

Professional Ceramic Capacitors - Class I, II and III

MIL-STD-202F

The professional ceramic disc capacitors were specially developed for applications in severe environmental conditions, high humidity, temperature, gas, vapor and solvents.

The capacitors are flame retardant epoxy coated, meeting UL 94-V0 flammability specifications. The capacitors are 100% screened on following electrical parameters: Capacitance, loss factor, test voltage. After the 100% test, the capacitors are audited on its electrical and mechanical parameters with the following AQL:

Electrical parameters: 0.065% level II Mechanical parameters: 0.65% level II

The capacitors withstand the following reliability essays:

Terminal strength: method 211 - condition A

Resistance to solvents: method 215

Resistance to soldering heat: method 210 - condition B

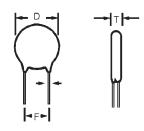
Solderability: method 208

Thermal shock: method 107 - condition A

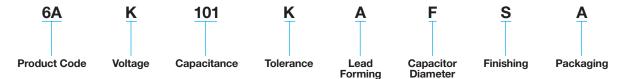
Humidity (steady state): method 103 – condition B Life (at elevated ambient temperature): method 108 –

condition D

Operating temperature and storage: -55... +125° C



HOW TO ORDER

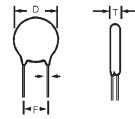




General Specifications - Class I and II Professional

DIELECTRIC - CLASS I

These ceramic capacitors have linear temperature coefficient, very low tolerances, low losses, high insulation resistance and are specially suitable for tuned circuits, timing and other precision circuits.



100V ... 500V PERFORMANCE CHARACTERISTICS CLASS I

Measured at	1.0 MHz @ 1.0 Vrms / 25°C
Dissipation Factor (%)	$C_R \le 30 \text{ pF} \rightarrow \le 1/C_R + 0.07$ $C_R > 30 \text{ pF} \rightarrow \le 0.1\%$
Tolerance	$C_{\rm R} < 10 \ {\rm pF} \rightarrow \pm 0.25 \ {\rm pF}, \pm 0.5 \ {\rm pF}$ $C_{\rm R} \ge 10 \ {\rm pF} \rightarrow \pm 5\%, \pm 10\%$
Insulation Resistance (IR)	@ V _R → ≥ 10 GΩ

Dielectric Strength NOTE: Charging current limited to 50 mA	@ $V_R = 100V \rightarrow Vt = 250V (DC)$ @ $V_R = 500V \rightarrow Vt = 1250V (DC)$
Operating Temperature Range (°C)	-55 +125°C Epoxy Coated
Climatic Category	30 / 85 / 56

DIMENSION TABLE - CLASS I LOW AND MEDIUM VOLTAGE PROFESSIONAL 100V / 500V CLASS I EPOXY COATED - CAPACITANCE VS. DISC DIAMETER millimeters (inches)

Temp.		P0	N7	750	N1500		
Coefficient		1	14.	1		1	
Digits 1, 2, 3 of P.N.	6AK	6AQ	6GK	6GQ	6HK	6HQ	
Rated Voltage (V _R)	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	
C _R (pF)							
1.0							
1.2							
1.5 1.8							
2.2							
2.7							
3.3							
3.9							
4.7		5.0 (0.197)					
5.6	5.0 (0.197)	0.0 (0.101)					
6.8 8.2	, ,			5.0 (0.197)			
10			5.0 (0.197)				
12			3.0 (0.191)				
15							
18						5.0 (0.197)	
22					5.0 (0.197)		
27							
33		6.0 (0.236)					
39 47		7.0 (0.276)					
56	7.0 (0.276)		-	6.0 (0.236)			
68	0.0 (0.045)	8.0 (0.315)		7.0 (0.276)		6.0 (0.236)	
82	8.0 (0.315)	9.0 (0.354)	7.0 (0.276)			(/	
100	9.0 (0.354)	11.0 (0.433)		8.0 (0.315)		7.0 (0.276)	
120	3.0 (0.004)		8.0 (0.315)		7.0 (0.276)		
150	11.0 (0.433)	12.0 (0.472)		9.0 (0.354)		8.0 (0.315)	
180 220	12.0 (0.472)	14.0 (0.551)	10.0 (0.394)	11.0 (0.433)	8.0 (0.315)	9.0 (0.354)	
270	12.0 (0.412)	16.0 (0.630)	11.0 (0.433)		9.0 (0.354)		
330		19.0 (0.748)	11.0 (0.100)	14.0 (0.551)	10.0 (0.394)	11.0 (0.433)	

