

Design ID: **QLKT**

Description: **512 Mbit 45nm SPI Flash Memory**

Marketing device name(s):

**MT25QL512ABBxxPP-xTT (PP=package code, TT=temperature code)**

Valid speed grades: **up to 133 MHZ STR, up to 90 MHZ DTR**

Zip filename: **IBIS\_MT25QL512ABB.zip**

IBIS filename: **mt25ql512abb\_it.ibs** File rev: **2.6.2 and later**

IBIS filename: **mt25ql512abb\_at.ibs** File rev: **2.6.2 and later**

IBIS filename: **mt25ql512abb\_aut.ibs** File rev: **2.6.2 and later**

Date: **September 25, 2017**

Datasheet Link (from micron.com): [https://www.micron.com/~media/documents/products/datasheet/nor-flash/serial-nor/mt25q/die-rev-b/mt25q\\_qlkt\\_l\\_512\\_abb\\_0.pdf](https://www.micron.com/~media/documents/products/datasheet/nor-flash/serial-nor/mt25q/die-rev-b/mt25q_qlkt_l_512_abb_0.pdf)

E-mail [modelsupport@micron.com](mailto:modelsupport@micron.com) for questions regarding Quality Report.

## Device Parameters

VCC Slow: **2.7** Typical: **3.0** Fast: **3.6**

Junction Temperature (Industrial) Slow: **100** Typical: **50** Fast: **-40**

Junction Temperature (Automotive) Slow: **120** Typical: **50** Fast: **-40**

Junction Temperature (Automotive Grade 1 - AUT) Slow: **125** Typical: **40** Fast: **-40**

VDDQ/VSSQ Decoupling Capacitance (Approximate value at 10MHz) – Full Die: **455 pF**

VDDQ/VSSQ Decoupling Capacitance ESR – Full Die: **1.5 ohm**

## **IBIS Quality Summary**

1. ☒ Include the IBIS Quality Specification 2.0 Overall IBIS Quality level. For details on IBIS Quality, reference the quality specification and quality checklist on IBIS quality webpage [http://www.ibis.org/quality\\_wip/checklist.html](http://www.ibis.org/quality_wip/checklist.html).

**Overall IBIS Quality Level: 3MS**

**Exceptions: NO**

2. ☒ Include the filename of the IBIS Quality Checklist that accompanies this report.

**Filename: [mt25ql512abb\\_ibis\\_quality\\_checklist.xlsx](#)**

## IBIS Model Correlation: datasheet

1. ☒ Compare C\_comp with datasheet Input Capacitance. Provide C\_comp comparison table for all models and for all package combinations (i.e. x4, x8 and x16).

Component name: **Bare die**

Signal	IBIS die min [pF]	IBIS die max [pF]	Spec tot min [pF]	Spec tot max [pF]
DQ0	2.99	3.65		10.00
DQ1	3.11	3.57		10.00
DQ2/WP#	6.81	7.87		10.00
DQ3/HOLD#	7.22	8.38		10.00
C	2.05	2.61		6.00
RESET#	1.69	2.07		6.00
S#	4.66	5.90		10.00

Component name: **MT25QL512ABBxx12**

Signal	IBIS pkg [pF]	IBIS tot min [pF]	IBIS tot max [pF]	Spec tot min [pF]	Spec tot max [pF]
DQ0	1.31	4.30	4.96	NA	10.0
DQ1	0.80	3.91	4.37	NA	10.0
DQ2/WP#	0.91	7.72	8.78	NA	10.0
DQ3/HOLD#	1.22	8.44	9.60	NA	10.0
C	0.91	2.96	3.52	NA	6.0
RESET#	1.00	2.69	3.07	NA	6.0
S#	0.92	5.58	6.82	NA	10.0

Component name: **MT25QL512ABBxxW9**

Signal	IBIS pkg [pF]	IBIS tot min [pF]	IBIS tot max [pF]	Spec tot min [pF]	Spec tot max [pF]
DQ0	0.16	3.15	3.81	NA	10.0
DQ1	0.15	3.26	3.72	NA	10.0
DQ2/WP#	0.15	6.96	8.02	NA	10.0
DQ3/HOLD#	0.17	7.39	8.55	NA	10.0
C	0.15	2.20	2.76	NA	6.0
S#	0.15	4.81	6.05	NA	10.0

Component name: **MT25QL512ABBxxSF**

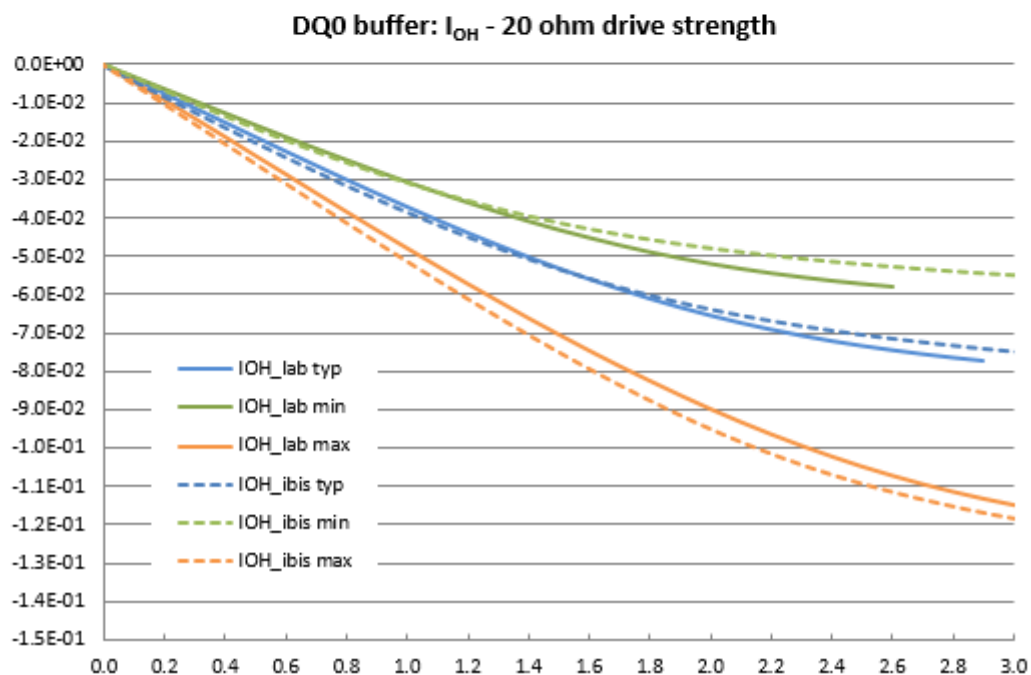
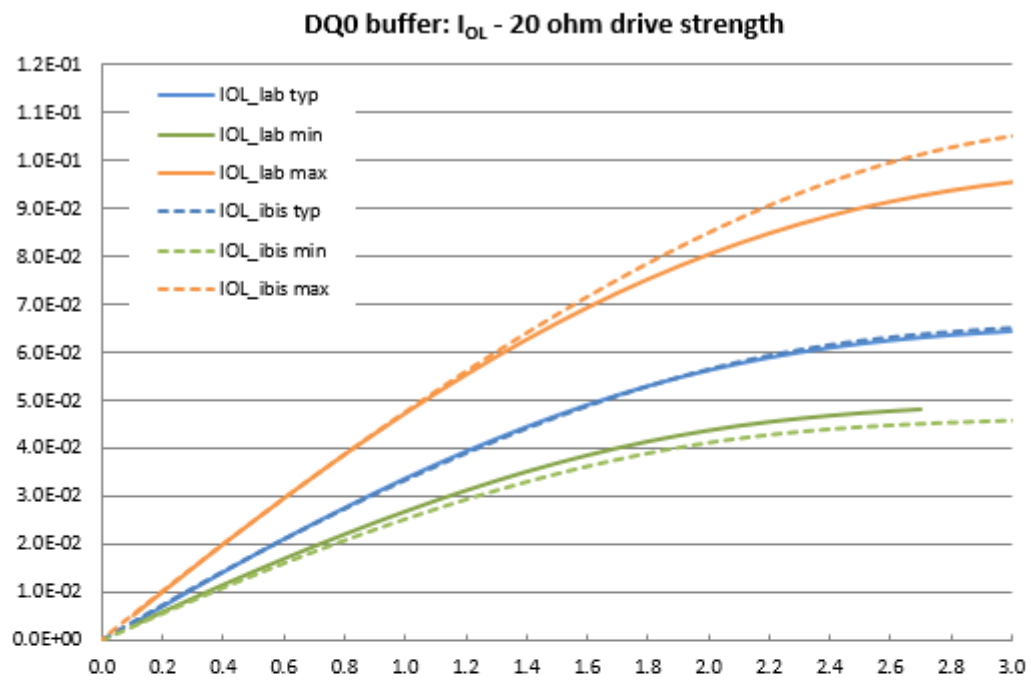
Signal	IBIS pkg [pF]	IBIS tot min [pF]	IBIS tot max [pF]	Spec tot min [pF]	Spec tot max [pF]
DQ0	0.26	3.25	3.91	NA	10.0
DQ1	0.40	3.51	3.97	NA	10.0
DQ2/WP#	0.42	7.23	8.29	NA	10.0
DQ3/HOLD#	0.41	7.63	8.79	NA	10.0
C	0.40	2.45	3.01	NA	6.0
RESET#	0.25	1.94	2.32	NA	6.0
S#	0.29	4.95	6.19	NA	10.0

