

ZCM Series Datasheet

SMD Precision Metal Film Resistors | MELF Style

ORDERING CODE-Example

New SAP Part Nr.:

ZCM	207	F	K	E	07-	1K	AA
Serie	Power rating 102 = 0,2W 204 = 0,4W 207 = 1,0W	Tol. B = ±0,1% C = ±0,25% D = ±0,5% F = ±1% G = ±2% J = ±5% - = Jumper	Pack-Code K = Blister tape reel	TCR C = ±15ppm D = ±25ppm E = ±50ppm F = ±100ppm - = Jumper	Forming type 07- = 07 inch (Reel diameter) or 13- = 13 inch (Reel diameter)	R Value OR = Jumper	Special AA = Standard

Historical VTM Part Nr.:

ZC	0207	F	K	E	07	1K
Type	Size	Tol.	K = Blister tape reel	TC	Reel diam.	R Value

APPLICATIONS

- Automotive
- Charger
- Alternative Energy
- Power Supply
- Home Appliances
- Industrial

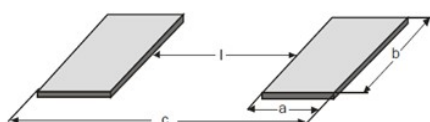
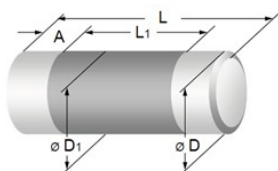
FEATURES

- Precision MELF resistor
- Advanced MELF technology
- Excellent stability in different environmental conditions
- Best in class pulse load capability
- AEC – Q200 Qualified
- Intrinsic sulfur resistance
- RoHs & REACH Compliant

ELECTRICAL SPECIFICATIONS

Type			ZCM102	ZCM204	ZCM207
Historical Part Number	SMD		-	ZC0204	ZC0207
Nominal Power Rating P ₇₀	[W]		0,2	0,4	1,0
Resistance Range (Other values upon request)	[Ω]	Min	10R	0R22	0R16
		Máx	2M21	10M	10M
E-Series			E24 / E96 / E192		
Tolerances	±[%]		B = 0,1%, F = 1%	B = 0,1%, C = 0,25%, D = 0,5%, F = 1%, G = 2%, J = 5%	
Temperature Coefficient IEC60115-1 clause 4.2 ; 4.8 (+20 / -55[°C] and (+20 / +125[°C])	±[10 ⁻⁶ K ⁻¹]		Depends on the value, please check the table below		
Working Temperature Range	[°C]		-55 ... +125	-55 ... +155	
Permissible film temperature (<i>9F max.</i>)	[°C]		125	155	
Max. Working Voltage	[AC or DC] _{RMS}		150	200	350
Dielectric Withstanding Voltage IEC115-1 clause 4.7 (1[min])	[V] _{RMS}		200	300	500

DIMENSIONS [mm]



Type	Historical P/N:	L	Ø D	L ₁	Ø D ₁	A	MASS (mg)
ZCM102	-	2,2 ^{+0/-0,15}	1,1 ^{+0/-0,1}	1,2 min.	D ^{+0/-0,1}	0,40 ±0,05	7
ZCM204	ZC0204	3,6 ±0 / -0,2	1,4 ±0 / -0,1	1,8 min.	D ±0 / -0,15	0,80 ±0,10	22
ZCM207	ZC0207	5,8 ±0 / -0,3	2,2 ±0,2	2,6 min.	D ±0 / -0,2	1,25 ±0,2	77

Recommended solder pads dimensions

Type	Wave soldering				Reflow soldering			
	l	a	b	c	l	a	b	c
ZCM102	0,7	1,2	1,5	3,1	1,1	0,8	1,3	2,7
ZCM204	1,5	1,5	1,8	4,5	1,7	1,2	1,6	4,1
ZCM207	2,4	2,3	2,6	7,0	2,6	2,0	2,4	6,6

