

## ► Specifications / Spezifikationen

| Items                                    | Characteristics                                                 |
|------------------------------------------|-----------------------------------------------------------------|
| Temperature range                        | -25°C ~ + 85°C                                                  |
| Rated voltage $V_r$                      | 350 VDC - 500 VDC                                               |
| Surge voltage                            | Repetitive max. 30 sec per 6 Minutes                            |
| Leakage current max. $I_L$ (20°C, 5 min) | $0.01 \cdot C \cdot V_r$ [ $\mu A$ ] or 3 mA, which is smaller. |
| Capacitance tolerance                    | +/- 20%                                                         |
| Useful life                              | 6000 h at 85°C                                                  |
| Field failure rate                       | $0.5 \text{ FIT} = 0.5 \cdot 10^{-9} \text{ Failures/hour}$     |
| Failure rate                             | Less than 0.1% within the useful life                           |



## ► Outline Drawing / Bauformen

Shape: B (ØD = 51-101)  
(for Bolt - Mounting, M12x16)

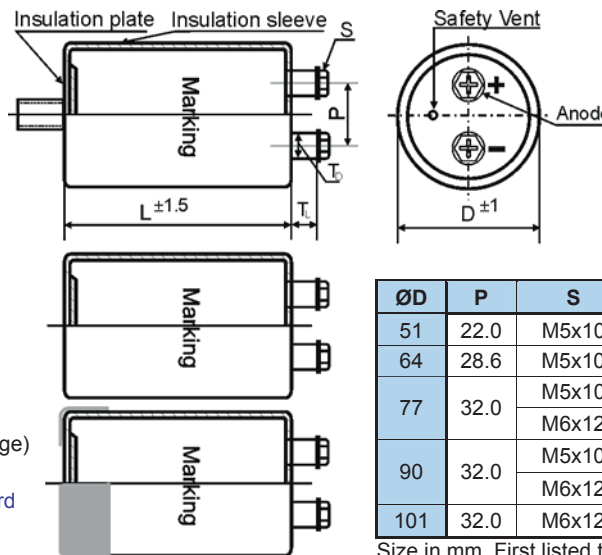
Form: B (ØD = 51-101)  
(für Bolzenbefestigung, M12x16)

Shape: N  
(for PBT-Holder ØD = 77-90 and  
Press Ring ØD = 64-90)

Form: N  
(für PBT-Halter ØD = 77-90 und  
Einpressring ØD = 64-90)

Shape: Y (ØD = 51-101)  
(double sleeve, bracket free of charge)

Form: Y (ØD = 51-101)  
(mit doppelter Isolierung, Schelle wird  
kostenlos mitgeliefert)



Size in mm. First listed terminal is standard.

## ► Ripple Current Multiplier / Wechselstrommultiplikator

| Frequency [Hz] | 50/60 | 120  | 300  | 1k   | ≥ 10k |
|----------------|-------|------|------|------|-------|
| multiplier     | 0.80  | 1.00 | 1.18 | 1.34 | 1.45  |

| Forced cooling [m/sec] | $v < 1.0$ | $v \geq 1.0$ |
|------------------------|-----------|--------------|
| multiplier             | 1.0       | 1.1          |

## ► Product Code / Bestellbezeichnung

Example: 12000µF 500V D=101mm L=237mm with Y-Bracket

HCGF6

Type of series

2H

Rated voltage code

| Code | Voltage | Code | Voltage |
|------|---------|------|---------|
| 2V   | 350     | 2W   | 450     |
| 2G   | 400     | 2H   | 500     |

123

Capacitance code

The first two digits are significant. The last digit indicates the number of following zeros in µF.

