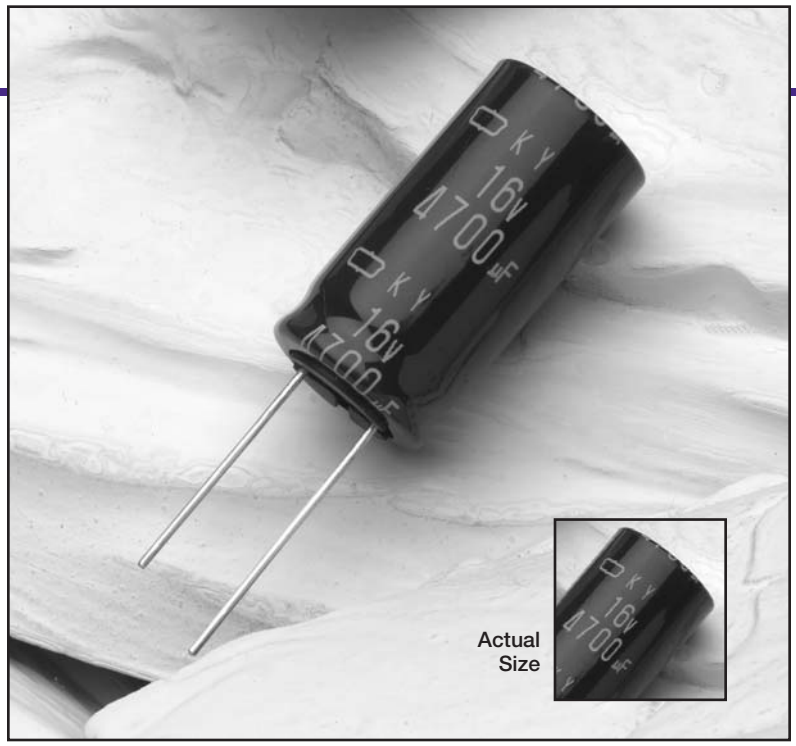
KY Series

UPGRADE
Engineering Bulletin Jul 03

UNITED CHEMI-CON

- **Miniature**
- **Low Impedance**
- **Very Long Life 4k-10k Hours**
- **Large Capacitance**
- **+105°C Maximum Temperature**



The KY series is a low impedance series from United Chemi-Con. These capacitors are different from the standard low impedance capacitors, as they use an innovative low resistivity electrolyte. With low impedance values and recently upgraded lifetime ratings of 4,000-10,000 hours (depending on case size) with the full rated ripple current applied, the KY series is ideal for use in DC-DC converters and computer applications. If a much lower impedance capacitor is required, please use the KZE series. The KY capacitors are available with a standard PVC sleeve or optional PET (polyester) sleeve.

The KY 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: 22 to 18,000μF.**
- **Voltage range: 6.3 to 50VDC.**
- **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: 4,000 to 10,000 hours at +105°C with the rated ripple current applied, depending on case size.**

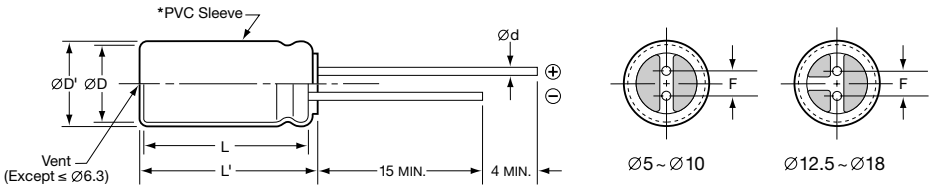
KY Specifications

<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 50VDC</td></tr>
<tr><td>Capacitance Range</td><td>22 to 18,000μF</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></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></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</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr>
<tr><td>Z(−25°C)/Z(+20°C)</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>Z(−40°C)/Z(+20°C)</td><td>8</td><td>6</td><td>4</td><td>3</td><td>3</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>22-180μF</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>4,700-18,000μF</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 colspan="2">Ø5 & Ø6.3mm</td><td colspan="2">Ø8 & Ø10mm</td><td colspan="2">Ø12.5-Ø18mm</td></tr>
<tr><td>Rated Voltage</td><td>6.3-10V</td><td>16-50V</td><td>6.3-10V</td><td>16-50V</td><td>6.3-10V</td><td>16-50V</td></tr>
<tr><td>Test Time</td><td>4,000 Hours</td><td>5,000 Hours</td><td>6,000 Hours</td><td>7,000 Hours</td><td>8,000 Hours</td><td>10,000 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 KY Series