## IBIS Model Correlation: measurements

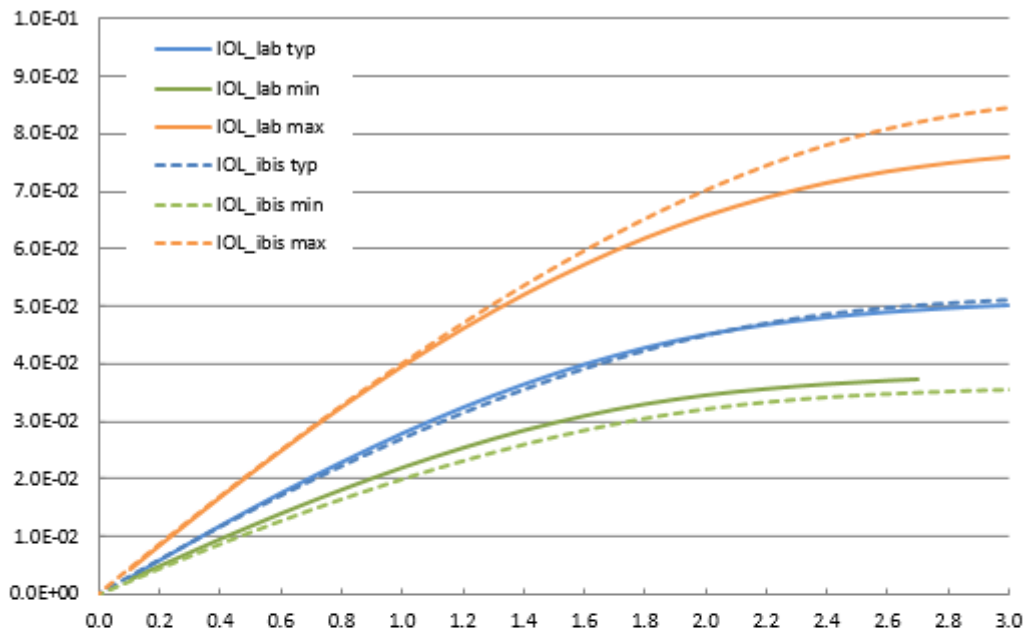
1. ☒ For Output or I/O models compare measured IOH/IOL data with IBIS pullup/pulldown data.  
If the measurement conditions are different from the IBIS conditions, run Spice simulations using the same measurement conditions such as VCC, temperature, and process. Include measurement conditions in the image labels.

Measurement conditions:

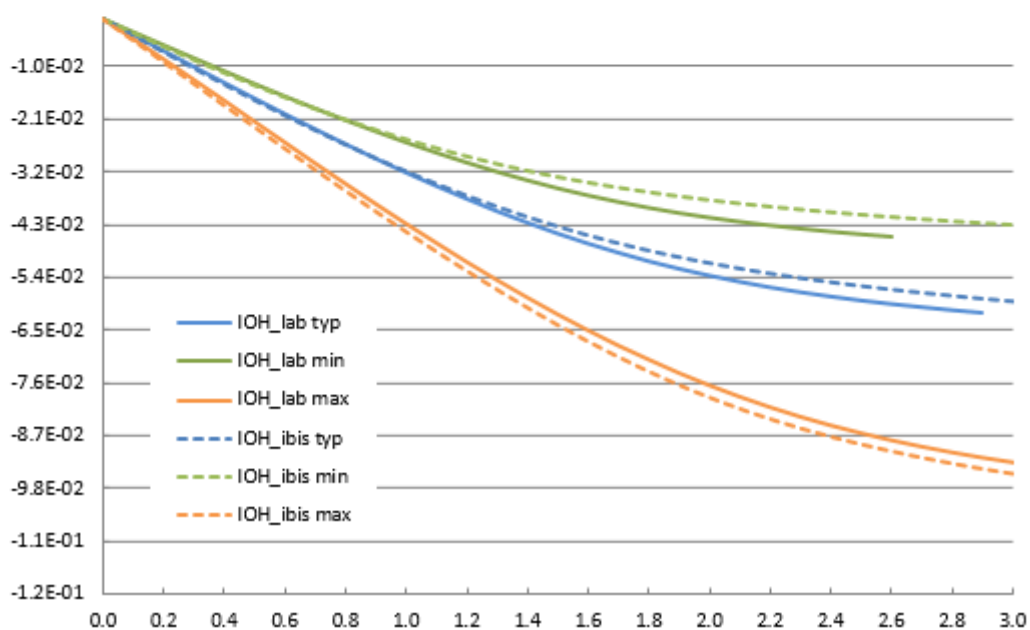
**35°C, 3.0V for typ; 85°C, 2.7V for min; -40°C, 3.6V for max**



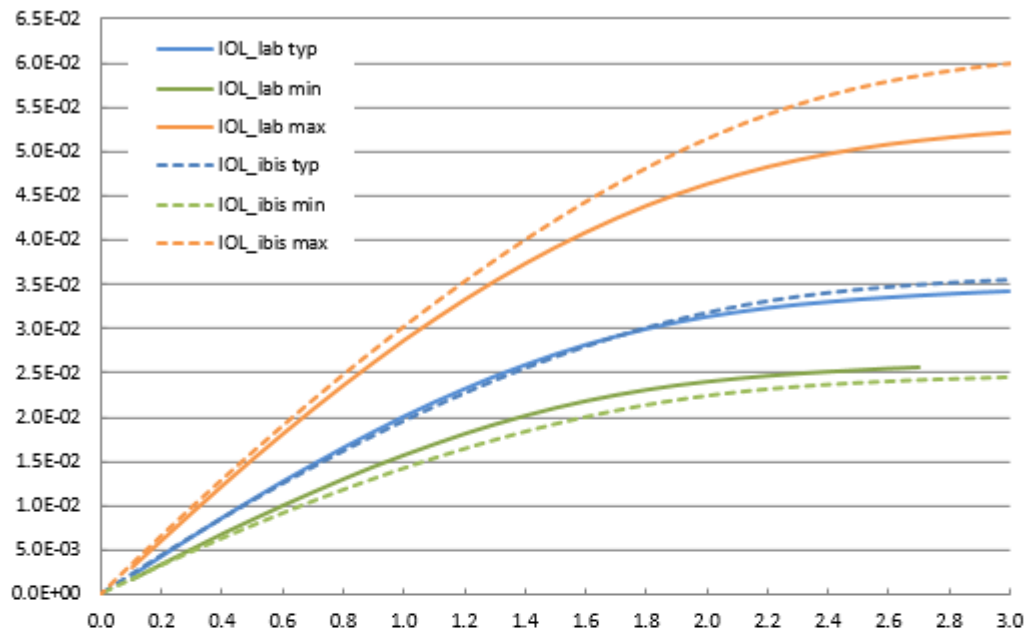
DQ0 buffer:  $I_{OL}$  - 30 ohm drive strength



