



LM5050 High Side OR-ing FET Controller

TI reference design number: PMP20096 Rev A

Input: 5V – 75V

DC – DC Test Results

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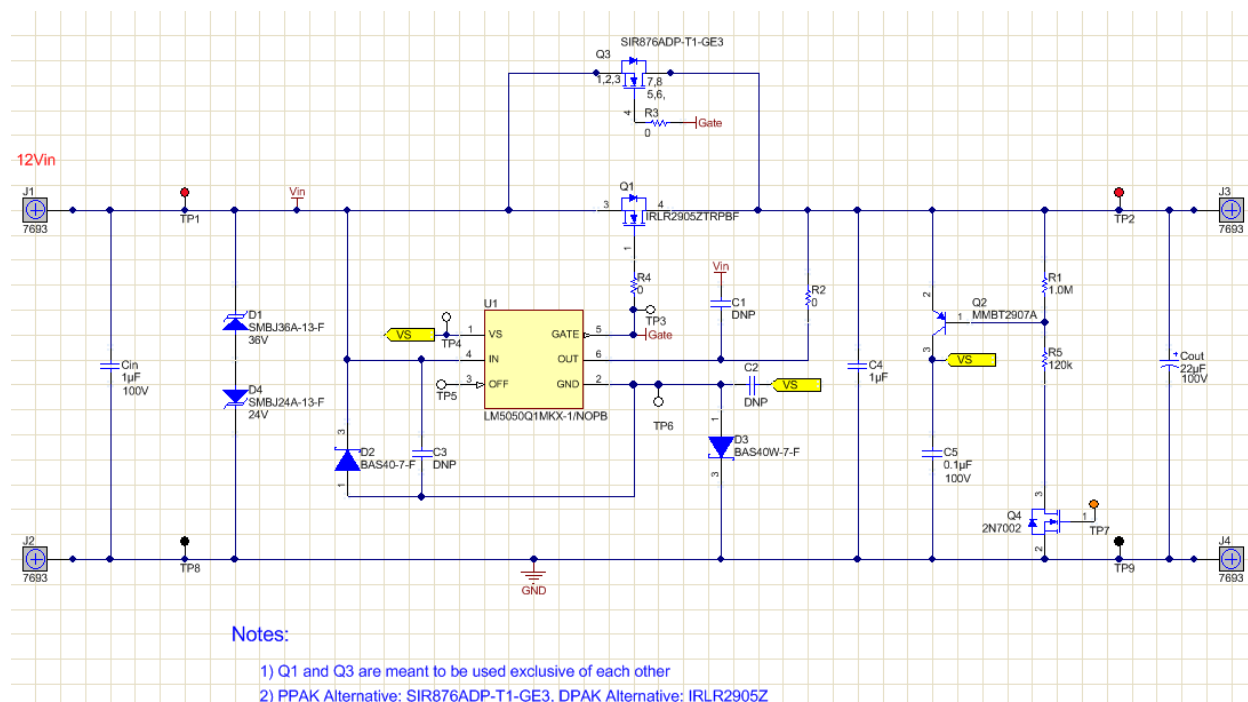
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1 Circuit Description

PMP20096 is an OR-ing FET controller targeted for automotive applications. This design uses the LM5050 OR-ing FET controller, and adds reverse polarity protection and a low quiescent current mode. In this implementation, mosfet Q2 was removed from the original PNP20096 and a PNP BJT based circuit was soldered on to achieve the low-quiescent effect.

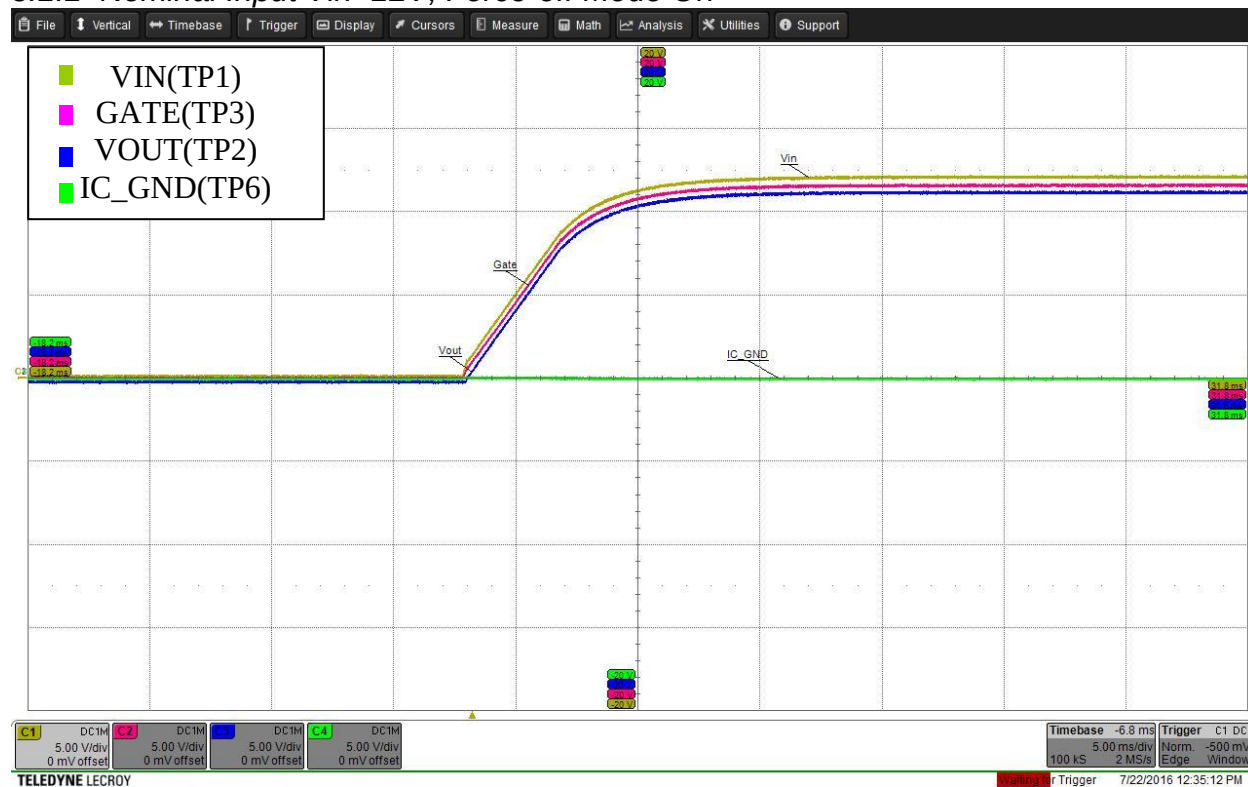
All tests were performed at room temperature on an open bench, unless otherwise specified.

