

HD74HC377

Octal D-type Flip-Flops (with Enable)

REJ03D0622-0200
(Previous ADE-205-501)
Rev.2.00
Mar 30, 2006

Description

Information at the D inputs meeting the setup time requirements is transferred to the Q outputs on the positive-going edge of the clock pulse if the enable input $\bar{G}$ is low. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going pulse. When the clock input is at either the high or low level, the D input signal has no effect at the output. The circuits are designed to prevent false clocking by transitions at the $\bar{G}$ input.

Features

- High Speed Operation: $t_{pd} = 13$ ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 2$ to 6 V
- Low Input Current: 1 μ A max
- Low Quiescent Supply Current: I_{CC} (static) = 4 μ A max ($T_a = 25^\circ\text{C}$)
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HC377P	DILP-20 pin	PRDP0020AC-B (DP-20NEV)	P	—
HD74HC377FPEL	SOP-20 pin (JEITA)	PRSP0020DD-B (FP-20DAV)	FP	EL (2,000 pcs/reel)
HD74HC377RPEL	SOP-20 pin (JEDEC)	PRSP0020DC-A (FP-20DBV)	RP	EL (1,000 pcs/reel)

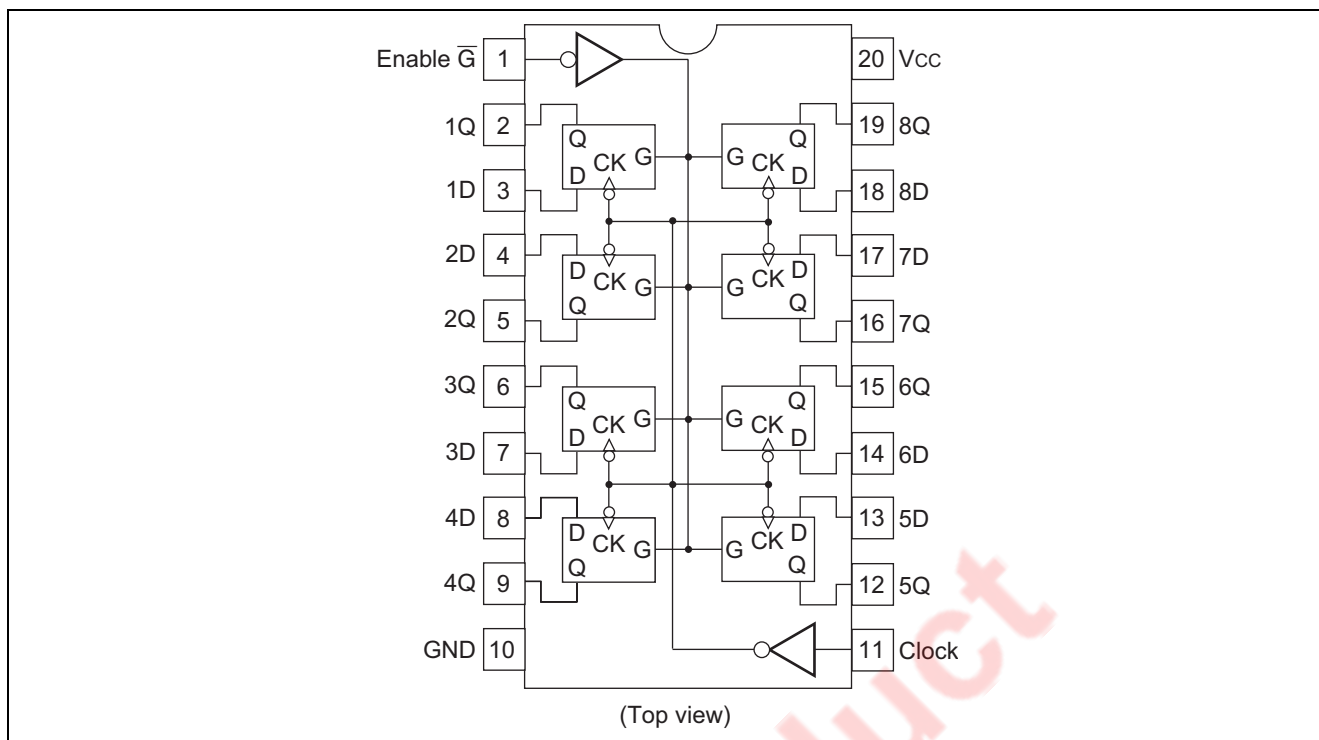
Note: Please consult the sales office for the above package availability.