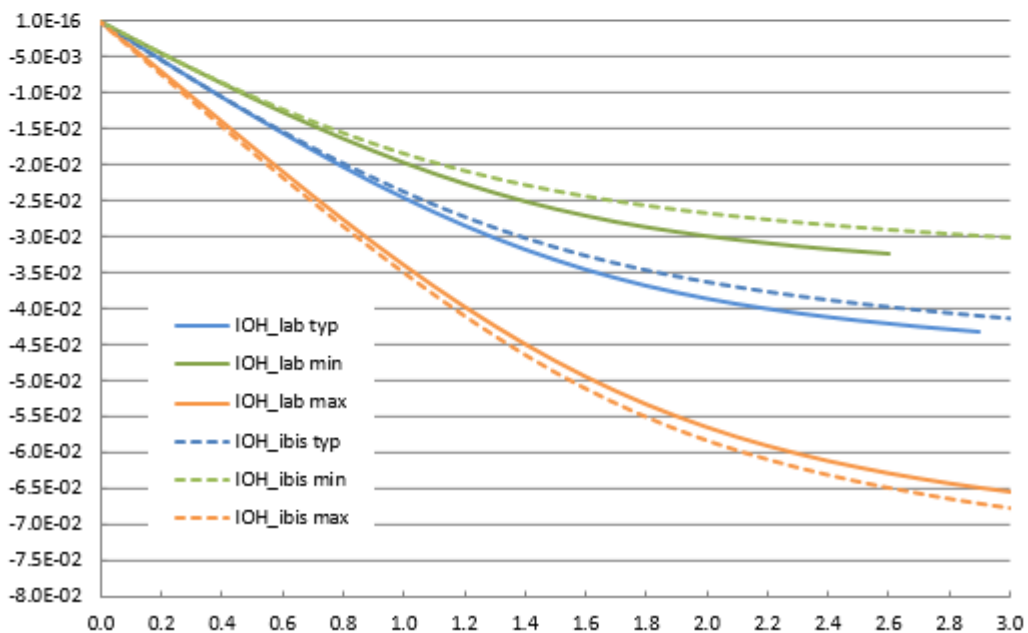
DQ0 buffer:  $I_{OH}$  - 30 ohm drive strength



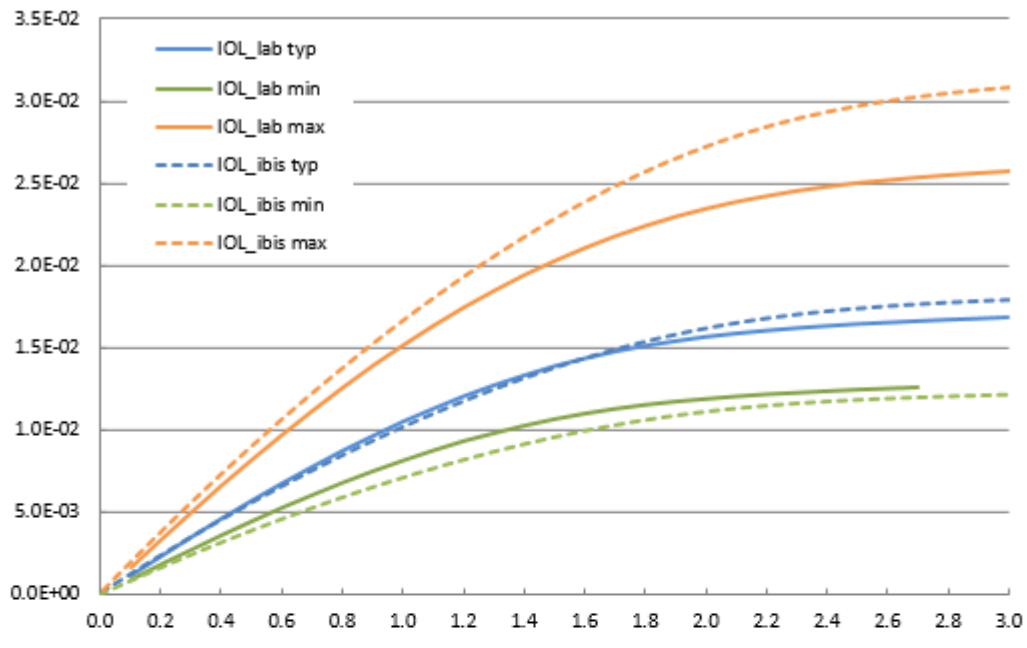
DQ0 buffer:  $I_{OL}$  - 45 ohm drive strength



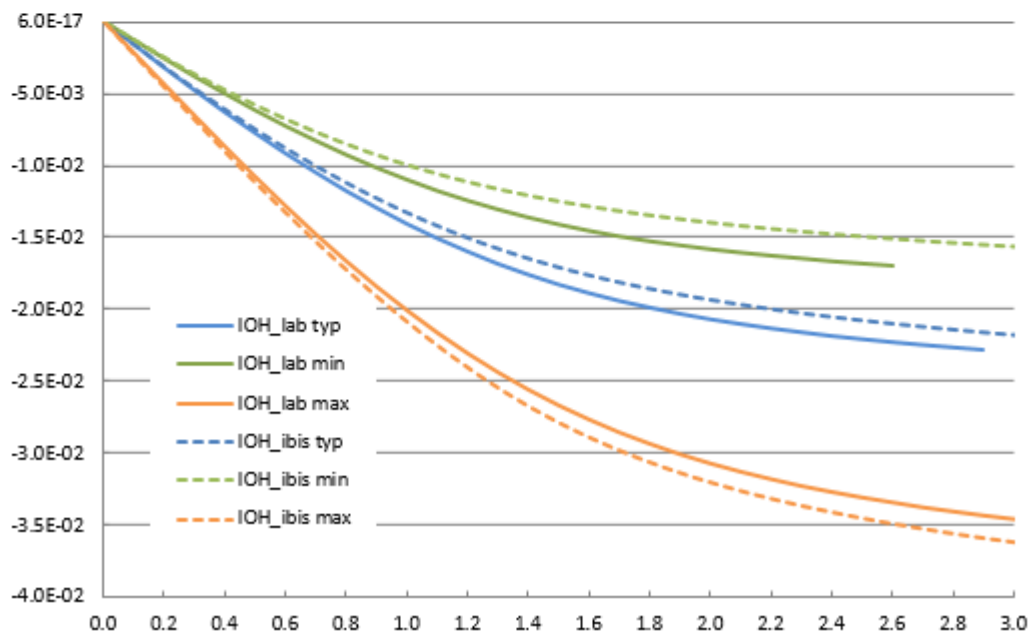
DQ0 buffer:  $I_{OH}$  - 45 ohm drive strength



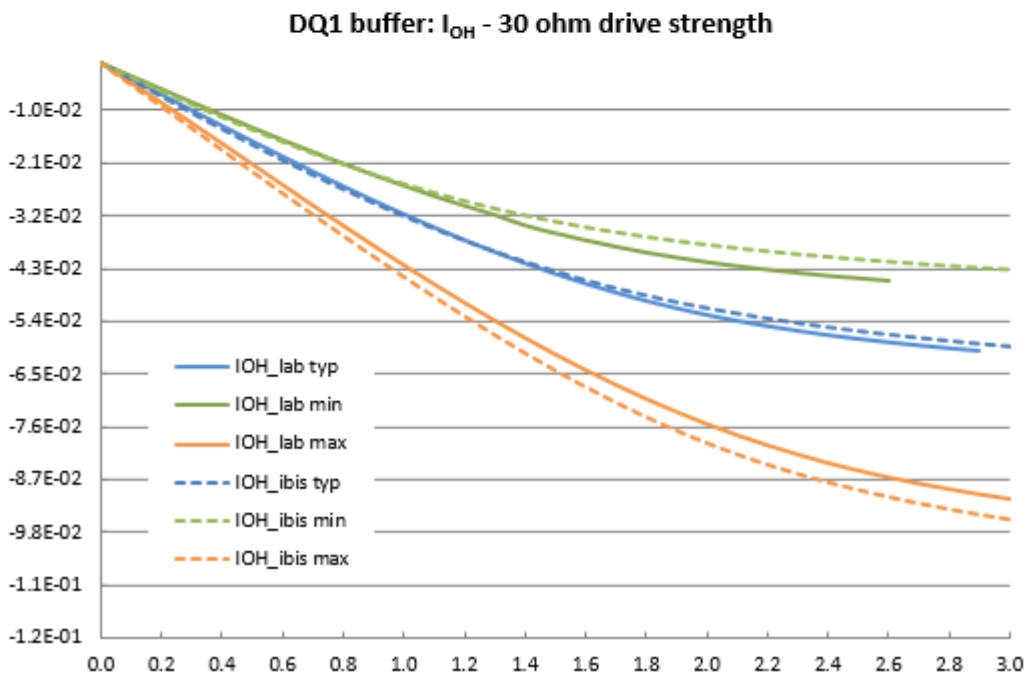
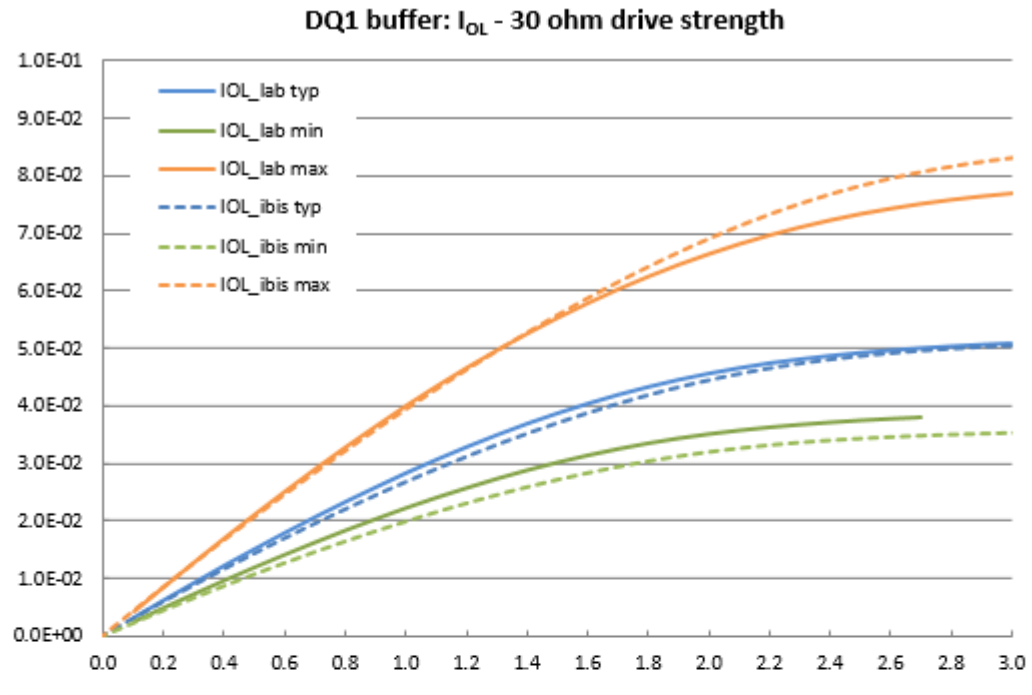
DQ0 buffer:  $I_{OL}$  - 90 ohm drive strength

