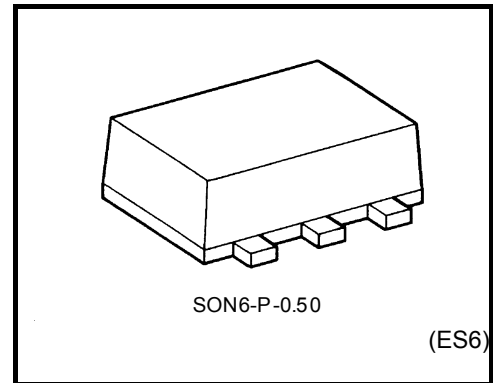


TC7PA19AFE

Chip Select Decoder

Features

- Operating voltage range: $V_{CC} = 1.4\sim 3.6\text{ V}$
- High-speed operation: $t_{pd} = 3.3\text{ ns (max) at } V_{CC} = 3.0\sim 3.6\text{ V}$
 $t_{pd} = 3.9\text{ ns (max) at } V_{CC} = 2.3\sim 2.7\text{ V}$
 $t_{pd} = 8.0\text{ ns (max) at } V_{CC} = 1.65\sim 1.95\text{ V}$
 $t_{pd} = 10.0\text{ ns (max) at } V_{CC} = 1.4\sim 1.6\text{ V}$
- High-level output current:
 $I_{OH}/I_{OL} = \pm 24\text{ mA (min) at } V_{CC} = 3.0\text{ V}$
 $I_{OH}/I_{OL} = \pm 18\text{ mA (min) at } V_{CC} = 2.3\text{ V}$
 $I_{OH}/I_{OL} = \pm 4\text{ mA (min) at } V_{CC} = 1.4\text{ V}$
- 3.6 V tolerant inputs



Weight: 0.003 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

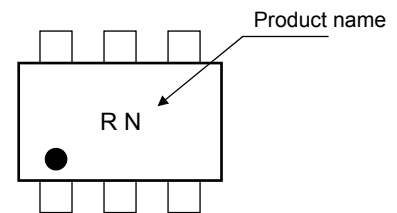
Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	-0.5~4.6	V
DC input voltage	V_{IN}	-0.5~4.6	V
DC output voltage	V_{OUT}	-0.5~ $V_{CC} + 0.5$ (Note 1)	V
Input diode current	I_{IK}	-50	mA
Output diode current	I_{OK}	± 50 (Note 2)	mA
DC output current	I_{OUT}	+50	mA
Power dissipation	P_D	150	mW
DC V_{CC} /ground current	I_{CC}	± 100	mA
Storage temperature	T_{stg}	-65~150	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

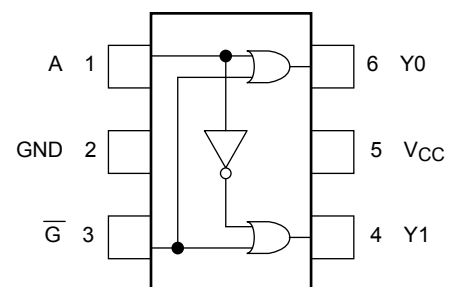
Note 1: High or Low state. The I_{OUT} absolute maximum rating must be adhered to.

Note 2: $V_{OUT} < GND, V_{OUT} > V_{CC}$

Marking



Pin Assignment (top view)



Truth Table

Inputs		Outputs		Selected Output
Enable	Select	Y0	Y1	
\bar{G}	A			
H	X	H	H	None
L	L	L	H	Y0
L	H	H	L	Y1

X : Don't care

Operating Ranges

Characteristics	Symbol	Value	Unit
Supply voltage	V_{CC}	1.4~3.6	V
		1.2~3.6 (Note 3)	
Input voltage	V_{IN}	-0.3~3.6	V
Output voltage	V_{OUT}	0~ V_{CC} (Note 4)	V
Output Current	I_{OH}/I_{OL}	± 24 (Note 5)	mA
		± 18 (Note 6)	
		± 4 (Note 7)	
Operating temperature	T_{opr}	-40~85	°C
Input rise and fall time	d_t/d_v	0~10 (Note 8)	ns/V

