

## Polypropylene (PP) Film and Foil Capacitors for Pulse Applications PCM 7.5 mm to 15 mm

### Special Features

- Pulse duty construction
- Very low dissipation factor
- Negative capacitance change versus temperature
- Very low dielectric absorption
- According to RoHS 2002/95/EC

### Typical Applications

For high frequency applications e.g.

- Sample and hold
- Timing
- LC-Filtering
- Oscillating circuits
- Audio equipment

### Construction

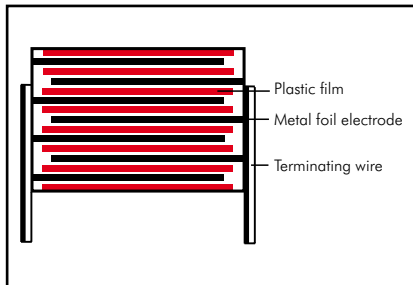
#### Dielectric:

Polypropylene (PP) film

#### Capacitor electrodes:

Metal foil

#### Internal construction:



#### Encapsulation:

Solvent-resistant, flame-retardant plastic case with epoxy resin seal, UL 94 V-0

#### Terminations:

Tinned wire.

#### Marking:

Colour: Red. Marking: Black.

Epoxy resin seal: Yellow

### Electrical Data

#### Capacitance range:

100 pF to 0.22 μF (E12-values on request)

#### Rated voltages:

63 VDC, 100 VDC, 250 VDC, 400 VDC, 630 VDC, 1000 VDC

#### Capacitance tolerances:

±20%, ±10%, ±5%

#### Operating temperature range:

-55° C to +100° C

#### Test specifications:

In accordance with IEC 60384-13 and EN 131 800

#### Climatic test category:

55/100/56 in accordance with IEC

#### Insulation resistance at +20° C:

≥ 5 × 10<sup>5</sup> MΩ

(mean value: 1 × 10<sup>6</sup> MΩ)

Measuring voltage:

U<sub>r</sub> = 63 V: U<sub>test</sub> = 50 V/1 min.

U<sub>r</sub> ≥ 100 V: U<sub>test</sub> = 100 V/1 min.

Test voltage: 2 U<sub>r</sub>, 2 sec.

#### Maximum pulse rise time:

1000 V/μsec for pulses equal to the rated voltage

#### Dielectric absorption:

0.05 %

#### Temperature coefficient:

-200 × 10<sup>-6</sup>/° C (general guide)

#### Dissipation factors at +20° C: tan δ

| at f    | C ≤ 0.1 μF              | 0.1 μF < C ≤ 0.22 μF   |
|---------|-------------------------|------------------------|
| 1 kHz   | ≤ 4 × 10 <sup>-4</sup>  | ≤ 3 × 10 <sup>-4</sup> |
| 10 kHz  | ≤ 5 × 10 <sup>-4</sup>  | ≤ 6 × 10 <sup>-4</sup> |
| 100 kHz | ≤ 10 × 10 <sup>-4</sup> | -                      |

#### Voltage derating:

A voltage derating factor of 1.35 % per K must be applied from +85° C for DC voltages and from +75° C for AC voltages.

#### Reliability:

Operational life > 300 000 hours

Failure rate < 5 fit (0.5 × U<sub>r</sub> and 40° C)

### Mechanical Tests

#### Pull test on leads:

10 N in direction of leads according to IEC 60068-2-21

#### Vibration:

6 hours at 10...2000 Hz and 0.75 mm displacement amplitude or 10 g in accordance with IEC 60068-2-6

#### Low air density:

1 kPa = 10 mbar in accordance with IEC 60068-2-13

#### Bump test:

4000 bumps at 390 m/sec<sup>2</sup> in accordance with IEC 60068-2-29

### Packing

Available taped and reeled.

Detailed taping information and graphs at the end of the catalogue.

For further details and graphs please refer to Technical Information.

