30 W DC-DC Converter P30D-Series

PHI-CON

- 4:1 wide input voltage range
- Standard 2" x 1" package
- Single, dual and triple output
- High efficiency up to 91 %
- Soft start
- Over current protection
- Over voltage protection
- Over temperature protection
- Continuous short circuit protection
- Adjustable output voltage
- On/Off - remote control input
- Heat sink optional

Model guide

Type	Input voltage		Input current		Output main		Output auxilary.		Efficiency	Capacity load
	nominal [V_{DC}]	range [V_{DC}]	no load [mA] max.	full load [mA] typ.	Voltage [V_{DC}]	current [mA]	Voltage [V_{DC}]	current [mA]	[%] typ.	[µF] max.
Single output										
P30D243R3S	24	9..36	100	1200	3.3	0..7500	-	-	89	20000
P30D2405S	24	9..36	100	1450	5.0	0..6000	-	-	90	14000
P30D2412S	24	9..36	100	1450	12.0	0..2500	-	-	89	2000
P30D2415S	24	9..36	100	1450	15.0	0..2000	-	-	89	2000
P30D483R3S	48	18..75	50	600	3.3	0..7500	-	-	89	20000
P30D4805S	48	18..75	50	720	5.0	0..6000	-	-	90	14000
P30D4812S	48	18..75	50	720	12.0	0..2500	-	-	90	2000
P30D4815S	48	18..75	50	710	15.0	0..2000	-	-	91	2000
Dual output										
P30D2405D	24	9..36	100	1450	±5.0	0..±3000	-	-	89	2*3000
P30D2412D	24	9..36	100	1450	±12.0	0..±1250	-	-	89	2*1300
P30D2415D	24	9..36	100	1450	±15.0	0..±1000	-	-	89	2*1300
P30D4805D	48	18..75	50	720	±5.0	0..±3000	-	-	90	2*3000
P30D4812D	48	18..75	50	730	±12.0	0..±1250	-	-	89	2*1300
P30D4815D	48	18..75	50	730	±15.0	0..±1000	-	-	89	2*1300
Triple output										
P30D243R3S12D	24	9..36	100	1300	3.3	500…5000	±12.0	±42..±420	88	15000 & 2*220
P30D243R3S15D	24	9..36	100	1300	3.3	500…5000	±15.0	±33..±330	88	15000 & 2*220
P30D2405S12D	24	9..36	100	1460	5.0	400…4000	±12.0	±42..±420	89	8000 & 2*220
P30D2405S15D	24	9..36	100	1450	5.0	400…4000	±15.0	±33..±330	89	8000 & 2*220
P30D483R3S12D	48	18..75	50	650	3.3	500…5000	±12.0	±42..±420	89	15000 & 2*220
P30D483R3S15D	48	18..75	50	650	3.3	500…5000	±15.0	±33..±330	88	15000 & 2*220
P30D4805S12D	48	18..75	50	720	5.0	400…4000	±12.0	±42..±420	90	8000 & 2*220
P30D4805S15D	48	18..75	50	715	5.0	400…4000	±15.0	±33..±330	90	8000 & 2*220

Designation key											
		Output power		Series designation	Input voltage range		Output voltage		Output configuration		Case option	
P	PHI-CON	**30**	30 W	**D**	**24**	9…36 V	**3R3**	3.3 V	**S**	single output	**blank**	standard
					48	36…75 V	**05**	5 V	**D**	± Dual output	**K**	heatsink
							12	12 V				
							15	15 V				

HY-LINE® POWER COMPONENTS

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

Schweiz:
Hochstrasse 355
CH-8200 Schaffhausen
Tel.: 052 647 42 00
E-Mail: power@hy-line.ch

