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APPLICATION NOTE

PERFORMANCE AND USAGE OF μPD22100C

1. ABSTRACT

In telephone line switching systems CMOS crosspoint switches reduce both space and power reguirements when compared with conventional systems. The μPD22100C is a 4×4 analog crosspoint switches and is suitable for applications in telephone line switching systems. The transmission quality of μPD22100C is superior to that of mechanical switches. This application note describes the basic function and the usage of μPD22100C.

2. BASIC FUNCTION

(1) Truth table and Timing chart

The μPD22100C consists of 16 crosspoint switches organized in 4 rows and 4 columns. The device has 4 to 16 line decoder and 16 bit latches as shown in Fig. 1. The schematic of each analog transfer gate is shown in Fig. 2. Any of the 16 switches can be selected by applying its address to the device and a pulse to the strobe input. The selected crosspoint will turn on if during strobe, Data In was logical high and will turn off if during strobe, Data In was logical low. Other switches are unaffected. Table 1 is truth table and Fig. 3 shows timing chart of the device.

Fig. 1 Block Daigram

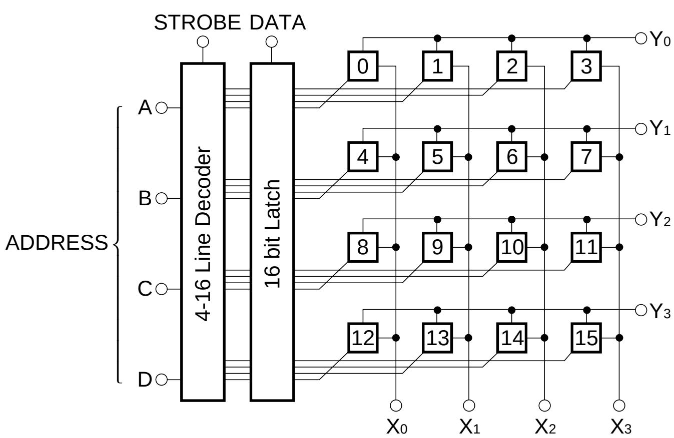

Fig. 2 Transfer Gate

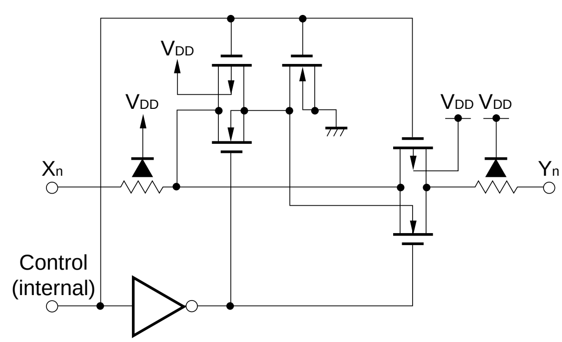

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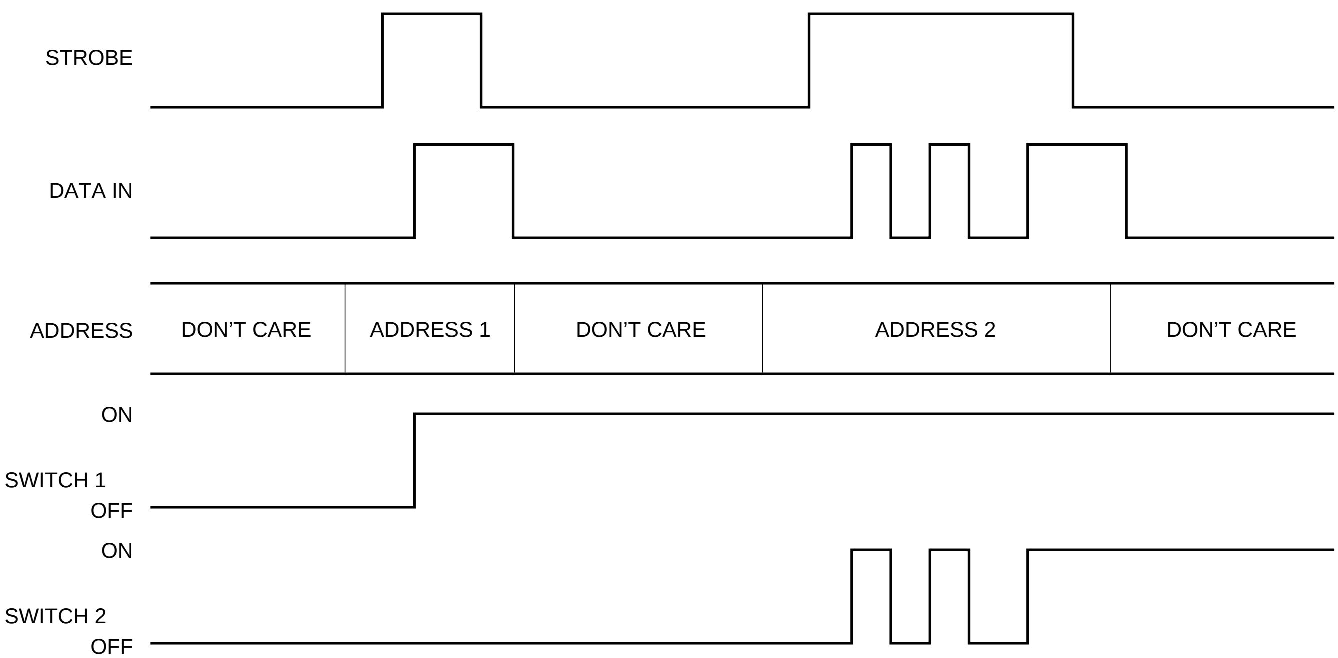
Table 1

