



FEATURES:

- AEC-Q200 certified/qualified
- Highly reliable multilayer electrode construction
- Special construction to prevent sulfuration in a sulfur containing environment
- Compatible with all soldering process
- 100% CCD inspection



PART NUMBER STRUCTURE

AGCR	0603 -	Q	K	-	1002	F	T
Series	Size	Power Rating	TCR		Resistance Value	Resistance Tolerance	Packaging
	0201	N = 1/20W	C = $\pm 50\text{ppm}/^{\circ}\text{C}$		3 DIGIT (J TOL.)	B = $\pm 0.10\%$	T = Tape & Reel
	0402	P = 1/16W	K = $\pm 100\text{ppm}/^{\circ}\text{C}$		4 DIGIT (D & F TOL.)	D = $\pm 0.50\%$	
	0603	Q = 1/10W	L = $\pm 200\text{ppm}/^{\circ}\text{C}$		Jumper	F = $\pm 1\%$	
	0805	R = 1/8W				J = $\pm 5\%$	
	1206	T = 1/4W					
	1210	Y = 1/3W					
	2010	V = 1/2W					
	2512	W = 3/4W					
		X = 1W					
		2X=2W					

Example P/N: AGCR0603-QK-1002FT

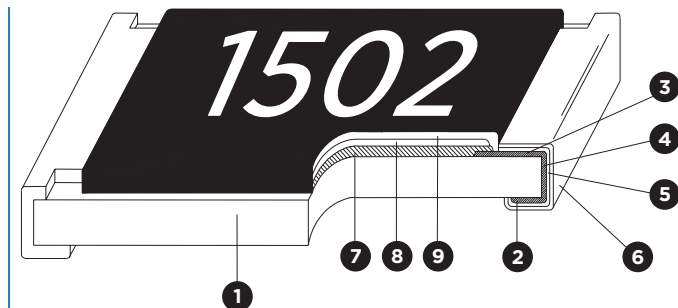
Standard Termination is 100% matte Tin over Nickel.

DIMENSIONS

Unit: inches (mm)

SIZE	L	W	T	D ₁	D ₂	WEIGHT (g) (1000pcs)
0201	0.024 $\pm$ 0.012 (0.60 $\pm$ 0.30)	0.012 $\pm$ 0.012 (0.30 $\pm$ 0.03)	0.009 $\pm$ 0.001 (0.23 $\pm$ 0.03)	0.005 $\pm$ 0.002 (0.15 $\pm$ 0.05)	0.005 $\pm$ 0.002 (0.15 $\pm$ 0.05)	0.150
0402	0.040 $\pm$ 0.002 (1.00 $\pm$ 0.05)	0.020 $\pm$ 0.002 (0.50 $\pm$ 0.05)	0.014 $\pm$ 0.002 (0.35 $\pm$ 0.05)	0.008 $\pm$ 0.004 (0.20 $\pm$ 0.10)	0.008 $\pm$ 0.004 (0.20 $\pm$ 0.10)	0.620
0603	0.063 $\pm$ 0.004 (1.60 $\pm$ 0.10)	0.031 $\pm$ 0.004 (0.80 $\pm$ 0.10)	0.017 $\pm$ 0.004 (0.45 $\pm$ 0.10)	0.012 $\pm$ 0.008 (0.30 $\pm$ 0.20)	0.012 $\pm$ 0.008 (0.30 $\pm$ 0.20)	2.042
0805	0.079 $\pm$ 0.004 (2.00 $\pm$ 0.10)	0.049 $\pm$ 0.004 (1.25 $\pm$ 0.10)	0.020 $\pm$ 0.004 (0.50 $\pm$ 0.10)	0.014 $\pm$ 0.008 (0.35 $\pm$ 0.20)	0.016 $\pm$ 0.010 (0.40 $\pm$ 0.20)	4.368
1206	0.122 $\pm$ 0.004 (3.10 $\pm$ 0.10)	0.061 $\pm$ 0.004 (1.55 $\pm$ 0.10)	0.022 $\pm$ 0.004 (0.55 $\pm$ 0.10)	0.020 $\pm$ 0.010 (0.50 $\pm$ 0.25)	0.020 $\pm$ 0.008 (0.50 $\pm$ 0.20)	8.947
1210	0.122 $\pm$ 0.004 (3.10 $\pm$ 0.10)	0.102 $\pm$ 0.006 (2.60 $\pm$ 0.15)	0.022 $\pm$ 0.004 (0.55 $\pm$ 0.10)	0.020 $\pm$ 0.010 (0.50 $\pm$ 0.25)	0.020 $\pm$ 0.008 (0.50 $\pm$ 0.20)	15.959
2010	0.196 $\pm$ 0.004 (5.00 $\pm$ 0.10)	0.098 $\pm$ 0.006 (2.50 $\pm$ 0.15)	0.022 $\pm$ 0.004 (0.55 $\pm$ 0.10)	0.024 $\pm$ 0.010 (0.60 $\pm$ 0.25)	0.020 $\pm$ 0.008 (0.50 $\pm$ 0.20)	24.241
2512	0.250 $\pm$ 0.004 (6.35 $\pm$ 0.10)	0.122 $\pm$ 0.006 (3.10 $\pm$ 0.15)	0.022 $\pm$ 0.004 (0.55 $\pm$ 0.10)	0.024 $\pm$ 0.010 (0.60 $\pm$ 0.25)	0.020 $\pm$ 0.008 (0.50 $\pm$ 0.20)	39.448

