

VITROHM
a YAGEO company

AEC - Q200 Qualified | RoHS COMPLIANT | REACH COMPLIANT

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

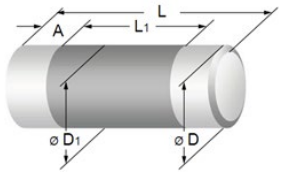
FEATURES

- 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

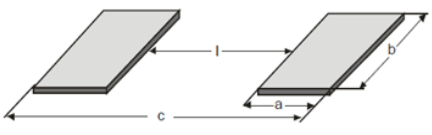
ELECTRICAL SPECIFICATIONS

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	[ºC]		-55 … +125	-55 … +155	
Permissible film temperature *(ϑF max.)*	[ºC]		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 $^{\pm0,05}$	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	24	6,6

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ZCM Series Datasheet

PERFORMANCE DATA

Type				ZCM102	ZCM204	ZCM207
Historical Part Number				-	ZC0204	ZC0207
Climatic Category				55/155/56		
Short Time Overload *IEC60115-1 clause 4.13* *(U=2,5* $\sqrt{P_{70} \times R}$ *, ≤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 *IEC60115-1 clause 4.27* *(U=10*, Severity 4, 10 pulses 10[µs]/700[µs]*	Standard operation	±[%]		-	0,15	0,25
	Power operation			-	0,15	0,5
Periodic electric overload *IEC60115-1 clause 4.39* *(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 70ºC, *IEC60115-1 clause 4.25.1* *(U=* 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. *IEC60115-1 clause 4.25.3* *(1000[h]*		±[%]	125ºC	0,25 (<211kΩ) ; 1 (>211kΩ)	0,15 (≤1M) ; 0,5 (>1M)	0.15 (<10R) ; 0.1 (10R≤1M) ; 0.25 (>1M)
			155ºC	-	0,3 (≤1M) ; 1 (>1M)	0.3 (<10R) ; 0.2 (10R≤1M) ; 0.5 (>1M)
Damp Heat, Steady State *IEC60115-1 clause 4.24* *(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 *IEC60115-1 clause 4.37* *(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 *IEC60068-2-14 ; IEC60115-1 clause 4.19* *(30[min] each , 1000 cycles)*		±[%]	-55~125ºC	-	0,25	0,25
			-55~155ºC	-	0,5	0,5
Vibration *IEC60068-2-6 ; IEC60115-1 clause 4.22* *(10;2000[Hz], ≤1,5[mm] , or ≤200[m/s²] 7,5[h])*		±[%]		-	0,05 (≤ 1M) ; 0,1 (>1M)	0,05
Resistance to Soldering Heat *IEC60115-1 clause 4.18* *(260±5[°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 *IEC60115-1 clause 4.38 ; IEC61340-3-1* *(3 positives + 3 negatives discharges)*		±[%]		-	0,5 [2 kV]	0,5 [4 kV]
Voltage proof *IEC60115-1 clause 4.7* U_{RMS}=U_{INS}, *60 [s]*				-	No flash over or breakdown	
Flammability *IEC60115-1 clause 4.35, IEC60695-11-5* *Needle flame test, 10[s]*				-	No burning after 30[s]	
Solderability *IEC60068-2-20 ; IEC60115-1 clause 4.17* *(235±3[ºC] 2±0,2[s],$SnAg_3Cu_{0.5}$ or $SnAg_{3.5}$)*				-	≥ 95% covered, no visible damage	

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Component Resistance to Solvents *IEC60068-2-45 ; IEC60115-1 clause 4.29* *(50[ºC] method 2)*		No visible damage
Resistance to solvents of Marking *IEC60068-2-45 ; IEC60115-1 clause 4.30* *(50[ºC] method 1)*		Marking visible , no visible damage
Marking *IEC60062*		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.

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 [ºC]		-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 [ºC]		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	-

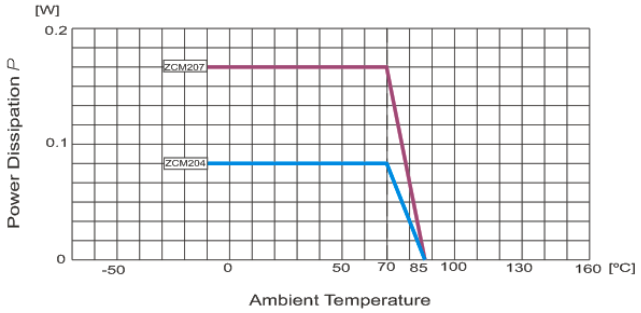
A suitable low thermal resistance of the circuit board assembly must be safeguarded in order to maintain the film temperature of the resistors within the specified limits.