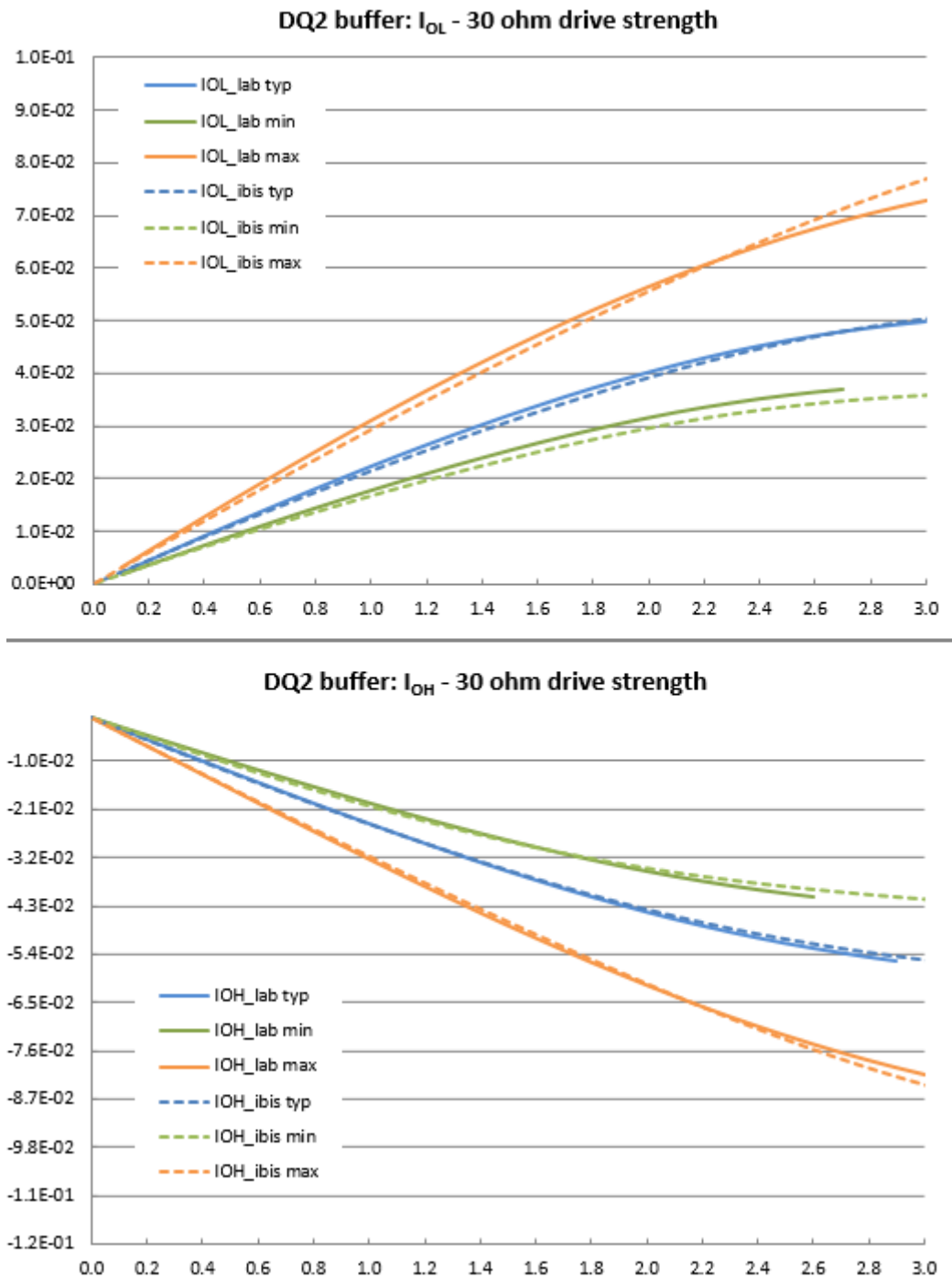


DQ0 buffer:  $I_{OH}$  - 90 ohm drive strength

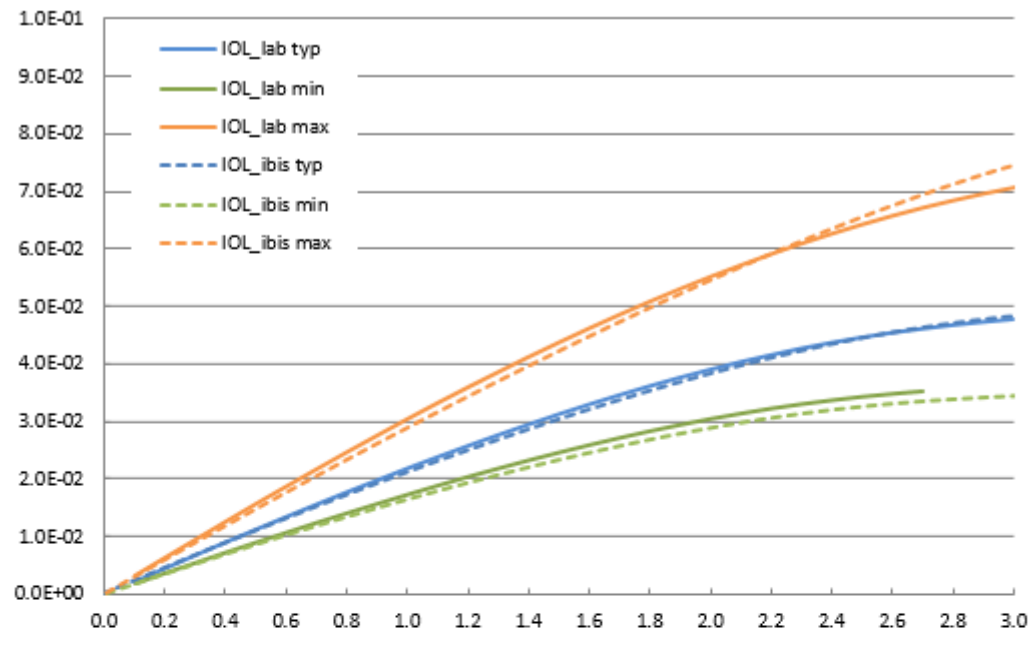




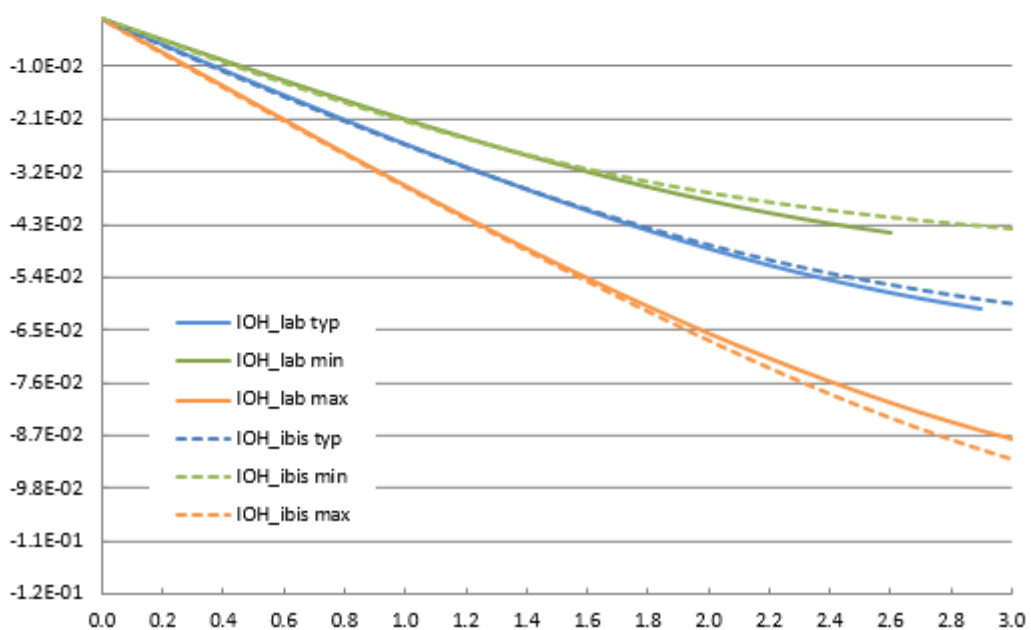




DQ3 buffer:  $I_{OL}$  - 30 ohm drive strength



DQ3 buffer:  $I_{OH}$  - 30 ohm drive strength



2. ☒ Compare C\_comp with measured C\_comp. Provide C\_comp comparison table for all models and for all package combinations (i.e x4, x8 and x16).

Component name: **MT25QL512ABBxx12**

Signal	IBIS pkg min [pF]	IBIS die min [pF]	IBIS die max [pF]	IBIS tot min [pF]	IBIS tot max [pF]	Measured min [pF]	Measured max [pF]
DQ0	1.31	2.99	3.65	4.30	4.96	4.84	4.87
DQ1	0.80	3.11	3.57	3.91	4.37	4.16	4.19
DQ2/WP#	0.91	6.81	7.87	7.72	8.78	8.36	8.39
DQ3/HOLD#	1.22	7.22	8.38	8.44	9.60	9.20	9.28
C	0.91	2.05	2.61	2.96	3.52	3.30	3.33
RESET#	1.00	1.69	2.07	2.69	3.07	2.90	2.93
S#	0.92	4.66	5.90	5.58	6.82	6.15	6.38

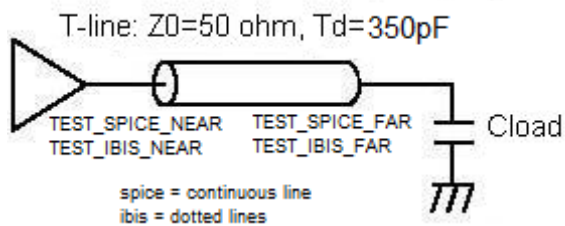
Component name: **MT25QL512ABBxxSF**

