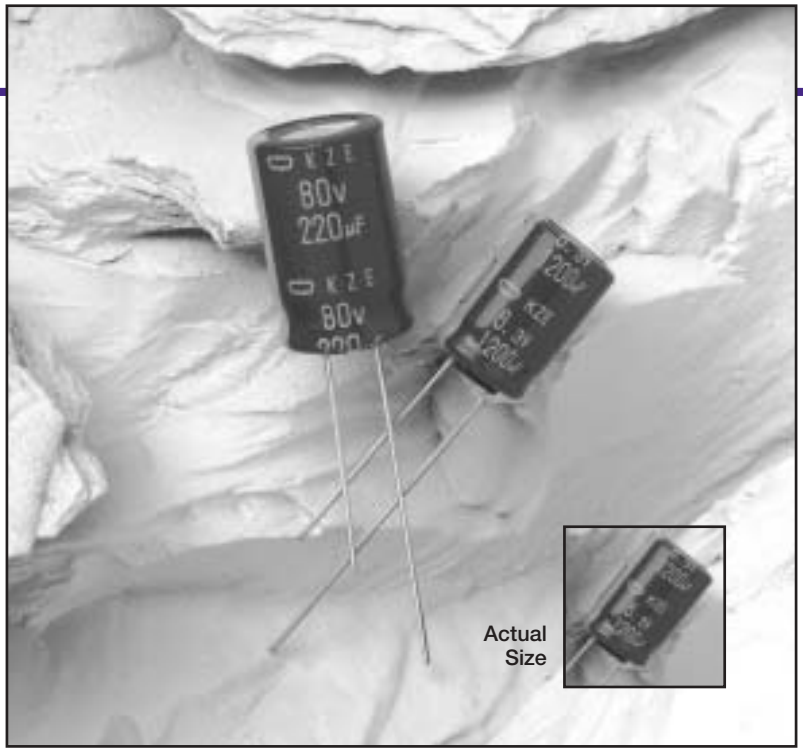
KZE Series

UPGRADE
Engineering Bulletin Nov 02

UNITED CHEMI-CON

- **Miniature**
- **Very Low Impedance**
- **Long Life 2k-5k Hours**
- **+105°C Maximum Temperature**



The KZE series is a very low impedance series from United Chemi-Con that is different from the standard low impedance capacitors because of a special low resistivity electrolyte. This series has been upgraded to include new 63, 80 and 100 volt models and is now available in a wider range of case sizes including new 18mm diameter products. The KZE series is designed for use in DC-DC converters, computer and storage applications, and is ideal for 42V automotive battery systems. These capacitors are available with a standard PVC sleeve or optional PET (polyester) sleeve.

The KZE series capacitors are non-solvent proof. Refer to the Mini-Glossary for cleaning guidelines and recommended cleaning agents that are compatible with United Chemi-Con products.

Summary of Specifications

- **Radial lead terminals.**
- **Capacitance range: 6.8 to 6,800μF.**
- **Voltage range: 6.3 to 100VDC.**
- **Category temperature range: −40°C to +105°C.**
- **Leakage current: 0.01CV or 3μA, whichever is greater, after 2 minutes 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 case size.**