30 W DC-DC Converter P30D-Series

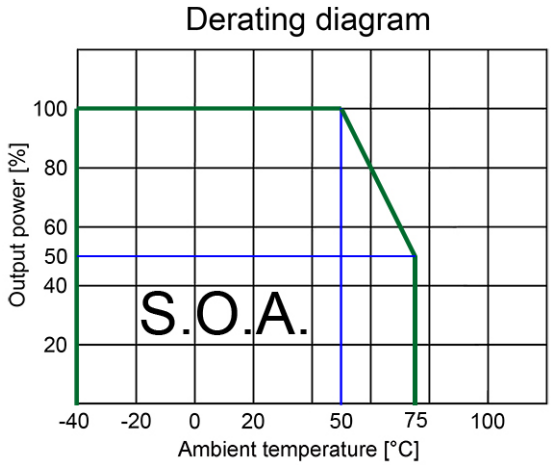
PHI-CON

Specifications

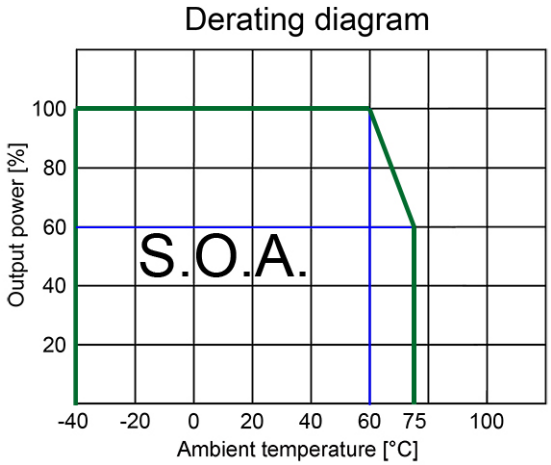
Input	
Input Filter:	Pi- type
Start up voltage	P30D12xx: 8.6 V, typ. P30D48xx: 17.8 V, typ.
Under voltage lockout	P30D12xx: 7.9 V, typ. P30D48xx: 16 V, typ.
Start up time	30 ms, typ.
Input reflected ripple current	20 mAp-p, typ (see figures. 1)
Remote control input Pin 3 (see figure 4)	"on" Open input or 3.0…12 V "off" Short to -Vin or 0…1.2 V
Input idle current @ rem. Ctrl "off"	5 mA @ nominal Vin
Isolation input to output	
Isolation voltage, 60 sec, & Input to output or to case	1600 V_{DC}, min.
Resistance	10^9 Ω, min.
Capacitance	1000 pF, typ.
Output	
Voltage tolerance	P30DxxxxS; P30DxxxxD: ± 1 % P30DxxxxSxxD main: ± 1 % P30DxxxxSxxD auxilary: ± 5 %
Over voltage protection with Z-diode clamp	P30Dxx3R3: 3.9 V P30Dxx05: 6.2 V P30Dxx12: 15 V P30Dxx15: 18 V
Line regulation	P30DxxxxS: ± 0.5 %, max. P30DxxxxD: ± 0.5 %, max. P30DxxxxSxxD main: ± 1 % P30DxxxxSxxD auxilary: ± 5 %
Load regulation @ 0…100% load change	P30DxxxxS: ± 0.5 %, max. P30DxxxxD: ± 1 %, max. P30DxxxxSxxD main: ± 1 %, max. P30DxxxxSxxD auxilary: ± 5 % max.
Voltage trim range (only P30DxxxxS, single output)	± 10 %, max. (see fig. 5)
Ripple and noise (at 20 MHz BW) (see figures 2)	P30DxxxxS: ≤100 mVp-p, max. P30DxxxxD: ≤100 mVp-p, max. P30DxxxxSxxD main: ≤50 mVp-p P30DxxxxSxxD auxilary: ≤75 mVp-p
Short circuit protection	Hiccup, automatic recovery
Temperature coefficient	± 0.02 % / °C
Transient recovery time	250 µs, typ. @ 25 % load change steps
Transient response deviation	± 3 %, max. @ 25 % load change steps
Over load protection	150 %, max. of full load