## Continuation

### General Data

| Capacitance | 63 VDC/40 VAC* |      |    |            | 100 VDC/63 VAC* |      |    |            | 250 VDC/160 VAC* |      |    |            | 400 VDC/250 VAC* |      |    |             | 630 VDC/300 VAC* |      |    |            | 1000 VDC/300 VAC** |      |    |            |   |      |    |            |   |      |    |            |
|-------------|----------------|------|----|------------|-----------------|------|----|------------|------------------|------|----|------------|------------------|------|----|-------------|------------------|------|----|------------|--------------------|------|----|------------|---|------|----|------------|---|------|----|------------|
|             | W              | H    | L  | PCM**      | W               | H    | L  | PCM**      | W                | H    | L  | PCM**      | W                | H    | L  | PCM**       | W                | H    | L  | PCM**      | W                  | H    | L  | PCM**      |   |      |    |            |   |      |    |            |
| 100 pF      |                |      |    |            | 3               | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b>  | 3                | 8.5  | 10 | <b>7.5</b> | 3                  | 8.5  | 10 | <b>7.5</b> | 3 | 8.5  | 10 | <b>7.5</b> |   |      |    |            |
| 150 "       |                |      |    |            | 3               | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b>  | 3                | 8.5  | 10 | <b>7.5</b> | 3                  | 8.5  | 10 | <b>7.5</b> | 3 | 8.5  | 10 | <b>7.5</b> | 3 | 8.5  | 10 | <b>7.5</b> |
| 220 "       |                |      |    |            | 3               | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b>  | 3                | 8.5  | 10 | <b>7.5</b> | 3                  | 8.5  | 10 | <b>7.5</b> | 3 | 8.5  | 10 | <b>7.5</b> | 3 | 8.5  | 10 | <b>7.5</b> |
| 330 "       |                |      |    |            | 3               | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b>  | 3                | 8.5  | 10 | <b>7.5</b> | 3                  | 8.5  | 10 | <b>7.5</b> | 3 | 8.5  | 10 | <b>7.5</b> | 3 | 8.5  | 10 | <b>7.5</b> |
| 470 "       |                |      |    |            | 3               | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b>  | 3                | 8.5  | 10 | <b>7.5</b> | 3                  | 8.5  | 10 | <b>7.5</b> | 3 | 8.5  | 10 | <b>7.5</b> | 3 | 8.5  | 10 | <b>7.5</b> |
| 680 "       |                |      |    |            | 3               | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b>  | 3                | 8.5  | 10 | <b>7.5</b> | 3                  | 8.5  | 10 | <b>7.5</b> | 3 | 8.5  | 10 | <b>7.5</b> | 3 | 8.5  | 10 | <b>7.5</b> |
| 1000 pF     |                |      |    |            | 3               | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b>  | 4                | 9    | 10 | <b>7.5</b> | 4                  | 9    | 10 | <b>7.5</b> | 4 | 9    | 10 | <b>7.5</b> | 4 | 9    | 10 | <b>7.5</b> |
| 1500 "      |                |      |    |            | 3               | 8.5  | 10 | <b>7.5</b> | 3                | 8.5  | 10 | <b>7.5</b> | 4                | 9    | 10 | <b>7.5</b>  | 4                | 9.5  | 13 | 10         | 4                  | 9.5  | 13 | 10         | 4 | 9.5  | 13 | 10         | 4 | 9.5  | 13 | 10         |
| 2200 "      |                |      |    |            | 3               | 8.5  | 10 | <b>7.5</b> | 4                | 9    | 10 | <b>7.5</b> | 4                | 9    | 10 | <b>7.5*</b> | 4                | 9.5  | 13 | 10         | 4                  | 9.5  | 13 | 10         | 4 | 9.5  | 13 | 10         | 4 | 9.5  | 13 | 10         |
| 3300 "      |                |      |    |            | 3               | 8.5  | 10 | <b>7.5</b> | 3                | 9    | 13 | 10         | 4                | 9.5  | 13 | 10          | 4                | 9.5  | 13 | 10*        | 5                  | 11   | 13 | 10         | 5 | 11   | 13 | 10         | 5 | 11   | 13 | 10         |
