KMF Series

UNITED CHEMI-CON

- Miniature
- Solvent Proof
- Low Impedance
- Long Life
- +105°C Maximum Temperature

The KMF series capacitors are designed for low impedances at high frequencies with the case sizes of the KME general purpose capacitors. These capacitors will operate over a wide temperature range, −55°C to +105°C, with a load life of between 2,000 and 5,000 hours with the rated ripple current applied, depending on the case size.

The KMF series capacitors up to 100 volts were developed to withstand HCFC cleaning agents for five minutes by ultrasonic, vapor or immersion. This solvent proof design allows all circuit board components to be cleaned together, at the same time, without resorting to more expensive epoxy end-sealed capacitors. Refer to the Mini-Glossary for recommended cleaning conditions.

Summary of Specifications

- **Radial lead terminals.**
- **Capacitance range: 0.47 to 15,000µF.**
- **Voltage range: 6.3 to 450VDC.**
- **Operating temperature range: −55°C to +105°C for 6.3 to 100V; −40°C to +105°C for 160 to 400V; −25°C to +105°C for 450V.**
- **Leakage current: See specifications table for leakage current values at +20°C.**
- **Standard capacitance tolerance: ±20%**
- **Nominal case size (D×L): 5×11mm to 18×40mm.**
- **Rated lifetime: 2,000 to 5,000 hours at +105°C with the rated ripple current applied, depending on rated voltage and case size.**

KMF Series

KMF Specifications

Item	Characteristics		
Rated Voltage Range	**6.3 to 100VDC**	**160 to 400VDC**	**450VDC**
Operating Temperature Range	−55 to +105°C	−40 to +105°C	−25 to +105°C
Capacitance Range	0.47 to 15,000μF	3.3 to 220μF	2.2 to 33μF
Capacitance Tolerance	±20% (M) at +20°C, 120Hz	±20% (M) at +20°C, 120Hz	
Leakage Current	I = 0.03CV or 4μA, whichever is greater, after 1 minute at +20°C. I = 0.01CV or 3μA, whichever is greater, after 2 minutes at +20°C.	CV ≤1,000: I = 0.10CV + 40 CV >1,000: I = 0.04CV + 100 } after 1 minute at +20°C CV ≤1,000: I = 0.03CV + 15 CV >1,000: I = 0.02CV + 25 } after 5 minutes at +20°C	
	Where I = Leakage current (μA), C = Nominal capacitance (μF) and V = Rated voltage (V)		

Dissipation Factor (Tan δ)

At +20°C, 120Hz

Rated Voltage (V)	6.3	10	16	25	35	50	63	100	160-250	400-450
Tan δ (DF)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	0.20	0.24

When nominal capacitance exceeds 1,000μF, add 0.02 to the values above for each 1,000μF increase.

Low Temperature Characteristics

At 120Hz, impedance (Z) ratio between the −25°C or −40°C value and +20°C value shall not exceed the values given below.

Rated Voltage (V)	6.3	10	16	25-100	160-250	400	350-450
Z(−25°C)/Z(+20°C)	4	3	2	2	3	5	6
Z(−40°C)/Z(+20°C)	8	6	4	3	6	6	–

Ripple Current Multipliers

Refer to the following page for Ripple Current Multipliers.

Load Life

The following specifications shall be satisfied when the capacitors are restored to +20°C after subjecting them to the DC rated voltage for the specified test time at +105°C with the rated ripple current applied. The sum of DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitors.

Case Diameter	Test Time (6.3-100V)
Ø5 & Ø6.3mm	2,000 hours
Ø8 & Ø10mm	3,000 hours
Ø12.5mm & above	5,000 hours

Capacitance change:
≤ ±20% of initial measured value

Tan δ (DF):
≤ 200% of initial specified value

Leakage current:
≤ initial specified value

Case Diameter	Test Time (160-450V)
Ø10mm & above	2,000 hours

Capacitance change:
≤ ±20% of initial measured value

Tan δ (DF):
≤ 200% of initial specified value

Leakage current:
≤ 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. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.

Capacitance change: ≤ ±20% of initial measured value
Tan δ (DF) : ≤ 200% of initial specified value
Leakage current : ≤ initial specified value for 6.3 to 100V
: ≤ 500% of initial specified value for 160 to 450V

Others

Satisfies characteristic W of JIS C5141

KMF Series

Ripple Current Multipliers

Refer to Section 4 of the Mini-Glossary for explanation of Ripple Current Multipliers.

