

SolidMatrix[®] 0402 Fast Acting Surface Mount Fuses



Features:

- Multilayer monolithic structure with glass ceramic body and silver fusing element
- Silver termination with nickel and pure-tin solder plating, providing excellent solderability
- Standard EIA0402/EIAJ1005 size
- Compatible with both wave and reflow soldering processes
- Operating temperature range: -55°C to +125°C (with de-rating)
- RoHS compliant



Clear-Time Characteristics (Fast Acting):

% of current rating	Clear-time at 25 °C
100%	4 hours min.
250%	5 seconds max.
400%	0.05 seconds max.

Agency Approval: Recognized Under the Components Program of Underwriters Laboratories. File Number: E232989

Patents: U.S. Patent numbers 6,034,589; 6,228,230; 6,602,766; 7,268,661 B2; and other pending patents

Interrupting Ratings:

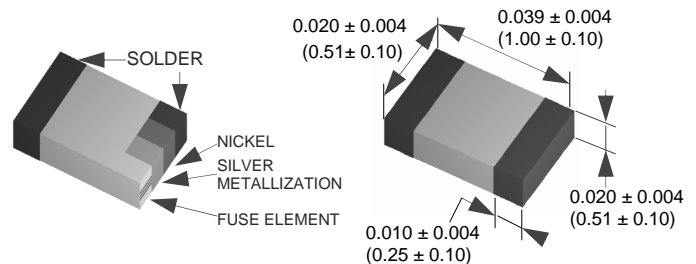
35A at rated voltage

Ordering Information:

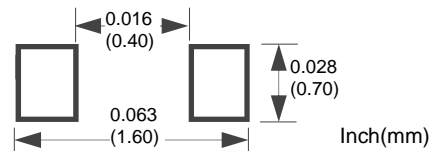
Part Number	Current Rating (A)	Voltage Rating (VDC)	Nominal Cold DCR (Ω) ¹
F0402FA0500V024T	0.5	24	0.380
F0402FA0750V024T	0.75	24	0.210
F0402FA1000V024T	1.0	24	0.120
F0402FA1500V024T	1.5	24	0.056
F0402FA2000V024T	2.0	24	0.035
F0402FA3000V024T	3.0	24	0.021
F0402FA4000V024T	4.0	24	0.014

1. Measured at $\leq 10\%$ rated current and 25°C ambient.

Shape and Dimensions:



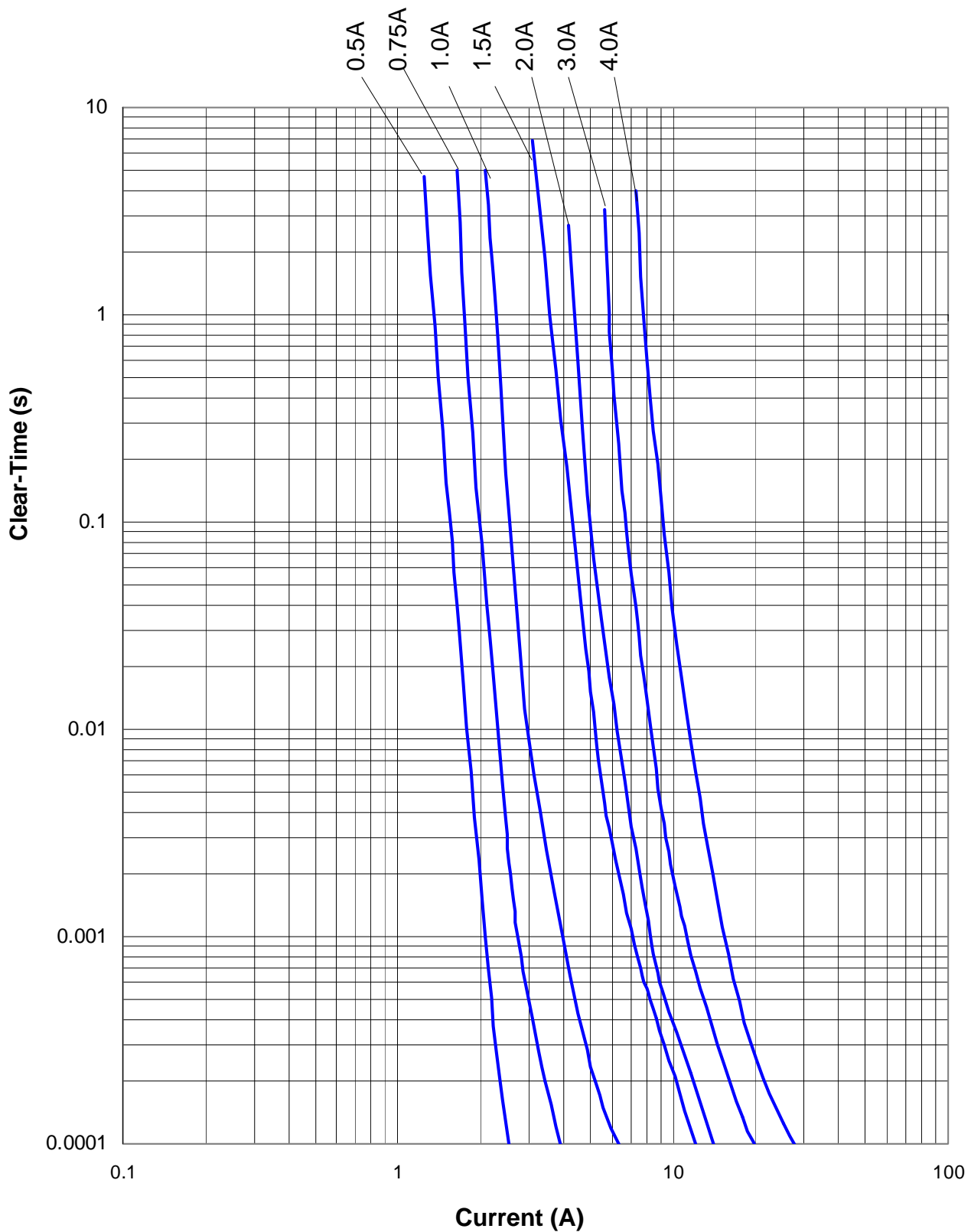
Recommended Land Pattern:



SolidMatrix® 0402 Fast Acting Surface Mount Fuses



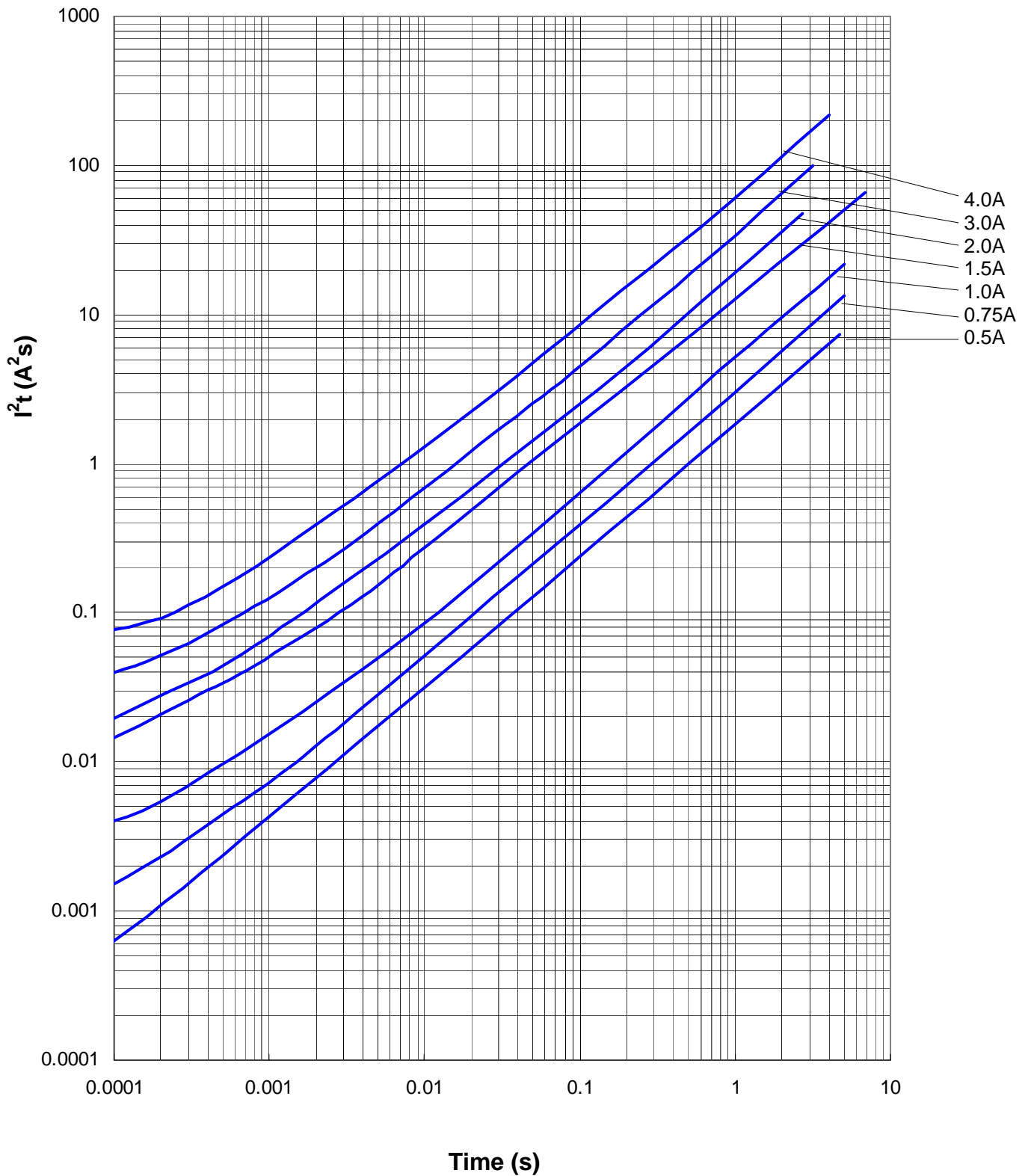
Average Clear-Time Curves



SolidMatrix® 0402 Fast Acting Surface Mount Fuses



Average I^2t vs. t Curves



SolidMatrix® Surface Mount Fuses

Product Identification:

F 0603 FA 1000 V024 T M

(1) (2) (3) (4) (5) (6) (7)

- (1) **Series code:** F—Chip Fuse
- (2) **Size code:** Standard EIA Chip Sizes
- (3) **Action code:** FA —Fast Acting; SB —Slow Blow; HI —High Inrush; FF—Very Fast Acting; HA—High Current
- (4) **Current rating code:** 1000 — 1000 mA (For HA, 10—10A)
- (5) **Voltage rating code:** V024 — 24 VDC
- (6) **Package code:** T — Tape & Reel, B — Bulk
- (7) **Marking code:** M—With marking (Optional)

Environmental Tests:

No.	Test	Requirement	Test condition	Test reference
1	Soldering heat resistance	DCR change $\leq \pm 10\%$ No mechanical damage	One dip at 260°C for 60 sec.	MIL-STD-202 Method 210
2	Solderability	Minimum 95% coverage	One dip at 255°C for 5 sec.	MIL-STD-202 Method 208
3	Thermal shock	DCR change $\leq \pm 10\%$ No mechanical damage	100 cycles between -65°C and +125°C	MIL-STD-202 Method 107
4	Moisture resistance	DCR change $\leq \pm 15\%$ No excessive corrosion	10 cycles	MIL-STD-202 Method 106
5	Salt spray	DCR change $\leq \pm 10\%$ No excessive corrosion	48 hour exposure	MIL-STD-202 Method 101
6	Mechanical vibration	DCR change $\leq \pm 10\%$ No mechanical damage	0.4" D.A. or 30 G between 5 – 3000 Hz	MIL-STD-202 Method 204
7	Mechanical shock	DCR change $\leq \pm 10\%$ No mechanical damage	1500 G, 0.5 ms, half-sine shocks	MIL-STD-202 Method 213
8	Terminal strength	No mechanical damage	30 sec. hanging for 1206 (1.5kg) and 0603 (0.5kg), 2 lb pushing for 0402	Refer to AEM QIQ007
9	Life	No electrical "opens" during testing voltage drop change shall be less than $\pm 20\%$ of initial value	80% rated current (75% for <1A fuses) for 2000 hours at ambient temperature between +20°C and +30°C	Refer to AEM QIQ106

Electrical Specifications:

Clear-Time Characteristics: Same as specified on the Short Form Data Sheet

Insulation Resistance after Opening: 20,000 ohms typical when cleared with rated voltage applied. Fuse clearing under low voltage conditions may result in lower after clearing insulation resistance values. (Note: Under normal fault conditions (low or rated voltage conditions), AEM SolidMatrix fuses provide sufficient after clearing insulation resistance values for circuit protection.)

Current Carrying Capacity: 100% rated current at +25°C ambient for 4 hours minimum when evaluated per MIL-PRF-23419

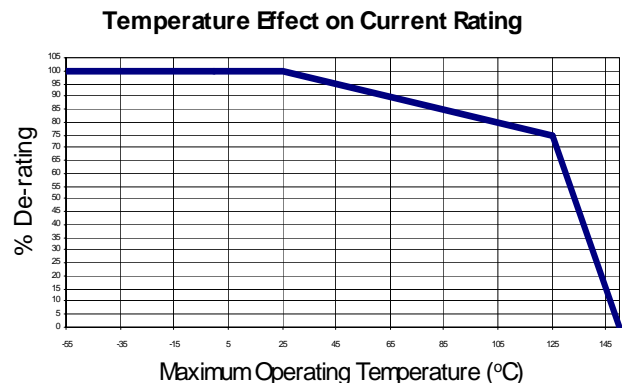
Interrupt Ratings: as specified in this catalog.

Fuse Selection and Temperature De-rating Guideline:

The ambient temperature affects the current carrying capacity of fuses. When a fuse is operating at a temperature higher than 25°C, the fuse shall be "de-rated".

To select a fuse from the catalog, the following rule may be followed:
 Catalog Fuse Current Rating = Nominal Operating Current / 0.75 / % De-rating at the maximum operating temperature.

Example: At maximum operating temperature of 65°C, % De-rating is 90%. The nominal operating current is 4A. The current rating for fuse selected from the catalog shall be:
 $4 / 0.75 / 90\% = 5.9$ or 6A.

