3 Input/Output Pad Cell Libraries IOlib and IO35lib

The Atmel Input/Output Cell Library IOlib contains a comprehensive list of input, output, bidirectional and tristate cells. The ATC35 (AT56000) (3.3V) cell library includes a special set of I/O cells, IO35lib, for interfacing with external 5V devices. Sections 3.1 to 3.4 deal with general information relating to the IOlib library, with the associated datasheets in Section 3.5.

Section 3.6 gives information specific to the IO35lib library and includes the associated datasheets.

3.1 IOlib Pad Cell Library General Information

3.1.1 Voltage Levels

The IOlib library is made up exclusively of low-voltage chip interface circuits powered by a voltage in the range of 3.0V to 3.6V. The library is compatible with SClib 3-volts standard cells library.

3.1.2 Power and Ground Pads

You are strongly encouraged to provide three kinds of power pairs for the IOlib library. These are "AC", "DC" and core power pairs. AC power is used by the I/O to switch its output from one state to the other. This switching generates noise in the AC power buses on the chip. DC power is used by the I/O to maintain its output in a steady state. The best noise performance is achieved when the DC power buses on the chip are free of noise; you are encouraged to use separate power pairs for AC and DC power to prevent most of the noise in the AC power buses from reaching the DC power buses. You can use the same power pairs to supply both DC power to the I/Os and power to the core without affecting noise performance.

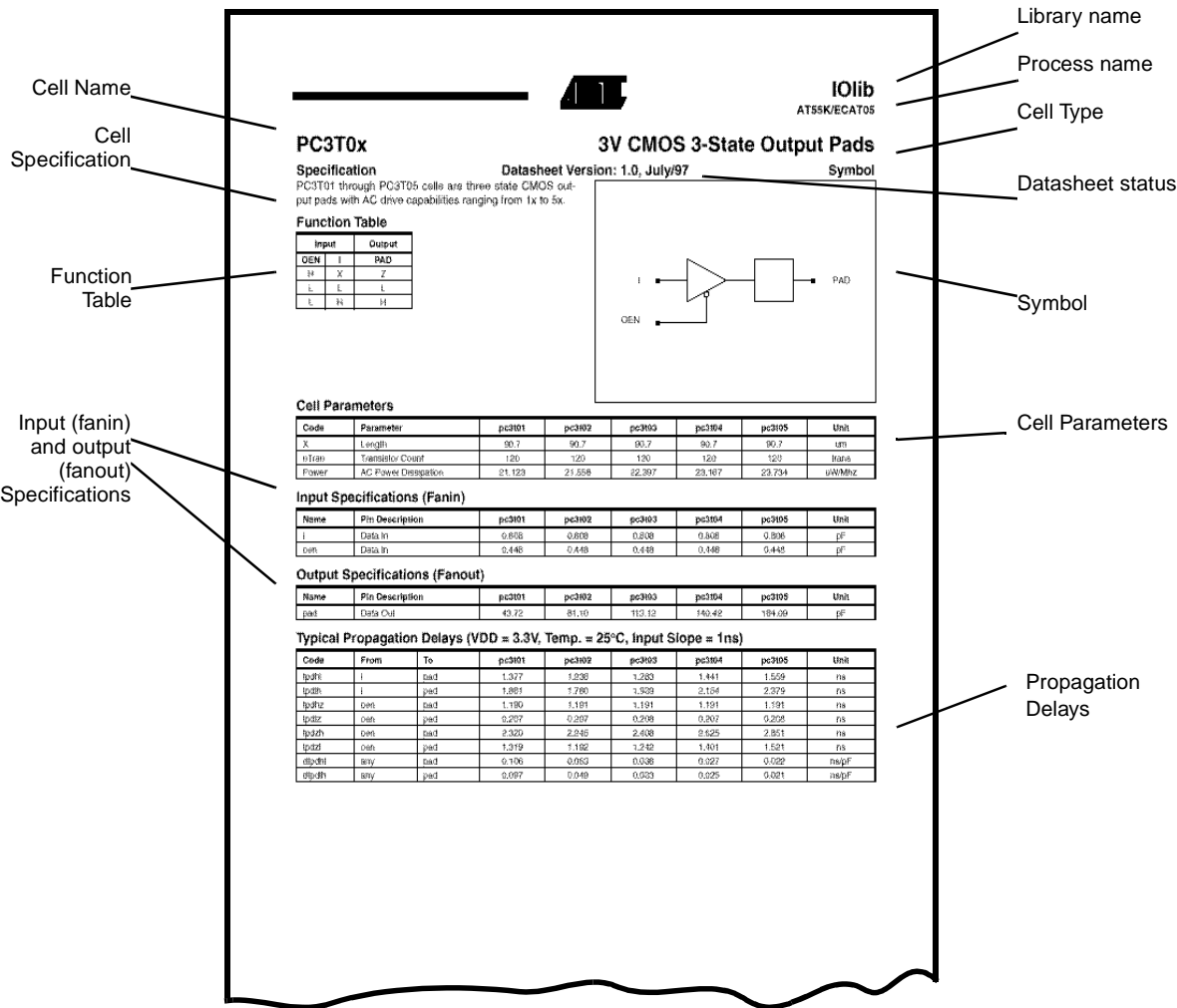## 3.2 Cell Presentation

3.2.1 Reading the Datasheet

An example IOlib datasheet is shown in Figure 3-1, and contains the following elements:

I/O Pad Cell Libraries IOlib/IO35lib

Figure 3-1 Example Datasheet

Cell Name

Cell Specification

Function Table

Input (fanin) and output (fanout) Specifications

Library name

Process name

Cell Type

Datasheet status

Symbol

Cell Parameters

Propagation Delays

3.2.1.1   Cell Name and Specification

The header (large font) gives the cell name and the cell type, such as "CMOS 3-State Output Pads". A lower case x in the cell name shows that there are series of cells as explained in the cell specification which is a brief description of the cells included in this datasheet.

3.2.1.2   Symbol

The symbol pictured on the data sheet is the one seen in the design tools when placing a schematic element.

3.2.1.3   Function Table

The Function Table is a truth table for the inputs and outputs of the cell. The possible state abbreviations are explained below.

Table 3 - 1 Function Table Codes

Code	Description	Code	Description
L	LOW level	X	Any level (Don't care)
Lr	Resistive LOW	hiZ	3-state output
H	HIGH Level	Zl	3-state output driven LOW from external source
Hr	Resistive High	Zh	3-state output driven HIGH from external source

3.2.1.4 Cell Parameters
The cell parameter table includes the following:

3.2.1.4.1 X Length
Length of the cell in um. Note that the height value,Y, for SClib cells is 11.2 um. For IOlib and IO35lib cells the height, Y, is 435 um.

3.2.1.4.2 Transistor Count
Ntran is the number of transistors in a cell. For megacell, this figure is expressed in NAND2 area equivalent transistors. This figure is used in capacitor estimation formula.

3.2.1.4.3 AC Power Dissipation
The AC power dissipation of the cell, at 3.3 V for SClib and IOlib and 3.3/5V for IO35lib, when all inputs are ON and all outputs are unloaded; no DC power is included. This value gives the power consumed in charging and discharging all parasitics and internal capacitance within a cell, including crossover currents. The power required to charge external loads must be calculated separately. To calculate the total power dissipation per cell, refer to the topic on Power, in Section 1.2.3.

3.2.1.4.4 Input/Output Specifications
The input and output specification tables detail table gives:

- The name of the pin.

- The values for Fanin/fanout in pF.

The capacitance value is the total capacitance that a signal driving in to that pin will have to drive; this includes gate capacitance as well as interconnect capacitance within the cell. For outputs, only the intrinsic capacitance associated with the output driver is included.

In CMOS the behaviour of a cell is independent of its load, as loads are purely capacitive. Nevertheless, a fanout figure has to be respected to stay within the limit of the delay estimation formula. This fanout figure is based on output fall and rise time staying within reasonable limits. In pre-layout simulation, where wiring loads are not known, it is recommended that all nets respect the fanout limit, and especially clocks and asynchronous signals. In post-layout, it is permitted to overload by a factor of 1.4.

3.2.1.4.5 Typical Propagation Delays
tpdhl   propagation delay, high-to-low

tpdlh   propagation delay, low-to-high

tpdhz   propagation delay, high-to-high impedance

tpdlz   propagation delay, low-to-high impedance

tpdzh   propagation delay, high impedance-to-high

tpdzl   propagation delay, high impedance-to-low

dtpdhl   differential (load-dependent) propagation delay, high-to-low or high impedance-to-low

dtpdlh   differential (load-dependent) propagation delay, low-to-high or high impedance-to-high

3.2.2 System Design Considerations
In order to use the new 0.35-micron I/O circuit designs efficiently, you must be familiar with certain configuration issues and limitations for power pads.

3.2.2.1 Power Connection Types
The type of power connection to be used can be confusing because of the large number and types of power pads available. Power pad selection is an important issue because the type of power pads used directly affects the setup that is required. Once you become familiar with how the power setup works, however, choosing the correct power pad combination becomes simple.

3.2.2.2 Power Pad Combinations for the IOlib Library
The following tables map the power cells to their respective sources.

Table 3 - 2 VSS Power Pad Combinations.

Core	Switching I/O	Quiet I/O	Library Cell Name	Signal Name
Vssi	VssAC	VssDC		
•			PV0I	VSS
	•		PV0A	VSS
		•	PV0D	VSS
	•	•	PV0E	VSS
•		•	PV0B	VSS
•	•	•	PV0F	VSS

Table 3 - 3 VDD Power Pad Combinations

Core	Switching I/O	Quiet I/O	Library Cell Name	Signal Name
Vddi	VddAC	VddDC		
•			PVDI	VDD
	•		PVDA	VDD
		•	PVDD	VDD
	•	•	PVDE	VDD
•		•	PVDB	VDD
•	•	•	PVDF	VDD

3.2.2.3   Design Questions

These are the types of questions that a system designer might ask:

• *Should I use separate AC and DC power buses*?

• Separate AC and DC buses are recommended to reduce SSO noise.

• *How do I use separate AC and DC power buses*?

• To separate the AC and DC buses use the appropriate cells with an "a", "d", or "i" suffix. Do not use cells with an "e" or a "f" suffix.

• *My chip is very low performance and does not produce much noise. Is there a power pad I could use that will supply all power buses with the same voltage*?

• You can use the PV0F and PVDF cells. These cells tie all of their corresponding voltage buses together in a single cell.

3.2.3 IO35lib Low Slew Rate Cells

The IO35lib cells comprise a series of 3V/5V input/output pads developed for low supply voltage processes in order to interface 3V ASICs to 5V environments.

All IO35lib cells are slew rate controlled. Advantage has been taken of the 3.3V to 5V level shifter (which is slow by construction) to reduce the slew rate without reducing speed.

Refer to the Atmel CBIC Application Note "Configuration of 3V/5V Input/Output Cells" for the general arrangement and placement rules for I/O, power and ground pad cells.

	Drive Capability (mA,Mil)	Power Drain (mA, Mil)
M***01	2.0	1.5
M***02	4.0	3.0
M***03	8.0	6.0
M***04	16.0	12.0

Drive Capability (drive units) I/O Cells per Pair

MV0E   54 (27 per side) i.e between two MV0E: 18xm***02

MV5E   54 (27 per side) i.e between two MV5E: 18xm***02

3.3 Decoding the Cell Name

This section describes the naming conventions for the pad library cells. Each cell name begins with a two-letter code that tells what type of cell it is. This section gives the detailed naming convention for pads.

I/O NAMING CONVENTION: 1234567

1 = P = Pad, M = Mixed pad (3/5V)

2 = The level used for characterization:

C	=	CMOS
T	=	TTL
G	=	GTL
E	=	ECL
S	=	SCSI
J	=	JTAG Support
V	=	POWER

3 = Output signal level:

0	=	0 Volts
3	=	3 Volts
5	=	5 Volts

4 = Pad Function:

B	=	Bidirectional
T	=	Three-State Output
D	=	Input
C	=	Clock Input
X	=	Crystal Oscillator

5 = Pad-function-related options:

0	=	Non-Inverting
1	=	Inverting
2	=	Schmitt Non-Inverting
3	=	Schmitt Inverting

6 = Capability (AC Drive, DC Drive):

3V CMOS	3V TTL	5V (DC)
1 = 2, 0.3 mA	1 = 2, 2 mA	1 = 2, 2 mA
2 = 4, 0.3 mA	2 = 4, 4 mA	2 = 4, 4 mA
3 = 6, 0.3 mA	3 = 8, 8 mA	3 = 8, 8 mA
4 = 8, 0.3 mA		4 = 16, 16 mA
5 = 10, 0.3 mA		

7 = Special Type:

U	=	Pullup
D	=	Pulldown

IOlib / IO35lib Cell Nomenclature

POWER PADS NAMING CONVENTION: 1234

1 and 2 = PV   P is for Pad, V is for Power

       = MV   M is for Mixed, V is for Power

3 = Output signal level:

    0   =   0 Volts

    3   =   3 Volts

    5   =   5 Volts

    D   = V_{DD} (3V)

4 = Bus Structure:

    A   =   AC

    D   =   DC

    I   =   Internal Power

    E   =   External Power (I/O DC and AC Shorted)

    B   =   Both Internal and I/O DC

    F   =   Full Connection of All Buses

              (Internal, DC, and AC)

Nomenclature

3.4 Cell Matrices

This section gives a quick-reference guide to the IOlib library pads

Table 3 - 4 CMOS and TTL Pads

CMOS Cell Name	3-State I/O	Output Only	3-State Output Only	Drive Strength	Pull-down Device	PullUp Device	Pad Sites Used
PC3B01	•			1x			1
PC3B02	•			2x			1
PC3B03	•			3x			1
PC3B04	•			4x			1
PC3B05	•			5x			1
PC3B01D	•			1x	•		1
PC3B02D	•			2x	•		1
PC3B03D	•			3x	•		1
PC3B04D	•			4x	•		1
PC3B05D	•			5x	•		1
PC3B01U	•			1x		•	1
PC3B02U	•			2x		•	1
PC3B03U	•			3x		•	1
PC3B04U	•			4x		•	1
PC3B05U	•			5x		•	1
PC3O01		•		1x			1
PC3O02		•		2x			1
PC3O03		•		3x			1
PC3O04		•		4x			1
PC3O05		•		5x			1
PC3T01			•	1x			1
PC3T02			•	2x			1
PC3T03			•	3x			1
PC3T04			•	4x			1
PC3T05			•	5x			1
PC3T01U			•	1x		•	1
PC3T02U			•	2x		•	1
PC3T03U			•	3x		•	1
PC3T04U			•	4x		•	1
PC3T05U			•	5x		•	1
PC3T01D			•	1x	•		1
PC3T02D			•	2x	•		1
PC3T03D			•	3x	•		1
PC3T04D			•	4x	•		1
PC3T05D			•	5x	•		1
PT3B01	•			2 mA			1
PT3B02	•			4 mA			1
PT3B03	•			8 mA			1
PT3B01D	•			2 mA	•		1
PT3B02D	•			4 mA	•		1
PT3B03D	•			8 mA	•		1
PT3B01U	•			2 mA		•	1
PT3B02U	•			4 mA		•	1
PT3B03U	•			8 mA		•	1
PT3O01		•		2 mA			1