Y

Fixing symbol code

B : Bolt  
ØD = 51 - 90

N : No double sleeve  
(PBT-Safety-holder or press ring)

Y : 3 Stoppers Bracket  
ØD = 51 – 101

refer to pages 89 – 96

G

Case code diameter

| ØD  | Code |
|-----|------|
| 51  | C    |
| 64  | D    |
| 77  | E    |
| 90  | F    |
| 101 | G    |

237

Case Code length

Length in mm  
(3 digits)

( )

Customers' specification

| Rated Voltage<br>Code<br>(Surge Voltage)<br>$V_r$<br>[V DC] | Capacitance<br>$C_r$<br>[μF] | Ripple Current<br>at<br>40°C/120Hz<br>[A RMS] | Ripple Current<br>at<br>85°C/120Hz<br>$I_r$<br>[A RMS] | ESR (typ)<br>at<br>20°C/100Hz<br>[mΩ] | Zmax<br>at<br>20°C/10kHz<br>[mΩ] | ESL (typ)<br>[nH] | DxL<br>[mm] | Product Code    |
|-------------------------------------------------------------|------------------------------|-----------------------------------------------|--------------------------------------------------------|---------------------------------------|----------------------------------|-------------------|-------------|-----------------|
| 350<br>2V<br>(400)                                          | 2 700                        | 20.8                                          | 7.7                                                    | 48                                    | 50                               | 17                | 51x115      | HCGF62V272□C115 |
|                                                             | 3 300                        | 24.3                                          | 9.0                                                    | 39                                    | 40                               | 17                | 51x130      | HCGF62V332□C130 |
|                                                             | 3 900                        | 25.6                                          | 9.5                                                    | 33                                    | 35                               | 18                | 64x96       | HCGF62V392□D096 |
|                                                             | 4 700                        | 30.5                                          | 11.3                                                   | 27                                    | 30                               | 18                | 64x115      | HCGF62V472□D115 |
|                                                             | 5 600                        | 34.6                                          | 12.8                                                   | 25                                    | 28                               | 18                | 64x130      | HCGF62V562□D130 |
|                                                             | 6 800                        | 38.6                                          | 14.3                                                   | 21                                    | 24                               | 20                | 77x115      | HCGF62V682□E115 |
|                                                             | 8 200                        | 44.1                                          | 16.3                                                   | 17                                    | 21                               | 20                | 77x130      | HCGF62V822□E130 |
|                                                             | 10 000                       | 52.4                                          | 19.4                                                   | 14                                    | 17                               | 20                | 77x155      | HCGF62V103□E155 |
|                                                             | 12 000                       | 57.5                                          | 21.3                                                   | 12                                    | 15                               | 20                | 90x131      | HCGF62V123□F131 |
|                                                             |                              | 59.6                                          | 22.1                                                   | 12                                    | 15                               | 20                | 77x171      | HCGF62V123□E171 |
|                                                             | 15 000                       | 68.8                                          | 25.5                                                   | 10                                    | 13                               | 20                | 90x157      | HCGF62V153□F157 |
|                                                             | 18 000                       | 82.0                                          | 30.4                                                   | 9                                     | 15                               | 20                | 90x196      | HCGF62V183□F196 |
|                                                             | 20 000                       | 86.4                                          | 32.0                                                   | 8                                     | 11                               | 20                | 90x196      | HCGF62V203□F196 |
|                                                             | 22 000                       | 88.8                                          | 32.9                                                   | 8                                     | 11                               | 29                | 101x175     | HCGF62V223□G175 |
|                                                             |                              | 97.8                                          | 36.2                                                   | 8                                     | 13                               | 20                | 90x236      | HCGF62V223□F236 |
|                                                             |                              | 98.0                                          | 36.3                                                   | 8                                     | 10                               | 20                | 90x221      | HCGF62V223□F221 |
|                                                             | 27 000                       | 110.4                                         | 40.9                                                   | 7                                     | 8                                | 29                | 101x237     | HCGF62V273□G237 |
| 400<br>2G<br>(450)                                          | 2 200                        | 17.8                                          | 6.6                                                    | 58                                    | 60                               | 17                | 51x100      | HCGF62G222□C100 |
|                                                             |                              | 18.9                                          | 7.0                                                    | 58                                    | 60                               | 20                | 51x115      | HCGF62G222□C115 |
|                                                             | 2 700                        | 21.4                                          | 7.9                                                    | 48                                    | 50                               | 20                | 64x96       | HCGF62G272□D096 |
|                                                             |                              | 22.0                                          | 8.2                                                    | 48                                    | 50                               | 20                | 51x130      | HCGF62G272□C130 |
|                                                             | 3 300                        | 23.6                                          | 8.7                                                    | 39                                    | 40                               | 20                | 64x96       | HCGF62G332□D096 |
|                                                             | 3 900                        | 27.5                                          | 10.2                                                   | 33                                    | 35                               | 20                | 64x115      | HCGF62G392□D115 |
|                                                             | 4 700                        | 31.7                                          | 11.7                                                   | 27                                    | 30                               | 20                | 64x130      | HCGF62G472□D130 |
|                                                             | 5 600                        | 35.1                                          | 13.0                                                   | 25                                    | 28                               | 20                | 77x115      | HCGF62G562□E115 |
