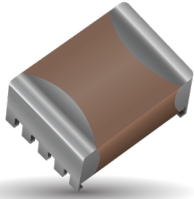


# SMPS Capacitors

## RH Style - Surface Mount 'J' Lead Range



The RH range uses high volumetric efficient X7R capacitors in a "J" style lead frame.

The range of components are uncoated and are suitable for input or output filter capacitors in high frequency DC-DC convertor, automotive, telecom, industrial and military applications.

When large ceramic capacitors are used in applications they can easily be affected by stresses caused by temperature variations, thermal shock, mechanical vibrations and PCB bend movement. The RH range is designed with a "J" type lead frame which greatly reduces all of these thermo mechanical stresses experienced by large capacitors. The RH range allows the capacitors to be doubled stacked so a higher volumetric efficiency can be achieved by the customer and this saves PCB space.

### FEATURES

- RH range has low ESR/ESL capability
- PCB space saving using double stacked MLCCs
- Enhanced thermo mechanical stress resistance

Note: KYOCERA AVX does not recommend or advise the use of adhesives to secure the RH components to the PCB.

### ELECTRICAL SPECIFICATIONS

**Temperature Coefficient** CECC 30 000, (4.24.1)

X7R: C Temperature Characteristic -  $\pm 15\%$ , -55°C to +125°C

#### Capacitance Test

Measured at 1 VRMS max at 1KHz

#### Dissipation Factor 25°C

2.5% max at 1KHz, 1 VRMS max

#### Insulation Resistance 25°C

100K megohms or 1000 megohms- $\mu$ F, whichever is less

#### Dielectric Withstanding Voltage 25°C (Flash Test)

250% rated voltage for 5 seconds with 50 mA max charging current. (500 Volt units @ 150% rated voltage)

#### Life Test (1000 hrs) CECC 30 000 (4.23)

200% rated voltage at +125°C.

(500 Volt units @ 120% rated voltage)

#### Thermal Shock IEC 68.2.14

-55°C to +125°C, 5 cycles

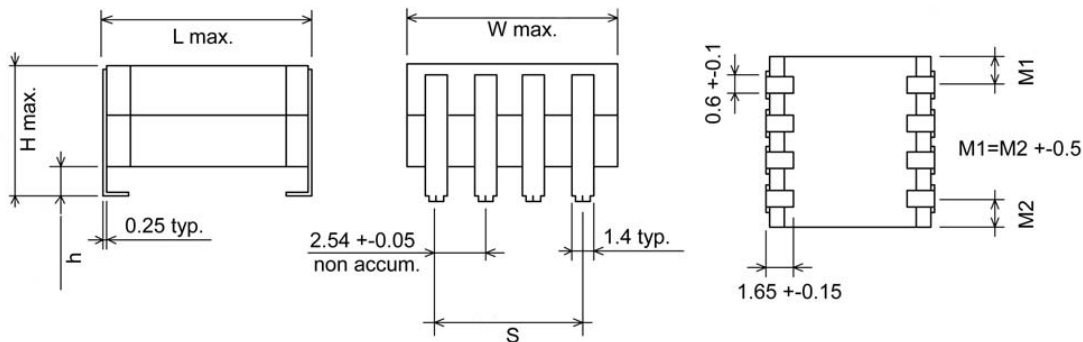
#### Resistance to Solder Heat IEC 68.2.20

| Typical ESR (m $\Omega$ ) 3 $\mu$ F, 100V X7R |    |
|-----------------------------------------------|----|
| ESR @ 100KHz                                  | 17 |
| ESR @ 500KHz                                  | 12 |
| ESR @ 1MHz                                    | 14 |