| 4700 "      |                |      |    |            | 3               | 8.5  | 10 | <b>7.5</b> | 4                | 9.5  | 13 | 10         | 5                | 11   | 13 | 10          | 5                | 11   | 13 | 10         | 6                  | 12   | 13 | 10         | 6 | 12   | 13 | 10         | 6 | 12   | 13 | 10         |
| 6800 "      |                |      |    |            | 4               | 9    | 10 | <b>7.5</b> | 5                | 11   | 13 | 10         | 6                | 12   | 13 | 10          | 6                | 12   | 13 | 10         | 5                  | 11   | 18 | 15         | 5 | 11   | 18 | 15         | 5 | 11   | 18 | 15         |
| 0.01 µF     |                |      |    |            | 4               | 9    | 10 | <b>7.5</b> | 5                | 11   | 13 | 10         | 5                | 11   | 18 | 15          | 6                | 12.5 | 18 | 15         | 6                  | 12.5 | 18 | 15         | 6 | 12.5 | 18 | 15         | 6 | 12.5 | 18 | 15         |
| 0.015 "     | 4              | 9    | 10 | <b>7.5</b> | 4               | 9.5  | 13 | 10         | 6                | 12   | 13 | 10*        | 6                | 12.5 | 18 | 15          | 8                | 15   | 18 | 15         | 8                  | 15   | 18 | 15         | 8 | 15   | 18 | 15         | 8 | 15   | 18 | 15         |
| 0.022 "     | 4              | 9.5  | 13 | 10         | 5               | 11   | 13 | 10         | 6                | 12.5 | 18 | 15         | 7                | 14   | 18 | 15          | 9                | 16   | 18 | 15         | 9                  | 16   | 18 | 15         | 9 | 16   | 18 | 15         | 9 | 16   | 18 | 15         |
| 0.033 "     | 4              | 9.5  | 13 | 10         | 6               | 12   | 13 | 10         | 7                | 14   | 18 | 15         | 8                | 15   | 18 | 15          | 9                | 16   | 18 | 15         | 9                  | 16   | 18 | 15         | 9 | 16   | 18 | 15         | 9 | 16   | 18 | 15         |
| 0.047 "     | 5              | 11   | 13 | 10         | 5               | 11   | 18 | 15         | 8                | 15   | 18 | 15         | 9                | 16   | 18 | 15          | 9                | 16   | 18 | 15         | 9                  | 16   | 18 | 15         | 9 | 16   | 18 | 15         | 9 | 16   | 18 | 15         |
| 0.068 "     | 6              | 12   | 13 | 10         | 6               | 12.5 | 18 | 15         | 9                | 16   | 18 | 15         | 9                | 16   | 18 | 15          | 9                | 16   | 18 | 15         | 9                  | 16   | 18 | 15         | 9 | 16   | 18 | 15         | 9 | 16   | 18 | 15         |
| 0.1 µF      | 6              | 12.5 | 18 | 15         | 7               | 14   | 18 | 15         |                  |      |    |            |                  |      |    |             |                  |      |    |            |                    |      |    |            |   |      |    |            |   |      |    |            |
| 0.15 "      | 8              | 15   | 18 | 15         | 9               | 16   | 18 | 15         |                  |      |    |            |                  |      |    |             |                  |      |    |            |                    |      |    |            |   |      |    |            |   |      |    |            |
| 0.22 "      | 9              | 16   | 18 | 15         |                 |      |    |            |                  |      |    |            |                  |      |    |             |                  |      |    |            |                    |      |    |            |   |      |    |            |   |      |    |            |

