



DW9255

35.42MHz SAW Filter for GPS Receivers

DS3861 - 3.1 November 1997

The DW9255 is a Surface Acoustic Wave (SAW) bandpass filter for use with the GP2000 Global Positioning System (GPS) receiver chip-set, available from Mitel Semiconductor. It is pre-tuned to the exact 2nd IF filter requirements of the GP2010 & GP2015 RF front-end devices, with a centre-frequency of 35.42MHz. The response is tuned for a flat passband, steep stopband and uniform passband group-delay with 3 external inductors. The device is realised on a Lithium Tantalate substrate and housed in a small leadless ceramic Surface Mount package.

The DW9255 gives significant improvement in correlated GPS Signal-to-Noise Ratio (SNR) performance compared to conventional LC bandpass filter schemes. This aids satellite signal acquisition and tracking capability from the GP2000 GPS chip-set. This device effectively filters out-of-band (unwanted) noise in the GPS signal. The Automatic Gain Control (AGC) within the GP2010 and GP2015 RF Front-end devices will then operate only on in-band noise for optimum gain and superior correlated GPS signal strength.

FEATURES

- Centre Frequency of 35.42MHz
- Insertion Loss of 17dB ±1dB (typical)
- 1dB Bandwidth 1.9MHz (typical)
- Passband Ripple 0.8dB (typical)
- Low Profile Ceramic Surface Mount Package
- Operating Temperature Range -40° to +85°C

APPLICATION

- Commercial Global Positioning

RELATED PRODUCTS AND PUBLICATIONS

Part	Description	Data Reference
GP2010	GPS receiver RF Front-end	DS4056
GP2015	Miniature GPS receiver RF Front-end	DS4374

