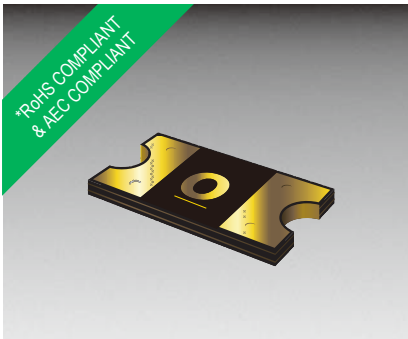




## Features

- Compliant with AEC-Q200 Rev-C Stress Test Qualification for Passive Components in Automotive Applications
- Compact design to save board space - 1206 footprint
- Small size results in very fast time to react to fault events
- Symmetrical design
- Low profile
- RoHS compliant\* and halogen free\*\*
- Agency recognition: 

## PRCP-NSMF Series - Polymer Resettable Circuit Protectors

### Electrical Characteristics

| Model            | V max.<br>Volts | I max.<br>Amps | I <sub>hold</sub> | I <sub>trip</sub> | Resistance        |                    | Max. Time To Trip |                  | Tripped Power Dissipation |
|------------------|-----------------|----------------|-------------------|-------------------|-------------------|--------------------|-------------------|------------------|---------------------------|
|                  |                 |                | Amperes at 23 °C  |                   | Ohms at 23 °C     |                    | Amperes at 23 °C  | Seconds at 23 °C | Watts at 23 °C            |
|                  |                 |                | Hold              | Trip              | R <sub>Min.</sub> | R <sub>1Max.</sub> |                   |                  | Typ.                      |
| PRCP-NSMF012     | 30.0            | 10             | 0.12              | 0.29              | 1.35              | 8.50               | 1.0               | 0.20             | 0.4                       |
| PRCP-NSMF020     | 24.0            | 10             | 0.20              | 0.46              | 0.60              | 2.60               | 1.0               | 0.60             | 0.6                       |
| PRCP-NSMF020/30X | 30.0            | 60             | 0.20              | 0.40              | 0.60              | 3.30               | 1.0               | 0.60             | 0.6                       |
| PRCP-NSMF035     | 6.0             | 100            | 0.35              | 0.75              | 0.30              | 1.20               | 8.0               | 0.10             | 0.6                       |
| PRCP-NSMF035/16X | 16.0            | 20             | 0.35              | 0.75              | 0.30              | 1.40               | 3.5               | 0.14             | 0.6                       |
| PRCP-NSMF050     | 13.2            | 100            | 0.50              | 1.00              | 0.15              | 0.70               | 8.0               | 0.10             | 0.4                       |
| PRCP-NSMF075     | 6.0             | 100            | 0.75              | 1.50              | 0.10              | 0.40               | 8.0               | 0.10             | 0.4                       |
| PRCP-NSMF110     | 6.0             | 100            | 1.10              | 2.20              | 0.06              | 0.20               | 8.0               | 0.10             | 0.6                       |
| PRCP-NSMF150     | 6.0             | 100            | 1.50              | 3.00              | 0.03              | 0.13               | 8.0               | 0.30             | 0.6                       |
| PRCP-NSMF200     | 6.0             | 100            | 2.00              | 4.00              | 0.02              | 0.085              | 8.0               | 1.00             | 0.7                       |

### Environmental Characteristics

|                                                              |                                    |               |                   |
|--------------------------------------------------------------|------------------------------------|---------------|-------------------|
| Operating Temperature.....                                   | -40 °C to +85 °C                   |               |                   |
| Maximum Device Surface Temperature<br>in Tripped State ..... | 125 °C                             |               |                   |
| Passive Aging .....                                          | +85 °C, 1000 hours .....           | ±5 % typical  | resistance change |
| Humidity Aging .....                                         | +85 °C, 85 % R.H. 1000 hours ..... | ±5 % typical  | resistance change |
| Thermal Shock .....                                          | +85 °C to -40 °C, 20 times .....   | ±10 % typical | resistance change |
| Solvent Resistance.....                                      | MIL-STD-202, Method 215 .....      | No change     |                   |
| Vibration .....                                              | MIL-STD-883C, Method 2007.1, ..... | No change     |                   |
|                                                              | ConditionA                         |               |                   |