General	
Switching frequency	330 kHz, typ.
Standard in accordance with	EN / IEC 60950-1
Radiated emissions	EN55032 level A
Conducted emissions (see fig. 3)	EN55032 level A
ESD	IEC61000-4-2 pref. criteria A
Radiated immunity	IEC61000-4-3 pref. criteria A
Fast transient (see figure 3)	IEC61000-4-4 pref. criteria A
Surge (see figure 3)	IEC61000-4-5 pref. criteria A
Conducted immunity	IEC61000-4-6 pref. criteria A
PFMF	IEC61000-4-8 pref. criteria A
Reliability calculated MTBF (MIL-HDBK-217 F) @ 25 °C	P30DxxxxS; > 435 000 h P30DxxxxD: > 435 000 h P30DxxxxSxxD: > 320 000 h
Environmental	
Operating ambient temperature	-40 …75 °C (with derating) -40 …50 °C (without derating)
Storage temperature	-55 …125 °C
Cooling	Air convection 16...33 cm/s
Maximum case temp.	105 °C, max.
Over temperature protection	115 °C, typ
Thermal impedance @ free air confection (35…65 LFM)	Without heatsink: 12 K/W Without heatsink: 10 K/W
Storage humidity	95 %, non condensing
Physical	
Dimensions	50.8 x 25.4 x 12 mm
Weight	P30DxxxxS: 45 g P30DxxxxSK: 56 g
Case material	Copper
Potting material	Epoxy, UL94-V0 rated
RoHS compliant	yes
Absolute maximum ratings	
Input surge voltage 100 ms max.	P30D24xx: 50 V_{DC} P30D48xx: 100 V_{DC}
Soldering temperature	≤ 260 °C, ≤ 10 s, ≥ 1.5 mm distance from case

Derating at Standard version without heat sink



Derating at heat sink version



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Deutschland:
Inselkammerstraße 10
D-82008 Unterhaching
Tel.: 089 614 503-10
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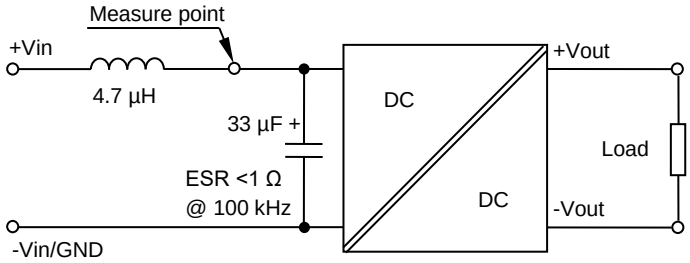
Measure circuit input reflected ripple current

Figure 1a Single output



The input reflected ripple current is measured through a source inductor 4.7 µH and a source capacitor Cin 33 µF, ESR <1 Ω at 100 kHz at nominal input voltage and full load.

Figure 1b Dual output version

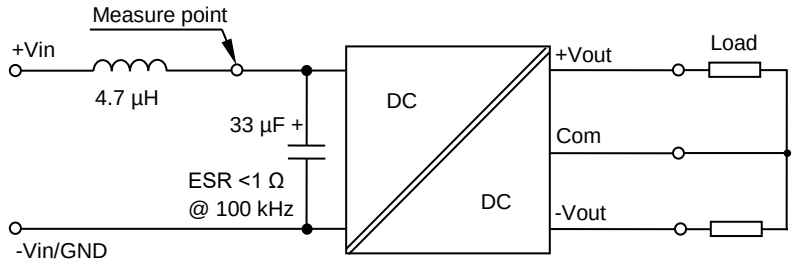
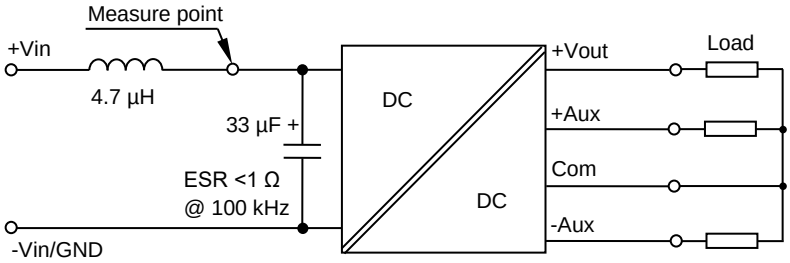
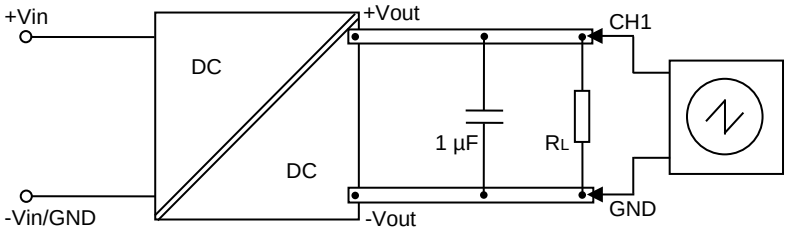