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PERFORMANCE DATE

Type				ZCM102	ZCM204	ZCM207
Historical Part Number				-	ZC0204	ZC0207
Climatic Category				55/155/56		
Short Time Overload <i>IEC60115-1 clause 4.13</i> ($U=2,5*\sqrt{P_{70} \times R}$, $\leq 2*U_{max}$, 5 [s])	Standard operation	±[%]		0,1 (<211kΩ) ; 0,15(>211kΩ)	0,03 (≤1M) ; 0,15 (>1M)	0,03 (≤1M) ; 0,15 (>1M)
	Power operation		-	0,05 (≤1M) ; 0,15 (>1M)	0,05 (≤1M) ; 0,15 (>1M)	
Single pulse high voltage overload <i>IEC60115-1 clause 4.27</i> ($U=10*\sqrt{P_{70} \times R}$,Severity 4, 10 pulses 10[μs]/700[μs]	Standard operation	±[%]		-	0,15	0,25
	Power operation		-	0,15	0,5	
Periodic electric overload <i>IEC60115-1 clause 4.39</i> ($U=15*\sqrt{P_{70} \times R}$,0,1[s]on, 2.5[s]off,1000 cycles	Standard operation	±[%]		-	0,15	0,15
	Power operation		-	0,3	0,3	
Failure Rate (Total, 90 , max, 60[%] cont. lev.)		[10 ⁻⁹ h ⁻¹]		≤ 0,1		
Endurance at 70°C, <i>IEC60115-1 clause 4.25.1</i> ($U=\sqrt{P_{70} \times R}$ U_{max} , 1,5[h]ON ; 0,5[h]OFF)	Precision operation	±[%]	1000h	-	0.05 (10R≤1M)	0.05 (10R≤1M)
			8000h	-	0.1 (10R≤1M)	0.1 (10R≤1M)
	Standard operation	±[%]	1000h	0,25 (<211kΩ) ;0,5(>211kΩ)	0.15 (<10R) ; 0.1 (10R≤1M) ; 0.25	0.15 (≤1M) ; 0.5 (>1M)
			8000h	0,5 (<211kΩ) ; 1 (>211kΩ)	0.3 (<10R) ; 0.2 (10R≤1M) ; 0.5	0.3 (≤1M) ; 1 (>1M)
Power operation	±[%]	1000h	-	0.25	0,25 (≤1M) ; 0,5 (>1M)	
		8000h	-	0.5	0,5 (≤1M) ; 1 (>1M)	
Endurance at upper Category Temp. <i>IEC60115-1 clause 4.25.3</i> (1000[h]	±[%]		125°C	0,25 (<211kΩ) ; 1 (>211kΩ)	0,15 (≤1M) ; 0,5 (>1M)	0.15 (<10R) ; 0.1 (10R≤1M) ; 0.25 (>1M)
			155°C	-	0,3 (≤1M) ; 1 (>1M)	0.3 (<10R) ; 0.2 (10R≤1M) ; 0.5 (>1M)
Damp Heat, Steady State <i>IEC60115-1 clause 4.24</i> (40 ⁺² [°C], 93 ⁺³ [% r.h.], 56[d])		±[%]		0,5 (<211kΩ) ; 1 (>211kΩ)	0,25 (≤ 1M) ; 1 (>1M)	0,25 (≤ 1M) ; 1 (>1M)
Damp Heat, Steady State, Accelerated <i>IEC60115-1 clause 4.37</i> (85 ⁺² [°C], 85 ⁺⁵ [%RH], $U = 0.3*\sqrt{P_{70} \times R}$)		±[%]		-	0,25 (≤ 1M) ; 2 (>1M)	0,5 (≤ 1M) ; 2 (>1M)
Temperature Cycling <i>IEC60068-2-14 ; IEC60115-1 clause 4.19</i> (30[<i>min</i>] each , 1000 cycles)	±[%]		-55~125°C	-	0,25	0,25
			-55~155°C	-	0,5	0,5
Vibration <i>IEC60068-2-6 ; IEC60115-1 clause 4.22</i> (10;2000[Hz], ≤1,5[mm] , or ≤200[m/s ²] 7,5[h])		±[%]		-	0,05 (≤ 1M) ; 0,1 (>1M)	0,05
Resistance to Soldering Heat <i>IEC60115-1 clause 4.18</i> (260 ⁺²⁵ [°C], 10 ⁺¹ [s])Solder bath method		±[%]		0,1 (<211kΩ) ; 0,25(>211kΩ)	0,1 (≤ 10R) ; 0,05 (>10R)	0,1 (≤ 10R) ; 0,05 (>10R)
Electrostatic Discharge <i>IEC60115-1 clause 4.38 ; IEC61340-3-1</i> (3 positives + 3 negatives discharges)		±[%]		-	0,5 [2 kV]	0,5 [4 kV]
Voltage proof <i>IEC60115-1 clause 4.7</i> $U_{RMS}=U_{INS}$, 60 [s]				-	No flash over or breakdown	
Flammability <i>IEC60115-1 clause 4.35, IEC60695-11-5</i> Needle flame test, 10[s]				-	No burning after 30[s]	
Solderability <i>IEC60068-2-20 ; IEC60115-1 clause 4.17</i> (235 ⁺²³ [°C] 2 ^{+0,2} [s],SnAg ₃ Cu _{0,5} or SnAg _{3,5})				-	≥ 95% covered, no visible damage	
Component Resistance to Solvents <i>IEC60068-2-45 ; IEC60115-1 clause 4.29</i> (50[°C] method 2)				No visible damage		
Resistance to solvents of Marking <i>IEC60068-2-45 ; IEC60115-1 clause 4.30</i> (50[°C] method 1)				Marking visible , no visible damage		
Marking <i>IEC60062</i>				Color code		