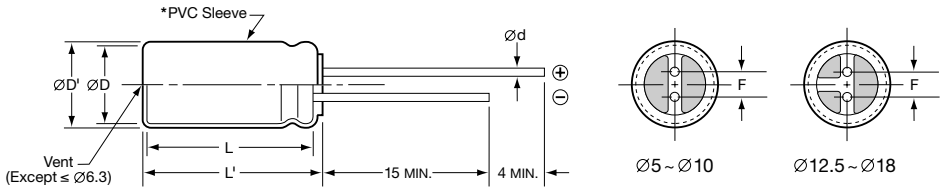
KZE Specifications

<table>
<tr><th>Item</th><th>Characteristics</th></tr>
<tr><td>Category Temperature Range</td><td>−40 to +105°C</td></tr>
<tr><td>Rated Voltage Range</td><td>6.3 to 100VDC</td></tr>
<tr><td>Capacitance Range</td><td>6.8 to 6,800µF</td></tr>
<tr><td>Capacitance Tolerance</td><td>±20% (M) at +20°C, 120Hz</td></tr>
<tr><td>Leakage Current</td><td>I = 0.01CV or 3µA, whichever is greater, after 2 minutes at +20°C.
Where I = Max. leakage current (µA), C = Nominal capacitance (µF) and V = Rated voltage (V)</td></tr>
<tr><td>Dissipation Factor (Tan δ)</td><td>At +20°C, 120Hz
<table>
<tr><td>Rated Voltage (V)</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>80</td><td>100</td></tr>
<tr><td>Tan δ (DF)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.09</td><td>0.09</td><td>0.08</td></tr>
</table>
When nominal capacitance exceeds 1,000µF, add 0.02 to the values above for each 1,000µF increase.</td></tr>
<tr><td>Impedance at 100kHz</td><td>At 100kHz, maximum impedance at +20°C and −10°C is specified in the Ratings Tables.</td></tr>
<tr><td>Low Temperature Characteristics</td><td>At 120Hz, impedance (Z) ratio between the −25°C or −40°C value and +20°C value shall not exceed the values given below.
<table>
<tr><td>Rated Voltage (V)</td><td>6.3-100</td></tr>
<tr><td>Z(−25°C)/Z(+20°C)</td><td>2</td></tr>
<tr><td>Z(−40°C)/Z(+20°C)</td><td>3</td></tr>
</table></td></tr>
<tr><td>Rated Ripple Current Multipliers
Refer to Section 4 of the Mini-Glossary for explanation of Rated Ripple Current Multipliers.</td><td>Frequency (Hz)
<table>
<tr><td>Capacitance (µF)</td><td>120Hz</td><td>1kHz</td><td>10kHz</td><td>100kHz</td></tr>
<tr><td>6.8-180µF</td><td>0.40</td><td>0.75</td><td>0.90</td><td>1.00</td></tr>
<tr><td>220-560µF</td><td>0.50</td><td>0.85</td><td>0.94</td><td>1.00</td></tr>
<tr><td>680-1,800µF</td><td>0.60</td><td>0.87</td><td>0.95</td><td>1.00</td></tr>
<tr><td>2,200-3,900µF</td><td>0.75</td><td>0.90</td><td>0.95</td><td>1.00</td></tr>
<tr><td>4,700-6,800µF</td><td>0.85</td><td>0.95</td><td>0.98</td><td>1.00</td></tr>
</table></td></tr>
<tr><td>Endurance
(Load Life)</td><td>The following specifications shall be satisfied when the capacitors are restored to +20°C after subjecting them to DC voltage for the specified test time at +105°C with the rated ripple current applied. The sum of the DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitors.
<table>
<tr><td>Case Diameter</td><td>Ø5 & Ø6.3mm</td><td>Ø8mm</td><td>Ø10mm</td><td>Ø12.5mm & Above</td></tr>
<tr><td>Test Time</td><td>2,000 Hours</td><td>3,000 Hours</td><td>4,000 Hours</td><td>5,000 Hours</td></tr>
</table>
Capacitance change: ≤ ±25% of initial measured value
Tan δ (DF) : ≤ 200% of initial specified value
Leakage current : ≤ initial specified value</td></tr>
<tr><td>Shelf Life</td><td>The following specifications shall be satisfied when the capacitors are restored to +20°C after exposing them for 500 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: ≤ ±25% of initial measured value
Tan δ (DF) : ≤ 200% of initial specified value
Leakage current : ≤ initial specified value</td></tr>
</table>

Diagram of Dimensions

VB/Radial Lead

Unit: mm



*Optional PET sleeve available upon request.

Gas escape end seal for all case diameters.

Refer to Packaging section for Miniature taping and ammo box specifications and Lead Configurations section for Miniature radial lead cut and lead forming options.

