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# HD74HC292/HD74HC294

Programmable Frequency Divider/Digital Timer

# HITACHI

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## Description



This device divides the incoming clock frequency by a number (a power of 2) that is preset by the Programming inputs. It has two Clock inputs, either of which may be used as a clock inhibit. The device also has an active-low Reset, which initializes the internal flip-flop states. Test Point outputs (TP1, TP2, TP3) are provided with HD74HC292 to facilitate incoming inspections.

Test Point output is provided with HD74HC294 to facilitate incoming inspections.

## Features

- High Speed Operation:  $t_{pd}$  (Clock to Q) = 16 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  $\mu$ A max
- Low Quiescent Supply Current:  $I_{CC}$  (static) = 4  $\mu$ A max ( $T_a = 25^\circ\text{C}$ )

## Function Table

$\overline{\text{CLR}}$	CLK1	CLK2	Q Output Mode
L	X	X	Cleared to L
H		L	Count
H	L		Count
H	H	X	Inhibit
H	X	H	Inhibit

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## HD74HC292

### Programming Inputs

### Frequency Division

					Q Out		TP1		TP2		TP3	
E	D	C	B	A	Binary	Decimal	Binary	Decimal	Binary	Decimal	Binary	Decimal
L	L	L	L	L	Inhibit		Inhibit	Inhibit	Inhibit	Inhibit	Inhibit	Inhibit
L	L	L	L	H	Inhibit		Inhibit	Inhibit	Inhibit	Inhibit	Inhibit	Inhibit
L	L	L	H	L	2 <sup>2</sup>	4	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>24</sup>	16,777,216
L	L	L	H	H	2 <sup>3</sup>	8	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>24</sup>	16,777,216
L	L	H	L	L	2 <sup>4</sup>	16	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>24</sup>	16,777,216
L	L	H	L	H	2 <sup>5</sup>	32	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>24</sup>	16,777,216
L	L	H	H	L	2 <sup>6</sup>	64	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>24</sup>	16,777,216
L	L	H	H	H	2 <sup>7</sup>	128	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>24</sup>	16,777,216
L	H	L	L	L	2 <sup>8</sup>	256	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>2</sup>	4
L	H	L	L	H	2 <sup>9</sup>	512	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>2</sup>	4
L	H	L	H	L	2 <sup>10</sup>	1,024	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>4</sup>	16
L	H	L	H	H	2 <sup>11</sup>	2,048	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>4</sup>	16
L	H	H	L	L	2 <sup>12</sup>	4,096	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>6</sup>	64
L	H	H	L	H	2 <sup>13</sup>	8,192	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>6</sup>	64
L	H	H	H	L	2 <sup>14</sup>	16,384	2 <sup>9</sup>	512	Disabled LOW		2 <sup>8</sup>	256
L	H	H	H	H	2 <sup>15</sup>	32,768	2 <sup>9</sup>	512	Disabled LOW		2 <sup>8</sup>	256
H	L	L	L	L	2 <sup>16</sup>	65,536	2 <sup>9</sup>	512	2 <sup>3</sup>	8	2 <sup>10</sup>	1,024
H	L	L	L	H	2 <sup>17</sup>	131,072	2 <sup>9</sup>	512	2 <sup>3</sup>	8	2 <sup>10</sup>	1,024
H	L	L	H	L	2 <sup>18</sup>	262,144	2 <sup>9</sup>	512	2 <sup>5</sup>	32	2 <sup>12</sup>	4,096
H	L	L	H	H	2 <sup>19</sup>	524,288	2 <sup>9</sup>	512	2 <sup>5</sup>	32	2 <sup>12</sup>	4,096
H	L	H	L	L	2 <sup>20</sup>	1,048,576	2 <sup>9</sup>	512	2 <sup>7</sup>	128	2 <sup>14</sup>	16,384
H	L	H	L	H	2 <sup>21</sup>	2,097,152	2 <sup>9</sup>	512	2 <sup>7</sup>	128	2 <sup>14</sup>	16,384
H	L	H	H	L	2 <sup>22</sup>	4,194,304	Disabled LOW		2 <sup>9</sup>	512	2 <sup>16</sup>	65,536
H	L	H	H	H	2 <sup>23</sup>	8,388,608	Disabled LOW		2 <sup>9</sup>	512	2 <sup>16</sup>	65,536
H	H	L	L	L	2 <sup>24</sup>	16,777,216	2 <sup>3</sup>	8	2 <sup>11</sup>	2,048	2 <sup>18</sup>	262,144
H	H	L	L	H	2 <sup>25</sup>	33,554,432	2 <sup>3</sup>	8	2 <sup>11</sup>	2,048	2 <sup>18</sup>	262,144
H	H	L	H	L	2 <sup>26</sup>	67,108,864	2 <sup>5</sup>	32	2 <sup>13</sup>	8,192	2 <sup>20</sup>	1,048,576
H	H	L	H	H	2 <sup>27</sup>	134,217,728	2 <sup>5</sup>	32	2 <sup>13</sup>	8,192	2 <sup>20</sup>	1,048,576
H	H	H	L	L	2 <sup>28</sup>	268,435,456	2 <sup>7</sup>	128	2 <sup>15</sup>	32,768	2 <sup>22</sup>	4,194,304
H	H	H	L	H	2 <sup>29</sup>	536,870,912	2 <sup>7</sup>	128	2 <sup>15</sup>	32,768	2 <sup>22</sup>	4,194,304
H	H	H	H	L	2 <sup>30</sup>	1,073,741,824	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>24</sup>	16,777,216
H	H	H	H	H	2 <sup>31</sup>	2,147,483,648	2 <sup>9</sup>	512	2 <sup>17</sup>	131,072	2 <sup>24</sup>	16,777,216

