



## FEATURES

- 20 WATTS MAXIMUM OUTPUT POWER
- ULTRA LOW QUIESCENT CURRENT
- SINGLE OUTPUT UP TO 4.5A
- SMALL SIZE AND LOW PROFILE : 1.0 x 1.0 x 0.39 INCH
- HIGH EFFICIENCY UP TO 90%
- 4:1 ULTRA WIDE INPUT VOLTAGE RANGE
- SIX-SIDED CONTINUOUS SHIELD
- MEET EN55022 CLASS A WITHOUT EXTERNAL COMPONENTS
- FIXED SWITCHING FREQUENCY
- INPUT TO OUTPUT ISOLATION:1600VDC
- INDUSTRY STANDARD PIN-OUT LCD15W SERIES COMPATIBLE
- CE MARK MEETS 2006/95/EC, 93/68/EEC AND 2004/108/EC
- UL60950-1, EN60950-1 AND IEC60950-1 SAFETY APPROVALS PENDING
- RoHS DIRECTIVE COMPLIANT

## APPLICATIONS

Wireless Network  
Telecom/Datacom  
Industry Control System  
Measurement Equipment  
Semiconductor Equipment

## OPTIONS

Positive logic Remote ON/OFF, Without trim pin, Without On/Off control pin

## DESCRIPTION

LCD20W DC/DC converters provide up to 20 watts of output power in an industry standard package and footprint. These units are specifically designed to meet the power needs of low profile. All models feature with 4:1 ultra wide input voltage of 9~36VDC and 18~75VDC, comprehensively protected against over-current, over-voltage and input under-voltage protection conditions, and trimmable output voltage.

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

OUTPUT SPECIFICATIONS			
Output power			20 Watts
Voltage accuracy			±1%
Minimum load			0%
Voltage adjustability (Note 5)	Single		±10%
Line regulation	LL to HL at Full Load	Single	± 0.2%
		Dual	± 0.5%
Load regulation	No Load to Full Load	Single	± 0.2%
		Dual	± 1.0%
		10% Load to 90% Load	Single
Dual	± 0.8%		
Cross regulation	Asymmetrical load 25% / 100% FL	Dual	± 5%
Ripple and noise	20MHz bandwidth (Measured with a 1µF M/C X7R and a 10µF T/C)		See table
Temperature coefficient			±0.02% / °C, max.
Transient response recovery time	25% load step change		250µS
Over voltage protection	3.3VDC output		3.7VDC~5.4VDC
	5VDC output		5.6VDC~7.0VDC
	12VDC output		13.5VDC~19.6VDC
	15VDC output		16.8VDC~20.5VDC
Over load protection	% of FL at nominal input		150%
Short circuit protection			Hiccup, automatics recovery
GENERAL SPECIFICATIONS			
Efficiency			See table
Isolation voltage	Input to Output	1600VDC, min.	1minute
	Input(Output) to Case	1000VDC, min.	1minute
Isolation resistance			10 <sup>9</sup> ohms, min.
Isolation capacitance			1500pF, max.
Switching frequency			330KHz±10%
Safety approvals pending		IEC60950-1, UL60950-1, EN60950-1	
Case material			Nickel-coated copper
Base material			FR4 PCB
Potting material			Silicon (UL94-V0)
Dimensions			1.0 X 1.0 X 0.39 Inch (25.4 X 25.4 X 9.9mm)
Weight			15g(0.53oz)
MTBF (Note 1)	BELLCORE TR-NWT-000332		1.766x10 <sup>6</sup> hrs
	MIL-HDBK-217F		5.530x10 <sup>5</sup> hrs

