

HD74HC109

Dual J-K Flip-Flops (with Preset and Clear)

REJ03D0561-0200
(Previous ADE-205-434)
Rev.2.00
Oct 11, 2005

Description

Each flip-flop has independent J, $\bar{K}$, preset, clear and clock inputs and Q and $\bar{Q}$ outputs. This device is edge sensitive to the clock input and changes state on the positive going transition of the clock pulse. Clear and preset are independent of the clock and accomplished by a low logic level on the corresponding input.

Features

- High Speed Operation: t_{pd} (Clock to Q) = 15 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) = 2 μ A max ($T_a = 25^\circ\text{C}$)
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HC109P	DILP-16 pin	PRDP0016AE-B (DP-16FV)	P	—
HD74HC109FPEL	SOP-16 pin (JEITA)	PRSP0016DH-B (FP-16DAV)	FP	EL (2,000 pcs/reel)
HD74HC109RPEL	SOP-16 pin (JEDEC)	PRSP0016DG-A (FP-16DNV)	RP	EL (2,500 pcs/reel)

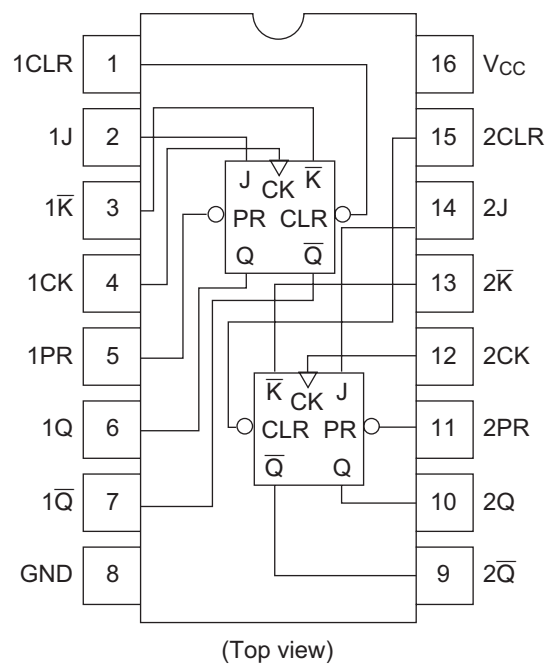
Note: Please consult the sales office for the above package availability.

Function Table

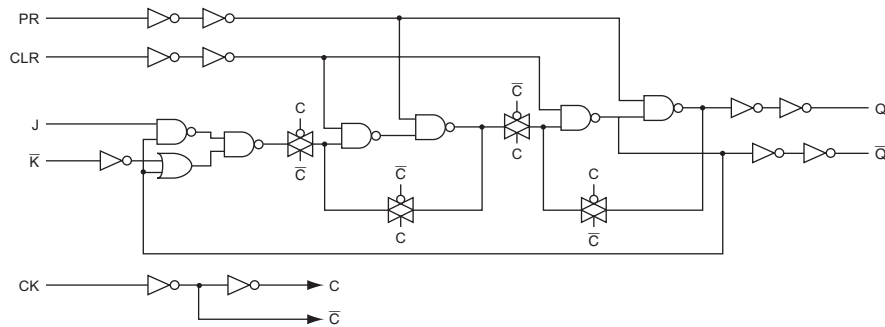
Inputs					Outputs	
Preset	Clear	Clock	J	$\bar{K}$	Q	$\bar{Q}$
L	H	X	X	X	H	L
H	L	X	X	X	L	H
L	L	X	X	X	H^{*1}	H^{*1}
H	H		L	L	L	H
H	H		H	L	Toggle	
H	H		L	H	Q_0	$\bar{Q}_0$
H	H		H	H	H	L
H	H	L	X	X	Q_0	$\bar{Q}_0$

Note: 1. Q and $\bar{Q}$ will remain high as long as preset and clear input are low, but Q and $\bar{Q}$ are unpredictable if preset and clear input go high simultaneously.