Note 3: Data retention only

Note 4: High or Low state

Note 5: $V_{CC} = 3.0\sim 3.6$ V

Note 6: $V_{CC} = 2.3\sim 2.7$ V

Note 7: $V_{CC} = 1.4\sim 1.9$ V

Note 8: $V_{IN} = 0.8\sim 2.0$ V, $V_{CC} = 3.0$ V

DC Electrical Characteristics (Ta = -40~85°C, 2.7 V < VCC ≤ 3.6 V)

Characteristics	Symbol	Test Condition		VCC (V)	Min	Max	Unit
High-Level Input Voltage	V _{IH}	—		2.7~3.6	2.0	—	V
Low-Level Input Voltage	V _{IL}	—		2.7~3.6	—	0.8	
High-Level Output Voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -100 μA	2.7~3.6	V _{CC} - 0.2	—	V
			I _{OH} = -12 mA	2.7	2.2	—	
			I _{OH} = -18 mA	3.0	2.4	—	
			I _{OH} = -24 mA	3.0	2.2	—	
Low-Level Output Voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 100 μA	2.7~3.6	—	0.2	V
			I _{OL} = 12 mA	2.7	—	0.4	
			I _{OL} = 18 mA	3.0	—	0.4	
			I _{OL} = 24 mA	3.0	—	0.55	
Input Leakage Current	I _{IN}	V _{IN} = 0~3.6 V		2.7~3.6	—	±10.0	μA
Quiescent Supply Current	I _{CC}	V _{IN} = V _{CC} or GND		2.7~3.6	—	20.0	μA
		V _{CC} ≤ V _{IN} ≤ 3.6 V		2.7~3.6	—	±20.0	
Increase in I _{CC} per Input	ΔI _{CC}	V _{IH} = V _{CC} - 0.6 V		2.7~3.6	—	750	

DC Electrical Characteristics (Ta = -40~85°C, 2.3 V ≤ VCC ≤ 2.7 V)

Characteristics	Symbol	Test Condition		VCC (V)	Min	Max	Unit
High-Level Input Voltage	V _{IH}	—		2.3~2.7	1.6	—	V
Low-Level Input Voltage	V _{IL}	—		2.3~2.7	—	0.7	
High-Level Output Voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -100 μA	2.3~2.7	V _{CC} - 0.2	—	V
			I _{OH} = -6 mA	2.3	2.0	—	
			I _{OH} = -12 mA	2.3	1.8	—	
			I _{OH} = -18 mA	2.3	1.7	—	
Low-Level Output Voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 100 μA	2.3~2.7	—	0.2	V
			I _{OL} = 12 mA	2.3	—	0.4	
			I _{OL} = 18 mA	2.3	—	0.6	
Input Leakage Current	I _{IN}	V _{IN} = 0~3.6 V		2.3~2.7	—	±10.0	μA
Quiescent Supply Current	I _{CC}	V _{IN} = V _{CC} or GND		2.3~2.7	—	20.0	μA
		V _{CC} ≤ V _{IN} ≤ 3.6 V		2.3~2.7	—	±20.0	

DC Electrical Characteristics (Ta = -40~85°C, 1.4 V ≤ VCC < 2.3 V)

Characteristics	Symbol	Test Condition		VCC (V)	Min	Max	Unit
High-Level Input Voltage	V _{IH}	—		1.4~2.3	V _{CC} × 0.7	—	V
Low-Level Input Voltage	V _{IL}	—		1.4~2.3	—	V _{CC} × 0.13	
High-Level Output Voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -100 μA	1.4	V _{CC} - 0.2	—	V
			I _{OH} = -4 mA	1.4	1.0	—	
Low-Level Output Voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 100 μA	1.4	—	0.2	V
			I _{OL} = 4 mA	1.4	—	0.3	
Input Leakage Current	I _{IN}	V _{IN} = 0~3.6 V		1.4	—	±10.0	μA
Quiescent Supply Current	I _{CC}	V _{IN} = V _{CC} or GND		1.4	—	20.0	μA
		V _{CC} ≤ V _{IN} ≤ 3.6 V		1.4	—	±20.0	

AC Electrical Characteristics (Ta = -40~85°C, input t_r = t_f = 2.0 ns)

Characteristics	Symbol	Test Condition		VCC (V)	Min	Max	Unit	
Propagation delay time (A or \overline{G} - Y0 or Y1)	t _{pLH} t _{pHL}	(Figure 1 and 2)	C _L =15pF, R _L =1MΩ	1.5 ± 0.1	1.8	10.0	ns	
				1.8 ± 0.15	1.5	8.0		
				2.5 ± 0.2	0.8	3.9		
				3.3 ± 0.3	0.6	3.3		
				C _L =30pF, R _L =500Ω	1.5 ± 0.1	2.0	13.0	ns
					1.8 ± 0.15	1.8	9.5	
					2.5 ± 0.2	1.2	5.0	
					3.3 ± 0.3	1.0	4.0	

For C_L = 50 pF, add approximately 300 ps to the AC maximum specification.

