PERICOM Semiconductor Corporation

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Date: December 16, 2003

Subject: PI3C3245 Characterization Report

Introduction

The PI3C3245 is a 2.5V/3.3V, High Bandwidth, Hot Insertion, 8-Bit, 2-Port Bus Switch. PB22 array is from CSM FAB-2. Ron and AC measurements are done side by side with the existing array CPBS24 array. This device is also available in two and four die versions as PI3C32X245 and PI3C34X245.

Reference

New Array: PB22-ENG-U01
Process: CSM Fab 2, 0.5µm, 1P2M, 3.3V
Date Code: EZ40284.1J
Lot #: Z0346ZC
Package: QSOP (Q20)

Old Array: CPBS24
Process: CSM Fab 1, 0.5µm, 1P2M, 3.3V
Date Code: W0304AOC
Lot #: 208574
Package: QSOP (Q20)

Test Equipment

DG2040 Data Generator
HP power supply & DMM
HP4145B DC Analyzer
HP4195A Spectrum Analyzer
HP4285A LCR Meter
TDS8000 Oscilloscope
HP8082A Pulse Generator
HP8110A Pulse Generator
Thermostream TP041000-A

Tables:

Table 1: DC Characteristics
Table 2: Ron Measurements, all paths, Vcc=3.0V, 25C
Table 3: Capacitance at 25C
Table 4: AC Characteristics
Table 5: Dynamic Icc, Vcc=3.6V, 25C

Conclusion:

1. Both arrays meet all the requirements.
2. I/O pins are 5V tolerant for both arrays.
3. Ron of Fab 2 array is somewhat lower than that of the Fab 1 array.
4. The new Fab 2 array is slightly faster than the old Fab 1 array.

Table 1. DC Characteristics

			Fab 2			Fab 1			Spec		
Param.	**Test Conditions**	**Vcc**	**-10°C**	**25°C**	**90°C**	**-10°C**	**25°C**	**90°C**	**Min**	**Max**	**Units**
VIH	Input High Volt.	3.0V	1.295	1.305	1.320	1.250	1.255	1.270	2.0		V
VIH	Input High Volt.	3.3V	1.425	1.435	1.455	1.375	1.380	1.395	2.0		V
VIH	Input High Volt.	3.6V	1.560	1.570	1.590	1.495	1.505	1.525	2.0		V
VIL	Input Low Volt.	3.0V	1.330	1.340	1.355	1.295	1.300	1.310		0.8	V
VIL	Input Low Volt.	3.3V	1.470	1.475	1.495	1.420	1.425	1.440		0.8	V
VIL	Input Low Volt.	3.6V	1.605	1.615	1.635	1.550	1.555	1.570		0.8	V
VH	Input Hysteresis	3.0V	35	35	35	45	45	40		n/a	mV
VH	Input Hysteresis	3.3V	45	40	40	45	45	45		n/a	mV
VH	Input Hysteresis	3.6V	45	45	45	55	50	45		n/a	mV
IIL	Vin=0V	3.6V	177 p	-46.9 n	-188 n	-39.8 n	-2.75 n	-41.2 n		± 1u	A
IIH	Vin=3.6V	3.6V	-408 p	325 p	4.07 n	-403 p	-407 p	864 p		± 1u	A
IIH	Vin=5.5V	3.6V	397 p	463 p	5.70 n	-583 p	298 p	1.38 n		± 1u	A
IOZL	Vout=0V	3.6V	620 p	-545 p	-7.32 n	-165 p	-334 p	-3.06 n		± 1u	A
IOZH	Vout=3.6V	3.6V	-427 p	739 p	11.3 n	-660 p	782 p	4.64 n		± 1u	A
IOZH	Vout=5.5V	3.6V	756 p	-245 p	14.7 n	571 p	-626 p	4.76 n		± 1u	A
VIK	Iin=-18mA, /BE	3.0V	-0.83	-0.79	-0.71	-0.79	-0.83	-0.73		-1.2	V
VIK	Iin=-18mA, A/B	3.0V	-0.77	-0.76	-0.70	-0.74	-0.77	-0.68		-1.2	V
ICCL	Vin=0V	3.6V	345	320	291	359	314	292		500	uA
ICCH	Vin=3.6V	3.6V	295	263	214	289	241	205		500	uA
ΔICC	Vin=3.0V	3.6V	298	272	263	289	239	213		750	uA
Ron	Ion = 48mA, Vin=0V	3.0V	4.29	4.56	5.42	4.77	5.17	6.25		7	Ω
Ron	Ion = 15mA, Vin=2.4V	3.0V	6.76	7.26	8.69	8.32	9.24	11.5		15	Ω

Ron is measured using 3C3245 arrays

Table 2. Ron Measurement, all paths, Vcc=3.0V, 25C

	Fab 2		Fab 1		
Channel	**Ion=48mA Vin=0V**	**Ion=15mA Vin=2.4V**	**Ion=48mA Vin=0V**	**Ion=15mA Vin=2.4V**	**Units**
A0-B0	4.51	5.02	5.15	9.10	Ω
A1-B1	4.60	6.84	5.17	9.24	Ω
A2-B2	4.52	7.20	5.08	9.06	Ω
A3-B3	4.56	7.26	5.17	9.24	Ω
A4-B4	4.52	7.20	5.10	9.12	Ω
A5-B5	4.62	7.33	5.13	9.12	Ω
A6-B6	4.52	7.20	5.06	9.00	Ω
A7-B7	4.52	7.20	5.12	9.12	Ω

