40W DC-DC Converter P40C-Series

PHI-CON

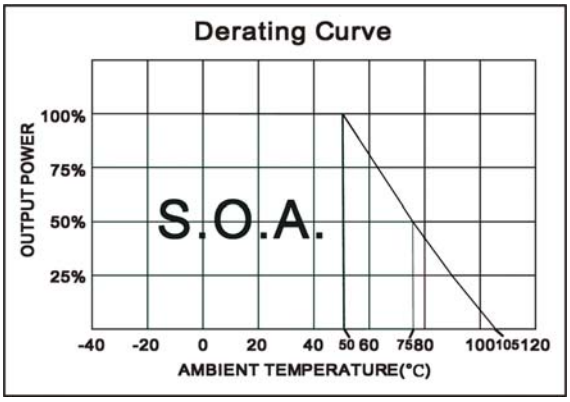
- 2:1 wide input voltage range
- High efficiency up to 92%
- Over current protection
- Over voltage protection
- Over temperature protection
- Continuous short circuit protection
- Adjustable output voltage
- On/Off - remote control input
- Soft start
- Standard 2" x 1" x 0.4" package

Model selection guide

Typ	Input voltage range [V_{DC}]	Input current no-load [mA]	Input current full-load [mA]	Output voltage [V_{DC}]	Output current range [mA]	Efficiency typ. [%]	Capacity load max. [µF]
Single output							
P40C123R3S	9...18	100	2450	3.3	0…8000	90	22000
P40C1205S	9...18	160	3665	5	0…8000	91	14000
P40C1212S	9...18	40	3665	12	0…3333	91	2000
P40C1215S	9...18	50	3665	15	0…2666	91	1500
P40C243R3S	18...36	60	1210	3.3	0…8000	91	22000
P40C2405S	18...36	90	1810	5	0…8000	92	14000
P40C2412S	18...36	30	1830	12	0…3333	91	2000
P40C2415S	18...36	40	1810	15	0…2666	92	1500
P40C483R3S	36...75	40	604	3.3	0…8000	91	22000
P40C4805S	36...75	60	905	5	0…8000	92	14000
P40C4812S	36...75	20	915	12	0…3333	91	2000
P40C4815S	36...75	20	905	15	0…2666	92	1500
Dual output							
P40C1212D	9...18	50	3665	±12	0…±1666	91	2 x 1200
P40C1215D	9...18	50	3625	±15	0…±1333	92	2 x 750
P40C2412D	18...36	50	1830	±12	0…±1666	91	2 x 1200
P40C2415D	18...36	40	1810	±15	0…±1333	92	2 x 750
P40C4812D	36...75	30	905	±12	0…±1666	92	2 x 1200
P40C4815D	36...75	40	905	±15	0…±1333	92	2 x 750

Designation key

		Output power		Series designation	Input voltage range		Output voltage		Output configuration	
P	PHI-CON	**40**	40 W	**C**	**12**	9…18 V	**3R3**	3.3 V	**S**	single output
					24	18…36 V	**5**	5 V	**D**	dual output
					48	36…75 V	**12**	12 V		
							15	15 V		