IOlib / IO35lib Cell Matrices

Table 3 - 4   CMOS and TTL Pads continued

TTL Cell Name	3-State I/O	Output Only	3-State Output Only	Drive Strength	Pull Down Device	PullUp Device	Pad Sites Used
PT3O02		•		4 mA			1
PT3O03		•		8 mA			1
PT3T01			•	2 mA			1
PT3T02			•	4 mA			1
PT3T03			•	8 mA			1
PT3T01D			•	2 mA	•		1
PT3T02D			•	4 mA	•		1
PT3T03D			•	8 mA	•		1
PT3T01U			•	2 mA		•	1
PT3T02U			•	4 mA		•	1
PT3T03U			•	8 mA		•	1

Table 3 - 5   CMOS/TTL Input Only Pad

CMOS Cell Name	Input Levels	Schmitt Input Level Shifter	Non-Inverting	Inverting	Pull Down Device	Pull Up Device	Pad Sites Used
PC3D01	CMOS		•				1
PC3D01D	CMOS		•		•		1
PC3D01U	CMOS		•			•	1
PC3D11	CMOS			•			1
PC3D11D	CMOS			•	•		1
PC3D11U	CMOS			•		•	1
PC3D21	CMOS	•	•				1
PC3D21D	CMOS	•	•		•		1
PC3D21U	CMOS	•	•			•	1
PC3D31	CMOS	•		•			1
PC3D31D	CMOS	•		•	•		1
PC3D31U	CMOS	•		•		•	1

Table 3 - 6   Core-Driven Clock Buffer Pads

Cell Name	Drive Strength	Non-Inverting	Inverting	vddDC Pad	vddAC Pad	vssDC Pad	Pad Sites Used
PC3C01	1x	•		•			1
PC3C02	2x	•		•			1
PC3C03	3x	•		•			1
PC3C04	4x	•		•			1

Cell Matrices

Table 3 - 7 IOlib Power Pads

Cell Name	Power Bus Connections						Pad Sites Used
	vssi	vssDC	vssAC	vddi	vddDC	vddAC	
PV0I	•						1
PV0A			•				1
PV0D		•					1
PV0E		•	•				1
PV0B	•	•					1
PV0F	•	•	•				1
PVDI				•			1
PVDA						•	1
PVDD					•		1
PVDE					•	•	1
PVDB				•	•		1
PVDF				•	•	•	1
PC45FR0LL	•	•	•				4
PC45FR0UR	•	•	•				4
PC45FR3LR				•	•	•	4
PC45FR3UL				•	•	•	4
PC45FRELL	•	•	•				4
PC45FRELR				•	•	•	4
PC45FREUL				•	•	•	4
PC45FREUR	•	•	•				4

Table 3 - 8 IO35lib Power Pads

Cell Name	Power Bus Connections				Pad Sites Used
	vssi	mixvss	vddi	mixvdd	
MV0E		•			1
MV0I	•				1
MV3I			•		1
MV5E				•	1
MC45FRELL	•	•			4
MC45FRELR				•	4
MC45FREUL				•	4
MC45FREUR	•	•			4
MC45FR0LL		•			4
MC45FR0UR		•			4

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3.5 IOlib and IO35lib Datasheets

The datasheets for IOlib and IO35lib cells follow.

IOlib / IO35lib Cell Datasheets

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Datasheets

List of IOlib cells

PC3B0x   3 Volts CMOS Bidirectional Pads
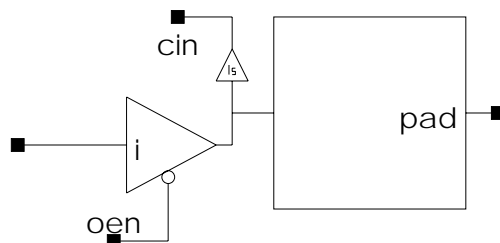
Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3B01, PC3B02, PC3B03, PC3B04 and PC3B05 are
3 Volts CMOS Bidirectional Pads with 1x, 2x, 3x, 4x
and 5x drive capabilities.

Function Table

Input		I/O	Output
OEN	**I**	**PAD**	**CIN**
H	X	hiZ	X
H	X	H	H
H	X	L	L
L	H	H	H
L	L	L	L

Cell Parameters

Code	Parameter	pc3b01	pc3b02	pc3b03	pc3b04	pc3b05	Unit
X	Length	80.0	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	86	86	86	86	86	trans
Power	AC Power Dissipation	42.5	61.4	63.3	65.3	67.4	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3b01	pc3b02	pc3b03	pc3b04	pc3b05	Unit
i	Data In	0.305	0.447	0.447	0.447	0.447	pF
oen	Data In	0.216	0.310	0.310	0.310	0.310	pF
pad	High Impedance	6.07	6.07	6.07	6.07	6.07	pF

Output Specifications (Fanout)

Name	Pin Description	pc3b01	pc3b02	pc3b03	pc3b04	pc3b05	Unit
cin	Data Out	6.80	6.80	6.80	6.80	6.80	pF
pad	Data Out	25.5	53.6	81.8	110	138	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3b01	pc3b02	pc3b03	pc3b04	pc3b05	Unit
tpdhl	i	pad	1.372	1.010	0.948	0.941	0.954	ns
tpdlh	i	pad	1.033	0.789	0.808	0.871	0.950	ns
tpdhz	oen	pad	0.583	0.466	0.466	0.466	0.466	ns
tpdlz	oen	pad	0.359	0.289	0.280	0.280	0.280	ns
tpdzh	oen	pad	1.276	1.004	1.021	1.085	1.165	ns
tpdzl	oen	pad	1.323	0.977	0.920	0.916	0.931	ns
tpdhl	pad	cin	0.148	0.148	0.148	0.148	0.148	ns
tpdlh	pad	cin	0.115	0.115	0.115	0.115	0.115	ns
dtpdhl	any	cin	0.128	0.128	0.128	0.128	0.128	ns/pF
dtpdlh	any	cin	0.167	0.167	0.167	0.167	0.167	ns/pF
dtpdhl	any	pad	0.120	0.060	0.040	0.030	0.024	ns/pF
dtpdlh	any	pad	0.116	0.058	0.039	0.029	0.023	ns/pF

PC3B0xD   3 Volts CMOS Bidirectional Pads with Pull-Down Resistor

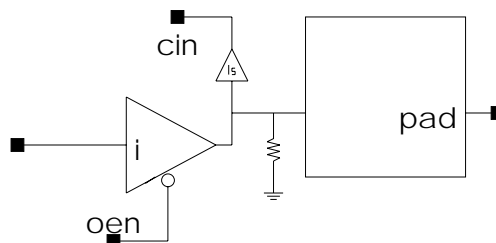**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3B01D, PC3B02D, PC3B03D, PC3B04D and PC3B05D are 3 Volts CMOS Bidirectional Pads with Pull-Down Resistor and with 1x, 2x, 3x, 4x and 5x drive capabilities.

Function Table

Input		I/O	Output
OEN	**I**	**PAD**	**CIN**
H	X	Lr	L
H	X	H	H
H	X	L	L
L	H	H	H
L	L	L	L

Cell Parameters

Code	Parameter	pc3b01d	pc3b02d	pc3b03d	pc3b04d	pc3b05d	Unit
X	Length	80.0	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	87	87	87	87	87	trans
Power	AC Power Dissipation	73.0	77.5	77.7	81.2	82.2	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3b01d	pc3b02d	pc3b03d	pc3b04d	pc3b05d	Unit
i	Data In	0.305	0.447	0.447	0.447	0.447	pF
oen	Data In	0.216	0.311	0.311	0.311	0.311	pF
pad	High Impedance	6.08	6.08	6.08	6.08	6.08	pF

Output Specifications (Fanout)

Name	Pin Description	pc3b01d	pc3b02d	pc3b03d	pc3b04d	pc3b05d	Unit
cin	Data Out	6.80	6.80	6.80	6.80	6.80	pF
pad	Data Out	25.8	54.0	82.1	110	138	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3b01d	pc3b02d	pc3b03d	pc3b04d	pc3b05d	Unit
tpdhl	i	pad	1.357	1.004	0.945	0.939	0.953	ns
tpdlh	i	pad	1.040	0.795	0.789	0.873	0.952	ns
tpdhz	oen	pad	0.583	0.466	0.466	0.466	0.466	ns
tpdlz	oen	pad	0.359	0.280	0.311	0.280	0.280	ns
tpdzh	oen	pad	1.283	1.007	1.023	1.087	1.166	ns
tpdzl	oen	pad	1.306	0.971	0.917	0.914	0.929	ns
tpdhl	pad	cin	0.148	0.148	0.148	0.148	0.148	ns
tpdlh	pad	cin	0.115	0.115	0.115	0.115	0.115	ns
dtpdhl	any	cin	0.128	0.128	0.128	0.128	0.128	ns/pF
dtpdlh	any	cin	0.167	0.167	0.167	0.167	0.167	ns/pF
dtpdhl	any	pad	0.118	0.059	0.040	0.030	0.024	ns/pF
dtpdlh	any	pad	0.116	0.058	0.039	0.029	0.023	ns/pF

PC3B0xU   3 Volts CMOS Bidirectional Pads with Pull-Up Resistor

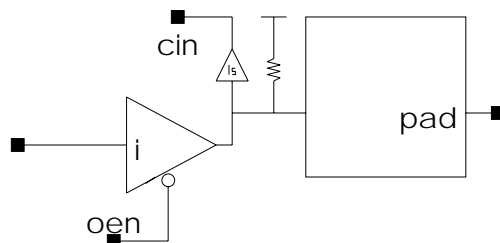**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3B01U, PC3B02U, PC3B03U, PC3B04U and PC3B05U are 3 Volts CMOS Bidirectional Pads with Pull-Up Resistor and with 1x, 2x, 3x, 4x and 5x drive capabilities.

Function Table

Input		I/O	Output
OEN	I	PAD	CIN
H	X	Hr	H
H	X	H	H
H	X	L	L
L	H	H	H
L	L	L	L

Cell Parameters

Code	Parameter	pc3b01u	pc3b02u	pc3b03u	pc3b04u	pc3b05u	Unit
X	Length	80.0	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	87	87	87	87	87	trans
Power	AC Power Dissipation	67.2	81.3	88.0	90.0	80.3	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3b01u	pc3b02u	pc3b03u	pc3b04u	pc3b05u	Unit
i	Data In	0.305	0.447	0.447	0.447	0.447	pF
oen	Data In	0.216	0.311	0.311	0.311	0.311	pF
pad	High Impedance	6.08	6.09	6.09	6.09	6.09	pF

Output Specifications (Fanout)

Name	Pin Description	pc3b01u	pc3b02u	pc3b03u	pc3b04u	pc3b05u	Unit
cin	Data Out	6.80	6.80	6.80	6.80	6.80	pF
pad	Data Out	25.0	53.2	81.3	109	138	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3b01u	pc3b02u	pc3b03u	pc3b04u	pc3b05u	Unit
tpdhl	i	pad	1.379	1.012	0.949	0.942	0.955	ns
tpdlh	i	pad	1.015	0.773	0.802	0.866	0.946	ns
tpdhz	oen	pad	0.584	0.466	0.466	0.466	0.466	ns
tpdlz	oen	pad	0.359	0.304	0.280	0.280	0.280	ns
tpdzh	oen	pad	1.255	0.995	1.016	1.080	1.161	ns
tpdzl	oen	pad	1.330	0.979	0.922	0.917	0.932	ns
tpdhl	pad	cin	0.148	0.148	0.148	0.148	0.148	ns
tpdlh	pad	cin	0.115	0.115	0.115	0.115	0.115	ns
dtpdhl	any	cin	0.128	0.128	0.128	0.128	0.128	ns/pF
dtpdlh	any	cin	0.167	0.167	0.167	0.167	0.167	ns/pF
dtpdhl	any	pad	0.121	0.060	0.040	0.030	0.024	ns/pF
dtpdlh	any	pad	0.113	0.057	0.038	0.029	0.023	ns/pF

PC3C0x   3 Volts CMOS Clock Buffer
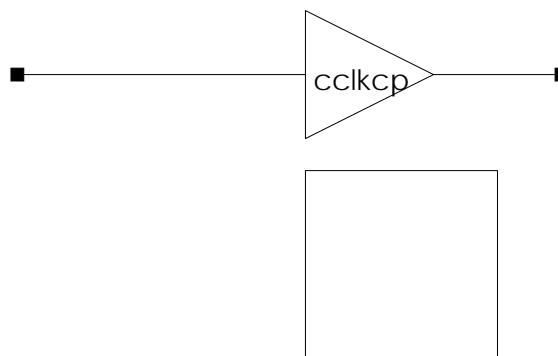
Specification   Datasheet Version: 2.1, March 99   **Symbol**

PC3C01, PC3C02, PC3C03 and PC3C04 are 3 Volts
CMOS Clock Buffer with 1x, 2x, 3x and 4x drive ca-
pabilities. These cells are driven from the core and not
from external connections.

cclkcp

Function Table

Input	Output
CCLK	**CP**
L	L
H	H

Cell Parameters

Code	Parameter	pc3c01	pc3c02	pc3c03	pc3c04	Unit
X	Length	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	13	23	39	54	trans
Power	AC Power Dissipation	26.3	47.8	111	122	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3c01	pc3c02	pc3c03	pc3c04	Unit
cclk	Data In	0.315	0.503	0.627	1.07	pF

Output Specifications (Fanout)

Name	Pin Description	pc3c01	pc3c02	pc3c03	pc3c04	Unit
cp	Data Out	42.0	80.6	188	224	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3c01	pc3c02	pc3c03	pc3c04	Unit
tpdhl	cclk	cp	0.459	0.470	0.607	0.489	ns
tpdlh	cclk	cp	0.279	0.276	0.374	0.290	ns
dtpdhl	any	cp	0.021	0.011	0.005	0.004	ns/pF
dtpdlh	any	cp	0.034	0.017	0.008	0.007	ns/pF

PC3D01   3 Volts CMOS Non-Inverting Input Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D01 is a 3 Volts CMOS Non-Inverting Input Pad.

Function Table

Input	Output
PAD	CIN
L	L
H	H
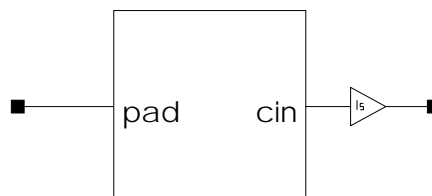
Cell Parameters

Code	Parameter	pc3d01	Unit
X	Length	80.0	um
nTran	Transistor Count	36	trans
Power	AC Power Dissipation	-0.197	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d01	Unit
pad	Data In	5.99	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d01	Unit
cin	Data Out	6.81	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d01	Unit
tpdhl	pad	cin	0.143	ns
tpdlh	pad	cin	0.109	ns
dtpdhl	any	cin	0.128	ns/pF
dtpdlh	any	cin	0.167	ns/pF

PC3D01D   3 Volts CMOS Non-Inverting Input Pad with Pull-Down Resistor

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D01D is a 3 Volts CMOS Non-Inverting Input Pad
with Pull-Down Resistor.