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

KY 16 VB 472 M 16X31 LL PS

- PS — Optional Sleeve Type: PS = PET Sleeve. Specify if required.
- LL — Lead Length: LL is Standard.
- 16X31 — Case Code: See Case Sizes in Tables.
- M — Capacitance Tolerance: M = ±20%
- 472 — 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. R47 = .47µF; 4R7 = 4.7µF; 47R = 47µF; 471 = 470µF; 472 = 4,700µF; 473 = 47,000µF).
- VB — Lead Configuration: VB = Radial Lead Terminals.
- 16 — DC Rated Voltage: Expressed in Volts (e.g. 16 = 16WVDC).
- KY — 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	KY6.3VB151M5X11LL	5 × 11	0.58	2.30	210
	330	KY6.3VB331M6X11LL	6.3 × 11	0.22	0.87	340
	680	KY6.3VB681M8X11LL	8 × 11.5	0.13	0.52	640
	820	KY6.3VB821M10X12LL	10 × 12.5	0.08	0.32	865
	1,000	KY6.3VB102M8X15LL	8 × 15	0.087	0.35	840
	1,200	KY6.3VB122M8X20LL	8 × 20	0.069	0.27	1,050
	1,200	KY6.3VB122M10X16LL	10 × 16	0.06	0.24	1,210
	1,500	KY6.3VB152M10X20LL	10 × 20	0.046	0.18	1,400
	1,800	KY6.3VB182M12X15LL	12.5 × 15	0.049	0.16	1,450
	2,200	KY6.3VB222M10X25LL	10 × 25	0.042	0.17	1,650

