AC Line EMI Suppression and RC Networks

PME271Y, Metallized Impregnated Paper, Class Y2, 250 VAC

Overview

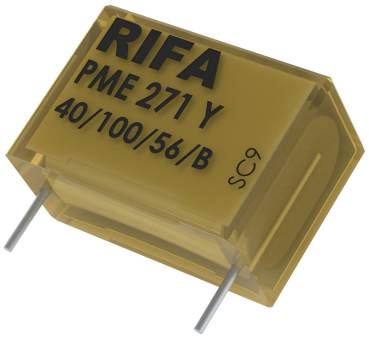
Multilayer, metallized paper, encapsulated and impregnated in self-extinguishing material that meets the requirements of UL 94 V–0.

Applications

For worldwide use as an electromagnetic interference suppressor in all Y2 applications, line-to-earth.

Benefits

- Approvals: ENEC, UL, cUL, CQC
- Rated voltage: 250 VAC 50/60 Hz
- Capacitance range: 0.001 – 0.1 µF
- Lead spacing: 10.2 – 25.4 mm
- Capacitance tolerance: ±20%
- Climatic category: 40/100/56/B, IEC 60068–1
- Tape & Reel packaging in accordance with IEC 60286–2
- RoHS compliance and lead-free terminations
- Operating temperature range of −40°C to +100°C
- 100% screening factory test at 3,000 VDC
- Highest possible safety regarding active and passive flammability



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Customer Part Number System

PME271	Y	410	M	R30
Series	Rated Voltage (VAC)	Capacitance Code (pF)	Capacitance Tolerance	Packaging
Y2, Metallized Paper	Y = 250	The last two digits represent significant figures. The first digit specifies the total number of digits.	M = ±20%	See Ordering Options Table

KEMET Internal Part Number System

P	271	H	E	102	M	250	A
Capacitor Class	Series	Lead Spacing (mm)	Size Code	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VAC)	Lead and Packaging Code
P = Paper	Y2, Metallized Paper	H = 10.2 Q = 15.2 C = 20.3 E = 25.4	See Dimension Table	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	250 = 250	See Ordering Options Table

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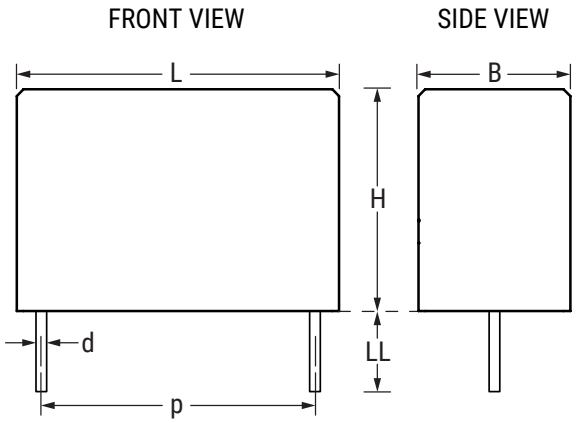
Benefits cont.

- Excellent self-healing properties ensure long life, even when subjected to frequent overvoltages
- Good resistance to ionization due to impregnated dielectric
- High dv/dt capability
- Impregnated paper that ensures excellent stability and reliability, particularly in applications with continuous operation

