

# LCD20 SERIES

DC-DC CONVERTER

2:1 WIDE INPUT RANGE  
UP TO 20Watts



## 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
- MEET EN55022 CLASS A WITHOUT EXTERNAL COMPONENTS
- 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	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
LCD20-12S3P3	9 ~ 18	3.3	4500	10	89	7000
LCD20-12S05	9 ~ 18	5	4000	10	89	5000
LCD20-12S12	9 ~ 18	12	1670	10	89	850
LCD20-12S15	9 ~ 18	15	1330	10	89	700
LCD20-12D12	9 ~ 18	±12	±833	10	89	±500
LCD20-12D15	9 ~ 18	±15	±667	10	90	±350
LCD20-24S3P3	18 ~ 36	3.3	4500	10	90	7000
LCD20-24S05	18 ~ 36	5	4000	10	91	5000
LCD20-24S12	18 ~ 36	12	1670	6	90	850
LCD20-24S15	18 ~ 36	15	1330	6	91	700
LCD20-24D12	18 ~ 36	±12	±833	6	90	±500
LCD20-24D15	18 ~ 36	±15	±667	6	90	±350
LCD20-48S3P3	36 ~ 75	3.3	4500	10	90	7000
LCD20-48S05	36 ~ 75	5	4000	10	90	5000
LCD20-48S12	36 ~ 75	12	1670	4	90	850
LCD20-48S15	36 ~ 75	15	1330	4	90	700
LCD20-48D12	36 ~ 75	±12	±833	4	89	±500
LCD20-48D15	36 ~ 75	±15	±667	4	90	±350

## PART NUMBER STRUCTURE

LCD20 - 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 12: ±12 15: ±15	□: 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	□: No assembly 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
	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
		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
		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		-10		+10	%
Ripple and noise	Measured by 20MHz bandwidth With a 1μF M/C X7R and a 10μF T/C	3.3Vout, 5Vout 12Vout, 15Vout			75 100	mVp-p
Temperature coefficient			-0.02		+0.02	%/°C
Transient response recovery time	25% load step change					250 μs
Over voltage protection			3.3Vout		5.4	VDC
			5Vout		7.0	
			12Vout		19.6	
			15Vout		20.5	
Over load protection	% of Iout rated; Hiccup mode					150 %
Short circuit protection						Continuous, automatic recovery

## GENERAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit	
Isolation voltage	1 minute	Input to Output	1600				VDC
		Input(Output) to Case	1000				
Isolation resistance	500VDC					1 GΩ	
Isolation capacitance						1500 pF	
Switching frequency	3.3Vout, 5Vout		248	275	303	kHz	
	Others		297	330	363		
Safety approvals						UL60950-1 EN60950-1 IEC60950-1	
Case material						Nickel-coated copper	
Base material						FR4 PCB	
Potting material						Silicone (UL94 V-0)	
Weight						15g (0.53oz)	
MTBF	MIL-HDBK-217F, Full load					1.477 x 10 <sup>6</sup> hrs	

**ENVIRONMENTAL SPECIFICATIONS**

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	Without derating	-40		+60	°C
	With derating	+60		+101	
Maximum case temperature				105	°C
Storage temperature range		-55		+125	°C
Thermal impedance	Vertical direction by natural convection (20LFM)		17.6		°C/W
	With heat-sink		14.8		
Thermal shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH

**EMC SPECIFICATIONS**

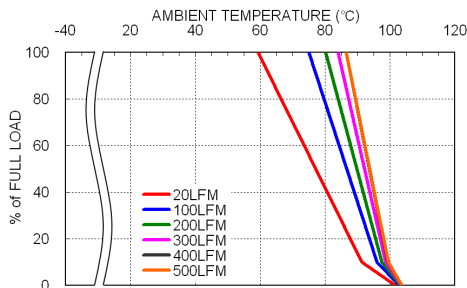
Parameter	Conditions	Level
EMI <sup>(3)</sup>	EN55022	Class A, Class B
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient <sup>(4)</sup>	EN61000-4-4 ± 2kV	Perf. Criteria A
Surge <sup>(4)</sup>	EN61000-4-5 ± 1kV	Perf. Criteria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

**Note:**

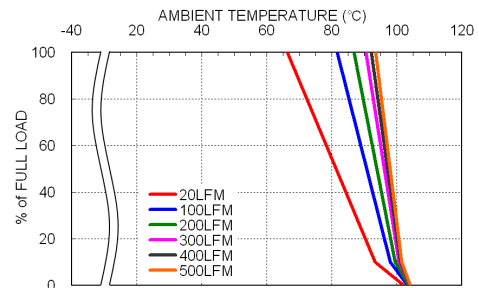
1. Test by minimum input and constant resistive load.
2. Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +Vout pin or -Vout pin.
3. The standard modules meet EN55022 Class A without external components and meet 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.

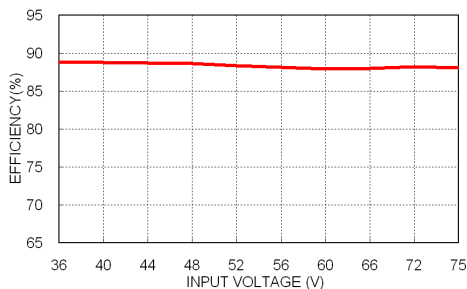
**CHARACTERISTIC CURVE**



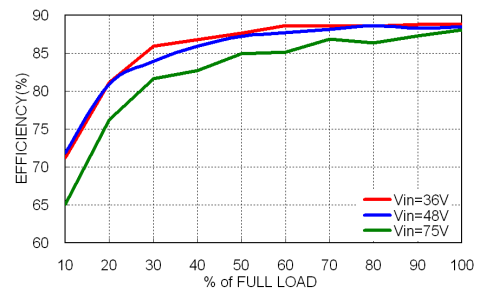
LCD20-48S05 Derating Curve



LCD20-48S05 Derating Curve With Heat-sink

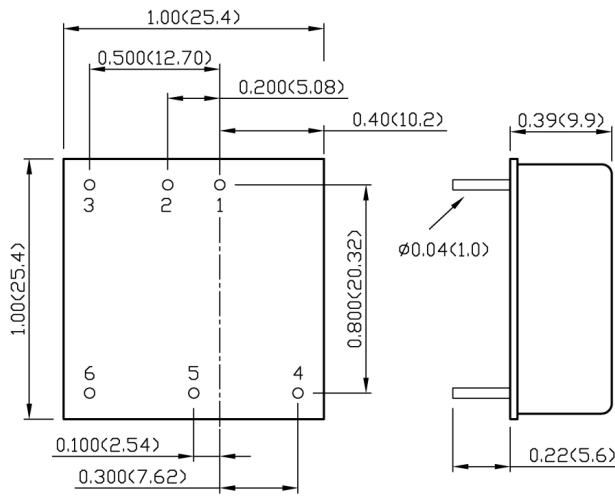


LCD20-48S05 Efficiency vs. Input Voltage



LCD20-48S05 Efficiency vs. Output Load

**MECHANICAL DRAWING**



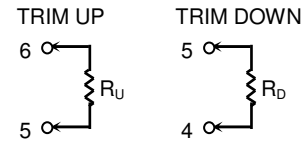
BOTTOM VIEW

**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)