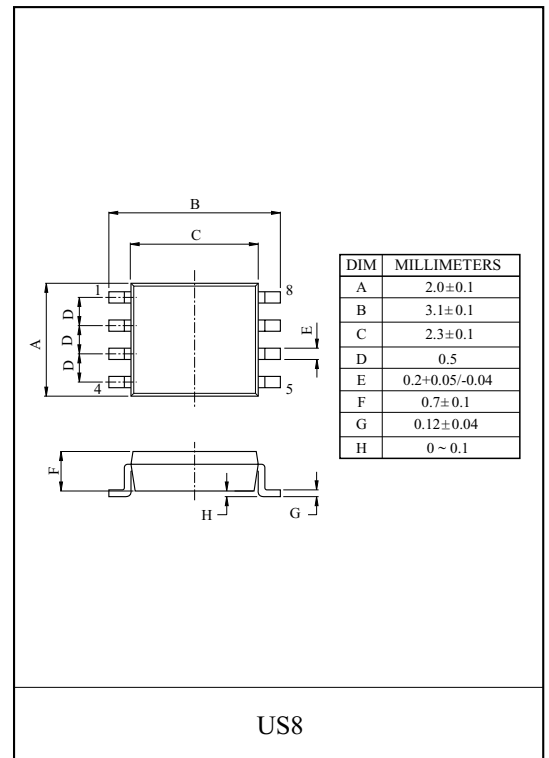
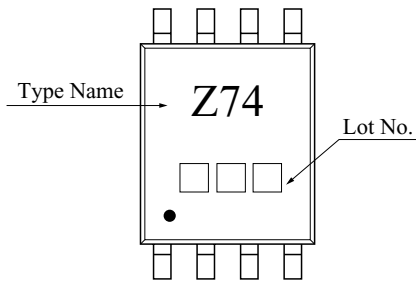


D-TYPE FLIP FLOP WITH PRESET AND CLEAR

FEATURES

- High output drive : $\pm 24\text{mA}(\text{min.}) @ V_{CC}=3\text{V}$.
- Super high speed operation : $t_{pd} 2.8\text{ns}(\text{typ.}) @ V_{CC}=3\text{V}, 50\text{pF}$.
- Operation voltage range : $V_{CC(\text{opr})}=1.65\sim 5.5\text{V}$.
- Latch-up performance : $\pm 500\text{mA}$ or more
- ESD performance : $\pm 200\text{V}$ or more (EIAJ)
 $\pm 2000\text{V}$ or more (MIL)
- Power down protection is provided on all inputs and outputs.

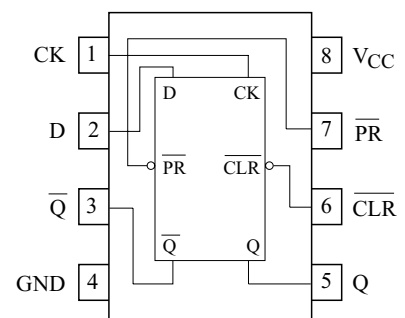
MARKING



MAXIMUM RATINGS (Ta=25 °C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{CC}	-0.5~6	V
DC Input Voltage	V_{IN}	-0.5~6	V
DC Output Voltage	V_{OUT}	-0.5~6	V
Input Diode Current	I_{IK}	-20	mA
Output Diode Current	I_{OK}	-20	mA
DC Output Current	I_{OUT}	±50	mA
DC V_{CC} /ground Current	I_{CC}	±50	mA
Power Dissipation	P_D	200	mW
Storage Temperature Range	T_{stg}	-65 ~ 150	°C
Lead Temperature (10s)	T_L	260	°C

PIN CONNECTION(TOP VIEW)

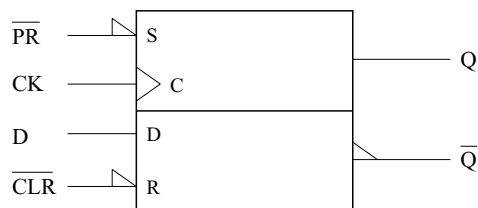


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Truth Table

Inputs				Outputs		Function
$\overline{\text{CLR}}$	$\overline{\text{PR}}$	D	CK	Q	$\overline{\text{Q}}$	
L	H	X	X	L	H	Clear
H	L	X	X	H	L	Preset
L	L	X	X	H	H	-
H	H	L	\downarrow	L	H	-
H	H	H	\downarrow	H	L	-
H	H	X	\lrcorner	Qn	Qn	No Change