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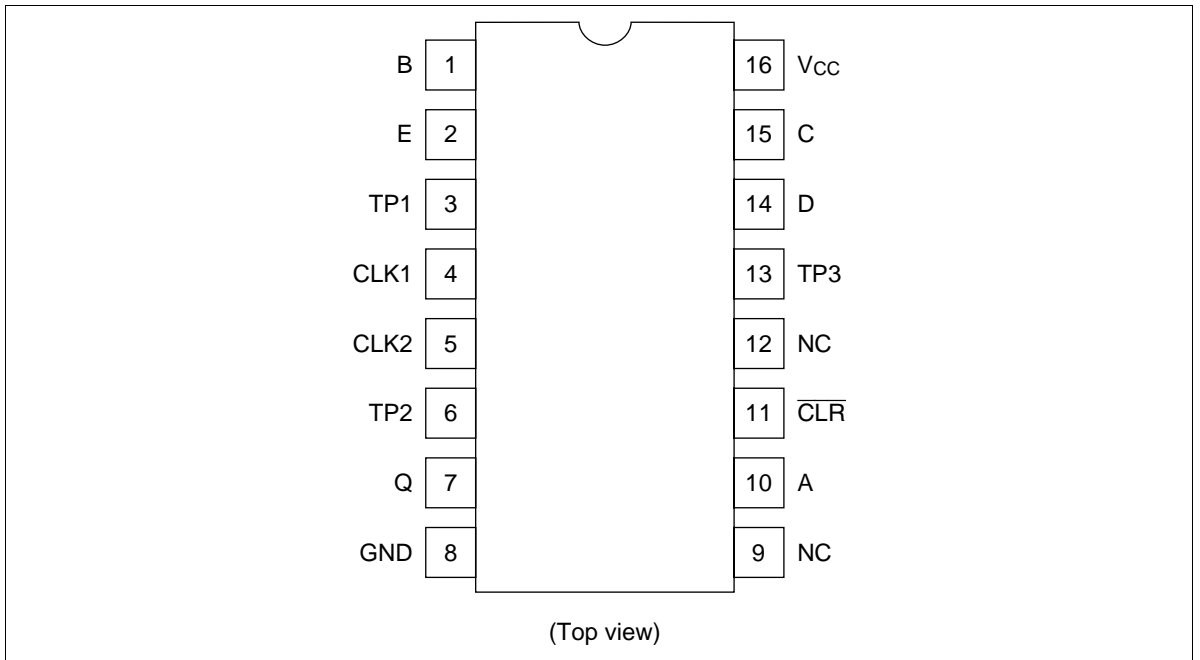
**HD74HC294**

