



PHI-CON

500 mA DC-DC Step Down Converter P78GxxC05-Series

- Pin compatible to linear 78xx regulator (TO-220)
- Not isolated
- Efficiency up to 95 %
- Input voltage range up to 36 V
- Positive or negative output voltage possible
- Operating temperature range -40... 85 °C
- Continuous short circuit protection



Model guide

Type	Input voltage		Input current		Output				Efficiency	
	Nom. [V _{DC}]	Range [V _{DC}]	No load		Voltage		Current max. [mA]	Capacitive load max. [μF]	@ V _{in} min. [%]	@ V _{in} max. [%]
			typ. [mA]	max. [mA]	[V _{DC}]	Tol. max. [%]				
P78G3R3C05	24	4.5...36	0.2	1.5	3.3	± 4	500	680	86	80
P78G05C05	24	6.5...36	0.2	1.5	5.0	± 3	500	680	90	84
	12	7.0...31			-5.0		-300	330	80	81
P78G09C05	24	12...36	0.2	1.5	9.0	± 3	500	680	93	90
P78G12C05	24	15...36	0.2	1.5	12.0	± 3	500	680	94	91
	12	8.0...24			-12.0		-150	330	84	85
P78G15C05	24	19...36	0.2	1.5	15.0	± 3	500	680	95	93
	12	8.0...21			-15		-150	330	85	87

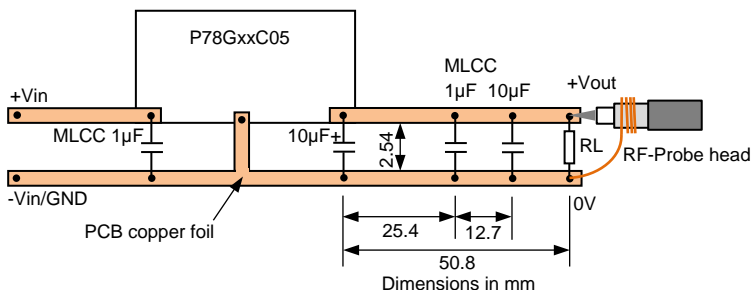
Specifications

Output	
Input voltage regulation	± 0.4 %, max.
Load regulation	± 0.6 % @ load 10..100 %
Temperature coefficient	± 0.03 % / °C
Ripple and noise @ >10 % load (at 20 MHz BW)	≤ 75 mVp-p (See Figure 1)
Short circuit protection	Continuous, automatic restart
Transient response deviation at 25% load step change, V _{in} nom.	≤ 250 mV
Transient recovery time at 25 % load step change, V _{in} nom.	≤ 1 ms
Input	
Ingrated filter	Capacitor
No load current consumption	≤ 1.5 mA
Reverse polarity	Unacceptable
Environmental	
Operating ambient temperature	-40 ... 85 °C see Derating Diagr.
Storage temperature	-55 ... 125 °C
Storage Humidity	Up to 95 %, non condensing
Cooling	free air convection >0.8 m/s

Safety standard	EN 62368-1, IEC-, UL 60950-1	
General		
Switching frequency	550...850 kHz	
Reliability calc. MTBF MIL-HDBK-217F	> 2 Mio. h @ 25 °C	
EMI		
CE	EN 55032, CISPR 32	Class B (see Figure 2)
RE	EN 55032, CISPR 32	Class B (see Figure 2)
EMC		
ESD	EN 61000-4-2	Contact ± 4 kV perf. Criteria B
RS	EN 61000-4-3	10 V/m perf. Criteria A
EFT	EN 61000-4-4	± 1 kV perf. Criteria B (see Figure 2)
Surge	EN 61000-4-5	Line to line ± 1 kV perf. Criteria B (see Figure 2)
CS	EN 61000-4-6	3 Vrms perf. Criteria A
Physical		
Case material	Plastic UL94V-0	
Dimensions	7.6 x 10.2 x 11.6 mm	
Weight	1.8 g	
Soldering temperature	≤260 °C duration ≤ 10 s, 1.5 mm distance to body	

1. The output load should not be less than 10 %. Operation under 10 % load will not damage the converter. However, they may not meet all listed specifications
2. The max. capacitive load should be tested within the input voltage range and under full load conditions.
3. All specifications measured at T_a 25 °C, humidity < 75 %, nominal input voltage and rated output load unless otherwise specified.
4. All parameter are specified for the positive application unless otherwise specified.