40W DC-DC Converter P40C-Series

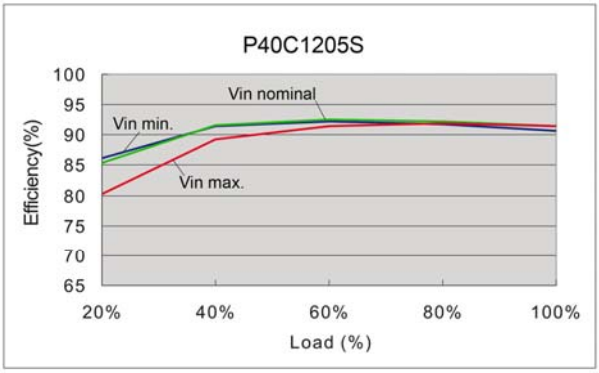
PHI-CON

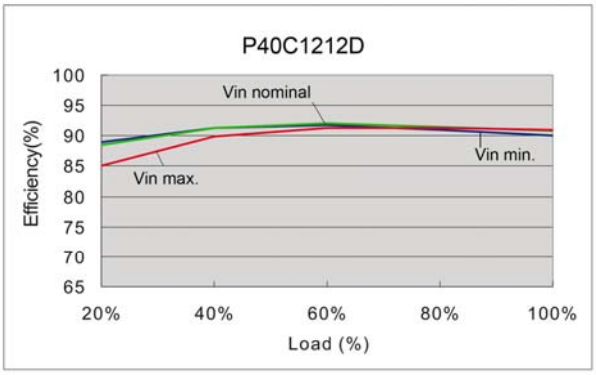
Specifications

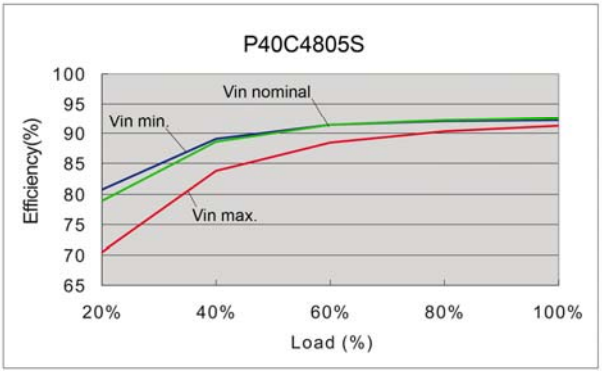
Input	
Input Filter:	Pi- type
Under voltage lockout	1 2V Type: on @ 8.6 V, off @ 7.9 V 24 V Type: on @ 17.8 V, off @ 16 V 48 V Type: on @ 33.5 V, off @ 30.5 V
Start up time	30 ms typ.
Remote control input Pin 3	"on" Open input or 3.0 V…12 V "off" Short to –Vin or 0 V…1.2 V
Input current remote "off"	5 mA @ nominal Vin
Input reflected ripple current	20 mAp-p, typ (see measure circuit)
Isolation	
Isolation voltage	Input to output or to case, 1600 V_{DC}, 3 sec.
Resistance	10^9 Ω, min
Capacitance	1000 pF, max
Output	
over voltage protection with Z-diode clamp	3.3 V-output-type 3.9 V 5 V-output-type 6.2 V (±)12 V-output-type 15 V (±15 V) (±)15 V-output-type 18 V (±18 V)
Voltage accuracy	±1 %
Voltage adjustability	±10 %, only for single output version
Ripple and noise (at 20 MHz BW)	100 mVp-p for 3.3 V & 5 V types 150 mVp-p for all other types
Short circuit protection	Hiccup, automatic recovery
Line voltage regulation	± 0.5 %
Load voltage regulation @ 0…100% load change	single: ±0.5 % dual: ±1 %, max. @ blanced load
Cross drift @ dual output	±5 % @ 75 % load difference
Temperature coefficient	± 0.02 % / °C
Transient recovery time	250 µs
Transient response deviation	±3 %, max @ load steps 75-50-25 %
Over load protection	115…130 % of full load

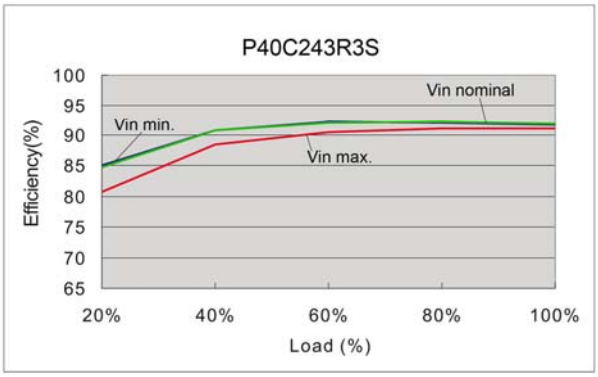
General	
Switching frequency	270 kHz, typ.
Standard in accordance with	EN / IEC 60950-1
Radiated emissions	EN55022 level B
Conducted emissions	EN55022 level B (with external filter)
ESD	EN61000-4-2 pref. criteria A
Radiated immunity	EN61000-4-3 pref. criteria A
Fast transient *	EN61000-4-4 pref. criteria A
Surge *	EN61000-4-5 pref. criteria A
*An external filter capacitor is required, if the module has to meet EN61000-4-4 and EN61000-4-5. Suggested type: Nippon chemi-con KY series, 220 µF / 100 V	
Conducted immunity	EN61000-4-6 pref. criteria A
PFMF	EN61000-4-8 pref. criteria A
Reliability calculated (MIL-HDBK-217 F)	MTBF > 328 khrs
Environmental	
Operating temperature	-40°C to +71°C (with derating)
Storage temperature	-55 °C to +125 °C
Maximum case temp.	+105 °C
Over temperature protection	+115 °C, typ
Humidity	95 % rel. Humidity
Physical	
Dimensions	50.8 x 25.4 x 10.2 mm
Weight	32 g
Case material	Nickel-coated copper
Base material	Plastic, UL94-V0 rated
Potting material	Epoxy, UL94-V0 rated
Absolute maximum ratings	
Input surge voltage 100 ms max.	12 V input : -0.7…25 V_{DC} 24 V input : -0.7…50 V_{DC} 48 V input : -0.7…100 V_{DC}
Soldering temperature	260°C, 10s, 1.5mm from case