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 KZE Series

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

KZE 6.3 VB 122 M 10X16 LL PS

- PS — Optional Sleeve Type: PS = PET Sleeve. Specify if required.
- LL — Lead Length: LL is Standard.
- 10X16 — Case Code: See Case Sizes in Tables.
- M — Capacitance Tolerance: M = ±20%
- 122 — 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. R12 = .12µF; 1R2 = 1.2µF; 12R = 12µF; 121 = 120µF; 122 = 1,200µF; 123 = 12,000µF).
- VB — Lead Configuration: VB = Radial Lead Terminals.
- 6.3 — DC Rated Voltage: Expressed in Volts (e.g. 6.3 = 6.3WVDC).
- KZE — Series Name: Indicates Basic Capacitor Design.

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	Rated Ripple Current (mA rms) at +105°C, 100kHz
6.3 Volts 8 Volts Surge	150	KZE6.3VB151M5X11LL	5 × 11	0.30	1.0	250
	330	KZE6.3VB331M6X11LL	6.3 × 11	0.13	0.41	405
	560	KZE6.3VB561M8X11LL	8 × 11.5	0.072	0.22	760
	820	KZE6.3VB821M8X15LL	8 × 15	0.056	0.17	995
	1,000	KZE6.3VB102M10X12LL	10 × 12.5	0.053	0.16	1,030
	1,200	KZE6.3VB122M8X20LL	8 × 20	0.041	0.13	1,250
	1,200	KZE6.3VB122M10X16LL	10 × 16	0.038	0.12	1,430
	1,500	KZE6.3VB152M10X20LL	10 × 20	0.023	0.069	1,820
	2,200	KZE6.3VB222M10X25LL	10 × 25	0.022	0.066	2,150
	3,300	KZE6.3VB332M12X20LL	12.5 × 20	0.021	0.053	2,360

