

# LCD15 SERIES

DC / DC Single & Dual Output: 15 Watts



## Features

- 2:1 Input range 12V, 24V and 48V
- Single & Dual outputs
- Industry Standard 1 x 1in package @ 15W
- High efficiency up to 89%
- Regulated output & Short circuit protection
- 1600V isolation
- Five sided continuous copper shield
- Remote ON / OFF, Negative or Positive Logic
- High operating temperature +85°C
- Zero load operation
- Output voltage trim

## Specifications:

<b>Input Voltage</b>	12VDC ( 9 ~ 18 ) 24VDC ( 18 ~ 36 ) 48VDC ( 36 ~ 75 )
<b>Input Filter</b>	Pi type
<b>Start-up Voltage</b>	12V input: 9V typ, 24V input: 17V typ. 48V input: 33V typ.
<b>Input Surge Voltage.</b> ( 100mS )	12VDC 36V, 24V: 50VDC. 48V: 100VDC
<b>Input Reverse Voltage Protection</b>	External input fuse required
<b>Input Reflected Ripple Current</b>	30mA p-p
<b>Start Up time</b>	Typically 30mS constant resistive load
<b>Remote ON/OFF</b> Negative Logic - Standard	DC-DC ON Short or 0V < Vr < 1.2V DC-DC OFF Open or 3.0V < Vr < 15V
( Positive Logic - Option )	DC-DC ON Open or 3.0V < Vr < 15V DC-DC OFF Short or 0V < Vr < 1.2V
	Input current of remote control pin: 0.5mA Remote off state input current: 2.5mA
<b>Output power</b>	15 watts
<b>Voltage Accuracy</b>	±1.0%
<b>Voltage Trim</b>	±10% External voltage trim
<b>Minim Load</b>	Zero
<b>Line Regulation</b>	Single ±0.2%, Dual ±0.5%
<b>Load Regulation</b>	Single ±0.2%, Dual ±1.0%
<b>Cross Regulation</b>	Dual ( ±5% asymmetrical 25% to 100% FL )
<b>Ripple &amp; noise</b>	See table. 20MHZ bandwidth
<b>Temp. Coefficient</b>	±0.02% / °C
<b>Transient Response</b>	250uS ( 25% load step change )
<b>Over Voltage Protection</b>	Set at 110 ~130% of Voltage output nominal
<b>Overload Protection</b>	Set at approx 150% of output load
<b>Short Circuit protection</b>	Continuous hiccup mode

<b>Efficiency</b>	Model dependant 84 ~ 89%
<b>Isolation</b>	Input – Output: 1600VDC Input / Output – Case: 1000VDC
<b>Isolation Cap.</b>	1000pF
<b>Switching Freq.</b>	400KHz
<b>Safety</b>	Designed to meet EN60950-1, UL60950-1
<b>Case Material</b>	Nickel-coated copper
<b>Base Material</b>	FR4 PCB
<b>Potting</b>	Epoxy UL94-V0
<b>Dimensions</b>	25.4 x 25.4 x 0.0mm
<b>Weight</b>	15g
<b>MTBF</b>	5.630 x 10 <sup>5</sup> Hrs
<b>Operating Temp</b>	-40°C to +85°C ( with derating )
<b>Case Temp</b>	+105°C maximum case temperature
<b>Over Temp. Protection</b>	Shutdown approx 115°C case temperature
<b>Thermal Impedance</b>	18.2°C / watt without heatsink 15.8°C / watt with optional heatsink
<b>Thermal shock</b>	MIL-STD-810F
<b>Vibration</b>	MIL-STD-810F
<b>Humidity</b>	5-95% RH
<b>EMC</b>	EN55022 Class A ( see note 9 )
<b>ESD</b>	EN61000-4-2
<b>Radiated Immunity</b>	EN61000-4-3
<b>Fast Transients</b>	EN61000-4-4
<b>Surge</b>	EN61000-4-5
<b>Conducted Immunity</b>	EN61000-4-6