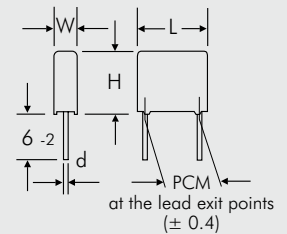
\* AC voltage:  $f \leq 1000 \text{ Hz}$ ;  $1.4 \times U_{\text{rms}} + \text{UDC} \leq U_r$

\*\* PCM = Printed circuit module = lead spacing

\* On ordering please state the required PCM (lead spacing!)  
If not specified, smaller PCM will be booked.

Dims. in mm.

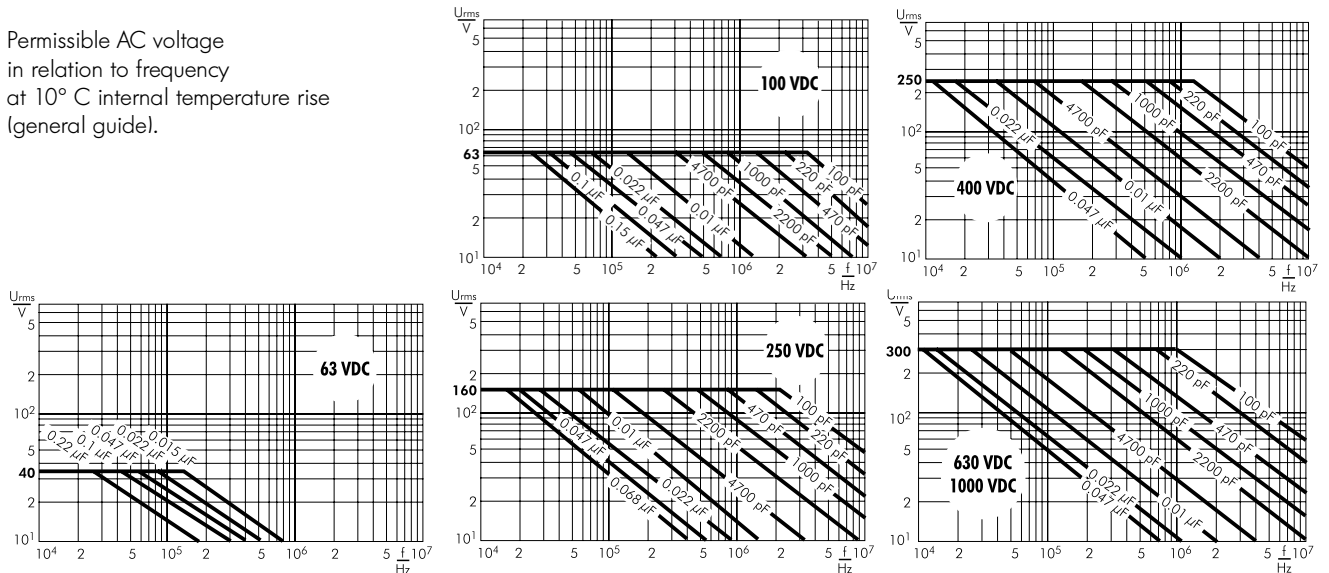
Taped version see page 121.



$d = 0.5 \phi$  if  $W = 3$   
 $d = 0.6 \phi$  if  $W \geq 4$   
 $d = 0.8 \phi$  if  $\text{PCM} = 15$

Rights reserved to amend design data without prior notification.

Permissible AC voltage in relation to frequency at 10° C internal temperature rise (general guide).



## Recommendation for Processing and Application of Through-Hole Capacitors

### Soldering Process

A preheating of through-hole WIMA capacitors is allowed for temperatures  $T_{\max} < 100^{\circ}\text{C}$ . In practice a preheating duration of  $t < 5$  min. has been proven to be best.

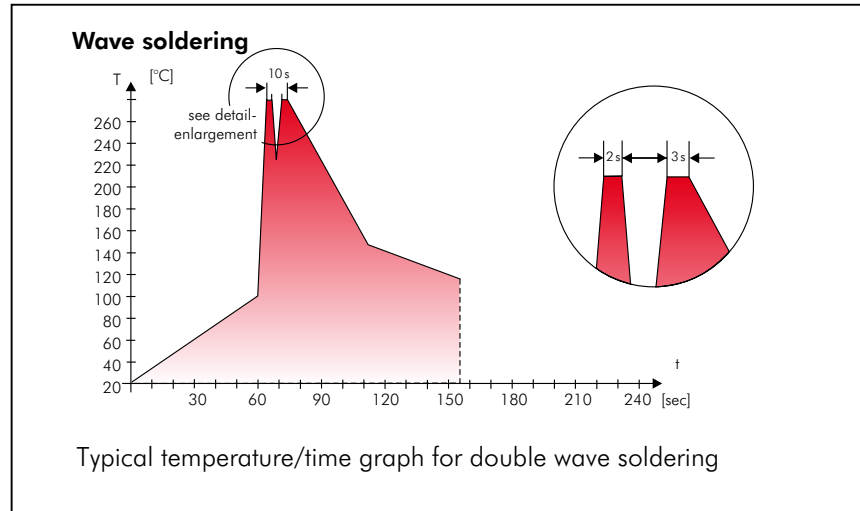
#### Single wave soldering

Soldering bath temperature:  $T < 260^{\circ}\text{C}$   
Immersion time:  $t < 5$  sec

