



CLEAR LOGIC

# CALCULATING CL8000 POWER SUPPLY CURRENT

## Introduction

This document will provide basic guidelines for power supply current calculation for CL8000 devices. Clear Logic's LASIC technology provides substantial power savings over comparable FLEX 8000 components.

## Background

Total power consumption for a given integrated circuit consists of the sum of the power consumed by internal circuitry and the power consumed by the device's inputs and outputs. This discussion is confined to the power consumed by the internal circuitry.

Internal power is equal to the product of the supply voltage ( $V_{CC}$ ) and the power supply current ( $I_{CC}$ ). Power supply current has two components - active supply current ( $I_{CC[ACTIVE]}$ ) and standby current ( $I_{CC0}$ ). For all CL8000 devices,  $I_{CC0}$  is guaranteed to have a maximum value of 10 mA, with a typical value of 0.5 mA.

Active supply current is a function of several design-dependent variables, and can thus vary substantially by application.  $I_{CC[ACTIVE]}$  (in microamps) can be derived by calculating the product of the maximum operating frequency in MHz ( $f_{MAX}$ ), the total number of logic elements used in the application, the average percentage of logic elements toggling at each clock ( $tog_{LC}$ ), and a constant (K).

For five volt CL8000 devices, K equals 50; for 3.3 volt CL8000 devices, K equals 40.

## Typical $I_{CC}$ Values

Table 1 shows representative  $I_{CC}$  values for the CL8000 family. These values assume 75% utilization of the device's logic elements, a maximum frequency of 10 MHz, and an average of 50% of logic cells toggling at each clock.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC}$	Power Supply Current	$T_A = 25^\circ\text{C}$ , no load. 75% of LEs utilized, 50% of utilized LEs switching simultaneously, $f=10$ MHz				
	CL8282A			39		mA
	CL8282AV			31.2		
	CL8452A			63		
	CL8636A			94.5		
	CL8820A			126		
	CL81188A			189		
	CL81500A			243		

**Table 1. Representative  $I_{CC}$  Values**

## $I_{CC}$ Specifications

Once Clear Logic receives a customer's bitstream file, a maximum power supply current value is calculated, based on the device type and the number of logic elements utilized. This maximum power supply current value  $I_{CC[\text{MAX}]}$  is then guaranteed for all production shipments of the device.

