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# PRODUCT/PROCESS CHANGE NOTICE (PCN)

PCN Number: **04-12**

Date Issued: **August 6, 2004**

Product(s) Affected: **PI6C180, 6C180B, 6C182, 6C182A, 6C182B, 6C184, 6C185-00, 6C185-01, 6C185-01B, PI6C185-02, 6C185-02B**

Manufacturing Location Affected: **Moving these CSMS Fab 1 product to already approved CSMS Fab 2.**

Date Effective: **November 5, 2004 (standard 90 day waiting period. (any remaining Fab 1 inventory will ship until depleted).**

Means of Distinguishing Changed Devices:

- Product Mark:
- Back Mark
- Date Code: **Added letter code \***
- Other

**\* Product will have a letter "B" as the first character of the date code for Fab 2 manufactured product.**

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Attachment:  Yes;  No

**See attached Characterization Comparison Data Report on a representative product. Data confirms Fab 2 devices have no significant performance differences than those produced in Fab 1.**

Samples: **Available upon request**

Description and Purpose of Change:

**Products are transferring from approved wafer fab subcontractor Chartered Semiconductor Manufacturing-Singapore's (CSM-S) Fab 1 to the already approved Fab 2 facility. The listed devices will be converted from their current 0.5-micron CMOS process on 150 mm wafers to Fab 2's equivalent 0.5 micron CMOS process on 200 mm wafers. CSM closed the older 150-mm wafer Fab 1 facility in March 2004. See CSM-S website for more information:**

<http://www.charteredsemi.com/media/corp/2003n/20030213.asp>

- Die Technology
- Wafer Fabrication
- Assembly Process
- Equipment
- Material
- Testing
- Manufacturing Site
- Data Sheet
- Other: **CSMS Fab 1 closure, porting to Fab 2**

Reliability/Qualification Summary: [http://www.pericom.com/pdf/gen/rel\\_CSM2.pdf](http://www.pericom.com/pdf/gen/rel_CSM2.pdf)

Customer Acknowledgement of Receipt:

Customer: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

E-Mail: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

Approval for shipments prior to effective date

Customer Comments (Optional): \_\_\_\_\_

**Date:** July 26, 2004

**Subject:** PI6C180 Full Characterization Comparison Report

**Introduction:**

The PI6C180 is a precision 1-18 Clock Buffer. Product from CSM-S Fab 1 and Fab 2 are compared side by side. This device generically represents other products in the same clock family that use the same die array: PI6C180B, 6C182, 6C182A, 6C182B, 6C184, 6C185-00, 6C185-01, 6C185-01B, PI6C185-02, 6C185-02B

**Reference:**

*New Die Array: C182*  
*CSM-S Fab 2: 0.5um, SPDM, 3.3V*  
*Date Code: AD0423OC*  
*Lot number: EA14391.2*  
*Package: SSOP (V48)*

*Old Die Array: CLK180*  
*CSM-S Fab 1: 0.5 um, SPDM, 3.3V*  
*Date Code: Z0410XC*  
*Package: SSOP (V48)*

**Data Sheet:**

PS8141E

**Equipment:**

HP power supply & DMM  
HP4145B DC Analyzer  
HP4285 LCR Meter  
TDS8000 Oscilloscope, TX P6209 Active Probe  
HP8082A Pulse generator  
Thermostream TP041000-A

