

LX7730 Input Power Savings

Description

The LX7730 is a spacecraft telemetry manager IC that functions as a companion to the FPGA. The LX7730 contains a 64-universal input multiplexer, 8 bi-level comparators with AMUX inputs, a programmable current source, a 12-bit analog-to-digital converter, a 10-bit digital-to-analog DAC and 8 fixed threshold bi-level inputs. The LX7730 can be powered using a single supply VCC. The LX7730's VCC typically consumes a total current of about 63mA at 15V with default settings. There are several options for reducing power consumption. The simplest option is to disable unused features using the 'function enable' register. Another option is to bypass the +5V linear regulator with a more efficient DC to DC converter. These two suggestions are described below.

1. Powering the LX7730 using two supplies for VCC and +5V.

The internal 5V linear regulator accounts for about 30mA of the 63mA total VCC current. Using an external switching regulator instead of LX7730's internal 5V linear regulator can typically save about 280mW when the external DC to DC regulator output efficiency is 90%. In this case, the DC to DC external regulator has to drive a voltage higher than the 5V output to disable the internal 5V linear regulator. Please contact the factory for more detailed recommendations.

2. Enabling/disabling internal blocks when needed

By disabling unused blocks in a LX7730 application, the power consumption can be dramatically reduced. The table below shows the LX7730 VCC input current by turning off one block a time. The total power savings can be derived by adding reduced input current for all the disabled blocks.

DISABLED BLOCK	LX7730 VCC=15V INPUT CURRENT(mA)	REDUCED INPUT CURRENT(mA)
CHIP ENABLE (All Blocks Enabled with default gain=0.4)	63	
CHIP DISABLE (All Blocks Disabled)	4.5	58.5
SENSOR MUX (IA gain=0.4)	42	21
SENSOR MUX (IA gain=2 or 10)	52	11
BI-LEV COMP with AMUX input	62	1
INSTRUMENTATION AMPLIFIER	62	1
10 BIT DAC	61	2
FIXED BI-LVL	62	1
12 BIT ADC	47	16
CURRENT SOURCE with 2mA OUTPUT	65	Increase 2mA

Although turning off unused blocks can save input power, it takes time to enable these blocks when they are needed. The table below shows the time needed to wake up disabled blocks (tested when VCC=15V).

DISABLED BLOCK NAME	Time Needed to Enable Blocks(uS)
CHIP ENABLE (All Blocks Enabled)	333
SENSOR MUX (IA gain=0.4 or 2)	4
SENSOR MUX (IA gain=10)	464
INSTRUMENTATION AMPLIFIER	40
10 BIT DAC	44
FIXED BI-LVL	1.8
12 BIT ADC	7.2
CURRENT SOURCE with 2mA OUTPUT	1.4

