IBIS/HSPICE Model Quality Report

Design ID: MT28EW256ABA
Description: 256Mb 45nm Embedded Parallel NOR
Marketing device name(s): MT28EW256ABA
Valid speed grades: Page access: 20ns
Zip filename: IBIS_MT28EW256ABA1xPP-xxIT.zip
IBIS filename: mt28ew256aba_3p0_it.ibs & mt28ew256aba_1p8_it.ibs   **File rev:** 2.0
HSpice filename: N/A   **File rev:** N/A
EBD filename (if applicable): N/A   **File rev:** N/A
Die rev: Rev A
Date: January 29, 2016
Datasheet Link (from micron.com): go to micron.com and search for the marketing part number

E-mail modelsupport@micron.com for questions regarding Quality Report.
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Device Parameters

VCCQ – Slow: 2.70 Typical: 3.00 Fast: 3.60
And (depending on the .ibs model)
VCCQ – Slow: 1.65 Typical: 1.80 Fast: 1.95
VCC – Slow: 2.7 Typical: 3.0 Fast: 3.60
Junction Temperature (Industrial) -   Slow: 100 Typical: 50 Fast: -40
VDDQ/VSSQ Decoupling Capacitance:
　　　Included in HSPICE DQ/DQS models?
　　　Amount per DQ/DQS model:
VDDQ/VSSQ Decoupling Capacitance Series Resistance:
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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.eda.org/pub/ibis/quality_wip/.

    Overall IBIS Quality Level: 3MS
    Exceptions:

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

    Filename: mt28ew256aba_Micron_ext_model_quality.xlsx

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IBIS MODEL Correlation

Datasheet Correlation

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

2.

Component name: **MT28EW256ABA1xJS**

		IBIS (pF)		Datasheet (pF)	
		min	max	min	max
DQ	C_comp	3.586	4.586	NA	NA
	C package	0.638	0.812	NA	NA
	C_total	4.224	5.398	NA	8.00
RY/BY#	C_comp	2.243	3.243	NA	NA
	C package	0.744	0.744	NA	NA
	C_total	2.987	3.987	NA	6.00
INPUT1 (A0, A5-A12, A16-A21, BYTE#, OE#)	C_comp	2.243	3.243	NA	NA
	C package	0.744	0.744	NA	NA
	C_total	2.987	3.987	NA	6.00
INPUT2 (A1-A4, A13-A15, A22, A23, CE#, WE#)	C_comp	2.816	3.816	NA	NA
	C package	0.697	0.782	NA	NA
	C_total	3.513	4.598	NA	6.00
RESET#	C_comp	6.323	7.323	NA	NA
	C package	0.690	0.690	NA	NA
	C_total	7.013	8.013	NA	6.00

Component name: **MT28EW256ABA1xPC**

		IBIS (pF)		Datasheet (pF)	
		min	max	min	max
DQ	C_comp	3.586	4.586	NA	NA
	C package	0.683	0.961	NA	NA
	C_total	4.269	5.547	NA	8.00
RY/BY#	C_comp	2.243	3.243	NA	NA
	C package	0.691	0.691	NA	NA
	C_total	2.934	3.934	NA	6.00
INPUT1 (A0, A5-A12, A16-A21, BYTE#, OE#)	C_comp	2.243	3.243	NA	NA
	C package	0.602	0.981	NA	NA
	C_total	2.845	4.224	NA	6.00
INPUT2 (A1-A4, A13-A15, A22, A23, CE#, WE#)	C_comp	2.816	3.816	NA	NA
	C package	0.542	0.735	NA	NA
	C_total	3.358	4.551	NA	6.00
RESET#	C_comp	6.323	7.323	NA	NA
	C package	0.605	0.605	NA	NA
	C_total	6.928	7.928	NA	6.00

Component name: **MT28EW256ABA1xPN**

		IBIS (pF)		Datasheet (pF)	
		min	max	min	max
DQ	C_comp	3.586	4.586	NA	NA
	C package	0.448	0.762	NA	NA
	C_total	4.034	5.348	NA	8.00
RY/BY#	C_comp	2.243	3.243	NA	NA
	C package	0.553	0.553	NA	NA
	C_total	2.796	3.796	NA	6.00
INPUT1 (A0, A5-A12, A16-A21, BYTE#, OE#)	C_comp	2.243	3.243	NA	NA
	C package	0.316	0.770	NA	NA
	C_total	2.559	4.013	NA	6.00
INPUT2 (A1-A4, A13-A15, A22, A23, CE#, WE#)	C_comp	2.816	3.816	NA	NA
	C package	0.320	0.579	NA	NA
	C_total	3.136	4.395	NA	6.00
RESET#	C_comp	6.323	7.323	NA	NA
	C package	0.572	0.572	NA	NA
	C_total	6.895	7.895	NA	6.00