Ordering Options Table

Lead Spacing Nominal (mm)	Type of Leads and Packaging	Lead Length (mm)	KEMET Lead and Packaging Code	Legacy Lead and Packaging Code
10.2	**Standard Lead and Packaging Options**			
	Bulk (Bag) – Short Leads	6 +0/−1	C	R06
	Bulk (Bag) – Maximum Length Leads	30 +5/−0	A	R30
	Tape & Reel (Standard Reel)	H_0 = 18.5 ±0.5	L	R19T0
	Other Lead and Packaging Options			
	Tape & Reel (Large Reel)	H_0 = 18.5 ±0.5	P	R19T1
Native 10.2 formed to 7.5	Ammo Pack	H_0 = 18.5 ±0.5	LAF3	R30XA
15.2	**Standard Lead and Packaging Options**			
	Bulk (Bag) – Short Leads	6 +0/−1	C	R06
	Bulk (Bag) – Maximum Length Leads	30 +5/−0	A	R30
	Tape & Reel (Standard Reel)	H_0 = 18.5 ±0.5	L	R19T0
	Other Lead and Packaging Options			
	Tape & Reel (Large Reel)	H_0 = 18.5 ±0.5	P	R19T1
20.3	**Standard Lead and Packaging Options**			
	Bulk (Bag) – Short Leads	6 +0/−1	C	R06
	Bulk (Bag) – Maximum Length Leads	30 +5/−0	A	R30
	Tape & Reel (Standard Reel)	H_0 = 18.5 ±0.5	L	R19T0
	Other Lead and Packaging Options			
	Tape & Reel (Large Reel)	H_0 = 18.5 ±0.5	P	R19T1
25.4	**Standard Lead and Packaging Options**			
	Bulk (Bag) – Short Leads	6 +0/−1	C	R06
	Bulk (Bag) – Maximum Length Leads	30 +5/−0	A	R30

Dimensions – Millimeters



p		B		H		L		d	
Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
10.2	±0.4	3.9	Maximum	7.5	Maximum	13.5	Maximum	0.6	±0.05
10.2	±0.4	4.1	Maximum	8.2	Maximum	13.5	Maximum	0.6	±0.05
10.2	±0.4	5.1	Maximum	10.5	Maximum	13.5	Maximum	0.6	±0.05
15.2	±0.4	5.2	Maximum	10.5	Maximum	18.5	Maximum	0.8	±0.05
15.2	±0.4	5.5	Maximum	11.0	Maximum	18.5	Maximum	0.8	±0.05
15.2	±0.4	7.3	Maximum	13.0	Maximum	18.5	Maximum	0.8	±0.05
20.3	±0.4	7.6	Maximum	14.0	Maximum	24.0	Maximum	0.8	±0.05
20.3	±0.4	9.0	Maximum	15.0	Maximum	24.0	Maximum	0.8	±0.05
20.3	±0.4	11.3	Maximum	16.5	Maximum	24.0	Maximum	0.8	±0.05
25.4	±0.4	12.1	Maximum	19.0	Maximum	30.5	Maximum	1.0	±0.05
Note: See the Ordering Options Table for lead length (LL) options.									

Performance Characteristics

Rated Voltage	250 VAC 50/60 Hz	
Capacitance Range	0.001 – 0.1 µF	
Capacitance Tolerance	±20%	
Temperature Range	–40°C to +100°C	
Climatic Category	40/100/56/B	
Approvals	ENEC, UL, CSA, CQC	
Dissipation Factor	Maximum Values at +23°C	
	1 kHz	1.3%
Test Voltage Between Terminals	The 100% screening factory test is carried out at 3,000 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test. This test may not be repeated due to potential capacitor damage. KEMET is not liable for any failures that result from repeating the test.	
Insulation Resistance	Minimum Value Between Terminals	
	12,000 MΩ	
In DC Applications	Recommended voltage ≤ 1,000 VDC	

Environmental Test Data

Test	IEC Publication	Procedure
Vibration	IEC 60068–2–6 Test Fc	3 directions at 2 hours each 10 – 500 Hz at 0.75 mm or 98 m/s^2
Bump	IEC 60068–2–29 Test Eb	4,000 bumps at 390 m/s^2
Solderability	IEC 60068–2–20 Test Ta	Solder globule method
Active flammability	IEC 60384–14	
Passive flammability	IEC 60384–14	Needle-flame test
Humidity	IEC 60068–2–3 Test Ca	+40°C and 90 – 95% R.H.

Approvals

Mark	Specification	File Number
	EN/IEC 60384–14	SE/0140–27D
	UL 60384–14 CAN/CSA–E60384–14–09	E73869
	CQC	14001107140

Environmental Compliance

All KEMET EMI capacitors are RoHS compliant.

