

# Digital Control in Power Electronics

## Regular Sampling & Multisampling Technique on TI f28379D

### DQ Step Response HIL vs. Simulink - Three Phase RL Load

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## 1 Introduction

This document provides a comparison between hardware in the loop (HIL) and Simulink simulation results for regular sampling and multisampling technique implemented on DSP TI F28379. For the purposes of this comparison a single pole system - three phase series RL connection has been used. Current is controlled via Internal Model Principle based current regulator in DQ frame. In terms of update rate ( $UR$ ) and feedback acquisition (with or without oversampling), eight different cases will be discussed:

OVERSAMPLING	UPDATE RATE
0	1
0	2
0	4
0	8
1	1
1	2
1	4
1	8

Table 1. The cases to be analyzed.

## 2 HIL vs. Simulink simulation results

Fig. 1-8 show comparison between D & Q current step responses obtained from HIL (data exported from DSP's RAM) and Simulink simulation, for all four of the afore mentioned cases.

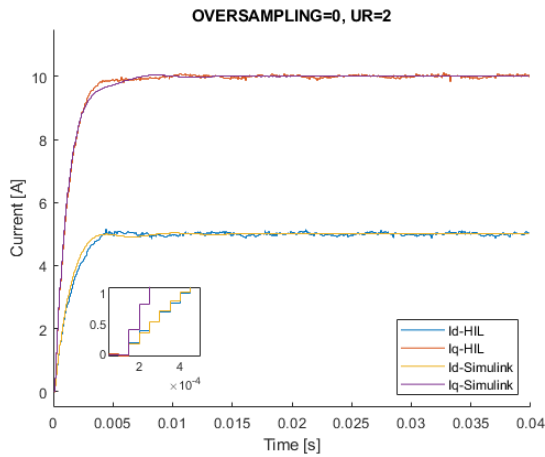


Fig. 1. DQ current step response - HIL vs. Simulink: OVERSAMPLING=0, UR=2.

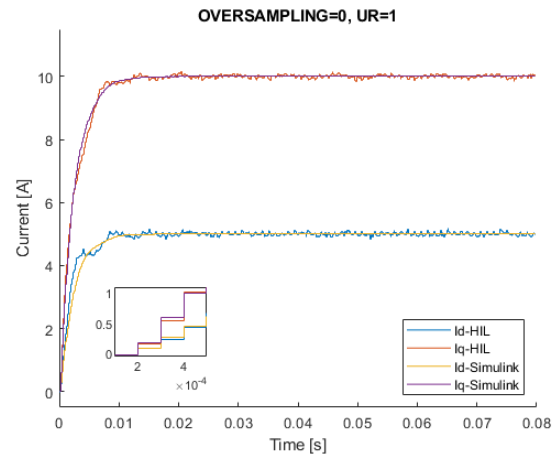


Fig. 2. DQ current step response - HIL vs. Simulink: OVERSAMPLING=0, UR=1.

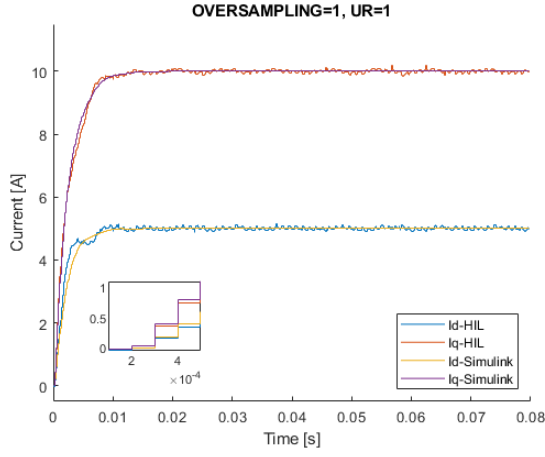


Fig. 3. DQ current step response - HIL vs. Simulink: OVERSAMPLING=1, UR=1.

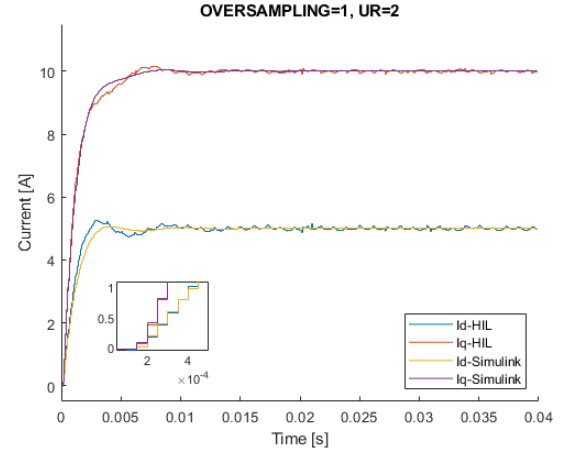


Fig. 4. DQ current step response - HIL vs. Simulink: OVERSAMPLING=1, UR=2.