Function Table

Input	Output
PAD	**CIN**
L	L
H	H
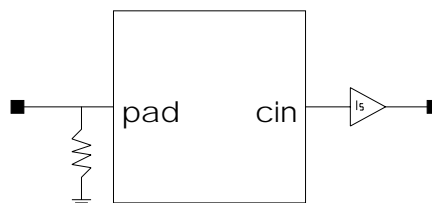
Cell Parameters

Code	Parameter	pc3d01d	Unit
X	Length	80.0	um
nTran	Transistor Count	37	trans
Power	AC Power Dissipation	-0.195	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d01d	Unit
pad	Data In	6.00	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d01d	Unit
cin	Data Out	6.81	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d01d	Unit
tpdhl	pad	cin	0.143	ns
tpdlh	pad	cin	0.109	ns
dtpdhl	any	cin	0.128	ns/pF
dtpdlh	any	cin	0.167	ns/pF

PC3D01U   3 Volts CMOS Non-Inverting Input Pad with Pull-Up Resistor

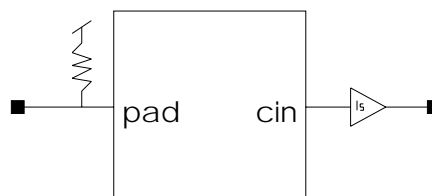**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D01U is a 3 Volts CMOS Non-Inverting Input Pad
with Pull-Up Resistor.

Function Table

Input	Output
PAD	**CIN**
L	L
H	H

Cell Parameters

Code	Parameter	pc3d01u	Unit
X	Length	80.0	um
nTran	Transistor Count	37	trans
Power	AC Power Dissipation	24.7	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d01u	Unit
pad	Data In	6.00	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d01u	Unit
cin	Data Out	6.81	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d01u	Unit
tpdhl	pad	cin	0.143	ns
tpdlh	pad	cin	0.109	ns
dtpdhl	any	cin	0.128	ns/pF
dtpdlh	any	cin	0.167	ns/pF

PC3D11   3 Volts CMOS Inverting Input Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D11 is a 3 Volts CMOS Inverting Input Pad.

Function Table

Input	Output
PAD	CIN
L	H
H	L
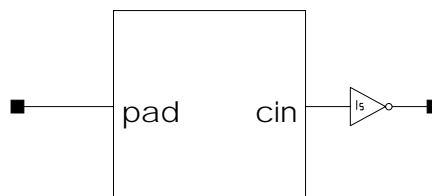
Cell Parameters

Code	Parameter	pc3d11	Unit
X	Length	80.0	um
nTran	Transistor Count	38	trans
Power	AC Power Dissipation	2.26	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d11	Unit
pad	Data In	5.99	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d11	Unit
cin	Data Out	6.26	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d11	Unit
tpdhl	pad	cin	0.190	ns
tpdlh	pad	cin	0.199	ns
dtpdhl	any	cin	0.139	ns/pF
dtpdlh	any	cin	0.164	ns/pF

PC3D11D 3 Volts CMOS Inverting Input Pad with Pull-Down Resistor

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D11D is a 3 Volts CMOS Inverting Input Pad with
Pull-Down Resistor.

Function Table

Input	Output
PAD	**CIN**
L	H
H	L

Cell Parameters

Code	Parameter	pc3d11d	Unit
X	Length	80.0	um
nTran	Transistor Count	39	trans
Power	AC Power Dissipation	2.26	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d11d	Unit
pad	Data In	6.00	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d11d	Unit
cin	Data Out	6.26	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d11d	Unit
tpdhl	pad	cin	0.190	ns
tpdlh	pad	cin	0.199	ns
dtpdhl	any	cin	0.139	ns/pF
dtpdlh	any	cin	0.164	ns/pF

PC3D11U   3 Volts CMOS Inverting Input Pad with Pull-Up Resistor

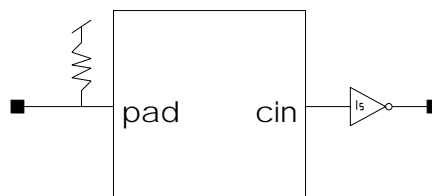**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D11U is a 3 Volts CMOS Inverting Input Pad with Pull-Up Resistor.

Function Table

Input	Output
PAD	**CIN**
L	H
H	L

Cell Parameters

Code	Parameter	pc3d11u	Unit
X	Length	80.0	um
nTran	Transistor Count	39	trans
Power	AC Power Dissipation	27.2	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d11u	Unit
pad	Data In	6.00	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d11u	Unit
cin	Data Out	6.26	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d11u	Unit
tpdhl	pad	cin	0.190	ns
tpdlh	pad	cin	0.199	ns
dtpdhl	any	cin	0.139	ns/pF
dtpdlh	any	cin	0.164	ns/pF

PC3D21   3 Volts CMOS Schmitt Non-Inverting Input Pad

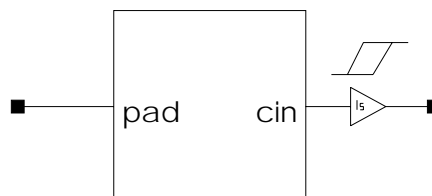**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D21 is a 3 Volts CMOS Schmitt Non-Inverting Input Pad.

Function Table

Input	Output
PAD	**CIN**
L	L
H	H

Cell Parameters

Code	Parameter	pc3d21	Unit
X	Length	80.0	um
nTran	Transistor Count	40	trans
Power	AC Power Dissipation	3.95	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d21	Unit
pad	Data In	5.98	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d21	Unit
cin	Data Out	5.05	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d21	Unit
tpdhl	pad	cin	0.795	ns
tpdlh	pad	cin	0.379	ns
dtpdhl	any	cin	0.188	ns/pF
dtpdlh	any	cin	0.185	ns/pF

DC Specifications (VDD=3.3V, Temp.=25°C)

Code	Parameter	pc3d21	Unit
VT+min/max	High Level Input Voltage	1.625/1.825	V
VT-min/max	Low Level Input Voltage	1.075/1.225	V
Vhysmin/max	Hysteresis	0.400/0.750	V

PC3D21D   **3 Volts CMOS Schmitt Non-Inverting Input Pad with Pull-Down Resistor**
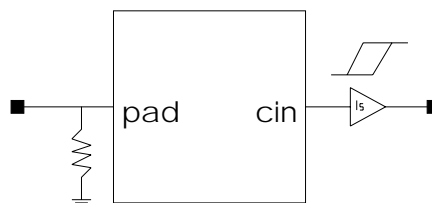
Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D21D is a 3 Volts CMOS Schmitt Non-Inverting Input Pad with Pull-Down Resistor.

Function Table

Input	Output
PAD	**CIN**
L	L
H	H

Cell Parameters

Code	Parameter	pc3d21d	Unit
X	Length	80.0	um
nTran	Transistor Count	41	trans
Power	AC Power Dissipation	3.95	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d21d	Unit
pad	Data In	6.00	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d21d	Unit
cin	Data Out	5.05	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d21d	Unit
tpdhl	pad	cin	0.795	ns
tpdlh	pad	cin	0.379	ns
dtpdhl	any	cin	0.188	ns/pF
dtpdlh	any	cin	0.185	ns/pF

DC Specifications (VDD=3.3V, Temp.=25°C)

Code	Parameter	pc3d21d	Unit
VT+min/max	High Level Input Voltage	1.625/1.825	V
VT-min/max	Low Level Input Voltage	1.075/1.225	V
Vhysmin/max	Hysteresis	0.400/0.750	V

PC3D21U   **3 Volts CMOS Schmitt Non-Inverting Input Pad with Pull-Up Resistor**
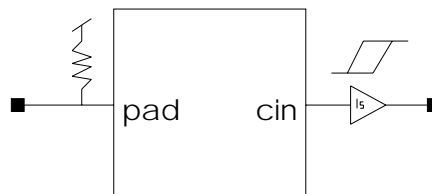
Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D21U is a 3 Volts CMOS Schmitt Non-Inverting Input Pad with Pull-Up Resistor.

Function Table

Input	Output
PAD	**CIN**
L	L
H	H

Cell Parameters

Code	Parameter	pc3d21u	Unit
X	Length	80.0	um
nTran	Transistor Count	41	trans
Power	AC Power Dissipation	29.7	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d21u	Unit
pad	Data In	6.00	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d21u	Unit
cin	Data Out	5.05	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d21u	Unit
tpdhl	pad	cin	0.795	ns
tpdlh	pad	cin	0.379	ns
dtpdhl	any	cin	0.188	ns/pF
dtpdlh	any	cin	0.185	ns/pF

DC Specifications (VDD=3.3V, Temp.=25°C)

Code	Parameter	pc3d21u	Unit
VT+min/max	High Level Input Voltage	1.625/1.825	V
VT-min/max	Low Level Input Voltage	1.075/1.225	V
Vhysmin/max	Hysteresis	0.400/0.750	V

PC3D31   **3 Volts CMOS Schmitt Inverting Input Pad**

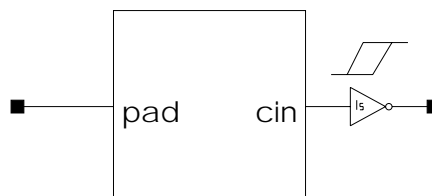**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D31 is a 3 Volts CMOS Schmitt Inverting Input
Pad.

Function Table

Input	Output
PAD	**CIN**
L	H
H	L

Cell Parameters

Code	Parameter	pc3d31	Unit
X	Length	80.0	um
nTran	Transistor Count	42	trans
Power	AC Power Dissipation	5.36	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d31	Unit
pad	Data In	5.98	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d31	Unit
cin	Data Out	9.04	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d31	Unit
tpdhl	pad	cin	0.465	ns
tpdlh	pad	cin	0.723	ns
dtpdhl	any	cin	0.067	ns/pF
dtpdlh	any	cin	0.182	ns/pF

DC Specifications (VDD=3.3V, Temp.=25°C)

Code	Parameter	pc3d31	Unit
VT+min/max	High Level Input Voltage	1.625/1.825	V
VT-min/max	Low Level Input Voltage	1.075/1.225	V
Vhysmin/max	Hysteresis	0.400/0.750	V

PC3D31D   3 Volts CMOS Schmitt Inverting Input Pad with Pull-Down Resistor

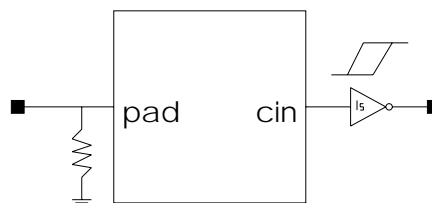**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D31D is a 3 Volts CMOS Schmitt Inverting Input
Pad with Pull-Down Resistor.

Function Table

Input	Output
PAD	**CIN**
L	H
H	L

Cell Parameters

Code	Parameter	pc3d31d	Unit
X	Length	80.0	um
nTran	Transistor Count	43	trans
Power	AC Power Dissipation	5.36	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d31d	Unit
pad	Data In	6.00	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d31d	Unit
cin	Data Out	9.04	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d31d	Unit
tpdhl	pad	cin	0.465	ns
tpdlh	pad	cin	0.723	ns
dtpdhl	any	cin	0.067	ns/pF
dtpdlh	any	cin	0.182	ns/pF

DC Specifications (VDD=3.3V, Temp.=25°C)

Code	Parameter	pc3d31d	Unit
VT+min/max	High Level Input Voltage	1.625/1.825	V
VT-min/max	Low Level Input Voltage	1.075/1.225	V
Vhysmin/max	Hysteresis	0.400/0.750	V

PC3D31U   3 Volts CMOS Schmitt Inverting Input Pad with Pull-Up Resistor

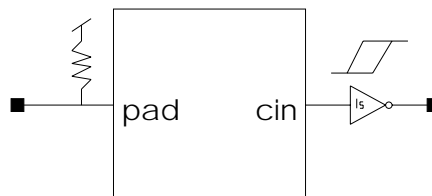**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3D31U is a 3 Volts CMOS Schmitt Inverting Input
Pad with Pull-Up Resistor.

Function Table

Input	Output
PAD	**CIN**
L	H
H	L

Cell Parameters

Code	Parameter	pc3d31u	Unit
X	Length	80.0	um
nTran	Transistor Count	43	trans
Power	AC Power Dissipation	31.1	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3d31u	Unit
pad	Data In	6.00	pF

Output Specifications (Fanout)

Name	Pin Description	pc3d31u	Unit
cin	Data Out	9.04	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3d31u	Unit
tpdhl	pad	cin	0.465	ns
tpdlh	pad	cin	0.723	ns
dtpdhl	any	cin	0.067	ns/pF
dtpdlh	any	cin	0.182	ns/pF

DC Specifications (VDD=3.3V, Temp.=25°C)

Code	Parameter	pc3d31u	Unit
VT+min/max	High Level Input Voltage	1.625/1.825	V
VT-min/max	Low Level Input Voltage	1.075/1.225	V
Vhysmin/max	Hysteresis	0.400/0.750	V

PC3O0x   3 Volts CMOS Output Pads

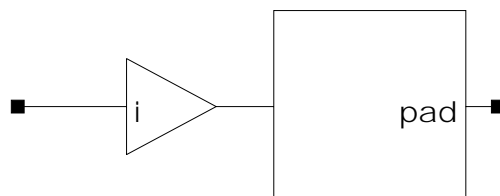**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3O01, PC3O02, PC3O03, PC3O04 and PC3O05 are
3 Volts CMOS Output Pads with 1x, 2x, 3x, 4x and 5x
drive capabilities.

Function Table

Input	Output
I	**PAD**
L	L
H	H

Cell Parameters

Code	Parameter	pc3o01	pc3o02	pc3o03	pc3o04	pc3o05	Unit
X	Length	80.0	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	70	70	70	70	70	trans
Power	AC Power Dissipation	53.7	77.4	80.3	83.3	86.4	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3o01	pc3o02	pc3o03	pc3o04	pc3o05	Unit
i	Data In	0.282	0.423	0.423	0.423	0.423	pF

Output Specifications (Fanout)

Name	Pin Description	pc3o01	pc3o02	pc3o03	pc3o04	pc3o05	Unit
pad	Data Out	25.6	53.8	81.9	110	138	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3o01	pc3o02	pc3o03	pc3o04	pc3o05	Unit
tpdhl	i	pad	1.231	0.894	0.835	0.830	0.844	ns
tpdlh	i	pad	0.887	0.636	0.625	0.661	0.711	ns
dtpdhl	any	pad	0.120	0.060	0.040	0.030	0.024	ns/pF
dtpdlh	any	pad	0.116	0.058	0.039	0.029	0.023	ns/pF

PC3T0x   3 Volts CMOS Three-State Output Pads

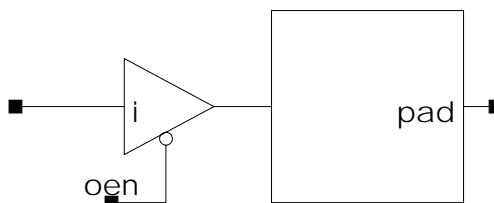**Specification**   Datasheet Version: 2.1, March 99   **Symbol**

PC3T01, PC3T02, PC3T03, PC3T04 and PC3T05 are
3 Volts CMOS Three-State Output Pads with 1x, 2x,
3x, 4x and 5x drive capabilities.