#### Double wave soldering

Soldering bath temperature:  $T < 260^{\circ}\text{C}$   
Immersion time:  $2 \times t < 3$  sec

Due to different soldering processes and heat requirements the graphs are to be regarded as a recommendation only.



## WIMA Quality and Environmental Philosophy

### ISO 9001:2000 Certification

ISO 9001:2000 is an international basic standard of quality assurance systems for all branches of industry. The approval according to ISO 9001:2000 of our factories by the VDE inspectorate certifies that organisation, equipment and monitoring of quality assurance in our factories correspond to internationally recognized standards.

### WIMA WPCS

The WIMA Process Control System (WPCS) is a quality surveillance and optimization system developed by WIMA. WPCS is a major part of the quality-oriented WIMA production. Points of application of WPCS during production process:

- incoming material inspection
- metallization
- film inspection
- schoopage
- pre-healing
- lead attachment
- cast resin preparation/encapsulation
- 100% final inspection
- AQL check

### WIMA Environmental Policy

All WIMA capacitors, irrespective of whether through-hole devices or SMD, are made of environmentally friendly materials. Neither during manufacture nor in the product itself any toxic substances are used, e.g.

- Lead
- PCB
- CFC
- Hydrocarbon chloride
- Chromium 6+
- PBB/PBDE
- Arsenic
- Cadmium
- Mercury
- etc.

We merely use pure, recyclable materials for packing our components, such as:

- carton
- cardboard
- adhesive tape made of paper
- polystyrene

We almost completely refrain from using packing materials such as:

- foamed polystyrene (Styropor®)
- adhesive tapes made of plastic
- metal clips

### RoHS Compliance

According to the RoHS Directive 2002/95/EC certain hazardous substances like e.g. lead, cadmium, mercury must not be used any longer in electronic equipment as of July 1st, 2006. For the sake of the environment WIMA has refrained from using such substances since years already.



WIMA Kondensatoren sind bleifrei konform RoHS 2002/95/EG

WIMA capacitors are lead free in accordance with RoHS 2002/95/EC

Tape for lead-free WIMA capacitors

### DIN EN ISO 14001:2005

WIMA's environmental management has been established in accordance with the guidelines of DIN EN ISO 14001:2005. The certification has been granted in June 2006.