Figure 1 Output ripple and noise measure circuit

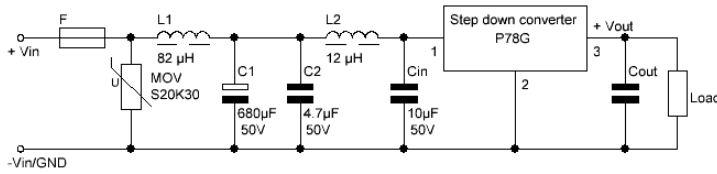




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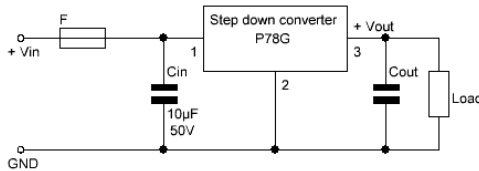
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Figure 2 EMC circuit



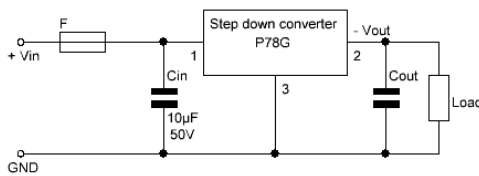
Type	Cout, MLCC type	
P78G3R3C05	22 µF	10 V
P78G05C05	22 µF	10 V
P78G09C05	22 µF	16 V
P78G12C05	22 µF	25 V
P78G15C05	22 µF	25 V

Typical application circuit for positive output



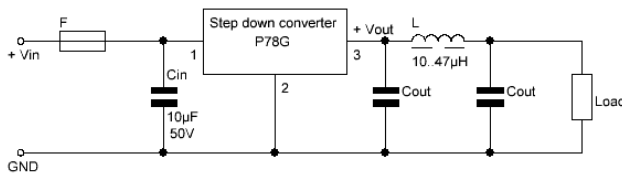
Type	Cout, MLCC type	
P78G3R3C05	22 µF	10 V
P78G05C05	22 µF	10 V
P78G09C05	22 µF	16 V
P78G12C05	22 µF	25 V
P78G15C05	22 µF	25 V

Typical application circuit for negative output



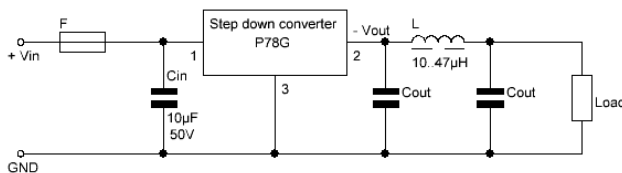
Type	Cout, MLCC type	
P78G3R3C05	22 µF	10 V
P78G05C05	22 µF	10 V
P78G09C05	22 µF	16 V
P78G12C05	22 µF	25 V
P78G15C05	22 µF	25 V

Application output filter circuit to reduce ripple & noise (positive output voltage mode)



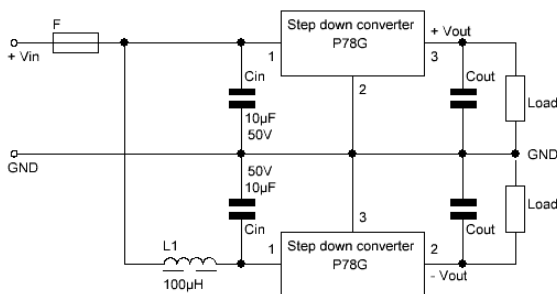
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P78G05C05	22 µF	10 V
P78G09C05	22 µF	16 V
P78G12C05	22 µF	25 V
P78G15C05	22 µF	25 V

