

## AN-805 – Recommended Ferrite Beads

Ferrite beads (or chips) are recommended for Renesas clock products for power supply filtering of the main supply rails.

The five leading parameters and characteristics to consider when selecting ferrite bead are DC resistance, AC impedance, bias current rating, material, and package size. What is desired for good isolation is a low-pass power filter. For that, a bead with some DC resistance is best. High current power beads should be avoided. How much resistance depends on how much voltage drop is allowed and, therefore, the maximum current of the device being powered.

- **DC Resistance:** This resistance is desirable to reduce the Q of the low pass LC filter. DC resistance in datasheets is usually 1.5 to 2 times the typical DC resistance. DC resistance should be measured with a 4-wire or Kelvin ohm meter. This is material dependent.
- **AC Impedance:** Impedance characteristics are also material dependent. Examine the impedance curves. Impedance is normally measured and specified at 100MHz. Select a bead with higher loss at 50MHz.
- **Bias Current Rating:** Ferrite beads are magnetic devices whose loss is affected by the bias current. When operating at close to maximum rating the impedance may decrease by half in some ferrite beads. Usually beads are now de-rated by manufactures.
- **Material:** Beads in different form factors have similar DC resistance and impedance characteristics that use the same material.
- **Package Size:** Manufactures may specify the package size in either mils (1 inch/1000) or millimeters (mm).

**Table 1. Examples of Suitable Ferrite Beads**

Manufacturer	Part Number	Z at 100MHz	Package Size	DC Resistance	Current (Ma)
Fair-rite	2504021217Y	120	0402	0.5	200
muRata	BLM15AG221SN1	220	0402	0.35	300
muRata	BLM15BB121SN1	120	0402	0.35	300
TDK	MMZ1005S241A	240	0402	0.18	200
TECSTAR	TB4532153121	120	0402	0.3	300
muRata	BLM18BB221SN1	220	0603	0.45	450
muRata	BLM18AG601SN1	600	0603	0.50	200
muRata	BLM18BD601SN1_PB	600	0603	0.65	200
Ceratech	HB-1T1608-601	600	0603	0.50	200
TDK	MMZ1608R301A	300	0603	0.20	500
muRata	BLM21A601R	600	0805	0.30	600
TDK	MMZ2012S601A	600	0805	0.30	600
STEWART	HZ0805E601R	600	0805	0.30	600
AssocCmpTch	CBG0805-600-50	600	0805	0.30	600

**Table 2. Package Size Conversion Chart**

mils	mm
0402 =	1005
0603 =	1608
0805 =	2012
1206 =	3216

## Revision History

Revision	Date	Description
1.01	Mar 23, 2023	Reformatted document to the latest Renesas template.
-	Dec 3, 2013	Initial release.

## IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers who are designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only to develop an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third-party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising from your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.01)

### Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,  
Koto-ku, Tokyo 135-0061, Japan  
[www.renesas.com](http://www.renesas.com)

### Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

### Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit [www.renesas.com/contact-us/](http://www.renesas.com/contact-us/).