



PHI-CON

# 15 W DC-DC Converter P15G-Series

- Wide 2:1 input range
- 1600 V<sub>DC</sub> isolation
- Continuous short circuit protection
- Over current & voltage protection
- Efficiency up to 89 %
- Wide operation temperature range -40...85 °C
- On / Off remote control input



## Model selection

Type	Input voltage		Input current		Output voltage [V <sub>DC</sub> ]	Output current [mA] max.	Efficiency [%] typ.	Capacitor Load [μF] max.
	Nominal [V <sub>DC</sub> ]	Range [V <sub>DC</sub> ]	no load [mA] typ.	full load [mA] typ.				
Single output								
P15G123R3S	12	9...18	20	1310	3.3	4000	85	1000
P15G1205S	12	9...18	20	1470	5.0	3000	86	1000
P15G1212S	12	9...18	20	1495	12.0	1300	88	330
P15G1215S	12	9...18	20	1420	15.0	1000	89	220
P15G243R3S	24	18...36	15	650	3.3	4000	86	1000
P15G2405S	24	18...36	15	730	5.0	3000	87	1000
P15G2412S	24	18...36	15	750	12.0	1300	88	330
P15G2415S	24	18...36	15	710	15.0	1000	89	220
P15G483R3S	48	36...75	10	330	3.3	4000	85	1000
P15G4805S	48	36...75	10	370	5.0	3000	86	1000
P15G4812S	48	36...75	10	375	12.0	1300	88	330
P15G4815S	48	36...75	10	360	15.0	1000	88	220
Dual output								
P15G1205D	12	9...18	20	1490	±5.0	±1500	85	2 x 470
P15G1212D	12	9...18	20	1420	±12.0	±625	89	2 x 220
P15G1215D	12	9...18	20	1435	±15.0	±500	89	2 x 100
P15G2405D	24	18...36	15	745	±5.0	±1500	85	2 x 470
P15G2412D	24	18...36	15	720	±12.0	±625	88	2 x 220
P15G2415D	24	18...36	15	710	±15.0	±500	89	2 x 100
P15G4805D	48	36...75	10	380	±5.0	±1500	84	2 x 470
P15G4812D	48	36...75	10	360	±12.0	±625	87	2 x 220
P15G4815D	48	36...75	10	360	±15.0	±500	88	2 x 100