Function Table

Input		Output
OEN	**I**	**PAD**
H	X	hiZ
L	H	H
L	L	L

Cell Parameters

Code	Parameter	pc3t01	pc3t02	pc3t03	pc3t04	pc3t05	Unit
X	Length	80.0	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	80	80	80	80	80	trans
Power	AC Power Dissipation	54.1	78.5	81.6	84.7	81.4	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3t01	pc3t02	pc3t03	pc3t04	pc3t05	Unit
i	Data In	0.294	0.436	0.436	0.436	0.436	pF
oen	Data In	0.205	0.300	0.300	0.300	0.300	pF
pad	High Impedance	6.07	6.07	6.07	6.07	6.07	pF

Output Specifications (Fanout)

Name	Pin Description	pc3t01	pc3t02	pc3t03	pc3t04	pc3t05	Unit
pad	Data Out	25.6	53.7	81.9	110	138	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3t01	pc3t02	pc3t03	pc3t04	pc3t05	Unit
tpdhl	i	pad	1.357	1.002	0.943	0.938	0.951	ns
tpdlh	i	pad	1.011	0.781	0.800	0.865	0.945	ns
tpdhz	oen	pad	0.583	0.466	0.466	0.466	0.466	ns
tpdlz	oen	pad	0.359	0.280	0.280	0.280	0.280	ns
tpdzh	oen	pad	1.254	0.993	1.013	1.079	1.160	ns
tpdzl	oen	pad	1.308	0.969	0.915	0.912	0.928	ns
dtpdhl	any	pad	0.120	0.060	0.040	0.030	0.024	ns/pF
dtpdlh	any	pad	0.116	0.058	0.039	0.029	0.023	ns/pF

PC3T0xD   3 Volts CMOS Three-State Output Pads with Pull-Down Resistor

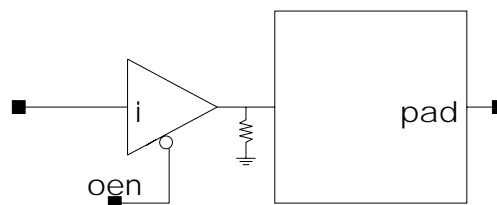**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3T01D, PC3T02D, PC3T03D, PC3T04D and PC3T05D are 3 Volts CMOS Three-State Output Pads with Pull-Down Resistor and with 1x, 2x, 3x, 4x and 5x drive capabilities.

Function Table

Input		Output
OEN	I	PAD
H	X	Lr
L	H	H
L	L	L

Cell Parameters

Code	Parameter	pc3t01d	pc3t02d	pc3t03d	pc3t04d	pc3t05d	Unit
X	Length	80.0	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	81	81	81	81	81	trans
Power	AC Power Dissipation	78.5	103	103	109	110	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3t01d	pc3t02d	pc3t03d	pc3t04d	pc3t05d	Unit
i	Data In	0.294	0.436	0.436	0.436	0.436	pF
oen	Data In	0.205	0.300	0.300	0.300	0.300	pF
pad	High Impedance	6.08	6.08	6.08	6.08	6.08	pF

Output Specifications (Fanout)

Name	Pin Description	pc3t01d	pc3t02d	pc3t03d	pc3t04d	pc3t05d	Unit
pad	Data Out	25.9	54.1	82.2	110	138	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3t01d	pc3t02d	pc3t03d	pc3t04d	pc3t05d	Unit
tpdhl	i	pad	1.343	0.997	0.940	0.936	0.950	ns
tpdlh	i	pad	1.017	0.767	0.793	0.867	0.946	ns
tpdhz	oen	pad	0.583	0.466	0.466	0.466	0.466	ns
tpdlz	oen	pad	0.359	0.340	0.311	0.280	0.280	ns
tpdzh	oen	pad	1.260	0.996	1.015	1.080	1.161	ns
tpdzl	oen	pad	1.290	0.964	0.912	0.909	0.926	ns
dtpdhl	any	pad	0.118	0.059	0.040	0.030	0.024	ns/pF
dtpdlh	any	pad	0.116	0.058	0.039	0.029	0.023	ns/pF

PC3T0xU   **3 Volts CMOS Three-State Output Pads with Pull-Up Resistor**

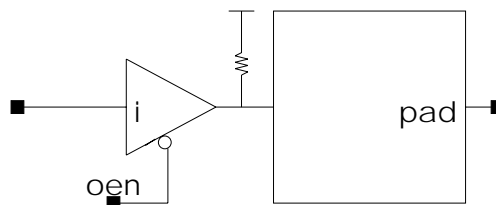**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PC3T01U, PC3T02U, PC3T03U, PC3T04U and PC3T05U are 3 Volts CMOS Three-State Output Pads with Pull-Up Resistor and with 1x, 2x, 3x, 4x and 5x drive capabilities.

Function Table

Input		Output
OEN	**I**	**PAD**
H	X	Hr
L	H	H
L	L	L

Cell Parameters

Code	Parameter	pc3t01u	pc3t02u	pc3t03u	pc3t04u	pc3t05u	Unit
X	Length	80.0	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	81	81	81	81	81	trans
Power	AC Power Dissipation	77.5	95.6	106	109	88.0	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pc3t01u	pc3t02u	pc3t03u	pc3t04u	pc3t05u	Unit
i	Data In	0.294	0.436	0.436	0.436	0.436	pF
oen	Data In	0.205	0.300	0.300	0.300	0.300	pF
pad	High Impedance	6.08	6.08	6.08	6.08	6.08	pF

Output Specifications (Fanout)

Name	Pin Description	pc3t01u	pc3t02u	pc3t03u	pc3t04u	pc3t05u	Unit
pad	Data Out	25.2	53.3	81.5	110	138	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pc3t01u	pc3t02u	pc3t03u	pc3t04u	pc3t05u	Unit
tpdhl	i	pad	1.363	1.005	0.944	0.938	0.951	ns
tpdlh	i	pad	0.994	0.773	0.794	0.860	0.940	ns
tpdhz	oen	pad	0.584	0.466	0.466	0.466	0.466	ns
tpdlz	oen	pad	0.359	0.280	0.280	0.280	0.280	ns
tpdzh	oen	pad	1.234	0.985	1.007	1.073	1.154	ns
tpdzl	oen	pad	1.315	0.971	0.917	0.913	0.929	ns
dtpdhl	any	pad	0.121	0.060	0.040	0.030	0.024	ns/pF
dtpdlh	any	pad	0.113	0.057	0.038	0.029	0.023	ns/pF

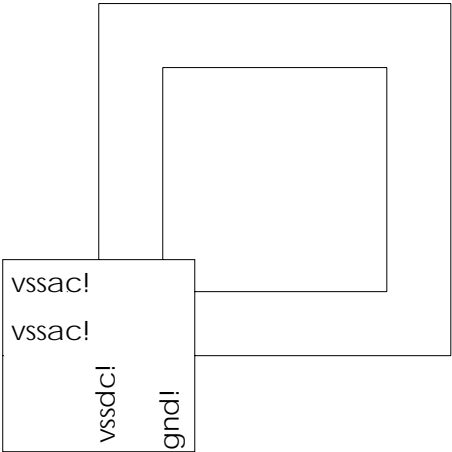**PC45FR0LL**   **Lower Left Corner Supply Pad**

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC45FR0LL is a Lower Left Corner Supply Pad.

vssac!

vssac!

vssdc!

gnd!

Cell Parameters

Code	Parameter	pc45fr0ll	Unit
X	Length	439.7	um
nTran	Transistor Count	40	trans

PC45FR0UR   **Upper Right Corner Supply Pad**
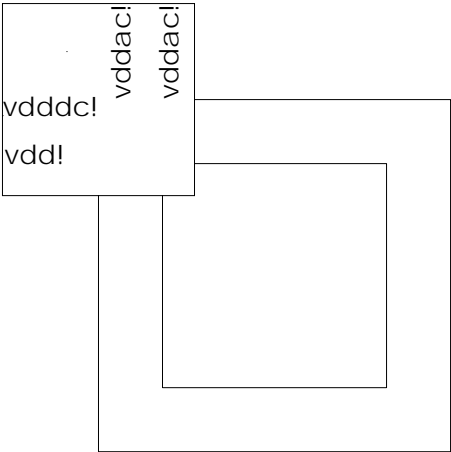
Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC45FR0UR is a Upper Right Corner Supply Pad.
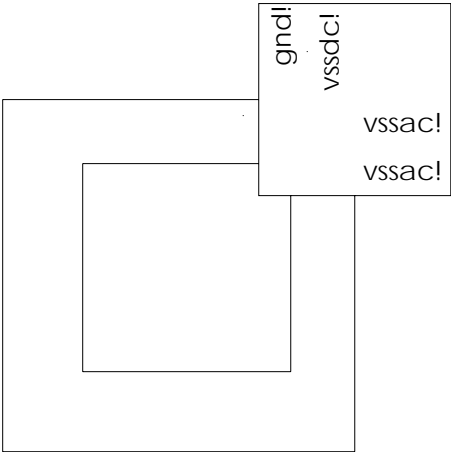
Cell Parameters

Code	Parameter	pc45fr0ur	Unit
X	Length	439.7	um
nTran	Transistor Count	40	trans

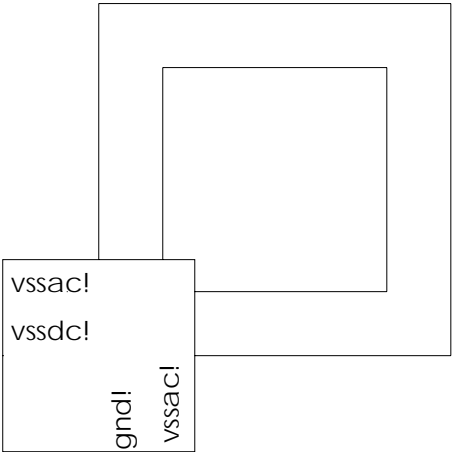**PC45FR3LR**   **Lower Right Corner Supply Pad**

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC45FR3LR is a Lower Right Corner Supply Pad.
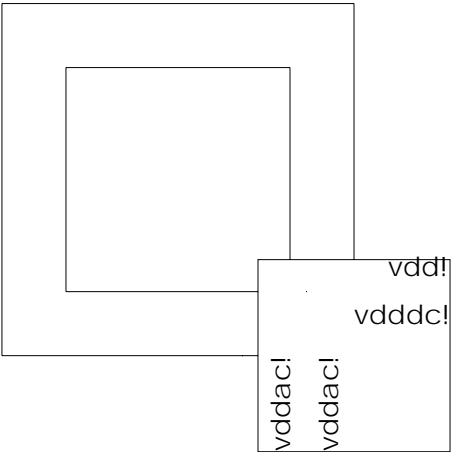
Cell Parameters

Code	Parameter	pc45fr3lr	Unit
X	Length	439.7	um
nTran	Transistor Count	40	trans

PC45FR3UL   **Upper Left Corner Supply Pad**

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC45FR3UL is a Upper Left Corner Supply Pad.

vddac!

vddac!

vdddc!

vdd!

Cell Parameters

Code	Parameter	pc45fr3ul	Unit
X	Length	439.7	um
nTran	Transistor Count	40	trans

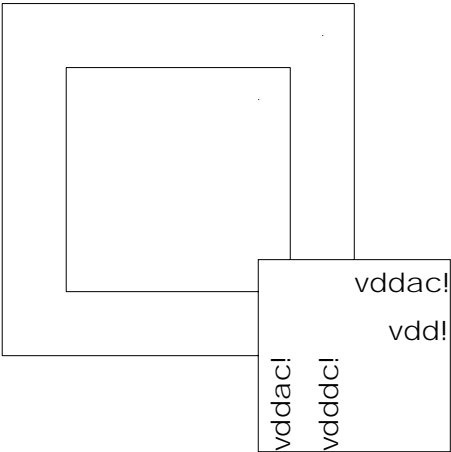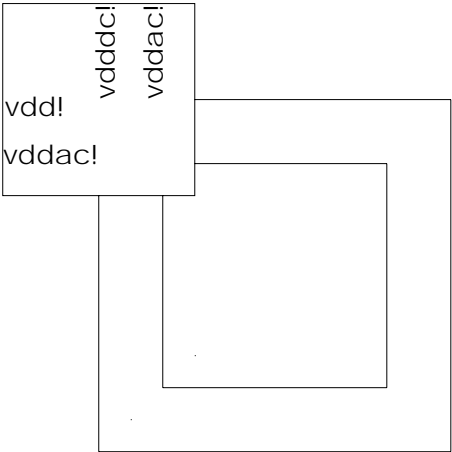## PC45FRELL   Lower Left Corner Supply Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC45FRELL is a Lower Left Corner Supply Pad.

vssac!

vssdc!

gnd!

vssac!

Cell Parameters

Code	Parameter	pc45frell	Unit
X	Length	439.7	um
nTran	Transistor Count	44	trans

PC45FRELR   **Lower Right Corner Supply Pad**

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC45FRELR is a Lower Right Corner Supply Pad.

vddac!

vdd!

vddac!
vdddc!

Cell Parameters

Code	Parameter	pc45frelr	Unit
X	Length	439.7	um
nTran	Transistor Count	24	trans

PC45FREUL   Upper Left Corner Supply Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC45FREUL is a Upper Left Corner Supply Pad.

Cell Parameters

Code	Parameter	pc45freul	Unit
X	Length	439.7	um
nTran	Transistor Count	24	trans

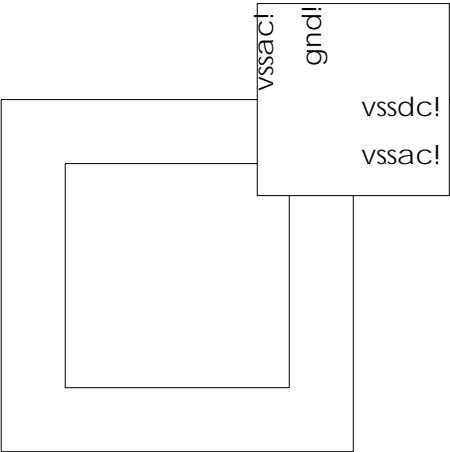**PC45FREUR**   **Upper Right Corner Supply Pad**

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PC45FREUR is a Upper Right Corner Supply Pad.

Cell Parameters

Code	Parameter	pc45freur	Unit
X	Length	439.7	um
nTran	Transistor Count	44	trans

PT3B0x

3 Volts TTL Bidirectional Pads

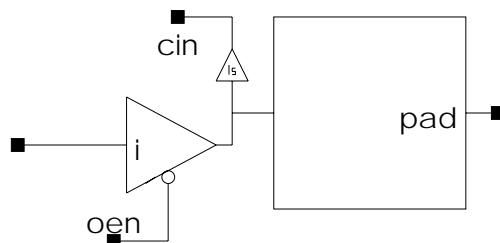**Specification**   **Datasheet Version: 2.1, March 99**   **Symbol**

PT3B01, PT3B02 and PT3B03 are 3 Volts TTL Bidi-
rectional Pads with 1x, 2x and 3x drive capabilities.

