

Features

- 100 outputs in one IC
- 2 analog inputs
- small form factor due to micro bump die attach
- cascade unlimited number of PE5001

Applications

- capacitive or resistive sensor field stimulation
- LCD dot matrix driver
- Multiplexing large arrays

General Description

This PE5001 is used to multiplex two analog input signals to up to 100 analog outputs. It includes switches, control logic and output drivers. A selected output will be connected either with the 'IN1-Input' or the 'IN2-Input'. The output selection is done by a high active data bit in the serial shift register. The input stream for the shift register is defined by the pin 'CDIN'. The register is shifted step by step in serial manner with a pulse on 'CSHIFT'. The last register output is set to pin 'CDOUT'. Pin 'CRESET' sets all registers to '0'. The nature of the PE5001 interface allows a daisy chain principle of an unlimited number of PE5001 ICs.

Functional description

The shift register controls the analog switches. A binary '1' in a register connects the output driver to IN1. A binary '0' connects the output driver to IN2. The reset signal CRESET is low active and sets all registers to binary '0'. Every positive cycle edge on CSHIFT causes the information in one register stage to shift into the next register stage. CDIN is the input for the first register and CDOUT the output of the last register. This way it is possible to cascade PE5001 ICs for a larger number of outputs. CSHIFT has an integrated buffer. The input cell is a standard CMOS Input cell with PullUp resistor.

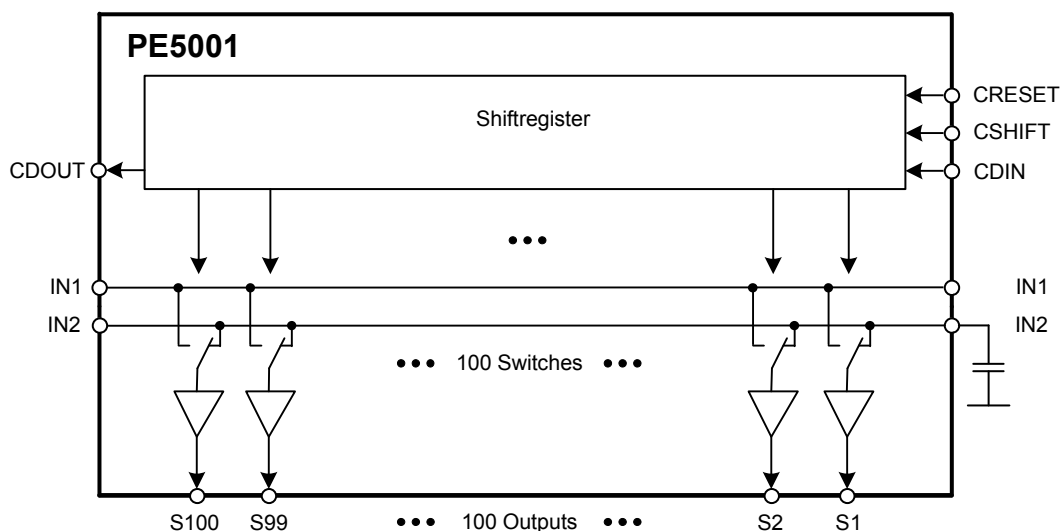


Figure 1: Block diagram with application environment

Electrical data

All voltages refer to GND = 0V (ground).

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Operating voltage	V_{DD}	-0.3	7	V
Input voltage	V_{IN}	-0.3	$V_{DD}+0.3$	V
Output voltage	V_{OUT}	-0.3	$V_{DD}+0.3$	V
Input current	I_{IN}	-10	10	mA
Storage temperature	T_{STG}	-40	125	°C
ESD protection (HBM)	V_{ESD}	2		kV

Stresses exceeding maximum ratings may damage the device. Maximum ratings are stress ratings only. Functional operation above the recommended operating conditions is not implied. Extended exposure to stresses above the recommended operating conditions may affect device reliability.