NOTES: MARKING [COLOR CODE]:

- ZCM204** Color code marking is applied according to IEC 60062 in four bands (E24 series) for 5 % tolerance, or in five bands (E96 or E192 series). Each color band appears as a single solid line, voids are permissible if at least 2/3 of the band is visible from each radial angle of view. The last color band for tolerance is approximately 50 % wider than the other bands.
 - ZCM207** Color code marking is applied according to IEC 60062 in four (E24 series) or six bands (E96 series). Each color band appears as a single solid line, voids are permissible if at least 2/3 of the band is visible from each radial angle of view. The last color band represents the TCR for resistors with TCR ≤50 ppm/K and nominal tolerance ≤1 %.
- Zero ohm jumpers** are marked with one centered black band.

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TEMPERATURE COEFFICIENT

ZCM102	ZCM204	ZCM207			
Resistance range			Tolerance	TCR	E-Series
-	0R22 ... 0R91	0R16 ... 0R91	± 5%	± 100 ppm/K	E24
-		0R22 ... 0R91	± 2%		
10R...2M21	0R82... 10M	1R... 10M	± 1%	± 50 ppm/K	E24 / E96
-	10R... 1M65	1R... 2M21	± 0,5%		E24 / E192
-	10R... 1M65	43R... 1M	± 0,5%	± 25 ppm/K	E24 / E192
-	22R... 1M65	43R... 1M	± 0,25%		
100R... 100K	22R... 1M65	43R... 1M	± 0,1%		
-	10R... 221K	100R... 511K	± 0,5%	± 15 ppm/K	E24 / E192
-	22R... 221K	100R... 511K	± 0,25%		
100R... 100K	43R... 221K	100R... 511K	± 0,1%		
Jumper $I_{\max} = 2A$	Jumper $I_{\max} = 3A$	Jumper $I_{\max} = 5A$	≤ 10 mΩ		

- The body coating color is light green for jumpers and for a temperature coefficient of ±50 or 100 [ppm], pink for ±25[ppm] and violet for ±15[ppm]

