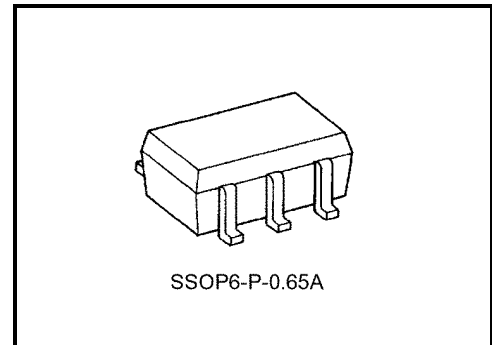


TC7PA53FU

2-Channel Multiplexer/Demultiplexer

Features

- Ultra-high speed operation: $t_{pd} = 0.4 \text{ ns (max) @} V_{CC} = 3.6 \text{ V, } C_L = 30 \text{ pF}$
- Ultra-low on resistance: $R_{ON} = 21 \Omega \text{ (max) @} V_{CC} = 3.6 \text{ V}$
- Operating voltage range: $V_{CC (opr)} = 1.8 \text{ to } 3.6 \text{ V}$
- High latch-up immunity: Higher than or equal to $\pm 500 \text{ mA}$
- High ESD: Higher than or equal to $\pm 200 \text{ V (JEITA)}$
: Higher than or equal to $\pm 2000 \text{ V (MIL)}$
- Power-down protection provided on all input pins

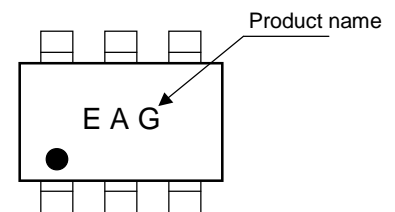


Weight: 0.0068 g (typ.)

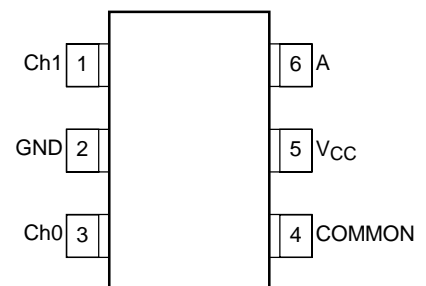
Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Power supply voltage		V_{CC}	-0.5 to 4.6	V
DC input voltage		V_{IN}	-0.5 to 4.6	V
Switch I/O voltage		V_S	-0.5 to $V_{CC} + 0.5$	V
Clamp diode current	Control input block	I_{IK}	-50	mA
	Switch block		± 50	
Switch through current		I_T	100	mA
Power dissipation		P_D	200	mW
DC V_{CC} /ground current		I_{CC}	± 100	mA
Storage temperature		T_{stg}	-65 to 150	°C

Marking



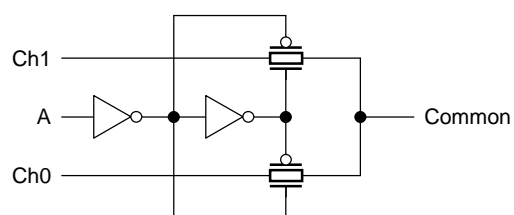
Pin Assignment (top view)



Truth Table

Input	On Channel
A	On Channel
L	Ch0
H	Ch1

System Diagram



Recommended Operating Conditions

Characteristics	Symbol	Rating	Unit
Power supply voltage	V_{CC}	1.8 to 3.6	V
Control input voltage	V_{IN}	0 to 3.6	V
Switch I/O voltage	V_S	0 to V_{CC}	V
Operating temperature	T_{opr}	-40 to 85	°C
Control input rise and fall time	d_t/d_f	0 to 10	ns/V

DC Electrical Characteristics (Ta = -40 to 85°C)

