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Melf Resistor Series

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Terminology & Glossary

► Terminology & Glossary

Terminology & Glossary

Derating Curve

The curve that expresses the relation between the ambient temperature and the maximum value of continuously loadable power at its temperature, which is generally expressed as a percentage.

Dielectric Withstanding Voltage

The rated voltage that can be applied to a designated point between the resistive element and the outer coating, or the resistive element and the mounting surface, without causing dielectric breakdown.

Maximum Overload Voltage

The maximum value of voltage capable of being applied to resistors for a short period of time in the overload test. Typically the applied voltage in the short time overload test is 2.5 times larger than the rated voltage. However, it should not exceed the maximum overload voltage.

Maximum Working Voltage

The maximum value of DC voltage or AC voltage (rms) capable of being applied continuously to resistors or element. However, the maximum value of the applicable voltage is the rated voltage at the critical resistance value or lower.

Power Rating

Power ratings are based on physical size, allowable change in resistance over life, thermal conductivity of materials, insulating and resistive materials, and ambient operating conditions. For best results, employ the largest physical size resistors at less than their maximum rated temperature and power.

Rated Ambient Temperature

The maximum ambient temperature at which resistors are capable of being used continuously with the prescribed rated power. The rated ambient temperature refers to the temperature around the resistors inside the equipment, not to the air temperature outside the equipment.

Rated Power

The maximum amount of power that can be continuously loaded to a resistor at a rated ambient temperature. Network and array products have both rated power per package as well as per element.

Rated Voltage

The maximum value of DC voltage or AC voltage (rms) capable of being applied continuously to resistors at the rated ambient temperature.



Resistor Tolerance

Resistor tolerance is expressed as the deviation from nominal value in percent and is measured at 25 °C only with no appreciable power applied. A resistor's value will also change with applied voltage (VCR) and temperature (TCR). For networks, absolute resistor tolerance refers to the overall tolerance of the network. Ratio tolerance refers to the relationship of each resistor to the others in the package.

Temperature Coefficient of Resistance (TCR)

TCR is expressed as the change in resistance in ppm (0.0001 %) with each degree Celsius of change in temperature. TCR is typically referenced at +25 °C and changes as the temperature increases (or decreases). A resistor with a TCR of 100 ppm/°C will change 0.1 % over a 10 °C change and 1 % over a 100 °C change. In the context of a resistor network, the TCR value is called the absolute TCR in that it defines the TCR of a specific resistor element. The term TCR tracking refers to the difference in TCR between each specific resistor in a network.

MELF Resistor - Alias & Acronym

Melf is the abbreviation of "Metal Electrode Leadless Face" and is a cylindrically shaped resistor designed for surface mounting.

Acronym: Leadless Resistor; Cylindrical Resistor; Metal Electrode Leadless Face device; Surface Mounted Leadless Component.

Low Noise Carbon MELF Resistors (RDM)

► Product Introduction

||| **Token Carbon Film MELF (RDM) is the cost-effective option.**

Features :

- Coating color: Yellow; Marking: Color code (3 color band).
- Free direction for mounting due to cylindrical design. Electrodes strength is higher than flat chip resistors.
- Specially plated electrodes for high solderability. Lower current noise than flat chip resistors. Lead (Pb)-free and RoHS compliant.
- Speciality carbon film technology. DIN: 0204, 0207, 0309.

Applications :

- Home appliances,
- Electrical Equipment,
- Consumer electronics.

Commercial grade low power carbon film resistors offer high quality performance for applications that do not require surge protection or precision tolerances.

Providing design engineers with an economical power resistor with high quality performance, Token Electronics now offers commercial grade low power carbon film resistors. Designated the RDM Series, the conformal coated resistors offer high quality performance for applications that do not require surge protection or precision tolerances.



The commercial grade carbon Melf resistors are available in flame retardant packaging and have ideal specifications for consumer electronic or electrical devices. The RDM Series resistors offer a wide resistance range for devices with power ratings below 1W, delivering high quality performance for general purpose applications.

The RDM Series resistors are ideal for general use applications including electrical equipment, small appliances and consumer electronics, such as televisions and other high-volume products.