H : High level
L : Low level
X : Irrelevant



Logic Diagram (1/2)



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	$^{\circ}C$

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	°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	—			I _{OH} = -4 mA
		6.0	5.9	6.0	—	5.9	—			I _{OH} = -5.2 mA
		4.5	4.18	—	—	4.13	—			
		6.0	5.68	—	—	5.63	—			
	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	—	—	2.0	—	20	μA	Vin = V _{CC} or GND, I _{out} = 0 μA	

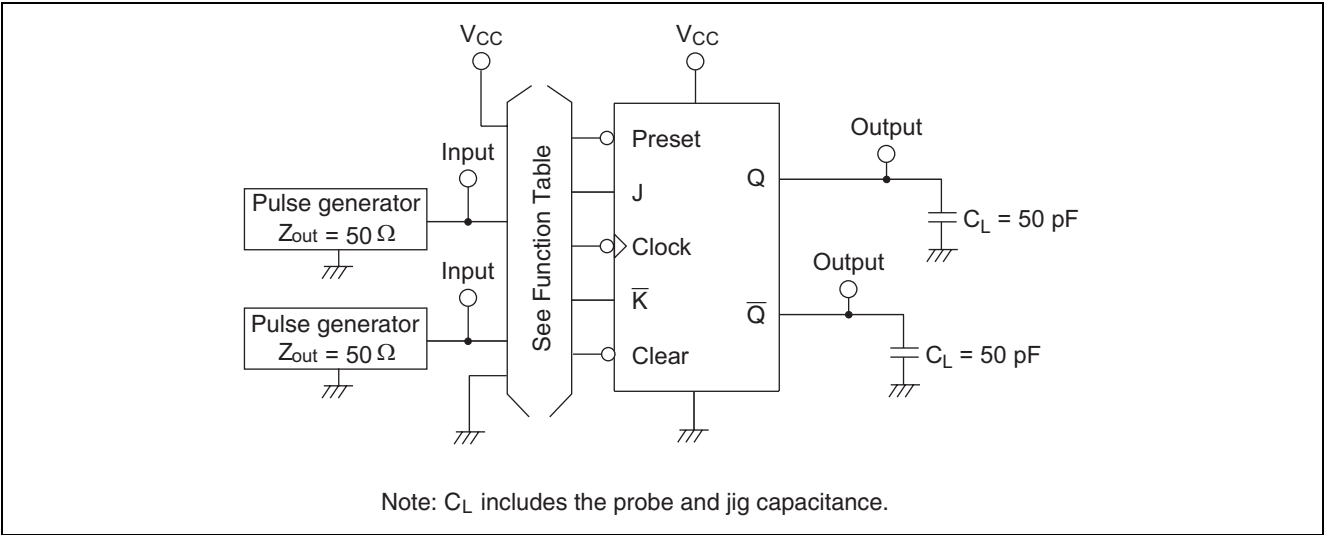
Switching Characteristics ($C_L = 50\text{ pF}$, Input $t_r = t_f = 6\text{ ns}$)

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	—	—	5	—	4	ns	
		4.5	—	—	27	—	21		
		6.0	—	—	32	—	25		
Propagation delay time	t _{PLH} , t _{PHL}	2.0	—	—	175	—	220	ns	Clock to Q or $\overline{Q}$
		4.5	—	15	35	—	44		
		6.0	—	—	30	—	37		
		2.0	—	—	190	—	240	ns	Preset or Clear to Clock
		4.5	—	14	38	—	48		
		6.0	—	—	32	—	41		
Removal time	t _{rem}	2.0	25	—	—	32	—	ns	
		4.5	5	1	—	6	—		
		6.0	4	—	—	5	—		