|                                                             | 6 800                        | 40.4                                          | 15.0                                                   | 21                                    | 24                               | 20                | 77x130      | HCGF62G682□E130 |
|                                                             | 8 200                        | 47.5                                          | 17.6                                                   | 17                                    | 20                               | 20                | 77x155      | HCGF62G822□E155 |
|                                                             | 10 000                       | 52.5                                          | 19.4                                                   | 14                                    | 17                               | 20                | 90x131      | HCGF62G103□F131 |
|                                                             |                              | 55.1                                          | 20.4                                                   | 17                                    | 20                               | 20                | 77x171      | HCGF62G103□E171 |
|                                                             |                              | 57.8                                          | 21.4                                                   | 17                                    | 20                               | 20                | 77x195      | HCGF62G103□E195 |
|                                                             | 12 000                       | 61.8                                          | 22.9                                                   | 12                                    | 15                               | 20                | 90x157      | HCGF62G123□F157 |
|                                                             | 15 000                       | 75.3                                          | 27.9                                                   | 10                                    | 13                               | 20                | 90x196      | HCGF62G153□F196 |
|                                                             | 18 000                       | 80.1                                          | 29.7                                                   | 9                                     | 12                               | 29                | 101x175     | HCGF62G183□G175 |
|                                                             |                              | 86.9                                          | 32.2                                                   | 9                                     | 12                               | 20                | 90x221      | HCGF62G183□F221 |
|                                                             |                              | 89.1                                          | 33.0                                                   | 9                                     | 12                               | 20                | 90x236      | HCGF62G183□F236 |
|                                                             | 20 000                       | 94.2                                          | 34.9                                                   | 9                                     | 12                               | 20                | 90x236      | HCGF62G203□F236 |
|                                                             | 22 000                       | 99.6                                          | 36.9                                                   | 8                                     | 11                               | 29                | 101x237     | HCGF62G223□G237 |
|                                                             |                              | 102.0                                         | 37.8                                                   | 8                                     | 11                               | 29                | 101x250     | HCGF62G223□G250 |
|                                                             | 27 000                       | 119.0                                         | 44.1                                                   | 7                                     | 10                               | 29                | 101x283     | HCGF62G273□G283 |
| 450<br>2W<br>(500)                                          | 1 800                        | 17.0                                          | 6.3                                                    | 77                                    | 80                               | 20                | 51x115      | HCGF62W182□C115 |
|                                                             | 2 200                        | 19.5                                          | 7.2                                                    | 63                                    | 65                               | 20                | 64x96       | HCGF62W222□D096 |
|                                                             |                              | 19.9                                          | 7.4                                                    | 63                                    | 65                               | 20                | 51x130      | HCGF62W222□C130 |
|                                                             | 2 700                        | 21.3                                          | 7.9                                                    | 52                                    | 54                               | 20                | 64x96       | HCGF62W272□D096 |
|                                                             | 3 300                        | 25.2                                          | 9.3                                                    | 42                                    | 44                               | 20                | 77x96       | HCGF62W332□E096 |
|                                                             |                              | 25.4                                          | 9.4                                                    | 42                                    | 44                               | 20                | 64x115      | HCGF62W332□D115 |
|                                                             | 3 900                        | 28.9                                          | 10.7                                                   | 38                                    | 40                               | 20                | 64x130      | HCGF62W392□D130 |
|                                                             | 4 700                        | 32.0                                          | 11.8                                                   | 34                                    | 36                               | 20                | 77x115      | HCGF62W472□E115 |
|                                                             | 5 600                        | 36.6                                          | 13.6                                                   | 31                                    | 33                               | 20                | 77x130      | HCGF62W562□E130 |
|                                                             | 6 800                        | 43.5                                          | 16.1                                                   | 25                                    | 27                               | 20                | 77x155      | HCGF62W682□E155 |
|                                                             | 8 200                        | 47.5                                          | 17.6                                                   | 21                                    | 23                               | 20                | 90x131      | HCGF62W822□F131 |
|                                                             |                              | 52.5                                          | 19.4                                                   | 21                                    | 23                               | 20                | 77x195      | HCGF62W822□E195 |
|                                                             | 10 000                       | 58.0                                          | 21.5                                                   | 17                                    | 19                               | 20                | 90x171      | HCGF62W103□F171 |
|                                                             | 12 000                       | 65.5                                          | 24.3                                                   | 16                                    | 18                               | 29                | 101x175     | HCGF62W123□G175 |
|                                                             |                              | 67.4                                          | 25.0                                                   | 16                                    | 18                               | 20                | 90x196      | HCGF62W123□F196 |