Table 1 – Ratings & Part Number Reference

Capacitance Value (µF)	Maximum Dimensions in mm			Lead Spacing (p)	f_o (MHz)	dV/dt (V/µs)	KEMET Internal Part Number	Customer Part Number
	B	H	L					
0.0010	3.9	7.5	13.5	10.2	53	2,000	P271HE102M250(1)	PME271Y410M(1)
0.0015	3.9	7.5	13.5	10.2	44	2,000	P271HE152M250(1)	PME271Y415M(1)
0.0022	3.9	7.5	13.5	10.2	37	2,000	P271HE222M250(1)	PME271Y422M(1)
0.0033	4.1	8.2	13.5	10.2	30	2,000	P271HH332M250(1)	PME271Y433M(1)
0.0047	5.1	10.5	13.5	10.2	24	2,000	P271HL472M250(1)	PME271Y447M(1)
0.0068	5.2	10.5	18.5	15.2	19	1,400	P271QE682M250(1)	PME271Y468M(1)
0.0100	5.2	10.5	18.5	15.2	16	1,400	P271QE103M250(1)	PME271Y510M(1)
0.0150	5.5	11.0	18.5	15.2	13	1,400	P271QH153M250(1)	PME271Y515M(1)
0.0220	7.3	13.0	18.5	15.2	9.8	1,400	P271QM223M250(1)	PME271Y522M(1)
0.0330	7.6	14.0	24.0	20.3	7.0	1,000	P271CE333M250(1)	PME271Y533M(1)
0.0470	9.0	15.0	24.0	20.3	6.0	1,000	P271CJ473M250(1)	PME271Y547M(1)
0.0680	11.3	16.5	24.0	20.3	4.6	600	P271CP683M250(1)	PME271Y568M(1)
0.1000	12.1	19.0	30.5	25.4	3.9	400	P271EJ104M250(1)	PME271Y610M(1)
Capacitance Value (µF)	**B (mm)**	**H (mm)**	**L (mm)**	**Lead Spacing (p)**	**f_o (MHz)**	**dV/dt (V/µs)**	**KEMET Internal Part Number**	**Customer Part Number**

(1) Insert ordering code for lead type and packaging. See Ordering Options Table for available options.

Soldering Process

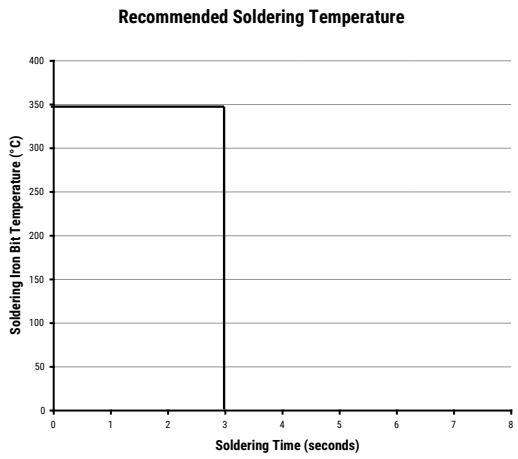
The implementation of the RoHS directive has resulted in the selection of SnAuCu (SAC) alloys or SnCu alloys as a primary solder. This has increased the liquidus temperature from 183°C for SnPb eutectic alloy to 217 – 221°C for the new alloys. As a result, the heat stress to the components, even in wave soldering, has increased considerably due to higher pre-heat and wave temperatures. Polypropylene capacitors are especially sensitive to heat (the melting point of polypropylene is 160 – 170°C). Wave soldering can be destructive, especially for mechanically small polypropylene capacitors (with lead spacing of 5 – 15 mm). Great care must be taken during soldering. The recommended solder profiles from KEMET should be used. Consult KEMET with any questions. In general, the wave soldering curve from IEC Publication 61760-1 Edition 2 serves as a solid guideline for successful soldering. See Figure 1.

Reflow soldering is not recommended for through-hole film capacitors. Exposing capacitors to a soldering profile in excess of the recommended limits may result in degradation or permanent damage to the capacitors.

