

# 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  $\overline{G}$  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  $\overline{G}$  input.



### Features


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

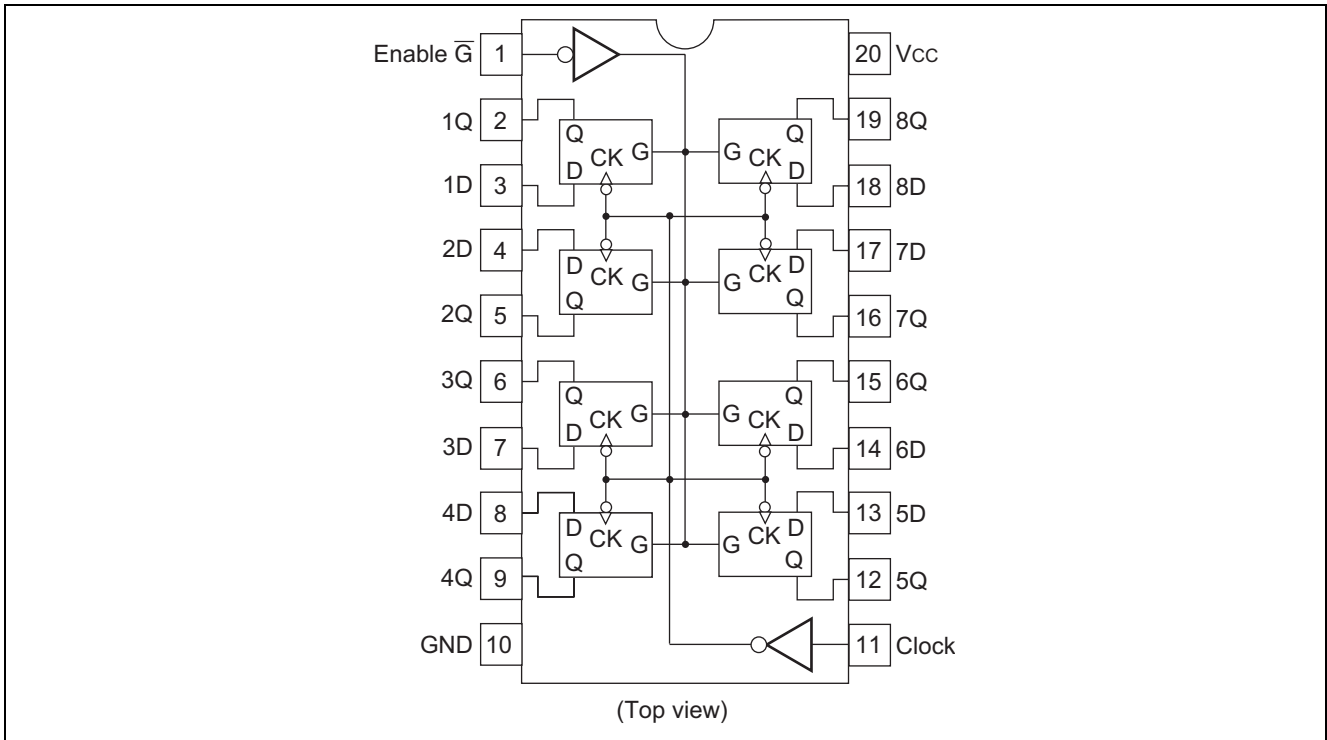
Note: Please consult the sales office for the above package availability.

### Function Table

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

- 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.  $\overline{Q}_0$  ; Complement of  $Q_0$  or level of  $\overline{Q}$  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	$I_{IK}, I_{OK}$	$\pm 20$	mA
Output current	$I_O$	$\pm 25$	mA
$V_{CC}$ , GND current	$I_{CC}$ or $I_{GND}$	$\pm 50$	mA
Power dissipation	$P_T$	500	mW
Storage temperature	$T_{stg}$	-65 to +150	$^{\circ}C$

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	$^{\circ}C$	
Input rise / fall time <sup>*1</sup>	$t_r, t_f$	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.

