PCSDRAM 100 Component Validation Summary

As part of Intel's enabling process, the following test/characterization procedure has been implemented on PC100 components. A small sample of components (2-5 devices) have been tested under the conditions described in Table 2.

The list of suppliers whose components have passed are listed in Table 1. If devices were found to be marginal to certain parameters, please see the comment section in the Table.

Table1 - Component Supplier Table

Supplier	Device	Part Number/Date Code	Comment
Fujitsu	16M - 2Mx8	MB81F16822B102FNES9745-M06	under evaluation
Hyundai	16M - 2Mx8	HY57V168010C TC-10S 9801TA	pass all parameters tested
LG	16M - 2Mx8	GM72V16821CP-7K 9752	under evaluation
Mitsubishi	16M - 2Mx8	M5M4V16S30DTP-8 811	pass all parameters tested
NEC	16M - 2Mx8	D4516821AG5-A10-7JF 9743BY018	under evaluation
Samsung	16M - 2Mx8	KM48S2020CT-GL ES 807	pass all parameters tested
Siemens	16M - 2Mx8	HYB39S16800AT-8 C9736	under evaluation
TI	16M - 2Mx8	TMX626812BDGE5M 82A1TO P	pass all parameters tested
Toshiba	16M - 2Mx8	G52805 9644MBD TC59S1608AFT-10	under evaluation
Fujitsu	64M - 8Mx8	81F64842B-103FN 9750 K01R1	pass all parameters tested
Hitachi	64M - 8Mx8	HM5264805TT-B60 9748	pass all parameters tested
Hyundai	64M - 8Mx8	HY57V658020ALTC-10P9749TA K0021E	pass all parameters tested
LG	64M - 8Mx8	LGS-M72V66841CT7J 9748	pass all parameters tested
Mitsubishi	64M - 8Mx8	M5M4V64S30ATP-8 806	pass all parameters tested
NEC	64M - 8Mx8	D4564841G5-A10-9JF ES9803E9001	under evaluation
Samsung	64M - 8Mx8	KM48S8030BT-GH 801	pass all parameters tested
Siemens	64M - 8Mx8	809SOM ZB 745812.01	under evaluation
TI	64M - 8Mx8	TMX664814A81A7ET	pass all parameters tested
Toshiba	64M - 8Mx8	A56877 9750KBD TC59S6408BFT-80	pass all parameters tested
Fujitsu	64M - 4Mx16	81F641642B-103FN 9805 MOO-41pc	pass all parameters tested
Hitachi	64M - 4Mx16	9751HM5264165TT-	pass all parameters tested

			B60	
Hyundai	64M - 4Mx16	9803HY57V651620ATC-10P	pass all parameters tested
LG	64M - 4Mx16	GM72V661641CT-7J 9807	under evaluation
Mitsubishi	64M - 4Mx16	M5M4V64S40ATP-8 810	pass all parameters tested
NEC	64M - 4Mx16	D4564163G5-A10-9JF 9803E9001	under evaluation
Samsung	64M - 4Mx16	KM416S4030BT-G10 FS 807	pass all parameters tested
Toshiba	64M - 4Mx16	TC59S6416BFT-80 9806	pass all parameters tested

Table 2. 100Mhz SDRAM Critical Parameters Test List

The list of critical parameters tested are access times, setup and hold times, drive strengths, input capacitances and input clamp characteristics. Test conditions are as follows:

Condition A: Vcc=3.6v, Ta=0C
Condition B: Vcc=3.0v, Tc= 85C

Parameter	units	Intel Spec		Test Conditions
Timing **		min	max	
Tac	ns		6	50pf load,Condition A,B
Toh	ns	3		50pf load,Condition A,B
Tset (all inputs) (need per pin results)	ns		2	Condition A,B
Thold (all inputs) (need per pin results)	ns		1	Condition A,B
Tras	clk		5	in functional pattern
Trcd	clk		2 or 3	in functional pattern
Trp	clk		2 or 3	in functional pattern
CL	clk		2 or 3	in functional pattern
Cin (Clk)	pf	2.5	4	1Mhz, 23C, 1.4v bias, 200mv peak to peak, VCC=3.3v
Cin (other inputs)	pf	2.5	5	1Mhz, 23C, 1.4v bias, 200mv peak to peak, VCC=3.3v
Cin (data pins)	pf	4.0	6.5	1Mhz, 23C, 1.4v bias, 200mv peak to peak, VCC=3.3v
vil	ns		0.8	
vih	ns	2.0v		Run worse case 100Mhz pattern at speed
Data Out I/V	ma	attached curve see fig.6 and 7	attached curve see fig.6 and 7	Conditions A, B

Vss/Vcc Clamp I/V (on DQ, CS, WE, CKE)	ma	attached curve see fig4 and 5		Vss=0v, Vcc=3.6v

Clamp and I/O driver I/V characteristics

VSS	I(ma)
-2.6	-57.23
-2.4	-45.77
-2.2	-38.26
-2	-31.22
-1.8	-24.58
-1.6	-18.37
-1.4	-12.65
-1.2	-7.57
-1	-3.37
-0.9	-1.75
-0.8	-0.58
-0.7	-0.05
-0.6	0
-0.4	0
-0.2	0
0	0

