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

TECHNICAL SPECIFICATION All specifications are typical at nominal input, full load and 25℃ otherwise noted

Model Number	Input Range VDC	Output Voltage VDC	Output Current @Full Load mA	Input Current @ No Load mA	Efficiency %	Maximum Capacitor Load (1) 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)
- **12:** 9~18
- **24:** 18~36
- **48:** 36~75

Output Quantity
- **S:** Single
- **D:** Dual

Output Voltage (VDC)
- **3P3:** 3.3
- **05:** 5
- **12:** 12
- **15:** 15
- **24:** 24

Dual:
- **12:** ±12
- **15:** ±15
- **24:** ±24

Option
- **□:** 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

Assembly Option
- **□:** 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 (Option) DC-DC ON		Open or 3 ~ 15VDC		
		Positive logic (Option) DC-DC OFF		Short or 0 ~ 1.2VDC		
		Negative logic (Standard) DC-DC ON		Short or 0 ~ 1.2VDC		
		Negative logic (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
		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	%/℃
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, 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					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 10^6 hrs

ENVIRONMENTAL SPECIFICATIONS

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

EMC SPECIFICATIONS

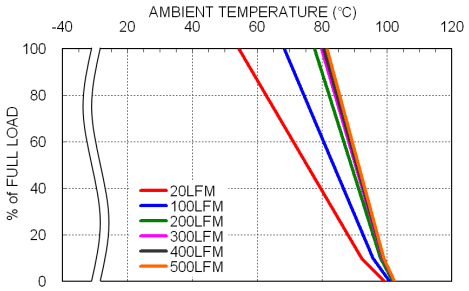
Parameter	Conditions		Level
EMI (3)	EN55022		Class A, Class B
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient (4)	EN61000-4-4	± 2kV	Perf. Criteria A
Surge (4)	EN61000-4-5	± 2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6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

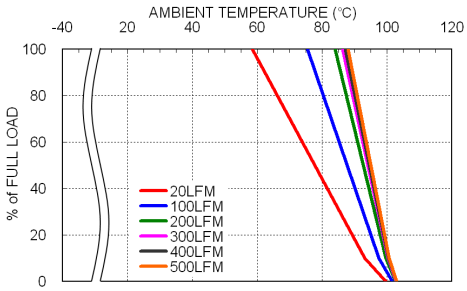
1. Test by minimum input and constant resistive load.
2. Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +Vout pin or -Vout pin.
3. The standard modules meet EN55022 Class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

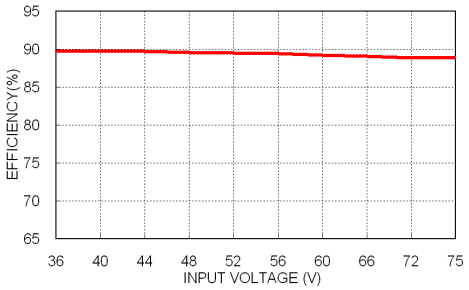
CHARACTERISTIC CURVE



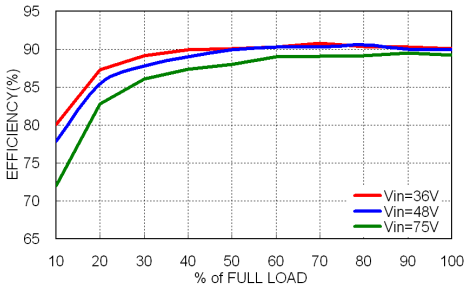
LCD30-48S05 Derating Curve



LCD30-48S05 Derating Curve With Heat-sink

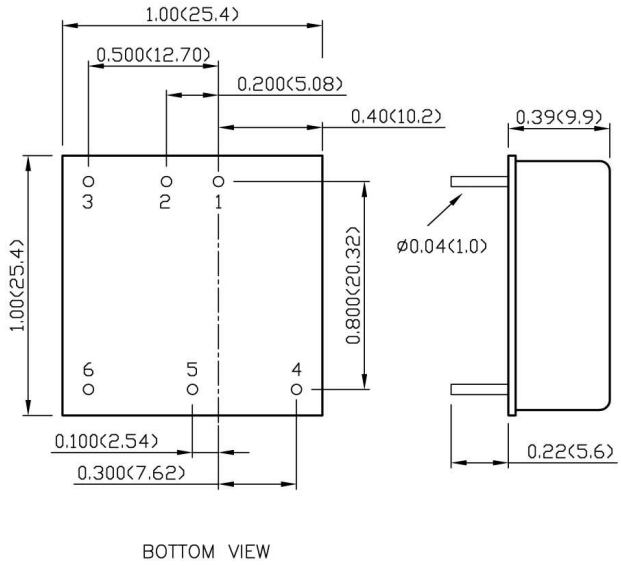


LCD30-48S05 Efficiency vs. Input Voltage



LCD30-48S05 Efficiency vs. Output Load

MECHANICAL DRAWING



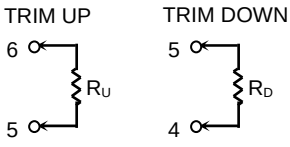
BOTTOM VIEW

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)