# GP2010/GP2015

## Using the Murata SAFJA35M4WC0Z00 Saw Filter

Application Brief

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### Description

This Application Brief has been prepared to advise users of the Zarlink GP2015 (or GP2010) GPS RF Front-end how to use a new 35.42MHz SAW which has recently become available from Murata. The Murata SAFJA35M4WC0Z00 SAW filter device (previous part no: SAFCC35.42 MC00Z) is a replacement for the Dynex DW9255 SAW filter (originally available from Zarlink under the same part number).

The Murata SAFJA35M4WC0Z00 SAW is supplied in a smaller package than the Dynex DW9255, and also requires different matching components from those used with the Dynex DW9255, to allow the SAW to operate correctly with the GP2015 (or GP2010).

The Frequency response of the SAW, as measured and supplied by Murata with some sample test data, is as shown in Figure 1. The average insertion loss of the SAW filter is 17.5dB

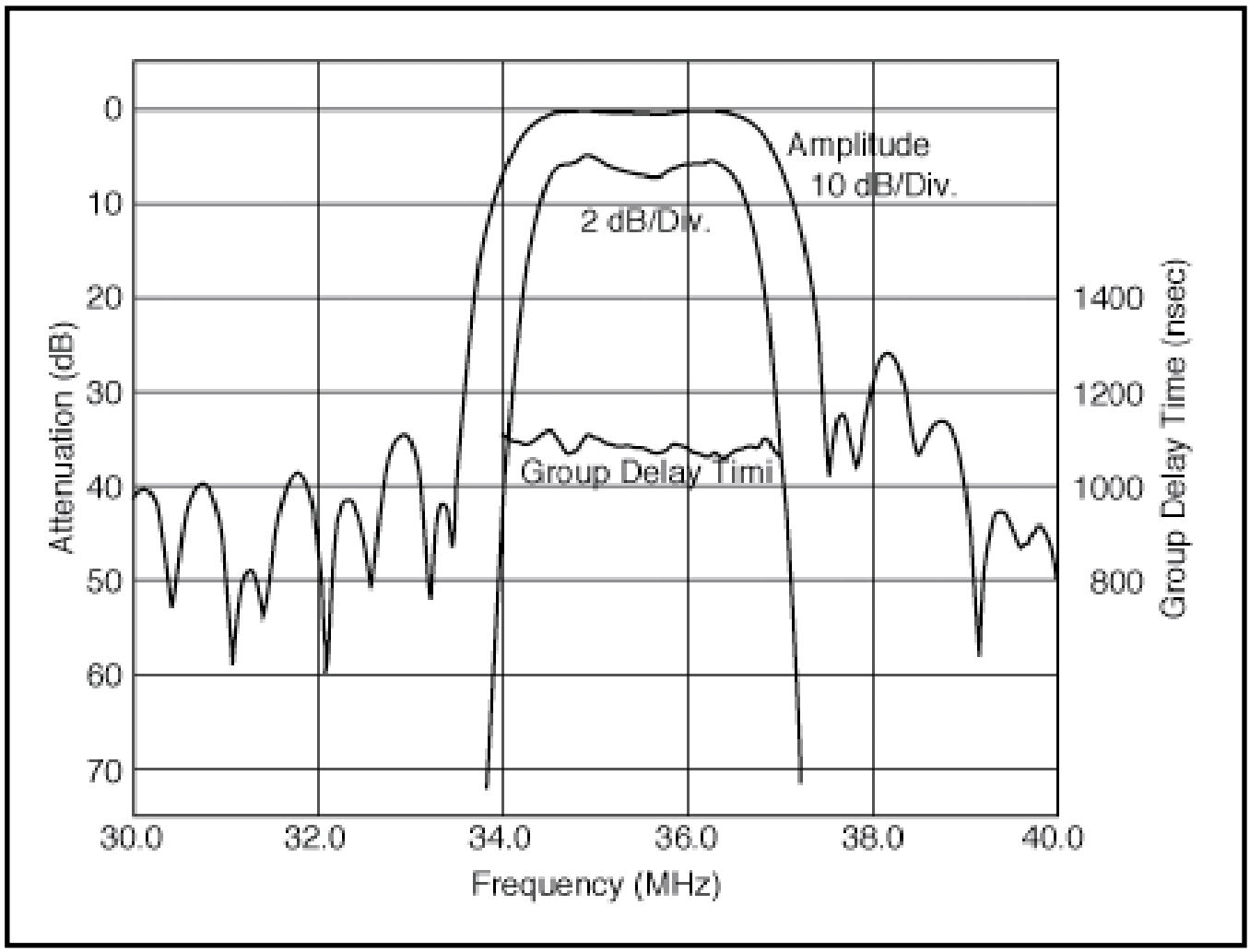



**Figure 1. Murata SAFJA35M4WC0Z00 SAW response plot**

The package used for the SAFJA35M4WC0Z00 SAW filter is a ceramic substrate with a metal shield/lid. The package dimensions are approx. 9.6mm x 5.1mm x 2.0mm. A copy of the package outline drawing used for the Murata SAFCC35.42MC00Z is shown in Figure 2

