FROLYT

SMD (Chip) Aluminum Electrolytic Capacitors **Downsized 105°C**

ERSM

Downsized SMD (Chip)
Endurance 2.000h at 105°C
Rated voltage range: 10V to 100V, Rated capacitance range: 4,7µF to 680µF
Size range: 8,9 x 10,0mm and 10,2 x 10,0mm
Designed as G-Kap (C_R measured at DC-Load) or bipolar Chip capacitor available
RoHS compliant
Special types on request

RoHS

Specifications

	Characteristics									
Temperature range	-55°C to +105°C									
Rated voltage range	10V to 100V									
Capacitance tolerance	±20%, other on request									(at 20°C, 100Hz)
Leakage current I_{ra}	I_{ra}=0,002 · C_R · V_R + 3µA or 5µA, whichever is greater, (I_{ra} [µA], C_R: Rated capacitance [µF], V_R: Rated voltage [V]) (at 20°C, after 5 minutes)									
Dissipation factor tan δ (D.F.)	Rated voltage (V_R)	10V	16V	25V	35V	40V	50V	63V	100V	
	tan δ_{max}	0,24	0,20	0,16	0,13	0,12	0,11	0,10	0,09	(at 20°C, 100Hz)
Low temperature characteristics Z_{max}-factor	Rated voltage (V_R)	10V	16V	25V	35V	40V	50V	63V	100V	
	Z(-40°C)/(20°C)	2	2	2	2	2	2	2	2	(100Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2.000 hours at 105°C.									
	Capacitance change	ΔC/C0 ≤ ±20%								
	D.F. (tan δ)	Δtan δ ≤ +200% of the initial specification value								
	Leakage current (I_{ra})	I_{ra} ≤ the initial specified value								
Shelf life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1.000 hours at 105°C without voltage applied.									
	Capacitance change	ΔC/C0 ≤ ±20%								
	D.F. (tan δ)	Δtan δ ≤ +200% of the initial specification value								
	Leakage current (I_{ra})	I_{ra} ≤ +200% of the initial specification value								
Surge voltage test	Die The capacitors shall be subjected to 1.000 cycles each consisting of charging with the specified surge voltage for 30±5 seconds through a protective resistor (R=0,1/C_R) and open-circuiting for 330 seconds at 105°C. The following specifications shall be satisfied when the capacitors are restored to 20°C.									
	Rated voltage (V_R)	10V	16V	25V	35V	40V	50V	63V	100V	
	Surge voltage (V_S)	11,5V	18,4V	28,8V	40,3	46V	57,5V	72,5V	115V	
	Appearance	No significant damage								
	Caoacitance change	ΔC/C0 ≤ ±10%								
	D.F. (tan δ)	tan δ ≤ the initial specified value								
	Leakage current (I_{ra})	I_{ra} ≤ the initial specified value								

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FROLYT

Aluminum-electrolytic capacitors SMD (Chip) for surface mounting,
Downsized, insulated, polarized, pulse proof
Endurance at least 2.000h at +105°C,

ERSM

Generic specification:
DIN EN 60384-1

Sectional specification:
DIN IEC 60384-18
without quality assessment

Opering temperature range:
-55°C to +105°C

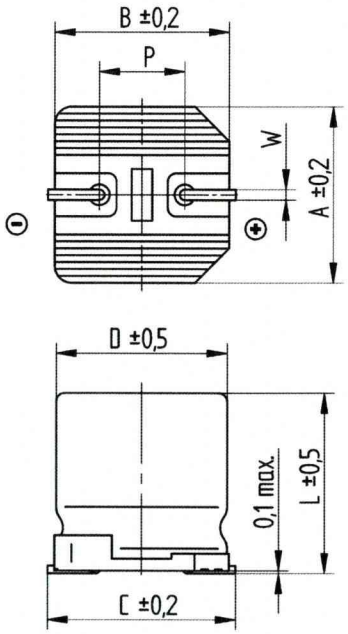
Climatic category:
55/105/56

Capacitance range:
±20% (other on request)

Surge voltage test V_S:
$V_S = 1{,}15 \cdot V_R$

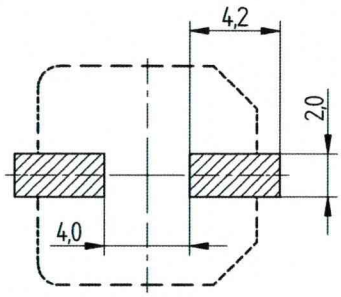
Leakage current I_{ra}:
measured at V_R at 20°C
$I_{ra} \leq 0{,}002\ C_R \cdot V_R + 3\mu A$ or $5\mu A$
(after 5 minutes, whichever is greater)
C_R: Rated capacitance (µF)
V_R: Rated voltage (V)

Reverse voltage:
at +20°C to +25°C = 2V (briefly)
at -55°C to +105°C = 1V (briefly)



The identification of polarity is carried out by the stamp image.