2 Schematic

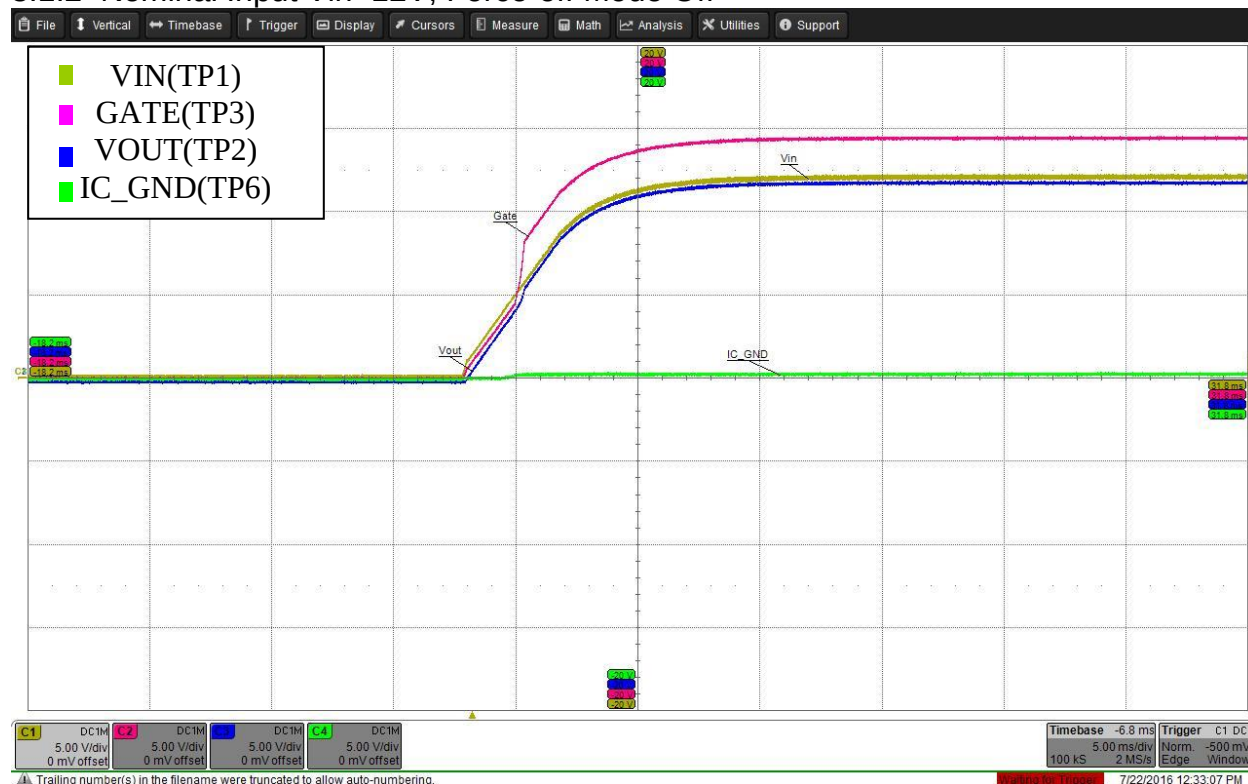


3 Basic Startup

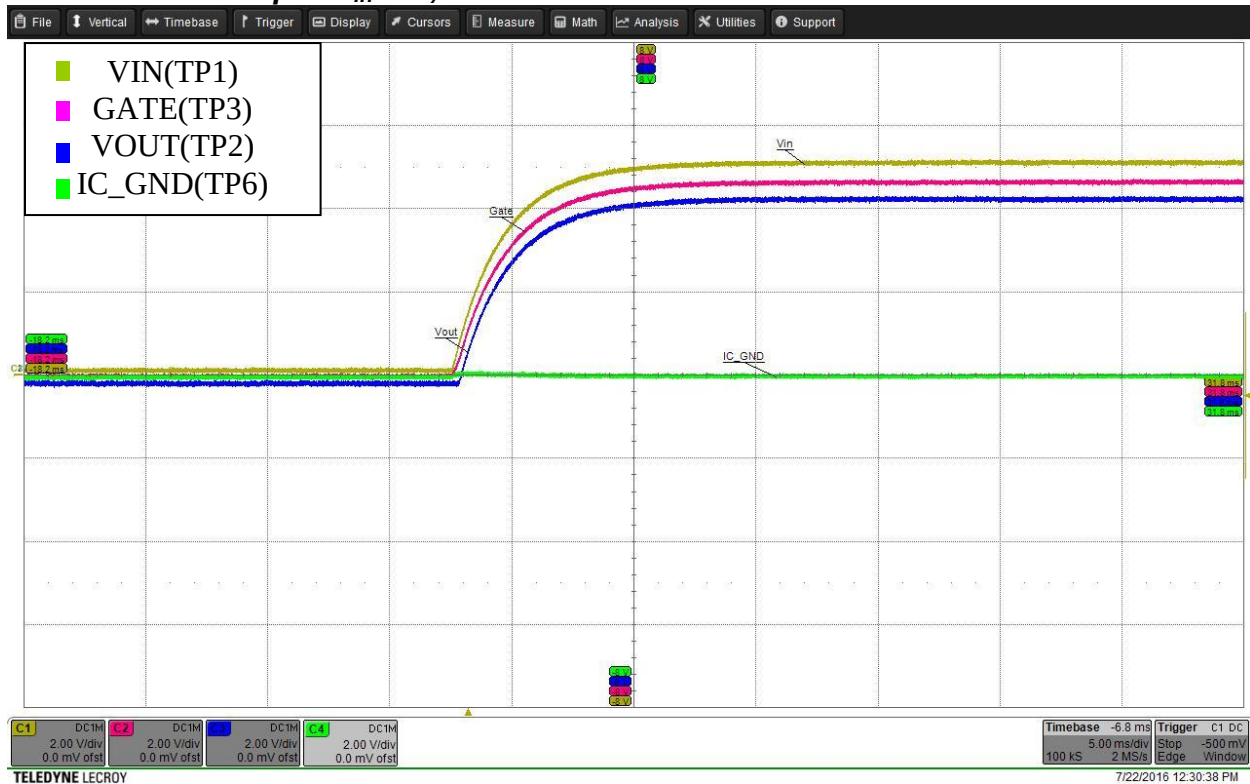
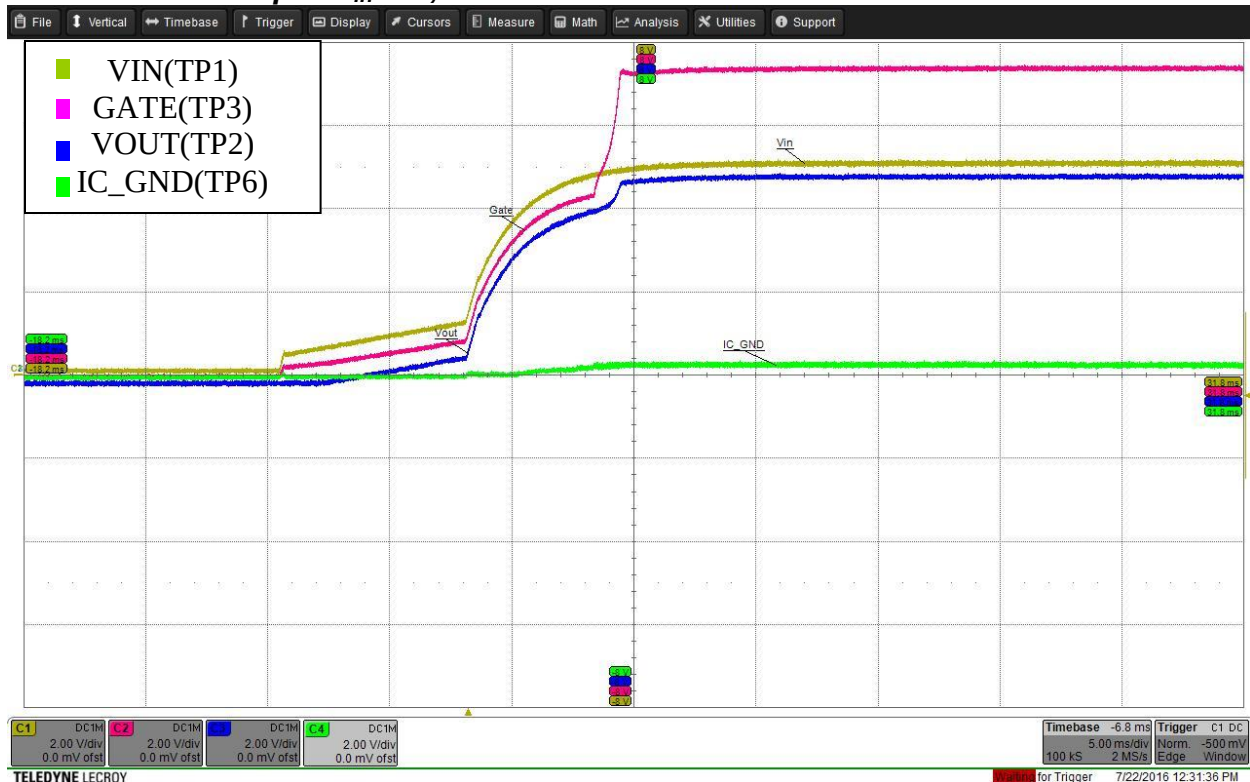
3.1.1 Nominal Input $V_{in}=12V$, Force-off Mode On