Ambient Temperature (°C)

≤ +65°C	+85°C	+105°C
2.23	1.73	1.00

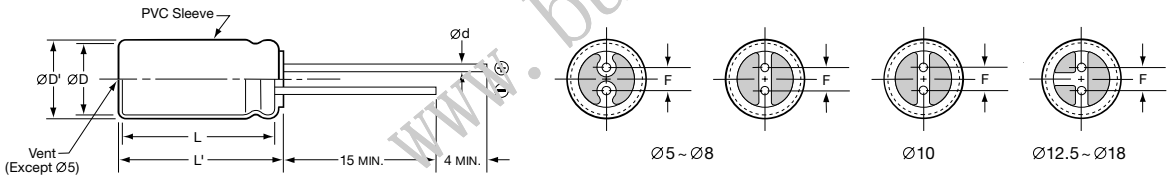
Frequency (Hz)

DC Rated Voltage	Case Diameter (Capacitance Range)	120Hz	1kHz	10kHz	100kHz
6.3V, 10V	Ø5 (≤47µF)	0.40	0.75	0.93	1.00
	Ø5 (100µF), Ø6.3, Ø8	0.70	0.86	0.96	1.00
	Ø10-Ø18	0.85	0.95	0.98	1.00
16-35V	Ø5 (≤22µF)	0.30	0.68	0.91	1.00
	Ø5 (≥33µF), Ø6.3, Ø8	0.50	0.80	0.94	1.00
	Ø10-Ø18	0.70	0.88	0.97	1.00
50V, 63V	Ø5 (≤3.3µF)	0.20	0.66	0.90	1.00
	Ø5 (≥4.7µF), Ø6.3, Ø8	0.40	0.76	0.93	1.00
	Ø10-Ø18	0.60	0.84	0.96	1.00
100V	Ø5 (≤1.0µF)	0.20	0.60	0.88	1.00
	Ø5 (≥2.2µF), Ø6.3, Ø8	0.30	0.65	0.90	1.00
	Ø10-Ø18	0.40	0.75	0.93	1.00
160-450V	Ø10	0.25	0.61	0.88	1.00
	Ø12.5-Ø18	0.35	0.66	0.89	1.00

Diagram of Dimensions

VB/Radial Lead

Unit: mm



Gas escape end seal for all case diameters.

For optional lead configurations and tape and ammo packaging, refer to the beginning of the Miniature section.

ØD	ØD' max.	L' max.	Ød	F ± 0.5
5	ØD + 0.5	L + 1.5	0.5	2.0
6.3	ØD + 0.5	L + 1.5	0.5	2.5
8	ØD + 0.5	L + 1.5	0.6	3.5
10, 12.5	ØD + 0.5	L + 1.5	0.6	5.0
16, 18	ØD + 0.5	L + 1.5	0.8	7.5

Part Numbering System for KMF Series

When ordering, always specify complete catalog number for KMF Series.

KMF 100 VB 221 M 16X25 LL

- LL — Lead Length: LL is Standard.
- 16X25 — Case Code: See Case Sizes in Tables.
- M — Capacitance Tolerance: M = ±20%
- 221 — Capacitance Value: Expressed in Microfarads. The first two digits are significant figures, and the third digit indicates the number of zeros for capacitance of 100µF or more. R indicates the decimal point for capacitance less than 100µF (e.g. R22 = .22µF; 2R2 = 2.2µF; 22R = 22µF; 221 = 220µF; 222 = 2,200µF; 223 = 22,000µF).
- VB — Lead Configuration: VB = Radial Lead Terminals.
- 100 — DC Rated Voltage: Expressed in Volts (e.g. 100 = 100WVDC).
- KMF — Series Name: Indicates Basic Capacitor Design.