INPUT SPECIFICATIONS			
Input voltage range	24VDC nominal input		9 ~ 36VDC
	48VDC nominal input		18 ~ 75VDC
Input filter			Pi type
Input surge voltage	24VDC input		50VDC 1sec, max.
	48VDC input		100VDC 1sec, max.
Input reflected ripple current	Nominal input and full load		30mA <sub>p-p</sub>
Start up time	Nominal input and constant resistive load	Power up	30ms, max.
		Remote ON/OFF	30ms, max.
Start-up voltage	24VDC input		9VDC, max.
	48VDC input		18VDC, max.
Shutdown voltage	24VDC input		8VDC
	48VDC input		16VDC
Remote ON/OFF (Note 6)			
Positive logic(Optional)	DC-DC ON		Open or 3V < Vr < 15V
	DC-DC OFF		Short or 0V < Vr < 1.2V
Negative logic(Standard)	DC-DC ON		Short or 0V < Vr < 1.2V
	DC-DC OFF		Open or 3V < Vr < 15V
Input current of Remote control pin	Nominal input		-0.5mA~1.0mA
Remote off state input current	Nominal input		2.0mA

ENVIRONMENTAL SPECIFICATIONS			
Operating ambient temperature(Note 7)			-40°C ~ +60°C (without derating)
			+60°C ~ +101°C(with derating)
Maximum case temperature			105°C
Storage temperature range			-55°C ~ +125°C
Thermal impedance (Note 8)	Natural convection		17.6°C/Watt
	Natural convection with Heat-sink		14.8°C/Watt
Thermal shock			MIL-STD-810F
Vibration			MIL-STD-810F
Relative humidity			5% to 95% RH

EMC CHARACTERISTICS			
EMI (Note 9)	EN55022		Class B
ESD	EN61000-4-2	Air Contact	± 8KV Perf. Criteria A
			± 6KV Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient (Note 10)	EN61000-4-4	± 2KV	Perf. Criteria A
Surge (Note 10)	EN61000-4-5	± 2KV	Perf. Criteria A
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A



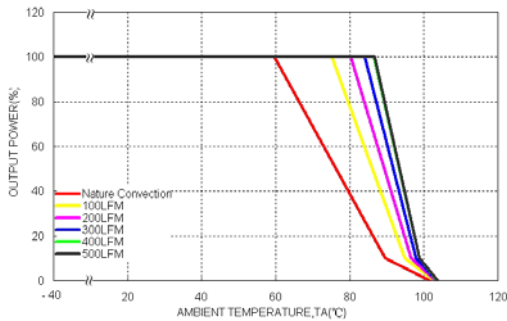
Model Number	Input Range	Output Voltage	Output Current		Output <sup>(3)</sup> Ripple & Noise	No Load <sup>(2)</sup> Input Current	Eff <sup>(3)</sup> (%)	Capacitor <sup>(4)</sup> Load max
			Min. Load	Full Load				
LCD20-24S3P3W	9 ~ 36 VDC	3.3 VDC	0mA	4500mA	75mVp-p	6mA	88	7000μF
LCD20-24S05W	9 ~ 36 VDC	5 VDC	0mA	4000mA	75mVp-p	6mA	89	5000μF
LCD20-24S12W	9 ~ 36 VDC	12 VDC	0mA	1670mA	100mVp-p	6mA	89	850μF
LCD20-24S15W	9 ~ 36 VDC	15 VDC	0mA	1330mA	100mVp-p	6mA	89	700μF
LCD20-24D12W	9 ~ 36 VDC	± 12 VDC	0mA	± 833mA	100mVp-p	6mA	89	± 500μF
LCD20-24D15W	9 ~ 36 VDC	± 15 VDC	0mA	± 667mA	100mVp-p	6mA	90	± 350μF
LCD20-48S3P3W	18 ~ 75 VDC	3.3 VDC	0mA	4500mA	75mVp-p	4mA	87	7000μF
LCD20-48S05W	18 ~ 75 VDC	5 VDC	0mA	4000mA	75mVp-p	4mA	89	5000μF
LCD20-48S12W	18 ~ 75 VDC	12 VDC	0mA	1670mA	100mVp-p	4mA	89	850μF
LCD20-48S15W	18 ~ 75 VDC	15 VDC	0mA	1330mA	100mVp-p	4mA	90	700μF
LCD20-48D12W	18 ~ 75 VDC	± 12 VDC	0mA	± 833mA	100mVp-p	4mA	89	± 500μF
LCD20-48D15W	18 ~ 75 VDC	± 15 VDC	0mA	± 667mA	100mVp-p	4mA	90	± 350μF