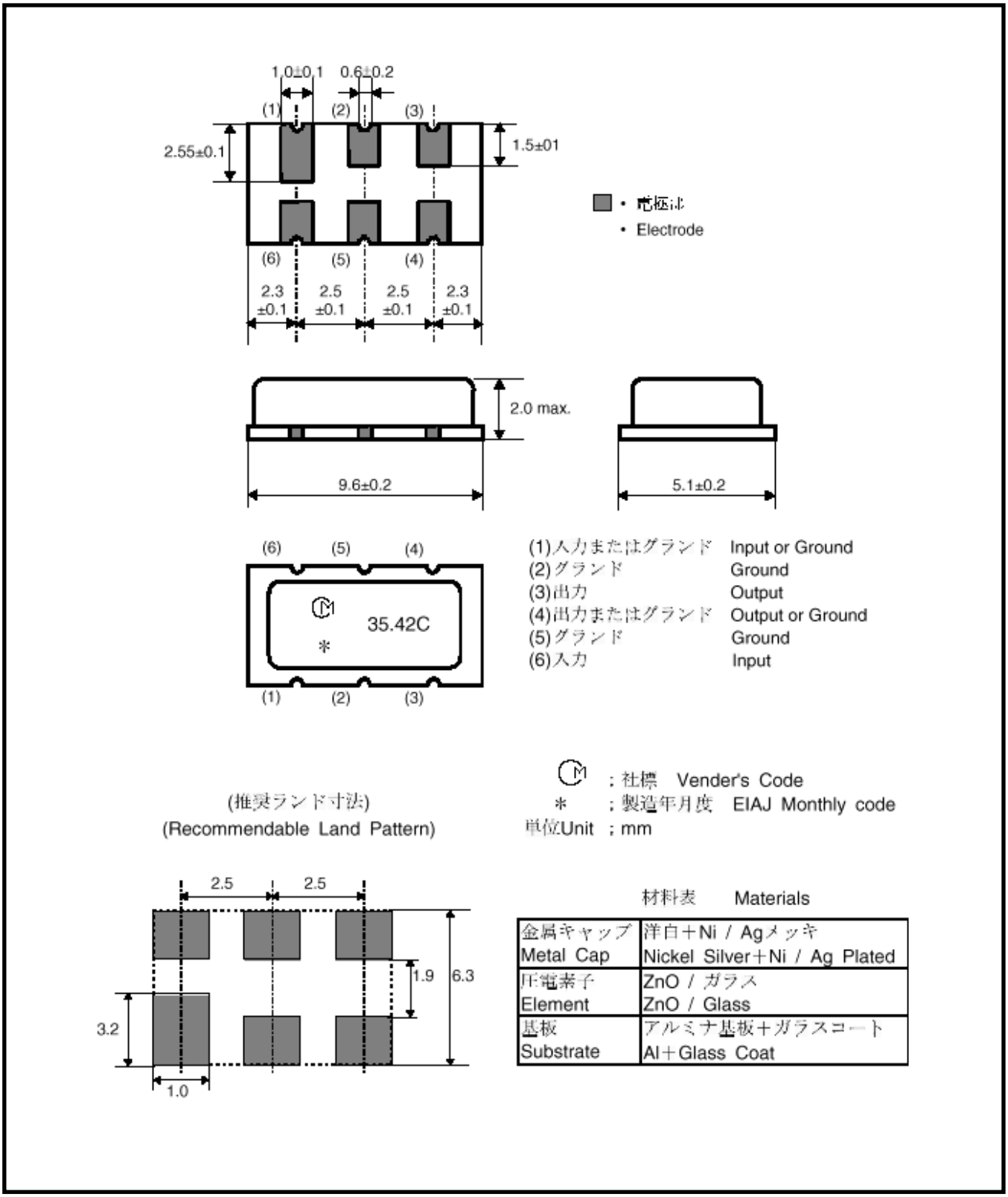
