POWER MATE TECHNOLOGY CO., LTD.
P-DUKE

LCD10 SERIES
10 WATTS DC-DC CONVERTER

FEATURES
- **10 WATTS MAXIMUM OUTPUT POWER**
- **ULTRA LOW QUIESCENT CURRENT**
- **SINGLE OUTPUT UP TO 3A**
- **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**
- **FIXED SWITCHING FREQUENCY**
- **INPUT TO OUTPUT ISOLATION:1600VDC**
- **BUILT-IN EN55022 CLASS B FILTER**
- **CE MARK MEETS 2006/95/EC, 2011/95/EC AND 2004/108/EC**
- **SAFETY MEETS UL60950-1, EN60950-1 AND IEC60950-1**
- **COMPLIANT TO RoHS EU DIRECTIVE 2011/65/EU**

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

OPTIONS
Positive logic Remote ON/OFF, Without trim , Without CTRL pin

DESCRIPTION
LCD10 DC/DC converters provide up to 10 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, 18~36 VDC and 36~75VDC, comprehensively protected against over-current, over-voltage and input under-voltage protection conditions, and trimmable output voltage. The converter can meet EN55022 Class B with an external capacitor only.

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

OUTPUT SPECIFICATIONS

Output power (Rated)			10 Watts
Output power (Maximum)		With Trim up 10%	11 Watts
		With Trim up 20%	12 Watts
Voltage accuracy			±1%
Minimum load			0%
Voltage adjustability	Single (Note 6)	3.3 & 12Vout	± 10%
		Others	+20%,-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	± 0.1%
		Dual	± 0.8%
Cross regulation Asymmetrical load 25%/100% FL Dual			± 5%
Ripple and noise 20MHz bandwidth (Note 4)			See table
Temperature coefficient			$\pm$0.02% / ºC, max.
Transient response recovery time 25% load step change			250μs
Over voltage protection	3.3VDC output		3.7VDC~5.4VDC
	5VDC output		6.3VDC~7.4VDC
	12VDC output		13.5VDC~19.6VDC
	15VDC output		18.3VDC~22.0VDC
	24VDC output		29.1VDC~32.5VDC
Over load protection	% of FL at nominal input		150%
Short circuit protection			Continuous, automatics recovery

GENERAL SPECIFICATIONS

Efficiency		See table
Isolation voltage	Input to Output	1600VDC, min. 1minute
	Input(Output) to Case	1000VDC, min. 1minute
Isolation resistance	500VDC	10^9ohms, min.
Isolation capacitance		1500pF, max.
Switching frequency		330kHz±10%
Design meets safety standard		IEC60950-1, UL60950-1, EN60950-1
Case material		Copper
Base material		FR4 PCB
Potting material		Epoxy (UL94-V0)
Dimensions		1.0 X 1.0 X 0.39 Inch (25.4 X 25.4 X 9.9 mm)
Weight		16.5g(0.58oz)
MTBF (Note 1)	BELLCORE TR-NWT-000332	1.756×10^6hrs
	MIL-HDBK-217F	1.111×10^6hrs

INPUT SPECIFICATIONS

Input voltage range	12VDC nominal input		9 ~ 18VDC
	24VDC nominal input		18 ~ 36VDC
	48VDC nominal input		36 ~ 75VDC
Input surge voltage	12VDC input		25VDC 1sec, max.
	24VDC input		50VDC 1sec, max.
	48VDC input		100VDC 1sec, max.
Input reflected ripple current			30mAp-p
Start up time	Nominal input and constant resistive load	Power up	30ms, max.
		Remote ON/OFF	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 7) Positive logic(Option)	DC-DC ON		Open or 3 V < 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		2.5mA

ENVIRONMENTAL SPECIFICATIONS

Operating ambient temperature		-40℃ to +85℃ (with derating)
Maximum case temperature		+105ºC
Storage temperature range		-55ºC ~ +125ºC
Thermal impedance (Note 8)	Natural convection	16.18 ℃/Watt
	Natural convection with heat-sink	15.13 ℃/Watt
Thermal shock		MIL-STD-810F
Vibration		MIL-STD-810F
Relative humidity		5% to 95% RH