Suffix „K” for heat sink version, e.g.: P15G2415SK

## Specifications

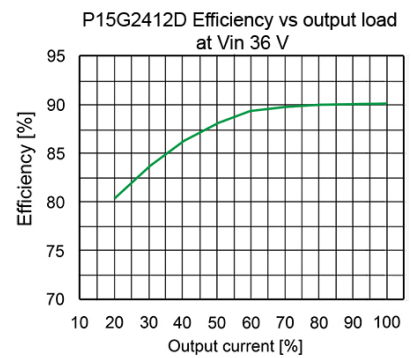
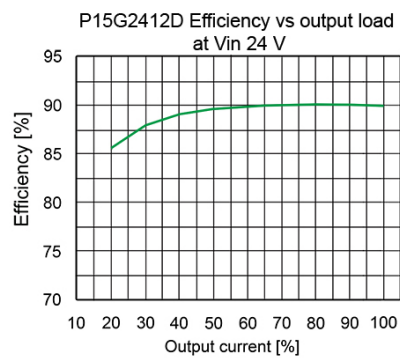
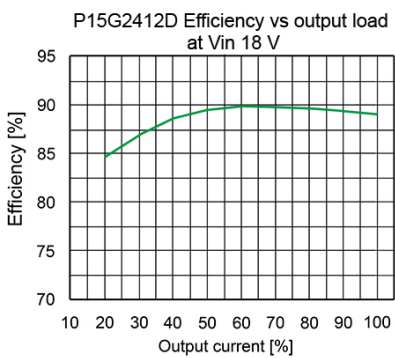
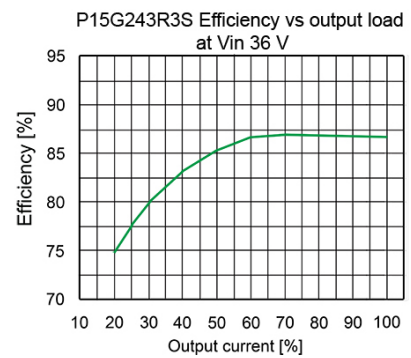
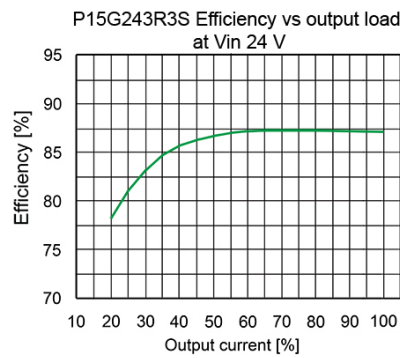
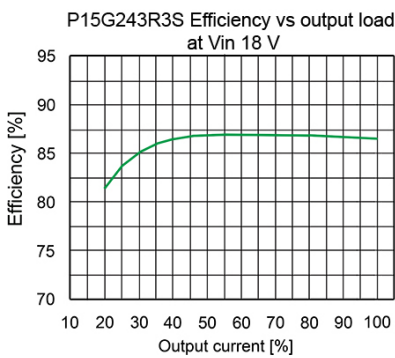
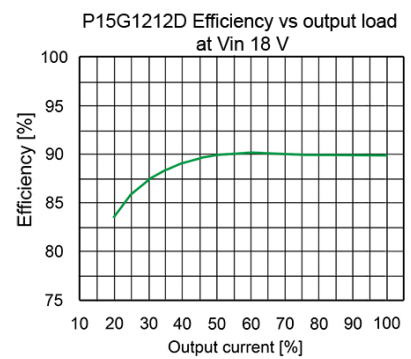
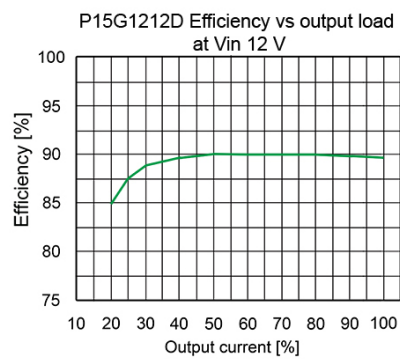
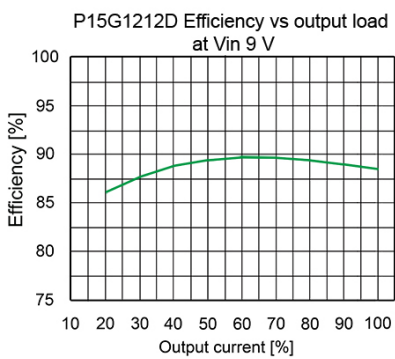
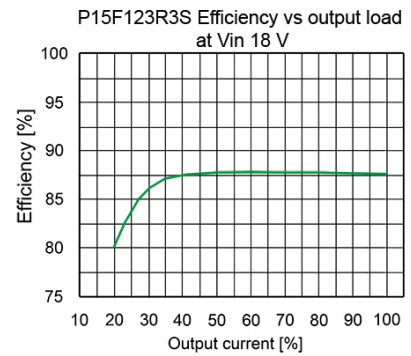
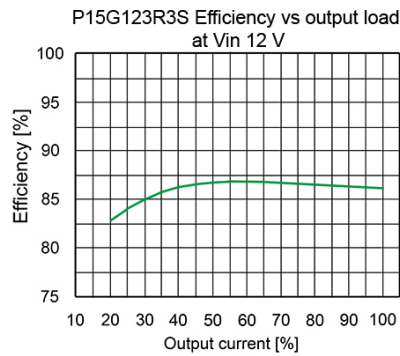
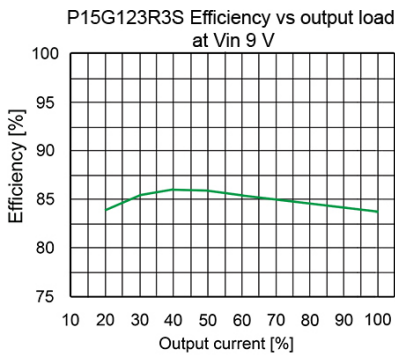
Input	
Filter	Pi Network
Start up time with R-load	20 ms, typ.
Reflected ripple current	20 mA <sub>p-p</sub> , typ. (see figure 1)
Remote CTRL on/off, Pin3	On: 3...12 V or open input Off: 0...1.2 V Standby current 5 mA typ.
Output	
Voltage accuracy	± 1 %, max.
Voltage trim range	± 10 %
Voltage balance @ dual output	± 1 %
Temperature coefficient	± 0.02 % / °C
Ripple and noise (20 MHz BW)	100 mV <sub>p-p</sub> , max. (see figure 2)
Short circuit protection	Indefinite (hiccup), Autom. restart
Over load protection	150 % typ. of I <sub>out</sub> max.
Over voltage protection	Z-diode clamping at: P15Gxx3R3x 3.9 V P15Gxx05x 6.2 V P15Gxx12x 15 V P15Gxx15x 18 V
Line regulation	P15GxxxxS: ± 0.2 %, max. P15GxxxxD: ± 0.5 % max.
Load regulation 0...100 % load (Dual @ symmetrical load)	P15GxxxxS: ± 0.5 %, max. P15GxxxxD: ± 1 %, max.
Cross regulation @ dual output	± 5 %
Transient recovery time	250 μs, typ.
Transient response deviation	3 %, max. @ 25 % load change steps
Isolation:	
Rated voltage in/out (for 60 s)	1600 V <sub>DC</sub>
Resistance	10 <sup>11</sup> Ω
Capacitance	1200 pF, max.