Efficiency vs output load









HY-LINE® POWER COMPONENTS

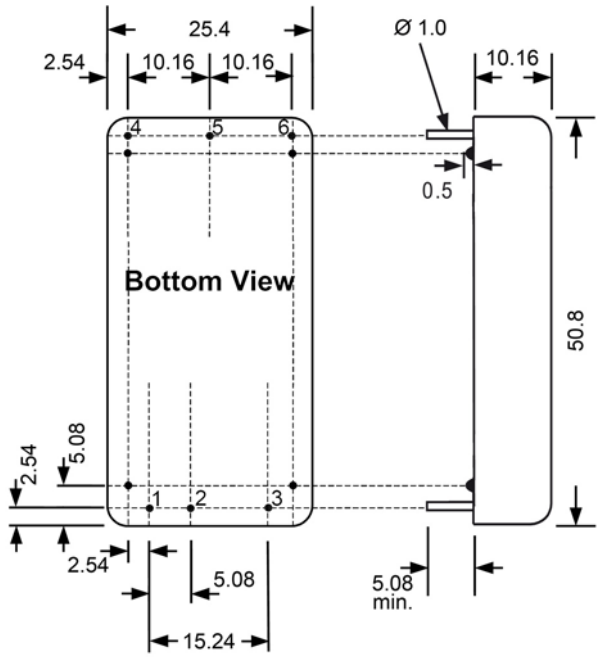
Deutschland:
Inselkammerstrasse 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

Schweiz:
Gründenstrasse 82
CH-8247 Flurlingen
Tel.: 052 647 42 00
E-Mail: power@hy-line.ch

40W DC-DC Converter P40C-Series

PHI-CON

Dimensions



All dimensions are typical in millimeters.

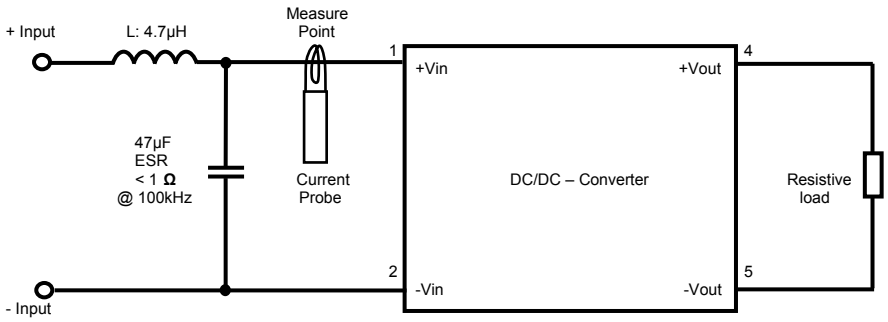
1. Pin diameter: 1.0 ±0.05
2. Pin pitch tolerance: ±0.35
3. Case tolerance: ±0.5
4. Stand-off tolerance: ±0.1

Pin connections

Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Rem.-Ctl.	Rem.-Ctl.
4	+ Vout	+ Vout
5	- Vout	Common
6	Trim	- Vout

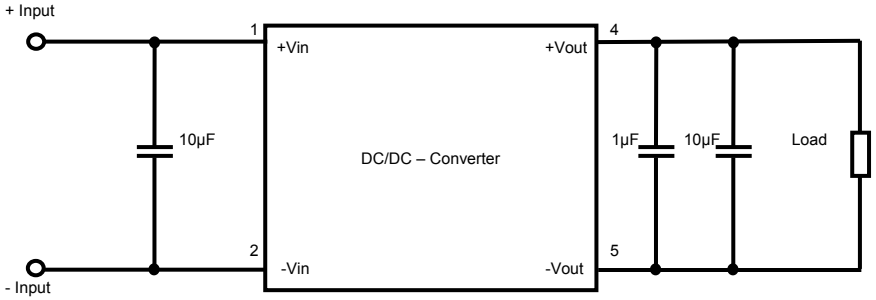
Input reflected ripple current measure circuit

The input reflected ripple current is measured through a source inductor 4.7 µH and a source capacitor Cin 47 µF, ESR<1 ohm at 100 kHz at nominal input voltage and full load.



Output ripple & noise reduction

To reduce ripple and noise, it is recommended to use a 1 µF ceramic disk and a 10 µF electrolytic capacitor.