MAXIMUM RESISTANCE CHANGE AT RATED DISSIPATION

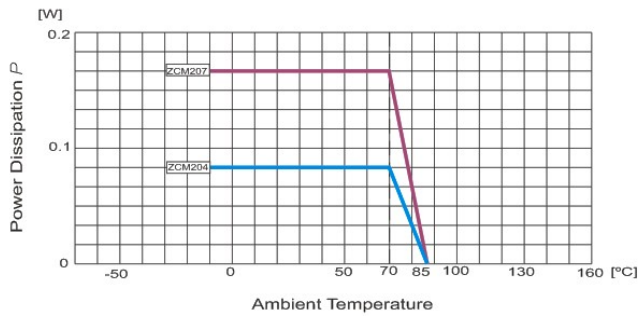
		ZCM102	ZCM204			ZCM207		
OPERATION MODE		STANDARD	PRECISION	STANDARD	POWER	PRECISION	STANDARD	POWER
Rated Power dissipation P ₇₀ [W]		0,2	0,07	0,25	0,4	0,125	0,4	1,0
Operating temp. range [°C]		-55 to 125	-10 to 85	-55 to 125	-55 to 155	-10 to 85	-55 to 125	-55 to 155
Permissible film temperature θF Max [°C]		125	85	125	155	85	125	155
Resistance range		10R – 2M21	10R – 1M	R22 – 1M	R22 – 10M	100R – 511K	1R0 – 1M	1R0 – 1M
Max. Resistance drift [%] [ΔR/R]	1000h	≤0,5	≤0,05	≤0,15	≤0,25	≤0,05	≤0,15	≤0,25
	8000h	≤1	≤0,1	≤0,3	≤0,5	≤0,1	≤0,3	≤0,5
	225 000h	-	≤0,25	≤0,75	-	≤0,25	≤1,0	-

- A suitable low thermal resistance of the circuit board assembly must be safeguarded in order to maintain the film temperature of the resistors within the specified limits.

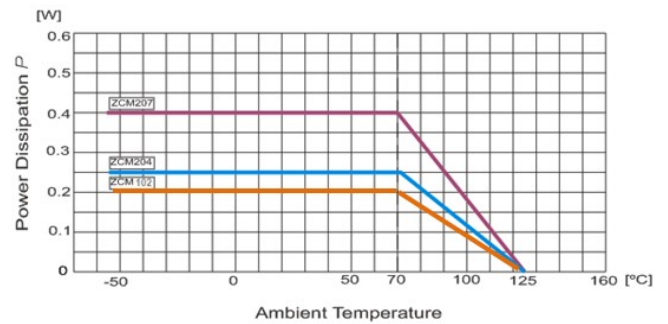
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PERFORMANCE GRAPH'S

