

Product Family: Low Ohm Metal Film Chip Resistor

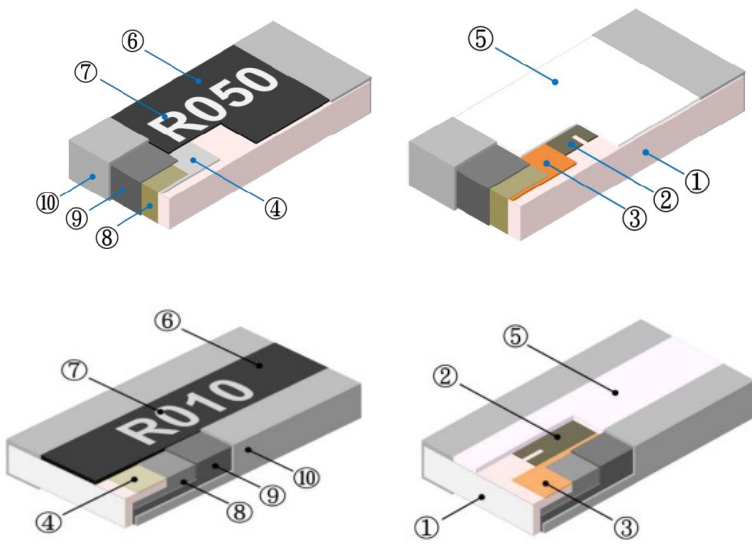
Part Number Series: KU Series


	Construction: - High purity alumina ceramic - Metal film resistive element - Epoxy-resin overcoat 100% matte tin over Ni terminations - Halogen free - RoHS compliant and Pb free - Inherently anti-sulfur	Features: 0201, 0402, 0603, 0805, 1206, 1210, 2010 & 2512, 0508, 0612, 1020, 1225 English case sizes - Power up to 3W - Resistance from 10mΩ~10Ω - TCR down to ±50ppm/°C - Tolerance down to ±0.25% - Moisture Sensitivity Level (MSL) = 1
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Description:

These low ohm, high power, specialty metal film chip resistors are ideal for applications that require precision and accuracy. A unique product, developed using metal film technology, allows for low TCR and tight tolerances that are sought out by those needing a more accurate and precise circuit while providing high power handling and excellent reliability.

Product Construction:

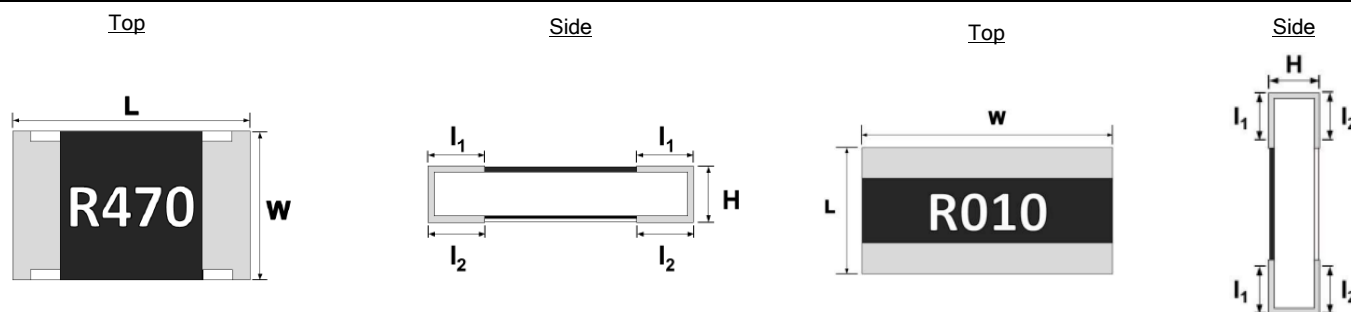
	Number	Layer
	1	Alumina substrate
	2	Resistive layer
	3	Bottom inner electrode (Cu)
	4	Top inner electrode
	5	Bottom protective overcoat (White: ≥39mΩ Green: <39mΩ)
	6	Top protective overcoat
	7	Marking
	8	Side inner electrode
	9	Barrier layer (Ni)
	10	Solder coating (Sn)

