

Aluminum Capacitors 105 °C, Miniature, Radial Lead



QUICK REFERENCE DATA					
DESCRIPTION	VALUE				
Nominal case size Ø D x L in inches [mm]	0.394 x 0.472 [10.0 x 12.0] to 0.709 x 1.575 [18.0 x 40.0]				
Operating temperature	-55 °C to +105 °C				
Rated capacitance range, C _R	33 μF to 6800 μF				
Tolerance on C _R	± 20 %				
Rated voltage range, U_R	6.3 WV _{DC} to 63 WV _{DC}				
Termination	2 and 3 radial leads and axial mount.				
Life validation test at 105 °C	$ \begin{array}{l} 4000 \ h \ (\geq 0.512" \ [13.0] \ diameter); \\ 3000 \ h \ (0.394" \ [10.0] \ diameter); \\ \Delta CAP \leq 20 \ \% \ (6.3 \ WV_{DC}), \\ \leq 15 \ \% \ (40 \ WV_{DC} \ to \ 63 \ WV_{DC}) \\ from \ initial \ measurement. \\ \Delta ESR \leq 1.3 \ x \ initial \\ specified \ limit. \\ \Delta DCL \leq 2 \ x \ initial \ specified \ limit. \\ \end{array} $				
Shelf life at 105 °C	1000 h: Δ CAP \leq 20 % (6.3 WV _{DC} to 25 WV _{DC}), \leq 15 % (40 WV _{DC} to 63 WV _{DC}) from initial measurements. Δ ESR \leq 1.3 x initial specified limit.				
DC leakage current	I = 0.01 CV (2 min charge time) I = 0.03 CV (1 min charge time) I in µA, C in µF, V in Volts				

FEATURES

- Improved SMPS output capacitors
- Highest ripple current ratings per case size



 Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RIPPLE CURRENT MULTIPLIERS							
TEMPERATURE							
AMBIE	NT TEMP	ERATURE		MULTIPLIE	RS		
	+105 °C			1.0			
	+85 °C	;		2.2			
	+75 °C	;		2.7			
	≤ +65 °C			3.0			
		FREC	UENCY (Hz)			
WV _{DC}	50 TO 60	100 TO 120	300 TO 400 1K TO 19K 20K TO 200				
6.3 to 63	0.60	0.70	0.75 0.82 1.0				

LOW TEMPERATURE PERFORMANCE								
CAPACITANCE RA	CAPACITANCE RATIO C ⁻⁵⁵ °C / C ⁺²⁵ °C MINIMUM AT 120 Hz							
MAXIMUM	VOL	ΓAGE	MULTI	PLIER				
CAPACITANCE	6.3 V t	o 16 V	0.	75				
CHANGE	25 V t	o 63 V	0.85					
MAXIMUM	VOL	TAGE	MULTIPLIER					
IMPEDANCE	6.3 V t	o 16 V	2.0					
CHANGE	25 V t	o 63 V	1.5					
ESL (TYPICA	L VALUES	AT 1 MHz	TO 10 MH	z)				
NOMINAL	0.394 0.512		0.630	0.709				
DIAMETER	[10.0]	[13.0]	[16.0]	[18.0]				
TYPICAL ESL (nH)	4.0	7.0	10.0	12.0				

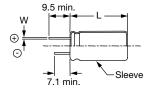




BULK SPECIFICATIONS in millimeters

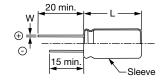
TERMINAL CODE C





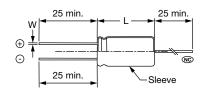
TERMINAL CODE D



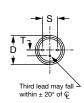


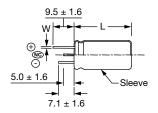
TERMINAL CODE J (1)





TERMINAL CODE O (2)





Notes

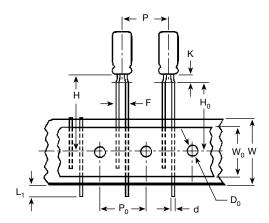
- Positive terminal
- O Negative terminal
- No charge potential
- (1) Available for 12.5 mm, 16 mm, and 18 mm diameter units
- (2) Available for 12.5 mm, 16 mm, and 18 mm diameter units with epoxy end-seal