Minimum VSS Clamp Current
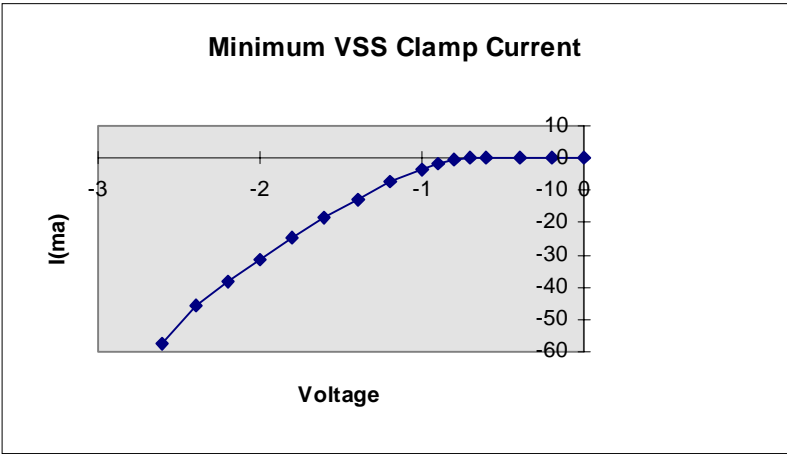
Figure 1: SDRAM VSS Clamp Characteristics

Notes:
1. Required for CK, CS, DQMB, DQ and CKE pins.
2. Must meet the temperature and voltage range specified above.
3. This drawing is not to scale. Comparisons should be made to the data table provided.

| VCC	I(ma)
2.6	18.31
2.4	15.3
2.2	12.48
2	9.83
1.8	7.35
1.6	5.06
1.4	3.02
1.2	1.34
1	0.23
0.9	0
0.8	0
0.7	0
0.6	0
0.4	0
0.2	0
0	0
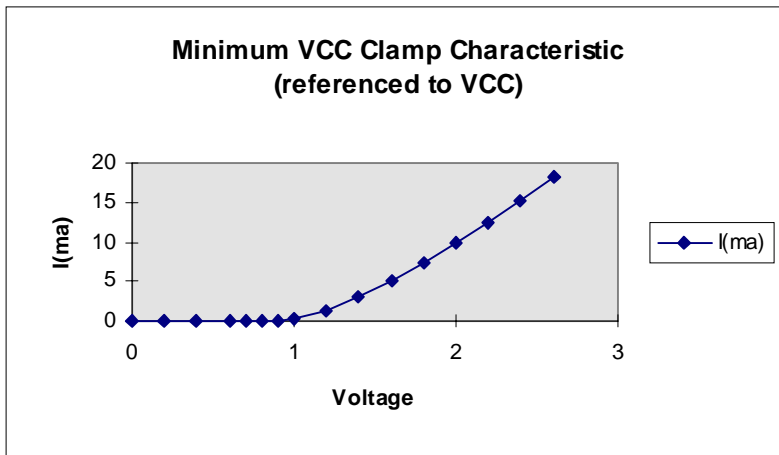
Figure 2: SDRAM VCC Clamp Characteristics

Notes:
1. Required for CK, CS, DQMB, DQ and CKE pins.
2. This data is referenced to the VCC voltage.
3. Must meet the temperature and voltage range specified above.
4. This drawing is not to scale. Comparisons should be made to the data table provided.