Recommended Soldering area on PC board



Soldering on PC board

Dimensions (mm)		
	Terminal length x Height	
	8,9 x 10,0	10,2 x 10,0
A	8,9	10,2
B	8,9	10,2
C	9,7	11,0
D	8,7	10.0
L	10,0	10,0
W	0,8-1,1	0,8-1,1
P	4,5	4,5

Endurance at least (after soldering)	
Ambient temperaturer	
≤ +40°C	192.000h
+85°C	8.000h
+105°C	2.000h

Dimensions Overview: Terminal length x Height (mm)

Capacitance	Rated voltage V_R [V]							
C_R [µF]	10	16	25	35	40	50	63	100
4,7								8,9 x 10,0
6,8							8,9 x 10,0	8,9 x 10,0
10						8,9 x 10,0	8,9 x 10,0	8,9 x 10,0
15					8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0
22				8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0
33			8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	10,2 x 10,0
47		8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	10,2 x 10,0
68	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	10,2 x 10,0	10,2 x 10,0	10,2 x 10,0	
100	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	10,2 x 10,0	10,2 x 10,0	10,2 x 10,0	10,2 x 10,0	
150	8,9 x 10,0	8,9 x 10,0	8,9 x 10,0	10,2 x 10,0	10,2 x 10,0			
220	8,9 x 10,0	8,9 x 10,0	10,2 x 10,0	10,2 x 10,0				
330	10,2 x 10,0	10,2 x 10,0	10,2 x 10,0					
470	10,2 x 10,0	10,2 x 10,0						
680	10,2 x 10,0							