Characteristics		Symbol	Test Condition	V _{CC} (V)	Min	Max	Unit
Input voltage	High level	V _{IH}	—	1.8	0.75 × V _{CC}	—	V
				2.3 to 3.6	0.7 × V _{CC}	—	
	Low level	V _{IL}	—	1.8	—	0.25 × V _{CC}	
				2.3 to 3.6	—	0.3 × V _{CC}	
On resistance V _{I/O} = V _{CC} or GND		R _{ON}	V _{IN} = 0 V, I _O = 24 mA	3.6	—	19	Ω
			V _{IN} = 1.9 V, I _O = -24 mA	3.6	—	18	
			V _{IN} = 3.6 V, I _O = -24 mA	3.6	—	16	
			V _{IN} = 0 V, I _O = 24 mA	3.0	—	21	
			V _{IN} = 3 V, I _O = -24 mA	3.0	—	17	
			V _{IN} = 0 V, I _O = 18 mA	2.3	—	25	
			V _{IN} = 2.3 V, I _O = -18 mA	2.3	—	20	
			V _{IN} = 0 V, I _O = 6 mA	1.8	—	32	
			V _{IN} = 1.8 V, I _O = -6 mA	1.8	—	26	
On resistance V _{I/O} = V _{CC} to GND		R _{ON}	0 < V _{IN} < 3.6 V, I _O = 24 mA	3.6	—	21	Ω
			0 < V _{IN} < 3 V, I _O = 24 mA	3.0	—	23	
			0 < V _{IN} < 2.3 V, I _O = 18 mA	2.3	—	42	
			0 < V _{IN} < 1.8 V, I _O = 6 mA	1.8	—	140	
Control input leakage current		I _{IN}	V _{IN} = 0 to 3.6 V	3.6	—	±5.0	μA
Switch I/O leakage current		I _{SZ}	V _{IN} = 0 to 3.6 V	3.6	—	10.0	μA
Quiescent supply current		I _{CC}	V _{IN} = V _{CC} or GND	3.6	—	20.0	μA
Increase in I _{CC} per Input		ΔI _{CC}	V _{IH} = 3 V	3.6	—	750	

AC Characteristics (Ta = -40°C to 85°C, input tr = tf = 2.0 ns, CL = 30 pF, RL = 500 Ω)

Characteristics	Symbol	Test Condition	VCC (V)	Min	Max	Unit
Propagation delay time (Note 12)	t _{pLH} t _{pHL}	—	1.8	—	0.7	ns
			2.5 ± 0.2	—	0.55	
			3.3 ± 0.3	—	0.4	
Output enable time	t _{pZL} t _{pZH}	—	1.8	—	9	ns
			2.5 ± 0.2	—	7	
			3.3 ± 0.3	—	5	
Output disable time	t _{pLZ} t _{pHZ}	—	1.8	—	9	ns
			2.5 ± 0.2	—	7	
			3.3 ± 0.3	—	5	

When C_L = 50 pF, add approximately 300 ps to the maximum values above.

Note 12: The propagation delay time is the calculated RC time constant of the typical on-state resistance of the switch and a load capacitance.

Capacitive Characteristics (Ta = 25°C)

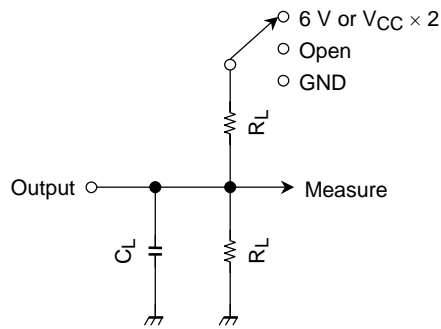
Characteristics	Symbol	Test Condition	VCC (V)	Typ.	Unit
Input capacitance	C _{IN}	—	1.8, 2.5, 3.3	3.0	pF
Power dissipation capacitance	C _{PD}	f _{IN} = 10 MHz (Note 13)	1.8, 2.5, 3.3	5.5	pF

Note 13: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation:

$$I_{CC} (\text{opr.}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

Figure 1 AC Test Circuit



Characteristics	Switch
t_{pLH} , t_{pHL}	Open
t_{pLZ} , t_{pZL}	6 V @ $V_{CC} = 3.3 \pm 0.3$ V
	$V_{CC} \times 2$ @ $V_{CC} = 2.5 \pm 0.2$ V
	@ $V_{CC} = 1.8$ V
t_{pHZ} , t_{pZH}	GND