**Note**

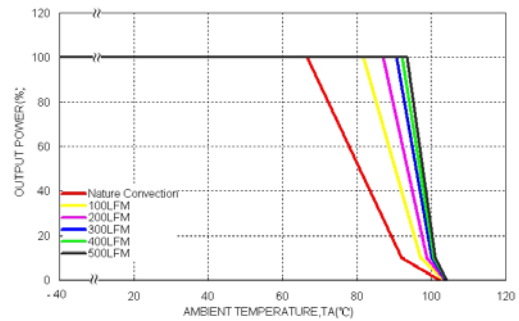
- BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C. MIL-HDBK-217F Notice2 @Ta=25 °C, Full load (Ground, Benign, controlled environment)
- Typical value at nominal input and no load.
- Typical value at nominal input and full load.
- Test by minimum input and constant resistive load.
- Trimming 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 the +OUTPUT pin or the -OUTPUT pin.
- The ON/OFF pin voltage is reference to -INPUT.  
The order number please see product standard table.
- Test condition with vertical direction by natural convection (20LFM).
- Heat-sink is optional and P/N:7G-0047C-F
- EN55022
  - To meet Class A without external components.
  - To meet Class B please refer to the suggestion filter in next page.
- 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, 220 μF/100V, ESR 48mΩ.

**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

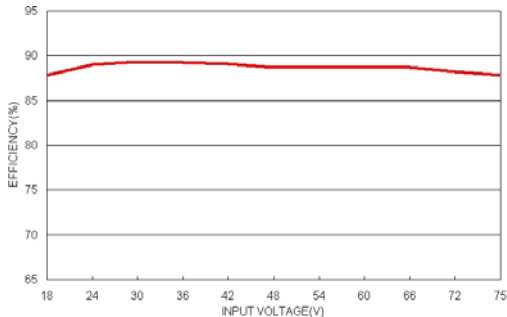
LCD20-48S05W Derating Curve



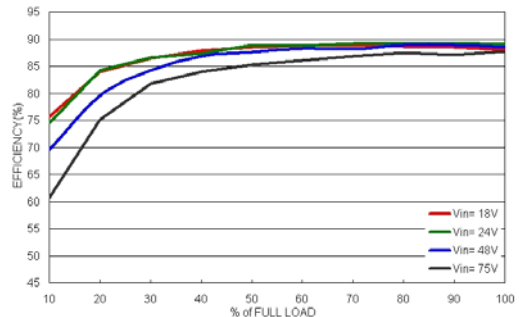
LCD20-48S05W Derating Curve With Heat-sink



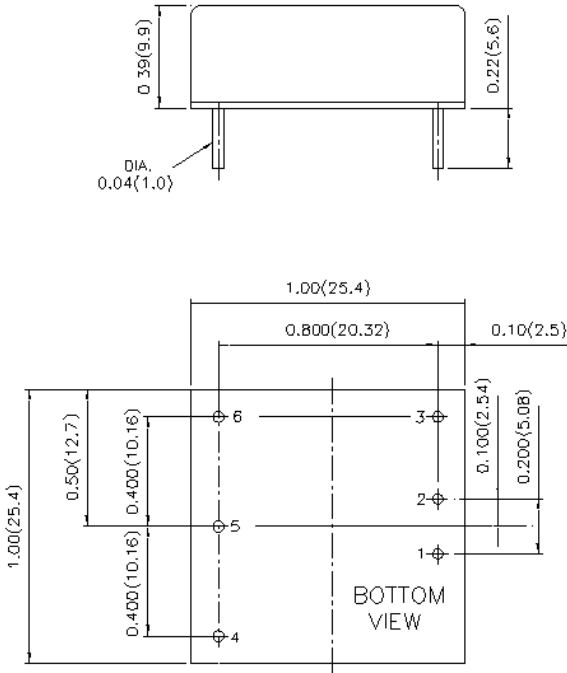
LCD20-48S05W Efficiency VS Input Voltage