General	
Switching frequency	375 kHz, typ
Safety Standards	EN-, IEC-, ULc-, UL 60950-1 EN-, IEC-, ULc-, UL 62368-1
Reliability MTBF	> 575 000 h
EMC Characteristics	
Radiated Emissions	EN55022 class A
Conducted Emissions	EN55022 class A (see figure3)
ESD EN61000-4-2	perf. criteria A
RS EN61000-4-3	perf. criteria A
EFT EN61000-4-4	perf. criteria A (see figure3)
Surge EN61000-4-5	perf. criteria A (see figure3)
CS EN61000-4-6	perf. criteria A
PFMF EN61000-4-8	perf. criteria A
Environmental	
Operating ambient temperature	-40...85 °C
Case temperature	105 °C, max.
Storage temperature	-55...125 °C
Derating	see diagram
Humidity	95 %, max., non condensing
Cooling	Free air convection 30-65 LFM
Physical	
Dimensions	25.4 x 25.4 x 10.9 mm
Weight	18 g, with heatsink 21.3 g
Case material	Nickel coated copper
Potting material	Epoxy (UL94V-0 rated)
Absolute maximum ratings	
Pin soldering temperature	< 260 °C max., < 10 s, > 1.5 mm body distance
Input surge voltage	
P15G12xxx	36 V <sub>DC</sub> , max., 100 ms, max.
P15G24xxx	50 V <sub>DC</sub> , max., 100 ms, max.
P15G48xxx	100 V <sub>DC</sub> , max., 100 ms, max.