Figure 1c Triple output version



Measure circuit output ripple and noise voltage

Figure 2a Single output



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Measure circuit output ripple and noise voltage

Figure 2b Dual output version

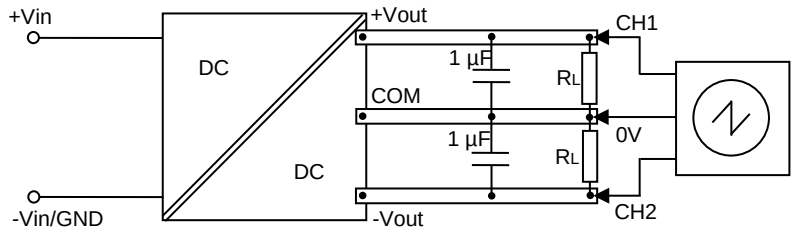
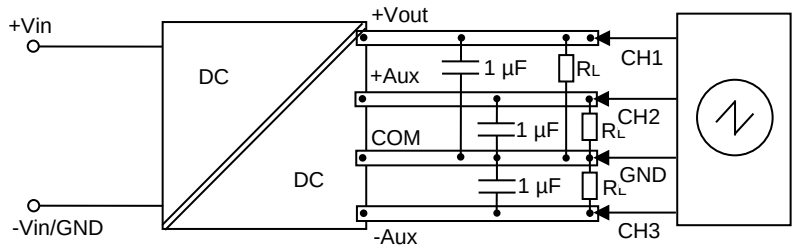


Figure 2c Triple output version



Recommended circuit to meet the EMC standard conducted emission EN 55032

Figure 3a Single output

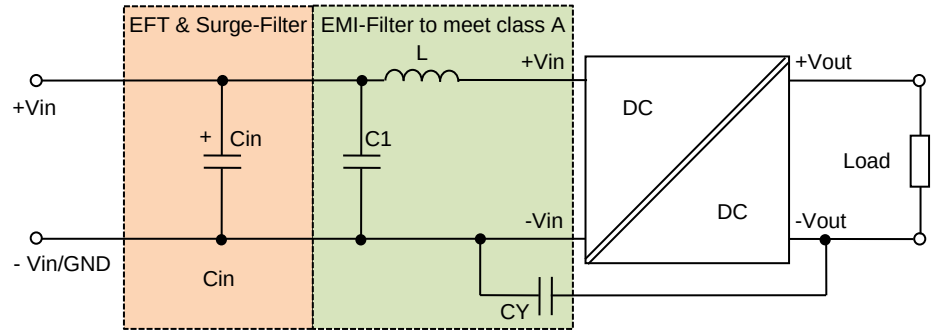


Figure 3b Dual output

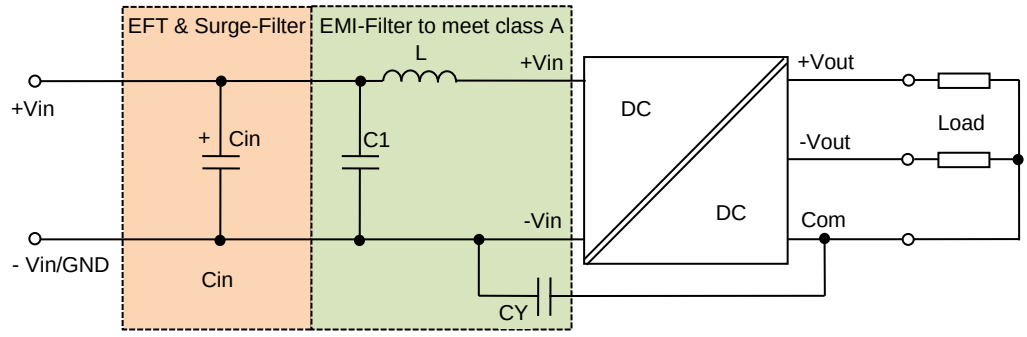


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Figure 3c Triple output version