Measurement Correlation

1. ☒ For Output or I/O models compare measured IOH/IOL data with IBIS pullup/pulldown data. If the measurement conditions are different than the IBIS conditions, run Spice simulations using the same measurement conditions such as VCC, temperature, and process. Include measurement conditions in the image labels.
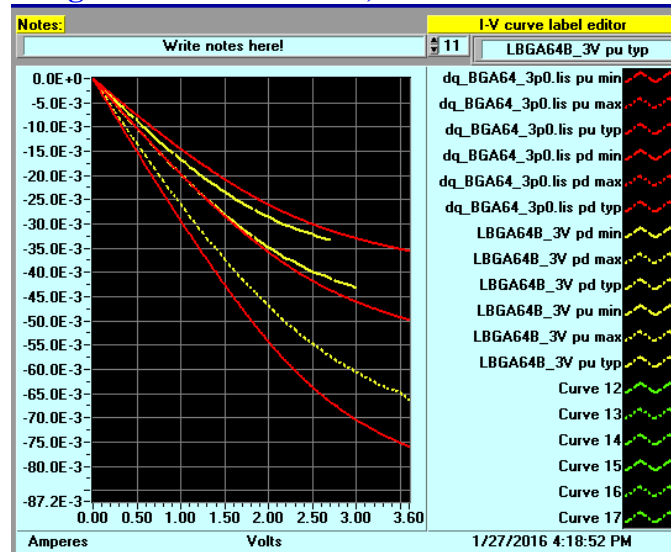
a. Model name: **DQ (Simulations Performed with Full Process Models)**
    i. Pullup comparison. Measurement conditions:
       VCCQ   = 3.0V(Typ), 2.7V(Min), 3.6V(Max)
       Ambient Temp=35C(Typ), 85C(Min), -40C(Max)
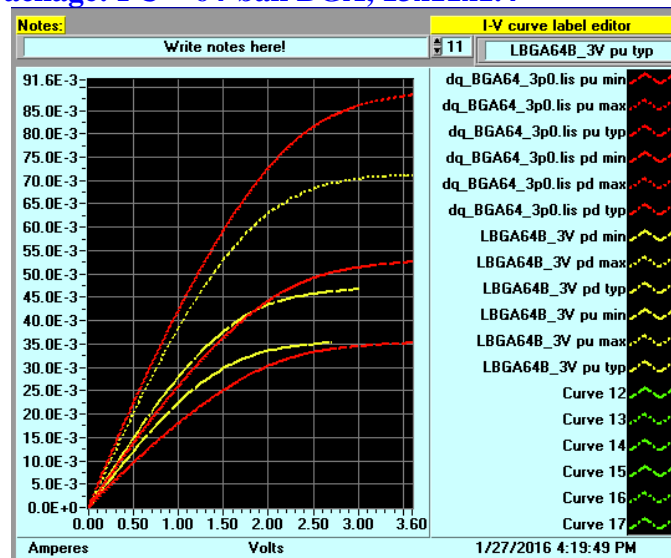   **Package: PC = 64-ball BGA, 13x11x1.4**
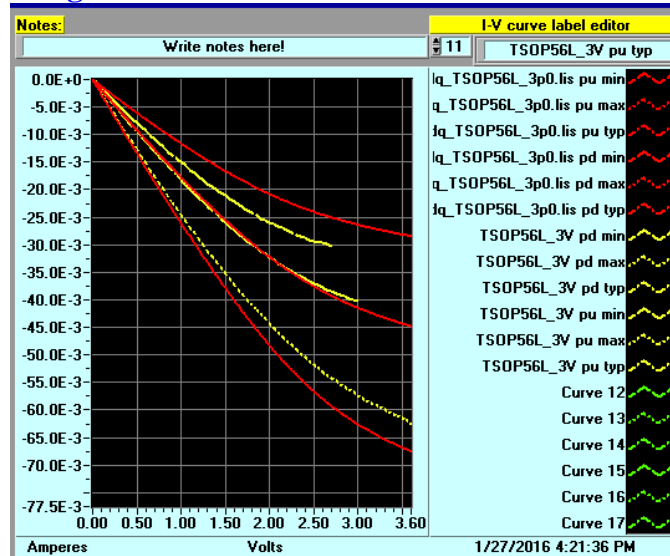

    ii. Pulldown comparison. Measurement conditions:
        VCCQ   = 3.0V(Typ), 2.7V(Min), 3.6V(Max)
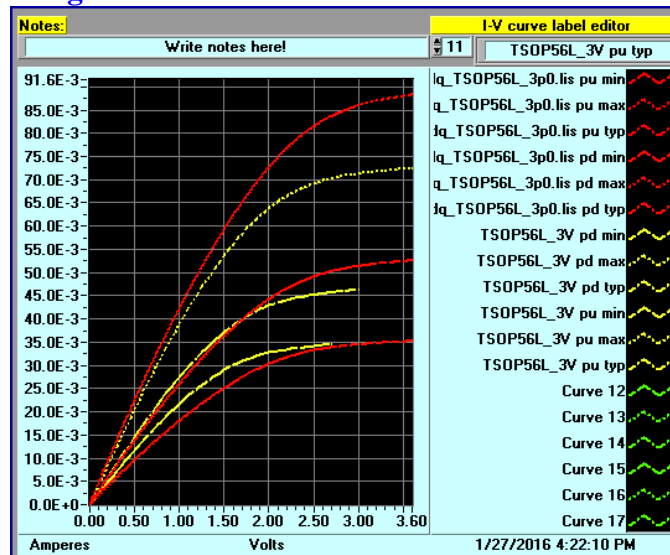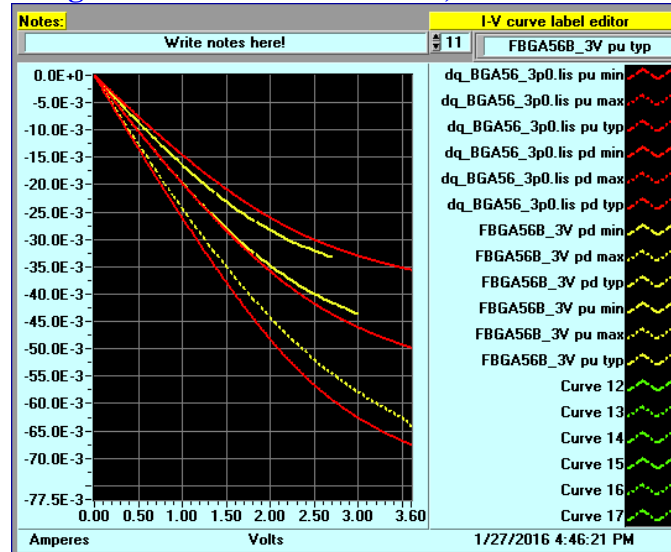   **Ambient Temp=35C(Typ), 85C(Min), -40C(Max)**
        Package: PC = 64-ball BGA, 13x11x1.4

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iii.   Pullup comparison. Measurement conditions:
        VCCQ   = 3.0V(Typ), 2.7V(Min), 3.6V(Max)
        Ambient Temp=35C(Typ), 85C(Min), -40C(Max)
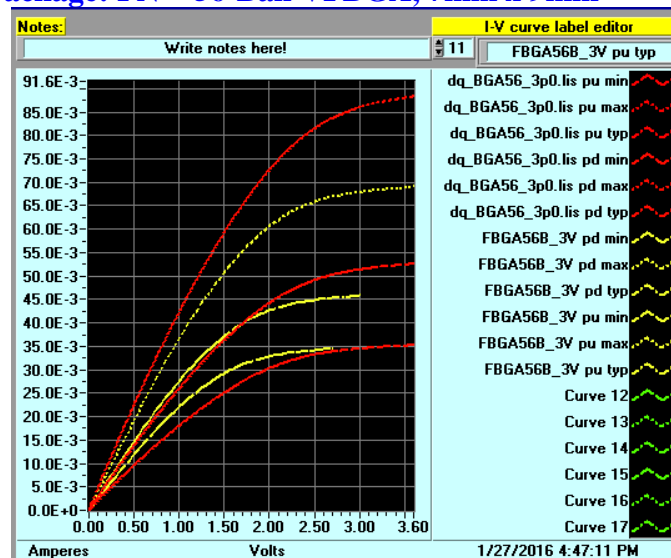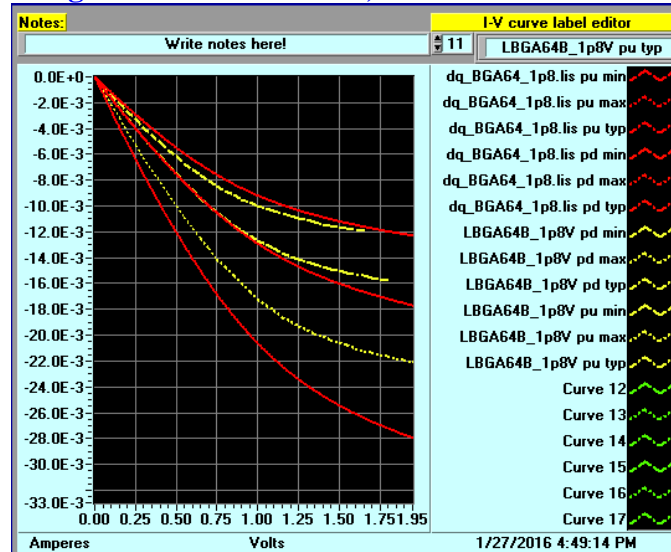   **Package: JS = 56L 14x20x1.2 TSOP**