The RDM Series film resistors feature power ratings from 0.125 to 1W, with a resistance range from 1 Ω to 1M Ω . Standard tolerances for the devices are to $\pm 2\%$ and $\pm 5\%$ with TCRs as low as $\pm 300\text{ppm}/^\circ\text{C}$ for values of 1K Ω or less. Maximum working voltage ranges from 200V to 350V.

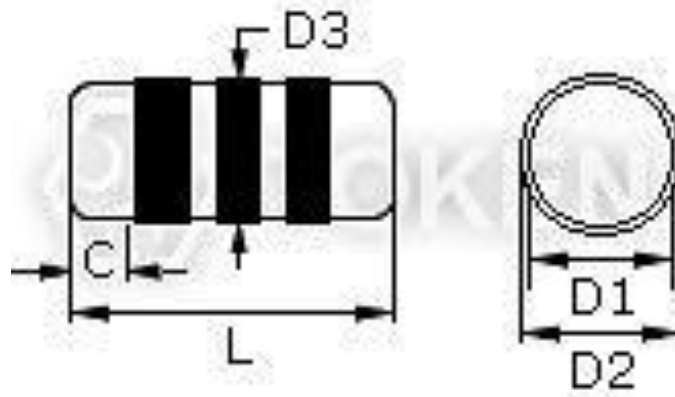
Contact our sales representative with your specific needs. Or you can link to Token official website "[Melf Resistors](http://www.token.com.tw)" for more information.



Dimensions

Dimensions (Unit: mm) Carbon Film (RDM)

Type	RDM73S	RDM73P	RDM74S	RDM74P	RDM16M	RDM17S	RDM17P	
DIN-44061 type	0204	0204	0207	0207	0207	0309	0309	
Dimensions (Unit: mm)	L	3.5±0.2	3.5±0.2	5.9±0.2	5.9±0.2	5.9±0.2	8.5±0.2	8.5±0.2
	C (Min.)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	D1	1.40±0.15	1.40±0.15	2.2±0.1	2.2±0.1	2.2±0.1	3.2±0.2	3.2±0.2
	D2 (Max.)	1.55	1.55	2.4	2.4	2.4	3.4	3.4
	D3 (Max.)	1.25	1.25	2.1	2.1	2.1	3.0	3.0



Carbon Film Low Noise MELF (RDM) Dimensions

Characteristics

Characteristics Lower Current Noise (RDM)

Type	RDM73S	RDM73P	RDM74S	RDM74P	RDM16M	RDM17S	RDM17P	
DIN-44061 type	0204	0204	0207	0207	0207	0309	0309	
Power Rating (W)	1/8	1/4	1/4	1/2	1	1/2	1	
Resistance Range (Ω) E24	1 ~ 1M							
Resistance Tolerance	G: $\pm 2\%$ J: $\pm 5\%$							
Max. Working Voltage (V)	200	250	300	300	350	350	350	
Max. Overload Voltage (V)	400	500	600	600	700	700	700	
Packaging & Qty (pcs)	Case	180K	180K	96K	96K	96K	50K	50K
	Reel	3K	3K	2K	2K	2K	2.5K	2.5K

Item	Characteristics					Test Method
Temp. Coefficient (PPM/ $^{\circ}$ C)	TCR Type	0 ~ -350	0 ~ -600	0 ~ -1000	0 ~ -1500	JIS-C(5202-5.2)
	>1/4W	<10K	11K~115K	160K~2M2	-	
	1/8W	<1K	1K1~47K	51K~470K	510K~1M	
Short Time Overload	$\pm (1.0\% + 0.05\Omega)$					JIS-C(5202-5.5)
Intermittent	$\pm (1.0\% + 0.05\Omega)$					JIS-C(5202-5.8)
Resistance to Soldering	$\pm (1.0\% + 0.05\Omega)$					JIS-C(5202-6.4)
Solderability	95% Coverage min					JIS-C(5202-6.5)
Moisture Resistance	$\pm (5.0\% + 0.1\Omega)$					JIS-C(5202-7.9)
Load Life	$\pm (3.0\% + 0.1\Omega)$					JIS-C(5202-7.10)

Order Codes

Order Codes Carbon MELF (RDM)

RDM74P	1R		J		TR	
Part Number	Resistance Value (Ω)		Resistance Tolerance (%)		Package	
RDM73S	1R2	1.2 Ω	G	$\pm 2\%$	P	Bulk
RDM73P	12R	12 Ω	J	$\pm 5\%$	TR	Taping Reel
RDM74S	120R	120 Ω				
RDM74P	12K	12K Ω				
RDM16M						
RDM17S						
RDM17P						

Non-Inductive Melf Resistors (RFM)

▶ Product Introduction

Non-Inductance MELF Resistors offer greater choice for high frequency applications.