Operating conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating voltage	V_{DD}	4,75	5	5,25	V
Operating temperature	T_A	-20	27	85	°C
Junction temperature	T_J			<150	°C

Static properties, shift register and driver

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input voltage High	V_H		3,5			V
Input voltage Low	V_L				1,5	V
Input current Pull-Up	I_I				1	μA
Linear operating range, output driver	V_{INTR}		0,5		4,5	V
Input resistance IN2/IN2	R_I		300	500		kOhm
Output driver current	I_O	static	1			mA
Supply current	I_S	f_{in} on IN1=10MHz, C_{load} =5pF all driver activ		24	30	mA

($V_{DD} = 5V, T = 27^\circ C$)

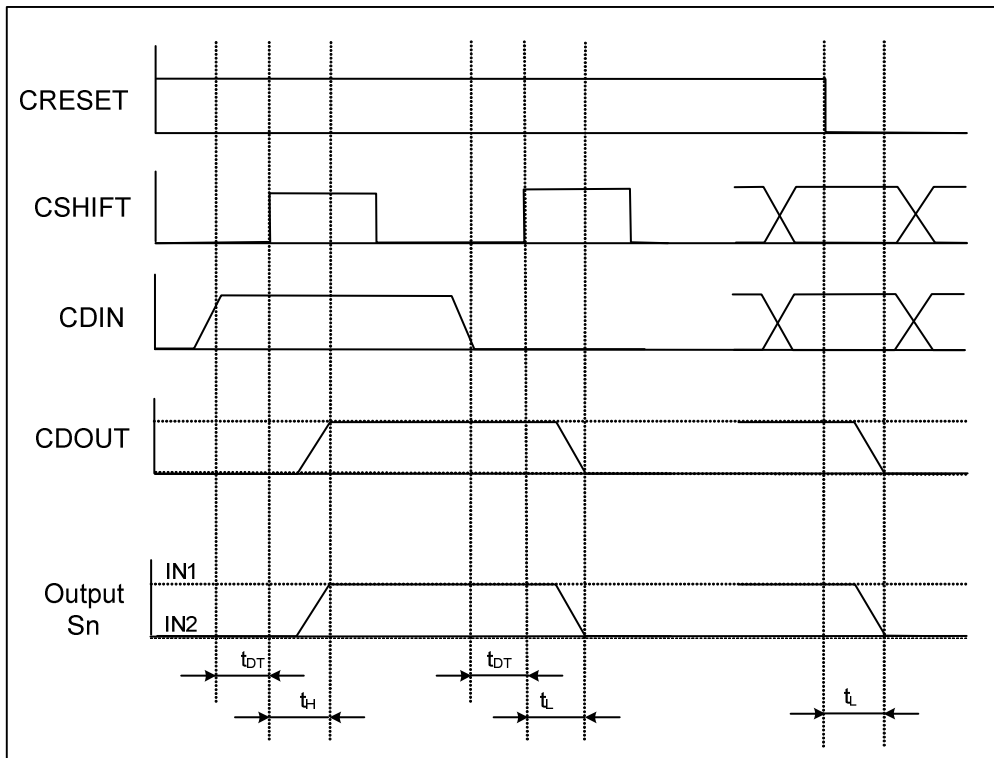
Dynamic properties

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Turn on / High time	tH	After positive edge			2	ns
Turn off / Low time	tL	After positive edge or reset			2	ns
Data precharging time	tDT		2			ns
Input frequency	f_{in}		0	10	15	MHz

($V_{DD} = 5V, T = 27^\circ C$)

Phase shift at 10MHz f_{in} and 5pF load is less than 5 degree.

Timing diagram



Interfaces

Pad	Name	IO-Typ	Function
1	S1	O	Analog Output 1
...
10	S10	O	Analog Output 10
11	IN1	I	Analog Input1
12	CFLAG In	I	Data flag input
13	S11	O	Analog Output 11
...
22	S20	O	Analog Output 20
23	IN2	I	Analog Input2
24	CRESET In	I	Reset input
25	S21	O	Analog Output 21
...
34	S30	O	Analog Output 30
35			n.c.
36	CSHIFT	I	Shift clock input
37	S31	O	Analog Output 31
...
46	S40	O	Analog Output 40
47	GND	P	Ground
48	GND	P	Ground
49	S41	O	Analog Output 41
...
58	S50	O	Analog Output 50
59	GND	P	Ground
60	GND	P	Ground
61	S51	O	Analog Output 51
...
70	S60	O	Analog Output 60
71	VDD	P	Supply voltage, 100nF external C
72	VDD	P	Supply voltage, 100nF external C
73	S61	O	Analog Output 61
...
82	S70	O	Analog Output 70
83	VDD	P	Supply voltage, 100nF external C
84	VDD	P	Supply voltage, 100nF external C
85	S71	O	Analog Output 71
...
94	S80	O	Analog Output 80
95			n.c.
96			n.c.
97	S81	O	Analog Output 81
...
106	S90	O	Analog Output 90
107	IN2	I	Analog Input 2
108	CRESET Out	O	Reset output
109	S91	O	Analog Output 91
...
118	S100	O	Analog Output 100
119	IN1	I	Analog Input 1
120	CFLAG Out	O	Data flag output