### Test Procedures And Requirements For Model PRCP-NSMF Series

| Test                  | Test Conditions                                       | Accept/Reject Criteria                   |
|-----------------------|-------------------------------------------------------|------------------------------------------|
| Visual/Mech. ....     | Verify dimensions and materials .....                 | Per P.R.C.P. physical description        |
| Resistance.....       | In still air @ 23 °C.....                             | R <sub>min</sub> ≤ R ≤ R <sub>1max</sub> |
| Time to Trip.....     | At specified current, V <sub>max</sub> , 23 °C .....  | T ≤ max. time to trip (seconds)          |
| Hold Current .....    | 30 min. at I <sub>hold</sub> .....                    | No trip                                  |
| Trip Cycle Life ..... | V <sub>max</sub> , I <sub>max</sub> , 100 cycles..... | No arcing or burning                     |
| Trip Endurance .....  | V <sub>max</sub> , 48 hours.....                      | No arcing or burning                     |
| Solderability .....   | ANSI/J-STD-002 .....                                  | 95 % min. coverage                       |

\* RoHS Directive 2015/863, Mar. 31, 2015 and Annex.

NIDEC COMPONENTS follows the prevailing definition of "halogen free" in the industry. NIDEC COMPONENTS considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

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## Applications

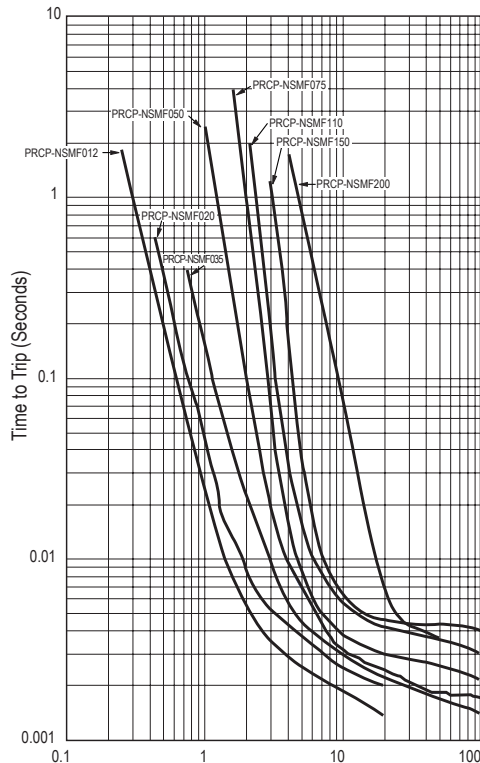
- USB port protection - USB 2.0, 3.0 & OTG
- Automotive electronic control modules
- HDMI 1.4 Source protection
- PC motherboards - Plug and Play protection
- Mobile phones - Battery and port protection
- PDAs / digital cameras
- Game console port protection

## PRCP-NSMF Series - Polymer Resettable Circuit Protectors

Thermal Derating Chart -  $I_{hold}$  (Amps)