**Tables:**

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**Conclusion:**

1. Both arrays meet all the data sheet requirements.
2. Both arrays can meet the 250ps skew requirement.

**Table 1. DC Characteristics**

Sym.	Test Conditions	Vcc	Fab 2			Fab 1			Data sheet		
			-10°C	25°C	90°C	-10°C	25°C	90°C	Min Spec	Max Spec	unit
V <sub>IH</sub>	Input High Volt.	3.135 V	1.565	1.570	1.590	1.545	1.555	1.595	2.0		V
V <sub>IH</sub>	Input High Volt.	3.300 V	1.660	1.665	1.685	1.645	1.655	1.695	2.0		V
V <sub>IH</sub>	Input High Volt.	3.465 V	1.755	1.760	1.780	1.725	1.740	1.780	2.0		V
V <sub>IL</sub>	Input Low Volt.	3.135 V	1.560	1.565	1.585	1.540	1.550	1.590		0.8	V
V <sub>IL</sub>	Input Low Volt.	3.300 V	1.655	1.660	1.680	1.640	1.650	1.690		0.8	V
V <sub>IL</sub>	Input Low Volt.	3.465 V	1.750	1.755	1.775	1.720	1.735	1.775		0.8	V
V <sub>OH</sub>	I <sub>OH</sub> =-1mA	3.135 V	3.12	3.12	3.12	3.12	3.12	3.12	2.4		V
V <sub>OL</sub>	I <sub>OL</sub> = 1mA	3.135 V	0.02	0.02	0.02	0.02	0.02	0.02		0.4	V
I <sub>OL</sub>	V <sub>out</sub> = 0.4 V	3.135 V	34.7 m	32.1 m	27.5 m	33.2 m	30.7 m	25.6 m		53m	A
I <sub>OL</sub>	V <sub>out</sub> = 1.0 V	3.135 V	74.5 m	68.9 m	59.4 m	70.5 m	65.4 m	55.2 m	54m		A
I <sub>OH</sub>	V <sub>out</sub> = 2.0 V	3.135 V	-85.4 m	-79.4 m	-68.7 m	-68.3 m	-63.1 m	-53.9 m	-54m		A
I <sub>OH</sub>	V <sub>out</sub> = 3.135 V	3.135 V	-45.9 u	-30.4 u	-44.1 u	69.2 u	-68.8 u	3.1 u		-46m	A
I <sub>OL</sub>	V <sub>out</sub> = 0.4 V	3.300 V	35.3 m	33.0 m	28.0 m	33.9 m	31.6 m	25.9 m		53m	A
I <sub>OL</sub>	V <sub>out</sub> = 1.0 V	3.300 V	76.6 m	71.6 m	61.0 m	73.1 m	68.1 m	56.5 m	54m		A
I <sub>OH</sub>	V <sub>out</sub> = 2.0 V	3.300 V	-98.1 m	-91.4 m	-79.3 m	-78.9 m	-73.2 m	-62.4 m	-54m		A
I <sub>OH</sub>	V <sub>out</sub> = 3.135 V	3.300 V	-15.2 m	-13.8 m	-12.1 m	-12.8 m	-11.4 m	-9.7 m		-46m	A
I <sub>OL</sub>	V <sub>out</sub> = 0.4 V	3.465 V	36.4 m	33.7 m	28.6 m	34.7 m	32.3 m	26.5 m		53m	A
I <sub>OL</sub>	V <sub>out</sub> = 1.0 V	3.465 V	79.5 m	73.7 m	63.0 m	75.4 m	70.6 m	58.3 m	54m		A
I <sub>OH</sub>	V <sub>out</sub> = 2.0 V	3.465 V	-111 m	-104 m	-90.1m	-88.6 m	-83.4 m	-71.0 m	-54m		A
I <sub>OH</sub>	V <sub>out</sub> = 3.135 V	3.465 V	-30.8 m	-27.5 m	-24.8 m	-25.5 m	-23.4 m	-19.8 m		-46m	A
I <sub>IOZ</sub>	V <sub>out</sub> = 0 V	3.465 V	-548 p	578 p	-163 p	-175 p	494 p	-10.6 n		N/A	A
I <sub>IOZ</sub>	V <sub>out</sub> = 3.465V	3.465 V	412 p	109 p	1.9 n	565 p	659 p	5.5 n		N/A	A
I <sub>IIL</sub>	V <sub>in</sub> =0V, Buf in	3.465 V	79 p	536 p	362 p	-1.4 n	-539 p	-2.4 n		5m	A
I <sub>IHH</sub>	V <sub>in</sub> =3.465V, Buf in	3.465 V	-1.7 n	346 p	2.7 n	-830 p	1.3 n	307 p		5m	A
I <sub>IIL</sub>	V <sub>in</sub> = 0 V, OE, Sdata, SClk	3.465 V	-8.7 u	-7.8 u	-6.8 u	-7.2 u	-6.6 u	-5.5 u		5m	A
I <sub>IHH</sub>	V <sub>in</sub> = 3.465V, OE, Sdata, SClk	3.465 V	-9.2 n	-10.5 n	-7.9 n	-8.2 n	-8.1 n	-4.6 n		5m	A
R <sub>p</sub>	Pullup, OE, Sdata, SClk	3.465 V	159	179	210	187	201	249		N/A	kΩ
I <sub>ccL</sub>	V <sub>in</sub> =0V	3.465 V	684 u	633 u	508 u	536 u	491 u	409 u		3m	A
I <sub>ccH</sub>	V <sub>in</sub> =3.6 V	3.465 V	682 u	633 u	505 u	537 u	491 u	409 u		3m	A