# Typical Dimensions for Taping Configuration

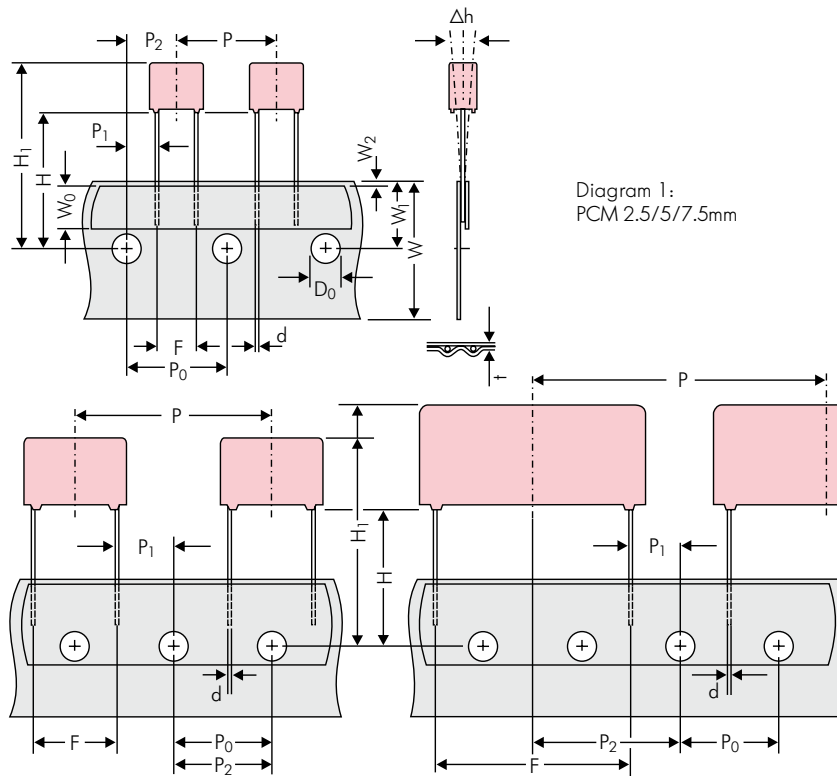


Diagram 1:  
PCM 2.5/5/7.5mm

Diagram 2: PCM 10/15 mm

Diagram 3: PCM 22.5 and 27.5\*mm

\*PCM 27.5 taping possible with two feed holes between components

| Designation                                      | Symbol         | Dimensions for Radial Taping                             |  |   |   |   |   |   |
|--|----------------|--|--|---|---|---|---|---|
|  |                | PCM 2.5 taping   | PCM 5 taping   | PCM 7.5 taping  | PCM 10 taping*  | PCM 15 taping*  | PCM 22.5 taping   | PCM 27.5 taping   |
| Carrier tape width                               | W              | 18.0 ±0.5  | 18.0 ±0.5  | 18.0 ±0.5   | 18.0 ±0.5   | 18.0 ±0.5   | 18.0 ±0.5   | 18.0 ±0.5   |
| Hold-down tape width                             | W <sub>0</sub> | 6.0 for hot-sealing adhesive tape                        | 6.0 for hot-sealing adhesive tape                        | 12.0 for hot-sealing adhesive tape                        | 12.0 for hot-sealing adhesive tape                        | 12.0 for hot-sealing adhesive tape                        | 12.0 for hot-sealing adhesive tape                        | 12.0 for hot-sealing adhesive tape                                  |
| Hole position                                    | W <sub>1</sub> | 9.0 ±0.5   | 9.0 ±0.5   | 9.0 ±0.5  | 9.0 ±0.5  | 9.0 ±0.5  | 9.0 ±0.5  | 9.0 ±0.5  |
| Hold-down tape position                          | W <sub>2</sub> | 0.5 to 3.0 max.  | 0.5 to 3.0 max.  | 0.5 to 3.0 max.   | 0.5 to 3.0 max.   | 0.5 to 3.0 max.   | 0.5 to 3.0 max.   | 0.5 to 3.0 max.   |
| Feed hole diameter                               | D <sub>0</sub> | 4.0 ±0.2   | 4.0 ±0.2   | 4.0 ±0.2  | 4.0 ±0.2  | 4.0 ±0.2  | 4.0 ±0.2  | 4.0 ±0.2  |
| Pitch of component                               | P              | 12.7 ±1.0  | 12.7 ±1.0  | 12.7 ±1.0   | 25.4 ±1.0   | 25.4 ±1.0   | 38.1 ±1.5   | 38.1 ±1.5 or 50.8 ±1.5  |
| Feed hole pitch                                  | P <sub>0</sub> | 12.7 ±0.3<br>cumulative pitch error max. 1.0 mm/20 pitch | 12.7 ±0.3<br>cumulative pitch error max. 1.0 mm/20 pitch | 12.7 ±0.3<br>cumulative pitch error max. 1.0 mm/20 pitch  | 12.7 ±0.3<br>cumulative pitch error max. 1.0 mm/20 pitch  | 12.7 ±0.3<br>cumulative pitch error max. 1.0 mm/20 pitch  | 12.7 ±0.3<br>cumulative pitch error max. 1.0 mm/20 pitch  | 12.7 ±0.3<br>cumulative pitch error max. 1.0 mm/20 pitch            |
| Feed hole centre to lead                         | P <sub>1</sub> | 5.1 ±0.5   | 3.85 ±0.7  | 2.6 ±0.7  | 7.7 ±0.7  | 5.2 ±0.7  | 7.8 ±0.7  | 5.3 ±0.7  |
| Hole centre to component centre                  | P <sub>2</sub> | 6.35 ±1.3  | 6.35 ±1.3  | 6.35 ±1.3   | 12.7 ±1.3   | 12.7 ±1.3   | 19.05 ±1.3  | 19.05 ±1.3  |
