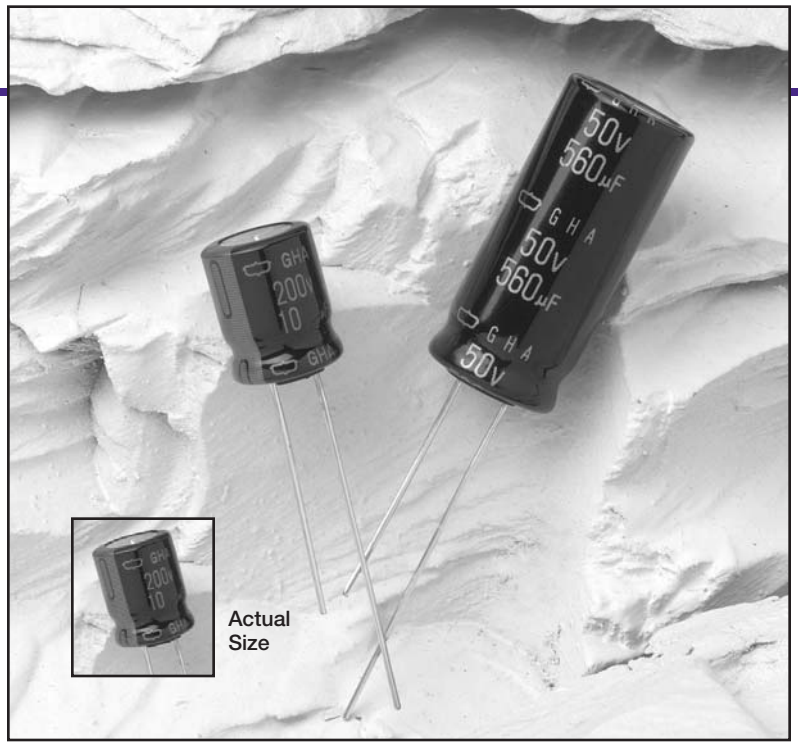
GHA Series

UNITED CHEMI-CON

- Miniature
- For Automotive Applications
- Ultra High Temperature Up to +150°C
- High Reliability
- Solvent Proof



The GHA series is a new high temperature radial lead aluminum electrolytic capacitor series that allows a maximum operating temperature of +150°C. The durable design of the GHA capacitors assures superior performance in automotive, inverter, ballast or any other environment where high temperature is a concern. The GHA capacitors have a rated lifetime of 1,000 hours at +150°C with the rated ripple current applied and are available in 10 voltage ratings from 10 to 200 VDC and a capacitance range of 10 to 6,800µF. The miniature case sizes of 8×12mm to 16×35.5mm (D×L) are highly recommended for compact, low profile modules used for automotive controls.

The GHA series capacitors are solvent proof. Refer to the Mini-Glossary for cleaning guidelines and recommended cleaning agents that are compatible with United Chemi-Con products. +105°C

Summary of Specifications

- **Radial lead terminals.**
- **Capacitance range: 10 to 6,800µF.**
- **Voltage range: 10 to 200VDC.**
- **Operating temperature range: −40°C to +150°C.**
- **Leakage current: See specifications table for leakage current values at +20°C.**
- **Standard capacitance tolerance: ±20%**
- **Nominal case size (D×L): 8×12mm to 16×35.5mm.**
- **Rated lifetime: 1,000 hours at +150°C with the rated ripple current applied.**

GHA Series

GHA Specifications

<table>
<tr><th>Item</th><th>Characteristics</th></tr>
<tr><td>Category Temperature Range</td><td>−40 to +150°C</td></tr>
<tr><td>Rated Voltage Range</td><td>10 to 200VDC</td></tr>
<tr><td>Capacitance Range</td><td>10 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>At +20°C
<table>
<tr><td>DC Rated Voltage</td><td>Test Time</td><td colspan="2">Leakage Current (μA)</td></tr>
<tr><td>10-100V</td><td>After 1 minute</td><td colspan="2">I = 0.03CV or 4μA, whichever is greater.</td></tr>
<tr><td>160-200V</td><td>After 1 minute</td><td>CV ≤ 1,000: I = 0.1CV + 40</td><td>CV > 1,000: I = 0.04CV + 100</td></tr>
</table>
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>10</td><td>16</td><td>25</td><td>35</td><td>50-63</td><td>80-100</td><td>160-200</td></tr>
<tr><td>Tan δ (DF)</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.08</td><td>0.20</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>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>10</td><td>16</td><td>25</td><td>35</td><td>50-63</td><td>80-100</td><td>160-200</td></tr>
<tr><td>Z(−25°C)/Z(+20°C)</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>3</td></tr>
<tr><td>Z(−40°C)/Z(+20°C)</td><td>6</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>6</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 1,000 hours at +150°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.
Capacitance change: ≤ ±30% of initial measured value for 10-100V
: ≤ ±20% of initial measured value for 160-200V
Tan δ (DF) : ≤ 300% of initial specified value for 10-100V
: ≤ 200% of initial specified value for 160-200V
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 1,000 hours at +150°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: ≤ ±30% of initial measured value for 10-100V
: ≤ ±20% of initial measured value for 160-200V
Tan δ (DF) : ≤ 300% of initial specified value for 10-100V
: ≤ 200% of initial specified value for 160-200V
Leakage current : ≤ 500% of initial specified value</td></tr>
</table>