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

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	Rated Ripple Current (mA rms) at +105°C, 100kHz
6.3 Volts 8 Volts Surge	3,900	KZE6.3VB392M12X25LL	12.5 × 25	0.018	0.045	2,770
	4,700	KZE6.3VB472M12X30LL	12.5 × 30	0.016	0.041	3,290
	5,600	KZE6.3VB562M12X35LL	12.5 × 35	0.015	0.039	3,400
	5,600	KZE6.3VB562M16X20LL	16 × 20	0.018	0.045	3,140
	6,800	KZE6.3VB682M16X25LL	16 × 25	0.016	0.043	3,460
10 Volts 13 Volts Surge	100	KZE10VB101M5X11LL	5 × 11	0.30	1.0	250
	220	KZE10VB221M6X11LL	6.3 × 11	0.13	0.41	405
	470	KZE10VB471M8X11LL	8 × 11.5	0.072	0.22	760
	680	KZE10VB681M8X15LL	8 × 15	0.056	0.17	995
	680	KZE10VB681M10X12LL	10 × 12.5	0.053	0.16	1,030
	1,000	KZE10VB102M8X20LL	8 × 20	0.041	0.13	1,250
	1,000	KZE10VB102M10X16LL	10 × 16	0.038	0.12	1,430
	1,200	KZE10VB122M10X20LL	10 × 20	0.023	0.069	1,820
	1,500	KZE10VB152M10X25LL	10 × 25	0.022	0.066	2,150
	2,200	KZE10VB222M12X20LL	12.5 × 20	0.021	0.053	2,360
	3,300	KZE10VB332M12X25LL	12.5 × 25	0.018	0.045	2,770
	3,900	KZE10VB392M12X30LL	12.5 × 30	0.016	0.041	3,290
	3,900	KZE10VB392M16X20LL	16 × 20	0.018	0.045	3,140
	4,700	KZE10VB472M12X35LL	12.5 × 35	0.015	0.039	3,400
	5,600	KZE10VB562M16X25LL	16 × 25	0.016	0.043	3,460
16 Volts 20 Volts Surge	56	KZE16VB56RM5X11LL	5 × 11	0.30	1.0	250
	120	KZE16VB121M6X11LL	6.3 × 11	0.13	0.41	405
	330	KZE16VB331M8X11LL	8 × 11.5	0.072	0.22	760
	470	KZE16VB471M8X15LL	8 × 15	0.056	0.17	995
	470	KZE16VB471M10X12LL	10 × 12.5	0.053	0.16	1,030
	680	KZE16VB681M8X20LL	8 × 20	0.041	0.13	1,250
	680	KZE16VB681M10X16LL	10 × 16	0.038	0.12	1,430
	1,000	KZE16VB102M10X20LL	10 × 20	0.023	0.069	1,820
	1,200	KZE16VB122M10X25LL	10 × 25	0.022	0.066	2,150
	1,500	KZE16VB152M12X20LL	12.5 × 20	0.021	0.053	2,360
	2,200	KZE16VB222M12X25LL	12.5 × 25	0.018	0.045	2,770
	2,700	KZE16VB272M12X30LL	12.5 × 30	0.016	0.041	3,290
	2,700	KZE16VB272M16X20LL	16 × 20	0.018	0.045	3,140
	3,300	KZE16VB332M12X35LL	12.5 × 35	0.015	0.039	3,400
	3,900	KZE16VB392M16X25LL	16 × 25	0.016	0.043	3,460
25 Volts 32 Volts Surge	47	KZE25VB47RM5X11LL	5 × 11	0.30	1.0	250
	100	KZE25VB101M6X11LL	6.3 × 11	0.13	0.41	405
	220	KZE25VB221M8X11LL	8 × 11.5	0.072	0.22	760
	330	KZE25VB331M8X15LL	8 × 15	0.056	0.17	995
	330	KZE25VB331M10X12LL	10 × 12.5	0.053	0.16	1,030
	470	KZE25VB471M8X20LL	8 × 20	0.041	0.13	1,250
	470	KZE25VB471M10X16LL	10 × 16	0.038	0.12	1,430
	680	KZE25VB681M10X20LL	10 × 20	0.023	0.069	1,820
	820	KZE25VB821M10X25LL	10 × 25	0.022	0.066	2,150
	1,000	KZE25VB102M12X20LL	12.5 × 20	0.021	0.053	2,360
	1,500	KZE25VB152M12X25LL	12.5 × 25	0.018	0.045	2,770
	1,800	KZE25VB182M12X30LL	12.5 × 30	0.016	0.041	3,290
	1,800	KZE25VB182M16X20LL	16 × 20	0.018	0.045	3,140
	2,200	KZE25VB222M12X35LL	12.5 × 35	0.015	0.039	3,400
	2,700	KZE25VB272M16X25LL	16 × 25	0.016	0.043	3,460
35 Volts 44 Volts Surge	33	KZE35VB33RM5X11LL	5 × 11	0.30	1.0	250
	56	KZE35VB56RM6X11LL	6.3 × 11	0.13	0.41	405
	150	KZE35VB151M8X11LL	8 × 11.5	0.072	0.22	760
	220	KZE35VB221M8X15LL	8 × 15	0.056	0.17	995
	220	KZE35VB221M10X12LL	10 × 12.5	0.053	0.16	1,030
	270	KZE35VB271M8X20LL	8 × 20	0.041	0.13	1,250

