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Heynen works for innovators

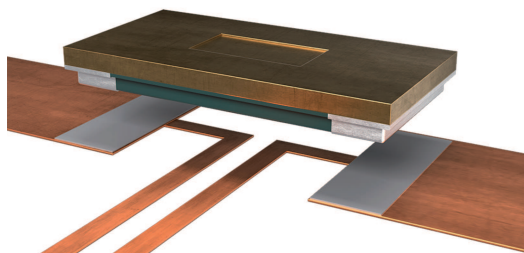


## ISA-PLAN® // PRECISION RESISTORS



### FMP // Size 2010

### PRELIMINARY VERSION



#### Features

- Power rating up to 4 W at 70°C (1.5 mOhm)
- Constant current up to 50 A (1.5 mOhm)
- Standard pad size (2010)
- High pulse power rating
- Excellent long-term stability
- Mounting: Reflow- and IR-soldering
- AEC-Q200 qualification in preparation
- RoHS 2011/65/EU compliant



#### Applications

- Current sensor for power hybrid applications
- Control systems for the automotive market
- Power modules
- Frequency converters
- Switch mode power supplies

#### Preliminary technical data

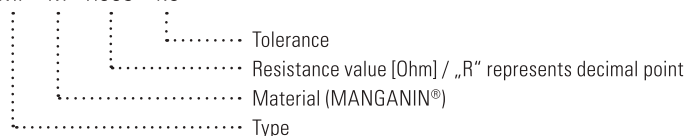
|                                                                                         |                |                                           |
|-----------------------------------------------------------------------------------------|----------------|-------------------------------------------|
| Resistance values                                                                       | <b>mOhm</b>    | 1.5 / 2 / 3 / 4 / 5 / 6                   |
| Tolerance                                                                               | <b>%</b>       | 1 / 5                                     |
| Temperature coefficient (20-60 °C)                                                      | <b>ppm/K</b>   | < 50                                      |
| Applicable temperature range                                                            | <b>°C</b>      | -65 to +170                               |
| Power rating                                                                            | <b>W</b>       | up to 4                                   |
| Dielectric withstanding voltage                                                         | <b>V AC/DC</b> | 200                                       |
| Inductance                                                                              | <b>nH</b>      | < 3                                       |
| Stability (at rated power) deviation after 2000h, T <sub>K</sub> = Terminal temperature |                | < 0.5 % (TK=80 °C)<br>< 1.0 % (TK=110 °C) |

| Type         | Value [mΩ] | R <sub>thi</sub> [K/W] | TCR [ppm/K] | P <sub>70 °C</sub><br>[W] | P <sub>110 °C</sub><br>[W] |
|--------------|------------|------------------------|-------------|---------------------------|----------------------------|
| FMP-Z-R0015* | 1.5        | 20                     | <50         | 4                         | 3                          |
| FMP-M-R002*  | 2          | 25                     | <50         | 3.5                       | 2                          |
| FMP-M-R003   | 3          | 40                     | <50         | 2.5                       | 1.5                        |
| FMP-V-R004*  | 4          | 50                     | <50         | 2                         | 1                          |
| FMP-V-R005   | 5          | 55                     | <50         | 2                         | 1                          |
| FMP-V-R006*  | 6          | 67                     | <50         | 1.5                       | 1                          |

\* values in preparation

#### Ordering code

FMP - M - R003 - 1.0



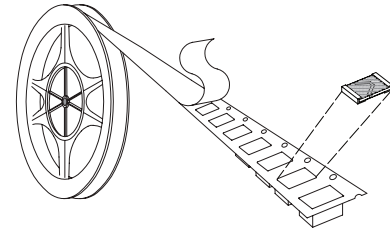
**FMP // Size 2010****Recommended solder profile**

Reflow- and IR-soldering

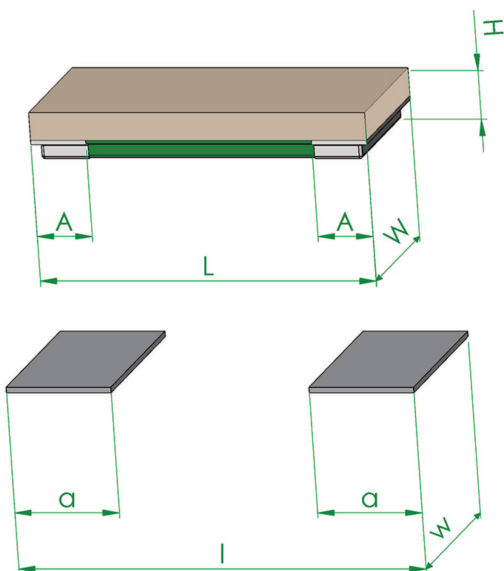
|             |     |      |     |     |
|-------------|-----|------|-----|-----|
| Temperature | °C  | 260  | 255 | 217 |
| Time        | sec | peak | 40  | 90  |