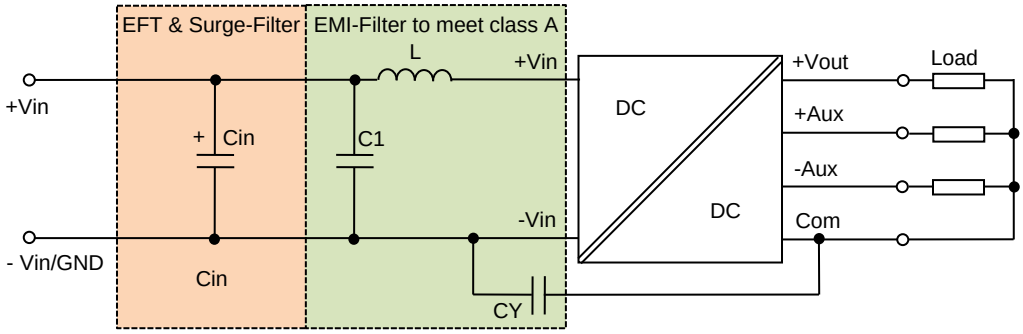


Table to figures 3a, 3b and 3c				
Type	Cin	C1	L	CY
P30D24xxx	220 µF/100 V	100 µF, 100 V	12 µH	470 pF, 2kV, MLCC
P30D48xxx	220 µF/100 V	100 µF, 100 V	12 µH	470 pF, 2kV, MLCC

Figure 4 On / Off remote control circuit for positive logig

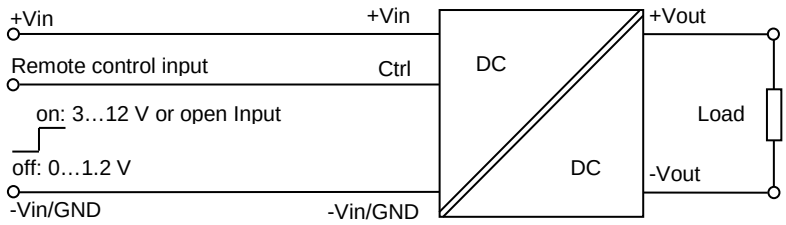
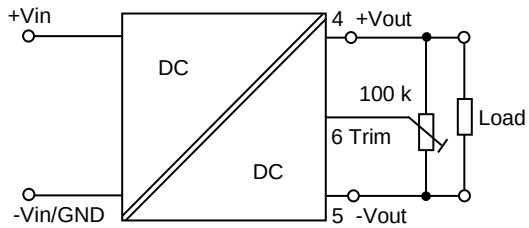


Figure 5 Trimming application note (Single output version only)
Output voltage trim function allows the user to increase or decrease the output voltage set point. The output voltage is adjustable in a range of ±10 %.



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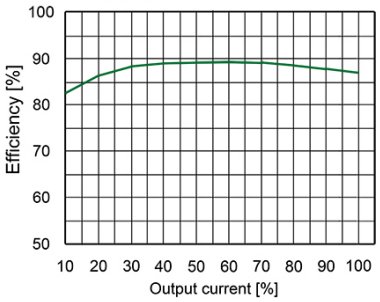
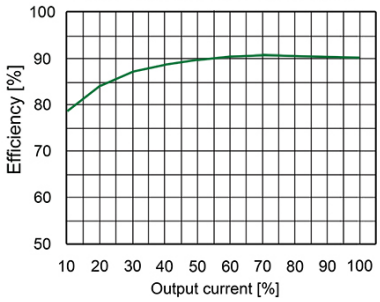
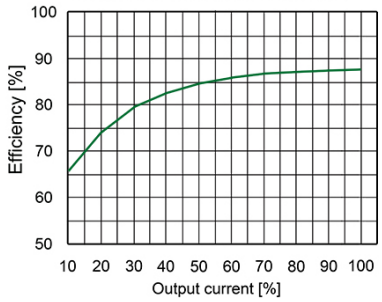
P30D243R3S Efficiency vs output current at input voltage 9 V



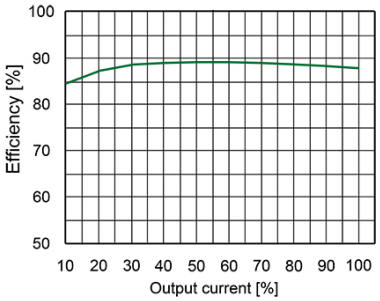
P30D243R3S Efficiency vs output current at input voltage 24 V



