

# @ 8' \$K SERIES

87#877cbj Yfhf'Gjbl`Y/ '8i U'Ci ldi h'' 0 watts



## Features

- Compact 1 x 1in H0 watt package
- Wide 4:1 input range
- 1600VDC Isolation
- Six Sided Shield
- High Efficiency 90%
- EN55022 class A without external components
- UL60950-1, EN60950-1 safety approvals
- No minimum load required

Model Number	Input Voltage	Output Voltage	Output Current @Full Load mA	Input Current @ No Load mA	Efficiency %	Maximum uF Capacitor Load (1)
LCD30-24S3P3W	9 ~ 36V	3.3V	7000	10	88	10000
LCD30-24S05W	9 ~ 36V	5V	6000	10	89	7200
LCD30-24S12W	9 ~ 36V	12V	2500	10	89	1200
LCD30-24S15W	9 ~ 36V	15V	2000	10	89	1000
LCD30-24S24W	9 ~ 36V	24V	1250	10	90	375
LCD30-24D12W	9 ~ 36V	±12V	±1250	10	89	±750
LCD30-24D15W	9 ~ 36V	±15V	±1000	10	91	±500
LCD30-24D24W	9 ~ 36V	±24V	±625	12	91	±180
LCD30-48S3P3W	18 ~ 75V	3.3V	7000	10	88	10000
LCD30-48S05W	18 ~ 75V	5V	6000	10	90	7200
LCD30-48S12W	18 ~ 75V	12V	2500	8	90	1200
LCD30-48S15W	18 ~ 75V	15V	2000	8	91	1000
LCD30-48S24W	18 ~ 75V	24V	1250	8	92	375
LCD30-48D12W	18 ~ 75V	±12V	±1250	8	91	±750
LCD30-48D15W	18 ~ 75V	±15V	±1000	8	92	±500
LCD30-48D24W	18 ~ 75V	±24V	±625	10	92	±180

## PART NUMBER STRUCTURE

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

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## 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			VDC	
	48Vin(nom)		18				
Shutdown voltage	24Vin(nom)		8			VDC	
	48Vin(nom)		16				
Start up time	Constant resistive load	Power up	30			ms	
		Remote ON/OFF	30				
Input surge voltage	1 second, max.	24Vin(nom)	50			VDC	
		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	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		mA
		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 (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	Single				
		24Vout	75			
Dual						
With a 10µF/25V X7R MLCC for each output	12Vout, ±15Vout	60				
	24Vout	75				
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 lout rated; Hiccup mode		170			%
Short circuit protection			Continuous, automatic recovery			

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## 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	3.3V <sub>out</sub> , 5V <sub>out</sub> 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				1.259 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:

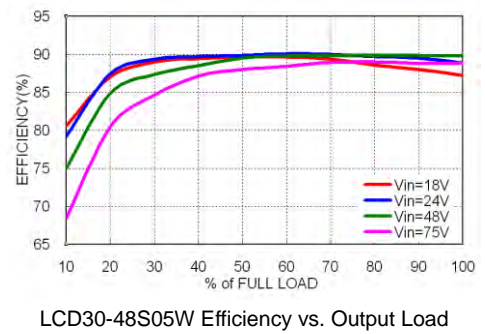
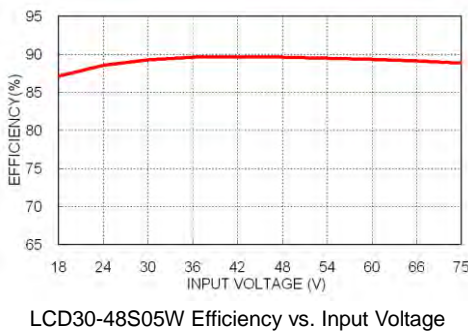
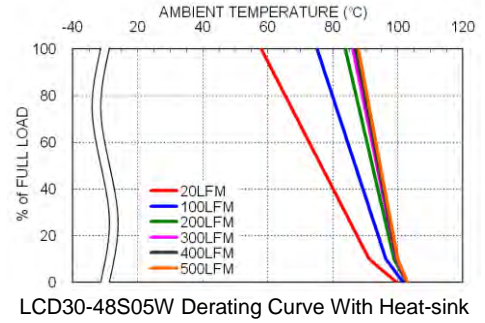
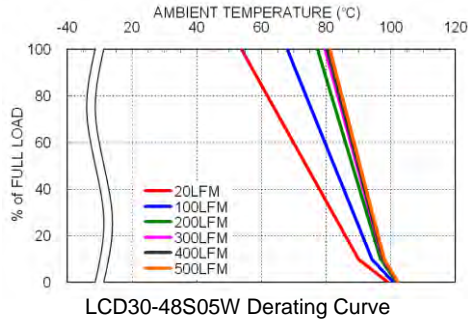
1. Test by minimum input and constant resistive load.
2. Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +V<sub>out</sub> pin or -V<sub>out</sub> pin.
3. The standard module meets EN55022 Class A and Class B with external components. For further information, please contact with P-DUKE.
4. The external input components are required if the module has to meet EN61000-4-4, EN61000-4-5.  
The LCD30-24XXXW 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 LCD30-48XXXW 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.

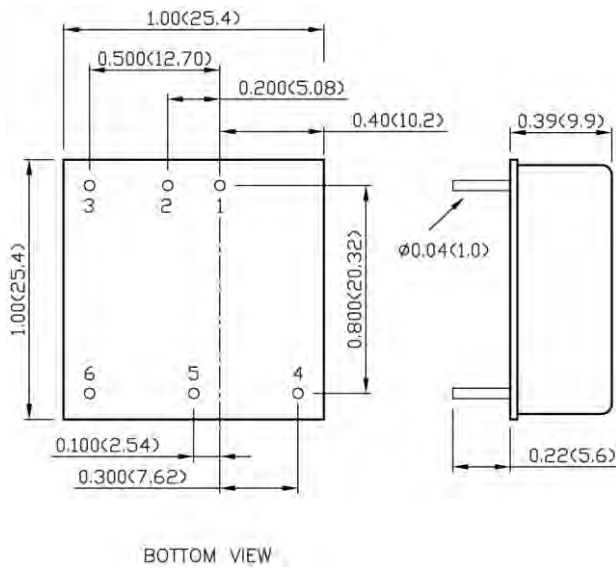
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## CHARACTERISTIC CURVE



## MECHANICAL DRAWING

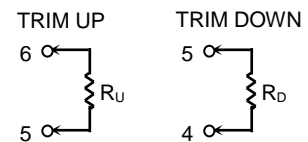


## PIN CONNECTION

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)