### DIMENSIONS

millimeters (inches)

| Style | L max        | W max        | H max        | S $\pm 0.1$<br>( $\pm 0.004$ ) | h                                       | No. of leads<br>per side |
|-------|--------------|--------------|--------------|--------------------------------|-----------------------------------------|--------------------------|
| RH21  | 7.20 (0.283) | 5.40 (0.213) | 4.80 (0.189) | 2.50 (0.098)                   | 2.05 $\pm 0.25$<br>(0.081 $\pm 0.001$ ) | 2                        |
| RH22  | 7.20 (0.283) | 5.40 (0.213) | 7.70 (0.303) | 2.50 (0.098)                   | 2.05 $\pm 0.25$<br>(0.081 $\pm 0.001$ ) | 2                        |
| RH31  | 7.62 (0.300) | 7.00 (0.270) | 5.08 (0.200) | 5.08 (0.200)                   | 1.78 $\pm 0.25$<br>(0.070 $\pm 0.010$ ) | 3                        |
| RH32  | 7.62 (0.300) | 7.00 (0.270) | 8.13 (0.320) | 5.08 (0.200)                   | 1.78 $\pm 0.25$<br>(0.070 $\pm 0.010$ ) | 3                        |
| RH41  | 9.20 (0.362) | 8.70 (0.342) | 4.90 (0.192) | 5.08 (0.200)                   | 1.60 $\pm 0.10$<br>(0.062 $\pm 0.004$ ) | 3                        |
| RH42  | 9.20 (0.362) | 8.70 (0.342) | 8.20 (0.323) | 5.08 (0.200)                   | 1.60 $\pm 0.10$<br>(0.062 $\pm 0.004$ ) | 3                        |
| RH51  | 10.7 (0.421) | 10.7 (0.421) | 4.90 (0.192) | 7.62 (0.300)                   | 1.60 $\pm 0.10$<br>(0.062 $\pm 0.004$ ) | 4                        |
| RH52  | 10.7 (0.421) | 10.7 (0.421) | 8.20 (0.323) | 7.62 (0.300)                   | 2.05 $\pm 0.25$<br>(0.081 $\pm 0.001$ ) | 4                        |
| RH61  | 14.9 (0.586) | 13.6 (0.535) | 4.90 (0.192) | 10.2 (0.400)                   | 1.60 $\pm 0.10$<br>(0.062 $\pm 0.004$ ) | 5                        |
| RH62  | 14.9 (0.586) | 13.6 (0.535) | 8.20 (0.323) | 10.2 (0.400)                   | 1.60 $\pm 0.10$<br>(0.062 $\pm 0.004$ ) | 5                        |



Performance of SMPS capacitors can be simulated by downloading SpiCalci software program -  
<http://www.kyocera-avx.com/download/software/SpiCalci-AVX.zip>  
 Custom values, ratings and configurations are also available.