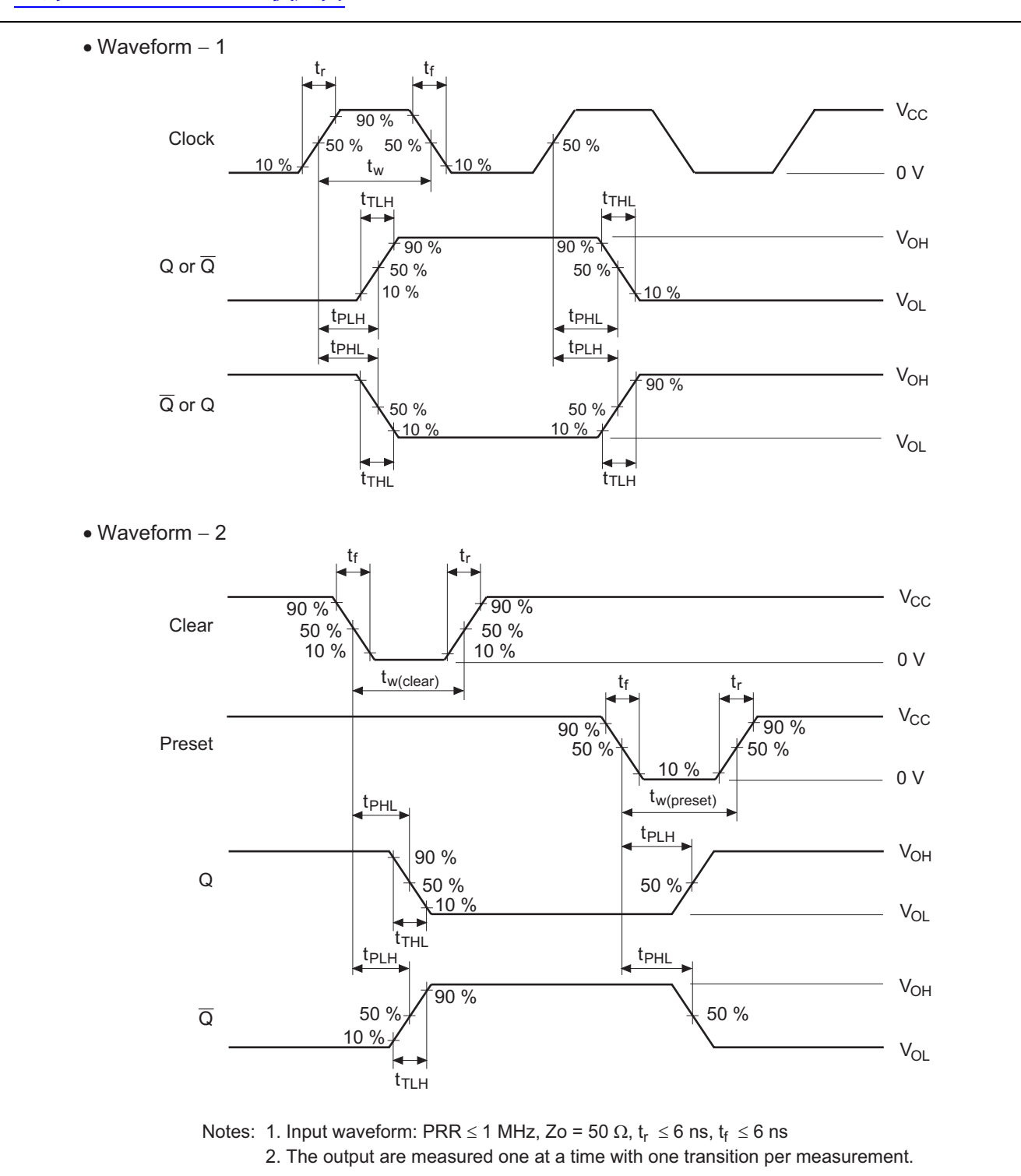
Switching Characteristics (C_L = 50 pF, Input t_r = t_f = 6 ns)

Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Setup time	t _{su}	2.0	100	—	—	125	—	ns	Data to Latch Enable
		4.5	20	4	—	25	—		
		6.0	17	—	—	21	—		
Hold time	t _h	2.0	0	—	—	0	—	ns	Latch Enable to Data
		4.5	0	-4	—	0	—		
		6.0	0	—	—	0	—		
Pulse width	t _w	2.0	80	—	—	100	—	ns	Latch Enable
		4.5	16	5	—	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	