| Model            | Ambient Operating Temperature |             |             |             |             |             |             |             |             |
|------------------|-------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                  | -40 °C                        | -20 °C      | 0 °C        | 23 °C       | 40 °C       | 50 °C       | 60 °C       | 70 °C       | 85 °C       |
| PRCP-NSMF012     | 0.19 / 0.46                   | 0.17 / 0.41 | 0.15 / 0.36 | 0.12 / 0.29 | 0.11 / 0.27 | 0.10 / 0.24 | 0.09 / 0.22 | 0.08 / 0.19 | 0.07 / 0.17 |
| PRCP-NSMF020     | 0.30 / 0.69                   | 0.27 / 0.62 | 0.24 / 0.55 | 0.20 / 0.46 | 0.18 / 0.42 | 0.16 / 0.38 | 0.14 / 0.34 | 0.12 / 0.30 | 0.11 / 0.25 |
| PRCP-NSMF020/30X | 0.30 / 0.60                   | 0.27 / 0.54 | 0.24 / 0.28 | 0.20 / 0.40 | 0.18 / 0.36 | 0.16 / 0.32 | 0.14 / 0.28 | 0.12 / 0.24 | 0.10 / 0.20 |
| PRCP-NSMF035     | 0.51 / 1.25                   | 0.46 / 1.16 | 0.40 / 0.95 | 0.35 / 0.75 | 0.30 / 0.70 | 0.27 / 0.66 | 0.24 / 0.60 | 0.22 / 0.55 | 0.18 / 0.44 |
| PRCP-NSMF035/16X | 0.58 / 1.24                   | 0.51 / 1.09 | 0.44 / 0.94 | 0.35 / 0.75 | 0.31 / 0.66 | 0.28 / 0.60 | 0.24 / 0.51 | 0.21 / 0.45 | 0.16 / 0.34 |
| PRCP-NSMF050     | 0.76 / 1.52                   | 0.68 / 1.36 | 0.59 / 1.18 | 0.50 / 1.00 | 0.44 / 0.88 | 0.40 / 0.80 | 0.35 / 0.70 | 0.32 / 0.64 | 0.26 / 0.52 |
| PRCP-NSMF075     | 1.11 / 2.22                   | 1.00 / 2.00 | 0.85 / 1.70 | 0.75 / 1.50 | 0.67 / 1.34 | 0.61 / 1.22 | 0.52 / 1.04 | 0.50 / 1.00 | 0.42 / 0.84 |
| PRCP-NSMF110     | 1.64 / 3.28                   | 1.46 / 2.92 | 1.30 / 2.60 | 1.10 / 2.20 | 0.92 / 1.84 | 0.83 / 1.66 | 0.80 / 1.60 | 0.65 / 1.30 | 0.52 / 1.04 |
| PRCP-NSMF150     | 2.20 / 4.40                   | 1.99 / 3.98 | 1.77 / 3.54 | 1.50 / 3.00 | 1.34 / 2.68 | 1.23 / 2.46 | 1.10 / 2.20 | 1.01 / 2.02 | 0.84 / 1.68 |
| PRCP-NSMF200     | 2.88 / 5.76                   | 2.61 / 5.22 | 2.28 / 4.56 | 2.00 / 4.00 | 1.80 / 3.60 | 1.66 / 3.32 | 1.51 / 3.02 | 1.39 / 2.78 | 1.19 / 2.38 |

Typical Time to Trip at 23 °C



The Time to Trip curves represent typical performance of a device in a simulated application environment. Actual performance in specific customer applications may differ from these values due to the influence of other variables.

### How to Order

PRCP - NSMF 020/30 X - 2 E

Product Designator \_\_\_\_\_

Series \_\_\_\_\_  
NSMF = 1206 Surface Mount Component

Hold Current,  $I_{hold}$  \_\_\_\_\_  
012-200 (0.12 Amps - 2.00 Amps)

High Voltage Options \_\_\_\_\_  
= Standard  
/16 = 16 Volt Rated  
/30 = 30 Volt Rated  
X = Product Shape

Packaging \_\_\_\_\_  
Packaged per EIA 481-1  
-2 = Tape and Reel

Halogen Free \_\_\_\_\_  
Non Hidden Foil

### Typical Part Marking

Represents total content. Layout may vary.