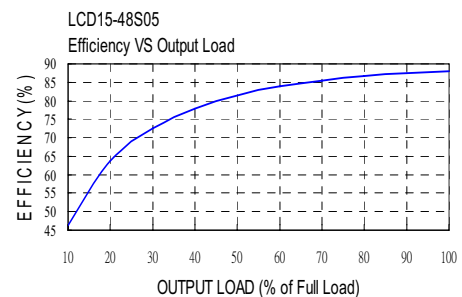
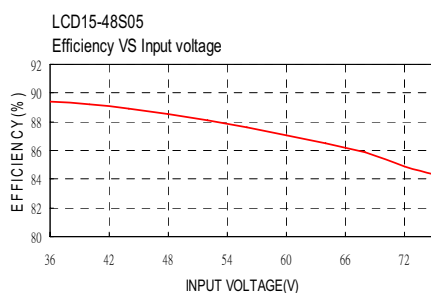
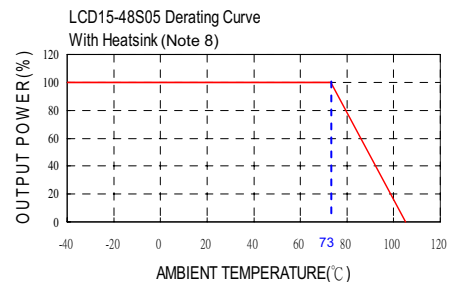
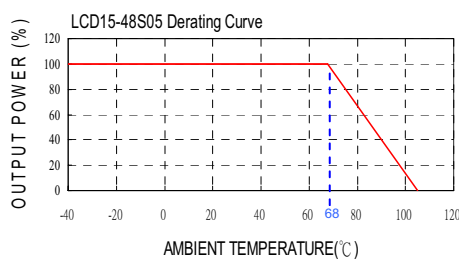
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Model Number	Input Range	Output Voltage	Output Current		Output <sup>(4)</sup> Ripple & Noise	Input Current		Eff <sup>(4)</sup> (%)	Capacitor <sup>(5)</sup> Load max
			Min. Load	Full Load		No Load <sup>(3)</sup>	Full Load <sup>(2)</sup>		
LCD15-12S3P3	9 - 18 V	3.3 V	0mA	4000mA	75mVp-p	120mA	1375mA	84	1000µF
LCD15-12S05	9 - 18 V	5 V	0mA	3000mA	75mVp-p	90mA	1524mA	86	1000µF
LCD15-12S12	9 - 18 V	12 V	0mA	1300mA	100mVp-p	40mA	1605mA	85	330µF
LCD15-12S15	9 - 18 V	15 V	0mA	1000mA	100mVp-p	40mA	1506mA	87	220µF
LCD15-12D05	9 - 18 V	± 5 V	0mA	± 1500mA	100mVp-p	30mA	1543mA	85	± 500µF
LCD15-12D12	9 - 18 V	± 12 V	0mA	± 625mA	100mVp-p	30mA	1506mA	87	± 150µF
LCD15-12D15	9 - 18 V	± 15 V	0mA	± 500mA	100mVp-p	30mA	1488mA	88	± 100µF
LCD15-24S3P3	18 - 36 V	3.3 V	0mA	4000mA	75mVp-p	50mA	671mA	86	1000µF
LCD15-24S05	18 - 36 V	5 V	0mA	3000mA	75mVp-p	65mA	763mA	86	1000µF
LCD15-24S12	18 - 36 V	12 V	0mA	1300mA	100mVp-p	20mA	783mA	87	330µF
LCD15-24S15	18 - 36 V	15 V	0mA	1000mA	100mVp-p	20mA	744mA	88	220µF
LCD15-24D05	18 - 36 V	± 5 V	0mA	± 1500mA	100mVp-p	20mA	772mA	85	± 500µF
LCD15-24D12	18 - 36 V	± 12 V	0mA	± 625mA	100mVp-p	15mA	744mA	88	± 150µF
LCD15-24D15	18 - 36 V	± 15 V	0mA	± 500mA	100mVp-p	25mA	744mA	88	± 100µF
LCD15-48S3P3	36 - 75 V	3.3 V	0mA	4000mA	75mVp-p	40mA	336mA	86	1000µF
LCD15-48S05	36 - 75 V	5 V	0mA	3000mA	75mVp-p	40mA	372mA	88	1000µF
LCD15-48S12	36 - 75 V	12 V	0mA	1300mA	100mVp-p	15mA	387mA	88	330µF
LCD15-48S15	36 - 75 V	15 V	0mA	1000mA	100mVp-p	15mA	372mA	88	220µF
LCD15-48D05	36 - 75 V	± 5 V	0mA	± 1500mA	100mVp-p	15mA	386mA	85	± 500µF
LCD15-48D12	36 - 75 V	± 12 V	0mA	± 625mA	100mVp-p	15mA	368mA	89	± 150µF
LCD15-48D15	36 - 75 V	± 15 V	0mA	± 500mA	100mVp-p	20mA	372mA	88	± 100µF

