# Application Note 325
# Crystal Selection Guide

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Specifications for selecting the appropriate crystal in a T1 or E1 application are given in the following order.

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| Table 1 | DS2155, DS21x5y, DS2154, and DS2152 Crystal Specifications |
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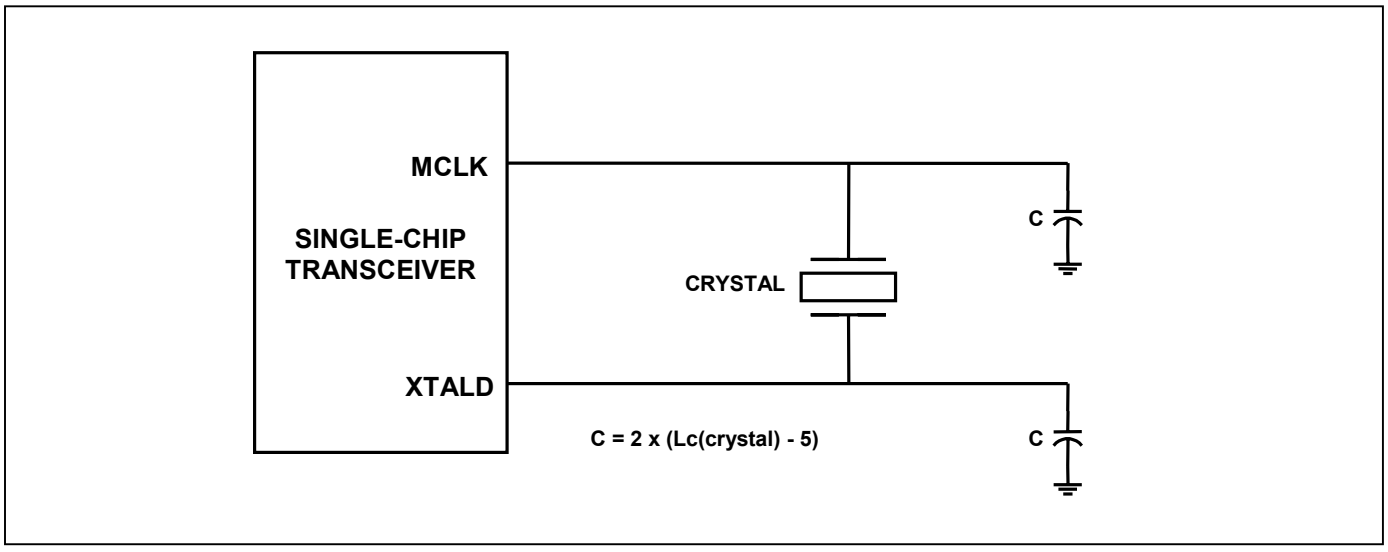
The DS2152, DS2154, DS21x5y, and DS2155 do not require a crystal for most applications. Typically, a clock derived from the system or supplied by an oscillator drives MCLK. If it is not a 1x clock, then appropriate divider can be used to drive the MCLK. For the DS2155, a 16.384MHz, 8.192MHz, 4.096MHz, 2.048MHz, or 1.544MHz clock must be applied at MCLK. ITU specification G.703 requires an accuracy of ±50ppm for both T1 and E1. TR62411 and ANSI specifications require an accuracy of ±32ppm for T1 interfaces. A prescaler divides the 16MHz, 8MHz, or 4MHz clock down to 2.048MHz. There is an on-board PLL for the jitter attenuator, which converts the 2.048MHz clock to a 1.544MHz rate for T1 applications. In an application that derives all timing from the network (loop timed), a crystal can be connected to MCLK and XTALD as shown in Figure 1. There is no pullability requirement for this crystal.

Specifications for selecting the appropriate crystal in a T1 or E1 application are given in Table 1. A list of crystal manufacturers is in Table 2. Table 5 lists oscillator manufacturers.

## Figure 1. Crystal Connection



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## Table 1. DS2155, DS21x5Y, DS2154 and DS2152 Crystal Specifications

| PARAMETER | SPECIFICATION |
|---|---|
| Parallel Resonant Frequency | 1.544MHz (T1), 2.048MHz (E1) |
| Mode | Fundamental |
| Load Capacitance | See Figure 1 |
| Tolerance | ±50ppm |
| Crystal Cut | AT |