Function Table

Inputs			Outputs	
Enable $\bar{G}$	Clock	Data	Q	$\bar{Q}$
H	X	X	Q_0	$\bar{Q}_0$
L		H	H	L
L		L	L	H
X	L	X	Q_0	$\bar{Q}_0$

- Notes: 1. H ; High level, L ; Low level, X ; Irrelevant,  ; Transition from L level to H level.
2. Q_0 ; The level of Q before the indicated steady-state input conditions were established.
3. $\bar{Q}_0$; Complement of Q_0 or level of $\bar{Q}$ before the indicated steady-state input conditions were established.

Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage range	V_{CC}	-0.5 to 7.0	V
Input / Output voltage	V_{IN}, V_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Input / Output diode current	I_{IK}, I_{OK}	± 20	mA
Output current	I_O	± 25	mA
V_{CC} , GND current	I_{CC} or I_{GND}	± 50	mA
Power dissipation	P_T	500	mW
Storage temperature	T_{stg}	-65 to +150	°C

Note: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	2 to 6	V	
Input / Output voltage	V_{IN}, V_{OUT}	0 to V_{CC}	V	
Operating temperature	T_a	-40 to 85	°C	
Input rise / fall time ^{*1}	t_r, t_f	0 to 1000	ns	$V_{CC} = 2.0 \text{ V}$
		0 to 500		$V_{CC} = 4.5 \text{ V}$
		0 to 400		$V_{CC} = 6.0 \text{ V}$

Note: 1. This item guarantees maximum limit when one input switches.

Waveform: Refer to test circuit of switching characteristics.

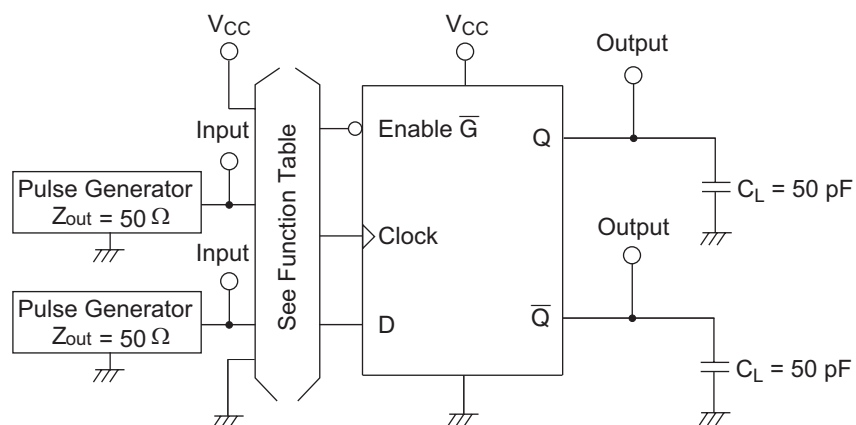
Electrical Characteristics

Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V _{IH}	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V _{IL}	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V _{OH}	2.0	1.9	2.0	—	1.9	—	V	Vin = V _{IH} or V _{IL}	I _{OH} = -20 µA
		4.5	4.4	4.5	—	4.4	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	—	—	4.13	—			I _{OH} = -4 mA
		6.0	5.68	—	—	5.63	—			I _{OH} = -5.2 mA
	V _{OL}	2.0	—	0.0	0.1	—	0.1	V	Vin = V _{IH} or V _{IL}	I _{OL} = 20 µA
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	—	0.26	—	0.33			I _{OL} = 4 mA
		6.0	—	—	0.26	—	0.33			I _{OL} = 5.2 mA
Input current	I _{in}	6.0	—	—	±0.1	—	±1.0	µA	Vin = V _{CC} or GND	
Quiescent supply current	I _{CC}	6.0	—	—	4.0	—	40	µA	Vin = V _{CC} or GND, I _{out} = 0 µA	