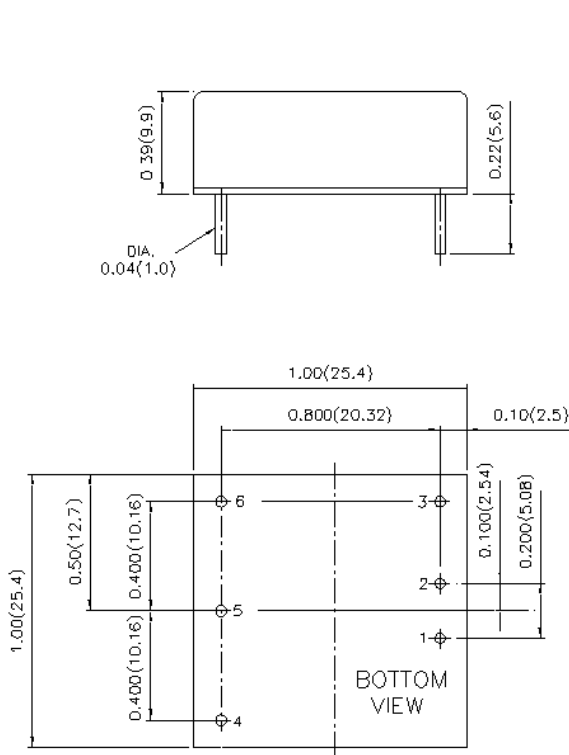
## Note

- 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)
- Maximum value at nominal input voltage and full load.
- Typical value at nominal input voltage and no load.
- Typical value at nominal input voltage and full load.
- Test by minimum Vin 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 +VOUT pin or the -VOUT pin.
- The ON/OFF control pin voltage is reference to -Vin.  
The order number please see product standard table.
- Heat sink is optional and P/N:7G-0047C-F
- The LCD15 series can meet EN55022 Class A with parallel external capacitors to the input pins.  
Recommend : 12Vin : 10µF /25V 1812 MLCC  
24Vin : 6.8µF /50V \* 2 pcs 1812 MLCC  
48Vin : 2.2µF /100V \* 2 pcs 1812 MLCC
- 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, ESR 48mΩ.

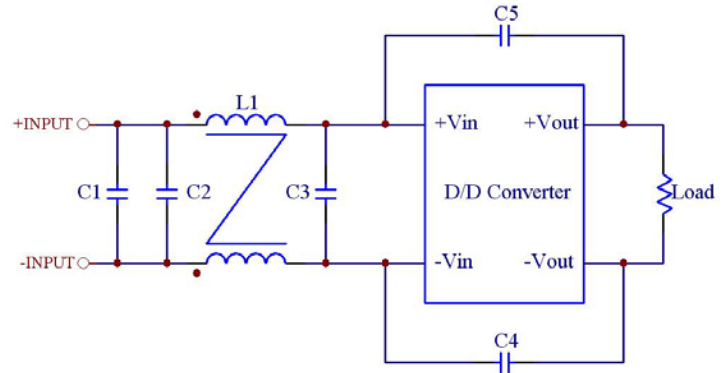


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- All dimensions in Inches (mm)  
Tolerance: X.XX±0.02 (X.X±0.5)  
X.XXX±0.01 (X.XX±0.25)
- Pin pitch tolerance ±0.01(0.25)
- Pin dimension tolerance ±0.004 (0.1)



## Recommended Filter for EN55022 Class B Compliance

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

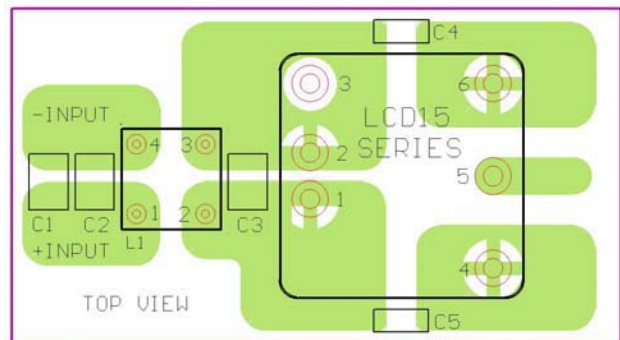
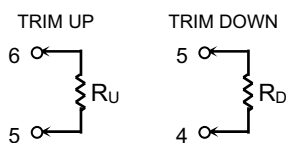
	C1	C2	C3	C4 & C5	L1
LCD15-12xxx	10µF/25V 1812 MLCC	N/A	10µF/25V 1812 MLCC	470pF/2KV 1808 MLCC	145µH Common Choke PMT-051
LCD15-24xxx	6.8µF/50V 1812 MLCC	N/A	6.8µF/50V 1812 MLCC	470pF/2KV 1808 MLCC	325µH Common Choke PMT-050
LCD15-48xxx	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2KV 1808 MLCC	325µH Common Choke PMT-050

## PIN CONNECTION

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

## EXTERNAL OUTPUT TRIMMING

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



## Recommended EN55022 Class B Filter Circuit Layout

## PRODUCT STANDARD TABLE

Option	Suffix
Negative remote ON/OFF(Standard)	
Positive remote ON/OFF	-A
without ON/OFF pin	-B
negative remote ON/OFF without TRIM pin	-C
without ON/OFF&TRIM pin	-D
positive remote ON/OFF without TRIM pin	-E