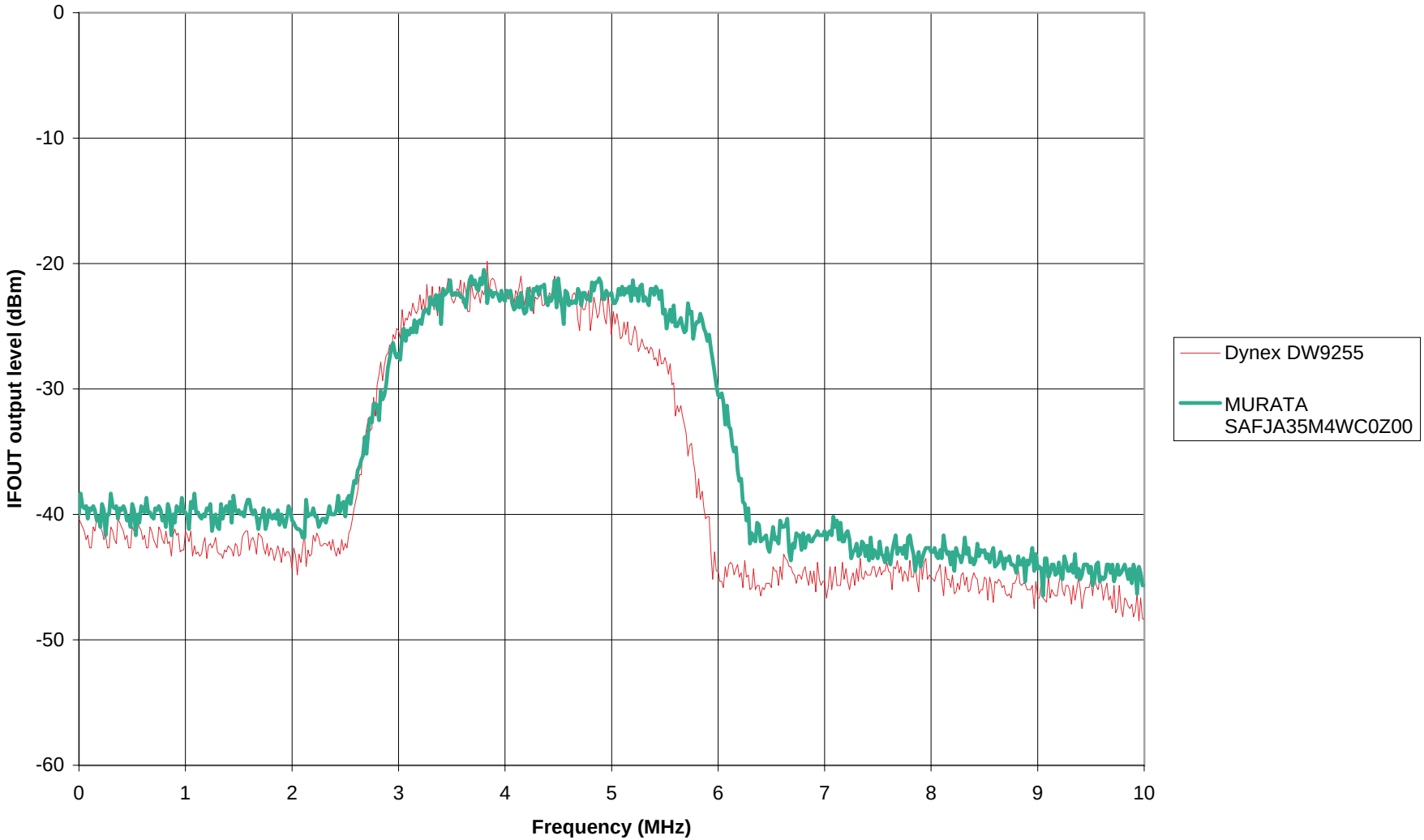