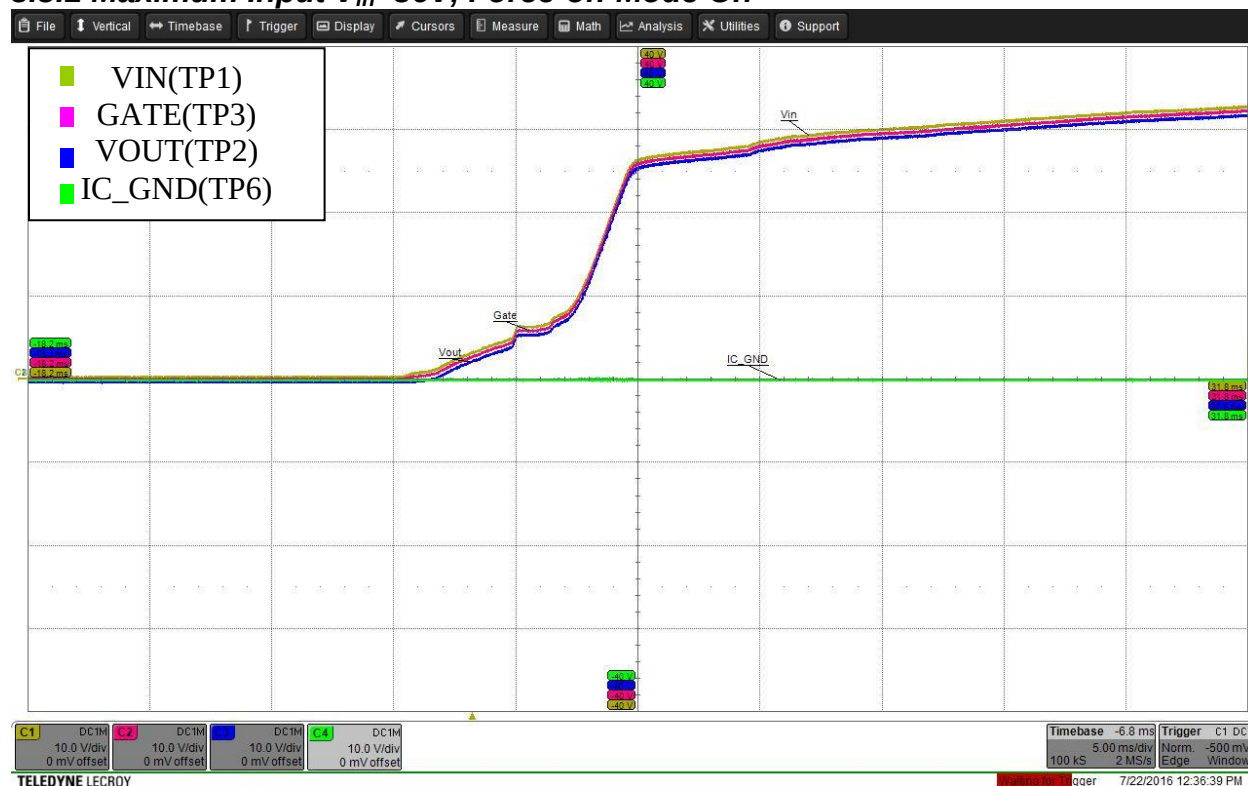
3.1.2 Nominal Input $V_{in}=12V$, Force-off Mode Off



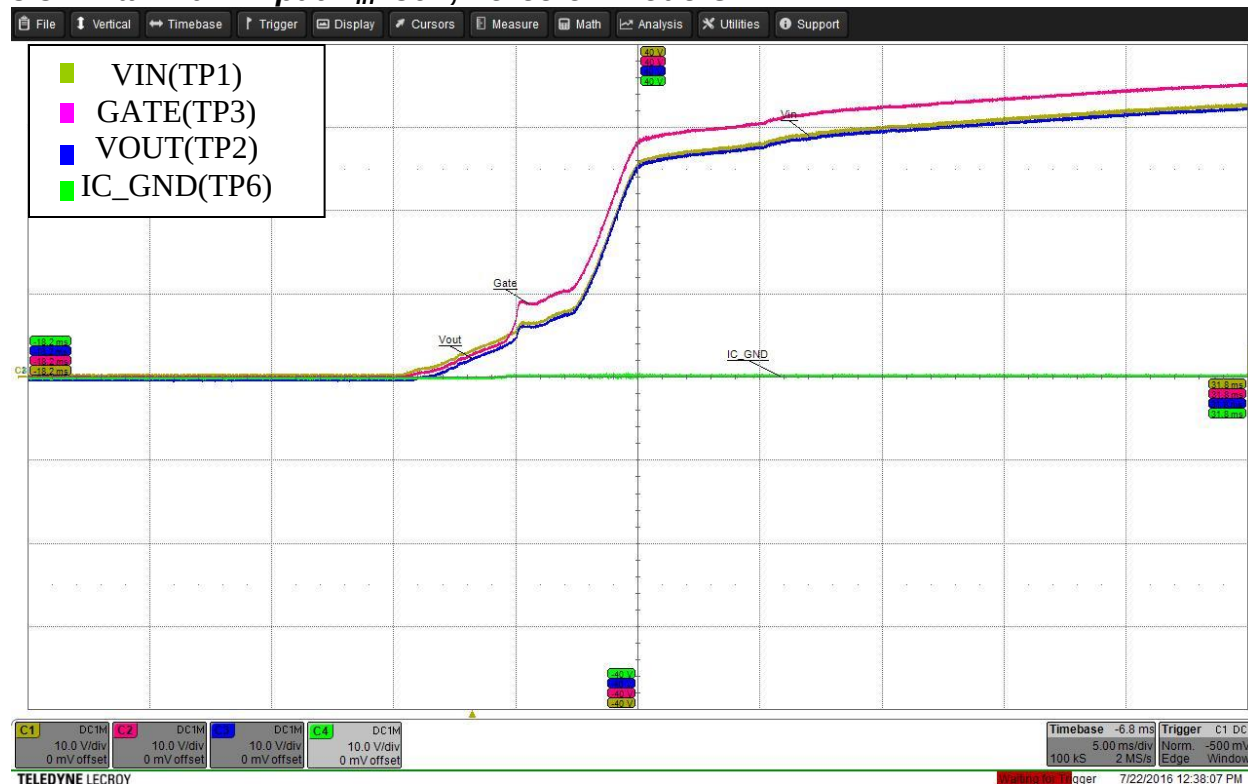
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3.2.1 Minimum Input $V_{in}=5V$, Force-off Mode On**3.2.2 Minimum Input $V_{in}=5V$, Force-off Mode Off**