**Table 2: Vout vs. Iout, Vcc=3.135V, 25C**

Vout	Fab 2		Fab 1	
	IOL	IOH	IOL	IOH
0	-5.1 uA	-121 mA	-33.9 uA	-90.3 mA
0.25	20.7 mA	-119 mA	19.6 mA	-89.2 mA
0.50	39.7 mA	-117 mA	37.4 mA	-87.7 mA
0.75	56.1 mA	-114 mA	52.9 mA	-85.9 mA
1.00	69.6 mA	-110 mA	65.4 mA	-83.6 mA
1.25	80.0 mA	-104 mA	74.7 mA	-80.6 mA
1.50	87.4 mA	-97.7 mA	80.9 mA	-76.1 mA
1.75	92.3 mA	-88.8 mA	84.7 mA	-69.9 mA
2.00	95.1 mA	-77.8 mA	86.8 mA	-61.8 mA
2.25	96.5 mA	-64.4 mA	87.5 mA	-51.6 mA
2.50	97.4 mA	-48.7 mA	87.9 mA	-39.2 mA
2.75	97.8 mA	-30.8 mA	88.2 mA	-25.0 mA
3.00	97.6 mA	-11.0 mA	88.1 mA	-8.88 mA
3.135	97.7 mA	-30.4uA	88.1 mA	-68.8 uA

**Table 3. Output EDGE Rate, Vcc = 3.135V, 25°C**

Parameter/Condition			Fab 2		Fab 1		Data Sheet Spec				
Parameter	From	To	66 MHz	100 MHz	66 MHz	100 MHz	66 MHz		100 MHz		
							Min	Max	Min	Max	
tSDRISE	0.4V	2.4V	1.86	1.63	2.01	1.86	1.5	4.0	1.5	4.0	V/ns
tSDFALL	2.4V	0.4V	1.85	1.73	2.23	2.10	1.5	4.0	1.5	4.0	V/ns

- Only the measured output have 30pF//500 Ohm load (soldered at the end of the output trace line)

**Table 4. Propagation Delay (measured on SDRAM 15), Freq=66Mhz**

Symbol.	Vcc	Load	Fab 2			Fab 1			Max Spec	Units
			-10°C	25°C	90°C	-10°C	25°C	90°C		
tpLH	3.135 V	Load A	3.642	3.769	4.046	3.701	3.845	4.206	5.0	nS
tpHL	3.135 V	Load A	3.700	3.834	4.101	3.922	4.091	4.429	5.0	nS
tpLH	3.135 V	Load B	3.654	3.770	4.049	3.701	3.967	4.232	5.0	nS
tpHL	3.135 V	Load B	3.609	3.736	3.962	3.824	4.058	4.310	5.0	nS

Load A: 30pF

Load B: 30pF// 500Ω

**Table 5. Propagation Delay (measured on SDRAM 15), Freq=100Mhz**

Symbol	Vcc	Load	Fab 2			Fab 1			Max Spec	Units
			-10°C	25°C	90°C	-10°C	25°C	90°C		
tpLH	3.135 V	Load A	3.794	3.929	4.186	3.947	4.120	4.425	5.0	nS
tpHL	3.135 V	Load A	3.871	4.037	4.297	4.030	4.205	4.501	5.0	nS
tpLH	3.135 V	Load B	3.783	3.923	4.215	3.948	4.133	4.385	5.0	nS
tpHL	3.135 V	Load B	3.686	3.814	4.101	3.882	4.042	4.288	5.0	nS

Load A: 30pF

Load B: 30pF// 500Ω

**Table 6. Enable/Disable Timing (measured on SDRAM 15), Freq=5Mhz**

Symbol.	Vcc	Load	Fab 2			Fab 1			Max Spec	Units
			-10°C	25°C	90°C	-10°C	25°C	90°C		
tpZH	3.135 V	Load C	2.258	2.337	2.498	2.314	2.386	2.565	8.0	nS
tpHZ	3.135 V	Load C	2.480	2.530	2.654	2.783	2.856	3.024	8.0	nS
tpZL	3.135 V	Load D	2.446	2.525	2.759	2.390	2.487	2.645	8.0	nS
tpLZ	3.135 V	Load D	2.453	2.518	2.685	2.469	2.549	2.679	8.0	nS