Part Numbering: Ex: KU0603UQ10R0F-T5

Series Name	English Size (Metric Size)	Power Code	Temp. Coefficient of Resistance (TCR)	Resistance Value	Resistance Tolerance	T&R Packaging Quantity
KU	0201 (0603) 0402 (1005) 0603 (1608) 0805 (2012) 1206 (3216) 1210 (3225) 2010 (5025) 2512 (6432) 0508 (1220) 0612 (1632) 1020 (2550) 1225 (3264)	L = Normal Power H = High Power U = Ultra-High Power	Q = ±50ppm/°C R = ±100ppm/°C G = ±150ppm/°C S = ±200ppm/°C*1 (Refer to electrical table)	Use 4 digit code for all values. "R" denotes decimal position as necessary. Ex: R470 = 0.470Ω 10R0 = 10Ω	C = ±0.25%*2 D = ±0.50% F = ±1.00% G = ±2.00% J = ±5.00%	-T4 = 4,000 pcs/reel -T5 = 5,000 pcs/reel -T10 = 10,000 pcs/reel (Refer to electrical table)

*Note: 1. For ±200ppm/°C, only available for certain case sizes and resistance range. Please refer to electrical specification tables for available offerings.

2. For 0.25% tolerance, only available for certain case sizes and resistance range. Please refer to electrical specification tables for available offerings.

Product Dimensions:

All dimensions shown in inches, mm in parentheses.

Dimension (Metric)	L	W	H	l ₁	l ₂
KU0201 (0603)	0.024 ±0.001 (0.60 ±0.03)	0.012 ±0.001 (0.30 ±0.03)	0.010 ±0.002 (0.26 ±0.05)	0.006 ±0.002 (0.15 ±0.05)	0.006 ±0.002 (0.15 ±0.05)
KU0402 (1005)	0.040 ±0.004 (1.00 ±0.10)	0.020 ±0.002 (0.50 ±0.05)	0.014 ±0.002 (0.35 ±0.05)	0.008 ±0.004 (0.20 ±0.10)	0.010 ±0.004 (0.25 ±0.10)
KU0603 (1608)	0.063 ±0.004 (1.60 ±0.10)	0.031 ±0.004 (0.80 ±0.10)	0.018 ±0.004 (0.45 ±0.10)	0.010 ±0.006 (0.25 ±0.15)	0.012 ±0.006 (0.30 ±0.15)
KU0805 (2012)	0.079 ±0.004 (2.00 ±0.10)	0.050 ±0.004 (1.25 ±0.10)	0.022 ±0.004 (0.55 ±0.10)	0.014 ±0.008 (0.35 ±0.20)	0.016 ±0.008 (0.40 ±0.20)
KU1206 (3216) 10mΩ≤R<39mΩ	0.130 ±0.008 (3.30 ±0.20)	0.067 ±0.008 (1.70 ±0.20)	0.026 ±0.008 (0.65 ±0.20)	0.008 ±0.006 (0.20 ±0.15)	0.027 ±0.008 (0.68 ±0.20)
KU1206 (3216) (39mΩ~10Ω)	0.122 ±0.004 (3.10 ±0.10)	0.063 ±0.004 (1.60 ±0.10)	0.022 ±0.004 (0.55 ±0.10)	0.016 ±0.008 (0.40 ±0.20)	0.018 ±0.008 (0.45 ±0.20)
KU1210 (3215)	0.122 ±0.004 (3.10 ±0.10)	0.098 ±0.006 (2.50 ±0.15)	0.022 ±0.004 (0.55 ±0.10)	0.020 ±0.008 (0.50 ±0.20)	0.020 ±0.008 (0.50 ±0.20)
KU2010 (5025)	0.197 ±0.008 (5.00 ±0.20)	0.098 ±0.006 (2.50 ±0.15)	0.022 ±0.004 (0.55 ±0.10)	0.023 ±0.010 (0.60 ±0.25)	0.023 ±0.010 (0.60 ±0.25)
KU2512 (6432)	0.248 ±0.008 (6.30 ±0.20)	0.126 ±0.008 (3.20 ±0.20)	0.022 ±0.004 (0.55 ±0.10)	0.025 ±0.010 (0.65 ±0.25)	0.025 ±0.010 (0.65 ±0.25)
KU2512 (6432) 3W			0.028 ±0.006 (0.70 ±0.15)		
KU0508 (1220)	0.050 ±0.004 (1.25 ±0.10)	0.079 ±0.004 (2.00 ±0.10)	0.022 ±0.006 (0.55 ±0.15)	0.010 ±0.006 (0.25 ±0.15)	0.014 ±0.006 (0.35 ±0.15)
KU0612 (1632)	0.063 ±0.006 (1.60 ±0.15)	0.126 ±0.008 (3.20 ±0.20)	0.022 ±0.006 (0.55 ±0.15)	0.012 ±0.008 (0.30 ±0.20)	0.019 ±0.008 (0.50 ±0.20)
KU1020 (2550)	0.098 ±0.006 (2.50 ±0.15)	0.197 ±0.006 (5.00 ±0.15)	0.022 ±0.006 (0.55 ±0.15)	0.016 ±0.008 (0.40 ±0.20)	0.019 ±0.008 (0.50 ±0.20)
KU1225 (3264)	0.126 ±0.008 (3.20 ±0.20)	0.248 ±0.008 (6.30 ±0.20)	0.022 ±0.006 (0.55 ±0.15)	0.024 ±0.010 (0.60 ±0.25)	0.031 ±0.010 (0.80 ±0.25)