| Rated Voltage<br>Code<br>(Surge Voltage)<br>$V_r$<br>[V DC] | Capacitance<br>$C_r$<br>[μF] | Ripple Current<br>at<br>40°C/120Hz<br>[A RMS] | Ripple Current<br>at<br>85°C/120Hz<br>$I_r$<br>[A RMS] | ESR (typ)<br>at<br>20°C/100Hz<br>[mΩ] | Zmax<br>at<br>20°C/10kHz<br>[mΩ] | ESL (typ)<br>[nH] | DxL<br>[mm] | Product Code    |
|-------------------------------------------------------------|------------------------------|-----------------------------------------------|--------------------------------------------------------|---------------------------------------|----------------------------------|-------------------|-------------|-----------------|
| 450<br>2W<br>(500)                                          | 15 000                       | 76.4                                          | 28.3                                                   | 15                                    | 17                               | 29                | 101x195     | HCGF62W153□G195 |
|                                                             |                              | 79.2                                          | 29.4                                                   | 15                                    | 17                               | 20                | 90x221      | HCGF62W153□F221 |
|                                                             |                              | 81.4                                          | 30.1                                                   | 15                                    | 17                               | 20                | 90x236      | HCGF62W153□F236 |
|                                                             | 18 000                       | 90.2                                          | 33.4                                                   | 14                                    | 16                               | 29                | 101x237     | HCGF62W183□G237 |
|                                                             |                              | 92.2                                          | 34.2                                                   | 14                                    | 16                               | 29                | 101x250     | HCGF62W183□G250 |
|                                                             | 22 000                       | 107.4                                         | 39.8                                                   | 12                                    | 14                               | 29                | 101x283     | HCGF62W223□G283 |
| 500<br>2H<br>(550)                                          | 1 200                        | 14.0                                          | 5.2                                                    | 112                                   | 120                              | 20                | 51x115      | HCGF62H122□C115 |
|                                                             |                              | 14.3                                          | 5.3                                                    | 112                                   | 120                              | 20                | 64x96       | HCGF62H122□D096 |
|                                                             | 1 500                        | 15.8                                          | 5.9                                                    | 90                                    | 96                               | 20                | 64x96       | HCGF62H152□D096 |
|                                                             |                              | 16.1                                          | 6.0                                                    | 90                                    | 96                               | 20                | 51x130      | HCGF62H152□C130 |
|                                                             | 1 800                        | 18.6                                          | 6.9                                                    | 75                                    | 80                               | 20                | 64x115      | HCGF62H182□D115 |
|                                                             | 2 200                        | 21.6                                          | 8.0                                                    | 61                                    | 65                               | 20                | 64x130      | HCGF62H222□D130 |
|                                                             |                              | 24.0                                          | 8.9                                                    | 61                                    | 65                               | 20                | 77x145      | HCGF62H222□E145 |
|                                                             | 2 700                        | 24.6                                          | 9.1                                                    | 50                                    | 53                               | 20                | 77x115      | HCGF62H272□E115 |
|                                                             | 3 300                        | 28.4                                          | 10.5                                                   | 45                                    | 48                               | 20                | 77x130      | HCGF62H332□E130 |
|                                                             | 3 900                        | 32.9                                          | 12.2                                                   | 38                                    | 41                               | 20                | 77x155      | HCGF62H392□E155 |
|                                                             | 4 700                        | 36.0                                          | 13.3                                                   | 34                                    | 37                               | 20                | 90x131      | HCGF62H472□F131 |
|                                                             |                              | 37.6                                          | 13.9                                                   | 34                                    | 37                               | 20                | 77x171      | HCGF62H472□E171 |
|                                                             | 5 600                        | 41.9                                          | 15.5                                                   | 28                                    | 31                               | 20                | 90x157      | HCGF62H562□F157 |
|                                                             |                              | 43.1                                          | 16.0                                                   | 28                                    | 31                               | 20                | 77x195      | HCGF62H562□E195 |
|                                                             | 6 800                        | 47.8                                          | 17.7                                                   | 23                                    | 25                               | 20                | 90x171      | HCGF62H682□F171 |
|                                                             | 8 200                        | 54.0                                          | 20.0                                                   | 21                                    | 23                               | 29                | 101x175     | HCGF62H822□G175 |
|                                                             |                              | 55.6                                          | 20.6                                                   | 21                                    | 23                               | 20                | 90x196      | HCGF62H822□F196 |
|                                                             | 10 000                       | 62.1                                          | 23.0                                                   | 17                                    | 19                               | 29                | 101x195     | HCGF62H103□G195 |
|                                                             |                              | 64.8                                          | 24.0                                                   | 17                                    | 19                               | 20                | 90x221      | HCGF62H103□F221 |
|                                                             |                              | 66.4                                          | 24.6                                                   | 17                                    | 19                               | 20                | 90x236      | HCGF62H103□F236 |
|                                                             | 12 000                       | 72.9                                          | 27.0                                                   | 16                                    | 18                               | 20                | 90x236      | HCGF62H123□F236 |
|                                                             |                              | 73.6                                          | 27.3                                                   | 16                                    | 18                               | 29                | 101x237     | HCGF62H123□G237 |
|                                                             | 15 000                       | 82.4                                          | 30.5                                                   | 14                                    | 16                               | 29                | 101x237     | HCGF62H153□G237 |

