

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
LCD20-12S24	9 ~ 18	24	833	12	90	220
LCD20-12D12	9 ~ 18	±12	±833	10	89	±500
LCD20-12D15	9 ~ 18	±15	±667	10	90	±350
LCD20-12D24	9 ~ 18	±24	±417	14	90	±100
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
LCD20-24S24	18 ~ 36	24	833	10	92	220
LCD20-24D12	18 ~ 36	±12	±833	6	90	±500
LCD20-24D15	18 ~ 36	±15	±667	6	90	±350
LCD20-24D24	18 ~ 36	±24	±417	12	91	±100
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
LCD20-48S24	36 ~ 75	24	833	8	91	220
LCD20-48D12	36 ~ 75	±12	±833	4	89	±500
LCD20-48D15	36 ~ 75	±15	±667	4	90	±350
LCD20-48D24	36 ~ 75	±24	±417	10	91	±100

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 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	□: 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	Open or 3 ~ 15VDC Short or 0 ~ 1.2VDC Short or 0 ~ 1.2VDC Open or 3 ~ 15VDC			
		(Option)	DC-DC OFF				
		Negative logic	DC-DC ON				
		(Standard)	DC-DC OFF				
		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	24Vout	-10		+20	%	
		Others	-10		+10		
Ripple and noise	Measured by 20MHz bandwidth					mVp-p	
	With a 1μF M/C X7R and a 10μF T/C	Single					75
		3.3Vout, 5Vout, 12Vout, 15Vout					
	With 2 pcs of 6.8μF/50V X7R MLCC	Dual					75
		24Vout					
With a 1μF M/C X7R and a 10μF T/C for each output	Dual	100					
	12Vout, 15Vout						
With a 4.7μF/50V X7R MLCC for each output	Dual	100					
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	16.8	20.5		
			24Vout	29.1	32.5		
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 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	Pending: LCD20-□□S24, LCD20-□□D24				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 ⁶ hrs

ENVIRONMENTAL SPECIFICATIONS

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

EMC SPECIFICATIONS

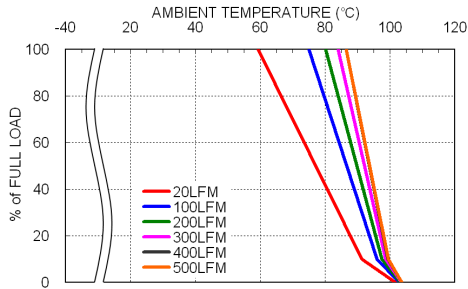
Parameter	Conditions	Level
EMI ⁽³⁾	EN55022	Class A, Class B
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient ⁽⁴⁾	EN61000-4-4 ± 2kV	Perf. Criteria A
Surge ⁽⁴⁾	EN61000-4-5 ± 2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6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

Note:

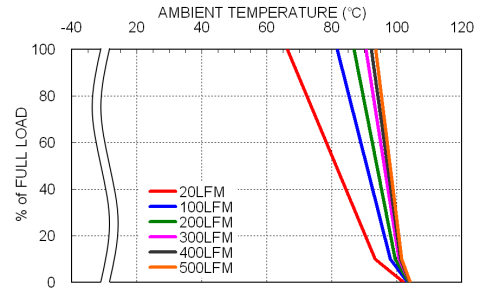
- Test by minimum input and constant resistive load.
- Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +Vout pin or -Vout pin.
- The standard modules meet EN55022 Class A without external components and meet Class B with external components.
For further information, please contact with P-DUKE.
- 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.

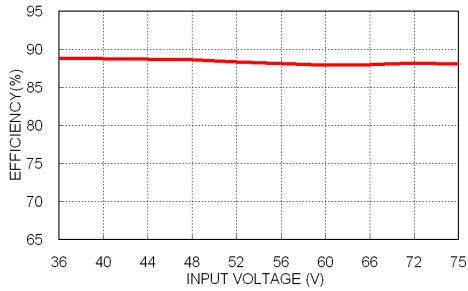
CHARACTERISTIC CURVE



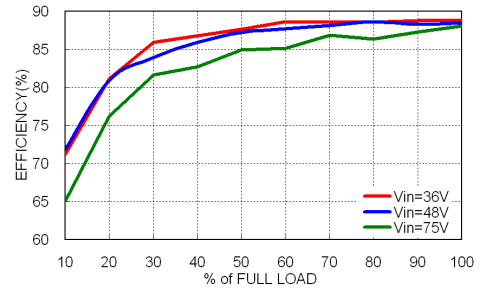
LCD20-48S05 Derating Curve



LCD20-48S05 Derating Curve With Heat-sink

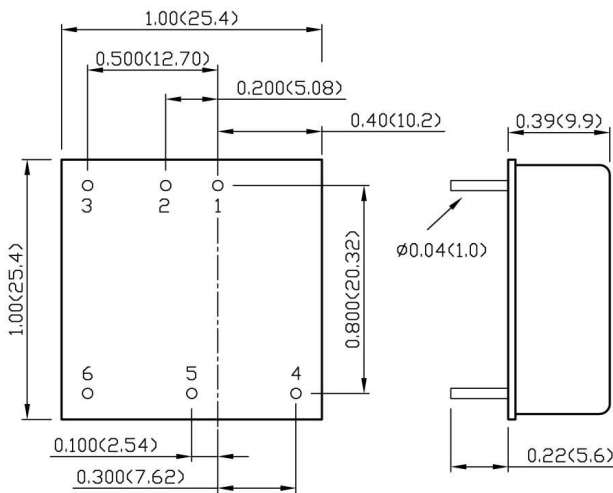


LCD20-48S05 Efficiency vs. Input Voltage



LCD20-48S05 Efficiency vs. Output Load

MECHANICAL DRAWING



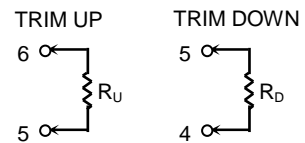
BOTTOM VIEW

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)