# SMPS Capacitors

## RH Style - Surface Mount 'J' Lead Range

### X7R STABLE DIELECTRIC

|                                                                                                                                                    | RH21/RH22<br>Style |      |      |      |     | RH31/RH32<br>Style |     |      |      | RH41/RH42<br>Style |     |     |      | RH51/RH52<br>Style |     |     |     | RH61/RH62<br>Style |     |     |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------|------|------|-----|--------------------|-----|------|------|--------------------|-----|-----|------|--------------------|-----|-----|-----|--------------------|-----|-----|-----|
| Voltage DC                                                                                                                                         |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| Cap $\mu$ F                                                                                                                                        | 25                 | 50   | 100  | 200  | 500 | 50                 | 100 | 200  | 500  | 50                 | 100 | 200 | 500  | 50                 | 100 | 200 | 500 | 50                 | 100 | 200 | 500 |
| 0.047                                                                                                                                              |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.056                                                                                                                                              |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.068                                                                                                                                              |                    |      |      |      |     |                    |     |      | RH31 |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.082                                                                                                                                              |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.1                                                                                                                                                |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.12                                                                                                                                               |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.15                                                                                                                                               |                    |      |      |      |     |                    |     |      | RH32 |                    |     |     | RH41 |                    |     |     |     |                    |     |     |     |
| 0.18                                                                                                                                               |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.22                                                                                                                                               |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.27                                                                                                                                               |                    |      |      |      |     |                    |     | RH31 |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.33                                                                                                                                               |                    |      |      |      |     |                    |     |      |      |                    |     |     | RH42 |                    |     |     |     | RH51               |     |     |     |
| 0.39                                                                                                                                               |                    |      |      |      |     |                    |     |      |      |                    |     |     |      | RH41               |     |     |     |                    |     |     |     |
| 0.47                                                                                                                                               |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.56                                                                                                                                               |                    |      |      |      |     |                    |     | RH32 |      |                    |     |     |      |                    |     |     |     | RH52               |     |     |     |
| 0.68                                                                                                                                               |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.78                                                                                                                                               |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 0.82                                                                                                                                               |                    |      |      |      |     |                    |     | RH31 |      |                    |     |     | RH42 |                    |     |     |     |                    |     |     |     |
| 1                                                                                                                                                  |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 1.2                                                                                                                                                |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 1.5                                                                                                                                                |                    |      |      |      |     |                    |     | RH31 |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 1.8                                                                                                                                                |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 2.2                                                                                                                                                |                    |      |      |      |     |                    |     | RH32 |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 3                                                                                                                                                  |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 3.3                                                                                                                                                |                    |      |      | RH21 |     |                    |     | RH32 |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 3.9                                                                                                                                                |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 4.7                                                                                                                                                |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 5.6                                                                                                                                                |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 6.8                                                                                                                                                |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 8.2                                                                                                                                                |                    |      | RH21 |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 10                                                                                                                                                 |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 12                                                                                                                                                 |                    |      |      | RH22 |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 15                                                                                                                                                 |                    | RH21 | RH22 |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 18                                                                                                                                                 |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 22                                                                                                                                                 |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 33                                                                                                                                                 |                    | RH22 | DEV  | DEV  |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 47                                                                                                                                                 |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| 68                                                                                                                                                 |                    | DEV  |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |
| <div><div></div> BME</div> <div><div></div> BME</div> <div><div></div> PME</div> <div><div></div> PME</div> <div><div></div> BME Development</div> |                    |      |      |      |     |                    |     |      |      |                    |     |     |      |                    |     |     |     |                    |     |     |     |

BME
BME
PME
PME
BME Development

### PACKAGING

For availability of further parts in the RH21/RH22 Series, contact manufacturing.

| Style | Qty/Reel 13" | Max. Qty/Waffle Pack |
|-------|--------------|----------------------|
| RH21  | 800          | 270                  |
| RH22  | 500          | 270                  |
| RH31  | 800          | 108                  |
| RH32  | 500          | 108                  |
| RH41  | see note     | 108                  |
| RH42  | 500          | 100                  |
| RH51  | 750          | 88                   |
| RH52  | see note     | 88                   |
| RH61  | 500          | 42                   |
| RH62  | see note     | 42                   |

Note: T&R is not yet available. Contact manufacturing for further information as this will be available in the future.

BME Available in RoHS and Non-RoHS PME

Available Only in Non-RoHS



### HOW TO ORDER

|                                                   |                             |                                                                                         |                                             |                                                                                                                          |                                                                          |                                                           |                                                                     |                                                                       |                                                  |                                                  |
|---------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| <b>RH</b><br>T<br>Style Code<br>(see table above) | <b>31</b><br>T<br>Size Code | <b>5</b><br>T<br>Voltage Code<br>3 = 25V<br>5 = 50V<br>1 = 100V<br>2 = 200V<br>7 = 500V | <b>C</b><br>T<br>Dielectric Code<br>C = X7R | <b>225</b><br>T<br>Capacitance Code<br>(2 significant digits + no. of zeros)<br>eg. 105 = 1 $\mu$ F<br>104 = 0.1 $\mu$ F | <b>M</b><br>T<br>Capacitance Tolerance<br>K = $\pm$ 10%<br>M = $\pm$ 20% | <b>A</b><br>T<br>Specification Code<br>A = Non-customized | <b>3</b><br>T<br>Package Code<br>3 = Waffle Pack<br>A = Tape & Reel | <b>0</b><br>T<br>Lead Dia. Code<br>0 = Standard<br>R = RoHS Compliant | <b>A</b><br>T<br>Lead Space Code<br>A = Standard | <b>3</b><br>T<br>Lead Style Code<br>3 = 'J' Lead |
|---------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------|