40 W DC-DC Converter P40B-Series

PHI-CON

- Wide 4:1 input range
- Efficiency up to 92 %
- Adjustable output voltage
- On/Off remote control
- 1600 V_{DC} isolation
- Continuous short circuit protection
- Over voltage protection
- Over temperature protection
- Standard package 2" x 2" x 0.4"
- -40...85°C operating temperature range
- Soft start function

Model guide

Type	Input voltage		Input current		Output voltage	Output current max.	Ripple & noise (see fig. 2) max.	Outp. over voltage protection	Efficiency @ full load typ	Output capacitor load
	Nominal [V_{DC}]	Range [V_{DC}]	no load typ. [mA]	full load typ. [mA]	[V_{DC}]	[mA]	[mVp-p]	[V_{DC}]	[%]	[µF] max.
Single output										
P40B243R3S	24	9...36	80	1600	3.3	10000	50	3.9	89	25000
P40B2405S	24	9...36	100	1900	5.0	8000	50	6.2	91	13000
P40B2412S	24	9...36	50	1920	12.0	3350	75	15	90	2300
P40B2415S	24	9...36	50	1920	15.0	2650	75	18	90	1500
P40B483R3S	48	18...75	60	800	3.3	10000	50	3.9	89	25000
P40B4805S	48	18...75	60	950	5.0	8000	50	6.2	92	13000
P40B4812S	48	18...75	30	960	12.0	3350	75	15	90	2300
P40B4815S	48	18...75	30	950	15.0	2650	75	18	91	1500
Dual output										
P40B2412D	24	9...36	60	1940	±12.0	±1650	150	±15	89	2 x 1200
P40B2415D	24	9...36	60	1940	±15.0	±1350	150	±18	89	2 x 750
P40B4812D	48	18...75	30	960	±12.0	±1650	150	±15	90	2 x 1200
P40B4815D	48	18...75	30	960	±15.0	±1350	150	±18	90	2 x 750

Ordering information: Add suffix "K" for heat sink version, E.G.: P40B2405SK

Specifications

Input	
Start up voltage	P24xxx: 8.6 V_{DC}, typ. P48xxx: 17.8 V_{DC}, typ.
Under voltage lockout	P24xxx: 7.9 V_{DC}, typ. P48xxx: 16 V_{DC}, typ.
Filter	π - type
Reflected ripple current	20 mAp-p, typ. (See fig. 1)
Remote control levels	
On	3 … 12 V_{DC} or open input
Off	0 … 1.2 V_{DC} (see figure 3)
Off state input idle current	5 mA, typ.
Isolation:	
Rated voltage input / output, input or output to case	1600 V_{DC}
Resistance	10^9 Ω
Capacitance	2500 pF, typ.
Output	
Voltage accuracy	± 1 %
Output voltage trim range	± 10 %
Voltage cross balance (dual outputs)	±5 % @ 75 % load difference
Line voltage regulation	± 0.5 %
Load voltage regulation single Load voltage regulation dual	± 0.5 % @ 0 %...100 % load ± 1 % @ 1 %...100 % load
Temperature coefficient	± 0.02 % / °C
Transient recovery time	250 µs, typ, @ 25 % load change steps
Transient response deviation	≤3 % @ 25 % load change steps
Short circuit protection	Continuous, hiccup
Over load protection	130 % of full load, typ.
Short circuit restart	Automatic
Over voltage protection (Z-diode) P40Bxx3R3x P40Bxx05x P40Bxx12x P40Bxx15x	 3.9 V_{DC} 6.2 V_{DC} 12 V_{DC} 15 V_{DC}
Start up time	25 ms, typ. @ R-load, nom. Vin

General	
Switching frequency	270 kHz, typ.
Safety standard in accordance with	IEC, EN 60950-1
Reliability Calculated MBTF	>150000 h
EMC characteristics	
Radiated emissions	EN55032 Class A
Conducted emissions	EN55032 Class A
ESD	EN61000-4-2 pref criteria A
RS	EN61000-4-3 pref criteria A
EFT	EN61000-4-4 pref criteria A
Surge	EN61000-4-5 pref criteria A
CS	EN61000-4-6 pref criteria A
PFMF	EN61000-4-8 pref criteria A
Environmental	
Operating temperatur (ambient)	-40 … 85 °C (see SOA diagram)
Case temperature	105 °C, max.
Storage temperature	-40 … 125 °C
Over temperature protection	Tc 110 °C, typ
Cooling	Free air convection
Thermal impedance	Without heat sink 10.8 K/W With heat sink 8.8 K/W
Storage humidity	95 %, non condensing
Physical	
Dimensions	50.8 x 50.8 x 10.16 mm
Weight	Standard version: 87 g Heat sink version: 100 g
Case material	Nickel coated brass
Potting Material	Epoxy (UL94V-0 rated)
Absolute max. ratings	
Pin soldering temperature 1.5 mm distance from body	260°C for 10 sec
Max. input voltage for 0.1s	
P40B24xxx	50 V_{DC}
P40B48xxx	100 V_{DC}