iv.   Pulldown comparison. Measurement conditions:
        VCCQ   = 3.0V(Typ), 2.7V(Min), 3.6V(Max)
        Ambient Temp=35C(Typ), 85C(Min), -40C(Max)
        Package: JS = 56L 14x20x1.2 TSOP

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v.   Pullup comparison. Measurement conditions:
VCCQ   = 3.0V(Typ), 2.7V(Min), 3.6V(Max)
Ambient Temp=35C(Typ), 85C(Min), -40C(Max)
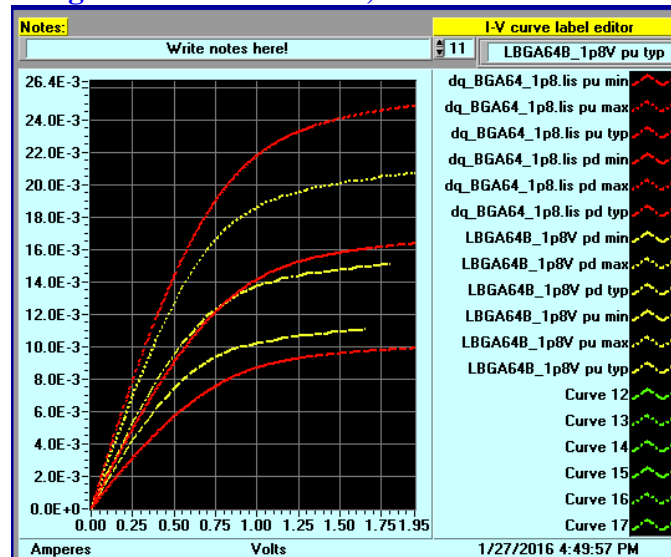**Package: PN = 56-Ball VFBGA, 7mm x 9mm**

vi.   Pulldown comparison. Measurement conditions:
VCCQ   = 3.0V(Typ), 2.7V(Min), 3.6V(Max)
Ambient Temp=35C(Typ), 85C(Min), -40C(Max)
Package: PN = 56-Ball VFBGA, 7mm x 9mm
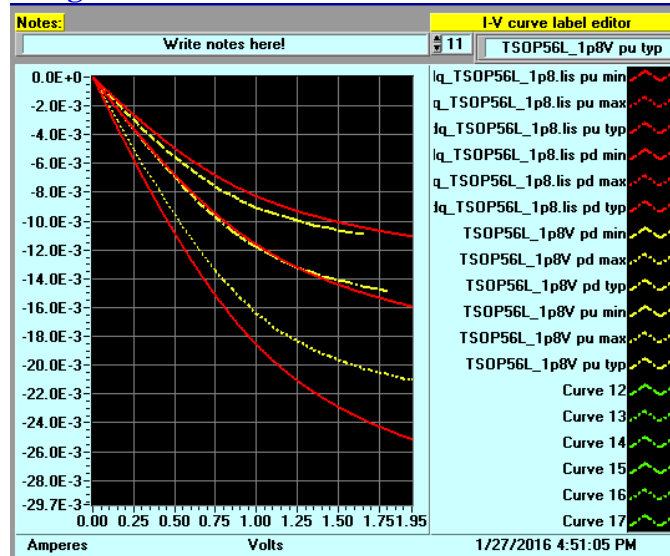
vii.   Pullup comparison. Measurement conditions:
VCCQ   = 1.8V(Typ), 1.65V(Min), 1.95V(Max)
Ambient Temp=35C(Typ), 85C(Min), -40C(Max)
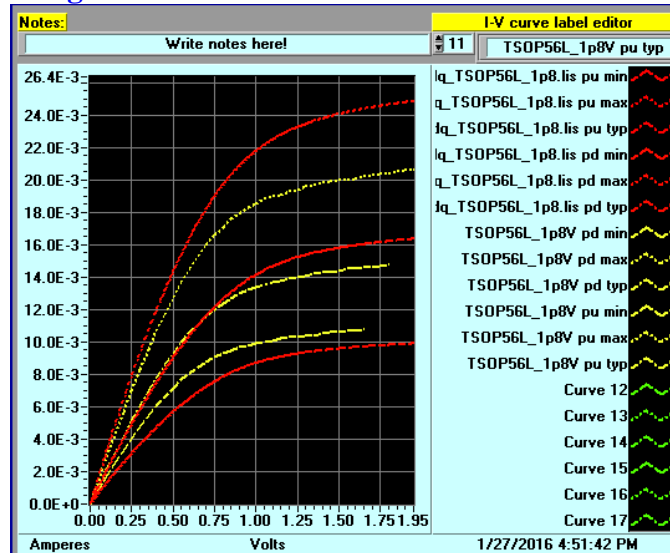**Package: PC = 64-ball BGA, 13x11x1.4**