Application output filter circuit to reduce ripple & noise (negative output voltage mode)



Type	Cout, MLCC type	
P78G3R3C05	22 µF	10 V
P78G05C05	22 µF	10 V
P78G09C05	22 µF	16 V
P78G12C05	22 µF	25 V
P78G15C05	22 µF	25 V

Typical application circuit for ± dual output

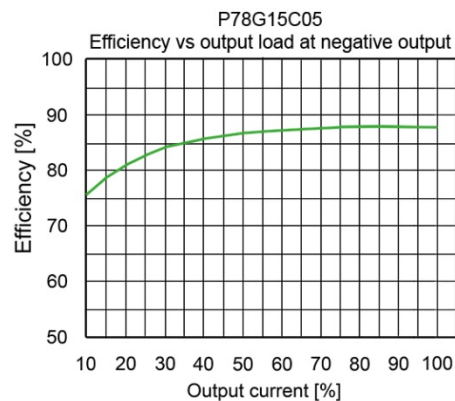
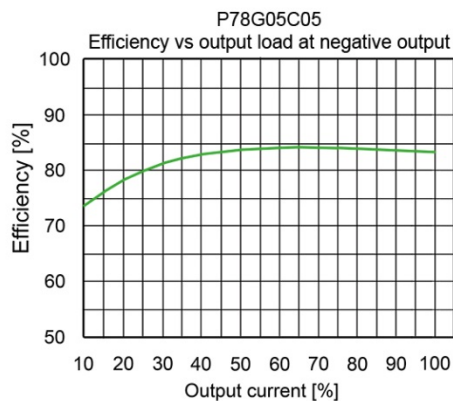
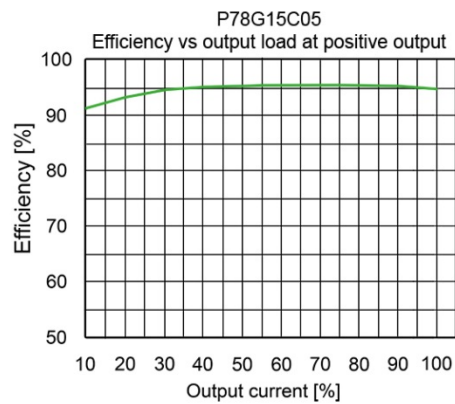
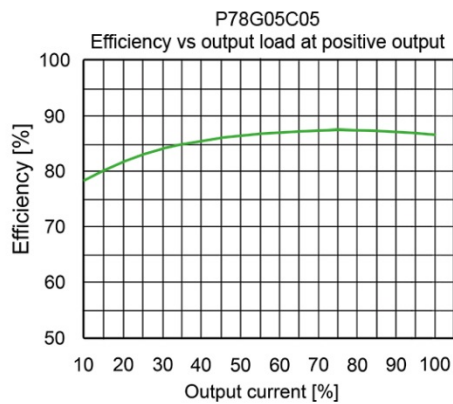
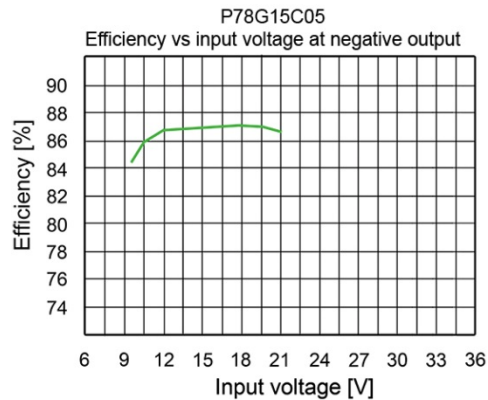
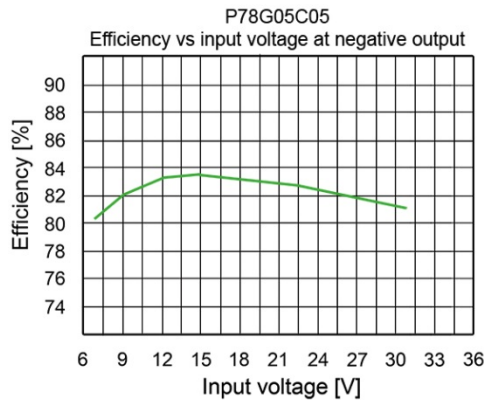
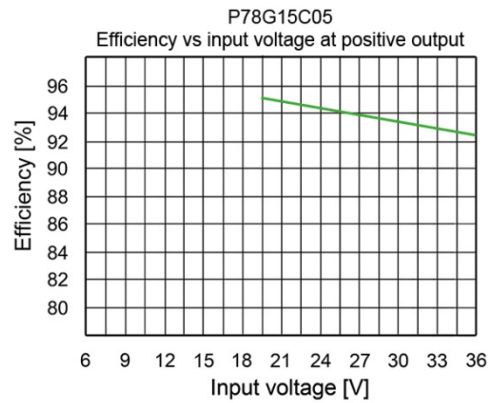
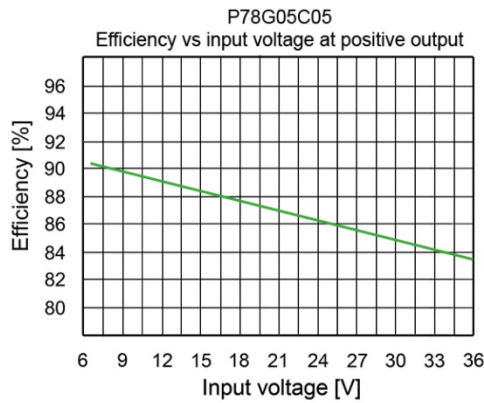