KMF Series

Standard Voltage Ratings - VB/Radial Lead

Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number	Nominal Case Size* D × L (mm)	Maximum Impedance (Ω) at +20°C, 100kHz	Maximum Impedance (Ω) at −10°C, 100kHz	Maximum Ripple Current (mA rms) at +105°C, 100kHz
6.3 Volts 8 Volts Surge	33	KMF6.3VB33RM5X11LL	5 × 11	1.3	3.9	154
	47	KMF6.3VB47RM5X11LL	5 × 11	1.3	3.9	154
	100	KMF6.3VB101M5X11LL	5 × 11	1.3	3.9	154
	220	KMF6.3VB221M6X11LL	6.3 × 11	0.6	1.8	260
	330	KMF6.3VB331M6X11LL	6.3 × 11	0.6	1.8	260
	470	KMF6.3VB471M8X11LL	8 × 11.5	0.33	0.99	400
	1,000	KMF6.3VB102M10X12LL	10 × 12.5	0.25	0.75	510
	2,200	KMF6.3VB222M12X20LL	12.5 × 20	0.085	0.26	1,120
	3,300	KMF6.3VB332M12X20LL	12.5 × 20	0.085	0.26	1,120
	4,700	KMF6.3VB472M16X25LL	16 × 25	0.06	0.18	1,570
	6,800	KMF6.3VB682M16X25LL	16 × 25	0.06	0.18	1,570
	10,000	KMF6.3VB103M16X31LL	16 × 31.5	0.048	0.14	1,810
	15,000	KMF6.3VB153M18X35LL	18 × 35.5	0.037	0.11	2,240
10 Volts 13 Volts Surge	22	KMF10VB22RM5X11LL	5 × 11	1.3	3.9	154
	33	KMF10VB33RM5X11LL	5 × 11	1.3	3.9	154
	47	KMF10VB47RM5X11LL	5 × 11	1.3	3.9	154
	100	KMF10VB101M5X11LL	5 × 11	1.3	3.9	154
	220	KMF10VB221M6X11LL	6.3 × 11	0.6	1.8	260
	330	KMF10VB331M8X11LL	8 × 11.5	0.33	0.99	400
	470	KMF10VB471M8X11LL	8 × 11.5	0.33	0.99	400
	1,000	KMF10VB102M10X16LL	10 × 16	0.19	0.57	635
	2,200	KMF10VB222M12X20LL	12.5 × 20	0.085	0.26	1,120
	3,300	KMF10VB332M12X25LL	12.5 × 25	0.07	0.21	1,320
	4,700	KMF10VB472M16X25LL	16 × 25	0.06	0.18	1,570
	6,800	KMF10VB682M16X31LL	16 × 31.5	0.048	0.14	1,810
	10,000	KMF10VB103M18X35LL	18 × 35.5	0.037	0.11	2,240
16 Volts 20 Volts Surge	10	KMF16VB10RM5X11LL	5 × 11	2.0	6.0	124
	22	KMF16VB22RM5X11LL	5 × 11	1.3	3.9	154
	33	KMF16VB33RM5X11LL	5 × 11	1.3	3.9	154
	47	KMF16VB47RM5X11LL	5 × 11	1.3	3.9	154
	100	KMF16VB101M6X11LL	6.3 × 11	0.6	1.8	260
	220	KMF16VB221M8X11LL	8 × 11.5	0.33	0.99	400
	330	KMF16VB331M8X11LL	8 × 11.5	0.33	0.99	400
	470	KMF16VB471M10X12LL	10 × 12.5	0.25	0.75	510
	1,000	KMF16VB102M10X20LL	10 × 20	0.14	0.42	860
	2,200	KMF16VB222M12X25LL	12.5 × 25	0.07	0.21	1,320
	3,300	KMF16VB332M16X25LL	16 × 25	0.06	0.18	1,570
	4,700	KMF16VB472M16X31LL	16 × 31.5	0.048	0.14	1,810
	6,800	KMF16VB682M18X35LL	18 × 35.5	0.037	0.11	2,240
	10,000	KMF16VB103M18X40LL	18 × 40	0.034	0.10	2,460
25 Volts 32 Volts Surge	4.7	KMF25VB4R7M5X11LL	5 × 11	3.0	9.0	100
	10	KMF25VB10RM5X11LL	5 × 11	2.0	6.0	124
	22	KMF25VB22RM5X11LL	5 × 11	1.3	3.9	154
	33	KMF25VB33RM5X11LL	5 × 11	1.3	3.9	154
	47	KMF25VB47RM5X11LL	5 × 11	1.3	3.9	154
	100	KMF25VB101M6X11LL	6.3 × 11	0.6	1.8	260
	220	KMF25VB221M8X11LL	8 × 11.5	0.33	0.99	400
	330	KMF25VB331M10X12LL	10 × 12.5	0.25	0.75	510
	470	KMF25VB471M10X16LL	10 × 16	0.19	0.57	635
	1,000	KMF25VB102M12X20LL	12.5 × 20	0.085	0.26	1,120
	2,200	KMF25VB222M16X25LL	16 × 25	0.06	0.18	1,570
	3,300	KMF25VB332M16X31LL	16 × 31.5	0.048	0.14	1,810
	4,700	KMF25VB472M18X35LL	18 × 35.5	0.037	0.11	2,240
	6,800	KMF25VB682M18X40LL	18 × 40	0.034	0.10	2,460

*The case sizes in table are with no sleeve, refer to diagram for case sizes with sleeve.