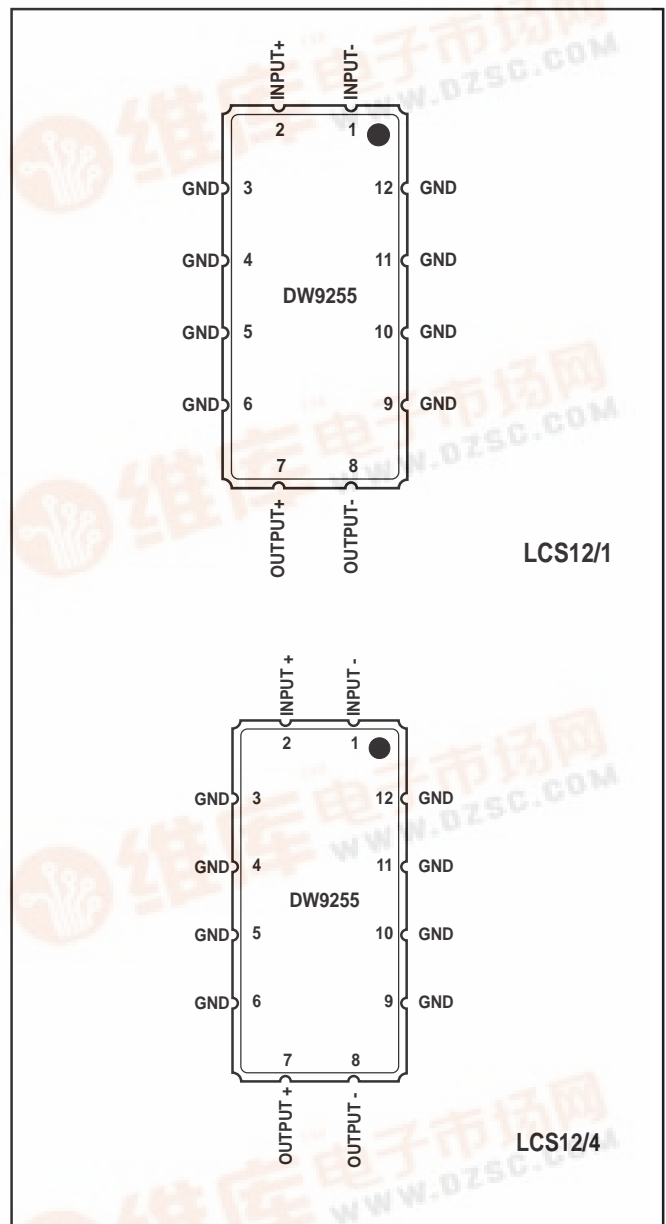


Fig.1 Pinout



DW9255

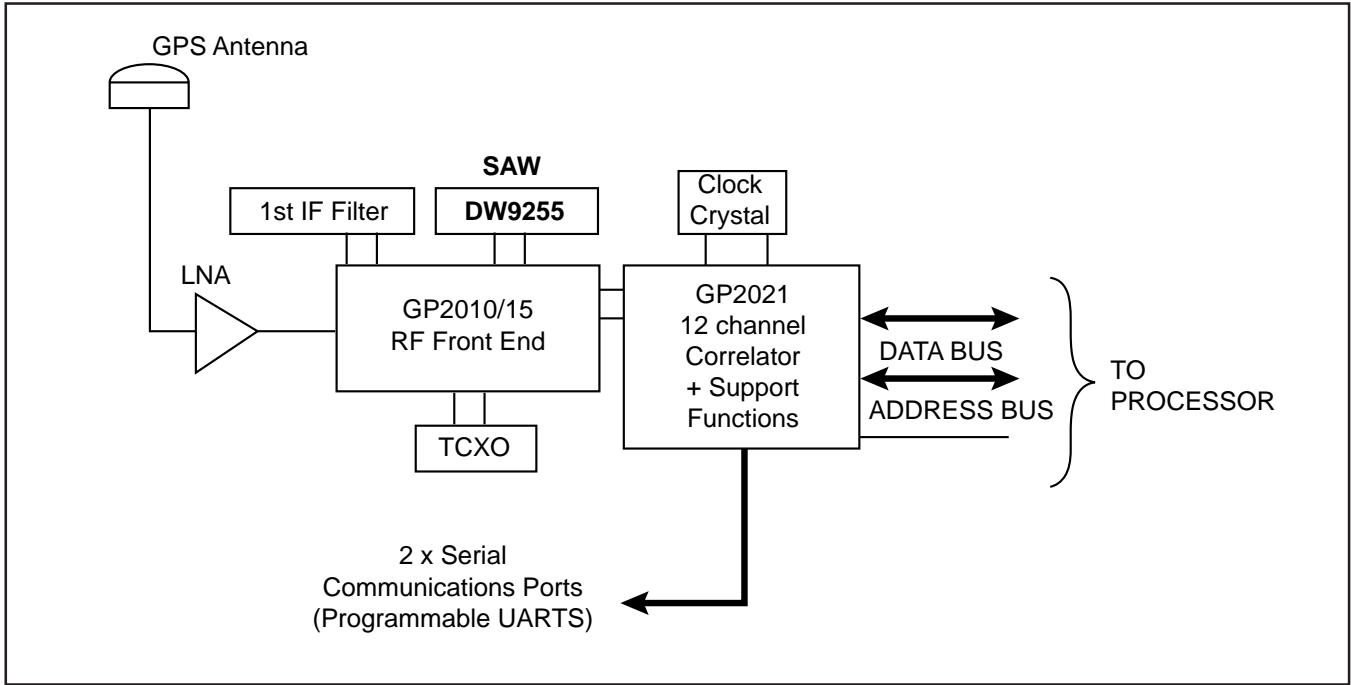


Fig.2 DW9255 used with GPS chipset

ELECTRICAL CHARACTERISTICS (Typ. @ 25°C)

Parameter	Min	Typ	Max	Units	
Centre Frequency	-	35.42	-	MHz	
1dB Bandwidth	1.6	1.9	-	MHz	
Insertion Loss	16	17	18	dB	
Amplitude Ripple (34.62 to 36.22MHz)	-	0.8	1.6	dB (pk to pk)	
Relative Attenuation (relative to insertion loss)	<28MHz	35	40	-	dB
	<31MHz	30	35	-	dB
	<33.5MHz	21	25	-	dB
	>37.5MHz	21	25	-	dB
	>40MHz	25	30	-	dB
	>50MHz	30	40	-	dB
	>63MHz	28	35	-	dB
Group Delay Ripple (34.62 to 36.22MHz)	-	190	300	ns	
Maximum Group Delay (34.62 to 36.22MHz)	-	1.6	1.7	µs	
Operating Temperature Range	-40	-	+85	°C	

DW9255 used as 2nd IF filter for GP2010/15

Centre Frequency	35.42MHz
Pass Band	$\pm 1.0\text{MHz}$ (within $\pm 1.0\text{dB}$)
Insertion loss	14-18dB
3rd IF Image frequency at 2nd IF	26.8MHz
Source Impedance	500 Ω typical
Load Impedance	1000 Ω typical

than 20dB) beyond this bandwidth, and so should have a brick-wall type response at these extremes. The DW9255 SAW filter provides a 1dB Bandwidth of typically 1.9MHz centred on 35.42MHz, with a typical pass band ripple of 0.8dB, when the SAW input and output capacitance is resonantly matched with inductors of optimum value. The out-of-band signal rejection is better than 21dB at $\pm 2.0\text{MHz}$, and better than 35dB at $\pm 7.5\text{MHz}$.

