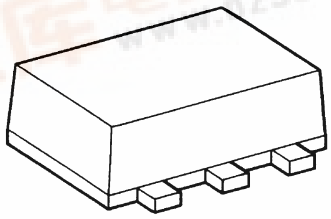
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7PA19AFE

Chip Select Decoder

Features

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



SON6-P-0.50 (ES6)

Weight: 0.003 g (typ.)

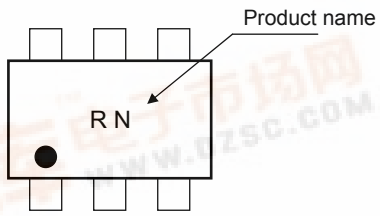
Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Value	Unit
Power 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

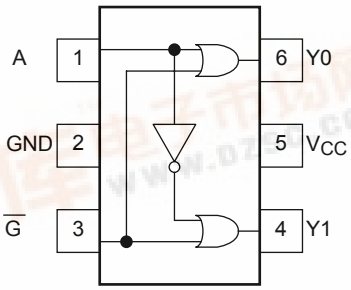
Note 1: High or Low state. The I_{OUT} maximum rating must be adhere to.

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

Marking



Pin Assignment (top view)



Truth Table

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

Recommended Operating Conditions

Characteristics	Symbol	Value		Unit
Power 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} = 3.0~3.6 V

Note 6: V_{CC} = 2.3~2.7 V

Note 7: V_{CC} = 1.4~1.9 V

Note 8: V_{IN} = 0.8~2.0 V, V_{CC} = 3.0 V

DC Electrical Characteristics (Ta = −40~85°C, 2.7 V < V_{CC} ≦ 3.6 V)

Characteristics	Symbol	Test Condition		V_{CC} (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 ≦ V_{CC} ≦ 2.7 V)

Characteristics	Symbol	Test Condition		V_{CC} (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 ≦ V_{CC} < 2.3 V)

Characteristics	Symbol	Test Condition		V_{CC} (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	V
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		V_{CC} (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	

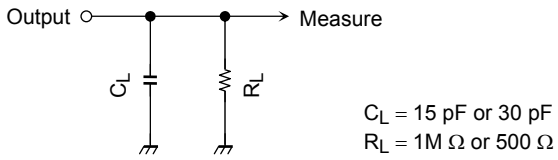
For C_L = 50 pF, add approximately 300 ps to the AC maximum specification.

Capacitive Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	V_{CC} (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

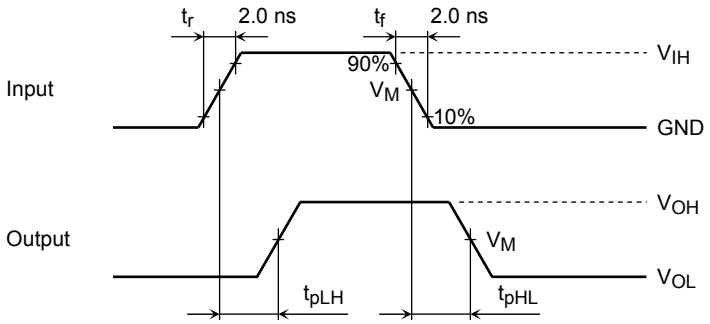
Note 9: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.
Average operating current can be obtained by the equation:
$I_{CC\ (opr.)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

Figure 1 Test Circuit



AC Waveforms

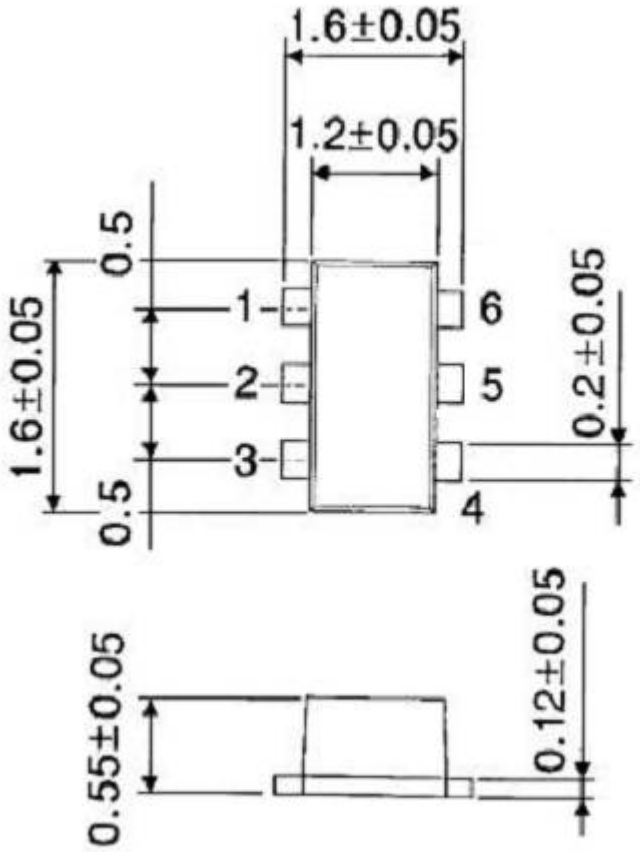
Figure 2 t_{pLH}, t_{pHL}



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

Package Dimensions

SON6-P-0.50 Unit : mm



Weight: 0.003 g (typ.)

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