KMF Series

Standard Voltage Ratings - VB/Radial Lead

Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number	Nominal Case Size* D×L (mm)	Maximum Impedance (Ω) at +20°C, 100kHz	Maximum Impedance (Ω) at −10°C, 100kHz	Maximum Ripple Current (mA rms) at +105°C, 100kHz
35 Volts 44 Volts Surge	4.7	KMF35VB4R7M5X11LL	5 × 11	3.0	9.0	100
	10	KMF35VB10RM5X11LL	5 × 11	2.0	6.0	124
	22	KMF35VB22RM5X11LL	5 × 11	1.3	3.9	154
	33	KMF35VB33RM5X11LL	5 × 11	1.3	3.9	154
	47	KMF35VB47RM6X11LL	6.3 × 11	0.6	1.8	260
	100	KMF35VB101M8X11LL	8 × 11.5	0.33	0.99	400
	220	KMF35VB221M10X12LL	10 × 12.5	0.25	0.75	510
	330	KMF35VB331M10X16LL	10 × 16	0.19	0.57	635
	470	KMF35VB471M10X20LL	10 × 20	0.14	0.42	860
	1,000	KMF35VB102M12X25LL	12.5 × 25	0.07	0.21	1,320
	2,200	KMF35VB222M16X31LL	16 × 31.5	0.048	0.14	1,810
	3,300	KMF35VB332M18X35LL	18 × 35.5	0.037	0.11	2,240
	4,700	KMF35VB472M18X40LL	18 × 40	0.034	0.10	2,460
50 Volts 63 Volts Surge	0.47	KMF50VBR47M5X11LL	5 × 11	7.0	21.0	66
	1.0	KMF50VB1R0M5X11LL	5 × 11	5.0	15.0	78
	2.2	KMF50VB2R2M5X11LL	5 × 11	4.0	12.0	88
	3.3	KMF50VB3R3M5X11LL	5 × 11	3.5	11.0	94
	4.7	KMF50VB4R7M5X11LL	5 × 11	3.0	9.0	100
	10	KMF50VB10RM5X11LL	5 × 11	2.0	6.0	124
	22	KMF50VB22RM5X11LL	5 × 11	1.3	3.9	154
	33	KMF50VB33RM6X11LL	6.3 × 11	0.6	1.8	260
	47	KMF50VB47RM6X11LL	6.3 × 11	0.6	1.8	260
	100	KMF50VB101M8X11LL	8 × 11.5	0.33	0.99	400
	220	KMF50VB221M10X16LL	10 × 16	0.19	0.57	635
	330	KMF50VB331M10X20LL	10 × 20	0.14	0.42	860
	470	KMF50VB471M12X20LL	12.5 × 20	0.085	0.26	1,120
	1,000	KMF50VB102M16X25LL	16 × 25	0.06	0.18	1,570
	2,200	KMF50VB222M18X35LL	18 × 35.5	0.037	0.11	2,240
63 Volts 79 Volts Surge	4.7	KMF63VB4R7M5X11LL	5 × 11	4.0	14.0	88
	10	KMF63VB10RM5X11LL	5 × 11	2.5	8.8	124
	22	KMF63VB22RM6X11LL	6.3 × 11	1.2	4.2	180
	33	KMF63VB33RM6X11LL	6.3 × 11	1.2	4.2	180
	47	KMF63VB47RM8X11LL	8 × 11.5	0.56	2.0	305
	100	KMF63VB101M10X12LL	10 × 12.5	0.5	1.8	380
	220	KMF63VB221M10X20LL	10 × 20	0.27	0.95	620
	330	KMF63VB331M12X20LL	12.5 × 20	0.16	0.56	890
	470	KMF63VB471M12X25LL	12.5 × 25	0.14	0.49	1,040
	1,000	KMF63VB102M16X31LL	16 × 31.5	0.06	0.21	1,790
100 Volts 125 Volts Surge	0.47	KMF100VBR47M5X11LL	5 × 11	10.0	35.0	55
	1.0	KMF100VB1R0M5X11LL	5 × 11	7.0	25.0	66
	2.2	KMF100VB2R2M5X11LL	5 × 11	6.0	21.0	72
	3.3	KMF100VB3R3M5X11LL	5 × 11	5.0	18.0	78
	4.7	KMF100VB4R7M5X11LL	5 × 11	4.0	14.0	88
	10	KMF100VB10RM6X11LL	6.3 × 11	1.2	4.2	180
	22	KMF100VB22RM8X11LL	8 × 11.5	0.66	2.3	282
	33	KMF100VB33RM10X12LL	10 × 12.5	0.5	1.8	380
	47	KMF100VB47RM10X16LL	10 × 16	0.32	1.1	500
	100	KMF100VB101M12X20LL	12.5 × 20	0.16	0.56	890
	220	KMF100VB221M16X25LL	16 × 25	0.09	0.32	1,440
	330	KMF100VB331M16X25LL	16 × 25	0.09	0.32	1,440
	470	KMF100VB471M16X31LL	16 × 31.5	0.06	0.21	1,790