Diameter (φ) = 9th Part Number Digit



Dimension Table - Class II

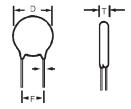
Low and Medium Voltage Professional



DIELECTRIC - CLASS II

These ceramic capacitors have a high dielectric constant, making possible high capacitance values in reduced dimensions, however temperature coefficient and loss factor are greater than Class I.

Typical applications are decoupling and by pass.



100V AND 500V PERFORMANCE CHARACTERISTICS CLASS II

Measured at	1.0 kHz @ 0.3 Vrms / 25°C
Dissipation Factor (%)	X5E / X5F / X5P ≤ 2.5% X5U / X5V / Z5V ≤ 3.0%
Capacitance Tolerance	X5E / X5F / X5P → ±10% X5U / X5V / Z5V → -20 +50% X5E / X5F / X5P / X5U → ±20%
Insulation Resistance (IR)	$@V_R \rightarrow ≥ 10 GΩ$

Dielectric Strength NOTE: Charging current limited to 50 mA	@ $V_R = 100V \rightarrow Vt = 250V$ (DC) @ $V_R = 500V \rightarrow Vt = 1250V$ (DC) Between leads and body insulation
Operating Temperature Range (°C)	-55 +125°C Epoxy Coated
Climatic Category	30 / 85 / 56

Note: Damp Heat Steady State: 90... 95% R.H. 40°C / 56 days. No voltage to be applied.

DIMENSION TABLE - CLASS II LOW AND MEDIUM VOLTAGE PROFESSIONAL 100V / 500V CLASS II EPOXY COATED millimeters (inches)

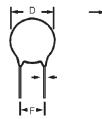
Temp. Coefficient	nt X5E		X5F		X5	X5P		X5U		X5V	
Digits 1,2,3											Z5V
of P.N.	6MK	6MQ	6NK	6NQ	60K	60Q	6SK	6SQ	6TK	6TQ	6UK
Rated Voltage (V _R)	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC
C _R (pF)											
56											
68											
82											
100											
120											
150	E 0 (0 107)	5.0 (0.197)									
180 220	5.0 (0.197)										
270											
330											
390											
470											
560			5.0 (0.197)	5.0 (0.197)		5.0 (0.197)					
680	6.0 (0.236)	6.0 (0.236)	0.0 (0.101)	0.0 (0.101)	5.0 (0.197)						
820	(, , , , , , , , , , , , , , , , , , ,				,						
1,000	7.0 (0.276)	7.0 (0.276)	6.0 (0.236)			6.0 (0.236)					
1,200	7.0 (0.276)	, ,	0.0 (0.230)	7.0 (0.276)	6.0 (0.236)	, ,	5.0 (0.197)	5.0 (0.197)			
1,500		9.0 (0.354)		7.0 (0.270)		7.0 (0.276)					
1,800	9.0 (0.354)	9.0 (0.004)	7.0 (0.276)		7.0 (0.276)	1.0 (0.210)					
2,200	` ′	10.0 (0.394)	7.0 (0.270)	9.0 (0.354)	7.0 (0.270)					5.0 (0.197)	
2,700	10.0 (0.394)	11.0 (0.433)		, ,		9.0 (0.354)	6.0 (0.236)		5.0 (0.197)		
3,300	11.0 (0.433)	12.0 (0.472)	9.0 (0.354)	10.0 (0.394)	9.0 (0.354)	10.0 (0.394)		7.0 (0.276)	(01101)		
3,900			11.0 (0.433)	11.0 (0.433)	10.0 (0.394)	12.0 (0.472)		, -/			5 0 (0 10=°
4,700			` ′	12.0 (0.472)	11.0 (0.433)	, ,	7.0 (0.070)			6.0 (0.236)	5.0 (0.197)
5,600					140/0551	14.0 (0.551)	7.0 (0.276)	9.0 (0.354)			
6,800 8,200					14.0 (0.551)			10.0 (0.394)			
10,000						16.0 (0.630)		11.0 (0.433)		7.0 (0.276)	6.0 (0.236)
12,000							10.0 (0.394)	12.0 (0.433)	7.0 (0.276)		0.0 (0.230)
15,000							10.0 (0.034)	12.0 (0.472)		9.0 (0.354)	7.0 (0.276)
22,000									9.0 (0.354)	10.0 (0.394)	10.0 (0.394)
33,000									3.0 (0.004)	12.0 (0.472)	12.0 (0.472)
47,000											14.0 (0.551)
100,000											19.0 (0.748)
,											1.1. (2 10)