| Feed hole centre to bottom edge of the component | H <sub>▲</sub> | 16.5 ±0.3<br>18.5 ±0.5                                   | 16.5 ±0.3<br>18.5 ±0.5                                   | 16.5 ±0.5<br>18.5 ±0.5                                    | 16.5 ±0.5<br>18.5 ±0.5                                    | 16.5 ±0.5<br>18.5 ±0.5                                    | 16.5 ±0.5<br>18.5 ±0.5                                    | 16.5 ±0.5<br>18.5 ±0.5  |
| Feed hole centre to top edge of the component    | H <sub>1</sub> | H+H <sub>component</sub> < H <sub>1</sub><br>32.25 max.  | H+H <sub>component</sub> < H <sub>1</sub><br>32.25 max.  | H+H <sub>component</sub> < H <sub>1</sub><br>24.5 to 31.5 | H+H <sub>component</sub> < H <sub>1</sub><br>25.0 to 31.5 | H+H <sub>component</sub> < H <sub>1</sub><br>26.0 to 37.0 | H+H <sub>component</sub> < H <sub>1</sub><br>30.0 to 43.0 | H+H <sub>component</sub> < H <sub>1</sub><br>35.0 to 45.0           |
| Lead spacing at upper edge of carrier tape       | F              | 2.5 ±0.5   | 5.0 <sup>+0.8</sup> <sub>-0.2</sub>                      | 7.5 ±0.8  | 10.0 ±0.8   | 15 ±0.8   | 22.5 ±0.8   | 27.5 ±0.8   |
| Lead diameter                                    | d              | 0.4 ±0.05  | 0.5 ±0.05  | 0.5 ±0.05 or 0.6 <sup>+0.06</sup> <sub>-0.05</sub>        | 0.5 ±0.05 or 0.6 <sup>+0.06</sup> <sub>-0.05</sub>        | 0.8 <sup>+0.08</sup> <sub>-0.05</sub>                     | 0.8 <sup>+0.08</sup> <sub>-0.05</sub>                     | 0.8 <sup>+0.08</sup> <sub>-0.05</sub>                               |
| Component alignment                              | Δh             | ± 2.0 max.   | ± 2.0 max.   | ± 3.0 max.  | ± 3.0 max.  | ± 3.0 max.  | ± 3.0 max.  | ± 3.0 max.  |
| Total tape thickness                             | t              | 0.7 ±0.2   | 0.7 ±0.2   | 0.7 ±0.2  | 0.7 ±0.2  | 0.7 ±0.2  | 0.7 ±0.2  | 0.7 ±0.2  |
| Package (see also page 122)                      | ▲              | ROLL/AMMO  |  |   | AMMO  |   |   |   |
|  |                | REEL ø 360 max.<br>ø 30 ±1                               | B 52 ±2<br>58 ±2 } depending on comp. dimensions         |   | REEL ø 360 max.<br>ø 30 ±1                                | 52 ±2<br>58 ±2 or 66 ±2                                   | REEL ø 500 max.<br>ø 25 ±1                                | 54 ±2<br>60 ±2<br>68 ±2 } depending on PCM and component dimensions |
| Unit   |                | see details page 124.                                    |  |   |   |   |   |   |

▲ Please give „H“ dimensions and desired packaging type when ordering.

• Diameter of leads see General Data.

\* PCM 10 and PCM 15 can be crimped to PCM 7.5.

Position of components according to PCM 7.5 (sketch 11). P<sub>0</sub> = 12.7 or 15.0 is possible

Dims in mm.

Please clarify customer-specific deviations with the manufacturer.