3.3.1 Maximum Input $V_{in}=36V$, Force-off Mode On



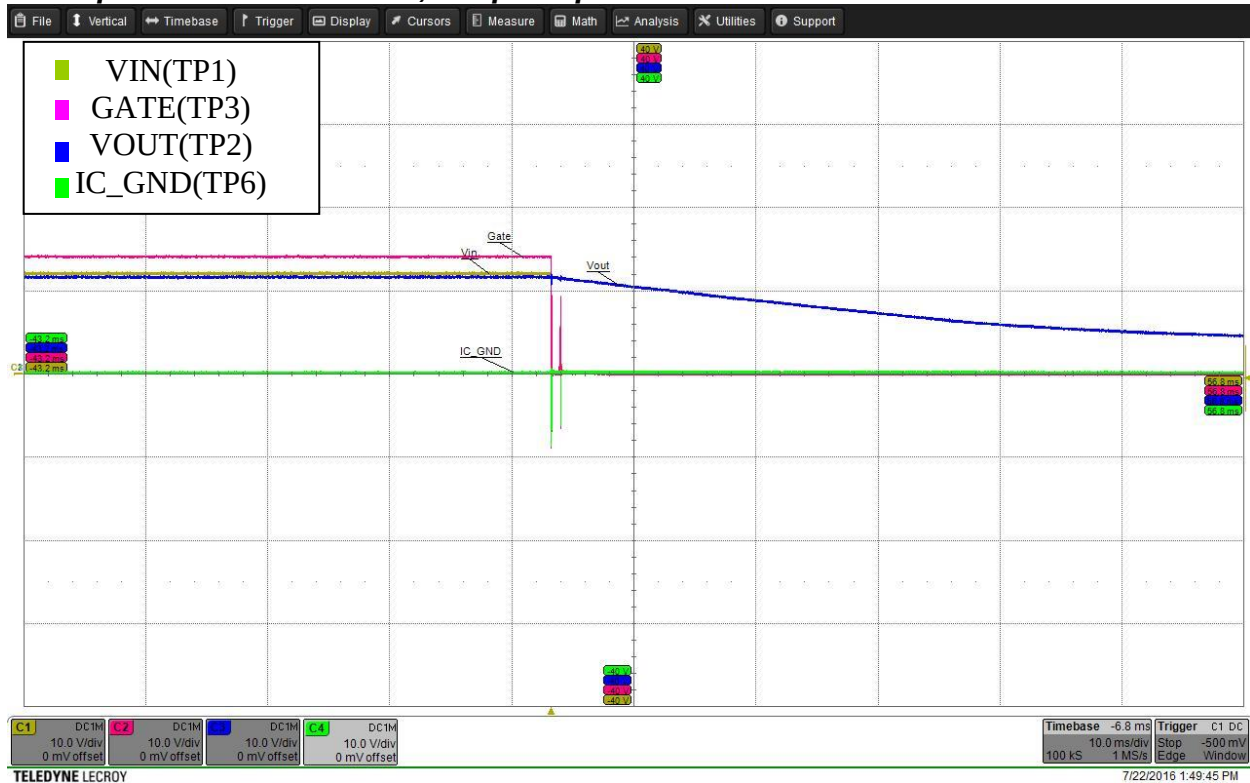
3.3.2 Maximum Input $V_{in}=36V$, Force-off Mode Off



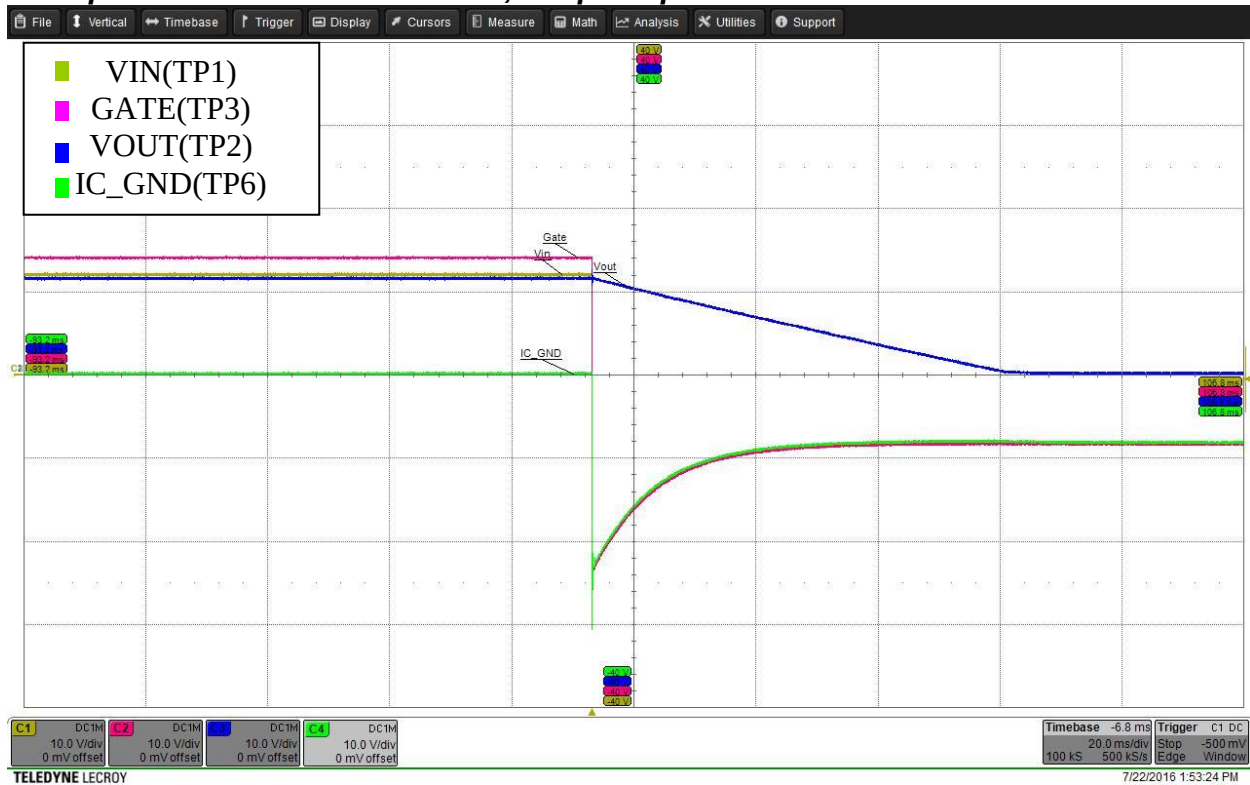
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4 OR-ing Function