HY-LINE® POWER COMPONENTS

Deutschland:
Inselkammerstrasse 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

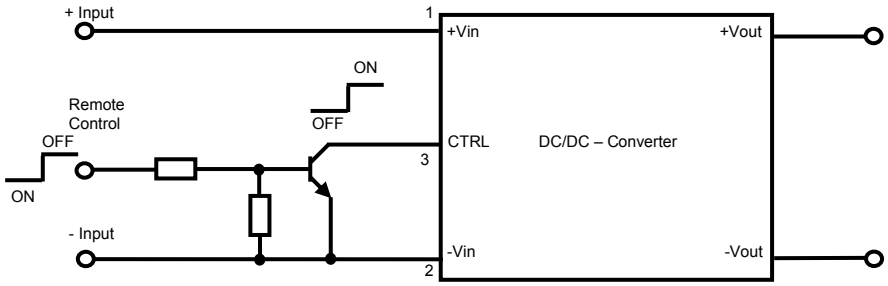
Schweiz:
Gründenstrasse 82
CH-8247 Flurlingen
Tel.: 052 647 42 00
E-Mail: power@hy-line.ch

40W DC-DC Converter P40C-Series

PHI-CON

On / Off Control

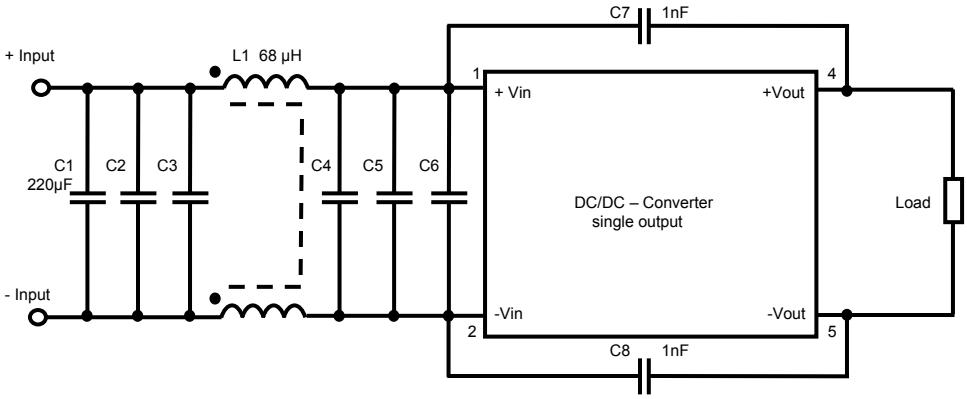
Positive logic turns ON the module during high logic and Off during low logic. CTRL function can be controlled by an external switch between the CRTL terminal and –Vin terminal. The switch can be an open collector or open drain for positive logic. If the CTRL feature is not used then do not connect the CTRL pin.



EMI Filter

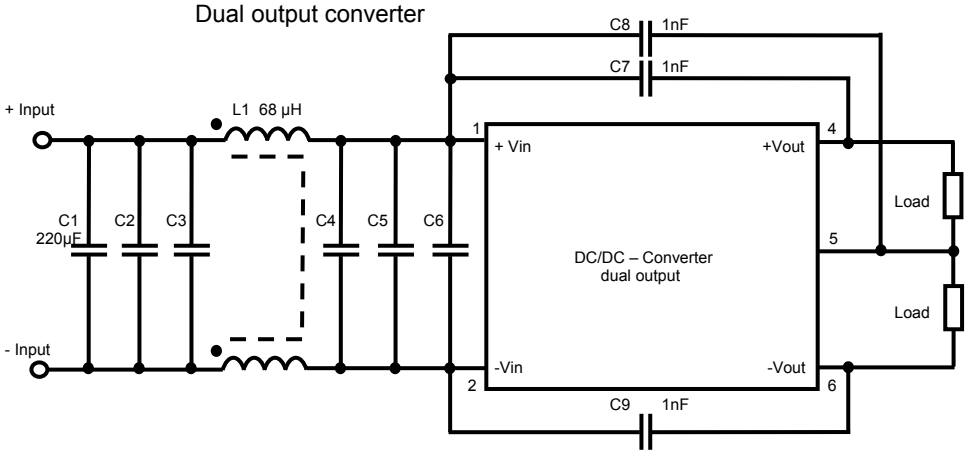
Input filter components are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module. All leads should be minimized to decrease radiated noise.