DIME	DIMENSIONS in inches [millimeters]									
CASE	NOM	INAL	STYLES	2 AND 4	STYLES	3 AND 5	LEAD S	PACING	LEAD DIAMETER	
CASE	D	L	D (max.)	L (max.)	D (max.)	L (max.)	S ± 0.024 [0.60]	T ± 0.020 [0.50]	NOMINAL	AWG
CC	0.394 [10.0]	0.512[13.0]	0.413 [10.5]	0.563 [14.3]	0.413[10.5]	0.630 [16.0]	0.197 [5.0]	n/a	0.025 [0.63]	22
CD	0.394 [10.0]	0.630 [16.0]	0.413 [10.5]	0.669 [17.0]	0.413[10.5]	0.740 [18.8]	0.197 [5.0]	n/a	0.025 [0.63]	22
CG	0.394 [10.0]	0.787 [20.0]	0.413 [10.5]	0.846 [21.5]	0.413[10.5]	0.906 [23.0]	0.197 [5.0]	n/a	0.025 [0.63]	22
DG	0.492 [12.5]	0.787 [20.0]	0.512 [13.0]	0.846 [21.5]	0.512 [13.0]	0.906 [23.0]	0.197 [5.0]	0.098 [2.5]	0.032 [0.81]	20
DK	0.492 [12.5]	0.984 [25.0]	0.512 [13.0]	1.043 [26.5]	0.512 [13.0]	1.142 [29.0]	0.197 [5.0]	0.098 [2.5]	0.032 [0.81]	20
DM	0.492 [12.5]	1.043 [26.5]	0.512[13.0]	1.102 [28.0]	0.512[13.0]	1.161 [29.5]	0.197 [5.0]	0.098 [2.5]	0.032 [0.81]	20
DT	0.492 [12.5]	1.319 [33.5]	0.512[13.0]	1.346 [34.2]	0.512[13.0]	1.417 [36.0]	0.197 [5.0]	0.098 [2.5]	0.032 [0.81]	20
DS	0.492 [12.5]	1.673 [42.5]	0.512[13.0]	1.720 [43.7]	0.512[13.0]	1.791 [45.5]	0.197 [5.0]	0.098 [2.5]	0.032 [0.81]	20
EK	0.630 [16.0]	0.984 [25.0]	0.650 [16.5]	1.031 [26.2]	0.650 [16.5]	1.098 [27.9]	0.295 [7.5]	0.150 [3.8]	0.032 [0.81]	20
EN	0.630 [16.0]	1.260 [32.0]	0.650 [16.5]	1.319 [33.5]	0.650 [16.5]	1.417 [36.0]	0.295 [7.5]	0.150 [3.8]	0.032 [0.81]	20
ER	0.630 [16.0]	1.417 [36.0]	0.650 [16.5]	1.476 [37.5]	0.650 [16.5]	1.575 [40.0]	0.295 [7.5]	0.150 [3.8]	0.032 [0.81]	20
EU	0.630 [16.0]	1.575 [40.0]	0.650 [16.5]	1.642 [41.7]	0.650 [16.5]	1.669 [42.4]	0.295 [7.5]	0.150 [3.8]	0.032 [0.81]	20
FR	0.709 [18.0]	1.417 [36.0]	0.728[18.5]	1.476 [37.5]	0.728 [18.5]	1.575 [40.0]	0.295 [7.5]	0.150 [3.8]	0.032 [0.81]	20
FV	0.709 [18.0]	1.575 [40.0]	0.728 [18.5]	1.653 [42.0]	0.728 [18.5]	1.693 [43.0]	0.295 [7.5]	0.150 [3.8]	0.032 [0.81]	20



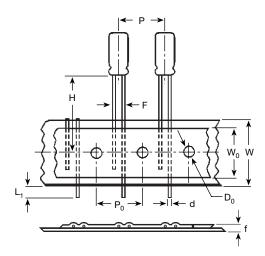
TAPE AND REEL, SPECIFICATIONS TO EIA-468D in inches [millimeters]

Formed Leads



DIMENSIONS in inches [millimeters] AND PACKAGING QUANTITIES								
CASE SIZE F LEAD SPACING STD. QTY/REEL								
0.236 x 0.453 [6.0 x 11.0]	0.197 [5.0]	800						
0.315 x 0.472 [8.0 x 12.0]	0.197 [5.0]	700						