Load C: 30pF//500Ω//500Ω

Load D: 30pF// 500Ω to Gnd, 500Ω to 2Vcc

**Table 7. Dynamic ICC, Vcc=3.465V at 25C**

	<b>Fab 2</b>	<b>Fab 1</b>	Units
66 MHz	197	181	mA
100 MHz	316	288	mA

-all outputs have 30pF load

-30pF load includes the probe, header pin and board capacitance

-BUF\_IN is switching from 0 to 3V

**Table 8. Capacitance, 25C**

Symb.	Pin	Vcc	<b>Fab 2</b>	<b>Fab 1</b>	TYP Spec	unit
<b>Cin</b>	Buf In	3.3 V	4.6	4.8	5.0	pF
<b>Cin</b>	OE	3.3 V	4.8	5.0	5.0	pF
<b>Cin</b>	SDATA	3.3 V	4.8	5.0	5.0	pF
<b>Cin</b>	SCLOCK	3.3 V	4.8	5.0	5.0	pF
<b>Cout</b>	SDRAM	3.3 V	6.3	6.6	6.0	pF

**Table 9. Propagation delay of all Outputs, Vcc=3.135V, 25C, Freq=66Mhz**

Pin #	Pin Name	<b>Fab 2</b>			<b>Fab 1</b>			unit
		LH	HL	Skew (LH-HL)	LH	HL	Skew (LH-HL)	
<b>4</b>	<b>SDRAM 0</b>	3.811	3.826	<b>0.015</b>	3.838	4.045	<b>0.207</b>	ns
<b>5</b>	<b>SDRAM 1</b>	3.838	3.839	<b>0.001</b>	3.903	4.018	<b>0.115</b>	ns
<b>8</b>	<b>SDRAM 2</b>	3.767	3.798	<b>0.031</b>	3.844	4.015	<b>0.171</b>	ns
<b>9</b>	<b>SDRAM 3</b>	3.798	3.807	<b>0.009</b>	3.879	3.981	<b>0.102</b>	ns
<b>13</b>	<b>SDRAM 4</b>	3.746	3.771	<b>0.025</b>	3.826	3.980	<b>0.154</b>	ns
<b>14</b>	<b>SDRAM 5</b>	3.770	3.786	<b>0.016</b>	3.858	3.964	<b>0.106</b>	ns
<b>17</b>	<b>SDRAM 6</b>	3.762	3.792	<b>0.030</b>	3.824	3.981	<b>0.157</b>	ns
<b>18</b>	<b>SDRAM 7</b>	3.788	3.794	<b>0.006</b>	3.844	3.980	<b>0.136</b>	ns
<b>21</b>	<b>SDRAM 16</b>	3.740	3.771	<b>0.031</b>	3.787	3.963	<b>0.176</b>	ns
<b>28</b>	<b>SDRAM 17</b>	3.728	3.758	<b>0.030</b>	3.815	3.970	<b>0.155</b>	ns
<b>31</b>	<b>SDRAM 8</b>	3.770	3.791	<b>0.021</b>	3.850	3.966	<b>0.116</b>	ns
<b>32</b>	<b>SDRAM 9</b>	3.738	3.774	<b>0.036</b>	3.822	4.001	<b>0.179</b>	ns
<b>35</b>	<b>SDRAM 10</b>	3.758	3.789	<b>0.031</b>	3.853	3.969	<b>0.116</b>	ns
<b>36</b>	<b>SDRAM 11</b>	3.740	3.775	<b>0.035</b>	3.837	4.022	<b>0.185</b>	ns
<b>40</b>	<b>SDRAM 12</b>	3.781	3.795	<b>0.014</b>	3.880	3.998	<b>0.118</b>	ns
<b>41</b>	<b>SDRAM 13</b>	3.745	3.784	<b>0.039</b>	3.842	4.029	<b>0.187</b>	ns
<b>44</b>	<b>SDRAM 14</b>	3.829	3.832	<b>0.003</b>	3.922	4.059	<b>0.137</b>	ns
<b>45</b>	<b>SDRAM 15</b>	3.779	3.827	<b>0.048</b>	3.891	4.106	<b>0.215</b>	ns
<b>Skew(same transition)</b>		<b>0.110</b>	<b>0.081</b>		<b>0.135</b>	<b>0.143</b>		