STYLE 1 PART IDENTIFICATION:  
PRCP-NSMF012 = 0  
PRCP-NSMF020 = 2  
PRCP-NSMF035 = 3  
PRCP-NSMF050 = 4  
PRCP-NSMF075 = 5  
PRCP-NSMF110 = 6  
PRCP-NSMF150 = 8  
PRCP-NSMF200 = A

STYLE 2 PART IDENTIFICATION:  
PRCP-NSMF020/30X = 2  
PRCP-NSMF035/16X = 3

BIWEEKLY DATE CODE WILL APPEAR ON THE PACKAGING LABEL:  
WEEK 1 AND 2 = A  
WEEK 51 AND 52 = Z

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# PRCP-NSMF Series - Polymer Resettable Circuit Protectors

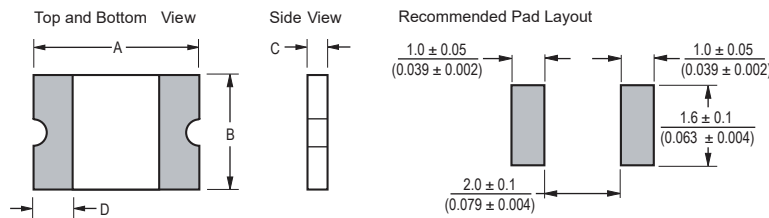
## Product Dimensions

| Model            | A               |                 | B               |                 | C               |                 | D               | Style |
|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------|
|                  | Min.            | Max.            | Min.            | Max.            | Min.            | Max.            | Min.            |       |
| PRCP-NSMF012     | 3.00<br>(0.118) | 3.40<br>(0.134) | 1.40<br>(0.055) | 1.80<br>(0.071) | 0.70<br>(0.028) | 1.10<br>(0.043) | 0.25<br>(0.010) | 1     |
| PRCP-NSMF020     | 3.00<br>(0.118) | 3.40<br>(0.134) | 1.40<br>(0.055) | 1.80<br>(0.071) | 0.48<br>(0.019) | 0.85<br>(0.033) | 0.25<br>(0.010) | 1     |
| PRCP-NSMF020/30X | 3.00<br>(0.118) | 3.40<br>(0.134) | 1.40<br>(0.055) | 1.80<br>(0.071) | 0.40<br>(0.016) | 0.85<br>(0.033) | 0.25<br>(0.010) | 2     |
| PRCP-NSMF035     | 3.00<br>(0.118) | 3.40<br>(0.134) | 1.40<br>(0.055) | 1.80<br>(0.071) | 0.48<br>(0.019) | 0.85<br>(0.033) | 0.25<br>(0.010) | 1     |
| PRCP-NSMF035/16X | 3.00<br>(0.118) | 3.40<br>(0.134) | 1.40<br>(0.055) | 1.80<br>(0.071) | 0.40<br>(0.016) | 0.85<br>(0.033) | 0.25<br>(0.010) | 2     |
| PRCP-NSMF050     | 3.00<br>(0.118) | 3.40<br>(0.134) | 1.40<br>(0.055) | 1.80<br>(0.071) | 0.48<br>(0.019) | 0.85<br>(0.033) | 0.25<br>(0.010) | 1     |
| PRCP-NSMF075     | 3.00<br>(0.118) | 3.40<br>(0.134) | 1.40<br>(0.055) | 1.80<br>(0.071) | 0.40<br>(0.016) | 0.70<br>(0.028) | 0.25<br>(0.010) | 1     |
| PRCP-NSMF110     | 3.00<br>(0.118) | 3.40<br>(0.134) | 1.40<br>(0.055) | 1.80<br>(0.071) | 0.40<br>(0.016) | 0.70<br>(0.028) | 0.25<br>(0.010) | 1     |
| PRCP-NSMF150     | 3.00<br>(0.118) | 3.40<br>(0.134) | 1.40<br>(0.055) | 1.80<br>(0.071) | 0.40<br>(0.016) | 0.70<br>(0.028) | 0.25<br>(0.010) | 1     |
| PRCP-NSMF200     | 3.00<br>(0.118) | 3.50<br>(0.138) | 1.40<br>(0.055) | 1.80<br>(0.071) | 0.70<br>(0.028) | 1.60<br>(0.063) | 0.25<br>(0.010) | 1     |

Packaging: 3000 pcs. per reel.