Function Table

Input		I/O	Output
OEN	**I**	**PAD**	**CIN**
H	X	hiZ	X
H	X	H	H
H	X	L	L
L	H	H	H
L	L	L	L

Cell Parameters

Code	Parameter	pt3b01	pt3b02	pt3b03	Unit
X	Length	80.0	80.0	80.0	um
nTran	Transistor Count	86	86	86	trans
Power	AC Power Dissipation	42.5	64.3	73.9	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pt3b01	pt3b02	pt3b03	Unit
i	Data In	0.305	0.447	0.447	pF
oen	Data In	0.216	0.310	0.310	pF
pad	High Impedance	6.07	6.07	6.07	pF

Output Specifications (Fanout)

Name	Pin Description	pt3b01	pt3b02	pt3b03	Unit
cin	Data Out	6.80	6.80	6.80	pF
pad	Data Out	25.5	53.6	110	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pt3b01	pt3b02	pt3b03	Unit
tpdhl	i	pad	1.372	1.025	0.961	ns
tpdlh	i	pad	1.033	0.812	0.883	ns
tpdhz	oen	pad	0.583	0.543	0.694	ns
tpdlz	oen	pad	0.359	0.441	0.589	ns
tpdzh	oen	pad	1.276	1.004	1.083	ns
tpdzl	oen	pad	1.323	0.977	0.916	ns
tpdhl	pad	cin	0.148	0.148	0.148	ns
tpdlh	pad	cin	0.115	0.115	0.115	ns
dtpdhl	any	cin	0.128	0.128	0.128	ns/pF
dtpdlh	any	cin	0.167	0.167	0.167	ns/pF
dtpdhl	any	pad	0.120	0.060	0.030	ns/pF
dtpdlh	any	pad	0.116	0.058	0.029	ns/pF

PT3B0xD   3 Volts TTL Bidirectional Pads with Pull-Down Resistor
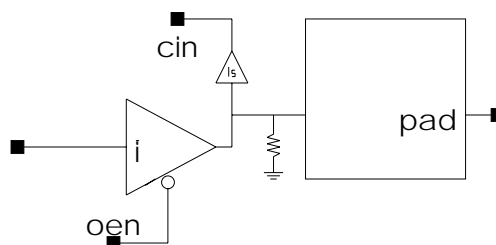
| Specification | Datasheet Version: 2.1, March 99 | Symbol |

PT3B01D, PT3B02D and PT3B03D are 3 Volts TTL
Bidirectional Pads with Pull-Down Resistor and with 1x,
2x and 3x drive capabilities.

Function Table

Input		I/O	Output
OEN	I	PAD	CIN
H	X	Lr	L
H	X	H	H
H	X	L	L
L	H	H	H
L	L	L	L

Cell Parameters

Code	Parameter	pt3b01d	pt3b02d	pt3b03d	Unit
X	Length	80.0	80.0	80.0	um
nTran	Transistor Count	87	87	87	trans
Power	AC Power Dissipation	73.0	80.5	90.1	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pt3b01d	pt3b02d	pt3b03d	Unit
i	Data In	0.305	0.447	0.447	pF
oen	Data In	0.216	0.311	0.311	pF
pad	High Impedance	6.08	6.08	6.08	pF

Output Specifications (Fanout)

Name	Pin Description	pt3b01d	pt3b02d	pt3b03d	Unit
cin	Data Out	6.80	6.80	6.80	pF
pad	Data Out	25.8	54.0	110	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pt3b01d	pt3b02d	pt3b03d	Unit
tpdhl	i	pad	1.357	1.022	0.961	ns
tpdlh	i	pad	1.040	0.805	0.884	ns
tpdhz	oen	pad	0.583	0.543	0.694	ns
tpdlz	oen	pad	0.359	0.390	0.589	ns
tpdzh	oen	pad	1.283	1.007	1.084	ns
tpdzl	oen	pad	1.306	0.971	0.914	ns
tpdhl	pad	cin	0.148	0.148	0.148	ns
tpdlh	pad	cin	0.115	0.115	0.115	ns
dtpdhl	any	cin	0.128	0.128	0.128	ns/pF
dtpdlh	any	cin	0.167	0.167	0.167	ns/pF
dtpdhl	any	pad	0.118	0.060	0.030	ns/pF
dtpdlh	any	pad	0.116	0.058	0.029	ns/pF

PT3B0xU   3 Volts TTL Bidirectional Pads with Pull-Up Resistor
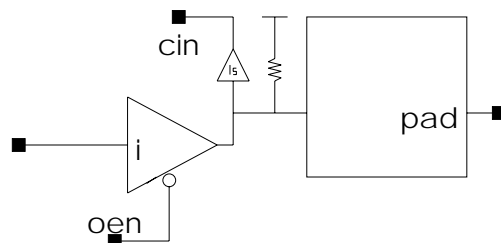
Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PT3B01U, PT3B02U and PT3B03U are 3 Volts TTL Bidirectional Pads with Pull-Up Resistor and with 1x, 2x and 3x drive capabilities.

Function Table

Input		I/O	Output
OEN	I	PAD	CIN
H	X	Hr	H
H	X	H	H
H	X	L	L
L	H	H	H
L	L	L	L

Cell Parameters

Code	Parameter	pt3b01u	pt3b02u	pt3b03u	Unit
X	Length	80.0	80.0	80.0	um
nTran	Transistor Count	87	87	87	trans
Power	AC Power Dissipation	67.2	89.1	98.7	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pt3b01u	pt3b02u	pt3b03u	Unit
i	Data In	0.305	0.447	0.447	pF
oen	Data In	0.216	0.311	0.311	pF
pad	High Impedance	6.08	6.09	6.09	pF

Output Specifications (Fanout)

Name	Pin Description	pt3b01u	pt3b02u	pt3b03u	Unit
cin	Data Out	6.80	6.80	6.80	pF
pad	Data Out	25.0	53.2	110	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pt3b01u	pt3b02u	pt3b03u	Unit
tpdhl	i	pad	1.379	1.027	0.962	ns
tpdlh	i	pad	1.015	0.797	0.879	ns
tpdhz	oen	pad	0.584	0.544	0.694	ns
tpdlz	oen	pad	0.359	0.390	0.589	ns
tpdzh	oen	pad	1.255	0.995	1.077	ns
tpdzl	oen	pad	1.330	0.979	0.917	ns
tpdhl	pad	cin	0.148	0.148	0.148	ns
tpdlh	pad	cin	0.115	0.115	0.115	ns
dtpdhl	any	cin	0.128	0.128	0.128	ns/pF
dtpdlh	any	cin	0.167	0.167	0.167	ns/pF
dtpdhl	any	pad	0.121	0.060	0.030	ns/pF
dtpdlh	any	pad	0.113	0.057	0.029	ns/pF

# IOlib
ATC35(AT56000)

PT3O0x   **3 Volts TTL Output Pads**
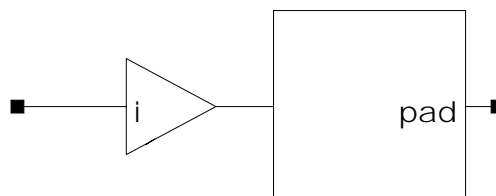
Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PT3O01, PT3O02 and PT3O03 are 3 Volts TTL Out-
put Pads with 1x, 2x and 3x drive capabilities.

Function Table

Input	Output
I	PAD
L	L
H	H

Cell Parameters

Code	Parameter	pt3o01	pt3o02	pt3o03	Unit
X	Length	80.0	80.0	80.0	um
nTran	Transistor Count	70	70	70	trans
Power	AC Power Dissipation	53.7	82.9	99.6	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pt3o01	pt3o02	pt3o03	Unit
i	Data In	0.282	0.423	0.423	pF

Output Specifications (Fanout)

Name	Pin Description	pt3o01	pt3o02	pt3o03	Unit
pad	Data Out	25.6	53.8	110	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pt3o01	pt3o02	pt3o03	Unit
tpdhl	i	pad	1.231	0.909	0.850	ns
tpdlh	i	pad	0.887	0.645	0.674	ns
dtpdhl	any	pad	0.120	0.060	0.030	ns/pF
dtpdlh	any	pad	0.116	0.058	0.029	ns/pF

PT3T0x   3 Volts TTL Three-State Output Pads
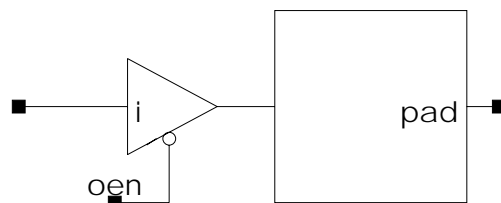
Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PT3T01, PT3T02 and PT3T03 are 3 Volts TTL Three-State Output Pads with 1x, 2x and 3x drive capabilities.

Function Table

Input		Output
OEN	**I**	**PAD**
H	X	hiZ
L	H	H
L	L	L

Cell Parameters

Code	Parameter	pt3t01	pt3t02	pt3t03	Unit
X	Length	80.0	80.0	80.0	um
nTran	Transistor Count	80	80	80	trans
Power	AC Power Dissipation	54.1	83.0	97.5	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pt3t01	pt3t02	pt3t03	Unit
i	Data In	0.294	0.436	0.436	pF
oen	Data In	0.205	0.300	0.300	pF
pad	High Impedance	6.07	6.07	6.07	pF

Output Specifications (Fanout)

Name	Pin Description	pt3t01	pt3t02	pt3t03	Unit
pad	Data Out	25.6	53.7	110	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pt3t01	pt3t02	pt3t03	Unit
tpdhl	i	pad	1.357	1.018	0.957	ns
tpdlh	i	pad	1.011	0.784	0.876	ns
tpdhz	oen	pad	0.583	0.543	0.694	ns
tpdlz	oen	pad	0.359	0.419	0.589	ns
tpdzh	oen	pad	1.254	0.994	1.077	ns
tpdzl	oen	pad	1.308	0.969	0.913	ns
dtpdhl	any	pad	0.120	0.060	0.030	ns/pF
dtpdlh	any	pad	0.116	0.058	0.029	ns/pF

PT3T0xD   3 Volts TTL Three-State Output Pads with Pull-Down Resistor
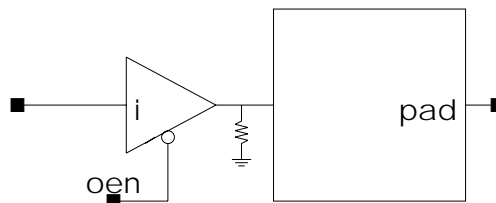
Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PT3T01D, PT3T02D and PT3T03D are 3 Volts TTL Three-State Output Pads with Pull-Down Resistor and with 1x, 2x and 3x drive capabilities.

Function Table

Input		Output
OEN	**I**	**PAD**
H	X	Lr
L	H	H
L	L	L

Cell Parameters

Code	Parameter	pt3t01d	pt3t02d	pt3t03d	Unit
X	Length	80.0	80.0	80.0	um
nTran	Transistor Count	81	81	81	trans
Power	AC Power Dissipation	78.5	107	122	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pt3t01d	pt3t02d	pt3t03d	Unit
i	Data In	0.294	0.436	0.436	pF
oen	Data In	0.205	0.300	0.300	pF
pad	High Impedance	6.08	6.08	6.08	pF

Output Specifications (Fanout)

Name	Pin Description	pt3t01d	pt3t02d	pt3t03d	Unit
pad	Data Out	25.9	54.1	110	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pt3t01d	pt3t02d	pt3t03d	Unit
tpdhl	i	pad	1.343	1.014	0.957	ns
tpdlh	i	pad	1.017	0.794	0.877	ns
tpdhz	oen	pad	0.583	0.543	0.694	ns
tpdlz	oen	pad	0.359	0.390	0.589	ns
tpdzh	oen	pad	1.260	0.996	1.078	ns
tpdzl	oen	pad	1.290	0.964	0.910	ns
dtpdhl	any	pad	0.118	0.060	0.030	ns/pF
dtpdlh	any	pad	0.116	0.058	0.029	ns/pF

PT3T0xU   3 Volts TTL Three-State Output Pads with Pull-Up Resistor
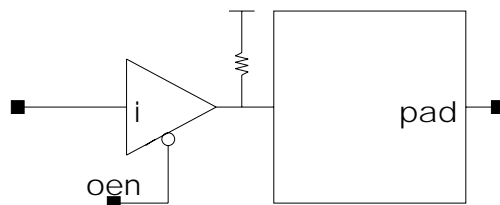
Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PT3T01U, PT3T02U and PT3T03U are 3 Volts TTL Three-State Output Pads with Pull-Up Resistor and with 1x, 2x and 3x drive capabilities.

Function Table

Input		Output
OEN	I	PAD
H	X	Hr
L	H	H
L	L	L

Cell Parameters

Code	Parameter	pt3t01u	pt3t02u	pt3t03u	Unit
X	Length	80.0	80.0	80.0	um
nTran	Transistor Count	81	81	81	trans
Power	AC Power Dissipation	77.5	107	122	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	pt3t01u	pt3t02u	pt3t03u	Unit
i	Data In	0.294	0.436	0.436	pF
oen	Data In	0.205	0.300	0.300	pF
pad	High Impedance	6.08	6.08	6.08	pF

Output Specifications (Fanout)

Name	Pin Description	pt3t01u	pt3t02u	pt3t03u	Unit
pad	Data Out	25.2	53.3	110	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	pt3t01u	pt3t02u	pt3t03u	Unit
tpdhl	i	pad	1.363	1.020	0.958	ns
tpdlh	i	pad	0.994	0.786	0.873	ns
tpdhz	oen	pad	0.584	0.544	0.694	ns
tpdlz	oen	pad	0.359	0.390	0.589	ns
tpdzh	oen	pad	1.234	0.985	1.071	ns
tpdzl	oen	pad	1.315	0.972	0.913	ns
dtpdhl	any	pad	0.121	0.060	0.030	ns/pF
dtpdlh	any	pad	0.113	0.057	0.029	ns/pF

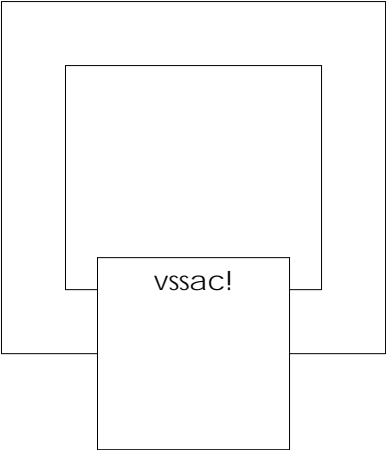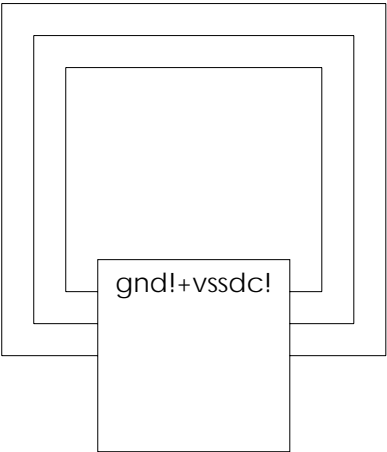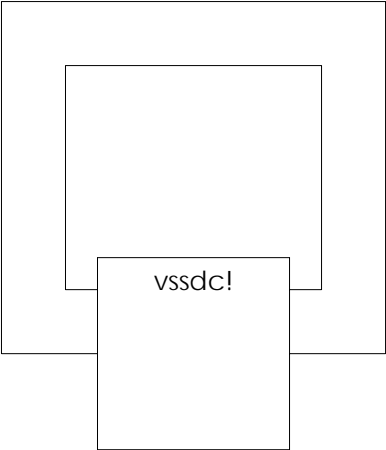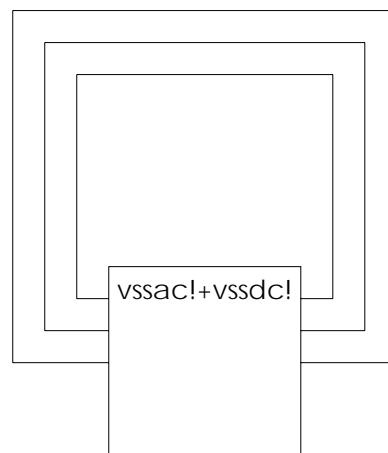## PV0A   VSS Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PV0A is a VSS Pad. This cell supplies VSS to the AC
section of the I/O circuitry.

vssac!