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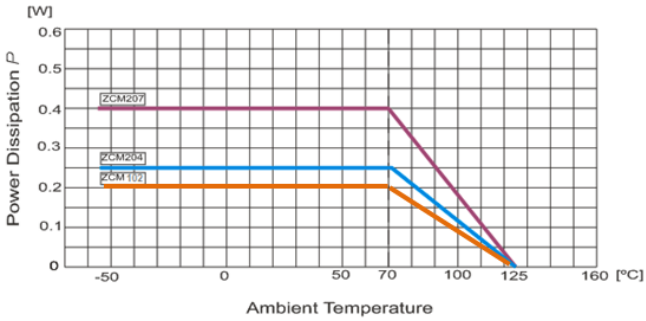
ZCM Series Datasheet

PERFORMANCE GRAPHS

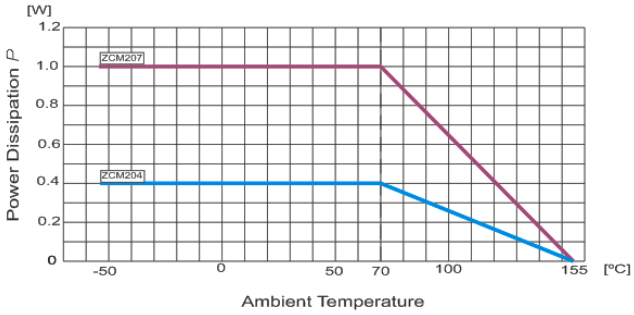
Derating – Precision Operation



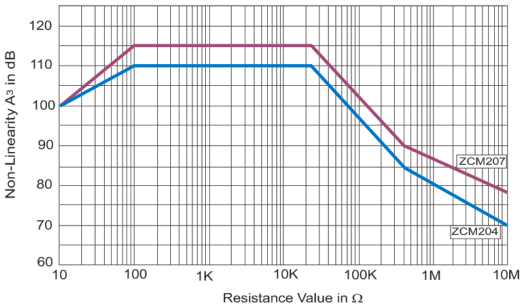
Derating – Standard Operation



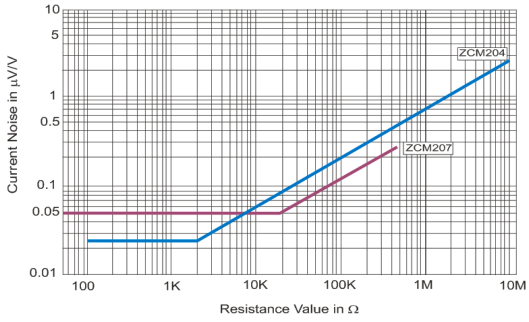
Derating – Power Operation



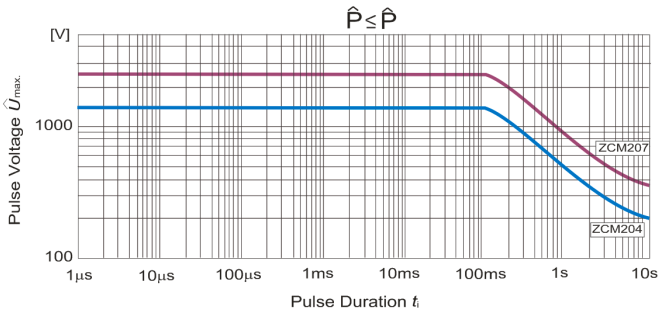
Non- Linearity



Current Noise



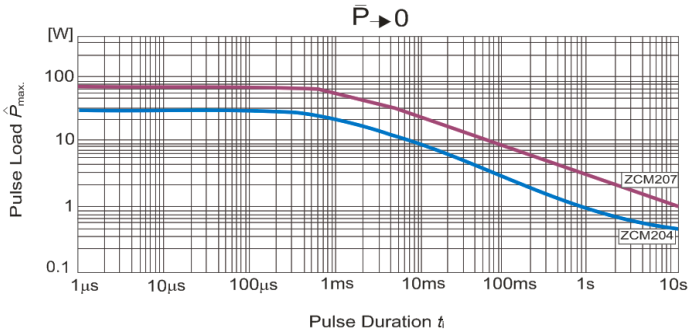
Pulse Voltage



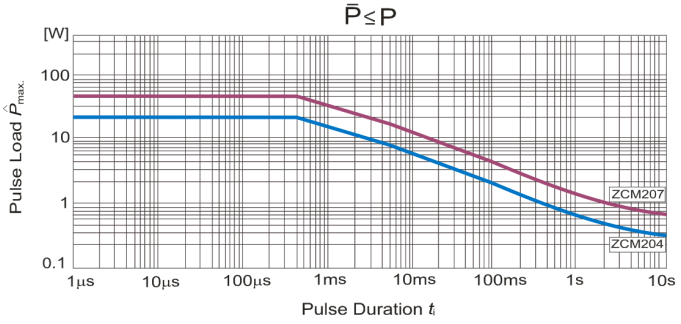
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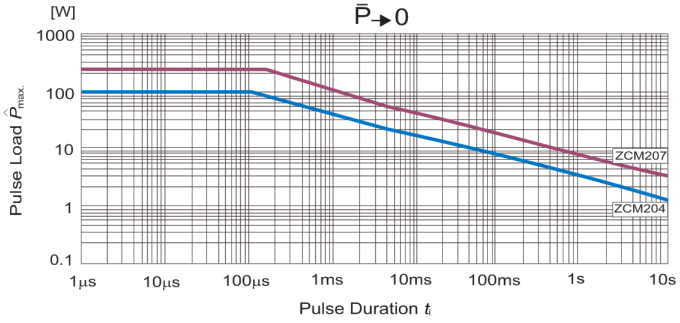
Single Pulse for *R* < 10Ω