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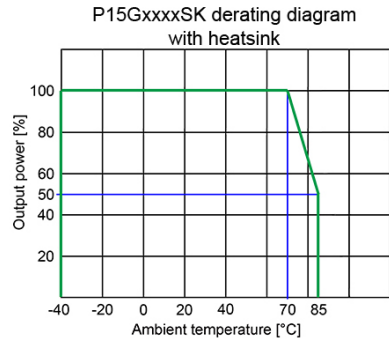
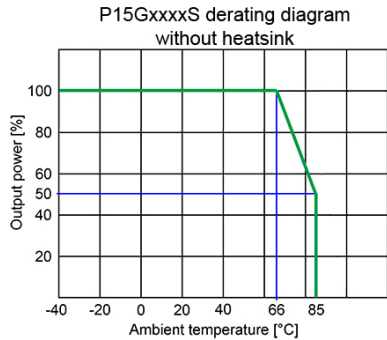
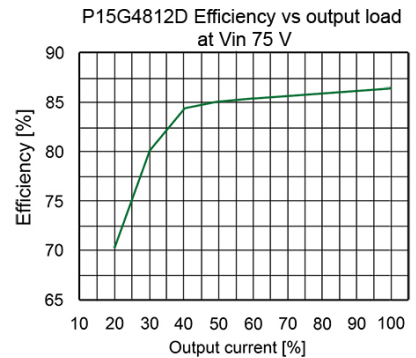
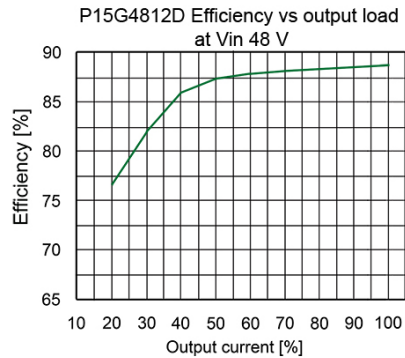
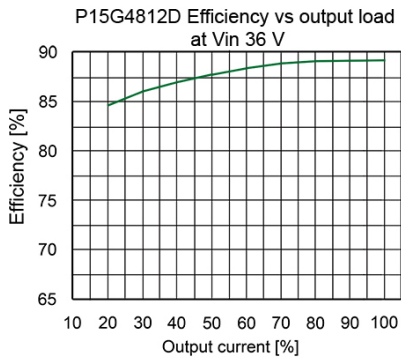
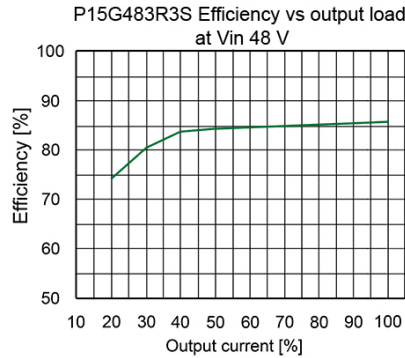
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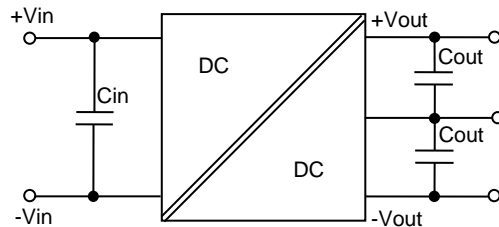
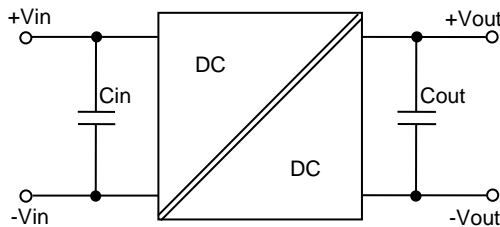


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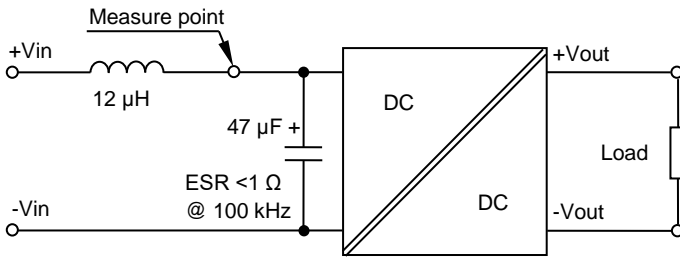
## Endtest circuits of factory for P15G-series



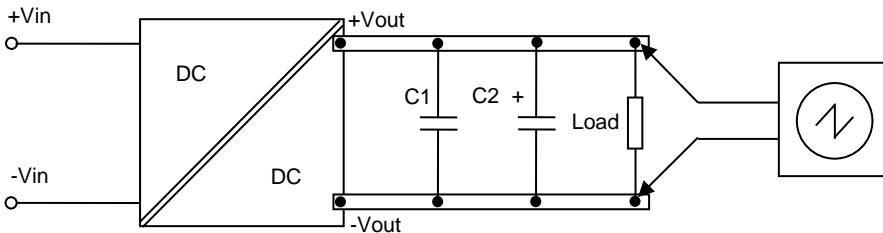
Type	Cin	Cout
P15Gxx3R3x, P15Gxx05x	100 $\mu$ F	470 $\mu$ F
P15Gxx12x, P15Gxx15x	100 $\mu$ F	100 $\mu$ F
P15Gxx24x	100 $\mu$ F	47 $\mu$ F