Do not place the polypropylene capacitor through an adhesive curing oven to cure resin for surface-mount components. Insert through-hole parts after curing the surface mount parts. Consult KEMET to discuss the actual temperature profile in the oven, if through-hole components must pass through the adhesive curing process. A maximum of two soldering cycles is recommended. Allow time for the capacitor surface temperature to return to a normal temperature before the second soldering cycle.

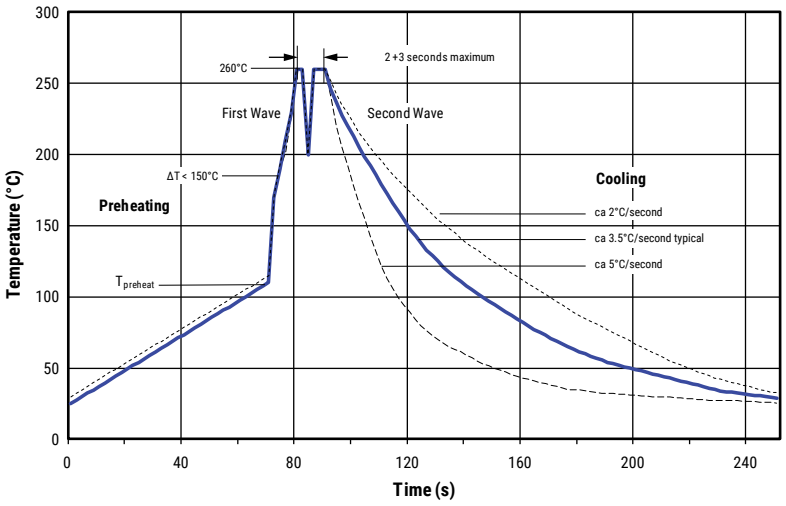
Manual Soldering Recommendations

Following is the recommendation for manual soldering with a soldering iron.



Soldering iron tip temperature should be set at 350°C (+10°C maximum), with the soldering duration not to exceed more than 3 seconds.

Wave Soldering Recommendations



Soldering Process cont.

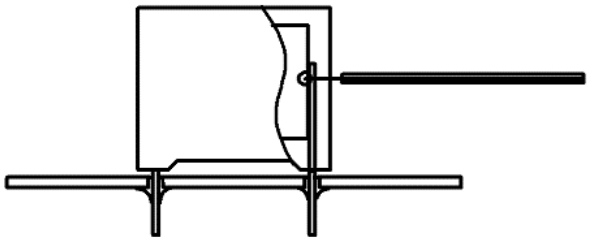
Wave Soldering Recommendations cont'd

1. The table indicates the maximum setup temperature for the soldering process.

Dielectric film material	Maximum Preheat Temperature			Maximum Peak Soldering Temperature	
	Capacitor Pitch ≤ 10 mm	Capacitor Pitch = 15 mm	Capacitor Pitch > 15 mm	Capacitor Pitch ≤ 15 mm	Capacitor Pitch > 15 mm
Polyester	130°C	130°C	130°C	270°C	270°C
Polypropylene	100°C	110°C	130°C	260°C	270°C
Paper	130°C	130°C	140°C	270°C	270°C
Polyphenylene Sulphide	150°C	150°C	160°C	270°C	270°C

2. The maximum temperature measured inside the capacitor: set the temperature so that inside the element the maximum temperature is below the limit.

Dielectric Film Material	Maximum Temperature Measured Inside the Element
Polyester	160°C
Polypropylene	110°C
Paper	160°C
Polyphenylene Sulphide	160°C