EMC CHARACTERISTICS

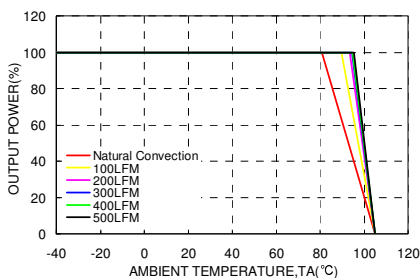|			
EMI (Note 9)	EN55022		Class A, Class B
ESD	EN61000-4-2	Air ± 8kV	Perf. Criteria A
		Contact ± 6kV	
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient (Note 10)	EN61000-4-4	± 2kV	Perf. Criteria A
Surge (Note 10)	EN61000-4-5	± 1kV	Perf. Criteria A
Conducted immunity	EN61000-4-6	3 Vr.m.s	Perf. Criteria A

LCD10 SERIES

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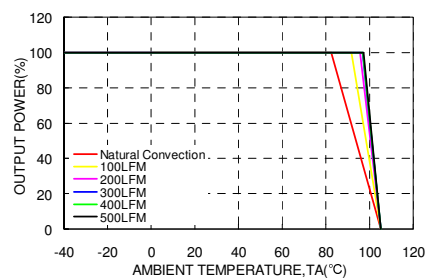| Model Number	Input Range	Output Voltage	Output Current		Output [3][4] Ripple & Noise	No Load [2] Input Current	Eff [3] (%)	Capacitor [5] Load max
			Min. Load	Full Load				
LCD10-12S3P3	9 ~ 18 VDC	3.3 VDC	0mA	3000mA	40mVp-p	10mA	83	3500µF
LCD10-12S05	9 ~ 18 VDC	5 VDC	0mA	2000mA	40mVp-p	10mA	86	2500µF
LCD10-12S12	9 ~ 18 VDC	12 VDC	0mA	830mA	60mVp-p	10mA	89	430µF
LCD10-12S15	9 ~ 18 VDC	15 VDC	0mA	670mA	60mVp-p	10mA	90	350µF
LCD10-12S24	9 ~ 18 VDC	24 VDC	0mA	416mA	60mVp-p	10mA	91	125µF
LCD10-12D05	9 ~ 18 VDC	± 5 VDC	0mA	± 1000mA	40mVp-p	10mA	86	±1440µF
LCD10-12D12	9 ~ 18 VDC	± 12 VDC	0mA	± 416mA	60mVp-p	10mA	89	± 250µF
LCD10-12D15	9 ~ 18 VDC	± 15 VDC	0mA	± 333mA	60mVp-p	10mA	90	± 180µF
LCD10-24S3P3	18 ~ 36 VDC	3.3 VDC	0mA	3000mA	40mVp-p	6mA	85	3500µF
LCD10-24S05	18 ~ 36 VDC	5 VDC	0mA	2000mA	40mVp-p	6mA	86	2500µF
LCD10-24S12	18 ~ 36 VDC	12 VDC	0mA	830mA	60mVp-p	6mA	91	430µF
LCD10-24S15	18 ~ 36 VDC	15 VDC	0mA	670mA	60mVp-p	6mA	90	350µF
LCD10-24S24	18 ~ 36 VDC	24 VDC	0mA	416mA	60mVp-p	6mA	91	125µF
LCD10-24D05	18 ~ 36 VDC	± 5 VDC	0mA	± 1000mA	40mVp-p	6mA	86	±1440µF
LCD10-24D12	18 ~ 36 VDC	± 12 VDC	0mA	± 416mA	60mVp-p	6mA	90	± 250µF
LCD10-24D15	18 ~ 36 VDC	± 15 VDC	0mA	± 333mA	60mVp-p	6mA	90	± 180µF
LCD10-48S3P3	36 ~ 75 VDC	3.3 VDC	0mA	3000mA	40mVp-p	4mA	85	3500µF
LCD10-48S05	36 ~ 75 VDC	5 VDC	0mA	2000mA	40mVp-p	4mA	87	2500µF
LCD10-48S12	36 - 75 VDC	12 VDC	0mA	830mA	60mVp-p	4mA	90	430µF
LCD10-48S15	36 ~ 75 VDC	15 VDC	0mA	670mA	60mVp-p	4mA	90	350µF
LCD10-48S24	36 ~ 75 VDC	24 VDC	0mA	416mA	60mVp-p	4mA	91	125µF
LCD10-48D05	36 ~ 75 VDC	± 5 VDC	0mA	± 1000mA	40mVp-p	4mA	87	±1440µF
LCD10-48D12	36 ~ 75 VDC	± 12 VDC	0mA	± 416mA	60mVp-p	4mA	91	± 250µF
LCD10-48D15	36 ~ 75 VDC	± 15 VDC	0mA	± 333mA	60mVp-p	4mA	90	± 180µF

