

HD74HC292/HD74HC294

Programmable Frequency Divider/Digital Timer

HITACHI

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 μ A max
- Low Quiescent Supply Current: I_{CC} (static) = 4 μ A max ($T_a = 25^\circ\text{C}$)

Function Table

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

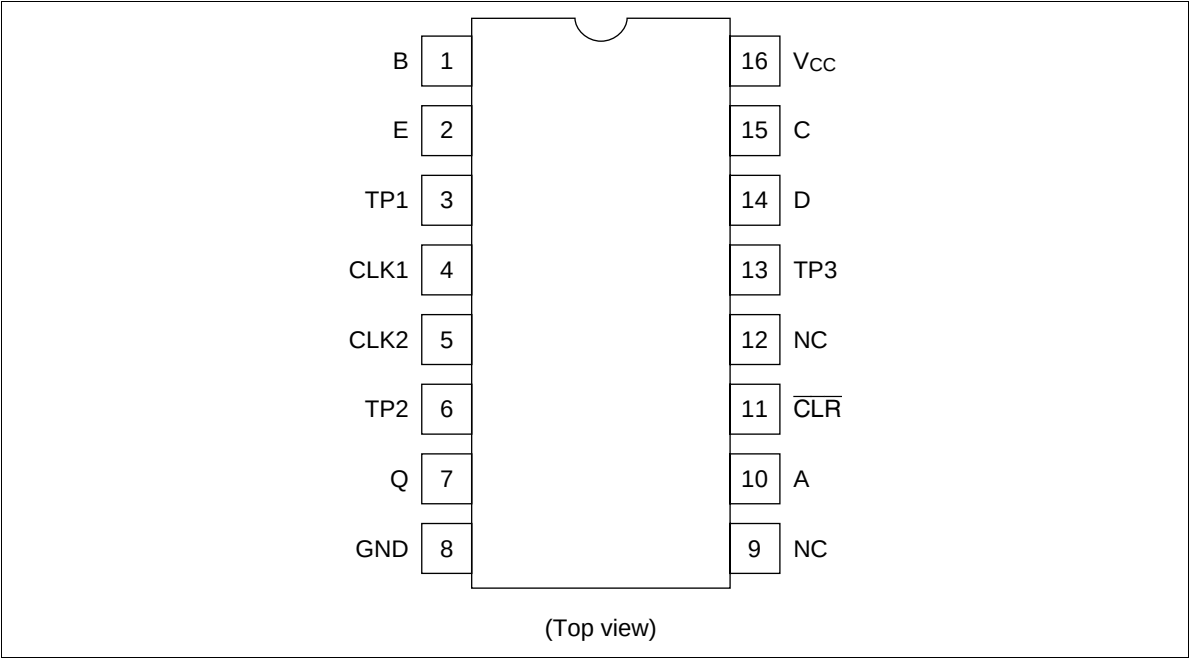
HD74HC294**Programming Inputs****Frequency Division**

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 ²	4	2 ⁹	512
L	L	H	H	2 ³	8	2 ⁹	512
L	H	L	L	2 ⁴	16	2 ⁹	512
L	H	L	H	2 ⁵	32	2 ⁹	512
L	H	H	L	2 ⁶	64	2 ⁹	512
L	H	H	H	2 ⁷	128	Disabled LOW	
H	L	L	L	2 ⁸	256	2 ²	4
H	L	L	H	2 ⁹	512	2 ³	8
H	L	H	L	2 ¹⁰	1,024	2 ⁴	16
H	L	H	H	2 ¹¹	2,048	2 ⁵	32
H	H	L	L	2 ¹²	4,096	2 ⁶	64
H	H	L	H	2 ¹³	8,192	2 ⁷	128
H	H	H	L	2 ¹⁴	16,384	2 ⁸	256
H	H	H	H	2 ¹⁵	32,768	2 ⁹	512