Cell Parameters

Code	Parameter	pv0a	Unit
X	Length	80.0	um
nTran	Transistor Count	20	trans

PV0B   VSS Pad
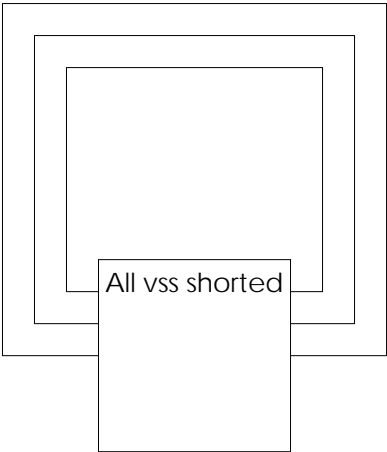
Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PV0B is a VSS Pad. This cell supplies VSS to the Core
and the DC section of the I/O circuitry.

gnd!+vssdc!

Cell Parameters

Code	Parameter	pv0b	Unit
X	Length	80.0	um
nTran	Transistor Count	20	trans

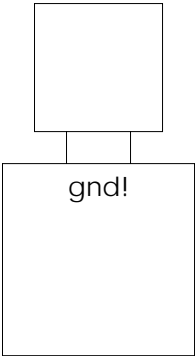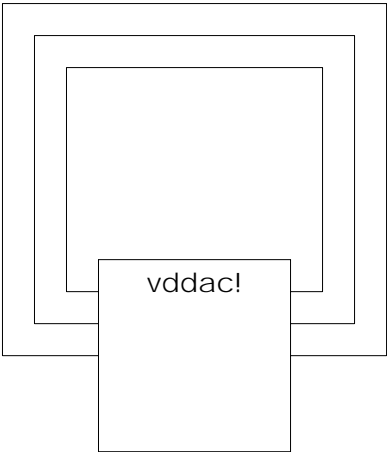# PV0D   VSS Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PV0D is a VSS Pad. This cell supplies VSS to the DC
section of the I/O circuitry.

vssdc!

Cell Parameters

Code	Parameter	pv0d	Unit
X	Length	80.0	um
nTran	Transistor Count	20	trans

PV0E   VSS Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PV0E is a VSS Pad. This cell supplies VSS to the AC and DC sections of the I/O circuitry. The use of this cell is subject to authorization by TSC.

vssac!+vssdc!

Cell Parameters

Code	Parameter	pv0e	Unit
X	Length	80.0	um
nTran	Transistor Count	20	trans

PV0F   VSS Pad
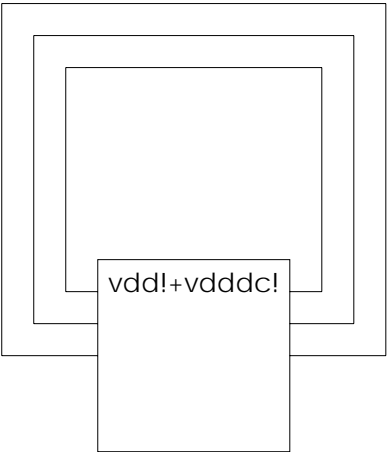
| Specification | Datasheet Version: 2.1, March 99 | Symbol |

PV0F is a VSS Pad. This cell supplies VSS to the Core,
AC and DC sections of the I/O circuitry. The use of
this cell is subject to authorization by TSC.

All vss shorted

Cell Parameters

Code	Parameter	pv0f	Unit
X	Length	80.0	um
nTran	Transistor Count	20	trans

VSS Pad

PV0I   **VSS Pad**

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PV0I is a VSS Pad. This cell supplies VSS to the Core.

gnd!

Cell Parameters

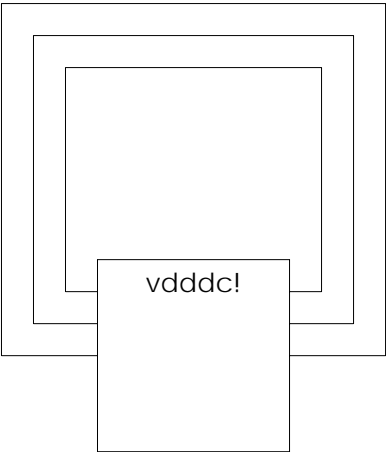| Code	Parameter	pv0i	Unit
X	Length	80.0	um
nTran	Transistor Count	20	trans

PVDA

VDD Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PVDA is a VDD Pad. This cell supplies VDD to the AC
section of the I/O circuitry.

vddac!

Cell Parameters

Code	Parameter	pvda	Unit
X	Length	80.0	um
nTran	Transistor Count	10	trans

VDD Pad

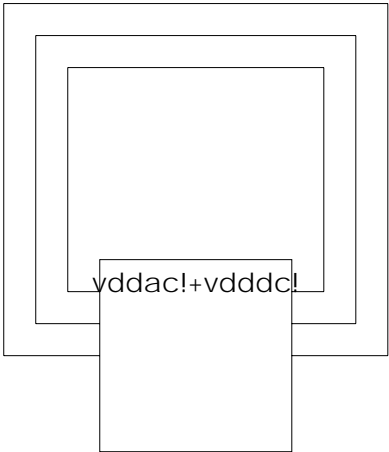## PVDB   VDD Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PVDB is a VDD Pad. This cell supplies VDD to the
Core and the DC section of the I/O circuitry.

vdd!+vdddc!

Cell Parameters

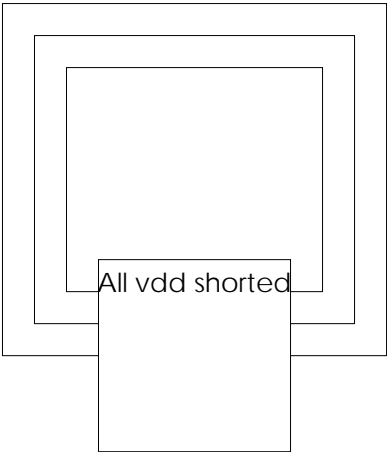| Code	Parameter	pvdb	Unit
X	Length	80.0	um
nTran	Transistor Count	10	trans

PVDD

VDD Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PVDD is a VDD Pad. This cell supplies VDD to the
DC section of the I/O circuitry.

Cell Parameters

Code	Parameter	pvdd	Unit
X	Length	80.0	um
nTran	Transistor Count	10	trans

VDD Pad

PVDE

VDD Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PVDE is a VDD Pad. This cell supplies VDD to the AC and DC sections of the I/O circuitry. The use of this cell is subject to authorization by TSC.

vddac!+vdddc!

Cell Parameters

Code	Parameter	pvde	Unit
X	Length	80.0	um
nTran	Transistor Count	10	trans

# PVDF   VDD Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PVDF is a VDD Pad. This cell supplies VDD to the
Core, AC and DC sections of the I/O circuitry. The use
of this cell is subject to authorization by TSC.

All vdd shorted

Cell Parameters

Code	Parameter	pvdf	Unit
X	Length	80.0	um
nTran	Transistor Count	10	trans

PVDI   VDD Pad

Specification   **Datasheet Version: 2.1, March 99**   **Symbol**

PVDI is a VDD Pad. This cell supplies VDD to the
Core.

vdd!
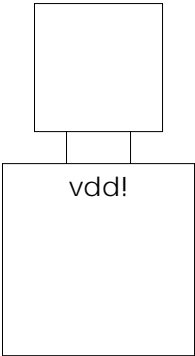
Cell Parameters

Code	Parameter	pvdi	Unit
X	Length	80.0	um
nTran	Transistor Count	10	trans

List of IO35lib cells

MC45FR0LL   Lower Left Corner Supply Pad

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC45FR0LL is a Lower Left Corner Supply Pad.

mixvss!

mixvss!

mixvss! mixvss!

Cell Parameters

Code	Parameter	mc45fr0ll	Unit
X	Length	439.7	um
nTran	Transistor Count	40	trans

MC45FR0UR   **Upper Right Corner Supply Pad**

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC45FR0UR is a Upper Right Corner Supply Pad.

Cell Parameters

Code	Parameter	mc45fr0ur	Unit
X	Length	439.7	um
nTran	Transistor Count	40	trans

MC45FRELL   Lower Left Corner Supply Pad

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC45FRELL is a Lower Left Corner Supply Pad.

mixvss!

mixvss!

gnd!

mixvss!
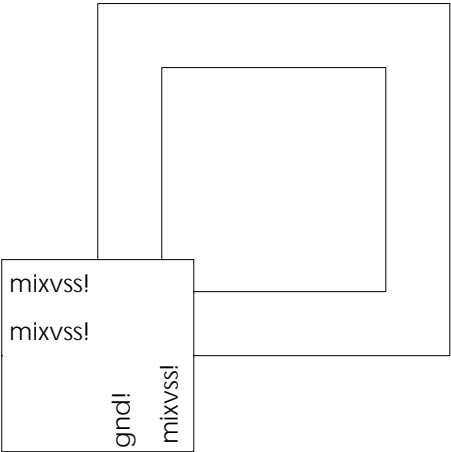
Cell Parameters

Code	Parameter	mc45frell	Unit
X	Length	439.7	um
nTran	Transistor Count	40	trans

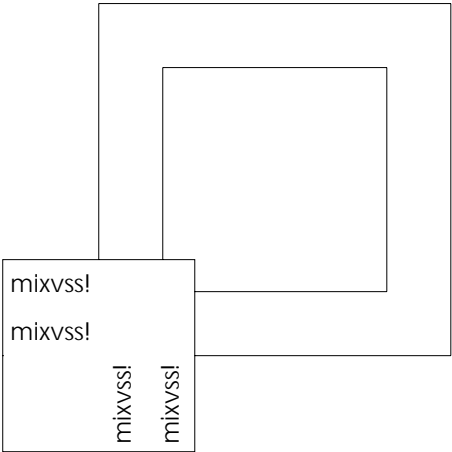**MC45FRELR**   **Lower Right Corner Supply Pad**

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC45FRELR is a Lower Right Corner Supply Pad.

mixvdd!

mixvdd!

mixvdd!

mixvdd!

Cell Parameters

Code	Parameter	mc45frelr	Unit
X	Length	439.7	um
nTran	Transistor Count	20	trans

MC45FREUL   Upper Left Corner Supply Pad

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC45FREUL is a Upper Left Corner Supply Pad.

Cell Parameters

Code	Parameter	mc45freul	Unit
X	Length	439.7	um
nTran	Transistor Count	20	trans

ATMEL

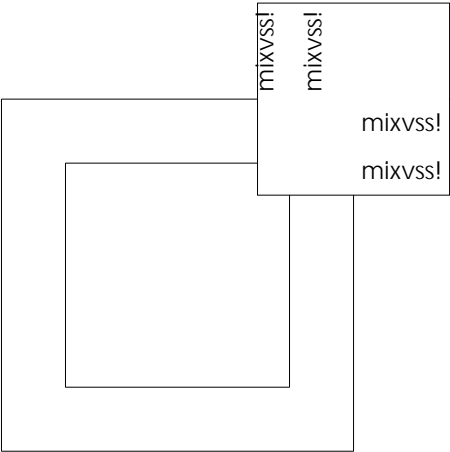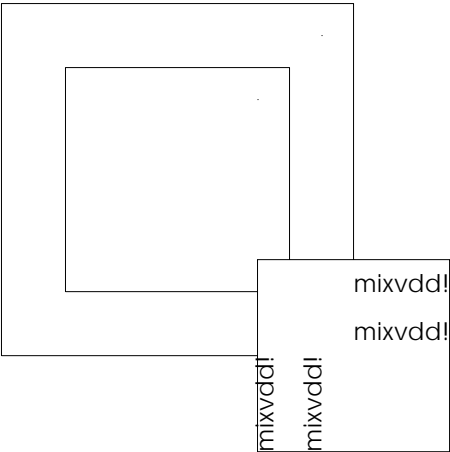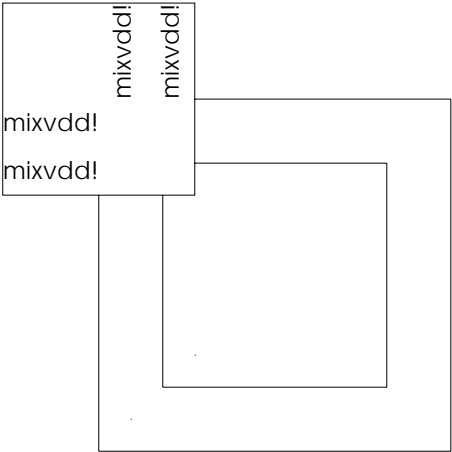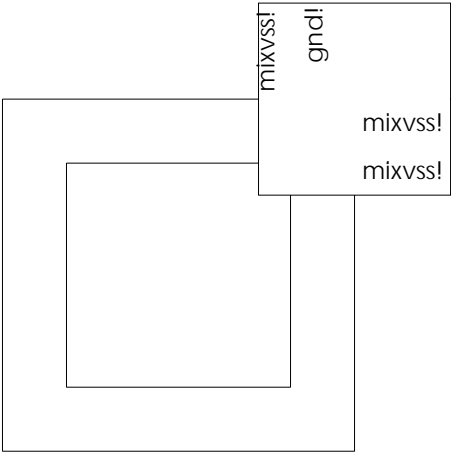## MC45FREUR   Upper Right Corner Supply Pad

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC45FREUR is a Upper Right Corner Supply Pad.

Cell Parameters

Code	Parameter	mc45freur	Unit
X	Length	439.7	um
nTran	Transistor Count	40	trans

MC5B0x   5 Volts CMOS Bidirectional Pads

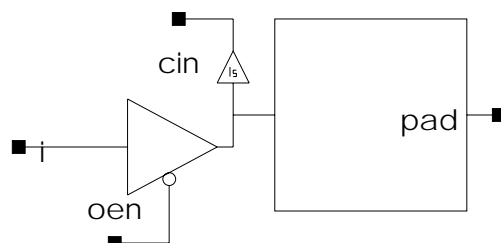**Specification**   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5B01, MC5B02, MC5B03 and MC5B04 are 5 Volts
CMOS Bidirectional Pads with 1x, 2x, 3x and 4x drive
capabilities.

Function Table

Input		I/O	Output
OEN	**I**	**PAD**	**CIN**
H	X	hiZ	X
H	X	H	H
H	X	L	L
L	H	H	H
L	L	L	L

Cell Parameters

Code	Parameter	mc5b01	mc5b02	mc5b03	mc5b04	Unit
X	Length	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	85	85	84	84	trans
Power	AC Power Dissipation	66.6	72.0	99.0	123	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5b01	mc5b02	mc5b03	mc5b04	Unit
i	Data In	0.094	0.094	0.094	0.094	pF
oen	Data In	0.087	0.087	0.087	0.087	pF
pad	High Impedance	5.60	5.60	5.61	5.61	pF

Output Specifications (Fanout)

Name	Pin Description	mc5b01	mc5b02	mc5b03	mc5b04	Unit
cin	Data Out	5.87	5.87	5.87	5.87	pF
pad	Data Out	54.9	112	226	453	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5b01	mc5b02	mc5b03	mc5b04	Unit
tpdhl	i	pad	2.327	2.298	2.727	3.265	ns
tpdlh	i	pad	2.192	2.179	2.034	2.449	ns
tpdhz	oen	pad	1.072	1.219	1.302	1.583	ns
tpdlz	oen	pad	1.407	1.526	1.709	1.939	ns
tpdzh	oen	pad	2.787	2.669	2.935	3.120	ns
tpdzl	oen	pad	2.463	2.333	2.318	2.558	ns
tpdhl	pad	cin	0.301	0.301	0.301	0.301	ns
tpdlh	pad	cin	0.114	0.114	0.114	0.114	ns
dtpdhl	any	cin	0.164	0.164	0.164	0.164	ns/pF
dtpdlh	any	cin	0.322	0.322	0.322	0.322	ns/pF
dtpdhl	any	pad	0.144	0.072	0.036	0.018	ns/pF
dtpdlh	any	pad	0.131	0.066	0.033	0.017	ns/pF

MC5B0xD   5 Volts CMOS Bidirectional Pads with Pull-Down Resistor
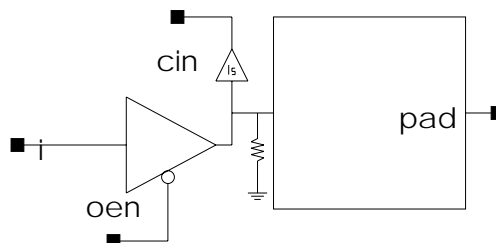
Specification   Datasheet Version: 1.1, March 99   **Symbol**

MC5B01D, MC5B02D, MC5B03D and MC5B04D are 5
Volts CMOS Bidirectional Pads with Pull-Down Resistor
and with 1x, 2x, 3x and 4x drive capabilities.