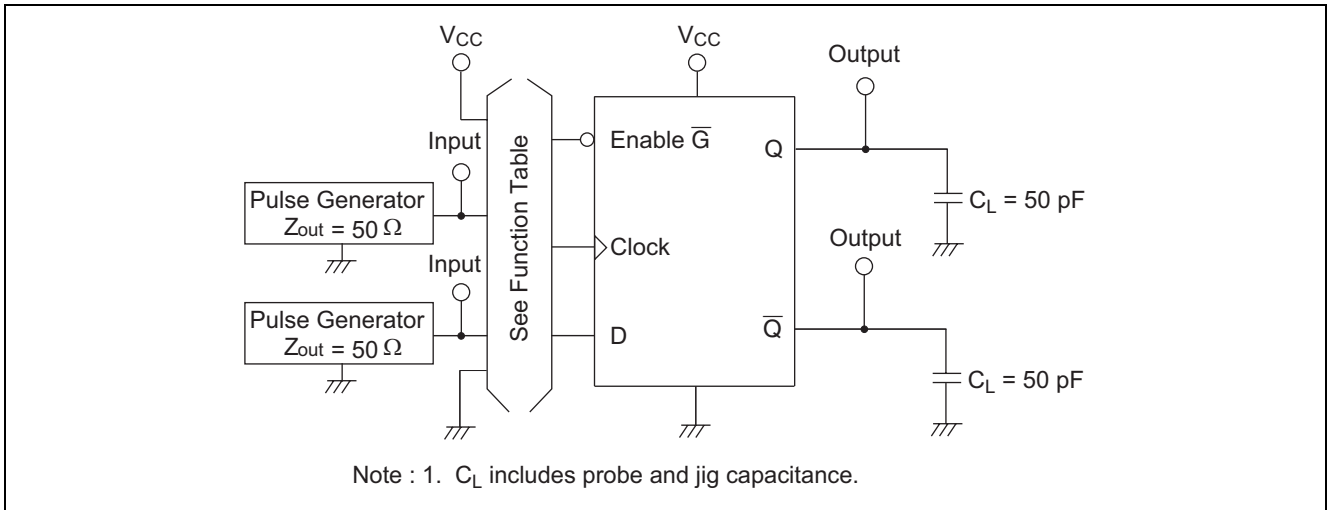
**Electrical Characteristics**

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

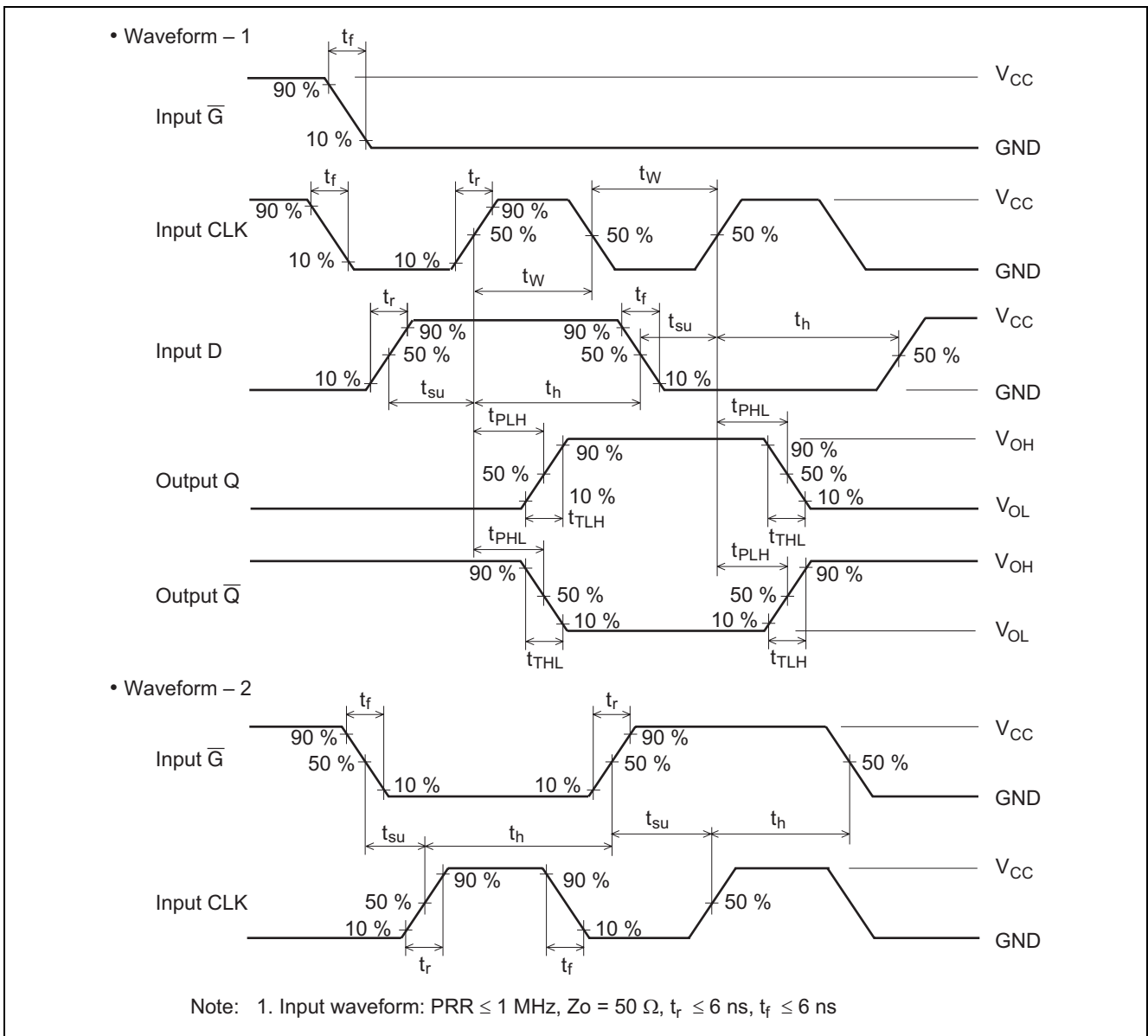
**Switching Characteristics (C<sub>L</sub> = 50 pF, Input t<sub>r</sub> = t<sub>f</sub> = 6 ns)**