Capacitive Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition		VCC (V)	TYP.	Unit
Input Capacitance	C _{IN}	—		1.8, 2.5, 3.3	6	pF
Power Dissipation Capacitance	C _{PD}	f _{IN} = 10 MHz	(Note 9)	1.8, 2.5, 3.3	20	pF

Note 9: 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:

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

Test Circuit

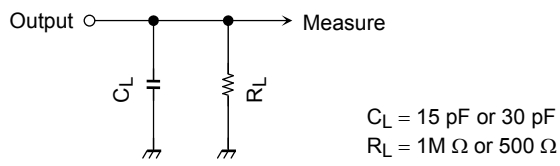
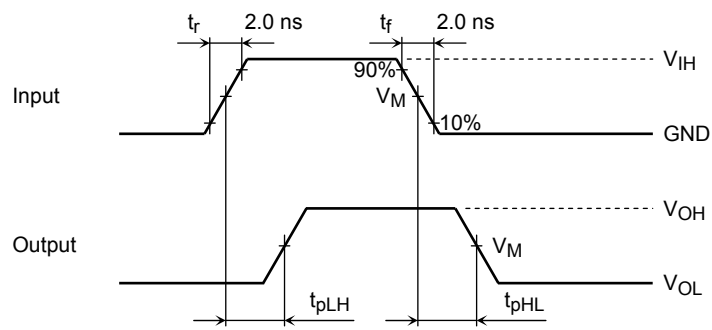


Figure 1

AC Waveforms



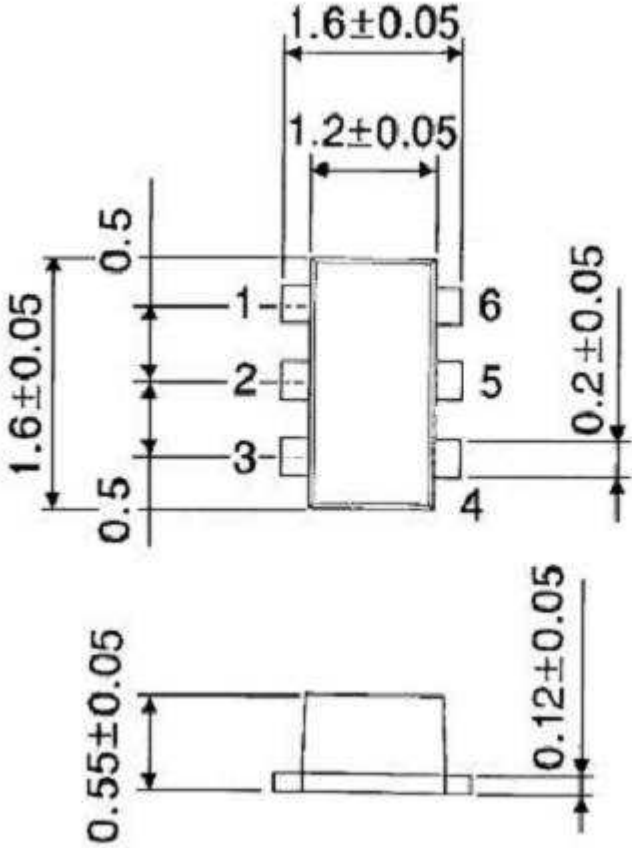
Symbol	V_{CC}			
	$3.3 \pm 0.3 \text{ V}$	$2.5 \pm 0.2 \text{ V}$	$1.8 \pm 0.15 \text{ V}$	$1.5 \pm 0.1 \text{ V}$
V_{IH}	2.7 V	V_{CC}	V_{CC}	V_{CC}
V_M	1.5 V	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$

Figure 2 t_{pLH} , t_{pHL}

Package Dimensions

SON6-P-0.50

Unit : mm



Weight: 0.003 g (typ.)

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