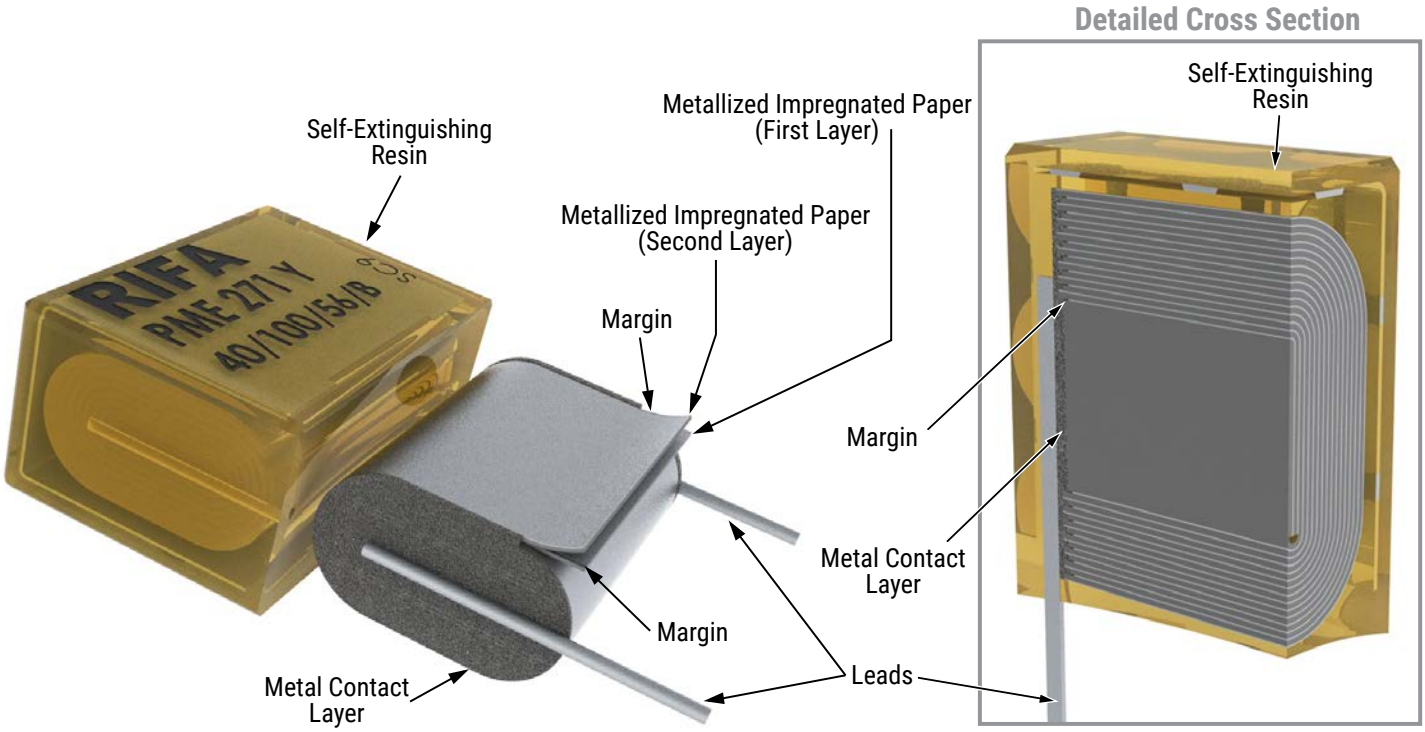
Temperature monitored inside the capacitor.

Selective Soldering Recommendations

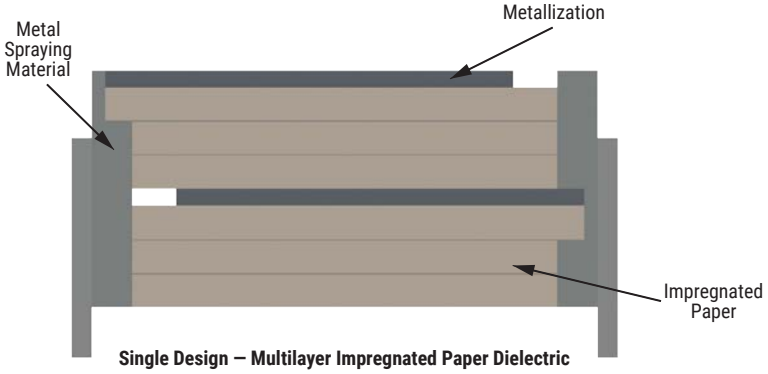
Selective dip soldering is a variation of reflow soldering. In this method, the printed circuit board with through-hole components to be soldered is preheated and transported over the solder bath, as in normal flow soldering, without touching the solder. When the board is over the bath, it is stopped. Pre-designed solder pots are lifted from the bath with molten solder, only at the places of the selected components, and pressed against the lower surface of the board to solder the components.