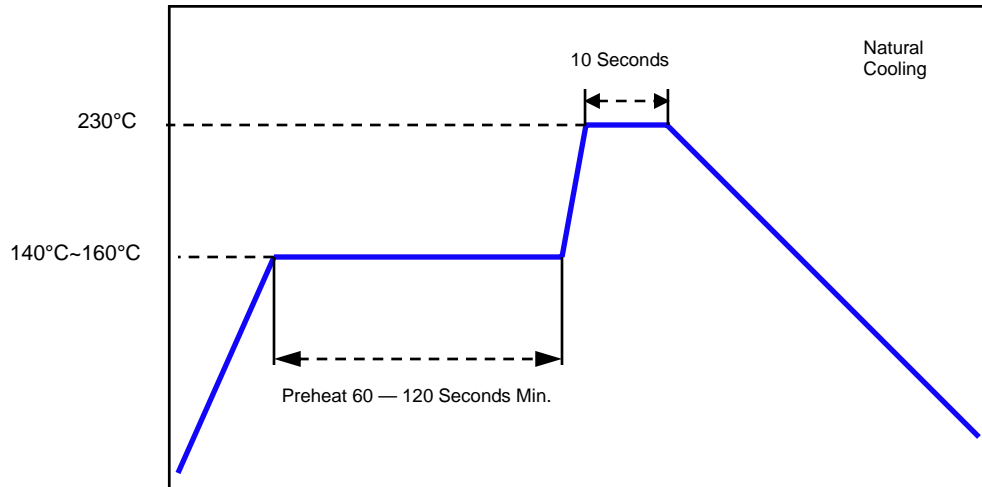


Specifications and descriptions in this literature are as accurate as known at the time of publish, but are subject to change without notice.

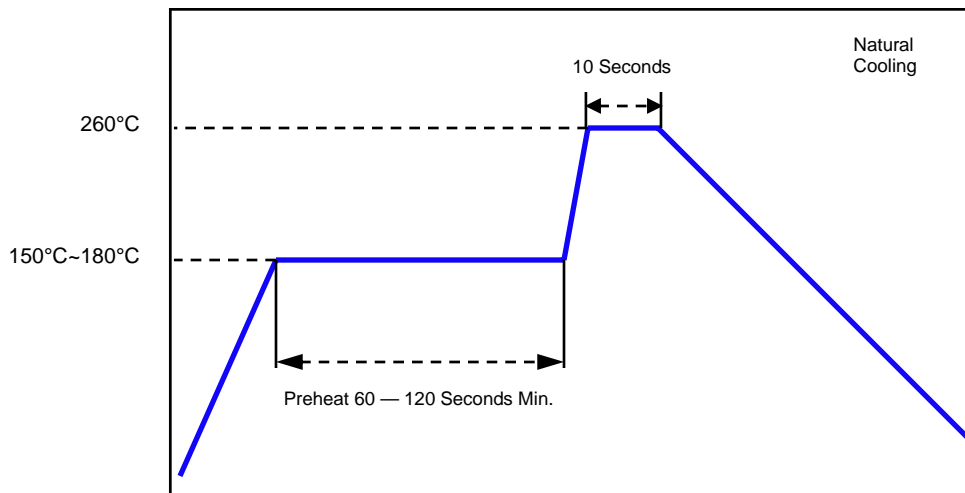
SolidMatrix[®] Surface Mount Fuses

Soldering Temperature Profiles

**Recommended Temperature Profile
for Sn/Pb Solder**



**Recommended Temperature Profile
for Lead-free Solder**



Recommended conditions for hand soldering:

1. Appropriate temperature (max.) of soldering iron tip/soldering time (max.): 280°C /10s or 350°C / 3s
2. Using hot air rework station with tip that can melt the solder on both terminations at the same time is strongly recommended. Do not directly contact the chip termination with the tip of soldering iron.

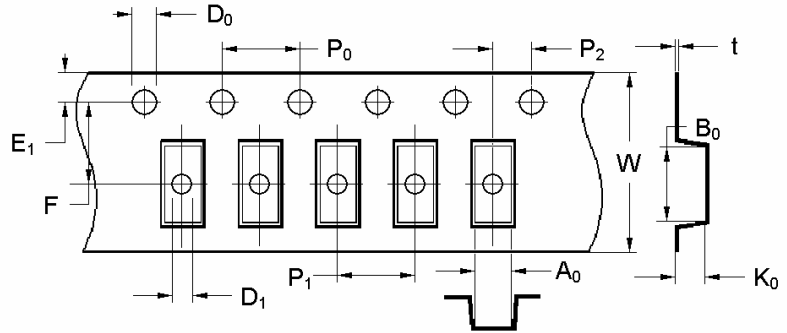
Packaging and Storage

Packaging

AEM's multilayer components are provided on tape-and-reel for use in pick-and-place machines or in bulk for special applications. Both tape-and-reel and bulk products are sealed in plastic bags with desiccant. The reel size can be 7 inches or 13 inches, depending on customers' preference.