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Technical specifications

Rated cap. C_R [µF]	Rated voltage V_R [V]	Size [mm] Terminal length x Height	tan δ 100Hz +20°C (max)	ESR [Ω] 100Hz +20°C (max)	ESR [Ω] 100kHz +20°C (typical)	Z [Ω] 10kHz +20°C (max)	Z [Ω] 100kHz +20°C (typical)	Z [Ω] 10kHz -40°C (max)	Z [Ω] 100kHz -40°C (typical)	I~ [mA]* 100Hz +105°C (max)	I~ [mA]* 100kHz +105°C (max)
68	10	8,9 x 10,0	0,24	5,62	0,43	0,59	0,45	6,10	3,40	105	159
100	10	8,9 x 10,0	0,24	3,82	0,43	0,59	0,45	6,10	3,40	127	193
150	10	8,9 x 10,0	0,24	2,55	0,43	0,59	0,45	6,10	3,40	155	236
220	10	8,9 x 10,0	0,24	1,74	0,43	0,59	0,45	6,10	3,40	188	286
330	10	10,2 x 10,0	0,24	1,16	0,30	0,44	0,32	4,50	2,40	246	374
470	10	10,2 x 10,0	0,24	0,81	0,30	0,42	0,32	4,30	2,40	293	446
680	10	10,2 x 10,0	0,24	0,56	0,30	0,40	0,32	4,00	2,40	353	536
47	16	8,9 x 10,0	0,20	6,77	0,43	0,59	0,45	6,10	3,40	95	145
68	16	8,9 x 10,0	0,20	4,68	0,43	0,59	0,45	6,10	3,40	115	174
100	16	8,9 x 10,0	0,20	3,18	0,43	0,59	0,45	6,10	3,40	139	211
150	16	8,9 x 10,0	0,20	2,12	0,43	0,59	0,45	6,10	3,40	170	259
220	16	8,9 x 10,0	0,20	1,45	0,43	0,59	0,45	6,10	3,40	206	313
330	16	10,2 x 10,0	0,20	0,96	0,30	0,44	0,32	4,50	2,40	269	409
470	16	10,2 x 10,0	0,20	0,68	0,30	0,42	0,32	4,30	2,40	321	489
33	25	8,9 x 10,0	0,16	7,72	0,43	0,59	0,45	6,10	3,40	89	136
47	25	8,9 x 10,0	0,16	5,42	0,43	0,59	0,45	6,10	3,40	107	162
68	25	8,9 x 10,0	0,16	3,74	0,43	0,59	0,45	6,10	3,40	128	195
100	25	8,9 x 10,0	0,16	2,55	0,43	0,59	0,45	6,10	3,40	155	236
150	25	8,9 x 10,0	0,16	1,70	0,43	0,59	0,45	6,10	3,40	190	289
220	25	10,2 x 10,0	0,16	1,16	0,30	0,44	0,32	4,50	2,40	246	374
330	25	10,2 x 10,0	0,16	0,77	0,30	0,44	0,32	4,50	2,40	301	458
22	35	8,9 x 10,0	0,13	9,40	0,43	0,73	0,45	6,80	3,40	81	123
33	35	8,9 x 10,0	0,13	6,27	0,43	0,73	0,45	6,80	3,40	99	151
47	35	8,9 x 10,0	0,13	4,40	0,43	0,73	0,45	6,80	3,40	118	180
68	35	8,9 x 10,0	0,13	3,04	0,43	0,73	0,45	6,80	3,40	142	216
100	35	10,2 x 10,0	0,13	2,07	0,30	0,52	0,32	5,10	2,40	184	280
150	35	10,2 x 10,0	0,13	1,38	0,30	0,50	0,32	4,90	2,40	225	342
220	35	10,2 x 10,0	0,13	0,94	0,30	0,48	0,32	4,70	2,40	273	415
15	40	8,9 x 10,0	0,12	12,73	0,43	0,73	0,45	6,80	3,40	70	106
22	40	8,9 x 10,0	0,12	8,68	0,43	0,73	0,45	6,80	3,40	84	128
33	40	8,9 x 10,0	0,12	5,79	0,43	0,73	0,45	6,80	3,40	103	157
47	40	8,9 x 10,0	0,12	4,06	0,43	0,73	0,45	6,80	3,40	123	187
68	40	10,2 x 10,0	0,12	2,81	0,30	0,52	0,32	5,10	2,40	158	240
100	40	10,2 x 10,0	0,12	1,91	0,30	0,52	0,32	5,10	2,40	191	291
150	40	10,2 x 10,0	0,12	1,27	0,30	0,50	0,32	4,90	2,40	234	356

* I~ (Rated ripple current) refers to an increase in temperature of 3K, special requirements or special types on request