Signal	IBIS pkg min [pF]	IBIS die min [pF]	IBIS die max [pF]	IBIS tot min [pF]	IBIS tot max [pF]	Measured min [pF]	Measured max [pF]
DQ0	0.26	2.99	3.65	3.25	3.91	3.41	3.42
DQ1	0.40	3.11	3.57	3.51	3.97	3.65	3.66
DQ2/WP#	0.42	6.81	7.87	7.23	8.29	7.62	7.63
DQ3/HOLD#	0.41	7.22	8.38	7.63	8.79	8.01	8.04
C	0.40	2.05	2.61	2.45	3.01	2.64	2.65
RESET#	0.25	1.69	2.07	1.94	2.32	2.02	2.04
S#	0.29	4.66	5.90	4.95	6.19	5.31	5.37

## IBIS Model Correlation: IBIS vs Spice

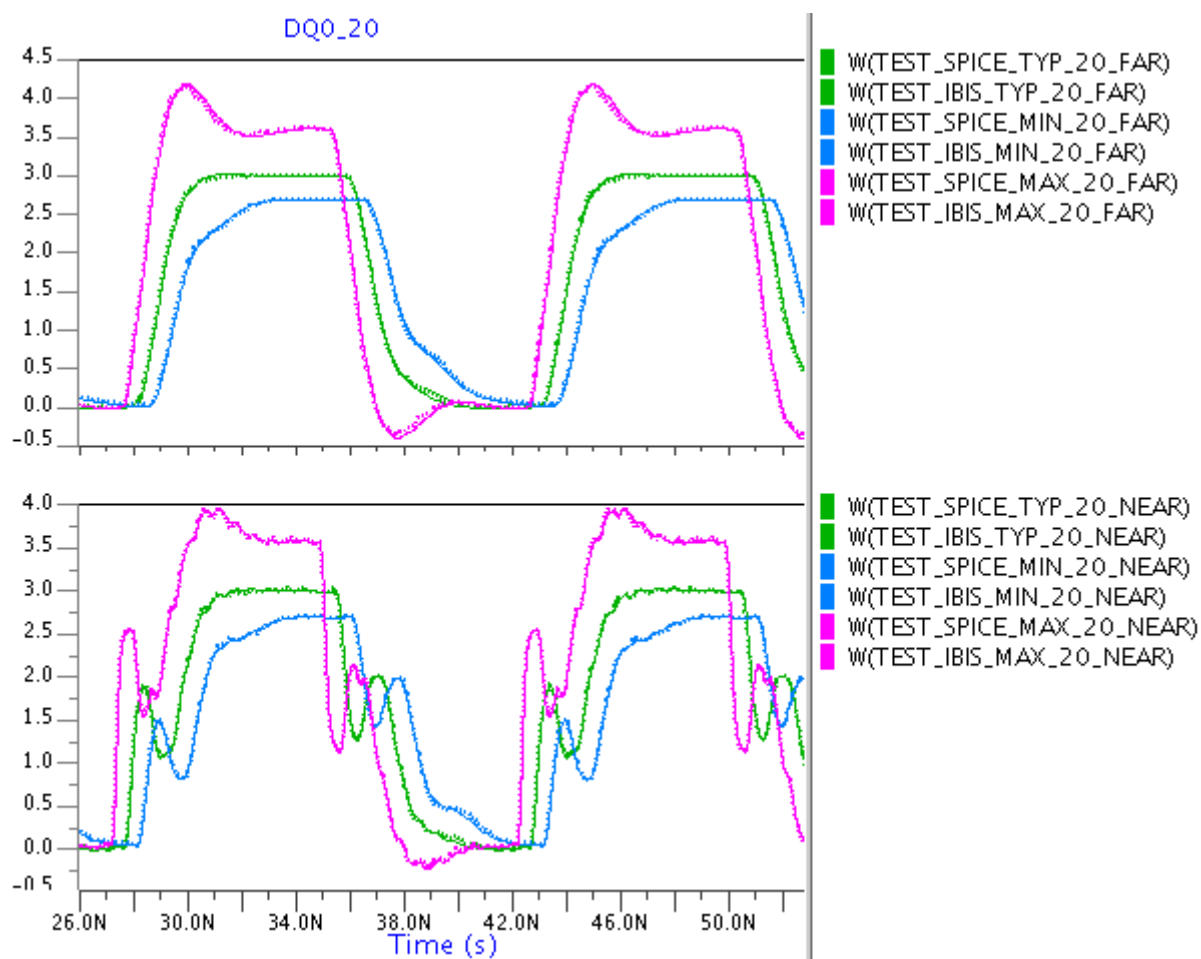
1. ☒ For all Output or I/O models, run Spice transient simulations using encrypted netlists and the IBIS model (b-element).
  - a. ☒ Use the setup and node naming conventions shown below for the IBIS and Spice files.  
Update the setup diagram if it is different. Indicate the version of Spice simulator used for simulations: **ELDO 16.2 patch1 (64 bits)**
  - b. ☒ Run simulations for all corners cases and at fastest speed grades, testing ODT models as loads when applicable