Using 6C180V Evaluation Board (Load=30pF at the end of trace line)

**Table 10. Propagation delay of all Outputs, Vcc=3.135V, 25C, Freq=100Mhz**

Pin #	Pin Name	Fab 2			Fab 1			unit
		LH	HL	Skew (LH-HL)	LH	HL	Skew (LH-HL)	
4	SDRAM 0	3.902	3.959	<b>0.057</b>	4.157	4.194	<b>0.037</b>	ns
5	SDRAM 1	3.986	4.071	<b>0.085</b>	4.157	4.187	<b>0.030</b>	ns
8	SDRAM 2	3.909	4.002	<b>0.093</b>	4.097	4.179	<b>0.082</b>	ns
9	SDRAM 3	3.948	4.071	<b>0.123</b>	4.112	4.202	<b>0.090</b>	ns
13	SDRAM 4	3.913	4.006	<b>0.093</b>	4.066	4.154	<b>0.088</b>	ns
14	SDRAM 5	3.927	4.044	<b>0.117</b>	4.078	4.162	<b>0.084</b>	ns
17	SDRAM 6	3.916	4.029	<b>0.113</b>	4.044	4.155	<b>0.111</b>	ns
18	SDRAM 7	3.931	4.045	<b>0.114</b>	4.056	4.165	<b>0.109</b>	ns
21	SDRAM 16	3.890	3.981	<b>0.091</b>	3.996	4.121	<b>0.125</b>	ns
28	SDRAM 17	3.879	3.998	<b>0.119</b>	4.001	4.147	<b>0.146</b>	ns
31	SDRAM 8	3.906	4.038	<b>0.132</b>	4.050	4.166	<b>0.116</b>	ns
32	SDRAM 9	3.884	4.001	<b>0.117</b>	4.040	4.183	<b>0.143</b>	ns
35	SDRAM 10	3.900	4.029	<b>0.129</b>	4.065	4.156	<b>0.091</b>	ns
36	SDRAM 11	3.884	3.996	<b>0.112</b>	4.071	4.192	<b>0.121</b>	ns
40	SDRAM 12	3.927	4.043	<b>0.116</b>	4.101	4.194	<b>0.093</b>	ns
41	SDRAM 13	3.898	4.005	<b>0.107</b>	4.079	4.194	<b>0.115</b>	ns
44	SDRAM 14	4.002	4.107	<b>0.105</b>	4.187	4.246	<b>0.059</b>	ns
45	SDRAM 15	3.963	4.052	<b>0.089</b>	4.171	4.259	<b>0.088</b>	ns
<b>Skew(same transition)</b>		<b>0.123</b>	<b>0.148</b>		<b>0.191</b>	<b>0.138</b>		

Using 6C180V Evaluation Board (Load=30pF at the end of trace line)

**Table 11. Propagation delay of all Outputs, Vcc=3.30V, 25C, Freq=66Mhz**

Pin #	Pin Name	Fab 2			Fab 1			unit
		LH	HL	Skew (LH-HL)	LH	HL	Skew (LH-HL)	
4	SDRAM 0	3.712	3.736	<b>0.024</b>	3.681	3.869	<b>0.188</b>	ns
5	SDRAM 1	3.732	3.748	<b>0.016</b>	3.771	3.883	<b>0.112</b>	ns
8	SDRAM 2	3.667	3.700	<b>0.033</b>	3.716	3.878	<b>0.162</b>	ns
9	SDRAM 3	3.702	3.710	<b>0.008</b>	3.749	3.846	<b>0.097</b>	ns
13	SDRAM 4	3.660	3.689	<b>0.029</b>	3.702	3.848	<b>0.146</b>	ns
14	SDRAM 5	3.679	3.694	<b>0.015</b>	3.737	3.836	<b>0.099</b>	ns
17	SDRAM 6	3.660	3.707	<b>0.047</b>	3.713	3.858	<b>0.145</b>	ns
18	SDRAM 7	3.682	3.711	<b>0.029</b>	3.731	3.852	<b>0.121</b>	ns
21	SDRAM 16	3.635	3.684	<b>0.049</b>	3.676	3.834	<b>0.158</b>	ns
28	SDRAM 17	3.632	3.670	<b>0.038</b>	3.699	3.845	<b>0.146</b>	ns
31	SDRAM 8	3.674	3.704	<b>0.030</b>	3.734	3.835	<b>0.101</b>	ns
32	SDRAM 9	3.648	3.692	<b>0.044</b>	3.709	3.879	<b>0.170</b>	ns
35	SDRAM 10	3.667	3.708	<b>0.041</b>	3.736	3.838	<b>0.102</b>	ns
36	SDRAM 11	3.647	3.694	<b>0.047</b>	3.721	3.890	<b>0.169</b>	ns
40	SDRAM 12	3.692	3.711	<b>0.019</b>	3.759	3.865	<b>0.106</b>	ns
41	SDRAM 13	3.656	3.702	<b>0.046</b>	3.727	3.898	<b>0.171</b>	ns
44	SDRAM 14	3.733	3.752	<b>0.019</b>	3.800	3.930	<b>0.130</b>	ns
45	SDRAM 15	3.691	3.750	<b>0.059</b>	3.772	3.979	<b>0.207</b>	ns
<b>Skew(same transition)</b>		<b>0.101</b>	<b>0.082</b>		<b>0.124</b>	<b>0.145</b>		

