Keywords: SFF-8472, optical modules, varialbe resistor, temperature-controlled resistors, laser transceiver fault detection

APPLICATION NOTE 1922

Calculator Converts Analog Signals to Digital Format for Optical SFF-8472 Standard

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Abstract: This application brief offers an online, interactive calculator for converting five analog signals from five monitored sensors to the digital format required by the SFF-8472 optical standard. The worksheet converts analog to hexadecimal, or hexadecimal back to analog, and enables conversions specific to power (received and transmitted) and bias current.

Overview

The DS1858 dual temperature-controlled nonvolatile (NV) variable resistors with three monitors consists of two 50kΩ, 256-position linear variable resistors, three analog monitor inputs (MON1, MON2, MON3), and a direct-to-digital temperature sensor. The device is capable of setting and temperature-compensating bias voltages and currents using minimal circuitry, which is beneficial in control applications. The data from the internal monitors and sensors can be used, for example, for a laser transceiver fault detection and correction.

This application note and online calculator demonstrates the calculations required to convert the raw analog signals from the five monitored channels sensors' to a digital format required by optical standard SFF-8472. An understanding of the data sheet for the DS1858 and optical standard SFF-8472 is required before continuing with these conversions.

Introduction

The accompanying calculator converts the DS1858 analog signals (temperature, V_{CC}, MON1, MON2, and MON3) to hexadecimal. The conversion utility also converts back from hexadecimal to analog. Additionally, the worksheet provides the same capability for SFF-8472 conversions specific to power (received and transmitted), and bias current.

Using the Worksheet

All input cells have a double-lined border. The converted values are in bold. Hexadecimal inputs have an MSB and LSB input. An analog input that is out of range results in an "Overscale" display in the answer cell.

DS1858 analog variables are converted to 16-bit hex and rounded to the nearest 8 LSB multiple, since the A/D is a 12-bit converter, and the 12-bit data is averaged four times. The SFF-8472 16-bit

conversions are made to within 1 LSB.

The link to the calculator is below. When prompted for username and password, log on as an anonymous user.

DS1858 calculator

Links to other application notes for the DS1858:
- Application note 166, "Interfacing digitally controlled potentiometers and resistors to laser drivers"
- Application note 174, "Monitor calibration in fiber optic applications"
- Application note 210, "Implementing internal calibration using the DS1858"
- Application note 228, "How to interpret DS1854, DS1857, and DS1858 temperature and voltage readings"
- Reference design 1766, "HFRD-03.0: Multi-Rate (1Gbps - 2.7Gbps) Small Form Factor Pluggable (SFP) Transmitter"

A complete list of nonvolatile and volatile digital pots.

Related Parts		
DS1858	Dual Temperature-Controlled Resistors with Three Monitors	Free Samples