Features :

- Low-inductance non-helical trimmed product.
- Over dissipation rating at 70°C up to 0.75W.
- Speciality high frequency product for RF applications.
- Suitable for more than GHz operation; Excellent overall stability: Class 0.5.
- Tolerance range: $\pm 0.5\%$ to $\pm 5.0\%$; Resistance range: 25 Ω to 200 Ω .
- Special metal film technology, DIN: 0102, 0204, 0207.
- Lead (Pb)-free and RoHS compliant.

Applications :

- Medical Equipment.
- Industrial electronics.
- Automatic Equipment Controller.
- HF and pulse loading applications.
- Testing & Measurement Equipment.
- Consumer Product, Printer Equipment.
- Communication Device, Cell phone, GPS, PDA.

The high frequency RFM specialty series of non-inductance MELF resistor from Token Electronics has been extended to offer more than GHz operation, making the devices more suitable for high frequency RF applications.

They are the perfect choice in high frequency circuit designs where the parasitic inductance of regular, helical trimmed resistors cannot be accepted, but where also pulse energies apply. Typical applications are in the fields of telecommunication equipment and industrial electronics.

These high stability, non-inductance MELF resistors have a footprint very close to comparable chip resistors but maintain their tolerance and deliver higher stability over a wider temperature range. Sizes range from 5.7 x 2.1mm for the RFM74 MELF-0207, through 3.45 x 1.3mm for the RFM73 MELF-0204 down to 2.2 x 1.3mm for the RFM72 MELF-0102.

Production is strictly controlled and follows an extensive set of instructions established for reproducibility. The groove on the metal alloy film of high grade ceramic rod is specially designed to achieve non inductance. The resistor elements are covered by a protective coating designed for mechanical, electrical and climatic protection.

The terminations are covered with final pure tin plating for keeping perfect solder ability. Four or five color code rings designate the resistance value and tolerance in accordance with IEC 60062.

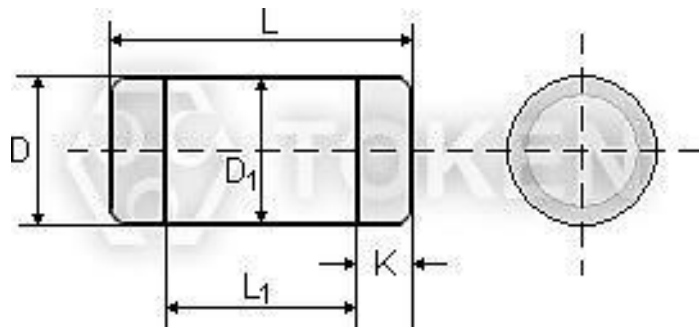
Token's RFM MELF standard series can be a replacement for Vishay, IRC, EBG, KAO, and Panasonic Precision Devices with more competitive price and short lead time. Contact us with your specific needs. Please link to Token official website "[Melf Resistors](http://www.token.com.tw)" for more information.