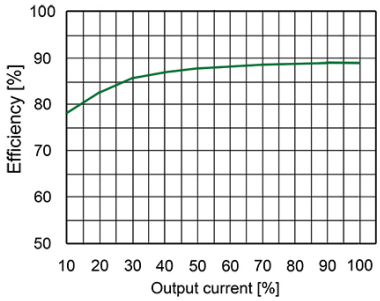
P30D243R3S Efficiency vs output current at input voltage 36 V



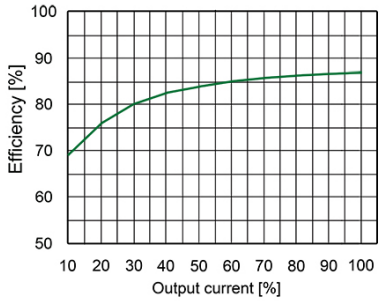
P30D2405D Efficiency vs output current at input voltage 9 V



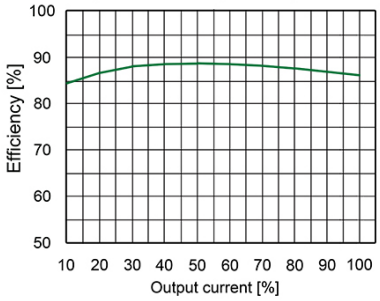
P30D2405D Efficiency vs output current at input voltage 24 V



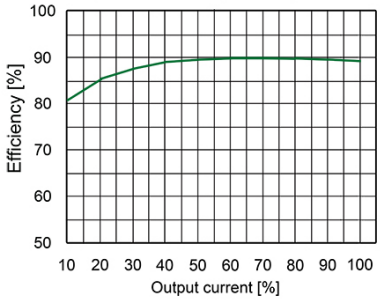
P30D2405D Efficiency vs output current at input voltage 36 V



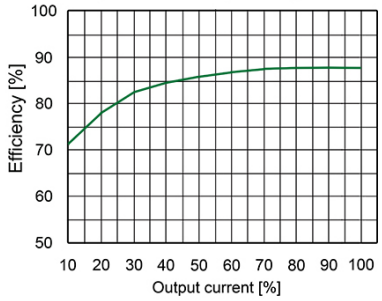
P30D243R3S12D Efficiency vs output current at input voltage 18 V



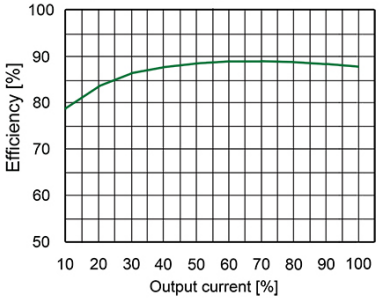
P30D243R3S12D Efficiency vs output current at input voltage 48 V



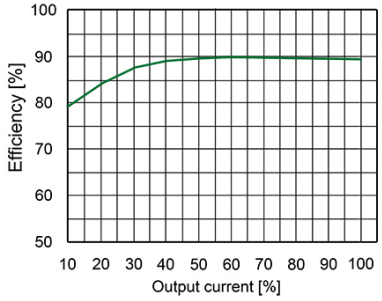
P30D243R3S12D Efficiency vs output current at input voltage 75 V



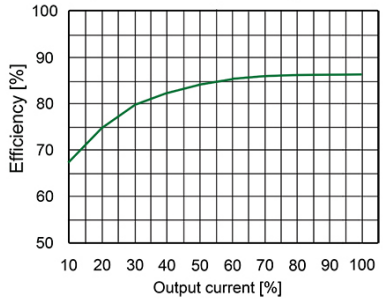
P30D483R3S15D Efficiency vs output current at input voltage 18 V



P30D483R3S15D Efficiency vs output current at input voltage 48 V



P30D483R3S15D Efficiency vs output current at input voltage 75 V



Note:

1. All parameter are specified at 25 °C, 75 % air humidity, nominal input voltage and full load unless otherwise noted.
2. P30D series is usable with parallel connected output.

