Make-Ps®
DC/DC CONVERTER

Single & Dual Output DC/DC Converter

Series LCD20
20Watt | DC-DC Converter

RoHS

FEATURES:

- 20W DIL PACKAGE
- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control:On/Off

APPLICATIONS:

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

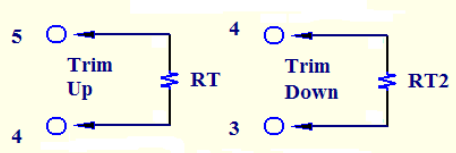
Model Selection Chart

Part Number	Input Voltage Vdc	Input Current No-Load (mA TYP)	Input Current Full Load (mA TYP)	Output Voltage Vdc	Output Current Full Load (mA)	Efficiency %TYP	Capacitor Load uF MAX
LCD20-12S3P3	9-18	30	1456	3.3	4500	85	8200
LCD20-12S05	9-18	30	1938	5	4000	86	5600
LCD20-12S12	9-18	30	1920	12	1670	87	960
LCD20-12S15	9-18	30	1911	15	1330	87	680
LCD20-12D12	9-18	30	1915	±12	±833	87	470
LCD20-12D15	9-18	30	1917	±15	±667	87	330
LCD20-24S3P3	18-36	25	719	3.3	4500	86	8200
LCD20-24S05	18-36	25	958	5	4000	87	5600
LCD20-24S12	18-36	25	949	12	1670	88	960
LCD20-24S15	18-36	25	945	15	1330	88	680
LCD20-24D12	18-36	25	947	±12	±833	88	470
LCD20-24D15	18-36	25	947	±15	±667	88	330
LCD20-48S3P3	36-75	20	356	3.3	4500	87	8200
LCD20-48S05	36-75	20	473	5	4000	88	5600
LCD20-48S12	36-75	20	474	12	1670	88	960
LCD20-48S15	36-75	20	472	15	1330	88	680
LCD20-48D12	36-75	20	473	±12	±833	88	470
LCD20-48D15	36-75	20	474	±15	±667	88	330

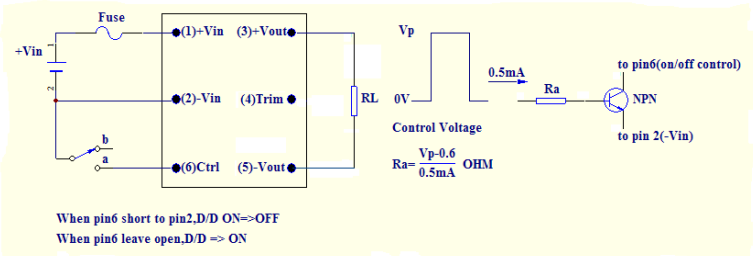
NOTE: All specifications in this datasheet are measured at an ambient temperature of 25°C, humidity<75%, nominal input voltage and at rated output load unless otherwise specified.

Output Voltage Adjustment

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



Control Pin Suggest Circuit



Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Start-up voltage / under voltage shut down	12 Vin		8.7/8.3	9	VDC
	24 Vin		16.9/16.2	18	
	48 Vin		33.0/30.5	36	VDC
Surge voltage (100 msec. max.)	12 Vin			25	V
	24 Vin			50	
	48 Vin			100	V
Reflected input ripple current			30		mA
Filter	LC Network				
Protection	Fuse Recommended				

Output Specifications

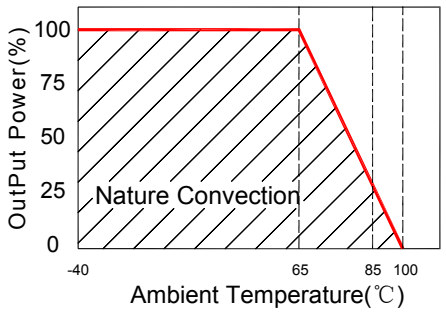
Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Output voltage adj. range	only for single output models			±10	%
Line Regulation (Vmin – Vmax)	single output			0.5	%
	dual output			0.5	%
Load Regulation (25 – 100 %)	single output			0.5	%
	dual output models balanced load			1.0	%
Load variation(25% /100%)	dual output models unbalanced load			5.0	%
Minimum load	required	0		10	%
Ripple and noise(20 MHz bandwidth)	with external capacitor (See Note 1)			100	mVp-p
Temperature coefficient			±0.05		%/℃
Output current limitation		at 150 % of Iout max., constant current			
Short circuit protection		Hiccup (automatic recovery)			
Over voltage protection	3.3VDC	3.7		5.4	Vout
	5VDC	5.6		7.0	Vout
	12VDC	13.5		19.6	Vout
	15VDC	16.8		20.5	Vout
Start up time	nominal Vin and constant resistive load		30		ms
Transient response setting time	25% load step change		300		us