## Table 2. Recommended Crystal Manufacturers for DS2155, DS21x5Y, DS2154, and DS2152

| MANUFACTURER | ADDRESS | PART |
|---|---|---|
| SARONIX | 141 Jefferson Drive<br>Menlo Park CA 94025<br>650-470-7700 or 800-227-8974 | COMMERCIAL TEMP RANGE<br>(T1, 3.088 MHz) NYP0308-XXGHE(L)*<br>(E1, 4.096 MHz) NYP0409-XXGHE (L)*<br>**Need to use divider for MCLK.* |
| ECLIPTEK | 3545 Cadillac Ave.<br>Costa Mesa, CA 92626-1401<br>714-433-1200 | COMMERCIAL TEMP RANGE<br>Crystal available for both T1 and E1 mode of operations. |

## Table 3. Recommended Oscillator Manufacturers

| MANUFACTURER | ADDRESS | PART |
|---|---|---|
| SARONIX | 141 Jefferson Drive<br>Menlo Park, CA 94025-1114<br>650-470-7700 or 800-227-8974 | 5V 8-Pin DIP<br>SCS-DS-1046 1.544MHz<br>SCS-DS-1047 2.048MHz |
| | | 3V 8-Pin DIP<br>SCS-DS-1048 1.544MHz<br>SCS-DS-1049 2.048MHz |

The DS2151 and DS2153 require a crystal that can be pulled off its center frequency. Table 5 lists manufacturers. The part numbers given are for leaded packages. Surface-mount devices typically do not meet the pullability specification. Some of the following manufacturers may offer surface-mountable packages in which the leads have been preformed (gull-winged) with a clip added to provide a third contact point.

## Table 4. DS2151 and DS2153 Crystal Specifications

| PARAMETER | SPECIFICATION |
|---|---|
| Parallel Resonant Frequency | 6.176 (T1), 8.192 (E1) |
| Mode | Fundamental |
| Load Capacitance | 18pF to 20pF |
| Tolerance | ±50ppm |
| Pullability | CL = 10pF, $\Delta$f = + 175 to + 250ppm<br>CL = 45pF, $\Delta$f = + 175 to - 250ppm |
| Effective Series Resistance | 35Ω (max) |
| Crystal Cut | AT |

## Table 5. Recommended Crystal Manufacturers for DS2151 and DS2153

| MANUFACTURER | ADDRESS | PART |
|---|---|---|
| M-TRON | 100 Douglas Ave.<br>P.O. Box 630<br>Yankton, SD 57078-0630<br>605-665-9321<br>605-665-1709 | COMMERCIAL TEMP RANGE<br>(T1, 6.176MHz) 4575-032<br>(E1, 8.192MHz) 4575-031<br>INDUSTRIAL TEMP RANGE<br>(T1, 6.176MHz) 4144-002<br>(E1, 8.192MHz) 4144-001<br>**Note: Do not use MP-1 Prefix** |
| RALTRON | 2315 N.W. 107th Ave.<br>Miami, FL 33172<br>305-593-6033<br>FAX: 305-594-3973 | COMMERCIAL TEMP RANGE<br>(T1, 6.176MHz) A-6.176-18.5-DS<br>(E1, 8.192MHz) A-8.192-18.5-DS<br>INDUSTRIAL TEMP RANGE<br>(T1, 6.176MHz) A-6.176-18.5-DSE<br>(E1, 8.192MHz) A-8, 192-18.5-DSE |
| SUNNY-EMI CO.<br>SUNTRAC (DIST) | 11925 Ventura Blvd.<br>Studio City, CA 91604<br>818-509-8985 | INDUSTRIAL TEMP RANGE<br>(T1, 6.176MHz) SE 061-32<br>(E1, 8.192MHz) SE 081-30 |
| JAN | 2341 Crystal Dr.<br>P.O. Box 6017<br>Fort Myers, FL 33906-6017<br>941-936-2297<br>FAX: 941-936-3750 | COMMERCIAL TEMP RANGE<br>(T1, 6.176MHz) JC6B18<br>(E1, 8.192MHz) JC8B18 |
| ECLIPTEK | 3545 Cadillac Ave.<br>Costa Mesa, CA 92626-1401<br>714-433-1200 | COMMERCIAL TEMP RANGE<br>(T1, 6.176MHz) ECX-4173-6.176M<br>(E1, 8.192MHz) ECX-3876-8.192M |
| SARONIX | Strategic Marketing, Inc.<br>624 W. University Suite 265<br>Denton, TX 76201 | COMMERCIAL TEMP RANGE<br>(T1, 6.176MHz) SRX5310(L)<br>(E1, 8.192MHz) SRX5469(L) |

Dallas Semiconductor has qualified a sample of each device from the above manufacturers and has found that the device meets or exceeds our specifications. We do not conduct an ongoing qualification of these manufacturers.