Part Numbering System for GHA Series

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

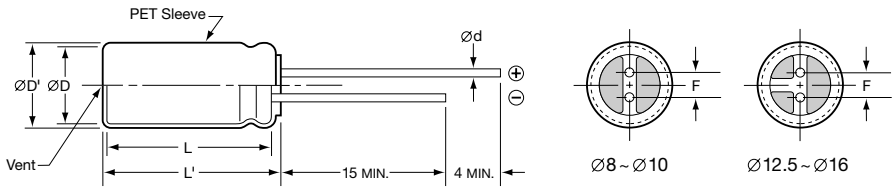
GHA 50 VB 561 M 12X30 LL

- LL: Lead Length: LL is Standard.
- 12X30: Case Code: See Case Sizes in Tables.
- M: Capacitance Tolerance: M = ±20%
- 561: 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. R56 = .56μF; 5R6 = 5.6μF; 56R = 56μF; 561 = 560μF; 562 = 5,600μF; 563 = 56,000μF).
- VB: Lead Configuration: VB = Radial Lead Terminals.
- 50: DC Rated Voltage: Expressed in Volts (e.g. 50 = 50WVDC).
- GHA: Series Name: Indicates Basic Capacitor Design.

Diagram of Dimensions

VB/Radial Lead

Unit: mm



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
8	ØD + 0.5	L + 1.5	0.6	3.5
10	ØD + 0.5	L + 1.5	0.6	5.0
12.5	ØD + 0.5	L + 1.5	0.6	5.0
16	ØD + 0.5	L + 1.5	0.8	7.5

Standard Voltage Ratings - VB/Radial Lead

Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number	Nominal Case Size* D × L (mm)	Maximum ESR (Ω) at +20°C, 120Hz	Rated Ripple Current (mA rms) at +150°C, 100kHz
10 Volts **13 Volts Surge**	220	GHA10VB221M8X12LL	8 × 12	1.507	270
	330	GHA10VB331M8X12LL	8 × 12	1.005	270
	470	GHA10VB471M8X12LL	8 × 12	0.705	270
	560	GHA10VB561M10X12LL	10 × 12.5	0.592	510
	680	GHA10VB681M10X16LL	10 × 16	0.488	660
	1,000	GHA10VB102M10X20LL	10 × 20	0.332	820
	2,200	GHA10VB222M12X20LL	12.5 × 20	0.166	1,000
	3,300	GHA10VB332M12X30LL	12.5 × 30	0.121	1,280
	4,700	GHA10VB472M16X25LL	16 × 25	0.092	1,370
	5,600	GHA10VB562M16X31LL	16 × 31.5	0.083	1,610
	6,800	GHA10VB682M16X31LL	16 × 31.5	0.073	1,670
16 Volts **20 Volts Surge**	220	GHA16VB221M8X12LL	8 × 12	1.205	270
	330	GHA16VB331M8X12LL	8 × 12	0.804	270
	330	GHA16VB331M10X12LL	10 × 12.5	0.804	510
	470	GHA16VB471M10X16LL	10 × 16	0.564	660
	560	GHA16VB561M10X16LL	10 × 16	0.474	660
	680	GHA16VB681M10X20LL	10 × 20	0.39	820
	1,000	GHA16VB102M12X20LL	12.5 × 20	0.265	1,000
	2,200	GHA16VB222M12X25LL	12.5 × 25	0.136	1,200
	3,300	GHA16VB332M16X25LL	16 × 25	0.10	1,370
	4,700	GHA16VB472M16X31LL	16 × 31.5	0.078	1,610
	5,600	GHA16VB562M16X35LL	16 × 35.5	0.071	1,720
25 Volts **32 Volts Surge**	100	GHA25VB101M8X12LL	8 × 12	2.321	270
	220	GHA25VB221M10X12LL	10 × 12.5	1.055	510
	330	GHA25VB331M10X16LL	10 × 16	0.703	660
	470	GHA25VB471M10X20LL	10 × 20	0.494	820
	560	GHA25VB561M10X20LL	10 × 20	0.414	820

