



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 91%
- 2:1 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 LCD15 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

LCD20 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 2:1 wide input voltage of 9~18 VDC, 18~36VDC and 36~75VDC, 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
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 ⁹ 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 ⁶ hrs	
	MIL-HDBK-217F	5.530x10 ⁵ hrs	

INPUT SPECIFICATIONS

Input voltage range	12VDC nominal input	9 ~ 18VDC
	24VDC nominal input	18 ~ 36VDC
	48VDC nominal input	36 ~ 75VDC
Input filter	Pi type	
Input surge voltage	12VDC input	25VDC 1sec, max.
	24VDC input	50VDC 1sec, max.
	48VDC input	100VDC 1sec, max.
Input reflected ripple current	Nominal input and full load	30mA _{p-p}
Start up time	Nominal input and constant resistive load	Power up Remote ON/OFF
		30ms, max. 30ms, max.
Start-up voltage	12VDC input	9VDC, max.
	24VDC input	18VDC, max.
	48VDC input	36VDC, max.
Shutdown voltage	12VDC input	8VDC
	24VDC input	16VDC
	48VDC input	33VDC
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 ± 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



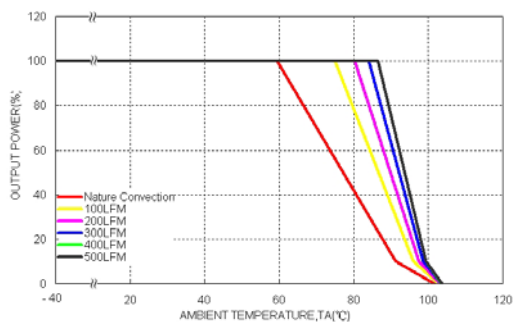
Model Number	Input Range	Output Voltage	Output Current		Output ⁽³⁾ Ripple & Noise	No Load ⁽²⁾ Input Current	Eff ⁽³⁾ (%)	Capacitor ⁽⁴⁾ Load max
			Min. Load	Full Load				
LCD20-12S3P3	9 ~ 18 VDC	3.3 VDC	0mA	4500mA	75mVp-p	10mA	87	7000μF
LCD20-12S05	9 ~ 18 VDC	5 VDC	0mA	4000mA	75mVp-p	10mA	89	5000μF
LCD20-12S12	9 ~ 18 VDC	12 VDC	0mA	1670mA	100mVp-p	10mA	89	850μF
LCD20-12S15	9 ~ 18 VDC	15 VDC	0mA	1330mA	100mVp-p	10mA	89	700μF
LCD20-12D12	9 ~ 18 VDC	± 12 VDC	0mA	± 833mA	100mVp-p	10mA	89	± 500μF
LCD20-12D15	9 ~ 18 VDC	± 15 VDC	0mA	± 667mA	100mVp-p	10mA	90	± 350μF
LCD20-24S3P3	18 ~ 36 VDC	3.3 VDC	0mA	4500mA	75mVp-p	6mA	87	7000μF
LCD20-24S05	18 ~ 36 VDC	5 VDC	0mA	4000mA	75mVp-p	6mA	90	5000μF
LCD20-24S12	18 ~ 36 VDC	12 VDC	0mA	1670mA	100mVp-p	6mA	90	850μF
LCD20-24S15	18 ~ 36 VDC	15 VDC	0mA	1330mA	100mVp-p	6mA	91	700μF
LCD20-24D12	18 ~ 36 VDC	± 12 VDC	0mA	± 833mA	100mVp-p	6mA	90	± 500μF
LCD20-24D15	18 ~ 36 VDC	± 15 VDC	0mA	± 667mA	100mVp-p	6mA	90	± 350μF
LCD20-48S3P3	36 ~ 75 VDC	3.3 VDC	0mA	4500mA	75mVp-p	4mA	87	7000μF
LCD20-48S05	36 ~ 75 VDC	5 VDC	0mA	4000mA	75mVp-p	4mA	89	5000μF
LCD20-48S12	36 ~ 75 VDC	12 VDC	0mA	1670mA	100mVp-p	4mA	90	850μF
LCD20-48S15	36 ~ 75 VDC	15 VDC	0mA	1330mA	100mVp-p	4mA	90	700μF
LCD20-48D12	36 ~ 75 VDC	± 12 VDC	0mA	± 833mA	100mVp-p	4mA	89	± 500μF
LCD20-48D15	36 ~ 75 VDC	± 15 VDC	0mA	± 667mA	100mVp-p	4mA	90	± 350μF

Note

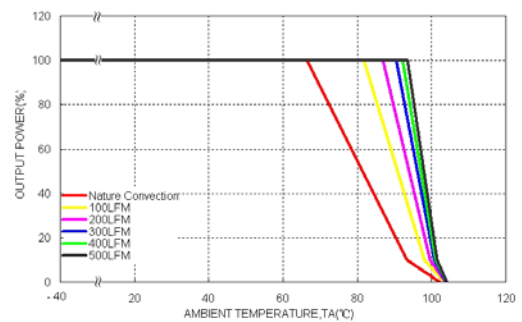
- BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C.
MIL-HDBK-217F Notice2 @Ta=25 °C, Full load (Ground, Benign, controlled environment)
- Typical value at nominal input and no load.
- Typical value at nominal input and full load.
- Test by minimum input and constant resistive load.
- Trimming 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.