**Figure 2. Murata SAFJA35M4WC0Z00 SAW filter package dimensions**

The response obtained with the Murata SAFJA35M4WC0Z00 is very close to the 2nd IF filter response required by a GP2010 or GP2015 RF Front-end.




**F**igure 3. GP2015 IFOUT response - comparison between Dynex DW9255 and Murata SAFJA35M4WC0Z00 SAWs - +25 ° - optimum inductor - GPS Antenna on RF input

A GP2015 device with Dynex DW9255 SAW has been measured for its IFOUT spectral response. The response was measured with a GPS Active antenna attached to the RF input in order to provide a realistic representation of the spectral noise, which would be seen by a real GPS receiver. The GP2015 was powered with +5V DC and its temperature maintained at +25C.

The same GP2015 was then used to set-up and use a Murata SAFJA35M4WC0Z00 SAW. By adjusting the value of the SAW input matching inductors (2 x 1.5uH rather than 2 x 560nH), and output matching inductor (2.7uH rather than 2.2uH), a frequency response was produced which was very close to that produced with a Dynex DW9255 SAW. The response plot for both SAW types appears in Figure 3. The bold line-plot applies to the SAFJA35M4WC0Z00 SAW.

The response of the Murata SAFJA35M4WC0Z00 is wider-band than the Dynex DW9255. The SAFJA35M4WC0Z00 has an upper-frequency corner approx. 400kHz above that of the Dynex DW9255. However the SAFJA35M4WC0Z00 SAW is within specified limits for the GPS system. A GPS receiver which uses a GP2010 or GP2015 RF Front-end, must ensure that the 2nd IF filtering at 35.42MHz centre frequency is largely flat, to give an IFOUT response which is also largely flat across 4.309MHz +/-1.023MHz. Figure 3 shows that this is true for both the Dynex DW9255 and SAFJA35M4WC0Z00. The response is an averaged response of noise, and includes the effects of the 3rd IF filter, which is on-chip on the GP2015 and GP2010.

The application circuit for the interface between the Murata SAFJA35M4WC0Z00 SAW and the Zarlink GP2015 GPS RF Front-end is shown in Figure 4. The same circuit can be used with the Zarlink GP2010 RF Front-end, but note that GP2010 pin-numbers will differ.