Using 6C180V Evaluation Board (Load=30pF at the end of trace line)

**Table 12. Propagation delay of all Outputs, Vcc=3.30V, 25C, Freq=100Mhz**

Pin #	Pin Name	Fab 2			Fab 1			unit
		LH	HL	Skew (LH-HL)	LH	HL	Skew (LH-HL)	
4	SDRAM 0	3.887	3.951	<b>0.064</b>	4.050	4.097	<b>0.047</b>	ns
5	SDRAM 1	3.916	4.004	<b>0.088</b>	4.052	4.085	<b>0.033</b>	ns
8	SDRAM 2	3.853	3.946	<b>0.093</b>	3.986	4.073	<b>0.087</b>	ns
9	SDRAM 3	3.888	4.001	<b>0.113</b>	4.008	4.096	<b>0.088</b>	ns
13	SDRAM 4	3.849	3.949	<b>0.100</b>	3.952	4.051	<b>0.099</b>	ns
14	SDRAM 5	3.875	3.992	<b>0.117</b>	3.970	4.060	<b>0.090</b>	ns
17	SDRAM 6	3.860	3.976	<b>0.116</b>	3.932	4.061	<b>0.129</b>	ns
18	SDRAM 7	3.877	4.002	<b>0.125</b>	3.947	4.072	<b>0.125</b>	ns
21	SDRAM 16	3.834	3.922	<b>0.088</b>	3.884	4.025	<b>0.141</b>	ns
28	SDRAM 17	3.820	3.948	<b>0.128</b>	3.892	4.050	<b>0.158</b>	ns
31	SDRAM 8	3.855	3.985	<b>0.130</b>	3.936	4.067	<b>0.131</b>	ns
32	SDRAM 9	3.837	3.951	<b>0.114</b>	3.923	4.078	<b>0.155</b>	ns
35	SDRAM 10	3.854	3.974	<b>0.120</b>	3.951	4.057	<b>0.106</b>	ns
36	SDRAM 11	3.838	3.942	<b>0.104</b>	3.953	4.087	<b>0.134</b>	ns
40	SDRAM 12	3.882	3.987	<b>0.105</b>	3.987	4.093	<b>0.106</b>	ns
41	SDRAM 13	3.848	3.948	<b>0.100</b>	3.965	4.091	<b>0.126</b>	ns
44	SDRAM 14	3.950	4.043	<b>0.093</b>	4.074	4.143	<b>0.069</b>	ns
45	SDRAM 15	3.909	3.996	<b>0.087</b>	4.057	4.154	<b>0.097</b>	ns
<b>Skew(same transition)</b>		<b>0.130</b>	<b>0.121</b>		<b>0.190</b>	<b>0.129</b>		

Using 6C180V Evaluation Board (Load=30pF at the end of trace line)