The temperature profile for selective soldering is similar to the double wave flow soldering outlined in this document. **However, instead of two baths, there is only one with a time from 3 to 10 seconds.** In selective soldering, the risk of overheating is greater than in double wave flow soldering. Great care must be taken so that the parts do not overheat.

Construction

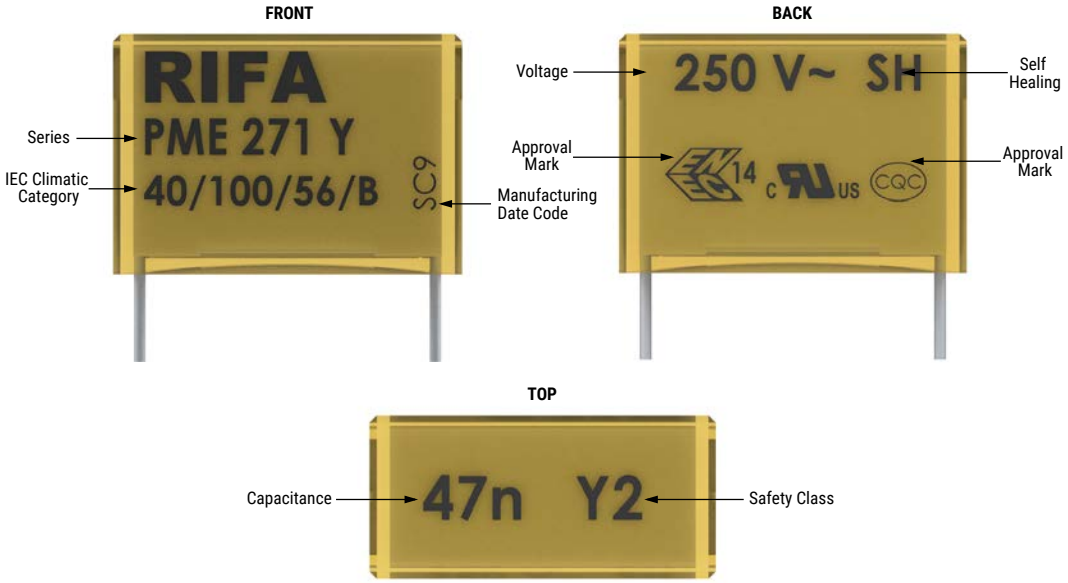


Winding Scheme



Single Design — Multilayer Impregnated Paper Dielectric
1 Section

Marking

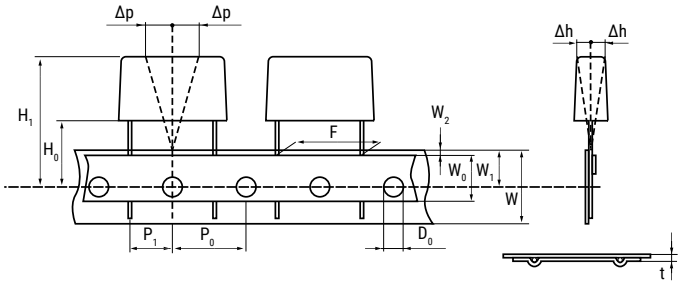


Packaging Quantities

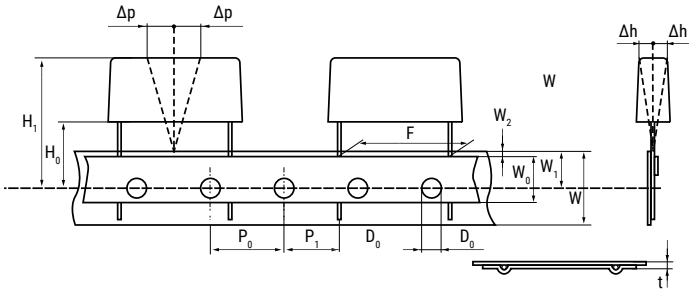
Lead Spacing (mm)	Thickness (mm)	Height (mm)	Length (mm)	Bulk Short Leads	Bulk Long Leads	Standard Reel 360 mm	Large Reel 500 mm	Ammo Formed
10.2	3.9	7.5	13.5	2,000	1,000	700	1,400	800
	4.1	8.2	13.5	2,000	1,000	600		780
	5.1	10.5	13.5	1,600	800	600	1,200	630
15.2	5.5	12.5	18.0	1,000	500	600		
	6.5	12.5	18.0	600	400	400		
	7.5	14.5	18.0	600	400	400		
	8.5	16.0	18.0	400	250	400		
	5.2	10.5	18.5	1,000	500	600		
	5.5	11.0	18.5	1,000	500	500		
	6.0	12.5	18.5	600	400	400		
	7.3	13.0	18.5	600	400	400	800	
	7.8	13.5	18.5	600	400	400		
	8.5	14.3	18.5	500	300	350		
20.3	7.6	14.0	24.0	1,500	250	250	500	
	8.4	14.0	24.0	1,200	200	250	500	
	9.0	15.0	24.0	1,500	200	250		
	11.3	16.5	24.0	1,000	150	180	400	