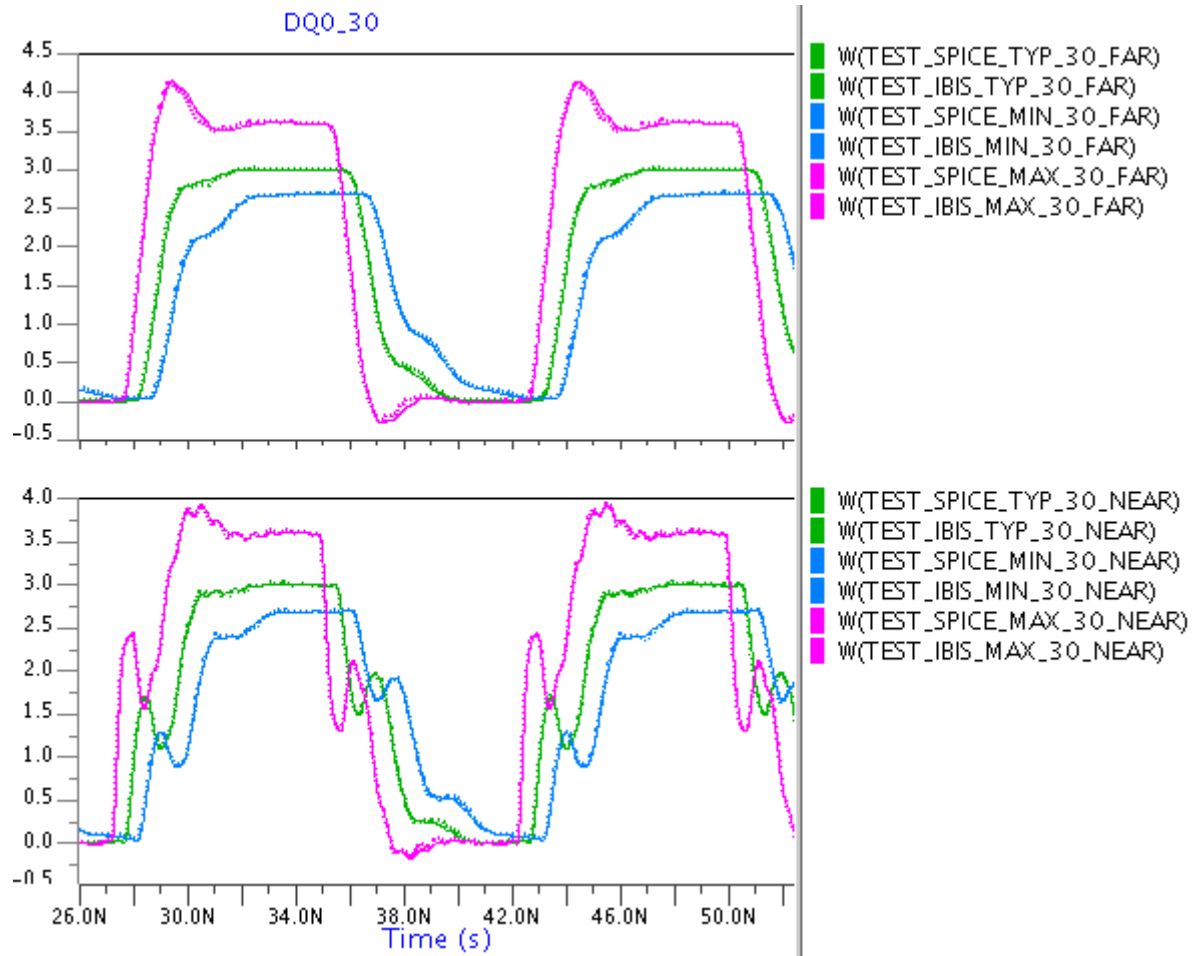
SETUP:

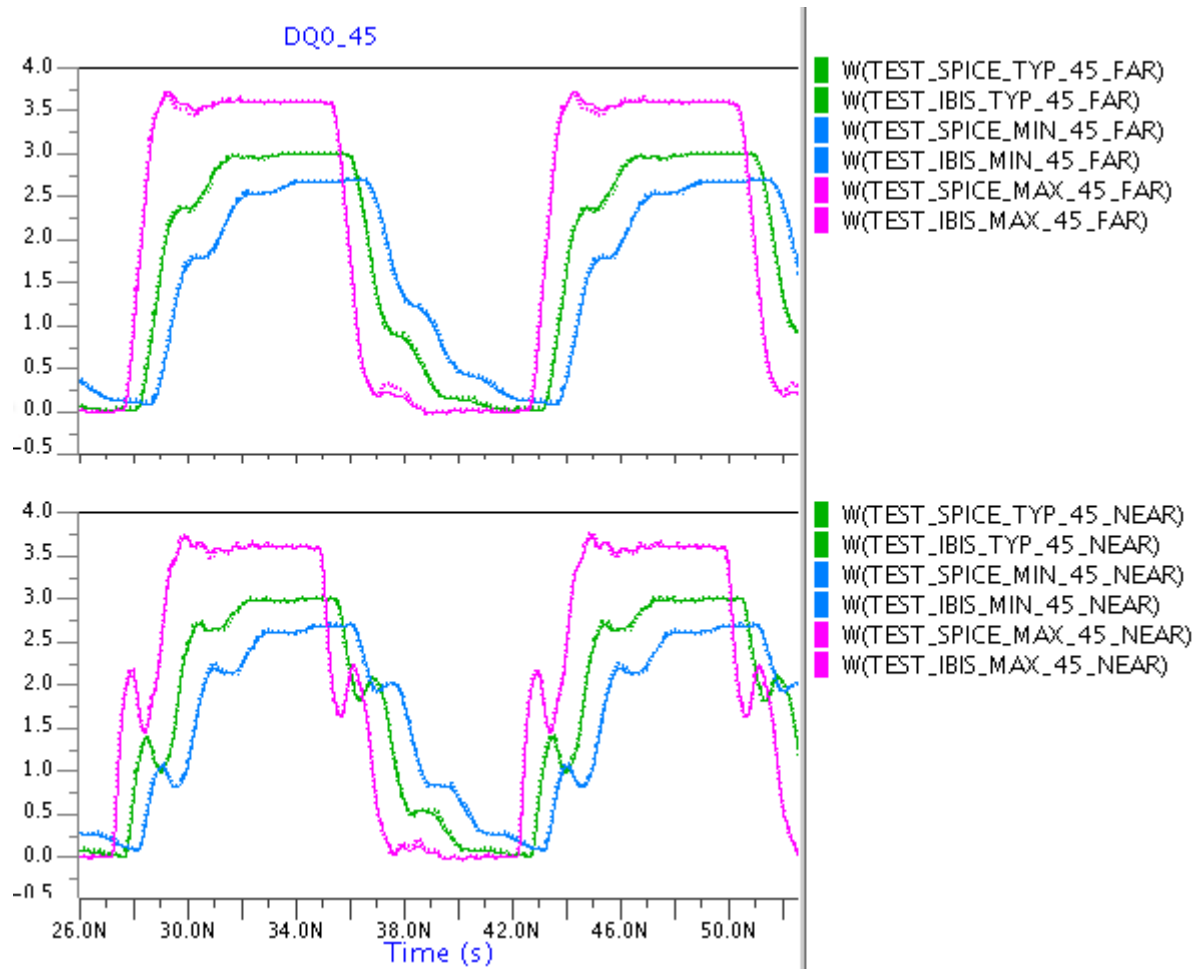


C load = 30pF for 20ohm drive strength,  
20pF for 30ohm,  
15pF for 45ohm,  
10pF for 90ohm

