Output Current Calculator for the MAX3905

MAXIM High-Frequency/Fiber Communications Group

MAXIM

Maxim Integrated Products

✖✗✕✖✗✕ MAXIM

Output Current Calculator for the MAX3905

1 Instructions

The MAX3905 150Mbps VCSEL Driver has several control inputs to compensate for VCSEL slope efficiency and threshold current variation over temperature. These nine control inputs are LOW[1, 2], DT0[1, 2], TC[1, 2, 3], and MOD[1, 2], as seen in Figure 1. If the temperature-dependent properties of the VCSEL are known, the attached spreadsheet can be used to program the correct combination of settings on the MAX3905 to achieve near-constant average power and extinction ratio. See Table 1 and Figure 2 for definitions of variables. The spreadsheet can be downloaded at:

http://pdfserv.maxim-ic.com/arpdf/AppAttachments/1hfdn32.zip

The spreadsheet contains two sheets, which provide opposite approaches for calculating the output currents. The first, under the "Current Input" tab, is useful when the desired temperature coefficient (TC_{LOW}), center of the flat bias current region (DT_0), low current at $T_J = DT_0$ (I_{DT0}), and modulation current (I_{MOD}) are known. The user inputs these from the blue drop-down lists under "Data Sheet Parameters," and the required control input connections to achieve these parameters are returned under the "Wirebond Connections" heading.

The second sheet, under the tab "Connection Input," is useful when the wirebond connections of the MAX3905 are known, but the output currents are not. In this sheet, the control input connections are entered in the blue drop-down menus under "Wirebond Connections," and the corresponding data sheet parameters are returned.

In both sheets, under the "MAX3905 Output Currents" heading, the junction temperature can be entered (boxes in yellow) and the corresponding high, low, and modulation currents are returned and plotted on the graph.

PARAMETER	DESCRIPTION
I_{LOW}	Total VCSEL current when the data input is logic low.
I_{HIGH}	Total VCSEL current when the data input is logic high.
I_{MOD}	$I_{HIGH} - I_{LOW}$
DT_0	The center of the temperature-stable low current region (T_W). DT_0 roughly corresponds to T_0 of the VCSEL.
I_{DT0}	I_{LOW} at $T_J = DT_0$.
T_W	The width (in °C) of the region where no temperature coefficient is applied to I_{LOW}.
TC_{MOD}	The temperature coefficient applied to I_{MOD}.
TC_{LOW}	The temperature coefficient applied to I_{LOW}. This coefficient is negative below $DT_0 - T_W/2$ and positive above $DT_0 + T_W/2$.
I_{OFF}	Total VCSEL current while squelched.