DIMENSIONS:  $\frac{\text{MM}}{(\text{INCHES})}$ 

### Style 1

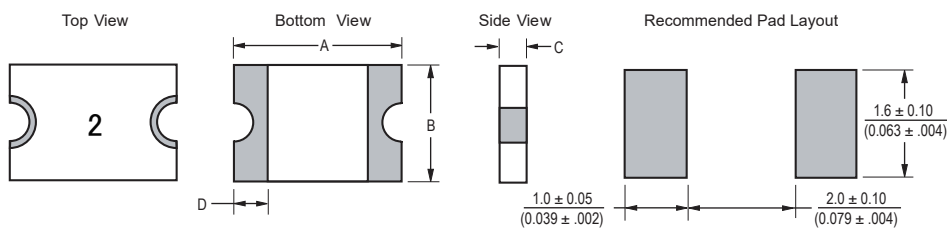


Terminal material:  
Electroless Ni under immersion Au

Termination pad solderability:  
Standard Au finish:  
Meets ANSI/J-STD-002 Category 2.

Recommended Storage:  
40 °C max./70 % RH max.

### Style 2

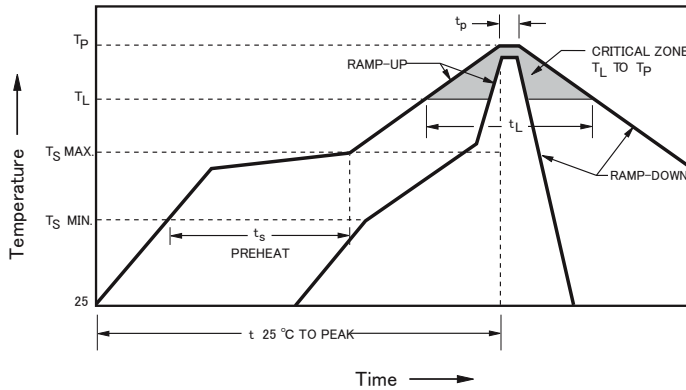


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## PRCP-NSMF Series - Polymer Resettable Circuit Protectors

### Solder Reflow Recommendations



#### Notes:

- PRCP-NSMF models are intended for reflow soldering (including, but not limited to heating plate, hot air, IR, nitrogen, and vapor phase).
  - Wave soldering is permissible only if the device is on the top of the PCB, opposite the heat source.
  - Hand soldering is not recommended for these devices.
  - All temperatures refer to the topside of the device, measured on the device body surface.
- If reflow temperatures exceed the recommended profile, devices may not meet the published specifications.
- Compatible with Pb and Pb-free solder reflow profile.
- Excess solder may cause a short circuit.

| Profile Feature                                                                                                                   | Pb-Free Assembly                   |
|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| Average Ramp-Up Rate ( $T_{s\max}$ to $T_p$ )                                                                                     | 3 °C/ second max.                  |
| PREHEAT:<br>Temperature Min. ( $T_{s\min}$ )<br>Temperature Max. ( $T_{s\max}$ )<br>Time ( $T_{s\min}$ to $T_{s\max}$ ) ( $t_s$ ) | 150 °C<br>200 °C<br>60~180 seconds |
| TIME MAINTAINED ABOVE:<br>Temperature ( $T_L$ )<br>Time ( $t_L$ )                                                                 | 217 °C<br>60~150 seconds           |
| Peak Temperature ( $T_p$ )                                                                                                        | 260 °C                             |
| Time within 5 °C of Actual Peak Temperature ( $t_p$ )                                                                             | 20~40 seconds                      |
| Ramp-Down Rate                                                                                                                    | 6 °C / second max.                 |
| Time 25 °C to Peak Temperature                                                                                                    | 8 minutes max.                     |