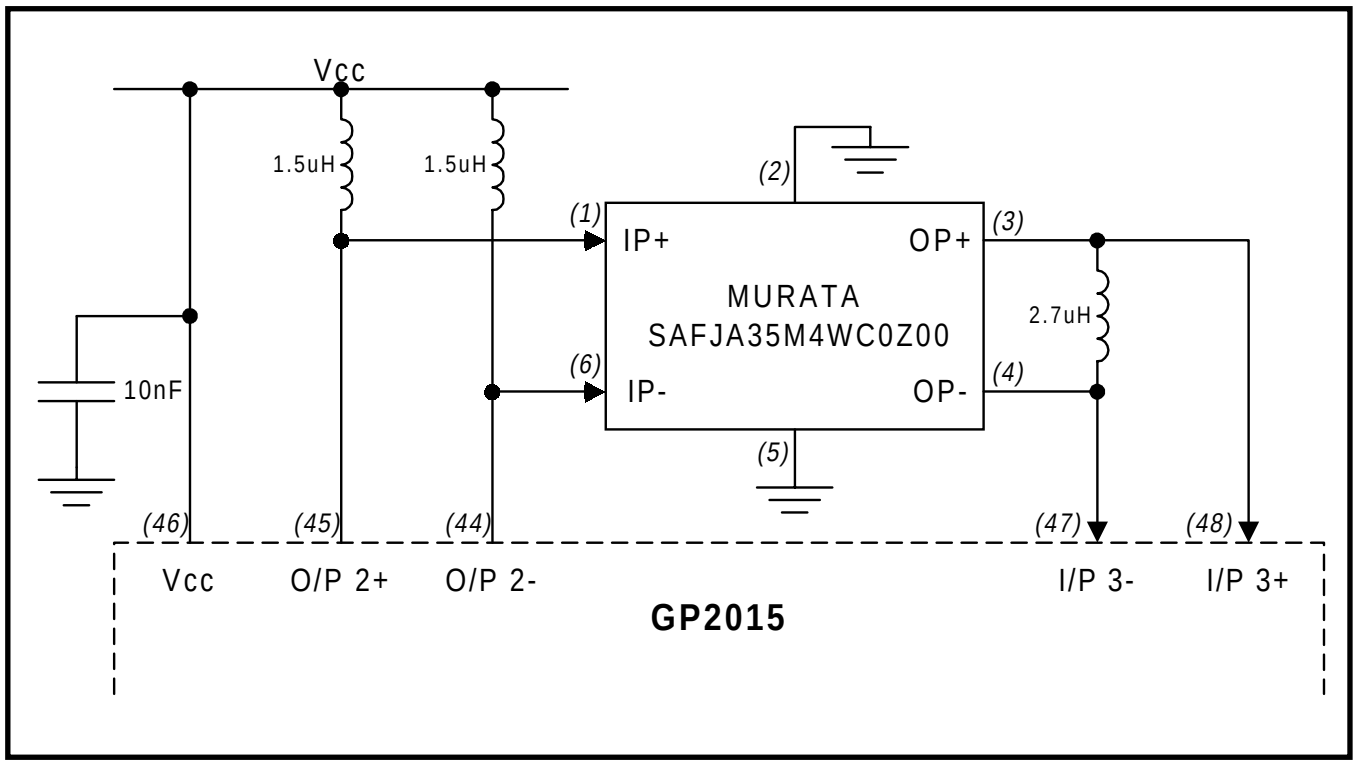



**Figure 4. Connections between SAFJA35M4WC0Z00 SAW and GP2015 RF Front-end**

The response plot of the Murata SAFJA35M4WC0Z00 shows that this SAW is acceptable for use with a Zarlink GP2010 or GP2015 RF Front-end. The 2 input matching inductors need to be set to 1.5 uH each (instead of 2 x 560nH with the Dynex DW9255) and the output matching inductor needs to be set to 2.7uH (instead of 2.2uH with the Dynex DW9255).

For both input and output inductors for the SAFJA35M4WC0Z00, it is recommended that magnetically shielded inductors are used, in order to resist interference from any fast clock signals from digital components (e.g. TDK MLF series inductors).

### Related Zarlink Semiconductor documents:

| Part No. | Description | Document number |
|---|---|---|
| | GP2000 GPS Receiver Hardware Design | AN4855 |
| GP2010 | GPS receiver RF front end | DS4056 |
| GP2015 | Miniature GPS receiver RF front end | DS4374 |
| GP2021 | 12 Channel GPS correlator | DS4077 |
| | GPS Orion 12 Channel GPS Receiver Design | AN4808 |
| P60ARM-B | 32-bit RISC microprocessor | DS3553 |

**Murata Contact Information:**

The Murata SAFJA35M4WC0Z00 SAW filter is available direct from Murata, and is NOT available through Zarlink Semiconductor.
Murata has sales offices at many places around the world. Consult any of the following major contact points for information on your nearest Murata sales-office and a copy of the product datasheet:

**1) Murata International Sales Department (Japan):**

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Shibuya-ku,
TOKYO 150-0002,
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Website: http://www.iijnet.or.jp/murata/index.html

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Website: http://www.mutata.com

**3) Murata International Sales Contacts Reference Website (English):**

http://www.iijnet.or.jp/murata/products/english/short/adresse.html

**For more information about all Zarlink products visit our Web Site at**

**www.zarlink.com**