The second external IF filter is connected between the output of Stage 2 and input of Stage 3. It is required to define the bandwidth of the RF section of the GPS receiver, hence it is critical to the receiver performance. The filter should be flat across the 2MHz bandwidth of the GPS Coarse-Acquisition (C/A) code signal. It should also have high rejection (greater

The frequency response of the DW9255 SAW filter with matching components is shown in Fig. 3. The matching components used with the GP2010/15 device are shown in Fig. 4.

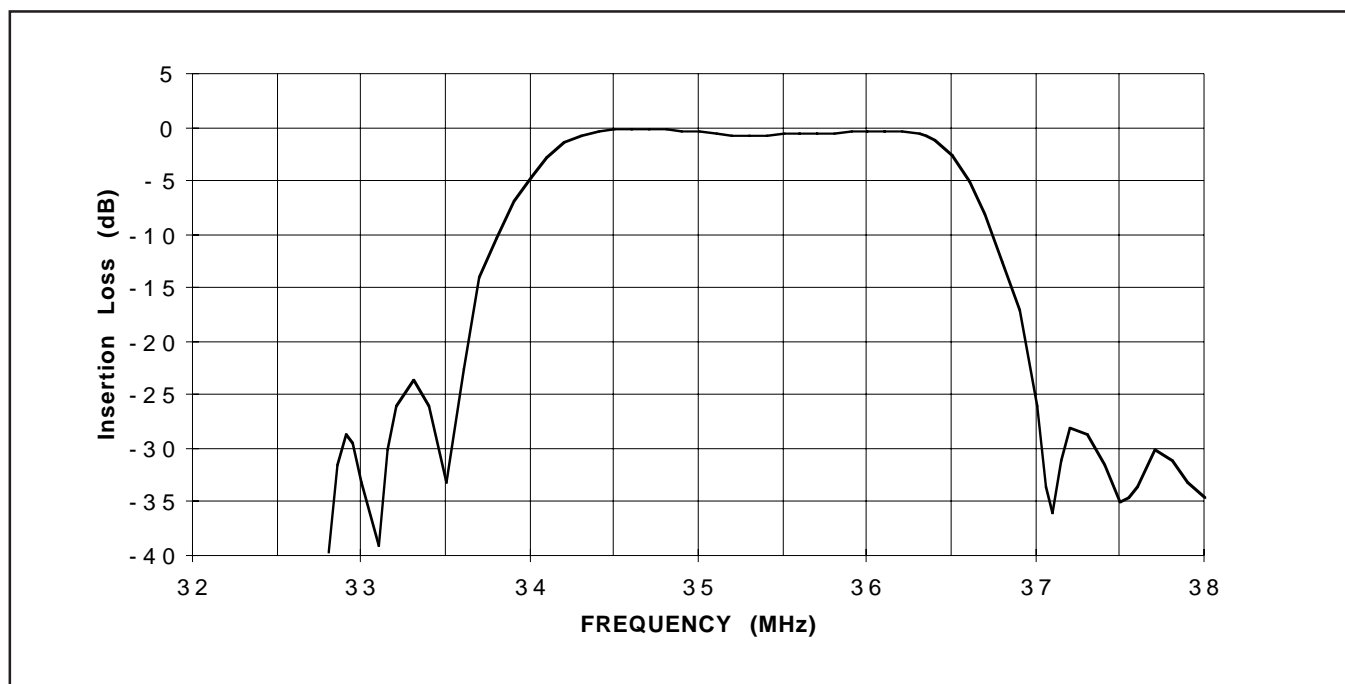