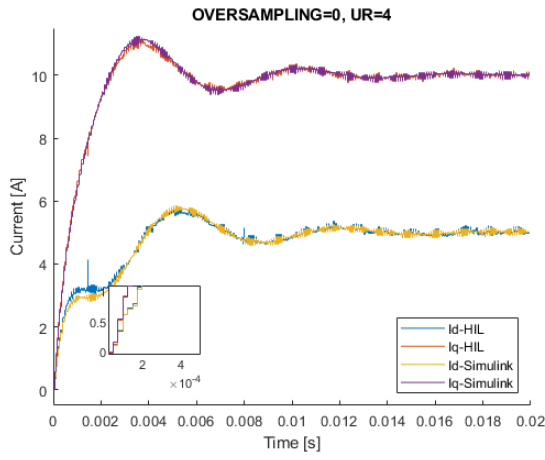


Fig. 5. DQ current step response - HIL vs. Simulink: OVERSAMPLING=0, UR=4.

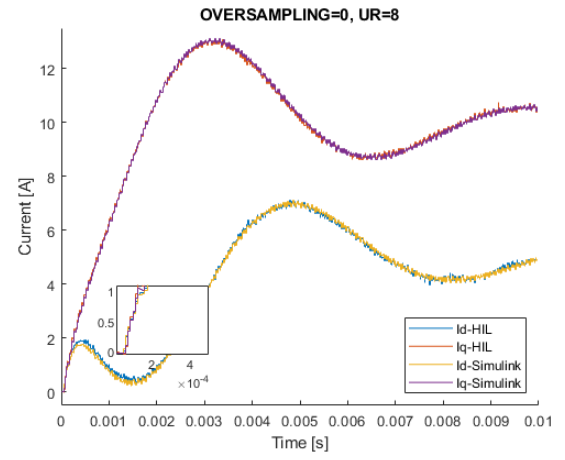


Fig. 6. DQ current step response - HIL vs. Simulink: OVERSAMPLING=0, UR=8.

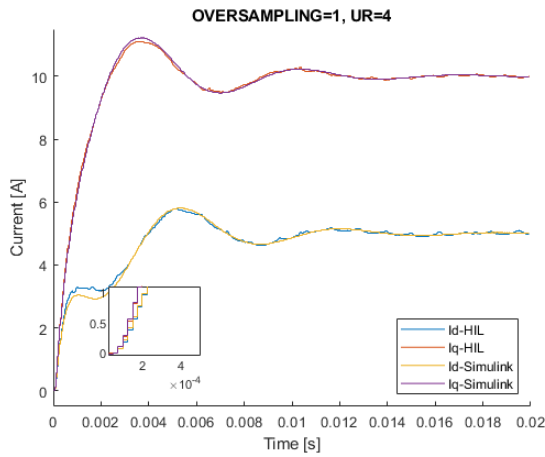


Fig. 7. DQ current step response - HIL vs. Simulink: OVERSAMPLING=1, UR=4.

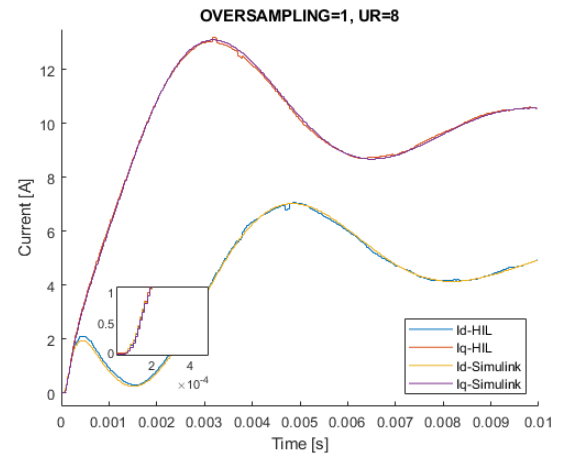


Fig. 8. DQ current step response - HIL vs. Simulink: OVERSAMPLING=1, UR=8.