viii.   Pulldown comparison. Measurement conditions:
VCCQ   = 1.8V(Typ), 1.65V(Min), 1.95V(Max)
Ambient Temp=35C(Typ), 85C(Min), -40C(Max)
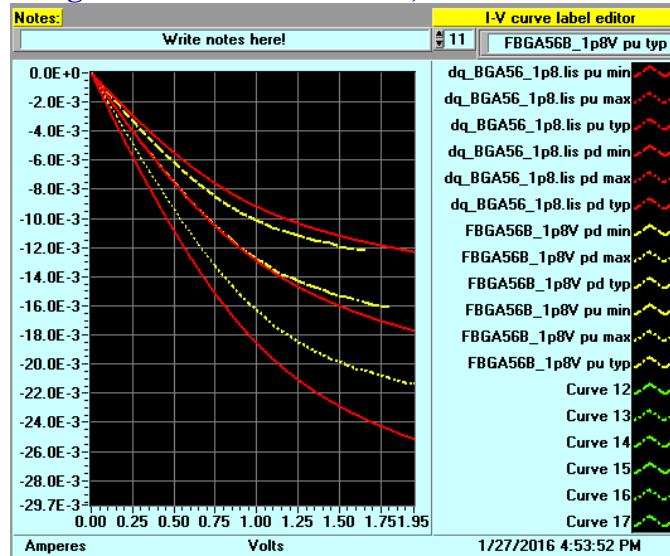**Package: PC = 64-ball BGA, 13x11x1.4**

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ix. Pullup comparison. Measurement conditions:
VCCQ   = 1.8V(Typ), 1.65V(Min), 1.95V(Max)
Ambient Temp=35C(Typ), 85C(Min), -40C(Max)
**Package: JS = 56L 14x20x1.2 TSOP**

x. Pulldown comparison. Measurement conditions:
VCCQ   = 1.8V(Typ), 1.65V(Min), 1.95V(Max)
Ambient Temp=35C(Typ), 85C(Min), -40C(Max)
Package: JS = 56L 14x20x1.2 TSOP

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xi.   Pullup comparison. Measurement conditions:
VCCQ   = 1.8V(Typ), 1.65V(Min), 1.95V(Max)
Ambient Temp=35C(Typ), 85C(Min), -40C(Max)
Package: PN = 56-Ball VFBGA, 7mm x 9mm

xii.   Pulldown comparison. Measurement conditions:
VCCQ   = 1.8V(Typ), 1.65V(Min), 1.95V(Max)
Ambient Temp=35C(Typ), 85C(Min), -40C(Max)
Package: PN = 56-Ball VFBGA, 7mm x 9mm
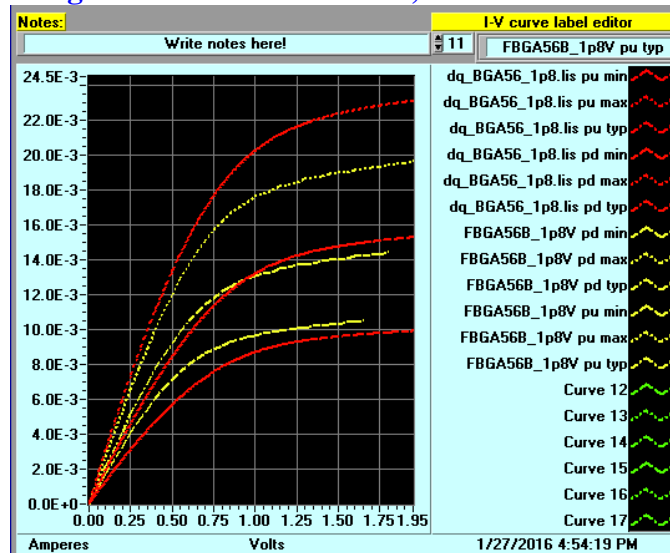
2. ☒ Compare C_comp with measured C_comp. Provide C_comp comparison table for all models and for all package combinations (i.e x4, x8 and x16).

Component name: **MT28EW256ABA1xJS**

		IBIS (pF)		Measured (pF)		
		min	max	typ	min	max
DQ	C_comp	3.586	4.586	NA	NA	NA
	C package	0.638	0.812	NA	NA	NA
	C_total	4.22	5.40	4.857	4.751	4.97
RY/BY#	C_comp	2.243	3.243	NA	NA	NA
	C package	0.744	0.744	NA	NA	NA
	C_total	2.987	3.987	3.614	3.613	3.62
INPUT1 (A0, A5-A12, A16-A21, BYTE#, OE#)	C_comp	2.243	3.243	NA	NA	NA
	C package	0.744	0.744	NA	NA	NA
	C_total	2.987	3.987	3.525	3.130	3.76
INPUT2 (A1-A4, A13-A15, A22, A23, CE#, WE#)	C_comp	2.816	3.816	NA	NA	NA
	C package	0.697	0.782	NA	NA	NA
	C_total	3.513	4.598	4.166	3.915	4.49
RESET#	C_comp	6.323	7.323	NA	NA	NA
	C package	0.690	0.690	NA	NA	NA
	C_total	7.013	8.013	7.599	7.585	7.61

Component name: **MT28EW256ABA1xPC**

|		IBIS (pF)		Measured (pF)		
		min	max	typ	min	max
DQ	C_comp	3.586	4.586	NA	NA	NA
	C package	0.683	0.961	NA	NA	NA
	C_total	4.269	5.547	4.785	4.615	5.07
RY/BY#	C_comp	2.243	3.243	NA	NA	NA
	C package	0.691	0.691	NA	NA	NA
	C_total	2.934	3.934	3.307	3.306	3.307
INPUT1 (A0, A5-A12, A16-A21, BYTE#, OE#)	C_comp	2.243	3.243	NA	NA	NA
	C package	0.602	0.981	NA	NA	NA
	C_total	2.845	4.224	3.393	3.017	3.612
INPUT2 (A1-A4, A13-A15, A22, A23, CE#, WE#)	C_comp	2.816	3.816	NA	NA	NA
	C package	0.542	0.735	NA	NA	NA
	C_total	3.358	4.551	3.863	3.540	4.256
RESET#	C_comp	6.323	7.323	NA	NA	NA
	C package	0.605	0.605	NA	NA	NA
	C_total	6.928	7.928	7.342	7.320	7.364