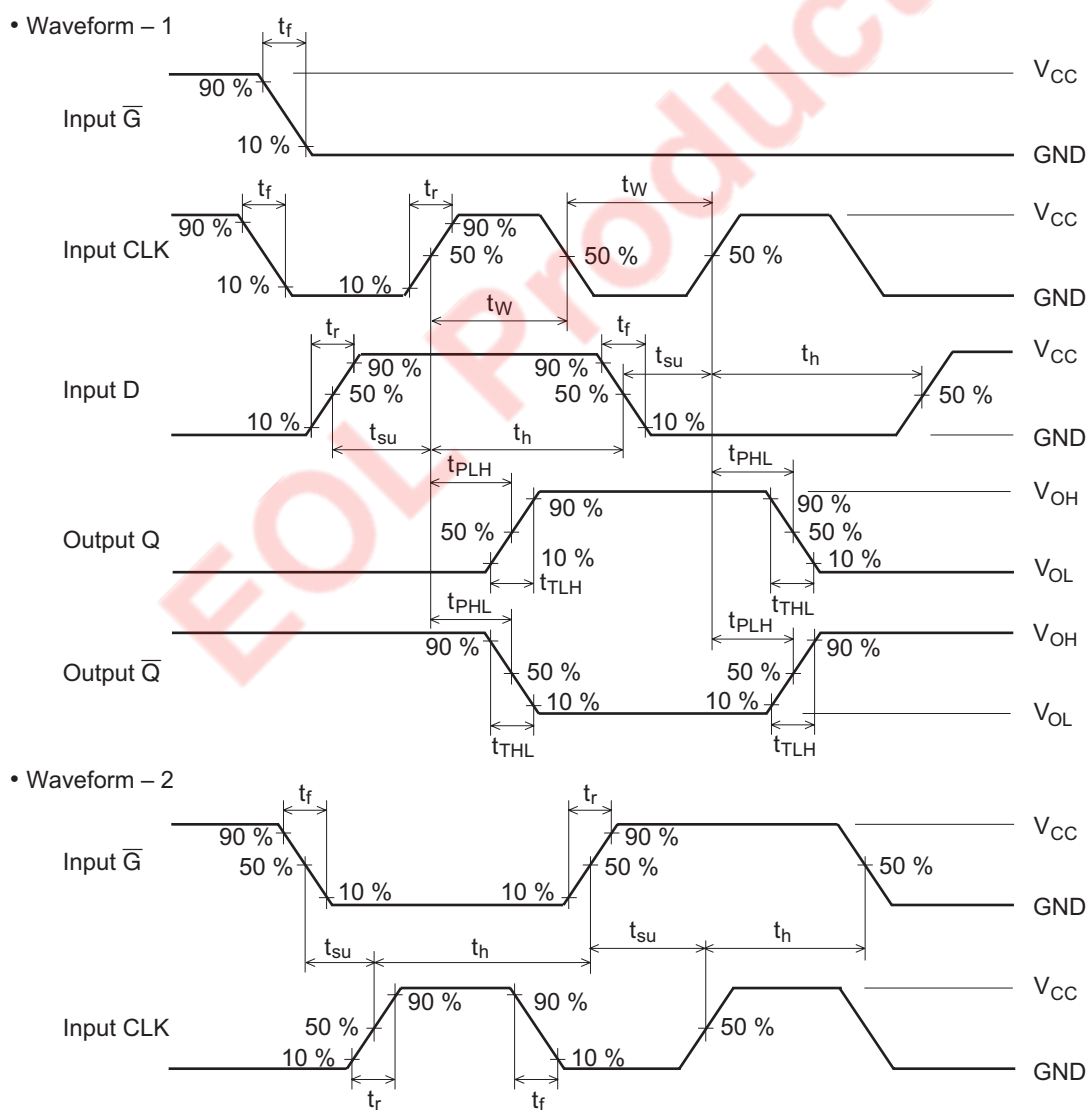
Switching Characteristics (C_L = 50 pF, Input t_r = t_f = 6 ns)

Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Maximum clock frequency	f _{max}	2.0	—	—	6	—	5	MHz		
		4.5	—	—	30	—	24			
		6.0	—	—	35	—	28			
Propagation delay time	t _{PLH} t _{PHL}	2.0	—	—	140	—	175	ns		
		4.5	—	13	28	—	35			
		6.0	—	—	24	—	30			
Setup time	t _{su}	2.0	100	—	—	125	—	ns		
		4.5	20	5	—	25	—			
		6.0	17	—	—	21	—			
Hold time	t _h	2.0	5	—	—	5	—	ns		
		4.5	5	0	—	5	—			
		6.0	5	—	—	5	—			
Pulse width	t _w	2.0	80	—	—	100	—	ns		
		4.5	16	—	—	20	—			
		6.0	14	—	—	17	—			
Output rise/fall time	t _{TLH} t _{THL}	2.0	—	—	75	—	95	ns		
		4.5	—	5	15	—	19			
		6.0	—	—	13	—	16			
Input capacitance	C _{in}	—	—	5	10	—	10	pF		