4.1 Input shorted from 12V, Output Open



4.2 Input -12V transient from 12V, Output Open



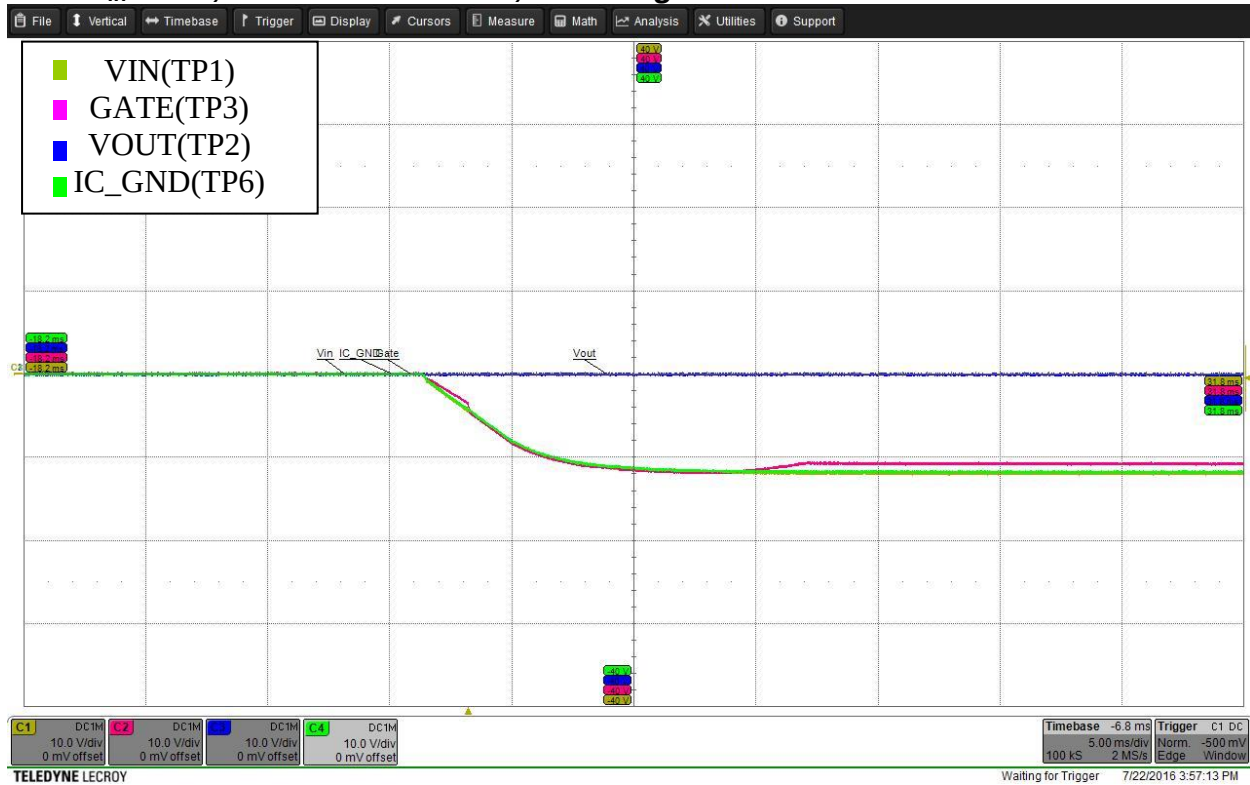
5 Low- I_q Function

5.1 Quiescent Currents

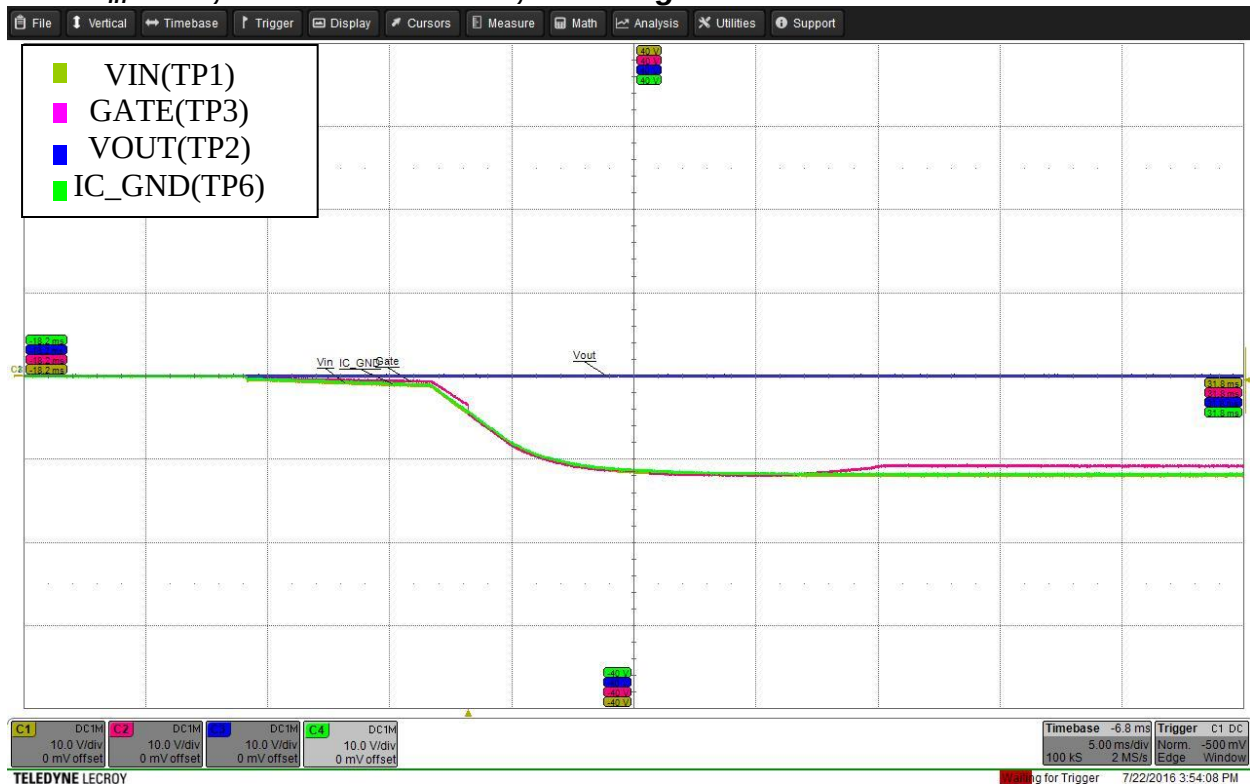
BJT solution R1= 1M R5=130K: Currents taken at Pin outputs					
			lin	lout	lvs
Nominal Voltage	IN=1K Ω , OUT=14V	Low-IQ mode OFF	205.6uA	-2.86mA	-676uA
		Low-IQ mode ON	0	0	0
	IN=12V, OUT=14V	Low-IQ mode OFF	-298.4uA	-1.08mA	-108.8uA
		Low-IQ mode ON	0	0	0
	IN=12V, OUT=1K Ω	Low-IQ mode OFF	-307.7uA	-3.310mA	-103.2uA
		Low-IQ mode ON	0	0	0
Low Voltage	IN=1K Ω , OUT=6V	Low-IQ mode OFF	111.5uA	-1.51mA	-386.6uA
		Low-IQ mode ON	0	0	0
	IN=5V, OUT=6V	Low-IQ mode OFF	-200.9uA	-241uA	-81uA
		Low-IQ mode ON	0	0	0
	IN=5V, OUT=1K Ω	Low-IQ mode OFF	-144.9uA	-2250uA	-59.2uA
		Low-IQ mode ON	0	0	0
High Voltage	IN=1K Ω , OUT=36V	Low-IQ mode OFF	229.1.4uA	-3.1mA	-798uA
		Low-IQ mode ON	0	0	0
	IN=25V, OUT=36V	Low-IQ mode OFF	-244.7uA	-2.892mA	-130.2uA
		Low-IQ mode ON	0	0	0
	IN=36V, OUT=1K Ω	Low-IQ mode OFF	-340uA	-3.3uA	-133.9uA
		Low-IQ mode ON	0	0	0