Single output converter



	C2, C3, C5, C6	C4	C7, C8
P40C12xxS	MLCC X7R, 6.8 µF / 50 V	330 µF	MLCC X7R, 1 nF / 2 kV
P40C24xxS	MLCC X7R, 4.7 µF / 50 V	220 µF	MLCC X7R, 1 nF / 2 kV
P40C48xxS	MLCC X7R, 1.5 µF / 100 V	220 µF	MLCC X7R, 1 nF / 2 kV

Dual output converter



	C2, C3, C5, C6	C4	C7, C8, C9
P40C12xxD	MLCC X7R, 6.8 µF / 50 V	330 µF	MLCC X7R, 1 nF / 2 kV
P40C24xxD	MLCC X7R, 4.7 µF / 50 V	220 µF	MLCC X7R, 1 nF / 2 kV
P40C48xxD	MLCC X7R, 1.5 µF / 100 V	220 µF	MLCC X7R, 1 nF / 2 kV

HY-LINE® POWER COMPONENTS

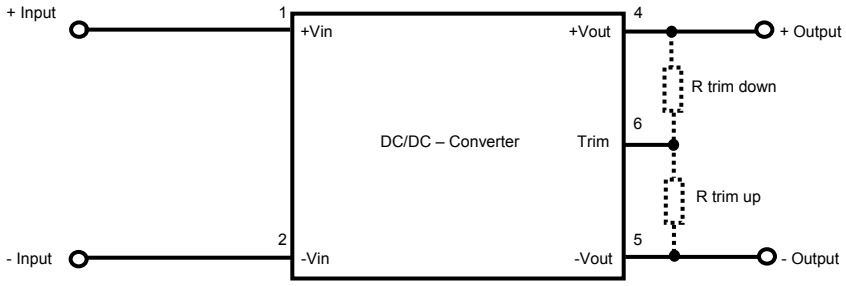
Deutschland:
Inselkammerstrasse 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

Schweiz:
Gründenstrasse 82
CH-8247 Flurlingen
Tel.: 052 647 42 00
E-Mail: power@hy-line.ch

40W DC-DC Converter P40C-Series

Trim circuit example

Output voltage trim function allows the user to increase or decrease the output voltage set point, the module may be connected with an external resistor (R_{trim}) between Trim and either +Vout or -Vout pin. By adjusting R_{trim}, the output voltage can be changed by 10 % of nominal the output voltage.



P40Cxx3R3S											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	[%]
V out	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.97	Vdc
R trim down	316	172	113	79.8	59.2	44.9	34.5	26.6	20.4	15.3	kΩ
Trim up	1	2	3	4	5	6	7	8	9	10	[%]
V out	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.63	Vdc
R trim up	545	184	103	67.7	47.7	34.8	25.9	19.3	14.2	10.3	kΩ

P40Cxx05S											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	[%]
V out	4.95	4.9	4.85	4.8	4.75	4.7	4.65	4.6	4.55	4.5	Vdc
R trim down	231	106	64.3	43.3	30.6	22.2	16.2	11.7	8.1	5.3	kΩ
Trim up	1	2	3	4	5	6	7	8	9	10	[%]
V out	5.05	5.1	5.15	5.2	5.25	5.3	5.35	5.4	5.45	5.5	Vdc
R trim up	245	114	70.6	49.1	36.3	27.7	21.6	17	13.4	10.6	kΩ

P40Cxx12S											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	[%]
V out	11.88	11.76	11.64	11.52	11.4	11.28	11.16	11.04	10.92	10.8	Vdc
R trim down	327	142	83.9	55.5	38.6	27.4	19.5	13.5	8.9	5.3	kΩ
Trim up	1	2	3	4	5	6	7	8	9	10	[%]
V out	12.12	12.24	12.36	12.48	12.6	12.72	12.84	12.96	13.08	13.2	Vdc
R trim up	371	184	118	84	63.5	49.8	39.9	32.5	26.7	22.1	kΩ

P40Cxx15S											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	[%]
V out	14.85	14.7	14.55	14.4	14.25	14.1	13.95	13.8	13.65	13.5	Vdc
R trim down	434	175	101	66	45.5	32.1	22.6	15.6	10.2	5.8	kΩ
Trim up	1	2	3	4	5	6	7	8	9	10	[%]
V out	15.15	15.3	15.45	15.6	15.75	15.9	16.05	16.2	16.35	16.5	Vdc
R trim up	347	179	115	82	61.7	47.9	37.9	30.3	24.4	19.7	kΩ

HY-LINE® POWER COMPONENTS

Deutschland:
Inselkammerstrasse 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

Schweiz:
Gründenstrasse 82
CH-8247 Flurlingen
Tel.: 052 647 42 00
E-Mail: power@hy-line.ch