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Figure 1 Measure circuit for reflected input ripple current.

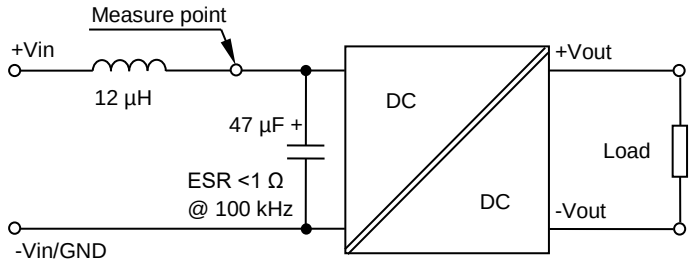
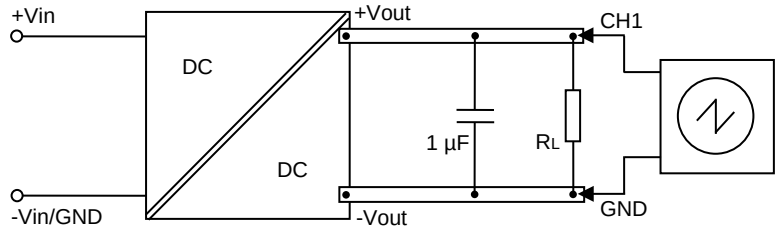


Figure 2 Measure circuit for output ripple & noise.
Single output



Dual output

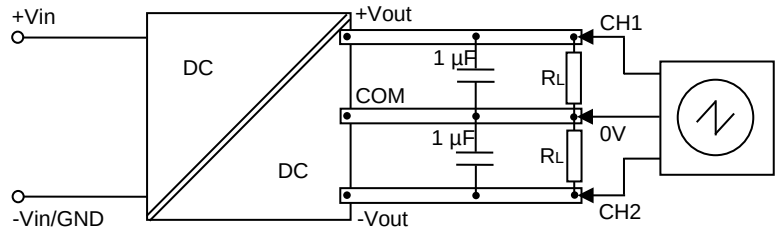


Figure 3 Application circuit remote control

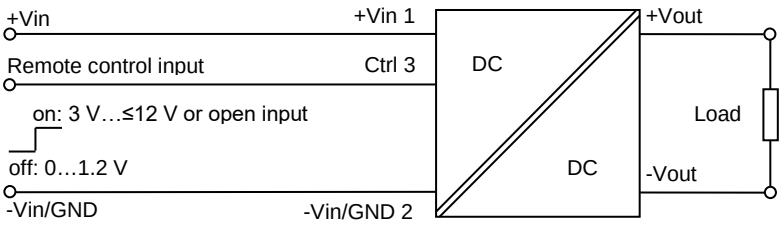
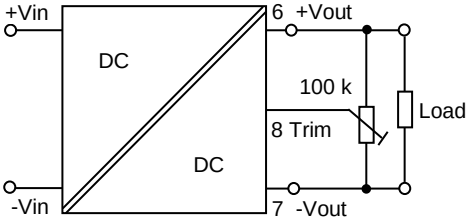
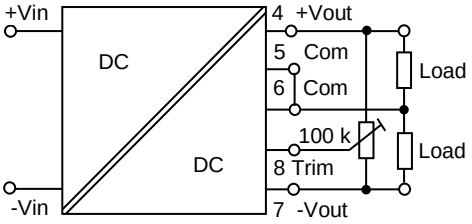


