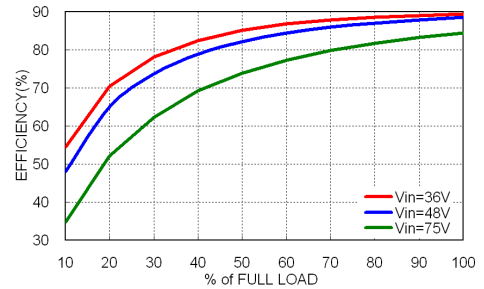
LCD15-48S05 Derating Curve



LCD15-48S05 Derating Curve With Heat-sink

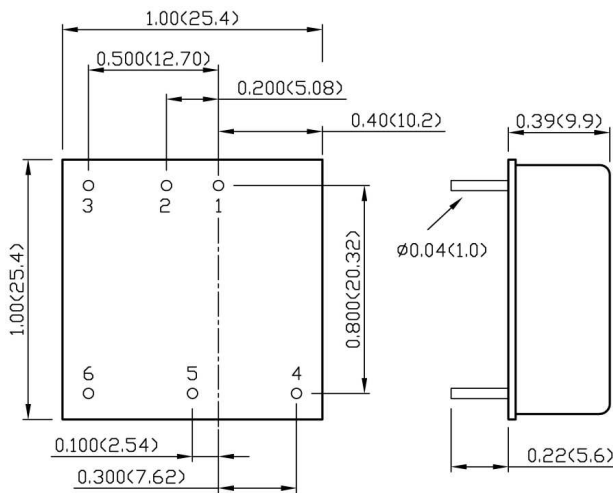


LCD15-48S05 Efficiency vs. Input Voltage



LCD15-48S05 Efficiency vs. Output Load

## MECHANICAL DRAWING



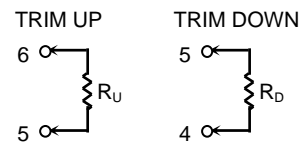
BOTTOM VIEW

### 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)