**Tape and reel information**

|                      |      |                |
|----------------------|------|----------------|
| Specification        |      | DIN EN 60286-3 |
| Tape width           | mm   | 12             |
| Reel size            | inch | 13             |
| Parts per reel       | pcs  | 12500          |
| Packaging weight net | g    | 481            |

**Information**

|                                     |                   |
|-------------------------------------|-------------------|
| Product status                      | under development |
| Sample availability                 | B-samples         |
| Qualification release acc. AEC-Q200 | Q2/2020           |
| Mass production availability        | Q4/2020           |

**Mechanical dimensions and pcb-layout proposal (Reflow-soldering) [mm] / Drawing Z-YL-257**

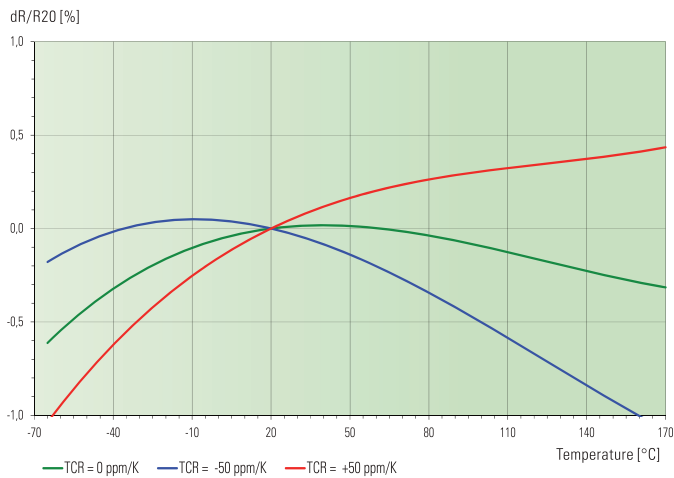
| type: | L         | W         | H        | A        |
|-------|-----------|-----------|----------|----------|
| FMP   | 5.08 ±0.2 | 2.54 ±0.2 | 0.4 ±0.2 | 0.7 ±0.2 |

| solder pad type: | l   | w   | a    |
|------------------|-----|-----|------|
| FMP              | 6.0 | 3.0 | 1.25 |

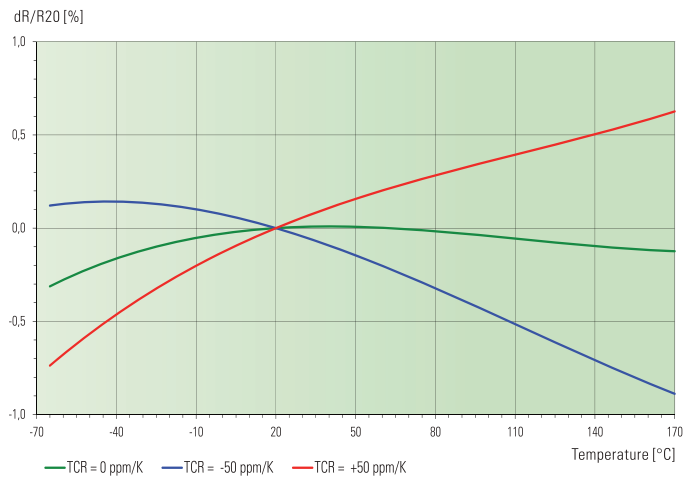


## FMP // Size 2010

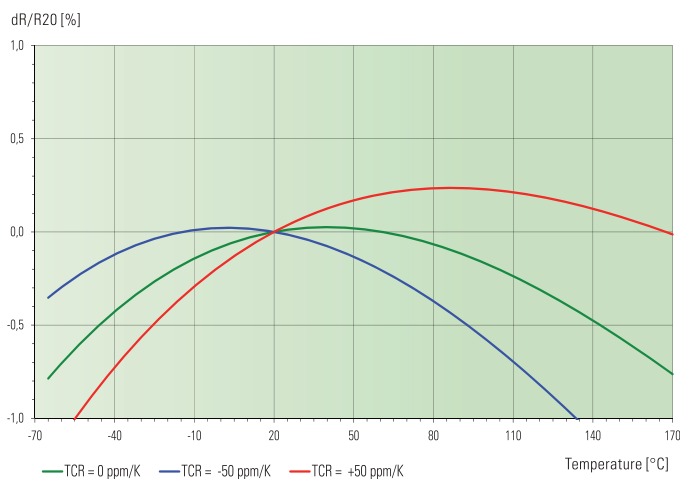
### Temperature dependence of the electrical resistance of MANGANIN® resistors



