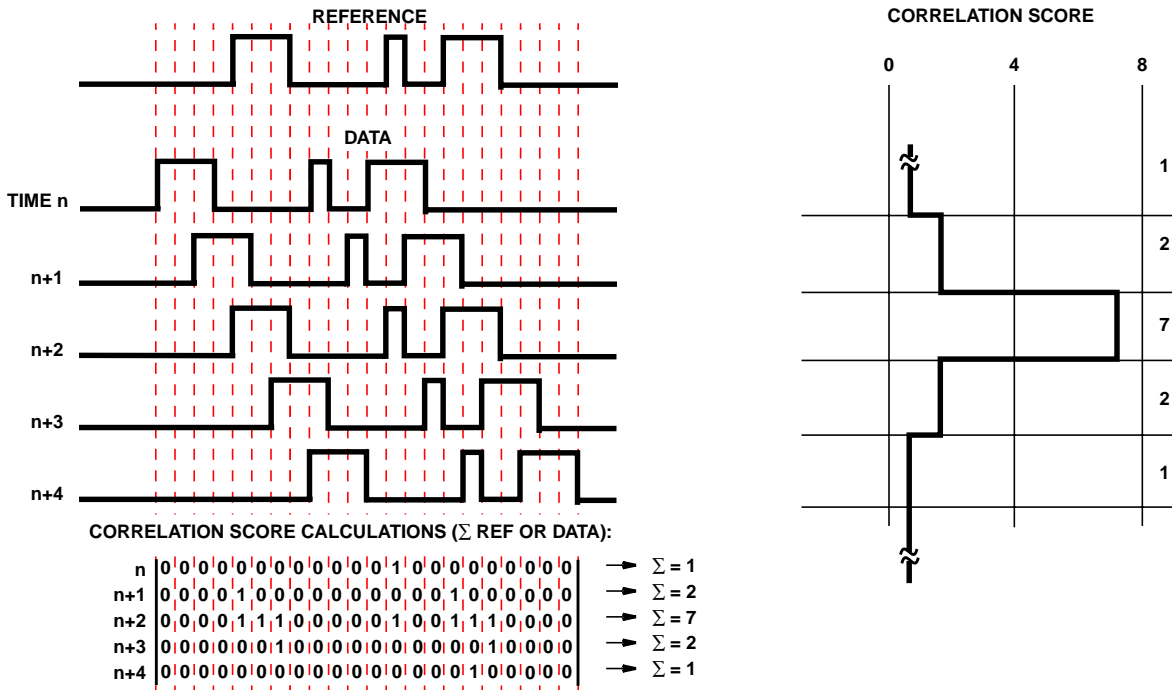


For single bit data, the output of the correlator, that is, the correlation score, represents the total number of data bits that match the reference at time n. At time n+1, the data slides past the reference by one sample, a new data sample is input into the device, and the new sum is calculated. When the data matches the reference most closely, a correlation peak is obtained. Figure 1 shows a stream of data being correlated with a reference and the corresponding peak in the output score.

The maximum possible correlation score (corresponding to a perfect match) equals the number of bits in the data stream. Assuming that the reference pattern occurs only once in the data, the correlation score will build slowly until it reaches the peak. Assuming random input data, most of the time

about half of the data samples will match the reference. The minimum correlation score for a given configuration will then be one half of the peak score.

This example is ideal; the received pulse is not corrupted by noise, so correlation is perfect. In the real world, noise on the input data will lower the correlation peak, making it more difficult to determine its position in the data. Quantizing the data using more than one bit helps to alleviate this problem. In the example shown in Figure 2, two bit quantization is used to illustrate this point. In this case, calculation of the maximum possible score must take into account the bit weighting. The output scores are shown normalized to their respective maximums so that a fair comparison is achieved. Note that using more data bits sharpens the peak of the score.