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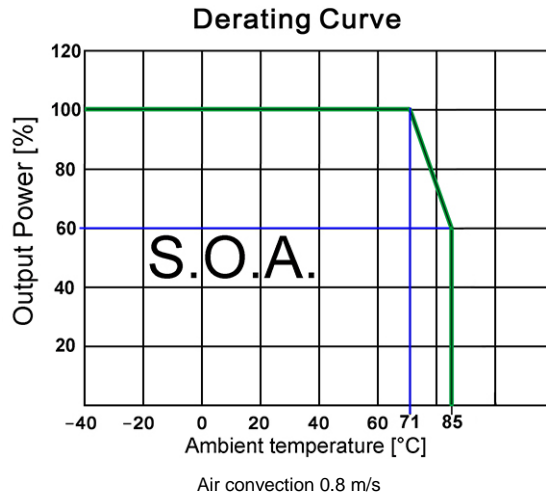


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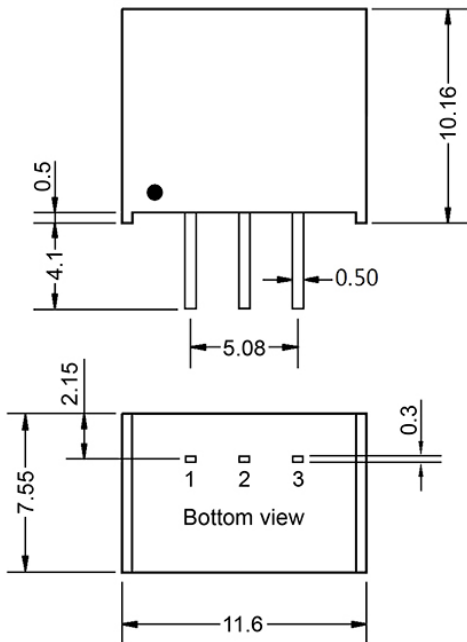
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Dimensions



Unit: mm
 Pin tolerance: ± 0.1 mm
 General tolerances: ± 0.25 mm

Pin assignment		
	Positiv output mode	Negativ output mode
1	+V Input	+V Input
2	GND	-V Output
3	+V Output	GND

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