# 500 mA DC-DC Step Down Converter P78H-Series

PHI-CON

- Low cost
- Non Isolated
- 3 Pin SIL compatible with 78Mxx linear regulator
- Efficiency up to 95 %
- Operating temperature range -40...+85 °C
- Wide Input Range
- Continuous short circuit protected


CE

**Model guide**

| Type | Input voltage | | Input current | | | Output | | Efficiency | | Capacitive load (see note 3) |
|---|---|---|---|---|---|---|---|---|---|---|
| | nominal | range | No load | @ Full load | | Voltage | Current | @ min. Vin | @ max. Vin | |
| | [$V_{DC}$] | [$V_{DC}$] | [mA] max. | @ $V_{in}$ min. [mA] typ. | @ $V_{in}$ max. [mA] typ. | [$V_{DC}$] | [mA] max. | [%] typ. | [%] typ. | [µF] max. |
| P78H3R3 | 48 | 9...72 | 3 | 225 | 31 | 3.3 | 500 | 82 | 75 | 100 |
| P78H05 | 48 | 9...72 | 3 | 315 | 44 | 5.0 | 500 | 88 | 80 | 100 |
| P78H6R5 | 48 | 9...72 | 3 | 397 | 55 | 6.5 | 500 | 91 | 83 | 100 |
| P78H7R2 | 48 | 14...72 | 3 | 285 | 60 | 7.2 | 500 | 91 | 84 | 100 |
| P78H09 | 48 | 14...72 | 3 | 350 | 75 | 9.0 | 500 | 92 | 86 | 100 |
| P78H12 | 48 | 17...72 | 3 | 375 | 95 | 12.0 | 500 | 94 | 89 | 100 |
| P78H15 | 48 | 21...72 | 3 | 300 | 95 | 15.0 | 400 | 95 | 89 | 100 |

**Specifications**

| | |
|---|---|
| **Input** | |
| Start up time @ Vin nominal and resistive load | 10 ms, typ. |
| Filter | Capacitors |
| Reflected input ripple current | 35 mA p-p, typ. (see Figure 1) |
| **Output** | |
| Voltage tolerance | ≤ ± 3 % |
| Line regulation | ± 1 % |
| Load regulation | ± 1 % @ load 10..100 % |
| Minimum output current | 10 mA (see Note 2) |
| Short circuit protection | continuously, automatic restart |
| Ripple and noise | ≤ 35 mVp-p, max. (see Figure 2) |
| Temperature coefficient | ± 0.02% / °C |
| **General** | |
| Switching frequency range | 120…800 kHz |
| Reliability calculated MTBF MIL-HDBK-217F @ 25 °C | ≥ 4.5 Mio. h |
| **Environmental** | |
| Operating ambient temperature | -40... 85 °C, Derating see diagram |
| Case temperature | ≤ 100 °C |
| Storage temperature | -40 ... 125 °C |
| Humidity | ≤ 95 %, non condensing |
| Cooling | Free air convection, 35…60 LFM |

| | | |
|---|---|---|
| **EMC characteristics** | | |
| RE | EN 55032 | Class B |
| CE | EN 55032 | Class B |
| ESD | EN-, IEC 61000-4-2 | Perf. Criteria A |
| RS | EN-, IEC 61000-4-3 | Perf. Criteria A |
| EFT | EN-, IEC 61000-4-4 | Perf. Criteria A |
| Surge | EN-, IEC 61000-4-5 | Perf. Criteria A |
| CS | EN-, IEC 61000-4-6 | Perf. Criteria A |
| PFMF | EN-, IEC 61000-4-8 | Perf. Criteria A |
| **Physical** | | |
| Dimensions of SIP3-case | | 11.68 x 7.5 x 10.15 mm |
| Weight | | 2 g |
| Case material | | Non conductive plastic, (UL94V-0 rated) |
| Potting material | | Silicon (UL94V-0 rated) |
| **Absolute maximum ratings** | | |
| Input voltage range | | 75 $V_{DC}$ duration ≤ 0.1 s |
| Soldering temperature, | | ≤ 260 °C duration ≤ 10 s, ≥ 1.5 mm distance from case |

Notes:

1. All values are specified at Ta 25 °C, nominal input voltage and full load unless otherwise specified.
2. Operation without load will not damage, however they may not meet all specifications. Minimum load of 10 mA is recommended.
3. Maximum capacitive output load is specified at minimal input voltage and constant resistive output load.

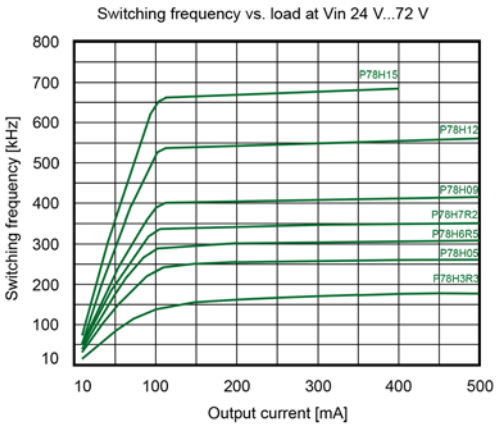




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**Figure 1 Input ripple current measure circuit**