Programming Inputs				Frequency Division			
D	C	B	A	Q Output		TP Output	
				Binary	Decimal	Binary	Decimal
L	L	L	L	Inhibit	Inhibit	Inhibit	Inhibit
L	L	L	H	Inhibit	Inhibit	Inhibit	Inhibit
L	L	H	L	2 <sup>2</sup>	4	2 <sup>9</sup>	512
L	L	H	H	2 <sup>3</sup>	8	2 <sup>9</sup>	512
L	H	L	L	2 <sup>4</sup>	16	2 <sup>9</sup>	512
L	H	L	H	2 <sup>5</sup>	32	2 <sup>9</sup>	512
L	H	H	L	2 <sup>6</sup>	64	2 <sup>9</sup>	512
L	H	H	H	2 <sup>7</sup>	128	Disabled LOW	
H	L	L	L	2 <sup>8</sup>	256	2 <sup>2</sup>	4
H	L	L	H	2 <sup>9</sup>	512	2 <sup>3</sup>	8
H	L	H	L	2 <sup>10</sup>	1,024	2 <sup>4</sup>	16
H	L	H	H	2 <sup>11</sup>	2,048	2 <sup>5</sup>	32
H	H	L	L	2 <sup>12</sup>	4,096	2 <sup>6</sup>	64
H	H	L	H	2 <sup>13</sup>	8,192	2 <sup>7</sup>	128
H	H	H	L	2 <sup>14</sup>	16,384	2 <sup>8</sup>	256
H	H	H	H	2 <sup>15</sup>	32,768	2 <sup>9</sup>	512

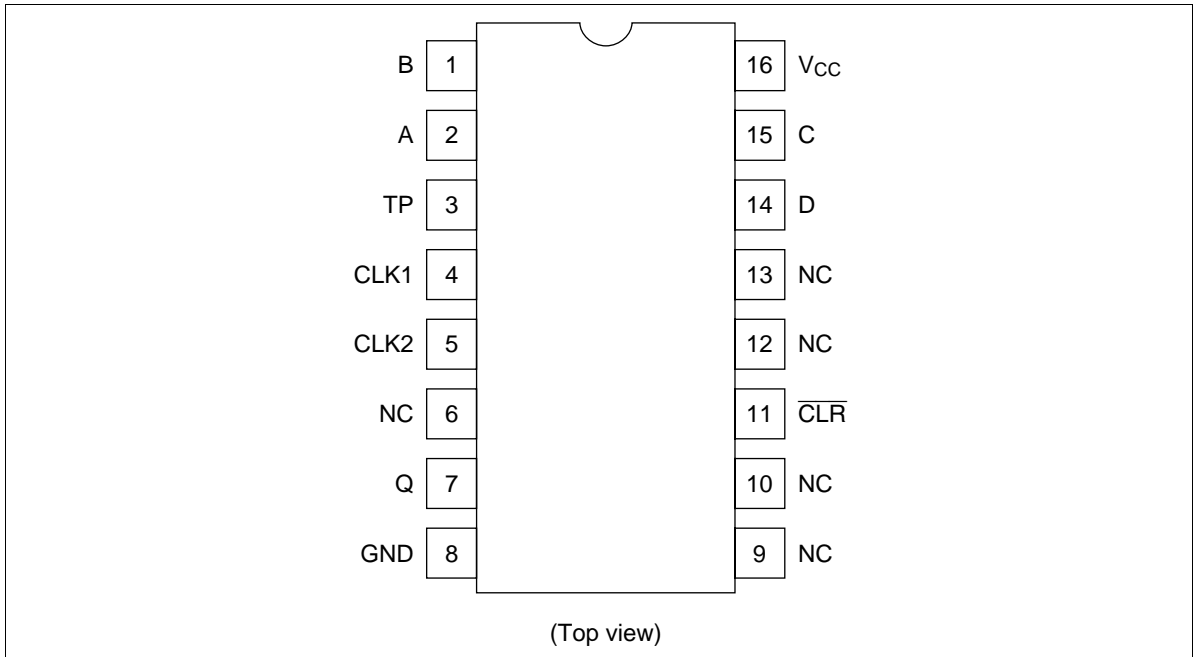
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## Pin Arrangement