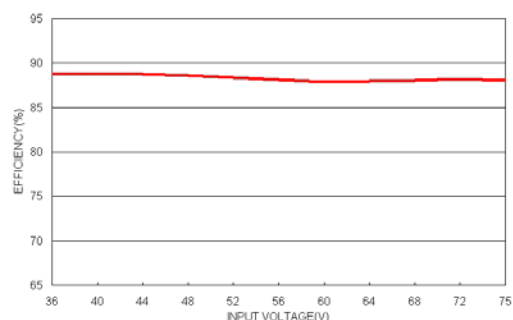
LCD20-48S05 Derating Curve



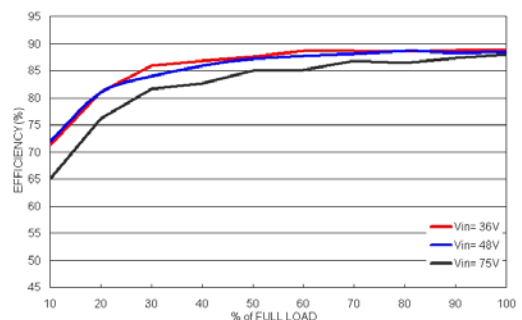
LCD20-48S05 Derating Curve With Heat-sink



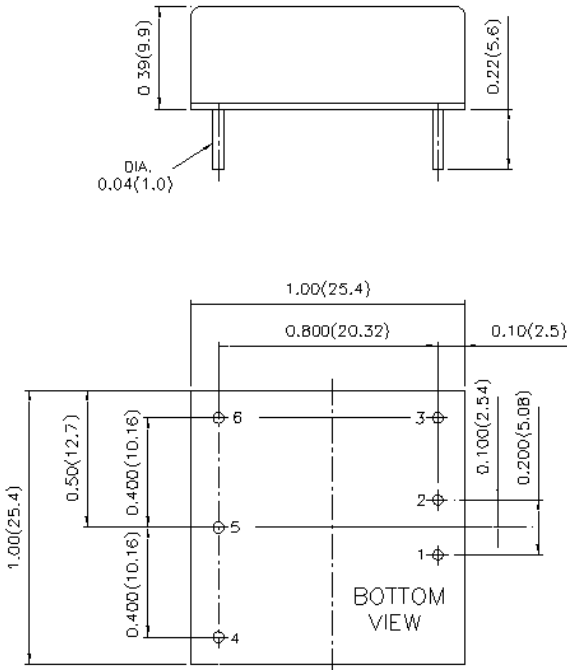
LCD20-48S05 Efficiency VS Input Voltage



LCD20-48S05 Efficiency VS Output Current



Mechanical Drawing:

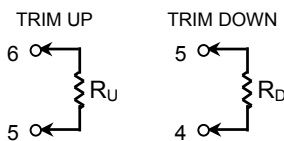


- All dimensions in Inch (mm)
Tolerance: X.XX±0.02 (X.X±0.5)
X.XXX±0.01 (X.XX±0.25)
- Pin pitch tolerance ±0.01(0.25)
- Pin dimension tolerance ±0.004 (0.1)

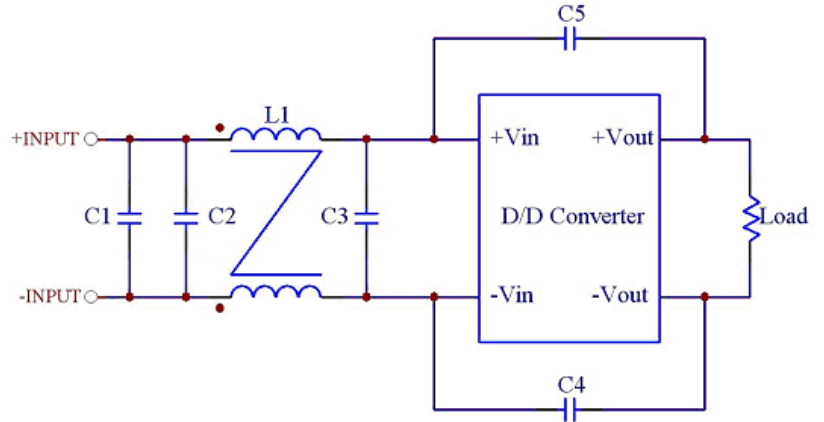
PIN CONNECTION		
PIN	SINGLE	DUAL
1	+INPUT	+INPUT
2	-INPUT	-INPUT
3	ON/OFF	ON/OFF
4	+OUTPUT	+OUTPUT
5	TRIM	COMMON
6	-OUTPUT	-OUTPUT

EXTERNAL OUTPUT TRIMMING

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



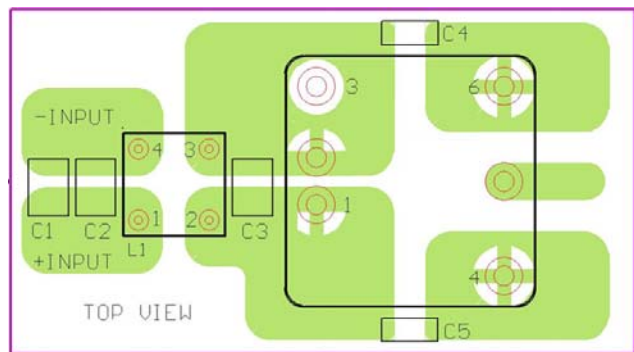
Recommended EMI Filter:



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
LCD20-12xxx	4.7µF /25V 1812 MLCC	N/A	N/A	470pF/2KV 1808 MLCC	325µH Common Choke PMT-050
LCD20-24xxx	4.7µF /50V 1812 MLCC	N/A	N/A	470pF/2KV 1808 MLCC	325µH Common Choke PMT-050
LCD20-48xxx	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2KV 1808 MLCC	325µH Common Choke PMT-050



Recommended EN55022 Class B Filter Circuit Layout

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