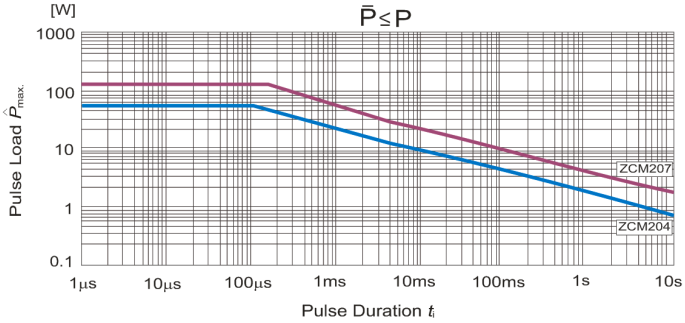
Continuous Pulse for *R* < 10Ω



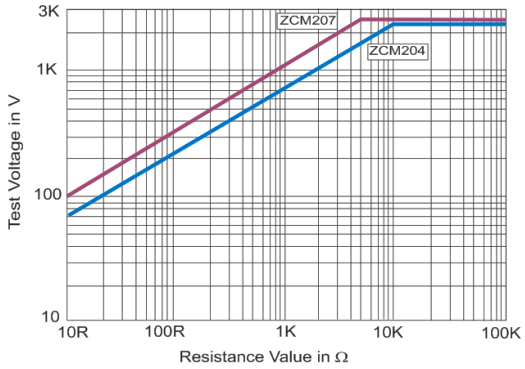
Single Pulse for *R* ≥ 10Ω



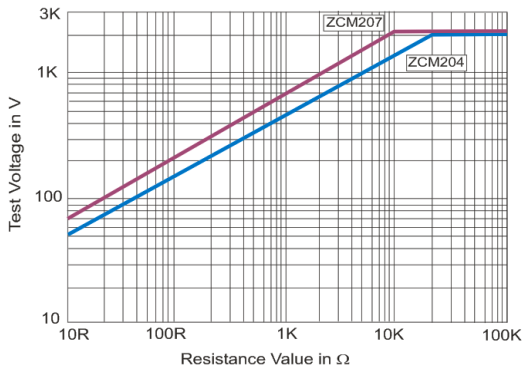
Continuous Pulse for *R* ≥ 10Ω



Single Pulse (1.2/50 [µs])



Single Pulse (10/700 [µs])

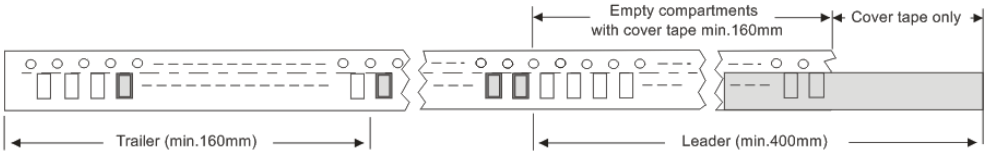


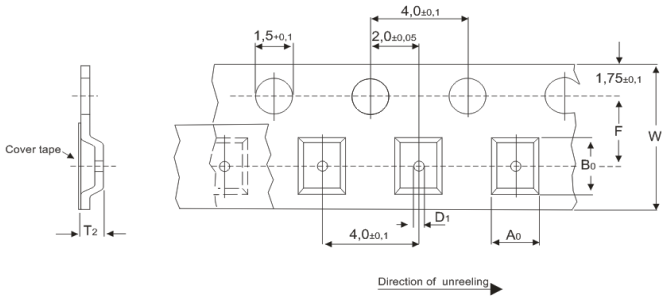
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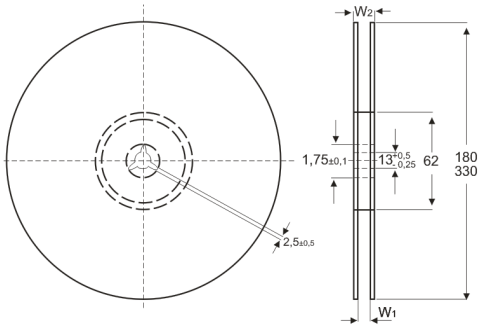
PACKAGING

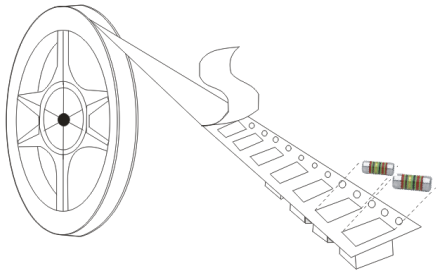
The type ZCM is packed in antistatic blister tape according to IEC60286-3, type 2a, packing details described below.





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

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