## ► Life Time Table / Brauchbarkeitsdauer – Tabelle

| HCGF6                    | Useful life as function of ambient temperature and ripple current |       |       |       |       |       |       |       |       |       |       |       |       |
|--------------------------|-------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| $I_r$ at 85°C            | x 1.0                                                             | x 1.2 | x 1.4 | x 1.6 | x 1.8 | x 2.0 | x 2.1 | x 2.2 | x 2.3 | x 2.4 | x 2.5 | x 2.6 | x 2.7 |
| $T_a = 40^\circ\text{C}$ | 250                                                               | 250   | 250   | 199   | 150   | 109   | 91    | 76    | 63    | 52    | 42    | 34    | 27    |
| $T_a = 45^\circ\text{C}$ | 243                                                               | 202   | 162   | 126   | 95    | 69    | 58    | 48    | 40    | 33    | 27    |       |       |
| $T_a = 50^\circ\text{C}$ | 154                                                               | 128   | 103   | 80    | 60    | 43    | 37    | 30    | 25    | 21    |       |       |       |
| $T_a = 55^\circ\text{C}$ | 97                                                                | 81    | 65    | 50    | 38    | 27    | 23    | 19    | 16    |       |       |       |       |
| $T_a = 60^\circ\text{C}$ | 62                                                                | 51    | 41    | 32    | 24    | 17    | 15    |       |       |       |       |       |       |
| $T_a = 65^\circ\text{C}$ | 39                                                                | 32    | 26    | 20    | 15    | 11    |       |       |       |       |       |       |       |
| $T_a = 70^\circ\text{C}$ | 25                                                                | 20    | 16    | 13    | 10    |       |       |       |       |       |       |       |       |
| $T_a = 75^\circ\text{C}$ | 16                                                                | 13    | 10    |       |       |       |       |       |       |       |       |       |       |
| $T_a = 80^\circ\text{C}$ | 10                                                                | 8     |       |       |       |       |       |       |       |       |       |       |       |
| $T_a = 85^\circ\text{C}$ | 6                                                                 |       |       |       |       |       |       |       |       |       |       |       |       |