Logic Diagram



Recommended Operating Conditions

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	1.65~5.5	V
		1.5~5.5 (Note1)	
Input Voltage	V_{IN}	0~5.5	V
Output Voltage	V_{OUT}	0~5.5 (Note2)	V
		0~ V_{CC} (Note3)	
Operating Temperature	T_{opr}	-40~85	$^{\circ}\text{C}$
Input Rise and Fall Time	d_i/d_v	0~20 ($V_{CC}=1.8\text{V} \pm 0.15\text{V}$, 2.5V $\pm 0.2\text{V}$)	ns/V
		0~10 ($V_{CC}=3.3\text{V} \pm 0.3\text{V}$)	
		0~5 ($V_{CC}=5.5\text{V} \pm 0.5\text{V}$)	

Note1 : Data retention only.

Note2 : $V_{CC}=0\text{V}$.

Note3 : High or low

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ELECTRICAL CHARACTERISTICS

DC Characteristics

CHARACTERISTIC		SYMBOL	TEST CONDITION		Ta=25 °C			Ta=-40~85 °C		UNIT	
					V _{CC} (V)	MIN.	TYP.	MAX.	MIN.		MAX.
Input Voltage	High Level	V _{IH}	-	1.65~1.8	0.75 × V _{CC}	-	-	0.75 × V _{CC}	-	V	
				2.3~5.5	0.7 × V _{CC}	-	-	0.7 × V _{CC}	-		
	Low Level	V _{IL}	-	1.65~1.95	-	-	0.25 × V _{CC}	-	0.25 × V _{CC}		
				2.3~5.5	-	-	0.3 × V _{CC}	-	0.3 × V _{CC}		
Output Voltage	High Level	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} =-100 μA	1.65	1.55	1.65	-	1.55	-	V
					2.3	2.2	2.3	-	2.2	-	
					3.0	2.9	3.0	-	2.9	-	
					4.5	4.4	4.5	-	4.4	-	
				I _{OH} =-4mA	1.65	1.29	1.52	-	1.29	-	
					2.3	1.9	2.15	-	1.9	-	
					3.0	2.4	2.8	-	2.4	-	
					4.5	3.8	4.2	-	3.8	-	
	Low Level	V _{OL}	V _{IN} =V _{IL}	I _{OH} =100 μA	1.8	-	0	0.1	-	0.1	V
					2.3	-	0	0.1	-	0.1	
					3.0	-	0	0.1	-	0.1	
					4.5	-	0	0.1	-	0.1	
				I _{OH} =4mA	1.65	-	0.08	0.24	-	0.24	
					2.3	-	0.1	0.3	-	0.3	
					3.0	-	0.15	0.4	-	0.4	
					4.5	-	0.22	0.55	-	0.55	
I _{OH} =8mA	1.65	-	0.08	0.24	-	0.24					
	2.3	-	0.1	0.3	-	0.3					
	3.0	-	0.15	0.4	-	0.4					
	4.5	-	0.22	0.55	-	0.55					
I _{OH} =16mA	1.65	-	0.08	0.24	-	0.24					
	2.3	-	0.1	0.3	-	0.3					
	3.0	-	0.15	0.4	-	0.4					
	4.5	-	0.22	0.55	-	0.55					
I _{OH} =24mA	1.65	-	0.08	0.24	-	0.24					
	2.3	-	0.1	0.3	-	0.3					
	3.0	-	0.15	0.4	-	0.4					
	4.5	-	0.22	0.55	-	0.55					
I _{OH} =32mA	1.65	-	0.08	0.24	-	0.24					
	2.3	-	0.1	0.3	-	0.3					
	3.0	-	0.15	0.4	-	0.4					
	4.5	-	0.22	0.55	-	0.55					
Input Leakage Current		I _{IN}	V _{IN} =5.5V or GND	0~5.5	-	-	±1	-	±10	μA	
Power Off Leakage Current		I _{OFF}	V _{IN} or V _{OUT} =5.5V	0.0	-	-	1	-	10	μA	
Quiescent Supply Current		I _{CC}	V _{IN} =5.5V or GND	1.65~5.5	-	-	1	-	10	μA	