AC Waveforms

Figure 2 t_{pLH} , t_{pHL}

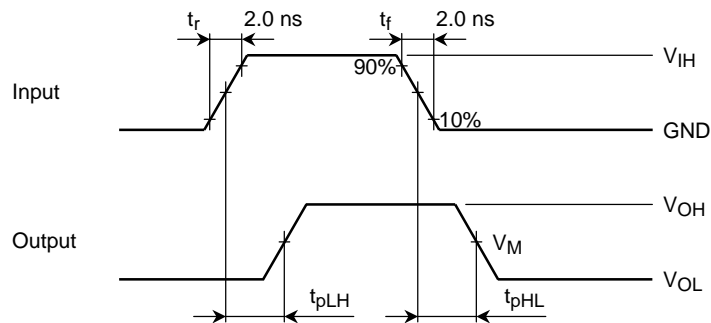
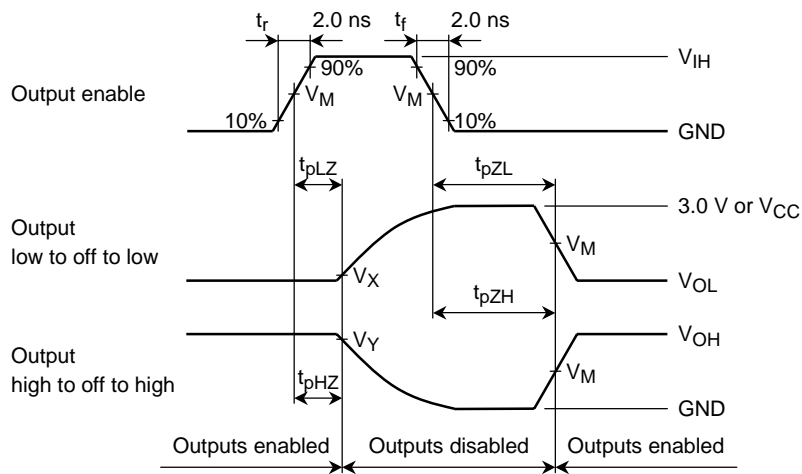


Figure 3 t_{pLZ} , t_{pHZ} , t_{pZL} , t_{pZH}

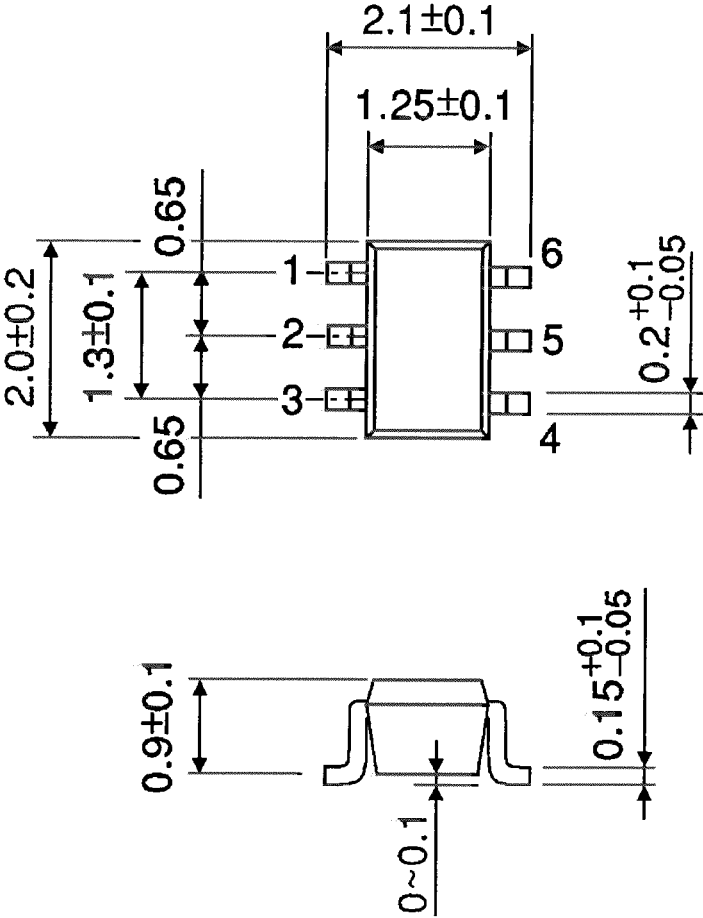


Symbol	V_{CC}		
	$3.3 \pm 0.3 \text{ V}$	$2.5 \pm 0.2 \text{ V}$	1.8 V
V_{IH}	2.7 V	V_{CC}	V_{CC}
V_M	1.5 V	$V_{CC}/2$	$V_{CC}/2$
V_X	$V_{OL} + 0.3 \text{ V}$	$V_{OL} + 0.15 \text{ V}$	$V_{OL} + 0.15 \text{ V}$
V_Y	$V_{OH} - 0.3 \text{ V}$	$V_{OH} - 0.15 \text{ V}$	$V_{OH} - 0.15 \text{ V}$

Package Dimensions

SSOP6-P-0.65A

Unit: mm



Weight: 0.0068 g (typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

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