Component name: **MT28EW256ABA1xPN**

Not Available

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IBIS vs Spice Correlation

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 11.2b (64 bits)**
    b. ☒ Run simulations for all corners cases and at fastest speed grades, testing ODT models as loads when applicable.
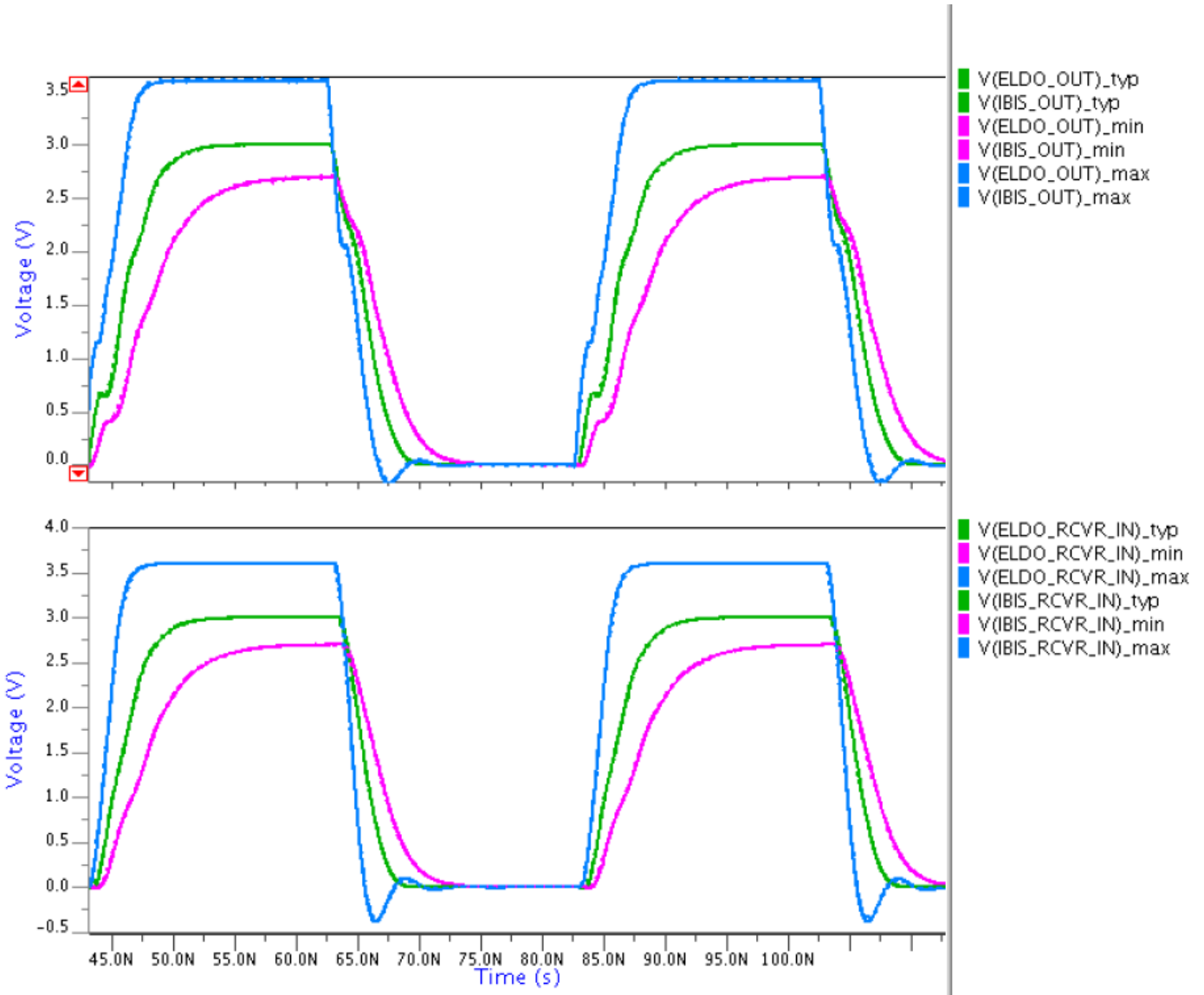
Setup

T-line: Z0 50 Ohms
Td: 0.5ns

ELDO_RCVR_IN
IBIS_RCVR_IN

ELDO_OUT
IBIS_OUT

C_load

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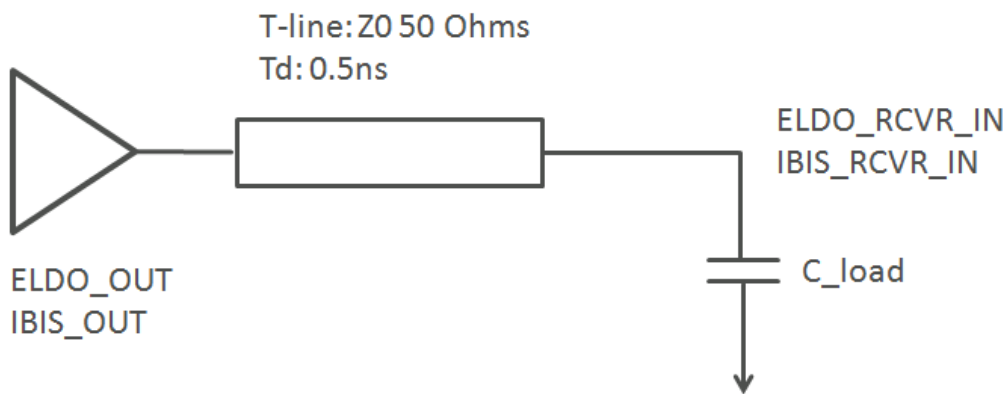
VCCQ: min=2.700V, typ=3.000V, max=3.600V
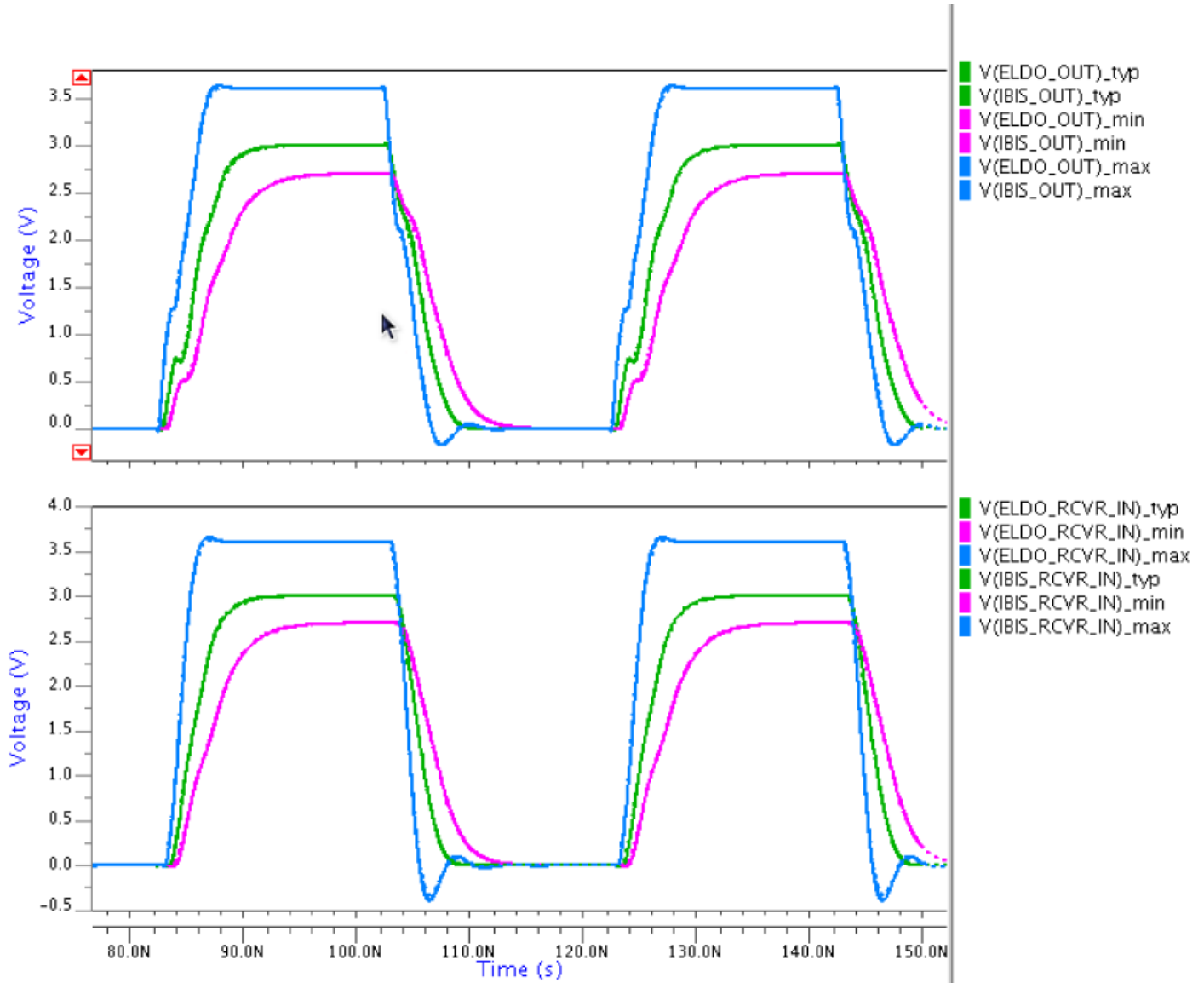**Package: JS = 56-pin TSOP, 14 x 20mm**
C_load=20pF