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

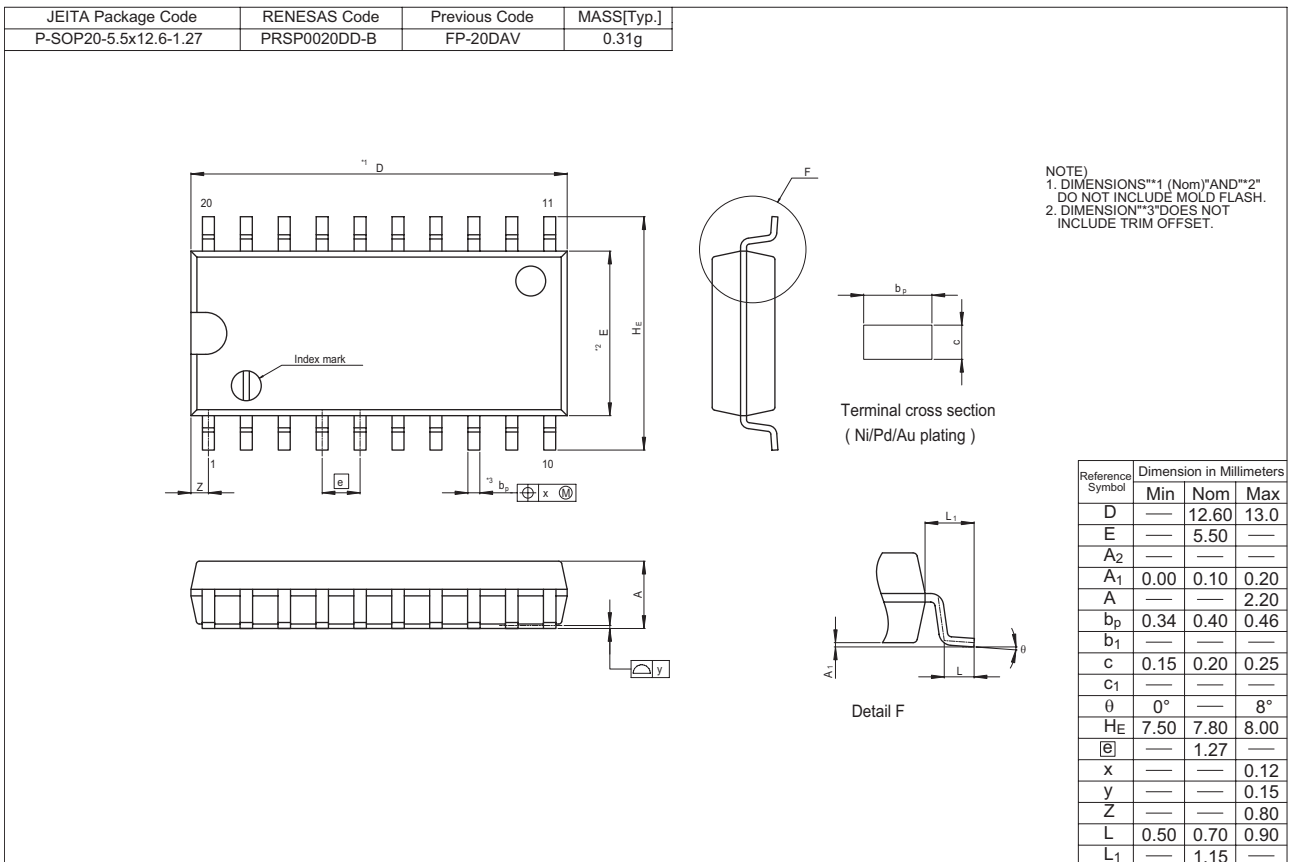