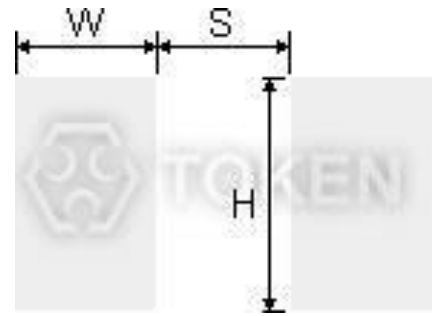
► Dimensions

Dimensions & Recommended Soldering Bath Dimensions (RFM)

Type		RFM72	RFM73	RFM74	RFM75
Metric sizes		DIN: 0102	DIN: 0204	DIN: 0207	DIN: 0207
Dimension (Unit: mm)	$L \pm 0.2$	2.2	3.45	5.7	6.0
	$L_1 \pm 0.2$	1.2	1.6	3.0	3.3
	$D \pm 0.2$	1.3	1.3	2.1	2.1
	$K \pm 0.1$	0.4	0.8 min	1.2 min	1.2 min
	$D_1 \pm 0.1$	$D+0/D-0.15$	$D+0/D-0.25$	$D+0/D-0.3$	$D+0/D-0.3$
Recommended Soldering Bath Dimension (Unit: mm)	S	1.0	1.6	2.6	2.8
	W	2.0	2.0	2.5	2.5
	H	2.0	2.5	2.5	2.5



High Frequency MELF Resistor (RFM) Dimensions



Recommended Soldering Bath (RFM) Dimensions

Characteristics

Characteristics (RFM)

Type	RFM72	RFM73	RFM74	RFM75
Metric sizes	DIN: 0102	DIN: 0204	DIN: 0207	DIN: 0207
Resistance range	25Ω ~ 200Ω			
Operating Temperature range	-55°C ~ 125°C			
Resistance Tolerance (%)	D(±0.5); F(±1.0); J(±5.0)			
Temperature coefficient (PPM/°C)	C1(±100); C2(±50); C3(±25); C5(±15); C6(±10)			
Rated dissipation (W) P70	0.125	0.25	0.5	0.75
Operating mode	standard	standard	standard	power
Climatic category (LCT/UCT/days)	55/125/56	55/125/56	55/155/56	55/155/56
Endurance, Max, resistance change at P70, ΔR/R max., after 1000h	≤0.5% for Tol.=±1% & ≤1% for Tol.=±5%			
Derating	standard type linear from 70°C to 125°C			
Insulation voltage	500V			
Insulation resistance	>1GΩ			

Order Codes

Order Codes (RFM)

RFM73	100R	F	C3	TR				
Part Number	Resistance Value (Ω)		Temperature coefficient (PPM/°C)		Package			
RFM72	100R	100	D	±0.5	C1	±100	P	Bulk
RFM73							TR	Taping Reel
RFM74			F	±1.0	C2	±50		
RFM75			J	±5.0	C3	±25		
					C5	±15		
					C6	±10		

Pulse Load Melf Resistors (RGM)

▶ Product Introduction

Pulse Load MELF Resistor (RGM) provides maximum thermal compliance.

Features :

- Tolerance range: $\pm 0.5\%$ to $\pm 10\%$; Resistance range: $10\text{K } \Omega \sim 1\text{G } \Omega$.
- High pulse handling capability. DIN: 0207, 0309, 0411.
- Temperature coefficient: $\pm 100\text{ppm}/^\circ\text{C}$, $\pm 200\text{ppm}/^\circ\text{C}$.
- Combine high resistance range with high voltage.
- Power dissipation rating at 70°C up to 3W.
- Speciality metal glaze film technology.
- Lead (Pb)-free and RoHS compliant.

Applications :

- Power Supply (SMPS): Voltage Divider, Isolation, PFC control, Mains Protection and Discharge Path Resistor.
- CTV, CRT Monitor: Isolation Resistor, Mains Protection, Discharge Path Resistor and Power Factor Control (PFC).
- Test & Measurement: Voltage Divider and Surge Protection.
- Home Appliances: Control Module for Surge Protection.
- Electronic Ballast: Ignition, Switching Spark Circuit.

Providing design engineers with a family of resistors designed specifically for surge and pulse applications, Token Electronics' family of power MELF resistors feature extended performance capability with ratings up to 3W.

Consisting of the RGM16M, RGM17M, RGM18M, and RGM74 Series resistors, the devices in the power MELF family all use Token's Metal Glaze resistive element on ceramic substrates. The RGM Anti-Surge Melf Series feature metal caps fitted on the terminals of the cylindrical resistor body to give the devices exceptional thermal compliance.