6 Reverse Polarity Protection

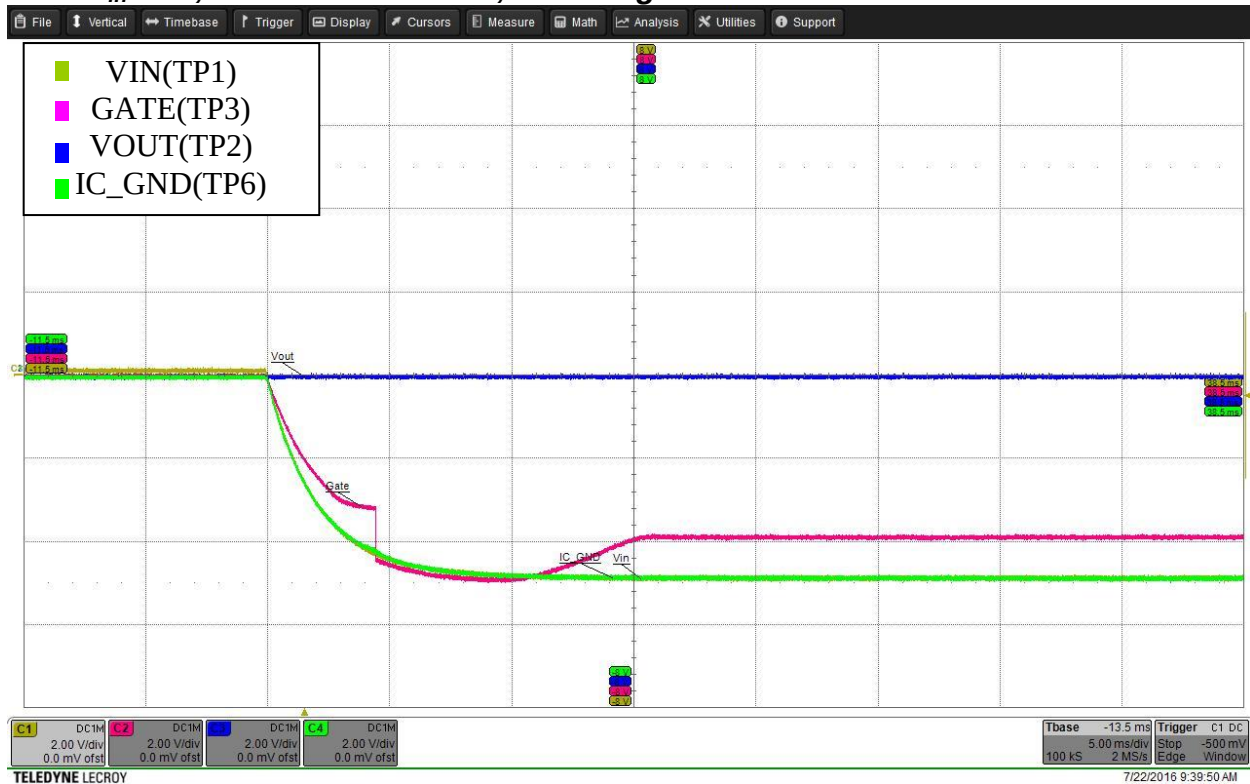
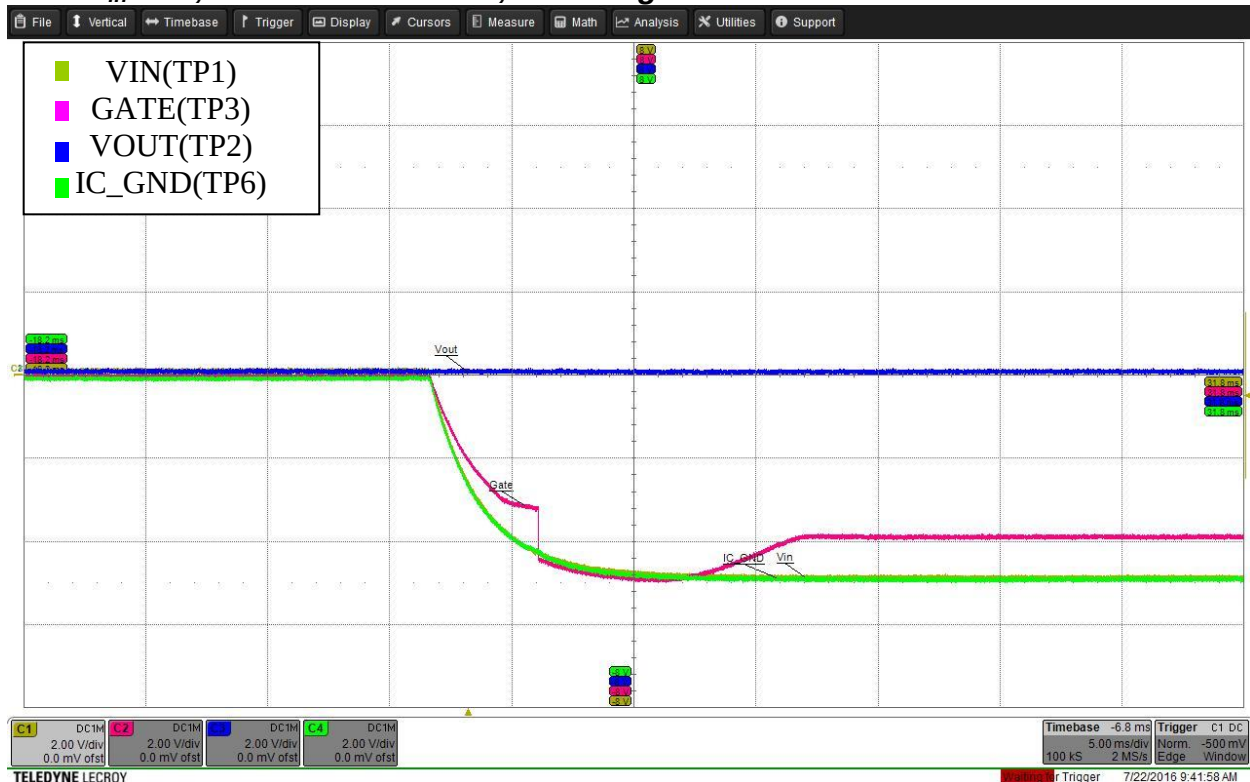
6.1.1 $V_{in} = -12V$, Force-off Mode On, Soft Plug