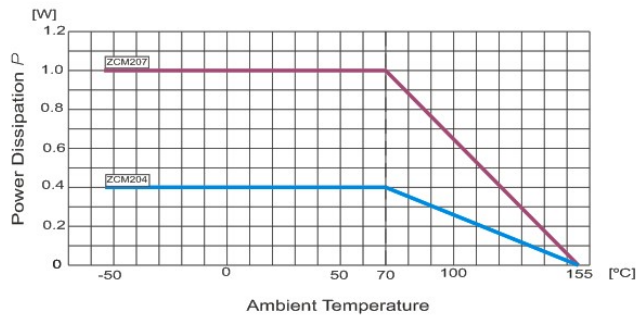
Derating – Precision Operation



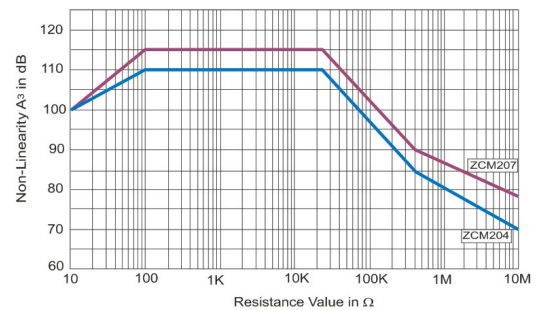
Derating – Standard Operation



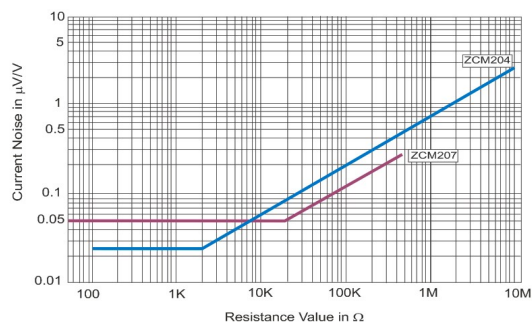
Derating – Power Operation



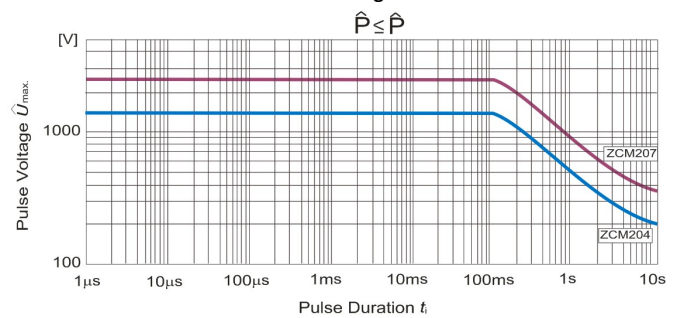
Non- Linearity



Current Noise

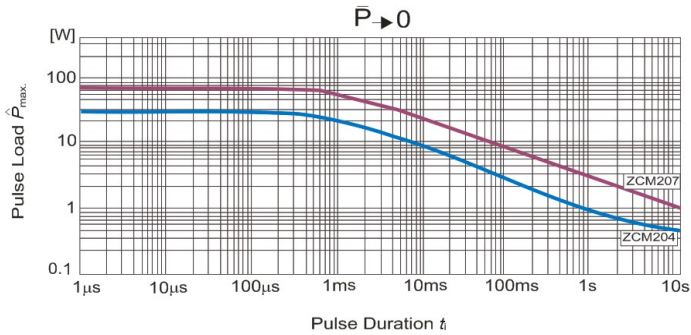


Pulse Voltage

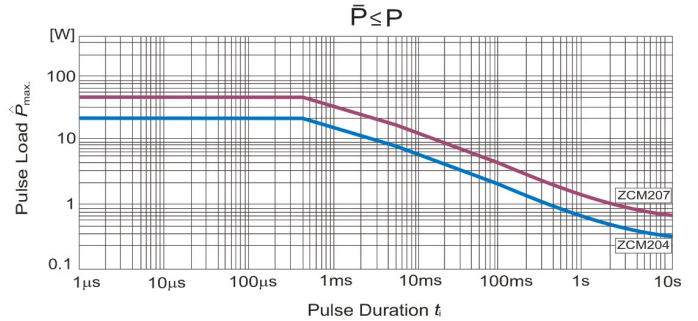


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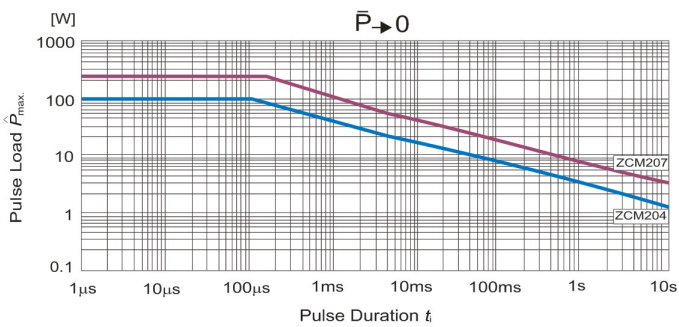
Single Pulse for $R < 10\Omega$