The resistors in the power MELF family provide excellent thermal compliance as well as a variety of surge capabilities. The rugged RGM18M Series resistors are rated up to 3W and provide maximum thermal compliance, while the RGM74 Series resistors offer as much as three times the surge rating of standard resistors, which equates to up to 10 times the surge rating of similar-sized flat thick film chip resistors. The range of capabilities allows customers to select the best device to provide stable performance in harsh environment applications.

The RGM MELF Series is a perfect fit when an anti-surge resistor is required. Other major applications of RGM resistors are: AC mains protection, isolation between primary/secondary circuits in TVs, voltage dividers, ignition/switching circuit in electronic ballasts.

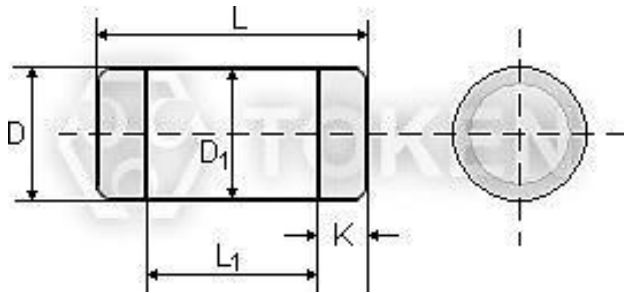
Token will also produce MELF devices outside these specifications to meet customer requirements. Contact us with your specific needs. Please link to Token official website "[Melf Resistors](http://www.token.com.tw)" for more information.



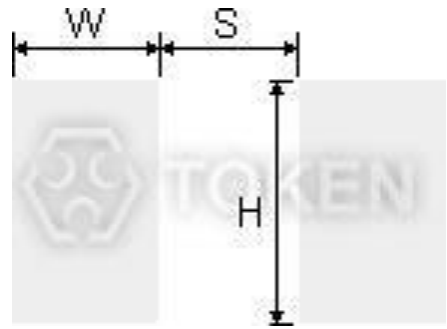
Dimensions

Dimensions & Recommended Soldering Bath Dimensions (RGM)

Type		RGM74	RGM16M	RGM17M	RGM18M
DIN type		DIN: 0207	DIN: 0207	DIN: 0309	DIN: 0411
Dimension Max (± 0.3 mm)	L	5.7	6.1	8.7	11
	L1	3.5	3.9	6.2	8.8
	D	2.1	2.1	3.1	3.9
	K	0.6	0.8	1.0	1.3
	D1	D+0/D-0.5	D+0/D-0.5	D+0/D-0.5	D+0/D-0.5
Recommended Soldering Bath Dimension (Unit: mm)	S	3.3	3.5	5.6	7.2
	W	3.2	4.0	5.0	7.0
	H	3.2	4.5	5.0	5.0



Pulse Load MELF (RGM) Dimensions



Recommended Soldering Bath (RGM) Dimensions

Characteristics

Characteristics (RGM)

Type	RGM74	RGM16M	RGM17M	RGM18M
DIN type	DIN: 0207	DIN: 0207	DIN: 0309	DIN: 0411
Resistance range (Ω)	10k ~ 1G	10k ~ 1G	10k ~ 1G	10k ~ 1G
Resistance Tolerance	D($\pm 0.5\%$); F($\pm 1\%$); J($\pm 5.0\%$); K($\pm 10\%$)			
Temperature coefficient	$\pm 100\text{ppm}/^\circ\text{C}$; $\pm 200\text{ppm}/^\circ\text{C}$			
Rated dissipation (W) P70	0.50	1.0	2.0	3.0
Operating voltage (V) U_{max}	1600	1600	2000	3000
Short time over load voltage (V)	3200	3200	4000	6000
Operating Temperature range	$-55^\circ\text{C} \sim 125^\circ\text{C}$			
Endurance, Max, resistance change at P70, $\Delta R/R$ max., after 1000h	10K Ω ~ 1M Ω	10K Ω ~ 1M Ω	10K Ω ~ 1M Ω	10K Ω ~ 1M Ω
	$\leq 1.50\%$			
Insulation voltage	$> 500\text{V}$			
Insulation resistance	$> 1\text{G}\Omega$			

Order Codes

Order Codes (RGM)

RGM16M	510K		J		TR	
Part Number	Resistance Value (Ω)		Resistance Tolerance (%)		Package	
RGM74	51K	51K Ω	D	$\pm 0.5\%$	P	Bulk
RGM16M	510K	510K Ω	F	$\pm 1.0\%$	TR	Taping Reel
RGM17M	5M1	5.1M Ω	J	$\pm 5.0\%$		
RGM18M	51M	51M Ω	K	$\pm 10\%$		
	510M	510M Ω				

Metal Film Ultra Precision Melf Resistors (RJM)

► Product Introduction

Token Precision Metal-Film Melf Resistors (RJM) offer more design options.