Unformed (Straight) Leads



DIMENSIONS in inches [millimeters] AND PACKAGING QUANTITIES								
CASE SIZE	F LEAD SPACING	STD. QTY/REEL						
0.236 x 0.453 [6.0 x 11.0]	0.098 [2.5]	800						
0.315 x 0.472 [8.0 x 12.0]	0.140 ⁽¹⁾ [3.5]	700						
0.394 x 0.512 [10.0 x 13.0]	0.197 [5.0]	500						
0.394 x 0.630 [10.0 x 16.0]	0.197 [5.0]	500						
0.394 x 0.787 [10.0 x 20.0]	0.197 [5.0]	500						

Note

⁽³⁾ Available as special order.



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DIMENSIONS in inches [millimeters]							
	CASE SIZE (DIAMETER x LENGTH)						
ITEM	0.236 x 0.433 [6.0 x 11.0]	0.315 x 0.472 [8.0 x 12.0]	0.394 x 0.512 [10.0 x 13.0]	0.394 x 0.630 [10.0 x 16.0]	0.394 x 0.787 [10.0 x 20.0]		
d - Lead-wire diameter	0.025 [0.63]	0.025 [0.63]	0.025 [0.63]	0.025 [0.63]	0.025 [0.63]		
P - Pitch of component	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]		
P ₀ - Feed hole pitch	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]		
F - Lead-to-lead distance	0.197 [5.0]	0.197 [5.0]	0.197 [5.0]	0.197 [5.0]	0.197 [5.0]		
K - Clinch height	0.098 [2.5]	0.157 [4.0]	n/a	n/a	n/a		
H - Height of component from tape center	0.728 [18.5]	0.787 [20.0]	0.906 [23.0]	0.906 [23.0]	0.906 [23.0]		
H ₀ - Lead-wire clinch height	0.630 [16.0]	0.630 [16.0]	n/a	n/a	n/a		
W - Tape width	0.709 [18.0]	0.709 [18.0]	0.709 [18.0]	0.709 [18.0]	0.709 [18.0]		
W ₀ - Hold down tape width	0.591 [15.0]	0.591 [15.0]	0.591 [15.0]	0.591 [15.0]	0.591 [15.0]		
D ₀ - Feed hole diameter	0.157 [4.0]	0.157 [4.0]	0.157 [4.0]	0.157 [4.0]	0.157 [4.0]		
t - Total tape thickness	0.028 [0.7]	0.028 [0.7]	0.028 [0.7]	0.028 [0.7]	0.028 [0.7]		
L ₁ - Maximum lead protrusion	0.118 [3.0]	0.118 [3.0]	0.118 [3.0]	0.118 [3.0]	0.118 [3.0]		

Note

ORDERING EXAMPLE

Electrolytic capacitor 678D series: 678D 108 M 6R3 DG 3 D

DESCRIPTION					
CODE	EXPLANATION				
678D	Product type				
108	Capacitance value (1000 μF)				
M	Tolerance (M = ± 20 %)				
6R3	Voltage rating at 105 °C (6R3 = 6.3 V)				
DG	Can size (see Dimensions table)				
3	Sleeve and sealing (3 = P.V.C. sleeve w/epoxy end seal)				
D	Terminal code / packaging (D = bulk; straight leads)				

Note

 For lead (Pb)-free / RoHS compliant products add suffix "E3" to part number. Example: 678D108M6R3DG3DE3