STRUCTURE



1	Alumina Substrate	6	Solder Plating (Sn)
2	Bottomside Electrode	7	Resistive Element
3	Topside Electrode	8	Resistive Element Overcoat
4	Edge Electrode	9	Primary Overcoat
5	Barrier Layer (Ni)		

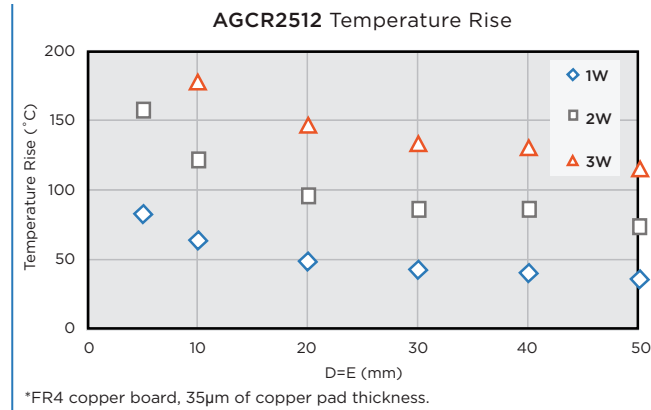
ELECTRICAL SPECIFICATION & RANGE

SIZE		0201	0402		0603		0805	
Power Rating at 70°C (W)		0.05W (1/20W)	0.063W (1/16W)	0.125W (1/8W)	0.10W (1/10W)	0.25W (1/4W)	0.125W (1/8W)	0.333W (1/3W)
Zero Ohm(Jumper) Current Rating		1A	1A		1A		2A	
Max. Working Voltage		25V	50V		75V		150V	
Max. Overload Voltage		50V	100V		150V		300V	
Operating Temp. Range		-55°C to +155°C	-55°C to +155°C		-55°C to +155°C		-55°C to +155°C	
Tol.	TCR	Resistance Range	Resistance Range		Resistance Range		Resistance Range	
±0.1% (B)	±50ppm	-	300Ω-1MΩ	300Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ
±0.5% (D)	±100ppm	-	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ
	±200ppm	-	-	-	-	-	-	-
±1% (F)	±100ppm	-	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ
	±200ppm	1Ω-10MΩ	1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω	1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω	1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω
±5% (J)	±100ppm	-	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ
	±200ppm	0Ω, 1Ω-10MΩ	0Ω, 1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω	0Ω, 1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω	0Ω, 1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω

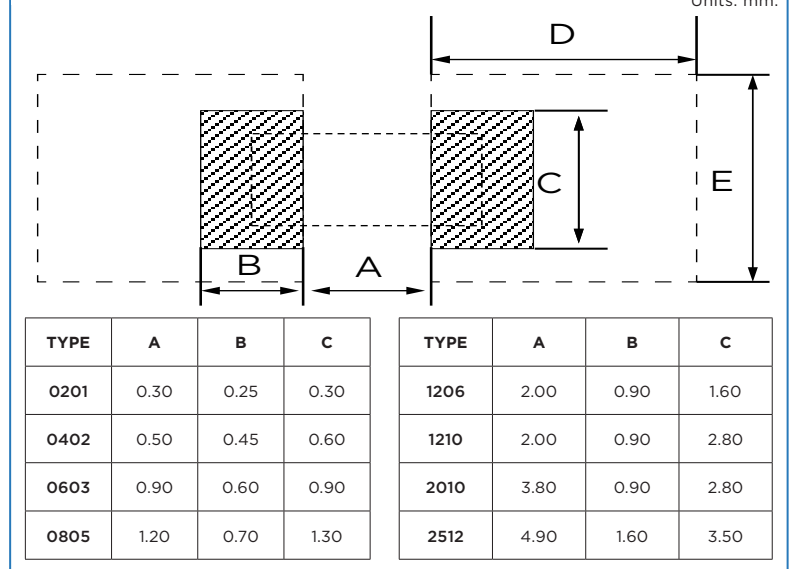
SIZE		1206		1210	2010		2512	
Power Rating at 70°C (W)		0.25W (1/4W)	0.50W (1/2W)	0.50W (1/2W)	0.75W (3/4W)	1.0W (1W)	1.0W (1W)	2.0W (2W)
Zero Ohm(Jumper) Current Rating		2A		2.5A	3.5A		4A	
Max. Working Voltage		200V		200V	400V		500V	
Max. Overload Voltage		400V		400V	800V		1000V	
Operating Temp. Range		-55°C to +155°C		-55°C to +155°C	-55°C to +155°C		-55°C to +155°C	
Tol.	TCR	Resistance Range		Resistance Range	Resistance Range		Resistance Range	
±0.5% (D)	±100ppm	10Ω-1MΩ	10Ω-1MΩ	-	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ
	±200ppm	-	-	-	-	-	-	-
±1% (F)	±100ppm	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ
	±200ppm	1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω	1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω	1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω
±5% (J)	±100ppm	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ
	±200ppm	0Ω, 1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω	0Ω, 1Ω-9.76Ω 1.02MΩ-10MΩ	0Ω, 1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω	0Ω, 1Ω-9.76Ω 1.02MΩ-10MΩ	1Ω-9.76Ω

NOTE: Operating Voltage = $(P \cdot R)^{1/2}$ or Max. overload voltage listed above, whichever is lower.
 Overload Voltage = $2.5 \cdot (P \cdot R)^{1/2}$ or Max. overload voltage listed above, whichever is lower.
 Jumper Resistance = <50mΩ

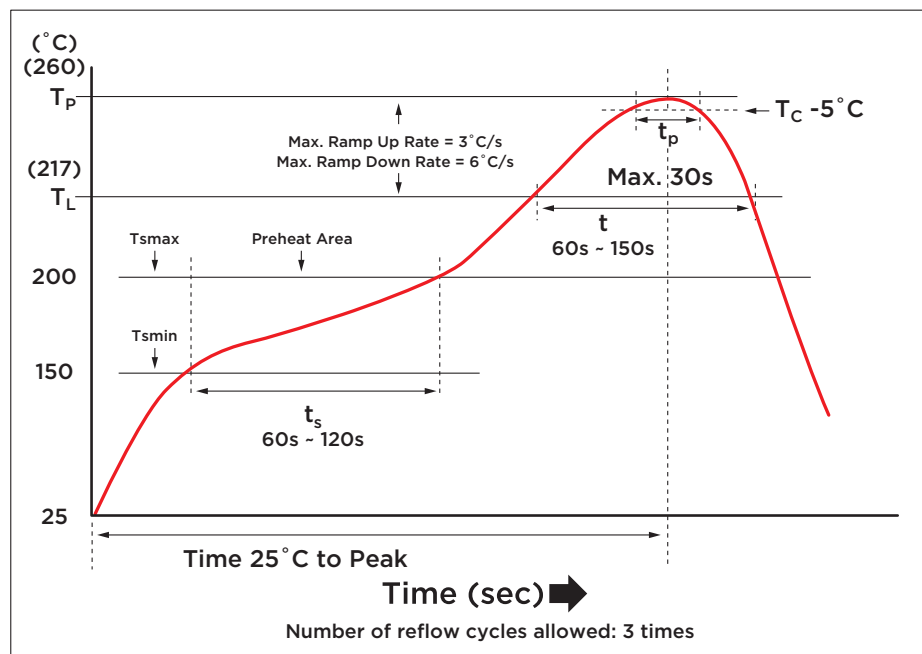
TEMPERATURE RISE



RECOMMENDED LAND PATTERN



SOLDERING CONDITION



REFLOW PROFILES

PROFILE FEATURE	Pb-FREE ASSEMBLY
PREHEAT Min. Temperature (T _{sm}) Max Temperature (T _{sm}) Preheating time (t _s) from (T _{sm} to T _{sm})"	150 °C 200 °C 60-120 seconds
Ramp-up rate (T _L to T _p)	3 °C/second max.
Liquidous temperature (T _L) Time (t _L) maintained above T _L	217 °C 60-150 seconds
Min. Peak temperature (T _{p min})	235°C
Max. Peak temperature (T _{p max})	260°C
Time (t _p) within 5 °C of the specified classification temperature (T _c)	30 seconds max.
Ramp-down rate (T _p to T _L)	6 °C/second max.
Time 25 °C to peak temperature	8 minutes max.