Features :

- DIN: 0102, 0204, 0207, 0411.
- Pure Sn termination on Ni barrier layer.
- Very high ratio of performance to price.
- High precision tolerance down to $\pm 0.05\%$.
- Force fitted steel caps, tin plated on nickel barrier.
- Superior overall stability, most advanced thin film technology.
- TCR down to $\pm 5\text{ppm}/^\circ\text{C}$, wide resistance range: 0.1Ω to $22\text{M}\Omega$.
- Compatible with lead (Pb)-free and lead containing soldering processes.

Applications :

- Measuring and calibration equipment.
- Industrial process control systems.
- Space and aircraft electronics.
- Test and measurement.
- Medical electronics.
- Telecom.

(RJM) professional thin film MELF resistors (Cylindrical Resistors) are the perfect choice for most fields of modern professional electronics where reliability and stability is of major concern.

(RJM) resistors combine the proven reliability of professional MELF products with a most advanced level of precision and stability first achieved with axial thin film high precision resistors.

This unique combination makes the product perfectly suited for all applications with outstanding requirements towards reliable precision and stability. The typical applications in the fields of telecommunication, automotive and medical equipment reflect the outstanding level of proven reliability.

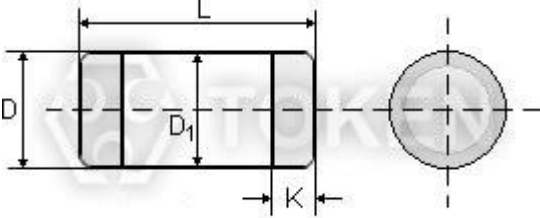
Token's (RJM) equate Vishay, Ohmite, Caddock, IRC, EBG, KOA, Panasonic Precision MELF with more competitive price and fast delivery. Contact us with your specific needs. Please link to Token official website "[Melf Resistors](http://www.token.com.tw)" for more information.



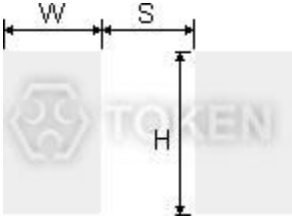
► Dimensions

Dimensions & Recommended Soldering Bath Dimensions (RJM)

Type	RJM72P	RJM73P	RJM73M	RJM74S	RJM74P	RJM16M	RJM17M	RJM18M
Metric type	DIN: 0102	DIN: 0204		DIN: 0207			DIN: 0309	DIN: 0411
Dimension (Unit: mm)	L(±0.3)	2.0	3.5	3.5	5.7	6.0	8.7	11.8
	D(±0.3)	1.25	1.3	1.3	2.1	2.1	3.1	3.6
	K(±0.2)	≥0.4	≥0.6	≥0.6	≥0.6	≥0.6	≥1.0	≥1.0
	D1(±0.1)	≥D-0.1	≥D-0.2	≥D-0.2	≥D-0.3	≥D-0.3	≥D-0.4	≥D-0.4
Recommended Soldering Bath Dimensions (Unit: mm)	S	1.3	1.5	1.5	2.8	3.2	5.6	8.2
	W	2.0	1.6	3.0	3.0	3.5	4.0	5.0
	H	1.3	1.6	3.0	3.0	3.5	4.0	5.0



Precision Melf (RJM) Dimensions



Recommended Soldering Bath (RJM) Dimensions

Characteristics

Characteristics (RJM)