*The case sizes in table are with no sleeve, refer to diagram for case sizes with sleeve.

KMF Series

Standard Voltage Ratings - VB/Radial Lead

Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number	Nominal Case Size* D×L (mm)	Maximum Impedance (Ω) at +20°C, 100kHz	Maximum Ripple Current (mA rms) at +105°C, 100kHz
160 Volts 200 Volts Surge Not Solvent Proof	10	KMF160VB10RM10X16LL	10 × 16	1.5	250
	22	KMF160VB22RM10X20LL	10 × 20	1.1	350
	33	KMF160VB33RM12X20LL	12.5 × 20	0.71	440
	47	KMF160VB47RM12X25LL	12.5 × 25	0.46	600
	100	KMF160VB101M16X25LL	16 × 25	0.24	910
	220	KMF160VB221M18X35LL	18 × 35.5	0.14	1,370
200 Volts 250 Volts Surge Not Solvent Proof	10	KMF200VB10RM10X16LL	10 × 16	1.5	250
	22	KMF200VB22RM10X20LL	10 × 20	1.1	350
	33	KMF200VB33RM12X20LL	12.5 × 20	0.71	440
	47	KMF200VB47RM12X25LL	12.5 × 25	0.46	600
	100	KMF200VB101M16X31LL	16 × 31.5	0.17	1,160
	220	KMF200VB221M18X35LL	18 × 35.5	0.14	1,370
250 Volts 300 Volts Surge Not Solvent Proof	4.7	KMF250VB4R7M10X16LL	10 × 16	3.5	165
	10	KMF250VB10RM10X20LL	10 × 20	2.8	230
	22	KMF250VB22RM12X25LL	12.5 × 25	1.2	360
	33	KMF250VB33RM12X25LL	12.5 × 25	1.2	360
	47	KMF250VB47RM16X25LL	16 × 25	0.6	570
	100	KMF250VB101M18X35LL	18 × 35.5	0.3	935
	220	KMF250VB221M18X40LL	18 × 40	0.27	1,000
400 Volts 450 Volts Surge Not Solvent Proof	3.3	KMF400VB3R3M10X20LL	10 × 20	2.9	195
	4.7	KMF400VB4R7M10X25LL	10 × 25	2.3	220
	10	KMF400VB10RM12X25LL	12.5 × 25	1.2	360
	22	KMF400VB22RM16X25LL	16 × 25	0.61	570
	33	KMF400VB33RM16X31LL	16 × 31.5	0.46	700
	47	KMF400VB47RM18X31LL	18 × 31.5	0.33	860
450 Volts 500 Volts Surge Not Solvent Proof	2.2	KMF450VB2R2M10X16LL	10 × 16	7.9	110
	3.3	KMF450VB3R3M10X20LL	10 × 20	6.2	135
	4.7	KMF450VB4R7M12X20LL	12.5 × 20	3.7	190
	10	KMF450VB10RM12X25LL	12.5 × 25	2.6	250
	22	KMF450VB22RM16X31LL	16 × 31.5	1.0	480
	33	KMF450VB33RM18X35LL	18 × 35.5	0.62	650

*The case sizes in table are with no sleeve, refer to diagram for case sizes with sleeve.