Function Table

Input		I/O	Output
OEN	I	PAD	CIN
H	X	Lr	L
H	X	H	H
H	X	L	L
L	H	H	H
L	L	L	L

Cell Parameters

Code	Parameter	mc5b01d	mc5b02d	mc5b03d	mc5b04d	Unit
X	Length	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	86	86	85	85	trans
Power	AC Power Dissipation	105	110	137	161	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5b01d	mc5b02d	mc5b03d	mc5b04d	Unit
i	Data In	0.095	0.095	0.095	0.095	pF
oen	Data In	0.087	0.087	0.087	0.087	pF
pad	High Impedance	5.61	5.62	5.63	5.63	pF

Output Specifications (Fanout)

Name	Pin Description	mc5b01d	mc5b02d	mc5b03d	mc5b04d	Unit
cin	Data Out	5.87	5.87	5.87	5.87	pF
pad	Data Out	55.4	112	226	454	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5b01d	mc5b02d	mc5b03d	mc5b04d	Unit
tpdhl	i	pad	2.314	2.296	2.726	3.266	ns
tpdlh	i	pad	2.201	2.184	2.037	2.453	ns
tpdhz	oen	pad	1.073	1.220	1.303	1.584	ns
tpdlz	oen	pad	1.411	1.530	1.711	1.941	ns
tpdzh	oen	pad	2.796	2.675	2.938	3.124	ns
tpdzl	oen	pad	2.440	2.322	2.312	2.554	ns
tpdhl	pad	cin	0.302	0.302	0.302	0.302	ns
tpdlh	pad	cin	0.114	0.114	0.114	0.114	ns
dtpdhl	any	cin	0.164	0.164	0.164	0.164	ns/pF
dtpdlh	any	cin	0.322	0.322	0.322	0.322	ns/pF
dtpdhl	any	pad	0.142	0.072	0.036	0.018	ns/pF
dtpdlh	any	pad	0.131	0.066	0.033	0.017	ns/pF

MC5B0xU   5 Volts CMOS Bidirectional Pads with Pull-Up Resistor
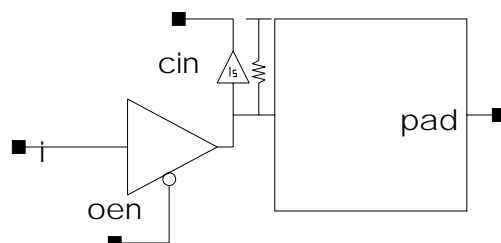
Specification   Datasheet Version: 1.1, March 99   **Symbol**

MC5B01U, MC5B02U, MC5B03U and MC5B04U are 5 Volts CMOS Bidirectional Pads with Pull-Up Resistor and with 1x, 2x, 3x and 4x drive capabilities.

Function Table

Input		I/O	Output
OEN	**I**	**PAD**	**CIN**
H	X	Hr	H
H	X	H	H
H	X	L	L
L	H	H	H
L	L	L	L

Cell Parameters

Code	Parameter	mc5b01u	mc5b02u	mc5b03u	mc5b04u	Unit
X	Length	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	86	86	85	85	trans
Power	AC Power Dissipation	125	130	157	181	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5b01u	mc5b02u	mc5b03u	mc5b04u	Unit
i	Data In	0.095	0.095	0.095	0.095	pF
oen	Data In	0.087	0.087	0.087	0.087	pF
pad	High Impedance	5.60	5.60	5.61	5.61	pF

Output Specifications (Fanout)

Name	Pin Description	mc5b01u	mc5b02u	mc5b03u	mc5b04u	Unit
cin	Data Out	5.87	5.87	5.87	5.87	pF
pad	Data Out	54.2	111	225	453	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5b01u	mc5b02u	mc5b03u	mc5b04u	Unit
tpdhl	i	pad	2.333	2.301	2.727	3.267	ns
tpdlh	i	pad	2.171	2.170	2.030	2.447	ns
tpdhz	oen	pad	1.072	1.219	1.302	1.583	ns
tpdlz	oen	pad	1.407	1.527	1.709	1.939	ns
tpdzh	oen	pad	2.751	2.650	2.921	3.111	ns
tpdzl	oen	pad	2.469	2.335	2.318	2.558	ns
tpdhl	pad	cin	0.303	0.303	0.303	0.303	ns
tpdlh	pad	cin	0.116	0.116	0.116	0.116	ns
dtpdhl	any	cin	0.164	0.164	0.164	0.164	ns/pF
dtpdlh	any	cin	0.322	0.322	0.322	0.322	ns/pF
dtpdhl	any	pad	0.146	0.073	0.036	0.018	ns/pF
dtpdlh	any	pad	0.128	0.065	0.033	0.017	ns/pF

MC5D00   **5 Volts CMOS Non-Inverting Input Pad**

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5D00 is a 5 Volts CMOS Non-Inverting Input Pad.

Function Table

Input	Output
PAD	**CIN**
L	L
H	H
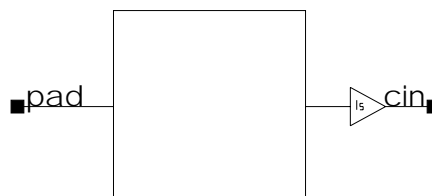
Cell Parameters

Code	Parameter	mc5d00	Unit
X	Length	80.0	um
nTran	Transistor Count	34	trans
Power	AC Power Dissipation	1.28	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d00	Unit
pad	Data In	5.49	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d00	Unit
cin	Data Out	5.88	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d00	Unit
tpdhl	pad	cin	0.296	ns
tpdlh	pad	cin	0.106	ns
dtpdhl	any	cin	0.165	ns/pF
dtpdlh	any	cin	0.322	ns/pF

MC5D00D — 5 Volts CMOS Non-Inverting Input Pad with Pull-Down Resistor

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5D00D is a 5 Volts CMOS Non-Inverting Input Pad
with Pull-Down Resistor.

Function Table

Input	Output
PAD	CIN
L	L
H	H
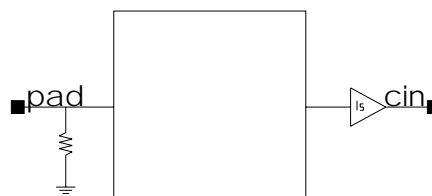
Cell Parameters

Code	Parameter	mc5d00d	Unit
X	Length	80.0	um
nTran	Transistor Count	35	trans
Power	AC Power Dissipation	1.29	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d00d	Unit
pad	Data In	5.51	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d00d	Unit
cin	Data Out	5.88	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d00d	Unit
tpdhl	pad	cin	0.297	ns
tpdlh	pad	cin	0.107	ns
dtpdhl	any	cin	0.165	ns/pF
dtpdlh	any	cin	0.322	ns/pF

MC5D00U   **5 Volts CMOS Non-Inverting Input Pad with Pull-Up Resistor**

**Specification**   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5D00U is a 5 Volts CMOS Non-Inverting Input Pad with Pull-Up Resistor.

Function Table

Input	Output
PAD	**CIN**
L	L
H	H
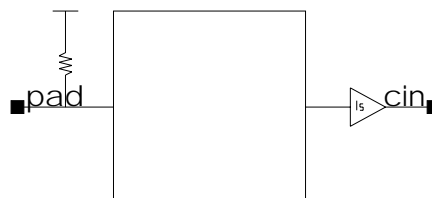
Cell Parameters

Code	Parameter	mc5d00u	Unit
X	Length	80.0	um
nTran	Transistor Count	35	trans
Power	AC Power Dissipation	59.1	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d00u	Unit
pad	Data In	5.50	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d00u	Unit
cin	Data Out	5.88	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d00u	Unit
tpdhl	pad	cin	0.298	ns
tpdlh	pad	cin	0.108	ns
dtpdhl	any	cin	0.165	ns/pF
dtpdlh	any	cin	0.322	ns/pF

MC5D10   5 Volts CMOS Inverting Input Pad

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5D10 is a 5 Volts CMOS Inverting Input Pad.

Function Table

Input	Output
PAD	CIN
L	H
H	L

pad   cin
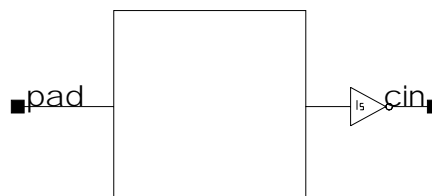
Cell Parameters

Code	Parameter	mc5d10	Unit
X	Length	80.0	um
nTran	Transistor Count	36	trans
Power	AC Power Dissipation	2.06	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d10	Unit
pad	Data In	5.50	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d10	Unit
cin	Data Out	5.88	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d10	Unit
tpdhl	pad	cin	0.204	ns
tpdlh	pad	cin	0.353	ns
dtpdhl	any	cin	0.164	ns/pF
dtpdlh	any	cin	0.322	ns/pF

MC5D10D   **5 Volts CMOS Inverting Input Pad with Pull-Down Resistor**

**Specification**   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5D10D is a 5 Volts CMOS Inverting Input Pad with Pull-Down Resistor.

Function Table

Input	Output
PAD	**CIN**
L	H
H	L
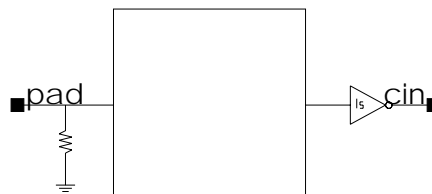
Cell Parameters

Code	Parameter	mc5d10d	Unit
X	Length	80.0	um
nTran	Transistor Count	37	trans
Power	AC Power Dissipation	2.06	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d10d	Unit
pad	Data In	5.52	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d10d	Unit
cin	Data Out	5.88	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d10d	Unit
tpdhl	pad	cin	0.204	ns
tpdlh	pad	cin	0.354	ns
dtpdhl	any	cin	0.164	ns/pF
dtpdlh	any	cin	0.322	ns/pF

MC5D10U   5 Volts CMOS Inverting Input Pad with Pull-Up Resistor

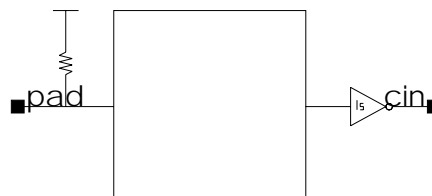**Specification**   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5D10U is a 5 Volts CMOS Inverting Input Pad with
Pull-Up Resistor.

Function Table

Input	Output
PAD	**CIN**
L	H
H	L

Cell Parameters

Code	Parameter	mc5d10u	Unit
X	Length	80.0	um
nTran	Transistor Count	37	trans
Power	AC Power Dissipation	59.8	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d10u	Unit
pad	Data In	5.50	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d10u	Unit
cin	Data Out	5.88	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d10u	Unit
tpdhl	pad	cin	0.205	ns
tpdlh	pad	cin	0.355	ns
dtpdhl	any	cin	0.164	ns/pF
dtpdlh	any	cin	0.322	ns/pF

MC5D20 **5 Volts CMOS Schmitt Non-Inverting Input Pad**

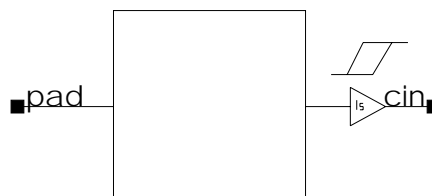Specification   Datasheet Version: 1.1, March 99   Symbol

MC5D20 is a 5 Volts CMOS Schmitt Non-Inverting Input Pad.

Function Table

Input	Output
PAD	**CIN**
L	L
H	H

Cell Parameters

Code	Parameter	mc5d20	Unit
X	Length	80.0	um
nTran	Transistor Count	38	trans
Power	AC Power Dissipation	4.14	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d20	Unit
pad	Data In	5.50	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d20	Unit
cin	Data Out	5.07	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d20	Unit
tpdhl	pad	cin	1.309	ns
tpdlh	pad	cin	0.397	ns
dtpdhl	any	cin	0.229	ns/pF
dtpdlh	any	cin	0.218	ns/pF

DC Specifications

Code	Parameter	mc5d20	Unit
VT+min/max	High Level Input Voltage	1.675/1.725	V
VT-min/max	Low Level Input Voltage	1.025/1.125	V
Vhysmin/max	Hysteresis	0.550/0.700	V

MC5D20D   **5 Volts CMOS Schmitt Non-Inverting Input Pad with Pull-Down Resistor**
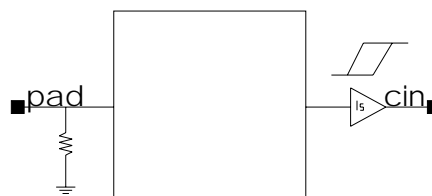
Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5D20D is a 5 Volts CMOS Schmitt Non-Inverting
Input Pad with Pull-Down Resistor.

Function Table

Input	Output
PAD	**CIN**
L	L
H	H

Cell Parameters

Code	Parameter	mc5d20d	Unit
X	Length	80.0	um
nTran	Transistor Count	39	trans
Power	AC Power Dissipation	4.13	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d20d	Unit
pad	Data In	5.52	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d20d	Unit
cin	Data Out	5.07	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d20d	Unit
tpdhl	pad	cin	1.310	ns
tpdlh	pad	cin	0.397	ns
dtpdhl	any	cin	0.229	ns/pF
dtpdlh	any	cin	0.218	ns/pF

DC Specifications

Code	Parameter	mc5d20d	Unit
VT+min/max	High Level Input Voltage	1.675/1.725	V
VT-min/max	Low Level Input Voltage	1.025/1.125	V
Vhysmin/max	Hysteresis	0.550/0.700	V

MC5D20U   **5 Volts CMOS Schmitt Non-Inverting Input Pad with Pull-Up Resistor**
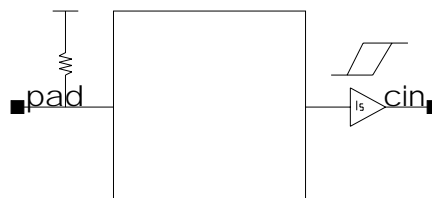
Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5D20U is a 5 Volts CMOS Schmitt Non-Inverting Input Pad with Pull-Up Resistor.