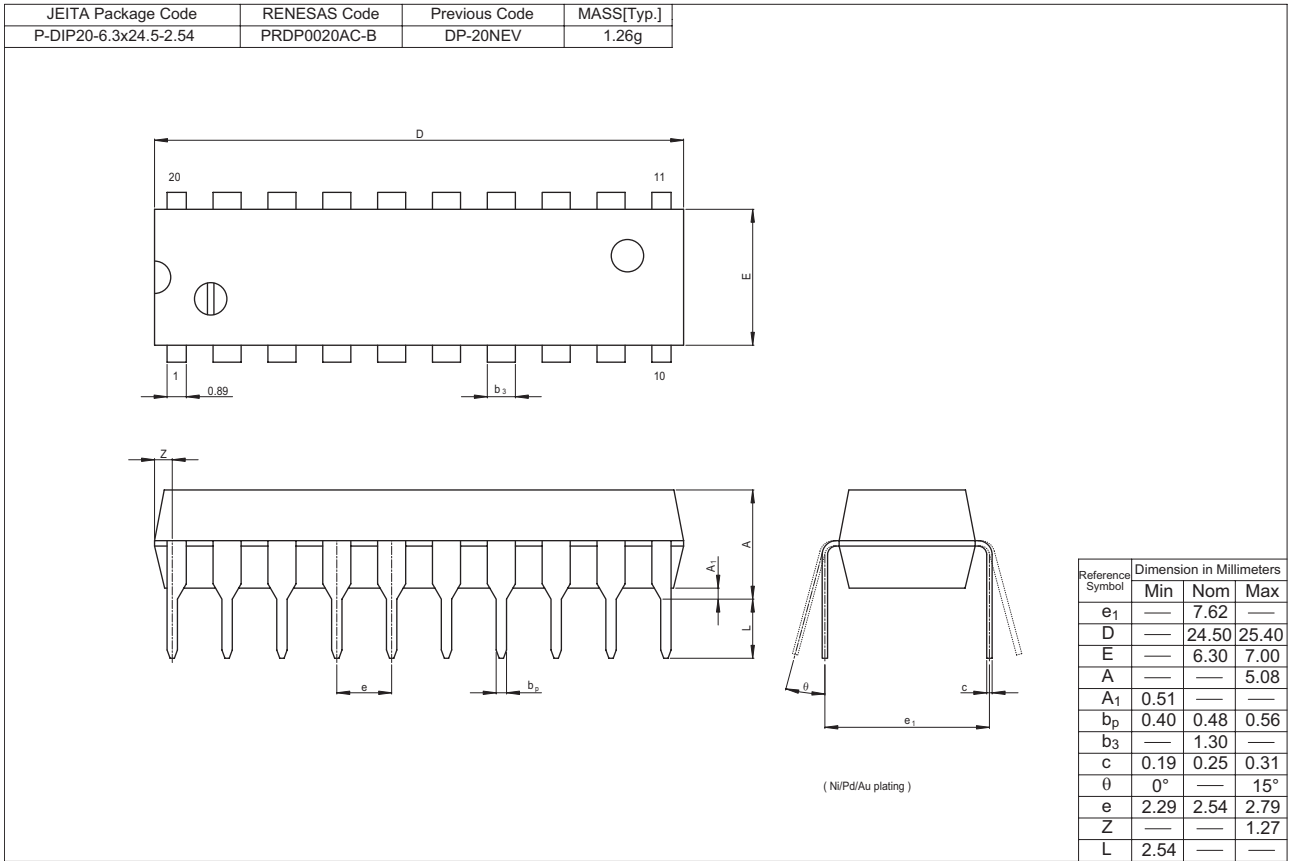
Test Circuit