Pull-Down			
Voltage (V)	I (mA) 100 min	I (mA) 100 max	I (mA) 66 min
0	0.0	0.0	0.0
0.4	27.5	70.2	17.7
0.65	41.8	107.5	26.9
0.85	51.6	133.8	33.3
1	58.0	151.2	37.6
1.4	70.7	187.7	46.6
1.5	72.9	194.4	48.0
1.65	75.4	202.5	49.5
1.8	77.0	208.6	50.7
1.95	77.6	212.0	51.5
3	80.3	219.6	54.2
3.45	81.4	222.6	54.9
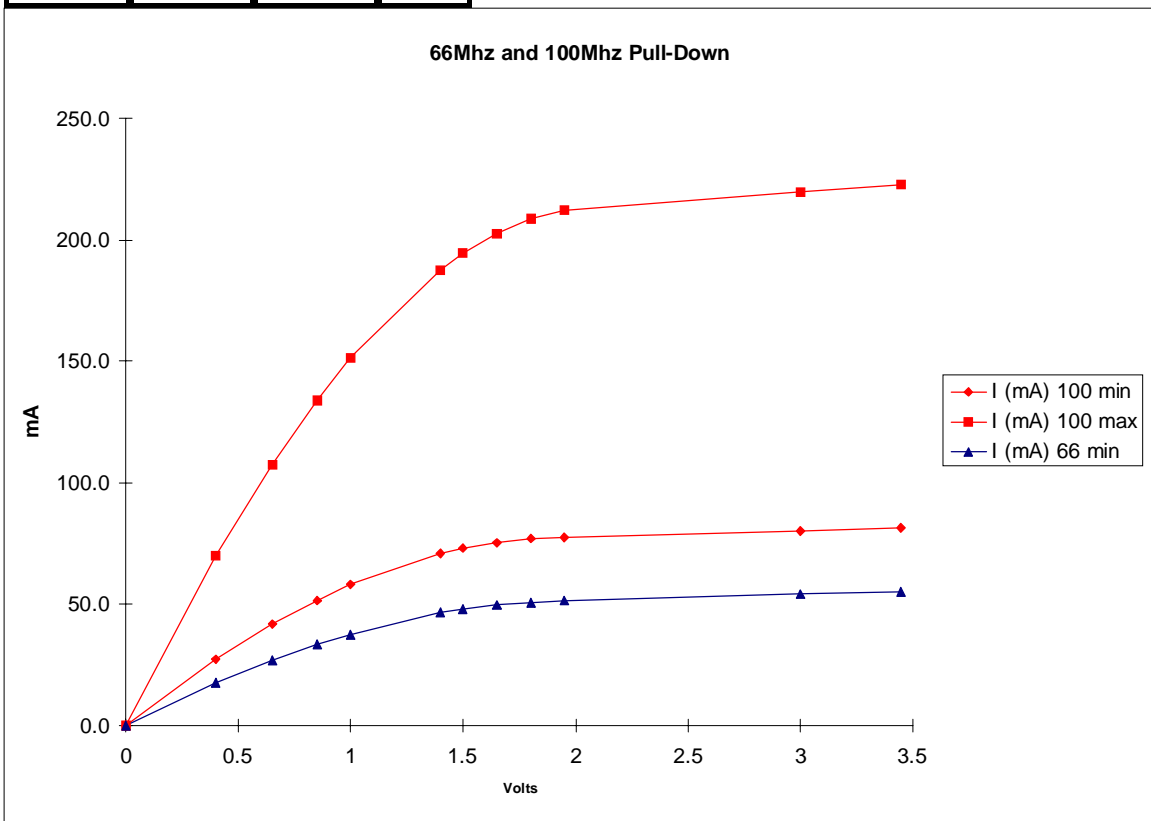
Figure 3: SDRAM DQ Output Buffer Pull-Down Characteristics

Notes:
1. Must meet the temperature and voltage range specified above.
2. This drawing is not to scale. Comparisons should be made to the data table provided.

	Pullup		
Voltage	100Mhz min	100Mhz max	66Mhz min
(V)	I(ma)	I(ma)	I(ma)
3.45		-2.4	
3.3		-27.3	
3	0	-74.1	-0.7
2.6	-21.1	-129.2	-7.5
2.4	-34.1	-153.3	-13.3
2	-58.7	-197	-27.5
1.8	-67.3	-226.2	-35.5
1.65	-73	-248	-41.1
1.5	-77.9	-269.7	-47.9
1.4	-80.8	-284.3	-52.4
1	-88.6	-344.5	-72.5
0	-93	-502.4	-93
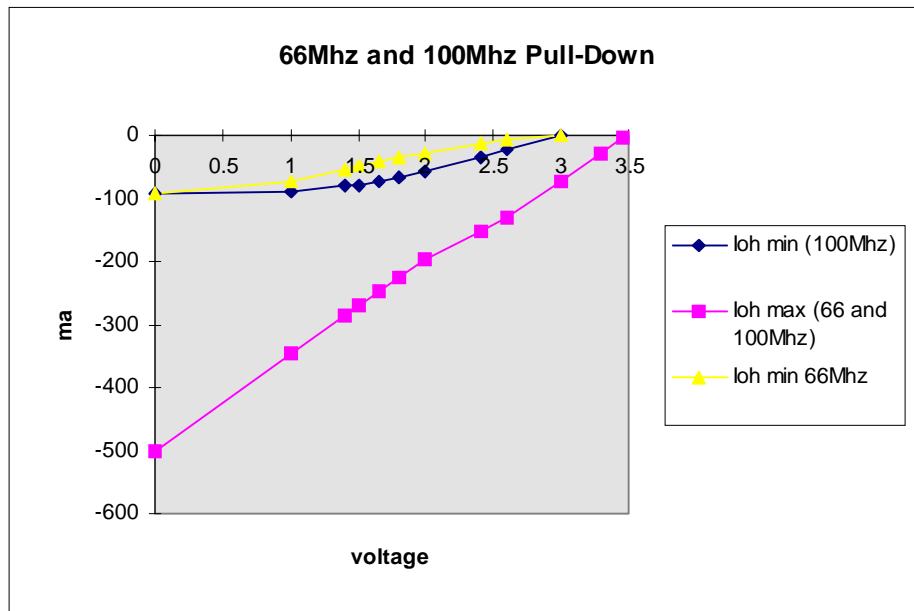
Figure 4: SDRAM DQ Output Buffer Pull-Up Characteristics
(For VCC = 3.0v - 3.45v)

Notes:
  1. Must meet the temperature and voltage range specified above.
This drawing is not to scale. Comparisons should be made to the data table provided.