***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**	2,700	KY6.3VB272M10X30LL	10 × 30	0.031	0.12	1,910
	2,700	KY6.3VB272M16X15LL	16 × 15	0.042	0.12	1,940
	3,300	KY6.3VB332M12X20LL	12.5 × 20	0.035	0.12	1,900
	3,900	KY6.3VB392M12X25LL	12.5 × 25	0.027	0.089	2,230
	3,900	KY6.3VB392M18X15LL	18 × 15	0.043	0.11	2,210
	4,700	KY6.3VB472M12X30LL	12.5 × 30	0.024	0.078	2,650
	5,600	KY6.3VB562M12X35LL	12.5 × 35	0.02	0.065	2,880
	5,600	KY6.3VB562M16X20LL	16 × 20	0.027	0.078	2,530
	6,800	KY6.3VB682M12X40LL	12.5 × 40	0.017	0.056	3,350
	6,800	KY6.3VB682M16X25LL	16 × 25	0.021	0.06	2,930
	6,800	KY6.3VB682M18X20LL	18 × 20	0.026	0.067	2,860
	8,200	KY6.3VB822M16X31LL	16 × 31.5	0.017	0.05	3,450
	10,000	KY6.3VB103M16X35LL	16 × 35.5	0.015	0.044	3,610
	10,000	KY6.3VB103M18X25LL	18 × 25	0.019	0.049	3,140
	12,000	KY6.3VB123M16X40LL	16 × 40	0.013	0.038	4,080
	12,000	KY6.3VB123M18X31LL	18 × 31.5	0.015	0.04	4,170
	15,000	KY6.3VB153M18X35LL	18 × 35.5	0.014	0.038	4,220
	18,000	KY6.3VB183M18X40LL	18 × 40	0.012	0.032	4,280
10 Volts **13 Volts Surge**	100	KY10VB101M5X11LL	5 × 11	0.58	2.30	210
	220	KY10VB221M6X11LL	6.3 × 11	0.22	0.87	340
	470	KY10VB471M8X11LL	8 × 11.5	0.13	0.52	640
	680	KY10VB681M8X15LL	8 × 15	0.087	0.35	840
	680	KY10VB681M10X12LL	10 × 12.5	0.08	0.32	865
	1,000	KY10VB102M8X20LL	8 × 20	0.069	0.27	1,050
	1,000	KY10VB102M10X16LL	10 × 16	0.06	0.24	1,210
	1,200	KY10VB122M10X20LL	10 × 20	0.046	0.18	1,400
	1,500	KY10VB152M10X25LL	10 × 25	0.042	0.17	1,650
	1,500	KY10VB152M12X15LL	12.5 × 15	0.049	0.16	1,450
	2,200	KY10VB222M10X30LL	10 × 30	0.031	0.12	1,910
	2,200	KY10VB222M12X20LL	12.5 × 20	0.035	0.12	1,900
	2,200	KY10VB222M16X15LL	16 × 15	0.042	0.12	1,940
	2,700	KY10VB272M18X15LL	18 × 15	0.043	0.11	2,210
	3,300	KY10VB332M12X25LL	12.5 × 25	0.027	0.089	2,230
	3,900	KY10VB392M12X30LL	12.5 × 30	0.024	0.078	2,650
	3,900	KY10VB392M16X20LL	16 × 20	0.027	0.078	2,530
	4,700	KY10VB472M12X35LL	12.5 × 35	0.02	0.065	2,880
	5,600	KY10VB562M12X40LL	12.5 × 40	0.017	0.056	3,350
	5,600	KY10VB562M16X25LL	16 × 25	0.021	0.06	2,930
	5,600	KY10VB562M18X20LL	18 × 20	0.026	0.067	2,860
	6,800	KY10VB682M16X31LL	16 × 31.5	0.017	0.05	3,450
	6,800	KY10VB682M18X25LL	18 × 25	0.019	0.049	3,140
	8,200	KY10VB822M16X35LL	16 × 35.5	0.015	0.044	3,610
	8,200	KY10VB822M18X31LL	18 × 31.5	0.015	0.04	4,170
	10,000	KY10VB103M16X40LL	16 × 40	0.013	0.038	4,080
	10,000	KY10VB103M18X35LL	18 × 35.5	0.014	0.038	4,220
	12,000	KY10VB123M18X40LL	18 × 40	0.012	0.032	4,280
16 Volts **20 Volts Surge**	56	KY16VB56RM5X11LL	5 × 11	0.58	2.30	210
	120	KY16VB121M6X11LL	6.3 × 11	0.22	0.87	340
	330	KY16VB331M8X11LL	8 × 11.5	0.13	0.52	640
	470	KY16VB471M8X15LL	8 × 15	0.087	0.35	840
	470	KY16VB471M10X12LL	10 × 12.5	0.08	0.32	865
	680	KY16VB681M8X20LL	8 × 20	0.069	0.27	1,050
	680	KY16VB681M10X16LL	10 × 16	0.06	0.24	1,210
	1,000	KY16VB102M10X20LL	10 × 20	0.046	0.18	1,400
	1,000	KY16VB102M12X15LL	12.5 × 15	0.049	0.16	1,450
	1,200	KY16VB122M10X25LL	10 × 25	0.042	0.17	1,650
	1,500	KY16VB152M10X30LL	10 × 30	0.031	0.12	1,910
	1,500	KY16VB152M12X20LL	12.5 × 20	0.035	0.12	1,900