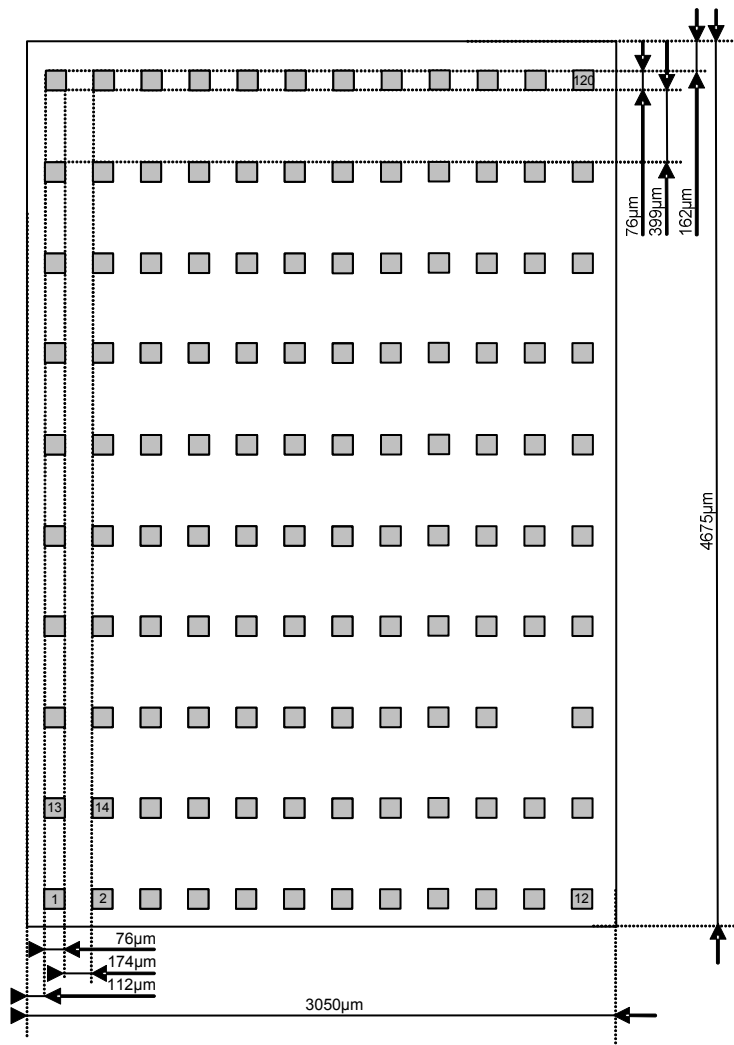
PE5001

Analog Multiplexer IC with
2 inputs and 100 outputs

Dimensions

The PE5001 has following dimensions:

Die size:	3050 μm x 4675 μm
Pad size:	76 μm x 76 μm
Pad distance to X direction Die:	112 μm
Pad distance to Y direction Die:	162 μm
Pad to pad distance X direction:	174 μm
Pad to pad distance Y direction:	399 μm
Number of Pads:	119
Layout X direction:	12 pad rows evenly distributed $2 \cdot 112 \mu\text{m}$ (border) + $12 \cdot 76 \mu\text{m}$ (pad) + $11 \cdot 174 \mu\text{m}$ (distance) = 3050 μm
Layout Y direction:	10 Pad- rows evenly distributed $2 \cdot 162 \mu\text{m}$ (border) + $10 \cdot 76 \mu\text{m}$ (pad) + $9 \cdot 399 \mu\text{m}$ (distance) = 4675 μm
Bump material:	NiAu



Top view of PE5001

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