

# 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		<input type="checkbox"/> Negative logic remote ON/OFF(Standard) <b>A:</b> Positive logic remote ON/OFF <b>B:</b> Without Ctrl pin <b>C:</b> Negative logic remote ON/OFF without Trim pin <b>D:</b> Without Ctrl & Trim pin <b>E:</b> Positive logic remote ON/OFF without Trim pin	<input type="checkbox"/> No assembly <b>HS:</b> Heat-sink <b>HC:</b> 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
	24Vin(nom)					18
	48Vin(nom)					36
Shutdown voltage	12Vin(nom)					8
	24Vin(nom)					16
	48Vin(nom)					33
Start up time	Constant resistive load	Power up Remote ON/OFF				30 30 ms
Input surge voltage	1 second, max.	12Vin(nom)				25
		24Vin(nom)				50
		48Vin(nom)				100
Input filter	Pi type					
Remote ON/OFF	Referred to -Vin pin	Positive logic DC-DC ON (Option) DC-DC OFF	Open or 3 ~ 15VDC Short or 0 ~ 1.2VDC			mA
		Negative logic DC-DC ON (Standard) DC-DC OFF	Short or 0 ~ 1.2VDC Open or 3 ~ 15VDC			
		Input current of Ctrl pin	-0.5	1.0		
		Remote off input current	2.0			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			
	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 <sup>(2)</sup>	Single output	15Vout, 24Vout	-10		+20	%		
		Others	-10		+10			
Ripple and noise	Measured by 20MHz bandwidth					mVp-p		
	Single	With a 22μF/25V X7R MLCC					3.3Vout, 5Vout	75
		With 2 pcs of 22μF/25V X7R MLCC					12Vout, 15Vout	75
		With 2 pcs of 6.8μF/50V X7R MLCC					24Vout	75
	Dual	With a 10μF/25V X7R MLCC for each output					12Vout, 15Vout	60
		With a 4.7μF/50V X7R MLCC for each output					24Vout	75
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

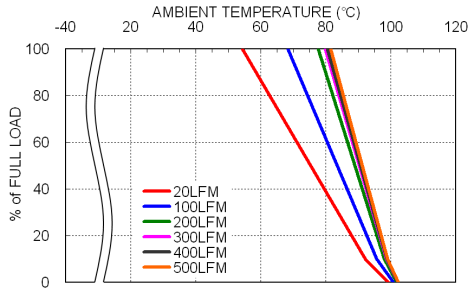
Parameter	Conditions	Level
EMI <sup>(3)</sup>	EN55022	Class A, Class B
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient <sup>(4)</sup>	EN61000-4-4 ± 2kV	Perf. Criteria A
Surge <sup>(4)</sup>	EN61000-4-5 ± 2kV	Perf. Criteria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

### Note:

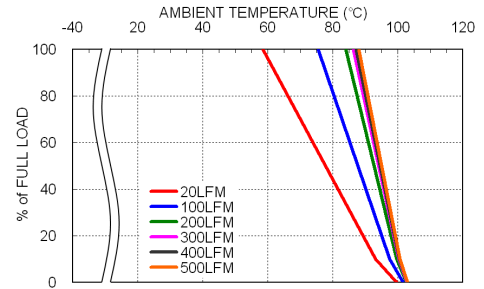
- Test by minimum input and constant resistive load.
- Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +Vout pin or -Vout pin.
- The standard modules meet EN55022 Class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

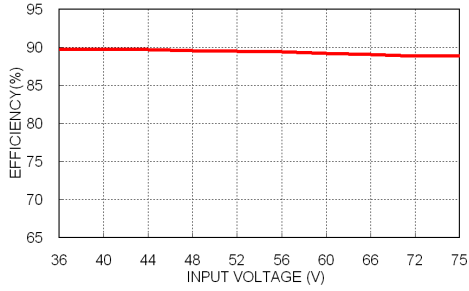
**CHARACTERISTIC CURVE**



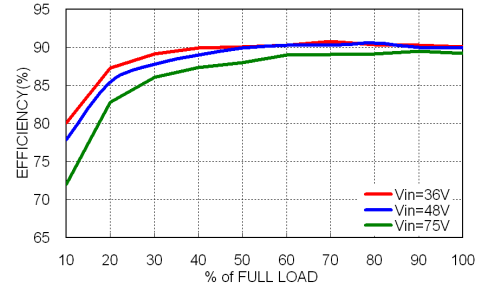
LCD30-48S05 Derating Curve



LCD30-48S05 Derating Curve With Heat-sink

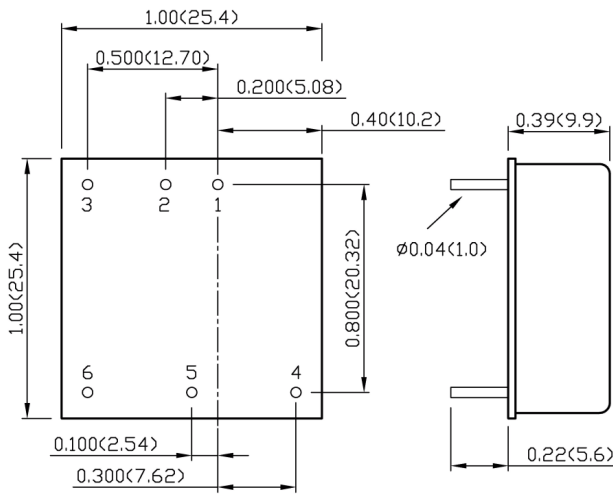


LCD30-48S05 Efficiency vs. Input Voltage



LCD30-48S05 Efficiency vs. Output Load

**MECHANICAL DRAWING**



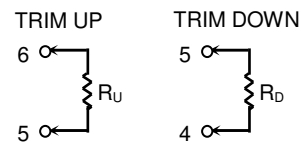
BOTTOM VIEW

**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)