POLYTRON DEVICES

DATA SHEET

DC-DC CONVERTERS

4:1 WIDE INPUT RANGE 40 WATT

RAILWAY APPLICATIONS

LWB40 SERIES

FEATURES

- 4:1 Wide Input Range
- Railway Applications: Meets EN50155, EN50121-3 and EN61373
- Safety Meets UL60950-1, EN60950-1, IEC 60950-1, EN50155
- Operating Temperature: -40 to +85°C
- Low Profile Package (1.00 × 2.00 × 0.40")
- Input/Output Isolation: 1600Vdc Min.
- High Efficiency to 92% @ FL
- Six-Sided Continuous Metal Shielding
- Compliant to RoHS & Reach

SELECTION GUIDE All specifications are typical at nominal input, full load and 25°C, unless otherwise noted.

Input Voltage Range Vdc	Output Voltage Vdc	Output Current at Full Load A	Input Current at No Load mA	Efficiency %	Model Number	Maximum Capacitor Load µF
9 - 36	3.3	10000	15	90	LWB40-24S33	26600
9 - 36	5	8000	15	91	LWB40-24S5	20000
9 - 36	12	3333	15	92	LWB40-24S12	3900
9 - 36	15	2666	15	92	LWB40-24S15	2600
9 - 36	24	1666	15	91	LWB40-24S24	1300
9 - 36	±12	±1666	15	90	LWB40-24-12	±2600
9 - 36	±15	±1333	15	90	LWB40-24-15	±1600
9 - 36	±24	±833	15	91	LWB40-24-24	±650
18 - 75	3.3	10000	10	90	LWB40-48S33	26600
18 - 75	5	8000	10	91	LWB40-48S5	20000
18 - 75	12	3333	10	92	LWB40-48S12	3900
18 - 75	15	2666	10	92	LWB40-48S15	2600
18 - 75	24	1666	10	91	LWB40-48S24	1300
18 - 75	±12	±1666	10	90	LWB40-48-12	±2600
18 - 75	±15	±1333	10	90	LWB40-48-15	±1600
18 - 75	±24	±833	10	91	LWB40-48-24	±650
43 - 160	3.3	10000	10	88	LWB40-110S33	26600
43 - 160	5	8000	10	89	LWB40-110S5	20000
43 - 160	12	3333	10	90.5	LWB40-110S12	3900
43 - 160	15	2666	10	91	LWB40-110S15	2600
43 - 160	24	1666	10	90	LWB40-110S24	1300
43 - 160	±12	±1666	10	89	LWB40-110-24	±2600
43 - 160	±15	±1333	10	89	LWB40-110-15	±1600
43 - 160	±24	±833	10	91	LWB40-110-24	±650

LWB40 SERIES

Input Specifications

Operating input voltage range, Vdc	9 Min., 24 Typ., 36 Max.	24Vin(nom)
	18 Min., 48 Typ., 75 Max.	48Vin(nom)
	43 Min., 110 Typ., 160 Max.	110Vin(nom)
Start up voltage, Vdc	9 Max.	24Vin(nom)
	18 Max.	48Vin(nom)
	43 Max.	110Vin(nom)
Shutdown voltage, Vdc	8 Typ	24Vin(nom)
	16 Typ.	48Vin(nom)
	40 Typ.	110Vin(nom)
Start up time, ms	60 Typ.	Constant resistive load, Power up
	60 Typ.	Constant resistive load, Remote ON/OFF
Input surge voltage, Vdc	50 Max.	1 second, max., 24Vin(nom)
	100 Max.	1 second, max., 48Vin(nom)
	170 Max.	1 second, max., 110Vin(nom)
Input filter[1]	Pi type	
Remote ON/ OFF,	Open or 3 - 12, Vdc	Referred to -Vin pin, Positive logic, DC-DC ON
	Short or 0 - 1.2, Vdc	Referred to -Vin pin, (Standard), DC-DC OFF
	Short or 0 - 1.2, Vdc	Referred to -Vin pin, Negative logic, DC-DC ON
	Open or 3 -12, Vdc	Referred to -Vin pin, (Option), DC-DC OFF
	-0.5 Min., 1 Max., mA	Referred to -Vin pin, Input current of Ctrl pin
	3 Typ., mA	Referred to -Vin pin, Remote off input current