### HD74HC292



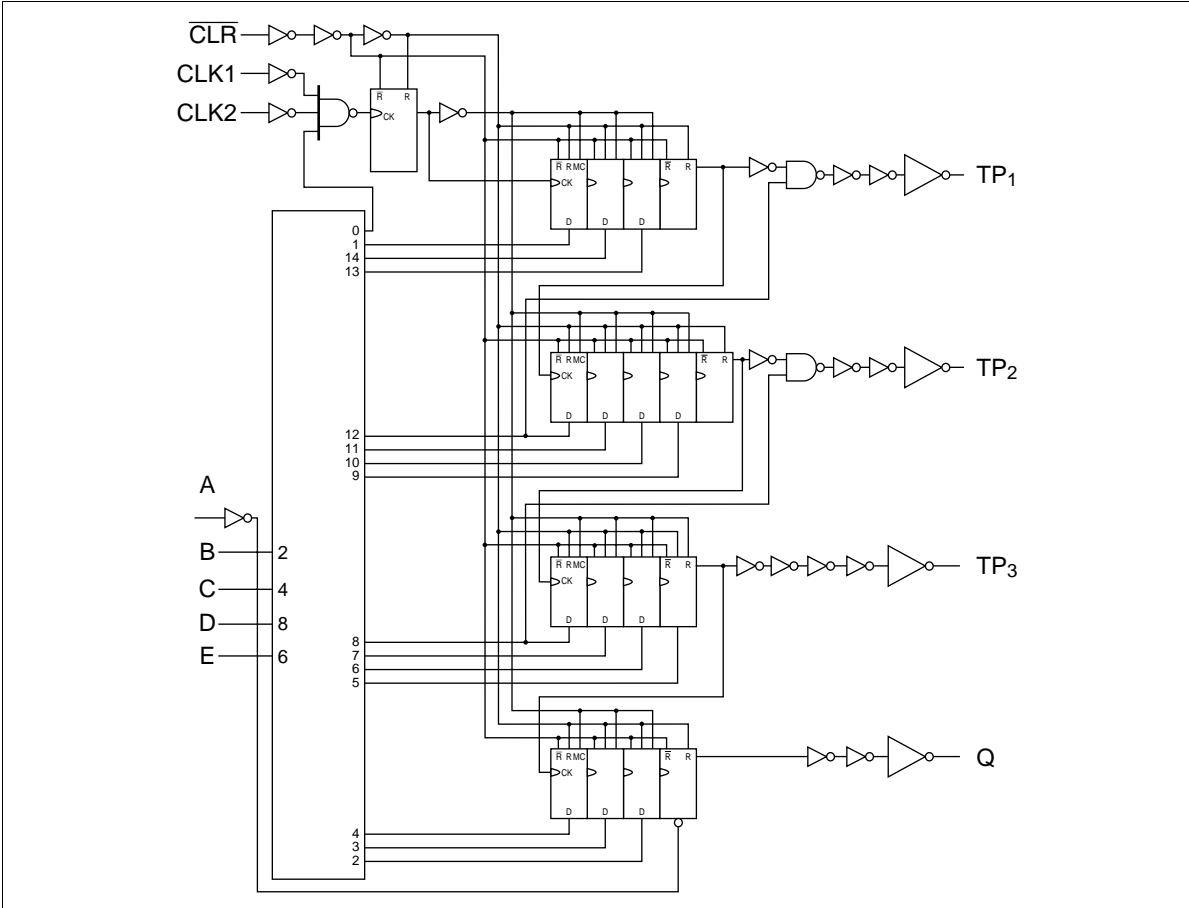