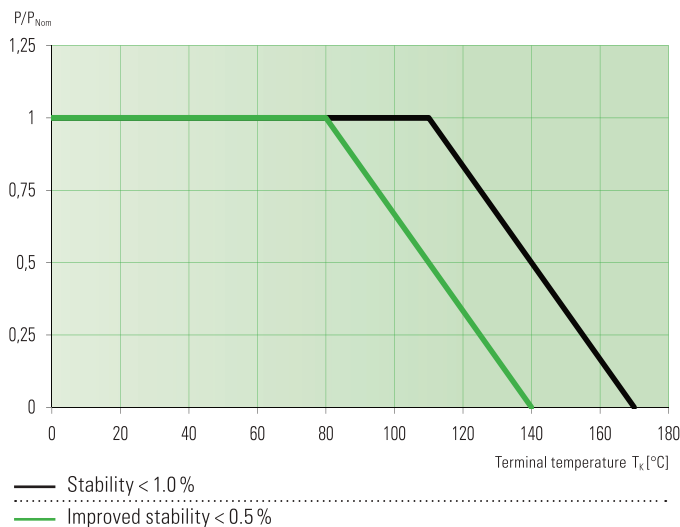
### Temperature dependence of the electrical resistance of ZERANIN® resistors

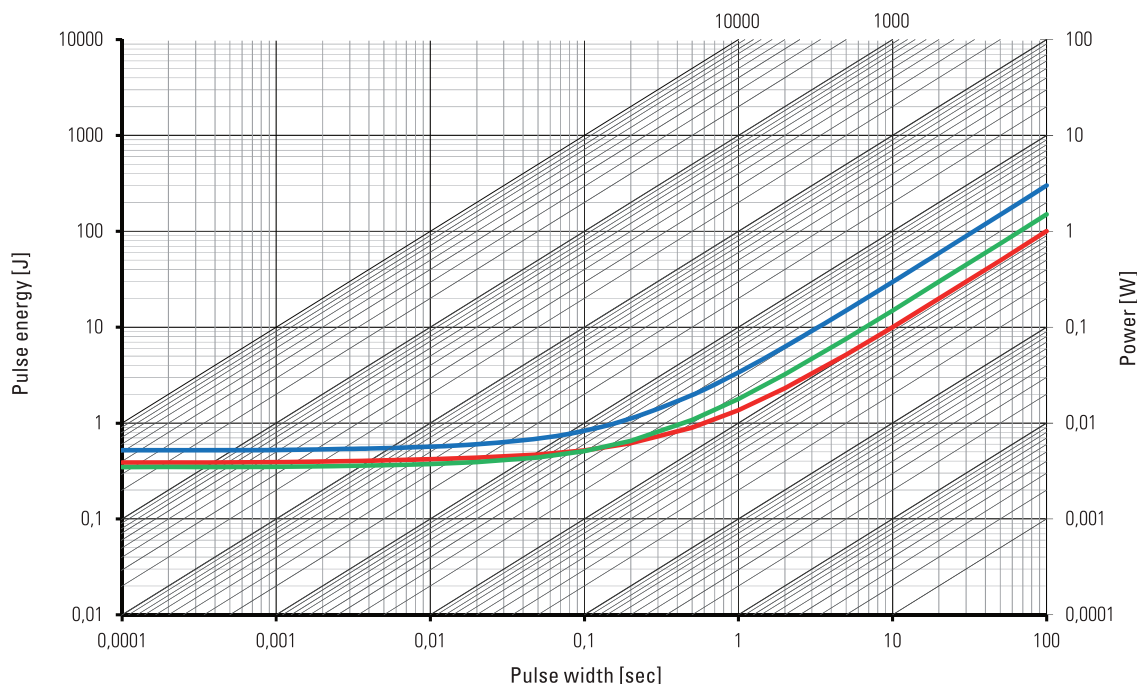


### Temperature dependence of the electrical resistance of NOVENTIN® resistors



### Power derating curve



**FMP // Size 2010****Maximum pulse energy respectively pulse power for permanent operation****FMP-Z-R0015, FMP-M-R003, FMP-V-R006**Maximum pulse energy / power continuous operation ( $T_K = 110\text{ °C}$ )**Specification**

| Parameters                | Test conditions                  | Specified values |
|---------------------------|----------------------------------|------------------|
| Temperature Cycling       | 2000 cycles (-55 °C to +150 °C)  | in preparation   |
| Low Temperature Storage   | -65 °C for 250 h                 |                  |
| Moisture Resistance       | MIL-STD-202 method 106           |                  |
| Mechanical Shock          | 100 g, 6 ms half sine            |                  |
| Vibration, High Frequency | 10 g, 10-2000 Hz, 24 h each axis |                  |
| Operational Life          | 2000 h, $T_K$ max at rated power |                  |
| High Temperature Exposure | 2000 h / 170 °C                  |                  |
| Bias Humidity             | +85 °C, 85 r.F., 1000 h, powered |                  |

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