Electrical Specifications:

Type	KU0201			KU0402			KU0603			KU0805		
Metric Size	0603			1005			1608			2012		
Power Rating (code)	1/20W (0.005W) (L)	1/10W (0.10W) (H)	1/5W (0.20W) (U)	1/16W (0.06W) (L)	1/8W (0.13W) (H)	1/4W (0.25W) (U)	1/10W (0.10W) (L)	1/5W (0.20W) (H)	2/5W (0.40W) (U)	1/8W (0.13W) (L)	1/4W (0.25W) (H)	1/2W (0.50W) (U)
Resistance Range	50mΩ~10Ω									39mΩ~10Ω		
Resistance Tolerance % (code)	±0.5%(D), ±1.0%(F), ±2.0%(G), ±5.0%(J)											
TCR ppm/°C (code)	50mΩ~99mΩ: ±100ppm(R) 100mΩ~10Ω: ±50ppm(Q)									39mΩ~49mΩ: ±150ppm(G) 50mΩ~99mΩ: ±100ppm(R) 100mΩ~10Ω: ±50ppm(Q)		
Maximum Rated Current	1.00A	1.41A	2.00A	1.12A	1.58A	2.24A	1.41A	2.00A	2.83A	1.79A	2.53A	3.58A
Maximum Overload Current	2.50A	3.16A	4.47A	2.80A	3.54A	5.00A	3.54A	4.47A	6.32A	4.48A	5.66A	8.00A
Rated Voltage	√(Power x Resistance)											
Operating Temperature Range	-55°C~+155°C											
Packaging	10,000pcs/reel (-T10)						5,000pcs/reel (-T5)					

