



CMX631A Low-Power SPM Detector

External Component Value Calculation - A Worked Example

German 16KHz FTZ Specification:

Must Not Decode Level = -27dB
Must Decode Level = -21dB

Using the graph supplied in the *FX631* datasheet, section 4.3 and following the steps 1, 2 and 3, the required 'gain-range' of -4.75dB to -6.80dB is obtained.

Note: This graph is produced using a V_{DD} of 3.0V.

For 5.0V, V_{DD} operation the graph provided in Figure 5 of the datasheet should be used. This will provide a 'gain-range' of -0.50dB to -2.50dB.

Using the 'gain-range' for 5.0V, V_{DD} , the mid-point gives a gain requirement of -1.5dB.

Assuming a Differential input:

$$\begin{array}{lcl} R_4 & = & R_1 \\ C_4 & = & C_3 \\ R_3 & = & R_2 \end{array}$$

$$\text{The amplifier gain (G) is set by: } G = \frac{R_1}{\sqrt{R_2^2 + X_{C3}^2}} = -1.5\text{dB or } 0.8414$$

For a system frequency of 16kHz and an input capacitor value of 330pF.

$$X_{C3} = \frac{1}{2\pi \times 16000 \times 330\text{pF}} = 30.143\text{k}\Omega$$

Choosing R_1 as 100k Ω (datasheet recommends $R_1 \geq 33\text{k}\Omega$)

$$G = \frac{R_1}{\sqrt{R_2^2 + X_{C3}^2}} \text{ then by transposition and calculation; } R_2 = 115\text{k}\Omega$$

Choosing $R_2 = 120\text{k}\Omega \pm 1\%$ and $R_1 = 100\text{k}\Omega \pm 1\%$ and $C_3 = 330\text{pF} \pm 10\%$;

and recalculating gives a variation in gain of -1.64dB to -2.10dB. This figure is still within the -0.5dB to -2.5dB 'gain-range'.

This same method and gain calculation can be used with common mode input.

NB: This application note also applies to the FX631

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Note that this Application Note is intended to be used in conjunction with the current CML Product Datasheet; printed Specifications apply.
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