25.4	10.6	16.1	30.5	1,000	150			
	10.5	17.3	30.5	1,000	100			
	12.1	19.0	30.5	800	100			
	15.3	22.0	30.5	600	75			

Lead Taping & Packaging (IEC 60286–2)

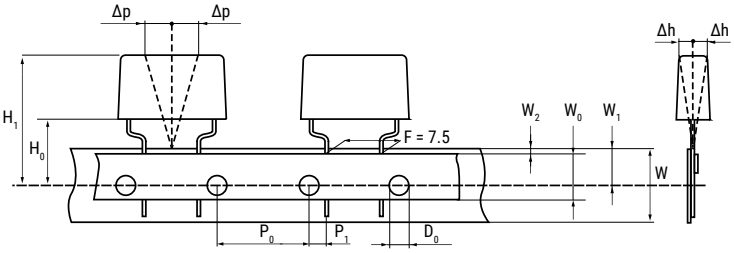
Lead Spacing 10.2 – 15.2 mm



Lead Spacing 20.3 – 22.5 mm



Formed Leads from 10.2 – 7.5 mm



Taping Specification

Dimensions in mm								Standard IEC 60286–2
Lead Spacing	+0.6/−0.1	F	Formed 7.5	10.2	15.2	20.3	22.5	F
Carrier Tape Width	±0.5	W	18	18	18	18	18	18 +1/−0.5
Hold-Down Tape Width	Minimum	W_0	5	5	5	5	5	
Position of Sprocket Hole	±0.5	W_1	9	9	9	9	9	9 +0.75/−0.5
Distance Between Tapes	Maximum	W_2	3	3	3	3	3	3
Sprocket Hole Diameter	±0.2	D_0	4	4	4	4	4	4
Feed Hole Lead Spacing	±0.3	P_0 (1)	12.7(4)	12.7	12.7	12.7	12.7	12.7
Distance Lead – Feed Hole	±0.7	P_1	3.75	7.6	5.1	8.9	5.3	P[1]
Deviation Tape – Plane	Maximum	Δp	1.3	1.3	1.3	1.3	1.3	1.3
Lateral Deviation	Maximum	Δh	2	2	2	2	2	2
Total Thickness	±0.2	t	0.7	0.7	0.7	0.7	0.9 Maximum	0.9 Maximum
Sprocket Hole/Cap Body	Nominal	H_0 (2)	18 +2/−0	18 +2/−0	18 +2/−0	18 +2/−0	18.5 ±0.5	18 +2/−0
Sprocket Hole/Top of Cap Body	Maximum	H_1 (3)	43	43	43	58	58	58 Maximum

(1) Maximum cumulative feed hole error, 1 mm per 20 parts
(2) 16.5 mm available on request
(3) Depending on case size
(4) 15 mm available on request

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