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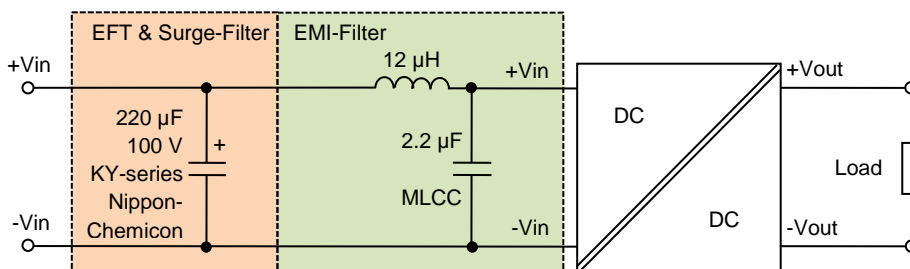
Measure circuit for reflected input ripple current  
Figure 1



Measure circuit for output ripple and noise voltage  
Figure 2

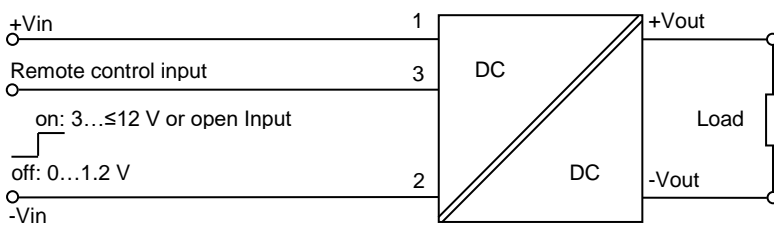


Input filter circuit to meet the class A specifications  
Figure 3

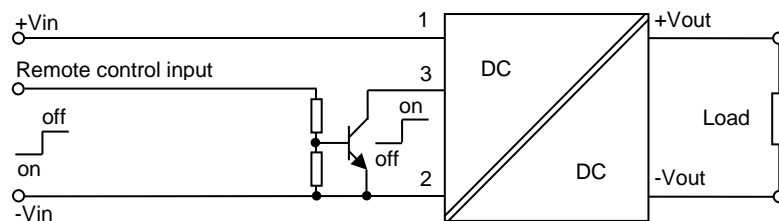


The filter components should be mounted as near as possible and with shortest connections to the DC/DC-Converter.

Remote control circuit for control voltage  $\leq 12 V_{DC}$



Remote control circuit for inverse logic and high control level

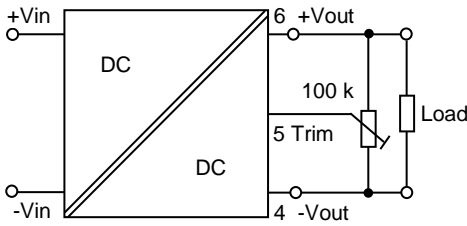




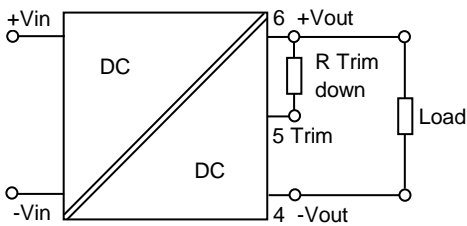
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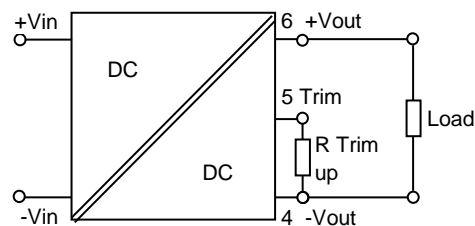
## Trimming circuits with trimming potentiometer