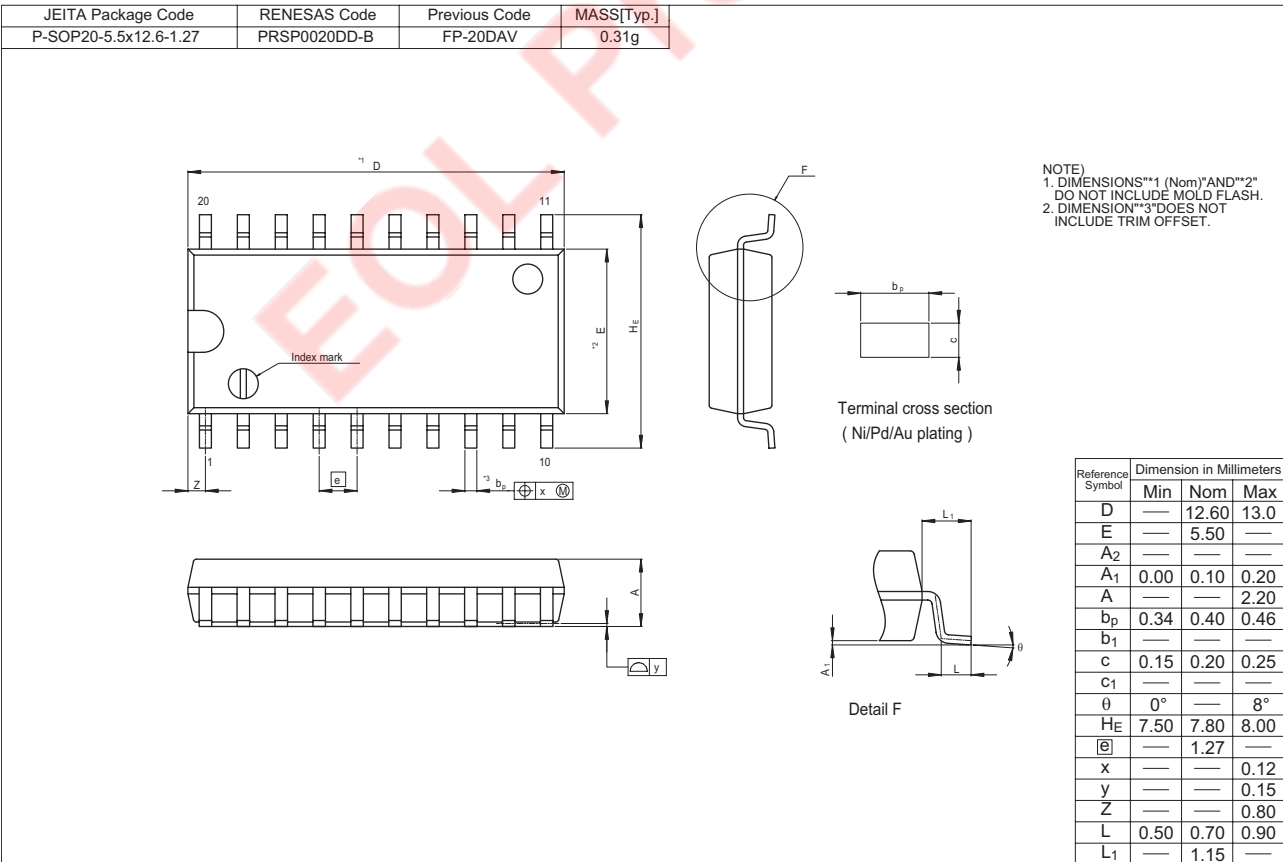
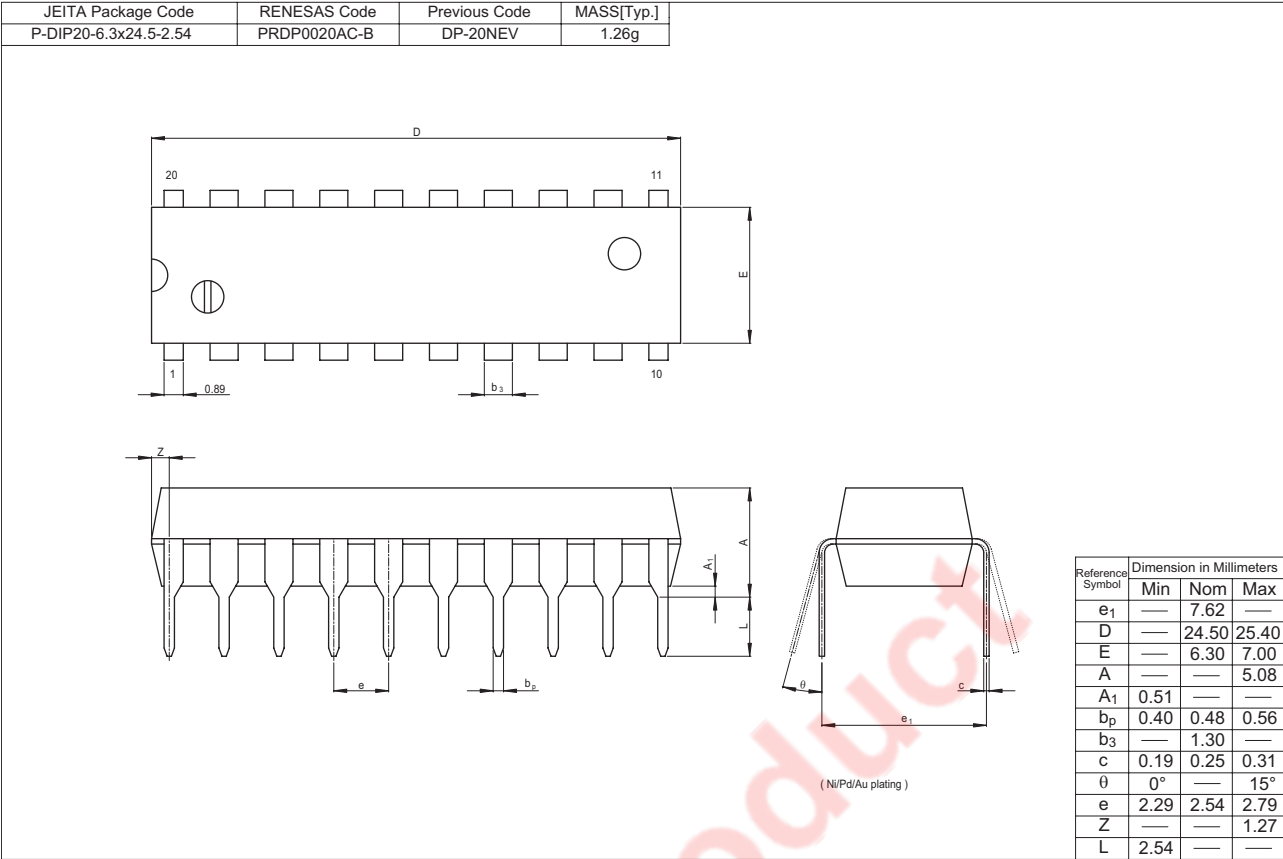
Test Circuit