MARKING

No Marking for 0201/0402

Jumper for all: Letter O

1% for 0805/0612/1206/1210/
2010/2512: 4 digits marking

Example:

RESISTANCE	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
MARKING	1000	2201	1002	4992	1003

5% for 0603/0805/0612/1206/1210/2010/2512: 3 digit s marking in E24

Example: 101 =100Ω 102 =1KΩ (1st and 2nd are E24 code and 3rd code is multiplier)

E24	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91
-----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

1% for 0603(E24): 3 digits marking in E24, When the E24 and E96 are the same resistance, this marking in E96

Example: 01A= 100Ω 05C=11KΩ 123=12KΩ 273=27KΩ

1% for 0603(E96): 3 digits marking in E96

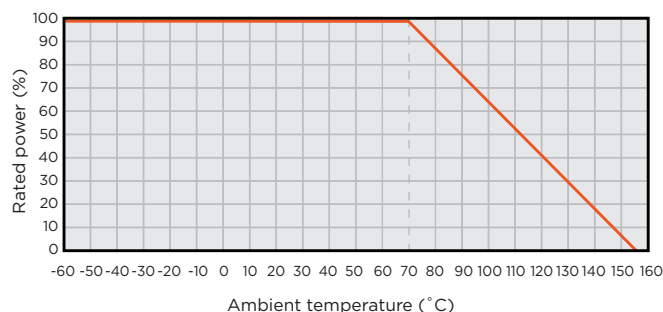
Example: 14C=13K7Ω 13C=13K3Ω 68B=4K99Ω 68X=49.9Ω



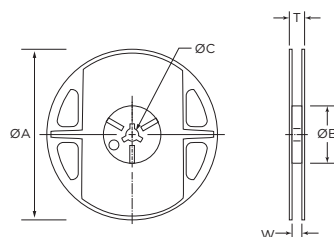
MARKING TABLE

CODE	E96		CODE	E96		CODE	E96		CODE	E96	
01	100		25	178		49	316		73	562	
02	102		26	182		50	324		74	576	
03	105		27	187		51	332		75	590	
04	107		28	191		52	340		76	604	
05	110		29	196		53	348		77	619	
06	113		30	200		54	357		78	634	
07	115		31	205		55	365		79	649	
08	118		32	210		56	374		80	665	
09	121		33	215		57	383		81	681	
10	124		34	221		58	392		82	698	
11	127		35	226		59	402		83	715	
12	130		36	232		60	412		84	732	
13	133		37	237		61	422		85	750	
14	137		38	243		62	432		86	768	
15	140		39	249		63	442		87	787	
16	143		40	255		64	453		88	806	
17	147		41	261		65	464		89	825	
18	150		42	267		66	475		90	845	
19	154		43	274		67	487		91	866	
20	158		44	280		68	499		92	887	
21	162		45	287		69	511		93	909	
22	165		46	294		70	523		94	931	
23	169		47	301		71	536		95	953	
24	174		48	309		72	549		96	976	
Code	A	B	C	D	E	F	G	X	Y		
Multiplier	10 ⁰	10 ¹	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁶	10 ⁻¹	10 ⁻¹		

DERATING CURVE



REEL SPECIFICATIONS

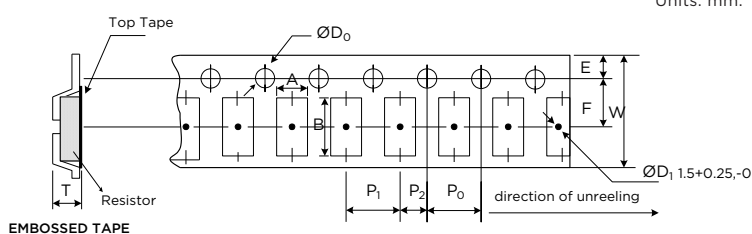
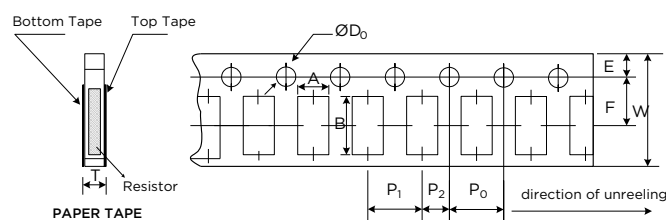


Minimum of 30 empty pockets at the beginning of reel, 65 minimum empty pockets at the end.