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VCCQ: min=2.700V, typ=3.000V, max=3.600V
Package: PC = 64-ball LBGA, 11 x 13mm
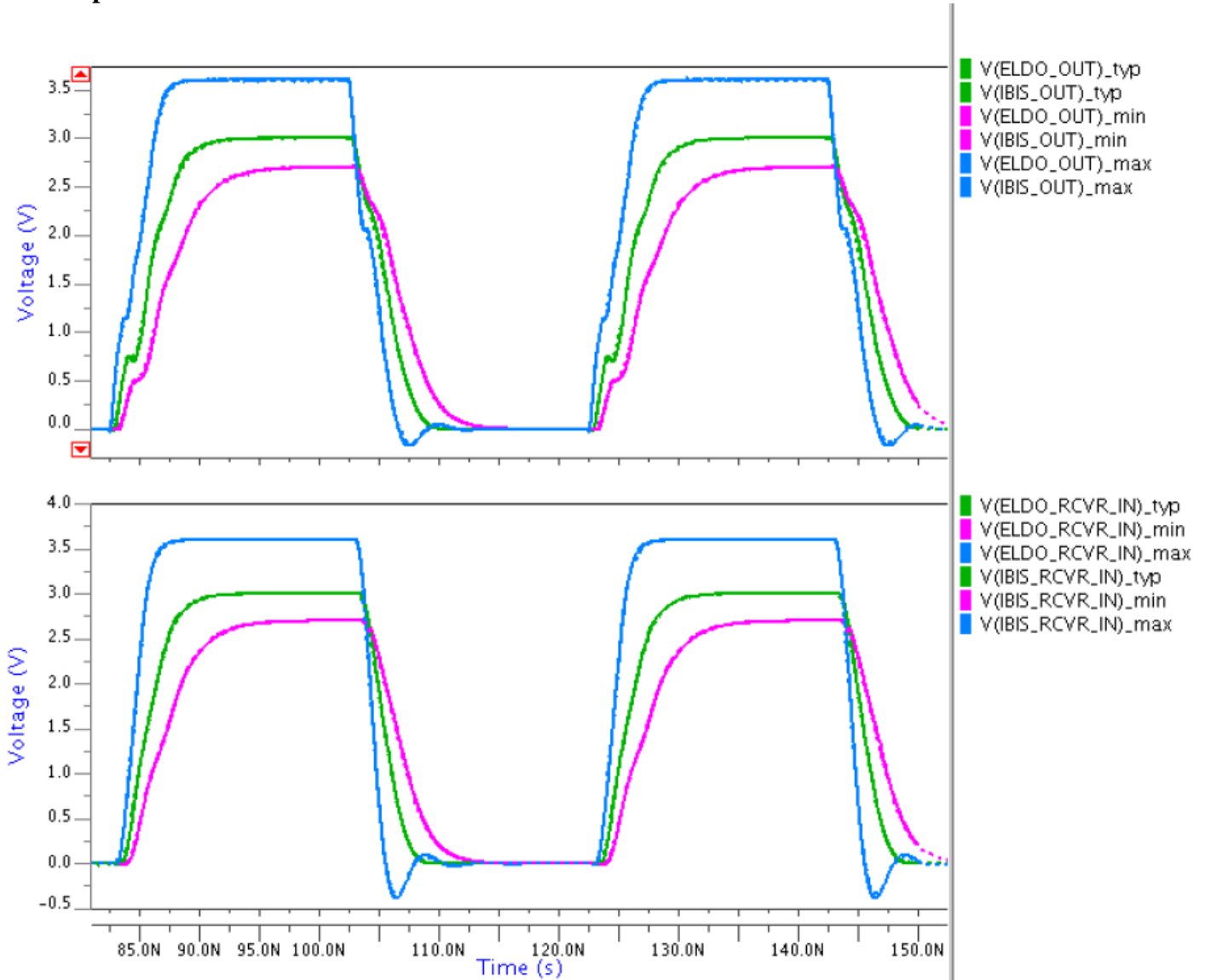**C_load=20pF**