Waveforms

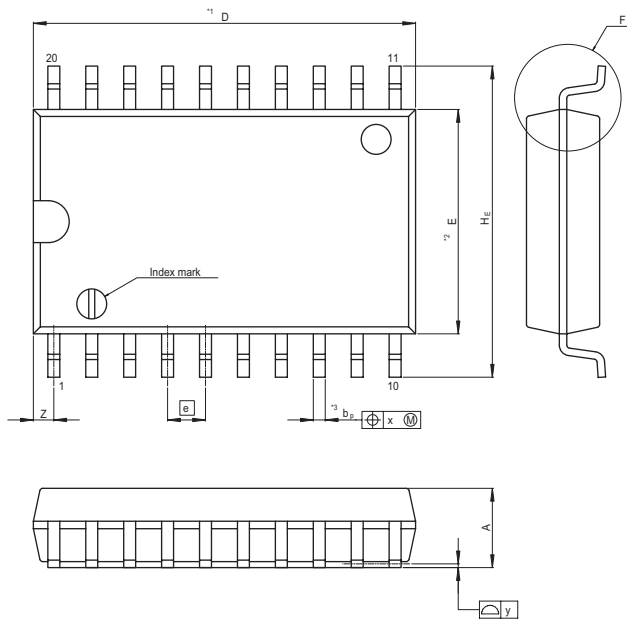


Package Dimensions

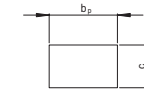


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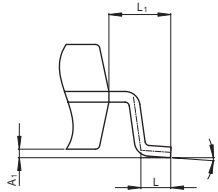
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP20-7.5x12.8-1.27	PRSP0020DC-A	FP-20DBV	0.52g



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 <sub>2</sub>	—	—	—
A <sub>1</sub>	0.10	0.20	0.30
A	—	—	2.65
b <sub>p</sub>	0.34	0.40	0.46
b <sub>1</sub>	—	—	—
c	0.20	0.25	0.30
c <sub>1</sub>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	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 <sub>1</sub>	—	1.45	—

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