Waveforms

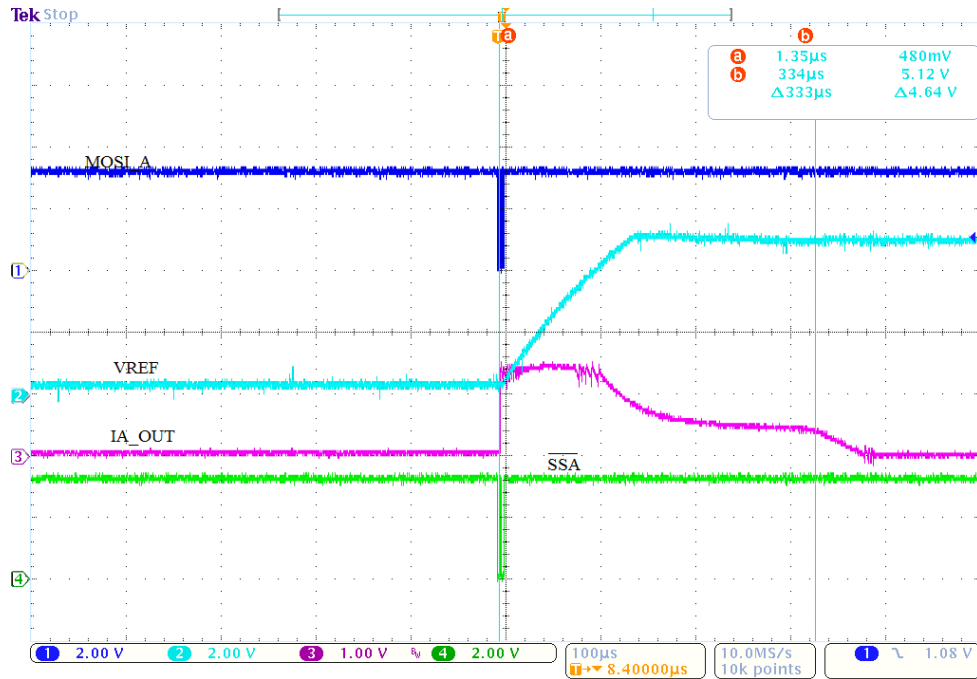


Fig. 1 Time needed to enable all blocks from disabled mode

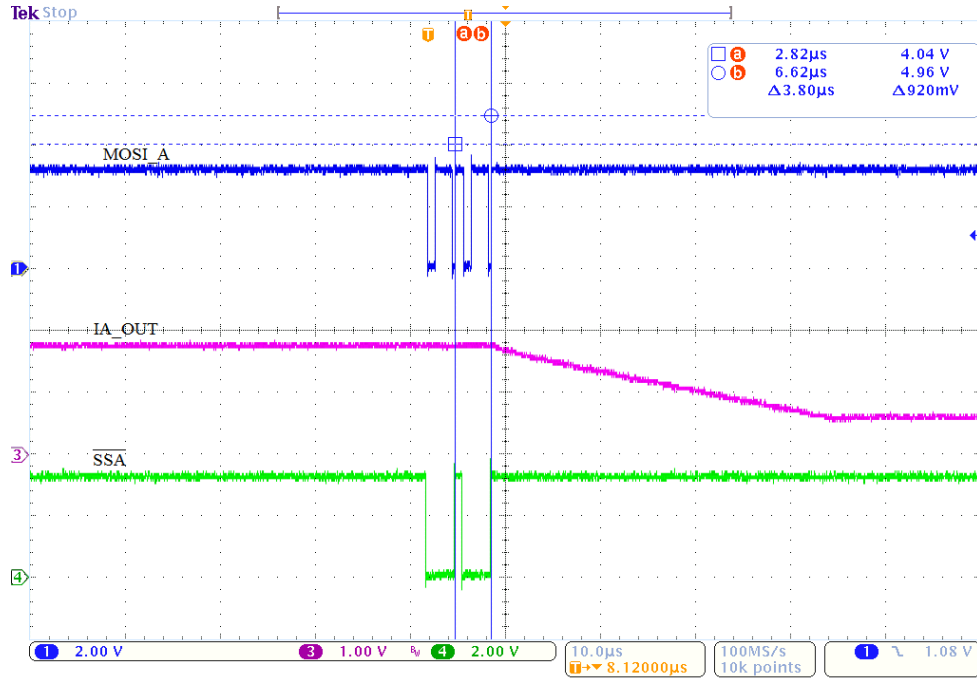


Fig. 2 Time needed to enable AMUX (gain=2 or 0.4)

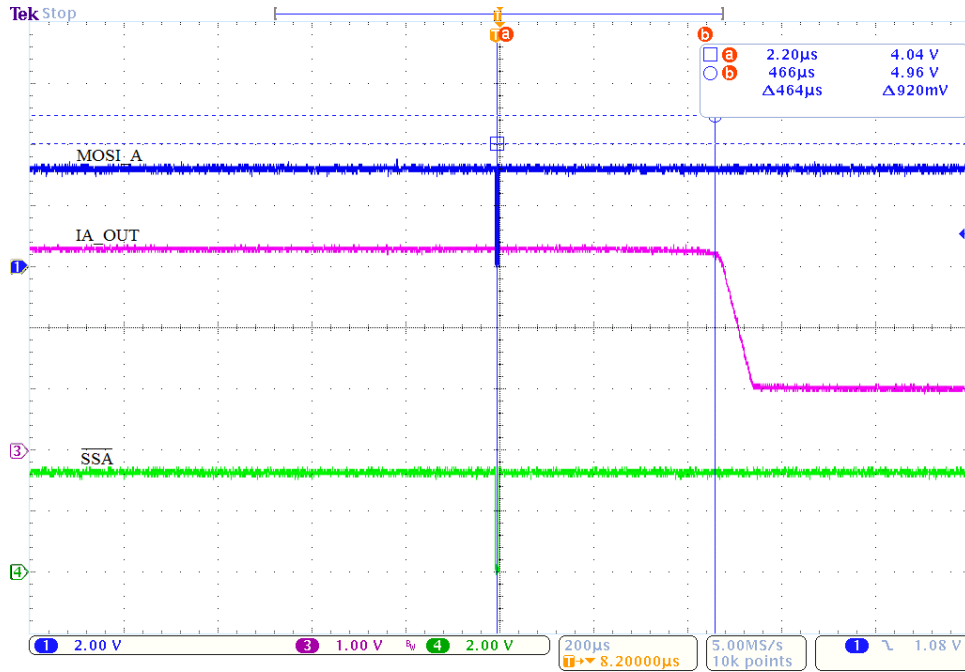


Fig. 3 Time needed to enable AMUX (gain=10)