LCD20-48S05W Efficiency VS Output Current

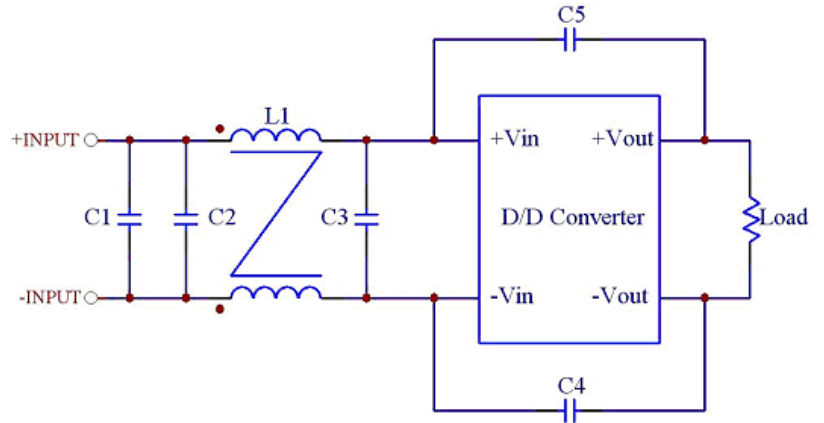


**Mechanical Drawing:**



- All dimensions in Inch (mm)  
Tolerance: X.XX±0.02 (X.X±0.5)  
X.XXX±0.01 (X.XX±0.25)
- Pin pitch tolerance ±0.01(0.25)
- Pin dimension tolerance ±0.004 (0.1)

**Recommended EMI Filter:**

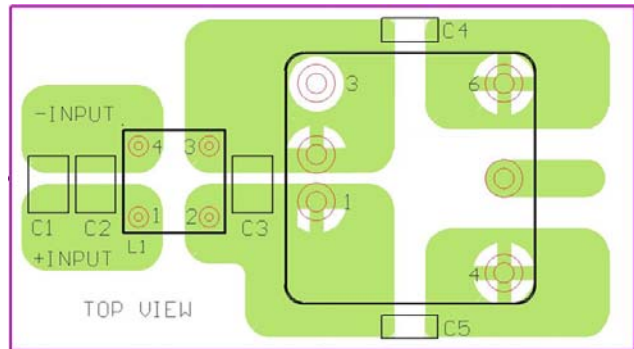


**Recommended Filter for Class B Compliance**

The components used in the above figure, together with the manufacturers' part numbers for these components, are as follows:

	C1	C2	C3	C4 & C5	L1
LCD20-24xxxW	4.7µF /50V 1812 MLCC	N/A	N/A	470pF/2KV 1808 MLCC	325µH Common Choke PMT-050
LCD20-48xxxW	2.2µF /100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF /100V 1812 MLCC	1000pF/2KV 1808 MLCC	325µH Common Choke PMT-050

PIN CONNECTION		
PIN	SINGLE	DUAL
1	+INPUT	+INPUT
2	-INPUT	-INPUT
3	ON/OFF	ON/OFF
4	+OUTPUT	+OUTPUT
5	TRIM	COMMON
6	-OUTPUT	-OUTPUT



**Recommended EN55022 Class B Filter Circuit Layout**

**EXTERNAL OUTPUT TRIMMING**

Output can be externally trimmed by using the method shown below.

TRIM UP

TRIM DOWN

PRODUCT STANDARD TABLE	
Option	Suffix
Negative logic remote ON/OFF(Standard)	
Positive logic remote ON/OFF	-A
without ON/OFF control pin	-B
Negative remote logic ON/OFF without TRIM pin	-C
without ON/OFF control & TRIM pin	-D
Positive remote logic ON/OFF without TRIM pin	-E