ELECTRICA	ELECTRICAL DATA AND ORDERING INFORMATION							
CAPACITANCE	PART NUMBER	NOMINAL CASE SIZE		. ESR 5 °C (Ω)	MAX. RIPPLE AT +105 °C (A)	MAX. IMPEDANCE		
(μ F)		DxL	20 Hz	20 kHz	20 kHz to 100 kHz	AT +25 °C (Ω) 100 kHz		
		6.3 WV _{DC} at 105	°C, SURGE = 9	V				
330.0	678D337M6R3CC3D	0.394 x 0.512 [10.0 x 13.0]	0.540	0.213	0.36	0.213		
470.0	678D477M6R3CD3D	0.394 x 0.630 [10.0 x 16.0]	0.340	0.133	0.49	0.132		
1000.0	678D108M6R3DG3D	0.492 x 0.787 [12.5 x 20.0]	0.200	0.071	0.83	0.070		
2200.0	678D228M6R3EK3D	0.630 x 0.984 [16.0 x 25.0]	0.110	0.041	1.36	0.045		
3300.0	678D338M6R3DS3D	0.492 x 1.673 [12.5 x 42.5]	0.067	0.031	1.67	0.032		
4700.0	678D478M6R3FR3D	0.709 x 1.417 [18.0 x 36.0]	0.066	0.029	2.02	0.031		
		10 WV _{DC} AT 105 °	C, SURGE = 1	3 V				
330.0	678D337M010CD3D	0.394 x 0.630 [10.0 x 16.0]	0.350	0.135	0.46	0.134		
470.0	678D477M010CG3D	0.394 x 0.787 [10.0 x 20.0]	0.235	0.092	0.63	0.090		
1000.0	678D108M010DM3D	0.492 x 1.043 [12.5 x 26.5]	0.120	0.062	0.98	0.061		
2200.0	678D228M010EK3D	0.630 x 0.984 [16.0 x 25.0]	0.115	0.042	1.52	0.046		
3300.0	678D338M010EN3D	0.630 x 1.260 [16.0 x 32.0]	0.085	0.038	1.56	0.041		
4700.0	678D487M010FR3D	0.709 x 1.417 [18.0 x 36.0]	0.070	0.031	1.97	0.033		

Terminal code "I" = tape and reel. Terminal code "+" = tape and ammo.
 Positive leader is standard. Negative leader is available by special order.