Figure 4 Application circuit output voltage trimming

Single output



Dual output



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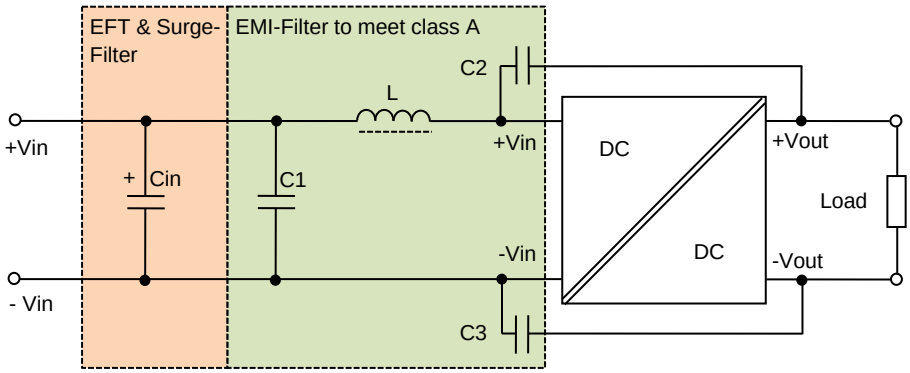
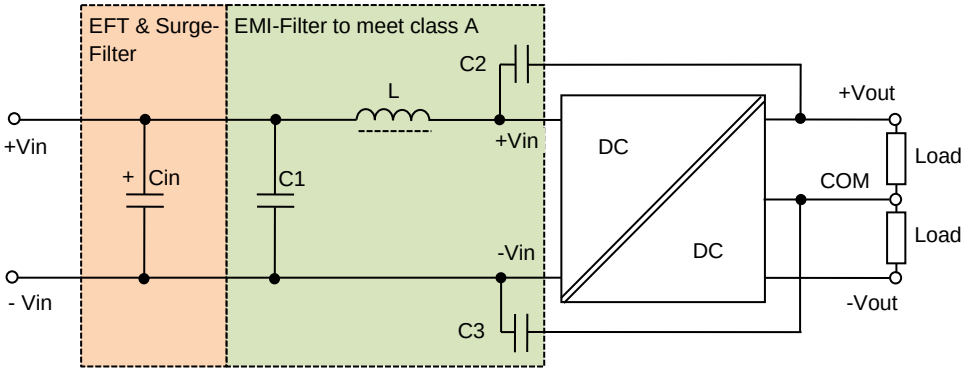
For the Single output: Maximum output deviation is 10 % inclusive of remote sense and trim. If remote sense is not being used, the + SENSE should be connected to it is corresponding +OUTPUT and likewise the - SENSE should be connected to its corresponding -OUTPUT.

Figure 5 Application circuit to meet EMI EN55032 ClassA, EFT IEC61000-4-4 perf. crit. A & Surge IEC61000-4-5 perf. crit. A
Single output



Dual output



BOM to Figure 5					
	Cin	C1	L	C2	C3
P40B-24xxxxx	220 µF, 100 V, KY-Series, nippon chemicon	100 µF, 100 V	12 µH	1 nF, 2 kV	1 nF, 2 kV
P40B-48xxxxx	220 µF, 100 V, KY-Series, nippon chemicon	100 µF, 100 V	12 µH	1 nF, 2 kV	1 nF, 2 kV

Note:

1. The maximum capacitive load is specified at minimal input voltage and constant resistive load.
2. With input filter circuit to meet of conducted emissions EN55032 class A. (See figure 5)
3. An external input blocking capacitor is required if the converter has to meet IEC61000-4-5. Suggested capacitor type: KY-series, 220 µF, 100 V, Nippon Chemicon. (See figure 5)
4. Not usable for parallel output operation.

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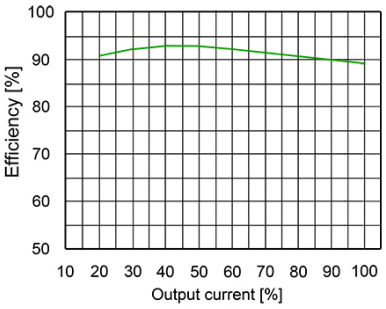
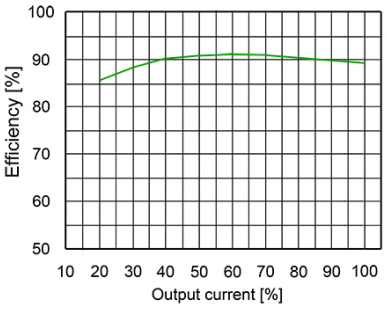
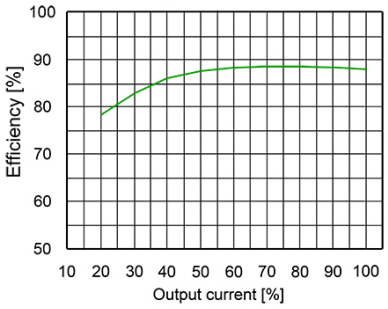
P40B243R3S Efficiency vs output current at input voltage 9 V