Table 1. MAX3905 Output Current and Temperature Coefficient Definitions

For more detail on the MAX3905, refer to the MAX3905 Data Sheet located at http://www.maxim-ic.com.
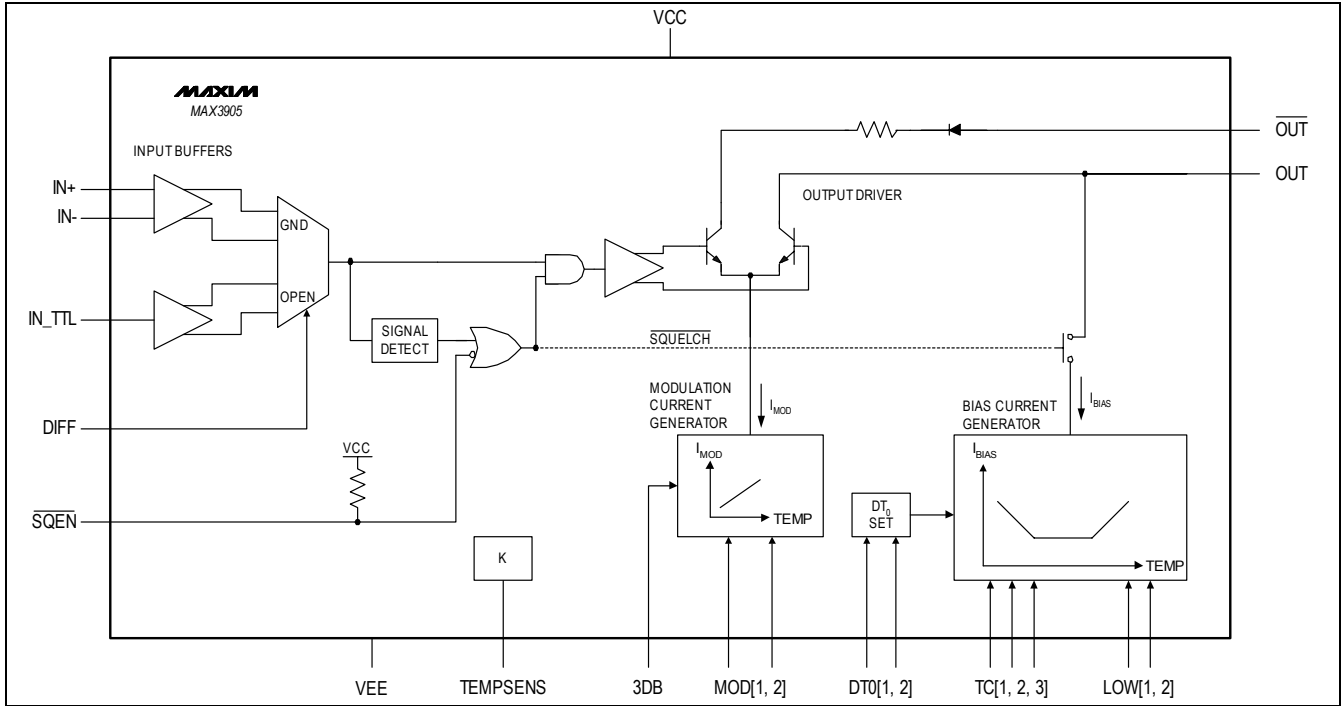
Figure 1. Functional Diagram of MAX3905 Showing MOD[1, 2], DT0[1, 2], TC[1, 2, 3], and LOW[1, 2] Inputs
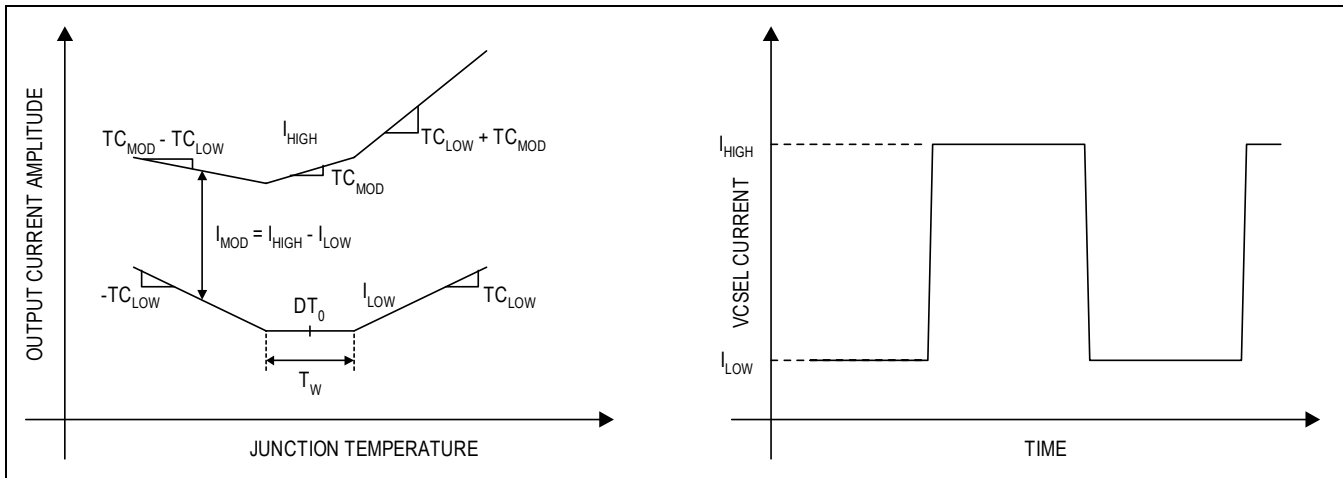

Figure 2. MAX3905 Output Current and Temperature Coefficient Definitions