***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
16 Volts 20 Volts Surge	1,500	KY16VB152M16X15LL	16 × 15	0.042	0.12	1,940
	2,200	KY16VB222M12X25LL	12.5 × 25	0.027	0.089	2,230
	2,200	KY16VB222M18X15LL	18 × 15	0.043	0.11	2,210
	2,700	KY16VB272M12X30LL	12.5 × 30	0.024	0.078	2,650
	2,700	KY16VB272M16X20LL	16 × 20	0.027	0.078	2,530
	3,300	KY16VB332M12X35LL	12.5 × 35	0.02	0.065	2,880
	3,900	KY16VB392M12X40LL	12.5 × 40	0.017	0.056	3,350
	3,900	KY16VB392M16X25LL	16 × 25	0.021	0.06	2,930
	3,900	KY16VB392M18X20LL	18 × 20	0.026	0.067	2,860
	4,700	KY16VB472M16X31LL	16 × 31.5	0.017	0.05	3,450
	4,700	KY16VB472M18X25LL	18 × 25	0.019	0.049	3,140
	5,600	KY16VB562M16X35LL	16 × 35.5	0.015	0.044	3,610
	5,600	KY16VB562M18X31LL	18 × 31.5	0.015	0.04	4,170
	6,800	KY16VB682M16X40LL	16 × 40	0.013	0.038	4,080
	8,200	KY16VB822M18X35LL	18 × 35.5	0.014	0.038	4,220
	10,000	KY16VB103M18X40LL	18 × 40	0.012	0.032	4,280
25 Volts 32 Volts Surge	47	KY25VB47RM5X11LL	5 × 11	0.58	2.30	210
	100	KY25VB101M6X11LL	6.3 × 11	0.22	0.87	340
	220	KY25VB221M8X11LL	8 × 11.5	0.13	0.52	640
	330	KY25VB331M8X15LL	8 × 15	0.087	0.35	840
	330	KY25VB331M10X12LL	10 × 12.5	0.08	0.32	865
	470	KY25VB471M8X20LL	8 × 20	0.069	0.27	1,050
	470	KY25VB471M10X16LL	10 × 16	0.06	0.24	1,210
	680	KY25VB681M10X20LL	10 × 20	0.046	0.18	1,400
	680	KY25VB681M12X15LL	12.5 × 15	0.049	0.16	1,450
	820	KY25VB821M10X25LL	10 × 25	0.042	0.17	1,650
	1,000	KY25VB102M10X30LL	10 × 30	0.031	0.12	1,910
	1,000	KY25VB102M12X20LL	12.5 × 20	0.035	0.12	1,900
	1,000	KY25VB102M16X15LL	16 × 15	0.042	0.12	1,940
	1,200	KY25VB122M18X15LL	18 × 15	0.043	0.11	2,210
	1,500	KY25VB152M12X25LL	12.5 × 25	0.027	0.089	2,230
	1,800	KY25VB182M12X30LL	12.5 × 30	0.024	0.078	2,650
	1,800	KY25VB182M16X20LL	16 × 20	0.027	0.078	2,530
	2,200	KY25VB222M12X35LL	12.5 × 35	0.02	0.065	2,880
	2,200	KY25VB222M18X20LL	18 × 20	0.026	0.067	2,860
	2,700	KY25VB272M12X40LL	12.5 × 40	0.017	0.056	3,350
	2,700	KY25VB272M16X25LL	16 × 25	0.021	0.06	2,930
	3,300	KY25VB332M16X31LL	16 × 31.5	0.017	0.05	3,450
	3,300	KY25VB332M18X25LL	18 × 25	0.019	0.049	3,140
	3,900	KY25VB392M16X35LL	16 × 35.5	0.015	0.044	3,610
	3,900	KY25VB392M18X31LL	18 × 31.5	0.015	0.04	4,170
	4,700	KY25VB472M16X40LL	16 × 40	0.013	0.038	4,080
	4,700	KY25VB472M18X35LL	18 × 35.5	0.014	0.038	4,220
	5,600	KY25VB562M18X40LL	18 × 40	0.012	0.032	4,280
35 Volts 44 Volts Surge	33	KY35VB33RM5X11LL	5 × 11	0.58	2.30	210
	56	KY35VB56RM6X11LL	6.3 × 11	0.22	0.87	340
	150	KY35VB151M8X11LL	8 × 11.5	0.13	0.52	640
	220	KY35VB221M8X15LL	8 × 15	0.087	0.35	840
	220	KY35VB221M10X12LL	10 × 12.5	0.08	0.32	865
	270	KY35VB271M8X20LL	8 × 20	0.069	0.27	1,050
	330	KY35VB331M10X16LL	10 × 16	0.06	0.24	1,210
	470	KY35VB471M10X20LL	10 × 20	0.046	0.18	1,400
	470	KY35VB471M12X15LL	12.5 × 15	0.049	0.16	1,450
	560	KY35VB561M10X25LL	10 × 25	0.042	0.17	1,650
	680	KY35VB681M10X30LL	10 × 30	0.031	0.12	1,910
	680	KY35VB681M12X20LL	12.5 × 20	0.035	0.12	1,900
	680	KY35VB681M16X15LL	16 × 15	0.042	0.12	1,940
	1,000	KY35VB102M12X25LL	12.5 × 25	0.027	0.089	2,230