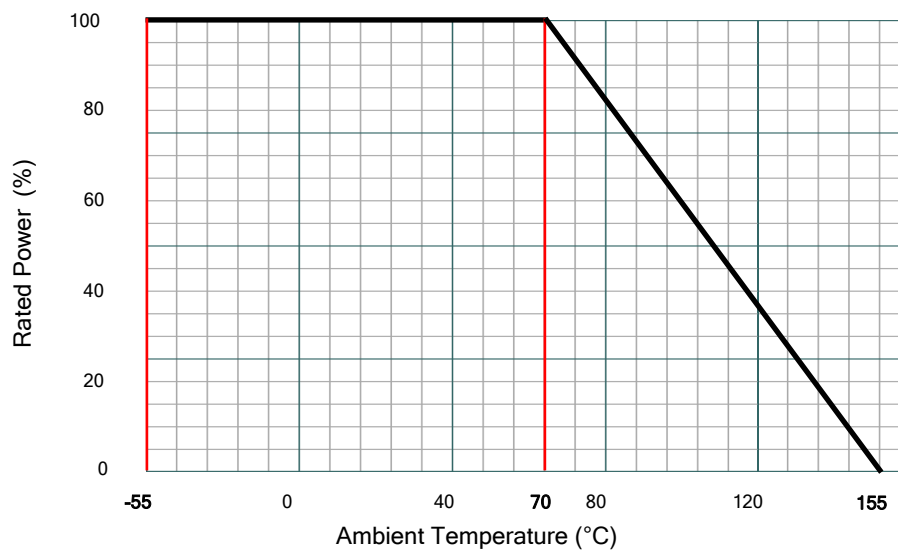
Type	KU1206					KU1210		KU2010		KU2512		
Metric Size	3216					3225		5025		6432		
Power Rating (code)	1/4W (0.25W) (L)	1/2W (0.50W) (H)	1/4W (0.25W) (L)	1/2W (0.50W) (H)	1W (U)	1/2W (0.5W) (L)	1W (H)	3/4W 0.75W (L)	1 ½W (1.5W) (H)	1W (L)	2W (H)	3W (U)
Resistance Range	10mΩ~<39mΩ		39mΩ~10Ω					100mΩ~10Ω				
Resistance Tolerance % (code)	±1.0%(F), ±2.0%(G), ±5.0%(J)		±0.25%(C)*, ±0.5%(D), ±1.0%(F), ±2.0%(G), ±5.0%(J)									
TCR ppm/°C (code)	10mΩ~<39mΩ: ±200ppm(S)		39mΩ~49mΩ: ±150ppm(G) 50mΩ~99mΩ: ±100ppm(R) 100mΩ~10Ω: ±50ppm(Q)					100mΩ~10Ω: ±50ppm(Q)				
Maximum Rated Current	5.00A	7.07A	2.53A	3.58A	5.06A	3.58A	5.06A	2.74A	3.87A	3.16A	4.47A	5.48A
Maximum Overload Current	12.50A	15.81A	6.33A	8.00A	11.32A	8.95A	11.32A	6.85A	8.66A	7.91A	10.00A	12.25A
Rated Voltage	√(Power x Resistance)											
Operating Temperature Range	-55°C~+155°C											
Packaging	5,000pcs/reel (-T5)							4,000pcs/reel (-T4)				

*Note: For case sizes 1206, 1210, 2010, and 2512: ±0.25% (C) is only available for 470mΩ~10Ω resistance range and TCR of 50ppm (Q).

Electrical Specifications (Cont.):

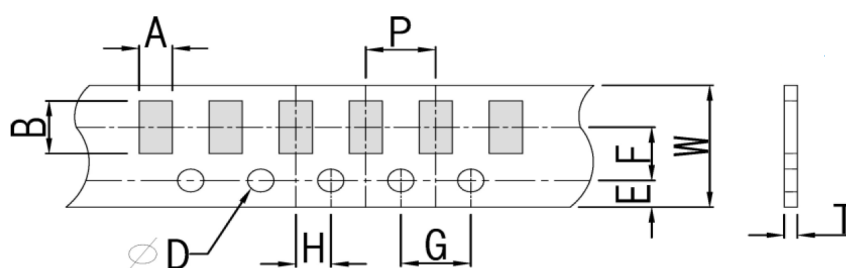
Type	KU0508	KU0612	KU1020	KU1225
Metric Size	1220	1632	2550	3264
Power Rating (code)	1W(U)	1W(U)	2W(U)	3W(U)
Resistance Range	10mΩ~2Ω			
Resistance Tolerance % (code)	±0.5%(D)*, ±1.0%(F), ±2.0%(G), ±5.0%(J)			
TCR ppm/°C (code)	10mΩ~19mΩ: ±150ppm (G) 20mΩ~2Ω: ±100ppm (R)			
Maximum Rated Current	10.00A	10.00A	14.14A	17.32A
Maximum Overload Current	22.36A	22.36A	31.62A	38.73A
Rated Voltage	$\sqrt{\text{Power} \times \text{Resistance}}$			
Operating Temperature Range	-55°C~+155°C			
Packaging	5,000pcs/reel (-T5)		4,000pcs/reel (-T4)	

*Note: For case sizes 0508, 0612, 1020 and 1225: ±0.5% (D) is only available for 100mΩ~2Ω resistance range and TCR of 100ppm (R)

Power Derating Curve:

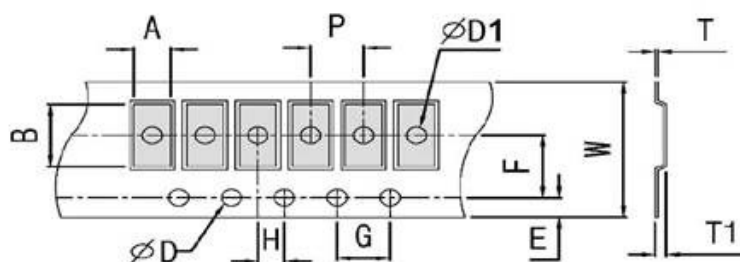
Reliability Specifications:

Test	Procedure	Specifications
Temperature Coefficient of Resistance JIS-C5201-1 4.8 IEC-60115-1 4.8	TCR +125°C, 25°C is the reference temperature	Refer to electrical specifications
Short Time Overload JIS-C5201-1 4.13 IEC-60115-1 4.13	Applied voltage: 6.25X rated power. Test: 5 seconds High power (2X/4X) and wide terminal type: 5 times rated power whichever is less for 5 seconds.	±1.0%
Insulation Resistance JIS-C5201-1 4.6 IEC-60115-1 4.6	100V for 1 minute	≥10GΩ
Dielectric Withstanding Voltage JIS-C5201-1 4.7	0805 / 0508 and above applied 500VAC for 1 minute. 0201 / 0402 / 0603 applied 300VAC for 1 minute.	No short or burned on the appearance
Core Body Strength JIS-C5201-1 4.15	Central part pressurizing force: 10N, for 10 seconds	Not broken
Leaching JIS-C5201-1 4.18 IEC-60068-2-58 8.2.1	260 ±5°C for 30 seconds	>95% coverage No visual damage
Rapid Change of Temperature JIS-C5201-1 4.19 IEC-60115-1 4.19	-55°C to +155°C, 300 cycles	±1.0% No visual damage
Damp Heat With Load JIS-C5201-1 4.24 IEC-60115-1 4.24	40 ±2°C , 90~95% R.H. RCWV or Max. working current whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"	±1.0%
Load Life JIS-C5201-1 4.25 IEC-60115-1 4.25.1	Test Temperature: 70°C ±2°C Applied voltage: rated voltage Test period: 1,000 hours with power cycling as follows: 90 min. power ON/30 min. power OFF	±1.0%
Resistance To Solder Heat JIS-C5201-1 4.18 IEC-60115-1 4.18	260°C for a period of 10 seconds.	±1.0% No visual damage
Terminal Strength JIS-C5201-1 4.32 AEC-Q200-006	Pressurizing force for 10 seconds 0201/ 0402/ 0603: 8N 0805/ 0508 and above: 17.7N	Not broken
Solderability JIS-C5201-1 4.17 IEC-60115-1 4.17	Dipped into molten solder for 3 seconds at 245 ±5°C	> 95% coverage No Visual damage
Biased Humidity MIL-STD-202 Method 103	1,000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24 ±4 hours after test conclusion.	±0.5%
High Temperature Exposure JIS-C5201-1 4.25 IEC 60068-2-2	At 155 ±5°C for 1000 hours.	±1.0%
Resistance to Solvent JIS-C-5201-1 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs	±1.0% No visual damage
Bending Strength JIS-C-5201-1 4.33 IEC-60115-1 4.33	Bending once for 5 seconds D: 0201/ 0402/ 0603 0805 = 5mm 1206/ 1210/ 0612 = 3mm 2010/ 2512/ 1020/ 1225 = 2mm	±1.0% No visual damage

Paper Tape Dimensions:

All dimensions in mm.