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AC Characteristics (unless otherwise specified, Input : $t_r=t_f=3ns$)

CHARACTERISTIC	SYMBOL	TEST CONDITION		Ta=25 °C			Ta=-40~85 °C		UNIT
			V _{CC} (V)	MIN.	TYP.	MAX.	MIN.	MAX.	
Maximum Clock Frequency	f _{MAX}	C _L =50pF, R _L =500 Ω	1.8 ± 0.15	51	-	-	38	-	MHz
			2.5 ± 0.2	130	-	-	100	-	
			3.3 ± 0.3	200	-	-	150	-	
			5.0 ± 0.5	200	-	-	180	-	
Propagation Delay Time (CK-Q, \bar{Q})	t _{PLH} t _{PHL}	C _L =15pF, R _L =1M Ω	1.8 ± 0.15	2.5	10.0	18.0	2.1	23.0	ns
			2.5 ± 0.2	2.0	4.9	7.5	1.7	9.0	
			3.3 ± 0.3	1.5	3.3	4.8	1.3	5.6	
			5.0 ± 0.5	1.0	2.4	3.5	1.0	3.9	
		C _L =50pF, R _L =500 Ω	3.3 ± 0.3	2.0	4.3	5.7	1.5	7.0	
			5.0 ± 0.5	1.5	2.8	4.0	1.3	4.4	
Propagation Delay Time (\overline{CLR} , \overline{PR} , -Q, \bar{Q})	t _{PLH} t _{PHL}	C _L =15pF, R _L =1M Ω	1.8 ± 0.15	2.5	10.0	17.0	2.1	21.0	ns
			2.5 ± 0.2	2.0	5.0	7.3	1.7	8.8	
			3.3 ± 0.3	1.5	3.4	4.8	1.3	5.6	
			5.0 ± 0.5	1.5	2.2	3.5	1.0	3.9	
		C _L =50pF, R _L =500 Ω	3.3 ± 0.3	2.0	4.3	5.7	1.5	7.0	
			5.0 ± 0.5	1.0	3.1	3.9	1.0	4.3	
Minimum Setup Time	t _s	C _L =50pF, R _L =500 Ω	2.5 ± 0.2	3.4	-	-	4.1	-	ns
			3.3 ± 0.3	2.1	-	-	2.5	-	
			5.0 ± 0.5	1.5	-	-	1.7	-	
Minimum Hold Time	t _h	C _L =50pF, R _L =500 Ω	2.5 ± 0.2	2.4	-	-	2.9	-	ns
			3.3 ± 0.3	1.4	-	-	1.5	-	
			5.0 ± 0.5	1.0	-	-	1.1	-	
Minimum Pulse Width (CK)	t _w (L) t _w (H)	C _L =50pF, R _L =500 Ω	2.5 ± 0.2	3.0	-	-	3.6	-	ns
			3.3 ± 0.3	3.0	-	-	3.3	-	
			5.0 ± 0.5	3.0	-	-	3.2	-	
Minimum Pulse Width (\overline{CLR} , \overline{PR})	t _w (L)	C _L =50pF, R _L =500 Ω	2.5 ± 0.2	3.0	-	-	3.6	-	ns
			3.3 ± 0.3	3.0	-	-	3.3	-	
			5.0 ± 0.5	3.0	-	-	3.2	-	
Minimum Removal Time	t _{rem}	C _L =50pF, R _L =500 Ω	2.5 ± 0.2	3.6	-	-	4.4	-	ns
			3.3 ± 0.3	2.2	-	-	2.5	-	
			5.0 ± 0.5	1.3	-	-	1.4	-	
Input Capacitance	C _{IN}	-	0~0.5	-	3.0	-	-	-	pF
Output Capacitance	C _{OUT}	-	0~0.5	-	5.0	-	-	-	pF
Power Dissipation Capacitance	C _{PD}	(Note 4)	3.3	-	30	-	-	-	pF
			5.5	-	47	-	-	-	

Note 4 : 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 : $I_{CC(opr)}=C_{PD} \cdot V_{CC} \cdot f_{IN}+I_{CC}$