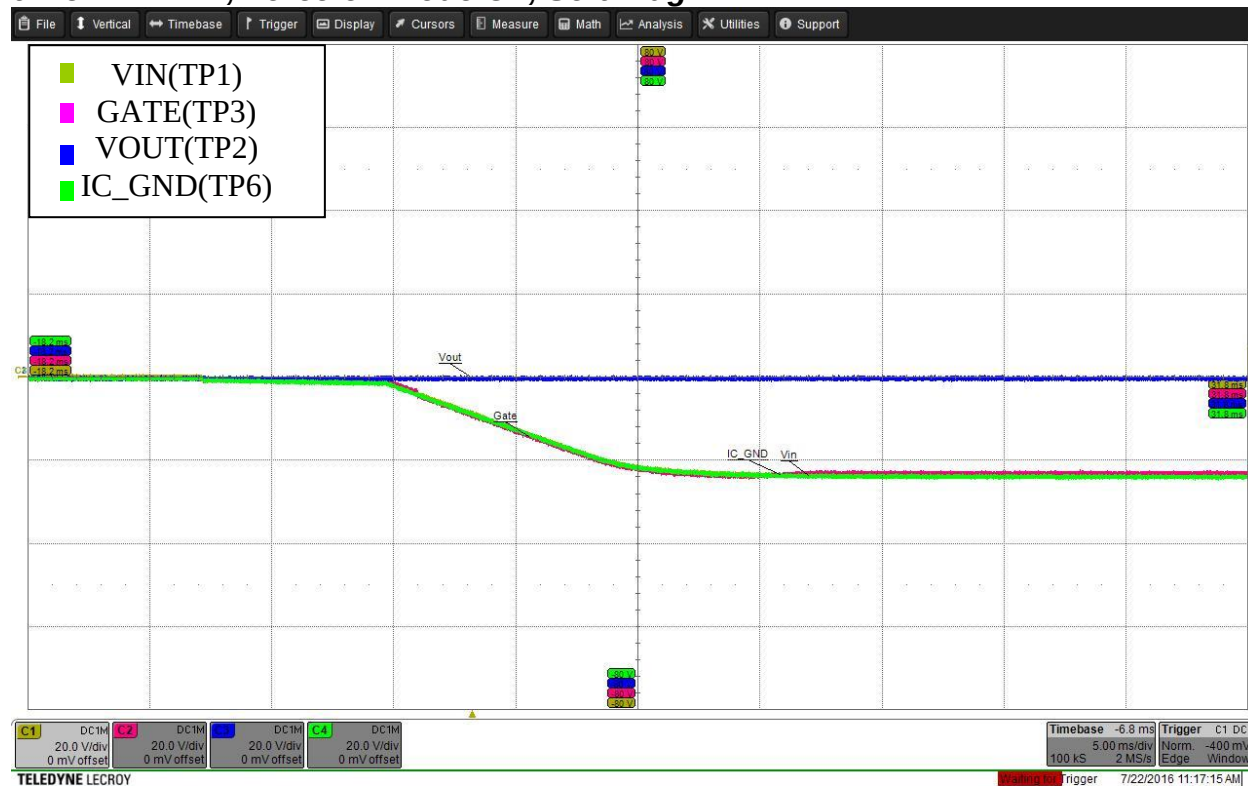
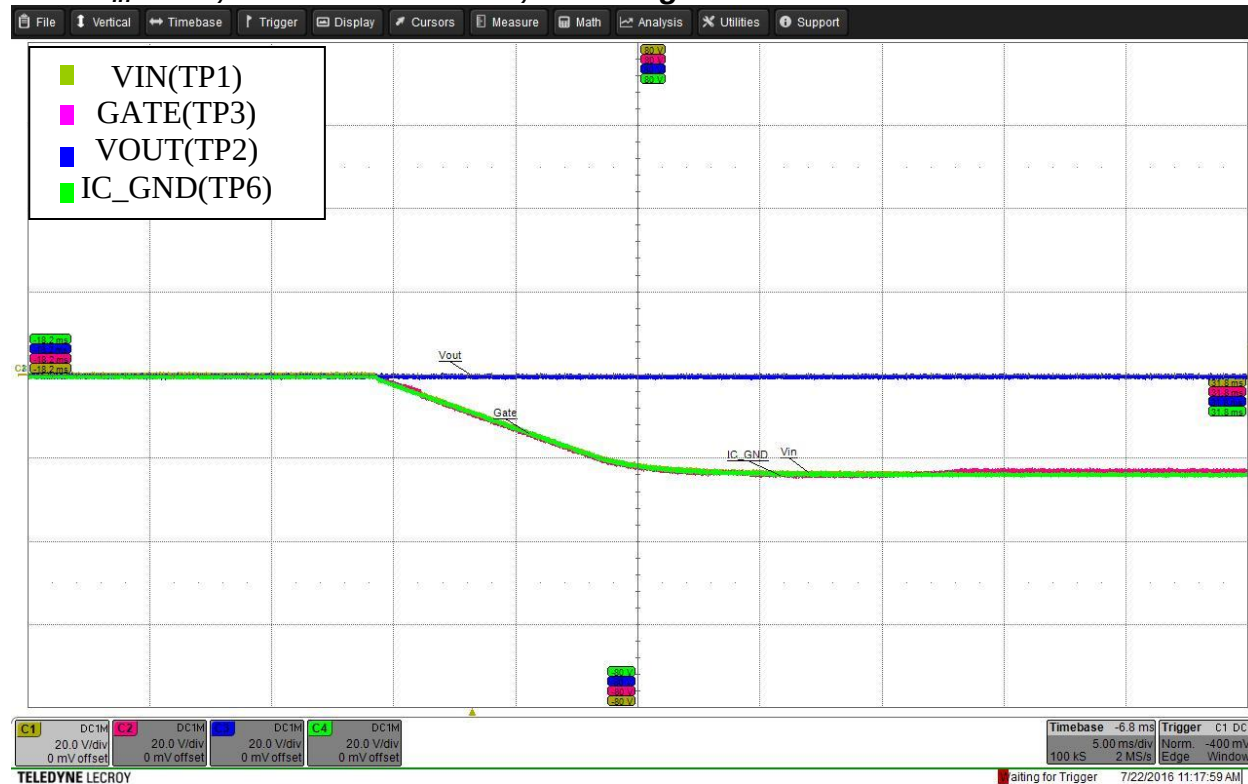
6.1.2 $V_{in} = -12V$, Force-off Mode Off, Soft Plug



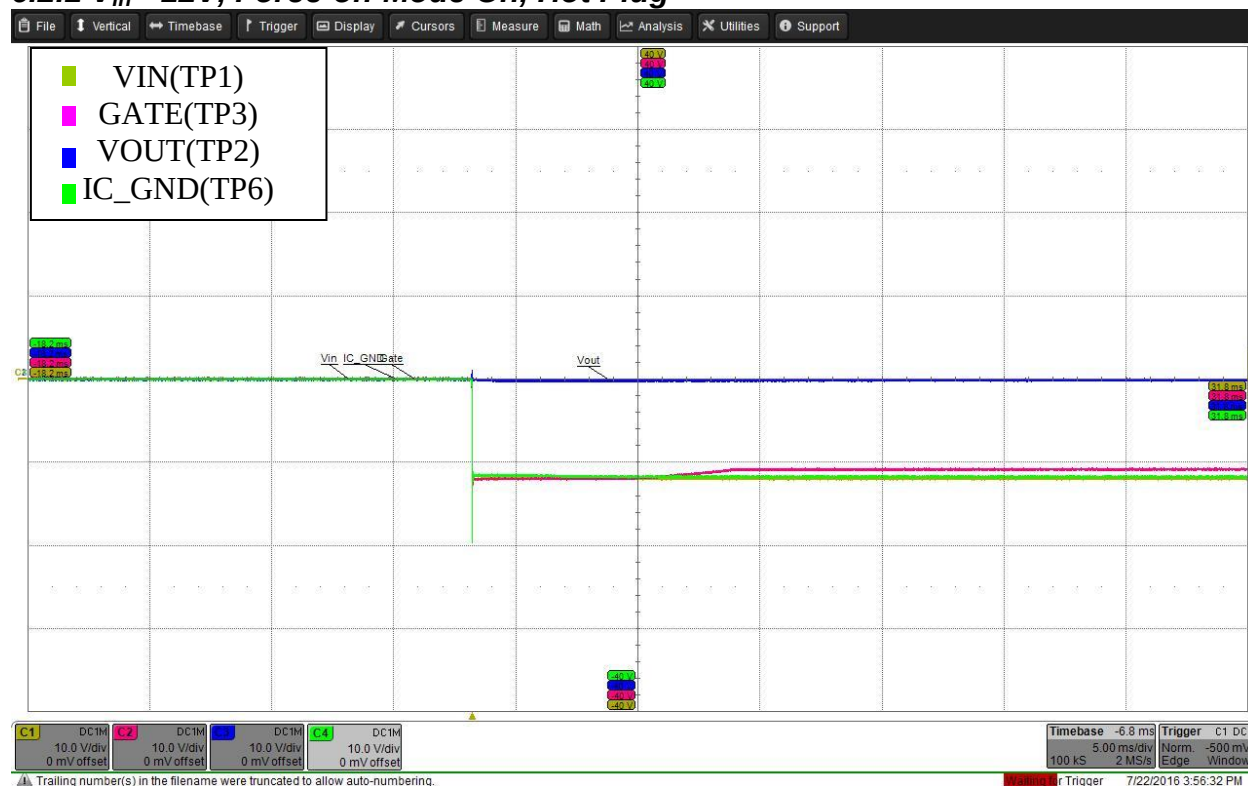
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6.1.3 $V_{in} = -5V$, Force-off Mode On, Soft Plug**6.1.4 $V_{in} = -5V$, Force-off Mode Off, Soft Plug**