General Specifications

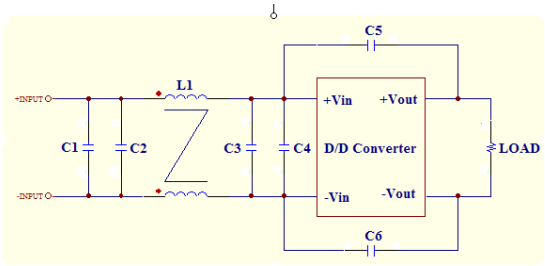
Parameters	Conditions	Min	Typ	Max	Units
Temperature ranges	Operating(with derating)	-40		+75	℃
	Case temperature			105	℃
	Storage	-55		+125	℃
Humidity	non condensing	5		95	%
Reliability, calculated MTBF	MIL-HDBK-217F, @ +25° C, ground benign	340000			Hours
Isolation voltage	For 60 seconds(Input/Output)			1500	VDC
Isolation capacity	Input/Output		1000		pF
Isolation resistance	Input/Output (500 VDC)	1000			MΩ
Remote On/Off	On	3.0 ~ 15 VDC or open circuit			
	Off	0 ~ 1.2 VDC or short circuit pin 6 and pin 2			
	Off idle current:		2.5		mA
Switching frequency (fixed)			330		KHz
Vibration and thermal shock		MIL-STD-810E			
Safety standards		EN 60950-1, IEC 60950-1			
Case material		nickel coated copper			
Base material		Non-conductive FR4			
Potting material		epoxy (UL 94V-0 rated)			
Weight		15 g (0.53 oz)			
Soldering temperature		max. 265℃ / 10sec			
EMI (Conducted&Radiation)		EN55022 Class A			

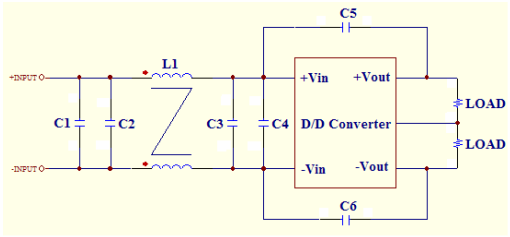
Note : 1 Ripple & Noise measurement bandwidth is 20 MHz, measured with a 1uF M/C and a 10uF T/C.

Temperature Derating Graph



EMC Considerations





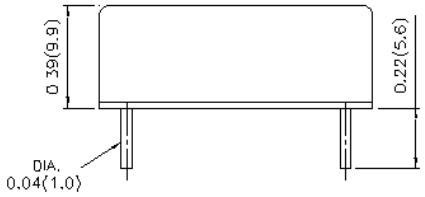
Suggested Schematic to comply with EN55022 Conducted Noise emission Class B

Following components are needed to comply with EN55022 Class B conducted noise:

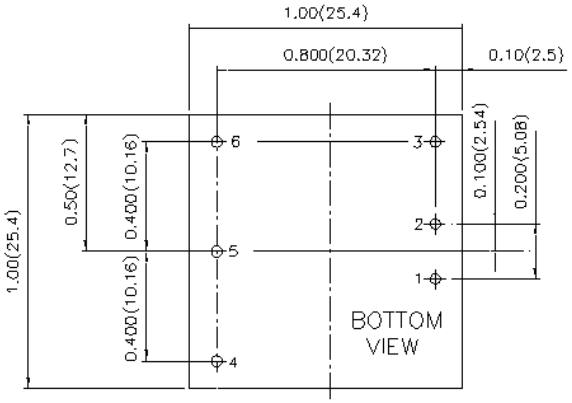
LCD20-12S(D)XXXX LCD20-24S(D)XXXX				LCD20-48S(D)XXXX			
Componet	**Value**	**Voltage**	**Reference**	**Componet**	**Value**	**Voltage**	**Reference**
C1,C2,C3	6.8uF	50V	1812 MLCC	C1,C2,C3,C4	2.2uF	100V	1812 MLCC
C5,C6	1000pF	2KV	1206 MLCC	C5,C6	1000pF	2KV	1206 MLCC
L1	325uH		Common Mode Choke	L1	260uH		Common Mode Choke

OUTLINE DRAWING

Package Style and Pinning (mm)



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



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

All specifications are typical at nominal input, nominal load and 25° C unless otherwise specified.
External, low ESR, 10 microfarad (minimum) capacitor across output is recommended for operation.