Note
1. BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40ºC.
   MIL-HDBK-217F Notice2 @Ta=25 ºC, Full load(Ground, Benign, controlled environment)
2. Typical value at nominal input and no load.
3. Typical value at nominal input and full load.
4. The ripple and noise of output voltage 24VDC is measured with a 1µF/50V X7R 1206 MLCC.
   The ripple and noise of other output voltage is measured with a 10µF/25V X7R 1206 MLCC.
5. Test by minimum input and constant resistive load.
6. 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.
7. The CTRL pin voltage is reference to -INPUT.
   The order number please see product standard table.
8. Heat-sink is optional and P/N:7G-0047C-F.
9. The LCD10 series standard module meet EN55022 Class A without external components and meet Class B with external components.
   For more detail information, please contact with P-DUKE.
10. 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.

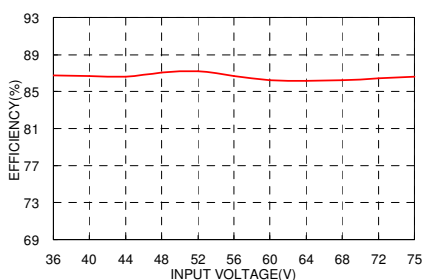**CAUTION:** This power module is not internally fused. An input line fuse must always be used.
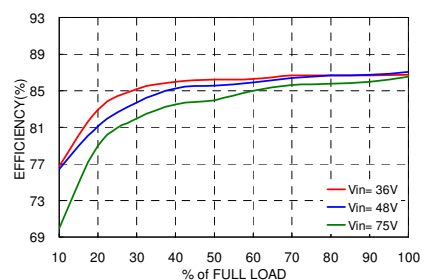
LCD10-48S05 Derating Curve

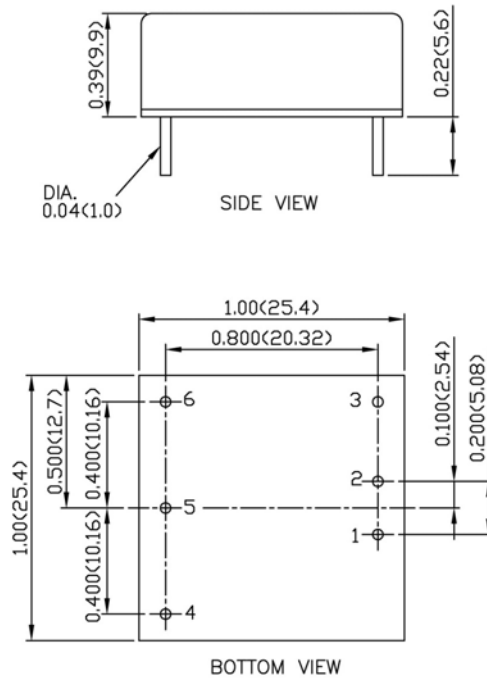LCD10-48S05 Derating Curve With Heat-sink

LCD10-48S05 Efficiency VS Input Voltage

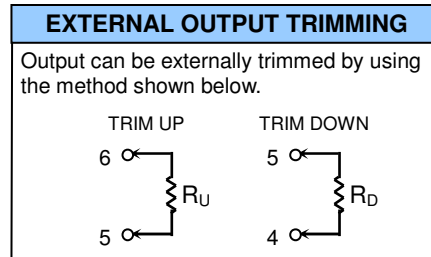LCD10-48S05 Efficiency VS Output Current

MECHANICAL DRAWING：

SIDE VIEW

BOTTOM VIEW

1. All dimensions in Inch (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	CTRL	CTRL
4	+OUTPUT	+OUTPUT
5	TRIM	COMMON
6	-OUTPUT	-OUTPUT

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 CTRL pin	-B
Negative logic remote ON/OFF without TRIM pin	-C
Without CTRL &TRIM pin	-D
Positive logic remote ON/OFF without TRIM pin	-E