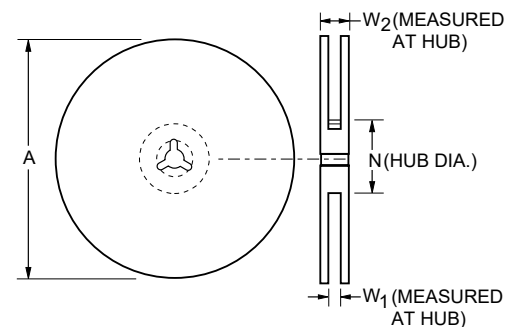
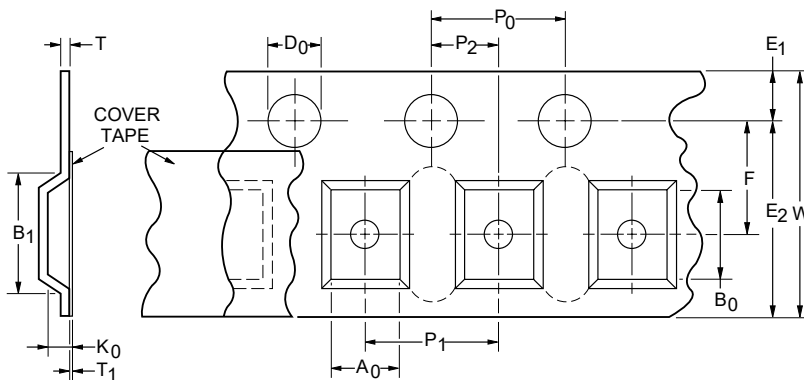
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# PRCP-NSMF Series Tape and Reel Specifications