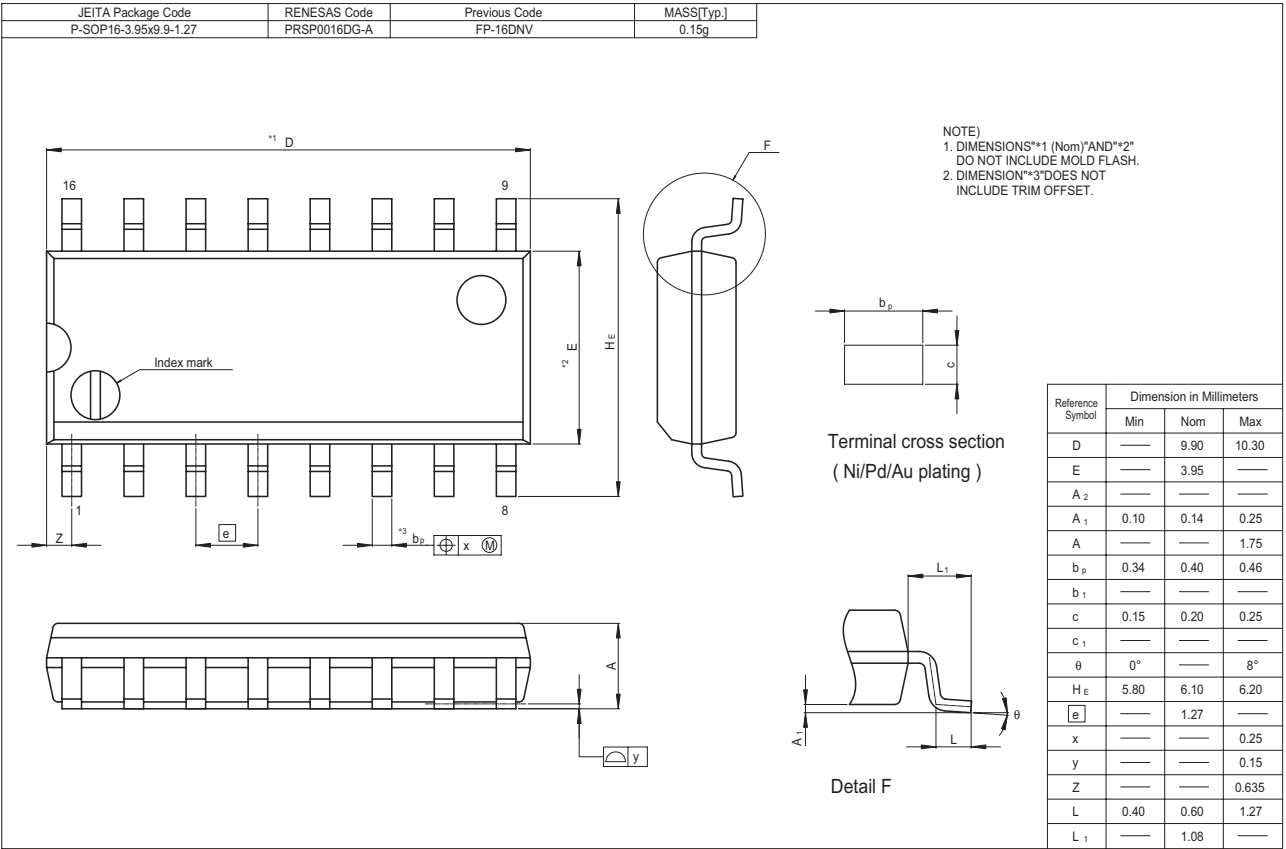
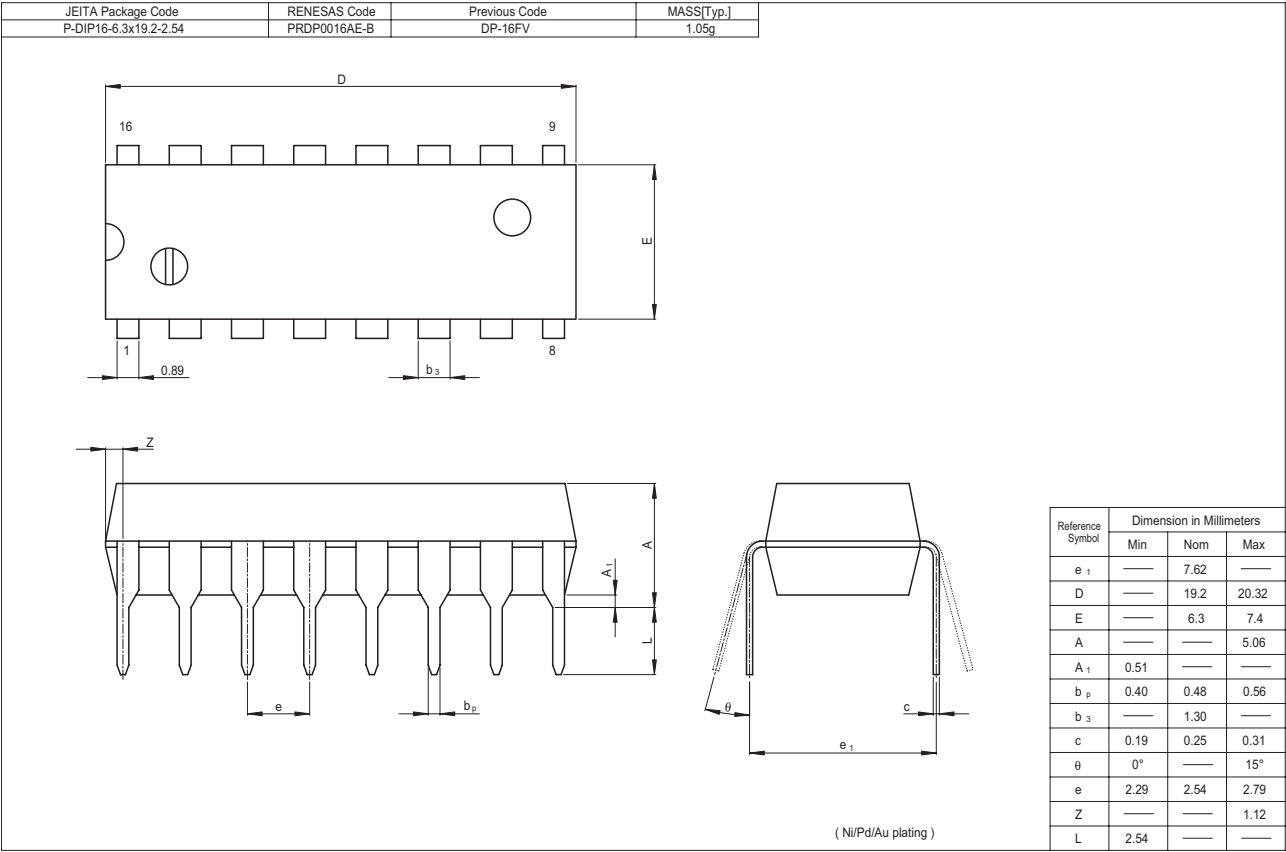
Test Circuit