**FIGURE 1. CONCEPTUAL DIAGRAM OF CORRELATION OF SINGLE BIT DATA AND REFERENCE**

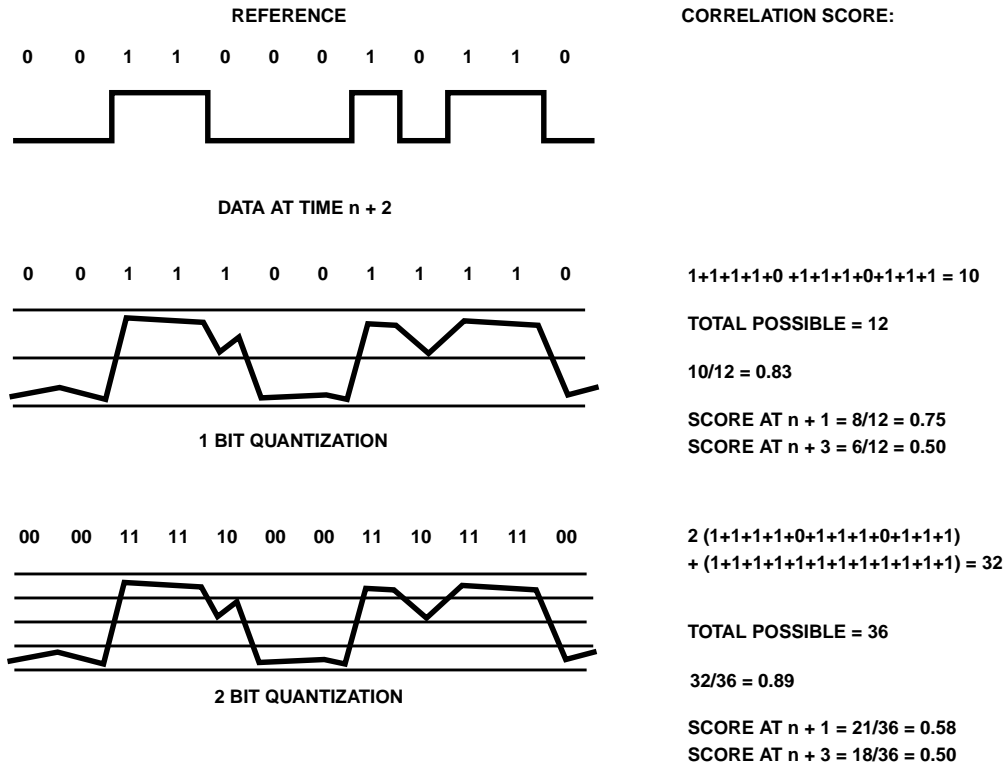


FIGURE 2. COMPARISON OF CORRELATION RESULTS USING ONE BIT AND TWO BIT DATA

All Intersil semiconductor products are manufactured, assembled and tested under **ISO9000** quality systems certification.

*Intersil semiconductor products are sold by description only. Intersil Corporation reserves the right to make changes in circuit design and/or specifications at any time without notice. Accordingly, the reader is cautioned to verify that data sheets are current before placing orders. Information furnished by Intersil is believed to be accurate and reliable. However, no responsibility is assumed by Intersil or its subsidiaries for its use; nor for any infringements of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Intersil or its subsidiaries.*

For information regarding Intersil Corporation and its products, see web site <http://www.intersil.com>

### Sales Office Headquarters

#### NORTH AMERICA

Intersil Corporation  
 P. O. Box 883, Mail Stop 53-204  
 Melbourne, FL 32902  
 TEL: (407) 724-7000  
 FAX: (407) 724-7240

#### EUROPE

Intersil SA  
 Mercure Center  
 100, Rue de la Fusee  
 1130 Brussels, Belgium  
 TEL: (32) 2.724.2111  
 FAX: (32) 2.724.22.05

#### ASIA

Intersil (Taiwan) Ltd.  
 7F-6, No. 101 Fu Hsing North Road  
 Taipei, Taiwan  
 Republic of China  
 TEL: (886) 2 2716 9310  
 FAX: (886) 2 2715 3029