Type	RJM72P	RJM73P	RJM73M	RJM74S	RJM74P	RJM16M	RJM17M	RJM18M
Metric type	DIN: 0102	DIN: 0204		DIN: 0207			DIN: 0309	DIN: 0411
Rated dissipation P70	0.125W	0.25W	0.5W	0.25W	0.50W	1.0W	2.0W	3.0W
Resistance range (Ω)	10 ~ 1M	10 ~ 10M						
Resistance tolerance (%)	J (± 5); F (± 1); D (± 0.5); C (± 0.25); B (± 0.10); A5 (± 0.05)							
Temperature coefficient (ppm/ $^{\circ}$ C)	C1 (± 100); C2 (± 50); C3 (± 25); C5 (± 15); C6 (± 10); C7 (± 5)							
Climatic category (LCT/UCT/days)	55 / 125 / 56							
Operating voltage Umax	150V	200V	250V	250V	300V	350V	400V	450V
Temperature range	-55 $^{\circ}$ C to 125 $^{\circ}$ C							
Insulation voltage (V)	300	500	500	500	600	700	800	900
Insulation resistance	>1G Ω							

● Notice: Resistance out of range, tolerance and temperature coefficient match are under request.

Order Codes

Order Codes (RJM)

RJM74P	10R		D		C6		P	
Part Number	Resistance Value (Ω)		Resistance Tolerance (%)		Temperature coefficient (PPM/ $^{\circ}$ C)		Package	
RJM72P							P	Bulk
RJM73P	0R1	0.1 Ω	J	$\pm 5\%$	C1	$\pm 100\text{ppm}/^{\circ}\text{C}$	TR	Taping Reel
RJM73M	10R	10 Ω	F	$\pm 1\%$	C2	$\pm 50\text{ppm}/^{\circ}\text{C}$		
RJM74S	100R	100 Ω	D	$\pm 0.5\%$	C3	$\pm 25\text{ppm}/^{\circ}\text{C}$		
RJM74P	1K	1K Ω	C	$\pm 0.25\%$	C5	$\pm 15\text{ppm}/^{\circ}\text{C}$		
RJM16M	10K	10K Ω	B	$\pm 0.10\%$	C6	$\pm 10\text{ppm}/^{\circ}\text{C}$		
RJM17M	100K	100K Ω	A5	$\pm 0.05\%$	C7	$\pm 5\text{ppm}/^{\circ}\text{C}$		
RJM18M	1M	1M Ω						
	10M	10M Ω						

► General Information

Token MELF Offers Designer a Greater Choice

Token Electronics is now offering the complete range of MELF products, comprising DIN-0411, DIN-0309, DIN-0207, DIN-0204 and DIN-0102. This high stability, close-tolerance MELF resistors have a footprint very close to comparable chip resistors but maintain their tolerance and deliver higher stability over a wider temperature range.

Where applications require even tighter tolerance, Token offer Ultra Precision range in the RJM package, with values from $0.1\Omega \sim 22M\Omega$, tolerance from $\pm 5\%$ down to as low as $\pm 0.05\%$ and TC from $\pm 50\text{ppm}/^\circ\text{C}$ to $\pm 5\text{ppm}/^\circ\text{C}$.

For high pulse load and high-frequency applications, Token Electronics offer specialized MELF resistor. The high pulse load resistors are metal glaze film RGM, available in values from $50K\Omega \sim 22M\Omega$ and $\pm 0.5\%$ precision tolerance, for $0.125\text{ W} \sim 3\text{ W}$ applications.

High-frequency RFM resistors are available for RF microwave applications where impedance change due to the parasitic inductance of regular resistors is not acceptable.

Chip Resistor Alternatives

In very low resistance values, between 0.1Ω and 475Ω , not usually offered by conventional chip resistors, these are available in RJM72P 0102, RJM73P 0204, RJM74P 0207 and standard RJM18M 0411 MELF precision packages.

All MELF-type resistors are available on blister tape for automated placement and maintain their high stability, high precision characteristics when exposed to soldering temperatures and operating stresses including moisture, vibration, humidity and temperature variation within the specified range.

This makes them suitable for a wide range of applications, from laboratory and prototyping work to installation in hostile environments such as airframe or under-bonnet areas, exposed parts of vehicles, or other places where electronic sensing and controls must be installed.