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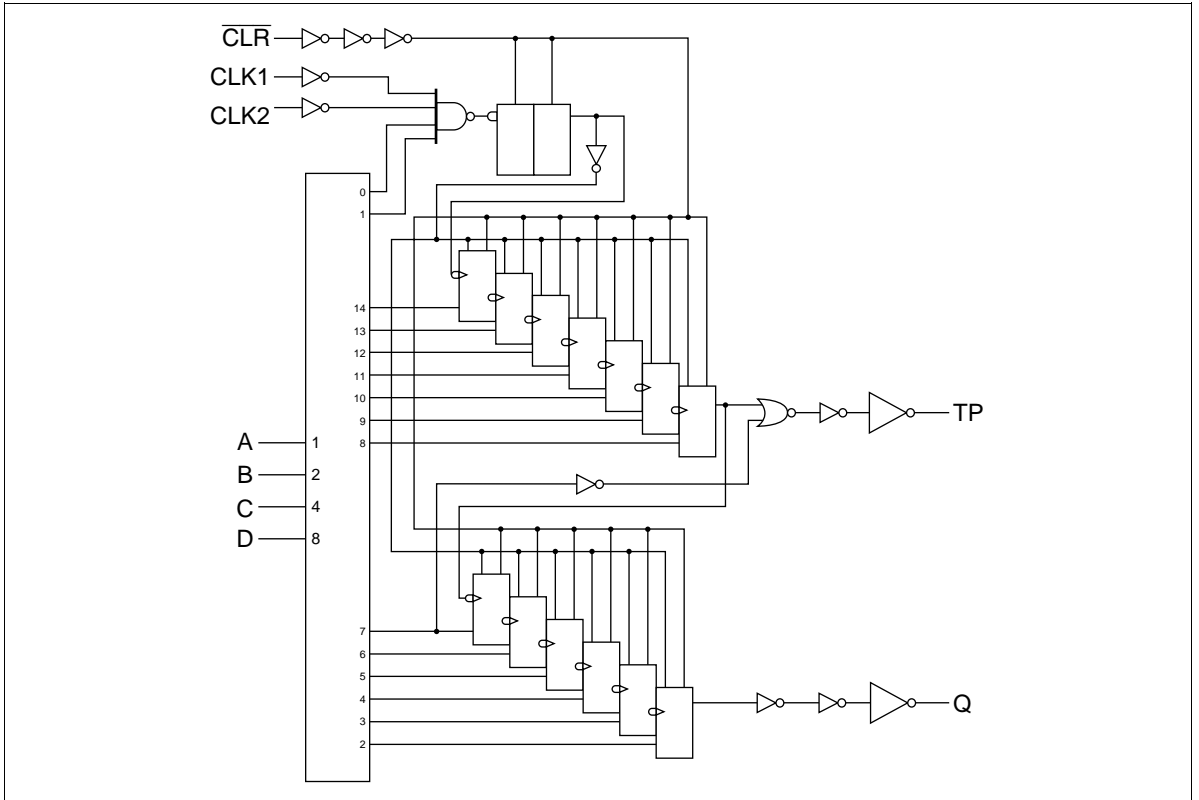
Logic Diagram