Table 3. Capacitance at 25C

Symbol	Description	Vcc	Fab 2	Fab 1	Typ	Units
Cin	Control Input	3.3 V	3.0	2.9	3.5	pF
Coff	A Cap, Switch Off	3.3 V	4.4	4.6	5.0	pF
Coff	B Cap, Switch Off	3.3V	4.6	4.8	5.0	pF
Con	A-B, Switch On	3.3 V	10.1	11.0	10	pF

HP4285A LCR Meter

Table 4. AC Characteristics

			Fab 2			Fab 1				
Symbol	**Vcc**	**Load**	**-10°C**	**25°C**	**90°C**	**-10°C**	**25°C**	**90°C**	**Max Spec**	**Units**
tpZH	2.3V	Load A	3.74	3.84	4.13	5.24	5.52	6.34	9.8	ns
tpHZ	2.3V	Load A	2.76	2.82	2.92	3.06	3.15	3.31	8.3	ns
tpZH	3.0V	Load A	2.98	3.09	3.30	3.88	4.04	4.42	6.5	ns
tpHZ	3.0V	Load A	1.91	2.03	2.10	2.12	2.19	2.34	5.5	ns
tpZL	2.3V	Load B	3.28	3.40	3.60	4.32	4.50	4.80	9.8	ns
tpLZ	2.3V	Load B	4.22	4.35	4.65	4.56	4.73	5.00	8.3	ns
tpZL	3.0V	Load B	2.64	2.73	2.91	3.33	3.48	3.76	6.5	ns
tpLZ	3.0V	Load B	3.53	3.67	3.89	3.81	3.98	4.16	5.5	ns

Load A: 50pF//250Ω

Load B: 50pF//500Ω, 500Ω to 2Vcc

Table 5. Dynamic Icc, Vcc=3.6V, 25C

Frequency	Fab 2	Fab 1	Units
0 MHz	0.359	0.285	mA
1MHz	0.504	0.593	mA
5MHz	1.413	1.621	mA
10MHz	2.534	2.883	mA
20MHz	4.741	5.291	mA

Date: October 17, 2003

Subject: Pericom Reliability Qualification – CSM-S Fab 2's 0.5 m Process – SiliconClock

Chartered Semiconductor Manufacturing – Singapore Fab 2's CMOS, 3.3 volt, 0.50- m process was recently qualified to Pericom's standard die level process qualification requirements for our SiliconClock family of Zero Delay (ZD) Clock Driver and Buffer products. CSM-S Fab 1 will be closing in March of 2004, so this is part of a continuing process to transfer products currently using similar CMOS, SPDM processes on 150 mm wafers to their Fab 2 facility. Fab 2 uses an equivalent 0.5- m CMOS, SPDM process on 200-mm wafers. A sample of 130 units from a representative lot of our PI6C2510-133 device type has already successfully completed 2000 hours of Dynamic High Temperature Operating Life (DHTOL) test with no failures at 150°C and 3.6 volts applied bias. It will complete 3000 hours on October 31. This device type was used as the qualification vehicle since it's one of the more complex of our ZD Clock Driver and Buffer products. Therefore, all products using this process technology and design rule will meet Pericom's Wafer Fab Process Qualification requirements. This device also passed High Temp Storage Life (HTSL), Unbiased HAST (UHAST), and Temperature Cycle (TMCL) testing as shown in the table below.

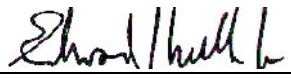
With no failures at the 168-hour timepoint, there is no concern over possible infant mortality issues that would require 100% burn-in for products using this process. This is the same result for all current Pericom designs and processes. The equivalent long-term life test FIT rate is 49.5 for Pericom devices using the same process and design rules, with a calculated MTBF of 260,000 hours. FIT rates are calculated using the Arrhenius equation, with an Activation Energy of 0.5 eV, an assumed customer system operating temperature of 55 °C, and a Confidence factor of 60%.

Pericom's Qualification Test results:

Rel Lot #	Device Type	Pkg. Type	Date Code	Stress Test	Stress Condition	Stress Duration	Sample Units	Results Pass/Fail
Q03007-1A	PI6C2510-133EL	L24	BY0323OC	DHTOL	150°C, 3.6 v	168 hrs	130	130/0
Q03007-1A	PI6C2510-133EL	L24	BY0323OC	DHTOL	150°C, 3.6 v	500 hrs	130	130/0
Q03007-1A	PI6C2510-133EL	L24	BY0323OC	DHTOL	150°C, 3.6 v	1000 hrs	130	130/0
Q03007-1A	PI6C2510-133EL	L24	BY0323OC	DHTOL	150°C, 3.6 v	2000 hrs	130	130/0
Q03007-1B	PI6C2510-133EL	L24	BY0323OC	HTSL	150°C	168 hrs	100	100/0
Q03007-1B	PI6C2510-133EL	L24	BY0323OC	HTSL	150°C	500 hrs	100	100/0
Q03007-1B	PI6C2510-133EL	L24	BY0323OC	HTSL	150°C	1000 hrs	100	100/0
Q03007-1C	PI6C2510-133EL	L24	BY0323OC	UHAST	130°C	96 hrs	80	80/0
Q03007-1D	PI6C2510-133EL	L24	BY0323OC	TMCL	-65, +150 °C	500 cycles	76	76/0

If there are any questions about this qualification, please contact me for further information.

Regards,



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