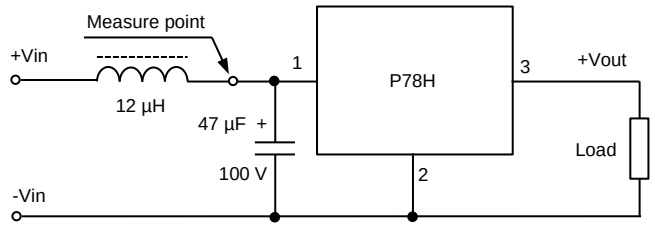
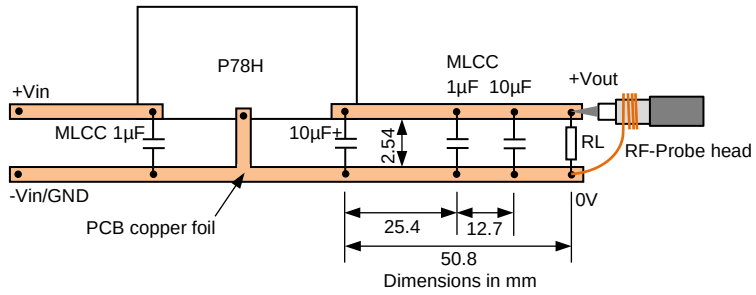



**Figure 2 Output ripple & noise measure circuit**




The output ripple & noise measured with 20 MHz bandwidth and 10…100 % loading.

**Figure 3 Typical application circuit**

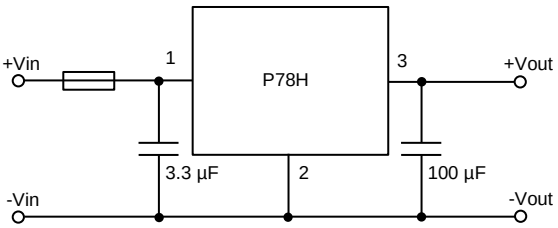
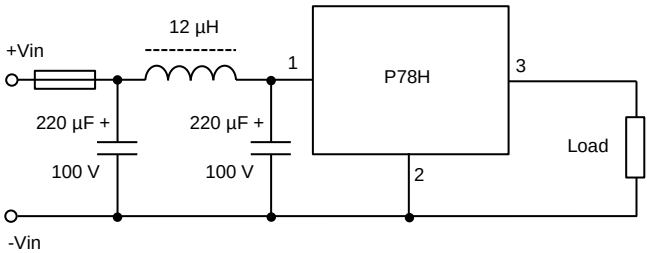



**Figure 4 Typical application circuit**




The input filter components are to fulfil the EMI & EMS requirements.



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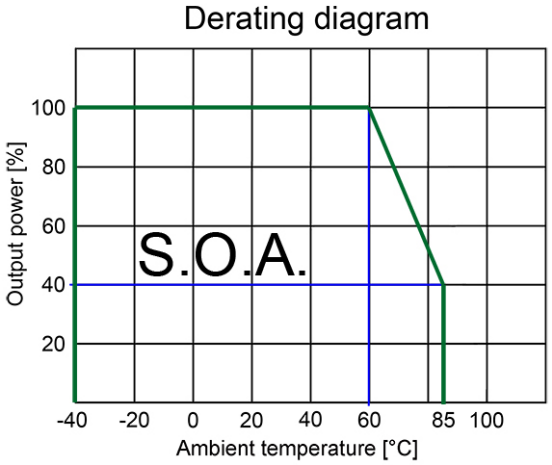
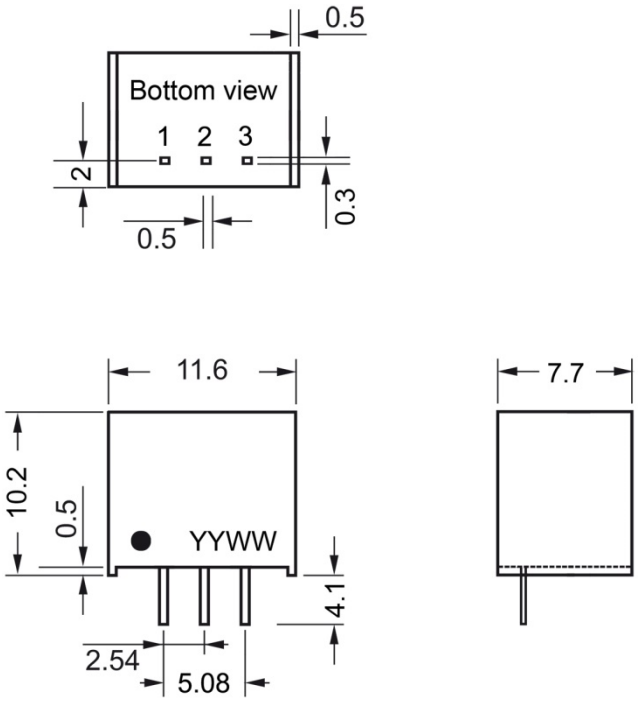



**Mechanical Dimensions**




| Pin assignment | |
|---|---|
| 1 | +V Input |
| 2 | GND |
| 3 | +V Output |

1. All dimensions in mm
2. Pitch tolerance ± 0.35 mm
3. Pin cross section tolerance ± 0.05 mm
4. Pin to package tolerance ± 0.5mm
5. Package tolerance ± 0.5mm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