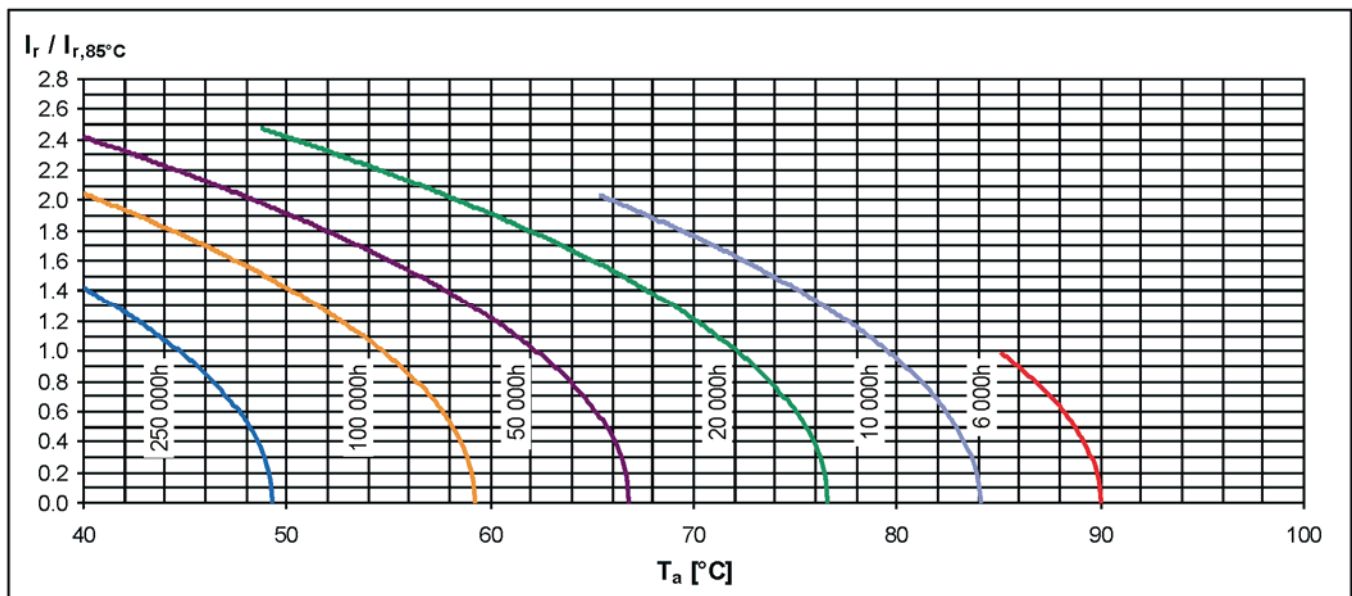
khrs

Max. value limited to 250 000 hours.

## ► Life Time Graph / Brauchbarkeitsdauer – Diagramm

Useful life depending on ambient temperature  $T_a$  and ripple current operating conditions  $I_r$  versus rated ripple current at the upper category temperature  $I_{r,85^\circ\text{C},120\text{Hz}}$

Brauchbarkeitsdauer in Abhängigkeit von Umgebungstemperatur  $T_u$  und Wechselstrombelastung  $I_r$  im Verhältnis zur max. Wechselstrombelastung bei oberer Kategorietemperatur  $I_{r,85^\circ\text{C},120\text{Hz}}$



## ► Life Time Tests and Requirements / Anforderungen Brauchbarkeitsdauer

| Life time test | Reference                                 | Test procedure                                                 | Life time criteria                                                                           |
|----------------|-------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Endurance test | JIS-C-5101-4<br>JIS-C-5102<br>IEC 60384-4 | $T_a = 85^\circ\text{C}$ ; $V_r$ , $I_r$ applied<br>4000 hours | $\Delta C/C < 15\%$<br>$\tan\delta < 175\%$ (of initial value)<br>$I_L = \text{spec. value}$ |
| Useful life    | JIS-C-5104-4<br>IEC 60384-4               | $T_a = 85^\circ\text{C}$ ; $V_r$ , $I_r$ applied<br>6000 hours | $\Delta C/C < 20\%$<br>$\tan\delta < 200\%$ (of initial value)<br>$I_L = \text{spec. value}$ |