Dimensions of Tape in Inches (mm)

Size	A _o	B _o	K _o	Type
0402 (1005)	0.026 ± 0.004 (0.67 ± 0.10)	0.046 ± 0.004 (1.17 ± 0.10)	0.025 ± 0.004 (0.63 ± 0.10)	Paper
0603 (1608)	0.039 ± 0.004 (0.98 ± 0.10)	0.071 ± 0.004 (1.80 ± 0.10)	0.037 ± 0.003 (0.95 ± 0.08)	Paper
	0.039 ± 0.004 (1.00 ± 0.10)	0.071 ± 0.004 (1.80 ± 0.10)	0.024 ± 0.003 (0.60 ± 0.08)	Paper (for FF)
	0.036 ± 0.004 (0.92 ± 0.10)	0.071 ± 0.004 (1.80 ± 0.10)	0.033 ± 0.004 (0.85 ± 0.10)	Plastic
0805	0.063 ± 0.004	0.093 ± 0.004	0.047 ± 0.004	Plastic
1206	0.071 ± 0.004	0.138 ± 0.004	0.050 ± 0.004	Plastic
1210	0.106 ± 0.004	0.137 ± 0.004	0.056 ± 0.004	Plastic
1812	0.144 ± 0.004	0.195 ± 0.004	0.072 ± 0.004	Plastic
2220	0.201 ± 0.004	0.235 ± 0.004	0.110 ± 0.004	Plastic



Size	E ₁	F	W	P ₁	P _o	P ₂	D _o	D ₁	t	
0402(1005)	0.069 ± 0.004 (1.75 ± 0.10)	0.138 ± 0.002 (3.50 ± 0.05)	0.318 ± 0.004 (8.00 ± 0.10)	0.079 ± 0.004 (2.00 ± 0.10)	0.157 ± 0.004 (4.00 ± 0.10)	0.040 ± 0.002 (1.00 ± 0.05)	0.059 ± 0.004/-0.00 (1.50 ± 0.10/-0.00)	N/A	0.009 ± 0.001 (0.23 ± 0.02)	
0603(1608)				0.157 ± 0.004 (4.00 ± 0.10)				0.079 ± 0.002 (2.00 ± 0.05)		0.039 max. (1.00 max.)
0805(2012)				0.318 ± 0.004 (8.00 ± 0.10)						
1206(3216)			0.472 ± 0.004 (12.00 ± 0.10)	0.004(8.00 ± 0.10)						
1812(4532)			0.004(8.00 ± 0.10)							
2220(5750)			0.004(8.00 ± 0.10)							

Packaging Data

Chip Size	Parts on 7 inch (178 mm) Reel
0402(1005)	10,000
0603(1608)	4,000
0805(2012)	3,000
1206(3216)	3,000
1210(3225)	2,000
1812(4532)	1,000
2220(5750)	1,000

Packaging and Storage

Storage

The maximum ambient temperature shall not exceed 40°C. Storage temperatures higher than 40°C could result in the deformation of packaging materials. The maximum relative humidity recommended for storage is 70%. High humidity with high temperature can accelerate the oxidation of the solder plating on the termination and reduce the solderability of the components. Sealed plastic bags with desiccant shall be used to reduce the oxidation of the termination and should only be opened prior to use. The products should not be stored in areas where harmful gases containing sulfur or chlorine are present.

Specifications and descriptions in this literature are as accurate as known at the time of publish, but are subject to change without notice. For the most updated information, please consult the factory.

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