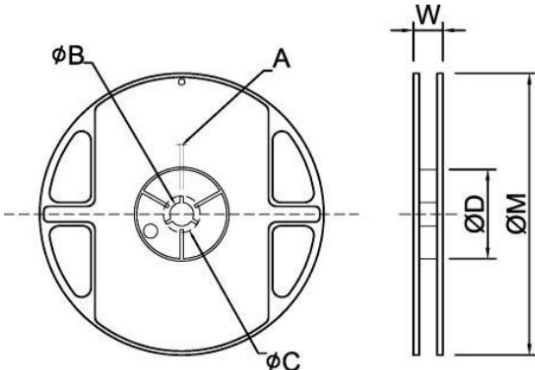
Type	A	B	W	E	F	G	H	T	øD	P
KU0201	0.45 ±0.10	0.75 ±0.10	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.35 ±0.10	1.50+0.10 /-0	2.00± 0.10
KU0402	0.70 ±0.10	1.20 ±0.10	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.45 ±0.10	1.50+0.10 /-0	2.00± 0.10
KU0603	1.05 ±0.20	1.80 ±0.20	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.60 ±0.10	1.50+0.10 /-0	4.00 ± 0.10
KU0805	1.55 ±0.20	2.30 ±0.20	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.75 ±0.10	1.50+0.10 /-0	4.00 ± 0.10
KU1206	1.90 ±0.20	3.05 ±0.20	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.75 ±0.10	1.50+0.10 /-0	4.00 ± 0.10
KU1210	2.85 ±0.20	3.05 ±0.20	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.75 ±0.10	1.50+0.10 /-0	4.00 ±0.10
KU0508	1.50 ±0.15	2.25 ±0.15	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.75 ±0.10	1.50+0.10 /-0	4.00 ±0.10
KU0612	2.85 ±0.20	3.05 ±0.20	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.75 ±0.10	1.50+0.10 /-0	4.00 ±0.10

Plastic Tape Dimensions

All dimensions in mm.

Type	A	B	W	E	F	G	H	T	øD	øD1	T1	P
KU2010	2.80 ±0.20	5.60 ±0.20	12.00 ±0.10	1.75 ±0.10	5.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.23 ±0.10	1.50+0.1 /-0	1.50 ±0.10	0.85 ±0.15	4.00 ±0.10
KU2512	3.40 ±0.20	6.70 ±0.20	12.00 ±0.10	1.75 ±0.10	5.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.23 ±0.10	1.50+0.1 /-0	1.50 ±0.10	0.85 ±0.15	4.00 ±0.10
KU1020	2.80 ±0.20	5.60 ±0.20	12.00 ±0.10	1.75 ±0.10	5.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.23 ±0.10	1.50+0.1 /-0	1.50 ±0.10	0.85 ±0.15	4.00 ±0.10
KU1225	3.40 ±0.20	6.70 ±0.20	12.00 ±0.10	1.75 ±0.10	5.50 ±0.05	4.00 ±0.10	2.00 ±0.05	0.23 ±0.10	1.50+0.1 /-0	1.50 ±0.10	0.85 ±0.15	4.00 ±0.10

Reel Dimensions:

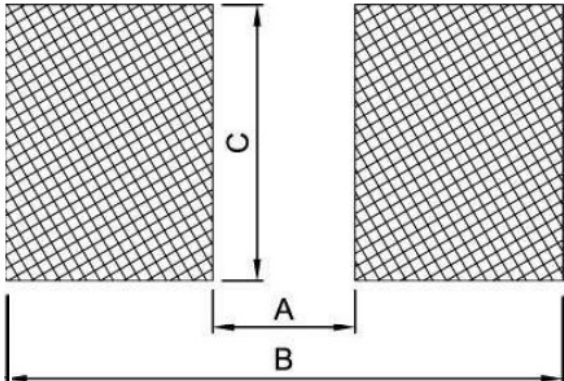


Technical drawing of a reel showing top and side views. The top view labels dimensions: A (width of a segment), B (outer diameter), C (inner diameter), D (hole diameter), M (mounting hole diameter), and W (segment width). The side view labels dimensions: W (segment width), D (hole diameter), and M (mounting hole diameter).