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

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	Rated Ripple Current (mA rms) at +105°C, 100kHz
35 Volts 44 Volts Surge	330	KZE35VB331M10X16LL	10 × 16	0.038	0.12	1,430
	470	KZE35VB471M10X20LL	10 × 20	0.023	0.069	1,820
	560	KZE35VB561M10X25LL	10 × 25	0.022	0.066	2,150
	680	KZE35VB681M12X20LL	12.5 × 20	0.021	0.053	2,360
	1,000	KZE35VB102M12X25LL	12.5 × 25	0.018	0.045	2,770
	1,200	KZE35VB122M12X30LL	12.5 × 30	0.016	0.041	3,290
	1,200	KZE35VB122M16X20LL	16 × 20	0.018	0.045	3,140
	1,500	KZE35VB152M12X35LL	12.5 × 35	0.015	0.039	3,400
	1,800	KZE35VB182M16X25LL	16 × 25	0.016	0.043	3,460
50 Volts 63 Volts Surge	22	KZE50VB22RM5X11LL	5 × 11	0.34	1.18	238
	56	KZE50VB56RM6X11LL	6.3 × 11	0.14	0.50	385
	100	KZE50VB101M8X11LL	8 × 11.5	0.074	0.22	724
	120	KZE50VB121M8X15LL	8 × 15	0.061	0.18	950
	150	KZE50VB151M10X12LL	10 × 12.5	0.061	0.18	979
	180	KZE50VB181M8X20LL	8 × 20	0.046	0.14	1,190
	220	KZE50VB221M10X16LL	10 × 16	0.042	0.12	1,370
	270	KZE50VB271M10X20LL	10 × 20	0.030	0.090	1,580
	330	KZE50VB331M10X25LL	10 × 25	0.028	0.085	1,870
	470	KZE50VB471M12X20LL	12.5 × 20	0.027	0.068	2,050
	560	KZE50VB561M12X25LL	12.5 × 25	0.023	0.059	2,410
	680	KZE50VB681M12X30LL	12.5 × 30	0.021	0.052	2,860
	820	KZE50VB821M12X35LL	12.5 × 35	0.019	0.051	2,960
	820	KZE50VB821M16X20LL	16 × 20	0.023	0.059	2,730
	1,000	KZE50VB102M16X25LL	16 × 25	0.021	0.056	3,010
63 Volts 79 Volts Surge	15	KZE63VB15RM5X11LL	5 × 11	0.88	3.5	165
	33	KZE63VB33RM6X11LL	6.3 × 11	0.35	1.4	265
	56	KZE63VB56RM8X11LL	8 × 11.5	0.22	0.88	500
	82	KZE63VB82RM8X15LL	8 × 15	0.16	0.64	665
	82	KZE63VB82RM10X12LL	10 × 12.5	0.11	0.44	690
	120	KZE63VB121M8X20LL	8 × 20	0.12	0.48	820
	120	KZE63VB121M10X16LL	10 × 16	0.076	0.31	950
	180	KZE63VB181M10X20LL	10 × 20	0.056	0.23	1,150
	180	KZE63VB181M12X16LL	12.5 × 16	0.072	0.29	1,150
	220	KZE63VB221M10X25LL	10 × 25	0.046	0.19	1,350
	270	KZE63VB271M12X20LL	12.5 × 20	0.041	0.13	1,500
	390	KZE63VB391M12X25LL	12.5 × 25	0.031	0.093	1,900
	470	KZE63VB471M12X30LL	12.5 × 30	0.028	0.084	2,300
	470	KZE63VB471M16X20LL	16 × 20	0.032	0.096	2,000
	560	KZE63VB561M12X35LL	12.5 × 35	0.024	0.072	2,500
	680	KZE63VB681M12X40LL	12.5 × 40	0.021	0.063	2,800
	680	KZE63VB681M16X25LL	16 × 25	0.025	0.075	2,600
	680	KZE63VB681M18X20LL	18 × 20	0.030	0.090	2,500
	820	KZE63VB821M16X31LL	16 × 31.5	0.021	0.063	2,850
	820	KZE63VB821M18X25LL	18 × 25	0.024	0.072	2,800
	1,000	KZE63VB102M16X35LL	16 × 35.5	0.019	0.057	2,900
	1,200	KZE63VB122M16X40LL	16 × 40	0.018	0.054	3,400
	1,200	KZE63VB122M18X31LL	18 × 31.5	0.020	0.060	3,300
	1,500	KZE63VB152M18X35LL	18 × 35.5	0.018	0.054	3,400
	1,800	KZE63VB182M18X40LL	18 × 40	0.017	0.051	3,500
80 Volts 100 Volts Surge	68	KZE80VB68RM10X12LL	10 × 12.5	0.17	0.66	480
	100	KZE80VB101M10X16LL	10 × 16	0.11	0.47	600
	120	KZE80VB121M10X20LL	10 × 20	0.084	0.34	800
	150	KZE80VB151M10X25LL	10 × 25	0.069	0.28	900
	150	KZE80VB151M12X16LL	12.5 × 16	0.11	0.34	750
	220	KZE80VB221M12X20LL	12.5 × 20	0.062	0.18	1,100
	330	KZE80VB331M12X25LL	12.5 × 25	0.047	0.14	1,250
	330	KZE80VB331M16X20LL	16 × 20	0.048	0.15	1,350