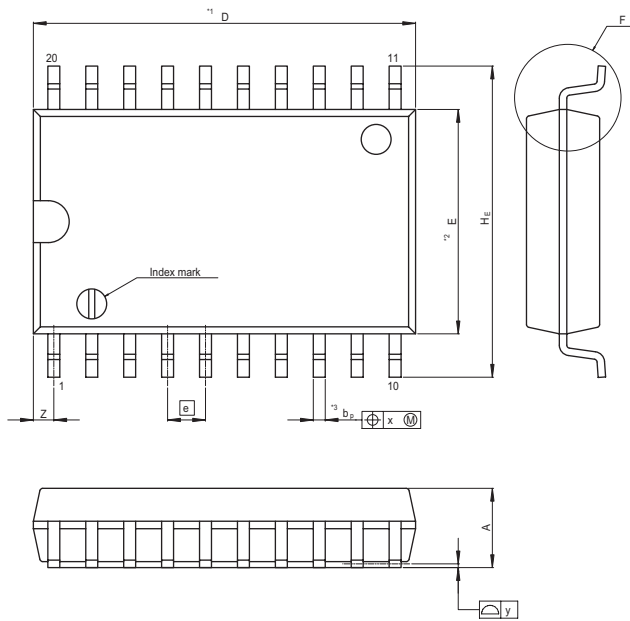
Waveforms



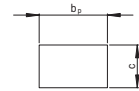
Package Dimensions



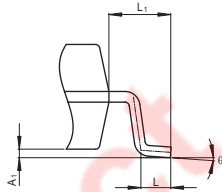
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP20-7.5x12.8-1.27	PRSP0020DC-A	FP-20DBV	0.52g



NOTE)
1. DIMENSIONS**1 (Nom)**AND**2*
@ DO NOT INCLUDE MOLD FLASH.
2. DIMENSION**3*DOES NOT
@ INCLUDE TRIM OFFSET.



Terminal cross section
(Ni/Pd/Au plating)



Detail F

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	12.80	13.2
E	—	7.50	—
A ₂	—	—	—
A ₁	0.10	0.20	0.30
A	—	—	2.65
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.20	0.25	0.30
c ₁	—	—	—
θ	0°	—	8°
H _E	10.00	10.40	10.65
@	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.935
L	0.40	0.70	1.27
L ₁	—	1.45	—

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