INPUTS						SELECTED CHANNELS															
STROBE	D	C	B	A	DATA	Y_0 X_0	Y_0 X_1	Y_0 X_2	Y_0 X_3	Y_1 X_0	Y_1 X_1	Y_1 X_2	Y_1 X_3	Y_2 X_0	Y_2 X_1	Y_2 X_2	Y_2 X_3	Y_3 X_0	Y_3 X_1	Y_3 X_2	Y_3 X_3
L	X	X	X	X	X	NC	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
H	L	L	L	L	L	OFF	NC	→	→	→	→	→	→	→	→	→	→	→	→	→	→
H	L	L	L	L	H	ON	NC	→	→	→	→	→	→	→	→	→	→	→	→	→	→
H	L	L	L	H	L	NC	OFF	NC	→	→	→	→	→	→	→	→	→	→	→	→	→
H	L	L	L	H	H	NC	ON	NC	→	→	→	→	→	→	→	→	→	→	→	→	→
H	L	L	H	L	L	NC	→	OFF	NC	→	→	→	→	→	→	→	→	→	→	→	→
H	L	L	H	L	H	NC	→	ON	NC	→	→	→	→	→	→	→	→	→	→	→	→
H	L	L	H	H	L	NC	→	→	OFF	NC	→	→	→	→	→	→	→	→	→	→	→
H	L	L	H	H	H	NC	→	→	ON	NC	→	→	→	→	→	→	→	→	→	→	→
⋮	⋮	⋮	⋮	⋮	⋮	⋮															⋮
H	H	H	H	H	L	NC	→	→	→	→	→	→	→	→	→	→	→	→	→	→	OFF
H	H	H	H	H	H	NC	→	→	→	→	→	→	→	→	→	→	→	→	→	→	ON

L	Low Level
H	High Level
NC	No Change
X	L or H

Fig. 3 Timing Chart



(2) Auto-Reset Function

The μPD22100C has an internal auto-reset function which disables all switches as power is applied. To use this auto-reset function, abrupt supply voltage is needed (see Fig. 4 and table 2). Application example is shown in Fig. 5.

Fig. 4 Supply Voltage Characteristics

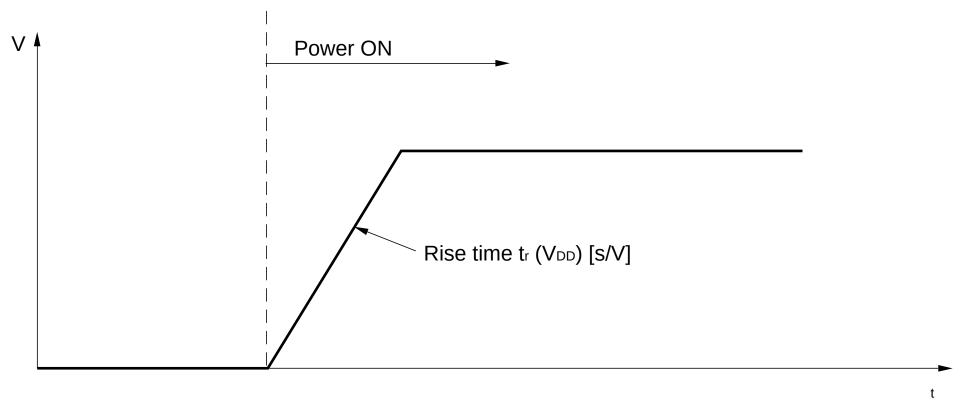
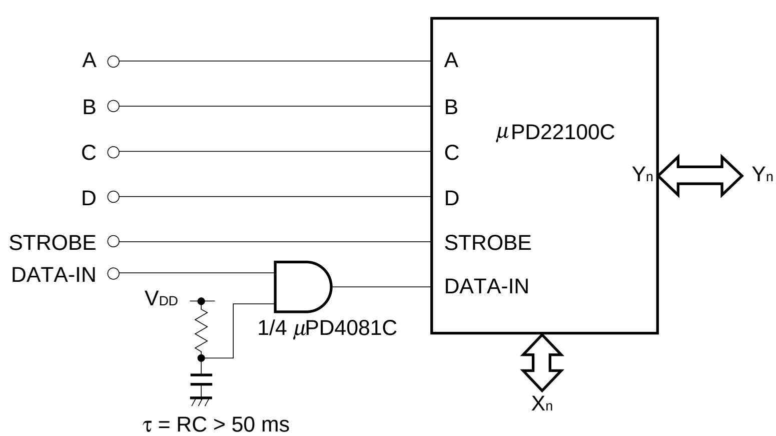