Unit: mm

TYPE	Ø A	ØB	ØC	W	T	PAPER TAPE (EA)	EMBOSSED (EA)	TAPE WIDTH	REEL Ø
0201 0402	178.0±1.5	60+1/-0	13.0±0.2	9.0±0.5	12.5±0.5	10,000	-	8mm	7 inch
0603 0805 1206 1210	178.0±1.5	60+1/-0	13.0±0.2	9.0±0.5	12.5±0.5	5,000	-	8mm	7 inch
2010 2512	178.0±1.5	60+1/-0	13.0±0.5	13.0±0.5	15.5±0.5	-	4,000	12mm	7 inch

TAPE SPECIFICATIONS



Units: mm.

TAPE	SIZE (Inches)	A	B	W	E	F	P ₀	P ₁	P ₂	ØD ₀	T
Paper	0201	0.38±0.05	0.68±0.05	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.42±0.20
	0402	0.65±0.10	1.15±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.10
	0603	1.10±0.10	1.90±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.10
	0805	1.60±0.10	2.40±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
	1206	1.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
	1210	2.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
Embossed	2010	2.8±0.10	5.40±0.20	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2 ⁺⁰
	2512	3.5±0.10	6.7±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2 ⁺⁰

ENVIRONMENTAL CHARACTERISTICS

TEST	REQUIREMENT			TEST METHOD
	±1% and Below	±5%	Jumper	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.			JIS-C-5201-1 4.8 IEC-60115-1 4.8 At 25°C/55°C and 25°C/+125°C, 25°C is the reference temperature
Short Time Overload	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	<50mΩ	JISC-5201-1 4.13 IEC-60115-1 4.13 RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds
Insulation Resistance	≥10G			JIS-C-5201-1 4.6 IEC-60115-1 4.6 Max. Overload Voltage for 1 minute
Operational Life	±(1.0%+0.10Ω)	±(2.0%+0.10Ω)	<100mΩ	MIL-STD-202 Method 108 Condition D Steady State T _A =125°C at derated power. Measurement at 24±4 hours after test conclusion.
Biased Humidity	±(1.0%+0.10Ω)	±(2.0%+0.10Ω)	<100mΩ	MIL-STD-202 Method 103 1000 hrs 85°C/85%RH 10% of operating power.(≤100V)
High Temperature Exposure	±(1.0%+0.05Ω)	±(1.5%+0.10Ω)	<50mΩ	MIL-STD-202 Method 108 at +155°C for 1000 hrs
Board Flex	±(0.25%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	AEC-Q200-005 Bending once for 60 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% min. coverage			JIS-C-5201-1 4.17 IEC-60115-1 4.17 J-STD-002 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.25%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	MIL-STD-202 Method 210 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover			JIS-C-5201-1 4.7 IEC-60115-1 4.7 1.42 times Max. Operating Voltage for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤10%			JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 260±5°C for 30 seconds
Temperature Cycling	±(0.5%+0.05Ω)	±(1.5%+0.05Ω)	<50mΩ	JESD22 Method JA-104 -55°C to +125°C, 1000 cycles
Mechanical Shock	±(0.25%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	MIL-STD-202 Method 213 Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	MIL-STD-202 Method 204 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000Hz
ESD	±(3%+0.05Ω)			AEC-Q200-002 Human body model 0201: 0.5KV 0402 /0603: 1KV 0805 and above: 2KV
	±(1%+0.05Ω)			IEC61340-3-1(Equivalent to MIL-STD-883) 3 positive + 3 negative discharges ESD voltage acc. to size.
Resistance to solvents	No visible damage on appearance and marking.			MIL-STD-202 Method 215 Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.
Terminal Strength	No breakages			AEC-Q200-006 Force of 1.8kg for 60 seconds.
Flammability	No ignition of the tissue paper or scorching of the pinewood board			UL-94 V-0 or V-1 are acceptable. Electrical test not required.
Sulfur Test	ΔR±1%		<50mΩ	EIA-977 (Condition A) 60±2°C, no power rating for 500 hrs.