Output Specifications

Voltage accuracy, %	-1 Min., +1 Max.	
Line regulation, %	-0.2 Min., +0.2 Max.	Low Line to High Line at Full Load
Load regulation, %	-0.5 Min., +0.5 Max.	No Load to Full Load, Single
	-1 Min., +1 Max.	No Load to Full Load, Dual
Cross regulation, %	-5 Min., +5 Max.	Asymmetrical load 25%/100% FL, Dual
Voltage and adjustability, %	-10 Min., +10 Max.	Single Output, 3.3Vout, 5Vout, 12Vout
	-10 Min., +20 Max.	Single Output, 15Vout, 24Vout
Ripple and noise, mVp-p	75 Typ., 100 Max.	Measured by 20MHz bandwidth with a 0.1uf/50V X7R MLCC, 3.3Vout, 5 Vout
	100 Typ., 125 Max.	Measured by 20MHz bandwidth with a 0.1uf/50V X7R MLCC, 12Vout, 15Vout
	150 Typ., 200 Max	Measured by 20MHz bandwidth with a 0.1uf/50V X7R MLCC, 24Vout
Temperature coefficient, %/ºC	-0.02 Min., +0.02 Max.	
Transient response recovery time, µs	250 Typ.	25% load step change
Over voltage protection, %	3.9 Typ.	Zener diode clamp, 3.3Vout
	6.2 Typ.	Zener diode clamp, 5Vout
	15 Typ.	Zener diode clamp, 12Vout
	20 Typ.	Zener diode clamp, 15Vout
	30 Typ.	Zener diode clamp, 24Vout
Over load protection, %	150 Typ.	% of Iout rated; Hiccup mode
Short circuit protection	Continuous, automatics recovery	

General Specifications

Isolation voltage, Vdc	1 minute	Input to Output	1600 Min.		
	1 minute	Input (Output) to Case	1600 Min.		
Isolation resistance, GΩ	500Vdc		1 Min.		
Isolation capacitance, pF					1500 Max.
Switching frequency, kHz			225 Min.	250 Typ.	275 Max.

Environmental Specifications

Operating ambient temperature, ºC		-40 Min.		+85 Max.
Maximum case temperature, ºC				+105 Max.
Over temperature range, ºC			+115 Typ.	
Storage temperature range, ºC		-55 Min.		+125 Max.
Thermal impedance[1], ºC/W	Vertical direction by natural convection (20LFM), Without Heat-sink		10.8 Typ.	
	Vertical direction by natural convection (20LFM), With Heat-sink		10.3 Typ.	
Thermal shock		MIL-STD-810F		
Shock		EN61373, MIL-STD-810F		
Vibration		EN61373, MIL-STD-810F		
Relative humidity		5% to 95% RH		

LWB40 SERIES

Physical Specifications

Design meet safety standard	UL60950-1, EN60950-1, IEC60950-1, EN50155
Case material	Copper
Base material	FR4 PCB
Potting material	Silicone (UL94 V-0)
Weight	32g (1.13oz)
MTBF	9.073 x 10^5hrs, MIL-HDBK-217F, Full load

EMC Specifications

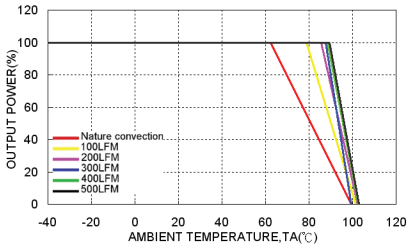
Specifications	Conditions		Level
EMI[2]	EN55011, EN55022		Class A
ESD	EN61000-4-2	Air ±8kV and Contact ±6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	20V/m	Perf. Criteria A
Fast transient[3]	EN61000-4-4	±2kV	Perf. Criteria A
Surge[3]	EN61000-4-5	±2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A

Note:

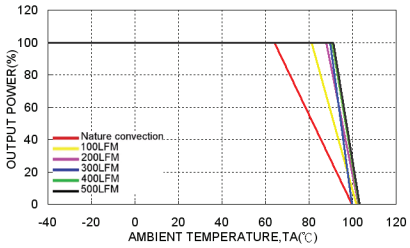
1. Test by minimum input and constant resistive load.
2. The standard modules meets EMI Class A or Class B with external components. For further information, please contact Polytron Devices.
3. The external input components are required if the module has to meet EN61000-4-4, EN61000-4-5.
   The LWB40-24XXX recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ58A, 58V, 3000Watt peak pulse power) to connect in parallel.
   The LWB40-48XXX recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ120A,120V, 3000Watt peak pulse power) to connect in parallel.
   The LWB40-110XXX recommended an aluminum electrolytic capacitor (Ruby-con BXF series, 68μF/200V 3pcs in parallel) and a TVS (SMDJ90A, 90V, 3000Watt peak pulse power 2pcs in series connection) to connect in parallel

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

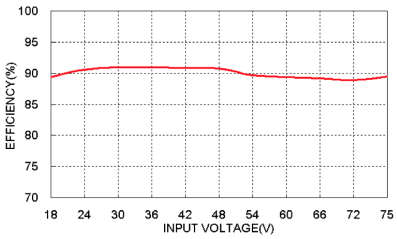
Characteristic Curve



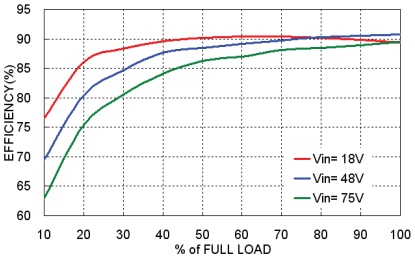
LWB40-24S05 Derating Curve



LWB40-24S05 Derating Curve
With Heat-sink



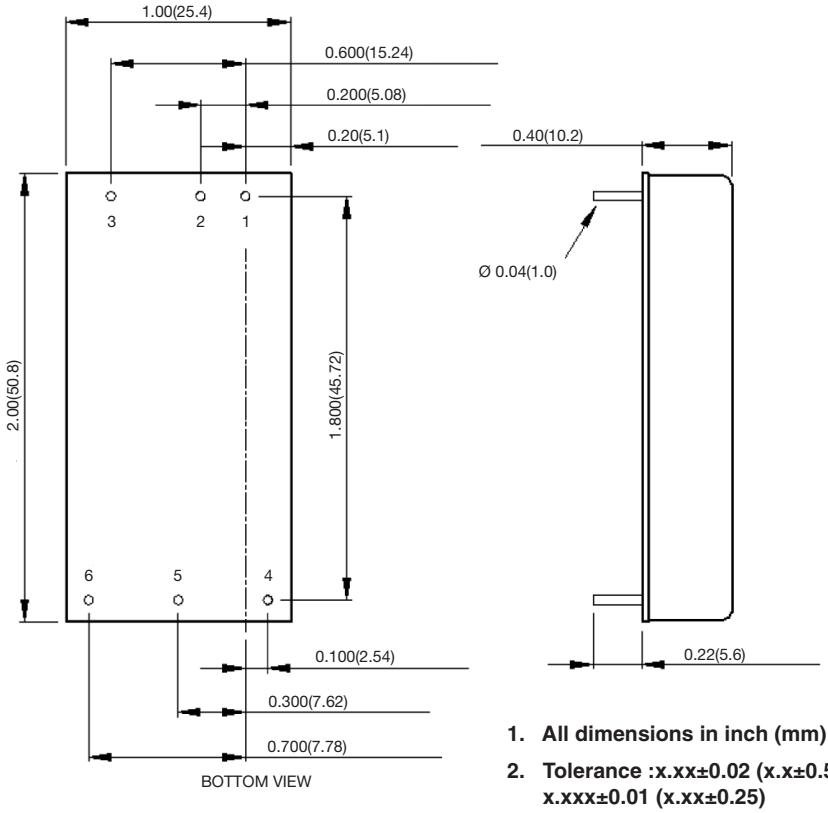
LWB40-24S05 Efficiency vs. Input Voltage



LWB40-24S05 Efficiency vs. Output Load

LWB40 SERIES

Mechanical Drawing



1. **All dimensions in inch (mm)**
2. **Tolerance :x.xx±0.02 (x.x±0.5) x.xxx±0.01 (x.xx±0.25)**
3. **Pin pitch tolerance ±0.01 (0.25)**
4. **Pin dimension tolerance ±0.004(0.1)**

PIN CONNECTION

PIN	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Ctrl	Ctrl
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout

EXTERNAL OUTPUT TRIMMING

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