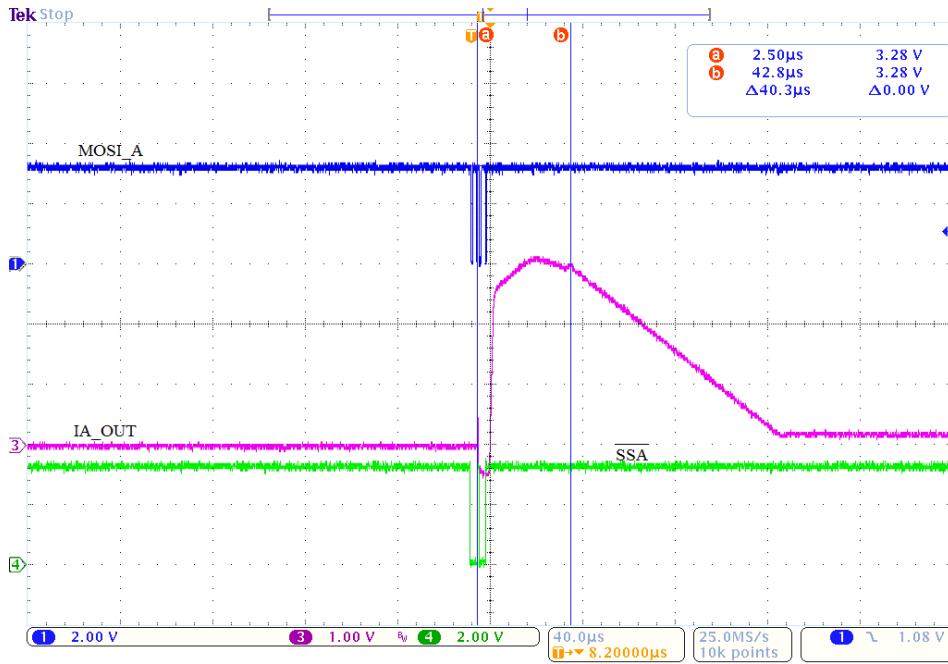


Fig. 4 Time needed to enable IA

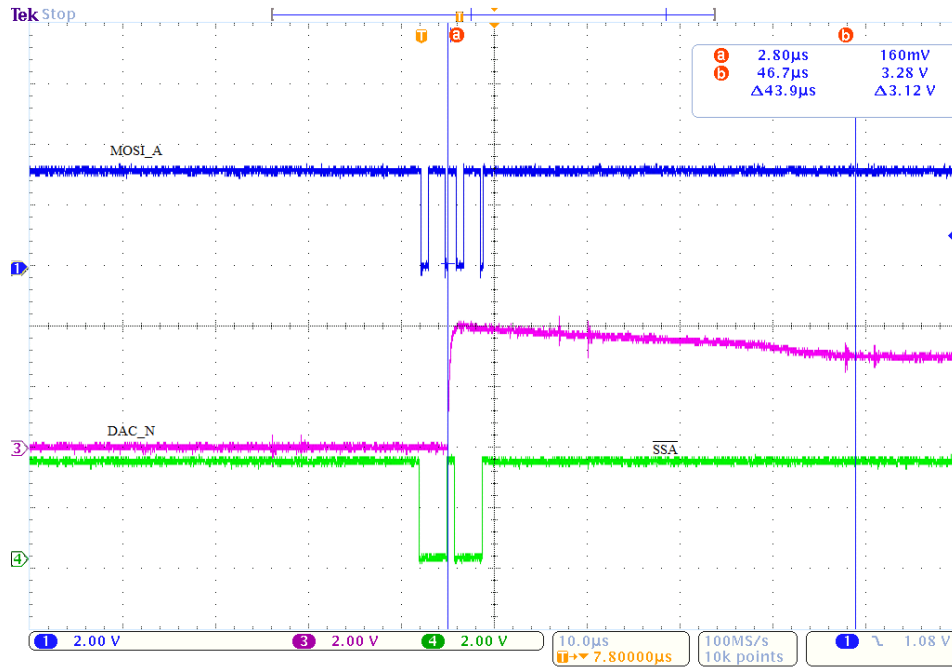


Fig. 4 Time needed to enable 10bit DAC and DAC_N settles

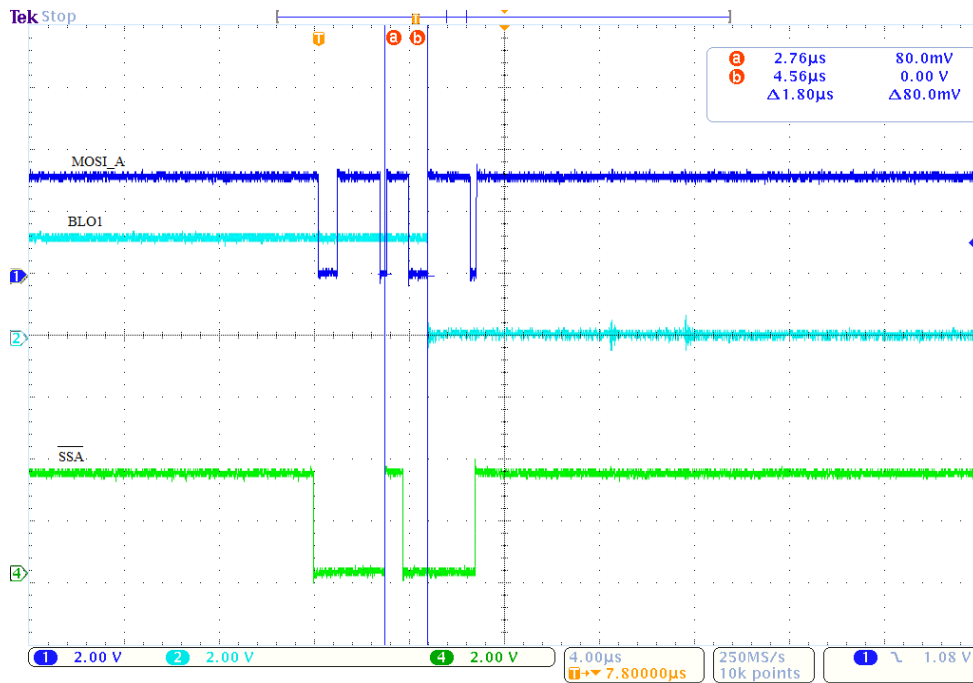