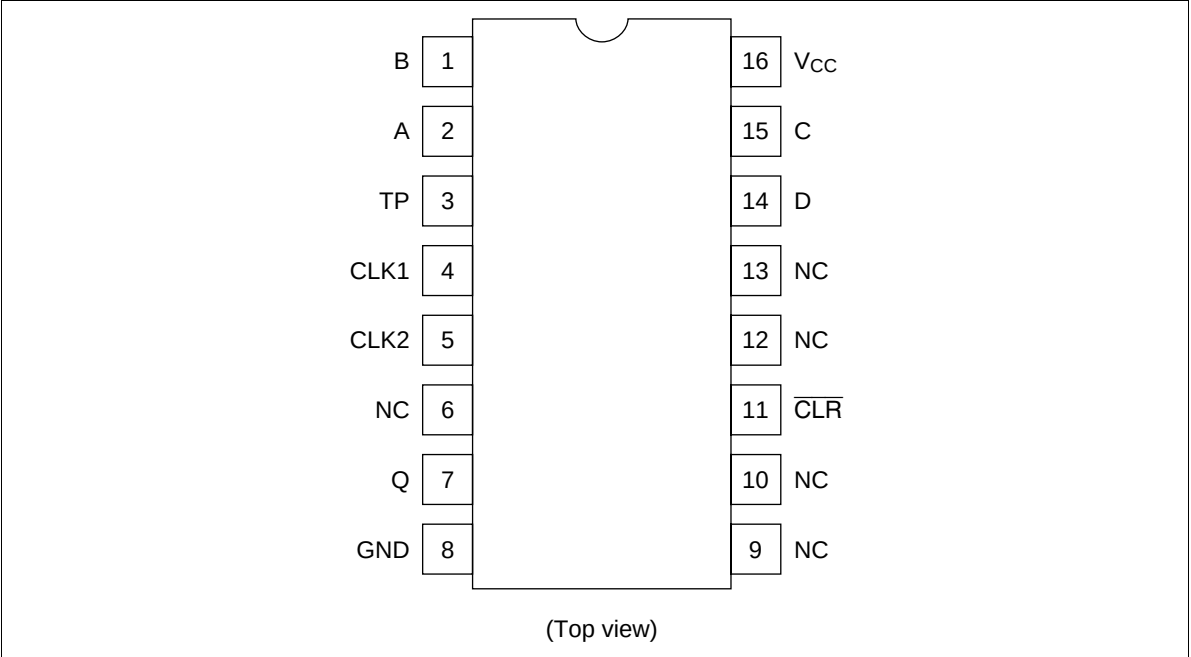
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Pin Arrangement

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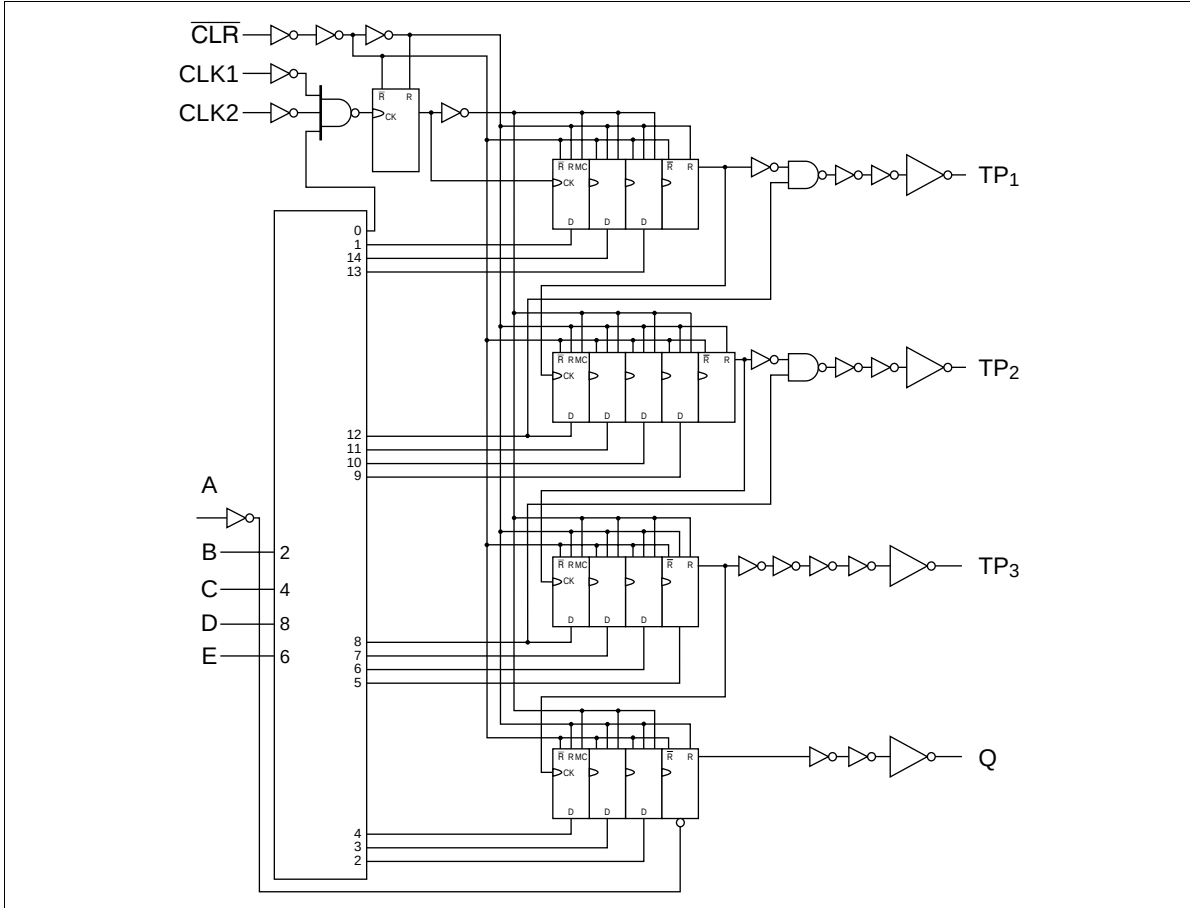