**Table 13. Propagation delay of all Outputs, Vcc=3.465V, 25C, Freq=66Mhz**

Pin #	Pin Name	Fab 2			Fab 1			unit
		LH	HL	Skew (LH-HL)	LH	HL	Skew (LH-HL)	
4	SDRAM 0	3.605	3.610	<b>0.005</b>	3.678	3.838	<b>0.160</b>	ns
5	SDRAM 1	3.651	3.641	<b>0.010</b>	3.720	3.804	<b>0.084</b>	ns
8	SDRAM 2	3.603	3.611	<b>0.008</b>	3.665	3.792	<b>0.127</b>	ns
9	SDRAM 3	3.636	3.619	<b>0.017</b>	3.693	3.758	<b>0.065</b>	ns
13	SDRAM 4	3.600	3.594	<b>0.006</b>	3.608	3.733	<b>0.125</b>	ns
14	SDRAM 5	3.628	3.613	<b>0.015</b>	3.671	3.742	<b>0.071</b>	ns
17	SDRAM 6	3.613	3.615	<b>0.002</b>	3.646	3.763	<b>0.117</b>	ns
18	SDRAM 7	3.635	3.619	<b>0.016</b>	3.663	3.757	<b>0.094</b>	ns
21	SDRAM 16	3.589	3.593	<b>0.004</b>	3.609	3.742	<b>0.133</b>	ns
28	SDRAM 17	3.581	3.582	<b>0.001</b>	3.628	3.747	<b>0.119</b>	ns
31	SDRAM 8	3.620	3.615	<b>0.005</b>	3.661	3.736	<b>0.075</b>	ns
32	SDRAM 9	3.593	3.605	<b>0.012</b>	3.637	3.779	<b>0.142</b>	ns
35	SDRAM 10	3.616	3.620	<b>0.004</b>	3.662	3.739	<b>0.077</b>	ns
36	SDRAM 11	3.595	3.609	<b>0.014</b>	3.645	3.791	<b>0.146</b>	ns
40	SDRAM 12	3.642	3.627	<b>0.015</b>	3.682	3.771	<b>0.089</b>	ns
41	SDRAM 13	3.609	3.621	<b>0.012</b>	3.653	3.801	<b>0.148</b>	ns
44	SDRAM 14	3.683	3.671	<b>0.012</b>	3.720	3.835	<b>0.115</b>	ns
45	SDRAM 15	3.644	3.670	<b>0.026</b>	3.689	3.879	<b>0.190</b>	ns
<b>Skew(same transition)</b>		<b>0.102</b>	<b>0.089</b>		<b>0.112</b>	<b>0.146</b>		

Using 6C180V Evaluation Board (Load=30pF at the end of trace line)

Table 14. Propagation delay of all Outputs, Vcc=3.465V, 25C, Freq=100Mhz

Pin #	Pin Name	Fab 2			Fab 1			unit
		LH	HL	Skew (LH-HL)	LH	HL	Skew (LH-HL)	
4	SDRAM 0	3.868	3.925	<b>0.057</b>	3.908	3.957	<b>0.049</b>	ns
5	SDRAM 1	3.896	3.978	<b>0.082</b>	3.936	3.969	<b>0.033</b>	ns
8	SDRAM 2	3.813	3.902	<b>0.089</b>	3.876	3.958	<b>0.082</b>	ns
9	SDRAM 3	3.844	3.958	<b>0.114</b>	3.898	3.981	<b>0.083</b>	ns
13	SDRAM 4	3.800	3.897	<b>0.097</b>	3.852	3.942	<b>0.090</b>	ns
14	SDRAM 5	3.827	3.929	<b>0.102</b>	3.868	3.951	<b>0.083</b>	ns
17	SDRAM 6	3.810	3.923	<b>0.113</b>	3.839	3.953	<b>0.114</b>	ns
18	SDRAM 7	3.828	3.940	<b>0.112</b>	3.857	3.969	<b>0.112</b>	ns
21	SDRAM 16	3.782	3.864	<b>0.082</b>	3.796	3.919	<b>0.123</b>	ns
28	SDRAM 17	3.763	3.889	<b>0.126</b>	3.807	3.949	<b>0.142</b>	ns
31	SDRAM 8	3.809	3.933	<b>0.124</b>	3.851	3.971	<b>0.120</b>	ns
32	SDRAM 9	3.786	3.896	<b>0.110</b>	3.834	3.983	<b>0.149</b>	ns
35	SDRAM 10	3.809	3.923	<b>0.114</b>	3.867	3.959	<b>0.092</b>	ns
36	SDRAM 11	3.788	3.886	<b>0.098</b>	3.867	3.990	<b>0.123</b>	ns
40	SDRAM 12	3.832	3.932	<b>0.100</b>	3.904	3.996	<b>0.092</b>	ns
41	SDRAM 13	3.799	3.895	<b>0.096</b>	3.879	3.993	<b>0.114</b>	ns
44	SDRAM 14	3.897	3.988	<b>0.091</b>	3.989	4.050	<b>0.061</b>	ns
45	SDRAM 15	3.852	3.943	<b>0.091</b>	3.972	4.059	<b>0.087</b>	ns
Skew(same transition)		<b>0.134</b>	<b>0.124</b>		<b>0.193</b>	<b>0.140</b>		