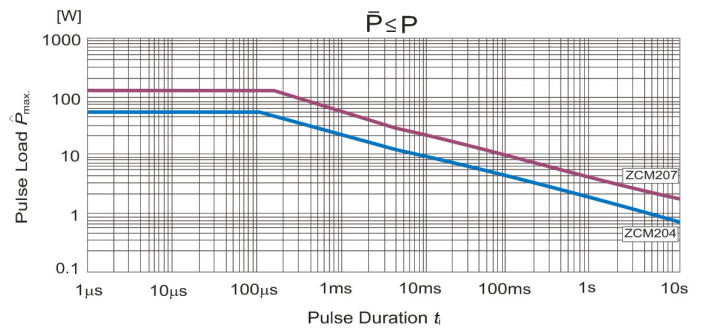
Continuous Pulse for $R < 10\Omega$



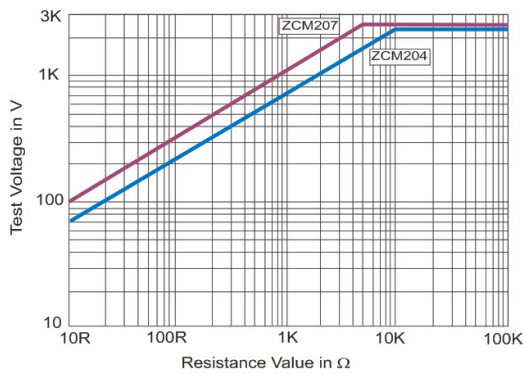
Single Pulse for $R \geq 10\Omega$



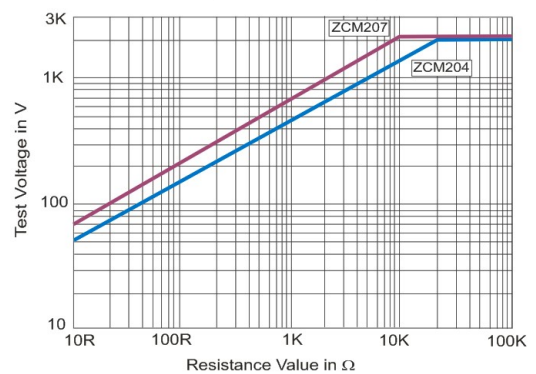
Continuous Pulse for $R \geq 10\Omega$



Single Pulse (1.2/50 [μs])



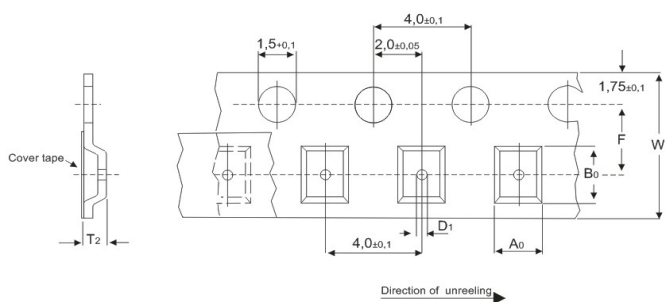
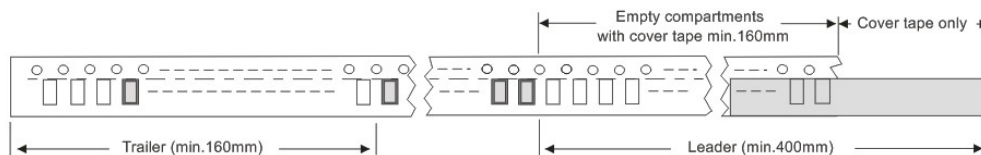
Single Pulse (10/700 [μs])



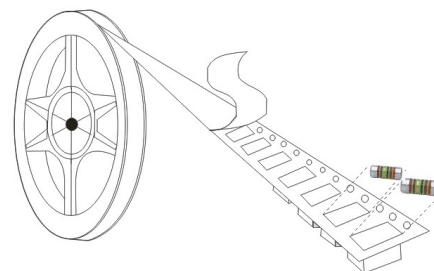
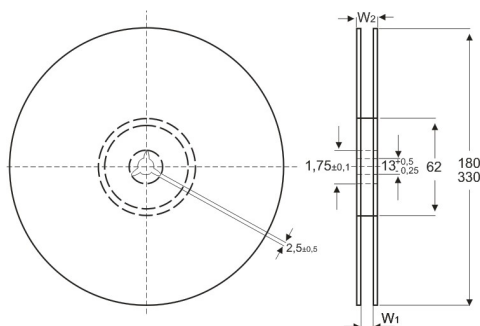
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PACKAGING - Blister tape

The type ZCM is packed in antistatic blister tape according to IEC60286-3, type 2a, packing details described below,



Type	A0	B0	F	W	D1	T2
ZCM102	1,3±0,1	2,47±0,1	3,5±0,05	8,0.±0,3/-0,1	1,0	≤ 1,65
ZCM204	1,55±0,1	3,7±0,1	3,5±0,05	8,0.±0,3	1,0	≤ 1,8
ZCM207	2,40±0,1	6,0±0,1	5,5±0,05	12,0.±0,3	1,5	≤ 2,7



Type	W1 [±1,5]	W2 [max]
ZCM102	8,4 ^{+1,5/-0}	14,4
ZCM204	8,4	14,4
ZCM207	12,4	18,4

Type	Packaging [dimensions]	Quantity [pcs]
ZCM102	07(inch) Blister tape	3000
ZCM204		3000
ZCM207		1500
ZCM204	13(inch) Blister tape	10000
ZCM207		7500