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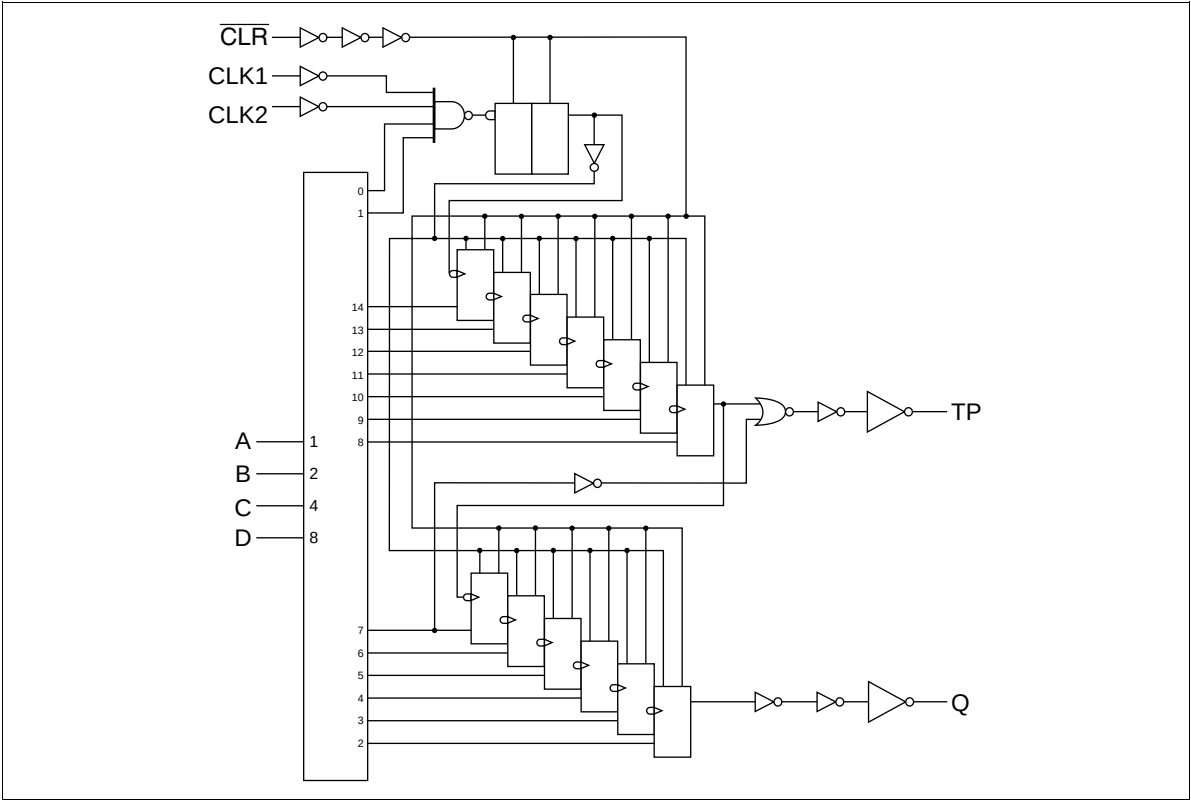