| Tape Dimensions     | PRCP-NSMF012<br>& PRCP-NSMF200<br>per EIA 481-1 | PRCP-NSMF020 ~<br>PRCP-NSMF050<br>per EIA 481-1 | PRCP-NSMF075 ~<br>PRCP-NSMF150<br>per EIA 481-1 | PRCP-NSMF020/30X<br>& PRCP-NSMF035/16X<br>per EIA 481-1 |
|---------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|---------------------------------------------------------|
| W                   | $8.0 \pm 0.30$<br>(0.315 $\pm$ 0.012)           | $8.0 \pm 0.30$<br>(0.315 $\pm$ 0.012)           | $8.0 \pm 0.30$<br>(0.315 $\pm$ 0.012)           | $8.0 \pm 0.30$<br>(0.315 $\pm$ 0.012)                   |
| P <sub>0</sub>      | $4.0 \pm 0.10$<br>(0.157 $\pm$ 0.004)           | $4.0 \pm 0.10$<br>(0.157 $\pm$ 0.004)           | $4.0 \pm 0.10$<br>(0.157 $\pm$ 0.004)           | $4.0 \pm 0.10$<br>(0.157 $\pm$ 0.004)                   |
| P <sub>1</sub>      | $4.0 \pm 0.10$<br>(0.157 $\pm$ 0.004)           | $4.0 \pm 0.10$<br>(0.157 $\pm$ 0.004)           | $4.0 \pm 0.10$<br>(0.157 $\pm$ 0.004)           | $4.0 \pm 0.10$<br>(0.157 $\pm$ 0.004)                   |
| P <sub>2</sub>      | $2.0 \pm 0.05$<br>(0.079 $\pm$ 0.002)           | $2.0 \pm 0.05$<br>(0.079 $\pm$ 0.002)           | $2.0 \pm 0.05$<br>(0.079 $\pm$ 0.002)           | $2.0 \pm 0.05$<br>(0.079 $\pm$ 0.002)                   |
| A <sub>0</sub>      | $1.90 \pm 0.10$<br>(0.075 $\pm$ 0.004)          | $1.90 \pm 0.10$<br>(0.075 $\pm$ 0.004)          | $1.90 \pm 0.10$<br>(0.075 $\pm$ 0.004)          | $1.90 \pm 0.10$<br>(0.075 $\pm$ 0.004)                  |
| B <sub>0</sub>      | $3.50 \pm 0.10$<br>(0.138 $\pm$ 0.004)          | $3.45 \pm 0.10$<br>(0.136 $\pm$ 0.004)          | $3.45 \pm 0.10$<br>(0.136 $\pm$ 0.004)          | $3.55 \pm 0.10$<br>(0.140 $\pm$ 0.004)                  |
| B <sub>1</sub> max. | $4.35$<br>(0.171)                               | $4.35$<br>(0.171)                               | $4.35$<br>(0.171)                               | $4.35$<br>(0.171)                                       |
| D <sub>0</sub>      | $1.5 + 0.10/-0.0$<br>(0.059 + 0.004/-0)         | $1.5 + 0.10/-0.0$<br>(0.059 + 0.004/-0)         | $1.5 + 0.10/-0.0$<br>(0.059 + 0.004/-0)         | $1.5 + 0.10/-0.0$<br>(0.059 + 0.004/-0)                 |
| F                   | $3.5 \pm 0.05$<br>(0.138 + 0.002)               | $3.5 \pm 0.05$<br>(0.138 + 0.002)               | $3.5 \pm 0.05$<br>(0.138 + 0.002)               | $3.5 \pm 0.05$<br>(0.138 + 0.002)                       |
| E <sub>1</sub>      | $1.75 \pm 0.10$<br>(0.069 $\pm$ 0.004)          | $1.75 \pm 0.10$<br>(0.069 $\pm$ 0.004)          | $1.75 \pm 0.10$<br>(0.069 $\pm$ 0.004)          | $1.75 \pm 0.10$<br>(0.069 $\pm$ 0.004)                  |
| E <sub>2</sub> min. | $6.25$<br>(0.246)                               | $6.25$<br>(0.246)                               | $6.25$<br>(0.246)                               | $6.25$<br>(0.246)                                       |
| T max.              | $0.6$<br>(0.024)                                | $0.6$<br>(0.024)                                | $0.6$<br>(0.024)                                | $0.6$<br>(0.024)                                        |
| T <sub>1</sub> max. | $0.1$<br>(0.004)                                | $0.1$<br>(0.004)                                | $0.1$<br>(0.004)                                | $0.1$<br>(0.004)                                        |
| K <sub>0</sub>      | $1.35 \pm 0.10$<br>(0.053 $\pm$ 0.004)          | $1.04 \pm 0.10$<br>(0.041 $\pm$ 0.004)          | $0.85 \pm 0.10$<br>(0.033 $\pm$ 0.004)          | $0.80 \pm 0.10$<br>(0.032 $\pm$ 0.004)                  |
| Leader min.         | $390$<br>(15.35)                                | $390$<br>(15.35)                                | $390$<br>(15.35)                                | $390$<br>(15.35)                                        |
| Trailer min.        | $160$<br>(6.30)                                 | $160$<br>(6.30)                                 | $160$<br>(6.30)                                 | $160$<br>(6.30)                                         |
| Reel Dimensions     |                                                 |                                                 |                                                 |                                                         |
| A max.              | $185$<br>(7.28)                                 | $185$<br>(7.28)                                 | $185$<br>(7.28)                                 | $185$<br>(7.28)                                         |
| N min.              | $50$<br>(1.97)                                  | $50$<br>(1.97)                                  | $50$<br>(1.97)                                  | $50$<br>(1.97)                                          |
| W <sub>1</sub>      | $8.4 + 1.5/-0.0$<br>(0.331 + 0.059/-0)          | $8.4 + 1.5/-0.0$<br>(0.331 + 0.059/-0)          | $8.4 + 1.5/-0.0$<br>(0.331 + 0.059/-0)          | $8.4 + 1.5/-0.0$<br>(0.331 + 0.059/-0)                  |
| W <sub>2</sub> max. | $14.4$<br>(0.567)                               | $14.4$<br>(0.567)                               | $14.4$<br>(0.567)                               | $14.4$<br>(0.567)                                       |

DIMENSIONS:  $\frac{\text{MM}}{(\text{INCHES})}$



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