General Specifications - Class III Professional

DIELECTRIC - CLASS III

These ceramic capacitors have linear temperature coefficient, very low tolerances, low losses, high insulation resistance and are specially suitable for tuned circuits, timing and other precision circuits. Meets IEC 384-8 (1988).



PERFORMANCE CHARACTERISTICS CLASS III

Measured at	1.0 kHz / 0.1 Vrms / 25°C				
Dissipation Factor (%)	$C_R \le 22 \text{ nF} \rightarrow \text{Y5V}, \text{Y5U} \le 7.5\%$ $C_R > 22 \text{ nF} \rightarrow \text{Y5V}, \text{Y5P} \le 5.0\%$				
Tolerance	Y5P → ±20% / -20 +50% Y5U → ±20% / -20 +50% Y5V → -20% +50% / -20 +80%				
Insulation	Y5P	≥12 MΩ			
Resistance (IR)	Y5U	4.7 nF100 nF \rightarrow ≥ 10 M Ω 200 nF \rightarrow ≥ 1 M Ω			
	Y5V	≥ 100 MΩ			
Dielectric Strength NOTE: Charging current limited to 50 mA	Between Vt = 1.25 V _R				
	Body insulation	$V_{R} = 25V Vt = 100V (DC)$ $V_{R} = 50V Vt = 150V (DC)$			
Operating Temperature Range (°C)	-55 +125°C				
Climatic Category	30 / 085 / 56				

EPOXY COATED - CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

Class III	Δ C/C (max.) ±12%	Range -30 +85°C	Δ C/C (max.) +30 -65%	Range -30 +85°C	Δ C/C (max.) +30 -65%	Range -30 +85°C		
Temp. Coefficient	Y	5P	Y	5U	Y5V			
Digits 1,2,3 of P.N.	6WF	6WH	6YF	6YH	6ZI	-1		
Rated Voltage (V _R)	25 VDC	50 VDC	25 VDC	50 VDC	50 VDC			
C _R (pF)								
4,700	5.0 (0.197)	5.0 (0.197)		5.0 (0.197)				
10,000	6.0 (0.236)	6.0 (0.236)	5.0 (0.197)	5.0 (0.197)	5.0 (6.197)			
22,000	7.0 (0.276)	8.0 (0.315)		6.0 (0.236)	5.0 (0.	197)		
33,000	8.0 (0.315)	9.0 (0.354)	6.0 (0.236)	7.0 (0.276)				
47,000	0.0 (0.054)	0.0 (0.254)	` '		8.0 (0.315)			
50,000	9.0 (0.354)		7.0 (0.276)	8.0 (0.315)				
68,000	11.0 (0.433)	11.0 (0.433) 11.0 (0.433)		0.0 (0.054)	6.0 (0.236)			
100,000	11.0 (0.433)		8.0 (0.315) 9.0 (0.354)					
220,000					10.0 (0.3	394)		