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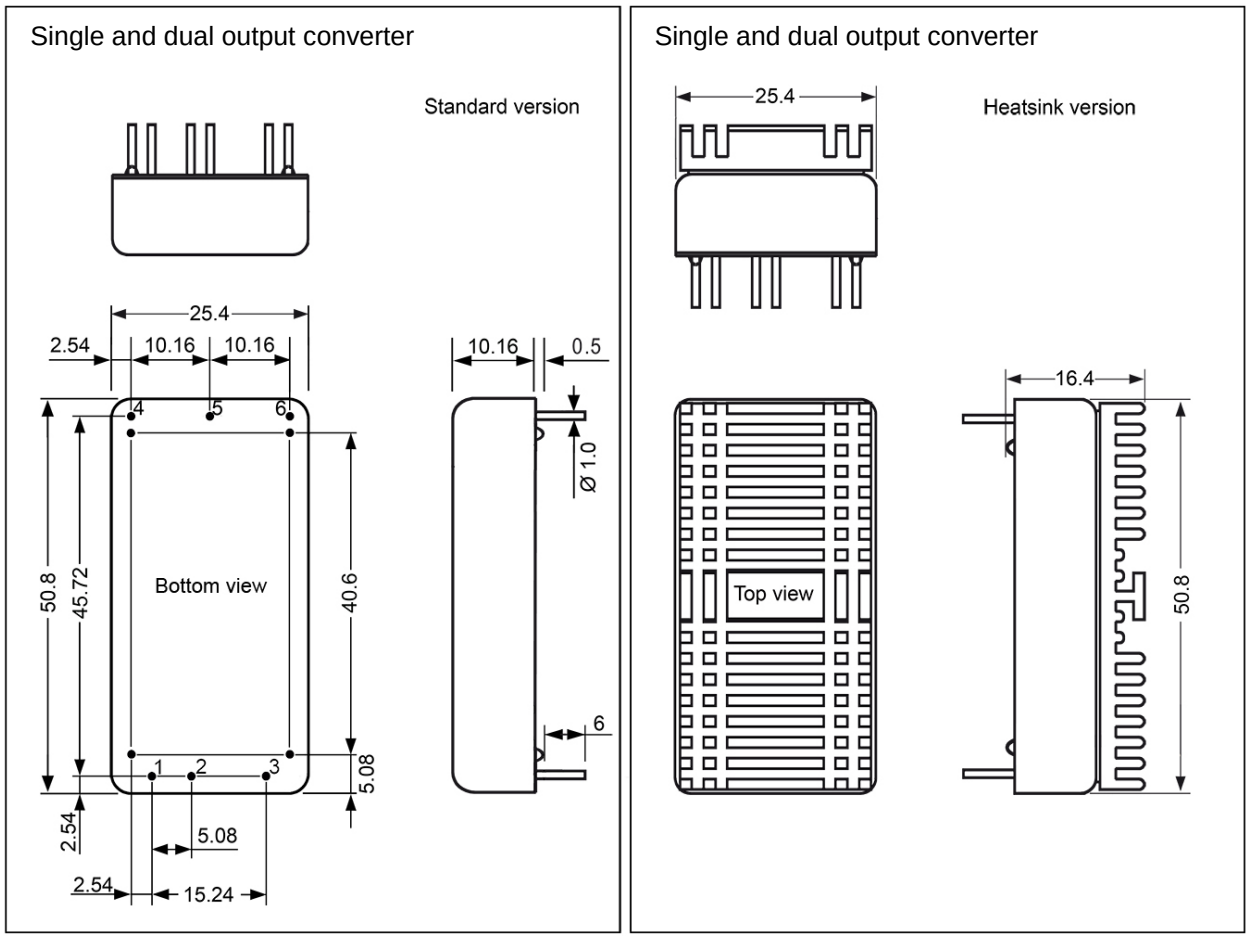
Dimensions



Dimensions in mm

1. Pin diameter tolerance: ± 0.05 mm
2. Pin length tolerance: ± 0.35 mm
3. Pitch tolerance: ± 0.35 mm
4. Case tolerance: ± 0.5 mm
5. Stand off tolerance: ± 0.1

Pin assignment single, dual output		
	P30DxxxxS	P30DxxxxD
1	+Vin	+Vin
2	-Vin	-Vin
3	Rem. Ctrl.	Rem. Ctrl.
4	+ Vout	+ Vout
5	- Vout	Com
6	Trim	- Vout