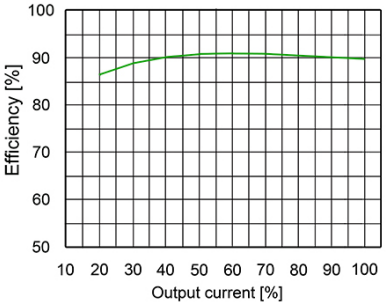
P40B243R3S Efficiency vs output current at input voltage 24 V



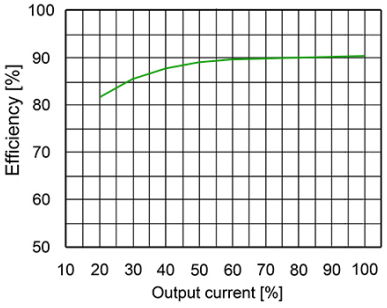
P40B243R3S Efficiency vs output current at input voltage 36 V



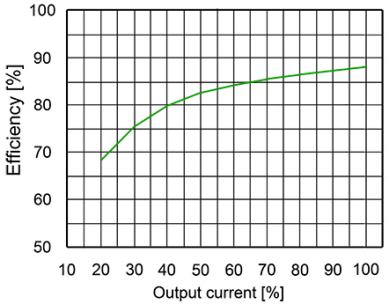
P40B2415S Efficiency vs output current at input voltage 9 V



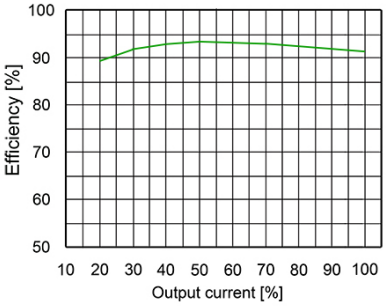
P40B2415S Efficiency vs output current at input voltage 24 V



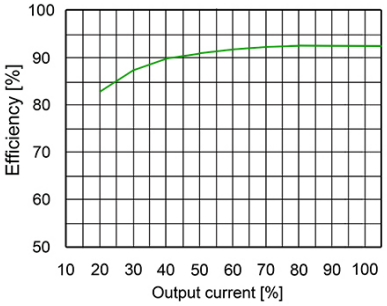
P40B2415S Efficiency vs output current at input voltage 36 V



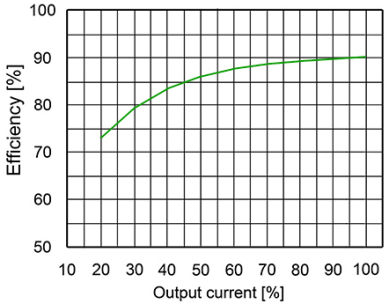
P40B4805S Efficiency vs output current at input voltage 18 V



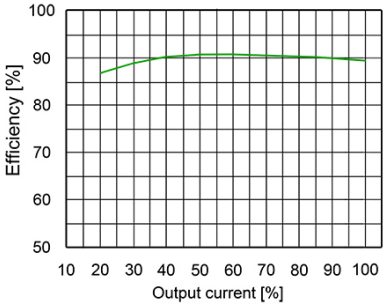
P40B4805S Efficiency vs output current at input voltage 48 V



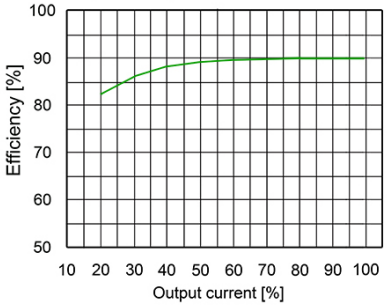
P40B4805S Efficiency vs output current at input voltage 75 V



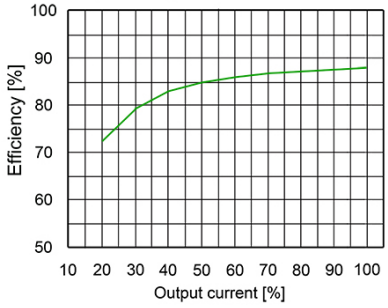
P40B4815D Efficiency vs output current at input voltage 18 V