***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**	1,000	KY35VB102M18X15LL	18 × 15	0.043	0.11	2,210
	1,200	KY35VB122M12X30LL	12.5 × 30	0.024	0.078	2,650
	1,200	KY35VB122M16X20LL	16 × 20	0.027	0.078	2,530
	1,500	KY35VB152M12X35LL	12.5 × 35	0.02	0.065	2,880
	1,800	KY35VB182M12X40LL	12.5 × 40	0.017	0.056	3,350
	1,800	KY35VB182M16X25LL	16 × 25	0.021	0.06	2,930
	1,800	KY35VB182M18X20LL	18 × 20	0.026	0.067	2,860
	2,200	KY35VB222M16X31LL	16 × 31.5	0.017	0.05	3,450
	2,200	KY35VB222M18X25LL	18 × 25	0.019	0.049	3,140
	2,700	KY35VB272M16X35LL	16 × 35.5	0.015	0.044	3,610
	2,700	KY35VB272M18X31LL	18 × 31.5	0.015	0.04	4,170
	3,300	KY35VB332M16X40LL	16 × 40	0.013	0.038	4,080
	3,300	KY35VB332M18X35LL	18 × 35.5	0.014	0.038	4,220
	3,900	KY35VB392M18X40LL	18 × 40	0.012	0.032	4,280
50 Volts **63 Volts Surge**	22	KY50VB22RM5X11LL	5 × 11	0.70	2.80	180
	56	KY50VB56RM6X11LL	6.3 × 11	0.30	1.20	295
	100	KY50VB101M8X11LL	8 × 11.5	0.17	0.68	555
	120	KY50VB121M8X15LL	8 × 15	0.12	0.48	730
	150	KY50VB151M10X12LL	10 × 12.5	0.12	0.48	760
	180	KY50VB181M8X20LL	8 × 20	0.091	0.36	910
	220	KY50VB221M10X16LL	10 × 16	0.084	0.34	1,050
	270	KY50VB271M10X20LL	10 × 20	0.06	0.24	1,220
	270	KY50VB271M12X15LL	12.5 × 15	0.061	0.20	1,260
	330	KY50VB331M10X25LL	10 × 25	0.055	0.22	1,440
	470	KY50VB471M10X30LL	10 × 30	0.043	0.17	1,690
	470	KY50VB471M12X20LL	12.5 × 20	0.045	0.15	1,660
	470	KY50VB471M16X15LL	16 × 15	0.055	0.17	1,690
	560	KY50VB561M12X25LL	12.5 × 25	0.034	0.11	1,950
	560	KY50VB561M18X15LL	18 × 15	0.054	0.15	1,930
	680	KY50VB681M12X30LL	12.5 × 30	0.03	0.10	2,310
	820	KY50VB821M12X35LL	12.5 × 35	0.025	0.083	2,510
	820	KY50VB821M16X20LL	16 × 20	0.034	0.10	2,210
	1,000	KY50VB102M12X40LL	12.5 × 40	0.021	0.069	2,920
	1,000	KY50VB102M16X25LL	16 × 25	0.025	0.075	2,555
	1,000	KY50VB102M18X20LL	18 × 20	0.036	0.097	2,490
	1,200	KY50VB122M16X31LL	16 × 31.5	0.022	0.066	3,010
	1,200	KY50VB122M18X25LL	18 × 25	0.026	0.07	2,740
	1,500	KY50VB152M16X35LL	16 × 35.5	0.019	0.057	3,150
	1,800	KY50VB182M16X40LL	16 × 40	0.016	0.048	3,710
	1,800	KY50VB182M18X31LL	18 × 31.5	0.021	0.057	3,635
	2,200	KY50VB222M18X35LL	18 × 35.5	0.017	0.046	3,680
	2,700	KY50VB272M18X40LL	18 × 40	0.014	0.038	3,800

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