Using 6C180V Evaluation Board (Load=30pF at the end of trace line)

Table 15: Undershoot and Ringback, Cl=30pF, Vcc=3.3V, 25C (all outputs switching)

Output Pin #	Pin Name	Fab 2		Fab 1		
		Under Shoot	Ring Back	Under Shoot	Ring Back	
4	SDRAM 0	-0.87	0.44	-0.91	0.43	V
5	SDRAM 1	-0.83	0.40	-0.84	0.39	V
8	SDRAM 2	-0.81	0.39	-0.86	0.41	V
9	SDRAM 3	-0.74	0.35	-0.76	0.36	V
13	SDRAM 4	-0.77	0.36	-0.81	0.38	V
14	SDRAM 5	-0.73	0.32	-0.74	0.34	V
17	SDRAM 6	-0.75	0.37	-0.81	0.38	V
18	SDRAM 7	-0.72	0.35	-0.78	0.36	V
21	SDRAM 16	-0.70	0.33	-0.73	0.35	V
28	SDRAM 17	-0.68	0.31	-0.69	0.33	V
31	SDRAM 8	-0.72	0.33	-0.72	0.33	V
32	SDRAM 9	-0.77	0.37	-0.79	0.38	V
35	SDRAM 10	-0.75	0.35	-0.77	0.36	V
36	SDRAM 11	-0.78	0.38	-0.82	0.39	V
40	SDRAM 12	-0.75	0.35	-0.77	0.36	V
41	SDRAM 13	-0.80	0.38	-0.84	0.39	V
44	SDRAM 14	-0.83	0.40	-0.86	0.41	V
45	SDRAM 15	-0.89	0.43	-0.94	0.44	V
MIN		<b>-0.89</b>	<b>0.31</b>	<b>-0.94</b>	<b>0.33</b>	V
MAX		<b>-0.68</b>	<b>0.44</b>	<b>-0.69</b>	<b>0.44</b>	V

Table 16: **Fab 1** Overshoot and Ringback, Cl=30pF, Vcc=3.3V, 25C (all outputs switching)

Output Pin #	Pin Name	<b>Fab 2</b>		<b>Fab 1</b>		
		Overshoot Level	Ringback Level	Overshoot Level	Ringback Level	
4	SDRAM 0	4.34	2.93	4.10	3.08	V
5	SDRAM 1	4.38	2.89	4.14	3.06	V
8	SDRAM 2	4.38	2.90	4.16	3.04	V
9	SDRAM 3	4.42	2.85	4.19	3.02	V
13	SDRAM 4	4.39	2.90	4.14	3.05	V
14	SDRAM 5	4.43	2.86	4.19	3.03	V
17	SDRAM 6	4.41	2.87	4.17	3.04	V
18	SDRAM 7	4.46	2.84	4.20	3.01	V
21	SDRAM 16	4.33	2.93	4.06	3.08	V
28	SDRAM 17	4.38	2.90	4.11	3.05	V
31	SDRAM 8	4.45	2.86	4.19	3.03	V
32	SDRAM 9	4.42	2.89	4.15	3.05	V
35	SDRAM 10	4.43	2.88	4.17	3.05	V
36	SDRAM 11	4.38	2.92	4.13	3.07	V
40	SDRAM 12	4.44	2.87	4.18	3.04	V
41	SDRAM 13	4.37	2.91	4.14	3.06	V
44	SDRAM 14	4.42	2.87	4.17	3.05	V
45	SDRAM 15	4.37	2.91	4.12	3.07	V
MIN		<b>4.33</b>	<b>2.84</b>	<b>4.06</b>	<b>3.01</b>	V
MAX		<b>4.46</b>	<b>2.93</b>	<b>4.20</b>	<b>3.08</b>	V