

# LCD30 SERIES

## DC-DC CONVERTER

2:1 WIDE INPUT RANGE  
UP TO 30Watts



### 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	OTP	LOW STANDBY POWER
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### 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
LCD30-12S3P3	9 ~ 18	3.3	7000	10	87	10000
LCD30-12S05	9 ~ 18	5	6000	10	89	7200
LCD30-12S12	9 ~ 18	12	2500	12	89	1200
LCD30-12S15	9 ~ 18	15	2000	12	89	1000
LCD30-12S24	9 ~ 18	24	1250	12	90	375
LCD30-12D12	9 ~ 18	±12	±1250	12	89	±750
LCD30-12D15	9 ~ 18	±15	±1000	12	90	±500
LCD30-12D24	9 ~ 18	±24	±625	14	90	±180
LCD30-24S3P3	18 ~ 36	3.3	7000	10	87	10000
LCD30-24S05	18 ~ 36	5	6000	10	90	7200
LCD30-24S12	18 ~ 36	12	2500	10	91	1200
LCD30-24S15	18 ~ 36	15	2000	10	91	1000
LCD30-24S24	18 ~ 36	24	1250	10	93	375
LCD30-24D12	18 ~ 36	±12	±1250	10	91	±750
LCD30-24D15	18 ~ 36	±15	±1000	10	91	±500
LCD30-24D24	18 ~ 36	±24	±625	12	92	±180
LCD30-48S3P3	36 ~ 75	3.3	7000	10	88	10000
LCD30-48S05	36 ~ 75	5	6000	10	90	7200
LCD30-48S12	36 ~ 75	12	2500	8	90	1200
LCD30-48S15	36 ~ 75	15	2000	8	91	1000
LCD30-48S24	36 ~ 75	24	1250	8	92	375
LCD30-48D12	36 ~ 75	±12	±1250	8	91	±750
LCD30-48D15	36 ~ 75	±15	±1000	8	92	±500
LCD30-48D24	36 ~ 75	±24	±625	10	92	±180

### PART NUMBER STRUCTURE

LCD30	- 48	S	05	-	A	HS
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)		Option	Assembly Option
	12: 9-18 24: 18-36 48: 36-75	S: Single  D: Dual	3P3: 3.3 05: 5 12: 12 15: 15 24: 24  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 with Clamp

**INPUT SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	12Vin(nom)		9	12	18	VDC
	24Vin(nom)		18	24	36	
	48Vin(nom)		36	48	75	
Input reflected ripple current	Nominal input and Full load		30			mAp-p
Start-up voltage	12Vin(nom)		9			VDC
	24Vin(nom)		18			
	48Vin(nom)		36			
Shutdown voltage	12Vin(nom)		8			VDC
	24Vin(nom)		16			
	48Vin(nom)		33			
Start up time	Constant resistive load	Power up	30			ms
		Remote ON/OFF	30			
Input surge voltage	1 second, max.	12Vin(nom)	25			VDC
		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			mA
		(Option) DC-DC OFF	Short or 0 ~ 1.2VDC			
		Negative logic DC-DC ON	Short or 0 ~ 1.2VDC			
		(Standard) DC-DC OFF	Open or 3 ~ 15VDC			
		Input current of Ctrl pin	-0.5	1.0		
		Remote off input current	2.0			

**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		
	10% Load to 90%Load	Single	-0.1		+0.1		
		Dual	-0.8		+0.8		
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%	
Voltage adjustability (2)	Single output	15Vout, 24Vout	-10		+20	%	
		Others	-10		+10		
Ripple and noise	Measured by 20MHz bandwidth					mVp-p	
	With a 22µF/25V X7R MLCC	Single					
		3.3Vout, 5Vout	75				
		12Vout, 15Vout	75				
	With 2 pcs of 22µF/25V X7R MLCC	Dual	24Vout	75			
			With a 10µF/25V X7R MLCC for each output	12Vout, 15Vout	60		
24Vout				75			
With a 4.7µF/50V X7R MLCC for each output							
Temperature coefficient			-0.02		+0.02	%/°C	
Transient response recovery time	25% load step change		250			µs	
Over voltage protection	3.3Vout		3.7		5.4	VDC	
	5Vout		5.6		7.0		
	12Vout		13.5		19.6		
	15Vout		18.3		22.0		
	24Vout		29.1		32.5		
Over load protection	% of Iout rated; Hiccup mode		140			%	
Short circuit protection	Continuous, automatic 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					1500	pF
Switching frequency		3.3Vout, 5Vout Others	248 297	275 330	303 363	kHz
Safety approvals						UL60950-1 EN60950-1 IEC60950-1
Case material						Copper
Base material						FR4 PCB
Potting material						Silicone (UL94 V-0)
Weight						16.5g (0.58oz)
MTBF	MIL-HDBK-217F, Full load					1.303 x 10 <sup>6</sup> hrs