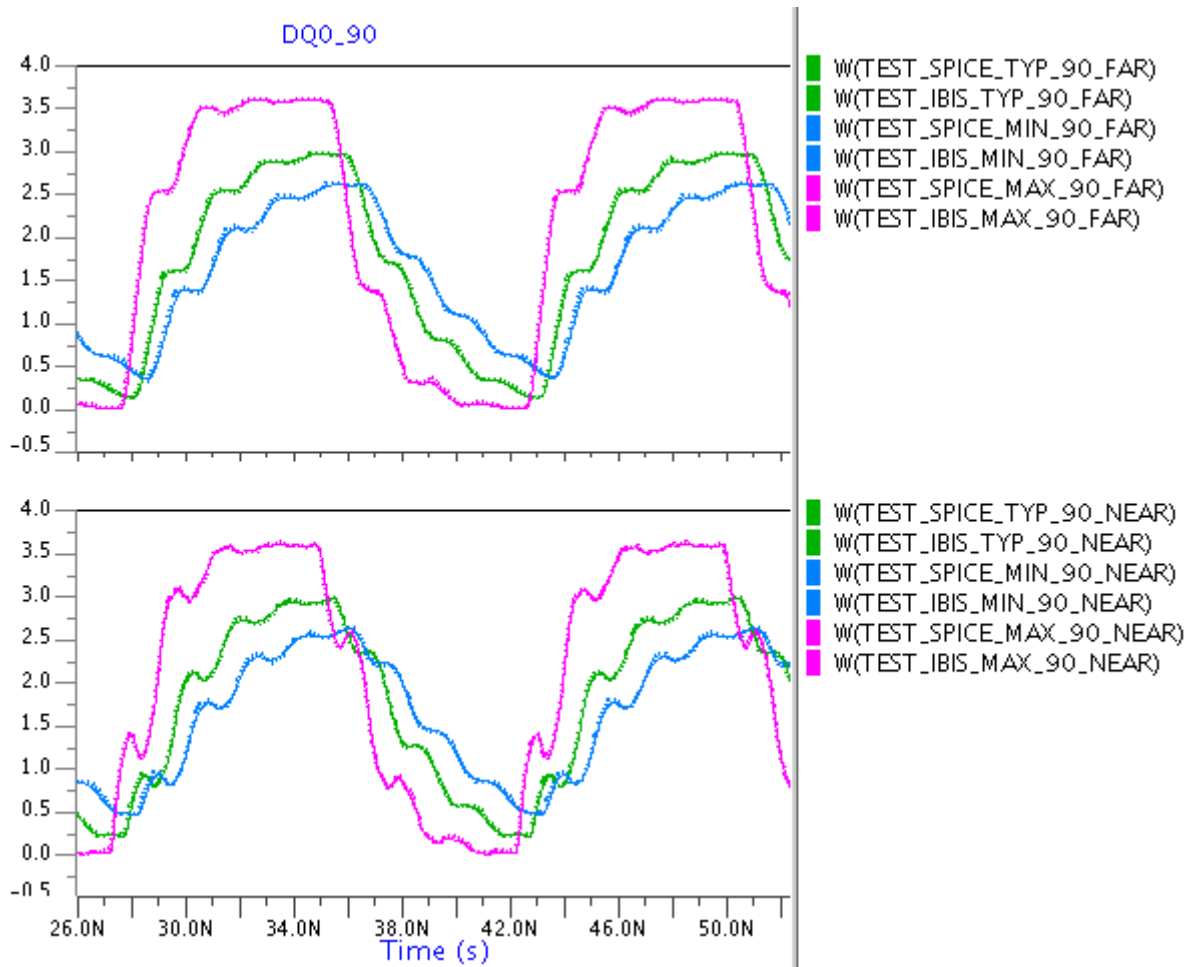
Datarate = 133MHz STR

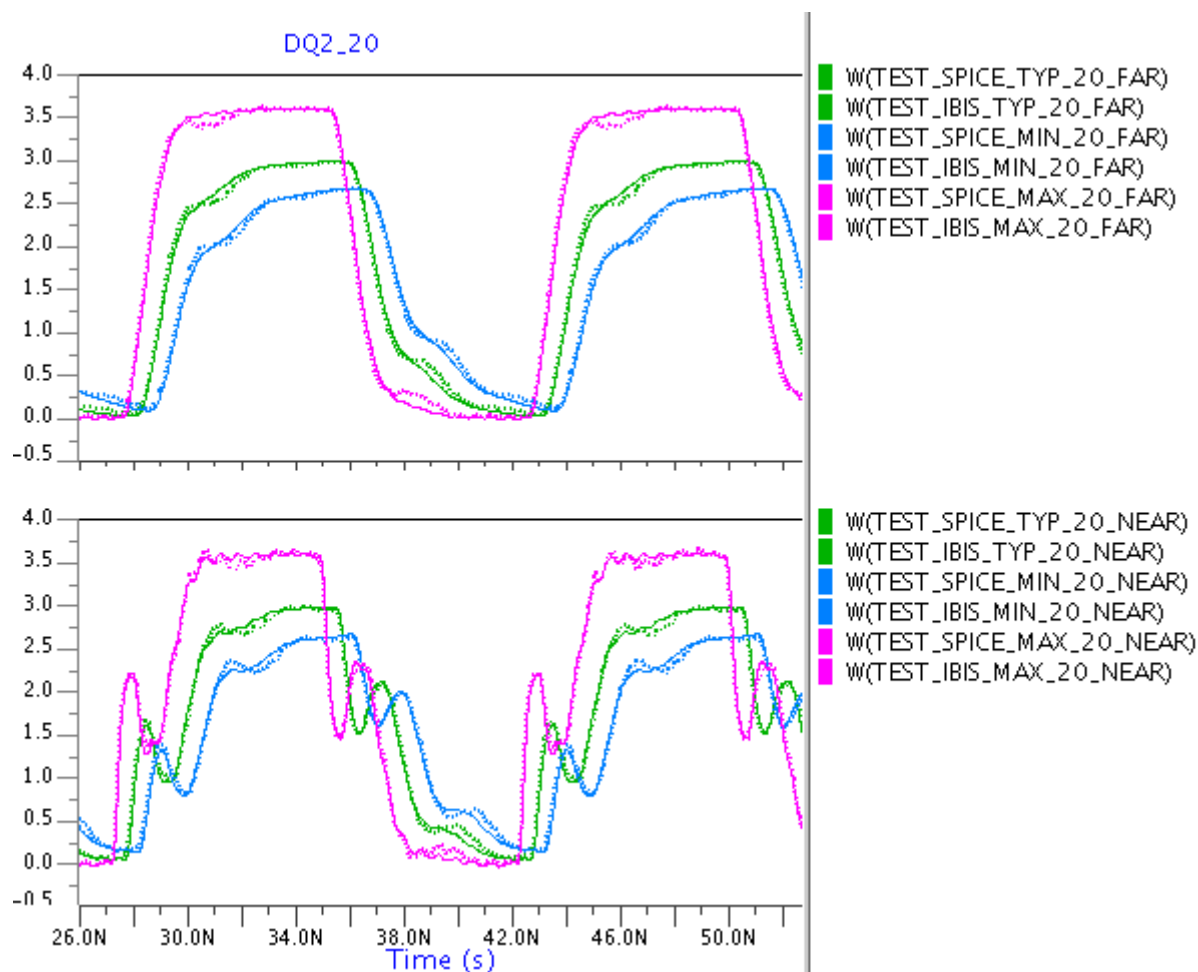


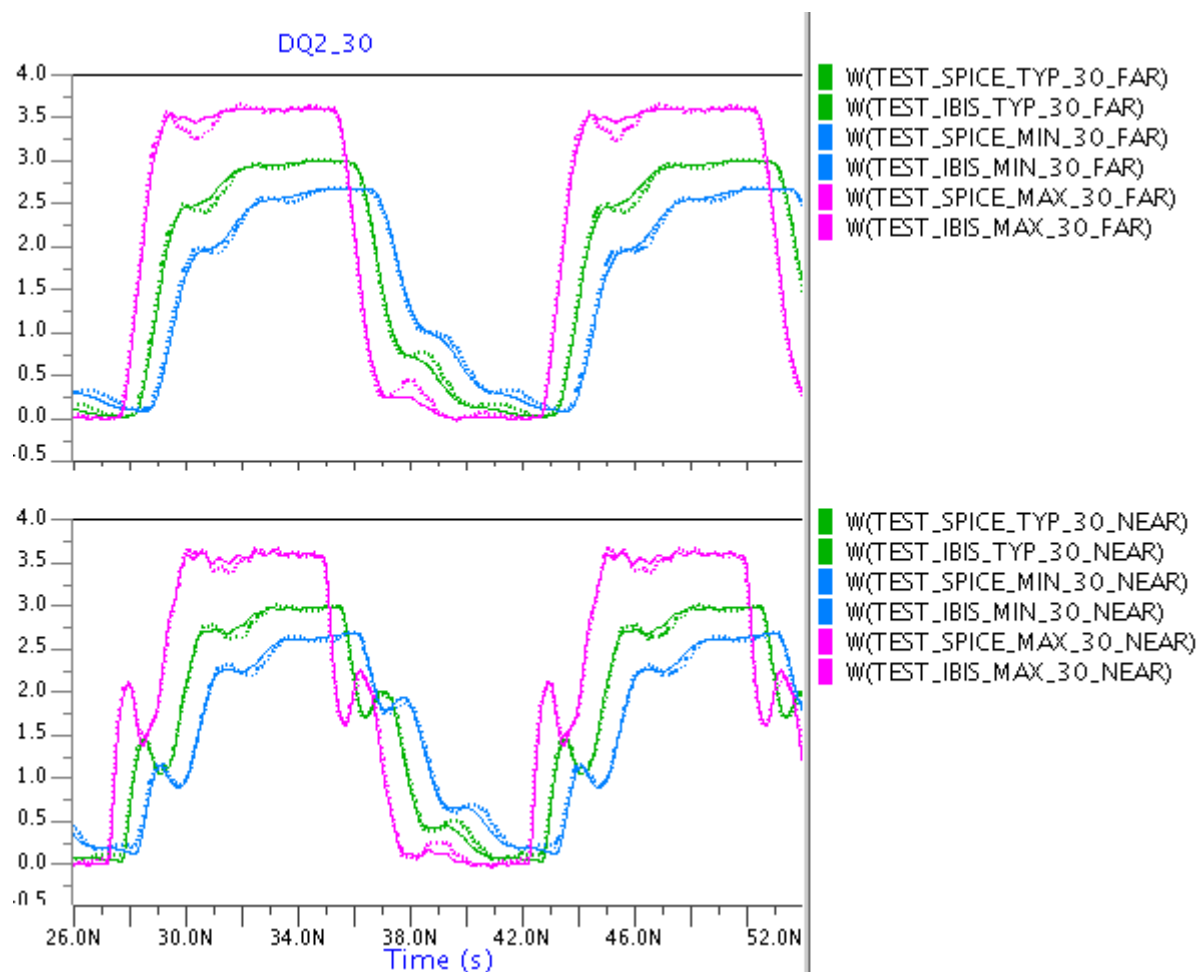


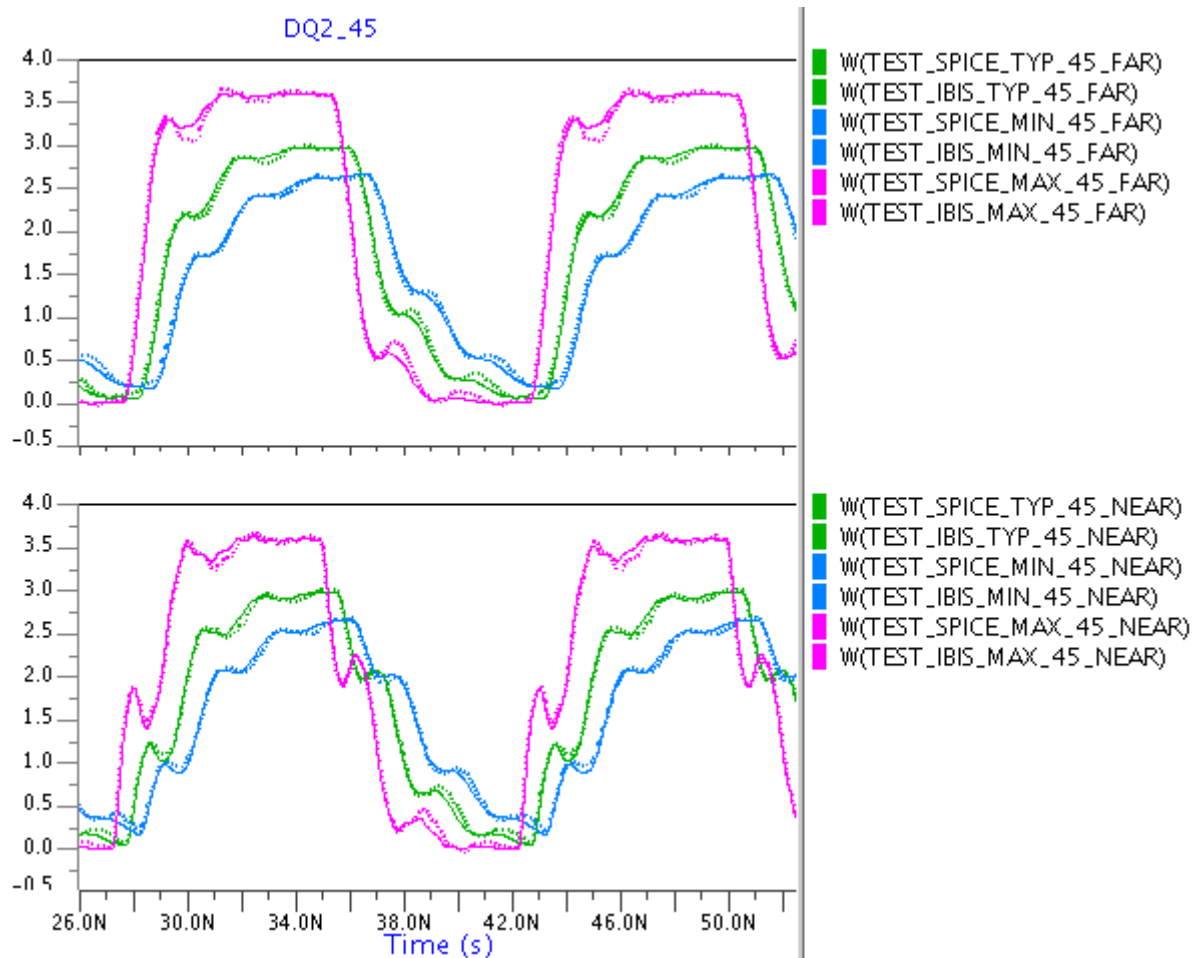


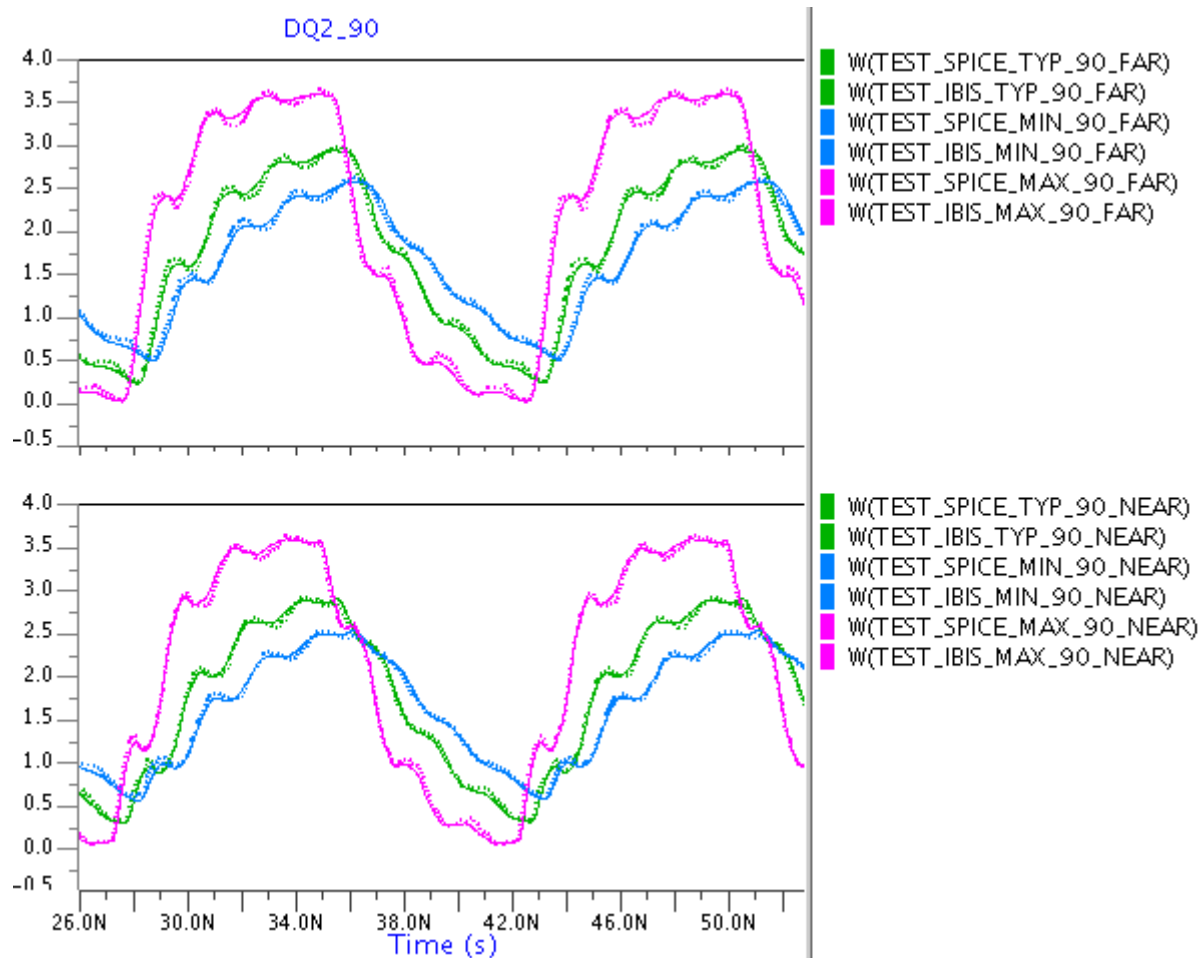












## **Comments**

IBIS vs Spice correlation waveforms for DQ1 have been omitted because very similar to the DQ0 ones. DQ3 waveforms also omitted (very similar to the DQ2 ones).

## **Document Revision History**

Rev **1.1** - Date **November 17, 2014**

IBIS revision **1.1**

Rev **1.2** - Date **April 1, 2015**

IBIS revision **1.2**

Rev **2.0** - Date **January 28, 2016**

IBIS revision **2.0**

Rev **2.6** - Date **March 15, 2017**

IBIS revision **2.6**

Rev **2.6.2** - Date **September 25, 2017**

IBIS revision **2.6.2**