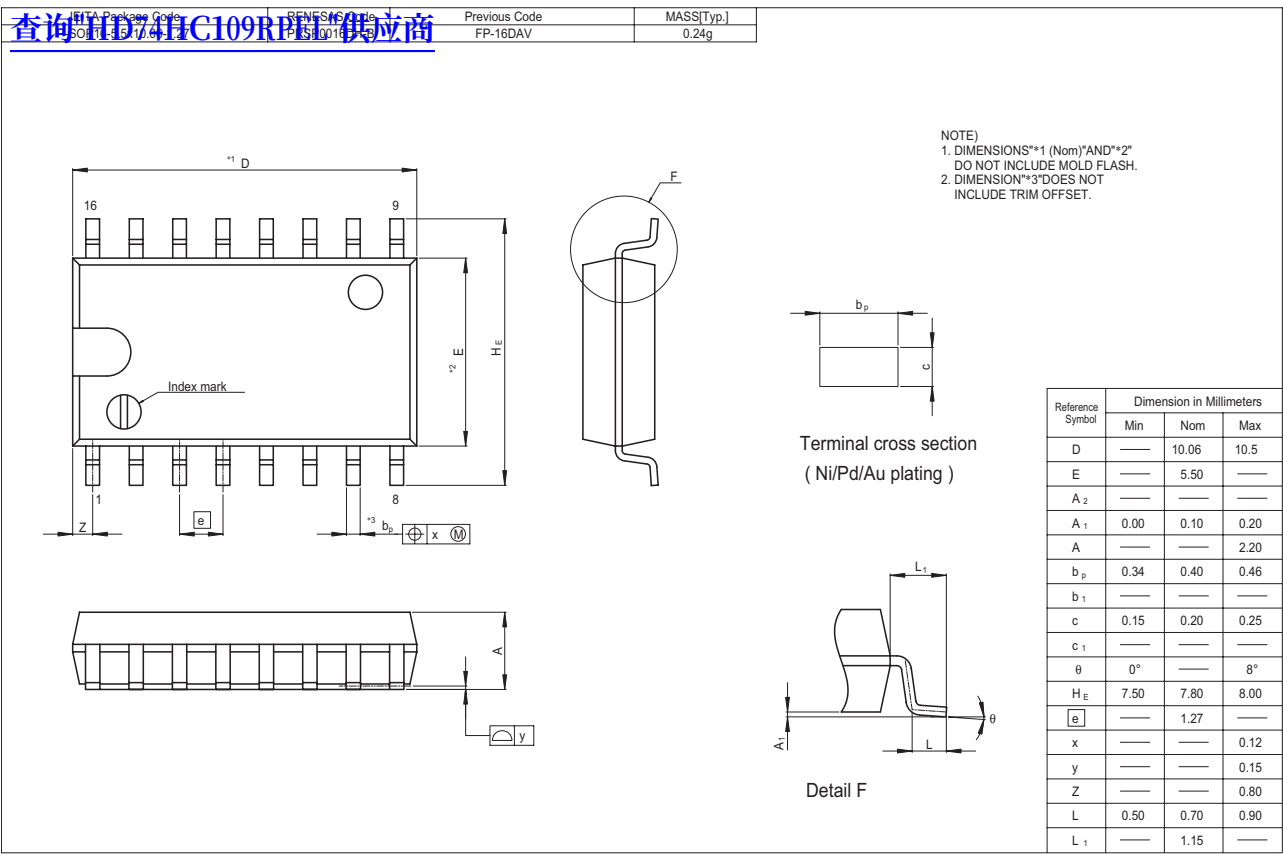


[本海"HD74HC109PEL"供应商](#)



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