## Trim down circuit with fixed resistor



## Trim up circuit with fixed resistor



## Table of fixed trimming resistors

Vout 3.3V - types											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	%
Vout=	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.970	Volts
Rtrim-down	286.268	154.699	100.178	70.355	51.546	38.601	29.147	21.940	16.264	11.678	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630	Volts
Rtrim-up	494.831	167.448	93.381	60.637	42.176	30.327	22.077	16.002	11.342	7.655	KOhms

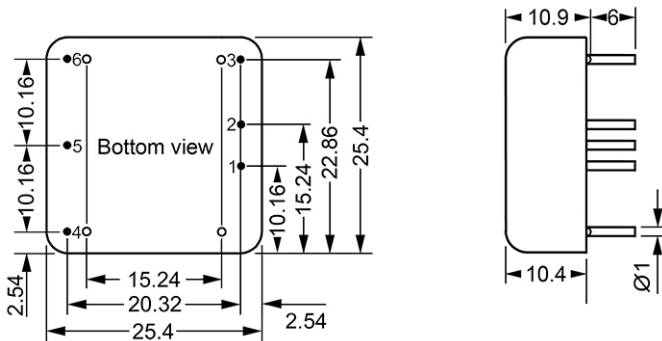
Vout 5V - types											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	%
Vout=	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.500	Volts
Rtrim-down	230.566	106.182	64.301	43.281	30.643	22.207	16.177	11.651	8.129	5.310	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	5.050	5.100	5.150	5.200	5.250	5.300	5.350	5.400	5.450	5.500	Volts
Rtrim-up	244.547	113.776	70.631	49.142	36.274	27.707	21.592	17.010	13.447	10.598	KOhms

Vout 12V - types											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	%
Vout=	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800	Volts
Rtrim-down	273.344	135.217	84.017	57.325	40.944	29.865	21.873	15.836	11.114	7.320	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200	Volts
Rtrim-up	462.903	197.859	120.658	83.855	62.317	48.178	38.184	30.746	24.994	20.413	KOhms

Vout 15V - types											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	%
Vout=	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500	Volts
Rtrim-down	433.811	174.916	100.946	65.907	45.468	32.077	22.625	15.596	10.165	5.842	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	15.150	15.300	15.450	15.600	15.750	15.900	16.050	16.200	16.350	16.500	Volts
Rtrim-up	347.293	178.523	115.235	82.084	61.683	47.863	37.882	30.336	24.430	19.682	KOhms

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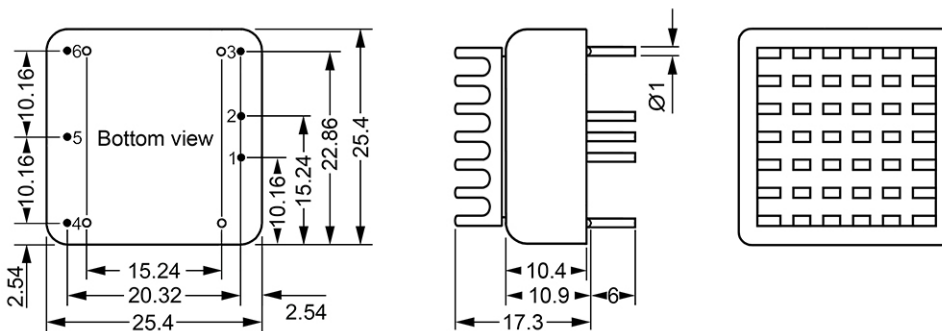
## Dimensions without heatsink P15GxxxxS, P15GxxxxD



Pin assignment		
Pin	Single	Dual
1	+V Input	+V Input
2	-V Input	-V Input
3	Remote control	Remote control
4	+V Output	+V Output
5	Trim Input	Common
6	-Vout	-Vout

All dimensions in mm  
 Pin diameter tolerance  $\pm 0.05$  mm  
 Pin pitch tolerance  $\pm 0.35$  mm  
 Case tolerance  $\pm 0.5$  mm  
 Stand off tolerance  $\pm 0.1$  mm

## Dimensions heatsink version P15GxxxxSK, P15GxxxxDK



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