***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 ESR (Ω) at +20°C, 120Hz	Rated Ripple Current (mA rms) at +150°C, 100kHz
25 Volts 32 Volts Surge	680	GHA25VB681M12X20LL	12.5 × 20	0.341	1,000
	1,000	GHA25VB102M12X25LL	12.5 × 25	0.232	1,200
	2,200	GHA25VB222M16X25LL	16 × 25	0.121	1,370
	3,300	GHA25VB332M16X35LL	16 × 35.5	0.09	1,720
35 Volts 44 Volts Surge	68	GHA35VB68RM8X12LL	8 × 12	2.925	210
	100	GHA35VB101M8X12LL	8 × 12	1.989	210
	100	GHA35VB101M10X12LL	10 × 12.5	1.989	510
	220	GHA35VB221M10X16LL	10 × 16	0.904	660
	330	GHA35VB331M10X20LL	10 × 20	0.603	820
	470	GHA35VB471M12X20LL	12.5 × 20	0.423	1,000
	560	GHA35VB561M12X20LL	12.5 × 20	0.355	1,000
	680	GHA35VB681M12X25LL	12.5 × 25	0.293	1,200
	1,000	GHA35VB102M16X25LL	16 × 25	0.199	1,370
50 Volts 63 Volts Surge	10	GHA50VB10RM8X12LL	8 × 12	16.575	140
	22	GHA50VB22RM8X12LL	8 × 12	7.534	140
	33	GHA50VB33RM8X12LL	8 × 12	5.023	140
	47	GHA50VB47RM8X12LL	8 × 12	3.527	140
	56	GHA50VB56RM8X12LL	8 × 12	2.96	140
	100	GHA50VB101M10X12LL	10 × 12.5	1.658	380
	220	GHA50VB221M10X20LL	10 × 20	0.753	640
	330	GHA50VB331M12X20LL	12.5 × 20	0.502	770
	470	GHA50VB471M12X25LL	12.5 × 25	0.353	960
	560	GHA50VB561M12X30LL	12.5 × 30	0.296	1,080
	680	GHA50VB681M16X25LL	16 × 25	0.244	1,190
	1,000	GHA50VB102M16X31LL	16 × 31.5	0.166	1,420
63 Volts 79 Volts Surge	56	GHA63VB56RM10X12LL	10 × 12.5	2.96	430
	68	GHA63VB68RM10X16LL	10 × 16	2.438	560
	100	GHA63VB101M10X20LL	10 × 20	1.658	710
	220	GHA63VB221M12X25LL	12.5 × 25	0.753	1,040
	330	GHA63VB331M12X30LL	12.5 × 30	0.502	1,170
	470	GHA63VB471M16X25LL	16 × 25	0.353	1,280
	560	GHA63VB561M16X31LL	16 × 31.5	0.296	1,520
	680	GHA63VB681M16X31LL	16 × 31.5	0.244	1,520
80 Volts 100 Volts Surge	33	GHA80VB33RM10X12LL	10 × 12.5	4.018	420
	47	GHA80VB47RM10X16LL	10 × 16	2.821	550
	56	GHA80VB56RM10X20LL	10 × 20	2.368	690
	68	GHA80VB68RM10X20LL	10 × 20	1.95	690
	100	GHA80VB101M12X20LL	12.5 × 20	1.326	820
	220	GHA80VB221M16X25LL	16 × 25	0.603	1,250
	330	GHA80VB331M16X31LL	16 × 31.5	0.402	1,480
100 Volts 125 Volts Surge	22	GHA100VB22RM10X12LL	10 × 12.5	6.027	390
	33	GHA100VB33RM10X16LL	10 × 16	4.018	510
	47	GHA100VB47RM10X20LL	10 × 20	2.821	640
	56	GHA100VB56RM10X20LL	10 × 20	2.368	640
	68	GHA100VB68RM12X20LL	12.5 × 20	1.95	760
	100	GHA100VB101M12X25LL	12.5 × 25	1.326	950
	220	GHA100VB221M16X31LL	16 × 31.5	0.603	1,380
160 Volts 200 Volts Surge	10	GHA160VB10RM10X12LL	10 × 12.5	33.15	210
	22	GHA160VB22RM10X20LL	10 × 20	15.068	350
	33	GHA160VB33RM12X20LL	12.5 × 20	10.045	470
	47	GHA160VB47RM12X20LL	12.5 × 20	7.053	470
	56	GHA160VB56RM12X25LL	12.5 × 25	5.92	600
	68	GHA160VB68RM12X25LL	12.5 × 25	4.875	600

***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 ESR (Ω) at +20°C, 120Hz	Rated Ripple Current (mA rms) at +150°C, 100kHz
200 Volts 250 Volts Surge	10	GHA200VB10RM10X12LL	10 × 12.5	33.15	210
	22	GHA200VB22RM10X20LL	10 × 20	15.068	350
	33	GHA200VB33RM12X20LL	12.5 × 20	10.045	470
	47	GHA200VB47RM12X25LL	12.5 × 25	7.053	600
	56	GHA200VB56RM12X30LL	12.5 × 30	5.92	690

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