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VCCQ: min=2.700V, typ=3.000V, max=3.600V
Package: PN = 56-Ball VFBGA, 7mm x 9mm
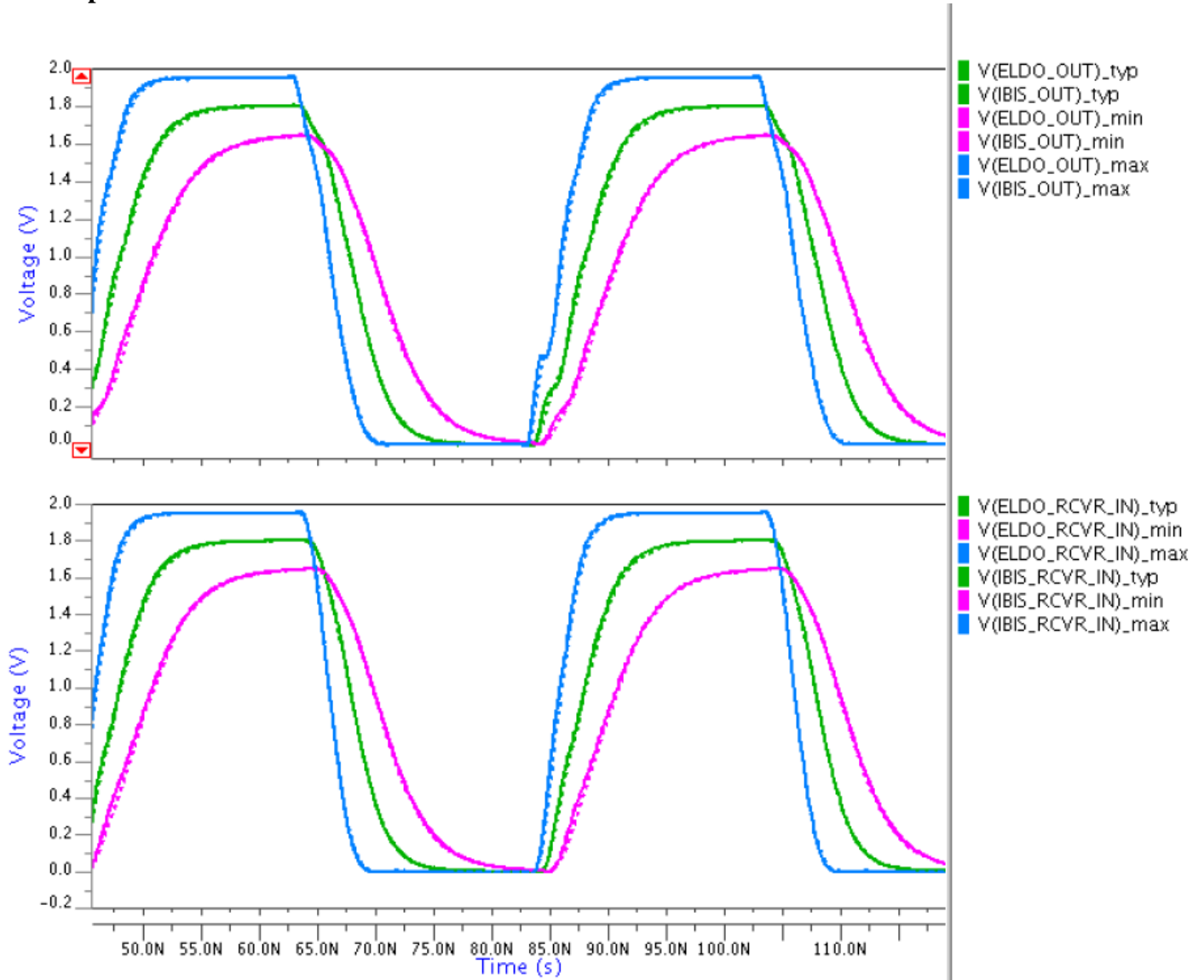**C_load=20pF**

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VCCQ: typ= 1.800V, min=1.650V, max=1.950V
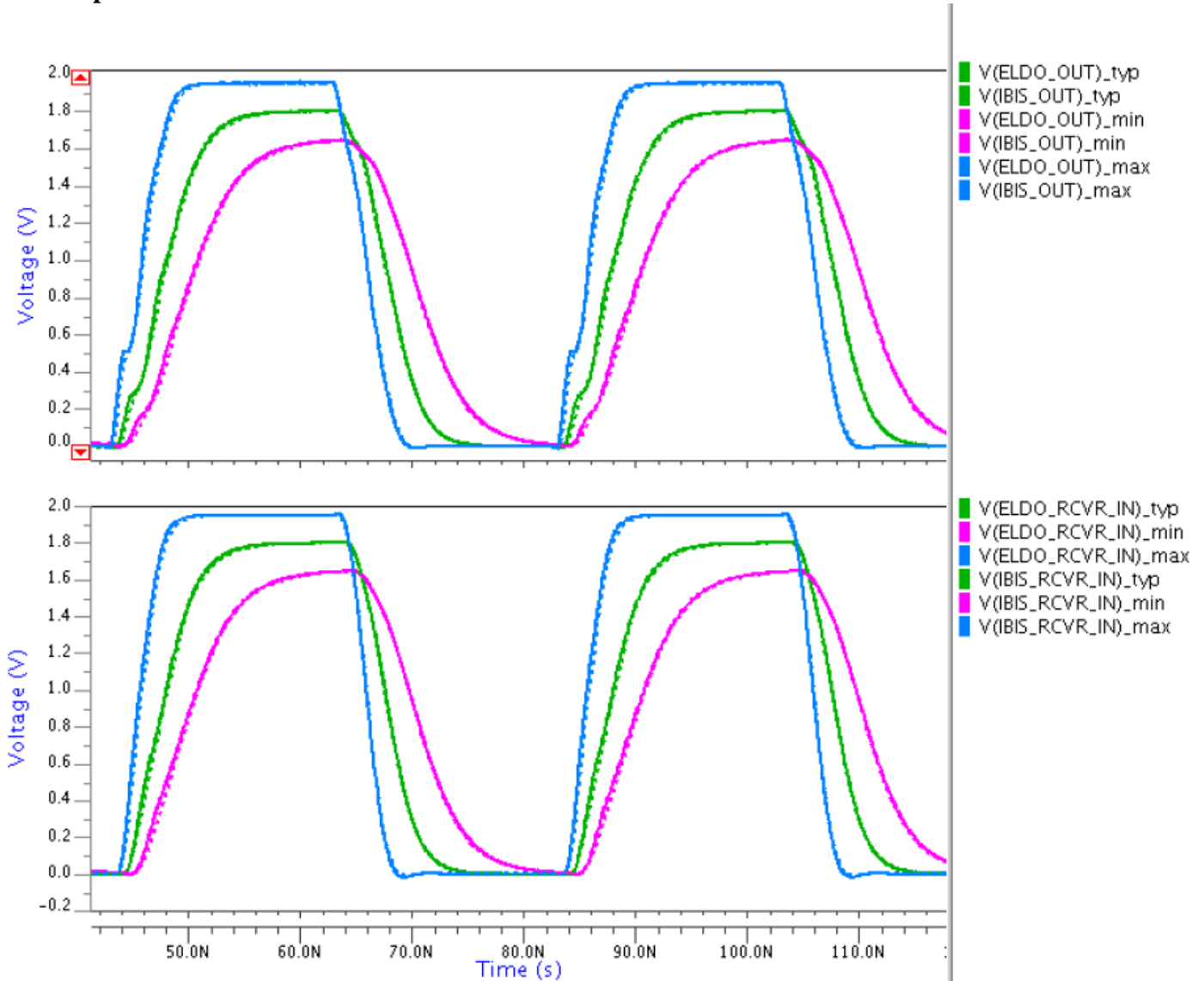**Package: PN = 56-Ball VFBGA, 7mm x 9mm**
C_load=20pF