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CAPACITANCE	PART NUMBER	NOMINAL CASE SIZE	MAX. ESR AT +25 °C (Ω)		MAX. RIPPLE AT +105 °C (A)	MAX. IMPEDANCE
(μ F)		DxL	20 Hz	20 kHz	20 kHz to 100 kHz	AT +25 °C (Ω) 100 kHz
		16 WV _{DC} AT 105 °	C, SURGE = 2	20 V		
220.0	678D227M016CC3D	0.394 x 0.512 [10.0 x 13.0]	0.585	0.217	0.40	0.217
330.0	678D337M016CD3D	0.394 x 0.630 [10.0 x 16.0]	0.370	0.137	0.52	0.136
470.0	678D477M016CG3D	0.394 x 0.787 [10.0 x 20.0]	0.250	0.098	0.70	0.094
1000.0	678D108M016DM3D	0.492 x 1.043 [12.5 x 26.5]	0.130	0.066	1.00	0.065
2200.0	678D228M016ER3D	0.630 x 1.417 [16.0 x 36.0]	0.074	0.032	1.78	0.034
3300.0	678D338M016FR3D	0.709 x 1.417 [18.0 x 36.0]	0.074	0.032	1.94	0.034
•		20 WV _{DC} AT 105 °	C, SURGE = 3	30 V	1	
220.0	678D227M020CD3D	0.394 x 0.630 [10.0 x 16.0]	0.380	0.150	0.41	0.148
330.0	678D337M020CG3D	0.394 x 0.787 [10.0 x 20.0]	0.270	0.100	0.61	0.098
470.0	678D477M020DG3D	0.492 x 0.787 [12.5 x 20.0]	0.250	0.077	0.45	0.075
1000.0	678D108M020DT3D	0.492 x 1.280 [12.5 x 33.5]	0.115	0.048	0.78	0.045
2200.0	678D228M020ER3D	0.630 x 1.417 [16.0 x 36.0]	0.077	0.032	1.80	0.034
3300.0	678D338M020FV3D	0.709 x 1.575 [18.0 x 40.0]	0.061	0.026	2.25	0.028
		25 WV _{DC} AT 105 °	C, SURGE = 3	35 V		
100.0	678D107M025CC3D	0.394 x 0.512 [10.0 x 13.0]	0.700	0.250	0.32	0.250
220.0	678D227M025CG3D	0.394 x 0.787 [10.0 x 20.0]	0.300	0.105	0.59	0.100
330.0	678D337M025DG3D	0.492 x 0.787 [12.5 x 20.0]	0.270	0.078	0.79	0.076
470.0	678D477M025DM3D	0.492 x 1.043 [12.5 x 26.5]	0.160	0.067	0.97	0.068
1000.0	678D108M025DS3D	0.492 x 1.673 [12.5 x 42.5]	0.090	0.034	1.60	0.036
2200.0	678D228M025FV3D	0.709 x 1.575 [18.0 x 40.0]	0.062	0.026	2.22	0.028
ı		40 WV _{DC} AT 105 °				
47.0	678D476M040CC3D	0.394 x 0.512 [10.0 x 13.0]	0.950	0.265	0.28	0.265
100.0	678D107M040CD3D	0.394 x 0.630 [10.0 x 16.0]	0.580	0.165	0.38	0.165
330.0	678D337M040DM3D	0.492 x 1.043 [12.5 x 26.5]	0.200	0.068	0.93	0.070
470.0	678D477M040EK3D	0.630 x 0.984 [16.0 x 25.0]	0.133	0.046	1.28	0.050
1000.0	678D108M040ER3D	0.630 x 1.417 [16.0 x 36.0]	0.080	0.033	1.76	0.035
		50 WV _{DC} AT 105 °			T T	
47.0	678D476M050CC3D	0.394 x 0.512 [10.0 x 13.0]	1.250	0.275	0.28	0.275
100.0	678D107M050CG3D	0.394 x 0.787 [10.0 x 20.0]	0.520	0.115	0.57	0.112
220.0	678D227M050DM3D	0.472 x 1.043 [12.5 x 26.5]	0.240	0.069	0.93	0.071
330.0	678D337M050EK3D	0.630 x 0.984 [16.0 x 25.0]	0.150	0.048	1.26	0.052
470.0	678D477M050DS3D 678D108M050FV3D	0.492 x 1.673 [12.5 x 42.5]	0.110	0.036	1.55	0.039
1000.0	678D108M050FV3D	0.709 x 1.575 [18.0 x 40.0]	0.077	0.028	2.15	0.032
22.0	678D336M063CC3D	63 WV _{DC} AT 105 °			0.27	0.200
33.0 47.0	678D336M063CC3D	0.394 x 0.512 [10.0 x 13.0] 0.394 x 0.630 [10.0 x 16.0]	1.600	0.288 0.180	0.27 0.37	0.288
100.0	678D107M063DG3D	0.492 x 0.787 [12.5 x 20.0]	0.450	0.180	0.72	0.180
220.0	678D227M063DT3D	0.492 x 0.787 [12.5 x 20.0]	0.450	0.093	1.10	0.090
220.0	678D227M063EK3D	0.630 x 0.984 [16.0 x 25.0]	0.170	0.050	1.23	0.054
330.0	678D337M063DS3D	0.492 x 1.673 [12.5 x 42.5]	0.170	0.038	1.51	0.034
470.0	678D477M063ER3D	0.630 x 1.417 [16.0 x 36.0]	0.130	0.035	1.70	0.040

Statements about product lifetime are based on calculations and internal testing. They should only be interpreted as estimations. Also due to external factors, the lifetime in the field application may deviate from the calculated lifetime. In general, nothing stated herein shall be construed as a guarantee of durability.



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EPA-201ELL151MM25S NCD681K10KVY5PF NRLF103M25V35X20F KM4700/16 KME50VB100M-8X11.5 SG220M1CSA-0407

ES5107M016AE1DA ESMG160ETD102MJ16S ESX472M16B MAL211929479E3 40D506F050DF5A 36DA273F050BB2A

KME25VB100M-6.3X11 052687X EKMA500ELL4R7ME07D NRE-S560M16V6.3X7TBSTF ERZA630VHN182UP54N

MAL214099813E3 MAL211990518E3 MAL204281229E3 NEV680M35EF 686KXM050M ERS1VM222L30OT EGW2GM150W16OT

EGS2GM6R8G12OC EHS2GM220W20OT ERF1VM222L30OT ERF1KM151G20OT RGA221M1HBK-1016G NXH 35V1800 16x20

EWH2DM471M40OT LKFB41E470MF LKMJ3551H332MF LKMJ2002E151MF LKMJ2502G820MF LKML3502A331MF

LKMB0901J180MF LKMB0901J2R2MF