Fig. 5 Time needed to enable Fixed Bi-Level Block

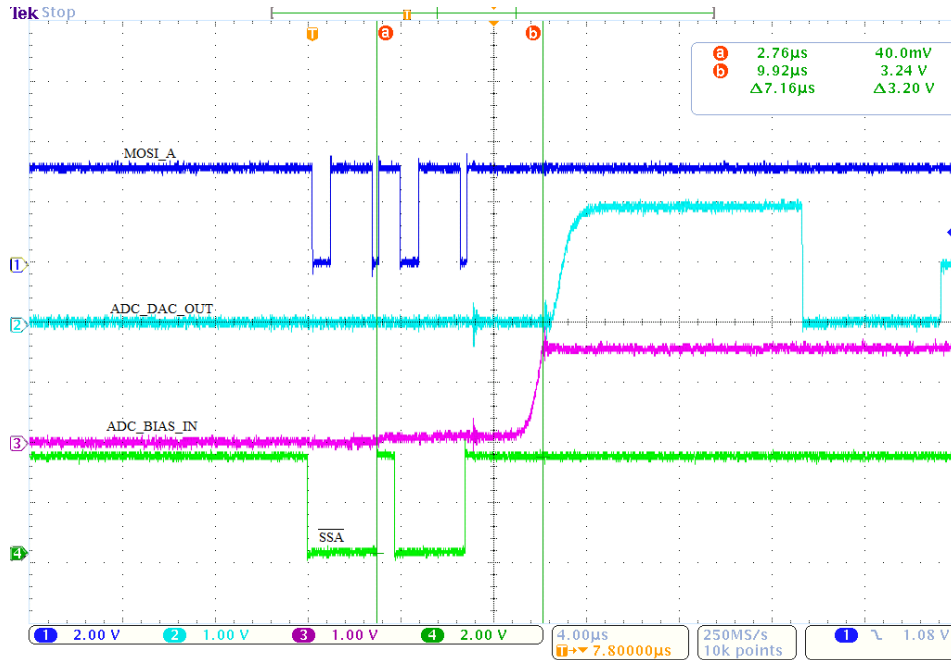


Fig. 6 Time needed to enable 12bit ADC



Fig. 7 Time needed to enable current source



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