RCWV (Rated continuous working voltage) = $\sqrt{P \cdot R}$ or Max operating voltage whichever is lower

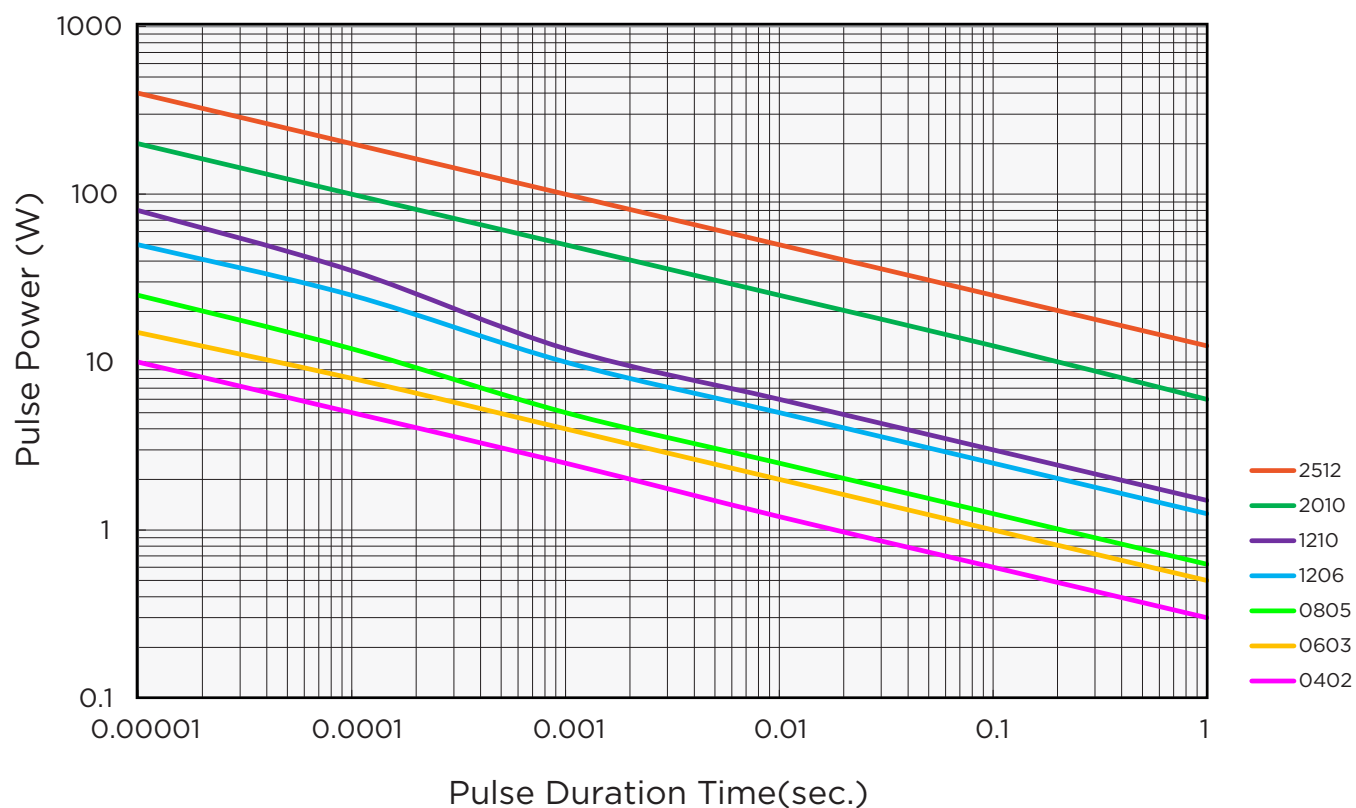
Storage Temperature: 15-28°C; Humidity < 80%RH

Shelf Life: 2 years from production date.

PULSE WITHSTANDING CAPACITY

The limit of acceptance was a shift in resistance of less than 1% from the initial value.
The power applied was subject to the restrictions of the maximum permissible impulse voltage.

AGCR SERIES SINGLE PULSE



Note: The limit of the applicable voltage is the max. overload voltage. Please consult us about the resistance characteristic when pulse is applied continuously. This data is a reference value, please be sure to test the products on the actual circuit before you use them.