Function Table

Input	Output
PAD	**CIN**
L	L
H	H

Cell Parameters

Code	Parameter	mc5d20u	Unit
X	Length	80.0	um
nTran	Transistor Count	39	trans
Power	AC Power Dissipation	62.7	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d20u	Unit
pad	Data In	5.51	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d20u	Unit
cin	Data Out	5.07	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d20u	Unit
tpdhl	pad	cin	1.310	ns
tpdlh	pad	cin	0.398	ns
dtpdhl	any	cin	0.229	ns/pF
dtpdlh	any	cin	0.218	ns/pF

DC Specifications

Code	Parameter	mc5d20u	Unit
VT+min/max	High Level Input Voltage	1.675/1.725	V
VT-min/max	Low Level Input Voltage	1.025/1.125	V
Vhysmin/max	Hysteresis	0.550/0.700	V

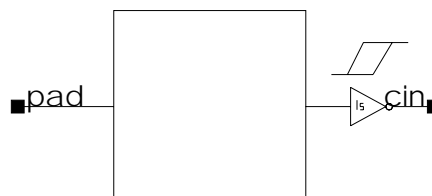## MC5D30   5 Volts CMOS Schmitt Inverting Input Pad

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5D30 is a 5 Volts CMOS Schmitt Inverting Input Pad.

Function Table

Input	Output
PAD	**CIN**
L	H
H	L

Cell Parameters

Code	Parameter	mc5d30	Unit
X	Length	80.0	um
nTran	Transistor Count	41	trans
Power	AC Power Dissipation	4.15	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d30	Unit
pad	Data In	5.50	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d30	Unit
cin	Data Out	5.09	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d30	Unit
tpdhl	pad	cin	0.464	ns
tpdlh	pad	cin	1.142	ns
dtpdhl	any	cin	0.206	ns/pF
dtpdlh	any	cin	0.212	ns/pF

DC Specifications

Code	Parameter	mc5d30	Unit
VT+min/max	High Level Input Voltage	1.675/1.725	V
VT-min/max	Low Level Input Voltage	1.025/1.125	V
Vhysmin/max	Hysteresis	0.550/0.700	V

MC5D30D   **5 Volts CMOS Schmitt Inverting Input Pad with Pull-Down Resistor**
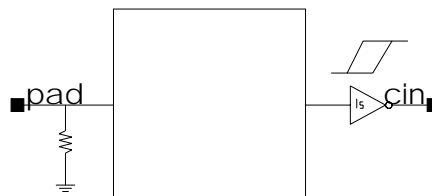
Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5D30D is a 5 Volts CMOS Schmitt Inverting Input Pad with Pull-Down Resistor.

Function Table

Input	Output
PAD	**CIN**
L	H
H	L

Cell Parameters

Code	Parameter	mc5d30d	Unit
X	Length	80.0	um
nTran	Transistor Count	42	trans
Power	AC Power Dissipation	4.14	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d30d	Unit
pad	Data In	5.52	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d30d	Unit
cin	Data Out	5.09	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d30d	Unit
tpdhl	pad	cin	0.464	ns
tpdlh	pad	cin	1.143	ns
dtpdhl	any	cin	0.206	ns/pF
dtpdlh	any	cin	0.212	ns/pF

DC Specifications

Code	Parameter	mc5d30d	Unit
VT+min/max	High Level Input Voltage	1.675/1.725	V
VT-min/max	Low Level Input Voltage	1.025/1.125	V
Vhysmin/max	Hysteresis	0.550/0.700	V

MC5D30U   5 Volts CMOS Schmitt Inverting Input Pad with Pull-Up Resistor

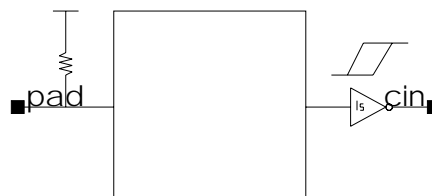**Specification**   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5D30U is a 5 Volts CMOS Schmitt Inverting Input
Pad with Pull-Up Resistor.

Function Table

Input	Output
PAD	**CIN**
L	H
H	L

Cell Parameters

Code	Parameter	mc5d30u	Unit
X	Length	80.0	um
nTran	Transistor Count	42	trans
Power	AC Power Dissipation	62.2	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5d30u	Unit
pad	Data In	5.51	pF

Output Specifications (Fanout)

Name	Pin Description	mc5d30u	Unit
cin	Data Out	5.09	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5d30u	Unit
tpdhl	pad	cin	0.465	ns
tpdlh	pad	cin	1.143	ns
dtpdhl	any	cin	0.206	ns/pF
dtpdlh	any	cin	0.212	ns/pF

DC Specifications

Code	Parameter	mc5d30u	Unit
VT+min/max	High Level Input Voltage	1.675/1.725	V
VT-min/max	Low Level Input Voltage	1.025/1.125	V
Vhysmin/max	Hysteresis	0.550/0.700	V

MC5O0x   **5 Volts CMOS Output Pads**

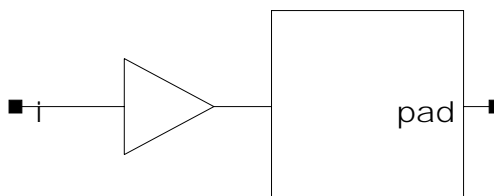**Specification**   Datasheet Version: 1.1, March 99   **Symbol**

MC5O01, MC5O02, MC5O03 and MC5O04 are 5 Volts
CMOS Output Pads with 1x, 2x, 3x and 4x drive capabilities.

Function Table

Input	Output
I	**PAD**
L	L
H	H

Cell Parameters

Code	Parameter	mc5o01	mc5o02	mc5o03	mc5o04	Unit
X	Length	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	64	64	63	63	trans
Power	AC Power Dissipation	84.5	93.6	136	179	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5o01	mc5o02	mc5o03	mc5o04	Unit
i	Data In	0.081	0.081	0.081	0.081	pF

Output Specifications (Fanout)

Name	Pin Description	mc5o01	mc5o02	mc5o03	mc5o04	Unit
pad	Data Out	54.9	112	226	454	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5o01	mc5o02	mc5o03	mc5o04	Unit
tpdhl	i	pad	2.310	2.289	2.723	3.265	ns
tpdlh	i	pad	2.174	2.169	2.029	2.446	ns
dtpdhl	any	pad	0.144	0.072	0.036	0.018	ns/pF
dtpdlh	any	pad	0.131	0.066	0.033	0.017	ns/pF

MC5T0x   5 Volts CMOS Three-State Output Pads
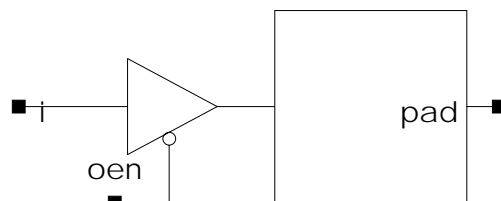
Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5T01, MC5T02, MC5T03 and MC5T04 are 5 Volts
CMOS Three-State Output Pads with 1x, 2x, 3x and 4x
drive capabilities.

Function Table

Input		Output
OEN	**I**	**PAD**
H	X	hiZ
L	H	H
L	L	L

Cell Parameters

Code	Parameter	mc5t01	mc5t02	mc5t03	mc5t04	Unit
X	Length	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	77	77	76	76	trans
Power	AC Power Dissipation	93.1	101	142	178	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5t01	mc5t02	mc5t03	mc5t04	Unit
i	Data In	0.084	0.084	0.084	0.084	pF
oen	Data In	0.076	0.076	0.076	0.076	pF
pad	High Impedance	5.59	5.59	5.60	5.60	pF

Output Specifications (Fanout)

Name	Pin Description	mc5t01	mc5t02	mc5t03	mc5t04	Unit
pad	Data Out	54.9	112	226	454	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5t01	mc5t02	mc5t03	mc5t04	Unit
tpdhl	i	pad	2.311	2.290	2.721	3.262	ns
tpdlh	i	pad	2.177	2.171	2.030	2.446	ns
tpdhz	oen	pad	1.072	1.219	1.302	1.583	ns
tpdlz	oen	pad	1.407	1.526	1.708	1.939	ns
tpdzh	oen	pad	2.773	2.661	2.930	3.117	ns
tpdzl	oen	pad	2.448	2.324	2.313	2.554	ns
dtpdhl	any	pad	0.144	0.072	0.036	0.018	ns/pF
dtpdlh	any	pad	0.131	0.066	0.033	0.017	ns/pF

MC5T0xD   5 Volts CMOS Three-State Output Pads with Pull-Down Resistor

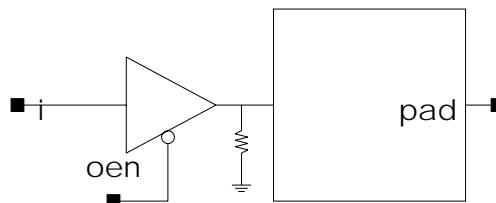**Specification**   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5T01D, MC5T02D, MC5T03D and MC5T04D are 5 Volts CMOS Three-State Output Pads with Pull-Down Resistor and with 1x, 2x, 3x and 4x drive capabilities.

Function Table

Input		Output
OEN	**I**	**PAD**
H	X	Lr
L	H	H
L	L	L

Cell Parameters

Code	Parameter	mc5t01d	mc5t02d	mc5t03d	mc5t04d	Unit
X	Length	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	78	78	77	77	trans
Power	AC Power Dissipation	150	159	199	235	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5t01d	mc5t02d	mc5t03d	mc5t04d	Unit
i	Data In	0.085	0.085	0.085	0.085	pF
oen	Data In	0.076	0.076	0.076	0.076	pF
pad	High Impedance	5.61	5.61	5.62	5.62	pF

Output Specifications (Fanout)

Name	Pin Description	mc5t01d	mc5t02d	mc5t03d	mc5t04d	Unit
pad	Data Out	55.5	112	227	454	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5t01d	mc5t02d	mc5t03d	mc5t04d	Unit
tpdhl	i	pad	2.298	2.287	2.722	3.263	ns
tpdlh	i	pad	2.185	2.176	2.032	2.449	ns
tpdhz	oen	pad	1.073	1.220	1.303	1.584	ns
tpdlz	oen	pad	1.411	1.530	1.711	1.941	ns
tpdzh	oen	pad	2.781	2.668	2.934	3.121	ns
tpdzl	oen	pad	2.425	2.314	2.308	2.551	ns
dtpdhl	any	pad	0.142	0.072	0.036	0.018	ns/pF
dtpdlh	any	pad	0.131	0.066	0.033	0.017	ns/pF

MC5T0xU — 5 Volts CMOS Three-State Output Pads with Pull-Up Resistor
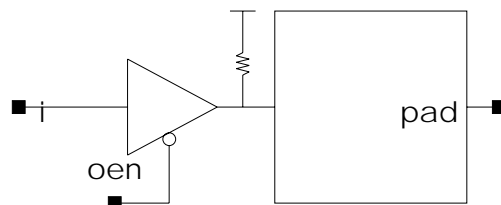
Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MC5T01U, MC5T02U, MC5T03U and MC5T04U are
5 Volts CMOS Three-State Output Pads with Pull-Up
Resistor and with 1x, 2x, 3x and 4x drive capabilities.

Function Table

Input		Output
OEN	**I**	**PAD**
H	X	Hr
L	H	H
L	L	L

Cell Parameters

Code	Parameter	mc5t01u	mc5t02u	mc5t03u	mc5t04u	Unit
X	Length	80.0	80.0	80.0	80.0	um
nTran	Transistor Count	78	78	77	77	trans
Power	AC Power Dissipation	149	157	198	234	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	mc5t01u	mc5t02u	mc5t03u	mc5t04u	Unit
i	Data In	0.085	0.085	0.085	0.085	pF
oen	Data In	0.076	0.076	0.076	0.076	pF
pad	High Impedance	5.60	5.60	5.61	5.61	pF

Output Specifications (Fanout)

Name	Pin Description	mc5t01u	mc5t02u	mc5t03u	mc5t04u	Unit
pad	Data Out	54.2	111	225	453	pF

Typical Propagation Delays (VDD=3.3V, Temp.=25°C, Input Slope=1ns)

Code	From	To	mc5t01u	mc5t02u	mc5t03u	mc5t04u	Unit
tpdhl	i	pad	2.317	2.292	2.723	3.264	ns
tpdlh	i	pad	2.156	2.162	2.027	2.444	ns
tpdhz	oen	pad	1.072	1.219	1.302	1.583	ns
tpdlz	oen	pad	1.407	1.527	1.709	1.939	ns
tpdzh	oen	pad	2.736	2.642	2.917	3.107	ns
tpdzl	oen	pad	2.454	2.327	2.314	2.555	ns
dtpdhl	any	pad	0.146	0.073	0.036	0.018	ns/pF
dtpdlh	any	pad	0.128	0.065	0.033	0.017	ns/pF

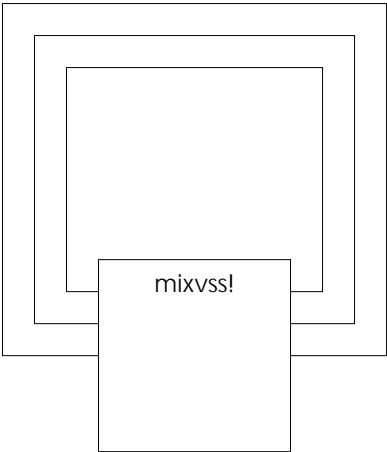## MV0E   MIXVSS Pad

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MV0E is a MIXVSS Pad. This cell supplies MIXVSS to
the MIXVSS section of the I/O circuitry.

mixvss!

Cell Parameters

Code	Parameter	mv0e	Unit
X	Length	80.0	um
nTran	Transistor Count	18	trans

MV0I   VSS Pad

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MV0I is a VSS Pad. This cell supplies VSS to the Core.

gnd!
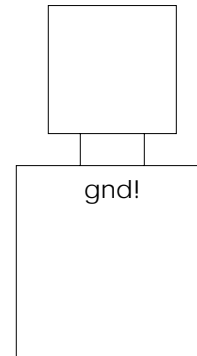
Cell Parameters

Code	Parameter	mv0i	Unit
X	Length	80.0	um
nTran	Transistor Count	18	trans

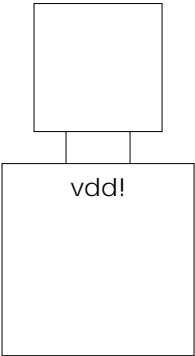**MV3I**   **3V VDD Pad**

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MV3I is a 3V VDD Pad. This cell supplies 3V VDD to
the Core.

Cell Parameters

Code	Parameter	mv3i	Unit
X	Length	80.0	um
nTran	Transistor Count	8	trans

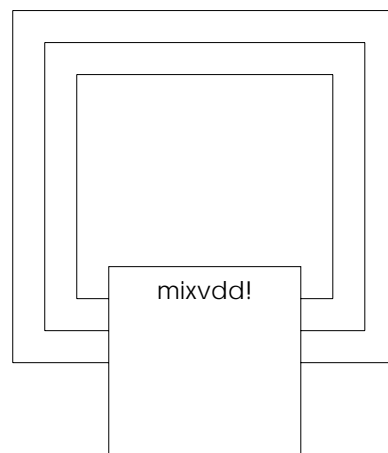**MV5E**   **5V MIXVDD Pad**

Specification   **Datasheet Version: 1.1, March 99**   **Symbol**

MV5E is a 5V MIXVDD Pad. This cell supplies 5V
MIXVDD to the 5V MIXVDD section of the I/O cir-
cuitry.

mixvdd!

Cell Parameters

Code	Parameter	mv5e	Unit
X	Length	80.0	um
nTran	Transistor Count	8	trans