HD74HC292



# HD74HC292/HD74HC294

## HD74HC294



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DC Characteristics

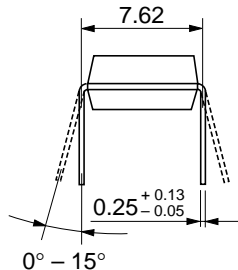
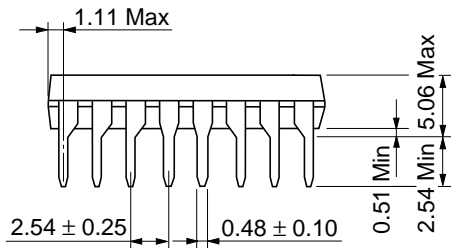
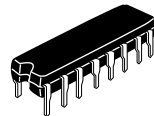
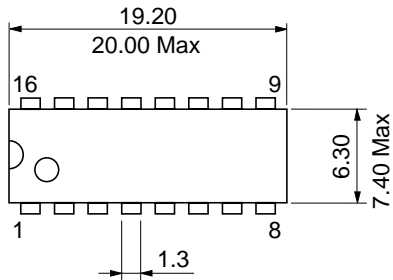
Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V <sub>IH</sub>	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V <sub>IL</sub>	2.0	—	—	0.5	—	0.5			V
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output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

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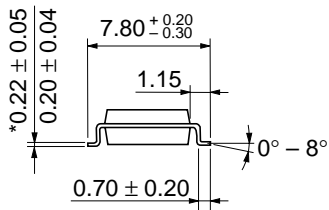
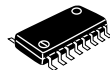
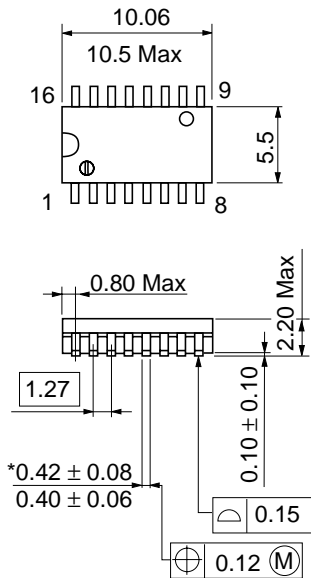
AC Characteristics ( $C_L = 50$  pF, Input  $t_r = t_f = 6$  ns)

Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$			$T_a = -40$ to $+85^\circ\text{C}$		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Maximum clock frequency	$f_{max}$	2.0	—	—	5	—	4	MHz	Clock to output
		4.5	—	—	27	—	21		
		6.0	—	—	31	—	24		
Propagation delay time	$t_{PLH}$	2.0	—	—	600	—	750	ns	Clock to output
		4.5	—	16	120	—	150		
		6.0	—	—	100	—	125		
Removal time	$t_{rem}$	2.0	100	—	—	125	—	ns	
		4.5	20	-4	—	25	—		
		6.0	17	—	—	21	—		
Pulse width	$t_w$	2.0	80	—	—	100	—	ns	
		4.5	16	14	—	20	—		
		6.0	14	—	—	17	—		
Output rise/fall time	$t_{TLH}$	2.0	—	—	75	—	95	ns	
	$t_{THL}$	4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
Input capacitance	$C_{in}$	—	—	5	10	—	10	pF	



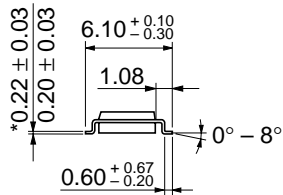
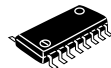
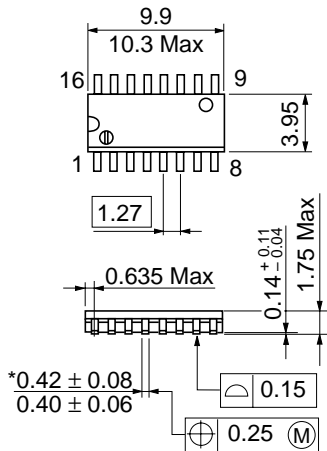


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.24 g



\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	FP-16DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.15 g

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