P40B4815D Efficiency vs output current at input voltage 48 V



P40B4812D Efficiency vs output current at input voltage 75 V



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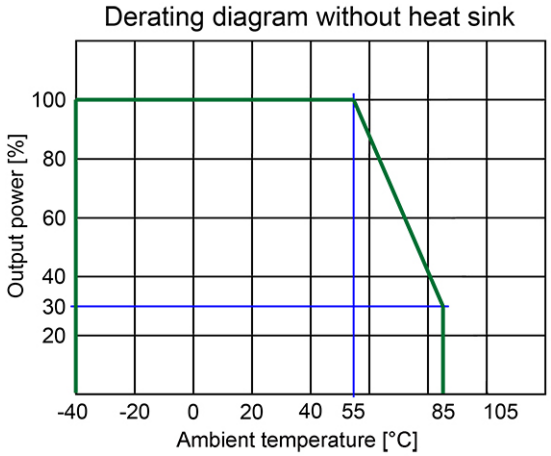
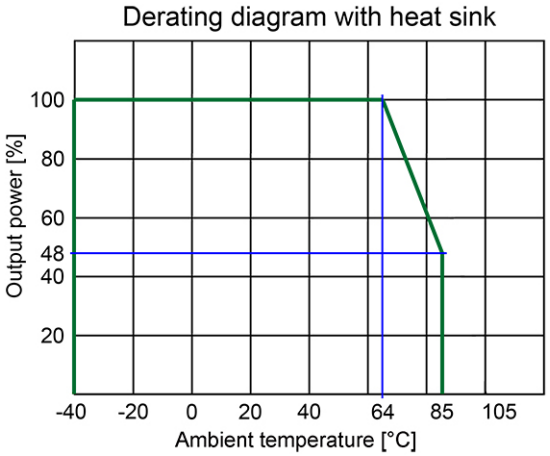
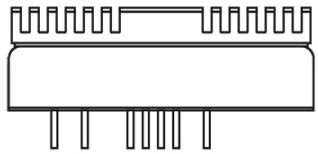


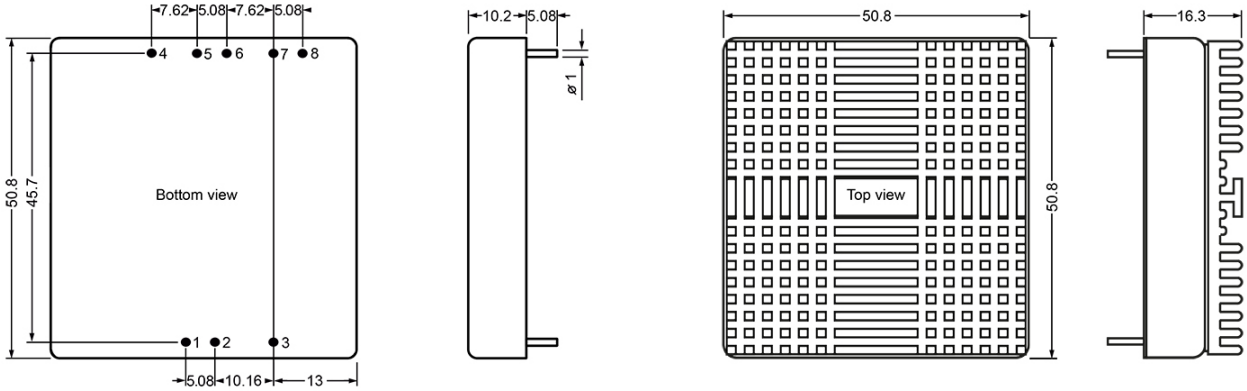


Dimensions

Standard version

Heat sink version





Pin Assignment		
Pin	Single output	Dual output
1	+ Vin	+ Vin
2	- Vin	- Vin
3	Rem ctrl	Rem ctrl
4	- Sense	+ Vout
5	+ Sense	Common
6	+ Vout	Common
7	- Vout	- Vout
8	Trim	Trim

Note:
All dimensions are in mm

1. Pin diameter tolerance ± 0.05 mm
2. Pin pitch tolerance ± 0.35
3. Pin length tolerance ± 0.35
4. Case tolerance ± 0.5

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