Logic Diagram

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DC Characteristics

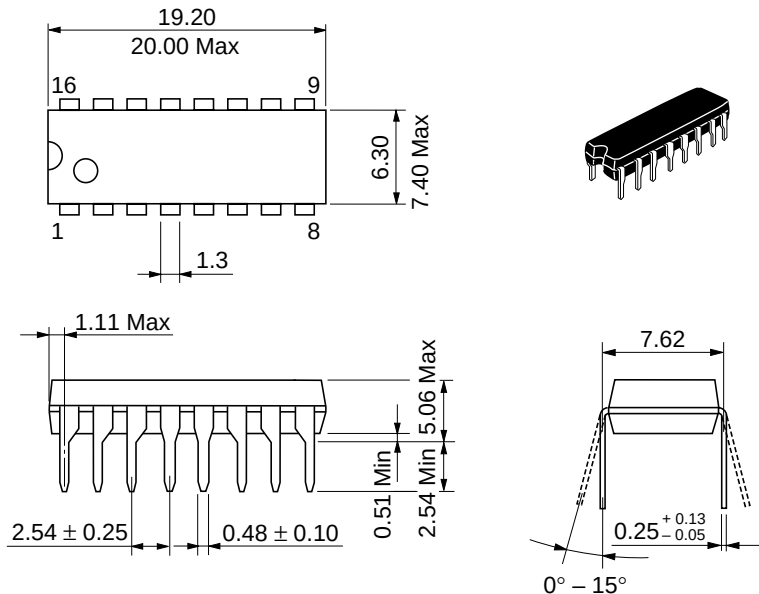
Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V _{IH}	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V _{IL}	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V _{OH}	2.0	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	

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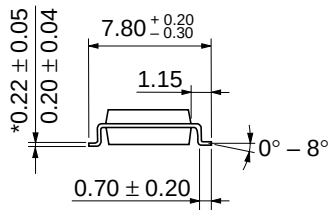
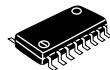
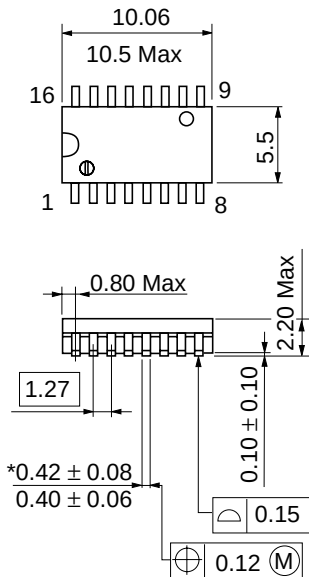
AC Characteristics (C_L = 50 pF, Input t_r = t_f = 6 ns)

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	—	—	5	—	4	MHz	
		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	

Unit: mm

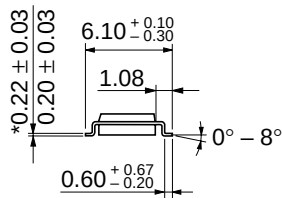
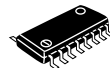
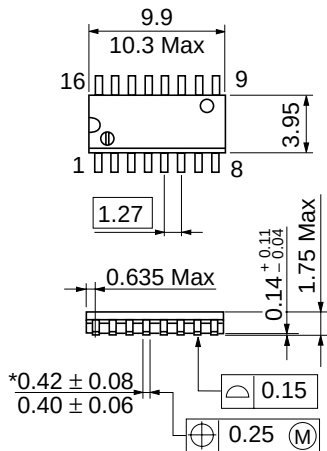


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



*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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