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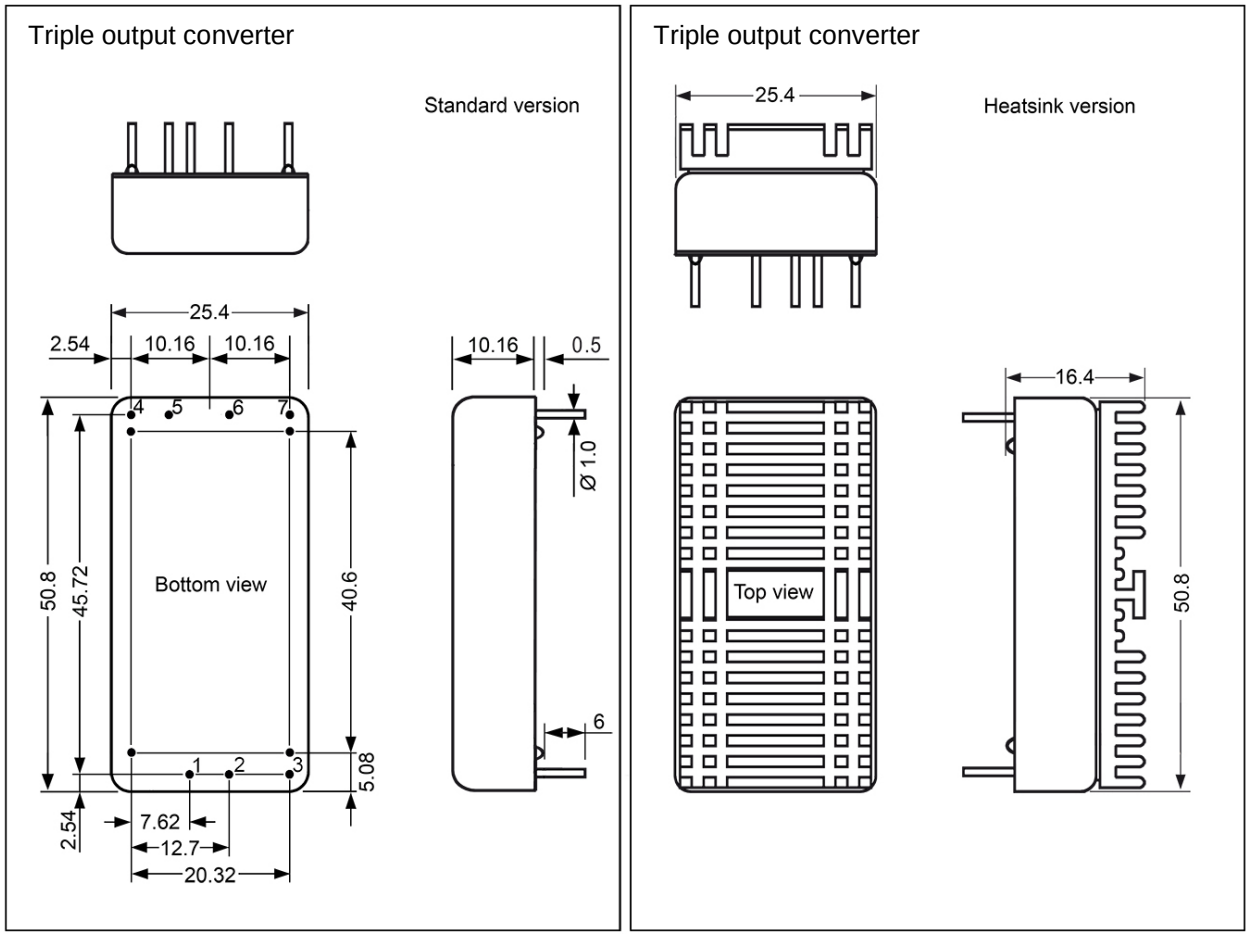

Dimensions in mm

1. Pin diameter tolerance: ± 0.05 mm
2. Pin length tolerance: ± 0.35 mm
3. Pitch tolerance: ± 0.35 mm
4. Case tolerance: ± 0.5 mm
5. Stand off tolerance: ± 0.1 mm

Pin assignment triple output	
	P30DxxxxSxxD
1	+Vin
2	-Vin
3	Rem. Ctrl.
4	+ Aux
5	- Aux
6	Com
7	+ Vout

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