Table 2

Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Supply Voltage Rise Time	t_r (V_{DD})	DATA IN = V_{SS}			25	ms/V

Fig. 5 Application Circuit



(3) "On" resistance R_{ON}

R_{ON} depends on input voltage, (V_{IS}), supply voltage (V_{DD}) and temperature shown in Fig. 6, Fig. 7 and Fig. 8.
Fig. 6 shows higher DC bias voltage reduces ON resistance resulting lower distortion.

Fig. 6 V_{IS} – R_{ON} Characteristic

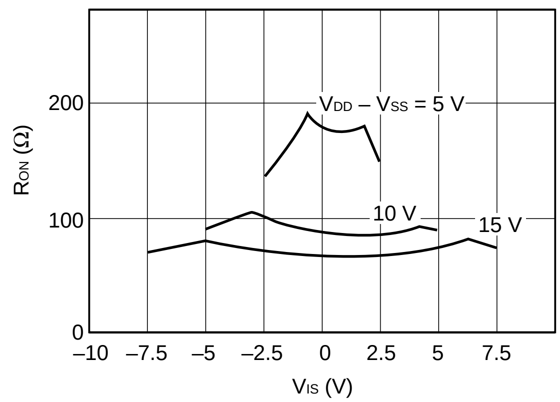


Fig. 7 R_{ON} – V_{DD} Characteristic

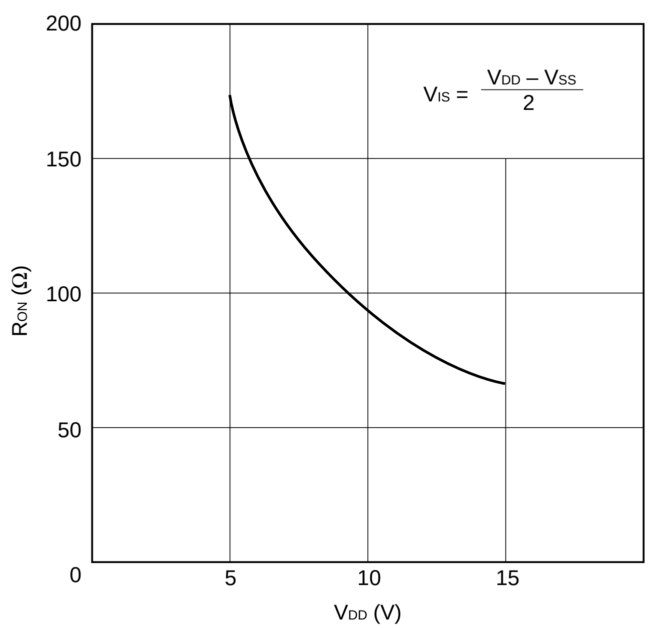


Fig. 8 R_{ON} – Temperature Characteristics