**ENVIRONMENTAL SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature		Without derating With derating	-40 +50		+50 +100	°C
Maximum case temperature					105	°C
Over temperature protection				115		°C
Storage temperature range			-55		+125	°C
Thermal impedance	Vertical direction by natural convection (20LFM)	Without heat-sink With heat-sink		15.0 13.8		°C/W
Thermal shock						MIL-STD-810F
Vibration						MIL-STD-810F
Relative humidity						5% to 95% RH

**EMC SPECIFICATIONS**

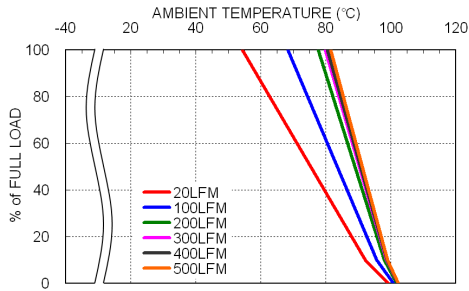
Parameter	Conditions		Level
EMI <sup>(3)</sup>	EN55022		Class A, Class B
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient <sup>(4)</sup>	EN61000-4-4	± 2kV	Perf. Criteria A
Surge <sup>(4)</sup>	EN61000-4-5	± 2kV	Perf. Criteria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

**Note:**

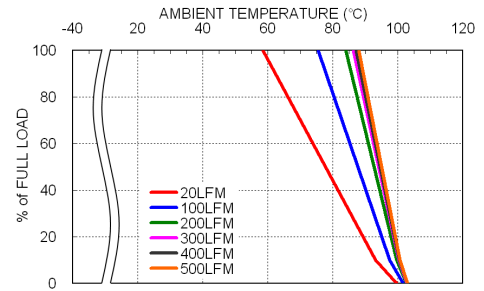
- Test by minimum input and constant resistive load.
- Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +Vout pin or -Vout pin.
- The standard modules meet EN55022 Class A and Class B with external components. For further information, please contact with P-DUKE.
- The external input components are required if the module has to meet EN61000-4-4, EN61000-4-5.  
The LCD30-12XXX recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ58A, 58V, 3000Watt peak pulse power) to connect in parallel.  
The LCD30-24XXX and LCD30-48XXX recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V).

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

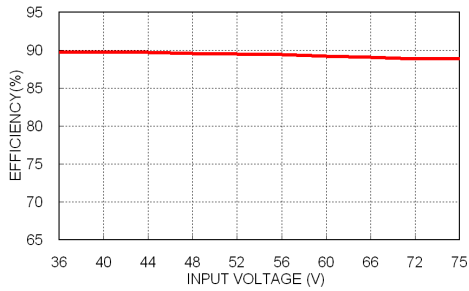
## CHARACTERISTIC CURVE



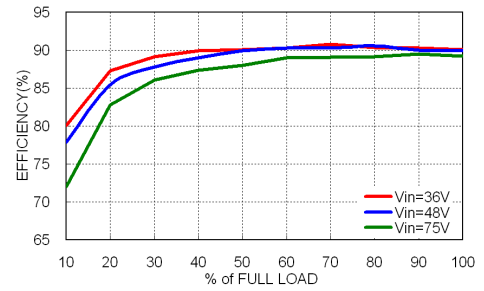
LCD30-48S05 Derating Curve



LCD30-48S05 Derating Curve With Heat-sink

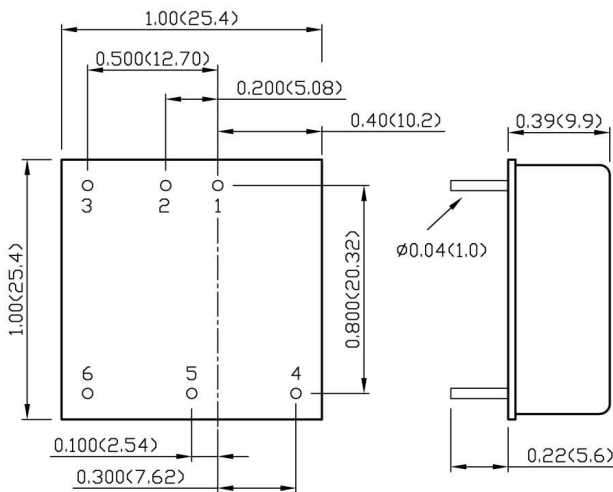


LCD30-48S05 Efficiency vs. Input Voltage



LCD30-48S05 Efficiency vs. Output Load

## MECHANICAL DRAWING



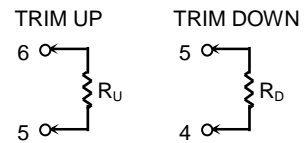
BOTTOM VIEW

### 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)