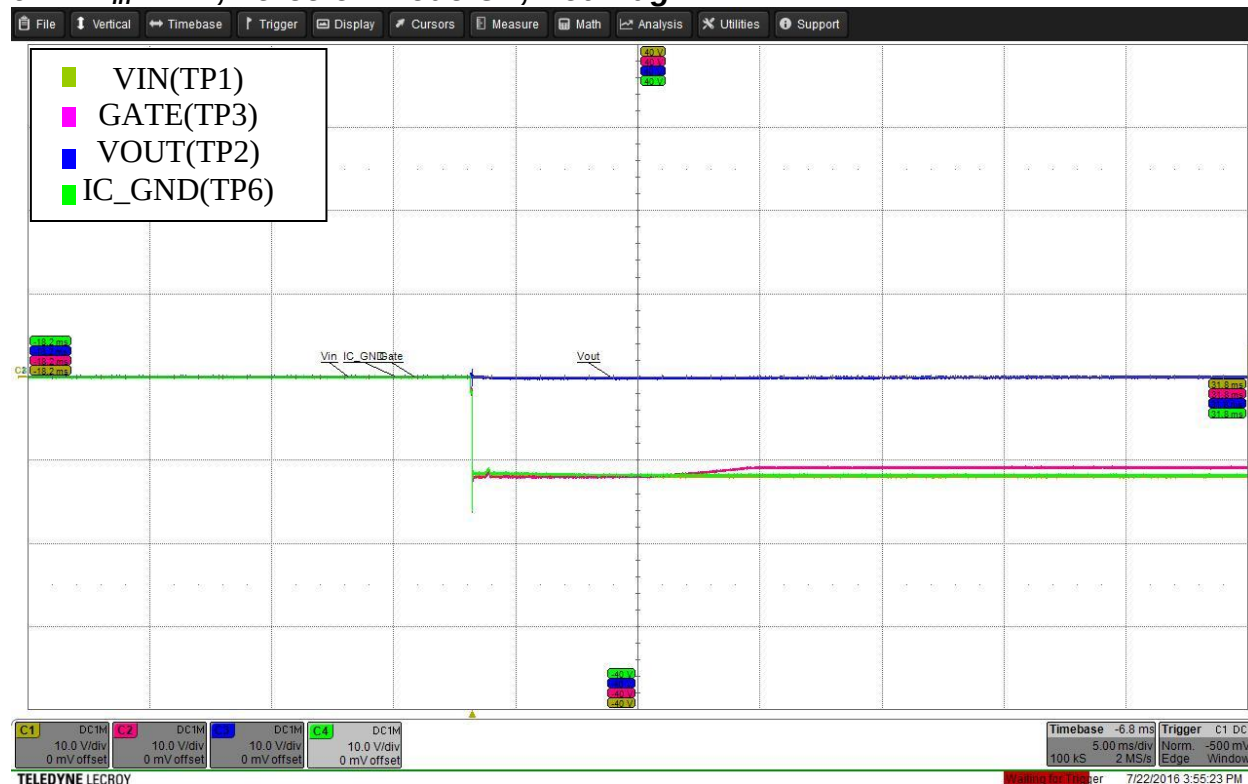
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6.1.5 $V_{in} = -24V$, Force-off Mode On, Soft Plug**6.1.6 $V_{in} = -24V$, Force-off Mode Off, Soft Plug**

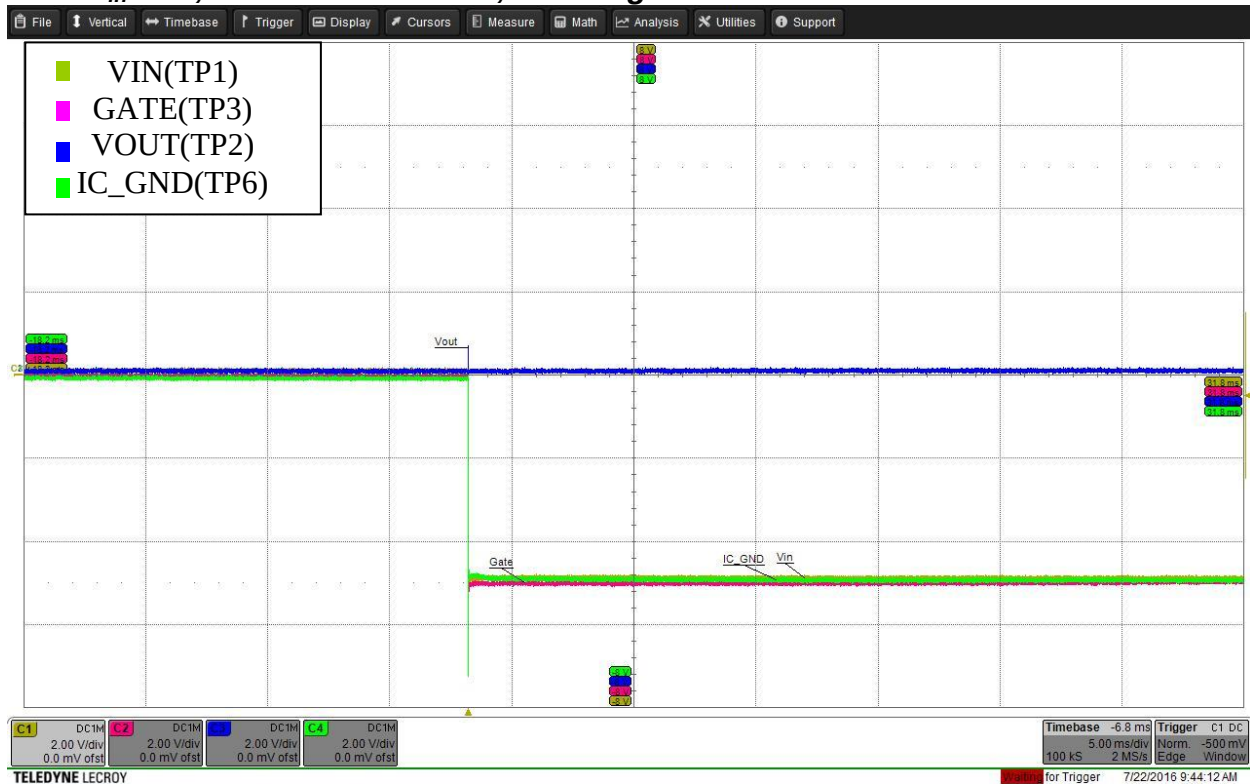
6.2.1 $V_{in} = -12V$, Force-off Mode On, Hot Plug



6.2.2 $V_{in} = -12V$, Force-off Mode Off, Hot Plug



6.2.3 $V_{in} = -5V$, Force-off Mode On, Hot Plug



6.2.4 $V_{in} = -5V$, Force-off Mode Off, Hot Plug



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6.2.5 $V_{in} = -24V$, Force-off Mode Off, Hot Plug**6.2.6 $V_{in} = -24V$, Force-off Mode On, Hot Plug**