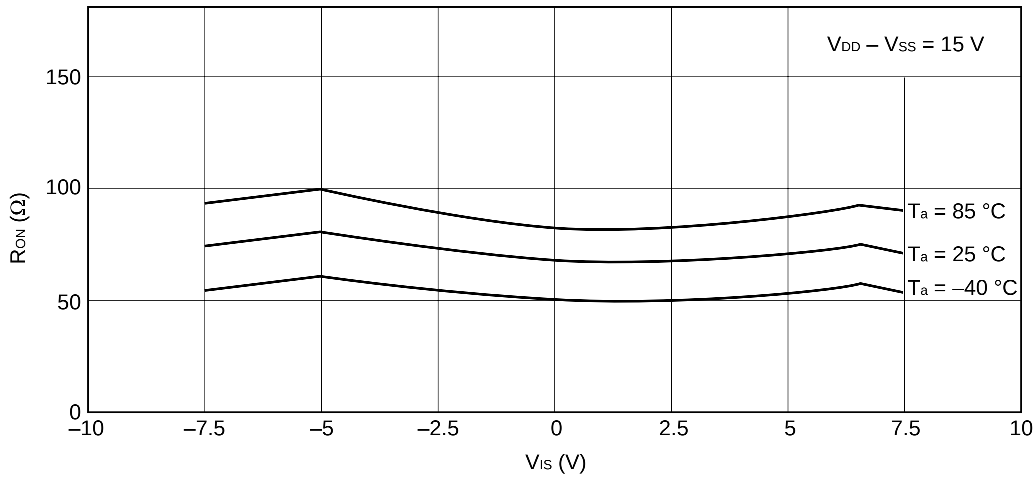
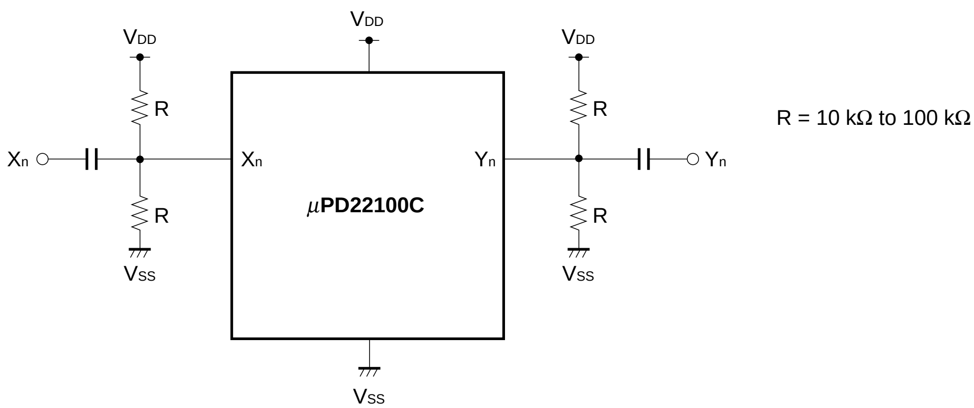


Fig. 9 DC Bias Circuit



(4) Frequency responce and Crosstalk characteristics

Fig. 10 and Fig. 11 show frequency responce. Fig. 12 shows crosstalk characteristics between given pair of terminal.

Fig. 10 Frequency Response (SW ON)

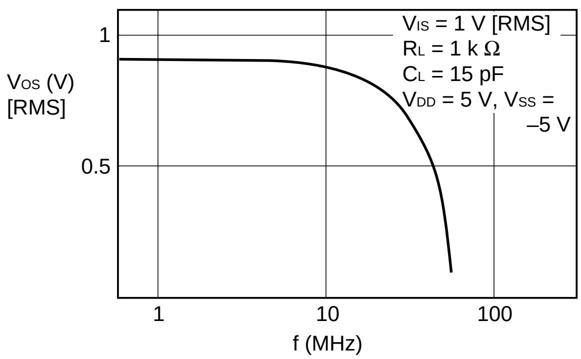


Fig. 11 Frequency Response (SW OFF)

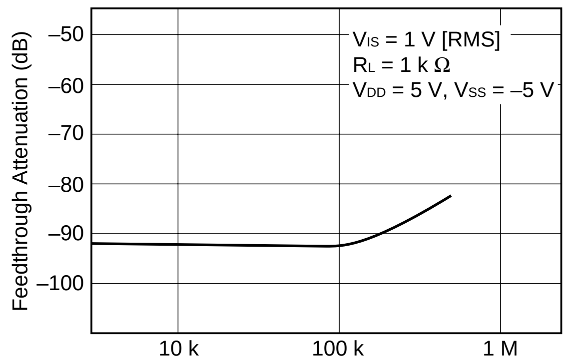
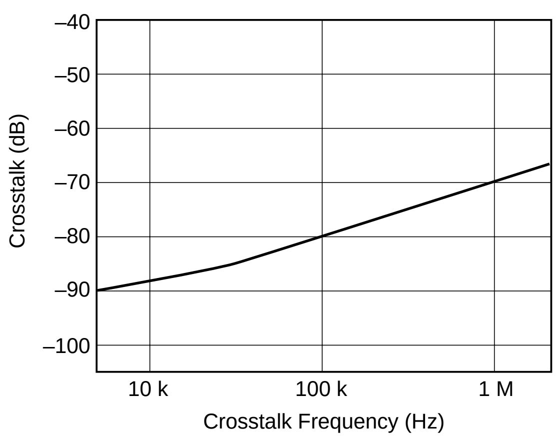


Fig. 12 Cross Talk Frequency Characteristic



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