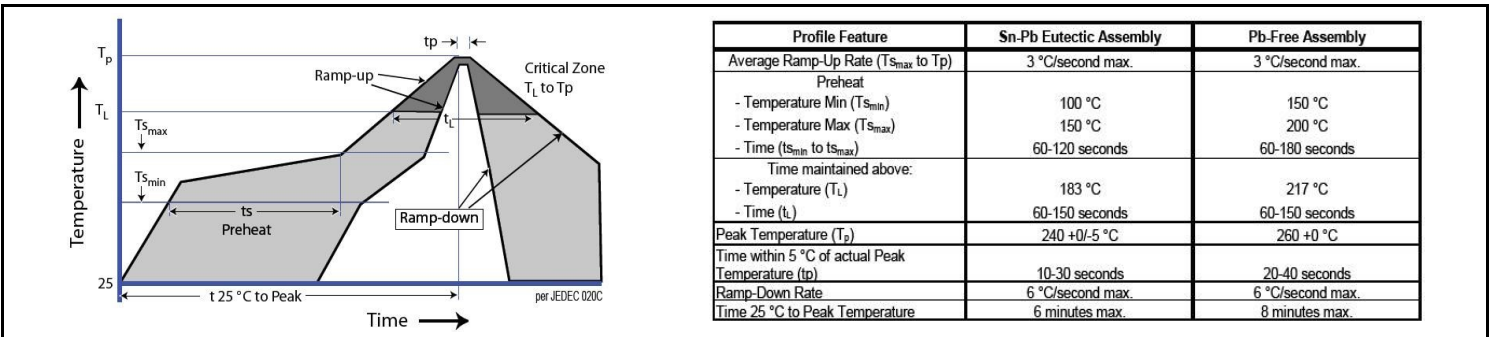
Type	A	øB	øC	øD	W	øM	
KU0201	2.00 ±0.50	13.5 ±1.00	21.0 ±1.00	60.0 ± 1.00	11.5 ±2.00	178 ±2.00	
KU0402							
KU0603							
KU0805							
KU1206							
KU1210					16.0 ±2.00		
KU2010							
KU2512					11.5 ±2.00		
KU0508							
KU0612					16.0 ±2.00		
KU1020							
KU1225							

All dimensions in mm.

Recommended Land Pattern:

	Type	A	B	C
	KU0201	0.25	0.85	0.35
	KU0402	0.50	1.60	0.70
	KU0603	0.80	2.40	1.00
	KU0805	1.30	2.90	1.45
	KU1206 (10mΩ~<39mΩ)	1.20	4.80	1.84
	KU1206 (39mΩ~10Ω)	2.20	4.20	1.80
	KU1210	2.00	4.40	2.70
	KU2010	3.80	6.60	2.70
	KU2512	4.90	8.10	3.40
	KU0508	0.40	1.80	2.00
	KU0612	0.50	2.60	3.20
	KU1020	1.00	4.05	5.50
	KU1225	1.20	5.20	7.00

All dimensions in mm.

Soldering Profile:**Marking Information:**

0201~0402: no marking	0603: 3 digits	0805~2512: 4 digits	0508: no marking	0612~1225: 4 digits

Standard E-96 Values and 0603 Resistance Codes																								
R-Value	100	102	105	107	110	113	115	118	121	124	127	130	133	137	140	143	147	150	154	158	162	165	169	174
Code	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
R-Value	178	182	187	191	196	200	205	210	215	221	226	232	237	243	249	255	261	267	274	280	287	294	301	309
Code	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
R-Value	316	324	332	340	348	357	365	374	383	392	402	412	422	432	442	453	464	475	487	499	511	523	536	549
Code	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
R-Value	562	576	590	604	619	634	649	665	681	698	715	732	750	768	787	806	825	845	866	887	909	931	953	976
Code	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96

E-96 Multiplier Code for 0603							
Code	S	R	A	H	C	D	E
Multiplier	10^{-2}	10^{-1}	10^0	10^1	10^2	10^3	10^4

Examples of E-96 Multiplier Code for 0603							
R-Value	4.99Ω	33.2Ω	475Ω	2.21KΩ	10.2KΩ	196KΩ	1MΩ
Code	68S	51R	66A	34H	02C	29D	01E

Examples of E-24 Resistance Code for 0603 ~ 0805							
R-Value	4.7Ω	33Ω	470Ω	5.6KΩ	62KΩ	200KΩ	
Code	4R7	330	471	562	623	204	

Examples of 4 Digit Resistance Codes for 0805 ~ 2512							
R-Value	5.6Ω	10Ω	22.6Ω	100Ω	1.1KΩ	10KΩ	332KΩ
Code	5R60	10R0	22R6	1000	1101	1002	3323

Storage Conditions:**Environment Conditions:**

Products should be stored under the following environmental conditions.

- Temperature: +5 to +35°C
- Humidity: 45 to 85% relative humidity
- Do not keep products in environments where they may be subject to particulate contamination or harmful gases such as sulfuric acid or hydrogen chloride as it may cause oxidization on electrodes, resulting in poor solderability.
- Products should be stored in a space that does not expose it to high temperatures, vibration, or direct sunlight.
- Products should be stored in the original airtight packaging until use.