Fig.3 Typical frequency response of DW9255 SAW filter used as 2nd IF filter

DW9255

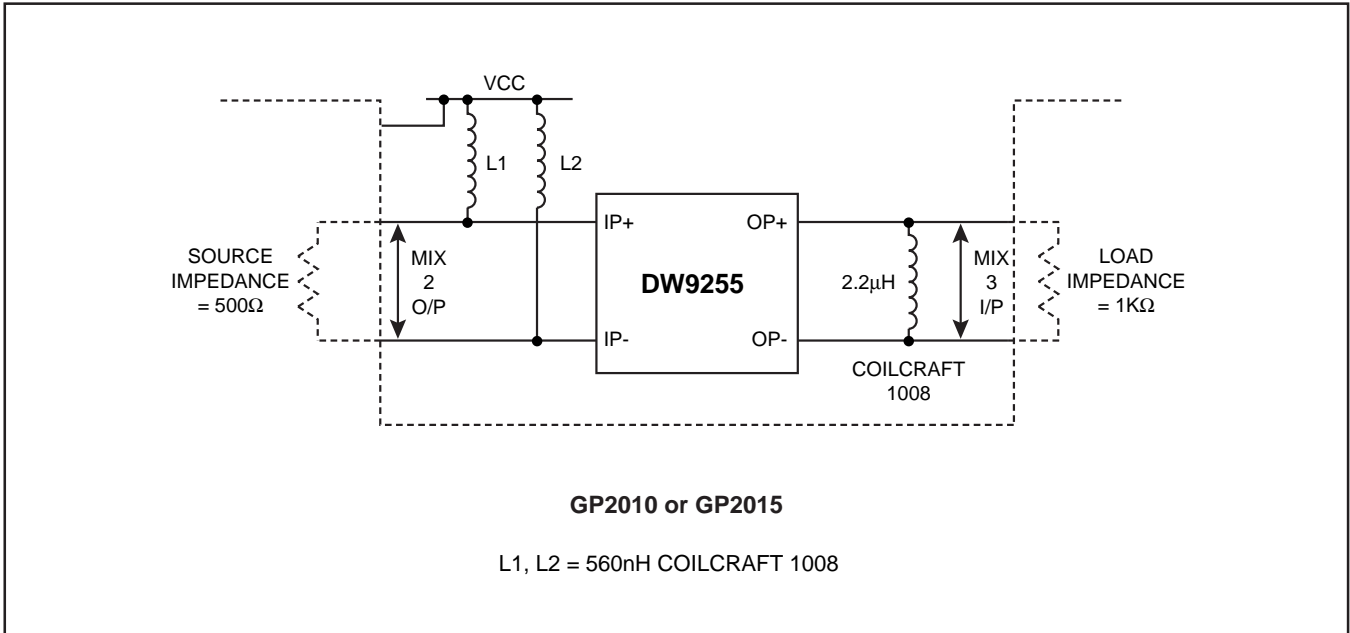


Fig.4 Typical matching components when used with GP2010 or GP2015 GPS Front-end IC

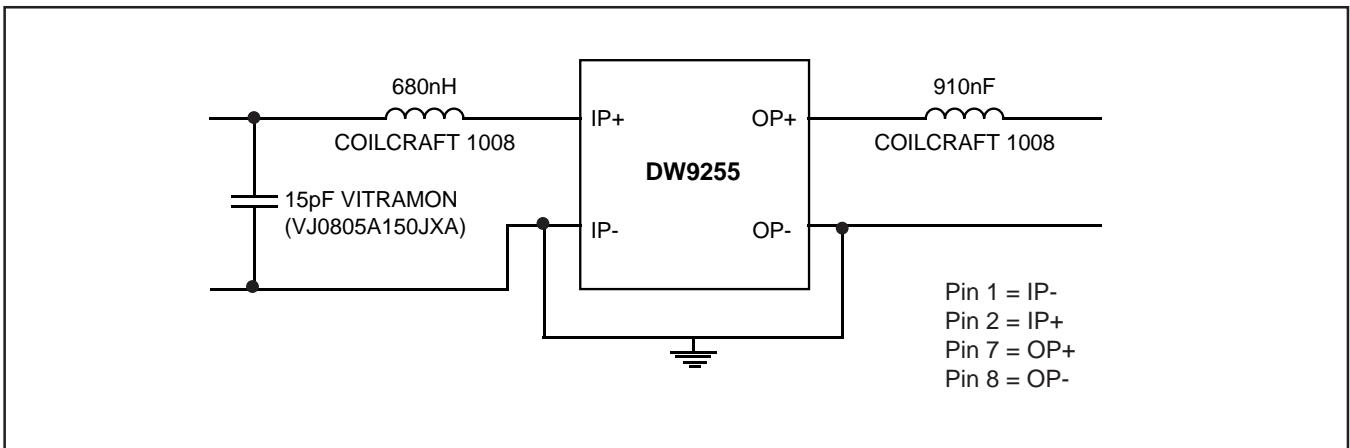


Fig.5 50Ω Matching network



<http://www.mitelsemi.com>

World Headquarters - Canada

Tel: +1 (613) 592 2122

Fax: +1 (613) 592 6909

North America

Tel: +1 (770) 486 0194

Fax: +1 (770) 631 8213

Asia/Pacific

Tel: +65 333 6193

Fax: +65 333 6192

**Europe, Middle East,
and Africa (EMEA)**

Tel: +44 (0) 1793 518528

Fax: +44 (0) 1793 518581

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