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Technical specifications

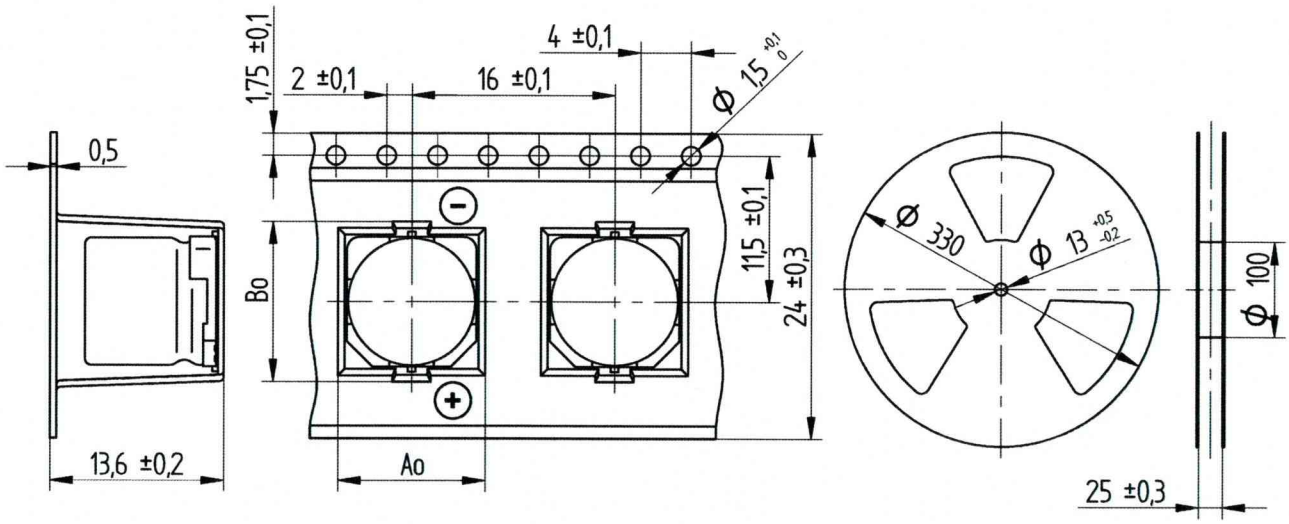
Rated cap. C_R [µF]	Rated voltage V_R [V]	Size [mm] Terminal length x Height	tan δ 100Hz +20°C (max)	ESR [Ω] 100Hz +20°C (max)	ESR [Ω] 100kHz +20°C (typical)	Z [Ω] 10kHz +20°C (max)	Z [Ω] 100kHz +20°C (typical)	Z [Ω] 10kHz -40°C (max)	Z [Ω] 100kHz -40°C (typical)	I~ [mA]* 100Hz +105°C (max)	I~ [mA]* 100kHz +105°C (max)
10	50	8,9 x 10,0	0,11	17,51	0,64	1,24	0,68	13,00	5,10	59	90
15	50	8,9 x 10,0	0,11	11,67	0,64	1,24	0,68	13,00	5,10	73	110
22	50	8,9 x 10,0	0,11	7,96	0,64	1,22	0,68	12,00	5,10	88	134
33	50	8,9 x 10,0	0,11	5,31	0,64	1,22	0,68	12,00	5,10	108	164
47	50	8,9 x 10,0	0,11	3,72	0,64	1,02	0,68	10,00	5,10	129	195
68	50	10,2 x 10,0	0,11	2,57	0,43	0,59	0,45	6,10	3,40	165	251
100	50	10,2 x 10,0	0,11	1,75	0,43	0,59	0,45	6,10	3,40	200	304
6,8	63	8,9 x 10,0	0,10	23,41	1,32	2,05	1,37	25,00	16,70	51	78
10	63	8,9 x 10,0	0,10	15,92	1,32	2,05	1,37	25,00	16,70	62	95
15	63	8,9 x 10,0	0,10	10,61	1,32	1,95	1,37	23,40	16,70	76	116
22	63	8,9 x 10,0	0,10	7,23	1,32	1,95	1,37	23,40	16,70	92	140
33	63	8,9 x 10,0	0,10	4,82	1,20	1,76	1,26	21,10	15,10	113	172
47	63	8,9 x 10,0	0,10	3,39	1,14	1,56	1,20	20,30	15,60	135	205
68	63	10,2 x 10,0	0,10	2,34	0,64	0,88	0,68	11,90	9,20	173	263
100	63	10,2 x 10,0	0,10	1,59	0,64	0,88	0,68	11,90	9,20	210	319
4,7	100	8,9 x 10,0	0,09	30,48	2,15	3,25	2,21	45,20	30,10	45	68
6,8	100	8,9 x 10,0	0,09	21,06	2,15	3,25	2,21	45,20	30,10	54	82
10	100	8,9 x 10,0	0,09	14,32	2,05	3,25	2,21	45,20	30,10	66	100
15	100	8,9 x 10,0	0,09	9,55	1,75	2,39	1,81	33,50	25,80	80	122
22	100	8,9 x 10,0	0,09	6,51	1,75	2,39	1,81	33,50	25,80	97	148
33	100	10,2 x 10,0	0,09	4,34	1,14	1,56	1,20	21,80	16,80	127	193
47	100	10,2 x 10,0	0,09	3,05	1,14	1,56	1,20	21,80	16,80	152	230

* I~ (Rated ripple current) refers to an increase in temperature of 3K, special requirements or special types on request

Packaging:
- Blister tapes on reel
- 300 components/ reel (one packaging unit)
- 2700 Chips = 9 Reels (minimum order quantity)

Blister: belt form and dimensions

Reel



Terminal length x Height	Dimensions [mm]	
	A_0	B_0
8,9 x 10,0	9,5 ±0,2	10,1 ±0,2
10,2 x 10,0	10,8 ±0,2	12,0 ±0,2

Ordering information for FROLYT SMD/ Chip electrolytic capacitors

- Series
- Rated capacitance/ Rated voltage
- Capacitance tolerance
- Dimensions (Terminal length x Height)
- Additional requirements

Ordering example: ERSM 47µF 63V ±20%, 8,9 x 10,0mm, Carrier Tape on reel

Soldering:
Recommended soldering conditions: http://www.frolyt.de/wp-content/uploads/Soldering_profils.pdf.