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

KZE
MINIATURE - 105°C

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	Rated Ripple Current (mA rms) at +105°C, 100kHz
80 Volts **100 Volts Surge**	390	KZE80VB391M12X30LL	12.5 × 30	0.042	0.13	1,500
	470	KZE80VB471M12X35LL	12.5 × 35	0.036	0.11	1,650
	470	KZE80VB471M16X25LL	16 × 25	0.038	0.12	1,700
	470	KZE80VB471M18X20LL	18 × 20	0.045	0.14	1,500
	560	KZE80VB561M12X40LL	12.5 × 40	0.032	0.095	1,800
	680	KZE80VB681M16X31LL	16 × 31.5	0.032	0.095	1,850
	680	KZE80VB681M18X25LL	18 × 25	0.036	0.11	1,750
	820	KZE80VB821M16X35LL	16 × 35.5	0.029	0.086	2,000
	820	KZE80VB821M18X31LL	18 × 31.5	0.030	0.090	1,900
	1,000	KZE80VB102M16X40LL	16 × 40	0.027	0.081	2,200
	1,000	KZE80VB102M18X35LL	18 × 35.5	0.027	0.081	2,200
	1,200	KZE80VB122M18X40LL	18 × 40	0.026	0.077	2,700
100 Volts **125 Volts Surge**	6.8	KZE100VB6R8M5X11LL	5 × 11	1.4	5.6	125
	15	KZE100VB15RM6X11LL	6.3 × 11	0.57	2.3	205
	27	KZE100VB27RM8X11LL	8 × 11.5	0.36	1.4	355
	39	KZE100VB39RM8X15LL	8 × 15	0.25	1.0	450
	47	KZE100VB47RM10X12LL	10 × 12.5	0.17	0.66	480
	56	KZE100VB56RM8X20LL	8 × 20	0.19	0.76	565
	68	KZE100VB68RM10X16LL	10 × 16	0.11	0.47	600
	82	KZE100VB82RM10X20LL	10 × 20	0.084	0.34	800
	100	KZE100VB101M12X16LL	12.5 × 16	0.11	0.34	750
	120	KZE100VB121M10X25LL	10 × 25	0.069	0.28	900
	150	KZE100VB151M12X20LL	12.5 × 20	0.062	0.18	1,100
	220	KZE100VB221M12X25LL	12.5 × 25	0.047	0.14	1,250
	220	KZE100VB221M16X20LL	16 × 20	0.048	0.15	1,350
	270	KZE100VB271M12X30LL	12.5 × 30	0.042	0.13	1,500
	330	KZE100VB331M12X35LL	12.5 × 35	0.036	0.11	1,650
	330	KZE100VB331M16X25LL	16 × 25	0.038	0.12	1,700
	330	KZE100VB331M18X20LL	18 × 20	0.045	0.14	1,500
	390	KZE100VB391M12X40LL	12.5 × 40	0.032	0.095	1,800
	470	KZE100VB471M16X31LL	16 × 31.5	0.032	0.095	1,850
	470	KZE100VB471M18X25LL	18 × 25	0.036	0.11	1,750
	560	KZE100VB561M16X35LL	16 × 35.5	0.029	0.086	2,000
	560	KZE100VB561M18X31LL	18 × 31.5	0.030	0.090	1,900
	680	KZE100VB681M16X40LL	16 × 40	0.027	0.081	2,200
	680	KZE100VB681M18X35LL	18 × 35.5	0.027	0.081	2,200
	820	KZE100VB821M18X40LL	18 × 40	0.026	0.077	2,700

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