VCCQ: typ= 1.800V, min=1.650V, max=1.950V
Package: PC = 64-ball LBGA, 11 x 13mm
C_load=20pF

Legend (top plot):
- V(ELDO_OUT)_typ
- V(IBIS_OUT)_typ
- V(ELDO_OUT)_min
- V(IBIS_OUT)_min
- V(ELDO_OUT)_max
- V(IBIS_OUT)_max

Legend (bottom plot):
- V(ELDO_RCVR_IN)_typ
- V(ELDO_RCVR_IN)_min
- V(ELDO_RCVR_IN)_max
- V(IBIS_RCVR_IN)_typ
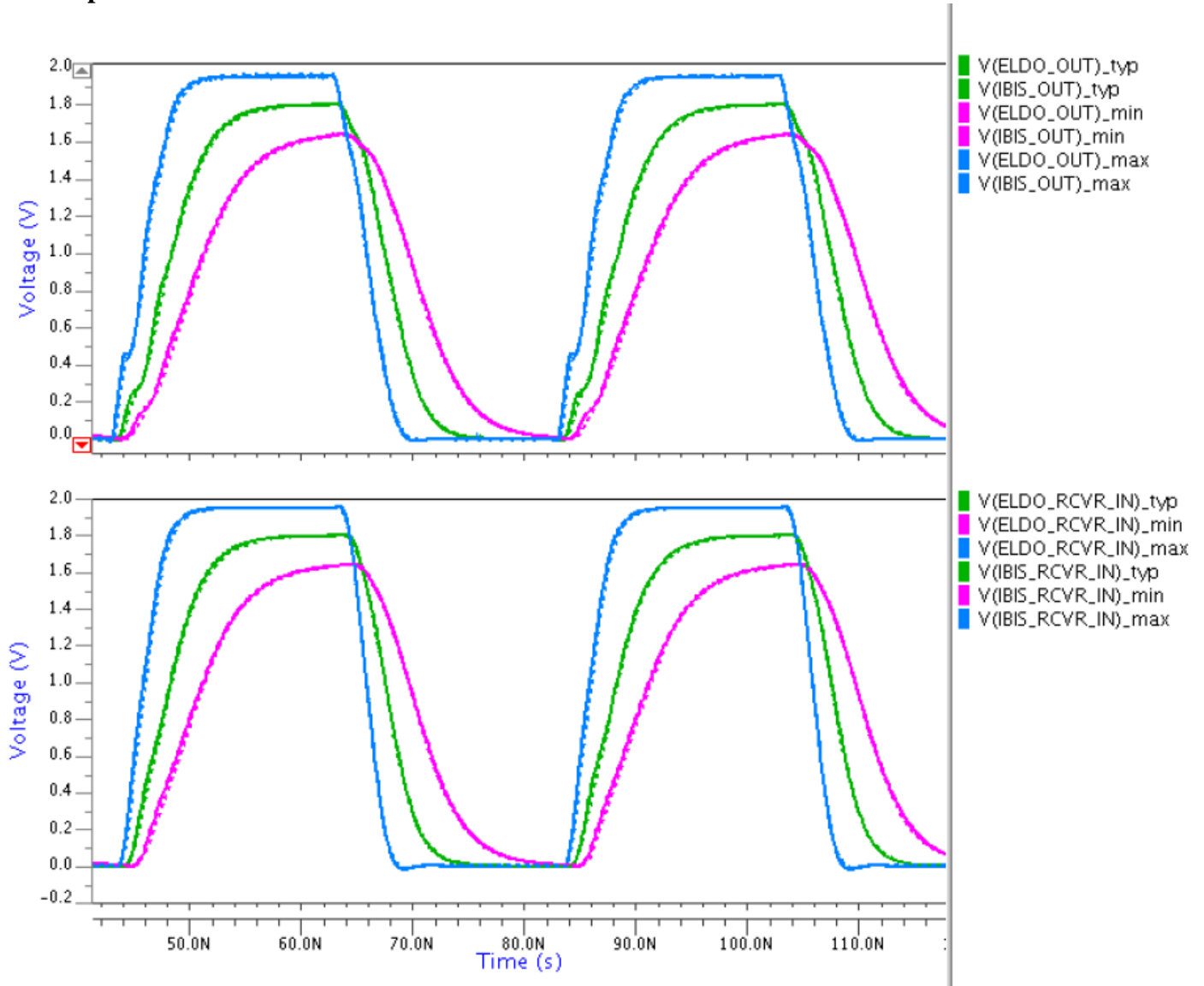- V(IBIS_RCVR_IN)_min
- V(IBIS_RCVR_IN)_max

VCCQ: typ= 1.800V, min=1.650V, max=1.950V
Package: JS = 56-pin TSOP, 14 x 20mm
C_load=20pF

Comments:

IV data matched to measurements for all three packages and both voltage ranges of operation.
Capacitance data matched to measurements for JS and PC package codes only

Document Revision History

Rev **1.1** - Date **August 22, 2014**
      a. IBIS revision **1.0**
      b. HSpice revision **N/A**
Rev **2.0** - Date **January 29, 2016**
      a. IBIS revision **2.0**
      b. HSpice revision **N/A**